PowerTech™ E 4.5 and 6.8L Diesel Engines Level 16 Electronic Fuel System With Denso HPCR

COMPONENT TECHNICAL MANUAL

PowerTech E 4.5 and 6.8 L Diesel Engines—Level 16 Electronic Fuel System with Denso HPCR

CTM502 09AUG10 (ENGLISH)

For complete service information also see:

PowerTech™ 4.5 L and 6.8 L Diesel Engines—Base Engine	**CTM104**
OEM Engine Accessories	**CTM67 (English Only)**
Application List	**CTM106819 (English)**

John Deere Power Systems
LITHO IN U.S.A.

Foreword

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

This manual (CTM502) covers only Level 16 Electronic Fuel System with the Denso High Pressure Common Rail (HPCR) and 2-valves per cylinder for PowerTech “E” engines. It is one of seven volumes on 4.5 L and 6.8 L engines. The following companion manual covers the base engine.

- CTM104—Base Engine

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

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

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

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

Before beginning repair on an engine, clean the engine.

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

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

Read each block of material completely before performing service to check for differences in procedures or specifications.

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

CD03523,000016D -19-30MAY07-1/1

Record of Changes

Publication and Translation Date CTM502 12/17/2009			
Section / Group	**Block Title**	**Comment**	**Update Date**
04/160	Communication Error Test Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Control Unit Information and Overview Test	Modified block to ensure compatibility.	08/06/2010
04/160	Cylinder Electronic Compression Test Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Cylinder Cutout Test Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Cylinder Misfire Test Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Digital Multimeter — Using	Modified block to ensure compatibility.	08/06/2010
04/160	Electrical Circuit Concepts	Combined Electrical Concepts, Troubleshooting Electronic Circuits, and Electronic Circuit Malfunctions blocks.	08/06/2010
04/160	Electronic Injector Calibration Information	Modified block to ensure compatibility.	08/06/2010
04/160	Engine Control Unit (ECU) — Reprogramming Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Engine Hours — Updating Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Harness Diagnostic Mode Test	Modified block to ensure compatibility.	08/06/2010
04/160	Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Internal Data Monitor — Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Keep Electronic Control Unit Connectors Clean	Added new block.	08/06/2010
04/160	Load Profile Information Test — Instructions	Modified block to ensure compatibility.	08/06/2010
04/160	Payload File — Downloading Instructions	Combined Downloading Electronic Injector Calibration Files and Payload File Downloading Instructions blocks.	08/06/2010
04/160	Snapshot Instructions	Modified block to ensure compatibility.	08/06/2010

BK34394,0000243 -19-06AUG10-1/1

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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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A John Deere ILLUSTRUCTION ® Manual
Previous Editions
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Section 01
General

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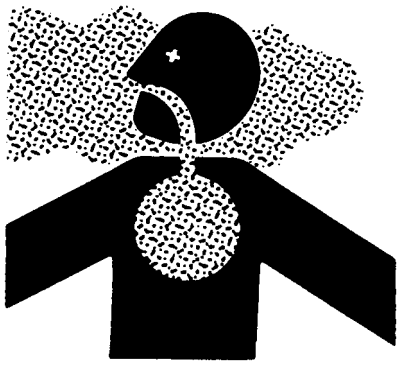
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Work In Ventilated Area

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.



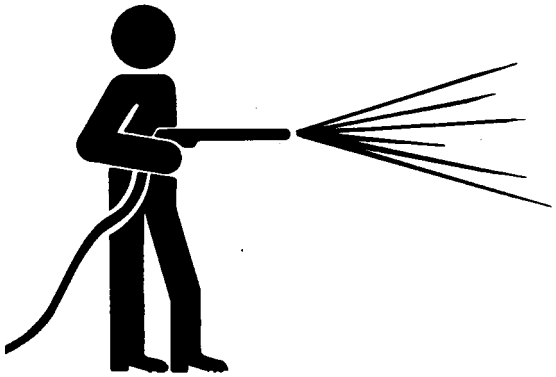
T81389 —UN—07DEC88

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

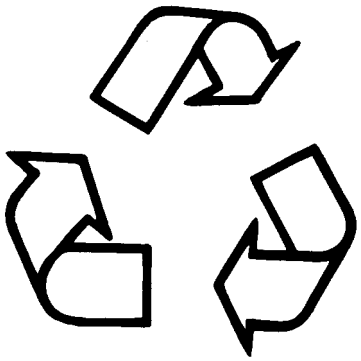
Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

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

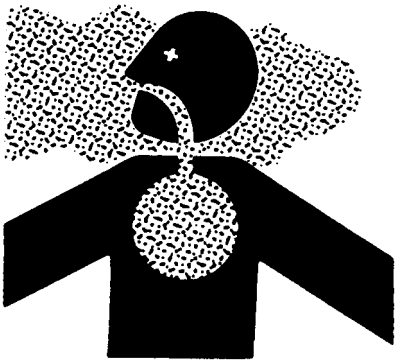
DX,DRAIN -19-03MAR93-1/1

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

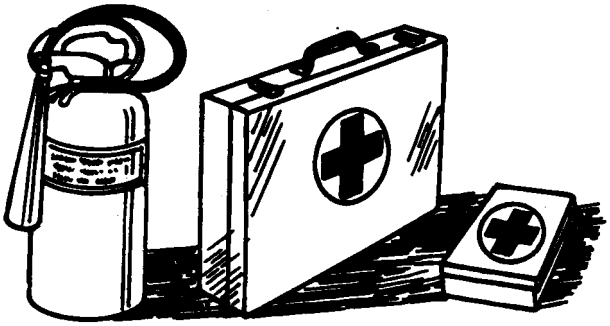
DX,FIRE1 -19-03MAR93-1/1

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

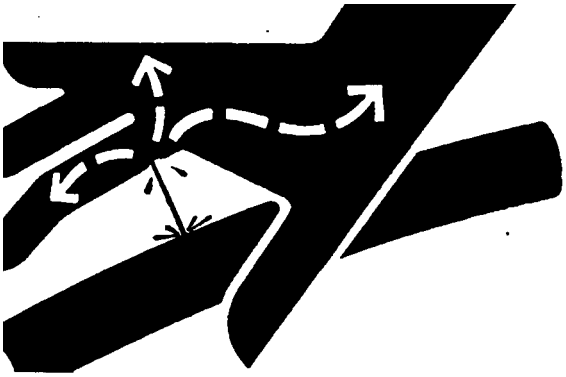
Avoid High-Pressure Fluids

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.



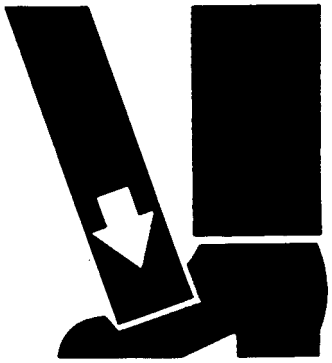
X9811 —UN—23AUG88

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.



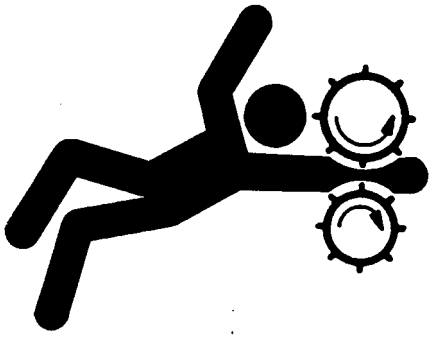
TS231 —19—07OCT88

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

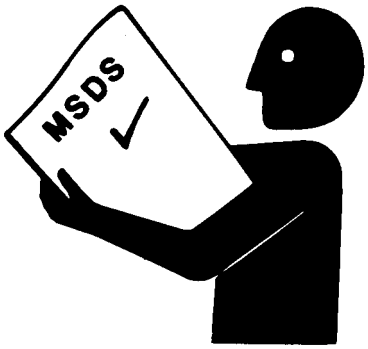
Handle Chemical Products Safely

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.)



