PowerTech™ 9.0 L Diesel Engines Level 14 Electronic Fuel System With Denso HPCR

COMPONENT TECHNICAL MANUAL

9.0 L Diesel Engines — Level 14 Electronic Fuel System with Denso HPCR

CTM385 15FEB11 (ENGLISH)

For complete service information also see:

9.0 L Diesel Engines — Base Engine	**CTM400**
OEM Engine Accessories	**CTM67**
Application List	**CTM106819**

John Deere Power Systems
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Introduction

Foreword

This manual is written for an experienced technician. Essential tools required in performing certain service work are identified in this manual and are recommended for use.

This manual (CTM385) covers only Level 14 Electronic Fuel System with the Denso High Pressure Common Rail (HPCR). The following manual covers the base engine.

- CTM400—base engine

Other manuals will be added in the future to provide additional information on electronic fuel systems as needed.

Live with safety: Read the safety messages in the introduction of this manual and the cautions presented throughout the text of the manual.

This is the safety-alert symbol. When you see this symbol on the machine or in this manual, be alert to the potential for personal injury.

Use this component technical manual in conjunction with the machine technical manual. An application listing in Section 01, Group 001 identifies product-model/component type-model relationship. See the machine technical manual for information on component removal and installation, and gaining access to the components.

Information is organized in sections and groups for the various components requiring service instruction. At the beginning of each group are summaries of the up coming group.

Before beginning repair on an engine, clean the engine.

This manual contains SI Metric units of measure followed immediately by the U.S. customary units of measure. Most hardware on these engines are metric sized.

Some components of this engine may be serviced without removing the engine from the machine. Refer to the specific machine technical manual for information on components that can be serviced without removing the engine from the machine and for engine removal and installation procedures.

Read each block of material completely before performing service to check for differences in procedures or specifications. Follow only the procedures that apply to the engine model number you are working on. If only one procedure is given, that procedure applies to all the engines in the manual.

CALIFORNIA PROPOSITION 65 WARNING: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

RG41183,00000EA -19-09JUN10-1/1

Record of Changes

Previous Translation Date			
12/03/2010			
Section / Group	**Block Title**	**Comment**	**Update Date**
06 / 210	9.0L 12V Wiring Diagram 1	Corrected pins 9 and 4 on Fuel Injector Connector	12/09/2010
06 / 210	9.0L 24V Wiring Diagram 1	Corrected pins 9 and 4 on Fuel Injector Connector	12/09/2010
04 / 160		Added DTC's 000097.00, 000644.02, 000676.03, and 000676.05 for Marine application	12/21/2010

BB78437,000005B -19-15FEB11-1/1

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Original Instructions. All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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General

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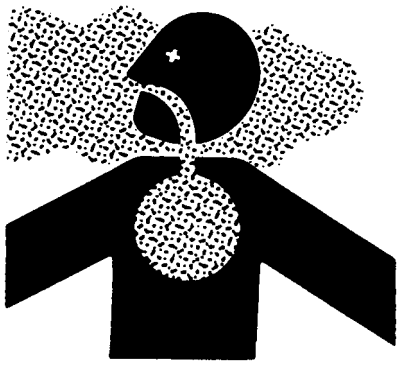
Work In Ventilated Area

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



TS220 —UN—23AUG88

DX,AIR -19-17FEB99-1/1

Recognize Safety Information

This is a safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

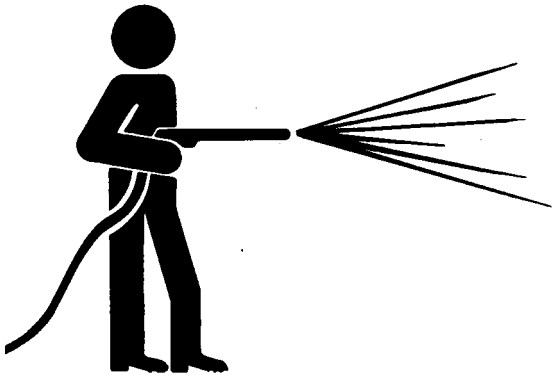
T81389 —UN—07DEC88

DX,ALERT -19-29SEP98-1/1

Work in Clean Area

Before starting a job:

- Clean work area and machine.
- Make sure you have all necessary tools to do your job.
- Have the right parts on hand.
- Read all instructions thoroughly; do not attempt shortcuts.



T6642EJ —UN—18OCT88

DX,CLEAN -19-04JUN90-1/1

Dispose of Waste Properly

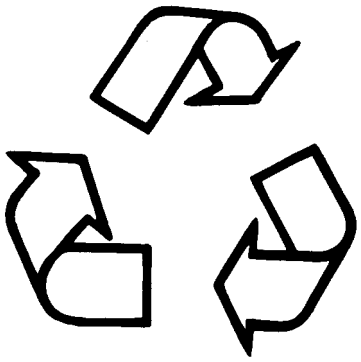
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.



TS1133 —UN—26NOV90

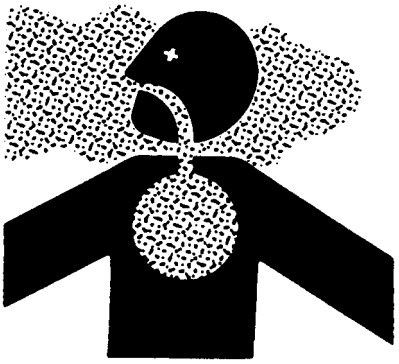
DX,DRAIN -19-03MAR93-1/1

Avoid Harmful Asbestos Dust

Avoid breathing dust that may be generated when handling components containing asbestos fibers. Inhaled asbestos fibers may cause lung cancer.

Components in products that may contain asbestos fibers are brake pads, brake band and lining assemblies, clutch plates, and some gaskets. The asbestos used in these components is usually found in a resin or sealed in some way. Normal handling is not hazardous as long as airborne dust containing asbestos is not generated.

Avoid creating dust. Never use compressed air for cleaning. Avoid brushing or grinding material containing asbestos. When servicing, wear an approved respirator. A special vacuum cleaner is recommended to clean asbestos. If not available, apply a mist of oil or water on the material containing asbestos.



TS220 —UN—23AUG88

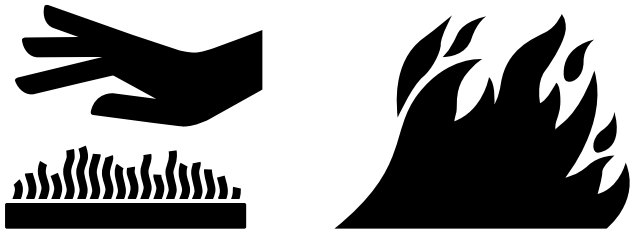
Keep bystanders away from the area.

DX,DUST -19-15MAR91-1/1

Avoid Hot Exhaust

Servicing machine or attachments with engine running can result in serious personal injury. Avoid exposure and skin contact with hot exhaust gases and components.

Exhaust parts and streams become very hot during operation. Exhaust gases and components reach temperatures hot enough to burn people, ignite, or melt common materials.



RG17488 —UN—21AUG09

DX,EXHAUST -19-20AUG09-1/1

Handle Fuel Safely—Avoid Fires

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

TS202 —UN—23AUG88

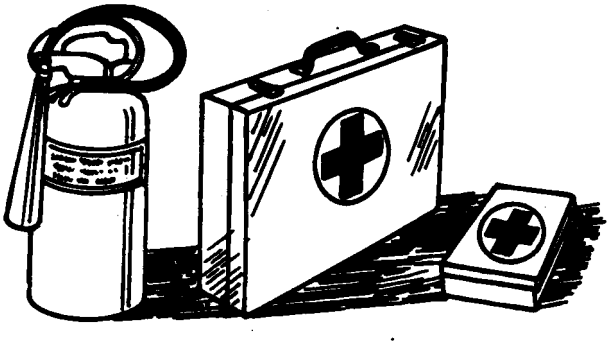
DX,FIRE1 -19-03MAR93-1/1

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 —UN—23AUG88

DX,FIRE2 -19-03MAR93-1/1

Handle Starting Fluid Safely

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

TS1356 —UN—18MAR92

DX,FIRE3 -19-16APR92-1/1

Handle Fluids Safely—Avoid Fires

When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

TS227 —UN—23AUG88

DX,FLAME -19-29SEP98-1/1

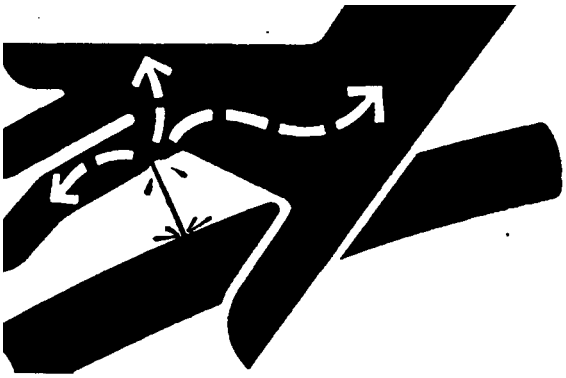
Avoid High-Pressure Fluids

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available in English from Deere & Company Medical Department in Moline, Illinois, U.S.A., by calling 1-800-822-8262 or +1 309-748-5636.



X9811 —UN—23AUG88

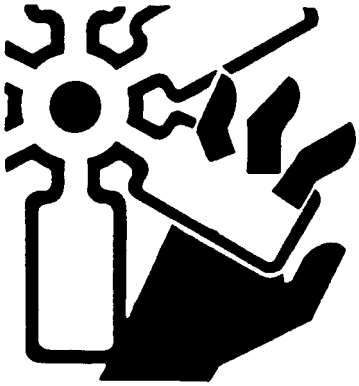
DX,FLUID -19-20AUG09-1/1

Install All Guards

Rotating cooling system fans, belts, pulleys, and drives can cause serious injury.

Keep all guards in place at all times during engine operation.

Wear close-fitting clothes. Stop the engine and be sure fans, belts, pulleys, and drives are stopped before making adjustments, connections, or cleaning near fans and their drive components.



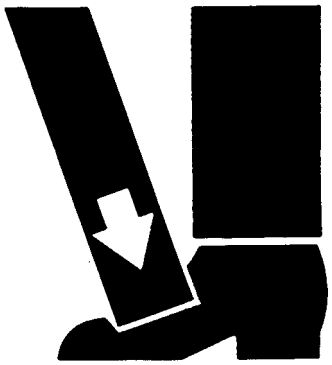
TS677 —UN—21SEP89

DX,GUARDS -19-18AUG09-1/1

Use Proper Lifting Equipment

Lifting heavy components incorrectly can cause severe injury or machine damage.

Follow recommended procedure for removal and installation of components in the manual.

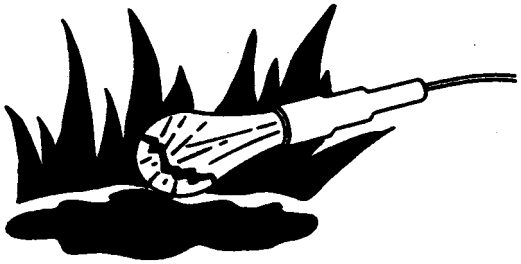


TS226 —UN—23AUG88

DX,LIFT -19-04JUN90-1/1

Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.



TS223 —UN—23AUG88

DX,LIGHT -19-04JUN90-1/1

Live With Safety

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

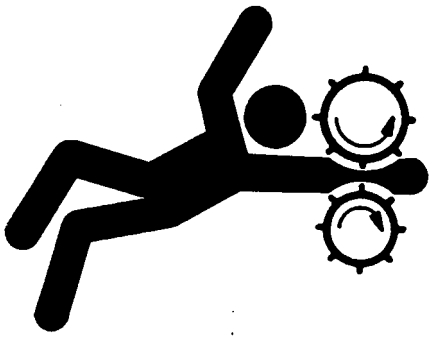
TS231 —19—07OCT88

DX,LIVE -19-25SEP92-1/1

Service Machines Safely

Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.



TS228 —UN—23AUG88

DX,LOOSE -19-04JUN90-1/1

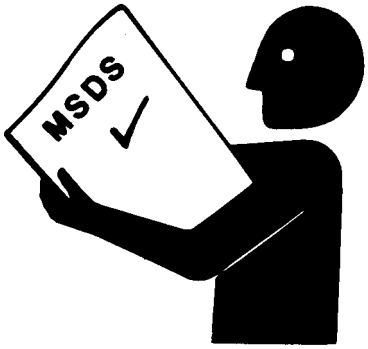
Handle Chemical Products Safely

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)



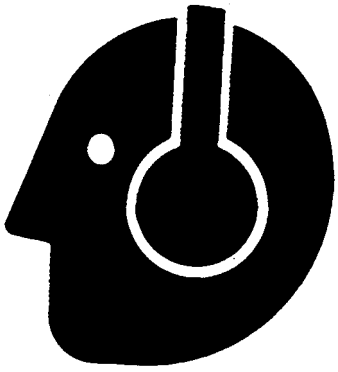
TS1132 —UN—26NOV90

DX,MSDS,NA -19-03MAR93-1/1

Protect Against Noise

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



TS207 —UN—23AUG88

DX,NOISE -19-03MAR93-1/1

Remove Paint Before Welding or Heating

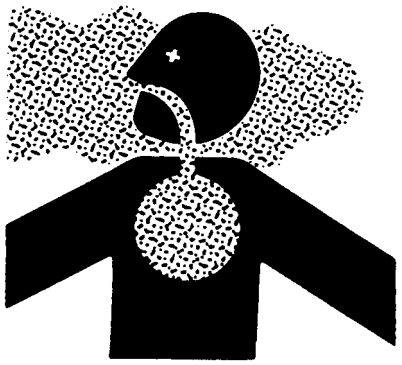
Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Remove paint before heating:

- Remove paint a minimum of 100 mm (4 in.) from area to be affected by heating. If paint cannot be removed, wear an approved respirator before heating or welding.
- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

Do not use a chlorinated solvent in areas where welding will take place.



TS220 —UN—23AUG88

Do all work in an area that is well ventilated to carry toxic fumes and dust away.

Dispose of paint and solvent properly.

DX,PAINT -19-24JUL02-1/1

Service Cooling System Safely

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

TS281 —UN—23AUG88

DX,RCAP -19-04JUN90-1/1

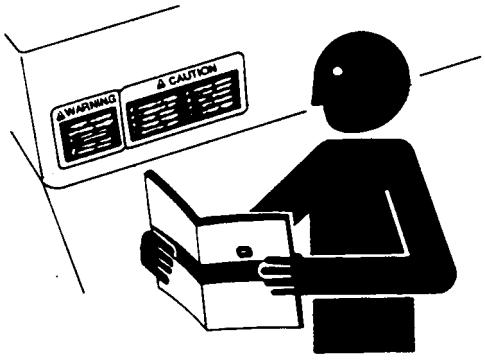
Follow Safety Instructions

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

There can be additional safety information contained on parts and components sourced from suppliers that is not reproduced in this operator's manual.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.



TS201 —UN—23AUG88

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.

DX,READ -19-16JUN09-1/1

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards.

Use power tools only to loosen threaded parts and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only service parts meeting John Deere specifications.

TS779 —UN—08NOV89

DX,REPAIR -19-17FEB99-1/1

Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

Keep all shields in place at all times. Make sure rotating shields turn freely.

Wear close-fitting clothing. Stop the engine and be sure that all rotating parts and drivelines are stopped before making adjustments, connections, or performing any type of service on engine or machine driven equipment.

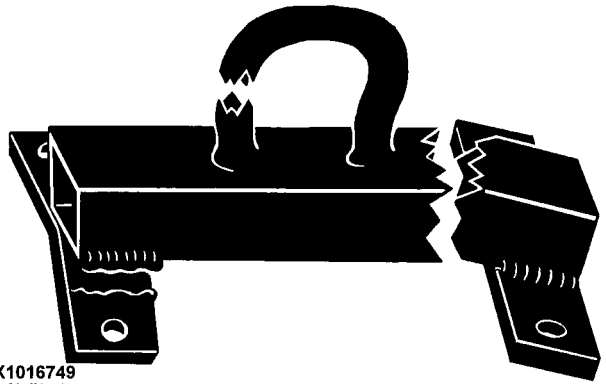
TS1644 —UN—22AUG95

DX,ROTATING -19-18AUG09-1/1

Construct Dealer-Made Tools Safely

Faulty or broken tools can result in serious injury. When constructing tools, use proper, quality materials, and good workmanship.

Do not weld tools unless you have the proper equipment and experience to perform the job.



LX1016749 —UN—01JUL97

DX,SAFE,TOOLS -19-10OCT97-1/1

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

On self-propelled equipment, disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

On towed implements, disconnect wiring harnesses from tractor before servicing electrical system components or welding on machine.

TS218 —UN—23AUG88

DX,SERV -19-17FEB99-1/1

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

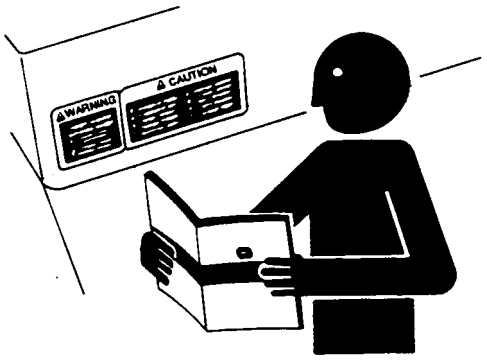
DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 —19—30SEP88

DX,SIGNAL -19-03MAR93-1/1

Replace Safety Signs

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



TS201—UN—23AUG88

DX,SIGNS1 -19-04JUN90-1/1

Prevent Battery Explosions

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

TS204—UN—23AUG88

DX,SPARKS -19-03MAR93-1/1

Protect Against High Pressure Spray

Spray from high pressure nozzles can penetrate the skin and cause serious injury. Keep spray from contacting hands or body.

If an accident occurs, see a doctor immediately. Any high pressure spray injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

TS1343—UN—18MAR92

DX,SPRAY -19-16APR92-1/1

Avoid Heating Near Pressurized Fluid Lines

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can accidentally burst when heat goes beyond the immediate flame area.

TS953 —UN—15MAY90

DX,TORCH -19-10DEC04-1/1

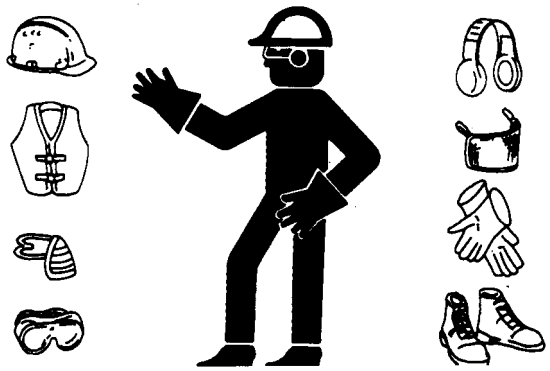
Wear Protective Clothing

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



TS206 —UN—23AUG88

DX,WEAR -19-10SEP90-1/1

Handling Batteries Safely

Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace grounded clamp last.

Sulfuric acid in battery electrolyte is poisonous and strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid hazards by:

- Filling batteries in a well-ventilated area
- Wearing eye protection and rubber gloves
- Avoiding use of air pressure to clean batteries
- Avoiding breathing fumes when electrolyte is added
- Avoiding spilling or dripping electrolyte
- Using correct battery booster or charger procedure.

If acid is spilled on skin or in eyes:

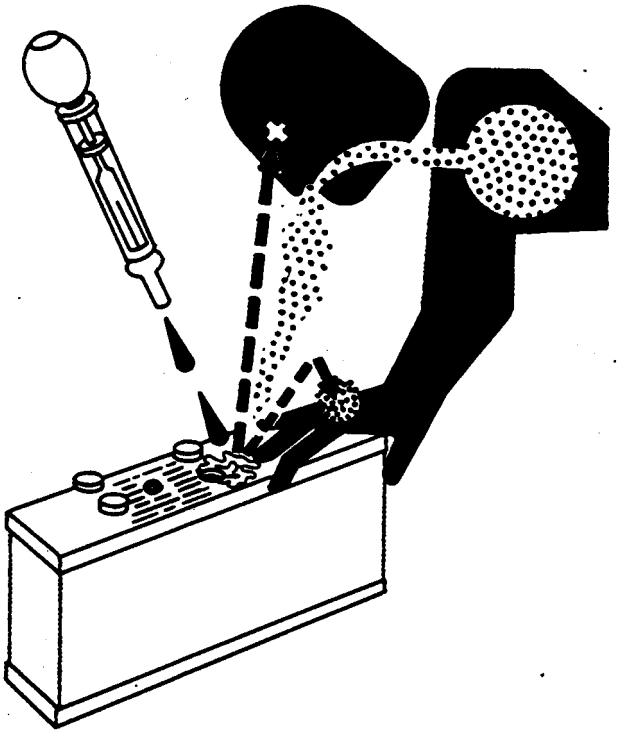
1. Flush skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush eyes with water for 15—30 minutes. Get medical attention immediately.

If acid is swallowed:

1. Do not induce vomiting.
2. Drink large amounts of water or milk, but do not exceed 2 L (2 qt.).
3. Get medical attention immediately.

WARNING: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. **Wash hands after handling.**

TS204 —UN—23AUG88



TS203 —UN—23AUG88

DX,WW,BATTERIES -19-02DEC10-1/1

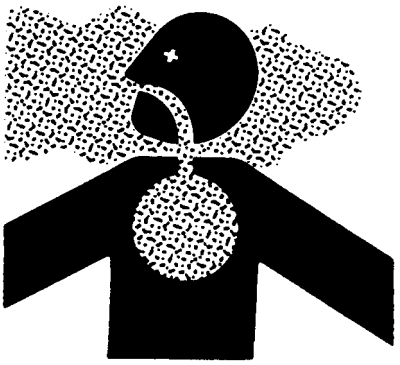
Handle Agricultural Chemicals Safely

Chemicals used in agricultural applications such as fungicides, herbicides, insecticides, pesticides, rodenticides, and fertilizers can be harmful to your health or the environment if not used carefully.

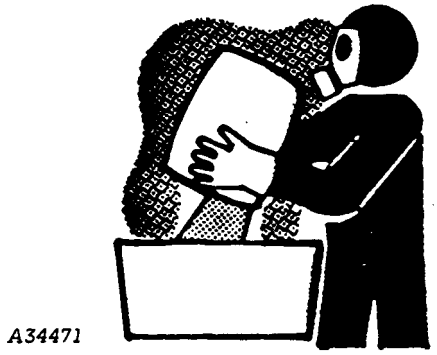
Always follow all label directions for effective, safe, and legal use of agricultural chemicals.

Reduce risk of exposure and injury:

- Wear appropriate personal protective equipment as recommended by the manufacturer. In the absence of manufacturer's instructions, follow these general guidelines:
  - Chemicals labeled **'Danger'**: Most toxic. Generally require use of goggles, respirator, gloves, and skin protection.
  - Chemicals labeled **'Warning'**: Less toxic. Generally require use of goggles, gloves, and skin protections.
  - Chemicals labeled **'Caution'**: Least toxic. Generally require use of gloves and skin protection.
- Avoid inhaling vapor, aerosol or dust.
- Always have soap, water, and towel available when working with chemicals. If chemical contacts skin, hands, or face, wash immediately with soap and water. If chemical gets into eyes, flush immediately with water.
- Wash hands and face after using chemicals and before eating, drinking, smoking, or urination.
- Do not smoke or eat while applying chemicals.
- After handling chemicals, always bathe or shower and change clothes. Wash clothing before wearing again.
- Seek medical attention immediately if illness occurs during or shortly after use of chemicals.
- Keep chemicals in original containers. Do not transfer chemicals to unmarked containers or to containers used for food or drink.



TS220 —UN—23AUG88



A34471 —UN—11OCT88

- Store chemicals in a secure, locked area away from human or livestock food. Keep children away.
- Always dispose of containers properly. Triple rinse empty containers and puncture or crush containers and dispose of properly.

DX,WW,CHEM01 -19-24AUG10-1/1

Wait Before Opening High-Pressure Fuel System

High-pressure fluid remaining in fuel lines can cause serious injury. Only technicians familiar with this type of system should perform repairs. Before disconnecting fuel lines, sensors, or any other components between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system, wait a minimum of 15 minutes after engine is stopped.

TS1343 —UN—18MAR92

DX,WW,HPCR2 -19-07JAN03-1/1

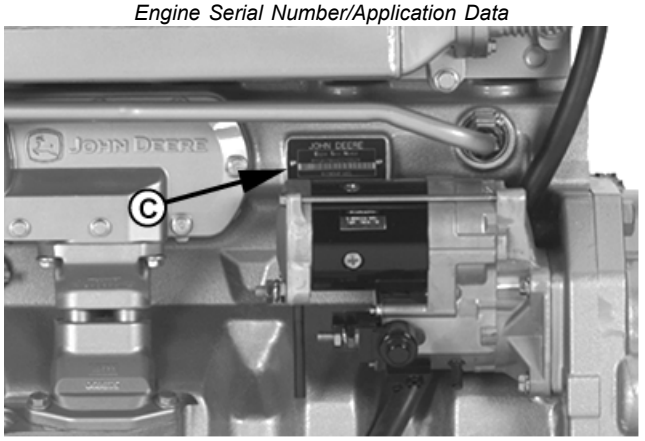
Engine Serial Number Plate Information

IMPORTANT: The engine serial number plate can be easily destroyed. Remove the plate or record the information elsewhere, before "hot tank" cleaning the block.

Example Engine Serial Number (A)

Each engine has a 13-digit John Deere engine serial number identifying the producing factory, engine displacement, emission tier level and sequential engine number. The following is an example:

Engine Serial Number/Application Data



Serial Number Plate

A—Engine Serial Number
B—Application Data or Type
C—Engine Serial Number Plate

RG6090L123456

RG	Factory producing engine
6	Number of Cylinders
090	Liter displacement
L	Emission Tier Level
123456	6-digit sequential engine number

Factory Producing Engine

CD	Saran, France
J	Rosario, Argentina
PE	Torreon, Mexico
RG	Waterloo, Iowa
T	Dubuque, Iowa

Emission Tier Level

B, C or E	Non-certified engines
F	Tier 1/Stage I emission certified engine
G, J or K	Tier 2/Stage II emission certified engine
L, M or N	Tier 3/Stage IIIA emission certified engine

Engine Application Data (B)

This information identifies the engine displacement, aspiration code, user code and application code. The following is an example:

6090HF485

6	Number of Cylinders
090	Liter displacement
H	Aspiration code
F	User factory code

Continued on next page

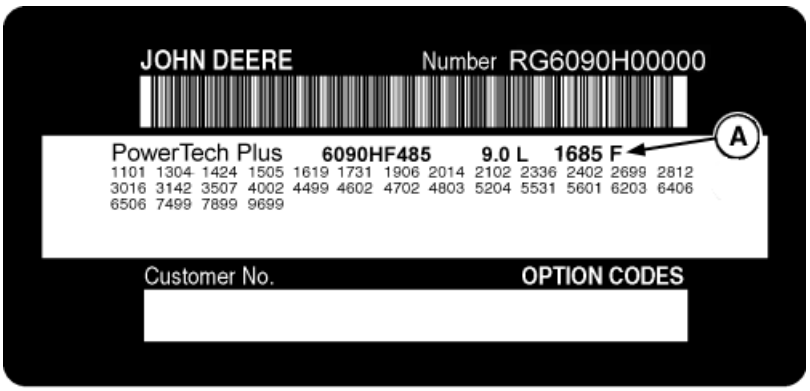
DN22556,0000058 -19-25JAN07-1/2

485	Application code
Aspiration code	
A	Turbocharged and Air-to-Coolant Aftercooled
D	Naturally aspirated
H	Turbocharged and Air-to-Air Aftercooled
T	Turbocharged, no aftercooling
User Factory Code	
AP	Industries JohnDeere Mexico S.A. de C.V. (Saltillo/Monterrey, Mexico)
AT	Agritalia srl (Vittoria, Sicily, Italy)
BE	Bell EquipmnetCo. (Richards Bay, South Africa)
CQ	John Deere Brazil (Horizontina, Brazil)
DW	John Deere Davenport Works (Davenport, Iowa)
E	John Deere Ottumwa Works (Ottumwa, Iowa)
F	OEM (Outside Equipment Manufacturers)
FF	Deere-Hitachi (Kernersville, North Carolina)
FG	Goldoni S.P.A. (Modena, Italy)
FM	Marine Engines
H	John Deere Harvester Works (East Moline, Illinois)
KV	John Deere Commercial Worksite Products (Knoxville, Tennessee/ Dubuque, Iowa)
L	John Deere Werke Mannheim (Germany)
LA	John Deere Werke Mannheim (Germany) (Engines with Bosch VP44 Injection Pump)
LV	John Deere Commercial Products (Augusta, Georgia)
N	John Deere Des Moines Works (Des Moines, Iowa)
P	Industrias John Deere Mexico S.A. de C.V. (Saltillo/Monterrey, Mexico)
PY	Larson & Toubro Ltd. (Pune, India)
RW	John Deere Waterloo Tractor Works (Waterloo, Iowa)
T	John Deere Dubuque Works (Dubuque, Iowa)
T8	Cameco Industries (Thibodaux, Louisiana)
TJ	Timberjack (Deere) (Sweden/Finland/Canada)
YC	John Deere Jialian Harvester Co. Limited (China)
Z	John Deere WERKE Zweibrucken (Germany)
Application Code	
485 etc.	This is the specific engine model for a given application

DN22556,0000058 -19-25JAN07-2/2

DN22556,0000058 -19-25JAN07-3/2

OEM Engine Option Code Label



RG13820 —UN—11JAN05

OEM Engine Label

A—Engine Base Code

An option code label is secured to the top of the valve cover and identifies the factory installed options on each OEM engine to ensure correct parts acquisition.

Always provide option code information and engine base code when ordering repair parts. A listing of option codes is given in parts catalogs and operator's manuals. See Engine Option Codes in Operators Manual for this engine model

NOTE: Before "hot tank" cleaning, ensure that option codes are recorded elsewhere.

DN22556,0000059 -19-31MAR06-1/1

Information Relative to Emissions Regulations

Depending on the final destination, engines can meet the emissions regulations according to the US Environmental Protection Agency (EPA), California Air Resources Board (CARB) and for Europe, the Directive 97/68/EC relating the measures against the emissions of particles and gaseous pollutant from internal combustion engines. Such engines are called "CERTIFIED" and receive an emission label stuck on the engine.

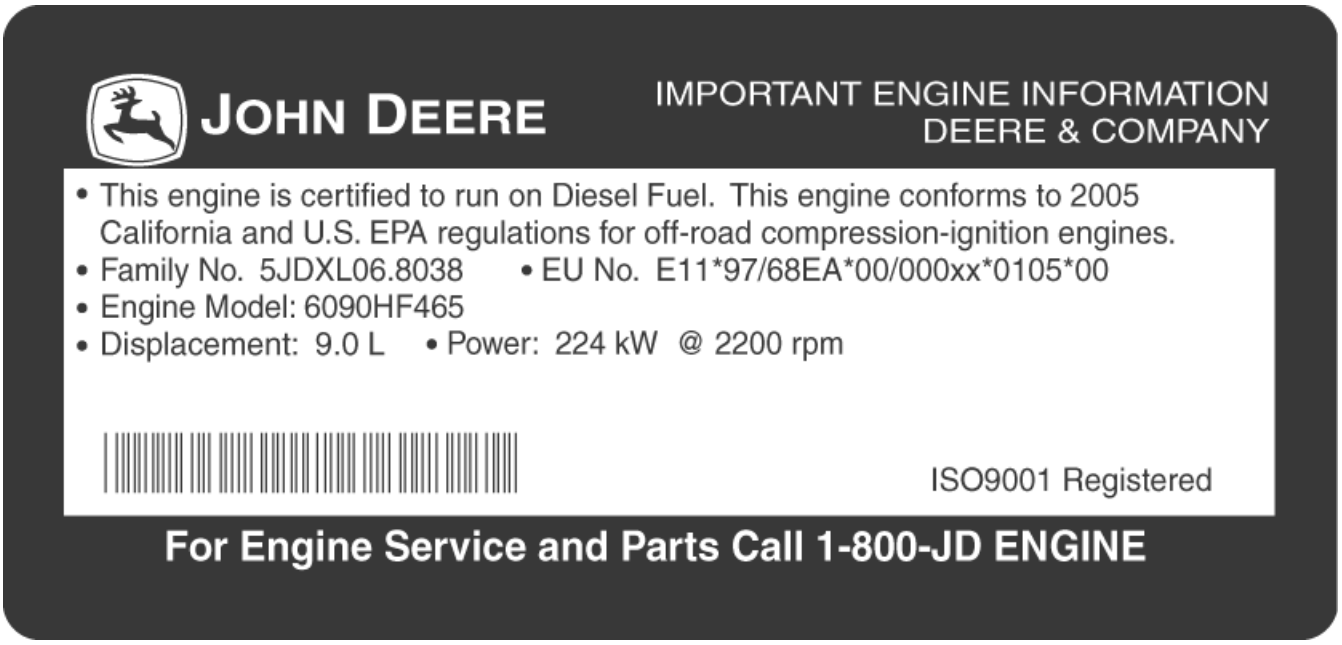
The regulations prohibit tampering with the emission-related components listed below which would render that component inoperative or to make any adjustment on the engine beyond published specifications. It is also illegal to install a part or component where the principle effect of that component is to bypass, defeat, or render inoperative any engine component or device which would affect the engine's conformance to the emission regulations. **To summarize, it is illegal to do anything except return the engine to its original published specifications.**

List of emission-related components:

- Fuel injection system
- Intake manifold
- Turbocharger
- Charge air cooling system
- Piston

RG40854,0000007 -19-15OCT07-1/1

Emissions Control System Certification Label



9.0L Engine Emissions Label

CAUTION: Statutes providing severe penalties for tampering with emissions controls may apply at the user's location.

The emissions warranty described below applies only to those engines marketed by John Deere that have been certified by the United States Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB); and used in the United States and Canada. The presence of an emissions label like the one shown signifies that the engine has been certified with the EPA and/or CARB. The EPA and CARB warranties only apply to new engines having the certification label affixed to the engine and sold as stated above in the geographic areas. The presence of an EU number in the third line of the label signifies that the engine has been certified with the European Union countries per Directive 97/68/EC. The emissions warranty does not apply to the EU countries.

NOTE: The hp/kW rating on the engine emissions certification label specifies the gross engine hp/kW, which is flywheel power without fan. In most applications this will not be the same rating as the advertised vehicle hp/kW rating.

OMRGP15,0000146 -19-25JAN07-1/1

Diesel Fuel

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel fuel produced by hydrotreating animal fats and vegetable oils is basically identical to petroleum diesel fuel. Renewable diesel that meets EN 590 or ASTM D975 is acceptable for use at all percentage mixture levels.

Required Fuel Properties

In all cases, the fuel shall meet the following properties:

Cetane number of 43 minimum. Cetane number greater than 47 is preferred, especially for temperatures below –20°C (–4°F) or elevations above 1500 m (5000 ft).

Cold Filter Plugging Point (CFPP) should be at least 5°C (9°F) below the expected lowest temperature or **Cloud Point** below the expected lowest ambient temperature.

Fuel lubricity should pass a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

Sulfur Content for Interim Tier 4 and EU Stage IIIB Engines

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- Use ONLY ultra low sulfur diesel (ULSD) fuel with a maximum of 0.0015% (15 mg/kg) sulfur content.

Sulfur Content for Other Engines

- Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.
- Use of diesel fuel with sulfur content less than 0.10% (1000 mg/kg) is STRONGLY recommended.
- Use of diesel fuel with sulfur content 0.10% (1000 mg/kg) to 0.50% (5000 mg/kg) may result in REDUCED oil and filter change intervals. Refer to table in Diesel Engine Oil and Filter Service Intervals.
- BEFORE using diesel fuel with sulfur content greater than 0.50% (5000 mg/kg), contact your John Deere dealer.

IMPORTANT: Do not mix used diesel engine oil or any other type of lubricating oil with diesel fuel.

Improper fuel additive usage may cause damage on fuel injection equipment of diesel engines.

DX,FUEL1 -19-03AUG09-1/1

Biodiesel Fuel

Biodiesel is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats. Biodiesel blends are biodiesel mixed with petroleum diesel fuel on a volume basis.

Biodiesel users in the U.S. are strongly encouraged to purchase biodiesel blends from a BQ-9000 Certified Marketer and sourced from a BQ-9000 Accredited Producer (as certified by the National Biodiesel Board). Certified Marketers and Accredited Producers can be found at the following website: http://www.bq-9000.org.

While 5% blends are preferred (B5), biodiesel concentrations up to a 20% blend (B20) in petroleum diesel fuel can be used in all John Deere engines. Biodiesel blends up to B20 can be used ONLY if the biodiesel (100% biodiesel or B100) meets ASTM D6751 (US), EN 14214 (EU), or equivalent specification. Expect a 2% reduction in power and a 3% reduction in fuel economy when using B20.

John Deere approved fuel conditioners containing detergent/dispersant additives are recommended when using lower biodiesel blends, but are required when using blends of B20 or greater.

John Deere engines can also operate on biodiesel blends above B20 (up to 100% biodiesel) ONLY if the biodiesel meets the EN 14214 specification (primarily available in Europe). Engines operating on biodiesel blends above B20 may not fully comply with all applicable emissions regulations. Expect up to a 12% reduction in power and an 18% reduction in fuel economy when using 100% biodiesel. John Deere approved fuel conditioners containing detergent/dispersant additives are required.

The petroleum diesel portion of biodiesel blends must meet the requirements of ASTM D975 (US) or EN 590 (EU) commercial standards.

Biodiesel blends up to B20 must be used within 90 days of the date of biodiesel manufacture. Biodiesel blends from B21 to B100 must be used within 45 days of the date of biodiesel manufacture.

Request a certificate of analysis from your fuel distributor to ensure that the fuel is compliant with the above specifications.

Consult your John Deere dealer for approved biodiesel fuel conditioners to improve storage and performance with biodiesel fuels.

When using biodiesel fuel, the engine oil level must be checked daily. If oil becomes diluted with fuel, shorten oil change intervals. Refer to Diesel Engine Oil and Filter Service Intervals for more details regarding biodiesel and engine oil change intervals.

The following must be considered when using biodiesel blends up to B20:

- Cold weather flow degradation
- Stability and storage issues (moisture absorption, oxidation, microbial growth)
- Possible filter restriction and plugging (usually a problem when first switching to biodiesel on used engines.)
- Possible fuel leakage through seals and hoses
- Possible reduction of service life of engine components

The following must also be considered when using biodiesel blends above B20.

- Possible coking and/or blocked injector nozzles, resulting in power loss and engine misfire if John Deere approved fuel conditioners containing detergent/dispersant additives are not used
- Possible crankcase oil dilution, requiring more frequent oil changes
- Possible corrosion of fuel injection equipment
- Possible lacquering and/or seizure of internal components
- Possible formation of sludge and sediments
- Possible thermal oxidation of fuel at elevated temperatures
- Possible elastomer seal and gasket material degradation (primarily an issue with older engines)
- Possible compatibility issues with other materials (including copper, lead, zinc, tin, brass, and bronze) used in fuel systems and fuel handling equipment
- Possible reduction in water separator efficiency
- Potential high acid levels within fuel system
- Possible damage to paint if exposed to biodiesel

IMPORTANT: Raw pressed vegetable oils are NOT acceptable for use as fuel in any concentration in John Deere engines. Their use could cause engine failure.

DX,FUEL7 -19-04OCT07-1/1

Minimizing the Effect of Cold Weather on Diesel Engines

John Deere diesel engines are designed to operate effectively in cold weather.

However, for effective starting and cold-weather operation, a little extra care is necessary. The following information outlines steps that can minimize the effect that cold weather may have on starting and operation of your engine. See your John Deere dealer for additional information and local availability of cold-weather aids.

Use Winter Grade Fuel

When temperatures fall below 0 °C (32 °F), winter grade fuel (No. 1-D in North America) is best suited for cold-weather operation. Winter grade fuel has a lower cloud point and a lower pour point.

Cloud point is the temperature at which wax will begin to form in the fuel and this wax causes fuel filters to plug. **Pour point** is the lowest temperature at which movement of the fuel is observed.

NOTE: On an average, winter grade diesel fuel has a lower BTU (heat content) rating. Using winter grade fuel may reduce power and fuel efficiency, but should not cause any other engine performance effects. Check the grade of fuel being used before troubleshooting for low-power complaints in cold-weather operation.

Air Intake Heater

An air intake heater is an available option for some engines to aid cold weather starting.

Ether

An ether port on the intake is available to aid cold weather starting.

CAUTION: Ether is highly flammable. Do not use ether when starting an engine equipped with glow plugs or an air intake heater.

Coolant Heater

An engine block heater (coolant heater) is an available option to aid cold weather starting.

Seasonal Viscosity Oil and Proper Coolant Concentration

Use seasonal grade viscosity engine oil based on the expected air temperature range between oil changes and a proper concentration of low silicate antifreeze as recommended. (See DIESEL ENGINE OIL and ENGINE COOLANT requirements in this section.)

Diesel Fuel Flow Additive

Use John Deere PREMIUM DIESEL FUEL CONDITIONER (winter formula), which contains anti-gel chemistry, or equivalent fuel conditioner to treat non-winter grade fuel (No. 2-D in North America) during the cold-weather season. This generally extends operability to about 10 °C (18 °F) below the fuel cloud point. For operability at even lower temperatures, use winter grade fuel.

IMPORTANT: Treat fuel when outside temperature drops below 0 °C (32 °F). For best results, use with untreated fuel. Follow all recommended instructions on label.

BioDiesel

When operating with biodiesel blends, wax formation can occur at warmer temperatures. Begin using John Deere PREMIUM BIODIESEL FUEL CONDITIONER (winter formula) at 5 °C (41 °F) to treat biodiesel fuels during the cold-weather season. Use B5 or lower blends at temperatures below 0 °C (32 °F). Use only winter grade petroleum diesel fuel at temperatures below -10 °C (14 °F).

Winterfronts

Use of fabric, cardboard, or solid winterfronts is not recommended with any John Deere engine. Their use can result in excessive engine coolant, oil, and charge air temperatures. This can lead to reduced engine life, loss of power and poor fuel economy. Winterfronts may also put abnormal stress on fan and fan drive components potentially causing premature failures.

If winterfronts are used, they should never totally close off the grill frontal area. Approximately 25% area in the center of the grill should remain open at all times. At no time should the air blockage device be applied directly to the radiator core.

Radiator Shutters

If equipped with a thermostatically controlled radiator shutter system, this system should be regulated in such a way that the shutters are completely open by the time the coolant reaches 93 °C (200 °F) to prevent excessive intake manifold temperatures. Manually controlled systems are not recommended.

If air-to-air aftercooling is used, the shutters must be completely open by the time the intake manifold air temperature reaches the maximum allowable temperature out of the charge air cooler.

For more information, see your John Deere dealer.

DX,FUEL10 -19-03AUG09-1/1

Handling and Storing Diesel Fuel

CAUTION: Handle fuel carefully. Do not fill the fuel tank when engine is running.

DO NOT smoke while you fill the fuel tank or service the fuel system.

Fill the fuel tank at the end of each day's operation to prevent water condensation and freezing during cold weather.

Keep all storage tanks as full as practicable to minimize condensation.

Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering.

Monitor water content of the fuel regularly.

When using bio-diesel fuel, the fuel filter may require more frequent replacement due to premature plugging.

Check engine oil level daily prior to starting engine. A rising oil level may indicate fuel dilution of the engine oil.

IMPORTANT: The fuel tank is vented through the filler cap. If a new filler cap is required, always replace it with an original vented cap.

When fuel is stored for an extended period or if there is a slow turnover of fuel, add a fuel conditioner to stabilize the fuel and prevent water condensation. Contact your fuel supplier for recommendations.

DX,FUEL4 -19-19DEC03-1/1

Lubricity of Diesel Fuel

Most diesel fuels manufactured in the United States, Canada, and the European Union have adequate lubricity to ensure proper operation and durability of fuel injection system components. However, diesel fuels manufactured in some areas of the world may lack the necessary lubricity.

IMPORTANT: Make sure the diesel fuel used in your machine demonstrates good lubricity characteristics.

Fuel lubricity should pass a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 12156-1.

If fuel of low or unknown lubricity is used, add John Deere PREMIUM DIESEL FUEL CONDITIONER (or equivalent) at the specified concentration.

Lubricity of Biodiesel Fuel

Significant improvement in lubricity can occur with biodiesel blends up to B20. The gain in lubricity above a 20% blend is limited.

DX,FUEL5 -19-05OCT07-1/1

Testing Diesel Fuel

DIESELSCAN™ is a John Deere fuel analysis program that can be used to monitor the quality of your fuel. The DIESELSCAN analysis verifies fuel type, cleanliness, water content, suitability for cold weather operation, and whether the fuel meets specifications.

Check with your John Deere dealer for availability of DIESELSCAN kits.

DIESELSCAN is a trademark of Deere & Company

DX,FUEL6 -19-14NOV05-1/1

Engine Oil and Filter Service Intervals

See applicable operator's manual for service intervals.

DM80898,000025E -19-14OCT10-1/1

Diesel Engine Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes.

John Deere Plus-50™ II oil is preferred.

John Deere Plus-50™ is also recommended.

Other oils may be used if they meet one or more of the following:

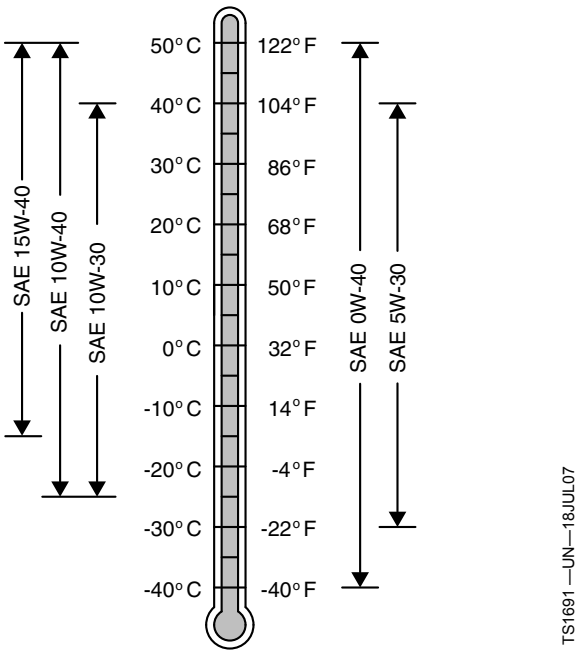
- John Deere Torq-Gard Supreme™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Multi-viscosity diesel engine oils are preferred.

Diesel fuel quality and fuel sulfur content must comply with all existing emissions regulations for the area in which the engine operates.

DO NOT use diesel fuel with sulfur content greater than 1.0% (10 000 mg/kg).

Plus-50 is a trademark of Deere & Company
Torq-Gard Supreme is a trademark of Deere & Company



Oil Viscosities for Air Temperature Ranges

DX,ENOIL11 -19-03AUG09-1/1

Diesel Engine Break-In Oil

New engines are filled at the factory with either John Deere Break-In™ or Break-In™ Plus Engine Oil. During the break-in period, add John Deere Break-In™ or Break-In™ Plus Engine Oil, respectively, as needed to maintain the specified oil level.

Operate the engine under various conditions, particularly heavy loads with minimal idling, to help seat engine components properly.

Change the oil and filter at 100 hours maximum for Break-In™ Oil or 500 hours maximum for Break-In™ Plus Oil during the initial operation of a new or rebuilt engine.

After engine overhaul, fill the engine with either John Deere Break-In™ or Break-In™ Plus Engine Oil.

If John Deere Break-In™ or Break-In™ Plus Engine Oil is not available, use a 10W-30 diesel engine oil meeting one of the following during the first 100 hours of operation:

- API Service Classification CE
- API Service Classification CD
- API Service Classification CC
- ACEA Oil Sequence E2
- ACEA Oil Sequence E1

Break-In is a trademark of Deere & Company.
Plus-50 is a trademark of Deere & Company.

IMPORTANT: Do not use Plus-50™ II, Plus-50 or engine oils meeting any of the following for the initial break-in of a new or rebuilt engine:

API CJ-4	**ACEA E9**
API CI-4 PLUS	**ACEA E7**
API CI-4	**ACEA E6**
API CH-4	**ACEA E5**
API CG-4	**ACEA E4**
API CF-4	**ACEA E3**
API CF-2	
API CF	

These oils will not allow the engine to break in properly.

John Deere Break-In™ Plus Engine Oil can be used for all John Deere diesel engines at all emission certification levels.

After the break-in period, use John Deere Plus-50 ™ II, John Deere Plus-50, or other diesel engine oil as recommended in this manual.

DX,ENOIL4 -19-03AUG09-1/1

Oil Filters

Filtration of oils is critical to proper operation and lubrication.

Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

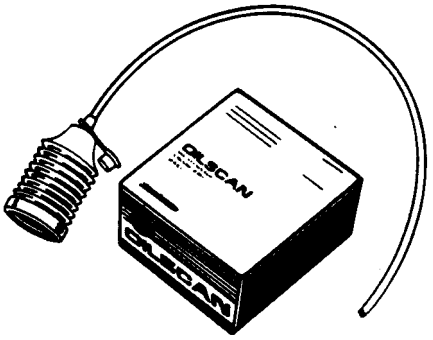
DX,FILT -19-18MAR96-1/1

OILSCAN ™ and COOLSCAN ™

OILSCAN ™ and COOLSCAN ™ are John Deere sampling programs to help you monitor machine performance and identify potential problems before they cause serious damage.

Oil and coolant samples should be taken from each system prior to its recommended change interval.

Check with your John Deere dealer for the availability of OILSCAN ™ and COOLSCAN ™ kits.



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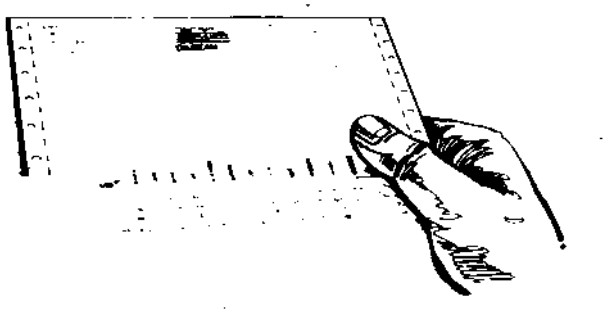

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OILSCAN is a trademark of Deere & Company.
COOLSCAN is a trademark of Deere & Company.

DX,OILSCAN -19-02DEC02-1/1

Grease

Use grease based on NLGI consistency numbers and the expected air temperature range during the service interval.

John Deere SD POLYUREA GREASE is preferred.

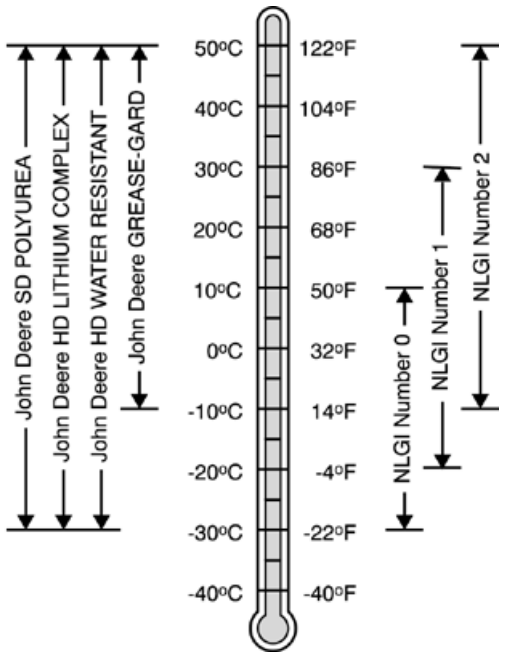
The following greases are also recommended

- John Deere HD LITHIUM COMPLEX GREASE
- John Deere HD WATER RESISTANT GREASE
- John Deere GREASE-GARD™

Other greases may be used if they meet the following:

NLGI Performance Classification GC-LB

IMPORTANT: Some types of grease thickeners are not compatible with others. Consult your grease supplier before mixing different types of grease.



TS1673 —UN—31OCT03

GREASE-GARD is a trademark of Deere & Company

DX,GREA1 -19-07NOV03-1/1

Alternative and Synthetic Lubricants

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual.

Some John Deere brand coolants and lubricants may not be available in your location.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to both conventional and synthetic oils.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

Avoid mixing different brands or types of oils. Oil manufacturers blend base stock and additives to create their oils and to meet certain specifications and performance requirements. Mixing different oils can interfere with proper functioning of these formulations and degrade lubricant performance.

Consult your authorized John Deere dealer to obtain specific information and recommendations.

DX,ALTER -19-11NOV09-1/1

Lubricant Storage

Your equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Whenever possible, store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

DX,LUBST -19-18MAR96-1/1

Mixing of Lubricants

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements.

Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Consult your John Deere dealer to obtain specific information and recommendations.

DX,LUBMIX -19-18MAR96-1/1

Heavy Duty Diesel Engine Coolant

The engine cooling system is filled to provide year-round protection against corrosion and cylinder liner pitting, and winter freeze protection to -37°C (-34°F). If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

John Deere COOL-GARD™ II Premix Coolant is preferred.

John Deere COOL-GARD II Premix is available in a concentration of 50% ethylene glycol.

Additional Recommended Coolants

The following engine coolants are also recommended:

- John Deere COOL-GARD II Concentrate in a 40% to 60% mixture of concentrate with quality water.
- John Deere COOL-GARD Premix (available in a concentration of 50% ethylene glycol).
- John Deere COOL-GARD Concentrate in a 40% to 60% mixture of concentrate with quality water.
- John Deere COOL-GARD PG Premix (available in a concentration of 55% propylene glycol).

John Deere COOL-GARD II Premix and COOL-GARD II Concentrate coolants do not require use of supplemental coolant additives.

John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix do not require use of supplemental coolant additives, except for periodic replenishment of additives during the drain interval.

Use John Deere COOL-GARD PG Premix when a non-toxic coolant formulation is required.

Other Coolants

It is possible that John Deere COOL-GARD II, COOL-GARD, and COOL-GARD PG coolants are unavailable in the geographical area where service is performed.

If these coolants are unavailable, use a coolant concentrate or prediluted coolant intended for use with heavy duty diesel engines and with a minimum of the following chemical and physical properties:

- Is formulated with a quality nitrite-free additive package.
- Provides cylinder liner cavitation protection according to either the John Deere Cavitation Test Method or a fleet study run at or above 60% load capacity.
- Protects the cooling system metals (cast iron, aluminum alloys, and copper alloys such as brass) from corrosion.

The additive package must be part of one of the following coolant mixtures:

- ethylene glycol or propylene glycol base prediluted (40% to 60%) heavy duty coolant
- ethylene glycol or propylene glycol base heavy duty coolant concentrate in a 40% to 60% mixture of concentrate with quality water

Water Quality

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

IMPORTANT: Do not use cooling system sealing additives or antifreeze that contains sealing additives.

Do not mix ethylene glycol and propylene glycol base coolants.

Do not use coolants that contain nitrites.

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DX,COOL3 -19-03NOV08-1/1

Supplemental Coolant Additives

Some coolant additives will gradually deplete during engine operation. For John Deere COOL-GARD™ Premix, COOL-GARD Concentrate, or John Deere COOL-GARD PG Premix, replenish coolant additives between drain intervals by adding a supplemental coolant additive as determined necessary by coolant testing.

John Deere LIQUID COOLANT CONDITIONER is recommended as a supplemental coolant additive for John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix.

John Deere LIQUID COOLANT CONDITIONER is not designed for use with COOL-GARD II Premix or COOL-GARD II Concentrate.

IMPORTANT: Do not add a supplemental coolant additive when the cooling system is drained and refilled with any of the following:

- **John Deere COOL-GARD II**
- **John Deere COOL-GARD**
- **John Deere COOL-GARD PG**

If other coolants are used, consult the coolant supplier and follow the manufacturer's recommendation for use of supplemental coolant additives.

The use of non-recommended supplemental coolant additives may result in additive drop-out and gelation of the coolant.

Add the manufacturer's recommended concentration of supplemental coolant additive. DO NOT add more than the recommended amount.

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DX,COOL4 -19-03NOV08-1/1

Operating in Warm Temperature Climates

John Deere engines are designed to operate using glycol base engine coolants.

Always use a recommended glycol base engine coolant, even when operating in geographical areas where freeze protection is not required.

John Deere COOL-GARD™ II Premix is available in a concentration of 50% ethylene glycol. However, there are situations in warm temperature climates where a coolant with lower glycol concentration (approximately 20% ethylene glycol) has been approved. In these cases, the low glycol formulation has been modified to provide the same level of corrosion inhibitor as John Deere COOL-GARD II Premix (50/50).

IMPORTANT: Water may be used as coolant *in emergency situations only.*

Foaming, hot surface aluminum and iron corrosion, scaling, and cavitation will occur when water is used as the coolant, even when coolant conditioners are added.

Drain cooling system and refill with recommended glycol base engine coolant as soon as possible.

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DX,COOL6 -19-03NOV08-1/1

Additional Information About Diesel Engine Coolants and John Deere LIQUID COOLANT CONDITIONER

Engine coolants are a combination of three chemical components: ethylene glycol or propylene glycol antifreeze, inhibiting coolant additives, and quality water.

Coolant Specifications

Some products, including John Deere COOL-GARD™ Premix coolant, are fully formulated coolants that contain all three components in their correct concentrations. Do not add an initial charge of supplemental coolant additives or water to John Deere COOL-GARD Premix.

John Deere COOL-GARD Concentrate contains both ethylene glycol and inhibiting coolant additives. Mix COOL-GARD Concentrate with quality water, but do not add an initial charge of supplemental coolant additives.

Replenish Coolant Additives

Some coolant additives will gradually deplete during engine operation. Periodic replenishment of inhibitors is required, even when John Deere COOL-GARD Premix, COOL-GARD Concentrate, or COOL-GARD PG Premix is used. Follow the recommendations in this manual for the use of supplemental coolant additives.

Why use John Deere LIQUID COOLANT CONDITIONER?

Operating without proper coolant additives will result in increased corrosion, cylinder liner erosion and pitting, and other damage to the engine and cooling system. A simple mixture of ethylene glycol or propylene glycol and water will not give adequate protection.

John Deere LIQUID COOLANT CONDITIONER is an additive system designed to reduce corrosion, erosion, and pitting when used with nitrite-containing diesel engine coolants such as John Deere COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix. Maintaining John Deere COOL-GARD coolants with John Deere LIQUID COOLANT CONDITIONER provides optimum protection for up to 5 years or 5000 hours of operation.

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Avoid Automotive-type Coolants

Never use automotive-type coolants (such as those meeting ASTM D3306). These coolants do not contain the correct additives to protect heavy-duty diesel engines. They often contain a high concentration of silicates and may damage the engine or cooling system. Do not treat an automotive engine coolant with a supplemental coolant additive because the high concentration of additives can result in additive fallout.

Water Quality

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate. All water used in the cooling system should meet the following minimum specifications for quality:

Chlorides	<40 mg/L
Sulfates	<100 mg/L
Total dissolved solids	<340 mg/L
Total hardness	<170 mg/L
pH	5.5 to 9.0

Freeze Protection

The relative concentrations of glycol and water in the engine coolant determine its freeze protection limit.

Ethylene Glycol	**Freeze Protection Limit**
40%	-24°C (-12°F)
50%	-37°C (-34°F)
60%	-52°C (-62°F)
Propylene Glycol	**Freeze Protection Limit**
40%	-21°C (-6°F)
50%	-33°C (-27°F)
60%	-49°C (-56°F)

DO NOT use a coolant-water mixture greater than 60% ethylene glycol or 60% propylene glycol.

DX,COOL7 -19-03NOV08-1/1

Diesel Engine Coolant

The engine cooling system is filled to provide year-round protection against corrosion and cylinder liner pitting, and winter freeze protection to -37°C (-34°F).

John Deere COOL-GARD is preferred for service.

If John Deere COOL-GARD is not available, use a low silicate ethylene glycol or propylene glycol base coolant concentrate in a 50% mixture of concentrate with quality water.

The coolant concentrate shall be of a quality that provides cavitation protection to cast iron and aluminum parts in the cooling system. John Deere COOL-GARD meets this requirement.

Freeze protection

A 50% mixture of ethylene glycol engine coolant in water provides freeze protection to -37°C (-34°F).

A 50% mixture of propylene glycol engine coolant in water provides freeze protection to -33°C (-27°F).

If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

Water quality

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol and propylene glycol base engine coolant concentrate.

IMPORTANT: Do not use cooling system sealing additives or antifreeze that contains sealing additives.

IMPORTANT: Do not mix ethylene glycol and propylene glycol base coolants.

DX,COOL8 -19-16NOV01-1/1

Testing Diesel Engine Coolant

Maintaining adequate concentrations of glycol and inhibiting additives in the coolant is critical to protect the engine and cooling system against freezing, corrosion, and cylinder liner erosion and pitting.

Test the coolant solution at intervals of 12 months or less and whenever excessive coolant is lost through leaks or overheating.

Coolant Test Strips

Coolant test strips are available from your John Deere dealer. These test strips provide a simple, effective method to check the freeze point and additive levels of your engine coolant.

When Using John Deere COOL-GARD II

John Deere COOL-GARD™ II Premix and COOL-GARD II Concentrate are maintenance free coolants for up to 6 years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix coolant. Test the coolant condition annually with coolant test strips designed for use with John Deere COOL-GARD II coolants. If the test strip chart indicates that additive is required, add John Deere COOL-GARD II COOLANT EXTENDER as directed.

Add only the recommended concentration of John Deere COOL-GARD II COOLANT EXTENDER. DO NOT add more than the recommended amount.

When Using John Deere COOL-GARD

Compare the test strip results to the supplemental coolant additive (SCA) chart to determine the amount of inhibiting additives in your coolant and whether more John Deere LIQUID COOLANT CONDITIONER should be added.

Add only the recommended concentration of John Deere LIQUID COOLANT CONDITIONER. DO NOT add more than the recommended amount.

CoolScan and CoolScan PLUS

For a more thorough evaluation of your coolant, perform a CoolScan™ or CoolScan PLUS™ analysis, where available. See your John Deere dealer for information.

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CoolScan PLUS is a trademark of Deere & Company

DX,COOL9 -19-03NOV08-1/1

Drain Intervals for Diesel Engine Coolant

Drain and flush the cooling system and refill with fresh coolant at the indicated interval, which varies with the coolant used.

John Deere COOL-GARD™ II Premix and COOL-GARD II Concentrate are maintenance free coolants for up to 6 years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix. Test the coolant condition annually with Coolant Test Strips designed for use with John Deere COOL-GARD II coolants. If the test strip chart indicates that additive is required, add John Deere COOL-GARD II COOLANT EXTENDER as directed.

When John Deere COOL-GARD Premix, COOL-GARD Concentrate or John Deere COOL-GARD PG Premix coolants are used, the drain interval may be extended to 5 years or 5000 hours of operation, provided that the coolant is tested annually AND additives are replenished, as needed, by adding a supplemental coolant additive.

If John Deere COOL-GARD II Premix or COOL-GARD II Concentrate is used, but the coolant is not tested OR additives are not replenished by adding John Deere COOL-GARD II COOLANT EXTENDER, the drain interval is 4 years or 4000 hours of operation. This drain interval only applies to COOL-GARD II coolants that have been maintained within a 40% to 60% mixture of concentrate with quality water.

If John Deere COOL-GARD Premix, COOL-GARD Concentrate, or COOL-GARD PG Premix is used, but the coolant is not tested OR additives are not replenished by adding a supplemental coolant additive, the drain interval is 3 years or 3000 hours of operation. This drain interval only applies to COOL-GARD Premix, COOL-GARD Concentrate, and COOL-GARD PG Premix that have been maintained within a 40% to 60% mixture of concentrate with quality water.

If a coolant other than COOL-GARD II, COOL-GARD, or COOL-GARD PG is used, reduce the drain interval to 2 years or 2000 hours of operation.

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DX,COOL11 -19-08JAN09-1/1

Section 02
Repair and Adjustments

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Fuel System - General Information

The Level 14 Engine Control Unit (ECU) is used control the High Pressure Common Rail (HPCR) fuel system. The HPCR fuel system includes the high pressure fuel pump, high pressure common rail, and electronic injectors.

The electronic injectors can not be serviced. If any part of the component fails, the entire injector must be replaced.

Electronic injectors cannot be tested for opening pressure because they are controlled electronically.

When servicing injectors it is important to complete the injector calibration procedure. Each injector has a specific calibration and this information can be obtained by scanning the bar code on the service injector box and downloading the injector information from the John Deere Custom Performance™ web site. An alternative is to enter the injector serial number, part number, and QR code listed on the injector. If the ECU is not programmed with the correct information for each injector and the correct cylinder that it is in then engine performance and emissions will be affected.

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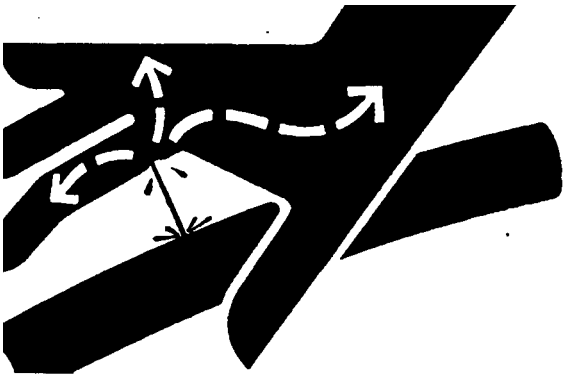
Relieve Fuel System Pressure

CAUTION: Escaping diesel fuel under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure to the system, be sure ALL connections are tight and lines, pipes and hoses are not damaged. Keep hands and body away from pinholes and nozzles which eject fluid under pressure. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.

If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.



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High Pressure Fluids

Any time the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 in this manual.

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Remove and Install Fuel Filters

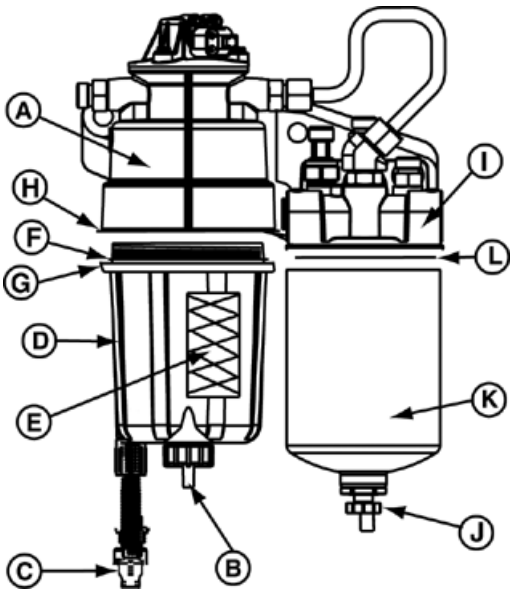
NOTE: Both primary and secondary filters must be replaced at the same time.

Remove and Install Primary Fuel Filter Element

NOTE: For applications other than OEM, refer to operator's manual for proper servicing, hourly replacement intervals, and filter locations.

NOTE: Do not pre-fill filter with fuel. This may introduce debris into the fuel system.

1. Thoroughly clean filter header (A) and surrounding area to keep from getting dirt and debris into fuel system.
2. Connect a fuel drain line to filter drain valve (B) on bottom of filter and drain all fuel from the filter canister (D).
3. Disconnect water-in-fuel sensor connector (C).
4. Turn filter canister (D) counter-clockwise (CCW) to remove.
5. Once filter canister is removed, pull filter element (E) down to remove from filter header (A).
6. Inspect filter header and filter canister sealing surfaces. Clean as required.
7. Place new packing on filter canister.
8. Place thin film of fuel on filter packing.
9. Place filter element in canister with tangs on bottom going into canister.
10. Install fuel filter onto fuel filter header. Tighten until fuel filter snugly mates with fuel filter header.



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Primary and Secondary Filter Parts Kit

A—Primary Filter Header
B—Primary Filter Canister Drain Valve
C—Water In Fuel Sensor Connector
D—Primary Filter Canister
E—Primary Filter Element
F—Primary Filter Packing
G—Primary Filter Canister Lip
H—Primary Filter Header Lip
I— Secondary Fuel Filter Header
J— Secondary Filter Drain Valve
K—Secondary Fuel Filter
L—Secondary Filter Packing

11. Turn filter additional 3/4 turn after seal contact with header.
12. Connect water-in-fuel sensor connector.

Continued on next page

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Remove and Install Secondary (Final) Fuel Filter

NOTE: For applications other than OEM, refer to operator's manual for proper servicing, hourly replacement intervals, and filter locations.

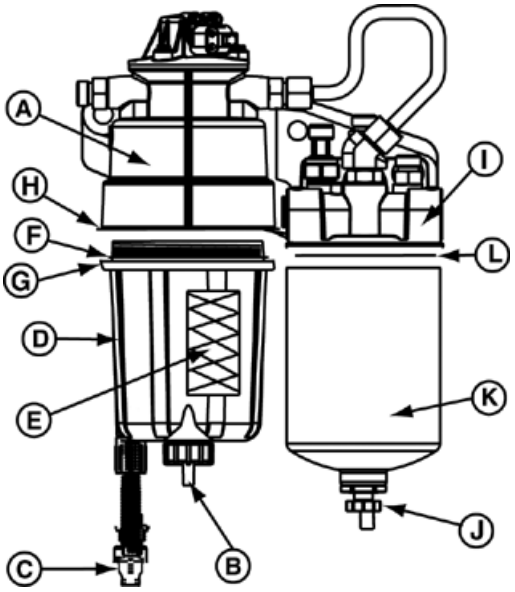
NOTE: Do not pre-fill filter with fuel. This may introduce debris into the fuel system.

NOTE: Filter replacement instructions are printed on the new filter.

1. Thoroughly clean filter header (I) and surrounding area to keep from getting dirt and debris into fuel system.
2. Connect a fuel drain line to filter drain valve (J) on bottom of filter and drain all fuel from the filter.
3. Turn filter (K) counter clockwise (CCW) to remove.
4. Inspect filter header sealing surface. Clean as required.
5. Install new filter fuel drain valve and tighten to specification.

Specification	
Secondary Fuel Filter Drain Valve—Torque	3.4 - 4 N·m (30 - 35 lb-in)

6. Place new filter packing (L) on filter.
7. Place thin film of fuel on packing.
8. Install fuel filter onto fuel filter header. Tighten until fuel filter snugly mates with fuel filter header (I).
9. Turn filter additional 3/4 turn after seal contact with header.



RG14250 —UN—06JUN05

Primary and Secondary Filter Parts Kit

A—Primary Filter Header
B—Primary Filter Canister Drain Valve
C—Water In Fuel Sensor Connector
D—Primary Filter Canister
E—Primary Filter Element
F—Primary Filter Packing
G—Primary Filter Canister Lip
H—Primary Filter Header Lip
I— Secondary Fuel Filter Header
J— Secondary Filter Drain Valve
K—Secondary Fuel Filter
L— Secondary Filter Packing

NOTE: To prime the fuel system before starting engine, turn ignition key to ON for 60 seconds.

RE38635,0000171 -19-24NOV08-2/2

Remove and Install Fuel Transfer Pump Assembly

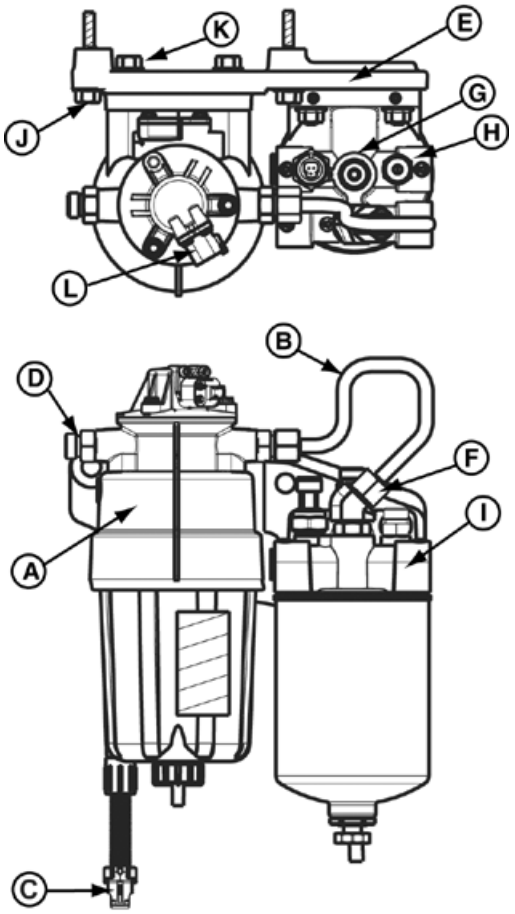
NOTE: For applications other than OEM, refer to vehicle manual for transfer pump information.

IMPORTANT: ALWAYS use a backup wrench when removing and/or installing fittings and/or fuel lines to avoid damage.

Remove Fuel Transfer Pump Assembly

1. Disconnect fuel lines from (B), (D), (F), (G) and (H). Cap connections on fuel lines to keep debris out of fuel system.
2. Disconnect fuel transfer pump connector (L).
3. Disconnect water in fuel sensor connector (C)
4. Remove filter assembly bracket cap screws (J) and remove filter assembly bracket (E) from engine.
5. Remove transfer pump header cap screws (K) from back of fuel filter assembly bracket. Remove transfer pump header (A) from fuel filter assembly bracket.

A—Primary Filter/Fuel Transfer Pump Header
B—Primary Fuel Filter Outlet
C—Water In Fuel Sensor Connector
D—Primary Fuel Filter Inlet
E—Filter Assembly Bracket
F—Secondary Fuel Filter Inlet
G—Air Bleed Valve
H—Secondary Filter Outlet
I— Secondary Filter Header
J— Filter Assembly Bracket Cap Screws
K—Fuel Transfer Pump Header Cap Screws
L—Fuel Transfer Pump Connector



Filter Assembly

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Install Fuel Transfer Pump Assembly

IMPORTANT: ALWAYS use a backup wrench when removing and/or installing fittings and/or fuel lines to avoid damage.

1. Place transfer pump header (A) on fuel filter assembly bracket (E). Install fuel transfer pump header cap screws (K) and tighten to specification.

Specification

Fuel Transfer Pump Cap Screws—Torque..... 35 ± 7 N·m (26 ± 5 lb-ft)

2. Install the fuel filter assembly bracket to cylinder block. Tighten filter assembly bracket cap screws (J) to specification.

Specification

Filter Assembly Bracket Cap Screws—Torque..... 68 ± 13 N·m (50 ± 10 lb-ft)

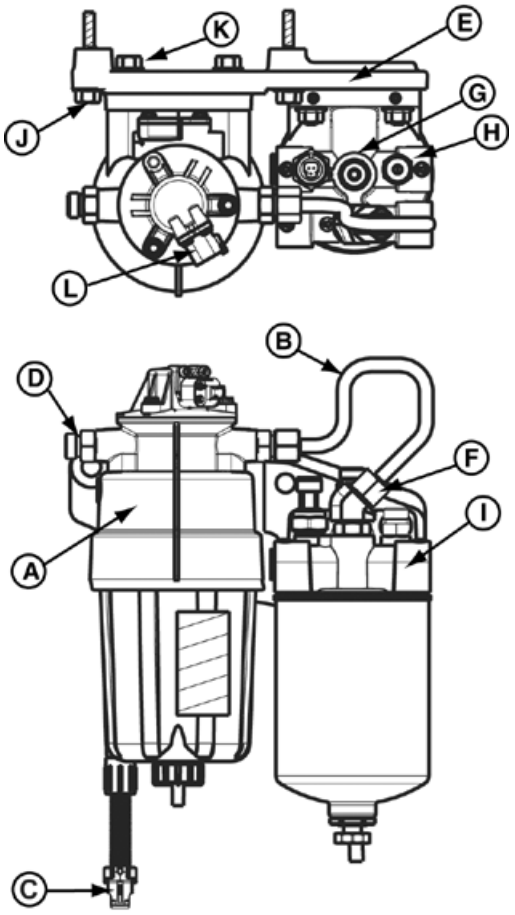
3. Connect fuel lines to fuel transfer pump inlet (D), outlet (B), secondary filter inlet (F), air bleed valve (G), and secondary fuel outlet (H) and tighten to specification.

Specification

Fuel Line Fittings—Torque..... 20 ± 4 N·m (15 ± 3 lb-ft)

4. Reconnect fuel transfer pump connector (L) and water in fuel connector (C).

NOTE: Turn ignition key to ON for 60 seconds to prime the fuel system before starting enine.



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Filter Assembly

A—Primary Filter/Fuel Transfer Pump Header
B—Primary Fuel Filter Inlet
C—Water In Fuel Sensor Connector
D—Primary Fuel Filter Outlet
E—Filter Assembly Bracket
F—Secondary Fuel Filter Inlet
G—Air Bleed Valve
H—Secondary Filter Outlet
I— Secondary Filter Header
J—Filter Assembly Bracket Cap Screws
K—Fuel Transfer Pump Header Cap Screws
L—Fuel Transfer Pump Connector

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Remove and Install High Pressure Fuel Pump Assembly

Remove High Pressure Fuel Pump

CAUTION: Let the engine sit for 5 minutes to allow rail pressure to lower.

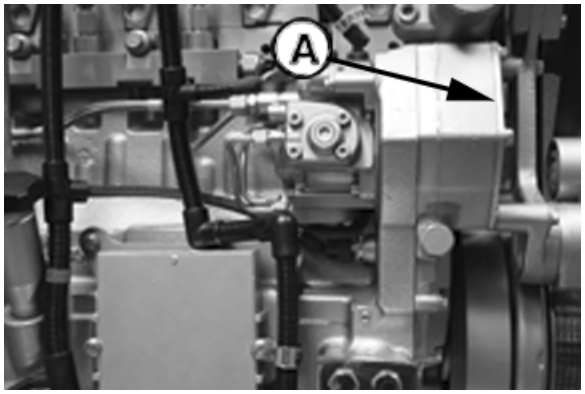
CAUTION: Open high pressure fuel lines slowly to insure the pressure has been relieved. High pressure fuel is dangerous.

IMPORTANT: ALWAYS use a backup wrench when removing and/or installing fittings and/or fuel lines to avoid damage.

NOTE: For applications other than OEM, refer to vehicle manual for high pressure pump information.

1. Remove cover (A) for access to high pressure pump gear.
2. Remove plugs in engine block and install JDG820 Flywheel Turning Tool. Rotate engine flywheel in normal running direction until No. 1 piston is at "TDC" of its compression stroke.
3. Install JDE81-4 Timing Pin into hole in flywheel.
4. Verify that timing marks (B and C) on the pump gear and cam gear are positioned as shown in the drawing.

A—Gear Housing Cover
B—Cam Gear Timing Mark
C—High Pressure Pump Gear Timing Mark
D—High Pressure Pump Mounting Holes
E—High Pressure Pump Gear Nut
F—Fuel Outlet Line
G—Overflow Port
H—Fuel Temperature Sensor Connector
I— Mounting Socket Screw
J— O-ring
K—Mounting Cap Screw (2)
L—Suction Control Valve Power Connector
M—Fuel Inlet Line



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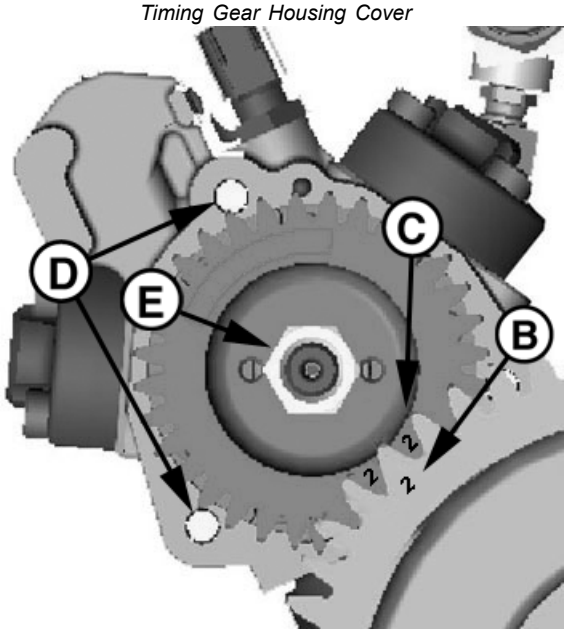
Timing Gear Housing Cover



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Gears and Timing Marks

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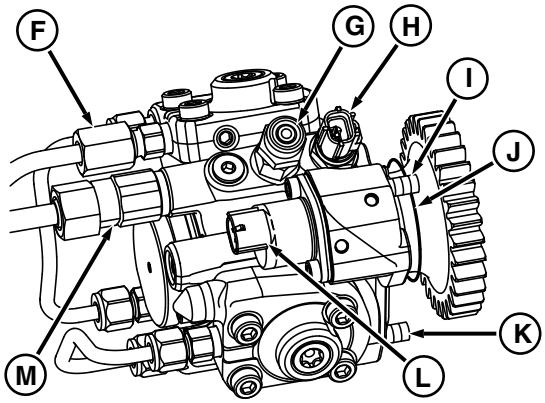
5. Remove fuel lines (F), (M), and (G). Cap all fuel lines to keep debris out of fuel system.
6. Disconnect Suction Control Valve power connector (L) and fuel temperature connector (H).



RG14254A —UN—03OCT08

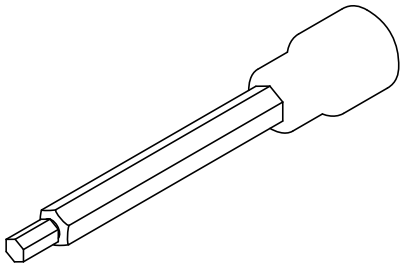
Remove High Pressure Fuel Pump

Continued on next page

AS58880,0000707 -19-12OCT09-2/6

IMPORTANT: Before the pump gear can be removed, the pump mounting screws must be loosened.

7. Loosen top pump mounting socket screw (I) using JDG10025.
8. Loosen pump mounting cap screws (K).

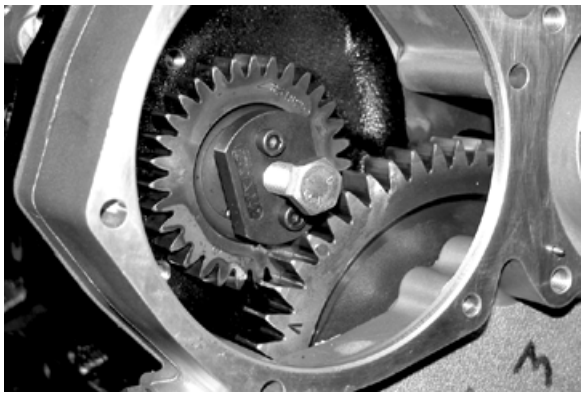


RG14255A —UN—03OCT08

Pump Socket Screw Installation/Removal Tool JDG10025

AS58880,0000707 -19-12OCT09-3/6

9. Remove pump gear nut (E).
10. Using JDG10015 Gear Puller, remove pump gear from pump shaft. Make sure the pump mounting screws are sufficiently loosened to allow the pump to be moved away from the mounting holes.
11. Remove pump gear and removal tool from gear housing.
12. Using JDG10025, remove top pump mounting socket screw (I).
13. Remove pump mounting cap screws (K).
14. Remove pump from engine.
15. If waiting on receipt of pump, replace gear housing cover (A).



RG14256 —UN—06JUN05

Pump Gear Removal Tool JDG10015

Continued on next page

AS58880,0000707 -19-12OCT09-4/6

Install High Pressure Fuel Pump

1. Engine is at No.1 “TDC-Compression” per pump removal procedure.
2. Remove pump gear cover (A).

IMPORTANT: When a failed injection pump is replaced, always replace high pressure pump gear and nut.

3. Put pump gear into position behind cam gear with timing marks on cam gear and pump gear positioned as shown.

NOTE: Pump gear timing mark is only on one side and must face engine gear train.

4. Place new o-ring (J) on pump and lubricate with JDT 308 (liquid oil coconut soap).
5. Install pump into block, aligning key on pump shaft with slot on pump gear.

NOTE: While installing pump, make sure that the timing marks on the cam and pump gear remain positioned as shown in the drawing.

6. Apply PM37418 (medium-strength thread lock/sealant) to pump mounting screws.
7. Loosely install top pump mounting socket screw (I).
8. Loosely install pump cap screws (K).
9. Apply PM37418 (medium-strength thread lock/sealant) to pump shaft threads.
10. Install nut (E) onto pump shaft and tighten to specification.

Specification	
Pump Gear Nut—Torque	95 N·m (70 lb-ft)

11. Tighten pump cap screws (K).

Specification	
Pump Mounting Screws—Torque	35 ± 7 N·m (26 ± 5 lb-ft)

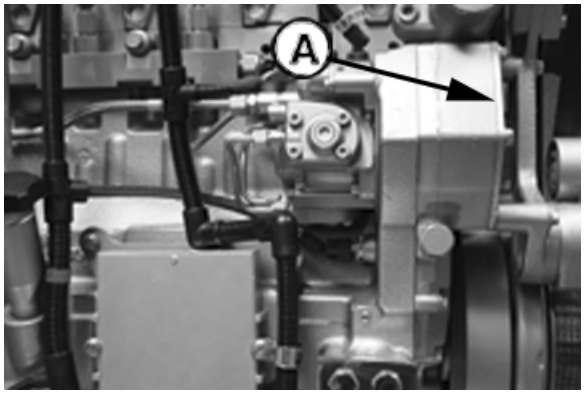
IMPORTANT: ALWAYS use a backup wrench when removing and/or installing fittings and/or fuel lines to avoid damage.

12. Connect fuel supply line (M) and tighten to specification.

Specification	
Fuel Supply Line—Torque	24 ± 5 N·m (18 ± 4 lb-ft)

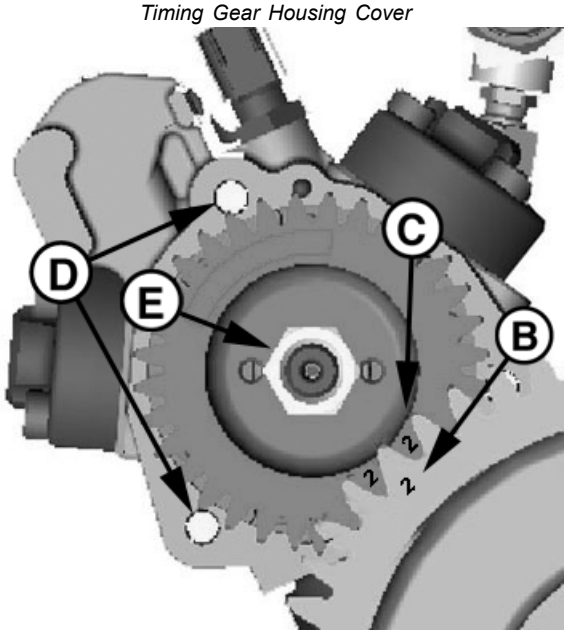
13. Connect high pressure fuel line (F) and tighten to specification.

Specification	
High Pressure Fuel Line—Torque	40 ± 4 N·m (32 ± 3 lb-ft)

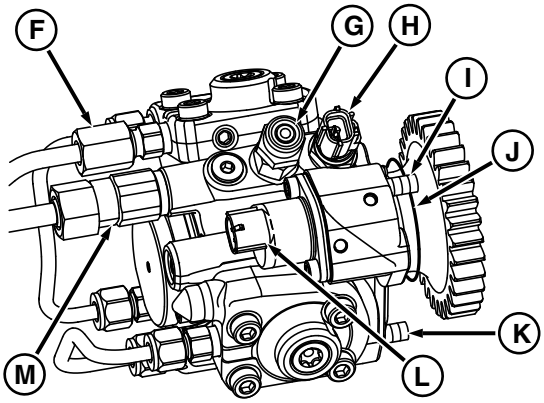


RG14252 —UN—06JUN05

Timing Gear Housing Cover



RG14253 —UN—13OCT05



RG14254A —UN—03OCT08

High Pressure Fuel Pump Components

A—Gear Housing Cover
B—Cam Gear Timing Mark
C—High Pressure Pump Gear Timing Mark
D—High Pressure Pump Mounting Holes
E—High Pressure Pump Gear Nut
F—Fuel Outlet Line
G—Fuel Overflow Port
H—Fuel Temperature Sensor Connector
I— Mounting Socket Screw
J— O-ring
K—Mounting Cap Screw (2)
L— Suction Control Valve Power Connector
M—Fuel Inlet Line

Continued on next page

AS58880,0000707 -19-12OCT09-5/6

14. Install leak-off line to the overflow port (G). Tighten to specification.

Specification	
Fuel Leak-Off Line—Torque	12 ± 2 N·m (9 ± 1 lb-ft)

15. Install gear housing cover with new gasket.

Specification	
Pump Gear Housing Cover—Torque	31 N·m (23 lb-ft)

16. Reconnect Suction Control Valve, fuel temperature, and cam position sensor wiring harness.
17. Remove JDG820 Flywheel Turning Tool and JDE81-4 Timing Pin. Install plugs back into engine block.

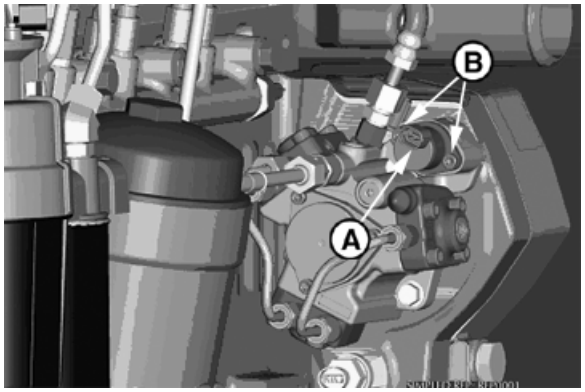
AS58880,0000707 -19-12OCT09-6/6

Remove and Install Fuel Suction Control Valve

IMPORTANT: Avoid contamination to the fuel high pressure pump or the suction control valve while removing and replacing. Failure to maintain a high level of cleanliness will cause further damage to the pump and other fuel system components.

IMPORTANT: The high pressure fuel pump doesn't necessarily have to be removed from the engine to change the suction control valve. However, if the engine compartment is heavily contaminated, it is recommended that the pump be removed completely, cleaned, and have the service work completed off the engine. Cleanliness is very important. Once the suction control valve is replaced, install pump back to engine and reassemble fuel system.

1. Thoroughly clean suction control valve area - solenoid connector, suction control valve mounting area, and surrounding pump and engine surfaces with an engine cleaner and degreaser. **Be certain the suction control valve area is clean and free from dirt/debris/dust. If practical, remove paint from the suction control valve joint area between the suction control valve and pump housing.**
2. Disconnect the suction control valve wire connector (A). **Avoid damaging the connector and plastic cover. DO NOT twist the connector.**
3. Loosen 2 suction control valve retaining bolts (B) with a 5 mm Allen hex tool. **Do not completely remove bolts. Beware of paint chips and other possible contamination sources. If necessary, clean the joint area again.**



RG14844 —UN—24APR06

Remove Suction Control Valve Assembly

A—Suction Control Valve Wire Connector
B—Suction Control Valve Retaining Bolts

4. With the 2 retaining bolts loose but not removed, remove the suction control valve from the pump body by hand, pulling straight out from pump. **DO NOT twist the valve or pry with any tool.**

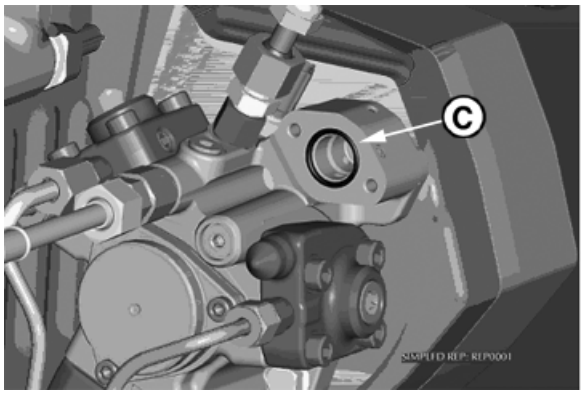
IMPORTANT: Install a properly sized cap plug in the valve opening in the pump body to protect the pump from contamination.

5. With the suction control valve separated from the pump, remove and discard the 2 retaining bolts.

Continued on next page

RE38635,0000159 -19-03OCT08-1/6

6. Check valve mounting surface on pump housing. Remove any residual gasket material from valve mounting surface. Exercise caution to not damage mounting surface. If o-ring (C) is stuck to pump housing surface rather than the Pump Control Valve, remove o-ring.
7. Ensure the o-ring groove in pump housing is clean and free from debris.



RG14845 —UN—24APR06

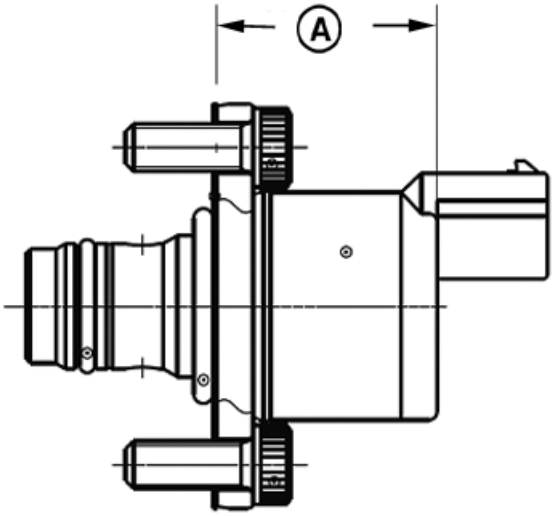
Suction Control Valve to Pump Housing O-Ring Seal

RE38635,0000159 -19-03OCT08-2/6

NOTE: If the length of the new valve exceeds 27.6 +/- 1 mm (1.09 +/- 0.040 in.), it is the incorrect valve for the 9L pump.

8. Verify the overall reference length of the valve to be 27.6 +/- 1 mm (1.09 +/- 0.040 in.)

A—27.6 +/- 1 mm (1.09 +/- 0.040 in.)



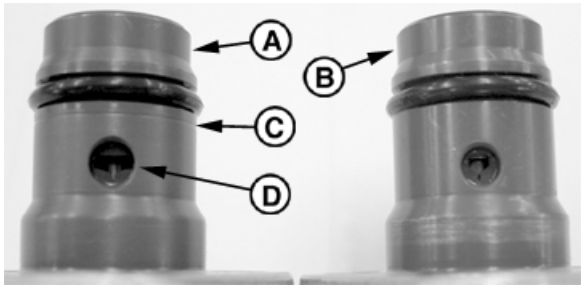
RG15103 —UN—01SEP06

Reference Length of Valve

RE38635,0000159 -19-03OCT08-3/6

9. In addition to checking length of the valve, a visual check can be made to determine if the correct valve is in the kit. As shown, the 9L valve (A) has a groove (C) on the valve body. The 350 Series valve (B) has none. Additionally, the valve for 9L has a different port geometry (D) than the valve for 350 Series.

A—Tier 3 450S (9L) Suction Control Valve
B—Tier 2 350S (4.5L/6.8L) Suction Control Valve
C—Groove on Body
D—Port Geometry



RG15156 —UN—13NOV06

Comparison of Tier 3 450S and Tier 2 350S Suction Control Valve

Continued on next page

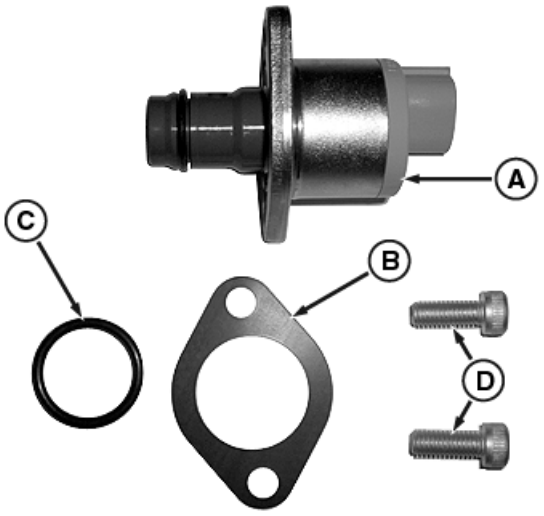
RE38635,0000159 -19-03OCT08-4/6

IMPORTANT: DO NOT handle replacement valve parts with dirty hands or gloves.

IMPORTANT: DO NOT allow engine coolant or brake fluid to contact o-rings.

10. Confirm replacement parts in kit, as shown.
11. Lubricate large and small o-rings with a small amount of diesel fuel. **Use just enough fuel to coat entire o-ring surfaces.**
12. Install large o-ring into groove in pump housing.

A—Suction Control Valve
B—Gasket
C—O-Ring (Valve to Pump Mounting Surface)
D—Valve Retaining Cap Screws -2-



RG14877A —UN—01OCT08

9L Suction Control Kit

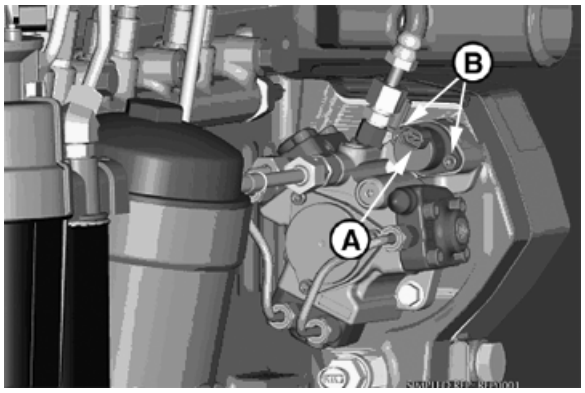
RE38635,0000159 -19-03OCT08-5/6

13. Install the new suction control valve assembly into the pump body by hand until suction control valve flange nearly contacts pump housing. The flange may not contact because of the o-ring. **When installing valve, DO NOT twist the valve. Damage to o-rings will occur. Push valve straight into pump housing same as when valve was removed. The electrical connector (A) should be on the top side, facing rear of engine, as shown (A).**
14. Install new retainer bolts (B) through valve flange and into pump housing. Tighten both bolts evenly, then tighten to specification.

Specification	
Suction Control Valve to Pump Housing—Torque	9 N·m (7 lb-ft)

IMPORTANT: DO NOT use any tool to connect wire harness. Damage to connector will occur. BE CERTAIN the electrical connector is in proper orientation. The electrical connector should be positioned on the top side, facing rear of engine. If the suction control valve is installed incorrectly, the valve will not function correctly

15. Connect suction control valve wire harness to electrical connector (A).
16. Connect negative (—) battery cable.
17. Start engine and perform computer diagnostics.



RG14844 —UN—24APR06

Install Suction Control Valve

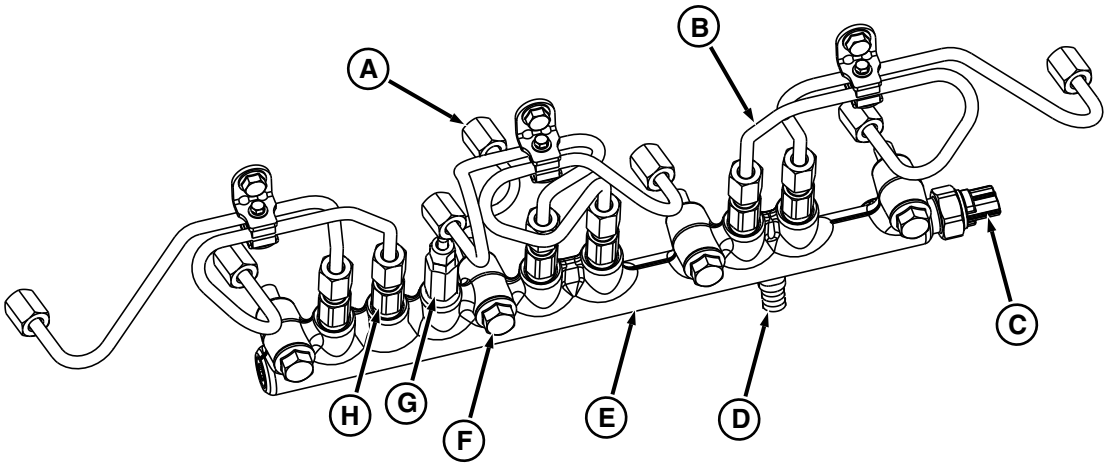
A—Wire Connector Position **B—Valve Retaining Bolts**

18. Check suction control valve - pump joint for fuel leaks. **Check for leaks on underside of suction control valve joint by hand and visually, using a small mirror.**
19. Perform the identical diagnostic procedure, as when troubleshooting, to verify proper operation of the replacement suction control valve and to prove the problem is solved.

RE38635,0000159 -19-03OCT08-6/6

Remove and Install High Pressure Common Rail

Remove High Pressure Common Rail



RG14462A —UN—03OCT08

High Pressure Common Rail

A—High Pressure Common Rail Leak-off Line Fitting
B—Injector Delivery Line Fitting (6)
C—Fuel Pressure Sensor
D—High Pressure Common Rail Fuel Inlet Line Fitting
E—High Pressure Rail
F—Cap Screw (4)
G—Pressure Limiter
H—Flow Damper (6)

CAUTION: Let the engine sit for 5 minutes to allow rail pressure to lower.

CAUTION: Open first line slowly to insure the pressure has been relieved. High pressure fuel is dangerous.

1. Disconnect fuel pressure sensor (C) connector.
2. If necessary, remove the pressure sensor. See REMOVE AND INSTALL FUEL RAIL PRESSURE SENSOR in Group 110 of this Section. Plug the opening.
3. Disconnect leak-off line fitting (A) from the pressure limiter (G).
4. Disconnect fuel inlet line fitting (D) and loosen high pressure pump outlet line fitting.
5. Disconnect the fuel lines from the flow dampers.

IMPORTANT: Do not bend or force lines out of the way.

a. Using a backup wrench on the inlet connector flats, loosen the fuel line fittings from the inlet connectors. The lines do not need to be removed.

IMPORTANT: While removing the fuel line fitting, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

b. Using a backup wrench on flow dampers, remove the fittings that connect the fuel lines to the flow dampers.

c. Remove the fuel line clamp screws and discard. Retain the isolators in a protected location.

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

d. Swing the fuel lines out of the way.

IMPORTANT: Immediately plug or cover fuel lines to prevent dirt from entering the fuel system.

6. If necessary, remove the flow dampers. See REMOVE AND INSTALL FLOW DAMPERS in this Group.
7. If necessary, remove the pressure limiter. See REMOVE AND INSTALL PRESSURE LIMITER in this Group.
8. Remove HPCR cap screws (F) and slide HPCR down and out to remove.

Install High Pressure Rail

1. Install High Pressure Common Rail (E) and tighten cap screws (F) to specification.

	Specification
High Pressure Common Rail Capscrews—Torque	70 ± 14 N·m (52 ± 10 lb-ft)

2. If removed, install flow dampers according to REMOVE AND INSTALL FLOW DAMPERS in this Group.

Continued on next page

RG41183,0000105 -19-03OCT08-1/2

3. If removed, install pressure limiter according to REMOVE AND INSTALL PRESSURE LIMITER in this Group.
4. Connect leak off line (A) and tighten to specification.

Specification

High Pressure Common Rail Leak-off Line Fittings—Torque.....15 ± 3 N·m (11 ± 2 lb-ft)

5. Install the fuel inlet line (D) to the HPCR and fuel pump.

Specification

Fuel Inlet Line Fittings—Torque..... 40 ± 4 N·m (30 ± 3 lb-ft)

6. Install and finger-start fuel lines to inlet connectors and flow dampers.
7. Assemble the fuel line clamps and clamp isolators with new clamp screws to the fuel lines.

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

8. Tighten the fuel line clamp screws to specification.

Specification

Fuel Line Clamp Screw—Torque..... 8.5 N·m (75 lb-in or 6 lb-ft)

IMPORTANT: While tightening the fuel delivery line fitting, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

9. Using a backup wrench, tighten the fuel line fittings to the inlet connectors and to the flow dampers.

Specification

Fuel Line Fittings—Torque..... 40 ± 4 N·m (30 ± 3 lb-ft)

10. If removed, install the pressure sensor. See REMOVE AND INSTALL FUEL RAIL PRESSURE SENSOR in Group 110 of this Section.
11. Connect fuel pressure sensor (C) connector.

RG41183,0000105 -19-03OCT08-2/2

Remove and Install Flow Dampers

Remove Flow Dampers

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Relieve pressure before opening rail.

1. Before removing flow damper, turn engine OFF and let sit for 5 minutes. This will relieve fuel pressure from the high pressure common rail.

IMPORTANT: If any dirt, paint chips, or debris enters the fuel system, injector failure will occur!

2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the faulty flow damper.
3. Disconnect the fuel line attached to the damper to be removed.

IMPORTANT: Do not bend or force lines out of the way.

a. Using a wrench on the inlet connector flats, loosen the fuel line fitting from the inlet connector. The line does not need to be removed.

IMPORTANT: While removing the fuel line fitting, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

b. Using a backup wrench on flow damper, remove the fitting that connects the fuel line to the flow damper.

c. Remove the fuel line clamp screw and discard. Retain the isolators in a protected location.

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

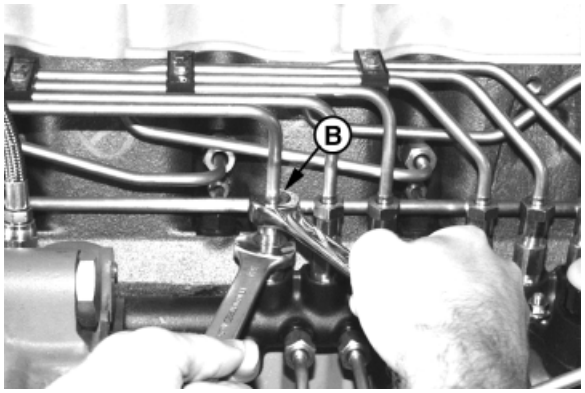
IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

d. Swing the fuel line out of the way.

IMPORTANT: Immediately plug or cover fuel lines to prevent dirt from entering the fuel system.

4. Remove flow damper, keeping internal components (C) together.

IMPORTANT: Make sure magnet is clean before using.

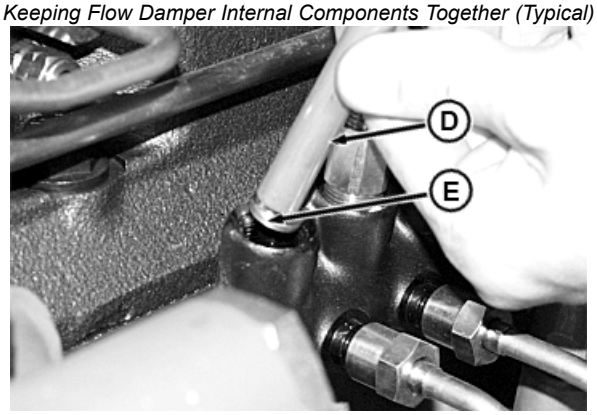


RG11759A —UN—26JUL01

Removing Fuel Line Fitting (Typical)

RG11760A —UN—11SEP09

Keeping Flow Damper Internal Components Together (Typical)



RG11761A —UN—11SEP09

Removing Orifice Plate (Typical)

B—Fuel Line Fitting
C—Internal Components
D—Magnet
E—Orifice Plate

5. Using a magnet (D), remove orifice plate (E) from inside flow damper bore on high pressure common rail.
6. Replace complete flow damper as an assembly.

Continued on next page

RG41183,0000106 -19-13SEP07-1/2

Install Flow Dampers

1. Insert new orifice plate (A) inside bore on high pressure common rail.
2. Holding spring (C) and piston (B) inside flow damper body (D), install new flow damper on high pressure common rail. Tighten flow damper to specification.

Specification

Flow Damper—Torque..... 176 N·m (130 lb-ft)

3. Install and finger-start fuel line to inlet connector and flow damper.
4. Assemble the fuel line clamp and clamp isolators with a new clamp screw to the fuel line.

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

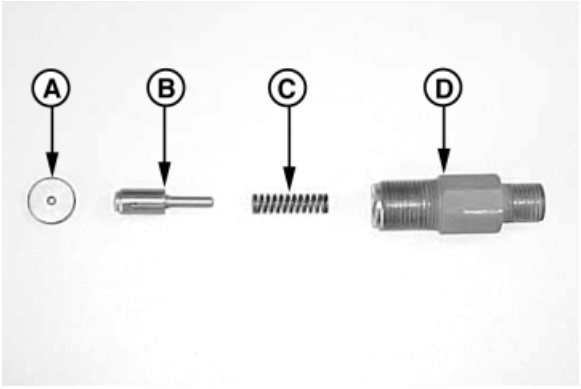
IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

5. Tighten the fuel line clamp screw to specification.

Specification

Fuel Line Clamp Screw—Torque..... 8.5 N·m (75 lb-in or 6 lb-ft)

IMPORTANT: While tightening the fuel delivery line fitting, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.



RG11845A —UN—31AUG01

Flow Damper Exploded View

A—Orifice Plate
B—Piston
C—Spring
D—Flow Damper Body

6. Tighten the fuel line fittings to the inlet connector and to the flow damper.

Specification

Fuel Line Fittings—Torque..... 40 ± 4 N·m (30 ± 3 lb-ft)

RG41183,0000106 -19-13SEP07-2/2

Remove and Install Pressure Limiter

Remove Pressure Limiter

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.

1. By letting the engine sit for at least 5 minutes, fuel pressure in the HPCR (A) will be relieved.

IMPORTANT: If any dirt, paint chips, or debris enters the fuel system, injector failure will occur!

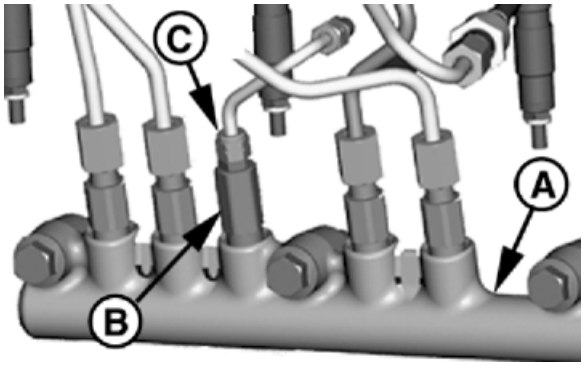
2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
3. Disconnect HPCR leak-off line fitting (C) from pressure limiter (B) using a backup wrench on the pressure limiter.

IMPORTANT: Clean magnet prior to removing pressure limiter.

4. Remove pressure limiter. The pressure limiter comes as an assembly. Due to the torque during installation, the crimp on the end of the assembly can come loose. When removing the pressure limiter, check to see if the entire assembly is together. If not, use a clean magnet to remove the loose components from the bore on the HPCR. Make sure the ball valve does not fall into the rail.

Install Pressure Limiter

IMPORTANT: When replacing pressure limiter, DO NOT use sealant or any Loctite. The seal is metal to metal.



RG14258 —UN—06JUN05

High Pressure Common Rail (HPCR)

A—High Pressure Common Rail (HPCR)
B—High Pressure Limiter
C—HPCR Leak-off Line Fitting

IMPORTANT: DO NOT remove and reinstall the same pressure limiter, a leak may result. A new pressure limiter should be installed.

1. Install pressure limiter into HPCR. Tighten to specification.

Specification	
Pressure Limiter—Torque	176 N·m (130 lb-ft)

2. Connect HPCR leak-off line fitting to pressure limiter using a backup wrench. Tighten fitting to specification.

Specification	
High Pressure Common Rail Leak-off Line Fitting—Torque	15 ± 3 N·m (12 ± 2 lb-ft)

RE38635,000014E -19-13SEP07-1/1

Remove and Install Leak-off Lines

There are three leak-off lines. They are located between the:

- Secondary filter and tee fitting on cylinder head, rear end
- High pressure fuel pump and tee fitting on cylinder head, front end
- High pressure common rail and cylinder head

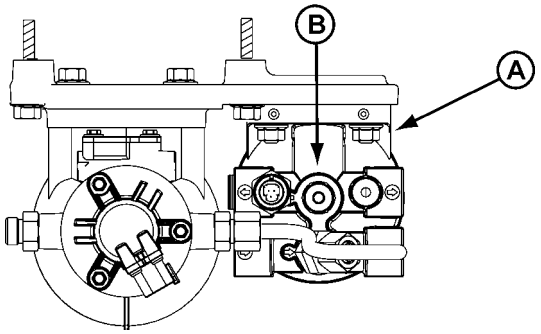
The return-to-tank line will be connected to one of the two tee fittings on the cylinder head, depending on the application.

IMPORTANT: ALWAYS use a backup wrench when removing and/or installing fittings and/or fuel lines to avoid damage.

IMPORTANT: Immediately plug or cover ports to prevent dirt from entering the fuel system. If any dirt, paint chips, or debris enters the fuel system, component failure will occur!

Remove Filter Leak-off Line

1. Disconnect leak off line from the air bleed/check valve located on the secondary filter head (A).



RG14274 —UN—02NOV05

Fuel Filter Assembly, Top View

A—Secondary Filter Head

B—Secondary Fuel Filter Air Leak-Off Port

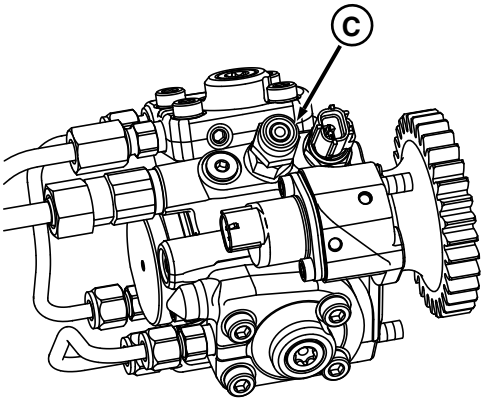
2. Disconnect leak-off line from the tee fitting on the cylinder head.

WL30140,000003F -19-03OCT08-1/3

Remove HP Fuel Pump Fuel Leak-Off Line

1. Disconnect the leak-off line from the leak-off port (C) on high pressure pump.
2. Disconnect the leak-off line from the tee fitting on the cylinder head.

C—HP Fuel Pump Fuel Leak-Off Port



RG14275A —UN—03OCT08

High Pressure Fuel Pump

Continued on next page

WL30140,000003F -19-03OCT08-2/3

Remove Common Rail Leak-Off Line

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.

1. By letting the engine sit for at least 5 minutes, fuel pressure in the HPCR (A) will be relieved.
2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
3. Disconnect the leak-off line (C) from the pressure limiter (B).
4. Disconnect the leak-off line from the fitting in the cylinder head.

Install Filter Leak-off Line

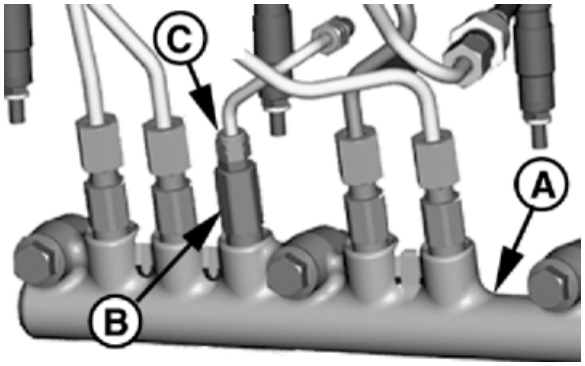
1. Install leak-off line to the tee fitting on the cylinder head.
2. Install leak-off line to the air bleed/check valve located on the secondary filter head (A).
3. Tighten leak-off line fittings to specification.

Specification	
Secondary Filter Leak-Off Line—Torque	24 ± 5 N·m (18 ± 4 lb-ft)

4. Tighten to specification.

Install HP Fuel Pump Fuel Leak-Off Line

1. Install leak-off line to the tee fitting on the cylinder head.
2. Install leak-off line to the high pressure pump leak-off port.



RG14258 —UN—06JUN05

High Pressure Common Rail

A—High Pressure Common Rail (HPCR)
B—High Pressure Limiter
C—HPCR Leak-off Line Fitting

3. Tighten fittings to specification.

Specification	
Fuel Pump Leak-Off Line—Torque	12 ± 2 N·m (9 ± 1 lb-ft)

Install Common Rail Leak-Off Line

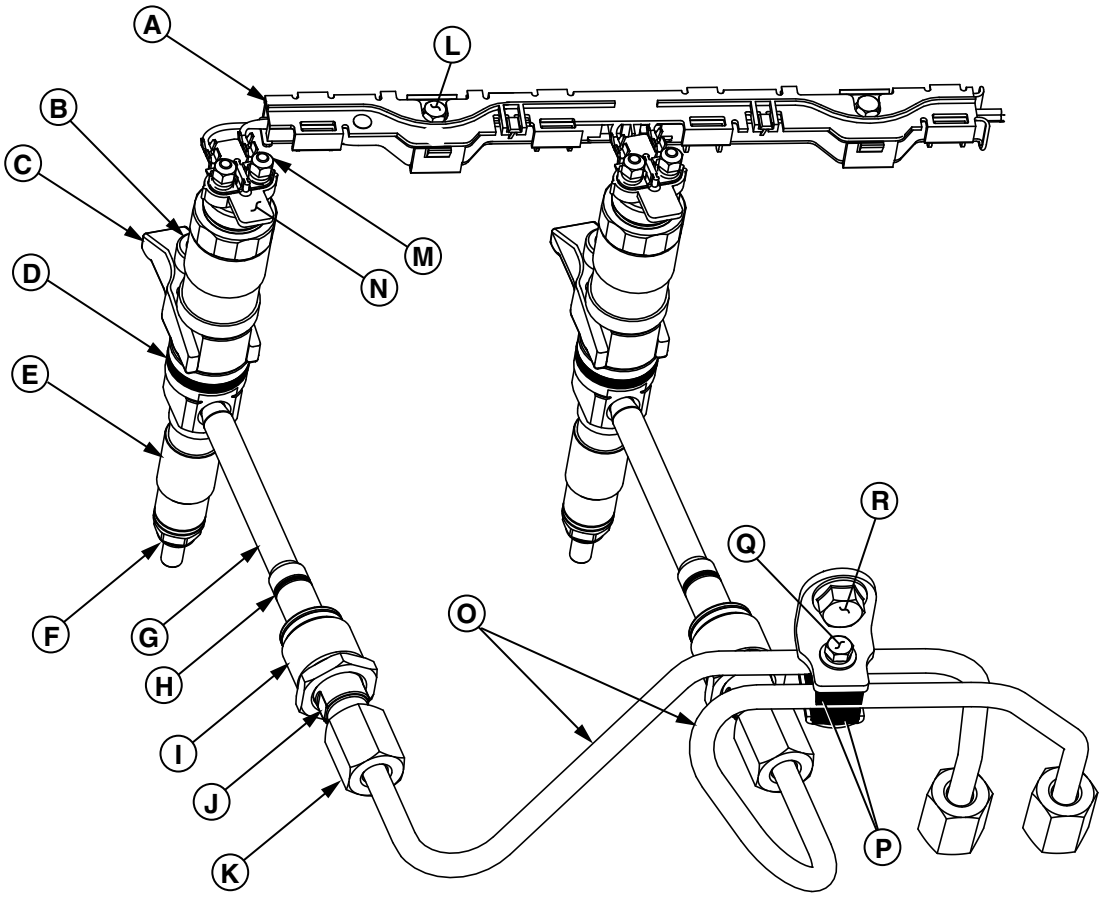
1. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
2. Connect the leak-off line to the pressure limiter.
3. Connect the leak-off line to the fitting in the cylinder head.
4. Tighten fittings to specification.

Specification	
Common Rail Leak-Off Line—Torque	15 ± 3 N·m (12 ± 2 lb-ft)

WL30140,000003F -19-03OCT08-3/3

Remove and Install Electronic Injectors (EIs)

Remove Injectors



RG14475A —UN—03OCT08

A—Injector Wiring Harness Carrier
B—Injector Clamp Screw
C—Injector Clamp
D—O-ring
E—Electronic Injector
F—Combustion Sealing Washer
G—Inlet Connector
H—Inlet Connector O-ring
I— Inlet Connector Nut
J— Lands on Connector Nut
K—Fuel Delivery Line Nut
L—Harness Carrier Screw
M—Terminal Nut
N—QR Code
O—Fuel Delivery Line Set
P—Isolators
Q—Line Clamp Screw
R—Line Clamp-to-Intake Manifold Screw

NOTE: When removing injectors for service, the wiring harness carrier assembly should be removed to provide clearance and avoid damage to carrier.

1. Remove rocker arm cover with vent tube. Disconnect engine wiring harness connectors as necessary.

NOTE: Some applications may require removal of the turbocharger. The turbo actuator assembly may be blocking some screws. Refer to the base engine manual.

IMPORTANT: The wiring harness-to injector terminal nuts can be reused only 3-4 times before replacement is necessary.

2. Disconnect the main injector harness connector.

NOTE: There are three delivery line sets, each set comprised of two fuel lines sharing a fuel line clamp.

3. Remove the clamp-to-intake manifold screw (R) of the fuel delivery line set (O) of the injector(s) to be removed.
4. Remove the fuel line nuts (K) of the fuel delivery line set of the injector(s) to be removed.
   a. Using a wrench on the inlet connector flats (J), remove the fuel line nut.

IMPORTANT: While removing the fuel line nut, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

   b. Loosen or remove the nuts that connect the same fuel lines to the flow dampers.
   c. Remove the clamp screw (Q) and discard. Retain the isolators (P) in a protected location.

Continued on next page

RE38635,0000021 -19-21JUL09-1/7

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

d. Swing the fuel lines away from the inlet connectors or remove the fuel lines.

IMPORTANT: Immediately plug or cover fuel lines to prevent dirt from entering the fuel system.

5. To ensure that injectors are replaced into the cylinders from which they are to be removed, record the serial number or QR code (N) of each injector to be removed and note in which cylinder each injector to be removed is located. If only one injector is to be removed, this step may be disregarded.
6. Remove inlet connector nut (I), using a wrench on the flats of the inlet connector to keep the inlet connector from rotating. Use a thin-profile wrench on the connector nut. Remove inlet connector (G) and discard.

IMPORTANT: While removing the inlet connector nut, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

IMPORTANT: Inlet connector and o-ring must be replaced whenever the inlet connector nut is loosened. The tip of the connector is comparatively soft and form-fits into the injector. Once deformed, the connector will not re-seal properly.

IMPORTANT: To provide better access and to prevent damage to the wiring harness carrier assembly that might be caused by removing injector(s), the harness carrier assembly should be removed.

7. Loosen terminal nuts (M) of all the injectors.
8. Remove the wire harness carrier screws (L).
9. Lift out the wire harness carrier. Retain the spacers.
10. Remove screw from injector clamp (C) and remove clamp.
11. At this point, the intake manifold may be removed. See REMOVE, INSPECT, AND INSTALL INTAKE MANIFOLD in Section 2, Group 80 of the base engine manual.

IMPORTANT: When removing an injector, do not twist the top of the injector. This will cause the calibration to be changed.

Immediately cover injector bore to prevent dirt from entering the fuel system.

Store injector in a clean location.

12. Hand-pull if possible, or use a "lady slipper" pry bar to carefully loosen injector from the cylinder head.
13. If necessary, remove injector sleeve from cylinder head injector bore. SeeFuel Injector Sleeves — Remove in CTM400.

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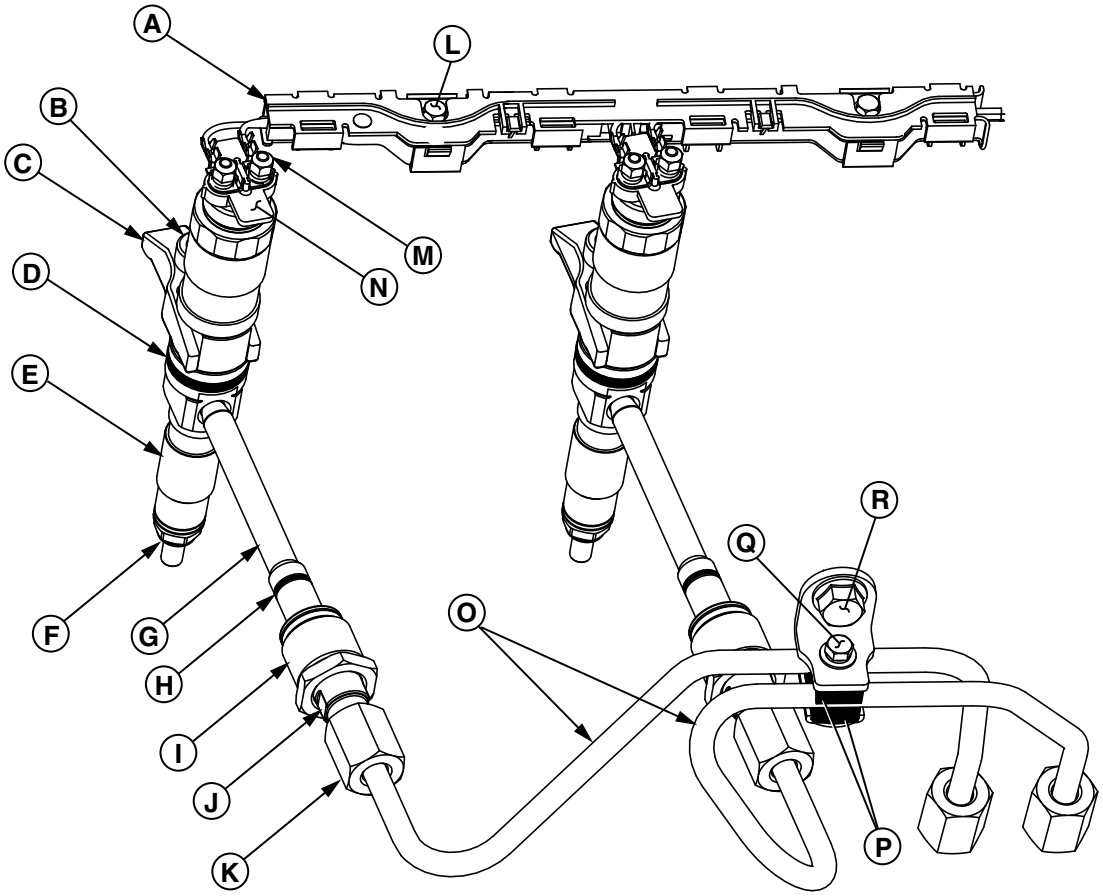
RE38635,0000021 -19-21JUL09-2/7

Install Injectors



RG14475A —UN—03OCT08

A—Injector Wiring Harness Carrier
B—Injector Clamp Screw
C—Injector Clamp
D—O-ring
E—Electronic Injector
F—Combustion Sealing Washer
G—Inlet Connector
H—Inlet Connector O-ring
I— Inlet Connector Nut
J—Lands on Connector Nut
K—Fuel Delivery Line Nut
L—Harness Carrier Screw
M—Terminal Nut
N—QR Code
O—Fuel Delivery Line Set
P—Isolators
Q—Line Clamp Screw
R—Line Clamp-to-Intake Manifold Screw

1. Perform an injector calibration, see ELECTRONIC INJECTOR CALIBRATION in Section 4 Group 160 later in this manual.

NOTE: This procedure takes the calibration information from the downloaded injector payload or what is typed in by the technician from the injector datasheet. The injector does not need to be connected to do this procedure. If the calibration does not complete you may need information from the injector.

2. See CLEAN ELECTRONIC INJECTOR (EI) BORE later in this section.
3. See CLEAN ELECTRONIC INJECTOR (EI) BODY later in this section.
4. See INSPECT ELECTRONIC INJECTOR (EI) BODY later in this section.
5. If removed, install the intake manifold. See REMOVE, INSPECT, AND INSTALL INTAKE MANIFOLD in Section 2, Group 80 of the base engine manual.
6. If previously removed, install injector sleeve in cylinder head injector bore. SeeFuel Injector Sleeves — Install in CTM400.

IMPORTANT: Use a new sealing washer any time that an injector is to be installed.

7. Make sure the O-ring (D) and combustion sealing washer (F) are installed on injector.
8. Lubricate O-ring with O-ring lube or petroleum grease. Apply a small quantity of grease on sealing washer to hold in place.

IMPORTANT: If reinstalling injectors, make sure they are placed in the same cylinder from which they were removed.

9. Position injector clamp (C) with clamp screw (B) on injector, then install injector in cylinder head.

IMPORTANT: Make sure that you have the fuel feed hole on the side of the injector positioned toward the inlet connector.

Continued on next page

RE38635,0000021 -19-21JUL09-3/7

IMPORTANT: When installing the injector, do not twist the top of the injector. This will cause the calibration to be changed.

10. Tighten injector clamp screw to 5 N·m (4 lb-ft), then loosen slightly.

IMPORTANT: Inlet connector and O-ring must be replaced whenever the inlet connector nut is loosened. The tip of the connector is comparatively soft and form-fits into the injector. Once deformed, the connector will not reseal properly.

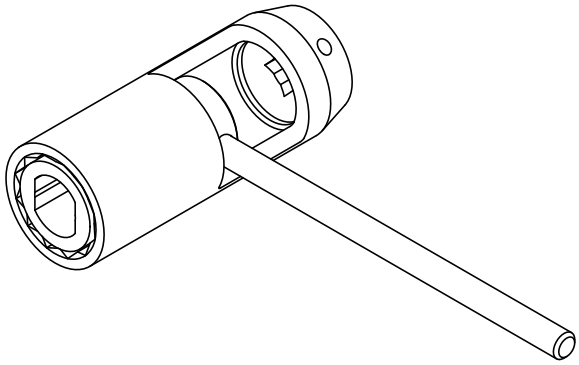
11. Place o-ring (H) on inlet connector.
12. Lubricate o-ring with AMOGELL 51455 (or equivalent) petroleum grease and insert inlet connector into cylinder head until seated on injector.

RE38635,0000021 -19-21JUL09-4/7

IMPORTANT: While tightening the inlet connector nut, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

13. Install inlet connector nut (I). To prevent connector rotation, hold inlet connector on flats. Use JDG10263 Feed Tube Torque Tool to hold connector while tightening connector nut. Tighten inlet connector nut to specification.

Specification	
Inlet Connector Nut—Torque	65 ± 5 N·m (48 ± 4 lb-ft)



RG14837A —UN—03OCT08

JDG10263 Feed Tube Torque Tool

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RE38635,0000021 -19-21JUL09-5/7

IMPORTANT: The injector clamp design has changed, beginning with engine serial number 6090L017988. The new clamp design has a different torque specification on the cap screw. Before final tightening of the clamp cap screw, identify which clamp is used on injectors so the proper torque can be applied.

14. Tighten injector clamp screw to specification.

Specification	
Old Injector Clamp Screw—Torque	47 ± 5 N·m (35 ± 4 lb-ft)
New Injector Clamp Screw—Torque	37 ± 5 N·m (27 ± 4 lb-ft)

15. Loosely install the line clamp to the intake manifold using clamp-to-intake manifold screw (R).
16. Install and finger-start the fuel lines to inlet connectors and flow dampers.
17. Assemble the clamp isolators (P) and the fuel delivery line set (O) to the line clamp with a new clamp screw (Q).

IMPORTANT: Inspect the clamp isolators. If cracked or otherwise damaged, replace them or damage to the fuel lines will result.

IMPORTANT: Always use a new clamp screw. The screw threads are deformed when turned into the clamp's lock nut and should not be reused.

18. Tighten the line clamp screw (Q) to specification.

Specification	
Fuel Line Clamp Screw—Torque	8.5 N·m (75 lb-in or 6 lb-ft)

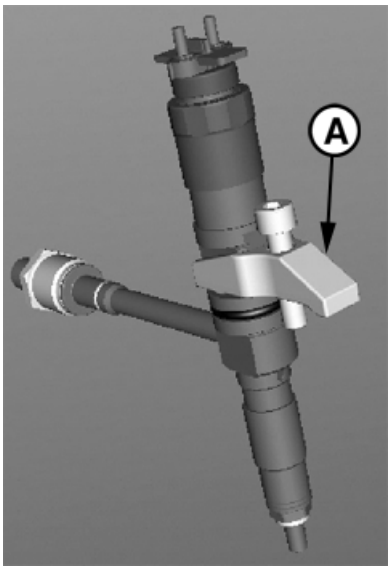
IMPORTANT: While tightening the fuel delivery line nut, do not allow the inlet connector to turn. If the inlet connector is allowed to turn, galling might occur on the injector sealing surface. This could cause fuel leaks.

19. Tighten the fuel delivery line nuts to the inlet connector and to the flow dampers.

Specification	
Fuel Line Nut—Torque	40 ± 4 N·m (30 ± 3 lb-ft)

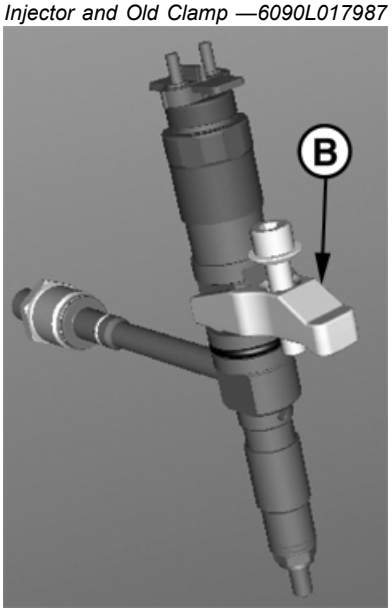
20. Tighten the line clamp screw (R) to the intake manifold.

Specification	
Fuel Line Clamp-to-Intake Manifold Screw—Torque	30 ± 6 N·m (22 ± 4 lb-ft)



RG15254 —UN—29MAR07

Injector and Old Clamp —6090L017987



RG15255 —UN—29MAR07

Injector and New Clamp 6090L017988—

A—Old Injector Clamp - Engines Prior To: 6090L017987

B—New Injector Clamp - Engines Beginning 6090L017988

Continued on next page

RE38635,0000021 -19-21JUL09-6/7

21. Install rocker arm cover, new gasket, and vent tube.

Specification	
Rocker Arm Cover Cap Screws—Torque	35 N·m (26 lb-ft)

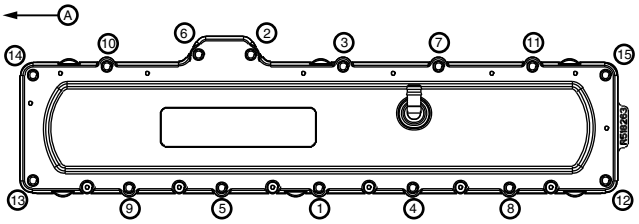
22. Reconnect engine wiring harness connectors.

23. Reinstall the injector harness connector using JDG1949 Wiring Harness Nut Socket.

Specification	
Captured Nuts Securing Wire Harness Leads—Torque	2.25 N·m (20 lb-in.)

NOTE: If the turbo was removed, install turbo. Refer to Install Turbocharger in Section 2 Group 80 of the base engine manual.

RG13907 —UN—14JAN05



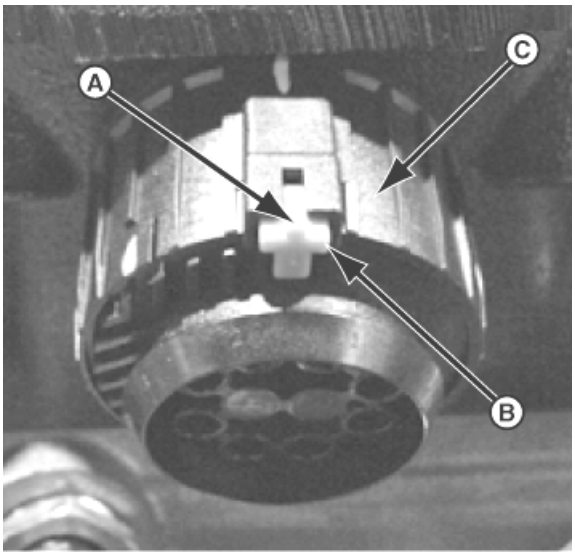
Rocker Arm Cover Tightening Sequence

RE38635,0000021 -19-21JUL09-7/7

Remove and Install Fuel Injector Wiring Harness

Removal Procedures

1. Using a jeweler's screwdriver, or other, similar tool, push tab (A) on red lock (B), away from connector on Receptacle Housing Assembly (C), unlocking it. Lock is shown in the unlocked position.

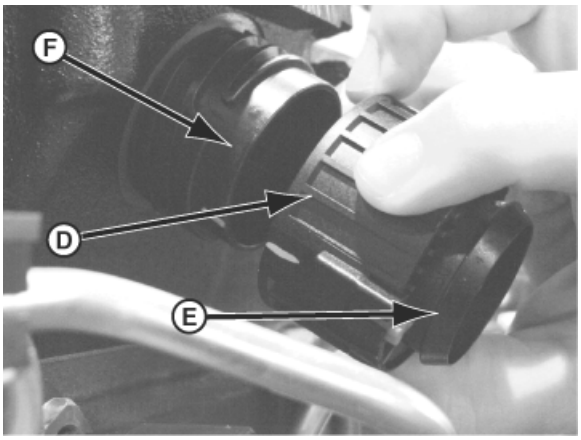


RG14700 —UN—23JAN06

Unlock Receptacle Housing Assembly

DM59778,0000078 -19-03DEC08-1/7

2. Facing side of engine and connector, grasp Collar (D), and turn it counter-clockwise, until Receptacle Housing Assembly (E) has been separated from Coupling Ring (F). The green line on the collar will line up with the green line on the receptacle housing assembly.



RG14701 —UN—23JAN06

Separate Receptacle Housing Assembly From Coupling Ring

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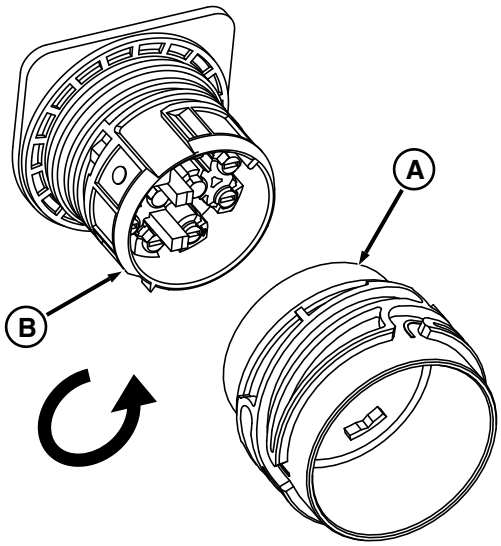
DM59778,0000078 -19-03DEC08-2/7

3. Using JDG1949 Special Socket Tool, with a 3/8 inch ratchet, push in and rotate the coupling ring (A) counter-clockwise, until It is free to be pulled from the fuel injector wiring harness connector (B). Retain coupling ring for installation procedures.
4. Remove rocker arm cover. See ADJUST VALVE CLEARANCE in base engine manual.

A—Coupling Ring

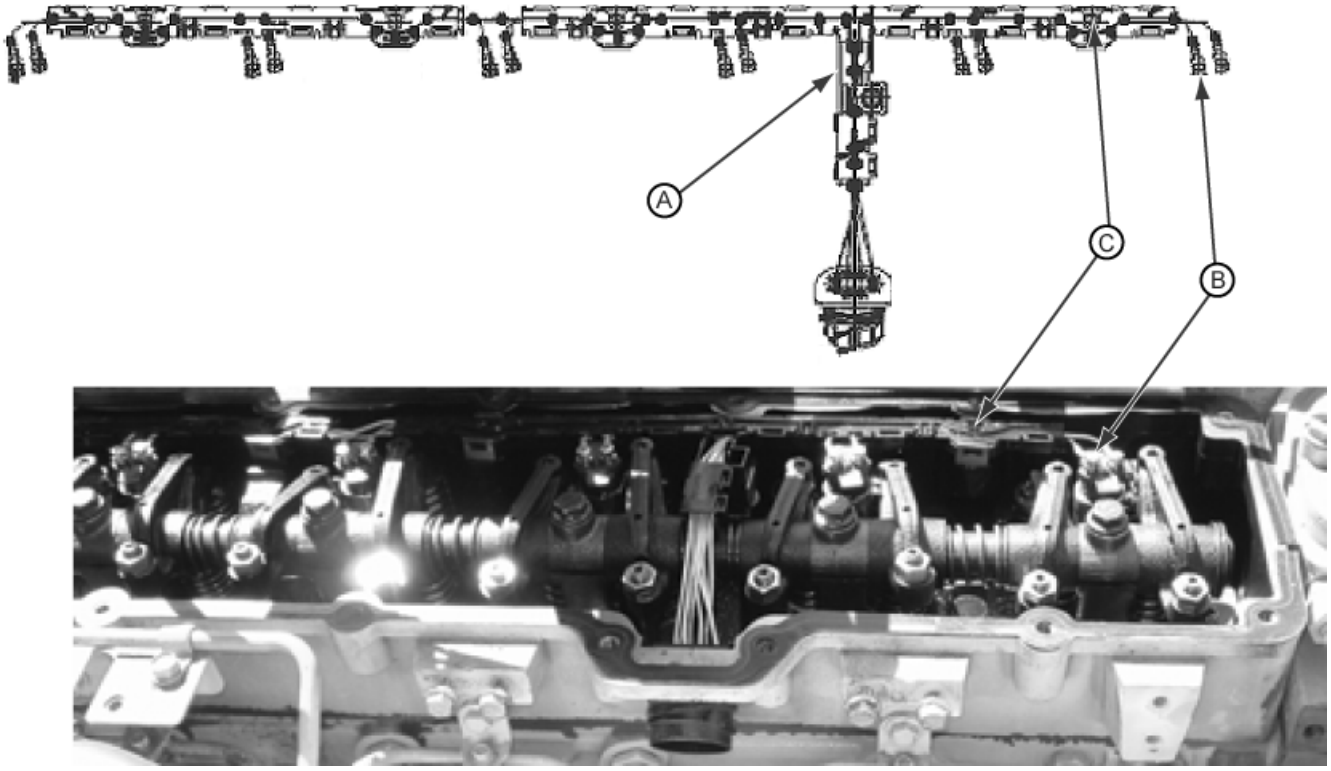
B—Fuel Injector Wiring Harness Connector



RG15181A —UN—03OCT08

Remove Coupling From Wiring Harness Connector

DM59778,0000078 -19-03DEC08-3/7



RG15244 —UN—23FEB07

Removal of Injector Wiring Harness

A—Fuel Injector Wiring Harness Carrier

B—Wiring Harness Leads with Captured Nuts

C—Carrier Captured Screws

5. Unscrew and remove 8 captured lock nuts (B) from electronic injectors (EI).
6. Unscrew 5 captured screws (C) in wiring harness carrier (A) from intake manifold.
7. From inside the valve lifter and rocker arm cavity, pull the fuel injector wiring harness connector into this area, until the front end of the connector has cleared the inside of the wall.
8. Lift fuel injector wiring harness assembly up and out.

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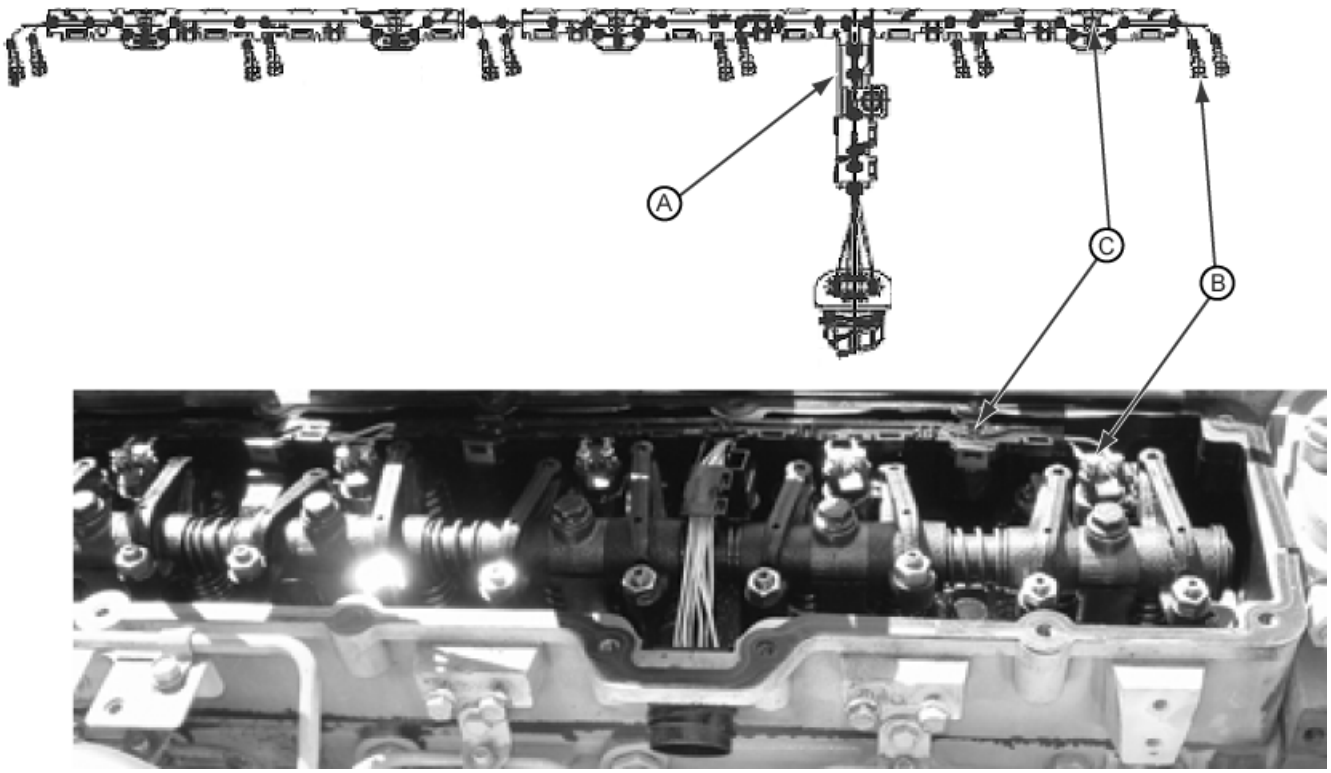
DM59778,0000078 -19-03DEC08-4/7

Installation Procedures



Installation of Injector Wiring Harness

A—Fuel Injector Wiring Harness Carrier **B—Wiring Harness Leads with Captured Nuts** **C—Carrier Captured Screws**

1. Lay fuel injector wiring harness carrier assembly (A) inside intake manifold.

NOTE: Engines built after engine serial number RG6090L027981 needs LOCTITE® 242. This harness does not have a deformed nut.

NOTE: No LOCTITE ® thread sealer is required to engine built before engine serial number RG6090L027982 on injector terminal posts for wiring leads.

2. Finger start both wire leads (B) to each fuel injector using captured lock nuts in eyelets.
3. Start five captured screws (C) in wiring harness carrier into intake manifold.
4. Tighten lock nuts on wiring leads to specification.

Specification	
Captured Nuts Securing Wire Harness Leads—Torque	2.25 N·m (1.7 lb-ft) (20 lb-in.)

LOCTITE is a trademark of Loctite Corp.

NOTE: Place feeler gauge in four positions where carrier captured screws (C) are located next to intake manifold. It is important for the wiring harness carrier to avoid rubbing against intake manifold.

5. Place 3 mm thick feeler gauge between wiring harness carrier clips (4 places, at captured screw locations) and intake manifold to insure clearance between wiring harness carrier and intake manifold.
6. Tighten the 5 captured screws (C) to specification.

Specification	
Wiring Harness Captured Screws to Intake Manifold—Torque	20 N·m (15 lb-ft)

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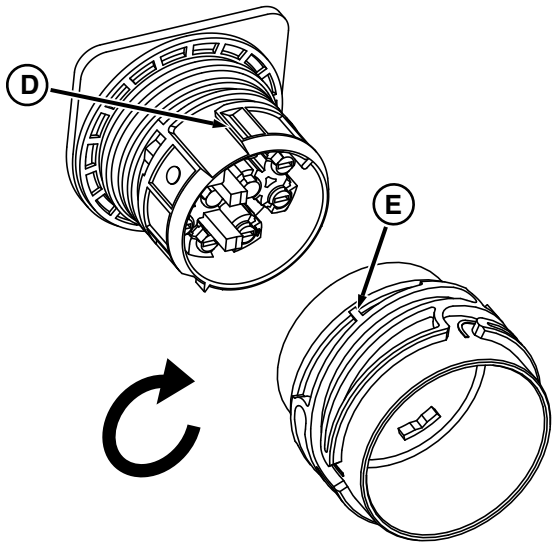
NOTE: This alignment procedure positions the tab housing with the white alignment mark located at the top-center (12:00 on a clock face) position (D).

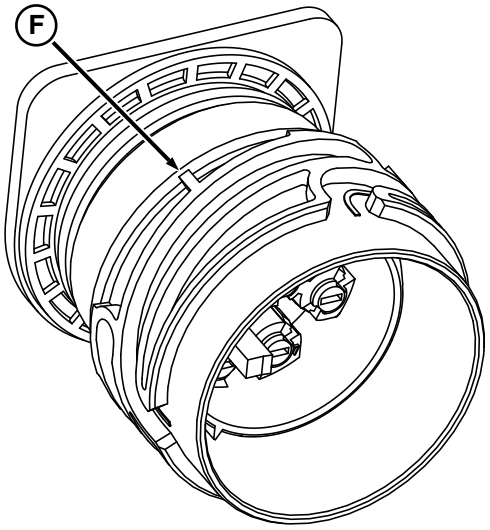
7. Press wiring harness tab housing (D) through hole in intake manifold so the tab housing seats against the machined surface and is aligned in the locating slot inside intake manifold.
8. Align the **longer** white bar on the coupling ring (E) with the tab housing bar. Finger start the coupling to engage the helix in the tab housing.

D—Wiring Harness Tab Housing Alignment Bar
E—Coupling Ring Long Alignment Bar
F—Coupling Ring Short Alignment Bar



RG15082 —UN—06MAR08

Assemble Coupling Ring to Tab Housing



RG15083A —UN—03OCT08

Alignment Bar Position

DM59778,0000078 -19-03DEC08-6/7

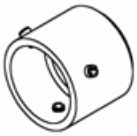
NOTE: The torque required to engage the coupling ring slightly decreases when the coupling ring is in the seated position in the tab housing depressions.

9. Using JDG1949 Special Socket Tool with a 3/8 inch ratchet, rotate the coupling ring **clockwise** to specification and so the short white alignment bar on coupling ring (F) is now at the top-center (12:00) position.

Specification

Coupling Ring to Tab Housing—Torque ..... 5 N·m (3.5 lb-ft) (44 lb-in.)

10. Install rocker arm cover. See ADJUST VALVE CLEARANCE in base engine manual.



RG14219 —UN—26OCT05

JDG1949 Special Socket Tool - Coupling Ring to Tab Housing

DM59778,0000078 -19-03DEC08-7/7

Clean Electronic Injector (EI) Bore

1. Clean light deposits out of electronic injector bore using an electric drill and D17030BR Thread Cleaning brush.
2. Work brush up and down several times to clean bore.

IMPORTANT: Be careful not to gouge or nick the sealing surface.

RG41183,0000109 -19-13SEP07-1/1

Clean Electronic Injector (EI) Orifice

Electronic injector orifice cannot be cleaned. If orifice is plugged, replace electronic injector.

RG41183,000010A -19-13SEP07-1/1

Clean Electronic Injector (EI) Body

IMPORTANT: Never use a steel brush to clean electronic injectors. Steel brush may damage electronic injectors.

1. Clean new or used electronic injectors by washing in diesel fuel.
2. If necessary, use a piece of SCOTCH-BRITE®or use a brass wire brush to remove carbon deposits.

IMPORTANT: Be careful not to gouge or nick the sealing surface.

SCOTCH-BRITE is a trademark of 3M Co.

RG41183,000010B -19-13SEP07-1/1

Inspect Electronic Injector (EI) Body

1. Inspect electronic injector body to see that it is not scratched or scored. Take a close look at the sealing surface where the fuel side feed tube mates with the EI body.
2. If electronic injector is scratched or scored, replace electronic injector.

RG41183,000010C -19-13SEP07-1/1

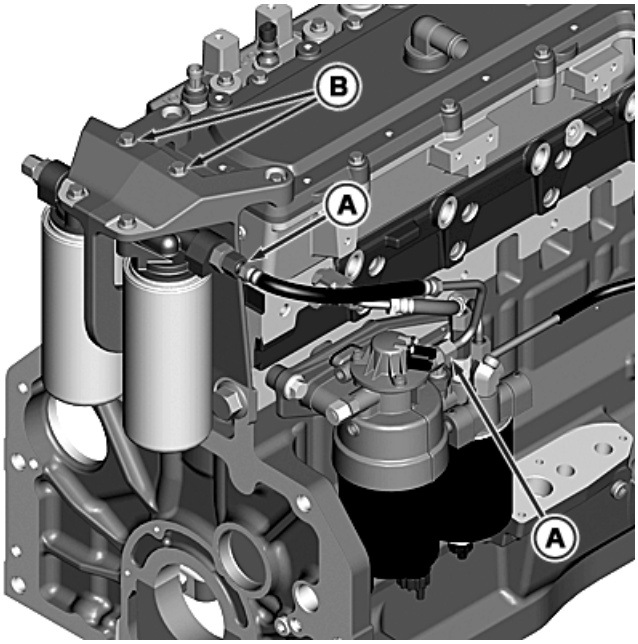
Remove and Install Fuel Doser Header

Remove Doser Header Assembly

1. Loosen fuel line fittings (A) from secondary fuel filter and fuel doser header and remove fuel line. Set line aside.
2. Loosen 2 cap screws (B) securing doser header to cylinder head.
3. Remove cap screws and doser header.

A—Fuel Line Fittings

B—Fuel Doser Header Cap Screws



Remove Fuel Doser Header

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RE38635,0000169 -19-18SEP08-1/4

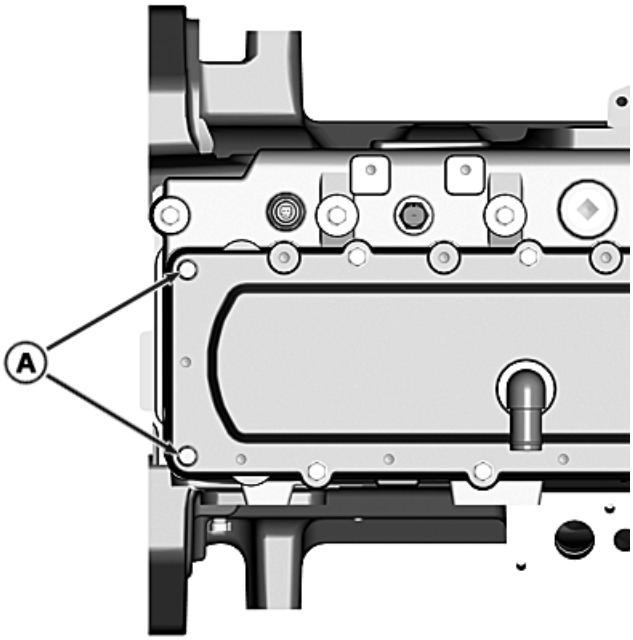
Install Doser Header Assembly

IMPORTANT: Be certain to keep doser elements UPRIGHT at all times. Internal liquid, while not hazardous, may leak out and create a sticky mess.

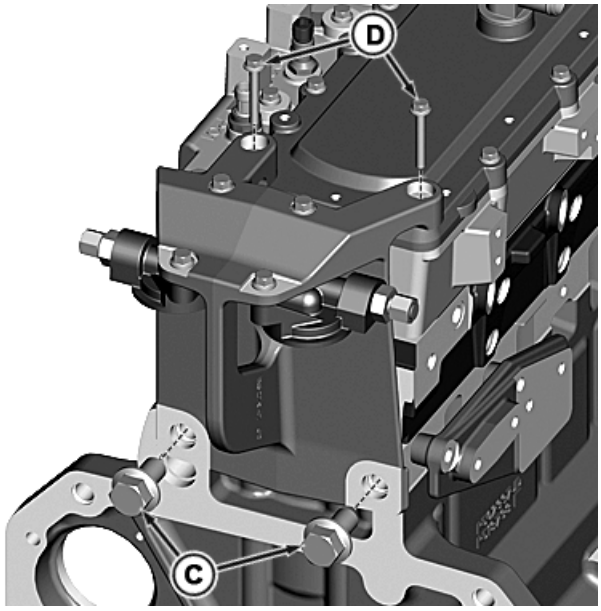
1. If the 2 dosing elements are on the header, remove and set aside for later installation.
2. If necessary, remove the 2 rear cap screws (A) from rocker arm cover.
3. Position header assembly (B) to engine, with the lower holes in the bracket (C) lining up with holes in cylinder block and the upper holes in bracket (D) lining up with the open holes in rocker arm cover.
4. Install the longer cap screws through 2 top holes into the cylinder head, and the shorter cap screws through the lower 2 holes into cylinder block. Tighten cap screws finger tight.
5. Torque cap screws to specification.

Specification	
Fuel Doser Bracket to Engine—Upper 2 Cap Screws—Torque	37 N•m (27 lb-ft)
Fuel Doser Bracket to Engine - Lower 2 Cap Screws—Torque	350 N•m (260 lb-ft)

A—Rear Rocker Arm Cover Cap Screws
B—Fuel Doser Header Bracket
C—Top Bracket Cap Screws
D—Lower Bracket Cap Screws



RG16446 —UN—12SEP08



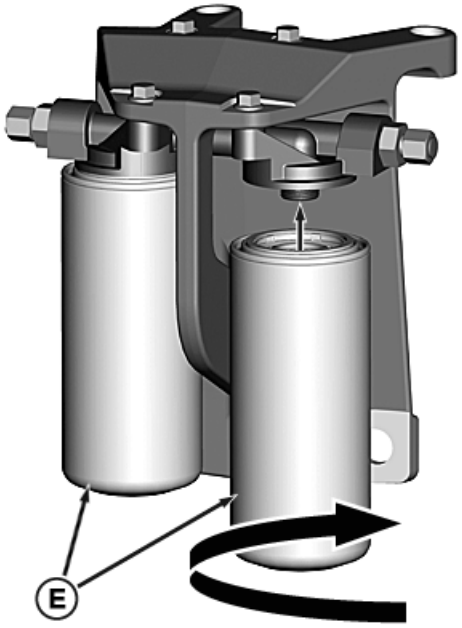
RG16447 —UN—12SEP08

Install Fuel Doser Header Bracket

Continued on next page

RE38635,0000169 -19-18SEP08-2/4

6. Install dosing elements (E) to header by turning element counterclockwise onto header adapter. After seal contact with header, tighten additional 1/4 turn (90°).



RG16448 —UN—12SEP08

Continued on next page

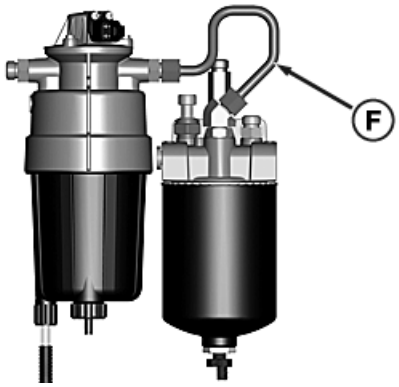
RE38635,0000169 -19-18SEP08-3/4

7. Remove the short “J” shaped fuel line (F) from primary and secondary fuel filer header.
8. Install fuel line (G) to dosing header and to primary fuel filter.
9. Tighten both fuel line fittings to specification.

Specification	
Fuel Line — Primary Fuel Filter to Dosing Element—Torque	37 N•m (27 lb-ft)

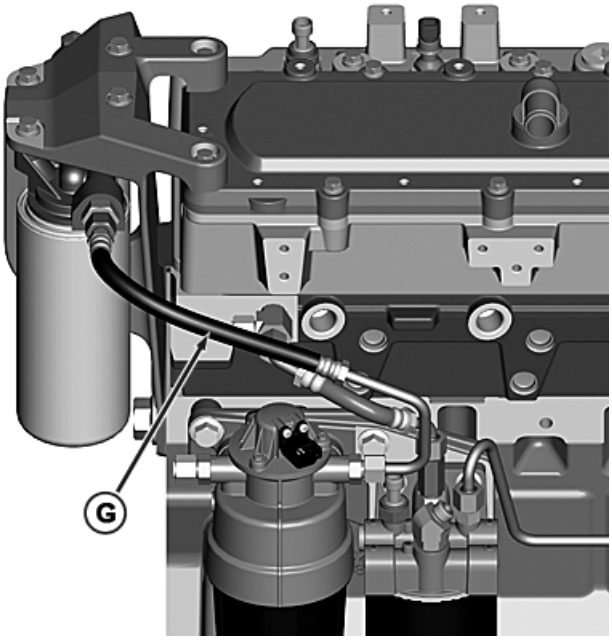
F—Fuel Line — Primary to Secondary Filter

G—Fuel Line — Primary Filter to Dosing Header



RG16449 —UN—12SEP08

Install Fuel Doser Elements



RG16500 —UN—12SEP08

Install Doser Fuel Line

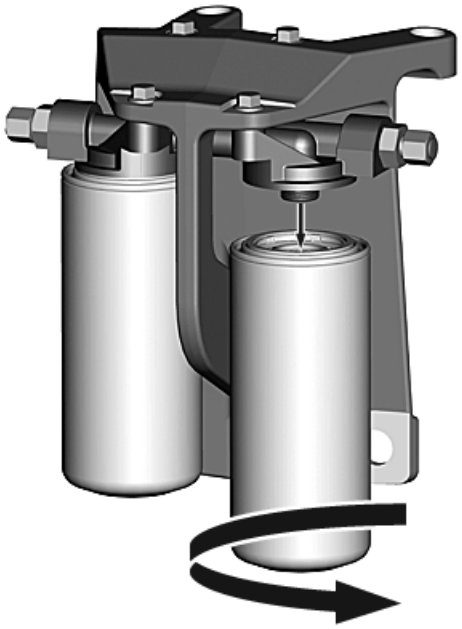
RE38635,0000169 -19-18SEP08-4/4

Remove and Replace Doser Elements

IMPORTANT: Be certain to keep doser elements UPRIGHT at all times. Internal liquid, while not hazardous, may leak out and create a sticky mess.

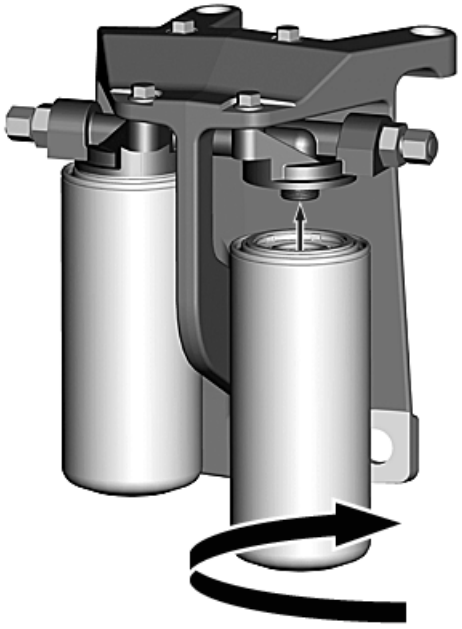
NOTE: Replace the doser elements at the same 500 hour, or every 12 months, interval as fuel filters.

1. Remove the two doser elements from header by turning the canister in a clockwise direction. Set aside in upright position.
2. Install dosing elements to header by turning element counterclockwise onto header adapter. After seal contact with header, tighten additional 1/4 turn (90°).



RG16502 —UN—12SEP08

Remove Dosing Elements from Header

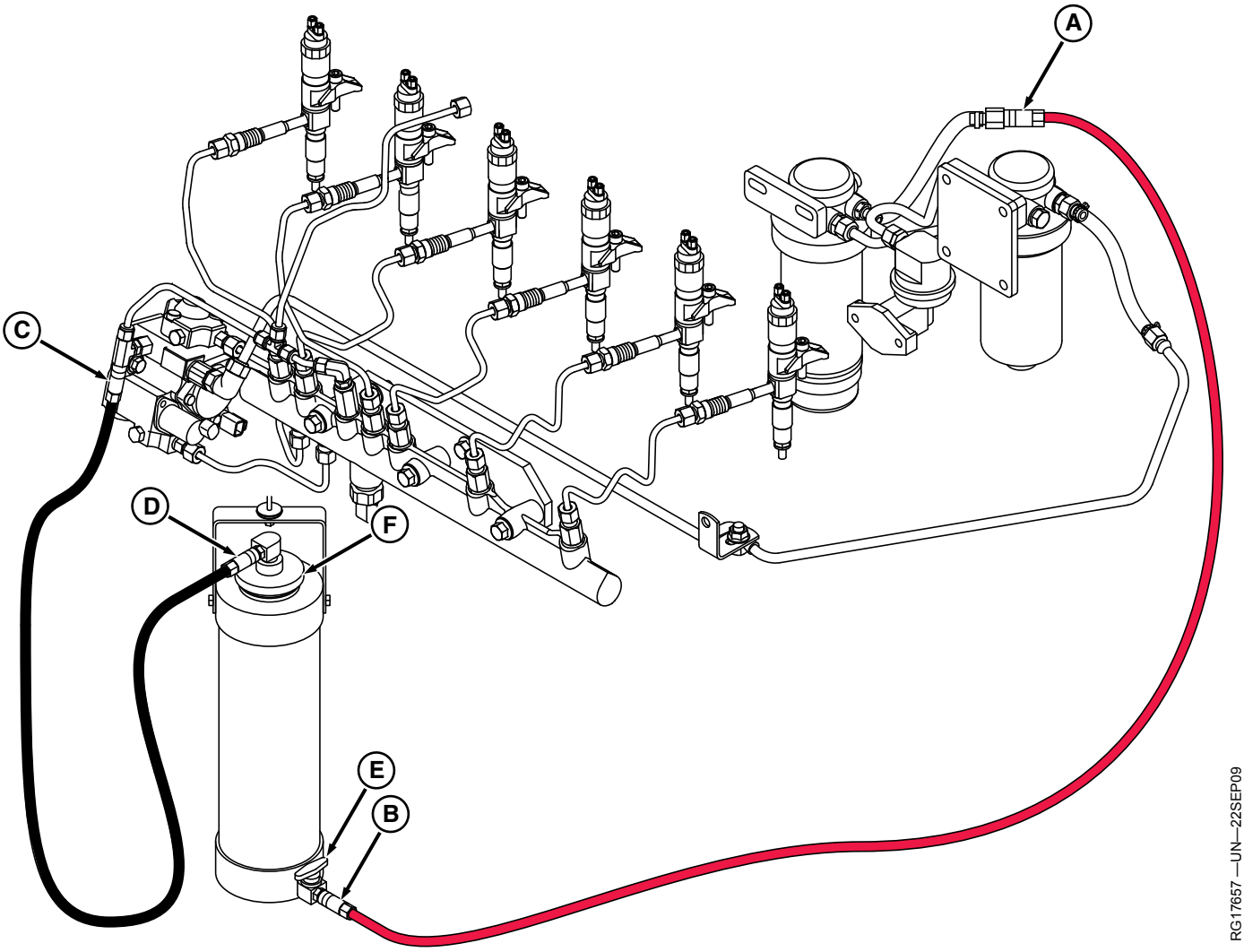


RG16501 —UN—12SEP08

Install Dosing Elements

RE38635,000016A -19-18SEP08-1/1

Clean Electronic injectors (In Engine)



Clean Electronic Injectors In-Engine

A—Fuel Filter Inlet
B—Reservoir Fuel Outlet
C—Fuel Return-to-Tank (Leak-off)
D—Reservoir Fuel Inlet
E—Shut-Off Valve
F—Filter

1. Change engine primary and secondary fuel filters.
2. Prime fuel system and start engine.
3. Run engine until normal operating temperature is reached.
4. Disconnect the fuel supply to the primary fuel filter (A).

   Connect the 2 meter (6 ft.) red hose (supply) to the primary fuel filter (A) using the appropriate adapter in the SW10015JD Fuel Injector Flush Kit.

   Connect the other end of the red hose to the bottom fitting (B) of the kit reservoir tank.
5. Disconnect fuel return-to-fuel tank (C). This location will vary for each application.

   Connect the 2 meter (6 ft.) black hose (return) to the tank line using the appropriate adapter in the SW10015JD Fuel Injector Flush Kit.

   Connect the other end of the black hose to the top side (D) of the kit reservoir tank so the return fuel flows through the flush kit filter (F).
6. Fill the reservoir tank with the full contents of TY26688 Diesel Fuel System Clean-Up solution.

   Open valve (E) on the reservoir tank.
7. Key-on engine to check for leaks and verify return fuel is flowing back to the reservoir. If the fluid level drops quickly, shut-off engine and check to make sure all of the return fuel to getting back to the tool reservoir.
8. Start engine and run at 1100 rpm.

   Allow engine to run for 20-40 minutes. Watch for fuel to get to the bottom of the warning decal. **Do not let the engine run out of fuel.**

   Shut-off engine.

Continued on next page

MK41968,0000041 -19-21OCT09-1/2

9. Remove and inspect the kit return filter element (SW10967P1) for debris. If badly contaminated, repeat Steps 6-9 to insure fuel system is fully clean.
10. Close valve (E) on reservoir tank

    Disconnect kit hoses and adapters.

    Reconnect fuel supply and fuel return lines.
11. Start engine and check for fuel leaks. Allow engine to run for 10-15 minutes to completely purge the cleaner solution from the fuel system.

MK41968,0000041 -19-21OCT09-2/2

Remove & Install EGR Valve

1. Disconnect wiring lead and remove 2 screws (A) securing EGR valve to intake manifold.
2. Place JDG10194 EGR Valve removal tool (D) at the base of EGR valve and install tool forcing screws into intake manifold. Carefully remove valve without binding by alternately turning the two forcing screws clockwise until the valve lands are past intake manifold port.
3. Remove gasket and clean mating surfaces. Vacuum any debris and loose carbon deposits from inside of intake manifold.
4. Replace o-rings (B) each time valve is removed.
5. Inspect valve lands (C) for wear and damage. Remove carbon deposits and debris.
6. Lubricate o-rings with clean engine oil. Carefully install new gasket and EGR valve into intake manifold as shown. Install 2 attaching screws through valve and into intake manifold to initial specification.

Specification	
EGR Valve Screws - Initial—Torque	5 N•m (4 lb-ft)

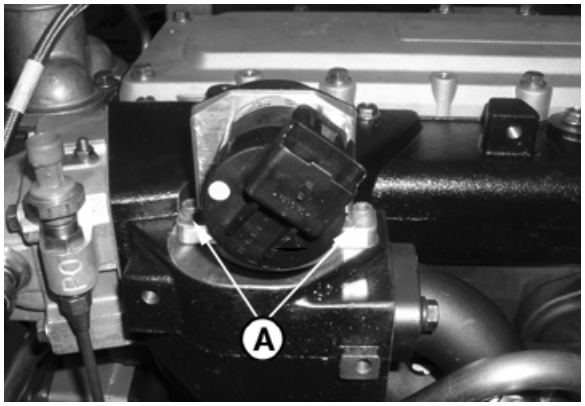
7. Tighten EGR valve attaching screws to final specification.

Specification	
EGR Valve Screws - Final—Torque	15 N•m (11 lb-ft)

8. Reconnect wiring lead to EGR valve.

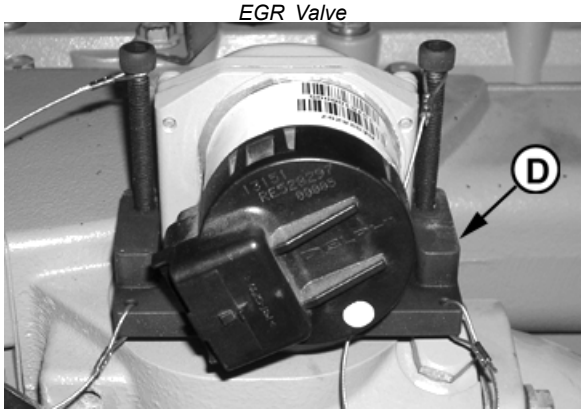
IMPORTANT: If installing a new EGR valve, recalibrate using Service Advisor™. See EXHAUST GAS RECIRCULATION VALVE RECALIBRATION under the Calibrations Tab - RETEST.

If reusing existing EGR valve, recalibrate using Service Advisor™. See HARNESS DIAGNOSTIC MODE TEST under the interactive test tab - RETEST.



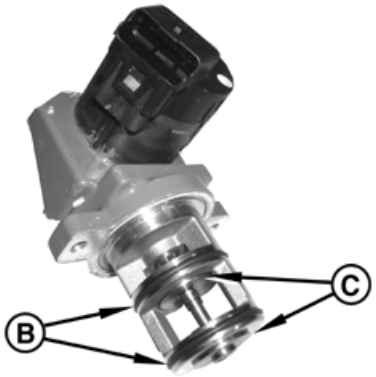
RG13947 —UN—28MAY05

EGR Valve



RG14881 —UN—26MAY06

JDG10194 EGR Removal Tool



RG14076 —UN—01APR05

Inspect EGR Valve

A—Attaching Screws
B—O-Rings
C—EGR Valve Lands
D—JDG10194 EGR Valve Removal Tool with Screws

RE38635,0000052 -19-04MAR08-1/1

Fuel System - General Information

The Level 14 Engine Control Unit (ECU) is used control the High Pressure Common Rail (HPCR) fuel system. The HPCR fuel system includes the high pressure fuel pump, high pressure common rail, and electronic injectors.

The electronic injectors can not be serviced. If any part of the component fails, the entire injector must be replaced.

Electronic injectors cannot be tested for opening pressure because they are controlled electronically.

When servicing injectors it is important to complete the injector calibration procedure. Each injector has a specific calibration and this information can be obtained by scanning the bar code on the service injector box and downloading the injector information from the John Deere Custom Performance™ web site. An alternative is to enter the injector serial number, part number, and QR code listed on the injector. If the ECU is not programmed with the correct information for each injector and the correct cylinder that it is in then engine performance and emissions will be affected.

RE38635,000006C -19-13SEP07-1/1

Remove and Install Coolant Temperature Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (N) in Section 03, Group 140 of this manual.

1. Disconnect sensor wiring harness and remove sensor.
2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor into thermostat housing.
3. Tighten sensor to specification.

Specification	
Coolant Temperature Sensor to Thermostat Housing—Torque	15 N•m (11 lb-ft)

RE38635,000006D -19-13SEP07-1/1

Remove and Install Fuel Rail Pressure Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 1 (C) in Section 03, Group 140 of this manual.

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Relieve pressure before opening rail.

1. Before removing fuel rail pressure sensor, turn engine OFF and let sit for 5 minutes. This will relieve fuel pressure from the High Pressure Common Rail.

IMPORTANT: If any dirt, paint chips, or debris enters the fuel system, injector failure will occur!

2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the fuel rail pressure sensor.
3. Disconnect fuel rail pressure sensor wiring connection and remove sensor.

NOTE: Sensor should not be reused once it has been removed from the fuel rail.

IMPORTANT: Do not get any grease or debris on tip of sensor.

4. Coat new sensor threads with TY6333 High Temperature Grease.
5. Verify that sensor is clean from all debris and install new sensor. Tighten to specification.

Specification	
Fuel Rail Pressure Sensor—Torque	98 N·m (72 lb-ft)

6. Reconnect sensor wiring connection.

RG41183,0000116 -19-13SEP07-1/1

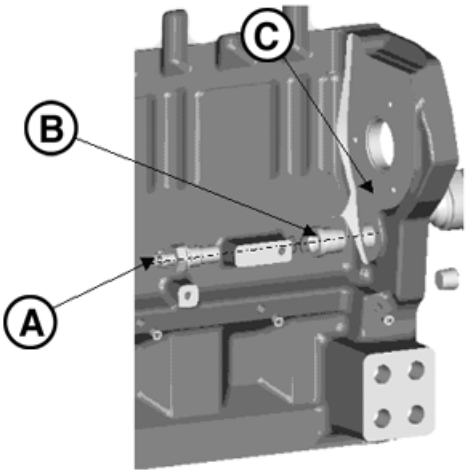
Remove and Install High Pressure Pump (Camshaft Timing) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 1 (F) in Section 03, Group 140 of this manual.

1. Disconnect sensor wiring harness and remove sensor (A).
2. Lubricate sensor O-ring with a soap solution and install sensor into bushing (B) in cylinder block flange (C).
3. Tighten sensor to specification.

Specification

Camshaft Timing Sensor to Cylinder Block—Torque ..... 13.5 N•m (10 lb-ft)



Camshaft Timing Sensor Location

A—Sensor
B—Sensor Bushing
C—Cylinder Block Flange

RE38635,000006E -19-13SEP07-1/1

Remove and Install Oil Pressure Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (L) in Section 03, Group 140 of this manual.

1. Disconnect sensor wiring harness and remove oil pressure sensor.
2. Install sensor into cylinder block in the position shown, finger tight.
3. Tighten sensor to specification.

Specification

Oil Pressure Sensor to Cylinder Block—Torque ..... 9 N•m (80 lb-in)

RE38635,000006F -19-13SEP07-1/1

Remove and Install Water in Fuel (WIF) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 1 (G) in Section 03, Group 140 of this manual.

1. Disconnect WIF sensor wiring connector and remove sensor.
2. Install sensor in fuel filter, then hand tighten.
3. Reconnect sensor wiring connector

RE38635,0000070 -19-13SEP07-1/1

Remove and Install Crankshaft Position Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (M) in Section 03, Group 140 of this manual.

1. Disconnect sensor wiring harness and remove crankshaft position sensor.
2. Lubricate crankshaft position sensor O-ring with soap solution and install sensor into cylinder block in the position shown, finger tight.
3. Tighten sensor to specification.

Specification

Crankshaft Position Sensor to Cylinder Block—Torque ..... 13.5 N•m (11 lb-ft)

RE38635,0000071 -19-13SEP07-1/1

Remove and Install Turbo Speed Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 3 (Q) in Section 03, Group 140 of this manual.

1. Disconnect turbocharger speed sensor wiring harness and remove sensor.
2. Install sensor, between housings below oil supply line.
3. Tighten speed sensor to specification.

Specification

Turbo Speed Sensor—Torque..... 12 ± 0.6 N·m (9 ± 0.4 lb-ft)

4. Reconnect wiring harness connector.

RE38635,0000072 -19-28SEP07-1/1

Remove and Install Manifold Air Pressure (MAP) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (I) in Section 03, Group 140 of this manual.

1. Disconnect manifold air pressure sensor wiring harness and remove sensor.
2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor, between housings below oil supply line.
3. Tighten pressure sensor to specification.

Specification

Manifold Air Pressure Sensor to Intake Manifold—Torque..... 17 N•m (13 lb-ft)

4. Reconnect wiring harness connector.

RE38635,0000073 -19-13SEP07-1/1

Remove and Install Manifold Air Temperature (MAT) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (J) in Section 03, Group 140 of this manual.

1. Disconnect manifold air temperature sensor wiring harness and remove sensor.
2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor, between housings below oil supply line.
3. Tighten temperature sensor to specification.

Specification

Manifold Air Temperature Sensor to Intake Manifold—Torque..... 17 N•m (13 lb-ft)

4. Reconnect wiring harness connector.

RE38635,0000074 -19-13SEP07-1/1

Remove and Install EGR Temperature Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 3 (P) in Section 03, Group 140 of this manual.

1. Disconnect EGR temperature sensor wiring harness and remove sensor.

NOTE: Washer can only be used once. If sensor has been tightened and then removed, washer cannot be reused and needs to be replaced.

2. Install EGR temperature sensor with a new washer.
3. Tighten EGR temperature sensor to specification.

Specification

EGR Temperature Sensor to EGR Cooler—Torque..... 60 N•m ±12N•m (44 lb-ft)

4. Reconnect EGR temperature sensor wiring connector.

RE38635,0000075 -19-18OCT07-1/1

Remove and Install Charge Air Cooler Outlet Air Temperature Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 3 (R) in Section 03, Group 140 of this manual.

1. Disconnect Charge Air Cooler Outlet Air Temperature Sensor wiring harness and remove sensor.

NOTE: Washer can only be used once. If sensor has been tightened and then removed, washer cannot be reused and needs to be replaced.

2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor with washer.
3. Tighten temperature sensor to specification.

Specification

Charge Air Cooler Outlet Air Temperature Sensor—Torque..... 17 N•m (13 lb-ft)

4. Reconnect wiring harness connector.

RE38635,0000076 -19-13SEP07-1/1

Remove and Replace Air Intake Temperature - Turbocharger Compressor Inlet

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 1 (H) in Section 03, Group 140 of this manual.

1. Disconnect jumper harness from air temperature sensor and remove sensor.

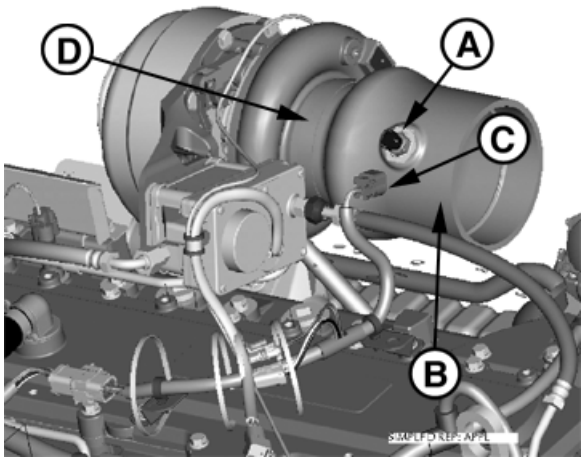
NOTE: Orient air temperature sensor pointing toward engine and in an upward direction 30 +/- 15°, as shown. Location of inlet hose clamp (D) adjusting screw not critical.

2. Install air temperature sensor (A) to air inlet hose (B).
3. Tighten sensor to specification.

Specification

Air Temperature Sensor to Air Inlet Hose—Torque..... 17 N•m (13 lb-ft)

4. Reconnect jumper harness (C) to sensor.



RG15422 —UN—12JUL07

Temperature Sensor - Compressor Inlet

A—Air Temperature Sensor
B—Air Inlet Hose
C—Jumper Harness Connector
D—Hose Clamp - Inlet Hose to Turbocharger Compressor

RE38635,0000077 -19-13SEP07-1/1

Engine Control Unit (ECU) Maintenance

IMPORTANT: DO NOT OPEN ENGINE CONTROL UNIT.

IMPORTANT: Do not pressure wash the Engine Control Unit (ECU).

IMPORTANT: Before welding on engines with ECU, remove ECU from Engine.

NOTE: For diagnosis and testing of the electronic engine control and sensors, refer to Group 160, TROUBLE CODE DIAGNOSTICS AND TESTS.

NOTE: The ECU is the system component LEAST likely to fail. Follow proper trouble shooting procedures and isolate the problem before replacing the ECU.

NOTE: For theory of operation on the ECU, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 later in this manual.

Normal operating conditions do not require any ECU maintenance. The ECU is not repairable. In the event that the ECU fails, it has to be replaced.
Harness connectors to the ECU are repairable. See REPAIR CINCH FLEX BOX CONNECTOR later in this Group.

Precautions

- Before welding on application, remove ECU from application and disconnect all connectors from ECU
- Avoid high pressure spay onto ECU. Do not spray directly into connectors.
- Avoid locating ECU near high temperature areas. Cooling or shielding may have to be provided to keep the ECU within its operating temperature range.
- The ECU must have a ground connection to the engine block. Provide a grounding strap if necessary.
- Avoid high vibration areas.
- Orient the ECU so moisture will not collect on its chassis or into the harness connectors. Keep the vent plug free of dirt and moisture.
- Protect ECU from road splash, foreign debris, and high pressure impact.
- Mount the ECU so the harness exits the chassis in a downward direction.
- If possible, mount the ECU in a vertical orientation (connectors in a vertical plane).

RG40854,00000D3 -19-18JAN08-1/1

Remove and Install Engine Control Unit (ECU)

IMPORTANT: DO NOT OPEN ENGINE CONTROL UNIT.

NOTE: The ECU is the system component LEAST likely to fail. Follow proper trouble shooting procedures and isolate the problem before replacing the ECU.

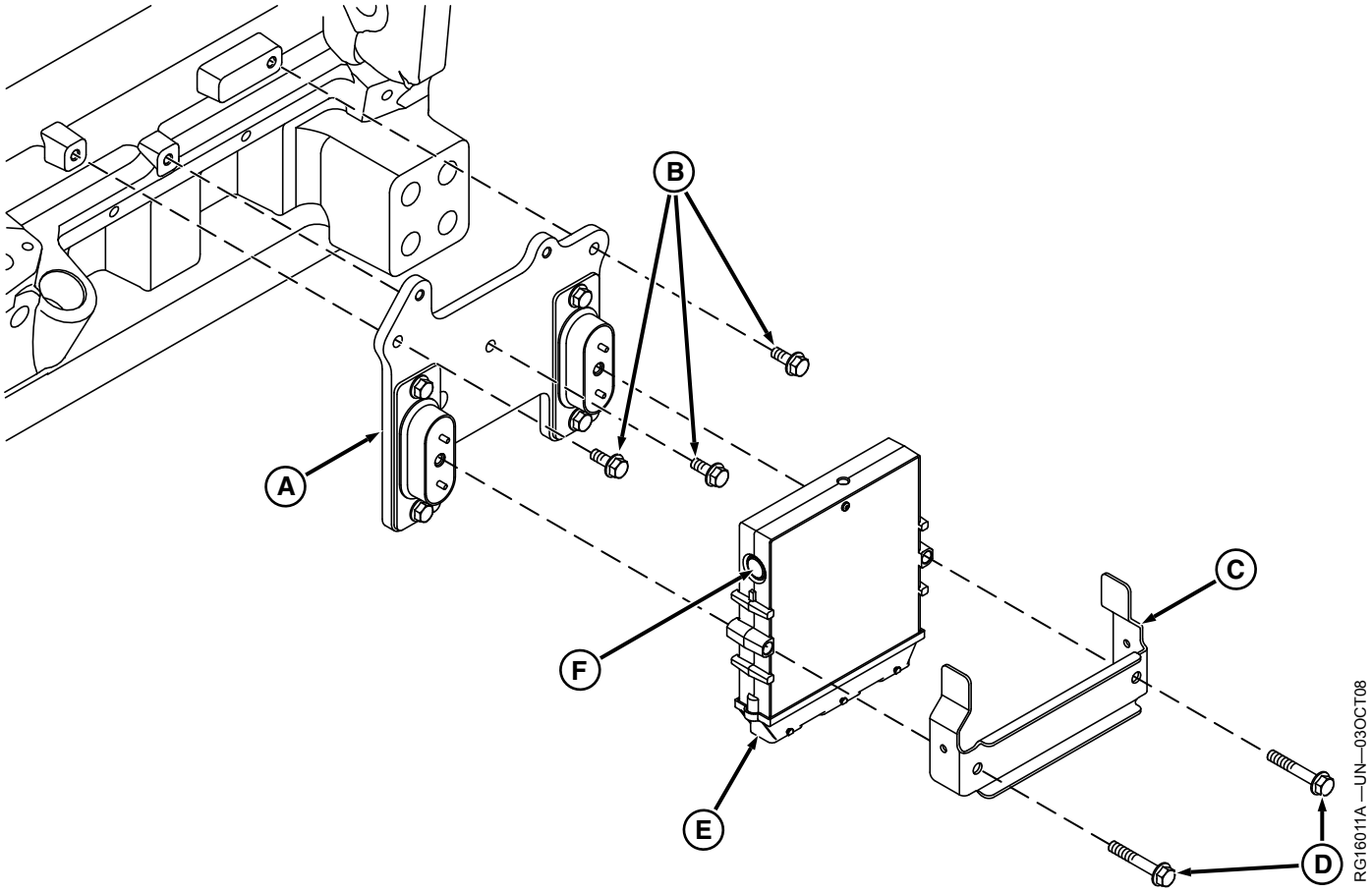
NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (O) in Section 03, Group 140 later in this manual.

Replacing ECU

IMPORTANT: If an ECU is not programmed identically with the original (failed) ECU, misleading diagnostic messages, poor performance, or engine damage can occur.

The ECU is not repairable and must be replaced if found to be defective.
The new ECU has to be programmed for its specific application. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in Section 04, group 160 later in this manual.
Do not force connectors when disconnecting or connecting wire harness to the ECU. Observe proper connector and polarity when reconnecting connectors. Make sure the connector is latched properly to its mating connector.
For connector locations, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 later in this manual.

Mounting ECU



ECU Engine Mount

A—ECU Hanger Plate
B—Short Cap Screws
C—ECU Strap
D—Long Cap Screws
E—ECU Connectors
F—Air Vent

Normal mounting location for the ECU is to the engine block. The mounting hardware supplied with the ECU provides the required ground connection to the engine block.

1. Install hanger plate (A) to the 3 mounting pads on right side of cylinder block with rubber isolation pads facing outwards. Tighten 3 cap screws (B) to specifications.

Continued on next page

DM59778,0000030 -19-03OCT08-1/3

2. Orient ECU with air vent (F) to rear of engine block and connectors (E) facing downwards. Place strap assembly (C) over ECU with rubber isolators against ECU and side guards covering the air vent. Tighten 2 cap screws (D) to specifications.

Specification

ECU hanger plate cap screws (3x)—Torque..... 35 ±7 N·m (26 lb-ft)

Specification

ECU mounting strap cap screws (2x)—Torque..... 35 ±7 N·m (26 lb-ft)

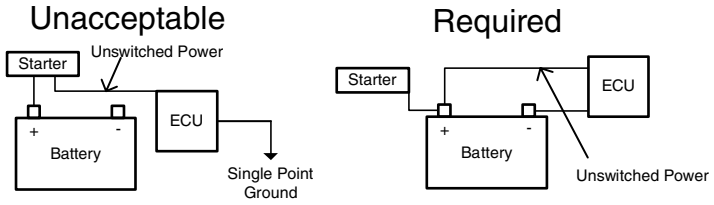
If the ECU is mounted in a different fashion, follow the requirements listed below.

- Avoid locations near high temperature areas. Cooling or shielding may have to be provided to keep the ECU within its operating temperature range.
- The ECU must have a ground connection to the engine block. Provide a grounding strap if necessary.
- Avoid high vibration areas.
- Orient the ECU so moisture will not collect on its chassis or into the harness connectors. Keep the vent plug free of dirt and moisture.
- Protect ECU from road splash, foreign debris, and high pressure impact.
- Mount the ECU so the harness exits the chassis in a downward direction.
- If possible, mount the ECU in a vertical orientation, air vent pointing downward (connectors in a vertical plane).

Wiring practices for power to ECU.

DM59778,0000030 -19-03OCT08-2/3

RG15361 —UN—18JUL07



Power Connection to ECU

- Power to the ECU is fused with a 20 Amp fuse.
- Power and ground to the ECU should come directly from the battery. All operating current is drawn from unswitched battery power.
- Switched power input to the ECU draws very little power. It used to signal the ECU that the application has been turned on. Loss of switched input power will cause the application to shutdown.

