PowerTech™ 13.5 L Diesel Engines Level 15 Electronic Fuel Systems With Delphi EUIs

COMPONENT TECHNICAL MANUAL

PowerTech 13.5 L Diesel Engines—Level 15 Electronic Fuel System with Delphi EUIs

CTM370 19MAY11 (ENGLISH)

For complete service information also see:

PowerTech™ 13.5 L Diesel Engines—Base Engine	CTM415
OEM Engine Accessories	CTM67
Application List	CTM106819

John Deere Power Systems

LITHO IN U.S.A.

Introduction

Foreword

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

This manual covers the fuel system, air system and engine control unit (ECU) on John Deere electronic controlled engines.

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 in this manual, be alert to the potential for personal injury.

Use this component technical manual in conjunction with the base engine repair manual and the respective machine technical manual. See the repair manuals for information on component removal and installation, and gaining access to the components.

This manual is divided into several parts: these include but are not limited to repair, theory of operation, diagnostics and tools. Repair procedures are provided for the fuel system, air system and electrical engine control system. The theory of operation section contains information that explains how these engine subsystems operate. The diagnostics section helps identify the cause of engine problems.

Applicable special tools and other materials needed to do the job, specifications, and helpful reference materials are covered in separate groups toward the end of this manual.

Fundamental service information is available from other sources covering basic theory of operation, fundamentals of troubleshooting, general maintenance, and basic types of failures and their causes.

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

DN22556,000000A -19-11MAR09-1/1

CALIFORNIA PROPOSITION 65 WARNING

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

RE38635,0000036 -19-15OCT07-1/1

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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 Information

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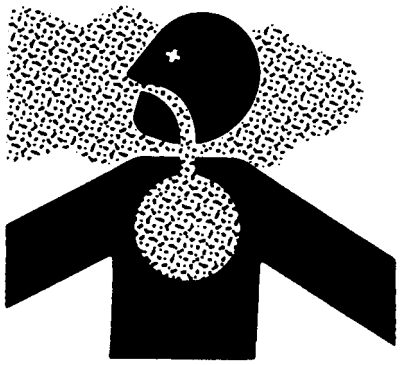
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Work In Ventilated Area

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.



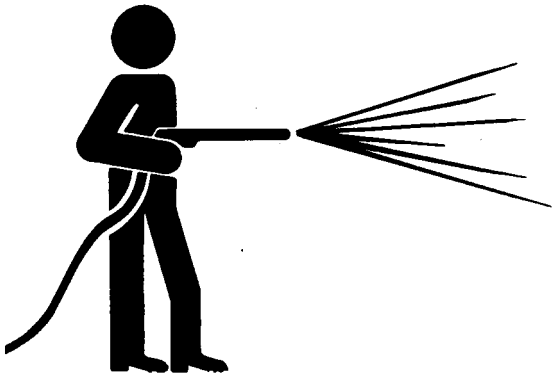
T81389 —UN—07DEC88

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

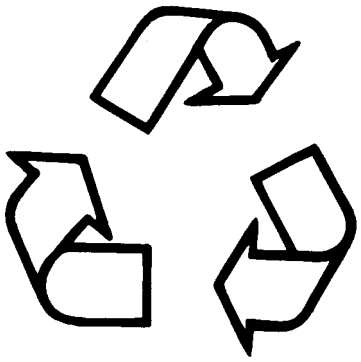
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

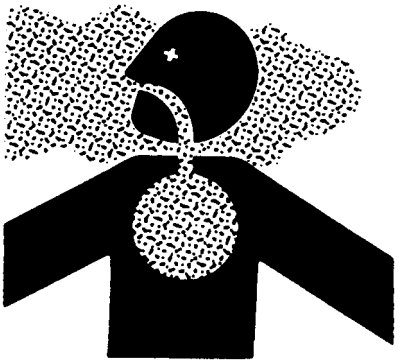
DX,DRAIN -19-03MAR93-1/1

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

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

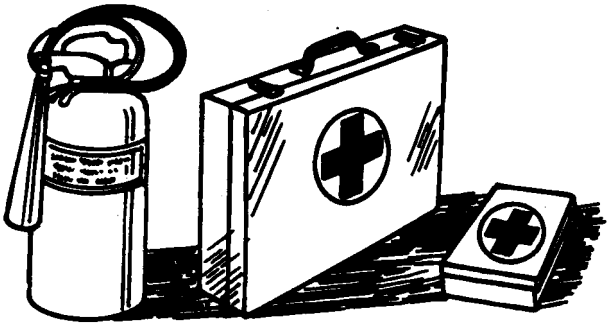
DX,FIRE1 -19-03MAR93-1/1

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

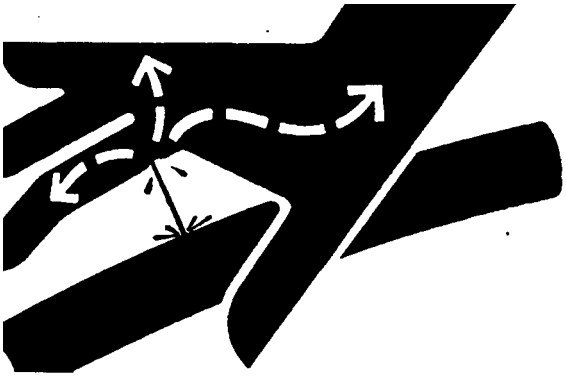
Avoid High-Pressure Fluids

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.



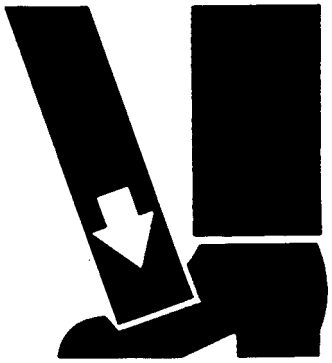
X9811 —UN—23AUG88

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

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.



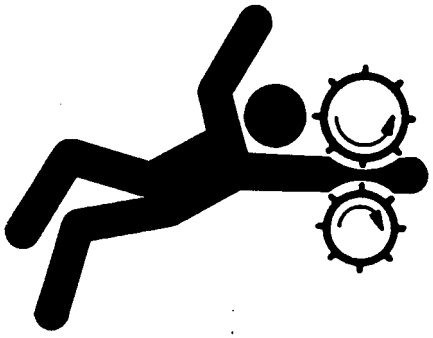
TS231 —19—07OCT88

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

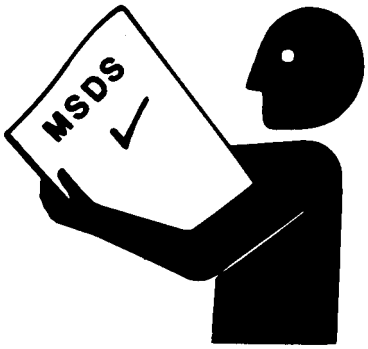
Handle Chemical Products Safely

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.)



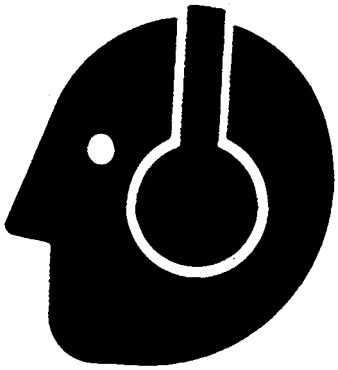
TS1132 —UN—26NOV90

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

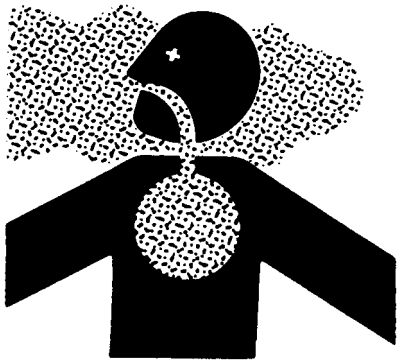
Avoid potentially toxic fumes and dust.

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

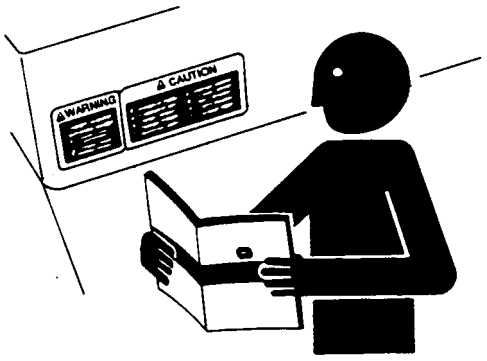
Follow Safety Instructions

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.



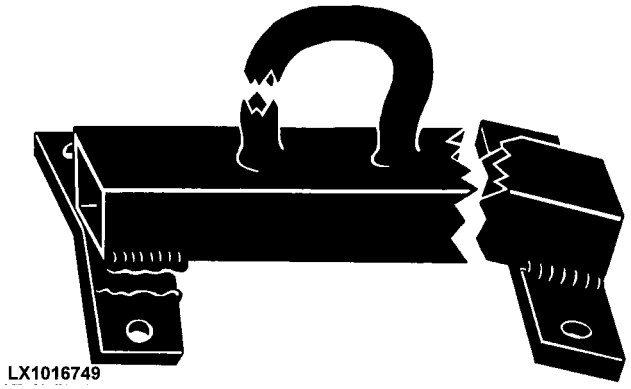
TS779 —UN—08NOV89

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

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.

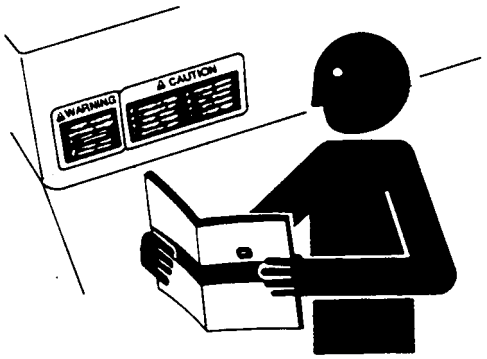


TS187 —19—30SEP88

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

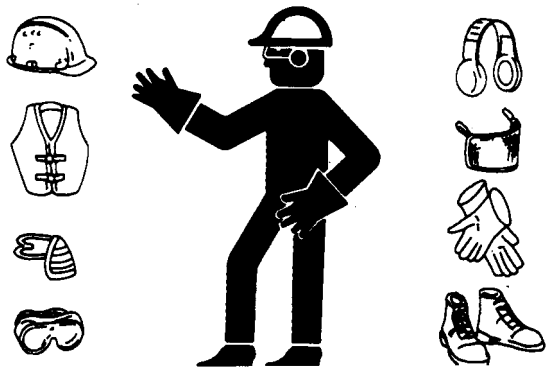
Wear Protective Clothing

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

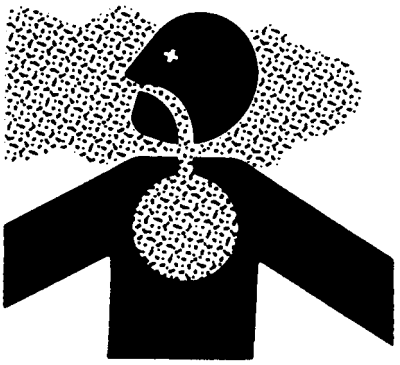
Handle Agricultural Chemicals Safely

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

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

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.

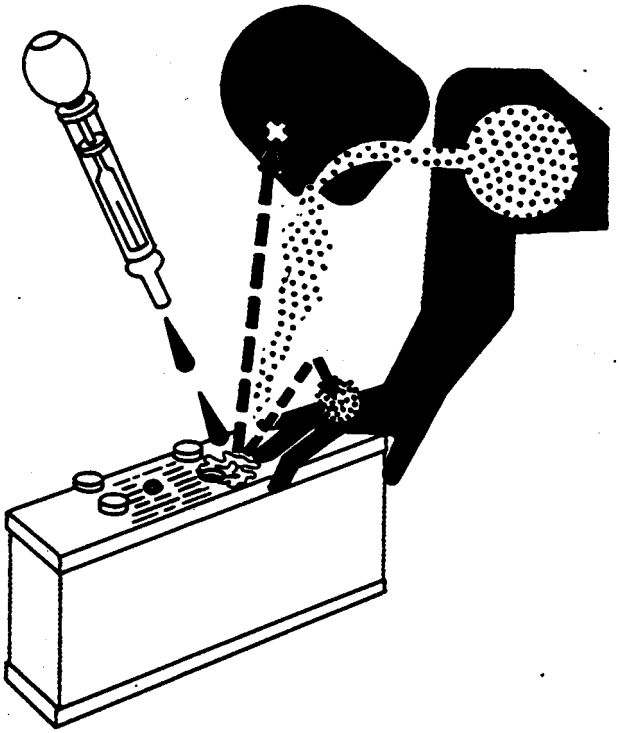
If acid is swallowed:

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

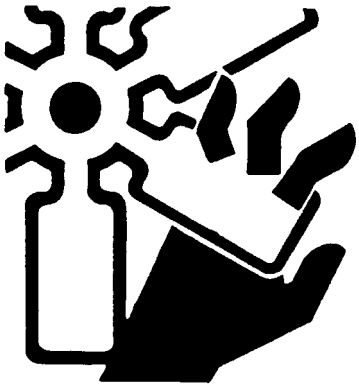
DX,WW,BATTERIES -19-02DEC10-1/1

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.



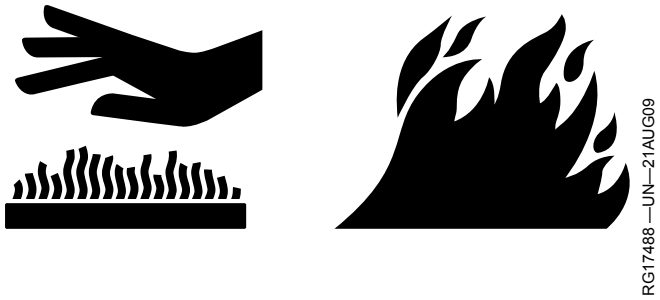
TS677 —UN—21SEP89

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

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

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.

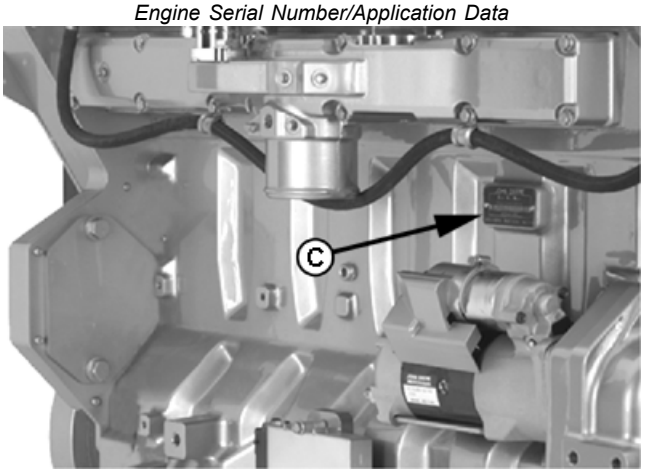
Example Engine Serial Number (A)

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:



RG14798 —UN—23JUN06

Engine Serial Number/Application Data



RG13887 —UN—26JUL05

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

RG6135L123456

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

Factory Producing Engine

CD	Saran, France
JO	Rosario, Argentina
PE	Torreon, Mexico
RG	Waterloo, Iowa
TO	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:

6135HF485

6	Number of Cylinders
135	Liter displacement
H	Aspiration code

Continued on next page

DB92450,0000059 -19-15OCT07-1/2

F	User factory code
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

DB92450,0000059 -19-15OCT07-2/2

DB92450,0000059 -19-15OCT07-3/2

OEM Engine Option Code Label



RG14813 —UN—27MAR06

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 OEM ENGINE OPTION CODE LABEL in Operators Manual for this engine model

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

DN22556,000000C -19-15OCT07-1/1

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

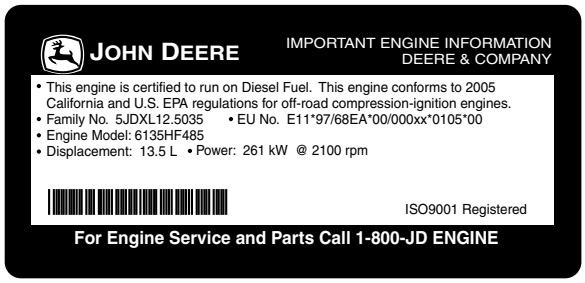
RG40854,0000007 -19-15OCT07-1/1

Emissions Control System Certification Label

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 in non-road mobile (self-propelled or portable/transportable[1]) equipment. 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.

[1]*Equipment moved at least once every 12 months.*



Emissions Label

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.

DN22556,000005A -19-15OCT07-1/1

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.

Diesel fuel quality and 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 10 000 mg/kg (10 000 ppm).

Sulfur content for Interim Tier 4 and Stage III B engines

- Use ONLY ultra low sulfur diesel (ULSD) fuel with a maximum of 15 mg/kg (15 ppm) sulfur content.

Sulfur Content for Tier 3 and Stage III A Engines

- Use of diesel fuel with sulfur content less than 1000 mg/kg (1000 ppm) is RECOMMENDED
- Use of diesel fuel with sulfur content 1000–5000 mg/kg (1000–5000 ppm) REDUCES oil and filter change intervals.
- BEFORE using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your John Deere dealer

Sulfur Content for Tier 2 and Stage II Engines

- Use of diesel fuel with sulfur content less than 500 mg/kg (500 ppm) is RECOMMENDED.
- Use of diesel fuel with sulfur content 500–5000 mg/kg (500–5000 ppm) REDUCES the oil and filter change interval
- BEFORE using diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm), contact your John Deere dealer

Sulfur Content for Other Engines

- Use of diesel fuel with sulfur content less than 5000 mg/kg (5000 ppm) is recommended.
- Use of diesel fuel with sulfur content greater than 5000 mg/kg (5000 ppm) REDUCES the oil and filter change intervals.

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

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

DX,FUEL1 -19-11APR11-1/1

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: Reduce the risk of fire. 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 biodiesel 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 -19-14APR11-1/1

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 Fuel-Protect Diesel Fuel Conditioner (or equivalent) at the specified concentration.

Lubricity of Biodiesel Fuel

Fuel lubricity can improve significantly with biodiesel blends up to B20 (20% biodiesel). Further increase in lubricity is limited for biodiesel blends greater than B20.

DX,FUEL5 -19-14APR11-1/1

Testing Diesel Fuel

A fuel analysis program can help to monitor the quality of diesel fuel. The fuel analysis can provide critical data such as cetane number, fuel type, sulfur content, water content, appearance, suitability for cold weather operations, bacteria, cloud point, acid number, particulate contamination, and whether the fuel meets specification.

Contact your John Deere dealer for more information on diesel fuel analysis.

DX,FUEL6 -19-14APR11-1/1

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:

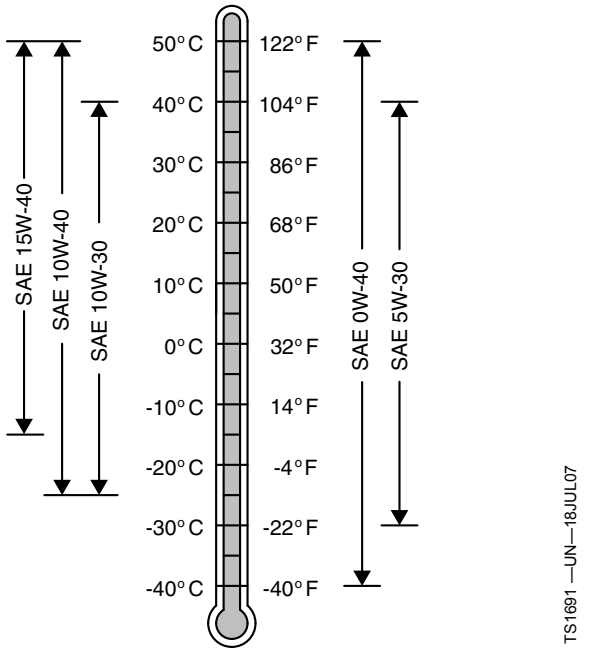
- John Deere Torq-Gard™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

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 10 000 mg/kg (10 000 ppm).

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



Oil Viscosities for Air Temperature Ranges

DX,ENOIL11 -19-11APR11-1/1

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.

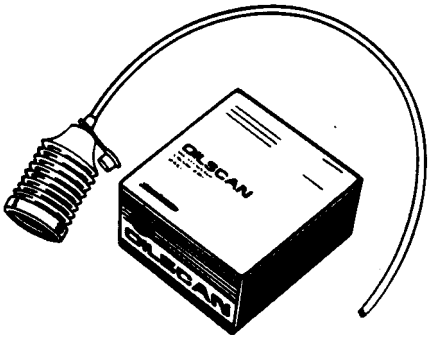
DX,FILT -19-18MAR96-1/1

OILSCAN ™ and COOLSCAN ™

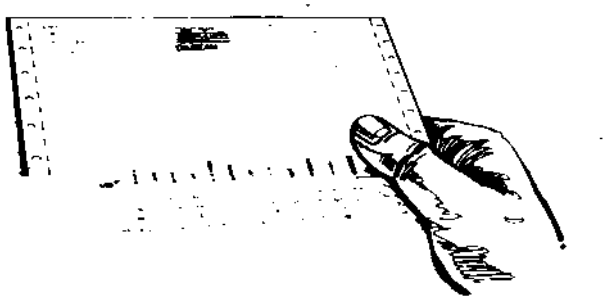
OILSCAN ™ and COOLSCAN ™ are John Deere sampling programs to help you monitor machine performance and identify potential problems before they cause serious damage.

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.



T6828AB —UN—15JUN89



T6829AB —UN—18OCT88

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.

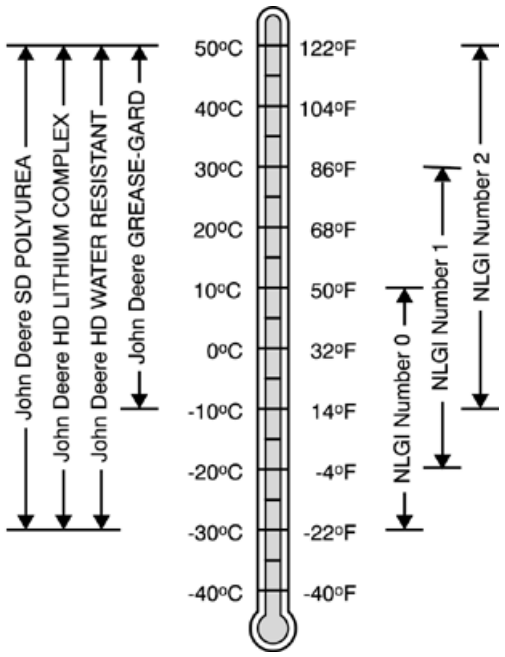
The following greases are also recommended:

- John Deere HD Lithium Complex Grease
- John Deere HD Water Resistant Grease
- John DeereGREASE-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

Greases for Air Temperature Ranges

GREASE-GARD is a trademark of Deere & Company

DX,GREA1 -19-14APR11-1/1

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.

Consult your John Deere dealer to obtain information and recommendations.

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 lubricants.

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

DX,ALTER -19-11APR11-1/1

Lubricant Storage

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

Use clean containers to handle all lubricants.

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 -19-11APR11-1/1

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.

The following engine coolants are preferred:

- John Deere COOL-GARD™ II Premix
- John Deere COOL-GARD II PG Premix

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

Additional Recommended Coolants

The following engine coolant is also recommended:

- John Deere COOL-GARD II Concentrate in a 40–60% mixture of concentrate with quality water.

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

Other Coolants

John Deere COOL-GARD II and COOL-GARD II PG coolants might not be available 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—60%) heavy duty coolant
- ethylene glycol or propylene glycol base heavy duty coolant concentrate in a 40—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 -19-14APR11-1/1

Supplemental Coolant Additives

Some coolant additives will gradually deplete during engine operation. For nitrite-containing coolants, 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 nitrite-containing coolants.

John Deere Liquid Coolant Conditioner is not designed for use with John Deere COOL-GARD™ II Premix, COOL-GARD II PG 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 II 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 -19-14APR11-1/1

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).

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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.

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™ , COOL-GARD II PG Premix and COOL-GARD II Concentrate are maintenance free coolants for up to six years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix or COOL-GARD II PG 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.

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

When Using Nitrite-Containing Coolants

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.

Coolant Analysis

For a more thorough evaluation of your coolant, perform a coolant analysis. The coolant analysis can provide critical data such as freezing point, antifreeze level, pH, alkalinity, nitrite content (cavitation control additive), molybdate content (rust inhibitor additive), silicate content, corrosion metals, and visual assessment.

Contact your John Deere dealer for more information on coolant analysis.

DX,COOL9 -19-11APR11-1/1

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, COOL-GARD II PG Premix and COOL-GARD II Concentrate are maintenance free coolants for up to six years or 6000 hours of operation, provided that the cooling system is topped off using only John Deere COOL-GARD II Premix or COOL-GARD II PG 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.

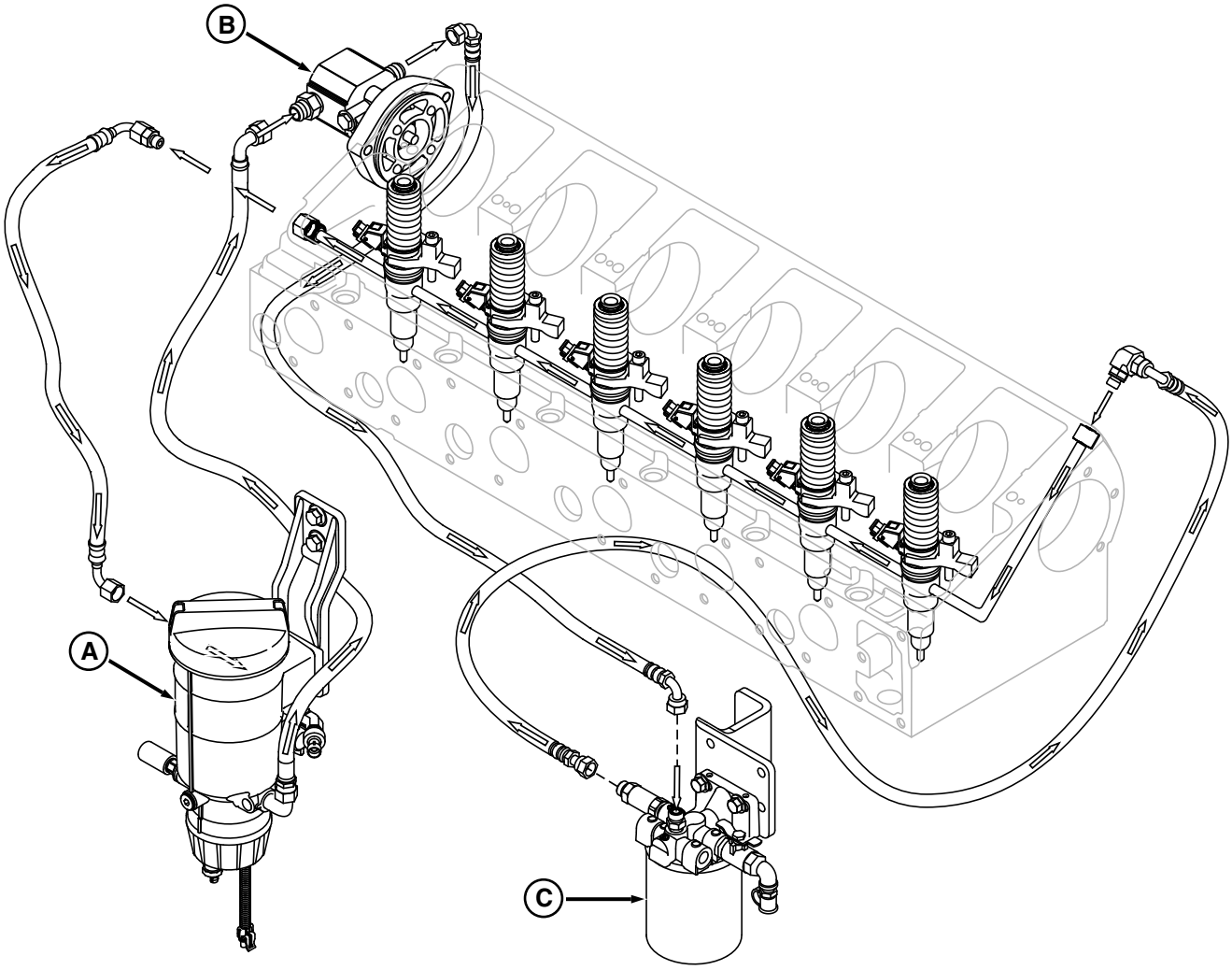
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If John Deere COOL-GARD™ II Premix, COOL-GARD II PG Premix, or COOL-GARD II Concentrate is used, but the coolant is not tested OR additives are not replenished by adding John Deere COOL-GARD II Coolant Extender, the drain interval is four years or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

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

DX,COOL11 -19-14APR11-1/1

13.5L Fuel Supply System Identification



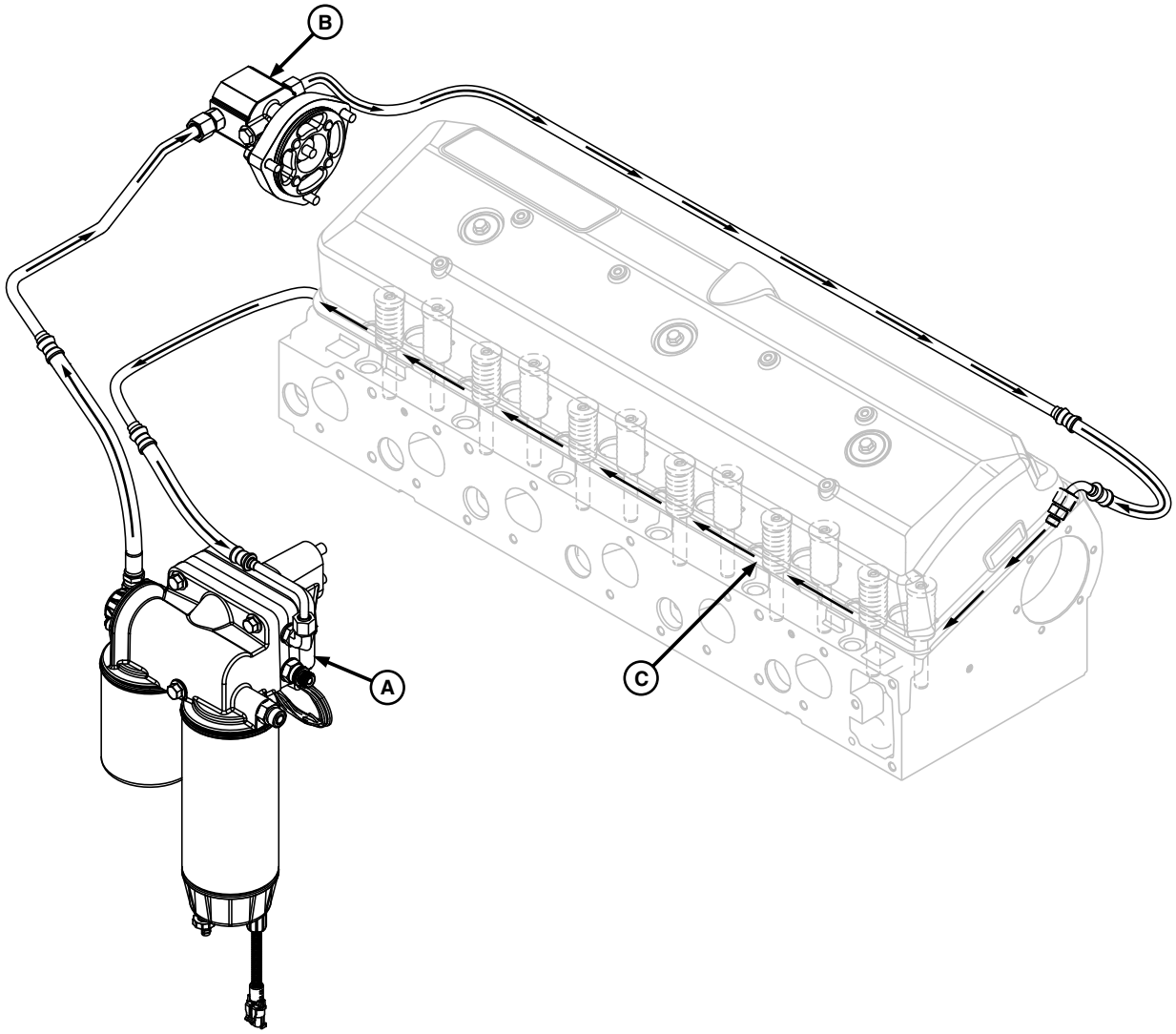
13.5L Type 1 Fuel Supply System

A—Primary Fuel Filter **B—Fuel Transfer Pump** **C—Secondary Fuel Filter**

Applicable Option Codes:
3503, 3516, 3547

Removal and Installation Procedures:
Primary Fuel Filter Assembly, see Install Primary Filter Assembly
Secondary (Final) Filter Assembly, see Install Secondary (Final) Filter Assembly
Fuel Filter/Water Separator Assembly, see Fuel Filter/Water Separator Assembly
Primary Fuel Filter/Water Separator, see Replacing Fuel Filter/Water Separator
Low Pressure Regulating Valve, see Remove and Install Low Pressure Regulating Valve
High Pressure Regulating Valve, see Remove and Install High Pressure Regulating Valve
Internal Filter Housing Screen Insert, see Remove and Install 100 Micron Internal Filter Housing Screen Insert
Fuel Filter Check Valve, see Remove and Install Fuel Filter Check Valve
Hand Primer, see Remove and Install Primer Pump
High Pressure Fuel Pump, see Remove and Install High Pressure Fuel Pump
Fuel Temperature Sensor, see Remove and Install Fuel Temperature Sensor
Fuel Pressure Sensor, see Remove and Install Fuel Pressure Sensor
Water-in-Fuel Sensor, see Remove and Install Water-in-Fuel (WIF) Sensor

Continued on next page
JB81757,000007F -19-29MAR11-1/2



RG15602 —UN—10OCT07

13.5L Type 2 Fuel Supply System

A—Fuel Filter Header Assembly with Electric Low Pressure Fuel Pump **B—High Pressure Fuel Pump** **C—Fuel Rail**

Applicable Option Codes:

3524, 3525

Removal and Installation Procedures:

Dual Filter Assembly, see Dual Fuel Filter Assembly
High Pressure Fuel Regulator Valve, see Remove and Install High Pressure Fuel Regulator Valve
Fuel Return Regulator Valve, see Remove and Install Fuel Return Regulator Valve
Fuel Filter Screen, see Remove and Install Fuel Filter Screen
High Pressure Fuel Pump, see Remove and Install High Pressure Fuel Pump
Fuel Filter Head Bracket, see Assemble and Install Fuel Filter Head Bracket
Fuel Filter Assembly, see Install Fuel Filter Assembly and Fuel Lines
Electric Low Pressure Fuel Pump, see Remove and Install Electric Low Pressure Fuel Pump
Fuel Temperature Sensor, see Remove and Install Fuel Temperature Sensor
High Pressure Fuel Sensor, see Remove and Install High Pressure Fuel Sensor
Low Pressure Fuel Sensor, see Remove and Install Low Pressure Fuel Sensor
Water-in-Fuel Sensor, see Remove and Install Water-in-Fuel (WIF) Sensor

JB81757,000007F -19-29MAR11-2/2

Section 02
Repair and Adjustments

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General Information

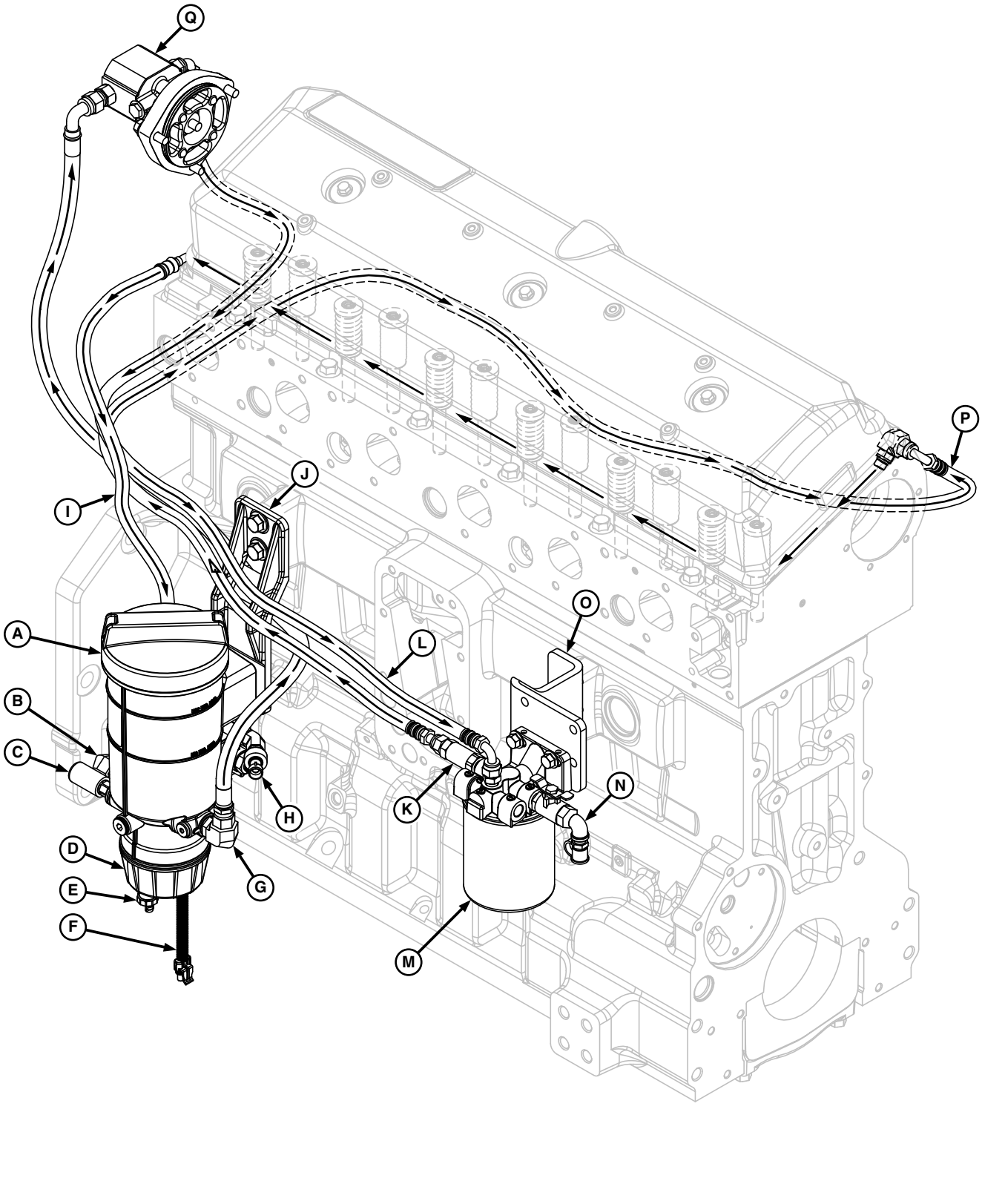
IMPORTANT: Always use a new (dry) fuel filter elements whenever an existing element is removed from the filter housing. Reusing a wet element may cause fuel to overflow from the filter housing during insertion of filter element. Also, trapped air in the core of a wet filter element may cause the engine to stall and not restart without additional system purging.

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.

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Fuel System Components



Fuel System - Dual Header Design

Continued on next page

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A—Primary Fuel Filter 10 micron
B—Fuel Inlet from Tank
C—Hand Primer
D—Water Bowl
E—Filter Drain
F—Water-in-Fuel Sensor
G—Fuel Outlet to Pump
H—Fuel Pressure Sensor
I— Fuel Return from Cylinder Head
J— Primary Filter Header
K—Secondary (Final) Filter Check Valve & Fuel Outlet to Cylinder Head
L—Clean Fuel Return from Fuel Pump
M—Secondary (Final) Fuel Filter 2 micron
N—Diagnostic Port
O—Secondary Filter Header
P—Clean Fuel Inlet to Cylinder Head & Fuel Rail
Q—High Pressure Fuel Pump

NOTE: Fuel flow through cylinder head may vary by engine application. High pressure fuel pump may be mounted as shown with fuel entering the front left side of the cylinder head and exiting the back of the head. On some machine applications, the high pressure fuel pump is rotated 180° and the fuel lines **on cylinder head** *are reversed, with fuel entering the back of the head and exiting the front left side of the head.*

IMPORTANT: During engine repair, cleanliness of the fuel supply rail in cylinder head is extremely important due to fuel flow through passage. Think of the fuel rails as internal passages of an injection pump; therefore, same cleanliness must be maintained when disconnecting inlet and outlet lines to fuel supply rail.

SS01820,0000809 -19-21JUL10-2/2

Install Primary Filter Assembly

1. Install 4 M10 cap screws (A) through 10 micron fuel filter header (B) into fuel filter. Tighten cap screws to specification.

Specification

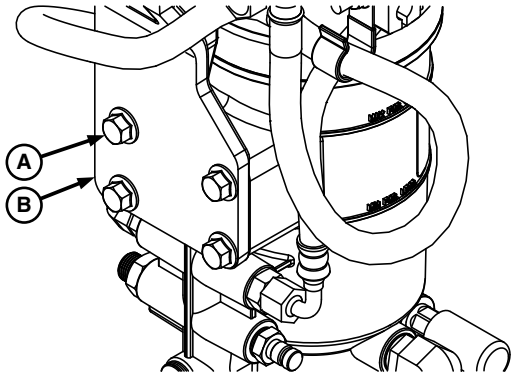
M10 Cap Screws - Filter Header to Filter—Torque ..... 50 N•m (37 lb-ft)

2. Install 2 M12 cap screws (C) through filter header and into cylinder block. Tighten cap screws to specification.

Specification

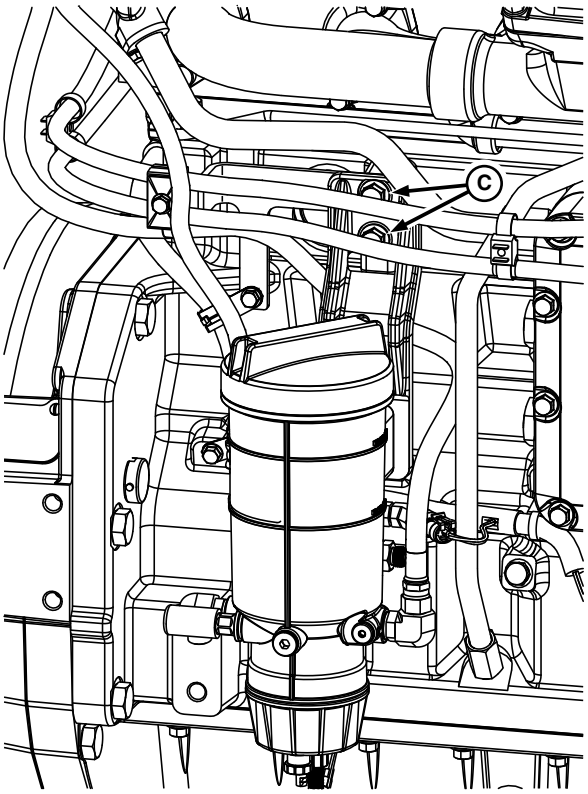
M12 Cap Screws - Filter Header to Cylinder Block—Torque ..... 68 N•m (50 lb-ft)

A—-4- M10 Cap Screws - Filter Header to Filter
B—Primary Filter Header
C—-2- M12 Cap Screws - Filter Header Assembly to Cylinder Block



RG15451 —UN—06AUG07

Primary Filter Assembly



RG15452 —UN—06AUG07

Assembly Primary Filter to Cylinder Block

SS01820,000080A -19-21JUL10-1/1

Install Secondary (Final) Filter Assembly

NOTE: When replacing secondary filter element, tighten element 3/4 to 1 full turn after seal contacts header.

1. Install 2 M10 flange head cap screws (A) through 2 micron fuel filter header (I), fuel filter mounting bracket, and into 2 nuts. Tighten cap screws to specification.

Specification

M10 Cap Screws—Torque ..... 35 N•m (26 lb-ft)

2. Apply LoctiteLOCTITE® 242 thread sealant to outlet check valve (B) threads. Install outlet check valve into left outlet port of fuel filter header. Tighten check valve to specification.

Specification

Outlet Check Valve to Filter Header—Torque ..... 25 N•m (19 lb-ft)

3. Install bleed valve (C) into right outlet port of fuel filter header. Tighten bleed valve to specification and rotate so handle is positioned on top within +/- 10 degrees.

Specification

Bleed Valve to Filter Header—Torque ..... 15 N•m (11 lb-ft)

4. Apply LoctiteLOCTITE® 242 to threads of 90 degree elbow (D) and install elbow into bleed valve. Hold bleed valve in position and tighten elbow to specification - continue to rotate to orient elbow to pint downward, as shown.

Specification

Elbow to Bleed Valve—Torque ..... 20 N•m (15 lb-ft)

5. Apply LoctiteLOCTITE® 242 to threads of diagnostic fitting (E) and install fitting into elbow. Tighten diagnostic fitting to specification.

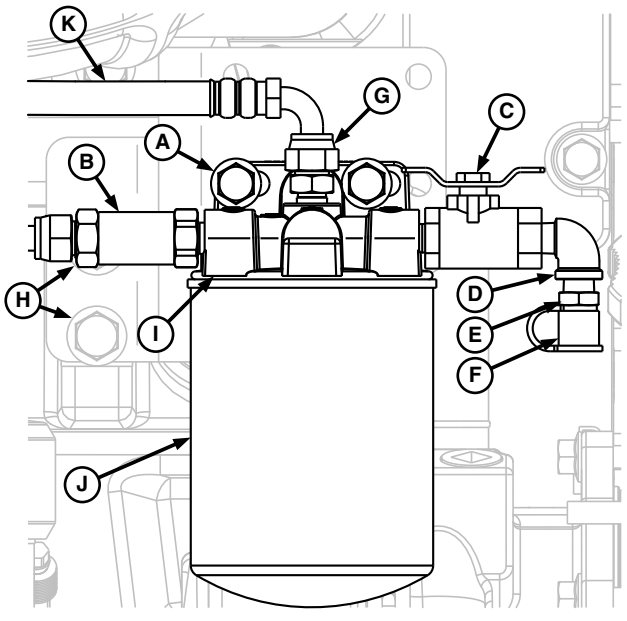
Specification

Diagnostic Fitting to Elbow—Torque ..... 25 N•m (19 lb-ft)

6. Install rubber dust cover (F) over diagnostic fitting end.

7. Apply LoctiteLOCTITE® 242 to threads of inlet adapter (G) and install adapter into top fuel inlet hole in fuel filter header. Tighten inlet adapter to specification.

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Secondary (Final) Fuel Filter Assembly

A—M10 Cap Screws -2-
B—Outlet Check Valve
C—Bleed Valve
D—90° Elbow
E—Diagnostic Fitting
F—Dust Cover
G—Inlet Adapter
H—M12 Cap Screws - Mounting Bracket to Cylinder Block
I— Fuel Filter Header
J— 2 Micron Secondary (Final) Fuel Filter

Specification

Inlet Adapter to Filter Header—Torque ..... 25 N•m (19 lb-ft)

8. Install 2 M12 flange head cap screws (H) through fuel filter mounting bracket into cylinder block. Tighten cap screws to specification.

Specification

M12 Cap Screws - Filter Mounting Bracket to Cylinder Block—Torque ..... 68 N•m (50 lb-ft)

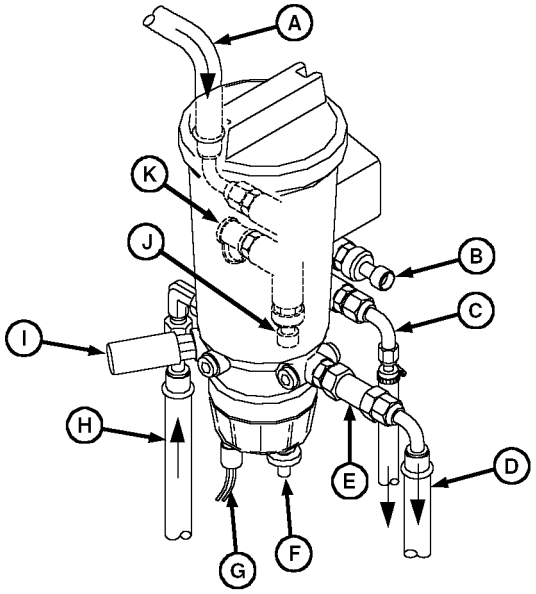
SS01820,000080B -19-21JUL10-1/1

Fuel Filter/Water Separator Assembly

Torque specifications for fuel filter assembly are as follows:

Fuel Filter Assembly—Specification

Fuel Line ORFS Fittings—Torque ..... 24 N·m (18 lb-ft)
Fitting (Fuel Return from Rail)—Torque ..... 33 N·m (24 lb-ft)
Fuel Pressure Sensor—Torque ..... 14 N·m (124 lb-in.)
Fitting (Fuel Pressure Sensor)—Torque ..... 14 N·m (124 lb-in.)
Fitting (Fuel Return to Tank)—Torque ..... 33 N·m (24 lb-ft)
Fitting (Fuel Outlet to Supply Pump)—Torque ..... 33 N·m (24 lb-ft)
Fitting (Fuel Inlet from Tank)—Torque ..... 33 N·m (24 lb-ft)
Fuel Primer—Torque ..... 14 N·m (124 lb-in.)
Fuel Primer-to-Fuel Filter Housing Adapter (Single Rail Fuel System)—Torque ..... 11 N·m (97 lb-in.)
Fuel Temperature Sensor—Torque ..... 14 N·m (124 lb-in.)
Check Valve and Fitting—Torque ..... 33 N·m (24 lb-ft)
Diagnostic Test Port and Fitting—Torque ..... 14 N·m (124 lb-in.)
Filter Housing Plugs—Torque ..... 7 N·m (62 lb-in.)
Filter Cap—Torque ..... 11 N·m (100 lb-in.)
Water Separator Bowl—Torque ..... 6 N·m (55 lb-in.)
Fuel Filter Return Tube (Inside Filter Housing)—Torque ..... 20 N·m (15 lb-ft)
Fuel Filter Assembly-to-Bracket Cap Screws—Torque ..... 50 N·m (37 lb-ft)



RG11164 —UN—18OCT00

Fuel Filter/Water Separator Assembly

A—Fuel Return (From Fuel Rail)
B—Fuel Pressure Sensor
C—Fuel Return (To Fuel Tank)
D—Fuel Outlet (To Supply Pump)
E—Check Valve
F—Water Drain
G—Water in Fuel Sensor
H—Fuel Inlet (From Fuel Tank)
I— Fuel Primer
J— Fuel Temperature Sensor
K—Diagnostic Test Port

Fuel Filter Bracket-to-Cylinder Block Cap Screws—Torque ..... 65 N·m (48 lb-ft)

SS01820,000080C -19-21JUL10-1/1

Replacing Fuel Filter/Water Separator

Remove Old Fuel Filter Element

CAUTION: If engine has been running, engine and fuel filter housing may be hot.

1. Close fuel shut-off valve (if equipped).
2. Clean entire area surrounding fuel filter assembly to keep debris from entering fuel system.
3. Remove cap from fuel filter housing.



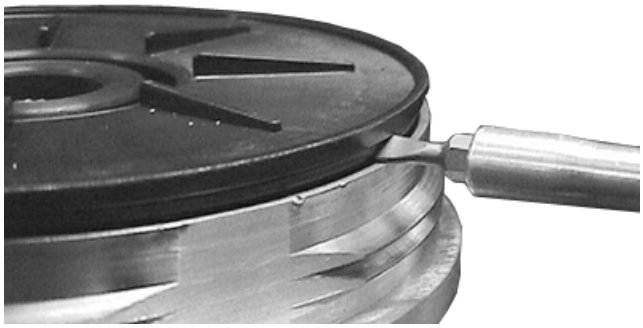
RG10302 —UN—27MAY04

Filter Cap

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4. Relieve vacuum in filter housing by operating hand primer until fuel filter “pops up”. If filter does not “pop up” after about 30 strokes of primer, a small screwdriver may be used, as shown, to **carefully** pry under filter flange to relieve vacuum in the housing.



Relieve Vacuum

SS01820,000080D -19-21JUL10-2/5

5. Lift filter element up in housing until filter seal clears inlet tube inside housing. Continue to hold filter suspended straight up in top of housing to drain fuel from filter.
6. Allow fuel to drain completely from filter into housing. Carefully begin rotating filter from housing, as shown, until completely upside down to ensure minimal leakage from fuel filter.
7. Place filter in container suitable for diesel fuel.

IMPORTANT: Reusing fuel filter once removed from housing may result in trapped air in the filter, causing fuel to overflow from the filter housing during insertion of filter element and/or cause the engine to stall and not restart without additional system purging.



Remove Filter Element

Continued on next page

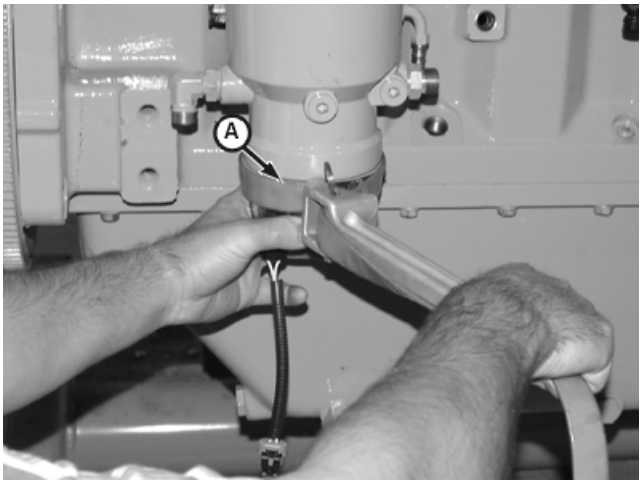
SS01820,000080D -19-21JUL10-3/5

Remove and Install Water Separator Bowl

IMPORTANT: Use the least amount of force as necessary with strap wrench when removing and installing separator bowl to prevent plastic bowl from cracking. When replacing water separator bowl, tighten bowl 3/4 to 1 turn after seal contacts element.

1. Disconnect wiring connector from water-in-fuel sensor.
2. Drain fuel from separator bowl.
3. Position a strap wrench (A) as close as possible to top edge of separator bowl. While applying pressure with strap wrench, grip bowl and twist with other hand, as shown, to remove bowl.
4. Install separator bowl and tighten by hand until seal makes contact. Tighten to the following specification.

Specification	
Water Separator Bowl-to-Filter Housing—Torque	5 N·m (44 lb-in.)



RG10351 —UN—13SEP99

Water Separator Bowl

A—Strap Wrench

5. Connect wiring to water-in-fuel sensor.

SS01820,000080D -19-21JUL10-4/5

Install New Fuel Filter Element

1. Check to ensure that the fuel level in the filter housing is between the MIN (B) and MAX (A) fuel levels indicated on the outside of the housing and on the corresponding marks on the center tube. If the fuel is below the MIN level, carefully open the fuel supply shut-off valve a small amount (if equipped) to add fuel.

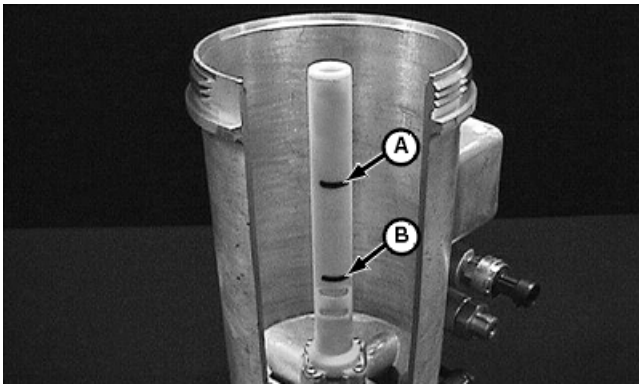
   Operate the hand primer to add more fuel if required or if the machine is not equipped with a fuel supply shut-off valve.

IMPORTANT: Fuel level below the MIN indication may result in trapped air in the filter causing the engine to stall and not restart without additional system purging. Fuel level above the MAX indication may cause fuel to overflow from the filter housing during insertion of filter element.

Always use a new filter element whenever an existing element has been removed from filter housing.

2. Insert **new** (dry) fuel filter into filter housing.
3. Reinstall fuel filter cap and tighten by hand to the following specification.

Specification	
Fuel Filter Cap/Cover-to-Housing—Torque	11 N·m (100 lb-in.)



RG10305 —UN—02SEP99

Fuel Level in Filter Housing

A—Maximum Level 63 mm (2-1/2 In.) from Top of Housing

B—Minimum Level 127 mm (5 In.) from Top of Housing

4. Open the fuel supply shut-off valve (if equipped).
5. Restart engine and allow to run for 5 minutes minimum at slow idle.

SS01820,000080D -19-21JUL10-5/5

Remove and Install Low Pressure Regulating Valve

1. Close fuel shut-off valve, if equipped.

NOTE: On high fuel tank applications without fuel shut-off valve, fuel tank return line must be pinched before disconnecting, then plugged,

2. Disconnect fuel tank return line from filter housing and drain fuel into clean container.
3. Remove low pressure regulating valve parts (A—G).

   To remove valve seat (B), use a standard wire tie strap with approximate 5/16 x 3/16 inch square head. Insert tie strap head through bore of valve seat, rotate to catch lip of seat and remove seat.
4. Clean and inspect all parts. Replace all O-rings and seals.
5. Install parts in reverse order.

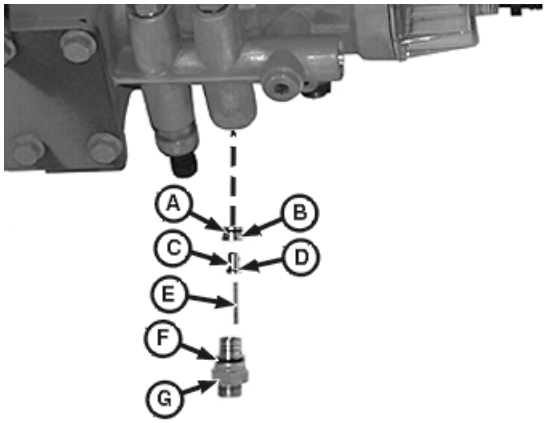
   Install valve seat (B) (O-ring end first) into bore of filter housing. Make sure it is firmly seated in bore.

   Install seal (D) with tapered edge of seal into lip of regulating valve (C).

   Spring (E) is color coded red, identifying it as the low pressure spring.

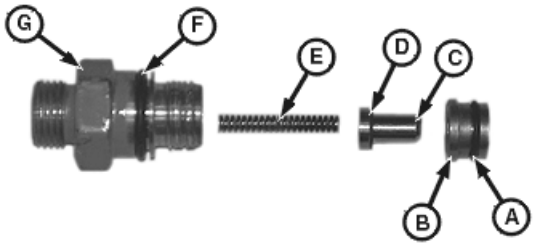
   Tighten valve housing (G) to specifications.

Specification	
Low Pressure Regulating Valve-to-Filter Housing—Torque	18 N·m (13 lb-ft)



RG10354 —UN—17SEP99

Low Pressure Regulating Valve



RG10356 —UN—17SEP99

Valve Components

A—O-Ring
B—Valve Seat
C—Low Pressure Regulating Valve
D—Seal
E—Spring, Low Pressure (Color Coded Red)
F—O-Ring
G—Valve Housing

SS01820,000080E -19-21JUL10-1/1

Remove and Install High Pressure Regulating Valve

1. Close fuel shut-off valve, if equipped.

NOTE: On high fuel tank applications without fuel shut-off valve, fuel tank return line must be pinched before disconnecting, then plugged,

2. Disconnect fuel tank return line from filter housing and drain fuel into clean container.
3. Open valve on water separator bowl and drain filter housing.
4. Remove fuel temperature sensor (F). See REMOVE AND INSTALL FUEL TEMPERATURE SENSOR in Group 110.
5. Remove high pressure regulating valve (C).
6. To remove screen (A), see REMOVE AND INSTALL 100 MICRON INTERNAL FILTER HOUSING SCREEN INSERT next in this Group.

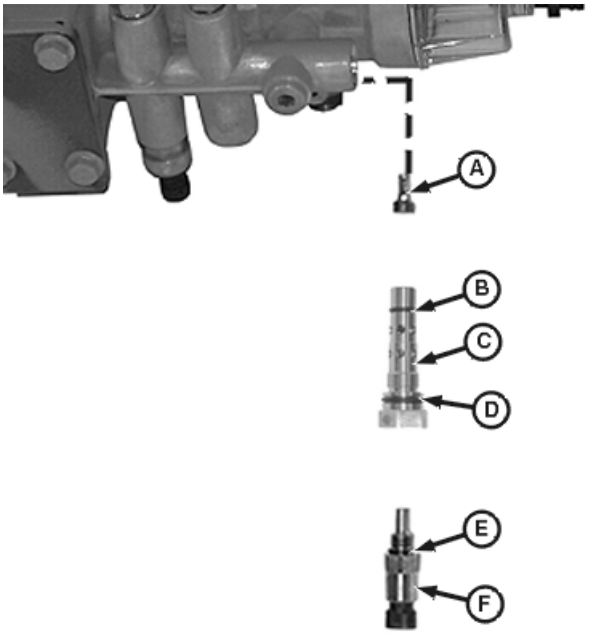
NOTE: High pressure regulating valve is not repairable. Do not disassemble valve. If defective, replace entire assembly.

7. Clean and inspect all parts. Replace all O-rings.
8. Install parts in reverse order.

   If removed, install screen (A). See REMOVE AND INSTALL 100 MICRON INTERNAL FILTER HOUSING SCREEN INSERT next in this Group.

   Tighten regulating valve to specifications.

Specification	
High Pressure Regulating Valve-to-Filter Housing—Torque	14 N·m (124 lb-in.)



High Pressure Regulating Valve

A—Screen
B—O-Ring
C—High Pressure Regulating Valve
D—O-Ring
E—O-Ring
F—Fuel Temperature Sensor

9. Install fuel temperature sensor (F). See REMOVE AND INSTALL FUEL TEMPERATURE SENSOR in Group 110.
10. Add fuel to filter housing between minimum and maximum marks on housing. Fuel can be added by throttling the fuel shut-off valve (if equipped), or by removing cover and adding fuel from a clean container.

SS01820,000080F -19-21JUL10-1/1

Remove and Install 100 Micron Internal Filter Housing Screen Insert

1. Remove fuel temperature sensor (F). See REMOVE AND INSTALL FUEL TEMPERATURE SENSOR in Group 110.

   Remove high pressure regulating valve (C). See REMOVE AND INSTALL HIGH PRESSURE REGULATING VALVE earlier in this Group.

IMPORTANT: If allen wrench is pushed too far into 10 micron screen during removal and installation, screen may be damaged. Tie a rubber band (K) approximately 10 mm (3/8 in.) from end of allen wrench, as shown, to prevent screen damage.

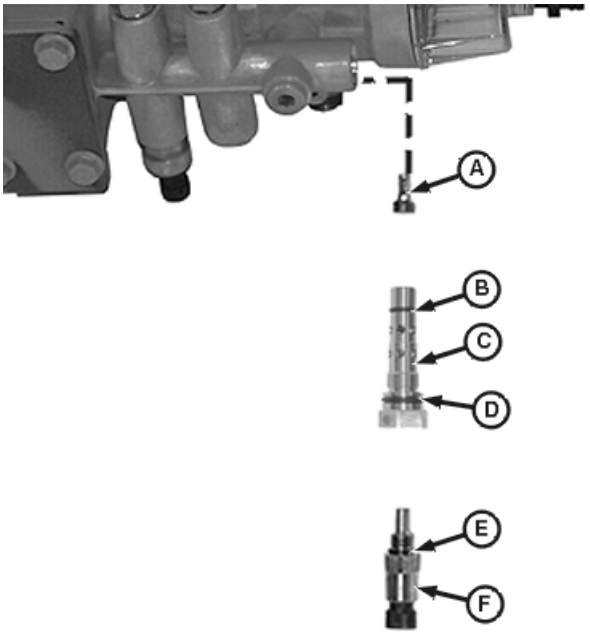
NOTE: Screen is approximately 91 mm (3-5/8 in.) up in bore of filter housing. Use a long allen wrench.

2. Attach a rubber band (K) on end of 5 mm allen wrench and remove 10 micron screen (A) from filter housing.
3. Clean and inspect screen.
4. Using allen wrench with rubber band, install screen in filter housing and tighten to the following specification.

Specification	
100 Micron Internal Filter Housing Screen—Torque	5 N·m (44 lb-in.)

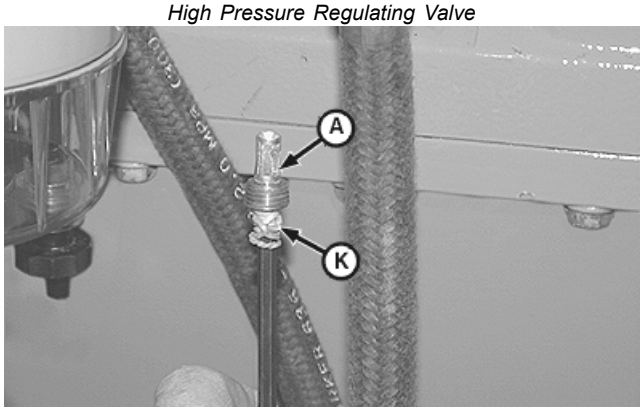
5. Install pressure regulating valve parts (B—D). See REMOVE AND INSTALL HIGH PRESSURE REGULATING VALVE earlier in this Group. Install fuel temperature sensor parts (E) and (F). See REMOVE AND INSTALL FUEL TEMPERATURE SENSOR in Group 110.

A—100 Micron Screen
B—O-Ring
C—High Pressure Regulating Valve
D—O-Ring
E—O-Ring
F—Fuel Temperature Sensor
K—Allen Wrench with Rubber Band



RG11168 —UN—30OCT00

High Pressure Regulating Valve



RG10358 —UN—17SEP99

Remove Screen

SS01820,0000810 -19-21JUL10-1/1

Remove and Install Fuel Filter Check Valve

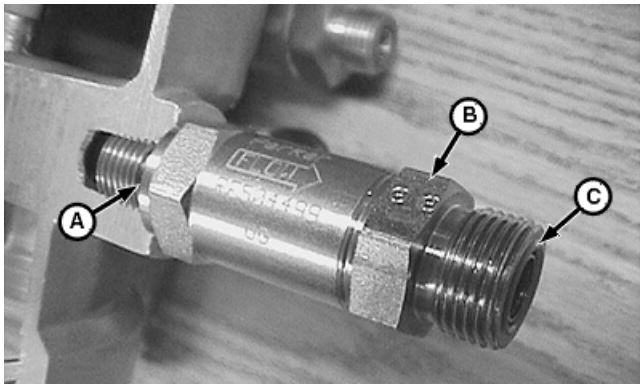
1. Close fuel shut-off valve (if equipped).
2. Disconnect fuel line (shown disconnected) and remove check valve (B). Remove O-rings (A) and (C) from both ends of check valve.
3. Install check valve in filter housing and tighten to specifications.

Specification	
Fuel Filter Check Valve to Fuel Filter Housing—Torque	33 N·m (24 lb-ft)

4. Connect fuel line and tighten to specifications.

Specification	
Fuel Line-to-Fuel Filter Check Valve—Torque	24 N·m (18 lb-ft)

5. Open fuel shut-off valve.



RG10307 —UN—31AUG99

Fuel Filter Check Valve

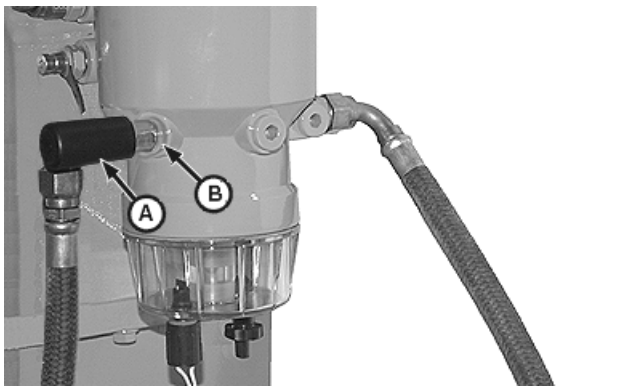
A—O-Ring
B—Check Valve
C—O-Ring

SS01820,0000811 -19-21JUL10-1/1

Remove and Install Primer Pump

1. Remove primer pump (A).
2. If required, remove adapter (B).
3. Clean and inspect parts.
4. Install primer pump and adapter with new O-rings and tighten to specifications.

Specification	
Fuel Primer —Torque	14 N·m (124 lb-in.)
Fuel Primer-to-Fuel Filter Housing Adapter —Torque	11 N·m (97 lb-in.)



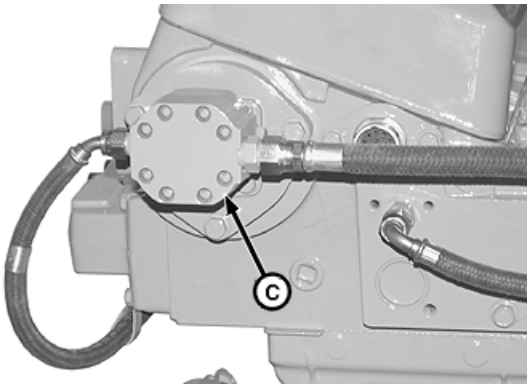
RG10360 —UN—30SEP99

Primer Pump

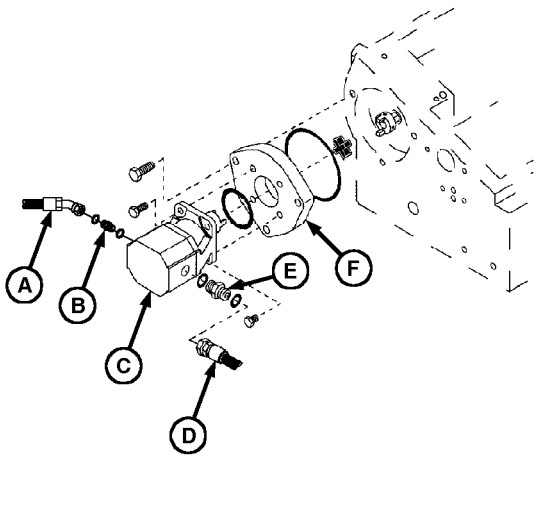
A—Primer Pump
B—Adapter

SS01820,0000812 -19-21JUL10-1/1

Remove and Install High Pressure Fuel Pump



Fuel Supply Pump



Removing High Pressure Fuel Pump

A—High Pressure Fuel Pump Outlet Line
B—Fitting
C—High Pressure Fuel Pump
D—High Pressure Fuel Pump Inlet Line
E—Fitting
F—Mounting Bracket

IMPORTANT: Plug or cap all fuel system connections and passages as lines or components are removed to keep debris out using JDG998 Fuel System Cap Plug Kit.

Remove High Pressure Fuel Pump

NOTE: Fuel flow through cylinder head may vary by engine application. High Pressure Fuel Pump (A) may be mounted as shown with fuel entering the front left side of the cylinder head and exiting the back of the head. On some machine applications, the High Pressure Fuel Pump is rotated 180° and the fuel lines **on cylinder head** *are reversed, with fuel entering the back of the head and exiting the front left side of the head.*

Add a reference mark (supply pump-to-cylinder head) and label fuel lines as they are disconnected, to ensure correct reinstallation of high pressure fuel pump.

1. Remove two fuel lines (A) and (D) connected to high pressure fuel pump. Cap all lines and fittings to keep debris out of fuel system.
2. Remove four cap screws securing high pressure fuel pump to mounting bracket (F) and remove pump. Remove and discard O-ring.

NOTE: Fuel supply pump is not serviceable; replace pump if determined to be defective.

3. Remove fittings (B) and (E) from pump and clean thoroughly if pump is to be replaced.

Install High Pressure Fuel Pump

1. Install fittings onto new pump using new O-rings. Tighten fittings securely.
2. Ensure that drive coupler set screw is tightened to specifications on supply pump drive shaft with end of shaft flush with coupler ID. Check drive coupler on camshaft drive pin also; adjust as needed.

Specification	
High Pressure Fuel Pump and Camshaft Drive Coupler Set Screws—Torque	4 N·m (3 lb-ft)

3. Position new rubber spider (vibration absorber) on drive coupler. Position new O-ring on face of high pressure fuel pump.
4. If removed, apply AR54749 Soap Lubricant to new O-ring on high pressure fuel pump mounting bracket (F) and install. Tighten mounting bracket cap screws to specifications.

Specification	
High Pressure Fuel Pump Mounting Bracket Cap Screws—Torque	50 N·m (37 lb-ft)

5. Install high pressure fuel pump with rubber spider properly meshed with coupler on rear of camshaft.

Continued on next page

SS01820,0000813 -19-21JUL10-1/2

6. Install four cap screws and tighten to specifications.

Specification
High Pressure Fuel Pump-to-Bracket—Torque ..... 25 N·m (18 lb-ft)

IMPORTANT: Before connecting ORFS fuel line fittings, be sure O-ring is correctly positioned in the groove of fitting. Tighten fitting ONLY to specified torque. DO NOT OVERTIGHTEN.

7. Install two fuel lines and tighten to specifications.

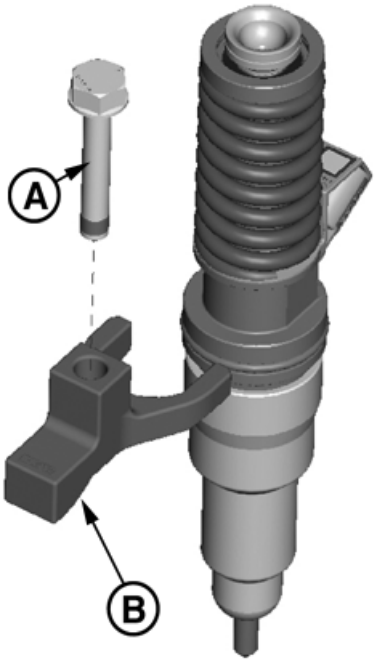
Specification
Inlet and Outlet Fittings to Fuel Pump—Torque ..... 30 N·m (22 lb-ft)

Specification
Fuel Line ORFS Fittings—Torque ..... 24 N·m (18 lb-ft)

SS01820,0000813 -19-21JUL10-2/2

Remove Electronic Unit Injector

1. Remove rocker arm shaft assembly, push rods and valve bridges.
2. Disconnect wiring harness lead from unit injector.
3. Loosen and remove injector clamp cap screw (A) and clamp (B) and set aside.
4. Remove unit injector from cylinder head.



RG15087 —UN—08FEB07

13.5L Electronic Unit Injector Assembly

SS01820,0000814 -19-21JUL10-1/1

Install Electronic Unit Injectors (EUI)

IMPORTANT: When servicing injectors it is important to complete the Injector Calibration procedure in Service ADVISOR. See "ELECTRONIC INJECTOR CALIBRATION INFORMATION" procedure in the appropriate diagnostic manual for this engine.

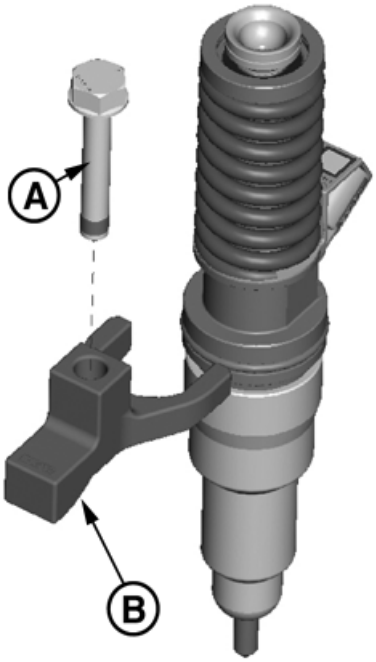
1. Coat injector sleeve ID in cylinder head, and o-ring on EUI body with AMOGELL Grease, or equivalent petroleum based grease.
2. Check injector O-ring for damage or other signs of necessary replacement. Replace if necessary.

IMPORTANT: Orient injectors with wiring harness connector pointing toward right rear of cylinder head, between valve springs, as shown.

3. Insert (6) injectors (C) into sleeves in cylinder head with hold down clamps (B) and long socket head cap screws (A).
4. Torque turn cap screws to specification.

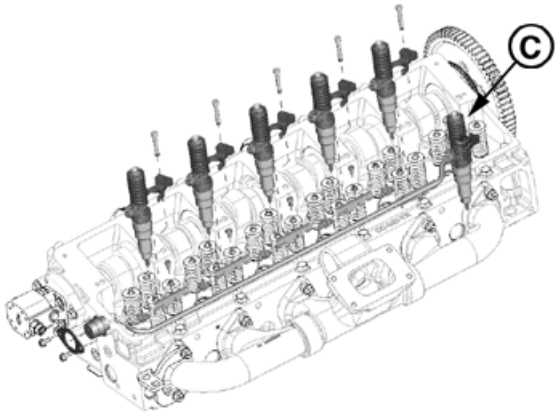
Specification	
Injector Hold Down Clamp to Cylinder Head—Torque Turn	45 N·m (33 lb-ft) + additional 90° turn

A—Flange Head Cap Screw
B—Injector Hold Down Clamp
C—Electronic Unit Injector Cylinder 1



RG15087 —UN—08FEB07

13.5L Electronic Unit Injector (EUI) Assembly



RG15086 —UN—08FEB07

Install EUI's

SS01820,0000815 -19-21JUL10-1/1

Install Injector Wiring Harness

1. Feed wiring harness through hole in rear of cylinder head. Seat connector (A) against cylinder head.
2. Install bracket (B) over connector and secure to cylinder head with 2 flanged head cap screws (C).
3. Tighten cap screws to specification.

Specification

Harness Connector Bracket to Cylinder Head—Torque..... 35 N·m (26 lb-ft)

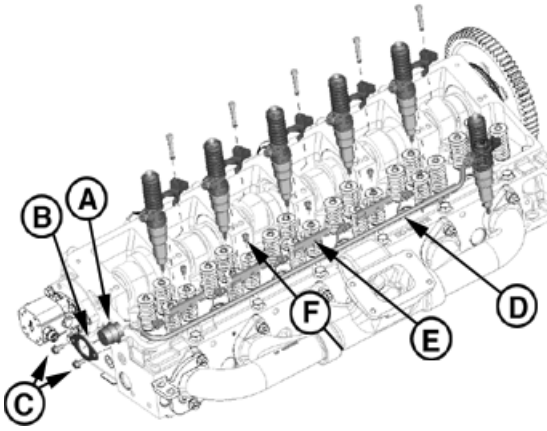
4. Press wiring harness (D) into groove in inside right wall of cylinder head, as shown.
5. Install 5 wiring harness clamps (E) over harness and secure with 5 short socket head cap screws (F).
6. Tighten socket head cap screws to specification.

Specification

Wiring Harness Clamps to Cylinder Head—Torque..... 35 N·m (26 lb-ft)

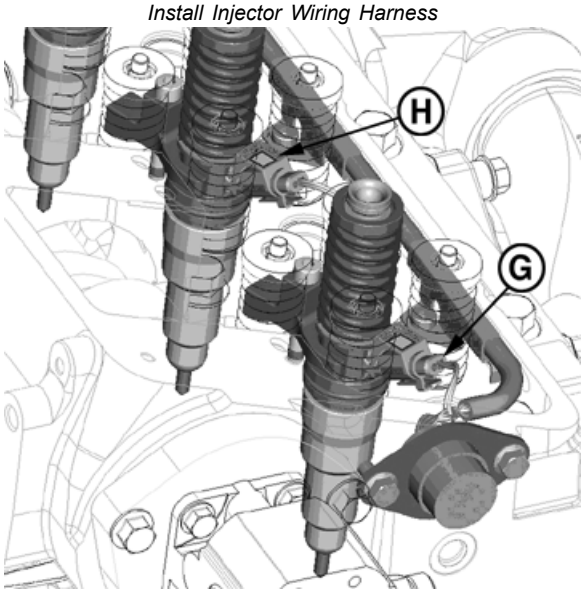
7. Seat 6 harness connectors (G) into injectors. Press until they snap into place.

A—External Harness Connector
B—Bracket
C—Flanged Head Cap Screws -2-
D—Wiring Harness
E—Harness Clamp -5-
F—Socket Head Cap Screws -5-
G—Injector Connector (#6 Injector Shown)
H—Injector Fuel Code Location



RG15088 —UN—08FEB07

Install Injector Wiring Harness



RG15089 —UN—08FEB07

Wiring Harness Connector and Fuel Code

SS01820,0000816 -19-21JUL10-1/1

Adjust Electronic Unit Injector Preload

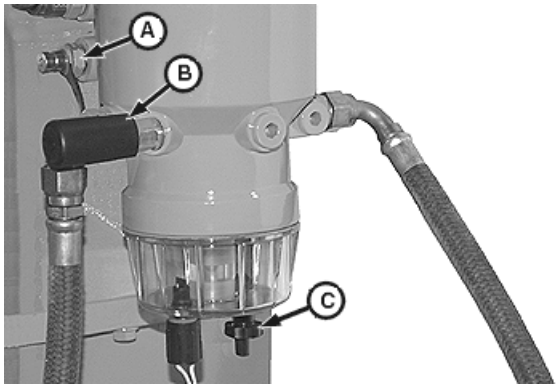
See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the Base Engine manual.

SS01820,0000817 -19-21JUL10-1/1

Bleed Fuel System

NOTE: Under normal conditions, fuel system bleeding is not required. Priming system with hand primer (B) is normally sufficient. If necessary to bleed the system, use the following procedure.

1. Drain water and contaminants from clear water separator sediment bowl by opening drain valve (C) and operating primer (B) until bowl is clear of water.
2. Close drain valve (C).
3. Attach a DR fitting and clear drain line to diagnostic fitting (A) and place end of line in suitable container for diesel fuel.
4. Pump hand primer (B) until a steady flow of fuel (without bubbles) comes out of line.
5. Disconnect line from diagnostic fitting.



RG10309 —UN—02SEP99

Bleed Fuel System

A—Diagnostic Port
B—Hand Primer
C—Water Drain Valve

6. Start engine and run for five minutes at slow idle.

SS01820,0000818 -19-21JUL10-1/1

Clean Electronic Injector 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.

SS01820,0000819 -19-21JUL10-1/1

Clean Electronic Injector Orifice

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

SS01820,000081A -19-21JUL10-1/1

Clean Electronic Injector 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.

SS01820,000081B -19-21JUL10-1/1

Inspect Electronic Injector 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.

SS01820,000081C -19-21JUL10-1/1

Group 91
Fuel System Repair and Adjustment — Type 2 Fuel Supply System

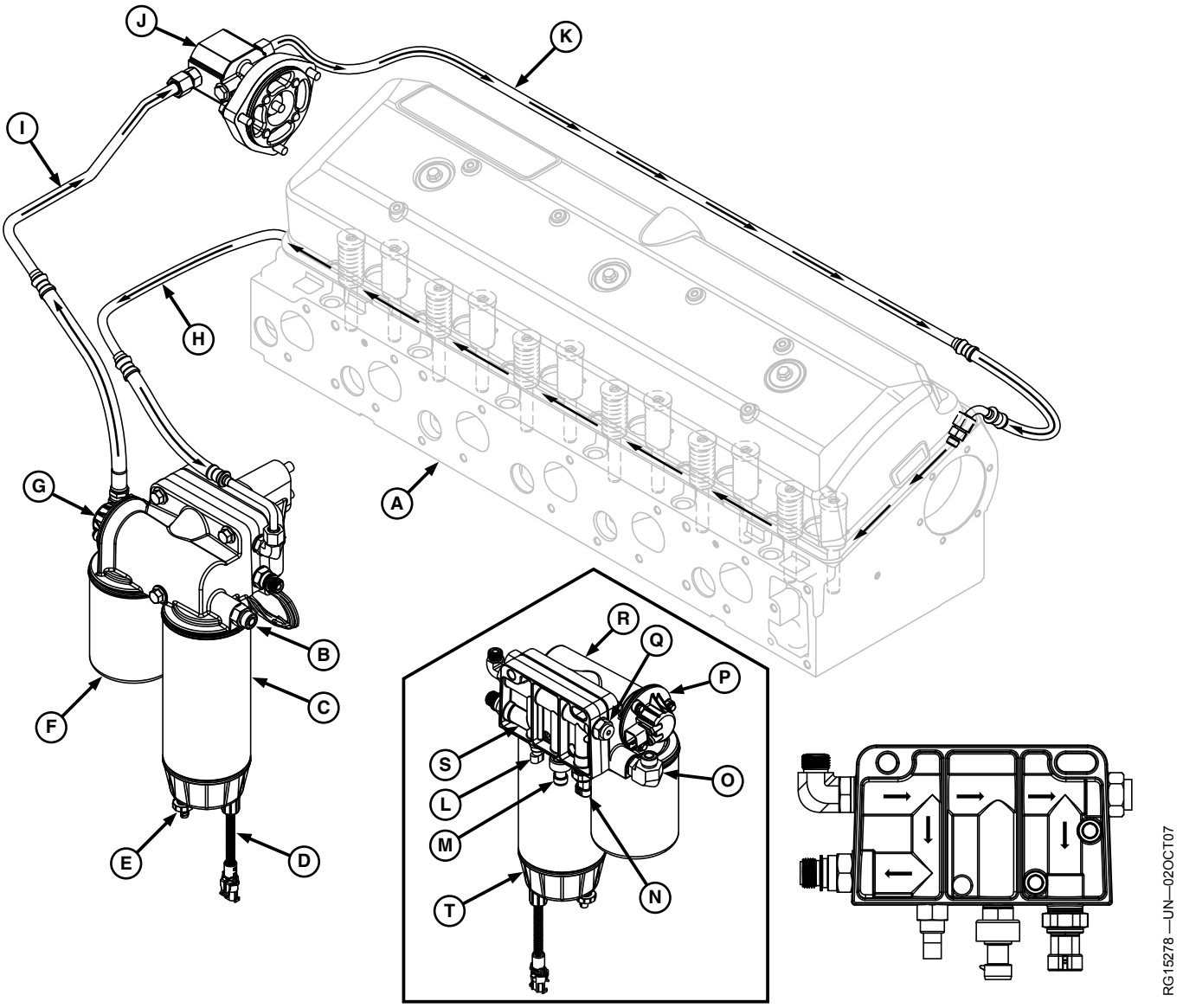
About This Group

DN22556,000068D -19-15OCT07-1/1

General Information

DN22556,000068C -19-15OCT07-1/1

Fuel System Components - Dual Filter, Right Hand Side



Dual Filter Right Hand Side Fuel System Components

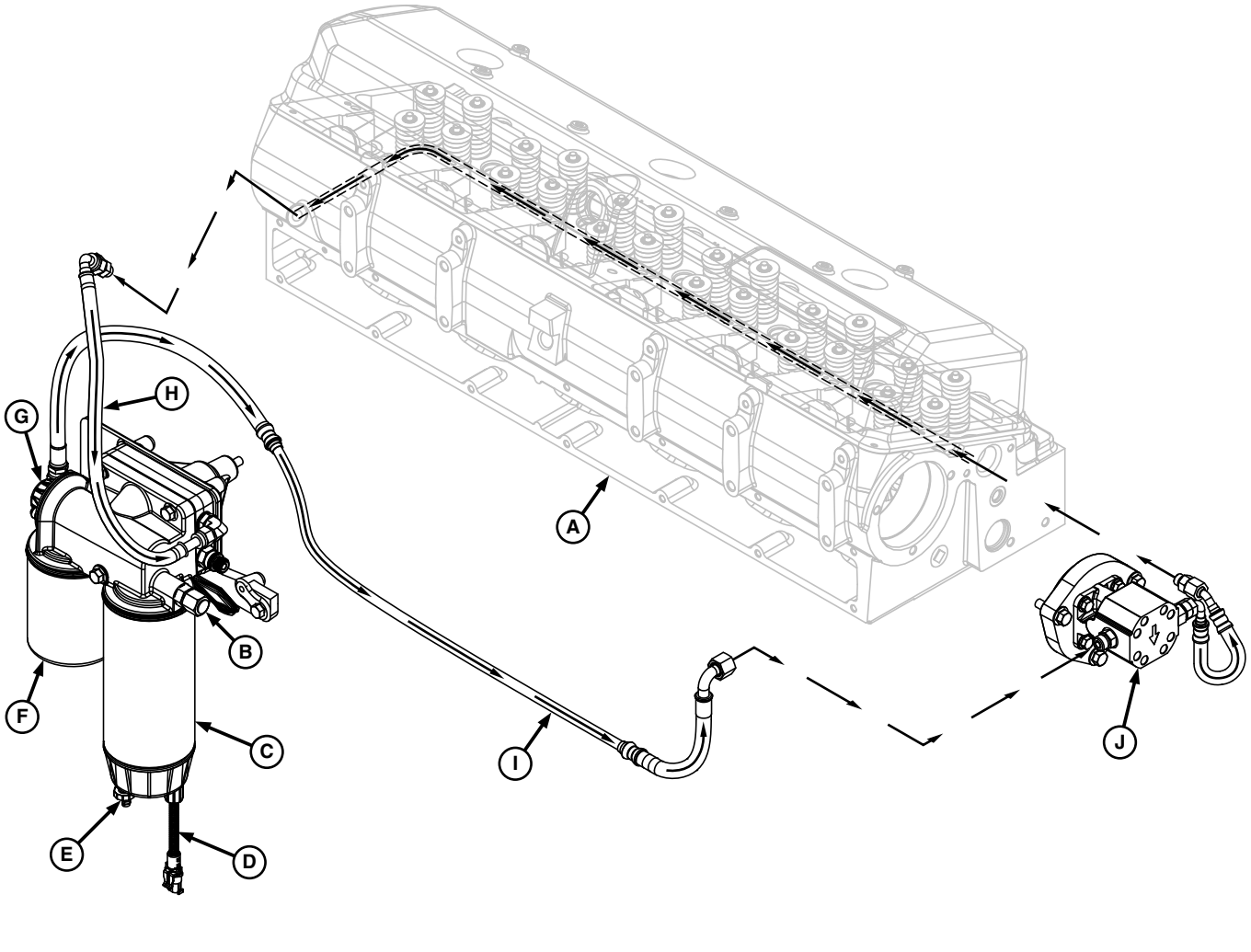
A—Cylinder Head
B—Inlet from Fuel Tank
C—Primary, 10 micron Fuel Filter
D—Water In Fuel Sensor
E—Water Drain
F—Final, 2 micron Fuel Filter
G—Electronic Fuel Transfer Pump
H—Return Line from Cylinder Head
I— Supply Line to Fuel Pump
J— Mechanical Fuel Pump
K—Fuel Line - Pump to Cylinder Head
L—Fuel Temperature Sensor
M—High Fuel Pressure Sensor
N—Low Fuel Pressure Sensor
O—Fuel Outlet to Fuel Pump
P—Electronic Fuel Pump
Q—High Pressure Regulating Valve
R—Fuel Filter Header Assembly
S—Low Pressure Regulating Valve
T—Water Bowl

NOTE: The right hand side fuel system is the version that is used in the repair sections which follow. A similar system is used on other applications, except it is mounted on the left hand side of the engine (shown next). Although external fuel line routing may vary, giving the appearance of a different fuel system, repair of the system is not changed from that used on the right hand side mounting.

IMPORTANT: During engine repair, cleanliness of the fuel system is extremely important. Be certain to close off fuel passages in the cylinder head, and cap fuel line connections and sensors whenever repair of the system is required.

RE38635,0000025 -19-15OCT07-1/1

Fuel System Components - Dual Filter, Left Hand Side



Low Pressure, Dual Filter, Fuel System - Left Hand Side

A—Cylinder Head
B—Inlet from Fuel Tank
C—Primary, 10 micron Fuel Filter
D—Water In Fuel Sensor
E—Water Drain
F—Final, 2 micron Fuel Filter
G—Electronic Fuel Transfer Pump
H—Return Line from Cylinder Head
I— Supply Line to Fuel Pump
J— Mechanical Fuel Pump

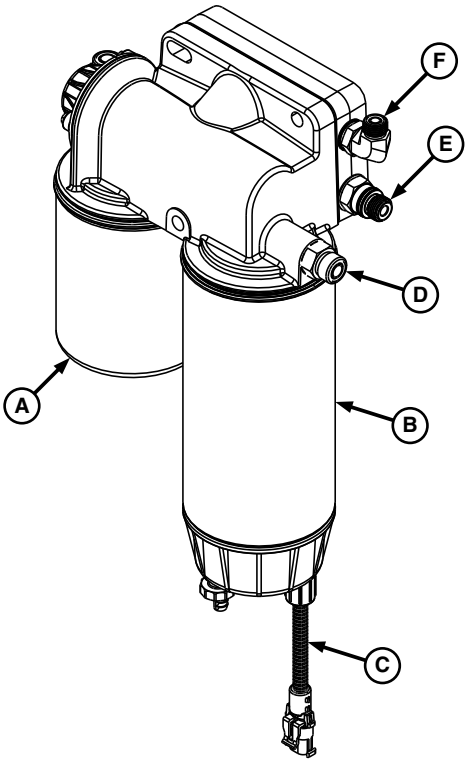
RE38635,000004E -19-15OCT07-1/1

Dual Fuel Filter Assembly

Torque specifications for fuel filter assembly are as follows:

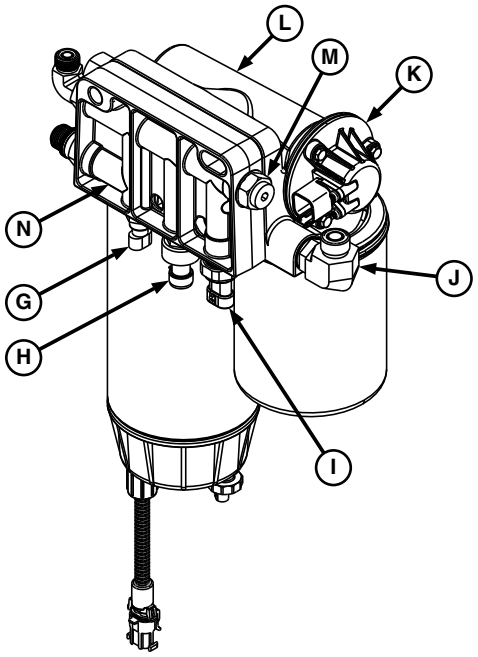
Fuel Filter Assembly—Specification	
Fuel Line ORFS Fittings—Torque	24 N·m (18 lb-ft)
Primary Fuel Filter Element (A)—Torque	Seal Contact + One Full Turn, Lubricated with Oil or Fuel
Final Filter Element (B)—Torque	Seal Contact + One Full Turn, Lubricated with Oil or Fuel
Water Separator Bowl to Primary Filter—Torque	Hand Tighten to Primary Filter
Water in Fuel Sensor (C)—Torque	2 N•m (15 lb-in.)
Fitting - Inlet from Fuel Tank (D)—Torque	34 N•m (25 lb-ft)
Fitting - Return to Tank (E)—Torque	34 N•m (25 lb-ft)
Fitting - Fuel Return from Cylinder Head (F)—Torque	34 N•m (25 lb-ft)
Fuel Temperature Sensor (G)—Torque	14 N·m (10 lb-ft.)
High Fuel Pressure Sensor (H)—Torque	14 N·m (10 lb-ft)
Low Fuel Pressure Sensor (I)—Torque	14 N·m (10 lb-ft.)
Fitting (J) - Outlet to Mechanical Fuel Pump—Torque	34 N•m (25 lb-ft)
Cap Screws - Electric Fuel Pump (K) to Filter Header—Torque	5 N•m (45 lb-in_
High Fuel Pressure Regulating Valve (M)—Torque	34 N•m (25 lb-ft)
Low Fuel Pressure Regulating Valve (N)—Torque	34 N•m (25 lb-ft)

A—Final (2 Micron) Fuel Filter
B—Primary (10 Micron) Fuel Filter
C—Water in Fuel Sensor
D—Inlet from Fuel Tank
E—Return to Tank
F—Return from Cylinder Head
G—Fuel Temperature Sensor
H—High Fuel Pressure Sensor
I— Low Fuel Pressure Sensor
J— Outlet to Mechanical Fuel Pump
K—Electronic Fuel Transfer Pump
L—Dual Fuel Filter Header
M—High Pressure Regulating Valve
N—Low Pressure Regulating Valve



RG15223 —UN—15FEB07

Dual Fuel Filter Assembly - Front View



RG15224 —UN—15FEB07

Dual Fuel Filter Assembly - Back Side View

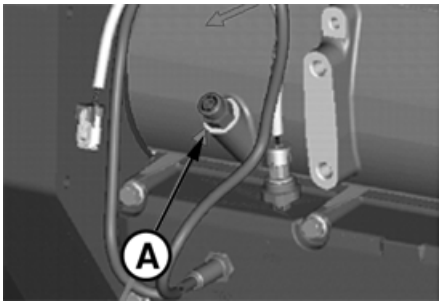
AS58880,00000AA -19-12JAN09-1/1

Install Fittings into Cylinder Head

1. Install Fitting (A) into side of cylinder head finger tight.
2. Install fitting (B) into rear of cylinder head finger tight.
3. Tighten both fittings to specification.

Specification	
Fuel Line Fittings in Cylinder Head—Torque	40 N•m (30 lb-ft)

A—Fitting in Side of Cylinder Head
B—Fitting in Rear of Cylinder Head



RG15091 —UN—14FEB08

Fuel Line Fittings in Cylinder Head

RE38635,0000027 -19-15OCT07-1/1

Assemble and Install Fuel Filter Head Bracket

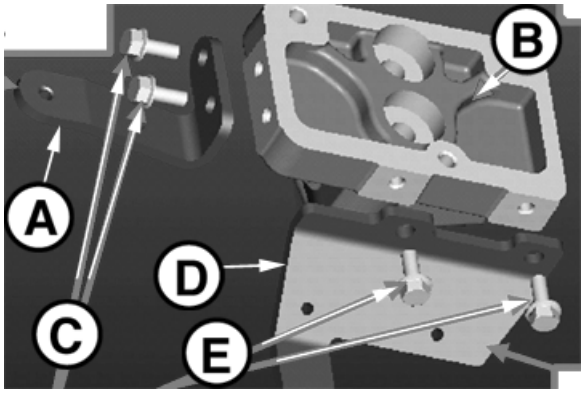
1. Place small jumper harness bracket (A) onto side of fuel filter header bracket (B) with formed leg away from large mounting face of header bracket, as shown.
2. Install 2 cap screws (C) through harness bracket into header bracket finger tight.
3. Place large jumper harness bracket (D) onto bottom of fuel filter bracket (B) with formed leg away from large mounting face of header bracket, as shown.
4. Install 2 cap screws (E) through harness bracket into header bracket finder tight.
5. Tighten 4 jumper harness bracket cap screws to specification.

Specification	
Jumper Harness Brackets to Fuel Filter Header Bracket—Torque	35 N•m (26 lb-ft)

6. Place fuel filter header bracket subassembly (G) onto block mounting pad on right hand rear of engine. Ensure small jumper harness bracket points toward rear of engine and large jumper harness bracket points down, as shown.
7. Install 2 cap screws (F) through fuel filter header bracket into cylinder block finger tight.
8. Tighten cap screws to specification.

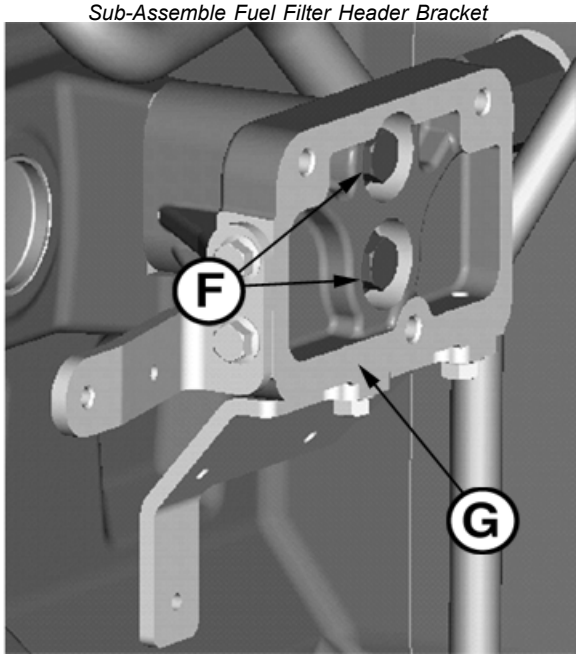
Specification	
Fuel Filter Header Bracket to Cylinder Block—Torque	125 N•m (93 lb-ft)

A—Small Jumper Harness Bracket
B—Fuel Filter Header Bracket
C—Cap Screws - Small Jumper Bracket to Header Bracket
D—Large Jumper Harness Bracket
E—Cap Screws - Large Jumper Harness Bracket to Header Bracket
F—Cap Screws - Bracket to Cylinder Block
G—Fuel Filter Header Bracket



RG15092 —UN—09FEB07

Sub-Assemble Fuel Filter Header Bracket



RG15093 —UN—09FEB07

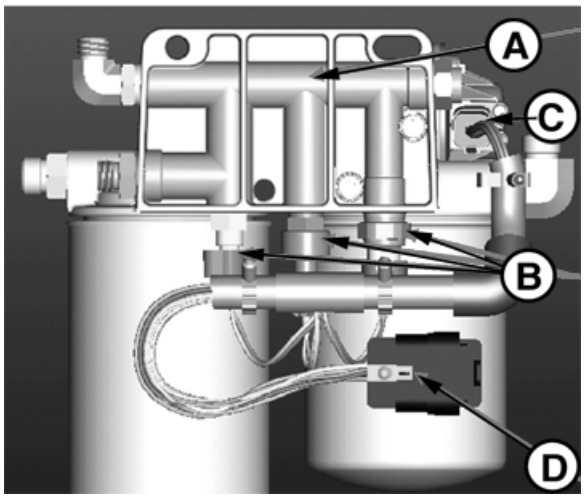
Install Fuel Filter Header Bracket

RE38635,0000028 -19-15OCT07-1/1

Install Jumper Harness to Fuel Filter Header Assembly

Install jumper harness connectors to 3 sensors (B) and electronic fuel pump (C) on back side of fuel filter assembly, as shown.

A—Fuel Filter Header (viewed from back side)
B—Sensor Connections
C—Electronic Transfer Pump Connector
D—Main Jumper Harness Connector



RG15094 —UN—09FEB07

Jumper Harness to Fuel Filter Assembly

RE38635,0000029 -19-15OCT07-1/1

Install Fuel Filter Assembly and Fuel Lines

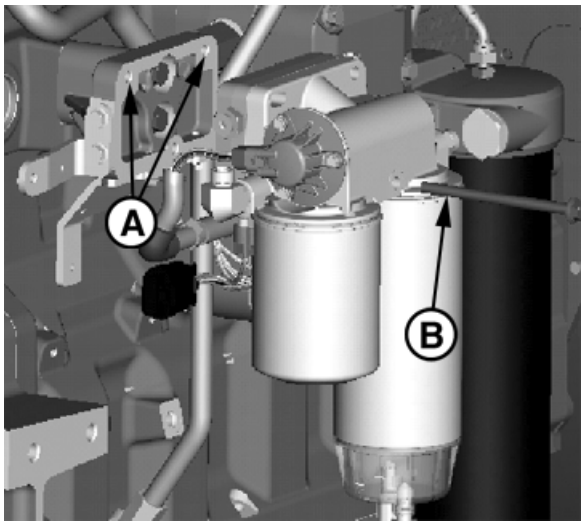
IMPORTANT: Note that, in addition to lining up cap screw holes (steps 1-7) when installing filter header, there are jumper harness clips on the back side of the filter assembly that also must line up with holes in the header brackets (steps 8-10).

1. Install guide pins into top (2) mounting holes (A) of fuel filter header bracket.
2. Install (1) long cap screw (B) through bottom hole of fuel filter header into header bracket finger tight.
3. Remove (1) guide pin from upper slot in left hand side of header bracket.
4. Install (1) short cap screw (C) through fuel filter header into header bracket finger tight.
5. Remove other guide pin from hole in header bracket - right hand side.
6. Install second short cap screw (D) through fuel filter header into header bracket finger tight.
7. Tighten (3) fuel filter header cap screws to specification.

Specification

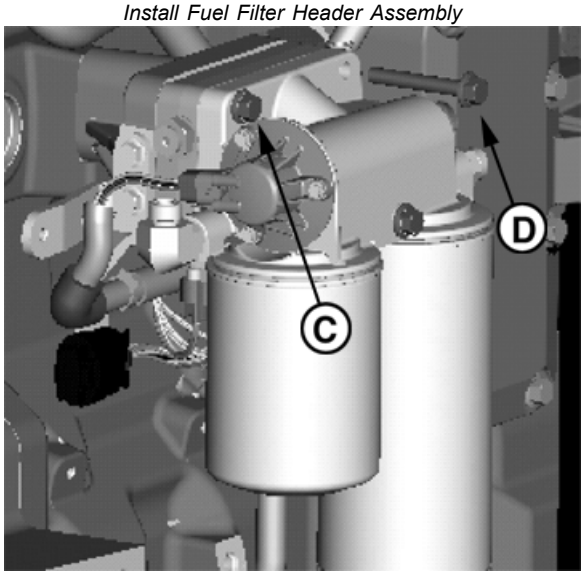
Fuel Filter
Header to Header
Bracket—Torque.....70 N•m (52 lb-ft)

A—Top Mounting Holes - Fuel Filter Header Bracket
B—Long Capscrew (1)
C—Short Cap Screw (1)
D—Short Cap Screw (1)



RG15095 —UN—09FEB07

Install Fuel Filter Header Assembly



RG15096 —UN—09FEB07

Fuel Filter Assembly

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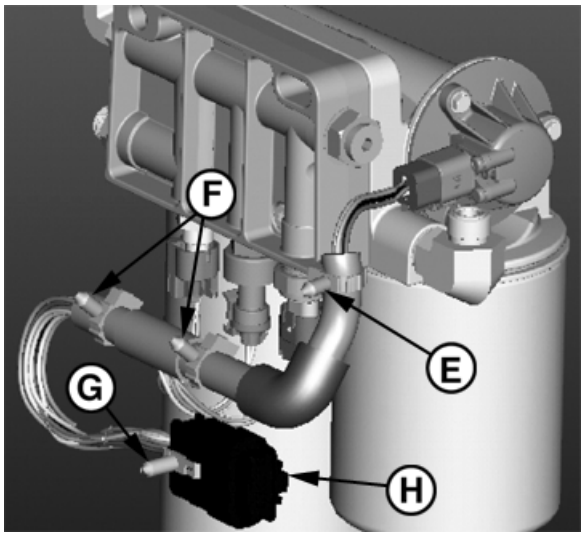
RE38635,000002A -19-15OCT07-1/5

8. Insert jumper harness clip nearest pump into hole in small jumper harness bracket (E).
9. Insert (2) jumper harness clips behind fuel filter header sensors (F) into respective holes in large harness bracket (F).

IMPORTANT: Be certain harness connector (H) is on outside face of harness bracket, as shown.

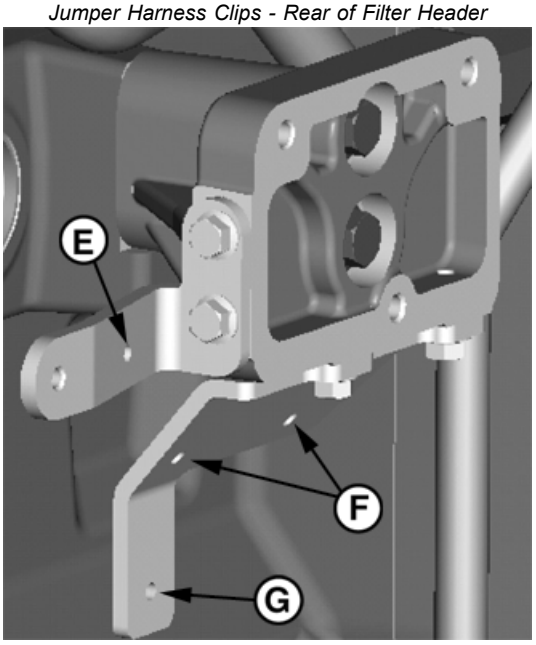
10. Insert (1) jumper harness connector clip (G) into lowest hole on large harness bracket (G).

E—Jumper Harness Clip Near Pump
F—Fuel Pump Sensor Clips
G—Jumper Harness Connector Clip
H—Jumper Harness Connector



RG15098 —UN—09FEB07

Jumper Harness Clips - Rear of Filter Header



RG15097 —UN—09FEB07

Jumper Harness Clip Locations - Header Bracket

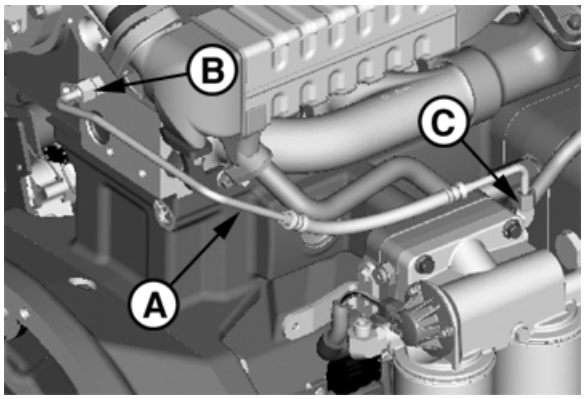
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RE38635,000002A -19-15OCT07-2/5

NOTE: Verify that o-rings are present at (2) fuel return line connection points and (2) fuel to transfer pump line connection points.

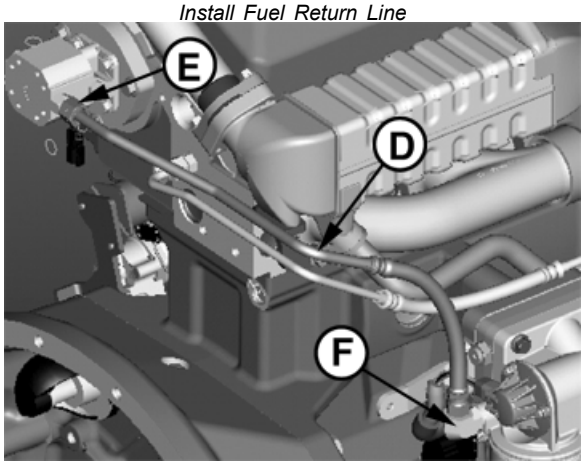
11. Install rigid end of fuel return line (A) to fitting at rear of cylinder head (B) finger tight.
12. Install elbow on end of flexible section of fuel return line to elbow fitting (C) on fuel filter header assembly.
13. Install rigid end of fuel to transfer pump line (D) to fitting in transfer pump (E).
14. Install flexible end of fuel line to transfer pump line to elbow fitting (F) on filter header assembly.

A—Fuel Return Line
B—Fitting at Rear of Cylinder Head
C—Elbow Fitting at Fuel Filter Header Assembly
D—Fuel to Transfer Pump Line
E—Fitting on Transfer Pump
F—Elbow Fitting on Filter Header Assembly



RG15099 —UN—09FEB07

Install Fuel Return Line



RG15185 —UN—09FEB07

Install Fuel to Transfer Pump Line

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RE38635,000002A -19-15OCT07-3/5

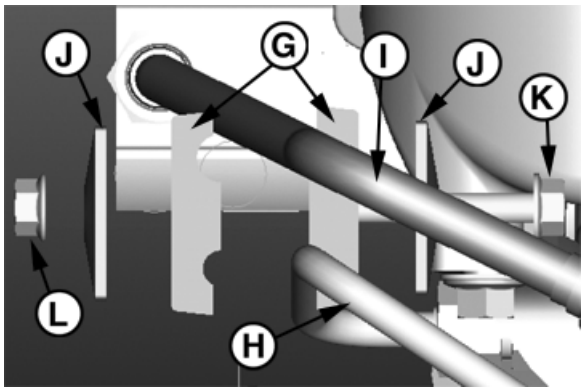
15. Place (2) clamp halves (G) over fuel return line (H) and fuel to transfer pump line (I). Ensure clamp half recesses match fuel line diameters.
16. Place (2) clamp plates (J) on clamp half faces, one per face, as shown. Ensure flat face of clamp plate is placed against clamp half face.
17. Insert cap screw (K) toward rear of engine through both clamp halves and clamp plates, as shown.
18. Install flange nut (L) onto cap screw finger tight.
19. Slide clamp assembly (M) away from engine to end of straight section of lines, as shown.
20. Tighten flange nut to specification.

Specification	
Flange Nut to Cap Screw Securing Line Clamp—Torque	35 N•m (26 lb-ft)

IMPORTANT: Verify fuel lines do not rub and clamp orientation is approximately vertical.

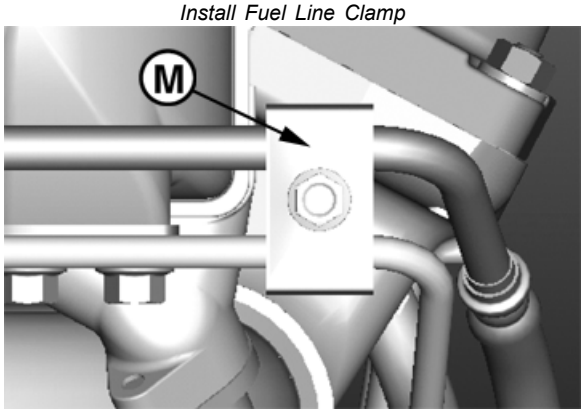
21. Tighten fuel return line and fuel to transfer pump line connections to specification.

Specification	
Fuel Return Line Connections—Torque	24 N•m (18 lb-ft)
Fuel to Transfer Pump Connections—Torque	37 N•m 27 lb-ft)



RG15186 —UN—09FEB07

Install Fuel Line Clamp



RG15187 —UN—09FEB07

Fuel Line Clamp

G—Fuel Line Clamp Halves
H—Fuel Return Line
I— Fuel to Transfer Pump Line
J— Clamp Plates
K—Clamp Cap Screw
L— Flange Nut
M—Final Clamp Location

Continued on next page

RE38635,000002A -19-15OCT07-4/5

NOTE: Verify that o-rings are present at both fuel to cylinder head line connections.

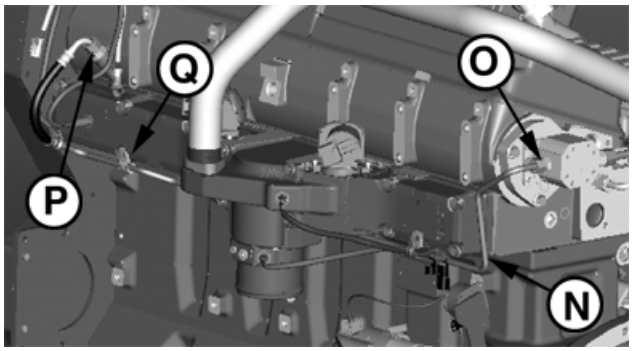
22. Install rigid end of fuel to cylinder head line (N) to fitting in transfer pump (O) finger tight.
23. Install flexible end of fuel to cylinder head line to fitting in side of cylinder head (P) finger tight.
24. Install one P-Clamp (Q) over fuel to cylinder head line with “P” facing toward engine, as shown.
25. Install (1) air intake manifold cap screw through P-Clamp (Q) in bottom hole, second from front of engine finger tight.
26. Tighten both fuel to cylinder head connections to specification.

Specification	
Fuel to Cylinder Head Connections—Torque	24 N•m (18 lb-ft)

27. Tighten air intake manifold cap screw securing P-clamp to specification.

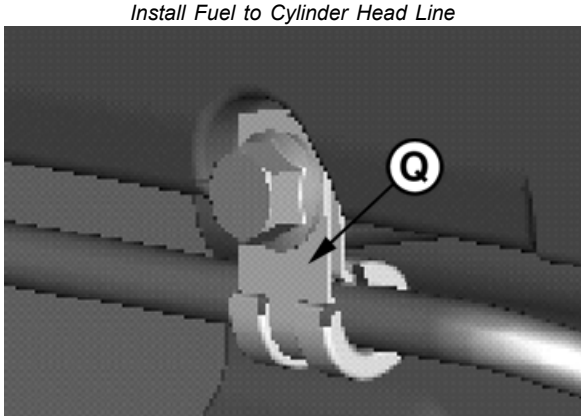
Specification	
Air Intake Manifold Cap Screw—Torque	50 N•m (37 lb-ft)

N—Fuel to Cylinder Head Line
O—Transfer Pump Fitting
P—Cylinder Head Fitting
Q—P Clamp



RG15188 —UN—09FEB07

Install Fuel to Cylinder Head Line



RG15189 —UN—09FEB07

P Clamp - Fuel to Cylinder Head Line

RE38635,000002A -19-15OCT07-5/5

Replace Fittings on Fuel Filter Assembly

1. Install return from cylinder head fuel line fitting (A) and tighten to specification.

Specification

Return from Cylinder Head Fitting—Torque ..... 34 N•m (25 lb-ft)

2. Install return to tank fuel line fitting (B) and tighten to specification.

Specification

Return to Tank Fuel Line Fitting—Torque ..... 34 N•m (25 lb-ft)

3. Install inlet fitting (C) for fuel line from tank and tighten to specification.

Specification

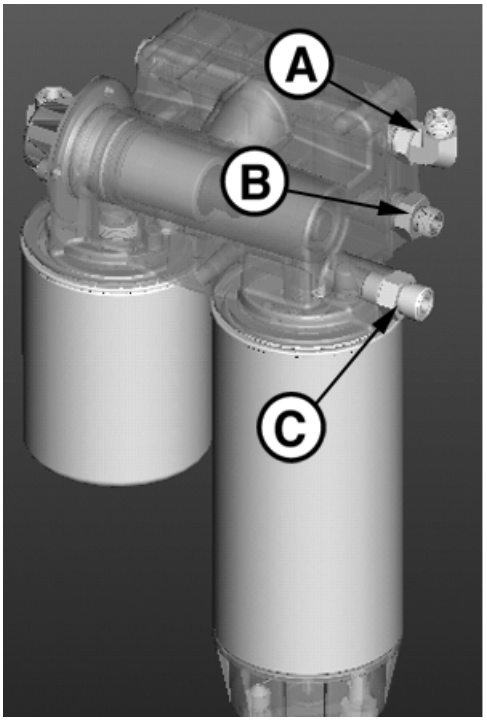
Inlet Fitting - Fuel Line from Tank—Torque ..... 34 N•m (25 lb-ft)

4. Install outlet fitting for fuel line to mechanical transfer pump and tighten to specification.

Specification

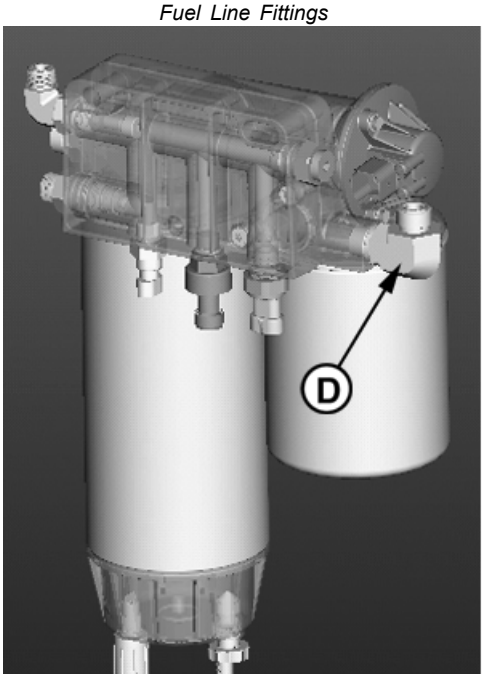
Outlet Fitting - Fuel Line to Mechanical Transfer Pump—Torque ..... 34 N•m (25 lb-ft)

A—Return from Cylinder Head
B—Return to Tank
C—Inlet from Tank
D—Outlet to Mechanical Transfer Pump (when installed)



RG15217 —UN—12FEB07

Fuel Line Fittings



RG15218 —UN—12FEB07

Transfer Pump Fitting

RE38635,000002B -19-15OCT07-1/1

Remove and Install High Pressure Fuel Regulator Valve

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 5 (U) in Section 03, Group 140 of this manual.

1. Remove high pressure fuel regulator valve from fuel filter header assembly.

NOTE: Plug bore with clean cap plug after removal of valve. It is very important to keep fuel system clean from any debris.

2. Coat valve O-ring with TY6333 High Temperature Grease and install valve in fuel filter header assembly. Tighten to specifications.

Specification
High Pressure Fuel Regulator Valve-to-Fuel Filter Header Assembly—Torque ..... 34 N·m (25 lb-ft)

DM59778,0000038 -19-28OCT07-1/1

Remove and Install Fuel Return Regulator Valve

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 5 (V) in Section 03, Group 140 of this manual.

1. Remove fuel return regulator valve from fuel filter header assembly.

NOTE: Plug bore with clean cap plug after removal of valve. It is very important to keep fuel system clean from any debris.

2. Coat valve O-ring with TY6333 High Temperature Grease and install valve in fuel filter header assembly. Tighten to specifications.

Specification
Fuel Return Regulator Valve-to-Fuel Filter Header Assembly—Torque ..... 34 N·m (25 lb-ft)

DM59778,0000039 -19-28OCT07-1/1

Remove and Install Fuel Filter Screen

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 5 (S,T) in Section 03, Group 140 of this manual.

1. Remove fuel return line from cylinder head at elbow fitting on fuel filter header assembly.
2. Remove elbow fitting from fuel filter header assembly.

IMPORTANT: If filter screen is damaged during removal, the filter header assembly has to be taken apart and inside cleaned of all debris. No debris must enter the fuel system.

3. Remove fuel filter screen from fuel filter header assembly. Use 5mm hex wrench to remove screen, being careful not to push wrench through screen.

NOTE: Plug bore and fuel line with clean cap plug after removal of valve. It is very important to keep fuel system clean from any debris.

4. Replace fuel filter screen into fuel filter header assembly.

Specification
Fuel Filter Screen-to- Fuel Filter Housing—Torque ..... 5 N•m (44 lb-in)

5. Coat elbow O-ring with TY6333 High Temperature Grease and install fitting to fuel filter housing. Make sure fitting is clean from all debris before installing. Tighten to specifications.

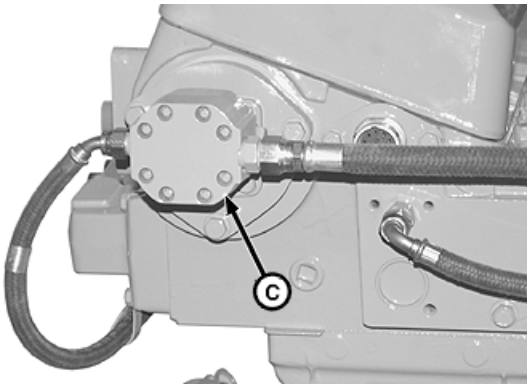
Specification
Return Fuel Line Fitting-to-Fuel Filter Header Assembly—Torque ..... 34 N·m (25 lb-ft)

6. Reconnect fuel return line to fitting.

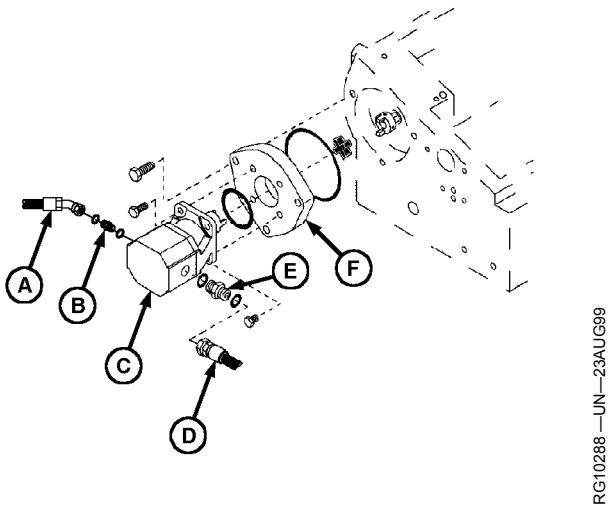
Specification
Fuel Return Line-to-Fitting—Torque ..... 34 N·m (25 lb-ft)

DM59778,000003A -19-15OCT07-1/1

Remove and Install High Pressure Fuel Pump



Fuel Supply Pump



Removing High Pressure Fuel Pump

A—High Pressure Fuel Pump Outlet Line
B—Fitting
C—High Pressure Fuel Pump
D—High Pressure Fuel Pump Inlet Line
E—Fitting
F—Mounting Bracket

IMPORTANT: Plug or cap all fuel system connections and passages as lines or components are removed to keep debris out using JDG998 Fuel System Cap Plug Kit.

Remove High Pressure Fuel Pump

NOTE: Fuel flow through cylinder head may vary by engine application. High Pressure Fuel Pump (A) may be mounted as shown with fuel entering the front left side of the cylinder head and exiting the back of the head. On some machine applications, the High Pressure Fuel Pump is rotated 180° and the fuel lines **on cylinder head** *are reversed, with fuel entering the back of the head and exiting the front left side of the head.*

Add a reference mark (supply pump-to-cylinder head) and label fuel lines as they are disconnected, to ensure correct reinstallation of high pressure fuel pump.

1. Remove two fuel lines (A) and (D) connected to high pressure fuel pump. Cap all lines and fittings to keep debris out of fuel system.
2. Remove four cap screws securing high pressure fuel pump to mounting bracket (F) and remove pump. Remove and discard O-ring.

NOTE: Fuel supply pump is not serviceable; replace pump if determined to be defective.

3. Remove fittings (B) and (E) from pump and clean thoroughly if pump is to be replaced.

Install High Pressure Fuel Pump

1. Install fittings onto new pump using new O-rings. Tighten fittings securely.
2. Ensure that drive coupler set screw is tightened to specifications on supply pump drive shaft with end of shaft flush with coupler ID. Check drive coupler on camshaft drive pin also; adjust as needed.

Specification	
High Pressure Fuel Pump and Camshaft Drive Coupler Set Screws—Torque	4 N·m (3 lb-ft)

3. Position new rubber spider (vibration absorber) on drive coupler. Position new O-ring on face of high pressure fuel pump.
4. If removed, apply AR54749 Soap Lubricant to new O-ring on high pressure fuel pump mounting bracket (F) and install. Tighten mounting bracket cap screws to specifications.

Specification	
High Pressure Fuel Pump Mounting Bracket Cap Screws—Torque	50 N·m (37 lb-ft)

5. Install high pressure fuel pump with rubber spider properly meshed with coupler on rear of camshaft.

Continued on next page

RE38635,00000B4 -19-21JUL10-1/2

6. Install four cap screws and tighten to specifications.

Specification
High Pressure Fuel Pump-to-Bracket—Torque ..... 25 N·m (18 lb-ft)

IMPORTANT: Before connecting ORFS fuel line fittings, be sure O-ring is correctly positioned in the groove of fitting. Tighten fitting ONLY to specified torque. DO NOT OVERTIGHTEN.

7. Install two fuel lines and tighten to specifications.

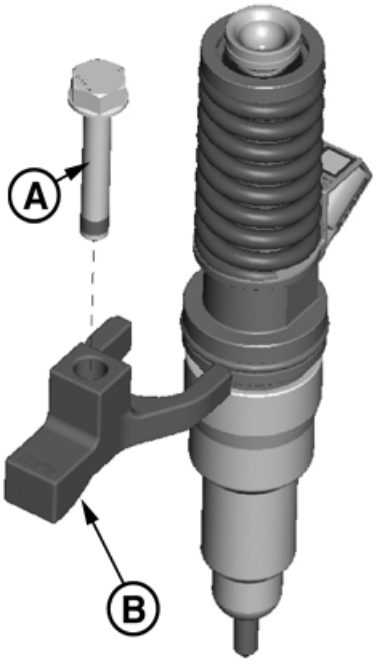
Specification
Inlet and Outlet Fittings to Fuel Pump—Torque ..... 30 N·m (22 lb-ft)

Specification
Fuel Line ORFS Fittings—Torque ..... 24 N·m (18 lb-ft)

RE38635,00000B4 -19-21JUL10-2/2

Remove Electronic Unit Injector

1. Remove rocker arm shaft assembly, push rods and valve bridges.
2. Disconnect wiring harness lead from unit injector.
3. Loosen and remove injector clamp cap screw (A) and clamp (B) and set aside.
4. Remove unit injector from cylinder head.



RG15087 —UN—08FEB07

13.5L Electronic Unit Injector Assembly

RE38635,00000CB -19-21JUL10-1/1

Install Electronic Unit Injectors (EUI)

IMPORTANT: When servicing injectors it is important to complete the Injector Calibration procedure in Service ADVISOR. See "ELECTRONIC INJECTOR CALIBRATION INFORMATION" procedure in the appropriate diagnostic manual for this engine.

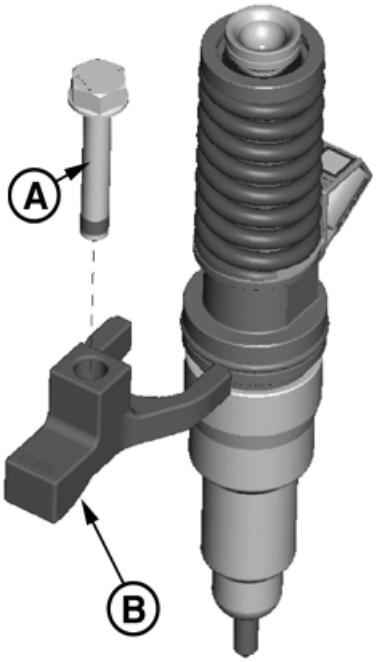
1. Coat injector sleeve ID in cylinder head, and o-ring on EUI body with AMOGELL Grease, or equivalent petroleum based grease.
2. Check injector O-ring for damage or other signs of necessary replacement. Replace if necessary.

IMPORTANT: Orient injectors with wiring harness connector pointing toward right rear of cylinder head, between valve springs, as shown.

3. Insert (6) injectors (C) into sleeves in cylinder head with hold down clamps (B) and long socket head cap screws (A).
4. Torque turn cap screws to specification.

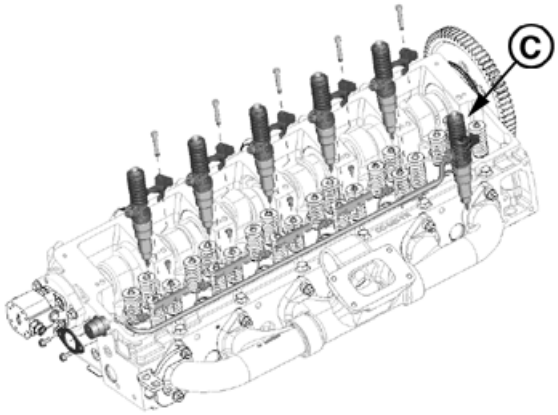
Specification	
Injector Hold Down Clamp to Cylinder Head—Torque Turn	45 N·m (33 lb-ft) + additional 90° turn

A—Flange Head Cap Screw
B—Injector Hold Down Clamp
C—Electronic Unit Injector Cylinder 1



RG15087 —UN—08FEB07

13.5L Electronic Unit Injector (EUI) Assembly



RG15086 —UN—08FEB07

Install EUI's

RE38635,00000C6 -19-21JUL10-1/1

Install Injector Wiring Harness

1. Feed wiring harness through hole in rear of cylinder head. Seat connector (A) against cylinder head.
2. Install bracket (B) over connector and secure to cylinder head with 2 flanged head cap screws (C).
3. Tighten cap screws to specification.

Specification

Harness Connector Bracket to Cylinder Head—Torque..... 35 N·m (26 lb-ft)

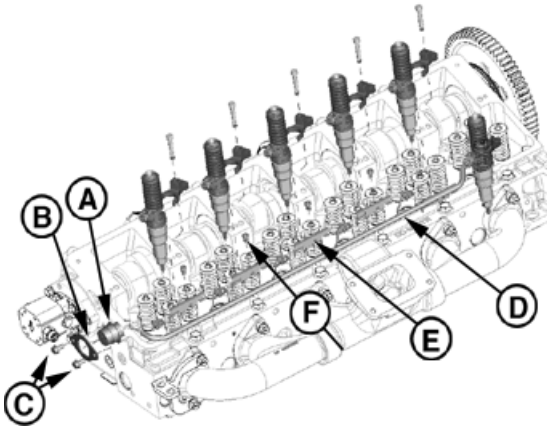
4. Press wiring harness (D) into groove in inside right wall of cylinder head, as shown.
5. Install 5 wiring harness clamps (E) over harness and secure with 5 short socket head cap screws (F).
6. Tighten socket head cap screws to specification.

Specification

Wiring Harness Clamps to Cylinder Head—Torque..... 35 N·m (26 lb-ft)

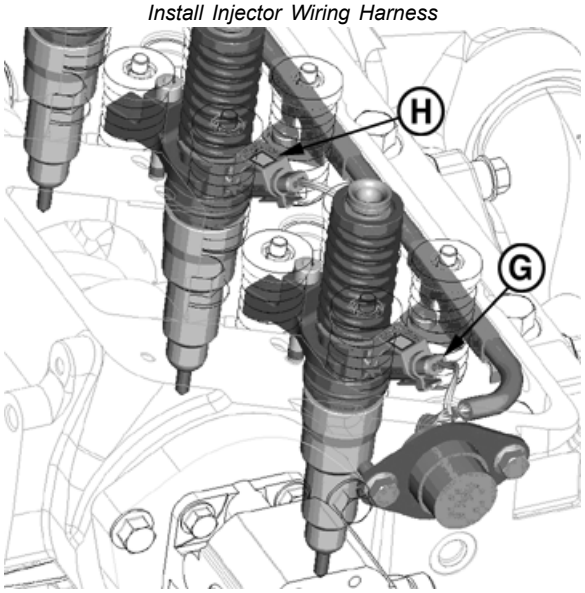
7. Seat 6 harness connectors (G) into injectors. Press until they snap into place.

A—External Harness Connector
B—Bracket
C—Flanged Head Cap Screws -2-
D—Wiring Harness
E—Harness Clamp -5-
F—Socket Head Cap Screws -5-
G—Injector Connector (#6 Injector Shown)
H—Injector Fuel Code Location



RG15088 —UN—08FEB07

Install Injector Wiring Harness



RG15089 —UN—08FEB07

Wiring Harness Connector and Fuel Code

AS58880,00000A9 -19-21JUL10-1/1

Adjust Electronic Unit Injector Preload

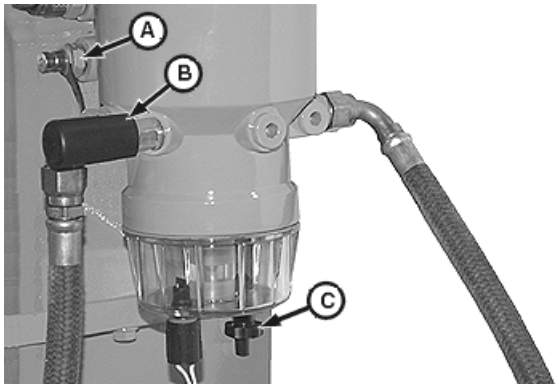
See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the Base Engine manual.

RE38635,00000B7 -19-21JUL10-1/1

Bleed Fuel System

NOTE: Under normal conditions, fuel system bleeding is not required. Priming system with hand primer (B) is normally sufficient. If necessary to bleed the system, use the following procedure.

1. Drain water and contaminants from clear water separator sediment bowl by opening drain valve (C) and operating primer (B) until bowl is clear of water.
2. Close drain valve (C).
3. Attach a DR fitting and clear drain line to diagnostic fitting (A) and place end of line in suitable container for diesel fuel.
4. Pump hand primer (B) until a steady flow of fuel (without bubbles) comes out of line.
5. Disconnect line from diagnostic fitting.



RG10309 —UN—02SEP99

Bleed Fuel System

A—Diagnostic Port
B—Hand Primer
C—Water Drain Valve

6. Start engine and run for five minutes at slow idle.

RE38635,00000B8 -19-21JUL10-1/1

Clean Electronic Injector 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.

RE38635,00000B9 -19-21JUL10-1/1

Clean Electronic Injector Orifice

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

RE38635,00000BA -19-21JUL10-1/1

Clean Electronic Injector 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.

RE38635,00000BB -19-21JUL10-1/1

Inspect Electronic Injector 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.

RE38635,00000BC -19-21JUL10-1/1

Remove, Inspect, and Install EGR Valve (Tier 3/Stage IIIA)

1. Disconnect wiring lead and remove two attaching screws (A). Place JDG10194 EGR removal tool at the base of the EGR valve and install tool forcing screws into the intake manifold. Carefully remove the valve without binding by alternately turning the two forcing screws until the valve lands are past the intake manifold port.
2. Remove gasket and clean mating surfaces. Vacuum debris and loose carbon deposits from intake housing.
3. Replace EGR O-rings (B) each time valve is removed.
4. Inspect valve lands (C) for wear and damage. Remove carbon deposits and debris.
5. Lubricate O-rings with clean engine oil. Carefully install EGR valve and new gasket with the motor pointing away from the engine. Tighten attaching screws (A) to initial specifications.

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

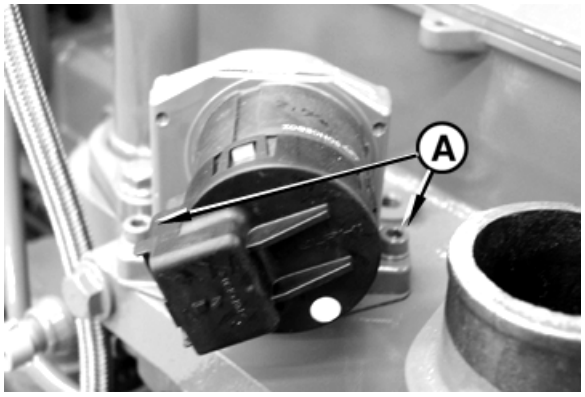
6. Tighten EGR attaching screws (A) to final specifications. Connect wiring lead.

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

IMPORTANT: If installing a new EGR valve, calibrate using Service Advisor™, see EGR VALVE RECALIBRATION under the Interactive Test tab.