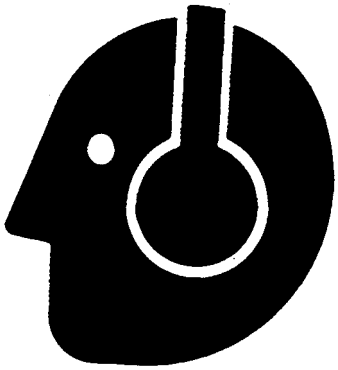
TS1132 —UN—26NOV90

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

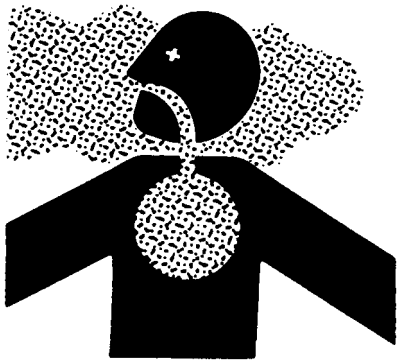
Avoid potentially toxic fumes and dust.

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

Stay Clear of Rotating Drivelines

Entanglement in rotating driveline can cause serious injury or death.

Keep tractor master shield and driveline shields in place at all times. Make sure rotating shields turn freely.

Wear close fitting clothing. Stop the engine and be sure that PTO driveline is stopped before making adjustments, connections, or cleaning out PTO driven equipment.

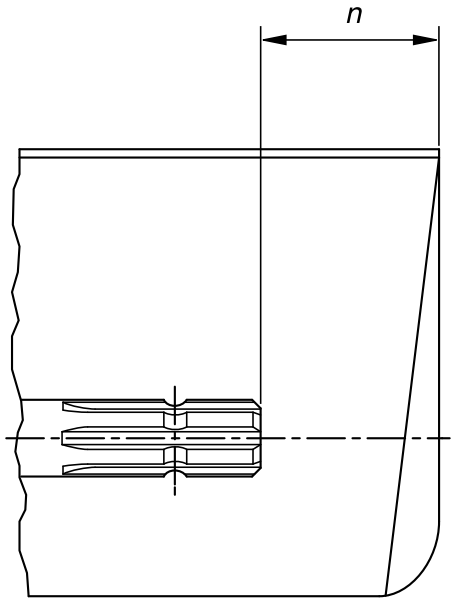
Do not install any adapter device between the tractor and the primary implement PTO drive shaft that will allow a 1000 rpm tractor shaft to power a 540 rpm implement at speeds higher than 540 rpm.

Do not install any adapter device that results in a portion of the rotating implement shaft, tractor shaft, or the adapter to be unguarded. The tractor master shield shall overlap the end of the splined shaft and the added adaptor device as outlined in the table.

PTO Type	Diameter	Splines	n ± 5 mm (0.20 in.)
1	35 mm (1.378 in.)	6	85 mm (3.35 in.)
2	35 mm (1.378 in.)	21	85 mm (3.35 in.)
3	45 mm (1.772 in.)	20	100 mm (4.00 in.)



TS1644 —UN—22AUG95



H96219 —UN—29APR10

DX,PTO -19-30JUN10-1/1

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

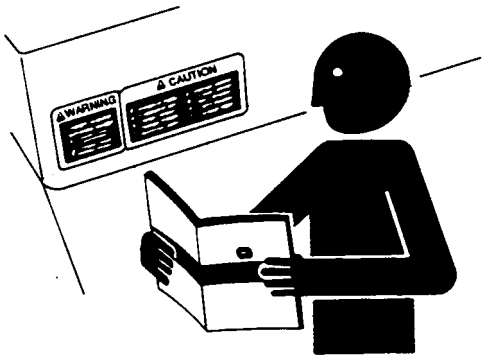
Follow Safety Instructions

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.



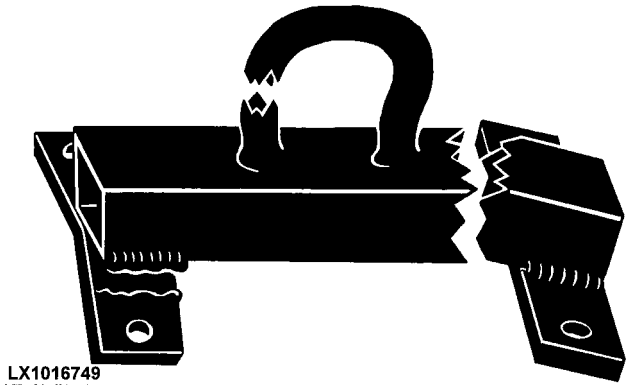
TS779 —UN—08NOV89

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.

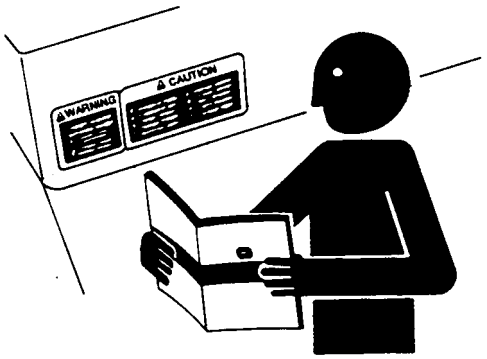


TS187 —19—30SEP88

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

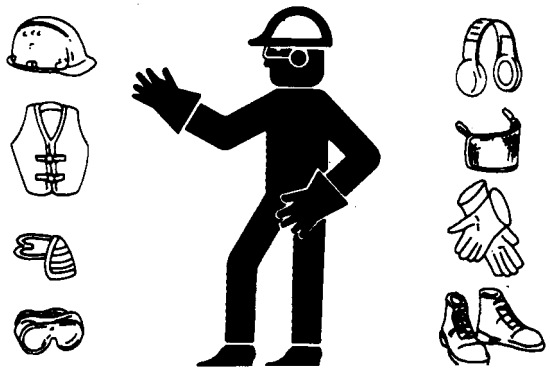
Wear Protective Clothing

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

Wait Before Opening High-Pressure Fuel System

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



TS1343 —UN—18MAR92

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

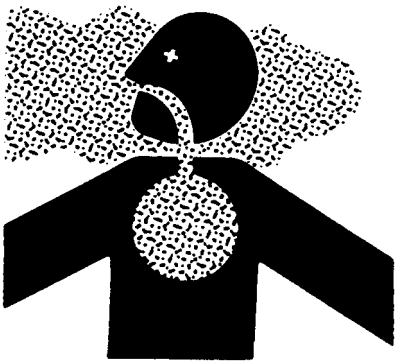
Handle Agricultural Chemicals Safely

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 way 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 -19-25MAR09-1/1

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.

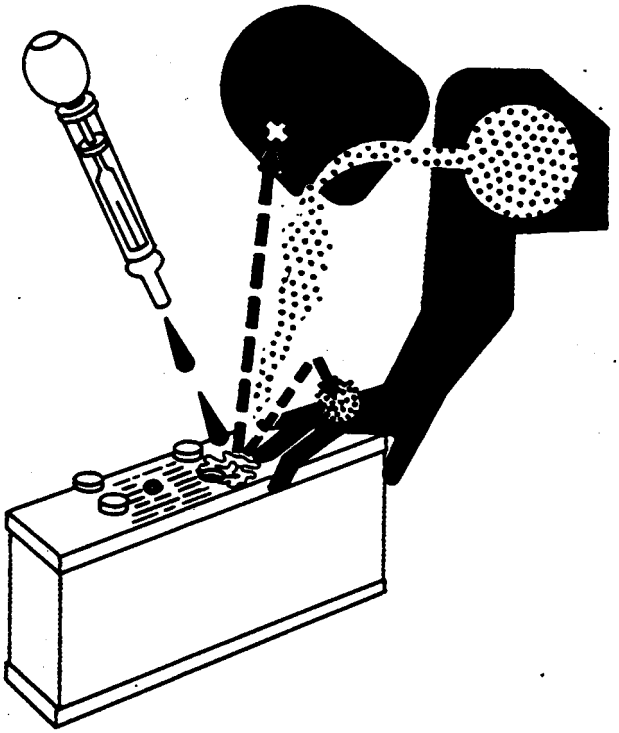
Sulfuric acid in battery electrolyte is poisonous and strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.