DM59778,0000030 -19-03OCT08-3/3

Remove and Install Low Pressure Fuel Pressure Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 2 (K) in Section 03, Group 140 of this manual.

Remove Low Pressure Fuel Pressure Sensor

1. Before removing fuel pressure sensor, turn engine OFF and let sit for 5 minutes. This will relieve fuel pressure.

IMPORTANT: If any dirt, paint chips, or debris enters the fuel system, injector failure will occur!

2. Thoroughly clean area around the fuel pressure sensor.
3. On final fuel filter head, disconnect wire harness connector from fuel pressure sensor connector.
4. Remove fuel pressure sensor.
5. Cover opening in filter head with a clean, lint-free cloth.

Install Fuel (Low) Pressure Sensor

IMPORTANT: Do not get any grease on tip of sensor.

1. Verify that sensor is clean from all debris
2. Remove covering from opening in filter head.
3. Install sensor. Tighten sensor to specification.

Specification

Low Pressure Fuel Pressure Sensor—Torque..... 14 N·m (10 lb-ft)(124 lb-in)

4. Reconnect wire harness connector to fuel pressure sensor connector.

DB92450,0000009 -19-13SEP07-1/1

Remove and Install Air Bleed/Check Valve

Remove Air Bleed/Check Valve

1. Before removing air bleed/check valve, turn engine OFF and let sit for 5 minutes. This will relieve fuel pressure.

IMPORTANT: If any dirt, paint chips, or debris enters the fuel system, injector failure will occur!

2. Thoroughly clean area around air bleed/check valve.

IMPORTANT: Be sure to hold the top half of the check valve with a wrench when removing the fuel line.

3. Use two wrenches, one on the top half of the valve and another on the nut of the connecting fuel line. Remove fuel line nut from air bleed/check valve (A).
4. Remove (both halves of valve as a single part) air bleed/check valve from head of final fuel filter.
5. Cover opening in filter head with a clean, lint-free cloth.
6. Remove and discard O-rings, one each from top and bottom of valve.

NOTE: This step is required only if the seal between the two valve parts has failed.

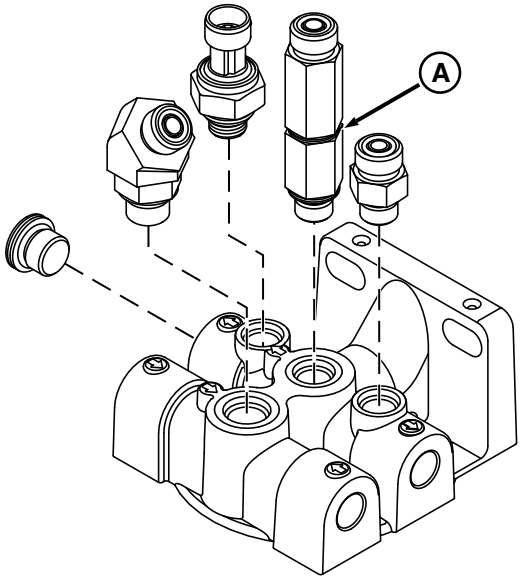
7. Separate the air bleed/check valve halves.
   a. Using two wrenches separate the two halves of air bleed/check valve.
   b. Remove and discard O-ring.

Install Air Bleed/Check Valve

1. Rejoin the air bleed/check valve halves.
   a. Install new O-ring between both halves of air bleed/check valve.
   b. Rejoin the air bleed/check valve halves. Tighten according specification.

Specification

Air Bleed/Check Valve Halves—Torque ..... 14 N·m (10 lb-ft)(124 lb-in)



RG15139A —UN—03OCT08

Final Fuel Filter Head, Air Bleeder Valve Location

A—Air Bleeder Valve

2. install new O-rings to top and bottom of air bleed/check valve halves.
3. Uncover opening in filter head.
4. Install air bleed/check valve into filter head. Tighten according to specification.

Specification

Air Bleed/Check Valve to Filter Head—Torque ..... 14 N·m (10 lb-ft)(124 lb-in)

5. Connect the fuel line to the air bleed/check valve. Hold a wrench on the top half of the valve as the fuel line is tightened. Tighten to specification.

Specification

Air Bleed/Check Valve to Fuel Line—Torque ..... 25 N·m (18 lb-ft)

DB92450,000000A -19-03OCT08-1/1

Welding

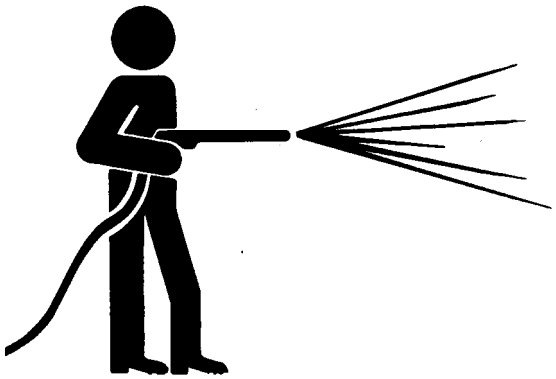
IMPORTANT: Before welding on engines with ECU, protect the ECU from high-current damage as follows:

1. **Disconnect all connectors to ECU.**
2. **Disconnect connector to electronic injectors.**
3. **Remove ECU from applications chassis.**
4. **Connect welder ground close to welding point and away from ECU. Make sure the ECU is not in the ground path of the welder.**

DM59778,0000024 -19-15OCT07-1/1

Using High-Pressure Washing

IMPORTANT: Reduce pressure when directing pressurized water at electronic or electrical components and connectors as this may cause the components to malfunction. Always reduce pressure and spray at 45 degree angle. Avoid spraying directly into connectors.



T6642EJ —UN—18OCT88

Using High-Pressure Washer

RG40854,00000D0 -19-26OCT10-1/1

Connectors

Connectors provide electrical conductivity between two devices. Connectors typically consist of an outer shell, terminals, and perhaps a seal and locking device. Connectors come in many shapes and sizes, the differences being the number and type of terminals, voltage and current ratings, and environmental characteristics. Connectors join together as pairs, one called the receptacle and the other called the plug.

For a connector to function properly, the terminals have to be kept clean and free of any foreign debris. Over time, moisture, dirt, and other contaminants can cause the terminals of the connector to erode and not make a good electrical connection. It is important that the seals around the connector pairs are functional when reconnecting the connector.

Certain precautions are required when working with connectors.

- Do not pull on wires to disconnect a connector.
- Observe the locking mechanism of the connector when disconnecting and reconnecting a connector.
- Do not force connectors into each other when reconnecting.
- Look for bent terminals before reconnecting connectors.
- If corrosion exists on any terminals, replace the terminal.
- Make sure the connector is free of dirt or grease.
- Make sure the connector is dry of any moisture before reconnecting.
- Do not probe through the wire insulation or through the back of the connector to make measurements.
- Always use Terminal Probe kit, JT07328 when making measurements on a connector terminal.

NOTE: For connector and sensor locations, see COMPONENT LOCATION in Section 03, Group 140 later in this manual.

NOTE: For wiring diagrams of connectors and harnesses, see ECU WIRING DIAGRAMS in Section 06, Group 210 later in this manual.

IMPORTANT: Do not use items such as paper clips or wires for inserting into connector terminals when making measurements. Damage can occur to the connector or terminal.

IMPORTANT: If a connector is not being used, apply the proper dust cap to protect it from foreign debris.

DB92450,0000048 -19-15OCT07-1/1

Connector Repair

Exposure to extreme weather conditions, excessive vibration, and changing environments make it important to apply the proper techniques in repairing a connector to keep an application running properly. Problems can arise from broken wires, corroded or dirty terminals, and bent or broken terminals. Wear and tear on terminals can cause a poor electrical connection between the terminal pairs.

Connector repair typically requires extracting the terminal from the connector shell, inserting a wire seal, crimping a new terminal onto a wire, and inserting the terminal back into the connector shell. If a connector shell needs replaced, all the terminals have to be extracted and inserted into the new shell. Different style connectors require specific tools and procedures for that connector. While there are many styles of connectors, certain practices can be applied to all connectors.

Some general guideline lines to follow are:

- Before removing a terminal, first label or record where the wire attaches.
- Before crimping a new terminal to a wire, make sure the wire is long enough to fit into the connector without straining it. Do not try stretching the wire longer by pulling it through the harness. It may be necessary to splice a new wire to the existing wire.
  - Use a Heat Shrinkable Insulated Splice for splicing wires together. Recommended part is JDP PM05240 for wire gauges 10-12 and PM05220 for smaller wires.
  - If a non heat shrinkable splice is used, apply heat shrink tubing over the splice to protect the wire from moisture and other contaminants.
- If applicable, apply the proper seal before crimping the wire onto the terminal.
- For a connector to function properly, the wire must be properly attached, or crimped, to the terminal.
  - Too loose of a crimp will allow the wire to pull out of the terminal and to tight of a crimp will cause the wire to break away from the terminal. A simple test is to gently pull on the wire to make sure it is securely crimped to the terminal.
  - On many terminals, the wire is crimped in two places, once around the insulation, and once around the bare metal. Visually inspect each crimp for proper alignment.
- When inserting a terminal into the connector housing, you should be able to feel it 'Lock' into place. Gently push and pull on the wire and make sure the terminal stays locked into the connector housing.
- Do not use excessive force when removing or inserting terminals into a connector housing.
- Make sure there is enough slack in the wires to account for vibration when the application is running.

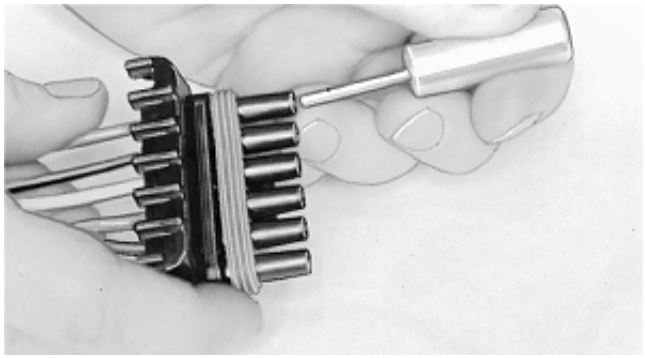
NOTE: For information on inspecting connectors, see TERMINAL TEST in Section 04, Group 160 later in this manual.

NOTE: For repair procedures on specific manufacturers connectors, see the Connector Repair sections in this section of the manual.

DB92450,0000049 -19-24AUG09-1/1

Repair WEATHERPACK™ Connector

1. Disconnect WEATHERPACK™ connector. Remove the tie bands and tape.
2. Open the secondary lock on the back of the connector.
3. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
4. Insert [1]JDG364 Extraction Tool over terminal contact in connector body. Extraction tool needs to be fully seated to unlock terminal tangs from the connector body. When tool is seated, gently pull the wire from the back of the connector. If the wire(s) or terminal(s) are being repaired, go to step 5. If the wires and terminals are OK and only the connector is being replaced, go to step 9.
5. Using [2] JDG145 Universal Electrical Pliers, cut off wire directly behind the terminal seal crimp. If any part of the seal is still on the wire, dispose of it.



TS0128 —UN—23AUG88

6. Using [2] JDG145 Universal Electrical Pliers, strip 6 mm (1/4 in.) insulation from end of wire.

WEATHERPACK is a trademark of Packard Electric

[1] Included in JT07195B Electrical Repair Kit
[2]Included in JDG155 Electrical Repair Tool Kit

DB92450,000004A -19-15OCT07-1/4

7. Select correct size of seal. Slide the seal over the wire insulation with the smaller diameter side facing the end of the wire. Small diameter side of seal should line up with the outer edge of the insulation.

IMPORTANT: The seal must fit snug over the cable insulation without a gap between the cable seal and the insulation.

NOTE: Cable seals are color coded for three sizes of wire:

- *Green - 18—20 Gauge Wire*
- *Gray - 14—16 Gauge Wire*
- *Blue - 10—12 Gauge Wire*

TS0136 —UN—23AUG88

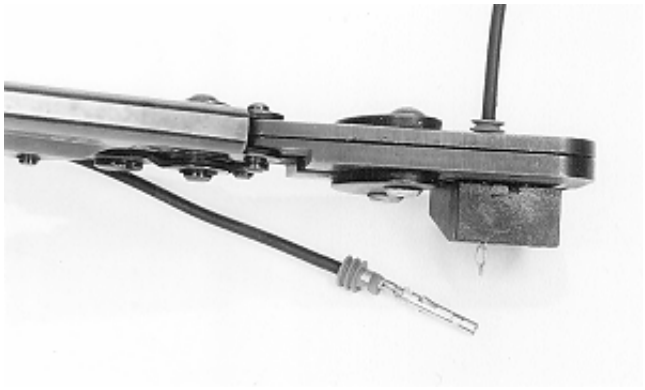
Continued on next page

DB92450,000004A -19-15OCT07-2/4

8. Select correct size terminal on wire and crimp in position with a W-type crimp using a JDG783 WEATHER PACK™ Crimping Tool.

NOTE: Terminals have numbered identification for two sizes of wire:

- *#15 - 14—16 Gauge Wire*
- *#19 - 18—20 Gauge Wire*



TS1623 —UN—02NOV94

WEATHER PACK is a trademark of Packard Electric

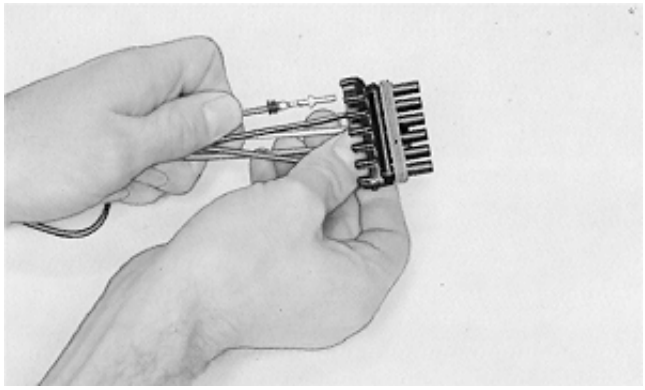
DB92450,000004A -19-15OCT07-3/4

9. Insert terminal into connector. Terminal should click when it is fully seated. Make sure the wire is inserted into the correct connector cavity.

IMPORTANT: Terminal tangs must be carefully spread to ensure good seating on connector body. If terminal is being reused in a new connector, make sure tangs are spread.

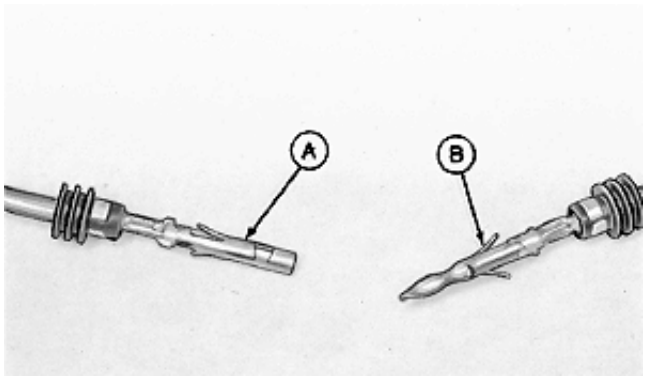
NOTE: Connector bodies are "keyed" for correct terminals. Be sure terminals are correctly aligned.

Correct terminal installation for sleeve (A) and pin (B) is illustrated.



TS0130 —UN—23AUG88

10. Gently pull on wire to insure that the terminal is locked in position.
11. Repair or transfer remaining wires.
12. Close the secondary lock on the back of the connector.
13. Retape wires and add the required tie bands to the harness.



TS0139 —UN—02DEC88

A—Sleeve **B—Pin**

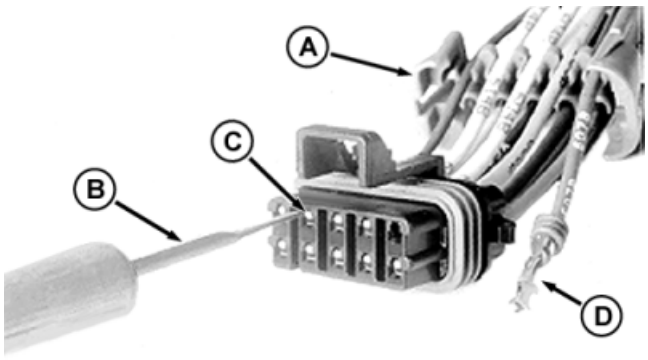
DB92450,000004A -19-15OCT07-4/4

Repair METRI-PACK Connector (Push Type)

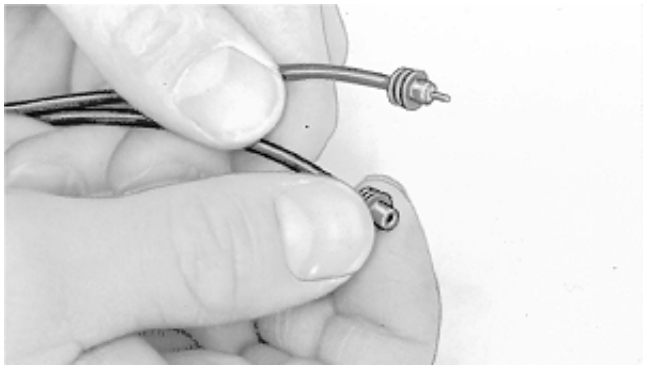
1. Disconnect the METRI-PACK connector. Remove the tie bands and tape.
2. Remove secondary lock (A).
3. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
4. Insert [1]JDG776 or JDG777 Terminal Extraction Tool (B) into connector cavity (C) pushing the terminal locking tab inward.

NOTE: Use JDG776 Extraction Tool with 56, 280, and 630 Series METRI-PACK terminals. Use JDG777 Extraction Tool with 150 Series METRI-PACK terminals.

5. Remove extraction tool and pull wire from the back of the connector.
6. Using [2] JDG145 Universal Electrical Pliers, cut off wire directly behind the terminal.
7. Using [2] JDG145 Universal Electrical Pliers strip 6 mm (1/4 in.) insulation from end of wire.



RW77137 —UN—08DEC98



TS0136 —UN—23AUG88

A—Connector Secondary Lock
B—Extraction Tool
C—Connector Body Socket
D—Terminal

[1]*Included in JT07195B Electrical Repair Kit*
[2]*Included in JDG155 Electrical Repair Tool Kit*

Continued on next page

DM59778,0000075 -19-13SEP07-1/2

8. Select the seal for the appropriate wire size (see note following). Slide the seal over the wire insulation with the smaller diameter side facing the end of the wire. Small diameter side of seal should line up with the outer edge of the insulation.

IMPORTANT: The seal must fit snug over the cable insulation, without a gap between the cable seal and the insulation.

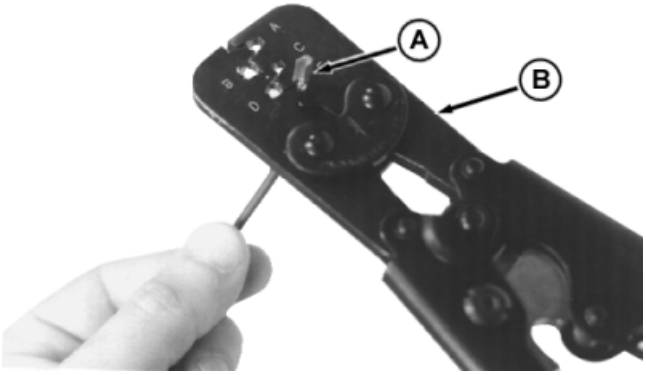
NOTE: Cable seals are color coded for three sizes of wire:

- *Green - 18—20 Gauge Wire*
- *Gray - 14—16 Gauge Wire*
- *Blue - 10—12 Gauge Wire*

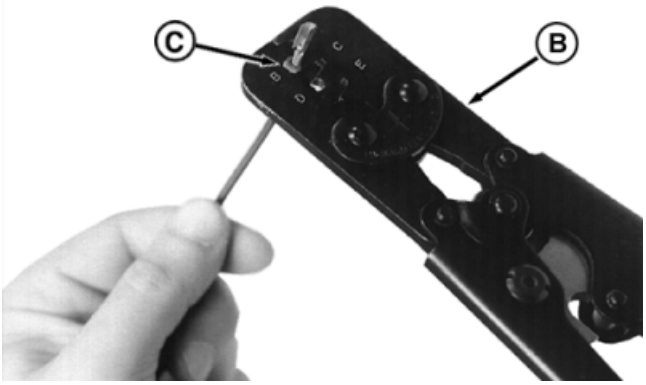
Crimp contact (A) on wire with a “W” type crimp using JDG865 Crimping Tool (B).

9. Crimp cable seal (C) on contact using JDG865 Crimping Tool (B).
10. Make sure locking tang (D) on the new terminal is in the outward position.
11. Push terminal into the correct connector cavity until terminal locks.
12. Gently pull on wire to verify terminal is locked into the connector.
13. Place the secondary lock back on the connector.
14. Retape the wires and add the required tie bands to the harness.

A—Contact
B—Tool
C—Cable Seal
D—Terminal Locking Tang



RW77139 —UN—07DEC98



RW77138A —UN—15MAR02

RW77140A —UN—15MAR02

DM59778,0000075 -19-13SEP07-2/2

Repair Cinch Flex Box Connector

Tools Required For Repair

- CINCH Crimper Tool JDG1727

RG14578 —UN—07MAR08

CINCH Crimper Tool

RG41183,00000E9 -19-01OCT08-1/16

- CINCH Terminal Remover Tool JDG 1725
- Wire Stripper JDG145
- Jeweler's screwdriver (or equivalent, narrow, flat-bladed tool)
  Secondary Lock Release Tool

RG14579 —UN—21NOV05

CINCH Terminal Remover Tool

RG15122 —UN—13JUN07

Secondary Lock Release Tool

Continued on next page

RG41183,00000E9 -19-01OCT08-2/16

Repair CINCH Connector by Replacing Terminal (0.6 or 1.5 mm)

1. To unlock CINCH connector from ECU connector, press on tab (A), and push on connector lock (B) behind tab, allowing Lock rotation.

RG14580 —UN—21NOV05

Tab and Connector Lock

RG41183,00000E9 -19-01OCT08-3/16

2. Continue pushing on connector lock, until it has been rotated 90° clockwise (clicked into place).
3. Remove CINCH connector from ECU connector.

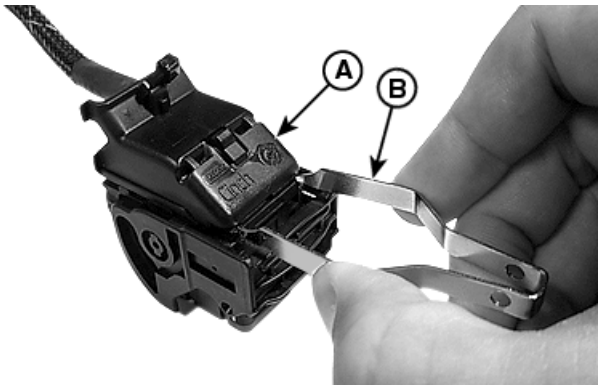
RG14592 —UN—01DEC05

Rotate lock 90 Degrees

Continued on next page

RG41183,00000E9 -19-01OCT08-4/16

4. Unlock two tabs to release wire guard. Insert lock release tool (B) between tabs and connector body, or use small bladed jewelers screwdriver to spread tabs away from connector body. Being careful not to break tabs off connector body, spread tabs to release wire guard (A).

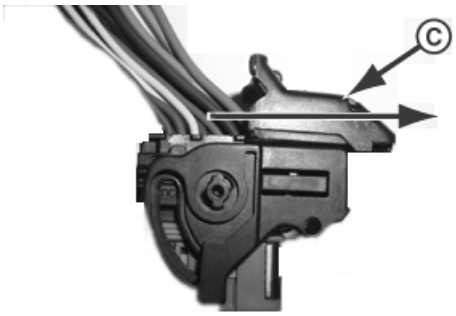


RG15123 —UN—13JUN07

Unlock Tabs to Release Wire Guard

RG41183,00000E9 -19-01OCT08-5/16

5. From wire side of connector, push on wire guard (C), and remove from connector.

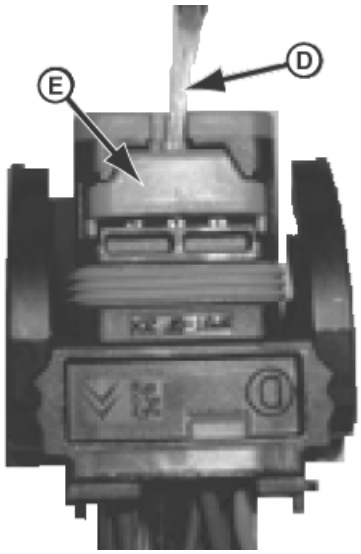


RG14581 —UN—21NOV05

Slide Guard Forward

RG41183,00000E9 -19-01OCT08-6/16

6. Insert thinly bladed tool (D) in the slot at the mating end of the connector and under the colored tab (E), as shown.



RG14582 —UN—21NOV05

Insert Thin-Bladed Tool Under Tab

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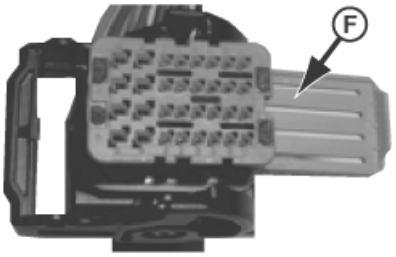
RG41183,00000E9 -19-01OCT08-7/16

7. Gently pry tab out, and slide terminal retainer (F) out to the end of the connector body. Retainer does not detach from the connector body.

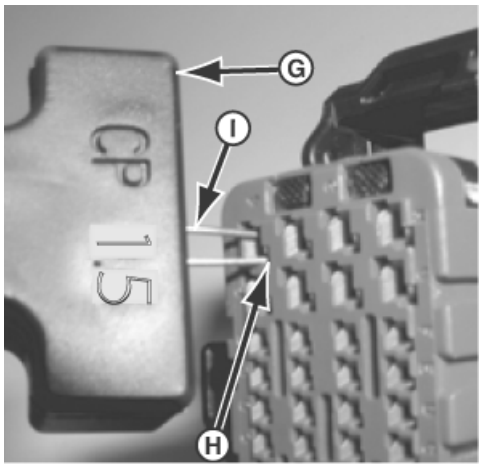


RG14583 —UN—01DEC05

Slide Terminal Retainer Out

RG41183,00000E9 -19-01OCT08-8/16

8. Insert CINCH Terminal extraction tool (G), as shown, into offset holes (H) on either side of the terminal to be extracted, tool wire sizes 1.5 mm end for larger wire size, and 0.6 mm end for smaller wire size (I). Press in until tool surface meets with connector surface.



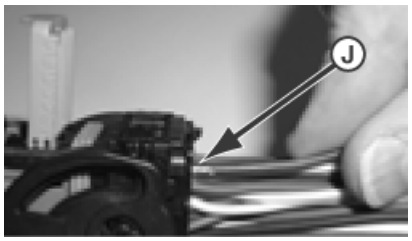
RG14595 —UN—21NOV05

Insert Terminal Extraction Tool

RG41183,00000E9 -19-01OCT08-9/16

9. With one hand, grasp connector, and with the other, grasp wire of terminal to be extracted (J), firmly pull on wire, until Terminal has been removed from connector.
10. Remove terminal extraction tool from connector. If wire was pulled out during step 8, or if wire was already broken off, leaving terminal inside the connector, do the following:
    a. Insert a 0.813-0.643 mm (20-22 AWG) diameter, single-strand piece of stiff wire into mating-side (opposite wire-side) of connector.
    b. Continue to push on terminal with wire, until terminal is completely ejected from connector, or until terminal is exposed at wire side of connector.
    c. If terminal is only exposed, use long-nose pliers to pull it from the connector.

RG14585 —UN—05DEC05



Remove Terminal and Wire

11. Cut back on insulated portion of wire, close to terminal-end of wire, but beyond any damage to either wire or insulation.

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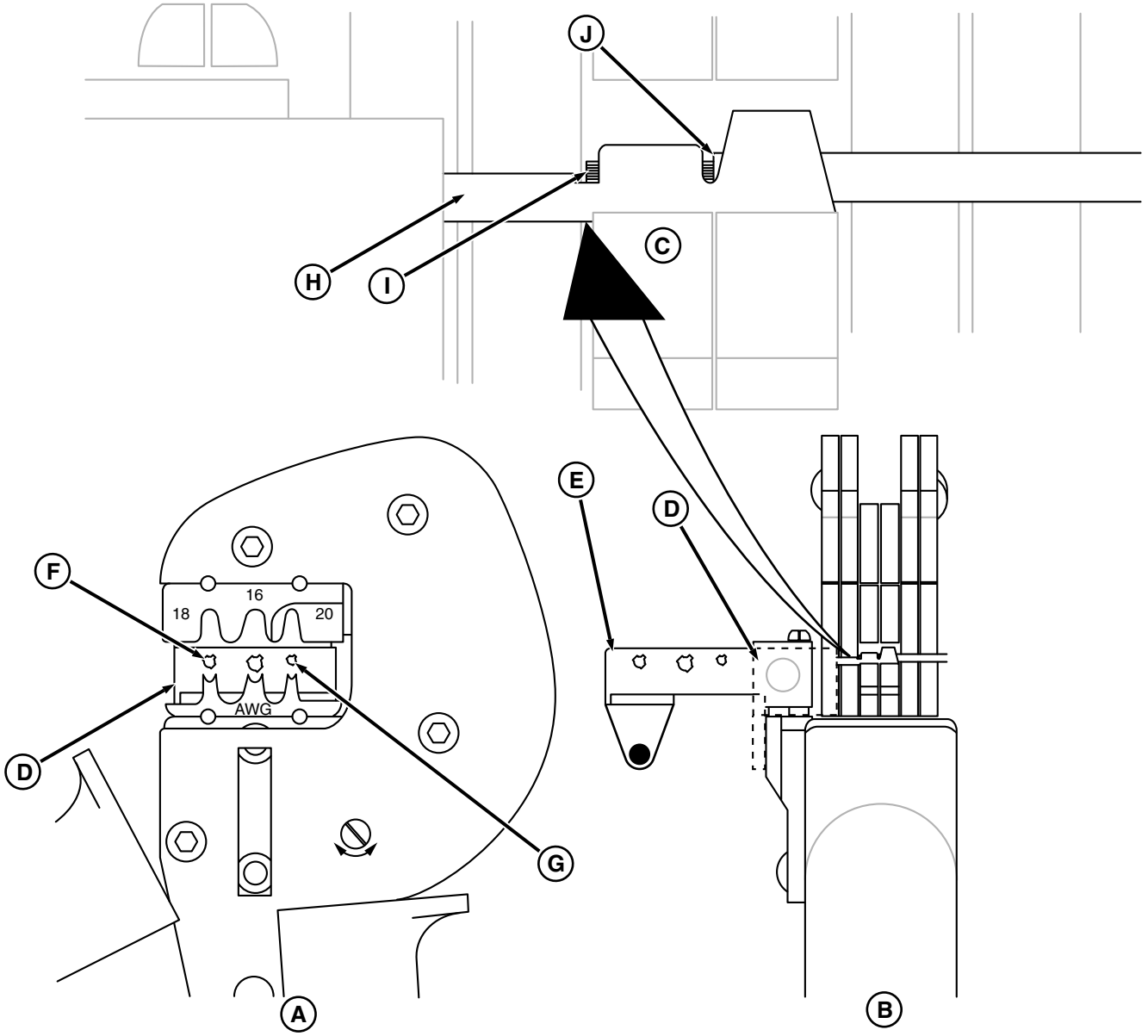
RG41183,00000E9 -19-01OCT08-10/16



CINCH Crimper Elements

A—Crimper Side View
B—Crimper Front View
C—Wire-in-Terminal Blowup
D—Terminal Block (Closed)
E—Terminal Block (Open)
F—1.5 mm Terminal Recess
G—0.6 mm Terminal Recess
H—Terminal Seated in Block Recess
I—Wire in Terminal (4.0 mm Insulation Stripped)
J—Wire in Terminal (insulation end)

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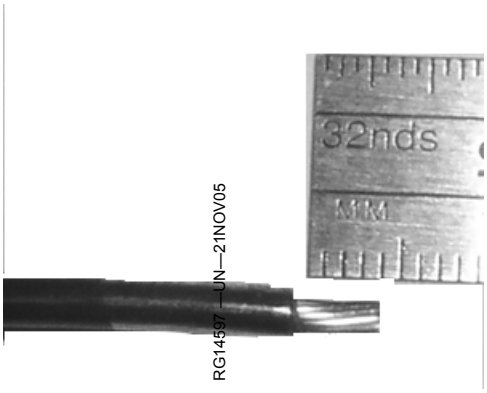
RG41183,00000E9 -19-01OCT08-11/16



Strip 4.0 mm of Wire Insulation

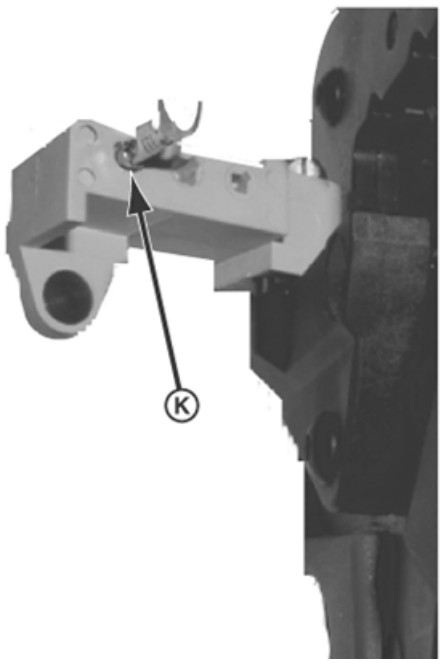
NOTE: The above figure is intended to only illustrate crimper and wire-loading elements. Its callouts relate only to its own legend, and not to the callouts in the procedural steps.

12. Using wire strippers, strip insulation from wire to expose approximately 4.0 mm (0.16 in.) length of wire, as shown.

RG41183,00000E9 -19-01OCT08-12/16

IMPORTANT: Use only JDG1727 Crimper. Use of another can result in an improper crimp. Attempting to insert an improperly crimped terminal can result in inability to fully seat, and to jam, the terminal inside the connector. This condition requires replacement of the entire connector.

13. Place female terminal in the matching recess (K) in crimper terminal block, as shown.



Terminal in Matching Recess of Crimper Terminal Block

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RG41183,00000E9 -19-01OCT08-13/16

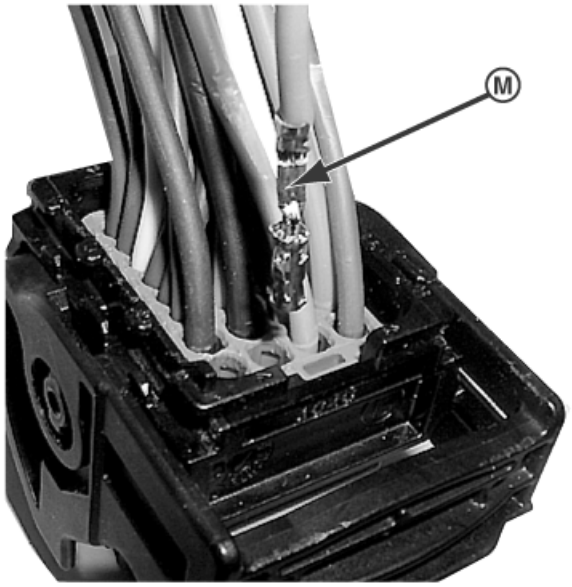
14. Lay stripped end of wire onto end of terminal to be crimped, with insulation overlapping, as shown (L).
15. Squeeze crimper handles, until they automatically unlock. Remove wire and terminal from crimper.

RG14588 —UN—01DEC05

Wire Onto Terminal in Crimping Pliers

RG41183,00000E9 -19-01OCT08-14/16

16. Fully insert terminal into connector (M), with crimped side of terminal facing away from the terminal retainer side of the connector and tabs on terminal aligned with offsets in connector, terminal hole, as shown.



RG14589 —UN—02DEC05

Correct Position For Terminal Insertion

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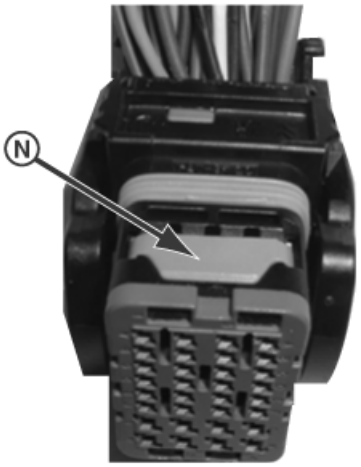
RG41183,00000E9 -19-01OCT08-15/16

NOTE: If retainer does not slide fully into position, terminal has not been completely seated. Check seating again. Do not force retainer. Retainer slides closed only when all connector terminals are fully seated

17. Close green terminal retainer, until its tab (N) is flush with connector surface.
18. Slide wire guard back onto connector, until it clicks into place.
19. Reconnect CINCH connector to ECU connector.
20. Push on lock toward wire side of connector, and continue rotating it 90 degrees, counter-clockwise, until it clicks into place, behind tab.



RG14599 —UN—01DEC05

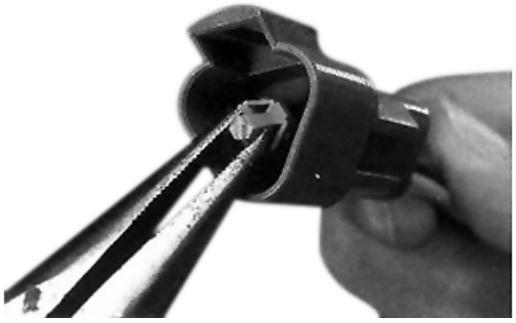
Push Tab Flush With Connector

RG41183,00000E9 -19-01OCT08-16/16

Repair DT Series Deutsch Connectors

Steps to remove, crimp, and insert a new terminal.

1. Disconnect the Deutsch connector. Remove the tie bands and tape.
2. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
3. Remove wedge using needle nose pliers or a hooked shaped wire. Pull wedge straight out. For connectors with a rectangular wedge (female terminals), use a jewelers screwdriver to remove the wedge from connector body.



RG15073 —UN—26JUN07

DM59778,000000A -19-15OCT07-1/9

4.

To remove the terminal, release the locking tab (A) from the terminal using a jewelers screwdriver. Gently, start to pull the wire from the connector.

A—Locking Tab

RG15074 —UN—26JUN07

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DM59778,000000A -19-15OCT07-2/9

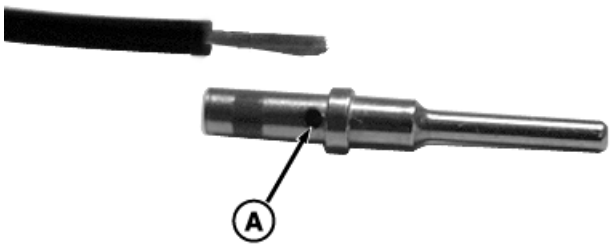
5. Hold the rear seal in place as the wire is pulled from the connector.

RG15046 —UN—26JUN07

DM59778,000000A -19-15OCT07-3/9

6. After terminal is removed from connector, cut wire directly behind terminal. Strip 6mm (1/4in) insulation from wire. Bare wire should be same length as the barrel on the terminal and should show through the inspection hole (A) when inserted into the terminal. Wire insulation should not protrude into the terminal.

A—Inspection Hole

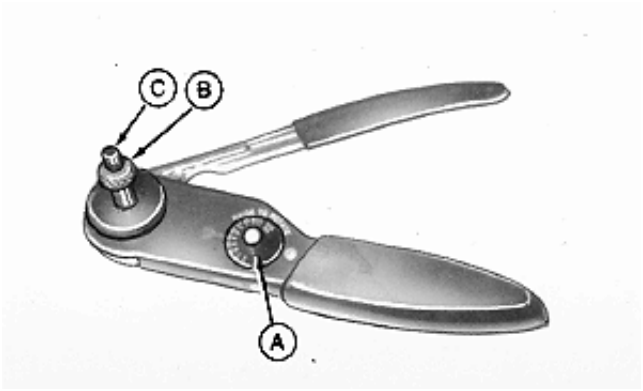


RG15070 —UN—26JUN07

DM59778,000000A -19-15OCT07-4/9

7. Adjust selector (A) on [1]JDG360 Crimping Tool for correct wire size .
8. Loosen lock nut (B) and turn adjusting screw (C) in until screw stops.

A—Selector
B—Lock Nut
C—Adjusting Screw



TS117 —UN—23AUG88

[1]*Included in JDG359 Deutsch Electrical Repair Kit*

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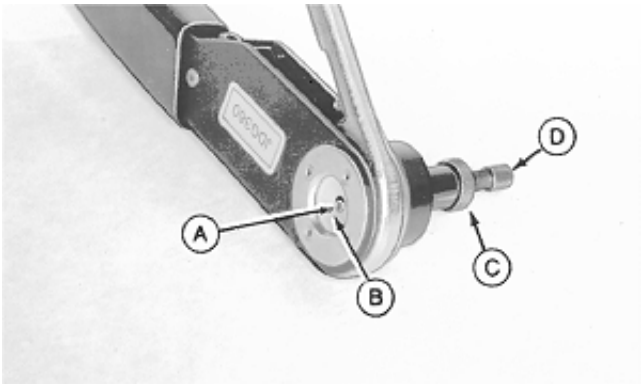
DM59778,000000A -19-15OCT07-5/9

9. Insert terminal (A) and turn adjusting screw (D) until terminal is flush with cover (B).

IMPORTANT: Select correct size terminal to fit connector body.

10. Tighten lock nut (C).

A—Terminal
B—Cover
C—Lock Nut
D—Adjusting Screw



TS0134 —UN—23AUG88

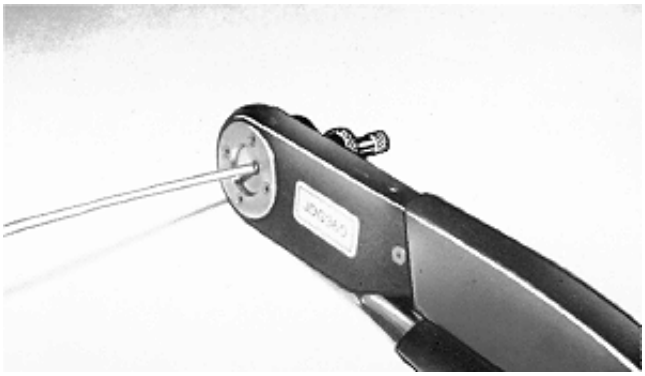
DM59778,000000A -19-15OCT07-6/9

11. Insert wire in terminal and crimp until handle contacts stop.

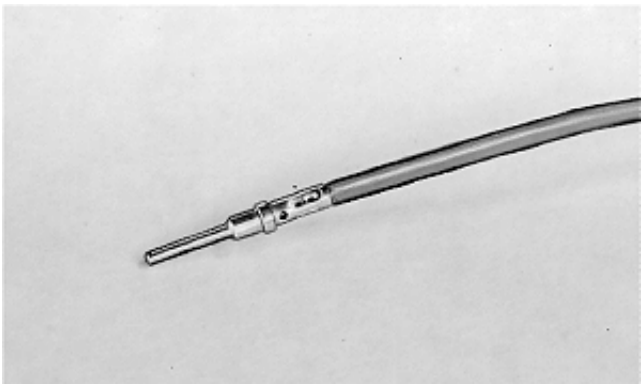
IMPORTANT: Terminal must remain centered between indenters while crimping. Once a crimp is started, it must be completed.

12. Release handle and remove terminal.

13. Inspect terminal to ensure all wires are in crimped barrel and insulation butts up to terminal. Wire should be visible through the inspection hole of the terminal.



TS118 —UN—23AUG88



TS0135 —UN—23AUG88

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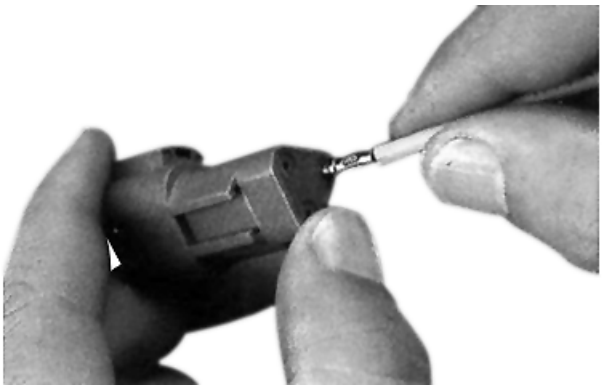
DM59778,000000A -19-15OCT07-7/9

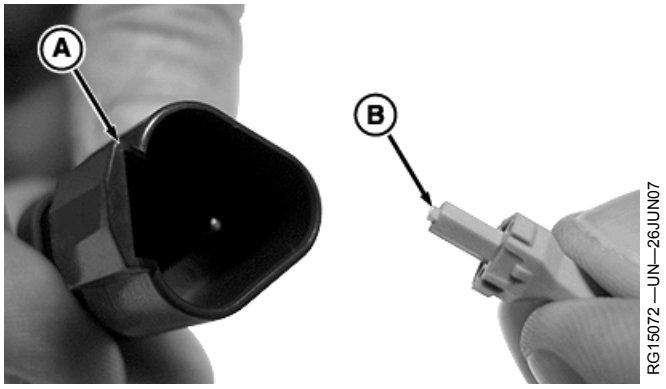
14. Hold connector with rear seal facing outward. Push terminal straight into connector cavity until positive stop is felt. Gently pull on wire to verify terminal is locked into the connector.



DM59778,000000A -19-15OCT07-8/9

15. Insert wedge with arrow pointing towards exterior locking tab. The wedge will snap into place. Rectangular wedges snap into place in any orientation.
16. When all terminals have been replaced, tape wires and add the required tie bands to the harness.

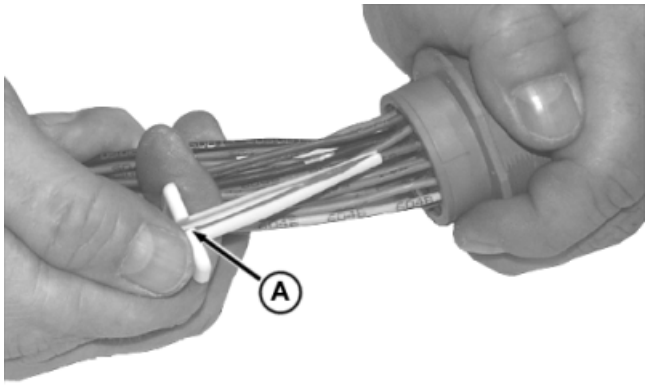
A—Locking Tab **B—Location of Arrow**



DM59778,000000A -19-15OCT07-9/9

Repair HD Series Deutsch Connectors

1. Disconnect the Deutsch connector. Remove the tie bands and tape.
2. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
3. Select correct size extractor tool for size of wire to be removed:
   - [1]JDG361 Extractor Tool - 12—14 Gauge Wire
   - [2]JDG362 Extractor Tool - 16—18 Gauge Wire
   - [3]JDG363 Extractor Tool - 20 Gauge Wire
   - [4]JDG785 Extractor Tool - 6-8 Gauge Wire



RW77142 —UN—07DEC98

A—Extractor Tool

4. Insert the extractor tool (A) over the wire to be removed.
5. Slide extractor tool along wire until tool tip snaps onto wire.

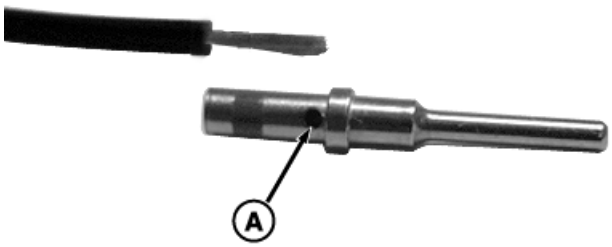
IMPORTANT: DO NOT twist tool when inserting in connector.

6. Slide extractor tool connector body until tool is positioned over terminal contact.
7. Pull wire from connector body using extraction tool.

[1]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[2]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[3]Included in JDG359 DEUTSCH Electrical Repair Kit
[4]Included in JT07195B Electrical Repair Tool Kit

RG40854,00000CB -19-15OCT07-1/5

8. Using [1]After terminal is removed from connector, cut wire directly behind terminal. using JDG145 Universal Electrical Pliers. Strip 6mm (1/4in) insulation from wire. Bare wire should be same length as the barrel on the terminal and should show through the inspection hole (A) when inserted into the terminal. Wire insulation should not protrude into the terminal.



RG15070 —UN—26JUN07

A—Inspection Hole

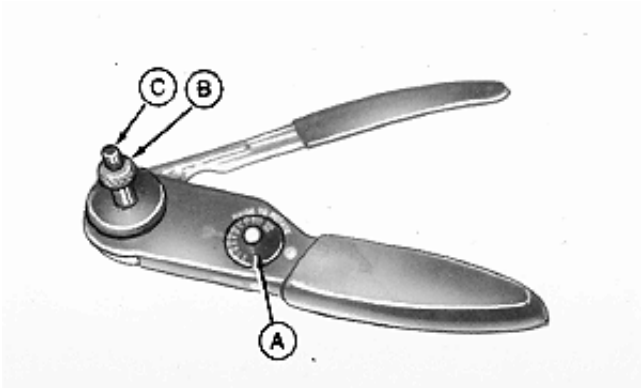
[1]Included in JDG155 Electrical Repair Tool Kit

Continued on next page

RG40854,00000CB -19-15OCT07-2/5

9. Adjust selector (A) on [1]JDG360 Crimping Tool for correct wire size .
10. Loosen lock nut (B) and turn adjusting screw (C) in until screw stops.

A—Selector
B—Lock Nut
C—Adjusting Screw



TS117 —UN—23AUG88

[1]Included in JDG359 Deutsch Electrical Repair Kit

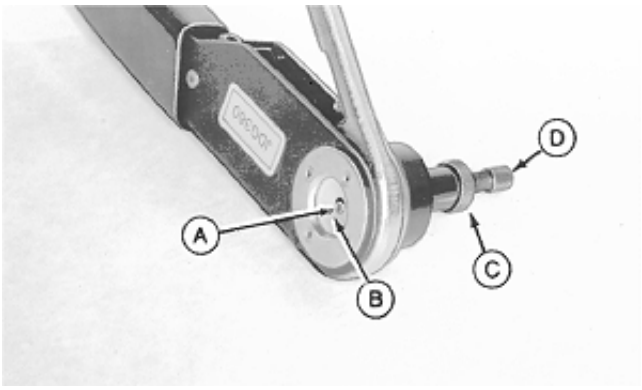
RG40854,00000CB -19-15OCT07-3/5

11. Insert terminal (A) and turn adjusting screw (D) until terminal is flush with cover (B).

IMPORTANT: Select correct size terminal to fit connector body.

12. Tighten lock nut (C).

A—Terminal
B—Cover
C—Lock Nut
D—Adjusting Screw



TS0134 —UN—23AUG88

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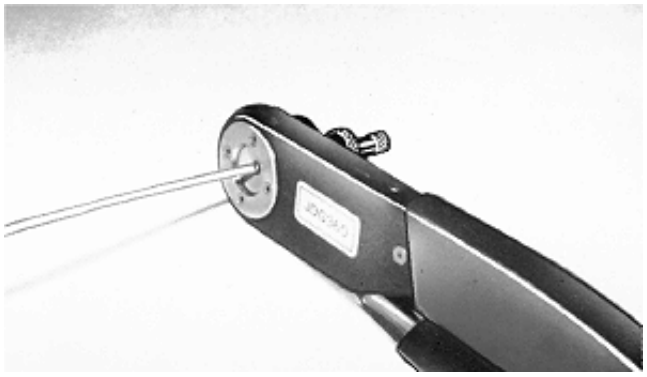
RG40854,00000CB -19-15OCT07-4/5

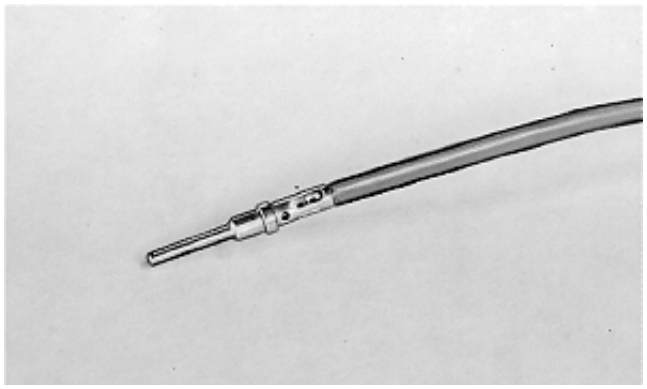
13. Insert wire in terminal and crimp until handle contacts stop.

IMPORTANT: Terminal must remain centered between indenters while crimping. Once a crimp is started, it must be completed.

14. Release handle and remove terminal.
15. Inspect terminal to ensure all wires are in crimped barrel and insulation butts up to terminal. Wire should be visible through the inspection hole of the terminal.
16. Push terminal straight into correct connector cavity until positive stop is felt.
17. Gently pull on wire to verify terminal is locked into the connector.
18. When all terminals have been replaced, tape wires and add the required tie bands to the harness.



TS118 —UN—23AUG88

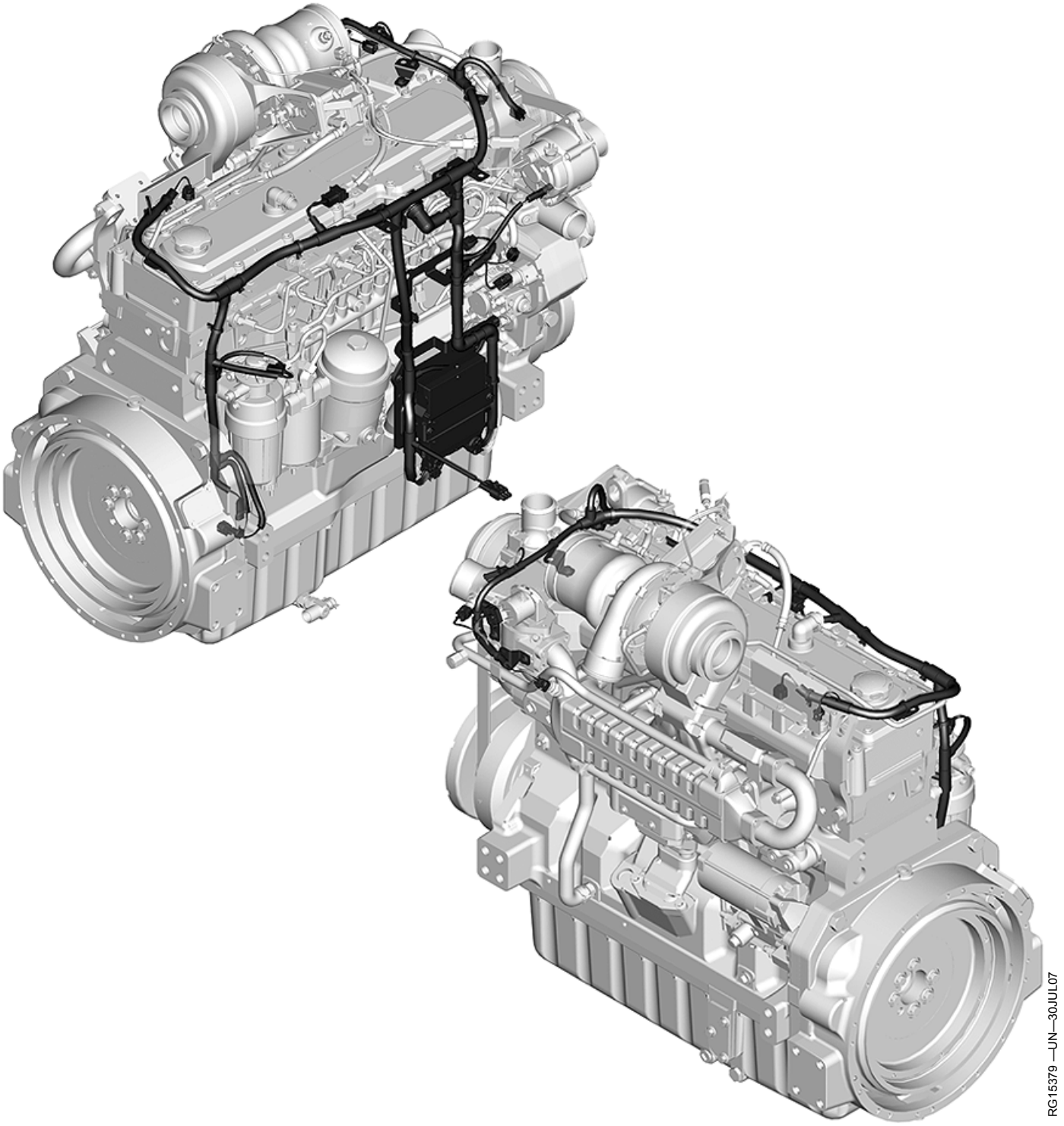


TS0135 —UN—23AUG88

RW77141 —UN—07DEC98

RG40854,00000CB -19-15OCT07-5/5

ECU Wiring Harness Routing



ECU Wiring Harness

BK53208,000005D -19-26JAN08-1/1

Remove and Install Engine Wiring Harness

The Engine Wire Harness is made up of one main harness that connects to ECU connector J01 and J03, Other interconnect and jumper harnesses may exist depending on application.

NOTE: See application manual for information on Control Panel Harness (J02).

NOTE: Disconnect cable from the negative battery terminal before removing or installing wire harness or any other major electrical components. Secure cable to prevent accidental shorts.

NOTE: For location of sensors and connectors, see COMPONENT LOCATION DIAGRAMS 6- 9 in Group 03, Section 140 later in this manual.

Remove Engine Wire Harness

1. Disconnect ECU connectors J01 (4) and J03 (3).
2. Disconnect connectors C02 (2) and X02 (6).
3. Remove harness clip (5) from ECU strap.

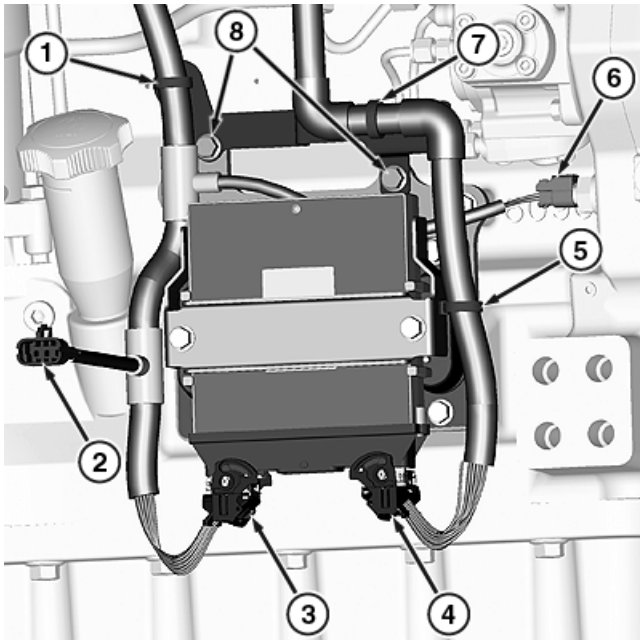


Diagram 1- Engine Wire Harness, ECU

1— Harness Clip
2— C02
3— J03
4— J01
5— Harness Clip
6— X02
7— Harness Clip
8— Harness Bracket to ECU Mounting Bracket

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DM59778,00000AD -19-03OCT08-1/7

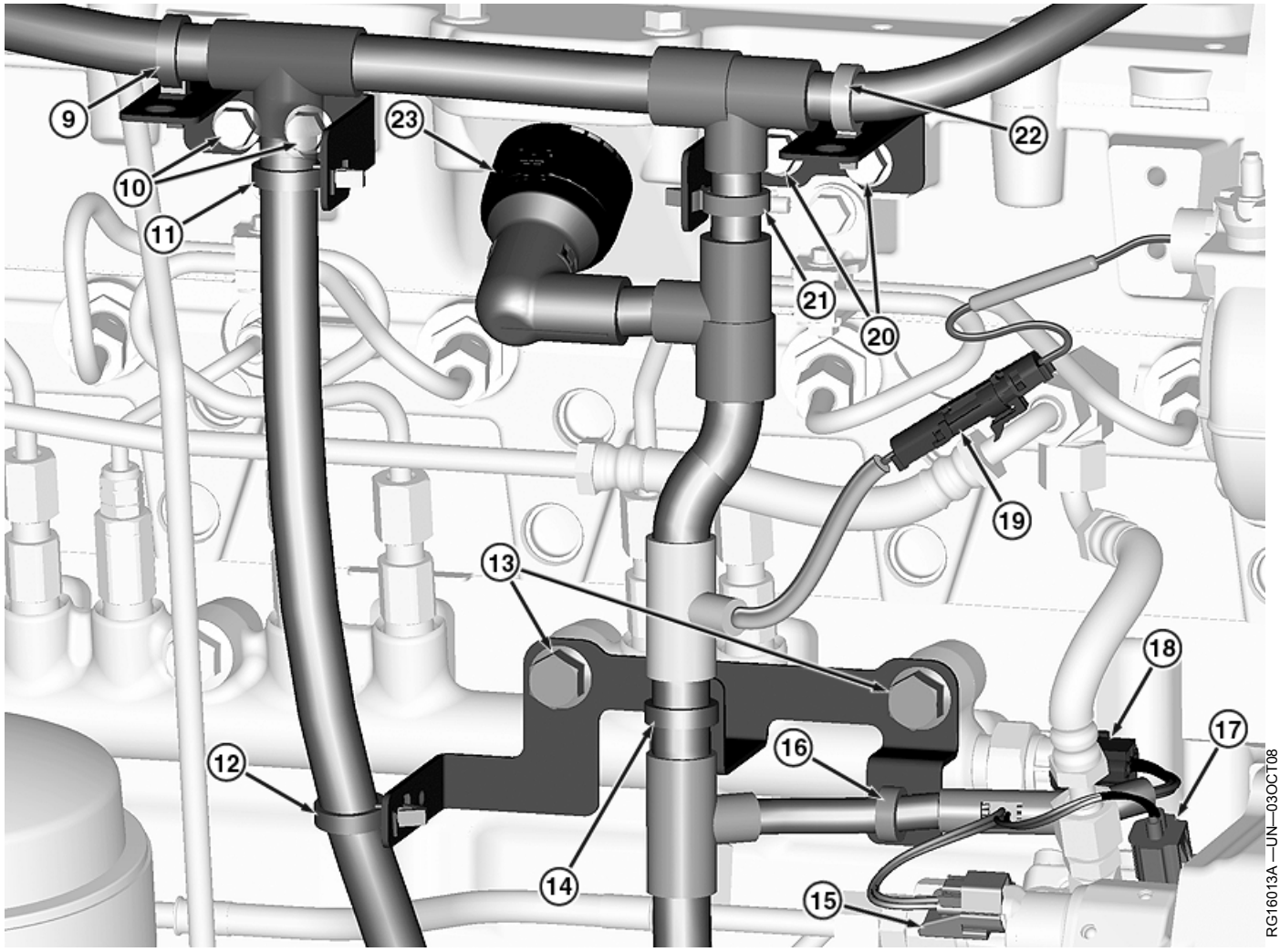

Diagram 2- Engine Wire Harness, Upper Right Side

9— Harness Clip
10— Harness Bracket
11— Harness Bracket
12— Harness Clip
13— Harness Bracket
14— Harness Clip
15— Y01
16— Harness Clip
17— T05
18— P05
19— C06
20— Harness Bracket
21— Harness Clip
22— Harness Clip
23— C01

4. Remove two harness clips (1,7) from harness bracket (8).
5. Disconnect connector C01 (23) by releasing the red lock and turning the connector counter-clockwise. Use a jewelers screwdriver or similar tool to depress the lock.
6. Disconnect connectors Y01 (15), T05 (17), P05 (18), and C06 (19).
7. Remove harness clips (12,14,16) from harness bracket (13).
8. Remove harness clips (9,11) from harness bracket (10).

Continued on next page

DM59778,00000AD -19-03OCT08-2/7

9. Remove harness clips (21,22) from harness bracket (20).
10. Disconnect Connectors C19 (27), P03 (28), D01 (29), P04 (30), and X01 (31).

24— Harness Clip
25— Harness Clip
26— Harness Bracket
27— C19
28— P03
29— D01
30— P04
31— X01

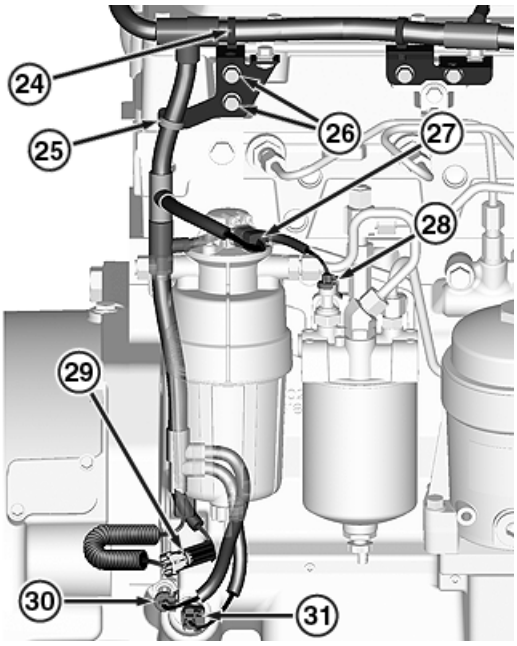

Diagram 3- Engine Wire Harness, Fuel System

DM59778,00000AD -19-03OCT08-3/7

11. Remove harness clips (24,25) from harness bracket (26).
12. Disconnect connectors C23 (38), T02 (33) and P01 (35).
13. Remove harness clip (34) from harness bracket (32).

32— Harness Bracket/Heat Shield
33— T02
34— Harness Clip
35— P01
36— Harness Clip
37— Harness Bracket
38— C23

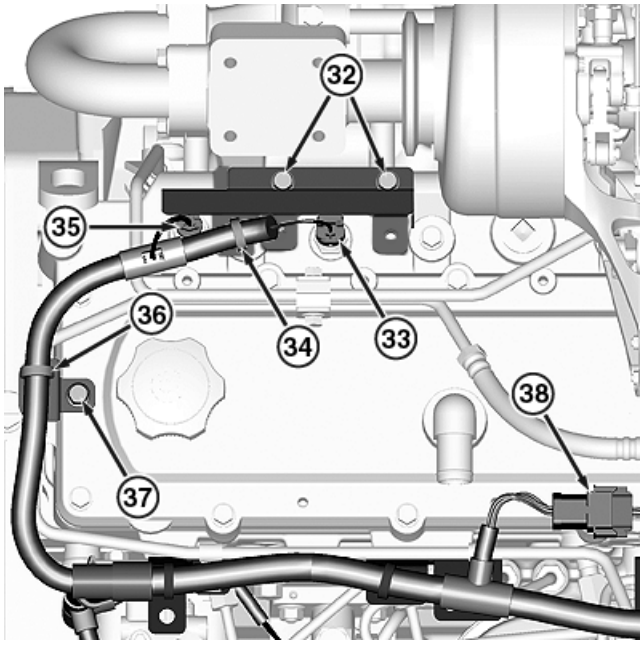

Diagram 4- Engine Wire Harness, Top rocker Arm Cover

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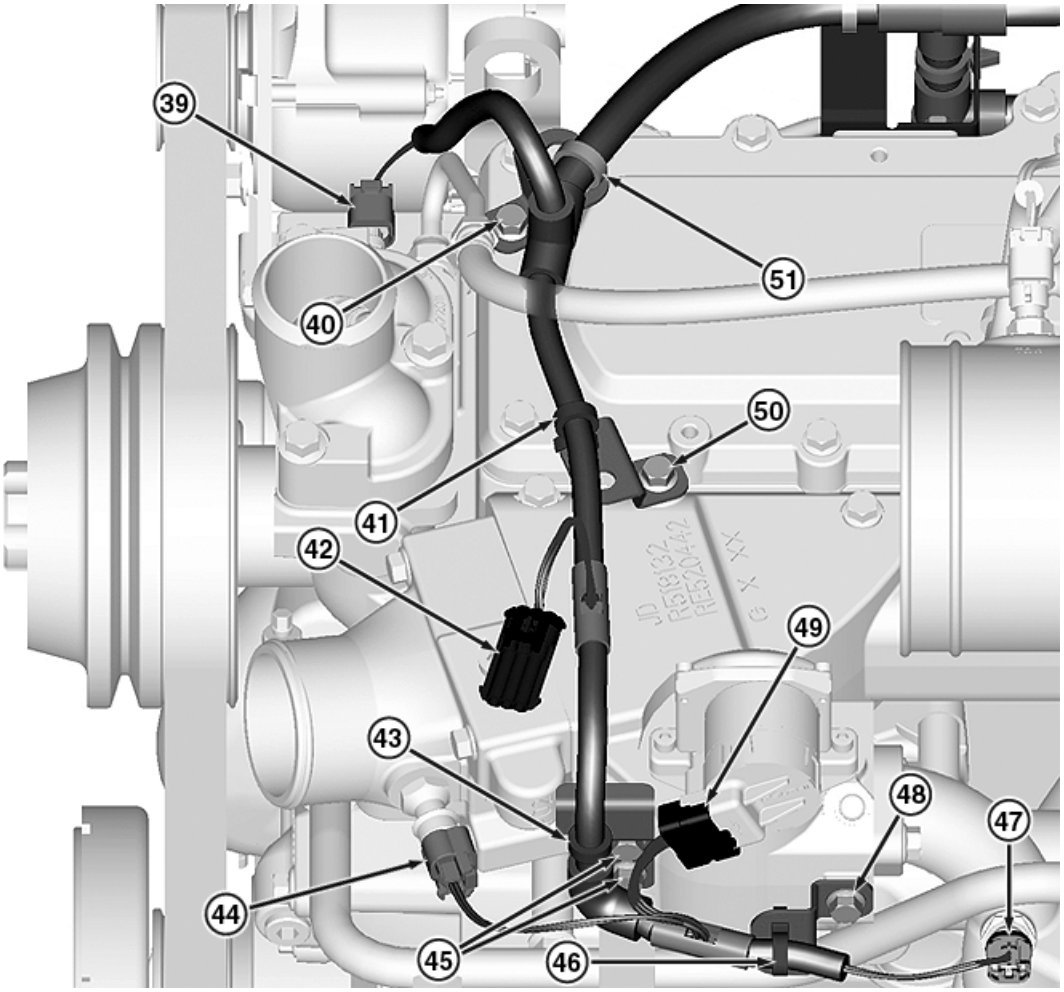

RG16016A —UN—03OCT08

Diagram 5- Engine Wire Harness, Exhaust System

39— T04
40— Harness Bracket
41— Harness Clip
42— C20
43— Harness Clip
44— T01
45— Harness Bracket
46— Harness Clip
47— T03
48— Harness Bracket
49— X03
50— Harness Bracket
51— Harness Clip

14. Remove harness clip (36) from harness bracket (37).
15. Disconnect connectors T04 (39), C20 (42), T01 (44), T03 (47), and X03 (49).
16. Remove harness clip (46) from harness bracket (48).
17. Remove harness clip (43) from harness bracket (45).
18. Remove harness clip (41) from harness bracket (50).
19. Remove harness clip (51) from harness bracket (40).

Install Engine Wire Harness

NOTE: Disconnect cable from the negative battery terminal before installing wire harness or any other major electrical components. Secure cable to prevent accidental shorts.

NOTE: Refer to the previous diagrams for reference locations for the install procedure.

1. Orient wire harness over engine as shown in the 'ECU Wiring Harness Routing and Connection' diagram earlier in this group.
2. Attach harness clip (51) to harness bracket (40). See diagram 5.
3. Attach harness clip (41) to harness bracket (50).
4. Attach harness clip (43) to harness bracket (45).
5. Attach harness clip (46) to harness bracket (48).

Specification

4 Harness Brackets—Torque ..... 20 ±4 N·m (15 lb-ft)

6. Connect connectors T04 (39), C20 (42), T01 (44), T03 (47), and X03 (49). See diagram 5. Route T04 underneath coolant hose.
7. Connect X03 (49) to EGR valve. Verify connector is inserted fully into EGR valve. Insert connector lock above latch in connector.

Continued on next page

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8. Attach harness clip (36) to harness bracket (37) See diagram 4.

Specification

Harness Bracket-to-Front Rocker Cover—Torque..... 20 ±4 N·m (15 lb-ft)

9. Attach harness clip (34) to harness bracket/heat shield (32).

Specification

Harness Bracket/Shield-to-Intake Manifold—Torque..... 35 ±7 N·m (26 lb-ft)

10. Connect connectors C23 (38), T02 (33) and P01 (35). See diagram 4.
11. Attach harness clips (24, 25) to harness bracket (26). See diagram 3.

Specification

Harness Bracket-to-Front of Intake Manifold—Torque..... 20 ±4 N·m (15 lb-ft)

12. Connect connectors C19 (27), P03 (28), D01 (29), P04 (30), and X01 (31). See diagram 3.
13. Attach harness clips (9, 11) to harness bracket 10). See diagram 2.
14. Attach harness clips (21, 22) to harness bracket 20).

Specification

Two Harness Brackets-to-Front of Intake Manifold—Torque..... 20 ±4 N·m (15 lb-ft)

15. Connect connector C01 (23) to fuel injector connector. Align two green marks on harness connector. Line up the orange marks on the two connector pairs and insert connector (Red Lock should also be lined up with the orange marks). Rotate connector clockwise until the red lock is at the 12 o'clock position. Depress the red lock on connector. Verify connector is locked in place.
16. Attach harness clips (12, 14, 16) to harness bracket (13). Route harness to left side of bracket (12) and insert clip in outer most hole. See diagram 2..

Specification

Harness Bracket-to-Fuel Rail—Torque..... 70 ±14 N·m (52 lb-ft)

17. Connect connectors C06 (19), P05 (18), T05 (17), and Y01 (15). See Diagram 2.
18. Attach two harness clips (1, 7) to harness bracket (8). See diagram 1.

Specification

Harness Bracket-to-ECU Bracket.—Torque..... 20 ±4 N·m (15 lb-ft)

19. Attach harness clip (5) to ECU strap.
20. Connect connectors J01 (3) and J03 (4) to ECU. Verify connectors are latched properly.
21. Connect connector X02 (6).
22. Connect connector C02 (2) to C07.

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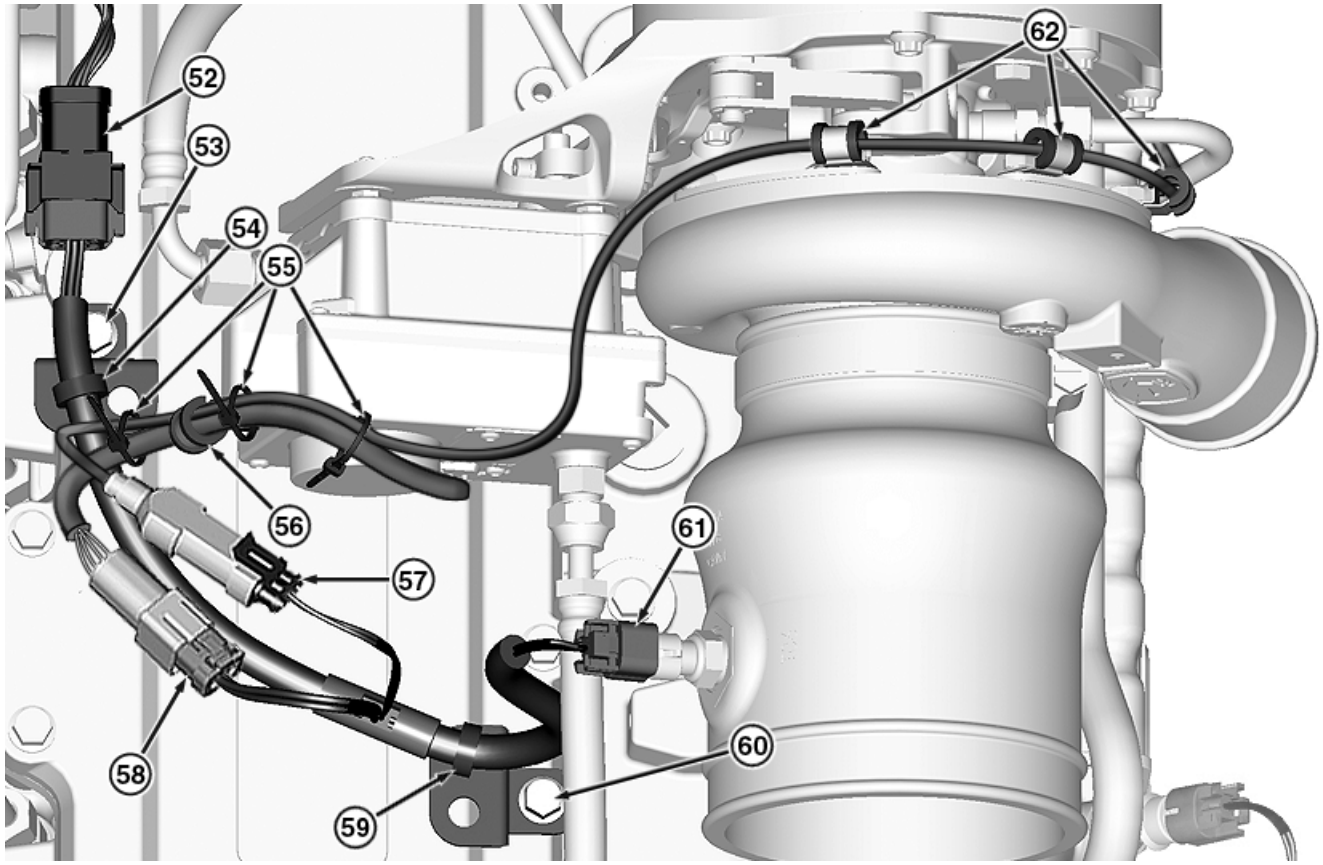
Install Rear Exhaust Turbo Interconnect Harness



RG16017A —UN—03OCT08

Rear Exhaust Turbo Interconnect Harness

52— C23
53— Harness Bracket
54— Harness Clip
55— Tie Bands
56— Cable Clamp
57— X05
58— X04
59— Harness Clip
60— Harness Bracket
61— T06
62— Cable Clamps

1. Attach harness clip (54) to harness bracket (53).
2. Attach harness clip (59) to harness bracket (60).

Specification	
2 Harness Brackets-to-Rocker Cover.—Torque	15±3 N·m (11 lb-ft)

3. Attach cable clamp (56) to VGT actuator.
4. Attach 3 cable clamps (62) to turbo assembly.
5. Connect connectors C23 (52), T06 (61), X04 (58), and X05 (57).
6. Secure 3 Tie Bands (55) around harnesses connected to VGT actuator and turbo speed sensor.

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Section 03
Theory Of Operation

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About This Group

In this group, the fuel system information is described in the following categories:

- Fuel System Operation
- Fuel Transfer Pump Operation
- Primary Filter Operation
- Secondary Fuel Filter Operation
- High Pressure Fuel Pump Operation
- High Pressure Common Rail (HPCR) Operation
- Electronic Injector (EI) Operation
  - EI - No Injection
  - EI - Begin Injection
  - EI - Ending Injection

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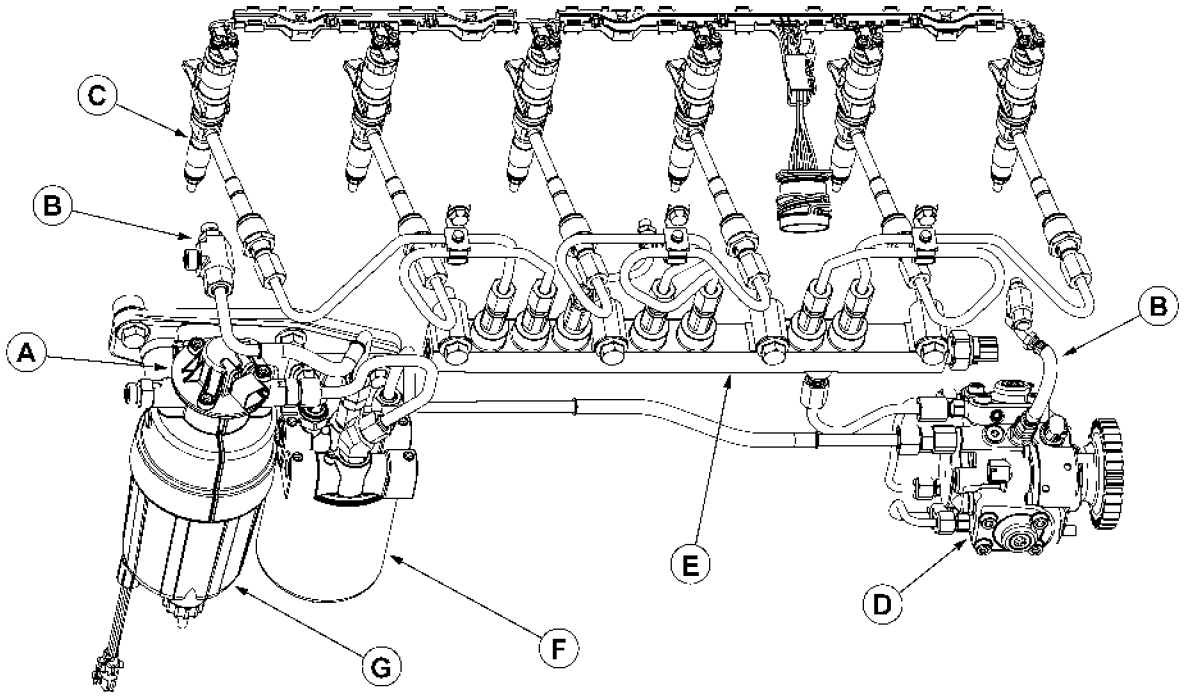
Fuel System Operation



RG16394 —UN—12AUG08

6090 Fuel System

A—Fuel Transfer Pump
B—Fuel Leak-Off Line
C—Electronic Injector
D—High Pressure Fuel Pump
E—High Pressure Common Rail
F—Secondary Fuel Filter
G—Primary Fuel Filter

The fuel transfer pump (A) draws fuel from the fuel tank through the primary filter (G) and pushes it through the secondary (final) fuel filter (F) to the high pressure fuel pump (D). The high pressure fuel pump raises fuel pressure to a predetermined pressure. This high-pressure fuel is routed into the high pressure common rail (HPCR) (E). The HPCR evenly distributes fuel to the electronic injectors (EIs) (C) which introduce fuel into their respective cylinders.

A passageway in the cylinder head collects the leak-off fuel from the injectors, HPCR, the fuel pump, and the secondary fuel filter. Injector leak-off fuel is collected internally, eliminating the need for external injector leak-off lines. Leak-off lines (B) on the HPCR pressure limiter, high pressure fuel pump overflow port, and the air/fuel bleed valve on the secondary fuel filter, route fuel to ports on the intake manifold which connect to the internal leak-off fuel passageway. A tee fitting at one of these leak-off ports connects the leak-off passageway to the back-to-tank line.

The Engine Control Unit (ECU) sends a current pulse signal in proper sequence to each EI. This signal momentarily enables the EIs to spray fuel into their respective cylinders. The length of time an EI injects fuel is determined by the ECU and the current operating conditions.

For component details, refer to the corresponding remove and install procedure in this Section. Also see Theory of Operation, Section 04.

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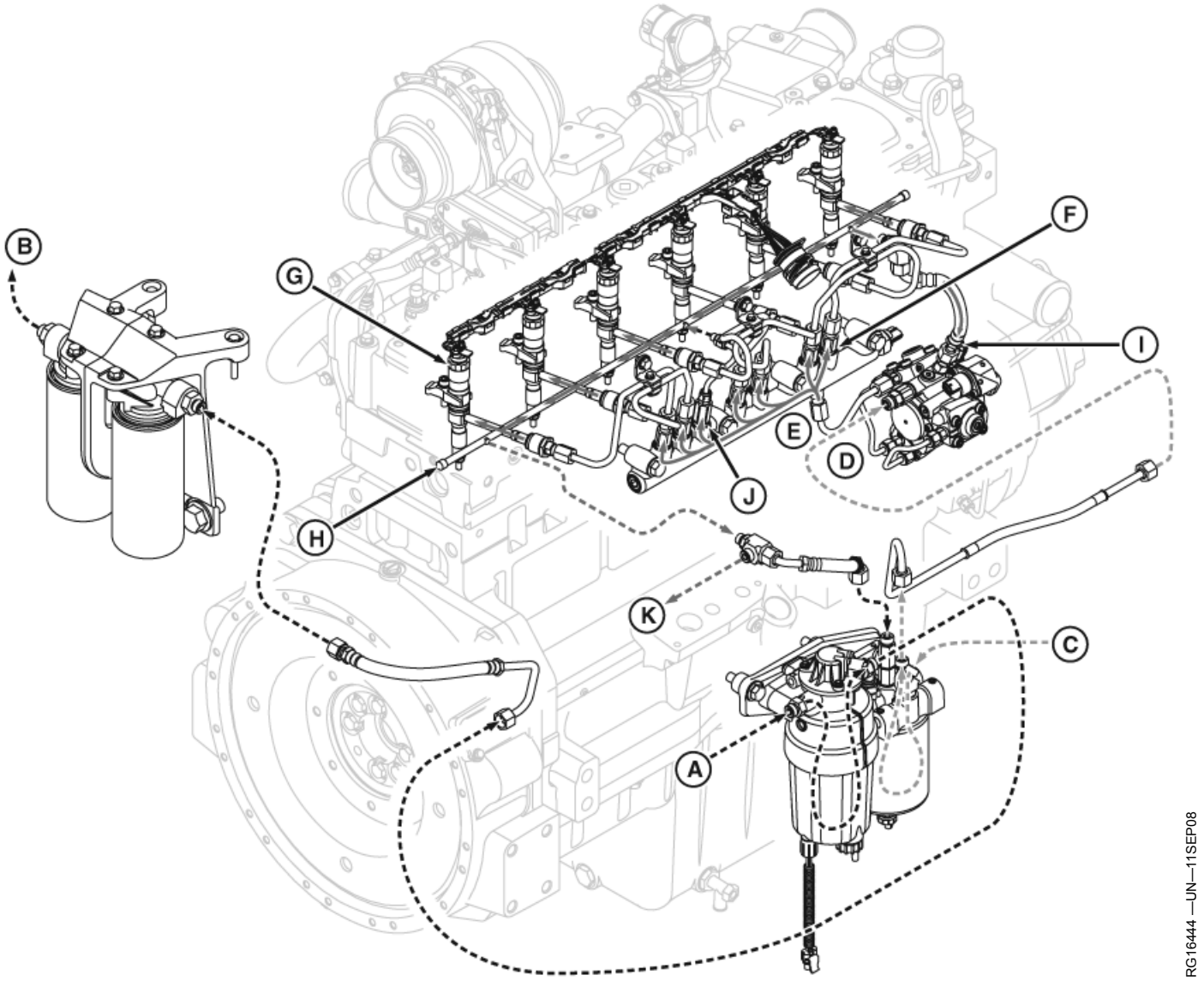
Fuel System Operation - Jet Fuel



Fuel System Operation - Jet Fuel

A—Primary Fuel Filter and Low Pressure Fuel Pump
B—Jet Fuel Lubricity Doser
C—Secondary Fuel Filter
D—High Pressure Fuel Pump
E—High Pressure Common Rail
F—Flow Dampers
G—Electronic Injectors
H—Fuel Leak-Off
I—High Pressure Pump Fuel Return Fitting
J—Pressure Limiter
K—Fuel Return Fitting

The low pressure fuel pump (A) draws fuel from the fuel tank through the primary filter (A) and pushes it through the jet fuel lubricity doser (B) and secondary (final) fuel filter (C) to the high pressure fuel pump (D). The high pressure fuel pump contains hardened components for jet fuel use and raises fuel pressure to a predetermined pressure. This high-pressure fuel is routed into the high pressure common rail (HPCR) (E). The HPCR evenly distributes fuel to the diamond coated electronic injectors (EIs) (G) which introduce fuel into their respective cylinders. Fuel Leak-Off (H) is routed from the front and rear of the cylinder head to a common fitting (I) at the high pressure fuel pump. Fuel flows from this fitting to the fuel cooler and back to the fuel tank. The fuel return fitting (K) near the secondary fuel filter collects leak-off fuel which is then routed to the secondary fuel filter (C) or the fuel cooler. Fuel exits the fuel cooler and returns to the fuel tank. The Engine Control Unit (ECU) sends a current pulse signal in proper sequence to each EI. This signal momentarily enables the EIs to spray fuel into their respective cylinders.

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Fuel Transfer Pump Operation

NOTE: The fuel transfer pump is not repairable.

The variable speed electric fuel transfer pump (A) is controlled by the ECU. Suction pulls fuel from the fuel tank through the fuel inlet (D) and through the primary filter (F). The pump pushes fuel through the outlet (B) into the secondary filter (G) and on to the high pressure fuel pump.

The low pressure fuel system sensor (E) is used by the ECU to measure the fuel pressure at the outlet of the secondary fuel filter. The ECU controls the pump speed between 1600 - 4200 rpm with the engine running to maintain a constant pressure of 20 kPa (2.9 psi) gauge at the outlet of the secondary filter (G). Note that the pressure may be higher than this with ignition ON and engine not running. The ECU also uses the low pressure fuel sensor for diagnostics to detect low pressure fuel system problems such as a plugged primary filter, secondary filter, an air leak between the fuel tank and the low pressure pump fuel inlet, or a plugged fuel tank screen.

The fuel transfer pump assembly also contains an internal pressure limiter to protect the secondary filter element from damage due to excessive pressure.

Fuel Transfer Pump Electrical

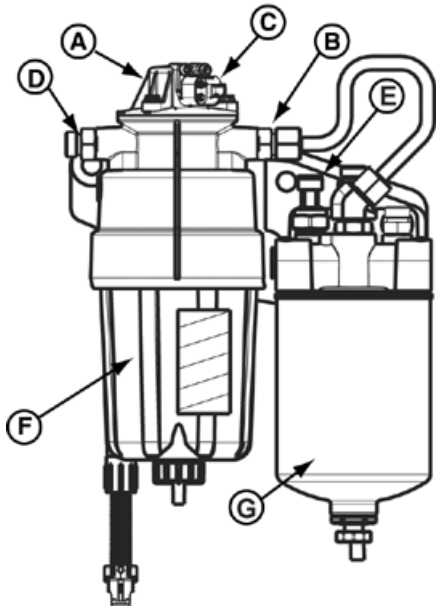
The fuel transfer pump has a six-way electrical connector. The pump is supplied with un-switched battery power (terminal 5) and ground (terminal 6) which act as the pump power supply.

The other four transfer pump terminals are connected to the ECU. The ECU provides voltage (+12V or +24V) to the pump enable input (terminal 4) when engine is running and for the first two minutes when ignition is ON but the engine is not running. The pump will not operate unless the enable signal is present.

The ECU controls the pump speed through a pulse width modulation (PWM) signal (terminal 1). The PWM signal has a frequency of 133Hz. The ECU controls an internal ground side electronic switch to generate the PWM signal. The greater the PWM percentage (percent of ON-time) supplied by the ECU, the higher the pump's speed. Since the PWM signal is produced by a ground side switch, the voltage measured between terminal 1 and ground decreases as the PWM percentage increases. The pump requires a PWM percentage of at least 20 percent to start. Once running, the pump will stay running until the PWM signal drops to 7 percent or less.

The fuel transfer pump also has a status output (terminal 3) which is monitored by the ECU. The fuel transfer pump provides a ground at the status output when the pump is operating correctly. The pump opens the ground at the status terminal when a problem is detected. Problems which will cause the transfer pump to indicate a bad status include the following:

- Loss of battery power or ground.



RG14264 —UN—06JUN05

Fuel Transfer Pump Assembly

A—Fuel Transfer Pump
B—Fuel Outlet
C—Fuel Transfer Pump Power Connector
D—Fuel Inlet
E—Low Pressure Fuel Pressure Sensor
F—Primary Filter
G—Secondary Filter

- Loss of enable signal from ECU such as an open or grounded circuit between the ECU and pump.
- Pump is drawing too much current.
- Pump's internal temperature sensor determines that fuel temperature is greater than 125°C (257°F).

The ECU will generate DTC 001075.12 after a period of time (typically 30 seconds) if the ECU has the pump enable commanded ON and the ECU detects a bad status (status input is not grounded). An open circuit in the status wire between the ECU and transfer pump will also cause this DTC to be generated.

The pump also has a current output indicator (terminal 2). This output is currently not used by the ECU.

Typical Fuel Transfer Pump Operation

The ECU switches ON the pump for a programmable time (typically 60 seconds) when the ignition is switched ON and the engine has not been started to prime and bleed the fuel system. The fuel pressure may be greater than 20 kPa (2.9 psi) during this prime cycle. If the engine is not started after programmable time has expired, the ECU will switch OFF the fuel transfer pump by setting the PWM signal to 7 percent. The ECU also switches OFF the pump enable signal after two minutes if engine is still not started. Once the engine is started, the ECU switches ON the pump enable signal (if it was OFF) and controls the pump speed with the PWM signal to maintain the low pressure fuel system at approximately 20 kPa (2.9 psi).

Continued on next page

RG40854,0000127 -19-06FEB08-1/2

Pump Response to an Invalid or Missing PWM Signal
The fuel transfer pump will cycle OFF and ON at high speed every five seconds if the enable signal is present and the PWM signal is not valid (open circuit, grounded, or noise present). This may cause low pressure fuel system pressures may be much greater than 20 kPa (2.9 psi).

Pump Response to a Loss of Enable Signal
The low pressure fuel pump will not operate without the enable signal and the pump status output will indicate bad status (not grounded).

Pump Response to a Loss of Battery Power or Ground
The low pressure fuel pump will not operate without battery power or ground and the pump status output will indicate bad status (not grounded).

Low Pressure Fuel Sensor

The low pressure fuel sensor is an absolute pressure sensor, like the MAP sensor. The Fuel Transfer Pump Pressure value displayed in Service ADVISOR is a calculated gauge pressure obtained by subtracting the barometric pressure from the absolute fuel pressure value obtained from the low pressure fuel sensor. Problems with the barometric pressure sensor (internal ECU sensor) can affect low pressure fuel system pressure measurement accuracy. The low pressure fuel sensor can measure pressures that are less than atmospheric pressure (negative pressure or partial vacuum). The low pressure fuel sensor will indicate a negative pressure if the engine is running and the fuel transfer pump is NOT running due to the suction that is generated by the high pressure pump.

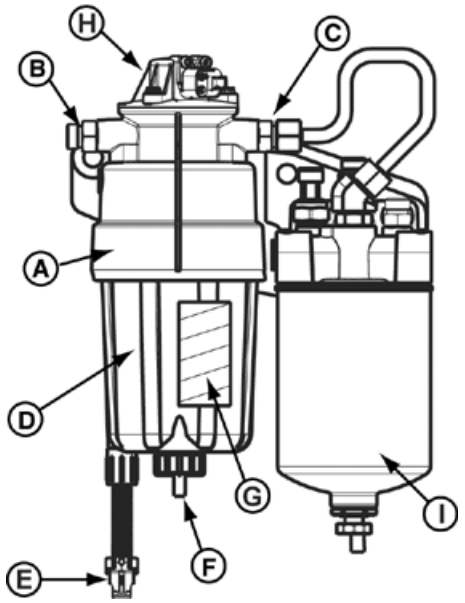
RG40854,0000127 -19-06FEB08-2/2

Primary Filter Operation

The primary fuel filter is positioned before the fuel transfer pump (H) to protect the pump from the more coarse contaminants which could damage, clog, or get stuck in the pump diaphragm. Fuel enters the filter through the primary fuel inlet (B) at the primary filter head (A) and flows into the canister (D) and around the outside of the 10-micron filter element (G). Fuel flows up through the center of the filter element to the filter outlet (C) and on to the secondary filter (I).

Water and the heavier fuel contaminants settle to the bottom of the canister. Water and contaminants can be removed by using the fuel drain valve (F). Also incorporated in the assembly is a water-in-fuel sensor (E). This sensor is used to determine the quality of the fuel entering the system.

A—Primary Filter Head
B—Primary Fuel Inlet
C—Primary Fuel Outlet
D—Primary Fuel Canister
E—Water In Fuel Sensor Connector
F—Primary Fuel Canister Drain Valve
G—Primary Fuel Canister Filter Element
H—Fuel Transfer Pump
I— Secondary Filter



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Primary Fuel Filter Assembly

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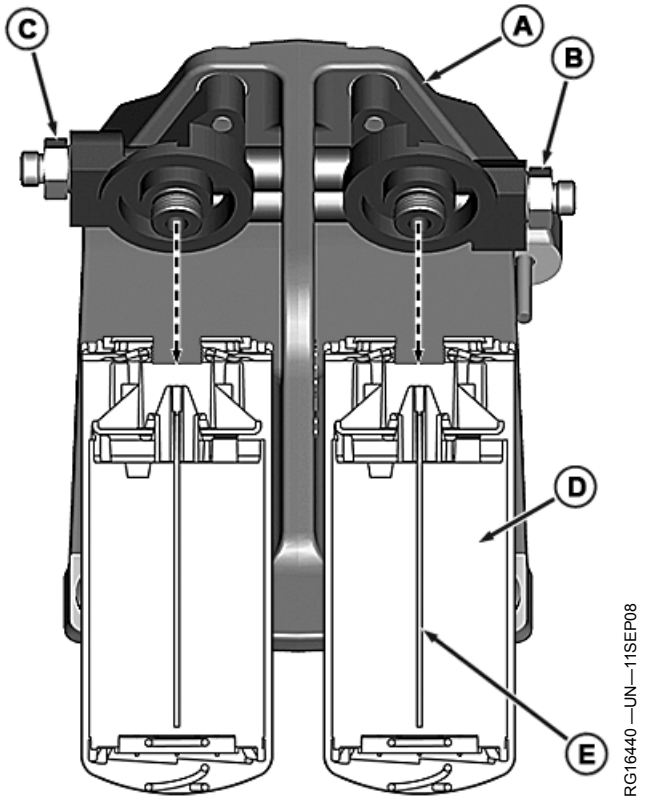
Doser Operation

Jet fuel has poor lubricity as compared to diesel. A lack of lubricity causes high pressure fuel system wear and early component failure or severe performance problems. The doser is designed to add a small amount of lubricity additive to the fuel. The doser resembles a spin on fuel filter. Filtered fuel enters the doser header inlet (B). Fuel can take two different routes and enter either doser. Fuel flows by an orifice at the top of the doser and a pressure differential is developed. Lubricity additive is drawn from the element (D) through the capillary tube (E). Fuel exits the doser header outlet (C) and flows into the secondary fuel filter.

A—Doser Header
B—Doser Inlet
C—Doser Outlet
D—Doser Lubricity Element
E—Capillary Tube



Doser Operation

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Secondary Fuel Filter Operation

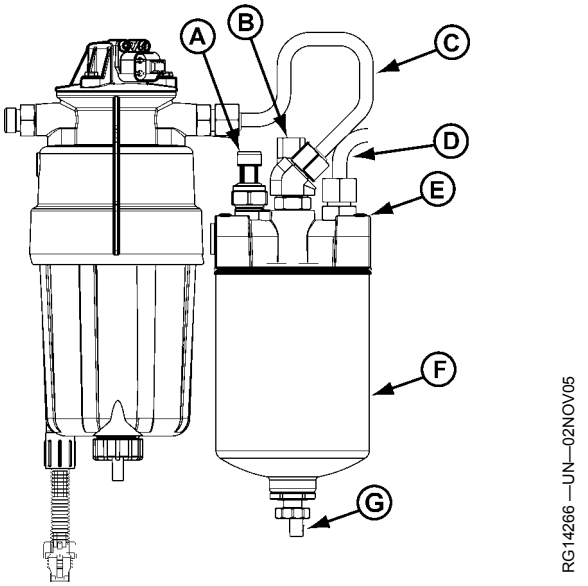
Fuel enters the secondary filter header (E) at the secondary fuel inlet (C), flows through a 2-micron filter (F), exits through the secondary fuel outlet (D), and proceeds to the high pressure fuel pump.

Water and the heavier fuel contaminants settle to the bottom of the canister. Water and contaminants can be removed by using the secondary fuel filter drain valve (G).

The air bleed/check valve (B) opens at 14 kPa (2 psi) to allow a continuous flow of leak-off fuel through a 3 mm orifice. Air is automatically bleed from the low-pressure fuel system through this orifice.

The pressure sensor (A) is on the outlet side of the filter. Signals from this sensor are used by the ECU to maintain fuel pressure to the high pressure fuel pump. Also, if fuel supply pressure drops to -5 kPa (likely due to a clogged filter), the ECU will set a fault code.

A—Pressure Sensor
B—Air Bleed/Check Valve
C—Secondary Fuel Inlet
D—Secondary Fuel Outlet
E—Secondary Filter Header
F—Secondary Fuel Filter Element
G—Secondary Fuel Filter Drain Valve



Secondary Fuel Filter Assembly

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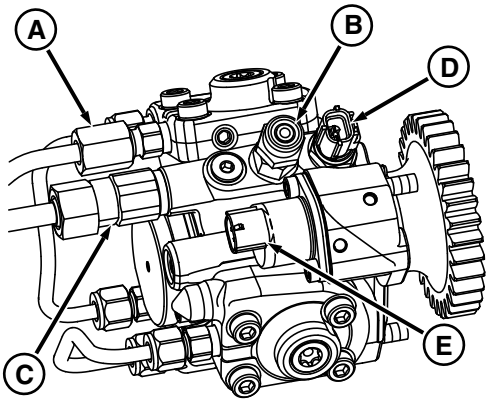
High Pressure Fuel Pump Operation

The 6090 high pressure common rail engine uses the Denso HP4 high pressure fuel pump. Filtered fuel enters the high pressure pump through the fuel inlet (A). A fuel temperature sensor (D) measures the temperature of the fuel just past the inlet filter. Once fuel passes through the inlet, it goes through a fuel inlet filter and continues through an internal transfer pump. Fuel is then routed either to lubricate the pump crankcase or to the internal fuel control valve. There are three high-pressure plunger chambers on this pump located 120 degrees from one another. Fuel in each chamber is pressurized when the pump drive shaft rotates. Each chamber is pressurized once per complete rotation of the engine. The engine takes two revolutions to fire all 6 injectors so each plunger chamber is pressurized twice for one complete firing of all 6 injectors. The pressurized fuel leave through the high pressure outlet (C). Excess fuel leaves the pump through the overflow port (B) and into the return-to-tank line. The over flow is controlled to a pressure less than 20 kPa (2.9 psi).



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High Pressure Pump Assembly

A—Fuel Inlet
B—Overflow Orifice
C—Fuel Outlet
D—Fuel Temperature Sensor
E—Suction Control Valve Solenoid

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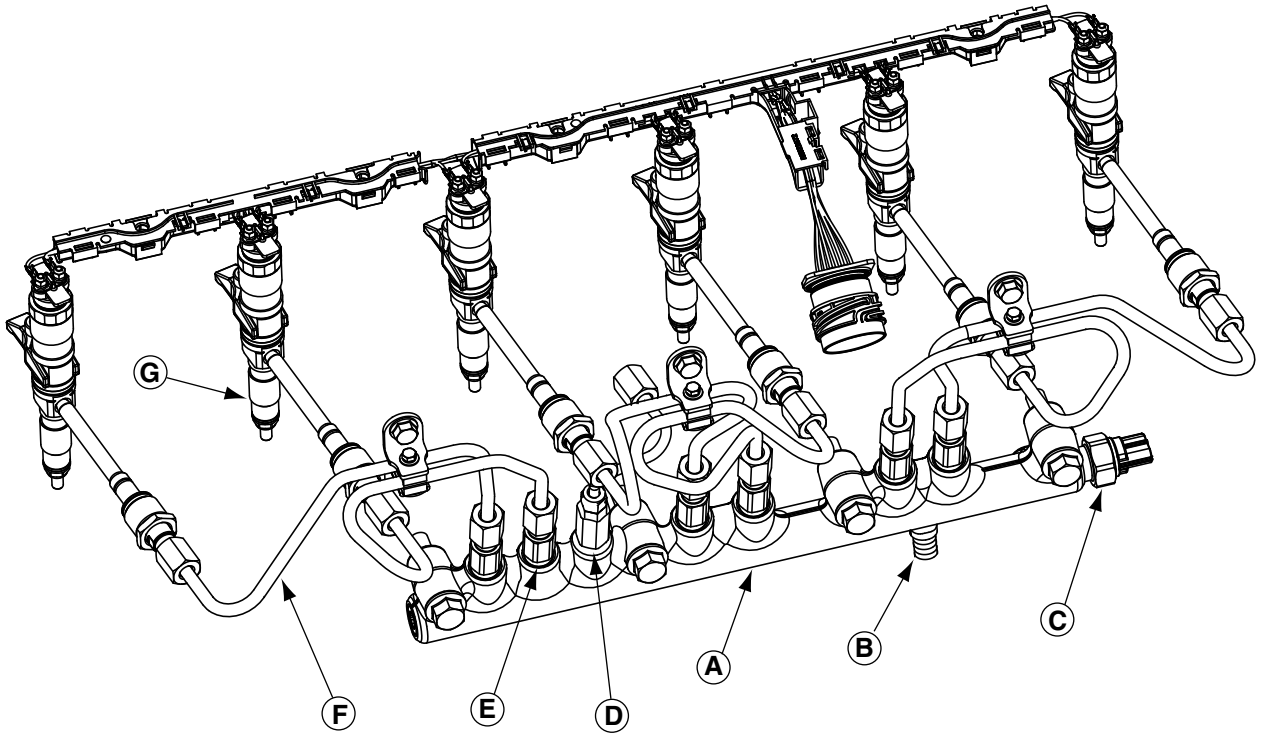
High Pressure Common Rail (HPCR) Operation



RG14257A —UN—03OCT08

High Pressure Common Rail Assembly

A—High Pressure Common Rail
B—High Pressure Fuel Inlet
C—Fuel Rail Pressure Sensor
D—Pressure Limiter
E—Flow Dampers
F—High Pressure Common Rail Delivery Lines
G—Electronic Injector (EI)

High pressure fuel is delivered to the high pressure common rail (HPCR) (A) through the high fuel pressure fuel inlet (B) from the high pressure fuel pump. The high pressure common rail delivery lines (F) transport the fuel to the electronic injectors (EIs) (G). The fuel rail pressure sensor (C) detects the fuel pressure inside the rail. The engine control unit uses this sensor to monitor the fuel pressure to determine how long to keep the high pressure fuel pump fuel control valve open.

If an abnormally high pressure is generated within the HPCR, the pressure limiter (D) opens to release the excess pressure and drain fuel back to the tank.

The flow dampers (E) use a piston and ball valve to reduce pressure pulsations. This ensures a steady pressure in the fuel lines to the electronic injectors. The flow limiters are also used to limit the maximum fuel flow to the EIs to prevent engine damage due to a failed EI or a high pressure leak by shutting off fuel to that particular EI. This is done by moving the ball valve until it seats to close the valve.

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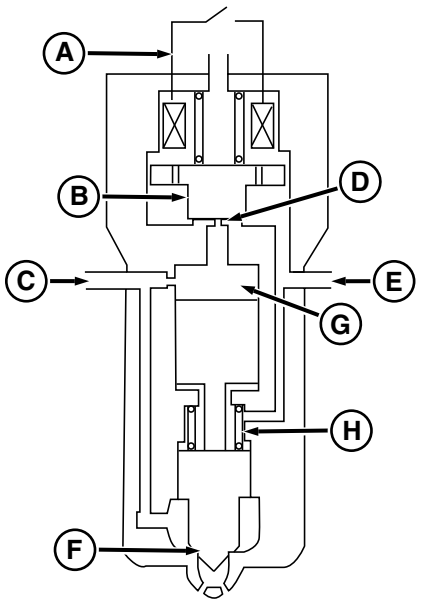
Electronic Injector (EI) Operation

The electronic injectors (EIs) are located in the engine's cylinder head and are electronically controlled by the ECU. The amount of fuel delivered to the cylinder is controlled by the ECU. The amount of fuel delivered to the cylinder is controlled by the length of time current is supplied to the two-way electromagnetic valve (TWV) on each electronic injector. This controls the volume of fuel, and the timing of delivery for each injector.

EI - No Injection

Fuel from the HPCR enters the EI at the fuel inlet (C). When no current is supplied to the TWV (A), the valve spring (H) and the hydraulic pressure of the fuel in the control chamber (G) cause the hydraulic piston to push the needle down and close the nozzle. This holds the high pressure fuel from the common rail inside the nozzle until injection.

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring



RG11556A —UN—16FEB01

No/Ending Injection

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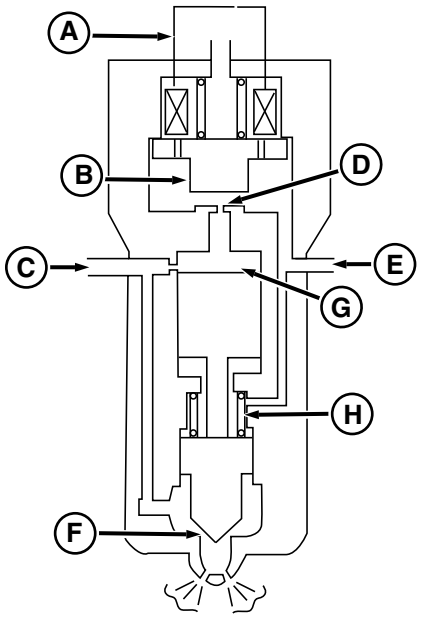
EI - Begin Injection

Injection begins when current is supplied from the ECU to the TWV (A). The electromagnetic force pulls the solenoid valve (B) up, causing the orifice seat (D) to open. The fuel in the control chamber (G) flows out of the injector to the fuel leak-off (E) line. Fuel is then routed back to the fuel tank. As the fuel exits the injector, the force is removed from the hydraulic piston and the nozzle needle lifts, allowing fuel through the nozzle (F) to begin the injection process.

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring



RG11557A —UN—26FEB01

Begin Injection

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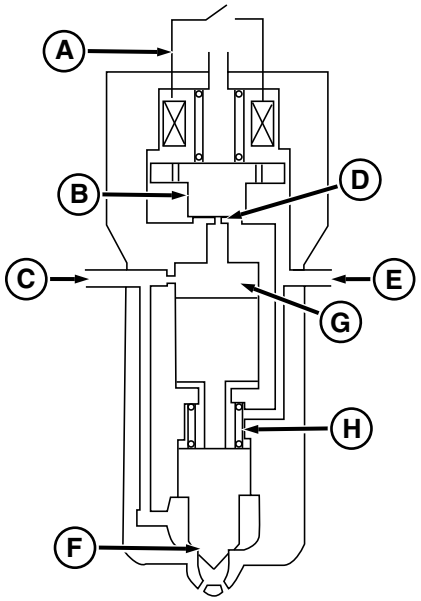
EI - Ending Injection

Injection ends when the current is removed from the TWV (A). The solenoid valve (B) closes causing fuel to fill the control chamber (G). The valve spring and the hydraulic force from the fuel in the control chamber cause the hydraulic piston to push the needle down and close the nozzle. At this time the injection is complete.

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring



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No/Ending Injection

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Group 135
Electronic Air System Operation

About This Group

In this group, the electronic air system information is described under the following headings:

- Electronic Air System Operation
- Exhaust Gas Recirculation flow and calculations
- Turbocharger
- Turbocharger Actuator
- Exhaust Gas Recirculation Cooler
- Exhaust Gas Recirculation Valve

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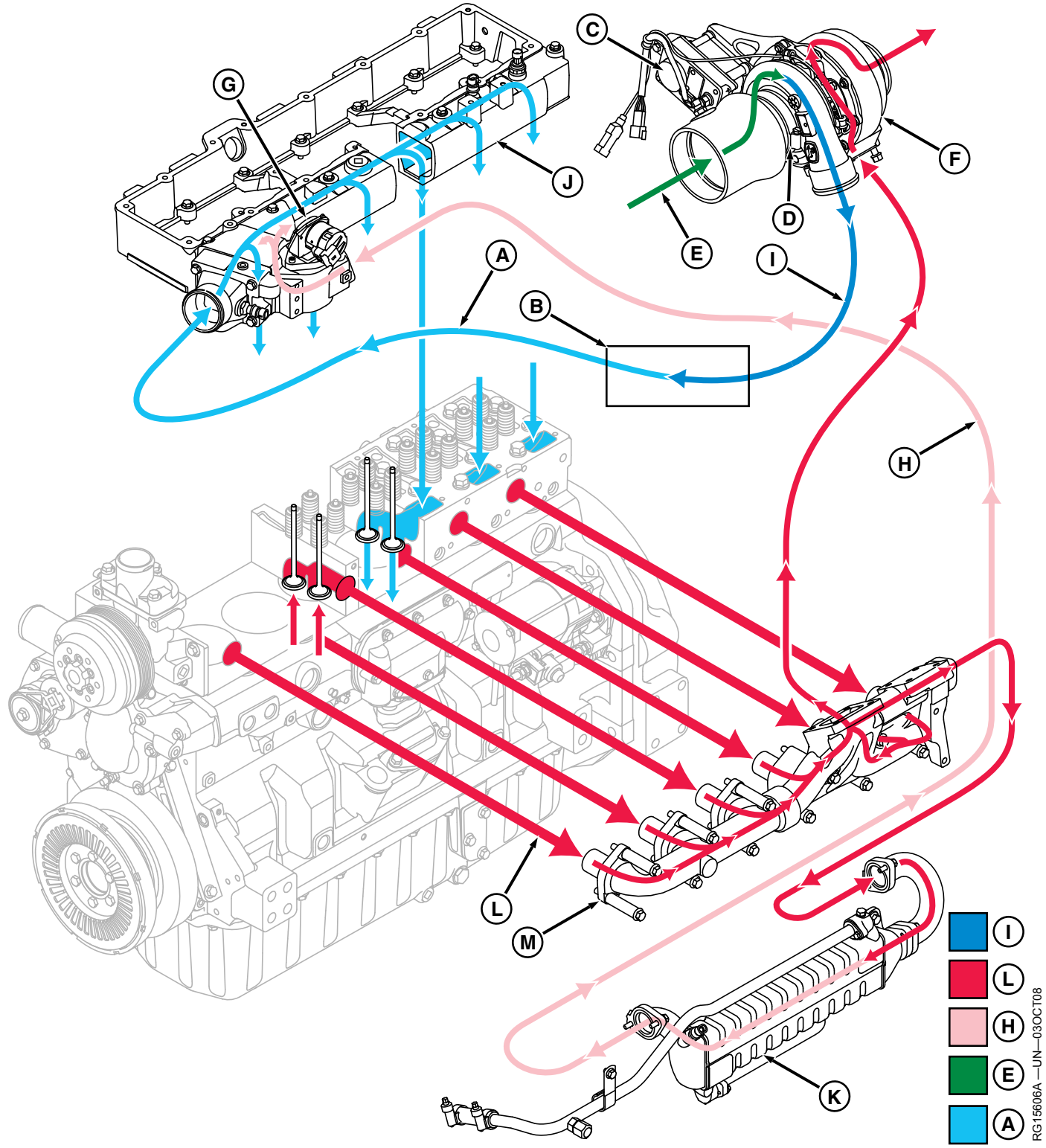
Electronic Air System Control Operation

Air System with EGR



A—Cooled charge air
B—Charge air cooler
C—VGT actuator
D—Turbocharger compressor
E—Fresh air in from filter
F—Turbocharger turbine
G—EGR valve
H—Cooled exhaust gas
I— Compressed air
J—Air intake manifold
K—EGR cooler
L—Hot exhaust gas
M—Exhaust manifold

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As the piston reaches the intake stroke it, sucks air (E) through the intake air filter, turbocharger compressor (D), which compresses and heats the air (I), charge air cooler (B), which cools the compressed air (A), into the air intake manifold (J), through ports in the head and into the piston cylinder. On the exhaust stroke the engine pushes exhaust gas (L) into the exhaust manifold (M), then into two different directions:

1. Through the turbocharger turbine (F), through the muffler and out to the atmosphere.
2. Through the EGR cooler (K) which cools the hot exhaust gas (H) and onto the EGR valve (G).

The exhaust of the hot gas speeds up the turbine helping to pull in and compress more air to create more power.

During engine operation the ECU continuously monitors and compares signal inputs from the temperature and pressure sensors on the engine. The ECU then calculates the amount of fuel needed to meet the required or requested condition.

The ECU also continuously monitors and compares signal inputs from the EGR temperature, charge air cooler outlet temperature, manifold air temperature, manifold absolute pressure, turbocharger speed and several other calculated values. The ECU then calculates the amount of exhaust gas to be mixed with the charge air. Once the ECU calculates that all required conditions have been met, it signals the EGR valve to open. It also signals the turbocharger actuator (C) to begin closing the turbocharger variable vanes. This increases the exhaust pressure and when the EGR valve opens the exhaust gas is pushed into the air intake manifold and is mixed with the cooled charge air. To increase the amount of exhaust gas being pushed into the air intake manifold the ECU commands the variable vanes on the turbocharger to close farther increasing exhaust pressure.

If the ECU determines any of the input signals are not what is expected for the current operating conditions it will try to calculate the amount of required EGR using available inputs. It may use default values or values from tables within the ECU to help make proper decisions.

IMPORTANT: The EGR valve is normally in either the fully closed or fully open condition. There are some instances where it may be at other positions but normally fully open or fully closed. The EGR valve is normally closed at startup, low load and high load low speed conditions.

NOTE: Mixing of charge air and exhaust gas helps lower the NOX emissions released to the atmosphere after combustion.

NOTE: During normal operation, the vanes never close completely, as they provide the only path for exhaust gas to escape to the atmosphere.

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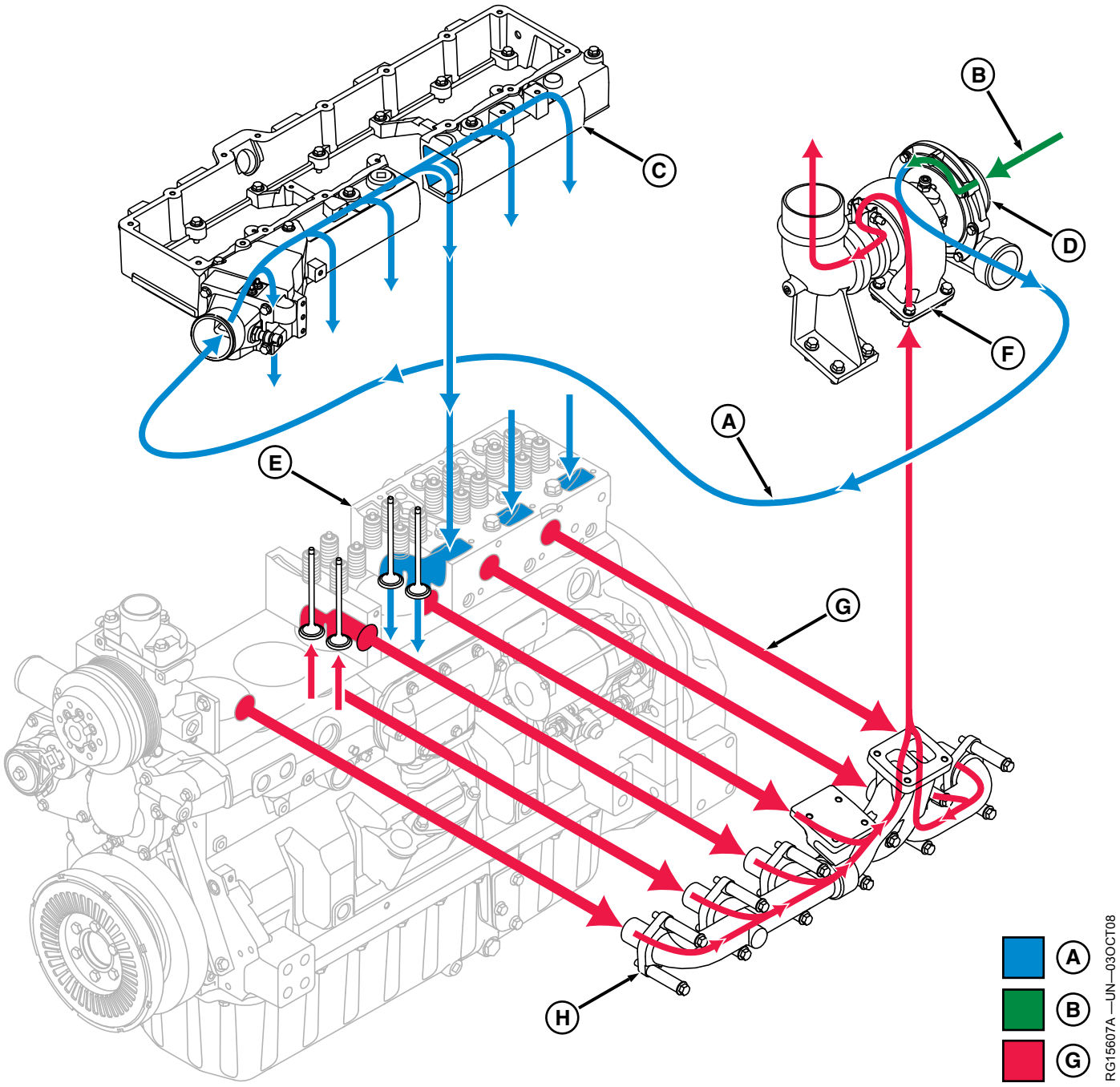
Air System without EGR



A—Compressed air
B—Fresh air in from filter
C—Intake air manifold
D—Turbocharger compressor
E—Head
F—Turbocharger turbine
G—Hot exhaust gas
H—Exhaust manifold

During engine cranking, the engine sucks air (B) through the intake air filter, turbocharger compressor (D), which compresses and heats the air (A), into the air intake manifold (C), through ports in the head (E) into the cylinders on the intake stroke of the piston. On the exhaust stroke of the piston the engine pushes exhaust gas (G) into the exhaust manifold (H), through the turbocharger turbine (F), through the muffler and out to the atmosphere.

The exhaust of the hot gas speeds up the turbine helping to pull in and compress more air to create more power.

During engine operation the ECU continuously monitors and compares signal inputs from the temperature and pressure sensors on the engine. The ECU then calculates the amount of fuel needed to meet the required or requested condition.

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If the ECU determines any of the input signals are not what is expected for the current operating conditions it will try to calculate the amount of required fuel using available inputs. It may use default values or values from tables within the ECU to help make proper decisions.

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Exhaust Gas Recirculation Flow and Calculations

An Exhaust Gas Recirculation (EGR) system directs exhaust gasses from an exhaust manifold to an intake manifold. When EGR flow is required, the EGR valve is opened and the variable geometry turbocharger (VGT) vane position is adjusted to achieve the desired flow. EGR is used as a primary means of reducing NOx emissions from the engine. If the air-to-fuel ratio becomes too low, the position of the EGR valve is reduced to keep it in the desired range. The required flow is calculated by the ECU using sensor information and other operating conditions.

The primary sensors used include the following.

- Charge Air Cooler Outlet Air Temperature
- Manifold Air Temperature
- EGR Temperature
- Coolant Temperature
- EGR Valve Position
- Manifold Air Pressure

The required EGR flow is determined by engine speed and load at normal operating conditions. In general, no EGR flow is used at slow speed, load conditions and when the engine is in a heavy acceleration. Under certain operating conditions where it is hard for the turbo to provide the required air flow the EGR valve may be in a position other that full open or closed.

There are significant interactions between the EGR and the air intake system. Anything which significantly impacts air flow will cause the EGR system to have difficulty with flow estimation and control. Items such as increased or decreased intake and exhaust restrictions or boost leaks can make it difficult to achieve good control. Poor electrical connections to the intercooler outlet temperature, manifold air temperature, manifold air pressure, and EGR temperature sensor in particular can cause a miss-calculation of EGR flow. Any miscalculation will cause an error code.

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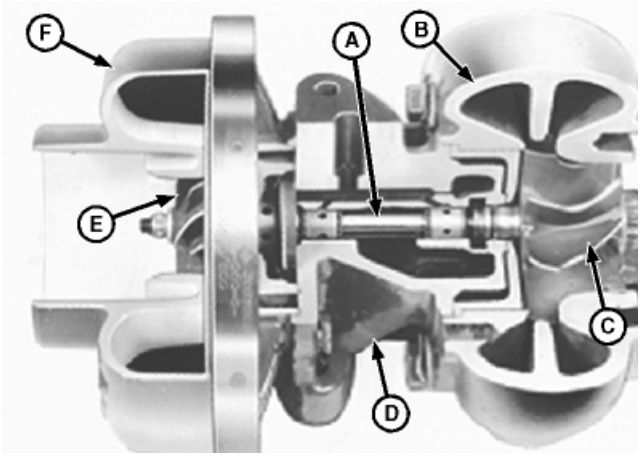
Turbocharger

The turbocharger, which is a turbine driven by exhaust gases, allows the engine to produce additional power using waste exhaust gas. Exhaust gases power the turbine to turn the compressor which draws in and pumps the intake air (“charge air”) to the intake manifold.

This engine employs a Variable Geometry Turbocharger (VGT), which uses moveable vanes in the exhaust turbine housing to restrict the flow of exhaust gasses. This decreases gas pressure to the turbine but increases gas velocity. Increased velocity of gas hitting the blades causes the turbocharger to turn faster.

While gas pressure is decreased to the turbine when the vanes close, pressure is increased inside the exhaust manifold (D). This pressure is also used to increase charge air pressure. When pressure rises inside the exhaust manifold due to increased load and the turbine vanes closing, the EGR (exhaust gas recirculation) valve will open to allow a portion of the exhaust gas to bypass the turbocharger through the EGR cooler and be routed to the intake manifold.

When air is compressed its temperature rises, so before entering the intake manifold, the charge air is routed through an air cooler to increase the air’s density, resulting in more air entering the combustion chambers. For more turbocharger information, refer to the Base Engine manual.



Turbocharger Components

A—Shaft
B—Turbine Housing
C—Turbine Wheel
D—Center Housing
E—Compressor Wheel
F—Compressor Housing

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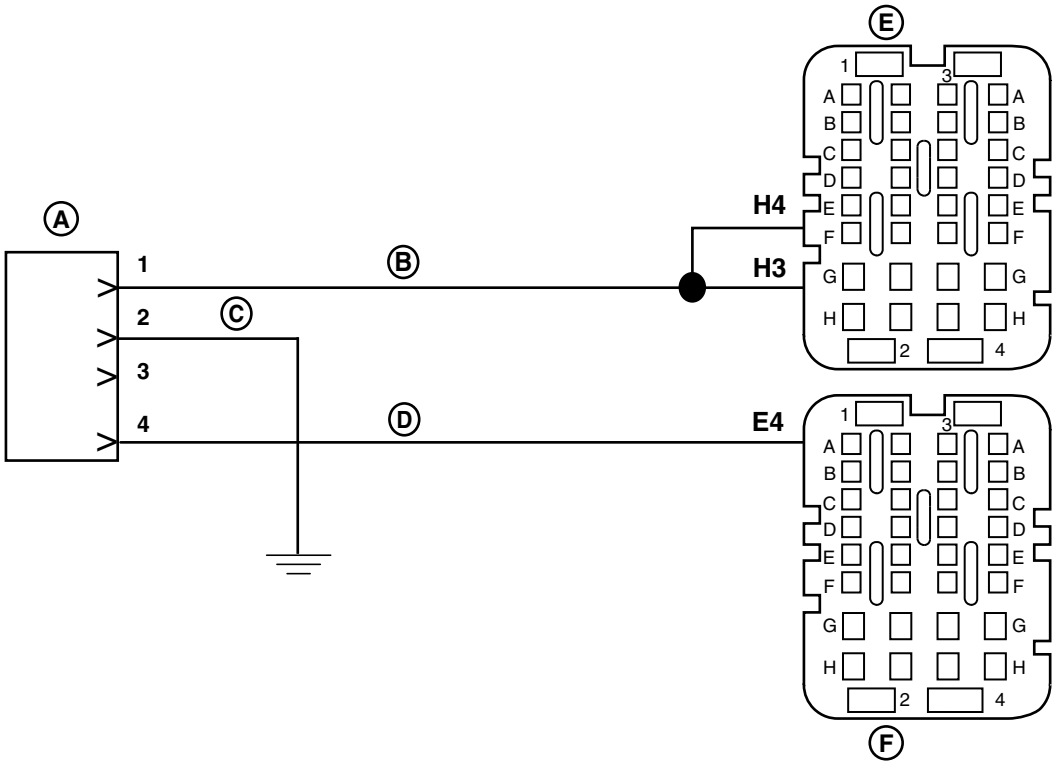
Turbocharger Actuator

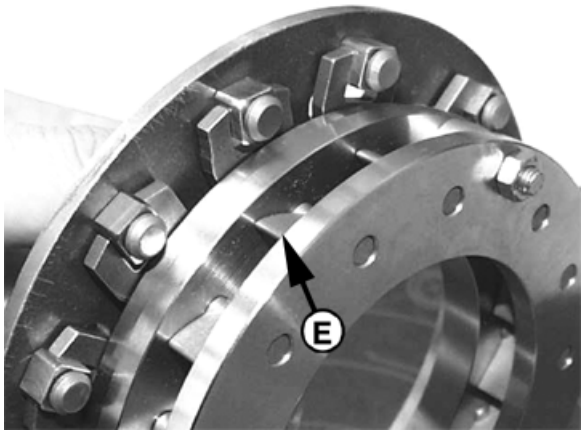


VGT Actuator Schematic

The Variable Geometry Turbocharger (VGT) uses an electronically controlled actuator to move the vanes in the exhaust turbine housing. The VGT vanes allow exhaust gas pressure to increase or decrease based on engine load demand and speed. The vanes work by restricting the flow of exhaust gasses, which decreases gas pressure to the turbine but increases gas velocity. Increased velocity of gas hitting the vanes cause the turbocharger turbine wheel to turn faster.

Various sensor inputs are used by the engine control unit (ECU) to continuously calculate a desired level of boost. The ECU sends analog signals to the actuator to move the vanes and EGR (exhaust gas recirculation) valve to ensure availability of proper exhaust pressures for EGR/fresh air mixing.

The variable output capability of the VGT provides the ability to increase low speed torque, provide a quicker transient response, and increase peak torque while also improving fuel economy. As engine speed and load demands increase, the ECU signals the VGT actuator to close the vanes on the turbine. This increases exhaust gas pressures and velocities, which increases engine boost. The increase in boost pressure also limits smoke and reduces emission particulates released to the atmosphere.



Variable Geometry Turbocharger Vanes

A—Actuator
B—H-Bridge
C—Actuator Ground Circuit
D—Actuator Command Circuit
E—ECU Connector J1
F—ECU Connector J3

To keep the actuator's circuit board from overheating, engine coolant is circulated through the actuator and returned to the thermostat housing. For more actuator information, refer to the Base Engine manual.

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Exhaust Gas Recirculation Cooler

Before exhaust gasses reach the EGR (exhaust gas recirculation) valve, the gasses are cooled in the exhaust gas cooler. The gasses travel through internal tubes surrounded by engine coolant. The coolant is routed from the intake manifold, through the cooler, and returned to the intake manifold. The cooler is a counter-flow design, which means that engine coolant flows in the opposite direction of the exhaust gases.

Exhaust gases enter the cooler at 450-750°C and exit at 170-250°C.

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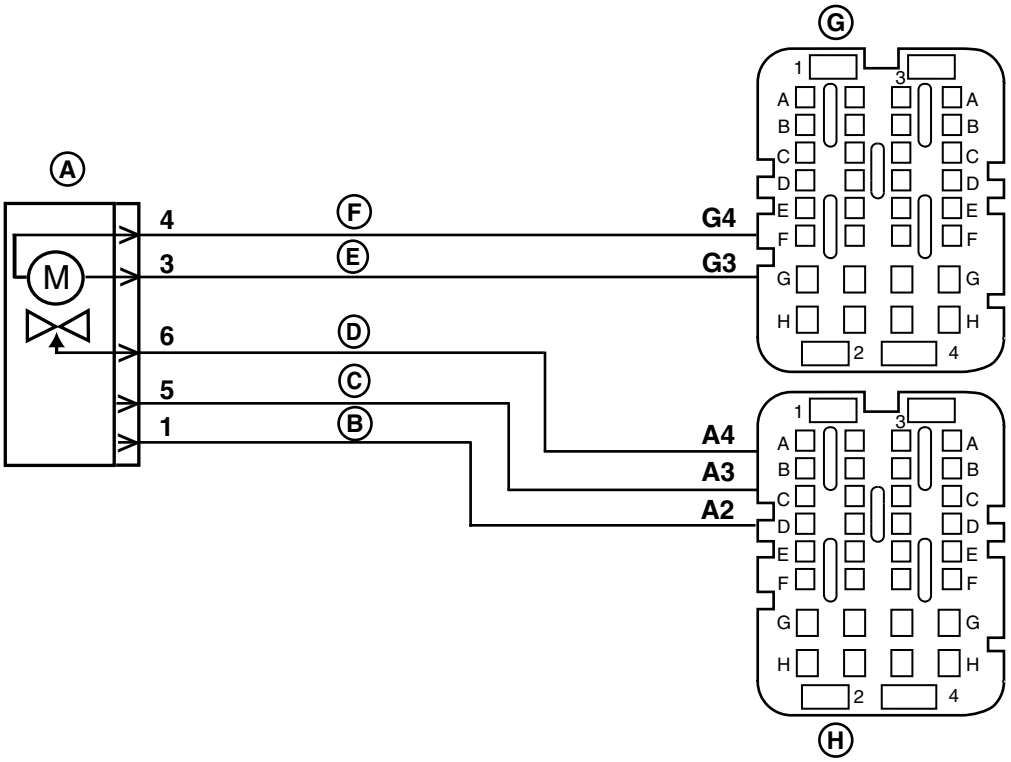
Exhaust Gas Recirculation Valve



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EGR Valve Schematic

A—EGR Valve
B—EGR Valve Position 5V Supply
C—EGR Valve Position Ground
D—EGR Valve Position Input
E—H-Bridge +
F—H-Bridge -
G—ECU Connector #J1
H—ECU Connector #J3

The Exhaust Gas Recirculation (EGR) valve is part of the intake manifold assembly. The function of the EGR valve, which is controlled by the engine ECU, is to mix given volumes of exhaust gases with the intake air. This mixture of exhaust gases and intake air increases engine boost allows more air to be introduced into the combustion chamber. This in turn allows more fuel to be introduced to the combustion process, to increase engine power. Diluting the intake air with as much as 10-12% exhaust gases (full load conditions) aids in controlling NOX (nitrous oxide) emissions.

The valve becomes functional when the engine is under load and the engine coolant is at operating temperature. At startup and under light load conditions, the valve remains closed.

As engine load and/or speed requirements and inputs from various temperature and pressure sensors change, the ECU calculates the appropriate analog “command” signal for the EGR valve. Valve position will change as the ECU varies the signal to regulate the amount of EGR allowed into the air intake manifold.

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About This Group

In this Group, the electronic control system is described in the following categories:

- Electronic Control System Terminology
- Component Location Diagram 1
- Component Location Diagram 2
- Component Location Diagram 3
- Component Location Diagram 4
- Electronic Control Unit (ECU) System Operation
- Controller Area Network (CAN)
- Measuring Temperature
- Engine Control Unit (ECU) Temperature Sensor
- Engine Coolant Temperature (ECT) Sensor
- Fuel Temperature Sensor
- Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor
- Charge Air Cooler Outlet Air Temperature Sensor
- Intake Manifold Air Temperature (MAT) Sensor
- Turbo Compressor Inlet Temperature Sensor
- Turbo Turbine Inlet Temperature
- Measuring Pressure
- Barometric Air Pressure (BAP) Sensor
- Fuel Rail Pressure Sensor
- Fuel Transfer Pump Pressure Sensor (optional)
- Manifold Air Pressure (MAP) Sensor
- Oil Pressure Sensor
- Measuring Speed
- Crank Position Sensor
- Pump Position Sensor
- Turbo Speed Sensor
- Throttle Descriptions
- CAN Throttle
- Pulse-Width Modulated (PWM) Throttle
- Analog Throttle
- Digital Multi-State Throttle
- Dual-State Throttle
- Tri-State Throttle
- Ramp Throttle
- Throttle Adjustments
- Throttle Offsets
- Self-Calibration
- Combination Throttle
- Marine Throttle
- Engine Derate and Shutdown Protection
- Electronic Injector (EI) Wiring Harness Connector
- Intake Air Heater Operation (optional)
- Torque Curve Selection
- Governor Droop Mode Selection
- Suction Control Valve
- Water in Fuel (WIF) Sensor
- Engine Coolant Level Switch (optional)
- Cruise Control Operation
- Power Supply #1
- Power Supply #2
- Power Supply #3
- Power Supply #4
- Power Supply #5

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Electronic Control System Terminology

Actuator	A device controlled by the ECU to perform a certain function.
Analog	Signal which has a continuous range of possible voltages, usually 0 volts (low) to 24 volts (high).
Application	Either a movable or stationary piece of equipment that the engine is placed in. Applications include, Tractors, Harvesters, Loaders, Irrigation Pumps, Generator Sets etc.
BAP	Barometric Air Pressure. Pressure of the atmosphere (atmospheric pressure).
Boost	Pressurized air in the intake manifold.
CAC	Charge Air Cooler. Cools the compressed air from the turbine before it enters the intake manifold.
CAN	Controller Area Network. The network on vehicles that allows communication between controllers.
Circuit Power	This is power supplied to a device for use by its internal component circuits.
Crank Sensor	Used to determine the angular position and velocity of the crankshaft in the 360° field of rotation.
Digital	A signal which consists of only two levels of voltage — usually 0 volts (low) to 24 volts (high).
DTC	Diagnostic Trouble Code. This is a code that is stored in the ECU's memory when it detects a problem in the electronic control system. There are two types of codes: Active and Stored. These codes are displayed on monitor panels and can be recalled by the service tool.
ECT	Engine Coolant Temperature.The temperature of the engine coolant.
ECU	Engine Control Unit. Computer that controls the fuel, air, and ignition systems on the engine.
EGR	Exhaust Gas Recirculation. Used to help reduce emissions.
EI	An Electronic Injector that is regulated by the ECU to control the proper amount of fuel.
FMI	Failure Mode Identifier. The second part of a two-part code that identifies control system fault codes according to the J1939 standard. This two-digit code identifies the type of failure that has occurred. The first half of the code is the Suspect Parameter Number (SPN).
H-Bridge	Circuits in the ECU set up in an H-configuration. This allows for current to be reversed to drive DC motors forward and reverse.
HPCR	High Pressure Common Rail. A device that distributes high pressure fuel to the injectors.
Input	This identifies a signal as an input to a device or controller.
J1939	The Society of Automotive Engineers (SAE) standard for communication between the electronic controllers on heavy-duty vehicles, both on- and off-highway.
JDCP	John Deere Custom Performance Program allows the customer to select software features and feature combinations prior to loading the software into the ECU. It is also one way by which embedded software is managed and updated in controllers without removal of the controller from the machine.
JDPS	John Deere Power Systems.
MAP	Manifold Air Pressure. The pressure of the air in the intake manifold, sometimes referred to as "boost" pressure.
MAT	Manifold Air Temperature. The temperature of the air in the intake manifold.
Meter Zero	This is the value the multi-meter reads in the ohm position, when the meter lead tips are held together.
OOR	Out-of-Range. The signal received by the ECU is out of the expected range of the device.

Continued on next page

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OORH	Out-of-Range High. Signal sensed by the ECU is higher than the component can produce (outside of acceptable limit). For some circuit types, this could be caused by an open input wire, an open ground wire, or an input wire shorted to a voltage higher than the ECU expects (+ battery).
OORL	Out-of-Range Low. Signal sensed by the ECU is lower than the component can produce (outside of acceptable limits). For some circuit types, this could be caused by an input wire or circuit power wire shorted to ground.
Output	This identifies a signal as an output from a device or controller.
Pin	A style of terminal that makes the electrical connection to a connector. Also called a male terminal.
Pump Position Sensor	Used to identify the cylinder that is on the compression stroke.
PWM	Pulse Width Modulation. A digital electronic signal of a fixed frequency. The on-time of the signal is increased or decreased (modulated) to indicate a change in condition.
RAM	Random Access Memory. The portion of the computer memory within the ECU that is used when the ECU is running. All data in this memory is lost when the ECU is “OFF”.
Socket	A style of terminal that makes the electrical connection to a connector. Also called a female terminal or receptacle.
Suction Control Valve	Suction Control Valve regulates the amount of fuel that the high pressure fuel pump supplies the HPCR.
SDS	Software Delivery System. Used by JDPS to maintain software and programming records.
Sensor	Device used by the ECU to monitor various engine parameters.
SPN	Suspect Parameter Number. The first half of a two-part code that identifies control system fault codes according to the J1939 Standard. The SPN identifies the system or component that has the failure. The second half of the code is the Failure Mode Identifier (FMI).
TDC	Top Dead Center. Point of uppermost piston travel.
Throttle Rate	How quickly the ECU changes the engine fuel rate in response to a throttle increase signal. Throttle rate has no impact on deceleration.
Trim Options	Options that can be enabled or disabled in the ECU programming, such as throttle selection, torque adjustment, governor gains, derates and shutdowns, etc.
TWV	Two-Way Valve. A component in the Electronic Injector (EI).
VGT	Variable Geometry Turbo. Used to reduce emissions.
WIF	Water In Fuel. The WIF sensor sends a signal to the ECU when water is detected in the fuel.

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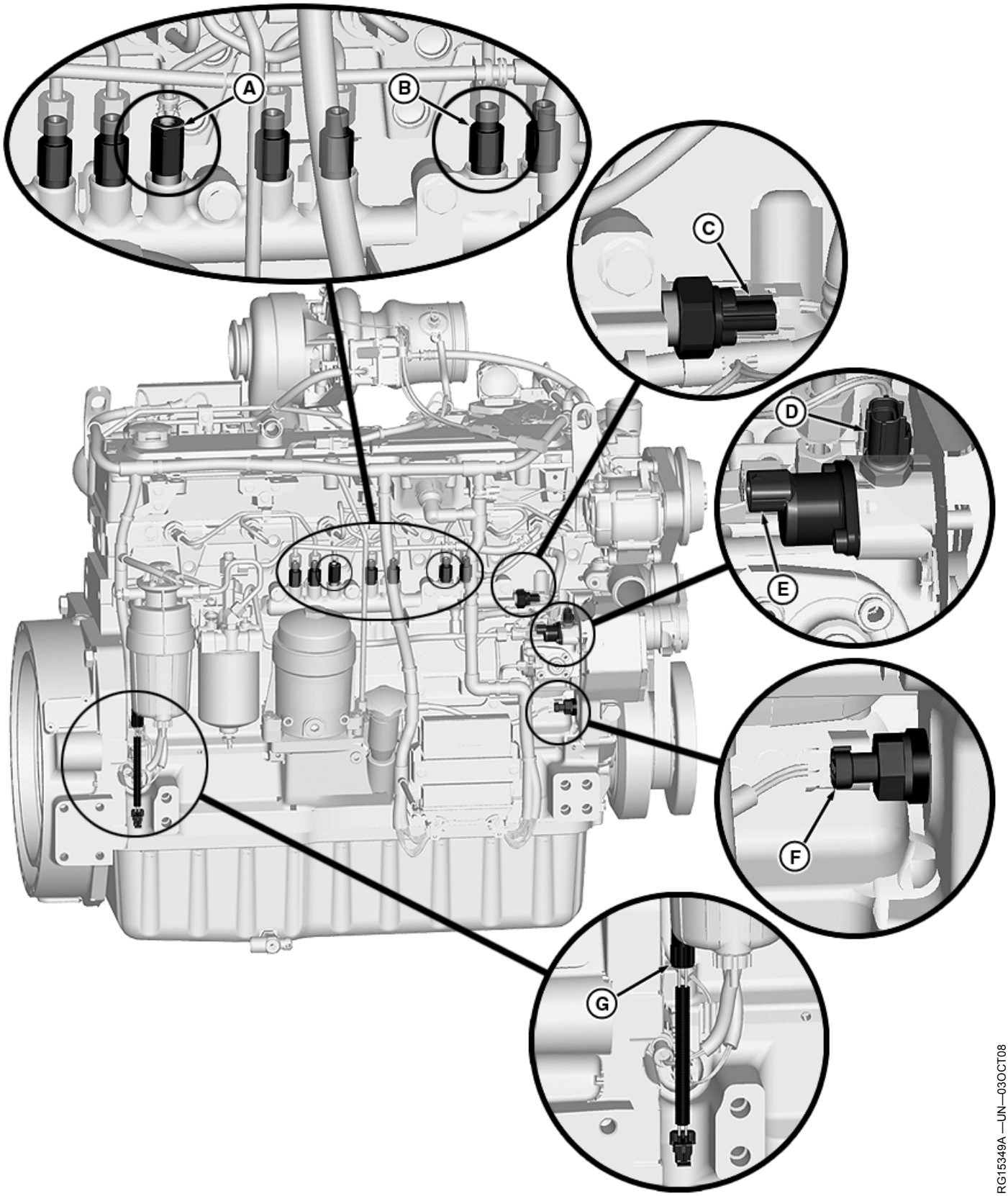
Component Location Diagram 1



Component Location Diagram 1

A—Pressure Limiter
B—Flow Damper
C—Fuel Rail Pressure Sensor
D—Fuel Temperature Sensor
E—Pump Control Valve
F—Pump Position Sensor
G—Water In Fuel (WIF) Sensor

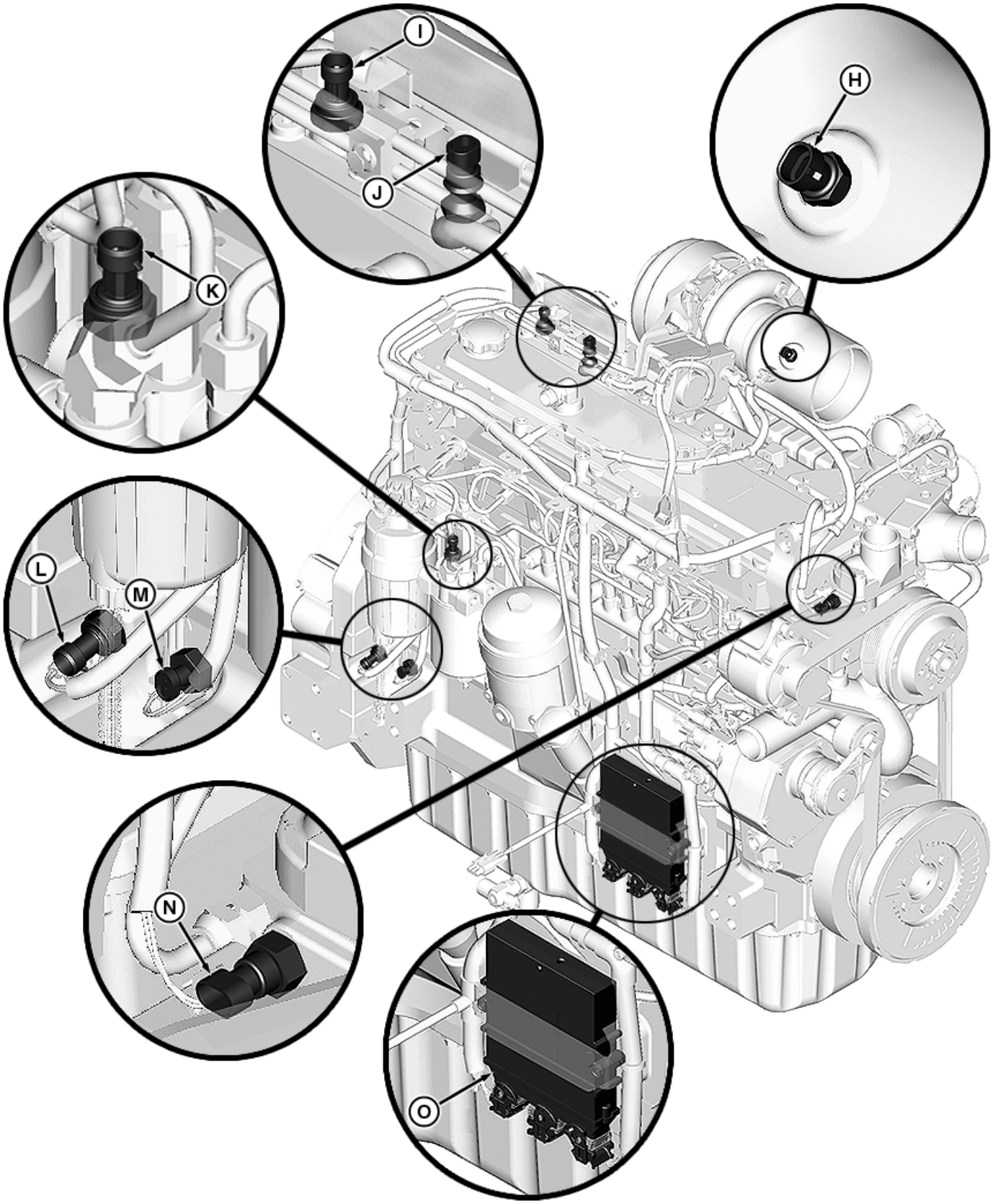
Continued on next page

DN22556,0000049 -19-03OCT08-1/2

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

DN22556,0000049 -19-03OCT08-2/2

Component Location Diagram 2



Component Location Diagram 2

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BK53208,0000048 -19-03OCT08-1/2

H—Turbo Compressor Inlet Temperature Sensor
I— Manifold Air Pressure (MAP) Sensor
J— Manifold Air Temperature (MAT) Sensor
K—Fuel Pressure Sensor
L— Oil Pressure Sensor
M—Crank Position Sensor
N—Engine Coolant Sensor
O—ECU

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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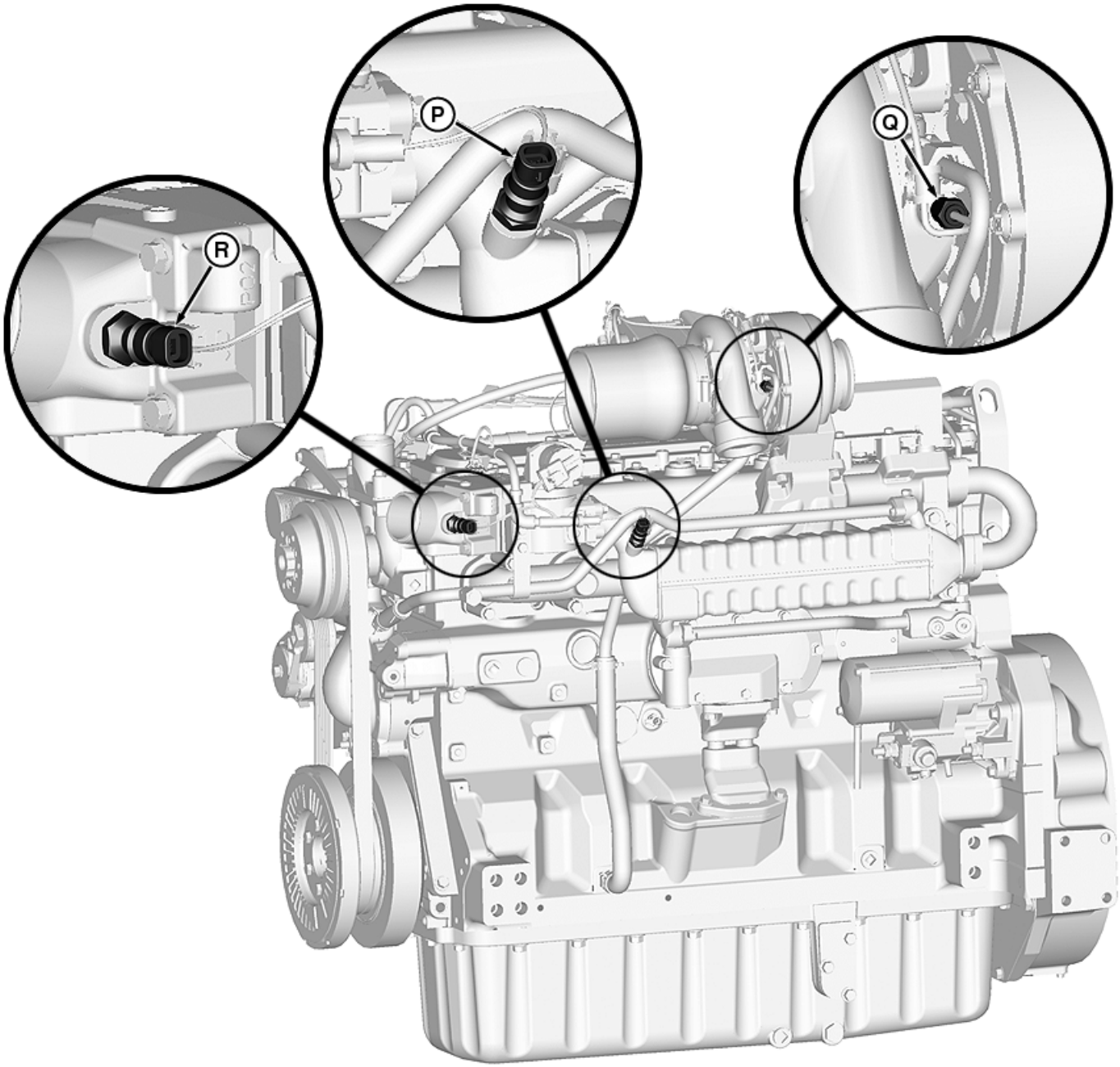
Component Location Diagram 3



Component Location Diagram 3

P—EGR Exhaust Temperature Sensor
Q—Turbo Speed Sensor
R—Charged Air Cooler Outlet Air Temperature Sensor

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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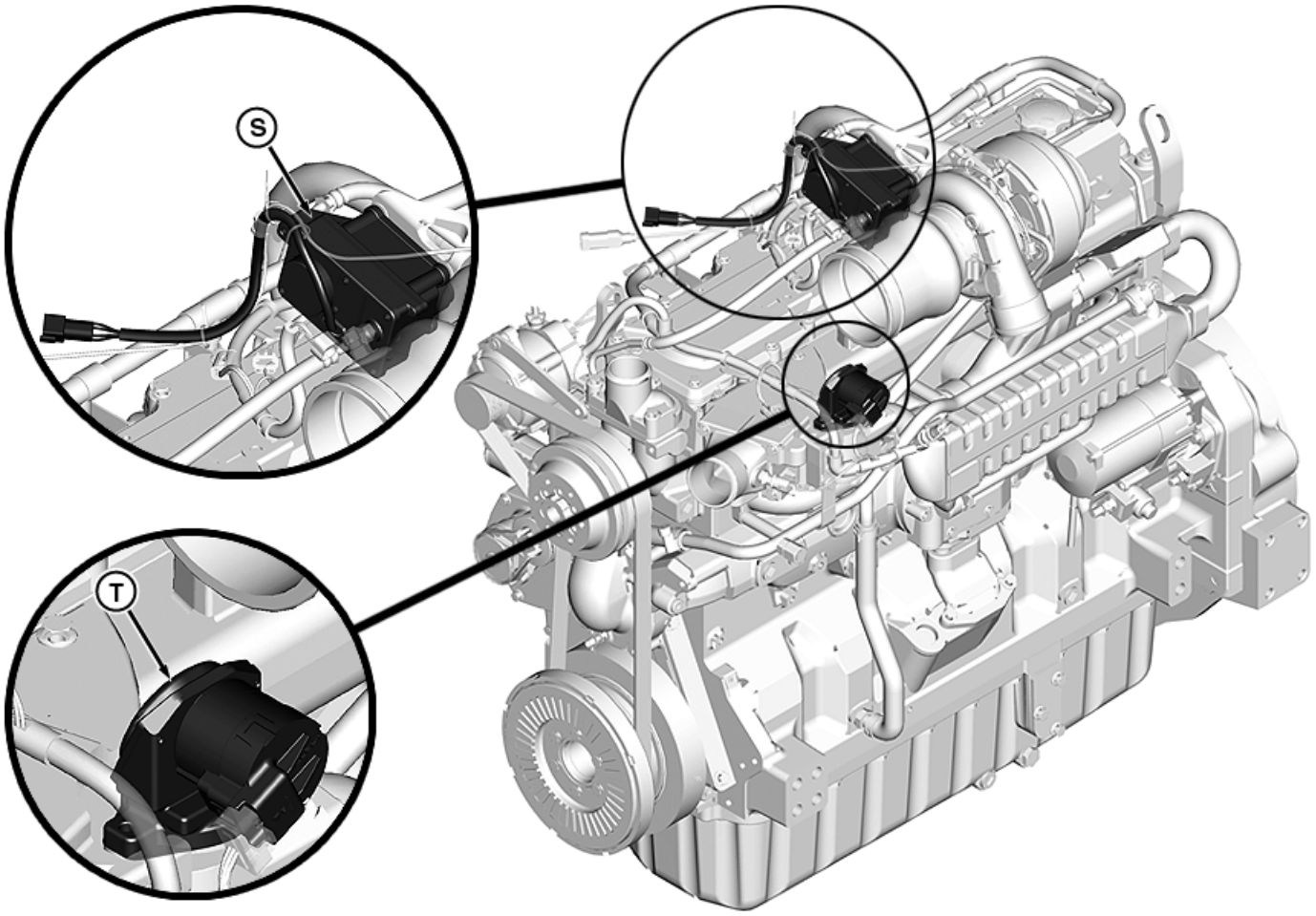
Component Location Diagram 4



Component Location Diagram 4

S—VGT Actuator **T—EGR Valve**

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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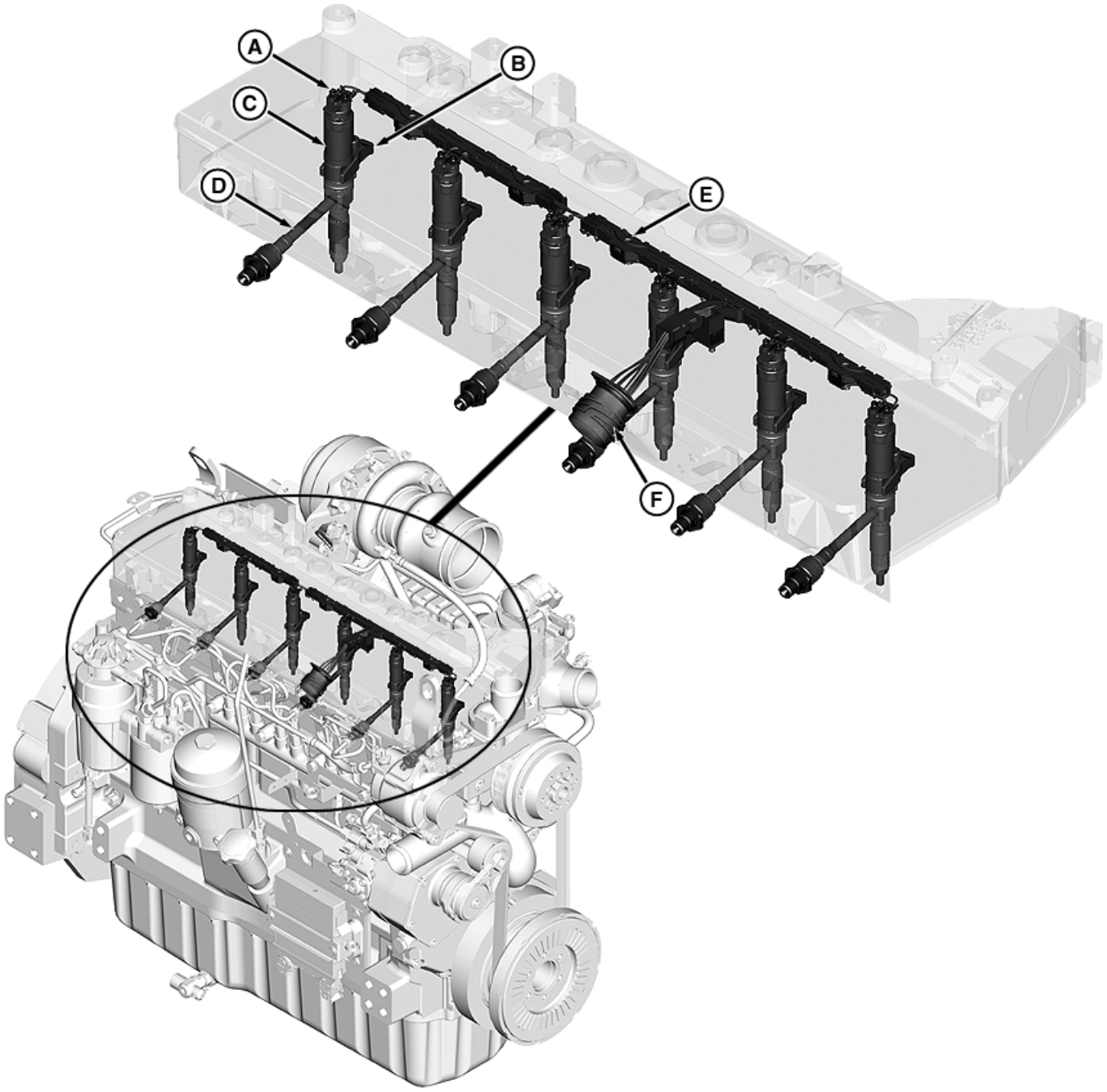
Component Location Diagram 5



Injector Wiring Harness

A—Terminal Nut
B—Injector Clamp
C—Electronic Injector
D—Inlet Connector
E—Injector Wiring Harness Carrier
F—Wiring Harness Connector

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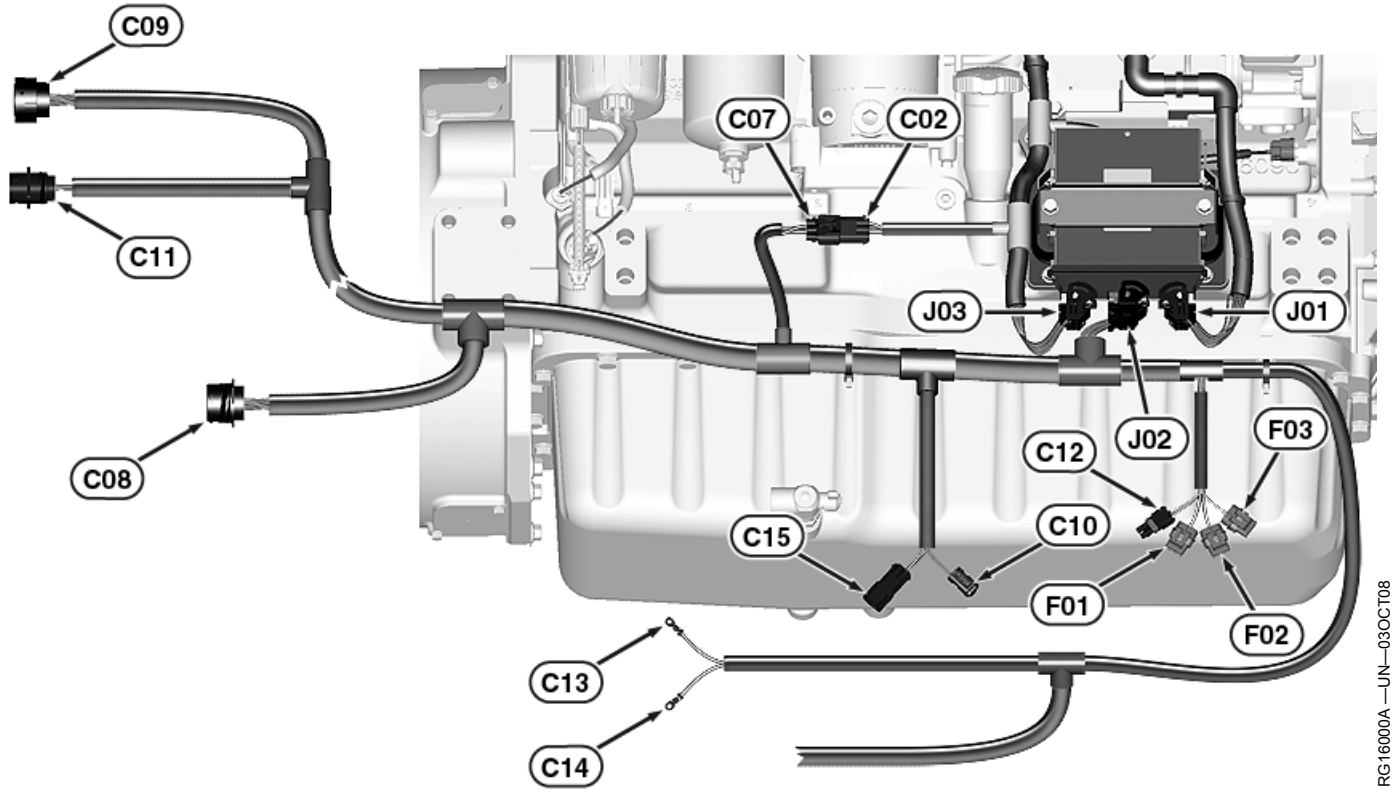
Component Location Diagram 6



Component Location Diagram 6

C02— Accessory Connector A
C07— Accessory Connector B
C08— Auxiliary Connector
C09— Control Panel Connector
C10— CAN Terminator
C11— CAN Diagnostic Connector
C12— Transient Voltage Protector
C13— Starter Relay Coil (Return)
C14— Starter Relay Coil (Signal)
C15— Remote On/Off
F01— Fuse, 30 Amp
F02— Fuse, 20 Amp
F03— Fuse, 15 Amp
J01— ECU Harness Connector, Black Face
J02— ECU Harness Connector, Red Face
J03— ECU Harness Connector, Blue Face

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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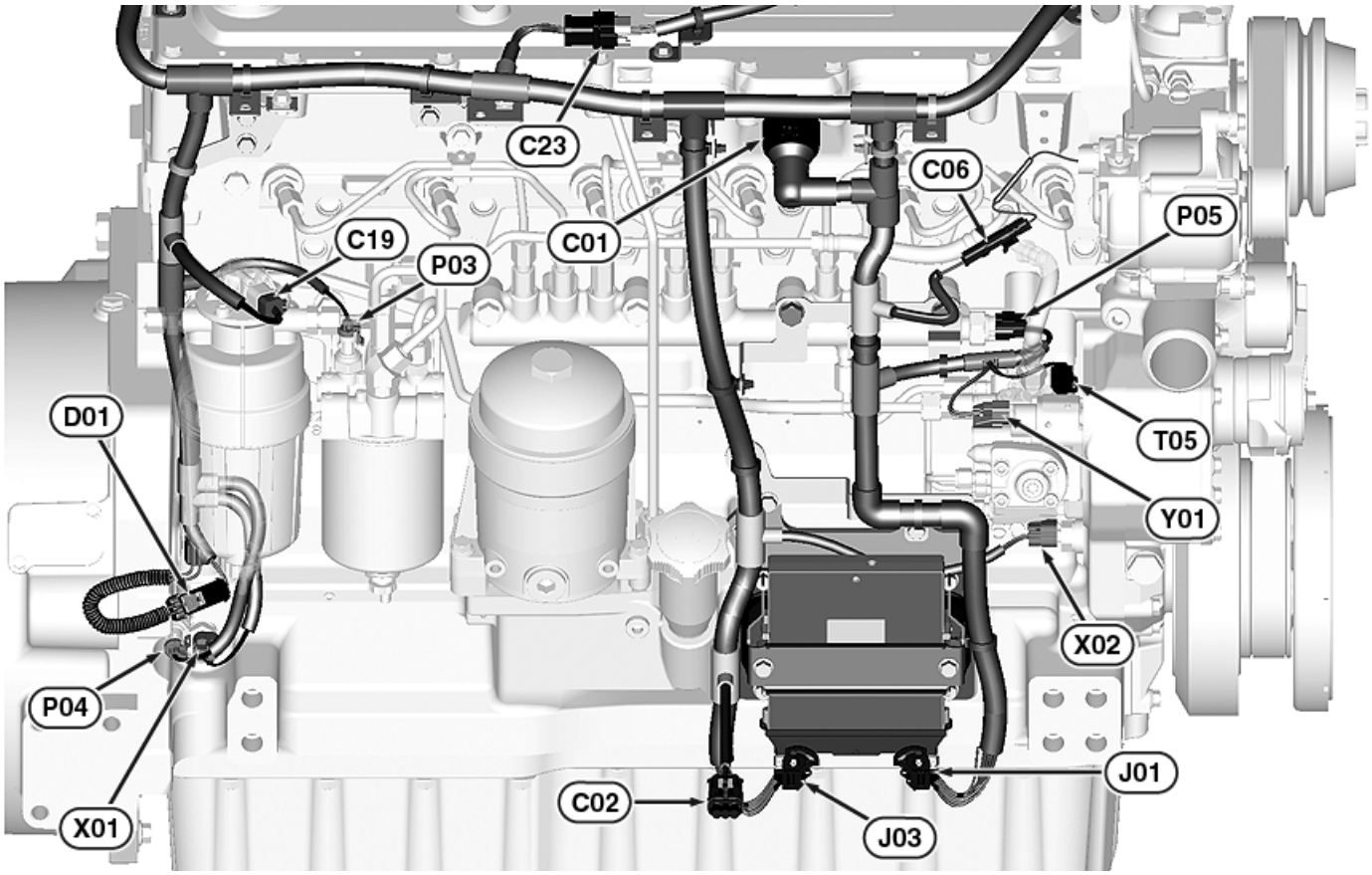
Component Location Diagram 7



Component Location Diagram 7

C01— Fuel Injector Connector
C02— Accessory Connector A
C06— Alternator Excitation
C19— Low Pressure Fuel Pump Connector
C23— VGT Interconnect
D01— Water-In-Fuel Connector
J01— ECU Harness Connector, Black Face
J03— ECU Harness Connector, Blue Face
P03— Low Pressure Fuel Pressure Sensor Connector
P04— Engine Oil Pressure Sensor Connector
P05— Fuel Rail Pressure Sensor Connector
T05— Fuel Temperature Sensor Connector
X01— Crank Position Sensor Connector
X02— Pump Position Sensor Connector
Y01— Suction Control Valve Connector

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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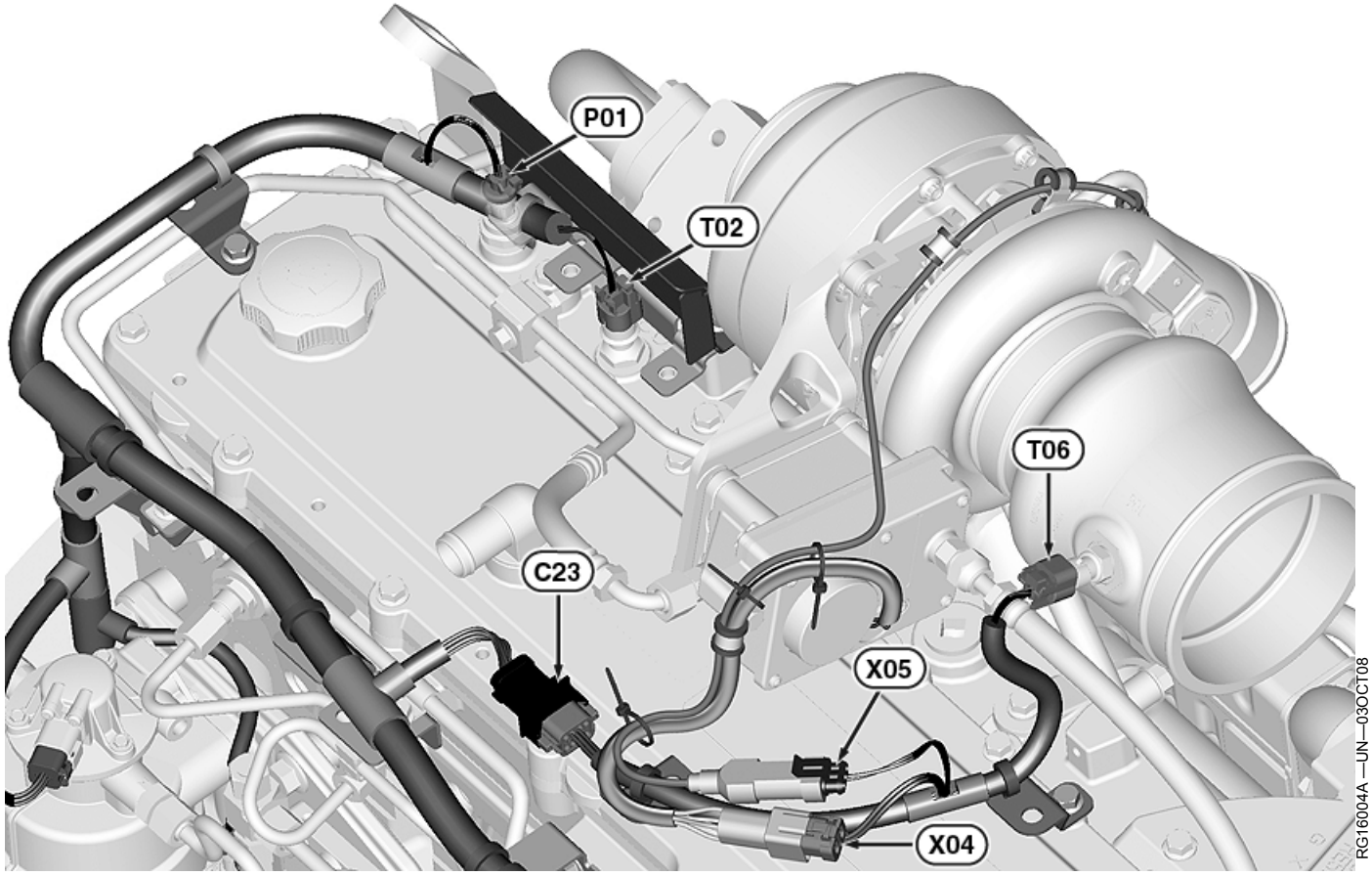
Component Location Diagram 8



Component Location Diagram 8

C23— VGT Interconnect
P01— Intake Manifold Air Pressure Sensor Connector
T02— Intake Manifold Air Temperature Sensor Connector
T06— Compressor Inlet Temperature Sensor Connector
X04— VGT Actuator Connector
X05— Turbo Speed Sensor Connector

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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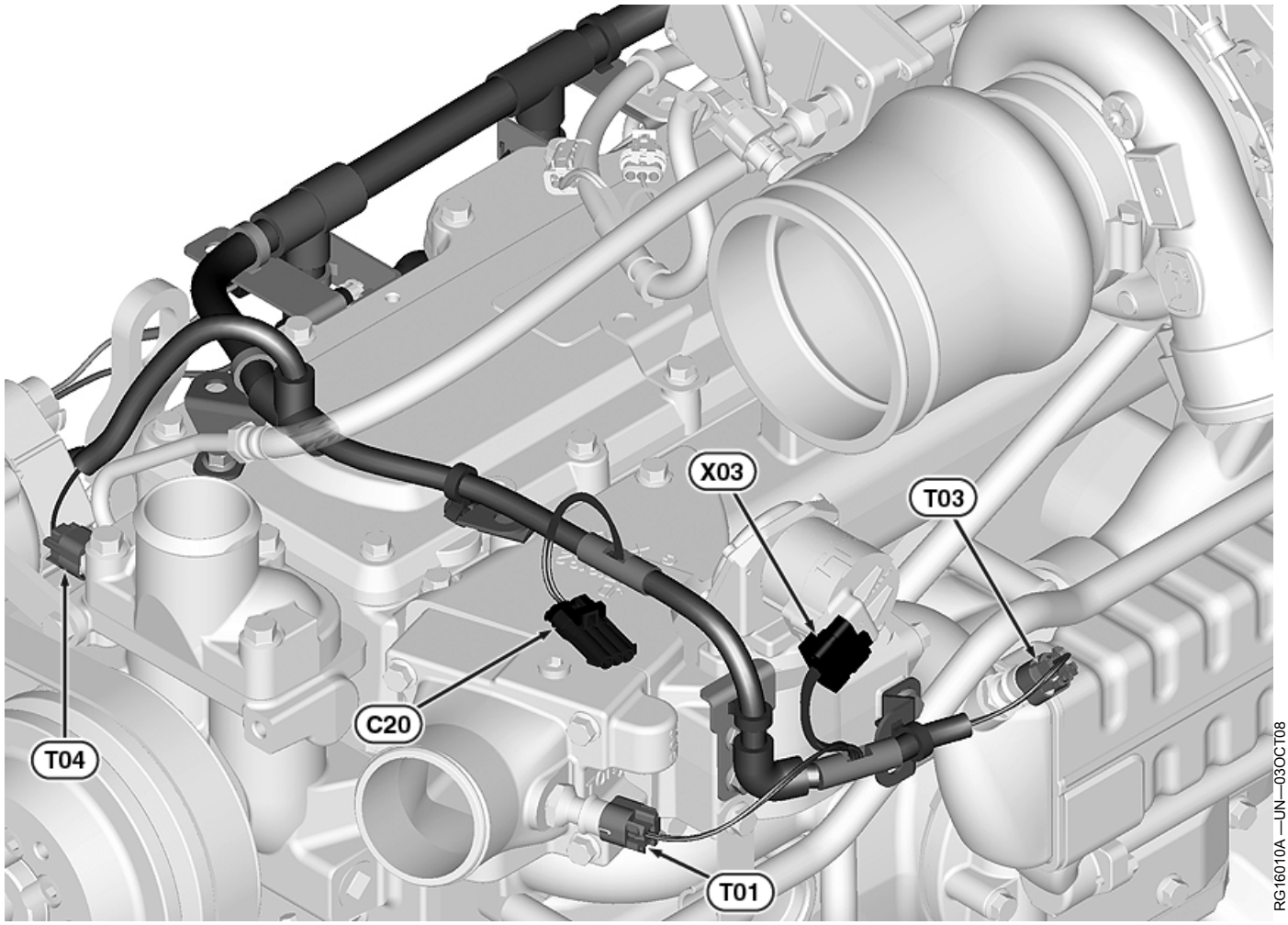
Component Location Diagram 9



Component Location Diagram 9

C20— Air Heater Jumper Connector
T01— Charge Air Cooler Outlet Temperature Sensor Connector
T03— EGR Temperature Sensor Connector
T04— Coolant Temperature Sensor Connector
X03— EGR Valve Connector

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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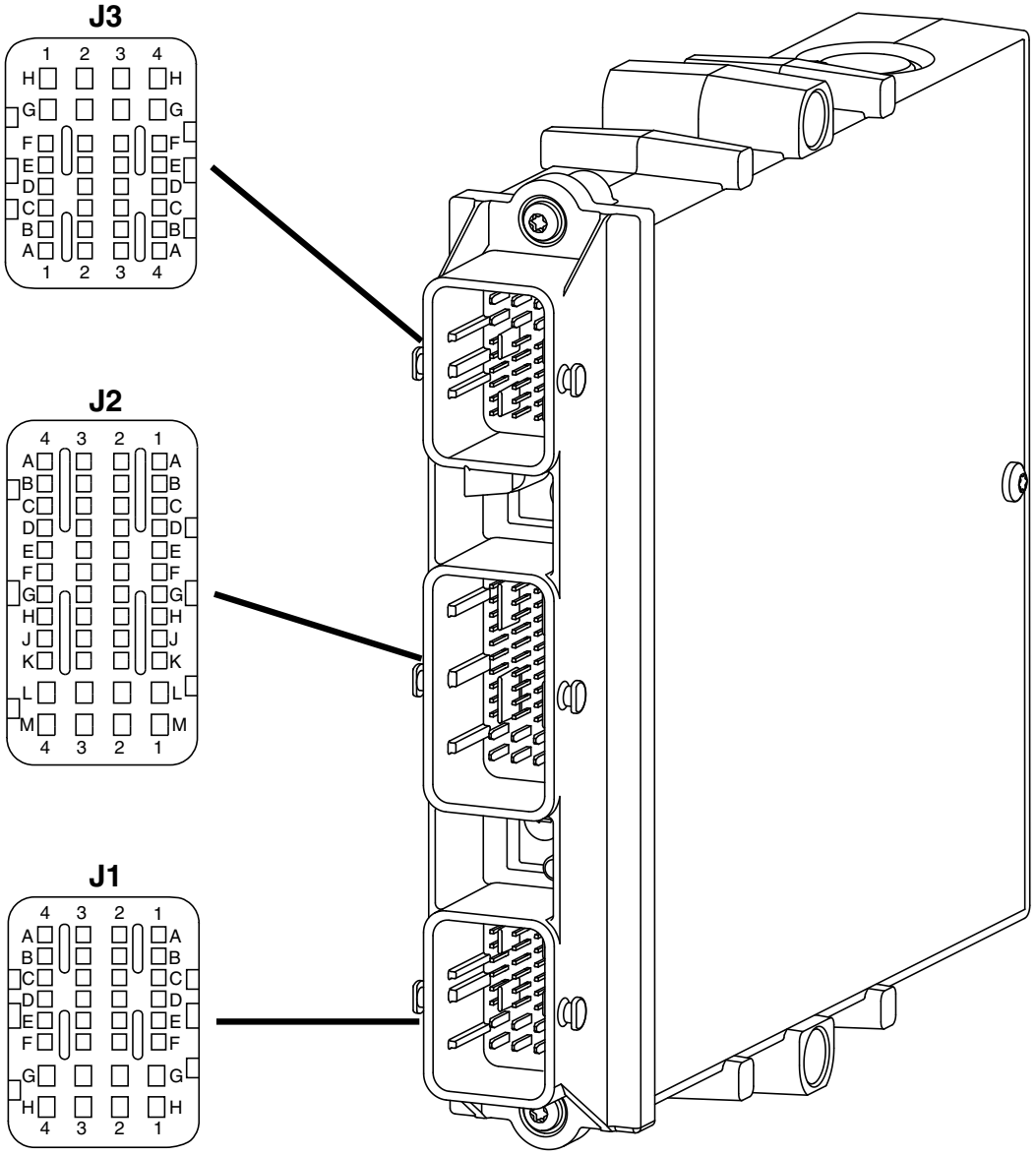
Engine Control Unit (ECU) System Operation



Engine Control Unit (ECU)

J1— 32 Pin Connector - Black Tip J2— 48 Pin Connector - Red Tip J3— 32-Pin Connector - Blue Tip

Main Components of the Engine Control Unit (ECU)

The ECU is the controller that follows a defined program to run the engine at the desired operating point while keeping within emissions regulation. This system is made up of input components (i.e. temperature and pressure sensors), and controlled components (i.e. injectors and actuators). The ECU consists of:

- Analog-to-digital converters (A/D)
- Digital-to-analog converters (D/A)
- Microprocessor (CPU)
- Memory (storage)
- Internal power supplies for external components

Analog-to-Digital and Digital-to-Analog Converters (A/D and D/A)

The A/D takes the analog input information from the external components and converts it to a digital value that the CPU can understand. The D/A converts the digital information from the CPU to analog information that is used by the external components.

Microprocessor (CPU)

The CPU is considered the “brains” of the ECU. It reads instructions from storage (memory) and interprets them. It receives information from external components, like sensors, through the A/D. It sends outputs to control external components, like actuators. It also performs mathematical computations and logical functions.

Memory

Continued on next page

Memory is a component capable of retaining digital information. This information can be operation code, data files, or fragments of data.

Temporary memory (RAM) is used to hold data for short periods of time. This information is lost when the key is turned to OFF position.

Permanent memory (Flash) stores information for long periods of time. This is where the program and calibration information is stored. The information in this type of memory is not lost when power is completely removed or if the controller is removed from the engine harness.

Internal Power Supplies for External Components

The ECU has several internal power supplies commonly referred to as sensor supplies, that deliver reference voltages to the engine sensors, throttles, and switches. There are OOR high and OOR low voltage diagnostic trouble codes associated with each power supply. Multiple power supplies are used, because there are so many external components. This also keeps critical components from being affected by shorts in other components.

Functions of the ECU

Basic Functions of the Engine Control System

The electronic control system serves as an engine governor by controlling the Electronic Injectors (EIs) so that the fuel is delivered according to a given set of engine conditions, precise amounts, and at precise time in relation to piston position. In order to achieve this, the control system performs the following functions:

- Constantly monitor engine operating conditions.
- Precisely determines piston position
- Deliver optimum amount of fuel for a given set of operating conditions
- Deliver fuel at optimum piston position
- Provide multiple control modes
- Perform system diagnosis

System Problem Diagnosis

The ECU can detect problems with external components and their associated wiring. There is a Harness Diagnostic Test that can be ran from Service ADVISOR to help diagnose some of the problems (see HARNESS DIAGNOSTIC MODE TEST later this section).

Sensor Monitoring

The ECU monitors its internal temperature to ensure the engine does not overheat and damage components. It monitors the power supplies to ensure they are operating at the proper voltage. Monitors proper running of stored programs. When the key is turned off, it even monitors its shut-down process to ensure it happens properly. If a problem exists, the ECU will generate a Diagnostic Trouble Code (DTC).

The ECU is continuously receiving real-time inputs from temperature, pressure, speed, and position sensors. The ECU compares these values with expected values for the operating conditions. If the ECU detects a problem, it will generate a DTC.

Diagnostic Trouble Codes (DTC)

These are codes that the ECU sends out over the CAN bus to tell the operator or service equipment it sees a problem (See DIAGNOSTIC TROUBLE CODES LIST later in this group). Some of these codes contain a snapshot of certain parameters at the time the codes sets which will be stored in the ECU. There may also be a recording of more data that is stored depending on the DTC (See VIEWING SNAPSHOT CAPTURE later this section).

Engine Starting Mode

When the key is turned to the “ON” position, a switched power voltage is sent to the Engine Control Unit (ECU). This energizes the ECU and allows it to “boot-up” and ready itself for engine start.

NOTE: If a wiring problem prevents the key ON signal from getting to the ECU, the engine will not start.

As soon as the ECU determines using the Crank Position Sensor input that the engine is cranking, it will determine using the Pump Position Sensor input when cylinder number 1 is coming to top-dead-center at the end of the compression stroke. It will then start injecting fuel when the next cylinder in the firing order (cylinder number 5) is at the correct position. At this point, the engine will start and the ECU will go into the running mode. To provide cold temperature enrichment, the amount of fuel injected is based on the temperature measured by the Engine Coolant Temperature (ECT) sensor.

Engine Running Mode

In the running mode, both the crank and pump position sensors allow the ECU to precisely determine piston position in relation to top-dead-center. The ECU uses this information to actuate each individual EI of the injection timing and rate. The ECU controls fuel delivery by energizing and de-energizing the two-way valve (TWV), which is located in the EI.

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Controller Area Network (CAN)

The CAN bus is a high-speed open interconnect network for electronic systems on the vehicle. It allows electronic systems to communicate with each other through a standard architecture of electronic signals over shielded twisted-pair wires. Just about any type of information can be communicated over the CAN Bus. Information such as throttle position, safety systems, engine condition, fuel system information, etc, can be transferred between vehicle controllers. Vehicles can communicate with laptop computers and other accessories. Information on the network can be displayed to the operator on a display panel, or relayed to another location via telemetry. Up to 30 Electronic Control Units or modules can be connected together through a single CAN network segment. A CAN connection (SAE J1939) is provided on the vehicle wiring harness. A round Deutsch 9-pin connector is provided primarily for service/diagnostic purposes. CAN also allows diagnostic software to communicate with the vehicle.

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Measuring Temperature

Temperature sensors are generally thermisters–temperature-sensitive variable resistors. The resistance of the sensor decreases as temperature increases (negative temperature coefficient). As the temperature changes it causes the voltage (D) to change. The ECU compares this voltage with values programmed into its memory. If the value measured is near the expected value, the ECU assumes everything is correct. If the value is above or below the expected value, the ECU will set the appropriate diagnostic trouble code (DTC). For more information on DTCs, see DIAGNOSTIC TROUBLE CODES LIST in Section 4, Group 160.

The ECU has the ability to derate the engine power, engine speed, or to shut down the engine in an attempt to protect the engine and its components. If certain temperatures exceed the threshold, the ECU will enable the engine protection. For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

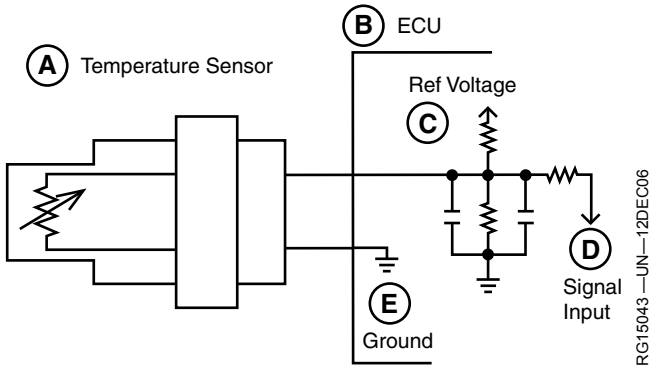

Figure 1

A—Temperature Sensor
B—ECU
C—Reference Voltage
D—Signal Input
E—Ground

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Engine Control Unit (ECU) Temperature Sensor

The ECU temperature sensor is located internal to the ECU. This sensor cannot be repaired or replaced without replacing the entire ECU. This sensor is used to determine the internal temperature of the ECU. If the temperature exceeds the temperature specification, the ECU will limit the speed of the engine in an attempt to protect the ECU from permanent damage.

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Engine Coolant Temperature (ECT) Sensor

The ECU monitors engine coolant temperature for:

- Engine protection purposes. Depending on the severity of the temperature increase, ECU transmits a diagnostic code for either moderate or extreme levels. The engine is derated correspondingly to each level of severity.
- If the ECU determines the coolant temperature is too low for the current operating conditions it will set an diagnostic trouble code. This normally indicates a thermostat that is stuck open.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

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Fuel Temperature Sensor

The ECU uses this sensor input to calculate fuel density and adjust fuel delivery accordingly. The ECU also uses the fuel temperature sensor for engine protection purposes. In addition, the air heater operation is driven off of the fuel temperature. If the temperature of the fuel drops below specification, the air heater will turn on for a predetermine length of time.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION 2for 4.5L COMPONENT LOCATION 6for 6.8L earlier in this Group.

For more air heater information, see INTAKE AIR HEATER OPERATION later in this Group.

DM80898,00000F7 -19-18APR08-1/1

Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor

The ECU uses this sensor to measure the temperature of the exhaust gas entering the EGR valve. The ECU then compares the temperatures of the EGR exhaust, charge air cooler outlet air, and the manifold air to determine if proper cooling and mixing has occurred. If the temperature is not correct, the ECU can adjust the signal going to the EGR valve to compensate the mixture accordingly. The ECU also uses this sensor for engine protection purposes.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 3 earlier in this Group.