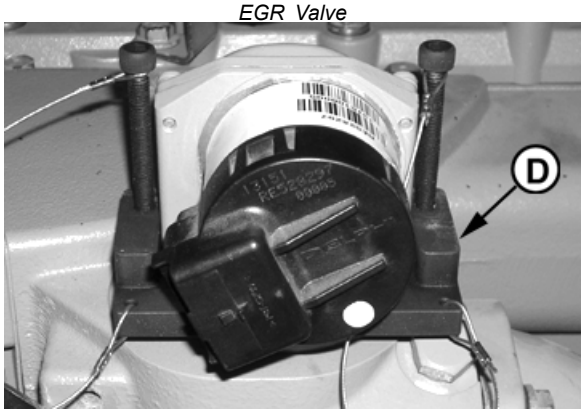
If reusing the EGR valve, recalibrate using Service Advisor™, see HARNESS DIAGNOSTIC MODE TEST under the interactive test tab.

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



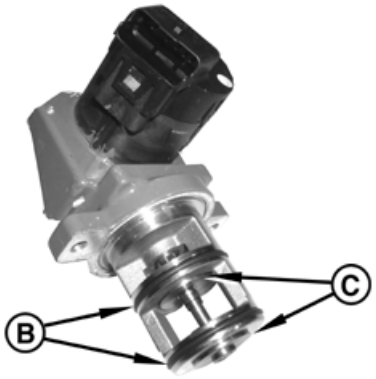
RG14089 —UN—22MAR05

EGR Valve



RG14881 —UN—26MAY06

JDG10194 EGR Removal Tool



RG14076 —UN—01APR05

Inspect EGR Valve

RG19661,0000244 -19-23JUL10-1/1

Remove, Inspect, and Install EGR Cooler

NOTE: For clarity, the turbocharger has been removed. Removing the turbocharger is not necessary to service the EGR cooler.

Remove EGR Cooler

1. Remove EGR crossover pipe.
2. Remove the cooler outlet tube cap screw and remove the tube by rotating and pulling from the thermostat housing.
3. Remove the EGR cooler inlet tube cap screw and loosen the large fitting to remove tube.
4. Remove two EGR cooler-to-support bracket cap screws and carefully remove cooler from the center exhaust manifold.

Inspect EGR Cooler

1. Check for signs of leakage.
2. Pressure-test cooler. Reference procedure
3. Replace sealing rings, if required.

Install EGR Cooler

1. Insure sealing rings are in place. Position ring gaps 120° apart and carefully slide the cooler inlet into the center exhaust manifold bore. Install, but do not tighten, the two cooler-to-support bracket cap screws.
2. Apply sealant to cooler inlet tube fitting. Apply O-ring lubricant to the flanged end of the coolant outlet tube and install in the engine coolant cooler housing.
3. Apply O-ring lubricant to the coolant outlet tube end and install by rotating and pushing the tube into thermostat housing.
4. Insure all tubes are in position and fully inserted into their respective housings. Tighten all cap screws to specifications.

Specification	
Cooler-to-Exhaust Manifold Cap Screws—Torque	50 N·m (37 lb-ft)



RG14679 —UN—12JAN06

EGR Crossover Pipe



RG14676 —UN—12JAN06

Specification	
Coolant Inlet and Outlet Line Cap Screws—Torque	35 N·m (26 lb-ft)

Specification	
Coolant Inlet Fitting—Torque	70 N·m (52 lb-ft)

5. Install EGR crossover pipe and gaskets. Tighten cap screws to specifications.

Specification	
EGR Pipe Cap Screws—Torque	50 N·m (37 lb-ft)

RG19661,0000245 -19-15OCT07-1/1

Remove and Install Variable Geometry Turbocharger Actuator

IMPORTANT: Disconnect the battery cables before performing any work. Insure power supply is in the "off" position when performing work on the turbocharger actuator or damage to the ECU/Actuator communication can result. When an actuator is connected to power, it will perform a baseline learn to record the fully open and closed positions. If this baseline learn is incorrect, the actuator will not perform correctly.

1. Disconnect actuator wiring harness (A).
2. Disconnect actuator coolant supply line (B) and coolant return line (C).

NOTE: Whenever disconnecting actuator linkage, ensure that the linkage does not bind or is forced out of position.

3. Disconnect actuator linkage arm (D) by loosening and removing allen screw.
4. Loosen and remove 4 hex nuts (E) securing actuator to bracket. Remove actuator assembly from turbocharger.

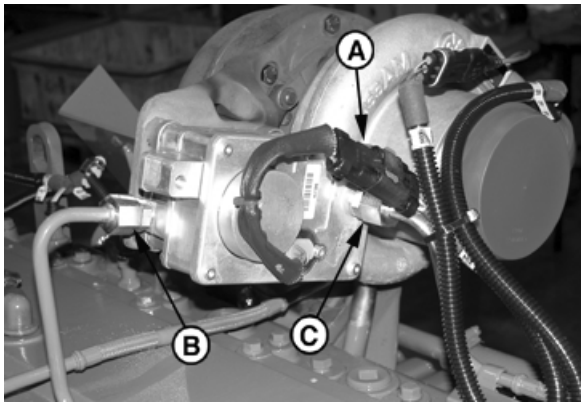
To install the actuator, reverse the steps shown above.

1. Position actuator to bracket and finger tighten 4 hex nuts.
2. Tighten nuts to specification

Specification	
Actuator to Bracket Hardware—Torque	13.5 N•m (10 lb-ft)

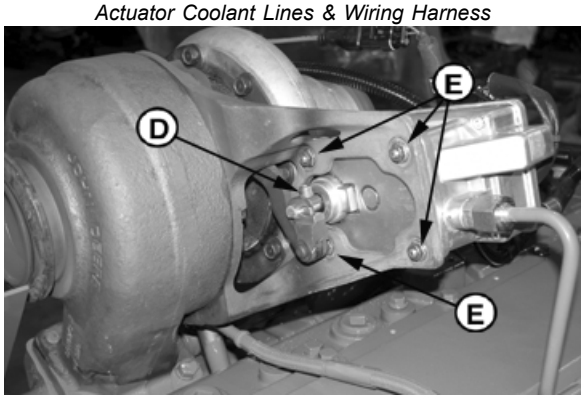
IMPORTANT: When installing actuator linkage, be certain there is free movement of the linkage, with no binding. The center joint of the linkage should be slightly loose when wiggled, with clearance between linkage arms on the pivot joint.

3. Position actuator linkage arm over actuator shaft and install stainless steel allen head screw to secure linkage to actuator shaft.
4. Carefully tighten allen screw to specification.



RG13943 —UN—04FEB05

Actuator Coolant Lines & Wiring Harness



RG13944 —UN—04FEB05

Actuator Linkage & Bracket Hardware

A—Actuator Wiring Harness
B—Actuator Coolant Supply
C—Actuator Coolant Return
D—Actuator Linkage Allen Screw
E—Actuator to Bracket Hardware

Specification	
Linkage Arm to Actuator Shaft—Torque Turn	7 N•m (5 lb-ft)

5. Connect actuator coolant supply and return lines to actuator. Secure nuts on both fittings, and using a second wrench, tighten fittings to specification.

Specification	
Coolant Lines to Actuator—Torque	24 N•m (18 lb-ft)

RG19661,0000246 -19-15OCT07-1/1

Remove and Install Actuator Linkage

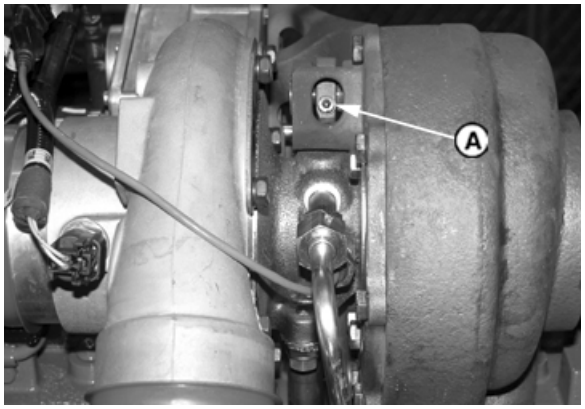
Remove Turbocharger Actuator Linkage

NOTE: Use caution when loosening or tightening linkage hardware. Stainless steel screws are brittle and break easily.

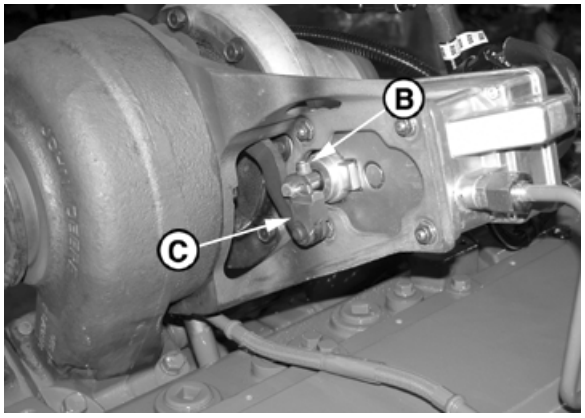
IMPORTANT: BE CERTAIN actuator wiring harness is disconnected before completing any repairs on linkage.

1. Position linkage arm so the inboard (turbocharger shaft) linkage set screw (A) is visible through bracket. Loosen and remove screw.
2. Lift actuator linkage off turbocharger shaft notch (linkage will not slide off end of shaft).
3. Position linkage on actuator shaft to access retainer screw (B). Loosen and remove screw.
4. Lift linkage assembly off notch in actuator shaft and set aside.

A—Actuator Linkage to Shaft Screw - Inboard
B—Actuator Linkage to Shaft - Outboard
C—Actuator Linkage Arm



RG14194 —UN—27MAY05



RG14195 —UN—27MAY05

Actuator Linkage Screw - Outboard Position

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RG19661,0000247 -19-15OCT07-1/4

Install Turbocharger Actuator Linkage

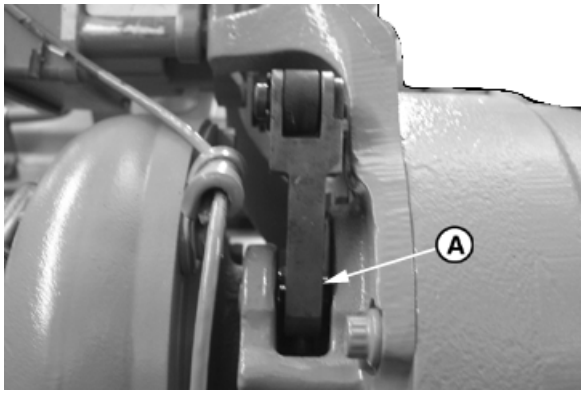
IMPORTANT: BE CERTAIN actuator wiring harness is disconnected before completing any repairs on linkage.

1. Insert linkage onto turbocharger pivot shaft flats (A).

NOTE: Use an open end wrench to exert slight pressure on linkage to align linkage with bolt hole in shaft. Additionally, use a wrench when tightening linkage hardware. Take care that the end link does not rotate on the shaft on an axis perpendicular to the axis of the shaft. This can cause binding of the linkage assembly.

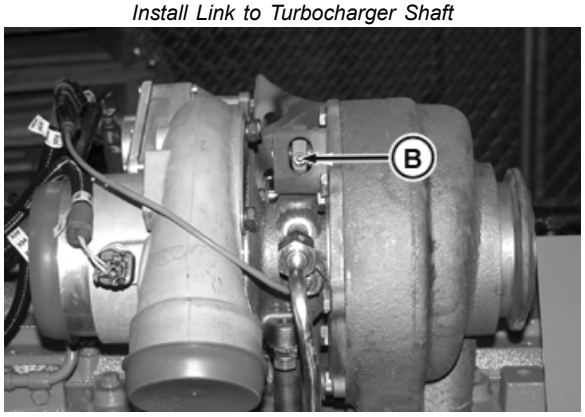
2. Install linkage (C) onto actuator shaft notch (D) and install M5 bolt through linkage and shaft finger tight (E).
3. Position linkage to notch on turbocharger shaft (B) and assemble linkage over shaft. Install M5 bolt to secure finger tight.

A—VGT Link - Turbocharger Shaft
B—M5 Bolt - Turbocharger Shaft
C—VGT Link - Actuator Shaft
D—Actuator Pivot Shaft
E—M5 Bolt - Actuator Shaft
F—Center Pivot Joint



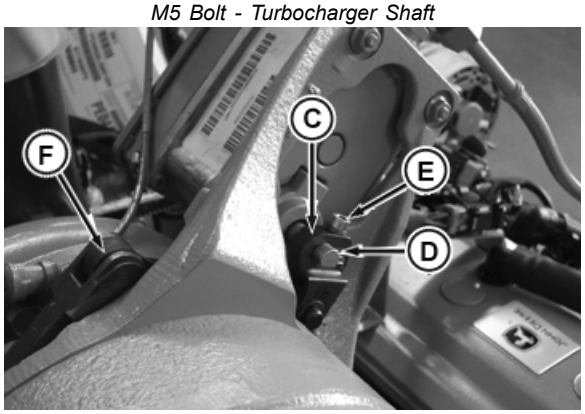
RG14210 —UN—28MAY05

Install Link to Turbocharger Shaft



RG14209 —UN—03JUN10

M5 Bolt - Turbocharger Shaft



RG14211 —UN—03JUN10

Install Link - Actuator Shaft

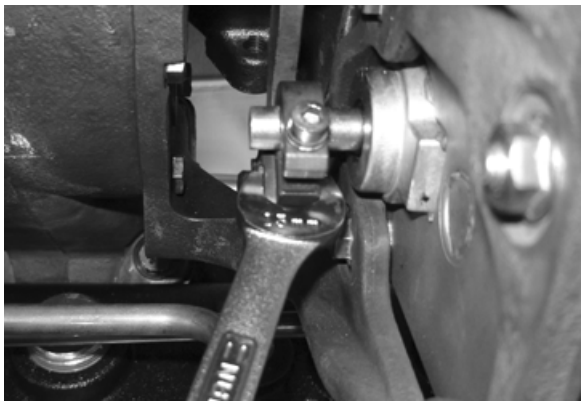
Continued on next page

RG19661,0000247 -19-15OCT07-2/4

IMPORTANT: DO NOT over tighten linkage hardware. Stainless steel screws are brittle and break easily.

4. Using an open end wrench to stabilize the links as the bolts are being tightened. Tighten the M5 bolt to specification.

Specification	
M5 Linkage Screws - Turbocharger & Actuator End—Torque	7 N•m (5 lb-ft)



RG14520 —UN—30SEP05

Using Wrench to Support Linkage

RG19661,0000247 -19-15OCT07-3/4

5. Check linkage orientation for free travel (as shown) and to be sure there is no binding. The linkage should travel freely through its entire range of travel. Note example of proper linkage adjustment and how the linkage is perpendicular to the shaft.

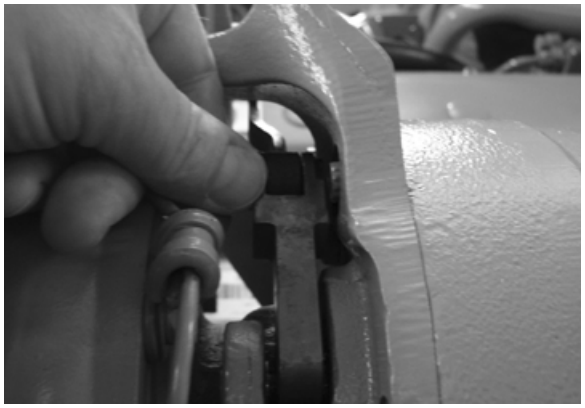
IMPORTANT: Be constantly aware of any binding in the linkage. Use an open end wrench to align and secure the linkage as hardware is tightened (as shown). After bolts are tightened, linkage should travel freely at all times and return immediately to original position when manually tested. The center pivot joint should have some play when linkage shaft is wiggled. If binding of the linkage is noted, use a wrench to gently pry the end link into necessary position such that linkage moves freely throughout its full range and the binding condition is corrected.

6. Verify again that the linkage moves freely and returns to original position when tested manually.

7. Connect engine harness to VGT actuator to turn on power.

CAUTION: When power to the actuator is "on", BE CERTAIN to keep fingers clear of linkage when performing diagnostic checks. The linkage actuates very quickly and fingers can be pinched.

8. Reference Service Advisor, Interactive Test Tab, to run Learn Value Reset Test for actuator and linkage. This test allows the actuator and linkage to check travel stops when running the learn cycle.



RG14218 —UN—28MAY05

Check for Linkage Free Travel



RG14474 —UN—12SEP05

Proper Linkage Adjustment

9. Conduct a diagnostic check of the harness and actuator. Reference this manual for specific procedures.

RG19661,0000247 -19-15OCT07-4/4

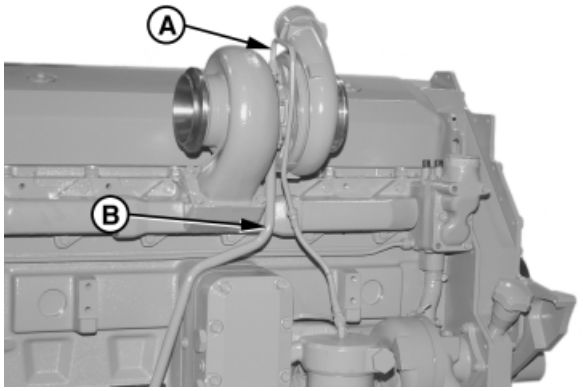
Remove Turbocharger

CAUTION: After operating engine, allow exhaust system to cool before removing turbocharger.

Thoroughly clean exterior of turbocharger and surrounding area to prevent entry of dirt into the air intake system during removal.

IMPORTANT: When cleaning turbocharger, do not spray directly into compressor cover or turbine housing. If turbocharger inspection is required, do not clean exterior prior to removal. Doing so may wash away evidence of a potential failure mode.

1. Refer to your machine technical manual to disconnect air inlet and exhaust piping.
2. Remove turbocharger air intake hose and exhaust elbow. Remove turbocharger air outlet piping (shown removed).
3. Disconnect oil inlet line (A) and oil return pipe (B) from turbocharger.
4. Disconnect turbocharger actuator coolant supply and return lines.



Removing Turbocharger

A—Oil Inlet Line **B—Oil Return Pipe**

5. Remove four mounting cap screws and lift turbocharger from exhaust manifold. Remove stainless steel gasket.
6. Place turbocharger on a clean flat surface. Cap or plug all air intake and exhaust openings.

RG19661,0000248 -19-15OCT07-1/1

Install Turbocharger

IMPORTANT: If turbocharger failed because of foreign material entering the air intake system, be sure to examine the system and clean as required to prevent a repeat failure.

If not done previously, prime (prelube) the turbocharger rotating assembly prior to mounting turbocharger on engine. Prelube center housing with clean engine oil through the oil drain hole. Turn rotating assembly by hand to lubricate bearings. (See PRELUBE TURBOCHARGER earlier in this group.)

1. Install two guide pins (A) in front turbocharger mounting holes as shown. Install stainless steel gasket (B) over guide pins.
2. Position turbocharger on stainless steel gasket and exhaust manifold.
3. Apply PT569 NEVER-SEEZ® Compound to turbocharger cap screws and tighten to specifications.

Specification	
Turbocharger-to-Exhaust Manifold—Torque	50 N·m (37 lb-ft)

4. If removed, apply LOCTITE® 242 Thread Lock and Sealant to turbocharger oil inlet fitting and install and tighten to specifications.

Specification	
Turbocharger Oil Inlet Fitting—Torque	50 N·m (37 lb-ft)

5. Apply PT569 NEVER-SEEZ® Compound to oil return pipe cap screws. Install oil return pipe (C) to turbocharger using a new gasket. Tighten oil return pipe cap screws to specifications.

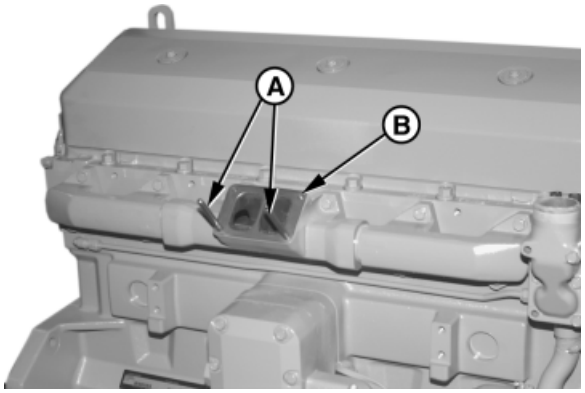
Specification	
Turbocharger Oil Return Pipe-to-Turbocharger—Torque	50 N·m (37 lb-ft)

Connect turbocharger oil inlet line (D) and tighten both ends to specifications.

Specification	
Turbocharger Oil Inlet Line (Both Ends)—Torque	35 N·m (26 lb-ft)

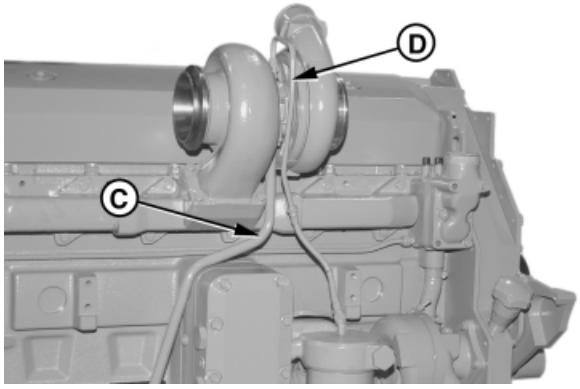
6. Connect actuator coolant supply and return lines to actuator. Secure nuts on both fittings, and using a second wrench, tighten fittings to specification.

NEVER-SEEZ is a registered trademark of the Emhart Chemical Group.
LOCTITE is a registered trademark of Loctite Corp.



RG8172 —UN—05DEC97

Guide Pins as Assembly Aid



RG8187C —UN—05DEC97

Installed Turbocharger

A—Guide Pins
B—Gasket
C—Oil Return Pipe
D—Oil Inlet Line

Specification	
Coolant Lines to Actuator—Torque	24 N•m (18 lb-ft)

IMPORTANT: Since the greatest suction force occurs between air cleaner and turbocharger, ensure that hose connections are tight to prevent entry of dirt into system.

7. Connect air inlet hose-to-turbocharger compressor housing.
8. Install air intake and exhaust piping onto turbocharger compressor and turbine ends as detailed in machine technical manual.

RG19661,0000249 -19-15OCT07-1/1

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 4 (Q) 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.

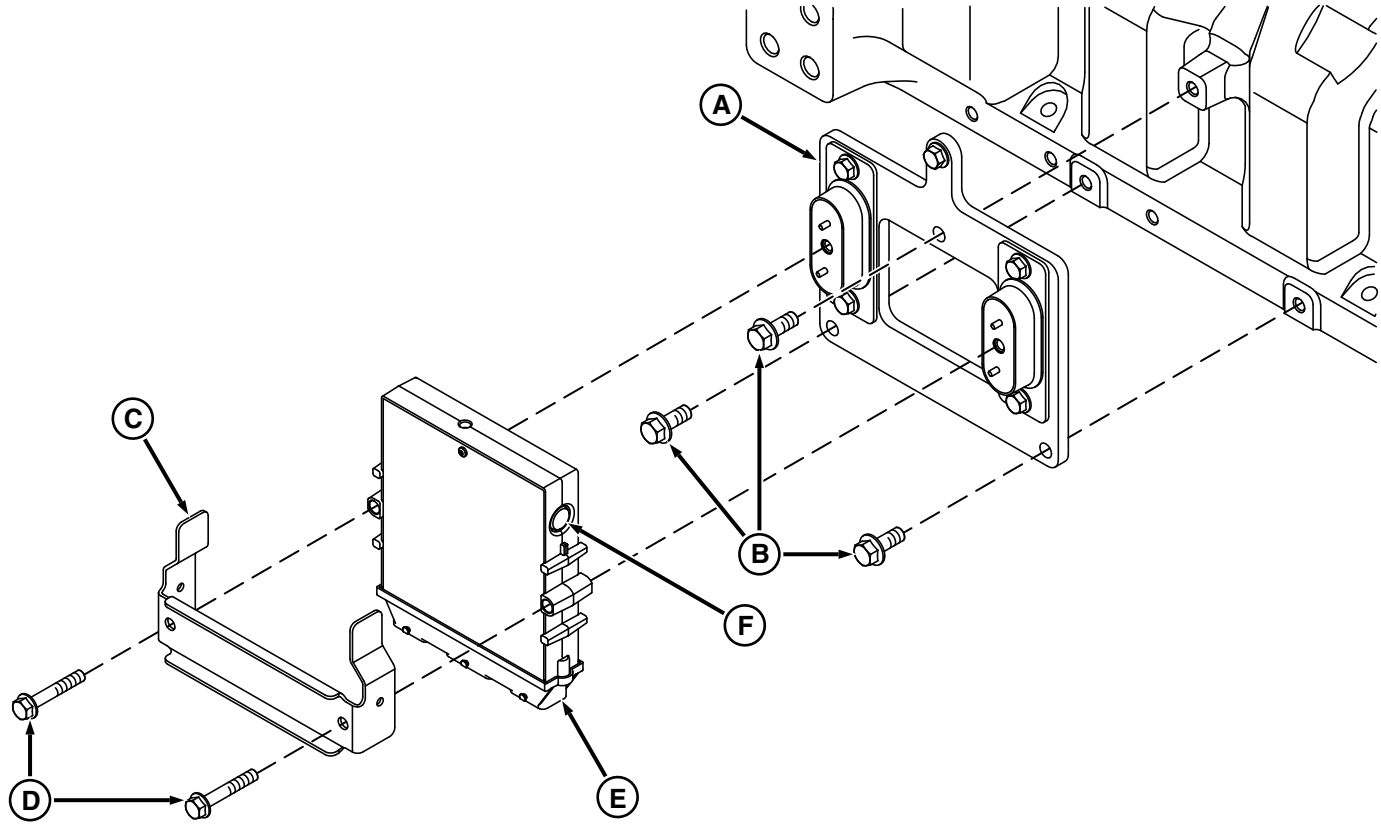
The ECU is not repairable and must be replaced if found to be defective.

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 Assembly
B—M10 x 25 Cap Screws
C—ECU Strap
D—M8 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 assembly (A) to 3 mounting pads (B) on left side of cylinder block with rubber isolated facing outwards. Tighten to specifications.
2. Place strap assembly (C) over ECU with rubber isolators against ECU and side guards covering the air vent (F). Mount ECU and strap to hanger with 2 cap screws (D). Orient ECU with connectors pointing down (E) and air vent on right side facing rear of engine block. Tighten to specifications.

Specification	
ECU hanger plate cap screws (3x)—Torque	50 ±10 N·m (37 lb-ft)

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

Continued on next page

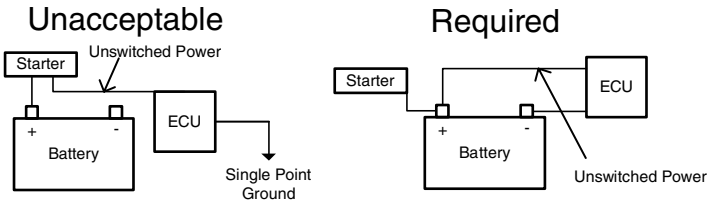
If the ECU is mounted in a different fashion, follow the requirements listed below.

- 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.

DM59778,0000025 -19-12DEC07-2/3

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.

DM59778,0000025 -19-12DEC07-3/3

Remove and Install Coolant Temperature Sensor

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

1. Disconnect coolant temperature sensor wiring connector and remove sensor.
2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

Coolant Temperature Sensor—Torque.....15 ± 3 N·m (11 ± 1 lb-ft)

3. Reconnect coolant temperature sensor wiring connector.

OUOD006,0000063 -19-15OCT07-1/1

Remove and Install Fuel Temperature Sensor

1. Disconnect fuel temperature sensor wiring connector and remove sensor from fuel filter housing.

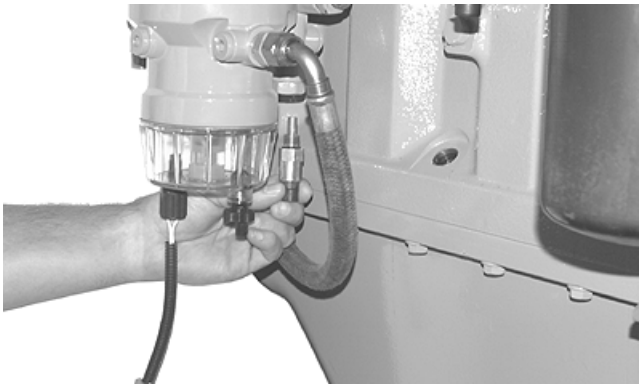
NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor in fuel filter housing. Tighten to specifications.

Specification

Fuel Temperature Sensor-to-Fuel Filter Housing—Torque..... 14 N·m (10 lb-ft)

3. Reconnect fuel temperature sensor connector.



RG10299 —UN—27AUG99

Fuel Temperature Sensor

DM59778,0000027 -19-15OCT07-1/1

Remove and Install Fuel Pressure Sensor

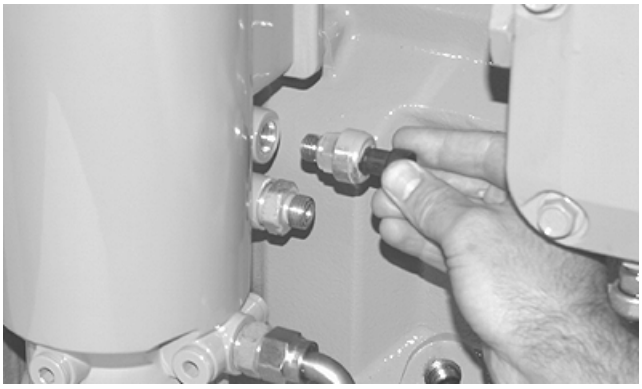
1. Disconnect fuel pressure sensor wiring connector and remove sensor from fuel filter housing.

NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Coat sensor O-ring with TY6333 High Temperature Grease. Verify sensor is clean from all debris and install sensor in fuel filter housing. Tighten to specifications.

Specification

Fuel Pressure Sensor-to-Fuel Filter Housing—Torque..... 14 N·m (10 lb-ft)



Fuel Pressure Sensor

3. Reconnect fuel pressure sensor wiring connector.

DM59778,0000028 -19-15OCT07-1/1

Remove and Install Water-in-Fuel (WIF) Sensor

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

1. Disconnect WIF sensor wiring connector and remove sensor from water separator bowl.

NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Install WIF sensor in water separator bowl. Tighten to specifications.

Specification

Water-in-Fuel Sensor-to-Water Separator Bowl—Torque..... 14 N·m (10 lb-ft)

3. Reconnect WIF sensor wiring connector.

DM59778,000002B -19-15OCT07-1/1

Remove and Install Oil Pressure Sensor

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

1. Disconnect oil pressure sensor connector and remove sensor from oil cooler housing.
2. Coat sensor O-ring with TY6333 High Temperature Grease. . Install sensor in oil cooler housing and tighten to specifications.

Specification

Engine Oil Pressure Sensor—Torque..... 9 N·m (80 lb-in)
Engine Oil Pressure Sensor Adapter-to-Filter Housing—Torque.....11 N·m (97 lb-in)

3. Reconnect oil pressure sensor wiring connector.

DM59778,000002C -19-15OCT07-1/1

Remove and Install Manifold Air Temperature (MAT) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 4 (O) in Section 03, Group 140 of this manual.

1. Disconnect manifold air temperature sensor wiring connector and remove sensor.

2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

Manifold Air Temperature (MAT) Sensor—Torque..... 17 N·m (13 lb-ft)

3. Reconnect MAT sensor wiring connector.

DN22556,0000019 -19-15OCT07-1/1

Remove and Install Manifold Absolute Pressure (MAP) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 4 (N) in Section 03, Group 140 of this manual.

1. Disconnect MAP sensor wiring connector and remove sensor.
2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

Manifold Absolute (MAP) Sensor—Torque..... 18 N·m (13 lb-ft)

3. Reconnect MAP sensor wiring connector.

DN22556,000001D -19-15OCT07-1/1

Remove and Install Exhaust Gas Recirculation (EGR) Exhaust Temperature Sensor

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

1. Disconnect EGR exhaust temperature sensor wiring connector 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 washer.
3. Tighten EGR temperature sensor to specification.

Specification

EGR Temperature Sensor—Torque..... 60 N·m (44 lb-ft)

4. Reconnect EGR exhaust temperature sensor wiring connector.

DN22556,000001C -19-15OCT07-1/1

Remove and Install Charge Air Cooler Outlet Temperature Sensor

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

1. Disconnect charge air cooler outlet temperature sensor wiring connector and remove sensor.
2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

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

3. Reconnect charge air cooler outlet temperature sensor wiring connector.

DN22556,000001B -19-15OCT07-1/1

Remove and Install Compressor Inlet Temperature Sensor

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

1. Disconnect compressor inlet temperature sensor wiring connector and remove sensor.
2. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

Compressor Inlet Sensor—Torque..... 25 N·m (18 lb-ft)

3. Reconnect compressor inlet temperature sensor wiring connector.

DN22556,000001A -19-15OCT07-1/1

Remove and Install Cam Position Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 4 (P) in Section 03, Group 140 of this manual.

IMPORTANT: Camshaft position sensor MUST BE removed for camshaft removal and installation.

1. Disconnect cam position sensor wiring connector.
2. Remove sensor from cylinder head.
3. Coat O-ring with TY6333 High Temperature Grease.
4. Install sensor in cylinder head. Tighten to specifications.

Specification	
Camshaft Position Sensor—Torque	14 N·m (10 lb-ft)

5. Reconnect cam position sensor wiring connector.

DM59778,000002D -19-15OCT07-1/1

Remove and Install Crank Position Sensor

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

NOTE: Crankshaft vibration damper and front seal shown removed.

1. Disconnect crankshaft position sensor wiring connector.
2. Remove sensor (B) from timing gear cover.
3. Before installing sensor, check sensor-to-crankshaft timing wheel dimension, using one of the following methods.

   Measure sensor depth using JDG1334 Depth Checking Tool:

   Install JDG1334 Depth Checking Tool (G) in sensor bore in timing gear cover and tighten by hand.

   Push in on pin (C) until it firmly contacts timing wheel (H).

   Check position of pin end (C) in relation to top surface of tool as shown in (D, E and F).

   If the lower shoulder of the pin extends above the top surface of the depth tool (D), sensor depth is too low. Add one R60756 shim to sensor when installing.

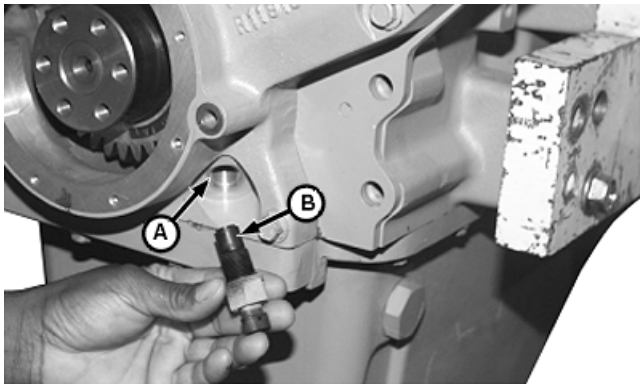
   If the lower shoulder of the pin is within ranges of marks (E), sensor depth is correct and no shim is required. (The correct sensor depth is between the top of the pin and the lower shoulder of the pin flush with the top surface of the depth tool.)

   If pin end is below top surface of depth tool (F), sensor is too high. Further investigation is required. Contact your Dealer DTAC representative.

   If JDG1334 Depth Checking Tool is not available, use a depth gauge to measure distance from sensor spotface (machined mounting surface) (A) on timing gear cover to face of crankshaft timing wheel tooth and compare to following specifications.

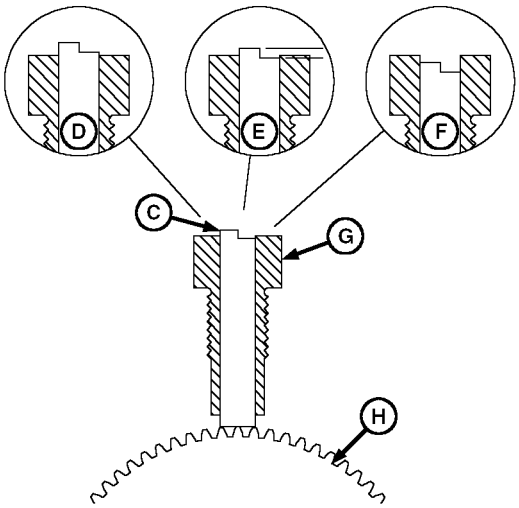
Specification	
Crankshaft Position Sensor Spotface (Mounting Surface)-to-Crankshaft Timing Wheel Tooth—Distance	36.7—38.2 mm (1.44—1.50 in.)

   If distance is less than 36.7 mm (1.44 in.), install R60756 shim when installing sensor. If distance is greater than 38.2 mm (1.50 in.), further investigation is required. Contact your Dealer DTAC representative.



RG10290 —UN—24AUG99

Crankshaft Position Sensor



RG10380 —UN—19OCT99

Using JDG1334 Depth Checking Tool

A—Machined Mounting Surface (Spotface)
B—Crankshaft Position Sensor
C—Pin (In JDG1334 Depth Checking Tool)
D—Sensor Depth Low (Shim Required)
E—Sensor Depth Correct (No Shim Required)
F—Sensor Depth too High (Requires Investigation)
G—JDG1334 Depth Checking Tool
H—Crankshaft Timing Wheel

4. Coat O-ring on sensor with TY6333 High Temperature Grease.
5. Install sensor (and shim if required) in timing gear cover. Tighten to specifications.

Specification	
Crankshaft Position Sensor—Torque	14 N·m (10 lb-ft)

6. Reconnect crankshaft position sensor wiring connector.

DM59778,000002E -19-15OCT07-1/1

Remove and Install Turbo Speed Sensor

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

1. Disconnect turbo speed sensor wiring connector and remove sensor.
2. Install sensor. Tighten to specifications.

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

3. Reconnect turbo speed sensor wiring connector.

RG41183,00000E7 -19-15OCT07-1/1

Welding

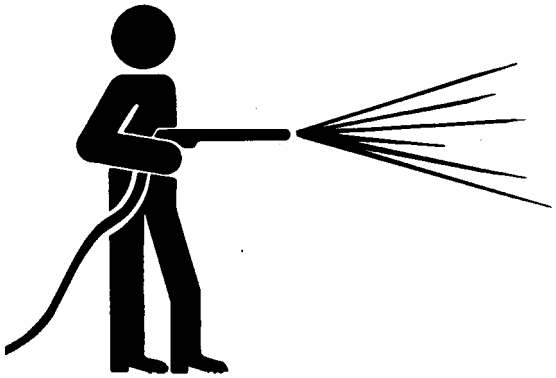
IMPORTANT: Before welding on engines with ECU, protect the ECU from high-current damage as follows:

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 Flex Probe kit, JDG10466 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 -19-25MAR11-1/1

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.

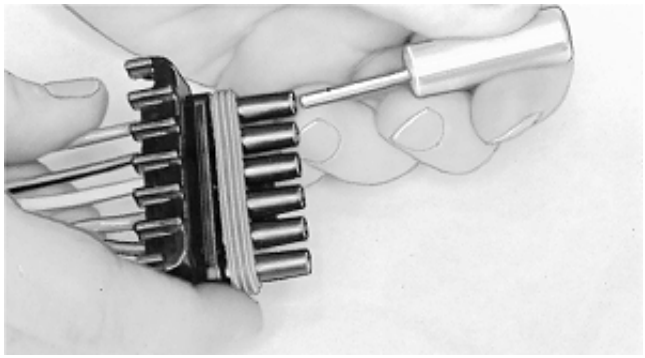
NOTE: For information on inspecting connectors, see TERMINAL TEST in Section 04, Group 160 later in this manual.

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

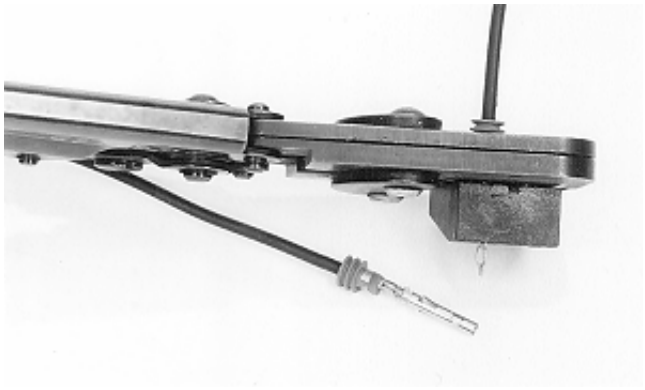
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DB92450,000004A -19-15OCT07-2/4

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

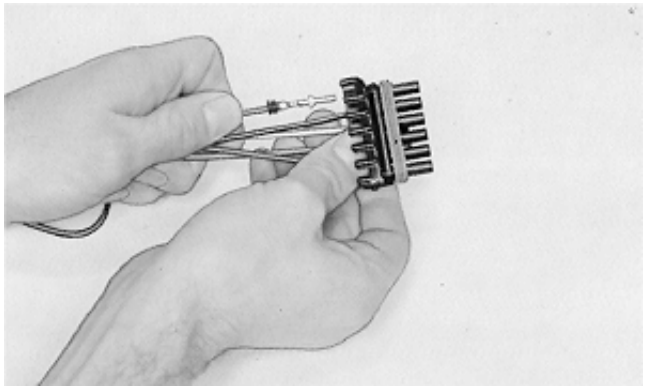
DB92450,000004A -19-15OCT07-3/4

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.

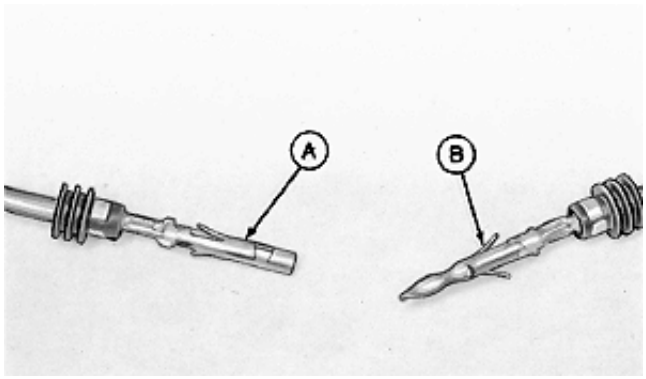
NOTE: Connector bodies are "keyed" for correct terminals. Be sure terminals are correctly aligned.

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**

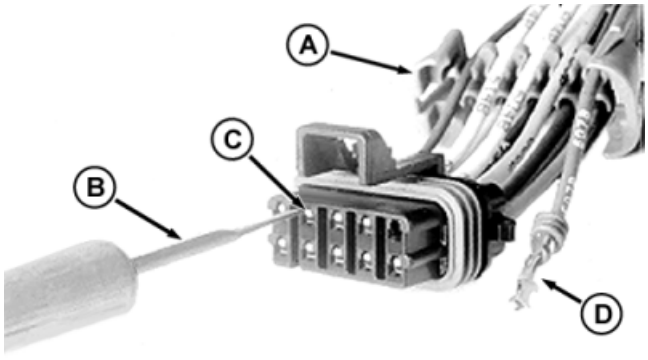
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Repair METRI-PACK Connectors (Push Type)

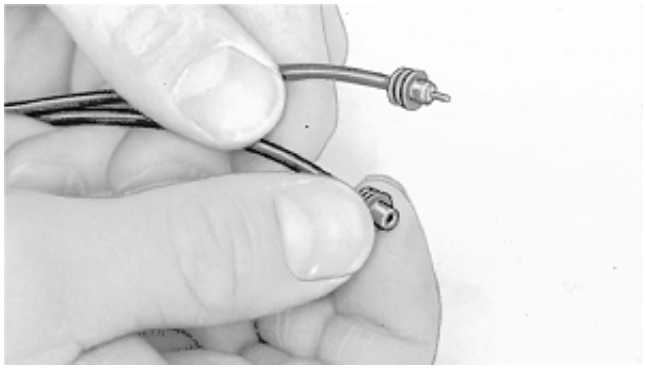
1. Disconnect the METRI-PACK connector. Remove the tie bands and tape.
2. Remove secondary lock (A).
3. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
4. Insert [1]JDG776 or JDG777 Terminal Extraction Tool (B) into connector cavity (C) 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 **C—Connector Body Socket**
B—Extraction Tool **D—Terminal**

[1]*Included in JT07195B Electrical Repair Kit*
[2]*Included in JDG155 Electrical Repair Tool Kit*

Continued on next page
DM59778,0000076 -19-15OCT07-1/2

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.

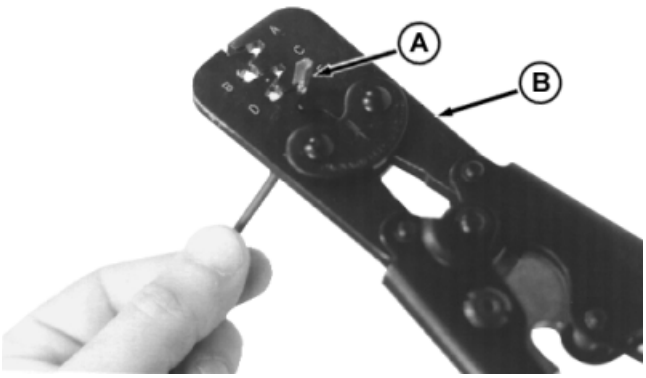
NOTE: Cable seals are color coded for three sizes of wire:

- *Green - 18—20 Gauge Wire*
- *Gray - 14—16 Gauge Wire*
- *Blue - 10—12 Gauge Wire*

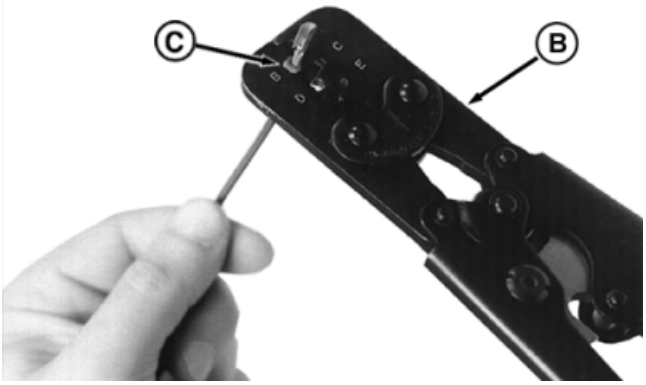
Crimp contact (A) on wire with a “W” type crimp using JDG865 Crimping Tool (B).

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



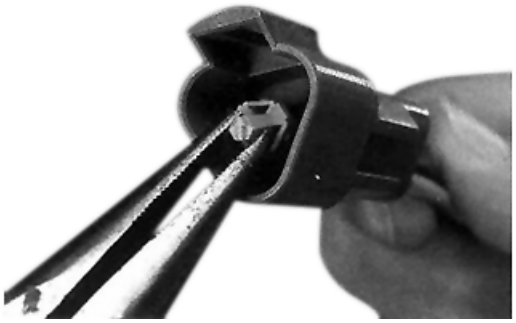
RW77140A —UN—15MAR02

DM59778,0000076 -19-15OCT07-2/2

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

Continued on next page

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

DM59778,000000A -19-15OCT07-2/9

5. Hold the rear seal in place as the wire is pulled from the connector.

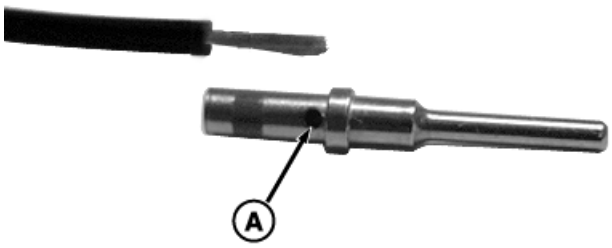


RG15046 —UN—26JUN07

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



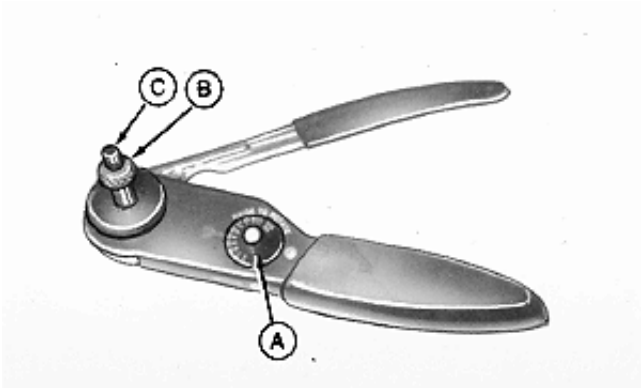
RG15070 —UN—26JUN07

Continued on next page

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*

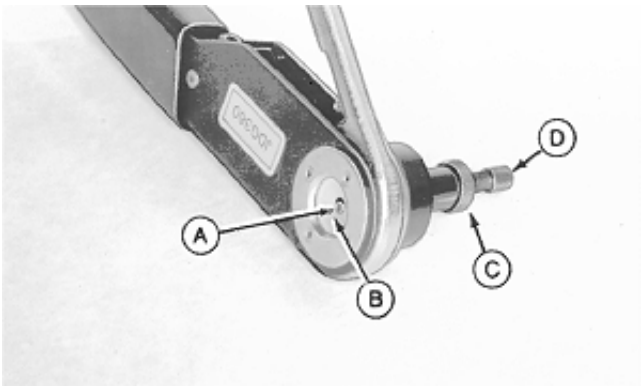
DM59778,000000A -19-15OCT07-5/9

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

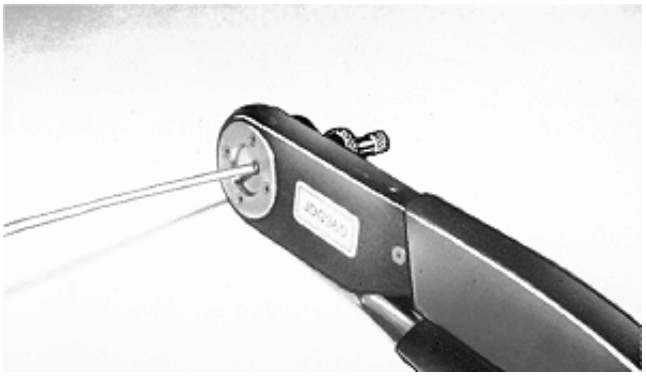
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DM59778,000000A -19-15OCT07-6/9

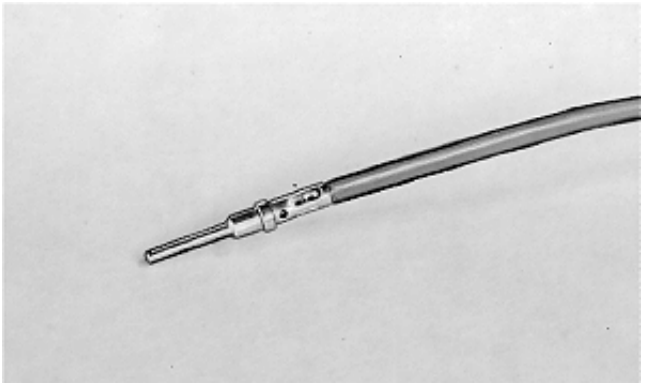
11. Insert wire in terminal and crimp until handle contacts stop.

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.



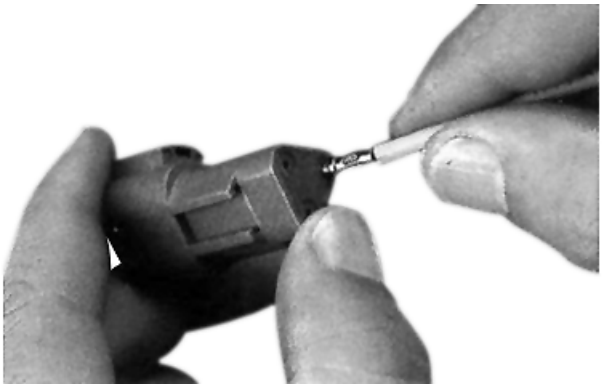
TS118 —UN—23AUG88



TS0135 —UN—23AUG88

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.



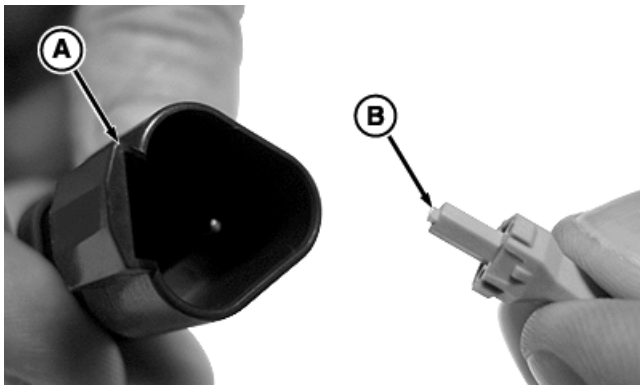
RG15071 —UN—26JUN07

Continued on next page

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**

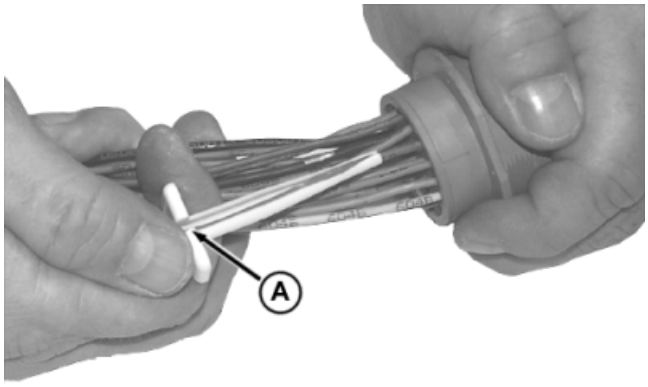


RG15072 —UN—26JUN07

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.

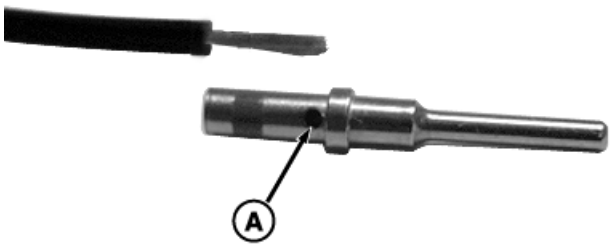
[1]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[2]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[3]Included in JDG359 DEUTSCH Electrical Repair Kit
[4]Included in JT07195B Electrical Repair Tool Kit

Continued on next page

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.

A—Inspection Hole



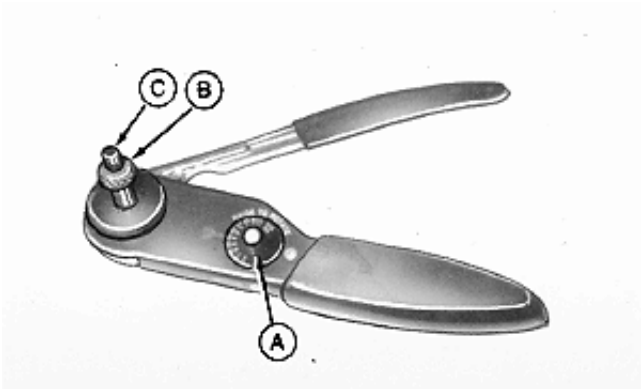
RG15070 —UN—26JUN07

[1]Included in JDG155 Electrical Repair Tool Kit

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

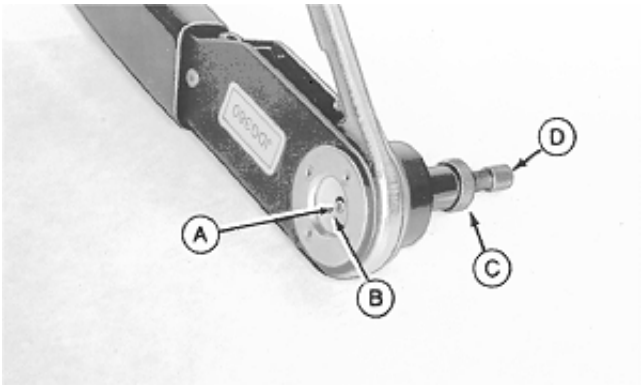
RG40854,00000CB -19-15OCT07-3/5

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

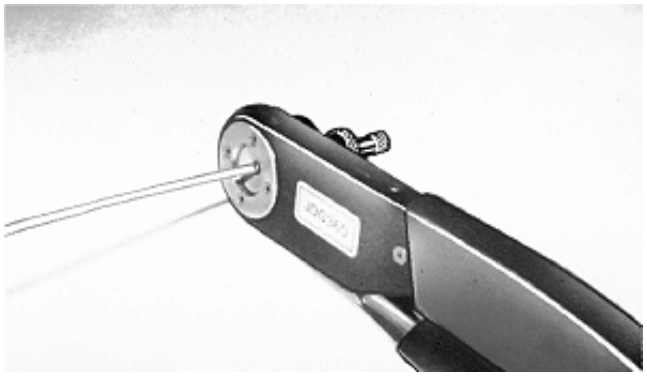
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RG40854,00000CB -19-15OCT07-4/5

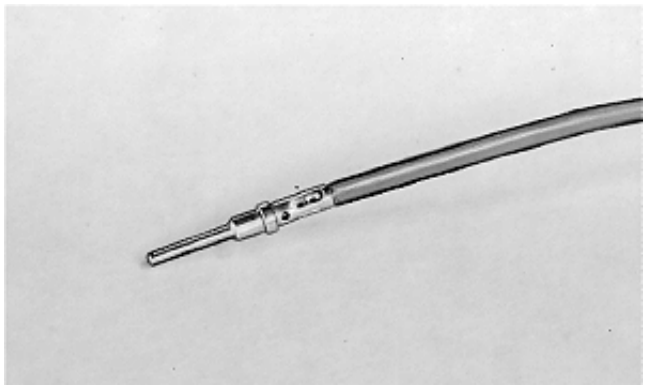
13. Insert wire in terminal and crimp until handle contacts stop.

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

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.



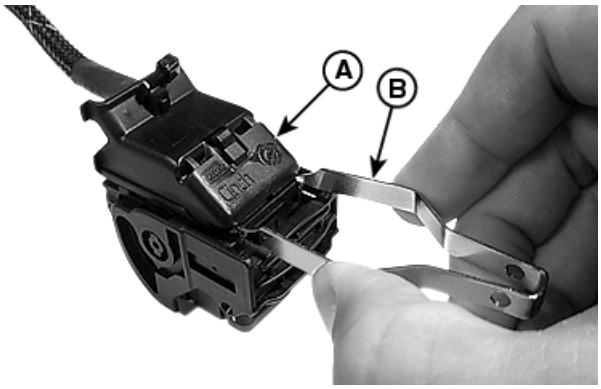
RG14592 —UN—01DEC05

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).

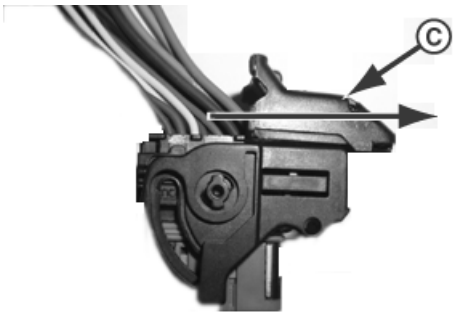


RG15123 —UN—13JUN07

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.

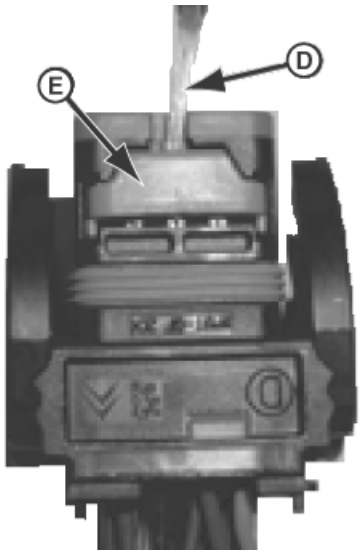


RG14581 —UN—21NOV05

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.



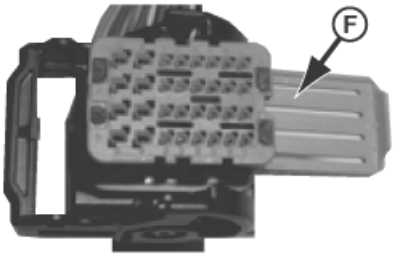
RG14582 —UN—21NOV05

Insert Thin-Bladed Tool Under Tab

Continued on next page

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.

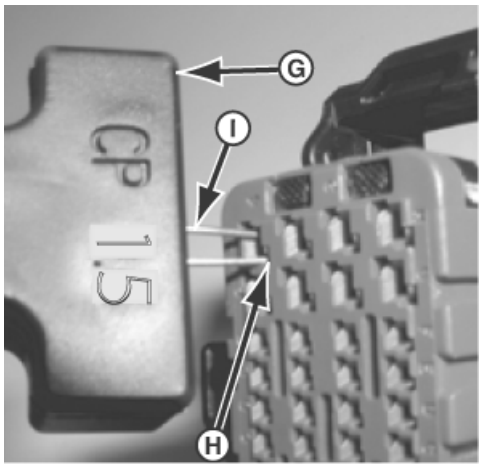


RG14583 —UN—01DEC05

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.



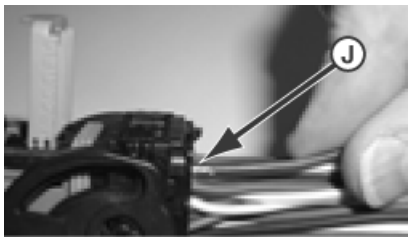
RG14595 —UN—21NOV05

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

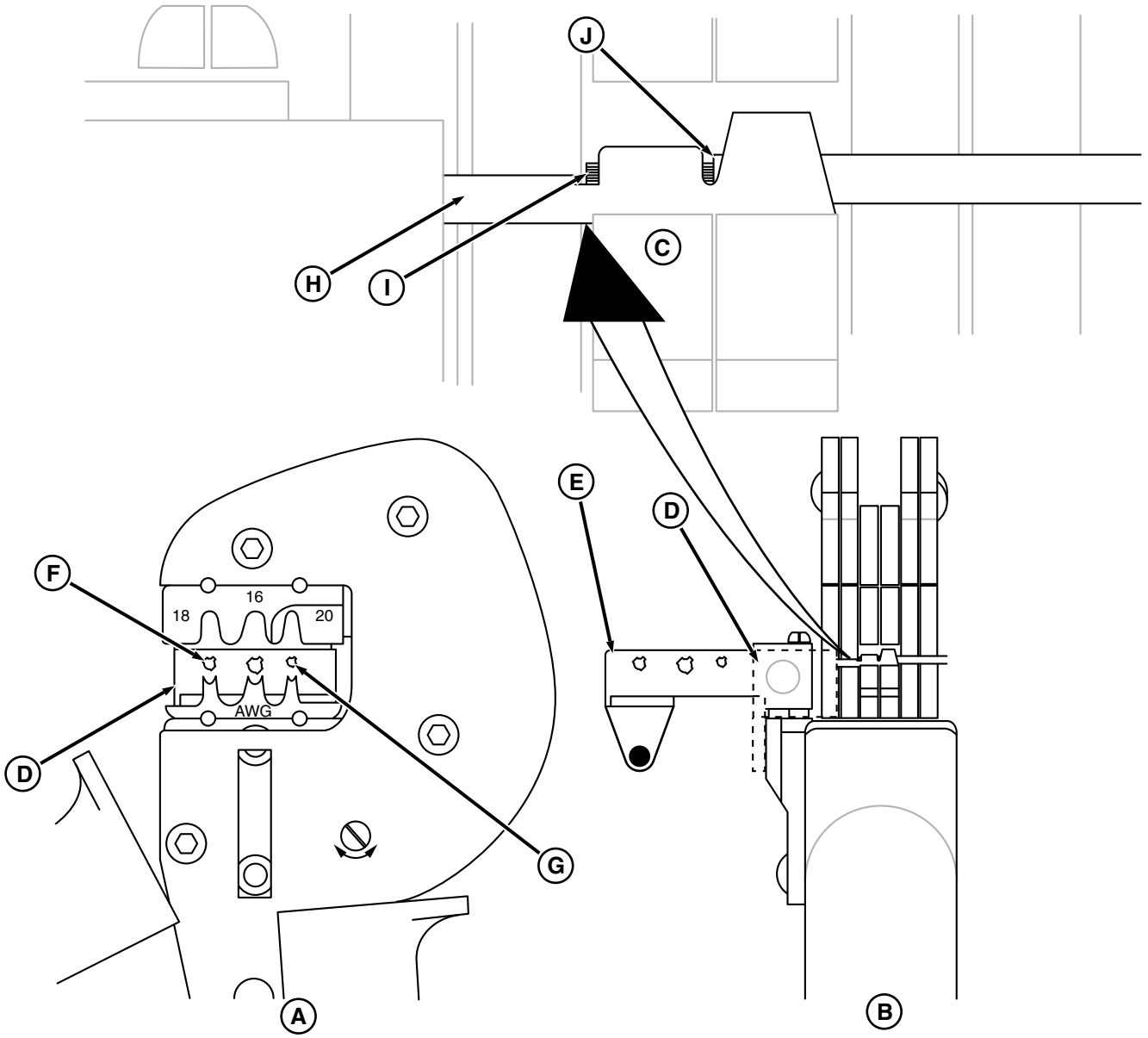


Remove Terminal and Wire

11. Cut back on insulated portion of wire, close to terminal-end of wire, but beyond any damage to either wire or insulation.

Continued on next page

RG41183,00000E9 -19-01OCT08-10/16



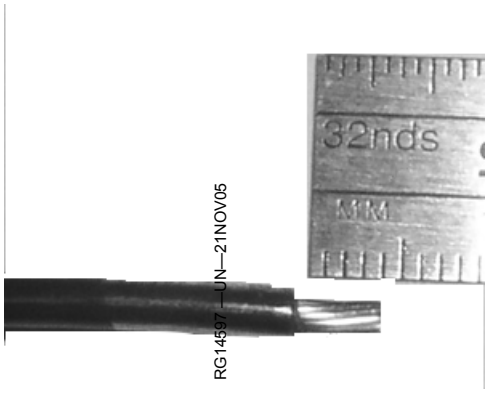
RG14613A —UN—01OCT08

Continued on next page

RG41183,00000E9 -19-01OCT08-11/16

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)



Strip 4.0 mm of Wire Insulation

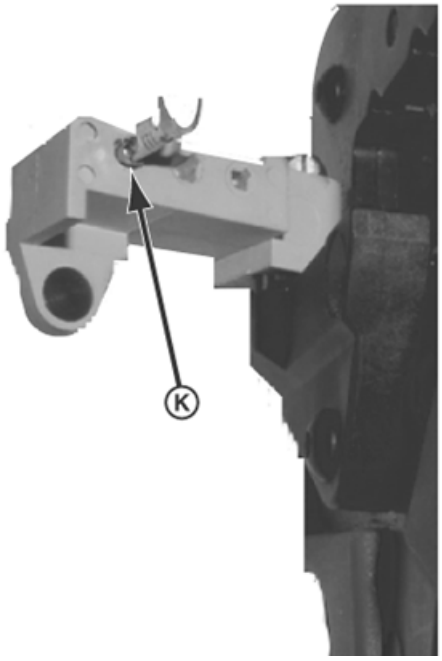
NOTE: The above figure is intended to only illustrate crimper and wire-loading elements. Its callouts relate only to its own legend, and not to the callouts in the procedural steps.

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

Continued on next page

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.

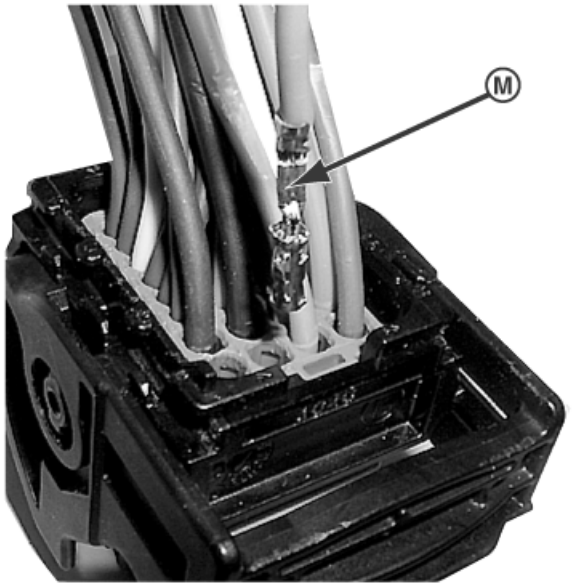


RG14588 —UN—01DEC05

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

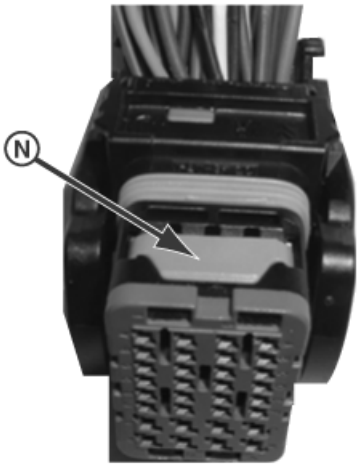
Correct Position For Terminal Insertion

Continued on next page

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

Remove and Install Electric Low Pressure Fuel Pump

Remove Electric Low Pressure Fuel Pump

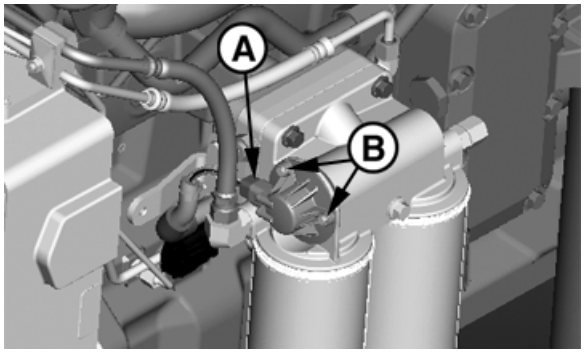
1. Disconnect jumper wiring harness (A) from electric fuel pump.
2. Loosen and remove -3- cap screws (B) securing fuel pump to filter header.
3. Remove fuel pump from filter header.

Install Electric Low Pressure Fuel Pump

1. Lubricate fuel pump O-ring and install fuel pump into fuel filter header.
2. Align -3- cap screw holes, with wiring harness connector facing engine block. Start -3- cap screws through fuel pump mounting face into fuel filter header finger tight.
3. Orient and reattach jumper wiring harness to fuel pump.
4. Tighten cap screws to specification.

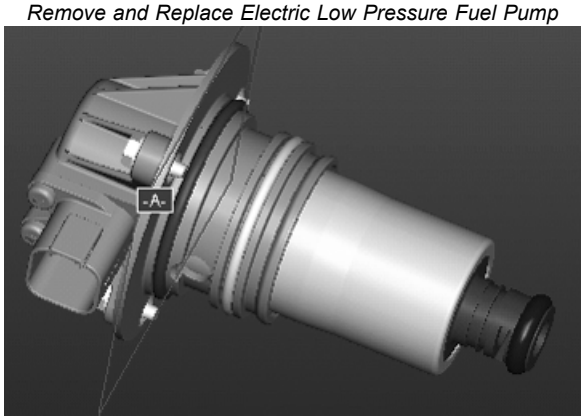
Specification

Fuel Pump to Fuel Filter Header Assembly—Torque..... 5 N•m (45 in-lb)



RG15225A —UN—02NOV09

Remove and Replace Electric Low Pressure Fuel Pump



RG15226 —UN—06SEP07

Electric Fuel Pump

A—Wiring Harness Connection B—Cap Screws -3-

DM59778,000003B -19-02NOV09-1/1

Remove and Install Fuel Temperature Sensor

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

1. Disconnect fuel temperature sensor wiring connector and remove sensor from fuel filter header assembly. .

NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor. Tighten to specifications.

Specification

Fuel Temperature Sensor-to-Fuel Filter Header Assembly—Torque..... 14 N·m (10 lb-ft)

3. Reconnect fuel temperature sensor connector.

DM59778,0000031 -19-15OCT07-1/1

Remove and Install High Pressure Fuel Sensor

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

1. Disconnect high pressure fuel sensor wiring connector and remove sensor from fuel filter header assembly.

NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor in fuel filter header assembly. Tighten to specifications.

Specification

High Pressure Fuel Sensor-to-Fuel Filter Header Assembly—Torque..... 14 N·m (10 lb-ft)

3. Reconnect high pressure fuel sensor wiring connector.

DM59778,0000032 -19-28OCT07-1/1

Remove and Install Low Pressure Fuel Sensor

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

1. Disconnect low pressure fuel sensor wiring connector and remove sensor from fuel filter header assembly.

NOTE: Plug bore with clean cap plug after removal of sensor. It is very important to keep fuel system clean from any debris.

2. Coat sensor O-ring with TY6333 High Temperature Grease and install sensor in fuel filter header assembly. Tighten to specifications.

Specification
Fuel Pressure Sensor-to-Fuel Filter Header Assembly—Torque ..... 14 N·m (10 lb-ft)

3. Reconnect low pressure fuel sensor wiring connector.

DM59778,0000033 -19-28OCT07-1/1

Remove and Install Water-in-Fuel (WIF) Sensor

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

1. Disconnect WIF sensor wiring connector and remove sensor from water separator bowl.

NOTE: Plug bore with clean cap plug after removal of valve. It is very important to keep fuel system clean from any debris.

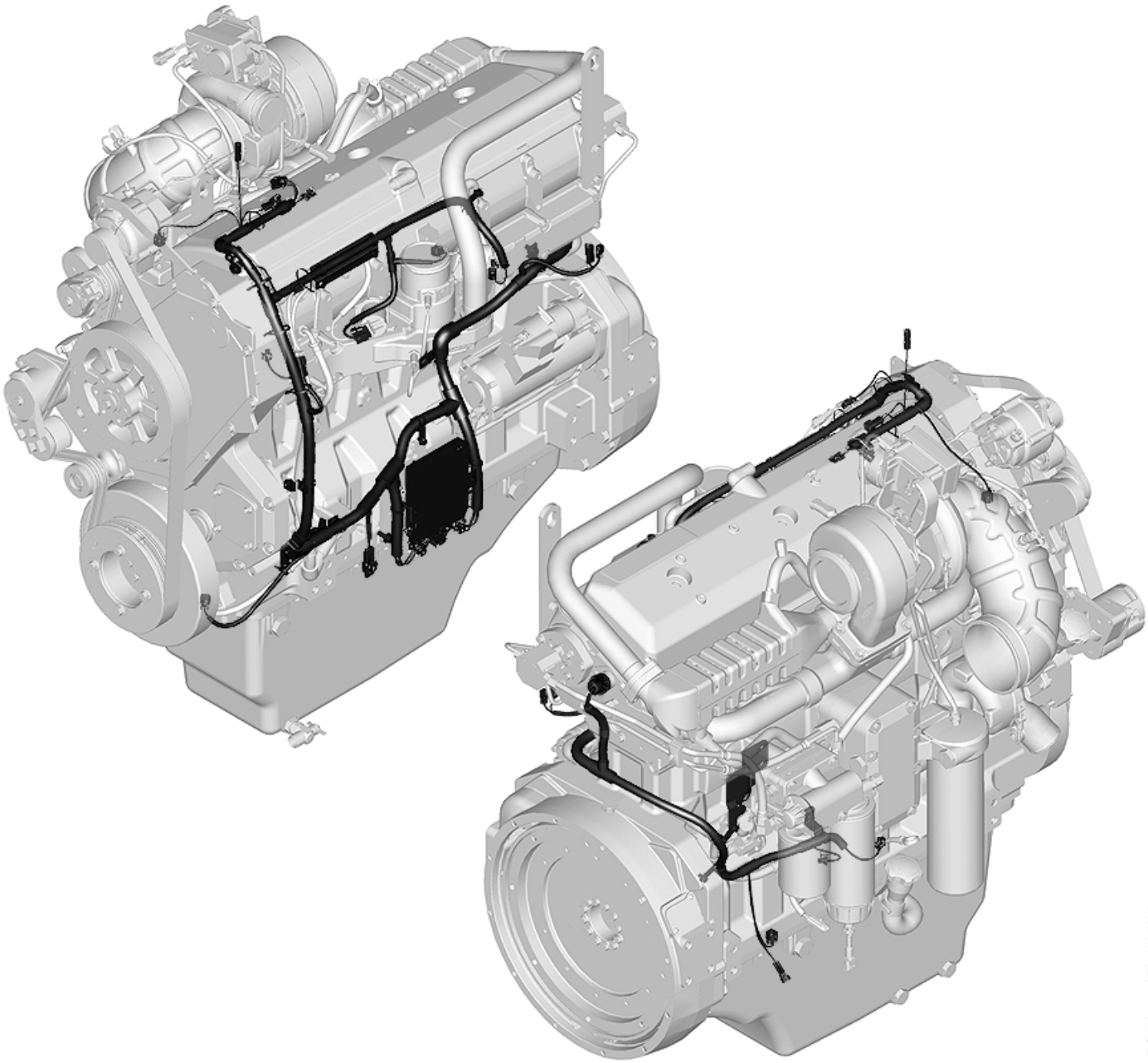
2. Install sensor in water separator bowl. Tighten to specifications.

Specification
Water-in-Fuel Sensor to Water Separator Bowl—Torque ..... 2 N·m (17 lb-in)

3. Reconnect WIF sensor wiring connector.

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ECU Wiring Harness Routing



ECU Wiring Harness

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Remove and Install Engine Wire 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.

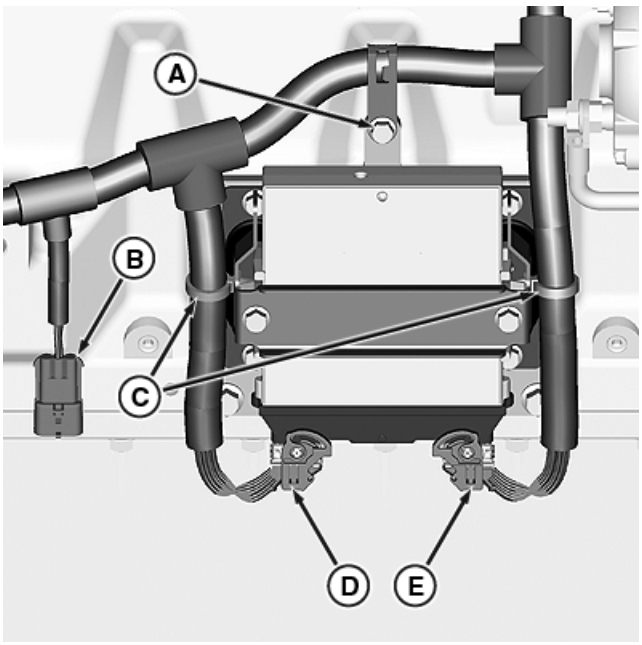
NOTE: See application manual for information on Control Panel Harness (J02).

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 7 - 10 in Group 03, Section 140 later in this manual.

Remove Engine Wire Harness

1. Disconnect ECU connectors J01 (D) and J03 (E) from ECU.
2. Remove two harness clips (C) from ECU strap.
3. Remove P-Clamp (A) from ECU hanger.



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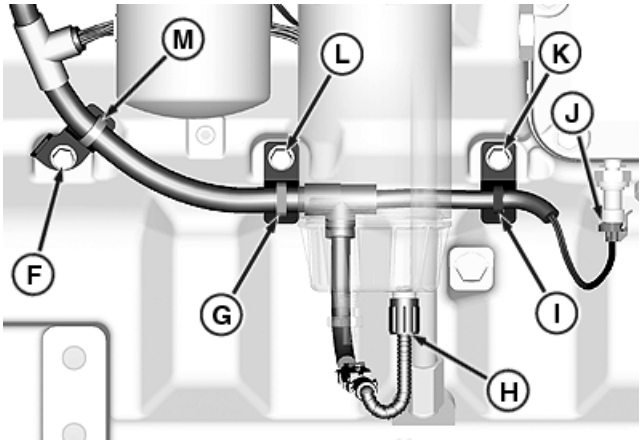
Diagram 1- Wire Harness, ECU Connectors

A—P-Clamp to ECU Hanger
B—C02/C07
C—Harness Clip
D—J01
E—J03

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4. Disconnect connector C02 from C07 (B).
5. Disconnect connectors D01 (H) and P04 (J).
6. Remove harness clip (I) from harness bracket (K) near oil cooler.
7. Remove harness clip (G) from harness bracket (L) between the two fuel filters.

F— Harness Bracket
G—Harness Clip
H—D01
I— Harness Clip
J— P04
K—Harness Bracket
L— Harness Bracket
M—Harness Clip



RG15686 —UN—17DEC07

Diagram 2- Wire Harness, Fuel System

Continued on next page

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8. Remove harness clip (M) from harness bracket (F) near primary fuel filter.
9. Disconnect connector C29 (P) from interconnect harness.

N—Harness Bracket
O—P-Clamp
P—C29

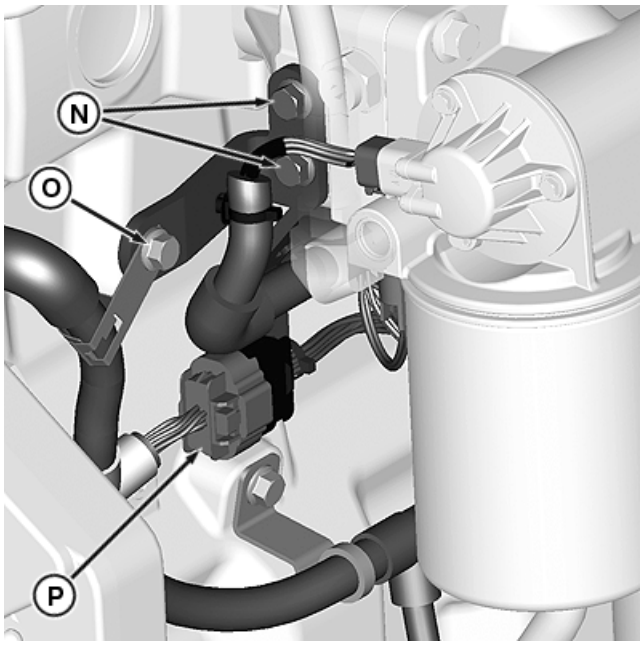


Diagram 3- Wire Harness, Fuel System

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10. Remove P-Clamp (O) from harness bracket (N) located behind fuel filter assembly.
11. Disconnect connector C01 (Q).

Q—C01
R—Fuel Injector Connector Flange
S—P-Clamp

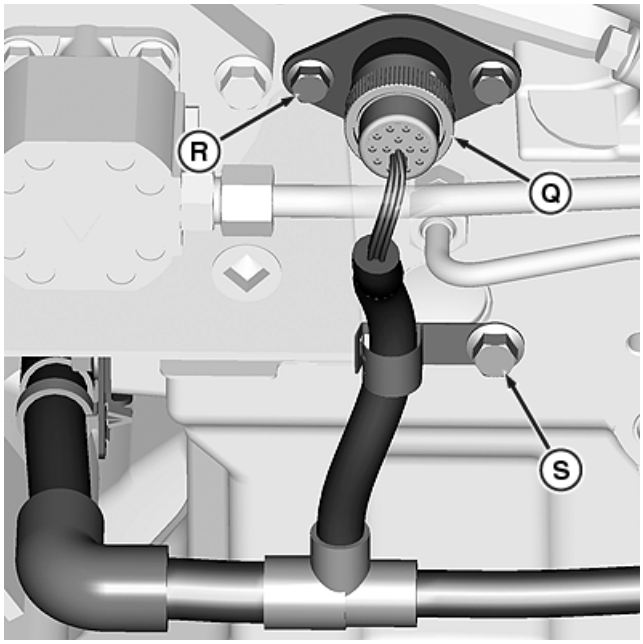


Diagram 4- Wire Harness, Fuel Injector

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12. Remove P-Clamp (S) from rear of cylinder head.
13. Disconnect connectors T01A /T03A (X) from interconnect harness.
14. Remove harness clip (V) from harness bracket (W) above starter motor.

T—Harness Bracket
U—Harness Clip
V—Harness Clip
W—Harness Bracket
X—T01A/T03A

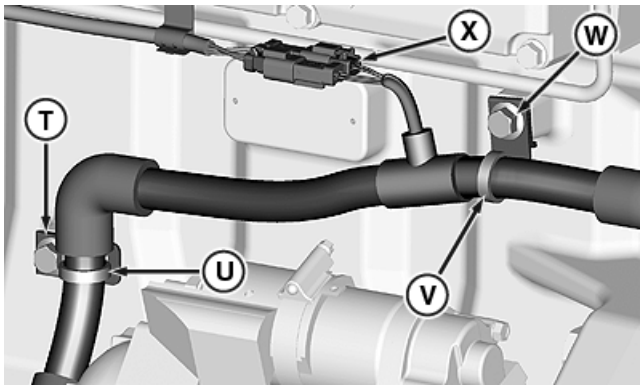


Diagram 5- Wire Harness, Starter Motor Area

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15. Remove harness clip (U) from harness bracket (T) in front of starter motor.
16. Remove connector X01 (AA).
17. Remove the two harness clips (CC,DD) from harness bracket (EE) located above front engine mount.
18. Remove harness clip (BB) from lower harness bracket (Z) behind front engine plate.

Y—Harness Bracket
Z—Harness Bracket
AA—X01
BB—Harness Clip
CC—Harness Clip
DD—Harness Clip
EE—Harness Bracket
FF—Harness Clip

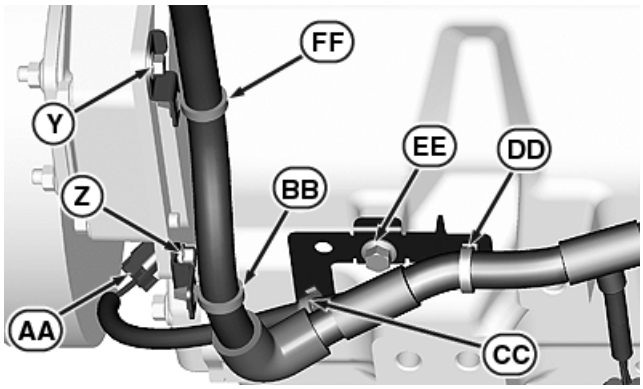


Diagram 6- Wire Harness, Lower Front

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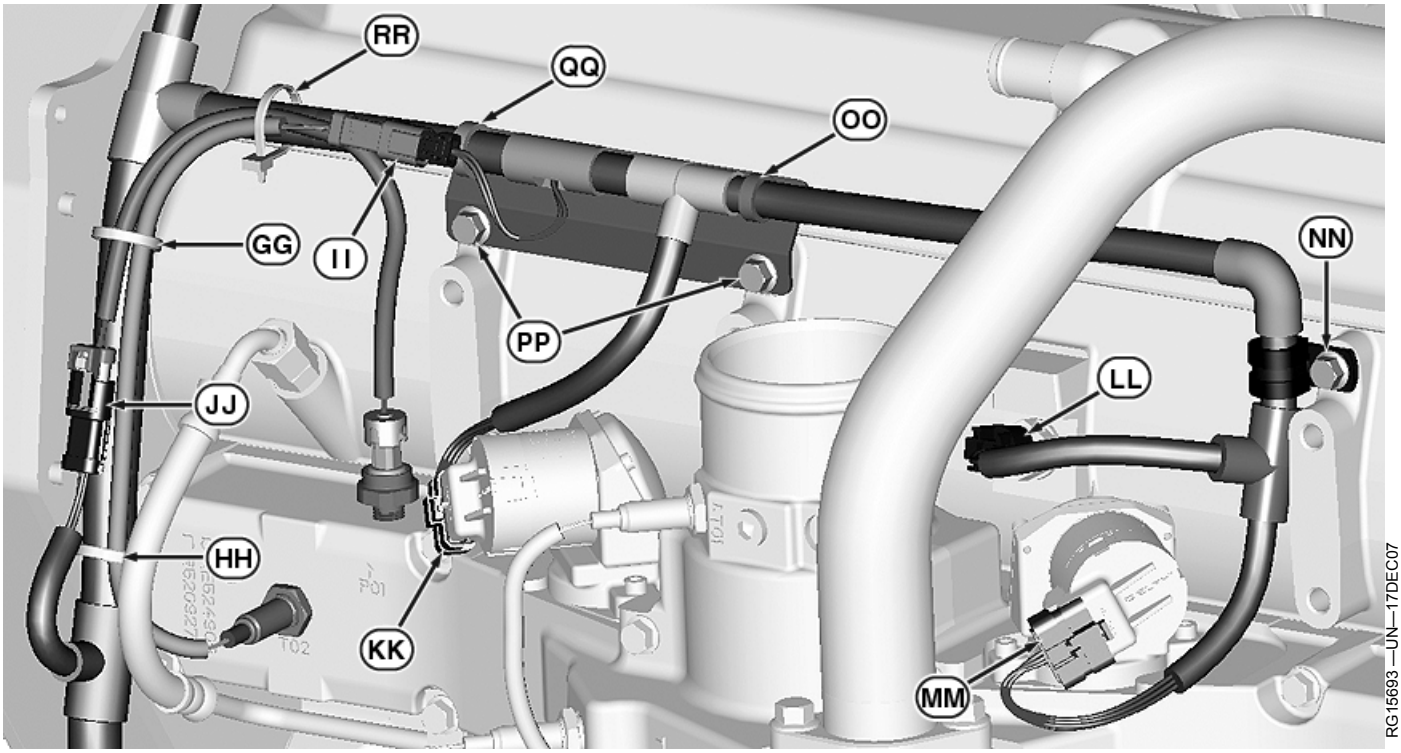


Diagram 7- Wire Harness, Upper Front

GG—Tie Band
HH—Tie Band
II— T02
JJ— P01
KK—X03
LL—X02
MM—X06
NN—P-Clamp
OO—Harness Clip
PP—Harness Bracket
QQ—Harness Clip
RR—Tie Band

19. Remove harness clip (FF) from upper harness bracket (Y) behind front engine plate.
20. Disconnect connectors T02 (II), P01 (JJ), X02 (LL), X03 (KK), and X06 (MM).
21. Remove tie bands (GG,HH) from harness running along front plate.
22. Remove tie band from harness (RR) along cylinder head.
23. Remove two harness clips (OO,QQ) from harness bracket (PP) on cylinder head.

Continued on next page

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24. Remove P-Clamp (NN) on cylinder head above rear EGR valve.
25. Disconnect connectors C06 (ZZ), T04 (SS), T06 (WW), X04 (XX), and X05 (VV).
26. Remove harness clip (UU) from bracket (TT) on front of valve cover.
27. Remove P-Clamp (YY) from top of valve cover.

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. Secure P-Clamp (YY) to top of valve cover. See diagram 8.

Specification

P-Clamp to Top of Valve Cover—Torque ..... 20 ±4 N·m (15 lb-ft)

2. Install harness clip (UU) to harness bracket (TT) on front plate.

Specification

Harness Bracket to Top of Front Plate—Torque ..... 20 ±4 N·m (15 lb-ft)

3. Connect connectors C06 (ZZ), T04 (SS), T06 (WW), X04 (XX), and X05 (VV). See diagram 8.
4. Secure P-Clamp (NN) to cylinder head above rear EGR valve. See diagram 7.

Specification

P-Clamp to Cylinder Head, Above Rear EGR Valve—Torque ..... 20 ±4 N·m (15 lb-ft)

5. Install 2 harness clips (OO,QQ) to harness bracket (PP) along side of cylinder head.

Specification

2 Cap Screws to Harness Bracket on Cylinder Head, Above Front EGR Valve—Torque ..... 20 ±4 N·m (15 lb-ft)

.

6. Install tie band (RR) around manifold pressure and manifold temperature sensor wires and main harness between bracket and harness tee. Trim excess.
7. Install tie band (GG) around manifold pressure and manifold temperature sensor wires and main harness below harness tee. Trim excess.
8. Install tie band (HH) around manifold pressure and manifold temperature sensor wires and main harness above harness breakout. Trim excess.

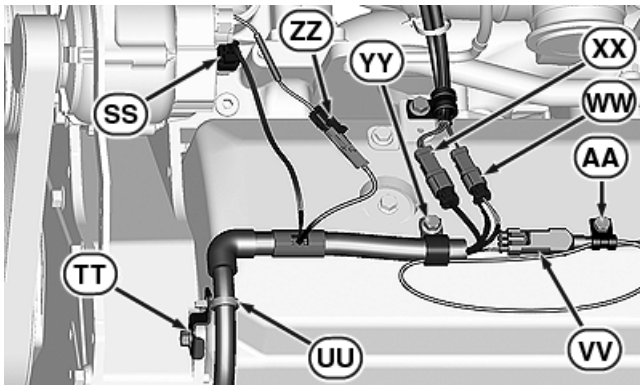


Diagram 8- Wire Harness, Rocker Cover

SS—T04
TT—Harness Bracket
UU—Harness Clip
VV—X05
WW—T06
XX—X04
YY—P-Clamp
ZZ—C06

NOTE: Do not secure wire harness to fuel hose.

9. Connect connectors T02 (II), P01 (JJ), X02 (LL), X03. See diagram 7
10. Connect connectors X03 (KK), and X06 (MM). See diagram 7. Verify connectors are inserted fully into EGR valve and insert connector lock above latch in connector.
11. Install harness clip (FF) to upper harness bracket (Y) behind front engine plate. See diagram 6.
12. Install harness clip (BB) to lower harness bracket (Z) behind front engine plate.

Specification

2 Harness Brackets (M8) to Back, Left Side of Front Plate—Torque ..... 20 ±4 N·m (15 lb-ft)

13. Install 2 harness clips (CC,DD) to bracket (EE) above engine mount.

Specification

Bracket (M10 x 20) Above Engine Mount—Torque ..... 50 ±10 N·m (37 lb-ft)

14. Connect connector X01 (AA). See diagram 6.
15. Install harness clip (U) to harness bracket (T) in front of starter motor. See diagram 5.
16. Install harness clip (V) to harness bracket (W) above starter motor.

Specification

2 Harness Brackets (M10 x 20) to Cylinder Head Near Starter Motor—Torque ..... 50 ±10 N·m (37 lb-ft)

17. Connect connectors T01A/ T03A (X) to main harness.

Continued on next page

18. Secure P-Clamp (S) to rear of cylinder head. See diagram 4.

Specification

P-Clamp to Rear of Cylinder Head—Torque ..... 50 ±10 N·m (37 lb-ft)

19. Connect connector C01 (Q) to cylinder head (R).

Specification

Connector Flange to Cylinder Head—Torque ..... 35 ±7 N·m (26 lb-ft)

20. Secure P-Clamp (O) to harness bracket (N) on fuel filter assembly. See diagram 3.

Specification

P-Clamp to Harness Bracket—Torque ..... 20 ±4 N·m (15 lb-ft)

Specification

Harness Bracket to Fuel Filter Assembly—Torque ..... 35 ±7 N·m (26 lb-ft)

21. Connect connector C29 (P) to main harness.

22. Install harness clip (M) to harness bracket (F). See diagram 2.

23. Install harness clip (G) to harness bracket (L).

24. Install harness clip (I) to harness bracket (K).

Specification

3 Harness Brackets Located Behind Fuel Filter Assembly—Torque ..... 20 ±4 N·m (15 lb-ft)

25. Connect connectors D01 (H) and P04 (J). See diagram 1.

26. Secure P-CLamp (A) to ECU hanger.

Specification

P-Clamp to ECU Hanger—Torque ..... 20 ±4 N·m (15 lb-ft)

27. Install 2 harness clips (C) to ECU strap.

28. Connect connector C02 to C07 (B).

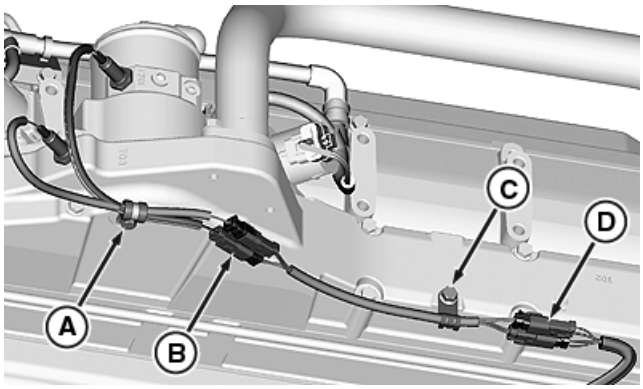
29. Connect ECU connectors J01 (D) and J03 to ECU (E).

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Interconnect Harnesses

1. Affected components for T01/T03 Interconnect.

- P-Clamps (A,C)
- Connectors T01B/ T03B (B).
- Connectors T01A/T03A (D).



RG15691 —UN—17DEC07

Interconnect Harness, T01/T03

A—P-Clamp
B—T01B/T03B
C—P-Clamp
D—T01A/T03A

Item	Measurement	Specification
P-Clamps to Top of Valve Cover, Interconnect Harness	Torque	20 ±4 N·m (15 lb-ft)

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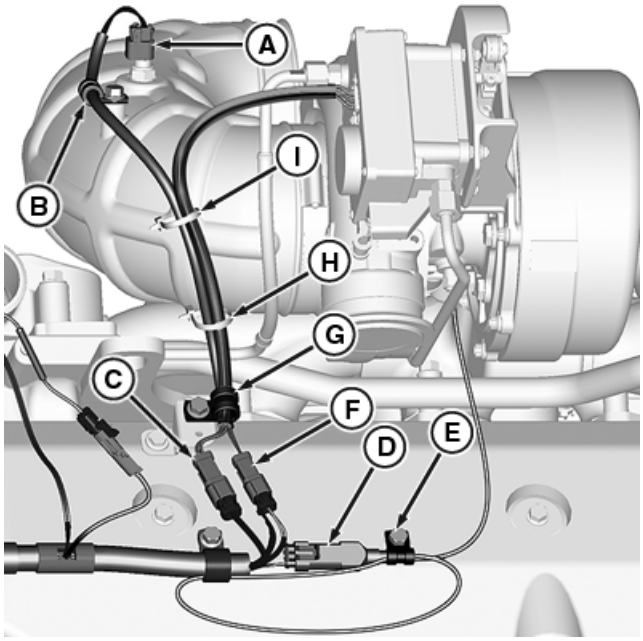
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1. Affected components for Turbo Harness Interconnect.

- P-Clamps (B,E,G).
- Tie Bands (H,I) around VGT and compressor inlet senor harnesses.
- Connectors T06 (A) T06B (F), X04 (C), and X05 (D).

2. Route excess harness length of X05 through two P-Clamps on either side of X05 connector.

A—T06
B—P-Clamp
C—X04
D—X05
E—P-Clamp
F—T06B
G—P-Clamp
H—Tie Band
I— Tie Band



Interconnect Harness, Turbo

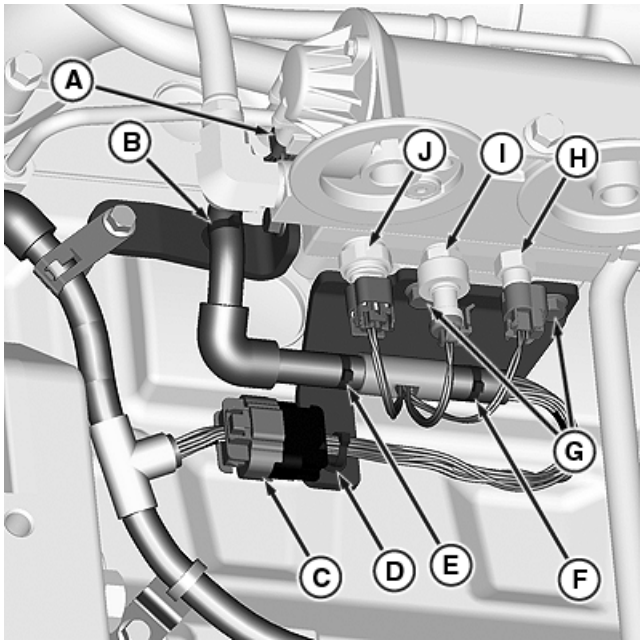
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1. Affected components for fuel system harness.

- Harness clip (B) to upper harness bracket of fuel filter assembly.
- Harness clips (D,E,F) to lower harness bracket (G) of fuel filter assembly.
- Connectors C19 (A), C29 (C), P07 (J), P03 (I), T05 (H).

Specification	
Lower Harness Bracket to Fuel Filter Assembly—Torque	35 ±7 N·m (26 lb-ft)

A—C19
B—Harness Clip
C—C29
D—Harness Clip
E—Harness Clip
F—Harness Clip
G—Harness Bracket
H—T05
I— P03
J—P07



Interconnect Harness, Fuel System

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Section 03
Theory of Operation

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Group 130
Electronic Fuel System Operation

About This Group

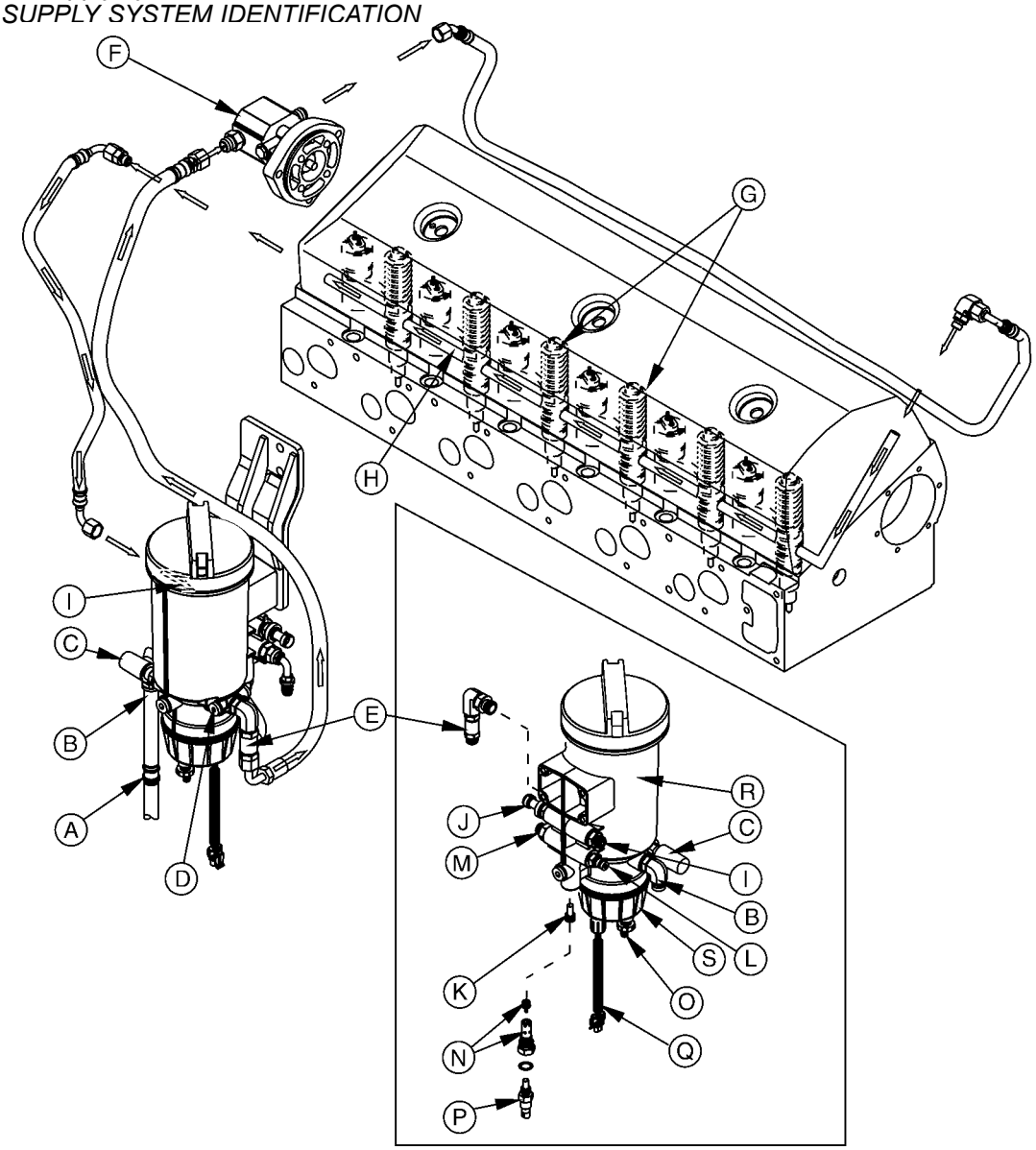
This group of the manual contains information on the operation of the low pressure fuel system. The group is divided into the following headings:

- Low Pressure Fuel System Flow Diagram
- Low Pressure Fuel Supply System Operation
- Electronic Unit Injector (EUI) Operation

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Type 1 Fuel Supply System Operation

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION



RG10667 —UN—14DEC99

OEM Applications Fuel Rail System

A—Pre-filter
B—Fuel Filter Inlet from Fuel Tank
C—Hand Primer
D—Vacuum Port
E—Fuel Filter Outlet to Transfer Pump (Check Valve)
F—Fuel Transfer Pump
G—EUIs
H—Fuel Rail
I—Fuel Return from Cylinder Head
J—Fuel Pressure Sensor
K—Head Debris Filter
L—Fuel Supply Pressure Quick Connect Port
M—Fuel Filter Housing Outlet to Fuel Tank (Low Pressure Regulating Valve)
N—High Pressure Regulating Valve and Housing
O—Water Drain
P—Fuel Temperature Sensor
Q—Water in Fuel Sensor
R—Fuel Filter Housing
S—Water Separator Bowl

The fuel transfer pump (F) draws fuel from the fuel tank through the pre-filter (A) and fuel filter. The fuel filter is located in the fuel filter housing (R). The fuel filter housing contains a hand primer pump (C) and a water separator bowl (S), which screws to the bottom of the fuel filter housing. A self-venting water drain valve (O) is mounted on the bottom of the clear bowl.

Fuel flows from the fuel filter outlet (E) to the inlet of the fuel transfer pump which is mounted on the rear of the cylinder head. The pump shaft is coupled to the end of the camshaft. The fuel transfer pump contains a pressure regulating valve for system over-pressure protection. A bypass valve in the pump base allows fuel to bypass the gears during hand priming.

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Fuel flows from the transfer pump into the side of the cylinder head, and then it enters the fuel rail (H). The fuel rail is a drilled passage in the cylinder head that routes fuel to each unit injector. The unused fuel is rejected back from the EUIs (G) into the fuel rail and returned to the back of the fuel filter housing (I).

In this portion of the fuel filter housing, the fuel passes by a fuel pressure sensor (J), and then it travels through a head debris filter (K), which is a 10 micron filter. After flowing through the head debris filter, the fuel enters a chamber that includes the fuel supply pressure quick connect port (L). Once the fuel is in this chamber, it will either travel through the low pressure regulating valve (M) or the high pressure regulating valve (N). If fuel goes through the low pressure regulating valve, it will return to the fuel tank. If fuel goes through the high pressure regulating valve, it will pass the fuel temperature sensor (P), which is mounted into the fuel filter housing. The fuel will return to the fuel filter to be cleaned, and it will be recirculated through this system.

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Type 2 Fuel Supply System Operation

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

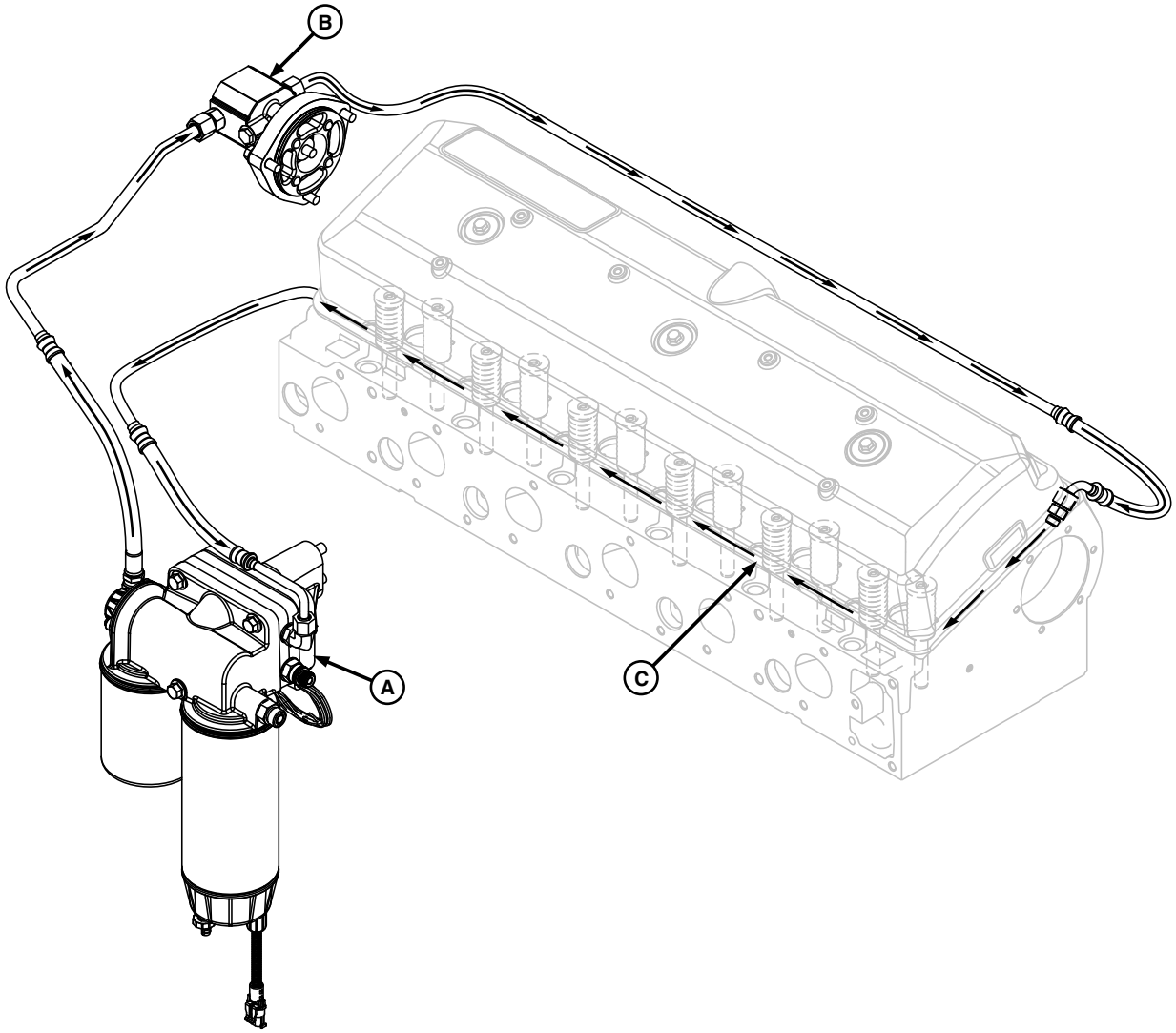


Figure 1 - Type 2 Fuel Supply System

A—Fuel Filter Header Assembly with Electric Low Pressure Fuel Pump
B—High Pressure Fuel Pump Assembly
C—Fuel Rail in Cylinder Head

Basic Operation and Components

The components shown in Figure 1 comprise the 13.5L type 2 fuel supply system. The type 2 fuel supply system utilizes an electric low pressure fuel pump contained in the fuel filter header assembly (A). The fuel filter header assembly includes primary and secondary fuel filters, fuel temperature and pressure sensors, and fuel pressure regulating valves. The low pressure fuel pump supplies fuel to a high pressure fuel pump assembly (B) mounted to the rear of the cylinder head. The high pressure fuel pump is driven by the camshaft and supplies fuel under pressure to the unit injectors through the fuel rail (C) in the cylinder head. Fuel that is not injected returns to the fuel filter header assembly. A portion of this fuel is returned to the fuel tank and the remainder is circulated back to the high pressure fuel pump.

Continued on next page

Fuel Supply System Flow

Fuel is drawn from the fuel tank (A) as shown in Figure 2 and flows through the fuel suction line (B) to the fuel filter header assembly (C) inlet port. Fuel is drawn through the 10 micron primary fuel filter (D) by the low pressure fuel pump (F). The low pressure fuel pump is powered by an electric motor. A water-in-fuel sensor (E) is contained in the primary fuel filter housing. A recirculating valve (G) opens to limit the pressure developed by the low pressure fuel pump to approximately 276 kPa (40 psi) if the secondary fuel filter (H) becomes restricted or if some other fuel system restriction occurs. The low pressure fuel sensor (I) measures the fuel supply system pressure at the secondary fuel filter outlet. The low pressure fuel sensor is an input to the ECU. The ECU controls the low pressure fuel pump speed to maintain the desired pressure. The desired low pressure fuel pump pressure varies between approximately 15 kPa (2.2 psi) to 200 kPa (30 psi) depending on operating conditions.

Fuel under pressure then flows from the fuel filter header assembly through a fuel line (J) to the high pressure fuel pump assembly (K). The high pressure fuel pump (L) is driven by the camshaft. The pressure developed by the high pressure pump is regulated by the high pressure fuel regulator valve (T) in the fuel filter header assembly. A bypass valve (M) permits fuel to flow around the mechanical pump to permit the low pressure fuel pump to prime and purge air from the fuel system with the engine not running. A pressure relief valve (N) opens to limit fuel supply system pressure to approximately 900 kPa (130 psi) if a fuel system restriction occurs.

Fuel under pressure then flows from the high pressure fuel pump (K) through a fuel line (O) to the fuel rail in the cylinder head (P) to supply fuel to the unit injectors. Fuel that is not injected is returned by a fuel line (Q) to the fuel filter header assembly (C). Return fuel passes through a serviceable filter screen (R) located in the fuel return inlet port of the fuel filter header assembly. The high pressure fuel sensor (S) measures the pressure applied to fuel in the fuel rail, less any pressure that is dropped between the fuel rail and the sensor. The high pressure fuel sensor is an input to the ECU and is used for fuel system diagnostics. The high pressure fuel regulator (T) regulates the high pressure fuel pump. The fuel pressure regulator maintains pressure in the fuel rail to a level approximately 650 kPa (90 psi) greater than the pressure developed by the low pressure fuel pump. For example, at full load the pressure developed by the low pressure fuel pump is typically 15 kPa (2.2 psi) resulting in a rail pressure of approximately 675 kPa (92 psi). At low idle, the pressure supplied by the low pressure fuel pump may exceed 150 kPa (22 psi) resulting in a rail pressure of approximately 800 kPa (112 psi). Note that with ignition ON and the engine not running, the low pressure fuel pump will operate for a period of time to prime the fuel system. The pressure developed by the low pressure fuel pump is approximately 200 kPa (30 psi) during the prime cycle. Since the high pressure fuel pump is not operating, the pressure measured by the high pressure fuel sensor will be nearly the same as the pressure measured by the low pressure fuel sensor.

A fuel temperature sensor (U) measures the temperature of return fuel and is an input to the ECU. The ECU will derate engine power if fuel temperature is too high. A fuel return regulator valve (V) opens at approximately 69 kPa (10 psi) to permit some fuel to return to the fuel tank through an orifice (W) via the return line (X). The fuel return regulator valve closes with the engine not running to prevent fuel in the fuel rail from draining back to the fuel tank.

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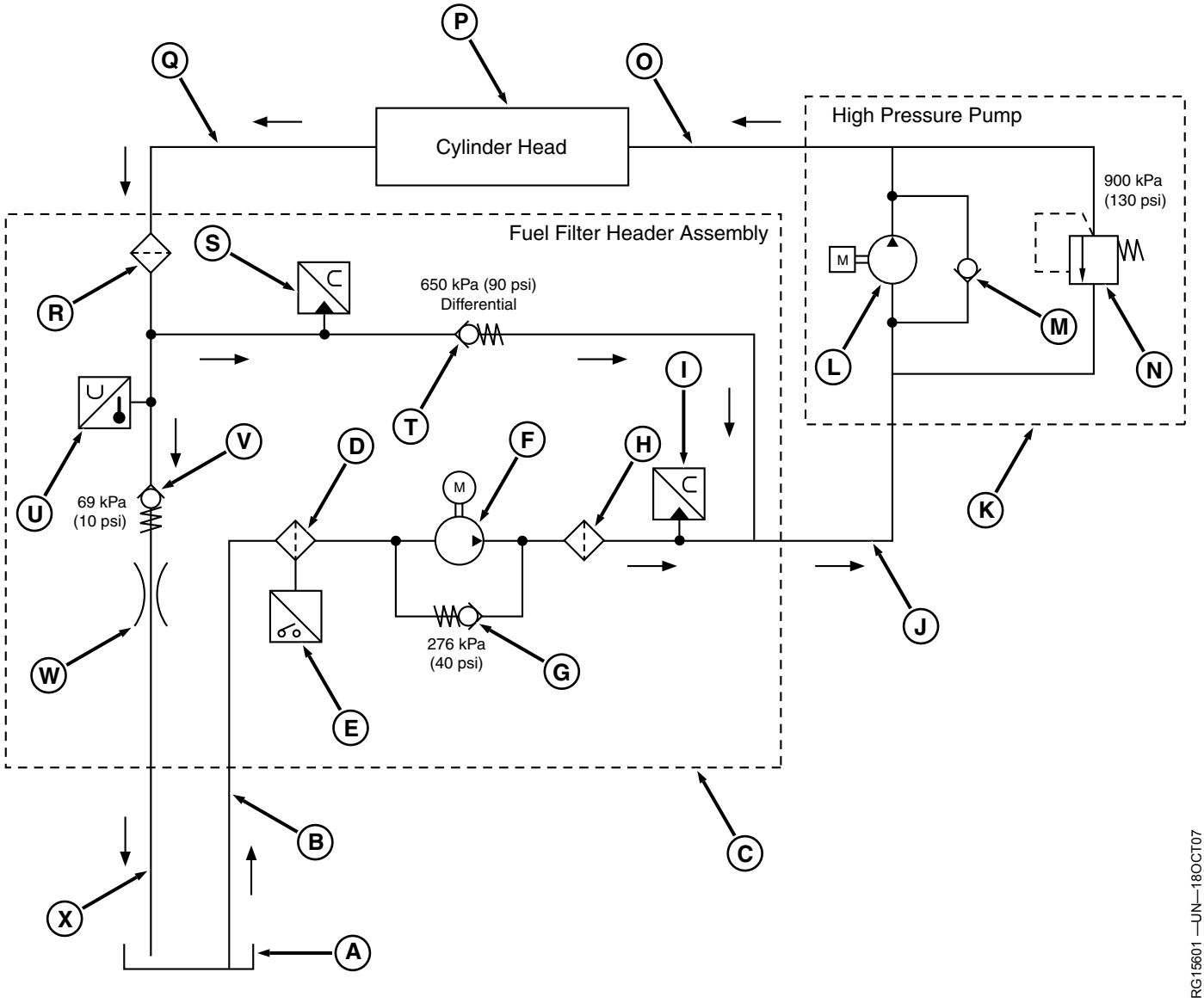


Figure 2 - Fuel Supply System Flow

A—Fuel Tank
B—Fuel Suction Line
C—Fuel Filter Header Assembly
D—Primary Fuel Filter
E—Water-In-Fuel Sensor
F—Electric Low Pressure Fuel Pump
G—Recirculating Valve
H—Secondary Fuel Filter
I— Low Pressure Fuel Sensor
J— Fuel Line
K—High Pressure Fuel Pump Assembly
L—High Pressure Fuel Pump
M—Bypass Valve
N—Pressure Relief Valve
O—Fuel Line
P—Cylinder Head and Fuel Rail
Q—Fuel Line
R—Filter Screen
S—High Pressure Fuel Sensor
T—High Pressure Fuel Regulator
U—Fuel Temperature Sensor
V—Fuel Return Regulator Valve
W—Orifice
X—Fuel Return Line

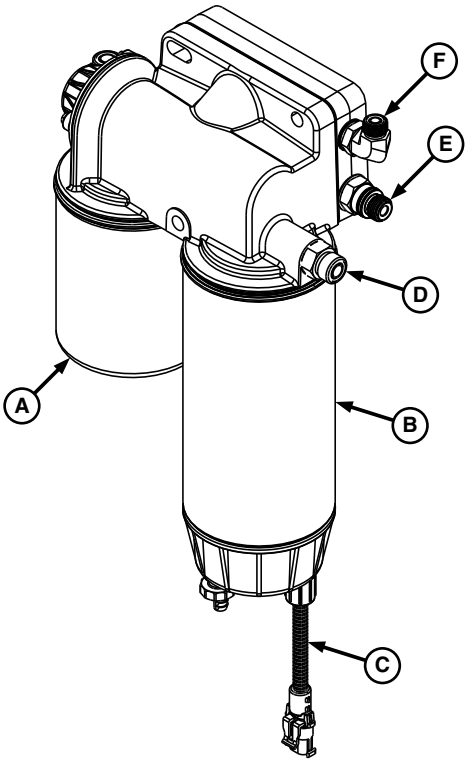
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Type 2 Fuel Supply System Fuel Filter Header Assembly

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

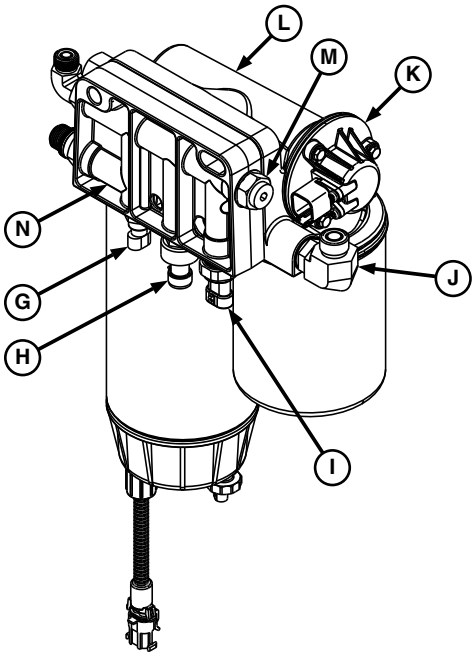
The type 2 fuel supply system fuel filter header assembly includes the fuel filters, electric low pressure fuel pump, pressure control valves, and fuel system sensors.

A—Secondary or Final Fuel Filter
B—Primary Fuel Filter
C—Water in Fuel Sensor
D—Inlet Port from Tank
E—Return Port to Tank
F—Return Port from Cylinder Head
G—Temperature Sensor
H—High Pressure Fuel Sensor
I— Low Pressure Fuel Sensor
J— Outlet Port to High Pressure Fuel Pump
K—Electric Low Pressure Fuel Pump
L—Fuel Filter Header Assembly
M—Fuel Pressure Regulating Valve
N—Fuel Return Regulating Valve



RG15223 —UN—15FEB07

Fuel Filter Header Assembly - Outside View



RG15224 —UN—15FEB07

Fuel Filter Header Assembly - Block Side View

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Type 2 Fuel Supply System Electric Low Pressure Fuel Pump

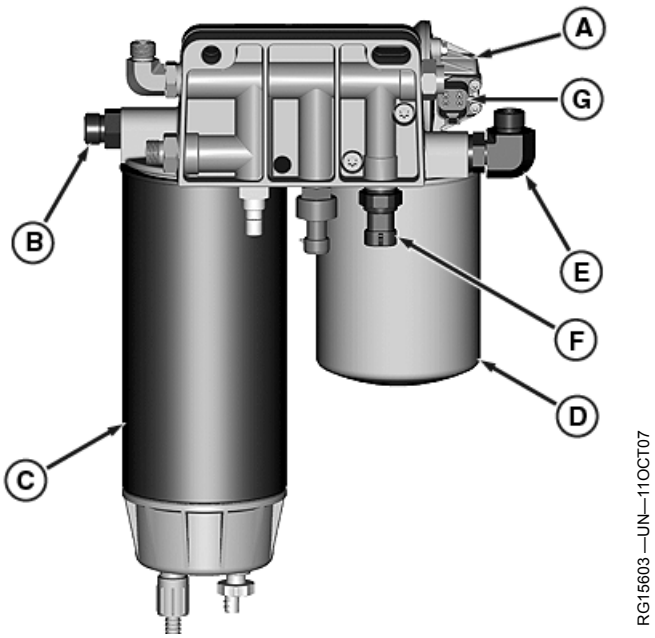
NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

NOTE: The electric low pressure fuel pump is NOT repairable and is NOT interchangeable with the electric fuel pump used on the 9.0L engine.

The variable speed electric low pressure fuel pump (A) is controlled by the ECU. Suction pulls fuel from the fuel tank through the fuel inlet (B) and through the primary filter (C). The low pressure fuel pump pushes fuel through the secondary filter (D) and through the fuel filter header outlet (E) to the high pressure fuel pump.

The low pressure fuel pressure sensor (F) is used by the ECU to measure fuel pressure at the outlet of the secondary fuel filter. The ECU controls the pump speed to maintain pressure to the desired value of 15 kPa (2.2 psi) to 200 kPa (30 psi), depending on operating conditions. The ECU also uses the low pressure fuel pressure sensor for diagnostics to detect low pressure fuel system problems such as a plugged primary filter or secondary filter, or air leaks in fuel suction lines.

The low pressure fuel pump assembly also contains an internal pressure limiter to protect the secondary fuel filter element from damage due to excessive pressure.



RG15603 —UN—11OCT07

Fuel Filter Header Assembly

A—Electric Low Pressure Fuel Pump
B—Fuel Inlet from Fuel Tank
C—Primary Filter
D—Secondary Filter
E—Fuel Outlet to High Pressure Fuel Pump
F—Low Pressure Fuel Sensor
G—Electrical Connector

Electrical Details

The low pressure fuel pump has a six-way electrical connector (G). The low pressure fuel pump is supplied with un-switched battery power (terminal 5) and ground (terminal 6) which act as the pump power supply. The low pressure fuel pump contains a microprocessor which is used to control the pump's electric motor and diagnose specific pump problems.

The other four terminals in the six-way electrical connector (G) are wired to the ECU. The ECU provides a voltage signal (+12V or +24V) to the electric low pressure pump enable input (terminal 4) when engine is running and for several minutes when ignition is ON but the engine is not running. The enable signal does not directly power the pump, but the pump will not operate unless the enable signal is present.

The ECU controls the low pressure fuel pump speed command through a pulse width modulation (PWM) signal (terminal 1). The PWM signal has a frequency of 133Hz. The ECU controls a ground-side electronic switch inside the ECU to generate the PWM signal. The greater the PWM percentage (percent of ON-time) supplied by the ECU, the higher the low pressure fuel pump's commanded speed. The low pressure fuel pump requires a PWM percentage of at least 20 percent to start. Once running, the pump will continue running until the PWM signal drops to 7 percent or less.

The low pressure fuel pump also has a status output (terminal 3) which is monitored by the ECU. The electric low pressure fuel pump's microprocessor provides a ground at the status output terminal when the pump is operating correctly. The low pressure fuel pump's microprocessor opens the ground at the status terminal when a problem is detected. Problems which will cause the low pressure fuel pump to indicate a NOT OK status include the following:

- Loss of battery power or ground
- 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 too high

The ECU will generate DTC 001075.12 after a period of time if the ECU has the low pressure fuel pump enable commanded ON and the ECU detects a NOT OK status (ECU status input is not grounded). An open circuit in the status wire between the ECU and low pressure fuel pump will also cause this DTC to be generated. Prior to generating DTC 00175.12, the ECU may cycle the low pressure fuel pump enable signal OFF and back ON again several times to attempt to cause the low pressure fuel pump to reset, if the failure condition is temporary.

The low pressure fuel pump also has a current output indicator (terminal 2). This output is currently not used by the ECU.

Continued on next page

Typical Low Pressure Fuel Pump Operation
The ECU switches ON the pump (enable signal is provided and PWM signal set to some value above 20 percent) for a programmable time (typically three or four minutes) 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 200 kPa (30 psi) during this prime cycle. If the engine is not started after the programmable time has expired, the ECU will switch OFF the low pressure fuel pump by setting the PWM signal to 7 percent. The ECU also switches OFF the pump enable signal after a programmable time has expired if engine is still not started. Once engine speed is detected, the ECU switches ON the pump enable signal (if it was OFF) and controls the pump speed command with the PWM signal to maintain pressure to the desired value. Note that at low speed and load conditions, the low pressure fuel pump may develop pressures that are greater than the desired pressure. This occurs because the low pressure fuel pump is operating at the lowest possible speed and the engine is only using a small quantity of fuel.

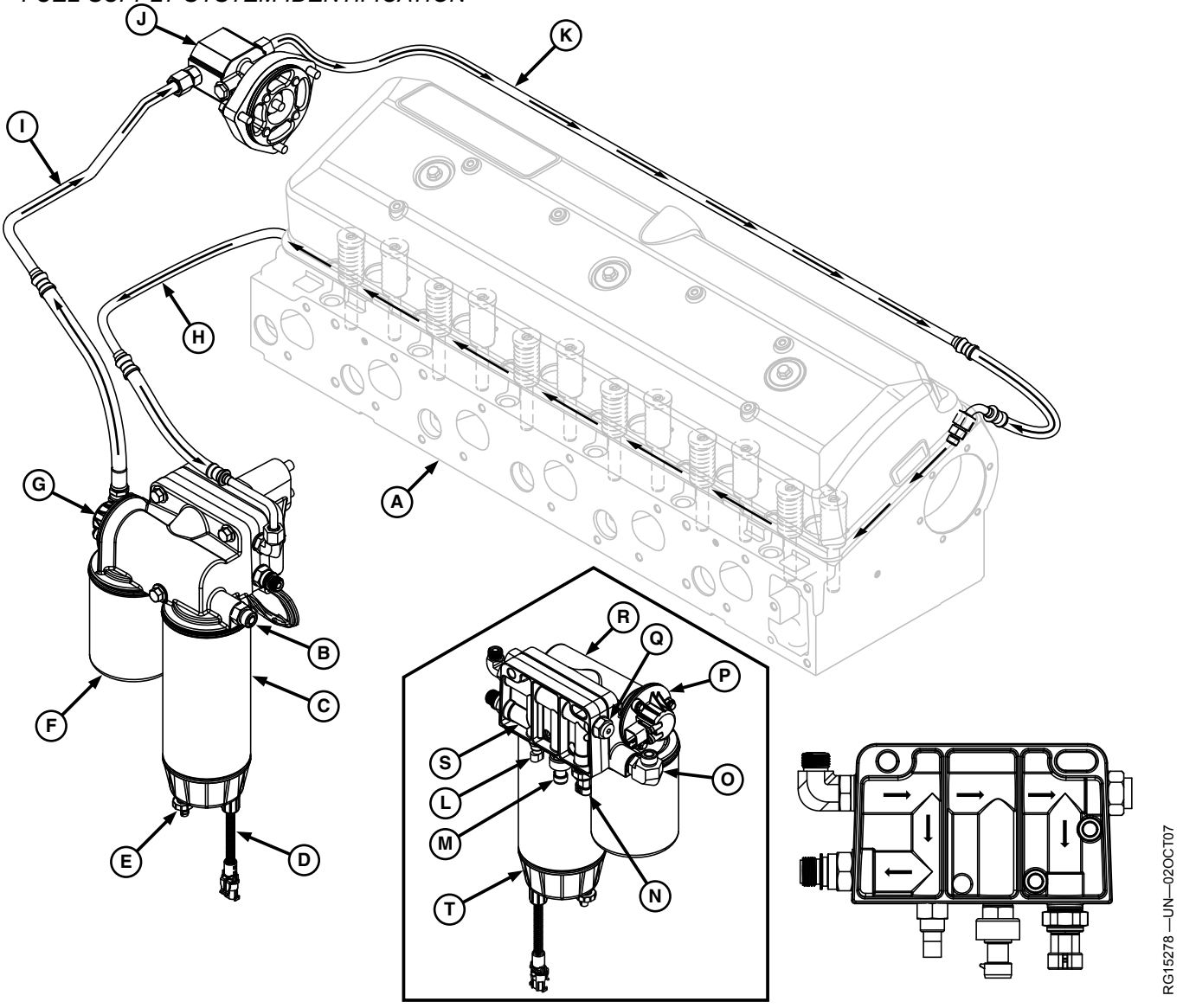
Pump Response to a Loss of Enable Signal
The low pressure fuel pump will not operate without the enable signal and the pump status output will indicate NOT OK status (not grounded).

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 NOT OK status (not grounded).

JB81757,0000085 -19-29MAY08-2/2

Type 2 Fuel Supply System Right Side Option

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION



Type 2 Fuel Supply System - Right Side Option

A—Cylinder Head and Fuel Rail
B—Fuel Inlet from Tank
C—Primary (10 micron) Fuel Filter
D—Water in Fuel Sensor
E—Water Drain
F—Secondary (Final - 2 micron) Fuel Filter
G—Electric Low Pressure Fuel Pump
H—Return Fuel Line from Cylinder Head
I— Fuel Outlet Line to High Pressure Fuel Pump
J—High Pressure Fuel Pump
K—Fuel Outlet Line to Cylinder Head
L—Fuel Temperature Sensor
M—High Pressure Fuel Sensor
N—Low Pressure Fuel Sensor
O—Fuel Outlet Port to High Pressure Fuel Pump
P—Electric Low Pressure Fuel Pump
Q—Fuel Pressure Regulating Valve
R—Fuel Filter Header Assembly
S—Fuel Return Regulator Valve
T—Water Bowl

The electric low pressure fuel pump (G) draws fuel from the fuel tank to the filtration system inlet (B) and into the primary, 10 micron fuel filter (C). The primary fuel filter is a part of an assembly which includes the secondary 2-micron filter (F), and filter header, or housing. The fuel filter housing (R) contains an electric low pressure fuel pump (P), pressure regulating valves (Q & S), and the high pressure fuel sensor (M), low pressure fuel sensor (N), and fuel temperature sensor (L). The primary filter includes a water separator bowl (T), which assembles to the bottom of the fuel filter housing. A water in fuel sensor (D) and self-venting water drain valve (E) are mounted on the bottom of the clear bowl.

Continued on next page

Fuel flows from the fuel filter header outlet to the inlet of the high pressure fuel pump (J), which is mounted on the rear of the cylinder head. The pump shaft is coupled to the end of the camshaft. The high pressure fuel pump contains a pressure relief valve for system over pressure protection. A bypass valve in the pump base allows fuel to bypass the pump gears during priming.

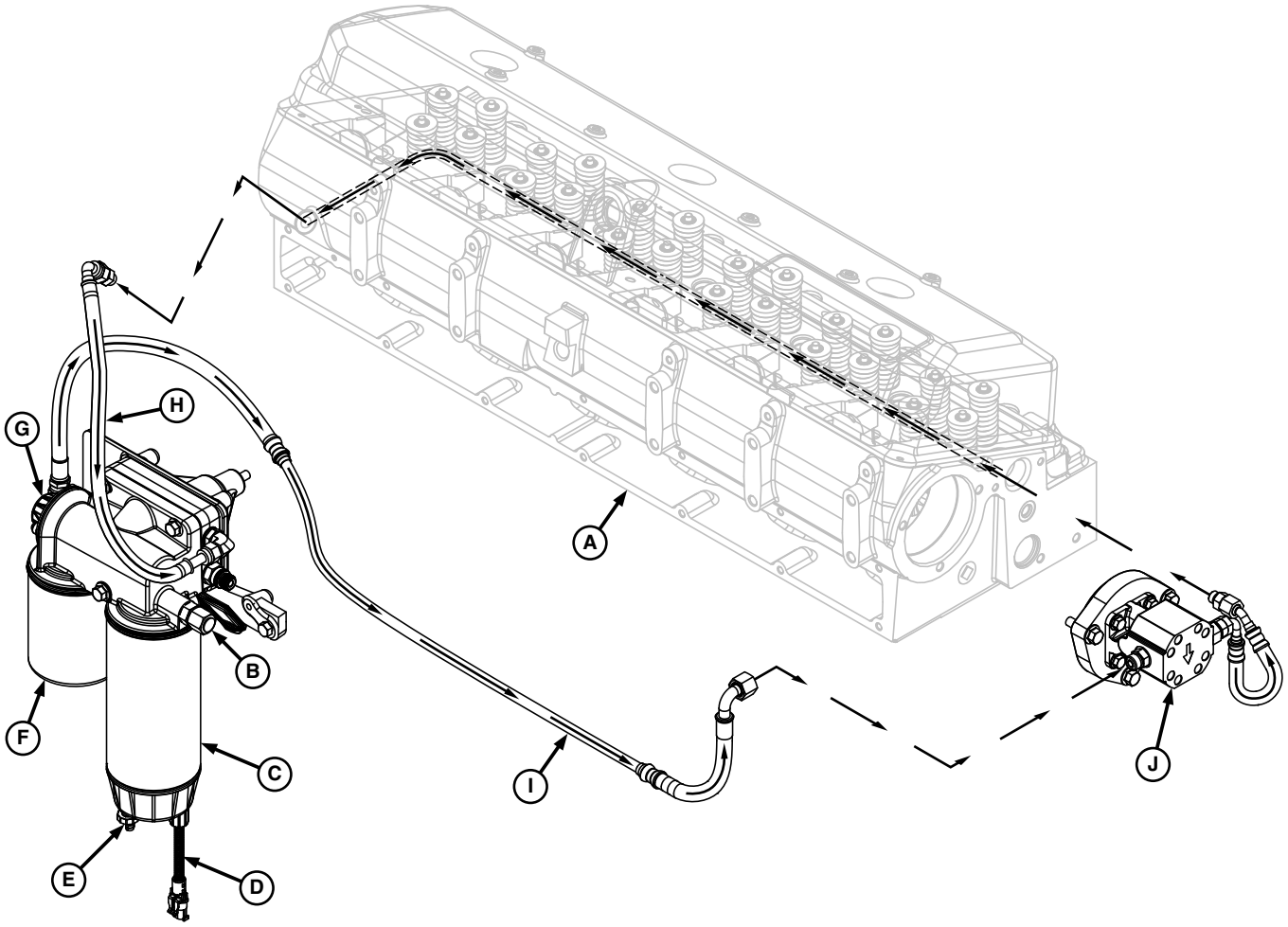
Fuel flows from the high pressure fuel pump into the side of the cylinder head, and then it enters the fuel rail. The fuel rail is a drilled passage in the cylinder head which routes fuel to each unit injector. Any fuel in the rail that is not injected is returned to the fuel filter housing (H).

Fuel returned to the fuel filter header (R) passes through a filter screen. A portion of the fuel returned from the fuel rail is returned to the fuel tank. The remainder of the return fuel is recirculated back to the high pressure fuel pump.