TS204 —UN—23AUG88

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 jump-start procedure



TS203 —UN—23AUG88

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.**

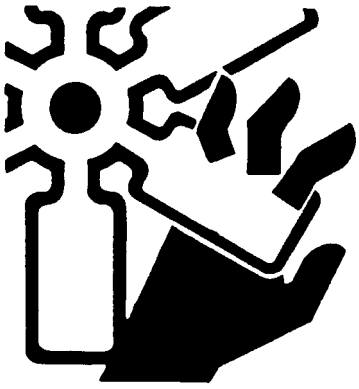
DX,WW,BATTERIES -19-13OCT09-1/1

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.



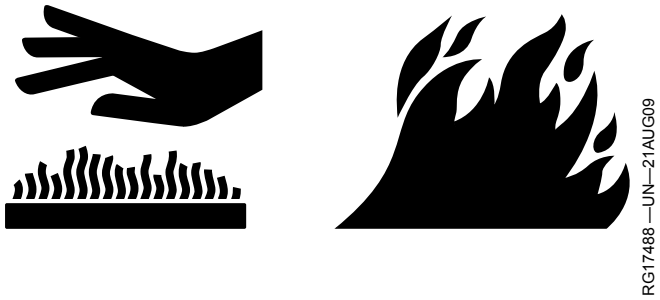
TS677 —UN—21SEP89

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.

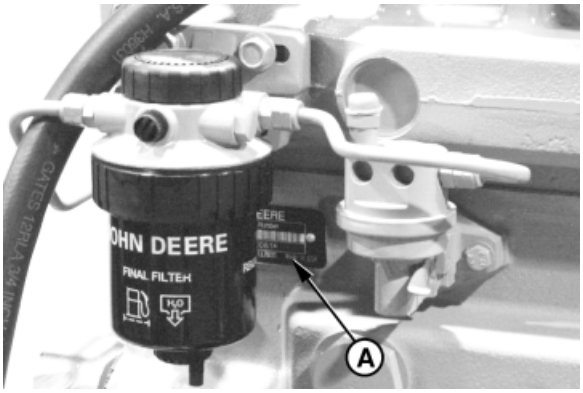
Exhaust parts and streams become very hot during operation. Exhaust gases and components reach temperatures hot enough to burn people, ignite, or melt common materials.



RG17488 —UN—21AUG09

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

Engine Serial Number Plate Information



RG7778 —UN—11NOV97



CD30857 —UN—21AUG06

Engine Serial Number/Application Data Plate

A—Engine Serial Number Plate **B—Engine Serial Number (13 digits)** **C—Application Data or Type** **D—Internal Factory Identification (Saran engines only)**

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

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

Engine Serial Number (B)

CD6068L123456

CD	Factory producing engine
6	Number of Cylinders
068	Liter displacement (6.8 liters)
L	Emission Tier Level
123456	6-digit sequential engine number

Factory Producing Engine

CD	Saran, France
JO	Rosario, Argentina
PE	Torreon, Mexico

Emission Tier Level

L, M or N	Tier 3/Stage IIIA emission certified engine

Engine Application Data (C)

The second line of information on the serial number plate identifies the engine/machine or OEM relationship. See Application manual, CTM106819. The following is an example:

6068HF285

6	Number of Cylinders
068	Liter displacement (6.8 liters)
H	Aspiration code
F	User factory code
285	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)

Continued on next page

CD03523,000016E -19-09DEC09-1/2

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
FS	SDMO Applications
FU	Power Unit for Generator Set
H	John Deere Harvester Works (East Moline, Illinois)
KV	John Deere Commercial Worksite Products (Knoxville, Tennessee/ Dubuque, Iowa)
L	John Deere Werke Mannheim (Germany)
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	John Deere Forestry (Timberjack, Sweden/Finland/Canada)
YC	John Deere Jialian Harvester Co. Limited (China)
Z	John Deere WERKE Zweibrucken (Germany)
Application Code	
285 etc.	This is the specific engine model for a given application. In this example (285), “2” denotes 2-valves per cylinder and “85” denotes Tier 3 engines.

CD03523,000016E -19-09DEC09-2/2

OEM Engine Option Code Label



CD30858 —UN—21AUG06

OEM Engine Option Code 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.

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

CD03523,000016F -19-21AUG06-1/1

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.

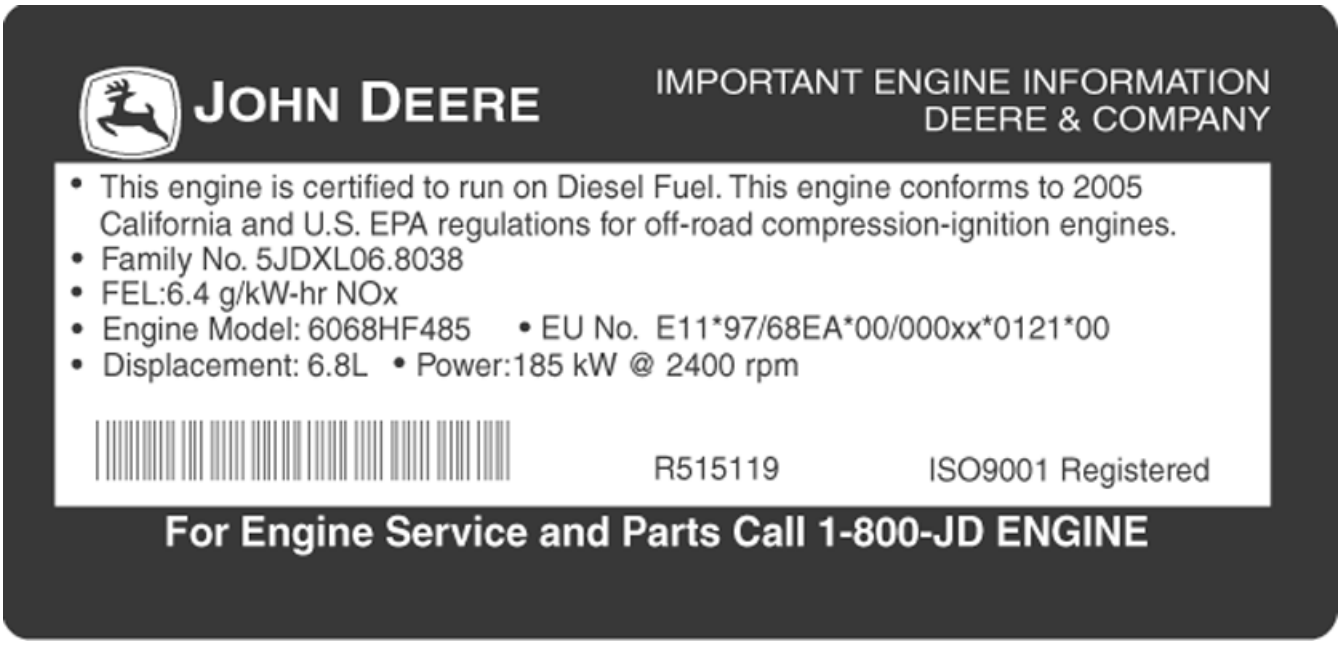
The regulations prohibit tampering with the emission-related components listed below which would render that component inoperative or to make any adjustment on the engine beyond published specifications. It is also illegal to install a part or component where the principle effect of that component is 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



RG14852 —UN—26APR06

6.8L Engine Emissions Label

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

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

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

RG19661,000022E -19-17APR07-1/1

Diesel Fuel

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

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

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

Required Fuel Properties

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

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

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

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

Sulfur Content for Interim Tier 4 and EU Stage IIIB Engines

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

Sulfur Content for Other Engines

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

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

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

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

Biodiesel Fuel

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Minimizing the Effect of Cold Weather on Diesel Engines

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

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

Use Winter Grade Fuel

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

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

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

Air Intake Heater

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

Ether

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

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

Coolant Heater

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

Seasonal Viscosity Oil and Proper Coolant Concentration

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

Diesel Fuel Flow Additive

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

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

BioDiesel

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

Winterfronts

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

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

Radiator Shutters

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

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

For more information, see your John Deere dealer.