DB92450,0000011 -19-15OCT07-1/1

Charge Air Cooler Outlet Air Temperature Sensor

The ECU uses this sensor to measure the temperature of the charge air cooler outlet air entering the manifold. The ECU then compares the temperatures of the EGR exhaust, charge air cooler outlet air, and the manifold air to determine if proper cooling and mixing has occurred. If the temperature is not correct, the ECU can adjust the signal going to the EGR valve to compensate the mixture accordingly. The ECU also uses this sensor for engine protection purposes.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 3 earlier in this Group.

RG41221,00002A6 -19-15OCT07-1/1

Intake Manifold Air Temperature (MAT) Sensor

EGR engines

The ECU uses this sensor to measure the temperature of the air in the intake manifold. The ECU then compares the temperatures of the EGR exhaust, charge air cooler outlet air, and the intake manifold air to determine if proper cooling and mixing has occurred. If the temperature is not correct, the ECU can adjust the signal going to the EGR valve to compensate the mixture accordingly. The MAT sensor helps the ECU calculate the correct fueling for the engine. The intake manifold air is the air that will be used in the cylinder for engine combustion. The ECU also uses this sensor for engine protection purposes.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 2 component (J) earlier in this Group.

Non-EGR engines

The ECU uses this sensor to measure the temperature of the air in the intake manifold. The ECU also uses this sensor for engine protection purposes.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 2 component (J) earlier in this Group.

DN22556,00006C9 -19-23OCT07-1/1

Turbo Compressor Inlet Temperature Sensor

The ECU uses this sensor to calculate the ambient air temperature into the turbo. The ECU also uses this sensor in addition to the charge air cooler outlet air temperature to calculate the temperature of the turbo compressor outlet temperature. From these calculations, the ECU can determine if the air/fuel ration is correct, or if changes are required.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 1 earlier in this Group.

DN22556,000003D -19-15OCT07-1/1

Turbo Turbine Inlet Temperature

There is no turbo turbine temperature sensor. This temperature is calculated by the ECU. The ECU uses the following parameters to create the model based temperature:

- Manifold Air Pressure
- Timing base on the crank position or the pump position sensor
- Fuel Rail Pressure
- Engine Speed
- Fresh Air to Fuel Ratio
- A software filter to represent a time delay for component heat up rate.

The ECU also uses this temperature for engine protection purposes.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

RG41221,00002A8 -19-15OCT07-1/1

Measuring Pressure

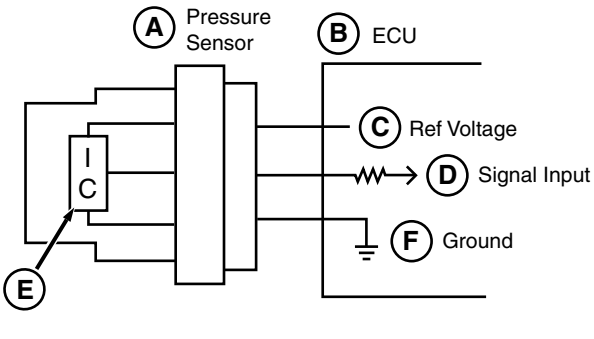
All engine pressure sensors (A) are 3-wire devices. As pressure changes, output changes. The ECU (B) supplies the sensor with a reference voltage (C) and ground (F). It monitors the output voltage from the sensor signal output wire (D). As the pressure changes, it causes the input to the ECU to change. The ECU compares the input value to a pre-programmed value in the ECU's memory.

There are many types of devices, and depending on the circuitry (E) in the device, the ECU determines how to process the input signal.

If the input value is near the expected value, then the ECU assumes everything is functioning properly. If the value is above or below the expected value, the ECU will set the appropriate diagnostic trouble code (DTC).

The ECU has the ability to derate the engine power, engine speed, or shut down the engine in an attempt to protect the engine and its components. If certain pressures exceed the threshold, the ECU will enable the engine protection.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.



Typical Pressure Sensor Schematic

A—Pressure Sensor
B—ECU
C—Ref Voltage
D—Signal Input
E—IC (Integrated Circuit)
F—Ground

For more information on DTC's, see DIAGNOSTIC TROUBLE CODES LIST in Section 4, Group 160.

RG40854,00000E5 -19-04JAN08-1/1

Barometric Air Pressure (BAP) Sensor

The BAP sensor is located internal to the ECU. This sensor cannot be repaired or replaced without replacing the entire ECU. This sensor is used to determine the pressure of the ambient air at the mounting location of the ECU. This helps the ECU determine the air density for calculating the correct air/fuel ratio.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

RG41221,00002A9 -19-15OCT07-1/1

Fuel Rail Pressure Sensor

The fuel rail pressure sensor sends a pressure equivalent signal to the ECU. The ECU monitors fuel pressure to control the amount and timing of fuel being transferred from the high pressure fuel pump to the high pressure common rail (HPCR). The ECU uses this signal input to determine if fuel rail pressure is adequate for the current operating condition. The ECU will command more or less fuel from the high pressure fuel pump by altering the signal to the suction control valve. The ECU also uses this sensor to determine if there is an electronic injector problem by measuring the drop of pressure every time the engine injects fuel to a specific cylinder. This sensor is used for engine protection.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

For more information on the suction control valve, see SUCTION CONTROL VALVE later in this Group.

DB92450,0000015 -19-30AUG07-1/1

Fuel Transfer Pump Pressure Sensor

The fuel pressure sensor sends a pressure equivalent signal to the ECU. The ECU monitors fuel pressure to determine if fuel is continuously passing through the low pressure side of the fuel system, or if there is a leak or blockage in it.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,0000420 -19-27AUG07-1/1

Manifold Air Pressure (MAP) Sensor

The ECU uses manifold absolute pressure to help calculate the amount of airflow into the engine. The MAP sensor also supplies the ECU with a direct measurement of turbo boost.

The ECU computes what MAP should be based on engine operating conditions and turbo speed. If the actual value of MAP from the sensor is significantly different for the current operating conditions the ECU will default to a MAP model and set DTC 000102.02.

The most probable causes of this error are boost air leaks and air intake restrictions.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,0000422 -19-15OCT07-1/1

Oil Pressure Sensor

The oil pressure sensor sends an oil pressure equivalent signal to the ECU. The ECU uses this signal to determine if engine oil pressure is adequate for the current operating conditions. The ECU monitors oil pressure for engine protection purposes.

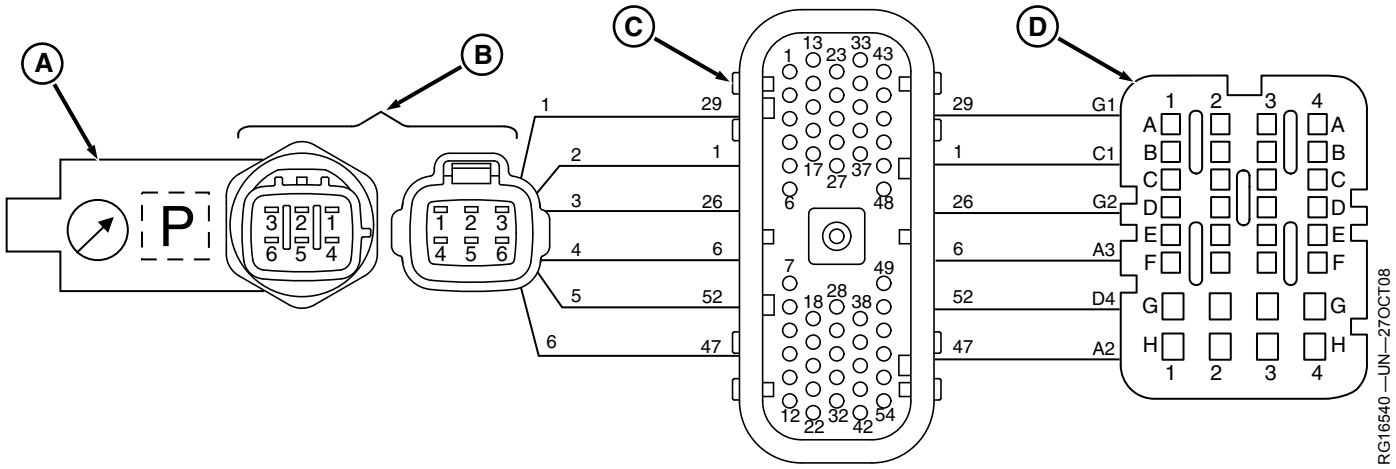
For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DB92450,0000016 -19-15OCT07-1/1

Dual Fuel Rail Pressure Sensor (Redundant ECU Applications)



Dual Fuel Rail Pressure Sensor

A—Dual Fuel Rail Pressure Sensor

B—P05 Sensor Connector

C—Switch Box Connector

D—J03 ECU or Redundant ECU Connector

The dual fuel rail pressure sensor sends two redundant pressure equivalent signals to the ECU. The ECU monitors fuel pressure to control the amount and timing of fuel being transferred from the high pressure fuel pump to the high pressure common rail (HPCR). The ECU uses this signal input to determine if fuel rail pressure is adequate for the current operating condition. The ECU will command more or less fuel from the high pressure fuel pump by altering the signal to the suction control valve. The ECU also uses this sensor to determine if there is an electronic injector problem by measuring the drop of pressure every time the engine injects fuel to a specific cylinder. This sensor is used for engine protection.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

NOTE: The Dual Fuel Rail Pressure Sensor is used on a limited number of engines and is in the same location as the common Fuel Rail Pressure sensor.

For more information on the suction control valve, see SUCTION CONTROL VALVE later in this Group.

BB78437,000014B -19-28OCT08-1/1

Measuring Speed

The camshaft position sensor measures engine speed by detecting the rotating teeth of a timing wheel mounted on the front of the camshaft drive gear. It can also measure the position of the rotation of the engine because it can detect a gap in teeth of the timing wheel where two of the teeth have been removed. This gap corresponds to top-dead-center of piston #1.

The sensor uses a coil wound around a magnet to create a voltage signal. As the tooth in the timing wheel passes directly under the sensor, the magnetic field is pulled towards the tooth. As the tooth passes the sensor, the magnetic field moves back toward the sensor. This creates a voltage in the coil that is sent to the ECU. By monitoring the frequency of these signals, the ECU calculates the component speed. When the gap in the teeth of the timing wheel is detected, the ECU interprets this change in the voltage pattern to be top-dead-center.

RG40854,00000E8 -19-15OCT07-1/1

Crank Position Sensor

It is an inductive type pickup sensor that detects teeth on the crankshaft timing gear. The ECU uses the crank position input to determine engine speed and the angular position of the crankshaft in its 360° field of rotation. The crankshaft timing gear is composed of 72 evenly-spaced teeth. Two of the teeth are ground back 1/2 the width of the teeth from the front of the gear. These partially ground-off teeth help the ECU to determine when cylinder #1 is at Top-Dead-Center (TDC).

The ECU uses the inputs of both the crank position and pump position sensors to precisely control the timing and duration of fuel injection.

The ECU provides engine protection for crank position sensor problems. If there is a problem with the crank position sensor, the ECU will use the pump position sensor to determine engine timing. This may require prolonged engine cranking to start the engine.

For more information on how speed sensors operate, see MEASURING SPEED earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DN22556,0000035 -19-27AUG07-1/1

Pump Position Sensor

It is an inductive type pickup sensor that detects teeth on the upper idler gear. The upper idler gear is composed of 12 evenly-spaced notches with one additional notch offset to tell the ECU that cylinder #1 is approaching Top-Dead-Center.

If there is a problem with the Pump Position Sensor, the ECU will use the Crank Position Sensor to determine engine timing. This may require prolonged engine cranking to start the engine.

For more information on how speed sensors operate, see MEASURING SPEED earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,0000447 -19-27AUG07-1/1

Turbo Speed Sensor

The turbo speed sensor is located on the turbocharger. The turbo speed sensor uses a flat spot on the shaft to measure turbo speed. The ECU monitors turbo speed to ensure that turbo is running within acceptable range. At most severe high turbo speed levels, the ECU will use this sensor for engine protection.

For more information on how speed sensors operate, see MEASURING SPEED earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION DIAGRAM 3 earlier in this Group.

RG41221,00002B1 -19-15OCT07-1/1

Throttle Descriptions

John Deere engines can accept several types of throttle inputs and in several different connection schemes depending on the application. Types of throttles are:

- Analog
- Digital
- Pulse Width Modulated (PWM)
- CAN (messages on the CAN bus)

More than one throttle can be enabled at a time in the ECU software. For finer control of engine speed, a combination throttle can be enabled in the ECU software (discussed later in this group).

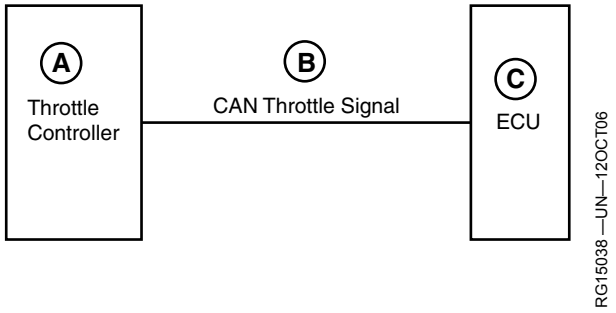
A description of each type follows later in this group.

DM80898,0000003 -19-15OCT07-1/1

CAN Throttle

CAN (Controller Area Network) throttle is information of the desired throttle position that is sent to the ECU by another controller over the CAN bus.

A—Throttle Controller
B—CAN Throttle Signal
C—ECU



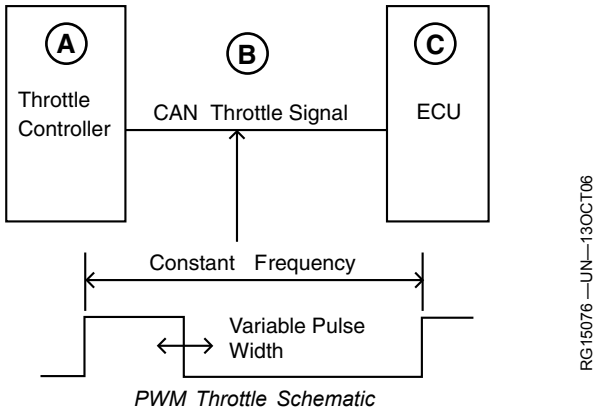
CAN Throttle Schematic

DM80898,0000045 -19-15OCT07-1/1

Pulse-Width-Modulated (PWM) Throttle

The PWM throttle signal is sent to the ECU by another controller. The PWM signal is a square wave signal with a constant frequency. The pulse width of the signal varies to indicate the desired throttle opening.

A—Throttle Controller
B—CAN Bus Throttle Signal
C—ECU



PWM Throttle Schematic

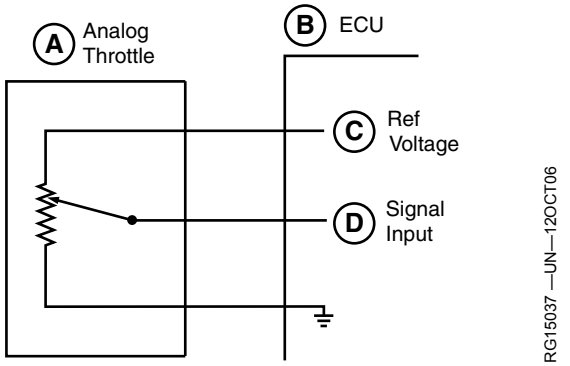
DM80898,000012A -19-15OCT07-1/1

Analog Throttle

An analog throttle uses a variable resistor (potentiometer) to supply voltage to the ECU. A reference voltage is sent to the throttle by the ECU. The resistance changes as the throttle position changes. In turn, input voltage to the ECU will vary according to the throttle position. The input voltage is monitored by the ECU which responds by sending out the appropriate control signals according to its programming.

A second analog throttle can also be enabled with the first (primary) analog throttle if that option has been set in the ECU software.

A—Analog Throttle
B—ECU
C—Reference Voltage
D—Signal Input



Position Sensor

RG41221,00002B7 -19-15OCT07-1/1

Digital Multi-State Throttle

The multi-state throttle is used when a few fixed engine speeds are desired. There are three types of multi-state throttles:

- Dual-State Throttle - See DUAL-STATE THROTTLE later in this Group.
- Tri-State Throttle - See TRI-STATE THROTTLE later in this Group.
- Ramp Throttle - See RAMP THROTTLE later in this Group.

DM80898,0000046 -19-15OCT07-1/1

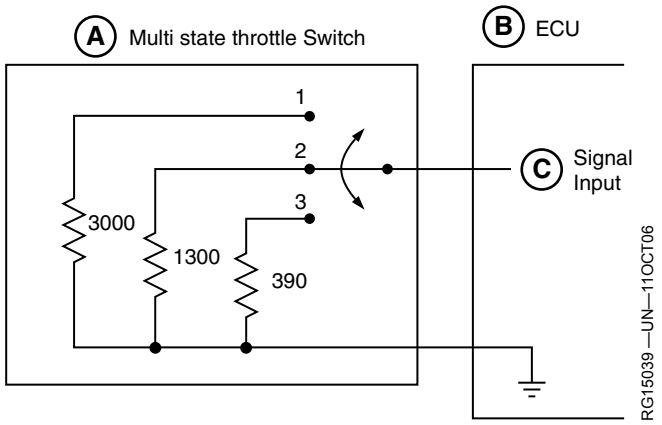
Dual-State Throttle

The dual-state throttle is used on applications that use two fixed engine speeds. The available positions are “Low Idle” (turtle) and “High Idle” (rabbit). The standard tri-state detent switch may be replaced with a 2-position detent switch with only the “turtle/low” and “rabbit/high” position resistance settings.

The switch uses two different resistors to change the voltage returned to the ECU. The ECU uses an internal conversion table to convert the voltage to a specific engine speed. When the switch is in the low idle position, the current is routed through a 390-ohm resistor. High idle position uses a 3000-ohm resistor.

If the panel has an analog throttle then the engine speed can be adjusted when the dual state throttle switch is in the low idle position.

NOTE: The three-position multi-state throttle switch may be used. The middle position is ignored.



Dual-State Throttle Switch Schematic

A—Multi state throttle switch
B—ECU
C—Signal input

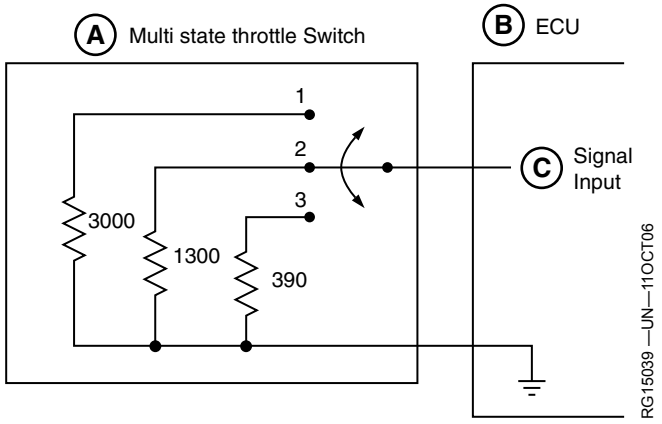
DM80898,0000047 -19-15OCT07-1/1

Tri-State Throttle

The digital tri-state (or “3-state”) throttle works similar to the dual-state throttle. This throttle uses a switch with three positions: minimum throttle (turtle–3), maximum throttle (Adj–2), and fast idle (rabbit–1). In the minimum throttle position, engine RPM defaults to a speed that has been set in the ECU according to the needs of the application. The fast idle (no-load) position speed is set in the ECU according to the needs of the application. In the maximum (Adj–2) throttle position, engine speed can be set within a range programmed into the ECU.

The switch uses three different resistors to change the voltage returned to the ECU. When the switch is in the minimum throttle position, current is routed through a 390-ohm resistor. The maximum throttle position uses a 1300-ohm resistor and the fast idle position uses a 3000-ohm resistor.

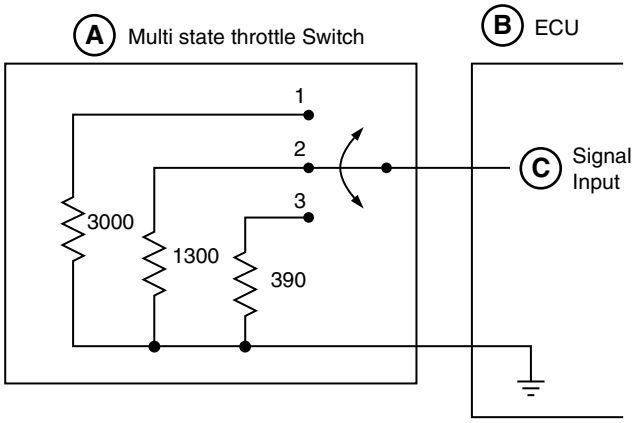
To change engine speed, the tri-state throttle must be in the Adj position and the “Bump Enable” switch must be in the “enable up” or “enable down” position while the “Idle Select” switch is held in the increase (+) or the decrease (–) position.



A—Multi-State throttle
B—ECU
C — Signal Input

DM80898,0000049 -19-15OCT07-1/1

Ramp Throttle



RG15039 —UN—11OCT06

A—Multi-State throttle **B—ECU** **C—Signal Input**

The digital ramp throttle operates between minimum throttle and fast idle and uses a 3-position “Ramp Throttle” switch. If the switch is held in the “Increase Throttle” (rabbit–1) position, the engine speed will ramp up in small increments. If the switch is held in the “Decrease Throttle” (turtle–3) position, the engine speed will ramp down. As long as this switch is held in a momentary position, the engine continues to ramp up or down until the maximum high or low throttle speed setting is reached. When released, the switch returns to the center “Hold Throttle” position.

This is a 3-position, spring-loaded-to-center switch. The “Increase” speed position (1) uses a 3000-ohm resistor. The “Decrease” speed position (3) uses a 390-ohm resistor, and the “Hold” position (2) uses a 1300-ohm resistor. The ramp throttle settings are reset to the factory settings when the key is turned off and back on.

The ramp rate selection is a trim option and sets the rate of change for engine speed increases or decreases. There are four ramp rate options available.

- **3-Second Exponential:** Engine speed will start to increase/decrease at a slow rate and will accelerate/decelerate at an increasingly faster rate the longer the switch is held. The engine throttle setting will go from 0% to 100% throttle in 3 to 5 seconds.
- **5-Second Linear:** Engine speed will increase/decrease at a constant rate. With this setting the engine throttle setting will go from 0% to 100% throttle in 5 seconds.
- **7-Second Linear:** Engine speed will increase/decrease at a constant rate. With this setting the engine throttle setting will go from 0% to 100% throttle in 7 seconds.
- **9-Second Linear:** Engine speed will increase/decrease at a constant rate. With this setting the engine throttle setting will go from 0% to 100% throttle in 9 seconds.
- **25-Second Linear:** Engine speed will increase/decrease at a constant rate. With this setting the engine throttle setting will go from 0% to 100% throttle in 25 seconds.
- **Custom Linear:**Engine speed will increase/decrease at a rate set by the user. With this setting the engine throttle setting will go from 0% to 100% throttle at a rate between 5 and 30 seconds determined by the user.

Ramp steps or “bumps” are minor increases or decreases, in the engine speed setting. When the ramp throttle switch is momentarily held in the “Increase Throttle” or “Decrease Throttle” positions, the engine speed will increase/decrease a selected percentage of the throttle range. The actual engine RPM speed change for each setting will vary.

Four ramp step rates are available:

- 0.4% of throttle range
- 0.8% of throttle range
- 1.6% of throttle range
- 2.8% of throttle range

DM80898,000004A -19-15OCT07-1/1

Throttle Adjustments

Throttle Rate

Throttle rate is how quickly the ECU changes the engine fuel rate in response to a throttle increase signal. Throttle rate has no impact on the deceleration. The ECU is shipped with the Maximum rate selected. Four rates are available: Maximum, Fast, Medium, and Slow.

NOTE: If Ramp Throttle is enabled, the Throttle Rate feature is disabled for all throttles.

Throttle Out-of-Range (OOR) Recovery

A throttle is determined to be Out-of-Range (OOR) when the ECU detects the input signal from that device is outside its expected normal limits (invalid). When the OOR condition is detected the ECU will set an diagnostic trouble code. The ECU will then ignore the input from the OOR throttle until it becomes valid, essentially setting its input to 0%. When the input becomes valid again the ECU will take appropriate action, which is determined by the recovery type programmed into the ECU. Typically, these errors occur when analog throttle endpoints are misaligned, but it can also be caused by faulty wiring.

Recovery types are:

- **Resume Recovery:** When a throttle Out-of-Range Error (OORE) condition is detected, only the OOR throttle input will be considered 0% until a valid input is received. The OOR throttle will immediately operate again as soon as the input is valid.

  IMPORTANT: This setting can cause rapid changes in the throttle if an intermittent OOR condition exists.

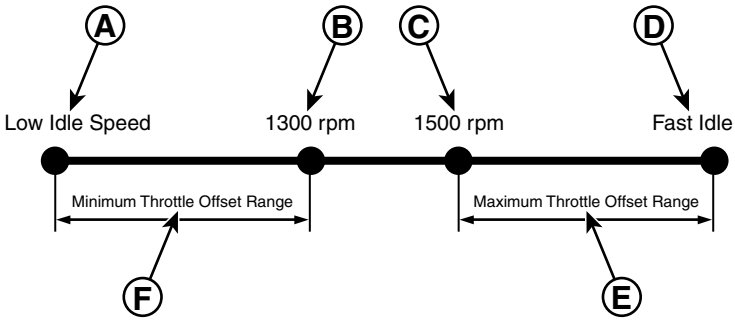
- **Idle Recovery:** When a throttle OOR condition is detected, only the OOR throttle input will be considered 0%. If the input becomes valid again after the OOR condition, the OOR throttle must be returned to low idle position (0% throttle) before the output of the throttle is allowed to increase above 0%.
- **Locked Recovery:** When a throttle OOR condition is detected, only the OOR throttle input will be considered 0% and will not be allowed to operate again until the power is reset on the ECU and the throttle input is valid.

The Throttle Out-of-Range (OOR) Recovery applies to all throttles except ramp throttle.Because the ramp throttle resets itself to minimum throttle for any Out-of-Range condition, selecting a different “Throttle Out-of-Range Recovery” will have no effect on the ramp throttle.

DM80898,000004B -19-15OCT07-1/1

Throttle Offsets

Minimum Throttle Offset



RG15075A —UN—03OCT08

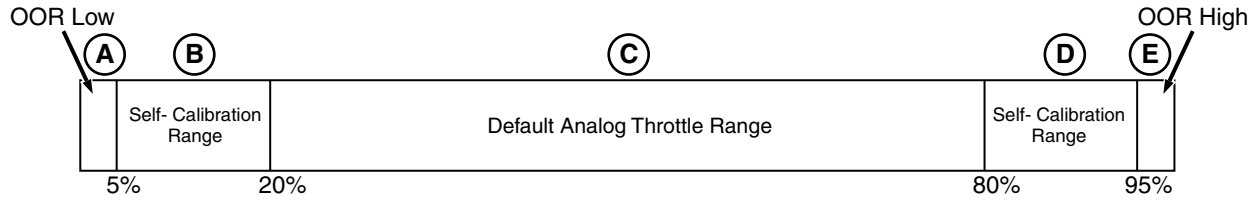
The Minimum Throttle Offset is used to pre-set the low speed idle bump. The number entered into the field on the Trim Page will be the rpm increase from the standard factory setting of the idle speed. This offset will apply to all active throttles. The maximum setting for the Minimum Throttle Offset is the difference between the Low Idle speed and 1300 rpm.

Maximum Throttle Offset (Tri-State Throttle Only)
The Maximum Throttle Offset is used to pre-set the high-speed idle bump. The number entered into the field on the Trim Page will be the amount of rpm below the fast idle speed. The engine will operate in the “mid” position only if the 3-state throttle option is selected. This offset will apply to all active throttles, but only if the 3-state throttle is active. The maximum setting for the Maximum Throttle Offset is the difference between the fast idle speed and 1500 rpm.

DM80898,000004C -19-03OCT08-1/1

Self-Calibration

RG15048A —UN—02OCT08



Analog Throttle Input Range

A—OOR (Out Of Range) Low
B—Self-Calibration Range
C—Default Analog Throttle Range
D—Self-Calibration Range
E—OOR (Out Of Range) High

With this feature enabled, it will automatically adjust throttle dead-band on every sweep of the throttle from idle to full throttle position. The Self-Calibration feature can adjust the 0% throttle setpoint from 20% to 5% of the Analog Throttle Input Range. Similarly, the 100% throttle setpoint can be adjusted between 80% and 95% of the Analog Throttle Input Range.

If the Self-Calibration feature is disabled, the operating range of the throttle will be limited to the Default Analog Throttle Range.

DM80898,0000004 -19-02OCT08-1/1

Combination Throttle

The combination throttle is the use of two or more throttle controls on an application to give coarse/fine/extra fine control. A maximum of 3 throttles may be combined. Normally, only two are used.

If the combination throttle is enabled, a master and a secondary throttle are selected. An additional third throttle can be selected as part of the combination. Each throttle can only be used once in the combination series (i.e.The Primary Analog Throttle selected as the master throttle cannot be selected as the second or third throttle in the combination).

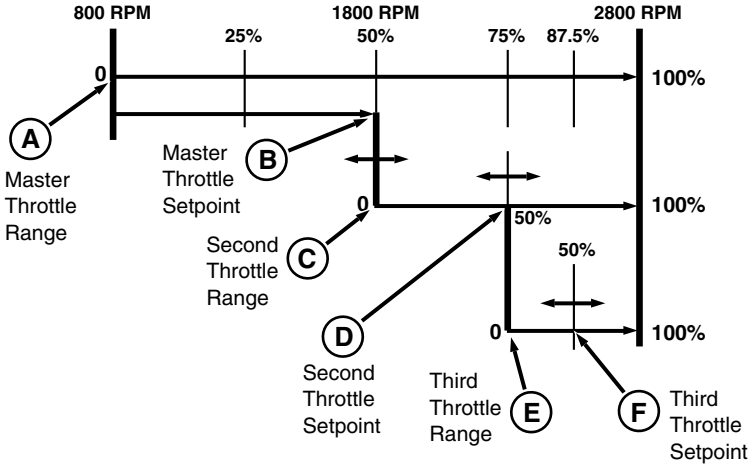
Any type of throttle can be used in the combination. Currently, the only OEM throttle types used are 2-state, 3-state, ramp, and analog. PWM and CAN throttles can be used but are not currently configured for use within the software.

The ECU uses inputs from all enabled throttles to set engine speed. If a combination throttle with 2 throttles is enabled, and a third throttle is enabled, the ECU will look at the input from the combination throttle and compare it to the third throttle. The engine speed will then be set to whichever one is highest.

The basic role of the throttle controls is to act as accelerators. This means that, as the throttle input increases, the engine speed increases. The master throttle always functions in this fashion.

While not common, there are throttle controls that function as decelerators. This means as the throttle input increases, the engine speed decreases. However, this function is not compatible with 3-state throttles.

The combination throttle operates in the following fashion: each throttle has an available throttle range of 0-100% (low idle to high idle speed), and as each throttle is added to the master, a finer resolution in engine speed is defined (see figure below).



A—Master Throttle Range
B—Master Throttle Setpoint
C—Second Throttle Range
D—Second Throttle Setpoint
E—Third Throttle Range
F—Third Throttle Setpoint

DM80898,0000005 -19-15OCT07-1/1

Marine Throttle

The marine engine has two dual throttle options:

- Dual throttles with transfer control
- Engine synchronization control.

To operate either option requires a variation of the marine transition harness. Which variation depends on feature configuration(s). Both options cannot operate simultaneously. Operation of each option is described as follows:

Dual-Throttle Transfer Control

This feature allows throttle control from one of two locations: the wheelhouse, or a secondary (auxiliary) station. when the ECU is initialized at key ON, throttle control defaults to the station selected via the trim options and is set up in the ECU during programming.

To change throttle control location during engine operation, the station select push-button switch at the requesting throttle is held engaged. The indicator lamp will briefly flash, indicating the throttle control transfer has started. The push-button is held engaged until the station indicator lamp is solid, indicating that throttle control transfer has been successful.

For transfer of throttle control to be successful, the position of the requested throttle must be within 2% of the active throttle position. For example, if the ECU is sampling a throttle command of 55% at the active throttle, then the ECU must receive a throttle command between 53% and 57% at the requesting throttle. If the requesting throttle is not within 2% (approximately 33 rpm) of the active throttle, the lamp flashes on and off. If the station select push-button switch is held engaged and the operator moves the requesting throttle to within 2%, transfer will occur. The lamp will go from flashing to solid and the switch at the requesting throttle can be released.

If the requesting throttle position is outside normal operating range, its lamp momentarily lights, then shuts off and remains off. If the switch contacts of both throttles are simultaneously closed, the ECU selects the “highest priority location”, which has been designated during ECU programming, via trim options.

At key ON, a test of the lamps at the throttle station(s) will occur. If any lamp does not briefly come on, replace the bulb. The lamp test will occur only if the key has been OFF for at least 30 seconds.

Engine Synchronization Control

The Engine Sync feature is selected via trim options and is set up in the ECU during programming. This feature allows the synchronous operation of two engines through a two-throttle, lead-follow system; one ECU is programmed as the Lead, and the other as the Follower. When the system is successfully engaged, the follower ECU runs off the lead ECU’s signal. On engines that also have the dual throttle option described above, auxiliary throttle location input is automatically deselected when the engine synchronization is in operation.

In order to enable this system, the following three criteria must be met and sustained for at least two seconds:

1. Both engines must be running at greater than, or equal to, 975 rpm.
2. The engines must be running to within 100 rpm, or less, of each other.
3. The individual throttle commands of each ECU must be within 5% of each other’s value.

When the synchronous throttle switch is turned on with the initial criteria met, the throttle station lamp comes on. If at least one of the three criteria is not met, the throttle station lamp flashes on and off until the failing condition has been corrected.

When engine synchronization is successful, the ECU will have automatically disabled the tachometer of the follower engine and will have set each engine to isochronous governor operation. When an engine is above or below engine rpm demand, its governor sends a signal back to the engine’s ECU and the ECU makes the appropriate adjustment.

During large demands for acceleration or deceleration, it is normal for the synchronization system to shut down. Synchronous operation may, at any time, be re-enabled, as long as the initial criteria are met.

At key ON, a test of the lamps at the throttle station(s) will occur. If any lamp does not briefly come on, replace the bulb. The lamp test will occur only if the key as been OFF for at least 30 seconds.

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Engine Derate and Shutdown Protection

The Engine Control Unit (ECU) will decrease the amount of fuel that is delivered to the engine (fuel derate), set the engine to a certain speed (speed derate), or shut the engine down when sensor inputs exceed normal operating ranges. A Diagnostic Trouble Code (DTC) always accompanies a derate.

See OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual for derate specifications per application.

There are three ECU engine protection options:

- **No Protection**– Engine ECU's with "No Protection" do not derate or shut down the engine if a fault occurs. The standard fault lamp will illuminate when a "Warning" fault is detected by the ECU, and the standard stop-engine lamp will illuminate when a "Shutdown" fault is detected. The engine operator is responsible for reducing engine speed and power when a "Warning" fault exists and for shutting down the engine when a "Shutdown" fault exists.
- **Engine Derate Protection WITHOUT Shutdown**– In addition to illuminating the standard fault indicating lights, the ECU will derate the engine when certain "Warning" faults are detected (depending on application). It is the responsibility of the operator to decide if it is necessary to shut down the engine.
- **Engine Derate Protection with Shutdown**– In addition to illuminating the standard fault indicating lights, the ECU will derate the engine when certain "Warning" and "Shutdown" faults are detected (depending on application). If a DTC that requires shutdown is set, the ECU will severely derate the engine and shut down the engine either immediately or in 30 seconds, depending on the shutdown timer setting in the ECU. If the fault has a 30-second shutdown delay, and the problem is corrected within the 30-second delay period, the power will increase at a rate determined by the fault, until full power is reached.

NOTE: CAN wait-to-start enables the CAN bus messages for shutdown and for wait-to-start. Disabling this feature disables both the wait-to-start broadcast and the shutdown broadcast.

Shutdown Override

NOTE: Holding the shutdown override switch continuously "ON" will not reset the 30-second timer.

Shutdowns can be overridden for 30 seconds at a time. This can be used to move a vehicle to a safe location. Each time the switch is pushed, the shutdown timer is reset to 30 seconds and the engine will run in a derated power mode.

Similarly, if the key switch is turned off, the engine Shutdown feature will be reset, but when restarted only 30 seconds of running is allowed until the engine will shut down again. Engine will remain in shutdown mode until fault condition has been corrected.

External Derate

Wiring in provided on the engine harness for additional switches that control engine derate. These additional external switches can provide an additional level of engine control. The external switch type and derate rate are selectable:

- **External Derate Enable:** When enabled with an active external derate circuit, the external derate feature will derate the engine when activated by an external device.
- **External Derate Input:** Input can range from ground to 24V, depending on application battery voltage. Either a normally open switch, or normally closed switch is used for the external derate input.
- **External Derate Rate:** Three external derate rates are available: 20% derate over 10 minutes, 20% derate over 1 minute, and 50% derate over 1 minute. Each provides a linear derate of engine power over the time selected. Derates are based on the 100% torque curve value, so operation below the derated power level is still possible.

NOTE: External Derate is not compatible with cruise control.

External Shutdown

Wiring is provided on the engine harness for additional engine shutdown switches. Either a normally-open or normally-closed switch can be used for the external shutdown input. When enabled and the external shutdown circuit is activated, the ECU will shut down the engine. Features include:

- **External Shutdown Timer:** The external shutdown timer can be set for either immediate shutdown, or a 30-second delayed shutdown. If the shutdown switch returns to normal before the end of the 30-second delay, the engine will resume normal running.
- **Override External Shutdown at Engine Start:** Some external shutdowns must be overridden when starting the engine. When enabled, the ECU will disable external shutdowns during engine startup.
- **Override External Shutdown Time:** Once the engine switches to "Run" mode (reaches low idle), the ECU will continue to disengage external shutdown for the time that has been selected. Three override times are available: 5 seconds, 30 seconds, and 1 minute.

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Electronic Injector (EI) Wiring Harness Connector

The EI wiring harness connector is located on the cylinder head carrier. This connector provides voltage and a ground from the ECU to the EI wiring harness internal to the cylinder head carrier.

For wiring information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DM80898,0000448 -19-20DEC06-1/1

Intake Air Heater Operation

The Intake Air Heater function is not included on all engines. The intake air heater is used to increase intake manifold air temperature to improve cold starting. When the operator turns the key from “OFF” to “ON”, the ECU calculates the fuel, determines if the temperature is below the set point, turns on the “Air Heater Indicator” light on the dash, and energizes the air heater relay. The air heater relay will in turn energize the air heater coils located in the intake manifold. The ECU will keep the air heater relay energized for an amount of time that is determined by the measured temperature. When the ECU has determined that the preheat time is adequate, it will turn off the “Air Heater Indicator” light and de-energize the air heater relay. If the operator turns the ignition from “ON” to “START” at this time, the engine will crank and start.

If the operator turns the key from “START” to “ON” without waiting for the “Air Heater Indicator” light to turn off, the ECU will de-energize the air heater relay and a key-off/key-on cycle is required before preheating is allowed again.

Anytime the engine cranks but does not start, a key-off/key-on cycle will be required before preheating is allowed again.

For application specific information on air heater times vs. temperatures, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

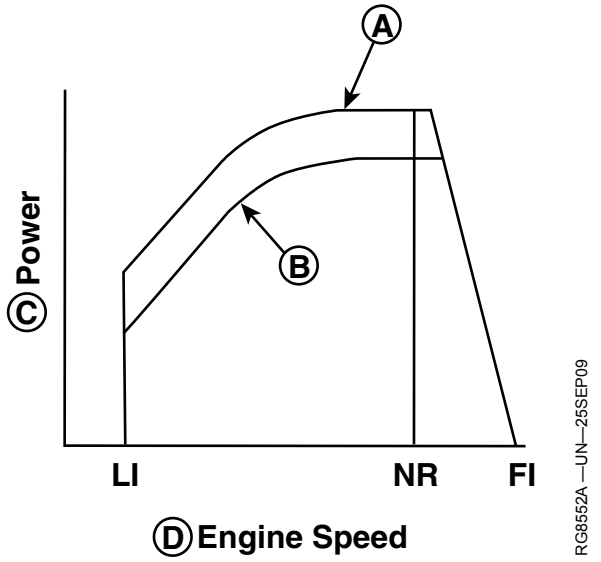
RG41221,00002C3 -19-30AUG07-1/1

Torque Curve Selection

The ECU has the ability to select one of the multiple torque curves that are stored in its memory. The ECU can switch between torque curves while the engine is running. This provides the proper speed and torque for the current conditions. The other controllers on the vehicle can also send CAN messages to the ECU to change torque curves. There is usually one normal torque curve, and then there are others that reduce power for component protection (i.e. hitches, axles, transmissions). In some instances a power boost for a short period of time is an option (i.e. unloading a combine while still picking).

NOTE: OEM applications have only 1 torque curve.

A—Normal Power Curve
B—Derated Power Curve
C—Power
D—Engine Speed
FI— Fast Idle
LI— Low (Slow) Idle
NR—Normal Rated



Torque Curves

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Governor Droop Mode Selection

The electronic control system provides all-speed governing. The Engine Control Unit (ECU) controls the engine speed based on the analog throttle input.

The ECU also has the ability to provide normal and isochronous (0%) droop governing. The normal droop gives a drop in engine speed with an increase in load or an increase in engine speed with a decrease in load. When in isochronous, the droop is set at 0%, and there is a no change in engine speed with changing loads until engine's torque limit is reached. The factory low idle speed is always set for isochronous governing. Droop selection can be determined by engine speed, load, and cruise control depending on the application.

Refer to application manual for information on governor droop parameters.

RG40854,00000F3 -19-15OCT07-1/1

Suction Control Valve

The Suction Control Valve is located on the high pressure fuel pump. The ECU sends an electronic signal to the Suction Control Valve through the solenoid to regulate the delivery of fuel to the High Pressure Common Rail (HPCR). When the Suction Control Valve is energized, fuel is allowed into the pumping chamber of the high pressure fuel pump. The pressurized fuel is then sent to the high pressure common rail (HPCR). The ECU varies the ON-time of this signal to ensure the proper amount of fuel is available.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

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Water in Fuel (WIF) Sensor

The water in fuel (WIF) sensor is located on the bottom of the final fuel filter in the water separator bowl. When water is detected in the fuel, a signal is sent to the ECU. The WIF sensor uses the resistance of fuel and water in the fuel system along with the principle that water is a better conductor then fuel. If water is present, the voltage will be lower. The ECU monitors this for engine protection purposes.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

RG41221,00000A8 -19-15OCT07-1/1

Engine Coolant Level Switch

This sensor provides ECU signal with a path to ground, whenever the engine coolant drops below a certain level.

Loss of coolant switch is used for engine protection purposes and is a trimmable option. The user has the ability to choose a normally open or a normally closed switch. Depending on the switch configuration, diagnostics will vary.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on trimmable options, see TRIM OPTIONS INFORMATION in Section 04, Group 160 later in this manual.

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Cruise Control Operation

The ECU is available with and without the cruise control function. It is an off-road cruise control that maintains constant engine speed under varying load conditions. This function is especially intended for field applications where an operator faces the need to turn the vehicle around at the end of each row. This cruise control allows the driver to use the throttle and/or brake to turn the vehicle around. When ready to resume field operations, the operator brings the engine speed above 1300 rpm and activates the Cancel/Resume function again to resume cruise speed. An internal timer gives the operator one minute to complete the turnaround maneuver.

The cruise control has the normal functions of:

- Cruise control power “ON” or “OFF”
- “Set” or “Bump Up” engine speed
- “Resume” or “Bump Down” engine speed
- Vehicle brake or clutch pedal to disengage cruise control

On 12-volt ECUs, the engine speed can be set from two different locations. The primary location would normally be in the cab of the vehicle and is used to set a constant engine speed while the vehicle is being driven. The secondary cruise control is normally used in a location that provides PTO speed control and is used with the engine in “neutral” or out of gear. Both locations have the normal cruise control functions.

RG40854,00000EF -19-15OCT07-1/1

Power Supply #1

John Deere engine sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors to for just one power supply and return to handle. For this reason, there are several sets of power supply voltages and grounds.

The following sensors use Power Supply #1:

NOTE: Some sensors are not available or are optional for certain applications. The sensors on the following list may not all be available on this engine.

- Fuel Rail Pressure Sensor

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Power Supply #2

John Deere engine sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors to for just one power supply and return to handle. For this reason, there are several sets of power supply voltages and grounds.

The following sensors use Power Supply #2:

NOTE: Some sensors are not available or are optional for certain applications. The sensors on the following list may not all be available on this engine.

- Fuel Transfer Pump Pressure Sensor
- Manifold Air Pressure Sensor
- Oil Pressure Sensor

DM80898,000043F -19-15OCT07-1/1

Power Supply #3

John Deere engine sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors to for just one power supply and return to handle. For this reason, there are several sets of power supply voltages and grounds.

The following sensors use Power Supply #3:

NOTE: Some sensors are not available or are optional for certain applications. The sensors on the following list may not all be available on this engine.

- Analog Throttle
- Fan Speed Sensor (some applications)
- A/C Pressure Switch (some applications)
- External Shutdown Switch (some applications)
- Multi-State Throttle (some applications)

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Power Supply #4

John Deere engine sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors to for just one power supply and return to handle. For this reason, there are several sets of power supply voltages and grounds.

The following sensors use Power Supply #4:

NOTE: Some sensors are not available or are optional for certain applications. The sensors on the following list may not all be available on this engine.

- Secondary Analog Throttle (some applications)
- Loss of Coolant Switch
- External Shutdown Switch
- External Derate Switch
- Override Shutdown Switch
- PTO Speed (some applications)
- Vehicle Speed (some applications)

DM80898,0000441 -19-04AUG07-1/1

Power Supply #5

John Deere engine sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors to for just one power supply and return to handle. For this reason, there are several sets of power supply voltages and grounds.

The following sensors use Power Supply #5:

NOTE: Some sensors are not available or are optional for certain applications. The sensors on the following list may not all be available on this engine.

- Exhaust Gas Recirculation Valve

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Section 04
Diagnostics

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About This Group

This section of the manual contains information for observable diagnostics and fuel-related test procedures. Use this information in conjunction with the 9.0 L Diesel Engines Base Engine Manual. Group 150 is divided into two areas: 1) diagnosis of observed malfunctions and 2) test procedures. The observed malfunctions area is further divided into the following headings, containing the following observable symptoms:

NOTE: Follow the diagnostic procedure of an active or stored DTC before pursuing any observable diagnostic procedure.

- E1 - Engine Cranks/Won't Start
- E2 - Engine Misfires/Runs Irregularly
- E3 - Engine Does Not Develop Full Power
- E4 - Engine Emits Excessive White Exhaust Smoke
- E5 - Engine Emits Excessive Black or Gray Exhaust Smoke
- E6 - Engine Will Not Crank
- E7 - Engine Idles Poorly
- E8 - Abnormal Engine Noise
- E9 - Analog Throttle (A) Will Not Respond
- E10 - Analog Throttle (B) Will Not Respond

- F1 - Low Pressure Fuel System Check
- F2 - High Pressure Fuel System Check
- F3 - Excessive Fuel Consumption
- F4 - Fuel in Oil
- F5 - Fuel in Coolant

- D1 - ECU Does Not Communicate with Service ADVISOR
- D2 - Diagnostic Gauge Does Not Communicate with ECU
- D3 - ECU Does Not Program with Service ADVISOR

- A1 - Intake Air Heater Check

Procedures for diagnosing some of the above symptoms are formatted such that a test or repair is recommended, then based on the results another test or repair is recommended. Other symptoms are formatted in a symptom - problem - solution format. In these symptoms, the problems are arranged in the most likely or easiest to check first. Symptoms arranged in both formats refer to test procedures in the second part of this section. The second part of this section manual contains the following test procedures:

- Test Procedures:
  - Check Fuel Supply Quality
  - Test the Fuel Bleed System
  - Check for Air in Fuel
  - Bleed the Fuel System
  - Check for Restricted Fuel Leak-off Line
  - Check High Pressure Fuel Pump Static Timing
  - Excessive Engine Crankcase Pressure (Blow-By)
  - Charge Air System Diagnostic
  - Variable Geometry Turbocharger (VGT) Component Test
  - Temperature Sensor Validity Test
  - EGR-VGT System Temperature and Flow Test
  - Bleed Coolant System

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E1 - Engine Cranks/Won't Start

RG41221,00000F0 -19-02AUG10-1/17

E1 - Engine Cranks/Won't Start Diagnostic Procedure

Additional References:

NOTE: This procedure should be followed if engine cranks, but will not start. If the engine will not crank, see E6 - ENGINE WILL NOT CRANK to diagnose the cranking system.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 4
- see 9.0L 24V WIRING DIAGRAM 4

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RG41221,00000F0 -19-02AUG10-2/17

1 Preliminary Checks	1. Verify sufficient fuel in fuel tank. 2. Verify that any remote switch used to shut down engine is in the RUN position. 3. Check for major intake air restriction. 4. Check for major exhaust restriction. 5. Check battery state of charge. 6. Verify engine cranking speed is adequate to start engine. See CHECK ENGINE CRANKING SPEED in Section 04, Group 150 of the base engine manual for minimum cranking speed specification. 7. In temperatures below 0°C (32°F), starting aids may be required to start engine. See owner's manual for more information on starting aids. Does engine start?	**YES:** Problem fixed. **NO:** GO TO 2

RG41221,00000F0 -19-02AUG10-3/17

2 Attempt to Connect to ECU with Service ADVISOR	1. Ignition ON, engine OFF. 2. Attempt to connect to ECU with Service ADVISOR. Were you able to connect to ECU with Service ADVISOR?	**YES:** GO TO 3 **NO:** Discontinue this test and perform procedure D1 - ECU Does Not Communicate with Service ADVISOR.

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3 Check for Active DTCs	Are there any active DTCs?	**YES:** Discontinue this test and perform test for the active DTC. **NO:** GO TO 4

RG41221,00000F0 -19-02AUG10-5/17

4 Read DTCs and Store Snapshot Information	1. Write down any stored DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see Snapshot Instructions earlier in this Group. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Clear stored DTCs. 3. Crank engine for 15 seconds. Are there any stored or active DTCs after cranking engine?	**YES:** Discontinue this test and perform test for the stored or active DTC. **NO:** GO TO 5

RG41221,00000F0 -19-02AUG10-6/17

5 Harness Diagnostic Mode Test	1. Ignition ON, engine OFF. 2. Perform Harness Diagnostic Mode Test in Service ADVISOR. Were any active DTCs generated during Harness Diagnostic Mode Test?	**YES:** Discontinue this test and perform test for the active DTC. **NO:** GO TO 6

RG41221,00000F0 -19-02AUG10-7/17

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SYSTEM CHECK, found later in this group. Use fuel that has known-good quality for the test. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 7

RG41221,00000F0 -19-02AUG10-8/17

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SYSTEM CHECK, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 8

RG41221,00000F0 -19-02AUG10-9/17

8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 9

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9 Camshaft Position and Crankshaft Position Signal Test	*NOTE: See DTC procedures 000636.02 — PUMP POSITION SENSOR SIGNAL INVALID DIAGNOSTIC PROCEDURE and 000637.02 in Group 04, Section 160 later in this manual for more information on speed sensor data points.* 1. Monitor and record the following data points in Service ADVISOR: • Crankshaft Position Signal Status • Camshaft Position Signal Status • Engine Speed Indicated by Crankshaft Sensor • Engine Speed Indicated by Camshaft Sensor • Crankshaft Position Signal Improper Pattern Indicator • Camshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Noise Indicator • Camshaft Position Signal Noise Indicator 2. Crank engine for 15 seconds. 3. Replay recording and review the recorded data points. Did the data points indicate the following while the engine is cranking at a steady speed? *NOTE: When engine first begins cranking, the data points may not indicate these values. Ignore data point values until engine has rotated at least two full revolutions.* • Crankshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Camshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Engine Speed Indicated by Crankshaft Sensor - The actual cranking speed (nearly same as camshaft position sensor speed). • Engine Speed Indicated by Camshaft Sensor - The actual cranking speed (nearly same as crank position sensor speed). • Crankshaft Position Signal Improper Pattern Indicator - 0 • Camshaft Position Signal Improper Pattern Indicator - 0 • Crankshaft Position Signal Noise Indicator - 0 • Camshaft Position Signal Noise Indicator - 0	**YES:** GO TO 12 **NO:** GO TO 10

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10 Check for Crankshaft Position Pattern Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Crank engine for 30 seconds. 5. Ignition OFF, engine OFF. 6. Reconnect crank sensor. Did engine start?	**YES:** Perform 000637.02 — CRANK POSITION SENSOR SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC were active. **NO:** GO TO 11

Continued on next page

RG41221,00000F0 -19-02AUG10-12/17

11 Check for Camshaft Position Pattern Problem

1. Verify crank sensor is reconnected.
2. Disconnect pump position sensor and secure connector away from rotating components.
3. Ignition ON, engine OFF.
4. Crank engine for 30 seconds.
5. Clear DTCs.
6. Ignition OFF, engine OFF.
7. Reconnect pump position sensor.

Did engine start?

YES: Perform 000636.02 — Pump Position Sensor Signal Invalid Diagnostic Procedure as though DTC were active.

NO: GO TO 12

RG41221,00000F0 -19-02AUG10-13/17

12 Service ADVISOR Compression Test

NOTE: Service ADVISOR Compression Test determines the relative compression between cylinders. A problem that causes low compression in all cylinders is not detected by this test. An engine with low compression in all cylinders will sound and feel different while cranking than an engine with good compression due to a lack of cranking speed fluctuation.

1. Perform Cylinder Electronic Compression Test in Service ADVISOR.
2. Listen and feel for cranking speed fluctuation during the Cylinder Electronic Compression Test and compare against another engine, if available.

Did Cylinder Electronic Compression Test results indicate a significant difference between cylinders or did engine crank as though compression were low in all cylinders?

YES: Check compression using mechanical gauge.

NO: GO TO 13

RG41221,00000F0 -19-02AUG10-14/17

13 Inspect Valve Train and Check Camshaft Timing

1. Ignition OFF, engine OFF.
2. Remove rocker arm cover.
3. Inspect valve train for obvious damage or valves that are out of adjustment.
4. Rotate engine using JDG820 Flywheel Turning Tool while observing valve train for proper operation.
5. Set engine at #1 TDC of compression stroke using JDE81-4 Timing Pin.
6. Check camshaft timing (possible sheared camshaft key or incorrect assembly). See CHECK HIGH PRESSURE FUEL PUMP STATIC TIMING test later in this section.
7. Remove timing pin and turning tool.

Were any mechanical problems found?

YES: Fix mechanical problem.

NO: Reinstall rocker arm cover. GO TO 14

RG41221,00000F0 -19-02AUG10-15/17

14 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Download latest ECU payload and reprogram ECU.

Did engine start?

YES: Problem fixed.

NO: GO TO 15

Continued on next page

RG41221,00000F0 -19-02AUG10-16/17

15 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did engine start?	**YES:** Problem fixed. **NO:** Open DTAC case.

RG41221,00000F0 -19-02AUG10-17/17

E2 - Engine Misfires/Runs Irregularly

RG41221,00000F1 -19-02AUG10-1/17

E2 - Engine Misfires/Runs Irregularly Diagnostic Procedure

RG41221,00000F1 -19-02AUG10-2/17

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

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2 Items Possibly Mistaken As Misfire or Irregular Running Engine	Check for the following items which may be mistaken for a misfire: • Engine accessories such as A/C clutch or fan drives cycling on and off. • Alterations to the engine and/or machine harness such as radios or non-John-Deere accessories. Does disabling or switching off these devices temporarily restore engine performance?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,00000F1 -19-02AUG10-4/17

3 Misfire and Cut-Out Test	1. Perform Cylinder Electronic Compression Test in Service ADVISOR. 2. Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle. Is each cylinder's contribution within 10 percent of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cut-Out Test?	 **YES:** GO TO 5 **NO:** GO TO 4

RG41221,00000F1 -19-02AUG10-5/17

4 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR. Is compression in the cylinder(s) with low contribution identified in Step 3 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**YES:** Check compression with mechanical gauge. **NO:** Replace injector(s) in cylinder(s) with low contribution.

RG41221,00000F1 -19-02AUG10-6/17

5 Check for Air in Fuel	Perform TEST FOR AIR IN FUEL procedure, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 6

RG41221,00000F1 -19-02AUG10-7/17

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 7

Continued on next page

RG41221,00000F1 -19-02AUG10-8/17

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

RG41221,00000F1 -19-02AUG10-9/17

8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

RG41221,00000F1 -19-02AUG10-10/17

9 Camshaft Position and Crankshaft Position Signal Test	*NOTE: See DTC procedures 000636.02 — PUMP POSITION SENSOR SIGNAL INVALID DIAGNOSTIC PROCEDURE and 000637.02 — CRANK POSITION SENSOR SIGNAL INVALID DIAGNOSTIC PROCEDURE in Group 04, Section 160 later in this manual for more information on speed sensor data points.* 1. Monitor and record the following data points in Service ADVISOR: • Crankshaft Position Signal Status • Camshaft Position Signal Status • Engine Speed Indicated by Crankshaft Sensor • Engine Speed Indicated by Camshaft Sensor • Crankshaft Position Signal Improper Pattern Indicator • Camshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Noise Indicator • Camshaft Position Signal Noise Indicator 2. Operate engine at speed and load where problem occurs. 3. Replay recording and review the recorded data points. Did the data points indicate the following with engine running? • Crankshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Camshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Engine Speed Indicated by Crankshaft Sensor - The actual cranking speed (nearly same as camshaft position sensor speed). • Engine Speed Indicated by Camshaft Sensor - The actual cranking speed (nearly same as crank position sensor speed). • Crankshaft Position Signal Improper Pattern Indicator - 0 • Camshaft Position Signal Improper Pattern Indicator - 0 • Crankshaft Position Signal Noise Indicator - 0 • Camshaft Position Signal Noise Indicator - 0	**YES:** GO TO 12 **NO:** GO TO 10

Continued on next page

RG41221,00000F1 -19-02AUG10-11/17

10 Check for Crankshaft Sensor Pattern Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Operate engine at speed and load where problem occurs. 5. Ignition OFF, engine OFF. 6. Reconnect crank sensor. Was engine performance restored?	**YES:** Perform 000637.02 — CRANK POSITION SENSOR SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC were active. **NO:** GO TO 11

RG41221,00000F1 -19-02AUG10-12/17

11 Check for Camshaft Position Pattern Problem	1. Verify crank sensor is reconnected. 2. Disconnect pump position sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Operate engine at speed and load where problem occurs. 5. Ignition OFF, engine OFF. 6. Reconnect pump position sensor. Was engine performance restored?	**YES:** Perform 000636.02 — Pump Position Sensor Signal Invalid Diagnostic Procedure as though DTC were active. **NO:** GO TO 12

RG41221,00000F1 -19-02AUG10-13/17

12 Check Throttle	1. Engine running at speed where misfire or irregular running occurs. 2. Throttle held at a steady position. 3. Monitor Throttle Position data point in Service ADVISOR. Does Throttle Position data point indicate throttle signal is changing by more than 3 percent?	**YES:** Check for throttle circuit problem. **NO:** GO TO 13

RG41221,00000F1 -19-02AUG10-14/17

13 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors fix rough running?	**YES:** Problem fixed **NO:** GO TO 14

Continued on next page

RG41221,00000F1 -19-02AUG10-15/17

14 Check EGR Valve	Part 1 Is engine equipped with a VGT and EGR valve? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 4, VGT Actuator (S) in Section 03, Group 140 earlier in this manual.*	 **YES:** Part 2 **NO:** GO TO 14
	Part 2 *NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.* 1. Operate engine under load until coolant temperature is at operating temperature. 2. Operate engine unloaded at low idle for five minutes. 3. Ignition OFF, engine OFF. 4. Remove EGR valve. 5. Check for stuck open EGR valve. 6. Inspect EGR valve and O-rings for damage. 7. Inspect intake and exhaust passages for damage which would permit EGR flow with EGR valve closed. 8. Verify that the part number of the EGR valve removed is the correct part for the engine. 9. Inspect EGR cooler for indication of coolant leakage. Were any problems found?	 **YES:** Fix problem or replace incorrect EGR valve. GO TO 15 **NO:** Reinstall EGR valve. GO TO 15

RG41221,00000F1 -19-02AUG10-16/17

15 Reprogram ECU	Download latest payload and reprogram ECU. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

RG41221,00000F1 -19-02AUG10-17/17

E3 - Engine Does Not Develop Full Power

RG41221,00000F2 -19-28OCT09-1/28

E3 - Engine Does Not Develop Full Power Diagnostic Procedure

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

RG41221,00000F2 -19-28OCT09-2/28

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

RG41221,00000F2 -19-28OCT09-3/28

2 Harness Diagnostic Mode Test	1. Write down any stored DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Discontinue this test and perform test for the active DTC.
	Were any active DTCs generated during Harness Diagnostic Mode Test?	**NO:** GO TO 3

RG41221,00000F2 -19-28OCT09-4/28

3 Preliminary Checks	*NOTE: Low engine power complaints are often due to the operator's expectations, rather than the engine not actually developing rated power. Compare the suspect engine's performance to another identical application, if possible.* Check for the following, if applicable, on the application. • Transmission problems, overheating or slipping. • Load on engine has changed. • Auxiliary drives with abnormally high loads. • Hydraulic system problems causing high engine loads. • Engine is otherwise overloaded.	**YES:** Problem fixed.
	Is engine performance restored?	**NO:** GO TO 4

Continued on next page

RG41221,00000F2 -19-28OCT09-5/28

4 Exhaust Check	Operate engine under the conditions where the low power complaint occurs. Does the engine produce excessive blue, white, or black exhaust smoke?	**YES:** Blue smoke - Check for internal engine damage. Perform EXCESSIVE ENGINE CRANKCASE PRESSURE (BLOW-BY) DIAGNOSTIC PROCEDURE **YES:** White smoke - Perform test E4 - ENGINE EMITS EXCESSIVE WHITE EXHAUST SMOKE. **YES:** Black smoke - Perform test E5 - ENGINE EMITS EXCESSIVE BLACK OR GRAY EXHAUST SMOKE. **NO:** GO TO 5

RG41221,00000F2 -19-28OCT09-6/28

5 Check for Misfire	Does engine misfire or run irregularly?	**YES:** Perform test E2 - ENGINE MISFIRES/RUNS IRREGULARLY. **NO:** GO TO 6

RG41221,00000F2 -19-28OCT09-7/28

6 Throttle Test	*NOTE: Some applications may have a limit on maximum throttle percentage by design. Consult engine distributor for more information.* 1. Ignition ON, engine OFF. 2. Monitor Throttle Position data point in Service ADVISOR. 3. Fully advance throttle lever. Is Throttle Position 97% or higher?	**YES:** GO TO 7 **NO:** Check for throttle circuit problem.

RG41221,00000F2 -19-28OCT09-8/28

7 Charge Air System Analysis	Perform CHARGE AIR SYSTEM DIAGNOSTIC found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

RG41221,00000F2 -19-28OCT09-9/28

8 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

RG41221,00000F2 -19-28OCT09-10/28

9 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 10

Continued on next page

RG41221,00000F2 -19-28OCT09-11/28

10 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 11

RG41221,00000F2 -19-28OCT09-12/28

11 VGT and Actuator Test	Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST, found later in this section. Was a problem found?	**YES:** Fix problem, recheck engine performance. **NO:** GO TO 12

RG41221,00000F2 -19-28OCT09-13/28

12 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors fix low power?	 **YES:** Problem Fixed **NO:** GO TO 13

RG41221,00000F2 -19-28OCT09-14/28

13 Intake and Exhaust Restriction and Air Leak Test	Check for intake and exhaust restrictions and leaks. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS and CHECK FOR EXHAUST AIR LEAKS in Section 04 of the base engine manual. Was a problem found?	**YES:** Fix problem, recheck engine performance. **NO:** GO TO 14

RG41221,00000F2 -19-28OCT09-15/28

14 Governor Selection Check	*NOTE: The following procedure does not apply to all applications.* 1. Monitor Desired Speed Governor Curve data points in Service ADVISOR. 2. Toggle the governor type switch between the two settings. Did the Desired Speed Governor Curve data point change?	 **YES:** GO TO 15 **NO:** See application manual for switch wiring and repair problem. Recheck engine performance.

RG41221,00000F2 -19-28OCT09-16/28

15 Reprogram ECU	1. Download latest ECU payload. 2. Modify Custom Performance trimable options to values specified by the engine distributor, if applicable. 3. Reprogram ECU. Is engine performance restored?	 **YES:** Problem fixed. **NO:** GO TO 16

Continued on next page

RG41221,00000F2 -19-28OCT09-17/28

16 EGR-VGT System Temperature and Flow Test	Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.	**YES:** GO TO 20
	Did system respond as described in the test?	**NO:** One air temperature sensor is not indicating correct temperature at start of test. GO TO 17 **NO:** MAP and barometric pressure are not as described. GO TO 19 **NO:** EGR temperature sensor indicates EGR flow is present before EGR is commanded open. GO TO 20

RG41221,00000F2 -19-28OCT09-18/28

17 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 20 **NO:** GO TO 18

RG41221,00000F2 -19-28OCT09-19/28

18 Check Wiring and Sensor	1. Check wiring and terminals for air temperature sensor that does not indicate temperature correctly.	
	2. If no wiring problem found, replace air temperature sensor that does not agree with the other two air temperature sensors.	**YES:** Problem fixed.
	Is engine performance restored?	**NO:** GO TO 20

RG41221,00000F2 -19-28OCT09-20/28

19 Check Pressure Sensors	1. Check MAP sensor wiring and terminals.	
	2. Replace MAP sensor if no wiring problems found.	
	3. Ignition ON, engine OFF.	**YES:** Engine performance is restored. Problem fixed.
	4. Compare Manifold Air Pressure - Absolute data point to Barometric Air Pressure data point.	**YES:** Engine performance is NOT restored. GO TO 20
	Are the Manifold Air Pressure - Absolute and Barometric Air Pressure within 10 kPa (1.5 psi) of each other with ignition ON, engine OFF?	**NO:** Replace ECU and recheck engine performance.

Continued on next page

RG41221,00000F2 -19-28OCT09-21/28

20 Check EGR Valve and EGR Cooler	*NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.*	
	1. Monitor EGR Valve Position - Actual in Service ADVISOR.	
	2. Operate engine under load at 1500 rpm until coolant temperature is above 79°C (175°F) and EGR valve begins to open as indicated by EGR valve position. Note that EGR valve will not open unless engine is under load.	
	3. Permit engine to run at low idle for five minutes.	
	4. Ignition OFF, engine OFF.	
	5. Remove EGR valve and check for presence of coolant in EGR cooler.	
	6. Check for damaged or broken EGR valve.	**YES:** Cooler leaking. Replace EGR cooler.
	7. Verify that the part number of the EGR valve removed is the correct part for the engine.	**YES:** EGR valve damaged or incorrect part. Replace EGR valve.
	Is coolant present in EGR cooler or is EGR valve damaged or the incorrect part?	**NO:** Reinstall EGR valve. GO TO 21

RG41221,00000F2 -19-28OCT09-22/28

21 Inspect Valve Train and Check Camshaft Timing	1. Permit engine to cool to ambient temperature.	
	2. Ignition OFF, engine OFF.	
	3. Remove rocker arm cover.	
	4. Inspect valve train for obvious damage or valves that are out of adjustment.	
	5. Rotate engine using JDG820 Flywheel Turning Tool while observing valve train for proper operation.	
	6. Set engine at #1 TDC of compression stroke using JDE81-4 Timing Pin.	
	7. Check camshaft timing. See CHECK HIGH PRESSURE FUEL PUMP STATIC TIMING test later in this section.	
	8. Remove timing pin and turning tool.	**YES:** Fix mechanical problem, recheck engine performance.
	Were any mechanical problems found?	**NO:** Reinstall rocker arm cover. GO TO 22

RG41221,00000F2 -19-28OCT09-23/28

22 Check Engine Load	1. Monitor Engine Load at Current Speed data point in Service ADVISOR.	
	2. Operate engine at speed and load where low power complaint occurs.	**YES:** GO TO 23
	Does Engine Load at Current Speed data point indicate a value of 95 percent or more?	**NO:** ECU is limiting engine power. Open DTAC case.

Continued on next page

RG41221,00000F2 -19-28OCT09-24/28

23 Check Fuel Rail Pressure Sensor	1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Disconnect ECU J3 connector. 4. Perform TERMINAL TEST on rail pressure sensor connector and J3 connector. 5. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J3-C1). 6. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J3-G1). 7. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J3-G2). Were Terminal Test results good and all resistance measurements less than 10 ohms?	**YES:** GO TO 24 **NO:** Fix problem. Retest engine performance.

RG41221,00000F2 -19-28OCT09-25/28

24 Replace Fuel Rail Pressure Sensor	1. Replace fuel rail pressure sensor. *NOTE: Verify that the replacement fuel rail pressure sensor is the correct part number for the 9.0L engine.* 2. Reconnect all electrical connectors. 3. Retest engine performance. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 25

RG41221,00000F2 -19-28OCT09-26/28

25 Check on Dynamometer	Check engine power on a certified dynamometer, if possible. Does engine develop rated power on dynamometer?	**YES:** Engine is operating as designed. **NO:** GO TO 26 **NO:** Engine cannot be tested on a dynamometer. Open DTAC case.

RG41221,00000F2 -19-28OCT09-27/28

26 Replace Injectors	*NOTE: For injector replacement instructions, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in section 2, group 090 earlier in this manual.* Replace injectors. Does engine develop rated power on dynamometer?	**YES:** Problem fixed. **NO:** Open DTAC case.

RG41221,00000F2 -19-28OCT09-28/28

E4 - Engine Emits Excessive White Exhaust Smoke

RG41221,00000F3 -19-02AUG10-1/14

E4 - Engine Emits Excessive White Exhaust Smoke Diagnostic Procedure

NOTE: This procedure should be used if the engine emits excessive white exhaust smoke. If engine emits a less heavy, bluish exhaust smoke, see 9.0L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04 of the Base Engine manual.

RG41221,00000F3 -19-02AUG10-2/14

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

RG41221,00000F3 -19-02AUG10-3/14

2 Check for Type of White Smoke	*NOTE: White exhaust smoke is caused by condensing liquid in the exhaust system. The liquid is typically diesel fuel or coolant. Unburned diesel fuel in the exhaust has a strong diesel fuel odor and causes a severe burning sensation in the eyes. Unburned diesel fuel is caused by a misfire or incomplete combustion. Too low of a coolant temperature may result in white smoke due to incomplete combustion. Poor quality fuel or fuel not blended for the operating conditions may also cause incomplete combustion. Coolant in the exhaust causes an odor that can be described as sweet. White smoke accompanied with coolant loss and overheating indicates that the white smoke is likely due to coolant in the exhaust.*	**YES:** White smoke is due to fuel in exhaust. GO TO 3
	Are you able to determine if the white smoke is caused by fuel or coolant?	**YES:** White smoke is due to coolant in exhaust. GO TO 10 **NO:** Not sure if fuel or coolant. Perform steps 3-12. Open DTAC case if no problem found.

RG41221,00000F3 -19-02AUG10-4/14

3 Check Engine Performance	Is engine idle quality and engine performance good?	**YES:** Reprogram ECU with latest payload. If white smoke still present, GO TO 4 **NO:** Engine performance is not acceptable. GO TO 4

RG41221,00000F3 -19-02AUG10-5/14

4 Misfire and Cut-Out Test	*NOTE: If white smoke is decreased substantially when a cylinder is cutout, the white smoke is likely caused by a misfire of that cylinder.*	
	1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cutout Test in Service ADVISOR with engine at slow idle.	**YES:** GO TO 6
	Is each cylinder's contribution within 10 percent of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cut-Out Test?	**NO:** GO TO 5

Continued on next page

RG41221,00000F3 -19-02AUG10-6/14

5 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR.	**YES:** Recheck compression with mechanical gauge. Determine cause of low compression.
	Is compression in the cylinder(s) with low contribution identified in Step 4 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**NO:** Replace injector(s) in cylinders with low contribution.

RG41221,00000F3 -19-02AUG10-7/14

6 Fuel Quality	Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section.	**YES:** GO TO 7
	Is white smoke still present?	**NO:** Problem fixed.

RG41221,00000F3 -19-02AUG10-8/14

7 Check Cooling System	1. Operate engine, under load if possible, until coolant temperature is above 88 °C (190 °F).	
	2. Return engine to slow idle, no load for 10 minutes.	**YES:** GO TO 8
	Were you able to cause coolant temperature to increase to 88 °C (190 °F) and is coolant temperature greater than 80 °C (175 °F) after 10 minutes at slow idle?	**NO:** Replace thermostat(s) and check for sources of cooling system heat loss.

RG41221,00000F3 -19-02AUG10-9/14

8 Inspect Valve Train and Check Camshaft Timing	1. Permit engine to cool to ambient temperature.	
	2. Ignition OFF, engine OFF.	
	3. Remove rocker arm cover.	
	4. Inspect valve train for obvious damage or valves that are out of adjustment.	
	5. Rotate engine using JDG820 Flywheel Turning Tool while observing valve train for proper operation.	
	6. Set engine at #1 TDC of compression stroke using JDE81-4 Timing Pin.	
	7. Check camshaft timing. See CHECK HIGH PRESSURE FUEL PUMP STATIC TIMING test later in this section.	
	8. Remove timing pin and turning tool.	**YES:** Fix mechanical problem. Recheck for white smoke.
	Were any mechanical problems found?	**NO:** Reinstall rocker arm cover. GO TO 9

RG41221,00000F3 -19-02AUG10-10/14

9 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure.	**YES:** Perform steps 10-12. Open DTAC case if no problem found.
	Is white smoke still present?	**NO:** Problem fixed.

Continued on next page

RG41221,00000F3 -19-02AUG10-11/14

10 Check EGR Cooler	Part 1	
	Is engine equipped with a VGT and EGR valve? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 4, VGT Actuator (S) in Section 03, Group 140 earlier in this manual.*	**YES:** Part 2 **NO:** GO TO 12
	Part 2 1. Monitor EGR Valve Position - Actual in Service ADVISOR. 2. Operate engine under load at 1500 rpm until coolant temperature is above 79°C (175°F) and EGR valve begins to open as indicated by EGR valve position. Note that EGR valve will not open unless engine is under load. 3. Permit engine to run at slow idle for five minutes. 4. Ignition OFF, engine OFF. 5. Remove EGR valve and check for presence of coolant in EGR cooler. Is coolant present in EGR cooler?	**YES:** Replace EGR cooler. **NO:** GO TO 11

RG41221,00000F3 -19-02AUG10-12/14

11 Pressurize Cooling System	Pressurize cooling system and check for accumulation of coolant in EGR cooler. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in Section 04 the base engine manual. Is coolant present in EGR cooler?	**YES:** Replace EGR cooler. **NO:** Reinstall EGR valve. GO TO 12

RG41221,00000F3 -19-02AUG10-13/14

12 Check for Head Gasket Failure	Check for failed head gasket. See CHECK FOR HEAD GASKET FAILURES in Section 04 of the base engine manual. Was problem found?	**YES:** Fix problem. **NO:** Locate source of coolant leakage into combustion chamber.

RG41221,00000F3 -19-02AUG10-14/14

E5 - Engine Emits Excessive Black or Gray Exhaust Smoke

RG41221,00000F4 -19-02AUG10-1/16

E5 - Engine Emits Excessive Black or Gray Exhaust Smoke Diagnostic Procedure

Additional References:

NOTE: This procedure should be used if the engine emits excessive black or gray smoke. If engine emits a bluish exhaust smoke, see 9.0L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04, of the Base Engine Manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 later in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 later in this manual.

For more information on EGR system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 later in this manual.

For more information on temperature sensor validity test, see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

RG41221,00000F4 -19-02AUG10-2/16

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

RG41221,00000F4 -19-02AUG10-3/16

2 Harness Diagnostic Mode Test	1. Ignition ON, engine OFF.	
	2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Discontinue this test and perform test for the active DTC.
	Were any active DTCs generated during Harness Diagnostic Mode Test?	**NO:** GO TO 3

Continued on next page

RG41221,00000F4 -19-02AUG10-4/16

3 Check Charge Air System and VGT	1. Perform CHARGE AIR SYSTEM DIAGNOSTIC test.	
	2. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST.	**YES:** GO TO 4
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

RG41221,00000F4 -19-02AUG10-5/16

4 Intake and Exhaust Restriction and Air Leak Test	Check for intake and exhaust restrictions and leaks. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS and CHECK FOR EXHAUST AIR LEAKS in Section 04 of the Base Engine Manual.	**YES:** GO TO 5
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

RG41221,00000F4 -19-02AUG10-6/16

5 EGR-VGT System Temperature and Flow Test	Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.	**YES:** GO TO 9
	Did system respond as described in the test?	**NO:** One air temperature sensor is not indicating correct temperature at start of test. GO TO 6 **NO:** MAP and barometric air pressure are not as described. GO TO 8 **NO:** EGR temperature sensor indicates EGR flow is present before EGR is commanded open. GO TO 11

RG41221,00000F4 -19-02AUG10-7/16

6 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point:	
	• Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point)	
	Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**YES:** GO TO 9
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** GO TO 7

Continued on next page

RG41221,00000F4 -19-02AUG10-8/16

7 Check Wiring and Sensor	1. Check wiring and terminals for air temperature sensor that does not indicate temperature correctly.	
	2. If no wiring problem found, replace air temperature sensor that does not agree with the other two air temperature sensors.	**YES:** GO TO 9
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

RG41221,00000F4 -19-02AUG10-9/16

8 Check Pressure Sensors	1. Check MAP sensor wiring and terminals.	
	2. Replace MAP sensor if no wiring problems found.	
	3. Ignition ON, engine OFF.	
	4. Compare Manifold Air Pressure - Absolute data point to Barometric Air Pressure data point.	**YES:** Recheck for black smoke.
	Are the Manifold Air Pressure - Absolute and Barometric Pressure within 10 kPa (1.5 psi) of each other with ignition ON, engine OFF?	**NO:** Replace ECU and recheck for black smoke.

RG41221,00000F4 -19-02AUG10-10/16

9 Cutout Test	Perform Cylinder Cutout Test in Service ADVISOR and watch for a decease in exhaust smoke when each cylinder is cut out.	**YES:** Replace injector in the affected cylinder and recheck for black smoke.
	Did smoke decrease substantially when a cylinder was cutout?	**NO:** GO TO 10

RG41221,00000F4 -19-02AUG10-11/16

10 Fuel Quality	Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section.	**YES:** GO TO 11
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

Continued on next page

RG41221,00000F4 -19-02AUG10-12/16

11 Check EGR Valve	*NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.* 1. Operate engine under load until coolant temperature is above 79°C (174°F). 2. Operate engine unloaded at low idle for five minutes. 3. Ignition OFF, engine OFF. 4. Remove EGR valve. 5. Check for stuck open or broken EGR valve. 6. Inspect EGR valve and O-rings for damage. 7. Inspect intake and exhaust passages for damage which would permit EGR flow with EGR valve closed. 8. Verify that the part number of the EGR valve removed is the correct part for the engine. 9. Inspect EGR cooler for indication of coolant leakage. Were any problems found?	**YES:** Fix problem or replace incorrect EGR valve. Recheck for black smoke. **NO:** Step 9 has NOT been performed. Reinstall EGR valve. GO TO 9 **NO:** Step 9 has been performed. Reinstall EGR valve. GO TO 12

RG41221,00000F4 -19-02AUG10-13/16

12 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure. Is black smoke still present when engine is operated under conditions where black smoke was observed?	**YES:** GO TO 13 **NO:** Problem fixed.

RG41221,00000F4 -19-02AUG10-14/16

13 Check Fuel Rail Pressure Sensor Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector. 3. Perform TERMINAL TEST on rail pressure sensor connector P05 and J3 connector. 4. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J3-C1). 5. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J3-G1). 6. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J3-G2). Were Terminal Test results good and all resistance measurements less than 10 ohms?	**YES:** GO TO 14 **NO:** Fix problem. If black smoke still present, GO TO 14

RG41221,00000F4 -19-02AUG10-15/16

14 Replace Rail Pressure Sensor	Replace rail pressure sensor. Is black smoke still present when engine is operated under conditions where black smoke was observed?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,00000F4 -19-02AUG10-16/16

E6 - Engine Will Not Crank

RG41221,00000F5 -19-12SEP07-1/15

E6 - Engine Will Not Crank Diagnostic Procedure

Control Unit Response:
The ECU is not part of the engine cranking circuit.

Additional References:

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 4, 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 4, 9.0L 24V WIRING DIAGRAM 6
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RG41221,00000F5 -19-12SEP07-2/15

1 Preliminary Checks	1. Inspect batteries, stater motor, starter solenoid, starter relay, and single point ground for loose connections, corroded terminals, or cables that are not connected.	
	2. Check fuse F01.	
	3. Verify that any remote switch used to shut down engine is in the RUN position.	
	4. If application has no remote switches, verify that remote switch jumper at connector C15 is present.	**YES:** Fix problem. GO TO 13
	Were any problems found?	**NO:** GO TO 2

RG41221,00000F5 -19-12SEP07-3/15

2 Check Battery State of Charge	1. Ignition OFF, engine OFF.	
	2. Measure battery terminal voltage.	**YES:** GO TO 3
	Is the voltage greater than 12.2V for 12V systems or 24.4V for 24V systems?	**NO:** Recharge or replace batteries. GO TO 13

RG41221,00000F5 -19-12SEP07-4/15

3 Check Battery Voltage While Attempting Crank	1. Ignition ON, engine OFF for 30 seconds.	
	2. Monitor battery terminal voltage.	
	3. Hold key switch in start position for 3 seconds.	**YES:** GO TO 5
	Is the voltage greater than 11V for 12V systems or 22V for 24V systems while attempting to crank engine?	**NO:** GO TO 4

Continued on next page

RG41221,00000F5 -19-12SEP07-5/15

4 Load Test Batteries	1. Ignition OFF, engine OFF.	
	2. Load test batteries.	**YES:** Check for internal starter problem Check for hydro locked or seized engine, or load not disengaged.
	Do batteries pass load test?	**NO:** Recharge or replace batteries. GO TO 13

RG41221,00000F5 -19-12SEP07-6/15

5 Check Starter Relay Battery Supply Voltage	1. Ignition OFF, engine OFF.	
	2. Measure the voltage from the starter relay battery voltage supply terminal to single point ground.	**YES:** GO TO 6
	Is the voltage within 1V of battery terminal voltage?	**NO:** Fix problem. GO TO 13

RG41221,00000F5 -19-12SEP07-7/15

6 Check Voltage at Starter Relay Coil	*NOTE: Some applications may have safety switches or other interlocks which interrupt the starter relay control circuit (high side or ground). Consult equipment manufacturer's information to determine if application has any starter interlocks.*	
	1. Monitor the voltage between the starter relay coil high side terminal (wire between key switch and relay) and single point ground.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 7
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** GO TO 11

RG41221,00000F5 -19-12SEP07-8/15

7 Check Starter Relay Coil Ground	1. Monitor the voltage between the starter relay coil high side terminal and starter relay coil ground terminal.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 8
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** Fix open ground circuit. GO TO 13

RG41221,00000F5 -19-12SEP07-9/15

8 Check Starter Relay Output Voltage	1. Monitor the voltage between the starter relay output terminal and single point ground.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 9
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** Replace starter relay. GO TO 13

Continued on next page

RG41221,00000F5 -19-12SEP07-10/15

9 Check Starter Solenoid Control Circuit	*NOTE: Some gear-reduction type starter motors may have an additional starter relay located near the starter motor which controls the voltage supplied to the starter solenoid. Consult stater motor manufacturer for more information.* 1. Monitor the voltage between the starter solenoid "S" terminal and single point ground. 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** GO TO 10 **NO:** Fix open circuit between starter relay output and starter solenoid. GO TO 13

RG41221,00000F5 -19-12SEP07-11/15

10 Check Starter Cables	1. Monitor the voltage between the starter solenoid battery terminal and starter ground terminal (large cable connections). 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** Remove and bench test stater motor and starter solenoid. **NO:** Check starter cables for poor connections or high resistance. GO TO 13

RG41221,00000F5 -19-12SEP07-12/15

11 Check Key Switch Voltage Supply	1. Ignition OFF, engine OFF. 2. Measure the voltage between the key switch battery supply terminal and single point ground. Is the voltage within 2V of battery terminal voltage?	**YES:** GO TO 12 **NO:** Fix open circuit between key switch and battery positive terminal. GO TO 13

RG41221,00000F5 -19-12SEP07-13/15

12 Check Key Switch	1. Monitor the voltage between the key switch start terminal and single point ground. 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** Fix open circuit between key switch and starter relay coil high side terminal. GO TO 13 **NO:** Replace key switch. GO TO 13

RG41221,00000F5 -19-12SEP07-14/15

13 Verification	Attempt to crank engine. Does engine crank?	**YES:** Problem fixed. **NO:** GO TO 1

RG41221,00000F5 -19-12SEP07-15/15

E7 - Engine Idles Poorly

RG41221,00000F6 -19-02AUG10-1/15

E7 - Engine Idles Poorly Diagnostic Procedure

RG41221,00000F6 -19-02AUG10-2/15

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

RG41221,00000F6 -19-02AUG10-3/15

2 Items Possibly Mistaken As Poor Idle Quality	Check for the following items which may be mistaken for poor idle quality: • Engine accessories such as A/C clutch or fan drives cycling on and off. • Alterations to the engine and/or machine harness such as radios or non-John-Deere accessories. Does disabling or switching off these devices temporarily restore engine performance?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,00000F6 -19-02AUG10-4/15

3 Cut-Out Test	Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle. Does the sound of the engine change equally when each injector is disabled during the Cylinder Cut-Out Test?	**YES:** GO TO 5 **NO:** GO TO 4

RG41221,00000F6 -19-02AUG10-5/15

4 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR. Is compression in the cylinder(s) with low contribution identified in Step 3 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**YES:** Check compression with mechanical gauge. **NO:** Replace injector(s) in cylinder(s) with low contribution. Recheck idle quality.

RG41221,00000F6 -19-02AUG10-6/15

5 Check for Air in Fuel	Perform TEST FOR AIR IN FUEL procedure, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 6

RG41221,00000F6 -19-02AUG10-7/15

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 7

Continued on next page

RG41221,00000F6 -19-02AUG10-8/15

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

RG41221,00000F6 -19-02AUG10-9/15

8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

RG41221,00000F6 -19-02AUG10-10/15

9 Check Throttle	1. Throttle at low idle position. 2. Monitor Throttle Position data point in Service ADVISOR. Does Throttle Position data point indicate throttle signal is changing by more than 3 percent?	 **YES:** Check for throttle circuit problem. **NO:** GO TO 10

RG41221,00000F6 -19-02AUG10-11/15

10 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors restore engine performance?	 **YES:** Problem Fixed **NO:** GO TO 11

RG41221,00000F6 -19-02AUG10-12/15

11 Check EGR Valve	Part 1 Is engine equipped with a VGT and EGR valve? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 4, VGT Actuator (S) in Section 03, Group 140 earlier in this manual.*	 **YES:** Part 2 **NO:** GO TO 12
	Part 2 *NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.* 1. Remove EGR valve. 2. Check for stuck open EGR valve. 3. Inspect EGR valve and O-rings for damage. 4. Inspect intake and exhaust passages for damage which would permit EGR flow with EGR valve closed. 5. Inspect EGR cooler for indication of coolant leakage. Were any problems found?	 **YES:** Fix problem. Check idle quality. **NO:** Reinstall EGR valve. GO TO 12

RG41221,00000F6 -19-02AUG10-13/15

12 Check Valve Adjustment	Perform valve adjustment. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 13

Continued on next page

RG41221,00000F6 -19-02AUG10-14/15

13 Reprogram ECU	Download latest payload and reprogram ECU. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

RG41221,00000F6 -19-02AUG10-15/15

E8 - Abnormal Engine Noise

Symptom	Problem	Solution
E8 - Abnormal Engine Noise	Air in Fuel	Perform procedure TEST FOR AIR IN FUEL later in this section.
	Worn main or connecting rod bearings	Determine bearing clearance. See GROUP 030 — CYLINDER BLOCK, LINERS, PISTONS AND RODS REPAIR SPECIFICATIONS in Section 06, Group 200 or GROUP 040 — CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL REPAIR SPECIFICATIONS in Section 06, Group 200 of the base engine manual.
	Excessive crankshaft end play	Check crankshaft end play. See CHECK CRANKSHAFT END PLAY in Section 02, Group 040 of the base engine manual.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See GROUP 040 — CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL REPAIR SPECIFICATIONS in Section 06, Group 200 of the base engine manual.
	Worn connecting rod bushings and piston pins	Inspect piston pins and bushings. See INSPECT PISTON PINS AND BUSHINGS in Section 02, Group 030 of the base engine manual.
	Scored pistons	Inspect pistons. See INSPECT PISTON PINS AND BUSHINGS in Section 02, Group 030 of the base engine manual.
	Worn timing gears or excess back lash	Check timing gear back lash. See CHECK CAMSHAFT END PLAY AND MEASURE GEAR BACKLASH in Section 02, Group 050 of the base engine manual.
	Excessive valve clearance	Check and adjust valve clearance. See ADJUST VALVE CLEARANCE in Section 02, Group 021 of the base engine manual.
	Worn camshaft	Inspect camshaft. See VISUALLY INSPECT CAMSHAFT in Section 02, Group 050 of the base engine manual.

Continued on next page

Symptom	Problem	Solution
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See DISASSEMBLE AND ASSEMBLE ROCKER ARM ASSEMBLY in Section 02, Group 021 of the base engine manual.
	Insufficient engine lubrication	See 9.0L - L2 - ENGINE OIL PRESSURE LOW in Section 04, Group 150 of the base engine manual.
	Whining turbocharger noise	Inspect the compression outlet side of the turbo for loose hose. Make sure all hose clamps from the turbo compression outlet to the aftercooler are tightened and in good condition. *NOTE: It may be necessary to warm the hoses by running the engine for a short time to achieve the proper torque on the hose clamps.* **CAUTION: Parts may be hot!** Also make sure that the alignment of the turbo to the charge air cooler is correct and not putting stress on the hose or the clamps. *NOTE: It may be necessary to realign the charge air cooler in the vehicle frame.* See TURBOCHARGER INSPECTION in Section 02, Group 080 in the base engine manual.

RG41221,00002C2 -19-27JUL07-2/2

E9 - Primary Analog Throttle Does Not Respond

RG41221,00000F8 -19-02JUN08-1/8

E9 - Primary Analog Throttle Does Not Respond

RG41221,00000F8 -19-02JUN08-2/8

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Are there any active DTC codes?	**YES:** Troubleshoot those codes first. **NO:** GO TO 2

RG41221,00000F8 -19-02JUN08-3/8

2 Low Pressure Fuel Test	Perform low pressure fuel test, see F1 - LOW PRESSURE FUEL SYSTEM CHECK later in this Section. Did test pass?	**YES:** GO TO 3 **NO:** Return to F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST procedure and perform tests.

RG41221,00000F8 -19-02JUN08-4/8

3 High Pressure Fuel Test	Perform high pressure fuel test, see F2 - HIGH PRESSURE FUEL SYSTEM CHECK later in this Section. Did test pass?	**YES:** GO TO 4 **NO:** Return to F2 - HIGH PRESSURE FUEL SYSTEM CHECK procedure and perform tests.

RG41221,00000F8 -19-02JUN08-5/8

4 Throttle Response Test	1. Ignition ON, Engine ON. 2. Adjust throttle to different speed points. Did engine respond to throttle movement?	**YES:** Problem fixed, return to service. **NO:** GO TO 5

Continued on next page

RG41221,00000F8 -19-02JUN08-6/8

5 Reprogram ECU	1. Download latest ECU software payload file.	
	2. Program ECU and ensure the correct throttle options are set on the trim page as you start the programming sequence.	**YES:** GO TO 6
	Was programming successful?	**NO:** Repeat this step. If ECU will still not program, see REPROGRAMMING ENGINE CONTROL UNIT (ECU) in Section 4 Group 160 later in this manual.

RG41221,00000F8 -19-02JUN08-7/8

6 Throttle Response Test	1. Ignition ON, Engine ON.	
	2. Adjust throttle to different speed points.	**YES:** Problem fixed, return to service.
	Did engine respond to throttle movement?	**NO:** Start a DTAC case.

RG41221,00000F8 -19-02JUN08-8/8

E10 - Secondary Analog Throttle Does Not Respond

RG41221,00000F9 -19-02JUN08-1/7

E10 - Secondary Analog Throttle Does Not Respond

RG41221,00000F9 -19-02JUN08-2/7

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Are there any active DTC codes?	**YES:** Troubleshoot those codes first. **NO:** GO TO 2

RG41221,00000F9 -19-02JUN08-3/7

2 Primary Analog Throttle Test	Perform primary analog throttle test, see E9 - ANALOG THROTTLE (A) DOES NOT RESPOND later in this Section. Did test pass?	**YES:** GO TO 3 **NO:** Return to F1 procedure and perform tests.

RG41221,00000F9 -19-02JUN08-4/7

3 Throttle Response Test	1. Ignition ON, Engine ON. 2. Select secondary analog throttle. 3. Adjust secondary analog throttle to different speed points. Did engine respond to throttle movement?	**YES:** Problem fixed, return to service. **NO:** GO TO 4

RG41221,00000F9 -19-02JUN08-5/7

4 Reprogram ECU	1. Download latest ECU software payload file. 2. Program ECU and ensure the correct throttle options are set on the trim page as you start the programming sequence. Was programming successful?	**YES:** GO TO 5 **NO:** Repeat this step. If ECU will still not program, see REPROGRAMMING ENGINE CONTROL UNIT (ECU) in Section 4 Group 160 later in this manual.

Continued on next page

RG41221,00000F9 -19-02JUN08-6/7

5 Throttle Response Test	1. Ignition ON, Engine ON.	
	2. Adjust secondary analog throttle to different speed points.	**YES:** Problem fixed, return to service.
	Did engine respond to throttle movement?	**NO:** Start a DTAC case.

RG41221,00000F9 -19-02JUN08-7/7

F1 - Low Pressure Fuel System Check

DB92450,0000059 -19-02JUN08-1/17

F1 – Low Pressure Fuel Supply System Test Diagnostic Procedure

Additional References:
For more fuel transfer pump system information, see FUEL TRANSFER PUMP OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2, 9.0L 12V WIRING DIAGRAM 8
- see 9.0L 24V WIRING DIAGRAM 2, 9.0L 24V WIRING DIAGRAM 8
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

DB92450,0000059 -19-02JUN08-2/17

1 Check for Active DTCs	Were you referred to this Low Pressure Fuel Supply Test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

DB92450,0000059 -19-02JUN08-3/17

2 Preliminary Check	**CAUTION: DO NOT PRESSURIZE THE FUEL TANK! Doing this causes the seal on the front of the high pressure pump to rupture. When such a rupture occurs, fuel passes around the seal, and fills the engine crankcase. This condition causes severe damage to the engine and requires replacement of the high pressure pump.** 1. Check for adequate fuel level in fuel tank. 2. Check for restricted vent in fuel tank or fuel cap. 3. Check for loose or misaligned fuel filter housing. 4. Check for ruptured fuel lines. 5. Check for pinched or kinked fuel lines. 6. Check for loose, broken, or cracked fuel line fittings.	**YES:** Fix problem. GO TO 3
	Was the problem found?	**NO:** GO TO 3

Continued on next page

DB92450,0000059 -19-02JUN08-4/17

3 Check for Fuel Transfer Pump Operation	*NOTE: The fuel transfer pump should operate when ignition is switched ON to prime and purge air from the fuel system. If engine is not started within a programmable period of time (typically 60 seconds), the ECU switches the fuel transfer pump OFF.* 1. Ignition OFF, engine OFF. 2. Disconnect low pressure fuel sensor connector to cause ECU to command pump to 45 percent speed. Ignore DTC 000094.04 which will be set when fuel sensor is disconnected. 3. Ignition ON, engine OFF. 4. Listen and feel for fuel transfer pump operation during prime cycle after ignition is switched ON. 5. Ignition OFF, engine OFF. 6. Reconnect sensor. Did fuel transfer pump operate with ignition ON?	**YES:** GO TO 4 **NO:** Perform 001075.12 — LOW PRESSURE FUEL PUMP ERROR DETECTED DIAGNOSTIC PROCEDURE as though the DTC were active.

DB92450,0000059 -19-02JUN08-5/17

4 Replace Fuel Filters	1. Ignition OFF, engine OFF. 2. Drain primary and secondary filter into a clean container. 3. Check for water, dirt, or other contaminants in the drained fuel. 4. Replace primary and secondary fuel filter elements. Was an abnormal amount of water or contaminants present in the drained fuel?	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 5 **NO:** GO TO 5

DB92450,0000059 -19-02JUN08-6/17

5 Check Low Pressure Fuel - Actual Pressure in Service ADVISOR	1. Ignition ON, engine OFF for 60 seconds to prime and purge air. 2. Ignition OFF, engine OFF. 3. Ignition ON, engine OFF. 4. Monitor Low Pressure Fuel - Actual Pressure data point. Does the Low Pressure Fuel - Actual Pressurel data point indicate 15 kPa (2.2 psi) or above during initial 60 seconds after ignition is ON?	**YES:** GO TO 11 **NO:** GO TO 6

Continued on next page

DB92450,0000059 -19-02JUN08-7/17

6 Temporary Fuel Supply Check

NOTE: Use a clean hose and fuel that has known-good quality in a clean container for this step.

1. Ignition OFF, engine OFF.
2. Disconnect fuel inlet line from the primary fuel filter.
3. Inspect fuel inlet at primary filter header for debris.
4. Install a hose on primary filter housing fuel inlet port and place other end of hose in a container of clean fuel.
5. Ignition ON, Engine OFF.
6. Monitor Low Pressure Fuel - Actual Pressure.

Does the Low Pressure Fuel - Actual Pressure data point indicate 15 kPa (2.2 psi) or above?

YES: Repair restriction or air leak between fuel pick-up line and primary filter. GO TO 11

NO: GO TO 7

DB92450,0000059 -19-02JUN08-8/17

7 Check Fuel Flow

1. Ignition OFF, engine OFF.
2. Disconnect low pressure fuel sensor connector to cause ECU to command pump to 45 percent speed. Ignore DTC 000094.04 which will be set when fuel sensor is disconnected.
3. Disconnect fuel line between secondary filter outlet and high pressure pump inlet.

IMPORTANT: Do NOT crank engine with high pressure pump inlet fuel line disconnected.

4. Reposition fuel line and place high pressure pump inlet end in a container suitable for diesel fuel.
5. Reconnect fuel line to secondary filter outlet.
6. Ignition ON, engine OFF for 30 seconds.
7. Ignition OFF, engine OFF.

Is fuel flow at least 0.5L (17 oz) in 30 seconds?

YES: GO TO 8

NO: Check for restrictions in fuel filter headers. If none found, GO TO 10

DB92450,0000059 -19-02JUN08-9/17

8 Low Pressure Fuel Sensor Harness Checks

1. Ignition OFF, engine OFF.
2. Disconnect ECU J3 connector and low pressure fuel sensor connector.
3. Perform TERMINAL TEST on J3 and low pressure fuel sensor connectors.
4. On the harness, measure the resistance between the ECU fuel pressure signal (J3-C2) and fuel pressure connector signal (P03-3).
5. On the harness, measure the resistance between the ECU fuel pressure return (J3-H3) and fuel pressure connector return (P03-1).
6. On the harness, measure the resistance between the ECU fuel pressure 5V supply (J3-H4) and fuel pressure connector 5V supply (P03-2).

Were Terminal Test results good and were all resistance measurements less than 10 ohms?

YES: Replace low pressure fuel sensor. GO TO 9

NO: Fix problem. GO TO 11

Continued on next page

DB92450,0000059 -19-02JUN08-10/17

9 Check Fuel Pressure After Sensor Replacement	1. Ignition OFF, Engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. 4. Monitor Low Pressure Fuel - Actual Pressure data point. 5. Place engine under load. Does the Low Pressure Fuel - Actual Pressure data point indicate 15 kPa (2.2 psi) or above with engine running under load and is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 10

DB92450,0000059 -19-02JUN08-11/17

10 Replace Fuel Transfer Pump	1. Ignition OFF, engine OFF. 2. Replace fuel transfer pump. 3. Reinstall all fuel lines removed for testing. 4. Ignition ON, engine OFF for 60 seconds to purge air from fuel system. 5. Ignition OFF, engine OFF. 6. Ignition ON, engine ON or cranking. 7. Monitor Low Pressure Fuel - Actual Pressure data point. 8. Place engine under load. Does the Low Pressure Fuel - Actual Pressure data point indicate 15 kPa (2.2 psi) or above with engine running under load and is engine performance restored?	**YES:** Problem fixed. **NO:** Fuel pressure is NOT above 15 kPa (2.2 psi). Verify air is purged from system. Open DTAC case. **NO:** Fuel pressure is above 15 kPa (2.2 psi) but engine performance is NOT restored or will not start. Low pressure fuel system is operating correctly.

DB92450,0000059 -19-02JUN08-12/17

11 Verification	1. Ignition OFF, engine OFF. 2. Reconnect fuel inlet line from fuel tank and all electrical connectors, if applicable. 3. Ignition ON, engine ON or cranking. 4. Monitor Low Pressure Fuel - Actual Pressure data point. 5. Place engine under load if engine started. Does the Low Pressure Fuel - Actual Pressure data point indicate 15 kPa (2.2 psi) or above with engine running under load and is engine performance restored?	**YES:** Low pressure fuel system is operating correctly. **NO:** Pressure is more than 15 kPa (2.2 psi) but engine performance is not restored or engine does not start. GO TO 12

Continued on next page

DB92450,0000059 -19-02JUN08-13/17

12 Check Fuel Flow	1. Ignition OFF, engine OFF. 2. Disconnect low pressure fuel sensor connector to cause ECU to command pump to 45 percent speed. Ignore DTC 000094.04 which will be set when fuel sensor is disconnected. 3. Disconnect fuel line between secondary filter outlet and high pressure pump inlet. 4. Reposition fuel line and place high pressure pump inlet end in a container suitable for diesel fuel. 5. Reconnect fuel line to secondary filter outlet. 6. Ignition ON, engine OFF for 30 seconds. 7. Ignition OFF, engine OFF. Is fuel flow at least 0.5L (17 oz) in 30 seconds?	**YES:** GO TO 13 **NO:** Check for restriction between low pressure fuel sensor and high pressure pump.

DB92450,0000059 -19-02JUN08-14/17

13 Low Pressure Fuel Sensor Atmospheric Pressure Check	1. Verify fuel line between secondary fuel filter outlet and high pressure fuel pump inlet still disconnected. 2. Disconnect fuel transfer pump 6-way connector C19 to prevent pump from operating. 3. Ignition ON, engine OFF. 4. Monitor Low Pressure Fuel - Actual Pressure data point. Does the Low Pressure Fuel - Actual Pressure data point indicate 0 kPa (0 psi) within +/- 7 kPa (1 psi)?	**YES:** Low pressure fuel system is functioning correctly. Reinstall fuel lines and electrical connectors. **NO:** GO TO 14

DB92450,0000059 -19-02JUN08-15/17

14 Barometric Pressure Check	Part 1 Is the engine equipped with a manifold absolute pressure sensor?	**YES:** GO TO Part 2 **NO:** GO TO 15
	Part 2 Monitor Barometric Air Pressure and Manifold Air Pressure- Absolute data points. Are the two data points within 10 kPa (1.5 psi) of each other?	**YES:** GO TO 15 **NO:** Perform 000108.02 — BAROMETRIC PRESSURE SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC was active.

Continued on next page

DB92450,0000059 -19-02JUN08-16/17

15 Low Pressure Fuel Sensor Harness Checks	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and low pressure fuel sensor connector. 3. Perform TERMINAL TEST on J3 and low pressure fuel sensor connectors. 4. On the harness, measure the resistance between the ECU fuel pressure signal (J3-C2) and fuel pressure connector signal (P03-3). 5. On the harness, measure the resistance between the ECU fuel pressure return (J3-H3) and fuel pressure connector return (P03-1). 6. On the harness, measure the resistance between the ECU fuel pressure 5V supply (J3-H4) and fuel pressure connector 5V supply (P03-2). Were Terminal Test results good and were all resistance measurements less than 10 ohms?	**YES:** Replace low pressure fuel sensor. GO TO 11 **NO:** Fix problem. GO TO 11

DB92450,0000059 -19-02JUN08-17/17

F2 - High Pressure Fuel System Check

JB81757,000002D -19-02AUG10-1/25

F2 - High Pressure Fuel Supply System Test Diagnostic Procedure

Additional References:
For fuel system operation information, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

IMPORTANT: Thoroughly clean all fuel lines, fittings, and components prior to making any disconnections or connections to prevent debris from entering the fuel system, which can damage engine and components.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

JB81757,000002D -19-02AUG10-2/25

1 Check for Active DTCs	Were you referred to this High Pressure Fuel System Check while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test.

JB81757,000002D -19-02AUG10-3/25

2 Preliminary Fuel System Checks	Has test F1 - LOW PRESSURE FUEL SYSTEM CHECK found earlier in this group been performed?	**YES:** GO TO 3 **NO:** Perform test F1 - LOW PRESSURE FUEL SYSTEM CHECK prior to performing test F2 - HIGH PRESSURE FUEL SYSTEM CHECK.

Continued on next page

JB81757,000002D -19-02AUG10-4/25

3 Engine Start Status	Does engine start?	**YES:** GO TO 17 **NO:** GO TO 4

JB81757,000002D -19-02AUG10-5/25

4 Check Fuel Rail Pressure	1. Monitor Fuel Rail Pressure - Actual data point in Service ADVISOR. 2. Ignition ON, engine cranking. Is the fuel rail pressure - actual 20 MPa (2900 psi) or above with engine cranking?	 **YES:** GO TO 10 **NO:** GO TO 5

JB81757,000002D -19-02AUG10-6/25

5 Check High Pressure Fuel Pump	*NOTE: This check is used to verify that the high pressure pump is rotating and capable of delivering fuel to the rail when the engine is cranking. The suction at the high pressure pump inlet will draw the low pressure fuel system into a negative pressure (partial vacuum) if the high pressure pump is rotating and low pressure pump is not operating.* 1. Ignition OFF, engine OFF. 2. Ignition ON, engine OFF 30 seconds to cause fuel transfer pump to prime system. 3. Ignition OFF, engine OFF. 4. Disconnect fuel transfer pump 6-way connector. Ignore DTC 001075.12 which will become active due to pump being disconnected. 5. Ignition ON, engine OFF. 6. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR. 7. Crank engine for 30 seconds. Does Low Pressure Fuel - Actual Pressure decrease while cranking engine to a negative pressure value of -2 kPa to -10 kPa (-3 psi to -14 psi)?	**YES:** Reconnect fuel transfer pump. GO TO 6 **NO:** Check for high pressure fuel pump shaft failure, debris at pump inlet, or stuck closed SCV.

Continued on next page

JB81757,000002D -19-02AUG10-7/25

6 Pressure Limiter Test

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

NOTE: For pressure limiter replacement, see REMOVE AND INSTALL PRESSURE LIMITER in Section 02, Group 090 earlier in this manual.

1. Ignition OFF, engine OFF for at least 5 minutes to permit rail pressure to decrease.
2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
3. Disconnect fuel return line from the pressure limiter valve. DO NOT remove the pressure limiter valve from fuel rail.
4. Cap the return line fitting that was originally connected to the pressure limiter. DO NOT cap the pressure limiter.
5. Connect a temporary fuel line to the pressure limiter outlet and route to a suitable container for diesel fuel.
6. Ignition ON, engine cranking for 20 seconds.
7. Check temporary fuel line for fuel flow through pressure limiter with engine cranking.

Is fuel flow through the pressure limiter present?

YES: Replace pressure limiter valve and retest fuel rail pressure.

NO: Reinstall return line. GO TO 7

JB81757,000002D -19-02AUG10-8/25

7 Injector Leak-off Check

1. Ignition OFF, engine OFF.
2. Disconnect injector fuel leak-off line at fuel return tee and cap tee.
3. Connect a clear hose to the injector leak off line, routing the other end into a suitable container for diesel fuel.
4. Ignition ON, engine cranking for 20 seconds.

Is fuel flow from injector leak-off line greater than 147 mL (5 oz.) during the 20 seconds of engine cranking?

YES: Check for damaged feed tubes or injectors. Verify only one combustion sealing washer on each injector.

NO: GO TO 8

JB81757,000002D -19-02AUG10-9/25

8 Check for Stuck or Leaking Injector with Compression Test

NOTE: For Cylinder Electronic Compression Test information, see Cylinder Electronic Compression Test Instructions in Section 04, Group 160.

1. Perform Cylinder Electronic Compression Test in Service ADVISOR.
2. Compare compression between cylinders.

Does one cylinder have 10 percent or higher compression than the other cylinders?

YES: Replace injector in cylinder with higher compression and retest fuel rail pressure.

NO: GO TO 9

Continued on next page

JB81757,000002D -19-02AUG10-10/25

9 Replace High Pressure Fuel Pump	Replace high pressure fuel pump and SCV.	**YES:** Problem fixed.
	Is the fuel rail pressure - actual 20 MPa (2900 psi) or above with engine cranking or running?	**NO:** Replace injectors. Open DTAC case if fuel rail pressure is still below 20 MPa (2900 psi).

JB81757,000002D -19-02AUG10-11/25

10 Check Fuel Rail Pressure Sensor	*NOTE: High resistance in the fuel rail pressure sensor circuit can cause the ECU to incorrectly determine fuel rail pressure is higher than actual fuel rail pressure.* 1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Ignition ON, engine cranking.	**YES:** GO TO 11
	Did engine start?	**NO:** GO TO 12

JB81757,000002D -19-02AUG10-12/25

11 Check Fuel Rail Pressure Sensor Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector. 3. Perform TERMINAL TEST on rail pressure sensor connector P05 and J3 connector. 4. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J3-C1). 5. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J3-G1). 6. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J3-G2).	**YES:** Replace fuel rail pressure sensor.
	Were Terminal Test results good and all resistance measurements less than 10 ohms?	**NO:** Fix problem. Verify engine starts.

JB81757,000002D -19-02AUG10-13/25

12 Check for Fuel Rail Pressure DTC	Verify fuel rail pressure sensor is still disconnected.	**YES:** Cause of no-start is not the high pressure fuel system. Reconnect sensor and return to original procedure.
	Is DTC 000157.03 active?	**NO:** GO TO 13

Continued on next page

JB81757,000002D -19-02AUG10-14/25

13 Check Fuel Rail Pressure Sensor Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector. 3. Perform TERMINAL TEST on rail pressure sensor connector P05 and J3 connector. 4. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J3-C1). 5. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J3-G1). 6. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J3-G2). Were Terminal Test results good and all resistance measurements less than 10 ohms?	**YES:** GO TO 14 **NO:** Fix problem.

JB81757,000002D -19-02AUG10-15/25

14 Check for Shorted Fuel Rail Pressure Sensor Circuits	1. On the harness, measure the resistance between the ECU rail pressure signal (J3-C1) and single point ground. 2. On the harness, measure the resistance between the ECU 5V supply (J3-G1) and single point ground. 3. On the harness, measure the resistance between the ECU return (J3-G2) and single point ground. Were all resistance measurements greater than 10k ohms?	**YES:** GO TO 15 **NO:** Fix problem.

JB81757,000002D -19-02AUG10-16/25

15 Check for Wire to Wire Short	On the harness, measure the resistance between the ECU rail pressure signal (J3-C1) and all other terminals in the J3 connector. Were all resistance measurements greater than 10k ohms?	**YES:** GO TO 16 **NO:** Fix problem.

JB81757,000002D -19-02AUG10-17/25

16 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage from the ECU rail pressure signal (J3-C1) to single point ground. 3. On the harness, measure the voltage from the ECU 5V supply (J3-G1) to single point ground. 4. On the harness, measure the voltage from the ECU rail pressure return (J3-G2) to single point ground. 5. Ignition OFF, engine OFF. Were all voltage measurements less than 0.5V?	**YES:** Replace ECU. **NO:** Fix problem.

Continued on next page

JB81757,000002D -19-02AUG10-18/25

17 Suction Control Valve and Pressure Limiter Check

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

NOTE: For pressure limiter replacement, see REMOVE AND INSTALL PRESSURE LIMITER in Section 02, Group 090 earlier in this manual.

NOTE: A sticking suction control valve (SCV) causes low power, DTC 001347.07, and black smoke. The SCV may only stick intermittently, and usually occurs after the engine is at low idle for a period of time and throttle is then advanced. If the SCV sticks open, the fuel rail pressure will rapidly increase to 220 MPa (32,000 psi) or more, causing the pressure limiter to open. Fuel rail pressure is then limited to approximately 50 MPa (7250 psi) with the pressure limiter open. Shutting the engine down and restarting should reset the pressure limiter and temporarily restore performance. The sticking SCV may also fail such that it causes fuel rail pressure to be erratic resulting in poor performance and possibly generating DTC 001347.07.

1. Ignition OFF, engine OFF for at least 5 minutes to permit rail pressure to decrease.
2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
3. Disconnect fuel return line from the pressure limiter valve. DO NOT remove the pressure limiter valve from fuel rail.
4. Cap the return line fitting that was originally connected to the pressure limiter. DO NOT cap the pressure limiter.
5. Connect a temporary fuel line to the pressure limiter outlet and route to a suitable container for diesel fuel.
6. Ignition ON, engine OFF.
7. Using the graph feature in SERVICE ADVISOR, record the following data points:
   - Fuel Rail Pressure - Actual
   - Fuel Rail Pressure – Desired
8. Start engine and operate at low idle for two minutes.

NOTE: If any fuel flow is present through pressure limiter; discontinue test, replace pressure limiter, and return to this step.

9. Snap throttle several times.
10. Operate engine at speed and load where problem occurs.
11. Compare graph of Fuel Rail Pressure - Actual and Fuel Rail Pressure - Desired to those shown in the examples below.

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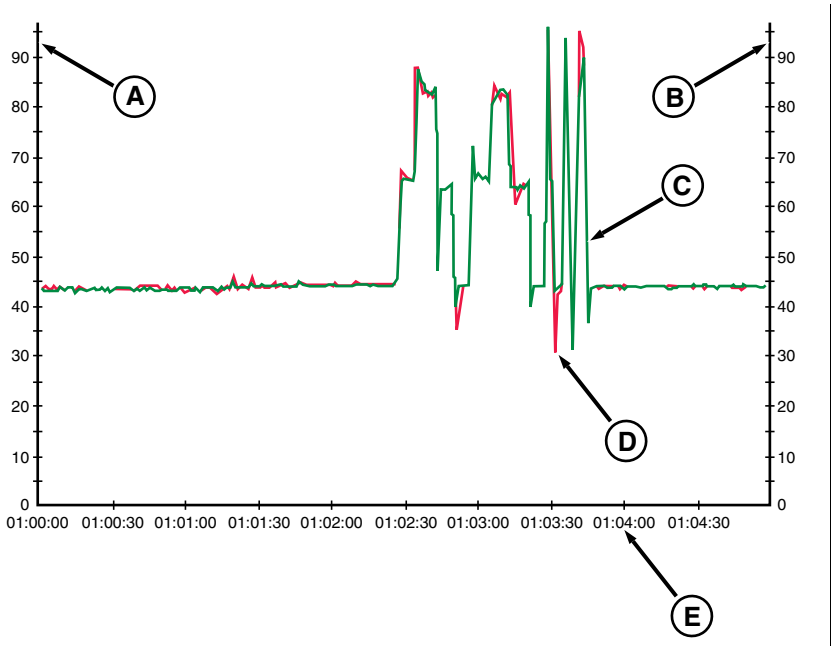
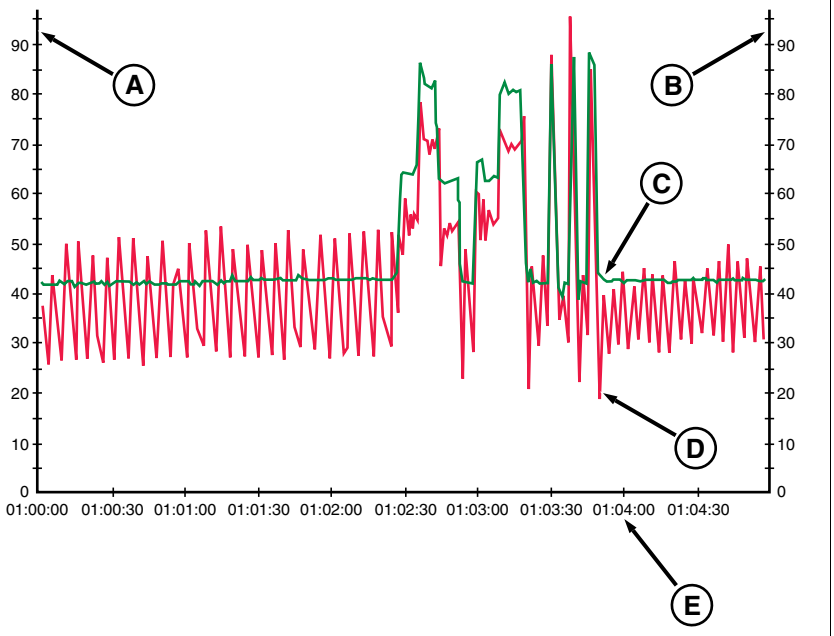


RG15365A —UN—03OCT08

Good SCV.

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)



RG15366A —UN—03OCT08

Sticking SCV Causing Erratic Rail Pressure

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)

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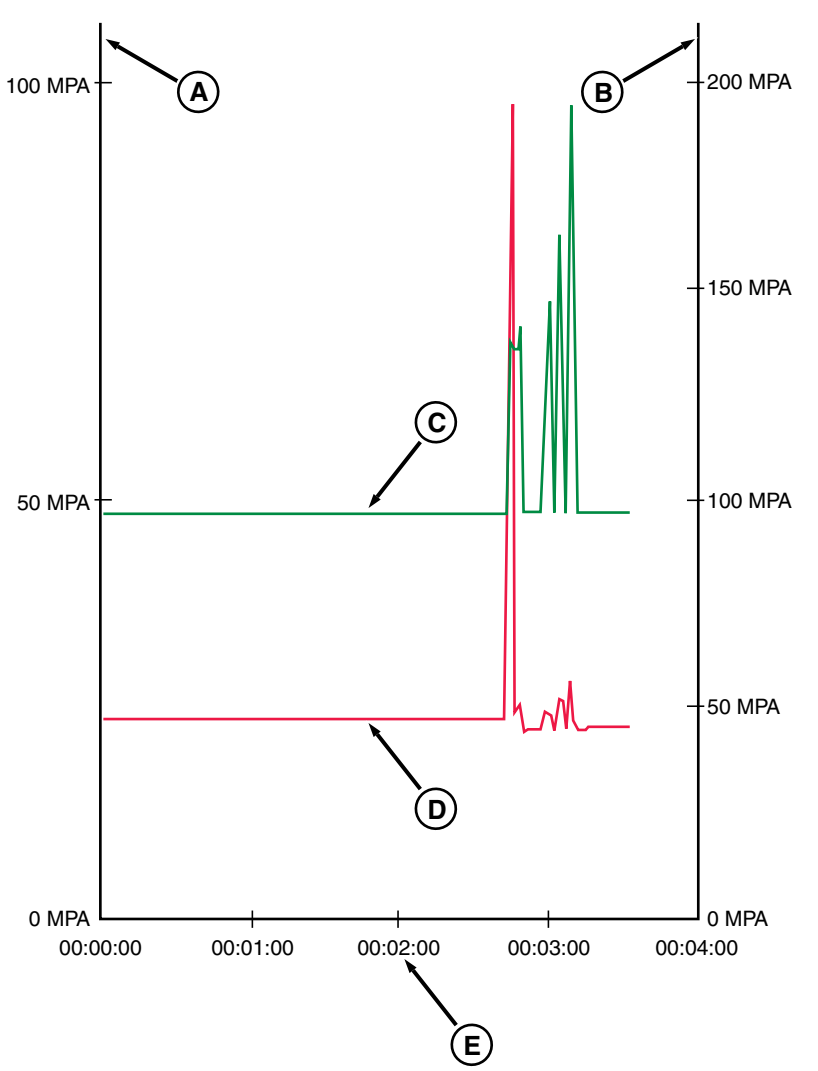


RG15372A —UN—03OCT08

Sticking SCV Causing Pressure Limiter to Open. Note Difference in Pressure Scales.

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)

Is the graph that is generated similar to the examples of a sticking SCV or was any fuel flow present through pressure limiter?

YES: Replace SCV and pressure limiter. Reprogram ECU with latest payload.

NO: GO TO 18

Continued on next page

JB81757,000002D -19-02AUG10-21/25

18 Injector Leak-off Check

1. Ignition OFF, engine OFF.
2. Disconnect injector fuel leak-off line at tee and cap tee.
3. Connect a clear hose to the injector leak off line, routing the other end into a suitable container for diesel fuel.
4. Start engine and operate at 800 rpm.

Is fuel flow from injector leak-off line greater than 440 mL (15 oz.) per minute?

YES: Check for damaged feed tubes or injectors.

NO: No fuel flow is present. Check for restrictions in the injector leak off line and galley.

NO: Fuel flow present and within specification. Reinstall fuel return line. GO TO 19

JB81757,000002D -19-02AUG10-22/25

19 High Pressure Fuel Pump Overflow Orifice Test

1. Ignition OFF, engine OFF.
2. Disconnect the fuel leak-off line between the tee coming from the injector and fuel rail leak-off lines, and the high pressure fuel pump overflow orifice fitting.
3. Connect a clear hose to the overflow orifice, routing the other end into a suitable container for diesel fuel.
4. Start engine and operate at 800 rpm.

Is fuel flow from pump leak-off line greater than 489 mL (16.5 oz.) per minute?

YES: Replace high pressure fuel pump. GO TO 20

NO: No fuel flow is present. Replace high pressure fuel pump. GO TO 20

NO: Fuel flow present and within specification. Reinstall fuel return line. GO TO 20

JB81757,000002D -19-02AUG10-23/25

20 Misfire and Cut-Out Test

1. Perform Cylinder Misfire Test in Service ADVISOR.
2. Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle.

Is each cylinder's contribution within 10 percent of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cutout Test?

YES: High pressure fuel system is operating correctly. Return to original procedure.

NO: GO TO 21

JB81757,000002D -19-02AUG10-24/25

21 Check Compression

Perform Cylinder Electronic Compression Test in Service ADVISOR.

Is compression in the cylinder(s) with low contribution identified in Step 20 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?

YES: Check compression with mechanical gauge.

NO: Replace injector(s) in cylinder(s) with low contribution.

JB81757,000002D -19-02AUG10-25/25

F3 - Excessive Fuel Consumption

Symptom	Problem	Solution
F3 - Excessive Fuel Consumption	Diagnostic trouble codes	Resolve active diagnostic trouble codes.
	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Engine overloaded	Reduce engine load
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Determine cause of low compression and repair as required.
	Leaks in fuel supply system	Locate source of leak and repair as required.
	Improper valve clearance.	Adjust valves. See ADJUST VALVE CLEARANCE in the Base Engine Manual.
	Fuel injectors defective.	If testing indicates a possible faulty injector, remove and inspect injectors. See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2, Group 100 of this manual.
	Low engine temperature.	Coolant temperature too low. Check thermostat. See INSPECT THERMOSTAT AND TEST OPENING TEMPERATURE in the Base Engine Manual.
	Incorrect EGR Valve or Restricted EGR Cooler, if equipped. *NOTE: For component location see COMPONENT LOCATION DIAGRAM 4, VGT Actuator (S) in Section 03, Group 140 earlier in this manual.* *NOTE: Calculated low EGR flow causes the ECU to increase exhaust back pressure using VGT position in an attempt to increase EGR flow.*	Replace EGR valve with correct part number or replace EGR cooler.
	Check for ECU Software Updates	Reprogram ECU with latest payload.

RG41221,00000FB -19-23OCT07-1/1

F4 - Fuel in Oil

AS58880,000000A -19-06OCT10-1/9

F4 - Fuel in Oil Diagnostic Procedure

AS58880,000000A -19-06OCT10-2/9

1 Oil Contamination Test	*NOTE: Hydraulic oil leaking into the engine crankcase from a hydraulic pump may be mistaken as fuel in the oil. Laboratory analysis can be used to determine if the contaminate is fuel or hydraulic oil.* 1. Check for an increase in engine oil level and a decrease in oil viscosity (oil is too thin). 2. Submit oil sample to laboratory to identify contaminant, if uncertain. Is the contaminant fuel?	**YES:** GO TO 2 **NO:** Perform test for identified contaminant.

AS58880,000000A -19-06OCT10-3/9

2 Check for Restricted Fuel Return Lines	Perform CHECK FOR RESTRICTED FUEL LEAK-OFF LINE test in this group. Did return fuel system pass test?	**YES:** GO TO 3 **NO:** Repair problem. GO TO 3

AS58880,000000A -19-06OCT10-4/9

3 Check High Pressure Pump Front Seal	*NOTE: For removal and installation procedures, see REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP ASSEMBLY, Section 02, Group 090 in this manual.* Remove high pressure pump and check for seal damage. Is there evidence of seal damage?	**YES:** Replace high pressure pump. **NO:** Reinstall pump. GO TO 4

AS58880,000000A -19-06OCT10-5/9

4 Check for Black Smoke	Does engine emit gray or black exhaust smoke?	**YES:** Perform test E5 - ENGINE EMITS EXCESSIVE BLACK OR GRAY EXHAUST SMOKE. **NO:** GO TO 5

AS58880,000000A -19-06OCT10-6/9

5 Check Engine Performance	1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cutout Test in Service ADVISOR. Do test results indicate low contribution from a single cylinder?	**YES:** Replace injector for that cylinder. **NO:** GO TO 6

Continued on next page

AS58880,000000A -19-06OCT10-7/9

6 Check for Loose Injector Clamp	*NOTE: For torque specifications, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in section 2, group 090 earlier in this manual.* Remove rocker cover and check for loose Electronic Injector (EI) clamps. Were the clamps tight?	**YES:** GO TO 7 **NO:** Tighten all loose EI clamps.

AS58880,000000A -19-06OCT10-8/9

7 Check Injectors	1. Remove injectors. 2. Check for damaged injector O-rings. Was any O-ring damage observed?	 **YES:** Replace O-rings and feed tubes. **NO:** Replace injectors and feed tubes.

AS58880,000000A -19-06OCT10-9/9

F5 - Fuel in Coolant

JB81757,000003A -19-24FEB09-1/3

F5 - Fuel in Coolant Diagnostic Procedure

JB81757,000003A -19-24FEB09-2/3

1	**Inspect Fuel Cooler (If equipped)**	If the application has a liquid-to-liquid fuel cooler, test for an internal leak. Were any problems found?	**YES:** Replace Fuel Cooler **NO:** Replace Cylinder Head

JB81757,000003A -19-24FEB09-3/3

D1 - ECU Does Not Communicate with Service ADVISOR

RG41221,00000FD -19-02DEC10-1/27

D1 - ECU Does Not Communicate with Service ADVISOR Diagnostic Procedure

Additional References:
For information on connecting to Service ADVISOR see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 later in this manual.

For information on reprogramming ECU see REPROGRAMMING ENGINE CONTROL UNIT (ECU) in Section 04, Group 160 later in this manual.

For tool identification, see ELECTRONIC SYSTEM DIAGNOSTIC TOOLS in Section 05, Group 180 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 4
- see 9.0L 24V WIRING DIAGRAM 4

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 later in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

RG41221,00000FD -19-02DEC10-2/27

1 Preliminary Checks	Perform as many of these preliminary checks as possible to help determine if problem is related to the computer, cables, or adaptor: • Verify all connections between diagnostic connector and service tool are properly connected and fully seated. • Verify that the adaptor type shown in the Select Readings Option in Service ADVISOR matches the adaptor being used (PDM or EDL) and the type of communication between computer and adaptor (parallel, USB, or Bluetooth). • Close Service ADVISOR and shut down computer. Restart computer, open Service ADVISOR and attempt to connect to ECU. • Attempt to connect to the ECU on a different application, if one is available. • Try to connect using a different USB port (EDL or PDM with USB adaptor). • Try to connect using a different USB or parallel cable, if available. • Try to connect using Bluetooth, if using EDL and computer has Bluetooth capability. • Try to connect using a different adaptor or different type of adaptor, if available.	**YES:** Determine which cable or adaptor is defective and replace, if applicable.
	• Try to connect using a different computer, if available.	**NO:** No other application available to verify equipment. GO TO 2
	• Try reprogramming ECU.	**NO:** Service ADVISOR connected to ECU on a different application. GO TO 2
	Does Service ADVISOR now connect to the original ECU?	**NO:** Service ADVISOR would not connect to ECU on a different application and you have narrowed down problem to computer. Open DTAC case.

RG41221,00000FD -19-02DEC10-3/27

2 Check Adaptor Type	Are you using an EDL adaptor?	**YES:** GO TO 3 **NO:** PDM GO TO 5

RG41221,00000FD -19-02DEC10-4/27

3 Check for EDL Green Power Light	*NOTE: The EDL will NOT operate unless power and ground are present at the 9-pin diagnostic connector (C11). However, the green power indicator light on the EDL will flash or illuminate steady, depending on EDL firmware level, if the EDL is connected to the computer's USB port and power is NOT present at the 9-pin diagnostic connector.* 1. If using USB cable, disconnect USB cable from EDL. 2. Attach the 26-pin EDL cable to the EDL and application's 9-pin diagnostic connector. 3. Ignition ON, engine OFF. Is the EDL green power light ON steady?	**YES:** GO TO 4 **NO:** GO TO 6

Continued on next page

RG41221,00000FD -19-02DEC10-5/27

4 Check for Red Error Light - EDL	1. For USB connection, attach the USB cable to the EDL and the computer.	**YES:** Replace EDL. GO TO 25
	2. Open Service ADVISOR and attempt to connect to the ECU.	**NO:** EDL with USB GO TO 8
	Is the EDL red error indicator light ON?	**NO:** EDL with Bluetooth GO TO 9

RG41221,00000FD -19-02DEC10-6/27

5 Check for Green Power Light - PDM	a. If using parallel cable, attach the parallel cable to the PDM and the computer. b. If using USB adaptor, connect the adaptor to the PDM and attach the USB cable to the USB adaptor and the computer. 1. Attach the 26-pin PDM cable to the PDM and application's 9-pin diagnostic connector.	
	2. Ignition ON engine OFF.	**YES:** GO TO 10
	Is the PDM green power indicator light ON?	**NO:** GO TO 6

RG41221,00000FD -19-02DEC10-7/27

6 Check Diagnostic Connector Voltage Supply	*NOTE: Terminal B of the 9-pin diagnostic connector C11 may be supplied by an ignition or unswitched battery source, depending on the application.* 1. Disconnect EDL or PDM cable from 9-pin diagnostic connector. 2. Ignition ON, engine OFF.	
	3. On the harness, measure the voltage from the 9-pin diagnostic connector C11 voltage supply (C11-B) to ground (C11-A).	**YES:** GO TO 7
	Is the voltage greater than 10V?	**NO:** Fix problem. GO TO 25

RG41221,00000FD -19-02DEC10-8/27

7 Check Cable	1. Disconnect 26-pin cable from EDL or PDM.	
	2. Perform TERMINAL TEST on cable. 3. On the cable, measure the resistance between the 26-pin connector power (terminal 9) and the 9-pin connector power (terminal B).	
	4. On the cable, measure the resistance between the 26-pin connector ground (terminal 8) and the 9-pin connector ground (terminal A).	**YES:** Replace EDL or PDM. GO TO 25
	Were Terminal Test results good and are both resistance measurements less than 10 ohms?	**NO:** Replace cable. GO TO 25

Continued on next page

RG41221,00000FD -19-02DEC10-9/27

8 Check for Amber Data Transfer Light - EDL with USB

NOTE: The EDL amber data transfer light will flash ON briefly while Service ADVISOR attempts to connect to ECU if communication between the EDL and computer is good but there is no response from the ECU.

1. Monitor EDL amber data transfer light closely.

YES: Amber light flashed ON briefly. GO TO 11

2. Reattempt to connect Service ADVISOR to the ECU.

YES: Amber light is ON continuous. Service ADVISOR is now connected to the ECU. If data points are not visible, verify correct model was selected.

Did amber data transfer light flash ON briefly or is the amber light ON continuous?

NO: No communication between computer and EDL. Perform checks listed in Step 1 to isolate problem.

RG41221,00000FD -19-02DEC10-10/27

9 Check for Amber Data Transfer Light - EDL with Bluetooth

Monitor EDL amber data transfer light closely while attempting to connect Service ADVISOR to the ECU.

YES: Amber light flashed ON briefly. GO TO 11

Did amber data transfer light flash ON briefly or is the amber light ON continuous?

YES: Amber light is ON continuous. Service ADVISOR is connected to the ECU. If data points are not visible, verify correct model was selected.

NO: No communication between computer and EDL. Use USB cable. GO TO 1

RG41221,00000FD -19-02DEC10-11/27

10 Check for Red CAN Light - PDM

1. Monitor PDM red CAN light.

YES: Red CAN light flashed several times. GO TO 11

2. Attempt to connect Service ADVISOR to the ECU.

YES: Red CAN light is ON continuous. Service ADVISOR is connected to the ECU. If data points are not visible, verify correct model was selected.

Did red CAN light flash several times or is red CAN light ON continuous?

NO: No communication between computer and PDM. Perform checks listed in Step 1 to isolate problem.

RG41221,00000FD -19-02DEC10-12/27

11 Check Engine Operation

Attempt to start engine.

YES: GO TO 12

Does engine start?

NO: GO TO 13

Continued on next page

RG41221,00000FD -19-02DEC10-13/27

12 Test ECU Terminals

1. Ignition OFF, engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on J2-A1, J2-B1, and J2-K2.

Were any problems found?

YES: Fix problem. GO TO 25

NO: GO TO 16

RG41221,00000FD -19-02DEC10-14/27

13 Check ECU Fuses and Voltages

1. Ignition ON, engine OFF.
2. Check ECU ignition fuse (F01) and ECU battery supply fuse (F02).
3. Measure voltage from ECU ignition fuse to single point ground.
4. Measure voltage from ECU battery supply fuse to single point ground.

Are both fuses good and are both voltage measurements within 1V of battery voltage?

YES: GO TO 14

NO: Fix problem. GO TO 25

RG41221,00000FD -19-02DEC10-15/27

14 Test ECU Terminals

1. Ignition OFF, engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on J2.

Were any problems found?

YES: Fix problem. GO TO 25

NO: GO TO 15

RG41221,00000FD -19-02DEC10-16/27

15 Check ECU Voltages

1. Ignition ON, engine OFF.
2. On the harness, measure voltage from ECU ignition (J2-B2) to ECU ground (J2-L2).
3. On the harness, measure voltage from ECU battery supply (J2-L1) to ECU ground (J2-L2).

Are both measurements within 1V of battery voltage?

YES: GO TO 16

NO: Fix problem. GO TO 25

RG41221,00000FD -19-02DEC10-17/27

16 Check CAN Wiring for Open Circuit

1. Ignition OFF, engine OFF.
2. Disconnect application battery negative cable.
3. On the harness, measure the resistance between ECU CAN High (J2-A1) and diagnostic connector C11 CAN High (C11-C).
4. On the harness, measure the resistance between ECU CAN Low (J2-B1) and diagnostic connector C11 CAN Low (C11- D).

NOTE: If BOTH readings are approximately 60 ohms or 120 ohms, CAN High and CAN Low are likely swapped between the ECU and the diagnostic connector.

Were both measurement less than 10 ohms?

YES: Reconnect ECU J2 connector. GO TO 17

NO: Fix problem. GO TO 25

Continued on next page

RG41221,00000FD -19-02DEC10-18/27

17 Check CAN for Short to Ground

1. On the harness, measure the resistance between the diagnostic connector C11 CAN High (C11-C) and single point ground.
2. On the harness, measure the resistance between the diagnostic connector C11 CAN Low (C11- D) and single point ground.

Were all measurements greater than 1k ohms?

YES: GO TO 18

NO: Repair short to ground of CAN signal wiring. GO TO 25

RG41221,00000FD -19-02DEC10-19/27

18 Check CAN Terminator(s)

On the harness, measure the resistance between diagnostic connector C11 CAN High (C11-C) and CAN Low (C11- D).

Is the resistance between 50 and 130 ohms?

YES: GO TO 19

NO: Resistance is greater than 130 ohms. GO TO 25

NO: Resistance is less than 50 ohms: Repair short between CAN High and CAN Low. GO TO 25

RG41221,00000FD -19-02DEC10-20/27

19 Check CAN for Short to Voltage

1. Reconnect application battery negative cable.
2. Ignition ON, engine OFF.
3. On the harness, measure the voltage from the application diagnostic connector C11 CAN High (C11-C) to single point ground.
4. On the harness, measure the voltage from the application diagnostic connector C11 CAN Low (C11- D) to single point ground.

Were both measurements less than 4 volts?

YES: GO TO 22

NO: Repair short to power of CAN wiring. GO TO 25

RG41221,00000FD -19-02DEC10-21/27

20 Check CAN Wiring for Open Circuit

1. Locate CAN terminator(s) in application wire harness. One terminator is typically located near the ECU J2 connector (C10). A second terminator may be located near the diagnostic gauge or near some other electronic module on the application. Consult application technical information for the location of the second terminator, if applicable.
2. Disconnect the CAN terminator(s).
3. Perform TERMINAL TEST on CAN terminator(s) and connector(s).
4. On the harness, measure the resistance between diagnostic connector C11 CAN High (C11-C) and terminator connector(s) CAN High.
5. On the harness, measure the resistance between diagnostic connector C11 CAN Low (C11- D) and terminator connector(s) CAN Low.

Are all measurements less than 10 ohms and are terminal test results OK?

YES: GO TO 21

NO: Fix problem. GO TO 25

Continued on next page

RG41221,00000FD -19-02DEC10-22/27

21 Check Terminator Resistance	Measure resistance of CAN terminator(s). Is the resistance of each terminator between 110 and 130 ohms?	**YES:** Recheck CAN harness resistance and TERMINAL TESTs. Fix problem. GO TO 25 **NO:** Replace defective CAN terminator(s). GO TO 25

RG41221,00000FD -19-02DEC10-23/27

22 Disconnect Other Electronic Control Modules	1. Ignition OFF, engine OFF. 2. If applicable, disconnect diagnostic gauge and all other devices that are connected to CAN, except ECU. 3. Ignition ON, engine OFF. 4. Attempt to connect Service ADVISOR to ECU. Did Service ADVISOR connect to ECU?	 **YES:** Determine which device is causing CAN communication problem. GO TO 25 **NO:** GO TO 23

RG41221,00000FD -19-02DEC10-24/27

23 Reprogram ECU	1. Download payload for the ECU. 2. Attempt to reprogram the ECU. Was Service ADVISOR able to reprogram ECU?	 **YES:** GO TO 25 **NO:** GO TO 24

RG41221,00000FD -19-02DEC10-25/27

24 Replace ECU	*NOTE: Verify that Service ADVISOR connects to the ECU on a different application with the equipment you are using prior to replacing ECU.* 1. Replace ECU and program with payload. 2. Attempt to connect Service ADVISOR to ECU. Did Service ADVISOR connect to ECU?	 **YES:** Problem fixed. **NO:** Open DTAC case.

RG41221,00000FD -19-02DEC10-26/27

25 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and negative battery cable, if removed 3. Ignition ON, engine OFF. 4. Attempt to connect Service ADVISOR to ECU. Did Service ADVISOR connect to the ECU?	 **YES:** Problem fixed. **NO:** GO TO 1

RG41221,00000FD -19-02DEC10-27/27

D2 - ECU Does Not Communicate with Diagnostic Gauge or Gauge Displays CAN Bus Error

RG41221,00000FF -19-03OCT08-1/8

D2 - ECU Does Not Communicate with Diagnostic Gauge or Gauge Displays CAN Bus Error Diagnostic Procedure

Additional References:
For information on connecting to Service ADVISOR see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 later in this manual

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 4
- see 9.0L 24V WIRING DIAGRAM 4
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 later in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RG41221,00000FF -19-03OCT08-2/8

1 Check for Blank Diagnostic Gauge	1. Ignition ON, engine OFF.	
	2. View diagnostic gauge display.	**YES:** GO TO 2
	Is diagnostic gauge display blank?	**NO:** GO TO 3

RG41221,00000FF -19-03OCT08-3/8

2 Check Diagnostic Gauge Voltage Supply	*NOTE: The diagnostic gauge has two identical 6-way connectors identified as "A" and "B". The diagnostic gauge left-side connector "A", as viewed from the rear of the gauge, should be connected to the wire harness containing the CAN wires, ignition, and ground.*	
	1. Ignition OFF, engine OFF.	
	2. Disconnect diagnostic gauge left side 6-way connector (as viewed from rear of gauge) identified as "A".	
	3. Perform Terminal Test on connector.	
	4. Ignition ON, engine OFF.	
	5. On the harness, measure the voltage from the diagnostic gauge 6-way connector terminal 1 (+) to terminal 6 (-).	**YES:** Replace diagnostic gauge. GO TO 6
	Are terminal test results good and is voltage within 1V of battery terminal voltage?	**NO:** Fix problem. GO TO 6

Continued on next page

RG41221,00000FF -19-03OCT08-4/8

3 Check ECU Communication	1. Ignition ON, engine OFF. 2. Attempt to connect Service ADVISOR to ECU. Does Service ADVISOR connect to the ECU?	**YES:** GO TO 4 **NO:** Discontinue this test and perform diagnostic procedure D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR.

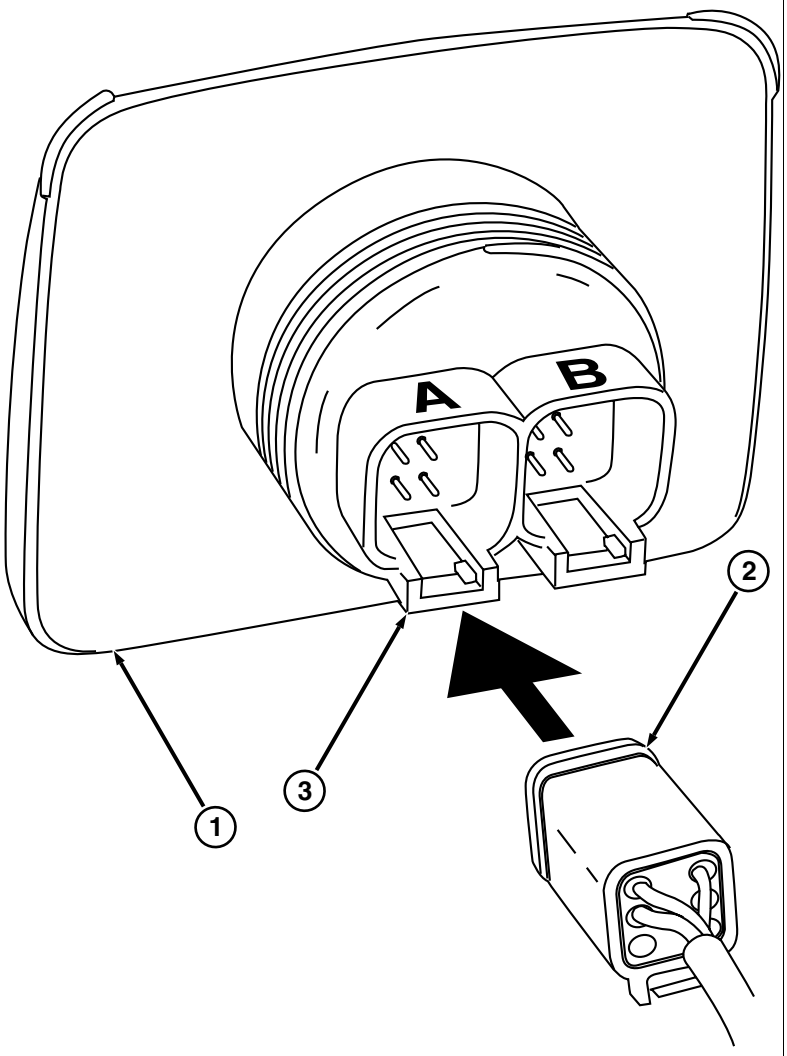
Continued on next page

RG41221,00000FF -19-03OCT08-5/8

4 Check for Correct Connection

NOTE: The diagnostic gauge has two identical 6-way connectors identified as "A" and "B". The diagnostic gauge left-side connector "A", as viewed from the rear of the gauge, should be connected to the wire harness containing the CAN wires, ignition, and ground.

1. Ignition OFF, engine OFF.
2. Access view of rear of diagnostic gauge (1) and verify that the wire harness containing the CAN wires (2) is mated to connector "A" (3).



RG15515A —UN—03OCT08

Diagnostic Gauge Connectors

1— Rear View of Diagnostic Gauge
2— Wire Harness Connector with CAN Wiring
3— Left-Side Connector Identified as "A"

Is application wire harness 6-way connector containing the CAN wires connected to the diagnostic gauge left-side connector "A", as viewed from the rear of the gauge?

YES: GO TO 5

NO: Connect to the left-side connector. GO TO 6

Continued on next page

RG41221,00000FF -19-03OCT08-6/8

5 Check CAN Wiring Continuity to Diagnostic Connector	1. Disconnect diagnostic gauge 6-way connector containing the CAN wires. 2. On the harness, measure the resistance between the diagnostic gauge 6-way connector terminal 2 and 9-pin diagnostic connector C11-C. 3. On the harness, measure the resistance between the diagnostic gauge 6-way connector terminal 3 and 9-pin diagnostic connector C11-D. Are both resistance measurements less than 10 ohms?	**YES:** Replace diagnostic gauge. GO TO 6 **NO:** Fix CAN wiring. GO TO 6

RG41221,00000FF -19-03OCT08-7/8

6 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. 4. Check diagnostic gauge operation. Does diagnostic gauge display engine information?	**YES:** Problem fixed. **NO:** GO TO 1

RG41221,00000FF -19-03OCT08-8/8

D3 - ECU Does Not Program With Service ADVISOR

JB81757,000002C -19-27OCT10-1/7

D3 - ECU Does Not Program with Service ADVISOR Diagnostic Procedure

Additional References:
For information on connecting to Service ADVISOR see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 later in this manual.

For information on reprogramming ECU see REPROGRAMMING ENGINE CONTROL UNIT (ECU) in Section 04, Group 160 later in this manual.

JB81757,000002C -19-27OCT10-2/7

1 Preliminary Checks	Perform these checks: • Verify all connections between diagnostic connector and service tool are properly connected and fully seated. • Verify that the adaptor type shown in the Available Adapters menu in Service ADVISOR matches the adaptor being used (PDM or EDL) and the type of communication between computer and adaptor (parallel or USB). • Close Service ADVISOR and shut down computer. Restart computer, open Service ADVISOR and attempt to reprogram the ECU. • Check engine payload file name for correct engine serial number. Download the correct payload if engine serial number does not match payload file name. • If replacing the ECU, verify that the new ECU serial number was correctly entered when downloading the payload. Were you able to reprogram the ECU?	**YES:** Problem solved. **NO:** GO TO 2

JB81757,000002C -19-27OCT10-3/7

2 Communication Error Message	Does an error message appear in Service ADVISOR indicating “Error Communicating and Programming the ECU”?	**YES:** GO TO 3 **NO:** Perform steps indicated in error message. Consult WebHelpR in Service ADVISOR help menu.

JB81757,000002C -19-27OCT10-4/7

3 Check for New ECU	Are you attempting to program a new replacement ECU?	**YES:** GO TO 4 **NO:** Attempting to reprogram the original ECU. GO TO 5

Continued on next page

JB81757,000002C -19-27OCT10-5/7

4 Parameters	Were you able to successfully retrieve the parameters from the old ECU when prompted in Service ADVISOR?	**YES:** Consult WebHelpR in Service ADVISOR help menu. **NO:** Old ECU is available and operational. GO TO 5 **NO:** Old ECU is not available or is not operational. Consult WebHelpR in Service ADVISOR help menu.

JB81757,000002C -19-27OCT10-6/7

5 Check for Service Advisor Communication	*NOTE: A live connection in Service ADVISOR cannot be obtained with a new ECU until it has been programmed.* 1. Ignition OFF, engine OFF. 2. Connect old or original ECU to wire harness. 3. Ignition ON, engine OFF.	**YES:** Attempting to reprogram original ECU. Replace original ECU.
	4. Attempt to connect to ECU (live connection) using Service ADVISOR.	**YES:** Attempting to program a new ECU. Consult WebHelpR in Service ADVISOR help menu.
	Does Service ADVISOR connect to the old or original ECU?	**NO:** Discontinue test D5 and start test D1.

JB81757,000002C -19-27OCT10-7/7

A1 - Intake Air Heater Check

JB81757,0000040 -19-12SEP07-1/19

A1 - Intake Air Heater Check Diagnostic Procedure

Related Information:
The optional intake air heater are two high power electric heating elements located at the entrance to the intake manifold.
A relay controlled by the ECU provides the voltage supply to the parallel-connected intake air heating elements. The heating elements are grounded to the intake manifold.
The ECU supplies a high side output to the intake air heater relay coil to energize the relay.
The ECU uses coolant temperature to determine if the intake air heater relay should be energized.
A wait to start lamp controlled by the ECU is illuminated to signal the operator to not crank the engine until the ECU has completed the preheating cycle.

Control Unit Response:
The engine may not start or may require extended crank times in cold weather if the intake air heater does not operate.

Additional References:
For further intake air heater information, see INTAKE AIR HEATER OPERATION in Section 03, Group 140 earlier in this manual.
For application specific information on intake air heater preheat time versus coolant temperature, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1, 9.0L 12V WIRING DIAGRAM 3, 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 1, 9.0L 24V WIRING DIAGRAM 3, 9.0L 24V WIRING DIAGRAM 6

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

JB81757,0000040 -19-12SEP07-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. Is 000110.00, 000110.03, 000110.04, 000110.15, or 000110.16 an active DTC?	**YES:** Discontinue test A1. Perform test for DTC with SPN 000110. **NO:** GO TO 2

Continued on next page

JB81757,0000040 -19-12SEP07-3/19

2 Check Intake Air Heater Fuse	Measure the voltage between the intake air heater relay battery supply terminal (large cable) and single point ground.	**YES:** GO TO 3
	Is the voltage within 1V of battery terminal voltage?	**NO:** Check 50A intake air heater fuse or repair open circuit between battery and relay. GO TO 3

JB81757,0000040 -19-12SEP07-4/19

3 Check Wait to Start Lamp	1. Ignition OFF, engine OFF.	
	2. Disconnect coolant temperature sensor to cause ECU to energize intake air heater relay at next key cycle.	
	NOTE: Ignore DTC 000110.03 which will be generated due to coolant temperature sensor being disconnected.	
	3. Ignition ON, engine OFF.	**YES:** GO TO 4
	4. Observe if wait to start lamp is illuminated for several seconds and is then extinguished.	**NO:** Diagnose lamp circuit and verify ECU is programmed for intake air heater. GO TO 17
	Does the wait to start lamp illuminate and then go out?	**NO:** Application does not have a wait to start lamp. GO TO 4

JB81757,0000040 -19-12SEP07-5/19

4 Check Voltage at Heating Elements	1. Ignition OFF, engine OFF.	
	2. Verify coolant temperature sensor is still disconnected.	
	3. Monitor the voltage between the heating element connection on top of intake manifold and single point ground	**YES:** GO TO 10
	4. Ignition ON, engine OFF.	**NO:** Voltage is always near 0V. GO TO 5
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON and then drops to near 0V?	**NO:** Voltage is always within 5V of battery terminal voltage. Replace stuck intake air heater relay, GO TO 17

JB81757,0000040 -19-12SEP07-6/19

5 Check Intake Air Heater Relay Control	1. Ignition OFF, engine OFF.	
	2. Monitor voltage between intake air heater relay coil high side (C04) and single point ground.	
	3. Ignition ON, engine OFF.	**YES:** GO TO 6
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?	**NO:** GO TO 8

Continued on next page

JB81757,0000040 -19-12SEP07-7/19

6 Check Intake Air Heater Relay Ground	1. Ignition OFF, engine OFF.	
	2. Measure the resistance between the intake air heater coil low side (C03) and single point ground.	**YES:** GO TO 7
	Is resistance less than 10 ohms?	**NO:** Fix open ground circuit, GO TO 17

JB81757,0000040 -19-12SEP07-8/19

7 Check Intake Air Heater Relay	1. Monitor the voltage between the intake air heater output (C05) and single point ground.	
	2. Ignition ON, engine OFF.	**YES:** Repair open circuit between intake air heater relay output and intake air heater.
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?	**NO:** Replace intake air heater relay.

JB81757,0000040 -19-12SEP07-9/19

8 Check Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector.	
	3. Perform TERMINAL TEST on J1-F4.	
	4. On the harness, measure the resistance between the ECU intake air heater relay control (J1-F4) and the intake air heater relay coil high side (C04).	**YES:** GO TO 9
	Were Terminal Test results good and resistance less than 10 ohms?	**NO:** Fix problem. GO TO 17

JB81757,0000040 -19-12SEP07-10/19

9 Reprogram ECU	1. Reinstall all connectors except coolant temperature sensor.	
	2. Download latest payload and reprogram ECU.	
	3. Monitor voltage between intake air heater relay coil high side (C04) and single point ground.	
	4. Ignition ON, engine OFF.	**YES:** Problem fixed.
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?	**NO:** Replace ECU. GO TO 17

JB81757,0000040 -19-12SEP07-11/19

10 Check Heating Element Resistance	*NOTE: Normal heating element resistance at room temperature is much less than 1 ohm. The resistance increases significantly when the heating elements are hot.*	
	1. Ignition OFF, engine OFF.	
	2. Verify heating element connections are tight and free from corrosion.	
	3. At the intake air heating element, measure the resistance between the heating element power connection (studs at top of intake manifold) and ground (studs at bottom of intake manifold).	**YES:** GO TO 11
	Is the resistance less than 2 ohms?	**NO:** Replace heating elements. GO TO 17

Continued on next page

JB81757,0000040 -19-12SEP07-12/19

11 Check Heating Elements	1. Verify coolant temperature sensor is still disconnected. 2. Ignition OFF, engine OFF. 3. Remove intake air hose at intake manifold inlet. 4. Ignition ON, engine OFF. 5. Observe the two intake air heating elements. Do both heating elements glow for several seconds after ignition is ON?	**YES:** Reinstall air hose. GO TO 12 **NO:** Replace heating elements. GO TO 17

JB81757,0000040 -19-12SEP07-13/19

12 Coolant Temperature Accuracy Check	1. Reconnect coolant temperature sensor connector. 2. Ignition ON, engine OFF 3. Monitor Coolant Temperature data point in Service ADVISOR. Does the Coolant Temperature data point indicate the actual coolant temperature near the sensor within 5°C (9°F)?	**YES:** Intake air heater system is functioning correctly. **NO:** GO TO 13

JB81757,0000040 -19-12SEP07-14/19

13 Check Coolant Temperature Circuit	*NOTE: For coolant temperature sensor replacement instructions, see REMOVE AND INSTALL COOLANT TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.* 1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and coolant temperature sensor connector. 3. Perform TERMINAL TEST on J3 and coolant temperature sensor connector. 4. On the harness, measure the resistance between the ECU coolant temperature signal (J3-D3) and the coolant temperature sensor connector signal (T04-A). 5. On the harness, measure the resistance between the ECU reference (J3-H3) and the coolant temperature sensor connector reference (T04-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** Replace coolant temperature sensor. GO TO 14 **NO:** Fix problem. GO TO 14

JB81757,0000040 -19-12SEP07-15/19

14 Recheck Coolant Temperature Accuracy	1. Reconnect coolant temperature sensor connector. 2. Ignition ON, engine OFF 3. Monitor Coolant Temperature data point in Service ADVISOR. Does the Coolant Temperature data point indicate actual coolant temperature within 5°C (9°F)?	**YES:** Intake air heater system is functioning correctly. **NO:** GO TO 15

Continued on next page

JB81757,0000040 -19-12SEP07-16/19

15 Reprogram ECU		
	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF	
	5. Monitor Coolant Temperature data point in Service ADVISOR.	**YES:** Problem fixed.
	Does the Coolant Temperature data point indicate actual coolant temperature within 5°C (9°F)?	**NO:** GO TO 16

JB81757,0000040 -19-12SEP07-17/19

16 Replace ECU		
	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF	
	4. Monitor Coolant Temperature data point in Service ADVISOR.	**YES:** Intake air heater system is functioning correctly.
	Does the Coolant Temperature data point indicate actual coolant temperature within 5°C (9°F)?	**NO:** Open DTAC case.

JB81757,0000040 -19-12SEP07-18/19

17 Verification		
	1. Verify coolant temperature sensor is still disconnected.	
	2. Ignition OFF, engine OFF.	
	3. Remove intake air hose at intake manifold inlet.	
	4. Ignition ON, engine OFF.	
	5. Observe the two intake air heating elements.	**YES:** Intake air heater system is functioning correctly.
	Do both heating elements glow for several seconds after ignition is ON?	**NO:** GO TO 3.

JB81757,0000040 -19-12SEP07-19/19

Check Fuel Supply Quality

RG41183,0000117 -19-03OCT08-1/8

Check Fuel Supply Quality Diagnostic Procedure

Additional References:
Fuel samples can be analyzed in a laboratory for contamination and ratings. See TESTING DIESEL FUEL in Group 01, Section 002, for more information.

RG41183,0000117 -19-03OCT08-2/8

1 Low Pressure Fuel System Check	Has Low Pressure Fuel System Check been performed?	**YES:** GO TO 5 **NO:** GO TO 2

RG41183,0000117 -19-03OCT08-3/8

2 Check Fuel in Filters	1. Ignition OFF, engine OFF. 2. Drain primary and secondary filter into a clean container. 3. Check for water, dirt, or other contaminants in the drained fuel. Is an abnormal amount of water or contaminants present in the drained fuel?	**YES:** GO TO 3 **NO:** GO TO 4

RG41183,0000117 -19-03OCT08-4/8

3 Check Fuel Supply	Check fuel in tank for water or contaminants. Is an abnormal amount of water or contaminants present in the fuel?	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 4 **NO:** GO TO 4

RG41183,0000117 -19-03OCT08-5/8

4 Replace Fuel Filters	*NOTE: For fuel filter replacement and priming instructions, see REMOVE AND INSTALL FUEL FILTERS in Group 02, Section 90 earlier in this manual.* 1. Drain fuel from primary filter inlet line. 2. Replace primary and secondary fuel filters. 3. Ignition ON, engine OFF for 60 seconds to prime and purge air. Cycle ignition if necessary until system is primed. 4. Start engine and check performance. Does engine start and have good performance?	**YES:** Problem solved. **NO:** Fuel in tank was NOT replaced. GO TO 5 **NO:** Fuel in tank was replaced. GO TO 6

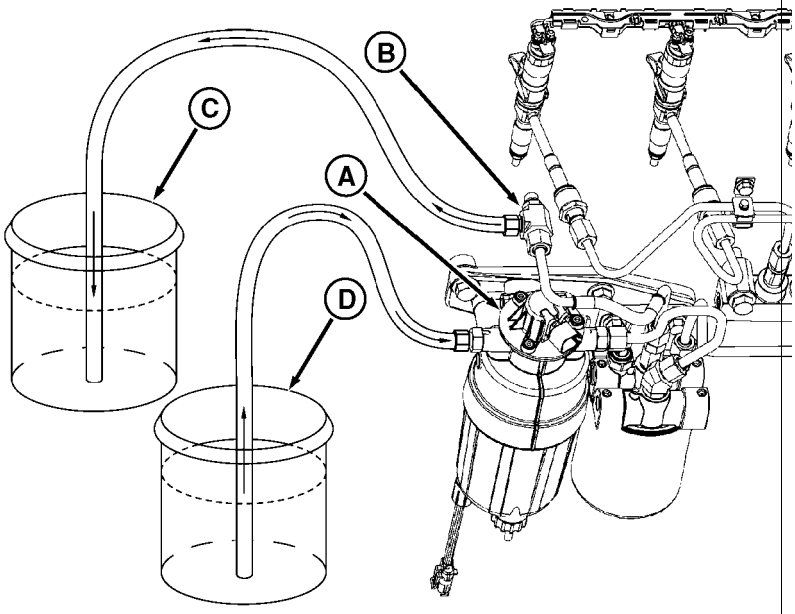
Continued on next page

RG41183,0000117 -19-03OCT08-6/8

5 Temporary Known Good Fuel Supply Installation

NOTE: Use a clean hose and fresh fuel that has known-good quality in a clean container for this step. Do not use fuel from the fuel tank.

1. Ignition OFF, engine OFF.
2. Disconnect fuel inlet line from the primary fuel filter.
3. Install a hose on primary filter housing fuel inlet port and place other end of hose in a container of at least 3.8L (1 gal) of clean fuel.



RG15360A —UN—03OCT08

Temporary Fuel Supply

A—Fuel Inlet at Primary Filter
B—Fuel Return
C—Contaminated Fuel
D—Known Good Fuel

4. Disconnect fuel line between secondary filter outlet and high pressure pump inlet.
5. Reposition fuel line and place high pressure pump inlet end in a 3.8L (1 gal) or larger container suitable for diesel fuel.
6. Reconnect fuel line to secondary filter outlet.
7. Ignition ON, engine OFF for 60 seconds.
8. Ignition OFF, engine OFF.
9. Repeat steps 7-8 until 1.9L (1/2 gal) of new fuel has been pulled into the fuel system.
10. Reinstall fuel line between secondary filter and high pressure pump.

IF OK: GO TO 6

Continued on next page

RG41183,0000117 -19-03OCT08-7/8

6 Purge Fuel System	1. Disconnect fuel return line and place in a 3.8L (1 gal) or larger container suitable for diesel fuel. a. If engine starts, start engine and operate at low idle until at least 1.9L (1/2 gal) of return fuel is present in container. Add additional fuel to the temporary fuel supply container if necessary. b. If engine does not start, crank engine for 20 second intervals with 2 minutes between intervals, cycling ignition OFF between crank intervals. Repeat until at least 1.9L (1/2 gal) of return fuel is present in the container or until engine starts. 2. Ignition OFF, engine OFF. 3. Reconnect fuel lines. 4. Check engine performance. Does engine start and have good performance?	**YES:** Problem fixed. **NO:** Fuel quality is not the cause of the problem.

RG41183,0000117 -19-03OCT08-8/8

Test The Fuel Bleed System

CAUTION: Do not pressurize the fuel tank to prime the fuel system after running out of fuel or servicing the fuel filters. Pressurizing the fuel system causes the front seal on the high pressure pump to rupture. A ruptured front seal on the high pressure fuel pump fills the engine crankcase with diesel fuel, causing severe damage to the engine and requiring replacement of the high pressure pump.

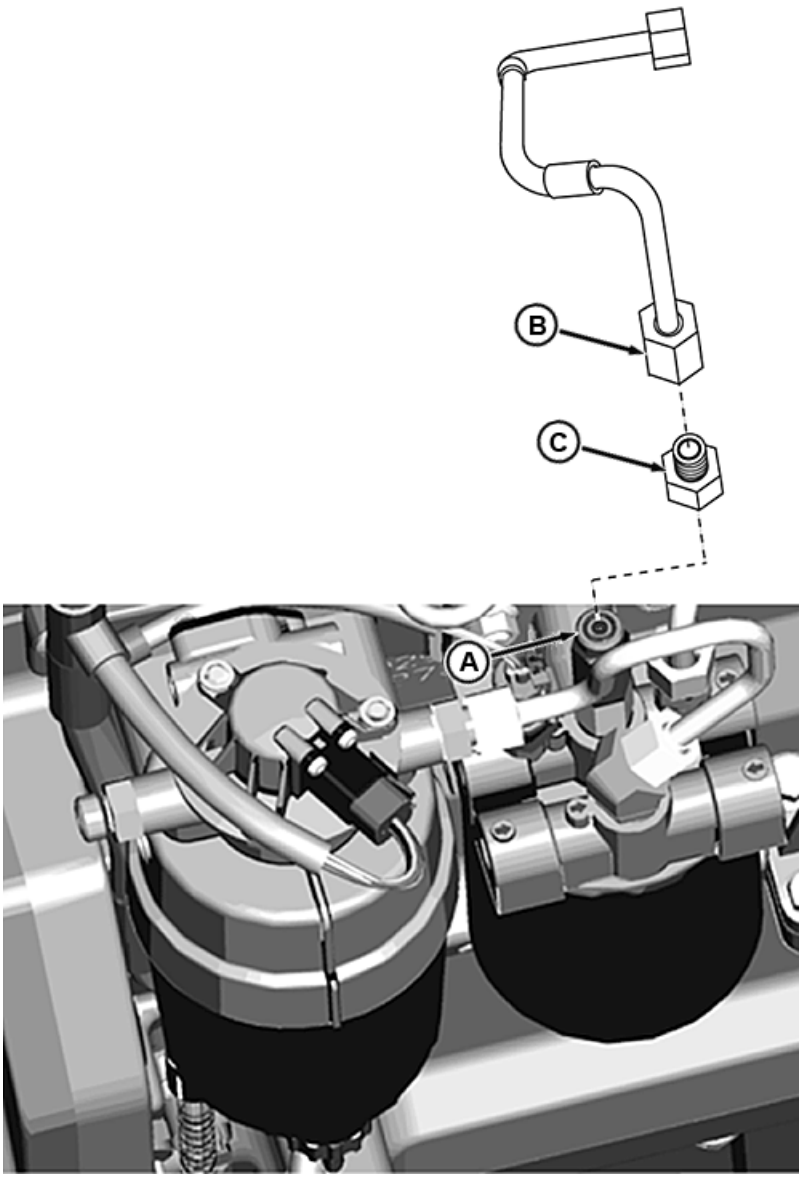
DB92450,000002E -19-03NOV09-1/5

Test The Fuel Bleed System Diagnostic Procedure

Continued on next page

DB92450,000002E -19-03NOV09-2/5

1 Fuel Flow Verification



RG15161A —UN—03NOV09

Fuel Filter Assembly With Bleeder Line

A—Fuel/Air Bleed Valve
B—Fuel Bleed Line
C—Cap (11/16th-16 UNC 2A)

NOTE: When a filter (or filters) has been changed, or the engine run out of fuel, turning the ignition key on for 60 seconds prior to starting the engine should bleed most of the air out of the fuel system. If, after cranking the engine for 20 seconds, it doesn't start, turn the ignition key OFF, then ON, and wait an additional 60 seconds before again attempting to start the engine.

1. Ignition OFF, engine OFF
2. Disconnect the fuel bleed line (B) at the fuel/air bleed valve (A). See REMOVE AND INSTALL AIR BLEED/CHECK VALVE, section 02, group 110 earlier in this CTM.
3. Cap (C) the open fuel bleed line to avoid fuel spills.
4. Attach a fuel line to the bleed valve, and place the other end in a 3.8L (1 gal.) or larger container.

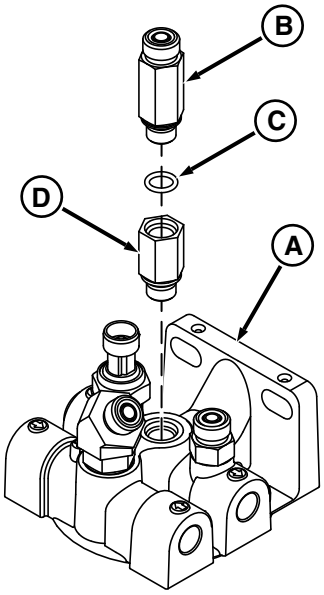
Continued on next page

DB92450,000002E -19-03NOV09-3/5

	5. Ignition ON engine OFF. Is fuel flow from the air bleed system steady at approximately 3 mm (0.125 in) diameter stream?	**YES:** Reinstall bleed line and return to previous diagnostic procedure. **NO:** GO TO 2.

DB92450,000002E -19-03NOV09-4/5

❷ Bleed Valve Assembly Check



RG15160A —UN—03OCT08

Filter Head With Air Bleed/Check Valve Assembly

A—Fuel Filter Head
B—Check Valve
C—O- Ring
D—Orifice

To check Bleed Valve Assembly:

1. Remove bleed valve assembly (check valve and orifice) from filter head, and check for debris. See REMOVE AND INSTALL AIR BLEED/CHECK VALVE, section 02, group 110 earlier in this CTM.
2. Separate check valve (B) from orifice (C), as shown, and check for debris.
3. Ensure both check valve and orifice are open, and that valve is not sticking, limiting fuel flow.
4. Reinstall or replace bleed valve assembly, as required. See REMOVE AND INSTALL AIR BLEED/CHECK VALVE, section 02, group 110 earlier in this CTM.

Is fuel flow from the air bleed system steady at approximately 3 mm (0.125 in) diameter stream?

YES: Return to the previous diagnostic procedure.

NO: GO TO F1- LOW PRESSURE FUEL SYSTEM CHECK.

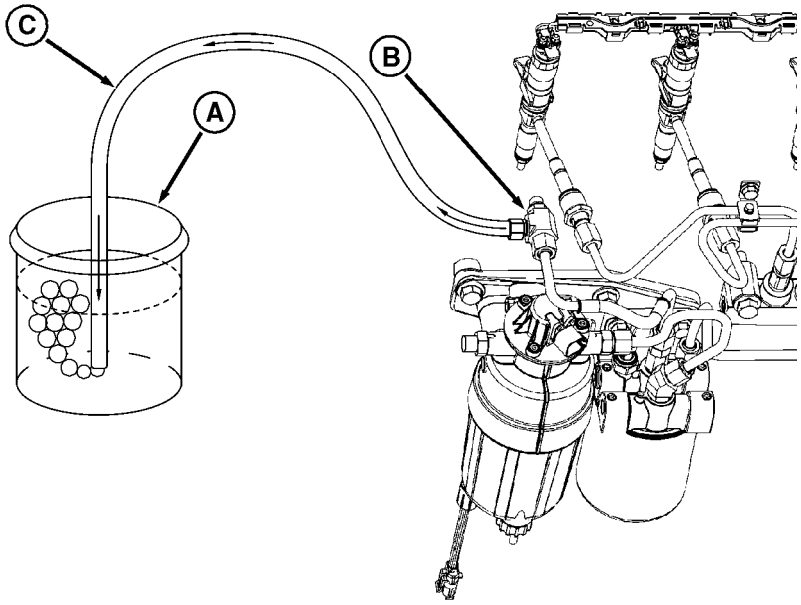
DB92450,000002E -19-03NOV09-5/5

Test for Air in Fuel

The fuel system will self-purge air, but a large amount of air entering the fuel system can cause the engine to be hard to start, run rough, misfire, knock, smoke, or produce low power.

To check for air in the fuel system, follow the procedure below.

1. Preliminary checks:
   - Check for loose fittings between fuel tank and fuel supply pump.
   - Check for loose fittings on the fuel cooler, if applicable.
   - Make sure primary filter element is on tight and gasket is intact.
   - Check for damaged fuel pick-up tube in tank.
   - Check for low fuel level in tank.
   - Check for foaming in tank. Foaming strongly suggests air leaking past injectors. If there is foaming, inspect the injector hold down clamp torque, O-rings and seals. See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 of this manual.
   - Air may enter system when engine is turned off. Verify lines are properly tightened between the secondary filter and the high pressure fuel pump and between high pressure fuel pump leak-off port and cylinder head.
2. Check for air in fuel system:
   a. Disconnect the return-to-tank line from the return fuel T-connector (B). The location of the T-connector may vary by application.
   b. Install a clear plastic hose (C) with proper fittings from JT03513C, Fuel Supply System Test Kit, between the T-connector and the return-to-tank line, OR submerge hose in a container of clean fuel (A), as shown.



RG15376A —UN—03OCT08

Test for Air in Return Fuel

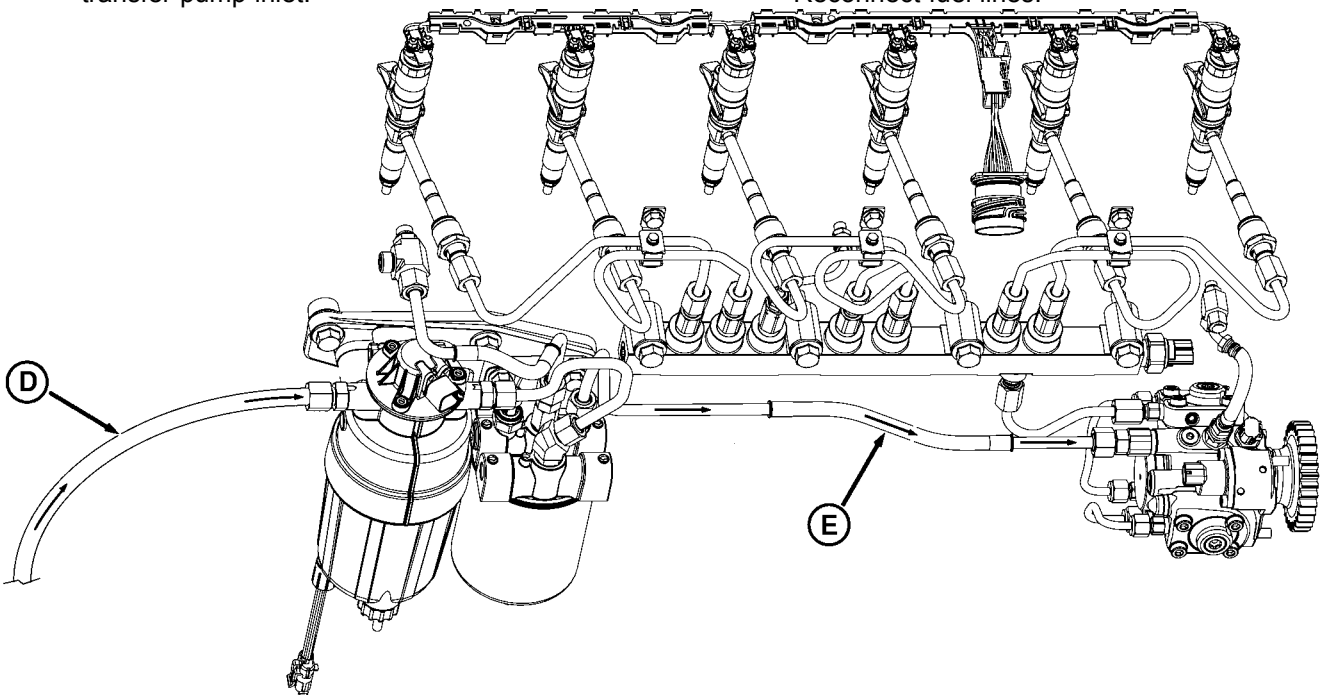
A—Container with Clean Fuel **B—Return Fuel T-connector** **C—Clear Plastic Hose**

   c. Start engine. Run engine for 1 minute at 1500 rpm. Observe hose and container (if used) for bubbles. Stop engine.
   d. If bubbles were present in the return fuel, go to the next step to determine source of the air. Reconnect fuel lines.

Continued on next page

RG41183,0000118 -19-03OCT08-1/2

3. Check for air in fuel tank supply line:
   a. Disconnect the fuel tank supply line at fuel transfer pump inlet.
   b. Install a clear plastic hose (D) with proper fittings between the fuel tank supply line and the fuel transfer pump inlet.
   c. Operate engine and check for air bubbles in hose. If bubbles are present, check for damaged tank, damaged tank components, and for loose or damaged fuel supply lines and hoses.
   d. If no problem was found, go to the next step. Reconnect fuel lines.



Checking for Air in Fuel Supply Lines

D—Clear Plastic Hose in Fuel Supply Line

E—Clear Plastic Hose Between Secondary Filter Outlet and High Pressure Pump Inlet

4. Check for air in the high pressure pump fuel supply line:

   CAUTION: Do NOT disconnect high pressure fuel pump OUTLET line between high pressure pump and fuel rail.

   a. Disconnect the line between the secondary filter outlet and the high pressure fuel pump inlet.
   b. Install a clear plastic hose (E) with proper fittings between the filter and the pump.
   c. Ignition ON, engine OFF for 60 seconds to purge air from fuel system.
   d. Operate engine and check for air bubbles in hose. If bubbles are present, check for damaged primary filter head or gasket, and for loose or damaged primary filter.
5. Check for other causes of air in return line:
   a. Check fuel cooler for air leaks, if applicable.
   b. If source of air was not found, combustion gas may be leaking into the fuel return of one or more injectors. Inspect the injector hold down clamp torque, O-rings and seals. See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 of this manual. Reconnect fuel lines.

RG41183,0000118 -19-03OCT08-2/2

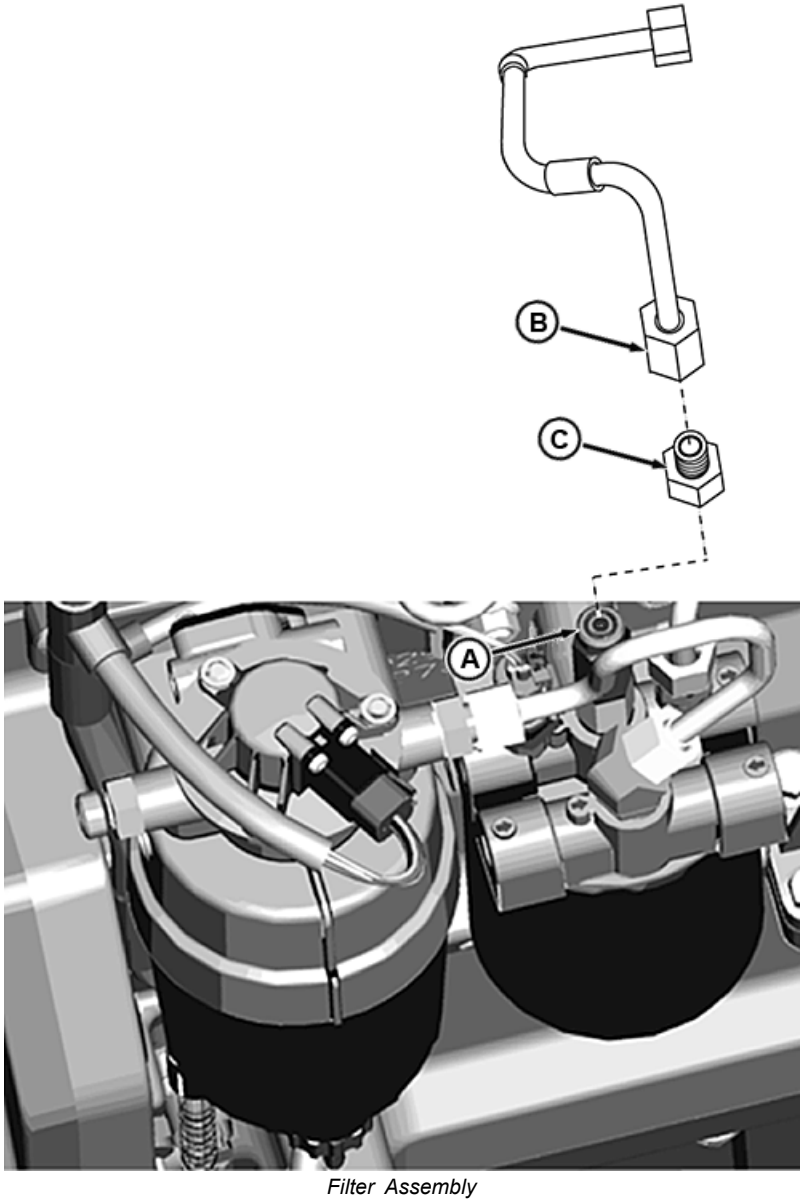
Bleed The Fuel System

CAUTION: Do not pressurize the fuel tank to prime the fuel system after running out of fuel or servicing the fuel filters. Pressurizing the fuel system causes the front seal on the High Pressure pump to rupture. A ruptured front seal on the High pressure fuel pump fills the engine crankcase with diesel fuel, and causes damage to the engine. It also requires replacement of the high Pressure pump.

1. Verify that fuel is flowing.

NOTE: When a filter (or filters) has been changed, or the engine has run out of fuel, turning the ignition key on for 60 seconds prior to starting the engine should bleed most of the air out of the fuel system. If, after cranking the engine for 20 seconds it doesn't start, turn the ignition key OFF, then ON, and wait an additional 60 seconds before again attempting to start the engine. If the engine still won't start, the following steps will insure that the air bleed system is functioning

a. Ignition OFF, engine OFF.



RG15161A —UN—03NOV09

Filter Assembly

A—Fuel Bleeder Valve **B—Fuel Bleeder Line** **C—Cap**

b. Disconnect the air bleed line (B) at the air bleed valve (A), as shown.

c. Cap (C) the air bleed line (B) to avoid fuel spills. Use 11/16th-16 UNC 2A cap.

d. Attach a fuel line to the air bleed valve, and place the other end in a 3.8 L (1.0 gal.) or larger container.

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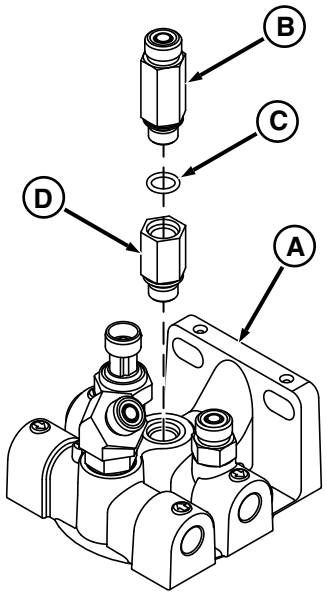
DB92450,0000065 -19-06OCT10-1/3

e. Ignition ON engine OFF, observe fuel flow is a steady stream at approximately 3 mm (0.125 in) in diameter.

f. If fuel flow is steady at approximately 3 mm (0.125 in) diameter stream, reinstall the bleed line (See Section 02, Group 090 earlier in this manual), and return to original diagnostic procedure. If not, continue with this procedure.

DB92450,0000065 -19-06OCT10-2/3

2. Check air bleed/check valve assembly.
   a. Remove the check valve (C) and orifice (D) from the filter head (A) , as shown, and check for debris. (See REMOVE AND INSTALL AIR BLEED/CHECK VALVE section 02, group 110 of this manual.
   b. Make sure the check valve and orifice assembly is free of debris and not blocked, and that the valve is not sticking limiting fuel flow.
   c. If the valve is not sticking, continue with this procedure. If the valve is sticking: replace valve, reassemble air bleed/check valve assembly, and reinstall it. (See REMOVE AND INSTALL AIR BLEED/CHECK VALVE section 02, group 110 of this manual.
3. Check the fuel flow.
   a. Ignition ON, Engine OFF.
   b. Observe fuel flow.
   c. If fuel flow is steady at approximately 3 mm (0.125 in) diameter stream, return back to original diagnostic procedure. If not, see F1 - LOW PRESSURE FUEL SYSTEM CHECK.



RG15160A —UN—03OCT08

Filter Head With Air Bleed/Check Valve Assembly

A—Fuel Filter Head
B—Check Valve
C—O Ring
D—Orifice

DB92450,0000065 -19-06OCT10-3/3

Check for Restricted Fuel Leak-off Line

This check will determine if the fuel leak-off line is restricted or not designed correctly for the application.

1. Check all return lines and ensure there are no kinked or pinched lines.
2. Install (T-in) a pressure gauge capable of accurately reading 20 kPa (2.9 psi) in fuel leak-off line between engine and fuel tank. Install the gauge at the engine end of the leak-off line.
3. Do NOT remove fuel tank cap.
4. Monitor pressure gauge.
5. Operate engine under various conditions from low idle to governed rpm under load.
6. Determine if pressure gauge exceeds 20 kPa (2.9 psi) at any time.
7. Remove fuel tank cap if pressure gauge exceeds 20 kPa (2.9 psi) and recheck return pressure.
8. If return pressure is less than 20 kPa (2.9 psi) with fuel cap removed, inspect tank vent. If pressure does not decrease with fuel cap removed, locate source of restriction in fuel return line.

RG41183,000011B -19-20JUL07-1/1

Check High Pressure Fuel Pump Static Timing

IMPORTANT: There is no timing adjustment for the fuel pump. Use this procedure to check for proper installation.

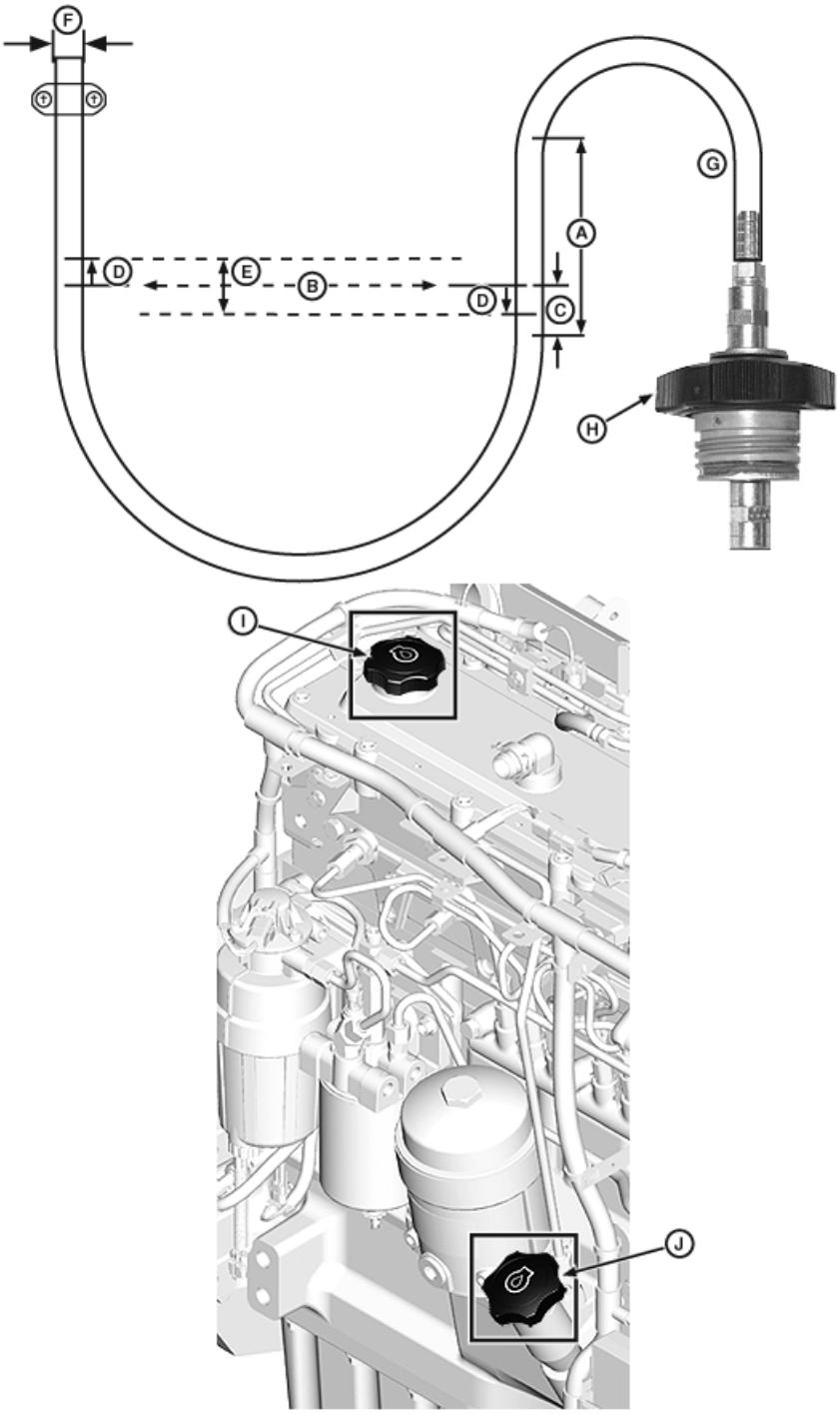
1. Remove cover from the pump gear housing. Clean off gasket material.
2. Remove plugs in engine block and install JDG820 Flywheel Turning Tool. Rotate engine flywheel in normal running direction until No. 1 piston is at “TDC” of its compression stroke.
3. Install JDE81-4 Timing Pin into hole in flywheel.
4. Check if timing marks on the pump gear and cam gear are aligned. See REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP ASSEMBLY in Section 2, Group 90 earlier in this manual for timing mark alignment information.

NOTE: If timing marks are not aligned, engine may be at No. 6 TDC-Compression. Rotate engine one full revolution in running direction until JDE81-4 Timing Pin engages in flywheel again.

5. If timing marks are not aligned when engine is at No. 1 TDC—Compression, see REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP ASSEMBLY in Section 2 Group 90 earlier in this manual or see INSTALL CAMSHAFT in the base engine manual if camshaft is not correctly timed to the crankshaft.
6. If timing marks are aligned, no adjustment is necessary.
7. Install gear housing cover with new gasket. For pump gear housing cover cap screw torque specifications, see REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP ASSEMBLY in Section 2 Group 90.
8. Remove JDG820 Flywheel Turning Tool and JDE81-4 Timing Pin. Install plugs back into engine block.

RG41183,000011C -19-28AUG07-1/1

Excessive Engine Crankcase Pressure (Blow-By)



Blow-By Measurement Setup

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A—30.5 cm (12 in.) Vertical Tubing, Both Sides
B—Fluid Level Prior to Start of Test
C—Minimum 76.2 mm (3 in.) Vertical Fluid Prior to Start of Test
D—Maximum Allowable Vertical Fluid Travel 25.4 mm (1.0 in.) Each Side
E—Max. Allow. Total Vertical Fluid Travel 50.8 mm (2.0 in.) Both Sides
F—9.5 mm (0.375 in.) o.d. (outer dimension) 6.35 mm (1/4 in) i.d. (inner dimension) Tubing (minimum length 91.4 cm (3 ft))
G—DFRG9 Monometer
H—Fabricated Oil Fill Cap Adaptor from DFRG9
I— Oil Fill Cap on Rocker Cover
J— Combination Oil Fill Cap and Dipstick

Most blow-by comes from combustion gas leakage past any of three places: 1. piston rings, 2. valve guides, or sealing ring in the turbocharger. As blow-by increases, crankcase pressure also increases. Measuring crankcase pressure is the best way to determine whether or not there is excess leakage past the piston rings, valve guides, or turbocharger seal.