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Type 2 Fuel Supply System Left Side Option

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION



Type 2 Fuel Supply System - Left Side Option

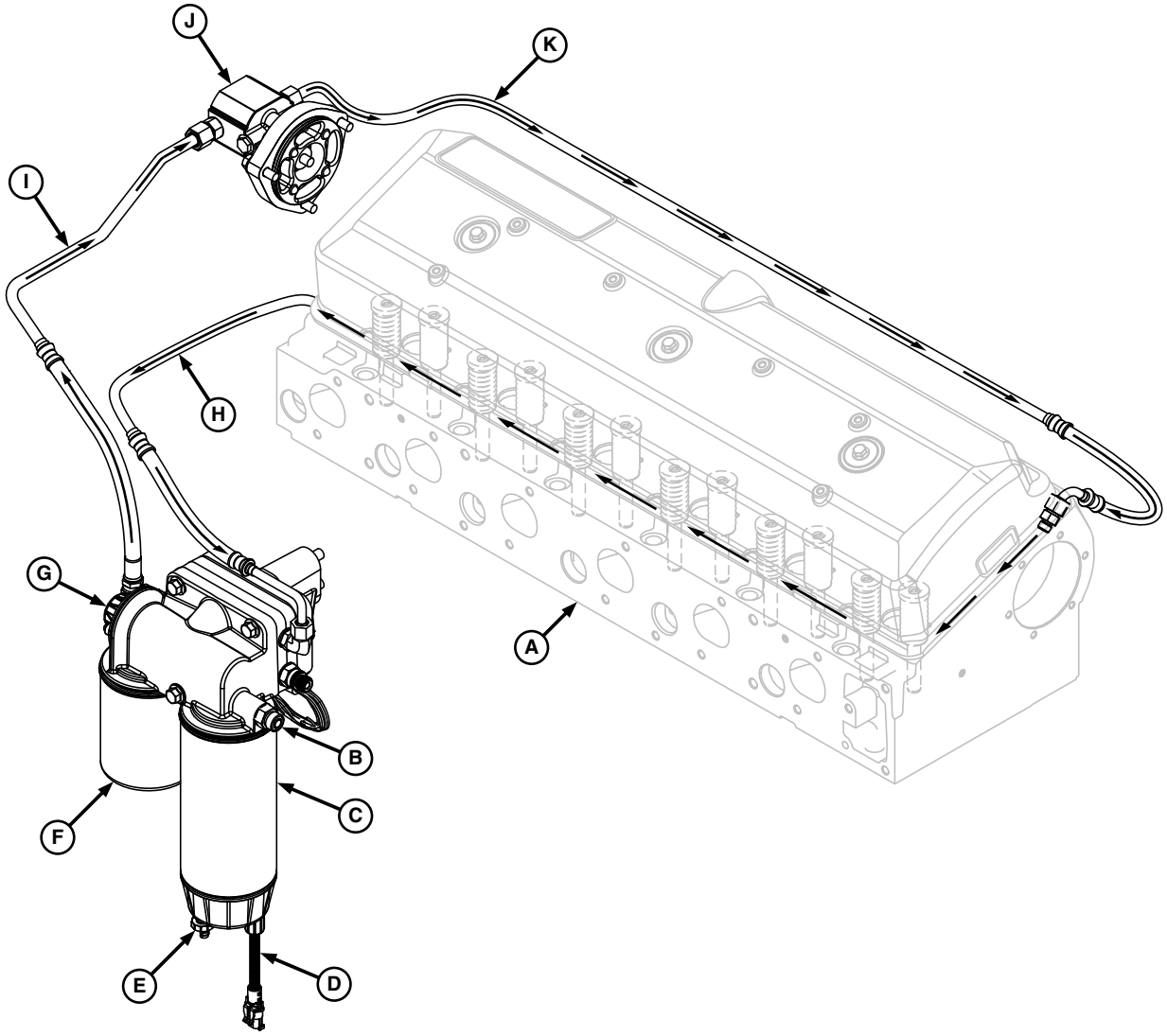
A—Cylinder Head and Fuel Rail
B—Fuel Inlet from Tank
C—Primary (10 micron) Fuel Filter
D—Water in Fuel Sensor
E—Water Drain
F—Secondary (Final - 2 micron) Fuel Filter
G—Electric Low Pressure Fuel Pump
H—Return Fuel Line from Cylinder Head
I— Fuel Outlet Line to High Pressure Fuel Pump
J— High Pressure Fuel Pump
K—Fuel Outlet from High Pressure Fuel Pump to Cylinder Head

Fuel supply system flow with left side option is the same as the right side option, except that the direction of fuel flow through the fuel rail is in the opposite direction. See FUEL SUPPLY SYSTEM WITH RIGHT SIDE OPTION.

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Type 2 Fuel Supply System Fuel Filters and Water Separator

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION



Type 2 Fuel Supply System Fuel Filters and Water Separator

A—Cylinder Head and Fuel Rail
B—Fuel Inlet Port from Tank
C—Primary Fuel Filter
D—Water in Fuel Sensor
E—Water Drain
F—Secondary (Final) Fuel Filter
G—Electric Low Pressure Fuel Pump
H—Fuel Return Line from Cylinder Head
I—Fuel Line to High Pressure Fuel Pump
J—High Pressure Fuel Pump
K—Fuel Line - High Pressure Fuel Pump to Cylinder Head

The fuel inlet port (B) at the fuel filter header assembly is plumbed to the fuel tank. The primary fuel filter (C) is the larger (longer) of the two filters. The electric low pressure fuel pump (G) pulls fuel from the fuel tank through the 10 micron primary filter. Water and the heavier contaminants settle to the bottom of the canister. When water reaches a certain quantity, the water-in-fuel sensor (D) detects the water. The water-in-fuel sensor is an input to the ECU. The ECU will generate an active DTC, alerting the operator of the need to drain water. The water and heavier contaminants are removed from the filter by use of the drain plug (E). Filtered fuel then flows up through the center of the primary fuel filter element and through the fuel filter header to the electric low pressure fuel pump (G). Fuel from the low pressure fuel pump is pushed through the secondary, or final, fuel filter (F).

The filtered fuel exits the fuel filter header and flows to the high pressure fuel pump (J) for delivery to the fuel rail in the cylinder head (A). Fuel that is not injected is returned to the fuel filter header through the fuel return line (H) where it flows through a serviceable screen. A portion of the return fuel is returned to the fuel tank. The remainder is routed back to the high pressure fuel pump.

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Type 2 Fuel Supply System Fuel Return

NOTE: For fuel supply system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

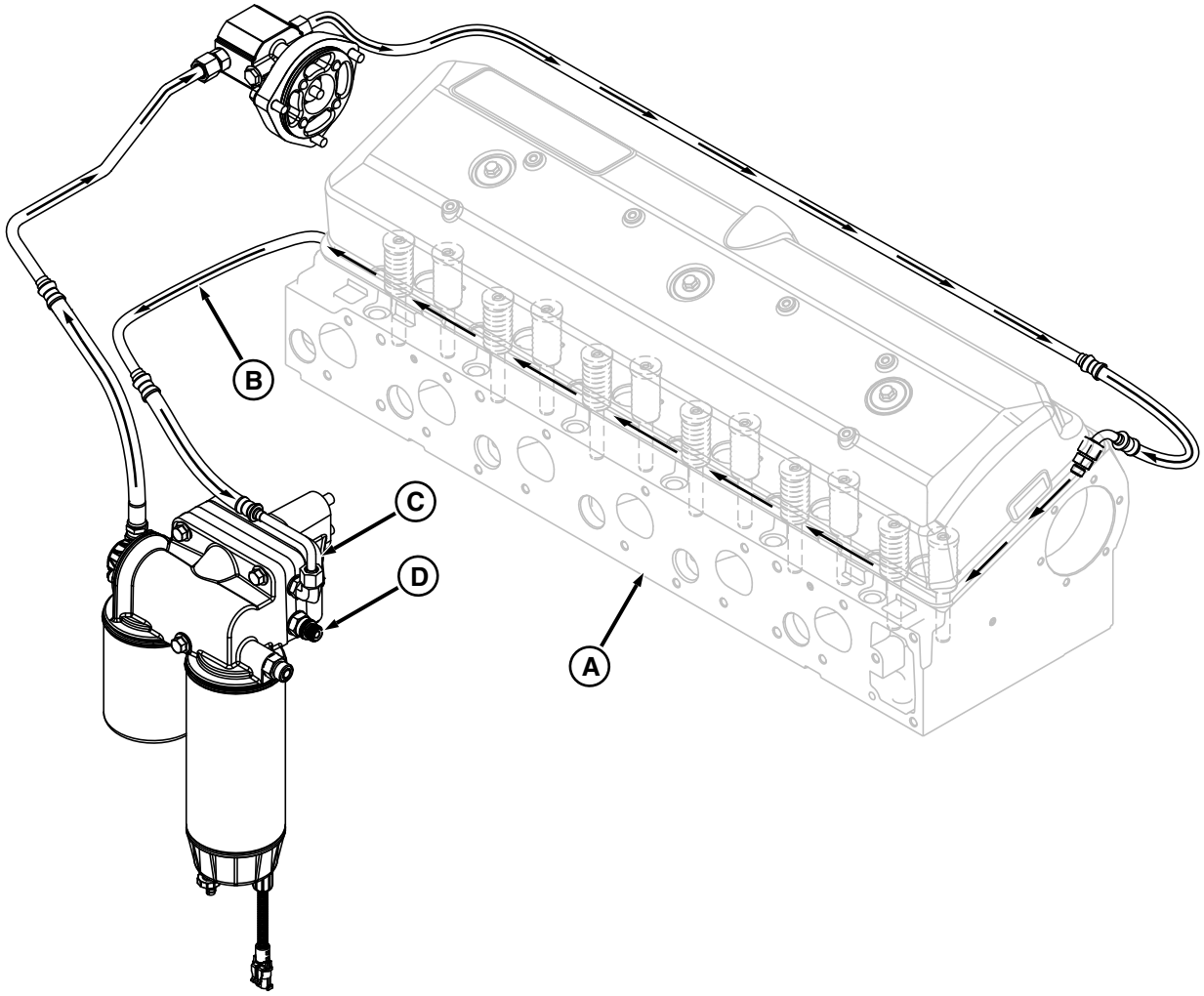


Figure 1 - Type 2 Fuel Supply System Fuel Return

A—Cylinder Head with Fuel Rail (Right Side Option Shown) **B—Fuel Return Line from Cylinder Head** **C—Fuel Filter Header Assembly** **D—Fuel Return Regulator Valve**

Fuel under pressure flows through the single fuel rail in the cylinder head (A) shown in Figure 1. Fuel in the fuel rail that is not injected is returned to the fuel filter header assembly through an external fuel line (B). A portion of the fuel that is returned to the fuel filter header assembly (C) flows through the fuel return regulator valve (D) and back to the fuel tank through the fuel return line.

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Fuel Return Regulator Valve Details

The fuel return regulator valve controls the amount of fuel that returns to the fuel tank. The valve is designed to block any return fuel flow when fuel system pressure is below approximately 69 kPa (10 psi) to help limit fuel drain-back with engine off. Figure 2 shows a cross section of the fuel return regulator valve with the fuel return regulator valve in the blocking or static position. A spring in the valve keeps the poppet (E) at the valve inlet port seated which prevents fuel from flowing through the fuel return regulator to the valve outlet port (F).

E—Poppet

F—Outlet Port

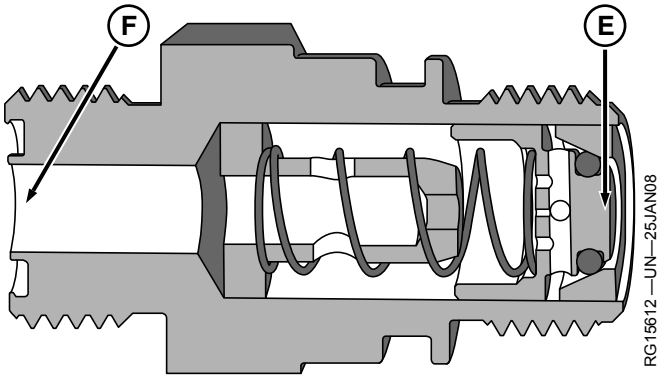


Figure 2 - Fuel Return Regulator Valve in Blocking Position

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Figure 3 shows the fuel return regulator valve in the system priming position with fuel system pressures between approximately 69 kPa (10 psi) to 124 kPa (18 psi). The fuel system pressure causes the poppet (G) to overcome the spring tension and move off of its seat. This permits fuel to flow around the poppet and through a series of orifices (H) and (I) and on to the valve outlet port to the fuel tank.

G—Poppet

H—1 mm (0.040 inch) Orifices (4X)

I— 0.5 mm (0.020 inch) Orifice (1X)

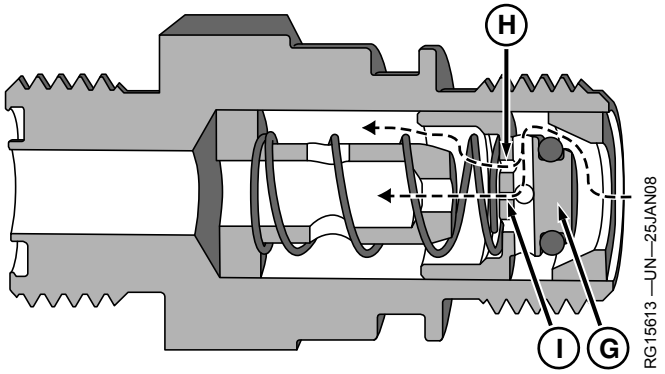


Figure 3 - Fuel Return Regulator Valve in the Priming Position

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Figure 4 shows details of the orifices in the valve. There are four 1 mm (0.039 inch) orifices (J) and one 0.5 mm (0.020 inch) orifice (K). With the valve in the priming position, fuel flows through all five orifices.

J— 1 mm (0.040 inch) Orifices (4X)

K—0.5 mm (0.020 inch) Orifice (1X)

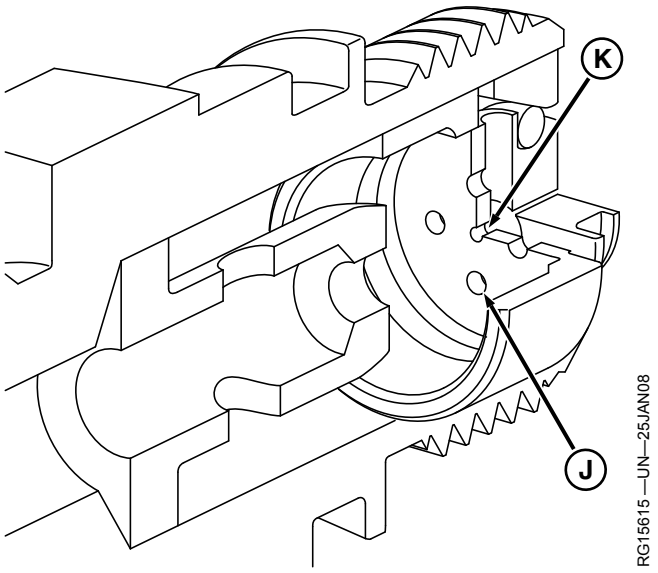


Figure 4 - Orifice Details

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Figure 5 shows the fuel return regulator valve in the flow limiting position with fuel system pressures greater than approximately 124 kPa (18 psi) such as when the engine is running. The higher pressure causes the poppet to seat against an internal stop in the valve which blocks flow through the four 1 mm (0.040 inch) orifices. Some return fuel is still able to flow through the 0.5 mm (0.020 inch) orifice (L) to the outlet port (M) and on to the fuel tank.

L—0.5 mm (0.020 inch) Orifice (1X) **M—Outlet Port**

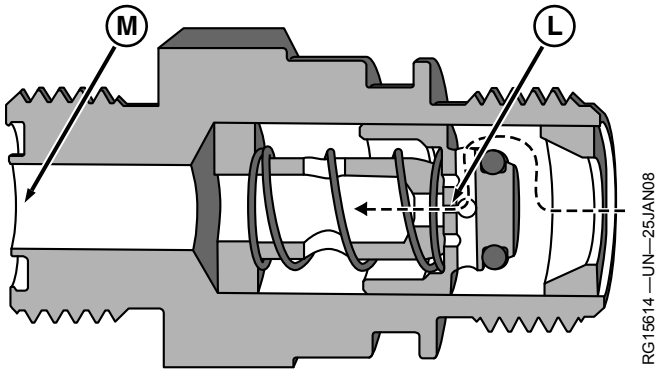


Figure 5 - Fuel Regulator Valve in the Flow Limiting Position

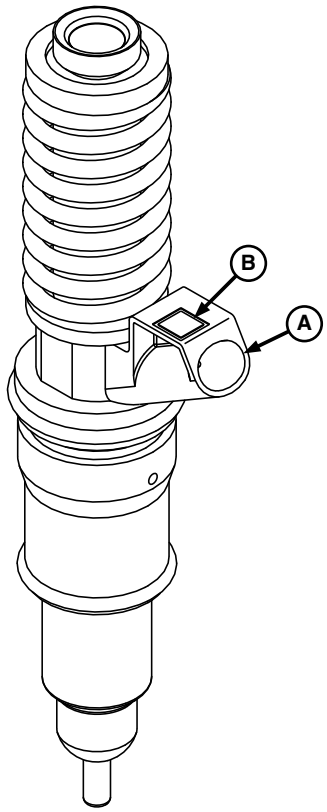
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Electronic Unit Injector (EUI) Operation

The electronic unit injector pumping action is created by the up and down movement of the plunger. The plunger movement is caused by the rotation of the camshaft and the rocking action of the rocker arms. The larger return spring will move the plunger up as the camshaft rotates and relaxes the force on the rocker arm.

The electronic unit injector for the 6135 engine is different from the injector used in the 6125 engine. The large solenoid which was attached to the side of the injector is gone and has been replaced by a much smaller solenoid located inside the injector. The smaller and internally located solenoid allows pilot injection to be run closer to regular injection. The wiring harness now attaches to a tab (A) on the side of the injector. On top of this tab information is printed relative to that specific injector. Each injector is tested for timing and fuel delivery against a known baseline injector. This information is then printed on the top of the tab (B) and is used whenever the injector is serviced. Information included on the tab is part number, serial number, and bar code information related to injection timing and fuel delivery.

A—Wiring Harness Connection B—Injector Data Location



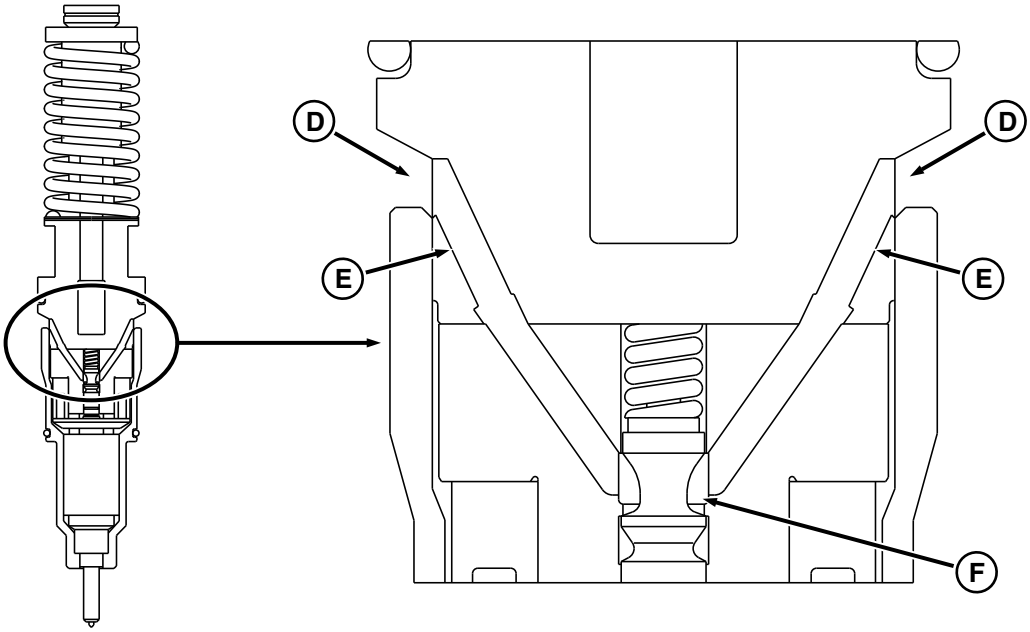
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6135 Electronic Unit Injector

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EUI Fill Cycle



RG15275A —UN—30OCT09

Injector Fuel Passages

The electronic unit injector will fill with fuel when the plunger (C) is moving up. Fuel from the fuel rail (located at D) is drawn into fuel passages (E) with the upward movement of the plunger. Fuel flows past the open spill valve (F) into fuel plunger cylinder (G). The spill valve and fuel passages (E) also allows the leak off of excess fuel and any air into the fuel rail.

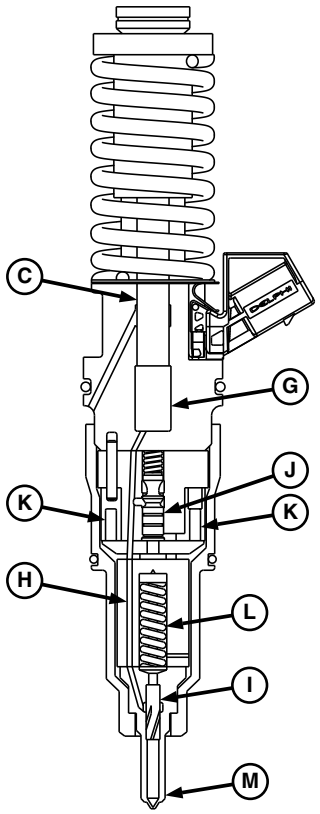
EUI Pumping Cycle

The pumping cycle begins when the camshaft lobe pushes on the rocker arm to cause the plunger (C) to start moving down. During the first downward movement of the plunger, the vent port will close.

Further downward movement of the plunger will force fuel from the plunger cylinder (G). Fuel will flow down high pressure fuel passage (H), to the needle valve (I). This flow will continue until the injection cycle begins.

EUI Injection Cycle

The injection cycle will start when the Engine Control Unit (ECU) energizes the EUI solenoid (J) and coil wires (K). This will occur during the downward stoke of the plunger.



RG15274 —UN—27APR07

Electronic Unit Injector Operation

C—Plunger
D—Fuel Rail Location
E—Fuel Passages to and from Fuel Rail
F—Spill Valve
G—Plunger Cylinder
H—High Pressure Fuel Passage
I— Injector Needle
J—Injector Solenoid
K—Coil Wires
L—Injector Spring
M—Injector Tip

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RE38635,000004D -19-02NOV09-2/3

The energized solenoid will close the spill valve until the force of the injector spring (L) is overcome. With the spill valve closed, fuel can not escape from the plunger cylinder (G). The downward movement of the plunger will cause the fuel pressure to rise. When the pressure reaches 30,000 kPa (300 bar) (4350 psi), the injector needle (I) will start to move up and injection will begin. As the plunger continues to move down, pressure will rapidly rise to approximately 160,000 kPa (1600 bar) (23,200 psi). The injector is capable of pressures of 180,000 kPa (1800 bar) (26,100 psi). Injection takes place in a 140° cone angle spray pattern from 6 equally spaced holes 60° apart in the injector tip (M). Injection will continue until the ECU de-energizes the solenoid. The spill valve will then open allowing fuel pressure to drop rapidly. The injector needle will close and injection will stop. Excess fuel will be drawn out the spill valve and through passages (E) to the fuel rail (D) by the upward movement of the plunger. Fuel will spill back to the fuel rail until the reduced pressure allows the injector spring (L) to close.

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About This Group

This group of the manual contains information on the operation of the Air system. The group is divided into the following headings:

- Intake and Exhaust System
- Turbocharger Operation
- Turbocharger Actuator Operation
- EGR Valve and VGT Operation

DN22556,0000022 -19-15OCT07-1/1

Intake and Exhaust System Operation, non-EGR engines

Engine suction draws dust-laden outside air through an air inlet stack into the air cleaner. Air is filtered through dry-type primary and final filter elements in the air cleaner canister. Clean air travels through the intake air hose to the turbocharger, through the air-to-air aftercooler and into the intake manifold.

Exhaust, as it is expelled out of the exhaust manifold, drives the turbocharger to deliver a larger quantity of air than what could be delivered under naturally aspirated (non-turbocharged) conditions. The increased air volume available to the engine allows additional fuel to be delivered to the combustion chamber. Thus, power output of the engine is increased.

An air-to-air aftercooler cools the turbocharger compressor discharge air by routing it through a heat exchanger before it enters the engine. The heat exchanger uses no liquid coolant but relies on air flow to cool the charge air.

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Turbocharger Operation

The turbocharger, which is basically an air pump that is driven by exhaust gases, allows the engine to produce added power without increasing displacement. Turbochargers are specially matched for the power ratio requirements of each specific application.

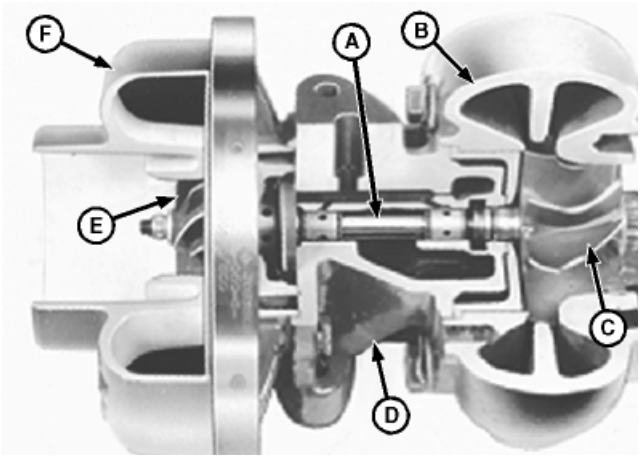
The turbine wheel (C) is driven by the hot engine exhaust gases. These gases flowing through the turbine housing (B) act on the turbine wheel causing shaft (A) to turn.

The variable geometry turbocharger used on Tier 3/Stage IIIA engines have adjustable vanes (G) on the exhaust (turbine) side. These vanes are opened and closed to regulate exhaust gases to the exhaust gas recirculator cooler, depending on engine load demand. The vanes are electronically controlled by the turbocharger actuator, which is liquid cooled and is part of the turbocharger assembly.

Compressor wheel (E) brings in filtered air and discharges the compressed air into the intake manifold where it is then delivered to engine cylinders.

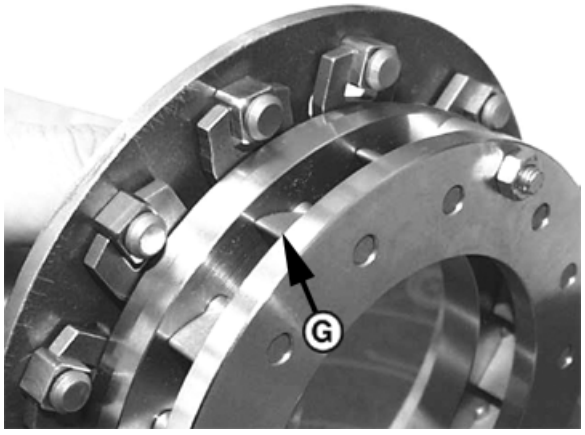
Engine oil under pressure from the engine lubrication system is forced through passages in center housing (D) to bearings.

A—Shaft
B—Turbine Housing
C—Turbine Wheel
D—Center Housing
E—Compressor Wheel
F—Compressor Housing
G—Adjustable Vanes



RG9098 —UN—27MAR98

Turbocharger Components

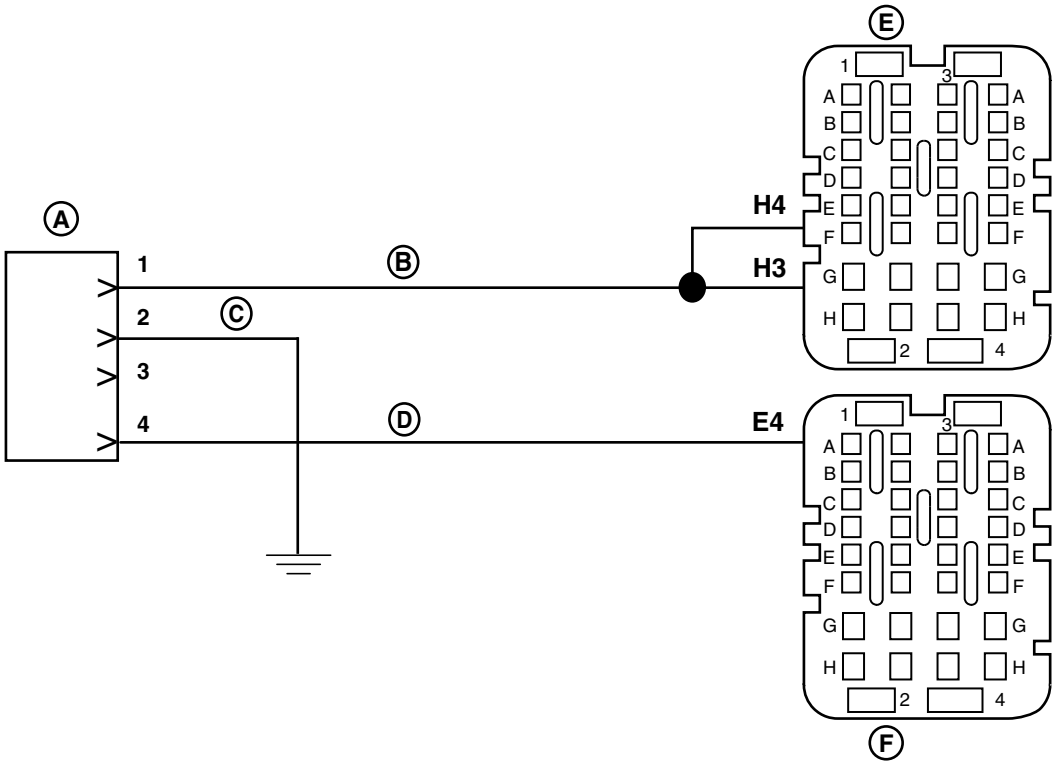


RG14466 —UN—30AUG05

VGT Adjustable Vanes

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Turbocharger Actuator Operation



VGT Actuator Schematic

A—Turbo Actuator
B—H-Bridge
C—Turbo Actuator Ground Circuit
D—Turbo Actuator Command Circuit
E—ECU Connector J1
F—ECU Connector J3

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 be increased or decreased based on engine load demand and speed. They 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 blades causes the turbo 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 accordingly to ensure availability of proper exhaust pressures for EGR/fresh air mixing.

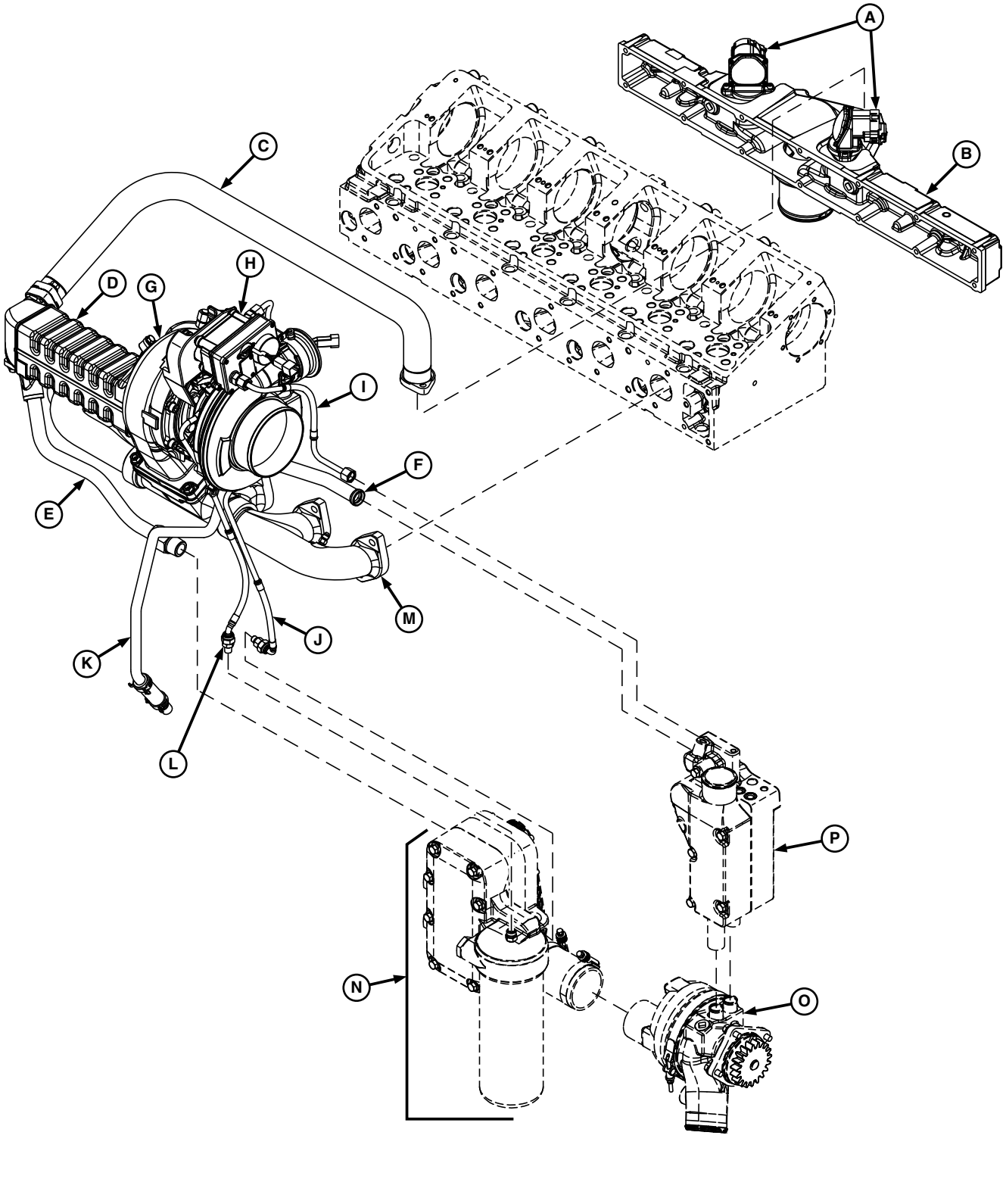
The variable output capability of the VGT provides the ability to increase low speed torque, provide a quicker transient response, and increase peak torque while also improving fuel economy. As engine speed and load demands increase, the ECU signals the VGT actuator to close the vanes on the turbine. This drives exhaust gas pressures and velocities upward, which in turn increases engine boost. The increase in boost pressures also limits smoke and reduces emission particulates released to the atmosphere.

To keep the actuator's circuit board from overheating, engine coolant plumbed from the coolant pump is circulated through the actuator and returned to the thermostat housing. For more actuator information, refer to the Base Engine manual.

For more information on component location, see COMPONENT LOCATION DIAGRAM 1 in Section 03 Group 140.

DN22556,000054F -19-25MAR11-1/1

Exhaust Gas Recirculator (EGR) & Variable Geometry Turbocharger (VGT) Operation



EGR & VGT

Continued on next page

RG19661,000024C -19-15OCT07-1/2

A—EGR Valves
B—Intake Manifold
C—Intake Crossover Tube
D—EGR Cooler
E—EGR Cooler Coolant Supply Line
F—EGR Cooler Coolant Return Line
G—Variable Geometry Turbocharger (VGT)
H—VGT Actuator
I— Actuator Coolant Return Line
J— Actuator Coolant Supply Line
K—VGT Oil Drain Line
L—VGT Oil Supply Line
M—Exhaust Manifold
N—Oil Cooler & Filter Assembly
O—Coolant Pump
P—Coolant Manifold

Design features new to the air system of the 13.5 L Tier III/Stage IIIA PowerTech Plus engine include Exhaust Gas Recirculation (EGR) and the Variable Geometry Turbocharger (VGT). The EGR and VGT are common features in all T3 John Deere PowerTech Plus engines.

The EGR and VGT are both performance and emissions control features. The VG turbocharger has adjustable vanes in the exhaust turbine housing. These vanes, controlled by a water-cooled electronic actuator (H), open or close to control the volume of exhaust gases to be routed through the cooler (D). The gases then pass through a cooler which is bolted to the exhaust manifold (M) and crossover pipe (C). After cooling, a portion of the exhaust gases are mixed with intake air by the dual EGR valves (A), located on the intake manifold (B). The engine control unit (ECU) controls the quantity of exhaust gas to be mixed with intake air for combustion, depending on load demand of the engine. Under full load conditions, as much as 10-12% of the intake air used for combustion is recirculated exhaust gases. The additional volume of air gained by recirculation of cooled exhaust gases allows the 13.5 L engine to run with higher boost pressures. This allows increased fuel delivery and increases in power output of the engine. Harmful emissions released to the atmosphere are also reduced.

The VGT has an electronically controlled, liquid cooled actuator (H) as a part of its assembly. The actuator is controlled by the engine control unit (ECU). The actuator, as stated, adjusts the vanes on the turbine wheel to ensure proper exhaust gas volumes to be directed to the cooler. The actuator is cooled by engine coolant. The supply line (J) is plumbed from the engine oil cooler (N) to the actuator, and the return line (I) returns heated coolant to the thermostat housing (P). 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 wheel. This drives exhaust gas pressures and velocities upward, which in turn increases engine boost. The increase in boost pressures limits smoke and reduces emission particulates released to the atmosphere.

The exhaust gases are transmitted from the VGT to an exhaust gas cooler. The cooler is bolted to the exhaust manifold with a two-bolt flange. This cooler operates much like a radiator, in that it has internal fins, which, using engine coolant routed through an external line (E) directly from the engine oil cooler, cools the exhaust gases. The cooler is a counterflow design, meaning engine coolant flows in the opposite direction as the exhaust gases. After engine coolant flows through the cooler, it is returned through another external line (F) to the engine thermostat housing. The exhaust gases enter the cooler at approximately 600° C and exit at approximately 200° C.

The cooled exhaust gas passes from the cooler (D) through a crossover pipe C) to the opposite side of the engine to the intake manifold. (B). Dual EGR Valves (A), are located on top of the intake manifold and are a part of the intake manifold assembly. The function of the EGR valve, also controlled by the engine ECU, is to mix given volumes of exhaust gases with the intake air, depending on engine load demand. This mixture of exhaust gases and intake air serves two purposes: (1). It allows more cooled air to be introduced into the combustion chamber. This in turn allows more fuel to be introduced to the combustion process, allowing increased power levels. (2). Diluting the intake air with as much as 10-12% exhaust gases (full load conditions) aids in controlling NOX emissions released into the atmosphere following combustion. The EGR valve is functional only when the engine is under load and the coolant is at operating temperature. At start-up, when engine coolant is cold, and under no-to-light load conditions, the valve remains closed. When engine load and/or speed demands reach a predetermined level, the ECU signals the EGR valve to open. The valve then mixes the proper amount of cooled exhaust gas with the cooled intake air and releases this mixture to the intake manifold for combustion. Exhaust gases not mixed with intake air are recirculated and mixed a second time.

The EGR function, exhaust and intake manifolds, and VGT are monitored closely by several sensors. The sensors are monitored by the ECU, and fault codes will be generated if conditions are outside of design guidelines. Sensors include exhaust gas temperature, charge air temperature, mixed air (intake and exhaust) temperature, Manifold Air Pressure (MAP) intake, and MAP exhaust

RG19661,000024C -19-15OCT07-2/2

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)
- Monitoring Engine Parameters
- 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 Turbine Inlet Temperature
- Turbo Compressor Inlet Temperature Sensor
- Measuring Pressure
- Barometric Air Pressure (BAP) Sensor
- Fuel Transfer Pump Pressure Sensor
- Manifold Air Pressure (MAP) Sensor
- Oil Pressure Sensor
- Measuring Speed
- Crank Position Sensor
- Cam 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 Unit Injector (EUI) Wiring Harness Connector
- Torque Curve Selection
- Governor Droop Mode Selection
- Water in Fuel (WIF) Sensor
- Engine Coolant Level Switch (optional)
- Cruise Control Operation
- Power Supply #2
- Power Supply #3
- Power Supply #4
- Power Supply #5

DM80898,000041A -19-15OCT07-1/1

Electronic Control System Terminology

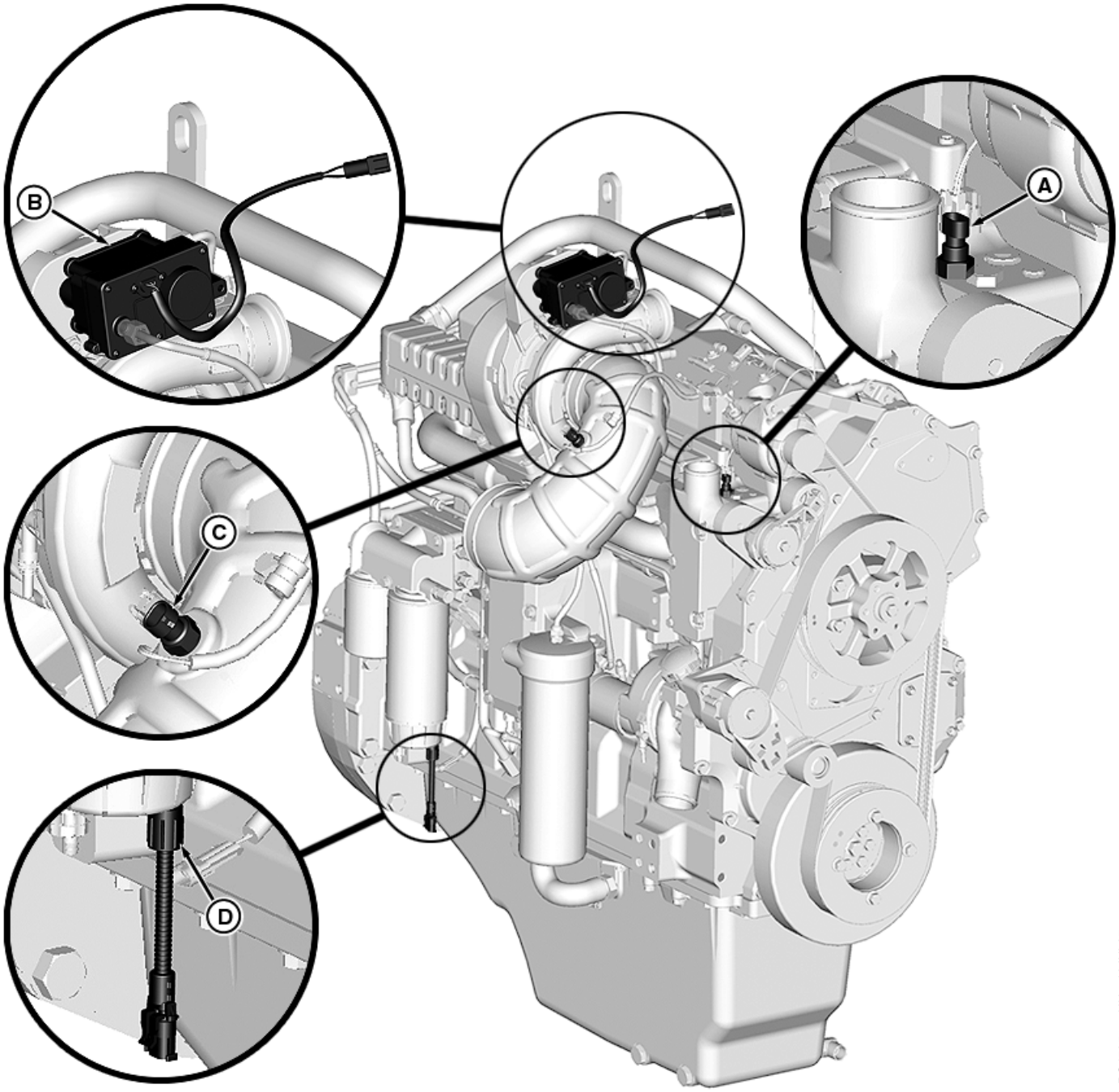
Actuator	A device controlled by the ECU to perform a certain function.
Analog	Signal which has a continuous range of possible voltages, usually 0 volts (low) to 24 volts (high).
Application	Either a movable or stationary piece of equipment that the engine is placed in. Applications include, Tractors, 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.
CAM Position Sensor	Used to identify the cylinder that is on the compression stroke.
CAN	Controller Area Network. The network on vehicles that allows communication between controllers.
CAN Terminator	A resistive device used to terminate the bus lines on the J1939 communications bus.
Circuit Power	This is power supplied to a device for use by its internal component circuits.
Crank Position 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.
EDL	Electronic Data Link. Electronic module that can connect to more than one data bus on an application, used to interface the application electronic controllers to the PC.
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.
EUI	An Electronic Unit 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.
High Pressure Rail	High Pressure 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.

Continued on next page

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.
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.
PDM	Parallel Data Module. Electronic module used to interface the application electronic controllers to the PC.
Pin	A style of terminal that makes the electrical connection to a connector. Also called a male terminal.
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”.
Pump Control Valve	See Suction Control Valve
SDS	Software Delivery System. Used by JDPS to maintain software and programming records.
Sensor	Device used by the ECU to monitor various engine parameters.
Socket	A style of terminal that makes the electrical connection to a connector. Also called a female terminal or receptacle.
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).
Suction Control Valve	Suction Control Valve regulates the amount of fuel that the high pressure fuel pump supplies the high pressure rail.
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 (EUI).
VGT	Variable Geometry Turbo. A turbocharger that has movable vanes inside to change the amount of boost to drive the exhaust gas into the intake for emissions control.
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



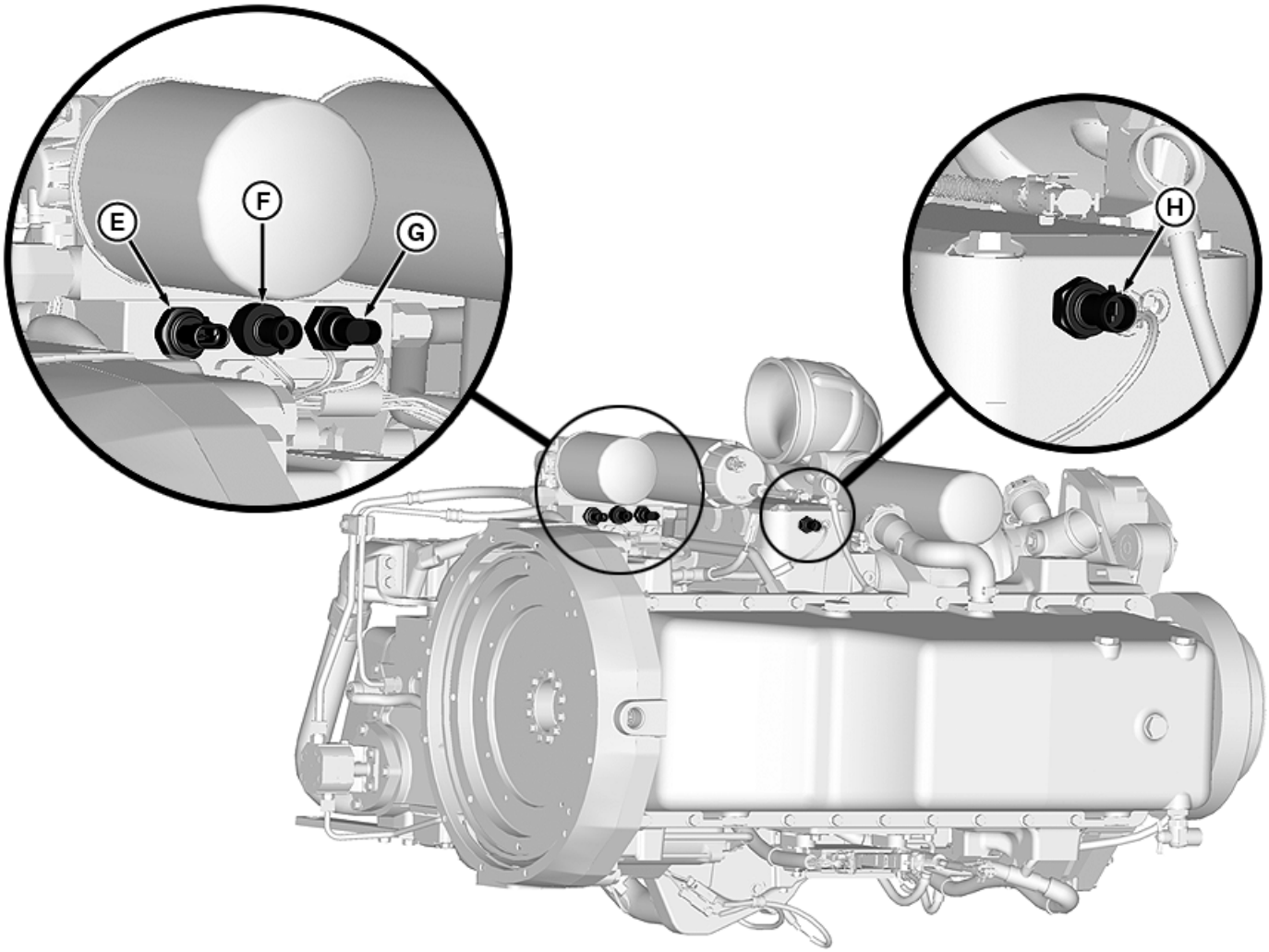
Component Location Diagram 1

A—Engine Coolant Temperature Sensor
B—VGT Actuator
C—Compressor Inlet Temperature Sensor
D—Water In Fuel (WIF) Sensor

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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Component Location Diagram 2



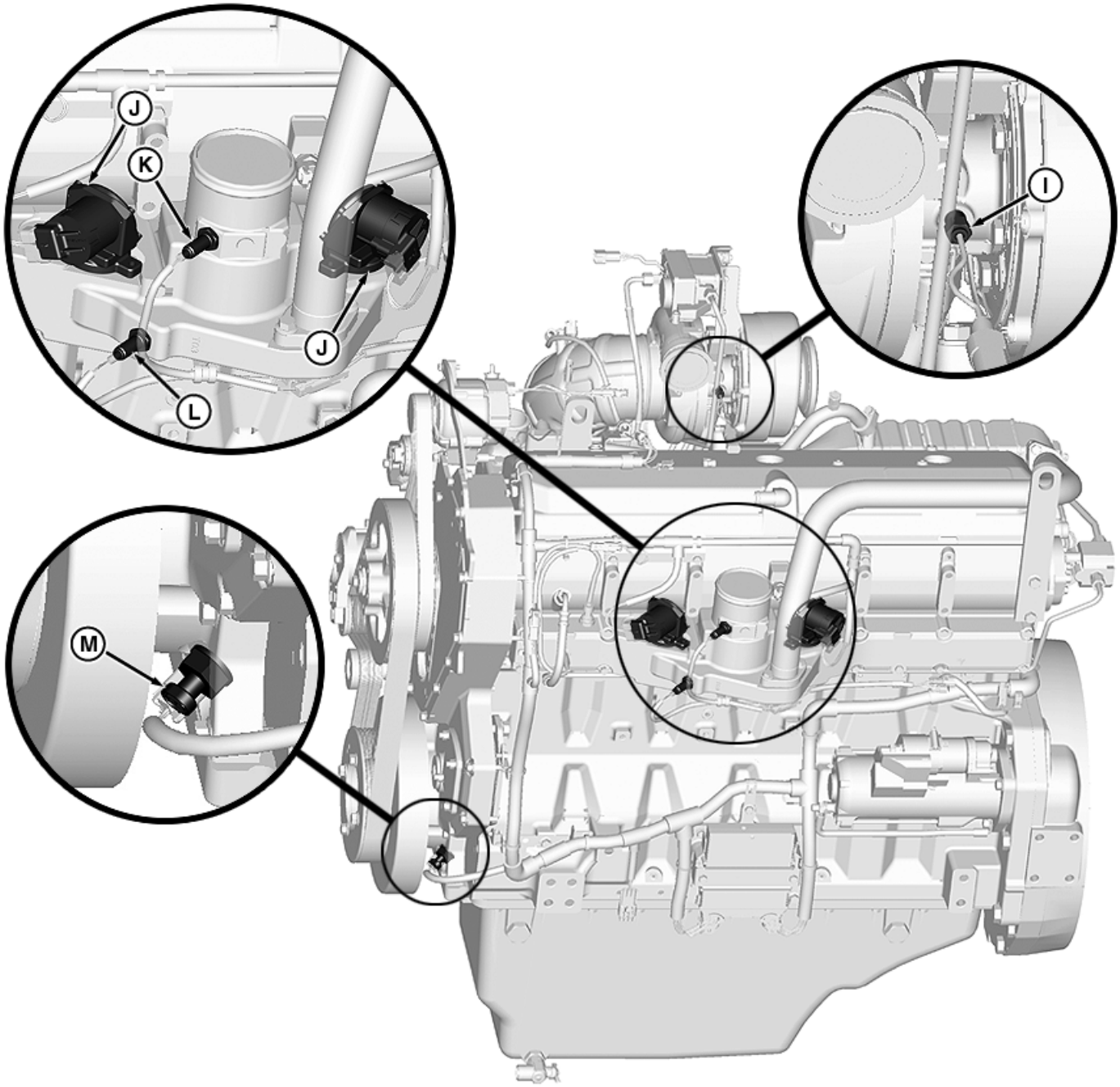
Component Location Diagram 2

E—Low Pressure Fuel Sensor **F—Fuel Rail Pressure Sensor** **G—Fuel Temperature Sensor** **H—Oil Pressure Sensor**

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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Component Location Diagram 3

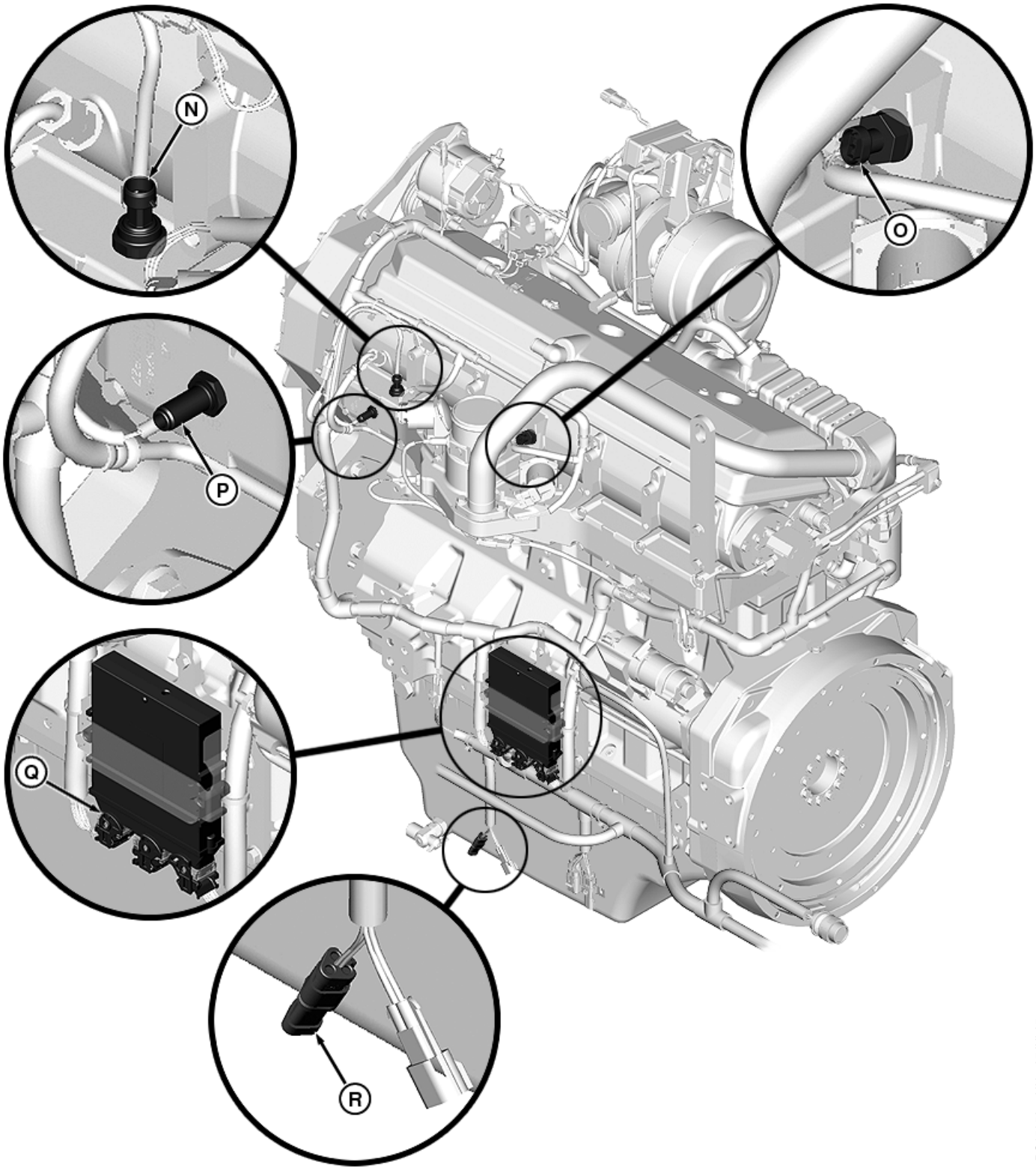


Component Location Diagram 3

I— Turbo Speed Sensor
J— EGR Valves
K—Charge Air Cooler Outlet Temperature Sensor
L—EGR Exhaust Temperature Sensor
M—Crankshaft Position Sensor

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Component Location Diagram 4



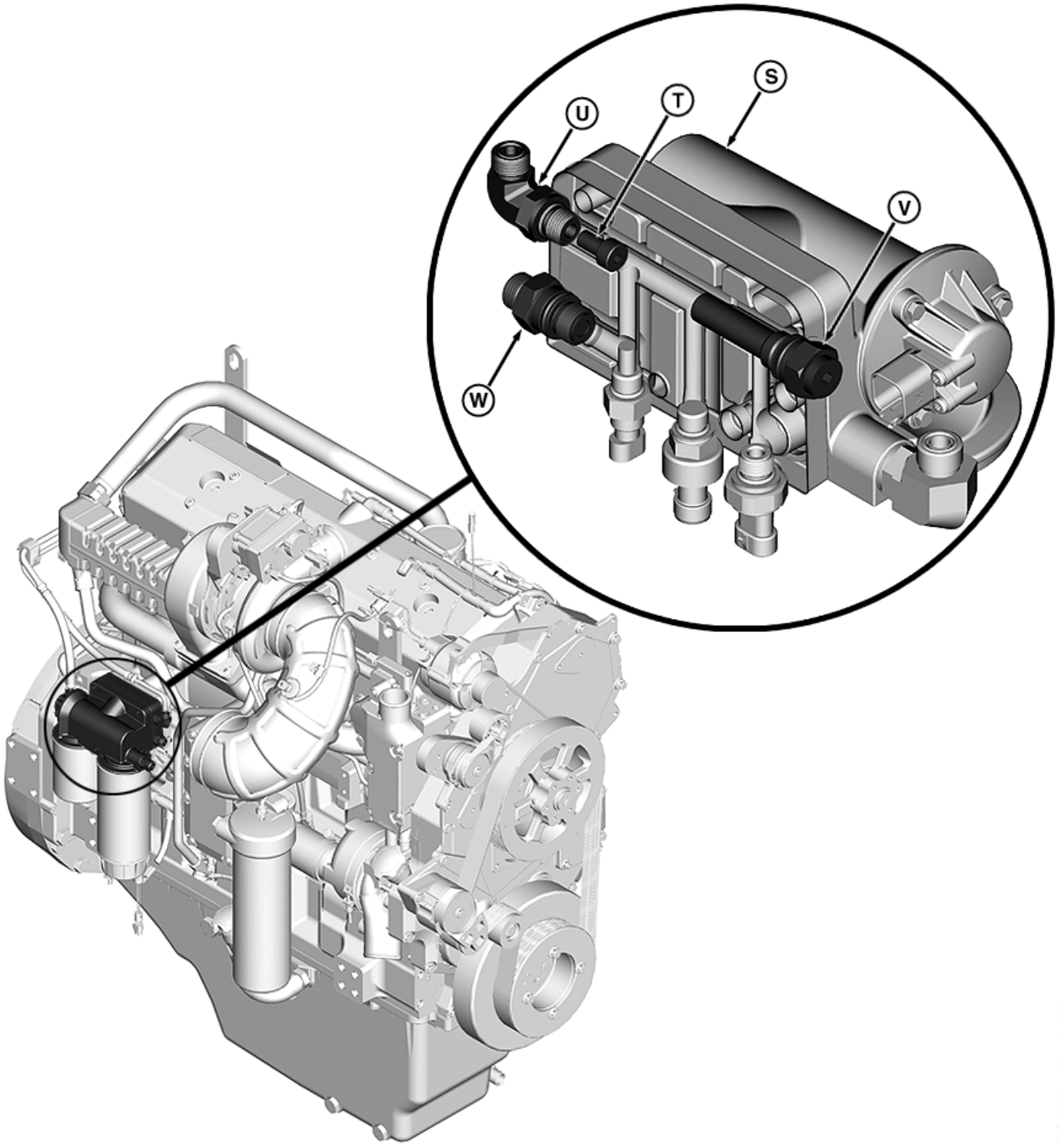
Component Location Diagram 4

N—Manifold Absolute Pressure (MAP) Sensor
O—Camshaft Position Sensor
P—Manifold Air Temperature (MAT) Sensor
Q—ECU
R—CAN Terminator

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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Component Location Diagram 5



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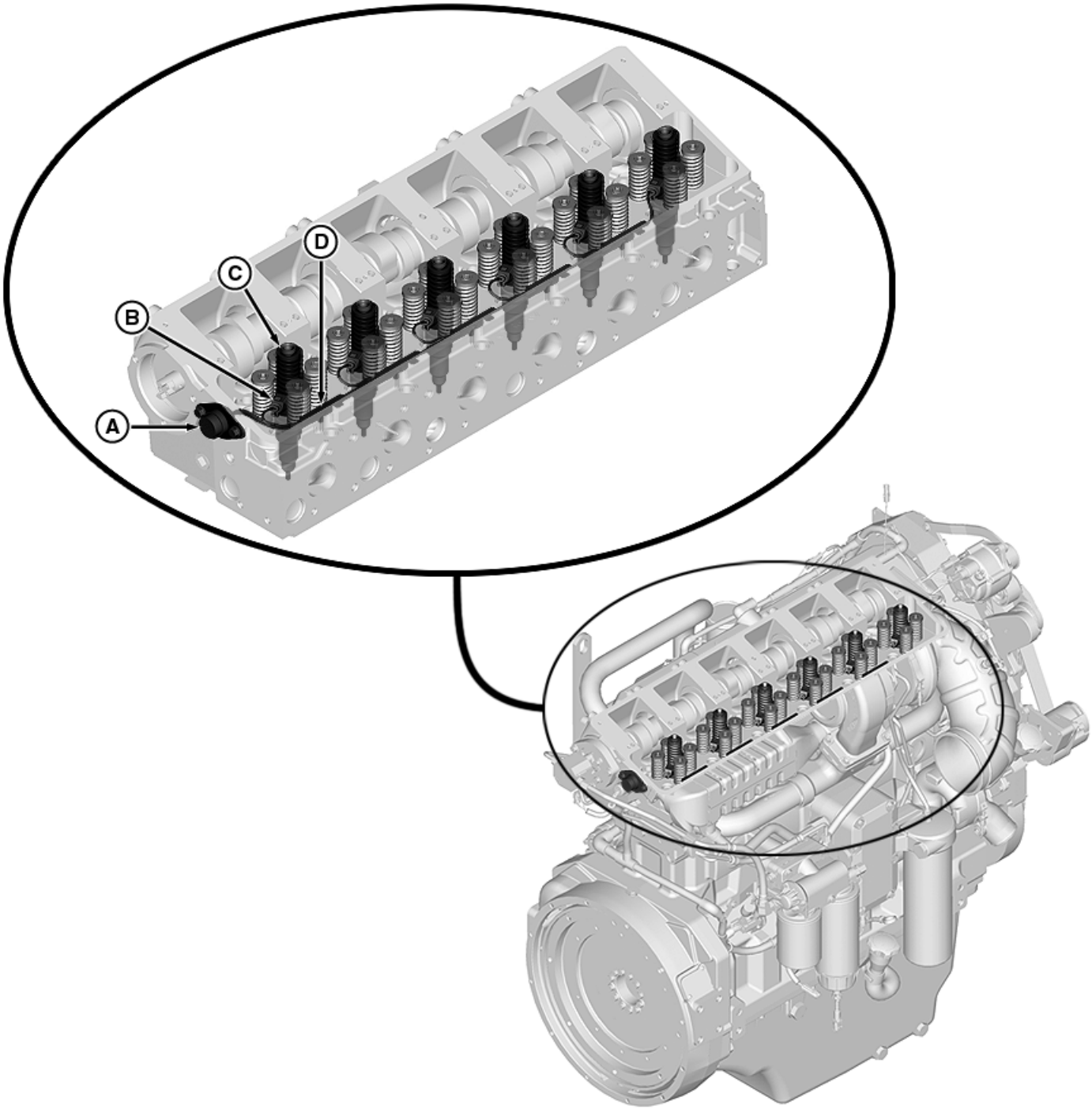
Component Location Diagram 5

S—Fuel Filter Head Assembly (Reverse Side)
T—Filter Screen
U—Filter Return Line Fitting
V—High Pressure Reg Valve
W—Low Pressure Reg Valve

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

BK53208,000004E -19-15OCT07-1/1

Component Location Diagram 6

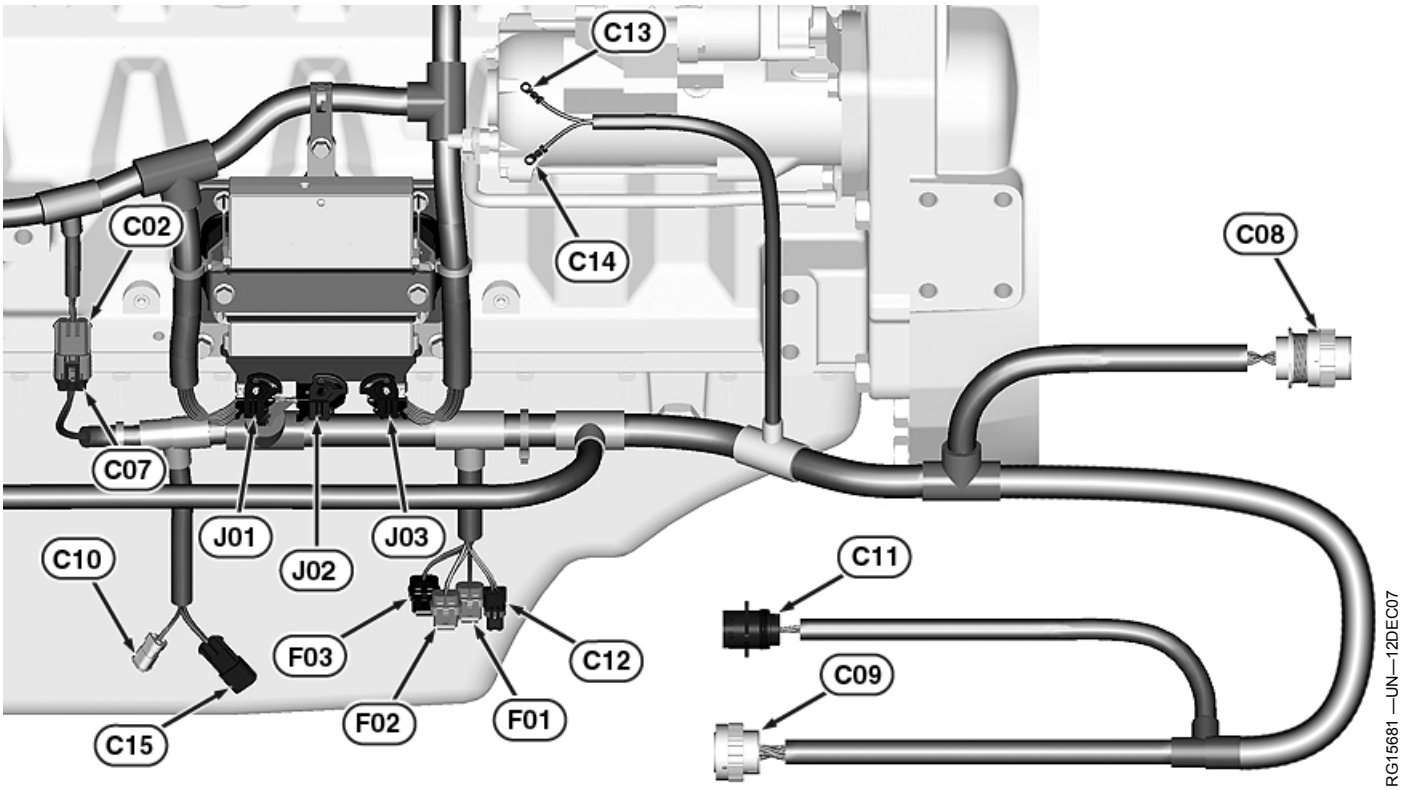


Injector Harness

A—External Harness Connector **B—Injector Connector** **C—Electronic Unit Injector** **D—Harness Clamp**

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Component Location Diagram 7



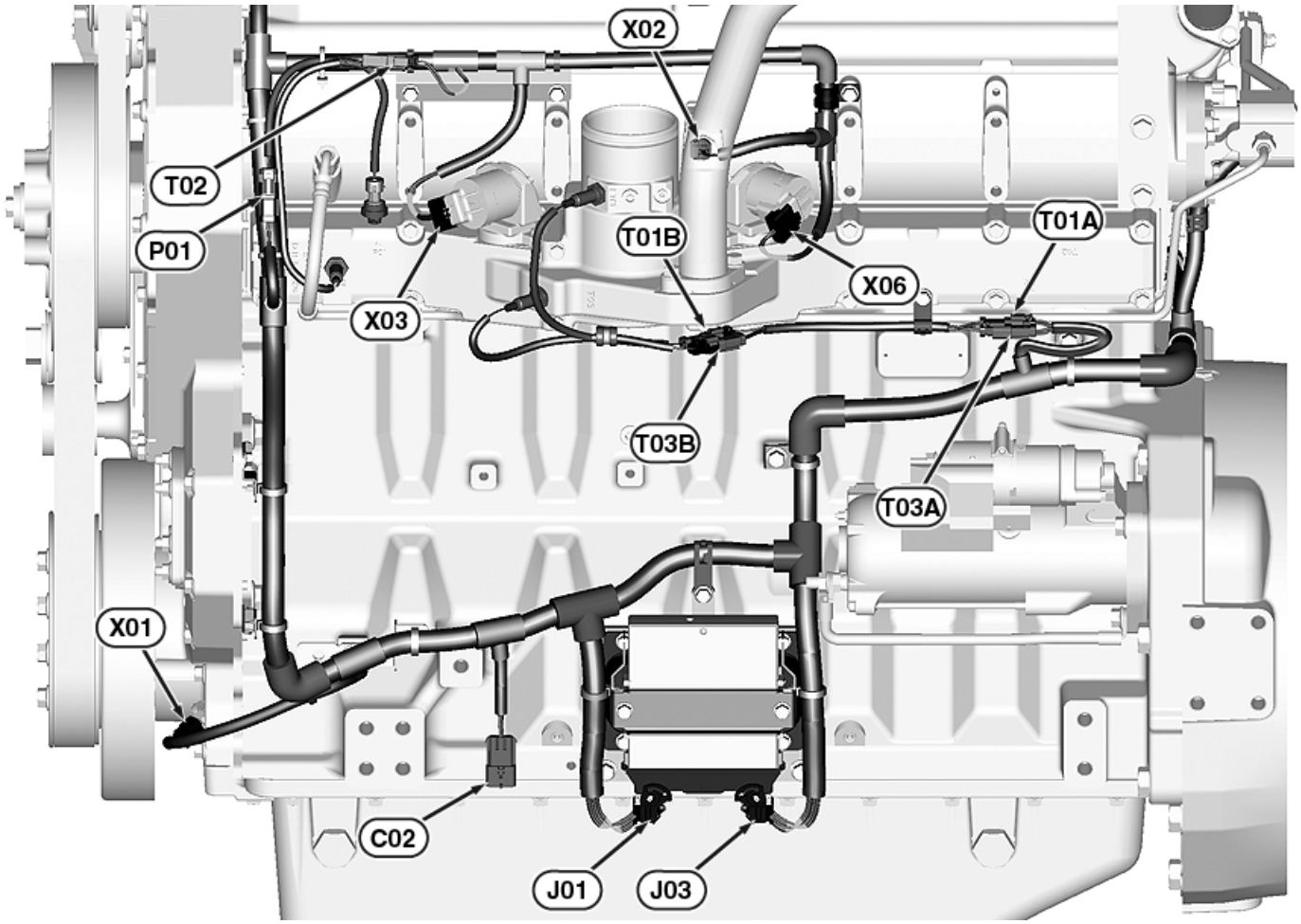
Component Location Diagram 7

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 8



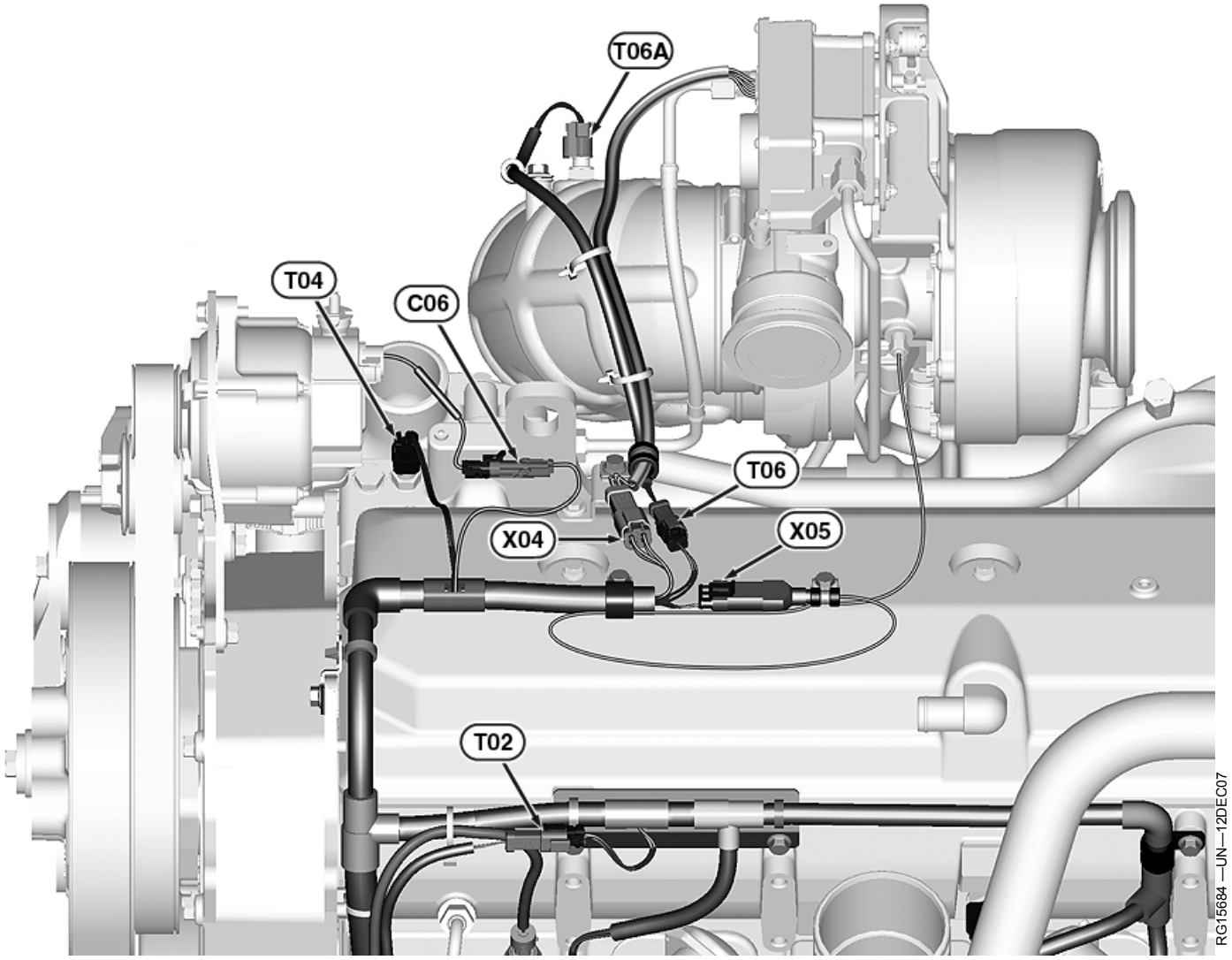
Component Location Diagram 8

C02— Accessory Connector A
J01— ECU Harness Connector, Black Face
J03— ECU Harness Connector, Red Face
P01— Manifold Air Pressure Sensor Connector
T01A— Charge Air Cooler Outlet Temperature Sensor Interconnect A
T01B— Charge Air Cooler Outlet Temperature Sensor Interconnect B
T02— Intake Manifold Air Temperature Sensor Connector
T03A— EGR Temperature Sensor Interconnect A
T03B— EGR Temperature Sensor Interconnect B
X01— Crankshaft Position Sensor Connector
X02— Camshaft Position Sensor Connector
X03— Front EGR Valve Connector
X06— Rear EGR Valve Connector

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

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Component Location Diagram 9



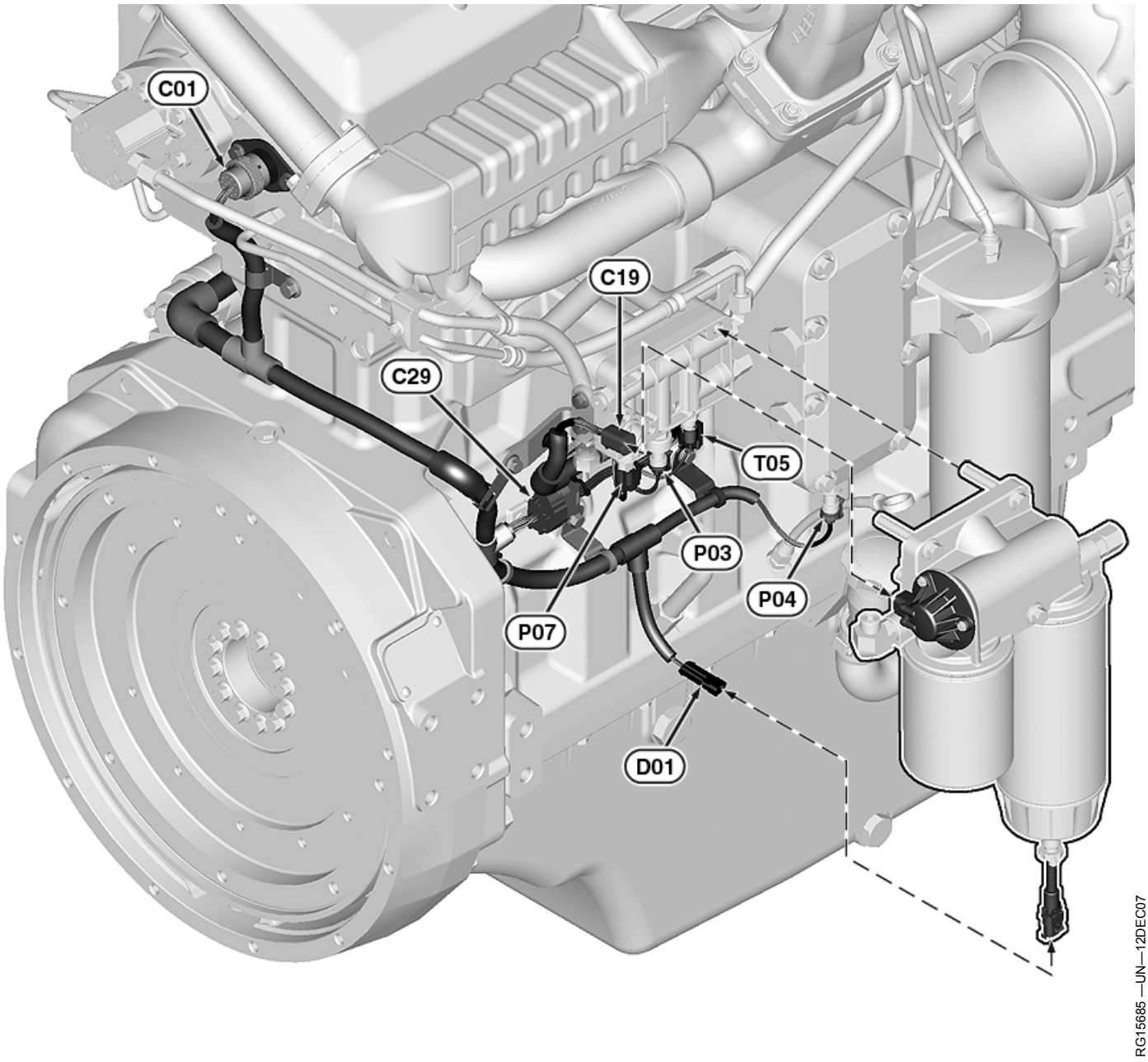
Component Location Diagram 9

C06— Alternator Excitation
T02— Intake Manifold Air Temperature Sensor Connector
T04— Coolant Temperature Sensor Connector
T06— Compressor Inlet Temperature Sensor Interconnect
T06A— 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 10



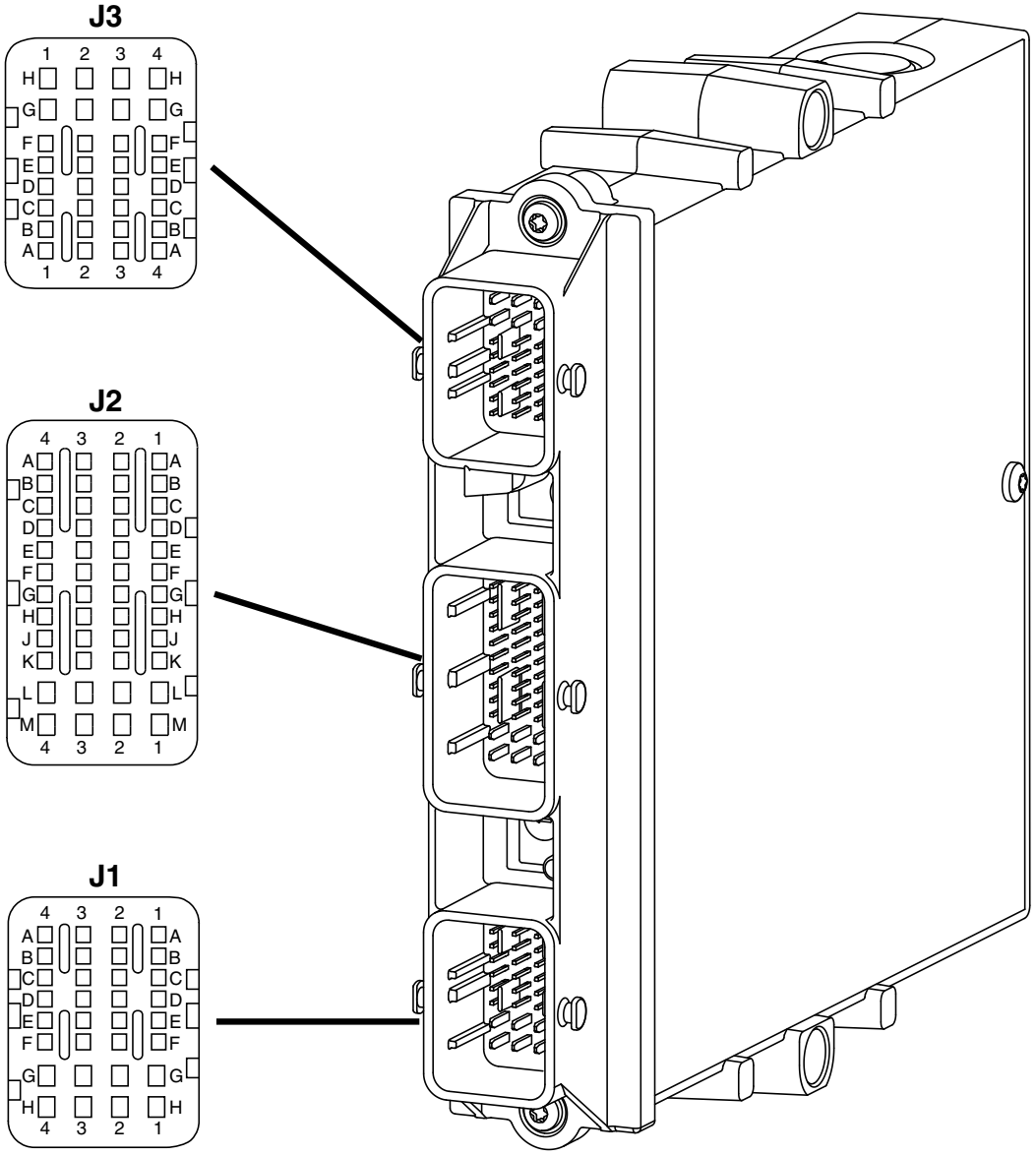
Component Location Diagram 10

C01— Fuel Injector Harness Connector
C19— Electronic Fuel Transfer Pump Connector
C29— Low Pressure Fuel System Interconnect
D01— Water-In-Fuel Sensor Connector
P03— High Pressure Fuel Sensor Connector
P04— Engine Oil Pressure Sensor Connector
P07— Low Pressure Fuel Sensor Connector
T05— Fuel Temperature Sensor Connector

NOTE: Some of the sensors shown are optional and are NOT used on all applications.

BK53208,000006F -19-29MAY08-1/1

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 SNAPSHOT INSTRUCTIONS 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.

DM80898,0000418 -19-30MAR11-2/2

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.

DM80898,00000E1 -19-15OCT07-1/1

Monitoring Engine Parameters

In order for the electronic control system to deliver fuel according to a given set of operating conditions and, on some applications to provide engine protection, the following engine parameters are monitored by the ECU:

- Crank Position
- Engine Control Unit (ECU) Temperature
- Engine Coolant Temperature (ECT)
- Fuel Rail Pressure
- Fuel Temperature
- Fuel Transfer Pump Pressure
- Manifold Air Pressure (MAP)
- Oil Pressure
- Pump Position
- Throttle Position
- Turbo Compressor Inlet Temperature
- Turbo Speed
- Turbo Turbine Inlet Temperature
- Water In Fuel (WIF)
- Manifold Air Temperature (MAT)
- Barometric Air Pressure (BAP)
- Throttle Position
- Power Supply #2
- Power Supply #3
- Power Supply #4
- Power Supply #5
- External Derate
- External Shutdown
- VGT Valve Position
- EGR Valve Position

OUOD006,0000064 -19-15OCT07-1/1

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.

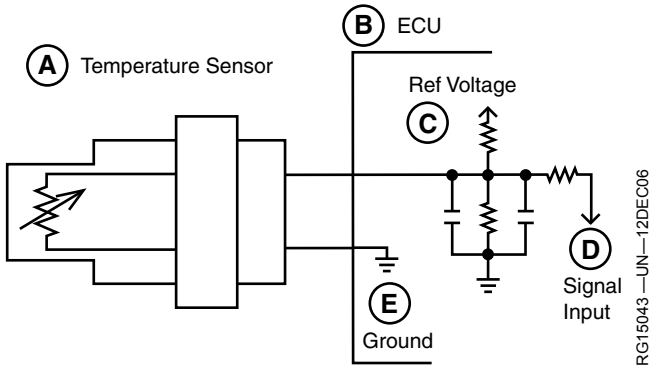


Figure 1

A—Temperature Sensor
B—ECU
C—Reference Voltage
D—Signal Input
E—Ground

RG40854,00000E4 -19-15OCT07-1/1

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.

RG41221,00002A7 -19-15OCT07-1/1

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 DIAGRAM 1 earlier in this Group.

DB92450,000000F -19-25MAR11-1/1

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.

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 earlier in this Group.

DM80898,000043A -19-25MAR11-1/1

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 4 earlier in this Group.

DN22556,00006CA -19-25MAR11-1/1

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

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

Measuring Pressure

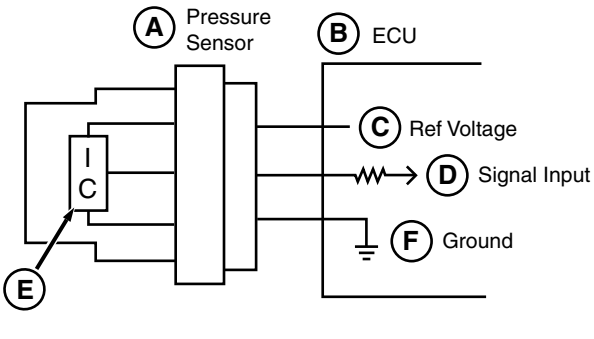
All engine pressure sensors (A) are 3-wire devices. As pressure changes, output changes. The ECU (B) supplies the sensor with a reference voltage (C) and ground (F). It monitors the output voltage from the sensor signal output wire (D). As the pressure changes, it causes the input to the ECU to change. 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

High-Pressure Fuel 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 high 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 DIAGRAM 2 earlier in this Group.

DN22556,00000D8 -19-25MAR11-1/1

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 DIAGRAM 2 earlier in this Group.

OUOD006,0000065 -19-25MAR11-1/1

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 DIAGRAM 4 earlier in this Group.

DM80898,0000422 -19-25MAR11-1/1

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 DIAGRAM 2 earlier in this Group.

DB92450,0000016 -19-25MAR11-1/1

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

The Crank Position Sensor is located on the front of the timing gear cover. It is an inductive type pickup sensor that detects teeth on the crankshaft timing gear. The ECU uses the timing position input to determine engine speed and precise piston position in relation to the firing order. The crankshaft timing gear is composed of 60 evenly-spaced teeth and three 3-tooth section with no notches. The three different 3-tooth sections help the ECU determine when cylinder #1 is at Top-Dead-Center (TDC).

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. The ECU provides engine protection for Crank Position Sensor problems.

For more information on how speed sensors operate, see MEASURING SPEEDearlier 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.

DM80898,0000438 -19-25MAR11-1/1

Cam Position Sensor

It is an inductive type pickup sensor that detects teeth on the cam shaft. There are 6 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 Cam 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 DIAGRAM 4 earlier in this Group.

DM80898,0000423 -19-25MAR11-1/1

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).

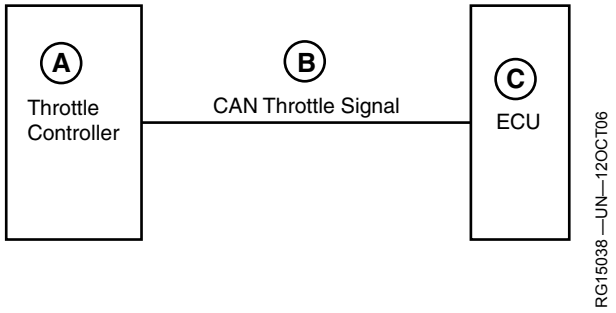
A description of each type follows later in this group.

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



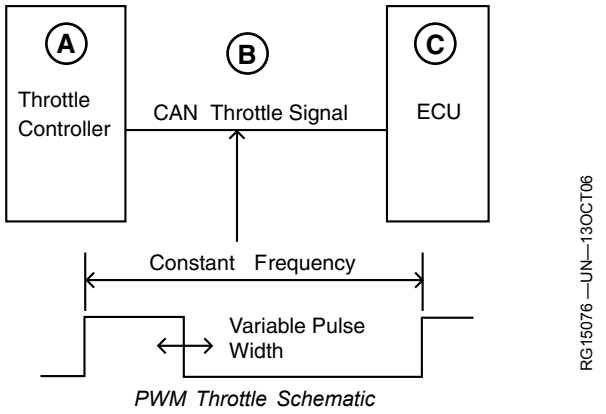
CAN Throttle Schematic

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

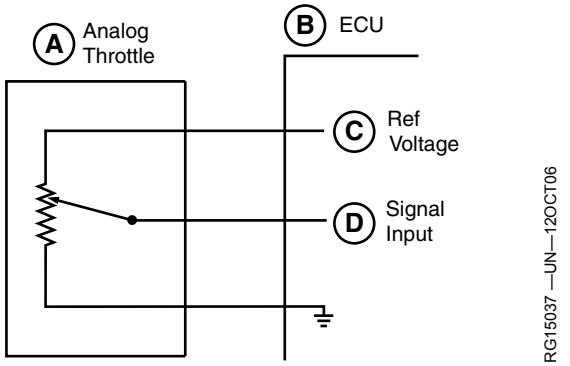
DM80898,000012A -19-15OCT07-1/1

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

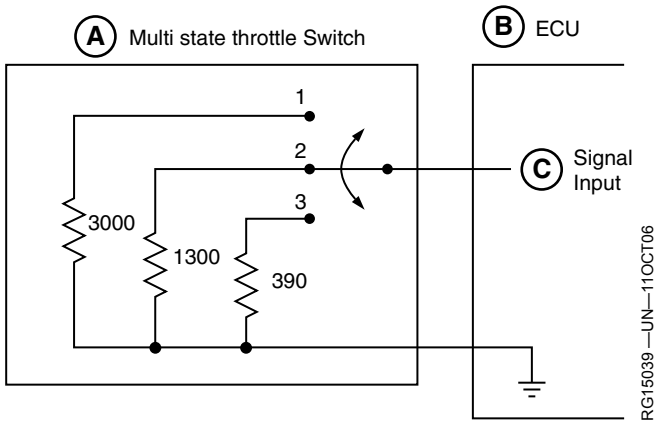
Dual-State Throttle

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

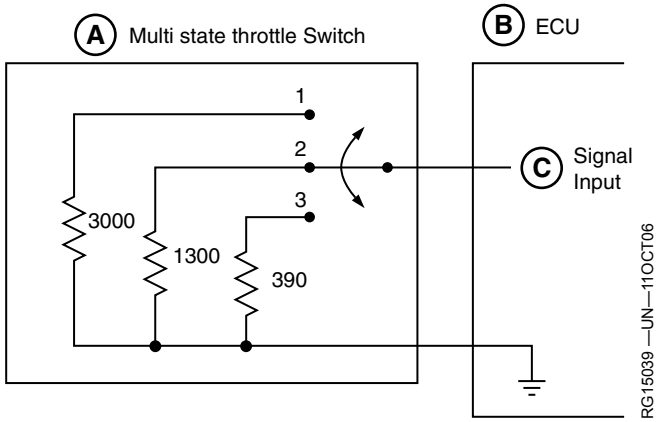
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Tri-State Throttle

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.

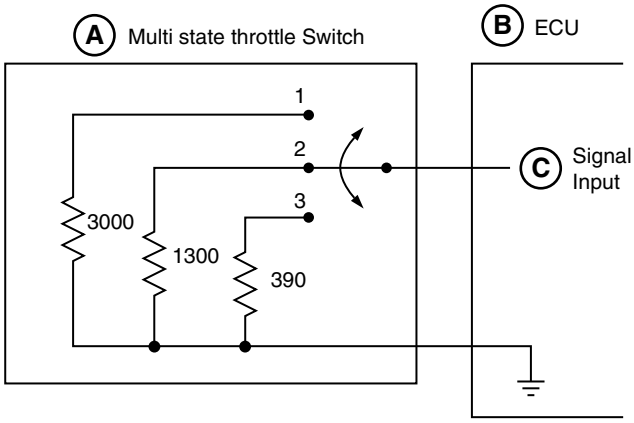
To change engine speed, the tri-state throttle must be in the Adj position and the “Bump Enable” switch must be in the “enable up” or “enable down” position while the “Idle Select” switch is held in the increase (+) or the decrease (–) position.



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.

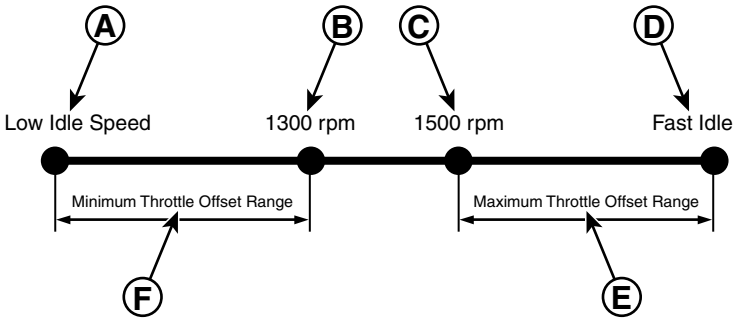
- **Idle Recovery:** When a throttle OOR condition is detected, only the OOR throttle input will be considered 0%. If the input becomes valid again after the OOR condition, the OOR throttle must be returned to low idle position (0% throttle) before the output of the throttle is allowed to increase above 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

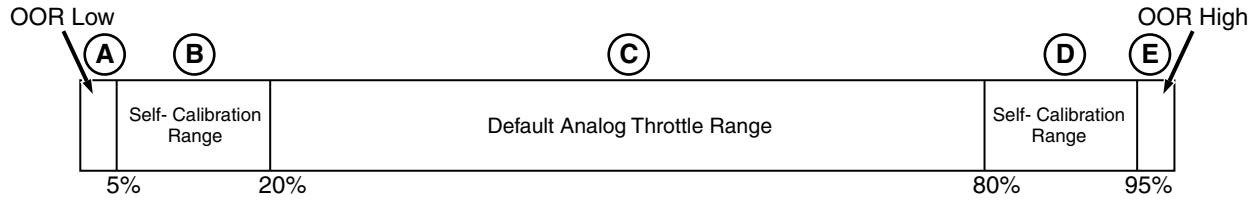
The Minimum Throttle Offset is used to pre-set the low speed idle bump. The number entered into the field on the Trim Page will be the rpm increase from the standard factory setting of the idle speed. This offset will apply to all active throttles. The maximum setting for the Minimum Throttle Offset 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

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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).

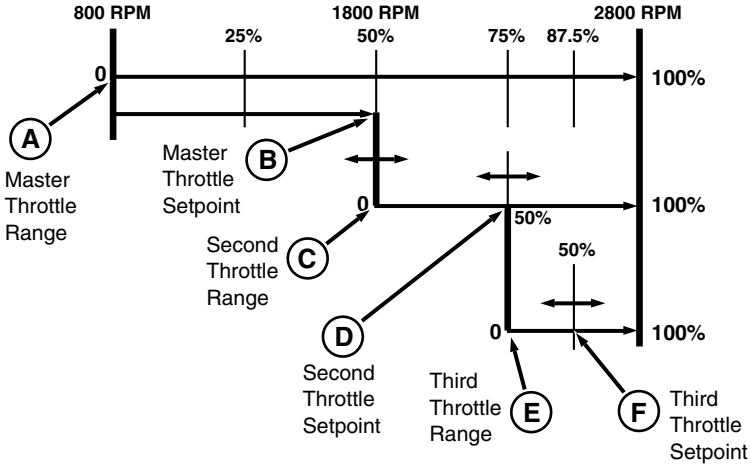
Any type of throttle can be used in the combination. Currently, the only OEM throttle types used are 2-state, 3-state, ramp, and analog. PWM and CAN throttles can be used but are not currently configured for use within the software.

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.

DM80898,0000007 -19-15OCT07-1/1

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 Unit Injector (EUI) Wiring Harness Connector

The EUI wiring harness connector is located in the end of the head. This connector provides voltage and a ground from the ECU to the EUI wiring harness internal to the head.

For wiring information, see ELECTRONIC UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.

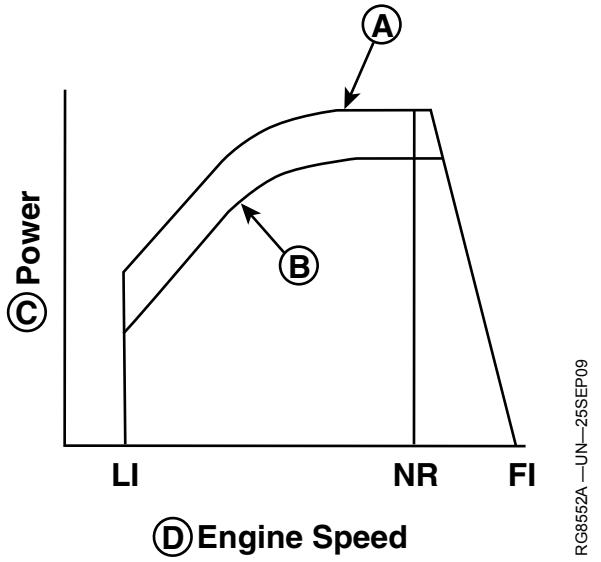
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Torque Curve Selection

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

RG40854,00000F2 -19-02NOV09-1/1

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

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 Diagram 1 earlier in this Group.

RG41221,00000A8 -19-25MAR11-1/1

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 #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.

- Primary Analog Throttle

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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.

- Drop/Isochronous Governor Switch
- Multi-State Throttle Switch
- Secondary Analog Throttle

DM80898,000044B -19-15OCT07-1/1

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

DM80898,0000442 -19-15OCT07-1/1

Section 04
Diagnostics

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About this Group

NOTE: Group 165, Common Observables, contains additional diagnostic procedures that are common to all fuel system types.

This group of the manual contains necessary information for observable diagnostics and fuel-related test procedures. Use this information in conjunction with the Base Engine Manual. Group 150 is divided into two areas: diagnosing malfunctions and test procedures. The diagnosing malfunctions area is further divided into the following headings, containing the following observable symptoms:

- **(E)** Diagnosing General Engine Malfunctions:
  - 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
  - E7 - Engine idles poorly
- **(F)** Diagnosing Low Pressure Fuel System Malfunctions
  - F1 - Fuel supply system 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 testing procedures in the second part of this section. The second part of this section of the manual contains the following testing procedures:

- Fuel System Testing Procedures:
  - Check fuel supply quality
  - Test for air in fuel
  - Check fuel supply pressure
  - Bleed fuel system
  - Restarting engine that has run out of fuel
  - Exhaust gas recirculation (EGR) system diagnostic
  - VGT Component Test

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E1 - Engine Cranks but Won't Start

DN22556,0000449 -19-18NOV08-1/18

E1 - Engine Cranks/Won't Start Diagnostic Procedure

DN22556,0000449 -19-18NOV08-2/18

1 E1 - Preliminary Check

Before using this diagnostic chart:

1. Ensure that fuel quality and quantity are OK
2. Ensure that engine cranking speed is OK
3. Ensure that engine has the proper oil for the current conditions. Refer to base engine manual for the proper oil at current air temperatures
4. Ensure that the engine has the coolant for the current conditions. Refer to base engine manual for the proper coolant guidelines.

No problems found:
GO TO 2

Problem found:
Repair and retest

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2 Battery Voltage Test

Monitor battery voltage while cranking the engine.

NOTE: If engine will not start while cranking; and either batteries do not maintain a minimum of 8 volts (in extremely cold weather, -40 ° C (, 6 volts), or engine RPM drops below 80 RPM; see ENGINE CRANKING SPEED requirements in the Base Engine manual.

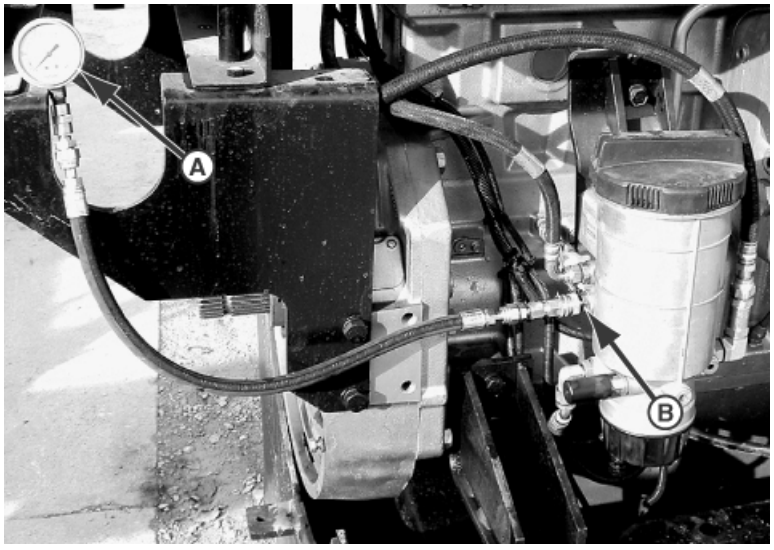
Battery voltage is adequate while cranking:
GO TO 3

Battery voltage is not adequate while cranking:
Charge or replace batteries, and GO TO 2

DN22556,0000449 -19-18NOV08-4/18

3 Fuel Pressure Check

1. Install a 0-150 psi pressure gauge (A) on the diagnostic port (B).



RG14686 —UN—19JAN06

Gauge on Diagnostic Port

2. Crank the engine over.

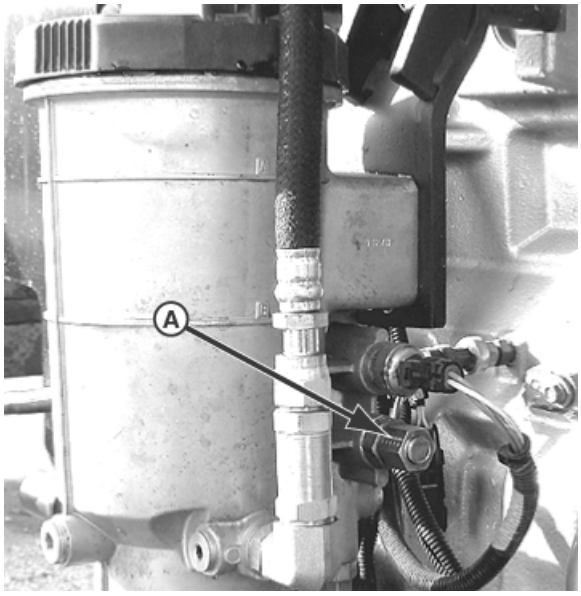
NOTE: Pay attention to the how quickly the fuel pressure reaches 20 PSI. If it was almost instantaneous the fuel is probably air free. If it climbed slowly the fuel is probably saturated with air and it will take the pump awhile to compress the air. Air in the fuel will lead to hard starting; air comes from air leaks on the vacuum side of the system or combustion leaks on the pressure side of the fuel system.

A minimum of 20 PSI is attained:
GO TO 10

A minimum of 20 PSI is not attained:
GO TO 4

Continued on next page

DN22556,0000449 -19-18NOV08-5/18

4 Additional : Fuel Pressure Check	1. Install a cap (A) on the return to tank fuel outlet on the primary fuel filter.  RG14687 —UN—18JAN06 *Cap on Primary Fuel Filter Return* 2. Crank engine over.	**A minimum of 20 PSI is attained:** GO TO 8 **A minimum of 20 PSI is not attained:** GO TO 5

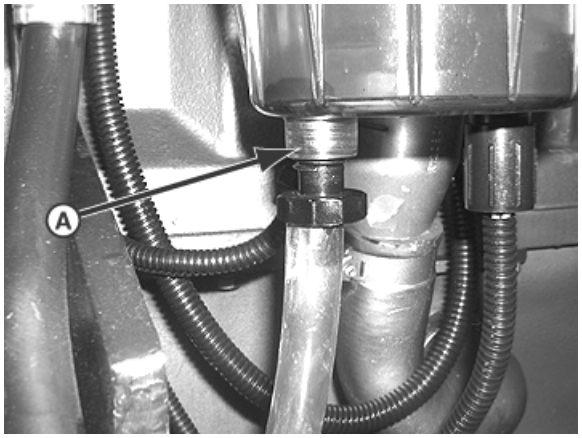
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5 Fuel Supply Condition (Plugged)

1. Close fuel shutoff valve, if equipped.

2. Drain the water separator bowl (A) contents into a small container, using the water separator petcock.

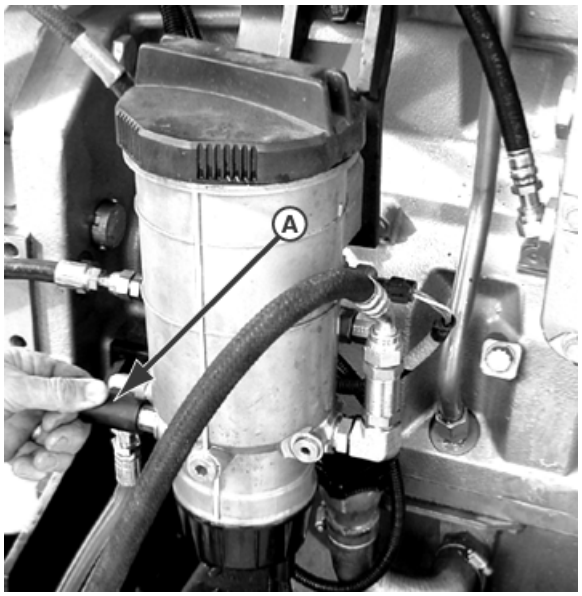


RG14688 —UN—18JAN06

Drain Water Separator bowl Contents

3. Remove the fuel supply line to the primary fuel filter, and install a temporary fuel line in its place. Put the other end of the line into a suitable diesel fuel container filled with diesel fuel.

4. Using the hand primer (A), pump clean fuel into the separator bowl.



RG14689 —UN—18JAN06

Hand Primer

Clean fuel was pumped into the sediment bowl:
GO TO 7

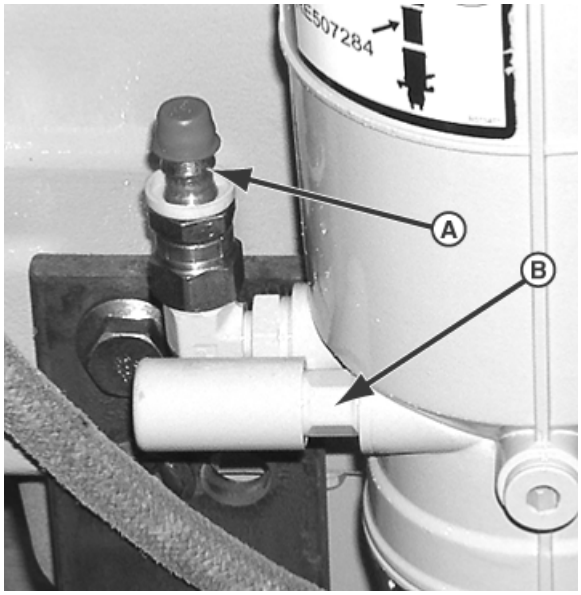
Clean fuel was not pumped into the sediment bowl:
GO TO 6

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DN22556,0000449 -19-18NOV08-7/18

6 Debris in Fuel System/Failed Hand Primer

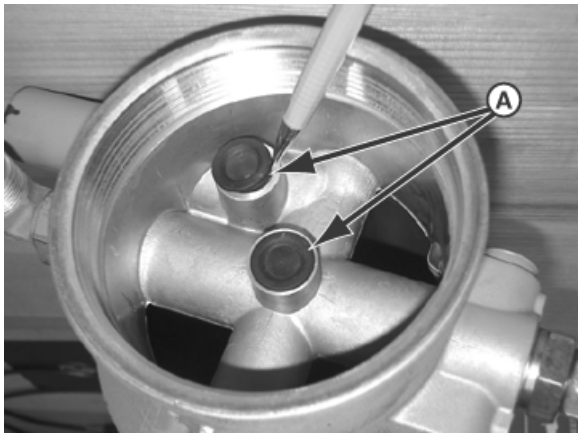
1. Remove the fuel inlet fitting (A) and hand primer (B) from the primary fuel filter assembly. (See base engine manual.) Check for debris in the fuel inlet area of the filter assembly.



RG14690 —UN—18JAN06

Fuel Inlet Area

2. Remove the water separator bowl. (See REMOVE AND INSTALL WATER SEPARATOR BOWL.) Blow out fuel passages, including the two, small flapper valves (A), located on the bottom of the fuel filter assembly.



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Flapper Valves

Continued on next page

3. Check the flapper valves. The spring (B) should hold them tightly against the seat. If not, replace as needed.



RG14692 —UN—19JAN06

Spring

Clean fuel was pumped into the sediment bowl:
GO TO 7

CAUTION: Wear safety goggles while clearing passages to protect your eyes.

4. Reassemble water separator, hand primer, fuel inlet fitting.

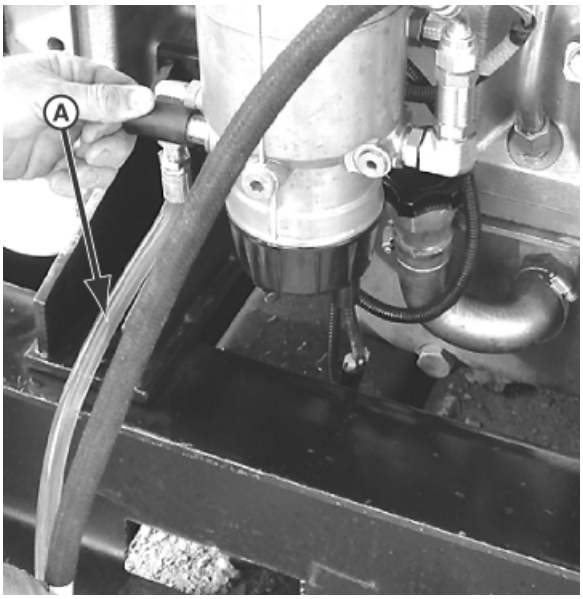
Clean fuel was not pumped into the sediment bowl:
GO TO 6

Continued on next page

DN22556,0000449 -19-18NOV08-9/18

7 Fuel Filter/Check Valve Condition

1. Close water separator petcock.
2. Remove the fuel supply line from the primary fuel filter to the two-micron secondary fuel filter.
3. 3. Install a temporary fuel line from the primary fuel filter outlet to the temporary fuel supply tank.



RG14693 —UN—19JAN06

Temporary Fuel Line

4. Use the hand primer to pump fuel through the fuel filter and into the container.

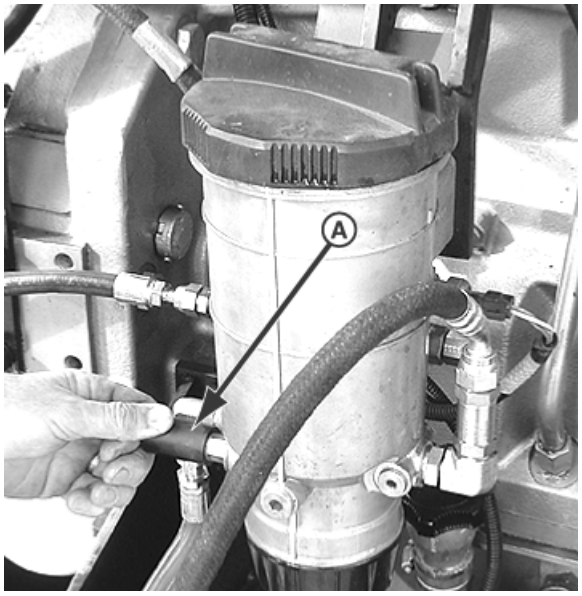
NOTE: Some applications will have a check valve on the outlet to the transfer pump, if there is a check valve make sure it is not blocked by debris.

Fuel was pumped into the Container:
Reinstall transfer pump supply line, and GO TO 9

Fuel was not pumped into the Container:
Replace fuel filter, or check valve (See base engine manual), and repeat 7

Continued on next page

DN22556,0000449 -19-18NOV08-10/18

8 Low Pressure Regulator Failure	1. Replace the low pressure fuel regulator. (See base engine manual.) 2. Remove the plug from the return to fuel tank line and install a temporary line; put the other end into a temporary fuel container filled with good fuel. 3. Install a temporary fuel line from the same container to the primary fuel filter inlet. 4. Purge air from the fuel system by pumping the hand primer (A).  RG14694 —UN—18JAN06 5. Crank Engine Over.	**20 PSI fuel pressure was observed:** GO TO 9 **20 PSI fuel pressure was not observed:** GO TO 10

DN22556,0000449 -19-18NOV08-11/18

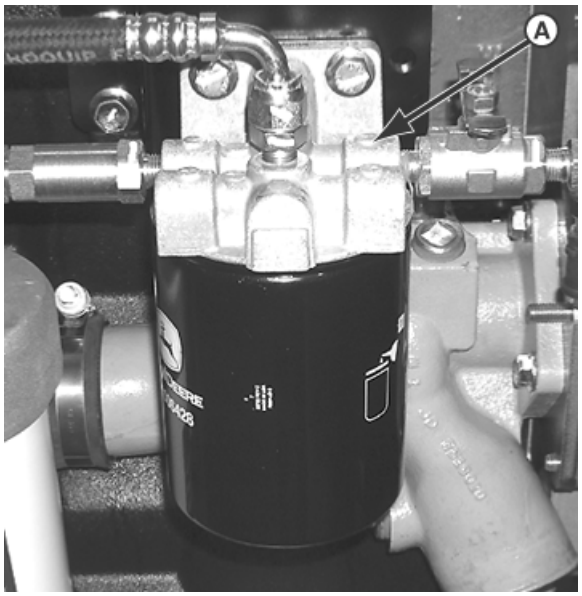
9 Engine Start Test I	Attempt engine start	**Engine started:** Replace all lines, remove all plugs, problem condition solved. **Engine did not start:** GO TO 10

Continued on next page

DN22556,0000449 -19-18NOV08-12/18

10 Engine Start Test II

1. Remove pressure gauge from diagnostic port.
2. Remove the fuel inlet (A) (Transfer pump outlet line) line from the 2-Micron secondary filter assembly.



RG14695 —UN—18JAN06

Secondary Filter Fuel Inlet Removal

3. Install pressure gauge on transfer pump outlet line. (Deadheads the transfer pump.)
4. Cap the inlet to the two-micron secondary fuel filter, where the transfer pump outlet line was attached.
5. While monitoring fuel line pressure, crank the engine over.

Pressure greater than 760 Kpa (110 PSI) was attained:
GO TO 10

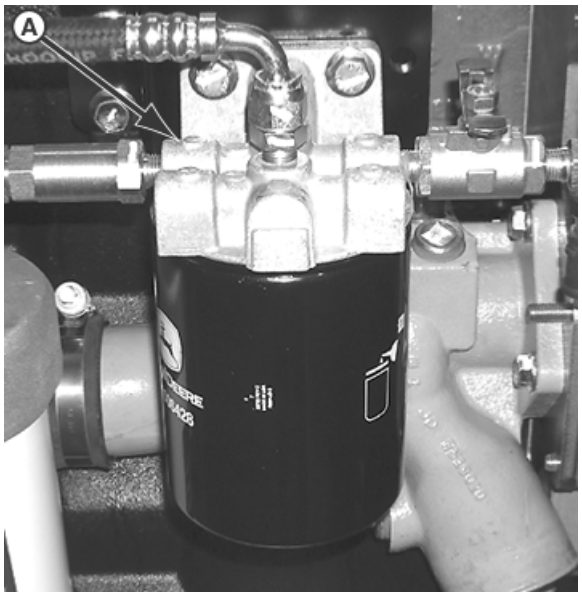
Pressure greater than 760 Kpa (110 PSI) was not attained:
Service transfer pump. (Refer to base engine manual.) When service complete, repeat this step.

Continued on next page

DN22556,0000449 -19-18NOV08-13/18

11 Two-Micron Fuel Filter Test

1. Remove the pressure gauge, from the transfer pump outlet line, at the two-micron secondary filter. Reinstall the fuel line onto the secondary filter inlet.
2. Remove the fuel line from the secondary filter outlet (A) assembly.



RG14696 —UN—18JAN06

Secondary Filter Fuel Outlet Removal

3. Install pressure gauge on the outlet of secondary fuel filter. (This will deadhead transfer pump.)
4. Cap secondary fuel filter outlet line to cylinder head fuel inlet.
5. Crank engine over, and monitor the fuel line pressure.

Pressure greater than 760 Kpa (110 PSI) was attained:
GO TO 12

Pressure greater than 760 Kpa (110 PSI) was not attained:
Replace two-micron filter, and repeat step 11.

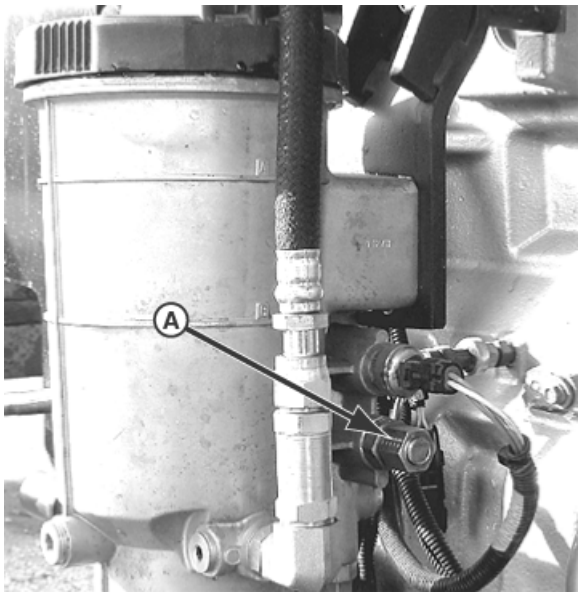
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DN22556,0000449 -19-18NOV08-14/18

12 High Pressure Fuel Regulator

1. Remove the pressure gauge from the two-micron secondary fuel filter and reattach the original fuel line to the two-micron secondary fuel filter.

2. Remove the fuel line from the return to tank fuel outlet, and cap it (A).



RG14687 —UN—18JAN06

Cap on Primary Fuel Filter Return

3. Install the pressure gauge on the primary fuel filter diagnostic port.

4. Crank the engine over.

Fuel pressure reads from between 85 to 90 PSI: GO TO 13

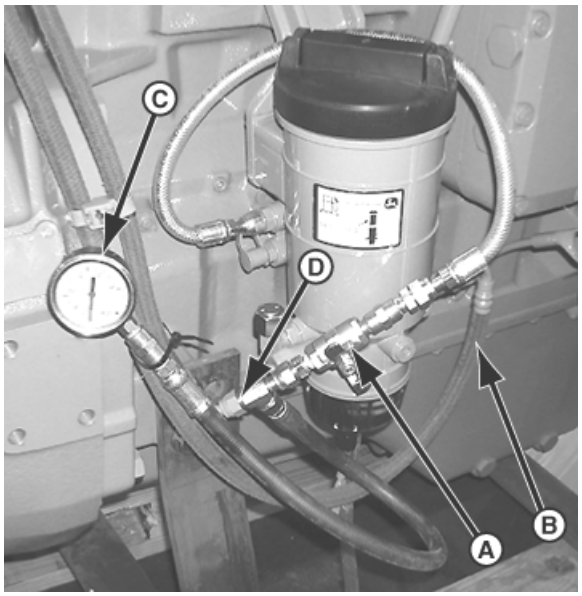
Fuel pressure does not read from between 85 to 90 PSI: Replace high pressure regulator, and clean screen filter. (See base engine manual.) Repeat test.

Continued on next page

DN22556,0000449 -19-18NOV08-15/18

13 Air/Combustion Gas in Fuel System

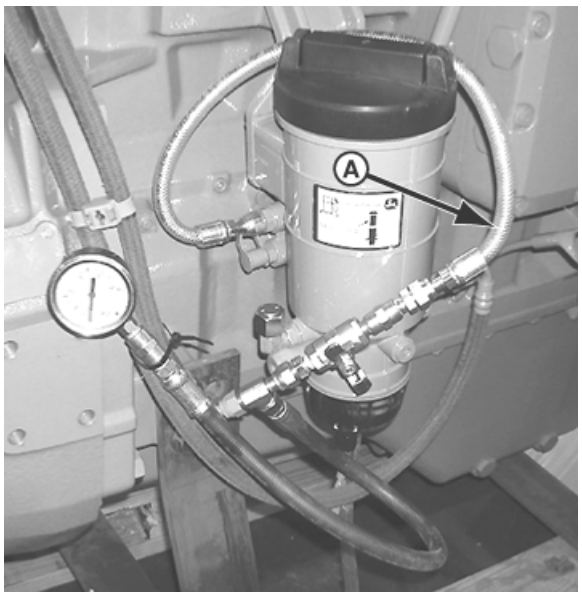
1. Install a two-way valve (A) on the recirculation line outlet (B) to the primary fuel filter, with a pressure gauge (C) on the cylinder head side (D).



RG14697 —UN—18JAN06

Two-Way Valve and Pressure Gauge

2. Remove the cap on the return to tank fuel outlet and install the temporary return fuel line.
3. Install a reinforced clear fuel line (A) between the two-way valve and the primary fuel filter.



RG14698 —UN—18JAN06

Reinforced, Clear Line

NOTE: : Use Suction Control Valve high pressure hose PMK3150-06. This hose is available at your John Deere dealer. This is not high temperature hose and should be removed as soon as the test is done.

4. Close the two-way valve. (This increases the fuel pressure during cranking to about 100 PSI, forcing any air from the injection nozzles.)
5. Crank Engine.

Engine Started:GO TO 14

Engine did not Start:GO TO 15

Continued on next page

DN22556,0000449 -19-18NOV08-16/18

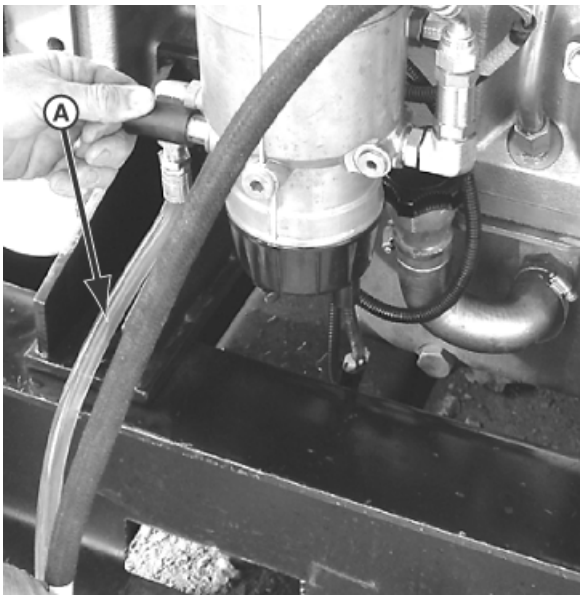
14 Air/Combustion Gas in Fuel System II	Open the two-way valve allowing fuel recirculation; monitor the clear plastic line for air bubbles. *NOTE: Kinds of air bubbles:* *1. Normal. (Seen more clearly in the return to supply tank clear fuel line.) Visible on close examination. These bubbles are trapped normally in diesel fuel, and should not be a problem.* *2. Air infiltration. (Seen more clearly in the return to supply tank clear fuel line.) Clusters of bubbles easy to see. These bubbles occur when there is an air leak on the vacuum side of the fuel system.* *3. Foam (fuel discoloration). These bubbles occur when combustion gas is leaking into the fuel system:* • *Pink discoloration is slight.* • *White discoloration is extreme.*	**Normal air bubbles are seen:**Problem resolved. **Clusters of bubbles are seen:**Air infiltrations on the vacuum side of the fuel system. Check for air leaks, faulty o-rings, cracked fuel lines. Replace as required. **Foam is seen:**For torque specifications, see base engine manual. Tighten the hold down clamps of the unit injectors to torque specifications. If the foam continues, it will be necessary to replace and torque the leaking nozzle(s). (See base engine manual.)

Continued on next page

DN22556,0000449 -19-18NOV08-17/18

15 Bleed Fuel System

1. Open recirculation valve, allowing fuel to flow from cylinder head into primary fuel filter.
2. Install a clear line at diagnostic port on primary fuel filter, putting open end of the line into temporary fuel supply container.



RG14693 —UN—19JAN06

Temporary Fuel Line

3. Crank engine over, while bleeding trapped air and fuel from fuel system into a suitable container.
4. Remove temporary fuel line from diagnostic port.
5. Crank engine over.

Engine started: Open recirculation line valve and repeat Step 13.

Engine did not start: Refer to Base Engine manual and check camshaft to crankshaft timing.

DN22556,0000449 -19-18NOV08-18/18

E2 - Engine Misfires/Runs Irregularly

DN22556,000044A -19-16JUL10-1/14

E2 - Engine Misfires/Runs Irregularly Diagnostic Procedure

DN22556,000044A -19-16JUL10-2/14

1 E2 - Preliminary Check	Before using this diagnostic chart, check for the following that could cause or be mistaken as miss/rough running: 1. Intake manifold air leaks 2. Engine mechanical problems 3. Transmission problems 4. Engine Accessories, such as A/C, cycling on and off 5. Electromagnetic interference (EMI) from improperly installed radios etc.	**No problems found:** GO TO 2 **Problem found:** Repair and retest.

DN22556,000044A -19-16JUL10-3/14

2 Active DTC Test	1. Connect SERVICE ADVISOR. For instructions on connecting to SERVICE ADVISOR , see CONNECTING TO SERVICE ADVISOR earlier in this Group. 2. Ignition ON, engine OFF 3. Start ECU communication software 4. Ignition ON, engine idling 5. Read DTCs using SERVICE ADVISOR™.	**No active DTCs:** GO TO 3 **Active DTCs present:** Diagnose active DTCs first. If any of the DTCs have an SPN of 636 or 637, diagnose those first.

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DN22556,000044A -19-16JUL10-4/14

3 Engine Performance Check	1. Ignition ON, engine idling 2. Observe engine performance.	**Not running rough:** GO TO 4 **Running rough:** GO TO 6

DN22556,000044A -19-16JUL10-5/14

4 Recreate Conditions	Operate engine under conditions where the miss/rough running complaint occurs.	**Not running rough:** No problem found, verify complaint and try to reproduce conditions of miss/rough running complaint. **Running rough:** GO TO 5

Continued on next page

DN22556,000044A -19-16JUL10-6/14

5 Active DTC Test with Engine Running Rough	when engine is rRead DTCsunning rough.	**No active DTCs:** GO TO 6 **Active DTCs present:** Diagnose active DTCs first. If any of the DTCs have an SPN of 636 or 637, diagnose those first.

DN22556,000044A -19-16JUL10-7/14

6 Compression and Misfire Test	1. Perform the Compression Test. For instructions, see CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS in Section 04 Group 160.	**All cylinders scored within 10% of each other on both tests:** GO TO 7
	2. Make note of the results.	**One or more cylinders scored 10% or more lower than the rest on the compression test and DIFFERENT cylinder(s) scored 10% or more lower on the misfire test:** GO TO 8
	3. Perform the Engine Misfire Test. For instructions, see CYLINDER MISFIRE TEST INSTRUCTIONS in Section 04 Group 160.	**One or more cylinders scored 10% or more lower than the rest on the compression test and the SAME cylinder(s) scored 10% or more lower on the misfire test:** GO TO 9
	4. Make note of the results.	**All cylinders scored within 10% of each other on the compression test and one or more cylinders scored 10% or lower than the rest on the misfire test:** GO TO 10

DN22556,000044A -19-16JUL10-8/14

7 Fuel Supply System Check	Check the fuel supply system.	**Fuel supply system is OK:** GO TO 11
	• See F1 - FUEL SUPPLY SYSTEM CHECK or F1 - TYPE 2 FUEL SUPPLY SYSTEM CHECK in this Group.	**Fuel supply system problem found:** Repair fuel supply system problem and retest

DN22556,000044A -19-16JUL10-9/14

8 Inconclusive Test Results	These types of results indicate either the misfire test or the compression test could not operate correctly. Further engine diagnostics should be performed to determine if the engine misfire is caused by a faulty EUI or by a compression problem.	

Continued on next page

DN22556,000044A -19-16JUL10-10/14

9 Low Compression Pressure Check	Determine the cause of low compression pressure on the low scoring cylinders.	

DN22556,000044A -19-16JUL10-11/14

10 Suspected EUI(s) Pre-Load Adjustment Check	1. Check EUI pre-load adjustment on the EUI(s) of the cylinder(s) that tested low on the misfire test. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the base engine manual. 2. If EUI pre-load is adjusted properly, replace the EUI(s) of the cylinder(s) that tested low on the misfire test.	

DN22556,000044A -19-16JUL10-12/14

11 EUI and Valve Adjustment Test	Check EUI pre-load adjustment and check valve adjustment. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the base engine manual.	**EUIs and valves properly adjusted:** GO TO 12 **EUIs and valves NOT properly adjusted:** Adjust EUIs and valves to specification and retest. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the base engine manual.

DN22556,000044A -19-16JUL10-13/14

12 Verification Check	1. Ensure there are no engine mechanical problems 2. Ensure there is not something drawing excessive engine power 3. If none of the above problems are found, see E3 - ENGINE DOES NOT DEVELOP FULL POWER in this Group.	

DN22556,000044A -19-16JUL10-14/14

E3 - Engine Does Not Develop Full Power

DN22556,000044B -19-16JUL10-1/14

E3 - Engine Does Not Develop Full Power Diagnostic Procedure

DN22556,000044B -19-16JUL10-2/14

1 E3 - Preliminary Check	Before using this diagnostic chart, ensure that: 1. There are no problems with transmission 2. There are no engine mechanical problems 3. There is not an excessive load on the engine 4. There is no unbalanced ballast 5. The air and fuel filters are not restricted or plugged 6. Fuel quality is OK	**Problem not found:** GO TO 2 **Problem found:** Repair and retest

DN22556,000044B -19-16JUL10-3/14

2 Intermittent Fault Test	1. Connect SERVICE ADVISOR™. For instructions on connecting to SERVICE ADVISOR™, see CONNECTING TO SERVICE ADVISOR™ earlier in this Group. 2. Ignition ON, engine OFF 3. Start ECU communication software 4. Ignition ON, engine idling 5. Read DTCs using SERVICE ADVISOR™. *NOTE: Look for DTCs that indicate a fuel derate is or has been in effect.*	**No DTCs present:** GO TO 3 **DTCs present:** Go to appropriate diagnostic procedure.

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DN22556,000044B -19-16JUL10-4/14

3 Exhaust Emission Check	1. Operate engine at full load rated speed 2. Under these conditions, determine type of exhaust emitted.	**Small amount or no exhaust smoke:** GO TO 4 **Heavy white exhaust smoke:** See E4 - ENGINE EMITS EXCESSIVE WHITE EXHAUST SMOKE DIAGNOSTIC PROCEDURE later in this Group. **Heavy black or gray exhaust smoke:** See E5 - ENGINE EMITS EXCESSIVE BLACK or GRAY EXHAUST SMOKE DIAGNOSTIC PROCEDURE later in this Group.

Continued on next page

DN22556,000044B -19-16JUL10-5/14

4 Torque Curve Selection Check	*NOTE: 6750/6850 Self-Propelled Forage Harvester applications only use one torque curve; therefore, this check is not required.* The ECU on engines has the ability to operate on multiple torque curves. To check that the engine is operating on the correct torque curve under the operating conditions where there is a low power complaint: 1. Recreate the conditions of the low power complaint. 2. Read the Torque Curve Parameter using SERVICE ADVISOR™. 3. Compare the torque curve number with the table in the specification section. See APPLICATION SPECIFICATIONS in Section 06, Group 210.	**The torque curve number displayed IS correct for the operating conditions of the low power complaint:** GO TO 5 **The torque curve number displayed IS NOT correct for the operating conditions of the low power complaint:** Refer to machine manual to determine components that if faulty could prevent the correct torque curve from being selected OR Faulty torque curve select wiring

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DN22556,000044B -19-16JUL10-6/14

5 Governor Droop Mode Selection Check	1. Operate engine and attempt to recreate the low power condition. 2. Read the Desired Speed Governor parameter and the Maximum Speed Governor parameter using SERVICE ADVISOR™ 3. Compare governor selection to the appropriate chart governor mode chart. See APPLICATION SPECIFICATIONS in Section 06, Group 210.	**Governor selection is correct:** GO TO 6 **Governor selection is incorrect:** Refer to machine manual to determine components that if faulty could prevent the correct governor from being selected. OR Faulty governor select wiring.

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Continued on next page

DN22556,000044B -19-16JUL10-7/14

6 Compression and Misfire Test	1. Perform the Compression Test. For instructions, see CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS in Group 160. 2. Make note of the results. 3. Perform the Engine Misfire Test. For Instructions, see CYLINDER MISFIRE TEST INSTRUCTIONS in Group 160. 4. Make note of the results.	**All cylinders scored within 10% of each other on both tests:** GO TO 7 **One or more cylinders scored 10% or more lower than the rest on either test:** * Go to E2 - ENGINE MISFIRES/RUNS IRREGULARLY in this Group.

DN22556,000044B -19-16JUL10-8/14

7 Throttle Test	1. Operate engine at full load rated speed 2. At these operating conditions, read the Throttle Position data parameter using SERVICE ADVISOR™.	**97% or above:** GO TO 8 **Below 97%:** Refer to machine manual and perform the THROTTLE CALIBRATION CHECK procedure and retest.

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DN22556,000044B -19-16JUL10-9/14

8 Turbocharger Boost Pressure Check	Check the Turbo Boost pressure. See CHECK INTAKE MANIFOLD PRESSURE (TURBO BOOST) in the base engine manual.	**Intake manifold pressure in range or above, compared to boost specification:** GO TO 9 **Intake manifold pressure below range compared to boost specification:** GO TO 10

DN22556,000044B -19-16JUL10-10/14

9 Fuel Supply System Check	Check the fuel supply system.	**Fuel supply system is OK:** Engine appears to be delivering full power. Check for vehicle problems that could cause an excessive load on the engine.
	• See F1 - FUEL SUPPLY SYSTEM CHECK or F1 - TYPE 2 FUEL SUPPLY SYSTEM CHECK in this Group.	**Fuel supply system problem found:** Repair fuel supply system problem and retest.

Continued on next page

DN22556,000044B -19-16JUL10-11/14

10 Checking Potential Causes of Low Boost Pressure	Check for the following that can cause reduced boost pressure: • Restricted air cleaner • Intake air leak • Exhaust air leak • Restriction in exhaust	**None of the above problems found:** GO TO 11
	• Faulty turbocharger. See TURBOCHARGER SEVEN-STEP INSPECTION in the base engine manual.	**Problem found:** Repair and retest.

DN22556,000044B -19-16JUL10-12/14

11 Fuel Supply System Check	Check the fuel supply system.	**Fuel supply system is OK:** GO TO 12
	• See F1 - FUEL SUPPLY SYSTEM CHECK or F1 - TYPE 2 FUEL SUPPLY SYSTEM CHECK in this Group.	**Fuel supply system problem found:** Repair fuel supply system problem and retest

DN22556,000044B -19-16JUL10-13/14

12 EUI and Valve Adjustment Test	1. Check EUI pre-load adjustment and check valve adjustment. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in the base engine manual. 2. Ensure there are no engine mechanical problems 3. Ensure there isn't something drawing excessive engine power 4. If none of above problems are found, the most likely cause of low power is damaged spill valves in the EUIs. Replace and retest.	

DN22556,000044B -19-16JUL10-14/14

E4 - Engine Emits Excessive White Exhaust Smoke

DN22556,000044C -19-18NOV08-1/14

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 13.5L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04 of the base engine manual.

DN22556,000044C -19-18NOV08-2/14

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.