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

Handling and Storing Diesel Fuel

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

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

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

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

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

Monitor water content of the fuel regularly.

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

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

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

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

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

Lubricity of Diesel Fuel

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

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

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

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

Lubricity of Biodiesel Fuel

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

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

Testing Diesel Fuel

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

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

DIESELSCAN is a trademark of Deere & Company

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

Engine Oil and Filter Service Intervals

See applicable operator's manual for service intervals.

DM80898,000025E -19-15OCT07-1/1

Diesel Engine Oil

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

John Deere Plus-50™ II oil is preferred.

John Deere Plus-50™ is also recommended.

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

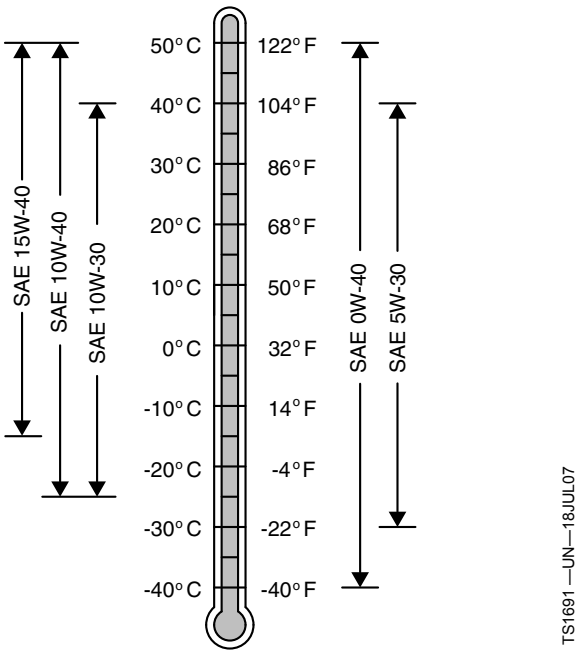
- John Deere Torq-Gard Supreme™
- API Service Category CJ-4
- API Service Category CI-4 PLUS
- API Service Category CI-4
- ACEA Oil Sequence E9
- ACEA Oil Sequence E7
- ACEA Oil Sequence E6
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Multi-viscosity diesel engine oils are preferred.

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

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

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



Oil Viscosities for Air Temperature Ranges

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

Diesel Engine Break-In Oil

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

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

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

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

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

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

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

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

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

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

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

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

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

Oil Filters

Filtration of oils is critical to proper operation and lubrication.

Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

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

Grease

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

John Deere SD POLYUREA GREASE is preferred.

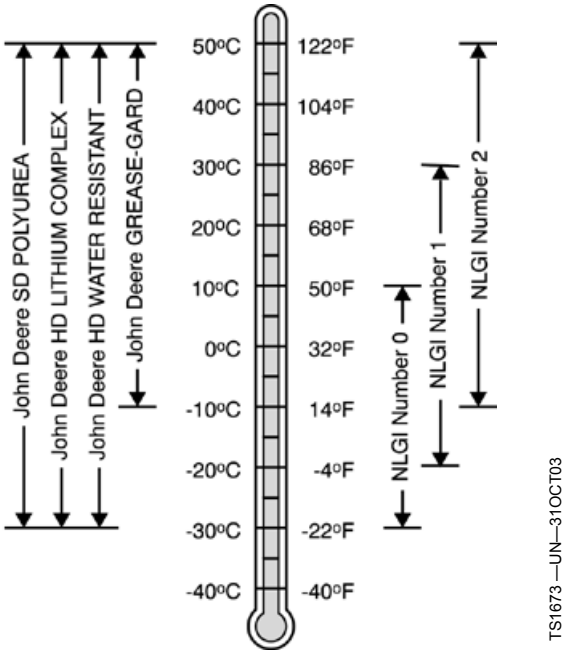
The following greases are also recommended

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

Other greases may be used if they meet the following:

NLGI Performance Classification GC-LB

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



GREASE-GARD is a trademark of Deere & Company

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

Alternative and Synthetic Lubricants

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

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

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

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

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

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

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

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

Lubricant Storage

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

Use clean containers to handle all lubricants.

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

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

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

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

Mixing of Lubricants

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

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

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

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

Heavy Duty Diesel Engine Coolant

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

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

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

Additional Recommended Coolants

The following engine coolants are also recommended:

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

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

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

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

Other Coolants

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

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

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

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

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

Water Quality

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

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

Do not mix ethylene glycol and propylene glycol base coolants.

Do not use coolants that contain nitrites.

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

Supplemental Coolant Additives

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

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

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

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

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

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

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

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

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

Operating in Warm Temperature Climates

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

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

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

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

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

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

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

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

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

Coolant Specifications

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

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

Replenish Coolant Additives

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

Why use John Deere LIQUID COOLANT CONDITIONER?

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

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

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Avoid Automotive-type Coolants

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

Water Quality

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

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

Freeze Protection

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

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

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

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

Diesel Engine Coolant

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

John Deere COOL-GARD is preferred for service.

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

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

Freeze protection

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

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

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

Water quality

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

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

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

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

Testing Diesel Engine Coolant

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

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

Coolant Test Strips

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

When Using John Deere COOL-GARD II

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

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

When Using John Deere COOL-GARD

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

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

CoolScan and CoolScan PLUS

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

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CoolScan is a trademark of Deere & Company
CoolScan PLUS is a trademark of Deere & Company

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

Drain Intervals for Diesel Engine Coolant

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

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

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

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

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

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

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

Section 02
Repair and Adjustments

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Fuel System - General Information

The Level 16 Engine Control Unit (ECU) is used to control the High Pressure Common Rail (HPCR) fuel system. The HPCR fuel system includes the high pressure fuel pump, high pressure common rail, and electronic injectors.

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

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

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

CD03523,0000172 -19-15FEB07-1/1

Relieve Fuel System Pressure

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

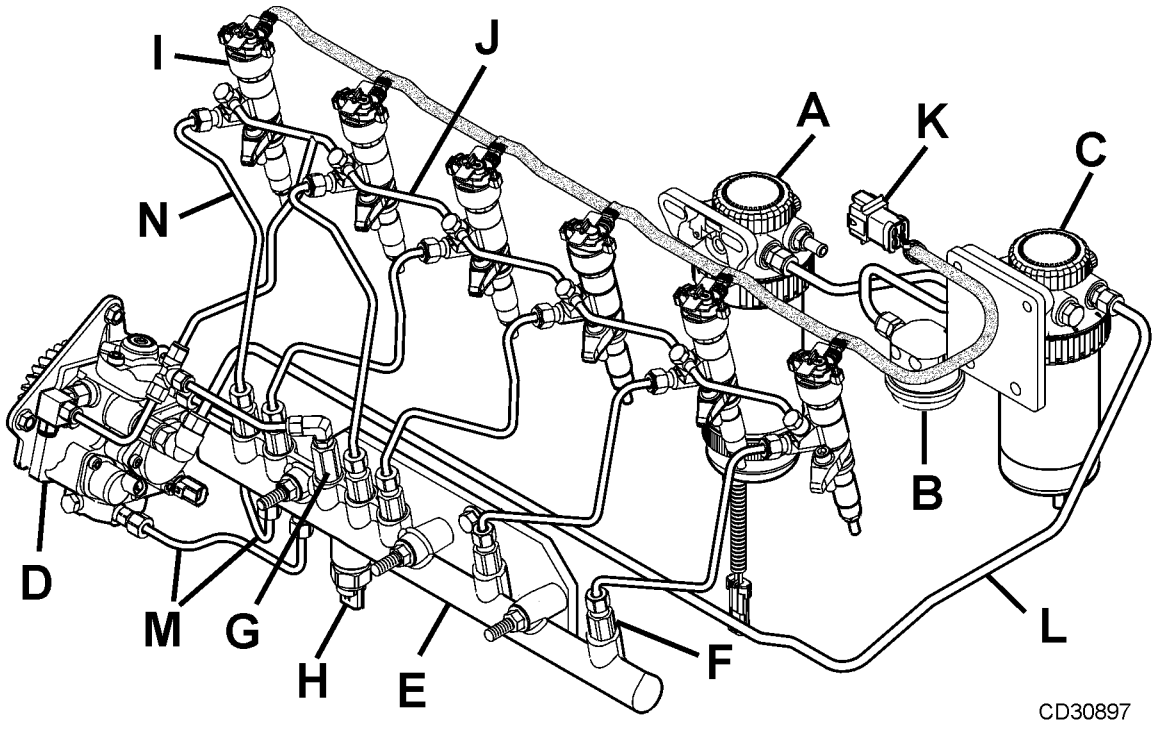
Any time the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 in this manual.