NOTE: the following items are required

- *A small amount of colored water.*
- *Minimum 91.44 cm (3 ft) clear, flexible, plastic tubing 6.35 mm (1/4 in) inner dimension (id) diameter.*
- *Marking pen, pencil, or crayon.*

DB92450,0000038 -19-02AUG10-2/6

Excessive Engine Crankcase Pressure (Blow-By) Diagnostic Procedure

DB92450,0000038 -19-02AUG10-3/6

1 Measure Crankcase Pressure Test

Before performing the test:

1. Ensure that crankcase vent tube is open to the atmosphere.
2. On applications with dipstick and oil fill cap combined, remove dipstick and install oil fill cap adaptor (H) to dipstick/fill cap tube (J). On applications with a small dipstick and fill cap on rocker cover (I), remove fill cap and install oil fill cap adaptor (H).
3. Attach other end of tubing to a fixed panel, brace, or other firm surface, forming a “U”, as shown above. On both sides, and opposite each other, the tubing must be vertical (A) for 30.5 cm (12 in.). Ensure that tubing is completely open, with no kinks or pinches in it.
4. Pour enough liquid into tube to allow a level of from 76.2 mm (3 in.) to 152.4 mm (6 in.) up both vertical sides of the tube (C). Mark the fluid level. Measure down 25.4 mm (1 in.) from fluid level in tube side nearest to the dipstick tube, and mark it. Measure up 25.4 mm (1 in.) from fluid level in tube side farthest from the dipstick tube, and mark it (D).

NOTE: If at any time during this test, prior to the end, fluid travel exceeds the total (50.8 mm (2.0 in.) both sides) maximum allowable travel, it is not necessary to continue this test

Perform crankcase pressure test, as follows:

5. Ignition ON, engine ON. Let engine stabilize, at low idle, and observe total fluid travel for both sides (E).
6. If possible, slowly load the engine. If not possible, slowly advance idle. Stop at 25% load, or approximate idle increase, and allow engine to stabilize. When engine is stabilized, observe total fluid travel for both sides.
7. Increase load, or advance idle and stop every, additional 25%. When engine is stabilized, observe total fluid travel for both sides.
8. Continue to as near as possible to full load, or to high idle. When engine is stabilized, and observe total fluid travel for both sides.

At any time during test, did total fluid travel (E) exceed 50.8 mm (2 in.)?

YES: GO TO 2

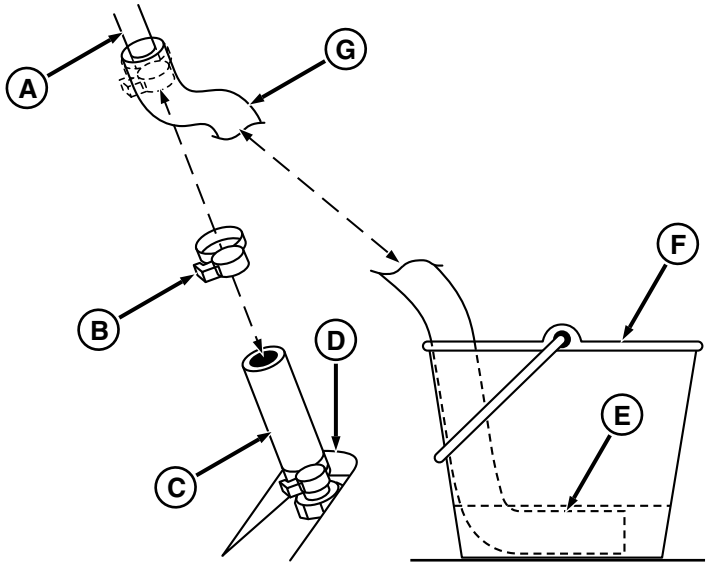
NO: The crankcase pressure meets John Deere application guidelines. Either return to original diagnostic procedure, or return to customer.

Continued on next page

DB92450,0000038 -19-02AUG10-4/6

❷ Turbocharger Test

1. On turbocharger oil return rigid tubing (A) side of turbocharger oil return flexible tubing (C), remove and retain clamp (B), and remove end of flexible tubing from end of turbocharger oil return rigid tubing.



RG15142A —UN—01OCT08

Remove Turbocharger Oil Return Flexible Hose

A—Turbocharger Oil Return Rigid Tubing
B—Clamp
C—Turbocharger Oil Return Flexible Tubing
D—Crankcase
E—Water, 3.8 Liters (1.0 gallon)
F—19 Liter (5-gallon) Bucket
G—Test Flexible Tubing

2. Plug or cap open end of turbocharger oil return flexible tubing (C).
3. Obtain 19-liter (5-gallon) bucket (F), and place on ground or floor, near turbocharger oil drain line.
4. Measure outer dimension of rigid tubing (A), and obtain length of flexible tubing (G), of same inner dimension as rigid tubing outer dimension, and of sufficient length to place between rigid tubing and bucket as follows:
   a. Attach one end of flexible tubing to open end of rigid tubing.
   b. Secure flexible tubing to rigid tubing using clamp, from step 1.
   c. Place other end of flexible tubing in bucket.
5. Pour approximately 3.8 liters (1.0 gallons) of water (E) into bucket. Bucket-end of flexible tubing must be completely submerged.
6. Check that crankcase engine oil level is full.
7. Using John-Deere-approved oil test kit, obtain an engine oil sample, and send off for oil scan analysis.

NOTE: This test should not exceed 3 minutes without shutting engine down. Then check engine oil level, and refill if necessary. Pour out bucket contents, and refill with 3.8 liters (1.0 gallons) of water.

8. Perform crankcase pressure test, as follows:
   a. Ignition ON, engine ON. Let engine stabilize, at low idle, and observe total fluid travel for both sides (E).
   b. If possible, slowly load the engine. If not possible, slowly advance idle. Stop at 25% load, or approximate idle increase, and allow engine to stabilize. When engine is stabilized, observe total fluid travel for both sides.
   c. Increase load, or advance idle and stop every, additional 25%. When engine is stabilized, observe total fluid travel for both sides.
   d. Continue to as near as possible to full load, or to high idle. When engine is stabilized, and observe total fluid travel for both sides.
9. Monitor oil level in bucket to avoid oil spills.
10. Check for bubbles appearing in bucket.

Continued on next page

	11. When test is completed: *NOTE: If engine blow-by is found, to determine area of engine, remove head, and examine rings and valve guides, see GROUP 020 — CYLINDER HEAD AND VALVES REPAIR SPECIFICATIONS in base engine CTM.* a. Remove cap or plug from end of turbocharger oil return flexible tubing. b. Loosen clamp, remove flexible tubing drain line from rigid tubing, and remove clamp from test flexible tubing. c. Reattach turbocharger oil return flexible tubing and clamp to turbocharger oil return rigid tubing. Tighten clamp. For torque specification, see Section 6, Group 200 ELECTRONIC FUEL SYSTEM REPAIR AND ADJUSTMENT SPECIFICATIONS in this CTM. Did bubbles appear in the bucket water?	**YES:** Remove and replace turbocharger, see AIR INTAKE AND EXHAUST SYSTEM OPERATION in base engine manual. GO TO 1 **NO:** To locate engine blow-by, perform Cylinder Electronic Compression Test in Service ADVISOR.

DB92450,0000038 -19-02AUG10-6/6

Charge Air System Diagnostic

JB81757,000003C -19-28AUG07-1/9

Charge Air System Diagnostic

JB81757,000003C -19-28AUG07-2/9

1 Visual Inspection	1. Check for loose hose clamps. 2. Inspect air filter for damage or blockage that would restrict air flow or permit unfiltered air to flow into the engine. 3. Remove inlet air pipes and check for dirt tracks from unfiltered air. 4. Check for soft inlet air hoses which may collapse between air cleaner and turbo compressor inlet. 5. Inspect charge air cooler for debris or other blockage which would reduce the external cooling air flow through the cooling fins. 6. Check engine cooling fan and fan drive. Was a problem found?	**YES:** Fix problem. GO TO 2. **NO:** GO TO 2.

JB81757,000003C -19-28AUG07-3/9

2 Check for Internal Air Flow Restriction	Check for evidence of oil or other or other contamination in charge air cooler which would reduce internal air flow through the cooler's tubes. Is oil or other contamination present in the charge air cooler?	**YES:** GO TO 3. **NO:** GO TO 4.

JB81757,000003C -19-28AUG07-4/9

3 Clean Charge Air Cooler	1. Remove charge air cooler. 2. Use John Deere Coolant System Cleaner PMCC2638, or equivalent, per the cleaner instructions to clean the oil residue from the CAC. 3. Use compressed air to completely dry the inside of the CAC. Could oil or other contamination be removed from the charge air cooler?	**YES:** Reinstall charge air cooler. GO TO 4. **NO:** Replace charge air cooler. GO TO 4.

JB81757,000003C -19-28AUG07-5/9

4 Turbo Compressor–Side Evaluation	1. Without removing variable geometry turbo (VGT), examine compressor housing and blades for damage. (See TURBOCHARGER INSPECTION, Section 02, Group 080 in base engine manual.) 2. Remove the compressor outlet tube to the charge air cooler. Check for debris from the compressor housing and blades, and for oil leaking from the seal of compressor housing shaft. 3. Spin turbine. Turbine should spin freely without noise or binding. Was damage, debris, or leaking oil found or does turbine bind or scrape when spinning?	**YES:** GO TO 5. **NO:** GO TO 6.

Continued on next page

JB81757,000003C -19-28AUG07-6/9

5 Remove and Inspect Turbo

1. Remove turbocharger. (See REMOVE TURBOCHARGER in section 02, Group 080 of base engine manual.)
2. Inspect for debris or oil. (See TURBOCHARGER INSPECTION in Section 02, Group 080 of base engine manual.)

Was there debris or oil in the compressor outlet to the charge air cooler?

YES: Replace turbocharger. (See INSTALL TURBOCHARGER in section 02, Group 080 of base engine manual.) Then remove, clean, and reinstall charge air cooler, and GO TO 6.

NO: GO TO 6.

JB81757,000003C -19-28AUG07-7/9

6 Charge Air Cooling System Check

NOTE: This procedure requires fabrication of caps for the inlet and outlet of charge air cooler outlet. Constructions of one of the caps requires the ability to receive and seal a supply air line,

1. At the intake manifold, remove charge air cooler outlet tube, and cap outlet tube.
2. At the turbocharger, remove charge air cooler inlet tube, and cap inlet tube.
3. Install a supply air line to the charge air system.
4. Slowly pressurize the charge air system to 206.85 kPa (30 psi), and maintain this pressure.
5. Using soapy water, check the charge air system joints for air leaks.

Were any joint leaks found?

YES: Repair or replace leaking components. GO TO 7.

NO: Keep air supply line connected. GO TO 7.

JB81757,000003C -19-28AUG07-8/9

7 Charge Air Cooler Check

1. With air supply line to charge air cooler still connected, shut off the air supply.
2. Measure how much time elapses for air pressure to reach 0 kPa (0 psi).

Was the time to reach 0 kPa (0 psi) greater than 60 seconds?

YES: Charge air system is operating correctly.

NO: Replace charge air cooler.

JB81757,000003C -19-28AUG07-9/9

Variable Geometry Turbocharger (VGT) Component Test

DM59778,00000A9 -19-21NOV08-1/11

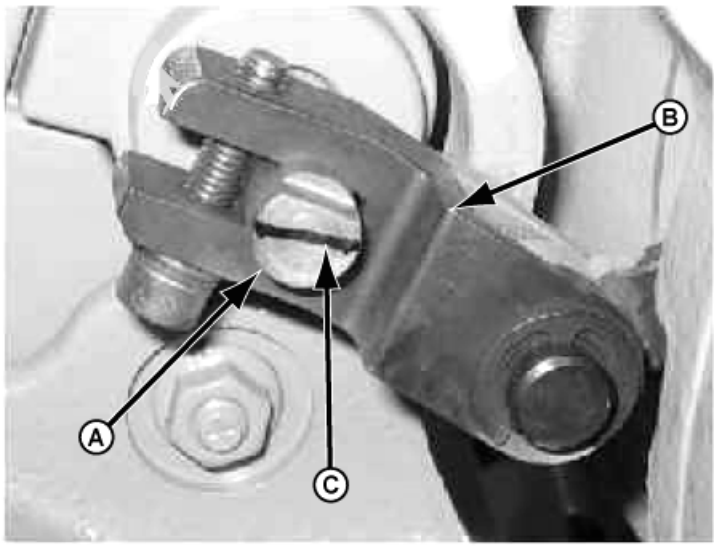
Variable Geometry Turbocharger (VGT) Component Test Diagnostic Procedure

Continued on next page

DM59778,00000A9 -19-21NOV08-2/11

1 VGT Linkage Test

NOTE: If the temperature is below freezing, run the engine for several minutes to melt away any ice that may be binding the linkage.

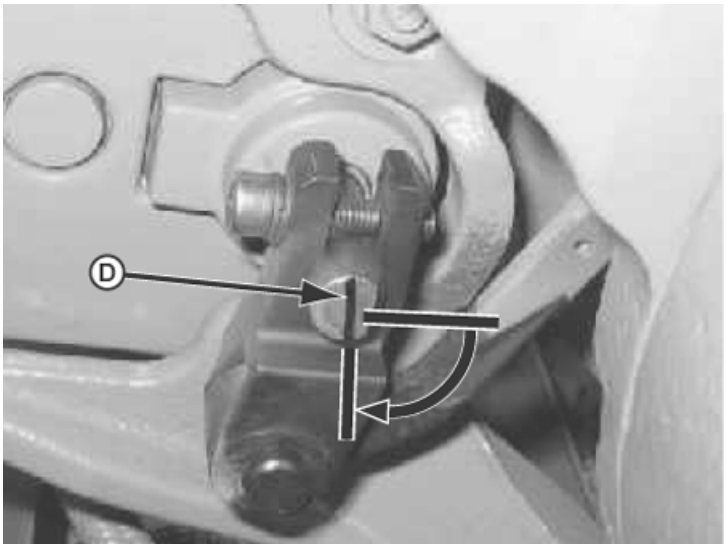


RG15154 —UN—08NOV06

Actuator Shaft at Rest

A—Actuator Shaft
B—VGT-Actuator Linkage
C—Mark Made at End of Shaft

1. Ignition OFF, Engine OFF.
2. With the actuator at rest, mark the end of the actuator shaft (A) with a horizontal line, as shown (C).
3. Rotate the actuator linkage (B) clockwise, until it stops. The line should be vertical, approximately 90º from the original position, as shown (D).



RG15153 —UN—08NOV06

Actuator Shaft Rotated

D—Actuator Shaft Rotated 90°

Release the linkage and allow it to spring back on its own.

Did the linkage move freely from the resting position to full travel and back without stopping or binding?

YES: Return to the previous diagnostic procedure.

NO: GO TO 2.

Continued on next page

DM59778,00000A9 -19-21NOV08-3/11

2 Check Linkage for Excessive Binding	Using minimum force, try to manually rotate the linkage back to its return position. Continue to cycle the linkage back and fourth through its full rotation. Does the linkage travel the full rotation with minimum force?	**YES:** Return to the previous diagnostic procedure. **NO:** GO TO 3

DM59778,00000A9 -19-21NOV08-4/11

3 Isolate Binding	1. Remove VGT-actuator linkage (B) only from actuator shaft (A). See REMOVE AND INSTALL TURBOCHARGER ACTUATOR LINKAGE (6 CYLINDER ENGINE) in the base engine manual. 2. Rotate linkage in both directions, and from stop to stop (approximately 90º). Did the turbine vanes move freely, through the full rotation and in both directions, without sticking?	**YES:** GO TO 4. **NO:** GO TO TURBOCHARGER FAILURE ANALYSIS in the base engine manual.

DM59778,00000A9 -19-21NOV08-5/11

4 Actuator Movement Check	Using an appropriate-size wrench, rotate actuator shaft, approximately 90° clockwise (D). Did the actuator shaft move freely between stops?	**YES:** GO TO 5. **NO:** Replace actuator. See REMOVE AND INSTALL VARIABLE GEOMETRY TURBOCHARGER ACTUATOR (4 CYLINDER ENGINE - IF EQUIPPED) in the base engine manual.

DM59778,00000A9 -19-21NOV08-6/11

5 Linkage Adjustment	1. Adjust the VGT-actuator linkage (B), See REMOVE AND INSTALL TURBOCHARGER ACTUATOR LINKAGE (6 CYLINDER ENGINE) in the base engine manual. 2. Rotate the actuator linkage (B) clockwise, until it stops (D). Did the linkage move freely without binding?	**YES:** Return to original diagnostic procedure. Or, trouble resolved - return to customer. **NO:** Replace linkage. See REMOVE AND INSTALL TURBOCHARGER ACTUATOR LINKAGE (6 CYLINDER ENGINE), in the base engine manual.

DM59778,00000A9 -19-21NOV08-7/11

6 Travel Range Test	1. Ignition ON, Engine OFF. 2. PerformVGT TRAVEL RANGE TEST in Service ADVISOR. Did test pass?	 **YES:** Return to original diagnostic procedure. **NO:** GO TO 7.

Continued on next page

DM59778,00000A9 -19-21NOV08-8/11

7 Linkage Disconnected Test	1. Ignition OFF, Engine OFF. 2. Disconnect actuator linkage for actuator shaft only. 3. Ignition ON, Engine OFF 4. Perform VGT TRAVEL RANGE TEST in Service ADVISOR. Did test pass?	**YES:** GO TO 8. **NO:** Replace VGT actuator and verify problem fixed.

DM59778,00000A9 -19-21NOV08-9/11

8 Test Linkage for Binding	1. Ignition OFF, Engine OFF. 2. Remove actuator linkage form turbo shaft. 3. Move linkage and check for possible binding points. Did linkage move freely with no binding?	**YES:** GO TO 9. **NO:** Replace linkage. See REMOVE AND INSTALL BET ACTUATOR LINKAGE in base engine manual

DM59778,00000A9 -19-21NOV08-10/11

9 Test Turbo for Binding	1. Install linkage. See REMOVE AND INSTALL BET ACTUATOR LINKAGE in base engine manual 2. Ignition ON, Engine OFF. 3. Perform VGT LEARN VALUE RESET TEST in Service ADVISOR. Did the test pass?	**YES:** Return to original diagnostic procedure. **NO:** Replace turbo and verify it fixed problem.

DM59778,00000A9 -19-21NOV08-11/11

Temperature Sensor Validity Test

JB81757,000002E -19-27AUG07-1/3

Temperature Sensor Validity Test Diagnostic Procedure

JB81757,000002E -19-27AUG07-2/3

1 Check Recorded Difference Between Sensors Placed in Hot Water	*NOTE: For sensor removal and installation procedures, see applicable procedure in Section 2, Group 110 earlier in this manual.* 1. Ignition OFF, engine OFF. 2. Remove the temperature sensors indicated in the applicable diagnostic procedure from the engine and reconnect the sensors to the corresponding wire harness connectors. 3. Ignition ON, engine OFF. 4. Record the data points in Service ADVISOR that are associated with each of the temperature sensors as defined in the diagnostic procedure. 5. Fill a cup size or larger container with the hottest water available. Use an insulated container, if available. 6. Place each of the applicable sensor probes in the water for 15 seconds and quickly go to the next sensor to minimize the change in water temperature. Sensors can be placed in the water at the same time if the wire harness length permits. Do not submerse the sensor electrical connectors. 7. Place the first sensor that was tested back into the water for 15 seconds to determine the decrease in water temperature that occurred during the test. 8. Stop the data point recording and save the recording. 9. Replay the data point recording and monitor the maximum temperature reported when the first sensor tested was initially placed in the water and the maximum temperature reported when the same sensor was placed back in the water at the conclusion of the test. Did the recorded information indicate that the change in water temperature was less than 2°C (4°F) during the test?	**YES:** Test complete. Return to the diagnostic procedure. **NO:** Repeat the TEMPERATURE SENSOR VALIDITY TEST. Use a larger container of hot water, if available.

JB81757,000002E -19-27AUG07-3/3

EGR-VGT System Temperature and Flow Test

JB81757,000002F -19-02JUN08-1/4

EGR-VGT System Temperature and Flow Test Procedure

Continued on next page

JB81757,000002F -19-02JUN08-2/4

1 Check System Response

1. Engine not operated for the past eight hours (preferred).
2. Ambient air temperature above 10°C (50°F) (preferred). In lower ambient temperatures, additional running time may be necessary before the EGR valve will be commanded open. In very low ambient temperatures, the EGR valve may not be commanded open.
3. Ignition ON, engine OFF.
4. Monitor and record the following data points in Service ADVISOR:
   a. Turbo Compressor Inlet Temperature
   b. Charge Air Cooler Outlet Temperature
   c. Manifold Air Temperature
   d. EGR Temperature
   e. Coolant Temperature
   f. EGR Valve Position - Actual
   g. Manifold Air Pressure - Absolute
   h. Barometric Air Pressure
5. Data points should indicate the following on a cold engine with engine not running:
   a. Turbo Compressor Inlet Temperature - Approximately the same as actual ambient temperature.
   b. Charge Air Cooler Outlet Temperature - Within 5°C (9°F) of Manifold Air Temperature and approximately the same as actual ambient temperature.
   c. Manifold Air Temperature - Within 5°C (9°F) of Charge Air Cooler Outlet Temperature and approximately the same as actual ambient temperature.
   d. EGR Temperature - Approximately the same as ambient temperature or coolant temperature, if temperature is above 10°C (50°F). EGR Temperature sensor is not designed to accurately indicate temperatures below 10°C (50°F).
   e. Coolant Temperature - Approximately the same as actual coolant temperature.
   f. EGR Valve Position - Actual - 0% (closed).
   g. Manifold Air Pressure - Absolute - Within 10 kPa (1.5 psi) of Barometric Air Pressure data point.
   h. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric air pressure.
6. Start engine and operate at 1200 rpm.
7. Data points should indicate the following as the engine warms up:
   a. Turbo Compressor Inlet Temperature - Initially approximately the same as actual ambient temperature, but increasing to not more than 15°C (27°F) above actual ambient air temperature.
   b. Charge Air Cooler Outlet Temperature - Within 5°C (9°F) of Manifold Air Temperature and not more than 15°C (27°F) above Turbo Compressor Inlet Temperature.
   c. Manifold Air Temperature - Within 5°C (9°F) of Charge Air Cooler Outlet Temperature.
   d. EGR Temperature - Within 12°C (22°F) of Coolant Temperature when coolant temperatures are between 30°C (86°F) and 79°C (174°F).
   e. Coolant Temperature - Approximately the same as actual coolant temperature.
   f. EGR Valve Position - Actual - 0% (closed).
   g. Manifold Air Pressure - Absolute -Increased above the Ignition ON, engine OFF value.
   h. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric air pressure.
8. Place engine under load when coolant temperature reaches 79°C (174°F), the minimum coolant temperature for EGR valve opening. The EGR valve should begin opening as shown by an increase in the EGR Valve Position - Actual data point after several minutes, if ambient temperatures are greater than 10°C (50°F).
9. Data points should indicate the following several minutes after the EGR valve opens:
   a. Turbo Compressor Inlet Temperature - Not more than 15°C (27°F) above actual ambient air temperature.

Continued on next page

	b. Charge Air Cooler Outlet Temperature - Typically higher than Turbo Compressor Inlet Temperature, but not more than 15°C (27°F) above Turbo Compressor Inlet Temperature. c. Manifold Air Temperature - Typically 10-15°C (18-21°F) higher than the Charge Air Cooler Outlet Temperature due to the hot exhaust gas being supplied by the EGR valve. d. EGR Temperature - Higher than Coolant Temperature, typically a value near 150°C (302°F). e. Coolant Temperature - Approximately the same as actual coolant temperature. f. EGR Valve Position - Actual - Greater than 0%, typically at the full open position of approximately 90%. g. Manifold Air Pressure - Absolute -Increases as engine speed and load are increased. Value may fluctuate as the ECU controls the VGT actuator. h. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric air pressure.	**YES:** System is operating correctly. Return to diagnostic procedure.
	Did the temperatures and pressures respond as described without erratic changes?	**NO:** System is not operating correctly. Return to diagnostic procedure.

JB81757,000002F -19-02JUN08-4/4

Bleed Coolant System

See BLEED AIR FROM COOLANT SYSTEM in the base engine manual.

JB81757,0000030 -19-28AUG07-1/1

About This Group

This group of the manual contains necessary information to diagnose the electronic control system, fuel system and air system. Use this information in conjunction with Base Engine Manual.

See the Base Engine Manual for:

- Removal of base engine components
- base engine repair procedures
- base engine disassembly
- base engine inspection
- base engine assembly

Parts such as sensors, actuators, connectors, terminals and wiring harnesses are serviceable and available.

To help diagnose electronic control system problems, see APPLICATION SPECIFICATIONS in Section 06, Group 210 of this manual. It contains useful information, such as system wiring schematic and ECU terminal identification.

IMPORTANT: Under no circumstances should the Engine Control Unit (ECU) be opened.

NOTE: Instruction is given throughout the diagnostic charts to make resistance and voltage measurements in the ECU/Cab connector and the ECU/Engine connector. Note that these measurements are normally made in the harness connector. Measurements made on the ECU itself will specifically call that out.

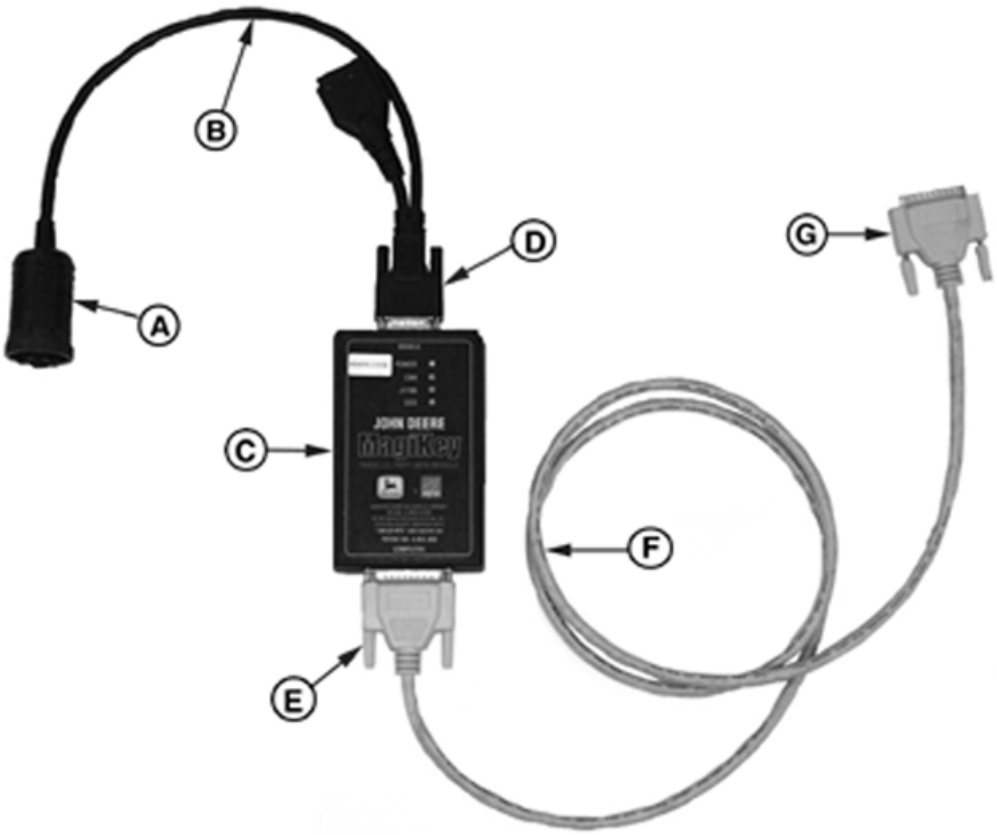
RG41221,00001DC -19-28AUG07-1/1

Connecting to Service ADVISOR

Refer to the appropriate section below for instructions on connecting Service Advisor to your application.

Connecting to Service ADVISOR with PDM Adaptor

The Parallel Data Module (PDM) adapter is used to provide communication between the computer and the ECU.



RG11737A —UN—18MAY01

Connecting to Service ADVISOR

A—Diagnostic Connector Mate
B—John Deere Controller Cable
C—PDM (Parallel Data Module)
D—26 Pin PDM Connector
E—25 Pin PDM Connector
F—Parallel Cable
G—Computer Connector

The PDM is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

DS10023 ECU Communication Hardware Kit or JDIS121 ECU Communication Hardware Kit is required to connect Service ADVISOR to the ECU.

Instructions for connecting to Service ADVISOR with PDM:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable (B) to the diagnostic connector on the engine harness using the diagnostic connector mate (A).
3. Connect the other end of the John Deere Controller Cable to the PDM (C) module at the 26 pin PDM connector (D).
4. Connect the parallel cable (F) to the PDM module at the 25 pin PDM connector (E).
5. Connect the other end of the parallel cable to the computer with Service ADVISOR installed.
6. Key ON, engine off or running.

Continued on next page

DM59778,000007B -19-27OCT10-1/6

7. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
8. Select Parallel Data Module (PDM) as the current adapter in the Select Readings Adapter box.
9. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
10. Press the Connect button after selecting the engine model.
11. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
12. If power to the PDM is lost while cranking the engine for the Cylinder Electronic Compression Test, use the Power Adapter. The Power Adapter connects between the PDM and the 26 pin PDM connector.

RG12277 —UN—22APR02

Power Adapter

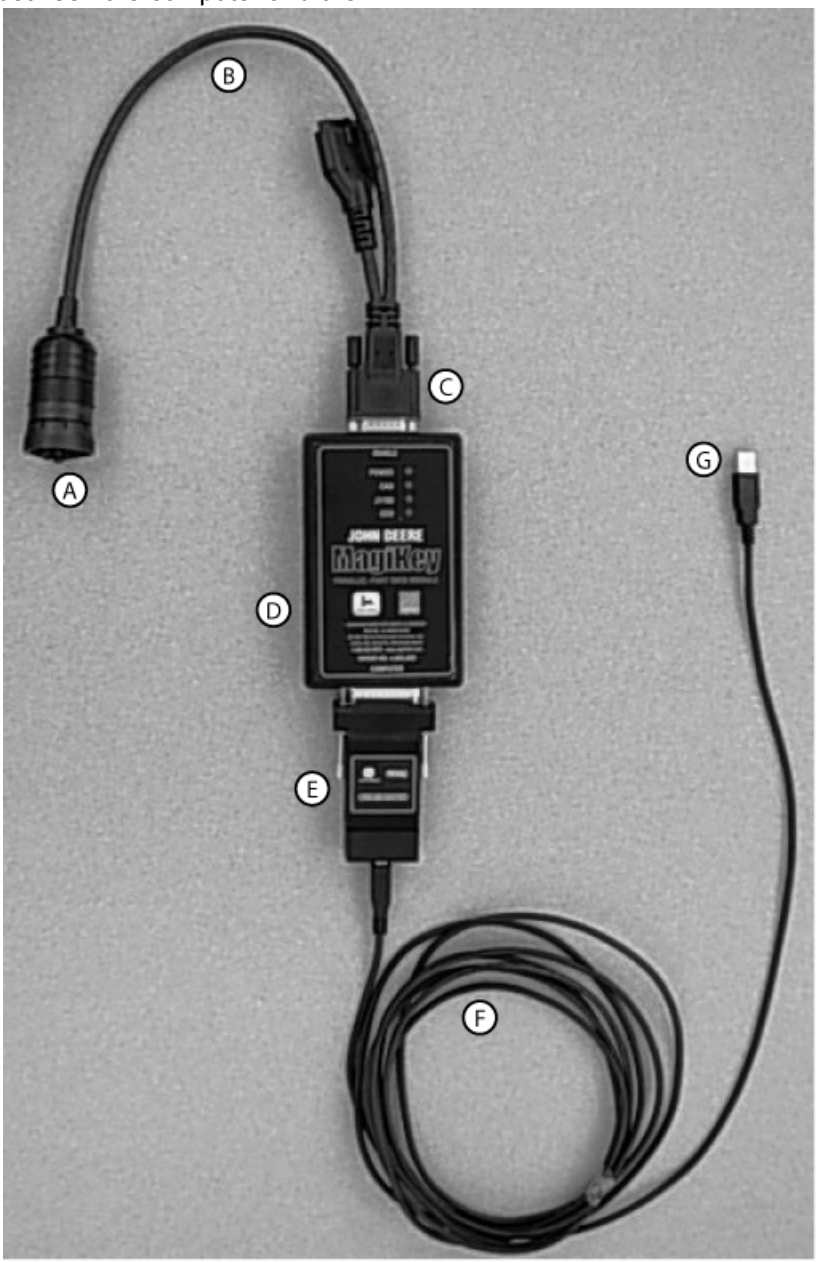
13. When finished, replace the dust cap on the diagnostic connector.

Continued on next page

DM59778,000007B -19-27OCT10-2/6

Connecting to Service ADVISOR with PDM Adaptor and USB Adaptor

The Parallel Data Module (PDM) adapter is used to provide communication between the computer and the ECU. The USB adapter is used to permit the PDM to connect to a USB port on the computer.



RG15119A —UN—30MAY07

A—Diagnostic Connector Mate
B—John Deere Controller Cable
C—26 Pin PDM Connector
D—Parallel Data Module (PDM)
E—USB Adapter
F—USB Cable
G—computer Connector

The PDM is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

DS10023 ECU Communication Hardware Kit or JDIS121 ECU Communication Hardware Kit is required to connect Service ADVISOR to the ECU.

Instructions for connecting Service ADVISOR:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable (B) to the diagnostic connector on the engine harness using the diagnostic connector mate (A).
3. Connect the other end of the John Deere Controller Cable to the PDM (D) module at the 26 pin PDM connector (C).

Continued on next page

DM59778,000007B -19-27OCT10-3/6

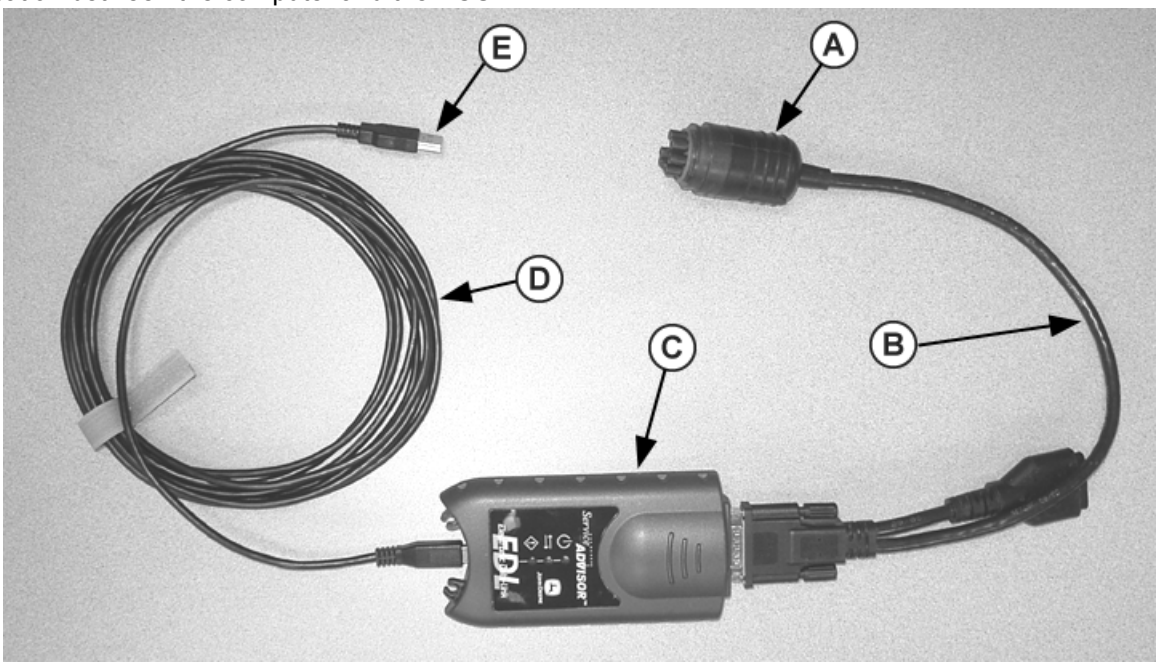
4. Connect the USB adaptor (E) to the PDM module.
5. Connect the USB cable (F) to the USB adapter.
6. Connect the USB cable computer connector (G) to the USB port on the computer.
7. Key ON, engine off or running.
8. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
9. Select Parallel Data Module (PDM) with USB Adapter as the current adapter in the Select Readings Adapter box.
10. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
11. Press the Connect button after selecting the engine model.
12. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
13. When finished, replace the dust cap on the diagnostic connector.

Continued on next page

DM59778,000007B -19-27OCT10-4/6

Connecting to Service ADVISOR with EDL Adaptor using USB Cable

The Electronic Data Link (EDL) adapter is used to provide communication between the computer and the ECU.



RG14546 —UN—27OCT05

Connecting to Service ADVISOR

A—to 9-Pin Diagnostic Connector on Engine
B—John Deere Controller Cable
C—EDL (Electronic Data Link)
D—USB Cable
E—to computer with Service ADVISOR

The EDL is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

DS10117 ECU Communication Hardware Kit contains the EDL and cables necessary to connect Service ADVISOR to the ECU.

Instructions for connecting Service ADVISOR to the ECU:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable (B) to the diagnostic connector on the engine harness.
3. Connect the other end of the John Deere Controller Cable to the EDL (C).
4. Connect the USB cable (D) to the EDL.
5. Connect the other end of the USB cable to the computer with Service ADVISOR installed.
6. Key ON, engine off or running.
7. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
8. Select Electronic Data Link (EDL) Stand-alone USB Device as the current adapter in the Select Readings Adapter box.
9. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
10. Press the Connect button after selecting the engine model.
11. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
12. When finished, replace the dust cap on the diagnostic connector.

Connecting to Service ADVISOR with EDL Adaptor using Bluetooth

The Electronic Data Link (EDL) adapter is used to provide communication between the computer and the ECU using Bluetooth wireless communications. The computer must have a Bluetooth adaptor or be Bluetooth capable for this feature to work.

The EDL is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

Continued on next page

DS10117 ECU Communication Hardware Kit contains the EDL and cables necessary to connect Service ADVISOR to the ECU.

Instructions for connecting Service ADVISOR to the ECU using Bluetooth wireless:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable to the diagnostic connector on the engine harness.
3. Connect the other end of the John Deere Controller Cable to the EDL.
4. Key ON, engine off or running.
5. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
6. Select Electronic Data Link (EDL) using Bluetooth as the current adapter in the Select Readings Adapter box.
7. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
8. Press the Connect button after selecting the engine model.
9. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
10. When finished, replace the dust cap on the diagnostic connector.

DM59778,000007B -19-27OCT10-6/6

Communication Error Test Instructions

The Communication Error Test is used to reset the communication protocol between the ECU and the other control units on the application.

Performing the Communication Error Test

1. Ignition ON, Engine OFF.
2. In Service ADVISOR, select Communication Error Test.
3. Follow instructions given by the diagnostic software.

RG40049,00001D3 -19-26OCT10-1/1

Control Unit Information and Overview Test

This test gathers specific information from the ECU and puts it into a printable format. The test automatically starts and gathers all of the information listed below. When all the information has been gathered, it is displayed on the screen. The following options are then displayed: Refresh, Exit, and Print.

Refresh:
Selecting this option gathers the information again and displays the new data.

Exit:
Selecting this option exits the test.

Print:
Selecting this option allows the user to print the data now or save it to a file and print it later. For more information, see Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions in this group.

The information gathered is:

- Date tested
- Engine Serial number
- Engine Hourmeter
- ECU serial number
- ECU software assembly part number
- Engine model number
- ECU configuration file part number
- ECU software part number
- Vehicle option part number
- Performance option part number
- Operating code compatibility code
- EOL compatibility code
- Option assembly part number
- ECU part number
- Injector number
- Injector part number
- Injector serial number
- Injector calibration code
- See, **Other data that can be collected** below to collect additional data points.
- Active and Stored trouble codes at the time test data is taken

Other data that can be collected:
This test can be set up to collect other static data. Any data point that is available to view can be setup to get sent with this report. The ControlUnitInformation.ini file located in the “C:\Documents and Settings\All Users\Application Data\Service ADVISOR\CAL\Connectivity Applications\AEA Data Files\Procedure Files” folder

just needs to be modified. To modify the file see below:

1. Open the ControlUnitInformation.ini using a text editor like Notepad.
2. Scan down to the text that starts with “[Level”.
3. Insert your ECU level under the one(s) listed or replace the number with the controller you are connecting to.
4. The first item under the Level is NumberofDPs. This is the number of data points you want to list. You MUST match the number of data points and this number for the test to run properly.
5. the first data point is DP1= “the data point name you want to record”
6. Continue adding data points using the format in step 5 above.
7. When finished adding the data points simply save the file and close the text editor.

To perform the test:

1. In Service ADVISOR, select **Interactive Tests** from the shortcut bar.
2. Select **Control Unit Information and Overview**.
3. The test automatically starts to gather information, then displays it on the screen.
4. At the end of the data gathering, the following options are available: Refresh, Exit, or Print.

DN22556,00006A8 -19-29NOV10-1/1

Cylinder Cutout Test Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in Section 04, Group 160.

The Cylinder Cutout Test is used to aid in identifying a cylinder that is having a problem or to help in diagnosing mechanical or intermittent problems. During the test, the Engine Control Unit (ECU) disables the cylinder that the technician selects while the engine is running. Ideally the test would be performed while operating the vehicle under the conditions that the problem occurs especially if the engine is loaded. At the end of test, a results page can be displayed for diagnostic purposes. The Cylinder Cutout Test cannot determine if an engine is developing low power. The test is only a guide to help determine if there is a problem in a cylinder. The results alone should not be used as a conclusive reason for replacing parts. Other information such as the results of a Cylinder Electronic Compression Test, Cylinder Misfire Test, and other engine diagnostic procedures should be used along with this test information to accurately determine the source of the engine problem.

1. Ensure that the battery and starter are in good working condition.
2. Ignition ON, engine running.
3. Warm engine to normal operating temperature, 85°—97 °C (185°—207 °F).
4. Check for Diagnostic Trouble Codes (DTCs) and address any active codes.

NOTE: The ECU does not allow the test to run if there is an active DTC related to the crankshaft or camshaft position signal or if the coolant temperature is out of normal operating range. If the engine goes into an overspeed condition while running test, the test stops.

5. Select Cylinder Cutout Test in the Interactive Tests shortcut bar of Service ADVISOR.
6. Click on the “Active” button under the cylinder number to be cut out and then click on “Initiate”.

NOTE: You can cut out only one cylinder at a time, but you can test all cylinders before proceeding to the Results page.

7. Observe engine operation closely during the test, especially the engine sound and any vibrations. If the sound or vibration does not change with a cylinder cut out, that cylinder probably has issues. If the sound or vibration changes or increases with a cylinder cut out, that cylinder is probably contributing normally. If the engine is loaded, you may detect a slight change in engine RPM, especially in the first 1 or 2 seconds of the test. The governor quickly responds and regains any lost engine speed. The active data points displayed are: Current Fuel Rate, Engine Speed, Manifold Air Pressure - Actual, and Engine Load at Current Speed.
8. Elapsed Time is displayed at the bottom of the screen. Click on the Restore button to stop the test
9. Repeat the procedure for each cylinder to be cutout by using the instructions in steps 6, 7, and 8. Try to run each test for approximately the same amount of time.
10. Click on the “Results” button to view the test results.
11. The results data points displayed are: Average Desired Fuel, Engine Speed, Manifold Air Pressure, and Engine Load at Current Speed.

NOTE: Run this test at least 3 times to ensure repeatable, accurate results.

The best analysis is obtained by observing the engine during the cutout test. An increase in engine sound or vibration (as in a “miss” or “misfire”) would indicate that the cylinder being cutout was contributing to the total engine operation and probably is ok. The governor on the engine corrects the engine speed to compensate for the cutout cylinder very quickly, so it is difficult to see an rpm change. If the cylinder being cutout does not make a significant difference to the engine sound or vibration, then the cylinder is probably not working.

If the engine vibration or sound slightly changes when the cylinder is cutout, the cylinder is working but not to the full potential. To confirm this diagnostic, perform a Cylinder Misfire Test and Cylinder Electronic Compression Test to help confirm the cylinder has a problem.

If the sound is better with a cylinder cutout, this cylinder is probably firing at the wrong time. This may be due to a damaged injector or a bad electrical connection between the ECU and injector. If the results of the Cylinder Cutout Test and Cylinder Misfire Test lead to the same cylinder and the Cylinder Electronic Compression Test checks good for that cylinder, then the injector wiring or injector is probably bad. If this is the case, first check the electrical connections, looking for shorts or damaged wires. Then if no problems are found, replace faulty injector.

Compare the values from cylinder to cylinder displayed on the results screen to further evaluate each cylinders contribution to the engine operation.

In the sample report below, Cylinder 1 injector was disconnected prior to the test. The Average Desired Fuel results show that the ECU did cutout Cylinder 1 during the test. Cylinder 1 data points do not show enough change to verify that the cylinder was not working, but the sound or vibration observable did indicate that the engine definitely has a miss.

Continued on next page

	Average Desired Fuel	Engine Speed	Manifold Air Pressure	Engine Load
Cyl1				
Initial	1.54 oz./min.	1000 rpm	0.4 psi	10.5 percent
Average	1.53 oz./min.	1003 rpm	0.4 psi	10.9 percent
Cyl2				
Initial	1.51 oz./min.	999 rpm	0.5 psi	11.4 percent
Average	1.96 oz./min.	1000 rpm	0.5 psi	13.2 percent
Cyl3				
Initial	1.54 oz./min.	1004 rpm	0.5 psi	10.0 percent
Average	1.93 oz./min.	1000 rpm	0.4 psi	13.1 percent
Cyl4				
Initial	1.54 oz./min.	1006 rpm	0.5 psi	10.3 percent
Average	1.80 oz./min.	999 rpm	0.5 psi	12.8 percent
Cyl5				
Initial	1.50 oz./min.	1007 rpm	0.5 psi	11.6 percent
Average	1.83 oz./min.	999 rpm	0.5 psi	12.9 percent
Cyl6				
Initial	1.50 oz./min.	1000 rpm	0.5 psi	11.1 percent
Average	1.98 oz./min.	1000 rpm	0.5 psi	13.3 percent

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Cylinder Electronic Compression Test Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in this Group.

The Service ADVISOR™ cylinder electronic compression test is used in conjunction with the cylinder cutout and cylinder misfire tests to help diagnose engine performance issues. During the compression test, the engine is cranked while the ECU inhibits fueling to prevent the engine from starting. The ECU uses the crankshaft position sensor (or camshaft position sensor on some engines) to precisely measure engine speed and crankshaft position during the test. The ECU uses this information to measure the speed of the crankshaft through a range of a few degrees before top dead center and a range of a few degrees after top dead center of the compression stroke of each cylinder.

In a cylinder with good compression, the work of compressing air in the cylinder causes the crankshaft speed to decrease as a piston approaches top dead center of its compression stroke. Conversely, the compressed air in the cylinder pushes this piston back downward after top dead center resulting in an increase of the crankshaft speed. This is also evident when an engine is rotated over by hand using a crankshaft turning tool. It is difficult to rotate the crankshaft as each piston approaches top dead center of its compression stroke. The crankshaft is then easy to rotate, or may rotate on its own, for a few degrees after top dead center of each compression stroke.

In a cylinder with low compression, the crankshaft speed does not decrease much as a piston approaches top dead center of its compression stoke. Also, the crankshaft speed will not increase much after top dead center. This difference in crankshaft speed before and after top dead center is how Service ADVISOR determines the difference in compression between cylinders. The larger the difference between the crankshaft speed before and after top dead center of the compression stroke for each cylinder, the higher the compression for that cylinder.

The results for the compression test are displayed in Service ADVISOR as a percentage. The cylinder, or cylinders, with the largest difference between the crankshaft speed before and after top dead center is assigned a value of 100%. The value of compression for the other cylinders is expressed as a percentage of the cylinder with the highest compression. Therefore, the results are an indication of relative compression, which is the compression of each cylinder compared to the cylinder with the highest compression. In an engine with good compression in all cylinders, the relative compression percentage values are typically all greater than 80%. However, the same would be true of an engine where all cylinders had low compression, such as a dusted engine.

NOTE: It is important to understand that the compression test only indicates the difference between the compression measured for each cylinder, not if the compression is sufficient for good engine performance.

The compression test is most useful for determining if the cause of a misfire of one or two cylinders is likely due to a compression problem. For example, if the cutout and misfire test indicated that cylinder #6 was contributing less than the other cylinders, the compression test results could be used to help determine if the cause of low contribution from #6 was compression-related.

When the compression is similar in all cylinders, interpreting the test results is easy. Figure 1 shows typical engine cranking speed during the compression test along with the test results. If all readings are greater than approximately 80%, then there is likely not a significant difference between the compression in each cylinder.

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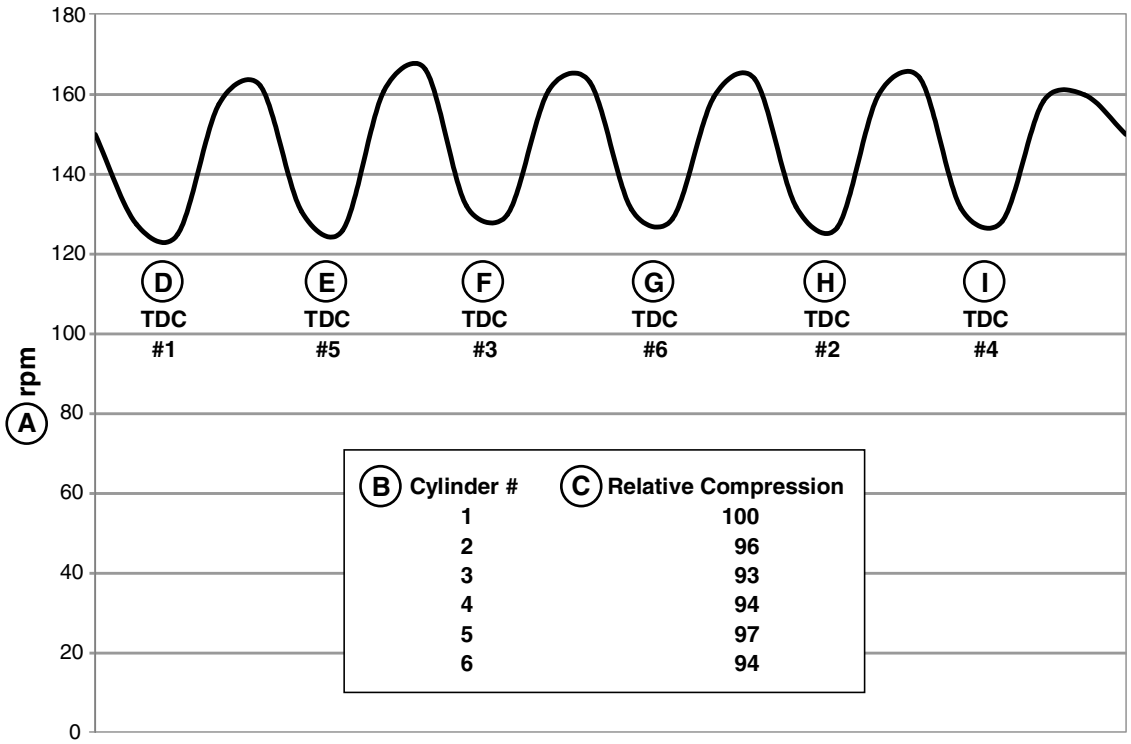

Figure 1
Cranking Speed and Typical Cylinder Electronic Compression Test Results when All Cylinders have Similar Compression.

A—rpm
B—Cylinder Number
C—Relative Compression
D—Top Dead Center (TDC) #1
E—Top Dead Center (TDC) #5
F—Top Dead Center (TDC) #3
G—Top Dead Center (TDC) #6
H—Top Dead Center (TDC) #2
I— Top Dead Center (TDC) #4

However, when one cylinder has very low compression, the crankshaft speed is also affected for all the other cylinders. In the example shown in Figure 2, cylinder #6 of a 6 cylinder engine with firing order 1 5 3 6 2 4 has very low compression. The low compression in cylinder #6 causes the crankshaft speed to not decrease much as the #6 piston approaches top dead center of its compression stroke. The cranking motor has an easy task of rotating the crankshaft over top dead center for cylinder #6. However, the crankshaft speed also does not increase much after top dead center of the #6 compression stroke since there is not much compressed air in the cylinder to push the piston back downward. This lack of help from the compressed air in cylinder #6 after top dead center causes a decrease in the speed of the crankshaft. Therefore, the speed of the crankshaft when the next piston in the firing order (#2) approaches top dead center will be less than it would have been if #6 had good compression. Thus cylinder #2 will likely be determined to have the highest relative compression (100%) since its speed before top dead center is probably less than that of the other cylinders. It takes time for the cranking motor to accelerate the crankshaft back up to speed, so the cylinders in the firing order after #2 may also be affected by the decrease in crankshaft momentum due to the #6 compression problem. As the crankshaft speed continues to increase, the next cylinders in the firing order may indicate an increasingly lower relative compression.

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SS01820,00007F2 -19-10NOV10-2/4

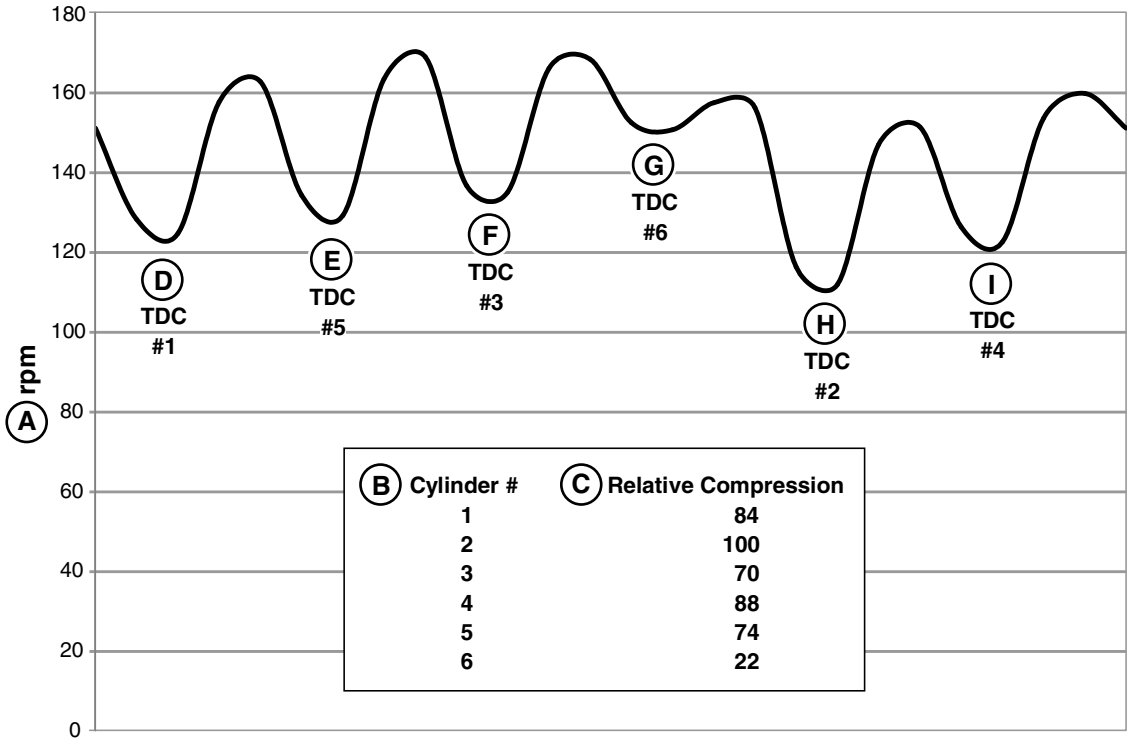

Figure 2
Cranking Speed and Typical Cylinder Electronic Compression Test Results When One Cylinder has Low Compression (Cylinder #6).

A—rpm
B—Cylinder Number
C—Relative Compression
D—Top Dead Center (TDC) #1
E—Top Dead Center (TDC) #5
F—Top Dead Center (TDC) #3
G—Top Dead Center (TDC) #6
H—Top Dead Center (TDC) #2
I— Top Dead Center (TDC) #4

There are a couple of hints from the compression test results shown in Figure 2 that indicate there is likely a compression problem with cylinder #6. First, cylinder #6 is indicating the lowest relative compression value which is substantially less than the other cylinders. Second, the next cylinder in the firing order, #2, has the highest relative compression. However, the decrease in crankshaft speed after top dead center of #6 due to the lack of help from the compressed air in the cylinder makes it difficult to determine if there is also a problem with the other cylinders. Note that the test results for some cylinders are lower than 80% due to low compression in cylinder #6, even though there is likely no compression problem in these cylinders. However, if the engine is partially disassembled to repair the low compression problem with #6, then the other cylinders should also be inspected.

The compression test can also be used to diagnose problems such as a damaged cylinder head gasket causing a compression leak between adjacent cylinders. This would likely result in two adjacent cylinders also having low compression as shown in Figure 3. Again, the other cylinders in the firing order would be affected by the two cylinders with low compression.

Continued on next page

Be aware that the compression test can provide inconclusive results if the engine is coupled to a high-inertia load through a rubber coupling or long shaft. The shaft or coupling acts as a torsional spring while the engine is being cranked. Thus the engine cranking speed fluctuations due to cylinder compression are not as evident. It may be necessary to temporarily disconnect the engine from the coupling or shaft to perform the compression test.

Before executing the Cylinder Electronic Compression Test

- Warm engine to normal operating temperature.
- Repair the cause of any Diagnostic Trouble Codes (DTCs) if possible.

  NOTE: The ECU does not allow the test to run if there is an active engine timing error code (any 637 code), the engine cranking speed is below 100 rpm, coolant temperature is below -30 °C (-22 °F) or above 200 °C (392 °F).

- Ensure that the battery and starter are in good working condition

Performing the Cylinder Electronic Compression Test:

1. Ignition ON, Engine OFF.
2. Select Cylinder Electronic Compression Test in the Interactive Tests shortcut bar in Service ADVISOR.

Cylinder	Relative Compression
1	81
2	100
3	99
4	80
5	14
6	17

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Figure 3
Typical Results with Compression Leak between Cylinders #5 and #6

3. Follow instruction given by the diagnostic software.

The software instructs that the engine be cranked for up to 12 seconds. Typically, it should take less than 5 seconds. Service ADVISOR should be observed carefully for instructions during the test.

Error messages and test results are displayed on the Service ADVISOR screen.

NOTE: Run this test at least 3 times to ensure repeatable, accurate results.

Further engine diagnostics should be performed to determine the cause of low compression.

SS01820,00007F2 -19-10NOV10-4/4

Cylinder Misfire Test Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in Section 04 Group160.

The Cylinder Misfire Test compares the performance of each cylinder relative to each of the other cylinders. The test helps identify problems such as an engine misfire or irregularly running engine. During the test, the Engine Control Unit (ECU) disables a cylinder, then accelerate the engine with a fixed amount of fuel and measure the time taken to accelerate the engine from one speed to the next with that cylinder disabled. The ECU then repeats the procedure for the remaining cylinders.

The Cylinder Misfire Test cannot determine if an engine is delivering low power. The test results are only a guide to help determine if there is a problem in a cylinder. The results alone should not be used as a conclusive reason for replacing parts. Other information such as the results of a Cylinder Electronic Compression Test, Cylinder Cutout Test, and other engine diagnostic procedures should be used along with this test information to accurately determine the source of an engine problem.

1. Ignition ON, Engine running.
2. Warm engine to normal operating temperature, between 40 °C (104 °F) and 110 °C (230 °F).
3. Refresh codes and address all active DTCs.

NOTE: The ECU does not allow the test to run if there is an active DTC related to the crankshaft or camshaft position signal or if the coolant temperature is out of normal operating range. If the engine goes into an over speed condition while running test, the test stops.

4. Remove any load to the engine that may change during the test. For example, turn off the air conditioner.
5. Select Cylinder Misfire test in the Service ADVISOR Interactive Tests shortcut bar.
6. Follow instruction given by the diagnostic software. The software instructs the user to move the throttle from slow idle position to wide open throttle position, then back to slow idle position once for each cylinder tested. The throttle movement triggers the ECU to accelerate the engine with a fixed amount of fuel.

Results shown represent each cylinder's performance as a percentage in relation to the average of all cylinders. If any cylinder is above or below the average by more than 10%, it indicates the cylinder is contributing either too much (above average) or not enough (below average) in relation to the average engine performance.

Service ADVISOR displays the test results and whether the test was successful. These results and the Cylinder Electronic Compression and Cylinder Cutout Test results should be compared to help determine if there is a problem in a specific cylinder.

NOTE: Run this test at least three times to ensure repeatable, accurate results.

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Diagnostic Gauge Active DTC Viewing Instructions

NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

IMPORTANT: Ignoring active trouble codes can result in severe engine damage. Refer to the trouble shooting procedures later in this section for fixing active DTCs.

A Diagnostic Trouble Code (DTCs) is set when an operating condition is not within a specified range. This is an indicator to the operator that a problem area needs to be corrected. The diagnostic gauge alerts the operator when a DTC is active by turning on a warning light and changing to the WARNING screen showing information about the DTC. The warning screen is described below.

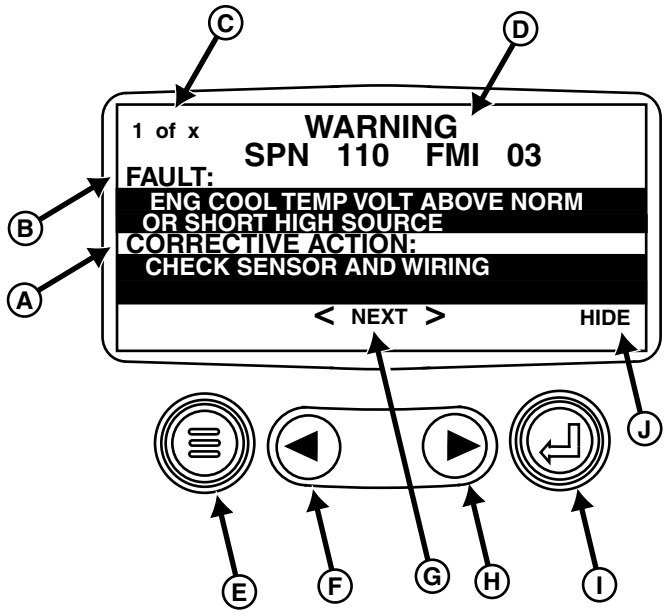

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Figure 1. Active Code Diagnostic Screen

A—Corrective Action
B—Diagnostic Code Description
C—Current and Total number of Active Codes
D—SPN (Suspect Parameter Number) FMI (Failure Mode Identifier) Diagnostic Code
E—Menu Key
F—Left/Up Scroll Key
G—Next
H—Right/Down Scroll Key
I— Enter Key
J— Hide

1. When the diagnostic gauge receives a diagnostic trouble code, the engine parameter screen is replaced with the "Warning" screen. See figure 1.
2. Display features for the Active Codes Diagnostic Screen are described below:
   - SPN/FMI code (D). Refers to the trouble shooting diagnostic procedure.
   - Name of diagnostic code (B) referenced in manual.
   - A brief description for corrective action (A).
   - The word "NEXT" (G) indicates there are more fault codes to be viewed.
   - Two SCROLL KEYS (F,H) are used to cycle through the codes.
   - "1 of x" (C) indicates the current diagnostic code displayed of the total number.
   - To hide (J) this screen and return to the parameter display screen, press the "Enter" Key (I). Pressing the Enter Key again returns to the warning screen.

NOTE: To refresh active DTCs, you must return to the 1-UP or 4-UP screen.

3. To return to the Main Menu screen, press the menu button (E), shown in figure 4.

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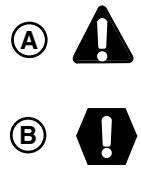
DB92450,000005F -19-18APR08-1/2

4. The parameter display screen displays one of the following icons when a DTC is active. See figure 2. An amber light sets when a DTC becomes active and a red light sets when the engine has derated or shutdown.

RG14795 —UN—14MAY07



A—Warning

B—Engine Derate or Shutdown

Figure 2. Icons Indicates a Fault Warning, Engine Derate, or Shutdown

DB92450,000005F -19-18APR08-2/2

Diagnostic Gauge Stored DTC Clearing Instructions

NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

Procedure for clearing stored diagnostic codes on Power View diagnostic gauge.

1. Turn power to diagnostic gauge OFF.
2. Turn power to diagnostic gauge ON. As soon as screen backlight comes on, simultaneously press and hold MENU (C) and ENTER (F) keys. See figure 1.
3. If successful, the screen shown in figure 1 will appear.

NOTE: If the screen in figure 1 does not appear, repeat step 2. This may take several attempts due to the short timing window.

4. Select CLEAR FAULT CODES (A). Press ENTER (F) key.

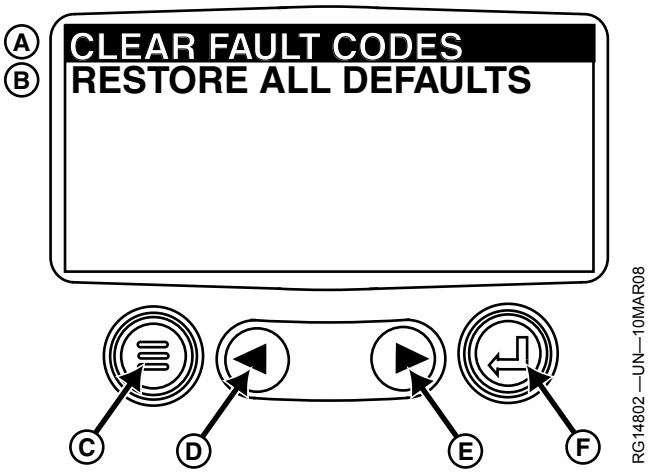


Figure 1. Clear Stored Fault Codes Screen

A—Clear Fault Codes
B—Restore All Defaults
C—Menu Key
D—Left/Up Scroll Key
E—Right/Down Scroll Key
F—Enter Key

DB92450,0000061 -19-18APR08-1/2

5. Screen shows stored fault codes have been cleared. See figure 2.
6. Cycle power to the diagnostic gauge again for normal operation.

A—Cleared All Fault Codes

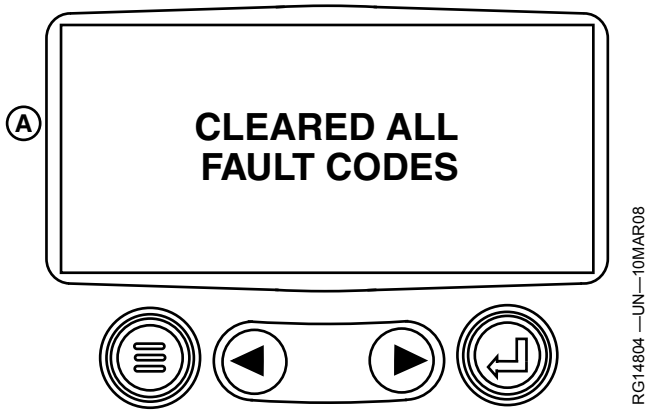


Figure 2. Clear All Fault Codes Screen

DB92450,0000061 -19-18APR08-2/2

Diagnostic Gauge Stored DTC Viewing Instructions

NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

Stored Diagnostic Trouble Codes (DTCs) are a history of DTCs that were once active. When a DTC becomes inactive, it is saved as a 'STORED' code. Stored codes can be reviewed and used as a trouble shooting aid in diagnosing intermittent problems and in range operating conditions. A count is kept of how many times a code has been active. Stored codes can be cleared from the diagnostic gauge. See DIAGNOSTIC GAUGE STORED DTC CLEARING INSTRUCTIONS later in this section of the manual. Instructions for viewing stored codes are described below.

1. Press MENU KEY (B). Main menu is displayed. See figure 1.
2. Using the SCROLL KEYS (C,D), navigate the menu until STORED CODES (A) is highlighted. Press the ENTER KEY (E).
3. REQUESTING FAULT CODES will momentarily be displayed on the display screen.

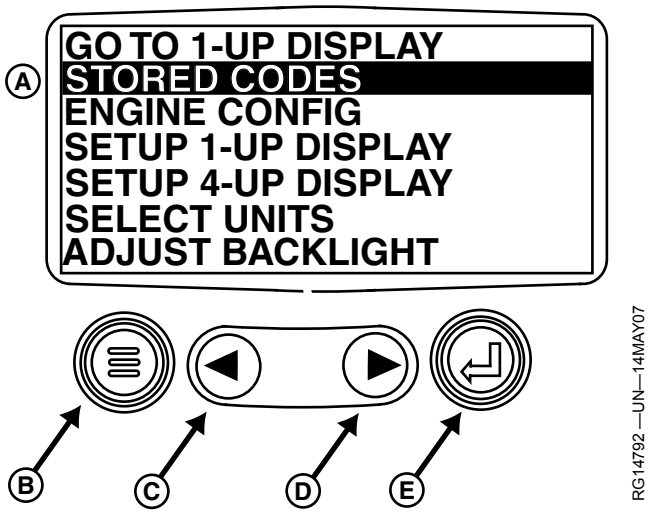


Figure 1. Main Menu

A—Stored Codes
B—Menu Key
C—Left/Up Scroll Key
D—Right/Down Scroll Key
E—Enter Key

4. A new screen showing stored code information appears. See figure 2. If there are no stored fault codes, "No Stored Fault Codes" screen is momentarily displayed. Power View then returns to main menu display. Press the MENU KEY (E) to get back to the parameter display screen.

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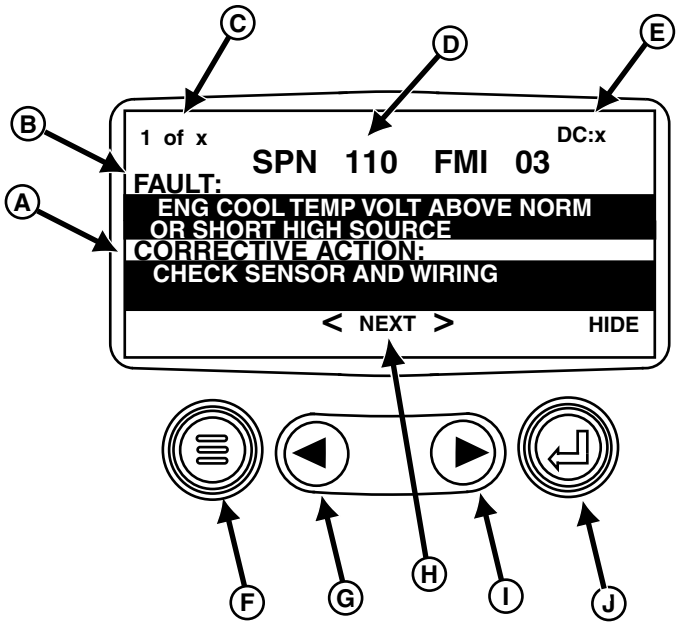

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Figure 2. Stored Code Diagnostic Screen

A—Corrective Action
B—Diagnostic Code Description
C—Current and Total number of Stored Codes
D—SPN (Suspect Parameter Number) FMI (Failure Mode Identifier) Diagnostic Code
E—Diagnostic Count
F—Menu Key
G—Left/Up Scroll Key
H—Next
I— Right/Down Scroll Key
J— Enter Key

5. Display features for the Stored Codes Diagnostic Screen are described below:
   - SPN/FMI code (D). Refers to the trouble shooting diagnostic procedure.
   - Name of diagnostic code (B) referenced in manual.
   - A brief corrective action (A).
   - The word “NEXT” (H) indicates there are more stored codes to can be viewed.
   - The two ARROW KEYS (G,I) are used to cycle through the codes.
   - “1 of x” (C) indicates the current diagnostic code displayed of the total number.
   - Diagnostic Count (E) indicates how many times the code has been active since it was lasted cleared.
6. Press the MENU KEY (F) to return to the main menu. Press the MENU KEY (E) again to return to the parameter screen.

DB92450,0000060 -19-18APR08-2/2

Diagnostic Trouble Code Designations

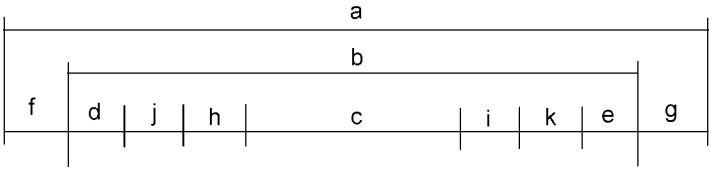
SPN/FMI CODES

SPN/FMI codes are written as a two-part code derived from the SAE J1939 standard. The first part is called the Suspect Parameter Number (SPN). The SPN can contain up to 6 digits. The SPN identifies the system or the component that has the failure; for example SPN 110 indicates a failure in the engine coolant temperature circuit. The second part of the code is called the Failure Mode Identifier (FMI) code. The FMI contains 2 digits and identifies the type of failure that has occurred. For example, FMI 03 indicates value Out of Range High (OORH). In order to determine the exact failure, both the SPN and FMI are required. Combining SPN 110 with FMI 03 yields “engine coolant temperature input voltage out of range high.”

On these applications the ECU transmits SPN/FMI codes over the Controller Area Network (CAN). This allows for service tools such as Service ADVISOR to display active and stored DTCs. When using Service ADVISOR, the codes will be displayed in a 000000.00 format. For example, code 110.03 will be displayed as 000110.03.

RG14537 —UN—31OCT05

FMI Designators



Relationship of FMI Designations and Range of Sensor Input

Region a: Total signal input range possible that can be seen by an electronic module.

Region b: Total signal range physically possible as defined by an application.

Region c: Range defined as normal for a given real world measurement.

Region d: Range defined as Extremely below normal, of what is considered normal for the given real world measurement. Associated with FMI 01.

Region e: Range defined as Extremely above normal, of what is considered normal for the given real world measurement. Associated with FMI 00.

Region f: Range which is low outside the range of what is considered physically possible for a given system. Associated with FMI 04 (Out Of Range Low, OORL).

Region g: Range which is high outside the range of what is considered physically possible for a given system. Associated with FMI 03 (Out Of Range High, OORH), 05, 06.

Region h: Range defined as Slightly below normal, of what is considered normal for a given real-world measurement. Associated with FMI 17.

Region i: Range defined as Slightly above normal, of what is considered normal for a given real-world measurement. Associated with FMI 15.

Region j: Range defined as Moderately below normal, of what is considered normal for a given real-world measurement. Associated with FMI 18.

Region k: Range defined as Moderately above normal, of what is considered normal for a given real-world measurement. Associated with FMI 16.

FMI	Description
00	**Data Valid but Above Normal Operational Range—Extreme Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition. Broadcast of data values is continued as normal.
01	**Data Valid but Below Normal Operational Range—Extreme Level** The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition. Broadcast of data values is continued as normal.
02	**Data Erratic, Intermittent or Incorrect** Measurements that change at a rate that is not considered possible in the real world condition and caused by improper operation of the measuring device or its connection to the module. Broadcast of data value is substituted with the "error indicator" value. Incorrect data includes any data not received and any data that is exclusive of the situations covered by FMIs 3, 4, 5 and 6 below. Data may also be considered incorrect if it is inconsistent with other information collected or known about the system.
03	**Value Out of Range High (OORH)** A voltage signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a high level when the controller commands it to low. Broadcast of data value is substituted with the "error indicator" value.

Continued on next page

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04	**Value Out of Range Low (OORL)** A voltage signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a low level when the controller commands it to high. Broadcast of data value is substituted with the "error indicator" value.
05	**Current Below Normal** A current signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains off when the controller commands it on. Broadcast of data value is substituted with the "error indicator" value.
06	**Current Above Normal** A current signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains on when the controller commands it off. Broadcast of data value is substituted with the "error indicator" value.
07	**Mechanical System not Responding or Out of Adjustment** Any fault that is detected as the result of an improper mechanical adjustment or an improper response or action of a mechanical system that, with a reasonable confidence level, is not caused by an electronic or electrical system failure. This type of fault may or may not be directly associated with the value of general broadcast information.
08	**Abnormal Frequency or Pulse Width or Period**To be considered in cases of FMI 4 and 5. Any frequency or PWM signal that is outside the predefined limits which bound the signal range for frequency or duty cycle (outside region b of the signal range). Also if the signal is an controller output, any signal whose frequency or duty cycle is not consistent with the signal which is emitted. Broadcast of data value is substituted with the "error indicator" value.
09	**Abnormal Update Rate**Any failure that is detected when receipt of data via the data link or as input from a smart actuator or smart sensor is not at the update rate expected or required by the controller (outside region c of the signal range). Also any error that causes the controller not to send information at the rate required by the system. This type of fault may or may not be directly associated with the value of general broadcast information.
10	**Abnormal Rate of Change**Any data, exclusive of the abnormalities covered by FMI 2, that is considered valid but whose data is changing at a rate that is outside the predefined limits that bound the rate of change for a properly functioning system (outside region c of the signal range). Broadcast of data values is continued as normal.
11	**Root Cause Not Known**It has been detected that a failure has occurred in a particular subsystem but the exact nature of the fault is not known. Broadcast of data value is substituted with the "error indicator" value.
12	**Bad Intelligent Device or Component**Inconsistency of data indicates that a device with some internal intelligence, such as a controller, module, smart sensor or smart actuator, is not properly functioning. This data may be internal to a module or external from a data link message or from various system responses. Broadcast of data value is substituted with the "error indicator" value. This error is to include all internal controller trouble codes that cannot be caused by connections or systems external to the controller.
13	**Out of Calibration**A failure that can be identified to be the result of not being properly calibrated. This may be the case for a subsystem which can identify that the calibration attempting to be used by the controller is out of date. Or it may be the case that the mechanical subsystem is determined to be out of calibration. This failure mode does not relate to a signal range.
14	**Special Instructions**SPNs 611 through 615 are defined as "System Diagnostic Codes" and are used to identify failures that cannot be tied to a specific field-replaceable component. Specific subsystem fault isolation is the goal of any diagnostic system, but for various reasons this cannot always be accomplished. These SPNs allow the manufacturer some flexibility to communicate non-"specific component" diagnostic information. Because SPN 611-615 use the standard SPN/FMI format, it allows the use of standard diagnostic tools, electronic dashboards, satellite systems and other advanced devices that scan Parameter Groups containing the SPN/FMI formats. Because manufacturer-defined codes are not desirable in terms of standardization, the use of these codes should only occur when diagnostic information cannot be communicated as a specific component and failure mode. This failure mode does not relate to the signal range, and may or may not be directly associated with the value of general broadcast information.
15	**Data Valid but Above Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
16	**Data Valid but Above Normal Operating Range—-Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
17	**Data Valid but Below Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
18	**Data Valid but Below Normal Operating Range—Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.

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19	**Received Network Data In Error**Any failure that is detected when the data received via the network is found substituted with the "error indicator" value (i.e. FE (16), see J1939/71). This type of failure is associated with received network data. The component used to measure the real world signal is wired directly to the module sourcing the data to the network and not to the module receiving the data via the network. This type of fault may or may not be directly associated with the value of general broadcast information.
20-30	**Reserved for SAE Assignment**
31	**Not Available or Condition Exists**Used to indicate that the FMI is not available or that the condition that is identified by the SPN exists. When no applicable FMI exists for the reported SPN, FMI 31 can be used. Also in cases when the reported SPN name has the failure information in it, FMI 31 can be used to indicated that the condition reported by the SPN exists. This type of fault may or may not be directly associated with the value of general broadcast information.

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Diagnostic Trouble Codes List

SPN.FMI	Description
000028.03	Digital Throttle Signal Out of Range High
000028.04	Digital Throttle Signal Out of Range Low
000029.03	Secondary Analog Throttle Signal Out of Range High
000029.04	Secondary Analog Throttle Signal Out of Range Low
000091.03	Primary Analog Throttle Signal Out of Range High
000091.04	Primary Analog Throttle Signal Out of Range Low
000091.09	Throttle CAN Message Missing
000094.03	Low Pressure Fuel Signal Out of Range High
000094.04	Low Pressure Fuel Signal Out of Range Low
000094.17	Low Pressure Fuel Signal Slightly Low
000097.03	Water In Fuel Signal Out of Range High
000097.04	Water In Fuel Signal Out of Range Low
000097.16	Water in Fuel Detected
000100.01	Engine Oil Pressure Signal Extremely Low
000100.04	Engine Oil Pressure Signal Out of Range Low
000100.18	Engine Oil Pressure Signal Moderately Low
000100.31	Engine Oil Pressure Detected with Engine Stopped
000102.02	Manifold Air Pressure Signal Invalid
000102.03	Manifold Air Pressure Signal Out of Range High
000102.04	Manifold Air Pressure Signal Out of Range Low
000103.00	Turbo Speed Extremely High
000103.05	Turbo Speed Signal Circuit has High Resistance
000103.08	Turbo Speed Signal Invalid
000103.31	Turbo Speed Signal Missing
000105.00	Manifold Air Temperature Signal Extremely High
000105.03	Manifold Air Temperature Signal Out of Range High
000105.04	Manifold Air Temperature Signal Out of Range Low
000105.15	Manifold Air Temperature Signal Slightly High
000105.16	Manifold Air Temperature Signal Moderately High
000107.00	Air Filter Restriction Switch Activated
000108.02	Barometric Air Pressure Signal Invalid
000110.00	Coolant Temperature Signal Extremely High
000110.03	Coolant Temperature Signal Out of Range High
000110.04	Coolant Temperature Signal Out of Range Low
000110.15	Coolant Temperature Signal Slightly High
000110.16	Coolant Temperature Signal Moderately High
000110.17	Coolant Temperature Signal Slightly Low
000111.01	Coolant Level Extremely Low
000157.03	Fuel Rail Pressure Signal Out of Range High
000157.04	Fuel Rail Pressure Signal Out of Range Low
000157.10	Fuel Rail Pressure Loss Detected
000157.17	Fuel Rail Pressure Not Developed
000158.17	ECU Power Down Error
000171.03	Ambient Air Temperature Signal Out of Range High
000171.04	Ambient Air Temperature Signal Out of Range Low
000174.00	Fuel Temperature Signal Extremely High
000174.03	Fuel Temperature Signal Out of Range High
000174.04	Fuel Temperature Signal Out of Range Low
000174.16	Fuel Temperature Signal Moderately High
000189.00	Engine Speed Derate Condition Exists

Continued on next page

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SPN.FMI	Description
000190.00	Engine Speed Extremely High
000190.16	Engine Speed Moderately High
000237.02	VIN Security Data Invalid
000237.13	VIN Option Code Security Data Conflict
000237.31	VIN Security Data Missing
000412.00	EGR Temperature Signal Extremely High
000412.03	EGR Temperature Signal Out of Range High
000412.04	EGR Temperature Signal Out of Range Low
000412.15	EGR Temperature Signal Slightly High
000412.16	EGR Temperature Signal Moderately High
000611.03	Injector Shorted to Voltage Source
000611.04	Injector Shorted to Ground
000627.01	All Injector Circuits Have High Resistance
000627.18	Injector Power Supply Voltage Moderately Low
000629.12	ECU EEPROM Error
000629.13	ECU Boot Block Error
000636.02	Camshaft Position Signal Invalid
000636.05	Camshaft Position Circuit Has High Resistance
000636.06	Cam Sensor Circuit Has Low Resistance
000636.08	Camshaft Position Circuit Has Low Resistance
000636.10	Camshaft Position Signal Rate of Change Abnormal
000637.02	Crankshaft Position Signal Invalid
000637.05	Crankshaft Position Circuit Has High Resistance
000637.06	Crankshaft Position Circuit Has Low Resistance
000637.07	Crankshaft and Camshaft Position Signals Out of Sync
000637.08	Crankshaft Position Signal Missing
000637.10	Crankshaft Position Signal Rate of Change Abnormal
000640.11	External Engine Protection Commanded
000640.31	External Derate Commanded
000641.04	VGT Actuator Supply Voltage Out of Range Low
000641.12	VGT Actuator Communication Error
000641.13	VGT Actuator Learn Error
000641.16	VGT Actuator Temperature Moderately High
000647.05	Engine Fan Drive Circuit Has High Resistance
000647.07	Engine Fan Drive Not Responding
000647.31	Engine Fan Drive Manual Purge Switch active too long
000651.02	Injector #1 Part # Data Invalid
000651.05	Injector #1 Circuit Has High Resistance
000651.06	Injector #1 Circuit Has Low Resistance
000651.07	Injector #1 Not Responding
000651.13	Injector #1 Calibration Fault
000652.02	Injector #2 Part # Data Invalid
000652.05	Injector #2 Circuit Has High Resistance
000652.06	Injector #2 Circuit Has Low Resistance
000652.07	Injector #2 Not Responding
000652.13	Injector #2 Calibration Fault
000653.02	Injector #3 Part # Data Invalid
000653.05	Injector #3 Circuit Has High Resistance
000653.06	Injector #3 Circuit Has Low Resistance
000653.07	Injector #3 Not Responding
000653.13	Injector #3 Calibration Fault
000654.02	Injector #4 Part # Data Invalid

Continued on next page

SPN.FMI	Description
000654.05	Injector #4 Circuit Has High Resistance
000654.06	Injector #4 Circuit Has Low Resistance
000654.07	Injector #4 Not Responding
000654.13	Injector #4 Calibration Fault
000655.02	Injector #5 Part # Data Invalid
000655.05	Injector #5 Circuit Has High Resistance
000655.06	Injector #5 Circuit Has Low Resistance
000655.07	Injector #5 Not Responding
000655.13	Injector #5 Calibration Fault
000656.02	Injector #6 Part # Data Invalid
000656.05	Injector #6 Circuit Has High Resistance
000656.06	Injector #6 Circuit Has Low Resistance
000656.07	Injector #6 Not Responding
000656.13	Injector #6 Calibration Fault
000898.09	Engine Speed CAN Message Invalid
000970.31	External Shutdown Switch Activated
000971.31	External Derate Switch Activated
001075.12	Low Pressure Fuel Pump Status Error
001109.31	Approaching Engine Protection Shutdown
001110.31	Engine Protection Shutdown Active
001136.00	ECU Temperature Signal Extremely High
001136.16	ECU Temperature Signal Moderately High
001172.03	Turbo Compressor Inlet Temperature Signal Out of Range High
001172.04	Turbo Compressor Inlet Temperature Signal Out of Range Low
001180.00	Calculated Turbo Turbine Inlet Temperature Signal Extremely High
001180.16	Calculated Turbo Turbine Inlet Temperature Signal Moderately High
001321.05	Starter Relay Control Current Below Normal Operating Range
001321.16	Starter Relay Control Above Normal Operating Range
001347.03	Suction Control Valve Signal Out of Range High
001347.05	Suction Control Valve Circuit Has High Resistance
001347.07	Fuel Rail Pressure Actual to Desired Mismatch
001349.02	Fuel Rail Pressure Signals Mismatch
001349.03	Redundant Fuel Rail Pressure Signal Out of Range High
001349.04	Redundant Fuel Rail Pressure Signal Out of Range Low
001569.31	Engine in Power Derate Condition
001638.00	Hydraulic Oil Temperature Signal Extremely High
001638.03	Hydraulic Oil Temperature Signal Out of Range High
001638.04	Hydraulic Oil Temperature Signal Out of Range Low
001638.09	Hydraulic Oil Temperature Signal Erratic
001638.16	Hydraulic Oil Temperature Signal Moderately High
001639.01	Fan Speed Signal Extremely Low
001639.16	Fan Speed Signal Moderately High
001639.18	Fan Speed Signal Moderately Low
002000.13	Incorrect ECU for Application
002003.09	No CAN Message From Source Address 3
002004.09	No CAN Message From Source Address 4
002005.09	No CAN Message From Source Address 5
002005.14	Incorrect CAN Message Received From Source Address 5
002030.09	No CAN Message From Source Address 30
002071.09	No CAN Message From Source Address 71
002630.00	Charge Air Cooler Outlet Temperature Signal Extremely High
002630.03	Charge Air Cooler Outlet Temperature Signal Out of Range High

Continued on next page

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SPN.FMI	Description
002630.04	Charge Air Cooler Outlet Temperature Signal Out of Range Low
002630.15	Charge Air Cooler Outlet Temperature Signal Slightly High
002630.16	Charge Air Cooler Outlet Temperature Signal Moderately High
002659.02	Calculated EGR Flow Rate Invalid
002659.15	Calculated EGR Flow Rate Slightly High
002659.17	Calculated EGR Flow Rate Slightly Low
002790.16	Calculated Compressor Outlet Temperature Moderately High
002791.02	EGR Valve Position Signal Invalid
002791.03	EGR Valve Position Signal Out of Range High
002791.04	EGR Valve Position Signal Out of Range Low
002791.07	EGR Valve Not Reaching Expected Position
002791.13	EGR Valve Calibration Change Over a Short Period of Time
002791.31	EGR Valve Calibration Change Over a Long Period of Time
002795.07	VGT Actuator Not Reaching Expected Position
003509.03	Sensor Supply #1 Voltage Out of Range High
003509.04	Sensor Supply #1 Voltage Out of Range Low
003510.03	Sensor Supply #2 Voltage Out of Range High
003510.04	Sensor Supply #2 Voltage Out of Range Low
003511.03	Sensor Supply #3 Voltage Out of Range High
003511.04	Sensor Supply #3 Voltage Out of Range Low
003512.03	Sensor Supply #4 Voltage Out of Range High
003512.04	Sensor Supply #4 Voltage Out of Range Low
003513.03	Sensor Supply #5 Voltage Out of Range High
003513.04	Sensor Supply #5 Voltage Out of Range Low
003587.05	Ether Hold Control Circuit Has High Resistance
003587.06	Ether Hold Control Circuit Has Low Resistance
003587.11	Ether Aid Malfunction
523379.03	Single Point Ground #7 Has High Resistance
523744.31	A/C Compressor is ON When it Should be OFF
523926.03	Reverse Pump Pressure Sensor #1 Signal Out Of Range High
523926.04	Reverse Pump Pressure Sensor #1 Signal Out Of Range Low
523927.03	Forward Pump Pressure Sensor #2 Signal Out Of Range High
523927.04	Forward Pump Pressure Sensor #2 Signal Out Of Range Low

DN22556,0000691 -19-16APR10-4/4

Digital Multimeter — Using

It is recommended that a digital multimeter (JT07306 or equivalent with an analog display) be used to make the required measurements in the diagnostic procedures. A knowledge of the operation of the particular meter used is assumed.

Instructions for measuring voltages from Point A (+) to Point B (-):

- Ignition OFF, Engine OFF.
- Disconnect connectors as directed by diagnostic procedure.
- Connect test leads as directed by diagnostic procedure.
- Select 'V' with the selector knob.
- Ignition ON, Engine OFF.

NOTE: The display indicates the selected function. In this example, the positive test lead from the volt-ohm input of the meter should be connected to Point A and the negative test lead from the common input of the meter should be connected to Point B.

Unless otherwise stated, all voltage measurements are direct current (D.C.).

IMPORTANT: Before making a resistance measurement, make sure that there is no voltage on the circuit.

Instructions for measuring resistance from Point A to Point B:

RG11126 —UN—08JUN07

Digital Multimeter

- Ignition OFF, Engine OFF.
- Disconnect connectors as directed by diagnostic procedure.
- Connect test leads as directed by diagnostic procedure.
- Select Ω with the selector knob.

NOTE: Some procedures may require the meter leads to be reversed to get the proper measurement.

DN22556,000003F -19-30JUN10-1/1

EGR Valve — Clean Test Instructions

This test is used to aid in identifying an EGR valve problem. Problems could include mechanical or electrical problems. During this test the EGR valve is forced to open and close rapidly using full power. This may dislodge soot or other contaminants allowing the valve to move freely. There is no indication the valve has moved during the test except sound, unless the valve is removed.

NOTE: If the valve is removed, ensure that it is in a place that is stable because the valve will move as it opens and closes.

IMPORTANT: There is a pinch hazard while the valve is opening and closing. Keep fingers away from valve.

EGR Valve Clean Test

IMPORTANT: Do not run the engine if the EGR valve is removed from the system.

- Warm engine to normal operating temperature.

Performing the EGR Valve Clean Test

NOTE: If EGR valve is installed on the engine, proceed to step 1. If EGR valve is removed from system go directly to step 2 with Ignition ON, Engine OFF.

1. Ignition ON, engine running at slow idle.
2. Select EGR Valve Clean Test in the Service ADVISOR Tests and Calibrations shortcut bar.
3. Follow instructions given by the diagnostic software.
4. Ignition ON, Engine OFF
5. Select Harness Diagnostic Mode Test in the Service ADVISOR Tests and Calibrations shortcut bar.
6. Review and diagnose DTCs displayed at end of the Harness Diagnostic Mode Test. If codes related to the EGR valve are present, refer to their troubleshooting procedures first.

DN22556,0000001 -19-14FEB11-1/1

Electrical Circuit Concepts

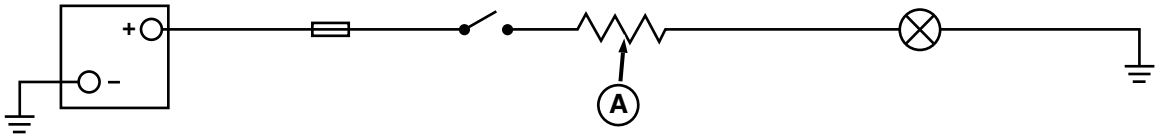
Tests include making measurements of voltage and resistance, as well as checking for open circuits and short circuits. An understanding of Voltage (volts), Current (amps), Resistance (ohms), Open circuit, and Short circuit is required to properly diagnose electrical problems.

Circuit Malfunctions

There are four major circuit malfunctions, High-resistance circuit, Open circuit, Grounded circuit, and Shorted circuit.

1. **High Resistance Circuit:**

RG9891 —UN—03MAR08



High Resistance Circuit

A—Unwanted Resistance

A circuit having unwanted resistance (A) that causes a voltage drop and reduces current flow.

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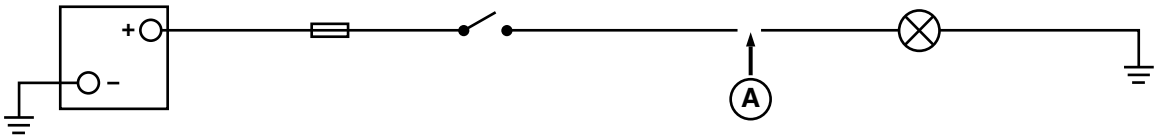
DN22556,000003E -19-16FEB11-1/6

2. **Open Circuit:**

RG9892 —UN—03MAR08



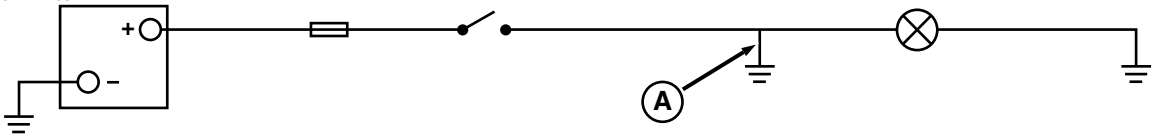
Open Circuit

A—Break or Separation in Circuit

A circuit having a break or a separation (A) that prevents current from flowing in the circuit.

3. **Grounded Circuit:**

RG9893 —UN—04MAR08

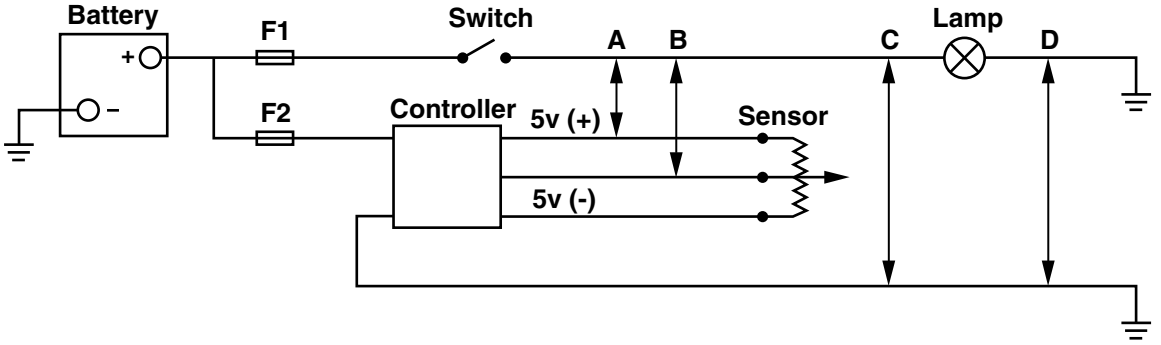


Grounded Circuit

A—Voltage Wire in Contact with Machine Frame

A voltage wire in contact with the machine frame (A), providing continuity with the battery ground terminal.

4. **Shorted Circuit:**



RG9894 —UN—12MAY10

Shorted Circuit

A wire-to-wire contact of two adjacent wires that provides unwanted continuity between the two wires. The following are types of short circuits:

- (A) Voltage wire shorted to another voltage wire (wires of equal or unequal voltage).
- (B) Voltage wire shorted to a sensor signal wire (wires of unequal voltage).
- (C) Voltage wire shorted to a ground wire (wires of battery voltage or regulated voltage, shorted to a ground wire connecting a component to the battery negative terminal).
- (D) Ground wire shorted to another ground wire (wires of zero voltage).

NOTE: The ground to ground type of short does not create an observable malfunction. Therefore, no further explanation for trouble shooting is necessary.

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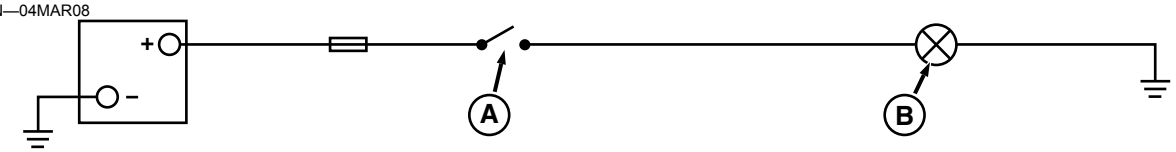
DN22556,000003E -19-16FEB11-2/6

Locations of Circuit Malfunctions:

RG9895 —UN—04MAR08



Locations of Circuit Malfunctions

A—Controlling Switch **B—Load**

In a “Simple Electrical Circuit” the circuit malfunctions occur at only three locations. They are:

1. Before the controlling switch (A).
2. Between the controlling switch (A) and the load (B).
3. After the load (B).

Electrical components can become faulty with the same three circuit malfunctions. Sometimes component malfunctions can easily be confused with circuit malfunctions. Therefore, care must be exercised when isolating the cause of the problem.

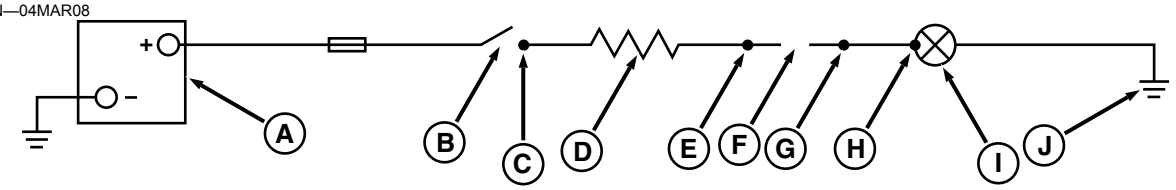
Example: A component may not operate before disconnecting an electrical connection, but it operates after reconnecting the connector.

Reason: Oxidation of the terminals created “High Resistance” and a voltage drop that prevents the proper amount of current flow to the component. Disconnecting and reconnecting the connector, removed some oxidation and reestablished good continuity through the connector.

DN22556,000003E -19-16FEB11-3/6

Electrical Circuit — Malfunction Troubleshooting

RG9896 —UN—04MAR08



Troubleshooting Circuit Malfunctions

A—Battery
B—Switch
C—Component Terminal
D—Unwanted Resistance
E—Circuit Connector
F—Open Circuit
G—Circuit Connector
H—Component Terminal
I— Load (Lamp)
J— Ground

1. **High Resistance Circuit:**

   A “High Resistance” circuit can result in slow, dim or no component operation (for example: loose, corroded, dirty, or oily terminals, gauge of wire too small or broken strands of wire).

2. **Open Circuit:**

   An “Open” circuit results in no component operation because the circuit is incomplete (for example: broken wire, terminals disconnected, open protective device, or open switch).

   Do the following to isolate the location of a “High Resistance” or “Open” circuit:

   a. With the controlling switch (B) closed (on) and the load (I) connected into the circuit, check for proper voltage at a location easily accessible between (C) and (H).

   - If voltage is low, move toward the voltage source (A) to locate the point of voltage drop.
   - If voltage is correct, move toward the load (I) and ground terminal (J) to locate the voltage drop.

   NOTE: The example shows high resistance (D) between (C) and (E) and the open circuit (F) between (E) and (G).

   b. Repair the circuit as required.

   c. Perform Verification Procedure after completing the repair.

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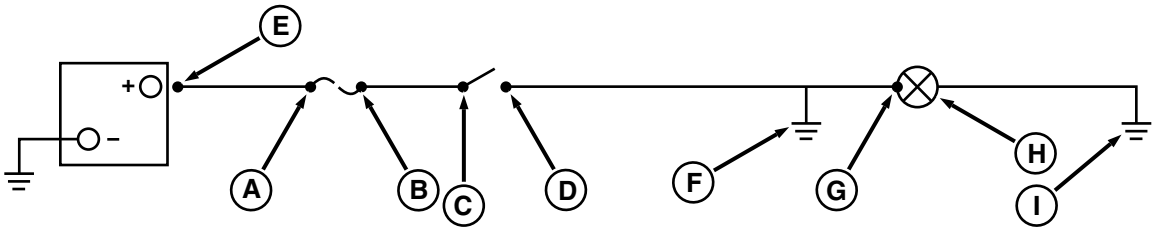
DN22556,000003E -19-16FEB11-4/6



RG9897 —UN—12MAY10

Ground Circuit

A—Fuse "A" Terminal
B—Fuse "B" Terminal
C—Switch
D—Component Terminal
E—Wire Terminal
F—Grounded Circuit
G—Component Terminal
H—Load (Lamp)
I— Ground

3. **Ground Circuit:**

A "Grounded" circuit (F) results in no component operation and the fuse or circuit breaker opens (for example: a power wire contacting the machine frame, chassis, or component housing).

Do the following to isolate the location of a "Grounded" circuit:

a. Switch (C) must be open (off). Check for continuity to ground between (D) and (I).

- If there is continuity, there is a grounded circuit between (D) and (I). Repair the circuit.
- No continuity, go to step b.

b. Disconnect the load (H) at component terminal (G).

c. With the controlling switch (C) open (off), check for continuity to ground between (D) and (I).

- If there is continuity, there is a grounded circuit between (D) and (G). Repair the circuit.

NOTE: The example is grounded between (D) and (G) at (F).

- Perform an operational check-out on the component after completing the repair.

Continued on next page

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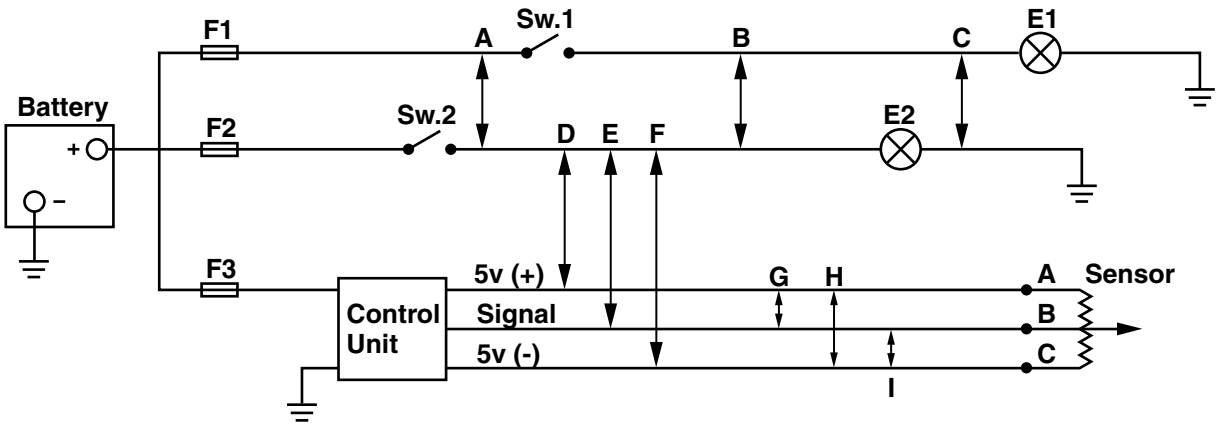

4. **Shorted Circuit:**

Machines equipped with several electronic control devices contain wiring harnesses that can become shorted by one of the following ways shown above.

1. Battery wire from fuse (F1) is shorted at (A) to another battery wire after switch (Sw.2).
   - Result: Lamp (E2) is on all of the time.
2. Battery wire from fuse (F1) is shorted at (B) to another battery wire after switches (Sw.1 & 2).
   - Result: Both lamps (E1 & E2) operate on either switch (Sw. 1 or 2).
3. Battery wire from fuse (F1) is shorted at (C) to a ground wire.
   - Result: Fuse (F1) opens after closing switch (Sw. 1)
4. Battery wire from switch (Sw. 2) is shorted at (D) to a regulated voltage wire.
   - Result: The sensor signal voltage is distorted. [1]
5. Battery wire from switch (Sw. 2) is shorted at (E) to the sensor signal voltage wire.
   - Result: The sensor signal is distorted. [1]
6. Battery wire from switch (Sw. 2) is shorted at (F) to the sensor ground wire.
   - Result: Fuse (F2) opens after closing switch (Sw. 2) and the sensor signal is distorted. [1]
7. Controller regulated voltage wire is shorted at (G) to the sensor signal voltage wire.
   - Result: The sensor signal is distorted.
8. Controller regulated voltage wire is shorted at (H) to the sensor ground wire.
   - Result: The sensor signal is distorted. [1]
9. Sensor voltage wire is shorted at (I) to the sensor ground wire.
   - Result: The sensor signal is distorted. [1]

Do the following to isolate a "Shorted Circuit:"

a. Review the machine electrical schematic to identify the circuits for the component that does not operate.

b. Disconnect the components at each end of the circuits, to single out the affected wires.

c. To prevent damage to connector terminals, obtain mating connector terminals from repair parts. DO NOT force meter probes into connector terminals.

d. Connect the meter leads across two of the affected circuits. The meter should show no continuity between the two circuits. Repeat the check across another combination of two circuits until all affected circuits have been checked.

e. Then, connect a meter lead to each affected circuit one at a time and touch the other meter leads to all terminals in the connector. The meter should show no continuity between any two circuits.
Example: A 37 pin connector contains three wires to a sensor. With one meter probe attached to each of the three wires, one at a time, touch the other meter probe to the remaining 36 wires. If there is continuity between any two wires, the circuit is shorted. Repair the circuit.

f. Alternate Method to Check for Shorted Circuit. With the components disconnected at each end of the suspected circuits, turn on the key switch. Connect one meter lead to a good frame ground. With the other meter probe, touch each of the suspected circuits one at a time. If there is a voltage reading, the circuit is shorted to another voltage wire. Repair the circuit.

g. Repair the "Shorted Circuit" as follows:

- Wires not in a loom: Wrap individual wires with electrical tape or replace the damaged wire and band as required.
- Wires in a loom: If hot spots exist in shorted area of the harness, replace the harness. If hot sports are not noticeable, install a new wire of proper gauge between the last two connections. Use tie bands to secure the wire to outside of the harness.

h. Perform Verification Procedure after completing the repair.

[1]The sensor signal voltage goes out of range and a fault code may be restored. The control unit may shut down or provide limited operation for its function.

DN22556,000003E -19-16FEB11-6/6

Electronic Injector - Calibration Information

Purpose:

The purpose of this test is to place the proper injector information in the ECU for each injector whether swapping them or installing a new one. Information in the ECU is specific for each injector and the cylinder that it is installed in. If the information is not correct, it could cause the engine to be out of emissions regulations or cause engine problems like low power.

A Service ADVISOR connection is required. In the Calibrations shortcut bar, select Injector Calibration.

Operation:

Options:

- Swap Injectors
- Change Information
- View History
- Exit
- Print

Swap Injectors:

This procedure is used when moving injectors from one cylinder to another to see if the symptom moves with the injector. When injectors are moved to different cylinders, the ECU needs to be updated with this information. Since the information for the existing injectors is already in the ECU, it needs to be moved to a different cylinder number. Select the “Swap Injectors” button and the screen displays a Swap To box for each cylinder, with a pull down menu that allows you to select the injector to transfer the information to. After making the selections and clicking on the “Next” button, Service ADVISOR will display the original injector information, the new injector information and ask for confirmation before actually moving the injector information. Pressing the "Yes" button will swap the injectors and pressing the "No" button will take you back to the pervious screen to make the correction. Once the injectors information has been swapped press "Ok".

Change Information

If an injector is being replaced, then the information for that injector must be loaded into the ECU. This is done by selecting the “Change Information” button. The screen displays a table showing the existing information that is stored in the ECU. There is a Change To box for each cylinder, with a pull down menu that allows you to select the injector to transfer the information to, if you have an injector calibration file (injector payload). For downloading injector calibration files, see Payload File — Downloading Instructions in Section 04 Group 160. If the injector calibration file is available, selecting the file that corresponds with the injector serial number installed in the cylinder automatically populates all information fields for that cylinder. If the specific calibration file for the injector was not downloaded then select Unlisted and enter the data manually. Once all the injector information has been updated, click the “Next” button, verify that the data entered is correct, and then click the “Yes” button.

View History

Anytime an injector calibration is performed with Service ADVISOR a history is kept for reviewing any injector changes in the past. This information is only kept on the computer that performed the injector calibration procedure. So if multiple computers are used, not all information will be in one history report.

Exit

Stops test and asks for Cancel confirmation. If “Yes” is Selected, test is exited. If “No” is selected then you are returned to the opening screen to start testing again.

Print

Allows you to print what is displayed on the screen. For more information see Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions in Section 04 Group 160.

RG41183,00000FD -19-21JAN11-1/1

Engine Control Unit (ECU) — Reprogramming Instructions

IMPORTANT: Some applications may have more than one ECU on the same CAN Bus. All control units, except the one to be programmed, must be disabled by either disconnecting them or pulling their power fuse.

The ECU may be reprogrammed using Service ADVISOR. See eLearning under the Service ADVISOR help section.

Also, refer to the training material provided with your Service ADVISOR training course. All authorized Service ADVISOR users have received this training. On-line training is available at John Deere University, which is an internet-based distance-learning application.

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Engine Hours — Updating Instructions

This procedure explains how to update the engine hours in the ECU. The opening screen displays the current operating hours and asks you to enter the new engine hours value.

NOTE: The new hours cannot be less than the current hours displayed.

You can use whole and tenths of hours. You can change the value before you save it to the ECU, if you have made a mistake, or you can change it after you save it.

1. From the Short Cut bar select “Calibrations”.
2. Select “Connected Calibrations”.
3. Select “Data Input Calibrations”.

   NOTE: On applications that have more than one ECU you need to select that ECU from the list.

4. From the list select “ECU-Engine Serial Number”.
5. Select “Engine Hourmeter”.
6. On the first screen enter the new engine hours then click “Send”.
7. The next screen asks if you want to proceed. Select the “Yes” button to continue and “No” button to return to the first screen.
8. The next screen displays the value you entered. If correct select the “OK” button. If not select the “Not OK” button to return to the first screen.

   IMPORTANT: Be sure to cycle the key before selecting OK. If you do not cycle the key the screen displays “Calibration was successfully completed” even though it was not.

9. Next screen says to turn the Ignition OFF for 90 seconds then back ON. Wait 10 seconds, then press “OK” button.
10. The Next screen says “Calibration was successfully completed”, if it was. If you want to run it again select “Yes”. Select “No” to exit the calibration. Select the “Print” button to print the test results.

For more information on printing see, Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions in Section 04, Group160.

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Exhaust Gas Recirculation Valve Calibration

For instructions on connecting to Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.

The EXHAUST GAS RECIRCULATION VALVE CALIBRATION procedure resets all stored valve positions data. For more information see EXHAUST GAS RECIRCULATION VALVE in Section 3 Group 135.

NOTE: This procedure is only ran if you replace the EGR valve with a new valve.

NOTE: Replacing a valve to test for a bad valve (part swapping) is not recommended. It will cause several error codes to be generated because the stored values the ECU is using to compare to will be out of tolerance of the new valve.

1. Ignition ON, engine OFF.
2. Select EXHAUST GAS RECIRCULATION VALVE CALIBRATION in Service ADVISOR.
3. Follow the instructions on the screens.

NOTE: The screen will ask to select EGR 1 or EGR 2. On 4.5L, 6.8L and 9.0L there is only 1 (one) valve so select EGR 1.

4. When successful, click “OK”.
5. Turn ignition OFF for thirty seconds.
6. Ignition ON, engine OFF for thirty seconds minimum. The EGR valve performs a learn process for minimum and maximum travel.
7. Start and run engine to normal operating temperature to ensure engine is operating correctly.

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Failure Mode Indicator Designations

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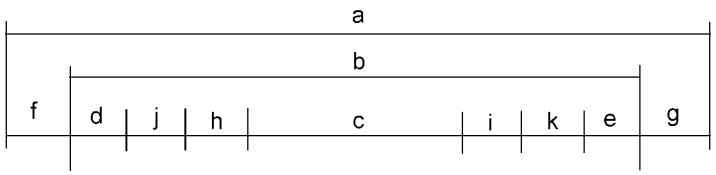


Relationship of FMI Designations and Range of Sensor Input

Region a: Total signal input range possible that can be seen by an electronic module.

Region b: Total signal range physically possible as defined by an application.

Region c: Range defined as normal for a given real world measurement.

Region d: Range defined as Extremely below normal, of what is considered normal for the given real world measurement. Associated with FMI 01.

Region e: Range defined as Extremely above normal, of what is considered normal for the given real world measurement. Associated with FMI 00.

Region f: Range which is low outside the range of what is considered physically possible for a given system. Associated with FMI 04 (Out Of Range Low, OORL).

Region g: Range which is high outside the range of what is considered physically possible for a given system. Associated with FMI 03 (Out Of Range High, OORH), 05, 06.

Region h: Range defined as Slightly below normal, of what is considered normal for a given real-world measurement. Associated with FMI 17.

Region i: Range defined as Slightly above normal, of what is considered normal for a given real-world measurement. Associated with FMI 15.

Region j: Range defined as Moderately below normal, of what is considered normal for a given real-world measurement. Associated with FMI 18.

Region k: Range defined as Moderately above normal, of what is considered normal for a given real-world measurement. Associated with FMI 16.

FMI	Description
00	**Data Valid but Above Normal Operational Range—Extreme Level.** The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition. Broadcast of data values is continued as normal.
01	**Data Valid but Below Normal Operational Range—Extreme Level** The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined extreme level limits for that particular measure of the real world condition. Broadcast of data values is continued as normal.
02	**Data Erratic, Intermittent or Incorrect** Measurements that change at a rate that is not considered possible in the real world condition and caused by improper operation of the measuring device or its connection to the module. Broadcast of data value is substituted with the "error indicator" value. Incorrect data includes any data not received and any data that is exclusive of the situations covered by FMIs 3, 4, 5 and 6 below. Data may also be considered incorrect if it is inconsistent with other information collected or known about the system.
03	**Value Out of Range High (OORH)** A voltage signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a high level when the ECM commands it to low. Broadcast of data value is substituted with the "error indicator" value.
04	**Value Out of Range Low (OORL)** A voltage signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a low level when the ECM commands it to high. Broadcast of data value is substituted with the "error indicator" value.
05	**Current Below Normal** A current signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains off when the ECM commands it on. Broadcast of data value is substituted with the "error indicator" value.
06	**Current Above Normal** A current signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains on when the ECM commands it off. Broadcast of data value is substituted with the "error indicator" value.
07	**Mechanical System not Responding or Out of Adjustment** Any fault that is detected as the result of an improper mechanical adjustment or an improper response or action of a mechanical system that, with a reasonable confidence level, is not caused by an electronic or electrical system failure. This type of fault may or may not be directly associated with the value of general broadcast information.

Continued on next page

08	**Abnormal Frequency or Pulse Width or Period**To be considered in cases of FMI 4 and 5. Any frequency or PWM signal that is outside the predefined limits which bound the signal range for frequency or duty cycle (outside region b of the signal range). Also if the signal is an ECM output, any signal whose frequency or duty cycle is not consistent with the signal which is emitted. Broadcast of data value is substituted with the "error indicator" value.
09	**Abnormal Update Rate**Any failure that is detected when receipt of data via the data link or as input from a smart actuator or smart sensor is not at the update rate expected or required by the ECM (outside region c of the signal range). Also any error that causes the ECM not to send information at the rate required by the system. This type of fault may or may not be directly associated with the value of general broadcast information.
10	**Abnormal Rate of Change**Any data, exclusive of the abnormalities covered by FMI 2, that is considered valid but whose data is changing at a rate that is outside the predefined limits that bound the rate of change for a properly functioning system (outside region c of the signal range). Broadcast of data values is continued as normal.
11	**Root Cause Not Known**It has been detected that a failure has occurred in a particular subsystem but the exact nature of the fault is not known. Broadcast of data value is substituted with the "error indicator" value.
12	**Bad Intelligent Device or Component**Inconsistency of data indicates that a device with some internal intelligence, such as a controller, module, smart sensor or smart actuator, is not properly functioning. This data may be internal to a module or external from a data link message or from various system responses. Broadcast of data value is substituted with the "error indicator" value. This error is to include all internal controller trouble codes that cannot be caused by connections or systems external to the controller.
13	**Out of Calibration**A failure that can be identified to be the result of not being properly calibrated. This may be the case for a subsystem which can identify that the calibration attempting to be used by the controller is out of date. Or it may be the case that the mechanical subsystem is determined to be out of calibration. This failure mode does not relate to a signal range.
14	**Special Instructions**SPNs 611 through 615 are defined as "System Diagnostic Codes" and are used to identify failures that cannot be tied to a specific field-replaceable component. Specific subsystem fault isolation is the goal of any diagnostic system, but for various reasons this cannot always be accomplished. These SPNs allow the manufacturer some flexibility to communicate non-"specific component" diagnostic information. Because SPN 611-615 use the standard SPN/FMI format, it allows the use of standard diagnostic tools, electronic dashboards, satellite systems and other advanced devices that scan Parameter Groups containing the SPN/FMI formats. Because manufacturer-defined codes are not desirable in terms of standardization, the use of these codes should only occur when diagnostic information cannot be communicated as a specific component and failure mode. This failure mode does not relate to the signal range, and may or may not be directly associated with the value of general broadcast information.
15	**Data Valid but Above Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
16	**Data Valid but Above Normal Operating Range—-Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
17	**Data Valid but Below Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
18	**Data Valid but Below Normal Operating Range—Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
19	**Received Network Data In Error**Any failure that is detected when the data received via the network is found substituted with the "error indicator" value (i.e. FE (16), see J1939/71). This type of failure is associated with received network data. The component used to measure the real world signal is wired directly to the module sourcing the data to the network and not to the module receiving the data via the network. This type of fault may or may not be directly associated with the value of general broadcast information.
20-30	**Reserved for SAE Assignment**
31	**Not Available or Condition Exists**Used to indicate that the FMI is not available or that the condition that is identified by the SPN exists. When no applicable FMI exists for the reported SPN, FMI 31 can be used. Also in cases when the reported SPN name has the failure information in it, FMI 31 can be used to indicated that the condition reported by the SPN exists. This type of fault may or may not be directly associated with the value of general broadcast information.

WL30140,0000041 -19-18APR08-2/2

Fuel Rail Cap and Plug Kit

For instructions on connecting to Service ADVISOR, see earlier in this Group.

Engine Applications:

All JDPS diesel engines that have High Pressure Common Rail (HPCR) fuel systems.

Tool Use:

- This tool is used to determine which cylinder is causing a no start condition because the high pressure fuel system can not build pressure.

IMPORTANT: Ensure the area you are working in is free from debris. Any debris getting into the fuel system will cause problems.

Tool Use Instructions:

1. Ignition OF, Engine OFF.

IMPORTANT: Ensure engine has not been cranked for at least 5 minutes to let the rail pressure drop to a safe level.

NOTE: Test one fuel line at a time.

2. Loosen the line at both ends.
3. Disconnect the line at the fuel rail end only.
4. Using JDG10760, “Cap” the fuel rail outlet and “Plug” the disconnected end of the chosen line.
5. Tighten the chosen line at the injector feed tube.
6. Try starting the engine; if it starts you have found the bad cylinder. See troubleshooting procedure below.
7. If engine still does not start, remove cap and pug. Reinstall the chosen line to specification. Select another line to test.
8. If none of the injectors are the problem for the no start follow the Engine Cranks/Won’t Start procedure in this manual.

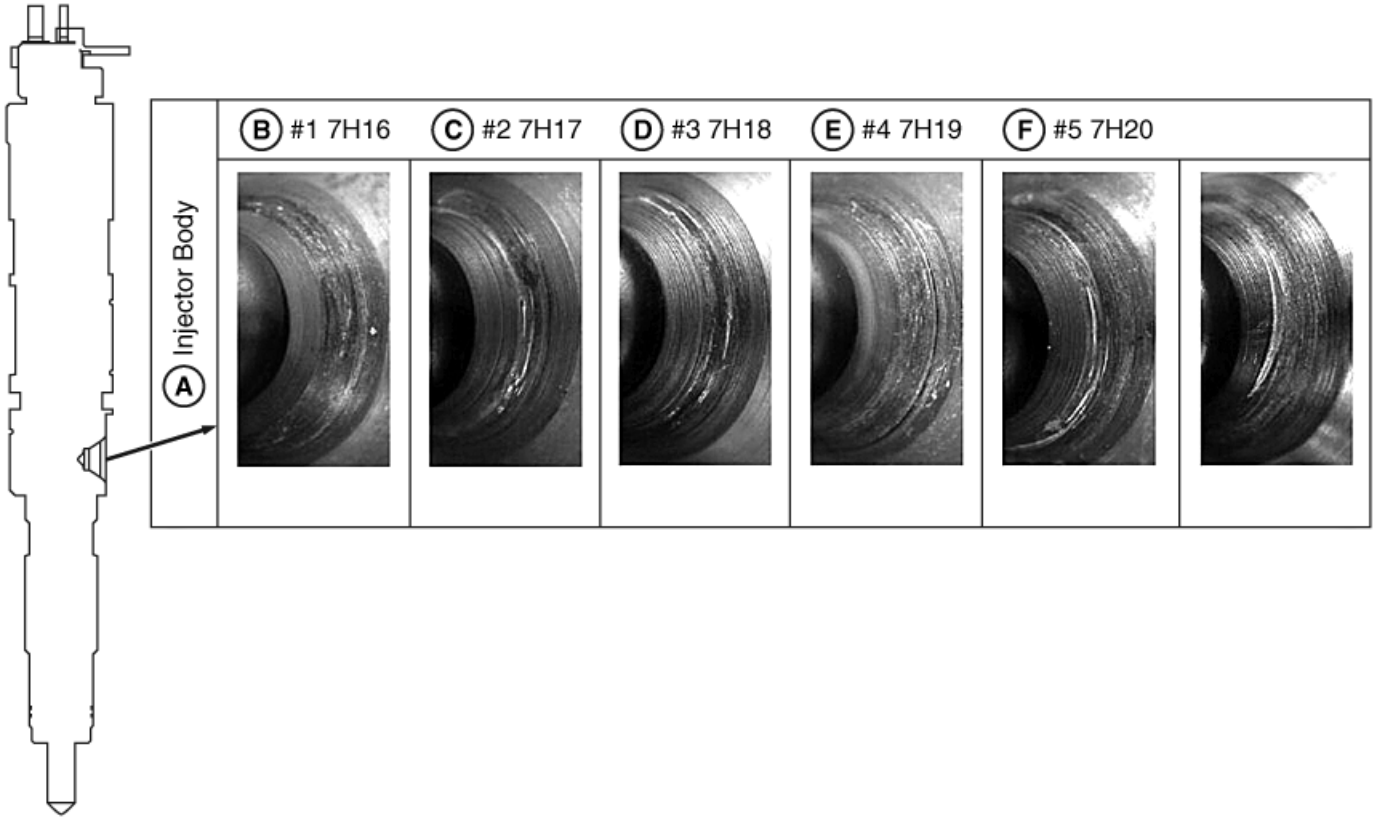
NOTE: Note: It is very uncommon for more than one cylinder to be bad causing a no start; however, that could be a possibility.

Troubleshooting Procedure:

1. Remove the fuel feed tube of the cylinder causing the no start.
2. Inspect the fuel feed tub and fuel inlet on injector for galling.
3. If galling is indicated on fuel feed tube only, replace fuel feed tube and try starting again.
4. If galling is indicated at the injector fuel inlet replace injector and fuel feed tube and try restarting again.

Continued on next page

Examples of galling are shown in the graphic below for different injectors.



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Harness Diagnostic Mode Test

NOTE: Before performing this test, ensure that you have saved all Snapshot Captures and Snapshot Recordings. For more information see Snapshot Instructions in this group.

Purpose:
This procedure is designed to test the engine wiring harness and associated components for numerous types of errors. Including opens, shorts, actuator communication, and cycling.

Test Conditions:
This test can only be performed when the engine is not running. Cylinder fueling is disabled for all cylinders when the test is initiated. If the ECU senses an engine start request, the Harness Diagnostic Mode Test is aborted and the engine will start.

Test Operation:
The ECU continuously monitors the wiring harness and it also sets up and triggers some special tests. When the Harness Diagnostic Mode Test starts, all codes and related Snapshot information is erased from the ECU memory. The test starts and checks are made of various components. You may hear various actuators move, as the actuators do a learn cycle. The ECU compares these new learned values with the original values that were created when the part was new and last good learned. If the ECU determines the learned values are valid, it stores them as the last valid values, but does not change the original values. The ECU gathers test information as it runs the various tests. If it finds any problems during the test, it stores the code and display it at the end of the test.

Test Procedures:

1. From the Short Cut bar select in Service ADVISOR select “Interactive Tests”.
2. Select “Connected Interactive Tests”.
3. Select “Harness Diagnostic Mode Test”.

NOTE: Before performing this test, ensure that you have saved all Snapshot Captures and Snapshot Recordings. For more information see Snapshot Instructions in this group.

4. A screen appears with a list of all the ECU codes (active and stored) and an Occurrence Count. These codes are presently active or stored in the ECU.
5. Press “Next” to start the test, “Cancel” to exit the test, or “Print” to print a list of the codes. For more information on printing see Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions. After pressing “Next” follow the directions on the screen.
6. At the end of the test, another list of codes are presented.
7. Go to those DTCs displayed and troubleshoot them to resolve the problem, starting with the active codes.

NOTE: If a stored code does not show back up after the test, it may be a bad or intermittent connection. You may want to run the test again while performing the Wiggle Test to see if the code reappears. If it does, check the harness and connector for problems.

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Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions

In Service ADVISOR, the user can print or save the results screen of interactive tests and calibrations. The user can also export entire jobs for technical review that include the test or calibration results.

With a live connection to the ECU:

Perform your selected test or calibration.

Printing or Saving Results from an Interactive Test or Calibration:

Perform your selected test or calibration. When complete, perform the steps below.

1. Select the “Print” button.
2. In the dialog box that opens:
   a. Select your printer to print a hard copy.
   b. Select PDF to save a PDF copy to the location you want.
   c. Select Microsoft XPS Document Writer to save as an internet viewable file.

To Export or Save a “Job”:

1. Select “File” from the Menu bar.
2. Select “Open/Manage Jobs” from the drop-down list.
3. Your current job will already be open.
4. If you need to Export a different job, select the job from the list. This terminates your current readings connection to the ECU.
5. Do not select “Open Job” at this time, or the dialog box is closed and you will need to go back to step 2.
6. Select “Edit Job” to add description or serial number information if needed.
7. Select “OK”.
8. Select “Export Job”.
9. Fill in details and attachments as applicable.
10. Select the “Export Type”.
11. Select “DTAC Case” and add your case number if applicable.
12. Select “Attach File” and add any attachments as needed.
13. Select “Save” to save the Job to the hard drive as a Zip file.
14. Select “Send” to send the job to the Export Type selected.
15. If “Send” is selected, the job is exported directly to a .ftp server that is viewable by authorized John Deere personnel. Make sure that you contact the person who is to receive the information and inform them that you have exported the data.

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Internal Data Monitor — Instructions

Internal Data Monitor (IDM) is a feature in Service ADVISOR that is used for recording multiple data points monitored by the Engine Control Unit (ECU) at a selectable sample rate. The number of data points selected for recording and the sample rate that is selected determines the length of the recording. These recordings are stored internally in the ECU RAM memory and then uploaded to Service ADVISOR.

Selecting Data Points: To select a data point, place the cursor over the name of the data point and click. To select more than one data point hold down the Ctrl key on the keyboard and click on the data points to be recorded. A maximum of 32 data points may be selected.

NOTE: If you make a mistake and do not hold the Ctrl key down, you must go back and re-select all other data points you selected. You can un-select a data point by holding down the Ctrl key and clicking on the data point.

Select Sampling Rate: Choose desired sample rate from the drop-down menu.

NOTE: The sample rate is how often the ECU gathers the information and stores it. Selecting 5 ms (5 milliseconds or 0.005 seconds) means every 5 ms the ECU takes and stores data. Selecting 1000 ms (1 second) means every 1000 ms the ECU gathers and stores data. The faster the sample rate more often the data is taken, reducing the available recording time. The number of data points selected also affects recording time.

Start Trigger Modes:

- **One Time** – This mode records the data points selected at the selected sample rate selected until the allocated ECU RAM memory is full or user clicks “Stop”.
- **Continuous** – This mode records the selected data points until the user clicks “Stop” to stop the recording session.

  NOTE: If the estimated recording time is exceeded and the allocated ECU RAM memory is full the data collected starts over writing the oldest data in that allocated memory area

- **Internal** – This mode allows the user to record the selected data points triggered by selected data point value(s). You can set a trigger using One Data Point or Two Data Points. Select the data point(s) you want to use as start trigger(s) from the drop-down list. There are three start trigger conditions: Equal Too, Greater Than, and Less Than. Also there is a user-defined trigger value. The options allow a maximum of two different data points to control start triggering. If the Two Data Point start trigger is selected there is a selection for an operand of either an And or an Or between the two. Here is an example using two start trigger data points: Engine RPM Greater Than 1000 rpm And Engine Load Less Than 50%. The recording begins when both data point trigger values are met.

Stop Trigger Modes of Internal Start Trigger Mode:

- **One Time** – In this mode the recording stops when the allocated ECU RAM memory is full or user clicks “Stop”.
- **Continuous** – In this mode the recording stops when the user selects the “Stop” button.

  NOTE: If the estimated recording time is exceeded and the allocated ECU RAM memory is full the data collected starts over writing the oldest data in that allocated memory area

- **Internal** – In this mode the recording stops when triggered by the selected stop data point value(s). You can set a trigger using One Data Point or Two Data Points. Select the data point(s) you want to use as stop trigger(s) from the drop-down list. There are three stop trigger conditions: Equal Too, Greater Than, and Less Than. Also there is a user-defined trigger value. The options allow a maximum of two different data points to control stop triggering. If the Two Data Point stop trigger is selected there is a selection for an operand of either an And or an Or between the two. Here is an example using two stop trigger data points: Engine rpm Greater Than 1000 rpm, Or Engine Load Less Than 50%. The recording stops when both data point trigger values are met or “Cancel” is selected.

IMPORTANT: Recordings made with IDM are stored temporarily in the ECU RAM memory, so if a power interruption occurs while the recording is being made or downloading it to Service ADVISOR, the recording is lost.

Set Up Procedure:

1. Connect Service ADVISOR, see Connecting To Service ADVISOR in Section 04, Group 160.
2. Select Internal Data Monitor on the Service ADVISOR Interactive Tests shortcut bar.
3. Select the data points you want to record and click the “Next” button to continue.
4. The different start trigger modes for recording IDM data are shown below.

One Time:

1. Select the start trigger mode One Time. Select the desired sampling rate then click “Next” to continue.
2. Ensure the data points you selected are displayed on the screen. Click “Next” to continue.

NOTE: The software estimates the recording length and displays it on the screen.

Continued on next page

3. Click “Start” to begin recording. Once the recording is complete or user clicks “Stop”, Service ADVISOR automatically begins to upload the recording from the ECU to the computer used to connect to the ECU.
4. Once Service ADVISOR has completed the upload, the screen displays the name and location of the recording. As an example: C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files\IDM_RG6090M123456_20100518_200637.zip, where IDM_RG6090M123456_20100518_200637.zip is the name and C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files is the location This is the default location.
5. Select “Yes” or “No” to run this test again.

NOTE: You are required to re-enter your previous selections or enter new selections to run the test again. The software does not automatically remember your previous selections.

See Recording Playback in this procedure to play a recording.

Continuous:

1. Select the start trigger mode Continuous. Select the desired sampling rate then click “Next” to continue.
2. Ensure the data points you selected are displayed on the screen. Click “Next” to continue.

NOTE: The software estimates the recording length and display it on the screen.

3. Click “Start” to begin recording. The recording stops when the “Stop” button is pressed. Once the recording is complete, Service ADVISOR automatically begins to upload the recording from the ECU to the computer used to connect to the ECU.
4. Once Service ADVISOR has completed the upload the screen displays the name and location of the recording. As an example: C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files\IDM_RG6090M123456_20100518_200637.zip. Where IDM_RG6090M123456_20100518_200637.zip is the name and C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files is the location. This is the default location.
5. Select “Yes” or “No” to run this test again.

NOTE: You are required to re-enter your previous selections or enter new selections to run the test again. The software does not automatically remember your previous selections.

See Recording Playback in this procedure to play a recording.

Internal:

1. Select the start trigger mode Internal. Select the desired sampling rate then click “Next” to continue.
2. In the pull down menu “Select number of start triggers”, select One Data Point or Two Data Points.
3. In the “Select trigger options for data point 1” use the pull down menu to select the data point that is to be designated as the start trigger. Then select the condition from the pull down menu and enter a trigger value.
4. If two data point start triggers are selected, in the “Select trigger options for data point 2” use the pull down menu to select the data point that is to be designated as the start trigger. Then select the condition from the pull down menu and enter a trigger value. Enter the operand And/Or based on your desired trigger mode.
5. Click “Next” to continue to the next screen.

NOTE: If you selected One Time or Continuous start triggering skip to step 11.

6. Select the stop trigger mode from the pull down menu and click “Next”.

NOTE: See Stop Trigger Modes of Internal Start Trigger Mode above for specific information about stop trigger modes.

7. In the pull down menu “Select number of stop triggers”, select One Data Point or Two Data Points.
8. In the “Select trigger options for data point 1” use the pull down menu to select the data point that is to be designated as the stop trigger. Then select the condition from the pull down menu and enter a trigger value.
9. If two data point start triggers are selected, in the “Select trigger options for data point 2” use the pull down menu to select the data point that is to be designated as the stop trigger. Then select the condition from the pull down menu and enter a trigger value. Enter the operand And/Or based on your desired trigger mode.
10. Click “Next” to continue setup.

NOTE: The software will estimate the recording length and display it on the screen.

11. Confirm the data points you selected and the recording setup displayed on the screen are correct. Click “Next” to continue or “Back” to make changes.
12. Click “Start” to begin the recording. When all trigger(s) that were configured are met, the recording begins and records until the stop trigger(s) settings are met or the memory is full or “Stop” or “Cancel” is selected, depending on the type of stop trigger you selected.

Continued on next page

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13. Once the recording is complete, Service ADVISOR automatically begins to upload the recording from the ECU RAM to the computer used to connect to the ECU.
14. Once Service ADVISOR has completed the upload, the screen displays the name and location of the recording. As an example: C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles\IDM_RG6090M123456_20100518_200637.zip, where IDM_RG6090M123456_20100518_200637.zip is the name and C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles is the location. This is the default location.
15. Select “Yes” or “No” to run this test again.

See Recording Playbackin this procedure to play a recording.

Recording Playback:

The default IDM recording location is “C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles\”. The IDM prefix means that the file is an IDM recording.
Example:
IDM_RG6090R123456_20100330_113523.zip was created on March 30, 2010 at 11:35:23 AM.

To playback a recording from the Shortcut Bar:

1. Select the Disconnect From Model(s) icon to disconnect from the current connection, if you are connected live or viewing a recording.

   NOTE: If you do not disconnect when you try to open a recording a popup box appears that says “This will terminate your Readings connection. Would you like to proceed?” Select “Yes” so you can open or import your recording.

2. Select Recordings on the Service ADVISOR readings shortcut bar.
3. Select the recording you want to view.

   NOTE: If the recording you want to view is not listed, see To import a recording to play back in this procedure.

4. Now view the recording as though it was a live connection.

   IMPORTANT: The Disconnect From Model(s) icon displays as though a real connection is being made. Do not forget this is a recording of a live connection.

5. To close the recording select the Disconnect From Model(s) icon. A window appears that says “This will terminate your Readings connection. Would you like to proceed?” Select “Yes” so you can close your recording.

To import a recording to playback:

1. Select the Disconnect From Model(s) icon to disconnect from the current connection, if you are connected live or viewing a recording.

   NOTE: If you do not disconnect when you try to open a recording a popup box appears that says “This will terminate your Readings connection. Would you like to proceed?” Select “Yes” so you can open or import your recording.

2. From the Menu bar, click on Readings.
3. Click on Recordings.
4. Click Open / Manage Recordings. The Open / Manage Recordings window appears.
5. Click “Import” and a Browse for Folder window appears, where you can select the file you want to view.
6. Select the file you want to view and press “OK”. The recording is opened in Service ADVISOR.
7. A window appears that says “The recording file “name of file” import was successful. Would you like to replay this recording now?” Select “Yes” to open the file in Service ADVISOR. Select “No” if you do not want to open the file at this time.

   NOTE: You can import the file for playback at a later time or import several so you can have them available to view at a later time.

8. Now view the recording as though it was a live connection.

   IMPORTANT: The Disconnect From Model(s) icon displays as though a real connection is being made. Do not forget this is a recording of a live connection.

9. To close the recording select the Disconnect From Model(s) icon. A window appears that says “This will terminate your Readings connection. Would you like to proceed?” Select “Yes” so you can close your recording.

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Intermittent DTC Diagnostics

Intermittent DTCs are problems that periodically “go away”. A problem such as a loose terminal that intermittently does not make contact with its mating terminal is a likely cause of an intermittent fault. Other intermittent DTCs may only be set only under certain operating conditions such as heavy load, extended idle, etc. When diagnosing intermittent DTCs, take special note of the condition of wiring and connectors since a high percentage of intermittent problems originate here. Check for loose, dirty, or partially disconnected connectors. Inspect the wiring routing looking for possible intermittent shorts to ground caused by contact with external parts (for example, rubbing against sharp sheet metal edges). Inspect the connector vicinity looking for wires that are partially pulled out of connector terminals, damaged connectors, poorly positioned terminals, and corroded or damaged terminals. Look for broken wires, damaged splices, and wire-to-wire shorts.

NOTE: The ECU is the component LEAST likely to fail. Only replace the ECU if the diagnostic procedure indicates that ECU replacement is necessary.

Suggestions for diagnosing intermittent DTCs:

- If the diagnostic procedure indicates that the problem is intermittent, try to reproduce the operating conditions that were present when the DTC set. Service ADVISOR can be used to help locate intermittent problems, as it includes a function called Recording. The Recording function permits the recording of data parameter values during a diagnostic session. If a DTC sets during a certain diagnostic session, the parameters can be played back and observed to see what each applicable parameter’s value was when the DTC occurred.
- If a faulty connection or wire is suspected to be the cause of the intermittent problem: clear DTCs, then check the connection or wire by wiggling it while watching Service ADVISOR to see if the fault resets.
- The voltage measured at the ECU input for most sensors can be monitored in Service ADVISOR as a data point. The minimum and maximum value of voltage measured since the data point was selected is displayed along with the current value of voltage. An intermittent open or shorted circuit will cause the voltage value to momentarily become approximately 5V or 0V, depending on the circuit and the type of failure. If computer screen cannot be seen while performing the test, have an assistant monitor the voltage while the harness is wiggled to help determine where the intermittent connection is located. If an assistant is not available, check the minimum and maximum voltage columns in the data points screen after each section of the harness is wiggled to help isolate the problem location.

Possible Causes of Intermittent DTCs:

- Faulty connection between sensor or actuator and harness.
- Faulty contact between terminals in connector.
- Faulty terminal/wire connection.
- Electromagnetic interference (EMI) from an improperly installed 2-way radio, etc. can cause erroneous signals to be sent to the ECU.

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Keep Electronic Control Unit Connectors Clean

IMPORTANT: Keep terminals clean and free of foreign debris. Moisture, dirt and other contaminants may cause the terminals to erode over time and not make a good electrical connection.

1. If a connector is not in use, put on the proper dust cap or an appropriate seal to protect it from foreign debris and moisture.

IMPORTANT: Do not probe through the wire insulation or through the back of the connector. Do not insert items such as paper clips or wires into connector terminals.

2. Make measurements on a connector terminal using JDG10466 Flex Probe Kit in SERVICEGARD.
3. Observe the locking mechanism of the connector when disconnecting and reconnecting.
4. Do not pull on wires to disconnect.
5. Before reconnecting:
   - Look for bent terminals; do not force connectors into each other.
   - Replace any terminal where corrosion exists.
   - Clean the connector of any foreign debris.
   - Dry the connector of any moisture.
6. When reconnecting, make sure seals around the connector pairs are functional.

DX,WW,ECU03 -19-11JUN09-1/1

Load Profile Information Test — Instructions

IMPORTANT: This test is only available if the ECU is loaded with the latest operating code. If no data is returned after the test completes contact DTAC to verify your software operating code.

Overview

Load profile information is collected and stored by the ECU during engine operation. The load profile is a table that represents the number of hours the engine ran at pre-defined Load/RPM combinations. This information can be used when consulting a customer on how an engine or machine is being utilized. The information can also be used by technicians in diagnosing engine issues. Service ADVISOR is used to access, view, and print the information.

Information gathered:

- Date tested
- Engine hours
- Product serial number
- Engine serial number
- Total fuel consumption
- Engine Load Profile

Selections available:

"Exit":
Exits the Load Profile Information test.

"Print":
Allows the user to print or save the Load Profile.

Performing Load Profile Information Test:

1. Select Interactive Tests from the Shortcut Bar.
2. Select Connected Interactive Tests.

   NOTE: List displays all connected engines.

3. Select ECU-Engine Serial Number

   NOTE: This is the Engine Serial Number of the engine you want to gather data from.

4. Select Engine Load Profile Information. The screen now displays: Please wait while reading the data.

   NOTE: It may take up to 30 seconds for the data to be displayed.

5. The Load Profile table is displayed on the screen.
6. To print or save the information see Interactive Tests and Calibration Results - Printing, Exporting, or Saving Instructions in Section 4 Group 160.

DN22556,0000055 -19-06OCT10-1/1

Payload File — Downloading Instructions

NOTE: An Internet connection is needed.

Electronic components in this engine have specific settings for optimum performance and to maintain emissions compliance. To maintain these settings, when any of the electronic components are replaced or swapped, the ECU needs to be reprogrammed with the correct settings for that component. This is done by performing the applicable calibration in Service ADVISOR.

The default location for the files to be downloaded to is "C:\sds\payloadsn".

To download a payload file:

1. Connect to the internet.
2. In Service ADVISOR, select "Program" from the Menu Bar.
3. Select "Download Payloads" from the drop-down list.
4. On the John Deere Custom Performance web page that comes up, click on the "Calibrated Component Search" tab.
5. Select the tab for the component you are downloading the payload for.

   NOTE: For injectors, first select the type of search you would like to do.

6. Type in the required information.

   IMPORTANT: If you mis-typed one of the numbers it may be a valid component but not the one you want which could cause problems when updating the ECU or operation of the engine.

7. Verify the information you typed in.
8. If the information is correct click the "Submit" button.
9. Verify the information displayed is correct.
10. Click the "Download Selected" button.
11. If the information is not for your item, click on the "Search Again" button and repeat steps 5 - 10.
12. A window will popup and tell you if the file was downloaded successfully.

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Service ADVISOR Data Parameter Description

Following is a list of the data parameters that can be read in Service ADVISOR. Included in the list is a brief description of each parameter and each parameter's unit of measurement.

Parameter	Units Metric (Eng)	Description
Alternate Emission Control Device State		Indicates if EGR flow is being limited to protect the engine. A value of 0 indicates no limiting, a value of 3 indicates EGR flow is inhibited.
Barometric Air Pressure	kPa (psi)	Atmospheric pressure indicted by barometric air pressure sensor (internal to ECU).
Camshaft Position Signal Improper Pattern Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Camshaft Position Signal Missing Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Camshaft Position Signal Noise Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Camshaft Position Signal Status		Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. Any other value indicates a problem has been detected.
Charge Air Cooler Outlet Temperature	degC (degF)	Temperature indicated by charge air cooler outlet temperature sensor.
Charge Air Cooler Outlet Temperature Input Voltage	Volts	Input voltage measured by the ECU.
Cold Start Aid Enabled	ON/OFF	Indicates if cold start aid is enabled by ECU.
Cold Start Aid Status		Indicates if cold start aid relay is on.
Cold Start Aid Time Remaining	Sec	Amount of remaining fuel system priming time.
Cold Start Aid Wait Lamp	ON/OFF	Indicates if cold start aid wait lamp is on.
Coolant Temperature	degC (degF)	Temperature indicated by coolant temperature sensor.
Coolant Temperature Input Voltage	Volts	Input voltage measured by the ECU.
Crankshaft Position Signal Improper Pattern Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Crankshaft Position Signal Missing Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Crankshaft Position Signal Noise Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Crankshaft Position Signal Status		Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. Any other value indicates a problem has been detected.
Cruise Accelerate		Indicates the status of the cruise accelerate switch.
Cruise Brake Switch		Indicates the status of the cruise brake switch.
Cruise Clutch Switch		Indicates the status of the cruise clutch switch.
Cruise Coast Switch		Indicates the status of the cruise coast switch.
Cruise Control Active		Indicates if the cruise control is active.
Cruise Control On/Off		Indicates the status of the cruise ON or OFF switch.
Cruise Control State		Indicates current cruise control mode.
Cruise Resume Switch		Indicates the status of the cruise resume switch.
Cruise Set Switch		Indicates the status of the cruise set switch.
Desired Fuel	mg/stroke	Total amount of fuel (main and pilot) desired per compression stroke.
Desired Speed Governor Curve		The mode selected is dependent on the application.
Digital Throttle Input Voltage	Volts	Input voltage measured by the ECU.
ECU Boot Block Part Number		File name of the ECU boot block.
ECU Configuration File Part Number		File name of the configuration file in the ECU.
ECU EOL Data Part Number		File name of the data programmed into the ECU at the End of the Assembly Line (EOL).
ECU Part Number		Part number for the ECU hardware.
ECU Serial Number		Serial number of the ECU.
ECU Software Assembly Part Number		Revision number of the ECU software.
ECU Software Part Number		File name of the ECU software.
ECU Temperature	degC (degF)	Temperature indicated by ECU temperature sensor (internal to ECU).

Continued on next page

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Parameter	Units Metric (Eng)	Description
EGR Failed Learn Cycle Attempts (Forward)	Count	Number of failed learn cycles since EGR valve calibration.
EGR Failed Learn Cycle Attempts (Rear)	Count	Number of failed learn cycles since EGR valve calibration.
EGR Temperature	degC (degF)	Temperature indicated by EGR temperature sensor.
EGR Temperature Input Voltage	Volts	Input voltage measured by the ECU.
EGR Valve Last Valid Closed Position (Forward)		Value of EGR valve stored closed position from last valid learn cycle.
EGR Valve Last Valid Closed Position (Rear)		Value of EGR valve stored closed position from last valid learn cycle.
EGR Valve Last Valid Open Position (Forward)		Value of EGR valve stored open position from last valid learn cycle.
EGR Valve Last Valid Open Position (Rear)		Value of EGR valve stored open position from last valid learn cycle.
EGR Valve Latest Learned Closed Position (Forward)		Value of EGR valve most recent learned closed position (valid or invalid). Value is 0 if no learn cycle has occurred since ignition was switched ON.
EGR Valve Latest Learned Closed Position (Rear)		Value of EGR valve most recent learned closed position (valid or invalid). Value is 0 if no learn cycle has occurred since ignition was switched ON.
EGR Valve Latest Learned Open Position (Forward)		Value of EGR valve most recent learned open position (valid or invalid). Value is 0 if no learn cycle has occurred since ignition was switched ON.
EGR Valve Latest Learned Open Position (Rear)		Value of EGR valve most recent learned open position (valid or invalid). Value is 0 if no learn cycle has occurred since ignition was switched ON.
EGR Valve Original Closed Position (Forward)		Value of EGR valve closed position when originally calibrated. Value is 0 if calibration fails.
EGR Valve Original Closed Position (Rear)		Value of EGR valve closed position when originally calibrated. Value is 0 if calibration fails.
EGR Valve Original Open Position (Forward)		Value of EGR valve open position when originally calibrated. Value is 0 if calibration fails.
EGR Valve Original Open Position (Rear)		Value of EGR valve open position when originally calibrated. Value is 0 if calibration fails.
EGR Valve Position (Forward) - Actual	%	Current position of EGR valve indicated by EGR valve position sensor.
EGR Valve Position (Rear) - Actual	%	Current position of EGR valve indicated by EGR valve position sensor.
EGR Valve Position (Forward and Rear) - Desired	%	EGR valve position commanded by ECU.
EGR Valve Position Input Voltage (Forward)	Volts	Input voltage measured by the ECU.
EGR Valve Position Input Voltage (Rear)	Volts	Input voltage measured by the ECU.
EGR Valve Successful Learn Cycles (Forward)	Count	Number of successful learn cycles since calibration.
EGR Valve Successful Learn Cycles (Rear)	Count	Number of successful learn cycles since calibration.
Engine Hourmeter	hr	Stored engine hours.
Engine Load at Current Speed	%	Percentage of load on the engine at a given speed.
Engine Model Number		The model number for the engine.
Engine Oil Pressure	kPa (psi)	Pressure indicated by engine oil pressure sensor.
Engine Oil Pressure Input Voltage	Volts	Input voltage measured by the ECU.
Engine Serial Number		Serial number of the engine.
Engine Speed	rev/m	Engine speed measured by crankshaft position sensor or camshaft position sensor.
Engine Speed Indicated by Camshaft Position Sensor	rev/m	Engine speed measured by camshaft position sensor (value indicates crankshaft speed).
Engine Speed Indicated by Crankshaft Position Sensor	rev/m	Engine speed measured by crankshaft position sensor.
Exhaust Manifold Temperature - Calculated	degC (degF)	Temperature that is a function of Manifold Air Temperature, Fuel Rail Pressure, Engine Speed, Start of Injection, and fuel-to-air ratio.
Fan Speed - Actual	rev/m	Current fan speed indicated by sensor.
Fan Speed - Desired	rev/m	Fan speed commanded by ECU.
Fan State	ON/OFF	Indicates if fan is commanded ON or OFF.
Fuel Rail Pressure - Actual	MPa (psi)	Pressure indicated by the fuel rail pressure sensor.
Fuel Rail Pressure - Desired	MPa (psi)	Fuel rail pressure commanded by ECU.
Fuel Rail Pressure Input Voltage	Volts	Input voltage measured by the ECU.
Fuel System Part Number		The part number for the fuel system used on the engine.

Continued on next page

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Parameter	Units Metric (Eng)	Description
Fuel System Serial Number		The serial number for the fuel system used on the engine.
Fuel Temperature	degC (degF)	Temperature indicated by fuel temperature sensor.
Fuel Temperature Input Voltage	Volts	Input voltage measured by the ECU.
Fuel Usage Rate	L/hr (gal/hr)	Current rate of fuel usage.
Low Pressure Fuel - Actual Pressure	kPa (psi)	Pressure indicated by low pressure fuel sensor.
Low Pressure Fuel - Desired Pressure	kPa (psi)	Low pressure fuel commanded by ECU.
Low Pressure Fuel Input Voltage	Volts	Input voltage measured by the ECU.
Low Pressure Fuel Pump Duty Cycle	%	Duty cycle of PWM speed control signal supplied to low pressure fuel pump.
Low Pressure Fuel Pump Enable	ON/OFF	Indicates if low pressure fuel pump is enabled by ECU.
Low Pressure Fuel Pump Priming Time Remaining	Sec	Amount of remaining fuel system priming time.
Low Pressure Fuel Pump Status	OK/NOT OK	Indicates if low pressure fuel pump has detected a problem.
Low Pressure Fuel Pump Status Indicator	%	Value of 0 indicates proper operation. Any other value indicates a problem has been detected.
Manifold Air Pressure - Absolute	kPa (psi)	Pressure (absolute) indicated by manifold air pressure sensor.
Manifold Air Pressure - Actual	kPa (psi)	Pressure (gauge) indicated by manifold air pressure sensor.
Manifold Air Pressure - Estimated	kPa (psi)	ECU estimate of manifold air pressure (gauge).
Manifold Air Pressure Input Voltage	Volts	Input voltage measured by the ECU.
Manifold Air Temperature	degC (degF)	Temperature indicated by manifold air temperature sensor.
Manifold Air Temperature Input Voltage	Volts	Input voltage measured by the ECU.
Option Assembly Part Number		Part number of application options.
Performance Option Part Number		Part number indicating engine power level.
Pilot Injection Active	ON/OFF	Indicates if pilot injection is currently active.
Primary Analog Throttle Input Voltage	Volts	Input voltage measured by the ECU.
Secondary Analog Throttle Input Voltage	Volts	Input voltage measured by the ECU.
Sensor Supply #2 Voltage	Volts	Voltage of ECU 5 volt power supply #2.
Sensor Supply #3 Voltage	Volts	Voltage of ECU 5 volt power supply #3.
Sensor Supply #4 Voltage	Volts	Voltage of ECU 5 volt power supply #4.
Sensor Supply #5 Voltage	Volts	Voltage of ECU 5 volt power supply #5.
Start of Injection Position	DEG	Position of crankshaft when injection is commanded.
Switched Battery Voltage	Volts	Switched voltage (ignition) measured by the ECU.
Throttle Position	%	Percent of the throttle being used.
Throttle Type		Type of throttle being used on this application.
Torque Curve Number		Torque curve the ECU is currently using to limit fuel.
Total Fuel Consumption	L (gal)	Stored total amount of fuel consumed.
Turbo Actuator Position - Actual	%	Turbo vane position indicated by turbocharger actuator.
Turbo Actuator Position - Desired	%	Turbo vane position commanded by ECU.
Turbo Compressor Inlet Temperature	degC (degF)	Temperature indicated by turbo compressor inlet air temperature sensor.
Turbo Compressor Inlet Temperature Input Voltage	Volts	Input voltage measured by the ECU.
Turbo Speed - Actual	rev/m	Speed indicated by turbo speed sensor.
Turbo Speed - Estimated	rev/m	ECU estimate of turbo speed.
Unswitched Battery Voltage	Volts	Battery voltage measured by the ECU.
Vehicle Driveshaft Speed	rev/m	Speed of the vehicle driveshaft.
Vehicle Option Part Number		Part number of payload options programmed.
Vehicle Serial Number		Serial number of the vehicle.
Vehicle Speed - CAN	km/h (mph)	Vehicle speed as determined by some other module and transmitted on CAN.
Vehicle Speed - ECU	km/h (mph)	Vehicle speed calculated by ECU from speed signal.
Water In Fuel	True/False	Indicates if water is detected by water in fuel sensor.
Water In Fuel Input Voltage	Volts	Input voltage measured by the ECU.

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Snapshot Instructions

NOTE: To view Snapshot information Service ADVISOR is required.

Snapshot information is categorized in two types, Snapshot Capture, and Snapshot Recording. Snapshot information is generated when an engine DTC is set.

- **Snapshot Capture** - Is a snapshot of specific Data Points at the exact instant in time that the DTC was set. All engine DTCs have a Snapshot Capture associated with them. This information also contains the engine hours for the first and latest occurrence of the DTC.
- **Snapshot Recording** - Is a short recording of specific data points when certain DTCs are set. The recording will include data point readings for a short period before and after the DTC was set. These are normally 2—5 seconds long, depending on the DTC that was set. Only specific DTCs have a Snapshot Recording associated with them when the DTC is set. If the DTC Count is greater than one then the snapshot recording could contain playbacks of the first and latest occurrences and can be played back by selecting the occurrence to be viewed.

IMPORTANT: It is important to save all Snapshot information before clearing DTCs or running the Harness Diagnostic Mode Test. Once codes have been cleared then the Snapshot information is also cleared. For help in troubleshooting engine DTCs it is recommended not to clear codes until the problem has been resolved.

NOTE: To save all Snapshot Capture and Snapshot Recording information, at one time, click the "Save All Snapshots" button at the bottom of the screen.

NOTE: Snapshot Capture and Snapshot Recording files are stored in "C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles".

Viewing a Snapshot Capture

1. With a live connection already established with Service ADVISOR, click on the Get Diagnostic Trouble Codes icon to get codes.
2. The window displays all active and stored codes. In this window there is a button displayed for each DTC to get the Snapshot Capture information.
3. To view the Snapshot Capture information for a DTC, click the "Snapshot Capture" button under the Status and Counts columns for that DTC. At the same time the information is being displayed in the Service ADVISOR window, Service ADVISOR is downloading this information for viewing off-line.

Viewing a Snapshot Recording

1. With a live connection already established with Service ADVISOR, click on the Get Diagnostic Trouble Codes icon to get codes.
2. The window displays all active and stored codes. In this window there is a button displayed for each DTC to get the Snapshot Recording information.
3. To view the Snapshot Recording information for a DTC, click the "Snapshot Recording" button under the Status and Counts columns for that DTC. At the same time the information is being displayed in the Service ADVISOR window, Service ADVISOR is downloading this information for viewing off-line.
4. Click on the play button to start the playback of the recording. For more information about playing a recording and other options available select "Help" from the menu bar and then select either "Help Topics" or "Service ADVISOR eLearning".

Importing a Snapshot Recording for playback when off-line can be found in "C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles".

Viewing a Snapshot Capture or Snapshot Recording Off-Line

1. Select "Readings" from the Menu Bar.
2. Select "Recordings" from the drop-down list.
3. Select "Open / Manage Recordings" from the expanded drop-down list.
4. Select the capture or recording you would like to view then Click the "Open" button.

NOTE: If the capture or recording you want to view is not in the list click the "Import" button. For instructions on how to Import a file, see Importing Snapshot Files below.

5. The item selected opens in the recording window.

Importing Snapshot Files

1. Select "Readings" from the Menu Bar.
2. Select "Recordings" from the drop-down list.
3. Select "Open / Manage Recordings" from the expanded drop-down list.
4. Click the "Import" button.

NOTE: The Browse For Folder dialog box opens to the "C:\Documents and Settings\All Users\Application Data\Service ADVISOR\RecordingFiles" folder.

5. Select the folder where the item you want to import is located.

Continued on next page

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6. Click on the “OK” button and the import process starts.
7. A dialog box is displayed saying import successful and ask if you want to view it.
8. Click on the “No” button if you want to import more files.
9. Click on the “Yes” button to view the item.

Exporting a Snapshot Capture or Snapshot Recording

1. Select “Help” from the Menu Bar.
2. Select “Help Topics” from the drop-down list.
3. Type in “export” in the keyword box.
4. Select, “Export Recording File” and follow the instructions.

SS01820,00002E6 -19-16FEB11-2/2

Terminal Test

The purpose of this test is to check for electrical terminal and connector problems.

Terminal Basics

Terminals are typically made from a base metal that is plated with tin or an alloy. The plating material helps protect the base metal of the terminal from corroding. There are two main varieties of terminals; pins (male) and sockets (female). The male pins are inserted into the female sockets to provide the electrical connection between wires or electrical devices. The female socket terminals typically contain one or more contact springs which provide firm contact points with the male pin terminal.

Terminal Problems

The five main types of terminal problems are corrosion, loose fit, bent terminals, pushed out terminals, and crimp problems.

Corrosion or foreign material on terminals acts as a series resistance between the contact spring and the mating terminal. This series resistance can decrease the voltage measured by the ECU at its inputs. Corrosion, liquids, or other foreign material in a connector may also provide a parallel resistance that permits current to flow between other terminals in the connector. This parallel path can increase or decrease the voltage measured by the ECU at its inputs. Once terminals are corroded, they must be replaced. Scraping the layer of corrosion from the terminal also removes any remaining plating material resulting in a rapid reappearance of the corrosion.

A loose fit between the pin and the socket terminals may result in an intermittent open circuit. The loose fit is usually due to a damaged or worn contact spring inside the female socket terminal. Loose fitting terminals may be caused by misaligned terminals or by previous troubleshooting procedures where a probe was inserted into the female socket terminal to obtain a measurement.

Bent male pin terminals may cause an open circuit and possibly a short circuit with adjacent pins in the connector. Bent terminals are often caused by connector alignment or improper terminal crimping techniques.

Terminals that are partially pushed out of the connector may cause an open circuit or an intermittent connection if the tip of the partially pushed out terminal makes electrical contact with the tip of the mating terminal. Pushed out terminals are caused by misaligned terminals or by terminals that were not fully seated in the connector during assembly.

Terminals are crimped to wire ends to provide electrical and mechanical connection to the wire. The wire end may pull out of the terminal if not crimped correctly or if the wire has been pulled on with too much force. This results in an open circuit or an intermittent open circuit if the wire end makes contact with the terminal.

Terminal Test Visual Inspection

Inspect the terminals on both sides of the connection including the ECU or sensor for the following problems:

- Corrosion on the terminals or in the connector.
- Water or other foreign material in the connector.
- Bent terminals.
- Pushed out terminals.

Replace or reinsert terminals. Replace connector if damaged.

Terminal Test Loose Fit Check

- Select the proper terminal adapter, Flex Probe, from JDG10466 that matches the terminal you are testing.
- Gently insert the male pin terminal fully into the female socket terminal without twisting or bending.
- Slowly pull the male pin terminal out of the female socket terminal. There should be a noticeable tension as terminal probe is withdrawn.

Replace terminals that have a loose fit.

Terminal Test Crimp Check

- Remove connector back shell to gain access to wire insertion end of connector, if applicable.
- Gently pull on each wire in the connector.

Replace terminal if wire end pulls out of the terminal.

Terminal Tips

- Use the specified extraction tools to remove terminals.
- Always use the specified terminal as a replacement. The plating on mating terminals must be compatible or corrosion could occur.
- Always use the specified seals for those connectors that require them.
- Always use the correct crimping tool to attach replacement terminals.
- After crimping a terminal to the wire end, pull gently on the terminal to make sure that it is securely crimped.

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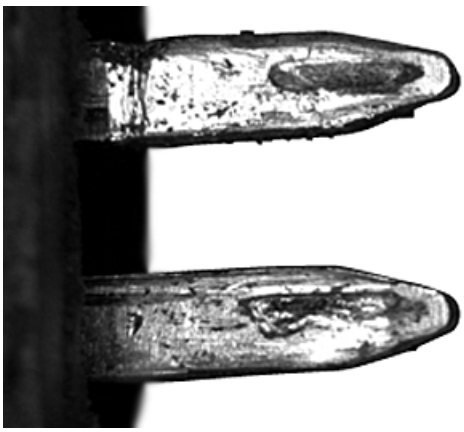

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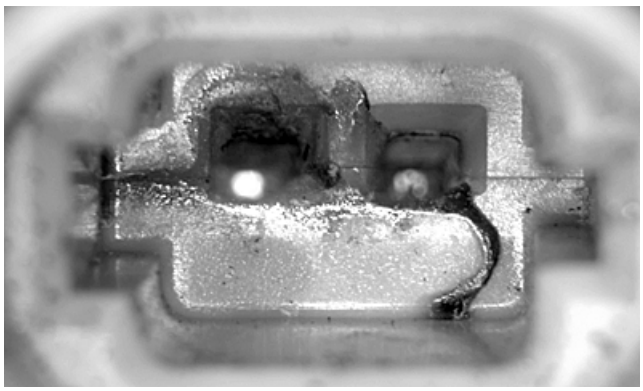

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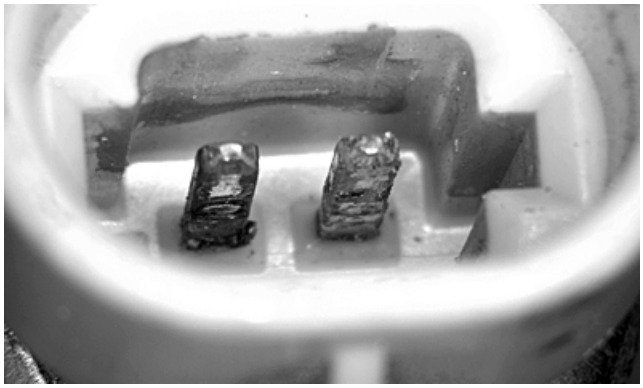

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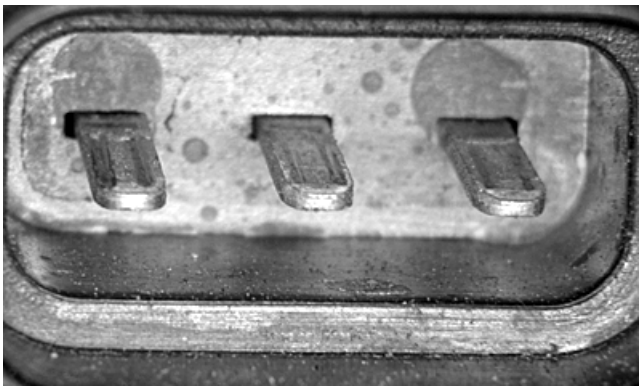

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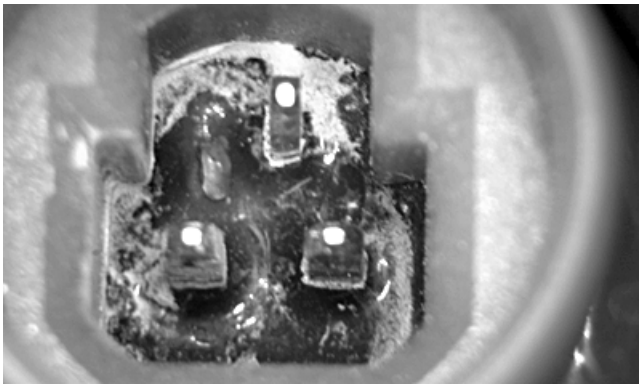
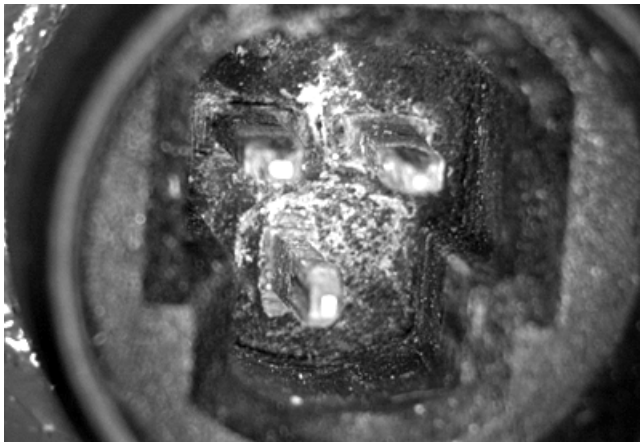


RG16621 —UN—25NOV08



RG16623 —UN—25NOV08

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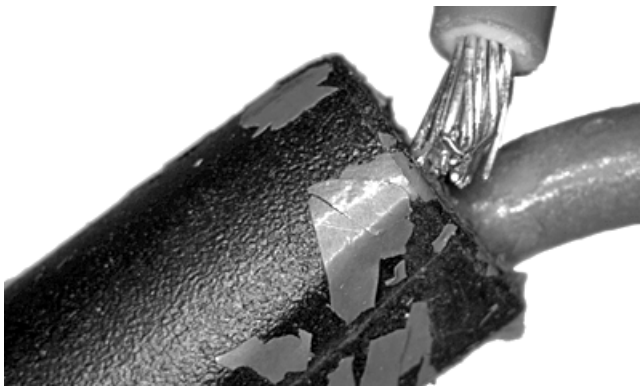
DN22556,0000056 -19-22OCT10-2/3

RG16624 —UN—25NOV08


RG16619 —UN—25NOV08

DN22556,0000056 -19-22OCT10-3/3

Trim Options Information

Trimmable options are features that can be turned ON or Off during an ECU programming cycle. These features will customize an engine for each individual customer. Not all engines have the trim feature.

To update trimmable features, download the software payload file and start the programming sequence through the service tool. The trim page automatically appears if the payload has trim incorporated.

For more information to help select the correct option, use the help documentation available in each section of the trim page.

RG41221,00001EB -19-18APR08-1/1

VGT Actuator Travel Range Test

For instructions on connecting to Service ADVISOR, see earlier in this Group.

This test is used to aid in identifying a VGT actuator problem. Problems could include mechanical or electrical problems.

The actuator travel range describes the distance between two physical stops internal to the actuator. The distance that the actuator shaft travels between these stops is measured before it leaves the manufacturer to ensure they are within a certain range.

When the turbo/actuator is received as an assembly the travel range is described as the distance between one stop on the actuator (turbo vanes in full open position) and the opposite stop on the turbo (vanes in the full closed position). The range is measured at the assembly factory and the original and current full open and full closed values are stored in the actuator.

IMPORTANT: When just an actuator is received as a replacement part there are no values stored in the actuator.

IMPORTANT: The actuator will move during the test. Ensure fingers are clear of linkage.

NOTE: To ensure correct calibration values are stored in the actuator, do not power the actuator until you have connected it to the turbo and connected the linkage. If you have powered the actuator with it disconnected you will need to recalibrate it, see VGT — LEARN VALUE RESET INSTRUCTINS.

There are original and current travel range values stored in the actuator once an initial calibration has been done. This test will overwrite the current travel range values at the end of test. The final screen will display the original and current travel range values. It will also display minimum and maximum travel range limits. If the current travel range is outside of these limits the screen will display Test Failed. At this time you should perform the Variable Geometry Turbocharger (VGT) Component Test. If the current travel range is between the minimum and maximum travel range, the screen will display Test Passed. If the test passed then the system does not detect any movement problems between the actuator and turbo.

Before performing the VGT Actuator Travel Range Test

- Warm engine to normal operating temperature.

Performing the VGT Actuator Travel Range Test

1. Ignition ON, Engine OFF.
2. Select VGT Actuator Travel Range Test in Service ADVISOR.
3. Follow instruction given by the diagnostic software.

NOTE: Run this test at least 3 times to ensure repeatable, accurate results.

IMPORTANT: When ever an actuator, turbo or linkage has been replaced a new calibration needs to be performed to update the original values stored in the actuator. See VGT — LEARN VALUE RESET INSTRUCTINS for more information.

DN22556,0000003 -19-16JUL10-1/1

VGT — Learn Value Reset Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in Section 04, Group 160.

1. Ignition ON, engine OFF.
2. Select VGT Learn Value Reset under the Service ADVISOR Calibrations shortcut bar.
3. Follow the instructions in the diagnostic software.
4. Ignition OFF for 90 seconds.
5. Ignition ON, Engine OFF. The VGT automatically goes through the learn process. The VGT creates an audible noise when cycling.

SS01820,00002E9 -19-03JAN11-1/1

000028.03 — Digital Throttle Signal Out of Range High

Digital Throttle Signal is above the high voltage specification.

RG41221,00001FD -19-20JAN09-1/21

000028.03 — Throttle #3 Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000028.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Digital Throttle Input Voltage increases above its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope if there are more than one throttle set up in the Trim Options.

Additional References:
For more digital throttle information, see DIGITAL MULTI-STATE THROTTLE, see DUAL-STATE THROTTLE, see TRI-STATE THROTTLE , or see RAMP THROTTLE in Section 03, Group 140 earlier in this manual, depending on the type of multi-state throttle employed on the application.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Panel connector terminal - Yellow/Purple

Continued on next page

RG41221,00001FD -19-20JAN09-2/21

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000028.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,00001FD -19-20JAN09-3/21

2 Check Digital Throttle Wiring	1. Ignition OFF, Engine OFF. 2. Check wiring connections at digital throttle. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,00001FD -19-20JAN09-4/21

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect harness connector and panel connector C09 on the control panel. 3. Perform TERMINAL TEST on C09 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,00001FD -19-20JAN09-5/21

4 Check Digital Throttle Return Circuit Resistance	On the harness, measure the resistance between harness connector C09-S and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

RG41221,00001FD -19-20JAN09-6/21

5 Check For Digital Throttle Signal Circuit Shorted to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between harness connector C09-R and C09-S. Is the voltage greater than 5.5V?	**YES:** GO TO 6 **NO:** GO TO 8

Continued on next page

RG41221,00001FD -19-20JAN09-7/21

6 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect ECU connector J02.	
	3. Perform TERMINAL TEST on J02-B4 and J02-G3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 7

RG41221,00001FD -19-20JAN09-8/21

7 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Measure the resistance between ECU J02-B4 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1.

RG41221,00001FD -19-20JAN09-9/21

8 Check for DTC Change with Digital Throttle Signal Shorted to Return	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on harness connector terminals C09-R and C09-S.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs	**YES:** GO TO 9
	Is DTC 00028.04 now an active DTC?	**NO:** GO TO 10

RG41221,00001FD -19-20JAN09-10/21

9 Check for DTC 000028.03 with Throttle Reconnected	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from C09.	
	3. Reconnect C09 to instrument panel.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000028.03 now an active DTC?	**NO:** GO TO 12

Continued on next page

RG41221,00001FD -19-20JAN09-11/21

10 Terminal Test

1. Ignition OFF, Engine OFF
2. Disconnect ECU connector J02.
3. Perform TERMINAL TEST on J02-B4 and J02-G3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

RG41221,00001FD -19-20JAN09-12/21

11 Check Digital Throttle Circuit Continuity

1. Disconnect harness connector C09.
2. On the harness, measure the resistance between ECU J02-G3 and harness connector C09-S.
3. On the harness, measure the resistance between ECU J02-B4 and harness connector C09-R.

Were both resistance measurements less than 10 ohms?

YES: Replace ECU. Recheck for DTC.

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,00001FD -19-20JAN09-13/21

12 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU connector J02.

Did the 000028.03 code toggle between active and stored?

YES: Locate and repair intermittent problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,00001FD -19-20JAN09-14/21

13 Replace Terminals and Throttle switch

1. Ignition OFF, engine OFF.
2. Replace terminals C09-R and C09-S in harness connector.
3. Replace throttle switch.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000028.03 active?

YES: Contact DTAC for support..

NO: Problem fixed. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,00001FD -19-20JAN09-15/21

14 Check for Intermittent Connection

1. Ignition ON, engine OFF.	
2. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU connector J02.	**YES:** Locate and repair intermittent problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
Did the 000028.03 code toggle between active and stored?	**NO:** GO TO 15

RG41221,00001FD -19-20JAN09-16/21

15 Review Snapshot Instruction

1. Review snapshot information stored in step 1.	
2. Operate engine under conditions where DTC became active.	**YES:** GO TO 2
Is DTC 000028.03 now active?	**NO:** GO TO 16

RG41221,00001FD -19-20JAN09-17/21

16 Terminal Test

1. Ignition OFF, engine OFF.	
2. Disconnect harness connector C09 on control panel.	
3. Perform Terminal Test on C09 and panel connector.	
4. Disconnect ECU J02 connector.	
5. Perform Terminal Test on J02-G3 and J02-B4.	**YES:** GO TO 17
Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,00001FD -19-20JAN09-18/21

17 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
Is DTC 000028.03 now active?	**NO:** GO TO 18

RG41221,00001FD -19-20JAN09-19/21

18 Check DTAC Solutions

Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000028.03.	**YES:** Perform steps identified in DTAC solution.
Were any applicable solutions found?	**NO:** GO TO 19

RG41221,00001FD -19-20JAN09-20/21

19 ECU Reprogram

Check Custom Performance for possible ECU software updates.	**YES:** Reprogram ECU with latest version of software.
Is a later version of ECU software available?	**NO:** Contact DTAC for support..

RG41221,00001FD -19-20JAN09-21/21

000028.04 — Digital Throttle Signal Out of Range Low

Digital Throttle Signal is below the low voltage specification.

RG41221,00001FE -19-20JAN09-1/19

000028.04 — Digital Throttle Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000028.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Digital Throttle Input Voltage decreases below its low voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope if there are more than one throttle set up in the Trim Options.

Additional References:
For more digital throttle information, see DIGITAL MULTI-STATE THROTTLE, see DUAL-STATE THROTTLE, see TRI-STATE THROTTLE , or see RAMP THROTTLE in Section 03, Group 140 earlier in this manual, depending on the type of multi-state throttle employed on the application.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Panel connector terminal - Yellow/Purple

Continued on next page

RG41221,00001FE -19-20JAN09-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000028.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

RG41221,00001FE -19-20JAN09-3/19

2 Check Digital Throttle Wiring	1. Ignition OFF, engine OFF. 2. Check wiring connections at digital throttle. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,00001FE -19-20JAN09-4/19

3 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect harness connector and panel connector C09 on the control panel. 3. Perform TERMINAL TEST on C09 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,00001FE -19-20JAN09-5/19

4 Check for DTC 00028.04	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 00028.04 still an active DTC?	**YES:** GO TO 7 **NO:** GO TO 5

RG41221,00001FE -19-20JAN09-6/19

5 Check for DTC 00028.03	Is DTC 00028.03 now an active DTC with harness connector C09 still disconnected?	**YES:** Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,00001FE -19-20JAN09-7/19

6 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.

Did the 000028.04 code toggle between active and stored?

YES: Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,00001FE -19-20JAN09-8/19

7 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J02 connector.
3. Perform TERMINAL TEST on J02-B4 and J02-G3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 8

RG41221,00001FE -19-20JAN09-9/19

8 Check Digital Throttle Circuit Continuity

1. On the harness, measure the resistance between ECU J02-G3 and harness connector C09-S.
2. On the harness, measure the resistance between ECU J02-B4 and harness connector C09-R.

Were both resistance measurements less than 10 ohms?

YES: GO TO 9

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,00001FE -19-20JAN09-10/19

9 Check for Signal Shorted to Ground

On the harness, measure the resistance between ECU J02-B4 and single point ground.

Was the resistance less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 10

RG41221,00001FE -19-20JAN09-11/19

10 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Measure the resistance between ECU J02-B4 and all other terminals in the ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

Continued on next page

RG41221,00001FE -19-20JAN09-12/19

11 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.

Did the 000028.04 code toggle between active and stored?

YES: Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Replace ECU. Recheck for DTC.

RG41221,00001FE -19-20JAN09-13/19

12 Check for Intermittent Short to Ground

1. Ignition ON, engine OFF.
2. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.

Did the 000028.04 code toggle between active and stored?

YES: Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,00001FE -19-20JAN09-14/19

13 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 00028.04 now active?

YES: GO TO 2

NO: GO TO 14

RG41221,00001FE -19-20JAN09-15/19

14 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect harness connector C09.
3. Perform TERMINAL TEST on C09.
4. Disconnect ECU J02 connector.
5. Perform TERMINAL TEST on J02-G3 and J02-B4.

Were Terminal Test results good?

YES: GO TO 15

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,00001FE -19-20JAN09-16/19

15 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 00028.04 now active?

YES: GO TO 2

NO: GO TO 16

Continued on next page

RG41221,00001FE -19-20JAN09-17/19

16 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 00028.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 17

RG41221,00001FE -19-20JAN09-18/19

17 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,00001FE -19-20JAN09-19/19

000029.03 — Secondary Analog Throttle Signal Out of Range High

Secondary Analog Throttle Signal is above the high voltage specification.

RG41221,0000200 -19-20JAN09-1/23

000029.03 — Secondary Analog Throttle Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003510.03
000029.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Secondary Analog Throttle Input Voltage increases above its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more secondary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Panel connector terminal C09 - Yellow/Purple

Continued on next page

RG41221,0000200 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000029.03 reappear active?

YES: GO TO 2

NO: GO TO 15

RG41221,0000200 -19-20JAN09-3/23

2 Throttle Linkage Check

1. Ignition OFF, Engine OFF
2. Check throttle linkage for any slipping.
3. Check throttle linkage for misalignment.

NOTE: Use application manual for linkage and alignment procedures.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41221,0000200 -19-20JAN09-4/23

3 Device Disconnected Test

1. Ignition OFF, Engine OFF.
2. Disconnect harness connector C08.
3. Ignition ON, Engine OFF.
4. Refresh codes.

Is DTC 000029.04 now an active DTC?

YES: GO TO 4

NO: GO TO 9

RG41221,0000200 -19-20JAN09-5/23

4 Terminal Test

1. Ignition OFF, Engine OFF.
2. Perform a TERMINAL TEST on C08-A, C08-C, and C08-F.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 5

RG41221,0000200 -19-20JAN09-6/23

5 Check Secondary Analog Throttle Return Circuit Continuity

On the harness, measure the resistance between C08-C and single point ground.

Is the resistance less than 5 ohms?

YES: GO TO 6

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000200 -19-20JAN09-7/23

6 Check Secondary Analog Throttle 5V Supply	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between C08-A (+) and C08-C (-).	**YES:** Discontinue this test and perform tests for DTC 003510.03 as though DTC was active.
	Is the voltage greater than 5.5V?	**NO:** GO TO 7

RG41221,0000200 -19-20JAN09-8/23

7 Check for DTC 000029.03 with Throttle Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect C08.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000029.03 still active?	**NO:** GO TO 15

RG41221,0000200 -19-20JAN09-9/23

8 Check Secondary Analog Throttle Wiring	Check the wiring between the secondary analog throttle potentiometer and C08 harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000200 -19-20JAN09-10/23

9 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Perform a TERMINAL TEST on C08-A, C08-C, and C08-F.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

RG41221,0000200 -19-20JAN09-11/23

10 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Perform TERMINAL TEST on J02-G2, J02-G3, and J02-F3..	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 11

Continued on next page

RG41221,0000200 -19-20JAN09-12/23

11 Check Secondary Analog Throttle Circuit Continuity

1. On the harness, measure the resistance between ECU J02-G2 and harness connector C08-A.
2. On the harness, measure the resistance between ECU J02-G3 and harness connector C08-C.
3. On the harness, measure the resistance between ECU J02-F3 and harness connector C08-F.

Were all resistance measurements less than 10 ohms?

YES: GO TO 12

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000200 -19-20JAN09-13/23

12 Check for Short to Voltage

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between ECU J02-F3 and single point ground.

Is the voltage greater than 0.5V?

YES: Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,0000200 -19-20JAN09-14/23

13 Check Signal Circuit for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J03.
3. Measure the resistance between J02-F3 and all other terminals in ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Locate and repair wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000200 -19-20JAN09-15/23

14 Check for Intermittent Short to Voltage

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Monitor DTCs in Service ADVISOR while gently wiggling on the wiring harness between harness connector C08 and ECU connector J02.

Does the status of DTC 000029.03 toggle between active and stored?

YES: There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000200 -19-20JAN09-16/23

15 Check for Intermittent Short to Voltage

1. Ignition ON, engine OFF.
2. Monitor DTCs in Service ADVISOR while gently wiggling on the wiring harness between harness connector C08 and ECU connector J02.

Does the status of DTC 000029.03 toggle between active and stored?

YES: There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 16

RG41221,0000200 -19-20JAN09-17/23

16 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000029.03 now active?

YES: GO TO 2

NO: GO TO 17

RG41221,0000200 -19-20JAN09-18/23

17 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect harness connector C08.
3. Perform a TERMINAL TEST on C08-A, C08-C, and C08-F.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 18

RG41221,0000200 -19-20JAN09-19/23

18 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU connector J02.
3. Perform TERMINAL TEST on J02-G2, J02-G3, and J02-F3..

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 19

RG41221,0000200 -19-20JAN09-20/23

19 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 000029.03 now active?

YES: GO TO 2

NO: GO TO 20

RG41221,0000200 -19-20JAN09-21/23

20 Check DTAC Solutions

Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000029.03.

Were any applicable solutions found?

YES: Perform steps identified in DTAC solution.

NO: GO TO 21

Continued on next page

RG41221,0000200 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000200 -19-20JAN09-23/23

000029.04 — Secondary Analog Throttle Signal Out of Range Low

Secondary Analog Throttle Signal is below the low voltage specification.

RG41221,0000201 -19-20JAN09-1/24

000029.04 — Secondary Analog Throttle Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003510.04
000029.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Secondary Analog Throttle Input Voltage decreases below its low voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more secondary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Auxiliary connector terminal C08 - Yellow/Purple

Continued on next page

RG41221,0000201 -19-20JAN09-2/24

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000029.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000201 -19-20JAN09-3/24

2 Throttle Linkage Check	1. Ignition OFF, engine OFF. 2. Check throttle linkage for any slipping. 3. Check throttle linkage for misalignment. *NOTE: Use application manual for linkage and alignment procedures* Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000201 -19-20JAN09-4/24

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect harness connector C08. 3. Perform a TERMINAL TEST on C08-A, C08-C, and C08-F. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,0000201 -19-20JAN09-5/24

4 Check Secondary Analog Throttle Return Circuit Continuity	On the harness, measure the resistance between C08-C and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000201 -19-20JAN09-6/24

5 Check for Shorted Signal Circuit	On the harness, measure the resistance between secondary analog throttle signal C08-B and return C08-C. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,0000201 -19-20JAN09-7/24

6 Check Secondary Analog Throttle 5V Supply	1. Ignition ON, engine OFF.	**YES:** GO TO 7
	2. On the harness, measure the voltage between C08-A (+) and C08-C (-).	**NO:** Voltage is less than 4.5V, GO TO 11
	Is the voltage between 4.5V and 5.5V?	**NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

RG41221,0000201 -19-20JAN09-8/24

7 Check for DTC 000029.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on harness connector terminals C08-A and C08-B.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000029.03 now an active DTC?	**NO:** GO TO 12

RG41221,0000201 -19-20JAN09-9/24

8 Reconnect Throttle and Check for DTC 000029.04	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from C08.	
	3. Reconnect harness connector C08.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000029.04 an active DTC?	**NO:** GO TO 10

RG41221,0000201 -19-20JAN09-10/24

9 Check Wiring to Secondary Analog Throttle	Check wiring between harness connector C08 and secondary analog throttle.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

Continued on next page

RG41221,0000201 -19-20JAN09-11/24

10 Check for Intermittent Problem	1. Ignition ON, engine OFF.	
	2. Monitor DTCs in Service ADVISOR while gently wiggling wiring harness between harness connector C08 and ECU connector J02.	**YES:** There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR
	Does the status of DTC 000029.04 toggle between active and stored?	**NO:** GO TO 9

RG41221,0000201 -19-20JAN09-12/24

11 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 12

RG41221,0000201 -19-20JAN09-13/24

12 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Perform a TERMINAL TEST on terminals J02-G2, J02-G3, and J02-F3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

RG41221,0000201 -19-20JAN09-14/24

13 Check Circuit Continuity	On the harness, measure the resistance between the following ECU J02 connector terminals and harness connector C08 terminals:	
	• J02-G2 to C08-A • J02-F3 to C08-F • J02-G3 to C08-C	**YES:** GO TO 14
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000201 -19-20JAN09-15/24

14 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J02-F3 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the resistance less than 100k ohms?	**NO:** GO TO 15

Continued on next page

RG41221,0000201 -19-20JAN09-16/24

15 Check for Wire-Wire Short	1. Disconnect ECU J01 and J03 connectors.	
	2. Verify harness connector C08 is still disconnected.	
	3. On the harness, measure the resistance between J02-F3 and all other terminals in the J01 , J02, and J03 connectors.	**YES:** GO TO 16
	Were all resistance measurements greater than 100k ohms?	**NO:** Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000201 -19-20JAN09-17/24

16 Reconnect and Check for DTC 000029.04	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Refresh DTCs.	**YES:** Recheck procedure. GO TO 2
	Is DTC 000029.04 still active?	**NO:** Problem is intermittent. GO TO 17

RG41221,0000201 -19-20JAN09-18/24

17 Check for Intermittent Problem	1. Ignition ON, engine OFF.	
	2. Monitor DTCs in Service ADVISOR while gently wiggling wiring harness between harness connector C08 and ECU connector J02.	**YES:** There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR
	Does the status of DTC 000029.04 toggle between active and stored?	**NO:** GO TO 18

RG41221,0000201 -19-20JAN09-19/24

18 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active.	**YES:** GO TO 2
	Is DTC 000029.04 now active?	**NO:** GO TO 19

RG41221,0000201 -19-20JAN09-20/24

19 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect harness connector C08.	
	3. Perform TERMINAL TEST on terminals C08-A, C08-C, and C08-F.	
	4. Disconnect ECU J02 connector.	
	5. Perform TERMINAL TEST on J02-G2, J02-G3, and J02-F3.	**YES:** GO TO 20
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000201 -19-20JAN09-21/24

20 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000029.04 now active?	**YES:** GO TO 2 **NO:** GO TO 21

RG41221,0000201 -19-20JAN09-22/24

21 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000029.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 22

RG41221,0000201 -19-20JAN09-23/24

22 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000201 -19-20JAN09-24/24

000091.03 — Primary Analog Throttle Signal Out of Range High

Primary Analog Throttle Signal is above the high voltage specification.

RG41221,0000203 -19-20JAN09-1/23

000091.03 — Primary Analog Throttle Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003511.03
000091.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Primary Analog Throttle Input Voltage increases above its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more primary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Panel connector small terminal - Yellow/Purple
- Panel connector large terminal - Yellow/Blue

Continued on next page

RG41221,0000203 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000091.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000203 -19-20JAN09-3/23

2 Throttle Linkage Check	1. Ignition OFF, Engine OFF 2. Check throttle linkage for any slipping. 3. Check throttle linkage for misalignment. *NOTE: Use application manual for linkage and alignment procedures.* Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000203 -19-20JAN09-4/23

3 Device Disconnected Test	1. Ignition OFF, Engine OFF. 2. Disconnect harness connector C09. 3. Ignition ON, Engine OFF. 4. Refresh codes. Is DTC 000091.04 now an active DTC?	**YES:** GO TO 4 **NO:** GO TO 9

RG41221,0000203 -19-20JAN09-5/23

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform a TERMINAL TEST on C09-M, C09-C, and C09-L. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

RG41221,0000203 -19-20JAN09-6/23

5 Check Primary Analog Throttle Return Circuit Continuity	On the harness, measure the resistance between C09-C and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 6 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000203 -19-20JAN09-7/23

6 Check Primary Analog Throttle 5V Supply	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between C09-M(+) and C09-C (-).	**YES:** Discontinue this test and perform tests for DTC 003511.03 as though DTC was active.
	Is the voltage greater than 5.5V?	**NO:** GO TO 7

RG41221,0000203 -19-20JAN09-8/23

7 Check for DTC 000091.03 with Throttle Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect C09.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000091.03 still active?	**NO:** GO TO 15

RG41221,0000203 -19-20JAN09-9/23

8 Check Primary Analog Throttle Wiring	Check the wiring between the primary analog throttle potentiometer and C09 harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found.	**NO:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000203 -19-20JAN09-10/23

9 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Perform a TERMINAL TEST on C09-M, C09-C, and C09-L.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

RG41221,0000203 -19-20JAN09-11/23

10 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Perform TERMINAL TEST on J02-A3, J02-A4, and J02-C3..	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 11

Continued on next page

RG41221,0000203 -19-20JAN09-12/23

11 Check Primary Analog Throttle Circuit Continuity

1. On the harness, measure the resistance between ECU J02-A3 and harness connector C09-M.
2. On the harness, measure the resistance between ECU J02-A4 and harness connector C09-L.
3. On the harness, measure the resistance between ECU J02-C3 and harness connector C09-C.