DN22556,000044C -19-18NOV08-3/14

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 an 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.*	
	Are you able to determine if the white smoke is caused by fuel or coolant?	**YES:** White smoke is due to fuel in exhaust. GO TO 3 **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.

DN22556,000044C -19-18NOV08-4/14

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

DN22556,000044C -19-18NOV08-5/14

4 Misfire and Cut-Out Test	*NOTE: If white smoke is decreased substantially when a cylinder is cut-out, the white smoke is likely caused by a misfire of that cylinder.*	
	1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cut-Out Test in Service ADVISOR and watch for a decease in white exhaust smoke when each cylinder is cut out.	**YES:** GO TO 5
	Did test results indicate low contribution from one or more cylinders?	**NO:** GO TO 6

Continued on next page

DN22556,000044C -19-18NOV08-6/14

5 Check Compression	Perform mechanical compression test as described in base engine manual. Was compression also low in the same cylinder(s) that had low contribution during the Misfire and Cut-Out Test?	**YES:** Determine cause of low compression. **NO:** Replace injector(s) in cylinders with low contribution.

DN22556,000044C -19-18NOV08-7/14

6 Fuel Quality	Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section. Is white smoke still present?	**YES:** GO TO 7 **NO:** Problem fixed.

DN22556,000044C -19-18NOV08-8/14

7 Check Cooling System	1. Operate engine, under load if possible, until coolant temperature is above 88°C (190°F). 2. Return engine to low idle, no load for 10 minutes. 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 low idle?	**YES:** GO TO 8 **NO:** Replace thermostat(s) and check for sources of cooling system heat loss.

DN22556,000044C -19-18NOV08-9/14

8 Check Camshaft Timing	Check camshaft timing as described in Section 02, Group 050 of the base engine manual. Is camshaft timing correct?	**YES:** GO TO 9 **NO:** Set camshaft timing and timing gear backlash. Recheck for white smoke.

DN22556,000044C -19-18NOV08-10/14

9 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure. Is white smoke still present?	**YES:** Perform steps 10-12. Open DTAC case if no problem found. **NO:** Problem fixed.

DN22556,000044C -19-18NOV08-11/14

10 Check EGR Cooler	Part 1 Is engine equipped with a VGT and EGR valve? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 1, VGT Actuator (B) in Section 03, Group 140 earlier in this manual.*	 **YES:** Part 2 **NO:** GO TO 12
	Part 2 1. Monitor EGR Valve Position (Forward)- 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. Is coolant present in EGR cooler?	 **YES:** Replace EGR cooler. **NO:** GO TO 11

Continued on next page

DN22556,000044C -19-18NOV08-12/14

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

DN22556,000044C -19-18NOV08-13/14

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.

DN22556,000044C -19-18NOV08-14/14

E5 - Engine Emits Excessive Black or Gray Exhaust Smoke

DN22556,000044D -19-18NOV08-1/7

E5 - Engine Emits Excessive Black or Gray Exhaust Smoke Diagnostic Procedure

NOTE: This procedure should be used if the engine emits excessive black or gray smoke. If engine emits a less heavy or bluish exhaust smoke, see 13.5L - L1 - EXCESSIVE OIL CONSUMPTION diagnostic procedure in Section 04 Group 150 of the base engine manual.

DN22556,000044D -19-18NOV08-2/7

1 E5 - Preliminary Check	Before using this diagnostic procedure: 1. Ensure fuel quantity and quality are OK, see CHECK FUEL SUPPLY QUALITY later in this Group. 2. Ensure engine is not excessively loaded. 3. Ensure air filter is not restricted or plugged.	**Problem not found:** GO TO 2 **Problem found:** Repair and retest.

DN22556,000044D -19-18NOV08-3/7

2 Intake and Exhaust Restriction and Air Leak Test	Check for intake and exhaust restrictions and air leaks. See all of the following: • Intake and exhaust restrictions, see CHECK FOR INTAKE AND EXHAUST RESTRICTIONS in Section 04 Group 150 in the base engine manual. • Intake air leaks, see CHECK FOR INTAKE AIR LEAKS in Section 04 Group 150 in the base engine manual. • Exhaust leaks, see CHECK FOR EXHAUST AIR LEAKS in Section 04 Group 150 in the base engine manual.	**No restrictions or leaks found:** GO TO 3 **Restrictions or leaks found:** Repair or replace components as necessary.

DN22556,000044D -19-18NOV08-4/7

3 Turbocharger Failure	Check for turbocharger failure. See TURBOCHARGER SEVEN-STEP INSPECTION in Section 02 Group 080 of the base engine manual.	**No turbocharger failure found:** GO TO 4 **Turbocharger failure found:** Follow appropriate repair procedure found in the above inspection in Base Engine manual.

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DN22556,000044D -19-18NOV08-5/7

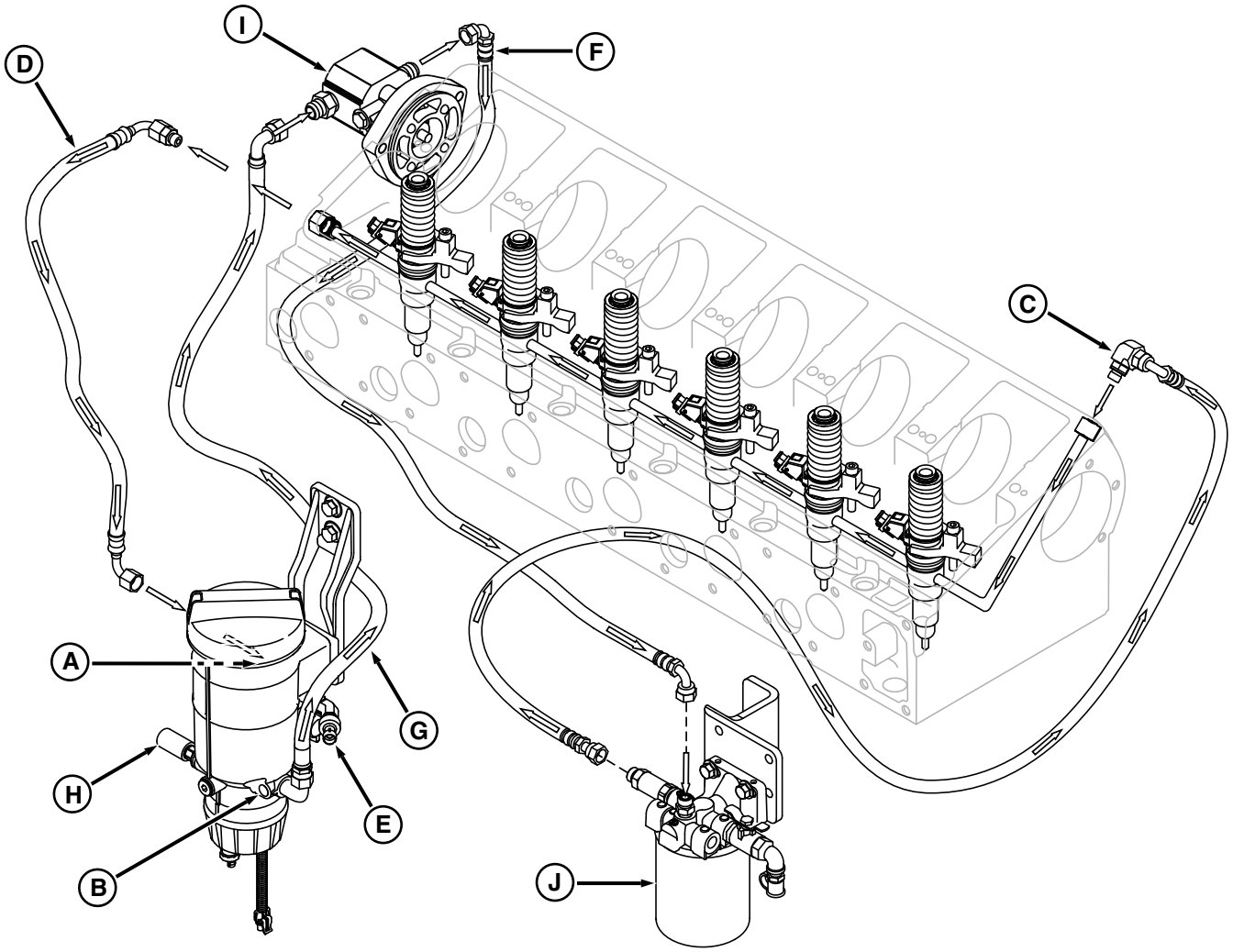
4 Cam to Crank Timing Test	Verify cam/crank timing is correct. See CHECK AND ADJUST CAMSHAFT-TO-CRANKSHAFT TIMING in Section 02 Group 050 of the base engine manual.	**Camshaft to crankshaft timing OK:** GO TO 5 **Camshaft to crankshaft timing not OK:** Adjust cam/crank timing. See CHECK AND ADJUST CAMSHAFT-TO-CRANKSHAFT TIMING in base engine manual.

DN22556,000044D -19-18NOV08-6/7

5 Valve Lash Test	Check valve lash. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in Section 02 Group 020 of the base engine manual.	**Valve lash on all valves within specification:** If no other problems are found, see E3 - ENGINE DOES NOT DEVELOP FULL POWER earlier in this Group. **Valve lash on one or more valves out of specification:** Adjust valve lash and retest.

DN22556,000044D -19-18NOV08-7/7

F1 - Fuel Supply System Check



Fuel Rail Supply System

A—Fuel Supply Pressure Quick Connect
B—Vacuum Port
C—Fuel Line from Secondary Filter Entering Cylinder Head
D—Fuel Line Returning to Fuel Filter Housing
E—Return to Tank Fuel Line from Fuel Filter Housing
F—Fuel Line between Transfer Pump and Secondary Filter
G—Fuel Line between Fuel Filter Housing and Transfer Pump
H—Hand Primer
I— Transfer Pump
J— Secondary Filter

For theory of operation information, see FUEL SYSTEM OPERATION in Section 03, Group 130.

DN22556,0000457 -19-18NOV08-1/10

F1 - Fuel Supply System Check Diagnostic Procedure

Continued on next page

DN22556,0000457 -19-18NOV08-2/10

1 Fuel System Observation and Supply Pressure Test	1. Check for ruptured fuel lines. 2. If fuel system has been recently opened (filter changed, line removed etc.), check affected o-rings on fittings and filter for air leaks. 3. If no leaks found or if engine has been run out of fuel, perform fuel system bleed procedure. See BLEED FUEL SYSTEM later in this Group and retest. 4. Connect a 0-1000 kPa (0-150 psi) gauge to the fuel supply pressure quick connect port (A). 5. Start engine and check fuel pressure at idle and at rated speed. If engine won't start, check fuel pressure while cranking. **Fuel Supply Pressure Specifications:** • Cranking: 135-175 kPa (20-25 psi) • Idle: 410-555 kPa (60-80 psi) • Rated speed: 480-620 kPa (70-90 psi)	**Fuel pressure within specification for ALL conditions:** GO TO 5 **Fuel pressure below specification for ANY condition:** GO TO 2

DN22556,0000457 -19-18NOV08-3/10

2 Fuel Filter and Pre-filter Test	1. Install a 0 - 760 mm (0-30 in.) Hg gauge at the vacuum port (B). 2. Perform bleed procedure if there is not a quick connect at the vacuum port. See BLEED FUEL SYSTEM later in this Group and retest. 3. Start engine and monitor vacuum at full load rated speed.	**508 mm (20 in.) Hg or less:** GO TO 3 **Greater than 508 mm (20 in.) Hg:** Plugged fuel filter OR Plugged pre-filter

DN22556,0000457 -19-18NOV08-4/10

3 Transfer Pump Test	**IMPORTANT: Before disconnecting any fuel line, completely clean any debris from around the fitting. Do NOT allow debris to enter the fuel line.** 1. Connect Pressure Test Fitting from JT03513 Fuel Supply System Test Kit and a 0-1000 kPa (0-150 psi) to the fuel line returning to the fuel filter housing (D) on the fuel filter housing end so the gauge dead ends that line. 2. Check fuel pressure at cranking.	**Fuel pressure above 760 kPa (110 psi):** GO TO 4 **Fuel pressure equal to or below 760 kPa (110 psi):** Faulty transfer pump

Continued on next page

DN22556,0000457 -19-18NOV08-5/10

4 High Pressure Regulating Valve Test	1. Disconnect pressure gauge at end of fuel line returning to fuel filter housing (D) 2. Reconnect that fuel line to the fuel filter housing. 3. Perform bleed procedure. See BLEED FUEL SYSTEM later in this Group and retest. 4. Connect 0-1000 kPa (0-150 psi) pressure gauge to the fuel supply pressure quick connect port (A). 5. Pinch off the return to tank fuel line (E). 6. Check fuel pressure at cranking, idle, and rated speed **Fuel Supply Pressure Specifications:** • Cranking: 135-175 kPa (20-25 psi) • Idle: 410-555 kPa (60-80 psi) • Rated speed: 480-620 kPa (70-90 psi)	**Fuel pressure within specification for ALL conditions:** Faulty low pressure regulating valve **Fuel pressure below specification for ANY condition:** Faulty high pressure regulating valve OR Faulty head debris filter (100 micron internal filter).

DN22556,0000457 -19-18NOV08-6/10

5 Air in Fuel Test on Return-to-Tank Fuel Line	1. If a hard start symptom is being diagnosed, an attempt should be made to recreate conditions of when the hard starting was observed such as early morning starts. 2. Fit clear line from JT03513 Fuel Supply System Test Kit after the low pressure regulating valve on the return-to-tank fuel line. 3. Start/crank engine and watch for air/bubbles in return-to-tank fuel line (E). *NOTE: Air/bubbles can be defined as:* • *Normal: bubbles visible on close examination* • *Air infiltration: clusters of bubbles easily visible* • *Foam: fuel discoloration (pink = slight) (white = extreme)*	**Normal amount of bubbles detected:** GO TO 8 **Air infiltration or foam detected:** GO TO 6

DN22556,0000457 -19-18NOV08-7/10

6 Air in Fuel Test between Transfer Pump and Fuel Filter	**IMPORTANT: Before disconnecting any fuel line, completely clean any debris from around the fitting. Do not allow debris to enter the fuel line.** 1. Fit a clear line from JT03513 Fuel Supply System Test Kit between transfer pump and fuel filter. 2. Start/crank engine and watch for air/bubbles in fuel line between transfer pump and fuel filter (G). *NOTE: Air bubbles can be defined as:* • *Normal: bubbles visible on close examination* • *Air infiltration: clusters of bubbles easily visible* • *Foam: fuel discoloration (pink = slight) (white = extreme)*	**Normal amount of bubbles detected:** GO TO 7 **Air infiltration or foam detected:** Inspect fuel filter housing, hand primer, and fuel filter/water separator seal for signs of leakage. Replace components as required.

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DN22556,0000457 -19-18NOV08-8/10

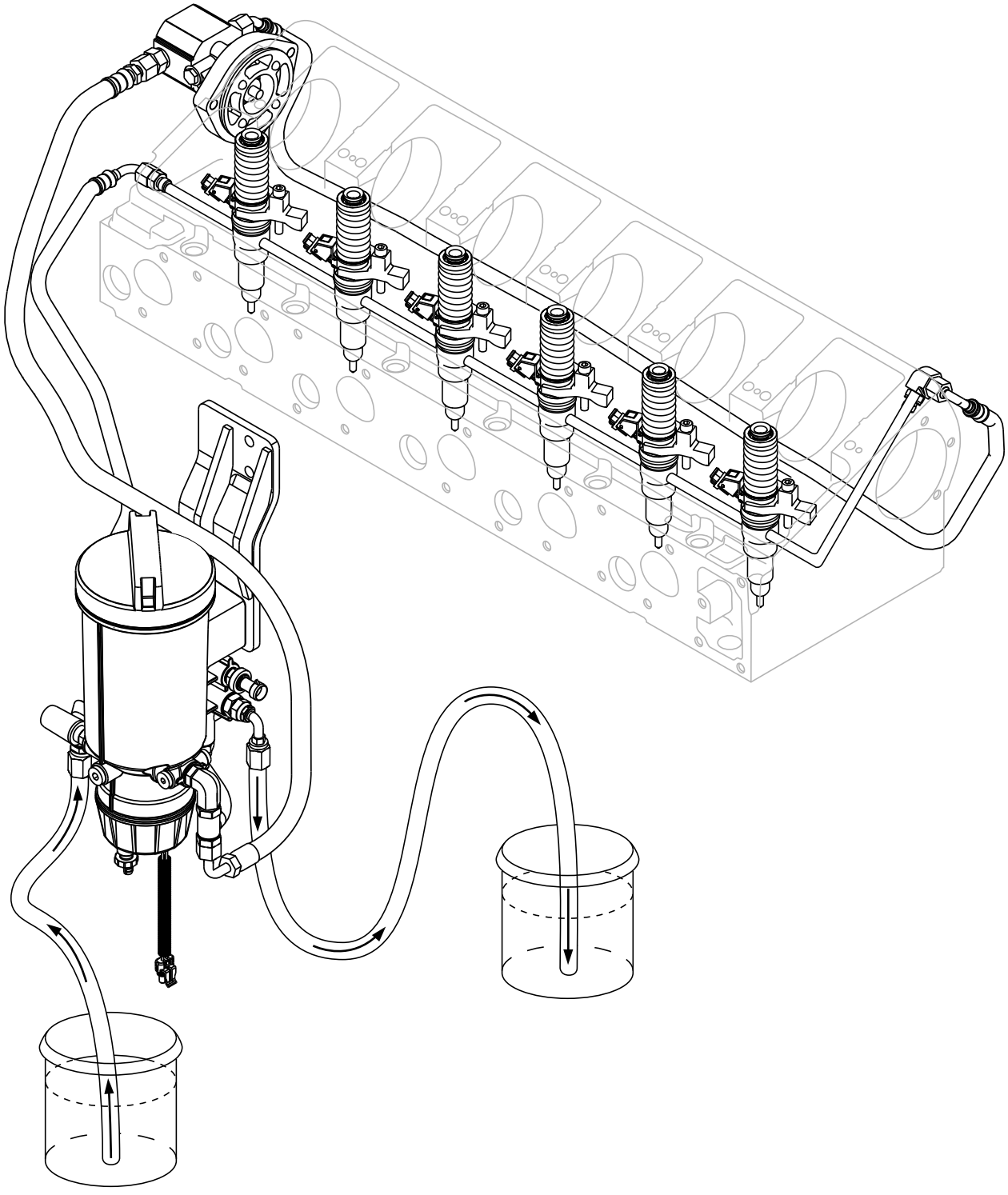
7 Leaks in Fuel System Check	1. Check the weep hole on the side of the fuel transfer pump. If weep hole is wet, with fuel, replace pump and retest. 2. Check that the hold down cap screw on all EUIs is tightened to spec. See FUEL SYSTEM REPAIR AND ADJUSTMENT SPECIFICATIONS in Section 06, Group 200. 3. If torques are correct, remove EUIs and inspect seats for combustion gas leaks. See INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 02, Group 090.	

DN22556,0000457 -19-18NOV08-9/10

8 Drainback Test	**IMPORTANT: Before disconnecting any fuel line, completely clean any debris from around the fitting. Do not allow debris to enter the fuel line.** **IMPORTANT: DO NOT start engine at any time during this test.** 1. Install a clear line between fuel filter outlet and transfer pump (G) 2. Perform bleed procedure. See BLEED FUEL SYSTEM later in this Group.	**No drainback observed at these locations:** If all the above items check OK, the fuel system appears to be operating correctly.
	3. Pump hand primer on fuel filter until the clear line is full.	**Drainback is detected in clear line between low pressure regulating valve and tank (E):** Faulty low pressure regulating valve
	4. Watch the clear line for several minutes to see if fuel is draining back through the clear lines between: • Fuel filter outlet AND transfer pump • Low pressure regulating valve AND fuel tank	**Drainback detected in clear line between fuel filter and transfer pump (G):** Faulty check valve after fuel filter

DN22556,0000457 -19-18NOV08-10/10

Check Fuel Supply Quality



RG15368 —UN—25JUL07

Test Quality of Fuel

The quality of diesel fuel affects engine performance. For fuel specifications see DIESEL FUEL in Section 2 group 002 earlier in this manual.

Perform the following:

1. Drain water and contaminants from water separator / sediment bowl into a clean container by opening drain valve.
2. Check for water or debris in the drained fuel.

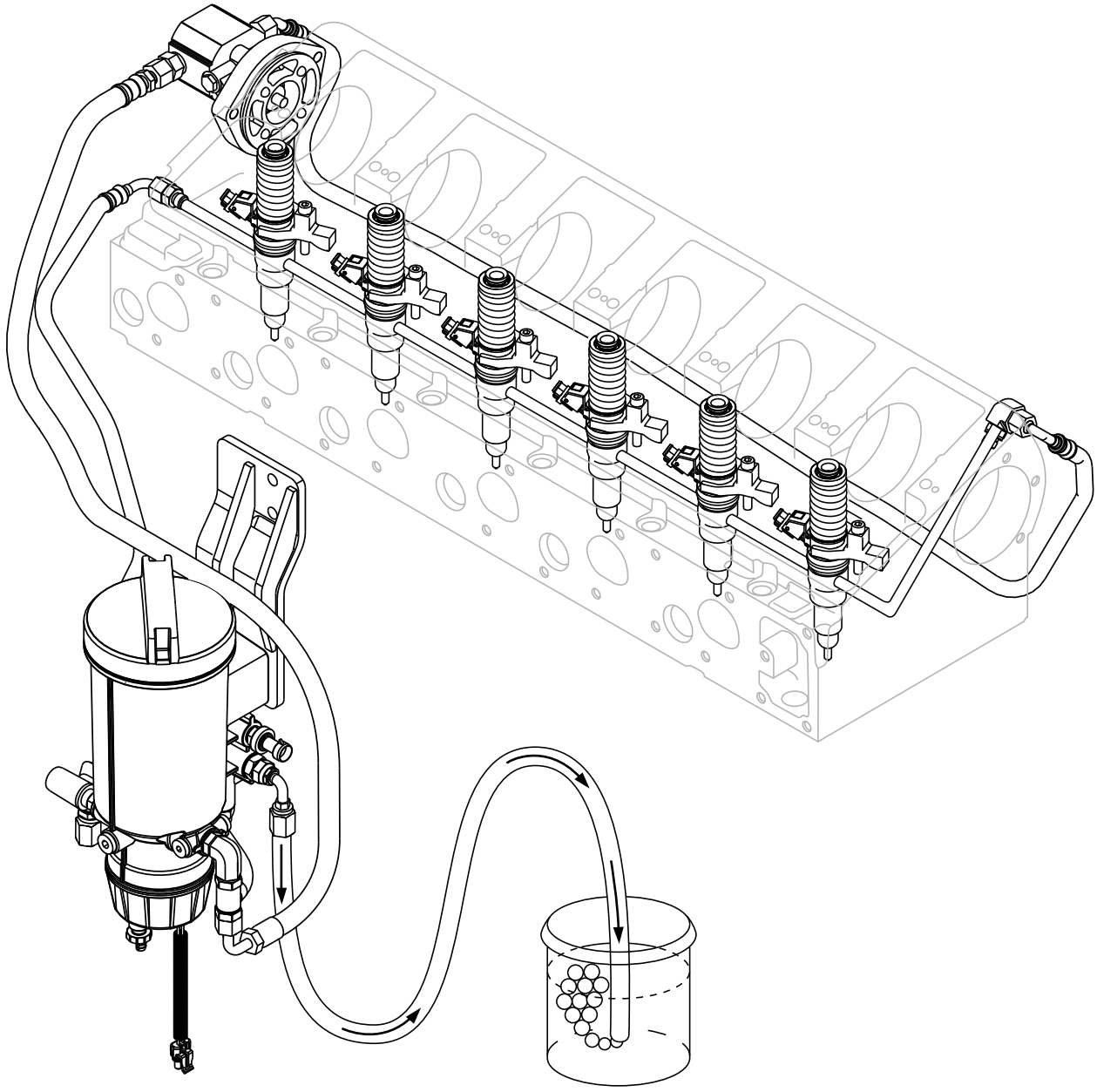
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DN22556,000045D -19-18APR08-1/2

3. Remove and drain secondary filter into a clean container.
4. Check for water or debris in the drained fuel.
5. Bleed fuel system. See BLEED FUEL SYSTEM later in this Group.
6. Repeat steps 1-5 above.
7. If water or debris is still found replace filters and repeat steps 1-5. If water and or debris is still found drain and clean fuel tank as per application maintenance manual, else go to step 8.
8. Run engine for 1 minute at 1500 rpm.
9. Operate under load for 1 minute. Repeat steps 1 - 7.
10. Reduce engine speed to idle and shutdown engine.
11. Perform a fuel test, see qq TESTING DIESEL FUEL in Section 2 Group 005 earlier in this manual. If problem still exists go to step 12.
12. Have fuel supplier test his fuel.

DN22556,000045D -19-18APR08-2/2

Test for Air in Fuel



RG15370 —UN—25JUL07

Check For Air In Fuel System

The fuel system will self-purge of 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 system, follow the procedure below.

1. Preliminary checks:
   - Check for loose fittings between fuel tank and low pressure fuel 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 INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 2 of this manual.
   - Air may enter system when engine is turned off: Make sure 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 filter assembly.

Continued on next page

BK53208,0000058 -19-18APR08-1/2

b. Install a clear plastic hose with proper fittings from the return-to-tank port on the filter assembly and submerge hose in a container of clean fue.
c. Start engine. Run engine for 1 minute at 1500 rpm. Observe hose and container for bubbles. Stop engine.
d. If there are bubbles, go to the next step to determine source of the air. Reconnect fuel lines.

3. Check for air in fuel tank supply line:
   a. Disconnect the fuel tank supply line from the fuel primary filter.
   b. Install a clear plastic hose with proper fittings between the fuel tank supply line and the primary filter.

      NOTE: Tool JT03513C Fuel Supply System Test Kit is designed for this task.

   c. Operate engine and check for air bubbles in hose. If there are bubbles, check for damaged tank, damaged tank components, and for loose or damaged fuel supply lines and hoses.
   d. If no problem was found reconnect fuel lines, go to the next step.
4. Check for air in the high pressure pump fuel supply line:
   a. Disconnect the line between the secondary filter and the high pressure fuel pump.
   b. Install a clear plastic hose with proper fittings between the filter and the pump.
   c. Operate engine and allow hose to fill with fuel, then check for air bubbles in hose. If there are bubbles, check for damaged primary filter head or gasket, and for loose or damaged primary filter.
   d. If no problem was found reconnect fuel lines, go to the next step.
5. Check for air in the fuel return line:
   a. Disconnect the line between the head and the primary filter.
   b. Install a clear plastic hose with proper fittings between the head and filter.
   c. Operate engine and allow hose to fill with fuel, then check for air bubbles in hose. If there are bubbles, a likely cause is air leaking past one or more injectors. Inspect the injector hold down clamp torque, o-rings and seals. See INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 2 of this manual. Reconnect fuel lines.
   d. If source of air was not found, check fuel cooler (if applicable) for leaks.

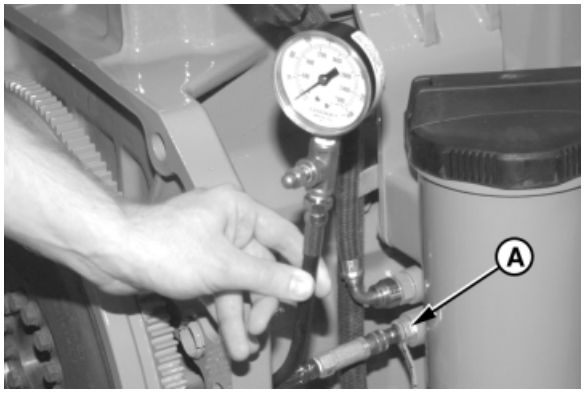
BK53208,0000058 -19-18APR08-2/2

Check Fuel Supply Pressure

1. Connect a 0-1000 kPa (0-150 psi) gauge to the Diagnostic Quick-connect on the air purge valve after removing the dust cap and cleaning the quick-disconnect.
2. Open bleed valve
3. Start/crank engine. Fuel transfer pump should maintain minimum pressure shown in specification.

Specification

Fuel Transfer Pump Pressure—Cranking (Minimum 200 RPM)	135–175 kPa (1.35–1.75 bar) (20–25 psi)
Normal (Idle)	410–555 kPa (4.1–5.5 bar) (60–80 psi)
Rated Speed	480–620 kPa (4.8–6.2 bar) (70–90 psi)



RG10661 —UN—14DEC99

Checking Fuel Supply Pressure

A—Fuel Supply Pressure Quick Connect Port

DN22556,0000461 -19-18APR08-1/1

Bleed Fuel System

NOTE: Under normal conditions, fuel system bleeding is not required. Priming system with hand primer (B) is normally sufficient. If necessary to bleed the system, use the following procedure.

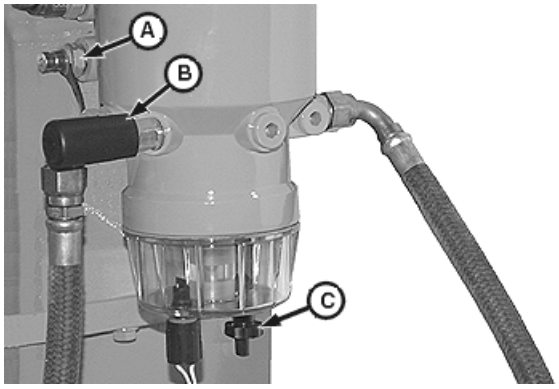
1. Drain water and contaminates from clear water separator sediment bowl by opening drain valve (C) and operating primer (B) until bowl is clear of water.
2. Attach an open line to diagnostic port (A) and place end of line in suitable container for diesel fuel.
3. Pump hand primer (B) until a steady flow of fuel (without bubbles) comes out of line.

   NOTE: It can take up to 200 strokes until fuel comes out steadily.

4. Disconnect line from diagnostic port (A).
5. Pump hand primer (B).

   NOTE: If engine has been run out of fuel, 200 strokes will be necessary.

6. Start engine and run for five minutes.



RG10309 —UN—02SEP99

Bleed Fuel System

A—Diagnostic Port
B—Hand Primer
C—Water Drain Valve

NOTE: If engine does not start after 20 seconds of cranking, pump hand primer an additional 100 strokes, and attempt to start engine again.

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Restarting Engine That Has Run Out Of Fuel

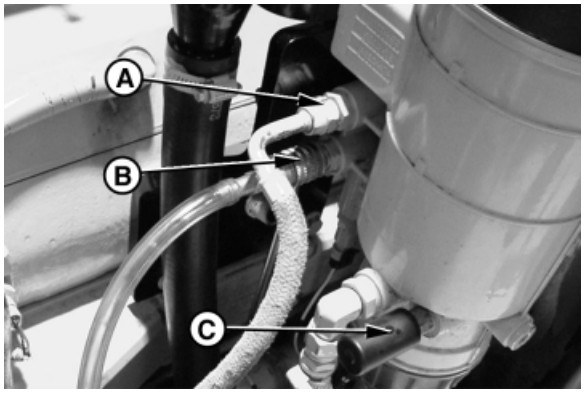
1. Connect a clear hose or pump with clear hose to the diagnostic port (B). Pump 0.5—1.0 gallons of fuel into a bucket by using hand primer (C) or by installing a electric fuel pump on the line from the diagnostic port.
2. Remove the clear hose/pump from the diagnostic port
3. Remove the fuel return line (A) and cap-off the hose end and hose fitting.
4. Pump hand primer (C) 50 times to build fuel pressure in fuel rail.
5. Start engine and run up to high idle for 1 minute

NOTE: If engine does not start after 20 seconds of cranking, pump hand primer an additional 50 strokes, wait at least 1 minute to let starter cool down, and attempt to start engine again.

6. Repeat Step 5 until engine has started

NOTE: As step 5 is repeated, allow 2-3 minutes between cranking in order to sufficiently cool the starter.

7. Holding the return line over a bucket, remove the cap and install into filter housing
8. Start engine and run up to high idle for 2 minutes, then stop engine



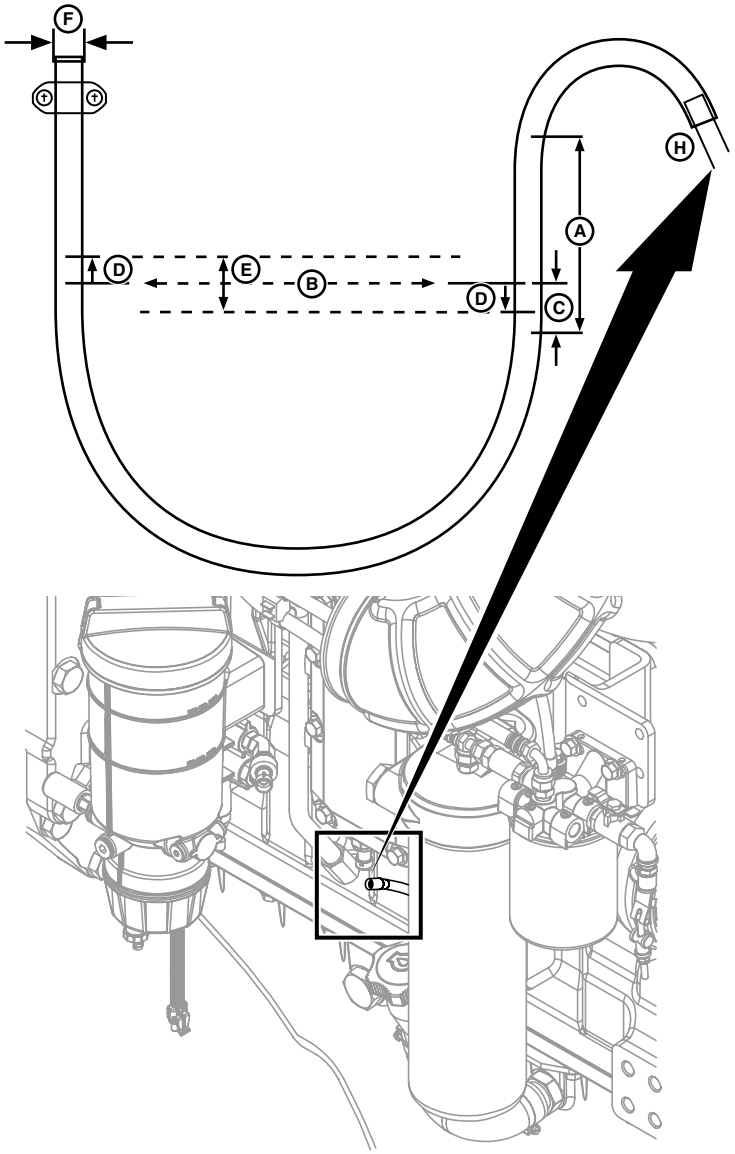
RG12040 —UN—12NOV01

A—Fuel Return Line
B—Diagnostic Port
C—Hand Primer

9. Ignition ON, engine OFF
10. Clear any stored Diagnostic Trouble Codes (DTCs) that may have occurred during this procedure

DN22556,0000463 -19-18APR08-1/1

Excessive Engine Crankcase Pressure (Blow-By)



RG15367 —UN—24JUL07

Blow-by Test Setup

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 25.4mm (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—Oil Dipstick Tube

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 or valve guides.

NOTE: the following items are required

- *A small amount of antifreeze or 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.*

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DB92450,0000037 -19-18NOV08-1/5

Excessive Engine Crankcase Pressure (Blow-By) Diagnostic Procedure

DB92450,0000037 -19-18NOV08-2/5

1 Measure Crankcase Pressure Test

Before doing the test:

1. Ensure that crankcase vent tube is open to the atmosphere.
2. Remove dipstick and attach tubing (F) to dipstick tube (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 exceed 50.8 mm (2 in.)?

YES: GO TO 2

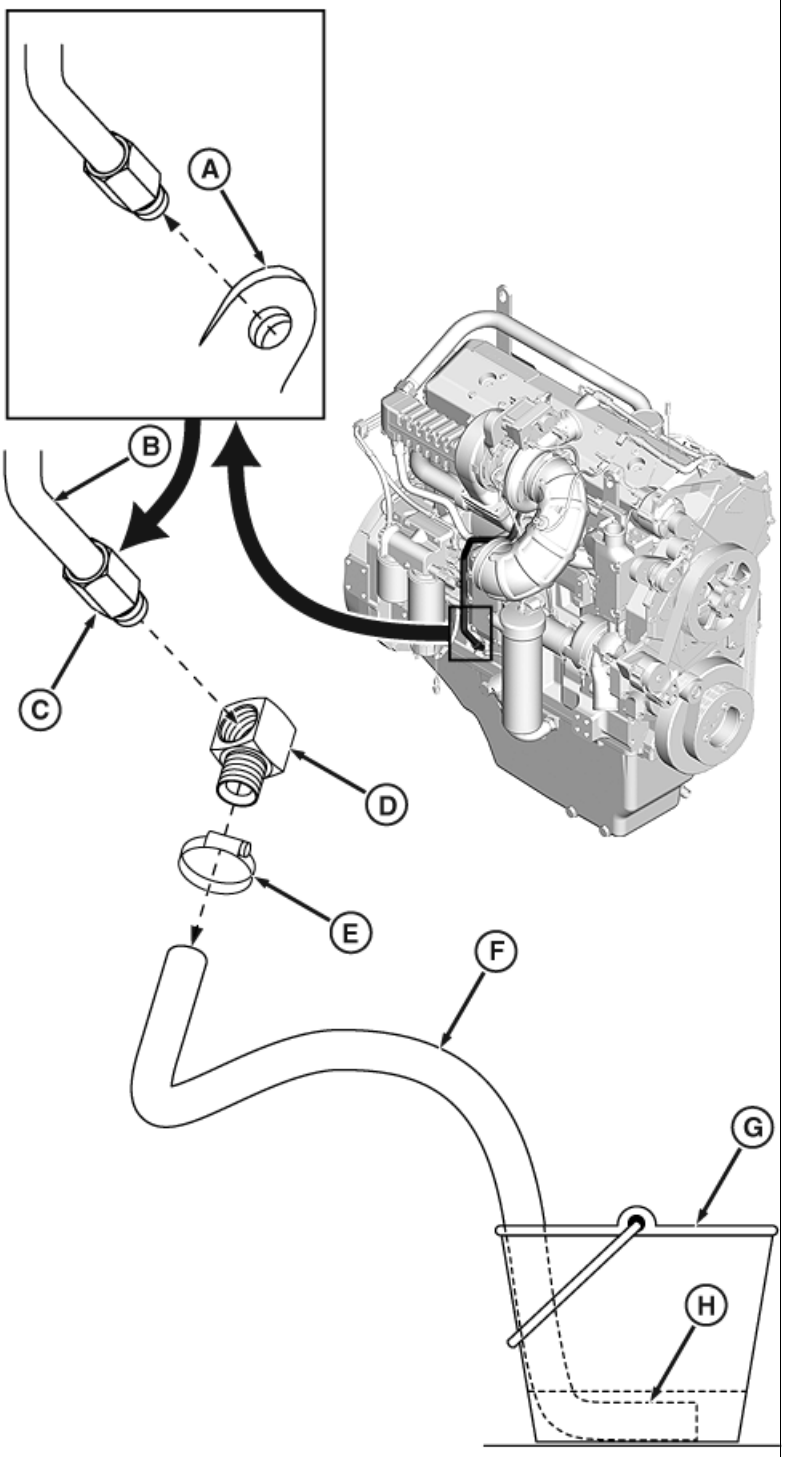
NO: The crankcase pressure meets John Deere application guidelines. Either return to original diagnostic procedure, or return to customer.

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DB92450,0000037 -19-18NOV08-3/5

❷ Turbocharger Test

1. Remove connector (C) on turbocharger oil return rigid tubing (B) from engine block tapped hole (A).



RG15358 —UN—27NOV07

Install Fitting to Turbocharger Oil Return Rigid Tubing

A—Engine Block Tapped Hole
B— Turbocharger Oil Return Rigid Tubing
C—Connector
D—1/2 in. - 14 NPT 90 Degree Fitting
E—Clamp
F—Flexible Tubing
G—19 Liter (5-gallon) Bucket
H—Water

2. Install a 1/2 in. - 14 NPT 90 degree fitting (D) to the connector (C).

Continued on next page

DB92450,0000037 -19-18NOV08-4/5

3. Obtain 19-liter (5-gallon) bucket (G), and place on ground or floor, near turbocharger oil drain line. 4. Measure outer dimension of fitting (D), and obtain length of flexible tubing (F), of same inner dimension as fitting outer dimension, and of sufficient length to place between rigid tubing and bucket as follows: a. Attach one end of flexible tubing (F) to open end of fitting (D). b. Secure flexible tubing to fitting using clamp (E). c. Place other end of flexible tubing into bucket (G). 5. . Pour approximately 3.8 liters (1.0 gallons) of water (H) into bucket (G). Bucket-end of flexible tubing (F) 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. Dispose of bucket contents in an approved manner at the completion of the test.* 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. 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 CLEAN AND INSPECT CYLINDER HEAD in the base engine manual.* 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 in the base engine manual. GO TO 1 **NO:** To locate engine blow-by, see ENGINE COMPRESSION PRESSURE in the base engine manual. (If possible, do compression test with digital gauge.)

DB92450,0000037 -19-18NOV08-5/5

Exhaust Gas Recirculation (EGR) System Diagnostic

IMPORTANT: Be sure to run coolant in specified operating levels at all times. Running the engine low on coolant could cause an EGR cooler failure.

BK34394,00000B4 -19-29MAY08-1/13

Exhaust Gas Recirculation (EGR) System Diagnostic

BK34394,00000B4 -19-29MAY08-2/13

1 EGR Temperature Sensors (In Place) Temperature Comparison	*NOTE: If the engine has been run recently, GO TO 2*	
	1. Ignition ON, engine OFF.	
	2. With the engine cold (engine has not been run for last 12 hrs), using Service ADVISOR™, monitor the following data points: • Charge Air Cooler Outlet Temperature • Manifold Air Temperature • EGR Temperature	**YES:** GO TO 3
	Were the temperatures of the three sensors within ±2° Celsius (4° F) of one another?	**NO:** GO TO 2

SERVICE ADVISOR is a trademark of Deere & Company

BK34394,00000B4 -19-29MAY08-3/13

2 EGR Temperature Sensors (Removed) Temperature Comparison	1. Ignition OFF, engine OFF.	
	2. Individually remove charge air cooler outlet temperature, manifold air temperature, and EGR temperature sensors from the engine.	
	NOTE: If while removing a sensor it was necessary to disconnect the harness assembly connector, reconnect it.	
	3. Hold each sensor tightly inside your fist for an equal amount of time.	
	4. Using Service ADVISOR, monitor temperatures of each sensor.	**YES:** GO TO 3
	Were the temperatures of the three sensors within ±2° Celsius (4° F) of one another?	**NO:** GO TO 10

BK34394,00000B4 -19-29MAY08-4/13

3 Intake Manifold Pressure Sensor	1. Key ON, engine OFF.	
	2. Using Service ADVISOR, compare Barometric Air Pressure and Manifold Air Pressure (Absolute).	**YES:** GO TO 4
	Were they within ±14 kPa (2 psi) of each other?	**NO:** GO TO 10

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BK34394,00000B4 -19-29MAY08-5/13

4 EGR Valve Travel	1. Start and, if possible, load engine. 2. Use chart feature of Service ADVISOR to monitor EGR Valve Position (Forward)- Actual, EGR Valve Position (Rear) - Actual, and EGR Valve Position (Forward and Rear) - Desired, ECU values. 3. Look for points where the EGR Valve Position - Actual value may hang up for brief periods, and then break loose and again match the EGR Valve Position - Desired value. Did the actual valve position values always smoothly, closely follow the desired values?	**YES:** GO TO 5 **NO:** GO TO 10

BK34394,00000B4 -19-29MAY08-6/13

5 Harness Test	*NOTE: Anytime a new EGR valve is installed, valve recalibration using Service ADVISOR, must be done.* 1. Engine OFF, ignition OFF. 2. Remove EGR valve. (See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) in Section 02, Group 080 of the base engine manual.) Do not remove electrical connections to EGR valve. 3. Cover cavity in engine from which EGR valve was removed. 4. Ignition ON, engine OFF. 5. Using Service ADVISOR, perform a HARNESS DIAGNOSTIC MODE TEST. Did the valve move freely, without hesitation or setting fault codes?	**YES:** GO TO 6 **NO:** Replace EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) in Section 02, Group 080 of the base engine manual.

BK34394,00000B4 -19-29MAY08-7/13

6 Coolant Leakage In The EGR Cavity	1. Ignition OFF. 2. (EGR Valve still removed, and cavity still covered.) Check for moisture/coolant in the cavity. Was moisture/coolant present?	**YES:** GO TO 7 **NO:** Reinstall the EGR valve, see REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) in Section 02, Group 080 of the base engine manual and GO TO 8

Continued on next page

BK34394,00000B4 -19-29MAY08-8/13

7 Coolant Leakage In EGR Cavity (Continued)	1. Engine ON, and run at slow idle. (EGR Valve still removed, and cavity still covered.)	
	2. Periodically remove the cover, and check for coolant in the EGR cavity.	**YES:** See REMOVE AND INSTALL EGR COOLER (TIER 3/STAGE IIIA) Section 02, Group 080 of the base engine manual.
	Could coolant be seen leaking into the EGR chamber?	**NO:** Reinstall the EGR valve (See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) in Section 02, Group 080 of the base engine manual) and GO TO 9

BK34394,00000B4 -19-29MAY08-9/13

8 EGR Cooler Leak To Cooling System	1. Run the engine at slow idle, and no load, for 20 minutes.	
	2. After 20 minutes, load the engine until the EGR valve opens.	
	3. Watch for the following conditions: • White smoke • Engine misfire • Hydraulic engine lock or knocking	**YES:** See REMOVE AND INSTALL EGR COOLER (TIER 3/STAGE IIIA) Section 02, Group 080 of the base engine manual.
	Were any of these conditions present?	**NO:** GO TO 9

BK34394,00000B4 -19-29MAY08-10/13

9 EGR Cooler Leak Test	1. Run a hose from the radiator cap overflow to a container with clear water in it.	
	2. Monitor Manifold Air Pressure - Actual while loading the engine, until the manifold pressure exceeds 96.5 kPa (14 psi).	
	3. Using Service ADVISOR to monitor Manifold Air Pressure - Actual, load the engine until the manifold pressure exceeds radiator cap pressure.	**YES:** See REMOVE AND INSTALL EGR COOLER (TIER 3/STAGE IIIA) in Section 02, Group 080 of the base engine manual.
	Were gas bubbles visible in the container?	**NO:** GO TO 11

BK34394,00000B4 -19-29MAY08-11/13

10 Connector Test	Disconnect the suspect connector and check for corrosion and fit.	**YES:** GO TO 11
	Was the connector in good condition, and did it fit tightly?	**NO:** Clean, repair, or replace the defective connector (See CONNECTOR REPAIR in Section 02, Group 110, earlier in this manual) and GO TO 1

Continued on next page

BK34394,00000B4 -19-29MAY08-12/13

11 Problem Resolved/Not Resolved	If problem persists: 1. Create a DTAC case. 2. Select the parameters listed in EXHAUST GAS RECIRCULATION in the CONNECTION-READINGS section of Service ADVISOR. 3. Engine ON. 4. Record a minimum of 5 minutes of engine performance, and if possible, while engine is experiencing problems. 5. Attach recording to DTAC case. Was problem resolved?	**YES:** Return to previous diagnostic procedure. **NO:** Submit DTAC case.

BK34394,00000B4 -19-29MAY08-13/13

Variable Geometry Turbocharger (VGT) Component Test

DB92450,000002D -19-18APR08-1/7

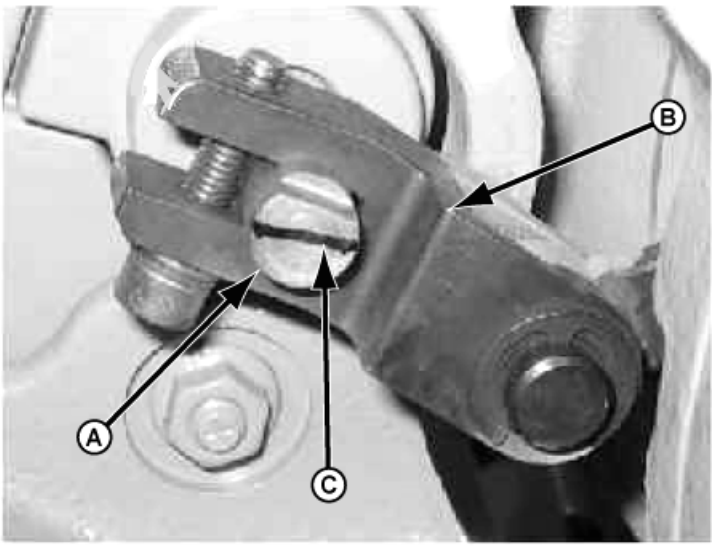
Variable Geometry Turbocharger (VGT) Component Test Diagnostic Procedure

Continued on next page

DB92450,000002D -19-18APR08-2/7

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.

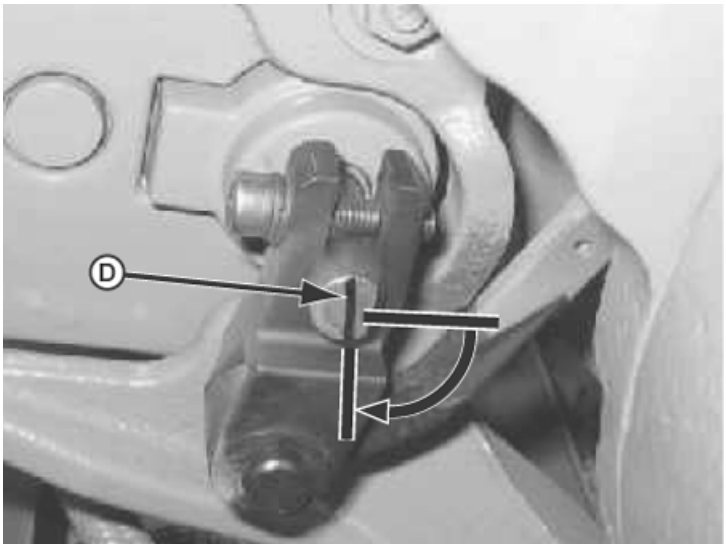


RG15154 —UN—08NOV06

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

DB92450,000002D -19-18APR08-3/7

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

DB92450,000002D -19-18APR08-4/7

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.

DB92450,000002D -19-18APR08-5/7

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.

DB92450,000002D -19-18APR08-6/7

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.

DB92450,000002D -19-18APR08-7/7

Group 155
Observable Diagnostics and Tests With Type 2 Fuel Supply System

About this Group

NOTE: Group 165, Common Observables, contains additional diagnostic procedures that are common to all fuel system types.

This group of the manual contains necessary information for observable diagnostics and fuel-related test procedures. Use this information in conjunction with the base engine Manual. Group 150 is divided into two areas: diagnosing malfunctions and test procedures. The diagnosing malfunctions area is further divided into the following headings, containing the following observable symptoms:

- **(E)** Diagnosing General Engine Malfunctions:
  - 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
  - E8 - Primary analog throttle does not respond
  - E9 - Secondary analog throttle does not respond
- **(F)** Diagnosing Fuel System Malfunctions
  - F1 - Type 2 Fuel Supply System 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 testing procedures in the second part of this section. The second part of this section of the manual contains the following testing procedures:

- Fuel System Testing Procedures:
  - Check fuel supply quality
  - Test for air in fuel
  - Bleed fuel system
  - Type 2 Fuel Return to Tank System Check
  - Restarting engine that has run out of fuel
  - Charge air system diagnostic
  - VGT Component Test

DN22556,0000696 -19-29MAY08-1/1

E1 - Engine Cranks but Won't Start

DN22556,00006A2 -19-20MAY09-1/17

E1 - Engine Cranks but Won't Start Diagnostic Procedure

NOTE: This procedure should be followed if engine cranks, but will not start. If the engine will not crank, see ENGINE WILL NOT CRANK to diagnose the cranking system.

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.

DN22556,00006A2 -19-20MAY09-2/17

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. Battery terminal voltage should be above 12.2V (24.4V for 24V systems). 6. Verify engine cranking speed is adequate to start engine. Compare engine cranking speed with values in cranking table. See CHECK ENGINE CRANKING SPEED in Section 04 of the base engine manual. Does engine start?	**YES:** Problem fixed. **NO:** GO TO 2

DN22556,00006A2 -19-20MAY09-3/17

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 ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR.

DN22556,00006A2 -19-20MAY09-4/17

3 Check for Active DTCs	Are there any active DTCs?	**YES:** Discontinue this test and perform test for the active DTC, starting with any DTC with SPN of 000636 or 000637. **NO:** GO TO 4

Continued on next page

DN22556,00006A2 -19-20MAY09-5/17

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 30 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

DN22556,00006A2 -19-20MAY09-6/17

5 Harness Diagnostic Mode Test	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Were any DTCs generated during Harness Diagnostic Mode Test?	**YES:** Discontinue this test and perform test for the DTC. **NO:** GO TO 6

DN22556,00006A2 -19-20MAY09-7/17

6 Fuel System Test	*NOTE: For fuel system type identification, see FUEL SYSTEM IDENTIFICATION* Perform F1 - TYPE 1 FUEL SUPPLY SYSTEM TEST or F1 - TYPE 2 FUEL SUPPLY SYSTEM TEST, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 7

DN22556,00006A2 -19-20MAY09-8/17

7 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 8

DN22556,00006A2 -19-20MAY09-9/17

8 Check for Air in Fuel	Perform procedure TEST FOR AIR IN FUEL, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 9

Continued on next page

DN22556,00006A2 -19-20MAY09-10/17

9 Camshaft Position and Crankshaft Position Signal Test

NOTE: See DTC procedures 000636.02 and 000637.02 in Section 04, Group 160 later in this manual for more information on position sensor data points.

1. Monitor and record the following data points in Service ADVISOR:
   - Crankshaft Position Signal Status
   - Camshaft Position Signal Status
   - Crankshaft Position Signal Improper Pattern Indicator
   - Camshaft Position Signal Improper Pattern Indicator
   - Crankshaft Position Signal Noise Indicator
   - Camshaft Position Signal Noise Indicator
   - Crankshaft Position Signal Missing Indicator
   - Camshaft Position Signal Missing 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 – 63 for speeds below 400 rpm, 47 for speeds above 400 rpm.
- Camshaft Position Signal Status – 63 for speeds below 400 rpm, 47 for speeds above 400 rpm.
- 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%
- Crankshaft Position Signal Missing Indicator - 0%
- Camshaft Position Signal Missing Indicator - 0%

YES: GO TO 12

NO: GO TO 10

DN22556,00006A2 -19-20MAY09-11/17

10 Check for Crankshaft Position Signal Problem

1. Ignition OFF, engine OFF.
2. Disconnect crankshaft position sensor and secure connector away from rotating components.

NOTE: Ignore DTC 000637.08 which may be set due to the disconnected sensor.

3. Ignition ON, engine OFF.
4. Crank engine for 20 seconds.
5. Ignition OFF, engine OFF.
6. Reconnect crankshaft position sensor.

Did engine start?

YES: Perform diagnostic procedure for 000637.02 as though DTC were active.

NO: GO TO 11

Continued on next page

DN22556,00006A2 -19-20MAY09-12/17

11 Check for Camshaft Position Signal Problem	1. Verify crankshaft position sensor is reconnected. 2. Disconnect camshaft position sensor and secure connector away from rotating components. *NOTE: Ignore DTC 000636.08 which may be set due to the disconnected sensor.* 3. Ignition ON, engine OFF. 4. Crank engine for 20 seconds. 5. Clear DTCs. 6. Ignition OFF, engine OFF. 7. Reconnect camshaft position sensor. Did engine start?	**YES:** Perform diagnostic procedure for 000636.02 as though DTC were active. **NO:** GO TO 12

DN22556,00006A2 -19-20MAY09-13/17

12 Inspect Valve Train and Camshaft Timing Check	1. Ignition OFF, engine OFF. 2. Remove rocker arm cover. 3. Rotate engine using JDG820 turning tool while observing valve train for proper operation. 4. Check camshaft timing. See CHECK AND ADJUST CAMSHAFT-TO-CRANKSHAFT TIMING in base engine manual. Were any problems found?	**YES:** Adjust camshaft timing or repair valve train problems. **NO:** GO TO 13

DN22556,00006A2 -19-20MAY09-14/17

13 Valve Clearance and Injector Preload Check	Check valve clearances and injector preload. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in base engine manual. Were all components within specifications?	**YES:** GO TO 14 **NO:** See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in base engine manual.

DN22556,00006A2 -19-20MAY09-15/17

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

DN22556,00006A2 -19-20MAY09-16/17

15 Replace ECU	Replace ECU. Did engine start?	**YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,00006A2 -19-20MAY09-17/17

E2 - Engine Misfires/Runs Irregularly

DN22556,000069E -19-16JUL10-1/17

E2 - Engine Misfires/Runs Irregularly Diagnostic Procedure

DN22556,000069E -19-16JUL10-2/17

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.

DN22556,000069E -19-16JUL10-3/17

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

DN22556,000069E -19-16JUL10-4/17

3 Misfire and Cut-Out Test	1. Perform CYLINDER MISFIRE TEST INSTRUCTIONS in Service ADVISOR. 2. Perform CYLINDER CUTOUT TEST INSTRUCTIONS 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

DN22556,000069E -19-16JUL10-5/17

4 Check Compression	Perform CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS 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. See base engine manual for instructions. **NO:** Check injector preload in cylinder(s) with low contribution. Replace injector if preload is correct.

DN22556,000069E -19-16JUL10-6/17

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

Continued on next page

DN22556,000069E -19-16JUL10-7/17

6 Low Pressure Fuel Supply System Test	Perform F1 - Type 2 Fuel Supply System Check, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 7

DN22556,000069E -19-16JUL10-8/17

7 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

DN22556,000069E -19-16JUL10-9/17

8 Camshaft Position and Crankshaft Position Signal Test	*NOTE: See DTC procedures 000636.02 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 • Crankshaft Position Signal Improper Pattern Indicator • Camshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Noise Indicator • Camshaft Position Signal Noise Indicator • Crankshaft Position Signal Missing Indicator • Camshaft Position Signal Missing 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 – 47 for speeds above 400 rpm. • Camshaft Position Signal Status – 47 for speeds above 400 rpm. • 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% • Crankshaft Position Signal Missing Indicator - 0% • Camshaft Position Signal Missing Indicator - 0%	**YES:** GO TO 11 **NO:** GO TO 9

DN22556,000069E -19-16JUL10-10/17

9 Check for Crankshaft Sensor Pattern Problem	1. Ignition OFF, engine OFF. 2. Disconnect crankshaft 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 crankshaft sensor. Was engine performance restored?	**YES:** Perform DTC 000637.02 as though DTC were active. **NO:** GO TO 10

Continued on next page

DN22556,000069E -19-16JUL10-11/17

10 Check for Camshaft Position Pattern Problem	1. Verify crankshaft sensor is reconnected. 2. Disconnect camshaft 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 camshaft position sensor. Was engine performance restored?	**YES:** Perform DTC 000636.02 as though DTC were active. **NO:** GO TO 11

DN22556,000069E -19-16JUL10-12/17

11 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 12

DN22556,000069E -19-16JUL10-13/17

12 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:** GO TO Part 2 **NO:** GO TO 13
	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 13 **NO:** Reinstall EGR valve. GO TO 13

Continued on next page

DN22556,000069E -19-16JUL10-14/17

13 Inspect Valve Train and Camshaft Timing Check	1. Ignition OFF, engine OFF. 2. Remove rocker arm cover. 3. Rotate engine using JDG820 turning tool while observing valve train for proper operation. 4. Check camshaft timing. See CHECK AND ADJUST CAMSHAFT-TO-CRANKSHAFT TIMING in base engine manual. Were any problems found?	**YES:** Adjust camshaft timing or repair valve train problems. GO TO 14 **NO:** GO TO 14

DN22556,000069E -19-16JUL10-15/17

14 Valve Clearance and Injector Preload Check	Check valve clearances and injector preload. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in base engine manual. Were all components within specifications?	**YES:** GO TO 15 **NO:** Adjust valve clearance and injector preload. GO TO 15

DN22556,000069E -19-16JUL10-16/17

15 Reprogram ECU	Download latest payload and reprogram ECU. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,000069E -19-16JUL10-17/17

E3 - Engine Does Not Develop Full Power

DN22556,000069F -19-16JUL10-1/27

E3 - Engine Does Not Develop Full Power Diagnostic Procedure

DN22556,000069F -19-16JUL10-2/27

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.

DN22556,000069F -19-16JUL10-3/27

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

DN22556,000069F -19-16JUL10-4/27

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

DN22556,000069F -19-16JUL10-5/27

4 Exhaust Check	Operate engine under the conditions where the low power complaint occurs.	**YES:** Blue smoke - Check for internal engine damage. Perform EXCESSIVE ENGINE CRANKCASE PRESSURE (BLOW-BY) DIAGNOSTIC PROCEDURE
	Does the engine produce excessive blue, white, or black exhaust smoke?	**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

Continued on next page

DN22556,000069F -19-16JUL10-6/27

5 Check for Misfire	Does engine misfire or run irregularly?	**YES:** Perform test E2 - ENGINE MISFIRES/RUNS IRREGULARLY. **NO:** GO TO 6

DN22556,000069F -19-16JUL10-7/27

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.

DN22556,000069F -19-16JUL10-8/27

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

DN22556,000069F -19-16JUL10-9/27

8 Fuel Supply System Test	Perform F1 - TYPE 2 FUEL SUPPLY SYSTEM CHECK, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

DN22556,000069F -19-16JUL10-10/27

9 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 10

DN22556,000069F -19-16JUL10-11/27

10 Engine Type	Does engine have EGR valves and VGT turbocharger?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,000069F -19-16JUL10-12/27

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 13

Continued on next page

DN22556,000069F -19-16JUL10-13/27

12 Check Manifold Pressure	Check manifold pressure (boost). See base engine manual. Is manifold pressure within specification?	**YES:** GO TO 13 **NO:** Determine cause of low manifold pressure. Recheck engine performance.

DN22556,000069F -19-16JUL10-14/27

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

DN22556,000069F -19-16JUL10-15/27

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.

DN22556,000069F -19-16JUL10-16/27

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

DN22556,000069F -19-16JUL10-17/27

16 Engine Type	Does engine have EGR valves and VGT turbocharger?	**YES:** GO TO 17 **NO:** GO TO 22

Continued on next page

DN22556,000069F -19-16JUL10-18/27

17 EGR-VGT System Temperature and Flow Test	Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST.	**YES:** GO TO 22
	Did system respond as described in the test?	**NO:** One air temperature sensor is not indicating correct temperature at start of test. GO TO 18 **NO:** Manifold Air Pressure - Absolute and Barometric Air Pressure are not as described. GO TO 20 **NO:** EGR Temperature indicates EGR flow is present before EGR is commanded open. GO TO 21

DN22556,000069F -19-16JUL10-19/27

18 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?	
	• 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 22 **NO:** GO TO 19

DN22556,000069F -19-16JUL10-20/27

19 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 22

DN22556,000069F -19-16JUL10-21/27

20 Check Pressure Sensors	1. Check manifold air pressure sensor wiring and terminals.	
	2. Replace manifold air pressure 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 22
	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

DN22556,000069F -19-16JUL10-22/27

21 Check EGR Valve and EGR Cooler	1. Monitor EGR Valve Position (Forward)- 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. Mark EGR valves so that they can be installed in their original locations.	
	6. Remove EGR valves and check for presence of coolant in EGR cooler.	
	7. Check for damaged or broken EGR valves.	**YES:** Cooler leaking. Replace EGR cooler.
	8. Verify that the part number of the EGR valves removed are the correct part for the engine.	**YES:** EGR valve(s) damaged or incorrect part. Replace EGR valve(s).
	Is coolant present in EGR cooler or is EGR valve damaged or the incorrect part?	**NO:** Reinstall EGR valves in their original locations. GO TO 22

DN22556,000069F -19-16JUL10-23/27

22 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. Check camshaft timing. See base engine manual.	
	5. Check valve adjustment and injector preload.	**YES:** Fix mechanical problem, recheck engine performance.
	Were any mechanical problems found?	**NO:** Reinstall rocker arm cover. GO TO 23

DN22556,000069F -19-16JUL10-24/27

23 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 24
	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.

DN22556,000069F -19-16JUL10-25/27

24 Check on Dynamometer	Check engine power on a certified dynamometer, if possible.	**YES:** Engine is operating as designed.
	Does engine develop rated power on dynamometer?	**NO:** GO TO 25
		NO: Engine cannot be tested on a dynamometer. Open DTAC case.

Continued on next page

DN22556,000069F -19-16JUL10-26/27

25 Replace Injectors	Replace injectors. Does engine develop rated power on dynamometer?	**YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,000069F -19-16JUL10-27/27

E4 - Engine Emits Excessive White Exhaust Smoke

DN22556,00006A0 -19-20NOV08-1/14

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 13.5L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04 of the base engine manual.

DN22556,00006A0 -19-20NOV08-2/14

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.

DN22556,00006A0 -19-20NOV08-3/14

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 an 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.

DN22556,00006A0 -19-20NOV08-4/14

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

DN22556,00006A0 -19-20NOV08-5/14

4 Misfire and Cut-Out Test	*NOTE: If white smoke is decreased substantially when a cylinder is cut-out, the white smoke is likely caused by a misfire of that cylinder.*	
	1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cut-Out Test in Service ADVISOR and watch for a decease in white exhaust smoke when each cylinder is cut out.	**YES:** GO TO 5
	Did test results indicate low contribution from one or more cylinders?	**NO:** GO TO 6

Continued on next page

DN22556,00006A0 -19-20NOV08-6/14

5 Check Compression	Perform mechanical compression test as described in base engine manual. Was compression also low in the same cylinder(s) that had low contribution during the Misfire and Cut-Out Test?	**YES:** Determine cause of low compression. **NO:** Replace injector(s) in cylinders with low contribution.

DN22556,00006A0 -19-20NOV08-7/14

6 Fuel Quality	Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section. Is white smoke still present?	**YES:** GO TO 7 **NO:** Problem fixed.

DN22556,00006A0 -19-20NOV08-8/14

7 Check Cooling System	1. Operate engine, under load if possible, until Coolant Temperature is above 88°C (190°F). 2. Return engine to low idle, no load for 10 minutes. 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 low idle?	 **YES:** GO TO 8 **NO:** Replace thermostat(s) and check for sources of cooling system heat loss.

DN22556,00006A0 -19-20NOV08-9/14

8 Check Camshaft Timing	Check camshaft timing as described in Section 02, Group 050 of the base engine manual. Is camshaft timing correct?	**YES:** GO TO 9 **NO:** Set camshaft timing and timing gear backlash. Recheck for white smoke.

DN22556,00006A0 -19-20NOV08-10/14

9 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure. Is white smoke still present?	**YES:** Perform steps 10-12. Open DTAC case if no problem found. **NO:** Problem fixed.

DN22556,00006A0 -19-20NOV08-11/14

10 Check EGR Cooler	Part 1 Is engine equipped with a VGT and EGR valve? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 1, VGT Actuator (B) in Section 03, Group 140 earlier in this manual.*	 **YES:** Part 2 **NO:** GO TO 12
	Part 2 1. EGR Valve Position (Forward)- 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. Is coolant present in EGR cooler?	 **YES:** Replace EGR cooler. **NO:** GO TO 11

Continued on next page

DN22556,00006A0 -19-20NOV08-12/14

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

DN22556,00006A0 -19-20NOV08-13/14

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.

DN22556,00006A0 -19-20NOV08-14/14

E5 - Engine Emits Excessive Black or Gray Exhaust Smoke

DN22556,00006A1 -19-07JAN09-1/15

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 13.5L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04, of the base engine 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.

For more information on charge air system test, see CHARGE AIR SYSTEM 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, if equipped.

For more information on EGR system test, see EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST in Section 04, Group 150 later in this manual, if equipped.

For more information on temperature sensor validity test, see TEMPERATURE SENSOR VALIDITY TEST in Section 04, Group 150 later in this manual, if applicable.

DN22556,00006A1 -19-07JAN09-2/15

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.

DN22556,00006A1 -19-07JAN09-3/15

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

DN22556,00006A1 -19-07JAN09-4/15

3 Check Charge Air System and VGT	Perform CHARGE AIR SYSTEM test.	**YES:** GO TO 4
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

Continued on next page

DN22556,00006A1 -19-07JAN09-5/15

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. Is black smoke still present when engine is operated under conditions where black smoke was observed?	**YES:** GO TO 5 **NO:** Problem fixed.

DN22556,00006A1 -19-07JAN09-6/15

5 Check VGT System	Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. Is black smoke still present when engine is operated under conditions where black smoke was observed?	**YES:** GO TO 6 **NO:** Problem fixed.

DN22556,00006A1 -19-07JAN09-7/15

6 EGR-VGT System Temperature and Flow Test	Perform EGR-VGT SYSTEM TEMPERATURE AND FLOW TEST. Did system respond as described in the test?	**YES:** GO TO 10 **NO:** One air temperature sensor is not indicating correct temperature at start of test. GO TO 7 **NO:** MAP and barometric pressure are not as described. GO TO 9 **NO:** EGR temperature sensor indicates EGR flow is present before EGR is commanded open. GO TO 10

DN22556,00006A1 -19-07JAN09-8/15

7 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? • 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 11 **NO:** GO TO 8

Continued on next page

DN22556,00006A1 -19-07JAN09-9/15

8 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.

Is black smoke still present when engine is operated under conditions where black smoke was observed?

YES: GO TO 11

NO: Problem fixed.

DN22556,00006A1 -19-07JAN09-10/15

9 Check Pressure Sensors

1. Check manifold air pressure sensor wiring and terminals.
2. Replace manifold air pressure sensor if no wiring problems found.
3. Compare Manifold Air Pressure - Absolute to Barometric Air Pressure data points with Ignition ON, engine OFF.

Are the Manifold Air Pressure - Absolute and Barometric Air Pressure within 10 kPa (1.5 psi) of each other with ignition ON, engine OFF.

YES: Recheck for black smoke.

NO: Replace ECU and check for black smoke.

DN22556,00006A1 -19-07JAN09-11/15

10 Check EGR Valve

NOTE: For EGR valve removal and installation instructions, see REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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. Inspect EGR cooler for indication of coolant leakage.

Were any problems found?

YES: Fix problem. Check for black smoke.

NO: GO TO 11

DN22556,00006A1 -19-07JAN09-12/15

11 Cut-Out Test

Perform Cylinder Cut-Out Test in Service ADVISOR and watch for a decease in exhaust smoke when each cylinder is cut out.

Did test results indicate less than a 90 percent contribution from a cylinder or did smoke decrease substantially when a cylinder was cut-out?

YES: Replace injector in the affected cylinder. Recheck for black smoke.

NO: GO TO 12

DN22556,00006A1 -19-07JAN09-13/15

12 Fuel Quality

Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section.

Is black smoke still present when engine is operated under conditions where black smoke was observed?

YES: GO TO 13

NO: Problem fixed.

Continued on next page

DN22556,00006A1 -19-07JAN09-14/15

13 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure.	**YES:** Open DTAC case.
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

DN22556,00006A1 -19-07JAN09-15/15

E8 - Primary Analog Throttle Does Not Respond

DN22556,0000697 -19-09MAY08-1/8

E8 - Primary Analog Throttle Does Not Respond

DN22556,0000697 -19-09MAY08-2/8

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.	**YES:** Troubleshoot those codes first.
	Are there any active DTC codes?	**NO:** GO TO 2

DN22556,0000697 -19-09MAY08-3/8

2 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:** GO TO 3

DN22556,0000697 -19-09MAY08-4/8

3 Low Pressure Fuel Test	Perform low pressure fuel test, see F1 - Type 2 Fuel Supply System Check later in this Section.	**YES:** GO TO 4
	Did test pass?	**NO:** Return to F1 - Type 2 Fuel Supply System Check procedure and perform tests.

DN22556,0000697 -19-09MAY08-5/8

4 High Pressure Fuel Test	Perform high pressure fuel test, see F1 - Type 2 Fuel Supply System Check later in this Section.	**YES:** GO TO 5
	Did test pass?	**NO:** Return to F1 - Type 2 Fuel Supply System Check procedure and perform tests.

Continued on next page

DN22556,0000697 -19-09MAY08-6/8

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. Was programming successful?	**YES:** GO TO 6 **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.

DN22556,0000697 -19-09MAY08-7/8

6 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:** Start a DTAC case.

DN22556,0000697 -19-09MAY08-8/8

E9 - Secondary Analog Throttle Does Not Respond

DN22556,0000698 -19-18APR08-1/7

E9 - Secondary Analog Throttle Does Not Respond

DN22556,0000698 -19-18APR08-2/7

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

DN22556,0000698 -19-18APR08-3/7

2 Primary Analog Throttle Test	Perform primary analog throttle test, see E8 - PRIMARY ANALOG THROTTLE DOES NOT RESPOND earlier in this Section. Did test pass?	**YES:** GO TO 3 **NO:** Return to F1 procedure and perform tests.

DN22556,0000698 -19-18APR08-4/7

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

DN22556,0000698 -19-18APR08-5/7

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

DN22556,0000698 -19-18APR08-6/7

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.

DN22556,0000698 -19-18APR08-7/7

F1 - Type 2 Fuel Supply System Check

DN22556,00006A4 -19-25MAR11-1/46

F1 – Type 2 Fuel Supply System Test Diagnostic Procedure

Additional References:

NOTE: For fuel system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

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 13.5L 12V ECU WIRING DIAGRAM 2, 13.5L 12V ECU WIRING DIAGRAM 8
- see 13.5L 24V ECU WIRING DIAGRAM 2, 13.5L 24V ECU WIRING DIAGRAM 8
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing seeTERMINAL TEST in Section 04, Group 160 later in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Flex Probe Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

DN22556,00006A4 -19-25MAR11-2/46

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. GO TO 2

DN22556,00006A4 -19-25MAR11-3/46

2 Preliminary Check	**CAUTION: DO NOT PRESSURIZE THE FUEL TANK! Doing this may cause damage to fuel system components.** 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. Was the problem found?	**YES:** Fix problem. GO TO 44 **NO:** GO TO 3

DN22556,00006A4 -19-25MAR11-4/46

3 Engine Start Status	Does engine start?	**YES:** Engine starts and runs without stalling. GO TO 17 **YES:** Engine starts but stalls while running. GO TO 4 **NO:** GO TO 5

Continued on next page

DN22556,00006A4 -19-25MAR11-5/46

4 Check Low Pressure Fuel Pump Status Indicators	1. Ignition ON, engine running under conditions where problem occurs. 2. Monitor the following data points in Service ADVISOR: • Low Pressure Fuel Pump Status • Low Pressure Fuel Pump Status Indicator Does Low Pressure Fuel Pump Status remain OK and Low Pressure Fuel Pump Status Indicator remain at 0% while engine is still running just prior to engine stalling? *NOTE: The Low Pressure Fuel Pump Status may transition to NOT OK by design after the engine stalls. It is critical to monitor the Low Pressure Fuel Pump Status while engine is still running.*	**YES:** GO TO 17 **NO:** Perform 001075.12 — LOW PRESSURE FUEL PUMP ERROR DETECTED DIAGNOSTIC PROCEDURE as though the DTC were active.

DN22556,00006A4 -19-25MAR11-6/46

5 Check Low Pressure Fuel Pump Status Indicators	1. Ignition OFF, engine OFF for at least 30 seconds to cause low pressure fuel pump to prime fuel system at next ignition cycle. 2. Ignition ON, engine OFF. 3. Monitor the following data points in Service ADVISOR: • Low Pressure Fuel Pump Status • Low Pressure Fuel Pump Status Indicator Does Low Pressure Fuel Pump Status remain OK and Low Pressure Fuel Pump Status Indicator remain at 0% within at least first 60 seconds after ignition is switched ON?	**YES:** GO TO 6 **NO:** Perform 001075.12 — LOW PRESSURE FUEL PUMP ERROR DETECTED DIAGNOSTIC PROCEDURE as though the DTC were active.

Continued on next page

DN22556,00006A4 -19-25MAR11-7/46

6 Check for Low Pressure Fuel Pump Operation	*NOTE: The electric low pressure fuel 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, the ECU switches the pump OFF.*	
	1. Ignition OFF, engine OFF.	
	2. Disconnect low pressure fuel sensor connector to cause ECU to command pump to 90 percent speed. Ignore DTC 000094.04 which will be set when sensor is disconnected.	
	3. Ignition ON, engine OFF.	
	4. Verify that low pressure fuel pump operates for at least 60 seconds after ignition is switched ON by listening and feeling for vibration at low pressure fuel pump.	
	5. Ignition OFF, engine OFF.	**YES:** Fuel filter elements have NOT been replaced while diagnosing this problem. GO TO 7.
	6. Reconnect low pressure fuel sensor.	**YES:** Fuel filter elements have already been replaced while diagnosing this problem. GO TO 9
	Did low pressure fuel pump operate with ignition ON?	**NO:** Perform 001075.12 — LOW PRESSURE FUEL PUMP ERROR DETECTED DIAGNOSTIC PROCEDURE as though the DTC were active.

DN22556,00006A4 -19-25MAR11-8/46

7 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.	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 8
	Was an abnormal amount of water or contaminants present in the drained fuel?	**NO:** GO TO 8

DN22556,00006A4 -19-25MAR11-9/46

8 Check Engine Performance	Ignition ON, engine OFF for at least 60 seconds to prime and purge air.	
	NOTE: Some applications may require four minutes or more to completely prime the fuel system after filter replacement. Cycle ignition OFF and back ON again if low pressure fuel pump stops operating before system is primed.	**YES:** Problem fixed.
	Does engine now start?	**NO:** GO TO 9

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DN22556,00006A4 -19-25MAR11-10/46

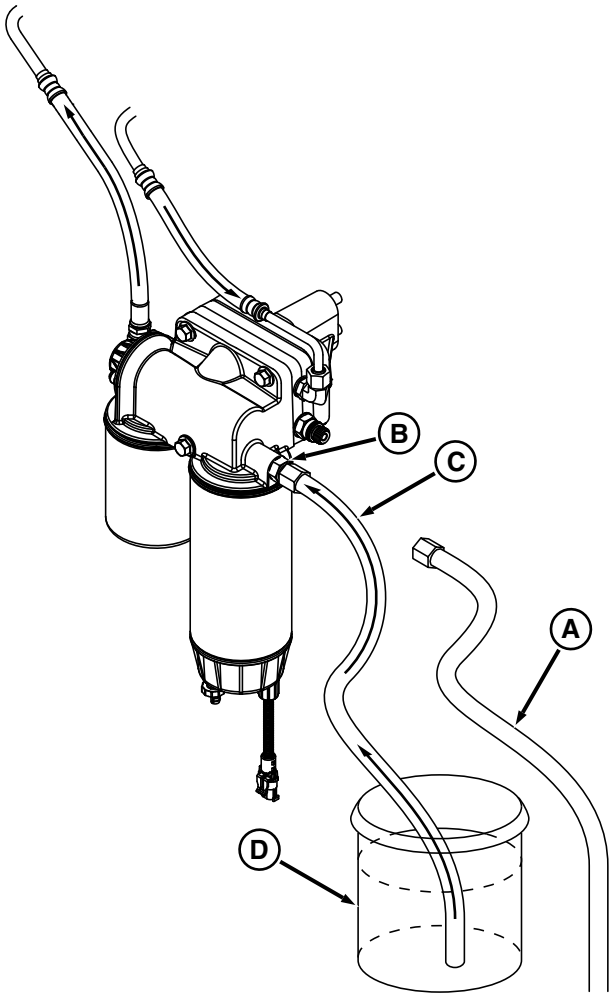
9 Check Fuel Pressure in Service ADVISOR	1. Ignition OFF, engine OFF.	
	2. Ignition ON, engine OFF.	
	3. Monitor Low Pressure Fuel - Actual Pressure data point.	**YES:** GO TO 14
	Does the Low Pressure Fuel - Actual Pressure data point indicate 150 kPa (22 psi) or above during initial 60 seconds after ignition is ON?	**NO:** GO TO 10

Continued on next page

DN22556,00006A4 -19-25MAR11-11/46

10 Temporary Fuel Supply Check

NOTE: Use a clean hose and fuel that has known-good quality in a clean container for this step.



RG15619 —UN—26OCT07

Temporary Fuel Supply

A—Fuel Suction Line
B—Fuel Inlet
C—Temporary Fuel Supply Hose
D—Container of Diesel Fuel

1. Ignition OFF, engine OFF.
2. Disconnect fuel suction line (A) from the fuel filter header.
3. Inspect fuel inlet (B) at fuel filter header for debris.
4. Install a temporary fuel supply hose (C) at fuel filter header inlet port and place other end of hose in a container of clean diesel fuel (D).
5. Ignition ON, engine OFF for at least 60 seconds to purge air.
6. Ignition OFF, engine OFF for 10 seconds.
7. Ignition ON, Engine OFF.
8. Monitor Low Pressure Fuel - Actual Pressure data point.

Does the Low Pressure Fuel - Actual Pressure data point indicate 150 kPa (22 psi) or above during initial 60 seconds after ignition is ON?

YES: GO TO 11

NO: GO TO 12

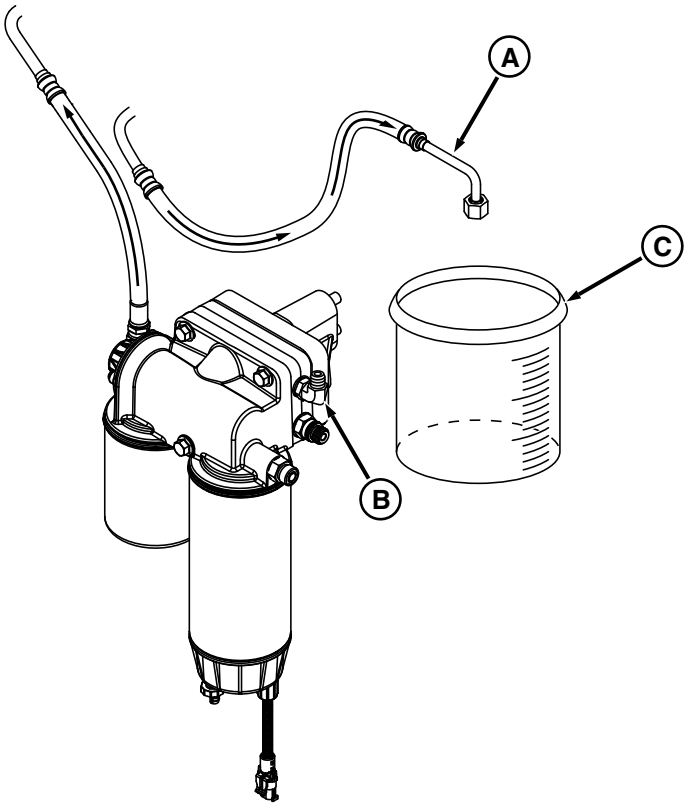
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DN22556,00006A4 -19-25MAR11-12/46

11 Check Engine Performance	Does engine now start?	**YES:** Locate source of suction line air leak or restriction between fuel tank and fuel filter header. GO TO 44 **NO:** GO TO 14

DN22556,00006A4 -19-25MAR11-13/46

12 Check Fuel Flow Rate Through Fuel Rail



RG15674 —UN—26OCT07

Check Fuel Flow

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Empty Container

1. Ignition OFF, engine OFF.
2. Disconnect fuel return line (A) at fuel filter header (B).
3. Place fuel return line (A) in an empty container suitable for diesel fuel (C).
4. Ignition ON, engine OFF.
5. Measure the quantity of fuel that flows from the return line in 15 seconds.

Is fuel flow rate at least 0.3L (10 oz) in 15 seconds?

YES: GO TO 15
NO: GO TO 13

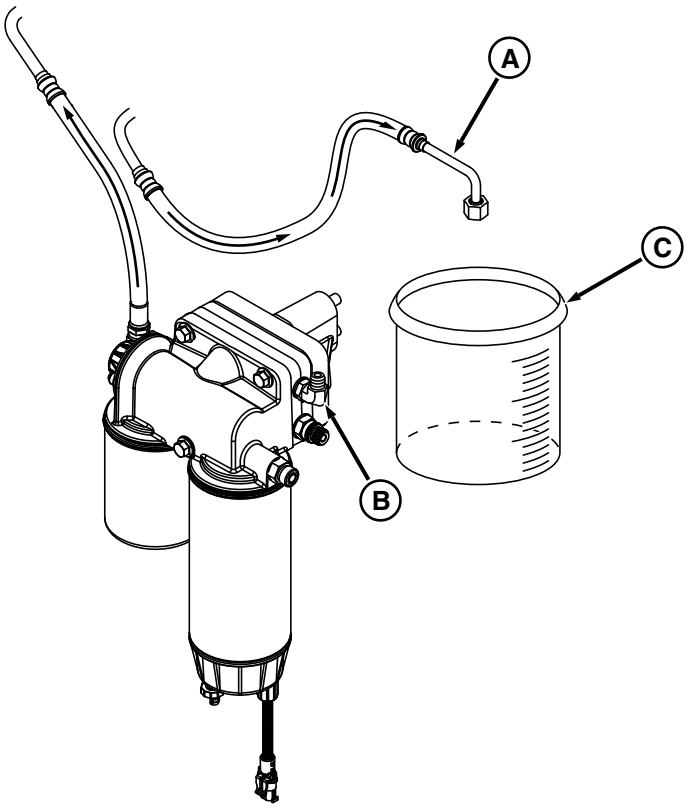
DN22556,00006A4 -19-25MAR11-14/46

13 Check for Fuel in Engine Oil	Check for fuel in engine oil (high oil level on dipstick) indicating a large internal fuel leak Is fuel present in engine oil?	**YES:** Perform procedure CHECK FOR FUEL IN OIL **NO:** Replace electric low pressure fuel pump. GO TO 44

Continued on next page

DN22556,00006A4 -19-25MAR11-15/46

14 Check Fuel Flow Through Fuel Rail



RG15674 —UN—26OCT07

Check Fuel Flow

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Empty Container

1. Ignition OFF, engine OFF.
2. Disconnect fuel return line (A) at fuel filter header (B).
3. Place fuel return line (A) in an empty container suitable for diesel fuel (C).
4. Ignition ON, engine OFF.
5. Measure the quantity of fuel that flows from the return line in 15 seconds.

Is fuel flow rate at least 0.3L (10 oz) in 15 seconds?

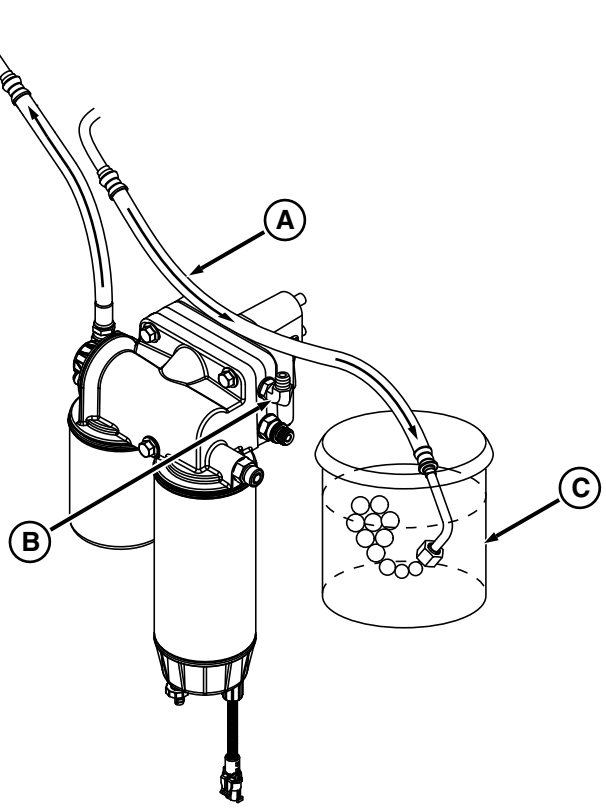
YES: GO TO 15

NO: Check for restriction between fuel filter header outlet port and fuel rail in cylinder head. If none found, GO TO 15

Continued on next page

DN22556,00006A4 -19-25MAR11-16/46

15 Check for Air in Fuel



RG15618 —UN—26OCT07

Check for Air in Fuel

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Container of Diesel Fuel

1. Ignition OFF, engine OFF.
2. Fuel return line (A) disconnected from fuel filter header (B).
3. Submerge the end of the fuel return line (A) into a container of diesel fuel (C).
4. Ignition ON, engine OFF so that electric low pressure fuel pump will prime system.
5. Check for air in return fuel for 60 seconds.

Is air present in the return fuel?

YES: Perform procedure CHECK FOR AIR IN FUEL

NO: GO TO 16

DN22556,00006A4 -19-25MAR11-17/46

16 Engine Start

NOTE: Air in fuel is purged through the fuel return to tank line. A restriction in the fuel return to tank system may cause no other symptom other than the inability to purge air from the fuel system. The previous step may temporarily purge air from the fuel system.

1. Ignition OFF, engine OFF
2. Reinstall fuel return line.
3. Attempt to start engine.

Does engine start?

YES: Perform procedure TYPE 2 FUEL RETURN TO TANK SYSTEM CHECK

NO: Low pressure fuel system is NOT the cause of the no-start. Reconnect all electrical connectors and fuel lines, return to ENGINE CRANKS BUT DOES NOT START procedure.

Continued on next page

DN22556,00006A4 -19-25MAR11-18/46

17 Check for DTC 000157.16	Is this procedure being performed as a solution for DTC 000157.16?	**YES:** GO TO 18 **NO:** GO TO 21

DN22556,00006A4 -19-25MAR11-19/46

18 Compare Fuel Pressure Data Points to Determine Sensor Accuracy	*NOTE: With ignition ON and engine not running, the electric low pressure fuel pump should operate for a programmable period of time to prime and purge air from fuel system. The low pressure fuel sensor and high pressure fuel sensor should indicated similar pressure values under these conditions.* 1. Monitor the following data points in Service ADVISOR: • Low Pressure Fuel - Actual Pressure • High Pressure Fuel - Actual Pressure 2. Ignition ON, engine OFF to cause the electric low pressure fuel pump to operate. Is High Pressure Fuel - Actual Pressure data point within 70 kPa (10 psi) of Low Pressure Fuel - Actual Pressure within 60 seconds of ignition ON?	**YES:** GO TO 19 **NO:** GO TO 42

DN22556,00006A4 -19-25MAR11-20/46

19 Check For Low Pressure Fuel System Pressure Too High	1. Ignition ON, engine running under conditions where DTC 000157.16 is active. 2. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR. Is Low Pressure Fuel - Actual Pressure greater than 275 kPa (40 psi)?	**YES:** Replace electric low pressure fuel pump. GO TO 44 **NO:** GO TO 20

DN22556,00006A4 -19-25MAR11-21/46

20 Check Fuel Return to Tank	Perform procedure TYPE 2 FUEL RETURN TO TANK SYSTEM CHECK. Was a fuel return to tank system problem found?	**YES:** Fix fuel return problem. GO TO 44 **NO:** Replace high pressure regulator valve in fuel filter header assembly. GO TO 44

DN22556,00006A4 -19-25MAR11-22/46

21 Fuel Filter Replacement Check	Have the fuel filter elements been replaced while diagnosing this problem?	**YES:** Engine performance problem exists WITHOUT setting DTC 000094.17, 000157.01, or 000157.18. GO TO 24 **YES:** DTC 000094.17, 000157.01, or 000157.18 is active. GO TO 29 **NO:** GO TO 22

Continued on next page

DN22556,00006A4 -19-25MAR11-23/46

22 Replace Fuel Filter Elements

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 23

NO: GO TO 23

DN22556,00006A4 -19-25MAR11-24/46

23 Check for Active Fuel System DTCs or Engine Performance Problem After Filter Replacement

1. Ignition ON, engine OFF for at least 60 seconds to prime and purge air.

NOTE: Some applications may require four minutes or more to completely prime the fuel system after filter replacement. Cycle ignition OFF and back ON again if low pressure fuel pump stops operating before system is primed.

YES: Engine performance problem still exists WITHOUT setting DTC 000094.17, 000157.01, or 000157.18. GO TO 24

2. Start engine and operate under conditions where DTC or performance problem occurs.

YES: DTC 000094.17, 000157.01, or 000157.18 still active. GO TO 29

Is DTC 000094.17, 000157.01, or 000157.18 still active or does engine performance problem still exist?

NO: Problem fixed.

DN22556,00006A4 -19-25MAR11-25/46

24 Check High Pressure Fuel - Actual Pressure with Engine Running

1. Monitor High Pressure Fuel - Actual Pressure data point in Service ADVISOR.
2. Ignition ON, engine running at speed and load where engine performance problem was observed.

YES: Fuel supply system is NOT the cause of engine performance problem.

Is High Pressure Fuel - Pressure data point at least 500 kPa (72 psi) when engine performance problem is observed?

NO: GO TO 25

DN22556,00006A4 -19-25MAR11-26/46

25 Check for Low Pressure Fuel Measurement Error Causing Low Pressure Fuel Pump to Operate Too Slowly

1. Ignition OFF, engine OFF.
2. Disconnect low pressure fuel sensor connector to cause ECU to control low pressure fuel pump speed based on engine load. Ignore DTC 000094.04 which may be set when sensor is disconnected.
3. Monitor High Pressure Fuel - Actual Pressure data point in Service ADVISOR.

YES: Fuel supply system is not the cause of engine performance problem.

4. Ignition ON, engine running at speed and load where engine performance problem was observed.

NO: Engine has a MAP sensor. GO TO 26

Is engine performance problem still present?

NO: Engine does NOT have a MAP sensor. GO TO 27

Continued on next page

DN22556,00006A4 -19-25MAR11-27/46

26 Barometric Pressure Sensor Check With MAP Sensor	1. Ignition ON, engine OFF.	
	2. Monitor the following data points in Service ADVISOR: • Barometric Air Pressure • Manifold Air Pressure - Absolute Are the two data points within 10 kPa (1.5 psi) of each other?	**YES:** GO TO 28 **NO:** Perform 000108.02 — BAROMETRIC PRESSURE SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC was active.

DN22556,00006A4 -19-25MAR11-28/46

27 Barometric Pressure Sensor Check Without MAP Sensor	Monitor Barometric Air Pressure data point in Service ADVISOR.	
	NOTE: Actual barometric pressure varies considerably with altitude and local weather conditions. For approximate barometric pressure at altitude, see BAROMETRIC PRESSURE VERSUS ALTITUDE in Section 06, Group 210. Is Barometric Air Pressure within 20 kPa (3 psi) of the actual barometric pressure?	**YES:** GO TO 28 **NO:** Perform 000108.02 — BAROMETRIC PRESSURE SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC was active.

DN22556,00006A4 -19-25MAR11-29/46

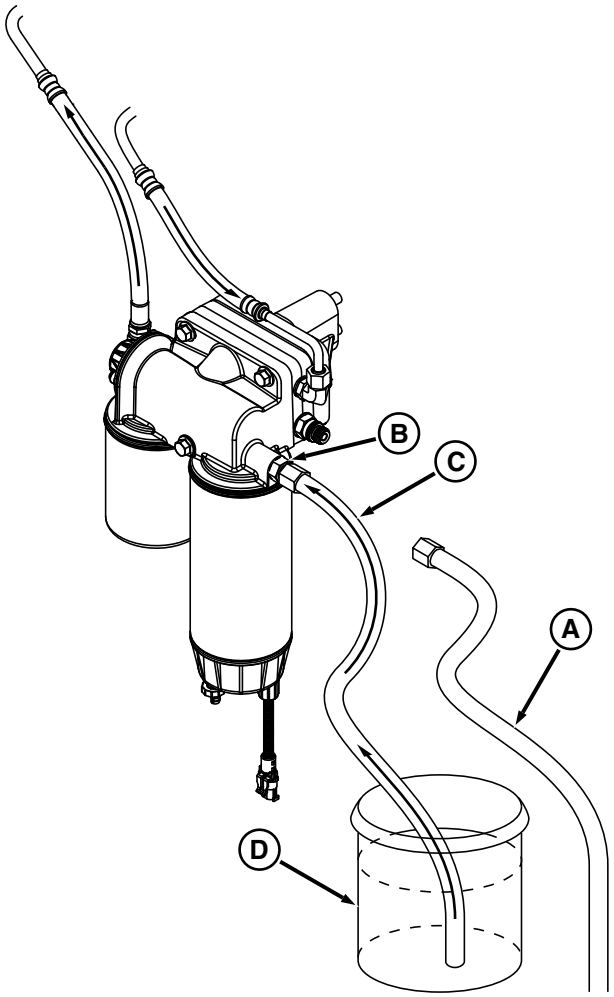
28 Low Pressure Fuel Sensor Harness Checks	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J3 connector and low pressure fuel sensor connector.	
	3. PerformTERMINAL TEST on J3 and low pressure fuel sensor connectors.	
	4. On the harness, measure the resistance between the ECU fuel pressure signal (J3-C1) and low pressure fuel sensor connector signal (P07-C).	
	5. On the harness, measure the resistance between the ECU return (J3-H3) and low pressure fuel sensor connector return (P07-B).	
	6. On the harness, measure the resistance between the ECU 5V supply (J3-H4) and low pressure fuel sensor connector 5V supply (P07-A). Were Terminal Test results good and were all resistance measurements less than 10 ohms?	**YES:** Replace low pressure fuel sensor. GO TO 44 **NO:** Fix problem. GO TO 44

Continued on next page

DN22556,00006A4 -19-25MAR11-30/46

29 Temporary Fuel Supply Check

NOTE: Use a clean hose and fuel that has known-good quality in a clean container for this step.



RG15619 —UN—26OCT07

Temporary Fuel Supply

A—Fuel Suction Line
B—Fuel Inlet
C—Temporary Fuel Supply Hose
D—Container of Diesel Fuel

1. Ignition OFF, engine OFF.
2. Disconnect fuel suction line (A) from the fuel filter header (B).
3. Install a temporary fuel supply hose (C) at fuel filter header inlet port and place other end of hose in a container of clean diesel fuel (D).
4. Ignition ON, engine OFF for at least 60 seconds to purge air.
5. Ignition OFF, engine OFF for 10 seconds.
6. Ignition ON, Engine OFF.
7. Ignition ON, engine running at speed and load where DTC 000094.17, 000157.01, or 000157.18 is active.

Is DTC 000094.17, 000157.01, or 000157.18 still active?

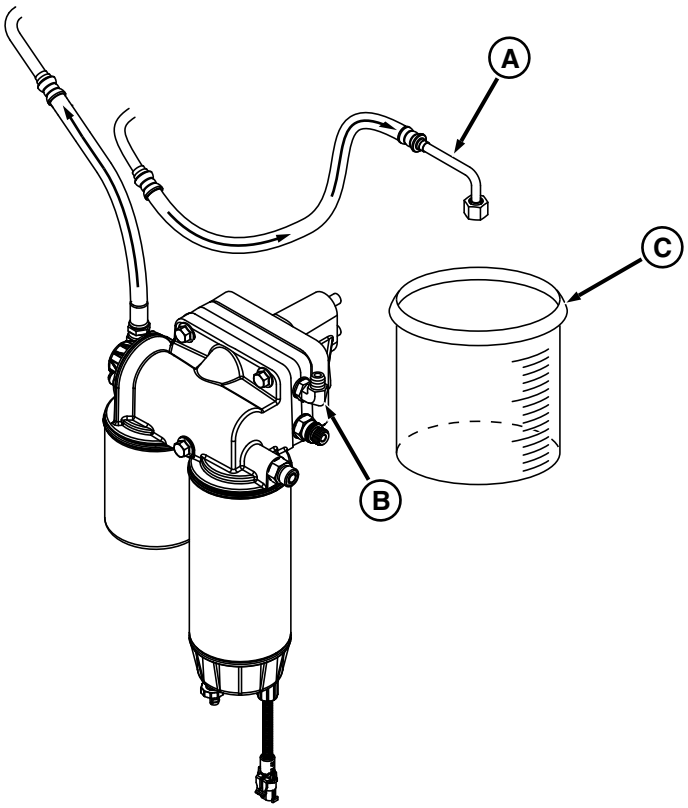
YES: GO TO 30

NO: Locate source of suction line air leak or restriction between fuel tank and fuel filter header. GO TO 44.

Continued on next page

DN22556,00006A4 -19-25MAR11-31/46

30 Check Fuel Flow Through Fuel Rail



RG15674 —UN—26OCT07

Check Flow Rate Through Rail

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Empty Container

1. Ignition OFF, engine OFF.
2. Disconnect fuel return line (A) at fuel filter header (B).
3. Place fuel return line (A) in an empty container suitable for diesel fuel (C).
4. Ignition ON, engine OFF.
5. Measure the quantity of fuel that flows from the return line in 15 seconds.

Is fuel flow rate at least 0.3L (10 oz) in 15 seconds?

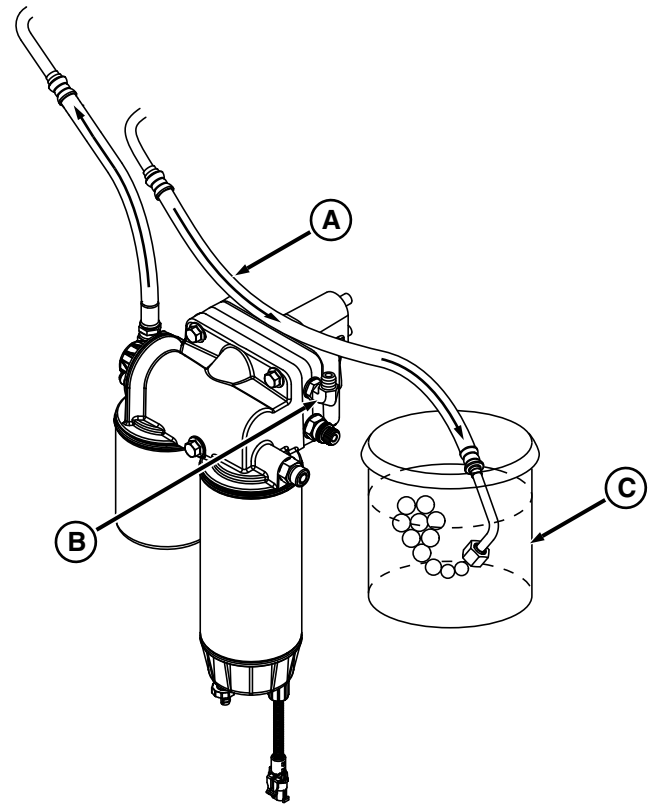
YES: GO TO 31

NO: Check for restriction between fuel filter header outlet port and fuel rail in cylinder head. If none found, GO TO 31

Continued on next page

DN22556,00006A4 -19-25MAR11-32/46

31 Check for Air in Fuel



RG15618 —UN—26OCT07

Check for Air in Fuel

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Container of Diesel Fuel

1. Ignition OFF, engine OFF.
2. Fuel return line (A) disconnected from fuel filter header (B).
3. Submerge the end of the fuel return line (A) into a container of diesel fuel (C).
4. Ignition ON, engine OFF so that electric low pressure fuel pump will prime system.
5. Check for air in return fuel for 60 seconds.

Is air present in the return fuel?

YES: Perform procedure CHECK FOR AIR IN FUEL

NO: GO TO 32

DN22556,00006A4 -19-25MAR11-33/46

32 Fuel Sensor Atmospheric Pressure Check

1. Ignition OFF, engine OFF
2. Disconnect low pressure fuel pump 6-way connector C19 to prevent pump from operating.
3. Disconnect fuel filter header fuel outlet and return lines so that both fuel pressure sensors are measuring atmospheric pressure.
4. Ignition ON, engine OFF.
5. Monitor the following data points in Service ADVISOR:
   - Low Pressure Fuel - Actual Pressure
   - High Pressure Fuel - Actual Pressure

Do both data points indicate 0 kPa (0 psi) within +/- 14 kPa (2 psi)?

YES: GO TO 36

NO: Engine has a MAP sensor. GO TO 33

NO: Engine does NOT have a MAP sensor. GO TO 34

Continued on next page

DN22556,00006A4 -19-25MAR11-34/46

33 Barometric Pressure Sensor Check With MAP Sensor	1. Ignition ON, engine OFF.	
	2. Monitor the following data points in Service ADVISOR: • Barometric Air Pressure • Manifold Air Pressure - Absolute	**YES:** GO TO 35
	Are the two data points within 10 kPa (1.5 psi) of each other?	**NO:** Perform 000108.02 — BAROMETRIC PRESSURE SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC was active.

DN22556,00006A4 -19-25MAR11-35/46

34 Barometric Pressure Sensor Check Without MAP Sensor	Monitor Barometric Air Pressure data point in Service ADVISOR.	
	NOTE: Actual barometric pressure varies considerably with altitude and local weather conditions. For approximate barometric pressure at altitude, see BAROMETRIC PRESSURE VERSUS ALTITUDE.	**YES:** GO TO 35
	Is Barometric Air Pressure within 30 kPa (4.5 psi) of the actual barometric pressure?	**NO:** Perform 000108.02 — BAROMETRIC PRESSURE SIGNAL INVALID DIAGNOSTIC PROCEDURE as though DTC was active.

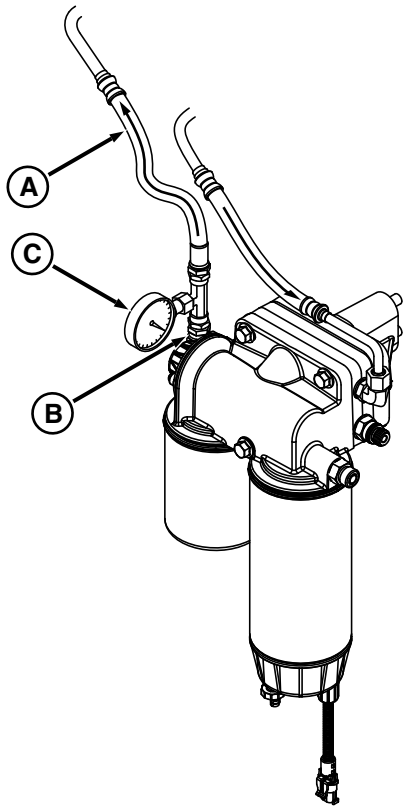
DN22556,00006A4 -19-25MAR11-36/46

35 Check Fuel Pressure Sensor Circuits Continuity	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J3 connector and low pressure fuel sensor and high pressure fuel sensor connectors.	
	3. Perform TERMINAL TEST on J3 and both fuel pressure sensor connectors.	
	4. On the harness, measure the resistance between the ECU low pressure fuel signal (J3-C1) and low pressure fuel sensor connector signal (P07-C).	
	5. On the harness, measure the resistance between the ECU return (J3-H3) and low pressure fuel sensor connector return (P07-B).	
	6. On the harness, measure the resistance between the ECU 5V supply (J3-H4) and low pressure fuel sensor connector 5V supply (P07-A).	
	7. On the harness, measure the resistance between the ECU high pressure fuel signal (J3-C2) and high pressure fuel sensor connector signal (P03-3).	
	8. On the harness, measure the resistance between the ECU return (J3-H3) and high pressure fuel sensor connector return (P03-1).	
	9. On the harness, measure the resistance between the ECU 5V supply (J3-H4) and high pressure fuel sensor connector 5V supply (P03-2).	**YES:** Replace fuel pressure sensor(s) which did not indicate 0 kPa (0 psi) within +/- 14 kPa (2 psi) in step 32. GO TO 44
	Were Terminal Test results good and were all resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 44

Continued on next page

DN22556,00006A4 -19-25MAR11-37/46

36 Measure Low Pressure Fuel - Pressure With Gauge



RG15672 —UN—26OCT07

Check Low Pressure Fuel - Pressure

A—High Pressure Fuel Pump Supply Line
B—Fuel Filter Header
C—Gauge

1. Ignition OFF, engine OFF.
2. Disconnect high pressure fuel pump supply line (A) at fuel filter header (B).
3. Install (T-in) a gauge (C) capable or measuring 275 kPa (40 psi) at the fuel filter header outlet (B) and connect the high pressure fuel pump supply line (A) to the gauge (C).

NOTE: Alternatively, the gauge may be placed at the high pressure fuel pump inlet port if this location is more accessible.

4. Ignition ON, engine OFF for at least 60 seconds to purge air.
5. Ignition OFF, engine OFF for 10 seconds.
6. Monitor Low Pressure Fuel - Actual Pressure in Service ADVISOR.
7. Ignition ON, engine running under conditions where DTC is active.

Is the pressure indicated on the gauge within +/- 14 kPa (2 psi) of the Low Pressure Fuel - Actual Pressure data point?

YES: GO TO 38

NO: GO TO 37

Continued on next page

DN22556,00006A4 -19-25MAR11-38/46

37 Check Low Pressure Sensor Wire Harness Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and low pressure fuel sensor connectors. 3. Perform TERMINAL TEST on J3 and low pressure fuel sensor connectors. 4. On the harness, measure the resistance between the ECU low pressure fuel signal (J3-C1) and low pressure fuel sensor connector signal (P07-C). 5. On the harness, measure the resistance between the ECU return (J3-H3) and low pressure fuel sensor connector return (P07-B). 6. On the harness, measure the resistance between the ECU 5V supply (J3-H4) and low pressure fuel sensor connector 5V supply (P07-A). Were Terminal Test results good and were all resistance measurements less than 10 ohms?	**YES:** Replace low pressure fuel sensor. GO TO 44 **NO:** Fix problem. GO TO 44

DN22556,00006A4 -19-25MAR11-39/46

38 Compare Desired Versus Actual Pressure	1. Monitor the following data points in Service ADVISOR: • Low Pressure Fuel - Actual Pressure • Low Pressure Fuel - Desired Pressure 2. Ignition ON, engine running under conditions where DTC is active. *NOTE: It is normal for the Low Pressure Fuel - Actual Pressure to be much greater than Low Pressure Fuel - Desired Pressure under low load conditions. The electric low pressure fuel pump is being driven at the slowest possible speed under these conditions and the pump is supplying more fuel than the engine is consuming. It is also normal for Low Pressure Fuel - Actual Pressure to be less than Low Pressure Fuel - Desired Pressure for short periods of time as the ECU attempts to control pump speed to regulate the fuel supply system. However, a problem is indicated if the low pressure fuel pump cannot continually maintain the desired pressure with engine operating under load.* Is Low Pressure Fuel - Actual Pressure greater than or equal to Low Pressure Fuel - Desired Pressure?	**YES:** GO TO 39 **NO:** Replace electric low pressure fuel pump. GO TO 44

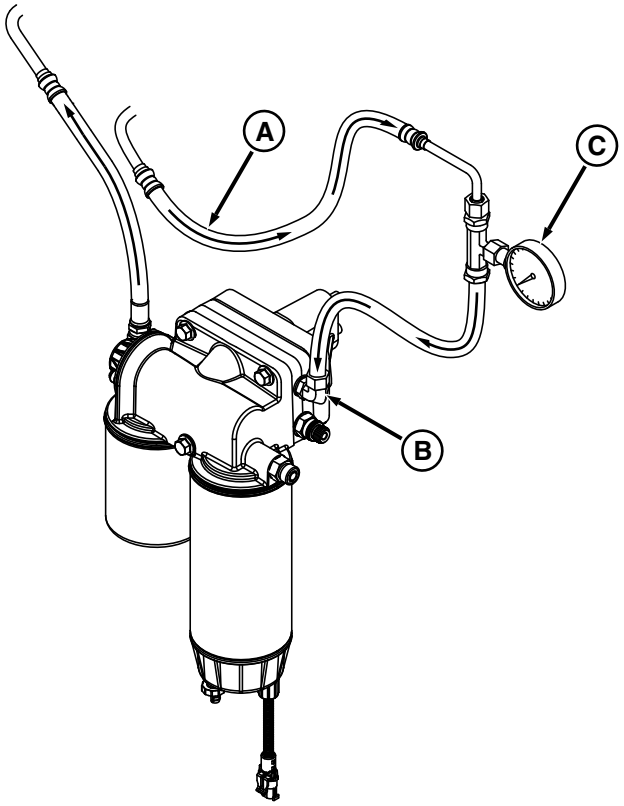
DN22556,00006A4 -19-25MAR11-40/46

39 Check for DTC 000094.17	Is DTC 000094.17 still being generated?	**YES:** Open DTAC case. **NO:** DTC 000157.01 or 000157.18 is being generated. GO TO 40.

Continued on next page

DN22556,00006A4 -19-25MAR11-41/46

40 Measure High Pressure Fuel - Pressure With Gauge



RG15617 —UN—26OCT07

Check High Pressure Fuel - Pressure with Gauge

A—Fuel Return Line
B—Fuel Filter Header
C—Gauge

1. Ignition OFF, engine OFF.
2. Disconnect fuel return line (A) from cylinder head at fuel filter header (B).
3. Install (T-in) a gauge (C) capable or measuring 1400 kPa (200 psi) at the fuel filter header return inlet (B) and connect the fuel return line (A) to the gauge (C).

NOTE: Alternatively, the gauge may be placed at the cylinder head fuel rail outlet port if this location is more accessible.

4. Ignition ON, engine OFF for at least 60 seconds to purge air.
5. Ignition OFF, engine OFF for 10 seconds.
6. Monitor High Pressure Fuel - Actual Pressure in Service ADVISOR.
7. Ignition ON, engine running under conditions where DTC is active.
8. Is the pressure indicated on the gauge within +/- 140 kPa (20 psi) of the High Pressure Fuel - Actual Pressure data point?

YES: GO TO 43
NO: GO TO 41

DN22556,00006A4 -19-25MAR11-42/46

41 Check Fuel Filter Screen

1. Ignition OFF, engine OFF.
2. Remove fuel filter screen from fuel filter header assembly. See REMOVE AND INSTALL FUEL FILTER SCREEN in Section 02, Group 091.

Is debris present in fuel return screen?

YES: Clean or replace screen. GO TO 44
NO: Reinstall screen. GO TO 42

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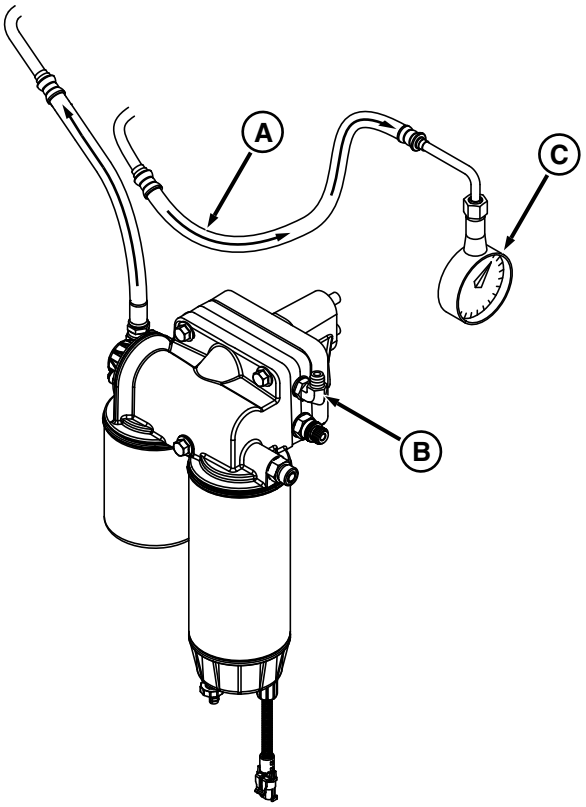
DN22556,00006A4 -19-25MAR11-43/46

42 Check High Pressure Fuel Sensor Wire Harness Continuity	1. Ignition OFF, engine OFF. 2. Disconnect ECU J3 connector and high pressure fuel sensor connectors. 3. Perform TERMINAL TEST on J3 and fuel pressure sensor connectors. 4. On the harness, measure the resistance between the ECU high pressure fuel signal (J3-C2) and high pressure fuel sensor connector signal (P03-3). 5. On the harness, measure the resistance between the ECU return (J3-H3) and high pressure fuel sensor connector return (P03-1). 6. On the harness, measure the resistance between the ECU 5V supply (J3-H4) and high pressure fuel sensor connector 5V supply (P03-2). Were Terminal Test results good and were all resistance measurements less than 10 ohms?	**YES:** Replace high pressure fuel sensor. GO TO 44 **NO:** Fix problem. GO TO 44

Continued on next page

43 Check High Pressure Fuel Pump

NOTE: This step will measure the maximum pressure developed by the high pressure fuel pump (pump output is dead-headed) using a gauge. The gauge must be capable of measuring at least 1400 kPa (200 psi).



RG15616 —UN—26OCT07

Measure High Pressure Fuel Pump Maximum Pressure (Dead-Head)

A—Fuel Return Line From Cylinder Head
B—Fuel Filter Header
C—Gauge

1. Ignition OFF, engine OFF.
2. Fuel return line (A) disconnected from fuel filter header (B).
3. Install (dead-head) a gauge (C) capable or measuring 1400 kPa (200 psi) in the fuel return line (A).

NOTE: Alternatively, the gauge may be placed at the cylinder head fuel rail outlet port if this location is more accessible.

4. Start engine and operate at low idle while monitoring fuel pressure gauge. If gauge does not indicate at least 500 kPa (72 psi), slowly increase engine speed to 1200 rpm.

Does fuel pressure gauge indicate at least 500 kPa (72 psi)?

YES: Replace fuel pressure regulator valve in fuel filter header. GO TO 44

NO: Replace high pressure fuel pump. GO TO 44

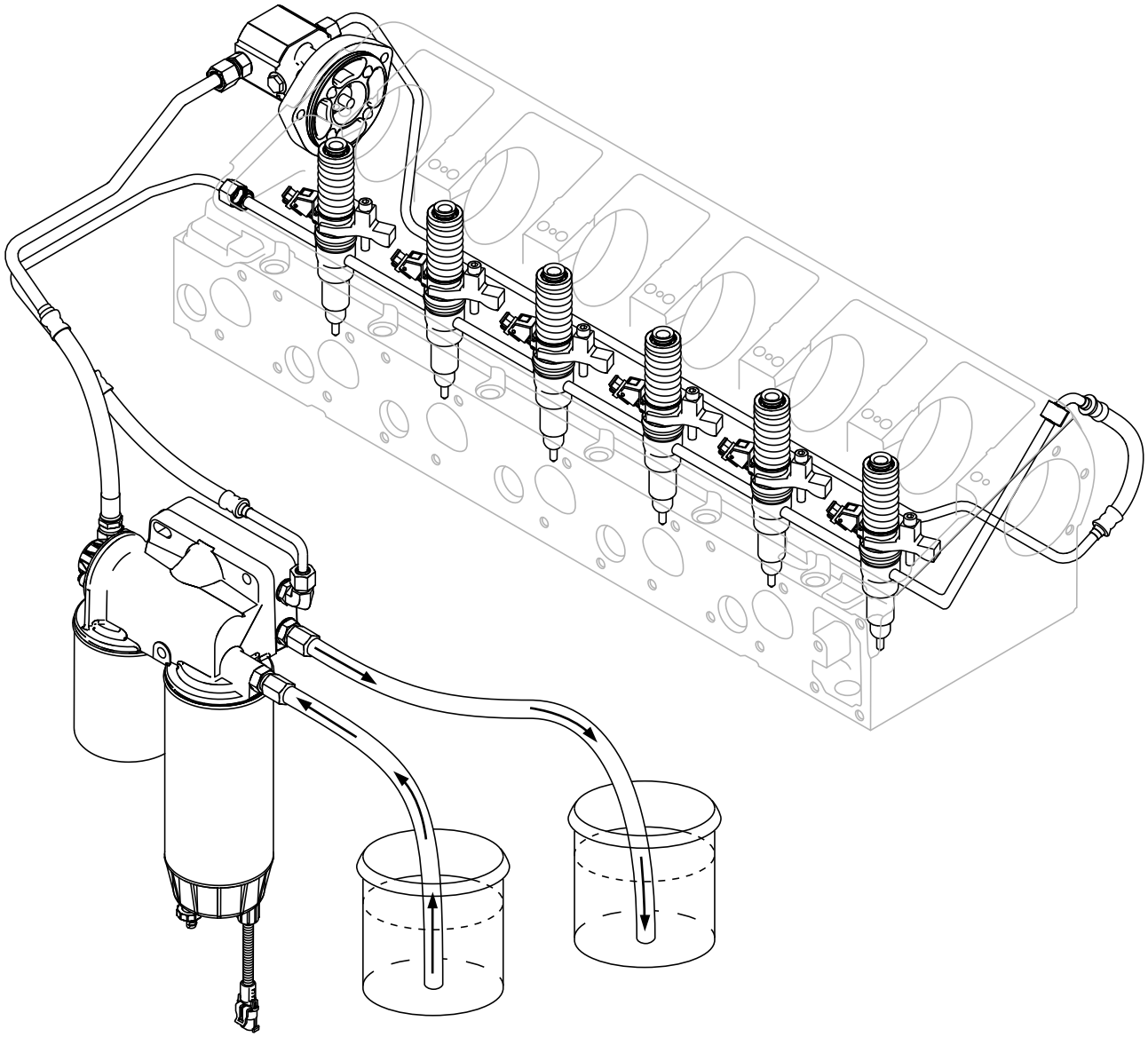
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DN22556,00006A4 -19-25MAR11-45/46

44 Verification	1. Reinstall all fuel lines, fuel components, and electrical connectors, if applicable. 2. Ignition ON, engine OFF for 60 seconds to purge air from fuel. 3. Ignition OFF, engine OFF for at least 10 seconds. 4. Ignition ON, engine running at speed and load where DTCs were active or engine performance problem existed. Is DTC 000094.17, 000157.01, 000157.16, 000157.18 still active or does engine performance problem still exist?	**YES:** GO TO 1 **NO:** Fuel supply system is performing correctly.

DN22556,00006A4 -19-25MAR11-46/46

Check Fuel Supply Quality



RG15369A —UN—02NOV09

Test Quality of Fuel

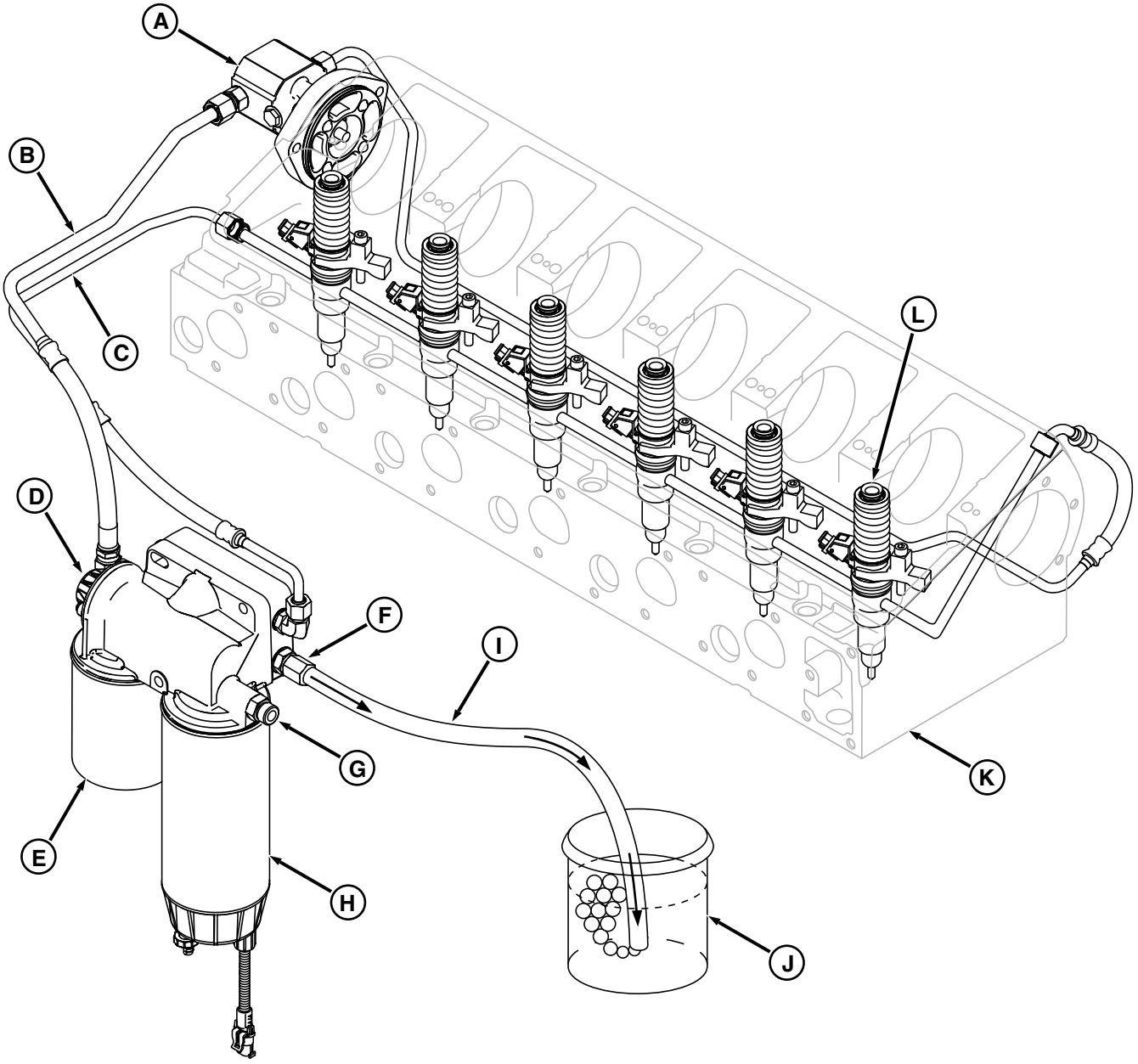
The quality of diesel fuel affects engine performance. For fuel specifications see DIESEL FUEL in Section 2 group 002 earlier in this manual.

Perform the following:

1. Drain water and contaminants from water separator / sediment bowl into a clean container by opening drain valve.
2. Close water separator drain valve.
3. Check for water or debris in the drained fuel.
4. Key ON for 3 minutes to prime fuel system.
5. Repeat steps 1-4 above.
6. If water or debris is still found replace filters and repeat steps 1-5. If water and or debris is still found drain and clean fuel tank as per application maintenance manual, else go to step 8.
7. Run engine for 1 minute at least 1500 rpm.
8. Operate under load for 1 minute. Repeat steps 1 - 5.
9. Reduce engine speed to idle and shutdown engine. If problem still exists go to step 10.
10. Perform a fuel test, see TESTING DIESEL FUEL in Section 2 Group 005 earlier in this manual. If problem still exists go to 11.
11. Have fuel supplier test their fuel.

DN22556,000069D -19-02NOV09-1/1

Test for Air in Fuel



Check For Air In Fuel System

A—High Pressure Fuel Pump
B—Fuel Supply Line
C—Fuel Return Line
D—Low Pressure Fuel Pump
E—Secondary Filter
F—Return to Tank Port
G—Tank Supply Port
H—Primary Filter
I— Clear Plastic Hose
J— Container of Clean Fuel
K—Cylinder Head
L—Electronic Unit Injector

The fuel system will self-purge of 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.

NOTE: Tool JT03513C Fuel Supply System Test Kit is designed for use with these tasks. For a description see Section 5 Group 170.

To check for air in the 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 (H) is on tight and gasket is intact.
   - Check for damaged fuel pick-up tube in tank.
   - Check for low fuel level in tank.

Continued on next page

- 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 INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 2 Group 90 earlier in this manual.
- Air may enter system when engine is turned off: Make sure lines are properly tightened between the secondary filter (E) and the high pressure fuel pump (A) and between high pressure fuel pump leak-off port and cylinder head (K).

2. Check for air in fuel system:
   a. Disconnect the return-to-tank line from the filter assembly.
   b. Install a clear plastic hose (I) with proper fittings from the return-to-tank port (F) on the filter assembly and submerge hose in a container of clean fuel (J).
   c. Start engine. Run engine to at least 1500 rpm for 1 minute . Observe hose and container for bubbles. Stop engine.
   d. If there are bubbles, go to the next step to determine source of the air. Reconnect fuel lines.
3. Check for air in fuel tank supply line:
   a. Disconnect the fuel tank supply line from the fuel primary filter.
   b. Install a clear plastic hose (I) with proper fittings between the fuel tank supply line (G) and the primary filter (H).
   c. Operate engine and check for air bubbles in hose. If there are bubbles, check for damaged tank, damaged tank components, and for loose or damaged fuel supply lines and hoses.
   d. If no problem was found reconnect fuel lines, go to the next step.
4. Check for air in the high pressure pump fuel supply line (B):
   a. Disconnect the line between the secondary filter (E) and the high pressure fuel pump (A).
   b. Install a clear plastic hose (I) with proper fittings between the filter and the pump.
   c. Operate engine and allow hose to fill with fuel, then check for air bubbles in hose. If there are bubbles, check for damaged primary filter head or gasket, and for loose or damaged primary filter.
   d. If no problem was found reconnect fuel lines, go to the next step.
5. Check for air in the fuel return line (C):
   a. Disconnect the line between the head (K) and the primary filter (H).
   b. Install a clear plastic hose with proper fittings between the head and filter.
   c. Operate engine and allow hose to fill with fuel, then check for air bubbles in hose. If there are bubbles, a likely cause is air leaking past one or more injectors. Inspect the injector hold down clamp torque, o-rings and seals. See INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 2 Group 90 earlier in this manual. Reconnect fuel lines.
   d. If source of air was not found, check fuel cooler (if applicable) for leaks.

DN22556,000045E -19-18APR08-2/2

Bleed Fuel System

Key on for 3 minutes to all system to auto bleed.

NOTE: Do not crank engine while purging. This will cause the system to push air into the injectors which will take quite some time to expel the air.

DN22556,0000694 -19-18APR08-1/1

Type 2 Fuel Return To Tank System Check

JB81757,000008D -19-21NOV08-1/8

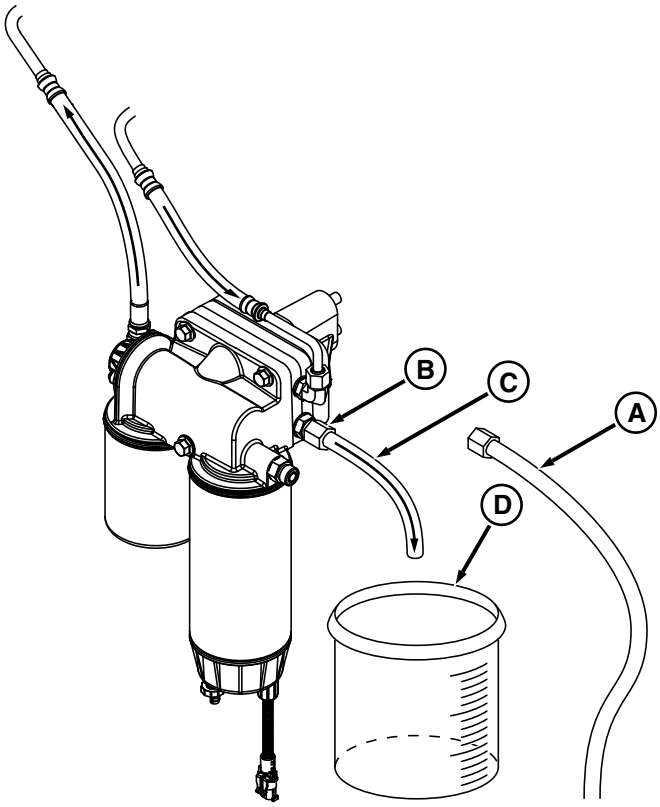
Type 2 Fuel Return To Tank System Check

Additional References:

NOTE: For fuel system identification, see 13.5L FUEL SUPPLY SYSTEM IDENTIFICATION

JB81757,000008D -19-21NOV08-2/8

1 Check for Fuel Return to Tank Flow



RG15673 —UN—26OCT07

Check Return to Tank Flow Rate

A—Fuel Return to Tank Line
B—Fuel Filter Header
C—Temporary Fuel Return to Tank Hose
D—Container

1. Ignition OFF, engine OFF.
2. Disconnect fuel return to tank line (A) from fuel filter header (B).
3. Install a temporary hose (C) to fuel filter header (B).
4. Place end of temporary hose (C) in a container suitable for diesel fuel (D).
5. Ignition ON, engine running at 1000 rpm for 60 seconds.
6. Measure amount of fuel in the container (D).

Does at least 0.3L (10 oz) of fuel flow through temporary hose in 60 seconds?

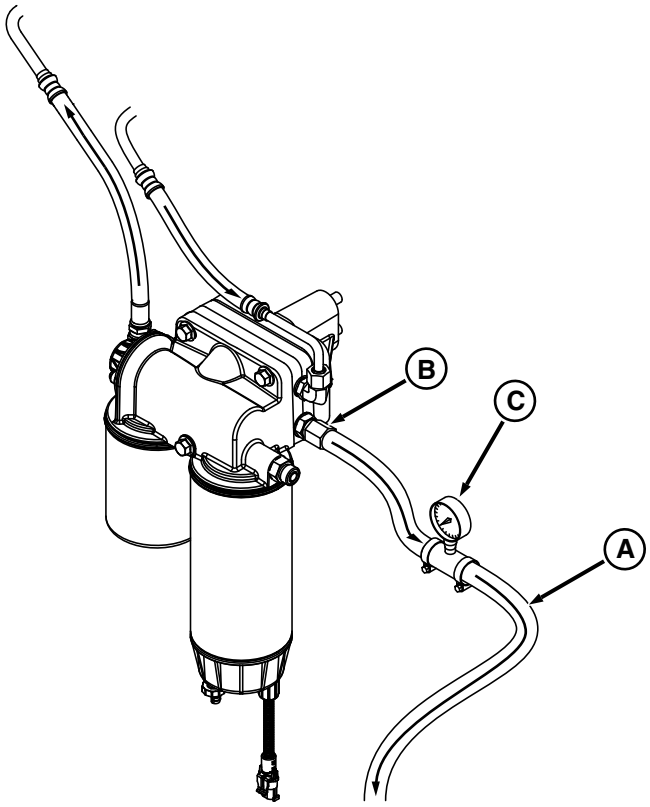
YES: GO TO 2

NO: GO TO 6

Continued on next page

JB81757,000008D -19-21NOV08-3/8

❷ Check Fuel Return to Tank Line Pressure



RG15620 —UN—26OCT07

Measure Fuel Return to Tank Pressure

A—Fuel Return to Tank Line
B—Fuel Filter Header
C—Gauge

1. Verify fuel filler cap on fuel tank is installed.
2. Ignition OFF, engine OFF
3. Fuel return to tank line (A) removed from fuel filter header (B).
4. Install (T-in) a gauge (C) capable of accurately reading 20 kPa.
5. Ignition ON, engine OFF for 60 seconds.

Does gauge indicate pressure greater than 20 kPa (3 psi)?

YES: GO TO 3

NO: GO TO 4

JB81757,000008D -19-21NOV08-4/8

❸ Check Tank Vent

1. Ignition OFF, engine OFF.
2. Remove fuel tank filler cap.
3. Ignition ON, engine OFF for 60 seconds.

Does gauge indicate pressure greater than 20 kPa (3 psi)?

YES: Locate restriction in fuel return to tank line. GO TO 2

NO: Locate fuel tank vent restriction. GO TO 2

Continued on next page

JB81757,000008D -19-21NOV08-5/8

4 Check Fuel Return To Tank Pressure Engine Running	Ignition ON, engine running at 1200 rpm. Does gauge indicate pressure greater than 20 kPa (3 psi)?	**YES:** GO TO 5 **NO:** Fuel return to tank system is operating correctly. Return to DTC or observable procedure.

JB81757,000008D -19-21NOV08-6/8

5 Check Tank Vent	1. Ignition OFF, engine OFF. 2. Remove fuel tank filler cap. 3. Ignition ON, engine running at 1200 rpm. Does gauge indicate pressure greater than 20 kPa (3 psi)?	 **YES:** Repair restriction in fuel return to tank line. GO TO 2 **NO:** Repair fuel tank vent restriction. GO TO 2

JB81757,000008D -19-21NOV08-7/8

6 Check Fuel Return Regulator Valve	*NOTE: See REMOVE AND INSTALL FUEL RETURN REGULATOR VALVE in Section 02, Group 091.* 1. Ignition OFF, engine OFF. 2. Remove fuel return regulator valve. 3. Inspect valve for debris which would block fuel flow through valve. Was debris present?	 **YES:** Remove debris, reinstall valve. GO TO 1 **NO:** Replace fuel return regulator valve. GO TO 1.

JB81757,000008D -19-21NOV08-8/8

Restarting Engine That Has Run Out Of Fuel

DN22556,000069A -19-21NOV08-1/3

Restarting Engine That Has Run Out Of Fuel Diagnostic Procedure

DN22556,000069A -19-21NOV08-2/3

1 Bleeding Air From The Fuel System	1. Ignition ON, Engine OFF for 3 minutes. *NOTE: This will allow the fuel system to bleed the air from the rail and lines. Do not try to start the engine during this time or air will be sucked into the rail and injectors making the engine hard to start.* 2. Crank the engine. Did engine start?	**YES:** Everything is working normally. **NO:** See, ENGINE CRANKS BUT WON'T START earlier in this Group.

DN22556,000069A -19-21NOV08-3/3

Charge Air System

DN22556,0000699 -19-18APR08-1/7

Charge Air System Diagnostic Procedure

NOTE: A failing turbocharger, or charge air system (for example, air leakage from the charge air cooler system), will result in black smoke and low power.