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Fuel System Components



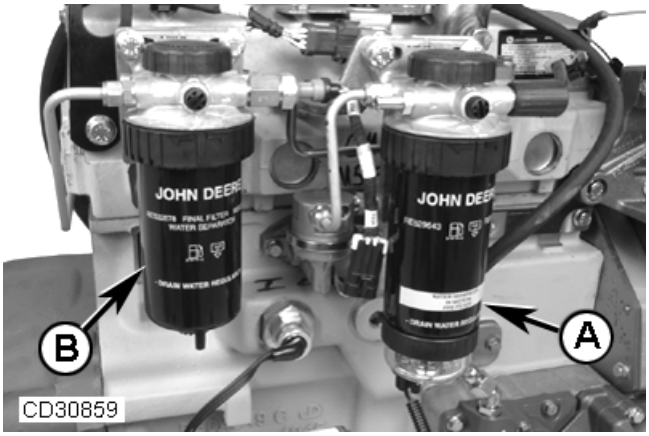
CD30897 —UN—05OCT06

Fuel system components

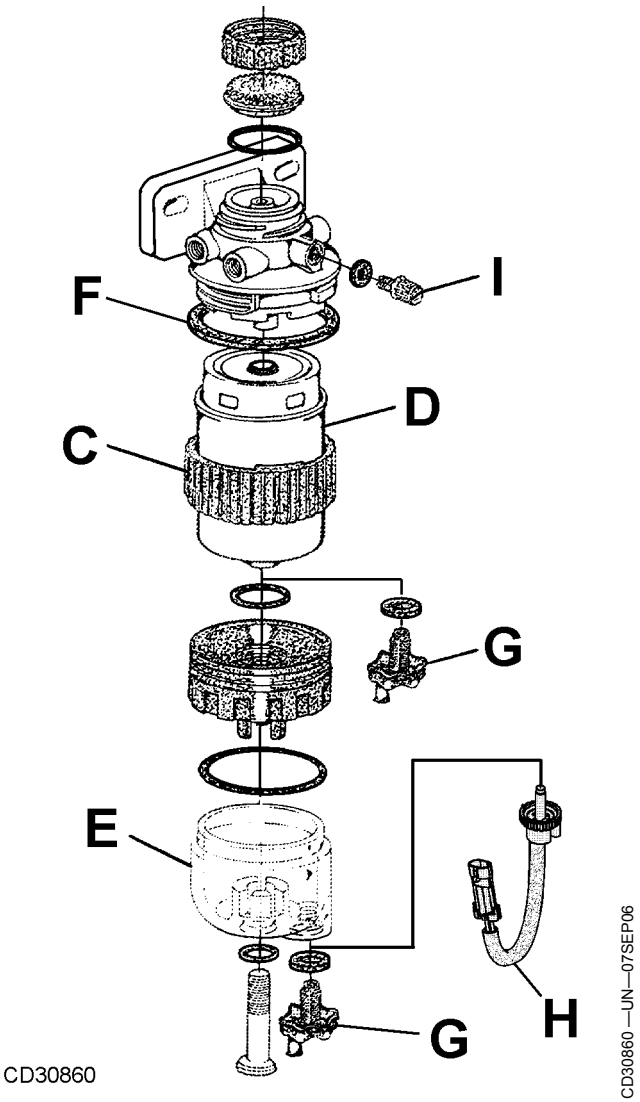
A—Primary fuel filter
B—Fuel transfer pump
C—Final fuel filter
D—High pressure fuel pump
E—High pressure common rail (HPCR)
F—Flow damper
G—Fuel pressure limiter
H—Fuel pressure sensor
I— Electronic injector (EI)
J— Fuel leak-off line
K—Wiring harness
L—Fuel supply line
M—Pump-to-rail high pressure line
N—High pressure delivery line

CD03523,000017A -19-09OCT06-1/1

Replace Fuel Filter Element (Primary or Final)



Fuel filter typical location



Replace fuel filter element - Exploded view

Continued on next page

NOTE: Refer to operator's manual for proper servicing and (hourly) replacement intervals.

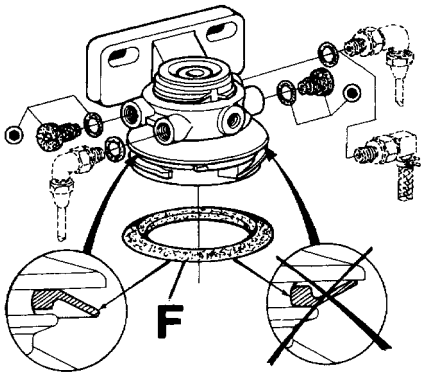
1. When applicable, disconnect water-in-fuel connector (H).
2. Loosen retaining ring (C) by lifting it, and remove filter element (D).

NOTE: To avoid spilling of fuel, seal old filter element using plug from new element.

3. If equipped, remove sediment glass bowl (E) from previous filter element and reinstall it onto the new element.

IMPORTANT: Install fuel filter element dry. Do not prefill new fuel filters as it could contaminate fuel system with unfiltered fuel.

4. Install dust seal (F) as shown.
5. Position the new filter element in proper location inside the mounting base then tighten retaining ring about 1/3 turn until ring fits into the detent. DO NOT overtighten.
6. If applicable, connect water-in-fuel connector (H).



CD30667 —UN—17JUN98

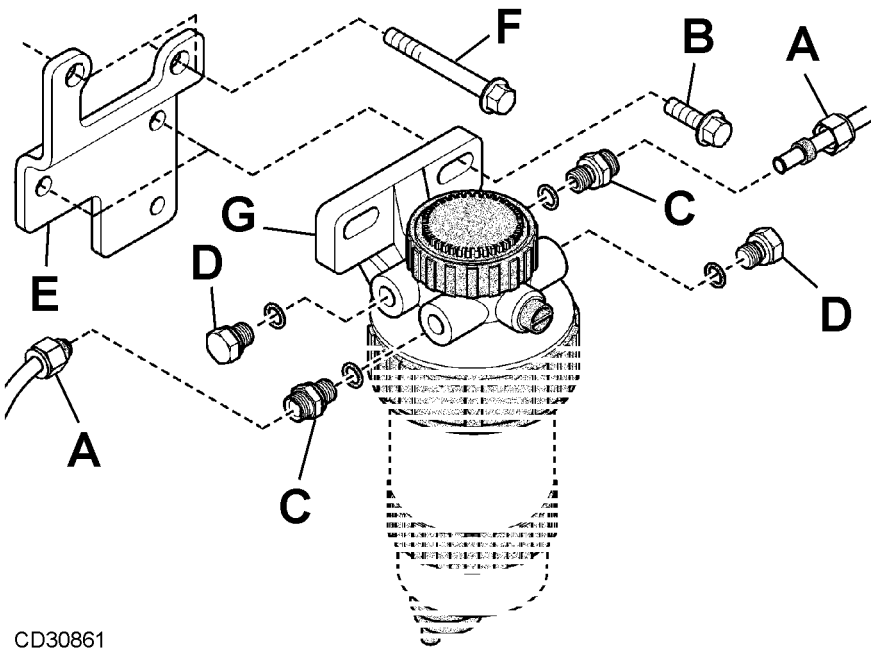
Replace fuel filter element - Dust seal

A—Primary fuel filter
B—Final fuel filter
C—Retaining ring
D—Filter element
E—Sediment bowl
F—Dust seal
G—Drain screw
H—Water-in-fuel connector
I— Bleed screw