Were all resistance measurements less than 10 ohms?

YES: GO TO 12

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000203 -19-20JAN09-13/23

12 Check for Short to Voltage

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between ECU J02-A4 and single point ground.

Is the voltage greater than 0.5V?

YES: Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,0000203 -19-20JAN09-14/23

13 Check Signal Circuit for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J03.
3. Measure the resistance between J02-A4 and all other terminals in ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Locate and repair wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000203 -19-20JAN09-15/23

14 Check for Intermittent Short to Voltage

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Monitor DTCs in Service ADVISOR while gently wiggling on the wiring harness between harness connector C09 and ECU connector J02.

Does the status of DTC 000091.03 toggle between active and stored?

YES: There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000203 -19-20JAN09-16/23

15 Check for Intermittent Short to Voltage	1. Ignition ON, engine OFF.	
	2. Monitor DTCs in Service ADVISOR while gently wiggling on the wiring harness between harness connector C09 and ECU connector J02.	**YES:** There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does the status of DTC 000091.03 toggle between active and stored?	**NO:** GO TO 16

RG41221,0000203 -19-20JAN09-17/23

16 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active.	**YES:** GO TO 2
	Is DTC 000091.03 now active?	**NO:** GO TO 17

RG41221,0000203 -19-20JAN09-18/23

17 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect harness connector C09.	
	3. Perform a TERMINAL TEST on C09-M, C09-C, and C09-L.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 18

RG41221,0000203 -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Perform TERMINAL TEST on J02-A3, J02-A4, and J02-C3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 19

RG41221,0000203 -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 000091.03 now active?	**NO:** GO TO 20

RG41221,0000203 -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000091.03.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** GO TO 21

Continued on next page

RG41221,0000203 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000203 -19-20JAN09-23/23

000091.04 — Primary Analog Throttle Signal Out of Range Low

Primary Analog Throttle Input Voltage is below the low voltage specification.

RG41221,0000204 -19-06OCT10-1/24

000091.04 — Primary Analog Throttle Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003511.04
000091.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Primary Analog Throttle Input Voltage is below its low voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more primary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Panel connector small terminal - Yellow/Purple
- Panel connector large terminal - Yellow/Blue

Continued on next page

RG41221,0000204 -19-06OCT10-2/24

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000091.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000204 -19-06OCT10-3/24

2 Throttle Linkage Check	1. Ignition OFF, engine OFF. 2. Check throttle linkage for any slipping. 3. Check throttle linkage for misalignment. *NOTE: Use application manual for linkage and alignment procedures* Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000204 -19-06OCT10-4/24

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect harness connector C09. 3. Perform a TERMINAL TEST on C09-L, C09-C, and C09-M. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,0000204 -19-06OCT10-5/24

4 Check Primary Analog Throttle Return Circuit Continuity	On the harness, measure the resistance between C09-C and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000204 -19-06OCT10-6/24

5 Check for Shorted Signal Circuit	On the harness, measure the resistance between primary analog throttle signal C09-L and return C09-C. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,0000204 -19-06OCT10-7/24

6 Check Primary Analog Throttle 5V Supply	1. Ignition ON, engine OFF.	**YES:** GO TO 7
	2. On the harness, measure the voltage between C09-M (+) and C09-C (-).	**NO:** Voltage is less than 4.5V, GO TO 11
	Is the voltage between 4.5V and 5.5V?	**NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003511.03 as though DTC were active.

RG41221,0000204 -19-06OCT10-8/24

7 Check for DTC 000091.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on harness connector terminals C09-M and C09-L.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000091.03 now an active DTC?	**NO:** GO TO 12

RG41221,0000204 -19-06OCT10-9/24

8 Reconnect Throttle and Check for DTC 000091.04	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from C09.	
	3. Reconnect harness connector C09.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 8
	Is DTC 000091.04 an active DTC?	**NO:** GO TO 10

RG41221,0000204 -19-06OCT10-10/24

9 Check Wiring to Primary Analog Throttle	Check wiring between harness connector C09 and primary analog throttle.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

Continued on next page

RG41221,0000204 -19-06OCT10-11/24

10 Check for Intermittent Problem	1. Ignition ON, engine OFF.	
	2. Monitor DTCs in Service ADVISOR while gently wiggling wiring harness between harness connector C09 and ECU connector J02.	**YES:** There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR
	Does the status of DTC 000091.04 toggle between active and stored?	**NO:** GO TO 9

RG41221,0000204 -19-06OCT10-12/24

11 Check for DTC 003511.04	Is DTC 003511.04 active?	**YES:** Discontinue this test. Perform test for DTC 003511.04. **NO:** GO TO 12

RG41221,0000204 -19-06OCT10-13/24

12 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Perform a TERMINAL TEST on terminals J02-A3, J02-C3, and J02-A4.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

RG41221,0000204 -19-06OCT10-14/24

13 Check Circuit Continuity	On the harness, measure the resistance between the following ECU J02 connector terminals and harness connector C09 terminals:	
	• J02-A3 to C09-M • J02-A4 to C09-L • J02-C3 to C09-C	**YES:** GO TO 14
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000204 -19-06OCT10-15/24

14 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J02-A4 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the resistance less than 100k ohms?	**NO:** GO TO 15

Continued on next page

RG41221,0000204 -19-06OCT10-16/24

15 Check for Wire-Wire Short

1. Disconnect ECU J01 and J03 connectors.
2. Verify harness connector C09 is still disconnected.
3. On the harness, measure the resistance between J02-A4 and all other terminals in the J01 , J02, and J03 connectors.

Were all resistance measurements greater than 100k ohms?

YES: GO TO 16

NO: Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000204 -19-06OCT10-17/24

16 Reconnect and Check for DTC 000091.04

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.

Is DTC 000091.04 still active?

YES: Recheck procedure. GO TO 2

NO: Problem is intermittent. GO TO 17

RG41221,0000204 -19-06OCT10-18/24

17 Check for Intermittent Problem

1. Ignition ON, engine OFF.
2. Monitor DTCs in Service ADVISOR while gently wiggling wiring harness between harness connector C09 and ECU connector J02.

Does the status of DTC 000091.04 toggle between active and stored?

YES: There is an intermittent wiring problem. Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

NO: GO TO 18

RG41221,0000204 -19-06OCT10-19/24

18 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000091.04 now active?

YES: GO TO 2

NO: GO TO 19

RG41221,0000204 -19-06OCT10-20/24

19 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect harness connector C09.
3. Perform TERMINAL TEST on terminals C09-M, C09-C, and C09-L.
4. Disconnect ECU J02 connector.
5. Perform TERMINAL TEST on J02-A3, J02-C3, and J02-A4.

Were Terminal Test results good?

YES: GO TO 20

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000204 -19-06OCT10-21/24

20 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000091.04 now active?	**YES:** GO TO 2 **NO:** GO TO 21

RG41221,0000204 -19-06OCT10-22/24

21 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000091.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 22

RG41221,0000204 -19-06OCT10-23/24

22 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000204 -19-06OCT10-24/24

000094.03 — Low Pressure Fuel Signal Out of Range High

The Low Pressure Fuel Signal exceeds the sensor's high voltage specification.

RG41221,0000206 -19-20JAN09-1/22

000094.03 — Low Pressure Fuel Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003510.03
000094.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Low Pressure Fuel Input Voltage rises above the sensor's high voltage specification. The voltage corresponds to a pressure that is higher than what is physically possible for the signal.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For sensor location see COMPONENT LOCATION in Section 3 Group 140.

For more fuel transfer pump pressure sensor information, see FUEL TRANSFER PUMP PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU small terminal - Orange/Green
- Low pressure fuel sensor P03 - Purple/Gray

Continued on next page

RG41221,0000206 -19-20JAN09-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000094.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000206 -19-20JAN09-3/22

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect fuel transfer pump pressure sensor connector P03. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000094.03 go to stored and 000094.04 become active?	**YES:** GO TO 3 **NO:** GO TO 7

RG41221,0000206 -19-20JAN09-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on P03 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,0000206 -19-20JAN09-5/22

4 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P03-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000206 -19-20JAN09-6/22

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P03-2 (+) and P03-1 (-). Is the voltage greater than 5.5V?	**YES:** Discontinue this test and perform tests for DTC 003510.03 as though DTC was active. **NO:** GO TO 6

Continued on next page

RG41221,0000206 -19-20JAN09-7/22

6 Check for DTC 000094.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect P03.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** Replace fuel transfer pump pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000094.03 still active?	**NO:** GO TO 12

RG41221,0000206 -19-20JAN09-8/22

7 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform Terminal Test on J03-H4, J03-H3, and J03-C2.	**YES:** GO TO 8
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000206 -19-20JAN09-9/22

8 Check fuel transfer pump pressure sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-H3 and fuel transfer pump pressure sensor connector P03-1.	
	2. On the harness, measure the resistance between ECU J03-H4 and fuel transfer pump pressure sensor connector P03-2.	
	3. On the harness, measure the resistance between ECU J03-C2 and fuel transfer pump pressure sensor connector P03-3.	**YES:** GO TO 9
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000206 -19-20JAN09-10/22

9 Check for Short to Voltage	1. Ignition ON, engine OFF.	
	2. Measure the voltage between ECU J03-C2 and single point ground.	**YES:** Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the voltage greater than 0.5V?	**NO:** GO TO 10

Continued on next page

RG41221,0000206 -19-20JAN09-11/22

10 ECU J03 Disconnected Code Change Test	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 0000094.03.*	
	1. ECU connector J03 still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Refresh codes.	**YES:** GO TO 14
	Is DTC 000094.03 still active?	**NO:** GO TO 11

RG41221,0000206 -19-20JAN09-12/22

11 Check Signal Circuit for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between J03-C2 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Locate wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 100k ohms?	**NO:** GO TO 12

RG41221,0000206 -19-20JAN09-13/22

12 Check for Intermittent Short to Voltage	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel transfer pump pressure sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Low Pressure Fuel Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 13

RG41221,0000206 -19-20JAN09-14/22

13 Check for Active DTC 000094.03	Refresh DTCs	**YES:** Recheck measurements. GO TO 2
	Is DTC 000094.03 still active?	**NO:** Problem is intermittent. Contact DTAC for support.

RG41221,0000206 -19-20JAN09-15/22

14 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Reconnect all connectors.	
	4. Ignition ON, engine OFF.	**YES:** Contact DTAC for support.
	Is DTC 000094.03 still active?	**NO:** Problem fixed.

Continued on next page

RG41221,0000206 -19-20JAN09-16/22

15 Check for Intermittent Short to Voltage

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel transfer pump pressure sensor and ECU J03 connector.

NOTE: The Low Pressure Fuel Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.

Was the source of the intermittent short to voltage found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 16

RG41221,0000206 -19-20JAN09-17/22

16 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000094.03 now active?

YES: GO TO 2

NO: GO TO 17

RG41221,0000206 -19-20JAN09-18/22

17 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect fuel transfer pump pressure sensor connector P03.
3. Perform Terminal Test on P03.
4. Disconnect ECU J03 connector.
5. Perform Terminal Test on J03-H3, J03-H4, and J03-C2.

Were Terminal Test results good?

YES: GO TO 18

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000206 -19-20JAN09-19/22

18 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 000094.03 now active?

YES: GO TO 2

NO: GO TO 19

RG41221,0000206 -19-20JAN09-20/22

19 Check DTAC Solutions

Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000094.03.

Were any applicable solutions found?

YES: Perform steps identified in DTAC solution.

NO: GO TO 20

RG41221,0000206 -19-20JAN09-21/22

20 ECU Reprogram

Check Custom Performance for possible ECU software updates.

Is a later version of ECU software available?

YES: Reprogram ECU with latest version of software.

NO: Contact DTAC for support.

RG41221,0000206 -19-20JAN09-22/22

000094.04 — Low Pressure Fuel Signal Out of Range Low

The Low Pressure Fuel Signal drops below the sensor's low voltage specification.

RG41221,0000207 -19-20JAN09-1/23

000094.04 — Low Pressure Fuel Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000094.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Low Pressure Fuel Input Voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for the signal.

Alarm Level:
Warning

Control Unit Response:
ECU's will operate normally.

Additional References:
For sensor location see COMPONENT LOCATION in Section 3 Group 140.

For more fuel transfer pump pressure sensor information, see FUEL TRANSFER PUMP PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Low Fuel Pressure Sensor P03 - Purple/Gray

Continued on next page

RG41221,0000207 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000094.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000207 -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect fuel transfer pump pressure sensor connector P03. 3. Perform a TERMINAL TEST on connector P03. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000207 -19-20JAN09-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P03-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000207 -19-20JAN09-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between fuel transfer pump pressure sensor signal P03-3 and return P03-1. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

RG41221,0000207 -19-20JAN09-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P03-2 (+) and P03-1 (-). Is the voltage between 4.5V and 5.5V?	**YES:** GO TO 6 **NO:** Voltage is less than 4.5V, GO TO 10 **NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

Continued on next page

RG41221,0000207 -19-20JAN09-7/23

6 Check for DTC 000094.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF. 2. On the harness, install flex probes on fuel transfer pump pressure sensor connector terminals P03-2 and P03-3. 3. Connect jumper wire between flex probes. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.03 now an active DTC?	**YES:** GO TO 7 **NO:** GO TO 11

RG41221,0000207 -19-20JAN09-8/23

7 Reconnect Sensor and Check for DTC 000094.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P03. 3. Reconnect fuel transfer pump pressure sensor connector P03. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.04 an active DTC?	**YES:** Replace fuel transfer pump pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

RG41221,0000207 -19-20JAN09-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel transfer pump pressure sensor and ECU J03 connector. *NOTE: The Low Pressure Fuel Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

RG41221,0000207 -19-20JAN09-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in fuel transfer pump pressure sensor connector P03. 3. Replace fuel transfer pump pressure sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

Continued on next page

RG41221,0000207 -19-20JAN09-11/23

10 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 11

RG41221,0000207 -19-20JAN09-12/23

11 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J03. 3. Perform a TERMINAL TEST on terminals J03-H4, J03-H3, and J03-C2. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

RG41221,0000207 -19-20JAN09-13/23

12 Check Circuit Continuity	On the harness, measure the resistance between the following ECU J01 connector terminals and fuel transfer pump pressure sensor P03 connector terminals: • J03-H3 to P03-1 • J03-H4 to P03-2 • J03-C2 to P03-3 Were all resistance measurements less than 10 ohms?	 **YES:** GO TO 13 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000207 -19-20JAN09-14/23

13 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-C2 and single point ground. Is the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14

RG41221,0000207 -19-20JAN09-15/23

14 Check for Wire-Wire Short	1. Disconnect ECU connectors J01 and J02. 2. Verify fuel transfer pump pressure sensor connector P03 is still disconnected. 3. On the harness, measure the resistance between J03-C2 and all other terminals in ECU connectors J01, J02, and J03. Were all resistance measurements greater than 100k ohms?	 **YES:** GO TO 15 **NO:** Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000207 -19-20JAN09-16/23

15 Reconnect and Check for DTC 000094.04

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.

Is DTC 000094.04 still active?

YES: Recheck procedure. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

RG41221,0000207 -19-20JAN09-17/23

16 Check for Intermittent Wiring Problem

1. Ignition ON, engine OFF.
2. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel transfer pump pressure sensor and ECU J03 connector.

NOTE: The Low Pressure Fuel Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.

Was the source of the intermittent problem found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 17

RG41221,0000207 -19-20JAN09-18/23

17 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000094.04 now active?

YES: GO TO 2

NO: GO TO 18

RG41221,0000207 -19-20JAN09-19/23

18 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect fuel transfer pump pressure sensor connector P03.
3. Perform TERMINAL TEST on P03.
4. Disconnect ECU J03 connector.
5. Perform TERMINAL TEST on terminals J03-C2, J03-H3, and J03-H4.

Were Terminal Test results good?

YES: GO TO 19

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

RG41221,0000207 -19-20JAN09-20/23

19 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 000094.04 now active?

YES: GO TO 2

NO: GO TO 20

Continued on next page

RG41221,0000207 -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000094.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

RG41221,0000207 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000207 -19-20JAN09-23/23

000094.17 — Low Pressure Fuel Signal Slightly Low

The ECU senses a Low Pressure Fuel - Actual Pressure below specification.

RG41221,00002BB -19-20JAN09-1/12

000094.17 — Low Pressure Fuel Signal Slightly Low

Troubleshooting Sequence:
003510.04
000094.04
001075.12
000094.17

When DTC is Displayed:
When the engine is running or cranking for prolonged periods and the error is active.

Related Information
The ECU detects a Low Pressure Fuel - Actual Pressure below -5 kPa (-0.5 psi).

Alarm Level:
Warning

Control Unit Response:
The ECU does not derate the engine. The engine may feel like it has a loss of power.

Additional References:
For more fuel transfer pump pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more two wire fuel transfer pump information, see FUEL TRANSFER PUMP OPERATION in Section 03, Group 130 earlier in this manual

For more 5 wire fuel transfer pump information, see FUEL TRANSFER PUMP OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

Continued on next page

RG41221,00002BB -19-20JAN09-2/12

1 Read DTCs and Store Snapshot Information	*NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 1. Ignition ON, Engine OFF. 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group 3. Write down all DTCs and their occurrence count. If any DTCs have Snapshot Capture or Snapshot Recording information save the information. For instructions on saving and using Snapshot Information, see SNAPSHOT INSTRUCTIONS earlier in this group. 4. Ignition ON, Engine ON. 5. Refresh DTC list. Is 000094.17 active?	**YES:** GO TO 2 **NO:** GO TO 4

RG41221,00002BB -19-20JAN09-3/12

2 Low Pressure Fuel System Check	Check fuel system, see F1 - LOW PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this Section. Did test pass?	**YES:** GO TO 3 **NO:** See F1 - LOW PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this Section.

RG41221,00002BB -19-20JAN09-4/12

3 Diagnostic Code Check	1. Ignition OFF, Engine OFF. 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group 3. Ignition ON, Engine CRANKING or ON. 4. Refresh codes. Is 000094.17 active?	**YES:** Start a DTAC case. **NO:** Problem fixed. Return to service.

RG41221,00002BB -19-20JAN09-5/12

4 Occurrence Count Check	1. Ignition ON, Engine OFF. 2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 3. Review occurrence counts in the snapshot capture information for this code. Is count greater that five?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,00002BB -19-20JAN09-6/12

5 Fuel Transfer Pump Pressure Sensor Connector Test	1. Disconnect fuel transfer pump pressure sensor connector. 2. Perform TERMINAL TEST on fuel transfer pump pressure sensor connector. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 6

Continued on next page

RG41221,00002BB -19-20JAN09-7/12

6 Engine Hours Between Failures Check	1. Ignition ON, Engine OFF	
	2. Using Service ADVISOR read and record the current Engine Hourmeter value.	
	3. Retrieve the latest saved snapshot capture and record the Engine Hourmeter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.	
	4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter vlaue.	**YES:** Clear codes and return to service.
	Is the difference greater than 50 hours?	**NO:** GO TO 7

RG41221,00002BB -19-20JAN09-8/12

7 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. GO TO 1
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 8
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 9

RG41221,00002BB -19-20JAN09-9/12

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 2
	Did 000094.17 reappear active?	**NO:** GO TO 7 and review the data again.

RG41221,00002BB -19-20JAN09-10/12

9 Connector Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect fuel transfer pump pressure sensor connector and ECU J3 connector.	
	3. Perform TERMINAL TEST on fuel transfer pump pressure sensor connector and ECU J3 connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 10

RG41221,00002BB -19-20JAN09-11/12

10 ECU Reprogram	1. Using Service ADVISOR download the latest software payload for your application.	
	2. Reprogram the ECU with the payload just downloaded.	
	3. Ignition ON, Engine ON.	
	4. Refresh DTC list.	**YES:** Start a DTAC case.
	Is 000094.17 active?	**NO:** Problem fixed. Return to service.

RG41221,00002BB -19-20JAN09-12/12

000097.00 — Water in Fuel Detected Most Severe Level

The ECU detects water in fuel.

RE42287,00003ED -19-21DEC10-1/14

000097.00 — Water In Fuel Detected Diagnostic Procedure

Troubleshooting Sequence:
000097.04

When DTC is Displayed:
When the ignition is on and the error is active.

Related Information:
The water in fuel sensor indicates to the ECU that water is present for longer than a duration defined in the ECU.

Alarm Level:
Stop

Control Unit Response:
The ECU will derate the engine.

Additional References:
For further water in fuel sensor information, see WATER IN FUEL (WIF) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• Water in Fuel Sensor D01 - Purple/Red

RE42287,00003ED -19-21DEC10-2/14

1 Drain Water	1. Ignition OFF, engine OFF.	
	2. Open the drain valve on the bottom of the primary fuel filter.	
	3. After the water is drained, close valve.	
	4. If engine is equipped with an electric fuel transfer pump, disconnect electric fuel transfer pump connector C19.	
	NOTE: Disregard DTCs related to the low pressure fuel pump	
	5. Ignition ON, engine OFF.	
	6. Monitor the Water in fuel Input Voltage in Service ADVISOR.	**YES:** GO TO 2
	Is the voltage less than 4 volts?	**NO:** GO TO 11

Continued on next page

RE42287,00003ED -19-21DEC10-3/14

2 Read DTCs and Store Snapshot Information	1. Ignition OFF, engine OFF. 2. If equipped, reconnect fuel transfer pump connector C19. 3. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 4. Connect Service ADVISOR, see Connecting to Service ADVISOR earlier in this Group. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see Snapshot Instructions earlier in this Group. 6. Refresh Codes. Did 000097.00 reappear active?	**YES:** GO TO 3 **NO:** GO TO 5

RE42287,00003ED -19-21DEC10-4/14

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform Terminal Test on water-in-fuel sensor and harness connector. 3. Inspect harness for melted or pinched areas near the water-in-fuel sensor. Were any problems found?	**YES:** Repair problem. Run Harness Diagnostic Mode Test in Service ADVISOR. **NO:** GO TO 4

RE42287,00003ED -19-21DEC10-5/14

4 WIF Sensor Resistance Check	On the water-in-fuel sensor measure the resistance between signal (terminal A) and return (terminal B). Was the resistance value between 200k and 240k ohms?	**YES:** GO TO 5 **NO:** Replace WIF sensor. Run Harness Diagnostic Mode Test in Service ADVISOR.

RE42287,00003ED -19-21DEC10-6/14

5 Occurrence Count Check	Review stored information and look at occurrence count for 000097.00. Is occurrence recorded in step 2 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

RE42287,00003ED -19-21DEC10-7/14

6 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform Terminal Test on the water-in-fuel sensor harness connector. Were any problems found?	**YES:** Repair problem. Run Harness Diagnostic Mode Test in Service ADVISOR. **NO:** GO TO 8

Continued on next page

RE42287,00003ED -19-21DEC10-8/14

7 Further Review of Snapshot Information	Review stored information collected in step 2	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 8 **NO:** GO TO 9

RE42287,00003ED -19-21DEC10-9/14

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace WIF sensor, Run Harness Diagnostic Mode Test in Service ADVISOR.
	Did 000097.00 reappear when engine operating point was reached?	**NO:** GO TO 7 and confirm operating point.

RE42287,00003ED -19-21DEC10-10/14

9 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform Terminal Test on the water-in-fuel sensor harness connector and ECU J3 connector.	**YES:** Repair problem. Run Harness Diagnostic Mode Test in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

RE42287,00003ED -19-21DEC10-11/14

10 ECU Reprogram	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR.	
	2. Run Harness Diagnostic Mode Test in Service ADVISOR.	**YES:** Replace WIF sensor. Run Harness Diagnostic Mode Test in Service ADVISOR.
	Is 000097.00 active?	**NO:** Problem fixed, bad ECU program.

RE42287,00003ED -19-21DEC10-12/14

11 Prime Fuel System	1. Ignition OFF, Engine OFF	
	2. If equipped, reconnect fuel transfer pump connector C19. Otherwise prime fuel system with the mechanical primer located on the mechanical transfer pump. 3. Ignition ON, Engine OFF 4. Wait 5 minutes for the system to prime and code to possibly reappear	
	5. Refresh DTCs	**YES:** Perform fuel quality check, see Check Fuel Supply Quality in Section 4 Group 150 earlier in this manual.
	Is DTC 000097.16 active?	**NO:** GO TO 12

Continued on next page

RE42287,00003ED -19-21DEC10-13/14

12 Operate Engine	1. Ignition ON, Engine running	
	2. Operate engine at fast idle for 5 minutes	
	3. Refresh DTCs	**YES:** Perform fuel quality check, see Check Fuel Supply Quality in Section 4 Group 150 earlier in this manual.
	Is DTC 000097.16 active?	**NO:** Possible Fuel Quality Problem

RE42287,00003ED -19-21DEC10-14/14

000097.03 — Water In Fuel Signal Out of Range High

The Water In Fuel Signal exceeds the sensor's high voltage specification.

RG41221,0000208 -19-20JAN09-1/20

000097.03 — Water In Fuel Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000097.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Water In Fuel Input Voltage increases above the sensor's high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to operate in a normal manner.

Additional References:
For more Water In Fuel sensor information, see WATER IN FUEL (WIF) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Water in fuel sensor D01 - Purple/Red

Continued on next page

RG41221,0000208 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000097.03 reappear active?

YES: GO TO 2

NO: GO TO 13

RG41221,0000208 -19-20JAN09-3/20

2 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on WIF sensor connector D01 and WIF sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41221,0000208 -19-20JAN09-4/20

3 Check WIF Sensor Return Circuit Resistance

On the harness, measure the resistance between WIF sensor connector D01-B and single point ground.

Is the resistance less than 5 ohms?

YES: GO TO 4

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000208 -19-20JAN09-5/20

4 Check For WIF Signal Circuit Shorted to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between coolant temperature sensor connector D01-A (+) and D01-B (-).

Is the voltage greater than 5.5V?

YES: GO TO 5

NO: GO TO 7

RG41221,0000208 -19-20JAN09-6/20

5 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on J03-D2 and J03-H3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 6

Continued on next page

RG41221,0000208 -19-20JAN09-7/20

6 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between ECU J03-D2 and all other terminals in the ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,0000208 -19-20JAN09-8/20

7 Check for DTC Change with Coolant Temperature Sensor Signal Shorted to Return	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on WIF sensor connector terminals D01-A and D01-B.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs	**YES:** GO TO 8
	Is DTC 000097.04 now an active DTC?	**NO:** GO TO 9

RG41221,0000208 -19-20JAN09-9/20

8 Check for DTC 000097.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from D01.	
	3. Reconnect D01 to WIF sensor.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** Replace WIF sensor. Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000097.03 now an active DTC?	**NO:** GO TO 11

RG41221,0000208 -19-20JAN09-10/20

9 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform Terminal Test on J03-D2 and J03-H3.	**YES:** GO TO 10
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000208 -19-20JAN09-11/20

10 Check WIF Sensor Circuit Continuity

1. Disconnect WIF sensor connector D01.
2. On the harness, measure the resistance between ECU J03-D2 and WIF sensor connector D01-A.
3. On the harness, measure the resistance between ECU J03-H3 and WIF sensor connector D01-B.

Were both resistance measurements less than 10 ohms?

YES: Replace ECU. Recheck for DTC.

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000208 -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Water In Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between WIF sensor and ECU J03 connector.

NOTE: The Water In Fuel Input Voltage will increase to approximately 5V when the sensor circuit is open or shorted to a voltage source.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,0000208 -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in WIF sensor connector D01.
3. Replace WIF sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000097.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

RG41221,0000208 -19-20JAN09-14/20

13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor Water In Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between WIF sensor and ECU J03 connector.

NOTE: The Water In Fuel Input Voltage will increase to approximately 5V when the sensor circuit is open or shorted to a voltage source.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000208 -19-20JAN09-15/20

14 Review Snapshot Instruction

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000097.03 now active?

YES: GO TO 2

NO: GO TO 15

Continued on next page

RG41221,0000208 -19-20JAN09-16/20

15 Terminal Test		
	1. Ignition OFF, engine OFF.	
	2. Disconnect WIF sensor connector D01.	
	3. Perform Terminal Test on D01.	
	4. Disconnect ECU J03 connector.	
	5. Perform Terminal Test on J03-D2 and J03-H3.	**YES:** GO TO 16
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000208 -19-20JAN09-17/20

16 Get More Information		
	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 000097.03 now active?	**NO:** GO TO 17

RG41221,0000208 -19-20JAN09-18/20

17 Check DTAC Solutions		
	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000097.03.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** GO TO 18

RG41221,0000208 -19-20JAN09-19/20

18 ECU Reprogram		
	Check Custom Performance for possible ECU software updates.	**YES:** Reprogram ECU with latest version of software.
	Is a later version of ECU software available?	**NO:** Contact DTAC for support.

RG41221,0000208 -19-20JAN09-20/20

000097.04 — Water In Fuel Signal Out of Range Low

The Water In Fuel Signal drops below the sensor's low voltage specification.

RG41221,0000209 -19-20JAN09-1/24

000097.04 — Water In Fuel Signal Out of Range Low

Troubleshooting Sequence:
000097.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Water In Fuel Input Voltage drops below the minimum threshold. The voltage is lower than what is physically possible for the Water In Fuel sensor to achieve.

Alarm Level:
Warning

Control Unit Response:
The ECU's will continue to work normally.

Additional References:
For further water-in-fuel sensor information, see WATER IN FUEL (WIF) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Water in fuel sensor D01 - Purple/Red

Continued on next page

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1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000097.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000209 -19-20JAN09-3/24

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the WIF sensor connector D01. 3. Perform TERMINAL TEST on D01 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000209 -19-20JAN09-4/24

3 Check for DTC 000097.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 000097.04 still an active DTC?	**YES:** GO TO 9 **NO:** GO TO 4

RG41221,0000209 -19-20JAN09-5/24

4 Check for DTC 000097.03	Is DTC 000097.03 now an active DTC with WIF sensor connector D01 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 9

RG41221,0000209 -19-20JAN09-6/24

5 Sensor Shorted to Ground Test	On the WIF sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 100k ohms?	**YES:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

RG41221,0000209 -19-20JAN09-7/24

6 Sensor Internal Short Test	On the WIF sensor, measure the resistance between terminal A and terminal B. Is the resistance between 200K and 240K ohms?	**YES:** GO TO 7. **NO:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

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7 Fuel Quality Check	Perform a fuel quality analysis. Is the fuel quality OK?	**YES:** GO TO 8 **NO:** Fix fuel supply problem. Recheck for DTC.

RG41221,0000209 -19-20JAN09-9/24

8 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor Water In Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between WIF sensor and ECU J03 connector. *NOTE: The Water In Fuel Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent short to ground found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000209 -19-20JAN09-10/24

9 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on terminals J03-D2 and J03-H3.. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

RG41221,0000209 -19-20JAN09-11/24

10 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-D2 and WIF sensor D01-A. 2. On the harness, measure the resistance between ECU J03-H3 and WIF sensor D01-B. Were both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000209 -19-20JAN09-12/24

11 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-D2 and single point ground. Was the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

RG41221,0000209 -19-20JAN09-13/24

12 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 000097.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 000097.04 still active with J03 disconnected?

YES: GO TO 16

NO: GO TO 13

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13 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-D2 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000209 -19-20JAN09-15/24

14 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Water In Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between WIF sensor and ECU J03 connector.

NOTE: The Water In Fuel Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 15

RG41221,0000209 -19-20JAN09-16/24

15 Check for Active DTC 000097.04

Refresh DTCs

Is DTC 000097.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

RG41221,0000209 -19-20JAN09-17/24

16 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 000097.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

RG41221,0000209 -19-20JAN09-18/24

17 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Water In Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between WIF sensor and ECU J03 connector. *NOTE: The Water In Fuel Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 18

RG41221,0000209 -19-20JAN09-19/24

18 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000097.04 now active?	**YES:** GO TO 2 **NO:** GO TO 19

RG41221,0000209 -19-20JAN09-20/24

19 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect WIF sensor connector D01. 3. Perform TERMINAL TEST on D01. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-D2 and J03-H3. Were Terminal Test results good?	**YES:** GO TO 20 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000209 -19-20JAN09-21/24

20 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000097.04 now active?	**YES:** GO TO 2 **NO:** GO TO 21

RG41221,0000209 -19-20JAN09-22/24

21 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000097.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 22

RG41221,0000209 -19-20JAN09-23/24

22 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000209 -19-20JAN09-24/24

000097.16 — Water in Fuel Detected

The ECU detects water in fuel.

RG41221,000020A -19-04SEP09-1/14

000097.16 — Water In Fuel Detected Diagnostic Procedure

Troubleshooting Sequence:
000097.16

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The water-in-fuel voltage drops below the minimum threshold. The voltage is lower than what is physically possible for the water-in-fuel sensor to achieve.

Alarm Level:
Warning

Control Unit Response:
The ECU's will continue to work normally.

Additional References:
For further water-in-fuel sensor information, see WATER IN FUEL (WIF) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• Water in Fuel Sensor D01 - Purple/Red

RG41221,000020A -19-04SEP09-2/14

1 Drain Water	1. Ignition OFF, engine OFF.	
	2. Open the drain valve on the bottom of the primary fuel filter.	
	3. After the water is drained, close valve.	
	4. Disconnect low pressure fuel pump 6-way connector C19.	
	NOTE: Disregard DTCs related to the low pressure fuel pump	
	5. Ignition ON, engine OFF.	
	6. Monitor the Water in fuel Input Voltage in Service ADVISOR.	**YES:** GO TO 2
	Is the voltage less than 4 volts?	**NO:** GO TO 11

Continued on next page

RG41221,000020A -19-04SEP09-3/14

2 Read DTCs and Store Snapshot Information	1. Ignition OFF, engine OFF. 2. Reconnect low pressure fuel pump 6-way connector C19. 3. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 4. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000097.16 reappear active?	**YES:** GO TO 3 **NO:** GO TO 5

RG41221,000020A -19-04SEP09-4/14

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on water-in-fuel sensor and harness connector. 3. Inspect harness for melted or pinched areas near the water-in-fuel sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,000020A -19-04SEP09-5/14

4 WIF Sensor Resistance Check	On the water-in-fuel sensor measure the resistance between signal (terminal A) and return (terminal B). Was the resistance value between 200k and 240k ohms?	**YES:** GO TO 5 **NO:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000020A -19-04SEP09-6/14

5 Occurrence Count Check	Review stored information and look at occurrence count for 000097.16. Is occurrence recorded in step 2 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

RG41221,000020A -19-04SEP09-7/14

6 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the water-in-fuel sensor harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

Continued on next page

RG41221,000020A -19-04SEP09-8/14

7 Further Review of Snapshot Information	Review stored information collected in step 2	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 8 **NO:** GO TO 9

RG41221,000020A -19-04SEP09-9/14

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace WIF sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did 000097.16 reappear when engine operating point was reached?	**NO:** GO TO 7 and confirm operating point.

RG41221,000020A -19-04SEP09-10/14

9 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the water-in-fuel sensor harness connector and ECU J3 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

RG41221,000020A -19-04SEP09-11/14

10 ECU Reprogram	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000097.16 active?	**NO:** Problem fixed, bad ECU program.

RG41221,000020A -19-04SEP09-12/14

11 Prime Fuel System	1. Ignition OFF, Engine OFF	
	2. Reconnect low pressure fuel pump 6-way connector C19. 3. Ignition ON, Engine OFF 4. Wait 5 minutes for the system to prime and code to possibly reappear	
	5. Refresh DTCs	**YES:** Perform fuel quality check, see CHECK FUEL SUPPLY QUALITY in Section 4 Group 150 earlier in this manual.
	Did DTC 000097.16 reappear active?	**NO:** GO TO 12

Continued on next page

RG41221,000020A -19-04SEP09-13/14

12 Operate Engine	1. Ignition ON, Engine RUNNING	
	2. Operate engine at fast idle for 5 minutes	
	3. Refresh DTCs	**YES:** Perform fuel quality check, see CHECK FUEL SUPPLY QUALITY in Section 4 Group 150 earlier in this manual.
	Did DTC 000097.16 reappear active?	**NO:** Possible Fuel Quality Problem

RG41221,000020A -19-04SEP09-14/14

000100.01 — Engine Oil Pressure Signal Extremely Low

The ECU senses the Engine Oil Pressure to be extremely low.

RG41221,000020B -19-20JAN09-1/13

000100.01 — Engine Oil Pressure Signal Extremely Low Diagnostic Procedure

Trouble Shooting Sequence:
000100.01

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:

NOTE: OEM engines are programmed using trimmable features. The customer had the option to choose an engine shutdown feature. If this feature was programmed into the ECU , the ECU will shut the engine down if this code sets. If the shutdown feature was not selected, a standard derate will be activated.

The ECU senses a lower than expected engine oil pressure.
The engine must be running for the code to be set.
The warning value set point is dependent on engine speed.
001569.31 is set when this code is active and engine has not shut down.
001110.31 is set if the shutdown feature is enabled.
001109.31 code is set 30 seconds before the ECU shuts down the engine.

Alarm Level:
STOP

Control Unit Response:
Maximum engine power is derated up to 60 percent.

Additional references:
For further oil pressure sensor information, see OIL PRESSURE SENSOR in Section 03, Group 140, earlier in this manual.
For further pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

RG41221,000020B -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000100.01 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,000020B -19-20JAN09-3/13

2 Measure Engine Oil Pressure With External Gauge

1. Ignition OFF, Engine OFF.
2. Attach a pressure gauge to an available gallery hole on the engine. See CHECK ENGINE OIL PRESSURE in Base Engine Manual, Section 04, Group 150.
3. Ignition ON, Engine ON.
4. Record pressure reading from pressure gauge.
5. Monitor the Engine Oil Pressure using Service ADVISOR.

NOTE: Pressure readings can be indicated in Atmosphere or Absolute. To convert from Atmosphere to Absolute, add 14.7 PSI (101kPa)

Is the pressure gauge value approximately the same reading as in Service ADVISOR?

YES: Engine oil pressure sensor is OK. GO TO 3

NO: Look for engine related problem. GO TO 5

RG41221,000020B -19-20JAN09-4/13

3 Operation at High Altitude

If the application is being operated at high altitude, the ECU may not measure the oil pressure correctly. Reprogram the ECU.

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.

YES: ECU had not been previously reprogrammed. GO TO 5

3. Monitor DTCs in Service ADVISOR.

YES: ECU has already been reprogrammed. GO TO 4

4. Ignition ON, Engine ON.

NO: Verify problem is fixed. GO TO 10

Is 000100.01 still active?

NO: Not running at high altitude. GO TO 4

Continued on next page

RG41221,000020B -19-20JAN09-5/13

4 Check Engine Oil	*NOTE: If oil has appearance of fuel or water mixed in with it, diagnose that problem first.*	
	Inspect engine oil and oil level.	**YES:** Change engine oil and filter. GO TO 10
	• Does engine have break in oil that has been run for over 100 hours?	**NO:** Diagnose problem why engine has low oil pressure. Refer to 9.0L - L2 - ENGINE OIL PRESSURE LOW in the base engine manual, Section 04, Group 150 for further assistance.

RG41221,000020B -19-20JAN09-6/13

5 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect the engine oil sensor connector.	
	3. Perform TERMINAL TEST on the harness and sensor connectors.	
	4. Inspect surrounding area for pinched or melted wires.	
	5. Look for loose terminal connections.	**YES:** Repair problem. GO TO 10
	Are there any problems with the wiring or connectors?	**NO:** GO TO 6

RG41221,000020B -19-20JAN09-7/13

6 Check Oil Pressure Sensor	1. Remove engine oil sensor. See REMOVE AND INSTALL OIL PRESSURE SENSOR in Section 02, Group 110 earlier in this section.	
	2. Inspect engine housing, sensor housing, and O-ring for defects.	**YES:** Replace defective part. GO TO 10
	Were any defects found?	**NO:** GO TO 7

RG41221,000020B -19-20JAN09-8/13

7 Oil Pressure Sensor Operation	1. Ignition OFF, Engine OFF.	
	2. With engine oil pressure sensor still removed from engine, reconnect sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	**YES:** Wire harness and sensor OK. Retest application for cause of low engine oil pressure. GO TO 1
	4. Monitor the Engine Oil Pressure Input Voltage using Service ADVISOR.	**NO:** Engine oil pressure sensor already been replaced. GO TO 8
	Is the voltage between 0.5 and 0.65 volts?	**NO:** Replace engine oil pressure sensor. GO TO 10

Continued on next page

RG41221,000020B -19-20JAN09-9/13

8 Check Harness

NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000100.04

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.
4. Monitor the DTC codes from within Service ADVISOR.

Did 000100.04 become active?

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Look for corrosion or loose terminal in oil pressure circuit. Diagnose and fix problem. GO TO 10

NO: Problem with ECU. GO TO 9

RG41221,000020B -19-20JAN09-10/13

9 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Ignition ON, Engine ON.

Is 000100.01 still active?

YES: Replace ECU. GO TO 10

NO: Verify problem is fixed. GO TO 10

RG41221,000020B -19-20JAN09-11/13

10 Verification

1. Ignition OFF, Engine OFF.
2. Reconnect all connectors, hoses, sensors, etc.
3. Ignition ON, Engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Refresh DTCs.
6. Operate engine through normal speed and load.

Did DTC 000100.01 reappear as active with engine running?

YES: Problem not found. Recheck wiring, connectors, and engine operation. GO TO 1

NO: Problem fixed.

RG41221,000020B -19-20JAN09-12/13

11 Review Snapshot Instruction

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.

YES: Found a possible problem.
Repair possible problem.
Retest.

3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.

YES: Found operating point at which the code becomes active. GO TO 2

Did you find a possible problem or the operating point at which the code becomes active?

NO: Start DTAC case.

RG41221,000020B -19-20JAN09-13/13

000100.04 — Engine Oil Pressure Signal Out of Range Low

RG41221,000020D -19-20JAN09-1/23

000100.04 — Engine Oil Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000100.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The oil pressure input voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for oil pressure.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more engine oil pressure sensor information, see OIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Oil pressure sensor P04 - Purple/Gray

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RG41221,000020D -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000100.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,000020D -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect oil pressure sensor connector P04. 3. Perform a TERMINAL TEST on connector P04. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,000020D -19-20JAN09-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P04-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000020D -19-20JAN09-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between oil pressure sensor signal P04-3 and return P04-1. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

RG41221,000020D -19-20JAN09-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P04-2 (+) and P04-1 (-). Is the voltage between 4.5V and 5.5V?	**YES:** GO TO 6 **NO:** Voltage is less than 4.5V, GO TO 10 **NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

Continued on next page

RG41221,000020D -19-20JAN09-7/23

6 Monitor voltage with Signal Shorted to 5V	1. Ignition OFF, engine OFF. 2. On the harness, install flex probes on oil pressure sensor connector terminals P04-2 and P04-3. 3. Connect jumper wire between flex probes. 4. Ignition ON, engine OFF. 5. Monitor oil pressure input voltage in Service ADVISOR. Is the voltage 4.8 volts or greater?	**YES:** GO TO 7 **NO:** GO TO 11

RG41221,000020D -19-20JAN09-8/23

7 Reconnect Sensor and Check for DTC 000100.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P04. 3. Reconnect oil pressure sensor connector P04. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000100.04 an active DTC?	**YES:** Replace oil pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

RG41221,000020D -19-20JAN09-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Oil Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between oil pressure sensor and ECU J03 connector. *NOTE: The oil pressure input voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

RG41221,000020D -19-20JAN09-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in oil pressure sensor connector P04. 3. Replace oil pressure sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000100.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

RG41221,000020D -19-20JAN09-11/23

10 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 11

Continued on next page

RG41221,000020D -19-20JAN09-12/23

11 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J03.
3. Perform a TERMINAL TEST on terminals J03-H4, J03-H3, and J03-C3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,000020D -19-20JAN09-13/23

12 Check Circuit Continuity

On the harness, measure the resistance between the following ECU J01 connector terminals and Manifold Absolute pressure sensor P04 connector terminals:

- J03-H3 to P04-1
- J03-H4 to P04-2
- J03-C3 to P04-3

Were all resistance measurements less than 10 ohms?

YES: GO TO 13

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000020D -19-20JAN09-14/23

13 Check for Signal Shorted to Ground

On the harness, measure the resistance between ECU J03-C3 and single point ground.

Is the resistance less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,000020D -19-20JAN09-15/23

14 Check for Wire-Wire Short

1. Disconnect ECU connectors J01 and J02.
2. Verify oil pressure sensor connector P04 is still disconnected.
3. On the harness, measure the resistance between J03-C3 and all other terminals in ECU connectors J01, J02, and J03.

Were all resistance measurements greater than 100k ohms?

YES: GO TO 15

NO: Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000020D -19-20JAN09-16/23

15 Reconnect and Check for DTC 000100.04

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.

Is DTC 000100.04 still active?

YES: Recheck procedure. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

Continued on next page

RG41221,000020D -19-20JAN09-17/23

16 Check for Intermittent Wiring Problem	1. Ignition ON, engine OFF.	
	2. Monitor Oil Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between oil pressure sensor and ECU J03 connector. *NOTE: The oil pressure input voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

RG41221,000020D -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000100.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,000020D -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect oil pressure sensor connector P04. 3. Perform TERMINAL TEST on P04. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-C3, J03-H3, and J03-H4. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

RG41221,000020D -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000100.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,000020D -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000100.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

RG41221,000020D -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,000020D -19-20JAN09-23/23

000100.18 — Engine Oil Pressure Signal Moderately Low

The ECU senses an oil pressure below the warning value set point in the ECU.

RG41221,000020E -19-20JAN09-1/13

000100.18 — Engine Oil Pressure Signal Moderately Low Diagnostic Procedure

Trouble Shooting Sequence:
000100.18

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses a lower than expected engine oil pressure.
The engine must be running for the code to be set.
The warning value set point is dependent on engine speed.
001569.31 is also set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional references:
For further oil pressure sensor information, see OIL PRESSURE SENSOR in Section 03, Group 140, earlier in this manual.
For further pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

RG41221,000020E -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000100.18 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,000020E -19-20JAN09-3/13

2 Measure Engine Oil Pressure With External Gauge

1. Ignition OFF, Engine OFF.
2. Attach a pressure gauge to an available gallery hole on the engine. See CHECK ENGINE OIL PRESSURE in Base Engine Manual, Section 04, Group 150.
3. Ignition ON, Engine ON.
4. Record pressure reading from pressure gauge.
5. Monitor the Engine Oil Pressure using Service ADVISOR.

NOTE: Pressure readings can be indicated in Atmosphere or Absolute. To convert from Atmosphere to Absolute, add 14.7 PSI (101kPa)

Is the pressure gauge value approximately the same reading as in Service ADVISOR?

YES: Engine oil pressure sensor is OK. GO TO 3

NO: Look for engine related problem. GO TO 5

RG41221,000020E -19-20JAN09-4/13

3 Operation at High Altitude

If the application is being operated at high altitude, the ECU may not measure the oil pressure correctly. Reprogram the ECU.

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.

YES: ECU had not been previously reprogrammed. GO TO 5

3. Monitor DTCs in Service ADVISOR.

YES: ECU has already been reprogrammed. GO TO 4

4. Ignition ON, Engine ON.

NO: Verify problem is fixed. GO TO 10

Is 000100.18 still active?

NO: Not running at high altitude. GO TO 4

Continued on next page

RG41221,000020E -19-20JAN09-5/13

4 Check Engine Oil	*NOTE: If oil has appearance of fuel or water mixed in with it, diagnose that problem first.*	
	Inspect engine oil and oil level.	**YES:** Change engine oil and filter. GO TO 9
	• Does engine have break in oil that has been run for over 100 hours?	**NO:** Diagnose problem why engine has low oil pressure. Refer to 9.0L - L2 - ENGINE OIL PRESSURE LOW in the base engine manual, Section 04, Group 150 for further assistance.

RG41221,000020E -19-20JAN09-6/13

5 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect the engine oil sensor connector.	
	3. Perform TERMINAL TEST on the harness and sensor connectors.	
	4. Inspect surrounding area for pinched or melted wires.	
	5. Look for loose terminal connections.	**YES:** Repair problem. GO TO 10
	Are there any problems with the wiring or connectors?	**NO:** GO TO 6

RG41221,000020E -19-20JAN09-7/13

6 Check Oil Pressure Sensor	1. Remove engine oil sensor. See REMOVE AND INSTALL OIL PRESSURE SENSOR in Section 02, Group 110 earlier in this section.	
	2. Inspect engine housing, sensor housing, and O-ring for defects.	**YES:** Replace defective part. GO TO 10
	Were any defects found?	**NO:** GO TO 7

RG41221,000020E -19-20JAN09-8/13

7 Oil Pressure Sensor Operation	1. Ignition OFF, Engine OFF.	
	2. With engine oil pressure sensor still removed from engine, reconnect sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	**YES:** Wire harness and sensor OK. Retest application for cause of low engine oil pressure. GO TO 1
	4. Monitor the Engine Oil Pressure Input Voltage using Service ADVISOR.	**NO:** Engine oil pressure sensor already been replaced. GO TO 8
	Is the voltage between 0.5 and 0.65 volts?	**NO:** Replace engine oil pressure sensor. GO TO 10

Continued on next page

RG41221,000020E -19-20JAN09-9/13

8 Check Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000100.04*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	
	4. Monitor the DTC codes from within Service ADVISOR.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Look for corrosion or loose terminal in oil pressure circuit. Diagnose and fix problem. GO TO 10
	Did 000100.04 become active?	**NO:** Problem with ECU. GO TO 9

RG41221,000020E -19-20JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Ignition ON, Engine ON.	**YES:** Replace ECU. GO TO 10
	Is 000100.18 still active?	**NO:** Verify problem is fixed. GO TO 10

RG41221,000020E -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** Problem not found. Recheck wiring, connectors, and engine operation. GO TO 1
	Did DTC 000100.18 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000020E -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000020E -19-20JAN09-13/13

000100.31 — Engine Oil Pressure Detected with Engine Stopped

The ECU receives an engine oil pressure when engine speed is zero.

RG41221,000020F -19-20JAN09-1/10

000100.31 — Engine Oil Pressure Detected with Engine Stopped Diagnostic Procedure

Trouble Shooting Sequence:
000100.04
000100.31

When DTC is Displayed:
When the ignition is on, engine off, and the error is active.

Related Information:
The ECU senses an engine oil pressure when engine is not running.
Code is not set with engine running.

Alarm Level:
Warning

Control Unit Response:
The ECU continues to operate normally.

Additional references:
For further oil pressure sensor information, see OIL PRESSURE SENSOR in Section 03, Group 140, earlier in this manual.
For further pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• Oil Pressure Sensor P04 - Purple/Gray

Continued on next page

RG41221,000020F -19-20JAN09-2/10

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000100.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,000020F -19-20JAN09-3/10

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the engine oil sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 7 **NO:** GO TO 3

RG41221,000020F -19-20JAN09-4/10

3 Check Oil Pressure Sensor Ground Wire	1. Ignition OFF, Engine OFF. 2. Measure the resistance from sensor harness connector terminal 1 to single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Open wire in harness or corrosion in connector terminals. Perform TERMINAL TEST on ECU connector J3. Look for loose wire crimps or terminal connections within mating connectors. GO TO 7

RG41221,000020F -19-20JAN09-5/10

4 Check Oil Pressure Sensor Signal Wire	1. Ignition ON, Engine OFF. 2. In harness, measure voltage between signal (terminal 3) and ground (terminal 1) of engine oil pressure sensor connector. Is the voltage greater than 0.5 volts?	**YES:** GO TO 5 **NO:** Replace engine oil sensor. See REMOVE AND INSTALL OIL PRESSURE SENSOR in Section 02, Group 110 earlier in this section. GO TO 7

Continued on next page

RG41221,000020F -19-20JAN09-6/10

5 Check Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000100.04*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J1.	
	3. Ignition ON, engine OFF.	
	4. Refresh Codes from within Service ADVISOR.	**YES:** Recheck harness for open ground wire or a short to signal wire between engine oil pressure sensor connector and ECU. GO TO 7
	5. Monitor DTCs from within Service ADVISOR.	**YES:** If engine oil sensor has not been replaced, replace engine oil sensor. See REMOVE AND INSTALL OIL PRESSURE SENSOR in Section 02, Group 110 earlier in this section. GO TO 7
	Did DTC 100.04 become active?	**NO:** Problem with ECU. GO TO 6

RG41221,000020F -19-20JAN09-7/10

6 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Ignition ON, Engine OFF.	**YES:** Replace ECU. GO TO 7
	Is 000100.31 still active?	**NO:** Verify problem is fixed. GO TO 7

RG41221,000020F -19-20JAN09-8/10

7 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, Engine OFF.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	**YES:** Problem not found. Recheck wiring and connectors. GO TO 1
	Did DTC 000100.31 reappear as active?	**NO:** Problem fixed.

Continued on next page

RG41221,000020F -19-20JAN09-9/10

8 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000020F -19-20JAN09-10/10

000102.02 — Manifold Air Pressure Signal Invalid

The ECU receives an invalid pressure from the Manifold Air Pressure sensor.

RG41221,0000210 -19-20JAN09-1/8

000102.02 — Manifold Air Pressure Signal Invalid

Troubleshooting Sequence:
Any DTC with an SPN of 001172
Any DTC with an SPN of 000103
000102.02

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Manifold Air Pressure sensor is invalid compared to the expected pressure for the current engine operating conditions.

There are many sensors and calculated values that interact with this code. It is important to insure all sensors are operating properly to correctly diagnose this code.

Alarm Level:
Warning

Control Unit Response:
The ECU will use a default manifold air pressure model to run the engine.

Additional References:
For more Manifold Air Pressure sensor information, see MANIFOLD AIR PRESSURE (MAP) SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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RG41221,0000210 -19-20JAN09-2/8

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000102.02 reappear active?

YES: GO TO 2

NO: GO TO 6

RG41221,0000210 -19-20JAN09-3/8

2 Sensors Test

1. Ignition OFF, Engine OFF.
2. Test the sensors in an controlled operating environment. See EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Group 150 earlier in this Section.

Did test pass?

YES: GO TO 4

NO: GO TO 3

RG41221,0000210 -19-20JAN09-4/8

3 Terminal Test

1. Ignition OFF, Engine OFF.
2. Perform TERMINAL TEST on the sensor(s) that did not pass the EGR-VGT system temperature and flow test.

Were any problems found?

YES: Repair problems. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 4

RG41221,0000210 -19-20JAN09-5/8

4 VGT Compressor Test

1. Ignition OFF, Engine OFF.
2. Inspect VGT compressor, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Group 150 earlier in this Section.

Did test pass?

YES: GO TO 5

Repair problems. Run HARNESS DIAGNOSTIC MODE TEST.

NO: Perform VGT component test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Group 150 earlier in this Section.

Continued on next page

RG41221,0000210 -19-20JAN09-6/8

5 Air Pressure Problems Checks	1. Ignition OFF, Engine OFF.	
	2. Test for air leaks, see TEST FOR INTAKE AIR LEAKS in base engine manual. Did test pass?	**YES:** GO TO 6 **NO:** Test for air leaks, see TEST FOR INTAKE AIR LEAKS in base engine manual.

RG41221,0000210 -19-20JAN09-7/8

6 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause and repair or GO TO 2.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,0000210 -19-20JAN09-8/8

000102.03 — Manifold Air Pressure Signal Out of Range High

The Manifold Air Pressure Input Voltage exceeds the sensor's high voltage specification.

RG41221,0000211 -19-20JAN09-1/22

000102.03 — Manifold Air Pressure Signal Out of Range High

Troubleshooting Sequence:
003510.03
000102.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Manifold Air Pressure Signal Out of Range High exceeds the sensor's high voltage specification. The voltage corresponds to a pressure that is higher than what is physically possible for manifold air pressure.

Alarm Level:
Warning

Control Unit Response:
The ECU will use a default manifold air pressure model to run the engine and try to maintain the engine operating envelope.

Additional References:
For sensor location see COMPONENT LOCATION in Section 3 Group 140.

For more Manifold Air Pressure sensor information, see MANIFOLD AIR PRESSURE (MAP) SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU small terminal - Orange/Green
- Manifold Air Pressure Sensor P01 - Purple/Gray

Continued on next page

RG41221,0000211 -19-20JAN09-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000102.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000211 -19-20JAN09-3/22

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect MAP sensor connector P01. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000102.03 go to stored and 000102.04 become active?	**YES:** GO TO 3 **NO:** GO TO 7

RG41221,0000211 -19-20JAN09-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform a TERMINAL TEST on connector P01. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41221,0000211 -19-20JAN09-5/22

4 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P01-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000211 -19-20JAN09-6/22

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P01-2 (+) and P01-1 (-). Is the voltage greater than 5.5V?	**YES:** Discontinue this test and perform tests for DTC 003510.03 as though DTC was active. **NO:** GO TO 6

Continued on next page

RG41221,0000211 -19-20JAN09-7/22

6 Check for DTC 000102.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect P01.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** Replace MAP sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000102.03 still active?	**NO:** GO TO 12

RG41221,0000211 -19-20JAN09-8/22

7 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform Terminal Test on J03-H4, J03-H3, and J03-C4.	**YES:** GO TO 8
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000211 -19-20JAN09-9/22

8 Check MAP Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-H3 and MAP sensor connector P01-1.	
	2. On the harness, measure the resistance between ECU J03-H4 and MAP sensor connector P01-2.	
	3. On the harness, measure the resistance between ECU J03-C4 and MAP sensor connector P01-3.	**YES:** GO TO 9
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000211 -19-20JAN09-10/22

9 Check for Short to Voltage	1. Ignition ON, engine OFF.	
	2. Measure the voltage between ECU J03-C4 and single point ground.	**YES:** Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the voltage greater than 0.5V?	**NO:** GO TO 10

Continued on next page

RG41221,0000211 -19-20JAN09-11/22

10 ECU J03 Disconnected Code Change Test	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 0000102.03.*	
	1. ECU connector J03 still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Refresh codes.	**YES:** GO TO 14
	Is DTC 000102.03 still active?	**NO:** GO TO 11

RG41221,0000211 -19-20JAN09-12/22

11 Check Signal Circuit for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between J03-C4 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Locate wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 100k ohms?	**NO:** GO TO 12

RG41221,0000211 -19-20JAN09-13/22

12 Check for Intermittent Short to Voltage	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Monitor Manifold Air Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Manifold Air Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 13

RG41221,0000211 -19-20JAN09-14/22

13 Check for Active DTC 000102.03	Refresh DTCs	**YES:** Recheck measurements. GO TO 2
	Is DTC 000102.03 still active?	**NO:** Problem is intermittent. Contact DTAC for support.

RG41221,0000211 -19-20JAN09-15/22

14 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Reconnect all connectors.	
	4. Ignition ON, engine OFF.	**YES:** Contact DTAC for support.
	Is DTC 000102.03 still active?	**NO:** Problem fixed.

Continued on next page

RG41221,0000211 -19-20JAN09-16/22

15 Check for Intermittent Short to Voltage	1. Ignition ON, engine OFF.	
	2. Monitor Manifold Air Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector. *NOTE: The Manifold Air Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.* Was the source of the intermittent short to voltage found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 16

RG41221,0000211 -19-20JAN09-17/22

16 Check Snapshot Information	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000102.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000211 -19-20JAN09-18/22

17 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect MAP sensor connector P01. 3. Perform Terminal Test on P01. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-H3, J03-H4, and J03-C4. Were Terminal Test results good?	**YES:** GO TO 18 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000211 -19-20JAN09-19/22

18 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000102.03 now active?	**YES:** GO TO 2 **NO:** GO TO 19

RG41221,0000211 -19-20JAN09-20/22

19 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000102.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 20

RG41221,0000211 -19-20JAN09-21/22

20 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000211 -19-20JAN09-22/22

000102.04 — Manifold Air Pressure Signal Out of Range Low

The Manifold Air Pressure Input Voltage drops below the sensor's low voltage specification.

RG41221,0000212 -19-20JAN09-1/23

000102.04 — Manifold Air Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000102.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Manifold Air Pressure Input Voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for the manifold pressure signal.

Alarm Level:
Warning

Control Unit Response:
ECU's will continue to operate normally.

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Manifold Air Pressure sensor information, see MANIFOLD AIR PRESSURE (MAP) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine intake manifold pressure signal sensor P01 - Purple/Gray

Continued on next page

RG41221,0000212 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000102.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000212 -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect MAP sensor connector P01. 3. Perform a TERMINAL TEST on connector P01. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000212 -19-20JAN09-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P01-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000212 -19-20JAN09-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between MAP sensor signal P01-3 and return P01-1. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

RG41221,0000212 -19-20JAN09-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P01-2 (+) and P01-1 (-). Is the voltage between 4.5V and 5.5V?	**YES:** GO TO 6 **NO:** Voltage is less than 4.5V, GO TO 10 **NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

Continued on next page

RG41221,0000212 -19-20JAN09-7/23

6 Check for DTC 000102.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF. 2. On the harness, install flex probes on MAP sensor connector terminals P01-2 and P01-3. 3. Connect jumper wire between flex probes. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000102.03 now an active DTC?	**YES:** GO TO 7 **NO:** GO TO 11

RG41221,0000212 -19-20JAN09-8/23

7 Reconnect Sensor and Check for DTC 000102.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P01. 3. Reconnect MAP sensor connector P01. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000102.04 an active DTC?	**YES:** Replace MAP sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

RG41221,0000212 -19-20JAN09-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Manifold Air Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector. *NOTE: The Manifold Air Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

RG41221,0000212 -19-20JAN09-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in MAP sensor connector P01. 3. Replace MAP sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000102.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

RG41221,0000212 -19-20JAN09-11/23

10 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 11

Continued on next page

RG41221,0000212 -19-20JAN09-12/23

11 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J03. 3. Perform a TERMINAL TEST on terminals J03-H4, J03-H3, and J03-C4. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

RG41221,0000212 -19-20JAN09-13/23

12 Check Circuit Continuity	On the harness, measure the resistance between the following ECU J01 connector terminals and MAP sensor P01 connector terminals: • J03-H3 to P01-1 • J03-H4 to P01-2 • J03-C4 to P01-3 Were all resistance measurements less than 10 ohms?	**YES:** GO TO 13 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000212 -19-20JAN09-14/23

13 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-C4 and single point ground. Is the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14

RG41221,0000212 -19-20JAN09-15/23

14 Check for Wire-Wire Short	1. Disconnect ECU connectors J01 and J02. 2. Verify MAP sensor connector P01 is still disconnected. 3. On the harness, measure the resistance between J03-C4 and all other terminals in ECU connectors J01, J02, and J03. Were all resistance measurements greater than 100k ohms?	**YES:** GO TO 15 **NO:** Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000212 -19-20JAN09-16/23

15 Reconnect and Check for DTC 000102.04	1. Reconnect all electrical connectors. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is DTC 000102.04 still active?	**YES:** Recheck procedure. GO TO 2 **NO:** Problem is intermittent. Contact DTAC for support.

Continued on next page

RG41221,0000212 -19-20JAN09-17/23

16 Check for Intermittent Wiring Problem	1. Ignition ON, engine OFF.	
	2. Monitor Manifold Air Pressure Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector. *NOTE: The Manifold Air Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

RG41221,0000212 -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000102.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,0000212 -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect MAP sensor connector P01. 3. Perform TERMINAL TEST on P01. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-C4, J03-H3, and J03-H4. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

RG41221,0000212 -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000102.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,0000212 -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000102.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

RG41221,0000212 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000212 -19-20JAN09-23/23

000103.00 — Turbo Speed Extremely High

The ECU detects a turbo speed above the specification.

Continued on next page

RG41221,0000213 -19-29MAY08-1/19

000103.00 — Turbo Speed Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000107.00 or 000107.31
002795.07
000641.04 or 000641.12 or 000641.13
000102.03 or 000102.04
002659.17
000103.00

Related Information:
The ECU detects that turbo speed is above 116,000 rpm for aluminum wheel or 138,000 rpm for titanium wheel or some other programmed value.
This DTC may be caused by intake air (boost) leaks or turbo problems.
This DTC may also be caused by high altitude operation combined with high engine loads or by restrictions in the EGR system.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For more turbo speed sensor information, see TURBO SPEED SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 earlier in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Turbo speed sensor connector X05 - Blue/Green

Continued on next page
RG41221,0000213 -19-29MAY08-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Clear DTCs. 5. Start engine and increase speed to 1500 rpm. Place engine under load, if possible. Is 000103.00 an active or stored DTC?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000213 -19-29MAY08-3/19

2 Check for Turbo Actuator Problem	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000641.13 active?	**YES:** Discontinue test for 000103.00 and perform 000641.13 — VGT ACTUATOR LEARN ERROR DIAGNOSTIC PROCEDURE. **NO:** GO TO 3

RG41221,0000213 -19-29MAY08-4/19

3 Check Intake and Turbo	1. Ignition OFF, engine OFF. 2. Perform CHARGE AIR SYSTEM DIAGNOSTIC test. 3. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. Did you find a problem?	**YES:** Fix problem. GO TO 16 **NO:** GO TO 4

RG41221,0000213 -19-29MAY08-5/19

4 Test Sensor Terminals	1. Disconnect turbo speed sensor 3-way connector X05. 2. Perform TERMINAL TEST on turbo speed sensor connector. Were any problems found?	**YES:** Fix problem. GO TO 16 **NO:** GO TO 5

RG41221,0000213 -19-29MAY08-6/19

5 Check Sensor Resistance	On the turbo speed sensor, measure the resistance between the signal (1) and return (2). *NOTE: Turbo speed sensor resistance will increase significantly when turbo is at operating temperature. Permit a hot turbo to cool and recheck sensor resistance before replacing sensor, if hot resistance is greater than 1300 ohms.* Is the resistance between 600 ohms and 1300 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 6 **NO:** GO TO 15

Continued on next page

RG41221,0000213 -19-29MAY08-7/19

6 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 16
	Were any problems found?	**NO:** GO TO 7

RG41221,0000213 -19-29MAY08-8/19

7 Check Wire Harness Continuity	*NOTE: Verify that turbo speed sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and the turbo speed sensor connector signal (1).	
	2. On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and the turbo speed sensor connector return (2).	**YES:** GO TO 8
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000213 -19-29MAY08-9/19

8 Check for Sensor Return Shorted to Ground	On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 10k ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000213 -19-29MAY08-10/19

9 Check for Wire-to-Wire Short	1. Disconnect ECU J2 and J3 connectors.	
	2. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and all other terminals in the J1, J2, and J3 connectors.	**YES:** GO TO 10
	Are all resistance measurements greater than 10k ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000213 -19-29MAY08-11/19

10 Check for Twisted Pair	Inspect turbo speed signal and return wires between the turbo speed sensor connector and ECU J1 connector.	**YES:** GO TO 11
	Are the turbo speed signal and return wires twisted together throughout the wire harness?	**NO:** Replace wires with twisted pair. GO TO 16

Continued on next page

RG41221,0000213 -19-29MAY08-12/19

11 Inspect Turbo Speed Sensor and Target

NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.

1. Remove turbo speed sensor.
2. Remove turbo compressor air inlet hose.
3. Spin turbo compressor wheel and look for sensor target (one flat spot on turbo shaft) through sensor mounting hole. Examine shaft for damage which sensor may detect as another target.
4. Examine tip of turbo speed sensor for damage due to contact with turb shaft.

Were any problems found?

YES: Replace turbo speed sensor and other damaged parts. GO TO 16

NO: Replace turbo speed sensor. GO TO 12

RG41221,0000213 -19-29MAY08-13/19

12 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all electrical connectors and reinstall turbo air inlet hose.
3. Download latest ECU payload and reprogram ECU.
4. Clear DTCs.
5. Start engine and increase speed to 1500 rpm. Place engine under load or recreate the conditions which caused the DTC to become active.

Did 000103.00 reappear active or stored with engine running?

YES: GO TO 13

NO: Problem fixed.

RG41221,0000213 -19-29MAY08-14/19

13 Check EGR System

NOTE: Calculated low EGR flow causes the ECU to increase exhaust back pressure using VGT position in an attempt to increase EGR flow.

NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.

1. Ignition OFF, engine OFF.
2. Remove EGR valve.
3. Inspect EGR valve for damage or blockage.
4. Verify that the part number of the EGR valve removed is the correct part for the engine.
5. Inspect intake and exhaust passages and EGR cooler for blockage which would restrict EGR flow.

Were any problems found?

YES: Fix problem or replace incorrect EGR valve. GO TO 16

NO: Reinstall EGR valve. GO TO 14

RG41221,0000213 -19-29MAY08-15/19

14 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Clear DTCs.
5. Start engine and increase speed to 1500 rpm. Place engine under load or recreate the conditions which caused the DTC to become active.

Did DTC 000103.00 reappear active or stored with engine running?

YES: Open DTAC case.

NO: Problem fixed.

Continued on next page

RG41221,0000213 -19-29MAY08-16/19

15 Inspect Turbo Speed Sensor and Target	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.* 1. Remove turbo speed sensor. 2. Remove turbo compressor air inlet hose. 3. Spin turbo compressor and look for sensor target (one flat spot on turbo shaft) through sensor mounting hole. Examine shaft for damage which sensor may detect as another target. 4. Examine tip of turbo speed sensor for damage due to contact with turbo shaft. Were any problems found?	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 16 **NO:** Replace turbo speed sensor. GO TO 16

RG41221,0000213 -19-29MAY08-17/19

16 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors and reinstall turbo air inlet hose, if removed. 3. Ignition ON, engine OFF. 4. Clear DTCs. 5. Start engine and increase speed to 1500 rpm. Place engine under load or recreate the conditions which caused the DTC to become active. Did 000103.00 reappear active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed.

RG41221,0000213 -19-29MAY08-18/19

17 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review the snapshot recording to determine the barometric pressure when 000103.00 became active. Operation under high loads at high altitudes may cause 000103.00 to become active as part of the engine protection strategy.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** DTC becomes active only at high altitude. Open DTAC case.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 2

RG41221,0000213 -19-29MAY08-19/19

000103.05 — Turbo Speed Signal Circuit has High Resistance

The ECU detects low current on the turbo speed sensor wiring.

RG41221,0000215 -19-20JAN09-1/15

000103.05 — Turbo Speed Signal Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000103.05

Related Information:
The ECU detects high resistance or an open circuit in the turbo speed sensor circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For more turbo speed sensor information, see TURBO SPEED SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- Turbo speed sensor connector X05 - Blue/Green
- ECU large terminal - Orange/Green
- Turbo system interconnect C23 - Yellow/Purple

RG41221,0000215 -19-20JAN09-2/15

1 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect turbo speed sensor 3-way connector X05.	
	3. Perform TERMINAL TEST on turbo speed sensor connector.	**YES:** Fix problem. GO TO 13
	Were any problems found?	**NO:** GO TO 2

Continued on next page

RG41221,0000215 -19-20JAN09-3/15

2 Check Sensor Resistance	On the turbo speed sensor, measure the resistance between the signal (1) and return (2). *NOTE: Turbo speed sensor resistance will increase significantly when turbo is at operating temperature. Permit a hot turbo to cool and recheck sensor resistance before replacing sensor, if hot resistance is greater than 1300 ohms.* Is the resistance between 600 ohms and 1300 ohms?	**YES:** GO TO 3 **NO:** Remove turbo speed sensor. GO TO 12

RG41221,0000215 -19-20JAN09-4/15

3 Check VGT Interconnect	1. Disconnect VGT interconnect 8-way connector C23. 2. Perform TERMINAL TEST on C23. 3. On the VGT harness, measure the resistance between the 8-way connector signal (C23-1) and the turbo speed sensor connector signal (1). 4. On the VGT harness, measure the resistance between the 8-way connector return (C23-2) and the turbo speed sensor connector return (2). Are terminal test results good and are both resistance measurements less than 10 ohms?	**YES:** Reconnect C23. GO TO 4 **NO:** Fix problem. GO TO 13

RG41221,0000215 -19-20JAN09-5/15

4 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 5

RG41221,0000215 -19-20JAN09-6/15

5 Check Wire Harness Continuity	1. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and the turbo speed sensor connector signal (1). 2. On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and the turbo speed sensor connector return (2). Are both resistance measurements less than 10 ohms?	**YES:** GO TO 6 **NO:** Fix problem. GO TO 13

RG41221,0000215 -19-20JAN09-7/15

6 Check for Wire-to-Wire Short	1. Disconnect ECU J2 and J3 connectors. 2. On the harness, measure the resistance between the ECU turbo speed sensor signal (J1-B4) and all other terminals in the J1, J2, and J3 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 13

Continued on next page

RG41221,0000215 -19-20JAN09-8/15

7 Check for Short to Voltage	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU turbo speed sensor signal (J1-B4) and single point ground.	**YES:** GO TO 8
	Is voltage less than 0.5V?	**NO:** Fix problem. GO TO 13

RG41221,0000215 -19-20JAN09-9/15

8 Check for Intermittent Open Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 9
	Did 000103.05 reappear active?	**NO:** Recheck for intermittent open circuit. GO TO 1

RG41221,0000215 -19-20JAN09-10/15

9 Replace Turbo Speed Sensor	Has turbo speed sensor been replaced during this diagnostic procedure?	**YES:** GO TO 10
		NO: Remove turbo speed sensor. GO TO 12

RG41221,0000215 -19-20JAN09-11/15

10 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 11
	Did 000103.05 reappear active?	**NO:** Problem fixed.

RG41221,0000215 -19-20JAN09-12/15

11 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000103.05 reappear active?	**NO:** Problem fixed.

Continued on next page

RG41221,0000215 -19-20JAN09-13/15

12 Inspect Turbo Speed Sensor	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of turbo speed sensor for damage due to contact with turbocharger shaft.	**YES:** Replace turbo speed sensor. Determine cause if replacement sensor also becomes damaged. GO TO 13
	Does sensor appear damaged due to contact with shaft?	**NO:** Replace turbo speed sensor. GO TO 13

RG41221,0000215 -19-20JAN09-14/15

13 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did 000103.05 reappear active?	**NO:** Problem fixed.

RG41221,0000215 -19-20JAN09-15/15

000103.08 — Turbo Speed Signal Incorrect

The ECU detects that turbo speed is not valid.

RG41221,0000217 -19-20JAN09-1/17

000103.08 — Turbo Speed Signal Incorrect Diagnostic Procedure

Troubleshooting Sequence:
000103.05
000103.31
000103.00
000103.08

Related Information:
This DTC may be caused by electrical noise which causes the turbo speed to appear to be too high.
This DTC is also caused by a missing turbo speed signal.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For more turbo speed sensor information, see TURBO SPEED SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Turbo speed sensor connector X05 - Blue/Green

Continued on next page

RG41221,0000217 -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. Is 000103.00, 000103.05, or 000103.31 an active or stored DTC?	**YES:** Discontinue test for 00103.08 and perform test for 000103.00 — TURBO SPEED SIGNAL EXTREMELY HIGH DIAGNOSTIC PROCEDURE, 000103.05 — TURBO SPEED SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDURE, or 000103.31 — TURBO SPEED SIGNAL MISSING DIAGNOSTIC PROCEDURE. **NO:** GO TO 2

RG41221,0000217 -19-20JAN09-3/17

2 Check for Active DTC	1. Clear DTCs. 2. Start engine and increase speed to 1500 rpm. Place engine under load, if possible. Is 000103.08 an active or stored DTC?	**YES:** GO TO 3 **NO:** GO TO 15

RG41221,0000217 -19-20JAN09-4/17

3 Test Sensor Terminals	1. Disconnect turbo speed sensor 3-way connector X05. 2. Perform TERMINAL TEST on turbo speed sensor connector. Were any problems found?	**YES:** Fix problem. GO TO 14 **NO:** GO TO 4

RG41221,0000217 -19-20JAN09-5/17

4 Check Sensor Resistance	On the turbo speed sensor, measure the resistance between the signal (1) and return (2). *NOTE: Turbo speed sensor resistance will increase significantly when turbo is at operating temperature. Permit a hot turbo to cool and recheck sensor resistance before replacing sensor, if hot resistance is greater than 1300 ohms.* Is the resistance between 600 ohms and 1300 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 5 **NO:** GO TO 13

RG41221,0000217 -19-20JAN09-6/17

5 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 14 **NO:** GO TO 6

Continued on next page

RG41221,0000217 -19-20JAN09-7/17

6 Check Wire Harness Continuity	*NOTE: Verify that turbo speed sensor signal and return wires are in the specified connector cavities (not swapped).* 1. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and the turbo speed sensor connector signal (1). 2. On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and the turbo speed sensor connector return (2). Are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 14

RG41221,0000217 -19-20JAN09-8/17

7 Check for Sensor Return Shorted to Ground	On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and single point ground. Is the resistance greater than 10k ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 14

RG41221,0000217 -19-20JAN09-9/17

8 Check for Wire-to-Wire Short	1. Disconnect ECU J2 and J3 connectors. 2. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and all other terminals in the J1, J2, and J3 connectors. Are all resistance measurements greater than 10k ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 14

RG41221,0000217 -19-20JAN09-10/17

9 Check for Twisted Pair	Inspect turbo speed signal and return wires between the turbo speed sensor connector and ECU J1 connector. Are the turbo speed signal and return wires twisted together throughout the wire harness?	**YES:** GO TO 10 **NO:** Replace wires with twisted pair. GO TO 4

RG41221,0000217 -19-20JAN09-11/17

10 Inspect Turbo Speed Sensor and Target	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.* 1. Remove turbo speed sensor. 2. Remove turbo compressor air inlet hose. 3. Spin turbo compressor and look for sensor target (one flat spot on turbo shaft) through sensor mounting hole. Examine shaft for damage which sensor may detect as another target. 4. Examine tip of turbo speed sensor for damage due to contact with turbo shaft. Were any problems found?	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 14 **NO:** Replace turbo speed sensor. GO TO 11

Continued on next page

RG41221,0000217 -19-20JAN09-12/17

11 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors and reinstall turbo air inlet hose.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Clear DTCs.	
	5. Start engine and increase speed to 1500 rpm. Place engine under load, if possible.	**YES:** GO TO 12
	Did 000103.08 reappear active or stored with engine running?	**NO:** Problem fixed.

RG41221,0000217 -19-20JAN09-13/17

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Clear DTCs.	
	5. Start engine and increase speed to 1500 rpm. Place engine under load, if possible.	**YES:** Open DTAC case.
	Did DTC 000103.08 reappear active or stored with engine running?	**NO:** Problem fixed.

RG41221,0000217 -19-20JAN09-14/17

13 Inspect Turbo Speed Sensor and Target	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	1. Remove turbo speed sensor.	
	2. Remove turbo compressor air inlet hose.	
	3. Spin turbo compressor and look for sensor target (one flat spot on turbo shaft) through sensor mounting hole. Examine shaft for damage which sensor may detect as another target.	
	4. Examine tip of turbo speed sensor for damage due to contact with turbo shaft.	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 14
	Were any problems found?	**NO:** Replace turbo speed sensor. GO TO 14

RG41221,0000217 -19-20JAN09-15/17

14 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors and reinstall turbo air inlet hose, if removed.	
	3. Ignition ON, engine OFF.	
	4. Clear DTCs.	
	5. Start engine and increase speed to 1500 rpm. Place engine under load, if possible.	**YES:** GO TO 2
	Did 000103.08 reappear active with engine running?	**NO:** Problem fixed.

Continued on next page

RG41221,0000217 -19-20JAN09-16/17

15 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 3

RG41221,0000217 -19-20JAN09-17/17

000103.31 — Turbo Speed Signal Missing

The ECU does not detect a signal coming from the turbo speed sensor.

RG41221,0000218 -19-20JAN09-1/20

000103.31 — Turbo Speed Signal Missing Diagnostic Procedure

Troubleshooting Sequence:
000103.05
000103.31

Related Information:
This DTC may be caused by an open or shorted turbo speed sensor circuit.
This DTC may also be caused by a seized or broken turbo shaft or other turbo damage.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For more turbo speed sensor information, see TURBO SPEED SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Turbo speed sensor connector X05 - Blue/Green

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RG41221,0000218 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start engine. 5. Refresh DTCs. Did 000103.31 reappear active with engine running?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,0000218 -19-20JAN09-3/20

2 Check for Open Speed Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000103.05 active?	**YES:** Discontinue test for 000103.31 and perform 000103.05 — TURBO SPEED SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDURE. **NO:** GO TO 3

RG41221,0000218 -19-20JAN09-4/20

3 Check for Damaged Turbo	1. Monitor the Manifold Air Pressure - Actual data point in Service ADVISOR with engine not running. 2. Start engine and increase speed to 1500 rpm. Did Manifold Air Pressure increase by at least 2.1 kPa (0.3 psi) as engine speed was increased?	**YES:** GO TO 4 **NO:** Check for damaged turbo. Fix problem. GO TO 17

RG41221,0000218 -19-20JAN09-5/20

4 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Verify turbo speed sensor installation torque. Was turbo speed sensor fully threaded into mounting hole?	**YES:** GO TO 5 **NO:** Torque sensor to specified value. GO TO 17

RG41221,0000218 -19-20JAN09-6/20

5 Test Sensor Terminals	1. Disconnect turbo speed sensor 3-way connector X05. 2. Perform TERMINAL TEST on turbo speed sensor connector. Were any problems found?	**YES:** Fix problem. GO TO 17 **NO:** GO TO 6

Continued on next page

RG41221,0000218 -19-20JAN09-7/20

6 Check Sensor Resistance	On the turbo speed sensor, measure the resistance between the signal (1) and return (2). *NOTE: Turbo speed sensor resistance will increase significantly when turbo is at operating temperature. Permit a hot turbo to cool and recheck sensor resistance before replacing sensor, if hot resistance is greater than 1300 ohms.* Is the resistance between 600 ohms and 1300 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 7 **NO:** GO TO 16

RG41221,0000218 -19-20JAN09-8/20

7 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 17 **NO:** GO TO 8

RG41221,0000218 -19-20JAN09-9/20

8 Check Wire Harness Continuity	*NOTE: Verify that turbo speed sensor signal and return wires are in the specified connector cavities (not swapped).* 1. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and the turbo speed sensor connector signal (1). 2. On the harness, measure the resistance between ECU turbo speed sensor return (J1-B3) and the turbo speed sensor connector return (2). Are both resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 17

RG41221,0000218 -19-20JAN09-10/20

9 Check for Signal to Return Short	1. Verify turbo speed sensor is disconnected. 2. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and return (J1-B3). Is the resistance greater than 1k ohms?	**YES:** GO TO 10 **NO:** Fix problem. GO TO 17

RG41221,0000218 -19-20JAN09-11/20

10 Check for Short to Ground	On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 17

RG41221,0000218 -19-20JAN09-12/20

11 Check for Wire-to-Wire Short	1. Disconnect ECU J2 and J3 connectors. 2. On the harness, measure the resistance between ECU turbo speed sensor signal (J1-B4) and all other terminals in the J1, J2, and J3 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 17

Continued on next page

RG41221,0000218 -19-20JAN09-13/20

12 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between ECU turbo speed sensor signal (J1-B4) and single point ground.	**YES:** GO TO 13
	Is the voltage less than 0.5V?	**NO:** Fix problem. GO TO 17

RG41221,0000218 -19-20JAN09-14/20

13 Replace Turbo Speed Sensor	Has turbo speed sensor been replaced during this diagnostic procedure?	**YES:** GO TO 14
		NO: GO TO 16

RG41221,0000218 -19-20JAN09-15/20

14 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Download latest ECU payload and reprogram ECU.	**YES:** GO TO 15
	Did 000103.31 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000218 -19-20JAN09-16/20

15 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000103.31 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000218 -19-20JAN09-17/20

16 Inspect Turbo Speed Sensor and Target	*NOTE: See REMOVE AND INSTALL TURBO SPEED SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	1. Remove turbo speed sensor.	
	2. Remove turbo compressor air inlet hose.	
	3. Spin turbo compressor and look for sensor target (one flat spot on turbo shaft) through sensor mounting hole. Examine shaft for damage which cause sensor to not detect the target.	
	4. Examine tip of turbo speed sensor for damage due to contact with turbo shaft.	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 17
	Were any problems found?	**NO:** Replace turbo speed sensor. GO TO 17

RG41221,0000218 -19-20JAN09-18/20

17 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors and reinstall turbo air inlet hose, if removed.	
	3. Ignition ON, engine ON.	**YES:** GO TO 2
	Did 000103.31 reappear active with engine running?	**NO:** Problem fixed.

Continued on next page

RG41221,0000218 -19-20JAN09-19/20

18 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Problem is intermittent. GO TO 4

RG41221,0000218 -19-20JAN09-20/20

000105.00 — Manifold Air Temperature Signal Extremely High

The ECU senses manifold air temperature above specification.

Continued on next page

RG41221,0000219 -19-20JAN09-1/26

000105.00 — Manifold Air Temperature Signal Extremely High Diagnostic Procedure

Trouble Shooting Sequence:
002795.07
000110.00 or 000110.15 or 000110.16
000641.12
000103.00
000107.00
001172.16
002790.16
002630.00 or 002630.15 or 002630.16
002791.02 or 002791.05 or 002791.06
002659.17
000412.00 or 000412.15 or 000412.16
000105.00 or 000105.15 or 000105.16

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:

NOTE: OEM engines are programmed using trimmable features. The customer had the option to choose an engine shutdown feature. If this feature was programmed into the ECU , the ECU will shut the engine down if this code sets. If the shutdown feature was not selected, a standard derate will be activated.

The ECU senses manifold air temperature at or above 123° C (253° F) on OEM engines.
The engine has to be running for the code to be set.
001569.31 is set when this code is active and engine has not shut down.
001110.31 is set if the shutdown feature is enabled. The engine has to be running for 3 minutes before the code is set.
001109.31 is set 30 seconds before the ECU shuts down the engine.

Alarm Level:
STOP

Control Unit Response:
Maximum engine power is derated up to 60 percent.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Manifold Air Temp Sensor T02 -Purple/Gray

RG41221,0000219 -19-20JAN09-3/26

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000105.00 reappear active?

YES: GO TO 2

NO: GO TO 18

RG41221,0000219 -19-20JAN09-4/26

2 Let Engine Cool (If warm)

Time permitting, let the engine sit for 8 hours after being run.

IMPORTANT: While it is preferred to check sensor accuracy on a cool engine, this diagnostic procedure can be done on warm engines.

Has the engine been off for 8 hours?

YES: GO TO 3

NO: GO TO 4

RG41221,0000219 -19-20JAN09-5/26

3 Temperature Comparison

1. Ignition ON, engine OFF.
2. Monitor Manifold Air Temperature in Service ADVISOR and compare the reading with the Charge Air Cooler Outlet Temperature.

Are the temperatures within 6 degrees C (10 degrees F) of each other?

YES: GO TO 5

NO: GO TO 9

RG41221,0000219 -19-20JAN09-6/26

4 Temperature Comparison

1. Ignition OFF, Engine OFF.
2. Remove MAT Sensor from intake manifold.
3. Reconnect MAT sensor connector.
4. While holding the body of the sensor, measure temperature at the sensor tip using the JT07253 Infrared Temperature Gun.

IMPORTANT: For an accurate reading, the infrared beam needs to directly contact the sensor tip with little distance between the heat gun and the sensor.

5. Ignition ON, Engine OFF.
6. Monitor the Manifold Air Temperature data point in Service ADVISOR.

Are the temperatures within 6 degrees C (10 degrees F) of each other?

YES: GO TO 5

NO: GO TO 9

Continued on next page

RG41221,0000219 -19-20JAN09-7/26

5 Data Capture	1. Ignition ON, Engine Idling 2. Allow engine to get to operating temperature. 3. Create a recording of the following parameters in Service ADVISOR: • Manifold Air Temperature • Charge Air Cooler Outlet Temperature • EGR Temperature • EGR Valve Position - Actual • Barometric Air Pressure • Cold Start Aid Status • Coolant Temperature • Manifold Air Pressure - Absolute • Manifold Air Pressure - Estimated Is the Manifold Air Temperature greater than the Charge Air Cooler Temperature plus 6 degrees C (10 degrees F)?	**YES:** GO TO 9 **NO:** GO TO 6

RG41221,0000219 -19-20JAN09-8/26

6 Is 000105.00 active?	Is DTC 000105.00 active?	**YES:** GO TO 8 **NO:** GO TO 7

RG41221,0000219 -19-20JAN09-9/26

7 Operate Engine Under Load	1. View the snapshot recording if available. 2. Operate engine under conditions which cause DTC 000105.00 to become active. 3. Create a recording of the following parameters in Service ADVISOR: • Manifold Air Temperature • Charge Air Cooler Outlet Temperature • EGR Temperature • EGR Valve Position - Actual • Barometric Air Pressure • Cold Start Aid Status • Coolant Temperature • Manifold Air Pressure - Absolute • Manifold Air Pressure - Estimated Is DTC 000105.00 active?	**YES:** GO TO 8 **NO:** Review data recordings with DTAC.

RG41221,0000219 -19-20JAN09-10/26

8 Check Intake Air Heater (If equipped)	Perform INTAKE AIR HEATER CHECK in Section 4, Group 150. Were problems found?	**YES:** Fix problem. Recheck for DTC. **NO:** Review data recordings with DTAC.

Continued on next page

RG41221,0000219 -19-20JAN09-11/26

9 Terminal Test

NOTE: From here on through the manual, the manifold air temperature will be referred to as MAT

1. Ignition OFF, Engine OFF.
2. Disconnect the MAT sensor connector T02.
3. Perform TERMINAL TEST on the harness and sensor connector.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Are there any problems with the wiring or connectors?

NO: GO TO 10

RG41221,0000219 -19-20JAN09-12/26

10 Check for DTC

1. Ignition ON, Engine OFF.
2. Refresh codes.

YES: Replace MAT sensor

Did 000105.03 become active?

NO: GO TO 11

RG41221,0000219 -19-20JAN09-13/26

11 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAT sensor and ECU J03 connector.

NOTE: The Manifold Air Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Was the source of the intermittent short to ground found?

NO: GO TO 12

RG41221,0000219 -19-20JAN09-14/26

12 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-F1 and J03-B2.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Were any problems found?

NO: GO TO 13

RG41221,0000219 -19-20JAN09-15/26

13 Check Sensor Circuit Continuity

1. On the harness, measure the resistance between ECU J03-F1 and MAT sensor T02-A.
2. On the harness, measure the resistance between ECU J03-B2 and MAT sensor T02-B.

YES: GO TO 14

Were both resistance measurements less than 10 ohms?

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000219 -19-20JAN09-16/26

14 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-F1 and single point ground. Was the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 15

RG41221,0000219 -19-20JAN09-17/26

15 Check for DTC 000105.03 with J03 Disconnected	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 000105.03.* 1. Verify ECU J03 connector is still disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Is DTC 000105.03 active with J03 disconnected?	 **YES:** GO TO 16 **NO:** GO TO 17

RG41221,0000219 -19-20JAN09-18/26

16 Check for Wire-Wire Short	1. Ignition OFF, engine OFF. 2. Disconnect ECU connectors J01 and J02. 3. Measure the resistance between ECU J03-F1 and all other terminals in the ECU harness connectors J01, J02, and J03. Was any measurement less than 100k ohms?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Recheck Measurements. GO TO 2

RG41221,0000219 -19-20JAN09-19/26

17 Replace ECU	1. Replace ECU. 2. Reconnect all electrical connectors. 3. Refresh DTCs. Is DTC 000105.00 still active?	 **YES:** Contact DTAC for support. **NO:** Problem fixed.

RG41221,0000219 -19-20JAN09-20/26

18 Check for Intermittent Connection	1. Ignition ON, engine OFF. 2. Monitor Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAT sensor and ECU J03 connector. *NOTE: The Manifold Air Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent connection found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 19

Continued on next page

RG41221,0000219 -19-20JAN09-21/26

19 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000105.00 now active?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,0000219 -19-20JAN09-22/26

20 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect MAT sensor connector T02. 3. Perform TERMINAL TEST on T02. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-F1 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 21 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000219 -19-20JAN09-23/26

21 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000105.00 now active?	**YES:** GO TO 2 **NO:** GO TO 22

RG41221,0000219 -19-20JAN09-24/26

22 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000105.00. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 23

RG41221,0000219 -19-20JAN09-25/26

23 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000219 -19-20JAN09-26/26

000105.03 — Manifold Air Temperature Signal Out of Range High

The Manifold Air Temperature Signal exceeds the sensor's high voltage specification.

RG41221,000021A -19-20JAN09-1/20

000105.03 — Manifold Air Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000105.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Manifold Air Temperature Input Voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for intake manifold air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default manifold air temperature of 60° C (140° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Manifold Air Temperature sensor T02 - Purple/Gray

Continued on next page

RG41221,000021A -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000105.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,000021A -19-20JAN09-3/20

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on MAT sensor connector T02 and MAT sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,000021A -19-20JAN09-4/20

3 Check MAT Return Circuit Resistance	On the harness, measure the resistance between MAT sensor connector T02-B and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021A -19-20JAN09-5/20

4 Check For MAT Signal Circuit Shorted to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between MAT sensor connector T02-A (+) and T02-B (-). Is the voltage greater than 5.5V?	**YES:** GO TO 5 **NO:** GO TO 7

RG41221,000021A -19-20JAN09-6/20

5 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on connector J03. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,000021A -19-20JAN09-7/20

6 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-F1 and all other terminals in ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,000021A -19-20JAN09-8/20

7 Check for DTC Change with MAT Signal Shorted to Return

1. Ignition OFF, engine OFF.
2. On the harness, install flex probes on MAT sensor connector terminals T02-A and T02-B.
3. Connect jumper wire between flex probes.
4. Ignition ON, engine OFF.
5. Refresh DTCs

Is DTC 000105.04 now an active DTC?

YES: GO TO 8

NO: GO TO 9

RG41221,000021A -19-20JAN09-9/20

8 Check for DTC 000105.03 with Sensor Reconnected

1. Ignition OFF, engine OFF.
2. Remove flex probes from T02.
3. Reconnect T02 to MAT sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000105.03 now an active DTC?

YES: Replace MAT sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

RG41221,000021A -19-20JAN09-10/20

9 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-B2 and J03-F1.

Were Terminal Test results good?

YES: GO TO 10

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,000021A -19-20JAN09-11/20

10 Check MAT Sensor Circuit Continuity

1. Disconnect MAT sensor connector T02.
2. On the harness, measure the resistance between ECU J03-F1 and MAT sensor connector T02-A.
3. On the harness, measure the resistance between ECU J03-B2 and MAT sensor connector T02-B.

Were both resistance measurements less than 10 ohms?

YES: GO TO 11

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021A -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the MAT sensor and ECU J03 connector.

NOTE: The Manifold Air Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,000021A -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in MAT sensor connector T02.
3. Replace MAT sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000105.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

RG41221,000021A -19-20JAN09-14/20

13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor the Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the MAT sensor and ECU J03 connector.

NOTE: The Manifold Air Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

Continued on next page

RG41221,000021A -19-20JAN09-15/20

14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000105.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,000021A -19-20JAN09-16/20

15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect MAT sensor connector T02. 3. Perform TERMINAL TEST on T02. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-F1 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021A -19-20JAN09-17/20

16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000105.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,000021A -19-20JAN09-18/20

17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000105.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

RG41221,000021A -19-20JAN09-19/20

18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,000021A -19-20JAN09-20/20

000105.04 — Manifold Air Temperature Signal Out of Range Low

The Manifold Air Temperature Signal drops below the sensor's low voltage specification.

RG41221,000021B -19-20JAN09-1/23

000105.04 — Manifold Air Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000105.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Manifold Air Temperature Input Voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for manifold air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default manifold air temperature of 60° C (140° F).

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For further Manifold Air Temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Intake manifold air temperature sensor T02 - Purple/Gray

Continued on next page

RG41221,000021B -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 000105.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,000021B -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the MAT sensor connector T02. 3. Perform TERMINAL TEST on T02 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,000021B -19-20JAN09-4/23

3 Check for DTC 000105.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 000105.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

RG41221,000021B -19-20JAN09-5/23

4 Check for DTC 000105.03	Is DTC 000105.03 now an active DTC with MAT sensor connector T02 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

RG41221,000021B -19-20JAN09-6/23

5 Sensor Shorted to Ground Test	On the MAT sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 1k ohms?	**YES:** Replace MAT sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

RG41221,000021B -19-20JAN09-7/23

6 Sensor Internal Short Test	On the MAT sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 60 ohms?	**YES:** Replace MAT sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

RG41221,000021B -19-20JAN09-8/23

7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAT sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Manifold Air Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** Replace MAT sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021B -19-20JAN09-9/23

8 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-F1 and J03-B2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

RG41221,000021B -19-20JAN09-10/23

9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-F1 and MAT sensor T02-A.	
	2. On the harness, measure the resistance between ECU J03-B2 and MAT sensor T02-B.	**YES:** GO TO 10
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021B -19-20JAN09-11/23

10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-F1 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100k ohms?	**NO:** GO TO 11

RG41221,000021B -19-20JAN09-12/23

11 Check for DTC Active Status Change with J03 Disconnected	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 000105.04.*	
	1. Verify ECU J03 connector is still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Refresh codes.	**YES:** GO TO 15
	Is DTC 000105.04 still active with J03 disconnected?	**NO:** GO TO 12

Continued on next page

RG41221,000021B -19-20JAN09-13/23

12 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between ECU J03-F1 and all other terminals in the ECU harness connectors J01, J02, and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** GO TO 13

RG41221,000021B -19-20JAN09-14/23

13 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAT sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Manifold Air Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** GO TO 14

RG41221,000021B -19-20JAN09-15/23

14 Check for Active DTC 000105.04	Refresh DTCs	**YES:** Recheck measurements. GO TO 2
	Is DTC 000105.04 still active?	**NO:** Problem is intermittent. Contact DTAC for support.

RG41221,000021B -19-20JAN09-16/23

15 Replace ECU	1. Replace ECU.	
	2. Reconnect all electrical connectors.	
	3. Refresh DTCs.	**YES:** Contact DTAC for support.
	Is DTC 000105.04 still active?	**NO:** Problem fixed.

RG41221,000021B -19-20JAN09-17/23

16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Manifold Air Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAT sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Manifold Air Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent connection found?	**NO:** GO TO 17

Continued on next page

RG41221,000021B -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000105.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,000021B -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect MAT sensor connector T02. 3. Perform TERMINAL TEST on T02. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-F1 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021B -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000105.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,000021B -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000105.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

RG41221,000021B -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,000021B -19-20JAN09-23/23

000105.15 — Manifold Air Temperature Signal Slightly High

The ECU senses manifold air temperature above specification.

RG41221,000021C -19-20JAN09-1/15

000105.15 — Manifold Air Temperature Signal Slightly High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00 or 000110.15 or 000110.16
000105.15

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses manifold air temperature of 120° C (248° F) on OEM engines.
The engine has to be running for the code to be set.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to run normally.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Manifold Air Temperature sensor T02 – Purple/Gray

Continued on next page

RG41221,000021C -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000105.15 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,000021C -19-20JAN09-3/15

2 Check EGR Temperature	Part 1 Is engine equipped with an EGR temperature sensor? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 2 COMPONENT (J) in Section 03, Group 140 earlier in this manual.*	**YES:** GO TO Part 2 **NO:** GO TO 4
	1. Ignition ON, Engine ON. 2. Let engine run for 3 minutes. 3. Refresh codes from within Service Advisor. Are any DTCs related to high EGR temperature active. (412.15, 412.16, or 412.00)?	**YES:** GO TO 3 **NO:** GO TO 4

RG41221,000021C -19-20JAN09-4/15

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual. 3. Reconnect the EGR harness connector to the EGR valve. 4. Ignition ON, Engine OFF. 5. From within Service ADVISOR and under Interactive Tests, run ECU: EGR Valve Clean Test. 6. Observe that the EGR valve cycles open and closed. When the clean cycle has finished, the EGR valve should be completely closed. Does the EGR valve remain partly open after the clean test?	**YES:** Replace and calibrate new EGR valve. See EXHAUST GAS RECIRCULATION VALVE CALIBRATION earlier in this section of the manual. GO TO 12 **NO:** Reinstall EGR valve. GO TO 4

Continued on next page

RG41221,000021C -19-20JAN09-5/15

4 Preliminary Check of Air Intake System	Visually inspect components related to air intake system. • Restricted air intake plumbing. See CHECK AIR INTAKE SYSTEM in Base Engine Manual, Section 04, Group 150 and REMOVE, INSPECT, AND INSTALL INTAKE MANIFOLD in Base Engine Manual, Section 02, Group 080. • Restricted, dirty, or damaged charge air cooler. Refer to VEHICLE MAINTENANCE MANUAL for more information. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Damaged cooling fan shroud. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 12 **NO:** GO TO 5

RG41221,000021C -19-20JAN09-6/15

5 Terminal Test	*NOTE: From here on through the manual, the manifold air temperature will be referred to as MAT* 1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 6

RG41221,000021C -19-20JAN09-7/15

6 Check Manifold Air Temperature Sensor	1. Remove MAT sensor. See REMOVE AND INSTALL MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 12 **NO:** GO TO 7

RG41221,000021C -19-20JAN09-8/15

7 Check Manifold Air Temperature Sensor Operation	1. With MAT sensor removed from engine, reconnect MAT sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor Manifold Air Temperature from within Service ADVISOR. 4. If necessary, let the sensor cool down to the ambient temperature. Does the sensor reading closely match the ambient temperature?	**YES:** MAT sensor is OK. Diagnose engine air intake cooling system. GO TO 10 **NO:** MAT sensor has already been replaced. GO TO 8 **NO:** Replace MAT sensor. GO TO 12

Continued on next page

RG41221,000021C -19-20JAN09-9/15

8 Check Signal Wire In Harness	1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Ignition ON, Engine OFF. 4. Monitor DTCs from within Service ADVISOR. Did 105.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Recheck connectors and air intake system. GO TO 1 **NO:** GO TO 9

RG41221,000021C -19-20JAN09-10/15

9 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000105.03* 1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. 3. Ignition ON, Engine OFF. 4. Monitor the DTC codes from within Service ADVISOR. Did 000105.03 become active?	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 12 **NO:** Replace ECU. GO TO 12

RG41221,000021C -19-20JAN09-11/15

10 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See TEST FOR AIR INTAKE LEAKS in Base Engine Manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER INSPECTION in Base Engine Manual, Section 02, Group 080. Was cause of high manifold air temperature determined?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 11

RG41221,000021C -19-20JAN09-12/15

11 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual. 2. Reconnect all connectors and sensors. 3. Monitor DTCs in Service ADVISOR. 4. Let engine run for 3 minutes and refresh codes. Is 000105.15 still active?	**YES:** Problem not fixed. Verify air intake system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 12

Continued on next page

RG41221,000021C -19-20JAN09-13/15

12 Verification		
	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and air intake system. GO TO 1
	Did DTC 000105.15 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000021C -19-20JAN09-14/15

13 Review Snapshot Information		
	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000021C -19-20JAN09-15/15

000105.16 — Manifold Air Temperature Signal Moderately High

The ECU senses an manifold air temperature above specification.

RG41221,000021D -19-20JAN09-1/15

000105.16 — Manifold Air Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000110.00 or 000110.15 or 000110.16
000105.16

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses manifold air temperature of 121° C (250° F) on OEM engines.
The engine has to be running for the code to be set.
001569.31 is set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray
- Manifold Air Temperature sensor T02 - Purple/Gray

Continued on next page

RG41221,000021D -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000105.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,000021D -19-20JAN09-3/15

2 Check EGR Temperature	Part 1 Is engine equipped with an EGR temperature sensor? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 2 COMPONENT (J) in Section 03, Group 140 earlier in this manual.*	**YES:** GO TO Part 2 **NO:** GO TO 4
	1. Ignition ON, Engine ON. 2. Let engine run for 3 minutes. 3. Refresh codes from within Service Advisor. Are any DTCs related to EGR temperature active (412.15, 412.16, or 412.00)?	**YES:** GO TO 3 **NO:** GO TO 4

RG41221,000021D -19-20JAN09-4/15

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual. 3. Reconnect the EGR harness connector to the EGR valve. 4. Ignition ON, Engine OFF. 5. From within Service ADVISOR and under Interactive Tests, run ECU: EGR Valve Clean Test. 6. Observe that the EGR valve cycles open and closed. When the clean cycle has finished, the EGR valve should be completely closed. Does the EGR valve remain partly open after the clean test?	**YES:** Replace and calibrate new EGR valve. See EXHAUST GAS RECIRCULATION VALVE CALIBRATION earlier in this section of the manual. GO TO 12 **NO:** Reinstall EGR valve. GO TO 4

Continued on next page

RG41221,000021D -19-20JAN09-5/15

4 Preliminary Check of Air Intake System

Visually inspect components related to air intake system.

- Restricted air intake plumbing. See CHECK AIR INTAKE SYSTEM in Base Engine Manual, Section 04, Group 150 and REMOVE, INSPECT, AND INSTALL INTAKE MANIFOLD in Base Engine Manual, Section 02, Group 080.
- Restricted, dirty, or damaged charge air cooler. Refer to VEHICLE MAINTENANCE MANUAL for more information.
- Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manua, Section 02, Group 070.
- Damaged cooling fan shroud.
- Excessively high ambient air temperature.

Were any problems found?

YES: Fix problem(s). GO TO 12

NO: GO TO 5

RG41221,000021D -19-20JAN09-6/15

5 Terminal Test

NOTE: From here on through the manual, the manifold air temperature will be referred to as MAT

1. Ignition OFF, Engine OFF.
2. Disconnect the MAT sensor connector.
3. Perform TERMINAL TEST on the harness and sensor connector.
4. Inspect surrounding area for pinched or melted wires.

Are there any problems with the wiring or connectors?

YES: Repair problem. GO TO 12

NO: GO TO 6

RG41221,000021D -19-20JAN09-7/15

6 Check Manifold Air Temperature Sensor

1. Remove MAT sensor. See REMOVE AND INSTALL MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 02, Group 110 earlier in this manual.
2. Inspect engine housing, sensor housing, and O-ring for defects.

Were any defects found?

YES: Replace defective part. GO TO 12

NO: GO TO 7

RG41221,000021D -19-20JAN09-8/15

7 Check Manifold Air Temperature Sensor Wiring

1. With MAT sensor removed from engine, reconnect MAT sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor Manifold Air Temperature from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: MAT sensor is OK. Diagnose engine air intake cooling system. GO TO 10

NO: MAT sensor has already been replaced. GO TO 8

NO: Replace MAT sensor. GO TO 12

Continued on next page

RG41221,000021D -19-20JAN09-9/15

8 Check Signal Wire In Harness	1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Ignition ON, Engine OFF. 4. Monitor DTCs from within Service ADVISOR. Did 105.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Recheck air intake system. GO TO 1 **NO:** GO TO 9

RG41221,000021D -19-20JAN09-10/15

9 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000105.03* 1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. 3. Ignition ON, Engine OFF. 4. Monitor the DTC codes from within Service ADVISOR. Did 000105.03 become active?	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 12 **NO:** Replace ECU. GO TO 12

RG41221,000021D -19-20JAN09-11/15

10 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See TEST FOR AIR INTAKE LEAKS in Base Engine Manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER INSPECTION in Base Engine Manual, Section 02, Group 080. Was cause of high manifold air temperature determined?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 11

RG41221,000021D -19-20JAN09-12/15

11 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual. 2. Reconnect all connectors and sensors. 3. Monitor DTCs in Service ADVISOR. 4. Let engine run for 3 minutes and refresh codes. Is 000105.16 still active?	**YES:** Problem not fixed. Verify air intake system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 12

Continued on next page

RG41221,000021D -19-20JAN09-13/15

12 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and air intake system. GO TO 1
	Did DTC 000105.16 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000021D -19-20JAN09-14/15

13 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000021D -19-20JAN09-15/15

000107.00 — Air Filter Restriction Switch Activated

This code will set if the air pressure switch changes state due to excessively low air pressure (high vacuum).

WL30140,0000028 -19-28MAY08-1/7

000107.00 — Air Filter Restriction Switch Activated Diagnostic Procedure

Related Information:
The air pressure switch is located on the clean side of the air filter. Depending on application, the switch and ECU will be set up for either normally closed or normally open

Alarm Level:
Warning

Control Unit Response:
Refer to Derate Specifications for the application.

Engine performance will degrade according to the degree of restriction.

Additional References:

WL30140,0000028 -19-28MAY08-2/7

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000107.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

WL30140,0000028 -19-28MAY08-3/7

2 Check Air Filter and Ducting	Check air filter and all air intake ducting for restrictions. Was air filter dirty or were any restrictions found?	**YES:** Repair and retest. **NO:** GO TO 3

WL30140,0000028 -19-28MAY08-4/7

3 Check for Intake Restrictions	Inspect air intake system on suction side of turbo for any source of blockage. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS in Section 4 of the base engine manual. Were any restrictions found?	**YES:** Repair and retest. **NO:** GO TO 4

WL30140,0000028 -19-28MAY08-5/7

4 Switch Wiring Test	1. Disconnect the air filter pressure switch. 2. Disconnect the harness from the ECU. 3. Check the switch circuit for opens, grounds, and poor connections. Were any wiring problems found?	**YES:** Repair and retest. **NO:** Switch may be out of calibration. Replace switch and retest.

Continued on next page

WL30140,0000028 -19-28MAY08-6/7

5 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

WL30140,0000028 -19-28MAY08-7/7

000107.31 — Air Filter Restriction Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU detects restriction in the air filter.

Continued on next page

DN22556,0000651 -19-20JAN09-1/18

000107.31 — Air Filter Restriction Diagnostic Procedure

Troubleshooting Sequence:
000107.31

When DTC is Displayed:
When ever the engine is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have an air filter restriction detection switch. When this feature is programmed into the ECU, the ECU will derate the engine when the switch is activated.
The air filter restriction switch is located on the clean side of the air filter. The switch is activated when the air is restricted through the air filter.

Alarm Level:
Warning

Control Unit Response:
If the code is set, the ECU will derate the engine by 50% full power.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on engine derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Auxiliary connector C08 - Yellow/Purple

Continued on next page

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000107.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

DN22556,0000651 -19-20JAN09-3/18

2 Check Air Filter	Check air filter and dust valve. Check for any restrictions in inlet tube and filter system. See AIR INTAKE AND EXHAUST SYSTEM OPERATION in base engine manual, Section 03, Group 120. Was the air filter dirty or were any restrictions found?	**YES:** Fix problem. GO TO 15 **NO:** GO TO 3

DN22556,0000651 -19-20JAN09-4/18

3 Check for Intake Restrictions	Inspect air intake system on suction side of turbo for any source of blockage. See CHECK AIR INTAKE SYSTEM in base engine manual, Section 04, Group 150. Were any problems found?	**YES:** Fix problem. GO TO 15 **NO:** GO TO 4

DN22556,0000651 -19-20JAN09-5/18

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Remove wires or connector from air filter restriction switch. 3. Perform TERMINAL TEST on connector and air filter restriction switch. 4. Inspect surrounding area for pinched or melted wires. Were any problems found with the wiring or connectors?	**YES:** Fix problem. GO TO 15 **NO:** GO TO 5

DN22556,0000651 -19-20JAN09-6/18

5 Check Switch Operation	1. Ignition OFF, Engine OFF. 2. Test air filter restriction switch for proper operation. See PRESSURE TEST EGR COOLER FOR AIR LEAKS in base engine manual, Section 04, Group 150. 3. Measure the resistance across the air filter restriction switch terminals as the switch opens and closes in step 2 (Or manually open and close switch contacts). Does the switch operate properly and the resistance change as the contacts open and close?	**YES:** Switch operates properly. GO TO 6 **NO:** Replace switch. GO TO 15

Continued on next page

DN22556,0000651 -19-20JAN09-7/18

6 Check Harness

Step 1.

1. Ignition ON, Engine ON.
2. Refresh codes from within Service ADVISOR.
3. Record if 000107.31 is active.
4. GO TO step 2.

Step 2.

5. Ignition OFF, Engine OFF.
6. On the harness, connect the two wires from the air filter restriction switch together.
7. Ignition ON, Engine OFF.
8. Refresh codes from within Service ADVISOR.

Did 000107.31 change state from step 1?

YES: Problem with air filter restriction switch or air filter system. GO TO 2

NO: Problem in harness. GO TO 7

DN22556,0000651 -19-20JAN09-8/18

7 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the two wires to the air filter restriction switch from each other.
3. Disconnect C08 auxiliary connector in harness.
4. Perform TERMINAL TEST on both C08 connectors.
5. Inspect harness for pinched or melted wires near both C08 connectors.

Are there any problems with the wiring or connectors

YES: Fix problem. GO TO 15

NO: GO TO 8

DN22556,0000651 -19-20JAN09-9/18

8 Check Auxiliary Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal N to each individual wire of the air filter restriction switch.
3. On auxiliary harness connector C08, measure resistance from terminal Q to each individual wire of the air filter restriction switch.

Does each terminal, J and Q measure less than 5 ohms to one of the wires?

YES: GO TO 9

NO: Fix open wire in auxiliary harness. GO TO 15

DN22556,0000651 -19-20JAN09-10/18

9 Check Auxiliary Harness for Shorted Wire

NOTE: Make sure the wires to the air filter restriction switch are disconnected from the switch and not touching each other.

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal N to each terminal of C08.

Were any measurements less than 100 ohms?

YES: Fix shorted wire in auxiliary harness. GO TO 15

NO: Problem in main harness. GO TO 8

Continued on next page

DN22556,0000651 -19-20JAN09-11/18

10 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on ECU harness connector J2.
4. Inspect harness for pinched or melted wires near J2 ECU connector.

Are there any problems with the wiring or connector?

YES: Fix problem. GO TO 15

NO: GO TO 11

DN22556,0000651 -19-20JAN09-12/18

11 Check ECU Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness, measure resistance from connector C08, terminal N to ECU connector J2, terminal D3.
3. On ECU harness, measure resistance from connector C08, terminal Q to ECU connector J2, terminal G3.

Was either measurements greater than 5 ohms?

YES: GO TO 12

NO: Fix open wire in harness cable. GO TO 15

DN22556,0000651 -19-20JAN09-13/18

12 Check ECU Harness for Shorted Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness connector C08, measure resistance from terminal N to each terminal of C08.

Were any measurements less than 100 ohms?

YES: Fix shorted wire in ECU harness. GO TO 15

NO: ECU has not been reprogrammed. GO TO 13

NO: ECU has been reprogrammed. GO TO 14

DN22556,0000651 -19-20JAN09-14/18

13 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) earlier in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000107.31 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 15

DN22556,0000651 -19-20JAN09-15/18

14 Check ECU

NOTE: For ECU connector pinouts, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 earlier in this manual.

On ECU, measure resistance from terminal J2-D3 to terminal J2-G3.

Is the measurement between 700 ohms and 2000 ohms?

YES: Problem not found. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.

NO: Replace ECU. GO TO 15

Continued on next page

DN22556,0000651 -19-20JAN09-16/18

15 Verification		
	1. Ignition OFF, Engine OFF.	
	2. Reconnect all wiring, connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load ranges if possible.	**YES:** GO TO 1
	Did DTC 000107.31 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,0000651 -19-20JAN09-17/18

16 Review Snapshot Information		
	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active?	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

DN22556,0000651 -19-20JAN09-18/18

000108.02 — Barometric Pressure Signal Invalid

The ECU receives an invalid pressure from the barometric air pressure sensor.

RG41221,000021E -19-20JAN09-1/6

000108.02 — Barometric Pressure Signal Invalid Diagnostic Procedure

Troubleshooting Sequence:
000108.02

Related Information:
The barometric air pressure sensor is an internal ECU sensor and cannot be repaired.

Alarm Level:
Warning

Control Unit Response:
If this code sets, the ECU uses manifold air pressure for the barometric pressure value. If the manifold air pressure is invalid, a default value of 101 kPA (14.6PSI) is used as barometric air pressure to run the engine.

Additional References:
For further barometric air pressure sensor information, see BAROMETRIC AIR PRESSURE (BAP) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V ECU WIRING DIAGRAMS
- see 9.0L 24V ECU WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RG41221,000021E -19-20JAN09-2/6

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTC list. Is 000108.02 error code active?	**YES:** GO TO 2 **NO:** GO TO 4

Continued on next page

RG41221,000021E -19-20JAN09-3/6

2 Preliminary Check	Inspect the air vent located on the side of the ECU. Clear any debris blocking the passage. Is vent free of debris?	**YES:** GO TO 3 **NO:** Clear debris from air vent. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021E -19-20JAN09-4/6

3 Reprogram ECU	Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual. Is 000108.02 still active?	**YES:** Problem not fixed. Replace ECU. **NO:** Verify problem is fixed. . Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000021E -19-20JAN09-5/6

4 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** If no other active or stored codes exists, clear codes. Return to service and monitor further.

RG41221,000021E -19-20JAN09-6/6

000110.00 — Coolant Temperature Signal Extremely High

The ECU senses a coolant temperature above the 3rd threshold specification.

Continued on next page

RG41221,0000220 -19-20JAN09-1/13

000110.00 — Coolant Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000110.00

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active

Related Information:

NOTE: OEM engines are programmed using trimmable features. The customer had the option to choose an engine shutdown feature. If this feature was programmed into the ECU , the ECU will shut the engine down if this code sets. If the shutdown feature was not selected, a standard derate will be activated.

NOTE: For information on temperature values that trigger this fault, see OEM ENGINES - DERATE SPECIFICATIONS in Section 210, later in this manual.

The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active and engine has not shut down.
001109.31 is set 30 seconds before the ECU shuts down the engine.
001110.31 is set if the shutdown feature is enabled.

Alarm Level:
STOP

Control Unit Response:
Maximum engine power is derated up to 60 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Coolant temperature sensor T04 – Purple/Gray

Continued on next page

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Ignition ON, Engine ON.
4. Let engine idle for 3 minutes before proceeding.
5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
6. Refresh Codes.

Did 000110.00 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000220 -19-20JAN09-3/13

2 Preliminary Check of Cooling System

Visually inspect cooling system components.

- Remove any blockage on or near radiator.
- Inspect radiator hoses for signs of leakage or cracks.
- Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070.
- Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070.
- Inspect radiator cap for failure.
- Check radiator coolant is filled to proper level.
- Inspect cooling fan shroud for damage.
- Excessively high ambient air temperature.

Were any problems found?

YES: Fix problem(s). GO TO 10

NO: GO TO 3

RG41221,0000220 -19-20JAN09-4/13

3 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the coolant temperature sensor connector.
3. Perform TERMINAL TEST on the harness and sensor connectors.
4. Inspect surrounding area for pinched or melted wires.

Are there any problems with the wiring or connectors?

YES: Repair problem. GO TO 10

NO: GO TO 4

RG41221,0000220 -19-20JAN09-5/13

4 Check Coolant Temperature Sensor

1. Remove coolant temperature sensor. See REMOVE AND INSTALL COOLANT TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.
2. Inspect engine housing, sensor housing, and O-ring for defects.

Were any defects found?

YES: Replace defective part. GO TO 10

NO: GO TO 5

Continued on next page

RG41221,0000220 -19-20JAN09-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the coolant temperature from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor . GO TO 10

RG41221,0000220 -19-20JAN09-7/13

6 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the coolant temperature sensor connector.
3. Ignition ON, Engine OFF.
4. Monitor DTCs from within Service ADVISOR.

Did 110.03 become active?

YES: Wire harness is OK. GO TO 8

NO: GO TO 7

RG41221,0000220 -19-20JAN09-8/13

7 Check ECU

NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000110.03

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.
4. Monitor the DTC codes from within Service ADVISOR.

Did 000110.03 become active?

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10

NO: Replace ECU. GO TO 10

RG41221,0000220 -19-20JAN09-9/13

8 Check for Engine Related Causes

Check the following items that can cause high coolant temperature:

- Inspect cooling system. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150.
- Inspect cooling system components. See 9.0L - C1 - ENGINE COOLANT TEMPERATURE ABOVE NORMAL in Base Engine Manual, Section 04, Group 150.

Was cause of high coolant temperature determined?

YES: Repair problem. GO TO 10

NO: GO TO 9

Continued on next page

RG41221,0000220 -19-20JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1
	Is 000110.00 still active?	**NO:** Verify problem is fixed. GO TO 10

RG41221,0000220 -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000110.00 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,0000220 -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,0000220 -19-20JAN09-13/13

000110.03 — Coolant Temperature Signal Out of Range High

The coolant temperature input voltage exceeds the sensor's high voltage specification.

RG41221,0000221 -19-20JAN09-1/20

000110.03 — Coolant Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000110.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The coolant temperature input voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for coolant temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default coolant temperature of 90° C (194° F).
The ECU will try to maintain the engine operating envelope.

Additional References:
For more coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

Continued on next page

RG41221,0000221 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000110.03 reappear active?

YES: GO TO 2

NO: GO TO 13

RG41221,0000221 -19-20JAN09-3/20

2 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on coolant temperature sensor connector T04 and coolant temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41221,0000221 -19-20JAN09-4/20

3 Check Coolant Temperature Return Circuit Resistance

On the harness, measure the resistance between coolant temperature sensor connector T04-B and single point ground.

Is the resistance less than 10 ohms?

YES: GO TO 4

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000221 -19-20JAN09-5/20

4 Check For Coolant Temperature Signal Circuit Shorted to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between coolant temperature sensor connector T04-A (+) and T04-B (-).

Is the voltage greater than 5.5V?

YES: GO TO 5

NO: GO TO 7

RG41221,0000221 -19-20JAN09-6/20

5 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-D3 and J03-H3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 6

Continued on next page

RG41221,0000221 -19-20JAN09-7/20

6 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between ECU J03-D3 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,0000221 -19-20JAN09-8/20

7 Check for DTC Change with Coolant Temperature Sensor Signal Shorted to Return	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on coolant temperature sensor connector terminals T04-A and T04-B.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs	**YES:** GO TO 8
	Is DTC 000110.04 now an active DTC?	**NO:** GO TO 9

RG41221,0000221 -19-20JAN09-9/20

8 Check for DTC 000110.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from T04.	
	3. Reconnect T04 to coolant temperature sensor.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** Replace coolant temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000110.03 now an active DTC?	**NO:** GO TO 11

RG41221,0000221 -19-20JAN09-10/20

9 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-D3 and J03-H3.	**YES:** GO TO 10
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000221 -19-20JAN09-11/20

10 Check Coolant Temperature Sensor Circuit Continuity

1. Disconnect coolant temperature sensor connector T04.
2. On the harness, measure the resistance between ECU J03-D3 and coolant temperature sensor connector T04-A.
3. On the harness, measure the resistance between ECU J03-H3 and coolant temperature sensor connector T04-B.

Were both resistance measurements less than 10 ohms?

YES: GO TO 11

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000221 -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Coolant Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the coolant temperature sensor and ECU J03 connector.

NOTE: The coolant temperature input voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,0000221 -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in coolant temperature sensor connector T04.
3. Replace coolant temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000110.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

RG41221,0000221 -19-20JAN09-14/20

13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor the Coolant Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the coolant temperature sensor and ECU J03 connector.

NOTE: The coolant temperature input voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

Continued on next page

RG41221,0000221 -19-20JAN09-15/20

14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000110.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000221 -19-20JAN09-16/20

15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect coolant temperature sensor connector T04. 3. Perform TERMINAL TEST on T04. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-D3 and J03-H3. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000221 -19-20JAN09-17/20

16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000110.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000221 -19-20JAN09-18/20

17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000110.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

RG41221,0000221 -19-20JAN09-19/20

18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000221 -19-20JAN09-20/20

000110.04 — Coolant Temperature Signal Out of Range Low

The coolant temperature input voltage drops below the sensor's low voltage specification.

RG41221,0000222 -19-20JAN09-1/23

000110.04 — Coolant Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000110.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The coolant temperature input voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for coolant temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default coolant temperature of 90° C (194° F).

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For further coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

Continued on next page

RG41221,0000222 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 000110.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000222 -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the coolant temperature sensor connector T04. 3. Perform TERMINAL TEST on T04 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000222 -19-20JAN09-4/23

3 Check for DTC 000110.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 000110.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

RG41221,0000222 -19-20JAN09-5/23

4 Check for DTC 000110.03	Is DTC 000110.03 now an active DTC with coolant temperature sensor connector T04 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

RG41221,0000222 -19-20JAN09-6/23

5 Sensor Shorted to Ground Test	On the coolant temperature sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 100k ohms?	**YES:** Replace coolant temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

RG41221,0000222 -19-20JAN09-7/23

6 Sensor Internal Short Test	On the coolant temperature sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 60 ohms?	**YES:** Replace coolant temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

RG41221,0000222 -19-20JAN09-8/23

7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor Coolant Temperature Sensor Input Voltage data point in Service ADVISOR while gently wiggling wire harness between coolant temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The engine coolant temperature sensor input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** Replace coolant temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000222 -19-20JAN09-9/23

8 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-D3 and J03-H3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

RG41221,0000222 -19-20JAN09-10/23

9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-D3 and coolant temperature sensor T04-A.	
	2. On the harness, measure the resistance between ECU J03-H3 and coolant temperature sensor T04-B.	**YES:** GO TO 10
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000222 -19-20JAN09-11/23

10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-D3 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100k ohms?	**NO:** GO TO 11

Continued on next page

RG41221,0000222 -19-20JAN09-12/23

11 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 000110.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 000110.04 still active with J03 disconnected?

YES: GO TO 15

NO: GO TO 12

RG41221,0000222 -19-20JAN09-13/23

12 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-D3 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,0000222 -19-20JAN09-14/23

13 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Coolant Temperature Sensor Input Voltage data point in Service ADVISOR while gently wiggle wire harness between coolant temperature sensor and ECU J03 connector.

NOTE: The engine coolant temperature sensor input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000222 -19-20JAN09-15/23

14 Check for Active DTC 000110.04

Refresh DTCs

Is DTC 000110.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

RG41221,0000222 -19-20JAN09-16/23

15 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 000110.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

RG41221,0000222 -19-20JAN09-17/23

16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Engine Coolant Temperature Sensor Input Voltage data point in Service ADVISOR while gently wiggle wire harness between coolant temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The coolant temperature sensor input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent connection found?	**NO:** GO TO 17

RG41221,0000222 -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active.	**YES:** GO TO 2
	Is DTC 000110.04 now active?	**NO:** GO TO 18

RG41221,0000222 -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect coolant temperature sensor connector T04.	
	3. Perform TERMINAL TEST on T04.	
	4. Disconnect ECU J03 connector.	
	5. Perform TERMINAL TEST on J03-D3 and J03-H3.	**YES:** GO TO 19
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000222 -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 000110.04 now active?	**NO:** GO TO 20

RG41221,0000222 -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000110.04.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** GO TO 21

RG41221,0000222 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates.	**YES:** Reprogram ECU with latest version of software.
	Is a later version of ECU software available?	**NO:** Contact DTAC for support.

RG41221,0000222 -19-20JAN09-23/23

000110.15 — Coolant Temperature Signal Slightly High

The ECU senses coolant temperature above specification.

RG41221,0000223 -19-20JAN09-1/13

000110.15 — Coolant Temperature Signal Slightly High Diagnostic Procedure

Troubleshooting Sequence:
000110.15

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses coolant temperature of 110° C (230° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For further coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

Continued on next page

RG41221,0000223 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000110.15 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

RG41221,0000223 -19-20JAN09-3/13

2 Preliminary Check of Cooling System	Visually inspect cooling system components. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070. • Inspect radiator cap for failure. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

RG41221,0000223 -19-20JAN09-4/13

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the coolant temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connectors. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

RG41221,0000223 -19-20JAN09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL COOLANT TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

RG41221,0000223 -19-20JAN09-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the Coolant Temperature data point from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor . GO TO 10

RG41221,0000223 -19-20JAN09-7/13

6 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the coolant temperature sensor connector.
3. Ignition ON, Engine OFF.
4. Monitor DTCs from within Service ADVISOR.

Did 110.03 become active?

YES: Wire harness is OK. GO TO 8

NO: GO TO 7

RG41221,0000223 -19-20JAN09-8/13

7 Check ECU

NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000110.03

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.
4. Monitor the DTC codes from within Service ADVISOR.

Did 000110.03 become active?

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10

NO: Replace ECU. GO TO 10

RG41221,0000223 -19-20JAN09-9/13

8 Check for Engine Related Causes

Check the following items that can cause high coolant temperature:

- Inspect cooling system. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150.
- Inspect cooling system components. See 9.0L - C1 - ENGINE COOLANT TEMPERATURE ABOVE NORMAL in Base Engine Manual, Section 04, Group 150.

Was cause of high coolant temperature determined?

YES: Repair problem. GO TO 10

NO: GO TO 9

Continued on next page

RG41221,0000223 -19-20JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual. 2. Reconnect all connectors and sensors. 3. Monitor DTCs in Service ADVISOR. 4. Let engine run for 3 minutes and refresh codes. Is 000110.00 still active?	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 10

RG41221,0000223 -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF. 2. Reconnect all connectors, hoses, sensors, etc. 3. Ignition ON, Engine ON. 4. Monitor DTCs in Service ADVISOR. 5. Let engine run for 3 minutes. 6. Refresh DTCs. 7. Operate engine through normal speed and load. Did DTC 000110.15 reappear as active with engine running?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000223 -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active. 3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Retest. **YES:** Found operating point at which the code becomes active. GO TO 2 **NO:** Start DTAC case.

RG41221,0000223 -19-20JAN09-13/13

000110.16 — Coolant Temperature Signal Moderately High

The ECU senses coolant temperature above the 2nd threshold specification.

RG41221,0000224 -19-20JAN09-1/13

000110.16 — Coolant Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
00110.16

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active

Related Information:

NOTE: For information on temperature values that trigger this fault, see OEM ENGINES - DERATE SPECIFICATIONS in Section 210, later in this manual.

The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

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RG41221,0000224 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000110.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

RG41221,0000224 -19-20JAN09-3/13

2 Preliminary Check of Cooling System	Visually inspect cooling system components. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070. • Inspect radiator cap for failure. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

RG41221,0000224 -19-20JAN09-4/13

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the coolant temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connectors. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

RG41221,0000224 -19-20JAN09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL COOLANT TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

RG41221,0000224 -19-20JAN09-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the Coolant Temperature data point from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor . GO TO 10

RG41221,0000224 -19-20JAN09-7/13

6 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the coolant temperature sensor connector.
3. Ignition ON, Engine OFF.
4. Monitor DTCs from within Service ADVISOR.

Did 110.03 become active?

YES: Wire harness is OK. GO TO 8

NO: GO TO 7

RG41221,0000224 -19-20JAN09-8/13

7 Check ECU

NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000110.03

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.
4. Monitor the DTC codes from within Service ADVISOR.

Did 000110.03 become active?

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10

NO: Replace ECU. GO TO 10

RG41221,0000224 -19-20JAN09-9/13

8 Check for Engine Related Causes

Check the following items that can cause high coolant temperature:

- Inspect cooling system. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150.
- Inspect cooling system components. See 9.0L - C1 - ENGINE COOLANT TEMPERATURE ABOVE NORMAL in Base Engine Manual, Section 04, Group 150.

Was cause of high coolant temperature determined?

YES: Repair problem. GO TO 10

NO: GO TO 9

Continued on next page

RG41221,0000224 -19-20JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual. 2. Reconnect all connectors and sensors. 3. Monitor DTCs in Service ADVISOR. 4. Let engine run for 3 minutes and refresh codes. Is 000110.16 still active?	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 10

RG41221,0000224 -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF. 2. Reconnect all connectors, hoses, sensors, etc. 3. Ignition ON, Engine ON. 4. Monitor DTCs in Service ADVISOR. 5. Let engine run for 3 minutes. 6. Refresh DTCs. 7. Operate engine through normal speed and load. Did DTC 000110.16 reappear as active with engine running?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000224 -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active. 3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Retest. **YES:** Found operating point at which the code becomes active. GO TO 2 **NO:** Start DTAC case.

RG41221,0000224 -19-20JAN09-13/13

000110.17 — Coolant Temperature Signal Slightly Low

The ECU senses coolant temperature is not rising to normal operating temperatures.

RG41221,00002C7 -19-20JAN09-1/13

000110.17 — Coolant Temperature Signal Slightly Low Diagnostic Procedure

Troubleshooting Sequence:
00110.17

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses the coolant temperature is lower than expected.

NOTE: Running an engine with low coolant temperatures will eventually cause the EGR valve to stick. After 000110.17 has been resolved, verify proper EGR operation. Run Service ADVISOR and verify EGR desired position matches EGR actual position.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further coolant temperature sensor information, see ENGINE COOLANT TEMPERATURE (ECT) SENSOR in Section 03, Group 140 earlier in this manual

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

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RG41221,00002C7 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000110.17 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

RG41221,00002C7 -19-20JAN09-3/13

2 Check Thermostats	Test thermostats for proper function. See INSPECT THERMOSTAT AND TEST OPERATING TEMPERATURE in Base Engine Manual, Section 04, Group 150. Are all thermostats functioning properly?	**YES:** GO TO 3 **NO:** Replace thermostats. GO TO 10

RG41221,00002C7 -19-20JAN09-4/13

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the coolant temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connectors. Check for corrosion on connector and sensor terminals. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

RG41221,00002C7 -19-20JAN09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL COOLANT TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

RG41221,00002C7 -19-20JAN09-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant temperature sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the Coolant Temperature data point from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor and harness OK. Problem not found. GO TO 1

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor. GO TO 10

RG41221,00002C7 -19-20JAN09-7/13

6 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Perform TERMINAL TEST on both J3 connectors. Check for corrosion and loose fit on connector terminals.
4. Inspect surrounding area for pinched or melted wires.

Are there any problems with the wiring or connectors?

YES: Repair problem. GO TO 10

NO: GO TO 7

RG41221,00002C7 -19-20JAN09-8/13

7 Check Harness

1. On harness, measure the resistance between ECU harness connector J3, terminal D3 to coolant temperature sensor connector terminal A.
2. On harness, measure the resistance between ECU harness connector J3, terminal H3 to coolant temperature sensor connector terminal B.

Were both measurements less than 5 ohms?

YES: GO TO 8

NO: Look for high resistance connection in harness. Fix problem. GO TO 10

RG41221,00002C7 -19-20JAN09-9/13

8 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000110.17 still active?

YES: GO TO 9

NO: Verify problem is fixed. GO TO 10

Continued on next page

RG41221,00002C7 -19-20JAN09-10/13

9 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000110.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	
	4. Monitor the DTC codes from within Service ADVISOR.	**YES:** ECU OK. Problem not found. Recheck thermostat, wires and connections. GO TO 1
	Did 000110.03 become active?	**NO:** Replace ECU. GO TO 10

RG41221,00002C7 -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	
	8. Run Service ADVISOR and verify EGR desired position matches EGR actual position.	**YES:** GO TO 1
	Did DTC 000110.17 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,00002C7 -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,00002C7 -19-20JAN09-13/13

000111.01 — Coolant Level Extremely Low

The ECU detects a low coolant level.

RG41221,0000225 -19-20JAN09-1/18

000111.01 — Coolant Level Extremely Low Diagnostic Procedure

Troubleshooting Sequence:
000111.01

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have a coolant level low detection switch. When this feature is programmed into the ECU, the ECU will derate the engine when the switch is activated.
When the coolant level drops below a certain level, the switch will change states and the DTC is set.

Alarm Level:
Warning

Control Unit Response:
The ECU will derate the engine by 50% of full power.

Additional References:
For theory of operation, see ENGINE COOLANT LEVEL SWITCH in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on engine derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Auxillary Connector C08 - Yellow/Purple

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RG41221,0000225 -19-20JAN09-2/18

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000111.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000225 -19-20JAN09-3/18

2 Coolant Level Check	**CAUTION: Release of fluids from pressurized cooling system can cause serious burns. Before removing radiator cap, shut off engine and let cool. Use dry towel over radiator cap and slowly loosen cap to first stop to relieve pressure before removing completely.** 1. Ignition OFF, Engine OFF. 2. Remove radiator cap and check cooling system for proper level. Is coolant at proper level?	**YES:** GO TO 4 **NO:** Coolant level is low. GO TO 3

RG41221,0000225 -19-20JAN09-4/18

3 Check Cooling System	Visually inspect cooling system. • Inspect hoses for leaks and cracks. • Inspect radiator for cracks or leakage. • Inspect radiator cap. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in Base Engine Manual, Secton 04, Group 150. • Other engine related items causing loss of coolant temperature. See 9.0L - C1 ENGINE COOLANT TEMPERATURE ABOVE NORMAL in Base Engine Manual, Section 04, Group 150. Were any problems found?	**YES:** Repair problem with cooling system. GO TO 15 **NO:** GO TO 4

RG41221,0000225 -19-20JAN09-5/18

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Remove wires or connector from coolant level switch. 3. Perform TERMINAL TEST on connector and coolant level switch. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 15 **NO:** GO TO 5

Continued on next page

RG41221,0000225 -19-20JAN09-6/18

5 Check Coolant Switch

1. Ignition OFF, Engine OFF.
2. Verify the linkage moves freely to activate/deactivate the switch.
3. Verify the switch is mounted properly and not stuck in one position.
4. Measure the resistance across the coolant level switch terminals as the switch opens and closes in step 2.

Does the switch operate properly and the resistance change as the contacts open and close?

YES: Switch operates properly. GO TO 6

NO: Fix linkage or physical obstruction to switch. GO TO 15

NO: Switch does not change state. Replace switch. GO TO 15

RG41221,0000225 -19-20JAN09-7/18

6 Check Harness

Step 1.

1. Ignition ON, Engine OFF.
2. Refresh codes from within Service ADVISOR.
3. Record if 000111.01 is active.
4. GO TO step 2.

Step 2.

5. Ignition OFF, Engine OFF.
6. On the harness, connect the two wires from the coolant level switch together.
7. Ignition ON, Engine OFF.
8. Refresh codes from within Service ADVISOR.

Did 000111.01 change state from step 1?

YES: Problem with coolant level switch or linkage. GO TO 2

NO: Problem in harness. GO TO 7

RG41221,0000225 -19-20JAN09-8/18

7 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the two wires to the coolant level switch from each other.
3. Disconnect C08 auxiliary connector in harness.
4. Perform TERMINAL TEST on C08 connectors.
5. Inspect harness for pinched or melted wires near both C08 connectors.

Are there any problems with the wiring or connectors

YES: Fix problem. GO TO 15

NO: GO TO 8

RG41221,0000225 -19-20JAN09-9/18

8 Check Auxiliary Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal M to each individual wire of the coolant level switch.
3. On auxiliary harness connector C08, measure resistance from terminal Q to each individual wire of the coolant level switch.

Does each terminal M and Q measure less than 5 ohms to one of the wires?

YES: GO TO 9

NO: Fix open wire in auxiliary harness. GO TO 15

Continued on next page

RG41221,0000225 -19-20JAN09-10/18

9 Check Auxiliary Harness for Shorted Wire

NOTE: Make sure the wires to the coolant level switch are disconnected from the switch and not touching each other.

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal M to each terminal of C08.

Were any measurements less than 100 ohms?

YES: Fix shorted wire in auxiliary harness. GO TO 15

NO: Problem in main harness. GO TO 10

RG41221,0000225 -19-20JAN09-11/18

10 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on ECU harness connector J2.
4. Inspect harness for pinched or melted wires near J2 ECU connector.

Are there any problems with the wiring or connector.

YES: Fix problem. GO TO 15

NO: GO TO 11

RG41221,0000225 -19-20JAN09-12/18

11 Check ECU Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness, measure resistance from connector C08, terminal M to ECU connector J2, terminal G4.
3. On ECU harness, measure resistance from connector C08, terminal Q to ECU connector J2, terminal G3.

Was either measurements greater than 5 ohms?

YES: Fix open wire in ECU harness. GO TO 15

NO: GO TO 12

RG41221,0000225 -19-20JAN09-13/18

12 Check ECU Harness for Shorted Wire

1. Ignition OFF, Engine OFF.

YES: Fix shorted wire in ECU harness. GO TO 15

2. On ECU harness connector C08, measure resistance from terminal M to each terminal of C08.

NO: ECU has not been reprogrammed. GO TO 13

Were any measurements less than 100 ohms?

NO: ECU has been reprogrammed. GO TO 14

RG41221,0000225 -19-20JAN09-14/18

13 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000111.01 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 15

Continued on next page

RG41221,0000225 -19-20JAN09-15/18

14 Check ECU	*NOTE: For ECU connector pinouts, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 earlier in this manual.*	
	On ECU, measure resistance from terminal J2-G4 to terminal J2-G3.	**YES:** Problem not found. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.
	Is the measurement between 700 ohms and 2000 ohms?	**NO:** Replace ECU. GO TO 15

RG41221,0000225 -19-20JAN09-16/18

15 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all wires, connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load ranges if possible.	**YES:** GO TO 1
	Did DTC 000111.01 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,0000225 -19-20JAN09-17/18

16 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active?	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,0000225 -19-20JAN09-18/18

000157.03 — Fuel Rail Pressure Signal Out of Range High

The Fuel Rail Pressure Signal exceeds the sensor's high voltage specification.

RG41221,0000226 -19-20JAN09-1/32

000157.03 — Fuel Rail Pressure Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003509.03
000157.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Rail Pressure Input Voltage corresponds to a pressure that is higher than what is physically possible for fuel rail pressure.

Alarm Level:
STOP

NOTE: The alarm level is warning for redundant ECU applications.

Control Unit Response:
The ECU will derate the engine until it is running at 50% of full power.

The ECU will command the high pressure fuel pump to a default pressure of 200 MPa (29,000 psi).

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Rail Pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

RG41221,0000226 -19-20JAN09-2/32

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000157.03 reappear active?

YES: GO TO 2

NO: GO TO 23

RG41221,0000226 -19-20JAN09-3/32

2 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on fuel rail pressure sensor connector.

Were any problems found?

YES: Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1

NO: GO TO 3

RG41221,0000226 -19-20JAN09-4/32

3 Measure and Record Sensor Resistances

1. Ignition OFF, Engine OFF
2. Measure the following resistances on the sensor to verify they are within range.
3. Between signal (terminal 1) and ground (terminal 2) on the sensor (should be between 8k ohms and 17k ohms).
4. Between signal (terminal 1) and power (terminal 3) on the sensor (should be between 1k ohm and 3k ohms).
5. Between ground (terminal 2) and power (terminal 3) on the sensor (should be between 10k ohms and 15k ohms)

Are all resistances within range?

YES: GO TO 4

NO: Remove and replace sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor, and GO TO 1

RG41221,0000226 -19-20JAN09-5/32

4 Fuel Rail Pressure Input To Ground Test

1. Ignition OFF, Engine OFF
2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor harness connector.

Is the resistance between 250k and 270k ohms?

YES: GO TO 5

NO: GO TO 8

Continued on next page

RG41221,0000226 -19-20JAN09-6/32

5 Fuel Rail Pressure Input To Supply Test	1. Ignition OFF, Engine OFF	
	2. Measure the resistance between signal (terminal 1) and power (terminal 3) on the sensor harness connector.	**YES:** GO TO 6
	Is the resistance between 140k and 160k ohms?	**NO:** GO TO 12

RG41221,0000226 -19-20JAN09-7/32

6 Fuel Rail Pressure Ground To Supply Test	1. Ignition OFF, Engine OFF	
	2. Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor harness connector.	**YES:** GO TO 7
	Is the resistance between 90k and 120k ohms?	**NO:** GO TO 16

RG41221,0000226 -19-20JAN09-8/32

7 Fuel Rail Pressure Ground To Supply Voltage Test	1. Ignition ON, Engine OFF	
	2. Measure the voltage between ground (terminal 2) and input signal (terminal 3) on the sensor harness connector.	**YES:** Problem not found, reconnect all connectors. GO TO 1 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.
	Is the voltage below 5.5 volt	**NO:** GO TO 20

RG41221,0000226 -19-20JAN09-9/32

8 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J3), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 9

RG41221,0000226 -19-20JAN09-10/32

9 Fuel Rail Pressure Ground Wire Test	1. Disconnect ECU connector J3	
	2. Measure the resistance between ECU J3-G2 and sensor connector ground (terminal 2).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 10

Continued on next page

RG41221,0000226 -19-20JAN09-11/32

10 Fuel Rail Input Wire Test	Measure the resistance between J3-C1 and sensor connector signal (terminal 1).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 11

RG41221,0000226 -19-20JAN09-12/32

11 ECU Input To Ground Test	Measure the resistance between ECU J3- G2 to J3-C1	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 250k to 270k ohms?	**NO:** Remove and Replace ECU

RG41221,0000226 -19-20JAN09-13/32

12 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J3), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 13

RG41221,0000226 -19-20JAN09-14/32

13 Fuel Rail Pressure Power Wire Test	1. Disconnect ECU connector J3	
	2. Measure the resistance between J3-G1 and sensor connector power (terminal 3).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 14

RG41221,0000226 -19-20JAN09-15/32

14 Fuel Rail Input Wire Test	Measure the resistance between J3-C1 and sensor connector signal (terminal 1) on the sensor harness connector.	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 15

RG41221,0000226 -19-20JAN09-16/32

15 ECU Input To Supply Test	Measure the resistance between ECU J3- C1 to J3-G1	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 140k to 160k ohms?	**NO:** Remove and replace ECU

Continued on next page

RG41221,0000226 -19-20JAN09-17/32

16 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J3), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 17

RG41221,0000226 -19-20JAN09-18/32

17 Fuel Rail Pressure Power Wire Test	1. Disconnect ECU connector J3	
	2. Measure the resistance between J3-G1 and sensor connector power (terminal 3).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 18

RG41221,0000226 -19-20JAN09-19/32

18 Fuel Rail Ground Wire Test	Measure the resistance between J3-G2 and sensor connector ground (terminal 2).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 19

RG41221,0000226 -19-20JAN09-20/32

19 ECU Ground To Supply Test	Measure the resistance between ECU J3- G1 to J3-G2	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 90k to 120k ohms?	**NO:** Remove and replace ECU

RG41221,0000226 -19-20JAN09-21/32

20 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J3), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 21

RG41221,0000226 -19-20JAN09-22/32

21 Fuel Rail Pressure Input Shorted To High Voltage	1. Ignition OFF Engine OFF	
	2. Disconnect all ECU connectors.	
	3. Measure the resistance between J3-C1 and all other terminals in the other ECU connectors.	**YES:** Repair short in wiring and GO TO 1
	Were any readings less than 5 ohms?	**NO:** GO TO 22

Continued on next page

RG41221,0000226 -19-20JAN09-23/32

22 Wiring Harness Check	Look for pinched or melted wiring	**YES:** Repair wiring, and GO TO 1
	Was a wiring problem found?	**NO:** Remove and replace ECU

RG41221,0000226 -19-20JAN09-24/32

23 Occurrence Count Check	Review stored information and look at occurrence count	**YES:** GO TO 24
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 25

RG41221,0000226 -19-20JAN09-25/32

24 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** GO TO 25

RG41221,0000226 -19-20JAN09-26/32

25 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found. If a certain operating point exists when error occurs then GO TO 26
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 28

RG41221,0000226 -19-20JAN09-27/32

26 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 27
	Did 157.03 reappear when engine operating point was reached?	**NO:** GO TO 25 and confirm operating point.

RG41221,0000226 -19-20JAN09-28/32

27 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J3.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** Remove and replace Sensor

Continued on next page

RG41221,0000226 -19-20JAN09-29/32

28 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J3.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** GO TO 29

RG41221,0000226 -19-20JAN09-30/32

29 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service Advisor.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is 000157.03 active?	**NO:** Problem fixed, bad ECU program.

RG41221,0000226 -19-20JAN09-31/32

30 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,0000226 -19-20JAN09-32/32

000157.04 — Fuel Rail Pressure Signal Out of Range Low

The Fuel Rail Pressure Signal drops below the sensor's low voltage specification.

RG41221,0000227 -19-20JAN09-1/22

000157.04 — Fuel Rail Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003509.04
000157.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Rail Pressure Input Voltage corresponds to a pressure that is lower than what is physically possible for fuel rail pressure.

Alarm Level:
STOP

NOTE: The alarm level is warning for redundant ECU applications.

Control Unit Response:
The ECU will derate the engine until it is running at 50% of full power.

The ECU will command the high pressure fuel pump to a default pressure of 200 MPa (29,000 psi).

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel Rail Pressure Sensor P05 - Blue/Orange

Continued on next page

RG41221,0000227 -19-20JAN09-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000157.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,0000227 -19-20JAN09-3/22

2 Supply Voltage Test	1. Ignition ON, Engine OFF 2. Monitor Power Supply #1 Voltage using Service ADVISOR Is the voltage above 4.5 volts?	**YES:** GO TO 3 **NO:** GO TO 9

RG41221,0000227 -19-20JAN09-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector. Were any problems found?	**YES:** Repair problem, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** GO TO 4

RG41221,0000227 -19-20JAN09-5/22

4 Measure and Record Sensor Resistances	1. Ignition OFF, Engine OFF 2. Measure the following resistances on the sensor to verify they are within range. 3. Between signal (terminal 1) and ground (terminal 2), (between 8k ohms and 17k ohms). 4. Between signal (terminal 1) and power (terminal 3), (between 1k ohms and 3k ohms). 5. Between ground (terminal 2) and power (terminal 3), (between 10k ohms and 15k ohms) Are all resistances within range?	**YES:** GO TO 5 **NO:** Remove and replace sensor, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR, and GO TO 1

RG41221,0000227 -19-20JAN09-6/22

5 Fuel Rail Pressure Input to Ground Test	1. Ignition OFF, Engine OFF 2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor harness connector. Is the resistance between 240k and 270k ohms?	**YES:** GO TO 6 **NO:** GO TO 8

Continued on next page

RG41221,0000227 -19-20JAN09-7/22

6 Fuel Rail Pressure Power to Ground Test	Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor harness connector. Is the resistance between 90k and 120k?	**YES:** Problem not found, reconnect all connectors. GO TO 1 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made. **NO:** GO TO 7

RG41221,0000227 -19-20JAN09-8/22

7 Fuel Rail Pressure Power to Ground Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor connector. Is the resistance 5 ohms or less?	 **YES:** Repair shorted wire, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1. **NO:** Check for pinched or melted wiring, repair, and reconnect all connectors and GO TO 1.

RG41221,0000227 -19-20JAN09-9/22

8 Fuel Rail Pressure Signal to Ground Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor connector. Is the resistance 5 ohms or less?	 **YES:** Repair shorted wire, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** Check for pinched or melted wiring, repair, and reconnect all connectors and GO TO 1.

RG41221,0000227 -19-20JAN09-10/22

9 Fuel Rail Pressure Sensor Open and Short Test	Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor connector. Is the resistance near 0 ohms (shorted)? Is the resistance near infinity (open)?	**YES:** If (shorted) GO TO 10 **YES:** If (open) GO TO 11 **NO:** Problem not found, reconnect all connectors. GO TO 1 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

RG41221,0000227 -19-20JAN09-11/22

10 Wiring Harness Short Test

1. Ignition OFF, Engine OFF.
2. Disconnect all ECU connectors.
3. Measure the resistance between J3-G1 and all other terminals in the other ECU connectors

Were any readings less than 5 ohms?

YES: Repair wiring (short) and GO TO 1

NO: Check for pinched or melted wiring and repair then GO TO 1

RG41221,0000227 -19-20JAN09-12/22

11 Wiring Harness Power Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between J3-G1 and the power (terminal 3) in the Rail Pressure Sensor connector

Was the reading less than 5 ohms?

YES: GO TO 12

NO: Repair wiring and GO TO 1.

RG41221,0000227 -19-20JAN09-13/22

12 Wiring Harness Ground Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between J3-G2 and the ground (terminal 2) in the Rail Pressure Sensor connector.

Was the reading less than 5 ohms?

YES: Problem not found, reconnect all connectors. GO TO 1 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

NO: Repair wiring and GO TO 1.

RG41221,0000227 -19-20JAN09-14/22

13 Occurrence Count Check

Review stored information and look at occurrence count

Is occurrence recorded in step 1 greater than 5?

YES: GO TO 14

NO: GO TO 15

RG41221,0000227 -19-20JAN09-15/22

14 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on fuel rail pressure sensor connector.

Were any problems found?

YES: Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1

NO: GO TO 15

Continued on next page

RG41221,0000227 -19-20JAN09-16/22

15 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. If a certain operating point exists when error occurs then GO TO 16 **NO:** GO TO 18

RG41221,0000227 -19-20JAN09-17/22

16 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 157.04 reappear when engine operating point was reached?	 **YES:** GO TO 17 **NO:** GO TO 15 and confirm operating point.

RG41221,0000227 -19-20JAN09-18/22

17 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J3. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** Remove and replace Sensor

RG41221,0000227 -19-20JAN09-19/22

18 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J3. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** GO TO 19

RG41221,0000227 -19-20JAN09-20/22

19 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000157.04 active?	 **YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** Problem fixed, bad ECU program.

Continued on next page

RG41221,0000227 -19-20JAN09-21/22

20 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. GO TO 1.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and GO TO 1.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,0000227 -19-20JAN09-22/22

000157.10 — Fuel Rail Pressure Loss Detected

The ECU detects a sudden decrease in fuel pressure while the engine is not injecting or pumping.

Continued on next page

RG41221,0000228 -19-03AUG10-1/14

000157.10 — Fuel Rail Pressure Loss Detected Diagnostic Procedure

Troubleshooting Sequence:
000157.10

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a sudden decrease in fuel rail pressure while engine is not injecting fuel.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope. The engine may run normal when no load is applied.

Additional References:
For more fuel rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel Rail pressure sensor P05 - Blue/Orange

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.

Continued on next page

RG41221,0000228 -19-03AUG10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000157.10 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000228 -19-03AUG10-3/14

2 Fuel Lines/Fittings Leakage Test	1. Ignition ON, Engine ON. 2. Set engine speed and load to maximum point, if possible. 3. Inspect all fuel lines and fittings for leakage. Is there any fuel leakage present?	**YES:** Tighten loose fitting to proper specification or replace faulty fuel line, repeat this step. **NO:** GO TO 3

RG41221,0000228 -19-03AUG10-4/14

3 Injector Fuel Leak-off Test	1. Ignition OFF, Engine OFF. 2. Let engine sit 5 minutes to relieve fuel pressure. 3. Disconnect the injector fuel return line from the fuel return line “T” connector. 4. Cap off the fuel return “T” where the injector fuel return line was removed. 5. Connect a flexible hose to the injector fuel return line. 6. Place the hose into a container suitable for fuel. 7. Ignition ON, Engine ON. 8. Set engine to low idle. Is fuel flow less than 440mL (14.9oz) per minute?	**YES:** Flow is within specifications. GO TO 5 **NO:** GO TO 4

RG41221,0000228 -19-03AUG10-5/14

4 Faulty Electronic Injector Test	1. Ignition OFF, Engine OFF. 2. Reconnect all leak-off lines. 3. Ignition ON, Engine OFF. 4. Using the ECU diagnostic software, perform the Cylinder Cutout Test, Cylinder Misfire Test and the Cylinder Compression Test. For instructions, see Cylinder Cutout Test Instructions, see Cylinder Misfire Test Instructions and see Cylinder Electronic Compression Test Instructions earlier in this Group. Do all tests lead to the same results?	**YES:** Repair faults. **NO:** Start a DTAC case.

Continued on next page

RG41221,0000228 -19-03AUG10-6/14

5 High Pressure Pump Fuel Leak-off Test	1. Ignition OFF, Engine OFF. 2. Let engine sit 5 minutes to relieve fuel pressure. 3. Reconnect injector fuel return line to “T” connector. 4. Disconnect the high pressure fuel pump over flow line from the “T” connector. 5. Connect a flexible hose to the high pressure fuel pump over flow valve fuel return line. 6. Cap off the fuel return “T” where the high pressure fuel pump overflow valve fuel return line was removed. 7. Place the hose into a container suitable for fuel. 8. Ignition ON, Engine ON. 9. Set engine to low idle. Is fuel flow less than 489mL (16.5oz) per minute?	**YES:** Flow is within specifications. GO TO 6 **NO:** Replace high pressure fuel pump, repeat this step.

RG41221,0000228 -19-03AUG10-7/14

6 Pressure Limiter Fuel Leak-off Test	1. Ignition OFF, Engine OFF. 2. Let engine sit 5 minutes to relieve fuel pressure. 3. Reconnect high pressure fuel pump overflow valve fuel return line to “T” connector. 4. Disconnect fuel line from pressure limiter valve from the “T” connector. 5. Cap off the fuel return “T” where the pressure limiter fuel return line was removed. 6. Connect a flexible hose to the pressure limiter fuel return line. 7. Place the hose into a container suitable for fuel. 8. Ignition ON, Engine On. Is fuel flow present at the pressure limiter valve?	**YES:** Faulty fuel pressure limiter valve. Replace pressure limiter valve. See REMOVE AND INSTALL PRESSURE LIMITER in Section 2 Group 090 earlier in this manual. **NO:** GO TO 12

RG41221,0000228 -19-03AUG10-8/14

7 Occurrence Count Check	Review stored information and look at occurrence count Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 8 **NO:** GO TO 9

RG41221,0000228 -19-03AUG10-9/14

8 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector. Were any problems found?	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. **NO:** GO TO 9

Continued on next page

RG41221,0000228 -19-03AUG10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found. If a certain operating point exists when error occurs then GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 11

RG41221,0000228 -19-03AUG10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 2
	Did 157.10 reappear when engine operating point was reached?	**NO:** GO TO 9 and confirm operating point.

RG41221,0000228 -19-03AUG10-12/14

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J1.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor.
	Were any problems found?	**NO:** GO TO 12

RG41221,0000228 -19-03AUG10-13/14

12 Software Updates	1. Download latest ECU software payload.	
	2. Ignition ON, Engine OFF.	
	3. Reprogram ECU using Service Advisor.	
	4. Ignition ON, Engine ON.	
	5. Warm up engine then set throttle to high idle.	
	6. Rapidly return to low idle.	**YES:** Replace rail pressure sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor.
	Is 000157.10 active?	**NO:** Problem fixed, bad ECU program.

RG41221,0000228 -19-03AUG10-14/14

000157.17 — Fuel Rail Pressure Not Developed

The ECU does not detect 10 MPa (100 bar) (1450 psi) of fuel rail pressure after cranking the engine for approximately 5 seconds.

RG41221,0000229 -19-20JAN09-1/10

000157.17 — Fuel Rail Pressure Not Developed Diagnostic Procedure

Troubleshooting Sequence:
000157.10

When DTC is Displayed:
When ever the engine is cranking and the error is active.

Related Information:
The ECU does not detect 10 MPa (1450 psi) of fuel rail pressure after cranking the engine for approximately 5 seconds.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to try to start the engine.

Additional References:
For more fuel rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.

Continued on next page

RG41221,0000229 -19-20JAN09-2/10

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000157.17 reappear active?	**YES:** GO TO 2 **NO:** GO TO 2

RG41221,0000229 -19-20JAN09-3/10

2 Bleed Fuel System	Bleed the fuel system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 earlier in this manual. Has fuel system been bleed?	**YES:** GO TO 3 **NO:** Bleed the fuel system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 earlier in this manual.

RG41221,0000229 -19-20JAN09-4/10

3 Low Pressure Fuel System Test	Check low pressure fuel system, see F1 - LOW PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this manual. Were problems found and fixed?	**YES:** GO TO 4 **NO:** Check low pressure fuel system, see F1 - LOW PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this manual.

RG41221,0000229 -19-20JAN09-5/10

4 Engine Start Test	1. Ignition ON. 2. Try starting the engine. Does the engine start?	**YES:** GO TO 7 **NO:** GO TO 5

RG41221,0000229 -19-20JAN09-6/10

5 High Pressure Fuel System Test	Check high pressure fuel system, see F2 - HIGH PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this manual. Were problems found and fixed?	**YES:** GO TO 6 **NO:** Check high pressure fuel system, see F2 - HIGH PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this manual.

Continued on next page

RG41221,0000229 -19-20JAN09-7/10

6 Engine Start Test	1. Ignition ON. 2. Try starting the engine. Does the engine start?	**YES:** GO TO 7 **NO:** GO TO 5

RG41221,0000229 -19-20JAN09-8/10

7 DTC Code Check	Refresh codes. Is 000157.17 active?	**YES:** GO TO 8 **NO:** Problem fixed.

RG41221,0000229 -19-20JAN09-9/10

8 Software Updates	1. Ignition ON, Engine OFF. 2. Download latest ECU software payload. 3. Program ECU using Service Advisor. 4. Ignition ON, Engine ON. 5. Refresh codes. Is 000157.17 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41221,0000229 -19-20JAN09-10/10

000158.17 — ECU Power Down Error

The ECU is unable to complete proper power down procedures after detecting a key off condition.

RG41221,000022A -19-12SEP07-1/4

000158.17 — ECU Power Down Error Diagnostic Procedure

Troubleshooting Sequence:
000158.17

When DTC is Displayed:
DTC is active 164 seconds after ECU commands an internal electronic switch OFF.

Related Information:
The ECU contains an electronic switch which is commanded OFF several seconds after the ECU detects ignition as being OFF to reduce the amount of current drawn by the ECU.
This DTC is generated if the ECU commands the internal electronic switch OFF but the switch does not respond within 164 seconds.
This DTC is only active when ignition is OFF.

Alarm Level:
Warning

Control Unit Response:
The application battery may be discharged because the ECU will not power down.

Additional References:
For further ECU information, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 earlier in this manual.

RG41221,000022A -19-12SEP07-2/4

1 Reprogram ECU and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Download latest ECU payload and reprogram ECU. 5. Clear DTCs. 6. Disconnect Service ADVISOR. 7. Ignition OFF, engine OFF for 5 minutes. 8. Ignition ON, engine OFF. 9. Connect Service ADVISOR and check for stored or active DTCs Did 000158.17 reappear as an active or stored DTC?	**YES:** GO TO 2 **NO:** Problem fixed.

Continued on next page

RG41221,000022A -19-12SEP07-3/4

❷ **Replace ECU**	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Clear DTCs. 4. Disconnect Service ADVISOR. 5. Ignition OFF, engine OFF for 5 minutes. 6. Ignition ON, engine OFF. 7. Connect Service ADVISOR and check for stored or active DTCs Did 000158.17 reappear as an active or stored DTC?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000022A -19-12SEP07-4/4

000171.03 — Ambient Air Temperature Signal Out of Range High

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000059 -19-01APR10-1/1

000171.04 — Ambient Air Temperature Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,000005A -19-01APR10-1/1

000174.00 — Fuel Temperature Signal Extremely High

The ECU senses a fuel temperature above specification.

Continued on next page

RG41221,000022B -19-20JAN09-1/14

000174.00 — Fuel Temperature Signal Extremely High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00
000105.00 or 000105.16
000174.00

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:

NOTE: OEM engines are programmed using trimmable features. The customer had the option to choose an engine shutdown feature. If this feature was programmed into the ECU , the ECU will shut the engine down if this code sets. If the shutdown feature was not selected, a standard derate will be activated.

The ECU senses a fuel temperature of 100° C (212° F) on OEM engines.
The engine has to running for 3 minutes for the code to set. 001569.31 is set when this code is active and engine has not shut down.
001110.31 is set if the shutdown feature is enabled.
The engine has to be running for 3 minutes before the code is set.
001109.31 is set 30 seconds before the ECU shuts down the engine.

Alarm Level:
Stop

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Fuel temperature sensor T05 - Blue/Orange

Continued on next page

RG41221,000022B -19-20JAN09-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000174.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

RG41221,000022B -19-20JAN09-3/14

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 11 **NO:** GO TO 3

RG41221,000022B -19-20JAN09-4/14

3 Fuel Cooler Check	Perform this step if engine has a fuel cooler. If no fuel cooler exists, GO TO 4 1. Remove the fuel cooler. 2. Inspect the fuel cooler for damage or restrictions. 3. Check that the cooler fan is operational. Is the fuel cooler operational and free of damage or restrictions?	**YES:** GO TO 4 **NO:** Repair problem. GO TO 11

RG41221,000022B -19-20JAN09-5/14

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the fuel temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connectors. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 5

RG41221,000022B -19-20JAN09-6/14

5 Check Fuel Temperature Sensor	1. Remove fuel temperature sensor. See FUEL TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 11 **NO:** GO TO 6

Continued on next page

RG41221,000022B -19-20JAN09-7/14

6 Check Fuel Temperature Sensor Operation

1. With fuel sensor removed from engine, reconnect fuel temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the fuel temperature from within Service ADVISOR.
4. Perform one of two steps below.

NOTE: The fuel temperature sensor is more accurate at higher temperatures.

   a. Let the sensor cool down to the ambient temperature.

   b. Place the sensor in hot water and monitor water temperature with a thermometer.

Does the sensor reading closely match either the ambient or the hot water temperature?

YES: Fuel temperature sensor and harness are OK. Diagnose engine cooling system. GO TO 11

NO: Check harness. GO TO 7

RG41221,000022B -19-20JAN09-8/14

7 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the fuel temperature sensor connector.
3. Ignition ON, Engine OFF.
4. Monitor Fuel Temperature Input Voltage from within Service ADVISOR.

Is the voltage greater than 4.90 volts?

YES: Wire harness is OK. Replace fuel temperature sensor. GO TO 11

NO: GO TO 8

RG41221,000022B -19-20JAN09-9/14

8 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Perform TERMINAL TEST on ECU J3 connector.

Were any problems found?

YES: Fix problem. GO TO 11

NO: GO TO 9

RG41221,000022B -19-20JAN09-10/14

9 Check ECU

1. Ignition ON, Engine OFF.
2. Refresh Codes from within Service ADVISOR.

Did 000174.03 reappear active?

YES: GO TO 11

NO: Replace ECU. GO TO 11

Continued on next page

RG41221,000022B -19-20JAN09-11/14

10 Check Harness for Shorted Wire

1. Ignition OFF, Engine OFF.	
2. Disconnect all ECU connectors.	
3. Measure resistance from ECU connector J3-B1 to all other terminals on each ECU connector.	**YES:** Fix shorted wire in harness. GO TO 11
Were any measurements less than 10 ohms?	**NO:** Problem not found. Verify engine cooling system is operating properly. GO TO 1

RG41221,000022B -19-20JAN09-12/14

11 Verification

1. Ignition OFF, Engine OFF.	
2. Reconnect all connectors, hoses, sensors, etc.	
3. Ignition ON, Engine ON.	
4. Monitor DTCs in Service ADVISOR.	
5. Let engine run for 3 minutes.	
6. Refresh DTCs.	
7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1
Did DTC 000174.00 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000022B -19-20JAN09-13/14

12 Review Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,000022B -19-20JAN09-14/14

000174.03 — Fuel Temperature Signal Out of Range High

The Fuel Temperature Input Voltage exceeds the sensor's high voltage specification.

RG41221,000022C -19-20JAN09-1/20

000174.03 — Fuel Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000174.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Temperature Input Voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for fuel temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default fuel temperature of 40° C (104° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel temperature sensor T05 - Blue/Orange

Continued on next page

RG41221,000022C -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 000174.03 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,000022C -19-20JAN09-3/20

2 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on fuel temperature sensor connector T05 and fuel temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41221,000022C -19-20JAN09-4/20

3 Check Fuel Temperature Return Circuit Resistance

On the harness, measure the resistance between fuel temperature sensor connector T05-2 and single point ground.

Is the resistance less than 5 ohms?

YES: GO TO 4

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022C -19-20JAN09-5/20

4 Check For Fuel Temperature Signal Circuit Shorted to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between fuel temperature sensor connector T05-1 (+) and T05-2 (-).

Is the voltage greater than 5.5V?

YES: GO TO 5

NO: GO TO 7

RG41221,000022C -19-20JAN09-6/20

5 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-B1 and J03-H3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 6

Continued on next page

RG41221,000022C -19-20JAN09-7/20

6 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between ECU J03-B1 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,000022C -19-20JAN09-8/20

7 Check for DTC Change with Fuel Temperature Signal Shorted to Return	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on fuel temperature sensor connector terminals T05-1 and T05-2.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs	**YES:** GO TO 8
	Is DTC 000174.04 now an active DTC?	**NO:** GO TO 9

RG41221,000022C -19-20JAN09-9/20

8 Check for DTC 000174.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from T05.	
	3. Reconnect T05 to fuel temperature sensor.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** Replace fuel temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 000174.03 now an active DTC?	**NO:** GO TO 11

RG41221,000022C -19-20JAN09-10/20

9 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-B1 and J03-H3.	**YES:** GO TO 10
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,000022C -19-20JAN09-11/20

10 Check Fuel Temperature Sensor Circuit Continuity	1. Disconnect fuel temperature sensor connector T05. 2. On the harness, measure the resistance between ECU J03-B1 and fuel temperature sensor connector T05-1. 3. On the harness, measure the resistance between ECU J03-H3 and fuel temperature sensor connector T05-2. Were both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022C -19-20JAN09-12/20

11 Check for Intermittent Connection	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor the Fuel Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the fuel temperature sensor and ECU J03 connector. *NOTE: The Fuel Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

RG41221,000022C -19-20JAN09-13/20

12 Replace Terminals and Sensor	1. Ignition OFF, engine OFF. 2. Replace terminals in fuel temperature sensor connector T05. 3. Replace fuel temperature sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000174.03 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

RG41221,000022C -19-20JAN09-14/20

13 Check for Intermittent Connection	1. Ignition ON, engine OFF. 2. Monitor the Fuel Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the fuel temperature sensor and ECU J03 connector. *NOTE: The Fuel Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14

Continued on next page

RG41221,000022C -19-20JAN09-15/20

14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000174.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,000022C -19-20JAN09-16/20

15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect fuel temperature sensor connector T05. 3. Perform TERMINAL TEST on T05. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-B1 and J03-H3. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022C -19-20JAN09-17/20

16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000174.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,000022C -19-20JAN09-18/20

17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000174.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

RG41221,000022C -19-20JAN09-19/20

18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,000022C -19-20JAN09-20/20

000174.04 — Fuel Temperature Signal Out of Range Low

The Fuel Temperature Input Voltage drops below the sensor's low voltage specification.

RG41221,000022D -19-20JAN09-1/23

000174.04 — Fuel Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000174.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Temperature Input Voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for fuel temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default fuel temperature of 40° C (104° F).

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For further fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel temperature sensor T05 - Blue/Orange

Continued on next page

RG41221,000022D -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 000174.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,000022D -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the fuel temperature sensor connector T05. 3. Perform TERMINAL TEST on T05 connector . Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,000022D -19-20JAN09-4/23

3 Check for DTC 000174.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 000174.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

RG41221,000022D -19-20JAN09-5/23

4 Check for DTC 000174.03	Is DTC 000174.03 now an active DTC with fuel temperature sensor connector T05 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

RG41221,000022D -19-20JAN09-6/23

5 Sensor Shorted to Ground Test	On the fuel temperature sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 1k ohms?	**YES:** Replace fuel temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

RG41221,000022D -19-20JAN09-7/23

6 Sensor Internal Short Test	On the fuel temperature sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 50 ohms?	**YES:** Replace fuel temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

RG41221,000022D -19-20JAN09-8/23

7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor Fuel Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Fuel Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** Replace fuel temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022D -19-20JAN09-9/23

8 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-B1 and J03-H3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

RG41221,000022D -19-20JAN09-10/23

9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-B1 and fuel temperature sensor T05-1.	
	2. On the harness, measure the resistance between ECU J03-H3 and fuel temperature sensor T05-2.	**YES:** GO TO 10
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022D -19-20JAN09-11/23

10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-B1 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100k ohms?	**NO:** GO TO 11

Continued on next page

RG41221,000022D -19-20JAN09-12/23

11 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 000174.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 000174.04 still active with J03 disconnected?

YES: GO TO 15

NO: GO TO 12

RG41221,000022D -19-20JAN09-13/23

12 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-B1 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,000022D -19-20JAN09-14/23

13 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Fuel Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel temperature sensor and ECU J03 connector.

NOTE: The Fuel Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,000022D -19-20JAN09-15/23

14 Check for Active DTC 000174.04

Refresh DTCs

Is DTC 000174.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

RG41221,000022D -19-20JAN09-16/23

15 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 000174.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

RG41221,000022D -19-20JAN09-17/23

16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Fuel Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between fuel temperature sensor and ECU J03 connector. *NOTE: The Fuel Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

RG41221,000022D -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000174.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,000022D -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect fuel temperature sensor connector T05. 3. Perform TERMINAL TEST on T05. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-B1 and J03-H3. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,000022D -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000174.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,000022D -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000174.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

RG41221,000022D -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,000022D -19-20JAN09-23/23

000174.16 — Fuel Temperature Signal Moderately High

The ECU senses a fuel temperature above specification.

RG41221,000022E -19-20JAN09-1/14

000174.16 — Fuel Temperature Signal Moderately High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00 or 000110.16
000105.00 or 000105.16
000174.16

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses a fuel temperature of 95° C (203° F) on OEM engines.

Alarm Level:
Warning

Control Unit Response:
The ECU will control the engine to run under normal operation.

Additional References:
For further fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel temperature sensor T05 - Blue/Orange

Continued on next page

RG41221,000022E -19-20JAN09-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000174.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

RG41221,000022E -19-20JAN09-3/14

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 11 **NO:** GO TO 3

RG41221,000022E -19-20JAN09-4/14

3 Fuel Cooler Check	Perform this step if engine has a fuel cooler. If no fuel cooler exists, GO TO 4 1. Remove the fuel cooler. 2. Inspect the fuel cooler for damage or restrictions. 3. Check that the cooler fan is operational. Is the fuel cooler operational and free of damage or restrictions?	**YES:** GO TO 4 **NO:** Repair problem. GO TO 11

RG41221,000022E -19-20JAN09-5/14

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the fuel temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connectors. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 5

RG41221,000022E -19-20JAN09-6/14

5 Check Fuel Temperature Sensor	1. Remove fuel temperature sensor. See FUEL TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 11 **NO:** GO TO 6

Continued on next page

RG41221,000022E -19-20JAN09-7/14

6 Check Fuel Temperature Sensor Operation

1. With fuel sensor removed from engine, reconnect fuel temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the fuel temperature from within Service ADVISOR.
4. Perform one of two steps below.

NOTE: The fuel temperature sensor is more accurate at higher temperatures.

   a. Let the sensor cool down to the ambient temperature.

   b. Place the sensor in hot water and monitor water temperature with a thermometer.

Does the sensor reading closely match either the ambient or the hot water temperature?

YES: Fuel temperature sensor and harness are OK. Diagnose engine cooling system. GO TO 1

NO: Check harness. GO TO 7

RG41221,000022E -19-20JAN09-8/14

7 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the fuel temperature sensor connector.
3. Ignition ON, Engine OFF.
4. Monitor fuel temperature input voltage from within Service ADVISOR.

Is the voltage greater than 4.90 volts?

YES: Wire harness is OK. Replace fuel temperature sensor. GO TO 11

NO: GO TO 8

RG41221,000022E -19-20JAN09-9/14

8 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Perform TERMINAL TEST on ECU J3 connector.

Were any problems found?

YES: Fix problem. GO TO 11

NO: GO TO 9

RG41221,000022E -19-20JAN09-10/14

9 Check ECU

1. Ignition ON, Engine OFF.
2. Refresh Codes from within Service ADVISOR.

Did 000174.03 reappear active?

YES: GO TO 10

NO: Replace ECU. GO TO 11

Continued on next page

RG41221,000022E -19-20JAN09-11/14

10 Check Harness for Shorted Wire		
	1. Ignition OFF, Engine OFF.	
	2. Disconnect all ECU connectors.	
	3. Measure resistance from ECU connector J3-B1 to all other terminals on each ECU connector.	**YES:** Fix shorted wire in harness. GO TO 11
	Were any measurements less than 10 ohms?	**NO:** Problem not found. Verify engine cooling system is operating properly. GO TO 1

RG41221,000022E -19-20JAN09-12/14

11 Verification		
	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1
	Did DTC 000174.16 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000022E -19-20JAN09-13/14

12 Review Snapshot Information		
	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,000022E -19-20JAN09-14/14

000189.00 — Engine Speed Derate Condition Exists

The ECU detects a condition that requires an engine speed derate.

Related Information:
The engine speed derate diagnostic trouble code is information to the operator that the ECU has detected a condition and is derating the engine by limiting the maximum amount of engine speed available to the engine. This code will only set as a result of another DTC setting.

Alarm Level:
Warning

Control Unit Response:
The ECU will limit the amount of engine speed in an attempt to protect the engine.

Additional References:
For more information on derates see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 3 Group 140 earlier in this manual.

RG41221,000022F -19-27AUG07-1/1

000190.00 — Engine Speed Extremely High

The ECU detects that engine speed exceeds the maximum rpm.

RG41221,0000230 -19-03AUG10-1/12

000190.00 — Engine Speed Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000190.00

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects that engine speed exceeds the maximum rpm allowed.

Alarm Level:
Warning

Control Unit Response:
The ECU stops fuel flow to the high pressure common rail (HPCR), by turning off the suction control valve on the high pressure fuel pump.

Additional References:
For more fuel system information, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000230 -19-03AUG10-2/12

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000190.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000230 -19-03AUG10-3/12

2 Application Check	For the engine to exceed the maximum allowed engine speed at this level, the application must be mechanically pushing the engine. Check the application for anything that could be pushing the engine to an overspeed condition such as trying to use the engine as a break when going down hill. Problem found to be application related?	**YES:** Repair application problem. **NO:** GO TO 3

RG41221,0000230 -19-03AUG10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

RG41221,0000230 -19-03AUG10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 9.0L - L1 - EXCESSIVE OIL CONSUMPTION in Section 4 Group 150 of the base engine manual. 2. Fill oil to proper level. 3. Ignition ON, Engine ON. 4. Reconnect Service ADVISOR, if disconnected. 5. Run engine to highest load point you can for 5 minutes. 6. Refresh codes. Is 000190.00 still active?	**YES:** GO TO 5 **NO:** Problem fixed.

RG41221,0000230 -19-03AUG10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF. 2. Run Cylinder Electronic Compression Test and record values. 3. Run Cylinder Misfire Test and record values. 4. Run Cylinder Cutout Test and record values. Do these tests all point to a problem in a particular cylinder?	**YES:** Replace injector in the suspected cylinder. GO TO 6 **NO:** GO TO 7

RG41221,0000230 -19-03AUG10-7/12

6 Overspeed Test	1. Ignition ON, Engine ON. 2. Reconnect Service ADVISOR, if disconnected. 3. Run engine to highest load point you can for 5 minutes. 4. Refresh codes. Is 000190.00 still active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,0000230 -19-03AUG10-8/12

7 Occurrence Count Check	Review stored information and look at occurrence count for 000190.00. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 8 **NO:** Return application to service.

RG41221,0000230 -19-03AUG10-9/12

8 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

Continued on next page

RG41221,0000230 -19-03AUG10-10/12

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure. 3. Refresh codes. Did 000190.00 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 8 and confirm operating point.

RG41221,0000230 -19-03AUG10-11/12

10 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000190.00 active?	**YES:** Start DTAC case. **NO:** Problem fixed, bad ECU program.

RG41221,0000230 -19-03AUG10-12/12

000190.01 — Engine Overload Severe

The ECU detects severe engine overload condition of 120 minutes duration.

If too large of a propeller is installed on a boat the resulting propeller load curve will cause the engine to operate in higher torque, lower speed conditions than normal. The engine may fail if operated at these conditions for a prolonged amount of time.

NOTE: The values in the following explanation are the initial software values. Your ECU may be programmed differently.

DTC 000190.01 will set if an overload condition has existed for 120 minutes.

Overload Detection "Persistence" Timer:

- It takes 4 minutes above the overload curve to set an overload "condition." It takes 4 minutes below the curve to clear the condition.
- As long as more time is spent above the curve than below the curve, the overload condition will eventually be detected. Likewise, once the condition is detected it may take some minutes to clear.
- If the ECU is reset at any time, the persistence timer is initialized to 2 minutes (50% of the counter).
- When engine is not running, the 4 minute timer holds its current value.

Secondary Timer:

- Once the overload condition is detected, a secondary timer starts. After 118 minutes, the fault will set.
- If the overload condition clears as described above, the secondary timer is reset to 0 and the fault is cleared.
- If the ECU is reset at any point after an overload condition was detected, the secondary timer value is stored and the fault is cleared. If an overload condition is detected again, the stored secondary timer value is used. If the overload condition goes away, the stored secondary timer value is then cleared (no faults would be set).

If DTC 000190.01 sets, the following will occur:

- A warning light will come on.
- An engine shutdown will occur

BB78437,0000004 -19-06OCT10-1/1

000190.16 — Engine Speed Moderately High

The ECU detects that engine speed exceeds the maximum rpm.

RG41221,0000231 -19-03AUG10-1/12

000190.16 — Engine Speed Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000190.16

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects that engine speed exceeds the maximum rpm allowed.

Alarm Level:
Warning

Control Unit Response:
The ECU stops fuel flow to the high pressure common rail (HPCR), by turning off the suction control valve on the high pressure fuel pump.

Additional References:
For more fuel system information, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000231 -19-03AUG10-2/12

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000190.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000231 -19-03AUG10-3/12

2 Application Check	For the engine to exceed the maximum allowed engine speed at this level, the application must be mechanically pushing the engine. Check the application for anything that could be pushing the engine to an overspeed condition such as trying to use the engine as a break when going down hill. Problem found to be application related?	**YES:** Repair application problem. **NO:** GO TO 3

RG41221,0000231 -19-03AUG10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

RG41221,0000231 -19-03AUG10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 9.0L - L1 - EXCESSIVE OIL CONSUMPTION in Section 4 Group 150 of the base engine manual. 2. Fill oil to proper level. 3. Ignition ON, Engine ON. 4. Reconnect Service ADVISOR, if disconnected. 5. Run engine to highest load point you can for 5 minutes. 6. Refresh codes. Is 000190.16 still active?	**YES:** GO TO 5 **NO:** Problem fixed.

RG41221,0000231 -19-03AUG10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF. 2. Run Cylinder Electronic Compression Test and record values. 3. Run Cylinder Misfire Test and record values. 4. Run Cylinder Cutout Test and record values. Do these tests all point to a problem in a particular cylinder?	**YES:** Replace injector in the suspected cylinder. GO TO 6 **NO:** GO TO 7

RG41221,0000231 -19-03AUG10-7/12

6 Overspeed Test	1. Ignition ON, Engine ON. 2. Reconnect Service ADVISOR, if disconnected. 3. Run engine to highest load point you can for 5 minutes. 4. Refresh codes. Is 000190.16 still active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,0000231 -19-03AUG10-8/12

7 Occurrence Count Check	Review stored information and look at occurrence count for 000190.16. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 8 **NO:** Return application to service.

RG41221,0000231 -19-03AUG10-9/12

8 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

Continued on next page

RG41221,0000231 -19-03AUG10-10/12

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure. 3. Refresh codes. Did 000190.16 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 8 and confirm operating point.

RG41221,0000231 -19-03AUG10-11/12

10 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000190.16 active?	**YES:** Start DTAC case. **NO:** Problem fixed, bad ECU program.

RG41221,0000231 -19-03AUG10-12/12

000190.18 — Engine Overload Moderate

The ECU detects moderate engine overload condition of 30 minutes duration.

If too large of a propeller is installed on a boat the resulting propeller load curve will cause the engine to operate in higher torque, lower speed conditions than normal. The engine may fail if operated at these conditions for a prolonged amount of time.

NOTE: The values in the following explanation are the initial software values. Your ECU may be programmed differently.

DTC 000190.18 will set if an overload condition has existed for 30 minutes.

Overload Detection "Persistence" Timer:

- It takes 4 minutes above the overload curve to set an overload "condition." It takes 4 minutes below the curve to clear the condition.
- As long as more time is spent above the curve than below the curve, the overload condition will eventually be detected. Likewise, once the condition is detected it may some minutes to clear.
- If the ECU is reset at any time, the persistence timer is initialized to 2 minutes (50% of the counter).
- When engine is not running, the 4 minute timer holds its current value.

Secondary Timer:

- Once the overload condition is detected, a secondary timer starts. After 28 minutes, the fault will set.
- If the overload condition clears as described above, the secondary timer is reset to 0 and the fault is cleared.
- If the ECU is reset at any point after an overload condition was detected, the secondary timer value is stored and the fault is cleared. If an overload condition is detected again, the stored secondary timer value is used. If the overload condition goes away, the stored secondary timer value is then cleared (no faults would be set).

If DTC 000190.18 sets, the following will occur:

- A warning light will come on.
- A 20% fuel derate will occur

BB78437,0000005 -19-23SEP10-1/1

000237.02 — VIN Security Data Invalid

For troubleshooting procedures please see the application troubleshooting manual.

DB92450,000006E -19-11OCT07-1/1

000237.13 — VIN Option Code Security Data Conflict

For troubleshooting procedures please see the application troubleshooting manual.

DB92450,000006F -19-11OCT07-1/1

000237.31 — VIN Security Data Missing

For troubleshooting procedures please see the application troubleshooting manual.

DB92450,0000070 -19-11OCT07-1/1

000412.00 — EGR Temperature Signal Extremely High

The ECU senses the Exhaust Gas Recirculation (EGR) temperature above specification.

RG41221,0000232 -19-20JAN09-1/16

000412.00 — EGR Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000110.0, 000110.15, and 00110.16
000412.00

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses an EGR temperature of 299° C (570° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Stop

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further EGR temperature sensor information, seeEXHAUST GAS RECIRCULATION (EGR) EXHAUST TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.
For more information on exhaust gas recirculation valve, see EXHAUST GAS RECIRCULATION VALVE E in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray

Continued on next page

RG41221,0000232 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000412.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,0000232 -19-20JAN09-3/16

2 Check Intake Manifold Air Temperature	1. Ignition ON, Engine ON. 2. Let engine run for 3 minutes. 3. Refresh codes from within Service Advisor. Are any DTCs related to high manifold air temperature active (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

RG41221,0000232 -19-20JAN09-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual. 3. Reconnect the EGR harness connector to the EGR valve. 4. Ignition ON, Engine OFF. 5. From within Service ADVISOR and under Interactive Tests, run ECU: EGR Valve Clean Test. 6. Observe that the EGR valve cycles open and closed. When the clean cycle has finished, the EGR valve should be completely closed. Does the EGR valve remain partly open after the clean test?	**YES:** Replace and calibrate new EGR valve. See EXHAUST GAS RECIRCULATION VALVE CALIBRATION earlier in this section of the manual. GO TO 13 **NO:** Reinstall EGR valve. GO TO 4

Continued on next page

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4 Preliminary Check of Cooling System	Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070. • Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in Base Engine Manual, Section 04, Group 150. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 13 **NO:** GO TO 5

RG41221,0000232 -19-20JAN09-6/16

5 Check Exhaust Gas Recirculation Cooler	1. Ignition OFF, Engine OFF. 2. Remove exhaust gas recirculation cooler. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 100 earlier in this manual. 3. Inspect the EGR cooler for debris and carbon build up in the exhaust gas passage causing blockage or loss of heat transfer. 4. Inspect coolant passage for proper coolant flow through EGR cooler. Is the exhaust gas or coolant passages blocked or restricted?	**YES:** Replace EGR cooler. GO TO 13 **NO:** GO TO 6

RG41221,0000232 -19-20JAN09-7/16

6 Check Exhaust System	Check for restrictions or other signs of high exhaust temperature in the exhaust system. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS in Base Engine Manual, Section 04, Group 150. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 7

RG41221,0000232 -19-20JAN09-8/16

7 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding ares for pinched or melted wires. Were any defects found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 8

RG41221,0000232 -19-20JAN09-9/16

8 Check EGR Temperature Sensor	1. Remove EGR sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 13 **NO:** GO TO 9

Continued on next page

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9 Check EGR Temperature Sensor

1. Ignition OFF, Engine OFF.
2. With EGR temperature sensor removed from engine, reconnect EGR temperature sensor to its harness connector.
3. Ignition ON, Engine OFF.
4. Perform one or both of the steps below.
   a. Place the EGR temperature sensor in hot water along with a thermometer.
   b. Let the EGR temperature sensor cool down to ambient temperature.

YES: EGR temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

5. Monitor the EGR temperature from within Service ADVISOR.

NO: EGR temperature sensor has already been replaced. GO TO 10

Does the sensor reading closely match the temperature of the hot water or ambient air? Note that the EGR temperature sensor is not as accurate at lower temperatures, allow for more tolerance when measuring EGR temperature sensor at lower temperatures.

NO: Replace EGR temperature sensor. GO TO 13

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10 Check Signal Wire In Harness

NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000412.03

1. Ignition OFF, Engine OFF.
2. Disconnect the EGR temperature sensor connector.
3. Ignition ON, Engine OFF.

YES: ECU has not been reprogrammed. GO TO 12

4. Monitor DTCs from within Service ADVISOR.

YES: ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

Did 000412.03 become active?

NO: GO TO 11

RG41221,0000232 -19-20JAN09-12/16

11 Check ECU

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 13

4. Monitor the DTC codes from within Service ADVISOR.

NO: ECU has not been reprogrammed. GO TO 12

Did 000412.03 become active?

NO: ECU has been reprogrammed. Replace ECU. GO TO 13

Continued on next page

RG41221,0000232 -19-20JAN09-13/16

12 Reprogram ECU		
	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Is 000412.00 still active?	**NO:** Verify problem is fixed. GO TO 13

RG41221,0000232 -19-20JAN09-14/16

13 Verification		
	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1
	Did DTC 000412.00 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,0000232 -19-20JAN09-15/16

14 Review Snapshot Information		
	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,0000232 -19-20JAN09-16/16

000412.03 — EGR Temperature Signal Out of Range High

The EGR Temperature Input Voltage exceeds the sensor's high voltage specification.

RG41221,0000233 -19-20JAN09-1/20

000412.03 —EGR Temperature Signal Out of Range High Diagnostic Procedure

Related Information:
The EGR Temperature Input Voltage exceeds the sensor's high voltage specification. The voltage corresponds to a temperature that is lower than what is physically possible for EGR temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU's high EGR temperature engine protection feature disabled. The ECU will try to maintain the engine operating envelope.