DN22556,0000699 -19-18APR08-2/7

1 Air Filter Inspection	1. Inspect air filter for damage or blockage that would restrict air flow, or allow dirt into the engine.	
	2. Remove inlet air pipes, and check for damaged or loose clamps, and dirt tracks from unfiltered air.	**YES:** Repair identified problems, notify customer then GO TO 2
	Was damage, blockage, or dirt tracks found?	**NO:** GO TO 2

DN22556,0000699 -19-18APR08-3/7

2 Turbocharger, Compressor–Side Evaluation	1. Without removing turbocharger, examine compressor housing and blades for damage. See TURBOCHARGER SEVEN-STEP INSPECTION in Section 02, Group 080 of the 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.	**YES:** GO TO 3
	Was damage, debris, or leaking oil found?	**NO:** GO TO 4

DN22556,0000699 -19-18APR08-4/7

3 Turbocharger Diagnostics	1. Remove turbocharger. See REMOVE TURBOCHARGER in Section 02, Group 080 of the base engine manual.	
	2. Inspect for debris or oil. See TURBOCHARGER SEVEN-STEP INSPECTION in Section 02, Group 080 of the base engine manual.	**YES:** Replace turbocharger. (See INSTALL TURBOCHARGER in Section 02, Group 080 of the base engine manual.) Then remove and clean charge air cooler, reinstall, and GO TO 4
	Was there debris or oil in the compressor outlet to the charge air cooler?	**NO:** GO TO 4

Continued on next page

DN22556,0000699 -19-18APR08-5/7

4 Charge Air Cooling System Check	*NOTE: This procedure requires fabrication of caps for the inlet and outlet of the charge air cooler outlet. One of the caps constructions requires the ability to receive and seal a supply air line. Each kind of charge air system application requires a unique cap construction.* 1. At the intake manifold, remove charge air cooler outlet tube, and cap it. 2. At the turbocharger, remove charge air cooler inlet tube, and cap it with the supply air line cap. (See Note) 3. Install a supply air line to the charge air system. Slowly pressurize the charge air system to 206.85 kPa (30 psi). 4. Maintain 206.85 kPa (30 psi). Using soapy water, check the system joints for air leaks. Were any joint leaks found?	**YES:** Shut off air supply and tighten clamp on leaking joint, or replace irreparable tubing. **NO:** GO TO 5

DN22556,0000699 -19-18APR08-6/7

5 Charge Air Cooler Check	1. Turn supply air on. 2. Slowly pressurize the charge air cooler to 206.85 kPa (30 psi). 3. Without removing the supply air line, shut off air supply. 4. Time how long air pressure takes to reach 0 kPa (psi). Was time to go to zero greater than 60 seconds?	**YES:** Reattach the inlet and outlet tubing, then return to previous diagnostic procedure. **NO:** Replace charge air cooler. (See machine technical manual for removal, inspection and installation procedures.)

DN22556,0000699 -19-18APR08-7/7

Variable Geometry Turbocharger (VGT) Component Test

DN22556,0000550 -19-31MAR11-1/11

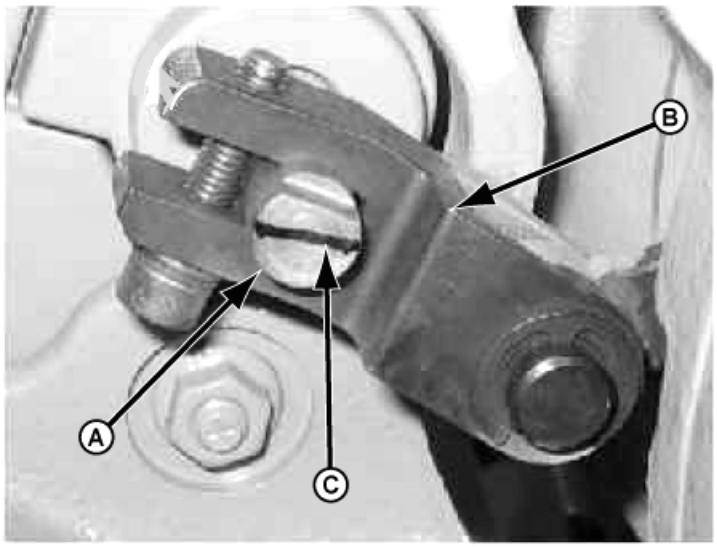
Variable Geometry Turbocharger (VGT) Component Test Diagnostic Procedure

Continued on next page

DN22556,0000550 -19-31MAR11-2/11

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.

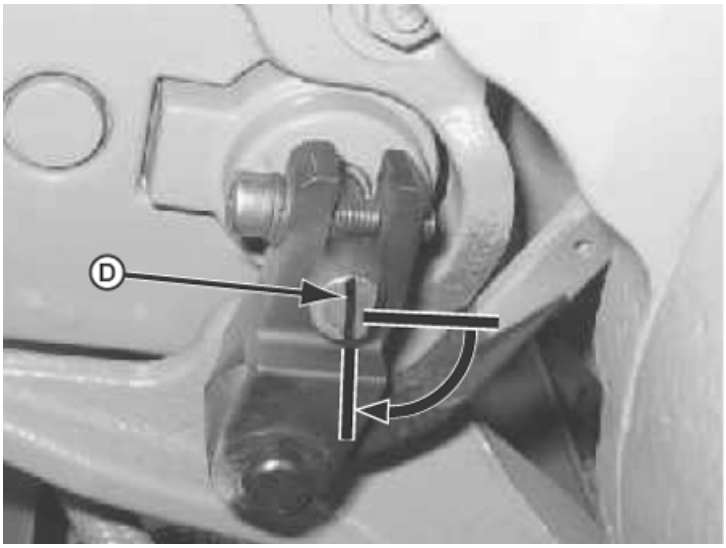


RG15154 —UN—08NOV06

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

DN22556,0000550 -19-31MAR11-3/11

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

DN22556,0000550 -19-31MAR11-4/11

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.

DN22556,0000550 -19-31MAR11-5/11

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.

DN22556,0000550 -19-31MAR11-6/11

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:** Perform VGT TRAVEL RANGE TEST in Service ADVISOR. **NO:** Replace linkage. See REMOVE AND INSTALL TURBOCHARGER ACTUATOR LINKAGE (6 CYLINDER ENGINE), in the base engine manual.

DN22556,0000550 -19-31MAR11-7/11

6 Travel Range Test	1. Ignition ON, Engine OFF. 2. Perform VGT TRAVEL RANGE TEST in Service ADVISOR. Did test pass?	 **YES:** Return to original diagnostic procedure. **NO:** GO TO 7.

Continued on next page

DN22556,0000550 -19-31MAR11-8/11

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.

DN22556,0000550 -19-31MAR11-9/11

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

DN22556,0000550 -19-31MAR11-10/11

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 INSTRUCTIONS in Service ADVISOR. Did the test pass?	**YES:** Return to original diagnostic procedure. **NO:** Replace turbo and verify it fixed problem.

DN22556,0000550 -19-31MAR11-11/11

About This Group

This group of the manual contains necessary information to diagnose the electronic control system. Use this information in conjunction with the 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, and wiring harnesses are serviceable and available.

To help diagnose electronic control system problems, see DIAGNOSTICS SPECIFICATIONS in Section 06, Group 210 of this manual. It contains useful information, such as system wiring schematic and ECU terminal identification.

IMPORTANT: Not under any 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 always made in the harness end of the connector. Measurements made on the ECU itself will specifically call that out.

DN22556,000037D -19-18APR08-1/1

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.

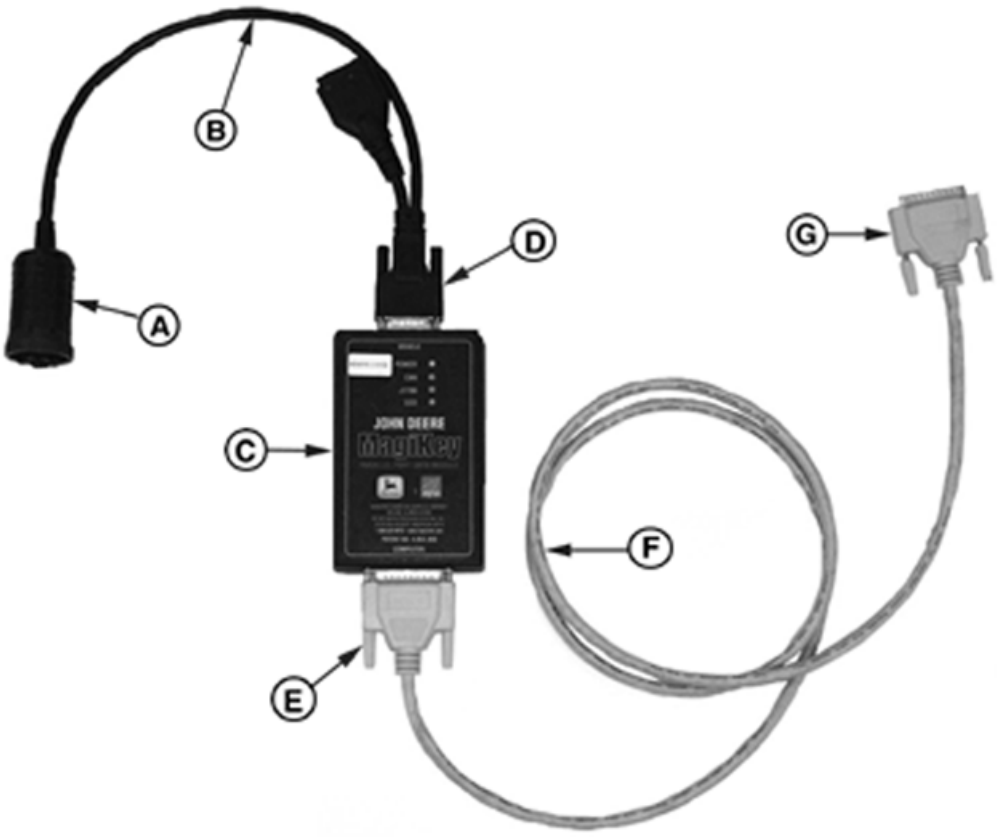
RG40049,00001D3 -19-26OCT10-1/1

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.

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DM59778,000007B -19-06MAY11-1/6

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

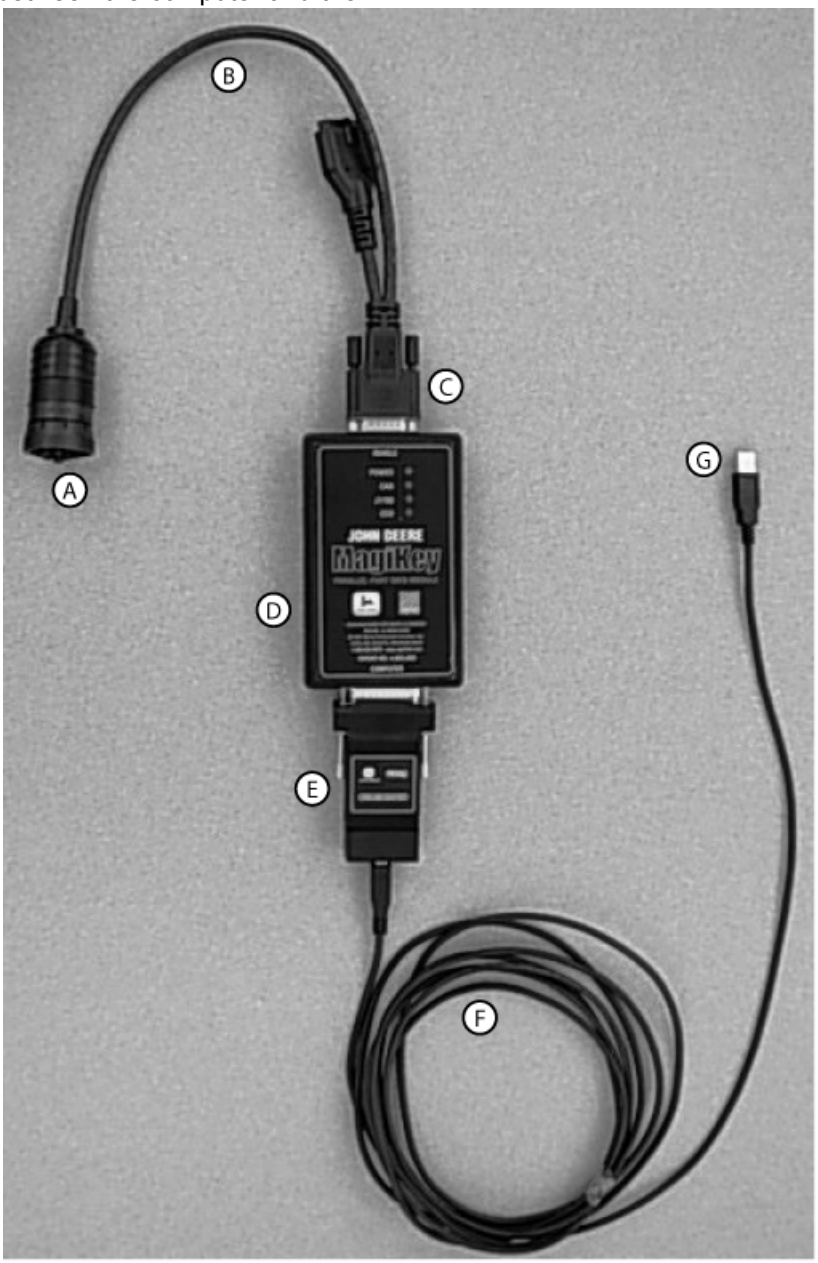
13. When finished, replace the dust cap on the diagnostic connector.

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DM59778,000007B -19-06MAY11-2/6

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).

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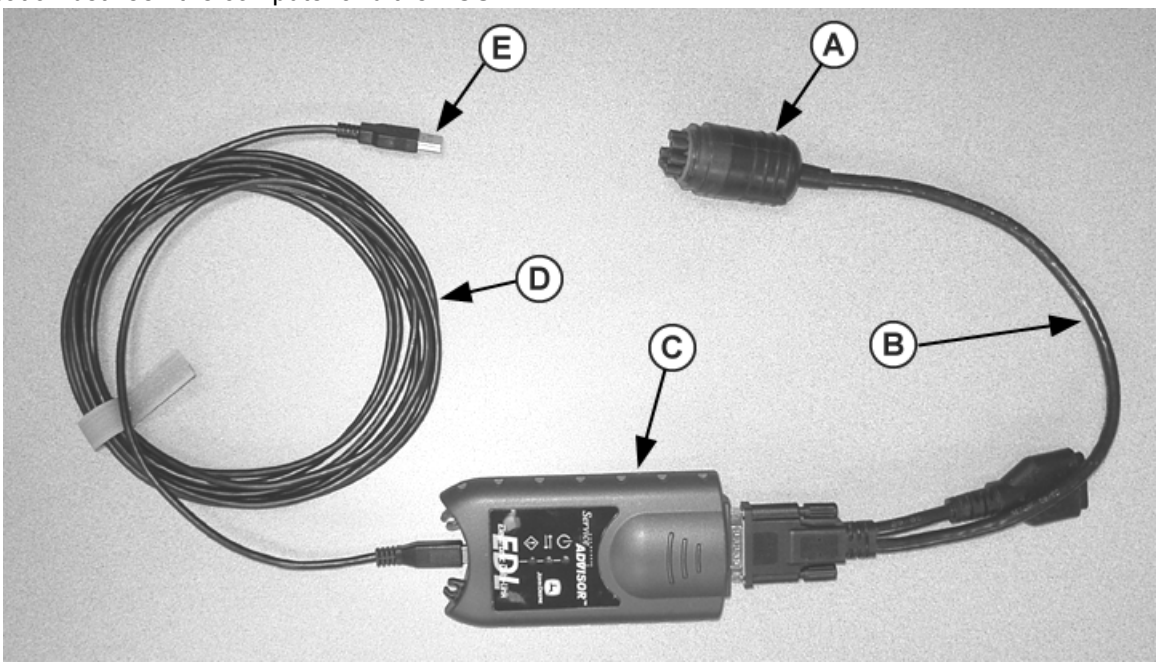
4. Connect the USB adaptor (E) to the PDM module.
5. Connect the USB cable (F) to the USB adapter.
6. Connect the USB cable computer connector (G) to the USB port on the computer.
7. Key ON, engine off or running.
8. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press 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.

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DM59778,000007B -19-06MAY11-4/6

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.

SA1001 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

SA1001 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.

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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 Tests and calibrations 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.

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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 Tests and Calibrations 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 operating normally. 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

Result: Cylinder Cutout Test Completed Successfully

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Cylinder Cutout Test Using JDG1250

IMPORTANT: This box was designed for the 10.5 and 12.5L engines. It will work on the 13.5L engine but affects the ECU differently thus setting codes in the Code and Test positions of the switch.

The injector disable box JDG1250 is another aid to identify a cylinder that is having a problem or to help in diagnosing mechanical or intermittent problems. During the test, the technician can disable a cylinder by selectively turning off an injector and detecting a change in the performance of the engine.

This Cylinder Cutout Test can not 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 an Electronic Unit Injector (EUI). Other information such as the results of a Compression Test and other engine diagnostic procedures should be used to accurately determine the source of the engine problem.

JDG1250 has three switch positions for each cylinder and are labeled as: Run, Code, and Test.

RUN — Normal engine operation. All cylinders are activated. Flashing light means the ECU is sending a signal to the EUI for injection cycles.
CODE — Disconnects the circuit to the specific EUI, disabling that cylinder, while causing a diagnostic code for that cylinder to set eg. 000651.06.
TEST — Disconnects the circuit to the specific EUI, disabling that cylinder, while causing a diagnostic code for that cylinder to set eg. 000651.05.

This tool especially beneficial to use on an engine that will not start.
With the JDG1250 installed crank the engine over to verify ECU is sending a signal to the EUIs, which is indicated by the LED lights flashing.
If lights flash it will give you the indication to look for a fuel system problem, if they do not flash perform the proper electrical diagnostic procedures.

Before executing the Cylinder Cutout Test

- Warm engine to normal operating temperature
- Repair the cause of any Diagnostic Trouble Codes (DTCs)
- Ensure that the battery and starter are in good working condition

Performing the Cylinder Cutout Test

1. Disconnect EUI harness connector from cylinder head. Install JDG1250 Injector Disable Box by connecting one end to the wire harness and the other end to the cylinder head.



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JDG1250 Injector Disable Box

2. Have all switches in the **RUN** cylinder setting.
3. Engine idling or under the conditions that the problem occurred.
4. Select the cylinder to be cut out.
5. Observe engine operation for any change. If no change occurred in the way the engine is operating, cylinder is not contributing.

NOTE: It is recommended that the test be run at least 3 times to ensure repeatable, accurate results.

EUI Harness Connector

EUI (Electronic Unit Injector)

- The fuel in 13.5 L engines is delivered by 6 (one for each cylinder) electronic unit injectors (EUIs). The EUIs are mounted in the cylinder head, under the valve cover, so that they spray directly into the center of the cylinder bore. Each EUI is an injection pump and injector combined, operating at much higher pressures than standard in-line or rotary injection pumps. The ECU controls the start of injection and the amount of fuel injected by turning the solenoid in the EUI valve housing on and off which in turn opens and closes the EUI spill valve.
- Power is supplied to the EUIs for cylinders 1, 2, and 3 by a common wire, and to the EUIs for cylinders 4, 5, and 6 by a different common wire. The ECU energizes and de-energizes the solenoids of individual EUIs by closing and opening the individual EUI ground circuits.

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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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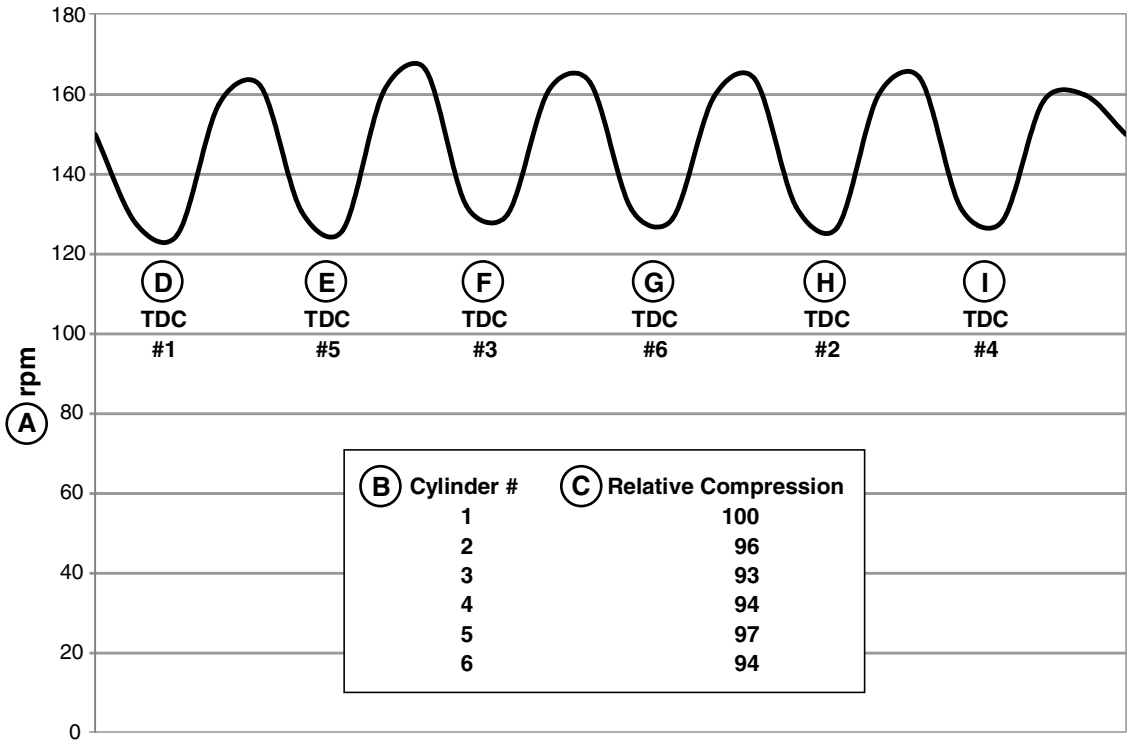


Figure 1
Cranking Speed and Typical Cylinder Electronic Compression Test Results when All Cylinders have Similar Compression.

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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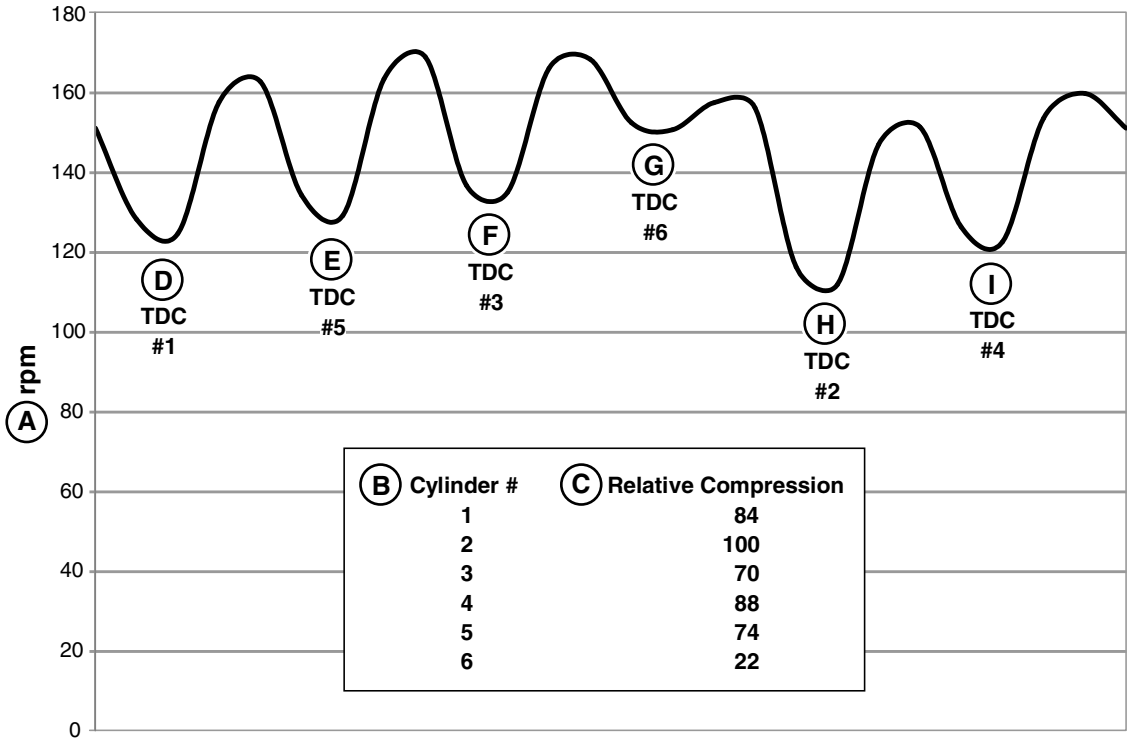


Figure 2
Cranking Speed and Typical Cylinder Electronic Compression Test Results When One Cylinder has Low Compression (Cylinder #6).

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 Tests and Calibrations 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.

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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 Tests and Calibrations 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 Data Parameters 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.

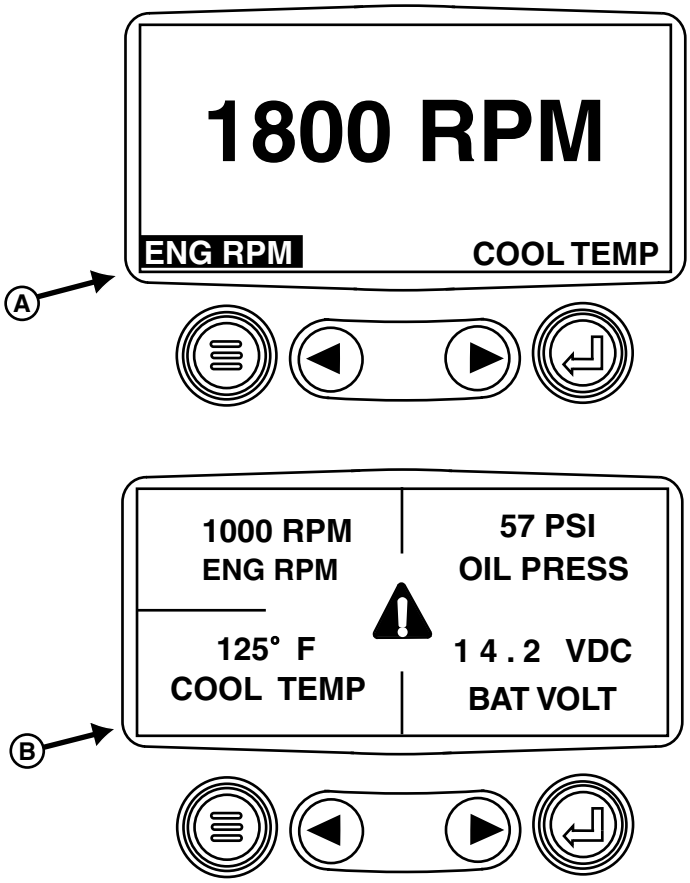


Figure 1. One and Four Parameter Displays

A—1-Up Display **B—4-Up Display**

The Power View diagnostic gauge can be used for displaying engine parameters. Two display modes can be selected, one showing a single parameter, called 1-Up Display (A), and the other showing 4 selectable parameters, called 4-Up Display (B). At power up, the gauge defaults to the mode that was last used. Examples of both are shown in figure 1.

NOTE: When the one-parameter display is selected, main menu shows "GO TO 4-UP DISPLAY", and when the four-parameter display is selected, main menu shows "GO TO 1-UP DISPLAY" in the top line.

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1. Changing to the 4 parameter display. See figure 2.
   a. Press the MENU KEY (F). Main Menu is displayed.
   b. With the SCROLL KEYS (G,H), select “GO TO 4-UP DISPLAY” (B).
   c. Press the ENTER KEY (I).
   d. The 4-Up Display will be shown.
2. Selecting engine parameters for 4-UP Dispaly.
   a. Press the MENU KEY (F). Main menu is displayed.
   b. Using the SCROLL KEYS (G,H), select SETUP 4-UP DISPLAY (B). Press ENTER KEY (I).
   c. In the next screen, select CUSTOM SETUP and press ENTER KEY (I). The 4-Up Display appears.
   d. With the SCROLL KEYS (G,H), select the window on the display you want to change. Press ENTER KEY (I).
   e. Scroll through the parameter list and select the parameter you want to display. Press ENTER KEY (I).
   f. The number of the display window will appear next to the selected parameter.
   g. Press MENU KEY (F) to return to the 4-Up Display. The new parameter should be displayed on the screen.

NOTE: The same method is used for selecting the default parameter for the 1-UP Display.

3. Changing units of measure.
   a. Press the MENU KEY (F). Main menu is displayed.
   b. Scroll through the menu to SELECT UNITS (E). Press ENTER KEY (I).
   c. With the SCROLL KEYS (G,H), select the desired unit of measure. Press ENTER KEY (I).
   d. Press MENU KEY (F) to return to the parameter display.

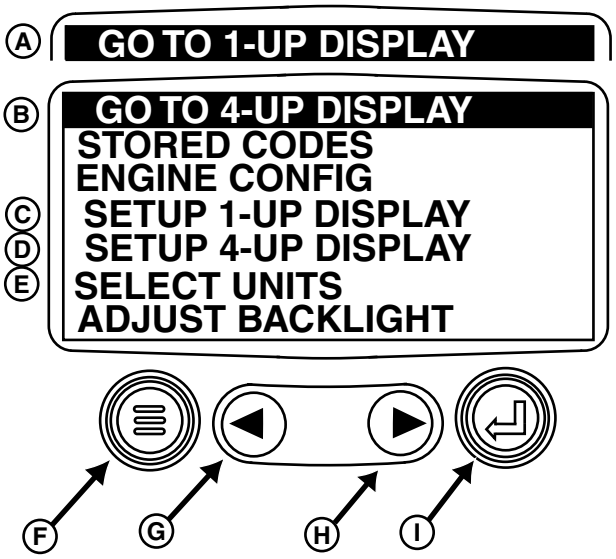


Figure 2. Main Menu.

A—Go To 1-Up Display
B—Go To 4-Up Display
C—Setup 1-Up Display
D—Setup 4-Up Display
E—Select Units
F—Menu Key
G—Left/Up Scroll Key
H—Right/DownScroll Key
I— Enter Key

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Diagnostic Gauge Active DTC Viewing Instructions

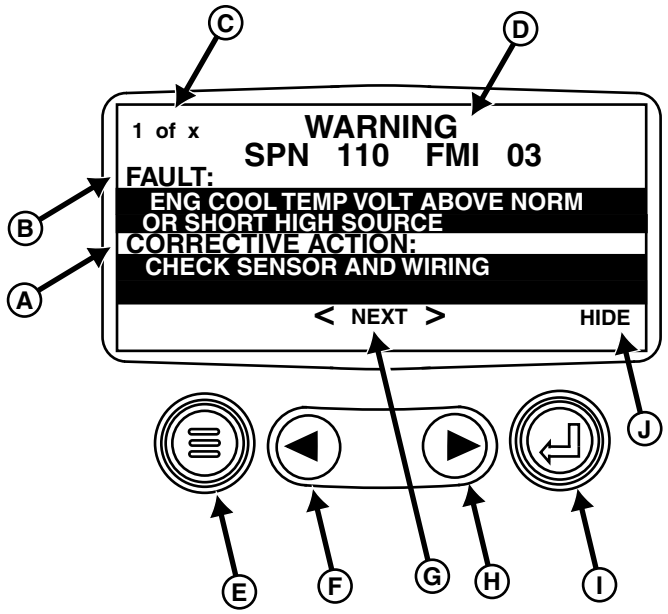
NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

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.

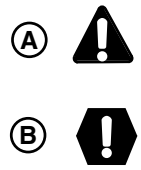
3. To return to the Main Menu screen, press the menu button (E), shown in figure 4.

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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 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.

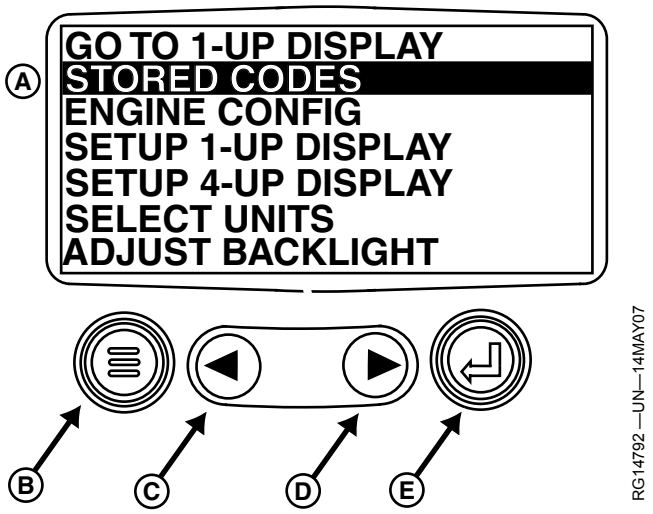
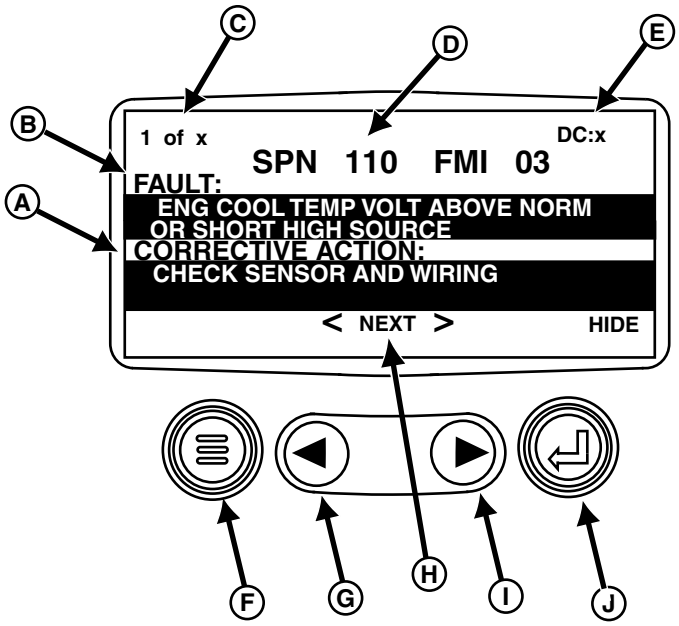


Figure 1. Main Menu

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.

Continued on next page



RG14796 —UN—16MAY07

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 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.

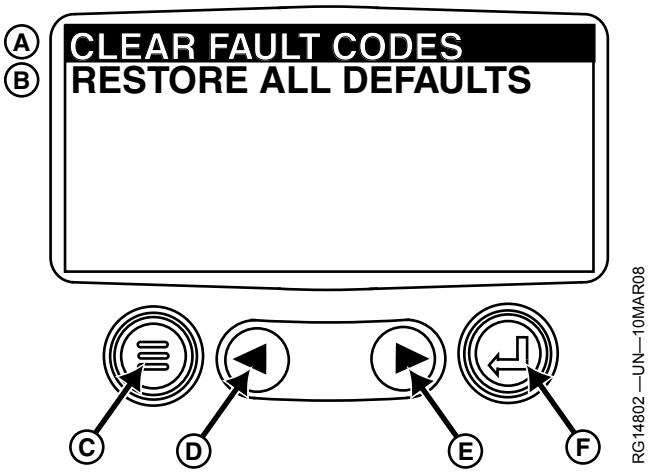


Figure 1. Clear Stored Fault Codes Screen

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

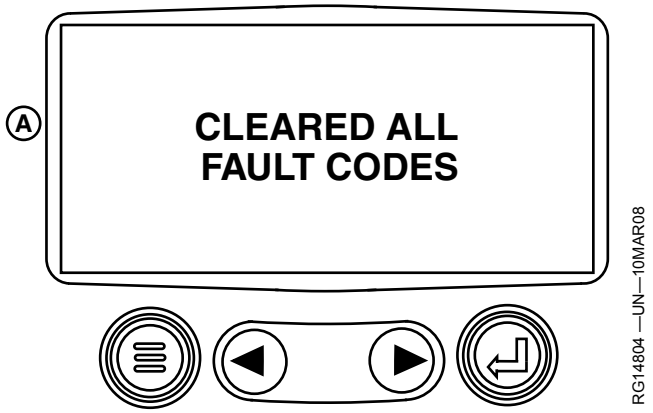


Figure 2. Clear All Fault Codes Screen

DB92450,0000061 -19-18APR08-2/2

Diagnostic Trouble Code Designations

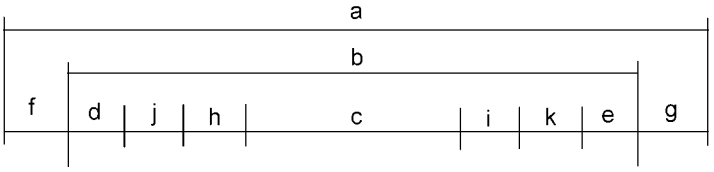
SPN/FMI CODES

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.

FMI Designators

RG14537 —UN—31OCT05



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.

Continued on next page

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
000107.31	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
000157.01	High Pressure Fuel Signal Extremely Low
000157.03	High Pressure Fuel Signal Out of Range High
000157.04	High Pressure Fuel Signal Out of Range Low
000157.16	High Pressure Fuel Signal Moderately High
000157.18	High Pressure Fuel Signal Moderately Low
000158.17	ECU Power Down Error
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

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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
000441.03	Gear Oil Temperature Signal Out of Range High
000441.04	Gear Oil Temperature Signal Out of Range Low
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	Camshaft Position Circuit Has Low Resistance
000636.08	Camshaft Position Signal Missing
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	Turbo Actuator Temperature Moderately High
000647.05	Engine Fan Drive Circuit Has High Resistance
000647.7	Engine Fan Drive Not Responding
000651.05	Injector #1 Circuit Has High Resistance
000651.06	Injector #1 Circuit Has Low Resistance
000651.13	Injector #1 Calibration Fault
000652.05	Injector #2 Circuit Has High Resistance
000652.06	Injector #2 Circuit Has Low Resistance
000652.13	Injector #2 Calibration Fault
000653.05	Injector #3 Circuit Has High Resistance
000653.06	Injector #3 Circuit Has Low Resistance
000653.13	Injector #3 Calibration Fault
000654.05	Injector #4 Circuit Has High Resistance
000654.06	Injector #4 Circuit Has Low Resistance
000654.13	Injector #4 Calibration Fault
000655.05	Injector #5 Circuit Has High Resistance
000655.06	Injector #5 Circuit Has Low Resistance
000655.13	Injector #5 Calibration Fault

Continued on next page

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SPN.FMI	Description
000656.05	Injector #6 Circuit Has High Resistance
000656.06	Injector #6 Circuit Has Low Resistance
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	Compressor Inlet Temperature Signal Out of Range High
001172.04	Compressor Inlet Temperature Signal Out of Range Low
001180.00	Calculated Turbine Inlet Temperature Signal Extremely High
001180.16	Calculated Turbine Inlet Temperature Signal Moderately High
001569.31	Engine in Power Derate Condition
001639.01	Fan Speed Signal Extremely Low
001639.16	Fan Speed Signal Moderately High
001639.18	Fan Speed Signal Moderately Low
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
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 (Forward)
002791.03	EGR Valve Position Signal Out of Range High (Forward)
002791.04	EGR Valve Position Signal Out of Range Low (Forward)
002791.07	EGR Valve Not Reaching Expected Position (Forward)
002791.13	EGR Valve Calibration Change Over a Short Period of Time (Forward)
002791.31	EGR Valve Calibration Change Over a Long Period of Time (Forward)
002795.07	VGT Actuator Not Reaching Expected Position
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
003822.02	EGR Valve Position Signal Invalid (Rear)
003822.03	EGR Valve Position Signal Out of Range High (Rear)
003822.04	EGR Valve Position Signal Out of Range Low (Rear)
003822.07	EGR Valve Not Reaching Expected Position (Rear)
003822.13	EGR Valve Calibration Change Over a Short Period of Time (Rear)

Continued on next page

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SPN.FMI	Description
003822.31	EGR Valve Calibration Change Over a Long Period of Time (Rear)
523379.03	Single Point Ground #7 Has High Resistance
523744.31	A/C Compressor is ON When It Should be OFF

DN22556,0000692 -19-06APR11-4/4

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:



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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

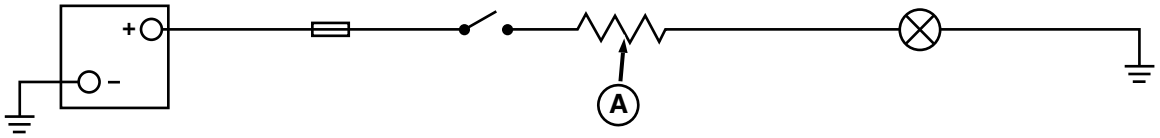
Tests include making measurements of voltage and resistance, as well as checking for open circuits and short circuits. An understanding of Voltage (volts), Current (amps), Resistance (ohms), Open circuit, and Short circuit is required to properly diagnose electrical problems.

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

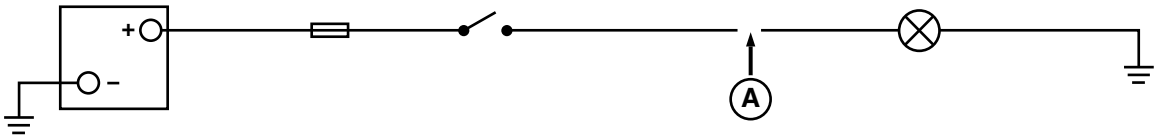
A circuit having unwanted resistance (A) that causes a voltage drop and reduces current flow.

Continued on next page

DN22556,000003E -19-30MAR11-1/6

2. **Open Circuit:**

RG9892 —UN—03MAR08



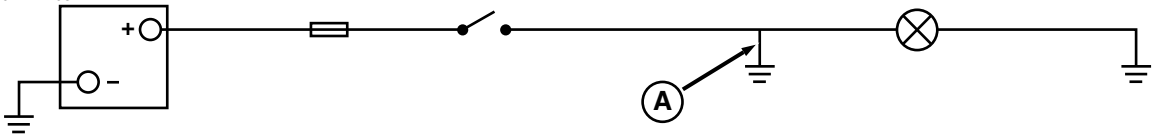
Open Circuit

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

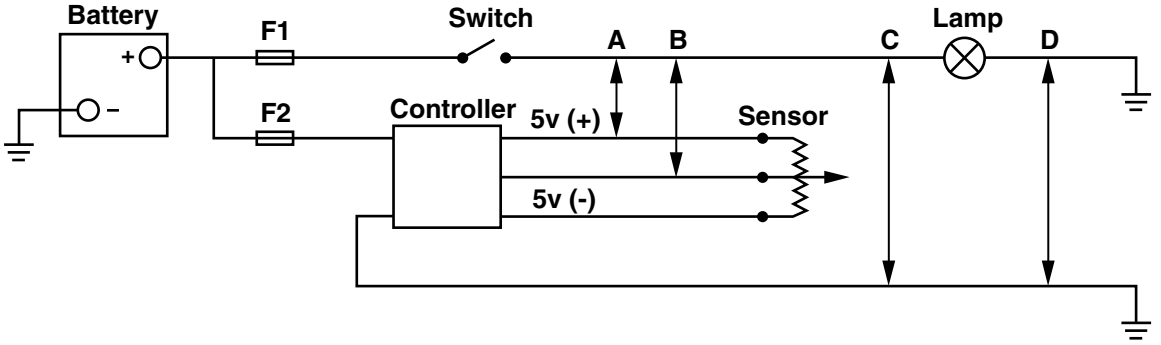


Grounded Circuit

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).

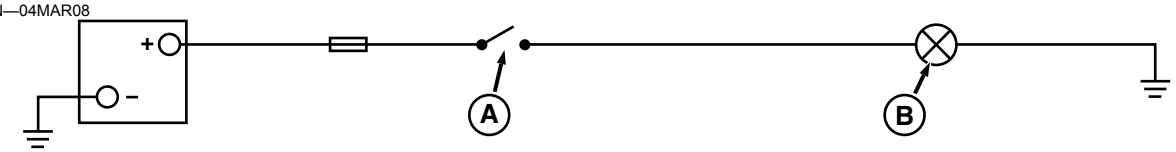
NOTE: The ground to ground type of short does not create an observable malfunction. Therefore, no further explanation for trouble shooting is necessary.

Continued on next page

DN22556,000003E -19-30MAR11-2/6

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.

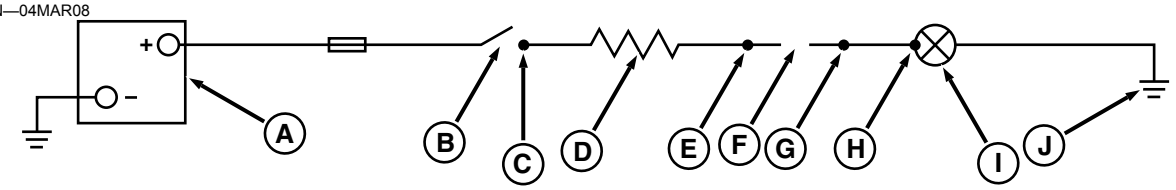
Example: A component may not operate before disconnecting an electrical connection, but it operates after reconnecting the connector.

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 -19-30MAR11-3/6

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.

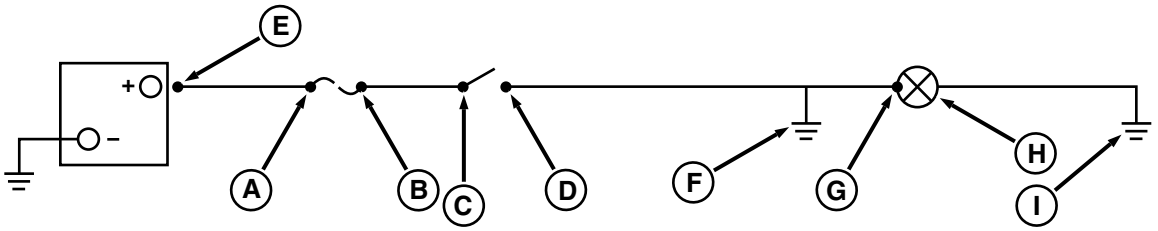
   NOTE: The example shows high resistance (D) between (C) and (E) and the open circuit (F) between (E) and (G).

   b. Repair the circuit as required.

   c. After completing the repair verify problem is resolved.

Continued on next page

DN22556,000003E -19-30MAR11-4/6



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).

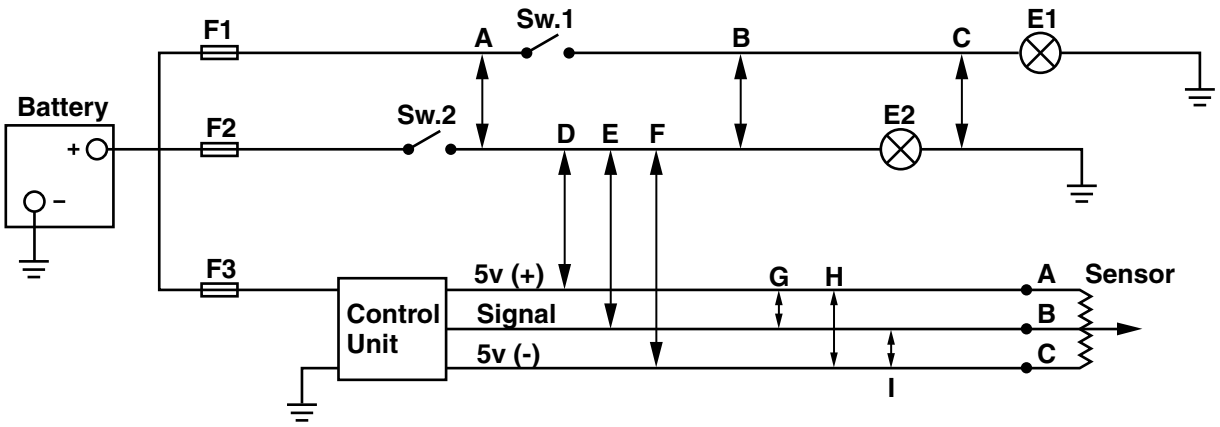
- If there is continuity, there is a grounded circuit between (D) and (G). Repair the circuit.

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

DN22556,000003E -19-30MAR11-5/6



Shorted Circuit

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 and 2).
   - Result: Both lamps (E1 and 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. After completing the repair verify problem is resolved.

[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 -19-30MAR11-6/6

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.

SS01820,00002DE -19-30JUN10-1/1

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 “Tests and 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.

SS01820,00002DF -19-28MAR11-1/1

Exhaust Gas Recirculation Valve Calibration

For instructions on connecting to Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.

The EGR VALVE RECALIBRATION procedure resets all stored valve positions data. For more information see EXHAUST GAS RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 EGR VALVE RECALIBRATION in Service ADVISOR.
3. Follow the instructions on the screens.

   NOTE: The screen will ask to select EGR 1 or EGR 2. On the 13.5L there is 2 (two) valves, so select EGR 1 or EGR 2.

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.

BK34394,0000067 -19-23JUL10-1/1

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. In Service ADVISOR, select Tests and Calibrations from the shortcut bar.
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 wiggling the wiring harness to see if the code reappears. If it does, check the harness and connector for problems.

SS01820,00002E1 -19-30MAR11-1/1

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.

SS01820,00002E2 -19-30JUN10-1/1

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.

RG41221,00001F3 -19-18APR08-1/1

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. In Service ADVISOR, select tests and Calibrations from the short cut bar.
3. Select Connected Interactive Tests.
4. Select Internal Data Monitor.
5. Select the data points you want to record and click the “Next” button to continue.
6. 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.

Continued on next page

SS01820,00002E4 -19-28MAR11-1/3

NOTE: The software estimates the recording length and displays it on the screen.

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\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.
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\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.
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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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.

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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.

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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.
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).
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.

Continued on next page

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Parameter	Units Metric (Eng)	Description
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 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 System Part Number		The part number for the fuel system used on the engine.
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.
High Pressure Fuel - Actual Pressure	kPa (psi)	Pressure indicated by high pressure fuel sensor.
High Pressure Fuel Input Voltage	Volts	Input voltage measured by the ECU.
Low Pressure Fuel - Actual Pressure	kPa (psi)	Pressure indicated by low pressure fuel sensor.

Continued on next page

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Parameter	Units Metric (Eng)	Description
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 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.

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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.

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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

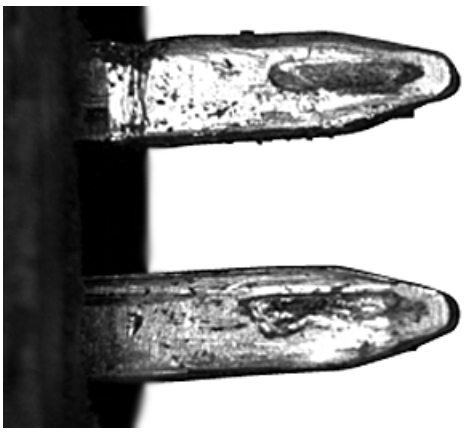
- Remove connector back shell to gain access to wire insertion end of connector, if applicable.
- Gently pull on each wire in the connector.

Replace terminal if wire end pulls out of the terminal.

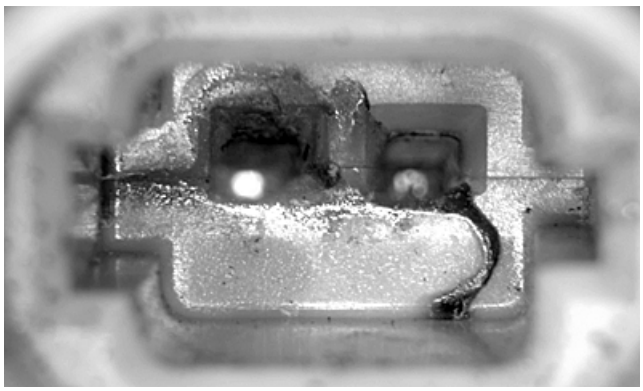
Terminal Tips

- 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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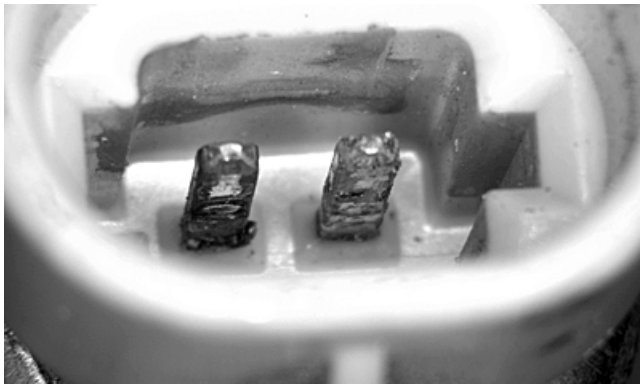
RG16614 —UN—25NOV08



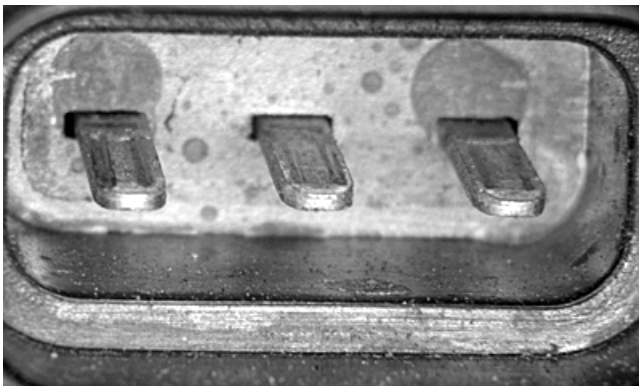
RG16615 —UN—25NOV08



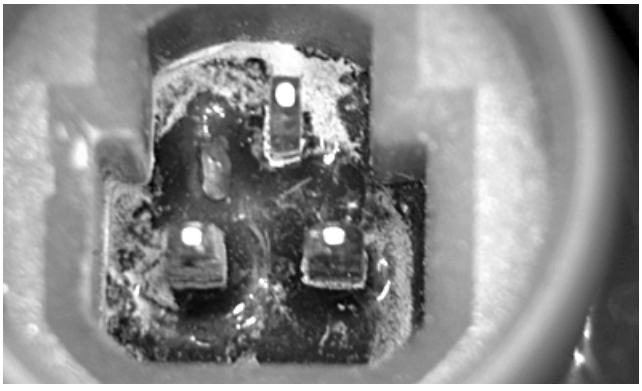
RG16616 —UN—25NOV08



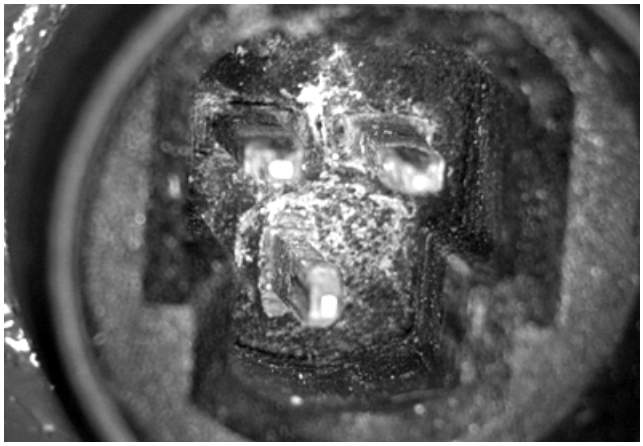
RG16617 —UN—25NOV08



RG16618 —UN—25NOV08



RG16621 —UN—25NOV08

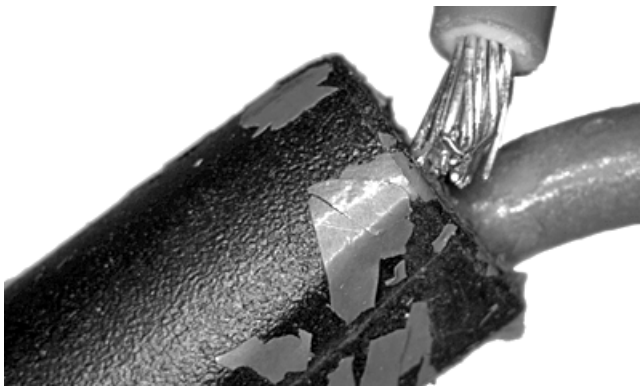


RG16623 —UN—25NOV08

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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 INSTRUCTIONS.

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 INSTRUCTIONS for more information.

DN22556,0000003 -19-31MAR11-1/1

VGT — Learn Value Reset Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in Section 04, Group 160.

The procedure resets the original stored values for the open and closed actuator positions. For more information see Turbocharger Operation in Section 3 Group 135.

NOTE: This procedure is performed only when the VGT actuator is replaced with a new actuator.

NOTE: Replacing an actuator to test for a bad actuator (part swapping) is not recommended. It could cause several DTCs to set, because the values stored in the ECU will be out of tolerance when the new actuator performs a learn.

1. Ignition ON, engine OFF.
2. Select All Calibrations in the Service ADVISOR Tests and Calibrations shortcut bar.
3. Select Interactive Calibrations.
4. Select VGT Learn Value Reset.
5. Follow the instructions in the diagnostic software.
6. Ignition OFF for 90 seconds.
7. Ignition ON, Engine OFF. The VGT automatically goes through the learn process. The VGT creates an audible noise when cycling.

DN22556,00000D9 -19-30MAR11-1/1

000028.03 — Digital Throttle Signal Out of Range High

Digital throttle signal is above the high voltage specification.

DN22556,00003A2 -19-25MAR11-1/15

000028.03 — Digital Throttle 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 signal increases above the 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 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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 small terminal C09 - Yellow/Purple
- Control Panel large terminal C09 - Yellow/Blue

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DN22556,00003A2 -19-25MAR11-2/15

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 000028.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00003A2 -19-25MAR11-3/15

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Check wiring connections at digital throttle. 3. Disconnect connector C09 on the control panel. 4. Perform TERMINAL TEST on C09 harness connector and panel connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003A2 -19-25MAR11-4/15

3 Harness Resistance Check	On the harness C09 connector, measure the resistance between signal (terminal B4) and return (terminal G3). Is resistance greater than 4k ohms?	**YES:** GO TO 4 **NO:** GO TO 5

DN22556,00003A2 -19-25MAR11-5/15

4 Return Wire Check	On the harness C09 connector, measure the resistance between return (terminal G3) and application single point ground. Is resistance less than 10 ohms?	**YES:** Repair open signal wire terminal B4 on C09. **NO:** GO TO 6

DN22556,00003A2 -19-25MAR11-6/15

5 Control Panel Resistance Check	1. Set the multi-state throttle switch to the rabbit position. 2. On the control panel C09 connector, measure the resistance between signal (terminal B4) and return (terminal G3). Is resistance greater than 10k ohms?	**YES:** GO TO 6 **NO:** GO TO 8

DN22556,00003A2 -19-25MAR11-7/15

6 Signal Wire Check	On the control panel C09 connector, measure the resistance between signal (terminal B4) and the corresponding wire on the switch. Is resistance greater than 10 ohms?	**YES:** Repair open signal wire. **NO:** GO TO 7

Continued on next page

DN22556,00003A2 -19-25MAR11-8/15

7 **Return Wire Check**	On the control panel C09 connector, measure the resistance between return (terminal G3) and the corresponding wire on the switch. Is resistance greater than 10 ohms?	**YES:** Repair open return wire. **NO:** GO TO 13

DN22556,00003A2 -19-25MAR11-9/15

8 **Occurrence Count Check**	Review stored information and look at occurrence count for 000028.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

DN22556,00003A2 -19-25MAR11-10/15

9 **Terminal Test**	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the digital throttle harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

DN22556,00003A2 -19-25MAR11-11/15

10 **Further Review of Snapshot Information**	1. Ignition ON, Engine OFF 2. 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 11 **NO:** GO TO 12

DN22556,00003A2 -19-25MAR11-12/15

11 **Engine Error Operating Point Test**	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes. Did 000028.03 reappear when engine operating point was reached?	 **YES:** GO TO 2 **NO:** GO TO 10 and confirm operating point.

DN22556,00003A2 -19-25MAR11-13/15

12 **Terminal Test**	1. Ignition OFF, Engine OFF 2. Disconnect digital throttle connector and ECU connector J2. 3. Perform TERMINAL TEST on the digital throttle harness connector and ECU J2 connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 13

Continued on next page

DN22556,00003A2 -19-25MAR11-14/15

13 Software Updates	1. Download latest ECU payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000028.03 active?	**YES:** Replace digital throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00003A2 -19-25MAR11-15/15

000028.04 — Digital Throttle Signal Out of Range Low

Digital throttle signal is below the low voltage specification.

DN22556,00003A3 -19-25MAR11-1/13

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 signal decreases below the 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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 small terminal C09 - Yellow/Purple
- Control Panel large terminal C09 - Yellow/Blue

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DN22556,00003A3 -19-25MAR11-2/13

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 000028.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00003A3 -19-25MAR11-3/13

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Check wiring connections on digital throttle. 3. Disconnect connector C09 on the control panel. 4. Perform TERMINAL TEST on C09 harness connector and panel connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003A3 -19-25MAR11-4/13

3 Harness Resistance Check	On the harness C09 connector, measure the resistance between signal (terminal B4) and return (terminal G3). Is resistance less than 10 ohms?	**YES:** Repair short between wires. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

DN22556,00003A3 -19-25MAR11-5/13

4 Control Panel Resistance Check	1. Set the multi-state throttle switch to the rabbit position. 2. On the control panel C09 connector, measure the resistance between signal (terminal B4) and return (terminal G3). Is resistance less than 500 ohms?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,00003A3 -19-25MAR11-6/13

5 Switch Check	1. Disconnect the wires on the multi-state throttle. 2. On the control panel C09 connector, measure the resistance between signal (terminal B4) and return (terminal G3). Is resistance less than 500 ohms?	**YES:** Repair shorted between wires. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Replace multi-state throttle switch. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

DN22556,00003A3 -19-25MAR11-7/13

6 Occurrence Count Check	Review stored information and look at occurrence count for 000028.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,00003A3 -19-25MAR11-8/13

7 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the digital throttle harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

DN22556,00003A3 -19-25MAR11-9/13

8 Further Review of Snapshot Information	1. Ignition ON, Engine OFF 2. 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

DN22556,00003A3 -19-25MAR11-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes. Did 000028.03 reappear when engine operating point was reached?	 **YES:** GO TO 2 **NO:** GO TO 8 and confirm operating point.

DN22556,00003A3 -19-25MAR11-11/13

10 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect digital throttle connector and ECU connector J2. 3. Perform TERMINAL TEST on the digital throttle harness connector and ECU J2 connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 11

Continued on next page

DN22556,00003A3 -19-25MAR11-12/13

11 Software Updates	1. Download latest ECU payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000028.03 active?	**YES:** Replace digital throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00003A3 -19-25MAR11-13/13

000029.03 — Secondary Analog Throttle Signal Out of Range High

Secondary analog throttle signal is above the high voltage specification.

DN22556,00003A5 -19-25MAR11-1/20

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 the 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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
- Control Panel small terminal C09 - Yellow/Purple
- Control Panel large terminal C09 - Yellow/Blue

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DN22556,00003A5 -19-25MAR11-2/20

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 000029.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00003A5 -19-25MAR11-3/20

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

DN22556,00003A5 -19-25MAR11-4/20

3 Terminal Test	1. Disconnect secondary analog throttle connector. 2. Perform TERMINAL TEST on secondary analog throttle harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003A5 -19-25MAR11-5/20

4 Secondary Analog Throttle Disconnected Test	*NOTE: Leave throttle connector disconnected.* 1. Ignition ON, Engine OFF. 2. Refresh codes. Did 00029.04 appear active and 00029.03 go stored?	**YES:** GO TO 5 **NO:** GO TO 7

Continued on next page

DN22556,00003A5 -19-25MAR11-6/20

5 Throttle Potentiometer Resistance Check	1. Ignition OFF, Engine OFF.	
	2. On the throttle potentiometer, measure the resistance between: • power (terminal C) and signal (terminal B). **Specification** Throttle Potentiometer—Resistance..... Between 350 and 550 ohms • power (terminal C) and return (terminal A). **Specification** Throttle Potentiometer—Resistance.....Between 4.2k and 6.2k ohms	**YES:** GO TO 6
	Were the resistance measurements within specifications?	**NO:** Replace secondary analog throttle potentiometer. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A5 -19-25MAR11-7/20

6 Harness Resistance Check	1. Ignition OFF, Engine OFF.	
	2. On the harness, measure the resistance between the secondary analog throttle potentiometer connector return (terminal A) and application single point ground.	**YES:** Repair open terminal A wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is resistance greater than 10 ohms?	**NO:** GO TO 7

DN22556,00003A5 -19-25MAR11-8/20

7 Secondary Analog Throttle Circuit Resistance Check	On the harness, measure the resistance between the secondary analog throttle potentiometer connector power (terminal C) and signal (terminal B).	**YES:** GO TO 8
	Is resistance less than 10 ohms?	**NO:** GO TO 10

DN22556,00003A5 -19-25MAR11-9/20

8 Terminal Test	1. Disconnect ECU connector J2.	
	2. Perform TERMINAL TEST on secondary analog throttle harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

Continued on next page

DN22556,00003A5 -19-25MAR11-10/20

9 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors.	
	2. On the ECU harness, measure the resistance between the secondary analog throttle potentiometer signal (terminal J2-F3) and all other terminals in all ECU connectors.	**YES:** Repair short to terminal J2-F3 in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	were any measurements less than 100 ohms?	**NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A5 -19-25MAR11-11/20

10 Terminal Test	1. Disconnect ECU connector J2.	
	2. Perform TERMINAL TEST on secondary analog throttle harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 11

DN22556,00003A5 -19-25MAR11-12/20

11 Secondary Analog Throttle Circuit Resistance Check, ECU Disconnected	*NOTE: Leave throttle connector disconnected.*	
	On the harness, measure the resistance between the secondary analog throttle connector power (terminal C) and signal (terminal B).	**YES:** GO TO 12
	Is resistance greater than 10M ohms?	**NO:** Repair shorted wiring problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A5 -19-25MAR11-13/20

12 ECU Resistance Check	On the ECU, measure the resistance between the power (terminal J2-G2) and signal (terminal J2-F3).	**YES:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance between 120k and 180k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A5 -19-25MAR11-14/20

13 Occurrence Count Check	Review stored information and look at occurrence count for 000029.03.	**YES:** GO TO 14
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 15

Continued on next page

DN22556,00003A5 -19-25MAR11-15/20

14 Terminal Test

1. Ignition OFF, Engine OFF	
2. Perform TERMINAL TEST on the secondary analog throttle harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
Were any problems found?	**NO:** GO TO 15

DN22556,00003A5 -19-25MAR11-16/20

15 Further Review of Snapshot Information

1. Ignition ON, Engine OFF	**YES:** Repair problem if found.
2. Review stored information collected in step 1	**YES:** If a certain operating point exists when error occurs then GO TO 16
Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 17

DN22556,00003A5 -19-25MAR11-17/20

16 Engine Error Operating Point Test

1. Ignition ON, Engine ON	
2. Set engine to operating point of failure and refresh codes.	**YES:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
Did 000029.03 reappear when engine operating point was reached?	**NO:** GO TO 15

DN22556,00003A5 -19-25MAR11-18/20

17 Terminal Test

1. Ignition OFF, Engine OFF	
2. Disconnect secondary analog throttle connector and ECU connector J2.	
3. Perform TERMINAL TEST on the secondary analog throttle harness connector and ECU J2 connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
Were any problems found?	**NO:** GO TO 18

DN22556,00003A5 -19-25MAR11-19/20

18 Software Updates

1. Download latest ECU payload and reprogram ECU using Service ADVISOR.	
2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
Is 000029.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003A5 -19-25MAR11-20/20

000029.04 — Secondary Analog Throttle Signal Out of Range Low

Secondary analog throttle signal is below the low voltage specification.

DN22556,00003A6 -19-25MAR11-1/23

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 the 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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 Conenctor C08 - Yellow/Purple

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DN22556,00003A6 -19-25MAR11-2/23

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 000029.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

DN22556,00003A6 -19-25MAR11-3/23

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

DN22556,00003A6 -19-25MAR11-4/23

3 Terminal Test	1. Disconnect secondary analog throttle connector. 2. Perform TERMINAL TEST on secondary analog throttle harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003A6 -19-25MAR11-5/23

4 Throttle potentiometer Resistance Check	On the throttle potentiometer, measure the resistance between: • power (terminal C) and signal (terminal B). **Specification** Throttle Potentiometer—Resistance..... Between 350 and 550 ohms • power (terminal C) and return (terminal A). **Specification** Throttle Potentiometer—Resistance.....Between 4.2k and 6.2k ohms Were the resistance measurements within specifications?	**YES:** GO TO 5 **NO:** Replace secondary analog throttle potentiometer. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003A6 -19-25MAR11-6/23

5 Secondary Analog Throttle Circuit Resistance Check Part 1	On the harness, measure the resistance between the secondary analog throttle harness connector signal (terminal B) and return (terminal A). Is resistance between 120k and 180k ohms?	**YES:** GO TO 6 **NO:** Measurement is greater than 180k ohms. GO TO 10 **NO:** Measurement is less than 10 ohms. GO TO 12

DN22556,00003A6 -19-25MAR11-7/23

6 Secondary Analog Throttle Circuit Resistance Check Part 2	On the harness, measure the resistance between the secondary analog throttle harness connector power (terminal C) and return (terminal A). Is resistance between 90k and 130k ohms?	**YES:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR **NO:** GO TO 7

DN22556,00003A6 -19-25MAR11-8/23

7 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Perform TERMINAL TEST on the ECU harness connector J2. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

DN22556,00003A6 -19-25MAR11-9/23

8 Terminal to Terminal Resistance Check	On the harness, measure the resistance between the secondary analog throttle harness connector power (terminal C) and the ECU harness connector power (terminal J2-G2). Is the resistance greater than 10 ohms?	**YES:** Repair open to in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

DN22556,00003A6 -19-25MAR11-10/23

9 ECU Resistance Check	On the ECU, measure the resistance between the power (terminal J2-G2) and return (terminal J2-G3). Was the resistance between 120k and 180k 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:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003A6 -19-25MAR11-11/23

10 Terminal to Terminal Resistance Check

1. Disconnect ECU connector J2.
2. On the harness, measure the resistance between the secondary analog throttle harness connector signal (terminal B) and the ECU harness connector signal (terminal J2-F3).

Is the resistance greater than 10 ohms?

YES: Repair open to in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 11

DN22556,00003A6 -19-25MAR11-12/23

11 Terminal Test

Perform TERMINAL TEST on the ECU harness connector J2.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

DN22556,00003A6 -19-25MAR11-13/23

12 Harness Resistance Check, ECU Disconnected

1. Disconnect ECU connector J2.
2. On the harness, measure the resistance between the secondary analog throttle harness connector signal (terminal B) and return (terminal A).

Is resistance less than 10 ohms?

YES: GO TO 13

NO: GO TO 14

DN22556,00003A6 -19-25MAR11-14/23

13 Terminal Test

Perform TERMINAL TEST on the ECU harness connector J2.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 15

DN22556,00003A6 -19-25MAR11-15/23

14 ECU Resistance Check

On the ECU, measure the resistance between the signal (terminal J2-F3) and return (terminal J2-G3).

Was the resistance between 120k and 180k ohms?

YES: Reconnect all connectors. GO TO 1

NO: Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A6 -19-25MAR11-16/23

15 Terminal to Terminal Resistance Check

On the harness, measure the resistance between the ECU harness connector J2 signal (terminal J2-F3) and all other ECU connector terminals.

Is the resistance less than 100 ohms on any terminal?

YES: Repair wiring for all measurements less than 100 ohms. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Reconnect all connectors. GO TO 1

Continued on next page

DN22556,00003A6 -19-25MAR11-17/23

16 Occurrence Count Check	Review stored information and look at occurrence count for 000029.04.	**YES:** GO TO 17
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 18

DN22556,00003A6 -19-25MAR11-18/23

17 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the secondary analog throttle harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 18

DN22556,00003A6 -19-25MAR11-19/23

18 Further Review of Snapshot Information	1. Ignition ON, Engine OFF	**YES:** Repair problem if found.
	2. Review stored information collected in step 1	**YES:** If a certain operating point exists when error occurs then GO TO 19
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 20

DN22556,00003A6 -19-25MAR11-20/23

19 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did 000029.04 reappear when engine operating point was reached?	**NO:** GO TO 18 and confirm operating point.

DN22556,00003A6 -19-25MAR11-21/23

20 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect secondary analog throttle connector and ECU connector J2.	
	3. Perform TERMINAL TEST on the secondary analog throttle harness connector and ECU J2 connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 21

Continued on next page

DN22556,00003A6 -19-25MAR11-22/23

21 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000029.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003A6 -19-25MAR11-23/23

000091.03 — Primary Analog Throttle Signal Out of Range High

Primary analog throttle signal is above the high voltage specification.

DN22556,00003A8 -19-04APR11-1/20

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 the 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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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 small terminal C09 - Yellow/Purple
- Control Panel large terminal C09 - Yellow/Blue

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DN22556,00003A8 -19-04APR11-2/20

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 000091.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00003A8 -19-04APR11-3/20

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

DN22556,00003A8 -19-04APR11-4/20

3 Terminal Test	1. Disconnect primary analog throttle connector. 2. Perform TERMINAL TEST on primary analog throttle harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003A8 -19-04APR11-5/20

4 Analog Throttle Disconnected Test	*NOTE: Leave throttle connector disconnected.* 1. Ignition ON, Engine OFF. 2. Refresh codes. Did 00091.04 appear active and 00091.03 go stored?	**YES:** GO TO 5 **NO:** GO TO 7

Continued on next page

DN22556,00003A8 -19-04APR11-6/20

5 Throttle potentiometer Resistance Check	1. Ignition OFF, Engine OFF.	
	2. On the throttle potentiometer, measure the resistance between: • power (terminal C) and signal (terminal B). **Specification** Throttle Potentiometer—Resistance..... Between 350 and 550 ohms • power (terminal C) and return (terminal A). **Specification** Throttle Potentiometer—Resistance.....Between 4.2k and 6.2k ohms	**YES:** GO TO 6
	Were the resistance measurements within specifications?	**NO:** Replace primary analog throttle potentiometer. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A8 -19-04APR11-7/20

6 Harness Resistance Check	1. Ignition OFF, Engine OFF.	
	2. On the harness, measure the resistance between the return (terminal A) and application single point ground.	**YES:** Repair open terminal A wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is resistance greater than 10 ohms?	**NO:** GO TO 7

DN22556,00003A8 -19-04APR11-8/20

7 Primary Analog Throttle Circuit Resistance Check	On the harness, measure the resistance between the primary analog throttle connector power (terminal C) and signal (terminal B).	**YES:** GO TO 8
	Is resistance less than 10 ohms?	**NO:** GO TO 10

DN22556,00003A8 -19-04APR11-9/20

8 Terminal Test	1. Disconnect ECU connector J2.	
	2. Perform TERMINAL TEST on the ECU J2 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

Continued on next page

DN22556,00003A8 -19-04APR11-10/20

9 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors.	
	2. On the harness, measure the resistance between the signal (terminal J2-A4) and all other terminals in all ECU connectors.	**YES:** Repair short to terminal J2-A4 in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	were any measurements less than 100 ohms?	**NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A8 -19-04APR11-11/20

10 Terminal Test	1. Disconnect ECU connector J2.	
	2. Perform TERMINAL TEST on the ECU J2 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 11

DN22556,00003A8 -19-04APR11-12/20

11 Primary Analog Throttle Circuit Resistance Check, ECU Disconnected	*NOTE: Leave throttle connector disconnected.*	
	On the harness, measure the resistance between the primary analog throttle connector power (terminal C) and signal (terminal B).	**YES:** GO TO 12
	Is resistance greater than 10M ohms?	**NO:** Repair shorted wiring problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A8 -19-04APR11-13/20

12 ECU Resistance Check	On the ECU, measure the resistance between the power (terminal J2-A3) and signal (terminal J2-A4).	**YES:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance between 120k and 180k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003A8 -19-04APR11-14/20

13 Occurrence Count Check	Review stored information and look at occurrence count for 000091.03.	**YES:** GO TO 14
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 15

Continued on next page

DN22556,00003A8 -19-04APR11-15/20

14 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the primary analog throttle harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 15

DN22556,00003A8 -19-04APR11-16/20

15 Further Review of Snapshot Information	1. Ignition ON, Engine OFF	**YES:** Repair problem if found.
	2. Review stored information collected in step 1	**YES:** If a certain operating point exists when error occurs then GO TO 16
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 17

DN22556,00003A8 -19-04APR11-17/20

16 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did 000091.03 reappear when engine operating point was reached?	**NO:** GO TO 15 and confirm operating point.

DN22556,00003A8 -19-04APR11-18/20

17 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect primary analog throttle connector and ECU connector J2.	
	3. Perform TERMINAL TEST on the primary analog throttle harness connector and ECU J2 connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 18

DN22556,00003A8 -19-04APR11-19/20

18 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000091.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003A8 -19-04APR11-20/20

000091.04 — Primary Analog Throttle Signal Out of Range Low

Primary analog throttle voltage is below the low voltage specification.

DN22556,00003A9 -19-25MAR11-1/23

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 decreases 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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 small terminal C09 - Yellow/Purple
- Control Panel large terminal C09 - Yellow/Blue

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DN22556,00003A9 -19-25MAR11-2/23

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 000091.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

DN22556,00003A9 -19-25MAR11-3/23

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

DN22556,00003A9 -19-25MAR11-4/23

3 Terminal Test	1. Disconnect primary analog throttle connector. 2. Perform TERMINAL TEST on primary analog throttle harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003A9 -19-25MAR11-5/23

4 Throttle potentiometer Resistance Check	On the throttle potentiometer, measure the resistance between: • power (terminal C) and signal (terminal B). **Specification** Throttle Potentiometer—Resistance..... Between 350 and 550 ohms • power (terminal C) and return (terminal A). **Specification** Throttle Potentiometer—Resistance.....Between 4.2k and 6.2k ohms Were the resistance measurements within specifications?	**YES:** GO TO 5 **NO:** Replace primary analog throttle potentiometer. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003A9 -19-25MAR11-6/23

5 **Primary Analog Throttle Circuit Resistance Check Part 1**	On the harness, measure the resistance between the primary analog throttle harness connector signal (terminal B) and return (terminal A). Is resistance between 120k and 180k ohms?	**YES:** GO TO 6 **NO:** Measurement is greater than 180k ohms. GO TO 10 **NO:** Measurement is less than 10 ohms. GO TO 12

DN22556,00003A9 -19-25MAR11-7/23

6 **Primary Analog Throttle Circuit Resistance Check Part 2**	On the harness, measure the resistance between the primary analog throttle harness connector power (terminal C) and return (terminal A). Is resistance between 90k and 130k ohms?	**YES:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR **NO:** GO TO 7

DN22556,00003A9 -19-25MAR11-8/23

7 **Terminal Test**	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Perform TERMINAL TEST on the ECU harness connector J2. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO **8**

DN22556,00003A9 -19-25MAR11-9/23

8 **Terminal to Terminal Resistance Check**	On the harness, measure the resistance between the primary analog throttle harness connector power (terminal C) and the ECU harness connector power (terminal J2-A3). Is the resistance greater than 10 ohms?	**YES:** Repair open to in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

DN22556,00003A9 -19-25MAR11-10/23

9 **ECU Resistance Check**	On the ECU, measure the resistance between the power (terminal J2-A3) and return (terminal J2-C3). Was the resistance between 120k and 180k 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:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003A9 -19-25MAR11-11/23

10 Terminal to Terminal Resistance Check	1. Disconnect ECU connector J2.	
	2. On the harness, measure the resistance between the primary analog throttle harness connector signal (terminal B) and the ECU harness connector signal (terminal J2-A4).	**YES:** Repair open to in wiring harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the resistance greater than 10 ohms?	**NO:** GO TO 11

DN22556,00003A9 -19-25MAR11-12/23

11 Terminal Test	Perform TERMINAL TEST on the ECU harness connector J2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 14

DN22556,00003A9 -19-25MAR11-13/23

12 Harness Resistance Check, ECU Disconnected	1. Disconnect ECU connector J2.	
	2. On the harness, measure the resistance between the primary analog throttle harness connector signal (terminal B) and return (terminal A).	**YES:** GO TO 13
	Is resistance less than 10 ohms?	**NO:** GO TO 14

DN22556,00003A9 -19-25MAR11-14/23

13 Terminal Test	Perform TERMINAL TEST on the ECU harness connector J2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 15

DN22556,00003A9 -19-25MAR11-15/23

14 ECU Resistance Check	On the ECU, measure the resistance between the signal (terminal J2-A4) and return (terminal J2-C3).	**YES:** Reconnect all connectors. GO TO 1
	Was the resistance between 120k and 180k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003A9 -19-25MAR11-16/23

15 Terminal to Terminal Resistance Check	On the harness, measure the resistance between the ECU harness connector J2 signal (terminal J2-A4) and all other ECU connector terminals. Is the resistance less than 100 ohms on any terminal?	**YES:** Repair wiring for all measurements less than 100 ohms. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003A9 -19-25MAR11-17/23

16 Occurrence Count Check	Review stored information and look at occurrence count for 000091.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 17 **NO:** GO TO 18

DN22556,00003A9 -19-25MAR11-18/23

17 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the primary analog throttle harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 18

DN22556,00003A9 -19-25MAR11-19/23

18 Further Review of Snapshot Information	1. Ignition ON, Engine OFF 2. 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 19 **NO:** GO TO 20

DN22556,00003A9 -19-25MAR11-20/23

19 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes. Did 000091.04 reappear when engine operating point was reached?	 **YES:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 18 and confirm operating point.

Continued on next page

DN22556,00003A9 -19-25MAR11-21/23

20 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect primary analog throttle connector and ECU connector J2.	
	3. Perform TERMINAL TEST on the primary analog throttle harness connector and ECU J2 connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 21

DN22556,00003A9 -19-25MAR11-22/23

21 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000091.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003A9 -19-25MAR11-23/23

000091.09 — Throttle CAN Message Missing

ECU received invalid or missing throttle information from the CAN bus. See application manual for troubleshooting procedures.

DN22556,00003AA -19-20MAY08-1/1

000094.03 — Low Pressure Fuel Signal Out of Range High

The low pressure fuel signal exceeds the high voltage specification.

DN22556,00003AC -19-25MAR11-1/15

000094.03 — Low Pressure Fuel Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000094.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The low pressure fuel signal 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 low pressure fuel pressure 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 DIAGRAM 10 2 in Section 3 Group 140.

For more engine low pressure fuel 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 Low pressure fuel sensor P07 - Purple/Gray
- Low pressure fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003AC -19-25MAR11-2/15

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 000094.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

DN22556,00003AC -19-25MAR11-3/15

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect low pressure fuel sensor connector. 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 4

DN22556,00003AC -19-25MAR11-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the engine low pressure fuel sensor and harness connector. 3. Inspect harness for melted or pinched areas near the engine low pressure fuel signal sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003AC -19-25MAR11-5/15

4 Sensor Short to Power Test	Measure the resistance between signal (terminal C) and power (terminal A) on the engine low pressure fuel signal sensor harness connector. Was the resistance value between 90k and 120k ohms?	**YES:** GO TO 5 **NO:** Signal and power wires shorted together. Repair short, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003AC -19-25MAR11-6/15

5 Harness Resistance Check ECU Disconnected	1. Disconnect all ECU connectors.	
	2. Perform TERMINAL TEST on all the ECU harness connector.	
	3. Measure the resistance between signal (terminal C) and all other terminals in the ECU harness connectors.	**YES:** Repair short in wiring. Run HARNESS DIAGNOSTIC MODE TEST.
	Was any resistance measurement less than 100 ohms?	**NO:** GO TO 6.

DN22556,00003AC -19-25MAR11-7/15

6 ECU Resistance Check	Measure the resistance between the power (terminal J3-H4) and signal (terminal J3-C1) on the ECU.	**YES:** 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.
	Was the resistance between 230k and 290k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003AC -19-25MAR11-8/15

7 Occurrence Count Check	Review stored information and look at occurrence count for 000094.03.	**YES:** GO TO 8
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 9

DN22556,00003AC -19-25MAR11-9/15

8 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine low pressure fuel signal sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

DN22556,00003AC -19-25MAR11-10/15

9 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 GO TO 10
		NO: GO TO 12

Continued on next page

DN22556,00003AC -19-25MAR11-11/15

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 11
	Did 000094.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,00003AC -19-25MAR11-12/15

11 Sensor Temperature Test	1. Ignition ON, Engine OFF	
	2. Refresh codes.	**YES:** Problem occurring. GO TO 2
	Is 000094.03 active?	**NO:** Replace low pressure fuel pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003AC -19-25MAR11-13/15

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine low pressure fuel signal 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 13

DN22556,00003AC -19-25MAR11-14/15

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:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000094.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003AC -19-25MAR11-15/15

000094.04 — Low Pressure Fuel Signal Out of Range Low

The low pressure fuel signal drops below the sensor's low voltage specification.

DN22556,00003AD -19-25MAR11-1/21

000094.04 — Low Pressure Fuel Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003510.04
000094.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The low pressure fuel signal 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 low pressure fuel signal.

Alarm Level:
Warning

Control Unit Response:
ECU's will operate normally.

Additional References:
For sensor location see COMPONENT LOCATION DIAGRAM 2 in Section 03 Group 140.
For interconnect connector location see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

For more engine low pressure fuel signal 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 Low pressure fuel sensor P07 - Purple/Gray
- Low pressure fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003AD -19-25MAR11-2/21

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 000094.04 reappear active?

YES: GO TO 2

NO: GO TO 13

DN22556,00003AD -19-25MAR11-3/21

2 Supply Voltage Test

1. Ignition ON, Engine OFF.
2. Monitor Power Supply #2 Voltage using Service ADVISOR.

Is the voltage above 4.5 volts?

YES: GO TO 3

NO: GO TO 9

DN22556,00003AD -19-25MAR11-4/21

3 Terminal Test

1. Ignition OFF, Engine OFF.
2. Perform TERMINAL TEST on Low Pressure Fuel 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

DN22556,00003AD -19-25MAR11-5/21

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 C) and return (terminal B), (between 40k ohms and 60k ohms).
4. Between signal (terminal C) and power (terminal A), (between 1.8k ohms and 2.6k ohms).
5. Between return (terminal B) and power (terminal A), (between 40k ohms and 60k 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

DN22556,00003AD -19-25MAR11-6/21

5 Low Pressure Fuel Input to return Test

1. Ignition OFF, Engine OFF
2. Measure the resistance between signal (terminal C) and return (terminal B) on the sensor harness connector.

Is the resistance between 90k and 120k ohms?

YES: GO TO 6

NO: GO TO 8

Continued on next page

DN22556,00003AD -19-25MAR11-7/21

6 Low Pressure Fuel Power to return Test	Measure the resistance between return (terminal B) and power (terminal A) on the sensor harness connector. Is the resistance between 210k and 310k?	**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

DN22556,00003AD -19-25MAR11-8/21

7 Low Pressure Fuel Power to return Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between return (terminal B) and power (terminal A) 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.

DN22556,00003AD -19-25MAR11-9/21

8 Low Pressure Fuel Signal to return Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between signal (terminal C) and return (terminal B) on the sensor harness 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.

DN22556,00003AD -19-25MAR11-10/21

9 Low Pressure Fuel Sensor Open and Short Test	Measure the resistance between return (terminal B) and power (terminal A) on the sensor connector. Is the resistance near 0 ohms (shorted)? Is the resistance near infinity (open)?	**YES:** If near 0 ohms (shorted) GO TO 10 **YES:** If near infinity (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

DN22556,00003AD -19-25MAR11-11/21

10 Wiring Harness Short Test

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

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

DN22556,00003AD -19-25MAR11-12/21

11 Wiring Harness Power Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between J3-C1 in the ECU harness connector and the power (terminal A) in the rail pressure sensor connector.

Was the reading less than 5 ohms?

YES: GO TO 12

NO: Repair wiring and GO TO 1.

DN22556,00003AD -19-25MAR11-13/21

12 Wiring Harness return Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between return (terminal J3-H3) and the return (terminal B) in the rail pressure sensor harness 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.

DN22556,00003AD -19-25MAR11-14/21

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

DN22556,00003AD -19-25MAR11-15/21

14 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on Low Pressure Fuel sensor harness 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

DN22556,00003AD -19-25MAR11-16/21

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

DN22556,00003AD -19-25MAR11-17/21

16 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 094.04 reappear when engine operating point was reached?	 **YES:** GO TO 17 **NO:** GO TO 15 and confirm operating point.

DN22556,00003AD -19-25MAR11-18/21

17 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on Low Pressure Fuel 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

DN22556,00003AD -19-25MAR11-19/21

18 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on Low Pressure Fuel 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

DN22556,00003AD -19-25MAR11-20/21

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 000094.04 active?	 **YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** Problem fixed, bad ECU program.

DN22556,00003AD -19-25MAR11-21/21

000094.17 — Low Pressure Fuel Signal Slightly Low

The ECU senses the low pressure fuel signal is below specification.

Continued on next page

DN22556,0000662 -19-25MAR11-1/12

000094.17 — Low Pressure Fuel Signal Slightly Low Diagnostic Procedure

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 low pressure fuel pressure specification below -15 kPa (-2.2 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 pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more low pressure fuel sensor information, see FUEL TRANSFER PUMP 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 13.5L 12V ECU WIRING DIAGRAM 2, 13.5L 12V ECU WIRING DIAGRAM 8
- see 13.5L 24V ECU WIRING DIAGRAM 2, 13.5L 24V ECU WIRING DIAGRAM 8

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. See TERMINAL TEST for information on use.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine Low pressure fuel sensor P07 - Purple/Gray
- Low pressure fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,0000662 -19-25MAR11-2/12

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

DN22556,0000662 -19-25MAR11-3/12

2 F1 - LOW PRESSURE FUEL SYSTEM CHECK	Check fuel system, see F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check in Group 150 earlier in this Section. Did test pass?	**YES:** GO TO 3 **NO:** See F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check in Group 150 earlier in this Section.

DN22556,0000662 -19-25MAR11-4/12

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 DATC case. **NO:** Problem fixed. Return to service.

DN22556,0000662 -19-25MAR11-5/12

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

DN22556,0000662 -19-25MAR11-6/12

5 Low Pressure Fuel Sensor Connector Test	1. Disconnect low pressure fuel sensor connector. 2. Perform TERMINAL TEST on low pressure fuel sensor connector. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 6

Continued on next page

DN22556,0000662 -19-25MAR11-7/12

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

DN22556,0000662 -19-25MAR11-8/12

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

DN22556,0000662 -19-25MAR11-9/12

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.

DN22556,0000662 -19-25MAR11-10/12

9 Connector Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect low pressure fuel sensor connector and ECU J3 connector.	
	3. Perform TERMINAL TEST on low pressure fuel sensor connector and ECU J3 connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 10

DN22556,0000662 -19-25MAR11-11/12

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.

DN22556,0000662 -19-25MAR11-12/12

000097.03 — Water In Fuel Signal Out of Range High

The water in fuel signal exceeds the sensor's high voltage specification.

DN22556,00003AE -19-25AUG09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

DN22556,00003AE -19-25AUG09-2/19

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 000097.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00003AE -19-25AUG09-3/19

2 Short to Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect WIF sensor connector. 3. On the harness, measure the voltage between the WIF sensor connector signal (terminal A) and return (terminal B). Was the voltage measurement less than 0.5 volts?	**YES:** GO TO 3 **NO:** Repair shorted wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003AE -19-25AUG09-4/19

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Perform TERMINAL TEST on water in fuel sensor harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003AE -19-25AUG09-5/19

4 Sensor Resistance Check	On the WIF sensor, measure the resistance between signal (terminal A) and return (terminal B). Was the resistance between 200k and 240k ohms?	**YES:** GO TO 5 **NO:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003AE -19-25AUG09-6/19

5 WIF Sensor Circuit Resistance Check	On the harness, measure the resistance between the WIF sensor connector signal (terminal A) and return (terminal B). Was the resistance between 6M and 7M ohms?	**YES:** GO TO 6 **NO:** GO TO 8.

Continued on next page

DN22556,00003AE -19-25AUG09-7/19

6 Terminal Test	1. Disconnect ECU connectors J1, J2 and J3. 2. Perform TERMINAL TEST on ECU connectors J1, J2 and J3. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

DN22556,00003AE -19-25AUG09-8/19

7 Terminal to Terminal Resistance Check	On the harness, measure the resistance between the ECU connector signal (terminal J3-D2) and all other ECU harness connector terminals . Were any resistance less than 100 ohms?	**YES:** Look for pinched or melted harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR **NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003AE -19-25AUG09-9/19

8 Harness Return Wire Resistance Check	On the harness, measure the resistance between the WIF sensor connector return (terminal B) and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** GO TO 10.

DN22556,00003AE -19-25AUG09-10/19

9 Harness Return Wire Resistance Check	On the harness, measure the resistance between the WIF sensor harness connector return (terminal B) and ECU J3 connector return (terminal J3-H3). Was the resistance less than 5 ohms?	**YES:** GO TO 10 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003AE -19-25AUG09-11/19

10 Harness Signal Wire Resistance Check	On the harness, measure the resistance between the WIF sensor harness connector signal (terminal A) and ECU connector J3 signal (terminal J3-D2). Was the resistance less than 5 ohms?	**YES:** GO TO 11 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003AE -19-25AUG09-12/19

11 ECU Resistance Check	On the ECU, measure the resistance between return (terminal J3-H3) and signal (terminal J3-D2). Was the resistance between 6M and 7M ohms?	**YES:** Reconnect all connectors and GO TO 2. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003AE -19-25AUG09-13/19

12 Occurrence Count Check	Review stored information and look at occurrence count for 000097.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 13 **NO:** GO TO 14

DN22556,00003AE -19-25AUG09-14/19

13 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect WIF sensor connector. 3. Perform TERMINAL TEST on the WIF sensor harness connector. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14

DN22556,00003AE -19-25AUG09-15/19

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 15 **NO:** GO TO 16

DN22556,00003AE -19-25AUG09-16/19

15 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000097.03 reappear when engine operating point was reached?	 **YES:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14 and confirm the operating point.

DN22556,00003AE -19-25AUG09-17/19

16 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect WIF sensor connector and ECU connector J3. 3. Perform TERMINAL TEST on the WIF sensor harness connector and ECU connector J3. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

Continued on next page

DN22556,00003AE -19-25AUG09-18/19

17 Software Updates	1. Download latest ECU software payload. 2. Reprogram ECU using Service ADVISOR. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000097.03 active?	**YES:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed.

DN22556,00003AE -19-25AUG09-19/19

000097.04 — Water In Fuel Signal Out of Range Low

The water in fuel signal drops below the sensor's low voltage specification.

DN22556,00003AF -19-25AUG09-1/19

000097.04 — Water In Fuel Signal Out of Range Low Diagnostic Procedure

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 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

DN22556,00003AF -19-25AUG09-2/19

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. Refresh Codes. Did 000097.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003AF -19-25AUG09-3/19

2 Monitor Code Test	1. Ignition OFF, Engine OFF. 2. Disconnect the water in fuel sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000097.03 become active and 000097.04 move to stored?	**YES:** GO TO 3 **NO:** GO TO 4

DN22556,00003AF -19-25AUG09-4/19

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on water in fuel sensor 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

DN22556,00003AF -19-25AUG09-5/19

4 Sensor Short to Ground Test	Measure the resistance from each terminal on the sensor to chassis ground. **Specification** Check for short to ground—Resistance..... Greater than 1k ohm Measure the resistance between the two sensor terminals. **Specification** Check for internal short—Resistance..... Greater than 50 ohms Is either measurement out of specification?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

Continued on next page

DN22556,00003AF -19-25AUG09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the water in fuel sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,00003AF -19-25AUG09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the water in fuel sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**NO:** Reconnect all connectors and GO TO 2.

DN22556,00003AF -19-25AUG09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal B) and signal (terminal A) in the water in fuel sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9.

DN22556,00003AF -19-25AUG09-9/19

8 Harness Physical Check	Terminal A has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** Problem not found, reconnect all connectors. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,00003AF -19-25AUG09-10/19

9 **ECU Resistance Check**	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-D2) in the ECU connector. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003AF -19-25AUG09-11/19

10 **Occurrence Count Check**	Review stored information and look at occurrence count for 000097.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003AF -19-25AUG09-12/19

11 **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 12

DN22556,00003AF -19-25AUG09-13/19

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 15

DN22556,00003AF -19-25AUG09-14/19

13 **Engine Error Operating Point Test**	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000097.04 reappear when engine operating point was reached?	 **YES:** GO TO 14 **NO:** GO TO 12 and confirm operating point.

Continued on next page

DN22556,00003AF -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the water in fuel sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003AF -19-25AUG09-16/19

15 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 16

DN22556,00003AF -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000097.04 active?	**NO:** GO TO 15.

DN22556,00003AF -19-25AUG09-18/19

17 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.
	Is 000097.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003AF -19-25AUG09-19/19

000097.16 — Water in Fuel Detected

The ECU detects water in fuel.

DN22556,00003B0 -19-02NOV09-1/14

000097.16 — Water In Fuel Detected Diagnostic Procedure

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 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

DN22556,00003B0 -19-02NOV09-2/14

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

DN22556,00003B0 -19-02NOV09-3/14

2 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 000097.04 reappear active?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00003B0 -19-02NOV09-4/14

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

DN22556,00003B0 -19-02NOV09-5/14

4 WIF Sensor Resistance Check	On the water in fuel sensor measure the resistance between signal (terminal A) and return (terminal B). Was either resistance value between 200k and 240k ohms?	**YES:** GO TO 3 **NO:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003B0 -19-02NOV09-6/14

5 Occurrence Count Check	Review stored information and look at occurrence count for 000097.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

DN22556,00003B0 -19-02NOV09-7/14

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

DN22556,00003B0 -19-02NOV09-8/14

7 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 8 **NO:** GO TO 9

DN22556,00003B0 -19-02NOV09-9/14

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 000097.04 reappear when engine operating point was reached?	**NO:** GO TO 7 and confirm operating point.

DN22556,00003B0 -19-02NOV09-10/14

9 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the water in fuel sensor harness connector and ECU J1 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

DN22556,00003B0 -19-02NOV09-11/14

10 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 WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000097.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003B0 -19-02NOV09-12/14

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

DN22556,00003B0 -19-02NOV09-13/14

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

DN22556,00003B0 -19-02NOV09-14/14

000100.01 — Engine Oil Pressure Signal Extremely Low

The engine oil pressure signal indicates that oil pressure is extremely low.

DN22556,00003B1 -19-25AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine oil pressure sensor P04 - Purple/Gray

Continued on next page

DN22556,00003B1 -19-25AUG09-2/13

1 Read DTCs and Store Snapshot Information

IMPORTANT: Verify engine oil level is correct before operating engine. Fill crankcase to the proper level before operating engine. Verify that crankcase is not overfilled. Too high of an oil level can cause oil foaming which can result in low oil pressure.

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.
5. Ignition ON, engine running.

Did 000100.01 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,00003B1 -19-25AUG09-3/13

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.

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

DN22556,00003B1 -19-25AUG09-4/13

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

DN22556,00003B1 -19-25AUG09-5/13

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 ENGINE OIL PRESSURE LOW in the base engine Manual, Section 04, Group 150 for further assistance.

DN22556,00003B1 -19-25AUG09-6/13

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

DN22556,00003B1 -19-25AUG09-7/13

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

DN22556,00003B1 -19-25AUG09-8/13

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

DN22556,00003B1 -19-25AUG09-9/13

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

DN22556,00003B1 -19-25AUG09-10/13

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

DN22556,00003B1 -19-25AUG09-11/13

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.

DN22556,00003B1 -19-25AUG09-12/13

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.

DN22556,00003B1 -19-25AUG09-13/13

000100.04 — Engine Oil Pressure Signal Out of Range Low

The engine oil pressure input voltage drops below the sensor's low voltage specification.

DN22556,00003B3 -19-25AUG09-1/23

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

Continued on next page

DN22556,00003B3 -19-25AUG09-2/23

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 14

DN22556,00003B3 -19-25AUG09-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the engine oil pressure harness connector. 3. Perform a TERMINAL TEST on the engine oil pressure sensor and harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003B3 -19-25AUG09-4/23

3 Sensor Short to Ground Test	On the oil pressure sensor, measure the resistance between signal (terminal 3) and chassis ground. Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003B3 -19-25AUG09-5/23

4 Sensor Internal Short Test	On the oil pressure sensor, measure the resistance between return (terminal 1) and signal (terminal 3). Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

DN22556,00003B3 -19-25AUG09-6/23

5 Harness Resistance Check	On the harness, measure the resistance between the oil pressure sensor return (terminal 1) and signal (terminal 3). Was the resistance less than 100 ohms?	**YES:** GO TO 6 **NO:** GO TO 9

DN22556,00003B3 -19-25AUG09-7/23

6 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3. 2. On the harness, measure the resistance between the oil pressure sensor connector return (terminal 1) and signal (terminal 3). Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** GO TO 9.

Continued on next page

DN22556,00003B3 -19-25AUG09-8/23

7 Terminal Test	Perform TERMINAL TEST on the ECU J3 harness connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

DN22556,00003B3 -19-25AUG09-9/23

8 Harness Physical Check	Signal (terminal 3) has low resistance to ground, check for: • Melted harness and wiring • Pinched harness and wiring. Was the problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem not found, reconnect all connectors. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

DN22556,00003B3 -19-25AUG09-10/23

9 ECU Resistance Check	On the ECU, measure the resistance between the oil pressure sensor return (terminal J3-H3) and signal (terminal J3-C3). Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003B3 -19-25AUG09-11/23

10 Harness Resistance Check	On the harness, measure the resistance between the oil pressure sensor connector return (terminal 1) and power (terminal 2). Was the resistance between 50k and 150k ohms?	**YES:** 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. **NO:** GO TO 11

Continued on next page

DN22556,00003B3 -19-25AUG09-12/23

11 Harness Resistance Check, ECU Disconnected	1. Disconnect ECU connector J3.	
	2. On the harness, measure the resistance between the engine oil pressure sensor harness connector power (terminal 2) and the ECU harness connector power (terminal J3-H4).	**YES:** GO TO 12
	Was the resistance less than 5 ohms?	**NO:** Check for pinched or melted wiring, repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003B3 -19-25AUG09-13/23

12 Terminal Test	Perform TERMINAL TEST on the ECU J3 harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

DN22556,00003B3 -19-25AUG09-14/23

13 ECU Resistance Check	On the ECU, measure the resistance between the oil pressure sensor return (terminal J3-H3) and signal (terminal J3-C3).	**YES:** Reconnect ECU connector and GO TO 2.
	Was the resistance between 50k and 150k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003B3 -19-25AUG09-15/23

14 Occurrence Count Check	Review stored information and look at occurrence count for 000100.04.	**YES:** GO TO 15
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 16

DN22556,00003B3 -19-25AUG09-16/23

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine oil pressure sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

DN22556,00003B3 -19-25AUG09-17/23

16 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 GO TO 17 **NO:** GO TO 19

Continued on next page

DN22556,00003B3 -19-25AUG09-18/23

17 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 18
	Did 000100.04 reappear when engine operating point was reached?	**NO:** GO TO 16 and confirm operating point.

DN22556,00003B3 -19-25AUG09-19/23

18 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the engine oil pressure sensor and surrounding ares.	**YES:** Replace oil pressure sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 19

DN22556,00003B3 -19-25AUG09-20/23

19 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine oil pressure 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 20

DN22556,00003B3 -19-25AUG09-21/23

20 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 21.
	Is 000100.04 active?	**NO:** GO TO 19.

DN22556,00003B3 -19-25AUG09-22/23

21 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 oil pressure sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000100.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003B3 -19-25AUG09-23/23

000100.18 — Engine Oil Pressure Signal Moderately Low

The ECU senses an oil pressure below the warning value set point in the ECU.

DN22556,00003B4 -19-25AUG09-1/13

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:

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine oil pressure sensor P04 - Purple/Gray

Continued on next page

DN22556,00003B4 -19-25AUG09-2/13

1 Read DTCs and Store Snapshot Information

IMPORTANT: Verify engine oil level is correct before operating engine. Fill crankcase to the proper level before operating engine. Verify that crankcase is not overfilled. Too high of an oil level can cause oil foaming which can result in low oil pressure.

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.
5. Ignition ON, engine running.

Did 000100.18 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,00003B4 -19-25AUG09-3/13

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.

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

DN22556,00003B4 -19-25AUG09-4/13

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

DN22556,00003B4 -19-25AUG09-5/13

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 ENGINE OIL PRESSURE LOW in the base engine Manual, Section 04, Group 150 for further assistance.

DN22556,00003B4 -19-25AUG09-6/13

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

DN22556,00003B4 -19-25AUG09-7/13

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

DN22556,00003B4 -19-25AUG09-8/13

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

DN22556,00003B4 -19-25AUG09-9/13

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

DN22556,00003B4 -19-25AUG09-10/13

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 000100.18 still active?

YES: Replace ECU. GO TO 10

NO: Verify problem is fixed. GO TO 10

DN22556,00003B4 -19-25AUG09-11/13

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 000100.18 reappear as active with engine running?

YES: Problem not found. Recheck wiring, connectors, and engine operation. GO TO 1

NO: Problem fixed.

DN22556,00003B4 -19-25AUG09-12/13

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.

DN22556,00003B4 -19-25AUG09-13/13

000100.31 — Engine Oil Pressure Detected with Engine Stopped

The engine oil pressure signal indicates engine oil pressure is above a programmed value with the engine stopped.

DN22556,00003B5 -19-25AUG09-1/10

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Engine oil pressure sensor P04 - Purple/Gray

Continued on next page

DN22556,00003B5 -19-25AUG09-2/10

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

DN22556,00003B5 -19-25AUG09-3/10

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

DN22556,00003B5 -19-25AUG09-4/10

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

DN22556,00003B5 -19-25AUG09-5/10

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

DN22556,00003B5 -19-25AUG09-6/10

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

DN22556,00003B5 -19-25AUG09-7/10

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

DN22556,00003B5 -19-25AUG09-8/10

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

DN22556,00003B5 -19-25AUG09-9/10

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.

DN22556,00003B5 -19-25AUG09-10/10

000102.02 — Manifold Air Pressure Signal Invalid

The manifold air pressure signal is invalid compared to the expected manifold air pressure.

DN22556,0000663 -19-25AUG09-1/8

000102.02 — Manifold Air Pressure Signal Invalid Diagnostic Procedure

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 large terminal - Orange/Green
- Intake manifold air pressure sensor P01 - Yellow/Purple

Continued on next page

DN22556,0000663 -19-25AUG09-2/8

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

DN22556,0000663 -19-25AUG09-3/8

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

DN22556,0000663 -19-25AUG09-4/8

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

DN22556,0000663 -19-25AUG09-5/8

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

DN22556,0000663 -19-25AUG09-6/8

5 Air Pressure Problems Checks	1. Ignition OFF, Engine OFF.	
	2. Test for air leaks, see CHECK FOR INTAKE AIR LEAKS in base engine manual. Did test pass?	**YES:** GO TO 6 **NO:** Test for air leaks, see CHECK FOR INTAKE AIR LEAKS in base engine manual.

DN22556,0000663 -19-25AUG09-7/8

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.

DN22556,0000663 -19-25AUG09-8/8

000102.03 — Manifold Air Pressure Signal Out of Range High

The manifold air pressure signal exceeds the sensor's high voltage specification.

DN22556,00003B7 -19-25AUG09-1/14

000102.03 — Manifold Air Pressure Signal Out of Range High Diagnostic Procedure

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 input voltage 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 DIAGRAM 4 in Section 3 Group 140.

For more intake 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 large terminal - Orange/Green
- Intake manifold air pressure sensor P01 - Yellow/Purple

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DN22556,00003B7 -19-25AUG09-2/14

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 000102.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

DN22556,00003B7 -19-25AUG09-3/14

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect intake manifold air pressure sensor connector. 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 4

DN22556,00003B7 -19-25AUG09-4/14

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the intake manifold air pressure sensor and harness connector. 3. Inspect harness for melted or pinched areas near the intake manifold air pressure sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003B7 -19-25AUG09-5/14

4 Sensor Short to Ground Test	Measure the resistance between signal (terminal C) and power (terminal B) on the intake manifold air pressure sensor harness connector. Was the resistance value between 120k and 180k ohms?	**YES:** GO TO 5 **NO:** Signal and power wires shorted together. Repair short, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003B7 -19-25AUG09-6/14

5 Harness Resistance Check ECU Disconnected	1. Disconnect all ECU connectors.	
	2. Perform TERMINAL TEST on all the ECU harness connector.	
	3. Measure the resistance between signal (terminal C) and all other terminals in the ECU harness connectors.	**YES:** Repair short in wiring. Run HARNESS DIAGNOSTIC MODE TEST.
	Was any resistance measurement less than 100 ohms?	**NO:** GO TO 6.

DN22556,00003B7 -19-25AUG09-7/14

6 ECU Resistance Check	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-C4) on the ECU.	**YES:** 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.
	Was the resistance between 120k and 180k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003B7 -19-25AUG09-8/14

7 Occurrence Count Check	Review stored information and look at occurrence count for 000102.03.	**YES:** GO TO 8
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 9

DN22556,00003B7 -19-25AUG09-9/14

8 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine intake manifold air pressure sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

DN22556,00003B7 -19-25AUG09-10/14

9 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 GO TO 10
		NO: GO TO 12

Continued on next page

DN22556,00003B7 -19-25AUG09-11/14

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 000102.03 reappear when engine operating point was reached?	**NO:** GO TO 11 and confirm the operating point.

DN22556,00003B7 -19-25AUG09-12/14

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine intake manifold air pressure 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 12

DN22556,00003B7 -19-25AUG09-13/14

12 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:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000102.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003B7 -19-25AUG09-14/14

000102.04 — Manifold Air Pressure Signal Out of Range Low

The manifold air pressure signal drops below the sensor's low voltage specification.

DN22556,00003B8 -19-25AUG09-1/21

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 pressure signal 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 intake 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 engine intake manifold pressure signal 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 large terminal - Orange/Green
• Intake manifold air pressure sensor P01 - Yellow/Purple

Continued on next page

DN22556,00003B8 -19-25AUG09-2/21

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 000102.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00003B8 -19-25AUG09-3/21

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the engine intake manifold pressure signal sensor harness connector. 3. Inspect harness for melted or pinched areas near the engine intake manifold pressure signal sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003B8 -19-25AUG09-4/21

3 Sensor Short to Ground Test	Measure the resistance from signal (terminal C) to chassis ground on the engine intake manifold pressure signal sensor. Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003B8 -19-25AUG09-5/21

4 Sensor Internal Short Test	Measure the resistance between return (terminal A) and signal (terminal C) on the engine intake manifold pressure signal sensor. Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

DN22556,00003B8 -19-25AUG09-6/21

5 Harness Resistance Check	Measure the resistance between the return (terminal A) and signal (terminal C) in the engine intake manifold pressure signal sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 6 **NO:** GO TO 9

DN22556,00003B8 -19-25AUG09-7/21

6 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3. 2. Perform TERMINAL TEST on the ECU J3 harness connector. 3. Measure the resistance between the return (terminal A) and signal (terminal C) in the engine intake manifold pressure signal sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** GO TO 8.

Continued on next page

DN22556,00003B8 -19-25AUG09-8/21

7 Harness Physical Check	Signal (terminal C) has low resistance to ground, check for: • Melted harness and wiring • Pinched harness and wiring. Was the problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem not found, reconnect ECU connector. GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

DN22556,00003B8 -19-25AUG09-9/21

8 ECU Resistance Check	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-C4) on the ECU. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem not found, reconnect all connectors. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

DN22556,00003B8 -19-25AUG09-10/21

9 Harness Resistance Check	Measure the resistance between the return (terminal A) and power (terminal B) in the engine intake manifold pressure signal sensor harness connector. Was the resistance between 50k and 150k ohms?	**YES:** 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. **NO:** GO TO 10

DN22556,00003B8 -19-25AUG09-11/21

10 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3. 2. Perform TERMINAL TEST on the ECU J3 harness connector. 3. Measure the resistance between the power (terminal B) in the engine intake manifold pressure signal sensor harness connector and power (terminal J3-H4). Was the resistance less than 5 ohms?	**YES:** GO TO 11 **NO:** Check for pinched or melted wiring, repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003B8 -19-25AUG09-12/21

11 ECU Resistance Check	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-C4) on the ECU.	**YES:** 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.
	Was the resistance between 50k and 150k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003B8 -19-25AUG09-13/21

12 Occurrence Count Check	Review stored information and look at occurrence count for 000102.04.	**YES:** GO TO 13
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 14

DN22556,00003B8 -19-25AUG09-14/21

13 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine intake manifold pressure signal sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 14

DN22556,00003B8 -19-25AUG09-15/21

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 GO TO 15 **NO:** GO TO 17

DN22556,00003B8 -19-25AUG09-16/21

15 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 16
	Did 000102.04 reappear when engine operating point was reached?	**NO:** GO TO 14 and confirm operating point.

Continued on next page

DN22556,00003B8 -19-25AUG09-17/21

16 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the engine intake manifold pressure signal sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 17

DN22556,00003B8 -19-25AUG09-18/21

17 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine intake manifold pressure signal 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 18

DN22556,00003B8 -19-25AUG09-19/21

18 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 19.
	Is 000102.04 active?	**NO:** GO TO 17.

DN22556,00003B8 -19-25AUG09-20/21

19 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.
	Is 000102.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003B8 -19-25AUG09-21/21

000103.00 — Turbo Speed Extremely High

The ECU detects a turbo speed above the specification.

DN22556,00003B9 -19-25AUG09-1/18

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
000103.00

Related Information:
The ECU detects that turbo speed is above 104,000 rpm 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.

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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 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 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 X05 - Blue/Green

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DN22556,00003B9 -19-25AUG09-2/18

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. 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 16

DN22556,00003B9 -19-25AUG09-3/18

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 test for 000641.13. **NO:** GO TO 3

DN22556,00003B9 -19-25AUG09-4/18

3 Check Intake and Turbo	1. Ignition OFF, engine OFF. 2. Perform CHARGE AIR SYSTEM test. 3. Perform VARIABLE GEOMETRY TURBOCHARGER (VGT) COMPONENT TEST. Did you find a problem?	**YES:** Fix problem. GO TO 15 **NO:** GO TO 4

DN22556,00003B9 -19-25AUG09-5/18

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 15 **NO:** GO TO 5

DN22556,00003B9 -19-25AUG09-6/18

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 14

Continued on next page

DN22556,00003B9 -19-25AUG09-7/18

6 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 15
	Were any problems found?	**NO:** GO TO 7

DN22556,00003B9 -19-25AUG09-8/18

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 15

DN22556,00003B9 -19-25AUG09-9/18

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 15

DN22556,00003B9 -19-25AUG09-10/18

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 15

DN22556,00003B9 -19-25AUG09-11/18

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 15

Continued on next page

DN22556,00003B9 -19-25AUG09-12/18

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 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 15 **NO:** Replace turbo speed sensor. GO TO 12

DN22556,00003B9 -19-25AUG09-13/18

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, if possible. Did 000103.00 reappear active or stored with engine running?	**YES:** GO TO 13 **NO:** Problem fixed.

DN22556,00003B9 -19-25AUG09-14/18

13 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. Did DTC 000103.00 reappear active or stored with engine running?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003B9 -19-25AUG09-15/18

14 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 15 **NO:** Replace turbo speed sensor. GO TO 15

Continued on next page

DN22556,00003B9 -19-25AUG09-16/18

15 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. Did 000103.00 reappear active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed.

DN22556,00003B9 -19-25AUG09-17/18

16 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

DN22556,00003B9 -19-25AUG09-18/18

000103.05 — Turbo Speed Signal Circuit has High Resistance

The ECU detects low current on the turbo speed sensor wiring.

DN22556,00003BB -19-25AUG09-1/14

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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 X05 - Blue/Green

DN22556,00003BB -19-25AUG09-2/14

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 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

DN22556,00003BB -19-25AUG09-3/14

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 11

DN22556,00003BB -19-25AUG09-4/14

3 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 12 **NO:** GO TO 4

DN22556,00003BB -19-25AUG09-5/14

4 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 5 **NO:** Fix problem. GO TO 12

DN22556,00003BB -19-25AUG09-6/14

5 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 6 **NO:** Fix problem. GO TO 12

DN22556,00003BB -19-25AUG09-7/14

6 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. Is voltage less than 0.5V?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 12

Continued on next page

DN22556,00003BB -19-25AUG09-8/14

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 Test in Service ADVISOR. Did 000103.05 reappear active?	**YES:** GO TO 8 **NO:** Recheck for intermittent open circuit. GO TO 1

DN22556,00003BB -19-25AUG09-9/14

8 Replace Turbo Speed Sensor	Has turbo speed sensor been replaced during this diagnostic procedure?	**YES:** GO TO 9 **NO:** Remove turbo speed sensor. GO TO 11

DN22556,00003BB -19-25AUG09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform Harness Diagnostic Test in Service ADVISOR. Did 000103.05 reappear active?	**YES:** GO TO 10 **NO:** Problem fixed.

DN22556,00003BB -19-25AUG09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000103.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003BB -19-25AUG09-12/14

11 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. Does sensor appear damaged due to contact with shaft?	**YES:** Replace turbo speed sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace turbo speed sensor. GO TO 12

Continued on next page

DN22556,00003BB -19-25AUG09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000103.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003BB -19-25AUG09-14/14

000103.08 — Turbo Speed Signal Invalid

The ECU detects that turbo speed is not valid compared to the estimated turbo speed.

DN22556,00003BD -19-25AUG09-1/17

000103.08 — Turbo Speed Signal Invalid 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 may 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 X05 - Blue/Green

Continued on next page

DN22556,00003BD -19-25AUG09-2/17

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, 000103.05, or 000103.31.

NO: GO TO 2

DN22556,00003BD -19-25AUG09-3/17

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

DN22556,00003BD -19-25AUG09-4/17

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

DN22556,00003BD -19-25AUG09-5/17

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

DN22556,00003BD -19-25AUG09-6/17

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

DN22556,00003BD -19-25AUG09-7/17

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

Continued on next page

DN22556,00003BD -19-25AUG09-8/17

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.	**YES:** GO TO 8
	Is the resistance greater than 10k ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003BD -19-25AUG09-9/17

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.	**YES:** GO TO 9
	Are all resistance measurements greater than 10k ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003BD -19-25AUG09-10/17

9 Check for Twisted Pair	Inspect turbo speed signal and return wires between the turbo speed sensor connector and ECU J1 connector.	**YES:** GO TO 10
	Are the turbo speed signal and return wires twisted together throughout the wire harness?	**NO:** Replace wires with twisted pair. GO TO 14

DN22556,00003BD -19-25AUG09-11/17

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.	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 14
	Were any problems found?	**NO:** Replace turbo speed sensor. GO TO 11

DN22556,00003BD -19-25AUG09-12/17

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.

Continued on next page

DN22556,00003BD -19-25AUG09-13/17

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. Did DTC 000103.08 reappear active or stored with engine running?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003BD -19-25AUG09-14/17

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. Were any problems found?	**YES:** Replace turbo speed sensor and other damaged parts. GO TO 14 **NO:** Replace turbo speed sensor. GO TO 14

DN22556,00003BD -19-25AUG09-15/17

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. Did 000103.08 reappear active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed.

DN22556,00003BD -19-25AUG09-16/17

15 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 3

DN22556,00003BD -19-25AUG09-17/17

000103.31 — Turbo Speed Signal Missing

The ECU does not detect a signal coming from the turbo speed sensor.

DN22556,00003BE -19-25AUG09-1/20

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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 X05 - Blue/Green

Continued on next page

DN22556,00003BE -19-25AUG09-2/20

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

DN22556,00003BE -19-25AUG09-3/20

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 test for 000103.05. **NO:** GO TO 3

DN22556,00003BE -19-25AUG09-4/20

3 Check for Damaged Turbo	1. Monitor the Manifold Absolute Pressure data point in Service ADVISOR with engine not running. 2. Start engine and increase speed to 1500 rpm. Did Manifold Absolute 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

DN22556,00003BE -19-25AUG09-5/20

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

DN22556,00003BE -19-25AUG09-6/20

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

DN22556,00003BE -19-25AUG09-7/20

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

DN22556,00003BE -19-25AUG09-8/20

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

DN22556,00003BE -19-25AUG09-9/20

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

DN22556,00003BE -19-25AUG09-10/20

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

DN22556,00003BE -19-25AUG09-11/20

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

DN22556,00003BE -19-25AUG09-12/20

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

DN22556,00003BE -19-25AUG09-13/20

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.

Is the voltage less than 0.5V?

YES: GO TO 13

NO: Fix problem. GO TO 17

DN22556,00003BE -19-25AUG09-14/20

13 Replace Turbo Speed Sensor

Has turbo speed sensor been replaced during this diagnostic procedure?

YES: GO TO 14

NO: GO TO 16

DN22556,00003BE -19-25AUG09-15/20

14 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all electrical connectors.
3. Download latest ECU payload and reprogram ECU.

Did 000103.31 reappear active with engine running?

YES: GO TO 15

NO: Problem fixed.

DN22556,00003BE -19-25AUG09-16/20

15 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.

Did DTC 000103.31 reappear active with engine running?

YES: Open DTAC case.

NO: Problem fixed.

DN22556,00003BE -19-25AUG09-17/20

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.

Were any problems found?

YES: Replace turbo speed sensor and other damaged parts. GO TO 17

NO: Replace turbo speed sensor. GO TO 17

DN22556,00003BE -19-25AUG09-18/20

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.

Did 000103.31 reappear active with engine running?

YES: GO TO 2

NO: Problem fixed.

Continued on next page

DN22556,00003BE -19-25AUG09-19/20

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

DN22556,00003BE -19-25AUG09-20/20

000105.00 — Manifold Air Temperature Signal Extremely High

The ECU senses manifold air temperature signal is above specification.

DN22556,00003BF -19-16SEP09-1/15

000105.00 — Manifold Air Temperature Signal Extremely 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:

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 an intake 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 intake manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE SENSOR (MAT) 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Intake manifold air temperature sensor T02 - Yellow/Purple

Continued on next page

DN22556,00003BF -19-16SEP09-2/15

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 000105.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00003BF -19-16SEP09-3/15

2 Check EGR Temperature	Part 1 Is engine equipped with an EGR temperature sensor? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 3 COMPONENT (L) in Section 03, Group 140 earlier in this manual.*	**YES:** GO TO Part 2 **NO:** GO TO 4
	Part 2 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

DN22556,00003BF -19-16SEP09-4/15

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,00003BF -19-16SEP09-5/15

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION 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

DN22556,00003BF -19-16SEP09-6/15

5 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature 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

DN22556,00003BF -19-16SEP09-7/15

6 Check Manifold Air Temperature Sensor	1. Remove manifold air temperature 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

DN22556,00003BF -19-16SEP09-8/15

7 Check Manifold Air Temperature Sensor Wiring	1. With manifold air temperature sensor removed from engine, reconnect manifold air temperature sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor the 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:** Manifold air temperature sensor is OK. Diagnose engine air intake cooling system. GO TO 10 **NO:** Manifold air temperature sensor has already been replaced. GO TO 8 **NO:** Replace manifold air temperature sensor. GO TO 12

Continued on next page

DN22556,00003BF -19-16SEP09-9/15

8 Check Signal Wire In Harness	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000105.03* 1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature 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

DN22556,00003BF -19-16SEP09-10/15

9 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 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

DN22556,00003BF -19-16SEP09-11/15

10 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See CHECK FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER SEVEN-STEP 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

DN22556,00003BF -19-16SEP09-12/15

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 000105.00 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

DN22556,00003BF -19-16SEP09-13/15

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 000105.00 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00003BF -19-16SEP09-14/15

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.

DN22556,00003BF -19-16SEP09-15/15

000105.03 — Manifold Air Temperature Signal Out of Range High

The manifold air temperature signal exceeds the sensor's high voltage specification.

DN22556,00003C0 -19-25AUG09-1/19

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 intake 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 intake 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 intake 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Intake manifold air temperature sensor T02 - Yellow/Purple

Continued on next page

DN22556,00003C0 -19-25AUG09-2/19

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 000105.03 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00003C0 -19-25AUG09-3/19

2 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on intake manifold air temperature sensor harness connector.
3. Inspect harness for melted or pinched areas near the intake manifold air temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

DN22556,00003C0 -19-25AUG09-4/19

3 Sensor Open Test

Measure the resistance between terminal 1 and terminal 2 on the intake manifold air temperature sensor.

Was the resistance value greater than 7.5M ohms?

YES: Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,00003C0 -19-25AUG09-5/19

4 Harness Resistance Check

Measure the resistance between the return (terminal 2) and signal (terminal 1) in the intake manifold air temperature sensor harness connector.

Was the resistance between 1k and 3k ohms?

YES: GO TO 5

NO: GO TO 6.

DN22556,00003C0 -19-25AUG09-6/19

5 Terminal to Terminal Resistance Check

1. Disconnect all ECU connectors.
2. Measure the resistance between the signal (terminal J3-F1) and all other ECU connector terminals in the ECU harness connectors.

Was any resistance less than 100 ohms?

YES: Look for pinched or melted 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

DN22556,00003C0 -19-25AUG09-7/19

6 **Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal 2) in the intake manifold air temperature sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8.

DN22556,00003C0 -19-25AUG09-8/19

7 **Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-F1) in the ECU connector and the signal (terminal 1) in the intake manifold air temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003C0 -19-25AUG09-9/19

8 **Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-B2) in the ECU connector and the return (terminal 2) in the intake manifold air temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003C0 -19-25AUG09-10/19

9 **ECU Resistance Check**	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-F1) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** 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. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003C0 -19-25AUG09-11/19

10 **Occurrence Count Check**	Review stored information and look at occurrence count for 000105.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003C0 -19-25AUG09-12/19

11 **Terminal Test**	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the intake manifold air temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

DN22556,00003C0 -19-25AUG09-13/19

12 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 13 **NO:** GO TO 15

DN22556,00003C0 -19-25AUG09-14/19

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 14
	Did 000105.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,00003C0 -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the intake manifold air temperature sensor and surrounding ares.	**YES:** Replace manifold air temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003C0 -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the intake manifold air temperature 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 16

DN22556,00003C0 -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000105.03 active?	**NO:** GO TO 15.

Continued on next page

DN22556,00003C0 -19-25AUG09-18/19

17 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.
	Is 000105.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003C0 -19-25AUG09-19/19

000105.04 — Manifold Air Temperature Signal Out of Range Low

The manifold air temperature input voltage drops below the sensor's low voltage specification.

DN22556,00003C1 -19-25AUG09-1/19

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 intake 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 intake manifold air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default intake 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 intake 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,00003C1 -19-25AUG09-2/19

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 000105.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003C1 -19-25AUG09-3/19

2 Monitor Code Test	1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000105.03 become active and 000105.04 move to stored?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00003C1 -19-25AUG09-4/19

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on intake manifold air temperature sensor harness connector. 3. Inspect harness for melted or pinched areas near the intake manifold air temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003C1 -19-25AUG09-5/19

4 Sensor Short Internally or to Ground Test	Measure the resistance from each terminal on the sensor to chassis ground. **Specification** Check for short to ground—Resistance..... Greater than 1k ohm Measure the resistance between the two sensor terminals. **Specification** Check for internal short—Resistance..... Greater than 50 ohms Is either measurement out of specification?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem not found. GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,00003C1 -19-25AUG09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the intake manifold air temperature sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,00003C1 -19-25AUG09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal 2) and signal (terminal 1) in the intake manifold air temperature sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**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.

DN22556,00003C1 -19-25AUG09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal 2) and signal (terminal 1) in the intake manifold air temperature sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9.

DN22556,00003C1 -19-25AUG09-9/19

8 Harness Physical Check	Terminal 1 has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** Problem not found. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,00003C1 -19-25AUG09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-F1) in the ECU connector. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003C1 -19-25AUG09-11/19

10 Occurrence Count Check	Review stored information and look at occurrence count for 000105.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003C1 -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the intake manifold air temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

DN22556,00003C1 -19-25AUG09-13/19

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 15

DN22556,00003C1 -19-25AUG09-14/19

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000105.04 reappear when engine operating point was reached?	 **YES:** GO TO 14 **NO:** GO TO 12 and confirm operating point.

Continued on next page

DN22556,00003C1 -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the intake manifold air temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003C1 -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the intake manifold air temperature 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 16

DN22556,00003C1 -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000105.04 active?	**NO:** GO TO 15.

DN22556,00003C1 -19-25AUG09-18/19

17 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.
	Is 000105.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003C1 -19-25AUG09-19/19

000105.15 — Manifold Air Temperature Signal Slightly High

The ECU senses a intake manifold air temperature above specification.

DN22556,00003C2 -19-25AUG09-1/15

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 an intake 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 intake 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Intake manifold air temperature sensor T02 - Yellow/Purple

Continued on next page

DN22556,00003C2 -19-25AUG09-2/15

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

DN22556,00003C2 -19-25AUG09-3/15

2 Check EGR Temperature	Part 1 Is engine equipped with an EGR temperature sensor? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 3 COMPONENT (L) 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

DN22556,00003C2 -19-25AUG09-4/15

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,00003C2 -19-25AUG09-5/15

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION 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

DN22556,00003C2 -19-25AUG09-6/15

5 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature 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

DN22556,00003C2 -19-25AUG09-7/15

6 Check Manifold Air Temperature Sensor	1. Remove manifold air temperature 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

DN22556,00003C2 -19-25AUG09-8/15

7 Check Manifold Air Temperature Sensor Operation	1. With manifold air temperature sensor removed from engine, reconnect manifold air temperature sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor the intake 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:** Manifold air temperature sensor is OK. Diagnose engine air intake cooling system. GO TO 10 **NO:** Manifold air temperature sensor has already been replaced. GO TO 8 **NO:** Replace manifold air temperature sensor. GO TO 12

Continued on next page

DN22556,00003C2 -19-25AUG09-9/15

8 Check Signal Wire In Harness	1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature 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

DN22556,00003C2 -19-25AUG09-10/15

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

DN22556,00003C2 -19-25AUG09-11/15

10 Check for Engine Related Causes	Check the following items that can cause high intake manifold air temperature: • Test for leaks. See CHECK FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER SEVEN-STEP INSPECTION in base engine manual, Section 02, Group 080. Was cause of high intake manifold air temperature determined?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 11

DN22556,00003C2 -19-25AUG09-12/15

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

DN22556,00003C2 -19-25AUG09-13/15

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.

DN22556,00003C2 -19-25AUG09-14/15

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.

DN22556,00003C2 -19-25AUG09-15/15

000105.16 — Manifold Air Temperature Signal Moderately High

The ECU senses an intake manifold air temperature above specification.

DN22556,00003C3 -19-25AUG09-1/15

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 an intake 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 intake 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Intake manifold air temperature sensor T02 - Yellow/Purple

Continued on next page

DN22556,00003C3 -19-25AUG09-2/15

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

DN22556,00003C3 -19-25AUG09-3/15

2 Check EGR Temperature	Part 1 Is engine equipped with an EGR temperature sensor? *NOTE: For component location see COMPONENT LOCATION DIAGRAM 3 COMPONENT (L) 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

DN22556,00003C3 -19-25AUG09-4/15

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,00003C3 -19-25AUG09-5/15

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION 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

DN22556,00003C3 -19-25AUG09-6/15

5 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the manifold air temperature 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

DN22556,00003C3 -19-25AUG09-7/15

6 Check Manifold Air Temperature Sensor	1. Remove manifold air temperature 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

DN22556,00003C3 -19-25AUG09-8/15

7 Check Manifold Air Temperature Sensor Wiring	1. With manifold air temperature sensor removed from engine, reconnect manifold air temperature sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor the intake 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:** manifold air temperature sensor is OK. Diagnose engine air intake cooling system. GO TO 10 **NO:** manifold air temperature sensor has already been replaced. GO TO 8 **NO:** Replace manifold air temperature sensor. GO TO 12

Continued on next page

DN22556,00003C3 -19-25AUG09-9/15

8 Check Signal Wire In Harness

1. Ignition OFF, Engine OFF.
2. Disconnect the manifold air temperature 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

DN22556,00003C3 -19-25AUG09-10/15

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

DN22556,00003C3 -19-25AUG09-11/15

10 Check for Engine Related Causes

Check the following items that can cause high intake manifold air temperature:

- Test for leaks. See CHECK FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150.
- Malfunctioning turbocharger compressor. See TURBOCHARGER SEVEN-STEP INSPECTION in base engine manual, Section 02, Group 080.

Was cause of high intake manifold air temperature determined?

YES: Repair problem. GO TO 12

NO: GO TO 11

DN22556,00003C3 -19-25AUG09-12/15

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

DN22556,00003C3 -19-25AUG09-13/15

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.

DN22556,00003C3 -19-25AUG09-14/15

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.

DN22556,00003C3 -19-25AUG09-15/15

000107.00 — Air Filter Restriction Switch Activated

The air filter restriction signal is indicating an air filter restriction.

DN22556,00003C4 -19-20MAY08-1/7

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:

DN22556,00003C4 -19-20MAY08-2/7

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

DN22556,00003C4 -19-20MAY08-3/7

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

DN22556,00003C4 -19-20MAY08-4/7

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 the base engine manual. Were any restrictions found?	**YES:** Repair and retest. **NO:** GO TO 4

DN22556,00003C4 -19-20MAY08-5/7

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

DN22556,00003C4 -19-20MAY08-6/7

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.

DN22556,00003C4 -19-20MAY08-7/7

000107.31 — Air Filter Restriction Switch Activated

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000664 -19-25MAR11-1/18

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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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

DN22556,0000664 -19-25MAR11-2/18

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 000107.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

DN22556,0000664 -19-25MAR11-3/18

2 Check Air Filter	Check air filter and dust valve. Check for any restrictions in inlet tube and filter system. See 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

DN22556,0000664 -19-25MAR11-4/18

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

DN22556,0000664 -19-25MAR11-5/18

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

DN22556,0000664 -19-25MAR11-6/18

5 Check Switch Operation	1. Ignition OFF, Engine OFF. 2. Test air filter restriction switch for proper operation. See CHECK AIR INTAKE SYSTEM 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

DN22556,0000664 -19-25MAR11-7/18

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

DN22556,0000664 -19-25MAR11-8/18

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

DN22556,0000664 -19-25MAR11-9/18

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

DN22556,0000664 -19-25MAR11-10/18

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

DN22556,0000664 -19-25MAR11-11/18

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

DN22556,0000664 -19-25MAR11-12/18

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

DN22556,0000664 -19-25MAR11-13/18

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

DN22556,0000664 -19-25MAR11-14/18

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

DN22556,0000664 -19-25MAR11-15/18

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

DN22556,0000664 -19-25MAR11-16/18

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.

DN22556,0000664 -19-25MAR11-17/18

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.

DN22556,0000664 -19-25MAR11-18/18

000108.02 — Barometric Air Pressure Signal Invalid

The barometric air pressure signal is invalid when compared to the estimated barometric pressure.

DN22556,00003C5 -19-25MAR11-1/6

000108.02 — Barometric Air 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 intake manifold air pressure for the barometric pressure value. If the intake 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.

DN22556,00003C5 -19-25MAR11-2/6

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

DN22556,00003C5 -19-25MAR11-3/6

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.

DN22556,00003C5 -19-25MAR11-4/6

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.

Continued on next page

DN22556,00003C5 -19-25MAR11-5/6

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.

DN22556,00003C5 -19-25MAR11-6/6

000110.00 — Coolant Temperature Signal Extremely High

The ECU senses a coolant temperature above the 3rd threshold specification.

Continued on next page

DN22556,00003C6 -19-25AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
• Engine 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

DN22556,00003C6 -19-25AUG09-3/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,00003C6 -19-25AUG09-4/13

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

DN22556,00003C6 -19-25AUG09-5/13

4 Check Coolant Temperature Sensor

1. Remove coolant temperature sensor. See ENGINE COOLANT TEMPERATURE (ECT) 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

DN22556,00003C6 -19-25AUG09-6/13

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 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

DN22556,00003C6 -19-25AUG09-7/13

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

DN22556,00003C6 -19-25AUG09-8/13

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

DN22556,00003C6 -19-25AUG09-9/13

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 13.5L - 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

DN22556,00003C6 -19-25AUG09-10/13

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

DN22556,00003C6 -19-25AUG09-11/13

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 000110.00 reappear as active with engine running?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003C6 -19-25AUG09-12/13

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.

DN22556,00003C6 -19-25AUG09-13/13

000110.03 — Coolant Temperature Signal Out of Range High

The coolant temperature signal exceeds the sensor's high voltage specification.

DN22556,00003C7 -19-25AUG09-1/18

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 engine 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 engine coolant temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default engine coolant temperature of 90° C (194° F).
The ECU will try to maintain the engine operating envelope.

Additional References:
For more engine 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Engine coolant temperature sensor T04 - Purple/Gray

Continued on next page

DN22556,00003C7 -19-25AUG09-2/18

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 000110.03 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00003C7 -19-25AUG09-3/18

2 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on coolant sensor harness connector.
3. Inspect harness for melted or pinched areas near the coolant sensor.

Were any problems found?

YES: Fix problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

DN22556,00003C7 -19-25AUG09-4/18

3 Sensor Open Test

Measure the resistance between terminal A and terminal B on the coolant sensor.

Was the resistance value greater than 7.5M ohms?

YES: Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,00003C7 -19-25AUG09-5/18

4 Harness Resistance Check

Measure the resistance between the return (terminal B) and signal (terminal A) in the coolant sensor harness connector.

Was the resistance between 1k and 3k ohms?

YES: GO TO 5

NO: GO TO 6.

DN22556,00003C7 -19-25AUG09-6/18

5 Terminal to Terminal Resistance Check

1. Disconnect all ECU connectors.
2. Measure the resistance between the signal (terminal J3-D3) and all other ECU connector terminals in the ECU harness connectors.

Was any resistance less than 100 ohms?

YES: Look for pinched or melted 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

DN22556,00003C7 -19-25AUG09-7/18

6	**Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal B) in the coolant sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8.

DN22556,00003C7 -19-25AUG09-8/18

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-D3) in the ECU connector and the signal (terminal A) in the coolant sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003C7 -19-25AUG09-9/18

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-H3) in the ECU connector and the return (terminal B) in the coolant sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003C7 -19-25AUG09-10/18

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-D3) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** Reconnect all connectors and GO TO 2. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003C7 -19-25AUG09-11/18

10	**Occurrence Count Check**	Review stored information and look at occurrence count for 000110.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003C7 -19-25AUG09-12/18

11	**Terminal Test**	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the coolant sensor harness connector. Were any problems found?	 **YES:** Fix problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

DN22556,00003C7 -19-25AUG09-13/18

12 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 13 **NO:** GO TO 14

DN22556,00003C7 -19-25AUG09-14/18

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 1
	Did 000110.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point

DN22556,00003C7 -19-25AUG09-15/18

14 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the coolant sensor harness connector and ECU J3 connector.	**YES:** Fix problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 15

DN22556,00003C7 -19-25AUG09-16/18

15 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 1
	Is 000110.03 active?	**NO:** GO TO 16

DN22556,00003C7 -19-25AUG09-17/18

16 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.
	Is 000110.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003C7 -19-25AUG09-18/18

000110.04 — Coolant Temperature Signal Out of Range Low

The coolant temperature signal drops below the sensor's low voltage specification.