7. Bleed fuel system.

CD03523,0000174 -19-19DEC06-2/2

Remove and Install Fuel Filter Base (Primary and Final)



CD30861 —UN—24AUG06

Fuel filter mounting base (primary and final)

A—Fuel lines
B—Fuel filter base-to-engine cap screws
C—Fitting
D—Plug
E—Bracket
F—Bracket-to-cylinder head cap screw
G—Fuel filter base

NOTE: Fuel filter base can be removed with or without filter element installed.

1. Disconnect fuel lines (A).
2. Loosen cap screws (B) and remove fuel filter base (G).
3. Remove bracket (E) from cylinder head if needed.
4. Replace and reinstall parts as necessary. Tighten cap screws to specification.

Fuel filter base—Specification

Bracket-to-cylinder head cap screw—Torque	70 N·m (52 lb-ft)
Fuel filter base-to-bracket cap screw—Torque	50 N·m (37 lb-ft)

NOTE: Fuel lines may be connected to different inlet and outlet ports depending on application.

5. Install fittings (C) and plugs (D), or optional accessories like fuel pressure sensor or fuel heater, on filter base as required. Tighten to specification.

Specification

Fittings,plugs or accessories-to-fuel filter base—Torque	10 N·m (7 lb-ft)

6. Install fuel lines then tighten tube nuts until seated on fitting shoulder.
7. If previously removed, install filter element then bleed fuel system.

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Remove Fuel Transfer Pump

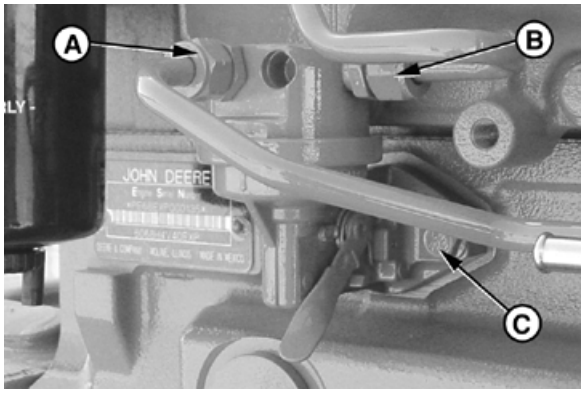
IMPORTANT: A backup wrench must always be used when disconnecting fittings or fuel lines from supply pump to avoid damage to fittings.

1. Disconnect fuel inlet line (A) and outlet line (B) and cap connections on fuel transfer pump and fuel lines to keep debris out of fuel system.
2. Remove cap screws (C) and remove fuel transfer pump assembly from cylinder block.

NOTE: The fuel transfer pump is driven by a push rod (D) that rides on an eccentric camshaft lobe. The cylinder head must be removed to remove this push rod.

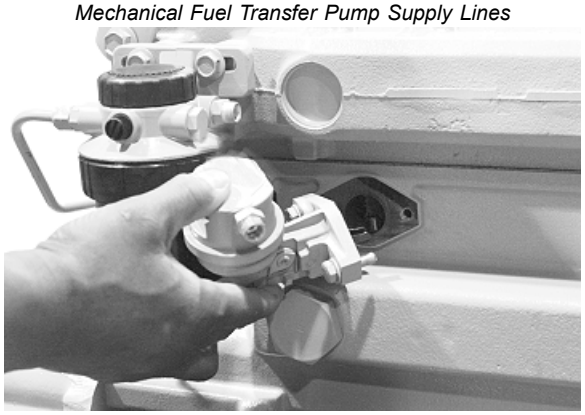
3. Cover opening on cylinder block to prevent dirt from entering the engine.
4. Inspect face of pump lever for wear. If lever face is worn flat or concave, replace pump.

A—Transfer Pump Inlet from Pre-Filter
B—Transfer Pump Outlet to Final Fuel Filter
C—Cap Screws
D—Push Rod



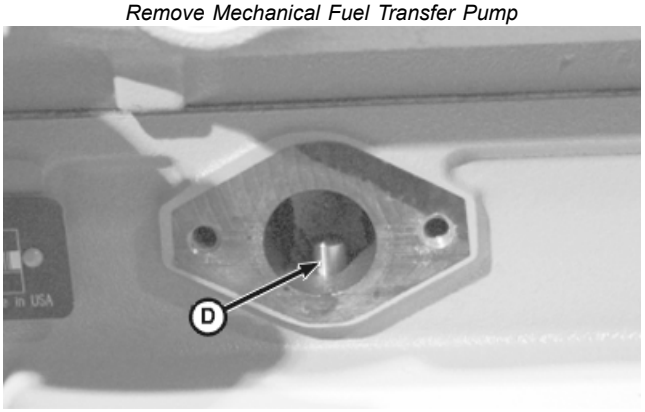
RG12453A —UN—14JUN02

Mechanical Fuel Transfer Pump Supply Lines



RG9051 —UN—16MAR98

Remove Mechanical Fuel Transfer Pump



RG12022 —UN—27NOV01

Mechanical Fuel Transfer Pump Push Rod

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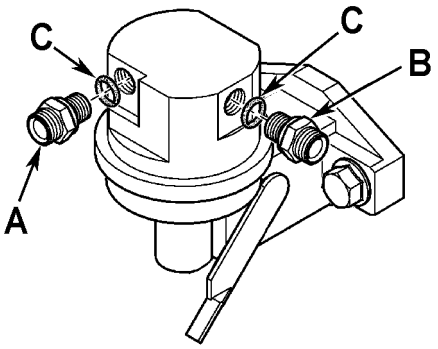
Install Fuel Transfer Pump

Assemble Fuel Transfer Pump

NOTE: If transfer pump is being replaced, inlet fitting (A) and outlet fitting (B) as well as respective O-rings (C) are not provided with the pump.

1. Remove and retain inlet (A) and outlet (B) fittings from old pump. Discard O-rings (C).
2. Install new O-rings and fittings into new transfer pump. Tighten fittings to specification.

Specification	
Inlet and outlet fitting-to-fuel transfer pump—Torque	10 N·m (7 lb-ft)



CD30924

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Assemble Fuel Transfer Pump

A—Inlet fitting
B—Oulet fitting
C—O-ring

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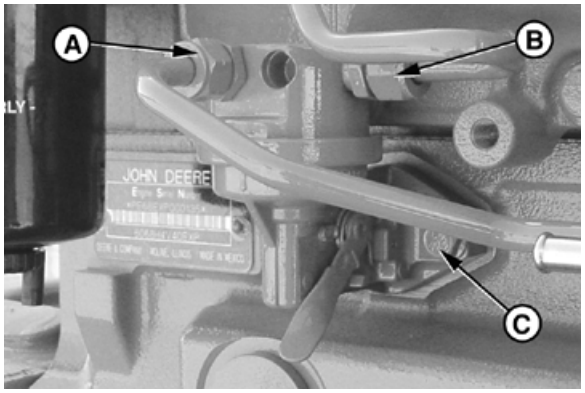
IMPORTANT: Apply LOCTITE 242 to threads of supply pump mounting cap screws (C) and fuel line fittings when reinstalling supply pump. DO NOT allow sealant to get into fuel system.