Additional References:
For more EGR exhaust temperature sensor information, seeEXHAUST GAS RECIRCULATION (EGR) EXHAUST TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or the TURBOCHARGER ACTUATOR CALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray

NOTE: It has been found in some older ECU operating codes that the EGR temperature was seen as an Out Of Range condition at low temperatures due to the high temperature range of the sensor. This problem has been addressed and fixed in the newer ECU operating codes. If this code does not clear up after the engine has been running for 5 minutes proceed with this troubleshooting procedure.

Continued on next page

RG41221,0000233 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000412.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,0000233 -19-20JAN09-3/20

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on EGR temperature sensor connector T03 and EGR temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000233 -19-20JAN09-4/20

3 Check EGR Temperature Return Circuit Resistance	On the harness, measure the resistance between EGR temperature sensor connector T03-B and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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4 Check For EGR Temperature Signal Circuit Shorted to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between EGR temperature sensor connector T03-A (+) and T03-B (-). Is the voltage greater than 5.5V?	**YES:** GO TO 5 **NO:** GO TO 7

RG41221,0000233 -19-20JAN09-6/20

5 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on terminals J03-E2 and J03-B2. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,0000233 -19-20JAN09-7/20

6 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-E2 and all other terminals in ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,0000233 -19-20JAN09-8/20

7 Check for DTC Change with EGR Temperature Signal Shorted to Return

1. Ignition OFF, engine OFF.
2. On the harness, install flex probes on EGR exhaust temperature sensor connector terminals T03-A and T03-B.
3. Connect jumper wire between flex probes.
4. Ignition ON, engine OFF.
5. Refresh DTCs

Is DTC 000412.04 now an active DTC?

YES: GO TO 8

NO: GO TO 9

RG41221,0000233 -19-20JAN09-9/20

8 Check for DTC 000412.03 with Sensor Reconnected

1. Ignition OFF, engine OFF.
2. Remove flex probes from T03.
3. Reconnect T03 to EGR temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000412.03 now an active DTC?

YES: Replace EGR temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

RG41221,0000233 -19-20JAN09-10/20

9 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-E2 and J03-B2.

Were Terminal Test results good?

YES: GO TO 10

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000233 -19-20JAN09-11/20

10 Check EGR Temperature Sensor Circuit Continuity

1. Disconnect EGR temperature sensor connector T03.
2. On the harness, measure the resistance between ECU J03-E2 and EGR temperature sensor connector T03-A.
3. On the harness, measure the resistance between ECU J03-B2 and EGR temperature sensor connector T03-B.

Were both resistance measurements less than 10 ohms?

YES: GO TO 11

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000233 -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the EGR Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the EGR exhaust temperature sensor and ECU J03 connector.

NOTE: The EGR Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,0000233 -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in EGR temperature sensor connector T03.
3. Replace EGR temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 000412.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

RG41221,0000233 -19-20JAN09-14/20

13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor the EGR Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the EGR exhaust temperature sensor and ECU J03 connector.

NOTE: The EGR Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

Continued on next page

RG41221,0000233 -19-20JAN09-15/20

14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000412.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000233 -19-20JAN09-16/20

15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect EGR temperature sensor connector T03. 3. Perform TERMINAL TEST on T03. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-E2 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000233 -19-20JAN09-17/20

16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000412.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000233 -19-20JAN09-18/20

17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000412.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

RG41221,0000233 -19-20JAN09-19/20

18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000233 -19-20JAN09-20/20

000412.04 — EGR Temperature Signal Out of Range Low

The EGR Temperature Input Voltage drops below the sensor's low voltage specification.

RG41221,0000234 -19-20JAN09-1/23

000412.04 — EGR Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000412.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The EGR Temperature Input Voltage drop below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for EGR temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more EGR temperature sensor information, seeEXHAUST GAS RECIRCULATION (EGR) EXHAUST TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray

Continued on next page

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1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 000412.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

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2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the EGR temperature sensor connector T03. 3. Perform TERMINAL TEST on T03 connector . Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

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3 Check for DTC 000412.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 000412.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

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4 Check for DTC 000412.03	Is DTC 000412.03 now an active DTC with EGR temperature sensor connector T03 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

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5 Sensor Shorted to Ground Test	On the EGR temperature sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 1k ohms?	**YES:** Replace EGR exhaust temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

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6 Sensor Internal Short Test	On the EGR temperature sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 50 ohms?	**YES:** Replace EGR temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

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7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor EGR Temperature Input Voltage data point in Service ADVISOR while gently wiggling wire harness between EGR temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The EGR Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** Replace EGR temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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8 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-E2 and J03-B2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

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9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-E2 and EGR temperature sensor T03-A.	
	2. On the harness, measure the resistance between ECU J03-B2 and EGR temperature sensor T03-B.	**YES:** GO TO 10
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-E2 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 1k ohms?	**NO:** GO TO 11

Continued on next page

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11 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 000412.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 000412.04 still active with J03 disconnected?

YES: GO TO 15

NO: GO TO 12

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12 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-E2 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

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13 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor EGR Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between EGR temperature sensor and ECU J03 connector.

NOTE: The EGR Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

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14 Check for Active DTC 000412.04

Refresh DTCs

Is DTC 000412.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

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15 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 000412.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

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16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor EGR Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between EGR temperature sensor and ECU J03 connector. *NOTE: The EGR Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

RG41221,0000234 -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 000412.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

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18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect EGR temperature sensor connector T03. 3. Perform TERMINAL TEST on T03. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-E2 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 000412.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

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20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000412.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

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21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

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000412.15 — EGR Temperature Signal Slightly High

The ECU senses the Exhaust Gas Recirculation (EGR) Temperature above specification.

RG41221,000029B -19-20JAN09-1/16

00412.15 — EGR Temperature Signal Slighty High Diagnostic Procedure

Troubleshooting Sequence:
000110.0, 000110.15, and 00110.16
000412.15

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:

The ECU senses an EGR temperature of 280° C (536° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 5 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further EGR temperature sensor information, see EXHAUST GAS RECIRCULATION (EGR) EXHAUST TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.
For more information on exhaust gas recirculation valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray

Continued on next page

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1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000412.15 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

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2 Check Manifold Air Temperature	1. Ignition ON, Engine ON. 2. Let engine run for 3 minutes. 3. Refresh codes from within Service Advisor. Are any DTCs related to high manifold air temperature active (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

RG41221,000029B -19-20JAN09-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual. 3. Reconnect the EGR harness connector to the EGR valve. 4. Ignition ON, Engine OFF. 5. From within Service ADVISOR and under Interactive Tests, run ECU: EGR Valve Clean Test. 6. Observe that the EGR valve cycles open and closed. When the clean cycle has finished, the EGR valve should be completely closed. Does the EGR valve remain partly open after the clean test?	**YES:** Replace and calibrate new EGR valve. See EXHAUST GAS RECIRCULATION VALVE CALIBRATION earlier in this section of the manual. GO TO 13 **NO:** Reinstall EGR valve. GO TO 4

Continued on next page

RG41221,000029B -19-20JAN09-5/16

4 Preliminary Check of Cooling System	Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070. • Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in Base Engine Manual, Section 04, Group 150. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 13 **NO:** GO TO 5

RG41221,000029B -19-20JAN09-6/16

5 Check Exhaust Gas Recirculation Cooler	1. Ignition OFF, Engine OFF. 2. Remove exhaust gas recirculation cooler. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 100 earlier in this manual. 3. Inspect the EGR cooler for debris and carbon build up in the exhaust gas passage causing blockage or loss of heat transfer. 4. Inspect coolant passage for proper coolant flow through EGR cooler. Is the exhaust gas or coolant passages blocked or restricted?	**YES:** Replace EGR cooler. GO TO 13 **NO:** GO TO 6

RG41221,000029B -19-20JAN09-7/16

6 Check Exhaust System	Check for restrictions or other signs of high exhaust temperature in the exhaust system. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS in Base Engine Manual, Section 04, Group 150. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 7

RG41221,000029B -19-20JAN09-8/16

7 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding ares for pinched or melted wires. Were any defects found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 8

RG41221,000029B -19-20JAN09-9/16

8 Check EGR Temperature Sensor	1. Remove EGR sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 13 **NO:** GO TO 9

Continued on next page

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9 Check EGR Temperature Sensor	1. Ignition OFF, Engine OFF.	
	2. With EGR temperature sensor removed from engine, reconnect EGR temperature sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	
	4. Perform one or both of the steps below.	
	a. Place the EGR temperature sensor in hot water along with a thermometer.	
	b. Let the EGR temperature sensor cool down to ambient temperature.	**YES:** EGR temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	5. Monitor the EGR Temperature from within Service ADVISOR.	**NO:** EGR temperature sensor has already been replaced. GO TO 10
	Does the sensor reading closely match the temperature of the hot water or ambient air? Note that the EGR temperature sensor is not as accurate at lower temperatures, allow for more tolerance when measuring EGR temperature sensor at lower temperatures.	**NO:** Replace EGR temperature sensor. GO TO 13

RG41221,000029B -19-20JAN09-11/16

10 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000412.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect the EGR temperature sensor connector.	
	3. Ignition ON, Engine OFF.	**YES:** ECU has not been reprogrammed. GO TO 12
	4. Monitor DTCs from within Service ADVISOR.	**YES:** ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Did 000412.03 become active?	**NO:** GO TO 11

RG41221,000029B -19-20JAN09-12/16

11 Check ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 13
	4. Monitor the DTC codes from within Service ADVISOR.	**NO:** ECU has not been reprogrammed. GO TO 12
	Did 000412.03 become active?	**NO:** ECU has been reprogrammed. Replace ECU. GO TO 13

Continued on next page

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12 Reprogram ECU		
	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Is 000412.15 still active?	**NO:** Verify problem is fixed. GO TO 13

RG41221,000029B -19-20JAN09-14/16

13 Verification		
	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1
	Did DTC 000412.15 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,000029B -19-20JAN09-15/16

14 Review Snapshot Information		
	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

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000412.16 — EGR Temperature Signal Moderately High

The ECU senses the Exhaust Gas Recirculation (EGR) temperature above specification.

RG41221,000029B -19-20JAN09-1/16

00412.16 — EGR Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000110.0, 000110.15, and 00110.16
000412.16

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:

The ECU senses an EGR temperature of 290° C (554° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Stop

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further EGR temperature sensor information, seeEXHAUST GAS RECIRCULATION (EGR) EXHAUST TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.
For more information on exhaust gas recirculation valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR temperature sensor T03 - Purple/Gray

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RG41221,000029B -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Ignition ON, Engine ON. 4. Let engine idle for 3 minutes before proceeding. 5. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 6. Refresh Codes. Did 000412.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,000029B -19-20JAN09-3/16

2 Check Manifold Air Temperature	1. Ignition ON, Engine ON. 2. Let engine run for 3 minutes. 3. Refresh codes from within Service Advisor. Are any DTCs related to high manifold air temperature active (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

RG41221,000029B -19-20JAN09-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual. 3. Reconnect the EGR harness connector to the EGR valve. 4. Ignition ON, Engine OFF. 5. From within Service ADVISOR and under Interactive Tests, run ECU: EGR Valve Clean Test. 6. Observe that the EGR valve cycles open and closed. When the clean cycle has finished, the EGR valve should be completely closed. Does the EGR valve remain partly open after the clean test?	**YES:** Replace and calibrate new EGR valve. See EXHAUST GAS RECIRCULATION VALVE CALIBRATION earlier in this section of the manual. GO TO 13 **NO:** Reinstall EGR valve. GO TO 4

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RG41221,000029B -19-20JAN09-5/16

4 Preliminary Check of Cooling System	Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in Base Engine Manual, Section 04, Group 150. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Base Engine Manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in Base Engine Manual, Section 02, Group 070. • Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in Base Engine Manual, Section 04, Group 150. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 13 **NO:** GO TO 5

RG41221,000029B -19-20JAN09-6/16

5 Check Exhaust Gas Recirculation Cooler	1. Ignition OFF, Engine OFF. 2. Remove exhaust gas recirculation cooler. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 100 earlier in this manual. 3. Inspect the EGR cooler for debris and carbon build up in the exhaust gas passage causing blockage or loss of heat transfer. 4. Inspect coolant passage for proper coolant flow through EGR cooler. Is the exhaust gas or coolant passages blocked or restricted?	**YES:** Replace EGR cooler. GO TO 13 **NO:** GO TO 6

RG41221,000029B -19-20JAN09-7/16

6 Check Exhaust System	Check for restrictions or other signs of high exhaust temperature in the exhaust system. See CHECK FOR INTAKE AND EXHAUST RESTRICTIONS in Base Engine Manual, Section 04, Group 150. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 7

RG41221,000029B -19-20JAN09-8/16

7 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding ares for pinched or melted wires. Were any defects found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 8

RG41221,000029B -19-20JAN09-9/16

8 Check EGR Temperature Sensor	1. Remove EGR sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 13 **NO:** GO TO 9

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RG41221,000029B -19-20JAN09-10/16

9 Check EGR Temperature Sensor	1. Ignition OFF, Engine OFF.	
	2. With EGR temperature sensor removed from engine, reconnect EGR temperature sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	
	4. Perform one or both of the steps below.	
	a. Place the EGR temperature sensor in hot water along with a thermometer.	
	b. Let the EGR temperature sensor cool down to ambient temperature.	**YES:** EGR temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	5. Monitor the EGR temperature from within Service ADVISOR.	**NO:** EGR temperature sensor has already been replaced. GO TO 10
	Does the sensor reading closely match the temperature of the hot water or ambient air? Note that the EGR temperature sensor is not as accurate at lower temperatures, allow for more tolerance when measuring EGR temperature sensor at lower temperatures.	**NO:** Replace EGR temperature sensor. GO TO 13

RG41221,000029B -19-20JAN09-11/16

10 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000412.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect the EGR temperature sensor connector.	
	3. Ignition ON, Engine OFF.	**YES:** ECU has not been reprogrammed. GO TO 12
	4. Monitor DTCs from within Service ADVISOR.	**YES:** ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Did 000412.03 become active?	**NO:** GO TO 11

RG41221,000029B -19-20JAN09-12/16

11 Check ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 13
	4. Monitor the DTC codes from within Service ADVISOR.	**NO:** ECU has not been reprogrammed. GO TO 12
	Did 000412.03 become active?	**NO:** ECU has been reprogrammed. Replace ECU. GO TO 13

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RG41221,000029B -19-20JAN09-13/16

12 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000412.16 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 13

RG41221,000029B -19-20JAN09-14/16

13 Verification

1. Ignition OFF, Engine OFF.
2. Reconnect all connectors, hoses, sensors, etc.
3. Ignition ON, Engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Let engine run for 3 minutes.
6. Refresh DTCs.
7. Operate engine through normal speed and load.

Did DTC 000412.16 reappear as active with engine running?

YES: Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1

NO: Problem fixed.

RG41221,000029B -19-20JAN09-15/16

14 Review Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.

YES: Found a possible problem.
Repair possible problem.
Retest.

3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.

Did you find a possible problem or the operating point at which the code becomes active?

YES: Found operating point at which the code becomes active. GO TO 2

NO: Start DTAC case.

RG41221,000029B -19-20JAN09-16/16

000611.03 — Injector Shorted to Voltage Source

The ECU detects that injector wiring is shorted to a power source.

RG41221,0000236 -19-20JAN09-1/18

000611.03 — Injector Shorted to Voltage Source Diagnostic Procedure

Troubleshooting Sequence:
000611.03

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects that injector wiring is shorted to a voltage source.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by either the injector high side wiring or injector low side wiring being shorted to a voltage source.

Alarm Level:
Stop

Control Unit Response:
The ECU will attempt to control the engine in a normal manner. Engine may run poorly or stall, depending on the location of short.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector connector C01 - Blue/Red
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

RG41221,0000236 -19-20JAN09-2/18

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000611.03 reappear active?

YES: GO TO 2

NO: GO TO 12

RG41221,0000236 -19-20JAN09-3/18

2 Check for DTC Change with Injector Harness Disconnected

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Is DTC 000611.03 still active?

YES: GO TO 5

NOTE: Ignore DTCs for high resistance in all injector circuits that may now be active because of this test.

NO: GO TO 3

RG41221,0000236 -19-20JAN09-4/18

3 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 11

NO: GO TO 4

RG41221,0000236 -19-20JAN09-5/18

4 Check Injector Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the injector harness (male pin terminals), measure the voltage between the each terminal of the injector harness connector and single point ground.

Was any voltage measurement greater than 0.5V?

YES: Fix problem. GO TO 11

NO: GO TO 5

Continued on next page

RG41221,0000236 -19-20JAN09-6/18

5 ECU Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector. 3. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 6

RG41221,0000236 -19-20JAN09-7/18

6 Check Engine Harness for Correct Pin Out	On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector and the 10-way injector connector: • Terminal J1-G1 to terminal 8 • Terminal J1-G2 to terminal 10 • Terminal J1-A1 to terminal 5 • Terminal J1-B1 to terminal 2 • Terminal J1-C1 to terminal 7 • Terminal J1-D1 to terminal 3 • Terminal J1-E1 to terminal 1 • Terminal J1-F1 to terminal 6 Are all resistance readings less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 11

RG41221,0000236 -19-20JAN09-8/18

7 Check Engine Harness for Short to Voltage Source	1. Reconnect engine harness to injector harness connector. 2. Ignition ON, engine OFF. 3. On the harness, measure the voltage from injector voltage supply 1 (J1-G1) to single point ground. 4. On the harness, measure the voltage from injector voltage supply 2 (J1-G2) to single point ground. Is any voltage greater than 0.5V?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 8

Continued on next page

RG41221,0000236 -19-20JAN09-9/18

8 Check Engine Harness for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. On the harness, measure the resistance between injector voltage supply 1 (J1-G1) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1
3. On the harness, measure the resistance between injector voltage supply 2 (J1-G2) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1

Are all resistance readings greater than 1k ohms?

YES: GO TO 9

NO: Fix problem. GO TO 11

RG41221,0000236 -19-20JAN09-10/18

9 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: GO TO 10

NO: Problem fixed.

RG41221,0000236 -19-20JAN09-11/18

10 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,0000236 -19-20JAN09-12/18

11 Verification

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: GO TO 2

NO: Problem fixed.

Continued on next page

RG41221,0000236 -19-20JAN09-13/18

12 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 14

RG41221,0000236 -19-20JAN09-14/18

13 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 000611.03 reappear active when engine operating point was reached?	**NO:** GO TO 14

RG41221,0000236 -19-20JAN09-15/18

14 Terminal Test and Harness Inspection	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector and injector harness connector.	
	3. Inspect engine wire harness and injector harness carefully for damage which may cause an intermittent short to a voltage source.	**YES:** Fix problem. GO TO 11
	Were any problems found?	**NO:** GO TO 15

RG41221,0000236 -19-20JAN09-16/18

15 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 2.
	Is 000611.03 active with engine running?	**NO:** GO TO 16.

RG41221,0000236 -19-20JAN09-17/18

16 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 2
	Is 000611.03 active with engine running?	**NO:** Problem fixed or conditions to generate 000611.03 have not been duplicated.

RG41221,0000236 -19-20JAN09-18/18

000611.04 — Injector Shorted to Ground

The ECU detects that injector wiring is shorted to ground.

RG41221,0000237 -19-20JAN09-1/20

000611.04 — Injector Shorted to Ground Diagnostic Procedure

Troubleshooting Sequence:
000611.04

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects that injector wiring is shorted to ground.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a short to ground of injector high side or low side wiring, or by an injector coil that is shorted to ground.

Alarm Level:
Stop

Control Unit Response:
The ECU will not permit the engine to operate when this DTC is active.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector connector C01 - Blue/Red
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

RG41221,0000237 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000611.04 reappear active?

YES: GO TO 2

NO: GO TO 14

RG41221,0000237 -19-20JAN09-3/20

2 Check for DTC Change with Injector Harness Disconnected

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Is DTC 000611.04 still active?

YES: GO TO 7

NOTE: Ignore DTCs for high resistance in all injector circuits that may now be active because of this test.

NO: GO TO 3

RG41221,0000237 -19-20JAN09-4/20

3 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 13

NO: GO TO 4

RG41221,0000237 -19-20JAN09-5/20

4 Check Injector Harness for Short to Ground

On the injector harness (male pin terminals), measure the resistance between each terminal of the injector harness connector and single point ground.

Are all resistance readings greater than 1k ohms?

YES: GO TO 7

NO: GO TO 5

Continued on next page

RG41221,0000237 -19-20JAN09-6/20

5 Inspect Injector Harness	1. Remove rocker cover.	
	2. Inspect injector harness for damage that would cause a short to ground.	**YES:** Replace injector harness. GO TO 13
	Were any problems found?	**NO:** GO TO 6

RG41221,0000237 -19-20JAN09-7/20

6 Check Injector Coils for Short to Ground	1. Loosen all injector terminal nuts.	
	2. Lift injector connectors away from injector studs.	
	3. On each of the injectors, measure the resistance between each injector stud and single point ground.	**YES:** Replace injector harness. GO TO 13
	Are all resistance readings greater than 1k ohms?	**NO:** Replace injector(s) having less than 1k ohms of resistance to ground. GO TO 13

RG41221,0000237 -19-20JAN09-8/20

7 ECU Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector.	
	3. Perform TERMINAL TEST on J1	**YES:** Fix problem. GO TO 13
	Were any problems found?	**NO:** GO TO 8

RG41221,0000237 -19-20JAN09-9/20

8 Check Engine Harness for Correct Pin Out	On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector and the 10-way injector connector: • Terminal J1-G1 to terminal 8 • Terminal J1-G2 to terminal 10 • Terminal J1-A1 to terminal 5 • Terminal J1-B1 to terminal 2 • Terminal J1-C1 to terminal 7 • Terminal J1-D1 to terminal 3 • Terminal J1-E1 to terminal 1 • Terminal J1-F1 to terminal 6	
	Are all resistance readings less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 13

Continued on next page

RG41221,0000237 -19-20JAN09-10/20

9 Check Engine Harness for Short to Ground

1. Reconnect engine harness to injector harness connector.
2. On the harness, measure the resistance between injector voltage supply 1 (J1-G1) and single point ground.
3. On the harness, measure the resistance between injector voltage supply 2 (J1-G2) and single point ground.

Are all resistance readings greater than 1k ohms?

YES: GO TO 10

NO: Fix problem. GO TO 13

RG41221,0000237 -19-20JAN09-11/20

10 Check Engine Harness for Wire-to-Wire Short

1. On the harness, measure the resistance between injector voltage supply 1 (J1-G1) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1
2. On the harness, measure the resistance between injector voltage supply 2 (J1-G2) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1

Are all resistance readings greater than 1k ohms?

YES: GO TO 11

NO: Fix problem. GO TO 13

RG41221,0000237 -19-20JAN09-12/20

11 Reprogram ECU

NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.

1. Ignition OFF, engine OFF.
2. Reconnect all connectors and reinstall rocker cover, if removed.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: GO TO 12

NO: Problem fixed.

RG41221,0000237 -19-20JAN09-13/20

12 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

Continued on next page

RG41221,0000237 -19-20JAN09-14/20

13 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Monitor DTCs in Service ADVISOR. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000611.04 reappear active?	**YES:** GO TO 2 **NO:** Problem fixed.

RG41221,0000237 -19-20JAN09-15/20

14 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 15 **NO:** GO TO 16

RG41221,0000237 -19-20JAN09-16/20

15 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh codes. Did 000611.04 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000237 -19-20JAN09-17/20

16 Terminal Test and Harness Inspection	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector and injector harness connector. 3. Inspect engine wire harness and injector harness carefully for damage which may cause an intermittent short to ground. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 17

RG41221,0000237 -19-20JAN09-18/20

17 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000611.04 active with engine running?	**YES:** GO TO 2. **NO:** GO TO 18.

Continued on next page

RG41221,0000237 -19-20JAN09-19/20

18 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000611.04 active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed or conditions to generate 000611.04 have not been duplicated.

RG41221,0000237 -19-20JAN09-20/20

000627.01 — All Injector Circuits Have High Resistance

The ECU detects that all injector circuits have high resistance.

RG41221,000023A -19-20JAN09-1/18

000627.01— All Injector Circuits Have High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.18
000627.01

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in all injector circuits.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few additional ohms of resistance in the injector circuits.
This DTC can also be caused by a low ECU voltage supply.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner, but the engine may not run due to low injector current.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

RG41221,000023A -19-20JAN09-2/18

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000627.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

RG41221,000023A -19-20JAN09-3/18

2 Check ECU Battery Voltage Supply	Monitor Battery Voltage data point in Service ADVISOR. Is the voltage greater than 11.7V for 12V systems or 23.5V for 24V systems?	**YES:** GO TO 3 **NO:** Recharge application batteries or determine cause of low ECU voltage. GO TO 11

RG41221,000023A -19-20JAN09-4/18

3 Check Connectors	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF. 2. Verify engine harness 10-way connector is fully attached to injector harness connector. 3. Verify ECU J1 connector is fully attached to ECU. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 4

RG41221,000023A -19-20JAN09-5/18

4 Terminal Test	1. Disconnect engine harness 10-way connector from injector harness connector. 2. Perform TERMINAL TEST on injector harness 10-way connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 5

RG41221,000023A -19-20JAN09-6/18

5 Check Injector #1 Circuit for High Resistance	On the injector harness 10-way connector (male pin terminals), measure the resistance between injector voltage supply (terminal 8) and injector #1 control (terminal 1). Is resistance reading less than 2 ohms?	**YES:** GO TO 6 **NO:** Repair problem. GO TO 11

Continued on next page

RG41221,000023A -19-20JAN09-7/18

6 ECU Terminal Test	Perform TERMINAL TEST on J1 connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 7

RG41221,000023A -19-20JAN09-8/18

7 Check Engine Harness for High Resistance	On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector and the 10-way injector connector: • Terminal J1-G1 to terminal 8 • Terminal J1-G2 to terminal 10 • Terminal J1-A1 to terminal 5 • Terminal J1-B1 to terminal 2 • Terminal J1-C1 to terminal 7 • Terminal J1-D1 to terminal 3 • Terminal J1-E1 to terminal 1 • Terminal J1-F1 to terminal 6 Are all resistance readings less than 2 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 11

RG41221,000023A -19-20JAN09-9/18

8 Check Injector Circuits for High Resistance	1. Reconnect engine harness to injector harness connector. 2. On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector: • Terminal J1-G1 to J1-B1 • Terminal J1-G1 to J1-D1 • Terminal J1-G1 to J1-E1 • Terminal J1-G2 to J1-A1 • Terminal J1-G2 to J1-C1 • Terminal J1-G2 to J1-F1 Are all resistance readings less than 2 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 11

RG41221,000023A -19-20JAN09-10/18

9 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** GO TO 10 **NO:** Problem fixed.

Continued on next page

RG41221,000023A -19-20JAN09-11/18

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000023A -19-20JAN09-12/18

11 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** GO TO 2 **NO:** Problem fixed.

RG41221,000023A -19-20JAN09-13/18

12 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 14

RG41221,000023A -19-20JAN09-14/18

13 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh codes. Did 000627.01 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,000023A -19-20JAN09-15/18

14 Terminal Test and Harness Inspection	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector and injector harness 10-way connector. 3. Inspect engine wire harness and injector harness carefully for damage which may cause an intermittent open circuit. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 15

Continued on next page

RG41221,000023A -19-20JAN09-16/18

15 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000627.01 active with engine running?	**YES:** GO TO 2. **NO:** GO TO 16.

RG41221,000023A -19-20JAN09-17/18

16 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000627.01 active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed or conditions to generate 000627.01 have not been duplicated.

RG41221,000023A -19-20JAN09-18/18

000627.18 — Injector Power Supply Voltage Moderately Low

The ECU detects a voltage below specification on ECU injector power supply terminals.

RG41221,00002A5 -19-29MAY08-1/17

000627.18 — Injector Power Supply Voltage Moderately Low

Related Information:
The ECU detects that its injector supply voltage supply is less than a programmable value for more than 1 second with engine speed greater than a programmable value.
The ECU has four internally-connected battery supply terminals and three internally-connected ground terminals.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
If ECU battery voltage supply is too low, injectors may not operate.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 4
- see 9.0L 24V WIRING DIAGRAM 4

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green

RG41221,00002A5 -19-29MAY08-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Start engine and operate at speeds above 1200 rpm. Did 000627.18 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

Continued on next page

RG41221,00002A5 -19-29MAY08-3/17

❷ Check Battery Voltage

1. Ignition ON, engine ON.
2. Measure voltage from application battery positive terminal to battery negative terminal for 12V applications or across series connected batteries for 24V applications.

Is voltage greater than 13V for 12V applications or 26V for 24V applications with engine running?

YES: GO TO 3

NO: Fix application charging system problem. GO TO 9

RG41221,00002A5 -19-29MAY08-4/17

❸ Check ECU Battery Voltage Data Point

Monitor Unswitched Battery Voltage data point in Service ADVISOR with engine running.

Is the voltage greater than 12.5V for 12V systems or 25V for 24V systems?

YES: GO TO 7

NO: GO TO 4

RG41221,00002A5 -19-29MAY08-5/17

❹ Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J2 connector.
3. Perform TERMINAL TEST on J2.

Where any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 5

RG41221,00002A5 -19-29MAY08-6/17

❺ Check ECU Battery Supply

NOTE: The ECU has four battery supply terminals and three ground terminals. The four battery supply terminals are all connected together inside the ECU, as are the three ground terminals.

1. On the harness, measure voltage from ECU unswitched battery supply (J2-L1) to ECU ground (J2-L2).
2. On the harness, measure voltage from ECU unswitched battery supply (J2-L4) to ECU ground (J2-L3).
3. On the harness, measure voltage from ECU unswitched battery supply (J2-M1) to ECU ground (J2-M2).
4. On the harness, measure voltage from ECU unswitched battery supply (J2-M4) to single point ground.

Are all voltage measurements within 1V of battery terminal voltage?

YES: GO TO 6

NO: Fix problem in ECU unswitched battery supply or ground circuits. GO TO 9

RG41221,00002A5 -19-29MAY08-7/17

❻ Check Wiring Harness Resistance

1. Disconnect application battery negative cable.
2. On the harness, measure resistance between each of the ECU unswitched battery supply terminals (J2-L1, J2-L4, J2-M1, and J2-M4) to the battery positive terminal.
3. On the harness, measure resistance between each of the ECU grounds (J2-L2, J2-L3, and J2-M2) to the disconnected battery negative terminal.

Are all resistance measurements less than 2 ohms?

YES: GO TO 7

NO: Fix problem. GO TO 9

Continued on next page

RG41221,00002A5 -19-29MAY08-8/17

7 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Start engine and operate at speeds above 1200 rpm. 5. Refresh DTCs. Did DTC 000627.18 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

RG41221,00002A5 -19-29MAY08-9/17

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Start engine and operate at speeds above 1200 rpm. 4. Refresh DTCs. Did DTC 000627.18 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,00002A5 -19-29MAY08-10/17

9 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Start engine and operate at speeds above 1200 rpm. 4. Refresh DTCs. Did DTC 000627.18 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,00002A5 -19-29MAY08-11/17

10 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

RG41221,00002A5 -19-29MAY08-12/17

11 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh codes. Did 000627.18 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 12

Continued on next page

RG41221,00002A5 -19-29MAY08-13/17

12 Check for Intermittent Wiring Problem		
	1. Ignition ON, engine OFF.	
	2. Monitor Unswitched Battery Voltage data point in Service ADVISOR.	
	3. Gently wiggle wiring harness between ECU and battery terminals.	**YES:** GO TO 13
	Is the minimum Unswitched Battery Voltage data point recorded during the check within 1V of battery terminal voltage?	**NO:** Repair source of intermittent high resistance in ECU battery supply and ground. GO TO 9

RG41221,00002A5 -19-29MAY08-14/17

13 Terminal Test and Harness Inspection		
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST of single point ground stud.	
	3. Perform TERMINAL TEST of ECU battery supply fuse holder.	
	4. Perform TERMINAL TEST at battery terminals.	
	5. Perform TERMINAL TEST on the ECU J2 connector.	
	6. Inspect engine wire harness for damage which may cause an intermittent open circuit.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 14

RG41221,00002A5 -19-29MAY08-15/17

14 Reconnect and Retest		
	1. Reconnect all connectors.	
	2. Start engine and operate at speeds above 1200 rpm.	
	3. Refresh DTCs.	**YES:** GO TO 2
	Is 000627.18 active with engine running?	**NO:** GO TO 15

RG41221,00002A5 -19-29MAY08-16/17

15 Reprogram ECU		
	1. Download latest ECU payload and reprogram ECU.	
	2. Start engine and operate at speeds above 1200 rpm.	
	3. Refresh DTCs.	**YES:** GO TO 2
	Is 000627.18 active with engine running?	**NO:** Problem fixed or conditions to generate 000627.18 have not been duplicated.

RG41221,00002A5 -19-29MAY08-17/17

000629.12 — ECU EEPROM Error

The ECU detects an internal problem.

Continued on next page

DN22556,0000652 -19-23SEP10-1/5

000629.12 — ECU EEPROM Error Diagnostic Procedure

Troubleshooting Sequence:
000629.12

When DTC is Displayed:
The ECU detects an internal memory problem.

Related Information:
This may be generated after ECU has been reprogrammed.

Alarm Level:
Stop

Control Unit Response:
The ECU will attempt to control the engine in a normal manner. Engine may not run or may run poorly.

DN22556,0000652 -19-23SEP10-2/5

1 Reprogram ECU and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Monitor Battery Voltage data point in Service ADVISOR. Is the voltage greater than 11.7V for 12V systems or 23.5V for 24V systems?	**YES:** GO TO 2 **NO:** Recharge application batteries or determine cause of low ECU voltage. GO TO 2

DN22556,0000652 -19-23SEP10-3/5

2 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Disconnect Service ADVISOR. 3. Ignition OFF, engine OFF for 5 minutes. 4. Ignition ON, engine OFF. 5. Connect Service ADVISOR Did 000629.12 reappear active?	**YES:** GO TO 3 **NO:** Problem fixed.

DN22556,0000652 -19-23SEP10-4/5

3 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Disconnect Service ADVISOR. 4. Ignition OFF, engine OFF for 5 minutes. 5. Ignition ON, engine OFF. 6. Connect Service ADVISOR Did 000629.12 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000652 -19-23SEP10-5/5

000629.13 — ECU Boot Block Error

The ECU detects an internal problem.

RG41221,000023D -19-12SEP07-1/4

000629.13 — ECU Boot Block Error Diagnostic Procedure

Troubleshooting Sequence:
000629.13

When DTC is Displayed:
The ECU detects an internal memory problem.

Related Information:
This DTC may be generated after ECU has been reprogrammed.

Alarm Level:
Stop

Control Unit Response:
The ECU will not permit engine to run.

RG41221,000023D -19-12SEP07-2/4

1 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Disconnect Service ADVISOR. 3. Ignition OFF, engine OFF for 5 minutes. 4. Ignition ON, engine OFF. 5. Connect Service ADVISOR Did 000629.13 reappear active?	**YES:** GO TO 2 **NO:** Problem fixed.

RG41221,000023D -19-12SEP07-3/4

2 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Disconnect Service ADVISOR. 4. Ignition OFF, engine OFF for 5 minutes. 5. Ignition ON, engine OFF. 6. Connect Service ADVISOR Did 000629.13 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000023D -19-12SEP07-4/4

000636.02 — Camshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) on the camshaft position sensor input.

RG41221,000023E -19-02JUN08-1/22

000636.02 — Camshaft Position Signal Invalid

Troubleshooting Sequence:
000636.08
000636.02

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects extra pulses (electrical noise) in the camshaft position sensor signal.

The extra pulses may be caused by electromagnetic interference or by a sensor signal wire that is shorted to some other signal wire.

Wiring problems such as loose terminals or water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crankshaft position sensor input to determine camshaft and pump position.
If a crank sensor DTC accompanies 000636.02, the engine cannot be started and will stall if running until at least one of the two codes is repaired.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- camshaft position sensor X02 - Purple/Gray

Continued on next page

RG41221,000023E -19-02JUN08-2/22

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Start or crank engine.
5. Refresh DTCs.

Did 000636.02 reappear active with engine running or cranking?

YES: GO TO 2

NO: GO TO 20

RG41221,000023E -19-02JUN08-3/22

2 Check Data Points

1. Monitor the following Data Points in Service ADVISOR:
   - Camshaft Position Signal Noise Indicator
   - Camshaft Position Signal Improper Pattern Indicator
   - Camshaft Position Signal Missing Indicator
   - Camshaft Position Signal Status
2. Operate engine through normal speed and load ranges.
3. Switch ON and OFF any electrical devices on the application.

CAUTION: Use caution when working near rotating components.

4. Gently wiggle wire harness between camshaft position sensor and ECU.

NOTE: The three Camshaft Position Signal Indicator data points will indicated 0% if recent camshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Camshaft Position Signal Status has a value of 47 if the camshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a camshaft position signal problem is detected. These data points can be used to locate intermittent problems with the camshaft position signal which are too brief to cause a DTC to become active.

YES: Found engine wiring problem. Repair problem. GO TO 19

NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.

YES: Some device on application causes the electrical noise. Open DTAC case.

Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?

NO: GO TO 3

RG41221,000023E -19-02JUN08-4/22

3 Test Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor.
3. Perform TERMINAL TEST on camshaft position sensor and connector.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 4

RG41221,000023E -19-02JUN08-5/22

4 Inspect Target

1. Remove camshaft position sensor.
2. Using mirror, visually inspect webs on rear face of inner camshaft gear through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris on webs and rear face of gear.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 5

Continued on next page

RG41221,000023E -19-02JUN08-6/22

5 Inspect Camshaft Position Sensor	*NOTE: See REMOVE AND INSTALL CAMSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of camshaft position sensor for damage due to contact with inner camshaft gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 19
	Does sensor appear damaged due to contact with gear?	**NO:** GO TO 6

RG41221,000023E -19-02JUN08-7/22

6 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A).	**YES:** Reinstall camshaft position sensor. Do not reconnect to harness. GO TO 7
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace camshaft position sensor. GO TO 19

RG41221,000023E -19-02JUN08-8/22

7 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 8

RG41221,000023E -19-02JUN08-9/22

8 Check for Shorted to Ground Sensor Return	On the harness, measure the resistance between the ECU connector camshaft position sensor return (J3-G3) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 19

RG41221,000023E -19-02JUN08-10/22

9 Check Sensor Circuit Resistance	*NOTE: Verify that camshaft position sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

RG41221,000023E -19-02JUN08-11/22

10 Test ECU Terminals	1. Disconnect ECU J2 connector.	
	2. Perform TERMINAL TEST on J2. Examine ECU battery supply (J2-L1), ignition (J2-B2), and ground (J2-L2) terminals carefully.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 11

Continued on next page

RG41221,000023E -19-02JUN08-12/22

11 Check for Intermittent ECU Power Supply Problem	1. Ignition ON, engine OFF.	
	2. Measure the voltage from ECU battery supply (J2-L1) to ECU ground (J2-L2) while gently wiggling wire harness.	
	3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently wiggling wire harness.	**YES:** Fix problem. GO TO 19
	Were any intermittent wiring problems found?	**NO:** GO TO 12

RG41221,000023E -19-02JUN08-13/22

12 Check for Wire-to-Wire Short	1. Ignition OFF, engine OFF.	
	2. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and all other terminals in the J1, J2, and J3 connectors.	**YES:** GO TO 13
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 19

RG41221,000023E -19-02JUN08-14/22

13 Check Sensor Wiring	Examine camshaft position sensor wiring between the camshaft position sensor and the ECU. Check for the following:	
	• Verify that camshaft position sensor signal and return wires are twisted together throughout the harness.	
	• Verify that no physical damage to camshaft position sensor signal and return wires is evident.	**YES:** Replace camshaft position sensor wiring with twisted pair or repair problem. GO TO 19
	Were any problems found?	**NO:** GO TO 14

RG41221,000023E -19-02JUN08-15/22

14 Check Wire Harness Routing	Examine routing of camshaft position sensor wiring between camshaft position sensor and ECU.	**YES:** Reroute camshaft position sensor wires away from device. GO TO 19
	Is camshaft position sensor wiring routed near sources of strong electric or magnetic fields such as 2-way radio antenna, alternator, inverter, a.c. generator, or other similar device on the application?	**NO:** GO TO 15

RG41221,000023E -19-02JUN08-16/22

15 Check for Alternator Noise	1. Disconnect negative battery cable.	
	2. Disconnect alternator positive output cable and insulate cable terminal.	
	3. Disconnect all other alternator connectors.	
	4. Reconnect negative battery cable.	
	5. Reconnect ECU and sensor connectors.	
	6. Ignition ON, engine ON.	**YES:** GO TO 16
	Did DTC 000636.02 reappear active with engine running?	**NO:** Repair alternator problem. GO TO 19

Continued on next page

RG41221,000023E -19-02JUN08-17/22

16 Replace Camshaft Position Sensor	Has camshaft position sensor been replaced during this procedure?	**YES:** GO TO 17 **NO:** Replace camshaft position sensor. GO TO 19

RG41221,000023E -19-02JUN08-18/22

17 Reprogram ECU	Download latest ECU payload and reprogram ECU. Did DTC 000636.02 reappear active with engine running?	**YES:** GO TO 18 **NO:** Problem fixed.

RG41221,000023E -19-02JUN08-19/22

18 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000636.02 reappear active with engine running?	 **YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000023E -19-02JUN08-20/22

19 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors (disconnect battery negative cable prior to reinstalling alternator positive cable, if applicable). 3. Ignition ON, engine ON. 4. Monitor DTCs in Service ADVISOR. 5. Refresh DTCs. 6. Operate engine through normal speed and load. Did DTC 000636.02 reappear active with engine running?	 **YES:** GO TO 1 **NO:** Problem fixed.

RG41221,000023E -19-02JUN08-21/22

20 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Retest. **YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest. **NO:** GO TO 2

RG41221,000023E -19-02JUN08-22/22

000636.05 — Camshaft Position Circuit Circuit Has High Resistance

The ECU detects low current on the camshaft position sensor wiring.

RG41221,000023F -19-20JAN09-1/14

000636.05 — Camshaft Position Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000636.05

Related Information:
The ECU detects high resistance or an open circuit in the camshaft position circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000636.08 may also be active when engine is running.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Camshaft position sensor X02 - Purple/Gray

RG41221,000023F -19-20JAN09-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect camshaft position sensor.	
	3. Perform TERMINAL TEST on camshaft position sensor and connector.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

RG41221,000023F -19-20JAN09-3/14

2 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** GO TO 3 **NO:** Remove camshaft position sensor. GO TO 11

RG41221,000023F -19-20JAN09-4/14

3 Test ECU Terminals	1. Disconnect ECU J3 connector. 2. Perform TERMINAL TEST on J3. Were any problems found?	 **YES:** Fix problem. GO TO 12 **NO:** GO TO 4

RG41221,000023F -19-20JAN09-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 5 **NO:** Fix problem. GO TO 12

RG41221,000023F -19-20JAN09-6/14

5 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors. 2. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and all other terminals in the J1, J2, and J3 connectors. Are all resistance measurements greater than 1k ohms?	 **YES:** GO TO 6 **NO:** Fix problem. GO TO 12

RG41221,000023F -19-20JAN09-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the ECU camshaft position sensor signal (J3-G4) and single point ground. Is voltage less than 0.5V?	 **YES:** GO TO 7 **NO:** Fix problem.. GO TO 12

RG41221,000023F -19-20JAN09-8/14

7 Check for Intermittent Open Circuit	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 8 **NO:** Recheck for intermittent open circuit. GO TO 1

Continued on next page

RG41221,000023F -19-20JAN09-9/14

8 Replace Camshaft Position Sensor	Has camshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 9 **NO:** Remove camshaft position sensor. GO TO 11

RG41221,000023F -19-20JAN09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

RG41221,000023F -19-20JAN09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000023F -19-20JAN09-12/14

11 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with inner camshaft gear. Does sensor appear damaged due to contact with gear?	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace camshaft position sensor. GO TO 12

RG41221,000023F -19-20JAN09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

RG41221,000023F -19-20JAN09-14/14

000636.06 — Camshaft Position Circuit Has Low Resistance

The ECU detects high current on the camshaft position sensor wiring.

RG41221,0000240 -19-20JAN09-1/16

000636.06 — Camshaft Position Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000636.06

Related Information:
The ECU detects low resistance or a short to ground in the camshaft position circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000636.08 may also be active when engine is running.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Camshaft position sensor X02 - Purple/Gray

RG41221,0000240 -19-20JAN09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect camshaft position sensor connector. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 now an active DTC?	**YES:** Remove camshaft position sensor. GO TO 13 **NO:** GO TO 2

Continued on next page

RG41221,0000240 -19-20JAN09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on camshaft position sensor and connector.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 3

RG41221,0000240 -19-20JAN09-4/16

3 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A).	**YES:** Do not reconnect sensor to harness. GO TO 4
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Remove camshaft position sensor. GO TO 13

RG41221,0000240 -19-20JAN09-5/16

4 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on connector J3.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 5

RG41221,0000240 -19-20JAN09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A).	**YES:** GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000240 -19-20JAN09-7/16

6 Check for Wire-to-Wire Short	1. Verify camshaft position sensor is disconnected.	
	2. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and return (J3-G3).	**YES:** GO TO 7
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000240 -19-20JAN09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and single point ground.	**YES:** GO TO 8
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

Continued on next page

RG41221,0000240 -19-20JAN09-9/16

8 Check for Wire-to-Wire Short

1. Disconnect ECU J1 and J2 connectors.
2. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and all other terminals in the J1, J2. and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 9

NO: Fix problem. GO TO 14

RG41221,0000240 -19-20JAN09-10/16

9 Check for Intermittent Shorted Circuit

1. Ignition OFF, engine OFF.
2. Reconnect all electrical connectors.
3. Ignition ON, engine OFF.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000636.06 reappear active?

YES: GO TO 10

NO: Recheck for intermittent shorted circuit. GO TO 1

RG41221,0000240 -19-20JAN09-11/16

10 Replace Camshaft Position Sensor

Has camshaft position sensor been replaced during this diagnostic procedure?

YES: GO TO 11

NO: Remove camshaft position sensor. GO TO 13

RG41221,0000240 -19-20JAN09-12/16

11 Reprogram ECU

1. Download latest ECU payload and reprogram ECU.
2. Ignition ON, engine OFF.
3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000636.06 reappear active?

YES: GO TO 12

NO: Problem fixed.

RG41221,0000240 -19-20JAN09-13/16

12 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000636.06 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,0000240 -19-20JAN09-14/16

13 Inspect Camshaft Position Sensor

Examine tip of camshaft position sensor for damage due to contact with inner camshaft gear

Does sensor appear damaged due to contact with gear?

YES: Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14

NO: Replace camshaft position sensor. GO TO 14

Continued on next page

RG41221,0000240 -19-20JAN09-15/16

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000240 -19-20JAN09-16/16

000636.08 — Camshaft Position Signal Missing

The ECU does not detect the camshaft position sensor input.

RG41221,0000241 -19-20JAN09-1/21

000636.08 — Camshaft Position Signal Missing

Troubleshooting Sequence:
000636.05 or 000636.06
000636.08

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU does not detect a camshaft position sensor signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the sensor wiring.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crank sensor input to determine camshaft and camshaft position.
If a crank sensor DTC accompanies 000636.08, the engine cannot be started and will stall if running until at least one of the two codes is repaired.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Camshaft position sensor X02 - Purple/Gray

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RG41221,0000241 -19-20JAN09-2/21

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000636.08 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 19

RG41221,0000241 -19-20JAN09-3/21

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 or 000636.06 active?	**YES:** Discontinue test for 000636.08 and perform test for 000636.05 — PUMP POSITION SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDURE or 000636.06 — PUMP POSITION SENSOR CIRCUIT HAS LOW RESISTANCE DIAGNOSTIC PROCEDURE . **NO:** GO TO 3

RG41221,0000241 -19-20JAN09-4/21

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL PUMP POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect camshaft position sensor connector. 3. Verify camshaft position sensor installation torque. Was camshaft position sensor fully threaded into mounting hole?	**YES:** GO TO 4 **NO:** Torque sensor to specified value. GO TO 18

RG41221,0000241 -19-20JAN09-5/21

4 Test Sensor Terminals	Perform TERMINAL TEST on camshaft position sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 18 **NO:** GO TO 5

Continued on next page

RG41221,0000241 -19-20JAN09-6/21

5 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 6 **NO:** Remove camshaft position sensor. GO TO 17

RG41221,0000241 -19-20JAN09-7/21

6 Check for Recent Mechanical Repair	Has an internal engine repair requiring removal of inner camshaft gear been performed just prior to 000636.08 appearing?	**YES:** GO TO 7 **NO:** GO TO 8

RG41221,0000241 -19-20JAN09-8/21

7 Inspect Target	1. Remove camshaft position sensor. 2. Verify that webs are visible through the camshaft position sensor mounting hole as engine is rotated. Are webs on inner camshaft gear visible?	 **YES:** GO TO 8 **NO:** Fix mechanical problem, GO TO 18

RG41221,0000241 -19-20JAN09-9/21

8 Test ECU Terminals	1. Disconnect ECU J3 connector. 2. Perform TERMINAL TEST on J3. Were any problems found?	 **YES:** Fix problem. GO TO 18 **NO:** GO TO 9

RG41221,0000241 -19-20JAN09-10/21

9 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 10 **NO:** Fix problem. GO TO 18

RG41221,0000241 -19-20JAN09-11/21

10 Check for Wire-to-Wire Short	1. Verify camshaft position sensor is disconnected. 2. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and return (J3-G3). Is the resistance greater than 1k ohms?	 **YES:** GO TO 11 **NO:** Fix problem. GO TO 18

Continued on next page

RG41221,0000241 -19-20JAN09-12/21

11 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 18

RG41221,0000241 -19-20JAN09-13/21

12 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors. 2. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and all other terminals in the J1, J2, and J3 connectors. Are all resistance measurements greater than 1k ohms?	 **YES:** GO TO 13 **NO:** Fix problem. GO TO 18

RG41221,0000241 -19-20JAN09-14/21

13 Check for Short to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between ECU camshaft position sensor signal (J3-G4) and single point ground. Is the voltage less than 0.5V?	 **YES:** GO TO 14 **NO:** Fix problem. GO TO 18

RG41221,0000241 -19-20JAN09-15/21

14 Replace Camshaft Position Sensor	Has camshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 15 **NO:** Remove camshaft position sensor. GO TO 17

RG41221,0000241 -19-20JAN09-16/21

15 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Download latest ECU payload and reprogram ECU. Did 000636.08 reappear active with engine running?	 **YES:** GO TO 16 **NO:** Problem fixed.

RG41221,0000241 -19-20JAN09-17/21

16 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000636.08 reappear active with engine running?	 **YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

RG41221,0000241 -19-20JAN09-18/21

17 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with inner camshaft gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 18
	Does sensor appear damaged due to contact with gear?	**NO:** Replace camshaft position sensor. GO TO 18

RG41221,0000241 -19-20JAN09-19/21

18 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine ON.	**YES:** GO TO 1
	Did 000636.08 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000241 -19-20JAN09-20/21

19 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 2

RG41221,0000241 -19-20JAN09-21/21

000636.10 — Camshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern on the camshaft position sensor input.

RG41221,0000242 -19-20JAN09-1/25

000636.10 — Camshaft Position Signal Rate of Change Abnormal

Troubleshooting Sequence:
000636.08
000636.10

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects an improper pattern (pulses missing) on the camshaft position sensor input.
Wiring problems such as loose terminals or water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crank sensor input to determine camshaft and pump position.
If a crank sensor DTC accompanies 000636.10, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Problems with the crank sensor circuit may also cause 000636.10 to be falsely generated.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Camshaft position sensor X02 - Purple/Gray

Continued on next page

RG41221,0000242 -19-20JAN09-2/25

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000636.10 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 23

RG41221,0000242 -19-20JAN09-3/25

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05, 000636.06, or any DTC with SPN 000637 now active?	**YES:** Discontinue test for 000636.10 and perform test 000636.05 — PUMP POSITION SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDURE, 000636.06 — PUMP POSITION SENSOR CIRCUIT HAS LOW RESISTANCE DIAGNOSTIC PROCEDURE, or DTC with SPN 000637. **NO:** GO TO 3

RG41221,0000242 -19-20JAN09-4/25

3 Check for Crank Sensor Signal Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. Ignore DTC 000637.08 which will be generated for the disconnected crank sensor. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Attempt to start engine. 6. Operate engine for one minute through rpm range and monitor DTCs, if engine started. 7. Ignition OFF, engine OFF. 8. Reconnect crank sensor. Did engine start and run without generating 000636.10?	**YES:** Check for loose crankshaft oil pump drive gear. **NO:** GO TO 4

Continued on next page

RG41221,0000242 -19-20JAN09-5/25

4 Check Speed Sensor Data Points

1. Monitor the following Data Points in Service ADVISOR:
   - Camshaft Position Signal Noise Indicator
   - Camshaft Position Signal Improper Pattern Indicator
   - Camshaft Position Signal Missing Indicator
   - Camshaft Position Signal Status
2. Operate engine through normal speed and load ranges.
3. Switch ON and OFF any electrical devices on the application.

CAUTION: Use caution when working near rotating components.

4. Gently wiggle wire harness between crank sensor and ECU.

NOTE: The three Camshaft Position Signal Indicator data points will indicated 0% if recent camshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Camshaft Position Signal Status has a value of 47 if the camshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a camshaft position signal problem is detected. These data points can be used to locate intermittent problems with the camshaft position signal which are too brief to cause a DTC to become active.

YES: Engine wiring problem. Repair problem. GO TO 22

NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.

YES: Some device on application causes the noise. Open DTAC case.

Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?

NO: GO TO 5

RG41221,0000242 -19-20JAN09-6/25

5 Check for Loose Sensor

NOTE: See REMOVE AND INSTALL PUMP POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor connector.
3. Verify camshaft position sensor installation torque.

YES: GO TO 6

Was camshaft position sensor fully threaded into mounting hole?

NO: Torque sensor to specified value. GO TO 22

RG41221,0000242 -19-20JAN09-7/25

6 Test Sensor Terminals

Perform TERMINAL TEST on camshaft position sensor and connector.

YES: Fix problem. GO TO 22

Were any problems found?

NO: GO TO 7

RG41221,0000242 -19-20JAN09-8/25

7 Inspect Target

1. Remove camshaft position sensor.
2. Using mirror, visually inspect webs on rear face of inner camshaft gear through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris on webs and rear face of gear.

YES: Fix problem. GO TO 22

Were any problems found?

NO: GO TO 8

Continued on next page

RG41221,0000242 -19-20JAN09-9/25

8 Inspect Sensor	Examine tip of camshaft position sensor for damage due to contact with inner camshaft gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 22
	Does sensor appear damaged due to contact with gear?	**NO:** GO TO 9

RG41221,0000242 -19-20JAN09-10/25

9 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A).	**YES:** Reinstall camshaft position sensor. Do not reconnect to harness. GO TO 10
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace camshaft position sensor. GO TO 22

RG41221,0000242 -19-20JAN09-11/25

10 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 22
	Were any problems found?	**NO:** GO TO 11

RG41221,0000242 -19-20JAN09-12/25

11 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU camshaft position sensor return (J3-G3) and single point ground.	**YES:** GO TO 12
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 22

RG41221,0000242 -19-20JAN09-13/25

12 Check Sensor Circuit Resistance	*NOTE: Verify that camshaft position sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A).	**YES:** GO TO 13
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 22

RG41221,0000242 -19-20JAN09-14/25

13 Check for Intermittent Short Between Signal and Return	1. Verify camshaft position sensor is disconnected.	
	2. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor return (J3-G3) while gently moving wire harness.	**YES:** GO TO 14
	Is resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 22

Continued on next page

RG41221,0000242 -19-20JAN09-15/25

14 Test ECU Terminals

1. Disconnect ECU J2 connector.
2. Perform TERMINAL TEST on J2. Examine ECU battery supply (J2-L1), ignition (J2-B2), and ground (J2-L2) terminals carefully.

Were any problems found?

YES: Fix problem. GO TO 22

NO: GO TO 15

RG41221,0000242 -19-20JAN09-16/25

15 Check for Intermittent ECU Power Supply Problem

1. Ignition ON, engine OFF.
2. Measure the voltage from ECU battery supply (J2-L1) to ECU ground (J2-L2) while gently moving wire harness.
3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently moving wire harness.

Were any intermittent wiring problems found?

YES: Fix problem. GO TO 22

NO: GO TO 16

RG41221,0000242 -19-20JAN09-17/25

16 Check for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and all other terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 17

NO: Fix problem. GO TO 22

RG41221,0000242 -19-20JAN09-18/25

17 Check Sensor Resistance at ECU

1. Reconnect camshaft position sensor connector.
2. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and return (J3-G3).

Is the resistance between 2500 ohms and 3500 ohms?

YES: GO TO 18

NO: Fix problem. GO TO 22

RG41221,0000242 -19-20JAN09-19/25

18 Inspect Sensor Wiring

Examine camshaft position sensor wiring between the camshaft position sensor and the ECU. Check for the following:

- Verify that camshaft position sensor signal and return wires are twisted together throughout the harness.
- Verify that no physical damage to camshaft position sensor signal and ground wires is evident.

Were any problems found?

YES: Replace camshaft position sensor wiring with twisted pair or repair problem. GO TO 22

NO: GO TO 19

Continued on next page

RG41221,0000242 -19-20JAN09-20/25

19 Replace Camshaft Position Sensor	Has camshaft position sensor been replaced during this procedure?	**YES:** GO TO 20 **NO:** Replace camshaft position sensor. GO TO 22

RG41221,0000242 -19-20JAN09-21/25

20 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reinstall ECU connectors.	
	3. Download latest ECU payload and reprogram ECU.	**YES:** GO TO 21
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000242 -19-20JAN09-22/25

21 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000242 -19-20JAN09-23/25

22 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000242 -19-20JAN09-24/25

23 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 4

RG41221,0000242 -19-20JAN09-25/25

000637.02 — Crankshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) on the crank sensor input.

RG41221,0000243 -19-02JUN08-1/22

000637.02 — Crankshaft Position Signal Invalid

Troubleshooting Sequence:
000637.08
000637.02

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects extra pulses (electrical noise) in the crank sensor signal.
The extra pulses may be caused by electromagnetic interference or by a sensor signal wire that is shorted to some other signal wire.
Wiring problems such as loose terminals or water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
The ECU will use the camshaft position sensor input to determine piston position.
Prolonged cranking time may be required to start the engine.
If a camshaft position sensor DTC accompanies 000637.02, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

Continued on next page

RG41221,0000243 -19-02JUN08-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000637.02 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 20

RG41221,0000243 -19-02JUN08-3/22

2 Check Speed Sensor Data Points	1. Monitor the following Data Points in Service ADVISOR: • Crankshaft Position Signal Noise Indicator • Crankshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Missing Indicator • Crankshaft Position Signal Status 2. Operate engine through normal speed and load ranges. 3. Switch ON and OFF any electrical devices on the application. **CAUTION: Use caution when working near rotating components.** 4. Gently wiggle wire harness between crank sensor and ECU. *NOTE: The three Crankshaft Position Signal Indicator data points will indicated 0% if recent camshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Crankshaft Position Signal Status has a value of 47 if the camshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a crankshaft position signal problem is detected. These data points can be used to locate intermittent problems with the crankshaft position signal which are too brief to cause a DTC to become active.* *NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.* Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?	**YES:** Engine wiring problem. Fix problem. GO TO 19 **YES:** Some device on application causes the noise. Open DTAC case. **NO:** GO TO 3

RG41221,0000243 -19-02JUN08-4/22

3 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 19 **NO:** GO TO 4

RG41221,0000243 -19-02JUN08-5/22

4 Inspect Target	1. Remove crank sensor. 2. Visually oil pump drive gear teeth for damage or debris as engine is rotated. Were any problems found?	**YES:** Fix problem. GO TO 19 **NO:** GO TO 5

Continued on next page

RG41221,0000243 -19-02JUN08-6/22

5 Inspect Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of crank sensor for damage due to contact with oil pump drive gear.	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 19
	Does sensor appear damaged due to contact with oil pump drive gear?	**NO:** GO TO 6

RG41221,0000243 -19-02JUN08-7/22

6 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (B) and return (A).	**YES:** Reinstall crank sensor. Do not reconnect to harness. GO TO 7
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace crank sensor. GO TO 19

RG41221,0000243 -19-02JUN08-8/22

7 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 8

RG41221,0000243 -19-02JUN08-9/22

8 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU connector crank sensor return (J3-F3) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 19

RG41221,0000243 -19-02JUN08-10/22

9 Check Sensor Circuit Resistance	*NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

RG41221,0000243 -19-02JUN08-11/22

10 Test ECU Terminals	1. Disconnect ECU J2 connector.	
	2. Perform TERMINAL TEST on J2. Examine ECU battery supply (J2-L1), ignition (J2-B2), and ground (J2-L2) terminals carefully.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 11

Continued on next page

RG41221,0000243 -19-02JUN08-12/22

11 Check for Intermittent ECU Power Supply Problem	1. Ignition ON, engine OFF.	
	2. Measure the voltage from ECU battery supply (J2-L1) to ECU ground (J2-L2) while gently wiggling wire harness.	
	3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently wiggling wire harness.	**YES:** Fix problem. GO TO 19
	Were any intermittent wiring problems found?	**NO:** GO TO 12

RG41221,0000243 -19-02JUN08-13/22

12 Check for Wire-to-Wire Short	1. Ignition OFF, engine OFF.	
	2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and all other terminals in the J1, J2, and J3 connectors.	**YES:** GO TO 13
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 19

RG41221,0000243 -19-02JUN08-14/22

13 Check Sensor Wiring	Examine crank sensor wiring between the crank sensor and the ECU. Check for the following:	
	• Verify that crank sensor signal and return wires are twisted together throughout the harness.	
	• Verify that no physical damage to crank sensor signal and return wires is evident.	**YES:** Replace crank sensor wiring with twisted pair or repair problem. GO TO 19
	Were any problems found?	**NO:** GO TO 14

RG41221,0000243 -19-02JUN08-15/22

14 Check Wire Harness Routing	Examine routing of crank sensor wiring between crank sensor and ECU.	**YES:** Reroute crank sensor wires away from device. GO TO 19
	Is crank sensor wiring routed near sources of strong electric or magnetic fields such as 2-way radio antenna, alternator, inverter, a.c. generator, or other similar device on the application?	**NO:** GO TO 15

RG41221,0000243 -19-02JUN08-16/22

15 Check for Alternator Noise	1. Disconnect negative battery cable.	
	2. Disconnect alternator positive output cable and insulate cable terminal.	
	3. Disconnect all other alternator connectors.	
	4. Reconnect negative battery cable.	
	5. Reconnect ECU and sensor connectors.	
	6. Ignition ON, engine ON.	**YES:** GO TO 16
	Did DTC 000637.02 reappear active with engine running?	**NO:** Repair alternator problem. GO TO 19

Continued on next page

RG41221,0000243 -19-02JUN08-17/22

16 Replace Crank Position Sensor	Has crank sensor been replaced during this procedure?	**YES:** GO TO 17 **NO:** Replace crank sensor. GO TO 19

RG41221,0000243 -19-02JUN08-18/22

17 Reprogram ECU	Download latest ECU payload and reprogram ECU. Did DTC 000637.02 reappear active with engine running?	**YES:** GO TO 18 **NO:** Problem fixed.

RG41221,0000243 -19-02JUN08-19/22

18 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000637.02 reappear active with engine running?	 **YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,0000243 -19-02JUN08-20/22

19 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors (disconnect battery negative cable prior to reinstalling alternator positive cable, if applicable). 3. Ignition ON, engine ON. 4. Monitor DTCs in Service ADVISOR. 5. Refresh DTCs. 6. Operate engine through normal speed and load. Did DTC 000637.02 reappear active with engine running?	 **YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000243 -19-02JUN08-21/22

20 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Retest. **YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest. **NO:** GO TO 2

RG41221,0000243 -19-02JUN08-22/22

000637.05 — Crank Sensor Circuit Has High Resistance

The ECU detects low current on the crank sensor wiring.

RG41221,0000244 -19-20JAN09-1/14

000637.05 — Crank Sensor Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000637.05

Related Information:
The ECU detects high resistance or an open circuit in the crank sensor circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000637.08 may also be active when engine is running.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.
For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

RG41221,0000244 -19-20JAN09-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect crank sensor.	
	3. Perform TERMINAL TEST on crank sensor and connector.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

RG41221,0000244 -19-20JAN09-3/14

2 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (B) and return (A).	**YES:** GO TO 3
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Remove crank sensor. GO TO 11

RG41221,0000244 -19-20JAN09-4/14

3 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 4

RG41221,0000244 -19-20JAN09-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).	**YES:** GO TO 5
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 12

RG41221,0000244 -19-20JAN09-6/14

5 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and all other terminals in the J1, J2 and J3 connectors.	**YES:** GO TO 6
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 12

RG41221,0000244 -19-20JAN09-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU crank sensor signal (J3-F4) and single point ground.	**YES:** GO TO 7
	Is voltage less than 0.5V?	**NO:** Fix problem. GO TO 12

RG41221,0000244 -19-20JAN09-8/14

7 Check for Intermittent Open Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did 000637.05 reappear active?	**NO:** Recheck for intermittent open circuit. GO TO 1

Continued on next page

RG41221,0000244 -19-20JAN09-9/14

8 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 9 **NO:** Remove crank sensor. GO TO 11

RG41221,0000244 -19-20JAN09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

RG41221,0000244 -19-20JAN09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,0000244 -19-20JAN09-12/14

11 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with timing wheel Does sensor appear damaged due to contact with timing wheel?	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace crank sensor. GO TO 12

RG41221,0000244 -19-20JAN09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000244 -19-20JAN09-14/14

000637.06 — Crankshaft Position Circuit Has Low Resistance

The ECU detects high current on the crank sensor wiring.

RG41221,0000245 -19-20JAN09-1/16

000637.06 — Crankshaft Position Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000637.06

Related Information:
The ECU detects low resistance or a short to ground in the crank sensor circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000637.08 may also be active when engine is running.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

RG41221,0000245 -19-20JAN09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect crank sensor connector. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000637.05 now an active DTC?	**YES:** Remove crank sensor. GO TO 13 **NO:** GO TO 2

Continued on next page

RG41221,0000245 -19-20JAN09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on crank sensor and connector.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 3

RG41221,0000245 -19-20JAN09-4/16

3 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (B) and return (A).	**YES:** Do not reconnect sensor to harness. GO TO 4
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Remove crank sensor. GO TO 13

RG41221,0000245 -19-20JAN09-5/16

4 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 5

RG41221,0000245 -19-20JAN09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).	**YES:** GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000245 -19-20JAN09-7/16

6 Check for Wire-to-Wire Short	1. Verify crank sensor is disconnected.	
	2. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and return (J3-F3).	**YES:** GO TO 7
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000245 -19-20JAN09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and single point ground.	**YES:** GO TO 8
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

Continued on next page

RG41221,0000245 -19-20JAN09-9/16

8 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and all other terminals in the J1, J2, and J3 connectors.	**YES:** GO TO 9
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000245 -19-20JAN09-10/16

9 Check for Intermittent Shorted Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 10
	Did 000637.06 reappear as active?	**NO:** Recheck for intermittent shorted circuit. GO TO 1

RG41221,0000245 -19-20JAN09-11/16

10 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 11
		NO: Remove crank sensor. GO TO 13

RG41221,0000245 -19-20JAN09-12/16

11 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 12
	Did 000637.06 reappear active?	**NO:** Problem fixed. GO TO 14

RG41221,0000245 -19-20JAN09-13/16

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000637.06 reappear active?	**NO:** Problem fixed.

RG41221,0000245 -19-20JAN09-14/16

13 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with timing wheel	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14
	Does sensor appear damaged due to contact with timing wheel?	**NO:** Replace crank sensor. GO TO 14

Continued on next page

RG41221,0000245 -19-20JAN09-15/16

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000245 -19-20JAN09-16/16

000637.07 — Crankshaft and Camshaft Position Signals Out of Sync

The ECU detects that the camshaft position and crankshaft position sensor inputs are not in sync with each other.

RG41221,0000246 -19-29MAY08-1/17

000637.07 — Crankshaft and Camshaft Position Signals Out of Sync Diagnostic Procedure

Troubleshooting Sequence:
000636.08 or 000637.08
000636.10, 000637.10, 000636.02 or 000637.02
000637.07

When DTC is Displayed:
The engine is running above 400 rpm and the error condition is active.

Related Information:
The ECU detects that the camshaft position sensor signal is not correctly timed relative to the crank sensor signal.
This DTC may be caused by incorrect camshaft timing or by a loose oil pump drive gear.
Wiring problems such as loose terminals or water in connectors may also cause this DTC to be active intermittently.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray
- Camshaft position sensor X02 - Purple/Gray

Continued on next page

RG41221,0000246 -19-29MAY08-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start engine. 5. Refresh DTCs. Did 000637.07 reappear active with engine running?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000246 -19-29MAY08-3/17

2 Check for Recent Mechanical Repair	Has an internal engine repair requiring camshaft or crankshaft removal been performed just prior to DTC 000637.07 appearing and does the DTC reappear repeatedly after refreshing active DTCs with engine running?	**YES:** Check camshaft timing. GO TO 14 **NO:** GO TO 3

RG41221,0000246 -19-29MAY08-4/17

3 Check for Crank Sensor Signal Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. Ignore DTC 000637.08 which will be generated for the disconnected crank sensor. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Attempt to start engine. 6. Operate engine for one minute through rpm range and monitor DTCs, if engine started. 7. Ignition OFF, engine OFF. 8. Reconnect crank sensor. Did engine start and run with good performance?	**YES:** Check for loose crankshaft oil pump drive gear. **NO:** GO TO 4

Continued on next page

RG41221,0000246 -19-29MAY08-5/17

4 Check Speed Sensor Data Points

1. Monitor the following Data Points in Service ADVISOR:
   - Camshaft Position Signal Noise Indicator
   - Camshaft Position Signal Improper Pattern Indicator
   - Camshaft Position Signal Status
   - Engine Speed Indicated by Camshaft Position Sensor
   - Crankshaft Position Signal Noise Indicator
   - Crankshaft Position Signal Improper Pattern Indicator
   - Crankshaft Position Signal Status
   - Engine Speed Indicated by Crankshaft Position Sensor
2. Operate engine through normal speed and load.
3. Switch ON and OFF any electrical devices on the application.

CAUTION: Use caution when working near rotating components.

4. Gently wiggle wire harness between speed sensors and ECU.

NOTE: The Crankshaft Position Signal Noise Indicator and Camshaft Position Signal Noise Indicator have a value of 0 if the signal is good. The value will temporarily increase if noise is detected in the sensor signal. The Crankshaft Position Signal Improper Pattern Indicator and Camshaft Position Signal Improper Pattern Indicator are 0 if recent sensor signal patterns were good. The value will increase if errors in the signal pattern are detected and will count down to 0 once the signal pattern is error-free. The Camshaft Position Signal Status and Crankshaft Position Signal Status has a value of 47 with engine speed above 400 rpm if the crank sensor signal is good. The value will be something other than 47 if a sensor signal problem is detected. These data points can be used to locate intermittent problems with the crank sensor signal which are too brief to cause a DTC to become active.

YES: Engine wiring problem. Repair problem. GO TO 14

NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.

YES: Some device on application causes the noise. Open DTAC case.

Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?

NO: GO TO 5

RG41221,0000246 -19-29MAY08-6/17

5 Test Crank Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect crank sensor.
3. Perform TERMINAL TEST on crank sensor and connector.

YES: Fix problem. GO TO 14

Were any problems found?

NO: Do not reconnect sensor. GO TO 6

RG41221,0000246 -19-29MAY08-7/17

6 Test Pump Position Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor.
3. Perform TERMINAL TEST on camshaft position sensor and connector.

YES: Fix problem. GO TO 14

Were any problems found?

NO: Do not reconnect sensor. GO TO 7

Continued on next page

RG41221,0000246 -19-29MAY08-8/17

7 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 8

RG41221,0000246 -19-29MAY08-9/17

8 Check Pump Position Sensor Circuit Resistance	*NOTE: Verify that camshaft position sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (A).	**YES:** GO TO 9
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000246 -19-29MAY08-10/17

9 Check Crank Position Sensor Circuit Resistance	*NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

RG41221,0000246 -19-29MAY08-11/17

10 Check for Intermittent Short Between Signal and Return	1. Crank sensor and camshaft position sensors are disconnected.	
	2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and the crank sensor return (J3-F3) while gently wiggling harness.	
	3. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and the camshaft position sensor return (J3-G3) while gently wiggling harness.	**YES:** GO TO 11
	Is resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

Continued on next page

RG41221,0000246 -19-29MAY08-12/17

11 Check for Intermittent Short Between Signal and Ground

1. Crank sensor and camshaft position sensors are disconnected.
2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and single point ground while gently wiggling harness.
3. On the harness, measure the resistance between the ECU camshaft position sensor signal (J3-G4) and single point ground while gently wiggling harness .

Is resistance greater than 1k ohms?

YES: GO TO 12

NO: Fix problem. GO TO 14

RG41221,0000246 -19-29MAY08-13/17

12 Reprogram ECU

1. Reinstall all connectors.
2. Download latest ECU payload and reprogram ECU.

Did 000637.07 reappear active with engine running?

YES: GO TO 13

NO: Problem fixed.

RG41221,0000246 -19-29MAY08-14/17

13 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.

Did 000637.07 reappear active with engine running?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,0000246 -19-29MAY08-15/17

14 Verification

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Refresh DTCs.
6. Operate engine through normal speed and load.

Did 000637.07 reappear active with engine running?

YES: GO TO 1

NO: Problem fixed.

RG41221,0000246 -19-29MAY08-16/17

15 Review Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.

YES: Found a possible problem.
Repair possible problem.
Retest.

2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.

YES: Found operating point at which the code becomes active.
Try to determine cause.
Repair and retest.

Did you find a possible problem or the operating point at which the code becomes active?

NO: GO TO 4

RG41221,0000246 -19-29MAY08-17/17

000637.08 — Crankshaft Position Signal Missing

The ECU does not detect the crank sensor input.

RG41221,0000247 -19-20JAN09-1/19

000637.08 — Crankshaft Position Signal Missing Diagnostic Procedure

Troubleshooting Sequence:
000637.05 or 000637.06
000637.08

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU does not detect a crank sensor signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the sensor wiring.

Alarm Level:
Warning

Control Unit Response:
The ECU will use the camshaft position sensor input to determine piston position.
Prolonged cranking time may be required to start the engine.
If a camshaft position sensor DTC accompanies 000637.08, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

Continued on next page

RG41221,0000247 -19-20JAN09-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000637.08 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000247 -19-20JAN09-3/19

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is DTC 000637.05 or 000637.06 now an active DTC?	**YES:** Discontinue test for 000637.08 and perform test for 000637.05 — CRANK SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDUREor 000637.06 — CRANK SENSOR CIRCUIT HAS LOW RESISTANCE DIAGNOSTIC PROCEDURE. **NO:** GO TO 3

RG41221,0000247 -19-20JAN09-4/19

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Verify crank sensor installation torque. Was crank sensor fully threaded into mounting hole?	**YES:** GO TO 4 **NO:** Torque sensor to specified value. GO TO 16

RG41221,0000247 -19-20JAN09-5/19

4 Test Sensor Terminals	Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 16 **NO:** GO TO 5

RG41221,0000247 -19-20JAN09-6/19

5 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 6 **NO:** Remove crank sensor. GO TO 15

Continued on next page

RG41221,0000247 -19-20JAN09-7/19

6 Test ECU Terminals	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 16
	Were any problems found?	**NO:** GO TO 7

RG41221,0000247 -19-20JAN09-8/19

7 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).	**YES:** GO TO 8
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000247 -19-20JAN09-9/19

8 Check for Wire-to-Wire Short	1. Verify crank sensor is disconnected.	
	2. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and return (J3-F3).	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000247 -19-20JAN09-10/19

9 Check for Short to Ground of Signal	On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and single point ground.	**YES:** GO TO 10
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000247 -19-20JAN09-11/19

10 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and all other terminals in the J1, J2 and J3 connectors.	**YES:** GO TO 11
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 16

RG41221,0000247 -19-20JAN09-12/19

11 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU crank sensor signal (J3-F4) and single point ground.	**YES:** GO TO 12
	Is the voltage less than 0.5V?	**NO:** Fix problem. GO TO 16

Continued on next page

RG41221,0000247 -19-20JAN09-13/19

12 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 13 **NO:** Remove crank sensor. GO TO 15

RG41221,0000247 -19-20JAN09-14/19

13 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Download latest ECU payload and reprogram ECU. Did DTC 000637.08 reappear active with engine running?	 **YES:** GO TO 14 **NO:** Problem fixed.

RG41221,0000247 -19-20JAN09-15/19

14 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000637.08 reappear active with engine running?	 **YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,0000247 -19-20JAN09-16/19

15 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with oil pump drive gear. Does sensor appear damaged due to contact with oil pump drive gear?	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 16 **NO:** Replace crank sensor. GO TO 16

RG41221,0000247 -19-20JAN09-17/19

16 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. Did DTC 000637.08 reappear active with engine running?	 **YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000247 -19-20JAN09-18/19

17 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Retest. **YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest. **NO:** GO TO 2

RG41221,0000247 -19-20JAN09-19/19

000637.10 — Crankshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern on the crank sensor input.

RG41221,0000248 -19-20JAN09-1/24

000637.10 — Crankshaft Position Signal Rate of Change Abnormal Diagnostic Procedure

Troubleshooting Sequence:
000637.08
000637.10

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects an improper pattern (pulses missing) on the crank sensor input.
Wiring problems such as loose terminals or water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the camshaft position sensor input to determine piston position.
If a camshaft position sensor DTC accompanies 000637.10, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

Continued on next page

RG41221,0000248 -19-20JAN09-2/24

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000637.10 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 22

RG41221,0000248 -19-20JAN09-3/24

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is DTC 000637.05 or 000637.06 now an active DTC?	**YES:** Discontinue test for 000637.10 and perform test for 000637.05 — CRANK SENSOR CIRCUIT HAS HIGH RESISTANCE DIAGNOSTIC PROCEDURE or 000637.06 — CRANK SENSOR CIRCUIT HAS LOW RESISTANCE DIAGNOSTIC PROCEDURE. **NO:** GO TO 3

RG41221,0000248 -19-20JAN09-4/24

3 Check Speed Sensor Data Points	1. Monitor the following Data Points in Service ADVISOR: • Crankshaft Position Signal Noise Indicator • Crankshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Missing Indicator • Crankshaft Position Signal Status 2. Operate engine through normal speed and load ranges. 3. Switch ON and OFF any electrical devices on the application. **CAUTION: Use caution when working near rotating components.** 4. Gently wiggle wire harness between crank sensor and ECU. *NOTE: The three Crankshaft Position Signal Indicator data points will indicated 0% if recent crankshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Crankshaft Position Signal Status has a value of 47 if the crankshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a crankshaft position signal problem is detected. These data points can be used to locate intermittent problems with the crankshaft position signal which are too brief to cause a DTC to become active.* *NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.* Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?	**YES:** Engine wiring problem. Fix problem. GO TO 21 **YES:** Some device on application causes the noise. Open DTAC case. **NO:** GO TO 4

Continued on next page

RG41221,0000248 -19-20JAN09-5/24

4 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Verify crank sensor installation torque. Was crank sensor fully threaded into mounting hole?	**YES:** GO TO 5 **NO:** Torque sensor to specified value. GO TO 21

RG41221,0000248 -19-20JAN09-6/24

5 Test Sensor Terminals	Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 6

RG41221,0000248 -19-20JAN09-7/24

6 Inspect Target	1. Remove crank sensor. 2. Visually inspect oil pump drive gear for damage or debris through sensor mounting hole as engine is rotated. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 7

RG41221,0000248 -19-20JAN09-8/24

7 Inspect Sensor	Examine tip of crank sensor for damage due to contact with oil pump drive gear. Does sensor appear damaged due to contact with oil pump drive gear?	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 21 **NO:** GO TO 8

RG41221,0000248 -19-20JAN09-9/24

8 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Reinstall crank sensor. Do not reconnect to harness. GO TO 9 **NO:** Replace crank sensor. GO TO 21

RG41221,0000248 -19-20JAN09-10/24

9 Test ECU Terminals	1. Disconnect ECU J3 connector. 2. Perform TERMINAL TEST on J3. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 10

RG41221,0000248 -19-20JAN09-11/24

10 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU connector crank sensor return (J3-F3) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 21

Continued on next page

RG41221,0000248 -19-20JAN09-12/24

11 Check Sensor Circuit Resistance

NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).

1. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and the crank sensor connector signal (B).
2. On the harness, measure the resistance between ECU crank sensor return (J3-F3) and the crank sensor connector return (A).

Are both resistance measurements less than 10 ohms?

YES: GO TO 12

NO: Fix problem. GO TO 21

RG41221,0000248 -19-20JAN09-13/24

12 Check for Intermittent Short Between Signal and Return

1. Verify crank sensor is disconnected.
2. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and the crank sensor return (J3-F3).

Is resistance greater than 1k ohms?

YES: GO TO 13

NO: Fix problem. GO TO 21

RG41221,0000248 -19-20JAN09-14/24

13 Test Terminals

1. Disconnect ECU J2 connector.
2. Perform TERMINAL TEST on J2. Examine ECU battery supply (J2-L1), ignition (J2-B2), and ground (J2-L2) terminals carefully.

Were any problems found?

YES: Fix problem. GO TO 21

NO: GO TO 14

RG41221,0000248 -19-20JAN09-15/24

14 Check for Intermittent ECU Power Supply Problem

1. Ignition ON, engine OFF.
2. Measure the voltage from ECU battery supply (J2-L1) to ECU ground (J2-L2) while gently wiggling wire harness.
3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently wiggling wire harness.

Were any intermittent wiring problems found?

YES: Fix problem. GO TO 21

NO: GO TO 15

RG41221,0000248 -19-20JAN09-16/24

15 Check for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. On the harness, measure the resistance between the ECU crank sensor signal (J3-F4) and all other terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 16

NO: Fix problem. GO TO 21

Continued on next page

RG41221,0000248 -19-20JAN09-17/24

16 Check Sensor Resistance at ECU	1. Reconnect crank sensor connector.	
	2. On the harness, measure the resistance between ECU crank sensor signal (J3-F4) and return (J3-F3).	**YES:** GO TO 17
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Fix problem. GO TO 21

RG41221,0000248 -19-20JAN09-18/24

17 Inspect Crank Sensor Wiring	Examine crank sensor wiring between the crank sensor and the ECU. Check for the following:	
	• Verify that crank sensor signal and return wires are twisted together throughout the harness.	
	• Verify that no physical damage to crank sensor signal and return wires is evident.	**YES:** Replace crank sensor wiring with twisted pair or repair problem. GO TO 21
	Were any problems found?	**NO:** GO TO 18

RG41221,0000248 -19-20JAN09-19/24

18 Replace Crank Sensor	Has crank sensor been replaced during this procedure?	**YES:** GO TO 19
		NO: Replace crank sensor. GO TO 21

RG41221,0000248 -19-20JAN09-20/24

19 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reinstall ECU connectors.	
	3. Download latest ECU payload and reprogram ECU.	**YES:** GO TO 20
	Did DTC 000637.10 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000248 -19-20JAN09-21/24

20 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000637.10 reappear active with engine running?	**NO:** Problem fixed.

RG41221,0000248 -19-20JAN09-22/24

21 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000637.10 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

RG41221,0000248 -19-20JAN09-23/24

22 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 3

RG41221,0000248 -19-20JAN09-24/24

000640.11 — External Engine Protection Commanded

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,000002D -19-29MAY08-1/1

000640.31 — External Derate Commanded

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,000002E -19-26JUL07-1/1

000641.04 — VGT Actuator Supply Voltage Out of Range Low

The ECU receives a message stating the power supplied to the actuator is to low.

RG41221,0000249 -19-20JAN09-1/19

000641.04 — VGT Actuator Supply Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000641.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU receives a message stating the power supplied to the actuator is to low. If this code sets, the engine may experience low power due to turbo actuator not moving properly.

Alarm Level:
Warning

Control Unit Response:
The turbo actuator has been disabled after numerous attempts to power it. Engine performance will be degraded.

Additional References:
For more turbo actuator information, see TURBOCHARGER ACTUATOR in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• VGT Actuator X04 - Yellow/Purple

Continued on next page

RG41221,0000249 -19-20JAN09-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Is 000641.04 active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000249 -19-20JAN09-3/19

2 Actuator Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect actuator connector from engine harness connector. 3. Ignition ON, Engine OFF. 4. Measure the voltage between the power (terminal 1) and ground (terminal 2) in the engine harness connector. Is the voltage approximately battery voltage?	**YES:** GO TO 8 **NO:** GO TO 3

RG41221,0000249 -19-20JAN09-4/19

3 VGT Actuator Connector Terminal Test	1. Disconnect VGT actuator connectors. 2. Perform TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41221,0000249 -19-20JAN09-5/19

4 Ground Connection Check	Measure resistance between VGT actuator ground (terminal 2) in engine harness and application single point ground. Is resistance less than 1 ohm?	**YES:** GO TO 5 **NO:** Repair connection. Reconnect all connectors and retest.

RG41221,0000249 -19-20JAN09-6/19

5 Power Connection Check One	Measure resistance between VGT actuator power (terminal 1) and the ECU VGT power (J1 terminal H3) in the engine harness. Is resistance less than 1 ohm?	**YES:** GO TO 6 **NO:** Repair connection. Reconnect all connectors and retest.

Continued on next page

RG41221,0000249 -19-20JAN09-7/19

6 Power Connection Check Two	Measure resistance between VGT actuator power (terminal 1) and the ECU VGT power (J1 terminal H4) in the engine harness. Is resistance less than 1 ohm?	**YES:** GO TO 7 **NO:** Repair connection. Reconnect all connectors and retest.

RG41221,0000249 -19-20JAN09-8/19

7 ECU Internal Resistance Check	Measure resistance between the ECU VGT power (J1 terminal H4) and ECU ground (J2 terminal M2) on the ECU. Is resistance between 4.5k and 5.5k ohms?	**YES:** Everything checks good. Reconnect all connectors and retest. **NO:** Wiring checks good. Replace ECU and retest.

RG41221,0000249 -19-20JAN09-9/19

8 Occurrence Count Check	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review occurrence counts in the snapshot capture information for this code. Is count greater than five?	 **YES:** GO TO 9 **NO:** GO TO 10

RG41221,0000249 -19-20JAN09-10/19

9 VGT Actuator and ECU Connector Terminal Test	1. Disconnect VGT actuator connector and all ECU connectors. 2. Perform TERMINAL TEST on all connectors. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 10

RG41221,0000249 -19-20JAN09-11/19

10 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active. Did you find a possible problem or the operating point at which the code becomes active?	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST. **YES:** Found operating point at which the code becomes active. GO TO 11 **NO:** GO TO 13

RG41221,0000249 -19-20JAN09-12/19

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point that caused error. Is 000641.04 active?	 **YES:** GO TO 12 **NO:** GO TO 17

Continued on next page

RG41221,0000249 -19-20JAN09-13/19

12 Actuator Cooling System Check

1. Ignition OFF, Engine OFF.
2. Bleed air from the actuator cooling system, see BLEED AIR FROM COOLANT SYSTEM in base engine manual.
3. Ignition ON, Engine ON.
4. Set engine to operating point that caused error.

Is 000641.04 active?

YES: Remove and Replace VGT actuator. Recalibrate, see VGT — Learn Value Reset Instructions.

NO: Problem fixes. Actuator cooling system had air in it.

RG41221,0000249 -19-20JAN09-14/19

13 VGT Connector Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect VGT actuator connector.
3. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 14

RG41221,0000249 -19-20JAN09-15/19

14 ECU Connector Terminal Test

1. Disconnect ECU connectors J1 (black face) and J2 (red face).
2. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 15

RG41221,0000249 -19-20JAN09-16/19

15 Actuator Removal and Install

1. Reconnect ECU connector.
2. Remove and Install turbo actuator, see REMOVE AND INSTALL TURBOCHARGER ACTUATOR in base engine manual.
3. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION in Service ADVISOR.
4. Refresh codes.

Is 000641.04 active?

YES: GO TO 16

NO: Problem fixed. Bad actuator.

Continued on next page

RG41221,0000249 -19-20JAN09-17/19

16 Reprogram ECU	1. Ignition ON, Engine OFF. 2. Reprogram ECU, see REPROGRAMMING ENGINE CONTROL UNIT (ECU). 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Is 000641.04 active?	**YES:** Remove and Replace ECU. Retest. **NO:** Problem fixed. Bad ECU program.

RG41221,0000249 -19-20JAN09-18/19

17 VGT Actuator Connector Terminal Test	1. Ignition OFF, Engine OF. 2. Disconnect VGT actuator connectors. 3. Perform TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Remove and Replace VGT actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION.

RG41221,0000249 -19-20JAN09-19/19

000641.12 — VGT Actuator Communication Error

The ECU has lost communications with the turbo actuator controller.

RG41221,000024B -19-04SEP09-1/16

000641.12 — VGT Actuator Communication Error Diagnostic Procedure

Troubleshooting Sequence:
000627.18
000641.04
000641.12

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU determines it has lost communications withe the actuator.

Alarm Level:
Warning

Control Unit Response:
The Actuator will go to the 20% closed position and stay there.

Additional References:
For more turbo actuator information, see TURBOCHARGER ACTUATOR in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see EXHAUST GAS RECIRCULATOR (EGR) AND VARIABLE GEOMETRY TURBOCHARGER (VGT) in the base engine manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- VGT Actuator X04 - Yellow/Purple

Continued on next page

RG41221,000024B -19-04SEP09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Is 000641.12 active?	**YES:** GO TO 2 **NO:** GO TO 10

RG41221,000024B -19-04SEP09-3/16

2 VGT Actuator Connector Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect VGT actuator connector. 3. Check both the actuator and engine harness connector, see TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 3

RG41221,000024B -19-04SEP09-4/16

3 Supply Voltage Check in Harness	1. Ignition ON, Engine OFF. 2. Monitor Battery Voltage on Service ADVISOR. 3. In the engine harness actuator connector measure the voltage between the power (terminal 1) and ground (terminal 2). Is the voltage battery voltage ±1 volt?	**YES:** GO TO 4 **NO:** GO TO 7

RG41221,000024B -19-04SEP09-5/16

4 ECU Connector Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. 3. Perform TERMINAL TEST on ECU Terminal J3-E4. Were any problems found?	**YES:** Repair problems and run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41221,000024B -19-04SEP09-6/16

5 Open Wire Test

1. Short meter leads together and write down the meter zero value.

2. In the engine harness connectors measure and record the following resistance values:

- Actuator connector, communications (UART) (terminal 4) to communications (UART) (terminal J3-E4).
- Actuator connector, ground (terminal 2) to ECU ground (terminal J2-M2).

Specification

NOTE: Subtract the value recorded in step 1 from each value above to get the actual resistance reading.

—Resistance.....Less than 0.5 ohms

Are values within specification?

YES: GO TO 6

NO: Repair open wire, reconnect all connectors and run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000024B -19-04SEP09-7/16

6 Communications Short Resistance Check

1. Ignition OFF, Engine OFF.

2. Remove all ECU connectors.

3. In the engine harness ECU connectors measure resistance between the communications (UART) (J3 terminal E4) wire and all other terminals.

Are any terminals shorted to J3 terminal E4?

YES: Repair wiring and run HARNESS DIAGNOSTIC MODE TEST.

NO: Remove and Replace VGT actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION.

RG41221,000024B -19-04SEP09-8/16

7 Supply Voltage Check to Chassis Ground

1. Ignition ON, Engine OFF.

2. Monitor Battery Voltage on Service ADVISOR.

3. In the engine harness actuator connector measure the voltage between the power (terminal 1) and application single point ground.

Is the voltage battery voltage ±1 volt?

YES: GO TO 8

NO: GO TO 9

Continued on next page

RG41221,000024B -19-04SEP09-9/16

8 Ground Connection Check	1. Ignition OFF, Engine OFF. 2. Short meter leads together and write down the meter zero value. 3. In engine harness actuator connector measure resistance between ground (terminal 2) and application single point ground. 4. Subtract the meter zero value from the measured value in step 3. Is resistance less than 0.5 ohms?	**YES:** GO TO 2 **NO:** Repair ground wire problem. Reconnect all connectors and run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000024B -19-04SEP09-10/16

9 Power Connection Check	1. Disconnect ECU connector J1 (black face). 2. Short meter leads together and write down the meter zero value. 3. In the engine harness connectors measure and record the following resistance values: • Actuator connector power (terminal 1) to ECU actuator drive (terminal J1-H3). • Actuator connector power (terminal 1) to ECU actuator drive (terminal J1-H4). • Actuator connector ground (terminal 2) to application single point ground. **Specification** *NOTE: Subtract the value recorded in step 2 from each value above to get the actual resistance reading.* —Resistance.....Less than 0.5 ohms are values within specification?	**YES:** GO TO 2 **NO:** Repair wire that does not meet specification. Reconnect all connectors and run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000024B -19-04SEP09-11/16

10 VGT Actuator and ECU Connector Terminal Test	1. Disconnect VGT actuator connector and all ECU connectors. 2. Check all connectors, see TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 11

Continued on next page

RG41221,000024B -19-04SEP09-12/16

11 Further Review of Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 12
Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 14

RG41221,000024B -19-04SEP09-13/16

12 Engine Error Operating Point Test

1. Reconnect all connectors.	
2. Ignition ON, Engine ON.	
3. Set engine to operating point that caused error.	**YES:** GO TO 13
Is 000641.12 active?	**NO:** GO TO 14

RG41221,000024B -19-04SEP09-14/16

13 Actuator Cooling System Check

1. Ignition OFF, Engine OFF.	
2. Bleed air from the actuator cooling system, see BLEED AIR FROM COOLANT SYSTEM in base engine manual.	
3. Ignition ON, Engine ON.	
4. Set engine to operating point that caused error.	**YES:** Remove and Replace VGT actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION.
Is 000641.12 active?	**NO:** Problem fixes. Actuator cooling system had air in it.

RG41221,000024B -19-04SEP09-15/16

14 Reprogram ECU

1. Ignition ON, Engine OFF.	
2. Reprogram ECU, see REPROGRAMMING ENGINE CONTROL UNIT (ECU).	
3. Run HARNESS DIAGNOSTIC MODE TEST.	
4. Refresh codes.	**YES:** Remove and Replace VGT actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION.
Is 000641.12 active?	**NO:** Problem fixed. Bad ECU program.

RG41221,000024B -19-04SEP09-16/16

000641.13 — VGT Actuator Learn Error

The ECU receives a message from the actuator stating it could not reach its expected end points.

RG41221,000024C -19-20JAN09-1/7

000641.13 — VGT Actuator Learn Error Diagnostic Procedure

Troubleshooting Sequence:
000641.13

When DTC is Displayed:
After running the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION.

Related Information:
The ECU receives a message from the actuator stating it could not reach its expected end points during the turbo learn portion of the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION.

Alarm Level:
Warning

Control Unit Response:
Engine will continue to operate without any performance loss.

Additional References:
For more turbo actuator information, see TURBOCHARGER ACTUATOR in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see EXHAUST GAS RECIRCULATOR (EGR) AND VARIABLE GEOMETRY TURBOCHARGER (VGT) in the base engine manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Continued on next page

RG41221,000024C -19-20JAN09-2/7

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Run HARNESS DIAGNOSTIC MODE TEST. 5. Refresh codes. Is 000641.13 active?	**YES:** GO TO 2 **NO:** Checks good. Return to service.

RG41221,000024C -19-20JAN09-3/7

2 Actuator Linkage Test	1. Ignition OFF, Engine OFF. **CAUTION: Turbo and linkage may be very hot.** 2. Check turbo to actuator linkage for free movement through it's complete travel, see REMOVE AND INSTALL ACTUATOR LINKAGE in base engine manual. Is linkage movement free?	**YES:** GO TO 3 **NO:** GO TO 5

RG41221,000024C -19-20JAN09-4/7

3 Actuator Linkage Hold Position Check	1. Not the position of the actuator linkage. It should change in the next step. 2. Ignition ON, Engine ON. 3. Linkage should have moved slightly and is being held in that position. Did linkage move and is it being held in position?	**YES:** GO TO 4 **NO:** Remove and replace Actuator. Recalibrate actuator , see TURBOCHARGER ACTUATOR CALIBRATION, in Service ADVISOR.

RG41221,000024C -19-20JAN09-5/7

4 Other Codes Check	1. Ignition ON, Engine OFF. 2. Refresh DTC list. Are there any 000641 error codes active?	**YES:** Troubleshoot those active codes. **NO:** Replace Actuator. Recalibrate actuator , see TURBOCHARGER ACTUATOR CALIBRATION, in Service .

Continued on next page

RG41221,000024C -19-20JAN09-6/7

5 Turbo Vane and Linkage Check	Test VGT, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Group 150 earlier in this manual. Did test pass?	**YES:** Checks good. Return to service. **NO:** Test VGT, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Group 150 earlier in this manual.

RG41221,000024C -19-20JAN09-7/7

000641.16 — VGT Actuator Temperature Moderately High

The ECU receives a turbo actuator temperature above specification message from the actuator.

RG41221,000024D -19-20JAN09-1/7

000641.16 — VGT Actuator Temperature Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000110.00 or 000110.15 or 000110.16
000641.12 or 000641.04
000641.16

When DTC is Displayed:
When ever the error is active and the engine has been running for a minimum of 3 minutes.

Related Information:
The turbo actuator notifies the ECU that the turbo actuator temperature is above specification, 115°C (239°F).

Alarm Level:
Warning

Control Unit Response:
Normal operation.

Additional References:
For more turbo actuator information, see TURBOCHARGER ACTUATOR in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see TURBOCHARGER in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or TURBOCHARGER ACTUATOR CALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Continued on next page

RG41221,000024D -19-20JAN09-2/7

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Run engine at idle for 5 minutes. 6. Refresh codes. Is 000641.16 active?	**YES:** GO TO 2 **NO:** GO TO 5

RG41221,000024D -19-20JAN09-3/7

2 Cool Engine Check	1. Ignition OFF, Engine OFF. 2. Cool engine to temperature of current surroundings. 3. Ignition ON, Engine OFF. 4. Connect Service ADVISOR, if not connected, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 5. Refresh codes. Is 000641.16 active?	**YES:** Replace VGT Actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION. Then GO TO 3 **NO:** GO TO 3

RG41221,000024D -19-20JAN09-4/7

3 Actuator Cooling System Check	1. Ignition OFF, Engine OFF. 2. Bleed air from the actuator cooling system, see BLEED AIR FROM COOLANT SYSTEM in base engine manual. Is air bleeding complete?	**YES:** GO TO 4 **NO:** Bleed air from the actuator cooling system, see BLEED AIR FROM COOLANT SYSTEM in base engine manual.

RG41221,000024D -19-20JAN09-5/7

4 Hot Operation Test	1. Ignition ON, Engine ON. 2. Run engine to hottest operating temperature. 3. Refresh codes. Is 000641.16 active?	**YES:** Remove and Replace actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION. **NO:** Problem fixed. Actuator cooling system had air in it.

Continued on next page

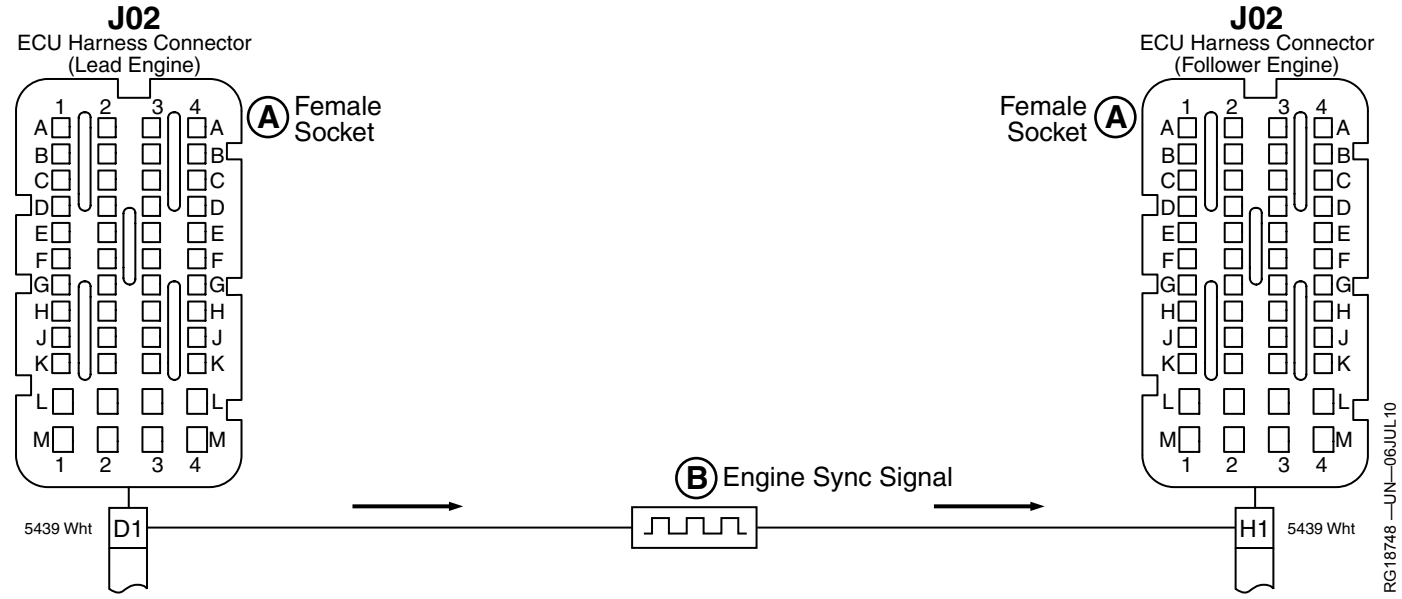
RG41221,000024D -19-20JAN09-6/7

5 Occurrence Count Check	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review occurrence counts in the snapshot capture information for cooling system codes (000110.00, 000110.15, 000110.16).	**YES:** Trouble shoot the code that's count nearly matches.
	Are any of the occurrence counts nearly the same as for 000641.16?	**NO:** GO TO 3.

RG41221,000024D -19-20JAN09-7/7

000644.02 — External Speed Command Input Erratic

Tachometer (Sync) signal erratic or intermittent



Dual Engine Synchronization (Marine only)

This feature allows the synchronous operation of two engines through a two-throttle, lead-follow system: one ECU is programmed as the Lead and the other as the Follower. When the system is successfully engaged, the follower ECU receives the lead ECU's tachometer output signal. For more information on dual engine synchronization, see Marine Throttle in Section 03, Group 140.

DTC 000644.02 will set if:

- The tachometer signal between the two ECUs is erratic or intermittent. This is most likely caused by radiated or conducted electrical "noise" from some part of the engine

If DTC 000644.02 sets, the following will occur:

- Synchronization will be disabled and normal throttle control will return to the follower engine.
- The code will set on the ECU receiving the tachometer signal. This will be the ECU of the follower engine.

If DTC 000640.31 sets:

Check loose electrical ground or power connections, including:

- All harness connectors.
- Alternator connections.
- Frame and battery ground connections.
- Electromagnetic interference (EMI) from an incorrectly installed 2-way radio.
- Interference from some radar source.

Also, corrosion, dirt, or paint can cause intermittent and "noisy" connections.

RE42287,00003EE -19-21DEC10-1/1

000647.05 — Engine Fan Drive Circuit Has High Resistance

For troubleshooting procedure please see the application troubleshooting manual.

WL30140,000002F -19-17JUL07-1/1

000647.07 — Engine Fan Drive Not Responding

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000030 -19-17JUL07-1/1

000647.31 — Engine Fan Drive Manual Purge Switch Active Too Long

For troubleshooting procedure please see the application troubleshooting manual.

DN22556,0000653 -19-29MAY08-1/1

000651.02 — Injector #1 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #1.

RG41221,000024E -19-12SEP07-1/14

000651.02 — Injector #1 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000651.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000024E -19-12SEP07-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,000024E -19-12SEP07-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,000024E -19-12SEP07-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,000024E -19-12SEP07-5/14

❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,000024E -19-12SEP07-6/14

5 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000651.02 active?

YES: GO TO 6

NO: Problem fixed, return application to service.

RG41221,000024E -19-12SEP07-7/14

6 ECU Programming Check

1. Download the latest ECU software payload.
2. Reprogram ECU.

Was the ECU programming successful?

YES: GO TO 7

NO: Check payload and try again.

RG41221,000024E -19-12SEP07-8/14

7 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000651.02 active?

YES: Start a DTAC case.

NO: Problem fixed, return application to service.

RG41221,000024E -19-12SEP07-9/14

8 Automatic Input of Injector Data

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate.
3. Select the sequence number of the injector file downloaded from the list of injectors.
4. Select Next.
5. Select Submit.
6. Select OK.
7. Select No.
8. Refresh codes.

Is 000651.02 active?

YES: GO TO 9

NO: Problem fixed, return application to service.

Continued on next page

RG41221,000024E -19-12SEP07-10/14

9 **Download Injector Calibration File**	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,000024E -19-12SEP07-11/14

10 **Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000651.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,000024E -19-12SEP07-12/14

11 **ECU Programming Check**	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,000024E -19-12SEP07-13/14

12 **Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000651.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,000024E -19-12SEP07-14/14

000651.05 — Injector #1 Circuit Has High Resistance

The ECU detects a high resistance in the cylinder #1 electronic injector circuit.

RG41221,000024F -19-20JAN09-1/16

000651.05 — Injector #1 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000651.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #1 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #1 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

Continued on next page

RG41221,000024F -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000651.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,000024F -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,000024F -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #1 low side control (terminal 1).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,000024F -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove rocker arm cover.
2. On the #1 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace #1 injector. GO TO 9

RG41221,000024F -19-20JAN09-6/16

5 ECU Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,000024F -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #1 control (terminal J1-E1) and the injector harness 10-way connector (terminal 1).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 10-way connector (terminal 8).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

RG41221,000024F -19-20JAN09-8/16

7 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

RG41221,000024F -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

RG41221,000024F -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

RG41221,000024F -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 9
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,000024F -19-20JAN09-12/16

11 Engine Error Operating Point Test

1. Ignition ON, engine ON
2. Set engine to operating point of failure and refresh DTCs.

Did 000651.05 reappear active when engine operating point was reached?

YES: GO TO 1

NO: GO TO 12

RG41221,000024F -19-20JAN09-13/16

12 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

1. Ignition OFF, engine OFF
2. Perform TERMINAL TEST on the ECU J1 connector, injector #1, and injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 13

RG41221,000024F -19-20JAN09-14/16

13 Reconnect and Retest

1. Reconnect all connectors.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000651.05 reappear active with engine running?

YES: GO TO 1.

NO: GO TO 14.

RG41221,000024F -19-20JAN09-15/16

14 Reprogram ECU

1. Download latest ECU payload and reprogram ECU.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000651.05 reappear active with engine running?

YES: GO TO 1

NO: Replace injector #1. GO TO 9

RG41221,000024F -19-20JAN09-16/16

000651.06 — Injector #1 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #1 electronic injector circuit.

RG41221,0000250 -19-20JAN09-1/17

000651.06 — Injector #1 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000651.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #1 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

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RG41221,0000250 -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000651.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000250 -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000651.05, high injector #1 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,0000250 -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,0000250 -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #1 terminal nuts.
2. Lift injector #1 connector away from injector studs.
3. On the injector harness connector (male pin terminals), measure the resistance between injector #1 control (terminal 1) and all other terminals in the injector harness connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector #1. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,0000250 -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,0000250 -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #1 control (terminal J1-E1) and all terminals in the J1, J2 and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,0000250 -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #1 control (terminal J1-E1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,0000250 -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000651.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,0000250 -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

RG41221,0000250 -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

RG41221,0000250 -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,0000250 -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000651.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,0000250 -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #1, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,0000250 -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000651.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,0000250 -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000651.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #1. GO TO 10

RG41221,0000250 -19-20JAN09-17/17

000651.07 — Injector #1 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #1.

RG41221,0000251 -19-19OCT10-1/13

000651.07 — Injector #1 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000651.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #1 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #1 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000251 -19-19OCT10-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000651.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

Continued on next page

RG41221,0000251 -19-19OCT10-3/13

2 Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #1 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

RG41221,0000251 -19-19OCT10-4/13

3 Clean Injectors	1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090. 2. Ignition ON, Engine ON. 3. Refresh Codes. Did 000651.07 reappear active?	**YES:** GO TO 4 **NO:** Problem fixed.

RG41221,0000251 -19-19OCT10-5/13

4 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #1?	**YES:** Replace injector #1. GO TO 11 **NO:** GO TO 5

Continued on next page

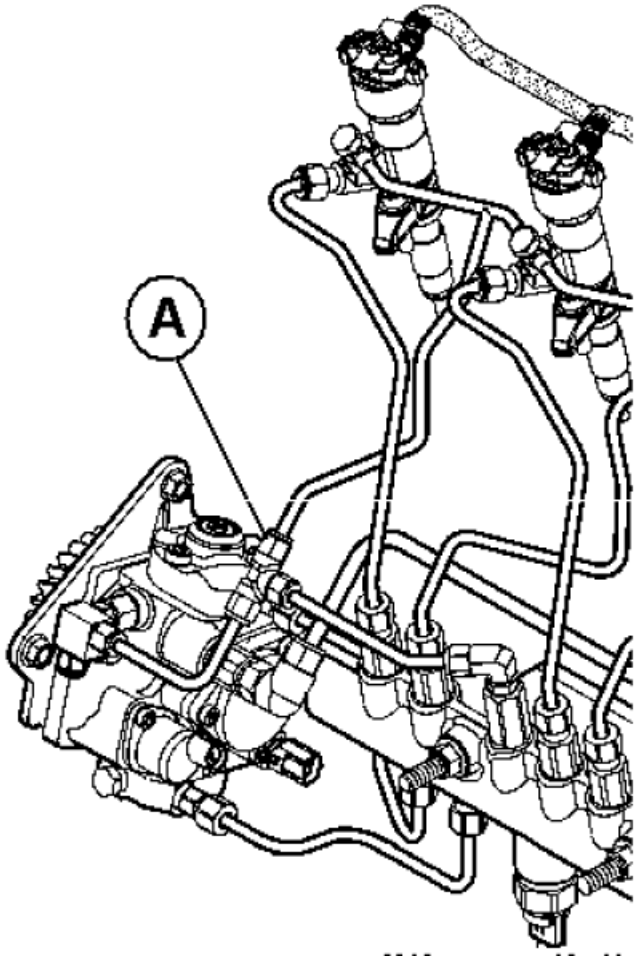
RG41221,0000251 -19-19OCT10-6/13

5 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



RG14958 —UN—31MAY07

A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

9.0L—Volume.....0.9L (30oz)

Is the collected amount more than the specification?

YES: Replace injector #1.
GO TO 11

NO: GO TO 6

Continued on next page

RG41221,0000251 -19-19OCT10-7/13

6 Check High Pressure Pump Static Timing	1. Ignition OFF, Engine OFF.	
	2. See CHECK HIGH PRESSURE FUEL PUMP STATIC TIMING in Section 4, Group 150 of this manual.	**YES:** Correct the high pressure pump timing. GO TO 11
	Were problems found?	**NO:** GO TO 7

RG41221,0000251 -19-19OCT10-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours.	**YES:** Return application to service.
	Is the difference greater than 50 hours?	**NO:** GO TO 8

RG41221,0000251 -19-19OCT10-9/13

8 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

RG41221,0000251 -19-19OCT10-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 2
	Did 000651.07 reappear when engine operating point was reached?	**NO:** GO TO 8 and check the operating point.

RG41221,0000251 -19-19OCT10-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR.	**YES:** GO TO 11
	Was reprogramming successful?	**NO:** Replace ECU, GO TO 11

RG41221,0000251 -19-19OCT10-12/13

11 DTC Check	Ignition ON, Engine Idling.	**YES:** Start a DTAC case.
	Is 000651.07 active?	**NO:** Problem fixed.

RG41221,0000251 -19-19OCT10-13/13

000651.13 — Injector #1 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,0000252 -19-12SEP07-1/9

000651.13 — Injector #1 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000651.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000252 -19-12SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,0000252 -19-12SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,0000252 -19-12SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,0000252 -19-12SEP07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,0000252 -19-12SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,0000252 -19-12SEP07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,0000252 -19-12SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,0000252 -19-12SEP07-9/9

000652.02 — Injector #2 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #2.

RG41221,0000253 -19-12SEP07-1/14

000652.02 — Injector #2 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000652.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000253 -19-12SEP07-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000253 -19-12SEP07-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,0000253 -19-12SEP07-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,0000253 -19-12SEP07-5/14

❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,0000253 -19-12SEP07-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000652.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

RG41221,0000253 -19-12SEP07-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

RG41221,0000253 -19-12SEP07-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000652.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000253 -19-12SEP07-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

Continued on next page

RG41221,0000253 -19-12SEP07-10/14

9 **Download Injector Calibration File**	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,0000253 -19-12SEP07-11/14

10 **Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,0000253 -19-12SEP07-12/14

11 **ECU Programming Check**	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,0000253 -19-12SEP07-13/14

12 **Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000253 -19-12SEP07-14/14

000652.05 — Injector #2 Circuit Has High Resistance

The ECU detects a High resistance in the cylinder #2 electronic injector circuit.

RG41221,0000254 -19-20JAN09-1/16

000652.05 — Injector #2 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000652.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #2 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #2 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000254 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000652.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,0000254 -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,0000254 -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #2 low side control (terminal 2).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,0000254 -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove heat shield and rocker arm cover.
2. On the #2 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace injector. GO TO 9

RG41221,0000254 -19-20JAN09-6/16

5 ECU Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,0000254 -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-B1) and the injector harness 10-way connector (terminal 2).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 10-way connector (terminal 8).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

RG41221,0000254 -19-20JAN09-8/16

7 Reprogram ECU	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

RG41221,0000254 -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

RG41221,0000254 -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

RG41221,0000254 -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 9
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,0000254 -19-20JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000652.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

RG41221,0000254 -19-20JAN09-13/16

12 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #2, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

RG41221,0000254 -19-20JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000652.05 reappear active with engine running?	**NO:** GO TO 14.

RG41221,0000254 -19-20JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000652.05 reappear active with engine running?	**NO:** Replace injector #2. GO TO 9

RG41221,0000254 -19-20JAN09-16/16

000652.06 — Injector #2 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #2 electronic injector circuit.

RG41221,0000255 -19-20JAN09-1/17

000652.06 — Injector #2 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000652.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #2 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

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RG41221,0000255 -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000652.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000255 -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000652.05, high injector #2 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,0000255 -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,0000255 -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #2 terminal nuts.
2. Lift injector #2 connector away from injector studs.
3. On the injector harness connector (male pin terminals), measure the resistance between injector #2 control (terminal 2) and all other terminals in the injector harness connector.

Are all resistance readings greater than 1k ohms?

YES: Replace #2 injector. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,0000255 -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,0000255 -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-B1) and all terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,0000255 -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #2 control (terminal J1-B1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,0000255 -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000652.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,0000255 -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000652.06 reappear active?	**NO:** Problem fixed.

RG41221,0000255 -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000652.06 reappear active?	**NO:** Problem fixed.

RG41221,0000255 -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,0000255 -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000652.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,0000255 -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #2, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,0000255 -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000652.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,0000255 -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000652.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #2. GO TO 10

RG41221,0000255 -19-20JAN09-17/17

000652.07 — Injector #2 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #2.

RG41221,0000256 -19-19OCT10-1/14

000652.07 — Injector #2 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000652.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #2 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #2 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000256 -19-19OCT10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000652.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

Continued on next page

RG41221,0000256 -19-19OCT10-3/14

2 Fuel Line Inspection

1. Ignition ON, Engine ON.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.

2. Check for injector #2 fuel supply line leak.
3. Ignition OFF, Engine OFF.
4. Check for over bent/pinched or cracked fuel line between the rail and the injector.

YES: Repair problem. GO TO 12

Were any problems found?

NO: GO TO 3

RG41221,0000256 -19-19OCT10-4/14

3 Clean Injectors

1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090.
2. Ignition ON, Engine ON.
3. Refresh Codes.

YES: GO TO 4

Did 000651.07 reappear active?

NO: Problem fixed.

RG41221,0000256 -19-19OCT10-5/14

4 Misfire Test

1. Ignition ON, Engine OFF.
2. Perform Cylinder Cutout Test and record results.
3. Perform Cylinder Misfire Test and record results.

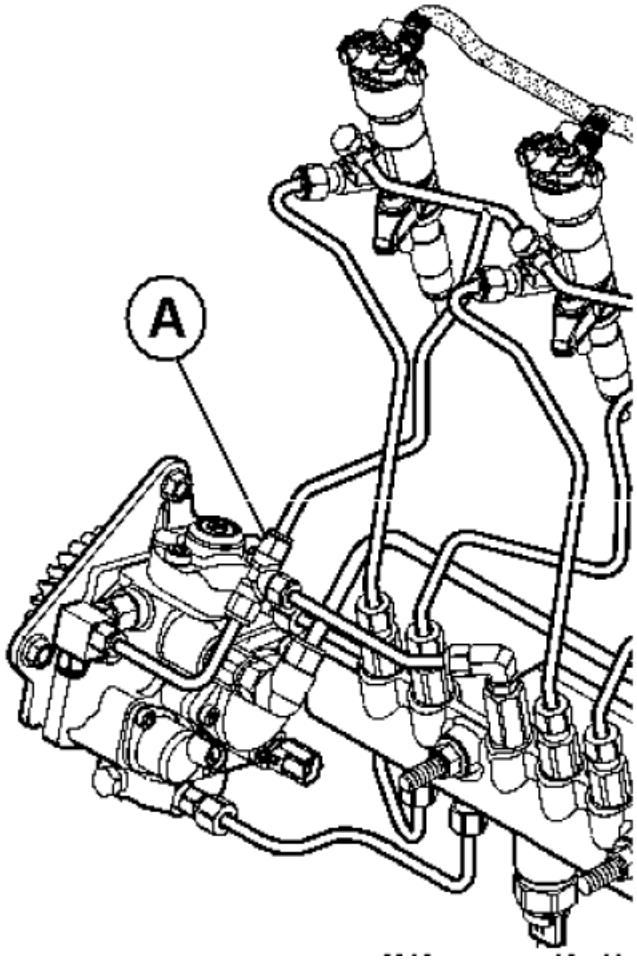
YES: Replace injector #2. GO TO 12

Do tests confirm a bad injector #2?

NO: GO TO 5

Continued on next page

RG41221,0000256 -19-19OCT10-6/14

5 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.  RG14958 —UN—31MAY07 **A—Leak off line "T" fitting** 3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container. **Specification** 9.0L—Volume.....0.9L (30oz) Is the collected amount more than the specification?	**YES:** Replace injector #2. GO TO 12 **NO:** GO TO 6
		RG41221,0000256 -19-19OCT10-7/14
6 Occurrence Count Check	Review stored information and look at occurrence count for 000652.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8
	Continued on next page	RG41221,0000256 -19-19OCT10-8/14

7 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #2?	**YES:** Replace injector #2. GO TO 12 **NO:** GO TO 9

RG41221,0000256 -19-19OCT10-9/14

8 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 9

RG41221,0000256 -19-19OCT10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 10 **NO:** GO TO 11

RG41221,0000256 -19-19OCT10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000652.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 9 and check the operating point.

RG41221,0000256 -19-19OCT10-12/14

11 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 12 **NO:** Replace ECU, GO TO 12

RG41221,0000256 -19-19OCT10-13/14

12 DTC Check	Ignition ON, Engine Idling. Is 000652.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,0000256 -19-19OCT10-14/14

000652.13 — Injector #2 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,0000257 -19-12SEP07-1/9

000652.13 — Injector #2 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000652.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000257 -19-12SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,0000257 -19-12SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,0000257 -19-12SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,0000257 -19-12SEP07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,0000257 -19-12SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,0000257 -19-12SEP07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,0000257 -19-12SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,0000257 -19-12SEP07-9/9

000653.02 — Injector #3 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #3.

RG41221,0000258 -19-28AUG07-1/14

000653.02 — Injector #3 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000653.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000258 -19-28AUG07-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000258 -19-28AUG07-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,0000258 -19-28AUG07-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,0000258 -19-28AUG07-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,0000258 -19-28AUG07-6/14

5 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000653.02 active?

YES: GO TO 6

NO: Problem fixed, return application to service.

RG41221,0000258 -19-28AUG07-7/14

6 ECU Programming Check

1. Download the latest ECU software payload.
2. Reprogram ECU.

Was the ECU programming successful?

YES: GO TO 7

NO: Check payload and try again.

RG41221,0000258 -19-28AUG07-8/14

7 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000653.02 active?

YES: Start a DTAC case.

NO: Problem fixed, return application to service.

RG41221,0000258 -19-28AUG07-9/14

8 Automatic Input of Injector Data

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate.
3. Select the sequence number of the injector file downloaded from the list of injectors.
4. Select Next.
5. Select Submit.
6. Select OK.
7. Select No.
8. Refresh codes.

Is 000653.02 active?

YES: GO TO 9

NO: Problem fixed, return application to service.

Continued on next page

RG41221,0000258 -19-28AUG07-10/14

9 Download Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,0000258 -19-28AUG07-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000653.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,0000258 -19-28AUG07-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,0000258 -19-28AUG07-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000653.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000258 -19-28AUG07-14/14

000653.05 — Injector #3 Circuit Has High Resistance

The ECU detects a high resistance in the cylinder #3 electronic injector circuit.

RG41221,0000259 -19-20JAN09-1/16

000653.05 — Injector #3 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000653.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #3 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #3 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000259 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000653.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,0000259 -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,0000259 -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #3 low side control (terminal 3).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,0000259 -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove rocker arm cover.
2. On the #3 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace #3 injector. GO TO 9

RG41221,0000259 -19-20JAN09-6/16

5 Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,0000259 -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-D1) and the injector harness 10-way connector (terminal 3). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 10-way connector (terminal 8). Are both resistance readings less than 2 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

RG41221,0000259 -19-20JAN09-8/16

7 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

RG41221,0000259 -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,0000259 -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,0000259 -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. GO TO 9 **YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,0000259 -19-20JAN09-12/16

11 Engine Error Operating Point Test

1. Ignition ON, engine ON
2. Set engine to operating point of failure and refresh DTCs.

Did 000653.05 reappear active when engine operating point was reached?

YES: GO TO 1
NO: GO TO 12

RG41221,0000259 -19-20JAN09-13/16

12 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

1. Ignition OFF, engine OFF
2. Perform TERMINAL TEST on the ECU J1 connector, injector #3, and injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9
NO: GO TO 13

RG41221,0000259 -19-20JAN09-14/16

13 Reconnect and Retest

1. Reconnect all connectors.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000653.05 reappear active with engine running?

YES: GO TO 1.
NO: GO TO 14.

RG41221,0000259 -19-20JAN09-15/16

14 Reprogram ECU

1. Download latest ECU payload and reprogram ECU.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000653.05 reappear active with engine running?

YES: GO TO 1
NO: Replace injector #3. GO TO 9

RG41221,0000259 -19-20JAN09-16/16

000653.06 — Injector #3 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #3 electronic injector circuit.

RG41221,000025A -19-20JAN09-1/17

000653.06 — Injector #3 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000653.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #3 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

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RG41221,000025A -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000653.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,000025A -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000653.05, high injector #3 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,000025A -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,000025A -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #3 terminal nuts.
2. Lift injector #3 connector away from injector studs.
3. On the injector harness connector (male pin terminals), measure the resistance between injector #3 control (terminal 3) and all other terminals in the injector harness connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector #3. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,000025A -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,000025A -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-D1) and all terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,000025A -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #3 control (terminal J1-D1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,000025A -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000653.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,000025A -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000653.06 reappear active?	**NO:** Problem fixed.

RG41221,000025A -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000653.06 reappear active?	**NO:** Problem fixed.

RG41221,000025A -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,000025A -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000653.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,000025A -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #3, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,000025A -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000653.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,000025A -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000653.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #3. GO TO 10

RG41221,000025A -19-20JAN09-17/17

000653.07 — Injector #3 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #3.

RG41221,000025B -19-19OCT10-1/14

000653.07 — Injector #3 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000653.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #3 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #3 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000025B -19-19OCT10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000653.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

Continued on next page

RG41221,000025B -19-19OCT10-3/14

❷ Fuel Line Inspection

1. Ignition ON, Engine ON.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.

2. Check for injector #3 fuel supply line leak.
3. Ignition OFF, Engine OFF.
4. Check for over bent/pinched or cracked fuel line between the rail and the injector.

Were any problems found?

YES: Repair problem. GO TO 12

NO: GO TO 3

RG41221,000025B -19-19OCT10-4/14

❸ Clean Injectors

1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090.
2. Ignition ON, Engine ON.
3. Refresh Codes.

Did 000651.07 reappear active?

YES: GO TO 4

NO: Problem fixed.

RG41221,000025B -19-19OCT10-5/14

❹ Misfire Test

1. Ignition ON, Engine OFF.
2. Perform Cylinder Cutout Test and record results.
3. Perform Cylinder Misfire Test and record results.

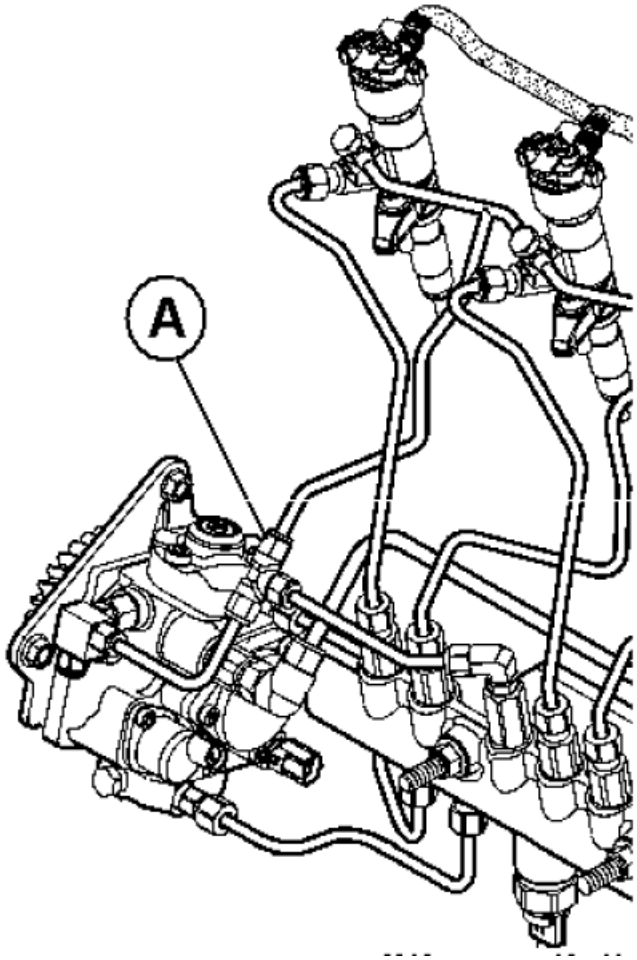
Do tests confirm a bad injector #3?

YES: Replace injector #3. GO TO 12

NO: GO TO 5

Continued on next page

RG41221,000025B -19-19OCT10-6/14

5 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.  RG14958 —UN—31MAY07 **A—Leak off line "T" fitting** 3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container. **Specification** 9.0L—Volume.....0.9L (30oz) Is the collected amount more than the specification?	**YES:** Replace injector #3. GO TO 12 **NO:** GO TO 6
		RG41221,000025B -19-19OCT10-7/14
6 Occurrence Count Check	Review stored information and look at occurrence count for 000653.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8
	Continued on next page	RG41221,000025B -19-19OCT10-8/14

7 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #3?	**YES:** Replace injector #3. GO TO 12 **NO:** GO TO 9

RG41221,000025B -19-19OCT10-9/14

8 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 9

RG41221,000025B -19-19OCT10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 10 **NO:** GO TO 11

RG41221,000025B -19-19OCT10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000653.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 9 and check the operating point.

RG41221,000025B -19-19OCT10-12/14

11 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 12 **NO:** Replace ECU, GO TO 12

RG41221,000025B -19-19OCT10-13/14

12 DTC Check	Ignition ON, Engine Idling. Is 000653.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,000025B -19-19OCT10-14/14

000653.13 — Injector #3 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,000025C -19-28AUG07-1/9

000653.13 — Injector #3 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000653.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000025C -19-28AUG07-2/9

1 QR Code Input Method Check	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,000025C -19-28AUG07-3/9

2 Verification and Reentry of QR Code	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,000025C -19-28AUG07-4/9

3 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,000025C -19-28AUG07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,000025C -19-28AUG07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,000025C -19-28AUG07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,000025C -19-28AUG07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,000025C -19-28AUG07-9/9

000654.02 — Injector #4 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #4.

RG41221,000025D -19-27AUG07-1/14

000654.02 — Injector #4 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000654.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000025D -19-27AUG07-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,000025D -19-27AUG07-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,000025D -19-27AUG07-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,000025D -19-27AUG07-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,000025D -19-27AUG07-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000654.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

RG41221,000025D -19-27AUG07-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

RG41221,000025D -19-27AUG07-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000654.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,000025D -19-27AUG07-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

Continued on next page

RG41221,000025D -19-27AUG07-10/14

9 Download Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,000025D -19-27AUG07-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,000025D -19-27AUG07-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,000025D -19-27AUG07-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,000025D -19-27AUG07-14/14

000654.05 — Injector #4 Circuit Has High Resistance

The ECU detects a high resistance in the cylinder #4 electronic injector circuit.

RG41221,000025E -19-20JAN09-1/16

000654.05 — Injector #4 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000654.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #4 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #4 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

Continued on next page

RG41221,000025E -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000654.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,000025E -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,000025E -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 10) and injector #4 low side control (terminal 5).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,000025E -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove rocker arm cover.
2. On the #4 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace #4 injector. GO TO 9

RG41221,000025E -19-20JAN09-6/16

5 ECU Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,000025E -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-A1) and the injector harness 10-way connector (terminal 5). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 10-way connector (terminal 10). Are both resistance readings less than 2 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

RG41221,000025E -19-20JAN09-8/16

7 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

RG41221,000025E -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000025E -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

RG41221,000025E -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. GO TO 9 **YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,000025E -19-20JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000654.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

RG41221,000025E -19-20JAN09-13/16

12 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #4, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

RG41221,000025E -19-20JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000654.05 reappear active with engine running?	**NO:** GO TO 14.

RG41221,000025E -19-20JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000654.05 reappear active with engine running?	**NO:** Replace injector #4. GO TO 9

RG41221,000025E -19-20JAN09-16/16

000654.06 — Injector #4 Circuit Has Low Resistance

The ECU detects a Low resistance in the cylinder #4 electronic injector circuit.

RG41221,000025F -19-20JAN09-1/17

000654.06 — Injector #4 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000654.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #4 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

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RG41221,000025F -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000654.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,000025F -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000654.05, high injector #4 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,000025F -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,000025F -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #4 terminal nuts.
2. Lift injector #4 connector away from injector studs.
3. On the injector harness 10-way connector (male pin terminals), measure the resistance between injector #4 control (terminal 5) and all other terminals in the 10-way connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,000025F -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,000025F -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-A1) and all terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,000025F -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #4 control (terminal J1-A1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,000025F -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000654.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,000025F -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000654.06 reappear active?	**NO:** Problem fixed.

RG41221,000025F -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000654.06 reappear active?	**NO:** Problem fixed.

RG41221,000025F -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,000025F -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000654.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,000025F -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #4, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,000025F -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000654.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,000025F -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000654.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #4. GO TO 10

RG41221,000025F -19-20JAN09-17/17

000654.07 — Injector #4 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #4.

RG41221,0000260 -19-19OCT10-1/14

000654.07 — Injector #4 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000654.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #4 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #4 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000260 -19-19OCT10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000654.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

Continued on next page

RG41221,0000260 -19-19OCT10-3/14

❷ Fuel Line Inspection

1. Ignition ON, Engine ON.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.

2. Check for injector #4 fuel supply line leak.
3. Ignition OFF, Engine OFF.
4. Check for over bent/pinched or cracked fuel line between the rail and the injector.

Were any problems found?

YES: Repair problem. GO TO 12

NO: GO TO 3

RG41221,0000260 -19-19OCT10-4/14

❸ Clean Injectors

1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090.
2. Ignition ON, Engine ON.
3. Refresh Codes.

Did 000651.07 reappear active?

YES: GO TO 4

NO: Problem fixed.

RG41221,0000260 -19-19OCT10-5/14

❹ Misfire Test

1. Ignition ON, Engine OFF.
2. Perform Cylinder Cutout Test and record results.
3. Perform Cylinder Misfire Test and record results.

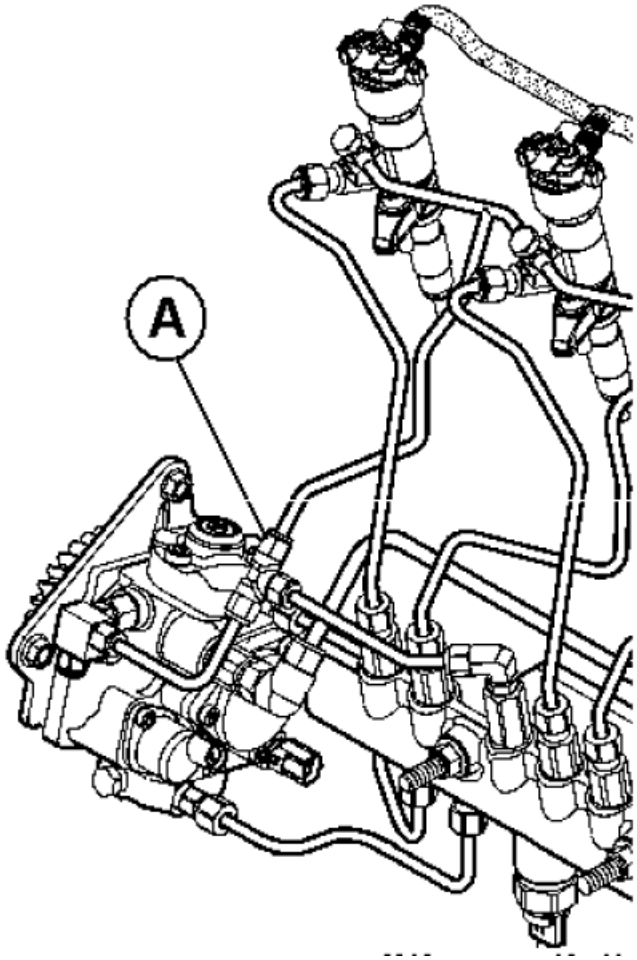
Do tests confirm a bad injector #4?

YES: Replace injector #4. GO TO 12

NO: GO TO 5

Continued on next page

RG41221,0000260 -19-19OCT10-6/14

5 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.  RG14958 —UN—31MAY07 **A—Leak off line "T" fitting** 3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container. **Specification** 9.0L—Volume.....0.9L (30oz) Is the collected amount more than the specification?	**YES:** Replace injector #4. GO TO 12 **NO:** GO TO 6
		RG41221,0000260 -19-19OCT10-7/14
6 Occurrence Count Check	Review stored information and look at occurrence count for 000654.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8
	Continued on next page	RG41221,0000260 -19-19OCT10-8/14

7 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #4?	**YES:** Replace injector #4. GO TO 12 **NO:** GO TO 9

RG41221,0000260 -19-19OCT10-9/14

8 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 9

RG41221,0000260 -19-19OCT10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 10 **NO:** GO TO 11

RG41221,0000260 -19-19OCT10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000654.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 9 and check the operating point.

RG41221,0000260 -19-19OCT10-12/14

11 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 12 **NO:** Replace ECU, GO TO 12

RG41221,0000260 -19-19OCT10-13/14

12 DTC Check	Ignition ON, Engine Idling. Is 000654.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,0000260 -19-19OCT10-14/14

000654.13 — Injector #4 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,0000261 -19-28AUG07-1/9

000654.13 — Injector #4 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000654.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000261 -19-28AUG07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,0000261 -19-28AUG07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,0000261 -19-28AUG07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,0000261 -19-28AUG07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,0000261 -19-28AUG07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,0000261 -19-28AUG07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,0000261 -19-28AUG07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,0000261 -19-28AUG07-9/9

000655.02 — Injector #5 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #5.

RG41221,0000262 -19-27AUG07-1/14

000655.02 — Injector #5 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000655.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000262 -19-27AUG07-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000262 -19-27AUG07-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,0000262 -19-27AUG07-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,0000262 -19-27AUG07-5/14

❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,0000262 -19-27AUG07-6/14

5 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000655.02 active?

YES: GO TO 6

NO: Problem fixed, return application to service.

RG41221,0000262 -19-27AUG07-7/14

6 ECU Programming Check

1. Download the latest ECU software payload.
2. Reprogram ECU.

Was the ECU programming successful?

YES: GO TO 7

NO: Check payload and try again.

RG41221,0000262 -19-27AUG07-8/14

7 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000655.02 active?

YES: Start a DTAC case.

NO: Problem fixed, return application to service.

RG41221,0000262 -19-27AUG07-9/14

8 Automatic Input of Injector Data

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate.
3. Select the sequence number of the injector file downloaded from the list of injectors.
4. Select Next.
5. Select Submit.
6. Select OK.
7. Select No.
8. Refresh codes.

Is 000655.02 active?

YES: GO TO 9

NO: Problem fixed, return application to service.

Continued on next page

RG41221,0000262 -19-27AUG07-10/14

9 Download Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,0000262 -19-27AUG07-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000655.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,0000262 -19-27AUG07-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,0000262 -19-27AUG07-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000655.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000262 -19-27AUG07-14/14

000655.05 — Injector #5 Circuit Has High Resistance

The ECU detects a high resistance in the cylinder #5 electronic injector circuit.

RG41221,0000263 -19-20JAN09-1/16

000655.05 — Injector #5 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000655.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #5 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #5 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000263 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000655.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,0000263 -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,0000263 -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 10) and injector #5 low side control (terminal 6).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,0000263 -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove rocker arm cover.
2. On the #5 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace injector. GO TO 9

RG41221,0000263 -19-20JAN09-6/16

5 ECU Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,0000263 -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #5 control (terminal J1-F1) and the injector harness 10-way connector (terminal 6).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 10-way connector (terminal 10).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

RG41221,0000263 -19-20JAN09-8/16

7 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000655.05 reappear active?	**NO:** Problem fixed.

RG41221,0000263 -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000655.05 reappear active?	**NO:** Problem fixed.

RG41221,0000263 -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000655.05 reappear active?	**NO:** Problem fixed.

RG41221,0000263 -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 9
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,0000263 -19-20JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000655.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

RG41221,0000263 -19-20JAN09-13/16

12 Terminal Test	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #5, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

RG41221,0000263 -19-20JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000655.05 reappear active with engine running?	**NO:** GO TO 14.

RG41221,0000263 -19-20JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000655.05 reappear active with engine running?	**NO:** Replace injector #5. GO TO 9

RG41221,0000263 -19-20JAN09-16/16

000655.06 — Injector #5 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #5 electronic injector circuit.

RG41221,0000264 -19-20JAN09-1/17

000655.06 — Injector #5 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000655.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #5 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000264 -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000655.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000264 -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way injector connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000655.05, high injector #5 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,0000264 -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,0000264 -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #5 terminal nuts.
2. Lift injector #5 connector away from injector studs.
3. On the injector harness connector (male pin terminals), measure the resistance between injector #5 control (terminal 6) and all other terminals in the injector harness connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector #5. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,0000264 -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Did you find a problem?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,0000264 -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #5 control (terminal J1-F1) and all terminals in the J1, J2, and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,0000264 -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #5 control (terminal J1-F1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,0000264 -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000655.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,0000264 -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000655.06 reappear active?	**NO:** Problem fixed.

RG41221,0000264 -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000655.06 reappear active?	**NO:** Problem fixed.

RG41221,0000264 -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,0000264 -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000655.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,0000264 -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #5, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,0000264 -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000655.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,0000264 -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000655.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #5. GO TO 10

RG41221,0000264 -19-20JAN09-17/17

000655.07 — Injector #5 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #5.

RG41221,0000265 -19-19OCT10-1/14

000655.07 — Injector #5 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000655.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #5 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #5 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000265 -19-19OCT10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000655.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

Continued on next page

RG41221,0000265 -19-19OCT10-3/14

❷ Fuel Line Inspection

1. Ignition ON, Engine ON.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.

2. Check for injector #5 fuel supply line leak.
3. Ignition OFF, Engine OFF.
4. Check for over bent/pinched or cracked fuel line between the rail and the injector.

Were any problems found?

YES: Repair problem. GO TO 12

NO: GO TO 3

RG41221,0000265 -19-19OCT10-4/14

❸ Clean Injectors

1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090.
2. Ignition ON, Engine ON.
3. Refresh Codes.

Did 000651.07 reappear active?

YES: GO TO 4

NO: Problem fixed.

RG41221,0000265 -19-19OCT10-5/14

❹ Misfire Test

1. Ignition ON, Engine OFF.
2. Perform Cylinder Cutout Test and record results.
3. Perform Cylinder Misfire Test and record results.

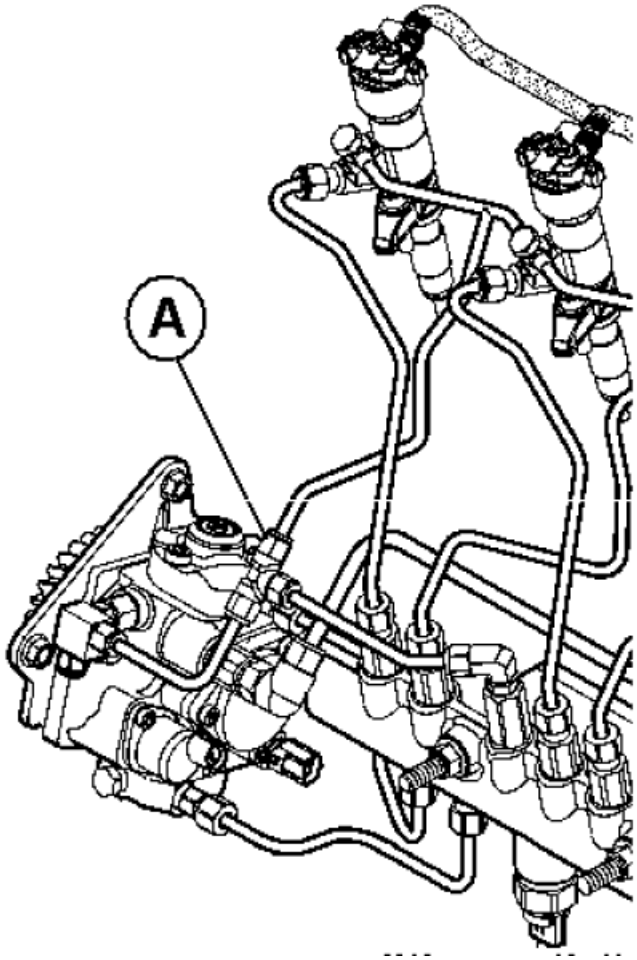
Do tests confirm a bad injector #5?

YES: Replace injector #5. GO TO 12

NO: GO TO 5

Continued on next page

RG41221,0000265 -19-19OCT10-6/14

5 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.  RG14958 —UN—31MAY07 **A—Leak off line "T" fitting** 3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container. **Specification** 9.0L—Volume.....0.9L (30oz) Is the collected amount more than the specification?	**YES:** Replace injector #5. GO TO 12 **NO:** GO TO 6
	RG41221,0000265 -19-19OCT10-7/14	
6 Occurrence Count Check	Review stored information and look at occurrence count for 000655.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8
	Continued on next page	RG41221,0000265 -19-19OCT10-8/14

7 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #5?	**YES:** Replace injector #5. GO TO 12 **NO:** GO TO 9

RG41221,0000265 -19-19OCT10-9/14

8 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 9

RG41221,0000265 -19-19OCT10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 10 **NO:** GO TO 11

RG41221,0000265 -19-19OCT10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000655.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 9 and check the operating point.

RG41221,0000265 -19-19OCT10-12/14

11 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 12 **NO:** Replace ECU, GO TO 12

RG41221,0000265 -19-19OCT10-13/14

12 DTC Check	Ignition ON, Engine Idling. Is 000655.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,0000265 -19-19OCT10-14/14

000655.13 — Injector #5 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,0000266 -19-12SEP07-1/9

000655.13 — Injector #5 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000655.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000266 -19-12SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,0000266 -19-12SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,0000266 -19-12SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,0000266 -19-12SEP07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,0000266 -19-12SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,0000266 -19-12SEP07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,0000266 -19-12SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,0000266 -19-12SEP07-9/9

000656.02 — Injector #6 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #6.

RG41221,0000267 -19-28AUG07-1/14

000656.02 — Injector #6 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000656.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,0000267 -19-28AUG07-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000267 -19-28AUG07-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

RG41221,0000267 -19-28AUG07-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

RG41221,0000267 -19-28AUG07-5/14

❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

RG41221,0000267 -19-28AUG07-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000656.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

RG41221,0000267 -19-28AUG07-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

RG41221,0000267 -19-28AUG07-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000656.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000267 -19-28AUG07-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000656.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

Continued on next page

RG41221,0000267 -19-28AUG07-10/14

9 Download Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

RG41221,0000267 -19-28AUG07-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000656.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

RG41221,0000267 -19-28AUG07-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

RG41221,0000267 -19-28AUG07-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000656.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

RG41221,0000267 -19-28AUG07-14/14

000656.05 — Injector #6 Circuit Has High Resistance

The ECU detects a high resistance in the cylinder #6 electronic injector circuit.

RG41221,0000268 -19-20JAN09-1/16

000656.05 — Injector #6 Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01
000656.05

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #6 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #6 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000268 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000656.05 reappear active?

YES: GO TO 2

NO: GO TO 10

RG41221,0000268 -19-20JAN09-3/16

2 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Perform TERMINAL TEST on injector harness connector.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

RG41221,0000268 -19-20JAN09-4/16

3 Check Injector Harness Resistance

On the injector harness 10-way connector (male pin terminals), measure the resistance between injector high voltage supply (terminal 10) and injector #6 low side control (terminal 7).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

RG41221,0000268 -19-20JAN09-5/16

4 Check Injector Coil Resistance

1. Remove rocker arm cover.
2. On the #6 injector, measure the resistance between the two injector studs.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace injector. GO TO 9

RG41221,0000268 -19-20JAN09-6/16

5 ECU Terminal Test

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 6

Continued on next page

RG41221,0000268 -19-20JAN09-7/16

6 Check Engine Harness Resistance	1. On the harness, measure the resistance between the ECU injector #6 control (terminal J1-C1) and the injector harness 10-way connector (terminal 7).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 10-way connector (terminal 10).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

RG41221,0000268 -19-20JAN09-8/16

7 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

RG41221,0000268 -19-20JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

RG41221,0000268 -19-20JAN09-10/16

9 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

RG41221,0000268 -19-20JAN09-11/16

10 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 9
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

Continued on next page

RG41221,0000268 -19-20JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000656.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

RG41221,0000268 -19-20JAN09-13/16

12 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #6, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

RG41221,0000268 -19-20JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000656.05 reappear active with engine running?	**NO:** GO TO 14.

RG41221,0000268 -19-20JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000656.05 reappear active with engine running?	**NO:** Replace injector #6. GO TO 9

RG41221,0000268 -19-20JAN09-16/16

000656.06 — Injector #6 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #6 electronic injector circuit.

RG41221,0000269 -19-20JAN09-1/17

000656.06 — Injector #6 Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000656.06

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC may also be displayed during Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #6 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Injector Connector C01 - Blue/Red

Continued on next page

RG41221,0000269 -19-20JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000656.06 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000269 -19-20JAN09-3/17

2 Check for DTC Change with Open Injector Harness

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.

1. Ignition OFF, engine OFF.
2. Disconnect 10-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000656.05, high injector #6 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: Do not reconnect injector harness connector. GO TO 5

RG41221,0000269 -19-20JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness connector.
3. Remove rocker cover.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

RG41221,0000269 -19-20JAN09-5/17

4 Check Injector Harness for Wire to Wire Short

1. Loosen injector #6 terminal nuts.
2. Lift injector #6 connector away from injector studs.
3. On the injector harness connector (male pin terminals), measure the resistance between injector #6 control (terminal 7) and all other terminals in the injector harness connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector #6. GO TO 10

NO: Replace injector harness. GO TO 10

RG41221,0000269 -19-20JAN09-6/17

5 ECU Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 6

RG41221,0000269 -19-20JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J2 and J3 connectors.
2. On the harness, measure the resistance between the ECU injector #6 control (terminal J1-C1) and all terminals in the J1, J2 and J3 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 7

NO: Fix problem. GO TO 10

RG41221,0000269 -19-20JAN09-8/17

7 Check Engine Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the ECU injector #6 control (terminal J1-C1) and single point ground.

Is voltage greater than 0.5V?

YES: Fix problem. GO TO 10

NO: GO TO 8

RG41221,0000269 -19-20JAN09-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000656.06 reappear active?

YES: GO TO 9

NO: Problem fixed.

Continued on next page

RG41221,0000269 -19-20JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000656.06 reappear active?	**NO:** Problem fixed.

RG41221,0000269 -19-20JAN09-11/17

10 Verification	*NOTE: See REMOVE AND INSTALL ELECTRONIC INJECTORS (EIS) in Section 02, Group 90 earlier in this manual for injector terminal torque specification.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000656.06 reappear active?	**NO:** Problem fixed.

RG41221,0000269 -19-20JAN09-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 10
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RG41221,0000269 -19-20JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000656.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

RG41221,0000269 -19-20JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform Terminal TestTERMINAL TEST on the ECU J1 connector, injector #6, and injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,0000269 -19-20JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000656.06 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 15.

RG41221,0000269 -19-20JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000656.06 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #6. GO TO 10

RG41221,0000269 -19-20JAN09-17/17

000656.07 — Injector #6 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #6.

RG41221,000026A -19-19OCT10-1/14

000656.07 — Injector #6 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000656.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #6 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #6 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000026A -19-19OCT10-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000656.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

Continued on next page

RG41221,000026A -19-19OCT10-3/14

2 Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #6 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. Were any problems found?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 3

RG41221,000026A -19-19OCT10-4/14

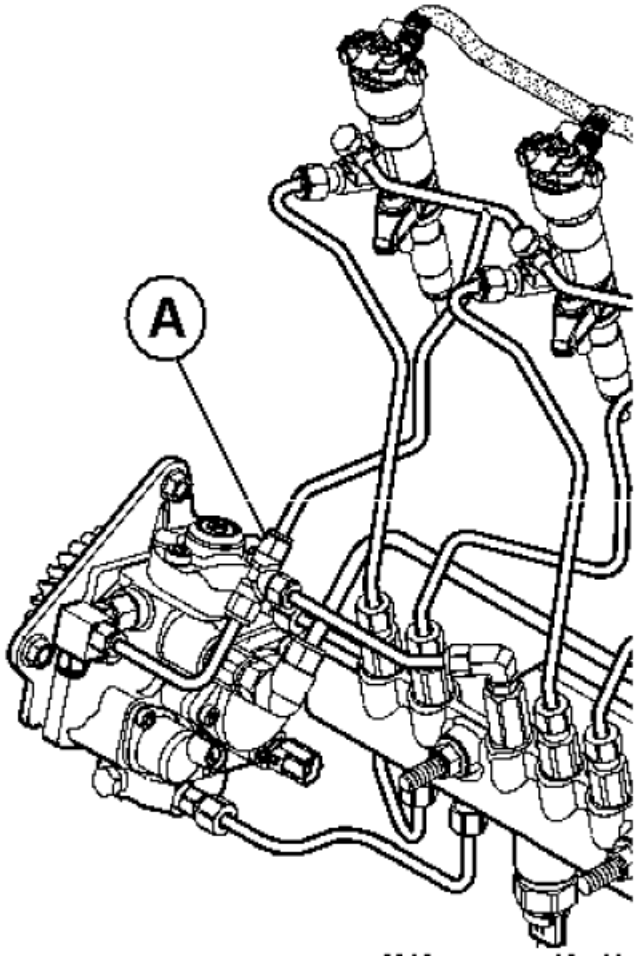
3 Clean Injectors	1. Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) procedure located in Section 2, Group 090. 2. Ignition ON, Engine ON. 3. Refresh Codes. Did 000651.07 reappear active?	**YES:** GO TO 4 **NO:** Problem fixed.

RG41221,000026A -19-19OCT10-5/14

4 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #6?	**YES:** Replace injector #6. GO TO 12 **NO:** GO TO 5

Continued on next page

RG41221,000026A -19-19OCT10-6/14

5 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.  RG14958 —UN—31MAY07 **A—Leak off line "T" fitting** 3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container. **Specification** 9.0L—Volume.....0.9L (30oz) Is the collected amount more than the specification?	**YES:** Replace injector #6. GO TO 12 **NO:** GO TO 6
	RG41221,000026A -19-19OCT10-7/14	
6 Occurrence Count Check	Review stored information and look at occurrence count for 000656.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8
	Continued on next page	RG41221,000026A -19-19OCT10-8/14

7 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #6?	**YES:** Replace injector #6. GO TO 12 **NO:** GO TO 9

RG41221,000026A -19-19OCT10-9/14

8 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 9

RG41221,000026A -19-19OCT10-10/14

9 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 10 **NO:** GO TO 11

RG41221,000026A -19-19OCT10-11/14

10 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000656.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 9 and check the operating point.

RG41221,000026A -19-19OCT10-12/14

11 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 12 **NO:** Replace ECU, GO TO 12

RG41221,000026A -19-19OCT10-13/14

12 DTC Check	Ignition ON, Engine Idling. Is 000656.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

RG41221,000026A -19-19OCT10-14/14

000656.13 — Injector #6 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

RG41221,000026B -19-12SEP07-1/9

000656.13 — Injector #6 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000656.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

RG41221,000026B -19-12SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

RG41221,000026B -19-12SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

RG41221,000026B -19-12SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

RG41221,000026B -19-12SEP07-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see DOWNLOADING ELECTRONIC INJECTOR CALIBRATION FILES earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,000026B -19-12SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

RG41221,000026B -19-12SEP07-7/9

6 ECU Programming	1. Download the latest ECU software. 2. Reprogram ECU. Was the ECU programming successful?	 **YES:** GO TO 7 **NO:** Replace ECU. GO TO 3

RG41221,000026B -19-12SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

RG41221,000026B -19-12SEP07-9/9

000676.03 — Cold Start Aid Signal Received When Not Expected

The ECU detects the cold start aid relay output is high when the ECU is not energizing the relay.

RE42287,00003EF -19-21DEC10-1/18

000676.03 — Cold Start Aid Signal Received When Not Expected Diagnostic Procedure

Troubleshooting Sequence:
000676.03

When DTC is Displayed:
The ECU is commanding the cold start aid relay OFF but is detecting that the cold start aid relay is energized.

Related Information:
The ECU supplies a high side output to the cold start aid relay coil to energize the relay. The ECU monitors the output of the relay to determine if the relay is energized.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
Engine performance may be affected if glow plugs are powered with engine at operating temperature.

Additional References:
For further cold start aid information, see INTAKE AIR HEATER OPERATION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTAN: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RE42287,00003EF -19-21DEC10-2/18

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF for at least 30 seconds. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. Did 000676.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

Continued on next page

RE42287,00003EF -19-21DEC10-3/18

2 Check Cold Start Aid Relay Output Voltage

NOTE: The cold start aid relay has four studs. The two smaller studs are connected to the relay coil. One of the large studs is connected to the battery voltage supply. The other large stud is the relay output which is connected to the intake air heater.

1. Ignition ON, engine OFF for at least 30 seconds.
2. Verify that the ECU cold start aid relay output sense terminal C05 is on the cold start aid relay output stud and not the cold start aid relay battery supply terminal.
3. Measure the voltage from the cold start aid relay output terminal to single point ground.

Is the cold start aid relay output terminal voltage greater than 1V?

YES: GO TO 3

NO: GO TO 5

RE42287,00003EF -19-21DEC10-4/18

3 Check for Energized Cold Start Aid Relay

Measure voltage from cold start aid relay coil high side terminal (C04) to single point ground.

Is voltage greater than 1V?

YES: GO TO 6

NO: GO TO 4

RE42287,00003EF -19-21DEC10-5/18

4 Check for Stuck Cold Start Aid Relay Contacts

1. Remove cold start aid fuse located in a sealed fuse holder near alternator output terminal.
2. Measure the voltage from the cold start aid relay output terminal (C05) to single point ground.

Is voltage greater than 1V?

YES: Repair short to voltage source in cold start aid relay output wiring. GO TO 11

NO: Replace cold start aid relay. GO TO 11

RE42287,00003EF -19-21DEC10-6/18

5 Check Cold Start Aid Relay Output Sense Wiring

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.
4. Measure the resistance between ECU cold start aid relay output sense (J1-A4) and cold start aid relay output terminal (C05).

Are Terminal Test results good and is resistance less than 10 ohms?

YES: GO TO 9

NO: Fix problem. GO TO 11

RE42287,00003EF -19-21DEC10-7/18

6 Check Cold Start Aid Relay Control Circuit

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.
4. Measure the resistance between ECU cold start aid relay control (J1-F4) and cold start aid relay coil high side terminal (C04).

Are Terminal Test results good and is resistance less than 10 ohms?

YES: Do not reconnect J1. GO TO 7

NO: Fix problem. GO TO 11

Continued on next page

RE42287,00003EF -19-21DEC10-8/18

7 Check Cold Start Aid Relay Control Circuit for Short to Voltage

1. Ignition ON, engine OFF.
2. Measure the voltage from cold start aid relay coil high side terminal (C04) to single point ground.

Is the voltage greater than 1V?

YES: Repair short to voltage of cold start aid control circuit. GO TO 11

NO: GO TO 8

RE42287,00003EF -19-21DEC10-9/18

8 Check Cold Start Aid Relay Control Circuit for Wire to Wire Short

1. Ignition OFF, engine OFF.
2. Remove cold start aid relay coil high side terminal (C04) from cold start aid relay.
3. Measure resistance between ECU cold start aid relay control (J1-F4) and all other terminals in the J1 connector.

Are all resistance values greater than 1k ohms?

YES: GO TO 9

NO: Fix problem. GO TO 11

RE42287,00003EF -19-21DEC10-10/18

9 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF for at least 30 seconds.
5. Refresh DTCs.

Did DTC 000676.03 reappear active?

YES: GO TO 10

NO: Problem fixed.

RE42287,00003EF -19-21DEC10-11/18

10 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF for at least 30 seconds.
4. Refresh DTCs.

Did DTC 000676.03 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

RE42287,00003EF -19-21DEC10-12/18

11 Verification

1. Ignition OFF, engine OFF for 10 seconds.
2. Reconnect all connectors.
3. Ignition ON, engine OFF for at least 30 seconds.
4. Refresh DTCs.

Did DTC 000676.03 reappear active?

YES: GO TO 2

NO: Problem fixed.

Continued on next page

RE42287,00003EF -19-21DEC10-13/18

12 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 11
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 14

RE42287,00003EF -19-21DEC10-14/18

13 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 2
	Did 000676.03 reappear active when engine operating point was reached?	**NO:** GO TO 14

RE42287,00003EF -19-21DEC10-15/18

14 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on the ECU J1 connector and cold start aid relay.	
	3. Inspect wiring harness for damage which could cause intermittent short to voltage source or wire to wire shorts.	**YES:** Fix problem. GO TO 11
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 15

RE42287,00003EF -19-21DEC10-16/18

15 Check for Intermittent Stuck Relay Contacts	1. Disconnect fuel temperature sensor to cause ECU to energize cold start aid relay at next key cycle.	
	2. Ignition ON, engine OFF for at least 30 seconds.	
	3. Refresh DTCs.	
	Did 000676.03 reappear active?	**YES:** Relay contacts may be stuck. GO TO 2
	NOTE: Cycle ignition OFF for 10 seconds and repeat sub-steps 2-3 several times to cycle relay contacts, if 000676.03 does not reappear active.	**NO:** GO TO 16

RE42287,00003EF -19-21DEC10-17/18

16 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON for at least 30 seconds.	
	3. Refresh DTCs.	**YES:** GO TO 2
	Did 000676.03 reappear active?	**NO:** Problem fixed or conditions necessary to duplicate 000676.03 not met.

RE42287,00003EF -19-21DEC10-18/18

000676.05 — Cold Start Aid Circuit Has High Resistance

The ECU detects the cold start aid relay output is low when the ECU is energizing the relay.

RE42287,00003F0 -19-21DEC10-1/17

000676.05 — Cold Start Aid Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000676.05

When DTC is Displayed:
The ECU is commanding the cold start aid relay ON but is detecting that the cold start aid relay is not energized.
This DTC will become stored when the ECU commands the cold start aid relay OFF.
The brief length of time that DTC is active may cause DTC to only be shown as a stored DTC.

Related Information:
The ECU uses fuel temperature to determine if cold start aid relay should be energized.
The ECU supplies a high side control to the cold start aid relay to energize the relay. The ECU monitors the output of the relay to determine if cold start aid relay is energized.
This DTC may be caused by wiring problems including an open cold start aid relay control circuit or an open circuit between the relay output and the ECU.
This DTC may also be caused by a defective cold start aid relay or a blown or missing cold start aid fuse.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
The engine may require extended crank time or may not start in low ambient temperatures if the air heater is not powered.

Additional References:
For further cold start aid information, see INTAKE AIR HEATER OPERATION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V EWIRING DIAGRAM 1
- see 9.0L 24V ECU WIRING DIAGRAM 1
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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RE42287,00003F0 -19-21DEC10-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Disconnect fuel temperature sensor connector to cause the ECU to attempt to energize the cold start aid relay at next key cycle.

NOTE: Ignore DTC 000174.03 which will be generated due to fuel temperature sensor being disconnected.

5. Clear DTCs.
6. Ignition OFF, engine OFF for 10 seconds.
7. Ignition ON, engine OFF.
8. Refresh DTCs.

Did 000676.05 reappear active or stored?

YES: GO TO 2

NO: GO TO 11

RE42287,00003F0 -19-21DEC10-3/17

2 Check Cold Start Aid Relay Voltage Supply

1. Ignition OFF, engine OFF.
2. Measure the voltage from the cold start aid relay battery voltage supply terminal (cable between alternator output and cold start aid relay) to single point ground.

Is voltage within 1V of battery terminal voltage?

YES: GO TO 3

NO: Check for blown or missing cold start aid fuse, loose connections, or open circuit. Fix problem. GO TO 10

RE42287,00003F0 -19-21DEC10-4/17

3 Check Cold Start Aid Relay Output Voltage

1. Verify fuel temperature sensor is still disconnected.
2. Ignition ON, engine OFF. Cold Start Aid relay should be energized for approximately 15 seconds.
3. Measure voltage from cold start aid relay output terminal (C05) to single point ground while ECU is attempting to energize relay.

Is voltage within 5V of battery terminal voltage?

YES: GO TO 4

NO: GO TO 5

RE42287,00003F0 -19-21DEC10-5/17

4 Check Relay Output Sense Wiring

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.
4. Measure the resistance between ECU cold start aid relay output sense (J1-A4) and cold start aid relay output sense terminal (C05).

Are Terminal Test results good and is resistance less than 10 ohms?

YES: GO TO 8

NO: Fix problem. GO TO 10

Continued on next page

RE42287,00003F0 -19-21DEC10-6/17

5 Check Cold Start Aid Relay Coil Ground Circuit	1. Ignition OFF, engine OFF.	
	2. Measure the resistance between the cold start aid relay control coil low side terminal (C03) and single point ground.	**YES:** GO TO 6
	Is resistance less than 2 ohms?	**NO:** Fix problem. GO TO 10

RE42287,00003F0 -19-21DEC10-7/17

6 Check Cold Start Aid Relay Operation	1. Ignition OFF, engine OFF.	
	2. Disconnect relay high side control terminal (C04) from relay stud.	
	3. Attach a fused jumper wire between the cold start aid relay battery supply terminal and the relay high side control stud.	
	4. Measure voltage from cold start aid relay output terminal to single point ground.	**YES:** Remove jumper wire. GO TO 7
	Is the voltage at relay output within 5V of battery terminal voltage?	**NO:** Replace cold start aid relay. GO TO 10

RE42287,00003F0 -19-21DEC10-8/17

7 Check Relay Control Wiring	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	
	3. Measure the resistance between ECU cold start aid relay control (J1-F4) and cold start aid relay coil high side control terminal (C04).	**YES:** GO TO 8
	Are Terminal Test results good and is resistance less than 2 ohms?	**NO:** Fix problem. GO TO 10

RE42287,00003F0 -19-21DEC10-9/17

8 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors except fuel temperature sensor.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Clear DTCs.	
	5. Ignition OFF, engine OFF for 10 seconds.	
	6. Ignition ON, engine OFF.	
	7. Refresh DTCs.	**YES:** GO TO 9
	Did DTC 000676.05 reappear active or stored?	**NO:** Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

Continued on next page

RE42287,00003F0 -19-21DEC10-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Clear DTCs. 5. Ignition OFF, engine OFF for 10 seconds. 6. Ignition ON, engine OFF. 7. Refresh DTCs. Did DTC 000676.05 reappear active or stored?	**YES:** Open DTAC case. **NO:** Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

RE42287,00003F0 -19-21DEC10-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors except fuel temperature sensor. 3. Ignition ON, engine OFF. 4. Clear DTCs. 5. Ignition OFF, engine OFF for 10 seconds. 6. Ignition ON, engine OFF. 7. Refresh DTCs. Did DTC 000676.05 reappear active or stored?	**YES:** GO TO 2 **NO:** Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

RE42287,00003F0 -19-21DEC10-12/17

11 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. GO TO 10 **YES:** If a certain operating point exists when error occurs then GO TO 12 **NO:** GO TO 13

RE42287,00003F0 -19-21DEC10-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000676.05 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 13

RE42287,00003F0 -19-21DEC10-14/17

13 Terminal Test	1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector, cold start aid relay, and cold start aid voltage supply circuit including fuse. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

Continued on next page

RE42287,00003F0 -19-21DEC10-15/17

14 Reconnect and Retest	1. Reconnect all connectors except fuel temperature sensor. 2. Ignition ON, engine OFF. 3. Clear DTCs. 4. Ignition OFF, engine OFF for 10 seconds. 5. Ignition ON, engine OFF. 6. Refresh DTCs. Did 000676.05 reappear active or stored?	**YES:** GO TO 2. **NO:** GO TO 15.

RE42287,00003F0 -19-21DEC10-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Clear DTCs. 4. Ignition OFF, engine OFF for 10 seconds. 5. Ignition ON, engine OFF. 6. Refresh DTCs. Did 000676.05 reappear active or stored?	**YES:** GO TO 2 **NO:** Problem fixed or conditions necessary to duplicate 000676.05 not met. Reconnect fuel temperature sensor and clear DTCs.

RE42287,00003F0 -19-21DEC10-17/17

000898.09 — Engine Speed CAN Message Invalid

For troubleshooting procedures please see the application troubleshooting manual.

RG41221,000026C -19-29MAY08-1/1

000970.31 — External Shutdown Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU has shutdown the engine due to the external shutdown switch being activated.

RG41221,000026D -19-20JAN09-1/16

000970.31 — External Shutdown Commanded Diagnostic Procedure

Troubleshooting Sequence:
000970.31

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have an external engine shutdown switch. When this feature is programmed into the ECU, the ECU will shutdown the engine when the switch is activated.

Alarm Level:
STOP

Control Unit Response:
If this code sets, the ECU will shut the engine down.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Auxiliary Connector C08 - Yellow/Purple

Continued on next page

RG41221,000026D -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000970.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,000026D -19-20JAN09-3/16

2 Check Condition That Set Switch	1. Ignition OFF, Engine OFF. 2. Refer to application manual to find what device is connected to external shutdown switch. 3. Inspect device for parameter that may have caused external shutdown switch to be activated. Depending on application, this may be wiring, mechanical linkage, or an environmental condition. Was a possible problem or operating point found that could cause the external shutdown switch to be activated?	**YES:** Repair problem. Retest application to verify DTC 970.31 is inactive. **NO:** No problem found. GO TO 3

RG41221,000026D -19-20JAN09-4/16

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Remove wires or connector from external shutdown switch. 3. Perform TERMINAL TEST on connector and external shutdown switch. 4. Inspect surrounding area for pinched or melted wires. Were any problems found with the wiring or connectors?	**YES:** Repair problem. GO TO 13 **NO:** GO TO 4

RG41221,000026D -19-20JAN09-5/16

4 Check Harness	Step 1. 1. Ignition ON, Engine OFF. 2. Refresh codes from within Service ADVISOR. 3. Record if 000970.31 is active. 4. GO TO step 2. Step 2. 5. Ignition OFF, Engine OFF. 6. On the harness, connect the two wires from the external shutdown switch together. 7. Ignition ON, Engine OFF. 8. Refresh codes from within Service ADVISOR. Did 000970.31 change state from step 1?	**YES:** Replace external shutdown switch. GO TO 13 **NO:** Problem in harness. GO TO 5

Continued on next page

RG41221,000026D -19-20JAN09-6/16

5 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the two wires to the external shutdown switch from each other.
3. On harness, disconnect C08 auxiliary connector from main harness.
4. Perform TERMINAL TEST on both C08 connectors.
5. Inspect harness for pinched or melted wires near both C08 connectors.

Were any problems found with the wiring or connectors?

YES: Repair problem. GO TO 13

NO: GO TO 6

RG41221,000026D -19-20JAN09-7/16

6 Check Auxiliary Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal K to each individual wire of the external shutdown switch.
3. On auxiliary harness connector C08, measure resistance from terminal Q to each individual wire of the external shutdown switch.

Does each terminal, K and Q measure less than 5 ohms to one of the wires?

YES: GO TO 7

NO: Fix open wire in auxiliary harness. GO TO 13

RG41221,000026D -19-20JAN09-8/16

7 Check Auxiliary Harness for Shorted Wire

NOTE: Make sure the wires to the external shutdown switch are disconnected from the switch and not touching each other.

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal K to each terminal of C08.

Was the measurements less than 100 ohms?

YES: Fix shorted wire in auxiliary harness. GO TO 13

NO: Problem in main harness. GO TO 8

RG41221,000026D -19-20JAN09-9/16

8 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on ECU harness connector J2.
4. Inspect harness for pinched or melted wires near J2 ECU connector.

Are there any problems with the wiring or connector?

YES: Fix problem. GO TO 13

NO: GO TO 9

RG41221,000026D -19-20JAN09-10/16

9 Check ECU Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness, measure resistance from connector C08, terminal K to ECU connector J2, terminal K1.
3. On ECU harness, measure resistance from connector C08, terminal Q to ECU connector J2, terminal G3.

Was either measurements greater than 5 ohms?

YES: Fix open wire in ECU harness. GO TO 13

NO: GO TO 10

Continued on next page

RG41221,000026D -19-20JAN09-11/16

10 Check ECU Harness for Shorted Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness connector C08, measure resistance from terminal K to each terminal of C08.

Were any measurements less than 100 ohms?

YES: Fix shorted wire in ECU harness. GO TO 13

NO: ECU has not been reprogrammed. GO TO 11

NO: ECU has been reprogrammed. GO TO 12

RG41221,000026D -19-20JAN09-12/16

11 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000970.31 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 13

RG41221,000026D -19-20JAN09-13/16

12 Check ECU

NOTE: For ECU connector pinouts, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 earlier in this manual.

On ECU, measure resistance from terminal J2-K1 to terminal J2-G3.

Is the measurement between 30K and 80K?

YES: Problem not found. Reconnect all connectors. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.

NO: Replace ECU. GO TO 13

RG41221,000026D -19-20JAN09-14/16

13 Verification

1. Ignition OFF, Engine OFF.
2. Reconnect all wires, connectors, hoses, sensors, etc.
3. Ignition ON, Engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Let engine run for 3 minutes.
6. Refresh DTCs.
7. Operate engine through normal speed and load ranges if possible.

Did DTC 000970.31 reappear as active with engine running?

YES: GO TO 1

NO: Problem fixed.

Continued on next page

RG41221,000026D -19-20JAN09-15/16

14 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active?	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000026D -19-20JAN09-16/16

000971.31 — External Derate Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU has derated the engine due to the external fuel derate switch being activated.

RG41221,000026E -19-20JAN09-1/16

000971.31 — External Derate Switch Activated Diagnostic Procedure

Troubleshooting Sequence:
000971.31

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have an external derate switch. When this feature is programmed into the ECU, the ECU will derate the engine when the switch is activated.

Alarm Level:
Warning

Control Unit Response:
If the code is set, the ECU will derate the engine by a certain percentage of full power depending on the trim option selected.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on engine derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5

located in Section 06, Group 210 later in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Auxiliary Connector C08 - Yellow/Purple

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RG41221,000026E -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000970.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG41221,000026E -19-20JAN09-3/16

2 Check Condition That Set Switch	1. Ignition OFF, Engine OFF. 2. Refer to application manual to find what device is connected to external fuel derate switch. 3. Inspect device for parameter that may have caused external fuel derate switch to be activated. Depending on application, this may be wiring, mechanical linkage, or an environmental condition. Was a possible problem or operating point found that could cause the external fuel derate switch to be activated?	**YES:** Repair problem. Retest application to verify DTC 971.31 is inactive. **NO:** No problem found. GO TO 3

RG41221,000026E -19-20JAN09-4/16

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Remove wires or connector from external fuel derate switch. 3. Perform TERMINAL TEST on connector and external fuel derate switch. 4. Inspect surrounding area for pinched or melted wires. Were any problems found with the wiring or connectors?	**YES:** Repair problem. GO TO 13 **NO:** GO TO 4

RG41221,000026E -19-20JAN09-5/16

4 Check Harness	Step 1. 1. Ignition ON, Engine OFF. 2. Refresh codes from within Service ADVISOR. 3. Record if 000971.31 is active. 4. GO TO step 2. Step 2. 5. Ignition OFF, Engine OFF. 6. On the harness, connect the two wires from the external fuel derate switch together. 7. Ignition ON, Engine OFF. 8. Refresh codes from within Service ADVISOR. Did 000971.31 change state from step 1?	**YES:** Replace external fuel derate switch. GO TO 13 **NO:** Problem in harness. GO TO 5

Continued on next page

RG41221,000026E -19-20JAN09-6/16

5 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the two wires to the external fuel derate switch from each other.
3. On harness, disconnect C08 auxiliary connector from main harness.
4. Perform TERMINAL TEST on both C08 connectors.
5. Inspect harness for pinched or melted wires near both C08 connectors.

Were any problems found with the wiring or connectors?

YES: Repair problem. GO TO 13

NO: GO TO 6

RG41221,000026E -19-20JAN09-7/16

6 Check Auxiliary Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal J to each individual wire of the external fuel derate switch.
3. On auxiliary harness connector C08, measure resistance from terminal Q to each individual wire of the external fuel derate switch.

Does each terminal, J and Q measure less than 5 ohms to one of the wires?

YES: GO TO 7

NO: Fix open wire in auxiliary harness. GO TO 13

RG41221,000026E -19-20JAN09-8/16

7 Check Auxiliary Harness for Shorted Wire

NOTE: Make sure the wires to the external fuel derate switch are disconnected from the switch and not touching each other.

1. Ignition OFF, Engine OFF.
2. On auxiliary harness connector C08, measure resistance from terminal J to each terminal of C08.

Was the measurements less than 100 ohms?

YES: Fix shorted wire in auxiliary harness. GO TO 13

NO: Problem in main harness. GO TO 8

RG41221,000026E -19-20JAN09-9/16

8 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J2.
3. Perform TERMINAL TEST on ECU harness connector J2.
4. Inspect harness for pinched or melted wires near J2 ECU connector.

Are there any problems with the wiring or connector?

YES: Fix problem. GO TO 13

NO: GO TO 9

RG41221,000026E -19-20JAN09-10/16

9 Check ECU Harness for Open Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness, measure resistance from connector C08, terminal J to ECU connector J2, terminal J1.
3. On ECU harness, measure resistance from connector C08, terminal Q to ECU connector J2, terminal G3.

Was either measurements greater than 5 ohms?

YES: Fix open wire in ECU harness. GO TO 13

NO: GO TO 10

Continued on next page

RG41221,000026E -19-20JAN09-11/16

10 Check ECU Harness for Shorted Wire

1. Ignition OFF, Engine OFF.
2. On ECU harness connector C08, measure resistance from terminal J to each terminal of C08.

Were any measurements less than 100 ohms?

YES: Fix shorted wire in ECU harness. GO TO 13

NO: ECU has not been reprogrammed. GO TO 11

NO: ECU has been reprogrammed. GO TO 12

RG41221,000026E -19-20JAN09-12/16

11 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 000971.31 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 13

RG41221,000026E -19-20JAN09-13/16

12 Check ECU

NOTE: For ECU connector pinouts, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION in Section 03, Group 140 earlier in this manual.

On ECU, measure resistance from terminal J2-J1 to terminal J2-G3.

Is the measurement between 30K and 80K?

YES: Problem not found. Reconnect all connectors. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.

NO: Replace ECU. GO TO 13

RG41221,000026E -19-20JAN09-14/16

13 Verification

1. Ignition OFF, Engine OFF.
2. Reconnect all wires, connectors, hoses, sensors, etc.
3. Ignition ON, Engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Let engine run for 3 minutes.
6. Refresh DTCs.
7. Operate engine through normal speed and load ranges if possible.

Did DTC 000971.31 reappear as active with engine running?

YES: GO TO 1

NO: Problem fixed.

Continued on next page

RG41221,000026E -19-20JAN09-15/16

14 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active?	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,000026E -19-20JAN09-16/16

001075.12 — Low Pressure Fuel Pump Status Error

The ECU detects an error from the low pressure fuel pump.

RG41221,00002C1 -19-29MAY08-1/20

001075.12 — Low Pressure Fuel Pump Status Error Diagnostic Procedure

Troubleshooting Sequence:
001075.12

When DTC is Displayed:
The ECU pump enable signal is ON and the pump status signal is not present for at least 30 seconds.

Related Information:
The low pressure fuel pump provides a low level signal (ground) to the ECU when the low pressure fuel pump status is good.
This DTC may be caused by wiring problems with the pump status or enable signal wires, or by a loss of battery voltage or ground to the low pressure fuel pump.

Alarm Level:
Warning

Control Unit Response:
ECU will attempt to operate in a normal manner. The engine may not start or may stall if low pressure fuel pump is not operational.

Additional References:

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 8
- see 9.0L 24V WIRING DIAGRAM 8
- located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

For more information on the low pressure fuel pump, see FUEL TRANSFER PUMP OPERATION in Section 03, Group 130 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Low pressure fuel pump C19 - Yellow/Purple

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RG41221,00002C1 -19-29MAY08-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition OFF, engine OFF for at least 5 seconds. 5. Ignition ON, engine OFF. Did 001075.12 reappear active within 60 seconds after ignition ON?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,00002C1 -19-29MAY08-3/20

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect low pressure fuel pump 6-way connector C19. 3. Perform TERMINAL TEST on 6-way connector C19. Were any problems found?	**YES:** Fix problem. GO TO 14 **NO:** GO TO 3

RG41221,00002C1 -19-29MAY08-4/20

3 Check Pump Power and Ground	On the harness, measure the voltage between the low pressure fuel pump 6-way connector battery voltage supply (C19-5) and ground (C19-6). Is the voltage within 1V of battery terminal voltage?	**YES:** GO TO 5 **NO:** GO TO 4

RG41221,00002C1 -19-29MAY08-5/20

4 Check Pump Ground	On the harness, measure the voltage between the low pressure fuel pump 6-way connector battery voltage supply (C19-5) and single point ground. Is the voltage within 1V of battery terminal voltage?	**YES:** Fix open circuit in pump ground wiring. GO TO 14 **NO:** Check 15A fuse F03. Fix open circuit in pump battery voltage supply wiring. GO TO 14

RG41221,00002C1 -19-29MAY08-6/20

5 Check for Pump Enable Signal	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the low pressure fuel pump 6-way connector enable signal (C19-4) and single point ground within 60 seconds of ignition ON. Is the voltage within 2V of battery terminal voltage?	**YES:** GO TO 6 **NO:** GO TO 7

Continued on next page

RG41221,00002C1 -19-29MAY08-7/20

6 Check Status Circuit	1. Ignition OFF, engine OFF for at least 5 seconds. 2. On the harness, place a jumper wire between the low pressure fuel pump 6-way connector status signal (C19-3) and single point ground. 3. Ignition ON, engine OFF. 4. Refresh DTCs. Did 001075.12 reappear active within 60 seconds after ignition ON?	**YES:** GO TO 9 **NO:** Remove jumper. GO TO 11

RG41221,00002C1 -19-29MAY08-8/20

7 Check Enable Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector. 3. Perform TERMINAL TEST on J1. 4. On the harness, measure the resistance between the ECU pump enable (J1-D4) and the pump 6-way connector enable (C19-4). Are Terminal Test results good and is resistance less than 10 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 14

RG41221,00002C1 -19-29MAY08-9/20

8 Check for Shorted Enable Circuit	On the harness, measure the resistance between the ECU pump enable (J1-D4) and single point ground. Is resistance greater than 10k ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 14

RG41221,00002C1 -19-29MAY08-10/20

9 Check Status Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector. 3. PerformTERMINAL TEST on J1. 4. On the harness, measure the resistance between the ECU pump status (J1-E2) and the pump 6-way connector status (C19-3). Are Terminal Test results good and is resistance less than 10 ohms?	**YES:** GO TO 10 **NO:** Fix problem. GO TO 14

RG41221,00002C1 -19-29MAY08-11/20

10 Check for Status Circuit Shorted to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage from the ECU pump status (J1-E2) to single point ground. Is the voltage less than 0.5V?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 14

Continued on next page

RG41221,00002C1 -19-29MAY08-12/20

11 Replace Low Pressure Pump	*NOTE: For pump replacement instructions, see REMOVE AND INSTALL FUEL TRANSFER PUMP ASSEMBLY in Group 02, Section 090 earlier in this manual.*	
	1. Ignition OFF, engine OFF.	
	2. Replace low pressure fuel pump.	
	3. Reconnect all electrical connectors.	
	4. Ignition ON, engine OFF.	**YES:** Recheck for intermittent wiring problems. GO TO 2
	Did 001075.12 reappear active 60 seconds after ignition ON?	**NO:** Problem fixed.

RG41221,00002C1 -19-29MAY08-13/20

12 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Download latest ECU payload and reprogram ECU.	
	5. Ignition OFF, engine OFF for at least 5 seconds.	
	6. Ignition ON, engine OFF.	**YES:** GO TO 13
	Did 001075.12 reappear active 60 seconds after ignition ON?	**NO:** Problem fixed.

RG41221,00002C1 -19-29MAY08-14/20

13 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	**YES:** Open DTAC case.
	Did 001075.12 reappear active 60 seconds after ignition ON?	**NO:** Problem fixed.

RG41221,00002C1 -19-29MAY08-15/20

14 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	**YES:** GO TO 3
	Did 001075.12 reappear active 60 seconds after ignition ON?	**NO:** Problem fixed.

RG41221,00002C1 -19-29MAY08-16/20

15 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Fix problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 16 **NO:** GO TO 17

Continued on next page

RG41221,00002C1 -19-29MAY08-17/20

16 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 001075.12 reappear active when engine operating point was reached?	**NO:** GO TO 17

RG41221,00002C1 -19-29MAY08-18/20

17 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector and fuel pump six-way connector C19.	
	3. Inspect wire harness between fuel pump and J1 connector for damage which may cause an intermittent problem.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 18

RG41221,00002C1 -19-29MAY08-19/20

18 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine OFF.	
	3. Gently wiggle wire harness between fuel pump and ECU J1 connector.	
	4. Refresh DTCs.	**YES:** GO TO 3.
	Is 001075.12 active after 60 seconds?	**NO:** Problem fixed or conditions to generate 001075.12 have not been duplicated.

RG41221,00002C1 -19-29MAY08-20/20

001109.31 — Approaching Engine Protection Shutdown

The ECU will shutdown the engine in 30 seconds due to a operating condition out of range.

NOTE: OEM applications can be programmed with trim options to disable certain engine parameters from shutting down the engine. For other applications, consult the operators manual for engine shutdown options.

NOTE: When protection shutdown options are over ridden, severe damage can be caused to an application by continuously running the engine. Diagnose the problem as soon as possible.

RG41221,0000273 -19-28AUG07-1/3

001109.31 — Approaching Engine Protection Shutdown Diagnostic Procedure

Troubleshooting Sequence:
All other DTCs that are set.
001109.31

Related Information:

When 001109.31 is set, an associated DTC is set along with it. The associated DTC is the code that needs to be diagnosed.

Alarm Level:
WARNING

Control Unit Response:
If this code sets, the ECU will shut down the engine in 30 seconds.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

RG41221,0000273 -19-28AUG07-2/3

1 Engine Protection Shutdown:	Parameters that can cause the ECU to shutdown the engine. • The ECU detects water in fuel. See diagnostic procedure for DTC 000097.16 • The ECU detects high manifold air temperature. See diagnostic procedure for DTC 000105.00 • The ECU detects low oil pressure. See diagnostic procedure for DTC 000100.01 • The ECU detects high engine coolant temperature. See diagnostic procedure for DTC 000110.00 • The ECU detects coolant level switch is active. See diagnostic procedure for DTC 000111.01 • The ECU detects high fuel temperature. See diagnostic procedure for DTC 000174.00 Were any operating conditions found to cause the ECU to shutdown the engine?	**YES:** Diagnose problem. Diagnostic troubleshooting procedures are found in this section of the manual for OEM applications.

RG41221,0000273 -19-28AUG07-3/3

001110.31 — Engine Protection Shutdown Active

The ECU has shutdown the engine due to a operating condition out of range.

RG41221,0000274 -19-29MAY08-1/3

001110.31 — Engine Protection Shutdown Active Diagnostic Procedure

Troubleshooting Sequence:
All other DTCs that are set.
001110.31

Related Information:

NOTE: OEM applications can be programmed with trim options to disable certain engine parameters from shutting down the engine. For other applications, consult the operators manual for engine shutdown options.

NOTE: When protection shutdown options are over ridden, severe damage can be caused to an application by continuously running the engine. Diagnose the problem as soon as possible.

When 001110.31 is set, an associated DTC is set along with it. The associated DTC is the code that needs to be diagnosed.

Alarm Level:
STOP

Control Unit Response:
If this code sets and the shutdown is enabled, the ECU will shut down the engine.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

RG41221,0000274 -19-29MAY08-2/3

❶ **Engine Protection Shutdown:**	Parameters that can cause the ECU to shutdown the engine. • The ECU detects water in fuel. See diagnostic procedure for DTC 000097.16 • The ECU detects high manifold air temperature. See diagnostic procedure for DTC 000105.00 • The ECU detects low engine oil pressure. See diagnostic procedure for DTC 000100.01 • The ECU detects high coolant temperature. See diagnostic procedure for DTC 000110.00 • The ECU detects coolant level switch is active. See diagnostic procedure for DTC 000111.01 • The ECU detects high fuel temperature. See diagnostic procedure for DTC 000174.00 Were any operating conditions found to cause the ECU to shutdown the engine?	**YES:** Diagnose problem. Diagnostic troubleshooting procedures are found in this section of the manual for OEM applications.

RG41221,0000274 -19-29MAY08-3/3

001136.00 — ECU Temperature Signal Extremely High

The ECU detects an internal temperature above specification.

RG41221,0000275 -19-20JAN09-1/9

001136.00 — ECU Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
All xxxxxx.06 codes
000611.04
001136.00

Related Information:
The ECU senses an internal ECU temperature of 135° C (275° F) on OEM engines.

Alarm Level:
STOP

Control Unit Response:
The ECU limits the engine to 1200 RPMs.

Additional References:
For further ECU information, see ENGINE CONTROL UNIT (ECU) MAINTENANCE in Section 02, Group 110 earlier in this manual.
For further ECU temperature sensor information, see ENGINE CONTROL UNIT (ECU) TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V ECU WIRING DIAGRAMS
- see 9.0L 24V ECU WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

Continued on next page

RG41221,0000275 -19-20JAN09-2/9

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001136.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000275 -19-20JAN09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) MAINTENANCE in Section 02, Group 110 earlier in this manual.* 1. Ignition OFF, Engine OFF. 2. Make the following checks: • Remove any items that are restricting the air flow around the ECU. • Remove dirt and debris from the ECU. Be cautious not to damage the connectors or strike ECU housing. Do not use a pressure wash to clean the ECU. • Verify the ECU is not mounted near high temperature components or in the path of high temperature air flow. Do any of the above conditions exist?	**YES:** Correct environment. GO TO 6 **NO:** GO TO 3

RG41221,0000275 -19-20JAN09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

RG41221,0000275 -19-20JAN09-5/9

4 Test ECU	If a Programming Harness is available, perform the following steps. 1. Ignition OFF, Engine OFF 2. Disconnect all connectors from ECU. 3. Remove ECU from application. 4. Connect ECU to programming harness 5. Power ECU on from the Programming Harness. 6. Wait for 20 minutes. 7. Refresh codes from within Service ADVISOR. Is 001136.00 still active?	**YES:** Bad sensor. Replace ECU. GO TO 6 **NO:** Programming Harness not available. GO TO 5 **NO:** 001136.00 not active. Recheck physical environment. GO TO 1

Continued on next page

RG41221,0000275 -19-20JAN09-6/9

5 Test ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect all connectors from ECU.	
	3. Remove ECU from application. Isolate ECU from any hot areas.	
	4. Reconnect ECU connector J2.	
	5. Ignition ON, Engine OFF.	
	6. Wait 20 minutes.	
	7. Refresh codes from within Service ADVISOR.	**YES:** Bad sensor. Replace ECU. GO TO 6
	Is 001136.00 still active?	**NO:** Recheck physical environment. GO TO 1

RG41221,0000275 -19-20JAN09-7/9

6 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 10 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 001136.00 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,0000275 -19-20JAN09-8/9

7 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,0000275 -19-20JAN09-9/9

001136.16 — ECU Temperature Signal Moderately High

The ECU detects an internal temperature above specification.