DN22556,00003C8 -19-25AUG09-1/19

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 engine 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 engine coolant temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default engine 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 engine 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Engine coolant temperature sensor T04 - Purple/Gray

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DN22556,00003C8 -19-25AUG09-2/19

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 000110.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003C8 -19-25AUG09-3/19

2 Monitor Code Test	1. Ignition OFF, Engine OFF. 2. Disconnect the engine coolant temperature sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000110.03 become active and 000110.04 move to stored?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00003C8 -19-25AUG09-4/19

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on engine coolant temperature sensor harness connector. 3. Inspect harness for melted or pinched areas near the engine coolant temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003C8 -19-25AUG09-5/19

4 Sensor Short Internally or to Ground Test	Measure the resistance from each terminal on the sensor to chassis ground. **Specification** Check for short to ground—Resistance..... Greater than 1k ohm Measure the resistance between the two sensor terminals. **Specification** Check for internal short—Resistance..... Greater than 50 ohms Is either measurement out of specification?	**YES:** Replace coolant temperature sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

Continued on next page

DN22556,00003C8 -19-25AUG09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine coolant temperature sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,00003C8 -19-25AUG09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the engine coolant temperature sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**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.

DN22556,00003C8 -19-25AUG09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal B) and signal (terminal A) in the engine coolant temperature sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9.

DN22556,00003C8 -19-25AUG09-9/19

8 Harness Physical Check	Terminal A has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** Problem not found, reconnect all connectors. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,00003C8 -19-25AUG09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-D3) in the ECU connector. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003C8 -19-25AUG09-11/19

10 Occurrence Count Check	Review stored information and look at occurrence count for 000110.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003C8 -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the engine coolant temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

DN22556,00003C8 -19-25AUG09-13/19

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 15

DN22556,00003C8 -19-25AUG09-14/19

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000110.04 reappear when engine operating point was reached?	 **YES:** GO TO 14 **NO:** GO TO 12 and confirm operating point.

Continued on next page

DN22556,00003C8 -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the engine coolant temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003C8 -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine coolant temperature 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 16

DN22556,00003C8 -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000110.04 active?	**NO:** GO TO 15.

DN22556,00003C8 -19-25AUG09-18/19

17 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.
	Is 000110.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003C8 -19-25AUG09-19/19

000110.15 — Coolant Temperature Signal Slightly High

The ECU senses an engine coolant temperature above specification.

DN22556,00003C9 -19-25AUG09-1/13

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 an engine 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Engine coolant temperature sensor T04 - Purple/Gray

Continued on next page

DN22556,00003C9 -19-25AUG09-2/13

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

DN22556,00003C9 -19-25AUG09-3/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,00003C9 -19-25AUG09-4/13

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

DN22556,00003C9 -19-25AUG09-5/13

4 Check Coolant Temperature Sensor

1. Remove coolant temperature sensor. See ENGINE COOLANT TEMPERATURE (ECT) 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

DN22556,00003C9 -19-25AUG09-6/13

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 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

DN22556,00003C9 -19-25AUG09-7/13

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. 8 **NO:** GO TO 7

DN22556,00003C9 -19-25AUG09-8/13

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

DN22556,00003C9 -19-25AUG09-9/13

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 13.5L - 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

DN22556,00003C9 -19-25AUG09-10/13

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

DN22556,00003C9 -19-25AUG09-11/13

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.

DN22556,00003C9 -19-25AUG09-12/13

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.

DN22556,00003C9 -19-25AUG09-13/13

000110.16 — Coolant Temperature Signal Moderately High

The ECU senses a engine coolant temperature above the 2nd threshold specification.

DN22556,00003CA -19-25AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Engine coolant temperature sensor T04 - Purple/Gray

Continued on next page

DN22556,00003CA -19-25AUG09-2/13

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

DN22556,00003CA -19-25AUG09-3/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,00003CA -19-25AUG09-4/13

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

DN22556,00003CA -19-25AUG09-5/13

4 Check Coolant Temperature Sensor

1. Remove coolant temperature sensor. See ENGINE COOLANT TEMPERATURE (ECT) 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

DN22556,00003CA -19-25AUG09-6/13

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 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

DN22556,00003CA -19-25AUG09-7/13

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

DN22556,00003CA -19-25AUG09-8/13

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

DN22556,00003CA -19-25AUG09-9/13

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 13.5L - 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

DN22556,00003CA -19-25AUG09-10/13

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

DN22556,00003CA -19-25AUG09-11/13

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.

DN22556,00003CA -19-25AUG09-12/13

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.

DN22556,00003CA -19-25AUG09-13/13

000110.17 — Coolant Temperature Signal Slightly Low

The ECU senses a engine coolant temperature is not rising to normal operating temperatures.

Continued on next page

DN22556,00003CB -19-25AUG09-1/13

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 engine 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 using 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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
- Engine 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 000110.17 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,00003CB -19-25AUG09-3/13

2 Check Thermostats	Test thermostats for proper function. See INSPECT THERMOSTAT AND TEST OPENING TEMPERATURE in base engine manual, Section 04, Group 150. Are all thermostats functioning properly?	**YES:** GO TO 3 **NO:** Replace thermostats. GO TO 10

DN22556,00003CB -19-25AUG09-4/13

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

DN22556,00003CB -19-25AUG09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See ENGINE COOLANT TEMPERATURE (ECT) 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

DN22556,00003CB -19-25AUG09-6/13

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 Coolant Temperature from within Service ADVISOR.	**YES:** Coolant temperature sensor and harness OK. Problem not found. GO TO 1
	4. If necessary, let the sensor cool down to the ambient temperature.	**NO:** Coolant temperature sensor has already been replaced. GO TO 6
	Does the sensor reading closely match the ambient temperature?	**NO:** Replace coolant temperature sensor. GO TO 10

DN22556,00003CB -19-25AUG09-7/13

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.	**YES:** Repair problem. GO TO 10
	Are there any problems with the wiring or connectors?	**NO:** GO TO 7

DN22556,00003CB -19-25AUG09-8/13

7 Check Harness	1. On harness, measure the resistance between ECU harness connector J3, terminal D3 to engine coolant sensor connector terminal A.	
	2. On harness, measure the resistance between ECU harness connector J3, terminal H3 to engine coolant sensor connector terminal B.	**YES:** GO TO 8
	Were both measurements less than 5 ohms?	**NO:** Look for high resistance connection in harness. Fix problem. GO TO 10

DN22556,00003CB -19-25AUG09-9/13

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.	**YES:** GO TO 9
	Is 000110.17 still active?	**NO:** Verify problem is fixed. GO TO 10

Continued on next page

DN22556,00003CB -19-25AUG09-10/13

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

DN22556,00003CB -19-25AUG09-11/13

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.

DN22556,00003CB -19-25AUG09-12/13

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.

DN22556,00003CB -19-25AUG09-13/13

000111.01 — Coolant Level Extremely Low

The ECU detects low engine coolant level.

DN22556,00003CC -19-04APR11-1/18

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 an engine 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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
- Engine coolant temperature sensor T04 - Purple/Gray
- Auxiliary Conenctor C08 - Yellow/Purple

Continued on next page

DN22556,00003CC -19-04APR11-2/18

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

DN22556,00003CC -19-04APR11-3/18

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

DN22556,00003CC -19-04APR11-4/18

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 13.5L - 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

DN22556,00003CC -19-04APR11-5/18

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Remove wires or connector from engine coolant level switch. 3. Perform TERMINAL TEST on connector and engine 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

DN22556,00003CC -19-04APR11-6/18

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 engine 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

DN22556,00003CC -19-04APR11-7/18

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 engine 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 engine coolant level switch or linkage. GO TO 2

NO: Problem in harness. GO TO 7

DN22556,00003CC -19-04APR11-8/18

7 Terminal Test

1. Ignition OFF, Engine OFF.
2. Disconnect the two wires to the engine coolant levelswitch 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

DN22556,00003CC -19-04APR11-9/18

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 engine coolant level switch.
3. On auxiliary harness connector C08, measure resistance from terminal Q to each individual wire of the engine 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

DN22556,00003CC -19-04APR11-10/18

9 Check Auxiliary Harness for Shorted Wire

NOTE: Make sure the wires to the engine 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

DN22556,00003CC -19-04APR11-11/18

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

DN22556,00003CC -19-04APR11-12/18

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

DN22556,00003CC -19-04APR11-13/18

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

DN22556,00003CC -19-04APR11-14/18

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

DN22556,00003CC -19-04APR11-15/18

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

DN22556,00003CC -19-04APR11-16/18

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.

DN22556,00003CC -19-04APR11-17/18

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.

DN22556,00003CC -19-04APR11-18/18

000157.01 — High Pressure Fuel Signal Extremely Low

The high pressure fuel signal indicates pressure is below 300 kPa (43.5 psi).

DN22556,000068F -19-06APR11-1/10

000157.01 — High Pressure Fuel Signal Extremely Low Diagnostic Procedure

Troubleshooting Sequence:
000157.01

When DTC is Displayed:
When ever the engine is running and the error is active.

Related Information:
The high pressure fuel - pressure is below 300 kPa (43.5 psi).

Alarm Level:
STOP

Control Unit Response:
The ECU will derate the engine until it is running at 50% of full power.

Additional References:
For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 earlier in this manual.

For more 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.

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- High pressure fuel sensor P03 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,000068F -19-06APR11-2/10

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 000157.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,000068F -19-06APR11-3/10

2 F1 - LOW PRESSURE FUEL SYSTEM CHECK	Perform the F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check earlier in this Group. Did Test Pass?	**YES:** Problem fixed. Return to service. **NO:** Perform the F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check earlier in this Group.

DN22556,000068F -19-06APR11-4/10

3 Occurrence Count Check	Review stored information and look at occurrence count Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 4 **NO:** GO TO 5

DN22556,000068F -19-06APR11-5/10

4 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,000068F -19-06APR11-6/10

5 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 6 **NO:** GO TO 8

Continued on next page

DN22556,000068F -19-06APR11-7/10

6 Engine Error Operating Point Test	1. Ignition ON, Engine ON	**YES:** GO TO 2
	2. Set engine to operating point of failure and refresh codes	**NO:** GO TO 5 and confirm operating point.
	Did 157.01 reappear when engine operating point was reached?	**NO:** Could not generate DTC. GO TO 7

DN22556,000068F -19-06APR11-8/10

7 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on high pressure fuel sensor connector and ECU connector J3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Were any problems found?	**NO:** GO TO 8

DN22556,000068F -19-06APR11-9/10

8 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 high pressure fuel sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Is 000157.01 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,000068F -19-06APR11-10/10

000157.03 — High Pressure Fuel Signal Out of Range High

The high pressure fuel signal corresponds to a fuel pressure that is higher than what is physically possible.

DN22556,00003CD -19-07APR11-1/15

000157.03 — High Pressure Fuel 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 high pressure fuel signal corresponds to a fuel pressure that is higher than what is physically possible.

Alarm Level:
STOP

Control Unit Response:
The ECU will try to maintain normal operating conditions.

Additional References:
For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- High pressure fuel sensor P04 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003CD -19-07APR11-2/15

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 000157.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

DN22556,00003CD -19-07APR11-3/15

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect high pressure fuel sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000157.03 go to stored and 000157.04 become active?	**YES:** GO TO 3 **NO:** GO TO 4

DN22556,00003CD -19-07APR11-4/15

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the high pressure fuell sensor and harness connector. 3. Inspect harness for melted or pinched areas near the high pressure fuel sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003CD -19-07APR11-5/15

4 Sensor Short to Power Test	Measure the resistance between signal (terminal 3) and power (terminal 2) on the high pressure fuel sensor harness connector. Was the resistance value between 210k and 310k ohms?	**YES:** GO TO 5 **NO:** Signal and power wires shorted together. Repair short, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00003CD -19-07APR11-6/15

5 Harness Resistance Check ECU Disconnected	1. Disconnect all ECU connectors.	
	2. Perform TERMINAL TEST on all the ECU harness connector.	
	3. Measure the resistance between signal (terminal 3) and all other terminals in the ECU harness connectors.	**YES:** Repair short in wiring. Run HARNESS DIAGNOSTIC MODE TEST.
	Was any resistance measurement less than 10 ohms?	**NO:** GO TO 6.

DN22556,00003CD -19-07APR11-7/15

6 ECU Resistance Check	Measure the resistance between the power (terminal J3-H4) and signal (terminal J3-C2) on the ECU.	**YES:** 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.
	Was the resistance between 210k and 310k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003CD -19-07APR11-8/15

7 Occurrence Count Check	Review stored information and look at occurrence count for 000157.03.	**YES:** GO TO 8
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 9

DN22556,00003CD -19-07APR11-9/15

8 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure fuel sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 9

DN22556,00003CD -19-07APR11-10/15

9 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 GO TO 10
		NO: GO TO 12

Continued on next page

DN22556,00003CD -19-07APR11-11/15

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 11
	Did 000157.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,00003CD -19-07APR11-12/15

11 Sensor Temperature Test	1. Ignition ON, Engine OFF	
	2. Refresh codes.	**YES:** Problem occurring. GO TO 2
	Is 000157.03 active?	**NO:** Replace high pressure fuel pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003CD -19-07APR11-13/15

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure 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 13

DN22556,00003CD -19-07APR11-14/15

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:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000157.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003CD -19-07APR11-15/15

000157.04 — High Pressure Fuel Signal Out of Range Low

The high pressure fuel signal drops below the sensor's low voltage specification.

DN22556,00003CE -19-06APR11-1/21

000157.04 — High Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003510.04
000157.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The high pressure input voltage corresponds to a pressure that is lower than what is physically possible.

Alarm Level:
STOP

Control Unit Response:
The ECU will try to maintain normal operating conditions.

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- High pressure fuel sensor P03 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003CE -19-06APR11-2/21

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 000157.04 reappear active?

YES: GO TO 2

NO: GO TO 13

DN22556,00003CE -19-06APR11-3/21

2 Supply Voltage Test

1. Ignition ON, Engine OFF.
2. Monitor Power Supply #2 Voltage using Service ADVISOR.

Is the voltage above 4.5 volts?

YES: GO TO 3

NO: GO TO 9

DN22556,00003CE -19-06APR11-4/21

3 Terminal Test

1. Ignition OFF, Engine OFF.
2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,00003CE -19-06APR11-5/21

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 3) and return (terminal 1), (between 40k ohms and 48k ohms).
4. Between signal (terminal 3) and power (terminal 2), (between 5M ohms and 13M ohms).
5. Between return (terminal 1) and power (terminal 2), (between 5M ohms and 13M 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

DN22556,00003CE -19-06APR11-6/21

5 High Pressure Fuel Input to Return Test

1. Ignition OFF, Engine OFF
2. Measure the resistance between signal (terminal 3) and return (terminal 1) on the sensor harness connector.

Is the resistance between 210k and 310k ohms?

YES: GO TO 6

NO: GO TO 8

Continued on next page

DN22556,00003CE -19-06APR11-7/21

6 High Pressure Fuel Power to Return Resistance Check	Measure the resistance between return (terminal 1) and power (terminal 2) 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

DN22556,00003CE -19-06APR11-8/21

7 High Pressure Fuel Power to Return Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between return (terminal 1) and power (terminal 2) on the sensor harness 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.

DN22556,00003CE -19-06APR11-9/21

8 High Pressure Fuel Signal to Return Short Test	1. Disconnect ECU connector J3. 2. Measure the resistance between signal (terminal 3) and return (terminal 1) on the sensor harness 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.

DN22556,00003CE -19-06APR11-10/21

9 High Pressure Fuel Sensor Open and Short Test	Measure the resistance between return (terminal 1) and power (terminal 2) on the sensor connector. Is the resistance near 0 ohms (shorted)? Is the resistance near infinity (open)?	**YES:** If near 0 ohms (shorted) GO TO 10 **YES:** If near infinity (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

DN22556,00003CE -19-06APR11-11/21

10 Wiring Harness Short Test

1. Ignition OFF, Engine OFF.
2. Disconnect all ECU connectors.
3. Measure the resistance between J3-C2 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

DN22556,00003CE -19-06APR11-12/21

11 Wiring Harness Power Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between J3-C2 in the ECU harness connector and the power (terminal 2) in the high pressure fuel sensor connector

Was the reading less than 5 ohms?

YES: GO TO 12

NO: Repair wiring and GO TO 1.

DN22556,00003CE -19-06APR11-13/21

12 Wiring Harness return Wire Resistance Test

1. Ignition OFF, Engine OFF.
2. Disconnect ECU connector J3.
3. Measure the resistance between return (terminal J3-H3) and the return (terminal 1) in the high pressure fuel 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.

DN22556,00003CE -19-06APR11-14/21

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

DN22556,00003CE -19-06APR11-15/21

14 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,00003CE -19-06APR11-16/21

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

DN22556,00003CE -19-06APR11-17/21

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.

DN22556,00003CE -19-06APR11-18/21

17 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,00003CE -19-06APR11-19/21

18 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,00003CE -19-06APR11-20/21

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.

DN22556,00003CE -19-06APR11-21/21

000157.16 — High Pressure Fuel Signal Moderately High

The high pressure fuel signal is higher than expected for normal operating conditions

DN22556,0000690 -19-06APR11-1/11

000157.16 — High Pressure Fuel Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000157.16

When DTC is Displayed:
When ever the engine is cranking or running and the error is active.

Related Information:
The high pressure fuel is above 1000 kPa, or higher than expected for a selected engine speed.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- High pressure fuel sensor P03 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,0000690 -19-06APR11-2/11

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will 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 000157.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 4

DN22556,0000690 -19-06APR11-3/11

2 F1 - Low Pressure Fuel System Check	Perform the F1 - LOW PRESSURE FUEL SYSTEM CHECK, see F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check earlier in this Group. Did Test Pass?	**YES:** Problem fixed. Return to service. **NO:** GO TO 3

DN22556,0000690 -19-06APR11-4/11

3 High Pressure Fuel System Test	Perform the high pressure fuel system test, see F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Check earlier in this Group. Did Test Pass?	**YES:** Problem fixed. Return to service. **NO:** Repeat procedure looking for problems in fuel system or harness. GO TO 1

DN22556,0000690 -19-06APR11-5/11

4 Occurrence Count Check	Review stored information and look at occurrence count Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 4 **NO:** GO TO 5

DN22556,0000690 -19-06APR11-6/11

5 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on high pressure fuel 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

DN22556,0000690 -19-06APR11-7/11

6 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 6 **NO:** GO TO 8

Continued on next page

DN22556,0000690 -19-06APR11-8/11

7 Engine Error Operating Point Test	1. Ignition ON, Engine ON	**YES:** GO TO 2
	2. Set engine to operating point of failure and refresh codes	**NO:** GO TO 5 and confirm operating point.
	Did 157.16 reappear when engine operating point was reached?	**NO:** Could not generate DTC. GO TO 7

DN22556,0000690 -19-06APR11-9/11

8 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on high pressure fuel sensor connector and ECU connector J3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Were any problems found?	**NO:** GO TO 8

DN22556,0000690 -19-06APR11-10/11

9 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 high pressure fuel sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Is 000157.16 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,0000690 -19-06APR11-11/11

000157.18 — High Pressure Fuel Signal Moderately Low

The high pressure fuel signal indicates pressure is below 400 kPa (58 psi).

DN22556,0000661 -19-29MAR11-1/10

000157.18 — High Pressure Fuel Signal Moderately Low Diagnostic Procedure

Troubleshooting Sequence:
000157.18

When DTC is Displayed:
When ever the engine is running and the error is active.

Related Information:
The high pressure fuel - actual pressure is below 400 kPa (58 psi).

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- High pressure fuel sensor P03 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,0000661 -19-29MAR11-2/10

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 000157.18 reappear active?	**YES:** GO TO 2 **NO:** GO TO 4

DN22556,0000661 -19-29MAR11-3/10

2 F1 - Low Pressure Fuel System Check	Perform the F1 - LOW PRESSURE FUEL SYSTEM CHECK, see F1 - Fuel Supply System Check or F1 - Type 2 Fuel Supply System Checkearlier in this Group. Is DTC 000157.18 still active?	**YES:** GO TO 3 **NO:** Problem fixed.

DN22556,0000661 -19-29MAR11-4/10

3 Occurrence Count Check	Review stored information and look at occurrence count Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 4 **NO:** GO TO 5

DN22556,0000661 -19-29MAR11-5/10

4 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on high pressure fuel sensor connector. Were any problems found?	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1 **NO:** GO TO 5

DN22556,0000661 -19-29MAR11-6/10

5 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 6 **NO:** GO TO 8

DN22556,0000661 -19-29MAR11-7/10

6 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 157.18 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 5 and confirm operating point. **NO:** Could not generate DTC. GO TO 7

Continued on next page

DN22556,0000661 -19-29MAR11-8/10

7 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on high pressure fuel sensor connector and ECU connector J3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Were any problems found?	**NO:** GO TO 8

DN22556,0000661 -19-29MAR11-9/10

8 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 high pressure fuel sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor. GO TO 1
	Is 000157.18 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,0000661 -19-29MAR11-10/10

000158.17 — ECU Power Down Error

The ECU is unable to complete proper power down procedures after detecting a key off condition.

DN22556,00003D1 -19-29MAR11-1/4

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.

For component location information, see FUEL SYSTEM IDENTIFICATION in Section 01, Group 003 earlier in this manual.

DN22556,00003D1 -19-29MAR11-2/4

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

DN22556,00003D1 -19-29MAR11-3/4

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.

DN22556,00003D1 -19-29MAR11-4/4

000174.00 — Fuel Temperature Signal Extremely High

The ECU senses a fuel temperature above specification.

Continued on next page

DN22556,00003D2 -19-25AUG09-1/14

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 120° C (248° 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

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 000174.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00003D2 -19-25AUG09-3/14

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 11 **NO:** GO TO 3

DN22556,00003D2 -19-25AUG09-4/14

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

DN22556,00003D2 -19-25AUG09-5/14

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

DN22556,00003D2 -19-25AUG09-6/14

5 Check Fuel Temperature Sensor	1. Remove fuel temperature sensor. See REMOVE AND INSTALL 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

DN22556,00003D2 -19-25AUG09-7/14

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 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

DN22556,00003D2 -19-25AUG09-8/14

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

DN22556,00003D2 -19-25AUG09-9/14

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

DN22556,00003D2 -19-25AUG09-10/14

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

DN22556,00003D2 -19-25AUG09-11/14

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

DN22556,00003D2 -19-25AUG09-12/14

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.

DN22556,00003D2 -19-25AUG09-13/14

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.

DN22556,00003D2 -19-25AUG09-14/14

000174.03 — Fuel Temperature Signal Out of Range High

The fuel temperature signal exceeds the sensor's high voltage specification.

DN22556,00003D3 -19-25AUG09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003D3 -19-25AUG09-2/19

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 000174.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003D3 -19-25AUG09-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect fuel temperature sensor connector. 3. Perform TERMINAL TEST on fuel temperature sensor, harness and connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003D3 -19-25AUG09-4/19

3 Sensor Open Test	Measure the resistance between terminal A and terminal B on the fuel temperature sensor. Was the resistance value greater than 7.5M ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003D3 -19-25AUG09-5/19

4 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the fuel sensor harness connector. Was the resistance between 1k and 3k ohms?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,00003D3 -19-25AUG09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J3-B1) and all other ECU connector terminals in the ECU harness connectors. Was any resistance less than 100 ohms?	**YES:** Look for pinched or melted 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

DN22556,00003D3 -19-25AUG09-7/19

6	**Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal B) in the fuel sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,00003D3 -19-25AUG09-8/19

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-B1) in the ECU connector and the signal (terminal A) in the fuel sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003D3 -19-25AUG09-9/19

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-H3) in the ECU connector and the return (terminal B) in the fuel sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003D3 -19-25AUG09-10/19

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-B1) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** 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. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003D3 -19-25AUG09-11/19

10	**Occurrence Count Check**	Review stored information and look at occurrence count for 000174.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

Continued on next page

DN22556,00003D3 -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect fuel temperature sensor connector.	
	3. Perform TERMINAL TEST on fuel temperature sensor, harness and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 12

DN22556,00003D3 -19-25AUG09-13/19

12 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 13 **NO:** GO TO 15

DN22556,00003D3 -19-25AUG09-14/19

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 14
	Did 000174.03 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,00003D3 -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the fuel temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003D3 -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the fuel temperature sensor, harness and connector also ECU J3 and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

Continued on next page

DN22556,00003D3 -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 4. Refresh codes. Is 000174.03 active?	**YES:** GO TO 17 **NO:** GO TO 15

DN22556,00003D3 -19-25AUG09-18/19

17 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000174.03 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00003D3 -19-25AUG09-19/19

000174.04 — Fuel Temperature Signal Out of Range Low

The fuel temperature signal drops below the sensor's low voltage specification.

DN22556,00003D4 -19-25AUG09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU WIRING DIAGRAM 3
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testng 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 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003D4 -19-25AUG09-2/19

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 000174.04 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00003D4 -19-25AUG09-3/19

2 Monitor Code Test

1. Ignition OFF, Engine OFF.
2. Disconnect the fuel temperature sensor connector.
3. Ignition ON, Engine OFF
4. Refresh codes.

Did 000174.03 become active and 000174.04 move to stored?

YES: GO TO 3

NO: GO TO 5

DN22556,00003D4 -19-25AUG09-4/19

3 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on fuel temperature sensor harness connector.
3. Inspect harness for melted or pinched areas near the fuel temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,00003D4 -19-25AUG09-5/19

4 Sensor Short to Ground Test

Measure the resistance from each terminal on the sensor to chassis ground.

Specification

Check for short to ground—Resistance..... Greater than 1k ohm

Measure the resistance between the two sensor terminals.

Specification

Check for internal short—Resistance..... Greater than 50 ohms

Is either measurement out of specification?

YES: Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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.

Continued on next page

DN22556,00003D4 -19-25AUG09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the fuel temperature sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,00003D4 -19-25AUG09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the fuel temperature sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**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.

DN22556,00003D4 -19-25AUG09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal B) and signal (terminal A) in the fuel temperature sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9.

DN22556,00003D4 -19-25AUG09-9/19

8 Harness Physical Check	Terminal 1 has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** Problem not found, reconnect all connectors. GO TO 5 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,00003D4 -19-25AUG09-10/19

9 **ECU Resistance Check**	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-B1) in the ECU connector. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

DN22556,00003D4 -19-25AUG09-11/19

10 **Occurrence Count Check**	Review stored information and look at occurrence count for 000174.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003D4 -19-25AUG09-12/19

11 **Terminal Test**	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the fuel temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

DN22556,00003D4 -19-25AUG09-13/19

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO **NO:** GO TO 15

DN22556,00003D4 -19-25AUG09-14/19

13 **Engine Error Operating Point Test**	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000174.04 reappear when engine operating point was reached?	 **YES:** GO TO 14 **NO:** GO TO 12and confirm operating point.

Continued on next page

DN22556,00003D4 -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the fuel temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003D4 -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the fuel temperature 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 16

DN22556,00003D4 -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000174.04 active?	**NO:** GO TO 15.

DN22556,00003D4 -19-25AUG09-18/19

17 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.
	Is 000174.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00003D4 -19-25AUG09-19/19

000174.16 — Fuel Temperature Signal Moderately High

The ECU senses a fuel temperature above specification.

DN22556,00003D5 -19-25AUG09-1/14

000174.16 — Fuel Temperature Signal Moderately 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:

The ECU senses a fuel temperature of 110° C (230° 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Purple/Gray
- Fuel system interconnect C29 - Purple/Green

Continued on next page

DN22556,00003D5 -19-25AUG09-2/14

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will 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 000174.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00003D5 -19-25AUG09-3/14

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 11 **NO:** GO TO 3

DN22556,00003D5 -19-25AUG09-4/14

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

DN22556,00003D5 -19-25AUG09-5/14

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

DN22556,00003D5 -19-25AUG09-6/14

5 Check Fuel Temperature Sensor	1. Remove fuel temperature sensor. See REMOVE AND INSTALL 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

DN22556,00003D5 -19-25AUG09-7/14

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 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

DN22556,00003D5 -19-25AUG09-8/14

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

DN22556,00003D5 -19-25AUG09-9/14

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

DN22556,00003D5 -19-25AUG09-10/14

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

DN22556,00003D5 -19-25AUG09-11/14

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

DN22556,00003D5 -19-25AUG09-12/14

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.

DN22556,00003D5 -19-25AUG09-13/14

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.

DN22556,00003D5 -19-25AUG09-14/14

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.

DN22556,00003D6 -19-15OCT07-1/1

000190.00 — Engine Speed Extremely High

The ECU detects that engine speed exceeds the maximum rpm.

DN22556,00003D7 -19-16JUL10-1/12

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 rail 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.

DN22556,00003D7 -19-16JUL10-2/12

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

DN22556,00003D7 -19-16JUL10-3/12

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

DN22556,00003D7 -19-16JUL10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

DN22556,00003D7 -19-16JUL10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 13.5L - 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.

DN22556,00003D7 -19-16JUL10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF. 2. Run CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS and record values. 3. Run CYLINDER MISFIRE TEST INSTRUCTIONS and record values. 4. Run CYLINDER CUTOUT TEST INSTRUCTIONS 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

DN22556,00003D7 -19-16JUL10-7/12

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.

DN22556,00003D7 -19-16JUL10-8/12

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.

DN22556,00003D7 -19-16JUL10-9/12

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

DN22556,00003D7 -19-16JUL10-10/12

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.

DN22556,00003D7 -19-16JUL10-11/12

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.

DN22556,00003D7 -19-16JUL10-12/12

000190.16 — Engine Speed Moderately High

The ECU detects that engine speed exceeds the maximum rpm.

DN22556,0000666 -19-16JUL10-1/12

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.

DN22556,0000666 -19-16JUL10-2/12

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

DN22556,0000666 -19-16JUL10-3/12

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

DN22556,0000666 -19-16JUL10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

DN22556,0000666 -19-16JUL10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 13.5L - 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.

DN22556,0000666 -19-16JUL10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF. 2. Run CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS and record values. 3. Run CYLINDER MISFIRE TEST INSTRUCTIONS and record values. 4. Run CYLINDER CUTOUT TEST INSTRUCTIONS 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

DN22556,0000666 -19-16JUL10-7/12

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.

DN22556,0000666 -19-16JUL10-8/12

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.

DN22556,0000666 -19-16JUL10-9/12

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

DN22556,0000666 -19-16JUL10-10/12

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.

DN22556,0000666 -19-16JUL10-11/12

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.

DN22556,0000666 -19-16JUL10-12/12

000237.02 — VIN Security Data Invalid

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,00003D9 -19-07APR11-1/1

000237.13 — VIN Option Code Security Data Conflict

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,00003DA -19-07APR11-1/1

000237.31 — VIN Security Data Missing

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,00003DB -19-07APR11-1/1

000412.00 — EGR Temperature Signal Extremely High

The ECU senses the Exhaust Gas Recirculation (EGR) temperature above specification.

DN22556,00003DC -19-25AUG09-1/16

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, 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temparature sensor connector T03 - Yellow/Purple

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DN22556,00003DC -19-25AUG09-2/16

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

DN22556,00003DC -19-25AUG09-3/16

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 intake manifold air temperature active. (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00003DC -19-25AUG09-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,00003DC -19-25AUG09-5/16

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,00003DC -19-25AUG09-6/16

5 Check Exhaust Gas Recirculation Cooler	1. Ignition OFF, Engine OFF. 2. Remove exhaust gas recirculation cooler. See REMOVE, INSPECT, AND INSTALL EGR COOLER 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

DN22556,00003DC -19-25AUG09-7/16

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

DN22556,00003DC -19-25AUG09-8/16

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

DN22556,00003DC -19-25AUG09-9/16

8 Check EGR Temperature Sensor	1. Remove EGR Temperature sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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

DN22556,00003DC -19-25AUG09-10/16

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 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

DN22556,00003DC -19-25AUG09-11/16

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

DN22556,00003DC -19-25AUG09-12/16

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

DN22556,00003DC -19-25AUG09-13/16

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 000412.00 still active?	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1 **NO:** Verify problem is fixed. GO TO 13

DN22556,00003DC -19-25AUG09-14/16

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 000412.00 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.

DN22556,00003DC -19-25AUG09-15/16

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. 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.

DN22556,00003DC -19-25AUG09-16/16

000412.03 — EGR Temperature Signal Out of Range High

The exhaust gas recirculation exhaust temperature input voltage exceeds the sensor's high voltage specification.

DN22556,00003DD -19-25AUG09-1/19

000412.03 —EGR Temperature Signal Out of Range High Diagnostic Procedure

Related Information:
The EGR exhaust 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 exhaust temperature engine protection feature disabled. The ECU will try to maintain the engine operating envelope.

Additional References:
For more EGR exhaust temperature sensor information, see EXHAUST 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temparature sensor connector T03 - Yellow/Purple

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

DN22556,00003DD -19-25AUG09-2/19

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 000412.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003DD -19-25AUG09-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect EGR exhaust temperature sensor connector. 3. Perform TERMINAL TEST on EGR exhaust temperature sensor, harness and connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00003DD -19-25AUG09-4/19

3 Sensor Open Test	Measure the resistance between terminal 1 and terminal 2 on the EGR exhaust temperature sensor. Was the resistance value greater than 7.5M ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00003DD -19-25AUG09-5/19

4 Harness Resistance Check	Measure the resistance between the return (terminal 2) and signal (terminal 1) in the EGR exhaust temperature sensor harness connector. Was the resistance between 1k and 3k ohms?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,00003DD -19-25AUG09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J3-E2) and all other ECU connector terminals in the ECU harness connectors. Was any resistance less than 100 ohms?	**YES:** Look for pinched or melted harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR **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

DN22556,00003DD -19-25AUG09-7/19

6	**Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal 2) in the EGR exhaust temperature sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,00003DD -19-25AUG09-8/19

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-E2) in the ECU connector and the signal (terminal 1) in the EGR exhaust temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003DD -19-25AUG09-9/19

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-B2) in the ECU connector and the return (terminal 2) in the EGR exhaust temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00003DD -19-25AUG09-10/19

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-E2) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** 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. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00003DD -19-25AUG09-11/19

10	**Occurrence Count Check**	Review stored information and look at occurrence count for 000412.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

Continued on next page

DN22556,00003DD -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect EGR exhaust temperature sensor connector.	
	3. Perform TERMINAL TEST on EGR exhaust temperature sensor, harness and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 12

DN22556,00003DD -19-25AUG09-13/19

12 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 13 **NO:** GO TO 15

DN22556,00003DD -19-25AUG09-14/19

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 14
	Did 000412.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,00003DD -19-25AUG09-15/19

14 temperature sensor Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the EGR exhaust temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003DD -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the EGR exhaust temperature sensor, harness and connector also ECU J3 and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

Continued on next page

DN22556,00003DD -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 4. Refresh codes. Is 000412.03 active?	**YES:** GO TO 17 **NO:** GO TO 15

DN22556,00003DD -19-25AUG09-18/19

17 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000412.03 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00003DD -19-25AUG09-19/19

000412.04 — EGR Temperature Signal Out of Range Low

The exhaust gas recirculation exhaust temperature input voltage drops below the sensor's low voltage specification.

DN22556,00003DE -19-25AUG09-1/19

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, see EXHAUST 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temparature sensor connector T03 - Yellow/Purple

Continued on next page

DN22556,00003DE -19-25AUG09-2/19

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 000412.04 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00003DE -19-25AUG09-3/19

2 Monitor Code Test

1. Ignition OFF, Engine OFF.
2. Disconnect the EGR temperature sensor connector.
3. Ignition ON, Engine OFF
4. Refresh codes.

Did 000412.03 become active and 000412.04 move to stored?

YES: GO TO 3

NO: GO TO 5

DN22556,00003DE -19-25AUG09-4/19

3 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on EGR temperature sensor harness connector.
3. Inspect harness for melted or pinched areas near the EGR temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,00003DE -19-25AUG09-5/19

4 Sensor Short Internally or to Ground Test

Measure the resistance from each terminal on the sensor to chassis ground.

Specification

Check for short to ground—Resistance..... Greater than 1k ohm

Measure the resistance between the two sensor terminals.

Specification

Check for internal short—Resistance..... Greater than 50 ohms

Is either measurement out of specification?

YES: Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

DN22556,00003DE -19-25AUG09-6/19

5 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on the EGR temperature sensor harness connector.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 6

Continued on next page

DN22556,00003DE -19-25AUG09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal 2) and signal (terminal 1) in the EGR temperature sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** Reconnect all connectors and GO TO 2.

DN22556,00003DE -19-25AUG09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3. 2. Measure the resistance between the return (terminal 2) and signal (terminal 1) in the EGR temperature sensor harness connector. Was the resistance less than 100 ohms?	 **YES:** GO TO 8 **NO:** GO TO 9.

DN22556,00003DE -19-25AUG09-9/19

8 Harness Physical Check	Terminal A has low resistance to ground, check for: • Melted harness and wiring • Pinched harness and wiring. Was the problem found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5.

DN22556,00003DE -19-25AUG09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-E2) in the ECU connector. Was the resistance less than 100 ohms?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors and GO TO 2.

DN22556,00003DE -19-25AUG09-11/19

10 Occurrence Count Check	Review stored information and look at occurrence count for 000412.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,00003DE -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the EGR temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

DN22556,00003DE -19-25AUG09-13/19

12 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 13 **NO:** GO TO 15

DN22556,00003DE -19-25AUG09-14/19

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 14
	Did 000412.04 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,00003DE -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the EGR temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00003DE -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the EGR temperature 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 16

DN22556,00003DE -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17.
	Is 000412.04 active?	**NO:** GO TO 15.

Continued on next page

DN22556,00003DE -19-25AUG09-18/19

17 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000412.04 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00003DE -19-25AUG09-19/19

000412.15 — EGR Temperature Signal Slightly High

The ECU senses the Exhaust Gas Recirculation (EGR) temperature above specification.

DN22556,0000667 -19-06APR11-1/16

00412.15 — EGR Temperature Signal Slightly 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temparature sensor connector T03 - Yellow/Purple

Continued on next page

DN22556,0000667 -19-06APR11-2/16

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 000412.15 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,0000667 -19-06APR11-3/16

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 intake manifold air temperature active. (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,0000667 -19-06APR11-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,0000667 -19-06APR11-5/16

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,0000667 -19-06APR11-6/16

5 Check Exhaust Gas Recirculation Cooler	1. Ignition OFF, Engine OFF. 2. Remove exhaust gas recirculation cooler. See REMOVE, INSPECT, AND INSTALL EGR COOLER 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

DN22556,0000667 -19-06APR11-7/16

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

DN22556,0000667 -19-06APR11-8/16

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

DN22556,0000667 -19-06APR11-9/16

8 Check EGR Temperature Sensor	1. Remove EGR sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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

DN22556,0000667 -19-06APR11-10/16

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 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

DN22556,0000667 -19-06APR11-11/16

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

DN22556,0000667 -19-06APR11-12/16

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

DN22556,0000667 -19-06APR11-13/16

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 000412.15 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 13

DN22556,0000667 -19-06APR11-14/16

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 000412.15 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.

DN22556,0000667 -19-06APR11-15/16

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.

DN22556,0000667 -19-06APR11-16/16

000412.16 — EGR Temperature Signal Moderately High

The ECU senses an Exhaust Gas Recirculation (EGR) exhaust temperature above specification.

DN22556,00003DF -19-25AUG09-1/16

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, 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temparature sensor connector T03 - Yellow/Purple

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DN22556,00003DF -19-25AUG09-2/16

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

DN22556,00003DF -19-25AUG09-3/16

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 intake manifold air temperature active. (105.15, 105.16, or 105.00)?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00003DF -19-25AUG09-4/16

3 Check EGR Valve	1. Ignition OFF, Engine OFF. 2. Remove EGR Valve. See REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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

DN22556,00003DF -19-25AUG09-5/16

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070.
- Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,00003DF -19-25AUG09-6/16

5 Check Exhaust Gas Recirculation Cooler

1. Ignition OFF, Engine OFF.
2. Remove exhaust gas recirculation cooler. See REMOVE, INSPECT, AND INSTALL EGR COOLER 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

DN22556,00003DF -19-25AUG09-7/16

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

DN22556,00003DF -19-25AUG09-8/16

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

DN22556,00003DF -19-25AUG09-9/16

8 Check EGR Temperature Sensor

1. Remove EGR sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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

DN22556,00003DF -19-25AUG09-10/16

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 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

DN22556,00003DF -19-25AUG09-11/16

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

DN22556,00003DF -19-25AUG09-12/16

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

DN22556,00003DF -19-25AUG09-13/16

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 000412.16 still active?	**NO:** Verify problem is fixed. GO TO 13

DN22556,00003DF -19-25AUG09-14/16

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 000412.16 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00003DF -19-25AUG09-15/16

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.

DN22556,00003DF -19-25AUG09-16/16

000441.03 — Gear Oil Temperature Signal Out of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000668 -19-15OCT07-1/1

000441.04 — Gear Oil Temperature Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000669 -19-15OCT07-1/1

000611.03 — Injector Shorted to Voltage Source

The ECU detects that injector wiring is shorted to a voltage source.

DN22556,00003E0 -19-22MAR11-1/18

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 harness connector C01 - Yellow/Purple

Continued on next page

DN22556,00003E0 -19-22MAR11-2/18

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000611.03 reappear active?

YES: GO TO 2

NO: GO TO 12

DN22556,00003E0 -19-22MAR11-3/18

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 connector C01 between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. 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

DN22556,00003E0 -19-22MAR11-4/18

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

DN22556,00003E0 -19-22MAR11-5/18

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

DN22556,00003E0 -19-22MAR11-6/18

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

DN22556,00003E0 -19-22MAR11-7/18

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 injector connector: • Terminal J1-G1 to terminal C • Terminal J1-G2 to terminal F • Terminal J1-A1 to terminal A • Terminal J1-B1 to terminal D • Terminal J1-C1 to terminal E • Terminal J1-D1 to terminal G • Terminal J1-E1 to terminal H • Terminal J1-F1 to terminal B Are all resistance readings less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 11

DN22556,00003E0 -19-22MAR11-8/18

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

DN22556,00003E0 -19-22MAR11-9/18

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

DN22556,00003E0 -19-22MAR11-10/18

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: GO TO 10

NO: Problem fixed.

DN22556,00003E0 -19-22MAR11-11/18

10 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

DN22556,00003E0 -19-22MAR11-12/18

11 Verification

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.03 reappear active?

YES: GO TO 1

NO: Problem fixed.

Continued on next page

DN22556,00003E0 -19-22MAR11-13/18

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

DN22556,00003E0 -19-22MAR11-14/18

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 1
	Did 000611.03 reappear active when engine operating point was reached?	**NO:** GO TO 14

DN22556,00003E0 -19-22MAR11-15/18

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

DN22556,00003E0 -19-22MAR11-16/18

15 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Is 000611.03 active with engine running?	**NO:** GO TO 16.

DN22556,00003E0 -19-22MAR11-17/18

16 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Is 000611.03 active with engine running?	**NO:** Problem fixed or conditions to generate 000611.03 have not been duplicated.

DN22556,00003E0 -19-22MAR11-18/18

000611.04 — Injector Shorted to Ground

The ECU detects that injector wiring is shorted to ground.

DN22556,00003E1 -19-22MAR11-1/21

000611.04 — Injector Shorted to Ground Diagnostic Procedure

Troubleshooting Sequence:
000611.04

When DTC is Displayed:
Depending on ECU software revision, this DTC may be displayed while the engine is cranking, running, or during Harness Diagnostic Mode and the error condition is active. However, on some versions of ECU software this DTC may only be displayed during Harness Diagnostic Mode Test in Service ADVISOR.

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 common high side (+90V) 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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 harness connector C01 - Yellow/Purple

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DN22556,00003E1 -19-22MAR11-2/21

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. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000611.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,00003E1 -19-22MAR11-3/21

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 connector C01 between engine harness and injector harness. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is DTC 000611.04 still active? *NOTE: Ignore DTCs for high resistance in all injector circuits that may now be active because of this test.*	**YES:** GO TO 7 **NO:** GO TO 3

DN22556,00003E1 -19-22MAR11-4/21

3 Terminal Test	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on injector harness connector C01. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 4

DN22556,00003E1 -19-22MAR11-5/21

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 C01 and single point ground. Are all resistance readings greater than 10k ohms?	**YES:** GO TO 7 **NO:** GO TO 5

DN22556,00003E1 -19-22MAR11-6/21

5 Inspect Injector Harness	1. Remove rocker cover. 2. Inspect injector harness for damage that would cause a short to ground. Were any problems found?	**YES:** Replace injector harness. GO TO 13 **NO:** GO TO 6

Continued on next page

DN22556,00003E1 -19-22MAR11-7/21

6 Check Injector Coils for Short to Ground	**Part 1**	
	1. Disconnect the electrical connector from one of the injectors.	
	2. On the injector harness connector C01 (male pin terminals), measure the resistance between each terminal of the injector harness connector C01 and single point ground.	**YES:** Replace injector which when its connector was removed, all resistance measurements became greater than 10k ohms. GO TO 13
	Are all resistance readings greater than 10k ohms?	**NO:** GO TO Part 2
	Part 2	**YES:** Replace injector harness. GO TO 13
	Have all injector connectors been removed?	**NO:** Do NOT reconnect injector connectors that have been removed. GO TO Part 1

DN22556,00003E1 -19-22MAR11-8/21

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

DN22556,00003E1 -19-22MAR11-9/21

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 injector connector:	
	• Terminal J1-G1 to terminal C • Terminal J1-G2 to terminal F • Terminal J1-A1 to terminal A • Terminal J1-B1 to terminal D • Terminal J1-C1 to terminal E • Terminal J1-D1 to terminal G • Terminal J1-E1 to terminal H • Terminal J1-F1 to terminal B	**YES:** GO TO 9
	Are all resistance readings less than 10 ohms?	**NO:** Fix problem. GO TO 13

DN22556,00003E1 -19-22MAR11-10/21

9 Check Engine Harness for Short to Ground	1. Verify connector C01 is still disconnected from injector harness.	
	2. On the engine harness, measure the resistance between injector voltage supply 1 (J1-G1) and single point ground.	
	3. On the engine harness, measure the resistance between injector voltage supply 2 (J1-G2) and single point ground.	**YES:** GO TO 10
	Are both resistance readings greater than 10k ohms?	**NO:** Fix problem. GO TO 13

Continued on next page

DN22556,00003E1 -19-22MAR11-11/21

10 Check Engine Harness for Wire-to-Wire Short

1. Disconnect ECU J02 and J03 connectors.
2. On the engine harness, measure the resistance between injector voltage supply 1 (J1-G1) and all other terminals in the J1, J2, and J3 connectors.
3. On the engine harness, measure the resistance between injector voltage supply 2 (J1-G2) and all other terminals in the J1, J2, and J3 connectors.

Are all resistance readings greater than 10k ohms?

YES: Recheck harness for intermittent wiring problem. If none found, GO TO 11

NO: Fix problem. GO TO 13

DN22556,00003E1 -19-22MAR11-12/21

11 Reprogram ECU

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: GO TO 12

NO: Problem fixed.

DN22556,00003E1 -19-22MAR11-13/21

12 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

DN22556,00003E1 -19-22MAR11-14/21

13 Verification

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: GO TO 1

NO: Problem fixed.

DN22556,00003E1 -19-22MAR11-15/21

14 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 15

NO: GO TO 16

Continued on next page

DN22556,00003E1 -19-22MAR11-16/21

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 or did engine stall?

YES: GO TO 1

NO: GO TO 16

DN22556,00003E1 -19-22MAR11-17/21

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 C01.
3. Inspect engine wire harness carefully for damage which may cause an intermittent short to ground.
4. Remove rocker cover.
5. Inspect injector wire harness carefully for damage which may cause an intermittent short to ground.

Were any problems found?

YES: Fix problem. GO TO 17

NO: GO TO 17

DN22556,00003E1 -19-22MAR11-18/21

17 Check for Intermittent Short to Ground

1. Reconnect all connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.
4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR repeatedly while gently wiggling injector wire harness and engine wire harness.

Did DTC 000611.04 become active?

YES: GO TO 1.

NO: GO TO 18.

DN22556,00003E1 -19-22MAR11-19/21

18 Reconnect and Retest

1. Reinstall rocker cover.
2. Ignition ON, engine OFF.
3. Refresh DTCs.
4. Start engine and operate under various conditions.
5. Gently wiggle wire harness between ECU and cylinder head.

CAUTION: Use caution when working near rotating components.

Did DTC 000611.04 become active while engine was running or did engine stall?

YES: GO TO 1.

NO: GO TO 19.

Continued on next page

DN22556,00003E1 -19-22MAR11-20/21

19 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Refresh DTCs. 4. Start engine and operate under various conditions. Did DTC 000611.04 become active while engine was running or did engine stall?	**YES:** GO TO 1 **NO:** Problem fixed or conditions to generate 000611.04 have not been duplicated.

DN22556,00003E1 -19-22MAR11-21/21

000627.01 — All Injector Circuits Have High Resistance

The ECU detects that all injector circuits have high resistance.

DN22556,000066A -19-22MAR11-1/18

000627.01— All Injector Circuits Have High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000611.04
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.

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 unswitched battery 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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 harness connector C01 - Yellow/Purple

Continued on next page

DN22556,000066A -19-22MAR11-2/18

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000627.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,000066A -19-22MAR11-3/18

2 Check ECU Unswitched Battery Voltage Supply	Monitor Unswitched 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

DN22556,000066A -19-22MAR11-4/18

3 Check Connectors	**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. 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

DN22556,000066A -19-22MAR11-5/18

4 Terminal Test	1. Disconnect engine harness from injector harness connector. 2. Perform TERMINAL TEST on injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 5

DN22556,000066A -19-22MAR11-6/18

5 Check Injector #1 Circuit for High Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector voltage supply (terminal C) 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

DN22556,000066A -19-22MAR11-7/18

6 ECU Terminal Test	Perform TERMINAL TEST on J1 connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 7

DN22556,000066A -19-22MAR11-8/18

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 injector connector: • Terminal J1-G1 to terminal C • Terminal J1-G2 to terminal F • Terminal J1-A1 to terminal A • Terminal J1-B1 to terminal D • Terminal J1-C1 to terminal E • Terminal J1-D1 to terminal G • Terminal J1-E1 to terminal H • Terminal J1-F1 to terminal B Are all resistance readings less than 2 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 11

DN22556,000066A -19-22MAR11-9/18

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

DN22556,000066A -19-22MAR11-10/18

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. 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

DN22556,000066A -19-22MAR11-11/18

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,000066A -19-22MAR11-12/18

11 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,000066A -19-22MAR11-13/18

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

DN22556,000066A -19-22MAR11-14/18

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 1 **NO:** GO TO 14

DN22556,000066A -19-22MAR11-15/18

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 open circuit. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 15

Continued on next page

DN22556,000066A -19-22MAR11-16/18

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 1. **NO:** GO TO 16.

DN22556,000066A -19-22MAR11-17/18

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 1 **NO:** Problem fixed or conditions to generate 000627.01 have not been duplicated.

DN22556,000066A -19-22MAR11-18/18

000627.18 — Injector Power Supply Voltage Moderately Low

The ECU detects a voltage below specification on ECU battery supply terminals

DN22556,00003E3 -19-22MAR11-1/17

000627.18 — Injector Power Supply Voltage Moderately Low Diagnostic Procedure

Troubleshooting Sequence:
000611.04
000627.18

Related Information:
The ECU detects that its unswitched battery 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 unswitched 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 unswitched battery voltage supply is too low, injectors may not operate.

Additional References:
For further electronic injector information, see ELECTRONIC UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see Component Location Diagram 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 4
- see 13.5L 24V ECU 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

Continued on next page

DN22556,00003E3 -19-22MAR11-2/17

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

DN22556,00003E3 -19-22MAR11-3/17

2 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

DN22556,00003E3 -19-22MAR11-4/17

3 Check ECU Unswitched 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

DN22556,00003E3 -19-22MAR11-5/17

4 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

Continued on next page

DN22556,00003E3 -19-22MAR11-6/17

5 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 battery supply (J2-L1) to ECU ground (J2-L2).
2. On the harness, measure voltage from ECU battery supply (J2-L4) to ECU ground (J2-L3).
3. On the harness, measure voltage from ECU battery supply (J2-M1) to ECU ground (J2-M2).
4. On the harness, measure voltage from ECU 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 battery supply or ground circuits. GO TO 9

DN22556,00003E3 -19-22MAR11-7/17

6 Check Wiring Harness Resistance

1. Disconnect application battery negative cable.
2. On the harness, measure resistance between each of the ECU 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 ECU battery negative terminal.

Are all resistance measurements less than 2 ohms?

YES: GO TO 7

NO: Fix problem. GO TO 9

DN22556,00003E3 -19-22MAR11-8/17

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.

DN22556,00003E3 -19-22MAR11-9/17

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.

DN22556,00003E3 -19-22MAR11-10/17

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.

Continued on next page

DN22556,00003E3 -19-22MAR11-11/17

10 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 11 **NO:** GO TO 12

DN22556,00003E3 -19-22MAR11-12/17

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 2
	Did 000627.18 reappear active when engine operating point was reached?	**NO:** GO TO 12

DN22556,00003E3 -19-22MAR11-13/17

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

DN22556,00003E3 -19-22MAR11-14/17

13 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST of single point ground stud.	
	3. Perform TERMINAL TESTof 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

DN22556,00003E3 -19-22MAR11-15/17

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

Continued on next page

DN22556,00003E3 -19-22MAR11-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Start engine and operate at speeds above 1200 rpm. 3. Refresh DTCs. Is 000627.18 active with engine running?	**YES:** GO TO 2 **NO:** Problem fixed or conditions to generate 000627.18 have not been duplicated.

DN22556,00003E3 -19-22MAR11-17/17

000629.12 — ECU EEPROM Error

The ECU detects an internal problem.

DN22556,000066B -19-06APR11-1/5

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.

DN22556,000066B -19-06APR11-2/5

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

DN22556,000066B -19-06APR11-3/5

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.

Continued on next page

DN22556,000066B -19-06APR11-4/5

❸ 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.

DN22556,000066B -19-06APR11-5/5

000629.13 — ECU Boot Block Error

The ECU detects an internal problem.

DN22556,00003E4 -19-15OCT07-1/4

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.

DN22556,00003E4 -19-15OCT07-2/4

❶ **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	**YES:** GO TO 2
	Did 000629.13 reappear active?	**NO:** Problem fixed.

DN22556,00003E4 -19-15OCT07-3/4

❷ **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	**YES:** Open DTAC case.
	Did 000629.13 reappear active?	**NO:** Problem fixed.

DN22556,00003E4 -19-15OCT07-4/4

000636.02 — Camshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) in the camshaft position signal.

DN22556,00003E5 -19-25AUG09-1/22

000636.02 — Camshaft Position Signal Invalid Diagnostic Procedure

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 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 signal to determine camshaft position.
If a crankshaft position signal 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 CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Cam position sensor X02 - Purple/Gray

Continued on next page

DN22556,00003E5 -19-25AUG09-2/22

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

DN22556,00003E5 -19-25AUG09-3/22

2 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 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

DN22556,00003E5 -19-25AUG09-4/22

3 Test Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor connector X02.
3. Perform TERMINAL TEST on camshaft position sensor and connector X02.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 4

DN22556,00003E5 -19-25AUG09-5/22

4 Inspect Target

1. Remove camshaft position sensor.
2. Inspect camshaft timing slots through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 5

Continued on next page

DN22556,00003E5 -19-25AUG09-6/22

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 camshaft.	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 19
	Does sensor appear damaged due to contact with camshaft?	**NO:** GO TO 6

DN22556,00003E5 -19-25AUG09-7/22

6 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (A) and return (B).	**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

DN22556,00003E5 -19-25AUG09-8/22

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

DN22556,00003E5 -19-25AUG09-9/22

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

DN22556,00003E5 -19-25AUG09-10/22

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 (A).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J3-G3) and the camshaft position sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

DN22556,00003E5 -19-25AUG09-11/22

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

DN22556,00003E5 -19-25AUG09-12/22

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

DN22556,00003E5 -19-25AUG09-13/22

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

DN22556,00003E5 -19-25AUG09-14/22

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

DN22556,00003E5 -19-25AUG09-15/22

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

DN22556,00003E5 -19-25AUG09-16/22

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

DN22556,00003E5 -19-25AUG09-17/22

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

DN22556,00003E5 -19-25AUG09-18/22

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.

DN22556,00003E5 -19-25AUG09-19/22

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.

DN22556,00003E5 -19-25AUG09-20/22

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.

DN22556,00003E5 -19-25AUG09-21/22

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

DN22556,00003E5 -19-25AUG09-22/22

000636.05 — Camshaft Position Circuit Has High Resistance

The ECU detects low current on the camshaft position wiring.

DN22556,00003E6 -19-04APR11-1/14

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 CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Cam position sensor X02 - Purple/Gray

DN22556,00003E6 -19-04APR11-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect camshaft position sensor connector X02.	
	3. Perform TERMINAL TEST on camshaft position sensor and connector X02.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

DN22556,00003E6 -19-04APR11-3/14

2 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** GO TO 3 **NO:** Remove camshaft position sensor. GO TO 11

DN22556,00003E6 -19-04APR11-4/14

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

DN22556,00003E6 -19-04APR11-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and the camshaft position sensor connector signal (A). 2. On the harness, measure the resistance between ECU camshaft position return (J3-G3) and the camshaft position sensor connector return (B). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 5 **NO:** Fix problem. GO TO 12

DN22556,00003E6 -19-04APR11-6/14

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 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

DN22556,00003E6 -19-04APR11-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the ECU camshaft position signal (J3-G4) and single point ground. Is voltage less than 0.5V?	 **YES:** GO TO 7 **NO:** Fix problem. GO TO 12

DN22556,00003E6 -19-04APR11-8/14

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 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

DN22556,00003E6 -19-04APR11-9/14

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

DN22556,00003E6 -19-04APR11-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform Harness Diagnostic Test in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

DN22556,00003E6 -19-04APR11-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003E6 -19-04APR11-12/14

11 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with camshaft. Does sensor appear damaged due to contact with camshaft?	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace camshaft position sensor. GO TO 12

DN22556,00003E6 -19-04APR11-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003E6 -19-04APR11-14/14

000636.06 — Camshaft Position Circuit Has Low Resistance

The ECU detects high current on the camshaft position wiring.

DN22556,00003E7 -19-25AUG09-1/16

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 CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

DN22556,00003E7 -19-25AUG09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect camshaft position sensor connector X02. 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

DN22556,00003E7 -19-25AUG09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on camshaft position sensor and connector X02.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 3

DN22556,00003E7 -19-25AUG09-4/16

3 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (A) and return (B).	**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

DN22556,00003E7 -19-25AUG09-5/16

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

DN22556,00003E7 -19-25AUG09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and the camshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU camshaft position return (J3-G3) and the camshaft position sensor connector return (B).	**YES:** GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003E7 -19-25AUG09-7/16

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 signal (J3-G4) and return (J3-G3).	**YES:** GO TO 7
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003E7 -19-25AUG09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU camshaft position 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

DN22556,00003E7 -19-25AUG09-9/16

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 signal (J3-G4) 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

DN22556,00003E7 -19-25AUG09-10/16

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 Test in Service ADVISOR.	**YES:** GO TO 10
	Did 000636.06 reappear active?	**NO:** Recheck for intermittent shorted circuit. GO TO 1

DN22556,00003E7 -19-25AUG09-11/16

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

DN22556,00003E7 -19-25AUG09-12/16

11 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform Harness Diagnostic Test in Service ADVISOR.	**YES:** GO TO 12
	Did 000636.06 reappear active?	**NO:** Problem fixed.

DN22556,00003E7 -19-25AUG09-13/16

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform Harness Diagnostic Test in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000636.06 reappear active?	**NO:** Problem fixed.

DN22556,00003E7 -19-25AUG09-14/16

13 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with camshaft.	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14
	Does sensor appear damaged due to contact with camshaft?	**NO:** Replace camshaft position sensor. GO TO 14

Continued on next page

DN22556,00003E7 -19-25AUG09-15/16

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000636.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003E7 -19-25AUG09-16/16

000636.08 — Camshaft Position Signal Missing

The ECU does not detect a camshaft position signal.

DN22556,00003E8 -19-25AUG09-1/19

000636.08 — Camshaft Position Signal Missing Diagnostic Procedure

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 signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the camshaft position wiring.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crankshaft position signal to determine camshaft position.
If a crankshaft position 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 CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

DN22556,00003E8 -19-25AUG09-2/19

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 000636.08 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 17

DN22556,00003E8 -19-25AUG09-3/19

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 or 000636.06 active?	**YES:** Discontinue test for 000636.08 and perform test for 000636.05 or 000636.06. **NO:** GO TO 3

DN22556,00003E8 -19-25AUG09-4/19

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CAMSHAFT 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 X02. 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 16

DN22556,00003E8 -19-25AUG09-5/19

4 Test Sensor Terminals	Perform TERMINAL TEST on camshaft position sensor and connector X02. Were any problems found?	**YES:** Fix problem. GO TO 16 **NO:** GO TO 5

DN22556,00003E8 -19-25AUG09-6/19

5 Check Sensor Resistance	On the camshaft position 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 camshaft position sensor. GO TO 15

Continued on next page

DN22556,00003E8 -19-25AUG09-7/19

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

DN22556,00003E8 -19-25AUG09-8/19

7 Check Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and the camshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU camshaft position return (J3-G3) and the camshaft position sensor connector return (B).	**YES:** GO TO 8
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 16

DN22556,00003E8 -19-25AUG09-9/19

8 Check for Wire-to-Wire Short	1. Verify camshaft position sensor is disconnected.	
	2. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and return (J3-G3).	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 16

DN22556,00003E8 -19-25AUG09-10/19

9 Check for Short to Ground of Signal	On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and single point ground.	**YES:** GO TO 10
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 16

DN22556,00003E8 -19-25AUG09-11/19

10 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) 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

DN22556,00003E8 -19-25AUG09-12/19

11 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between ECU camshaft position signal (J3-G4) 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

DN22556,00003E8 -19-25AUG09-13/19

12 Replace Camshaft Position Sensor	Has camshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 13 **NO:** Remove camshaft position sensor. GO TO 15

DN22556,00003E8 -19-25AUG09-14/19

13 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 14 **NO:** Problem fixed.

DN22556,00003E8 -19-25AUG09-15/19

14 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.

DN22556,00003E8 -19-25AUG09-16/19

15 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with camshaft. Does sensor appear damaged due to contact with camshaft?	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 16 **NO:** Replace camshaft position sensor. GO TO 16

DN22556,00003E8 -19-25AUG09-17/19

16 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. Did 000636.08 reappear active with engine running?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003E8 -19-25AUG09-18/19

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

DN22556,00003E8 -19-25AUG09-19/19

000636.10 — Camshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern in the camshaft position signal.

DN22556,00003E9 -19-25AUG09-1/25

000636.10 — Camshaft Position Signal Rate of Change Abnormal Diagnostic Procedure

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) in the camshaft position signal.
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 signal to determine camshaft position.
If a crankshaft position 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 crankshaft position signal may also cause 000636.10 to be falsely generated.

Additional References:
For more camshaft position sensor information, see CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Cam position sensor X02 - Purple/Gray

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DN22556,00003E9 -19-25AUG09-2/25

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

DN22556,00003E9 -19-25AUG09-3/25

2 Check for Open or Shorted 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 for 000636.05, 000636.06, or DTC with SPN 000637. **NO:** GO TO 3

DN22556,00003E9 -19-25AUG09-4/25

3 Check for Crankshaft Position Signal Problem	1. Ignition OFF, engine OFF. 2. Disconnect crankshaft position sensor connector X01 and secure connector away from rotating components. Ignore DTC 000637.08 which will be generated for the disconnected crankshaft position 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 crankshaft position sensor. Did engine start and run without generating 000636.10?	**YES:** Perform procedure for DTC 000637.02 as though DTC were active. **NO:** GO TO 4

Continued on next page

DN22556,00003E9 -19-25AUG09-5/25

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 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.

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. Repair problem. GO TO 22

YES: Some device on application causes the noise. Open DTAC case.

NO: GO TO 5

DN22556,00003E9 -19-25AUG09-6/25

5 Check for Loose Sensor

NOTE: See REMOVE AND INSTALL CAMSHAFT 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 X02.
3. Verify camshaft position sensor installation torque.

Was camshaft position sensor fully threaded into mounting hole?

YES: GO TO 6

NO: Torque sensor to specified value. GO TO 22

DN22556,00003E9 -19-25AUG09-7/25

6 Test Sensor Terminals

Perform TERMINAL TEST on camshaft position sensor and connector X02.

Were any problems found?

YES: Fix problem. GO TO 22

NO: GO TO 7

DN22556,00003E9 -19-25AUG09-8/25

7 Inspect Target

1. Remove camshaft position sensor.
2. Inspect camshaft timing slots through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris.

Were any problems found?

YES: Fix problem. GO TO 22

NO: GO TO 8

Continued on next page

DN22556,00003E9 -19-25AUG09-9/25

8 Inspect Sensor	Examine tip of camshaft position sensor for damage due to contact with camshaft.	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 22
	Does sensor appear damaged due to contact with camshaft?	**NO:** GO TO 9

DN22556,00003E9 -19-25AUG09-10/25

9 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (A) and return (B).	**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

DN22556,00003E9 -19-25AUG09-11/25

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

DN22556,00003E9 -19-25AUG09-12/25

11 Check for Shorted Return	On the harness, measure the resistance between the ECU camshaft position return (J3-G3) and single point ground.	**YES:** GO TO 12
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 22

DN22556,00003E9 -19-25AUG09-13/25

12 Check Circuit Resistance	*NOTE: Verify that camshaft position signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and the camshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU camshaft position return (J3-G3) and the camshaft position sensor connector return (B).	**YES:** GO TO 13
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 22

DN22556,00003E9 -19-25AUG09-14/25

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 signal (J3-G4) and the camshaft position 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

DN22556,00003E9 -19-25AUG09-15/25

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

DN22556,00003E9 -19-25AUG09-16/25

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

DN22556,00003E9 -19-25AUG09-17/25

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 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

DN22556,00003E9 -19-25AUG09-18/25

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

DN22556,00003E9 -19-25AUG09-19/25

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 signal and return wires are twisted together throughout the harness.
- Verify that no physical damage to camshaft position signal and return 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

DN22556,00003E9 -19-25AUG09-20/25

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

DN22556,00003E9 -19-25AUG09-21/25

20 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reinstall ECU connectors. 3. Download latest ECU payload and reprogram ECU. Did DTC 000636.10 reappear active with engine running?	 **YES:** GO TO 21 **NO:** Problem fixed.

DN22556,00003E9 -19-25AUG09-22/25

21 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000636.10 reappear active with engine running?	 **YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003E9 -19-25AUG09-23/25

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. Did DTC 000636.10 reappear active with engine running?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003E9 -19-25AUG09-24/25

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

DN22556,00003E9 -19-25AUG09-25/25

000637.02 — Crankshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) in the crankshaft position signal.

DN22556,00003EA -19-25AUG09-1/22

000637.02 — Crankshaft Position Signal Invalid Diagnostic Procedure

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 crankshaft position signal.
The extra pulses may be caused by electromagnetic interference or by a 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 signal to determine crankshaft position.
Prolonged cranking time may be required to start the engine.
If a camshaft position signal 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 crankshaft position 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 13.5L 12V ECU WIRING DIAGRAM 2, 13.5L 12V ECU WIRING DIAGRAM 4
- see 13.5L 24V ECU WIRING DIAGRAM 2, 13.5L 24V ECU 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
- Crankshaft position sensor X01 - Purple/Gray

Continued on next page

DN22556,00003EA -19-25AUG09-2/22

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

DN22556,00003EA -19-25AUG09-3/22

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 crankshaft position 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.

YES: Engine wiring problem. Fix 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 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

DN22556,00003EA -19-25AUG09-4/22

3 Test Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect crankshaft position sensor connector X01.
3. Perform TERMINAL TEST on crankshaft position sensor and connector X01.

YES: Fix problem. GO TO 9

Were any problems found?

NO: GO TO 4

DN22556,00003EA -19-25AUG09-5/22

4 Inspect Target

1. Remove crankshaft position sensor.
2. Visually inspect timing wheel teeth for damage or debris as engine is rotated.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 5

Continued on next page

DN22556,00003EA -19-25AUG09-6/22

5 Inspect Sensor	*NOTE: See REMOVE AND INSTALL CRANK POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of crankshaft position sensor for damage due to contact with timing wheel	**YES:** Replace crankshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 19
	Does sensor appear damaged due to contact with timing wheel?	**NO:** GO TO 6

DN22556,00003EA -19-25AUG09-7/22

6 Check Sensor Resistance	On the crankshaft position sensor, measure the resistance between the signal (A) and return (B).	**YES:** Reinstall crankshaft position sensor. Do not reconnect to harness. GO TO 7
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace crankshaft position sensor. GO TO 19

DN22556,00003EA -19-25AUG09-8/22

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

DN22556,00003EA -19-25AUG09-9/22

8 Check for Shorted Return	On the harness, measure the resistance between the ECU connector crankshaft position return (J3-F3) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 19

DN22556,00003EA -19-25AUG09-10/22

9 Check Circuit Resistance	*NOTE: Verify that crankshaft position signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

DN22556,00003EA -19-25AUG09-11/22

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

DN22556,00003EA -19-25AUG09-12/22

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.

Were any intermittent wiring problems found?

YES: Fix problem. GO TO 19

NO: GO TO 12

DN22556,00003EA -19-25AUG09-13/22

12 Check for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. On the harness, measure the resistance between the ECU crankshaft 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 13

NO: Fix problem. GO TO 19

DN22556,00003EA -19-25AUG09-14/22

13 Check Wiring

Examine crankshaft position wiring between the crankshaft sensor and the ECU. Check for the following:

- Verify that crankshaft position signal and return wires are twisted together throughout the harness.
- Verify that no physical damage to crankshaft position signal and return wires is evident.

Were any problems found?

YES: Replace crankshaft position wiring with twisted pair or repair problem. GO TO 19

NO: GO TO 14

DN22556,00003EA -19-25AUG09-15/22

14 Check Wire Harness Routing

Examine routing of crankshaft position wiring between crankshaft position sensor and ECU.

Is crankshaft position 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?

YES: Reroute crankshaft position wires away from device. GO TO 19

NO: GO TO 15

DN22556,00003EA -19-25AUG09-16/22

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.

Did DTC 000637.02 reappear active with engine running?

YES: GO TO 16

NO: Repair alternator problem. GO TO 19

Continued on next page

DN22556,00003EA -19-25AUG09-17/22

16 Replace Crankshaft Position Sensor	Has crankshaft position sensor been replaced during this procedure?	**YES:** GO TO 17 **NO:** Replace crankshaft position sensor. GO TO 19

DN22556,00003EA -19-25AUG09-18/22

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.

DN22556,00003EA -19-25AUG09-19/22

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.

DN22556,00003EA -19-25AUG09-20/22

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.

DN22556,00003EA -19-25AUG09-21/22

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

DN22556,00003EA -19-25AUG09-22/22

000637.05 — Crankshaft Position Circuit Has High Resistance

The ECU detects low current in the crankshaft position circuit.

DN22556,00003EB -19-25AUG09-1/14

000637.05 — Crankshaft Position Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000637.05

Related Information:
The ECU detects high resistance or an open circuit in the crankshaft position 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 crankshaft position 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Crankshaft position sensor X01 - Purple/Gray

DN22556,00003EB -19-25AUG09-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect crankshaft position sensor connector X01.	
	3. Perform TERMINAL TEST on crankshaft position sensor and connector X01.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

DN22556,00003EB -19-25AUG09-3/14

2 Check Sensor Resistance	On the crankshaft position sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** GO TO 3 **NO:** Remove crankshaft position sensor. GO TO 11

DN22556,00003EB -19-25AUG09-4/14

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

DN22556,00003EB -19-25AUG09-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A). 2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 5 **NO:** Fix problem. GO TO 12

DN22556,00003EB -19-25AUG09-6/14

5 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors. 2. On the harness, measure the resistance between the ECU crankshaft position 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 6 **NO:** Fix problem. GO TO 12

DN22556,00003EB -19-25AUG09-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the ECU crankshaft position signal (J3-F4) and single point ground. Is voltage less than 0.5V?	 **YES:** GO TO 7 **NO:** Fix problem. GO TO 12

DN22556,00003EB -19-25AUG09-8/14

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 Test in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 8 **NO:** Recheck for intermittent open circuit. GO TO 1

Continued on next page

DN22556,00003EB -19-25AUG09-9/14

8 Replace Crankshaft Position Sensor	Has crankshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 9 **NO:** Remove crankshaft position sensor. GO TO 11

DN22556,00003EB -19-25AUG09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform Harness Diagnostic Test in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

DN22556,00003EB -19-25AUG09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00003EB -19-25AUG09-12/14

11 Inspect Crankshaft Position Sensor	Examine tip of crankshaft position sensor for damage due to contact with timing wheel Does sensor appear damaged due to contact with timing wheel?	**YES:** Replace crankshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace crankshaft position sensor. GO TO 12

DN22556,00003EB -19-25AUG09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003EB -19-25AUG09-14/14

000637.06 — Crankshaft Position Circuit Has Low Resistance

The ECU detects high current on the crankshaft position wiring.

DN22556,00003EC -19-25AUG09-1/16

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 crankshaft position 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 crankshaft position 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Crankshaft position sensor X01 - Purple/Gray

DN22556,00003EC -19-25AUG09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect crankshaft position sensor connector X01. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000637.05 now an active DTC?	**YES:** Remove crankshaft position sensor. GO TO 13 **NO:** GO TO 2

Continued on next page

DN22556,00003EC -19-25AUG09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on crankshaft position sensor and connector X01.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 3

DN22556,00003EC -19-25AUG09-4/16

3 Check Sensor Resistance	On the crankshaft position sensor, measure the resistance between the signal (A) and return (B).	**YES:** Do not reconnect sensor to harness. GO TO 4
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Remove crankshaft position sensor. GO TO 13

DN22556,00003EC -19-25AUG09-5/16

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

DN22556,00003EC -19-25AUG09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B).	**YES:** GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003EC -19-25AUG09-7/16

6 Check for Wire-to-Wire Short	1. Verify crankshaft position sensor is disconnected.	
	2. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and return (J3-F3).	**YES:** GO TO 7
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 4

DN22556,00003EC -19-25AUG09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU crankshaft position 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

DN22556,00003EC -19-25AUG09-9/16

8 Check for Wire-to-Wire Short	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between the ECU crankshaft position 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

DN22556,00003EC -19-25AUG09-10/16

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 Test in Service ADVISOR.	**YES:** GO TO 10
	Did 000637.06 reappear as active?	**NO:** Recheck for intermittent shorted circuit. GO TO 1

DN22556,00003EC -19-25AUG09-11/16

10 Replace Crankshaft Position Sensor	Has crankshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 11
		NO: Remove crankshaft position sensor. GO TO 13

DN22556,00003EC -19-25AUG09-12/16

11 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform Harness Diagnostic Test in Service ADVISOR.	**YES:** GO TO 12
	Did 000637.06 reappear active?	**NO:** Problem fixed. GO TO 14

DN22556,00003EC -19-25AUG09-13/16

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform Harness Diagnostic Test in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000637.06 reappear active?	**NO:** Problem fixed.

DN22556,00003EC -19-25AUG09-14/16

13 Inspect Crankshaft Position Sensor	Examine tip of crankshaft position sensor for damage due to contact with timing wheel	**YES:** Replace crankshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14
	Does sensor appear damaged due to contact with timing wheel?	**NO:** Replace crankshaft position sensor. GO TO 14

Continued on next page

DN22556,00003EC -19-25AUG09-15/16

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform Harness Diagnostic Test in Service ADVISOR. Did 000637.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003EC -19-25AUG09-16/16

000637.07 — Crankshaft and Camshaft Position Signals Out of Sync

The ECU detects that the camshaft position and crankshaft position signals are not properly synchronized.

DN22556,00003ED -19-25AUG09-1/17

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 signal is not correctly timed relative to the crankshaft position signal. This DTC may be caused by incorrect camshaft timing or by a damaged crankshaft position timing wheel. 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 crankshaft position sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more camshaft position sensor information, see CAMSHAFT 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Crankshaft position sensor X01 - Purple/Gray
- Camshaft position sensor X02 - Purple/Gray

Continued on next page

DN22556,00003ED -19-25AUG09-2/17

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

DN22556,00003ED -19-25AUG09-3/17

2 Check for Recent Mechanical Repair	*NOTE: For camshaft timing instructions, see ADJUST CAMSHAFT-TO-CRANKSHAFT TIMING procedure in the base engine manual.* Has an internal engine repair requiring camshaft timing 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

DN22556,00003ED -19-25AUG09-4/17

3 Check for Damaged Crankshaft Position Timing Wheel	1. Ignition OFF, engine OFF. 2. Disconnect crankshaft position sensor connector X01 and secure connector away from rotating components. Ignore DTC 000637.08 which will be generated due to the disconnected sensor. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Attempt to start engine. 6. Operate engine for one minute through rpm range while monitoring DTCs, if engine started. 7. Ignition OFF, engine OFF. 8. Reconnect crankshaft position sensor. Did engine start, run, and have good performance?	**YES:** Remove crankshaft position sensor and check for damaged timing wheel. **NO:** GO TO 4

Continued on next page

DN22556,00003ED -19-25AUG09-5/17

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 Missing Indicator
   - Camshaft Position Signal Status
   - Crankshaft Position Signal Noise Indicator
   - Crankshaft Position Signal Improper Pattern Indicator
   - Crankshaft Position Signal Missing Indicator
   - Camshaft Position Signal Status
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 three Camshaft Position Signal Indicator data points and the three Crankshaft Position Signal Indicator data points will indicated 0% if recent 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 and Crankshaft Position Signal Status each have a value of 47 if the signal is good with engine speed above 400 rpm. The value will be something other than 47 if a signal problem is detected. These data points can be used to locate intermittent problems with the camshaft position signal or crankshaft position 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 signal problem. 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

DN22556,00003ED -19-25AUG09-6/17

5 Test Crankshaft Position Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect crankshaft position sensor connector X01.
3. Perform TERMINAL TEST on crankshaft position sensor and connector X01.

YES: Fix problem. GO TO 14

Were any problems found?

NO: Do not reconnect sensor. GO TO 6

DN22556,00003ED -19-25AUG09-7/17

6 Test Camshaft Position Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor connector X02.
3. Perform TERMINAL TEST on camshaft position sensor and connector X02.

YES: Fix problem. GO TO 14

Were any problems found?

NO: Do not reconnect sensor. GO TO 7

Continued on next page

DN22556,00003ED -19-25AUG09-8/17

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

DN22556,00003ED -19-25AUG09-9/17

8 Check Camshaft Position Circuit Resistance	*NOTE: Verify that camshaft position signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position signal (J3-G4) and the camshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU camshaft position return (J3-G3) and the camshaft position sensor connector return (B).	**YES:** GO TO 9
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003ED -19-25AUG09-10/17

9 Check Crankshaft Position Circuit Resistance	*NOTE: Verify that crankshaft position signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00003ED -19-25AUG09-11/17

10 Check for Intermittent Short Between Signal and Return	1. Verify crankshaft position sensor and camshaft position sensors are disconnected.	
	2. On the harness, measure the resistance between the ECU crankshaft position signal (J3-F4) and the crankshaft position sensor return (J3-F3) while gently wiggling harness.	
	3. On the harness, measure the resistance between the ECU camshaft position 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

DN22556,00003ED -19-25AUG09-12/17

11 Check for Intermittent Short Between Signal and Ground

1. Verify crankshaft position sensor and camshaft position sensors are disconnected.
2. On the harness, measure the resistance between the ECU crankshaft position signal (J3-F4) and single point ground while gently wiggling harness.
3. On the harness, measure the resistance between the ECU camshaft position 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

DN22556,00003ED -19-25AUG09-13/17

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.

DN22556,00003ED -19-25AUG09-14/17

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.

DN22556,00003ED -19-25AUG09-15/17

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.

DN22556,00003ED -19-25AUG09-16/17

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

DN22556,00003ED -19-25AUG09-17/17

000637.08 — Crankshaft Position Signal Missing

The ECU does not detect a crankshaft position signal.

DN22556,00003EE -19-25AUG09-1/21

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 crankshaft position signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the crankshaft position signal wiring.

Alarm Level:
Warning

Control Unit Response:
The ECU will use the camshaft position sensor input to determine crankshaft position.
Prolonged cranking time may be required to start the engine.
If a camshaft position signal 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 crankshaft position 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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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
- Crankshaft position sensor X01 - Purple/Gray

Continued on next page

DN22556,00003EE -19-25AUG09-2/21

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 000637.08 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 19

DN22556,00003EE -19-25AUG09-3/21

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is DTC 000637.05 or 000637.06 now an active DTC?	**YES:** Discontinue test for 000637.08 and perform test for 000637.05 or 000637.06. **NO:** GO TO 3

DN22556,00003EE -19-25AUG09-4/21

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANK POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crankshaft position sensor connector X01. 3. Verify crankshaft position sensor installation torque. Was crankshaft position sensor fully threaded into mounting hole?	**YES:** GO TO 4 **NO:** Torque sensor to specified value. GO TO 18

DN22556,00003EE -19-25AUG09-5/21

4 Test Sensor Terminals	Perform Terminal Test on crankshaft position sensor and connector X01. Were any problems found?	**YES:** Fix problem. GO TO 18 **NO:** GO TO 5

DN22556,00003EE -19-25AUG09-6/21

5 Check Sensor Resistance	On the crankshaft position 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 crankshaft position sensor. GO TO 17

DN22556,00003EE -19-25AUG09-7/21

6 Check for Recent Mechanical Repair	Has an internal engine repair requiring removal of crankshaft timing wheel been performed just prior to DTC 000637.08 appearing?	**YES:** GO TO 7 **NO:** GO TO 8

Continued on next page

DN22556,00003EE -19-25AUG09-8/21

7 **Inspect Target**	1. Remove crankshaft position sensor.	
	2. Verify that timing wheel teeth are visible through the crankshaft position sensor mounting hole as engine is rotated.	**YES:** GO TO 8
	Are teeth on timing wheel visible?	**NO:** Fix mechanical problem, GO TO 18

DN22556,00003EE -19-25AUG09-9/21

8 **Test ECU Terminals**	1. Disconnect ECU J3 connector.	
	2. Perform TERMINAL TEST on J3.	**YES:** Fix problem. GO TO 18
	Were any problems found?	**NO:** GO TO 9

DN22556,00003EE -19-25AUG09-10/21

9 **Check Sensor Circuit Resistance**	1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 18

DN22556,00003EE -19-25AUG09-11/21

10 **Check for Wire-to-Wire Short**	1. Verify crankshaft position sensor is disconnected.	
	2. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and return (J3-F3).	**YES:** GO TO 11
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 18

DN22556,00003EE -19-25AUG09-12/21

11 **Check for Short to Ground of Signal**	On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and single point ground.	**YES:** GO TO 12
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 18

DN22556,00003EE -19-25AUG09-13/21

12 **Check for Wire-to-Wire Short**	1. Disconnect ECU J1 and J2 connectors.	
	2. On the harness, measure the resistance between the ECU crankshaft position 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 18

Continued on next page

DN22556,00003EE -19-25AUG09-14/21

13 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU crankshaft position signal (J3-F4) and single point ground.	**YES:** GO TO 14
	Is the voltage less than 0.5V?	**NO:** Fix problem. GO TO 18

DN22556,00003EE -19-25AUG09-15/21

14 Replace Crankshaft Position Sensor	Has crankshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 15
		NO: Remove crankshaft position sensor. GO TO 7

DN22556,00003EE -19-25AUG09-16/21

15 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Download latest ECU payload and reprogram ECU.	**YES:** GO TO 16
	Did DTC 000637.08 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00003EE -19-25AUG09-17/21

16 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000637.08 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00003EE -19-25AUG09-18/21

17 Inspect Crankshaft Position Sensor	Examine tip of crankshaft position sensor for damage due to contact with timing wheel	**YES:** Replace crankshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 18
	Does sensor appear damaged due to contact with timing wheel?	**NO:** Replace crankshaft position sensor. GO TO 18

DN22556,00003EE -19-25AUG09-19/21

18 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine ON.	**YES:** GO TO 1
	Did DTC 000637.08 reappear active with engine running?	**NO:** Problem fixed.

Continued on next page

DN22556,00003EE -19-25AUG09-20/21

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

DN22556,00003EE -19-25AUG09-21/21

000637.10 — Crankshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern in the crankshaft position signal.

DN22556,00003EF -19-16SEP09-1/24

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) in the crankshaft position signal.
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 crankshaft position.
If a camshaft position signal 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 crankshaft position 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 13.5L 12V ECU WIRING DIAGRAM 2, 13.5L 12V ECU WIRING DIAGRAM 4
- see 13.5L 24V ECU WIRING DIAGRAM 2, 13.5L 24V ECU 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 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
- Crankshaft position sensor X01 - Purple/Gray

Continued on next page

DN22556,00003EF -19-16SEP09-2/24

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

DN22556,00003EF -19-16SEP09-3/24

2 Check for Open or Shorted 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 or 000637.06.

NO: GO TO 3

DN22556,00003EF -19-16SEP09-4/24

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 crankshaft position 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.

YES: Engine wiring problem. Repair problem. GO TO 21

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 4

Continued on next page

DN22556,00003EF -19-16SEP09-5/24

4 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANK POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crankshaft position sensor connector X01. 3. Verify crankshaft position sensor installation torque. Was crankshaft position sensor fully threaded into mounting hole?	**YES:** GO TO 5 **NO:** Torque sensor to specified value. GO TO 21

DN22556,00003EF -19-16SEP09-6/24

5 Test Sensor Terminals	Perform TERMINAL TEST on crankshaft position sensor and connector X01. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 6

DN22556,00003EF -19-16SEP09-7/24

6 Inspect Target	1. Remove crankshaft position sensor. 2. Visually inspect timing wheel teeth for damage or debris as engine is rotated. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 7

DN22556,00003EF -19-16SEP09-8/24

7 Inspect Sensor	Examine tip of crankshaft position sensor for damage due to contact with timing wheel Does sensor appear damaged due to contact with timing wheel?	**YES:** Replace crankshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 21 **NO:** GO TO 88

DN22556,00003EF -19-16SEP09-9/24

8 Check Sensor Resistance	On the crankshaft position sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Reinstall crankshaft position sensor. Do not reconnect to harness. GO TO 9 **NO:** Replace crankshaft position sensor. GO TO 21

DN22556,00003EF -19-16SEP09-10/24

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

Continued on next page

DN22556,00003EF -19-16SEP09-11/24

10 Check for Shorted Return	On the harness, measure the resistance between the ECU connector crankshaft position 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

DN22556,00003EF -19-16SEP09-12/24

11 Check Signal Circuit Resistance	*NOTE: Verify that crankshaft position sensor signal and return wires are in the specified connector cavities (not swapped).* 1. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and the crankshaft position sensor connector signal (A). 2. On the harness, measure the resistance between ECU crankshaft position return (J3-F3) and the crankshaft position sensor connector return (B). Are both resistance measurements less than 10 ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 21

DN22556,00003EF -19-16SEP09-13/24

12 Check for Intermittent Short Between Signal and Return	1. Verify crankshaft position sensor is disconnected. 2. On the harness, measure the resistance between the ECU crankshaft position signal (J3-F4) and the crankshaft position return (J3-F3). Is resistance greater than 1k ohms?	**YES:** GO TO 13 **NO:** Fix problem. GO TO 21

DN22556,00003EF -19-16SEP09-14/24

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

DN22556,00003EF -19-16SEP09-15/24

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

Continued on next page

DN22556,00003EF -19-16SEP09-16/24

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 crankshaft position 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

DN22556,00003EF -19-16SEP09-17/24

16 Check Sensor Resistance at ECU	1. Reconnect crankshaft position sensor connector. 2. On the harness, measure the resistance between ECU crankshaft position signal (J3-F4) and return (J3-F3). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** GO TO 17 **NO:** Fix problem. GO TO 21

DN22556,00003EF -19-16SEP09-18/24

17 Inspect Crankshaft Position Signal Wiring	Examine crankshaft position signal wiring between the crankshaft position sensor and the ECU. Check for the following: • Verify that crankshaft position signal and return wires are twisted together throughout the harness. • Verify that no physical damage to crankshaft position signal and return wires is evident. Were any problems found?	**YES:** Replace crankshaft position signal wiring with twisted pair or repair problem. GO TO 21 **NO:** GO TO 18

DN22556,00003EF -19-16SEP09-19/24

18 Replace Crankshaft Position Sensor	Has crankshaft position sensor been replaced during this procedure?	**YES:** GO TO 19 **NO:** Replace crankshaft position sensor. GO TO 21

DN22556,00003EF -19-16SEP09-20/24

19 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reinstall ECU connectors. 3. Download latest ECU payload and reprogram ECU. Did DTC 000637.10 reappear active with engine running?	**YES:** GO TO 20 **NO:** Problem fixed.

DN22556,00003EF -19-16SEP09-21/24

20 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did DTC 000637.10 reappear active with engine running?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,00003EF -19-16SEP09-22/24

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.

DN22556,00003EF -19-16SEP09-23/24

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

DN22556,00003EF -19-16SEP09-24/24

000640.11 — External Engine Protection Commanded

ECU received an invalid request to shut down the engine.

DN22556,00003F0 -19-25AUG09-1/5

000640.11 — External Engine Protection Commanded Diagnostic Procedure

Alarm Level:
STOP

Control Unit Response:
The engine will not shut down.

Additional References:
Refer to the equipment's diagnostic test manual.

DN22556,00003F0 -19-25AUG09-2/5

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 000640.11 error code active?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00003F0 -19-25AUG09-3/5

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.

DN22556,00003F0 -19-25AUG09-4/5

3 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:** Contact dealer or DTAC.

DN22556,00003F0 -19-25AUG09-5/5

000640.31 — External Derate Commanded

The ECU receives a valid engine shutdown signal.

DN22556,00003F1 -19-25AUG09-1/5

000640.31 — External Derate Commanded Diagnostic Procedure

Alarm Level:
STOP

Control Unit Response:
The engine will shut down. 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.

Additional References:
Refer to the equipment's diagnostic test manual.

DN22556,00003F1 -19-25AUG09-2/5

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 000640.13 error code active?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00003F1 -19-25AUG09-3/5

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.

DN22556,00003F1 -19-25AUG09-4/5

3 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:** Contact dealer or DTAC.

DN22556,00003F1 -19-25AUG09-5/5

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.

DN22556,00003F2 -19-31MAR11-1/19

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 OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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

DN22556,00003F2 -19-31MAR11-2/19

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

DN22556,00003F2 -19-31MAR11-3/19

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

DN22556,00003F2 -19-31MAR11-4/19

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

DN22556,00003F2 -19-31MAR11-5/19

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.

DN22556,00003F2 -19-31MAR11-6/19

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

DN22556,00003F2 -19-31MAR11-7/19

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.

DN22556,00003F2 -19-31MAR11-8/19

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.

DN22556,00003F2 -19-31MAR11-9/19

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

DN22556,00003F2 -19-31MAR11-10/19

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

DN22556,00003F2 -19-31MAR11-11/19

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

DN22556,00003F2 -19-31MAR11-12/19

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

DN22556,00003F2 -19-31MAR11-13/19

12 Actuator Cooling System Check	1. Ignition OFF, Engine OFF. 2. Bleed air from the actuator cooling system, see COOLING SYSTEM OPERATION 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 . **NO:** Problem fixes. Actuator cooling system had air in it.

DN22556,00003F2 -19-31MAR11-14/19

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

DN22556,00003F2 -19-31MAR11-15/19

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

DN22556,00003F2 -19-31MAR11-16/19

15 Actuator Removal and Install	1. Reconnect ECU connector. 2. Remove and Install turbo actuator, see REMOVE AND INSTALL VARIABLE GEOMETRY TURBOCHARGER ACTUATOR in base engine manual. 3. Recalibrate, see VGT — LEARN VALUE RESET. 4. Refresh codes. Is 000641.04 active?	**YES:** GO TO 16 **NO:** Problem fixed. Bad actuator.

Continued on next page

DN22556,00003F2 -19-31MAR11-17/19

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.

DN22556,00003F2 -19-31MAR11-18/19

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 REMOVE AND INSTALL VARIABLE GEOMETRY TURBOCHARGER ACTUATOR.

DN22556,00003F2 -19-31MAR11-19/19

000641.12 — VGT Actuator Communication Error

The ECU has lost communications with the turbo actuator controller.

DN22556,00003F3 -19-22JUL10-1/16

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 OPERATION in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see qEXHAUST GAS RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 4, 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU WIRING DIAGRAM 4, 13.5L 24V ECU 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

DN22556,00003F3 -19-22JUL10-2/16

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 11

DN22556,00003F3 -19-22JUL10-3/16

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

DN22556,00003F3 -19-22JUL10-4/16

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 9

DN22556,00003F3 -19-22JUL10-5/16

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

DN22556,00003F3 -19-22JUL10-6/16

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).	**YES:** GO TO 6
	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?	**NO:** Repair open wire, reconnect all connectors and run HARNESS DIAGNOSTIC MODE TEST.

DN22556,00003F3 -19-22JUL10-7/16

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.	**YES:** Repair wiring and run HARNESS DIAGNOSTIC MODE TEST.
	Are any terminals shorted to J3 terminal E4?	**NO:** Remove and Replace VGT actuator. Recalibrate, see TURBOCHARGER ACTUATOR CALIBRATION.

DN22556,00003F3 -19-22JUL10-8/16

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.	**YES:** GO TO 8
	Is the voltage battery voltage ±1 volt?	**NO:** GO TO 9

Continued on next page

DN22556,00003F3 -19-22JUL10-9/16

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.

DN22556,00003F3 -19-22JUL10-10/16

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.

DN22556,00003F3 -19-22JUL10-11/16

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

DN22556,00003F3 -19-22JUL10-12/16

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

DN22556,00003F3 -19-22JUL10-13/16

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

DN22556,00003F3 -19-22JUL10-14/16

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.

DN22556,00003F3 -19-22JUL10-15/16

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 ECU. Run HARNESS DIAGNOSTIC MODE TEST.
Is 000641.12 active?	**NO:** Problem fixed. Bad ECU program.

DN22556,00003F3 -19-22JUL10-16/16

000641.13 — VGT Actuator Learn Error

The ECU receives a message from the actuator stating it could not reach its expected end points.

DN22556,00003F4 -19-31MAR11-1/7

000641.13 — VGT Actuator Learn Error Diagnostic Procedure

Troubleshooting Sequence:
000641.13

When DTC is Displayed:
The ECU receives a message from the actuator stating it could not reach its expected end points during the VGT — LEARN VALUE RESET, VGT ACTUATOR TRAVEL RANGE TEST or the turbo learn portion of the HARNESS DIAGNOSTIC MODE TEST, in Service ADVISOR.

Related Information:
For more information on the Harness Diagnostic Mode Test , see HARNESS DIAGNOSTIC MODE TEST in Section 04 Group 160.
For more information on the VGT — Learn Value Reset test, see VGT — LEARN VALUE RESET INSTRUCTIONS in Section 04 Group 160.
For more information on the VGT — Actuator Travel Range Test , see VGT ACTUATOR TRAVEL RANGE TEST in Section 04 Group 160.

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 OPERATION in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see EXHAUST GAS RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 VGT — LEARN VALUE RESET 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

Continued on next page

DN22556,00003F4 -19-31MAR11-2/7

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.

DN22556,00003F4 -19-31MAR11-3/7

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

DN22556,00003F4 -19-31MAR11-4/7

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. Calibrate actuator , see VGT — LEARN VALUE RESET INSTRUCTIONS.

DN22556,00003F4 -19-31MAR11-5/7

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. Calibrate actuator , see VGT — LEARN VALUE RESET INSTRUCTIONS.

Continued on next page

DN22556,00003F4 -19-31MAR11-6/7

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.

DN22556,00003F4 -19-31MAR11-7/7

000641.16 — VGT Actuator Temperature Moderately High

The ECU receives a VGT actuator temperature above specification message from the actuator.

DN22556,00003F5 -19-31MAR11-1/7

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 VGT actuator notifies the ECU that the VGT actuator temperature is above specification, 115°C (239°F).

Alarm Level:
Warning

Control Unit Response:
Normal operation.

Additional References:
For more VGT actuator information, see TURBOCHARGER ACTUATOR OPERATION in Section 03, Group 135 earlier in this manual.

For more turbocharger information, see TURBOCHARGER OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 VGT — LEARN VALUE RESET 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

DN22556,00003F5 -19-31MAR11-2/7

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

DN22556,00003F5 -19-31MAR11-3/7

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. Calibrate, see VGT — LEARN VALUE RESET INSTRUCTIONS. Then GO TO 3

NO: GO TO 3

DN22556,00003F5 -19-31MAR11-4/7

3 Actuator Cooling System Check

1. Ignition OFF, Engine OFF.
2. Bleed air from the actuator cooling system, see COOLING SYSTEM OPERATION in base engine manual.

Is air bleeding complete?

YES: GO TO 4

NO: Bleed air from the actuator cooling system, see COOLING SYSTEM OPERATION in base engine manual.

DN22556,00003F5 -19-31MAR11-5/7

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. Calibrate, see VGT — LEARN VALUE RESET INSTRUCTIONS.

NO: Problem fixed. Actuator cooling system had air in it.

Continued on next page

DN22556,00003F5 -19-31MAR11-6/7

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.

DN22556,00003F5 -19-31MAR11-7/7

000647.05 — Engine Fan Drive Circuit Has High Resistance

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000066C -19-15OCT07-1/1

000647.07 — Engine Fan Drive Not Responding

For troubleshooting procedure please see the application troubleshooting manual.

DN22556,000066D -19-15OCT07-1/1

000651.05 — Injector #1 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #1 electronic injector circuit.

DN22556,00003F7 -19-02NOV09-1/16

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.

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 UNIT INJECTOR (EUI) 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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,00003F7 -19-02NOV09-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000651.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003F7 -19-02NOV09-3/16

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 connector C01 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

DN22556,00003F7 -19-02NOV09-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal C) and injector #1 low side control (terminal H). Is resistance less than 6 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,00003F7 -19-02NOV09-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect Injector #1 connector. 3. On the #1 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace #1 injector. GO TO 9

DN22556,00003F7 -19-02NOV09-6/16

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

DN22556,00003F7 -19-02NOV09-7/16

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 connector (terminal H).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness connector (terminal C).	**YES:** GO TO 7
	Are both resistance readings less than 6 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00003F7 -19-02NOV09-8/16

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

DN22556,00003F7 -19-02NOV09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

DN22556,00003F7 -19-02NOV09-10/16

9 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors and reinstall rocker cover, if removed.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

DN22556,00003F7 -19-02NOV09-11/16

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

DN22556,00003F7 -19-02NOV09-12/16

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 000651.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

DN22556,00003F7 -19-02NOV09-13/16

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 connector, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

DN22556,00003F7 -19-02NOV09-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000651.05 reappear active with engine running?	**NO:** GO TO 14.

DN22556,00003F7 -19-02NOV09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000651.05 reappear active with engine running?	**NO:** Replace injector #1. GO TO 9

DN22556,00003F7 -19-02NOV09-16/16

000651.06 — Injector #1 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #1 electronic injector circuit.

DN22556,00003F8 -19-22MAR11-1/17

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,00003F8 -19-22MAR11-2/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000651.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,00003F8 -19-22MAR11-3/17

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 connector C01 between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. 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

DN22556,00003F8 -19-22MAR11-4/17

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

DN22556,00003F8 -19-22MAR11-5/17

4 Check Injector Harness for Wire to Wire Short

1. Disconnect Injector #1 connector.
2. On the injector harness connector (male pin terminals), measure the resistance between injector #1 control (terminal H) 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

Continued on next page

DN22556,00003F8 -19-22MAR11-6/17

5 ECU Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector.	
	3. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 6

DN22556,00003F8 -19-22MAR11-7/17

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.	**YES:** GO TO 7
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 10

DN22556,00003F8 -19-22MAR11-8/17

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.	**YES:** Fix problem. GO TO 10
	Is voltage greater than 0.5V?	**NO:** GO TO 8

DN22556,00003F8 -19-22MAR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 9
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

DN22556,00003F8 -19-22MAR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00003F8 -19-22MAR11-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000651.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003F8 -19-22MAR11-12/17

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

DN22556,00003F8 -19-22MAR11-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000651.06 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 13

DN22556,00003F8 -19-22MAR11-14/17

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 connector, and injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

DN22556,00003F8 -19-22MAR11-15/17

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.

DN22556,00003F8 -19-22MAR11-16/17

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

DN22556,00003F8 -19-22MAR11-17/17

000651.13 — Injector #1 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,00003FA -19-16JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,00003FA -19-16JUL10-2/9

1	**Injector Code Input Method Check**	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00003FA -19-16JUL10-3/9

2	**Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,00003FA -19-16JUL10-4/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,00003FA -19-16JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,00003FA -19-16JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,00003FA -19-16JUL10-7/9

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

DN22556,00003FA -19-16JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,00003FA -19-16JUL10-9/9

000652.05 — Injector #2 Circuit Has High Resistance

The ECU detects an High resistance in the cylinder #2 electronic injector circuit.

DN22556,00003FC -19-22MAR11-1/16

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,00003FC -19-22MAR11-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000652.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00003FC -19-22MAR11-3/16

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 connector C01 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

DN22556,00003FC -19-22MAR11-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal C) and injector #2 low side control (terminal D). Is resistance less than 6 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,00003FC -19-22MAR11-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect Injector #2 connector. 3. On the #2 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

DN22556,00003FC -19-22MAR11-6/16

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

DN22556,00003FC -19-22MAR11-7/16

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 connector (terminal D).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness connector (terminal C).	**YES:** GO TO 7
	Are both resistance readings less than 6 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00003FC -19-22MAR11-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC UNIT INJECTORS (EUI) 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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

DN22556,00003FC -19-22MAR11-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

DN22556,00003FC -19-22MAR11-10/16

9 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

DN22556,00003FC -19-22MAR11-11/16

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

DN22556,00003FC -19-22MAR11-12/16

11 Engine Error Operating Point Test

1. Ignition ON, engine ON
2. Set engine to operating point of failure and refresh DTCs.

Did 000652.05 reappear active when engine operating point was reached?

YES: GO TO 1

NO: GO TO 12

DN22556,00003FC -19-22MAR11-13/16

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.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 13

DN22556,00003FC -19-22MAR11-14/16

13 Reconnect and Retest

1. Reconnect all connectors.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000652.05 reappear active with engine running?

YES: GO TO 1.

NO: GO TO 14.

DN22556,00003FC -19-22MAR11-15/16

14 Reprogram ECU

1. Download latest ECU payload and reprogram ECU.
2. Ignition ON, engine ON.
3. Refresh DTCs.

Did 000652.05 reappear active with engine running?

YES: GO TO 1

NO: Replace injector #2. GO TO 9

DN22556,00003FC -19-22MAR11-16/16

000652.06 — Injector #2 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #2 electronic injector circuit.

DN22556,00003FD -19-22MAR11-1/17

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,00003FD -19-22MAR11-2/17

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 DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000652.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,00003FD -19-22MAR11-3/17

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 connector C01 between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. 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

DN22556,00003FD -19-22MAR11-4/17

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

DN22556,00003FD -19-22MAR11-5/17

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 D) 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

Continued on next page

DN22556,00003FD -19-22MAR11-6/17

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

DN22556,00003FD -19-22MAR11-7/17

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

DN22556,00003FD -19-22MAR11-8/17

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

DN22556,00003FD -19-22MAR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000652.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,00003FD -19-22MAR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000652.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,00003FD -19-22MAR11-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000652.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00003FD -19-22MAR11-12/17

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

DN22556,00003FD -19-22MAR11-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000652.06 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 13

DN22556,00003FD -19-22MAR11-14/17

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. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

DN22556,00003FD -19-22MAR11-15/17

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.

DN22556,00003FD -19-22MAR11-16/17

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

DN22556,00003FD -19-22MAR11-17/17

000652.13 — Injector #2 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,00003FF -19-20JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,00003FF -19-20JUL10-2/9

❶ **Injector Code Input Method Check**	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00003FF -19-20JUL10-3/9

❷ **Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,00003FF -19-20JUL10-4/9

❸ **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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,00003FF -19-20JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,00003FF -19-20JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,00003FF -19-20JUL10-7/9

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

DN22556,00003FF -19-20JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,00003FF -19-20JUL10-9/9

000653.05 — Injector #3 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #3 electronic injector circuit.

DN22556,0000401 -19-22MAR11-1/16

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,0000401 -19-22MAR11-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000653.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,0000401 -19-22MAR11-3/16

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 connector C01 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

DN22556,0000401 -19-22MAR11-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal C) and injector #3 low side control (terminal G).	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,0000401 -19-22MAR11-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect injector #3 connector. 3. On the #3 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace #3 injector. GO TO 9

DN22556,0000401 -19-22MAR11-6/16

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

DN22556,0000401 -19-22MAR11-7/16

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 connector (terminal G). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness connector (terminal C). Are both resistance readings less than 6 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

DN22556,0000401 -19-22MAR11-8/16

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

DN22556,0000401 -19-22MAR11-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000401 -19-22MAR11-10/16

9 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000401 -19-22MAR11-11/16

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

DN22556,0000401 -19-22MAR11-12/16

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 000653.05 reappear active when engine operating point was reached?	**NO:** GO TO 12

DN22556,0000401 -19-22MAR11-13/16

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 connector, and injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

DN22556,0000401 -19-22MAR11-14/16

13 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000653.05 reappear active with engine running?	**NO:** GO TO 14.

DN22556,0000401 -19-22MAR11-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000653.05 reappear active with engine running?	**NO:** Replace injector #3. GO TO 9

DN22556,0000401 -19-22MAR11-16/16

000653.06 — Injector #3 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #3 electronic injector circuit.

DN22556,0000402 -19-04APR11-1/17

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,0000402 -19-04APR11-2/17

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000653.06 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,0000402 -19-04APR11-3/17

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 connector C01 between engine harness and injector harness. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. 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

DN22556,0000402 -19-04APR11-4/17

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

DN22556,0000402 -19-04APR11-5/17

4 Check Injector Harness for Wire to Wire Short	1. Disconnect injector #3 connector. 2. On the injector harness connector (male pin terminals), measure the resistance between injector #3 control (terminal G) 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

Continued on next page

DN22556,0000402 -19-04APR11-6/17

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

DN22556,0000402 -19-04APR11-7/17

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

DN22556,0000402 -19-04APR11-8/17

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

DN22556,0000402 -19-04APR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,0000402 -19-04APR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,0000402 -19-04APR11-11/17

10 Verification

1. Ignition OFF, engine OFF.
2. Reconnect all connectors and reinstall rocker cover, if removed.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000653.06 reappear active?

YES: GO TO 1

NO: Problem fixed.

DN22556,0000402 -19-04APR11-12/17

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

DN22556,0000402 -19-04APR11-13/17

12 Engine Error Operating Point Test

1. Ignition ON, engine ON
2. Set engine to operating point of failure and refresh DTCs.

Did 000653.06 reappear active when engine operating point was reached?

YES: GO TO 1

NO: GO TO 13

DN22556,0000402 -19-04APR11-14/17

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.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 14

DN22556,0000402 -19-04APR11-15/17

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.

DN22556,0000402 -19-04APR11-16/17

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

DN22556,0000402 -19-04APR11-17/17

000653.13 — Injector #3 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,0000404 -19-20JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,0000404 -19-20JUL10-2/9

1 Injector Code Input Method Check	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,0000404 -19-20JUL10-3/9

2 Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,0000404 -19-20JUL10-4/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,0000404 -19-20JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,0000404 -19-20JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,0000404 -19-20JUL10-7/9

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

DN22556,0000404 -19-20JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,0000404 -19-20JUL10-9/9

000654.05 — Injector #4 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #4 electronic injector circuit.

DN22556,0000406 -19-22MAR11-1/16

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,0000406 -19-22MAR11-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000654.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,0000406 -19-22MAR11-3/16

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 connector C01 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

DN22556,0000406 -19-22MAR11-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal F) and injector #4 low side control (terminal A).	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,0000406 -19-22MAR11-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect injector #4 connector. 3. On the #4 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace #4 injector. GO TO 9

DN22556,0000406 -19-22MAR11-6/16

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

DN22556,0000406 -19-22MAR11-7/16

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 connector (terminal A). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness connector (terminal F). Are both resistance readings less than 6 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

DN22556,0000406 -19-22MAR11-8/16

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

DN22556,0000406 -19-22MAR11-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000406 -19-22MAR11-10/16

9 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000406 -19-22MAR11-11/16

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

DN22556,0000406 -19-22MAR11-12/16

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

DN22556,0000406 -19-22MAR11-13/16

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

DN22556,0000406 -19-22MAR11-14/16

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.

DN22556,0000406 -19-22MAR11-15/16

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

DN22556,0000406 -19-22MAR11-16/16

000654.06 — Injector #4 Circuit Has Low Resistance

The ECU detects a Low resistance in the cylinder #4 electronic injector circuit.

DN22556,0000407 -19-22MAR11-1/17

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,0000407 -19-22MAR11-2/17

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 DTCs.
5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000654.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,0000407 -19-22MAR11-3/17

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 connector C01 between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. 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

DN22556,0000407 -19-22MAR11-4/17

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

DN22556,0000407 -19-22MAR11-5/17

4 Check Injector Harness for Wire to Wire Short

1. Disconnect injector #4 connector.
2. On the injector harness connector (male pin terminals), measure the resistance between injector #4 control (terminal A) and all other terminals in the connector.

Are all resistance readings greater than 1k ohms?

YES: Replace injector. GO TO 10

NO: Replace injector harness. GO TO 10

Continued on next page

DN22556,0000407 -19-22MAR11-6/17

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

DN22556,0000407 -19-22MAR11-7/17

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

DN22556,0000407 -19-22MAR11-8/17

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

DN22556,0000407 -19-22MAR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,0000407 -19-22MAR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,0000407 -19-22MAR11-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000407 -19-22MAR11-12/17

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

DN22556,0000407 -19-22MAR11-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000654.06 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 13

DN22556,0000407 -19-22MAR11-14/17

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. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

DN22556,0000407 -19-22MAR11-15/17

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.

DN22556,0000407 -19-22MAR11-16/17

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

DN22556,0000407 -19-22MAR11-17/17

000654.13 — Injector #4 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,0000409 -19-20JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,0000409 -19-20JUL10-2/9

1	**Injector Code Input Method Check**	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,0000409 -19-20JUL10-3/9

2	**Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,0000409 -19-20JUL10-4/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,0000409 -19-20JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,0000409 -19-20JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,0000409 -19-20JUL10-7/9

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

DN22556,0000409 -19-20JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,0000409 -19-20JUL10-9/9

000655.05 — Injector #5 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #5 electronic injector circuit.

DN22556,000040B -19-22MAR11-1/16

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.

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 UNIT INJECTOR (EUI) 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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

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DN22556,000040B -19-22MAR11-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000655.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,000040B -19-22MAR11-3/16

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 connector C01 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

DN22556,000040B -19-22MAR11-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal F) and injector #5 low side control (terminal B). Is resistance less than 6 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,000040B -19-22MAR11-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect injector #5 connector. 3. On the #5 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

DN22556,000040B -19-22MAR11-6/16

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

DN22556,000040B -19-22MAR11-7/16

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 connector (terminal B). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness connector (terminal F). Are both resistance readings less than 6 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

DN22556,000040B -19-22MAR11-8/16

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

DN22556,000040B -19-22MAR11-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,000040B -19-22MAR11-10/16

9 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,000040B -19-22MAR11-11/16

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

DN22556,000040B -19-22MAR11-12/16

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

DN22556,000040B -19-22MAR11-13/16

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

DN22556,000040B -19-22MAR11-14/16

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.

DN22556,000040B -19-22MAR11-15/16

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

DN22556,000040B -19-22MAR11-16/16

000655.06 — Injector #5 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #5 electronic injector circuit.

DN22556,000040C -19-22MAR11-1/17

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,000040C -19-22MAR11-2/17

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000655.06 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,000040C -19-22MAR11-3/17

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 injector connector C01 between engine harness and injector harness. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. 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

DN22556,000040C -19-22MAR11-4/17

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

DN22556,000040C -19-22MAR11-5/17

4 Check Injector Harness for Wire to Wire Short	1. Disconnect injector #5 connector. 2. On the injector harness connector (male pin terminals), measure the resistance between injector #5 control (terminal B) 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

Continued on next page

DN22556,000040C -19-22MAR11-6/17

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

DN22556,000040C -19-22MAR11-7/17

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

DN22556,000040C -19-22MAR11-8/17

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

DN22556,000040C -19-22MAR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,000040C -19-22MAR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,000040C -19-22MAR11-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,000040C -19-22MAR11-12/17

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

DN22556,000040C -19-22MAR11-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000655.06 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 13

DN22556,000040C -19-22MAR11-14/17

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. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

DN22556,000040C -19-22MAR11-15/17

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.

DN22556,000040C -19-22MAR11-16/17

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

DN22556,000040C -19-22MAR11-17/17

000655.13 — Injector #5 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,000040E -19-20JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,000040E -19-20JUL10-2/9

1	**Injector Code Input Method Check**	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,000040E -19-20JUL10-3/9

2	**Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,000040E -19-20JUL10-4/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,000040E -19-20JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,000040E -19-20JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,000040E -19-20JUL10-7/9

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

DN22556,000040E -19-20JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,000040E -19-20JUL10-9/9

000656.05 — Injector #6 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #5 electronic injector circuit.

DN22556,0000410 -19-25MAR11-1/16

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.

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 UNIT INJECTOR (EUI) OPERATION in Section 03, Group 130 earlier in this manual.
For component location, see COMPONENT LOCATION DIAGRAM 10 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 Flex Probe 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,0000410 -19-25MAR11-2/16

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 DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000656.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,0000410 -19-25MAR11-3/16

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 connector C01 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

DN22556,0000410 -19-25MAR11-4/16

3 Check Injector Harness Resistance	On the injector harness connector (male pin terminals), measure the resistance between injector high voltage supply (terminal F) and injector #6 low side control (terminal E). Is resistance less than 6 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,0000410 -19-25MAR11-5/16

4 Check Injector Coil Resistance	1. Remove rocker arm cover. 2. Disconnect injector #6 connector. 3. On the #6 injector, measure the resistance between the two injector studs. Is the resistance less than 6 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

DN22556,0000410 -19-25MAR11-6/16

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

DN22556,0000410 -19-25MAR11-7/16

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 connector (terminal E). 2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness connector (terminal F). Are both resistance readings less than 6 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 9

DN22556,0000410 -19-25MAR11-8/16

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.05 reappear active?	**YES:** GO TO 8 **NO:** Problem fixed.

DN22556,0000410 -19-25MAR11-9/16

8 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.05 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000410 -19-25MAR11-10/16

9 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000410 -19-25MAR11-11/16

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

DN22556,0000410 -19-25MAR11-12/16

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

DN22556,0000410 -19-25MAR11-13/16

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

DN22556,0000410 -19-25MAR11-14/16

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.

DN22556,0000410 -19-25MAR11-15/16

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

DN22556,0000410 -19-25MAR11-16/16

000656.06 — Injector #6 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #5 electronic injector circuit.

DN22556,0000411 -19-25MAR11-1/17

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.

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 UNIT INJECTOR (EUI) 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 13.5L 12V ECU WIRING DIAGRAM 1
- see 13.5L 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: 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 Flex Probe 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 injector connector C01 - Yellow/Purple

Continued on next page

DN22556,0000411 -19-25MAR11-2/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000656.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,0000411 -19-25MAR11-3/17

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 12-way connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. 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

DN22556,0000411 -19-25MAR11-4/17

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

DN22556,0000411 -19-25MAR11-5/17

4 Check Injector Harness for Wire to Wire Short

1. Disconnect injector #6 connector.
2. On the injector harness connector (male pin terminals), measure the resistance between injector #6 control (terminal E) 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

Continued on next page

DN22556,0000411 -19-25MAR11-6/17

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

DN22556,0000411 -19-25MAR11-7/17

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

DN22556,0000411 -19-25MAR11-8/17

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

DN22556,0000411 -19-25MAR11-9/17

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. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,0000411 -19-25MAR11-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

Continued on next page

DN22556,0000411 -19-25MAR11-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors and reinstall rocker cover, if removed. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000411 -19-25MAR11-12/17

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

DN22556,0000411 -19-25MAR11-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000656.06 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 13

DN22556,0000411 -19-25MAR11-14/17

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 #6, and injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

DN22556,0000411 -19-25MAR11-15/17

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.

DN22556,0000411 -19-25MAR11-16/17

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

DN22556,0000411 -19-25MAR11-17/17

000656.13 — Injector #6 Calibration Fault

The ECU detects an incorrect Injector Code was calibrated into the ECU.

DN22556,0000413 -19-20JUL10-1/9

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 Injector 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 UNIT INJECTOR (EUI) 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.

DN22556,0000413 -19-20JUL10-2/9

1 Injector Code Input Method Check	Was the Injector Code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,0000413 -19-20JUL10-3/9

2 Verification and Reentry of Injector 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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,0000413 -19-20JUL10-4/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,0000413 -19-20JUL10-5/9

4 Retrieve New Injector Calibration File	Download a new injector calibration file, see PAYLOAD FILE — DOWNLOADING INSTRUCTIONS earlier in this Group. Were you able to get a new calibration file?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,0000413 -19-20JUL10-6/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,0000413 -19-20JUL10-7/9

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

DN22556,0000413 -19-20JUL10-8/9

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 Injector Code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,0000413 -19-20JUL10-9/9

000898.09 — Engine Speed CAN Message Invalid

For troubleshooting procedure please see the application troubleshooting manual.

DN22556,0000416 -19-27MAY08-1/1

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.

DN22556,0000417 -19-25MAR11-1/16

000970.31 — External Shutdown Switch Activated 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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

DN22556,0000417 -19-25MAR11-2/16

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

DN22556,0000417 -19-25MAR11-3/16

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

DN22556,0000417 -19-25MAR11-4/16

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

DN22556,0000417 -19-25MAR11-5/16

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

DN22556,0000417 -19-25MAR11-6/16

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

DN22556,0000417 -19-25MAR11-7/16

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

DN22556,0000417 -19-25MAR11-8/16

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

DN22556,0000417 -19-25MAR11-9/16

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

DN22556,0000417 -19-25MAR11-10/16

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

DN22556,0000417 -19-25MAR11-11/16

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

DN22556,0000417 -19-25MAR11-12/16

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

DN22556,0000417 -19-25MAR11-13/16

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

DN22556,0000417 -19-25MAR11-14/16

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

DN22556,0000417 -19-25MAR11-15/16

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.

DN22556,0000417 -19-25MAR11-16/16

000971.31 — External Derate Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU has derated the engine due the external fuel derate switch being activated.

DN22556,0000418 -19-25MAR11-1/16

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 fuel 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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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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DN22556,0000418 -19-25MAR11-2/16

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

DN22556,0000418 -19-25MAR11-3/16

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

DN22556,0000418 -19-25MAR11-4/16

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

DN22556,0000418 -19-25MAR11-5/16

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

DN22556,0000418 -19-25MAR11-6/16

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

DN22556,0000418 -19-25MAR11-7/16

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

DN22556,0000418 -19-25MAR11-8/16

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

DN22556,0000418 -19-25MAR11-9/16

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

DN22556,0000418 -19-25MAR11-10/16

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

DN22556,0000418 -19-25MAR11-11/16

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

DN22556,0000418 -19-25MAR11-12/16

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

DN22556,0000418 -19-25MAR11-13/16

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

DN22556,0000418 -19-25MAR11-14/16

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

DN22556,0000418 -19-25MAR11-15/16

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.

DN22556,0000418 -19-25MAR11-16/16

001075.12 — Low Pressure Fuel Pump Status Error

The ECU detects an error in the low pressure fuel pump system.

JL45346,0000010 -19-30MAR11-1/20

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 a period of time.

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 13.5L 12V ECU WIRING DIAGRAM 8
- see 13.5L 24V ECU 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 LOW PRESSURE FUEL PUMP OPERATION in Section 03, Group 131 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 system interconnect C19 - Yellow/Purple

Continued on next page

JL45346,0000010 -19-30MAR11-2/20

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 or were you directed to perform steps for DTC 001075.12 as though it were active in another procedure?	**YES:** GO TO 2 **NO:** GO TO 15

JL45346,0000010 -19-30MAR11-3/20

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

JL45346,0000010 -19-30MAR11-4/20

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

JL45346,0000010 -19-30MAR11-5/20

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

JL45346,0000010 -19-30MAR11-6/20

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

JL45346,0000010 -19-30MAR11-7/20

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. Monitor Low Pressure Fuel Pump Status data point in Service ADVISOR. Does Low Pressure Fuel Pump Status indicate OK?	**YES:** Remove jumper. GO TO 11 **NO:** GO TO 9

JL45346,0000010 -19-30MAR11-8/20

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-E4) 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

JL45346,0000010 -19-30MAR11-9/20

8 Check for Shorted Enable Circuit	On the harness, measure the resistance between the ECU pump enable (J1-E4) and single point ground. Is resistance greater than 10k ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 14

JL45346,0000010 -19-30MAR11-10/20

9 Check Status 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 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

JL45346,0000010 -19-30MAR11-11/20

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

JL45346,0000010 -19-30MAR11-12/20

11 Replace Low Pressure Pump	*NOTE: For pump replacement instructions, see REMOVE AND INSTALL ELECTRIC LOW PRESSURE FUEL PUMP in Section 02, Group 115 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. 5. Monitor Low Pressure Fuel Pump Status data point in Service ADVISOR. Does Low Pressure Fuel Pump Status indicate OK for at least 60 seconds after ignition was switched ON?	**YES:** Problem fixed. **NO:** Recheck for intermittent wiring problems. GO TO 2

JL45346,0000010 -19-30MAR11-13/20

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. 7. Monitor Low Pressure Fuel Pump Status data point in Service ADVISOR. Does Low Pressure Fuel Pump Status indicate OK for at least 60 seconds after ignition was switched ON?	**YES:** Problem fixed. **NO:** GO TO 13

JL45346,0000010 -19-30MAR11-14/20

13 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Monitor Low Pressure Fuel Pump Status data point in Service ADVISOR. Does Low Pressure Fuel Pump Status indicate OK for at least 60 seconds after ignition was switched ON?	**YES:** Problem fixed. **NO:** Open DTAC case.

JL45346,0000010 -19-30MAR11-15/20

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor Low Pressure Fuel Pump Status data point in Service ADVISOR. Does Low Pressure Fuel Pump Status indicate OK for at least 60 seconds after ignition was switched ON?	**YES:** Problem fixed. **NO:** GO TO 3

JL45346,0000010 -19-30MAR11-16/20

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:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 16 **NO:** GO TO 17

Continued on next page

JL45346,0000010 -19-30MAR11-17/20

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

JL45346,0000010 -19-30MAR11-18/20

17 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, 12-way interconnect (C29), 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

JL45346,0000010 -19-30MAR11-19/20

18 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine OFF.	
	3. Monitor the following data points in Service ADVISOR: • Low Pressure Fuel Pump Status • Low Pressure Fuel Pump Status Indicator	
	4. Gently wiggle wire harness between fuel pump and ECU J1 connector.	**YES:** Problem fixed or conditions to generate 001075.12 have not been duplicated.
	Does Low Pressure Fuel Pump Status continually indicate OK and does Low Pressure Fuel Pump Status Indicator continually indicate 0% for at least 60 seconds after ignition was switched ON?	**NO:** Possible intermittent wiring problem. GO TO 3.

JL45346,0000010 -19-30MAR11-20/20

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.

DN22556,0000419 -19-15OCT07-1/3

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.

DN22556,0000419 -19-15OCT07-2/3

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.

DN22556,0000419 -19-15OCT07-3/3

001110.31 — Engine Protection Shutdown Active

The ECU has shutdown the engine due to a operating condition out of range.

DN22556,000041A -19-27MAY08-1/3

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.

DN22556,000041A -19-27MAY08-2/3

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.

DN22556,000041A -19-27MAY08-3/3

001136.00 — ECU Temperature Signal Extremely High

The ECU detects an internal temperature above specification.

DN22556,000041B -19-25AUG09-1/9

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) SYSTEM OPERATION 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 13.5L 12V ECU WIRING DIAGRAMS
- see 13.5L 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

DN22556,000041B -19-25AUG09-2/9

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

DN22556,000041B -19-25AUG09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION 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

DN22556,000041B -19-25AUG09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

DN22556,000041B -19-25AUG09-5/9

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

DN22556,000041B -19-25AUG09-6/9

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

DN22556,000041B -19-25AUG09-7/9

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.

DN22556,000041B -19-25AUG09-8/9

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.

DN22556,000041B -19-25AUG09-9/9

001136.16 — ECU Temperature Signal Moderately High

The ECU detects an internal temperature above specification.

DN22556,000041C -19-25AUG09-1/9

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) SYSTEM OPERATION 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 13.5L 12V ECU WIRING DIAGRAMS
- see 13.5L 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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DN22556,000041C -19-25AUG09-2/9

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

DN22556,000041C -19-25AUG09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) SYSTEM OPERATION 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

DN22556,000041C -19-25AUG09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

DN22556,000041C -19-25AUG09-5/9

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

DN22556,000041C -19-25AUG09-6/9

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

DN22556,000041C -19-25AUG09-7/9

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.

DN22556,000041C -19-25AUG09-8/9

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.

DN22556,000041C -19-25AUG09-9/9

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.

DN22556,000041D -19-25AUG09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temp sensor T06 - Purple/Gray
- Compressor inlet temp interconnect T06A - Yellow/Purple

Continued on next page

DN22556,000041D -19-25AUG09-2/19

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 001172.03 reappear active?

YES: GO TO 2

NO: GO TO 9

DN22556,000041D -19-25AUG09-3/19

2 Terminal Test

1. Ignition OFF, Engine OFF
2. Disconnect compressor inlet temperature sensor connector.
3. Perform TERMINAL TEST on compressor inlet temperature sensor, harness and connector.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 3

DN22556,000041D -19-25AUG09-4/19

3 Sensor Open Test

Measure the resistance between terminal A and terminal B on the compressor inlet temperature sensor.

Was the resistance value greater than 7.5M ohms?

YES: Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,000041D -19-25AUG09-5/19

4 Harness Resistance Check

Measure the resistance between the return (terminal B) and signal (terminal A) in the compressor inlet temperature sensor harness connector.

Was the resistance between 1k and 3k ohms?

YES: GO TO 5

NO: GO TO 6

DN22556,000041D -19-25AUG09-6/19

5 Terminal to Terminal Resistance Check

1. Disconnect all ECU connectors.
2. Measure the resistance between the signal (terminal J3-D1) and all other ECU connector terminals in the ECU harness connectors.

Was any resistance less than 100 ohms?

YES: Look for pinched or melted 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

DN22556,000041D -19-25AUG09-7/19

6	**Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal B) in the compressor inlet temperature sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,000041D -19-25AUG09-8/19

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-D1) in the ECU connector and the signal (terminal A) in the compressor inlet temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,000041D -19-25AUG09-9/19

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-H3) in the ECU connector and the return (terminal B) in the compressor inlet temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,000041D -19-25AUG09-10/19

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-D1) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** 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. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,000041D -19-25AUG09-11/19

10	**Occurrence Count Check**	Review stored information and look at occurrence count for 001172.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

Continued on next page

DN22556,000041D -19-25AUG09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect compressor inlet temperature sensor connector.	
	3. Perform TERMINAL TEST on compressor inlet temperature sensor, harness and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 12

DN22556,000041D -19-25AUG09-13/19

12 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 13 **NO:** GO TO 15

DN22556,000041D -19-25AUG09-14/19

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 14
	Did 001172.03 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,000041D -19-25AUG09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the compressor inlet temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run **HARNESS DIAGNOSTIC MODE TEST** in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,000041D -19-25AUG09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the compressor inlet temperature sensor, harness and connector; also ECU J3 and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

Continued on next page

DN22556,000041D -19-25AUG09-17/19

16 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 4. Refresh codes. Is 001172.03 active?	**YES:** GO TO 17 **NO:** GO TO 15

DN22556,000041D -19-25AUG09-18/19

17 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 001172.03 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,000041D -19-25AUG09-19/19

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.

DN22556,000041E -19-25AUG09-1/18

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 temp sensor T06 - Purple/Gray
- Compressor inlet temp interconnect T06A - Yellow/Purple

Continued on next page

DN22556,000041E -19-25AUG09-2/18

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 001172.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,000041E -19-25AUG09-3/18

2 Monitor Code Test	1. Ignition OFF, Engine OFF. 2. Disconnect the compressor inlet temperature sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 001172.03 become active and 001172.04 move to stored?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,000041E -19-25AUG09-4/18

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on compressor inlet temperature sensor harness connector. 3. Inspect harness for melted or pinched areas near the compressor inlet temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,000041E -19-25AUG09-5/18

4 Sensor Short Internally or to Ground Test	Measure the resistance from each terminal on the sensor to chassis ground. **Specification** Check for short to ground—Resistance..... Greater than 1k ohm Measure the resistance between the two sensor terminals. **Specification** Check for internal short—Resistance..... Greater than 50 ohms Is either measurement out of specification?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **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.

Continued on next page

DN22556,000041E -19-25AUG09-6/18

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the compressor inlet temperature sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,000041E -19-25AUG09-7/18

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the compressor inlet temperature sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**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.

DN22556,000041E -19-25AUG09-8/18

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal B) and signal (terminal A) in the compressor inlet temperature sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9.

DN22556,000041E -19-25AUG09-9/18

8 Harness Physical Check	Terminal A has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** GO TO 5.

DN22556,000041E -19-25AUG09-10/18

9 ECU Resistance Check	Measure the resistance between the return (terminal J3-H3) and signal (terminal J3-D1) in the ECU connector.	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100 ohms?	**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.

Continued on next page

DN22556,000041E -19-25AUG09-11/18

10 Occurrence Count Check	Review stored information and look at occurrence count for 001172.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

DN22556,000041E -19-25AUG09-12/18

11 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the compressor inlet temperature sensor harness connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

DN22556,000041E -19-25AUG09-13/18

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 14

DN22556,000041E -19-25AUG09-14/18

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 001172.04 reappear when engine operating point was reached?	 **YES:** GO TO 1 **NO:** GO TO 12 and confirm the operating point.

DN22556,000041E -19-25AUG09-15/18

14 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the compressor inlet temperature sensor harness connector and ECU J3 connector. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 15

DN22556,000041E -19-25AUG09-16/18

15 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 4. Refresh codes. Is 001172.04 active?	 **YES:** GO TO 16 **NO:** Problem intermittent. GO TO 10

Continued on next page

DN22556,000041E -19-25AUG09-17/18

16 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.
	Is 001172.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,000041E -19-25AUG09-18/18

001180.00 — Calculated Turbo Turbine Inlet Temperature Signal Extremely High

The ECU calculates that the turbo turbine inlet temperature is above specification.

Continued on next page

DN22556,0000420 -19-16SEP09-1/21

001180.00 — Calculated Turbo 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. The turbine inlet temperature is an approximate indication of the exhaust temperature.
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. The MAP and manifold air temperature sensors are the main sensor inputs use to calculate turbo turbine inlet temperature.

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 13.5L 12V ECU WIRING DIAGRAM 2-13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU WIRING DIAGRAM 2-13.5L 24V ECU 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 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.

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 - Yellow/Purple
- Intake manifold air temperature sensor T02 - Yellow/Purple
- EGR temperature sensor T03 - Yellow/Purple

DN22556,0000420 -19-16SEP09-3/21

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

DN22556,0000420 -19-16SEP09-4/21

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

DN22556,0000420 -19-16SEP09-5/21

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. 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

DN22556,0000420 -19-16SEP09-6/21

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. *NOTE: The charge air cooler outlet temperature sensor (connector T01) and the intake manifold air temperature sensor (connector T02) are identical parts and are located close to each other. Verify that the sensors are connected to the harness correctly.* 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

DN22556,0000420 -19-16SEP09-7/21

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? • 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

DN22556,0000420 -19-16SEP09-8/21

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 (T01-1). 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 (T01-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 5

DN22556,0000420 -19-16SEP09-9/21

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

DN22556,0000420 -19-16SEP09-10/21

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 (T02-1). 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 (T02-2). 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

DN22556,0000420 -19-16SEP09-11/21

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

DN22556,0000420 -19-16SEP09-12/21

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 (T03-1). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

DN22556,0000420 -19-16SEP09-13/21

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

DN22556,0000420 -19-16SEP09-14/21

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

DN22556,0000420 -19-16SEP09-15/21

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

DN22556,0000420 -19-16SEP09-16/21

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)
   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

DN22556,0000420 -19-16SEP09-17/21

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

DN22556,0000420 -19-16SEP09-18/21

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.

DN22556,0000420 -19-16SEP09-19/21

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.

DN22556,0000420 -19-16SEP09-20/21

18 Recheck System

1. Perform CHARGE AIR SYSTEM 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.

DN22556,0000420 -19-16SEP09-21/21

001180.16 — Calculated Turbo Turbine Inlet Temperature Moderately High

The ECU calculates that the turbo turbine inlet temperature is above specification.

Continued on next page

DN22556,0000421 -19-16SEP09-1/21

001180.16 — Calculated Turbo Turbine Inlet Temperature 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. The turbine inlet temperature is an approximate indication of the exhaust temperature.
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. The MAP and manifold air temperature sensors are the main sensor inputs use to calculate turbine inlet temperature.

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 13.5L 12V ECU WIRING DIAGRAM 2-13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU WIRING DIAGRAM 2-13.5L 24V ECU 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 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.

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 - Yellow/Purple
- Intake manifold air temperature sensor T02 - Yellow/Purple
- EGR temperature sensor T03 - Yellow/Purple

DN22556,0000421 -19-16SEP09-3/21

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

DN22556,0000421 -19-16SEP09-4/21

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

DN22556,0000421 -19-16SEP09-5/21

3 Check Air Temperature Sensors on a Cold Engine	1. Ignition ON, engine OFF. 2. Monitor the following data points in Service ADVISOR: a. 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

DN22556,0000421 -19-16SEP09-6/21

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. *NOTE: The charge air cooler outlet temperature sensor (connector T01) and the intake manifold air temperature sensor (connector T02) are identical parts and are located close to each other. Verify that the sensors are connected to the harness correctly.* 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

DN22556,0000421 -19-16SEP09-7/21

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? • 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

DN22556,0000421 -19-16SEP09-8/21

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 (T01-2).

Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?

YES: GO TO 7

NO: Fix problem. GO TO 5

DN22556,0000421 -19-16SEP09-9/21

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

DN22556,0000421 -19-16SEP09-10/21

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 (T02-2).

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

DN22556,0000421 -19-16SEP09-11/21

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

DN22556,0000421 -19-16SEP09-12/21

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 (T03-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

DN22556,0000421 -19-16SEP09-13/21

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

DN22556,0000421 -19-16SEP09-14/21

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

DN22556,0000421 -19-16SEP09-15/21

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

DN22556,0000421 -19-16SEP09-16/21

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

DN22556,0000421 -19-16SEP09-17/21

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

DN22556,0000421 -19-16SEP09-18/21

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.

DN22556,0000421 -19-16SEP09-19/21

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.

DN22556,0000421 -19-16SEP09-20/21

18 Recheck System

1. Perform CHARGE AIR SYSTEM 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.

DN22556,0000421 -19-16SEP09-21/21

001568.02 — Torque Curve Selection CAN Message Error

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000096 -19-28SEP10-1/1

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.

DN22556,0000425 -19-27MAY08-1/1

001639.01 — Fan Speed Signal Extremely Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000426 -19-15OCT07-1/1

001639.16 — Fan Speed Signal Moderately High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000427 -19-15OCT07-1/1

001639.18 — Fan Speed Signal Moderately Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000428 -19-15OCT07-1/1

002000.13 — Incorrect ECU for Application

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000429 -19-15OCT07-1/1

002005.09 — No CAN Message From Source Address 5

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000042A -19-27MAY08-1/1

002005.14 — Incorrect CAN Message Received From Source Address 5

The ECU receives a communication error message from the ACU.

OUOD007,000000C -19-07APR11-1/3

002005.14 — Incorrect CAN Message Received From Source Address 5 Diagnostic Procedure

OUOD007,000000C -19-07APR11-2/3

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.

OUOD007,000000C -19-07APR11-3/3

002030.09 — No CAN Message From Source Address 30

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000042B -19-27MAY08-1/1

002071.09 — No CAN Message From Source Address 71

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000042C -19-27MAY08-1/1

002630.00 — Charge Air Cooler Outlet Temperature Signal Extremely High

The ECU senses an Charge Air Cooler Outlet Temperature above specification.

DN22556,000042D -19-04APR11-1/13

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,000042D -19-04APR11-2/13

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

DN22556,000042D -19-04APR11-3/13

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

DN22556,000042D -19-04APR11-4/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,000042D -19-04APR11-5/13

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

DN22556,000042D -19-04APR11-6/13

5 Check Charge Air Cooler Outlet Temperature Sensor

1. Remove charge air cooler outlet temperature sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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 6

DN22556,000042D -19-04APR11-7/13

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.
5. Monitor the Charge Air Cooler Outlet Temperature from within Service ADVISOR.

Does the sensor reading match the temperature of the hot water or ambient air within 5° F?

YES: Charge air cooler outlet temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Charge air cooler outlet temperature sensor has already been replaced. GO TO 7

NO: Replace charge air cooler outlet temperature sensor. GO TO 10

DN22556,000042D -19-04APR11-8/13

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.
4. Monitor DTCs from within Service ADVISOR.

Did 002630.03 become active?

YES: ECU has not been reprogrammed. GO TO 9

YES: ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: GO TO 8

Continued on next page

DN22556,000042D -19-04APR11-9/13

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

DN22556,000042D -19-04APR11-10/13

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 002630.00 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,000042D -19-04APR11-11/13

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 002630.00 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

DN22556,000042D -19-04APR11-12/13

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.

DN22556,000042D -19-04APR11-13/13

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.