1. Install the fuel transfer pump to cylinder block with pumping lever resting on top of push rod, using a new O-ring. Tighten cap screws (C) to specifications.

Specification	
Fuel Transfer Pump Cap Screws—Torque	30 N·m (22 lb-ft)

IMPORTANT: Always use a backup wrench when installing fittings and/or fuel lines onto supply pump to avoid damage to fittings.

2. Connect supply pump inlet line (A) and outlet line (B) and tighten tube nut until seated on fitting shoulder.
3. Bleed the fuel system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 in this manual.



RG12453A —UN—14JUN02

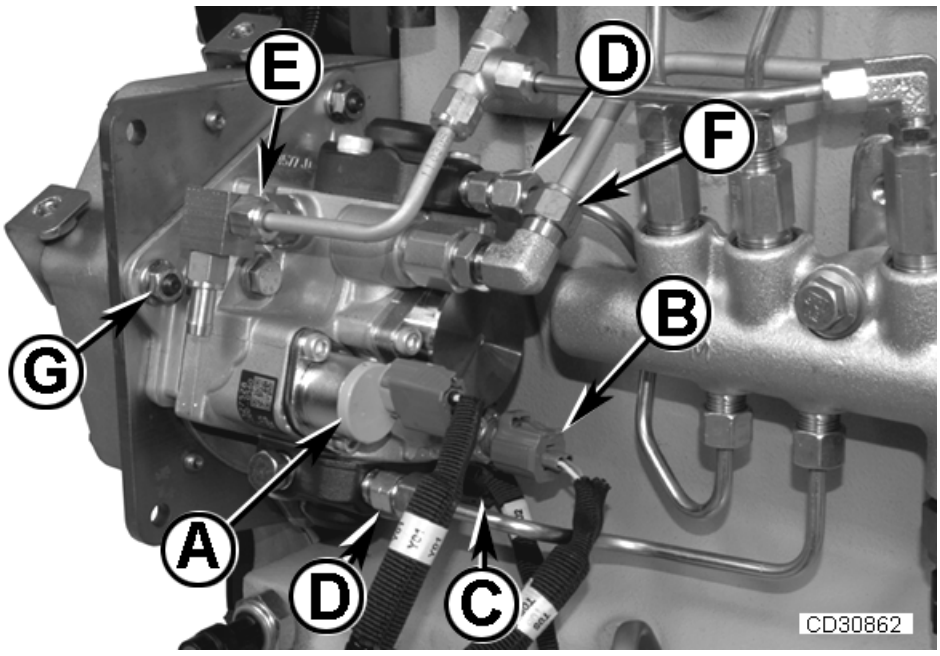
Fuel Transfer Pump Lines

A—Fuel Transfer Pump Inlet from Pre-filter
B—Fuel Transfer Pump Outlet to Final Fuel Filter
C—Cap Screws

RG41183,00000D0 -19-06AUG07-2/2

Remove and Install High Pressure Fuel Pump

Remove High Pressure Fuel Pump

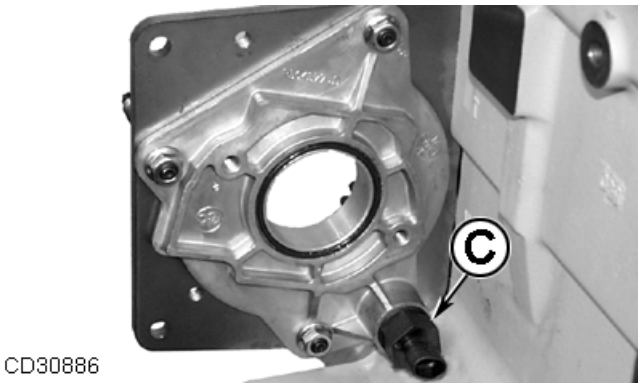


CD30862 —UN—04SEP06

Remove high pressure fuel pump

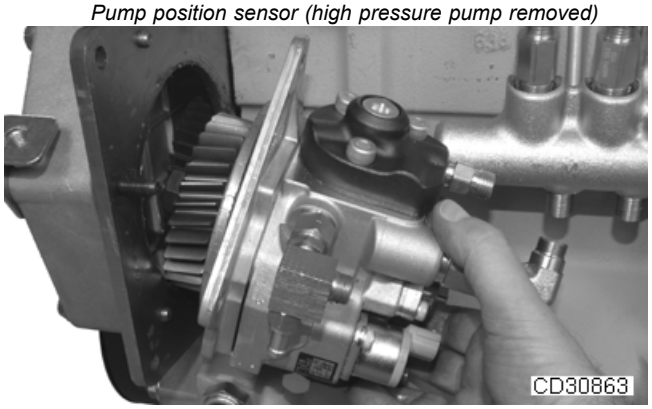
1. Disconnect wiring harness from suction control valve (A), from fuel temperature sensor (B) and from pump position sensor (C).
2. Remove high pressure fuel lines (D).
3. Remove fuel leak-off line (E).
4. Disconnect fuel supply line (F).
5. Remove the 3 nuts (G) fixing adapter plate on engine front plate.
6. Carefully remove high pressure pump assembly from engine.

A—Suction Control Valve
B—Fuel Temperature Sensor
C—Pump position sensor
D—High pressure fuel outlet
E—Leak-off line connection
F—Fuel supply inlet
G—Adapter plate nut



CD30886 —UN—04SEP06

Pump position sensor (high pressure pump removed)

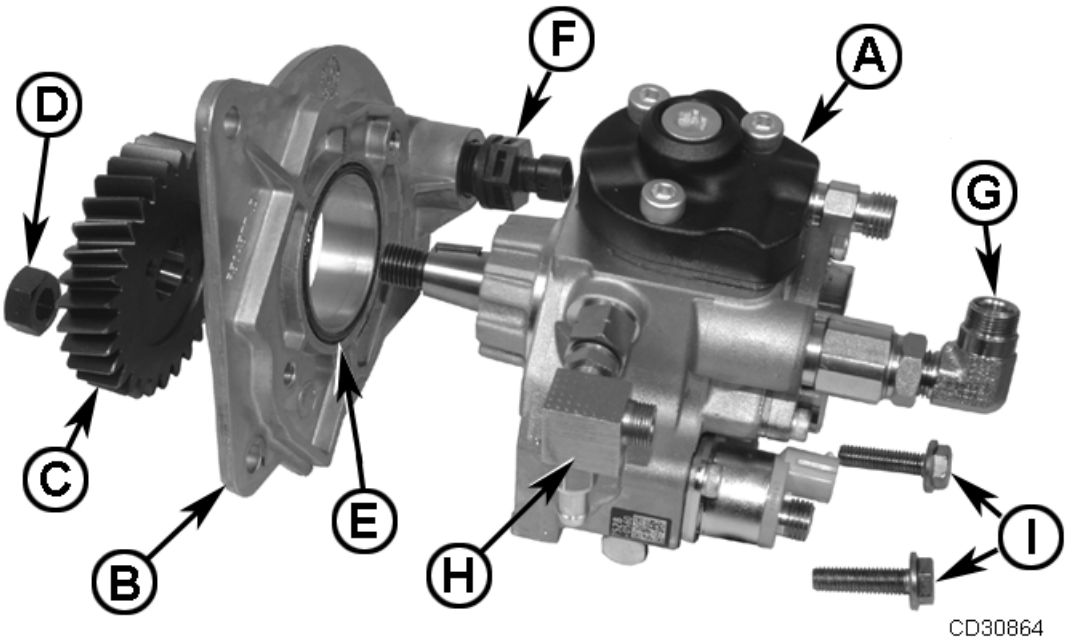


CD30863 —UN—04SEP06

Remove high pressure fuel pump

Continued on next page

CD03523,0000176 -19-05NOV09-1/3



CD30864 —UN—04SEP06

High pressure fuel pump exploded view

A—High pressure fuel pump
B—Adapter plate
C—Drive gear
D—Nut
E—O-ring
F—Pump position sensor
G—Fuel supply fitting
H—Fuel leak-off fitting
I— Cap screw (high pressure pump-to-adapter plate)

Disassemble and Reassemble High Pressure Fuel Pump

A) Disassembling

1. Remove gear (C) using JDG1560 tool. Use a vise with claws to block the gear when removing gear.
2. Remove the two cap screws (I) and separate high pressure pump (A) from adapter plate (B).
3. Replace parts as necessary.