RG41221,0000276 -19-20JAN09-1/9

001136.16 — ECU Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
All xxxxxx.06 codes
000611.04
001136.00
001136.16

Related Information:
The ECU senses an internal ECU temperature of 125° C (257° F) on OEM engines.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For further ECU information, see ENGINE CONTROL UNIT (ECU) MAINTENANCE in Section 02, Group 110 earlier in this manual.
For further ECU temperature sensor information, see ENGINE CONTROL UNIT (ECU) TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V ECU WIRING DIAGRAMS
- see 9.0L 24V ECU WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

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RG41221,0000276 -19-20JAN09-2/9

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001136.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000276 -19-20JAN09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) MAINTENANCE in Section 02, Group 110 earlier in this manual.* 1. Ignition OFF, Engine OFF. 2. Make the following checks: • Remove any items that are restricting the air flow around the ECU. • Remove dirt and debris from the ECU. Be cautious not to damage the connectors or strike ECU housing. Do not use a pressure wash to clean the ECU. • Verify the ECU is not mounted near high temperature components or in the path of high temperature air flow. Do any of the above conditions exist?	**YES:** Correct environment. GO TO 6 **NO:** GO TO 3

RG41221,0000276 -19-20JAN09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

RG41221,0000276 -19-20JAN09-5/9

4 Test ECU	If a Programming Harness is available, perform the following steps. 1. Ignition OFF, Engine OFF 2. Disconnect all connectors from ECU. 3. Remove ECU from application. 4. Connect ECU to programming harness 5. Power ECU on from the Programming Harness. 6. Wait for 20 minutes. 7. Refresh codes from within Service ADVISOR. Is 001136.00 still active?	**YES:** Bad sensor. Replace ECU. GO TO 6 **NO:** Programming Harness not available. GO TO 5 **NO:** 001136.00 not active. Recheck physical environment. GO TO 1

Continued on next page

RG41221,0000276 -19-20JAN09-6/9

5 Test ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect all connectors from ECU.	
	3. Remove ECU from application. Isolate ECU from any hot areas.	
	4. Reconnect ECU connector J2.	
	5. Ignition ON, Engine OFF.	
	6. Wait 20 minutes.	
	7. Refresh codes from within Service ADVISOR.	**YES:** Bad sensor. Replace ECU. GO TO 6
	Is 001136.00 still active?	**NO:** Recheck physical environment. GO TO 1

RG41221,0000276 -19-20JAN09-7/9

6 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 10 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 001136.00 reappear as active with engine running?	**NO:** Problem fixed.

RG41221,0000276 -19-20JAN09-8/9

7 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Retest.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. Try to determine cause. Repair and retest.
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Contact dealer or DTAC.

RG41221,0000276 -19-20JAN09-9/9

001172.03 — Turbo Compressor Inlet Temperature Signal Out of Range High

The turbo compressor inlet temperature input voltage exceeds the sensor's high voltage specification.

RG41221,0000277 -19-20JAN09-1/20

001172.03 — Turbo Compressor Inlet Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
001172.03

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The compressor inlet temperature input voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for compressor inlet temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default turbo compressor inlet temperature of 30° C (86° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more compressor inlet temperature sensor information, see TURBO COMPRESSOR INLET TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3
-located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Compressor inlet temperature sensor T06 - Purple/Gray
• Turbo system interconnect C23 - Yellow/Purple

Continued on next page

RG41221,0000277 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 001172.03 reappear active?

YES: GO TO 2

NO: GO TO 9

RG41221,0000277 -19-20JAN09-3/20

2 Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on compressor inlet temperature sensor connector T06 and compressor inlet temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41221,0000277 -19-20JAN09-4/20

3 Check Compressor Inlet Temperature Return Circuit Resistance

On the harness, measure the resistance between compressor inlet temperature sensor connector T06-B and single point ground.

Is the resistance less than 5 ohms?

YES: GO TO 4

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000277 -19-20JAN09-5/20

4 Check For Compressor Inlet Temperature Signal Circuit Shorted to Voltage Source

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between compressor inlet temperature sensor connector T06-A (+) and T06-B (-).

Is the voltage greater than 5.5V?

YES: GO TO 5

NO: GO TO 7

RG41221,0000277 -19-20JAN09-6/20

5 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-D1 and J03-H3.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 6

Continued on next page

RG41221,0000277 -19-20JAN09-7/20

6 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-D1 and all other terminals in ECU harness connectors J01, J02 and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,0000277 -19-20JAN09-8/20

7 Check for DTC Change with Turbo Compressor Inlet Temperature Signal Shorted to Return

1. Ignition OFF, engine OFF.
2. On the harness, install flex probes on compressor inlet temperature sensor connector terminals T06-A and T06-B.
3. Connect jumper wire between flex probes.
4. Ignition ON, engine OFF.
5. Refresh DTCs

Is DTC 0001172.04 now an active DTC?

YES: GO TO 8

NO: GO TO 9

RG41221,0000277 -19-20JAN09-9/20

8 Check for DTC 0001172.03 with Sensor Reconnected

1. Ignition OFF, engine OFF.
2. Remove flex probes from T06.
3. Reconnect T06 to compressor inlet temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 0001172.03 now an active DTC?

YES: Replace compressor inlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

RG41221,0000277 -19-20JAN09-10/20

9 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-D1 and J03-H3.

Were Terminal Test results good?

YES: GO TO 10

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000277 -19-20JAN09-11/20

10 Check Turbo Compressor Inlet Temperature Sensor Circuit Continuity

1. Disconnect compressor inlet temperature sensor connector T06.
2. On the harness, measure the resistance between ECU J03-D1 and compressor inlet temperature sensor connector T06-A.
3. On the harness, measure the resistance between ECU J03-H3 and compressor inlet temperature sensor connector T06-B.

Were both resistance measurements less than 10 ohms?

YES: GO TO 11

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000277 -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Turbo Compressor Inlet Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the compressor inlet temperature sensor and ECU J03 connector.

NOTE: The Turbo Compressor Inlet Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,0000277 -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in compressor inlet temperature sensor connector T06.
3. Replace compressor inlet temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 0001172.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

RG41221,0000277 -19-20JAN09-14/20

13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor the Turbo Compressor Inlet Air Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the compressor inlet temperature sensor and ECU J03 connector.

NOTE: The Turbo Compressor Inlet Air Temperature Input Voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

Continued on next page

RG41221,0000277 -19-20JAN09-15/20

14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 0001172.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

RG41221,0000277 -19-20JAN09-16/20

15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect compressor inlet temperature sensor connector T06. 3. Perform TERMINAL TEST on T06. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-D1 and J03-H3. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000277 -19-20JAN09-17/20

16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 0001172.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

RG41221,0000277 -19-20JAN09-18/20

17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 0001172.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

RG41221,0000277 -19-20JAN09-19/20

18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

RG41221,0000277 -19-20JAN09-20/20

001172.04 — Turbo Compressor Inlet Temperature Signal Out of Range Low

The Turbo Compressor Inlet Temperature Input voltage drops below the sensor's low voltage specification.

RG41221,0000278 -19-20JAN09-1/23

001172.04 — Turbo Compressor Inlet Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
001172.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The turbo compressor inlet temperature input voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for turbo compressor inlet temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default turbo compressor inlet temperature of 30° C (86° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more turbo compressor inlet temperature sensor information, see TURBO COMPRESSOR INLET TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Compressor inlet temperature sensor T06 - Purple/Gray
- Turbo system interconnect C23 - Yellow/Purple

Continued on next page

RG41221,0000278 -19-20JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 001172.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

RG41221,0000278 -19-20JAN09-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the compressor inlet temperature sensor connector T06. 3. Perform TERMINAL TEST on T06 connector . Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000278 -19-20JAN09-4/23

3 Check for DTC 001172.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 001172.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

RG41221,0000278 -19-20JAN09-5/23

4 Check for DTC 001172.03	Is DTC 001172.03 now an active DTC with compressor inlet temperature sensor connector T06 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

RG41221,0000278 -19-20JAN09-6/23

5 Sensor Shorted to Ground Test	On the compressor inlet temperature sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 1k ohms?	**YES:** Replace compressor inlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

RG41221,0000278 -19-20JAN09-7/23

6 Sensor Internal Short Test	On the compressor inlet temperature sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 50 ohms?	**YES:** Replace compressor inlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

RG41221,0000278 -19-20JAN09-8/23

7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor Turbo Compressor Inlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between compressor inlet temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Turbo Compressor Inlet Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent short to ground found?	**NO:** Replace compressor inlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000278 -19-20JAN09-9/23

8 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-D1 and J03-H3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

RG41221,0000278 -19-20JAN09-10/23

9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-D1 and compressor inlet temperature sensor T06-A.	
	2. On the harness, measure the resistance between ECU J03-H3 and compressor inlet temperature sensor T06-B.	**YES:** GO TO 10
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000278 -19-20JAN09-11/23

10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-D1 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100k ohms?	**NO:** GO TO 11

Continued on next page

RG41221,0000278 -19-20JAN09-12/23

11 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 001172.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 001172.04 still active with J03 disconnected?

YES: GO TO 15

NO: GO TO 12

RG41221,0000278 -19-20JAN09-13/23

12 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-D1 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

RG41221,0000278 -19-20JAN09-14/23

13 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Turbo Compressor Inlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between compressor inlet temperature sensor and ECU J03 connector.

NOTE: The Turbo Compressor Inlet Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

RG41221,0000278 -19-20JAN09-15/23

14 Check for Active DTC 001172.04

Refresh DTCs

Is DTC 001172.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

RG41221,0000278 -19-20JAN09-16/23

15 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 001172.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

RG41221,0000278 -19-20JAN09-17/23

16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Turbo Compressor Inlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between compressor inlet temperature sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Turbo Compressor Inlet Temperature Input Voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.	
	Was the source of the intermittent connection found?	**NO:** GO TO 17

RG41221,0000278 -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active.	**YES:** GO TO 2
	Is DTC 001172.04 now active?	**NO:** GO TO 18

RG41221,0000278 -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect compressor inlet temperature sensor connector T06.	
	3. Perform TERMINAL TEST on T06.	
	4. Disconnect ECU J03 connector.	
	5. Perform TERMINAL TEST on J03-D1 and J03-H3.	**YES:** GO TO 19
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000278 -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 001172.04 now active?	**NO:** GO TO 20

RG41221,0000278 -19-20JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001172.04.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** GO TO 21

RG41221,0000278 -19-20JAN09-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates.	**YES:** Reprogram ECU with latest version of software.
	Is a later version of ECU software available?	**NO:** Contact DTAC for support.

RG41221,0000278 -19-20JAN09-23/23

001180.00 — Calculated Turbo Turbine Inlet Temperature Signal Extremely High

The ECU senses a turbo turbine inlet temperature above specification.

Continued on next page

RG41221,000027A -19-29MAY08-1/21

001180.00 — Calculated Turbine Inlet Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 000107
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 000105
000108.02
Any DTC with SPN 000110
Any DTC with SPN 000157
Any DTC with SPN 000412
Any DTC with SPN 000641
Any DTC with SPN 001172
Any DTC with SPN 002630
Any DTC with SPN 002791
002795.07
001180.00

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU calculates that the turbo turbine inlet temperature is greater than a programmed value.
There is no physical turbine inlet temperature sensor. The ECU uses information from the intake manifold air temperature sensor, MAP sensor, and other measured or calculated values to calculate the turbine inlet temperature. This DTC may be caused by any condition that limits intake air flow including intake air restrictions, charge air (boost) leaks, or turbo problems.
A false measurement obtained from one of the sensors used to calculate turbine inlet temperature may cause DTC 001180.00 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2-9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 2-9.0L 24V WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 earlier in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on temperature sensor testing see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

Continued on next page

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature Sensor T01 - Purple/Gray

RG41221,000027A -19-29MAY08-3/21

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. Does the recorded information lead you to a possible cause of the problem?	**YES:** Fix problem. GO TO 2 **NO:** GO TO 2

RG41221,000027A -19-29MAY08-4/21

2 Check Intake and Exhaust System	1. Ignition OFF, engine OFF. 2. Check charge air system for loose clamps, damaged hoses, damaged charge air cooler, or other sources of charge air (boost) leaks. 3. Check for a restricted air filter element or other intake air flow restrictions. 4. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. 5. Check for exhaust system damage that could cause an exhaust restriction. Did you find a problem?	**YES:** Fix problem. GO TO 15 **NO:** Engine has NOT been operated in the past eight hours. GO TO 3 **NO:** Engine has been operated in the past eight hours. GO TO 4

RG41221,000027A -19-29MAY08-5/21

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. EGR Temperature b. Manifold Air Temperature c. Charge Air Cooler Outlet Temperature Are the temperatures reported by these data points within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

Continued on next page

RG41221,000027A -19-29MAY08-6/21

4 Check Air Temperature Sensors on a Warm Engine	1. Ignition OFF, engine OFF. 2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes: a. Charge air cooler outlet temperature sensor b. Intake manifold air temperature sensor c. EGR temperature sensor 3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection. 4. Ignition ON, engine OFF. 5. Monitor the temperature reported by the following data points in Service ADVISOR: a. Charge Air Cooler Outlet Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

RG41221,000027A -19-29MAY08-7/21

5 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	**YES:** GO TO 15 **NO:** Charge Air Cooler Outlet Temperature is higher or lower than the other two temperatures. GO TO 6
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 8
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** EGR Temperature is higher or lower than the other two temperatures. GO TO 10

Continued on next page

RG41221,000027A -19-29MAY08-8/21

6 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and charge air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on J3 and charge air cooler sensor connector. 4. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and the charge air cooler outlet temperature sensor connector signal (T01-A). 5. On the harness, measure the resistance between the ECU charge air cooler outlet temperature reference (J3-B2) and the charge air cooler outlet temperature sensor connector reference (T01-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 5

RG41221,000027A -19-29MAY08-9/21

7 Check Charge Air Cooler Outlet Temperature Circuit	1. Verify charge air cooler outlet temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000027A -19-29MAY08-10/21

8 Check Manifold Air Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and intake manifold air temperature sensor connector. 3. Perform TERMINAL TEST on J3 and intake manifold air temperature sensor connector. 4. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and the intake manifold air temperature sensor connector signal (T02-A). 5. On the harness, measure the resistance between the ECU manifold air temperature reference (J3-B2) and the intake manifold air temperature sensor connector reference (T02-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000027A -19-29MAY08-11/21

9 **Check Manifold Air Temperature Circuit**	1. Verify intake manifold air temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU manifold air temperature signal (J3-F1) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace intake manifold air temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000027A -19-29MAY08-12/21

10 **Check EGR Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and EGR temperature sensor connector. 3. Perform TERMINAL TEST on J3 and EGR temperature sensor connector. 4. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and the EGR temperature sensor connector signal (T03-A). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

RG41221,000027A -19-29MAY08-13/21

11 **Check EGR Temperature Circuit**	1. Verify EGR temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU EGR temperature signal (J3-E2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace EGR temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000027A -19-29MAY08-14/21

12 Retest Temperature Sensor Validity	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 13

RG41221,000027A -19-29MAY08-15/21

13 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 14

RG41221,000027A -19-29MAY08-16/21

14 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** Open DTAC case.

Continued on next page

RG41221,000027A -19-29MAY08-17/21

15 EGR-VGT System Temperature and Flow Test

1. Ignition OFF, engine OFF.
2. Reinstall all sensors.
3. Reconnect all electrical connectors.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 16

NO: Step 3 or 4 was performed earlier during this procedure. GO TO 18

NO: Step 3 or 4 was NOT performed earlier during this procedure. GO TO 4

RG41221,000027A -19-29MAY08-18/21

16 Recreate Operating Point

Recreate the engine operating point where 001180.00 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 001180.00 active?

YES: ECU has NOT been reprogrammed during this procedure. GO TO 17

YES: ECU was reprogrammed during this procedure. Open DTAC case.

NO: Problem fixed.

RG41221,000027A -19-29MAY08-19/21

17 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Download latest ECU payload and reprogram ECU.
3. Recreate the engine operating point where 001180.00 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 001180.00 active?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,000027A -19-29MAY08-20/21

18 Recheck System

1. Perform CHARGE AIR SYSTEM DIAGNOSTIC test.
2. Check the engine compartment for adequate fresh air supply to the engine for intake air and cooling.
3. Check exhaust system for restrictions.
4. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure.
5. Download latest ECU payload and reprogram ECU, if not already performed during this procedure.
6. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 16

NO: Open DTAC case.

RG41221,000027A -19-29MAY08-21/21

001180.16 — Turbine Inlet Temperature Signal Moderately High

The ECU senses a turbo turbine inlet temperature above specification.

Continued on next page

RG41221,000027B -19-10APR08-1/21

001180.16 — Calculated Turbine Inlet Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 000107
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 000105
000108.02
Any DTC with SPN 000110
Any DTC with SPN 000157
Any DTC with SPN 000412
Any DTC with SPN 000641
Any DTC with SPN 001172
Any DTC with SPN 002630
Any DTC with SPN 002791
002795.07
001180.16

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU calculates that the turbo turbine inlet temperature is greater than a programmed value.
There is no physical turbine inlet temperature sensor. The ECU uses information from the intake manifold air temperature sensor, MAP sensor, and other measured or calculated values to calculate the turbine inlet temperature. This DTC may be caused by any condition that limits intake air flow including intake air restrictions, charge air (boost) leaks, or turbo problems.
A false measurement obtained from one of the sensors used to calculate turbine inlet temperature may cause DTC 001180.16 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 5 percent.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2-9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 2-9.0L 24V WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 earlier in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on temperature sensor testing see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Intake manifold air temperature sensor T02 - Purple/Gray

RG41221,000027B -19-10APR08-3/21

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. Does the recorded information lead you to a possible cause of the problem?	**YES:** Fix problem. GO TO 2 **NO:** GO TO 2

RG41221,000027B -19-10APR08-4/21

2 Check Intake and Exhaust System	1. Ignition OFF, engine OFF. 2. Check charge air system for loose clamps, damaged hoses, damaged charge air cooler, or other sources of charge air (boost) leaks. 3. Check for a restricted air filter element or other intake air flow restrictions. 4. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. 5. Check for exhaust system damage that could cause an exhaust restriction. Did you find a problem?	**YES:** Fix problem. GO TO 15 **NO:** Engine has NOT been operated in the past eight hours. GO TO 3 **NO:** Engine has been operated in the past eight hours. GO TO 4

RG41221,000027B -19-10APR08-5/21

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. EGR Fresh Air Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

Continued on next page

RG41221,000027B -19-10APR08-6/21

4 Check Air Temperature Sensors on a Warm Engine	1. Ignition OFF, engine OFF. 2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes: a. Charge air cooler outlet temperature sensor b. Intake manifold air temperature sensor c. EGR temperature sensor 3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection. 4. Ignition ON, engine OFF. 5. Monitor the temperature reported by the following data points in Service ADVISOR: a. EGR Fresh Air Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

RG41221,000027B -19-10APR08-7/21

5 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (EGR Fresh Air Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** EGR Fresh Air Temperature is higher or lower than the other two temperatures. GO TO 6 **NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 8 **NO:** EGR Temperature is higher or lower than the other two temperatures. GO TO 10

Continued on next page

RG41221,000027B -19-10APR08-8/21

6 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and charge air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on J3 and charge air cooler sensor connector. 4. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and the charge air cooler outlet temperature sensor connector signal (T01-A). 5. On the harness, measure the resistance between the ECU charge air cooler outlet temperature reference (J3-B2) and the charge air cooler outlet temperature sensor connector reference (T01-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 5

RG41221,000027B -19-10APR08-9/21

7 Check Charge Air Cooler Outlet Temperature Circuit	1. Verify charge air cooler outlet temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000027B -19-10APR08-10/21

8 Check Manifold Air Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and intake manifold air temperature sensor connector. 3. Perform TERMINAL TEST on J3 and intake manifold air temperature sensor connector. 4. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and the intake manifold air temperature sensor connector signal (T02-A). 5. On the harness, measure the resistance between the ECU manifold air temperature reference (J3-B2) and the intake manifold air temperature sensor connector reference (T02-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000027B -19-10APR08-11/21

9 **Check Manifold Air Temperature Circuit**	1. Verify intake manifold air temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU manifold air temperature signal (J3-F1) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU manifold air temperature signal (J3-F1) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace intake manifold air temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000027B -19-10APR08-12/21

10 **Check EGR Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and EGR temperature sensor connector. 3. Perform TERMINAL TEST on J3 and EGR temperature sensor connector. 4. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and the EGR temperature sensor connector signal (T03-A). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

RG41221,000027B -19-10APR08-13/21

11 **Check EGR Temperature Circuit**	1. Verify EGR temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU EGR temperature signal (J3-E2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU EGR temperature signal (J3-E2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace EGR temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000027B -19-10APR08-14/21

12 Retest Temperature Sensor Validity	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (EGR Fresh Air Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 13

RG41221,000027B -19-10APR08-15/21

13 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (EGR Fresh Air Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 14

RG41221,000027B -19-10APR08-16/21

14 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (EGR Fresh Air Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • EGR Fresh Air Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of EGR Fresh Air Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** Open DTAC case.

Continued on next page

RG41221,000027B -19-10APR08-17/21

15 EGR-VGT System Temperature and Flow Test

1. Ignition OFF, engine OFF.
2. Reinstall all sensors.
3. Reconnect all electrical connectors.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 16

NO: Step 3 or 4 was performed earlier during this procedure. GO TO 18

NO: Step 3 or 4 was NOT performed earlier during this procedure. GO TO 4

RG41221,000027B -19-10APR08-18/21

16 Recreate Operating Point

Recreate the engine operating point where 001180.16 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 001180.16 active?

YES: ECU has NOT been reprogrammed during this procedure. GO TO 17

YES: ECU was reprogrammed during this procedure. Open DTAC case.

NO: Problem fixed.

RG41221,000027B -19-10APR08-19/21

17 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Download latest ECU payload and reprogram ECU.
3. Recreate the engine operating point where 001180.16 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 001180.16 active?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,000027B -19-10APR08-20/21

18 Recheck System

1. Perform CHARGE AIR SYSTEM DIAGNOSTIC test.
2. Check the engine compartment for adequate fresh air supply to the engine for intake air and cooling.
3. Check exhaust system for restrictions.
4. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure.
5. Download latest ECU payload and reprogram ECU, if not already performed during this procedure.
6. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 16

NO: Open DTAC case.

RG41221,000027B -19-10APR08-21/21

001321.05 — Starter Relay Control Current Below Normal Operating Range

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000060 -19-16APR10-1/1

001321.16 — Starter Relay Control Current Above Normal Operating Range

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000061 -19-06OCT10-1/1

001347.03 — Suction Control Valve Signal Out of Range High

ECU detects high current in the suction control valve return wire.

RG41221,000027F -19-20JAN09-1/15

001347.03 — Suction Control Valve Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
001347.03

When DTC is Displayed:
The engine is cranking or running, during Harness Diagnostic Mode Test, at key ON ECU startup process and the error condition is active.

Alarm Level:
Warning

Control Unit Response:
The ECU will not be able to control the high pressure pump suction control valve.

Related Information:
Typically this means that there is a short to power in the suction control valve circuit. The engine will probably not start because the valve is shut off when power is applied to it.

Additional References:
For more suction control valve information, see SUCTION CONTROL VALVE in Section 03, Group 140 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Suction control valve Y01 - Brown/Purple

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RG41221,000027F -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 001347.03 reappear active?

YES: GO TO 2

NO: GO TO 7

RG41221,000027F -19-20JAN09-3/15

2 Voltage Measurement With Ignition Key OFF

1. Monitor and write down the Unswitched Battery Voltage displayed in Service ADVISOR.
2. Ignition OFF, Engine OFF.
3. Disconnect the high pressure fuel pump suction control valve connector.
4. On the harness, measure the voltage between Drive + (terminal 1) and Drive - (terminal 2)

Does the voltage equal battery voltage ± 2v?

YES: GO TO 3

NO: GO TO 4

RG41221,000027F -19-20JAN09-4/15

3 Wiring Check

1. Ignition OFF, Engine OFF.
2. Disconnect all ECU connectors.
3. On the ECU harness, measure the voltage between Drive - (terminal J1-H2) and all other terminals in all ECU connectors.

NOTE: The battery is connected to J2 – L1, J2 – L4, J2 – M1, and J2 – M4.

Does the voltage equal battery voltage ± 2v?

YES: Short in suction control valve supply wire with terminal that measured same voltage.

NO: Problem not found, reconnect all connectors. GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

RG41221,000027F -19-20JAN09-5/15

4 Voltage Measurement With Ignition Key ON

1. Ignition ON, Engine OFF.
2. On the harness, measure the voltage between Drive + (terminal 1) and Drive - (terminal 2)

Does the voltage equal battery voltage ± 2v?

YES: GO TO 5

NO: GO TO 6

Continued on next page

RG41221,000027F -19-20JAN09-6/15

5 Wiring Check	1. Ignition OFF, Engine OFF. 2. Disconnect all ECU connectors. 3. Ignition ON, Engine OFF. 4. On the ECU harness, measure the voltage between Drive - (terminal J1-H2) and all other terminals in all ECU connectors. *NOTE: The battery is connected to J2 – L1, J2 – L4, J2 – M1, and J2 – M4. Ignition is connected to J2 – B2.* Does any measurement equal battery voltage ± 2v?	**YES:** Short in suction control valve supply wire with terminal that measured same voltage. **NO:** Problem not found, reconnect all connectors. GO TO 4 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

RG41221,000027F -19-20JAN09-7/15

6 ECU Drive Circuit Resistance Check	On the ECU, measure the resistance between Drive + (terminal J1-H1) and Drive - (terminal J1-H2). Is the resistance infinite ohms?	**YES:** Start a DTAC case. **NO:** Replace ECU. GO TO 1

RG41221,000027F -19-20JAN09-8/15

7 Occurrence Count Check	Review stored information and look at occurrence count for 001347.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 8 **NO:** GO TO 9

RG41221,000027F -19-20JAN09-9/15

8 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the suction control valve harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

RG41221,000027F -19-20JAN09-10/15

9 Review Engine Hours	Compare engine hours of last occurrence of the snapshot capture data with the current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 10

Continued on next page

RG41221,000027F -19-20JAN09-11/15

10 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

RG41221,000027F -19-20JAN09-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 1
	Did 001347.03 reappear when engine operating point was reached?	**NO:** GO TO 10 and confirm the operating point.

RG41221,000027F -19-20JAN09-13/15

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure fuel pump suction control valve connector and ECU J1 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

RG41221,000027F -19-20JAN09-14/15

13 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Ignition ON, Engine OFF.	
	4. Refresh codes.	**YES:** Start a DTAC Case.
	Is 001347.03 active?	**NO:** Problem fixed, faulty ECU program.

RG41221,000027F -19-20JAN09-15/15

001347.05 — Suction Control Valve Circuit Has High Resistance

The ECU is unable to match the measured pump current with the commanded pump current.

DN22556,000004C -19-09DEC10-1/19

001347.05 — Suction Control Valve Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
001347.03
001347.05

When DTC is Displayed:
The engine is cranking or running, during Harness Diagnostic Mode Test, at key ON ECU startup process and the error condition is active.

Alarm Level:
Warning

Control Unit Response:
The ECU will not be able to control the high pressure pump suction control valve.

Related Information:
Typically this means that there is a short to ground or an open in the high pressure fuel pump suction control valve circuit. The engine will probably not start because the valve is wide open which will cause maximum pressure which will trip the pressure relief valve on the rail.

Additional References:
For more suction control valve information, see SUCTION CONTROL VALVE in Section 03, Group 140 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 1
- see 9.0L 24V WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Suction control valve Y01 - Brown/Purple

Continued on next page

DN22556,000004C -19-09DEC10-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Cycle the ignition key OFF then ON. 5. Refresh Codes. Did 001347.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,000004C -19-09DEC10-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the high pressure fuel pump suction control valve connector. 3. Perform TERMINAL TEST on the suction control valve harness connector. Were any problems found?	**YES:** Repair problem. GO TO 2 **NO:** GO TO 3

DN22556,000004C -19-09DEC10-4/19

3 Valve Resistance Check	On the Suction Control Valve, measure the resistance between Drive + (terminal 1) and Drive - (terminal 2). **Specification** Suction Control Valve Coil—Resistance at room temperature..... 2.5 ± 1.0 ohms Is the measurement within specification?	**YES:** GO TO 4 **NO:** Replace suction control valve. GO TO 1

DN22556,000004C -19-09DEC10-5/19

4 Short to Ground Wiring Check	On the harness, measure the resistance between: • Drive + (terminal 1) and Drive - (terminal 2). • Drive + (terminal 1) and application single point ground. Is either measurement less than 10 ohms?	**YES:** GO TO 5 **NO:** GO TO 8

DN22556,000004C -19-09DEC10-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the ECU connector J1. 3. Perform TERMINAL TEST on connector ECU J1. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 6

Continued on next page

DN22556,000004C -19-09DEC10-7/19

6 Short to Ground Wiring, ECU Disconnected Check	On the harness, measure the resistance between: • Drive + (terminal 1) and Drive - (terminal 2). • Drive + (terminal 1) and application single point ground. Is either measurement less than 1000 ohms?	**YES:** Repair shorted wire that measured less than 1000 ohms. GO TO 1 **NO:** GO TO 7

DN22556,000004C -19-09DEC10-8/19

7 ECU Drive Circuit Resistance Check	On the ECU, measure the resistance between Drive + (terminal J1-H1) and Drive - (terminal J1-H2). Is the resistance infinite ohms?	**YES:** Start a DTAC case. **NO:** Replace ECU. GO TO 1

DN22556,000004C -19-09DEC10-9/19

8 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the ECU connector J1. 3. Perform TERMINAL TEST on connector ECU J1. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 9

DN22556,000004C -19-09DEC10-10/19

9 Open Wiring Check	On the harness, measure the resistance between: • suction control valve Drive + (terminal 1) and ECU Drive + (terminal J1-H1). • suction control valve Drive - (terminal 2) and ECU Drive - (terminal J1-H2). Is either measurement greater than 10 ohms?	**YES:** Repair open wire that measured greater than 10 ohms. GO TO 1 **NO:** GO TO 10

DN22556,000004C -19-09DEC10-11/19

10 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR. 2. Cycle the ignition key OFF then ON. 3. Refresh codes. Is 001347.05 active?	**YES:** Start a DTAC Case. **NO:** Problem fixed, faulty ECU program.

DN22556,000004C -19-09DEC10-12/19

11 Occurrence Count Check	Review stored information and look at occurrence count for 001347.05. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 12 **NO:** GO TO 13

Continued on next page

DN22556,000004C -19-09DEC10-13/19

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the suction control valve harness connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 14

DN22556,000004C -19-09DEC10-14/19

13 Review Engine Hours	Compare engine hours of last occurrence of the snapshot capture data with the current engine hours.	**YES:** Return application to service.
	Is the difference greater than 50 hours?	**NO:** GO TO 14

DN22556,000004C -19-09DEC10-15/19

14 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 15
		NO: GO TO 16

DN22556,000004C -19-09DEC10-16/19

15 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace high pressure fuel pump suction control valve. GO TO 1
	Did 001347.05 reappear when engine operating point was reached?	**NO:** GO TO 14 and confirm the operating point.

DN22556,000004C -19-09DEC10-17/19

16 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure fuel pump suction control valve connector and ECU J1 connector.	**YES:** Repair problem. GO TO 14
	Were any problems found?	**NO:** GO TO 17

DN22556,000004C -19-09DEC10-18/19

17 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR.	
	2. Cycle the ignition key OFF then ON.	
	3. Refresh codes.	**YES:** Start a DTAC Case.
	Is 001347.05 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,000004C -19-09DEC10-19/19

001347.07 — Fuel Rail Pressure Actual to Desired Mismatch

The ECU detects fuel rail pressure 5 MPa (725 psi) above or below the expected pressure.

Continued on next page

RG41221,0000281 -19-23SEP10-1/7

001347.07 — Fuel Rail Pressure Actual to Desired Mismatch Diagnostic Procedure

Troubleshooting Sequence:
000094.17
000157.03 or 157.04 or 157.10 or 001349.03 or 001349.04
001349.02
001347.07

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects fuel rail pressure 5 MPa (725 psi) above or below the expected pressure.

Alarm Level:
Warning

Control Unit Response: If this code sets, the ECU will command the high pressure fuel pump to increase or decrease the amount of fuel supplied to the HPCR.
The engine could miss or run rough.
Engine may have low power.

Additional References:
For more fuel rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel rail pressure sensor P05 - Blue/Orange

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.

IMPORTANT: Always use two wrenches when disconnecting and reconnecting fuel lines.

Continued on next page
RG41221,0000281 -19-23SEP10-2/7

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001347.07 reappear active?	**YES:** GO TO 2 **NO:** Intermittent problem. Check Snapshot information and try to duplicate error conditions.

RG41221,0000281 -19-23SEP10-3/7

2 Fuel Rail Pressure Sensor Voltage Check	*NOTE: Engine OFF for at least 15 minutes to ensure fuel rail pressure has dropped to 0.0 kPa (0.0 psi).* Monitor the following data points: • Fuel Rail Pressure Input Voltage **Specification** Fuel Rail Pressure Input Voltage—Voltage.....0.9 - 1.1 V • Fuel Rail Pressure - Actual **Specification** Fuel Rail Pressure—Pressure.....0.0 kPa (0.0 psi) Are all values within specifications?	**YES:** GO TO 5 **NO:** GO TO 3

RG41221,0000281 -19-23SEP10-4/7

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect fuel rail pressure sensor connector. 3. Perform TERMINAL TEST on fuel rail pressure sensor , harness and connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

Continued on next page

RG41221,0000281 -19-23SEP10-5/7

4 Fuel Rail Pressure Sensor Resistance Checks	On the fuel rail pressure sensor, make the following resistance measurements. • between signal (terminal 1) and return (terminal 2). **Specification** Fuel Rail Pressure Sensor—Resistance.....8k - 16.4k ohms • between signal (terminal 1) and supply (terminal 3). **Specification** Fuel Rail Pressure Sensor—Resistance.....1k - 3k ohms • between all terminals and sensor body.. **Specification** Fuel Rail Pressure Sensor—Resistance.....infinite ohms Are all measurements within specification.	**YES:** GO TO 5 **NO:** Replace fuel rail pressure sensor. GO TO 1

RG41221,0000281 -19-23SEP10-6/7

5 Fuel Rail Pressure System Check	Perform F2 - HIGH PRESSURE FUEL SYSTEM CHECK in Group 150 earlier in this Section. Did test pass?	**YES:** Problem fixed. Had bad Suction Control Valve. **NO:** Start a DTAC case.

RG41221,0000281 -19-23SEP10-7/7

001349.02 — Fuel Rail Pressure Signals Mismatch

The ECU detects a difference in the two fuel rail pressure readings

Continued on next page

BB78437,0000143 -19-24NOV08-1/23

001349.02 — Fuel Rail Pressure Signals Mismatch Diagnostic Procedure

Troubleshooting Sequence:
000157.03 or 157.04 or 001349.03 or 1349.04
001349.02

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a difference in the two redundant rail pressure signals of 15 MPa (2176 psi) or greater.**Alarm Level:** WARNING

Additional References:
For more Dual Fuel Rail Pressure Sensor information, see DUAL FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 9.0L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000143 -19-24NOV08-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.02 reappear active?	**YES:** GO TO 2 **NO:** GO TO 17

BB78437,0000143 -19-24NOV08-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Fuel Rail Pressure Sensor connector P05. 3. Perform TERMINAL TEST on connector P05 and Dual Fuel Rail Pressure Sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

Continued on next page

BB78437,0000143 -19-24NOV08-4/23

3 Check for Voltage at Sensor Connector	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the following points at the Dual Fuel Rail Pressure Connector and single point ground: • P05-1 • P05-2 • P05-6	**YES:** GO TO 9
	Were all voltage measurements above 4.95 volts?	**NO:** GO TO 4

BB78437,0000143 -19-24NOV08-5/23

4 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-G1, J03-C1, and J03-A2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 5

BB78437,0000143 -19-24NOV08-6/23

5 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J03-G1 and Dual Fuel Rail Pressure Sensor P05-1. • ECU J03-C1 and Dual Fuel Rail Pressure Sensor P05-2. • ECU J03-A2 and Dual Fuel Rail Pressure Sensor P05-6.	**YES:** GO TO 6
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000143 -19-24NOV08-7/23

6 Check for Signal Shorted to Ground	On the harness, measure the resistance between the following points and single point ground: • ECU J03-G1 • ECU J03-C1 • ECU J03-A2	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any resistance measurements less than 100k ohms?	**NO:** GO TO 7

Continued on next page

BB78437,0000143 -19-24NOV08-8/23

7 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between the terminal(s) with the low voltage from Step 3 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 8

BB78437,0000143 -19-24NOV08-9/23

8 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J03 connector.

NOTE: Both voltages will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Recheck Measurements. GO TO 2

BB78437,0000143 -19-24NOV08-10/23

9 Check for Voltage at Sensor Connector

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the following points at the Dual Fuel Rail Pressure Connector and single point ground:
   - P05-3
   - P05-4
   - P05-5

Were all voltage measurements below 0.5 volts?

YES: GO TO 14

NO: GO TO 10

BB78437,0000143 -19-24NOV08-11/23

10 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J03 connector.
3. Perform TERMINAL TEST on terminals J03-A3, J03-D4, and J03-G2.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

Continued on next page

BB78437,0000143 -19-24NOV08-12/23

11 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J03-G2 and Dual Fuel Rail Pressure Sensor P05-3. • ECU J03-A3 and Dual Fuel Rail Pressure Sensor P05-4. • ECU J03-D4 and Dual Fuel Rail Pressure Sensor P05-5. Were all resistance measurements less than 10 ohms?	**YES:** GO TO 12 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000143 -19-24NOV08-13/23

12 Check for Wire-Wire Short	1. Ignition OFF, engine OFF. 2. Disconnect ECU connectors J01 and J02. 3. Measure the resistance between the terminal(s) with the high voltage from Step 9 and all other terminals in the ECU harness connectors J01, J02, and J03. Was any measurement less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 13

BB78437,0000143 -19-24NOV08-14/23

13 Check for Intermittent Short to Voltage	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J03 connector. *NOTE: Both voltages will increase to approximately 5V when the sensor circuit is shorted to voltage.* Was the source of the intermittent short to voltage found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Recheck Measurements. GO TO 9

BB78437,0000143 -19-24NOV08-15/23

14 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on terminals J03-A3, J03-D4, J03-G1, J03-C1, J03-A2 and J03-G2. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 15

Continued on next page

BB78437,0000143 -19-24NOV08-16/23

15 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J03-G1 and Dual Fuel Rail Pressure Sensor P05-1. • ECU J03-C1 and Dual Fuel Rail Pressure Sensor P05-2. • ECU J03-G2 and Dual Fuel Rail Pressure Sensor P05-3. • ECU J03-A3 and Dual Fuel Rail Pressure Sensor P05-4. • ECU J03-D4 and Dual Fuel Rail Pressure Sensor P05-5. • ECU J03-A2 and Dual Fuel Rail Pressure Sensor P05-6 Were all resistance measurements less than 10 ohms?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000143 -19-24NOV08-17/23

16 Replace Dual Fuel Rail Pressure Sensor	1. Replace the Dual Fuel Rail Pressure Sensor and reconnect all connectors. 2. Check for the DTC 001349.02 under the conditions where it was previously active. Is the problem gone?	**YES:** Problem Solved. **NO:** Replace ECU.

BB78437,0000143 -19-24NOV08-18/23

17 Check for Intermittent Short	1. Ignition ON, engine OFF. 2. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J03 connector. *NOTE: Both voltages will decrease to approximately 0V when the sensor circuit is shorted to ground and increase to approximately 5V when the sensor circuit is shorted to voltage.* Was the source of the intermittent short found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 18

BB78437,0000143 -19-24NOV08-19/23

18 Check Snapshot Information	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.02 now active?	**YES:** GO TO 2 **NO:** GO TO 19

Continued on next page

BB78437,0000143 -19-24NOV08-20/23

19 Terminal Test		
	1. Ignition OFF, engine OFF.	
	2. Disconnect Dual Fuel Rail Pressure Sensor connector P05.	
	3. Perform Terminal Test on P05.	
	4. Disconnect ECU J03 connector.	
	5. Perform TERMINAL TEST on terminals J03-A3, J03-D4, J03-G1, J03-C1, J03-A2 and J03-G2.	**YES:** GO TO 20
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000143 -19-24NOV08-21/23

20 Get More Information		
	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 001349.02 now active?	**NO:** GO TO 21

BB78437,0000143 -19-24NOV08-22/23

21 Check DTAC Solutions		
	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.02.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** Contact DTAC for support.

BB78437,0000143 -19-24NOV08-23/23

001349.03 — Redundant Fuel Rail Pressure Signal Out of Range High

The Redundant Fuel Rail Pressure Signal exceeds the sensor's high voltage specification.

Continued on next page

BB78437,0000144 -19-24NOV08-1/22

001349.03 — Redundant Fuel Rail Pressure Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003513.03
001349.03
When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Redundant Fuel Rail Pressure Input Voltage corresponds to a pressure that is higher than what is physically possible for fuel rail pressure.

Alarm Level:
WARNING

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Dual Fuel Rail Pressure sensor information, see DUAL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 9.0L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000144 -19-24NOV08-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

Continued on next page

BB78437,0000144 -19-24NOV08-3/22

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF	
	2. Disconnect Dual Rail Pressure sensor connector P05.	
	3. Ignition ON, Engine OFF	
	4. Refresh codes.	**YES:** GO TO 3
	Did 001349.03 go to stored and 001349.04 become active?	**NO:** GO TO 7

BB78437,0000144 -19-24NOV08-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Perform a TERMINAL TEST on connector P05.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 4

BB78437,0000144 -19-24NOV08-5/22

4 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P05-4 and single point ground.	**YES:** GO TO 5
	Is the resistance less than 5 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000144 -19-24NOV08-6/22

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between P05-6 (+) and P05-4 (-).	**YES:** Discontinue this test and perform tests for DTC 003513.03 as though DTC was active.
	Is the voltage greater than 5.5V?	**NO:** GO TO 6

BB78437,0000144 -19-24NOV08-7/22

6 Check for DTC 001349.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect P05.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** Replace Dual Rail Pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 001349.03 still active?	**NO:** GO TO 12

Continued on next page

BB78437,0000144 -19-24NOV08-8/22

7 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform Terminal Test on J03-A2, J03-A3, and J03-D4. Were Terminal Test results good?	**YES:** GO TO 8 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000144 -19-24NOV08-9/22

8 Check Dual Rail Pressure Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-A3 and Dual Rail Pressure sensor connector P05-4. 2. On the harness, measure the resistance between ECU J03-A2 and Dual Rail Pressure sensor connector P05-6. 3. On the harness, measure the resistance between ECU J03-D4 and Dual Rail Pressure sensor connector P05-5. Were all resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000144 -19-24NOV08-10/22

9 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. Measure the voltage between ECU J03-D4 and single point ground. Is the voltage greater than 0.5V?	**YES:** Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

BB78437,0000144 -19-24NOV08-11/22

10 ECU J03 Disconnected Code Change Test	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 0001349.03.* 1. ECU connector J03 still disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Is DTC 001349.03 still active?	**YES:** GO TO 14 **NO:** GO TO 11

Continued on next page

BB78437,0000144 -19-24NOV08-12/22

11 Check Signal Circuit for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between J03-D4 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Locate wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 100k ohms?	**NO:** GO TO 12

BB78437,0000144 -19-24NOV08-13/22

12 Check for Intermittent Short to Voltage	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Rail Pressure sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Redundant Fuel Rail Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 13

BB78437,0000144 -19-24NOV08-14/22

13 Check for Active DTC 001349.03	Refresh DTCs	**YES:** Recheck measurements. GO TO 2
	Is DTC 001349.03 still active?	**NO:** Problem is intermittent. Contact DTAC for support.

BB78437,0000144 -19-24NOV08-15/22

14 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Reconnect all connectors.	
	4. Ignition ON, engine OFF.	**YES:** Contact DTAC for support.
	Is DTC 001349.03 still active?	**NO:** Problem fixed.

BB78437,0000144 -19-24NOV08-16/22

15 Check for Intermittent Short to Voltage	1. Ignition ON, engine OFF.	
	2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Rail Pressure sensor and ECU J03 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Redundant Fuel Rail Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 16

Continued on next page

BB78437,0000144 -19-24NOV08-17/22

16 Check Snapshot Information	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

BB78437,0000144 -19-24NOV08-18/22

17 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Rail Pressure sensor connector P05. 3. Perform Terminal Test on P05. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-A3, J03-A2, and J03-D4. Were Terminal Test results good?	**YES:** GO TO 18 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000144 -19-24NOV08-19/22

18 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 001349.03 now active?	**YES:** GO TO 2 **NO:** GO TO 19

BB78437,0000144 -19-24NOV08-20/22

19 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 20

BB78437,0000144 -19-24NOV08-21/22

20 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,0000144 -19-24NOV08-22/22

001349.04 — Redundant Fuel Rail Pressure Signal Out of Range Low

The Redundant Fuel Rail Pressure Input Voltage drops below the sensor's low voltage specification.

Continued on next page

BB78437,0000145 -19-28OCT08-1/23

001349.04 — Redundant Fuel Rail Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003513.04
001349.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Redundant Fuel Rail Pressure Input Voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for the redundant fuel rail pressure signal.

Alarm Level:
WARNING

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Dual Fuel Rail Pressure Sensor information, see DUAL FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 9.0L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000145 -19-28OCT08-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

Continued on next page

BB78437,0000145 -19-28OCT08-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect Dual Fuel Rail Pressure sensor connector P05.	
	3. Perform a TERMINAL TEST on connector P05.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 3

BB78437,0000145 -19-28OCT08-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P05-4 and single point ground.	**YES:** GO TO 4
	Is the resistance less than 5 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000145 -19-28OCT08-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between Dual Fuel Rail Pressure sensor signal P05-5 and return P05-4.	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is resistance less than 10k ohms?	**NO:** GO TO 5

BB78437,0000145 -19-28OCT08-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF.	**YES:** GO TO 6
	2. On the harness, measure the voltage between P05-6 (+) and P05-4 (-).	**NO:** Voltage is less than 4.5V, GO TO 10
	Is the voltage between 4.5V and 5.5V?	**NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003513.03 as though DTC were active.

BB78437,0000145 -19-28OCT08-7/23

6 Check for DTC 001349.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on Dual Fuel Rail Pressure sensor connector terminals P05-5 and P05-6.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 7
	Is DTC 001349.03 now an active DTC?	**NO:** GO TO 11

Continued on next page

BB78437,0000145 -19-28OCT08-8/23

7 Reconnect Sensor and Check for DTC 001349.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P05. 3. Reconnect Dual Fuel Rail Pressure sensor connector P05. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 001349.04 an active DTC?	**YES:** Replace Dual Fuel Rail Pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

BB78437,0000145 -19-28OCT08-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Fuel Rail Pressure sensor and ECU J03 connector. *NOTE: The Redundant Fuel Rail Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

BB78437,0000145 -19-28OCT08-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in Dual Fuel Rail Pressure sensor connector P05. 3. Replace Dual Fuel Rail Pressure sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 001349.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

BB78437,0000145 -19-28OCT08-11/23

10 Check for DTC 003513.04	Is DTC 003513.04 active?	**YES:** Discontinue this test. Perform test for DTC 003513.04. **NO:** GO TO 11

BB78437,0000145 -19-28OCT08-12/23

11 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J03. 3. Perform a TERMINAL TEST on terminals J03-A2, J03-A3, and J03-D4. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

BB78437,0000145 -19-28OCT08-13/23

12 Check Circuit Continuity

On the harness, measure the resistance between the following ECU J01 connector terminals and Dual Fuel Rail Pressure sensor P05 connector terminals:

- J03-A3 to P05-4
- J03-A2 to P05-6
- J03-D4 to P05-5

Were all resistance measurements less than 10 ohms?

YES: GO TO 13

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000145 -19-28OCT08-14/23

13 Check for Signal Shorted to Ground

On the harness, measure the resistance between ECU J03-D4 and single point ground.

Is the resistance less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

BB78437,0000145 -19-28OCT08-15/23

14 Check for Wire-Wire Short

1. Disconnect ECU connectors J01 and J02.
2. Verify Dual Fuel Rail Pressure sensor connector P05 is still disconnected.
3. On the harness, measure the resistance between J03-D4 and all other terminals in ECU connectors J01, J02, and J03.

Were all resistance measurements greater than 100k ohms?

YES: GO TO 15

NO: Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000145 -19-28OCT08-16/23

15 Reconnect and Check for DTC 001349.04

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.

Is DTC 001349.04 still active?

YES: Recheck procedure. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

BB78437,0000145 -19-28OCT08-17/23

16 Check for Intermittent Wiring Problem

1. Ignition ON, engine OFF.
2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Fuel Rail Pressure sensor and ECU J03 connector.

NOTE: The Redundant Fuel Rail Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.

Was the source of the intermittent problem found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 17

Continued on next page

BB78437,0000145 -19-28OCT08-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

BB78437,0000145 -19-28OCT08-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Fuel Rail Pressure sensor connector P05. 3. Perform TERMINAL TEST on P05. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-D4, J03-A3, and J03-A2. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

BB78437,0000145 -19-28OCT08-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 001349.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

BB78437,0000145 -19-28OCT08-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

BB78437,0000145 -19-28OCT08-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,0000145 -19-28OCT08-23/23

001568.02 — Torque Curve Selection Error

The ECU receives torque curve selection information over CAN, but the information received is not valid.

Related Information:
The ECU has the ability operate the engine on different torque curves. Individual curves can be selected based on information sent to the ECU over CAN (Controller Area Network) by another controller.

Alarm Level:
Warning

Control Unit Response:
The ECU will select a default torque curve to continue running.

Depending on application, the selected default torque curve may be a lower power curve.

WL30140,0000033 -19-30MAY08-1/4

001568.02—Torque Curve Selection Error Diagnostic Procedure

WL30140,0000033 -19-30MAY08-2/4

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTC list. Is 001568.02 error code active?	**YES:** GO TO 2 **NO:** GO TO 2

WL30140,0000033 -19-30MAY08-3/4

2 Occurrence Count Check	1. Ignition ON, Engine OFF. 2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 3. Review occurrence counts in the snapshot capture information for this code. Is count greater than five?	**YES:** Perform TERMINAL TEST, repair any problems. **NO:** For further troubleshooting procedures see the application manual.

WL30140,0000033 -19-30MAY08-4/4

001569.31 — Engine in Power Derate Condition

Engine in Power Derate Condition

Related Information:
The engine power derate diagnostic trouble code is information to the operator that the ECU has detected a condition such as high coolant temperature and is derating the engine by limiting the maximum amount of fuel available to the engine. This code will only set as a result of another DTC setting.

Alarm Level:

Warning

Control Unit Response:
The ECU will limit the amount of engine power in an attempt to protect the engine.

Additional References:
For more information on derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

For more information on derates see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 3 Group 140 earlier in this manual.

RG41221,0000282 -19-30MAY08-1/1

001638.00 — Hydraulic Oil Temperature Signal Extremely High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000655 -19-12OCT07-1/1

001638.03 — Hydraulic Oil Temperature Signal Out of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000656 -19-12OCT07-1/1

001638.04 — Hydraulic Oil Temperature Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000657 -19-12OCT07-1/1

001638.09 — Hydraulic Oil Temperature Signal Erratic

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000658 -19-23JUL07-1/1

001638.16 — Hydraulic Oil Temperature Signal Moderately High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000659 -19-12OCT07-1/1

001639.01 — Fan Speed Signal Extremely Low

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000035 -19-23JUL07-1/1

001639.16 — Fan Speed Signal Moderately High

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000036 -19-23JUL07-1/1

001639.18 — Fan Speed Signal Moderately Low

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000037 -19-23JUL07-1/1

002000.13 — Incorrect ECU for Application

For troubleshooting procedures please see the application troubleshooting manual.

RG40854,000000B -19-30MAY08-1/1

002003.09 — No CAN Message From Source Address 3

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,000005F -19-16APR10-1/1

002004.09 — No CAN Message From Source Address 4

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,000017E -19-28APR09-1/1

002005.09 — No CAN Message From Source Address 5

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000038 -19-30MAY08-1/1

002005.14 — Incorrect CAN Message Received From Source Address 5

The ECU receives a communication error message from the ACU.

DN22556,000065A -19-30MAY08-1/3

002005.14 — Incorrect ACU Message Received Diagnostic Procedure

DN22556,000065A -19-30MAY08-2/3

1 Communication Test	1. Connect to Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Group 160 earlier in this Section. 2. From Service ADVISOR run COMMUNICATION TEST. 3. Refresh codes.	
	Did 002005.14 reappear active?	**YES:** For troubleshooting procedures please see the application troubleshooting manual. **NO:** Problem fixed.

DN22556,000065A -19-30MAY08-3/3

002030.09 — No CAN Message From Source Address 30

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,0000039 -19-30MAY08-1/1

002071.09 — No CAN Message From Source Address 71

For troubleshooting procedures please see the application troubleshooting manual.

WL30140,000003A -19-30MAY08-1/1

002630.00 — Charge Air Cooler Outlet Temperature Signal Extremely High

The ECU senses an Charge Air Cooler Outlet Temperature above specification.

RG41221,0000283 -19-20JAN09-1/13

002630.00 - Charge Air Cooler Outlet Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 001172
Any DTC with SPN 000110
002630.00

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses a charge air cooler outlet temperature of 91° C (195° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Stop

Control Unit Response:
Maximum engine power is derated up to 60 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further charge air cooler outlet air temperature sensor information, see CHARGE AIR COOLER OUTLET AIR TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray

Continued on next page

RG41221,0000283 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 002630.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

RG41221,0000283 -19-20JAN09-3/13

2 Restricted or Dirty Charge Air Cooler	*NOTE: See application troubleshooting for information on removing, testing, and cleaning charge air cooler.* Make sure that the charge air cooler is clean and free from excess debris. The charge air cooler needs to be cleaned periodically. Is the charge air cooler clean of debris?	**YES:** GO TO 3 **NO:** Clean the charge air cooler. GO TO 10

RG41221,0000283 -19-20JAN09-4/13

3 Preliminary Check of Cooling System	Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in base engine manual, Section 04, Group 150. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070. • Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in base engine manual, Section 04, Group 150. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 4

RG41221,0000283 -19-20JAN09-5/13

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the charged air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding ares for pinched or melted wires. Were any defects found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 5

Continued on next page

RG41221,0000283 -19-20JAN09-6/13

5 Check Charge Air Cooler Outlet Temperature Sensor	1. Remove charged air cooler outlet temperature sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.	
	2. Inspect engine housing, sensor housing, and O-ring for defects.	**YES:** Replace defective part. GO TO 10
	Were any defects found?	**NO:** GO TO 6

RG41221,0000283 -19-20JAN09-7/13

6 Check Charge Air Cooler Outlet Temperature Sensor	1. Ignition OFF, Engine OFF.	
	2. With charged air cooler outlet temperature sensor removed from engine, reconnect sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	
	4. Perform one or both of the steps below.	
	a. Place the charged air cooler outlet temperature sensor in hot water along with a thermometer.	
	b. Let the charged air cooler outlet temperature sensor cool down to ambient temperature.	**YES:** Charged air cooler outlet temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	5. Monitor the charged air cooler outlet (or EGR fresh air) temperature from within Service ADVISOR.	**NO:** Charged air cooler outlet temperature sensor has already been replaced. GO TO 7
	Does the sensor reading match the temperature of the hot water or ambient air within 5° F?	**NO:** Replace charged air cooler outlet temperature sensor. GO TO 10

RG41221,0000283 -19-20JAN09-8/13

7 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 002630.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect the charged air cooler outlet temperature sensor connector.	
	3. Ignition ON, Engine OFF.	**YES:** ECU has not been reprogrammed. GO TO 9
	4. Monitor DTCs from within Service ADVISOR.	**YES:** ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Did 002630.03 become active?	**NO:** GO TO 8

Continued on next page

RG41221,0000283 -19-20JAN09-9/13

8 Check ECU

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Ignition ON, Engine OFF.
4. Monitor the DTC codes from within Service ADVISOR.

Did 002630.03 become active?

YES: Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10

NO: ECU has not been reprogrammed. GO TO 9

NO: ECU has been reprogrammed. Replace ECU. GO TO 10

RG41221,0000283 -19-20JAN09-10/13

9 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.
2. Reconnect all connectors and sensors.
3. Monitor DTCs in Service ADVISOR.
4. Let engine run for 3 minutes and refresh codes.

Is 002630.00 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 10

RG41221,0000283 -19-20JAN09-11/13

10 Verification

1. Ignition OFF, Engine OFF.
2. Reconnect all connectors, hoses, sensors, etc.
3. Ignition ON, Engine ON.
4. Monitor DTCs in Service ADVISOR.
5. Let engine run for 3 minutes.
6. Refresh DTCs.
7. Operate engine through normal speed and load.

Did DTC 002630.00 reappear as active with engine running?

YES: Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1

NO: Problem fixed.

Continued on next page

RG41221,0000283 -19-20JAN09-12/13

11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

RG41221,0000283 -19-20JAN09-13/13

002630.03 — Charge Air Cooler Outlet Temperature Signal Out Of Range High

The charge air cooler outlet temperature input voltage exceeds the sensor's high voltage specification.

RG41221,0000284 -19-20JAN09-1/20

002630.03 — Charge Air Cooler Outlet Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
002630.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The charge air cooler outlet temperature input voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for the charge air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default charge air cooler outlet temperature of -1° C (30° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more charge air cooler outlet temperature sensor information, see CHARGE AIR COOLER OUTLET AIR TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray

Continued on next page

RG41221,0000284 -19-20JAN09-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 002630.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,0000284 -19-20JAN09-3/20

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on charge air cooler outlet temperature sensor connector T01 and charge air cooler outlet temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41221,0000284 -19-20JAN09-4/20

3 Check Charge Air Cooler Outlet Temperature Return Circuit Resistance	On the harness, measure the resistance between charge air cooler outlet temperature sensor connector T01-B and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000284 -19-20JAN09-5/20

4 Check For Charge Air Cooler Outlet Temperature Signal Circuit Shorted to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between charge air cooler outlet temperature sensor connector T01-A (+) and T01-B (-). Is the voltage greater than 5.5V?	**YES:** GO TO 5 **NO:** GO TO 7

RG41221,0000284 -19-20JAN09-6/20

5 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on terminals J03-F2 and J03-B2. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

RG41221,0000284 -19-20JAN09-7/20

6 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connectors J01 and J02.	
	3. Measure the resistance between ECU J03-F2 and all other terminals in ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** Inspect harness for short to some voltage source. If none found, reinstall connectors and recheck procedure. GO TO 1

RG41221,0000284 -19-20JAN09-8/20

7 Check for DTC Change with Charge Air Cooler Outlet Temperature Signal Shorted to Return	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on charge air cooler outlet temperature sensor connector terminals T01-A and T01-B.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs	**YES:** GO TO 8
	Is DTC 0002630.04 now an active DTC?	**NO:** GO TO 9

RG41221,0000284 -19-20JAN09-9/20

8 Check for DTC 0002630.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Remove flex probes from T01.	
	3. Reconnect T01 to charge air cooler outlet temperature sensor.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** Replace charge air cooler outlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 0002630.03 now an active DTC?	**NO:** GO TO 11

RG41221,0000284 -19-20JAN09-10/20

9 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J03 connector.	
	3. Perform TERMINAL TEST on terminals J03-F2 and J03-B2.	**YES:** GO TO 10
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41221,0000284 -19-20JAN09-11/20

10 Check Charge Air Cooler Outlet Temperature Sensor Circuit Continuity

1. Disconnect charge air cooler outlet temperature sensor connector T01.
2. On the harness, measure the resistance between ECU J03-F2 and charge air cooler outlet temperature sensor connector T01-A.
3. On the harness, measure the resistance between ECU J03-B2 and charge air cooler outlet temperature sensor connector T01-B.

Were both resistance measurements less than 10 ohms?

YES: GO TO 11

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000284 -19-20JAN09-12/20

11 Check for Intermittent Connection

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Charge Air Cooler Outlet Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the charge air cooler outlet temperature sensor and ECU J03 connector.

NOTE: The charge air cooler outlet temperature input voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 12

RG41221,0000284 -19-20JAN09-13/20

12 Replace Terminals and Sensor

1. Ignition OFF, engine OFF.
2. Replace terminals in charge air cooler outlet temperature sensor connector T01.
3. Replace charge air cooler outlet temperature sensor.
4. Ignition ON, engine OFF.
5. Refresh DTCs.

Is DTC 0002630.03 active?

YES: Contact DTAC for support.

NO: Problem fixed.

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13 Check for Intermittent Connection

1. Ignition ON, engine OFF.
2. Monitor the Charge Air Cooler Outlet Temperature Input Voltage data point in Service ADVISOR while gently wiggling the wiring harness between the charge air cooler outlet temperature sensor and ECU J03 connector.

NOTE: The charge air cooler outlet temperature input voltage will increase to approximately 5V when the sensor circuit is open.

Was the source of the intermittent connection found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

Continued on next page

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14 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 0002630.03 now active?	**YES:** GO TO 2 **NO:** GO TO 15

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15 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect charge air cooler outlet temperature sensor connector T01. 3. Perform TERMINAL TEST on T01. 4. Disconnect ECU J03 connector. 5. Perform Terminal Test on J03-F2 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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16 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 0002630.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

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17 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 0002630.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 18

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18 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

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002630.04 — Charge Air Cooler Outlet Temperature Signal Out of Range Low

The charge air cooler outlet temperature input voltage drops below the sensor's low voltage specification.

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002630.04 — Charge Air Cooler Outlet Temperature Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
002630.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Charge Air Cooler Outlet temperature input voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for Charge Air Cooler Outlet temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default charge air cooler outlet temperature of 50° C (122° F). The ECU will try to maintain the engine operating envelope.

Additional References:
For more charge air cooler outlet temperature sensor information, see CHARGE AIR COOLER OUTLET AIR TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray

Continued on next page

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1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 002630.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

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2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect the charge air cooler outlet temperature sensor connector T01. 3. Perform TERMINAL TEST on T01 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

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3 Check for DTC 002630.04 Active Status Change with Sensor Disconnected	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 002630.04 still an active DTC?	**YES:** GO TO 8 **NO:** GO TO 4

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4 Check for DTC 002630.03	Is DTC 002630.03 now an active DTC with charge air cooler outlet temperature sensor connector T01 still disconnected?	**YES:** GO TO 5 **NO:** GO TO 8

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5 Sensor Shorted to Ground Test	On the charge air cooler outlet temperature sensor, measure the resistance between either terminal and single point ground. Is the resistance less than 1k ohms?	**YES:** Replace charge air cooler outlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

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6 Sensor Internal Short Test	On the charge air cooler outlet temperature sensor, measure the resistance between terminal A and terminal B. Is the resistance less than 50 ohms?	**YES:** Replace charge air cooler outlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

Continued on next page

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7 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor Charge Air Cooler Outlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between charge air cooler outlet temperature sensor and ECU J03 connector. *NOTE: The charge air cooler outlet temperature input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent short to ground found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Replace charge air cooler outlet temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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8 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform TERMINAL TEST on terminals J03-F2 and J03-B2. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

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9 Check Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-F2 and charge air cooler outlet temperature sensor T01-A. 2. On the harness, measure the resistance between ECU J03-B2 and charge air cooler outlet temperature sensor T01-B. Were both resistance measurements less than 10 ohms?	**YES:** GO TO 10 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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10 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-F2 and single point ground. Was the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 11

Continued on next page

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11 Check for DTC Active Status Change with J03 Disconnected

NOTE: Many new error codes will appear in the next step. Disregard all codes except 002630.04.

1. Verify ECU J03 connector is still disconnected.
2. Ignition ON, Engine OFF.
3. Refresh codes.

Is DTC 002630.04 still active with J03 disconnected?

YES: GO TO 15

NO: GO TO 12

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12 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connectors J01 and J02.
3. Measure the resistance between ECU J03-F2 and all other terminals in the ECU harness connectors J01, J02, and J03.

Was any measurement less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

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13 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor Charge Air Cooler Outlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between charge air cooler outlet temperature sensor and ECU J03 connector.

NOTE: The charge air cooler outlet temperature input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.

Was the source of the intermittent short to ground found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

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14 Check for Active DTC 002630.04

Refresh DTCs

Is DTC 002630.04 still active?

YES: Recheck measurements. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

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15 Replace ECU

1. Replace ECU.
2. Reconnect all electrical connectors.
3. Refresh DTCs.

Is DTC 002630.04 still active?

YES: Contact DTAC for support.

NO: Problem fixed.

Continued on next page

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16 Check for Intermittent Connection	1. Ignition ON, engine OFF.	
	2. Monitor Charge Air Cooler Outlet Temperature Input Voltage data point in Service ADVISOR while gently wiggle wire harness between charge air cooler outlet temperature sensor and ECU J03 connector. *NOTE: The charge air cooler outlet temperature input voltage will decrease to approximately 0V when the sensor circuit is shorted to ground.* Was the source of the intermittent connection found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

RG41221,0000285 -19-20JAN09-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1.	
	2. Operate engine under conditions where DTC became active. Is DTC 002630.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

RG41221,0000285 -19-20JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect charge air cooler outlet temperature sensor connector T01. 3. Perform TERMINAL TEST on T01. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on J03-F2 and J03-B2. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41221,0000285 -19-20JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator. Is DTC 002630.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

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20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 002630.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

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21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

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002630.15 — Charge Air Cooler Outlet Temperature Signal Slightly High

The ECU senses a Charge Air Cooler Outlet Temperature above specification.

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002630.15 — Charge Air Cooler Outlet Temperature Signal Slightly High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 001172
Any DTC with SPN 000110
002630.15

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses a charge air cooler outlet temperature of 88° C (190° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.

Alarm Level:
Warning

Control Unit Response:
The ECU continues to control the engine in normal operating parameters.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further charge air cooler outlet air temperature sensor information, see CHARGE AIR COOLER OUTLET AIR TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray

Continued on next page

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1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 002630.16 reappear active?

YES: GO TO 2

NO: GO TO 11

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2 Restricted or Dirty Charge Air Cooler

NOTE: See application troubleshooting for information on removing, testing, and cleaning charge air cooler.

Make sure that the charge air cooler is clean and free from excess debris. The charge air cooler needs to be cleaned periodically.

Is the charge air cooler clean of debris?

YES: GO TO 3

NO: Clean the charge air cooler. GO TO 10

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3 Preliminary Check of Cooling System

Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in base engine manual, Section 04, Group 150.

- Remove any blockage on or near radiator.
- Inspect radiator hoses for signs of leakage or cracks.
- Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070.
- Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in base engine manual, Section 04, Group 150.
- Check radiator coolant is filled to proper level.
- Inspect cooling fan shroud for damage.
- Excessively high ambient air temperature.

Were any problems found?

YES: Fix problem(s). GO TO 10

NO: GO TO 4

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4 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the charge air cooler outlet temperature sensor connector.
3. Perform TERMINAL TEST on the harness and sensor connector.
4. Inspect surrounding ares for pinched or melted wires.

Were any defects found?

YES: Fix problem. GO TO 10

NO: GO TO 5

Continued on next page

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5 Check Charge Air Cooler Outlet Temperature Sensor	1. Remove charge air cooler outlet temperature sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.	
	2. Inspect engine housing, sensor housing, and O-ring for defects.	**YES:** Replace defective part. GO TO 10
	Were any defects found?	**NO:** GO TO 6

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6 Check Charge Air Cooler Outlet Temperature Sensor	1. Ignition OFF, Engine OFF.	
	2. With charge air cooler outlet temperature sensor removed from engine, reconnect sensor to its harness connector.	
	3. Ignition ON, Engine OFF.	
	4. Perform one or both of the steps below.	
	a. Place the charge air cooler outlet temperature sensor in hot water along with a thermometer.	
	b. Let the charge air cooler outlet temperature sensor cool down to ambient temperature.	**YES:** Charge air cooler outlet temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	5. Monitor the charge air cooler outlet (or EGR fresh air) temperature from within Service ADVISOR.	**NO:** Charge air cooler outlet temperature sensor has already been replaced. GO TO 7
	Does the sensor reading match the temperature of the hot water or ambient air within 5° F?	**NO:** Replace charge air cooler outlet temperature sensor. GO TO 10

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7 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 002630.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect the charge air cooler outlet temperature sensor connector.	
	3. Ignition ON, Engine OFF.	**YES:** ECU has not been reprogrammed. GO TO 9
	4. Monitor DTCs from within Service ADVISOR.	**YES:** ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Did 002630.03 become active?	**NO:** GO TO 8

Continued on next page

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8 Check ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10
	4. Monitor the DTC codes from within Service ADVISOR.	**NO:** ECU has not been reprogrammed. GO TO 9
	Did 002630.03 become active?	**NO:** ECU has been reprogrammed. Replace ECU. GO TO 10

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9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Is 002630.15 still active?	**NO:** Verify problem is fixed. GO TO 10

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10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1
	Did DTC 002630.15 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

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11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

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002630.16 — Charge Air Cooler Outlet Temperature Signal Moderately High

The ECU senses an Charge Air Cooler Outlet Temperature above specification.

RG41221,0000287 -19-20JAN09-1/13

002630.16 — Charge Air Cooler Outlet Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 001172
Any DTC with SPN 000110
002630.16

When DTC is Displayed:
When the engine has been running 3 minutes and the error is active.

Related Information:
The ECU senses an charge air cooler outlet temperature of 89.5° C (193° F) on OEM engines.
The engine has to be running for 3 minutes before the code is set.
001569.31 is set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For further charge air cooler outlet air temperature sensor information, see CHARGE AIR COOLER OUTLET AIR TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 3

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray

Continued on next page

RG41221,0000287 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 002630.16 reappear active?

YES: GO TO 2

NO: GO TO 11

RG41221,0000287 -19-20JAN09-3/13

2 Restricted or Dirty Charge Air Cooler

NOTE: See application troubleshooting for information on removing, testing, and cleaning charge air cooler.

Make sure that the charge air cooler is clean and free from excess debris. The charge air cooler needs to be cleaned periodically.

Is the charge air cooler clean of debris?

YES: GO TO 3

NO: Clean the charge air cooler. GO TO 10

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3 Preliminary Check of Cooling System

Visually inspect cooling system components. See CHECK AND SERVICE COOLING SYSTEM in base engine manual, Section 04, Group 150.

- Remove any blockage on or near radiator.
- Inspect radiator hoses for signs of leakage or cracks.
- Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070.
- Inspect radiator cap for failure. See PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP in base engine manual, Section 04, Group 150.
- Check radiator coolant is filled to proper level.
- Inspect cooling fan shroud for damage.
- Excessively high ambient air temperature.

Were any problems found?

YES: Fix problem(s). GO TO 10

NO: GO TO 4

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4 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the charge air cooler outlet temperature sensor connector.
3. Perform TERMINAL TEST on the harness and sensor connector.
4. Inspect surrounding ares for pinched or melted wires.

Were any defects found?

YES: Fix problem. GO TO 10

NO: GO TO 5

Continued on next page

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5 Check Charge Air Cooler Outlet Temperature Sensor	1. Remove charge air cooler outlet temperature sensor. See REMOVE AND INSTALL EGR TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.	
	2. Inspect engine housing, sensor housing, and O-ring for defects.	**YES:** Replace defective part. GO TO 10
	Were any defects found?	**NO:** GO TO 6

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6 Check Charge Air Cooler Outlet Temperature Sensor	1. Ignition OFF, Engine OFF.	
	2. With charge air cooler outlet temperature sensor removed from engine, reconnect sensor to its harness connector. 3. Ignition ON, Engine OFF. 4. Perform one or both of the steps below. a. Place the charge air cooler outlet temperature sensor in hot water along with a thermometer. b. Let the charge air cooler outlet temperature sensor cool down to ambient temperature.	**YES:** Charge air cooler outlet temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	5. Monitor the charge air cooler outlet (or EGR fresh air) temperature from within Service ADVISOR.	**NO:** Charge air cooler outlet temperature sensor has already been replaced. GO TO 7
	Does the sensor reading match the temperature of the hot water or ambient air within 5° F?	**NO:** Replace charge air cooler outlet temperature sensor. GO TO 10

RG41221,0000287 -19-20JAN09-8/13

7 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 002630.03*	
	1. Ignition OFF, Engine OFF. 2. Disconnect the charge air cooler outlet temperature sensor connector.	
	3. Ignition ON, Engine OFF.	**YES:** ECU has not been reprogrammed. GO TO 9
	4. Monitor DTCs from within Service ADVISOR.	**YES:** ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Did 002630.03 become active?	**NO:** GO TO 8

Continued on next page

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8 Check ECU	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J3.	
	3. Ignition ON, Engine OFF.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J3. Diagnose and fix harness problem. GO TO 10
	4. Monitor the DTC codes from within Service ADVISOR.	**NO:** ECU has not been reprogrammed. GO TO 9
	Did 002630.03 become active?	**NO:** ECU has been reprogrammed. Replace ECU. GO TO 10

RG41221,0000287 -19-20JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See REPROGRAMMING ENGINE CONTROL UNIT (ECU) in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Is 002630.16 still active?	**NO:** Verify problem is fixed. GO TO 10

RG41221,0000287 -19-20JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** Problem not fixed. Recheck connectors and engine parameters that effect the exhaust system. GO TO 1
	Did DTC 002630.16 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

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11 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	2. Review all stored codes. Does information relate to a possible intermittent or operating condition causing the code to become active.	**YES:** Found a possible problem. Repair possible problem. Retest.
	3. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 2
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** Start DTAC case.

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002659.02 — Calculated EGR Flow Rate Invalid

The ECU senses a mismatch between the calculation methods used to determine exhaust gas recirculation flow.

Continued on next page

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002659.02 — Calculated EGR Flow Rate Invalid Diagnostic Procedure

Troubleshooting Sequence:
000107.00 or 000107.31
Any DTC with SPN 002791
Any DTC with SPN 000105
Any DTC with SPN 000412
Any DTC with SPN 002630
Any DTC with SPN 000102
Any DTC with SPN 000103
Any DTC with SPN 000641
002795.07
002659.02

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU detects a large variation between EGR flow calculated by temperature difference and EGR flow calculated by pressure difference.
There is no physical EGR flow sensor. The ECU uses the difference between intake manifold air temperature and charge air cooler outlet temperature to calculate EGR flow.
The ECU also uses the difference between the calculated exhaust manifold pressure and the intake manifold pressure (MAP) to calculate EGR flow.
This DTC may be caused by any condition that affects manifold pressures or actual EGR flow.
A false measurement obtained from one of the sensors used to calculate EGR flow may cause DTC 002659.02 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
The ECU will control the EGR/VGT system in open loop mode.

Additional References:
For further EGR valve information, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3, 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 3, 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 earlier in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on temperature sensor testing see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

Continued on next page

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray
- Intake manifold air temperature sensor T02 - Purple/Gray
- EGR exhaust gas temperature sensor T03 - Purple/Gray

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RG41221,0000288 -19-18FEB09-3/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 002795.07 or any DTC with SPN 002791 become active?	**YES:** Discontinue test for 002659.02 and perform test for 002795.07 — VGT ACTUATOR NOT REACHING EXPECTED POSITION DIAGNOSTIC PROCEDURE or DTC with SPN 002791. **NO:** GO TO 2

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2 Check Engine Temperature	Is engine at ambient temperature and has not been operated for at least eight hours?	**YES:** GO TO 3 **NO:** GO TO 4

RG41221,0000288 -19-18FEB09-5/23

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. Charge Air Cooler Outlet Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

Continued on next page

RG41221,0000288 -19-18FEB09-6/23

4 Check Air Temperature Sensors on a Warm Engine	1. Ignition OFF, engine OFF.	
	2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes: a. Charge air cooler outlet temperature sensor b. Intake manifold air temperature sensor c. EGR exhaust gas temperature sensor	
	3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection.	
	4. Ignition ON, engine OFF.	
	5. Monitor the temperature reported by the following data points in Service ADVISOR: a. Charge Air Cooler Outlet Temperature b. Manifold Air Temperature c. EGR Temperature	
	Are the temperatures reported by these data points within the following specifications?	
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**YES:** GO TO 15
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** GO TO 5

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5 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point:	
	• Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point)	
	• Intake manifold air temperature sensor (Manifold Air Temperature data point)	
	• EGR exhaust gas temperature sensor (EGR Temperature data point)	**YES:** GO TO 15
	Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	**NO:** Charge Air Cooler Outlet Temperature is higher or lower than the other two temperatures. GO TO 6
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 8
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** EGR Temperature is higher or lower than the other two temperatures. GO TO 10

Continued on next page

RG41221,0000288 -19-18FEB09-8/23

6 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J3 connector and charge air cooler outlet temperature sensor connector.	
	3. Perform TERMINAL TEST on J3 and charge air cooler outlet temperature sensor connector.	
	4. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and the charge air cooler outlet temperature sensor connector signal (T01-A).	
	5. On the harness, measure the resistance between the ECU charge air cooler outlet temperature reference (J3-B2) and the charge air cooler outlet temperature sensor connector reference (T01-B).	**YES:** GO TO 7
	Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 5

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7 Check Charge Air Cooler Outlet Temperature Circuit	1. Verify charge air cooler outlet temperature sensor is disconnected.	
	2. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and reference (J3-B2).	
	3. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground.	
	4. Ignition ON, engine OFF.	
	5. On the harness, measure the voltage between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground.	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 12
	Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**NO:** Fix problem. GO TO 5

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8 Check Intake Manifold Air Temperature Circuit Resistance	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J3 connector and intake manifold air temperature sensor connector.	
	3. Perform TERMINAL TEST on J3 and intake manifold air temperature sensor connector.	
	4. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and the intake manifold air temperature sensor connector signal (T02-A).	
	5. On the harness, measure the resistance between the ECU intake manifold air temperature reference (J3-B2) and the intake manifold air temperature sensor connector reference (T02-B).	**YES:** GO TO 9
	Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 5

Continued on next page

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9 **Check Intake Manifold Air Temperature Circuit**	1. Verify intake manifold air temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU intake manifold air temperature signal (J3-F1) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace intake manifold air temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,0000288 -19-18FEB09-12/23

10 **Check EGR Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and EGR exhaust gas temperature sensor connector. 3. Perform TERMINAL TEST on J3 and EGR exhaust gas temperature sensor connector. 4. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and the EGR exhaust gas temperature sensor connector signal (T03-A). 5. On the harness, measure the resistance between the ECU EGR exhaust gas temperature reference (J3-B2) and the EGR exhaust gas temperature sensor connector reference (T03-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

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11 **Check EGR Temperature Circuit**	1. Verify EGR exhaust gas temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace EGR exhaust gas temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

Continued on next page

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12 Retest Temperature Sensor Validity	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 13

RG41221,0000288 -19-18FEB09-15/23

13 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 14

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14 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** Open DTAC case.

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15 Check EGR Valve

NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.

1. Ignition OFF, engine OFF.
2. Remove EGR valve.
3. Inspect EGR valve and O-rings for damage or blockage.
4. Verify that the part number of the EGR valve removed is the correct part for the engine.
5. Inspect intake and exhaust passages for damage or blockage which would restrict EGR flow.

Were any problems found?

YES: Fix problem or replace incorrect EGR valve. GO TO 16

NO: GO TO 16

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16 Check EGR Valve Operation

1. Reconnect EGR valve connector and secure EGR valve to the engine. Do not permit valve to be suspended from wire harness.
2. Reconnect all other electrical connectors.
3. Ignition ON, engine OFF.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR while observing EGR valve.

Did EGR valve open and close one time without generating any DTCs with SPN 002791?

YES: Reinstall EGR valve. GO TO 17

NO: DTC with SPN 002791 is now active. Discontinue test for 2659.02 and perform test for DTC with SPN 002791.

NO: EGR valve did not open and close but no DTCs with SPN 002791 were generated. Replace EGR valve. GO TO 17

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17 EGR-VGT System Temperature and Flow Test

1. Ignition OFF, engine OFF.
2. Reinstall all sensors.
3. Reconnect all electrical connectors.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 18

NO: Step 3 or 4 was performed earlier during this procedure. GO TO 20

NO: Step 3 or 4 was NOT performed earlier during this procedure. GO TO 4

Continued on next page

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18 Recreate Operating Point	Recreate the engine operating point where 002659.02 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes. Is 002659.02 active?	**YES:** ECU has NOT been reprogrammed during this procedure. GO TO 19 **YES:** ECU was reprogrammed during this procedure. Open DTAC case. **NO:** Problem fixed.

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19 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Recreate the engine operating point where 002659.02 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes. Is 002659.02 active?	**YES:** Open DTAC case. **NO:** Problem fixed.

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20 Recheck System	1. Perform CHARGE AIR SYSTEM DIAGNOSTIC test. 2. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. 3. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure. 4. Check for restricted exhaust flow through EGR cooler. 5. Check for restricted coolant flow through EGR cooler. 6. Replace EGR valve, if not already replaced during this procedure. 7. Download latest ECU payload and reprogram ECU, if not already performed during this procedure. 8. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs. Were EGR-VGT System Temperature and Flow Test results good?	**YES:** GO TO 18 **NO:** Open DTAC case.

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002659.15 — Calculated EGR Flow Rate Slightly High

The ECU detects exhaust gas recirculation flow when the exhaust gas recirculation valve is closed.

Continued on next page

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002659.15 — Calculated EGR Flow Rate Slightly High Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 002791
Any DTC with SPN 000105
Any DTC with SPN 000412
Any DTC with SPN 002630
002659.15

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU calculates EGR flow is occurring when the EGR valve is closed.
There is no physical EGR flow sensor. The ECU uses the difference between intake manifold air temperature and charge air cooler outlet temperature to calculate EGR flow.
A false measurement obtained from one of the sensors used to calculate EGR flow may cause DTC 002659.15 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
The ECU will control the EGR/VGT system in open loop mode.

Additional References:
For further EGR valve information, EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3, 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 3, 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on temperature sensor testing see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Charge air cooler outlet temperature sensor T01 - Purple/Gray
• Intake manifold air temperature sensor T02 - Purple/Gray
• EGR exhaust gas temperature sensor T03 - Purple/Gray

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RG41221,0000289 -19-18FEB09-2/21

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did any DTC with SPN 002791 become active?

YES: Discontinue test for 002659.15 and perform test for DTC with SPN 002791.

NO: Engine is at ambient temperature and has not been operated in the past eight hours. GO TO 2

NO: Engine has been operated in the past eight hours. GO TO 3

RG41221,0000289 -19-18FEB09-3/21

2 Check Air Temperature Sensors on a Cold Engine

1. Ignition ON, engine OFF.
2. Monitor the following data points in Service ADVISOR:
   a. Charge Air Cooler Outlet Temperature
   b. Manifold Air Temperature
   c. EGR Temperature

Are the temperatures reported by these data points within the following specifications?

- Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.
- EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.

YES: GO TO 14

NO: GO TO 4

RG41221,0000289 -19-18FEB09-4/21

3 Check Air Temperature Sensors on a Warm Engine

1. Ignition OFF, engine OFF.
2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes:
   a. Charge air cooler outlet temperature sensor
   b. Intake manifold air temperature sensor
   c. EGR exhaust gas temperature sensor
3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection.
4. Ignition ON, engine OFF.
5. Monitor the temperature reported by the following data points in Service ADVISOR:
   a. Charge Air Cooler Outlet Temperature
   b. Manifold Air Temperature
   c. EGR Temperature

Are the temperatures reported by these data points within the following specifications?

- Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.
- EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.

YES: GO TO 14

NO: GO TO 4

Continued on next page

RG41221,0000289 -19-18FEB09-5/21

4 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	**YES:** GO TO 14 **NO:** Charge Air Cooler Outlet Temperature is higher or lower than the other two temperatures. GO TO 5
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 7
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** Exhaust Gas Recirculation Temperature is higher or lower than the other two temperatures. GO TO 9

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5 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and charge air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on J3 and charge air cooler outlet temperature sensor connector. 4. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and the charge air cooler outlet temperature sensor connector signal (T01-A). 5. On the harness, measure the resistance between the ECU charge air cooler outlet temperature reference (J3-B2) and the charge air cooler outlet temperature sensor connector reference (T01-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 6 **NO:** Fix problem. GO TO 4

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6 Check Charge Air Cooler Outlet Temperature Circuit	1. Verify charge air cooler outlet temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 11 **NO:** Fix problem. GO TO 4

Continued on next page

RG41221,0000289 -19-18FEB09-8/21

7 **Check Intake Manifold Air Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and intake manifold air temperature sensor connector. 3. Perform TERMINAL TEST on J3 and intake manifold air temperature sensor connector. 4. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and the intake manifold air temperature sensor connector signal (T02-A). 5. On the harness, measure the resistance between the ECU intake manifold air temperature reference (J3-B2) and the intake manifold air temperature sensor connector reference (T02-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 4

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8 **Check Intake Manifold Air Temperature Circuit**	1. Verify intake manifold air temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU intake manifold air temperature signal (J3-F1) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace intake manifold air temperature sensor. GO TO 11 **NO:** Fix problem. GO TO 4

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9 **Check EGR Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and EGR exhaust gas temperature sensor connector. 3. Perform TERMINAL TEST on J3 and EGR exhaust gas temperature sensor connector. 4. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and the EGR exhaust gas temperature sensor connector signal (T03-A). 5. On the harness, measure the resistance between the ECU EGR exhaust gas temperature reference (J3-B2) and the EGR exhaust gas temperature sensor connector reference (T03-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 10 **NO:** Fix problem. GO TO 4

Continued on next page

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10 Check EGR Temperature Circuit	1. Verify EGR exhaust gas temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace EGR exhaust gas temperature sensor. GO TO 11 **NO:** Fix problem. GO TO 4

RG41221,0000289 -19-18FEB09-12/21

11 Retest Temperature Sensor Validity	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 14 **NO:** GO TO 12

RG41221,0000289 -19-18FEB09-13/21

12 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors: a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) b. Intake manifold air temperature sensor (Manifold Air Temperature data point) c. EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 14 **NO:** GO TO 13

Continued on next page

RG41221,0000289 -19-18FEB09-14/21

13 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors:	
	a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point)	
	b. Intake manifold air temperature sensor (Manifold Air Temperature data point)	
	c. EGR exhaust gas temperature sensor (EGR Temperature data point)	
	Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?	
	• Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.	**YES:** GO TO 14
	• EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**NO:** Open DTAC case.

RG41221,0000289 -19-18FEB09-15/21

14 Check EGR Valve	*NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.*	
	1. Ignition OFF, engine OFF.	
	2. Remove EGR valve.	
	3. Inspect EGR valve and O-rings for damage.	
	4. Inspect intake and exhaust passages for damage which would permit EGR flow with EGR valve closed.	**YES:** Fix problem. GO TO 15
	Were any problems found?	**NO:** GO TO 15

RG41221,0000289 -19-18FEB09-16/21

15 Check EGR Valve Operation	1. Reconnect EGR valve connector and secure EGR valve to the engine. Do not permit valve to be suspended from wire harness.	
	2. Reconnect all other electrical connectors.	
	3. Ignition ON, engine OFF.	**YES:** Reinstall EGR valve. GO TO 16
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR while observing EGR valve.	**NO:** DTC with SPN 002791 is now active. Discontinue test for 2659.15 and perform test for DTC with SPN 002791.
	Did EGR valve open and close one time without generating any DTCs with SPN 002791?	**NO:** EGR valve did not open and close but no DTCs with SPN 002791 were generated. Replace EGR valve. GO TO 16

Continued on next page

RG41221,0000289 -19-18FEB09-17/21

16 EGR-VGT System Temperature and Flow Test

1. Ignition OFF, engine OFF.
2. Reinstall all sensors.
3. Reconnect all electrical connectors.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 17

NO: Step 2 or 3 was performed earlier during this procedure. GO TO 19

NO: Step 2 or 3 was NOT performed earlier during this procedure. GO TO 3

RG41221,0000289 -19-18FEB09-18/21

17 Recreate Operating Point

Recreate the engine operating point where 002659.15 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 002659.15 active?

YES: ECU has NOT been reprogrammed during this procedure. GO TO 18

YES: ECU was reprogrammed during this procedure. Open DTAC case.

NO: Problem fixed.

RG41221,0000289 -19-18FEB09-19/21

18 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Download latest ECU payload and reprogram ECU.
3. Recreate the engine operating point where 002659.15 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.

Is 002659.15 active?

YES: Open DTAC case.

NO: Problem fixed.

RG41221,0000289 -19-18FEB09-20/21

19 Recheck System

1. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure.
2. Replace EGR valve, if not already replaced during this procedure.
3. Download latest ECU payload and reprogram ECU, if not already performed during this procedure.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 17

NO: Open DTAC case.

RG41221,0000289 -19-18FEB09-21/21

002659.17 — Calculated EGR Flow Rate Slightly Low

The ECU does not detect exhaust gas recirculation flow when the EGR valve is open.

Continued on next page

RG41221,000028A -19-18FEB09-1/23

002659.17 — Calculated EGR Flow Rate Slightly Low Diagnostic Procedure

Troubleshooting Sequence:
Any DTC with SPN 002791
Any DTC with SPN 000105
Any DTC with SPN 000412
Any DTC with SPN 002630
002659.17

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU calculates that there is insufficient EGR flow when the EGR valve is open.
There is no physical EGR flow sensor. The ECU uses the difference between intake manifold air temperature and charge air cooler outlet temperature to calculate EGR flow.
This DTC may be caused by any condition that restricts actual EGR flow.
A false measurement obtained from one of the sensors used to calculate EGR flow may cause DTC 002659.17 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.
The ECU will control the EGR/VGT system in open loop mode.

Additional References:
For further EGR valve information, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 3, 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 3, 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on temperature sensor testing see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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RG41221,000028A -19-18FEB09-2/23

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Purple/Gray
- Intake manifold air temperature sensor T02 - Purple/Gray
- EGR exhaust gas temperature sensor T03 - Purple/Gray

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RG41221,000028A -19-18FEB09-3/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did any DTC with SPN 002791 become active?	**YES:** Discontinue test for 002659.17 and perform test for DTC with SPN 002791. **NO:** GO TO 2

RG41221,000028A -19-18FEB09-4/23

2 Check Engine Temperature	Is engine at ambient temperature and has not been operated for at least eight hours?	**YES:** GO TO 3 **NO:** GO TO 4

RG41221,000028A -19-18FEB09-5/23

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. Charge Air Cooler Outlet Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

Continued on next page

RG41221,000028A -19-18FEB09-6/23

4 Check Air Temperature Sensors on a Warm Engine	1. Ignition OFF, engine OFF. 2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes: a. Charge air cooler outlet temperature sensor b. Intake manifold air temperature sensor c. EGR exhaust gas temperature sensor 3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection. 4. Ignition ON, engine OFF. 5. Monitor the temperature reported by the following data points in Service ADVISOR: a. Charge Air Cooler Outlet Temperature b. Manifold Air Temperature c. EGR Temperature Are the temperatures reported by these data points within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** GO TO 5

RG41221,000028A -19-18FEB09-7/23

5 Temperature Sensor Validity Test	Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point: • Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point) • Intake manifold air temperature sensor (Manifold Air Temperature data point) • EGR exhaust gas temperature sensor (EGR Temperature data point) Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications? • Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other. • EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.	**YES:** GO TO 15 **NO:** Charge Air Cooler Outlet Temperature is higher or lower than the other two temperatures. GO TO 6 **NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 8 **NO:** EGR Temperature is higher or lower than the other two temperatures. GO TO 10

Continued on next page

RG41221,000028A -19-18FEB09-8/23

6 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and charge air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on J3 and charge air cooler outlet temperature sensor connector. 4. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and the charge air cooler outlet temperature sensor connector signal (T01-A). 5. On the harness, measure the resistance between the ECU charge air cooler outlet temperature reference (J3-B2) and the charge air cooler outlet temperature sensor connector reference (T01-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 5

RG41221,000028A -19-18FEB09-9/23

7 Check Charge Air Cooler Outlet Temperature Circuit Resistance	1. Verify charge air cooler outlet temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU charge air cooler outlet temperature signal (J3-F2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000028A -19-18FEB09-10/23

8 Check Intake Manifold Air Temperature Circuit Resistance	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and intake manifold air temperature sensor connector. 3. Perform TERMINAL TEST on J3 and intake manifold air temperature sensor connector. 4. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and the intake manifold air temperature sensor connector signal (T02-A). 5. On the harness, measure the resistance between the ECU intake manifold air temperature reference (J3-B2) and the intake manifold air temperature sensor connector reference (T02-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000028A -19-18FEB09-11/23

9 **Check Intake Manifold Air Temperature Circuit**	1. Verify intake manifold air temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU intake manifold air temperature signal (J3-F1) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU intake manifold air temperature signal (J3-F1) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace intake manifold air temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

RG41221,000028A -19-18FEB09-12/23

10 **Check EGR Temperature Circuit Resistance**	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and EGR exhaust gas temperature sensor connector. 3. Perform TERMINAL TEST on J3 and EGR exhaust gas temperature sensor connector. 4. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and the EGR exhaust gas temperature sensor connector signal (T03-A). 5. On the harness, measure the resistance between the ECU EGR exhaust gas temperature reference (J3-B2) and the EGR exhaust gas temperature sensor connector reference (T03-B). Are Terminal Test results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

RG41221,000028A -19-18FEB09-13/23

11 **Check EGR Temperature Circuit**	1. Verify EGR exhaust gas temperature sensor is disconnected. 2. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and reference (J3-B2). 3. On the harness, measure the resistance between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. 4. Ignition ON, engine OFF. 5. On the harness, measure the voltage between the ECU EGR exhaust gas temperature signal (J3-E2) and single point ground. Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**YES:** Replace EGR exhaust gas temperature sensor. GO TO 12 **NO:** Fix problem. GO TO 5

Continued on next page

RG41221,000028A -19-18FEB09-14/23

12 Retest Temperature Sensor Validity

Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors while monitoring the applicable data point:

- Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point)
- Intake manifold air temperature sensor (Manifold Air Temperature data point)
- EGR exhaust gas temperature sensor (EGR Temperature data point)

Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?

- Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.
- EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.

YES: GO TO 15

NO: GO TO 13

RG41221,000028A -19-18FEB09-15/23

13 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Download latest ECU payload and reprogram ECU.
3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors:
   a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point)
   b. Intake manifold air temperature sensor (Manifold Air Temperature data point)
   c. EGR exhaust gas temperature sensor (EGR Temperature data point)

Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?

- Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.
- EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.

YES: GO TO 15

NO: GO TO 14

RG41221,000028A -19-18FEB09-16/23

14 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Perform TEMPERATURE SENSOR VALIDITY TEST on the following sensors:
   a. Charge air cooler outlet temperature sensor (Charge Air Cooler Outlet Temperature data point)
   b. Intake manifold air temperature sensor (Manifold Air Temperature data point)
   c. EGR exhaust gas temperature sensor (EGR Temperature data point)

Are the maximum temperatures recorded during the Temperature Sensor Validity Test within the following specifications?

- Charge Air Cooler Outlet Temperature and Manifold Air Temperature within 5°C (9°F) of each other.
- EGR Temperature within 7°C (13°F) of Charge Air Cooler Outlet Temperature or Manifold Air Temperature.

YES: GO TO 15

NO: Open DTAC case.

Continued on next page

RG41221,000028A -19-18FEB09-17/23

15 Check EGR Valve

NOTE: For EGR valve removal and installation instructions, see REMOVE & INSTALL EGR VALVE in Section 02, Group 100 earlier in this manual.

1. Ignition OFF, engine OFF.
2. Remove EGR valve.
3. Inspect EGR valve for damage or blockage.
4. Verify that the part number of the EGR valve removed is the correct part for the engine.
5. Inspect intake and exhaust passages for blockage which would restrict EGR flow.

Were any problems found?

YES: Fix problem or replace incorrect EGR valve. GO TO 16

NO: GO TO 16

RG41221,000028A -19-18FEB09-18/23

16 Check EGR Valve Operation

1. Reconnect EGR valve connector and secure EGR valve to the engine. Do not permit valve to be suspended from wire harness.
2. Reconnect all other electrical connectors.
3. Ignition ON, engine OFF.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR while observing EGR valve.

Did EGR valve open and close one time without generating any DTCs with SPN 002791?

YES: Reinstall EGR valve. GO TO 17

NO: DTC with SPN 002791 is now active. Discontinue test for 2659.17 and perform test for DTC with SPN 002791.

NO: EGR valve did not open and close but no DTCs with SPN 002791 were generated. Replace EGR valve. GO TO 17

RG41221,000028A -19-18FEB09-19/23

17 EGR-VGT System Temperature and Flow Test

1. Ignition OFF, engine OFF.
2. Reinstall all sensors.
3. Reconnect all electrical connectors.
4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.

Were EGR-VGT System Temperature and Flow Test results good?

YES: GO TO 18

NO: Step 3 or 4 was performed earlier during this procedure. GO TO 20

NO: Step 3 or 4 was NOT performed earlier during this procedure. GO TO 4

Continued on next page

RG41221,000028A -19-18FEB09-20/23

18 Recreate Operating Point	Recreate the engine operating point where 002659.17 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes. Is 002659.17 active?	**YES:** ECU has NOT been reprogrammed during this procedure. GO TO 19 **YES:** ECU was reprogrammed during this procedure. Open DTAC case. **NO:** Problem fixed.

RG41221,000028A -19-18FEB09-21/23

19 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Download latest ECU payload and reprogram ECU. 3. Recreate the engine operating point where 002659.17 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes. Is 002659.17 active?	**YES:** Open DTAC case. **NO:** Problem fixed.

RG41221,000028A -19-18FEB09-22/23

20 Recheck System	1. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. 2. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure. 3. Check for restricted exhaust flow through EGR cooler. 4. Check for other restrictions between EGR valve and exhaust manifold. 5. Replace EGR valve, if not already replaced during this procedure. 6. Download latest ECU payload and reprogram ECU, if not already performed during this procedure. 7. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs. Were EGR-VGT System Temperature and Flow Test results good?	**YES:** GO TO 18 **NO:** Open DTAC case.

RG41221,000028A -19-18FEB09-23/23

002790.16 — Calculated Compressor Outlet Temperature Moderately High

The ECU senses a turbo compressor outlet temperature above specification.

Continued on next page

RG41221,000028B -19-18FEB09-1/18

002790.16 — Calculated Compressor Outlet Temperature Moderately High

Troubleshooting Sequence:
Any DTC with SPN 000107
Any DTC with SPN 001172
Any DTC with SPN 000103
Any DTC with SPN 000102
Any DTC with SPN 000105
Any DTC with SPN 000110
Any DTC with SPN 000157
Any DTC with SPN 000412
Any DTC with SPN 000641
Any DTC with SPN 002630
Any DTC with SPN 002791
002795.07
002790.16

When DTC is Displayed:
The engine is running and the error condition is active.

Related Information:
The ECU calculates that the turbo compressor outlet air temperature is greater than a programmed value.
There is no physical compressor outlet temperature sensor. The ECU uses the compressor inlet air temperature and the turbo speed along with the calculated intake air flow rate to calculate the compressor outlet temperature. The ECU uses information from several sensors to calculate the intake air flow rate.
Elevated compressor inlet air temperatures combined with high engine loads, especially at high altitudes, may cause high compressor outlet temperatures.
This DTC may be caused by any condition that limits intake air flow including intake air restrictions, charge air (boost) leaks, or turbo problems.
A false measurement obtained from one of the sensors used to calculate compressor outlet temperature may cause DTC 002790.16 to be falsely generated.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2-9.0L 12V WIRING DIAGRAM 3
- see 9.0L 24V WIRING DIAGRAM 2-9.0L 24V WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM DIAGNOSTIC in Section 04, Group 150 earlier in this manual.

For more information on variable geometry turbo test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 04, Group 150 earlier in this manual.

For more information on air temperature and flow system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 earlier in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Compressor inlet air temperature T06 - Purple/Gray

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RG41221,000028B -19-18FEB09-3/18

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.

Is 000103.00 or 000103.08 a stored DTC which occurred at nearly the same engine hours as 002790.16?

YES: Discontinue test for 002790.16 and perform test q000103.00 — TURBO SPEED SIGNAL EXTREMELY HIGH DIAGNOSTIC PROCEDURE or 000103.08 — TURBO SPEED SIGNAL INCORRECT DIAGNOSTIC PROCEDURE.

NO: GO TO 2

RG41221,000028B -19-18FEB09-4/18

2 Check Air Intake System

1. Ignition OFF, engine OFF.
2. Check charge air system for loose clamps, damaged hoses, damaged charge air cooler, or other sources of charge air (boost) leaks.
3. Check for a restricted air filter element or other intake air flow restrictions.
4. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST.

Did you find a problem?

YES: Fix problem. GO TO 12

NO: Engine has NOT been operated in the past eight hours. GO TO 3

NO: Engine has been operated in the past eight hours. GO TO 5

RG41221,000028B -19-18FEB09-5/18

3 Check Air Temperature Sensors on a Cold Engine

1. Ignition ON, engine OFF.
2. Monitor the following data points in Service ADVISOR:
   a. Turbo Compressor Inlet Temperature
   b. Charge Air Cooler Outlet Temperature

Are temperatures indicated by these data points within 5°C (9°F) of each other?

YES: GO TO 12

NO: GO TO 4

Continued on next page

RG41221,000028B -19-18FEB09-6/18

4 Recheck Air Temperature Sensors on a Cold Engine	1. Ignition OFF, engine OFF.	
	2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes:	
	a. Compressor inlet temperature sensor	
	b. Charge air cooler outlet temperature sensor	
	3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection.	
	4. Ignition ON, engine OFF.	
	5. Monitor the temperature reported by the following data points in Service ADVISOR:	
	a. Turbo Compressor Inlet Temperature	
	b. Charge Air Cooler Outlet Temperature	**YES:** GO TO 12
	Are temperatures indicated by these data points within 5°C (9°F) of each other?	**NO:** GO TO 6

RG41221,000028B -19-18FEB09-7/18

5 Check Air Temperature Sensors on a Warm Engine	1. Ignition OFF, engine OFF.	
	2. Remove the following sensors from the engine and permit sensors to cool to ambient temperature for 20 minutes:	
	a. Compressor inlet temperature sensor	
	b. Charge air cooler outlet temperature sensor	
	3. Reconnect each sensor to the respective harness connector. Do not permit sensor to contact warm engine components and do not touch the sensor probes during reconnection.	
	4. Ignition ON, engine OFF.	
	5. Monitor the temperature reported by the following data points in Service ADVISOR:	
	a. Turbo Compressor Inlet Temperature	
	b. Charge Air Cooler Outlet Temperature	**YES:** GO TO 12
	Are temperatures indicated by these data points within 5°C (9°F) of each other?	**NO:** GO TO 6

RG41221,000028B -19-18FEB09-8/18

6 Ambient Temperature Check	1. Ignition ON, engine OFF.	
	2. Compressor inlet temperature sensor removed from engine.	
	3. Monitor Turbo Compressor Inlet Temperature data point.	**YES:** GO TO 12
	Does Turbo Compressor Inlet Temperature data point indicate the actual ambient air temperature within 6°C (11°F)?	**NO:** GO TO 7

Continued on next page

RG41221,000028B -19-18FEB09-9/18

7 Check Compressor Inlet Temperature Sensor Circuit Resistance

1. Ignition OFF, engine OFF.
2. Disconnect ECU J3 connector and compressor inlet temperature sensor connector.
3. Perform TERMINAL TEST on J3 and compressor inlet temperature sensor connector.
4. On the harness, measure the resistance between the ECU compressor inlet temperature signal (J3-D1) and the compressor inlet temperature sensor connector signal (T06-A).
5. On the harness, measure the resistance between the ECU compressor inlet temperature reference (J3-H3) and the compressor inlet temperature sensor connector reference (T06-B).

Are Terminal Test results good and are both resistance measurements less than 10 ohms?

YES: GO TO 8

NO: Fix problem. GO TO 6

RG41221,000028B -19-18FEB09-10/18

8 Check Compressor Inlet Temperature Sensor Circuit

1. Verify compressor inlet temperature sensor is disconnected.
2. On the harness, measure the resistance between the ECU compressor inlet temperature signal (J3-D1) and reference (J3-H3).
3. On the harness, measure the resistance between the ECU compressor inlet temperature signal (J3-D1) and single point ground.
4. Ignition ON, engine OFF.
5. On the harness, measure the voltage between the ECU compressor inlet temperature signal (J3-D1) and single point ground.

Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?

YES: Replace compressor inlet temperature sensor. GO TO 9

NO: Fix problem. GO TO 6

RG41221,000028B -19-18FEB09-11/18

9 Ambient Temperature Check

1. Ignition ON, engine OFF.
2. Compressor inlet temperature sensor removed from engine.
3. Monitor Turbo Compressor Inlet Temperature data point.

Does Turbo Compressor Inlet Temperature data point indicate the actual ambient air temperature within 6°C (11°F)?

YES: GO TO 12

NO: GO TO 10

RG41221,000028B -19-18FEB09-12/18

10 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all electrical connectors.
3. Download latest ECU payload and reprogram ECU.
4. Compressor inlet temperature sensor removed from engine.
5. Monitor Turbo Compressor Inlet Temperature data point.

Does Turbo Compressor Inlet Temperature data point indicate the actual ambient air temperature within 6°C (11°F)?

YES: GO TO 12

NO: GO TO 11

Continued on next page

RG41221,000028B -19-18FEB09-13/18

11 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Compressor inlet temperature sensor removed from engine.	
	4. Monitor Turbo Compressor Inlet Temperature data point.	**YES:** GO TO 12
	Does Turbo Compressor Inlet Temperature data point indicate the actual ambient air temperature within 6°C (11°F)?	**NO:** Open DTAC case.

RG41221,000028B -19-18FEB09-14/18

12 EGR-VGT System Temperature and Flow Test	1. Ignition OFF, engine OFF.	
	2. Reinstall all sensors.	
	3. Reconnect all electrical connectors.	**YES:** GO TO 13
	4. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.	**NO:** Step 3 or 5 was performed earlier during this procedure. GO TO 15
	Were EGR-VGT System Temperature and Flow Test results good?	**NO:** Step 3 or 5 was NOT performed earlier during this procedure. GO TO 5

RG41221,000028B -19-18FEB09-15/18

13 Recreate Operating Point	Recreate the engine operating point where 002790.16 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.	**YES:** ECU has NOT been reprogrammed during this procedure. GO TO 14
	Is 002790.16 active?	**YES:** ECU was reprogrammed during this procedure. Open DTAC case.
		NO: Problem fixed.

RG41221,000028B -19-18FEB09-16/18

14 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Download latest ECU payload and reprogram ECU.	
	3. Recreate the engine operating point where 002790.16 became active as indicated by the snapshot capture and snapshot recording obtained in Step 1 and maintain for at least 10 minutes.	**YES:** Open DTAC case.
	Is 002790.16 active?	**NO:** Problem fixed.

Continued on next page

RG41221,000028B -19-18FEB09-17/18

15 Recheck System	1. Perform CHARGE AIR SYSTEM DIAGNOSTIC test. 2. Check the engine compartment for adequate fresh air supply to the engine for intake air and cooling. 3. Replace any sensor that does not appear to be responding correctly, if not already replaced during this procedure. 4. Download latest ECU payload and reprogram ECU, if not already performed during this procedure. 5. Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST after making any needed repairs. Were EGR-VGT System Temperature and Flow Test results good?	**YES:** GO TO 13 **NO:** Open DTAC case.

RG41221,000028B -19-18FEB09-18/18

002791.02 — EGR Valve Position Signal Invalid

The ECU detects the EGR valve is not able to achieve desired position.

Continued on next page

RG41221,000028C -19-18FEB09-1/14

002791.02 - EGR Valve Position Signal Invalid Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
002791.03 or 002791.04
000110.17
002791.02

When DTC is Displayed:
Only when the engine is running and the error is active.

Related Information
The ECU detects the EGR valve is not able to achieve desired position. The valve is being driven but the position signal returned to the ECU is not within specification.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For more information on the EGR valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

For component location see COMPONENT LOCATION in Section 3 Group 140 earlier in this manual.

IMPORTANT: When replacing EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Inspect intake manifold for debris and buildup.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EXHAUST GAS RECIRCULATION VALVE RECALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve connector X03 - Red/Green

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Continued on next page

RG41221,000028C -19-18FEB09-2/14

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh codes.

Does diagnostic display show any DTC with and SPN of 002791 other than 002791.02 or 000110.17 DTC active ?

YES: Refer to Trouble Shooting Sequence earlier in this procedure.

NO: Only DTC 002791.02 is active. GO TO 2

NO: No DTCs are active. GO TO 6

RG41221,000028C -19-18FEB09-3/14

2 EGR Valve Connector Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect EGR valve connector.
3. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 3

RG41221,000028C -19-18FEB09-4/14

3 EGR Valve Cleaning Cycle

1. Reconnect EGR valve connector.
2. Ignition ON, Engine ON.
3. Warm engine to normal operating temperature.
4. Run EGR Valve Clean Test.
5. Ignition ON, Engine OFF.
6. Run HARNESS DIAGNOSTIC MODE TEST.
7. Refresh codes.

Does diagnostic display show any DTC with and SPN of 002791 other than 002791.02 or 000110.17 DTC active ?

YES: Refer to Trouble Shooting Sequence earlier in this procedure.

NO: GO TO 4

RG41221,000028C -19-18FEB09-5/14

4 Visual Inspection of EGR Valve

1. Remove EGR valve.
2. Perform a visual inspection of the valve looking for damaged or broken parts or the poppet not seated against the flange.

Where any problems found?

YES: Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.

NO: GO TO 5

Continued on next page

RG41221,000028C -19-18FEB09-6/14

5 Visual Inspection of EGR Valve Movement

1. Reconnect EGR valve connector and leave valve out so you can watch it move.

IMPORTANT: Pinch hazard, keep hands away from valve while it cycles.

2. Ignition ON, Engine OFF.
3. Watch EGR valve for full opening (approximately 10 mm (0.393 in) and closure (flat against seat) and smooth movement.
4. Run HARNESS DIAGNOSTIC MODE TEST.

Did valve move smoothly and open and close fully and 002791.02 reappear active?

YES: Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.

NO: Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028C -19-18FEB09-7/14

6 Occurrence Count Check

1. Ignition OFF, Engine OFF.
2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
3. Review occurrence counts in the snapshot capture information for this code.

Is count greater than five?

YES: GO TO 7

NO: GO TO 8

RG41221,000028C -19-18FEB09-8/14

7 EGR Valve Connector Test

1. Disconnect EGR valve connector.
2. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 8

RG41221,000028C -19-18FEB09-9/14

8 Engine Hours Between Failures Check

1. Ignition OFF, Engine OFF
2. Using Service ADVISOR read and record the current Engine Hourmeter value.
3. Retrieve the latest saved snapshot capture and record the Engine Hourmeter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.
4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter value.

Is the difference greater than 50 hours?

YES: GO TO 9

NO: GO TO 10

Continued on next page

RG41221,000028C -19-18FEB09-10/14

9 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR Valve Clean Test test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Troubleshoot that DTC.
	7. Refresh codes.	**NO:** No DTCs appeared. Cleaning fixed problem. Return to service.
	Did 002791.03 or 002791.04 appear active?	**NO:** DTC 002791.02 appeared. Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.

RG41221,000028C -19-18FEB09-11/14

10 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 11
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 12

RG41221,000028C -19-18FEB09-12/14

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 12
	Did Code reappear active?	**NO:** GO TO 10 and review the data again.

Continued on next page

RG41221,000028C -19-18FEB09-13/14

12 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR Valve Clean Test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes.	**YES:** Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.
	Is 002791.02 active?	**NO:** Clean cycle test fixed problem. Return to service.

RG41221,000028C -19-18FEB09-14/14

002791.03 — EGR Valve Position Signal Out of Range High

The EGR valve position signal indicates a value that is out of the range of the expected highest value.

Continued on next page

RG41221,000028D -19-03AUG10-1/31

002791.03 — EGR Valve Position Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003513.03
002791.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The EGR valve position signal indicates a value that is out of the range of the expected highest value.

Alarm Level:
Warning

Control Unit Response:
DTC 002791.07 will also set causing the ECU to derate the engine until it is running at 80% of full power.

Additional References:
For more information on the EGR valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When replacing the EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Inspect intake manifold for debris and buildup.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EXHAUST GAS RECIRCULATION VALVE RECALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve connector X03 - Red/Green

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Continued on next page
RG41221,000028D -19-03AUG10-2/31

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Did 002791.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 19

RG41221,000028D -19-03AUG10-3/31

2 Valve Position Check	Using Service ADVISOR read EGR valve position input voltage. Is voltage below 5.5 volts?	**YES:** GO TO 3 **NO:** GO TO 16

RG41221,000028D -19-03AUG10-4/31

3 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR valve connector. 3. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem, reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41221,000028D -19-03AUG10-5/31

4 EGR Valve Reconnection Test	1. Reconnect the EGR valve connector. 2. Ignition ON, Engine OFF. 3. Refresh codes. Did 002791.03 reappear active?	**YES:** GO TO 5 **NO:** Problem fixed. Bad EGR valve connection.

Continued on next page

RG41221,000028D -19-03AUG10-6/31

5 EGR Valve Position Circuit Resistance Test	1. Ignition OFF, Engine OFF. 2. Disconnect EGR valve connector. 3. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to ground (terminal 5) and write down the value. 4. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to position input (terminal 6) and write down the value. 5. On the EGR valve measure the resistance of the EGR valve position circuit ground (terminal 5) to position input (terminal 6) and write down the value. Are all values between 20k and 95k ohms?	**YES:** GO TO 6 **NO:** Bad position circuit in EGR valve. Replace valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.

RG41221,000028D -19-03AUG10-7/31

6 ECU - EGR Valve Position Input Circuit Resistance Test	Measure the resistance between the position input (terminal 6) and the position ground (terminal 5) in the EGR valve harness connector. Is the measurement between 9k and 11k ohms?	**YES:** GO TO 7 **NO:** GO TO 9

RG41221,000028D -19-03AUG10-8/31

7 ECU - EGR Valve Position Supply Circuit Resistance Test	Measure the resistance between the position supply (terminal 1) and the position ground (terminal 5) in the EGR valve harness connector. Is the measurement between 109k and 111k ohms?	**YES:** GO TO 8 **NO:** GO TO 13

RG41221,000028D -19-03AUG10-9/31

8 ECU Connector Check	1. Disconnect ECU connector J3 (blue face). 2. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem and reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

RG41221,000028D -19-03AUG10-10/31

9 ECU Connector Check	1. Disconnect ECU connector J3 (blue face).	
	2. Perform a terminal test, see TERMINAL TEST earlier in this Group.	**YES:** Repair problem and reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 10

RG41221,000028D -19-03AUG10-11/31

10 EGR Valve Position Ground Circuit Harness Resistance Test	Measure the resistance between the position ground (terminal 5) in the EGR valve harness connector and the ECU harness connector position ground (terminal J3-A3).	**YES:** GO TO 11
	Is the measurement less than 2 ohms?	**NO:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-12/31

11 EGR Valve Position Input Circuit Harness Resistance Test	Measure the resistance between the position input (terminal 6) in the EGR valve harness connector and the ECU connector position input (terminal J3-A4).	**YES:** GO TO 12
	Is the measurement less than 2 ohms?	**NO:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-13/31

12 ECU - EGR Valve Position Input Circuit Resistance Test	Measure the resistance between the position input (terminal J3-A4) and the position ground (terminal J3-A3) on the ECU.	**YES:** Reconnect all connectors. Check harness for melted, pinched or frayed areas. Run HARNESS DIAGNOSTIC MODE TEST.
	Is the measurement between 9k and 11k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-14/31

13 ECU Connector Check	1. Disconnect ECU connector J3 (blue face).	
	2. Perform a terminal test, see TERMINAL TEST earlier in this Group.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,000028D -19-03AUG10-15/31

14 EGR Valve Position Supply Circuit Harness Resistance Test Two	Measure the resistance between the position supply (terminal 1) in the EGR valve harness connector and the ECU harness connector position supply (terminal J3-A2).	**YES:** GO TO 15
	Is the measurement less than 2 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-16/31

15 ECU - EGR Valve Position Supply Circuit Resistance Test	Measure the resistance between the position supply (terminal J3-A2) and the position ground (terminal J3-A3) on the ECU.	**YES:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.
	Is the measurement between 109K and 111K ohms?	**NO:** Remove and Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-17/31

16 ECU Connector Check	1. Ignition OFF, Engine OFF.	
	2. Disconnect the ECU connector that has the EGR valve signal input wire connected to it, J3 (blue face).	
	3. Disconnect the EGR valve connector.	
	4. Perform a terminal test on ECU and EGR valve connectors, see TERMINAL TEST earlier in this Group.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST
	Were any problems found?	**NO:** GO TO 17

RG41221,000028D -19-03AUG10-18/31

17 EGR Valve Position Voltage Check	1. EGR valve and ECU connector J3 still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Using Service ADVISOR read EGR Valve Position Input Voltage.	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST
	Is voltage above 5.5 volts?	**NO:** GO TO 18

Continued on next page

RG41221,000028D -19-03AUG10-19/31

18 Short To High Voltage Test

1. Ignition OFF, Engine OFF.
2. Measure resistance between the EGR valve signal input wire to all other wires in the ECU connector.

Was a short found?

YES: Repair, reconnect. Run HARNESS DIAGNOSTIC MODE TEST.

NO: Look at the harness and see if you can find any pinched, frayed or melted wiring. Repair, reconnect. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-20/31

19 Occurrence Count Check

1. Ignition OFF, Engine OFF.
2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
3. Review occurrence counts in the snapshot capture information for this code.

Is count greater that five?

YES: GO TO 20

NO: GO TO 21

RG41221,000028D -19-03AUG10-21/31

20 EGR Valve Connector Test

1. Disconnect EGR valve connector.
2. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 21

RG41221,000028D -19-03AUG10-22/31

21 Further Review of Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.

YES: Found a possible problem.
Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.

2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.

YES: Found operating point at which the code becomes active.
GO TO 22

Did you find a possible problem or the operating point at which the code becomes active?

NO: GO TO 25

Continued on next page

RG41221,000028D -19-03AUG10-23/31

22 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 23
	Did 002791.03 reappear active?	**NO:** GO TO 22 and confirm the operating point.

RG41221,000028D -19-03AUG10-24/31

23 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect EGR valve connector.	
	3. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 24

RG41221,000028D -19-03AUG10-25/31

24 Engine Error Operating Point Test Two	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Set engine to operating point that caused error.	**YES:** Replace EGR valve. Recalibrate EGR Valve using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.
	Did 002791.03 reappear active?	**NO:** Check wiring harness for pinched, frayed or melted wires.

RG41221,000028D -19-03AUG10-26/31

25 Engine Hours Between Failures Check	1. Ignition OFF, Engine OFF	
	2. Using Service ADVISOR read and record the current Engine Hourmeter value.	
	3. Retrieve the latest saved snapshot capture and record the Engine Hour meter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.	
	4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter vlaue.	**YES:** GO TO 26
	Is the difference greater than 50 hours?	**NO:** GO TO 27

Continued on next page

RG41221,000028D -19-03AUG10-27/31

26 EGR Valve Cleaning Cycle	1. Ignition ON, Engine ON.	
	2. Warm engine to normal operating temperature.	
	3. Run EGR Valve Clean Test test.	
	4. Ignition ON, Engine OFF.	
	5. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** 002791.03 or 002791.04. Troubleshoot the active code.
	6. Refresh codes.	**YES:** Any other 002791 code. Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.
	Did any 002791 code appear active?	**NO:** Cleaning fixed problem.

RG41221,000028D -19-03AUG10-28/31

27 EGR Valve Connector Terminal Test	1. Disconnect EGR valve connector.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 28

RG41221,000028D -19-03AUG10-29/31

28 EGR Valve Replacement / Recalibration Check	1. Replace EGR valve.	
	2. Recalibrate, use EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.	
	3. Refresh codes.	**YES:** GO TO 29
	Did 002791.03 reappear active?	**NO:** Problem fixed. Bad EGR valve.

RG41221,000028D -19-03AUG10-30/31

29 ECU Connector Terminal Test	1. Disconnect ECU connector.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-03AUG10-31/31

002791.04 — EGR Valve Position Signal Out of Range Low

The EGR valve position signal indicates a value that is out of the range of the expected lowest value.

Continued on next page

RG41221,000028E -19-18FEB09-1/17

002791.04 — EGR Valve Position Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003513.04
002791.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The EGR valve position signal indicates a value that is out of the range of the expected lowest value.

Alarm Level:
Warning

Control Unit Response:
002791.07 will also set causing the ECU to derate the engine until it is running at 80% of full power.

Additional References:
For more information on the EGR valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When replacing the EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Inspect intake manifold for debris and buildup.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EXHAUST GAS RECIRCULATION VALVE RECALIBRATION the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve Connector X03 - Red/Green

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RG41221,000028E -19-18FEB09-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Did 002791.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,000028E -19-18FEB09-3/17

2 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR valve connector. 3. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 3

RG41221,000028E -19-18FEB09-4/17

3 EGR Valve Disconnected Test	1. Leave the EGR valve connector disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Did 002791.03 appear active?	**YES:** GO TO 4 **NO:** GO TO 5

RG41221,000028E -19-18FEB09-5/17

4 EGR Valve Position Circuit Resistance Test	1. Ignition OFF, Engine OFF. 2. Disconnect EGR valve connector. 3. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to ground (terminal 5) and write down the value. 4. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to position input (terminal 6) and write down the value. 5. On the EGR valve measure the resistance of the EGR valve position circuit ground (terminal 5) to position input (terminal 6) and write down the value. Are all values between 20k and 95k ohms?	**YES:** Check wiring harness for melted, pinched, frayed wiring. Repair as needed. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Bad position circuit in EGR valve. Replace valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.

Continued on next page

RG41221,000028E -19-18FEB09-6/17

5 ECU - EGR Valve Position Input Circuit Resistance Test	Measure the resistance between the position input (terminal 6) and the position ground (terminal 5) in the EGR valve harness connector.	**YES:** GO TO 6
	Is the measurement less than 2 ohms?	**NO:** Recheck connector and wiring. Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028E -19-18FEB09-7/17

6 EGR Valve Connector Check	1. Ignition OFF, Engine OFF.	
	2. Disconnect the ECU connector that has the EGR valve signal input wire connected to it, J3 (blue face).	
	3. Perform a terminal test, see TERMINAL TEST earlier in this Group.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 7

RG41221,000028E -19-18FEB09-8/17

7 Short To Ground Test	1. ECU J3 still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Refresh codes.	**YES:** Repair short in harness. Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.
	Did 002791.04 go stored and 002791.03 become active?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028E -19-18FEB09-9/17

8 Occurrence Count Check	1. Ignition OFF, Engine OFF.	
	2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	3. Review occurrence counts in the snapshot capture information for this code.	**YES:** GO TO 9
	Is count greater that five?	**NO:** GO TO 10

RG41221,000028E -19-18FEB09-10/17

9 EGR Valve Connector Test	1. Disconnect EGR valve connector.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 10

Continued on next page

RG41221,000028E -19-18FEB09-11/17

10 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 11
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 13

RG41221,000028E -19-18FEB09-12/17

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 12
	Did 002791.04 reappear active?	**NO:** GO TO 10 and confirm the operating point.

RG41221,000028E -19-18FEB09-13/17

12 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect EGR valve connector.	
	3. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** Replace EGR valve. Recalibrate, see EGR VALVE REPLACE-MENT/RECALIBRATION CHECK.

RG41221,000028E -19-18FEB09-14/17

13 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect EGR valve connector.	
	3. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 14

Continued on next page

RG41221,000028E -19-18FEB09-15/17

14 EGR Valve Replacement/Recalibration Check	1. Replace EGR valve. 2. Ignition ON, Engine OFF 3. Recalibrate, use EGR VALVE REPLACEMENT/RECALIBRATION CHECK. 4. Refresh codes. Did 002791.04 reappear active?	**YES:** GO TO 15 **NO:** Problem fixed. Bad EGR valve.

RG41221,000028E -19-18FEB09-16/17

15 ECU Connector Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect ECU connector, J3 (blue face). 3. Perform TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028E -19-18FEB09-17/17

002791.07 — EGR Valve Not Reaching Expected Position

The ECU detects that the exhaust gas recirculation valve is not responding or is out of adjustment.

RG41221,0000291 -19-18FEB09-1/22

002791.07 - EGR Valve Not Reaching Expected Position Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
002791.03 or 002791.04
002791.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information
The ECU detects that the exhaust gas recirculation valve is not responding or is out of adjustment.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more information on the EGR valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

For component location information see COMPONENT LOCATION in Section 3 Group 140 earlier in this manual.

IMPORTANT: When replacing EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Inspect intake manifold for debris and buildup.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EGR VALVE REPLACEMENT/RECALIBRATION CHECK the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve connector X03 - Red/Green

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RG41221,0000291 -19-18FEB09-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Did 002791.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,0000291 -19-18FEB09-3/22

2 EGR Valve Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR valve connector. 3. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 3

RG41221,0000291 -19-18FEB09-4/22

3 EGR Valve Reconnection Test	1. Reconnect the EGR valve connector. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Did 002791.07 reappear active?	**YES:** GO TO 4 **NO:** Problem fixed. Bad EGR valve connection.

RG41221,0000291 -19-18FEB09-5/22

4 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector. 2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR Valve Clean Test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Did 002791.03 or 002791.04 appear active?	**YES:** Go troubleshoot that code. **NO:** GO TO Part 2
	Part 2 Is 002791.07 active?	**YES:** GO TO 5 **NO:** Cleaning cycle fixed problem.

Continued on next page

RG41221,0000291 -19-18FEB09-6/22

5 EGR Valve Stored Positions Values Check	1. Ignition ON, Engine OFF.	
	2. Monitor the following parameters: • EGR Valve Latest Learned Open Position **Specification** —Typical Open Values.....84.0000 - 88.0000 • EGR Valve Latest Learned Closed Position **Specification** —Typical Closed Values .....18.0000 - 22.0000	**YES:** GO TO 19
	Are the values within specifications?	**NO:** GO TO 6

RG41221,0000291 -19-18FEB09-7/22

6 EGR Valve Drive Motor Resistance Test	1. Ignition OFF, Engine OFF.	
	2. Measure the resistance between the EGR valve PWM drive #1 (terminal 3) and EGR valve PWM drive #2 (terminal 4) on the EGR valve.	**YES:** GO TO 7
	Is resistance between 2.5 and 4.5 ohms?	**NO:** Bad drive motor in EGR valve. Replace valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

RG41221,0000291 -19-18FEB09-8/22

7 EGR Valve Position Circuit Resistance Test	1. Disconnect EGR valve connector.	
	2. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to ground (terminal 5) and write down the value. 3. On the EGR valve measure the resistance of the EGR valve position circuit power (terminal 1) to position input (terminal 6) and write down the value. 4. On the EGR valve measure the resistance of the EGR valve position circuit ground (terminal 5) to position input (terminal 6) and write down the value.	**YES:** GO TO 8
	Are all values between 20k and 95k ohms?	**NO:** Bad position circuit in EGR valve. Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

RG41221,0000291 -19-18FEB09-9/22

8 Visual Inspection of EGR Valve	1. Remove EGR valve.	
	2. Perform a visual inspection of the valve looking for damaged or broken parts.	**YES:** Replace valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Were any problems found?	**NO:** GO TO 9

Continued on next page

RG41221,0000291 -19-18FEB09-10/22

9 Visual Inspection of EGR Valve Movement	1. Reconnect EGR valve connector and leave valve out so you can watch it move. **IMPORTANT: Pinch hazard, keep hands away from valve while it cycles.** 2. Ignition ON, Engine OFF. 3. Watch EGR valve for full closure and smooth movement. 4. Run HARNESS DIAGNOSTIC MODE TEST. Did valve move smoothly and close fully?	**YES:** GO TO Part 2 **NO:** Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Part 2 Is 002791.07 active?	**YES:** GO TO 10 **NO:** Problem intermittent, check connector and wiring.

RG41221,0000291 -19-18FEB09-11/22

10 ECU Connectors Terminal Test	1. Disconnect ECU connectors J1 and J3. 2. Perform a terminal test on both connectors, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 11

RG41221,0000291 -19-18FEB09-12/22

11 EGR Valve Motor Plus (+) Wire Harness Resistance Test	Measure the resistance between the EGR valve PWM drive #1 (terminal 3) in the EGR valve harness connector and the ECU harness connector J1, EGR valve PWM drive #1 (terminal J1-G3). Is resistance less than 2 ohms?	**YES:** GO TO 12 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,0000291 -19-18FEB09-13/22

12 EGR Valve Motor Plus (-) Wire Harness Resistance Test	Measure the resistance between the EGR valve PWM drive #2 (terminal 4) in the EGR valve harness connector and the ECU harness connector J1, EGR valve PWM drive #2 (terminal J1-G4). Is resistance less than 2 ohms?	**YES:** GO TO 13 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,0000291 -19-18FEB09-14/22

13 Occurrence Count Check	1. Ignition OFF, Engine OFF. 2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 3. Review occurrence counts in the snapshot capture information for this code. Is count greater than five?	**YES:** GO TO 14 **NO:** GO TO 15

Continued on next page

RG41221,0000291 -19-18FEB09-15/22

14 EGR Valve Connector Terminal Test

1. Disconnect EGR valve connector.
2. Perform TERMINAL TEST.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 15

RG41221,0000291 -19-18FEB09-16/22

15 Engine Hours Between Failures Check

1. Ignition OFF, Engine OFF
2. Using Service ADVISOR read and record the current Engine Hourmeter value.
3. Retrieve the latest saved snapshot capture and record the Engine Hourmeter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.
4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter vlaue.

Is the difference greater than 50 hours?

YES: GO TO 16

NO: GO TO 17

RG41221,0000291 -19-18FEB09-17/22

16 EGR Valve Cleaning Cycle

1. Reconnect EGR valve connector.
2. Ignition ON, Engine ON.
3. Warm engine to normal operating temperature.
4. Run EGR Valve Clean Test test.
5. Ignition ON, Engine OFF.
6. Run HARNESS DIAGNOSTIC MODE TEST.
7. Refresh codes.

Did any 002791 code other than 002791.07 appear active?

YES: If code is 002791.03 or 002791.04 troubleshoot that code. Otherwise replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

NO: Cleaning fixed problem. Return to service.

RG41221,0000291 -19-18FEB09-18/22

17 Further Review of Snapshot Information

1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.

YES: Found a possible problem.
Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.

2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.

YES: Found operating point at which the code becomes active.
GO TO 18

Did you find a possible problem or the operating point at which the code becomes active?

NO: GO TO 19

Continued on next page

RG41221,0000291 -19-18FEB09-19/22

18 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 2
	Did 002791.07 reappear active?	**NO:** GO TO 17 and confirm operating point.

RG41221,0000291 -19-18FEB09-20/22

19 EGR Valve Connector and ECU Connectors Terminal Test	1. Disconnect EGR valve connector and ECU J1 and J3 connectors.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 20

RG41221,0000291 -19-18FEB09-21/22

20 Reprogram ECU	1. Download latest ECU software payload.	
	2. Reprogram ECU.	
	3. Run EGR Valve Clean Test.	
	4. Refresh codes.	**YES:** Start a DTAC case.
	Is 002791.07 active?	**NO:** Problem fixed.

RG41221,0000291 -19-18FEB09-22/22

002791.13 — EGR Valve Calibration Change Over a Short Period of Time

This code indicates the EGR valve Open and Closed stored values have moved outside of programmed tolerance in a short period of time or the valve was replaced and not recalibrated.

Continued on next page

RG41221,0000292 -19-18FEB09-1/17

002791.13 — EGR Valve Calibration Change Over a Short Period of Time Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
002791.03 or 002791.04
002791.07
002791.02
002791.13

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information
This code indicates the EGR valve Open and Closed stored values have moved outside of programmed tolerance in a short period of time or the EGR valve was replaced and not recalibrated.

The ECU detects the EGR valve position values are not within specification.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For more information on the EGR valve, see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

For component location see COMPONENT LOCATION in Section 3 Group 140 earlier in this manual.

IMPORTANT: When replacing EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Inspect intake manifold for debris and buildup.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EGR VALVE REPLACEMENT/RECALIBRATION CHECK the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR valve connector X03 - Red/Green

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RG41221,0000292 -19-18FEB09-2/17

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RG41221,0000292 -19-18FEB09-3/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Run HARNESS DIAGNOSTIC MODE TEST. 5. Refresh codes. Is 002791.13 still active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,0000292 -19-18FEB09-4/17

2 Valve Change Inquiry	Has EGR valve been changed?	**YES:** GO TO 3 **YES:** GO TO Part 2. **NO:** Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK. **NO:** GO TO 3
	Part 2. Was EGR valve calibrated?	

RG41221,0000292 -19-18FEB09-5/17

3 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR valve connector. 3. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41221,0000292 -19-18FEB09-6/17

4 EGR Valve Reconnection Test	1. Reconnect the EGR valve connector. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Did 002791.13 reappear active?	**YES:** GO TO 5 **NO:** Problem fixed. Bad EGR valve connection.

Continued on next page

RG41221,0000292 -19-18FEB09-7/17

5 EGR Valve Cleaning Cycle

1. Reconnect EGR valve connector.
2. Ignition ON, Engine ON.
3. Warm engine to normal operating temperature.
4. Run EGR Valve Clean Test test.
5. Ignition ON, Engine OFF.
6. Run HARNESS DIAGNOSTIC MODE TEST.
7. Refresh codes.

Did any DTC with an SPN of 002791 appear active other than 002791.13?

YES: Refer to Trouble Shooting Sequence earlier in this procedure.

NO: No DTCs with an SPN or 002791 appeared active. Cleaning cycle fixed problem. Return to service.

NO: Only 002791.13 appeared active. GO TO 6

RG41221,0000292 -19-18FEB09-8/17

6 Visual Inspection of EGR Valve

1. Remove EGR valve.
2. Perform a visual inspection of the valve looking for damaged or broken parts or the poppet not seated against the flange.
3. Check for an obstruction in the manifold that would keep the valve from opening all the way.

Where any problems found?

YES: Damaged EGR valve. Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

YES: Obstruction in manifold. Remove obstruction and clean manifold. Run HARNESS DIAGNOSTIC MODE TEST.

NO: GO TO 7

RG41221,0000292 -19-18FEB09-9/17

7 Visual Inspection of EGR Valve Movement

1. Reconnect EGR valve connector and leave valve out so you can watch it move.

IMPORTANT: Pinch hazard, keep hands away from valve while it cycles.

2. Ignition ON, Engine OFF.
3. Watch EGR valve for full closure and smooth movement.
4. Run HARNESS DIAGNOSTIC MODE TEST.

Did valve move smoothly, open and close fully and 002791.13 reappear active?

YES: Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

NO: Moved smoothly and DTC 002791.31 did not reappear. Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

RG41221,0000292 -19-18FEB09-10/17

8 Occurrence Count Check	1. Ignition OFF, Engine OFF.	
	2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	3. Review occurrence counts in the snapshot capture information for this code.	**YES:** GO TO 9
	Is count greater than five?	**NO:** GO TO 10

RG41221,0000292 -19-18FEB09-11/17

9 EGR Valve Connector Test	1. Disconnect EGR valve connector.	
	2. Perform TERMINAL TEST on EGR valve, harness and connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 10

RG41221,0000292 -19-18FEB09-12/17

10 Engine Hours Between Failures Check	1. Ignition OFF, Engine OFF	
	2. Using Service ADVISOR read and record the current Engine Hourmeter value.	
	3. Retrieve the latest saved snapshot capture and record the Engine Hourmeter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.	
	4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter value.	**YES:** GO TO 11
	Is the difference greater than 50 hours?	**NO:** GO TO 12

RG41221,0000292 -19-18FEB09-13/17

11 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR Valve Clean Test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Troubleshoot that DTC.
	7. Refresh codes.	**NO:** No DTCs appeared. Cleaning fixed problem. Return to service.
	Did 002791.03 or 002791.04 appear active?	**NO:** DTC 002791.13 appeared. Remove and replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

Continued on next page

RG41221,0000292 -19-18FEB09-14/17

12 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 13
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 14

RG41221,0000292 -19-18FEB09-15/17

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Did Code reappear active?	**NO:** GO TO 12 and confirm operating point.

RG41221,0000292 -19-18FEB09-16/17

14 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR Valve Clean Test test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST.	
	7. Refresh codes.	**YES:** Remove and replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Is 002791.13 active?	**NO:** Cleaning Test fixed problem. Return to service.

RG41221,0000292 -19-18FEB09-17/17

002791.31 — EGR Valve Calibration Change Over a Long Time

This code indicates the EGR valve Open and Closed learned values have moved outside of programmed tolerance over a long period of time.

Continued on next page

RG41221,0000294 -19-20JAN09-1/15

002791.31 — EGR Valve Calibration Change over a Long Time Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
002791.03 or 002791.04
002791.13
002791.07
002791.02
002791.31

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information
This code indicates the EGR valve Open and Closed learned values have moved outside of programmed tolerance over a long period of time.

The ECU detects the EGR valve end points are out of specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more information on the EGR valve see EXHAUST GAS RECIRCULATION VALVE in Section 03, Group 135 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST earlier in this Group.

For component location information see COMPONENT LOCATION in Section 3 Group 140 earlier in this manual.

IMPORTANT: When replacing EGR valve be sure to:

- **Change gasket and O-rings.**
- **Lubricate O-rings with clean engine oil.**
- **Inspect intake manifold for debris and buildup.**
- **Clean O-ring lands if necessary with a non metallic instrument.**
- **Vacuum debris from intake manifold.**

IMPORTANT: Ensure valve seats easily by hand when installing.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or EGR VALVE REPLACEMENT/RECALIBRATION CHECK the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). These tests are located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve connector X03 - Red/Green

Continued on next page

RG41221,0000294 -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh codes. Did 002791.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

RG41221,0000294 -19-20JAN09-3/15

2 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the EGR valve connector. 3. Perform a terminal test, see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 3

RG41221,0000294 -19-20JAN09-4/15

3 EGR Valve Reconnection Test	1. Reconnect the EGR valve connector. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Did 002791.31 reappear active?	**YES:** GO TO 4 **NO:** Problem fixed. Bad EGR valve connection.

RG41221,0000294 -19-20JAN09-5/15

4 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector. 2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR Valve Clean Test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Did any DTC with an SPN of 002791 other than 002791.31 appear active?	**YES:** GO TO 5 **NO:** Cleaning cycle fixed problem. Return to service.

Continued on next page

RG41221,0000294 -19-20JAN09-6/15

5 Visual Inspection of EGR Valve

1. Remove EGR valve.	
2. Perform a visual inspection of the valve looking for damaged or broken parts or poppet not seated against the flange.	**YES:** Damaged EGR valve. Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE RECALIBRATION.
3. Check for an obstruction in the manifold that would keep the valve from opening all the way.	**YES:** Obstruction in manifold. Remove obstruction and clean manifold. Run HARNESS DIAGNOSTIC MODE TEST.
Where any problems found?	**NO:** GO TO 6

RG41221,0000294 -19-20JAN09-7/15

6 Visual Inspection of EGR Valve Movement

1. Reconnect EGR valve connector and leave valve out so you can watch it move. **IMPORTANT: Pinch hazard, keep hands away from valve while it cycles.**	
2. Ignition ON, Engine OFF.	
3. Watch EGR valve for full closure and smooth movement.	
4. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
Did valve move smoothly, open and close fully and 002791.31 reappear active?	**NO:** Moved smoothly and DTC 002791.31 did not reappear. Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,0000294 -19-20JAN09-8/15

7 Occurrence Count Check

1. Ignition OFF, Engine OFF.	
2. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
3. Review occurrence counts in the snapshot capture information for this code.	**YES:** GO TO 8
Is count greater that five?	**NO:** GO TO 9

RG41221,0000294 -19-20JAN09-9/15

8 EGR Valve Connector Test

1. Disconnect EGR valve connector.	
2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
Were any problems found?	**NO:** GO TO 9

Continued on next page

RG41221,0000294 -19-20JAN09-10/15

9 Engine Hours Between Failures Check	1. Ignition OFF, Engine OFF	
	2. Using Service ADVISOR read and record the current Engine Hourmeter value.	
	3. Retrieve the latest saved snapshot capture and record the Engine Hourmeter hours. For instructions on retrieving a saved snapshot capture see, SNAPSHOT INSTRUCTIONS earlier in this group.	
	4. Subtract the stored Engine Hourmeter value from the current Engine Hourmeter value.	**YES:** GO TO 10
	Is the difference greater than 50 hours?	**NO:** GO TO 11

RG41221,0000294 -19-20JAN09-11/15

10 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR Valve Clean Test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Troubleshoot that DTC.
	7. Refresh codes.	**NO:** No DTCs appeared. Cleaning fixed problem. Return to service.
	Did 002791.03 or 002791.04 appear active?	**NO:** DTC 002791.31 appeared. Remove and replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.

RG41221,0000294 -19-20JAN09-12/15

11 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 12
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 13

Continued on next page

RG41221,0000294 -19-20JAN09-13/15

12 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** Replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Did Code reappear active?	**NO:** GO TO 10 and confirm operating point.

RG41221,0000294 -19-20JAN09-14/15

13 EGR Valve Cleaning Cycle	1. Reconnect EGR valve connector.	
	2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR Valve Clean Test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST.	
	7. Refresh codes.	**YES:** Remove and replace EGR valve. Recalibrate using EGR VALVE REPLACEMENT/RECALIBRATION CHECK.
	Is 002791.31 active?	**NO:** Cleaning Test fixed problem. Return to service.

RG41221,0000294 -19-20JAN09-15/15

002795.07 — VGT Actuator Not Reaching Expected Position

The ECU senses a mismatch between the actual and desired turbo actuator position.

RG41221,0000295 -19-20JAN09-1/11

002795.07 — VGT Actuator Not Reaching Expected Position Diagnostic Procedure

Troubleshooting Sequence:
000641.12
002795.07

When DTC is Displayed:
Engine must be running (any speed).

Related Information:
The ECU receives a turbo actuator position that is different from the desired turbo actuator position.

Alarm Level:
Warning

Control Unit Response:
The ECU will derate the engine until it is running at 20% of full power.

Additional References:
For more turbo actuator information, see TURBOCHARGER ACTUATOR in Section 03, Group 135 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 04, Group 140 earlier in this manual.

For derate and shutdown information see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: It has been discovered that condensation on the variable geometry turbo linkage can freeze during cold weather and cause turbo fault codes to appear at initial start-up. If this is occurring, letting the application warm up for approximately 2 minutes to thaw the linkage and the problem will resolve itself. If problem does not go away proceed with this troubleshooting procedure.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7

located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST or the VGT Learn Value Reset test the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- VGT actuator connector X04 - Yellow/Purple

Continued on next page

RG41221,0000295 -19-20JAN09-2/11

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh DTC list. Is 002795.07 active?	**YES:** GO TO 2 **NO:** GO TO 4

RG41221,0000295 -19-20JAN09-3/11

2 Actuator Linkage Test	1. Ignition OFF, Engine OFF. **CAUTION: Turbo and linkage may be very hot.** 2. Perform actuator linkage movement test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 4 Group 150 earlier in this manual. Did test pass?	**YES:** GO TO 3 **NO:** Perform actuator linkage movement test, see VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST in Section 4 Group 150 earlier in this manual.

RG41221,0000295 -19-20JAN09-4/11

3 Actuator Position Check	Monitor Turbo Actuator Position - Actual and Turbo Actuator Position - Desired. Are values within 5% of one another?	**YES:** GO TO 4 **NO:** Replace actuator, recalibrate using Service ADVISOR, VGT Learn Value Reset test.

RG41221,0000295 -19-20JAN09-5/11

4 Occurrence Count Check	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 2. Review occurrence counts in the snapshot capture information for this code. Is count greater than five?	**YES:** GO TO 5 **NO:** GO TO 6

RG41221,0000295 -19-20JAN09-6/11

5 VGT Actuator Connector Terminal Test	1. Disconnect VGT actuator connectors. 2. Perform TERMINAL TEST. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 6

Continued on next page

RG41221,0000295 -19-20JAN09-7/11

6 Further Review of Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. Run HARNESS DIAGNOSTIC MODE TEST.
	2. Review information to see if you can determine a possible problem or the operating point that causes the code to become active.	**YES:** Found operating point at which the code becomes active. GO TO 7
	Did you find a possible problem or the operating point at which the code becomes active?	**NO:** GO TO 8

RG41221,0000295 -19-20JAN09-8/11

7 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** GO TO 2
	Did 002795.07 appear active when engine got hot?	**NO:** GO TO 8 and confirm the operating point.

RG41221,0000295 -19-20JAN09-9/11

8 Connector Terminal Test	1. Disconnect ECU J3 (blue face) and VGT connectors.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 9

RG41221,0000295 -19-20JAN09-10/11

9 Actuator Removal and Install	1. Reconnect ECU connector.	
	2. Remove and Install turbo actuator, see REMOVE AND INSTALL TURBOCHARGER ACTUATOR in base engine manual. Recalibrate, see VGT Learn Value Reset test in Service ADVISOR.	
	3. Ignition ON, Engine ON.	
	4. Refresh codes	**YES:** Replace turbo. Recalibrate, see VGT Learn Value Reset test in Service ADVISOR.
	Were any problems found?	**NO:** Return unit to service.

RG41221,0000295 -19-20JAN09-11/11

003509.03 — Sensor Supply #1 Voltage Out of Range High

The ECU detects a supply voltage above specification on the ECU 5 volt supply circuit.

RG41183,000011F -19-20JAN09-1/12

003509.03 — Sensor Supply #1 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003509.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #1 circuit.

The output from this supply comes out of J3 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #1 Voltage:
Fuel Rail Pressure Sensor.

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more sensor supply #1 information, see POWER SUPPLY #1 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel rail pressure sensor P05 - Blue/Orange

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RG41183,000011F -19-20JAN09-2/12

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual.
4. Refresh Codes.

Did 003509.03 reappear active?

YES: GO TO 2

NO: GO TO 5

RG41183,000011F -19-20JAN09-3/12

2 No Load Sensor Supply Voltage Check

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.

NOTE: New error codes will appear in the next step. Disregard all codes except for 003509.03

3. Ignition ON, Engine OFF.
4. Refresh codes.

Is 003509.03 still active?

YES: Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

RG41183,000011F -19-20JAN09-4/12

3 Wiring Harness Short to Battery Check

1. Ignition OFF, Engine OFF.
2. Measure voltage from power terminal (J3-G1) on the ECU harness connector to chassis ground.

Was the voltage greater than 5.5 volts?

YES: Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

RG41183,000011F -19-20JAN09-5/12

4 Wiring Harness Check

1. Disconnect all ECU connectors.
2. Measure resistance from power terminal (J3-G1) on the ECU harness connector to all other terminals of J1, J2 and J3 on the ECU harness.

Were any measurements less than 10 ohms?

YES: Look for shorted wires in harness for those that read 10 ohms or less and repair. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41183,000011F -19-20JAN09-6/12

5 Occurrence Count Check	Review stored information and look at occurrence count for 003509.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

RG41183,000011F -19-20JAN09-7/12

6 Harness Check	1. Ignition OFF, Engine OFF. 2. Inspect ECU connectors and harness wiring for pinched or melted wiring. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all ECU connectors. GO TO 7

RG41183,000011F -19-20JAN09-8/12

7 Further Review of Snapshot Information	Review stored information collected in step 1. Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** If a certain operating point exists when error occurs, GO TO 8 **NO:** GO TO 9

RG41183,000011F -19-20JAN09-9/12

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point of failure and refresh codes. Did 003509.03 reappear when engine operating point was reached?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** GO TO 2 **NO:** GO TO 7 and confirm the operating point.

RG41183,000011F -19-20JAN09-10/12

9 Retest	1. Ignition ON, Engine OFF. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 3. Refresh codes. Is 003509.03 active?	 **YES:** GO TO 2 **NO:** GO TO 10

RG41183,000011F -19-20JAN09-11/12

10 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003509.03 active?	 **YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41183,000011F -19-20JAN09-12/12

003509.04 — Sensor Supply #1 Voltage Out of Range Low

The ECU detects a supply voltage below specification on the ECU 5 volt supply circuit.

RG41183,0000120 -19-20JAN09-1/15

003509.04 — Sensor Supply #1 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003509.04

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage lower than 4.59 volts on the Sensor Supply #1 circuit.

Output from this supply comes from J3 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #1 Voltage:
Fuel Rail Pressure Sensor.

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more Sensor Supply #1 information, see POWER SUPPLY #1 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
-located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

RG41183,0000120 -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003509.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41183,0000120 -19-20JAN09-3/15

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3509.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *Fuel Rail Pressure Sensor* 3. Ignition ON, Engine OFF. 4. Refresh codes. Has 003509.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003509.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

RG41183,0000120 -19-20JAN09-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on the connector of the component just disconnected. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41183,0000120 -19-20JAN09-5/15

4 Check For Shorted Component	Part 1 Measure the resistance between each of the terminals on the component . Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO Part 2.
	Part 2 Measure the resistance from each terminal on the component to chassis ground. Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41183,0000120 -19-20JAN09-6/15

5 Wiring Harness Check	Check wiring harness for pinched or melted wiring. Were any problems found?	**YES:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41183,0000120 -19-20JAN09-7/15

6 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. *NOTE: Many new codes will appear in the next step. Disregard all codes except 3509.04.* 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003509.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

RG41183,0000120 -19-20JAN09-8/15

7 Harness Resistance Check With ECU Disconnected	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Measure the resistance between power (terminal J3-G1) in the ECU harness connector, to all other terminals in the ECU harness connectors J1, J2 and J3. Were any of the measurements less than 10 ohms?	 **YES:** Check for melted or pinched wire in harness for those that measured less than 10 ohms and repair. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. GO TO 2 and verify steps.

RG41183,0000120 -19-20JAN09-9/15

8 Occurrence Count Check	Review stored information and look at occurrence count for 003509.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

RG41183,0000120 -19-20JAN09-10/15

9 Harness Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. Inspect harness wiring for pinched or melted wires. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 10

Continued on next page

RG41183,0000120 -19-20JAN09-11/15

10 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 11 **NO:** GO TO 12

RG41183,0000120 -19-20JAN09-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003509.04 reappear when engine operating point was reached?	**NO:** GO TO 10 and confirm the operating point.

RG41183,0000120 -19-20JAN09-13/15

12 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003509.04 active?	**NO:** GO TO 13

RG41183,0000120 -19-20JAN09-14/15

13 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003509.04 active?	**NO:** Problem fixed, bad ECU program.

RG41183,0000120 -19-20JAN09-15/15

003510.03 — Sensor Supply #2 Voltage Out of Range High

The ECU detects a supply voltage above specification on the ECU 5 volt supply circuit.

RG41183,0000121 -19-10APR08-1/12

003510.03 — Sensor Supply #2 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003510.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #2 circuit.

There are two outputs from this supply. One from J1 and the other from J3. The outputs on J1 are currently not connected to any components.

Alarm Level:
Warning

Sensors Using Sensor Supply #2 Voltage from ECU connector J1:
Currently None.
Sensors Using Sensor Supply #2 Voltage from ECU connector J3:
Intake Manifold Air Pressure Sensor.
Engine Oil Pressure Sensor.
Low Pressure Fuel Pressure Sensor (optional).

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #2 information, see POWER SUPPLY #2 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

Continued on next page

RG41183,0000121 -19-10APR08-2/12

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003510.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

RG41183,0000121 -19-10APR08-3/12

2 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connectors J1 and J3. 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003510.03 still active?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41183,0000121 -19-10APR08-4/12

3 Wiring Harness Short to Battery Check	Look for voltage on Sensor Power Supply #2 Terminal on ECU harness connector. • Measure voltage from power terminal (J3-H4) on the ECU harness connector to chassis ground. Was voltage greater than 5.26 volts?	**YES:** Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41183,0000121 -19-10APR08-5/12

4 Wiring Harness Check	1. Ignition OFF, Engine OFF. 2. Look for shorted wire from Sensor Power Supply #2 to other wires in harness. • Measure resistance from power terminal (J3-H4) on the ECU harness connector to all other terminals of J1, J2 and J3 on the ECU harness. Were any measurements less than 10 ohms?	**YES:** Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41183,0000121 -19-10APR08-6/12

5 Occurrence Count Check	Review stored information and look at occurrence count for 003510.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

RG41183,0000121 -19-10APR08-7/12

6 Harness Check	1. Ignition OFF, Engine OFF. 2. Inspect ECU connectors and harness wiring for pinched or melted wiring. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 7

RG41183,0000121 -19-10APR08-8/12

7 Further Review of Snapshot Information	Review stored information collected in step 1. Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** If a certain operating point exists when error occurs, GO TO 8 **NO:** GO TO 9

RG41183,0000121 -19-10APR08-9/12

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point of failure and refresh codes. Did 003510.03 reappear when engine operating point was reached?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** GO TO 2 **NO:** GO TO 7 and confirm the operating point.

RG41183,0000121 -19-10APR08-10/12

9 Retest	1. Ignition ON, Engine OFF. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 3. Refresh codes. Is 003510.03 active?	 **YES:** GO TO 2 **NO:** GO TO 10

RG41183,0000121 -19-10APR08-11/12

10 Software Updates	1. Download latest software and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003510.03 active?	 **YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41183,0000121 -19-10APR08-12/12

003510.04 — Sensor Supply #2 Voltage Out of Range Low

The ECU detects a supply voltage below specification on the ECU 5 volt supply circuit.

RG41183,0000122 -19-20JAN09-1/15

003510.04 — Sensor Supply #2 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003510.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage lower than 4.59 volts on the Sensor Supply #2 circuit.

The output from this supply comes from ECU connectors, J1 (black face) and J3 (blue face). Currently there are no components connected to the output on J1.

Alarm Level:
Warning

Sensors Using Sensor Supply #2 Voltage from ECU connector J1:
Currently None.
Sensors Using Sensor Supply #2 Voltage from ECU connector J3:
Intake Manifold Air Pressure .
Engine Oil Pressure Sensor.
Low Pressure Fuel Pressure Sensor (optional).

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more Sensor Supply #2 information, see POWER SUPPLY #2 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 2
- see 9.0L 24V WIRING DIAGRAM 2
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine oil pressure sensor P04 - Purple/Gray
- Low pressure fuel sensor P03 - Purple/Gray
- Intake manifold air pressure sensor P01 - Purple/Gray

Continued on next page

RG41183,0000122 -19-20JAN09-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003510.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41183,0000122 -19-20JAN09-3/15

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3510.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *Engine Oil Pressure Sensor* • *Intake Manifold Air Pressure Sensor*. • *Low Pressure Fuel Pressure Sensor (optional)*. 3. Ignition ON, Engine OFF. 4. Refresh codes. Has 003510.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003510.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

RG41183,0000122 -19-20JAN09-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on the connector of the sensor just removed. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41183,0000122 -19-20JAN09-5/15

4 Check For Shorted Component	Part 1 Measure the resistance between each of the terminals on the component just disconnected and record . Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO Part 2.
	Part 2 Measure the resistance from each terminal on the component to chassis ground Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41183,0000122 -19-20JAN09-6/15

5 Wiring Harness Check	Check wiring harness for pinched or melted wiring. Were any problems found?	**YES:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41183,0000122 -19-20JAN09-7/15

6 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connectors J1 and J3. 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003510.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

RG41183,0000122 -19-20JAN09-8/15

7 Harness Resistance Check With ECU Disconnected	1. Ignition OFF, Engine OFF. 2. Look for shorted wires from Sensor Supply #2 to other wires in ECU harness. • Measure resistance from power (terminal J3-H4) of ECU harness connector to all other terminals of harness connectors J1, J2 and J3. Were any of the measurements less than 10 ohms?	 **YES:** Check for melted or pinched wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. GO TO 2

RG41183,0000122 -19-20JAN09-9/15

8 Occurrence Count Check	Review stored information and look at occurrence count for 003510.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

RG41183,0000122 -19-20JAN09-10/15

9 Harness Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connectors. Inspect wiring harness for pinched or melted wiring. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 10

Continued on next page

RG41183,0000122 -19-20JAN09-11/15

10 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 11 **NO:** GO TO 12

RG41183,0000122 -19-20JAN09-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003510.04 reappear when engine operating point was reached?	**NO:** GO TO 10 and confirm the operating point.

RG41183,0000122 -19-20JAN09-13/15

12 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003510.04 active?	**NO:** GO TO 13

RG41183,0000122 -19-20JAN09-14/15

13 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003510.04 active?	**NO:** Problem fixed, bad ECU program.

RG41183,0000122 -19-20JAN09-15/15

003511.03 — Sensor Supply #3 Voltage Out of Range High

The ECU detects a supply voltage above specification on the ECU 5 volt supply circuit.

RG41183,0000123 -19-20JAN09-1/13

003511.03 — Sensor Supply #3 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003511.03

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #3 circuit.

The output from this supply comes out of J2 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #3 Voltage:
Primary Analog Throttle.

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more Sensor Supply #3 information, see POWER SUPPLY #3 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

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RG41183,0000123 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003511.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

RG41183,0000123 -19-20JAN09-3/13

2 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 3 **NO:** GO TO 4

RG41183,0000123 -19-20JAN09-4/13

3 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. *NOTE: New error codes will appear in the next step. Disregard all codes except for 003511.03* 3. Connect ECU Programming Harness. 4. Turn Programming Harness Key Switch to ON. 5. Refresh codes. Is 003511.03 still active?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41183,0000123 -19-20JAN09-5/13

4 Wiring Harness Short to Battery Check	*NOTE: Skip steps 1 and 2 if programming harness is not connected.* 1. Turn Programming Harness Key Switch to OFF and wait for the red LED to turn OFF. 2. Remove ECU Programming Harness. 3. Ignition OFF, Engine OFF, if programming harness not used. 4. Measure voltage from power terminal (J2-A3) on the ECU harness connector to chassis ground. Was the voltage greater than 5.5 volts?	**YES:** Look for shorted wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

Continued on next page

RG41183,0000123 -19-20JAN09-6/13

5 Wire Harness Check	Measure resistance from power terminal (J2-A3) on the ECU harness connector to all other terminals of J1, J2 and J3 on the ECU harness.	**YES:** Look for shorted wires in harness for those measurements that were less than 10 ohms and repair. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 10 ohms?	**NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41183,0000123 -19-20JAN09-7/13

6 Occurrence Count Check	Review stored information and look at occurrence count for 003511.03.	**YES:** GO TO 7
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 8

RG41183,0000123 -19-20JAN09-8/13

7 Harness Check	1. Ignition OFF, Engine OFF.	
	2. Inspect ECU connectors and harness wiring for pinched or melted wiring. If necessary, remove connectors to get a better visual inspection.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 8

RG41183,0000123 -19-20JAN09-9/13

8 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 9
		NO: GO TO 10

RG41183,0000123 -19-20JAN09-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003511.03 reappear when engine operating point was reached?	**NO:** GO TO 8 and confirm the operating point.

Continued on next page

RG41183,0000123 -19-20JAN09-11/13

10 Retest	1. Ignition ON, Engine OFF. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 3. Refresh codes. Is 003511.03 active?	**YES:** GO TO 2 **NO:** GO TO 11

RG41183,0000123 -19-20JAN09-12/13

11 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003511.03 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41183,0000123 -19-20JAN09-13/13

003511.04 — Sensor Supply #3 Voltage Out of Range Low

The ECU detects a supply voltage below specification on the ECU 5 volt supply circuit.

RG41183,0000124 -19-20JAN09-1/16

003511.04 — Sensor Supply #3 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003511.04

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage lower than 4.59 volts on the Sensor Supply #3 circuit.

The output of this supply comes from J2 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #3 Voltage:
Primary Analog Throttle.

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more Sensor Supply #3 information, see POWER SUPPLY #3 in Section 03, Group 140, earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 6
- see 9.0L 24V WIRING DIAGRAM 6
- located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Control panel connector C09 - Yellow/Purple

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RG41183,0000124 -19-20JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160, earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160, earlier in this manual. 4. Refresh Codes. Did 003511.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 9

RG41183,0000124 -19-20JAN09-3/16

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3511.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *Primary Analog Throttle* 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #3 Voltage in Service ADVISOR. 5. Refresh codes. Has 003511.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003511.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

RG41183,0000124 -19-20JAN09-4/16

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on the connector of the sensor just removed. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41183,0000124 -19-20JAN09-5/16

4 Check For Shorted Wires on Related Component	Part 1 Measure the resistance between each of the terminals on the sensor and record . Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO Part 2.
	Part 2 Measure the resistance from each terminal on the sensor to chassis ground Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41183,0000124 -19-20JAN09-6/16

5 Wiring Harness Check	Check wiring harness for pinched or melted wiring. Were any problems found?	**YES:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41183,0000124 -19-20JAN09-7/16

6 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 7 **NO:** GO TO 8

RG41183,0000124 -19-20JAN09-8/16

7 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Connect ECU Programming Harness. *NOTE: Many new codes will appear in the next step. Disregard all codes except 3511.04.* 4. Turn Programming Harness Key Switch to ON. 5. Refresh codes. Is 003511.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST **NO:** GO TO 8

RG41183,0000124 -19-20JAN09-9/16

8 Harness Resistance Check With ECU Disconnected	*NOTE: Skip steps 1 and 2 if programming harness is not connected.* 1. Turn Programming Harness Key Switch to OFF and wait for the red LED to turn OFF. 2. Remove ECU Programming Harness. 3. Ignition OFF, Engine OFF. 4. Measure voltage from power terminal (J2-A3) on the ECU harness connector to chassis ground. Were any of the measurements less than 10 ohms?	 **YES:** Check for melted or pinched wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. GO TO 2

RG41183,0000124 -19-20JAN09-10/16

9 Occurrence Count Check	Review stored information and look at occurrence count for 003511.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 10 **NO:** GO TO 11

Continued on next page

RG41183,0000124 -19-20JAN09-11/16

10 Harness Check	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J2. Inspect wiring harness for pinched or melted wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 11

RG41183,0000124 -19-20JAN09-12/16

11 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 12 **NO:** GO TO 13

RG41183,0000124 -19-20JAN09-13/16

12 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003511.04 reappear when engine operating point was reached?	**NO:** GO TO 10 and verify operating point.

RG41183,0000124 -19-20JAN09-14/16

13 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003511.04 active?	**NO:** GO TO 14

RG41183,0000124 -19-20JAN09-15/16

14 Software Updates	1. Download latest ECU payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003511.04 active?	**NO:** Problem fixed, bad ECU program.

RG41183,0000124 -19-20JAN09-16/16

003512.03 — Sensor Supply #4 Voltage Out of Range High

The ECU detects a supply voltage above specification on the ECU 5 volt supply circuit.

RG41183,0000125 -19-20JAN09-1/13

003512.03 — Sensor Supply #4 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003512.03

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #4 circuit.

The output from this supply comes out of J2 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #4 Voltage:
Secondary Analog Throttle.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #4 information, see POWER SUPPLY #4 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

Continued on next page

RG41183,0000125 -19-20JAN09-2/13

1 Read DTCs and Store Snapshot Information

1. Ignition ON, Engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual.
4. Refresh Codes.

Did 003512.03 reappear active?

YES: GO TO 2

NO: GO TO 6

RG41183,0000125 -19-20JAN09-3/13

2 ECU Programming Harness Availability

Is the ECU programming harness available for use?

YES: GO TO 3

NO: GO TO 4

RG41183,0000125 -19-20JAN09-4/13

3 No Load Sensor Supply Voltage Check

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J2.

NOTE: New error codes will appear in the next step. Disregard all codes except for 003512.03

3. Connect ECU Programming Harness.
4. Turn Programming Harness Key Switch to ON.
5. Refresh codes.

Is 003512.03 still active?

YES: Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

RG41183,0000125 -19-20JAN09-5/13

4 Wiring Harness Short to Battery Check

NOTE: Skip steps 1 and 2 if programming harness is not used.

1. Turn Programming Harness Key Switch to OFF and wait for the red LED to turn OFF.
2. Remove ECU Programming Harness.
3. Ignition OFF, Engine OFF, if programming harness not used.
4. Measure voltage from power terminal (J2-G2) on the ECU harness connector to chassis ground.

Was the voltage greater than 5.5 volts?

YES: Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 5

Continued on next page

RG41183,0000125 -19-20JAN09-6/13

5 Wire Harness Check	Measure resistance from power terminal (J2-G2) on the ECU harness connector to all other terminals of J1, J2 and J3 on the ECU harness.	**YES:** Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 10 ohms?	**NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

RG41183,0000125 -19-20JAN09-7/13

6 Occurrence Count Check	Review stored information and look at occurrence count for 003512.03.	**YES:** GO TO 7
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 8

RG41183,0000125 -19-20JAN09-8/13

7 Harness Check	1. Ignition OFF, Engine OFF.	
	2. Inspect ECU connectors and harness wiring for pinched or melted wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 8

RG41183,0000125 -19-20JAN09-9/13

8 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 9
		NO: GO TO 10

RG41183,0000125 -19-20JAN09-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003512.03 reappear when engine operating point was reached?	**NO:** GO TO 8 and confirm the operating point.

RG41183,0000125 -19-20JAN09-11/13

10 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003512.03 active?	**NO:** GO TO 11

Continued on next page

RG41183,0000125 -19-20JAN09-12/13

11 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003512.03 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41183,0000125 -19-20JAN09-13/13

003512.04 — Sensor Supply #4 Voltage Out of Range Low

The ECU detects a supply voltage below specification on the ECU 5 volt supply circuit.

RG41183,0000126 -19-10APR08-1/15

003512.04 — Sensor Supply #4 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003512.04

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage lower than 4.59 volts on the Sensor Supply #4 circuit.

Output from this supply comes from J2 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #4 Voltage:
Secondary Analog Throttle.

Control Unit Response:
The ECU will try to maintain the engine operating envelope. Engine performance may be affected.

Additional References:
For more Sensor Supply #4 information, see POWER SUPPLY #4 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 5
- see 9.0L 24V WIRING DIAGRAM 5
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Auxiliary connector C08 - Yellow/Purple

Continued on next page

RG41183,0000126 -19-10APR08-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003512.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41183,0000126 -19-10APR08-3/15

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3512.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *Secondary Analog Throttle* 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #4 Voltage in Service ADVISOR. 5. Refresh codes. Has 003512.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003512.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

RG41183,0000126 -19-10APR08-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on the connector of the sensor just removed. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41183,0000126 -19-10APR08-5/15

4 Check For Shorted Wires on Related Component	Part 1 Measure the resistance between each of the terminals on the sensor . Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO Part 2.
	Part 2 Measure the resistance from each terminal on the sensor to chassis ground. Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41183,0000126 -19-10APR08-6/15

5 Wiring Harness Check	Check wiring harness for pinched or melted wiring. Were any problems found?	**YES:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41183,0000126 -19-10APR08-7/15

6 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. *NOTE: Many new codes will appear in the next step. Disregard all codes except 3512.04.* 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #4 Voltage in Service ADVISOR. 5. Refresh codes. Is 003512.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

RG41183,0000126 -19-10APR08-8/15

7 Harness Resistance Check With ECU Disconnected	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Measure the resistance between power (terminal J2-G2) in the ECU harness connector, to all other terminals in the ECU harness connectors J1, J2 and J3. Were any of the measurements less than 10 ohms?	 **YES:** Check for melted or pinched wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Problem not found, reconnect all connectors. GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

RG41183,0000126 -19-10APR08-9/15

8 Occurrence Count Check	Review stored information and look at occurrence count for 003512.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

Continued on next page

RG41183,0000126 -19-10APR08-10/15

9 Harness Check	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J2. Inspect harness wiring for pinched or melted wires.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 10

RG41183,0000126 -19-10APR08-11/15

10 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 11 **NO:** GO TO 12

RG41183,0000126 -19-10APR08-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003512.04 reappear when engine operating point was reached?	**NO:** GO TO 10

RG41183,0000126 -19-10APR08-13/15

12 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003512.04 active?	**NO:** GO TO 13

RG41183,0000126 -19-10APR08-14/15

13 Software Updates	1. Download the latest ECU software payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003512.04 active?	**NO:** Problem fixed, bad ECU program.

RG41183,0000126 -19-10APR08-15/15

003513.03 — Sensor Supply #5 Voltage Out of Range High

The ECU detects a supply voltage above specification on the ECU 5 volt supply circuit.

RG41183,0000127 -19-20JAN09-1/12

003513.03 — Sensor Supply #5 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003513.03

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #5 circuit.

The output from this supply comes out of J3 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #5 Voltage:
EGR Valve.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more sensor supply #5 information, see POWER SUPPLY #5 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

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RG41183,0000127 -19-20JAN09-2/12

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003513.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

RG41183,0000127 -19-20JAN09-3/12

2 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. *NOTE: New error codes will appear in the next step. Disregard all codes except for 003513.03* 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003513.03 still active?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

RG41183,0000127 -19-20JAN09-4/12

3 Wiring Harness Short to Battery Check	1. Ignition OFF, Engine OFF. 2. Measure voltage from power (terminal J3-A2) on the ECU harness connector to chassis ground. Was the voltage greater than 5.5 volts?	**YES:** Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

RG41183,0000127 -19-20JAN09-5/12

4 Wiring Harness Check	1. Disconnect all ECU connectors. 2. Measure resistance from power terminal (J3-A2) on the ECU harness connector to all other terminals of J1, J2 and J3 on the ECU harness. Were any measurements less than 10 ohms?	**YES:** Look for shorted wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

RG41183,0000127 -19-20JAN09-6/12

5 Occurrence Count Check	Review stored information and look at occurrence count for 003513.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

RG41183,0000127 -19-20JAN09-7/12

6 Harness Check	1. Ignition OFF, Engine OFF. 2. Inspect ECU connectors and harness wiring for pinched or melted wiring. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all ECU connectors. GO TO 7

RG41183,0000127 -19-20JAN09-8/12

7 Further Review of Snapshot Information	Review stored information collected in step 1. Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** If a certain operating point exists when error occurs, GO TO 8 **NO:** GO TO 9

RG41183,0000127 -19-20JAN09-9/12

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point of failure and refresh codes. Did 003513.03 reappear when engine operating point was reached?	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** GO TO 2 **NO:** GO TO 7

RG41183,0000127 -19-20JAN09-10/12

9 Retest	1. Ignition ON, Engine OFF. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 3. Refresh codes. Is 003513.03 active?	 **YES:** GO TO 2 **NO:** GO TO 10

RG41183,0000127 -19-20JAN09-11/12

10 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003513.03 active?	 **YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

RG41183,0000127 -19-20JAN09-12/12

003513.04 — Sensor Supply #5 Voltage Out of Range Low

The ECU detects a supply voltage below specification on the ECU 5 volt supply circuit.

RG41183,0000128 -19-10APR08-1/15

003513.04 — Sensor Supply #5 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003513.04

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage lower than 4.59 volts on the Sensor Supply #5 circuit.

The output of this supply comes from J3 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #5 Voltage:
EGR Valve.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #5 information, see POWER SUPPLY #5 in Section 03, Group 140, earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 9.0L 12V WIRING DIAGRAM 7
- see 9.0L 24V WIRING DIAGRAM 7
-located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve sensor X03 - Red/Green

Continued on next page

RG41183,0000128 -19-10APR08-2/15

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR in Section 04, Group 160, earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160, earlier in this manual. 4. Refresh Codes. Did 003513.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41183,0000128 -19-10APR08-3/15

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3513.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *EGR Valve Position* 3. Ignition ON, Engine OFF. 4. Refresh codes. Has 003513.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003513.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

RG41183,0000128 -19-10APR08-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on the connector of the sensor just removed. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

RG41183,0000128 -19-10APR08-5/15

4 Check For Shorted Component	Part 1 Measure the resistance between each of the terminals on the sensor and record . Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO Part 2.
	Part 2 Measure the resistance from each terminal on the sensor to chassis ground Were any measurements less than 10 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 5

Continued on next page

RG41183,0000128 -19-10APR08-6/15

5 Wiring Harness Check	Check wiring harness for pinched or melted wiring. Were any problems found?	**YES:** Repair wiring. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

RG41183,0000128 -19-10APR08-7/15

6 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003513.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

RG41183,0000128 -19-10APR08-8/15

7 Harness Resistance Check With ECU Disconnected	1. Ignition OFF, Engine OFF. 2. Look for shorted wires from Sensor Supply #5 to other wires in ECU harness. • Measure resistance from power (terminal J3-A2) of ECU harness connector to all other terminals of harness connectors J1, J2 and J3. Were any of the measurements less than 10 ohms?	 **YES:** Check for melted or pinched wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Reconnect all connectors. GO TO 2

RG41183,0000128 -19-10APR08-9/15

8 Occurrence Count Check	Review stored information and look at occurrence count for 003513.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

RG41183,0000128 -19-10APR08-10/15

9 Harness Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J3. Inspect wiring harness for pinched or melted wiring. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 10

Continued on next page

RG41183,0000128 -19-10APR08-11/15

10 Further Review of Snapshot Information	Review stored information collected in step 1.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs, GO TO 11 **NO:** GO TO 12

RG41183,0000128 -19-10APR08-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003513.04 reappear when engine operating point was reached?	**NO:** GO TO 10 and confirm operating point.

RG41183,0000128 -19-10APR08-13/15

12 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003513.04 active?	**NO:** GO TO 13

RG41183,0000128 -19-10APR08-14/15

13 Software Updates	1. Download latest ECU payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003513.04 active?	**NO:** Problem fixed, bad ECU program.

RG41183,0000128 -19-10APR08-15/15

003587.05 — Ether Hold Control Circuit Has High Resistance

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000147 -19-30OCT08-1/1

003587.06 — Ether Hold Control Circuit Has Low Resistance

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000148 -19-30OCT08-1/1

003587.11 — Ether Aid Malfunction

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,000005E -19-16APR10-1/1

523379.03 — Single Point Ground #7 Has High Resistance

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000065B -19-30MAY08-1/1

523744.31 — A/C Compressor is ON When it Should be OFF

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000065C -19-30MAY08-1/1

523926.03 — Reverse Pump Pressure Sensor #1 Signal Out Of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000065D -19-30JUL07-1/1

523926.04 — Reverse Pump Pressure Sensor #1 Signal Out Of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000065E -19-11JUL07-1/1

523927.03 — Forward Pump Pressure Sensor #2 Signal Out Of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000065F -19-23JUL07-1/1

523927.04 — Forward Pump Pressure Sensor #2 Signal Out Of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000660 -19-23JUL07-1/1

Section 05
Tools

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How to make tools 05-190-1
DFRG9 - Manometer 05-190-1

Repair and Adjustment Tools

NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC).

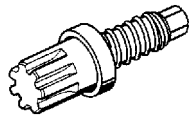
SERVICEGARD is a trademark of Deere & Company

RG41221,00001C7 -19-25NOV08-1/10

Flywheel Turning Tool..... JDG820

Used to rotate engine flywheel to lock engine at "TDC" to check high pressure fuel pump timing. Use with JDE81-4 Timing Pin.

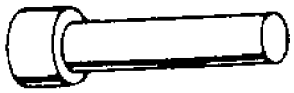
RG7056 —UN—17JUN05



RG41221,00001C7 -19-25NOV08-2/10

Timing Pin.....JDE81-4

Used to lock engine at "TDC". Use with JDG820 Flywheel Turning Tool.



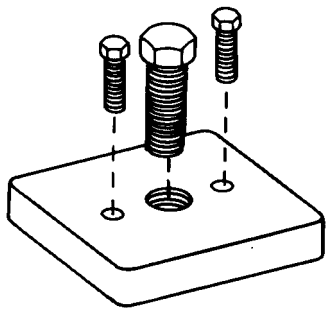
RG5068

RG5068 —UN—05DEC97

RG41221,00001C7 -19-25NOV08-3/10

Injection Pump Drive Gear Puller JDG10015

Remove drive gear from tapered shaft on Denso HP4 high pressure fuel pump.



JDG10015

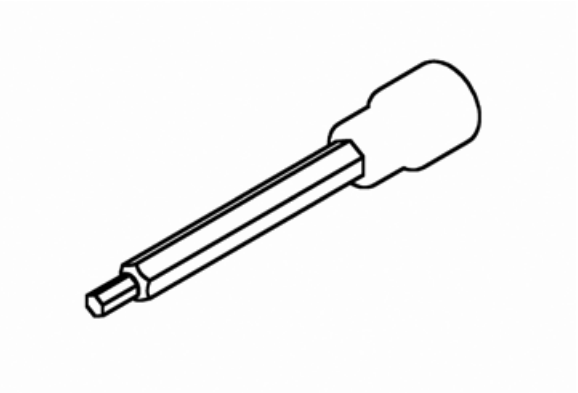
RG6032 —UN—13JAN92

Continued on next page

RG41221,00001C7 -19-25NOV08-4/10

Fuel Pump Screw Remover..... JDG10025

Use to remove and install deep seated fuel pump mounting screw



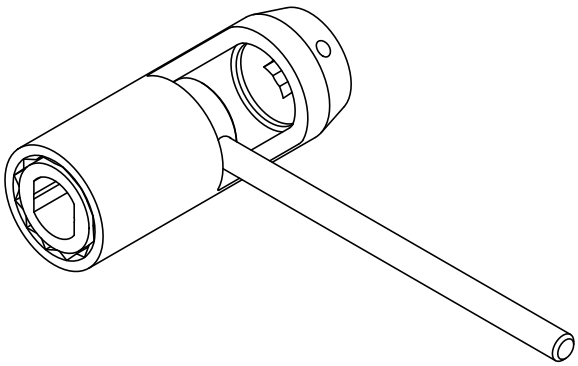
RG14226 —UN—20OCT06

Fuel Pump Screw Remover

RG41221,00001C7 -19-25NOV08-5/10

Feed Tube Torque Tool..... JDG10263

Used to hold injector fuel feed tube in place while tightening holding nut, in order to prevent galling of the end of the tube, and to reduce leaks.



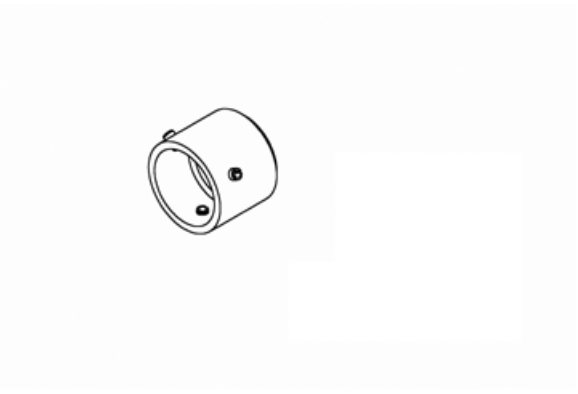
RG14837A —UN—03OCT08

Feed Tube Torque Tool

RG41221,00001C7 -19-25NOV08-6/10

Wiring Harness Nut Socket JDG1949

Used to remove and connect the injector harness coupling.



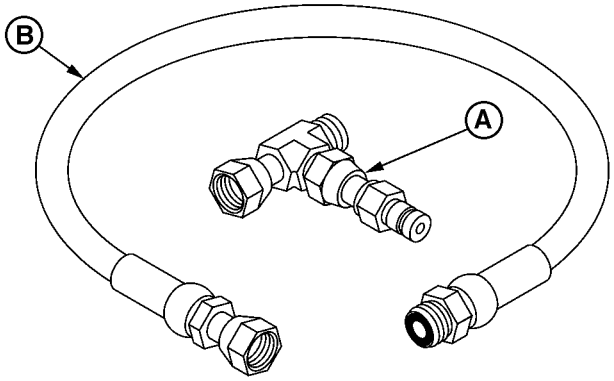
RG14219 —UN—26OCT05

Continued on next page

RG41221,00001C7 -19-25NOV08-7/10

Fuel Supply System Test Kit.....JT03513

Fuel Pressure Test Fitting is used with JT05472 Universal Pressure Test Kit to measure fuel transfer pump pressure. Fuel Air Detection Line is used to determine if air is present in fuel system. Kit consists of: JT03509 Fuel Pressure Test Fitting (A) and JT03513-1 Fuel Air Detection Line (B).



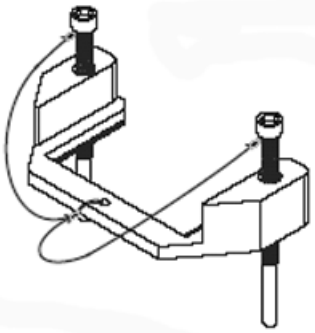
RG9041 —UN—21NOV97

JT03513

RG41221,00001C7 -19-25NOV08-8/10

EGR Removal Tool..... JDG10194

Used to remove EGR valve without damaging O-rings.



RG14880 —UN—08AUG06

EGR Removal Tool

RG41221,00001C7 -19-25NOV08-9/10

Fuel Rail Plug and Cap Kit JDG10760

Used to cap off fuel rail and plug corresponding line to determine if an injector is leaking and causing no rail pressure to be developed.

RG16331 —UN—22OCT08

Fuel Rail Plug and Cap Kit

RG41221,00001C7 -19-25NOV08-10/10

Electronic Fuel System Diagnostic Tools

Continued on next page

RE38635,0000156 -19-20OCT06-1/2

Compression Test Adapter JDG2047

Used to mechanically test cylinder compression for 9L engines. This is not an essential tool.

RG14220 —UN—20OCT06

Mechanical Compression Test Adapter

RE38635,0000156 -19-20OCT06-2/2

Connector Repair Tools

NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC).

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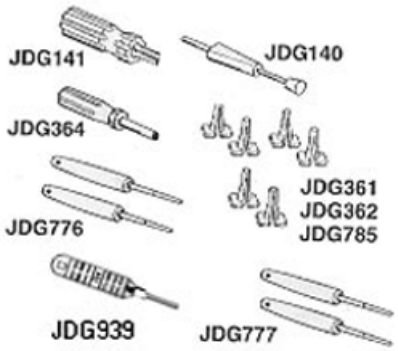
RG41221,00001C9 -19-27JUL07-1/9

Technician's Electrical Repair Kit..... JT07195B

This kit is assembled with the most commonly used tools used to repair wiring harnesses. This kit includes the following: **JDG140** - CPC and Metrimate terminal extraction tool, **JDG141** - CPC Blade Type terminal extraction tool, **JDG361** - Deutsch 12-14 gauge terminal extraction/insertion tool, **JDG362** - Deutsch 16-18 gauge terminal extraction/insertion tool, **JDG364** - WEATHERPACK terminal extraction tool, **JDG776** - Metripack terminal extraction tool - Wide, **JDG777** - METRI-PACK terminal extraction tool - Narrow, **JDG785** - Deutsch 6-8 gauge terminal extraction/insertion tool, and **JDG939** Metri-Pack Extraction Tool.

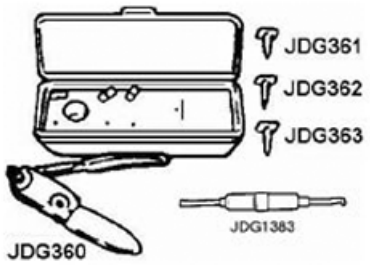


RG14535 —UN—17OCT05

RG41221,00001C9 -19-27JUL07-2/9

DEUTSCH™ Electrical Repair Tool Kit..... JDG359

Used to extract terminals from DEUTSCH™ electrical connectors. A special crimping tool is also included to crimp DEUTSCH terminals on wires. The following tools are included: **JDG360** - Deutsch Terminal Crimping Tool, **JDG361** - Deutsch 12-14 gauge terminal extraction/insertion tool (set of 2), **JDG362** - Deutsch 16-18 gauge terminal extraction/insertion tool (set of 2), **JDG363** - Deutsch 20-24 gauge terminal extraction/insertion tool (set of 2), and **JDG1383** - Deutsch Terminal Tool



RG14534 —UN—16OCT05

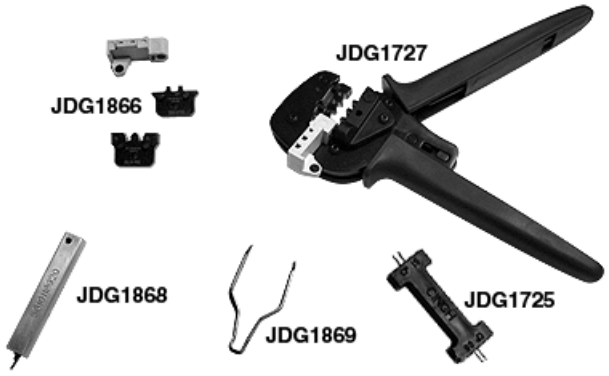
DEUTSCH is a trademark of Deutsch Co.

Continued on next page

RG41221,00001C9 -19-27JUL07-3/9

Flex Box Terminal Repair Kit JDG1744

Used for extracting and crimping Cinch terminals from Flex Box ECU connectors. A tool is also provided to unlock the connector cover for removal. The following tools are included: **JDG1727** - Crimper Tool, **JDG 1725** - Removal Tool, **JDG 1866** - Additional Jaw Set for Crimper (3 Pieces), **JDG1868** - Terminal Extraction Tool, **JDG1869** - Connector Cover Unlock Tool (Set of Two).



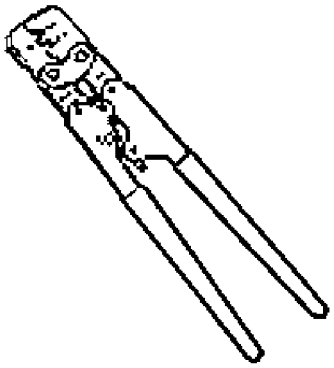
RG15124 —UN—25JUN07

JDG1744 Flex Box Terminal Repair Kit

RG41221,00001C9 -19-27JUL07-4/9

WEATHER PACK™ Crimping Tool..... JDG783

Used to crimp WEATHER PACK™ male and female terminals on 14-20 gauge wires. This tool crimps both the wire and the seal retainer at the same time.



RW25542A —UN—07MAR02

WEATHER PACK is a trademark of Packard Electric

RG41221,00001C9 -19-27JUL07-5/9

METRI-PACK™ Crimping Tool JDG865

Used to crimp push-type METRI-PACK™ male and female terminals on 14-20 gauge wires.

RG14531 —UN—14OCT05

METRI-PACK is a trademark of Packard Electric Inc.

Continued on next page

RG41221,00001C9 -19-27JUL07-6/9

Packard Crimper..... JDG707

Used to crimp WEATHER PACK, METRIPACK, SUMITOMO, and YAZAKI male and female terminals on 12-20 gauge wires. This tool crimps the wire and the seal retainer separately.

RG11679 —UN—05FEB01

RG41221,00001C9 -19-27JUL07-7/9

Crimping Pliers JDG144

Used for crimping open barrel terminals

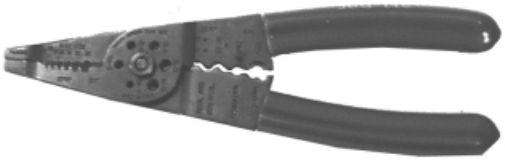
RG10739 —UN—26MAY00

JDG144 Crimping Pliers

RG41221,00001C9 -19-27JUL07-8/9

Electrician's Pliers JDG145

Used for stripping wire and crimping ring style and insulated terminals.



RG11686 —UN—13FEB01

RG41221,00001C9 -19-27JUL07-9/9

Other Material

Number	Name	Use
TY6333 (U.S.)	High Temperature Grease (NLGI Grade 2) (JDM J13C7 and J25C)	Sensor O-rings.
PM37418 (U.S.) PM38621 (Canadian) 242 (LOCTITE®)	Thread Lock and Sealer, medium strength (6 ml)	Applied to screw threads

LOCTITE is a registered trademark of Loctite Corp.

RG41221,00001CA -19-28JUL07-1/1

Diagnostic Tools

NOTE: Order tools (non-ECU communication parts and kits) according to information given in the U.S. SERVICEGARD™ Catalog or in the European Microfiche Tool Catalog (MTC) unless otherwise noted.

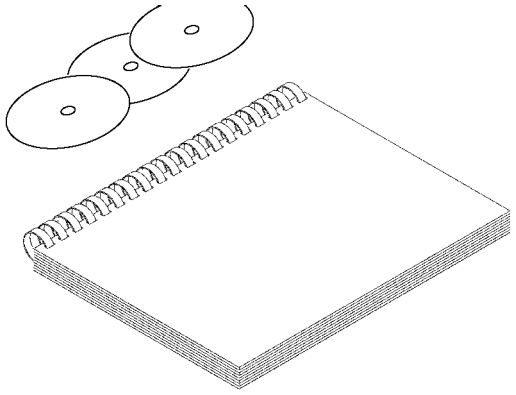
NOTE: ECU communication parts and kits are available from John Deere Distribution Service Center (DSC). **United States and Canadian Agricultural dealers DO NOT ORDER without first contacting your Branch or TAM.**

SERVICEGARD is a trademark of Deere & Company.

RG41221,00001CB -19-16JUN09-1/10

ECU Communication Software.....

Please refer to your John Deere Dealer website for information on obtaining the latest version of software.



RG8554 —UN—17OCT05

RG41221,00001CB -19-16JUN09-2/10

Digital Multimeter.....JT07306

Measure voltage, current, resistance, and frequency of electronic circuits. Optional temperature probe is available. Display has backlight control and records Min/Max values. Operates with 9 volt battery.

RG11126 —UN—08JUN07

JT07306 - Digital Multimeter

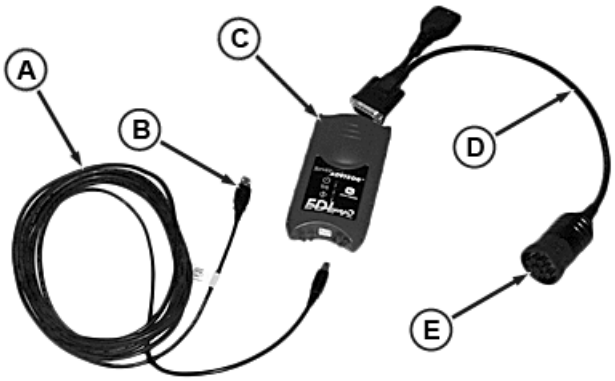
Continued on next page

RG41221,00001CB -19-16JUN09-3/10

ECU Communication Hardware Mini Kit (EDL) SA1001

Used with ECU Communication Software Kit, this kit enables a Windows-compatible computer to read information from the Engine Control Unit (ECU). The computer must be at least a Pentium 1 with 512 of RAM and a USB port. This kit allows communication with applications that use the black 9-pin Deutsch diagnostic connector. Kit includes USB cable, Electronic Data Link (EDL), cable to connect to the 9-pin diagnostic connector on the engine harness, and case. Kit parts may be purchased separately.

A—USB Cable
B—to PC with Service ADVISOR
C—EDL (Electronic Data Link)
D—John Deere Controller Cable
E—to 9-Pin Diagnostic Connector on Engine



RG16537 —UN—31OCT08

Carrying case not shown

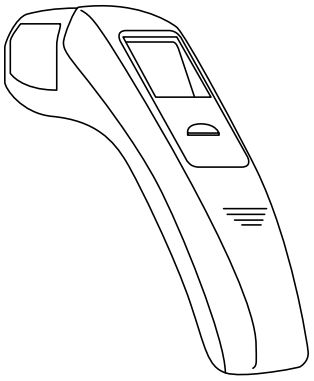
RG41221,00001CB -19-16JUN09-4/10

NOTE: The original ECU Communication Hardware Mini Kit DS10117 will allow ECU communication however may no longer be ordered.