DN22556,000042E -19-16SEP09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,000042E -19-16SEP09-2/19

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 002630.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,000042E -19-16SEP09-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect charge air cooler outlet temperature sensor connector. 3. Perform TERMINAL TEST on charge air cooler outlet temperature sensor, harness and connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,000042E -19-16SEP09-4/19

3 Sensor Open Test	Measure the resistance between Terminal 1 and Terminal 2 on the charge air cooler outlet temperature sensor. Was the resistance value greater than 7.5M ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,000042E -19-16SEP09-5/19

4 Harness Resistance Check	Measure the resistance between the return (Terminal 2) and signal (Terminal 1) in the charge air cooler outlet temperature sensor harness connector. Was the resistance between 1k and 3k ohms?	**YES:** GO TO 5 **NO:** GO TO 6

DN22556,000042E -19-16SEP09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J3-F2) and all other ECU connector terminals in the ECU harness connectors. Was any resistance less than 100 ohms?	**YES:** Look for pinched or melted 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

DN22556,000042E -19-16SEP09-7/19

6	**Harness Return Wire Resistance Check**	Measure the resistance between the return (Terminal 2) in the charge air cooler outlet temperature sensor harness connector and application single point ground. Was the resistance less than 5 ohms?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,000042E -19-16SEP09-8/19

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J3-F2) in the ECU connector and the signal (Terminal 1) in the charge air cooler outlet temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,000042E -19-16SEP09-9/19

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J3-B2) in the ECU connector and the return (Terminal 2) in the charge air cooler outlet temperature sensor harness connector. Was the resistance less than 5 ohms?	**YES:** GO TO 9 **NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,000042E -19-16SEP09-10/19

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-F2) in the ECU connector. Was the resistance between 1k and 3k ohms?	**YES:** 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. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,000042E -19-16SEP09-11/19

10	**Occurrence Count Check**	Review stored information and look at occurrence count for 002630.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 11 **NO:** GO TO 12

Continued on next page

DN22556,000042E -19-16SEP09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect charge air cooler outlet temperature sensor connector.	
	3. Perform TERMINAL TEST on charge air cooler outlet temperature sensor, harness and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 12

DN22556,000042E -19-16SEP09-13/19

12 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 13 **NO:** GO TO 15

DN22556,000042E -19-16SEP09-14/19

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 14
	Did 002630.03 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,000042E -19-16SEP09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the charge air cooler outlet temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,000042E -19-16SEP09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the charge air cooler outlet temperature sensor, harness and connector also ECU J3 and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

Continued on next page

DN22556,000042E -19-16SEP09-17/19

16 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 4. Refresh codes. Is 002630.03 active?	**YES:** GO TO 17 **NO:** GO TO 15

DN22556,000042E -19-16SEP09-18/19

17 Software Updates	1. Download latest ECU software payload and reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 002630.03 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,000042E -19-16SEP09-19/19

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.

DN22556,000042F -19-16SEP09-1/19

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,000042F -19-16SEP09-2/19

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 002630.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,000042F -19-16SEP09-3/19

2 Monitor Code Test	1. Ignition OFF, Engine OFF. 2. Disconnect the charge air cooler outlet temperature sensor connector. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 002630.03 become active and 002630.04 move to stored?	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,000042F -19-16SEP09-4/19

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on charge air cooler outlet temperature sensor harness connector. 3. Inspect harness for melted or pinched areas near the charge air cooler outlet temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,000042F -19-16SEP09-5/19

4 Sensor Short to Ground Test	Measure the resistance from each terminal on the sensor to chassis ground. **Specification** Check for short to ground—Resistance..... Greater than 1k ohm Measure the resistance between the two sensor terminals. **Specification** Check for internal short—Resistance..... Greater than 50 ohms Is either measurement out of specification?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 2 and confirm your findings. Look closely at connectors, wiring and terminal numbers where measurements were made.

Continued on next page

DN22556,000042F -19-16SEP09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the charge air cooler outlet temperature sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 6

DN22556,000042F -19-16SEP09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal 2) and signal (terminal 1) in the charge air cooler outlet temperature sensor harness connector.	**YES:** GO TO 7
	Was the resistance less than 100 ohms?	**NO:** Reconnect all connectors and GO TO 2

DN22556,000042F -19-16SEP09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J3.	
	2. Measure the resistance between the return (terminal 2) and signal (terminal 1) in the charge air cooler outlet temperature sensor harness connector.	**YES:** GO TO 8
	Was the resistance less than 100 ohms?	**NO:** GO TO 9

DN22556,000042F -19-16SEP09-9/19

8 Harness Physical Check	Terminal A has low resistance to ground, check for:	
	• Melted harness and wiring • Pinched harness and wiring.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the problem found?	**NO:** GO TO 5.

DN22556,000042F -19-16SEP09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J3-B2) and signal (terminal J3-F2) in the ECU connector.	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100 ohms?	**NO:** Reconnect all connectors and GO TO 2

DN22556,000042F -19-16SEP09-11/19

10 Occurrence Count Check	Review stored information and look at occurrence count for 002630.04.	**YES:** GO TO 11
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 12

Continued on next page

DN22556,000042F -19-16SEP09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the charge air cooler outlet temperature sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 12

DN22556,000042F -19-16SEP09-13/19

12 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 13 **NO:** GO TO 15

DN22556,000042F -19-16SEP09-14/19

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 14
	Did 002630.04 reappear when engine operating point was reached?	**NO:** GO TO 12 and confirm the operating point.

DN22556,000042F -19-16SEP09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the charge air cooler outlet temperature sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,000042F -19-16SEP09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the charge air cooler outlet temperature 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 16

Continued on next page

DN22556,000042F -19-16SEP09-17/19

16 Reconnect and Retest		
	1. Reconnect all connectors.	
	2. Ignition ON, Engine OFF.	
	3. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	4. Refresh codes.	**YES:** GO TO 17
	Is 002630.04 active?	**NO:** GO TO 15

DN22556,000042F -19-16SEP09-18/19

17 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.
	Is 002630.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,000042F -19-16SEP09-19/19

002630.15 — Charge Air Cooler Outlet Temperature Signal Slightly High

The ECU senses a Charge Air Cooler Outlet Temperature above specification.

DN22556,0000430 -19-24AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,0000430 -19-24AUG09-2/13

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

DN22556,0000430 -19-24AUG09-3/13

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

DN22556,0000430 -19-24AUG09-4/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,0000430 -19-24AUG09-5/13

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

DN22556,0000430 -19-24AUG09-6/13

5 Check Charge Air Cooler Outlet Temperature Sensor	1. Remove charge air cooler outlet temperature sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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

DN22556,0000430 -19-24AUG09-7/13

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 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

DN22556,0000430 -19-24AUG09-8/13

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

DN22556,0000430 -19-24AUG09-9/13

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

DN22556,0000430 -19-24AUG09-10/13

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 002630.15 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 10

DN22556,0000430 -19-24AUG09-11/13

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 002630.15 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

DN22556,0000430 -19-24AUG09-12/13

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.

DN22556,0000430 -19-24AUG09-13/13

002630.16 — Charge Air Cooler Outlet Temperature Signal Moderately High

The ECU senses an Charge Air Cooler Outlet Temperature above specification.

DN22556,0000431 -19-04APR11-1/13

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 13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU 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 - Yellow/Purple

Continued on next page

DN22556,0000431 -19-04APR11-2/13

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

DN22556,0000431 -19-04APR11-3/13

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

DN22556,0000431 -19-04APR11-4/13

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 INSPECT AND CHECK BELT TENSIONER SPRING TENSION in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See REPLACE BEARINGS IN FAN DRIVE 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

DN22556,0000431 -19-04APR11-5/13

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

DN22556,0000431 -19-04APR11-6/13

5 Check Charge Air Cooler Outlet Temperature Sensor

1. Remove charge air cooler outlet temperature sensor. See REMOVE AND INSTALL EXHAUST GAS RECIRCULATION (EGR) EXHAUST 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 6

DN22556,0000431 -19-04APR11-7/13

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.
5. Monitor the Charge Air Cooler Outlet Temperature from within Service ADVISOR.

Does the sensor reading match the temperature of the hot water or ambient air within 5° F?

YES: Charge air cooler outlet temperature sensor is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Charge air cooler outlet temperature sensor has already been replaced. GO TO 7

NO: Replace charge air cooler outlet temperature sensor. GO TO 10

DN22556,0000431 -19-04APR11-8/13

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.
4. Monitor DTCs from within Service ADVISOR.

Did 002630.03 become active?

YES: ECU has not been reprogrammed. GO TO 9

YES: ECU has been reprogrammed. Wire harness is OK. Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: GO TO 8

Continued on next page

DN22556,0000431 -19-04APR11-9/13

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

DN22556,0000431 -19-04APR11-10/13

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

DN22556,0000431 -19-04APR11-11/13

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

DN22556,0000431 -19-04APR11-12/13

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.

DN22556,0000431 -19-04APR11-13/13

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

DN22556,0000432 -19-16SEP09-1/23

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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3, 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU WIRING DIAGRAM 3, 13.5L 24V ECU 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 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 - Yellow/Purple
- Intake manifold air temperature sensor T02 - Yellow/Purple
- EGR temperature sensor T03 - Yellow/Purple

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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. 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 or DTC with SPN 002791.

NO: GO TO 2

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2 Check for Swapped Sensor Connectors

NOTE: The Charge Air Cooler Outlet Temperature sensor (connector T01) and the Intake Manifold Air Temperature sensor (connector T02) are identical parts and are located close to each other on the intake manifold. The connectors for the two sensors can be inadvertently swapped on some applications.

1. Inspect the wire harness to verify that the charge air outlet temperature sensor is connected to wire harness connector T01.
2. Inspect the wire harness to verify that the intake manifold air temperature sensor is connected to wire harness connector T02.

YES: Engine is at ambient temperature and has not been operated in the past eight hours. GO TO 3

NOTE: If connector tag numbers are not present, disconnect the charge air cooler outlet temperature sensor and verify that DTC 0002630.03 is generated. If DTC 000105.03 is generated instead, the sensor connectors are swapped.

YES: Engine has been operated in the past eight hours. GO TO 4

Were the sensors connected to the correct wire harness connectors?

NO: Connect the sensors to the correct wire harness connectors. GO TO 15

Continued on next page

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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

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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. *NOTE: The charge air cooler outlet temperature sensor (connector T01) and the intake manifold air temperature sensor (connector T02) are identical parts and are located close to each other. Verify that the sensors are connected to the harness correctly.* 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

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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 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

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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 (T01-1). 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 (T01-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **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. 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

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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 (T02-1). 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 (T02-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Fix problem. GO TO 5

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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

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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 (T03-1). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-2). 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 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

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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 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

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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

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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 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, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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. Inspect intake and exhaust passages for damage or blockage which would restrict EGR flow.

Were any problems found?

YES: Fix problem. 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

Continued on next page

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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

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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 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, see EXHAUST GAS RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3, 13.5L 12V ECU WIRING DIAGRAM 7
-see13.5L 24V ECU WIRING DIAGRAM 3, 13.5L 24V ECU 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 - Yellow/Purple
• Intake manifold air temperature sensor T02 - Yellow/Purple
• EGR temperature sensor T03 - Yellow/Purple

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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. 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

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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

Continued on next page

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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 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. *NOTE: The charge air cooler outlet temperature sensor (connector T01) and the intake manifold air temperature sensor (connector T02) are identical parts and are located close to each other. Verify that the sensors are connected to the harness correctly.* 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

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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 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:** Charge Air Cooler Outlet Temperature is higher or lower than the other two temperatures. GO TO 5 **NO:** Manifold Air Temperature is higher or lower than the other two temperatures. GO TO 7 **NO:** EGR Temperature is higher or lower than the other two temperatures. GO TO 9

Continued on next page

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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 (T01-1).	
	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 (T01-2).	**YES:** GO TO 6
	Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**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.	**YES:** Replace charge air cooler outlet temperature sensor. GO TO 11
	Are both resistance measurements greater than 10k ohms and is the voltage measurement less than 0.5V?	**NO:** Fix problem. GO TO 4

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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 (T02-1).	
	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 (T02-2).	**YES:** GO TO 8
	Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 4

Continued on next page

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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 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 (T03-1). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 10 **NO:** Fix problem. GO TO 4

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10 **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 11 **NO:** Fix problem. GO TO 4

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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 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

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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 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

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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 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: Open DTAC case.

Continued on next page

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14 Check EGR Valve

NOTE: For EGR valve removal and installation instructions, see REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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.

Were any problems found?

YES: Fix problem. GO TO 15

NO: GO TO 15

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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.
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 16

NO: DTC with SPN 002791 is now active. Discontinue test for 2659.15 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 16

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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

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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.

Continued on next page

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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.	**YES:** Open DTAC case.
	Is 002659.15 active?	**NO:** Problem fixed.

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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.	**YES:** GO TO 17
	Were EGR-VGT System Temperature and Flow Test results good?	**NO:** Open DTAC case.

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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

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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, EXHAUST GAS RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 3, 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU WIRING DIAGRAM 3, 13.5L 24V ECU 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.

Continued on next page

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Yellow/Purple
- Intake manifold air temperature sensor T02 - Yellow/Purple
- EGR temperature sensor T03 - Yellow/Purple

DN22556,0000434 -19-16SEP09-3/23

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.

YES: Discontinue test for 002659.17 and perform test for DTC with SPN 002791.

Did any DTC with SPN 002791 become active?

NO: GO TO 2

DN22556,0000434 -19-16SEP09-4/23

2 Check for Swapped Sensor Connectors

NOTE: The Charge Air Cooler Outlet Temperature sensor (connector T01) and the Manifold Air Temperature sensor (connector T02) are identical parts and are located close to each other on the intake manifold. The connectors for the two sensors can be inadvertently swapped on some applications.

1. Inspect the wire harness to verify that the charge air cooler outlet temperature sensor is connected to wire harness connector T01.
2. Inspect the wire harness to verify that the intake manifold air temperature sensor is connected to wire harness connector T02.

YES: Engine is at ambient temperature and has not been operated in the past eight hours. GO TO 3

NOTE: If connector tag numbers are not present, disconnect the charge air cooler outlet temperature sensor and verify that DTC 0002630.03 is generated. If DTC 000105.03 is generated instead, the sensor connectors are swapped.

YES: Engine has been operated in the past eight hours. GO TO 4

Were the sensors connected to the correct wire harness connectors?

NO: Connect the sensors to the correct wire harness connectors. GO TO 15

DN22556,0000434 -19-16SEP09-5/23

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.

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

Continued on next page

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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. *NOTE: The charge air cooler outlet temperature sensor (connector T01) and the intake manifold air temperature sensor (connector T02) are identical parts and are located close to each other. Verify that the sensors are connected to the harness correctly.* 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

DN22556,0000434 -19-16SEP09-7/23

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 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

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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 (T01-1). 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 (T01-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 5

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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

DN22556,0000434 -19-16SEP09-10/23

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 (T02-1). 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 (T02-2). 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

DN22556,0000434 -19-16SEP09-11/23

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

DN22556,0000434 -19-16SEP09-12/23

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 (T03-1). 5. On the harness, measure the resistance between the ECU EGR temperature reference (J3-B2) and the EGR temperature sensor connector reference (T03-2). Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**YES:** GO TO 11 **NO:** Fix problem. GO TO 5

DN22556,0000434 -19-16SEP09-13/23

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

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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 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

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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

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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 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

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15 Check EGR Valve

NOTE: For EGR valve removal and installation instructions, see REMOVE, INSPECT, AND INSTALL EGR VALVE (TIER 3/STAGE IIIA) 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. Inspect intake and exhaust passages for blockage which would restrict EGR flow.

Were any problems found?

YES: Fix problem. 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 2659.17 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

DN22556,0000434 -19-16SEP09-19/23

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

DN22556,0000434 -19-16SEP09-20/23

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.

Continued on next page

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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 002659.17 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 002659.17 active?	**NO:** Problem fixed.

DN22556,0000434 -19-16SEP09-22/23

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.	**YES:** GO TO 18
	Were EGR-VGT System Temperature and Flow Test results good?	**NO:** Open DTAC case.

DN22556,0000434 -19-16SEP09-23/23

002790.16 — Calculated Compressor Outlet Temperature Moderately High

The ECU determines that the turbo compressor outlet temperature is above specification.

Continued on next page

DN22556,0000435 -19-16SEP09-1/18

002790.16 — Calculated Compressor Outlet Temperature Moderately High Diagnostic Procedure

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 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 13.5L 12V ECU WIRING DIAGRAM 2-13.5L 12V ECU WIRING DIAGRAM 3
- see 13.5L 24V ECU WIRING DIAGRAM 2-13.5L 24V ECU 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 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.

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Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Charge air cooler outlet temperature sensor T01 - Yellow/Purple
- Compressor inlet temperature sensor T06 - Purple/Gray
- Compressor inlet temperature interconnect T06A - Yellow/Purple

DN22556,0000435 -19-16SEP09-3/18

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 for 000103.00 or 000103.08. **NO:** GO TO 2

DN22556,0000435 -19-16SEP09-4/18

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

DN22556,0000435 -19-16SEP09-5/18

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. EGR 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

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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. EGR Temperature	**YES:** GO TO 12
	Are temperatures indicated by these data points within 5°C (9°F) of each other?	**NO:** GO TO 6

DN22556,0000435 -19-16SEP09-7/18

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. EGR Temperature	**YES:** GO TO 12
	Are temperatures indicated by these data points within 5°C (9°F) of each other?	**NO:** GO TO 6

DN22556,0000435 -19-16SEP09-8/18

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

DN22556,0000435 -19-16SEP09-9/18

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 (T06-1).
5. On the harness, measure the resistance between the ECU compressor inlet temperature reference (J3-H3) and the compressor inlet temperature sensor connector reference (T06-2).

Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?

YES: GO TO 8

NO: Fix problem. GO TO 6

DN22556,0000435 -19-16SEP09-10/18

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

DN22556,0000435 -19-16SEP09-11/18

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

DN22556,0000435 -19-16SEP09-12/18

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

DN22556,0000435 -19-16SEP09-13/18

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.

Does Turbo Compressor Inlet Temperature data point indicate the actual ambient air temperature within 6°C (11°F)?

YES: GO TO 12

NO: Open DTAC case.

DN22556,0000435 -19-16SEP09-14/18

12 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 13

NO: Step 3 or 5 was performed earlier during this procedure. GO TO 15

NO: Step 3 or 5 was NOT performed earlier during this procedure. GO TO 5

DN22556,0000435 -19-16SEP09-15/18

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.

Is 002790.16 active?

YES: ECU has NOT been reprogrammed during this procedure. GO TO 14

YES: ECU was reprogrammed during this procedure. Open DTAC case.

NO: Problem fixed.

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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.

Is 002790.16 active?

YES: Open DTAC case.

NO: Problem fixed.

Continued on next page

DN22556,0000435 -19-16SEP09-17/18

15 Recheck System	1. Perform CHARGE AIR SYSTEM 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.

DN22556,0000435 -19-16SEP09-18/18

002791.02 — EGR Valve Position Signal Invalid (Forward)

The ECU detects the forward EGR valve is not able to achieve desired position.

Continued on next page

DN22556,0000436 -19-23JUL10-1/14

002791.02 - EGR Valve Position Signal Invalid (Forward) 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 forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 terminal - Red/Green

Continued on next page

DN22556,0000436 -19-23JUL10-2/14

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

DN22556,0000436 -19-23JUL10-3/14

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

DN22556,0000436 -19-23JUL10-4/14

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 CLEANING CYCLE 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

DN22556,0000436 -19-23JUL10-5/14

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. Calibrate using EGR VALVE RECALIBRATION.

NO: GO TO 5

Continued on next page

DN22556,0000436 -19-23JUL10-6/14

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. Calibrate using EGR VALVE RECALIBRATION.

NO: Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

DN22556,0000436 -19-23JUL10-7/14

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

DN22556,0000436 -19-23JUL10-8/14

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

DN22556,0000436 -19-23JUL10-9/14

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

DN22556,0000436 -19-23JUL10-10/14

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 CLEANING CYCLE 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. Calibrate using EGR VALVE RECALIBRATION.

DN22556,0000436 -19-23JUL10-11/14

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

DN22556,0000436 -19-23JUL10-12/14

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

DN22556,0000436 -19-23JUL10-13/14

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 CLEANING CYCLE test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Is 002791.02 active?	**YES:** Remove and replace EGR valve. Calibrate using EGR VALVE RECALIBRATION. **NO:** Clean cycle test fixed problem. Return to service.

DN22556,0000436 -19-23JUL10-14/14

002791.03 — EGR Valve Position Signal Out of Range High (Forward)

The forward EGR valve position signal indicates a value that is out of the range of the expected highest value.

DN22556,0000437 -19-23JUL10-1/31

002791.03 — EGR Valve Position Signal Out of Range High (Forward) 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 forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 EGR 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 terminal - Red/Green

Continued on next page

DN22556,0000437 -19-23JUL10-2/31

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

DN22556,0000437 -19-23JUL10-3/31

2 Valve Position Check	Using Service ADVISOR monitor EGR Valve Position Input Voltage (Forward). Is voltage below 5.5 volts?	**YES:** GO TO 3 **NO:** GO TO 16

DN22556,0000437 -19-23JUL10-4/31

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

DN22556,0000437 -19-23JUL10-5/31

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

DN22556,0000437 -19-23JUL10-6/31

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. Calibrate using EGR VALVE RECALIBRATION.

DN22556,0000437 -19-23JUL10-7/31

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

DN22556,0000437 -19-23JUL10-8/31

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

DN22556,0000437 -19-23JUL10-9/31

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.

DN22556,0000437 -19-23JUL10-10/31

9 ECU Connector Check	1. Disconnect ECU connector J3 (blue face). 2. Perform a TERMINAL TEST , see TERMINAL TEST earlier in this Group. Were any problems found?	**YES:** Repair problem and reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 10

Continued on next page

DN22556,0000437 -19-23JUL10-11/31

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.

DN22556,0000437 -19-23JUL10-12/31

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.

DN22556,0000437 -19-23JUL10-13/31

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.

DN22556,0000437 -19-23JUL10-14/31

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

DN22556,0000437 -19-23JUL10-15/31

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.

Continued on next page

DN22556,0000437 -19-23JUL10-16/31

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.

DN22556,0000437 -19-23JUL10-17/31

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

DN22556,0000437 -19-23JUL10-18/31

17 EGR Valve Position Voltage Check	1. EGR valve and ECU connector J3 still disconnected.	
	2. Ignition ON, Engine OFF.	
	3. Using Service ADVISOR monitor EGR Valve Position Input Voltage (Forward).	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST
	Is voltage above 5.5 volts?	**NO:** GO TO 18

DN22556,0000437 -19-23JUL10-19/31

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.	**YES:** Repair, reconnect. Run HARNESS DIAGNOSTIC MODE TEST.
	Was a short found?	**NO:** Look at the harness and see if you can find any pinched, frayed or melted wiring. Repair, reconnect. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

DN22556,0000437 -19-23JUL10-20/31

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.	**YES:** GO TO 20
	Is count greater that five?	**NO:** GO TO 21

DN22556,0000437 -19-23JUL10-21/31

20 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 21

DN22556,0000437 -19-23JUL10-22/31

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

DN22556,0000437 -19-23JUL10-23/31

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.

DN22556,0000437 -19-23JUL10-24/31

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

Continued on next page

DN22556,0000437 -19-23JUL10-25/31

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.

Did 002791.03 reappear active?

YES: Replace EGR valve. Calibrate EGR Valve using EGR VALVE RECALIBRATION.

NO: Check wiring harness for pinched, frayed or melted wires.

DN22556,0000437 -19-23JUL10-26/31

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 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 26

NO: GO TO 27

DN22556,0000437 -19-23JUL10-27/31

26 EGR Valve Cleaning Cycle

1. Ignition ON, Engine ON.
2. Warm engine to normal operating temperature.
3. Run EGR VALVE CLEANING CYCLE 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. Calibrate using EGR VALVE RECALIBRATION.

Did any 002791 code appear active?

NO: Cleaning fixed problem.

DN22556,0000437 -19-23JUL10-28/31

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

Continued on next page

DN22556,0000437 -19-23JUL10-29/31

28 EGR Valve Replacement / Recalibration Check	1. Replace EGR valve. 2. Calibrate, use EGR VALVE RECALIBRATION. 3. Refresh codes. Did 002791.03 reappear active?	**YES:** GO TO 29 **NO:** Problem fixed. Bad EGR valve.

DN22556,0000437 -19-23JUL10-30/31

29 ECU Connector Terminal Test	1. Disconnect ECU connector. 2. Perform TERMINAL TEST . Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

DN22556,0000437 -19-23JUL10-31/31

002791.04 — EGR Valve Position Signal Out of Range Low (Forward)

The forward EGR valve position signal indicates a value that is out of the range of the expected lowest value.

DN22556,0000438 -19-23JUL10-1/17

002791.04 — EGR Valve Position Signal Out of Range Low (Forward) 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 forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 EGR 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 terminal - Red/Green

Continued on next page

DN22556,0000438 -19-23JUL10-2/17

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

DN22556,0000438 -19-23JUL10-3/17

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

DN22556,0000438 -19-23JUL10-4/17

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

DN22556,0000438 -19-23JUL10-5/17

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. Calibrate using EGR VALVE RECALIBRATION.

Continued on next page

DN22556,0000438 -19-23JUL10-6/17

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. Is the measurement less than 2 ohms?	**YES:** GO TO 6 **NO:** Recheck connector and wiring. Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST.

DN22556,0000438 -19-23JUL10-7/17

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. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

DN22556,0000438 -19-23JUL10-8/17

7 Short To Ground Test	1. ECU J3 still disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Did 002791.04 go stored and 002791.03 become active?	 **YES:** Repair short in harness. Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

DN22556,0000438 -19-23JUL10-9/17

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. Is count greater that five?	 **YES:** GO TO 9 **NO:** GO TO 10

DN22556,0000438 -19-23JUL10-10/17

9 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 10

Continued on next page

DN22556,0000438 -19-23JUL10-11/17

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

DN22556,0000438 -19-23JUL10-12/17

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.

DN22556,0000438 -19-23JUL10-13/17

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. Calibrate, see EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

DN22556,0000438 -19-23JUL10-14/17

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

DN22556,0000438 -19-23JUL10-15/17

14 EGR Valve Replacement/Recalibration Check	1. Replace EGR valve. 2. Ignition ON, Engine OFF 3. Calibrate, use EGR VALVE RECALIBRATION. 4. Refresh codes. Did 002791.04 reappear active?	**YES:** GO TO 15 **NO:** Problem fixed. Bad EGR valve.

DN22556,0000438 -19-23JUL10-16/17

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.

DN22556,0000438 -19-23JUL10-17/17

002791.07 — EGR Valve Not Reaching Expected Position (Forward)

The ECU detects that the forward exhaust gas recirculation valve is not responding or is out of adjustment.

DN22556,0000439 -19-26JUL10-1/22

002791.07 - EGR Valve Not Reaching Expected Position (Forward) 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 forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 terminal - Red/Green

Continued on next page

DN22556,0000439 -19-26JUL10-2/22

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

DN22556,0000439 -19-26JUL10-3/22

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

DN22556,0000439 -19-26JUL10-4/22

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.

DN22556,0000439 -19-26JUL10-5/22

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 CLEANING CYCLE 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

DN22556,0000439 -19-26JUL10-6/22

5 EGR Valve Stored Positions Values Check	1. Ignition ON, Engine OFF.	
	2. Monitor the following parameters: • EGR Valve Latest Learned Open Position (Forward) **Specification** —Typical Open Values.....84.0000 - 88.0000 • EGR Valve Latest Learned Closed Position (Forward) **Specification** —Typical Closed Values .....18.0000 - 22.0000	**YES:** GO TO 19
	Are the values within specifications?	**NO:** GO TO 6

DN22556,0000439 -19-26JUL10-7/22

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. Calibrate using EGR VALVE RECALIBRATION.

DN22556,0000439 -19-26JUL10-8/22

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. Calibrate using EGR VALVE RECALIBRATION.

DN22556,0000439 -19-26JUL10-9/22

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. Calibrate using EGR VALVE RECALIBRATION.
	Were any problems found?	**NO:** GO TO 9

Continued on next page

DN22556,0000439 -19-26JUL10-10/22

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. Calibrate using EGR VALVE RECALIBRATION.
	GO TO Part 2 Is 002791.07 active?	**YES:** GO TO 10 **NO:** Problem intermittent, check connector and wiring.

DN22556,0000439 -19-26JUL10-11/22

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

DN22556,0000439 -19-26JUL10-12/22

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.

DN22556,0000439 -19-26JUL10-13/22

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.

DN22556,0000439 -19-26JUL10-14/22

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

DN22556,0000439 -19-26JUL10-15/22

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

DN22556,0000439 -19-26JUL10-16/22

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

DN22556,0000439 -19-26JUL10-17/22

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 CLEANING CYCLE 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. Calibrate using EGR VALVE RECALIBRATION.

NO: Cleaning fixed problem. Return to service.

DN22556,0000439 -19-26JUL10-18/22

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

DN22556,0000439 -19-26JUL10-19/22

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.

DN22556,0000439 -19-26JUL10-20/22

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

DN22556,0000439 -19-26JUL10-21/22

20 Reprogram ECU	1. Download latest ECU software payload.	
	2. Reprogram ECU.	
	3. Run EGR VALVE CLEANING CYCLE test.	
	4. Refresh codes.	**YES:** Start a DTAC case.
	Is 002791.07 active?	**NO:** Problem fixed.

DN22556,0000439 -19-26JUL10-22/22

002791.13 — EGR Valve Calibration Change Over a Short Period of Time (Forward)

This code indicates the forward 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

DN22556,000043A -19-26JUL10-1/17

002791.13 — EGR Valve Calibration Change Over a Short Period of Time (Forward) 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 forward 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 forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 .

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DN22556,000043A -19-26JUL10-2/17

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR valve terminal - Red/Green

DN22556,000043A -19-26JUL10-3/17

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

DN22556,000043A -19-26JUL10-4/17

2 Valve Change Inquiry	Has EGR valve recently been changed?	**YES:** GO TO 3 **YES:** GO TO Part 2. **NO:** Calibrate using EGR VALVE RECALIBRATION. **NO:** GO TO 3
	Part 2. Was EGR valve calibrated?	

DN22556,000043A -19-26JUL10-5/17

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

DN22556,000043A -19-26JUL10-6/17

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

DN22556,000043A -19-26JUL10-7/17

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 CLEANING CYCLE test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Refer to Trouble Shooting Sequence earlier in this procedure.
	7. Refresh codes.	**NO:** No DTCs with an SPN or 002791 appeared active. Cleaning cycle fixed problem. Return to service.
	Did any DTC with an SPN of 002791 appear active other than 002791.13?	**NO:** Only 002791.13 appeared active. GO TO 6

DN22556,000043A -19-26JUL10-8/17

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.	**YES:** Damaged EGR valve. Replace EGR valve. Calibrate using EGR 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 7

DN22556,000043A -19-26JUL10-9/17

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.	**YES:** Replace EGR valve. Calibrate using EGR VALVE RECALIBRATION.
	Did valve move smoothly, open and close fully and 002791.13 reappear active?	**NO:** Moved smoothly and DTC 002791.31 did not reappear. Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

DN22556,000043A -19-26JUL10-10/17

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

DN22556,000043A -19-26JUL10-11/17

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

DN22556,000043A -19-26JUL10-12/17

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

DN22556,000043A -19-26JUL10-13/17

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 CLEANING CYCLE 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. Calibrate using EGR VALVE RECALIBRATION.

Continued on next page

DN22556,000043A -19-26JUL10-14/17

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

DN22556,000043A -19-26JUL10-15/17

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** Replace EGR valve. Calibrate using EGR VALVE RECALIBRATION.
	Did Code reappear active?	**NO:** GO TO 12 and confirm operating point.

DN22556,000043A -19-26JUL10-16/17

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 CLEANING CYCLE test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	
	7. Refresh codes.	**YES:** Remove and replace EGR valve. Calibrate using EGR VALVE RECALIBRATION.
	Is 002791.13 active?	**NO:** Cleaning Test fixed problem. Return to service.

DN22556,000043A -19-26JUL10-17/17

002791.31 — EGR Valve Calibration Change Over a Long Period of Time (Forward)

This code indicates the forward EGR valve Open and Closed learned values have moved outside of programmed tolerance over a long period of time.

Continued on next page

DN22556,000043B -19-26JUL10-1/15

002791.31 — EGR Valve Calibration Change Over a Long Period of Time (Forward) 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 forward EGR valve Open and Closed learned values have moved outside of programmed tolerance over a long period of time.

The ECU detects the forward 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 terminal - Red/Green

Continued on next page

DN22556,000043B -19-26JUL10-2/15

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

DN22556,000043B -19-26JUL10-3/15

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

DN22556,000043B -19-26JUL10-4/15

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.

DN22556,000043B -19-26JUL10-5/15

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 CLEANING CYCLE 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

DN22556,000043B -19-26JUL10-6/15

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. Calibrate using EGR 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

DN22556,000043B -19-26JUL10-7/15

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. Calibrate using EGR VALVE RECALIBRATION.
	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.

DN22556,000043B -19-26JUL10-8/15

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

DN22556,000043B -19-26JUL10-9/15

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

DN22556,000043B -19-26JUL10-10/15

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

DN22556,000043B -19-26JUL10-11/15

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 CLEANING CYCLE 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. Calibrate using EGR VALVE RECALIBRATION.

DN22556,000043B -19-26JUL10-12/15

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

DN22556,000043B -19-26JUL10-13/15

12 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	
	2. Set engine to operating point that caused error.	**YES:** Replace EGR valve. Calibrate using EGR VALVE RECALIBRATION.
	Did Code reappear active?	**NO:** GO TO 10 and confirm operating point.

Continued on next page

DN22556,000043B -19-26JUL10-14/15

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 CLEANING CYCLE test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Is 002791.31 active?	**YES:** Remove and replace EGR valve. Calibrate using EGR VALVE RECALIBRATION. **NO:** Cleaning Test fixed problem. Return to service.

DN22556,000043B -19-26JUL10-15/15

002795.07 — VGT Actuator Not Reaching Expected Position

The ECU senses a mismatch between the actual and desired turbo actuator position.

DN22556,000043C -19-31MAR11-1/11

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 OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 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 X04 - Yellow/Purple

Continued on next page

DN22556,000043C -19-31MAR11-2/11

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

DN22556,000043C -19-31MAR11-3/11

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.

DN22556,000043C -19-31MAR11-4/11

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, TURBO LEARN VALUE RESET TEST.

DN22556,000043C -19-31MAR11-5/11

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

DN22556,000043C -19-31MAR11-6/11

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

DN22556,000043C -19-31MAR11-7/11

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

DN22556,000043C -19-31MAR11-8/11

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.

DN22556,000043C -19-31MAR11-9/11

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

DN22556,000043C -19-31MAR11-10/11

9 Actuator Removal and Install	1. Reconnect ECU connector.	
	2. Remove and Install turbo actuator, see REMOVE AND INSTALL VARIABLE GEOMETRY TURBOCHARGER ACTUATOR in base engine manual. Recalibrate, see VGT — LEARN VALUE RESET INSTRUCTIONS.	
	3. Ignition ON, Engine ON.	
	4. Refresh codes	**YES:** Replace turbo. Recalibrate, see VGT — LEARN VALUE RESET INSTRUCTIONS.
	Were any problems found?	**NO:** Return unit to service.

DN22556,000043C -19-31MAR11-11/11

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.

DN22556,000043F -19-16SEP09-1/12

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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

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DN22556,000043F -19-16SEP09-2/12

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

DN22556,000043F -19-16SEP09-3/12

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

DN22556,000043F -19-16SEP09-4/12

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

DN22556,000043F -19-16SEP09-5/12

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

DN22556,000043F -19-16SEP09-6/12

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

DN22556,000043F -19-16SEP09-7/12

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

DN22556,000043F -19-16SEP09-8/12

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

DN22556,000043F -19-16SEP09-9/12

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.

DN22556,000043F -19-16SEP09-10/12

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

DN22556,000043F -19-16SEP09-11/12

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.

DN22556,000043F -19-16SEP09-12/12

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.

DN22556,0000440 -19-16SEP09-1/15

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 13.5L 12V ECU WIRING DIAGRAM 2
- see 13.5L 24V ECU 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 pressure sensor P07 - Purple/Gray
- Intake manifold air pressure sensor T02 - Yellow/Purple

Continued on next page

DN22556,0000440 -19-16SEP09-2/15

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

DN22556,0000440 -19-16SEP09-3/15

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.

DN22556,0000440 -19-16SEP09-4/15

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

DN22556,0000440 -19-16SEP09-5/15

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

DN22556,0000440 -19-16SEP09-6/15

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.

DN22556,0000440 -19-16SEP09-7/15

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

DN22556,0000440 -19-16SEP09-8/15

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

DN22556,0000440 -19-16SEP09-9/15

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

DN22556,0000440 -19-16SEP09-10/15

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

DN22556,0000440 -19-16SEP09-11/15

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

DN22556,0000440 -19-16SEP09-12/15

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.

DN22556,0000440 -19-16SEP09-13/15

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

DN22556,0000440 -19-16SEP09-14/15

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.

DN22556,0000440 -19-16SEP09-15/15

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.

DN22556,0000441 -19-24AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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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DN22556,0000441 -19-24AUG09-2/13

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

DN22556,0000441 -19-24AUG09-3/13

2 ECU Programming Harness Availability

Is the ECU programming harness available for use?

YES: GO TO 3

NO: GO TO 4

DN22556,0000441 -19-24AUG09-4/13

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

DN22556,0000441 -19-24AUG09-5/13

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

DN22556,0000441 -19-24AUG09-6/13

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.

DN22556,0000441 -19-24AUG09-7/13

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

DN22556,0000441 -19-24AUG09-8/13

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

DN22556,0000441 -19-24AUG09-9/13

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

DN22556,0000441 -19-24AUG09-10/13

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

DN22556,0000441 -19-24AUG09-11/13

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

DN22556,0000441 -19-24AUG09-12/13

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.

DN22556,0000441 -19-24AUG09-13/13

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.

DN22556,0000442 -19-25MAR11-1/16

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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 6
- see 13.5L 24V ECU 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 C09 - Yellow/Purple
• Panel connector large terminal C09 - Yellow/Bule

Continued on next page

DN22556,0000442 -19-25MAR11-2/16

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

DN22556,0000442 -19-25MAR11-3/16

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.

DN22556,0000442 -19-25MAR11-4/16

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

DN22556,0000442 -19-25MAR11-5/16

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

DN22556,0000442 -19-25MAR11-6/16

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.

DN22556,0000442 -19-25MAR11-7/16

6 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,0000442 -19-25MAR11-8/16

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

DN22556,0000442 -19-25MAR11-9/16

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

DN22556,0000442 -19-25MAR11-10/16

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

DN22556,0000442 -19-25MAR11-11/16

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

DN22556,0000442 -19-25MAR11-12/16

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

DN22556,0000442 -19-25MAR11-13/16

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.

DN22556,0000442 -19-25MAR11-14/16

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

DN22556,0000442 -19-25MAR11-15/16

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.

DN22556,0000442 -19-25MAR11-16/16

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.

DN22556,0000443 -19-24AUG09-1/13

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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

DN22556,0000443 -19-24AUG09-2/13

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

DN22556,0000443 -19-24AUG09-3/13

2 ECU Programming Harness Availability

Is the ECU programming harness available for use?

YES: GO TO 3

NO: GO TO 4

DN22556,0000443 -19-24AUG09-4/13

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

DN22556,0000443 -19-24AUG09-5/13

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

DN22556,0000443 -19-24AUG09-6/13

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.

DN22556,0000443 -19-24AUG09-7/13

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

DN22556,0000443 -19-24AUG09-8/13

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

DN22556,0000443 -19-24AUG09-9/13

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

DN22556,0000443 -19-24AUG09-10/13

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.

DN22556,0000443 -19-24AUG09-11/13

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

DN22556,0000443 -19-24AUG09-12/13

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.

DN22556,0000443 -19-24AUG09-13/13

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.

DN22556,0000444 -19-25MAR11-1/15

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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 5
- see 13.5L 24V ECU 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 C08 - Yellow/Purple

Continued on next page

DN22556,0000444 -19-25MAR11-2/15

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

DN22556,0000444 -19-25MAR11-3/15

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.

DN22556,0000444 -19-25MAR11-4/15

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

DN22556,0000444 -19-25MAR11-5/15

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

DN22556,0000444 -19-25MAR11-6/15

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.

DN22556,0000444 -19-25MAR11-7/15

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

DN22556,0000444 -19-25MAR11-8/15

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.

DN22556,0000444 -19-25MAR11-9/15

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

DN22556,0000444 -19-25MAR11-10/15

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

DN22556,0000444 -19-25MAR11-11/15

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

DN22556,0000444 -19-25MAR11-12/15

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

DN22556,0000444 -19-25MAR11-13/15

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

DN22556,0000444 -19-25MAR11-14/15

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.

DN22556,0000444 -19-25MAR11-15/15

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.

DN22556,0000445 -19-24AUG09-1/12

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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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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DN22556,0000445 -19-24AUG09-2/12

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

DN22556,0000445 -19-24AUG09-3/12

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

DN22556,0000445 -19-24AUG09-4/12

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

DN22556,0000445 -19-24AUG09-5/12

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

DN22556,0000445 -19-24AUG09-6/12

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

DN22556,0000445 -19-24AUG09-7/12

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

DN22556,0000445 -19-24AUG09-8/12

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

DN22556,0000445 -19-24AUG09-9/12

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

DN22556,0000445 -19-24AUG09-10/12

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

DN22556,0000445 -19-24AUG09-11/12

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.

DN22556,0000445 -19-24AUG09-12/12

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.

DN22556,0000446 -19-24AUG09-1/15

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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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
• EGR valve terminal - Red/Green

Continued on next page

DN22556,0000446 -19-24AUG09-2/15

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

DN22556,0000446 -19-24AUG09-3/15

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.

DN22556,0000446 -19-24AUG09-4/15

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

DN22556,0000446 -19-24AUG09-5/15

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

DN22556,0000446 -19-24AUG09-6/15

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.

DN22556,0000446 -19-24AUG09-7/15

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

DN22556,0000446 -19-24AUG09-8/15

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

DN22556,0000446 -19-24AUG09-9/15

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

DN22556,0000446 -19-24AUG09-10/15

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

DN22556,0000446 -19-24AUG09-11/15

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

DN22556,0000446 -19-24AUG09-12/15

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.

DN22556,0000446 -19-24AUG09-13/15

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

DN22556,0000446 -19-24AUG09-14/15

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.

DN22556,0000446 -19-24AUG09-15/15

003822.02 — EGR Valve Position Signal Invalid (Rear)

The ECU detects the rear EGR valve is not able to achieve desired position.

Continued on next page

RG41221,000028C -19-16SEP09-1/14

003822.02 - EGR Valve Position Signal Invalid (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
003822.02

When DTC is Displayed:
Only when the engine is running and the error is active.

Related Information
The ECU detects the rear 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 for information on use.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR valve terminal - Red/Green

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RG41221,000028C -19-16SEP09-2/14

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 003822 other than 003822.02 or 000110.17 DTC active?

YES: Refer to Trouble Shooting Sequence earlier in this procedure.

NO: Only DTC 003822.02 is active. GO TO 2

NO: No DTCs are active. GO TO 6

RG41221,000028C -19-16SEP09-3/14

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 -19-16SEP09-4/14

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 CLEANING CYCLE 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 003822 other than 003822.02 or 000110.17 DTC active?

YES: Refer to Trouble Shooting Sequence earlier in this procedure.

NO: GO TO 4

RG41221,000028C -19-16SEP09-5/14

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 CALIBRATION.

NO: GO TO 5

Continued on next page

RG41221,000028C -19-16SEP09-6/14

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 003822.02 reappear active?	**YES:** Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION. **NO:** Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028C -19-16SEP09-7/14

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 -19-16SEP09-8/14

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 -19-16SEP09-9/14

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 -19-16SEP09-10/14

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 CLEANING CYCLE 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 003822.03 or 003822.04 appear active?	**NO:** DTC 003822.02 appeared. Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

RG41221,000028C -19-16SEP09-11/14

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 -19-16SEP09-12/14

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 -19-16SEP09-13/14

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 CLEANING CYCLE test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Is 003822.02 active?	**YES:** Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION. **NO:** Cleaning Test fixed problem. Return to service.

RG41221,000028C -19-16SEP09-14/14

003822.03 — EGR Valve Position Signal Out of Range High (Rear)

The rear EGR valve position signal indicates a value that is out of the range of the expected highest value.

RG41221,000028D -19-16SEP09-1/31

003822.03 — EGR Valve Position Signal Out of Range High (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.03
003822.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The rear 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 003822.07 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 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 for information on use.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR valve terminal - Red/Green

Continued on next page

RG41221,000028D -19-16SEP09-2/31

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 003822.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 19

RG41221,000028D -19-16SEP09-3/31

2 Valve Position Check	Using Service ADVISOR read EGR Valve Position Input Voltage (Rear). Is voltage below 5.5 volts?	**YES:** GO TO 3 **NO:** GO TO 16

RG41221,000028D -19-16SEP09-4/31

3 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the rear 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 -19-16SEP09-5/31

4 EGR Valve Reconnection Test	1. Reconnect the rear EGR valve connector. 2. Ignition ON, Engine OFF. 3. Refresh codes. Did 003822.03 reappear active?	**YES:** GO TO 5 **NO:** Problem fixed. Bad EGR valve connection.

Continued on next page

RG41221,000028D -19-16SEP09-6/31

5 EGR Valve Position Circuit Resistance Test	1. Ignition OFF, Engine OFF. 2. Disconnect rear 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 CALIBRATION.

RG41221,000028D -19-16SEP09-7/31

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 -19-16SEP09-8/31

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 -19-16SEP09-9/31

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 -19-16SEP09-10/31

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 -19-16SEP09-11/31

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 -19-16SEP09-12/31

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 -19-16SEP09-13/31

12 ECU - EGR Valve Position Input Circuit Resistance Test	Measure the resistance between the position input (terminal J3-A4) 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 109k and 111k ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028D -19-16SEP09-14/31

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 -19-16SEP09-15/31

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 -19-16SEP09-16/31

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 -19-16SEP09-17/31

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 rear EGR valve connector.	
	4. Perform a TERMINAL TEST on ECU and rear 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 -19-16SEP09-18/31

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 Exhaust Gas Recirculation 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 -19-16SEP09-19/31

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 -19-16SEP09-20/31

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 -19-16SEP09-21/31

20 EGR Valve Connector Test

1. Disconnect rear 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 -19-16SEP09-22/31

21 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 22

NO: GO TO 25

Continued on next page

RG41221,000028D -19-16SEP09-23/31

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 003822.03 reappear active?	**NO:** GO TO 22 and confirm the operating point.

RG41221,000028D -19-16SEP09-24/31

23 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect rear 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 -19-16SEP09-25/31

24 Engine Error Operating Point Test Two	1. Reconnect rear 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 CALIBRATION.
	Did 003822.03 reappear active?	**NO:** Check wiring harness for pinched, frayed or melted wires.

RG41221,000028D -19-16SEP09-26/31

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 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:** GO TO 26
	Is the difference greater than 50 hours?	**NO:** GO TO 27

Continued on next page

RG41221,000028D -19-16SEP09-27/31

26 EGR Valve Cleaning Cycle	1. Ignition ON, Engine ON.	
	2. Warm engine to normal operating temperature.	
	3. Run EGR VALVE CLEANING CYCLE test.	
	4. Ignition ON, Engine OFF.	
	5. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** 003822.03 or 003822.04. Troubleshoot the active code.
	6. Refresh codes.	**YES:** Any other 003822 code. Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did any 003822 code appear active?	**NO:** Cleaning fixed problem.

RG41221,000028D -19-16SEP09-28/31

27 EGR Valve Connector Terminal Test	1. Disconnect rear 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 -19-16SEP09-29/31

28 EGR Valve Replacement / Recalibration Check	1. Replace EGR valve.	
	2. Recalibrate, use EXHAUST GAS RECIRCULATION VALVE CALIBRATION.	
	3. Refresh codes.	**YES:** GO TO 29
	Did 003822.03 reappear active?	**NO:** Problem fixed. Bad EGR valve.

RG41221,000028D -19-16SEP09-30/31

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 -19-16SEP09-31/31

003822.04 — EGR Valve Position Signal Out of Range Low (Rear)

The rear EGR valve position signal indicates a value that is out of the range of the expected lowest value.

RG41221,000028E -19-16SEP09-1/17

003822.04 — EGR Valve Position Signal Out of Range Low (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.04
003822.04

When DTC is Displayed:
Whenever the ignition is on and the error is active.

Related Information:
The rear EGR valve position signal indicates a value that is out of the range of the expected lowest value.

Alarm Level:
Warning

Control Unit Response:
003822.07 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 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
- EGR valve terminal - Red/Green

Continued on next page

RG41221,000028E -19-16SEP09-2/17

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 003822.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 8

RG41221,000028E -19-16SEP09-3/17

2 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the rear 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 -19-16SEP09-4/17

3 EGR Valve Disconnected Test	1. Leave the rear EGR valve connector disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Did 003822.03 appear active?	**YES:** GO TO 4 **NO:** GO TO 5

RG41221,000028E -19-16SEP09-5/17

4 EGR Valve Position Circuit Resistance Test	1. Ignition OFF, Engine OFF. 2. Disconnect rear 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 CALIBRATION.

Continued on next page

RG41221,000028E -19-16SEP09-6/17

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 -19-16SEP09-7/17

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 -19-16SEP09-8/17

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 003822.04 go stored and 003822.03 become active??	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,000028E -19-16SEP09-9/17

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 -19-16SEP09-10/17

9 EGR Valve Connector Test	1. Disconnect rear 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 -19-16SEP09-11/17

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 -19-16SEP09-12/17

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 003822.04 reappear active?	**NO:** GO TO 10 and confirm the operating point.

RG41221,000028E -19-16SEP09-13/17

12 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect rear 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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

RG41221,000028E -19-16SEP09-14/17

13 EGR Valve Connector Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect rear 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 -19-16SEP09-15/17

14 EGR Valve Replacement/Recalibration Check	1. Replace EGR valve. 2. Ignition ON, Engine OFF 3. Recalibrate, use EXHAUST GAS RECIRCULATION VALVE CALIBRATION. 4. Refresh codes. Did 003822.04 reappear active?	**YES:** GO TO 15 **NO:** Problem fixed. Bad EGR valve.

RG41221,000028E -19-16SEP09-16/17

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 -19-16SEP09-17/17

003822.07 — EGR Valve Not Reaching Expected Position (Rear)

The ECU detects that the rear exhaust gas recirculation valve is not responding or is out or adjustment.

RG41221,0000291 -19-16SEP09-1/22

003822.07 - EGR Valve Not Reaching Expected Position (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
003822.03 or 003822.04
003822.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information
The ECU detects that the rear exhaust gas recirculation valve is not responding or is out or 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 for information on use.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- EGR valve terminal - Red/Green

Continued on next page

RG41221,0000291 -19-16SEP09-2/22

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 003822.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

RG41221,0000291 -19-16SEP09-3/22

2 EGR Valve Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the rear 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 -19-16SEP09-4/22

3 EGR Valve Reconnection Test	1. Reconnect the rear EGR valve connector. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Did 003822.07 reappear active?	**YES:** GO TO 4 **NO:** Problem fixed. Bad EGR valve connection.

RG41221,0000291 -19-16SEP09-5/22

4 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector. 2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR VALVE CLEANING CYCLE test. 5. Ignition ON, Engine OFF. 6. Run HARNESS DIAGNOSTIC MODE TEST. 7. Refresh codes. Did 003822.03 or 003822.04 appear active?	**YES:** Go troubleshoot that code. **NO:** GO TO Part 2
	Part 2 Is 003822.07 active?	**YES:** GO TO 5 **NO:** Cleaning cycle fixed problem.

Continued on next page

RG41221,0000291 -19-16SEP09-6/22

5 EGR Valve Stored Positions Values Check	1. Ignition ON, Engine OFF. 2. Monitor the following parameters: • EGR Valve Latest Learned Open Position (Rear) **Specification** —Typical Open Values.....84.0000 - 88.0000 • EGR Valve Latest Learned Closed Position (Rear) **Specification** —Typical Closed Values .....18.0000 - 22.0000 Are the values within specifications?	**YES:** GO TO 19 **NO:** GO TO 6

RG41221,0000291 -19-16SEP09-7/22

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. Is resistance between 2.5 and 4.5 ohms?	**YES:** GO TO 7 **NO:** Bad drive motor in EGR valve. Replace valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

RG41221,0000291 -19-16SEP09-8/22

7 EGR Valve Position Circuit Resistance Test	1. Disconnect rear 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. Are all values between 20k and 95k ohms?	**YES:** GO TO 8 **NO:** Bad position circuit in EGR valve. Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

Continued on next page

RG41221,0000291 -19-16SEP09-9/22

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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Were any problems found?	**NO:** GO TO 9

RG41221,0000291 -19-16SEP09-10/22

9 Visual Inspection of EGR Valve Movement	1. Reconnect rear 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:** GO TO Part 2
	Did valve move smoothly and close fully?	**NO:** Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Part 2	**YES:** GO TO 10
	Is 003822.07 active?	**NO:** Problem intermittent, check connector and wiring.

RG41221,0000291 -19-16SEP09-11/22

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.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 11

RG41221,0000291 -19-16SEP09-12/22

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).	**YES:** GO TO 12
	Is resistance less than 2 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,0000291 -19-16SEP09-13/22

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).	**YES:** GO TO 13
	Is resistance less than 2 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

RG41221,0000291 -19-16SEP09-14/22

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.	**YES:** GO TO 14
	Is count greater than five?	**NO:** GO TO 15

RG41221,0000291 -19-16SEP09-15/22

14 EGR Valve Connector Terminal Test	1. Disconnect rear EGR valve connector.	
	2. Perform TERMINAL TEST.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any problems found?	**NO:** GO TO 15

RG41221,0000291 -19-16SEP09-16/22

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.	**YES:** GO TO 16
	Is the difference greater than 50 hours?	**NO:** GO TO 17

RG41221,0000291 -19-16SEP09-17/22

16 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR VALVE CLEANING CYCLE test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	
	7. Refresh codes.	**YES:** If code is 003822.03 or 003822.04 troubleshoot that code. Otherwise replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did any 003822 code other than 003822.07 appear active?	**NO:** Cleaning fixed problem. Return to service.

Continued on next page

RG41221,0000291 -19-16SEP09-18/22

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

RG41221,0000291 -19-16SEP09-19/22

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 003822.07 reappear active?	**NO:** GO TO 17 and confirm operating point.

RG41221,0000291 -19-16SEP09-20/22

19 EGR Valve Connector and ECU Connectors Terminal Test	1. Disconnect rear 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 -19-16SEP09-21/22

20 Reprogram ECU	1. Download latest ECU software payload.	
	2. Reprogram ECU.	
	3. Run EGR VALVE CLEANING CYCLE test.	
	4. Refresh codes.	**YES:** Start a DTAC case.
	Is 003822.07 active?	**NO:** Problem fixed.

RG41221,0000291 -19-16SEP09-22/22

003822.13 — EGR Valve Calibration Change Over a Short Period of Time (Rear)

This code indicates the rear 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 -19-16SEP09-1/16

003822.13 — EGR Valve Calibration Change Over a Short Period of Time (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
003822.03 or 003822.04
003822.07
003822.13

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information
This code indicates the rear EGR valve Open and Closed learned values have moved out side of programmed tolerance in a short period of time or the EGR valve was replaced and not recalibrated.

The ECU detects the rear 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 RECIRCULATOR (EGR) & VARIABLE GEOMETRY TURBOCHARGER (VGT) OPERATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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
- EGR valve terminal - Red/Green

Continued on next page

RG41221,0000292 -19-16SEP09-2/16

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. Run HARNESS DIAGNOSTIC MODE TEST. 5. Refresh codes. Is 003822.13 still active?	**YES:** GO TO 22 **NO:** GO TO 8

RG41221,0000292 -19-16SEP09-3/16

2 Valve Change Inquiry	Has EGR valve recently been changed?	**YES:** GO TO 3 **YES:** GO TO Part 2. **NO:** Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION. **NO:** GO TO 3
	Part 2. Was EGR valve calibrated?	

RG41221,0000292 -19-16SEP09-4/16

3 EGR Valve Connector Check	1. Ignition OFF, Engine OFF. 2. Disconnect the rear 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 -19-16SEP09-5/16

4 EGR Valve Reconnection Test	1. Reconnect the rear EGR valve connector. 2. Ignition ON, Engine OFF. 3. Run HARNESS DIAGNOSTIC MODE TEST. 4. Refresh codes. Did 003822.13 reappear active?	**YES:** GO TO 5 **NO:** Problem fixed. Bad EGR valve connection.

Continued on next page

RG41221,0000292 -19-16SEP09-6/16

5 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR VALVE CLEANING CYCLE test.	
	5. Ignition ON, Engine OFF.	
	6. Run HARNESS DIAGNOSTIC MODE TEST.	**YES:** Refer to Trouble Shooting Sequence earlier in this procedure.
	7. Refresh codes.	**NO:** No DTCs with an SPN or 003822 appeared active. Cleaning cycle fixed problem. Return to service
	Did any DTC with an SPN of 003822 appear active other than 003822.13?	**NO:** Only 003822.13 appeared active. GO TO 6

RG41221,0000292 -19-16SEP09-7/16

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.	**YES:** Damaged EGR valve. Replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	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 7

RG41221,0000292 -19-16SEP09-8/16

7 Visual Inspection of EGR Valve Movement	1. Reconnect rear 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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did valve move smoothly, open and close fully and 003822.13 reappear active?	**NO:** Moved smoothly and DTC 003822.31 did not reappear. Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

Continued on next page

RG41221,0000292 -19-16SEP09-9/16

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 -19-16SEP09-10/16

9 EGR Valve Connector Test	1. Disconnect rear 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 -19-16SEP09-11/16

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 -19-16SEP09-12/16

11 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR VALVE CLEANING CYCLE 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 003822.03 or 003822.04 appear active?	**NO:** DTC 003822.02 appeared. Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

Continued on next page

RG41221,0000292 -19-16SEP09-13/16

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 -19-16SEP09-14/16

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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did Code reappear active?	**NO:** GO TO 12 and confirm operating point.

RG41221,0000292 -19-16SEP09-15/16

14 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR VALVE CLEANING CYCLE 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 CALIBRATION.
	Is 003822.13 active?	**NO:** Cleaning Test fixed problem. Return to service.

RG41221,0000292 -19-16SEP09-16/16

003822.31 — EGR Valve Calibration Change Over a Long Period of Time (Rear)

This code indicates the rear 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 -19-16SEP09-1/15

003822.31 — EGR Valve Calibration Change Over a Long Period of Time (Rear) Diagnostic Procedure

Troubleshooting Sequence:
003513.03 or 003513.04
003822.03 or 003822.04
003822.13
003822.07
003822.02
003822.31

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information
This code indicates the rear EGR valve Open and Closed learned values have moved out side of programmed tolerance over a long period of time.

The ECU detects the rear 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 CALIBRATION 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 13.5L 12V ECU WIRING DIAGRAM 7
- see 13.5L 24V ECU 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 DIAGRAM 3 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 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 for information on use.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• EGR valve terminal - Red/Green

Continued on next page

RG41221,0000294 -19-16SEP09-2/15

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 003822.31 reappear active?

YES: GO TO 2

NO: GO TO 7

RG41221,0000294 -19-16SEP09-3/15

2 EGR Valve Connector Check

1. Ignition OFF, Engine OFF.
2. Disconnect the rear 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 -19-16SEP09-4/15

3 EGR Valve Reconnection Test

1. Reconnect the rear EGR valve connector.
2. Ignition ON, Engine OFF.
3. Run HARNESS DIAGNOSTIC MODE TEST.
4. Refresh codes.

Did 003822.31 reappear active?

YES: GO TO 4

NO: Problem fixed. Bad EGR valve connection.

RG41221,0000294 -19-16SEP09-5/15

4 EGR Valve Cleaning Cycle

1. Reconnect rear EGR valve connector.
2. Ignition ON, Engine ON.
3. Warm engine to normal operating temperature.
4. Run EGR VALVE CLEANING CYCLE test.
5. Ignition ON, Engine OFF.
6. Run HARNESS DIAGNOSTIC MODE TEST.
7. Refresh codes.

Did any DTC with an SPN of 003822 other than 003822.31 appear active?

YES: GO TO 5

NO: Cleaning cycle fixed problem. Return to service

Continued on next page

RG41221,0000294 -19-16SEP09-6/15

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 CALIBRATION.
	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 -19-16SEP09-7/15

6 Visual Inspection of EGR Valve Movement	1. Reconnect rear 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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did valve move smoothly, open and close fully and 003822.31 reappear active?	**NO:** Moved smoothly and DTC 003822.31 did not reappear. Reinstall EGR valve. Run HARNESS DIAGNOSTIC MODE TEST.

RG41221,0000294 -19-16SEP09-8/15

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 -19-16SEP09-9/15

8 EGR Valve Connector Test	1. Disconnect rear 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 -19-16SEP09-10/15

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 -19-16SEP09-11/15

10 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON.	
	3. Warm engine to normal operating temperature.	
	4. Run EGR VALVE CLEANING CYCLE 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 003822.03 or 003822.04 appear active?	**NO:** DTC 003822.31 appeared. Remove and replace EGR valve. Recalibrate using EXHAUST GAS RECIRCULATION VALVE CALIBRATION.

RG41221,0000294 -19-16SEP09-12/15

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 -19-16SEP09-13/15

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 EXHAUST GAS RECIRCULATION VALVE CALIBRATION.
	Did Code reappear active?	**NO:** GO TO 10 and confirm operating point.

RG41221,0000294 -19-16SEP09-14/15

13 EGR Valve Cleaning Cycle	1. Reconnect rear EGR valve connector.	
	2. Ignition ON, Engine ON. 3. Warm engine to normal operating temperature. 4. Run EGR VALVE CLEANING 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 CALIBRATION.
	Is 003822.31 active?	**NO:** Cleaning Test fixed problem. Return to service.

RG41221,0000294 -19-16SEP09-15/15

200852.31 — A/C Compressor State Incorrect

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000009C -19-28SEP10-1/1

523379.03 — Single Point Ground #7 Has High Resistance

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000066E -19-28MAY08-1/1

523744.31 — A/C Compressor is ON When It Should be OFF

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000066F -19-28MAY08-1/1

E6 - Engine Will Not Crank

Symptom	Problem	Solution
E6 - Engine Will Not Crank	Weak battery	Check battery charge, replace if necessary.
	Corroded or loose battery connections	Clean battery terminals and connections.
	Defective main switch or start safety switch	Repair switch as required.
	Starter solenoid defective	Replace solenoid.
	Starter defective	Replace starter.
	Start circuit defective	Check for faulty start circuit wiring, fuses, or relays
	Engine is seized up	Check by rotating engine by hand using rotating tool JDG820.

DN22556,000044E -19-18APR08-1/1

E7 - Abnormal Engine Noise

Symptom	Problem	Solution
E7 - Abnormal Engine Noise	Worn main or connecting rod bearings	Determine bearing clearance. See CYLINDER BLOCK, LINERS, PISTONS AND RODS (GROUP 030) SPECIFICATIONS also see CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL (GROUP 040) 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 in the base engine manual.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See CRANKSHAFT, MAIN BEARINGS AND FLYWHEEL (GROUP 040) 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 ROD BUSHINGS in Section 02 Group 030 in the base engine manual.
	Scored pistons	Inspect pistons. See PRELIMINARY LINER, PISTON, AND ROD CHECKS in Section 02 Group 030 in the base engine manual.
	Worn timing gears or excess back lash	Check timing gear back lash. See ADJUST FRONT TIMING GEAR BACKLASH in Section 02 Group 030 in the base engine manual.
	Excessive valve clearance	Check and adjust valve clearance. See CHECK AND ADJUST VALVE ASSEMBLY CLEARANCES AND INJECTOR PRELOAD in Section 02 Group 020 in the base engine manual.
	Worn camshaft	Inspect camshaft. See VISUALLY INSPECT CAMSHAFT AND ROLLER FOLLOWERS in Section 02 Group 050 in the base engine manual.
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See REMOVE ROCKER ARM ASSEMBLY in Section 02 Group 020 in the base engine manual.

Continued on next page

Symptom	Problem	Solution
	Insufficient engine lubrication	See: 13.5L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04 Group 150 in the base engine manual. AND 13.5L ENGINES - L3 - ENGINE OIL PRESSURE LOW in Section 04 Group 150 in the base engine manual. AND 13.5L - L2 ENGINE OIL PRESSURE HIGH in Section 04 Group 150 in the base engine manual.
	Turbocharger noise	See TURBOCHARGER SEVEN-STEP INSPECTION in Section 02 Group 080 of the base engine manual.

DN22556,0000450 -19-18APR08-2/2

E10 - Engine Idles Poorly

Symptom	Problem	Solution
E7 - Engine Idles Poorly	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Air leak on suction side of air intake system	Check hose and pipe connections for tightness; repair as required. See AIR INTAKE AND EXHAUST SYSTEM (GROUP 080) SPECIFICATIONS in Section 6 Group 200 in the base engine manual.
	Electronic control system problem or basic engine problem	See E2 - ENGINE MISFIRES/RUNS IRREGULARLY for appropriate fuel system type, earlier in this Group.

DN22556,000044F -19-25MAR11-1/1

F3 - Excessive Fuel Consumption

Symptom	Problem	Solution
F3 - Excessive Fuel Consumption	Poor fuel quality	See CHECK FUEL SUPPLY QUALITY later in this Group.
	Engine overloaded	Reduce engine load
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Perform CYLINDER CUTOUT TEST INSTRUCTIONS, CYLINDER MISFIRE TEST INSTRUCTIONS and CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS in Group 160 later in this Section.
	Leaks in fuel supply system	Locate source of leak and repair as required.

DN22556,0000458 -19-20JUL10-1/1

F4 - Fuel in Oil

Symptom	Problem	Solution
F4 - Fuel in Oil	Cracked or worn Electronic Unit Injector (EUI) O-ring	Remove suspected EUI, replace EUI O-ring as required. See INSTALL ELECTRONIC UNIT INJECTORS (EUI) in Section 02, Group 090 earlier in this manual.
	Cracked cylinder head	Locate crack, repair/replace components as required.
	Bad Injector	Perform CYLINDER CUTOUT TEST INSTRUCTIONS, CYLINDER MISFIRE TEST INSTRUCTIONS and CYLINDER ELECTRONIC COMPRESSION TEST INSTRUCTIONS in Group 160 later in this Section. Replace bad injector.
	To Much Oil	Reduce oil level
	Engine Misfire	PerformCYLINDER MISFIRE TEST INSTRUCTIONS

DN22556,0000459 -19-16JUL10-1/1

D1 - ECU Does Not Communicate with Service ADVISOR

DN22556,000045A -19-25MAR11-1/27

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.
For connector location information, see COMPONENT LOCATION DIAGRAM 7 in Section 03 Group 140.

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 13.5L 12V ECU WIRING DIAGRAM 4
- see 13.5L 24V ECU 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 Flex Probe 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 Conenctor C10 - Yellow/Purple

Continued on next page

DN22556,000045A -19-25MAR11-2/27

1 Preliminary Checks

Perform as many of these preliminary checks as possible to help determine if problem is related to the PC, 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 PC and adaptor (parallel, USB, or Bluetooth).
- Close Service ADVISOR and shut down PC. Restart PC, 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 PC has Bluetooth capability.

YES: Determine which cable or adaptor is defective and replace, if applicable.

- Try to connect using a different adaptor or different type of adaptor, if available.

NO: No other application available to verify equipment. GO TO 2

- Try to connect using a different PC, if available.

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 PC. Open DTAC case.

DN22556,000045A -19-25MAR11-3/27

2 Check Adaptor Type

Are you using an EDL adaptor?

YES: GO TO 3

NO: PDM GO TO 5

DN22556,000045A -19-25MAR11-4/27

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 PC'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.

YES: GO TO 4

Is the EDL green power light ON steady?

NO: GO TO 6

DN22556,000045A -19-25MAR11-5/27

4 Check for Red Error Light - EDL

1. For USB connection, attach the USB cable to the EDL and the PC.

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

Continued on next page

DN22556,000045A -19-25MAR11-6/27

5 Check for Green Power Light - PDM

a. If using parallel cable, attach the parallel cable to the PDM and the PC.

b. If using USB adaptor, connect the adaptor to the PDM and attach the USB cable to the USB adaptor and the PC.

1. Attach the 26-pin PDM cable to the PDM and application's 9-pin diagnostic connector.
2. Ignition ON engine OFF.

Is the PDM green power indicator light ON?

YES: GO TO 10

NO: GO TO 6

DN22556,000045A -19-25MAR11-7/27

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).

Is the voltage greater than 10V?

YES: GO TO 7

NO: Fix problem. GO TO 25

DN22556,000045A -19-25MAR11-8/27

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).

Were Terminal Test results good and are both resistance measurements less than 10 ohms?

YES: Replace EDL or PDM. GO TO 25

NO: Replace cable. GO TO 25

DN22556,000045A -19-25MAR11-9/27

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 PC is good but there is no response from the ECU.

1. Monitor EDL amber data transfer light closely.

Did amber data transfer light flash ON briefly or is the amber light ON continuous?

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.

NO: No communication between PC and EDL. Perform checks listed in Step 1 to isolate problem.

Continued on next page

DN22556,000045A -19-25MAR11-10/27

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 PC and EDL. Use USB cable. GO TO 1

DN22556,000045A -19-25MAR11-11/27

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 PC and PDM. Perform checks listed in Step 1 to isolate problem.

DN22556,000045A -19-25MAR11-12/27

11 Check Engine Operation	Attempt to start engine.	**YES:** GO TO 12
	Does engine start?	**NO:** GO TO 13

DN22556,000045A -19-25MAR11-13/27

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.	**YES:** Fix problem. GO TO 25
	Were any problems found?	**NO:** GO TO 16

Continued on next page

DN22556,000045A -19-25MAR11-14/27

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

DN22556,000045A -19-25MAR11-15/27

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

DN22556,000045A -19-25MAR11-16/27

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

DN22556,000045A -19-25MAR11-17/27

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

DN22556,000045A -19-25MAR11-18/27

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

Continued on next page

DN22556,000045A -19-25MAR11-19/27

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 20

NO: Resistance is less than 50 ohms: Repair short between CAN High and CAN Low. GO TO 25

DN22556,000045A -19-25MAR11-20/27

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

DN22556,000045A -19-25MAR11-21/27

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

DN22556,000045A -19-25MAR11-22/27

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

Continued on next page

DN22556,000045A -19-25MAR11-23/27

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.	**YES:** Determine which device is causing CAN communication problem. GO TO 25
Did Service ADVISOR connect to ECU?	**NO:** GO TO 23

DN22556,000045A -19-25MAR11-24/27

23 Reprogram ECU

1. Download payload for the ECU.	
2. Attempt to reprogram the ECU.	**YES:** GO TO 25
Was Service ADVISOR able to reprogram ECU?	**NO:** GO TO 24

DN22556,000045A -19-25MAR11-25/27

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.	**YES:** Problem fixed.
Did Service ADVISOR connect to ECU?	**NO:** Open DTAC case.

DN22556,000045A -19-25MAR11-26/27

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.	**YES:** Problem fixed.
Did Service ADVISOR connect to the ECU?	**NO:** GO TO 1

DN22556,000045A -19-25MAR11-27/27

D2 - ECU Does Not Communicate with Diagnostic Gauge or Gauge Displays CAN Bus Error

Internal Diagnostic Gauge Errors

DN22556,000045C -19-21NOV08-1/8

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 13.5L 12V ECU WIRING DIAGRAM 4
- see 13.5L 24V ECU 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.

DN22556,000045C -19-21NOV08-2/8

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

DN22556,000045C -19-21NOV08-3/8

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

DN22556,000045C -19-21NOV08-4/8

❸ **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.

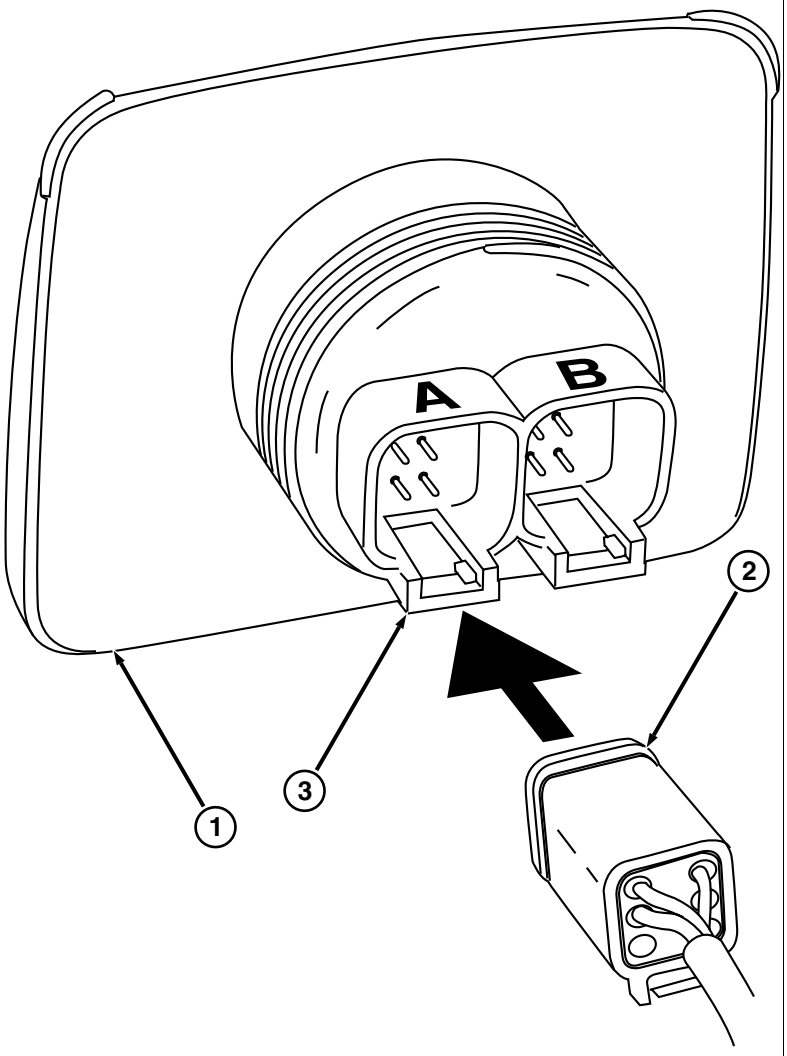
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DN22556,000045C -19-21NOV08-5/8

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).



RG15515 —UN—21SEP07

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

DN22556,000045C -19-21NOV08-6/8

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.	**YES:** Replace diagnostic gauge. GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix CAN wiring. GO TO 6

DN22556,000045C -19-21NOV08-7/8

6 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine ON.	
	4. Check diagnostic gauge operation.	**YES:** Problem fixed.
	Does diagnostic gauge display engine information?	**NO:** GO TO 1

DN22556,000045C -19-21NOV08-8/8

D3 - ECU Does Not Program with Service ADVISOR

DN22556,0000693 -19-18APR08-1/7

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.

DN22556,0000693 -19-18APR08-2/7

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 PC and adaptor (parallel or USB). • Close Service ADVISOR and shut down PC. Restart PC, 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

DN22556,0000693 -19-18APR08-3/7

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.

DN22556,0000693 -19-18APR08-4/7

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

DN22556,0000693 -19-18APR08-5/7

4 Parameters	Were you able to successfully retrieve the parameters from the original 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.

DN22556,0000693 -19-18APR08-6/7

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.

DN22556,0000693 -19-18APR08-7/7

Temperature Sensor Validity Test

DN22556,000064D -19-18APR08-1/3

Temperature Sensor Validity Test Diagnostic Procedure

DN22556,000064D -19-18APR08-2/3

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.

DN22556,000064D -19-18APR08-3/3

EGR/VGT Temperature and Flow Test

DN22556,000064E -19-25NOV08-1/4

EGR/VGT Temperature and Flow Test

Continued on next page

DN22556,000064E -19-25NOV08-2/4

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 (Forward) - Actual
   g. EGR Valve Position (Rear) - Actual
   h. Manifold Air Pressure - Absolute
   i. 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 (Forward) - Actual - Less than 5%.
   g. EGR Valve Position (Rear) - Actual - Less than 5%
   h. Manifold Air Pressure - Absolute - Within 10 kPa (1.5 psi) of Barometric Air Pressure data point.
   i. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric pressure.
6. Start engine and operate at least 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 (Forward) - Actual - 0% (closed).
   g. EGR Valve Position (Rear) - Actual - 0% (closed).l
   h. Manifold Air Pressure - Absolute - Increased above the Ignition ON, engine OFF value.
   i. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric 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 (Forward) - Actual and EGR Valve Position (Rear) - Actual data points 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:

Continued on next page

	a. Turbo Compressor Inlet Temperature - Not more than 15°C (27°F) above actual ambient air temperature. 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 engine coolant temperature. f. EGR Valve Position (Forward) - Actual - Greater than 0%, typically at the full open position of approximately 90%. g. EGR Valve Position (Rear) - Actual - Greater than 0%, typically at the full open position of approximately 90%. h. Manifold Air Pressure - Absolute - Increases as engine speed and load are increased. Value may fluctuate as the ECU controls the VGT actuator. i. Barometric Air Pressure - Within 10 kPa (1.5 psi) of actual barometric 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.

DN22556,000064E -19-25NOV08-4/4

Section 05
Tools

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Repair and Adjustment Tools

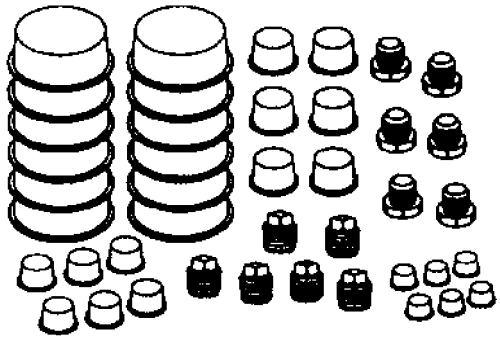
NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC).

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OUOD006,0000066 -19-15OCT07-1/8

Fuel System Cap Plug Kit..... JDG998

Use to protect the fuel system from dirt and debris when disconnecting fuel system components during routine maintenance and service.



RG8518 —UN—09OCT02

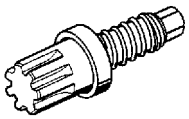
JDG998

OUOD006,0000066 -19-15OCT07-2/8

Flywheel Turning Tool..... JDG820

Use to rotate engine flywheel to find cylinder No. 1 and No. 6 “Top Dead Center” when adjusting electronic unit injector (EUI) preload. Use with JDG971 Timing Pins.

RG7056 —UN—17JUN05

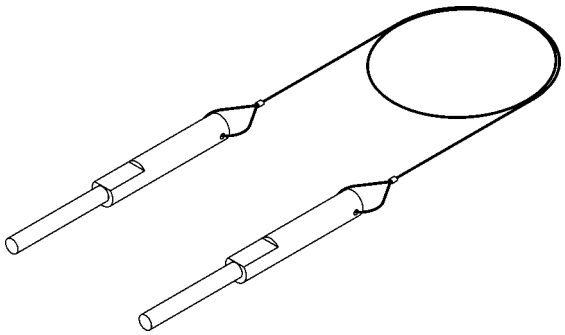


JDG820

OUOD006,0000066 -19-15OCT07-3/8

Cam/Crankshaft Timing Lock Pins JDG971

Set of two. Used to lock camshaft and crankshaft at “Top Dead Center” during timing gear backlash adjustment. Use on crankshaft only for valve clearance adjustments. Set consists of two 313796 Lock Pins.



RG8519 —UN—20MAY98

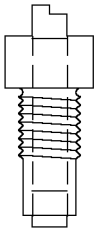
JDG971

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OUOD006,0000066 -19-15OCT07-4/8

Depth Checking Tool JDG1334

Used to check depth of crankshaft position sensor in timing gear cover.



RG10381 —UN—21OCT99

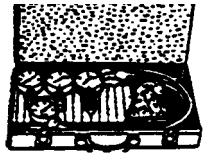
JDG1334

OUOD006,0000066 -19-15OCT07-5/8

Universal Pressure Test Kit JT05412

Used for testing engine oil pressure, intake manifold pressure (turbo boost), and fuel transfer pump pressure.

RG5162 —UN—23AUG88

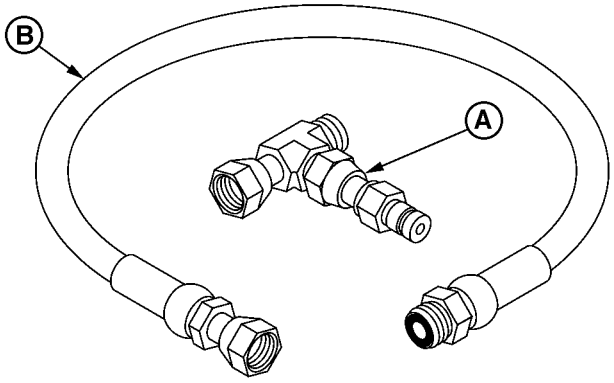


JT05412

OUOD006,0000066 -19-15OCT07-6/8

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).



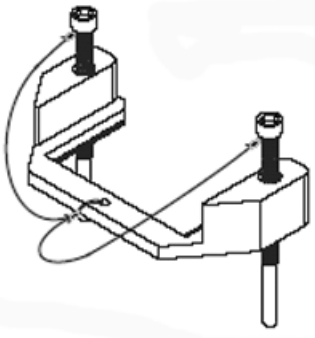
RG9041 —UN—21NOV97

JT03513

OUOD006,0000066 -19-15OCT07-7/8

EGR Removal Tool..... JDG10194

Used to remove EGR valve without damaging O-rings.



RG14880 —UN—08AUG06

EGR Removal Tool

OUOD006,0000066 -19-15OCT07-8/8

Connector Repair Tools

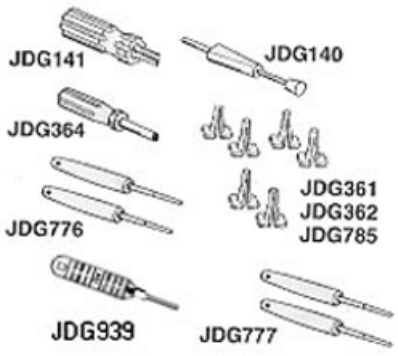
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OUOD006,0000067 -19-30MAR11-1/10

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.

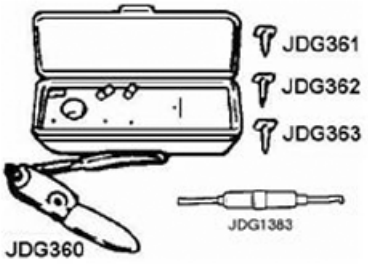


RG14535 —UN—17OCT05

OUOD006,0000067 -19-30MAR11-2/10

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

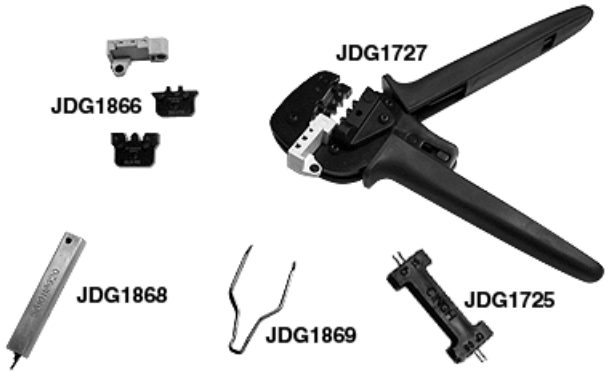
DEUTSCH is a trademark of Deutsch Co.

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OUOD006,0000067 -19-30MAR11-3/10

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).



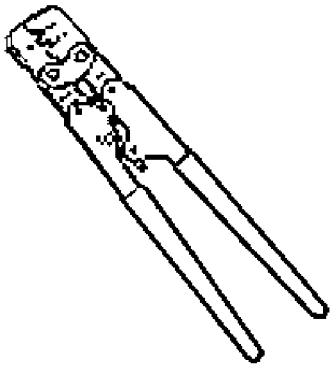
RG15124 —UN—25JUN07

JDG1744 Flex Box Terminal Repair Kit

OUOD006,0000067 -19-30MAR11-4/10

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

OUOD006,0000067 -19-30MAR11-5/10

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

OUOD006,0000067 -19-30MAR11-6/10

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

OUOD006,0000067 -19-30MAR11-7/10

Crimping Pliers JDG144

Used for crimping open barrel terminals

RG10739 —UN—26MAY00



JDG144 Crimping Pliers

OUOD006,0000067 -19-30MAR11-8/10

Electrician's Pliers JDG145

Used for stripping wire and crimping ring style and insulated terminals.



RG11686 —UN—13FEB01

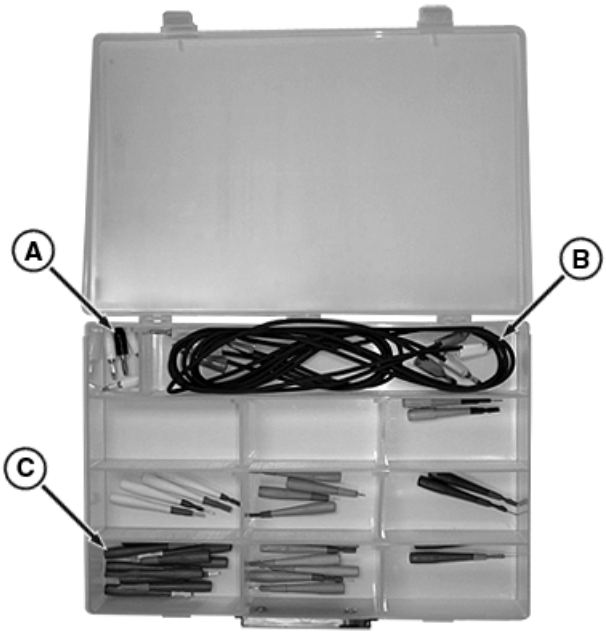
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OUOD006,0000067 -19-30MAR11-9/10

Flex Probe Kit..... JDG10466

Used along with digital multimeter to make measurements on connector and sensor terminals. Kit contains Test Leads, Test Lead Adaptors, and Flex Probes. Flex Probes have mating terminals for harness and sensor connectors and are color coded to identify which terminal they are used for. Can also be used to test terminals for proper fit.

A—Test Lead Adaptors
B—Test Leads
C—Flex Probes



RG15517 —UN—24SEP07

JDG10466

OUOD006,0000067 -19-30MAR11-10/10

Other Material

Number	Name	Use
PM37418 (U.S.) PM38621 (Canadian) 242 (LOCTITE®)	Thread Lock and Sealer, medium strength (6 ml)	Applied to screw threads
TY6333 (U.S.)	High Temperature Grease (NLGI Grade 2) (JDM J13C7 and J25C)	Sensor O-rings.
AR54749 (U.S.)	Soap Lubricant	Apply to fuel supply pump mounting bracket O-ring.

LOCTITE is a registered trademark of Loctite Corp.

OUOD006,0000068 -19-15OCT07-1/1

Electronic System Diagnostic Tools

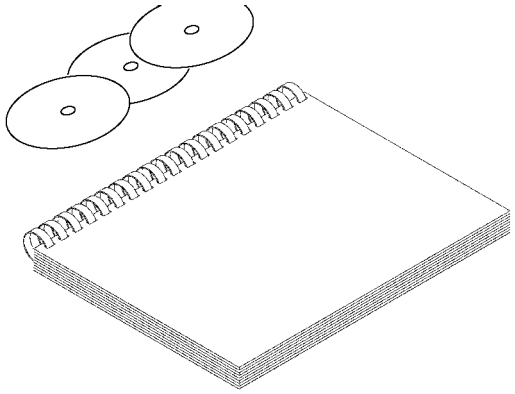
NOTE: ECU communication parts and kits are available from John Deere Distribution Service Center (DSC). **United States and Canadian**

Agricultural dealers DO NOT ORDER without first contacting your Branch or TAM.

DB92450,0000091 -19-25MAR11-1/9

ECU Communication Software.....

Please refer to your John Deere Dealer website for information on obtaining the latest version of software.

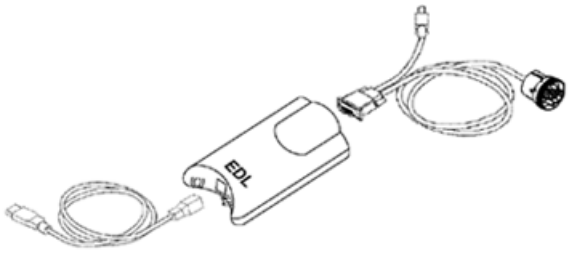


RG8554 —UN—17OCT05

DB92450,0000091 -19-25MAR11-2/9

ECU Communication Hardware Mini Kit.....DS10117

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), and cable to connect to the 9-pin diagnostic connector on the engine harness. Kit parts may be purchased separately.

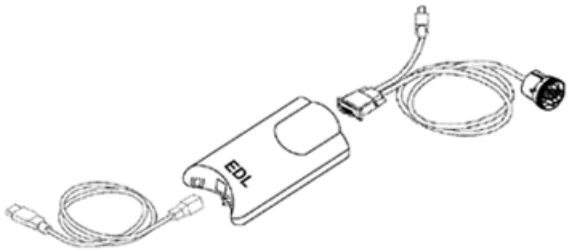


RG11747B —UN—19OCT05

DB92450,0000091 -19-25MAR11-3/9

ECU Communication Hardware Full Kit DS10118

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 MB of RAM and a USB port. In addition to the USB cable, Electronic Data Link (EDL), and cable to connect to the 9-pin diagnostic connector on the engine harness, this kit allows communication with applications that use the black 9-pin Deutsch diagnostic connector, gray 9-pin Deutsch diagnostic connector (early 8000 series tractors), and



RG11747B —UN—19OCT05

Not all kit components shown

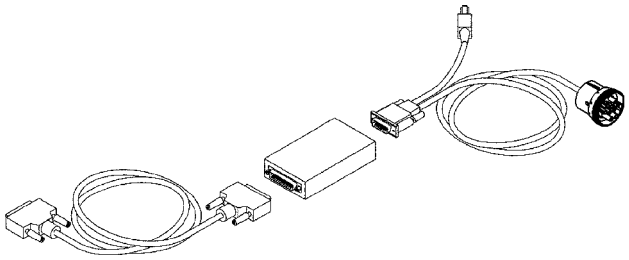
the flat 6-pin Weatherpack diagnostic connector (Lucas controllers). Kit parts may be purchased separately.

Continued on next page

DB92450,0000091 -19-25MAR11-4/9

ECU Communication Hardware Kit DS10023

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 an IEEE 1284 compliant parallel port. This kit allows communication with applications that use the black 9-pin Deutsch diagnostic connector.



RG11747 —UN—19OCT05

DB92450,0000091 -19-25MAR11-5/9

NOTE: ECU Communications Kit DS10023 can no longer be purchased. It will be supported on applications up to and including Tier III.

DB92450,0000091 -19-25MAR11-6/9

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.



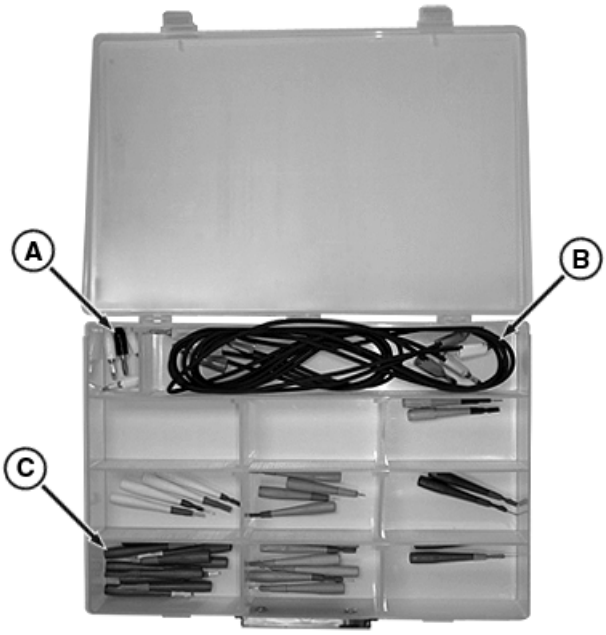
RG11126 —UN—08JUN07

JT07306 - Digital Multimeter

DB92450,0000091 -19-25MAR11-7/9

Flex Probe Kit.....JT07328

Probes have mating terminals for harness and sensor connectors. Used with a digital multimeter to make voltage and resistance measurements in diagnostic procedures. Can also be used to test terminals for proper fit.



RG15517 —UN—24SEP07

JDG10466

Continued on next page

DB92450,0000091 -19-25MAR11-8/9

Cylinder Cutout Box..... JDG1250

The Cylinder Cutout Box is used to help identify an injector that is not firing or having an intermittent problem. An injector can be disabled as the engine is running to detect a change in engine performance. No DTCs are set when disabling the injector.



RG13644 —UN—28APR04

DB92450,0000091 -19-25MAR11-9/9

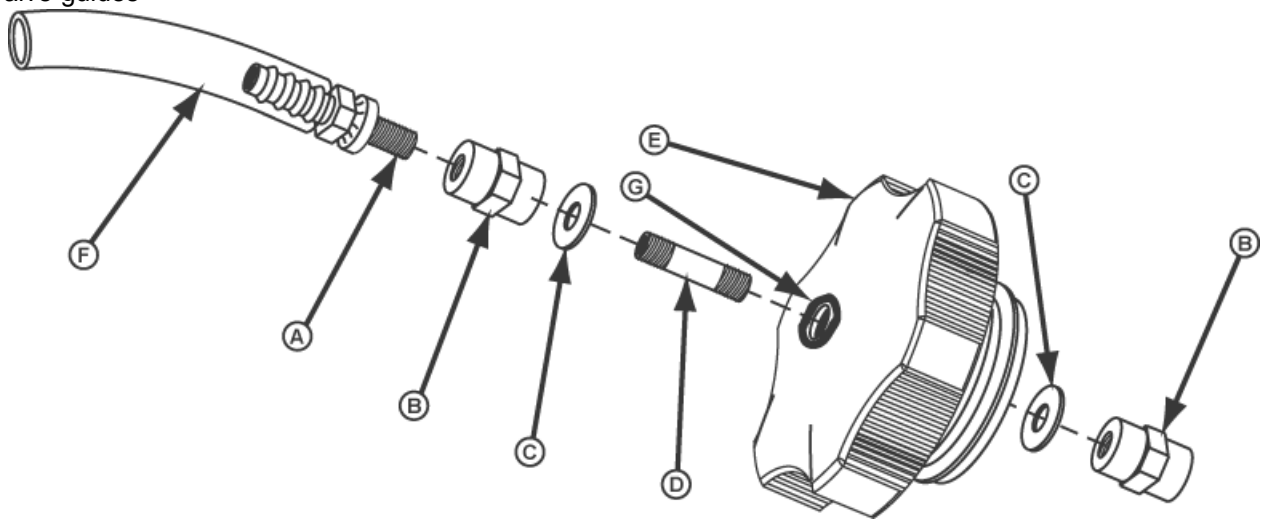
How To Make Tools

These tools can be made in a service shop using common shop tools and locally obtained materials.

DM59778,0000070 -19-15OCT07-1/1

DFRG9 - Monometer

Used to test for blow-by past piston rings, turbocharger, and valve guides



RG15140 —UN—13OCT06

DFRG9 - Monometer

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 Monometer 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.

DM59778,0000071 -19-15OCT07-1/1

Section 06
Specifications

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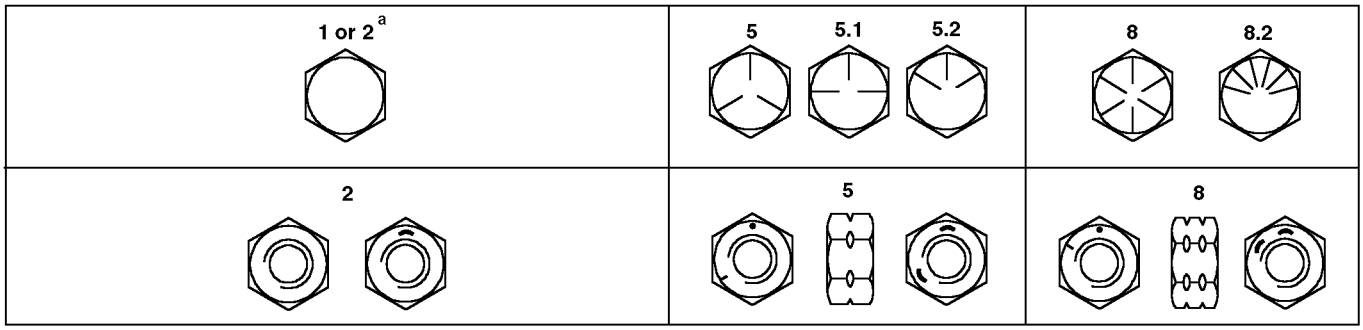
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Unified Inch Bolt and Cap Screw Torque Values



TORQ1A —UN—27SEP99

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.

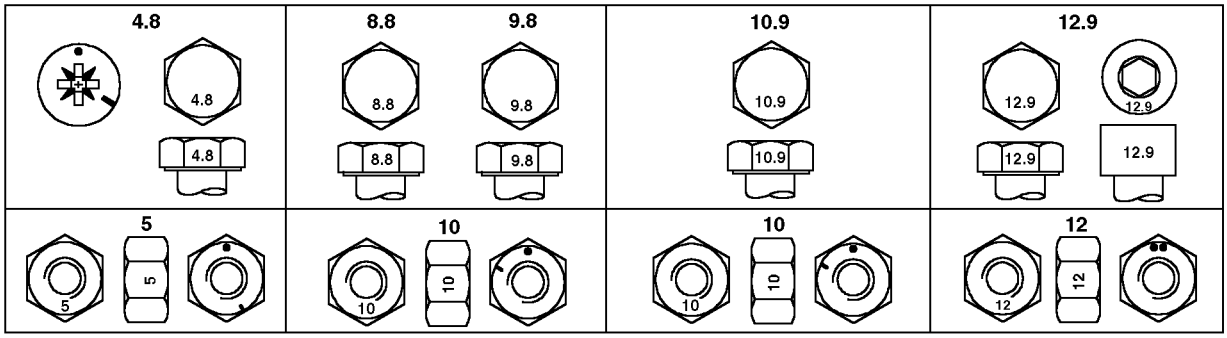
Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

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.

RG41221,00001CD -19-15OCT07-1/1

General OEM Engine Specifications

ITEM	UNIT OF MEASURE	6135L
Number of Cylinders	——	6
Fuel	——	Diesel
Stroke	mm (in.)	165 (6.50)
Bore	mm (in.)	127 (5.00)
Displacement	L (cu in.)	13.5 (838)
Compression Ratio	——	17:1
Physical Dimensions:		
Width	mm (in.)	808 (31.8)
Height	mm (in.)	1239 (48.8)
Length	mm (in.)	1326 (52.2)
Basic Dry Weight	kg (lb)	1205 (2650)

OUOD006,0000069 -19-15OCT07-1/1

Electronic Air System Repair and Adjustment Specifications

Item	Measurement	Specification
EGR Valve - Initial	Torque	5 N·m (4 lb-ft)
EGR Valve - Final	Torque	15 N·m (11 lb-ft)
Cooler-to-Exhaust Manifold Cap Screws	Torque	50 N·m (37 lb-ft)
EGR Cooler Inlet and Outlet Line Cap Screws	Torque	35 N·m (26 lb-ft)
EGR Cooler Inlet Fitting	Torque	70 N·m (52 lb-ft)
EGR Pipe Cap Screws	Torque	50 N·m (37 lb-ft)
VGR Actuator to Bracket Hardware	Torque	13.5 N•m (10 lb-ft)
VGR Linkage Arm to Actuator Shaft	Torque Turn	7 N•m (5 lb-ft)
Coolant Lines to VGR Actuator	Torque	24 N•m (18 lb-ft)
M5 Linkage Screws - Turbocharger & Actuator End	Torque	7 N•m (5 lb-ft)
Turbocharger-to-Exhaust Manifold	Torque	50 N·m (37 lb-ft)
Turbocharger Oil Inlet Fitting	Torque	50 N·m (37 lb-ft)
Turbocharger Oil Return Pipe-to-Turbocharger	Torque	50 N·m (37 lb-ft)
Turbocharger Oil Inlet Line (Both Ends)	Torque	35 N·m (26 lb-ft)
Coolant Lines to Actuator	Torque	24 N•m (18 lb-ft)

DM59778,0000074 -19-15OCT07-1/1

Fuel System with Type 1 Fuel Supply System Repair and Adjustment Specifications

Item	Measurement	Specification
Fuel Filter Assembly		
Fuel Line ORFS Fittings	Torque	24 N·m (18 lb-ft)
Fitting (Fuel Return from Rail)	Torque	33 N·m (24 lb-ft)
Fuel Pressure Sensor	Torque	14 N·m (124 lb-in.)
Fitting (Fuel Pressure Sensor)	Torque	14 N·m (124 lb-in.)
Fitting (Fuel Return to Tank)	Torque	33 N·m (24 lb-ft)
Fitting (Fuel Outlet to Supply Pump)	Torque	33 N·m (24 lb-ft)
Fitting (Fuel Inlet from Tank)	Torque	33 N·m (24 lb-ft)
Fuel Primer	Torque	14 N·m (124 lb-in.)
Fuel Primer-to-Fuel Filter Housing Adapter	Torque	11 N·m (97 lb-in.)
Fuel Temperature Sensor	Torque	14 N·m (124 lb-in.)
Check Valve and Fitting	Torque	33 N·m (24 lb-ft)
Diagnostic Test Port and Fitting	Torque	14 N·m (124 lb-in.)
Filter Housing Plugs	Torque	7 N·m (62 lb-in.)
Filter Cap	Torque	11 N·m (100 lb-in.)
Water Separator Bowl	Torque	6 N·m (55 lb-in.)
Fuel Filter Return Tube (Inside Filter Housing)	Torque	20 N·m (15 lb-ft)
Fuel Filter Assembly-to-Bracket Cap Screws	Torque	50 N·m (37 lb-ft)
Fuel Filter Bracket-to-Cylinder Block Cap Screws	Torque	65 N·m (48 lb-ft)
Water Separator Bowl-to-Filter Housing	Torque	5 N·m (44 lb-in.)
Fuel Filter Cap/Cover-to-Housing	Torque	11 N·m (100 lb-in.)
Low Pressure Regulating Valve-to-Filter Housing	Torque	18 N·m (13 lb-ft)
High Pressure Regulating Valve-to-Filter Housing	Torque	14 N·m (124 lb-in.)
100 Micron Internal Filter Housing Screen	Torque	5 N·m (44 lb-in.)
Fuel Filter Check Valve to Fuel Filter Housing	Torque	33 N·m (24 lb-ft)
Fuel Line-to-Fuel Filter Check Valve	Torque	24 N·m (18 lb-ft)
Fuel Primer	Torque	14 N·m (124 lb-in.)
Fuel Primer-to-Fuel Filter Housing Adapter	Torque	11 N·m (97 lb-in.)

Continued on next page

OUOD006,000006A -19-28OCT07-1/2

Item	Measurement	Specification
Fuel Supply Pump and Camshaft Drive Coupler Set Screws	Torque	4 N·m (3 lb-ft)
Fuel Supply Pump Mounting Bracket Cap Screws	Torque	50 N·m (37 lb-ft)
Fuel Supply Pump-to-Bracket	Torque	25 N·m (18 lb-ft)
Fuel Line ORFS Fittings	Torque	24 N·m (18 lb-ft)
Electronic Unit Injector Hold-Down Clamp Cap Screws	Initial Torque	35 N·m (26 lb-ft)
Harness Connector Bracket to Cylinder Head	Torque	35 N·m (26 lb-ft)
Wiring Harness Clamps to Cylinder Head	Torque	25 N·m (19 lb-ft)

OUOD006,000006A -19-28OCT07-2/2

Fuel System with Type 2 Fuel Supply System Repair and Adjustment Specifications

Item	Measurement	Specification
Fuel Filter Assembly		
Fuel Line ORFS Fittings	Torque	24 N·m (18 lb-ft)
Primary and Final Fuel Filter Element (A & B)	Torque	8 N•m (70 lb-in.)
Water in Fuel Sensor (C)	Torque	2 N•m (15 lb-in.)
Fitting - Inlet from Fuel Tank (D)	Torque	34 N•m (25 lb-ft)
Fitting - Return to Tank (E)	Torque	34 N•m (25 lb-ft)
Fitting - Fuel Return from Cylinder Head (F)	Torque	34 N•m (25 lb-ft)
Fuel Temperature Sensor (G)	Torque	14 N·m (10 lb-ft.)
High Pressure Fuel Sensor (H)	Torque	14 N·m (10 lb-ft)
Low Pressure Fuel Sensor (I)	Torque	14 N·m (10 lb-ft.)
Fitting (J) - Outlet to High Pressure Fuel Pump	Torque	34 N•m (25 lb-ft)
Cap Screws - Low Pressure Fuel Pump (K) to Filter Header	Torque	5 N•m (45 lb-in_
High Pressure Fuel Regulating Valve (M)	Torque	34 N•m (25 lb-ft)
Fuel Return Regulating Valve (N)	Torque	34 N•m (25 lb-ft)
Fuel Line Fittings in Cylinder Head	Torque	40 N•m (30 lb-ft)
Jumper Harness Brackets to Fuel Filter Header Bracket	Torque	35 N•m (26 lb-ft)
Fuel Filter Header Bracket to Cylinder Block	Torque	125 N•m (93 lb-ft)
Fuel Filter Header to Header Bracket	Torque	70 N•m (52 lb-ft)
Return from Cylinder Head Fitting	Torque	34 N•m (25 lb-ft)
Return to Tank Fuel Line Fitting	Torque	34 N•m (25 lb-ft)
Inlet Fitting - Fuel Line from Tank	Torque	34 N•m (25 lb-ft)
Outlet Fitting - Fuel Line to High Pressure Fuel Pump	Torque	34 N•m (25 lb-ft)
High Pressure Fuel Regulator Valve-to-Fuel Filter Header Assembly	Torque	34 N·m (25 lb-ft)
Fuel Return Regulator Valve-to-Fuel Filter Header Assembly	Torque	34 N·m (25 lb-ft)
Fuel Filter Screen-to- Fuel Filter Housing	Torque	5 N•m (44 lb-in)
Return Fuel Line Fitting-to-Fuel Filter Header Assembly	Torque	34 N·m (25 lb-ft)
Fuel Return Line-to-Fitting	Torque	34 N·m (25 lb-ft)

Continued on next page

Item	Measurement	Specification
Water Bowl-to-Final Filter	Torque	8 N·m (6 lb-ft)
Inlet Fitting-to-Fuel Filter Header Assembly	Torque	34 N·m (25 lb-ft)
Outlet Fitting-to-Fuel Filter Header Assembly	Torque	34 N·m (25 lb-ft)

DM59778,0000072 -19-28OCT07-2/2

Electronic Engine Control System Specifications With Type 1 Fuel Supply System

Item	Measurement	Specification
ECU Mounting Bracket to Cylinder Block Cap Screws	Torque	50 N·m (37 lb-ft)
ECU Mounting Strap to ECU Bracket Cap Screws	Torque	35 N·m (26 lb-ft)
Coolant Temperature Sensor	Torque	15 N·m (11 lb-ft)
Fuel Temperature Sensor-to-Fuel Filter Housing	Torque	14 N·m (10 lb-ft)
Fuel Pressure Sensor-to-Fuel Filter Housing	Torque	14 N·m (10 lb-ft)
Water-in-Fuel Sensor-to-Water Separator Bowl	Torque	14 N·m (10 lb-ft)
Engine Oil Pressure Sensor	Torque	9 N·m (80 lb-in.)
Engine Oil Pressure Sensor Adapter-to-Filter Housing	Torque	11 N·m (97 lb-in.)
Manifold Air Temperature (MAT) Sensor	Torque	17 N·m (13 lb-ft)
Manifold Absolute (MAP) Sensor	Torque	18 N·m (13 lb-ft)
EGR Temperature Sensor	Torque	60 N·m (44 lb-ft)
Charge Air Cooler Outlet Temperature Sensor	Torque	17 N·m (13 lb-ft)
Compressor Inlet Sensor	Torque	25 N·m (18 lb-ft)
Camshaft Position Sensor	Torque	14 N·m (10 lb-ft)
Crankshaft Position Sensor Spotface (Mounting Surface)-to-Crankshaft Timing Wheel Tooth	Distance	36.7—38.2 mm (1.44—1.50 in.)
Crankshaft Position Sensor	Torque	14 N·m (10 lb-ft)
Turbo Speed Sensor	Torque	12 N·m (9 lb-ft)

OUOD006,000006B -19-28OCT07-1/1

Electrical Engine Control System Specifications With Type 2 Fuel Supply System

Item	Measurement	Specification
Low Pressure Fuel Pump to Fuel Filter Header Assembly	Torque	5 N•m (45 in-lb)
Fuel Temperature Sensor-to-Fuel Filter Header Assembly	Torque	14 N·m (10 lb-ft)
High Pressure Fuel Sensor-to-Fuel Filter Header Assembly	Torque	14 N·m (10 lb-ft)
Low Pressure Fuel Sensor-to-Fuel Filter Header Assembly	Torque	14 N·m (10 lb-ft)
Water-in-Fuel Sensor to Water Separator Bowl	Torque	2 N·m (17 lb-in)
P-Clamp to Top of Valve Cover	Torque	20 ±4 N·m (15 lb-ft)
Harness Bracket to Top of Front Plate	Torque	20 ±4 N·m (15 lb-ft)
P-Clamp to Cylinder Head, Above Rear EGR Valve	Torque	20 ±4 N·m (15 lb-ft)
2 Cap Screws to Harness Bracket on Cylinder Head, Above Front EGR Valve	Torque	20 ±4 N·m (15 lb-ft)
2 Harness Brackets (M8) to Back, Left Side of Front Plate	Torque	20 ±4 N·m (15 lb-ft)
Bracket (M10 x 20) Above Engine Mount	Torque	50 ±10 N·m (37 lb-ft)
2 Harness Brackets (M10 x 20) to Cylinder Head near Starter Motor	Torque	50 ±10 N·m (37 lb-ft)
P-Clamp to Rear of Cylinder Head	Torque	50 ±10 N·m (37 lb-ft)
Connector Flange to Cylinder Head	Torque	35 ±7 N·m (26 lb-ft)
P-Clamp to Harness Bracket	Torque	20 ±4 N·m (15 lb-ft)
Harness Bracket to Fuel Filter Assembly	Torque	35 ±7 N·m (26 lb-ft)
3 Harness Brackets Located Behind Fuel Filter Assembly	Torque	20 ±4 N·m (15 lb-ft)
P-Clamp to ECU Hanger	Torque	20 ±4 N·m (15 lb-ft)
P-Clamps to Top of Valve Cover, Interconnect Harness	Torque	20 ±4 N·m (15 lb-ft)
Lower Harness Bracket to Fuel Filter Assembly	Torque	35 ±7 N·m (26 lb-ft)
ECU Hanger Assembly to Cylinder Block	Torque	50 ±10 N·m (37 lb-ft)
ECU Strap to Isolaters	Torque	35 ±7 N·m (26 lb-ft)

DM59778,0000073 -19-28JAN08-1/1

Application Specifications

- **OEM Engines**
  - Derate Specifications - See OEM ENGINES - DERATE SPECIFICATIONS in this Group
  - Sensor Characteristics - See Related SENSOR CHARACTERISTICS in this Group.
  - Wire Harness Connections - See Related WIRING DIAGRAM in this Group.

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OEM Engines - Derate Specifications

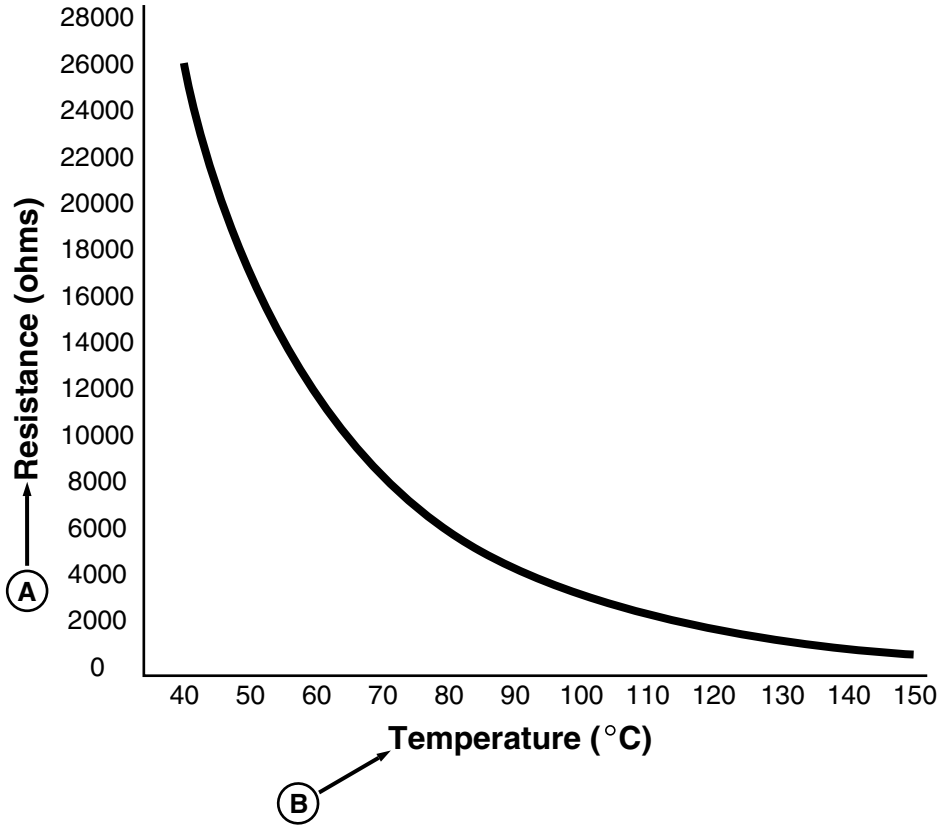
NOTE: The PEAK POWER LEVEL of an application is identified on the Emissions Information Label located near the valve cover. See INFORMATION RELATIVE TO EMISSIONS REGULATIONS in section 01, Group 001 earlier in this manual.

Listed below are the parameters that the Engine Control Unit (ECU) uses to derate the engine.

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 345kw (463hp).	000110.16	106°C (223°F)	20%
Engine Coolant Temperature (ECT). Peak Power Under 345kw (463hp).	000110.16	109°C (228°F)	20%
Engine Coolant Temperature (ECT). Peak Power Above or Wqual to 345kw (463hp).	000110.00	108°C (226°F)	60%
Engine Coolant Temperature (ECT). Peak Power Under 345kw (463hp).	000110.00	111°C (232°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 Pressure.	000157.01	Less than 300kPA (44psi)	50%
Fuel Temperature.	000174.00	120°C (248°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) @870 rpm . Less than 165kPa (24psi) @875 rpm Less than 250kPa (36psi) @1500 rpm: Less than 300kPa (44psi) @2000 rpm. Less than 350kPa (51psi) @2500 rpm	20%
Oil Pressure.	000100.01	Less than 1kPa (0.14psi) &870 rpm . Less than 135kPa (20psi) @875 rpm Less than 240kPa (35psi) @1500 rpm: Less than 280kPa (41psi) @2000 rpm. Less than 280kPa (41psi) @2500 rpm	60%
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%

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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

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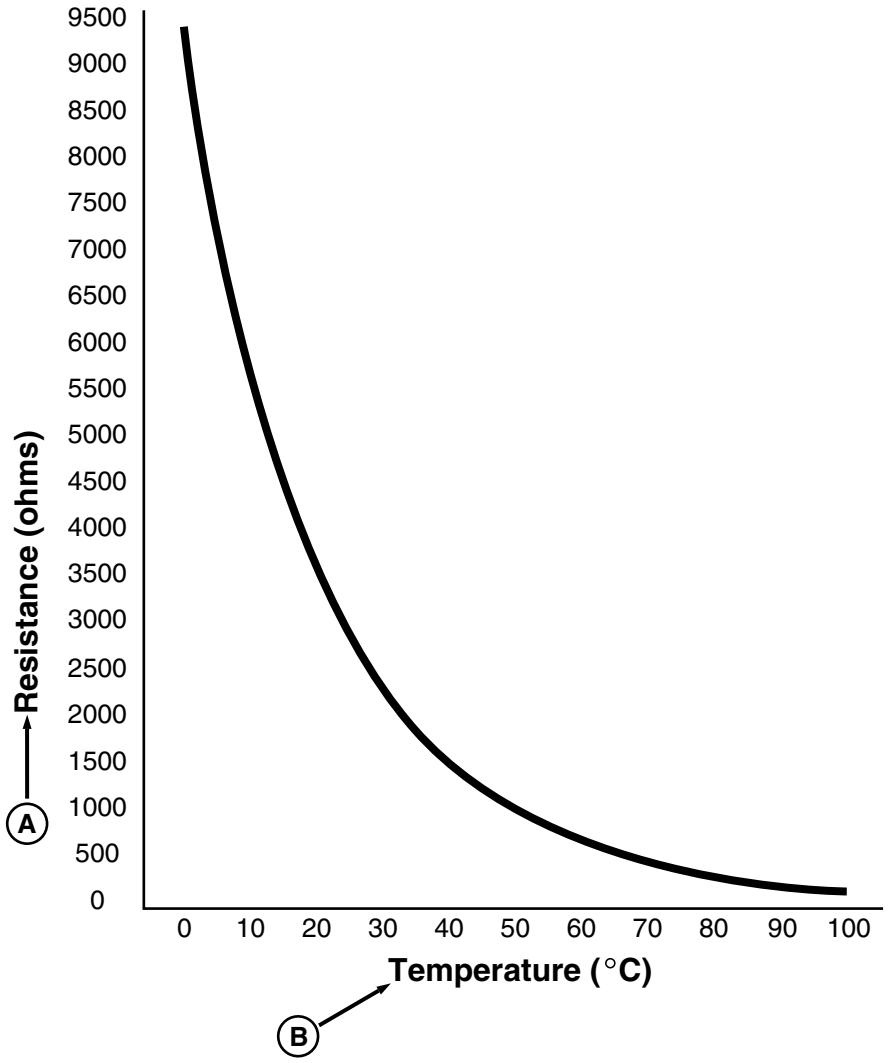
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

DN22556,0000673 -19-15OCT07-1/1

Compressor Inlet 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

RG15346 —UN—28JUN07

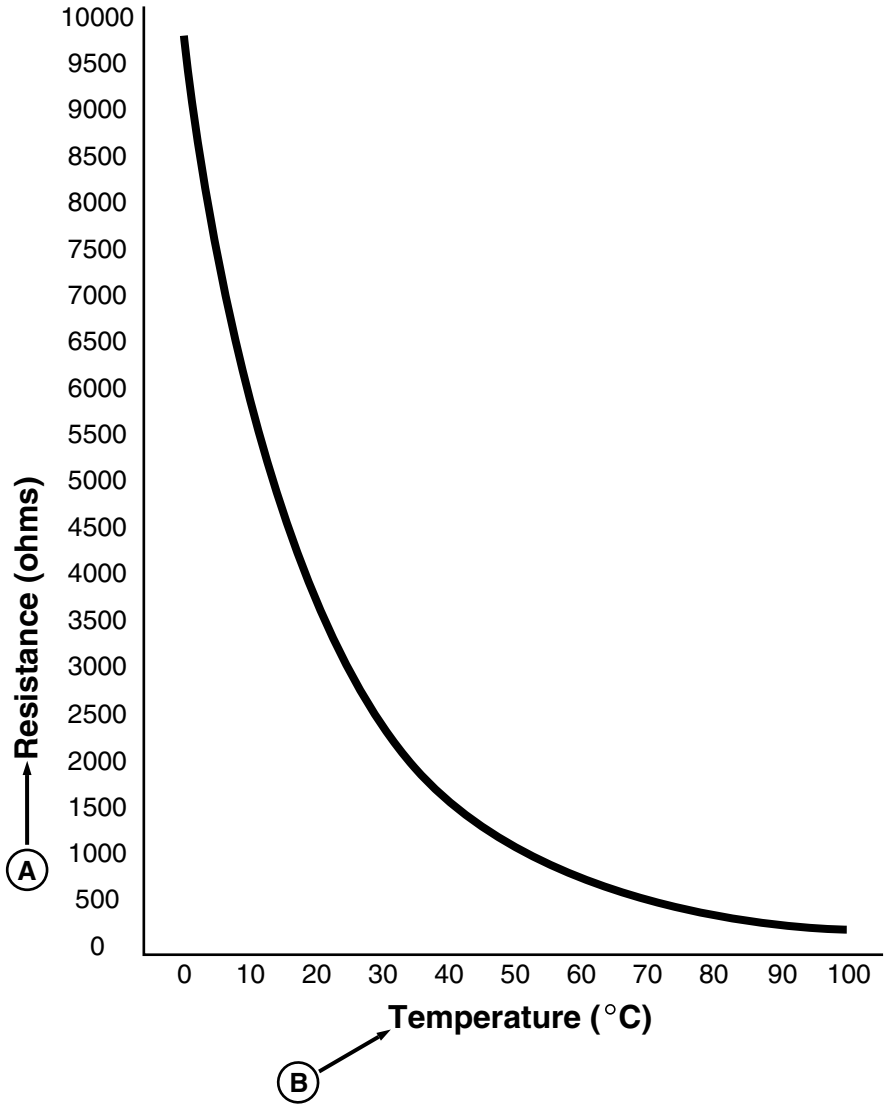
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

DN22556,0000674 -19-15OCT07-1/1

Manifold Air Temperature and Charge Air Cooler Outlet Temperature 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

RG15347 —UN—28JUN07

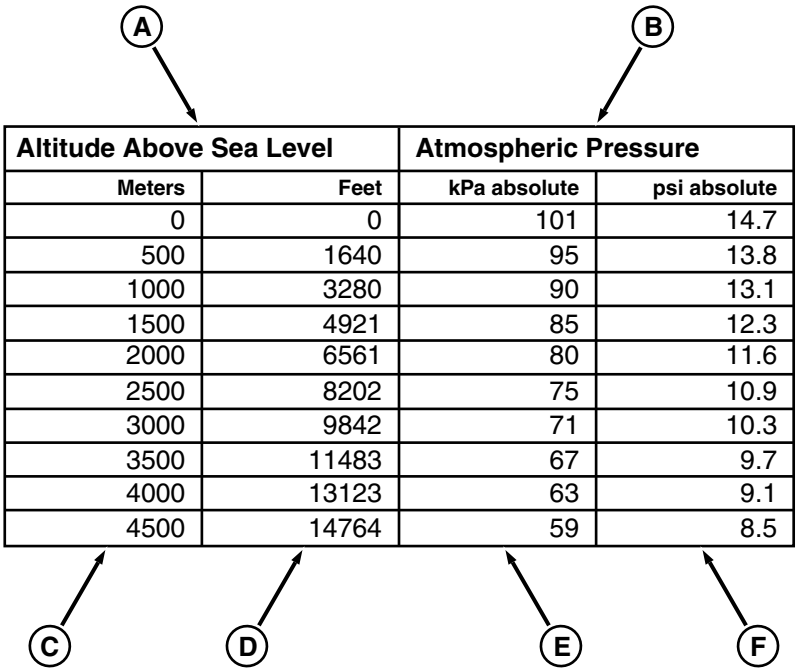
A—Resistance (ohms)

B—Temperature (degrees Celsius)

C—Temperature (degrees Fahrenheit)

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Barometric Pressure Versus Altitude



Altitude Above Sea Level		Atmospheric Pressure	
Meters	Feet	kPa absolute	psi absolute
0	0	101	14.7
500	1640	95	13.8
1000	3280	90	13.1
1500	4921	85	12.3
2000	6561	80	11.6
2500	8202	75	10.9
3000	9842	71	10.3
3500	11483	67	9.7
4000	13123	63	9.1
4500	14764	59	8.5

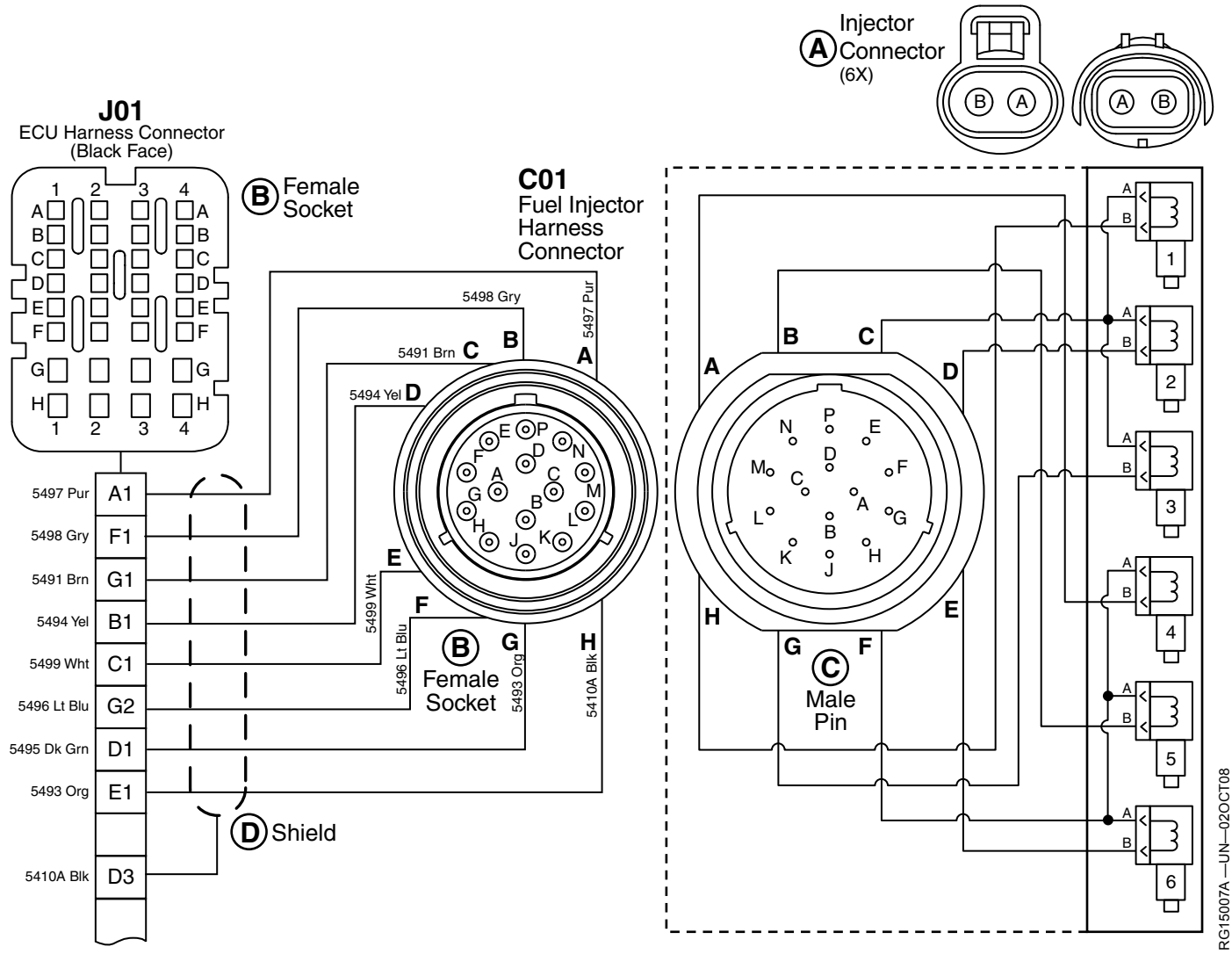
RG15611 —UN—25OCT07

Barometric Pressure Versus Altitude

A—Altitude Above Sea Level
B—Barometric Pressure
C—Meters
D—Feet
E—kPa Absolute
F—psi Absolute

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13.5L 12V ECU Wiring Diagram 1

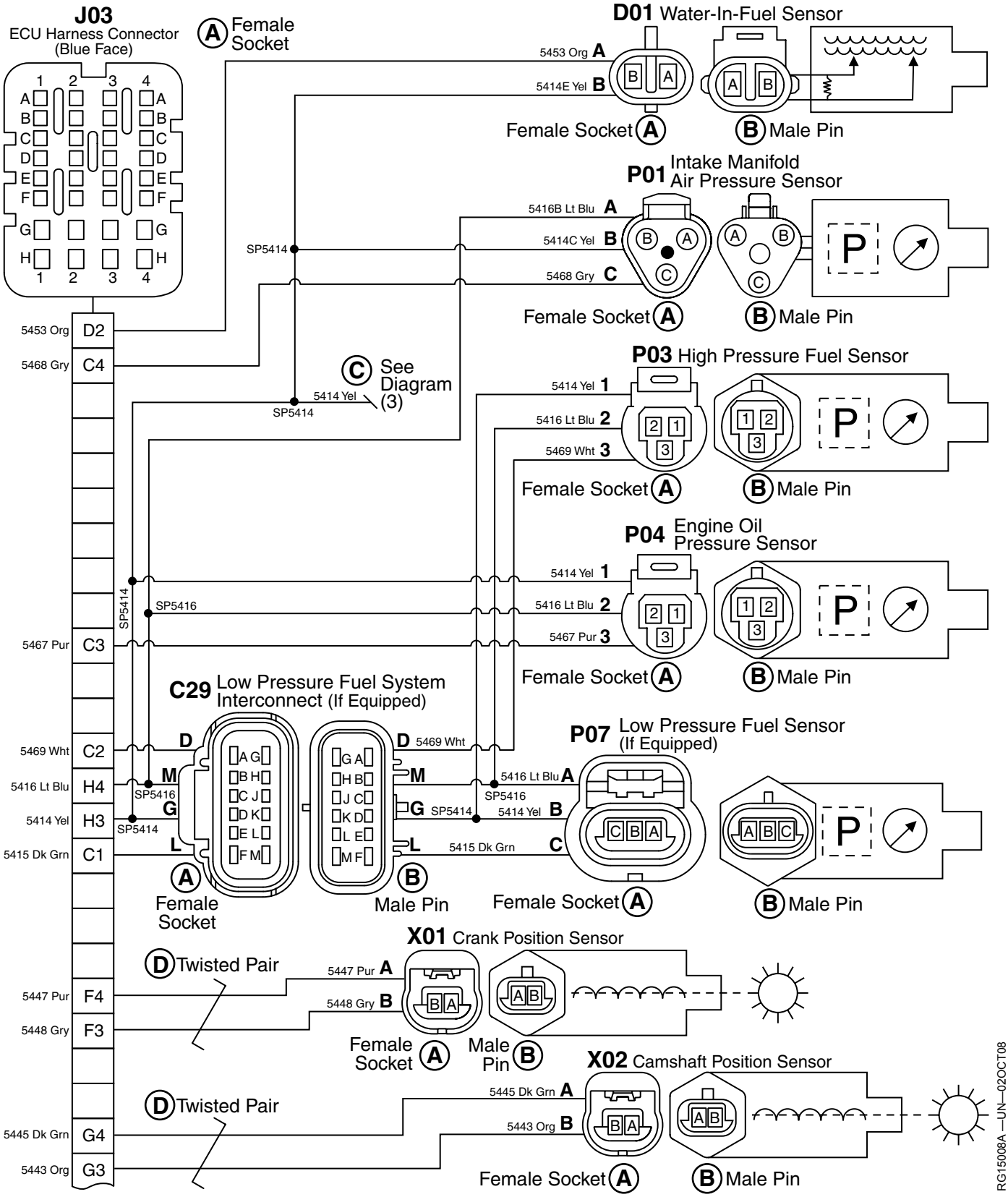


13.5 Liter 12V ECU Wiring Diagram 1

A—Injector Connector (6x)
B—Female Socket
C—Male Pin
D—Shield
C01— Fuel Injector Harness Connector
J01— ECU Harness 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-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D3—[5410 Black] Wiring Shield
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F1—5498 Gray] Injector #5 Inject Pulse
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power

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13.5L 12V ECU Wiring Diagram 2



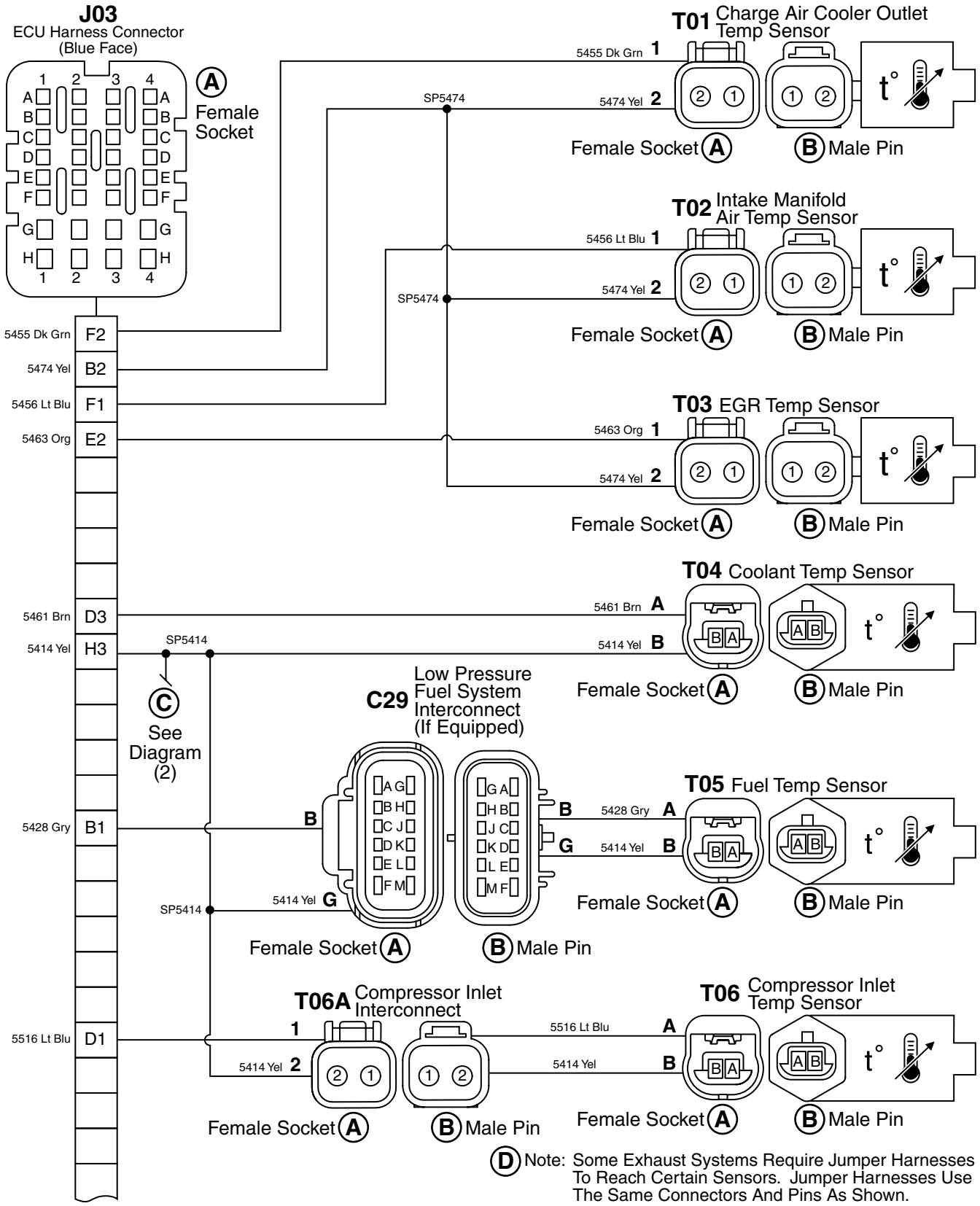
13.5 Liter 12V ECU Wiring Diagram 2

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A—Female Socket
B—Male Pin
C—See Diagram (3)
D—Twisted Pair
C29— Low Pressure Fuel System Interconnect (If Equipped)
D01— Water In Fuel Sensor
J03— ECU Harness Connector (Blue Face)
J3-C1—[5415 Dark Green] Low Pressure Fuel Signal
J3-C2—[5469 White] High 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] Crankshaft Position Return
J3-F4—[5447 Purple] Crankshaft Position Signal
J3-G3—[5443 Orange] Camshaft Position Return
J3-G4—[5445 Dark Green] Camshaft Position Signal
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— High Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
P07— Low Pressure Fuel Sensor (If Equipped)
X01— Crankshaft Position Sensor
X02— Camshaft Position Sensor

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13.5L 12V ECU Wiring Diagram 3



13.5 Liter 12V ECU Wiring Diagram 3

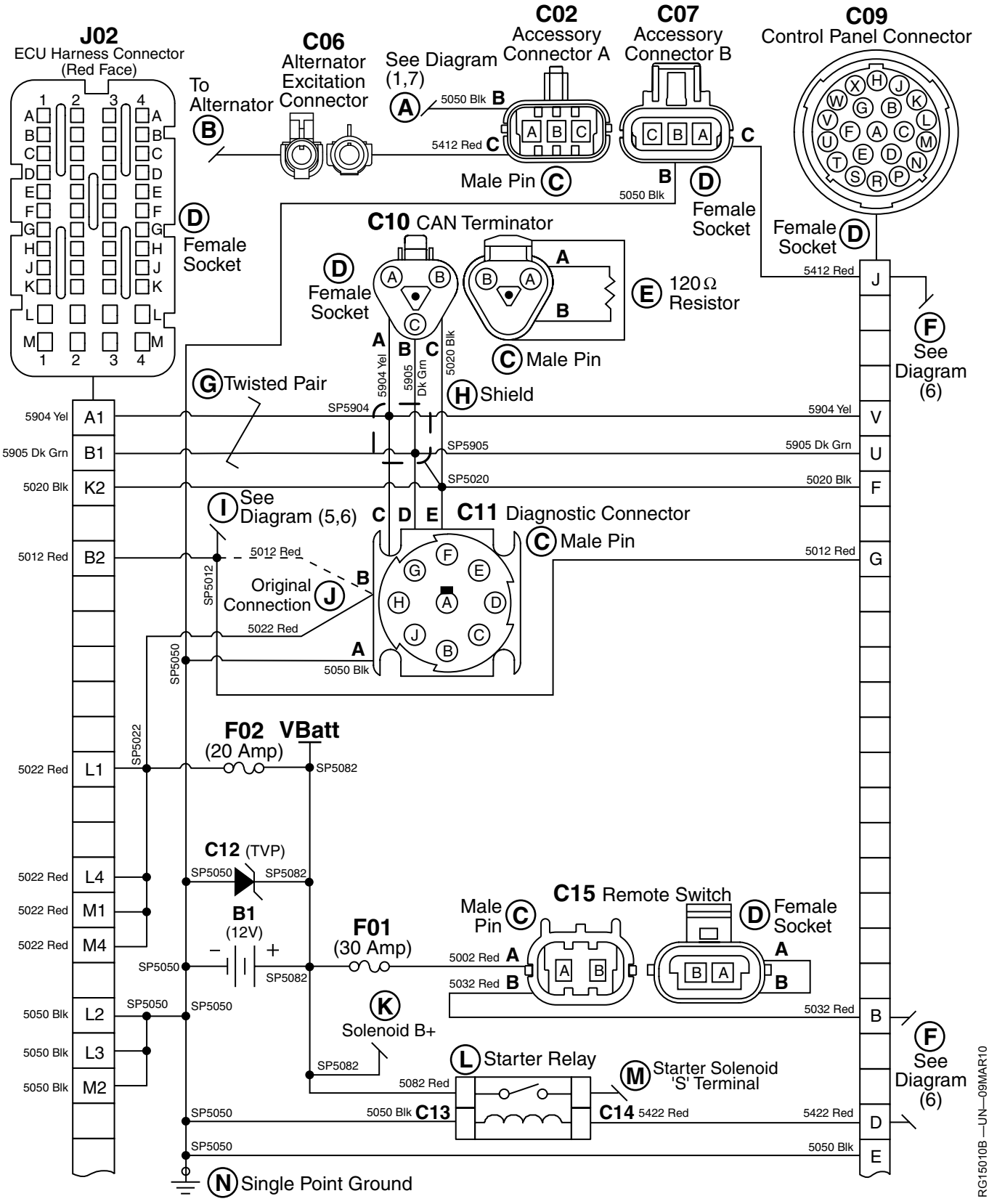
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A—Female Socket
B—Mail Pin
C—See Diagram (2)
D—Note: Some Exhaust Systems Require Jumper Harnesses to Reach Certain Sensors. Jumper Harnesses Use the Same Connectors and Pins as Shown
C29— Low Pressure Fuel System Interconnect (If Equipped)
J03— ECU Harness Connector (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
T06A— Compressor Inlet Sensor Interconnect

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13.5L 12V ECU Wiring Diagram 4



13.5 Liter 12V ECU Wiring Diagram 4

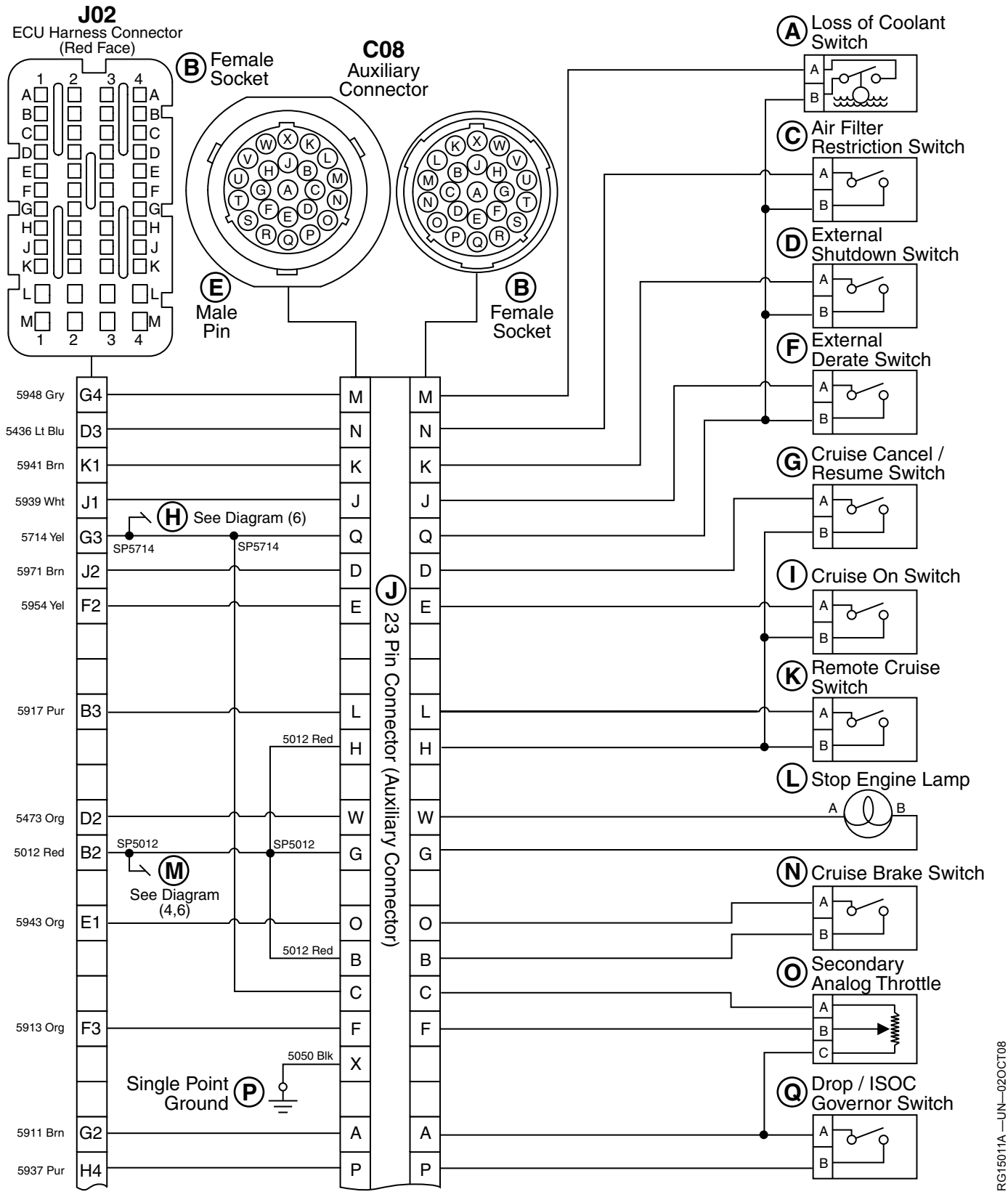
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A—See Diagram (7,8)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (6)
G—Twisted Pair
H—Shield
I— See Diagram (5,6)
J— Original Connection. See Instruction for Update
K—Solenoid B Positive
L—Starter Relay
M—Starter Solenoid 'S' Terminal
N—Single Point Ground
B1—12V
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
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

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13.5L 12V ECU Wiring Diagram 5



13.5 Liter 12V ECU Wiring Diagram 5

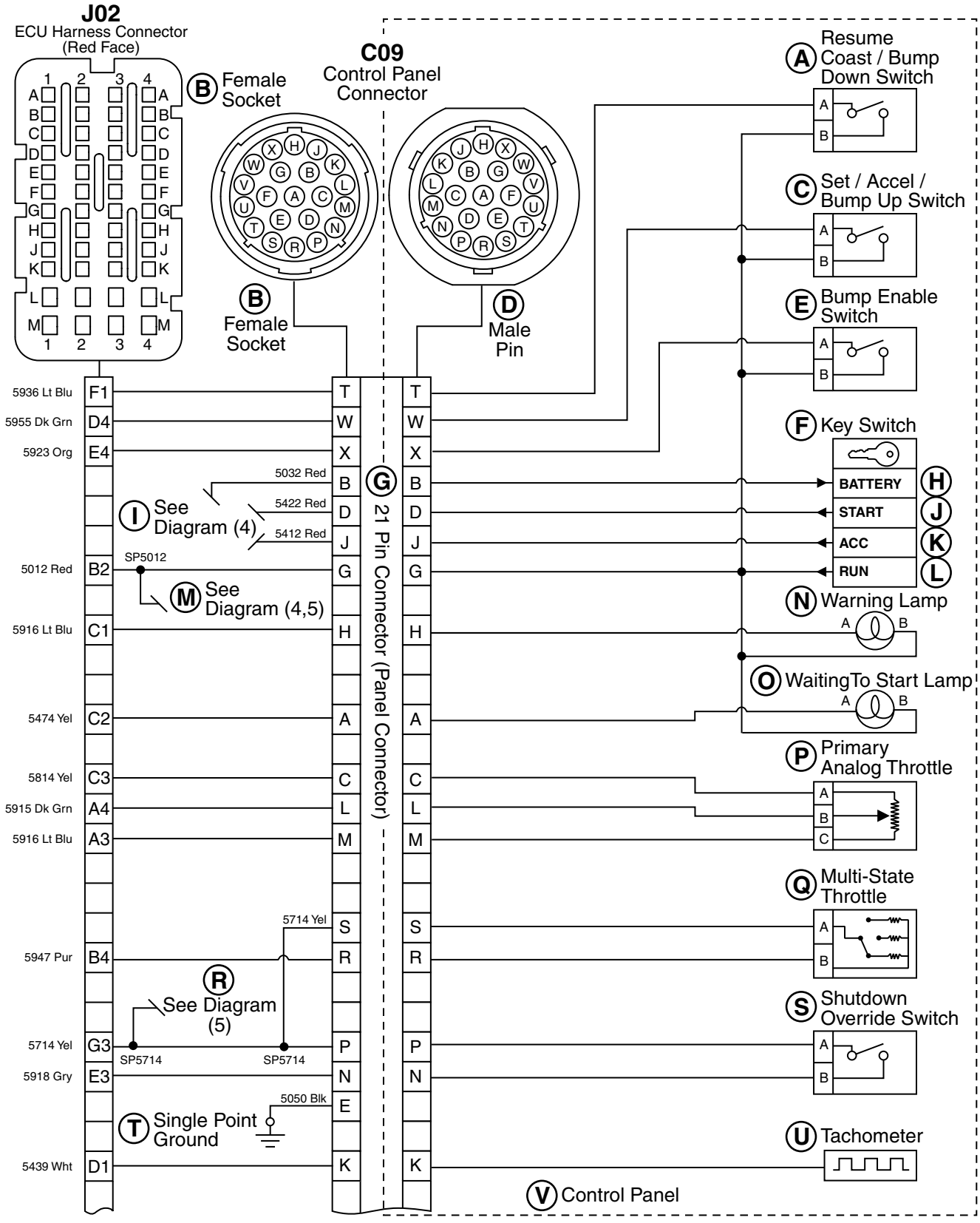
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DN22556,000067A -19-02OCT08-1/2

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

DN22556,000067A -19-02OCT08-2/2

13.5L 12V ECU Wiring Diagram 6



13.5 Liter 12V ECU Wiring Diagram 6

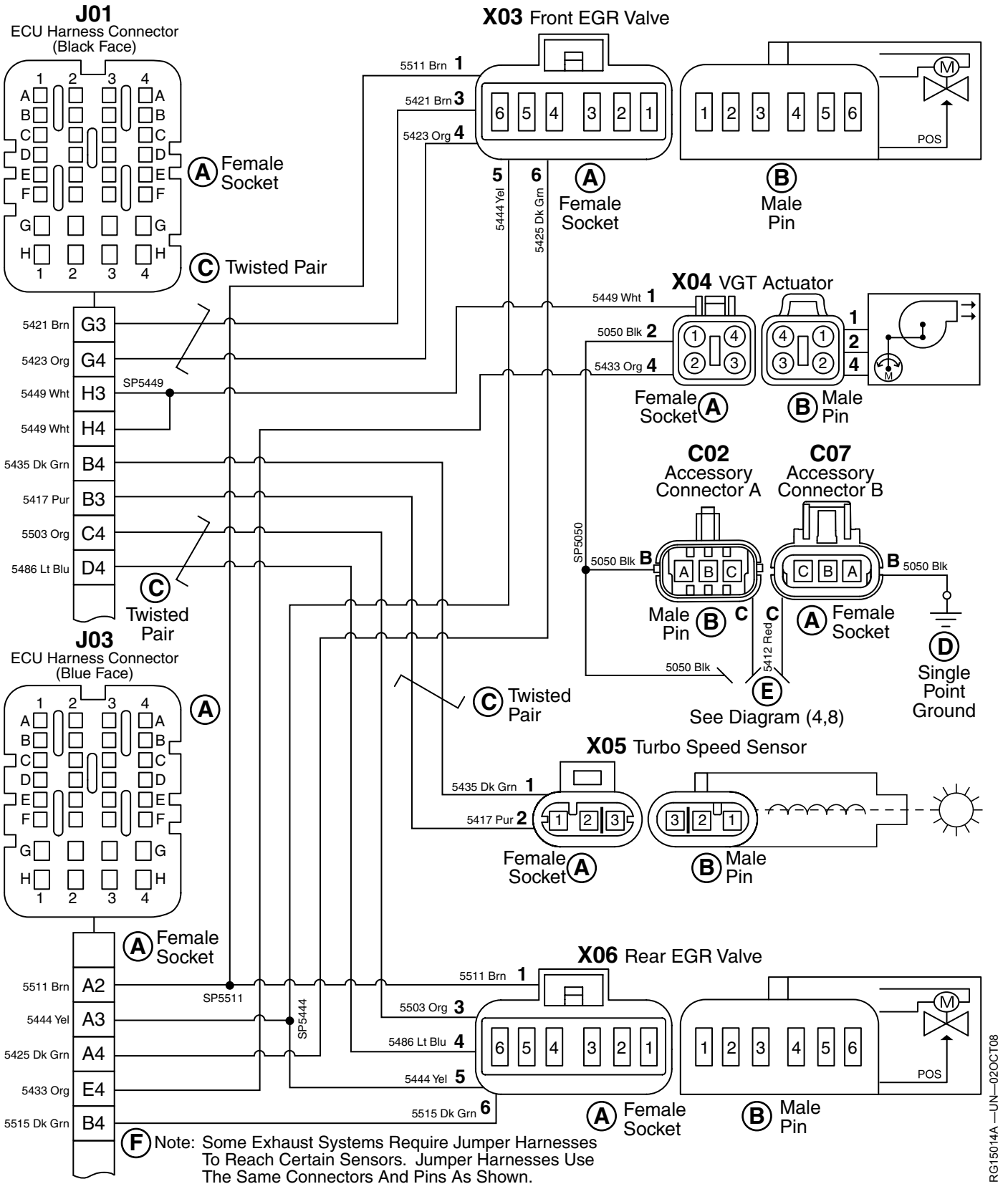
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DN22556,000067B -19-02OCT08-1/2

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] Multi-State 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

DN22556,000067B -19-02OCT08-2/2

13.5L 12V ECU Wiring Diagram 7



13.5 Liter 12V ECU Wiring Diagram 7

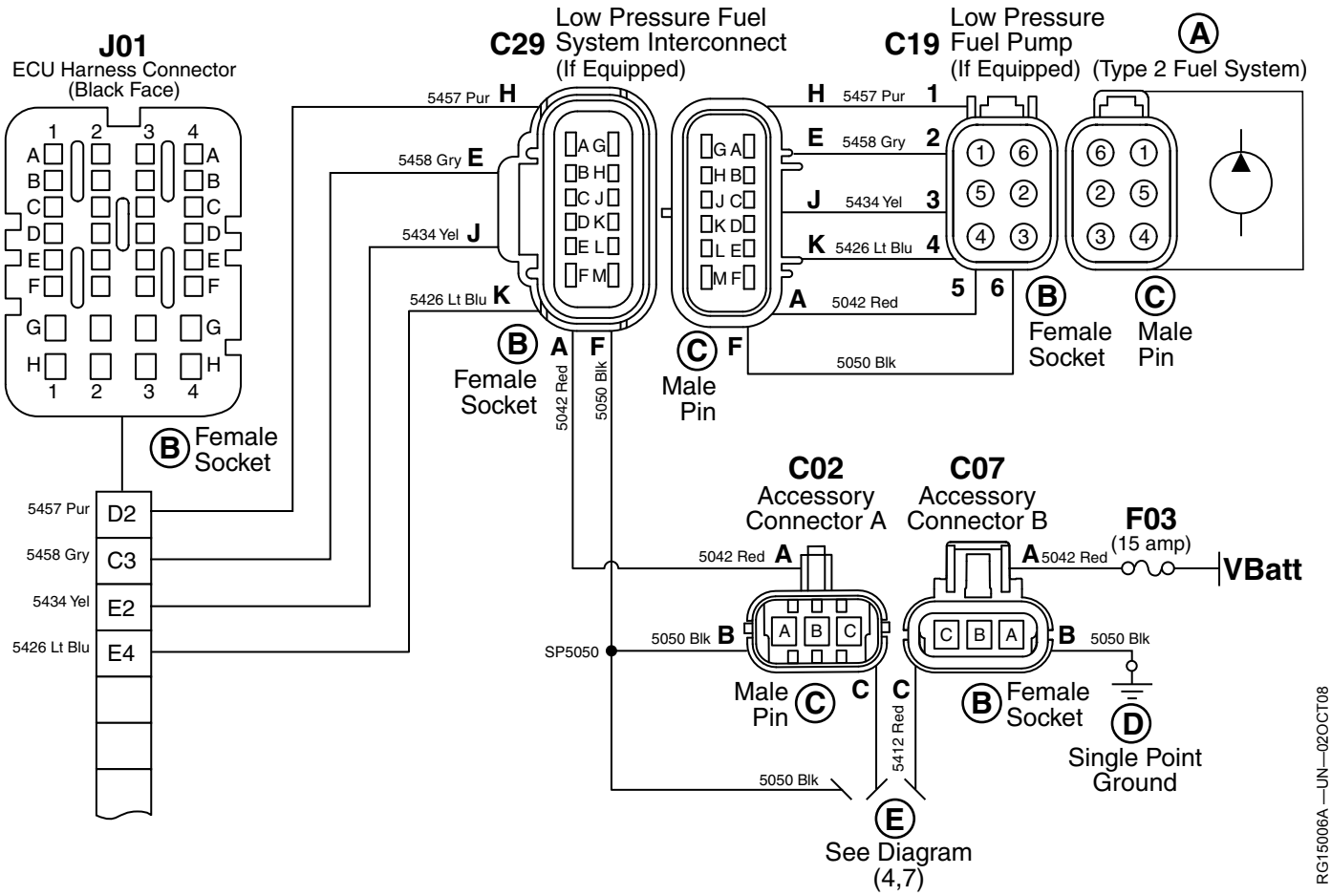
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DN22556,000067C -19-21MAY09-1/2

A—Female Socket
B—Mail Pin
C—Twisted Pair
D—Single Point Ground
E—See Diagram (4,8)
F—Note: Some Exhaust Systems Require Jumper Harnesses to Reach Certain Sensors. Jumper Harnesses Use the Same Connectors and Pins as Shown
C02— Accessory Connector A
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-B3—[5417 Purple] Turbo Speed Return
J1-B4—[5435 Dark Green] Turbo Speed Pulse
J1-C4—[5503 Orange] Rear EGR Valve PWM Drive #1
J1-D4—[5503 Orange] Rear EGR Valve PWM Drive #2
J1-G3—[5421 Brown] Front EGR Valve PWM Drive #1
J1-G4—[5423 Orange] Front 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] Front EGR Valve Position Signal
J3-B4—5515 Dark Green] Rear EGR Valve Position Signal
J3-E4—[5433 Orange] VGT Actuator Communications Signal
X03— Front EGR Valve
X04— VGT Actuator
X05— Turbo Speed Sensor
X06— Rear EGR Valve

DN22556,000067C -19-21MAY09-2/2

13.5L 12V ECU Wiring Diagram 8

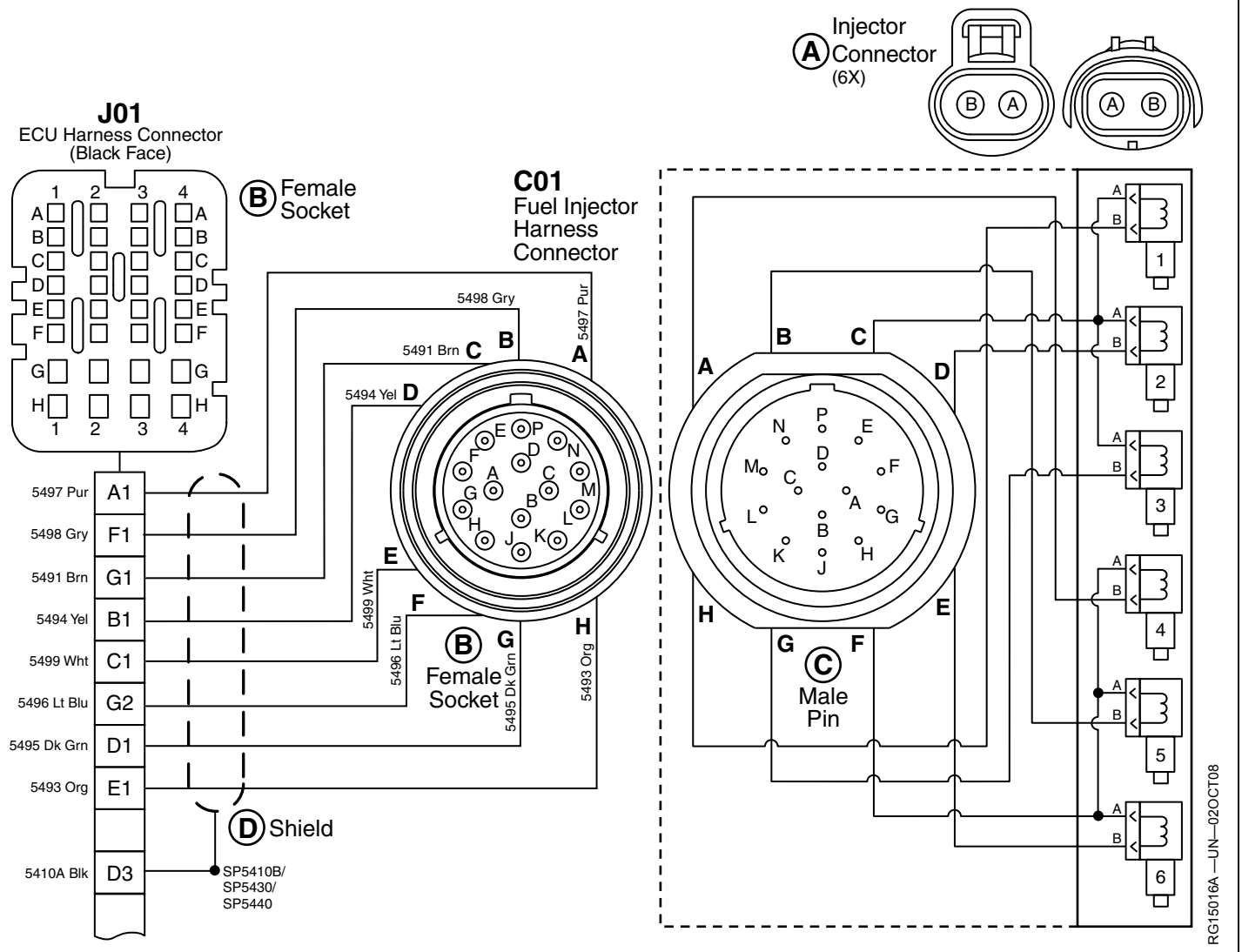


13.5 Liter 12V ECU Wiring Diagram 8

A—(Type 2 Fuel System)
B—Female Socket
C—Male Pin
D—Single Point Ground
E—See Diagram (4,7)
C02— Accessory Connector A
C07— Accessory Connector B
C19— Low Pressure Fuel Pump (If Equipped)
C29— Low Pressure Fuel System Interconnect (If Equipped)
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-E2—[5434 Yellow] Low Pressure Fuel Pump Status
J1-E4—[5426 Light Blue] Low Pressure Fuel Pump Enable Command
VBatt—Battery Positive

DN22556,000067D -19-02OCT08-1/1

13.5L 24V ECU Wiring Diagram 1



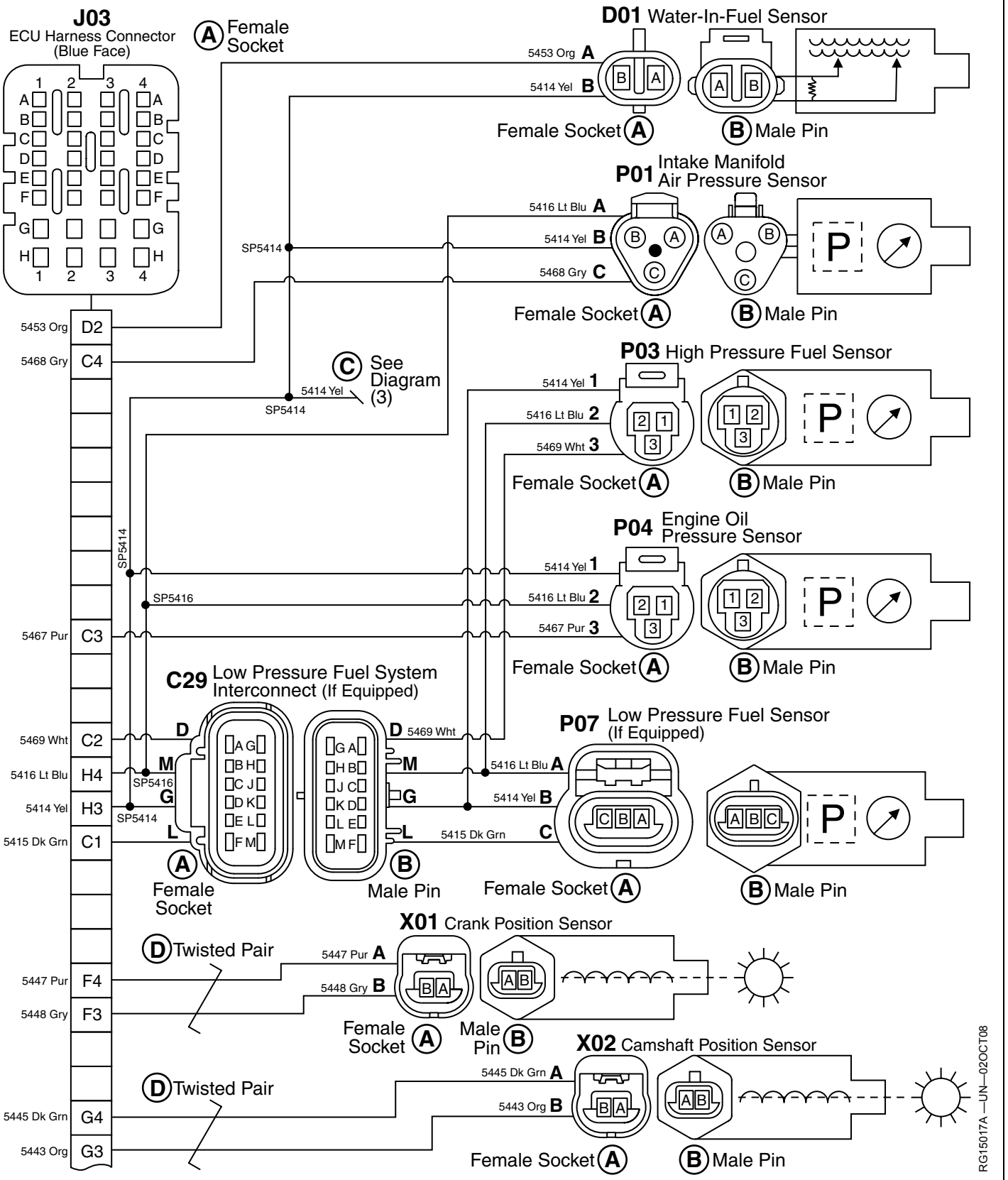
13.5 Liter 24V ECU Wiring Diagram 1

A—Injector Connector (6x)
B—Female Socket
C—Male Pin
D—Shield

C01— Fuel Injector Harness Connector
J01— ECU Harness 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-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D3—[5410 Black] Wiring Shield
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F1—5498 Gray] Injector #5 Inject Pulse
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power

DN22556,000067E -19-02OCT08-1/1

13.5L 24V ECU Wiring Diagram 2



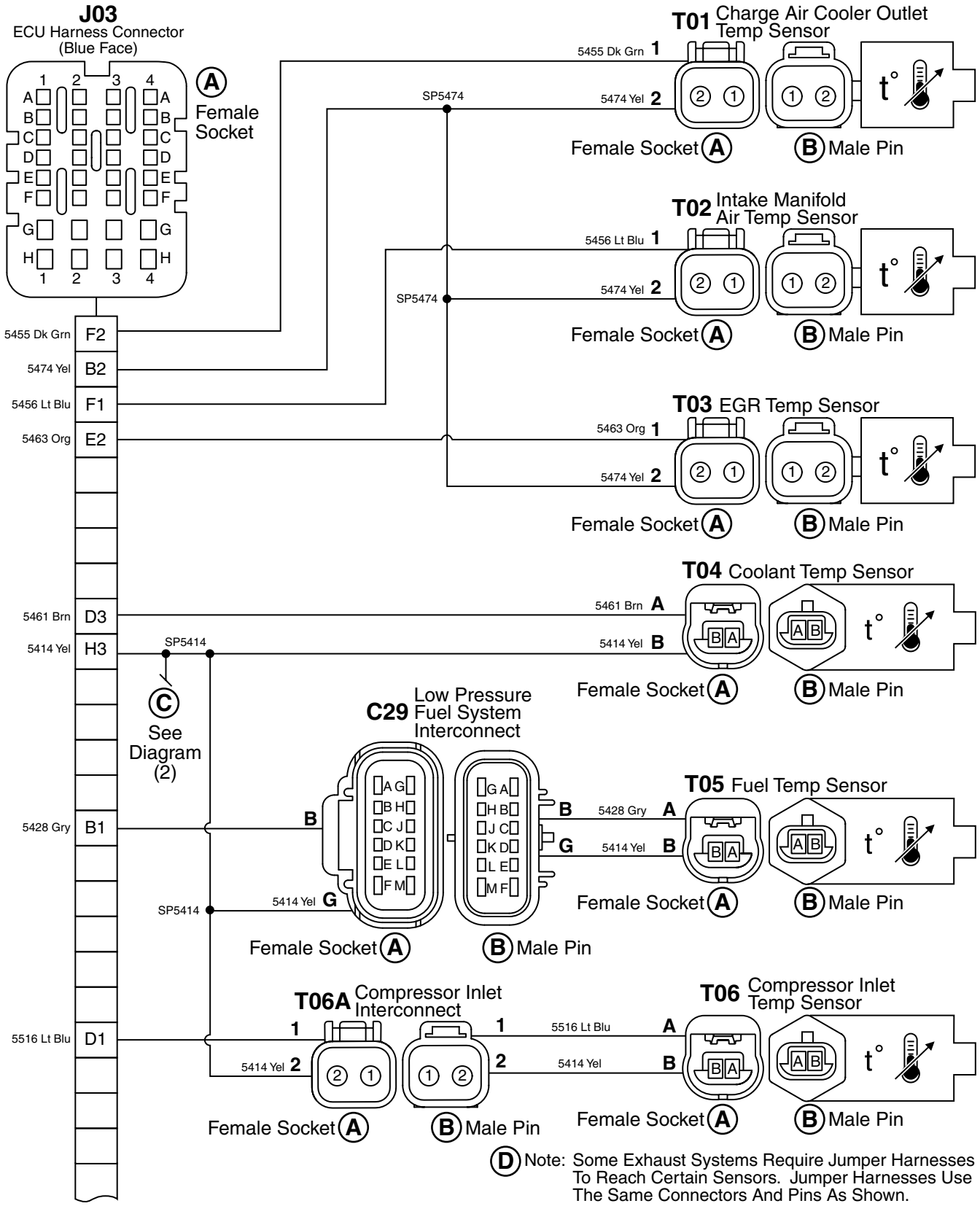
13.5 Liter 24V ECU Wiring Diagram 2

Continued on next page

A—Female Socket
B—Male Pin
C—See Diagram (3)
D—Twisted Pair
C29— Low Pressure Fuel System Interconnect (If Equipped)
D01— Water In Fuel Sensor
J03— ECU Harness Connector (Blue Face)
J3-C1—[5415 Dark Green] Low Pressure Fuel Signal
J3-C2—[5469 White] High 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] Crankshaft Position Return
J3-F4—[5447 Purple] Crankshaft Position Signal
J3-G3—[5443 Orange] Camshaft Position Return
J3-G4—[5445 Dark Green] Camshaft Position Signal
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— High Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
P07— Low Pressure Fuel Sensor (If Equipped)
X01— Crankshaft Position Sensor
X02— Camshaft Position Sensor

DN22556,000067F -19-02OCT08-2/2

13.5L 24V ECU Wiring Diagram 3



13.5 Liter 24V ECU Wiring Diagram 3

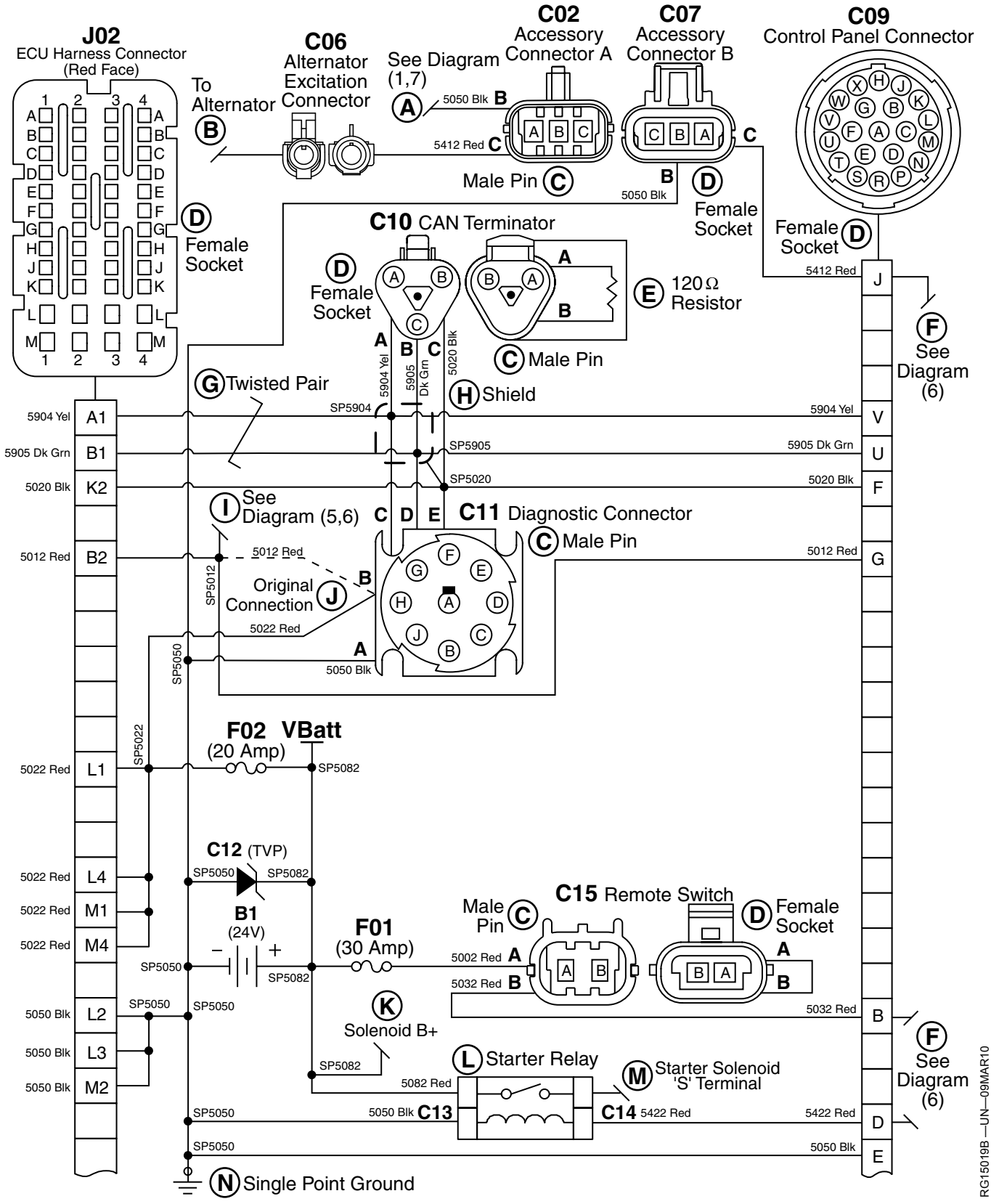
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DN22556,0000680 -19-21MAY09-1/2

A—Female Socket
B—Male Pin
C—See Diagram (2)
D—Note: Some Exhaust Systems Require Jumper Harnesses to Reach Certain Sensors. Jumper Harnesses Use the Same Connectors and Pins as Shown
C29— Low Pressure Fuel System Interconnect (If Equipped)
J03— ECU Harness Connector (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] Charged 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
T06A— Compressor Inlet Sensor Interconnect

DN22556,0000680 -19-21MAY09-2/2

13.5L 24V ECU Wiring Diagram 4



13.5 Liter 24V ECU Wiring Diagram 4

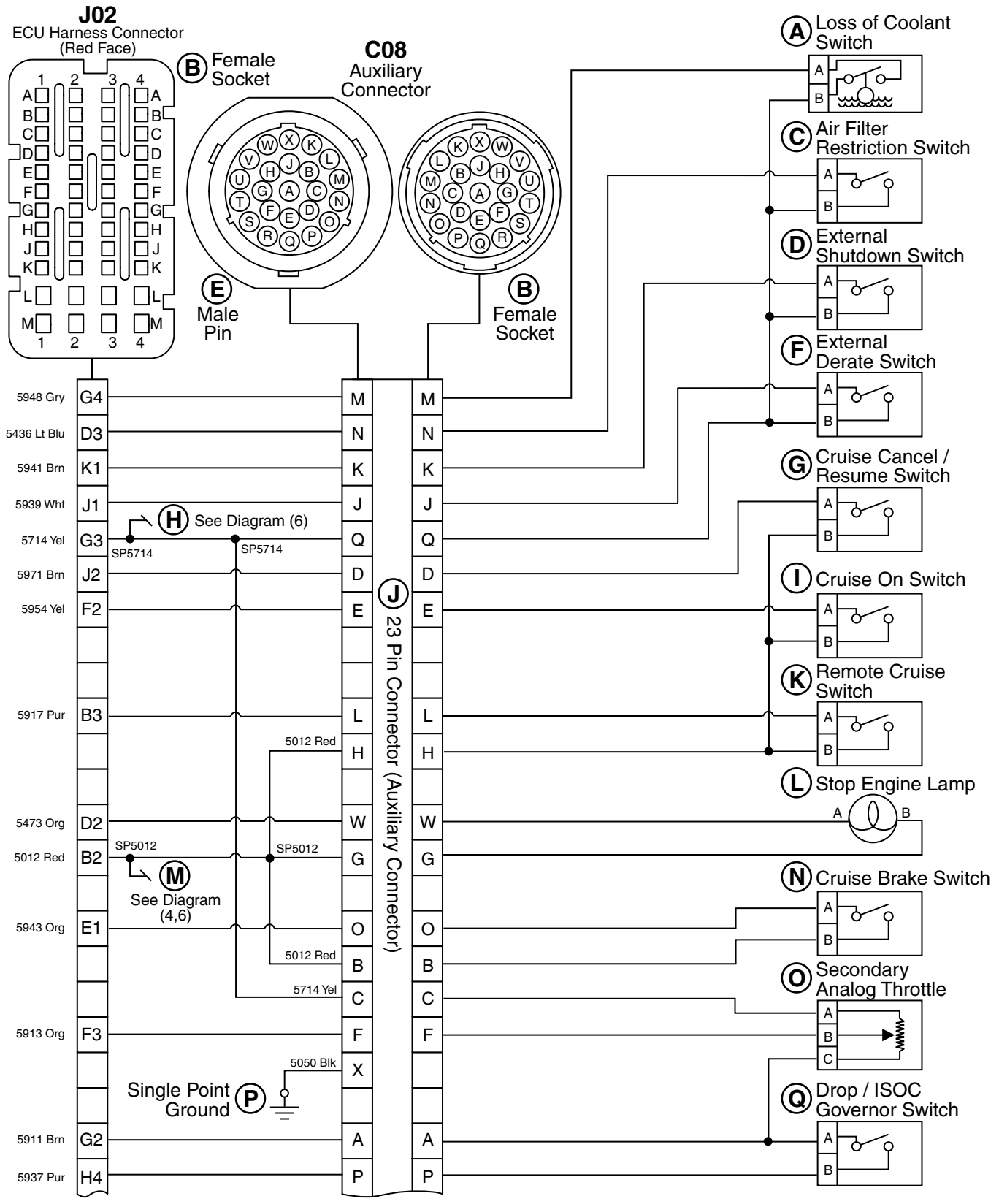
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DN22556,0000681 -19-09MAR10-1/2

A—See Diagram (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— Original Connection. See Instruction for Update
K—Solenoid B Positive
L—Starter Relay
M—Starter Solenoid 'S' Terminal
N—Single Point Ground
B1—24V
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
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 Return
J2-L3—[5050B Black] Battery Return
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Return
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

DN22556,0000681 -19-09MAR10-2/2

13.5L 24V ECU Wiring Diagram 5



13.5 Liter 24V ECU Wiring Diagram 5

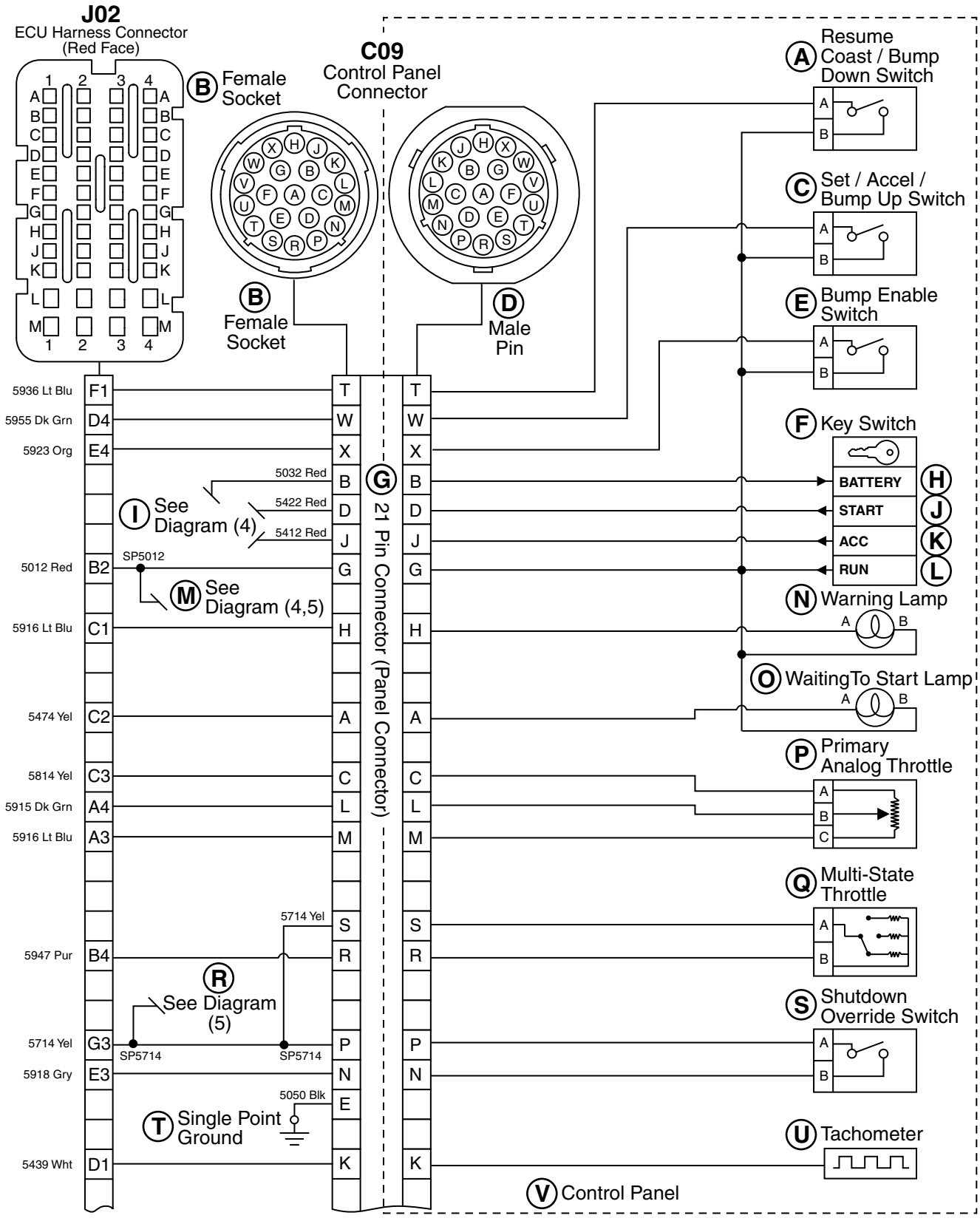
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DN22556,0000682 -19-02OCT08-1/2

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

DN22556,0000682 -19-02OCT08-2/2

13.5L 24V ECU Wiring Diagram 6



13.5 Liter 24V ECU Wiring Diagram 6

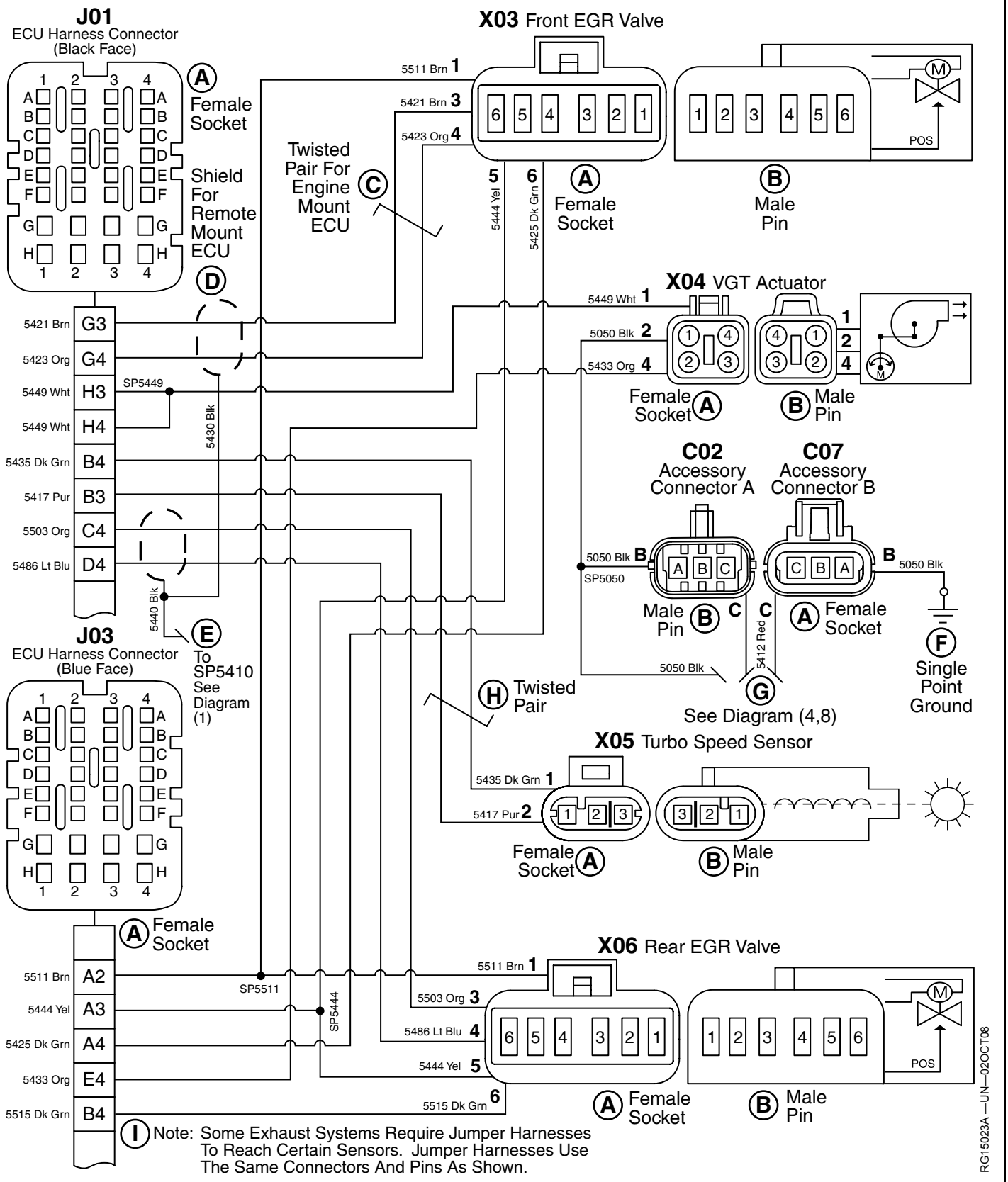
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DN22556,0000683 -19-02OCT08-1/2

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] Multi-State 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

DN22556,0000683 -19-02OCT08-2/2

13.5L 24V ECU Wiring Diagram 7



13.5 Liter 24V ECU Wiring Diagram 7

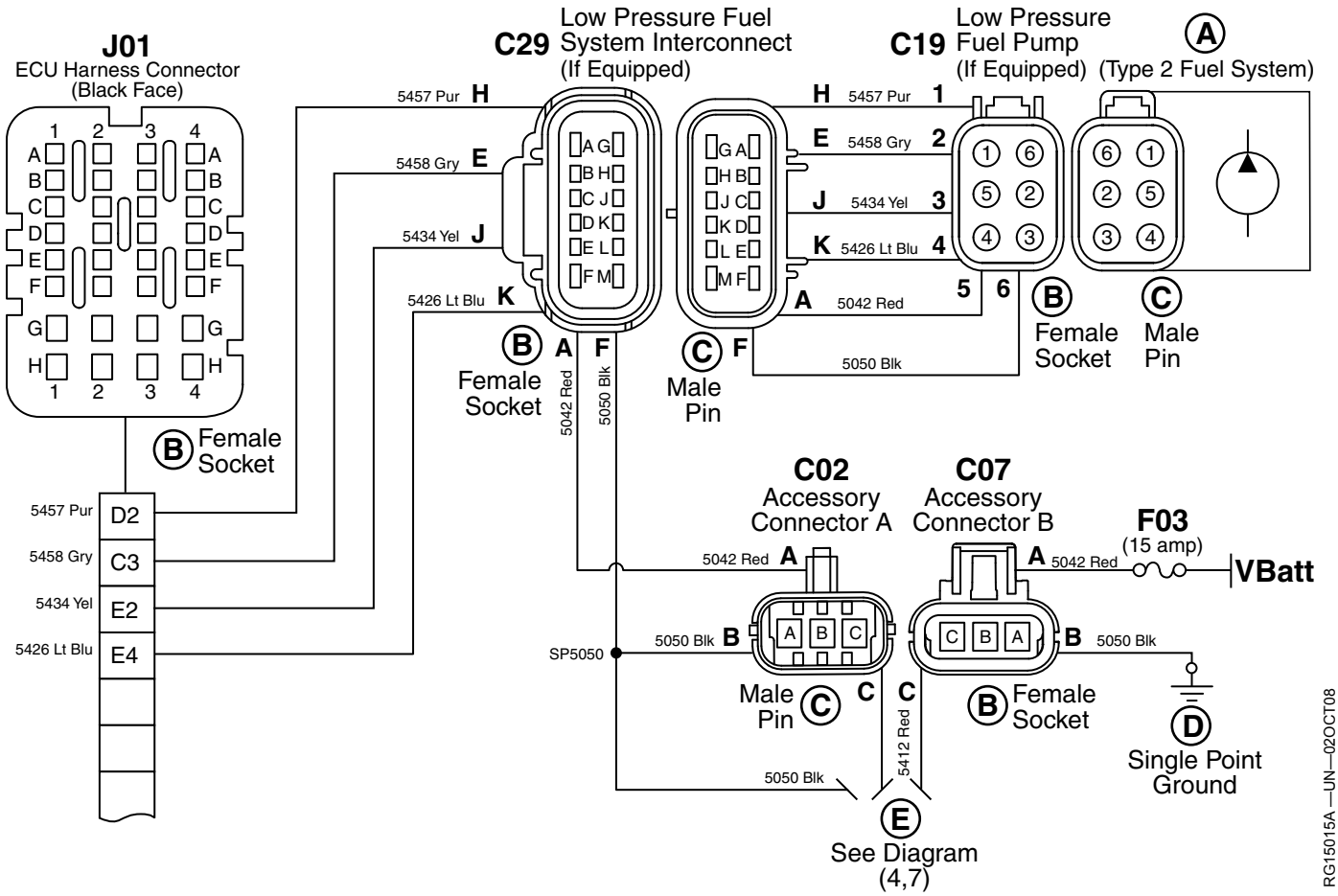
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DN22556,0000684 -19-21MAY09-1/2

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—Single Point Ground
G—See Diagram (4,8)
H—Twisted Pair
I— Note: Some Exhaust Systems Require Jumper Harnesses to Reach Certain Sensors. Jumper Harnesses Use the Same Connectors and Pins as Shown
C02— Accessory Connector A
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-B3—[5417 Purple] Turbo Speed Return
J1-B4—[5435 Dark Green] Turbo Speed Pulse
J1-C4—[5503 Orange] Rear EGR Valve PWM Drive #1
J1-D3—[5410 Black] Wiring Shield
J1-D4—[5503 Orange] Rear EGR Valve PWM Drive #2
J1-G3—[5421 Brown] Front EGR Valve PWM Drive #1
J1-G4—[5423 Orange] Front 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] Front EGR Valve Position Signal
J3-B4—5515 Dark Green] Rear EGR Valve Position Signal
J3-E4—[5433 Orange] VGT Actuator Communications Signal
X03— Front EGR Valve
X04— VGT Actuator
X05— Turbo Speed Sensor
X06— Rear EGR Valve

DN22556,0000684 -19-21MAY09-2/2

13.5L 24V ECU Wiring Diagram 8

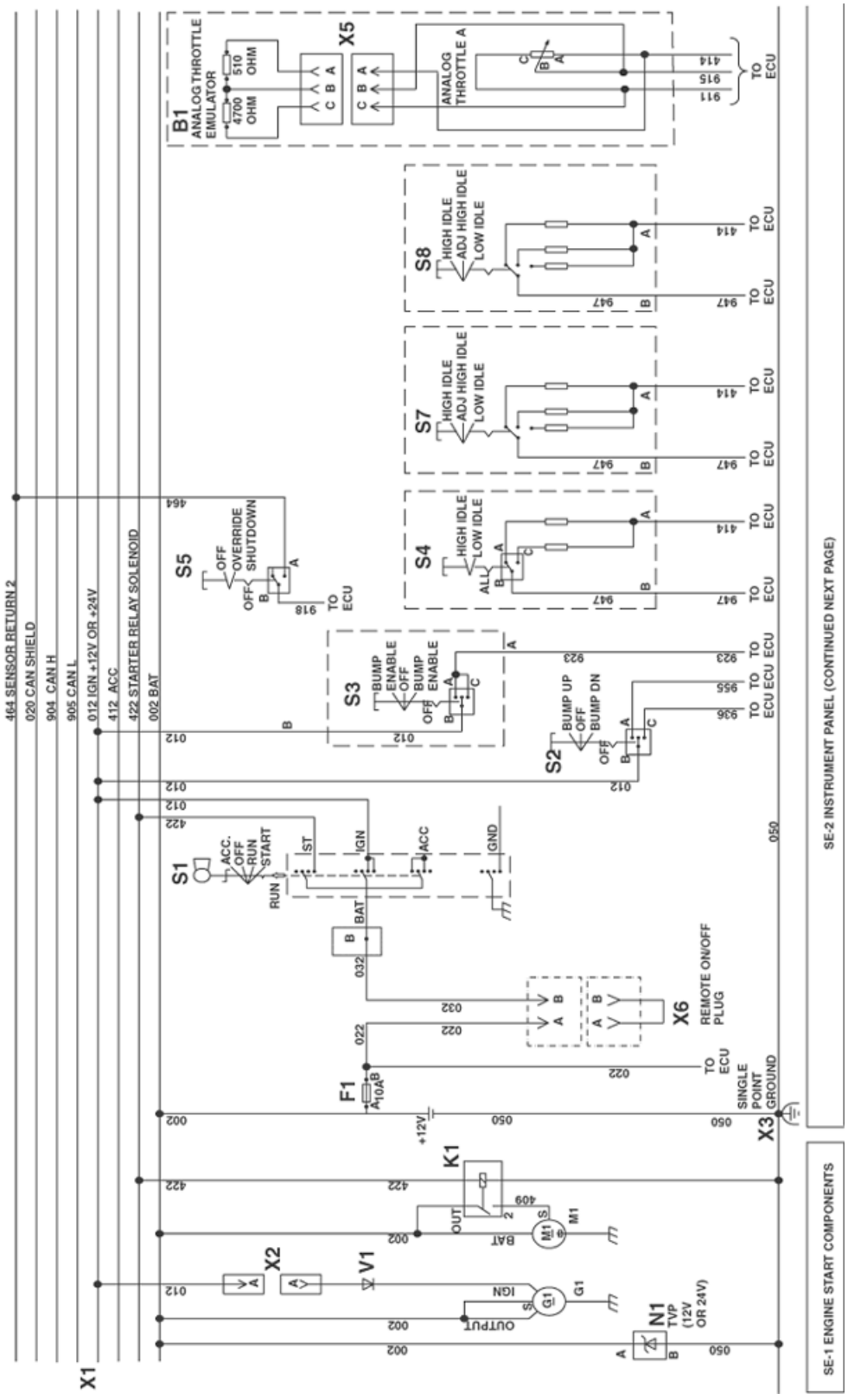


13.5 Liter 24V ECU Wiring Diagram 8

A—(Type 2 Fuel System)
B—Female Socket
C—Male Pin
D—Single Point Ground
E—See Diagram (4,7)
C02— Accessory Connector A
C07— Accessory Connector B
C19— Low Pressure Fuel Pump (If Equipped)
C29— Low Pressure Fuel System Interconnect (If Equipped)
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-E2—[5434 Yellow] Low Pressure Fuel Pump Status
J1-E4—[5426 Light Blue] Low Pressure Fuel Pump Enable Command
VBatt—Battery Positive

DN22556,0000685 -19-02OCT08-1/1

OEM Engines - Instrument Panel/Engine Start Components Electrical Wiring Diagram



Control Panel-Engine Start Components Wiring Diagram (sh 1)

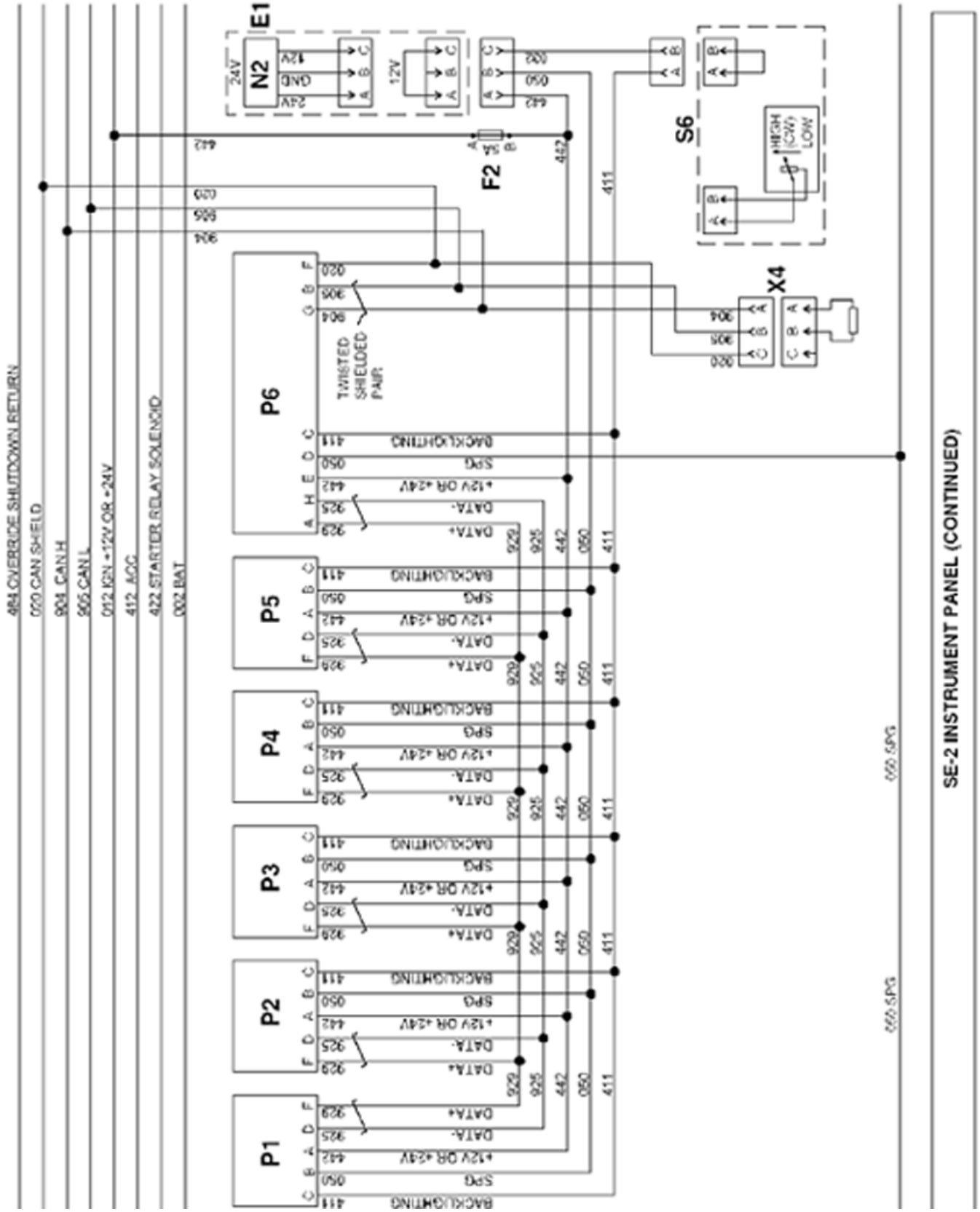
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RG40854,000002A -19-04JUN08-1/4

B1—Analog Throttle Emulator
F1—Fuse (10 Amp)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector (TVP) (12V or 24V)
SE-1—Engine Start Components
SE-2—Instrument Panel (Continued Next Page)
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary)
S4—Dual State Throttle Switch
S5—Override Shutdown Switch (Momentary)
S7—Tri-State Throttle Switch
S8—Ramp Throttle Switch
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X5—Analog Throttle Connector
X6—Remote ON/OFF Plug
002—Battery (BAT)
012—Ignition (IGN) +12V or +24V
020—CAN Shield
412—Accelerate (ACC)
422—Starter Relay Solenoid
464—Override Shutdown Return
904—CAN High (H)
905—CAN Low (L)
A—Output
B—Ignition (IGN)
C—Battery (BAT)
D—Output (OUT)
E—Start (ST)
F—Accelerate (ACC)
G—Ground (GND)
H—To ECU (10 Places)
I—Analog Throttle A

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RG40854,000002A -19-04JUN08-2/4



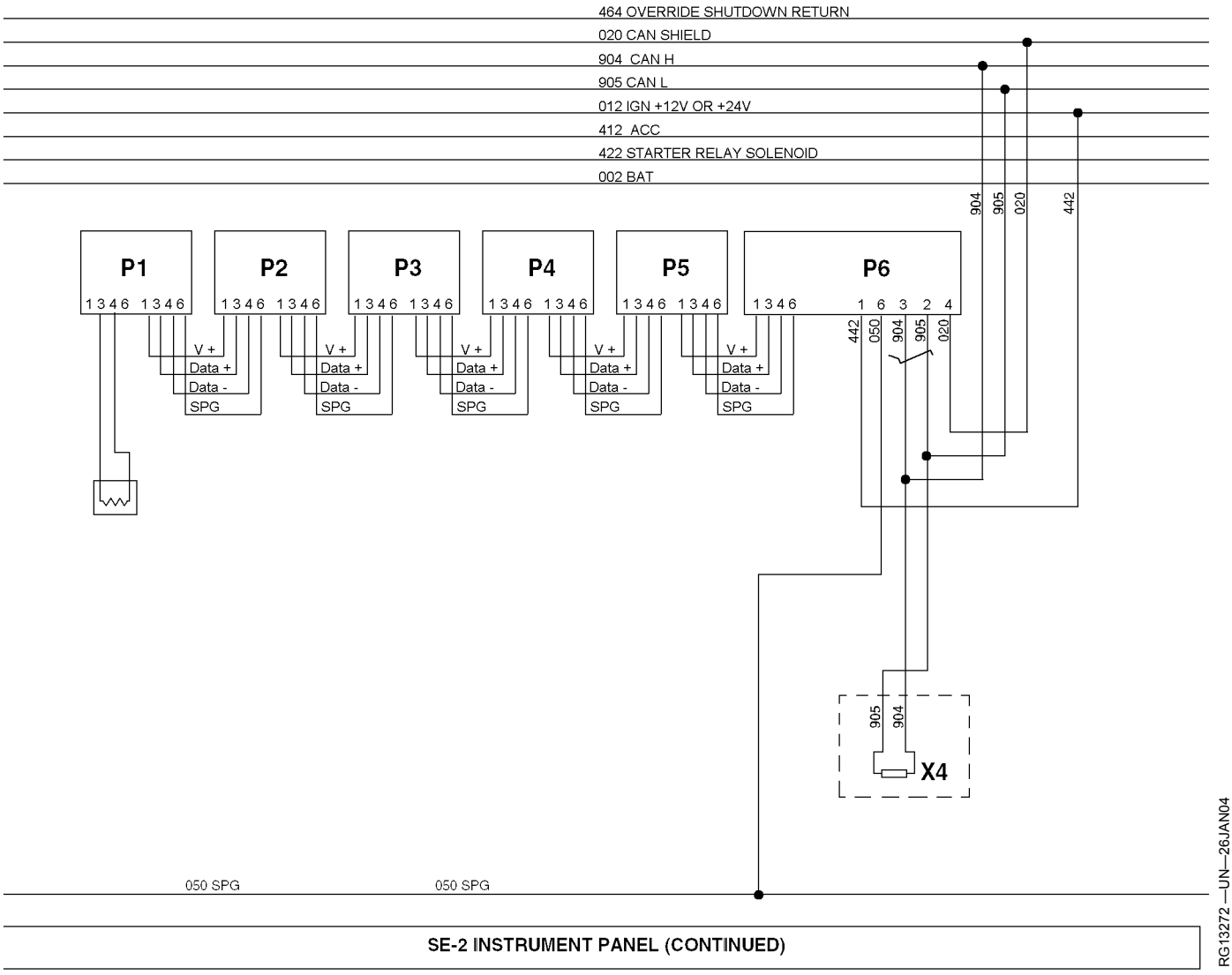
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RG40854,000002A -19-04JUN08-3/4

E1—Back Light Regulator (24V) or Plug (12V)
F2—Fuse (5 Amp)
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
SE-2—Instrument Panel (Continued)
S6—Dimmer Control or Jumper Plug
X4—CAN Terminator
002—Battery (BAT)
012—Ignition (IGN) +12V or +24V
020—CAN Shield
050—Single Point Ground (SPG)
411—Backlighting
412—Accelerate (ACC)
422—Starter Relay Solenoid
442—+12V or +24V
464—Override Shutdown Return
904—CAN High (H)
905—CAN Low (L)
925—Data-
929—Data+
A—Twisted Shielded Pair
B—High, (Clockwise CW), Low

RG40854,000002A -19-04JUN08-4/4

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

DM59778,0000022 -19-15OCT07-1/1

13.5L Wire Splice Location Diagrams

Wire harness splice location diagrams for 13.5L engine applications

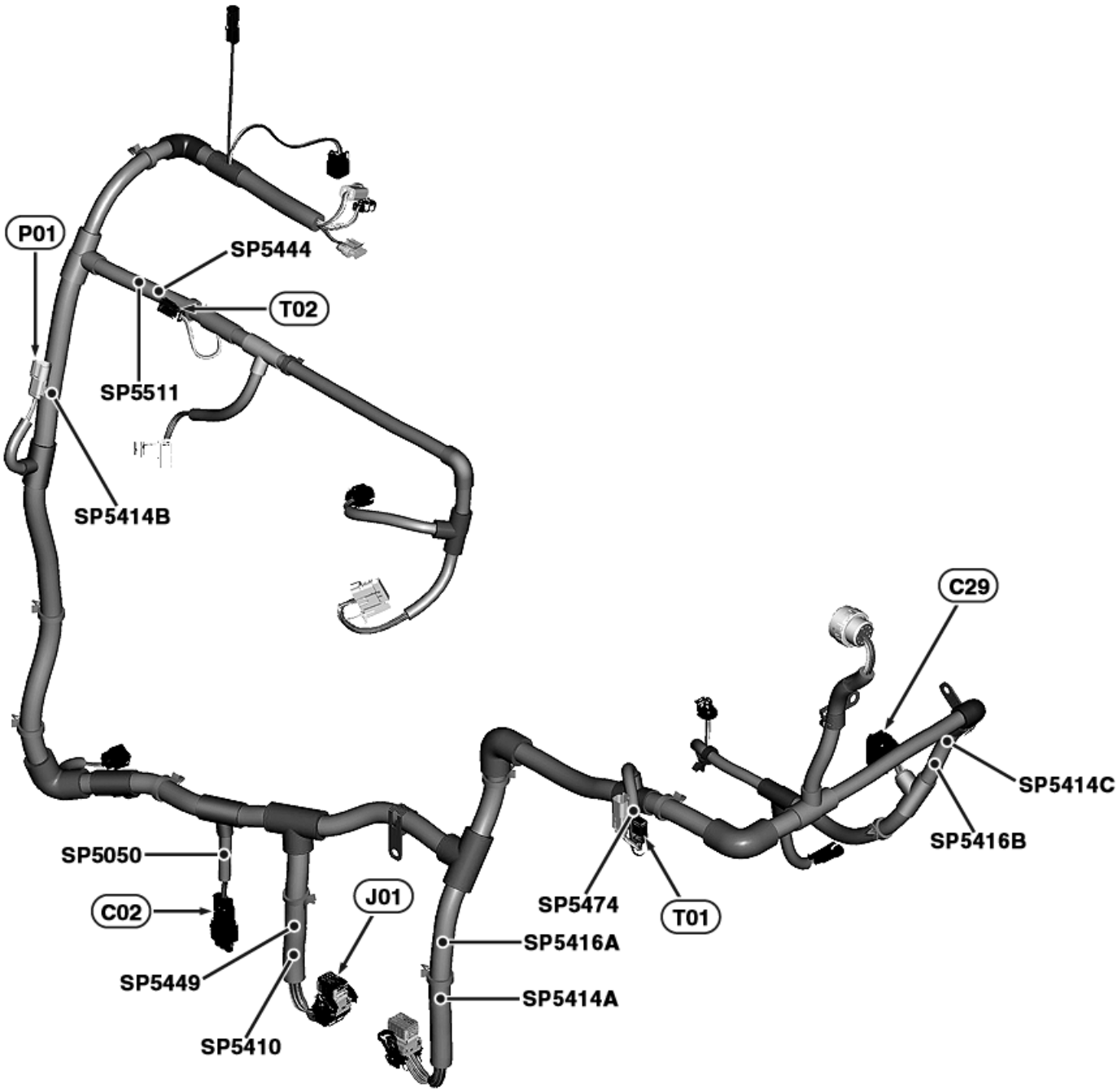
NOTE: The option code for the application can be found on the Option Code Label located near the top of the engine block.

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
8417 8418 8428	RE532999	J01, J03 Engine Harness
8410	RE532131	J01, J03 Engine Harness
8420 8422	RE532132	J01, J03 Engine Harness
8431 8432	RE536702	J01, J03 Engine Harness
8423 8424	RE533773	J01, J03 Engine Harness
8429 8430	RE535950	J01, J03 Engine Harness
8427	RE534138	J01, J03 Engine Harness
8494	RE537502	Engine Harness for Dual ECU
9221	RE536595	J2 OEM Harness
9222	RE536596	J2 OEM Harness
	RE534749	Low Pressure Fuel System Interconnect Harness
	RE534099	Standard Fuel System Interconnect Harness

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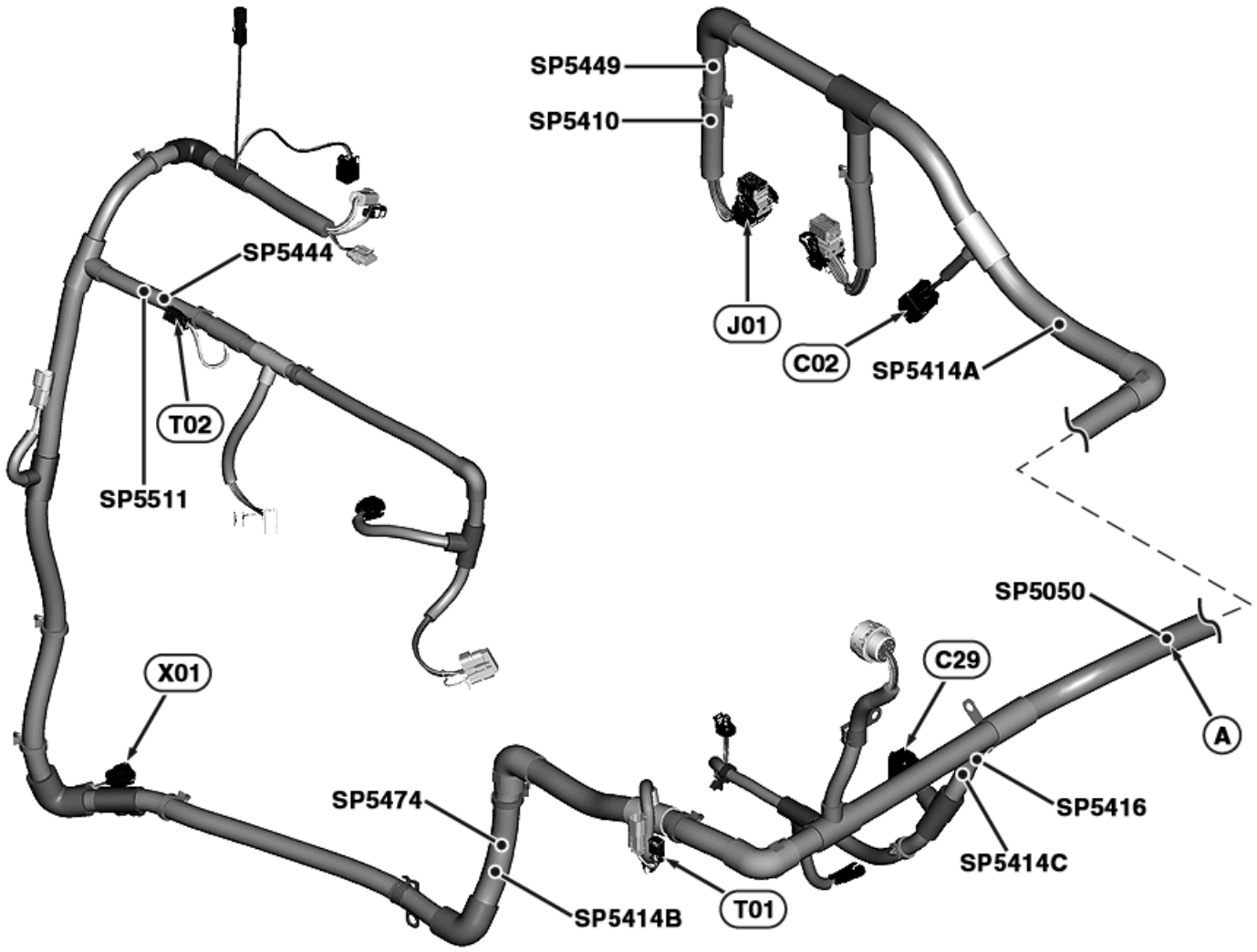


Splice Locations for Wire Harness RE532999, Option Codes 8417, 8418, and 8428

C02— Accessory Connector A
C29— Low Pressure Fuel System Interconnect
P01— Intake Manifold Air Pressure Sensor
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
J01— ECU Harness Connector (Black Face)
SP5050—Splice 5050
SP5410—Splice 5410
SP5414A—Splice 5414A
SP5414B—Splice 5414B
SP5414C—Splice 5414C
SP5416A—Splice 5416A
SP5416B—Splice 5416B
SP5444—Splice 5444
SP5449—Splice 5449
SP5474—Splice 5474
SP5511—Splice 5511

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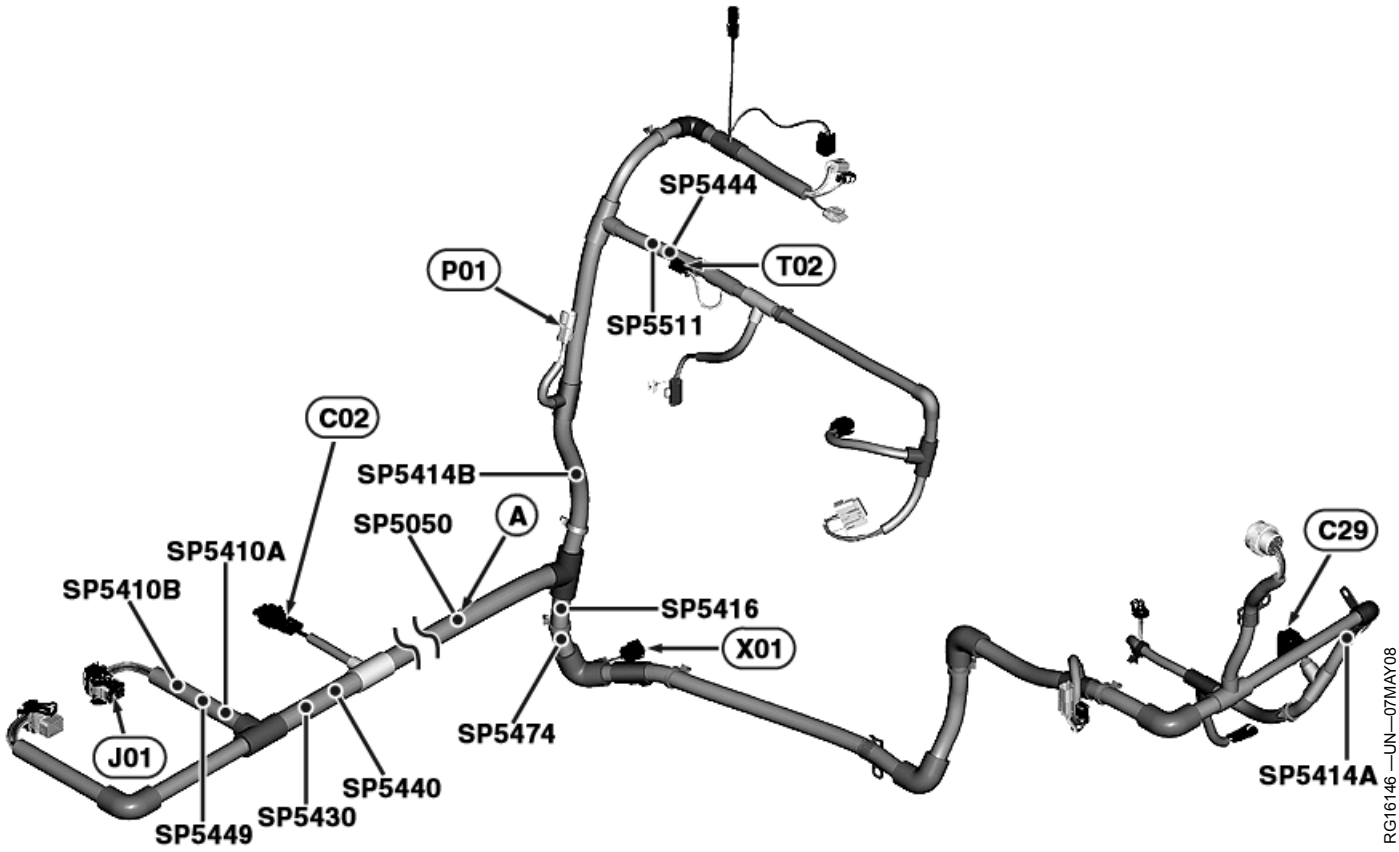


Splice Locations for Wire Harness RE532131, Option Code 8410

A—Splice 5050 Located Within 200mm (7.9in) from Harness T-Junction to C29
C02— Accessory Connector A
C29— Low Pressure Fuel System Interconnect
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
J01— ECU Harness Connector (Black Face)
X01— Crank Position Sensor
SP5050—Splice 5050
SP5410—Splice 5410
SP5414A—Splice 5414A
SP5414B—Splice 5414B
SP5414C—Splice 5414C
SP5416—Splice 5416
SP5444—Splice 5444
SP5449—Splice 5449
SP5474—Splice 5474
SP5511—Splice 5511

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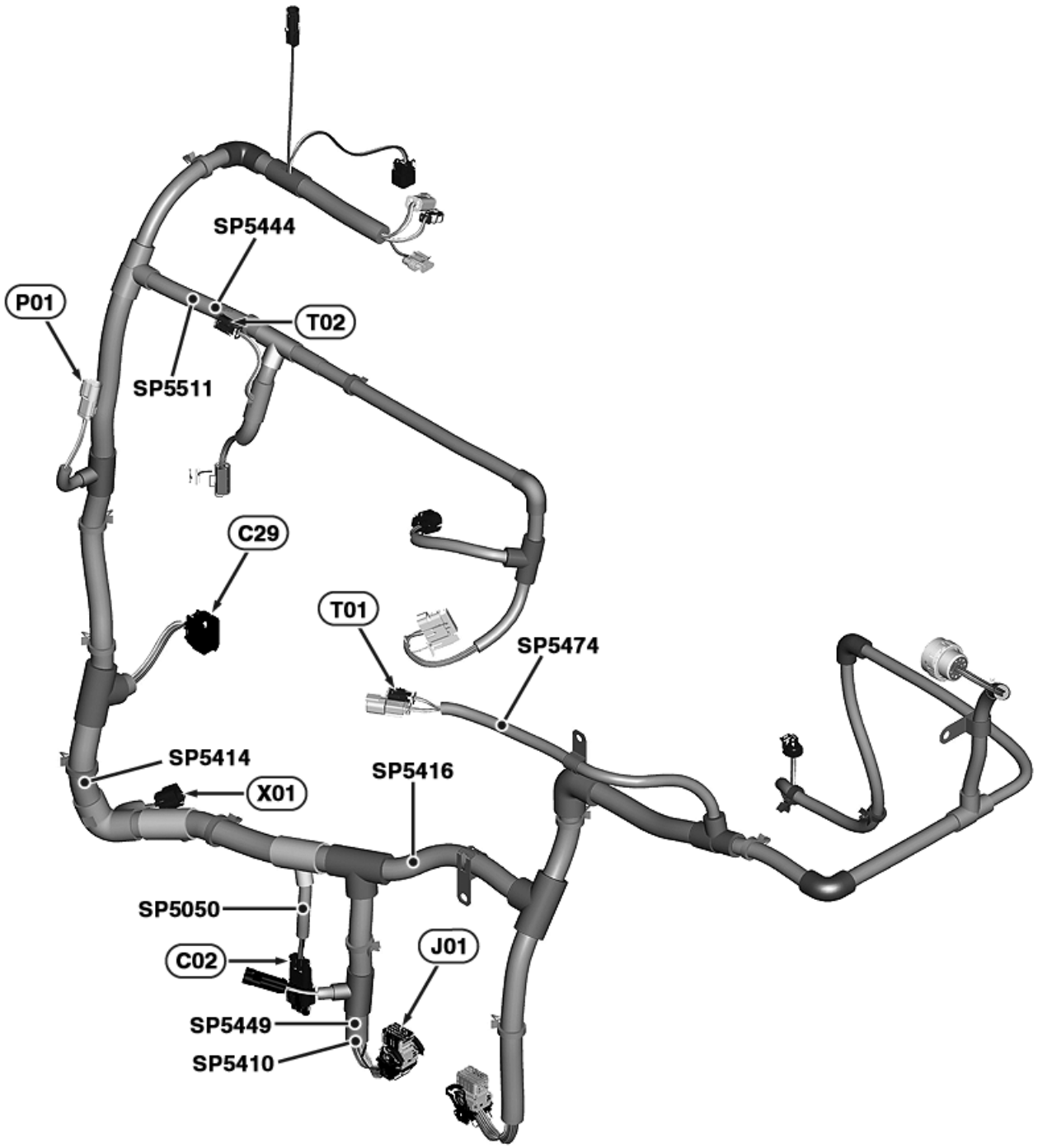


Splice Locations for Wire Harness RE532132, Option Codes 8420 and 8422

A—Splice 5050 Located Within 200mm (7.9in) from Harness T-Junction Near Splice 5416
C02— Accessory Connector A
C29— Low Pressure Fuel System Interconnect
P01— Intake Manifold Air Pressure Sensor
J01— ECU Harness Connector (Black Face)
X01— Crank Position Sensor
SP5050—Splice 5050
SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414A—Splice 5414A
SP5414B—Splice 5414B
SP5416—Splice 5416
SP5430—Splice 5430
SP5440—Splice 5440
SP5444—Splice 5444
SP5449—Splice 5449
SP5474—Splice 5474
SP5511—Splice 5511

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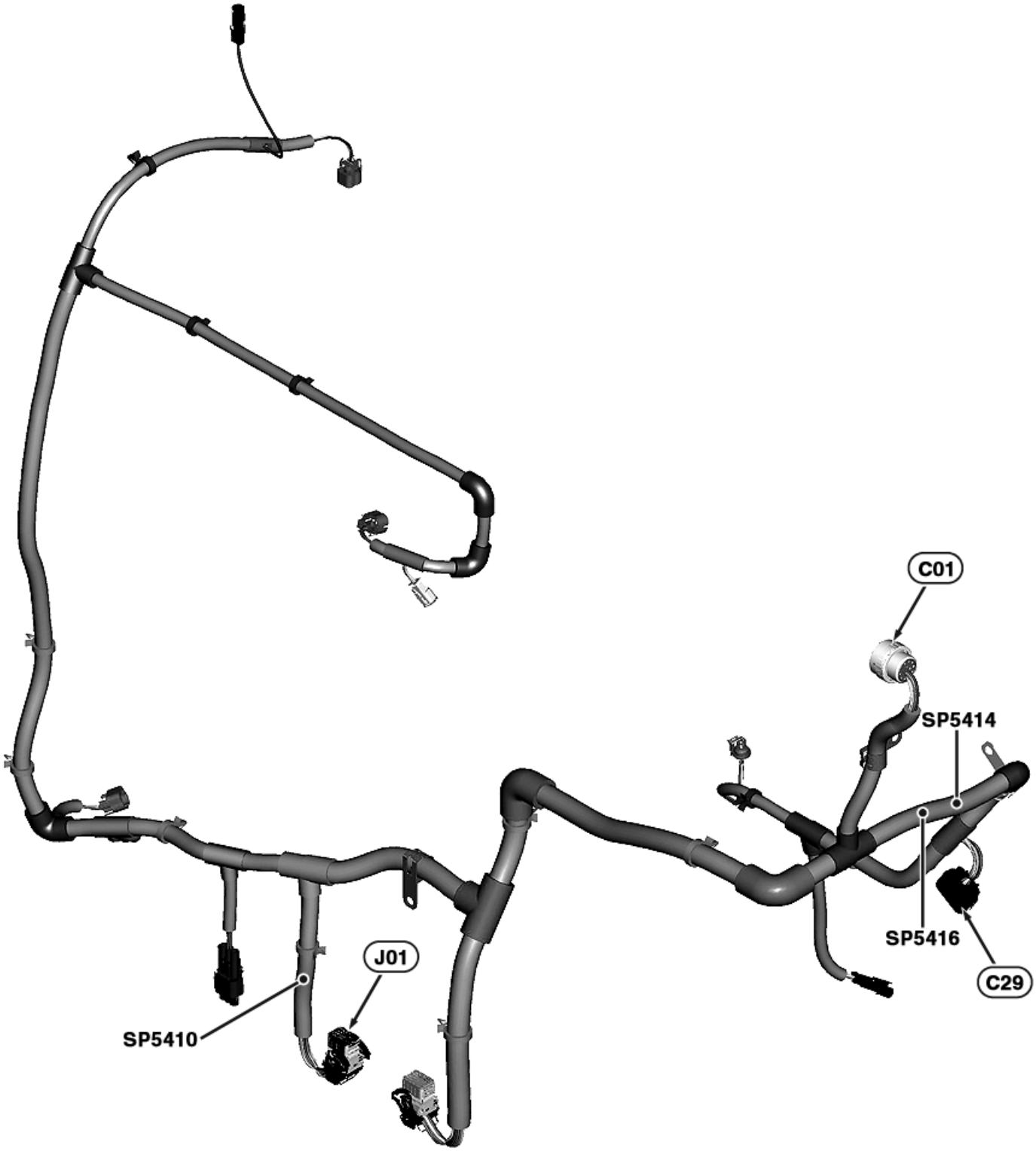


Splice Locations for Wire Harness RE536702, Option Codes 8431 and 8432

C02— Accessory Connector A
C29— Low Pressure Fuel System Interconnect
P01— Intake Manifold Air Pressure Sensor
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
J01— ECU Harness Connector (Black Face)
X01— Crank Position Sensor
SP5050—Splice 5050
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416
SP5444—Splice 5444
SP5449—Splice 5449
SP5474—Splice 5474
SP5511—Splice 5511

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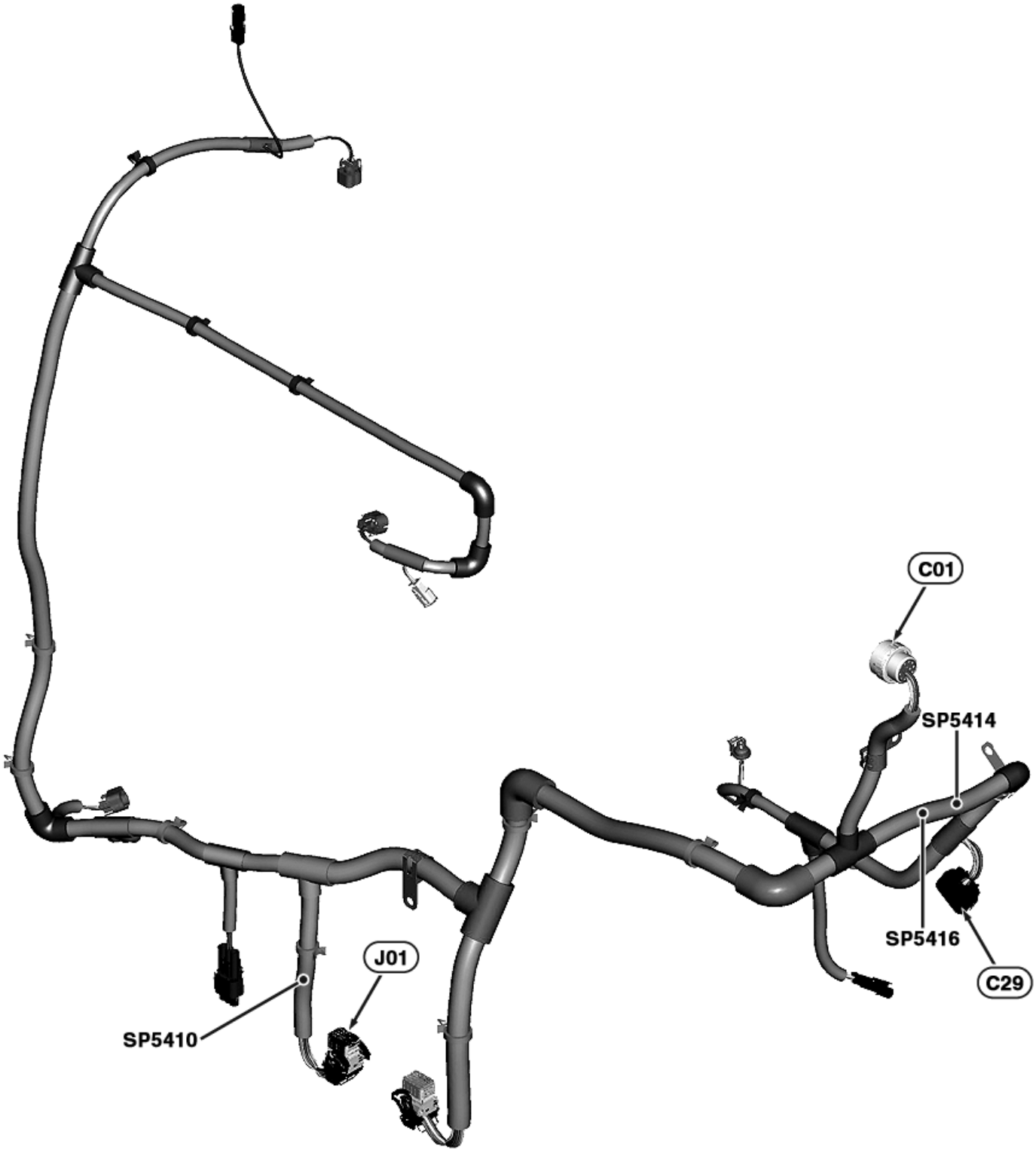


Splice Locations for Wire Harness RE533733, Option Codes 8423 and 8424

C01— Fuel Injector Harness Connector
C29— Low Pressure Fuel System Interconnect
J01— ECU Harness Connector (Black Face)
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416

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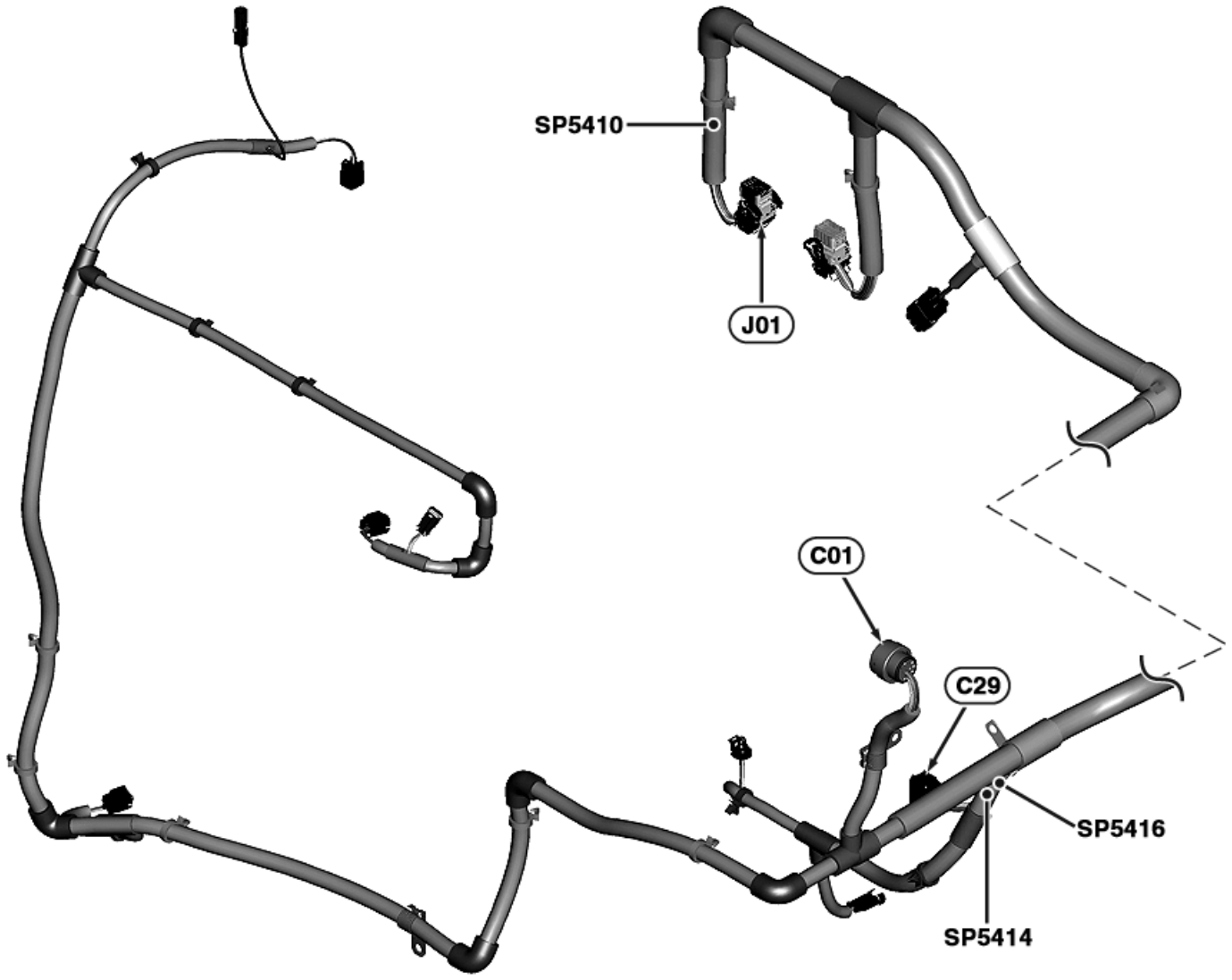


Splice Locations for Wire Harness RE535950, Option Codes 8429 and 8430

C01— Fuel Injector Harness Connector
C29— Low Pressure Fuel System Interconnect
J01— ECU Harness Connector (Black Face)
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416

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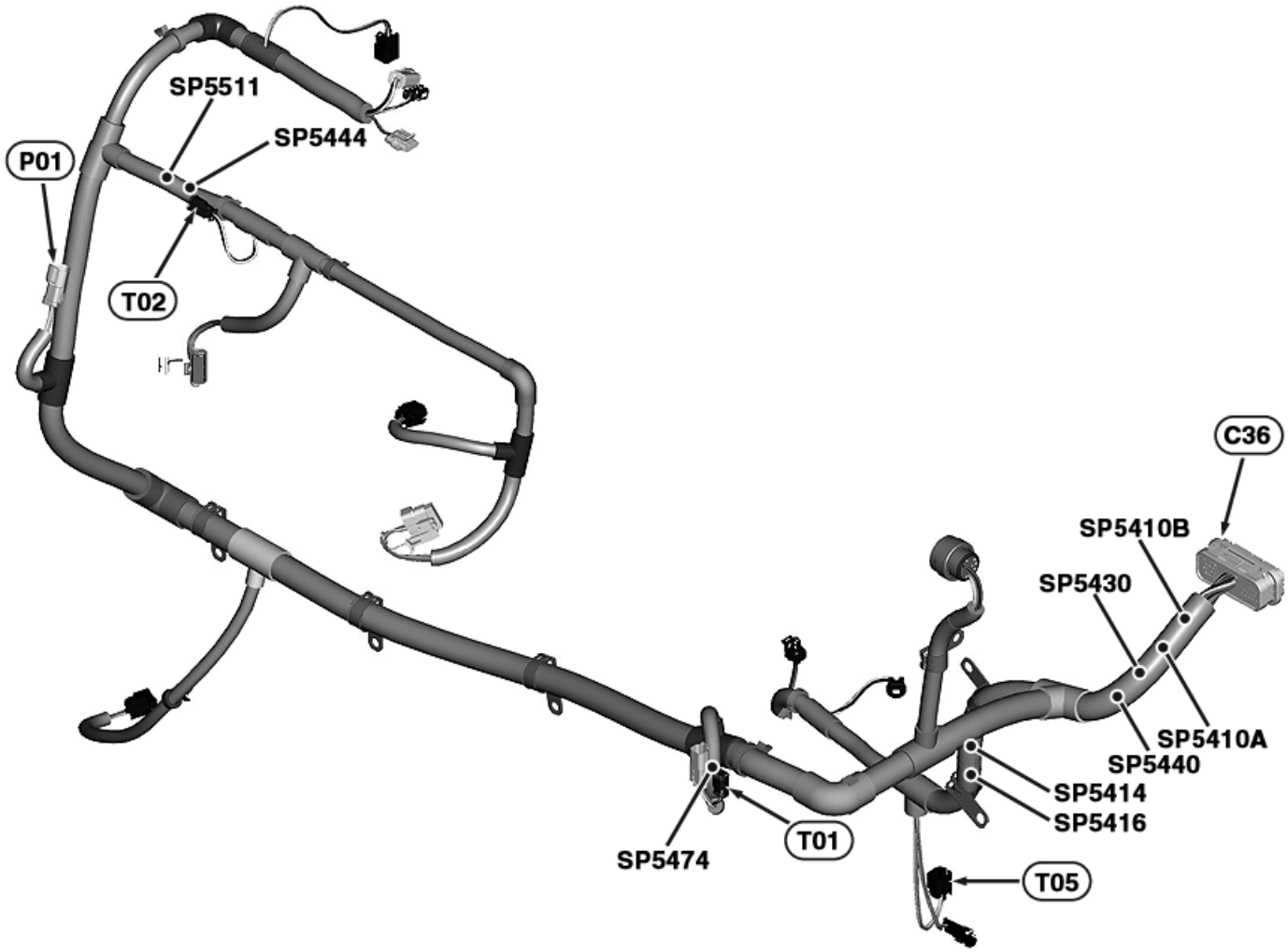


Splice Locations for Wire Harness RE534158, Option Code 8427

C01— Fuel Injector Harness Connector
C29— Low Pressure Fuel System Interconnect
J01— ECU Harness Connector (Black Face)
SP5410—Splice 5410
SP5414—Splice 5414
SP5416—Splice 5416

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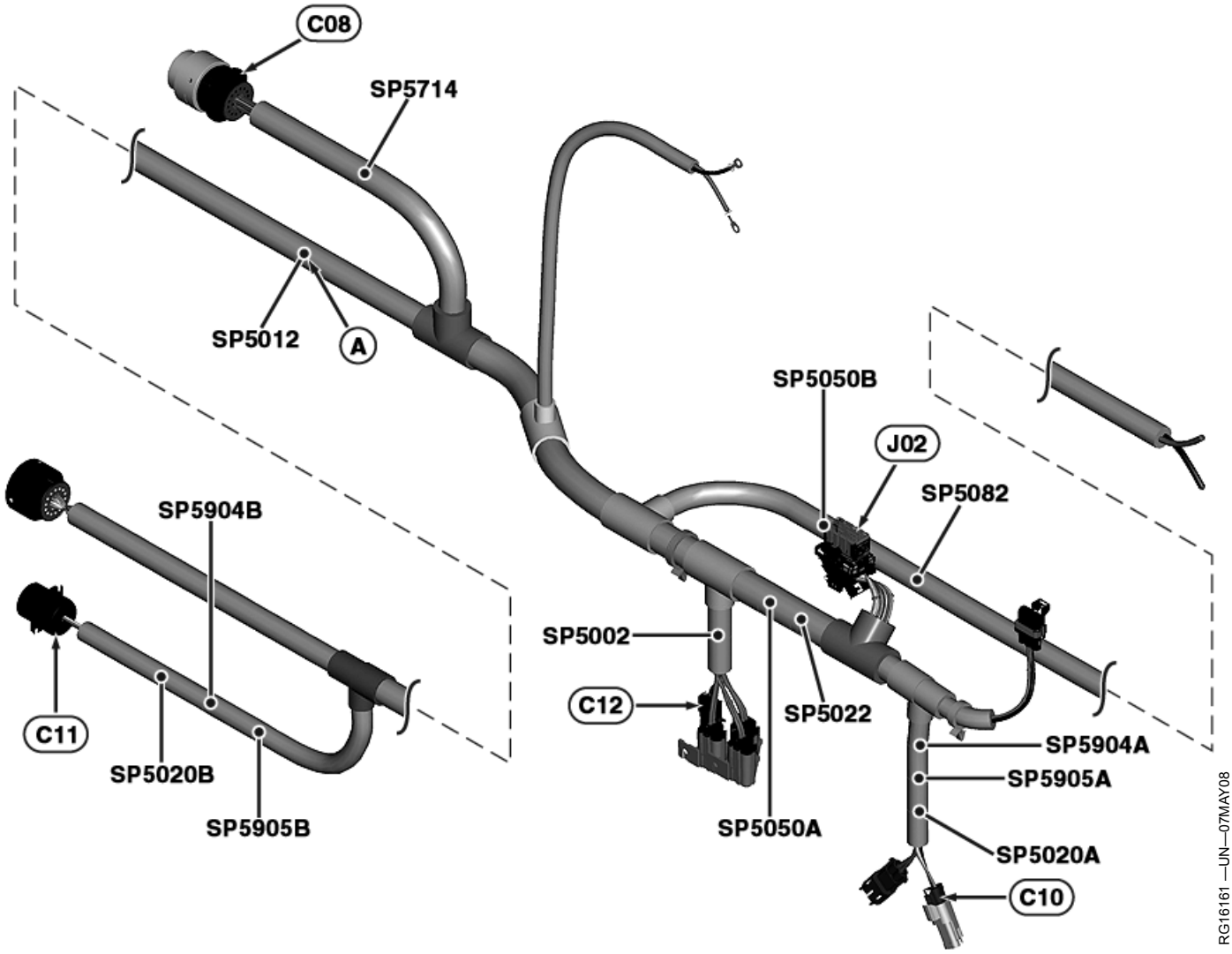


Splice Locations for Wire Harness RE537502, Option Code 8494

C36— Switch Box Harness Connector
P01— Intake Manifold Air Pressure Sensor
T01— Charge Air Cooler Outlet Temperature Sensor
T02— Intake Manifold Air Temperature Sensor
T05— Fuel Temperature Sensor
SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416
SP5430—Splice 5430
SP5440—Splice 5440
SP5444—Splice 5444
SP5474—Splice 5474
SP5511—Splice 5511

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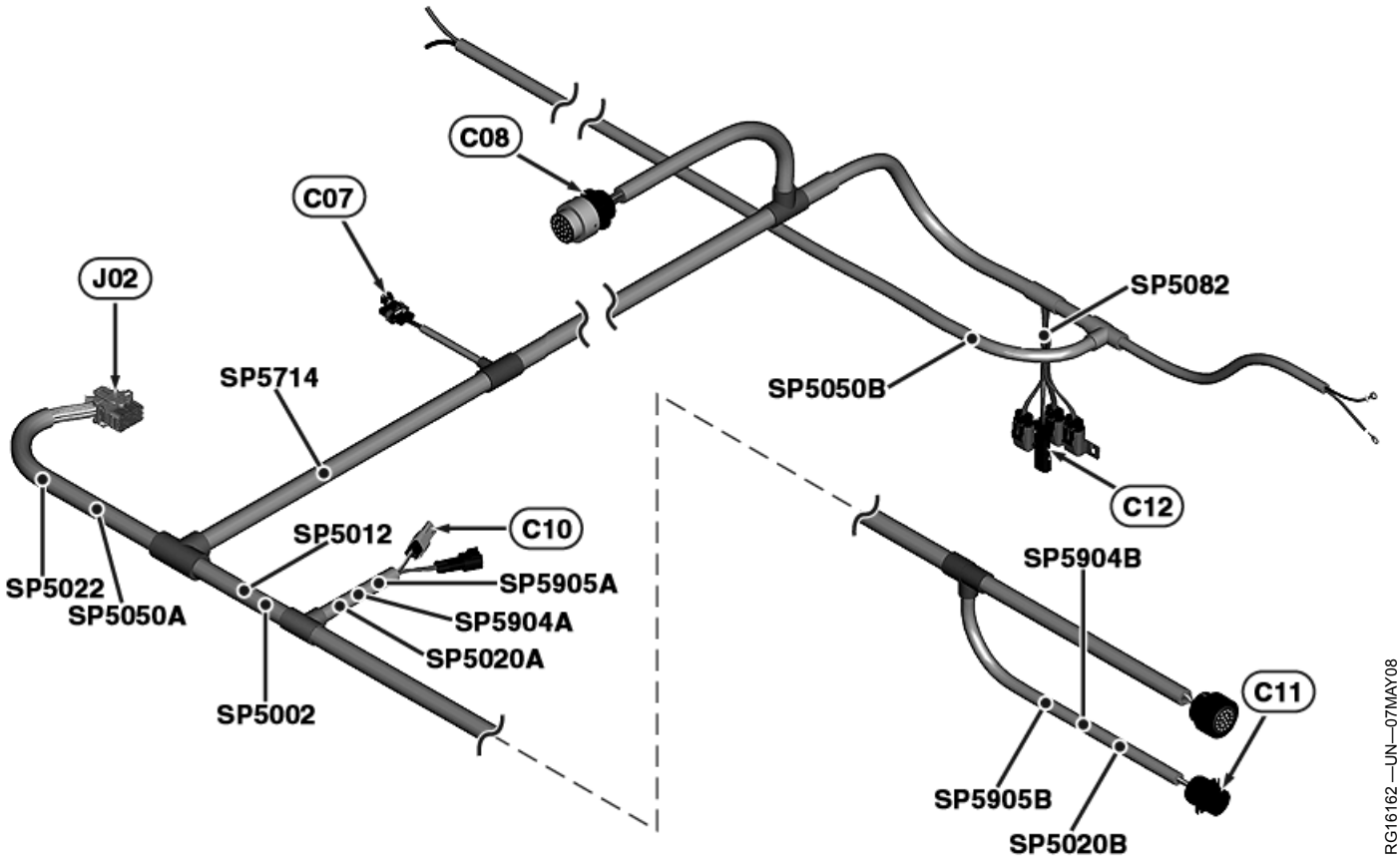


Splice Locations for Wire Harness RE536595, Option Code 9221

A—Splice 5012 Located Within 200mm (7.9in) from Harness T-Junction to C08
C08— Auxiliary Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
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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Splice Locations for Wire Harness RE536596, Option Code 9222

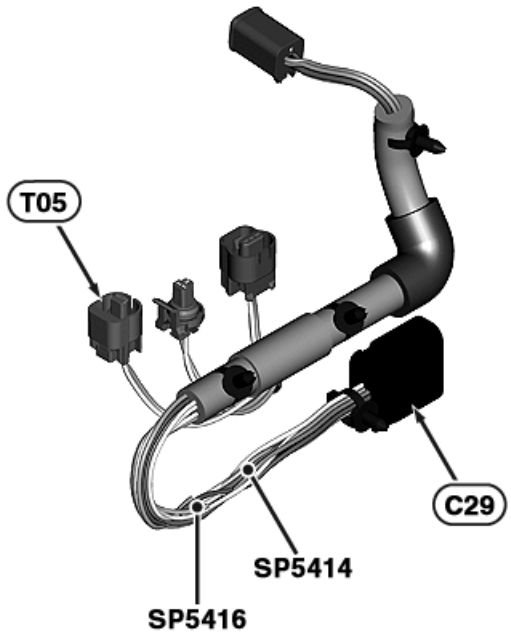
C07— Accessory Connector B
C08— Auxiliary Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
J02— ECU Harness Connector (Red Face)
SP5002—Splice 5002
SP5012—Splice 5012
SP5020A—Splice 5020A
SP5020B—Splice 5020B
SP5022—Splice 5022
SP5050A—Splice 5050A
SP5050B—Splice 5050B
SP5082—Splice 5082
SP5714—Splice 5714
SP5904A—Splice 5904A
SP5904B—Splice 5904B
SP5905A—Splice 5905A
SP5905B—Splice 5905B

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C29— Low Pressure Fuel System Interconnect
T05— Fuel Temperature Sensor

SP5414—Splice 5414
SP5416—Splice 5416

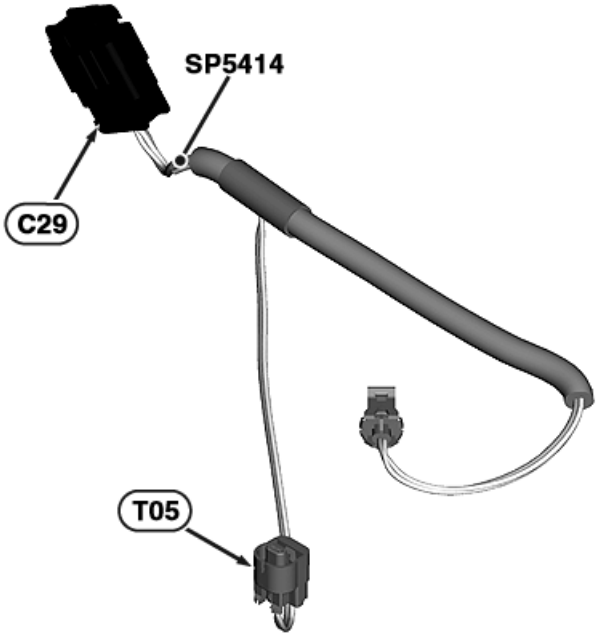


Splice Locations for Wire Harness RE534749, Low Pressure Fuel System Interconnect Harness

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C29— Low Pressure Fuel System Interconnect
T05— Fuel Temperature Sensor

SP5414—Splice 5414

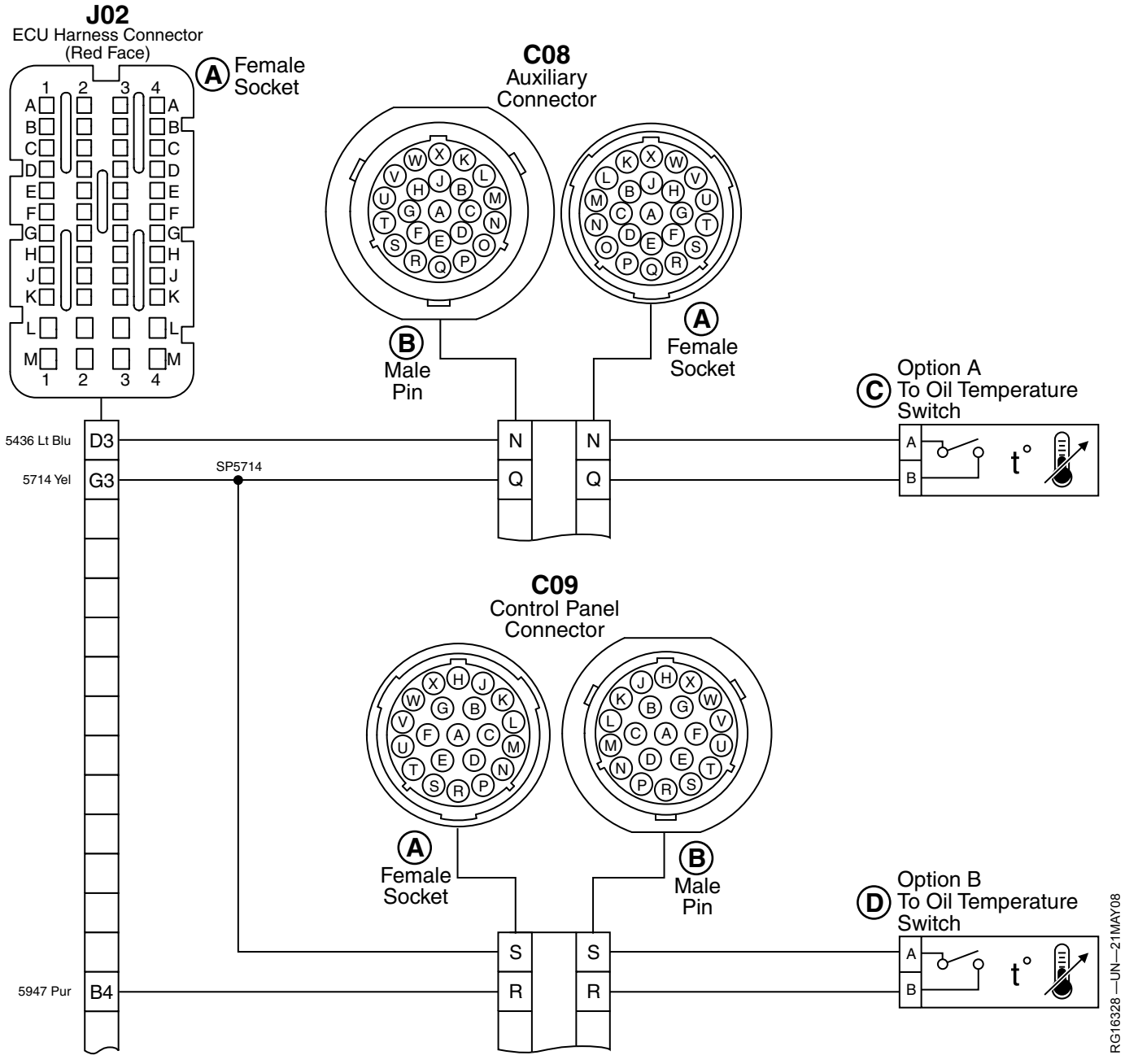


Splice Locations for Wire Harness RE534099, Standarde Fuel System Interconnect Harness

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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.



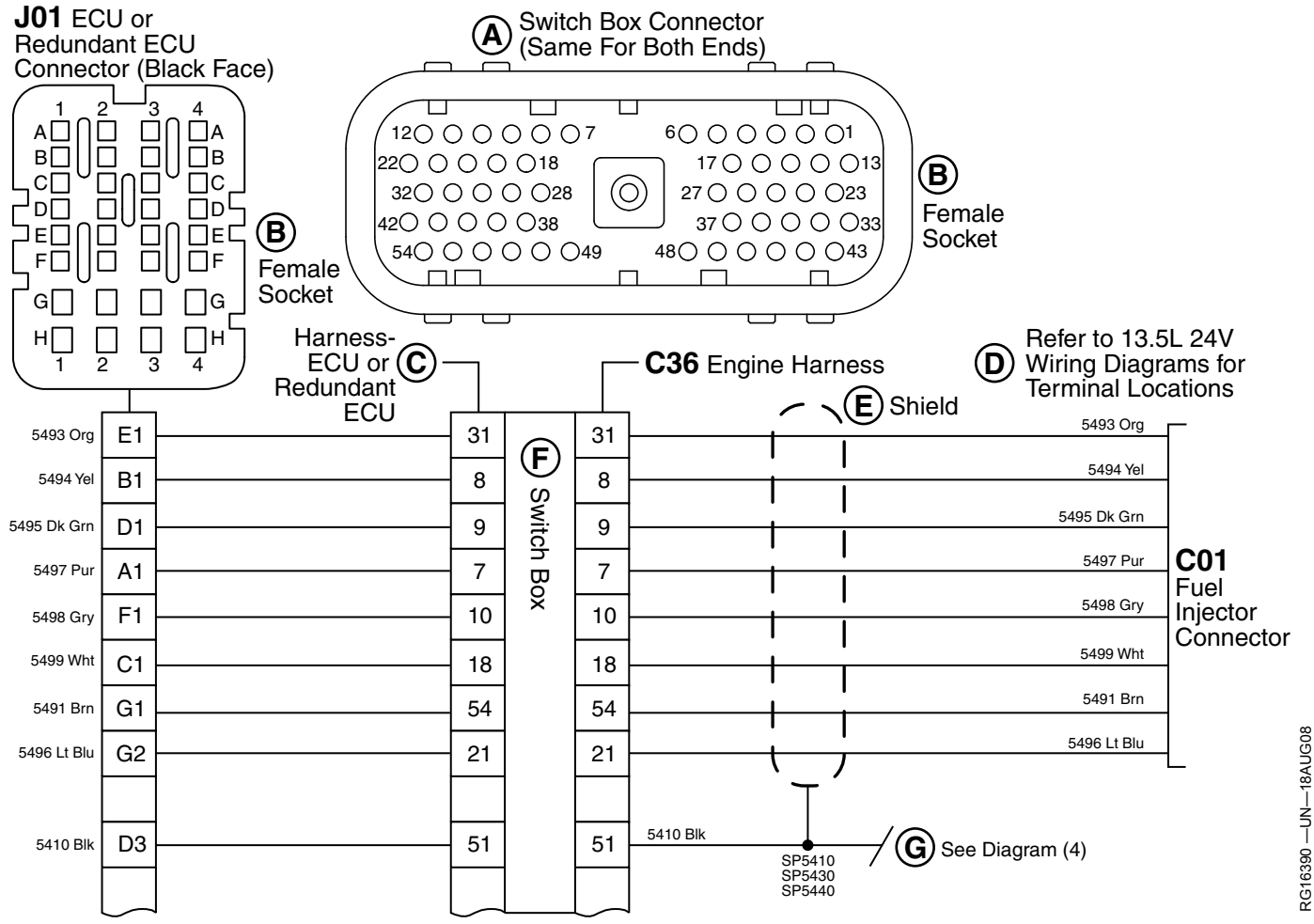
Oil Temperature Switch Wiring Option

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 13.5L Wiring Diagram

13.5L Redundant ECU Wiring Diagram 1



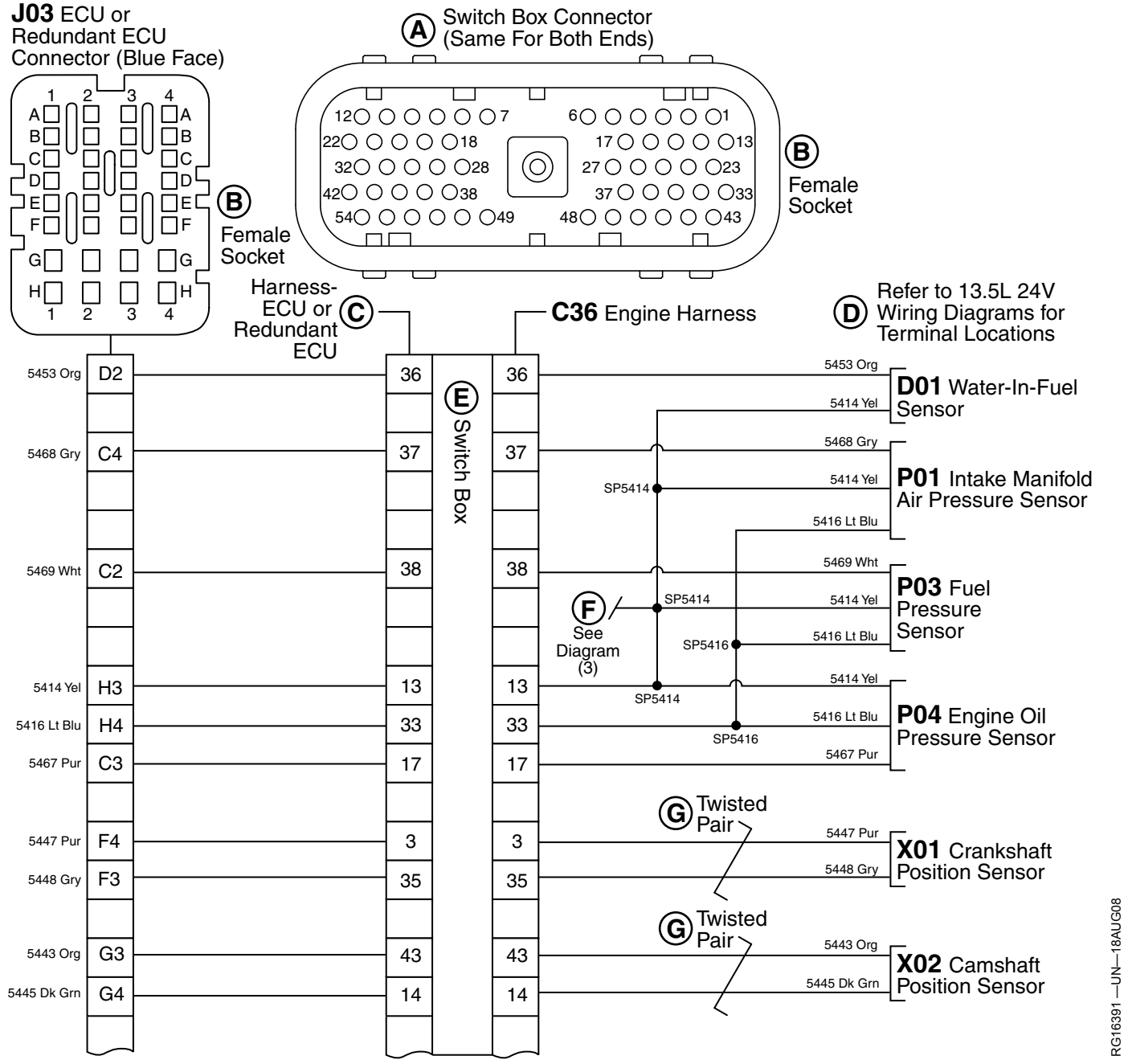
13.5L Redundant ECU Wiring Diagram 1

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 13.5L 24V Wiring Diagrams for Terminal Locations
E—Shield
F—Switch Box
G—See Diagram (4)
G—See Diagram (4)
C01— Fuel Injector Connector
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-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D3—[5410 Black] Wiring Shield
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F1—5498 Gray] Injector #5 Inject Pulse
J1-G1—[5491 Brown] Injector #1 & #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4 & #5 & #6 Power

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13.5L Redundant ECU Wiring Diagram 2



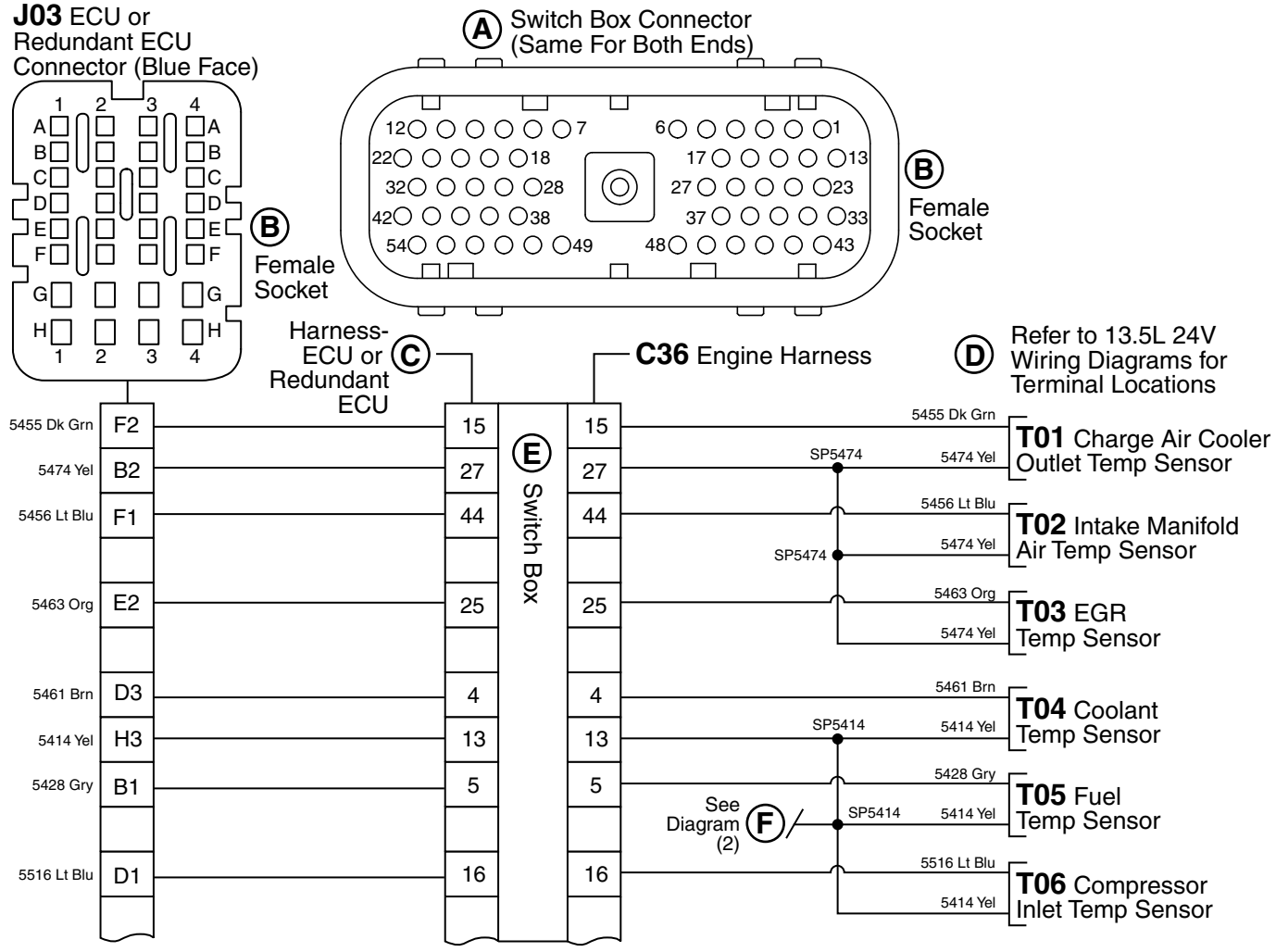
13.5L Redundant ECU Wiring Diagram 2

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 13.5L 24V Wiring Diagrams for Terminal Locations
E—Switch Box
F—See Diagram (3)
G—Twisted Pair
C36— Engine Harness
D01— Water In Fuel Sensor
J03— ECU or Redundant ECU Connector (Blue Face)
J3-C2—[5469 White] Fuel Pressure 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] Crankshaft Position Return
J3-F4—[5447 Purple] Crankshaft Position Signal
J3-G3—[5443 Orange] Camshaft Position Return
J3-G4—[5445 Dark Green] Camshaft Position Signal
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— High Pressure Fuel Sensor
P04— Engine Oil Pressure Sensor
X01— Crankshaft Position Sensor
X02— Camshaft Position Sensor

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13.5L Redundant ECU Wiring Diagram 3



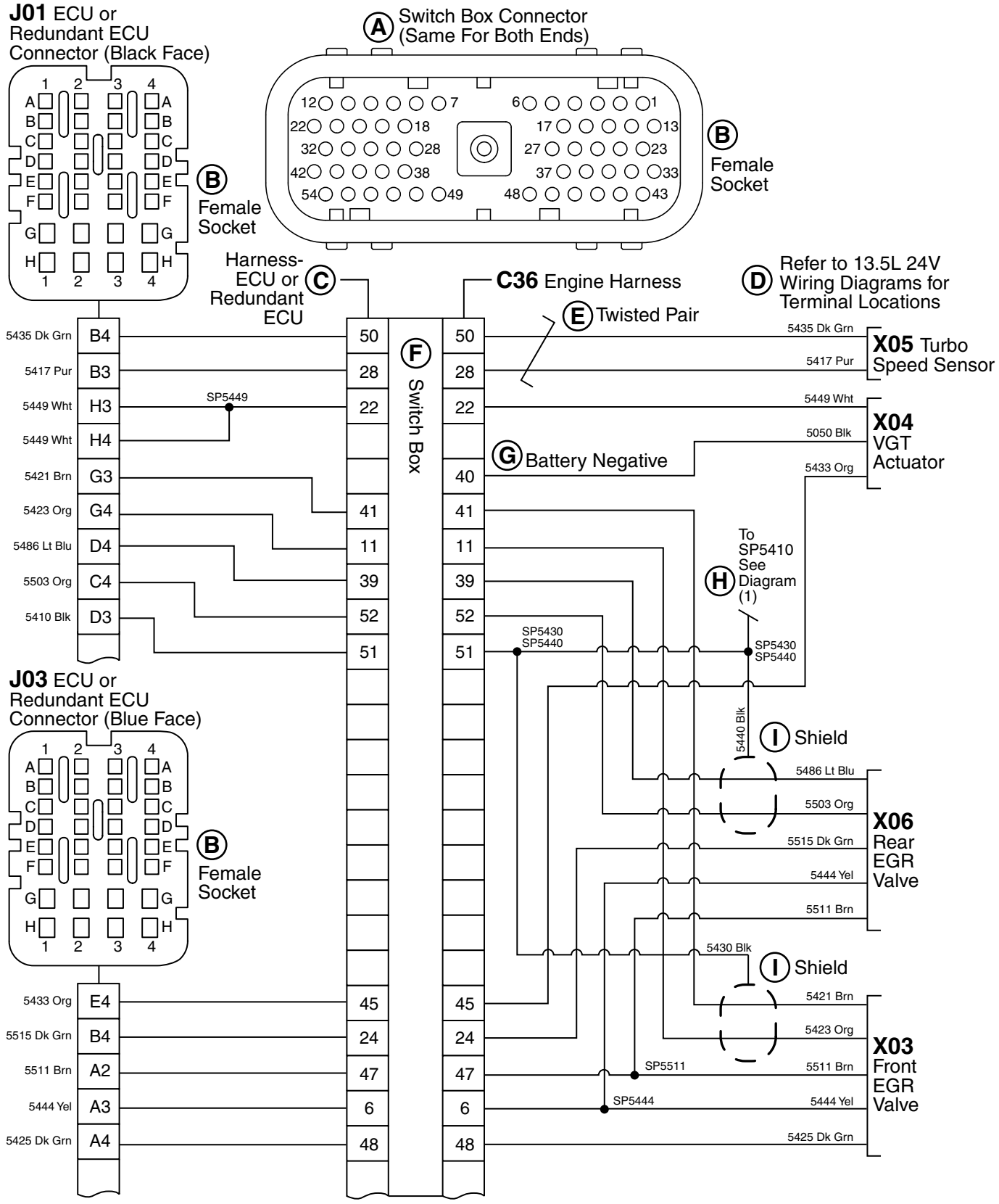
13.5L Redundant ECU Wiring Diagram 3

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 13.5L 24V Wiring Diagrams for Terminal Locations
E—Switch Box
F—See Diagram (2)
C36— Engine Harness
J03— ECU or Redundant ECU Connector (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] Charged 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

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13.5L Redundant ECU Wiring Diagram 4



13.5L 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 13.5L 24V Wiring Diagrams for Terminal Locations
E—Twisted Pair
F—Switch Box
G—Battery Negative
H—To SP5410, See Diagram (1)
I— Shield
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-C4—[5503 Orange] Rear EGR Valve PWM Drive #1
J1-D3—[5410 Black] Wiring Shield
J1-D4—[5503 Orange] Rear EGR Valve PWM Drive #2
J1-G3—[5421 Brown] Front EGR Valve PWM Drive #1
J1-G4—[5423 Orange] Front 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] Front EGR Valve Position Signal
J3-B4—5515 Dark Green] Rear EGR Valve Position Signal
J3-E4—[5433 Orange] VGT Actuator Communications Signal
X03— Front EGR Valve
X04— VGT Actuator
X05— Turbo Speed Sensor
X06— Rear EGR Valve

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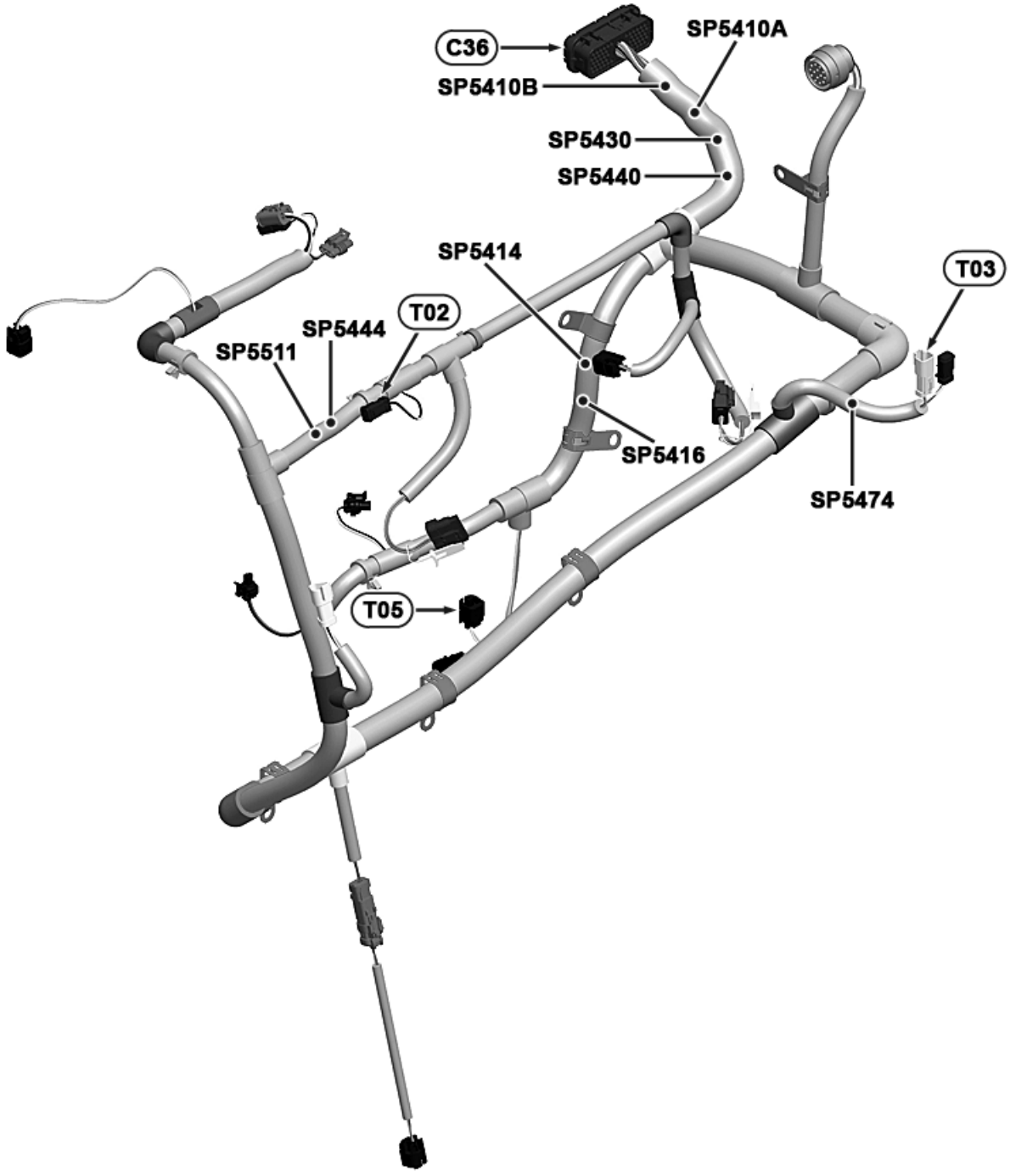
Redundant ECU Option 13.5L Wire Splice Location Diagram

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 13.5L PTP redundant ECU engine applications



RG16395 —UN—14AUG08

Splice Locations for Wire Harness RE537502, Option Code 8494

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C36— Switch Box Engine Harness Connector
T02— Intake Manifold Air Temperature Sensor
T03— EGR Temperature Sensor
T05— Fuel Temperature Sensor

SP5410A—Splice 5410A
SP5410B—Splice 5410B
SP5414—Splice 5414
SP5416—Splice 5416

SP5430—Splice 5430
SP5440—Splice 5440
SP5444—Splice 5444
SP5474—Splice 5474

SP5511—Splice 5511

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