RG41221,00001CB -19-16JUN09-5/10

Infrared Temperature Gun JT07253

Measures the heat of objects up to 932°F (500°C).



RG16019 —UN—19DEC07

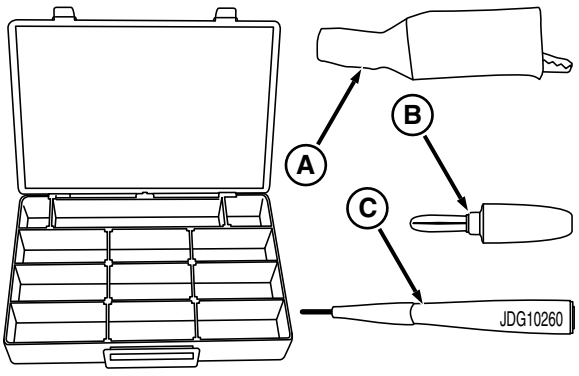
Infrared Temperature Gun

RG41221,00001CB -19-16JUN09-6/10

Connector Adapter Test Kit..... JDG10466

Tests terminals without spreading them apart.

A—Alligator Clip
B—Probe Adapter
C—Flex Probe



RG16031 —UN—20DEC07

Connector Adapter Test Kit

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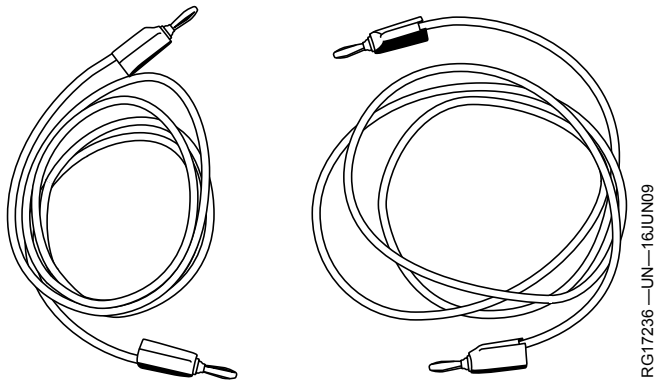
RG41221,00001CB -19-16JUN09-7/10

Jumper Leads..... J-35616-20

Closes or bypasses part of an electrical circuit

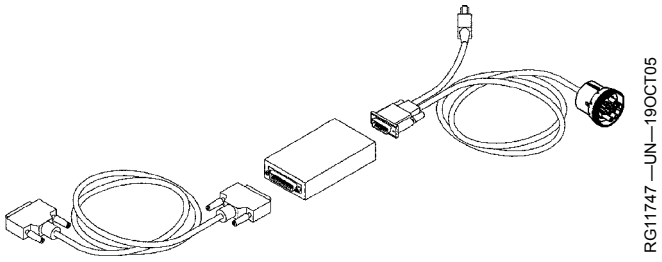


Jumper Leads

RG41221,00001CB -19-16JUN09-8/10

ECU Communication Hardware Kit (PDM).....DS10023

Used with ECU Communication Software Kit. Together, the kit enables a Windows ('95, '98, 2000, ME, and XP) or NT compatible computer to read information from the Engine Control Unit (ECU). The computer must be at least a 486/66 with 8 MB of RAM and an IEEE compliant parallel port. This kit allows communication with all John Deere applications that use the black 9-pin Deutsch diagnostic connector.



RG41221,00001CB -19-16JUN09-9/10

NOTE: This kit is no longer orderable. The blue EDL (Electronic Data Link) is the supported interface for ECU communication.

RG41221,00001CB -19-16JUN09-10/10

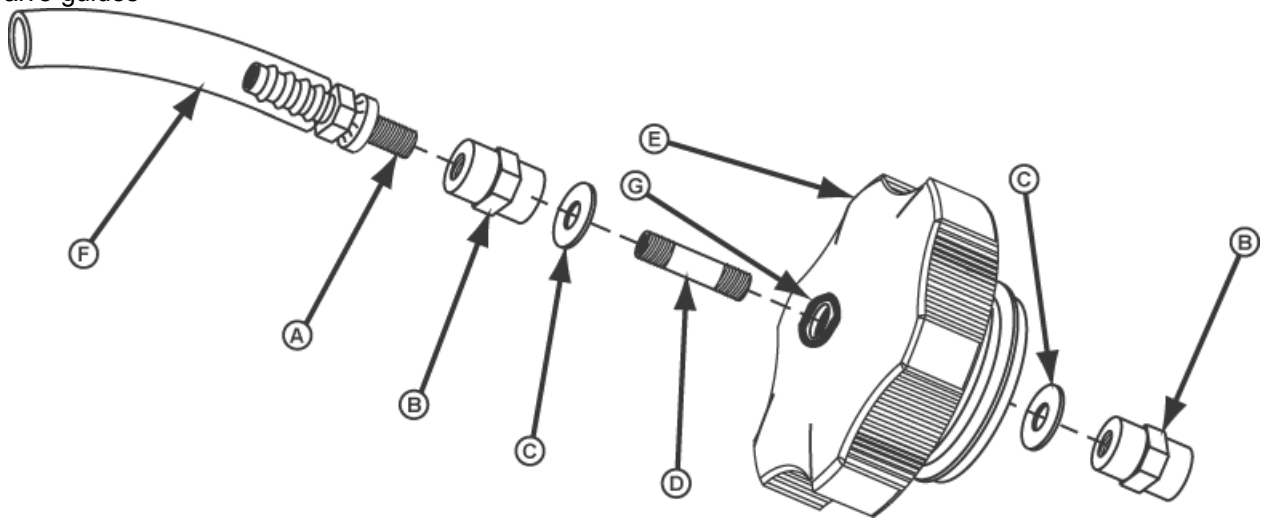
How to make tools

These tools can be made in a service shop using common shop tools and locally obtained materials.

DB92450,0000005 -19-29SEP06-1/1

DFRG9 - Manometer

Used to test for blow-by past piston rings, turbocharger, and valve guides



RG15140 —UN—13OCT06

DFRG9 - Manometer

A—Barb Connector (R65785)
B—Coupler Hex 14.25 mm (9/16 in) x 1/8NPT
C—Washer (24M7239)
D—Nipple (6.35cm (2.5 in)L x 1/8 NPT)
E—Oil Fill Cap (RE500250)
F—Clear Plastic Flexible Tubing, 6.35 mm (1/4" in) i.d. (minimum 91.446 cm (3.0 ft))
G—Silicone-based Sealant

Tools and Materials Required: Two each 14.25 mm (9/16 in) wrenches; One each 11.1125 mm (7/16 in) wrench; small pipe wrench; Sealant

Manufacture Manometer as follows:

1. Thread barb connector (A) into coupler (B), and tighten using 11.1125 mm (7/16 in) and 14.25 mm (9/16 in) wrenches.
2. Thread nipple (D) into other end of same coupler, and tighten using 14.25 mm (9/16 in) wrench and small pipe wrench.
3. With 11.1125 mm (7/16 in) drill bit, from top of cap (E) drill completely through cap.
4. Fit washer (C) onto close-fit nipple.
5. Push opposite end of nipple into hole in cap, until nipple end is through bottom of cap and washer is flush with top of cap.
6. Fit second washer (C) onto open end of nipple.
7. Thread second coupler onto open end of nipple), and tighten using two 14.25 mm (9/16 in) wrenches, until both washers are flush and snug to both ends of cap.
8. Fit end of tubing (F) onto barbed end of barb connector, as shown above.

DB92450,0000006 -19-06OCT10-1/1

Section 06
Specifications

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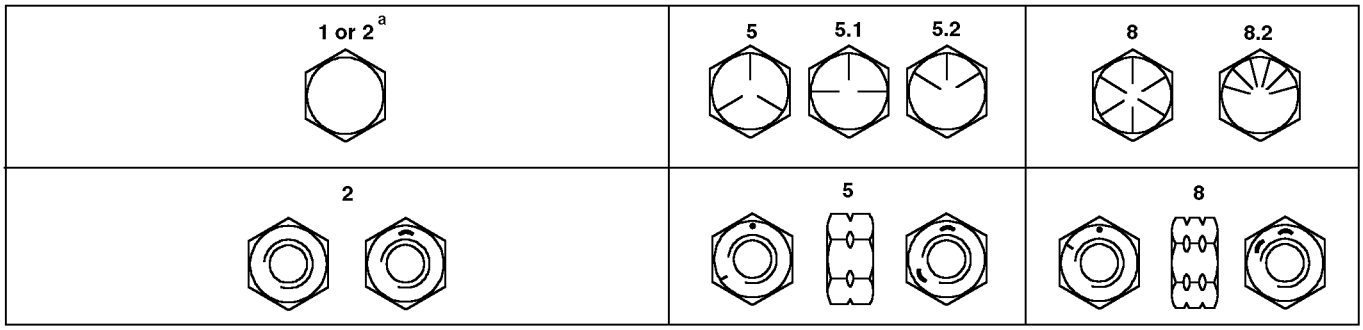
Unified Inch Bolt and Cap Screw Torque Values



Top, SAE Grade and Head Markings; Bottom, SAE Grade and Nut Markings

	Grade 1 (No Mark)		Grade 2[a] (No Mark)		Grade 5, 5.1 or 5.2		Grade 8 or 8.2	
Size	**Lubricated[b] N·m(lb-ft)**	**Dry[c] N·m(lb-ft)**	**Lubricated[b] N·m(lb-ft)**	**Dry[c] N·m(lb-ft)**	**Lubricated[b] N·m(lb-ft)**	**Dry[c] N·m(lb-ft)**	**Lubricated[b] N·m(lb-ft)**	**Dry[c] N·m(lb-ft)**
1/4	3.8 (2.8)	4.7 (3.5)	6 (4.4)	7.5 (5.5)	9.5 (7)	12 (9)	13.5 (10)	17 (12.5)
5/16	7.7 (5.7)	9.8 (7.2)	12 (9)	15.5 (11.5)	19.5 (14.5)	25 (18.5)	28 (20.5)	35 (26)
3/8	13.5 (10)	17.5 (13)	22 (16)	27.5 (20)	35 (26)	44 (32.5)	49 (36)	63 (46)
7/16	22 (16)	28 (20.5)	35 (26)	44 (32.5)	56 (41)	70 (52)	80 (59)	100 (74)
1/2	34 (25)	42 (31)	53 (39)	67 (49)	85 (63)	110 (80)	120 (88)	155 (115)
9/16	48 (35.5)	60 (45)	76 (56)	95 (70)	125 (92)	155 (115)	175 (130)	220 (165)
5/8	67 (49)	85 (63)	105 (77)	135 (100)	170 (125)	215 (160)	240 (175)	305 (225)
3/4	120 (88)	150 (110)	190 (140)	240 (175)	300 (220)	380 (280)	425 (315)	540 (400)
7/8	190 (140)	240 (175)	190 (140)	240 (175)	490 (360)	615 (455)	690 (510)	870 (640)
1	285 (210)	360 (265)	285 (210)	360 (265)	730 (540)	920 (680)	1030 (760)	1300 (960)
1-1/8	400 (300)	510 (375)	400 (300)	510 (375)	910 (670)	1150 (850)	1450 (1075)	1850 (1350)
1-1/4	570 (420)	725 (535)	570 (420)	725 (535)	1280 (945)	1630 (1200)	2050 (1500)	2600 (1920)
1-3/8	750 (550)	950 (700)	750 (550)	950 (700)	1700 (1250)	2140 (1580)	2700 (2000)	3400 (2500)
1-1/2	990 (730)	1250 (930)	990 (730)	1250 (930)	2250 (1650)	2850 (2100)	3600 (2650)	4550 (3350)

[a] Grade 2 applies for hex cap screws (not hex bolts) up to 6 in. (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

[b] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

[c] "Dry" means plain or zinc plated without any lubrication.

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

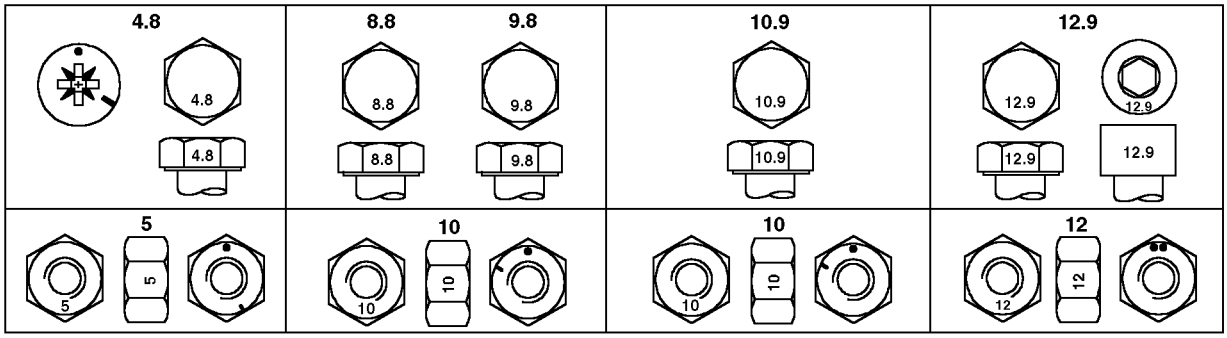
Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

RG41221,00001CC -19-15OCT07-1/1

Metric Bolt and Cap Screw Torque Values



Top, Property Class and Head Markings; Bottom, Property Class and Nut Markings

	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
Size	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**
M6	4.7 (3.5)	6 (4.4)	9 (6.6)	11.5 (8.5)	13 (9.5)	16.5 (12.2)	15.5 (11.5)	19.5 (14.5)
M8	11.5 (8.5)	14.5 (10.7)	22 (16)	28 (20.5)	32 (23.5)	40 (29.5)	37 (27.5)	47 (35)
M10	23 (17)	29 (21)	43 (32)	55 (40)	63 (46)	80 (59)	75 (55)	95 (70)
M12	40 (29.5)	50 (37)	75 (55)	95 (70)	110 (80)	140 (105)	130 (95)	165 (120)
M14	63 (46)	80 (59)	120 (88)	150 (110)	175 (130)	220 (165)	205 (150)	260 (190)
M16	100 (74)	125 (92)	190 (140)	240 (175)	275 (200)	350 (255)	320 (235)	400 (300)
M18	135 (100)	170 (125)	265 (195)	330 (245)	375 (275)	475 (350)	440 (325)	560 (410)
M20	190 (140)	245 (180)	375 (275)	475 (350)	530 (390)	675 (500)	625 (460)	790 (580)
M22	265 (195)	330 (245)	510 (375)	650 (480)	725 (535)	920 (680)	850 (625)	1080 (800)
M24	330 (245)	425 (315)	650 (480)	820 (600)	920 (680)	1150 (850)	1080 (800)	1350 (1000)
M27	490 (360)	625 (460)	950 (700)	1200 (885)	1350 (1000)	1700 (1250)	1580 (1160)	2000 (1475)
M30	660 (490)	850 (625)	1290 (950)	1630 (1200)	1850 (1350)	2300 (1700)	2140 (1580)	2700 (2000)
M33	900 (665)	1150 (850)	1750 (1300)	2200 (1625)	2500 (1850)	3150 (2325)	2900 (2150)	3700 (2730)
M36	1150 (850)	1450 (1075)	2250 (1650)	2850 (2100)	3200 (2350)	4050 (3000)	3750 (2770)	4750 (3500)

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.*

[b] *"Dry" means plain or zinc plated without any lubrication.*

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

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Electronic Air System Repair and Adjustment Specifications

Item	Measurement	Specification
EGR Cooler-to-Intake Manifold	Torque	34 N·m (25 lb-ft)
EGR Valve-to-Intake Manifold	Torque	11 N·m (8 lb-ft)
EGR Coolant Return Line to Cooler	Torque	11 N·m (8 lb-ft)
EGR Coolant Return Line P-Clamp Cap Screw	Torque	30 N·m (22 lb-ft)
EGR Coolant Supply Line to Cooler	Torque	11 N·m (8 lb-ft)
EGR Supply Line P-Clamp Cap Screw	Torque	30 N·m (22 lb-ft)
Turbocharger-to-Exhaust Manifold Cap Screws	Torque	40 N·m (30 lb-ft)
Turbo Charger Oil Supply Line Support Brackets	Torque	35 N·m (26 lb-ft)
Turbo Charger Oil Supply Line P-Clamp Cap Screws	Torque	15 N·m (11 lb-ft)
Turbo Charger Oil Supply Line to Turbo Charger Inlet	Torque	24 N·m (15 lb-ft)
Turbo Charger Oil Supply Line to Oil Filter Adaptor	Torque	24 N·m (15 lb-ft)
Turbo Charger Oil Drain Line	Torque	35 N·m (26 lb-ft)
Turbo Charger Oil Drain Line to Cylinder Block	Torque	60 N·m (44 lb-ft)
Turbocharger Oil Inlet Line P-Clamps	Torque	35 N·m (25 lb-ft)
Turbocharger Oil Inlet Line (At Turbocharger)	Torque	30 N·m (22 lb-ft)
Turbocharger Oil Inlet Line (At Oil Filter Header)	Torque	30 N·m (22 lb-ft)
Actuator Coolant Line P-Clamps	Torque	35 N·m (25 lb-ft)
Actuator Coolant Supply Line (At Actuator)	Torque	30 N·m (22 lb-ft)
Actuator Coolant Supply Line (At Cylinder Block)	Torque	30 N·m (22 lb-ft)
Actuator Coolant Return Line (At Actuator)	Torque	30 N·m (22 lb-ft)
Actuator Coolant Return Line (At Thermostat)	Torque	30 N·m (22 lb-ft)
Heat Shield to Intake Manifold	Torque	35 N·m (26 lb-ft)

DM59778,000006C -19-23JUL07-1/1

Electronic Fuel System Repair and Adjustment Specifications

Item	Measurement	Specification
Fuel Filter Mounting Bracket-to-Cylinder Head Cap Screws	Torque	70 N·m (52 lb-ft)
Primary Fuel Filter Canister to Filter Header	Torque	14 N·m (120 ib-in)
Secondary Fuel Filter Drain	Torque	3.4 - 4N·m (30 - 35 ib-in)
Fuel Transfer Pump Cap Screws	Torque	35 ± 7 N·m (26 ± 5 lb-ft)
Filter Assembly Bracket Cap Screws	Torque	68 ± 13 N·m (50 ± 10 lb-ft)
Fuel Line Fittings	Torque	20 ± 4 N·m (15 ± 3 lb-ft)
High Pressure Fuel Pump Gear Nut	Torque	64 ± 5 N·m (47 ± 4 lb-ft)
High Pressure Fuel Pump Mounting Screws	Torque	35 ± 7 N·m (26 ± 5 lb-ft)
Fuel Supply Line	Torque	24 N·m ± 5 (18 ± 4 lb-ft)
High Pressure Fuel Lines (both ends)	Torque	40 ± 4 N·m (32 ± 3 lb-ft)
Fuel Leak-Off Line	Torque	12 ± 2 N·m (9 ± 1 lb-ft)
Pump Gear Housing Cover	Torque	31 N·m (23 lb-ft)
Suction Control Valve-to-Pump Housing	Torque	9 N·m (7 lb-ft)
High Pressure Common Rail Bracket to Engine	Torque	70 ± 14 N·m (52 ± 10 lb-ft)
High Pressure Common Rail Leak-Off Line Fittings	Torque	15 ± 3 N·m (11 ± 2 lb-ft)
Fuel Inlet Line Fittings from Fuel Pump to Common Rail	Torque	40 ± 4 N·m (30 ± 3 lb-ft)
Fuel Line Clamp Screw	Torque	8.5 N·m (75 lb-in or 6 lb-ft)
High Pressure Fuel Line Fittings	Torque	40 ± 4 N·m (30 ± 3 lb-ft)
Flow Damper	Torque	176 N·m (130 lb-ft)
Fuel Line Clamp Screw at Flow Damper	Torque	8.5 N·m (75 lb-in or 6 lb-ft)
Fuel Line Fittings to Flow Damper	Torque	40 ± 4 N·m (30 ± 3 lb-ft)
Flow Damper	Torque	176 N·m (130 lb-ft)
Fuel Pump Leak-Off Line	Torque	12 ± 2 N·m (9 ± 1 lb-ft)
Pressure Limiter	Torque	176 N·m (130 lb-ft)
Common Rail Leak-Off Line	Torque	15 ± 3 N·m (12 ± 2 lb-ft)
Wiring Harness Captured Screws to Intake Manifold	Torque	20 N·m (15 lb-ft)
Injector Connector Coupling Ring to Tab Housing	Torque	5 N·m (3.5 lb-ft) (44 lb-in.)
Fuel Line Clamp-to-Intake Manifold Screw	Torque	30 ± 6 N·m (22 ± 4 lb-ft)
Rocker Arm Cover Cap Screws	Torque	35 N·m (26 lb-ft)

Continued on next page

DM59778,000006D -19-17DEC08-1/2

Item	Measurement	Specification
Captured Nuts Securing Wire Harness Leads to Injectors	Torque	2.25 N·m (20 lb-in.)

DM59778,000006D -19-17DEC08-2/2

Electronic Engine Control Repair and Adjustment Specifications

Item	Measurement	Specification
ECU Bracket to Cylinder Block	Torque	35 N•m (26 lb-ft)
ECU Strap to ECU Bracket	Torque	35 N•m (26 lb-ft)
Coolant Temperature Sensor to Thermostat Housing	Torque	15 N•m (11 lb-ft)
Fuel Temperature Sensor-to-Fuel Filter Housing	Torque	14 N·m (10 lb-ft)
EGR Temperature Sensor to Intake Manifold	Torque	60 N•m ±12N•m (44 lb-ft)
Charge Air Cooler Outlet Temperature Sensor	Torque	17 N•m (13 lb-ft)
Manifold Air Temperature (MAT) Sensor	Torque	17 N•m (13 lb-ft)
Oil Pressure Sensor to Cylinder Block	Torque	9 N•m (80 lb-in)
Fuel Rail Pressure Sensor	Torque	98 N·m (72 lb-ft)
Low Pressure Fuel Pressure Sensor	Torque	14 N·m (10 lb-ft)
Manifold Air Pressure (MAP) Sensor	Torque	17 N•m (13 lb-ft)
Crankshaft Position Sensor to Cylinder Block	Torque	13.5 N•m (11 lb-ft)
Pump Position Sensor to Cylinder Block	Torque	13.5 N•m (10 lb-ft)
Turbo Speed Sensor	Torque	12 N•m (9 lb-ft)
Turbo Inlet Compressor Temperature Sensor	Torque	17 N•m (13 lb-ft)
Water in Fuel (WIF) Sensor	Torque	Hand Tighten
Air Bleed/Check Valve Halves	Torque	14 N·m (10 lb-ft)(124 lb-in)
Air Bleed/Check Valve to Filter Head	Torque	14 N·m (10 lb-ft)(124 lb-in)
Air Bleed/Check Valve to Fuel Line	Torque	25 N·m (25 lb-ft)

DM59778,000006E -19-18OCT07-1/1

Application Specifications

- **OEM Engines**
  - Derate Specifications - See OEM ENGINES - DERATE SPECIFICATIONS in this Group
  - Sensor Characteristics - See Related SENSOR CHARACTERISTICS in this Group.
  - Air Heater Specifications - See OEM ENGINES - AIR HEATER SPECIFICATIONS in this Group.
  - Wire Harness Connections - See Related WIRING DIAGRAM in this Group.

RG41221,00001D1 -19-28AUG07-1/1

OEM Engines - Derate Specifications

NOTE: The PEAK POWER LEVEL of an application is identified on the Emissions Information Label located near the valve cover. See INFORMATION RELATIVE TO EMISSIONS REGULATIONS in section 01, Group 001 earlier in this manual.

Shown below are parameters and values that the Engine Control Unit (ECU) uses to determine if an engine must be derated.

Parameter	SPN-FMI	Value that Triggers Fault	Derate Limit (% Power or RPM)
Air Filter Restriction Switch. (Customer Trim Option)	000107.31	Air Filter Restriction Switch Active.	50%
Charged Air Cooler Outlet Temperature.	002630.16	89.5°C (193°F)	20%
Charged Air Cooler Outlet Temperature.	002630.00	91°C (196°F)	60%
Crankshaft Sensor Faults.	000637.02 000637.08 000637.10	Noise, Invalid Pattern, or Missing Pulse.	50%
Engine Control Unit (ECU) Temperature.	001136.00	135°C (275°F)	1200 rpm
Engine Coolant Level Switch. (Customer Trim Option)	000111.01	Engine Coolant Level Low Switch Active.	50%
Engine Coolant Temperature (ECT). Peak Power Above or Equal to 236kw (316hp).	000110.16	111°C (232°F)	20%
Engine Coolant Temperature (ECT). Peak Power Under 236kw (316hp).	000110.16	114°C (237°F)	20%
Engine Coolant Temperature(ECT). Peak Power Above or Equal to 236kw (316hp).	000110.00	113°C (235°F)	60%
Engine Coolant Temperature (ECT). Peak Power Under 236kw (316hp).	000110.00	116°C (241°F)	60%
Exhaust Gas Recirculation (EGR) Temperature.	000412.15	280°C (536°F)	5%
Exhaust Gas Recirculation (EGR) Temperature.	000412.16	290°C (554°F)	50%
Exhaust Gas Recirculation (EGR) Temperature.	000412.00	299°C (570°F)	50%
Exhaust Gas Recirculation (EGR) Valve.	002659.17 002791.02 002791.13	No EGR Flow, EGR Position Mismatch, EGR Invalid Position, or EGR Disabled.	20%
Fuel Temperature.	000174.00	100°C (212°F)	20%
Manifold Air Temperature (MAT).	000105.16	121°C (250°F)	20%
Manifold Air Temperature (MAT).	000105.00	123°C (253°F)	60%
Oil Pressure.	000100.18	Less than 1kPa (0.14psi) @700 rpm . Less than 202kPa (29psi) @701 rpm Less than 311kPa (45psi) @2000 rpm:	20%
Oil Pressure.	000100.01	Less than 1kPa (0.14psi) @700 rpm . Less than 146kPa (21psi) @701 rpm Less than 284kPa (41psi) @2000 rpm:	60%
Fuel Rail Pressure.	000157.03 000157.04	Out of Range Code Detected.	50%
Turbocharger Speed.	000103.00	139,000 rpm	50%
Turbocharger Compressor Outlet Temperature.	002790.16	260°C (500°F) Aluminum Housing. TBD Cast Iron Housing.	50%
Variable Geometry Turbo (VGT) Actuator Position.	002795.07	Position Not Controllable.	50%
Water-in-Fuel.	000097.16	Water Detected.	50%

DN22556,000046E -19-11JUL07-1/1

OEM Engines - Air Heater Specifications

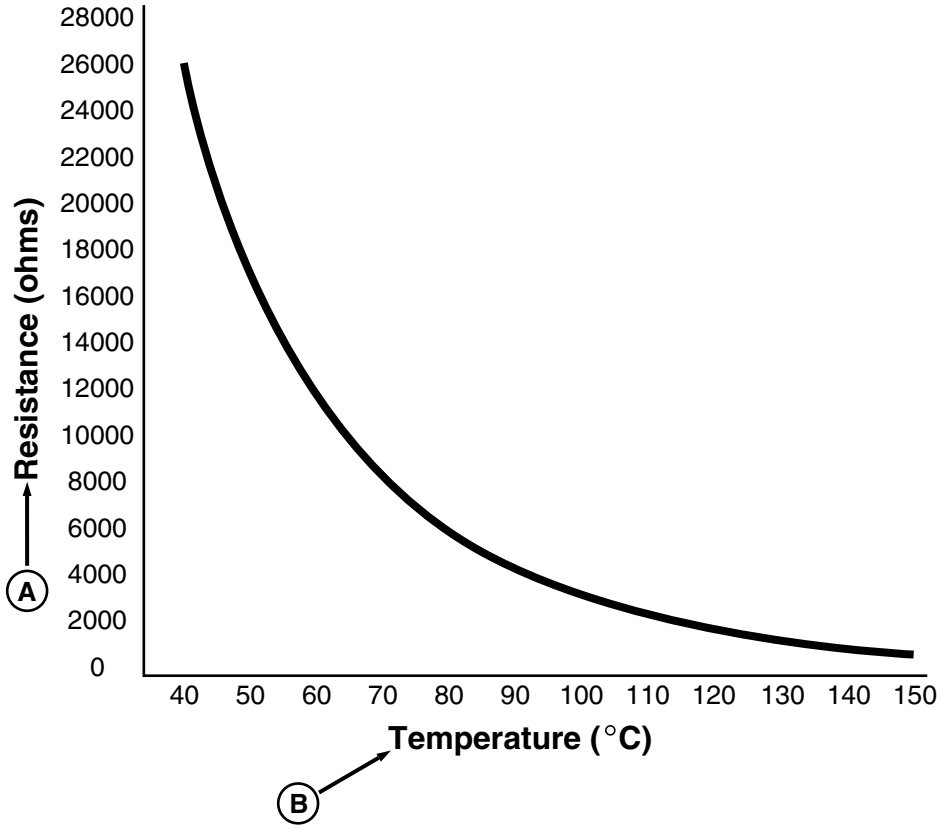
NOTE: Preheat time has an additional 5 seconds after the light turns off.

Air Heater Operation - OEM		
Engine Coolant Temperature	**Preheat Time**	**Reheat Time**
-30°C (-22°F)	15 seconds	45 seconds
-25°C (-13°F)	15 seconds	40 seconds
-20°C (-4°F)	27.5 seconds	35 seconds
-15°C (5°F)	25 seconds	27.5 seconds
-10°C (14°F)	15 seconds	20 seconds
-5°C (23°F)	15 seconds	0 seconds
0°C (32°F)	0 seconds	0 seconds

Air Heater Operating Conditions - OEM

RG41221,00001D9 -19-04AUG07-1/1

EGR Temperature Sensor Characteristics



B TEMP (°C)	C TEMP (°F)	A RESISTANCE (OHMS)
40	104	26065
45	113	21358
50	122	17599
55	131	14579
60	140	12140
65	149	10159
70	158	8541
75	167	7214
80	176	6120
85	185	5213
90	194	4459
95	203	3829
100	212	3300
105	221	2854
110	230	2478
115	239	2158
120	248	1886
125	257	1653
130	266	1453
135	275	1281
140	284	1133
145	293	1004
150	302	892.8

RG15345A —UN—03OCT08

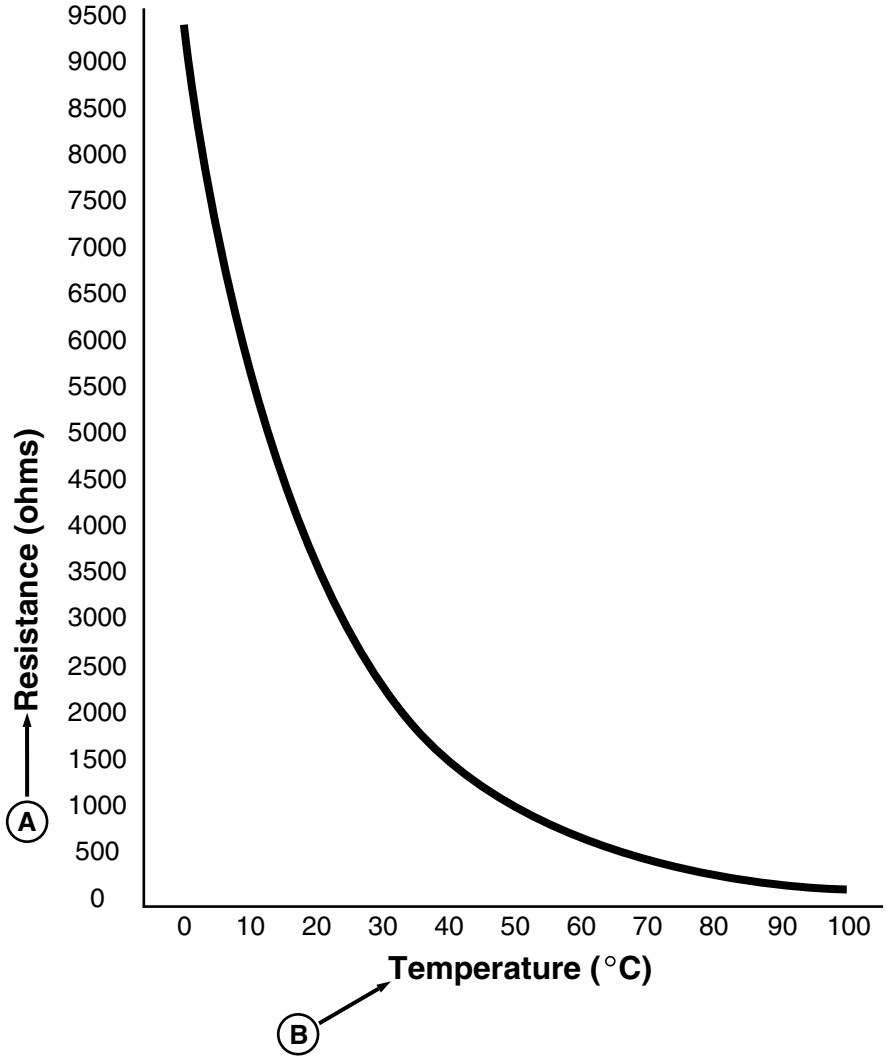
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

DM59778,0000021 -19-03OCT08-1/1

Compressor Inlet Air Temperature Sensor Characteristics



B TEMP (°C)	C TEMP (°F)	A RESISTANCE (OHMS)
0	32	9399
5	41	7263
10	50	5658
15	59	4441
20	68	3511
25	77	2795
30	86	2240
35	95	1806
40	104	1465
45	113	1195
50	122	980.3
55	131	808.8
60	140	670.9
65	149	559.4
70	158	468.7
75	167	394.6
80	176	333.8
85	185	283.5
90	194	241.8
95	203	207.1
100	212	178.0

RG15346A —UN—03OCT08

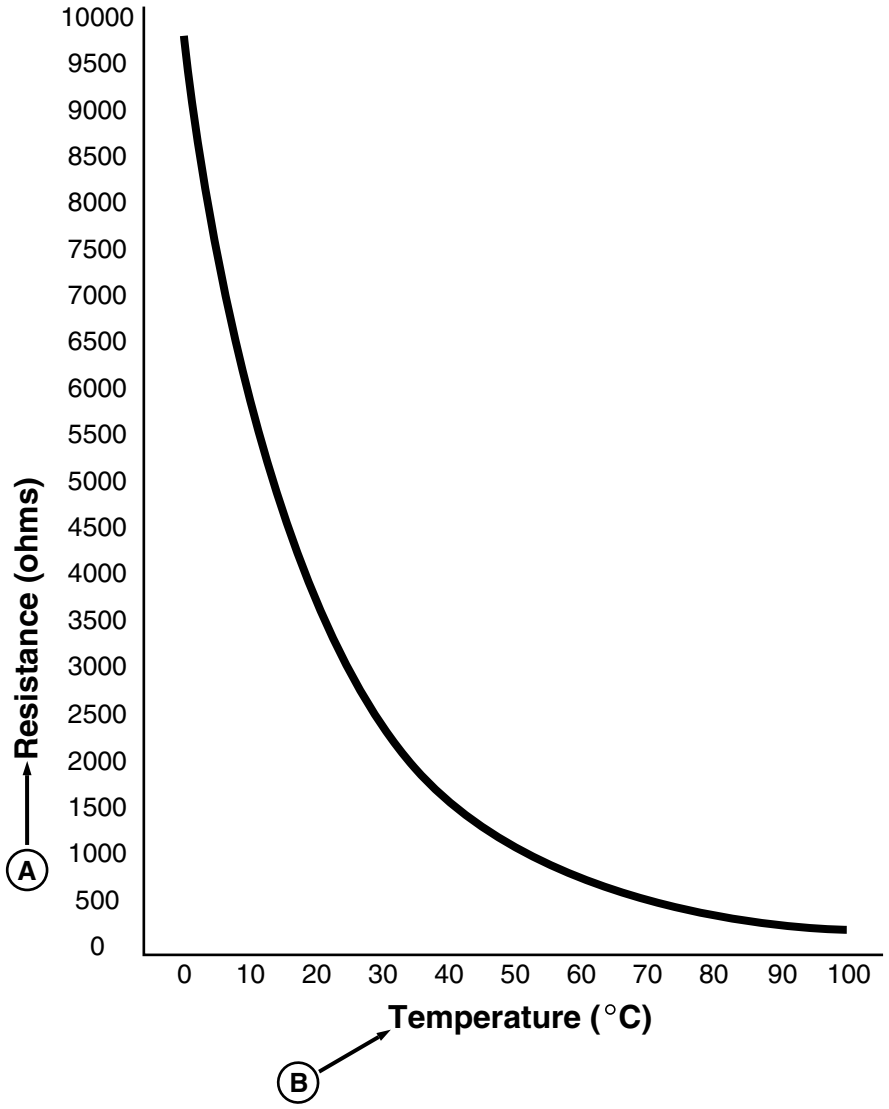
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

DM59778,0000020 -19-03OCT08-1/1

Manifold Air Temperature Sensor and Charged Air Cooler Outlet Temperature Sensor Characteristics



B TEMP (°C)	C TEMP (°F)	A RESISTANCE (OHMS)
0	32	9795
5	41	7616
10	50	5970
15	59	4712
20	68	3747
25	77	3000
30	86	2417
35	95	1959
40	104	1598
45	113	1311
50	122	1081
55	131	895.9
60	140	746.4
65	149	624.9
70	158	525.6
75	167	444.4
80	176	377.4
85	185	321.7
90	194	275.3
95	203	236.6
100	212	204.0

RG15347A —UN—03OCT08

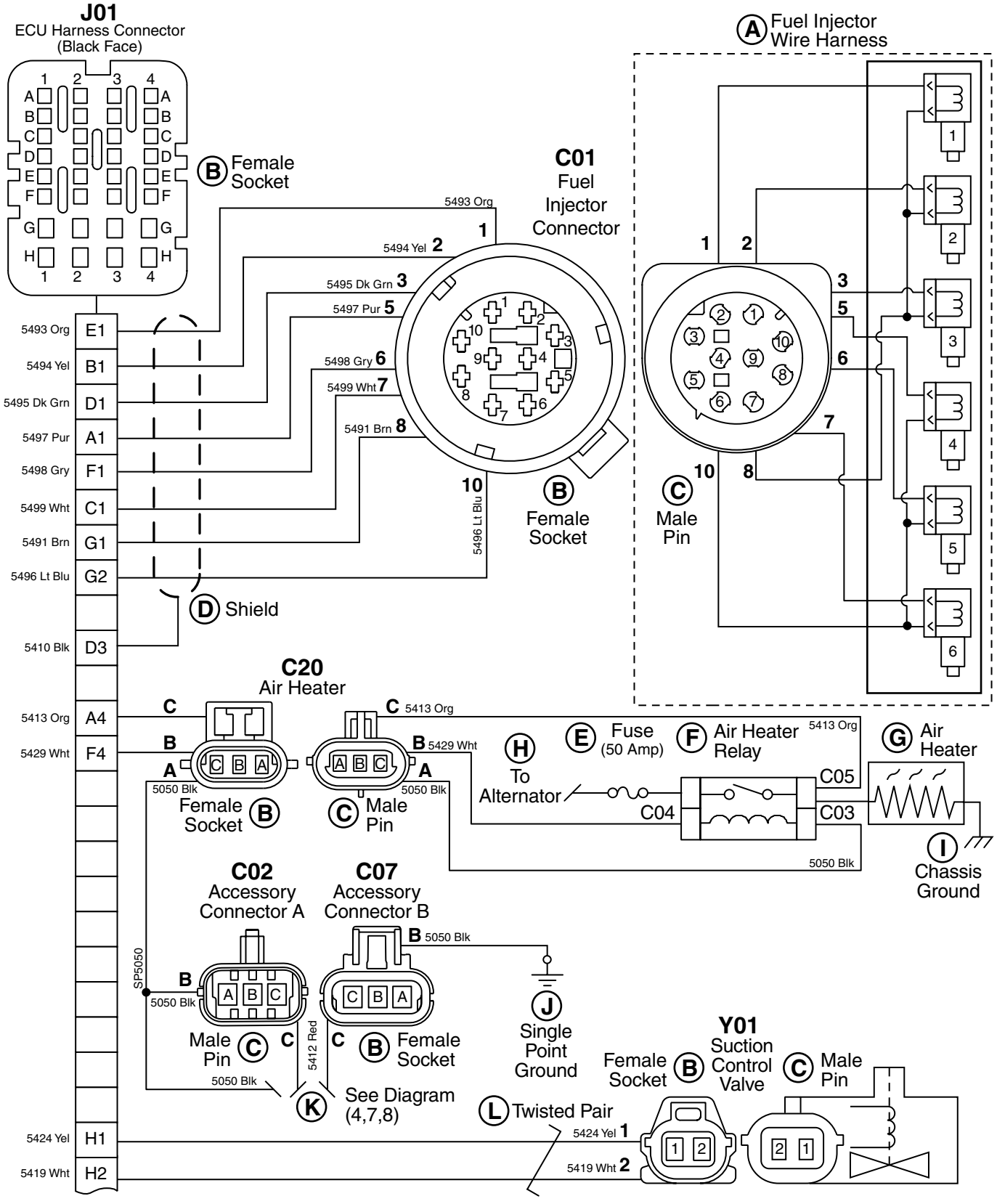
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

RG41221,00001D5 -19-03OCT08-1/1

9.0L 12V Wiring Diagram 1



9.0 Liter 12 Volt Wiring Diagram 1

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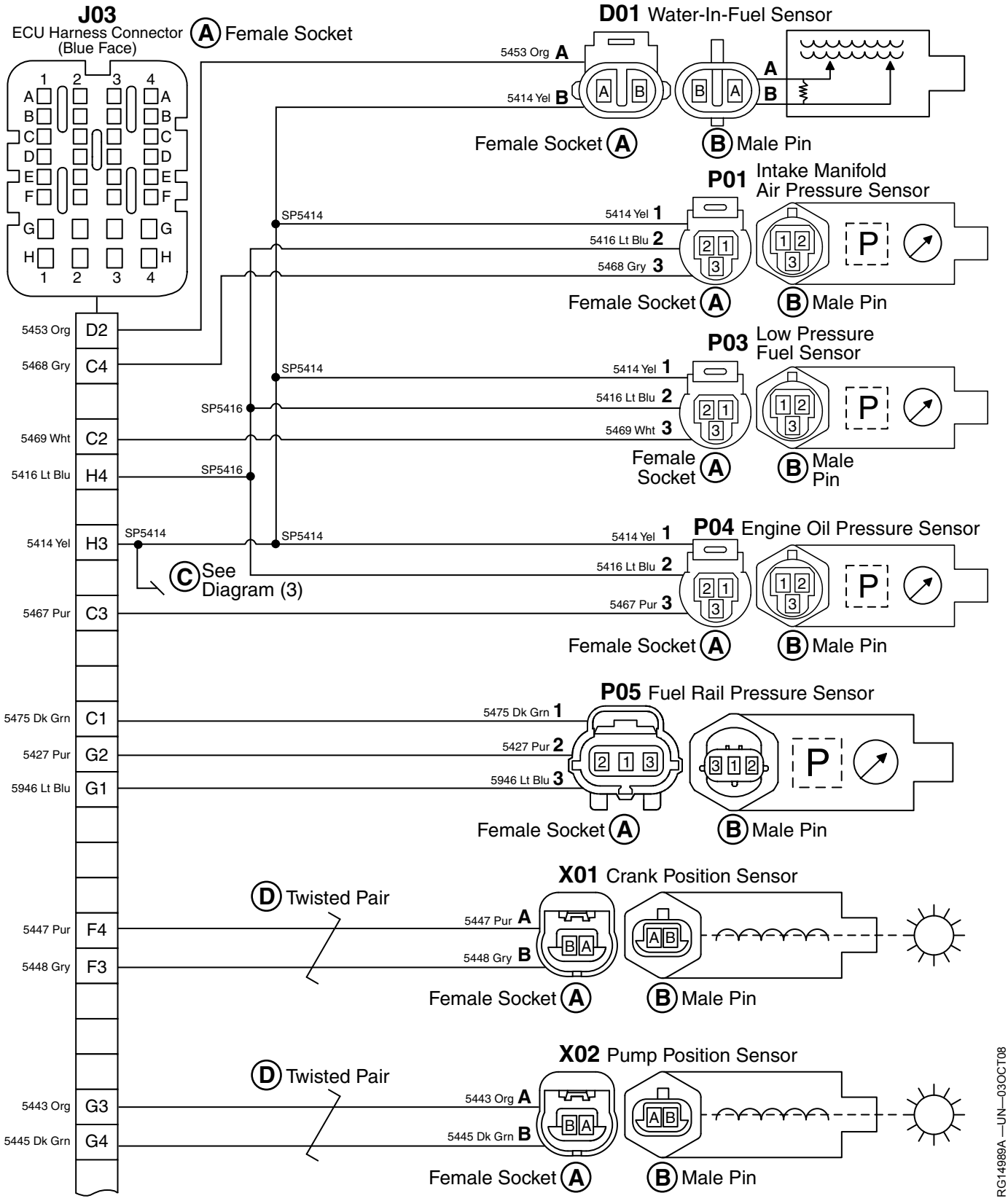
BK53208,0000034 -19-09DEC10-1/2

A—Fuel Injector Wire Harness
B—Female Socket
C—Male Pin
D—Shield
E—Fuse (50 Amp)
F—Air Heater Relay
G—Air Heater
H—To Alternator
I— Chassis Ground
J—Single Point Ground
K—See Diagram (4,7,8)
L—Twisted Pair
C01— Fuel Injector Connector
C02 — Accessory Connector A
C07— Accessory Connector B
C20— Air Heater Connector
J01— ECU Harness Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-A4—[5413 Orange] Air Heater Relay Signal
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D3—[5410A Black] Wiring Shield
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F4—[5429 White] Air Heater Relay Control
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power
J1-H1—[5424 Yellow] Suction Control Valve High Drive
J1-H2—[5419 White] Suction Control Valve Low Drive
Y01— Suction Control Valve

BK53208,0000034 -19-09DEC10-2/2

9.0L 12V Wiring Diagram 2



9.0 Liter 12 Volt Wiring Diagram 2

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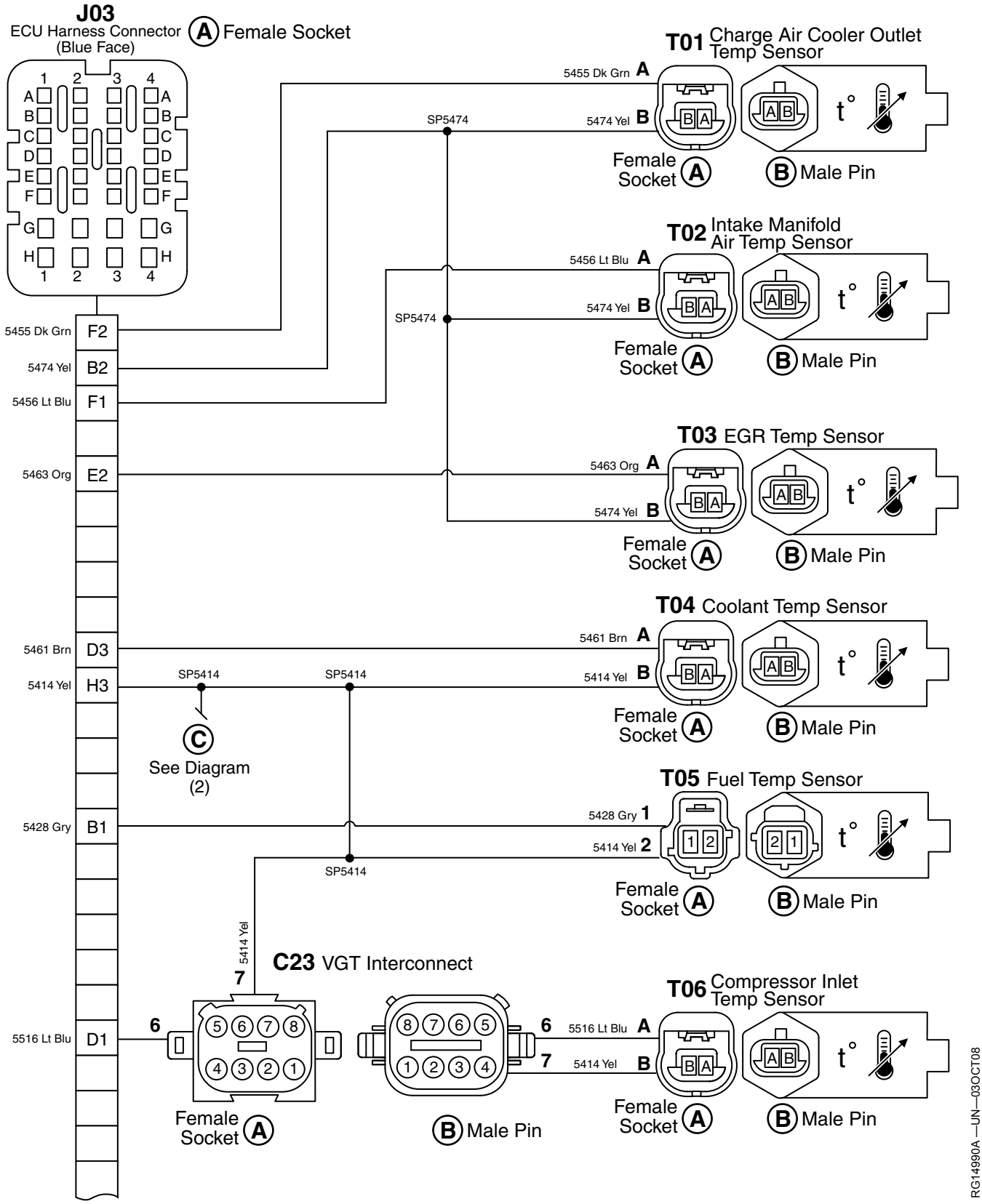
BK53208,0000035 -19-03OCT08-1/2

A—Female Socket
B—Male Pin
C—See Diagram (3)
D—Twisted Pair
D01— Water In Fuel Sensor
J03— ECU Harness Connector (Blue Face)
J3-C1—[5475 Dark Green] Fuel Rail Pressure Signal
J3-C2—[5469 White] Low Pressure Fuel Signal
J3-C3—[5467 Purple] Engine Oil Pressure Signal
J3-C4—[5468 Gray] Intake Manifold Air Pressure Signal
J3-D2—[5453 Orange] Water In Fuel Signal
J3-F3—[5448 Gray] Crank Position Return
J3-F4—[5447 Purple] Crank Position Pulse
J3-G1—[5946 Light Blue] 5 Volt Power Supply #1 Positive
J3-G2—[5427 Purple] 5 Volt Power Supply #1 Return
J3-G3—[5443 Orange] Pump Position Return
J3-G4—[5445 Dark Green] Pump Position Pulse
J3-H3—[5414A Yellow] 5 Volt Power Supply #2 Return
J3-H4—[5416A Light Blue] 5 Volt Power Supply #2 Positive
P01— Intake Manifold Air Pressure Sensor
P03— Low Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
X01— Crank Position Sensor
X02— Pump Position Sensor

BK53208,0000035 -19-03OCT08-2/2

9.0L 12V Wiring Diagram 3



9.0 Liter 12 Volt Wiring Diagram 3

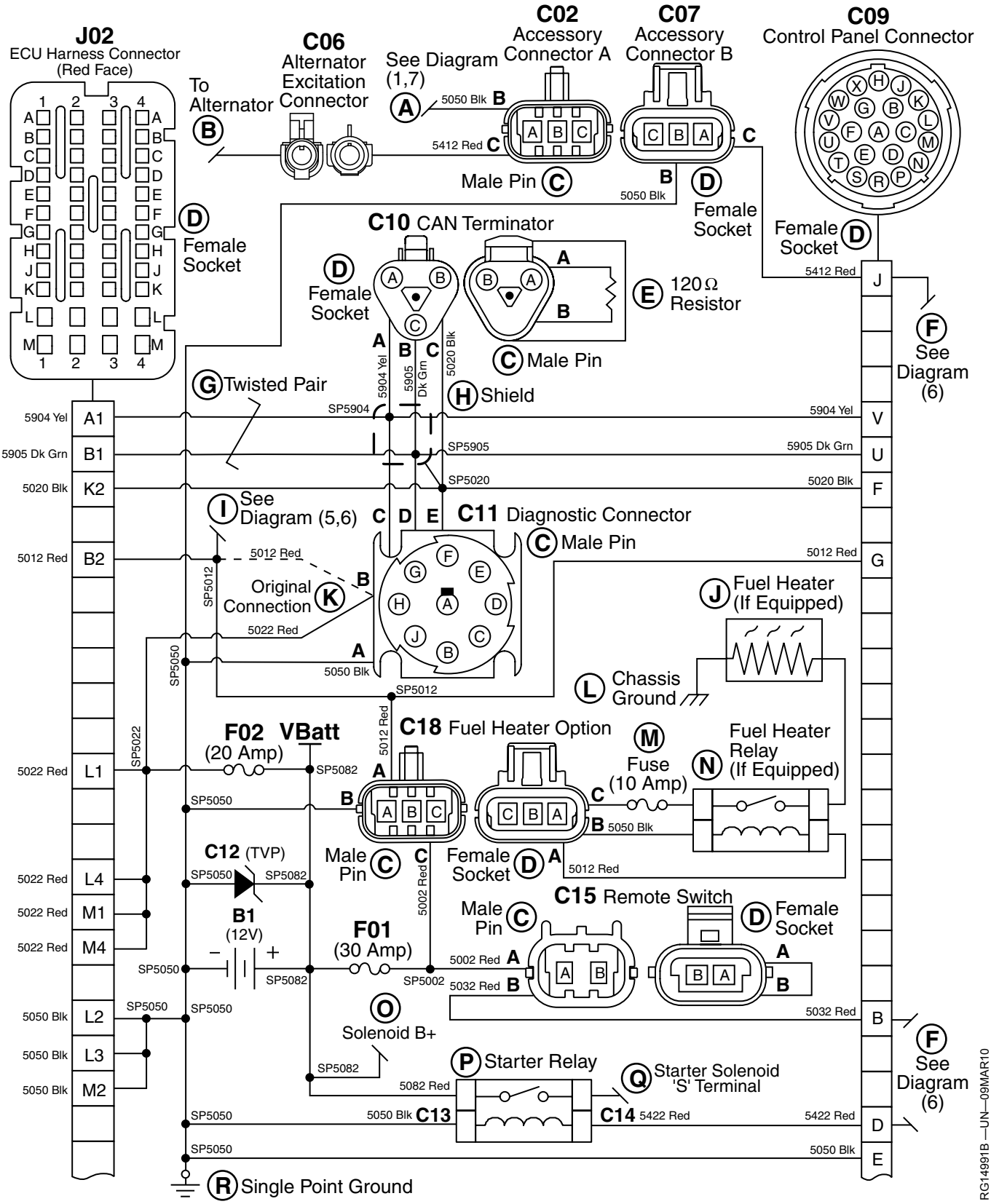
Continued on next page

BK53208,0000036 -19-03OCT08-1/2

A—Female Socket
B—Male Pin
C—See Diagram (2)
C23— VGT Interconnect
J03— ECU Harness Connecter (Blue Face)
J3-B1—[5428 Gray] Fuel Temperature Signal
J3-B2—[5474A Yellow] Precision Sensor Return
J3-D1—[5516 Light Blue] Compressor Inlet Temperature Signal
J3-D3—[5461 Brown] Coolant Temperature Signal
J3-E2—[5463 Orange] EGR Temperature Signal
J3-F1—[5456 Light Blue] Intake Manifold Air Temperature Signal
J3-F2—[5455 Dark Green] Charge Air Cooler Outlet Temperature Signal
J3-H3—[5414A Yellow] 5 Volt Power Supply #2 Return
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
T03— EGR Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor
T06— Compressor Inlet Temperature Sensor

BK53208,0000036 -19-03OCT08-2/2

9.0L 12V Wiring Diagram 4



9.0 Liter 12 Volt Wiring Diagram 4

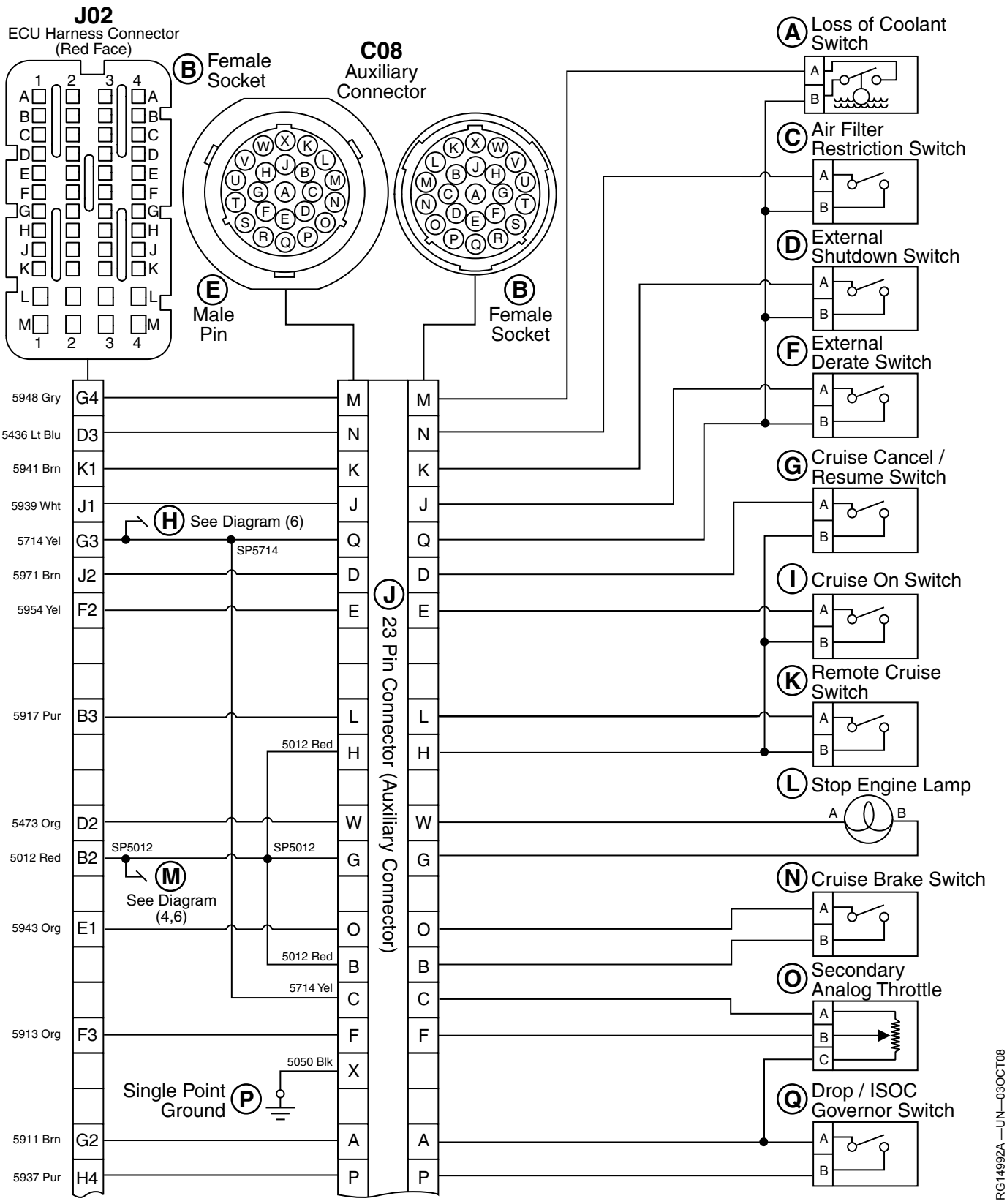
Continued on next page

BK53208,0000037 -19-09MAR10-1/2

A—See Diagram (1,7,8)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (6)
G—Twisted Pair
H—Shield
I— See Diagram (5,6)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—12 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Control
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

BK53208,0000037 -19-09MAR10-2/2

9.0L 12V Wiring Diagram 5



9.0 Liter 12 Volt Wiring Diagram 5

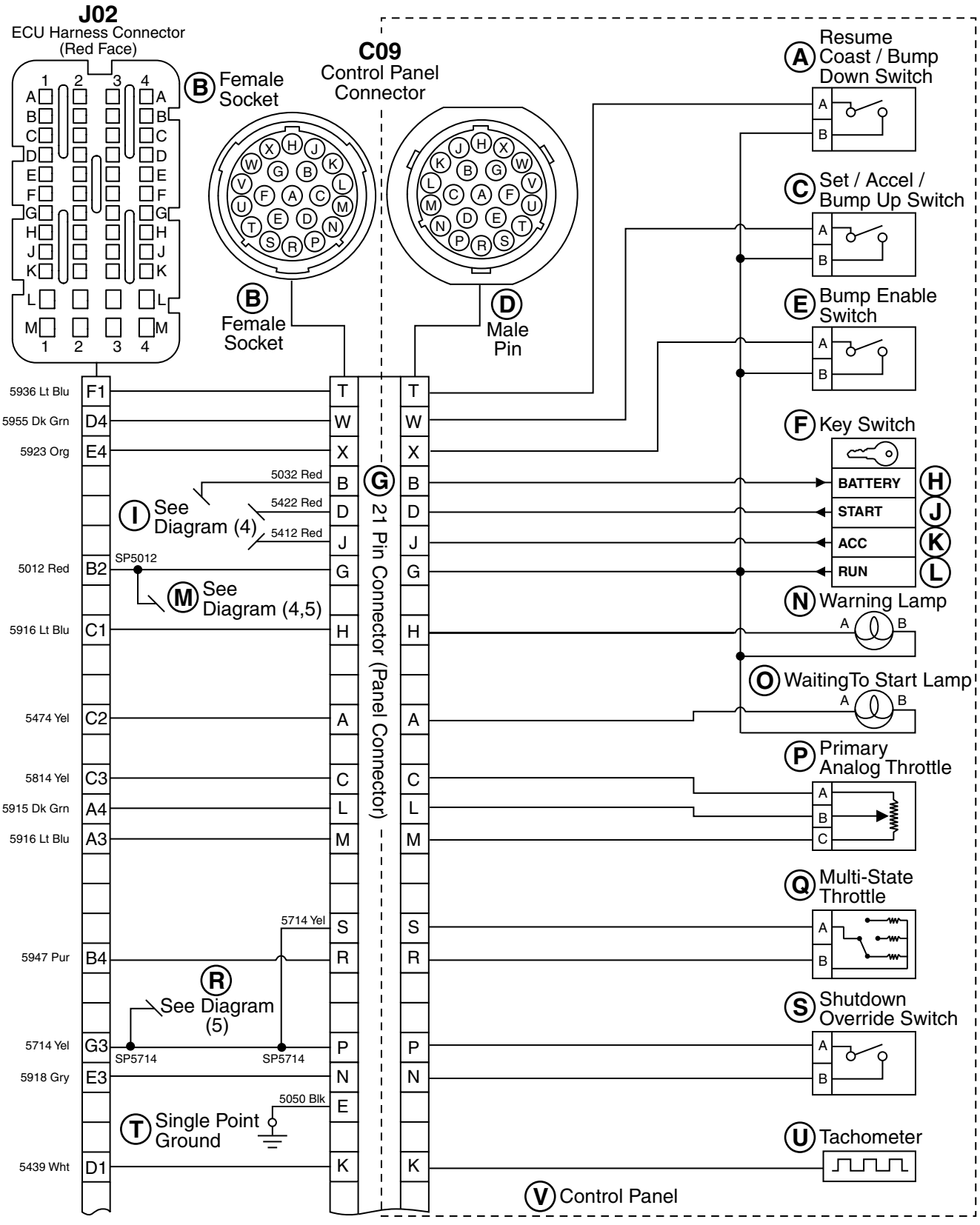
Continued on next page

BK53208,0000038 -19-03OCT08-1/2

A—Loss of Coolant Switch
B—Female Socket
C—Air Filter Restriction Switch
D—External Shutdown Switch
E—Male Pin
F—External Derate Switch
G—Cruise Cancel/Resume Switch
H—See Diagram (6)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (4,6)
N—Cruise Brake Switch
O—Secondary Analog Throttle
P—Single Point Ground
Q—Drop/Isoc (Isochronous) Governor Switch
C08— Auxiliary Connector
J02— ECU Harness Connector (Red Face)
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B3—[5917 Purple] Remote Cruise On/Off Switch
J2-D2—[5473 Orange] Stop Engine Lamp Return
J2-D3—[5436 Light Blue] Air Filter Restriction Switch
J2-E1—[5943 Orange] Cruise Brake Switch
J2-F2—[5954 Yellow] Cruise On/Off Switch
J2-F3—[5913 Orange] Secondary Analog Throttle Signal
J2-G2—[5911 Brown] 5 Volt Power Supply #4 Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #4 Return
J2-G4—[5948 Gray] Low Coolant Level Switch
J2-H4—[5937 Purple] Droop/Isochronous Governor Switch
J2-J1— [5939 White] External Derate Switch
J2-J2— [5971 Brown] Cruise Cancel/Resume Switch
J2-K1—[5941 Brown] External Shutdown Switch

BK53208,0000038 -19-03OCT08-2/2

9.0L 12V Wiring Diagram 6



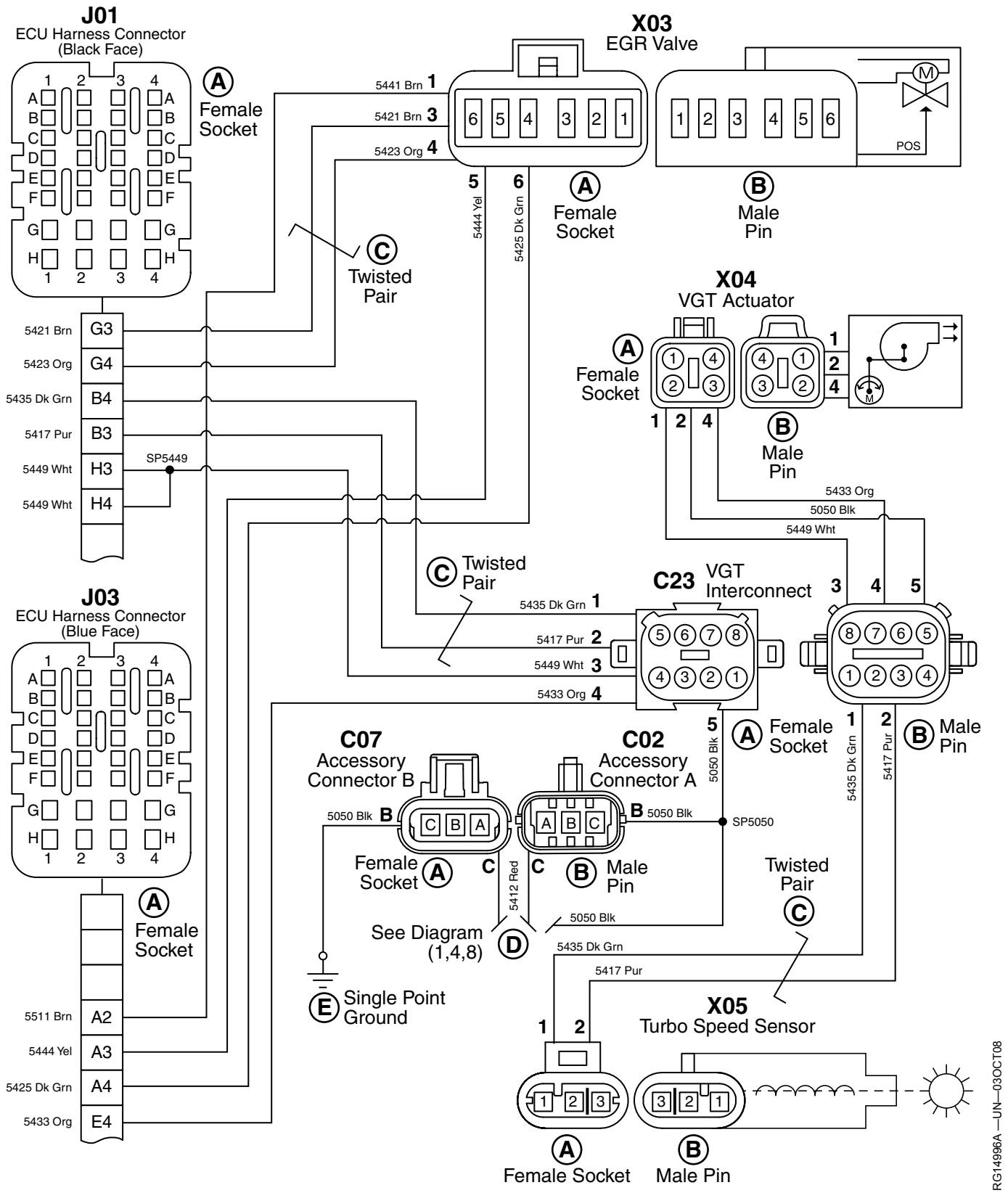
9.0 Liter 12 Volt Wiring Diagram 6

Continued on next page

A—Resume Coast/Bump Down Switch
B—Female Socket
C—Set Accel/Bump Up Switch
D—Male Pin
E—Bump Enable Switch
F—Key Switch
G—21 Pin Connector (Panel Connector)
H—Battery
I— See Diagram (4)
J—Start
K—Accessory
L—Run
M—See Diagram (4,5)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (5)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Return
J2-D1—[5439 White] Tachometer Pulse Output
J2-D4—[5955 Dark green] Set/Accel/Bump Up Switch
J2-E3—[5913 Orange] Secondary Analog Throttle Signal
J2-E4—[5923 Orange] Bump Enable Switch
J2-F1—[5936 Light Blue] Resume Coast/Bump Down Switch
J2-G3—[5714A Yellow] 5 Volt Power Supply #4 Return

BK53208,0000039 -19-03OCT08-2/2

9.0L 12V Wiring Diagram 7



9.0 Liter 12 Volt Wiring Diagram 7

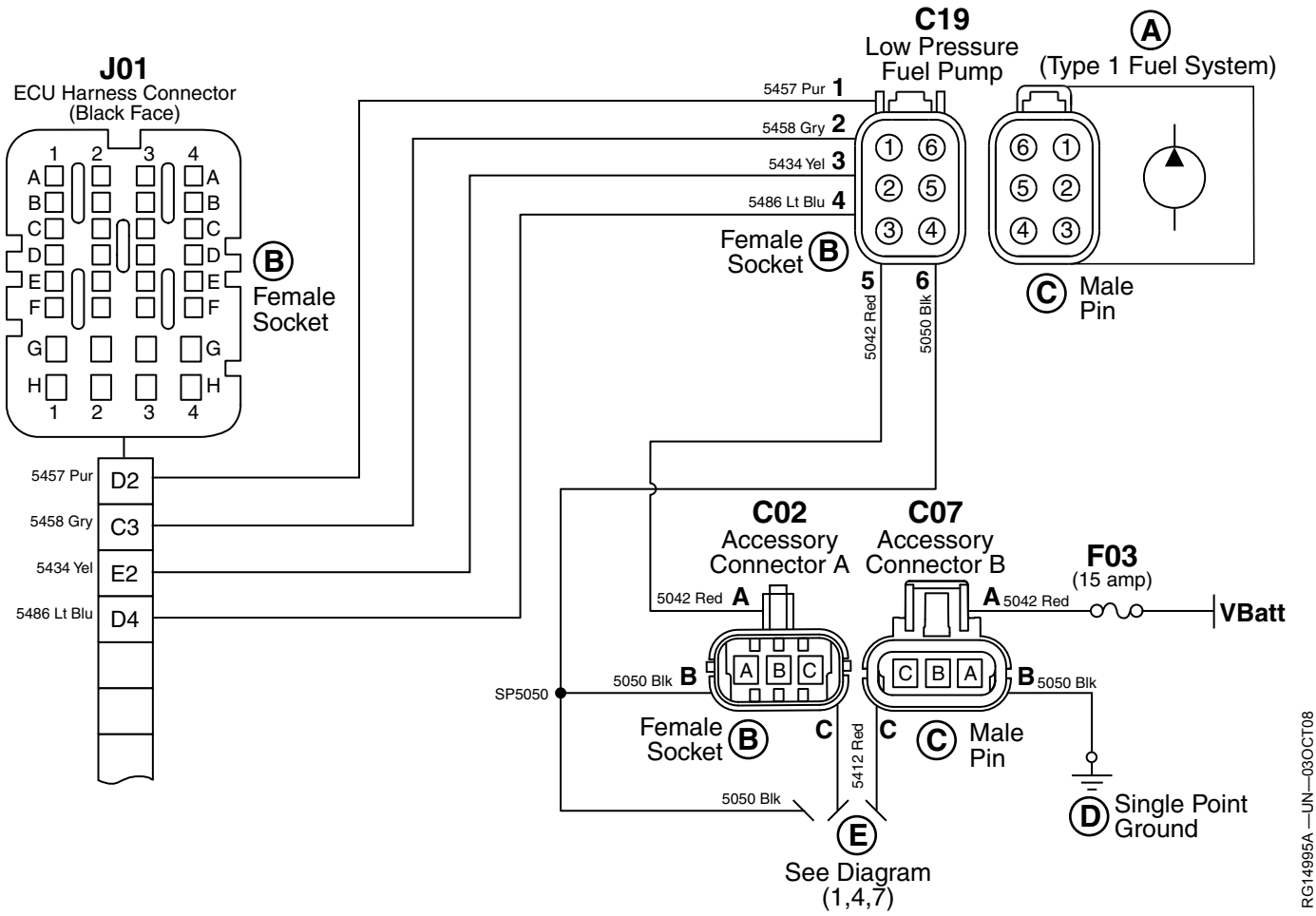
Continued on next page

BK53208,000003A -19-03OCT08-1/2

A—Female Socket
B—Male Pin
C—Twisted Pair
D—See Diagram (1,4,8)
E—Single Point Ground
C02— Accessory Connector A
C07— Accessory Connector B
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
J1-B3—[5417 Purple] Turbo Speed Return
J1-B4—[5435 Dark Green] Turbo Speed Pulse
J1-G3—[5421 Brown] EGR Valve PWM Drive #1
J1-G4—[5423 Orange] EGR Valve PWM Drive #2
J1-H3—[5449B White] VGT Actuator Power #1 Positive
J1-H4—[5449A White] VGT Actuator Power #1 Positive
J03— ECU Harness Connector (Blue Face)
J3-A2—[5511 Brown] 5 Volt Power Supply #5 Positive
J3-A3—[5444 Yellow] 5 Volt Power Supply #5 Return
J3-A4—[5425 Dark Green] EGR Valve Position Signal
J3-E4—[5433 Orange] VGT Actuator Communications Signal
X03— EGR Valve
X04— VGT Actuator
X05— Turbo Speed Sensor

BK53208,000003A -19-03OCT08-2/2

9.0L 12V Wiring Diagram 8

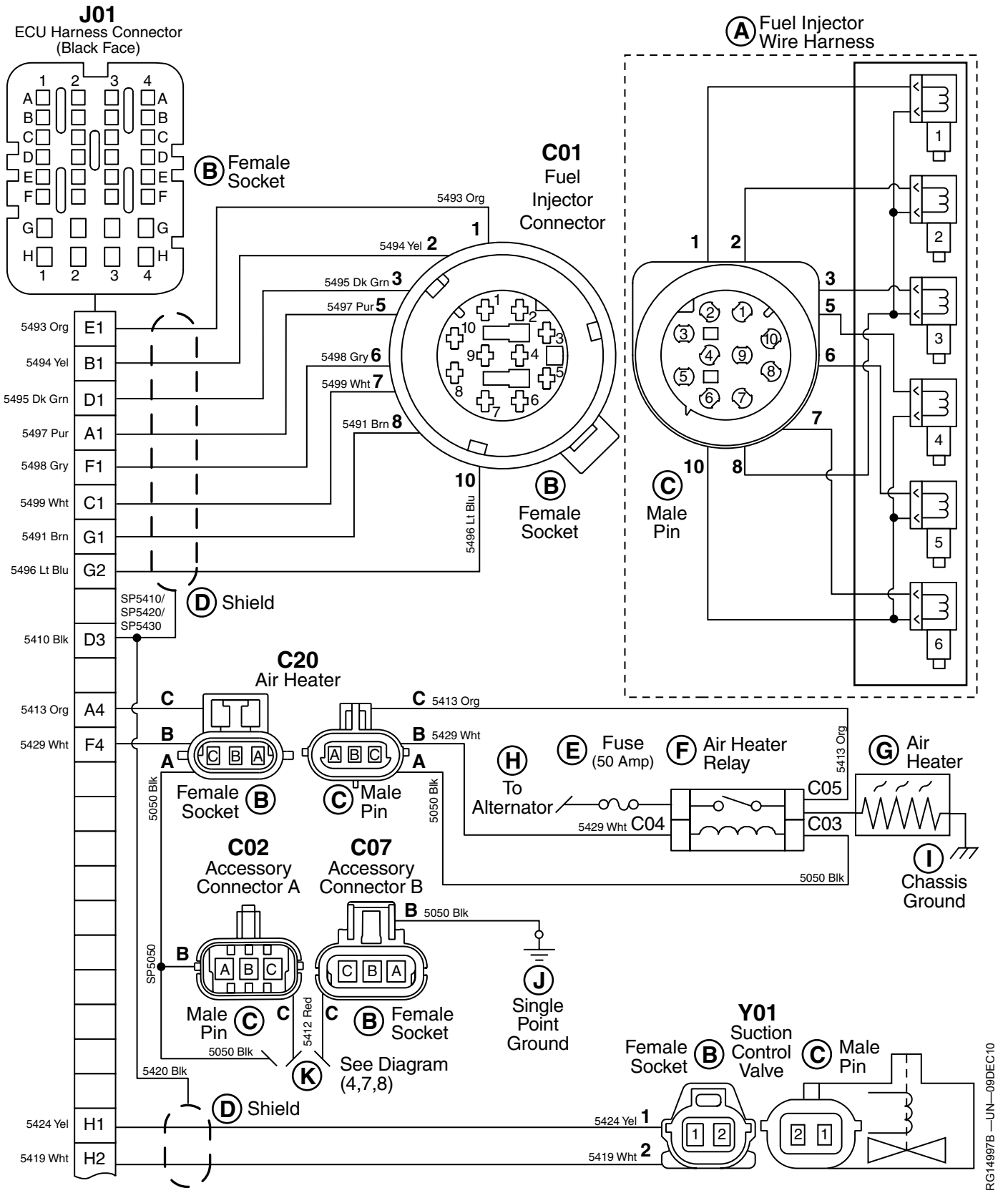


9.0 Liter 12 Volt Wiring Diagram 8

A—(Type 1 Fuel System)
B—Female Socket
C—Male Pin
D—Single Point Ground
E—See Diagram (1,4,7)
C02— Accessory Connector A
C07— Accessory Connector B
C19— Low Pressure Fuel Pump
F03— 15 Amp
J01— ECU Harness Connector (Black Face)
J1-C3—[5458 Gray] Low Pressure Fuel Pump Current Feedback
J1-D2—[5457 Purple] Low Pressure Fuel Pump PWM Drive
J1-D4—[5486 Light Blue] Low Pressure Fuel Pump Enable Command
J1-E2—[5434 Yellow] Low Pressure Fuel Pump Status
VBatt—Battery Positive

BK53208,000003B -19-03OCT08-1/1

9.0L 24V Wiring Diagram 1



9.0 Liter 24 Volt Wiring Diagram 1

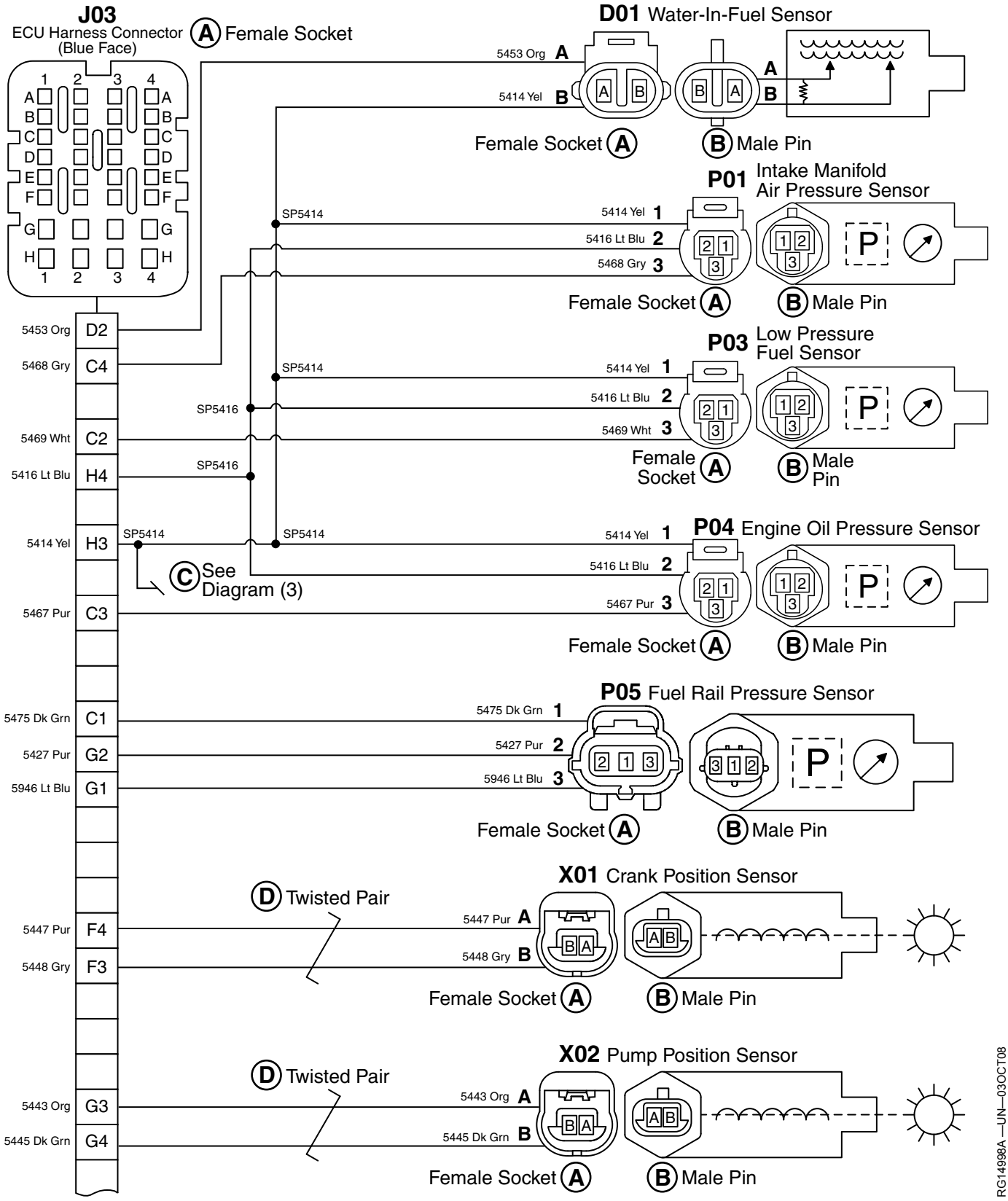
Continued on next page

BK53208,000003C -19-09DEC10-1/2

A—Fuel Injector Wire Harness
B—Female Socket
C—Male Pin
D—Shield
E—Fuse (50 Amp)
F—Air Heater Relay
G—Air Heater
H—To Alternator
I— Chassis Ground
J—Single Point Ground
K—See Diagram (4,7,8)
C01— Fuel Injector Connector
C02 — Accessory Connector A
C07— Accessory Connector B
C20— Air Heater Connector
J01— ECU Harness Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-A4—[5413 Orange] Air Heater Relay Signal
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D3—[5410A Black] Wiring Shield
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F4—[5429 White] Air Heater Relay Control
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power
J1-H1—[5424 Yellow] Suction Control Valve High Drive
J1-H2—[5419 White] Suction Control Valve Low Drive
Y01— Suction Control Valve

BK53208,000003C -19-09DEC10-2/2

9.0L 24V Wiring Diagram 2



9.0 Liter 24 Volt Wiring Diagram 2

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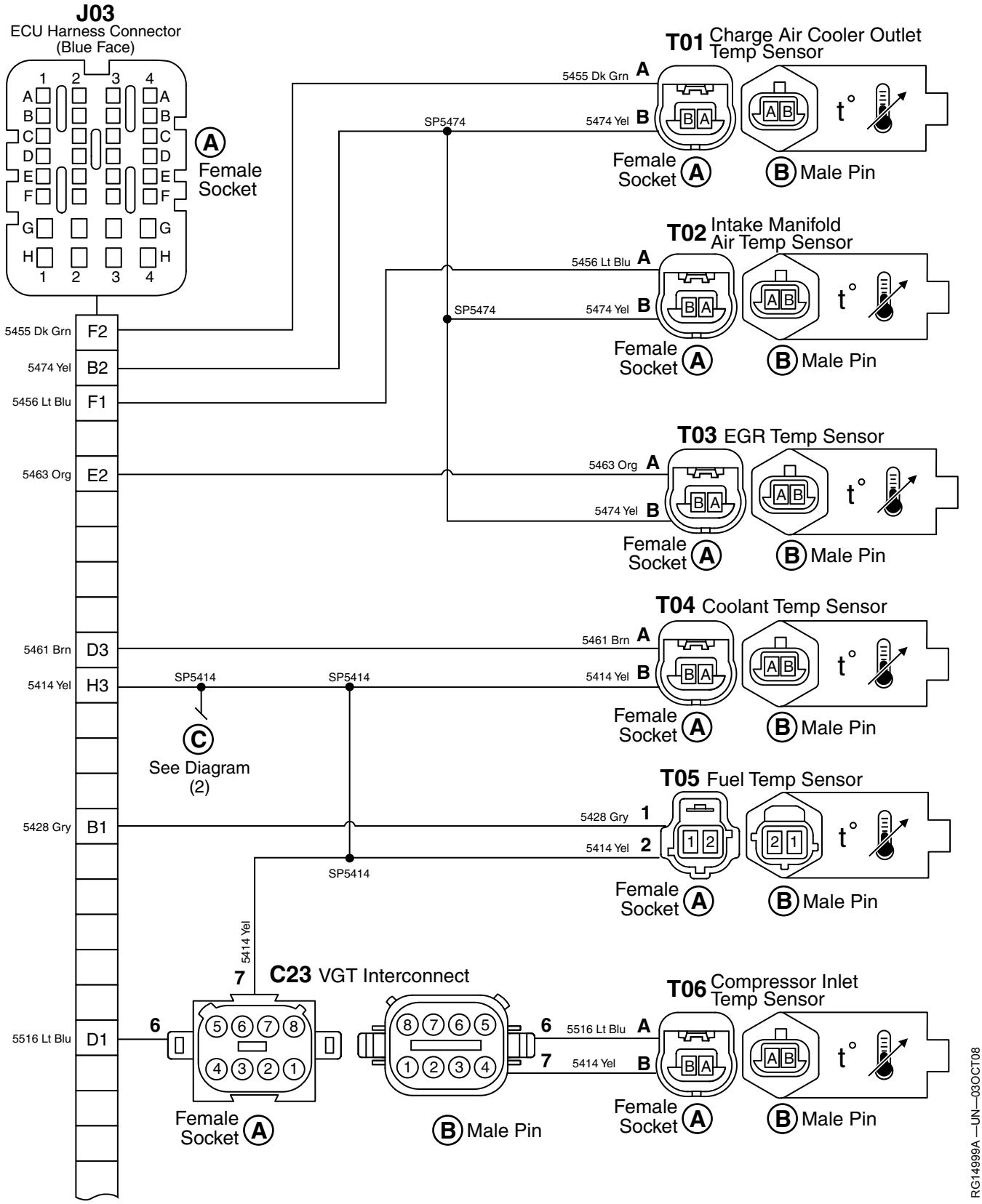
BK53208,000003D -19-03OCT08-1/2

A—Female Socket
B—Male Pin
C—See Diagram (3)
D—Twisted Pair
D01— Water In Fuel Sensor
J03— ECU Harness Connector (Blue Face)
J3-C1—[5475 Dark Green] Fuel Rail Pressure Signal
J3-C2—[5469 White] Low Pressure Fuel Signal
J3-C3—[5467 Purple] Engine Oil Pressure Signal
J3-C4—[5468 Gray] Intake Manifold Air Pressure Signal
J3-D2—[5453 Orange] Water In Fuel Signal
J3-F3—[5448 Gray] Crank Position Return
J3-F4—[5447 Purple] Crank Position Pulse
J3-G1—[5946 Light Blue] 5 Volt Power Supply #1 Positive
J3-G2—[5427 Purple] 5 Volt Power Supply #1 Return
J3-G3—[5443 Orange] Pump Position Return
J3-G4—[5445 Dark Green] Pump Position Pulse
J3-H3—[5414A Yellow] 5 Volt Power Supply #2 Return
J3-H4—[5416A Light Blue] 5 Volt Power Supply #2 Positive
P01— Intake Manifold Air Pressure Sensor
P03— Low Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
X01— Crank Position Sensor
X02— Pump Position Sensor

BK53208,000003D -19-03OCT08-2/2

9.0L 24V Wiring Diagram 3



9.0 Liter 24 Volt Wiring Diagram 3

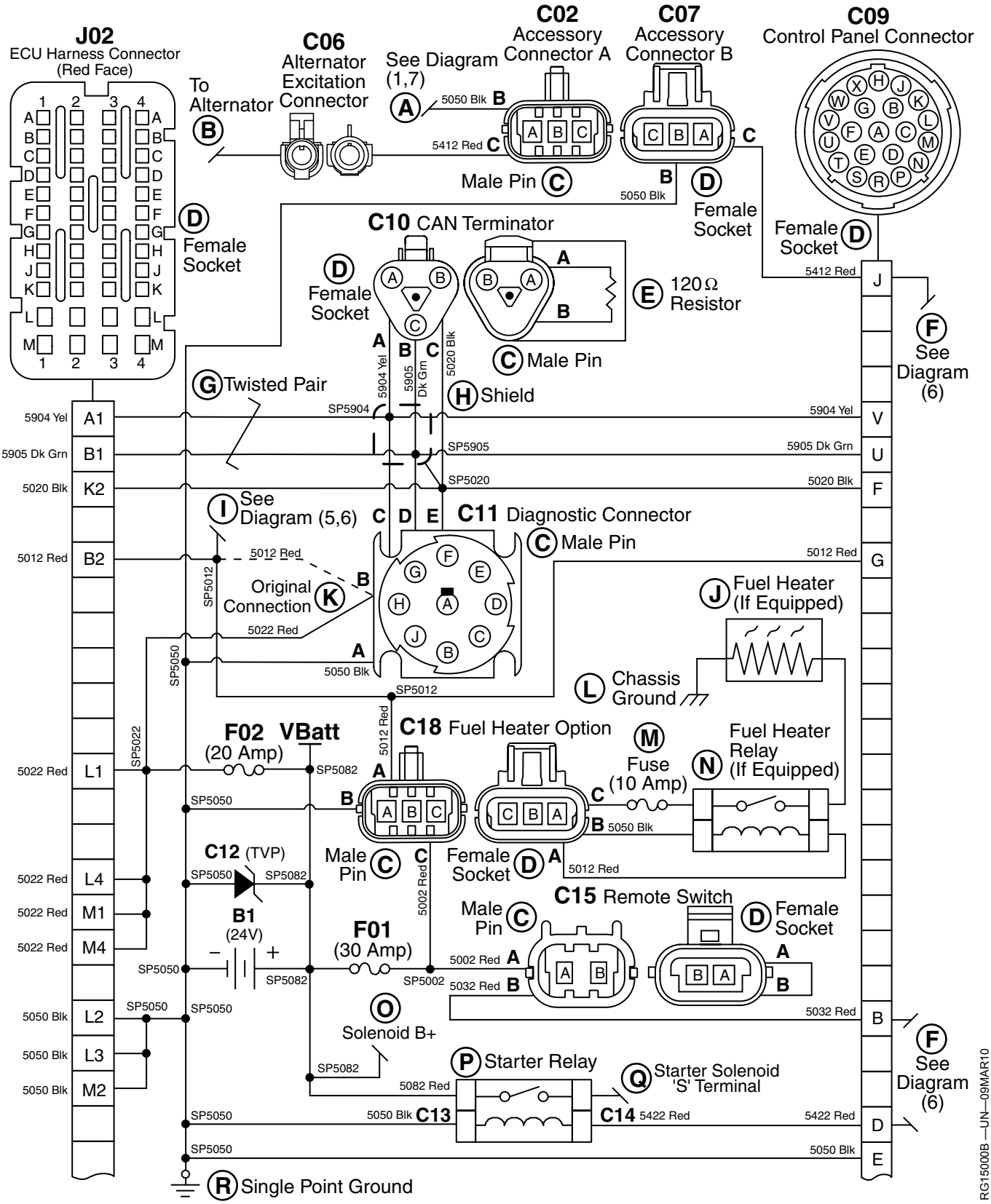
Continued on next page

BK53208,000003E -19-03OCT08-1/2

A—Female Socket
B—Male Pin
C—See Diagram (2)
C23— VGT Interconnect
J03— ECU Harness Connecter (Blue Face)
J3-B1—[5428 Gray] Fuel Temperature Signal
J3-B2—[5474A Yellow] Precision Sensor Return
J3-D1—[5516 Light Blue] Compressor Inlet Temperature Signal
J3-D3—[5461 Brown] Coolant Temperature Signal
J3-E2—[5463 Orange] EGR Temperature Signal
J3-F1—[5456 Light Blue] Intake Manifold Air Temperature Signal
J3-F2—[5455 Dark Green] Charge Air Cooler Outlet Temperature Signal
J3-H3—[5414A Yellow] 5 Volt Power Supply #2 Return
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
T03— EGR Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor
T06— Compressor Inlet Temperature Sensor

BK53208,000003E -19-03OCT08-2/2

9.0L 24V Wiring Diagram 4



9.0 Liter 24 Volt Wiring Diagram 4

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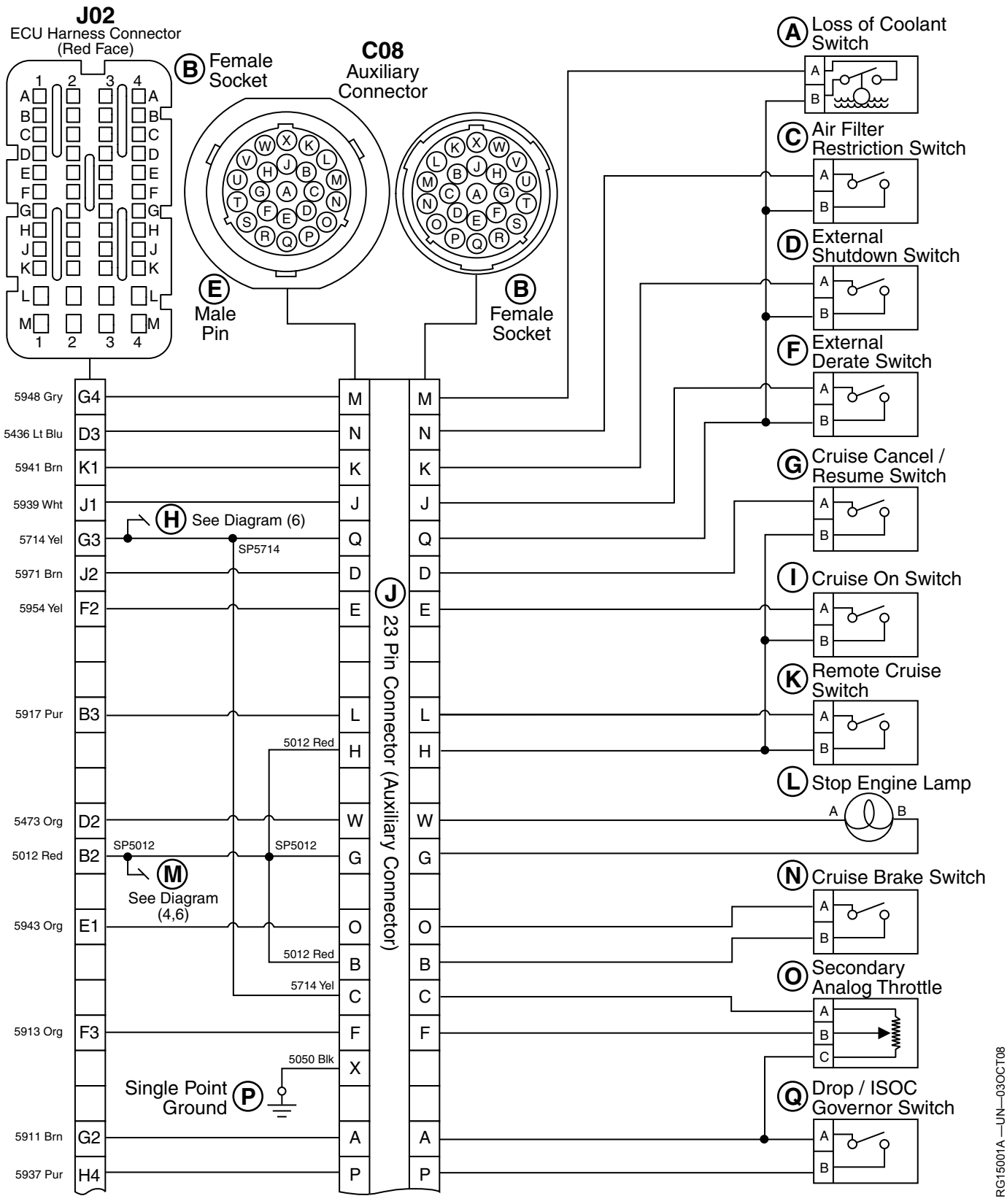
BK53208,000003F -19-09MAR10-1/2

A—See Diagram (1,7,8)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (6)
G—Twisted Pair
H—Shield
I— See Diagram (5,6)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—24 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Control
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

BK53208,000003F -19-09MAR10-2/2

9.0L 24V Wiring Diagram 5



9.0 Liter 24 Volt Wiring Diagram 5

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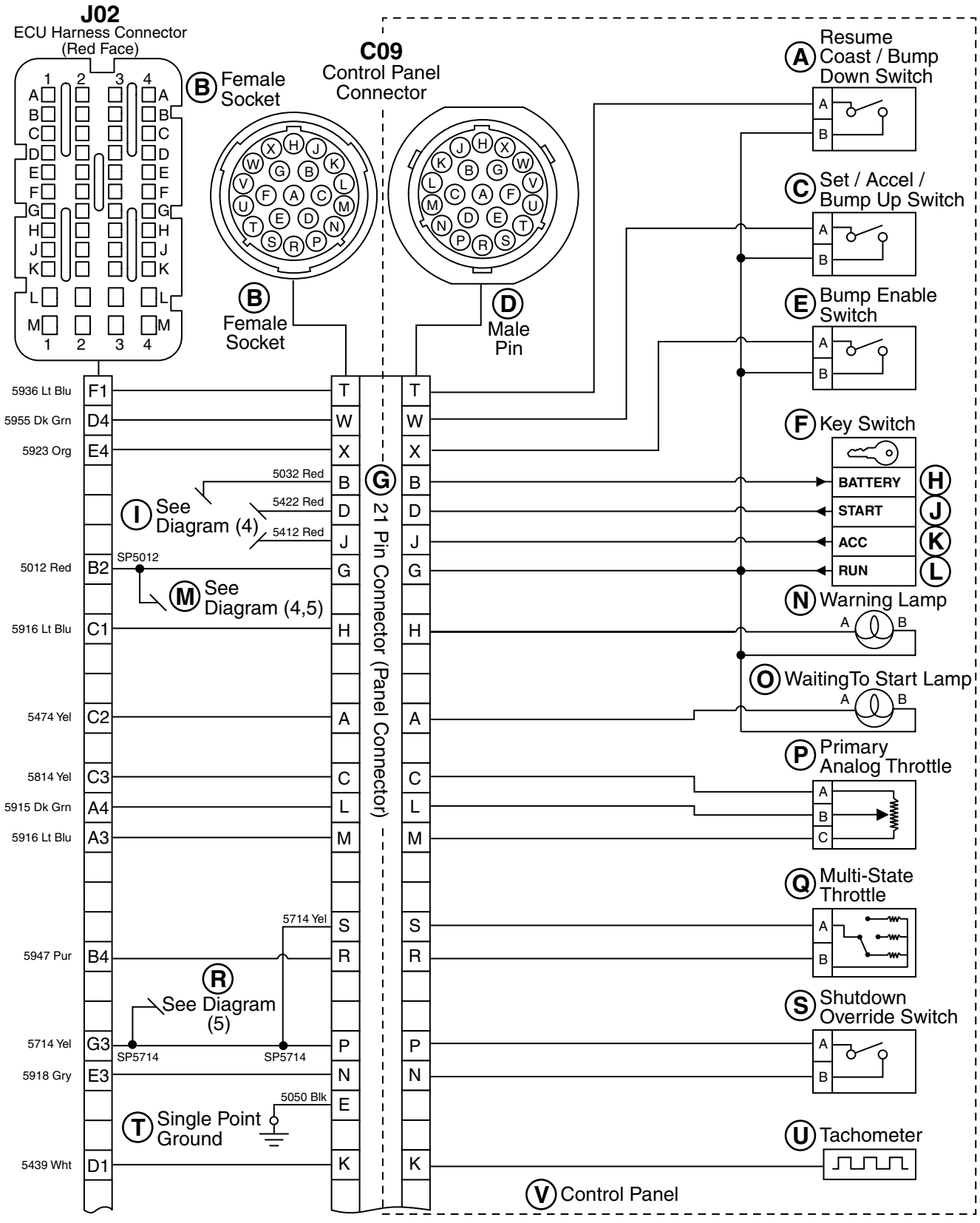
BK53208,0000040 -19-03OCT08-1/2

A—Loss of Coolant Switch
B—Female Socket
C—Air Filter Restriction Switch
D—External Shutdown Switch
E—Male Pin
F—External Derate Switch
G—Cruise Cancel/Resume Switch
H—See Diagram (6)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (4,6)
N—Cruise Brake Switch
O—Secondary Analog Throttle
P—Single Point Ground
Q—Drop/Isoc (Isochronous) Governor Switch
C08— Auxiliary Connector
J02— ECU Harness Connector (Red Face)
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B3—[5917 Purple] Remote Cruise On/Off Switch
J2-D2—[5473 Orange] Stop Engine Lamp Return
J2-D3—[5436 Light Blue] Air Filter Restriction Switch
J2-E1—[5943 Orange] Cruise Brake Switch
J2-F2—[5954 Yellow] Cruise On/Off Switch
J2-F3—[5913 Orange] Secondary Analog Throttle Signal
J2-G2—[5911 Brown] 5 Volt Power Supply #4 Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #4 Return
J2-G4—[5948 Gray] Low Coolant Level Switch
J2-H4—[5937 Purple] Droop/Isochronous Governor Switch
J2-J1— [5939 White] External Derate Switch
J2-J2— [5971 Brown] Cruise Cancel/Resume Switch
J2-K1—[5941 Brown] External Shutdown Switch

BK53208,0000040 -19-03OCT08-2/2

9.0L 24V Wiring Diagram 6



9.0 Liter 24 Volt Wiring Diagram 6

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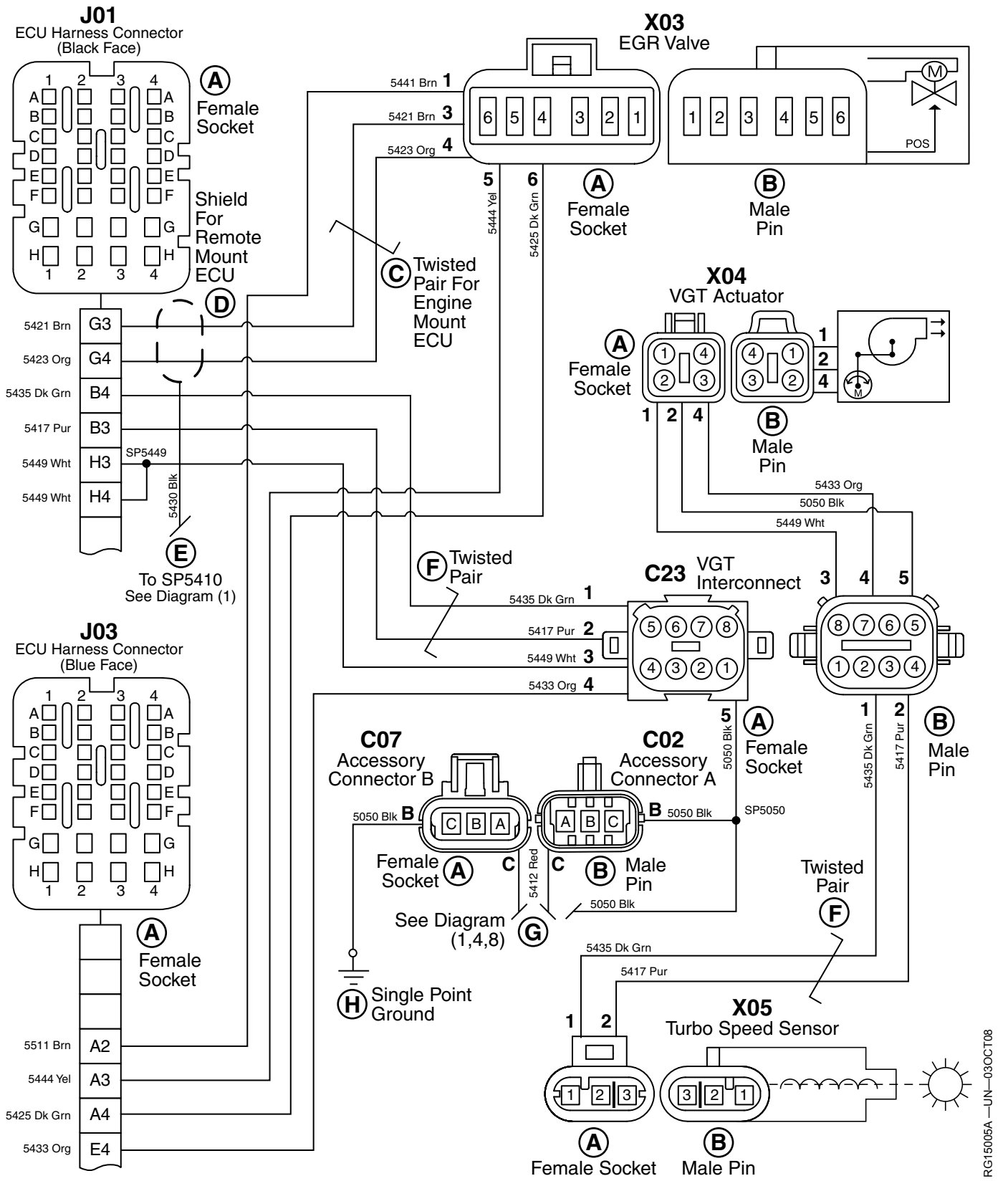
BK53208,0000041 -19-03OCT08-1/2

A—Resume Coast/Bump Down Switch
B—Female Socket
C—Set Accel/Bump Up Switch
D—Male Pin
E—Bump Enable Switch
F—Key Switch
G—21 Pin Connector (Panel Connector)
H—Battery
I— See Diagram (4)
J—Start
K—Accessory
L—Run
M—See Diagram (4,5)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (5)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Return
J2-D1—[5439 White] Tachometer Pulse Output
J2-D4—[5955 Dark green] Set/Accel/Bump Up Switch
J2-E3—[5913 Orange] Secondary Analog Throttle Signal
J2-E4—[5923 Orange] Bump Enable Switch
J2-F1—[5936 Light Blue] Resume Coast/Bump Down Switch
J2-G3—[5714A Yellow] 5 Volt Power Supply #4 Return

BK53208,0000041 -19-03OCT08-2/2

9.0L 24V Wiring Diagram 7



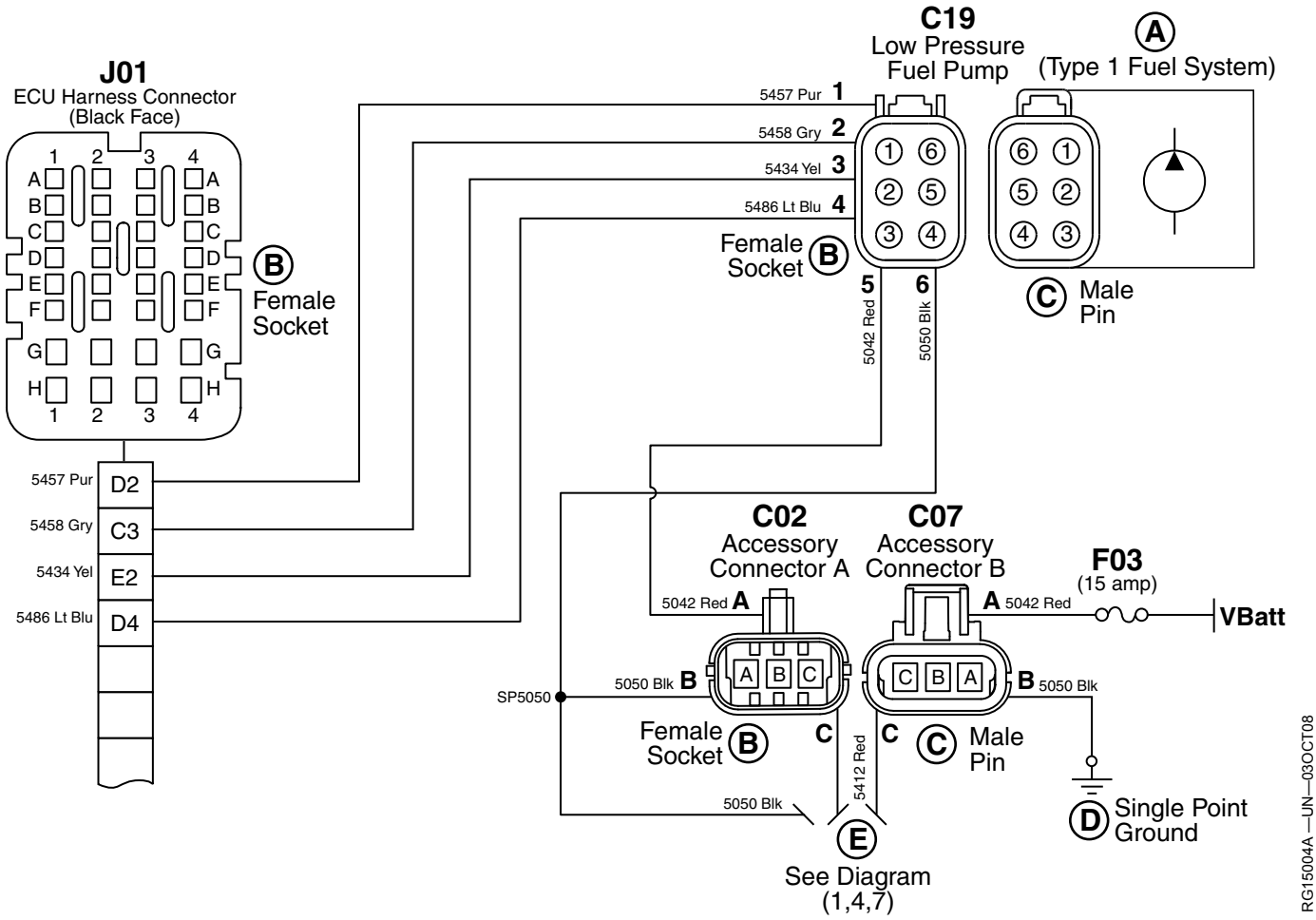
9.0 Liter 24 Volt Wiring Diagram 7

Continued on next page

A—Female Socket
B—Male Pin
C—Twisted Pair for Engine Mount ECU
D—Shield for Remote Mount ECU
E—To SP5410 See Diagram (1)
F—Twisted Pair
G—See Diagram (1,4,8)
H—Single Point Ground
C02— Accessory Connector A
C07— Accessory Connector B
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
J1-B3—[5417 Purple] Turbo Speed Return
J1-B4—[5435 Dark Green] Turbo Speed Pulse
J1-G3—[5421 Brown] EGR Valve PWM Drive #1
J1-G4—[5423 Orange] EGR Valve PWM Drive #2
J1-H3—[5449B White] VGT Actuator Power #1 Positive
J1-H4—[5449A White] VGT Actuator Power #1 Positive
J03— ECU Harness Connector (Blue Face)
J3-A2—[5511 Brown] 5 Volt Power Supply #5 Positive
J3-A3—[5444 Yellow] 5 Volt Power Supply #5 Return
J3-A4—[5425 Dark Green] EGR Valve Position Signal
J3-E4—[5433 Orange] VGT Actuator Communications Signal
X03— EGR Valve
X04— VGT Actuator
X05— Turbo Speed Sensor

BK53208,0000042 -19-03OCT08-2/2

9.0L 24V Wiring Diagram 8



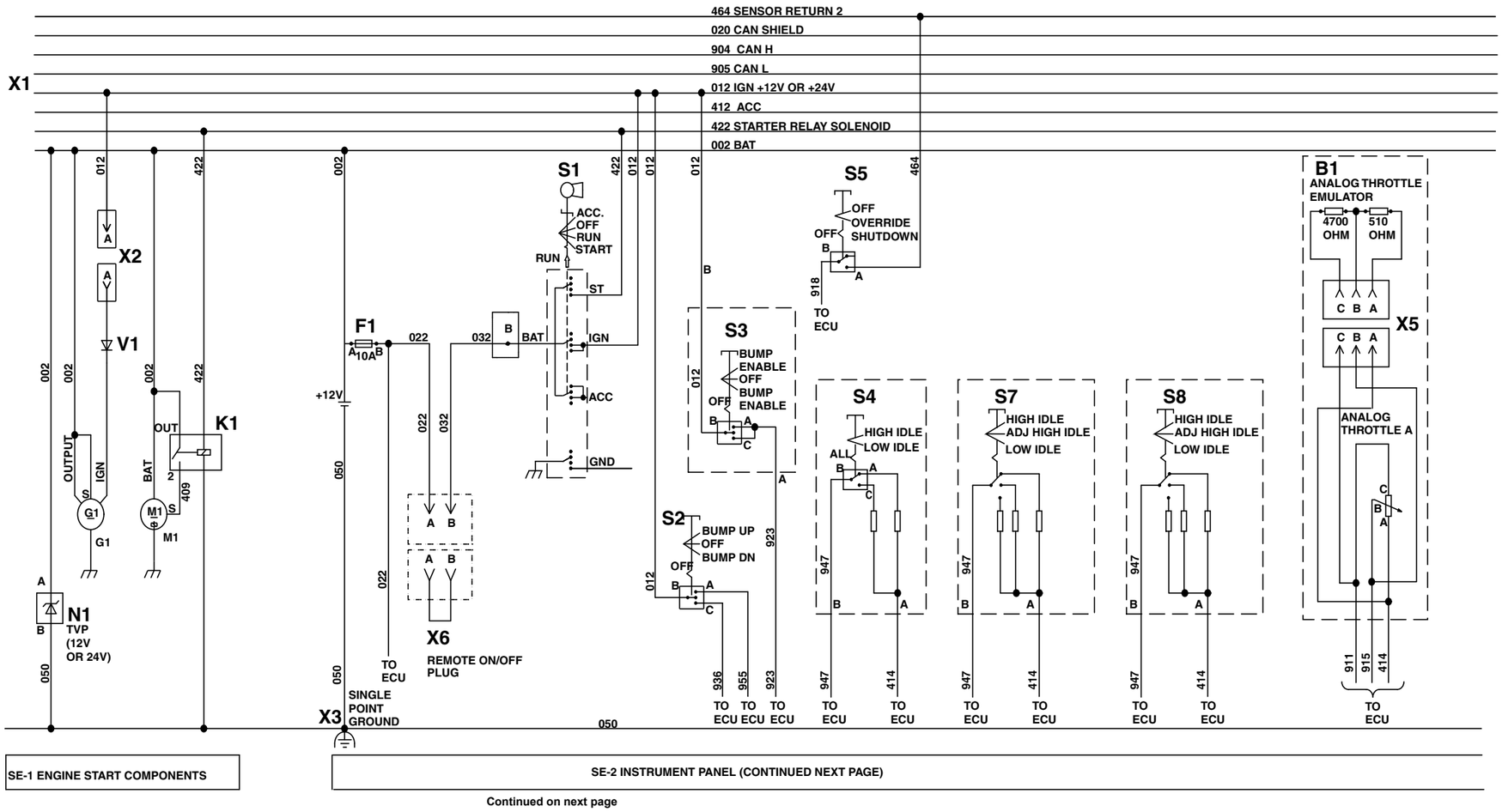
9.0 Liter 24 Volt Wiring Diagram 8

A—(Type 1 Fuel System)
B—Female Socket
C—Male Pin
D—Single Point Ground
E—See Diagram (1,4,7)
C02— Accessory Connector A
C07— Accessory Connector B
C19— Low Pressure Fuel Pump
F03— 15 Amp
J01— ECU Harness Connector (Black Face)
J1-C3—[5458 Gray] Low Pressure Fuel Pump Current Feedback
J1-D2—[5457 Purple] Low Pressure Fuel Pump PWM Drive
J1-D4—[5486 Light Blue] Low Pressure Fuel Pump Enable Command
J1-E2—[5434 Yellow] Low Pressure Fuel Pump Status
VBatt—Battery Positive

BK53208,0000043 -19-03OCT08-1/1

OEM Instrument Panel / Engine Start Components Electrical Wiring Diagram

RG12288 —19—23AUG02



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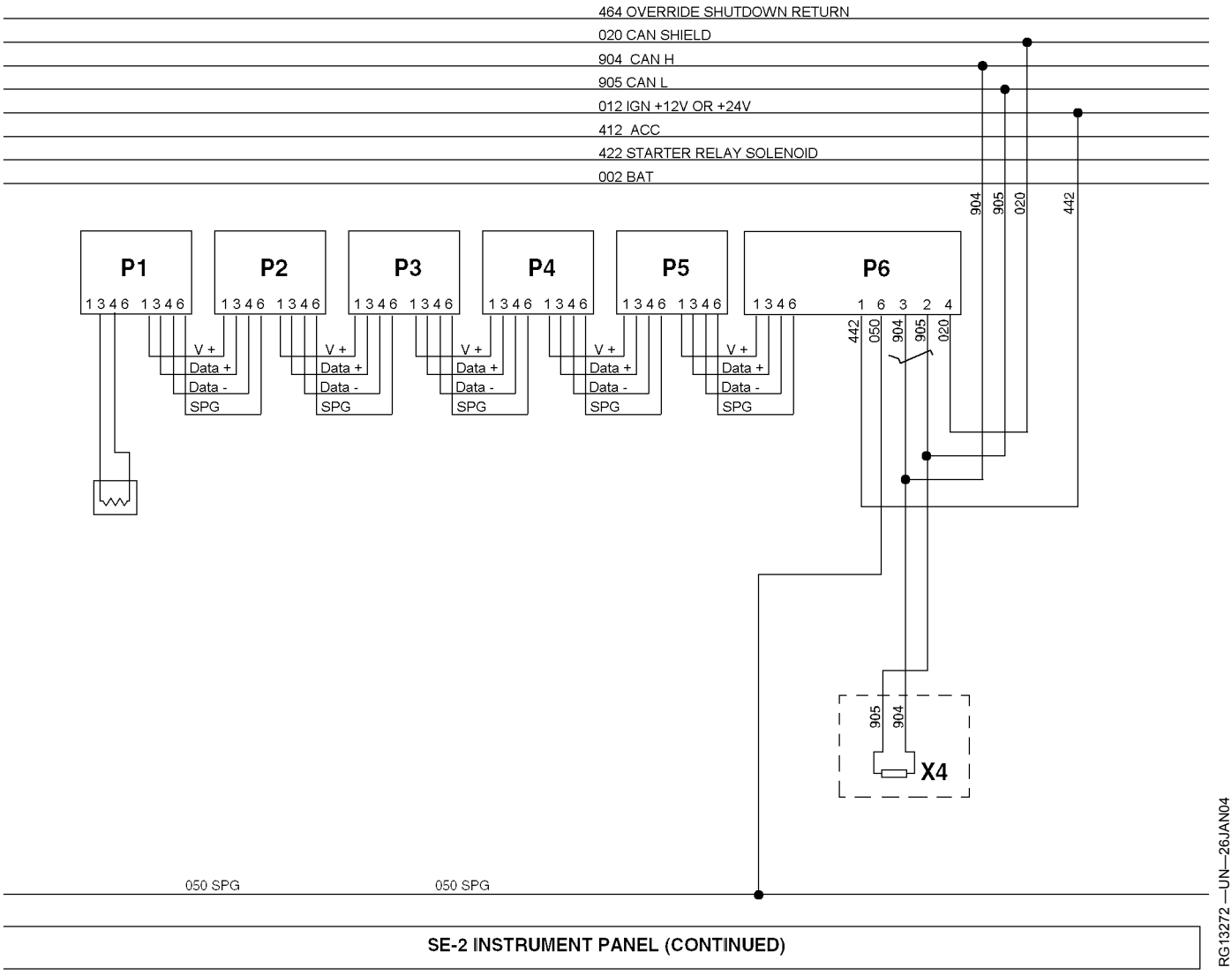
DN22556,0000467 -19-12JUL07-1/2

B1—Analog Throttle Emulator
E1—Back Light Regulator (24V) or Plug (12V)
F1—Fuse (10 Amp)
F2—Fuse (5 Amp)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
N2—Voltage Regulator (for 24V Operation)
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary
S4—Dual State Throttle Switch
S5—Override Shutdown Switch (Momentary)
S6—Dimmer Control or Jumper Plug
S7—Tri-state Throttle Switch
S8—Ramp Throttle Switch
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector
X6—Remote On/Off Plug

DN22556,0000467 -19-12JUL07-2/2

OEM Instrument Panel / Engine Start Components Electrical Wiring Diagram - Continued



OEM Instrument Panel Wiring Diagram

P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
X4—CAN Terminator

DN22556,0000468 -19-12JUL07-1/1

9.0L Wire Splice Location Diagrams

Wire harness splice location diagrams for 9.0L engine applications

NOTE: The option code for the application can be found on the Option Code Label located near the top of the engine block.

NOTE: The harness diagrams provided are for a typical John Deere supplied OEM harness. Splice locations may not apply to all applications.

The table below lists the harness part number used for each option code. Harness diagrams are located after the table.

Option Code	Harness Part Number	Harness Type
8401 8405 8424	RE529948	J01, J03 Engine Harness
8402	RE529950	J01, J03 Engine Harness
8407 8409 8412	RE529949	J01, J03 Engine Harness
8408 8410	RE529951	J01, J03 Engine Harness
8414 8420	RE532623	J01, J03 Engine Harness
8414 8421 8423	RE532656	J01, J03 Engine Harness
8428	RE538046	Engine Harness for Dual ECU
9216	RE536603	J2 OEM Harness
9217	RE536604	J2 OEM Harness

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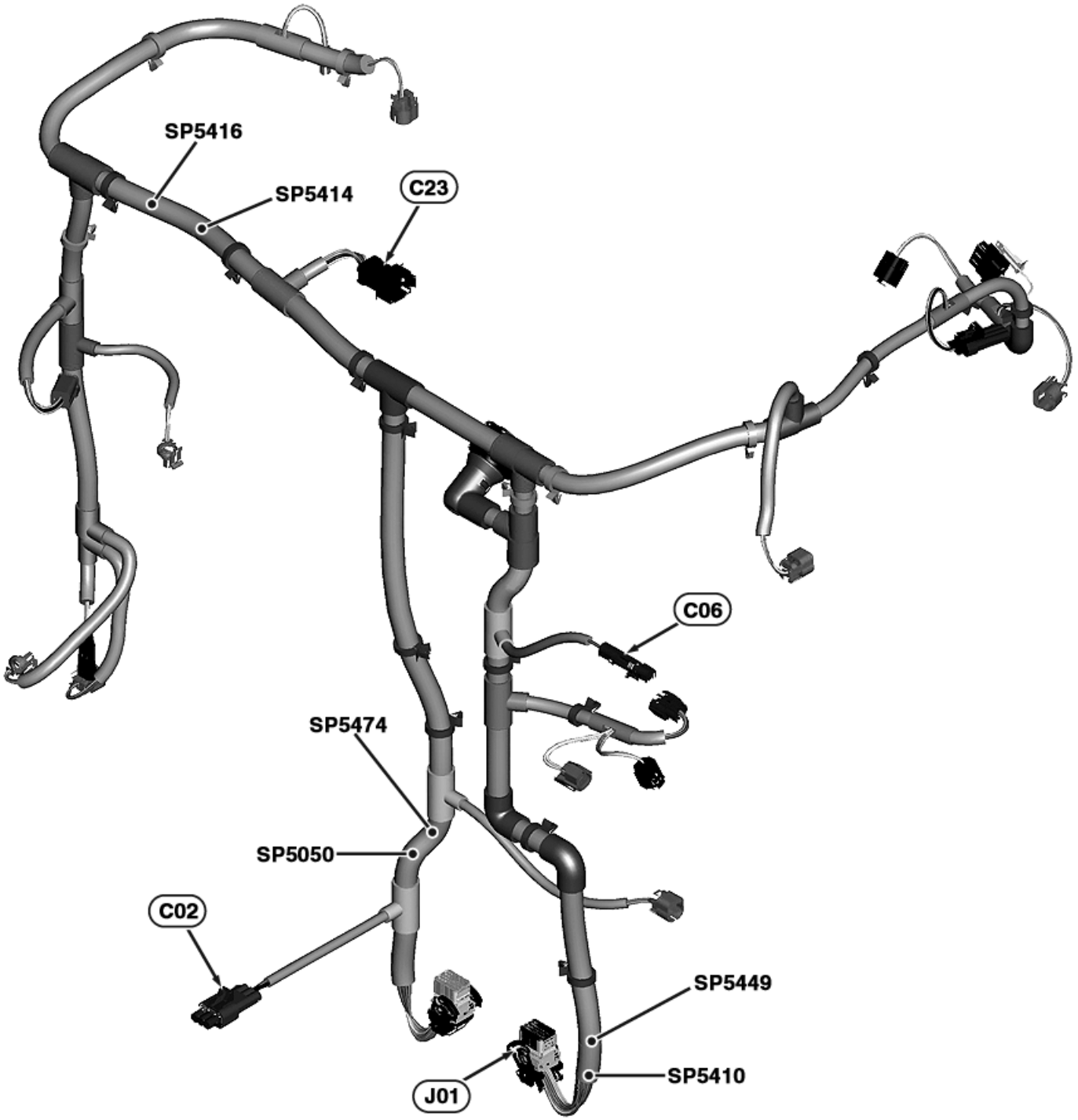

Splice Locations for Wire Harness RE529948, Option Codes 8401, 8405, and 8424

C02— Accessory Connector A
C06— Alternator Excitation
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416
SP5449—Splice 5449
SP5474—Splice 5474

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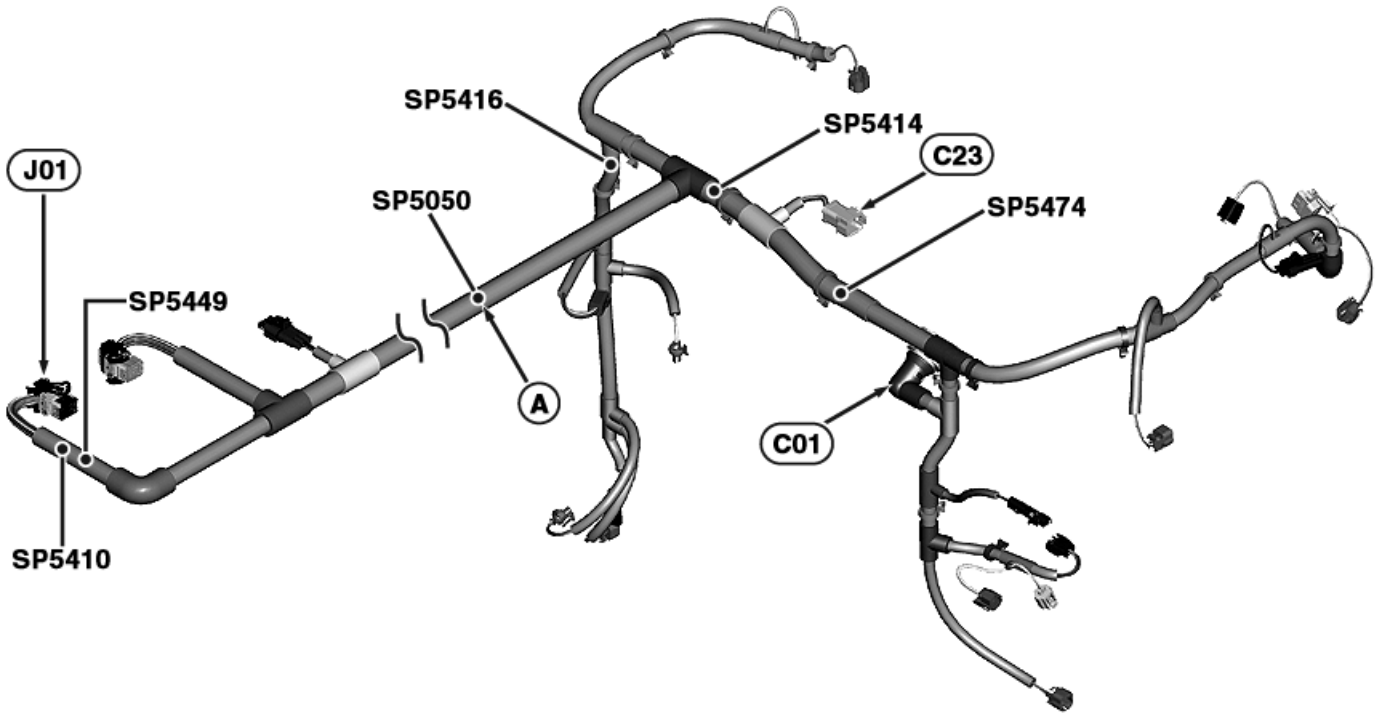

Splice Locations for Wire Harness RE529949, Option Codes 8407, 8409, and 8412

A—Splice 5050 Located 320mm (12.6in) from Harness T-Junction Near Splice 5414
C01— Fuel Injector Connector
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416
SP5449—Splice 5449
SP5474—Splice 5474

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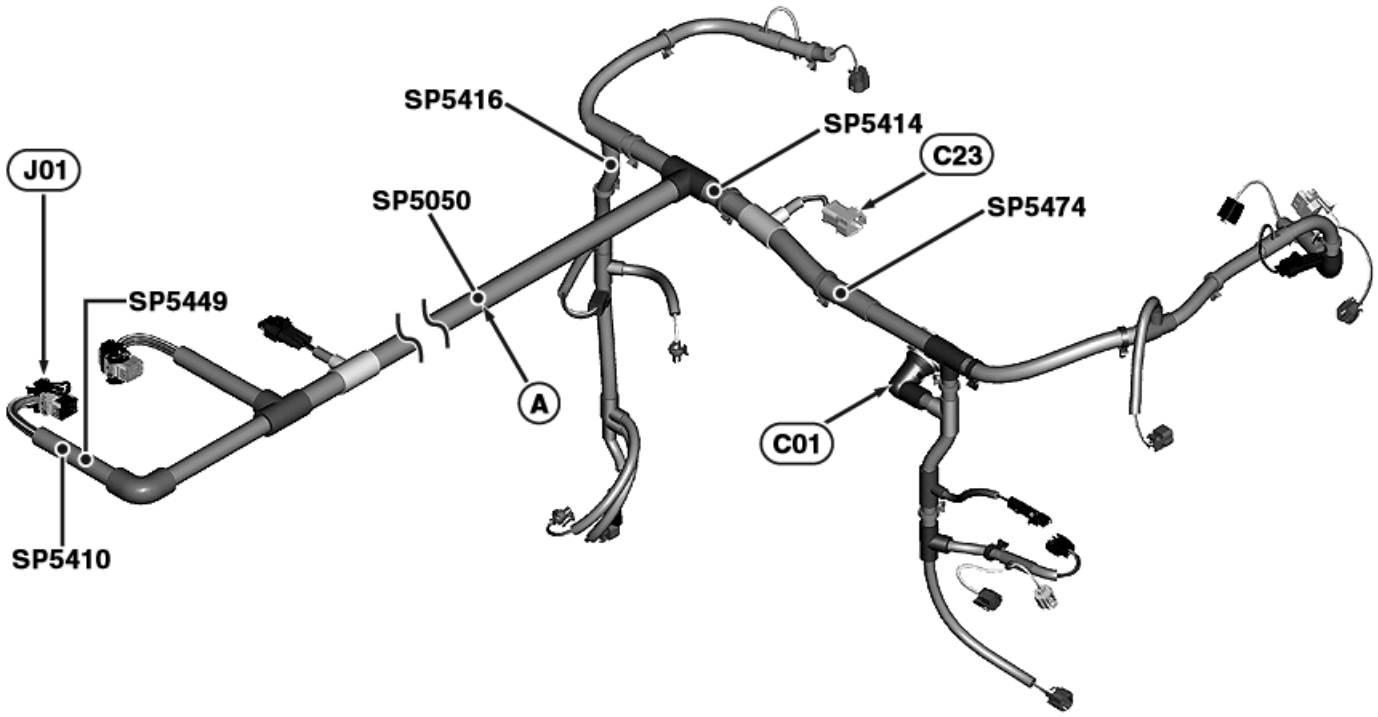

Splice Locations for Wire Harness RE529950, Option Code 8402

A—Splice SP5050 Located 320mm (12.6in) from Harness T-Junction Near Splice 5414
C01— Fuel Injector Connector
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416
SP5449—Splice 5449
SP5474—Splice 5474

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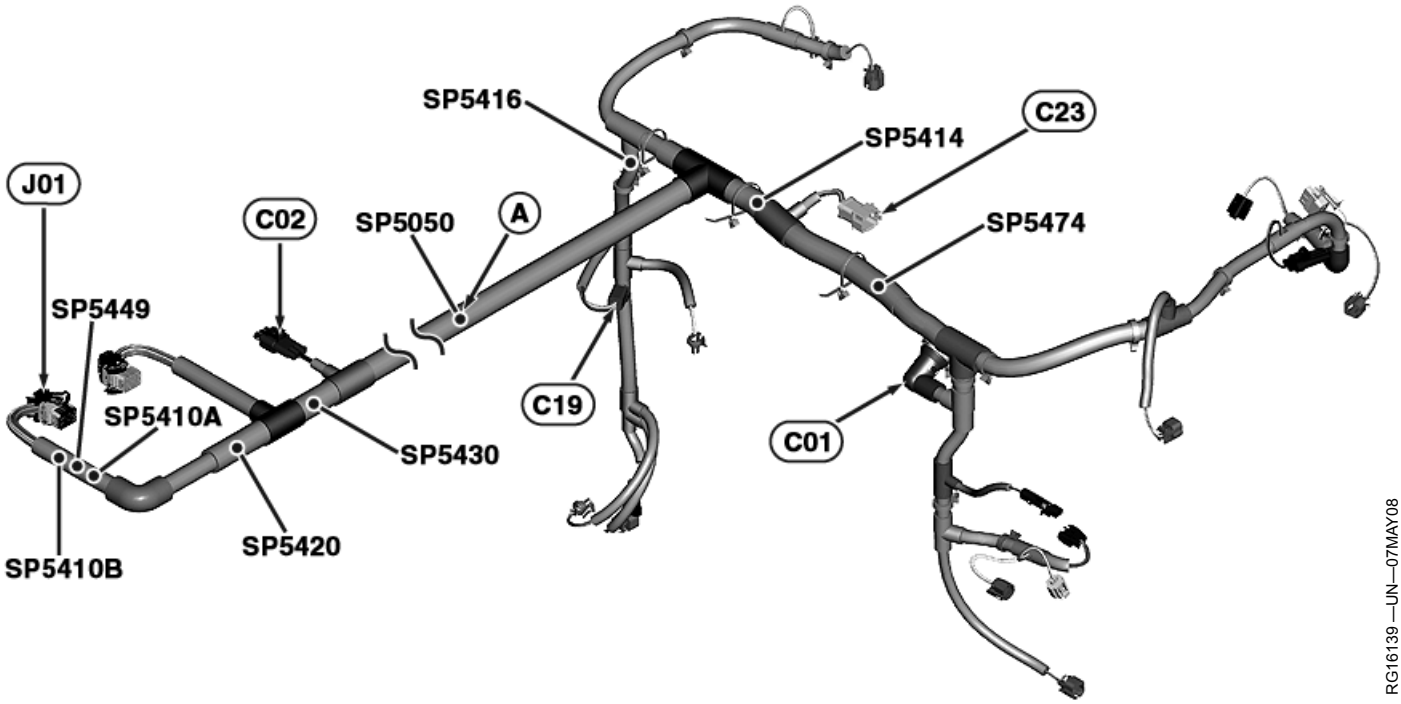

Splice Locations for Wire Harness RE529951, Option Codes 8408 and 8410

A—Splice 5050 Located 450mm (17.7in) from Harness T-Junction Near Splice 5414
C01— Fuel Injector Connector
C02— Accessory Connector A
C23— VGT Interconnect
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420
SP5430—Splice 5430
SP5449—Splice 5449
SP5474—Splice 5474

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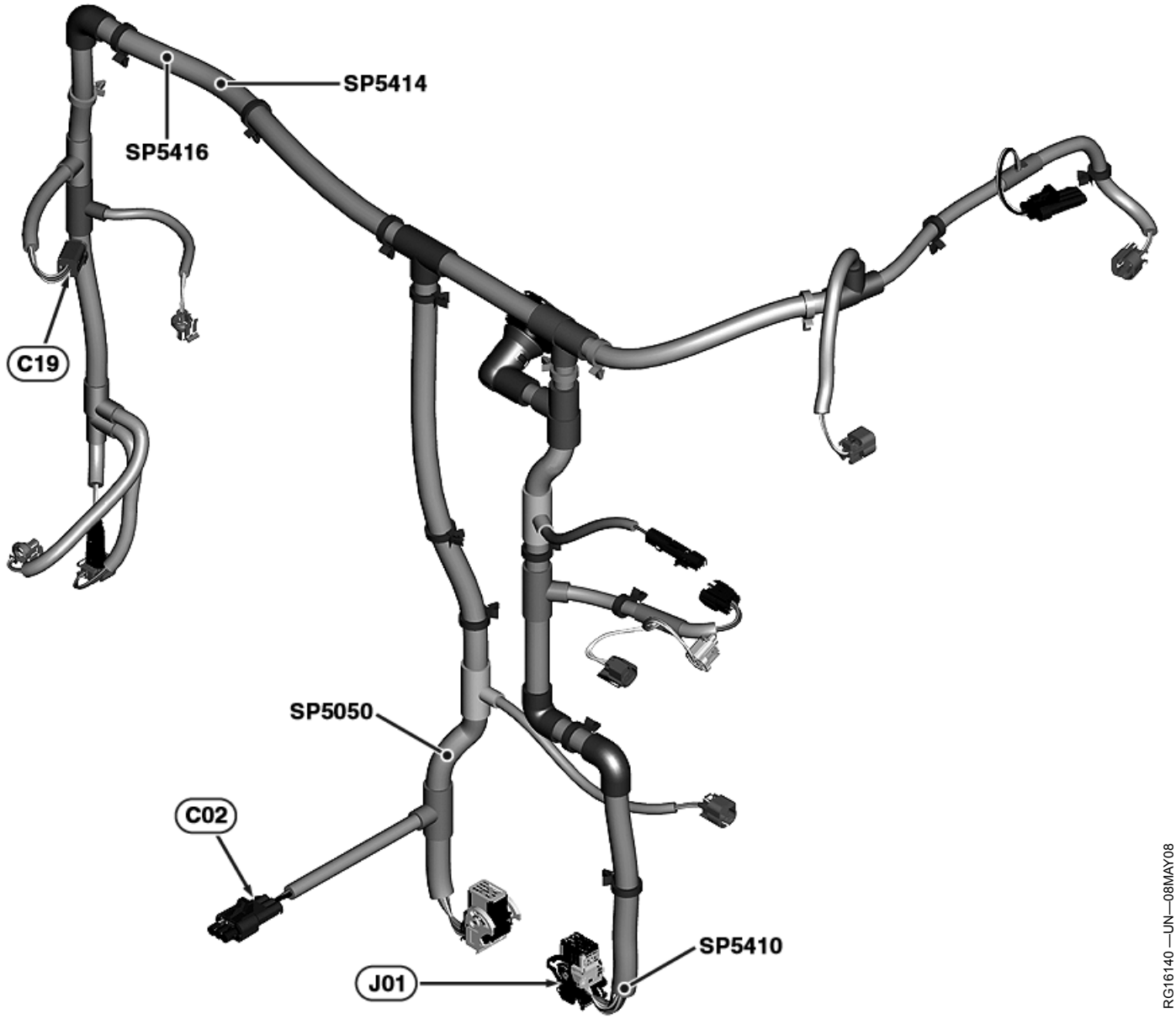

Splice Locations for Wire Harness RE532623, Option Codes 8414 and 8420

C02— Accessory Connector A
C19— Low Pressure Fuel Pump
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416

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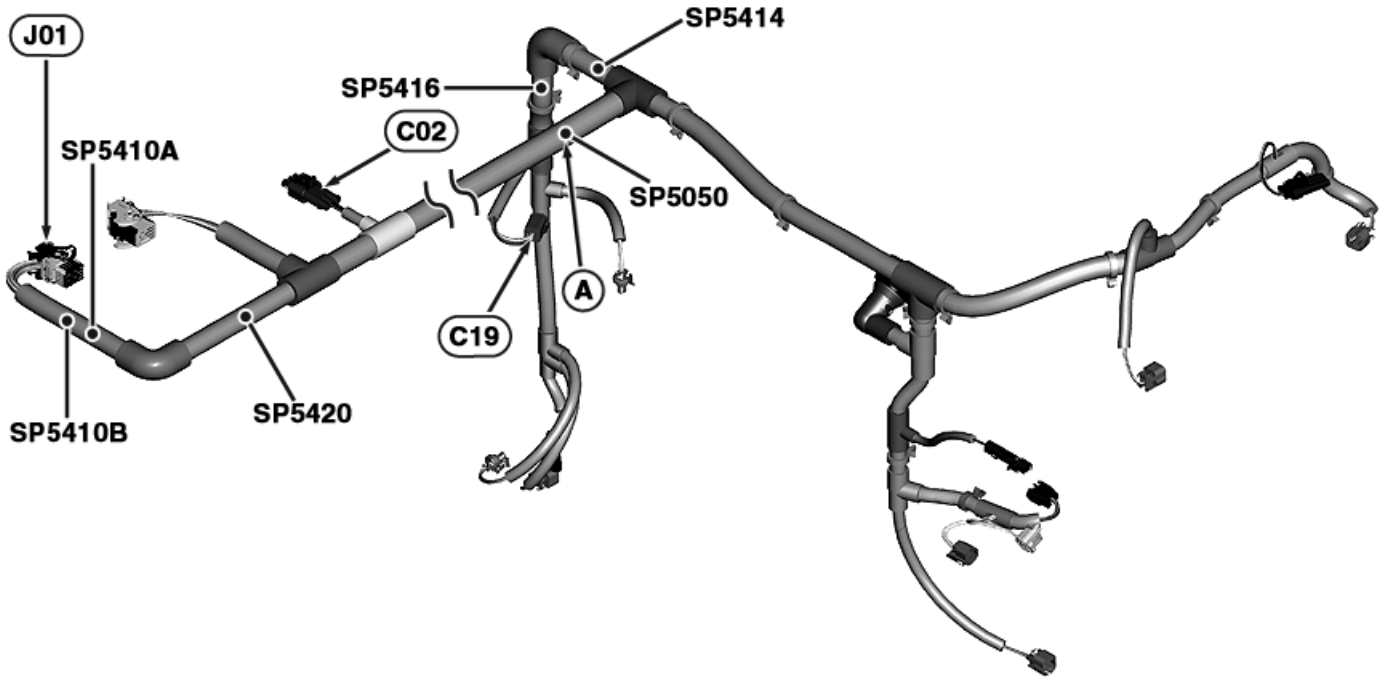

Splice Locations for Wire Harness RE532656, Option Codes 8415, 8421, and 8423

A—Splice 5050 Located Within 108mm (4.25in) from Harness T-Junction near splice 5414
C02— Accessory Connector A
C19— Low Pressure Fuel Pump
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420

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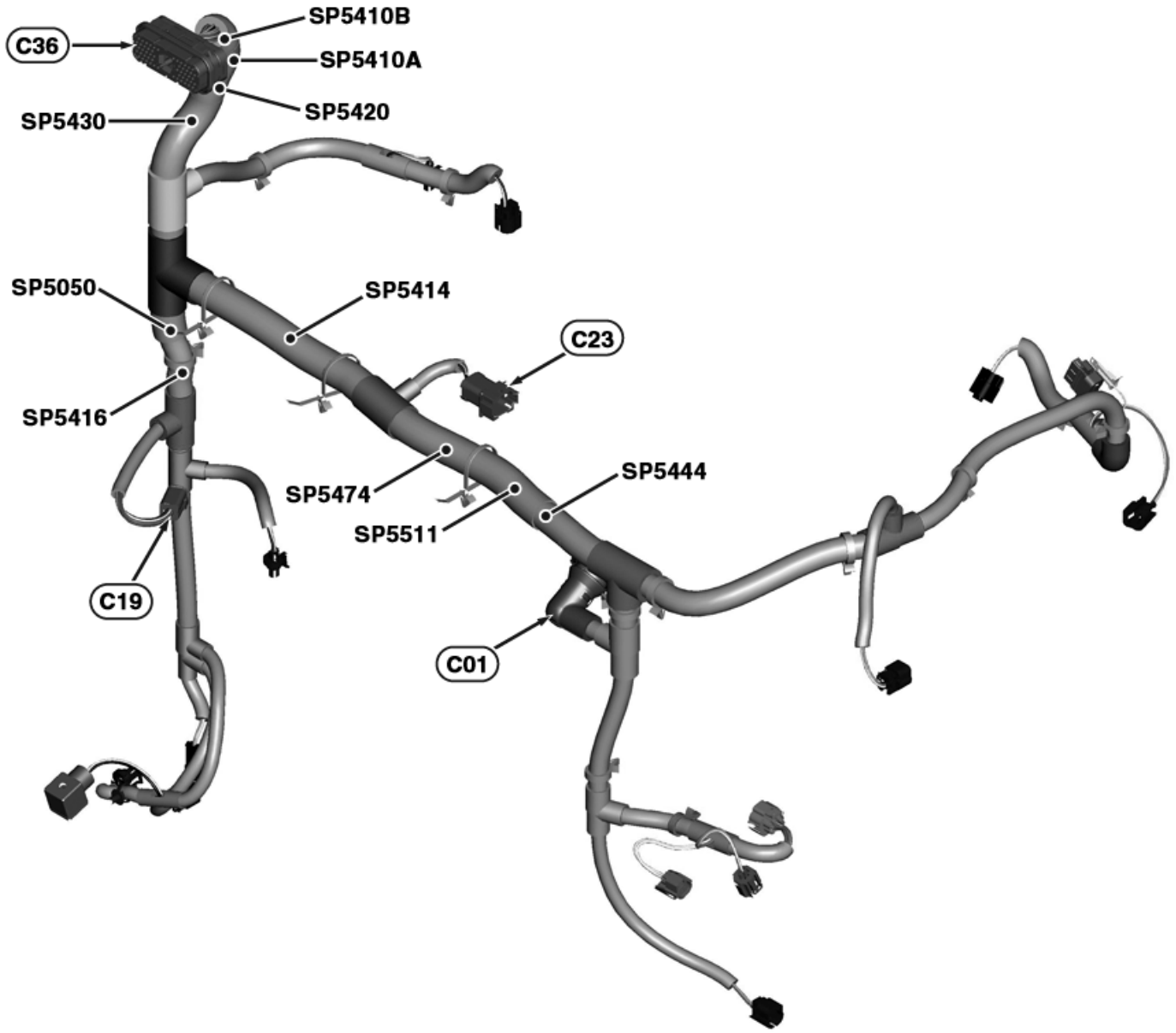

Splice Locations for Wire Harness RE538046, Option Code 8428

C01— Fuel Injector Connector
C19— Low Pressure Fuel Pump
C23— VGT Interconnect
C36— Switch Box Harness Connector
SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420
SP5430—Splice 5430
SP5444—Splice 5444
SP5474—Splice 5474
SP5511—Splice 5511

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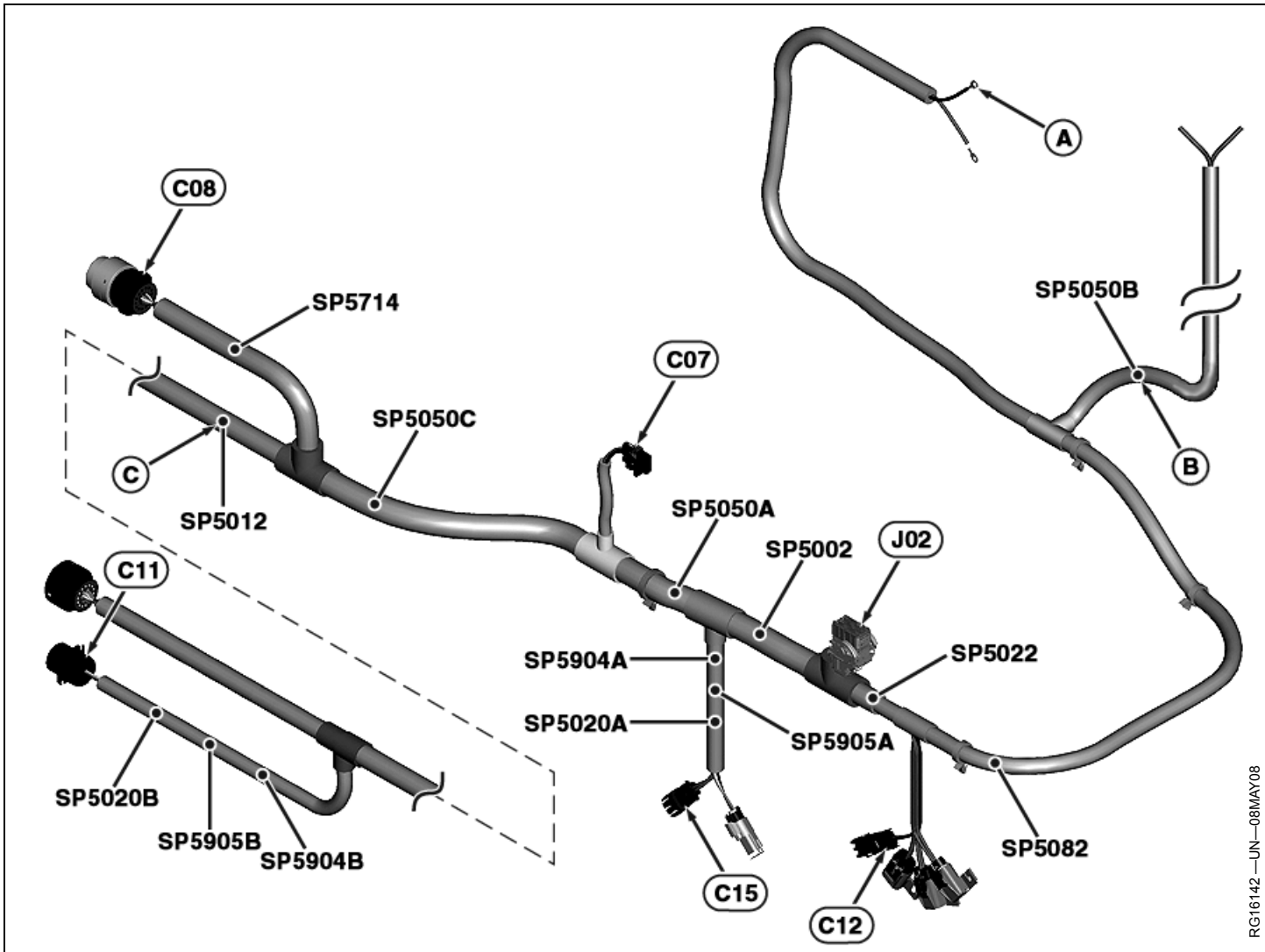

Splice Locations for Wire Harness RE536603, Option 9216

A—Splice 5012 Located Within 200mm (7.9in) from Harness T-Junction to C08
B—Splice 5050B Located Within 200mm (7.9in) from Harness T-Junction to Starter Relay Coil Connections
C—Starter Relay Coil Connections
C07— Accessory Connector B
C08— Auxiliary Connector
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C15— Remote Switch
J02— ECU Harness Connector (Red Face)
SP5002—Splice 5002
SP5012—Splice 5012
SP5020A—Splice 5020A
SP5020B—Splice 5020B
SP5022—Splice 5022
SP5050A—Splice 5050A
SP5050B—Splice 5050B
SP5050C—Splice 5050C
SP5082—Splice 5082
SP5714—Splice 5714
SP5904A—Splice 5904A
SP5904B—Splice 5904B
SP5905A—Splice 5905A
SP5905B—Splice 5905B

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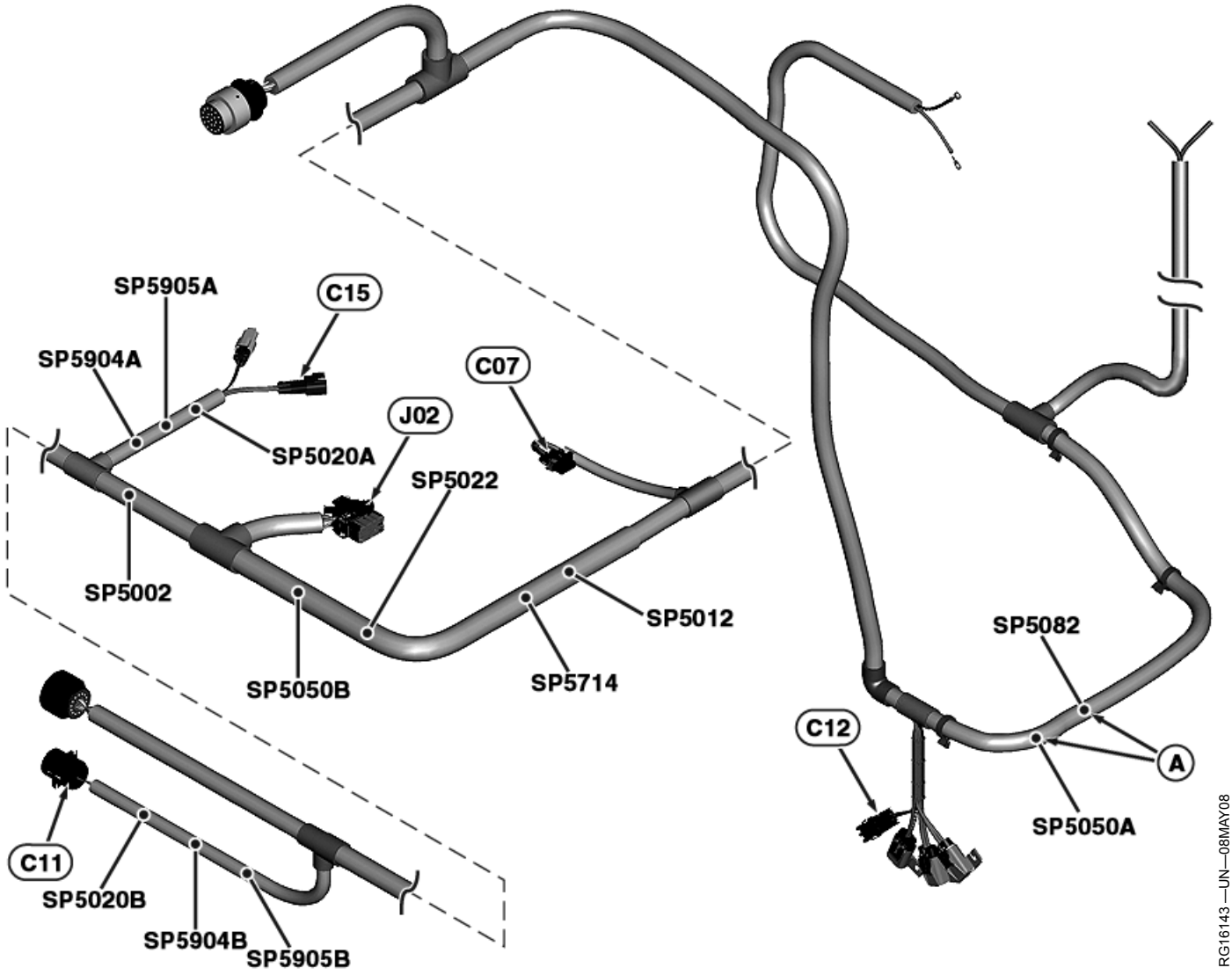

Splice Locations for Wire Harness RE536604, Option 9217

A—Splices SP5050A and SP5082 Located Within 200mm (7.9in) from Harness T-Junction to C12
C07— Accessory Connector B
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C15— Remote Switch
J02— ECU Harness Connector (Red Face)
SP5002—Splice 5002
SP5012—Splice 5012
SP5020A—Splice 5020A
SP5020B—Splice 5020B
SP5022—Splice 5022
SP5050A—Splice 5050A
SP5050B—Splice 5050B
SP5082—Splice 5082
SP5714—Splice 5714
SP5904A—Splice 5904A
SP5904B—Splice 5904B
SP5905A—Splice 5905A
SP5905B—Splice 5905B

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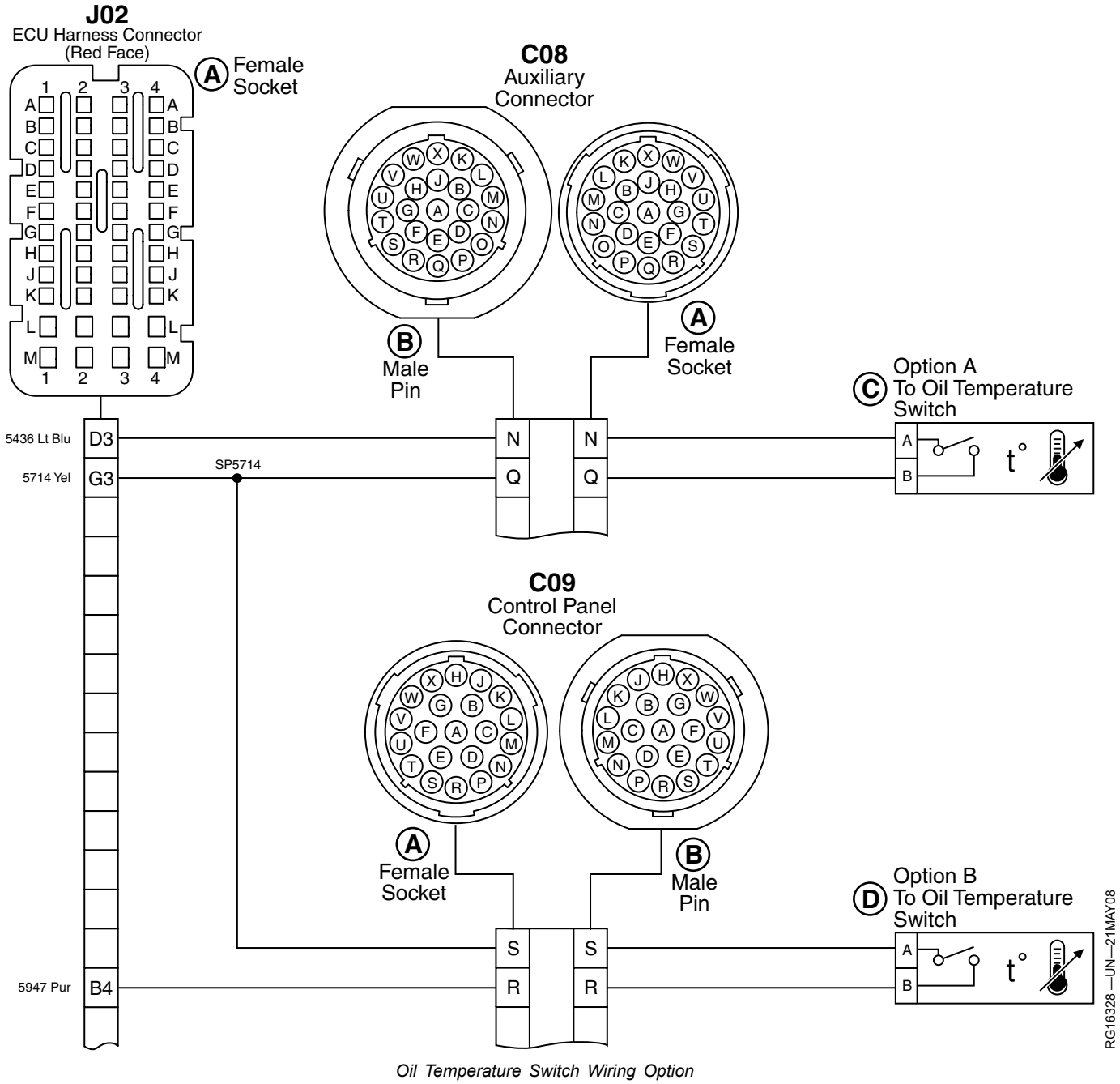
Oil Temperature Switch Option

Wire diagram for applications with optional oil temperature switch. The oil temperature switch replaces either the air filter restriction switch or the multi-state throttle connections going to J2 of the ECU.



Oil Temperature Switch Wiring Option

A—Female Socket
B—Male Pin
C—Option A. To Oil Temperature Switch
D—Option B. To Oil Temperature Switch
C08— Auxiliary Connector
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-B4—[5947 Purple] Oil Temperature Switch Signal. Option B
J2-D3—[5936 Light Blue] Oil Temperature Switch Signal. Option A
J2-G3—[5714A Yellow] 5 Volt Power Supply #4 Return

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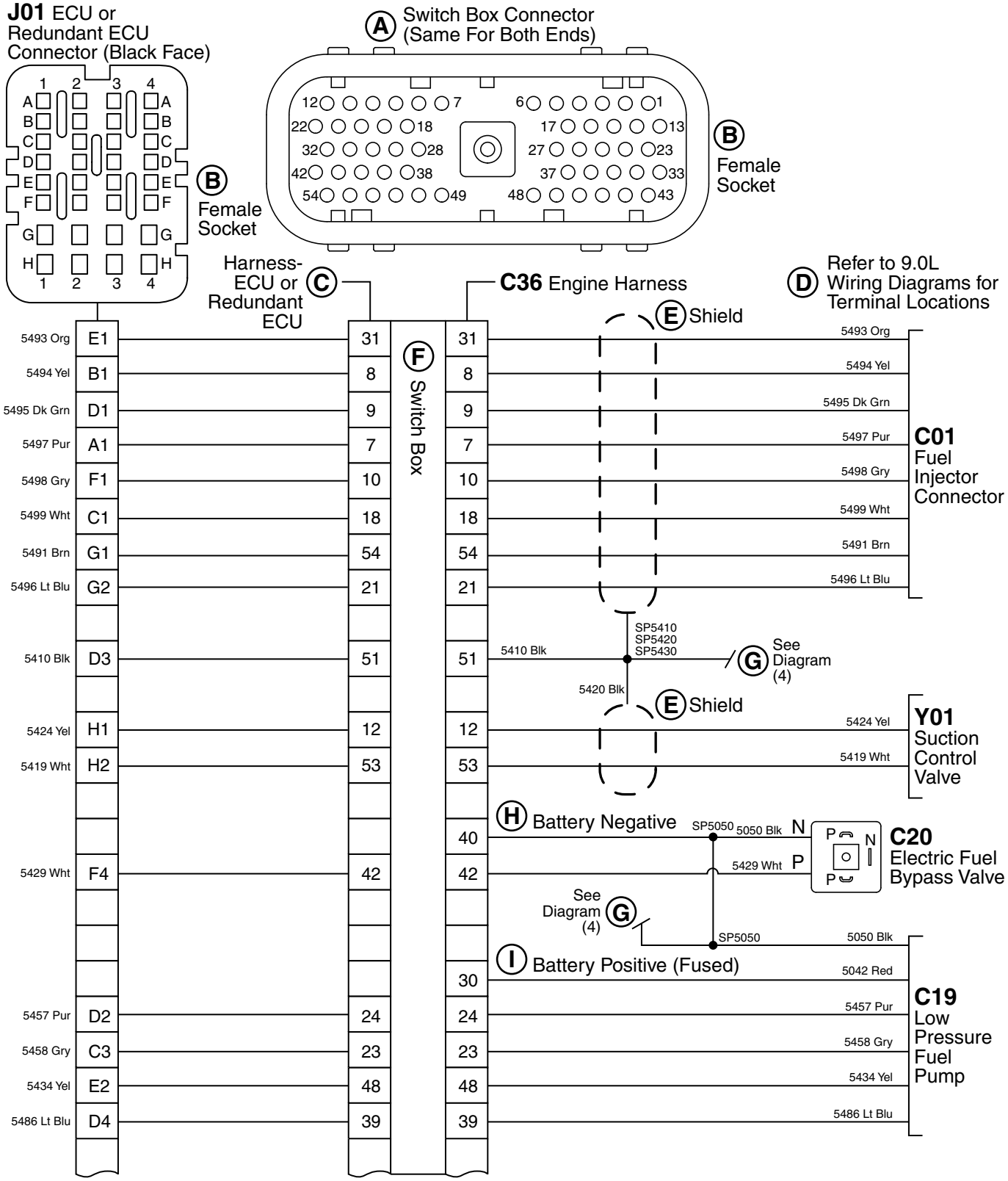
Redundant ECU Option 9.0L Wiring Diagrams

9.0L Redundant ECU Wiring Diagram 1



9.0L Redundant ECU Wiring Diagram 1

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A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 9.0L Wiring Diagrams for Terminal Locations
E—Shield
F—Switch Box
G—See Diagram (4)
H—Battery Negative
I— Battery Positive (Fused)
C01— Fuel Injector Connector
C19— Low Pressure Fuel Pump
C20— Electric Fuel Bypass Valve
C36— Engine Harness
J01— ECU or Redundant ECU Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-C3—[5458 Gray] Low Pressure Fuel Pump Current Feedback
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D2—[5457 Purple] Low Pressure Fuel Pump PWM Drive
J1-D3—[5410 Black] Wiring Shield
J1-D4—[5486 Light Blue] Low Pressure Fuel Pump Enable Command
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E2—[5434 Yellow] Low Pressure Fuel Pump Status
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F4—[5429 White] Electric Fuel Bypass Valve Control
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power
J1-H1—[5424 Yellow] Suction Control Valve High Drive
J1-H2—[5419 White] Suction Control Valve Low Drive
Y01— Suction Control Valve

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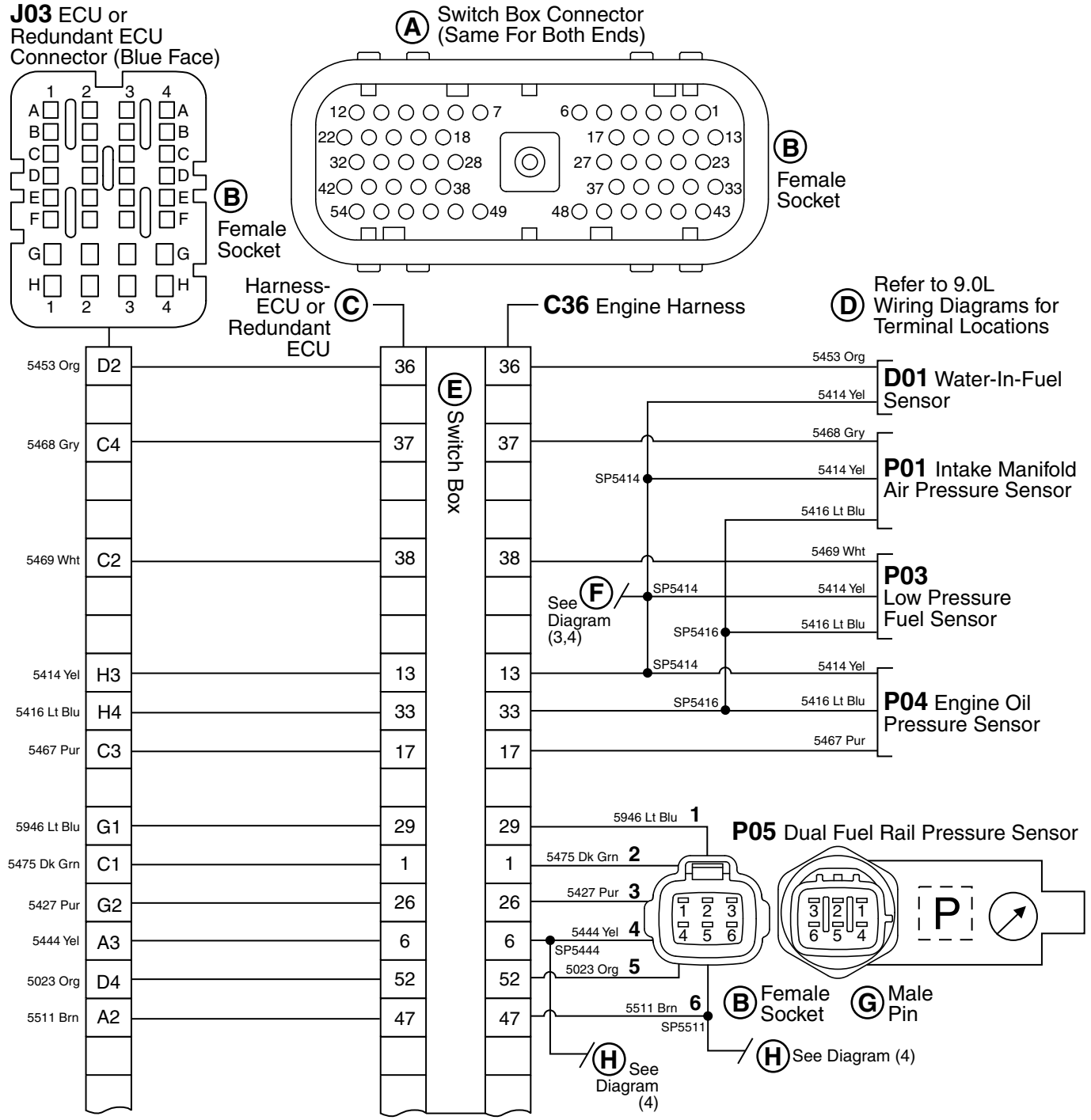
9.0L Redundant ECU Wiring Diagram 2



9.0L Redundant ECU Wiring Diagram 2

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A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 9.0L Wiring Diagrams for Terminal Locations
E—Switch Box
F—See Diagram (3,4)
G—Male Pin
H—See Diagram (4)
C36— Engine Harness
D01— Water In Fuel Sensor
J03— ECU or Redundant ECU Connector (Blue Face)
J3-A2—[5511 Brown] 5 Volt Power Supply #5 Positive
J3-A3—[5444 Yellow] 5 Volt Power Supply #5 Return
J3-C1—[5475 Dark Green] Primary Fuel Rail Pressure Signal
J3-C2—[5469 White] Low Pressure Fuel Signal
J3-C3—[5467 Purple] Engine Oil Pressure Signal
J3-C4—[5468 Gray] Intake Manifold Air Pressure Signal
J3-D2—[5453 Orange] Water In Fuel Signal
J3-D4—[5023 Orange] Redundant Fuel Rail Pressure Signal
J3-G1—[5946 Light Blue] 5 Volt Power Supply #1 Positive
J3-G2—[5427 Purple] 5 Volt Power Supply #1 Return
J3-H3—[5414 Yellow] 5 Volt Power Supply #2 Return
J3-H4—[5416 Light Blue] 5 Volt Power Supply #2 Positive
P01— Intake Manifold Air Pressure Sensor
P03— Low Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
P05— Dual Fuel Rail Pressure Sensor

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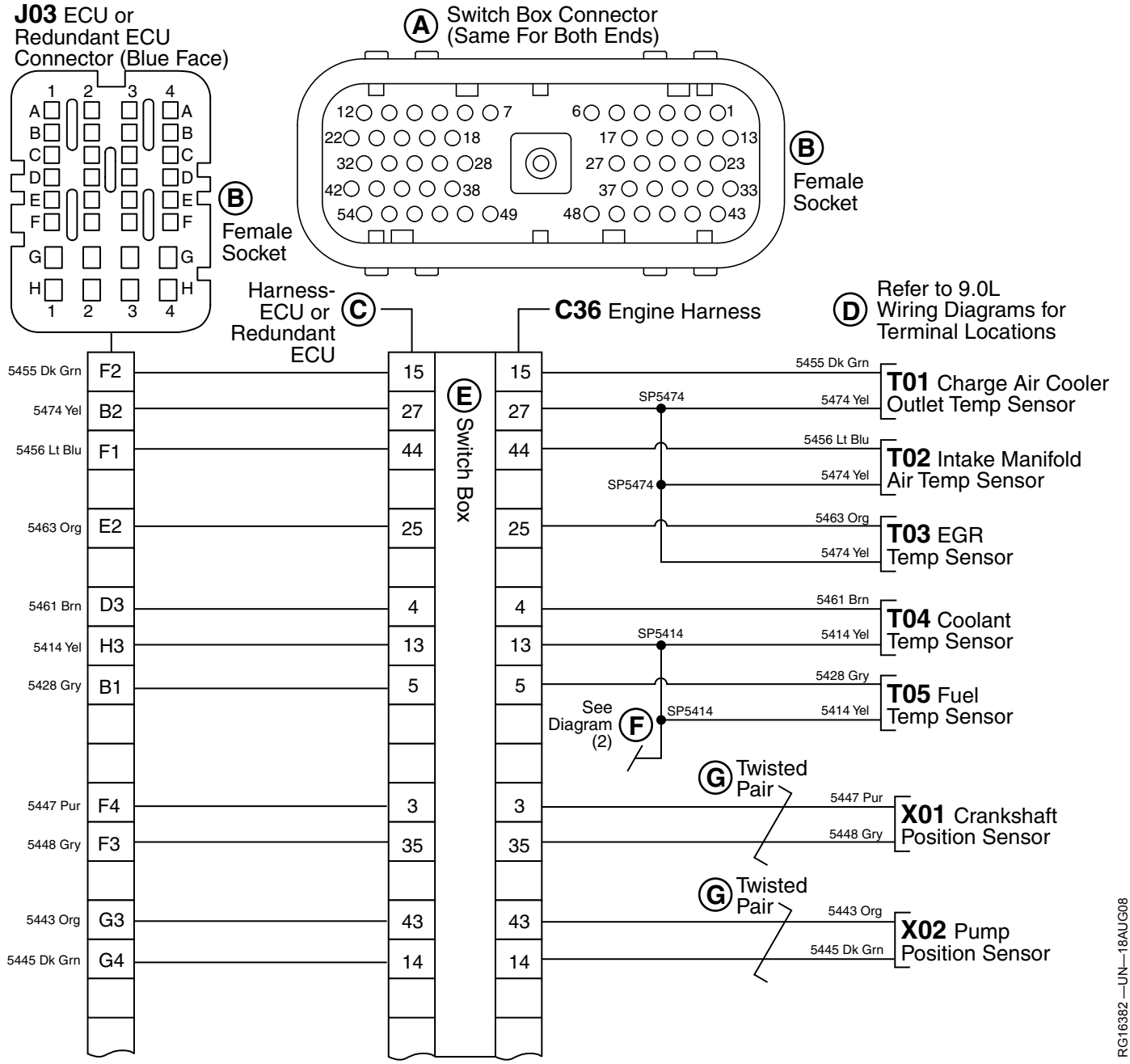
9.0L Redundant ECU Wiring Diagram 3



9.0L Redundant ECU Wiring Diagram 3

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 9.0L Wiring Diagrams for Terminal Locations
E—Switch Box
F—See Diagram (2)
G—Twisted Pair
C36— Engine Harness
J03— ECU or Redundant ECU Connector (Blue Face)
J3-B1—[5428 Gray] Fuel Temperature Signal
J3-B2—[5474 Yellow] Precision Sensor Return
J3-D3—[5461 Brown] Coolant Temperature Signal
J3-E2—[5463 Orange] EGR Temperature Signal
J3-F1—[5456 Light Blue] Intake Manifold Air Temperature Signal
J3-F2—[5455 Dark Green] Charge Air Cooler Outlet Temperature Signal
J3-F3—[5448 Gray] Crankshaft Position Return
J3-F4—[5447 Purple] Crank Position Pulse
J3-G3—[5443 Orange] Pump Position Return
J3-G4—[5445 Dark Green] Pump Position Pulse
J3-H3—[5414 Yellow] 5 Volt Power Supply #2 Return
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
T03— EGR Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor
X01— Crankshaft Position Sensor
X02— Pump Position Sensor

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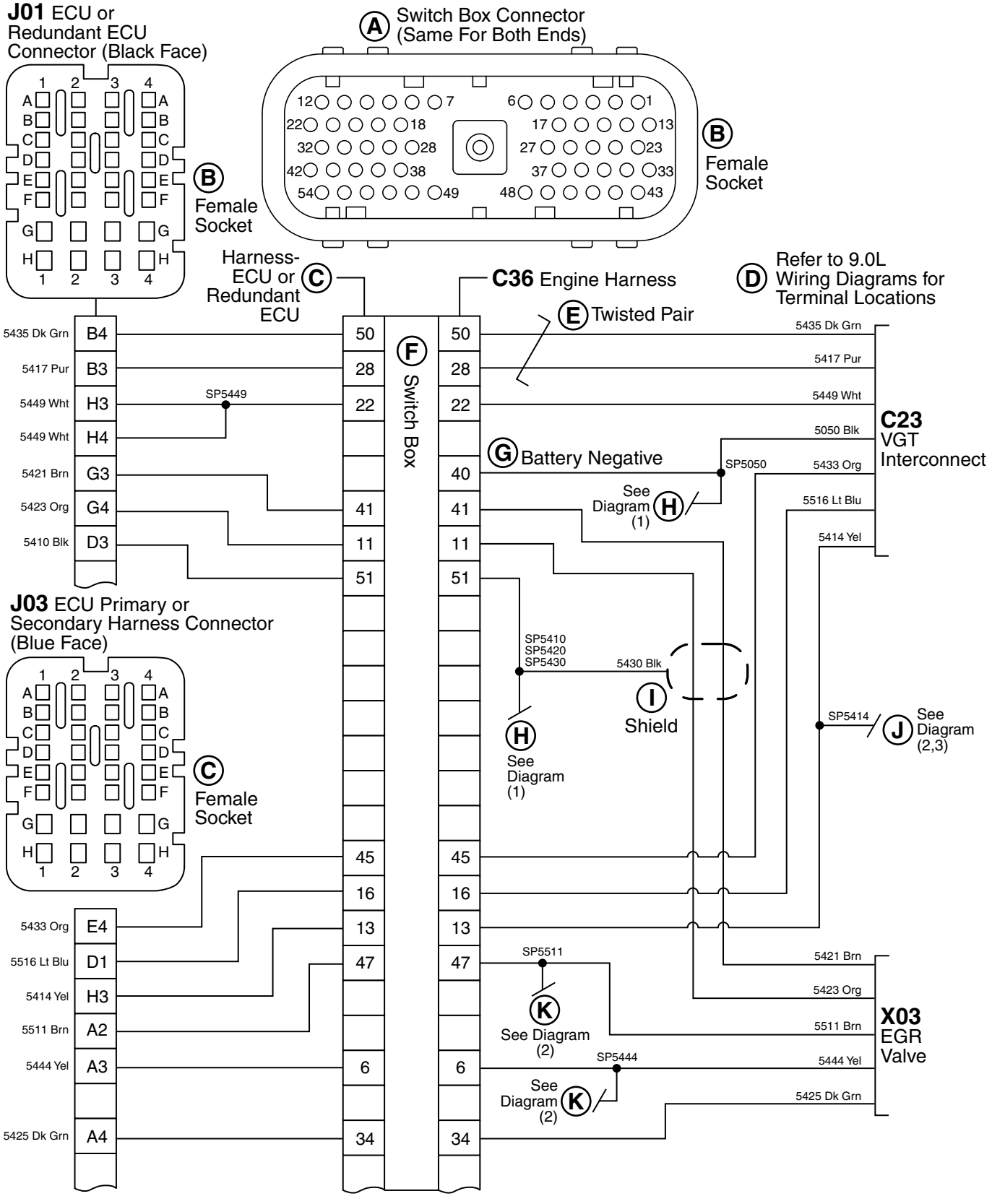
9.0L Redundant ECU Wiring Diagram 4



9.0L Redundant ECU Wiring Diagram 4

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A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 9.0L Wiring Diagrams for Terminal Locations
E—Twisted Pair
F—Switch Box
G—Battery Negative
H—See Diagram (1)
I— Shield
J—See Diagram (2,3)
K—See Diagram (2)
C23— VGT Interconnect
C36— Engine Harness
J01— ECU or Redundant ECU Connector (Black Face)
J1-B3—[5417 Purple] Turbo Speed Return
J1-B4—[5435 Dark Green] Turbo Speed Pulse
J1-D3—[5410 Black] Shield
J1-G3—[5421 Brown] EGR Valve PWM Drive #1
J1-G4—[5423 Orange] EGR Valve PWM Drive #2
J1-H3—[5449B White] VGT Actuator Power #1 Positive
J1-H4—[5449A White] VGT Actuator Power #1 Positive
J03— ECU or Redundant ECU Connector (Blue Face)
J3-A2—[5511 Brown] 5 Volt Power Supply #5 Positive
J3-A3—[5444 Yellow] 5 Volt Power Supply #5 Return
J3-A4—[5425 Dark Green] EGR Valve Position Signal
J3-D1—[5516 Light Blue] Turbo Speed Pulse
J3-E4—[5433 Orange] VGT Actuator Communications Signal
J3-H3—[5414 Yellow] 5 Volt Power Supply #2 Return
X03— EGR Valve

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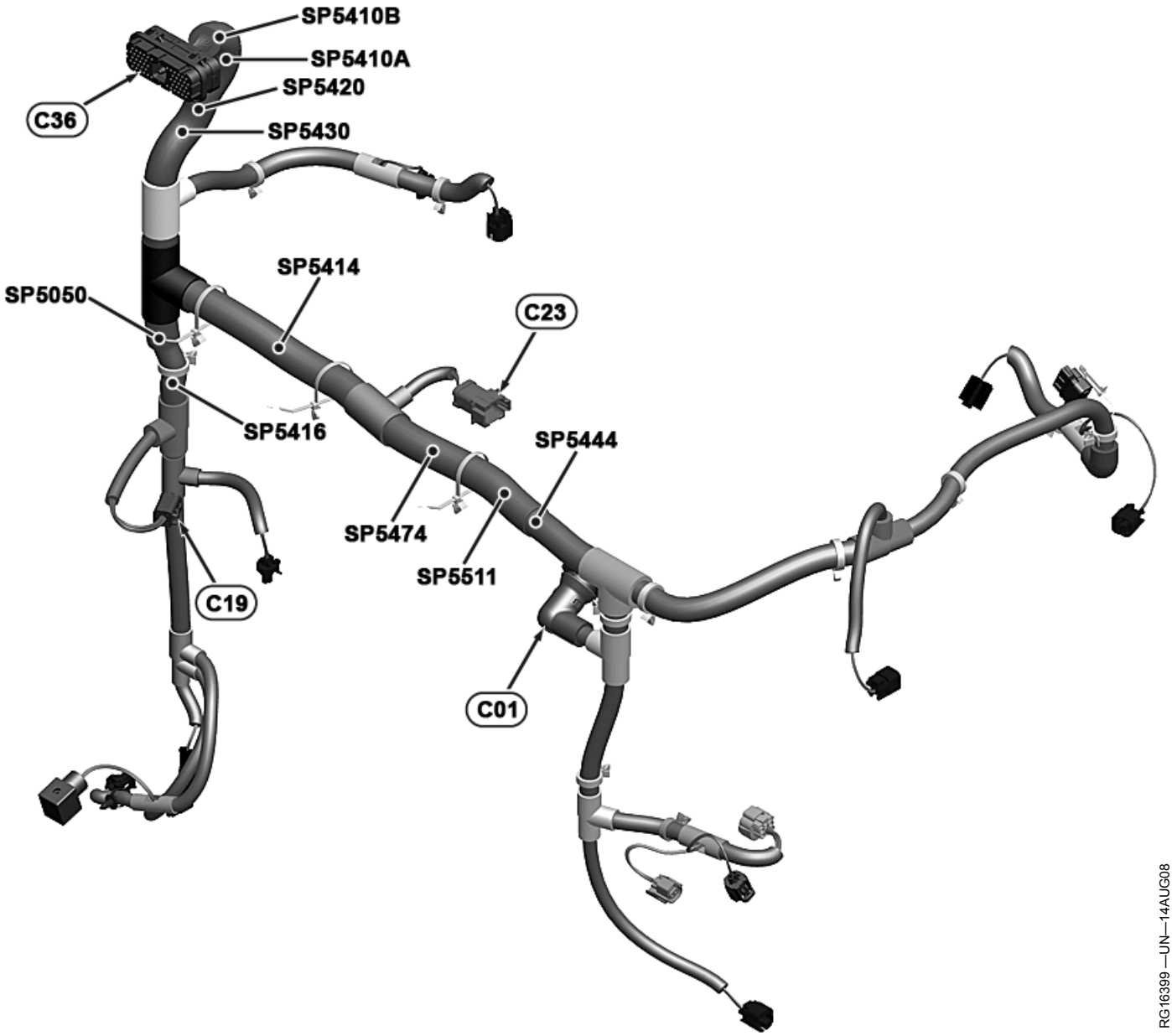
Redundant ECU Option 9.0L Wiring Splice Location Diagrams

NOTE: The option code for the application can be found on the Option Code Label located near the top of the engine block.

NOTE: The harness diagrams provided are for a typical John Deere supplied OEM harness.

Refer to applications manual for other harness wiring diagrams.

Wire harness splice location diagram for 9.0L PTP redundant ECU engine applications



Splice Locations for Wire Harness RE538046, Option Code 8428

C01— Fuel Injector Connector
C19— Low Pressure Fuel Pump Connector
C23— VGT Interconnect Connector
C36— Switch Box Engine Harness Connector
SP5050—Splice 5050
SP5410A—Splice 510A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420
SP5430—Splice 5430
SP5444—Splice 5444
SP5474—Splice 5474
SP5511—Splice 5511

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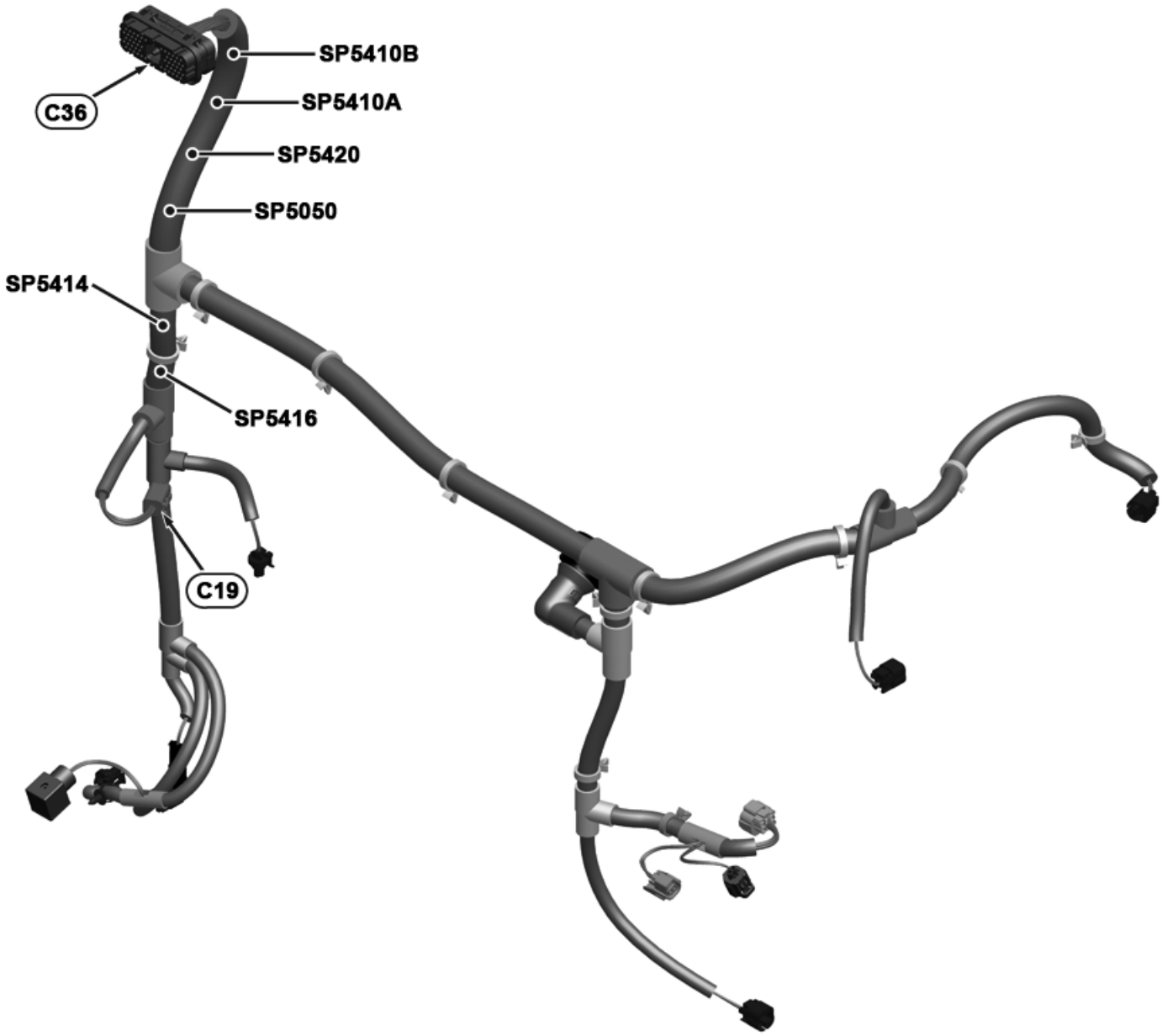
Wire harness splice location diagram for 9.0L PTE redundant ECU engine applications



Splice Locations for Wire Harness RE538066, Option Code 8429

C19— Low Pressure Fuel Pump Connector
C36— Switch Box Engine Harness Connector
SP5050—Splice 5050
SP5410A—Splice 510A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420

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