B) Reassembling

1. Install high pressure pump (A) on adapter plate (B) with a new O-ring (E). Tighten the 2 cap screws (I) to specification.

Specification

High pressure pump to adapter plate—Torque ..... 40 N·m (30 lb-ft)

2. Install gear (C) on pump shaft then tighten nut (D) to specification. Use a vise with claws to block the gear when tightening.

Specification

High pressure pump gear nut—Torque ..... 70 N·m (52 lb-ft)

3. Install pump position sensor (F) onto adapter plate then tighten to specification.

Specification

Pump position sensor to adapter plate—Torque ..... 15 N·m (11 lb-ft)

4. Install fuel supply elbow fitting (G) on high pressure pump. Orient fitting to be in line with fuel line. Tighten fitting nut to specification.

Specification

Fuel supply elbow fitting nut-to-high pressure pump—Torque ..... 20 N·m (15 lb-ft)

5. Install fuel leak-off fitting (H) on high pressure pump. Orient fitting vertical pointing down. Tighten fitting nut to specification.

Specification

Fuel leak-off fitting nut-to-high pressure pump—Torque ..... 15 N·m (11 lb-ft)

Continued on next page

CD03523,0000176 -19-05NOV09-2/3

Install high pressure fuel pump

1. Rotate engine to Top Dead Center (TDC) of number 1 cylinder and install JDG1571 Timing Pin in flywheel.
2. Remove plug (A) to access gear timing mark.
3. Replace O-rings (B & C) on adapter plate then install high pressure pump so that timing mark (D) can be seen through the timing gear cover opening as shown.
4. Install the 3 nuts (H) and tighten to specification.

Specification	
Adapter plate to engine front plate—Torque	40 N·m (30 lb-ft)

5. Install high pressure fuel lines (E) then tighten to specification.

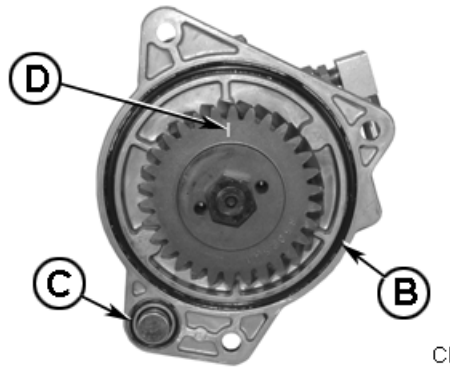
Specification	
High pressure fuel line (both ends)—Torque	30 N·m (22 lb-ft)

6. Install leak-off line (F) then tighten tube nuts until seated on fitting shoulder.
7. Install fuel supply line (G) then tighten tube nut until seated on fitting shoulder.
8. Reconnect wiring harness to suction control valve (I), to fuel temperature sensor (J) and to camshaft sensor (K).
9. Reinstall plug (A). Tighten to specification.

Specification	
Plug to access gear timing mark—Torque	50 N·m (37 lb-ft)

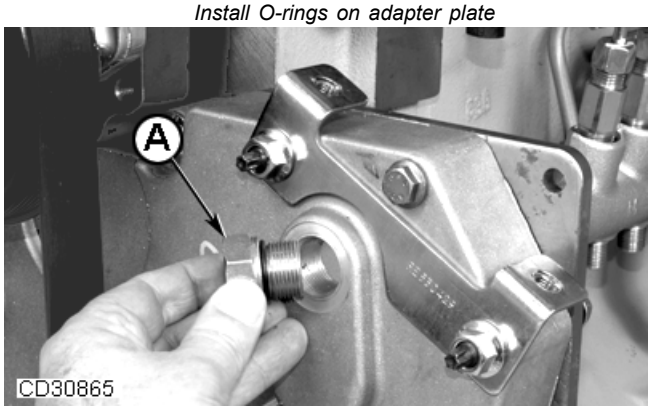
10. Bleed fuel system.

A—Plug to access gear timing mark
B—O-ring (adapter plate-to-front plate
C—O-ring (camshaft sensor)
D—High pressure pump gear timing mark
E—High pressure fuel line
F—Leak-off line
G—Fuel supply line
H—Adapter plate nut
I— Suction control valve
J— Fuel temperature sensor
K—Camshaft sensor



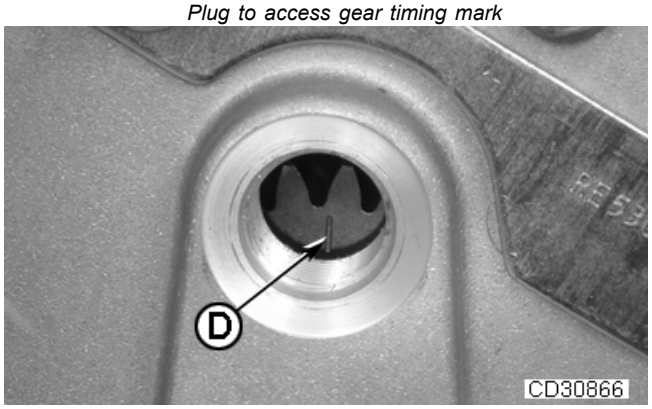
CD30868 —UN—05SEP06

Install O-rings on adapter plate



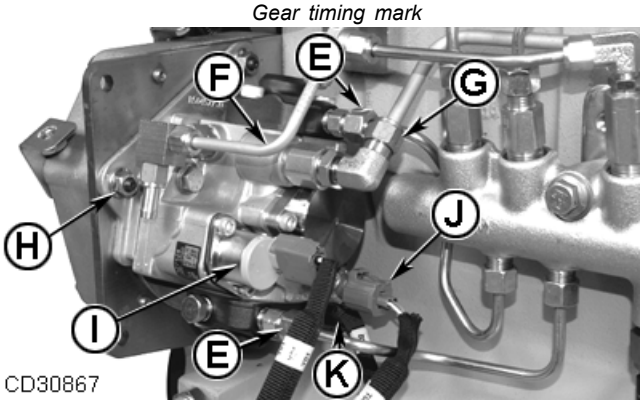
CD30865 —UN—05SEP06

Plug to access gear timing mark



CD30866 —UN—05SEP06

Gear timing mark



CD30867 —UN—05SEP06

Install high pressure pump

CD03523,0000176 -19-05NOV09-3/3

Remove and Install Suction Control Valve

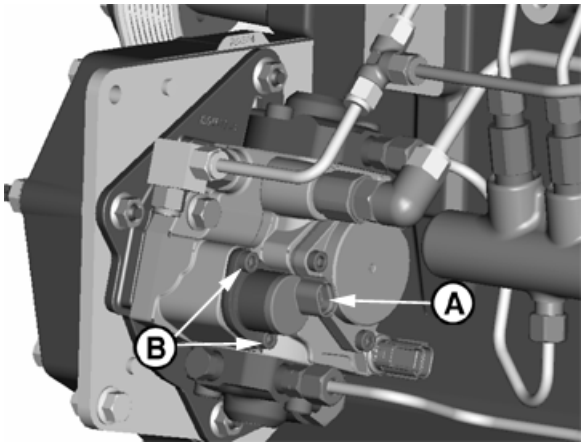
IMPORTANT: Avoid contamination to the fuel high pressure pump or the suction control valve while removing and replacing. Failure to maintain a high level of cleanliness will cause further damage to the pump and other fuel system components.

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

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

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

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



RG15101 —UN—01SEP06

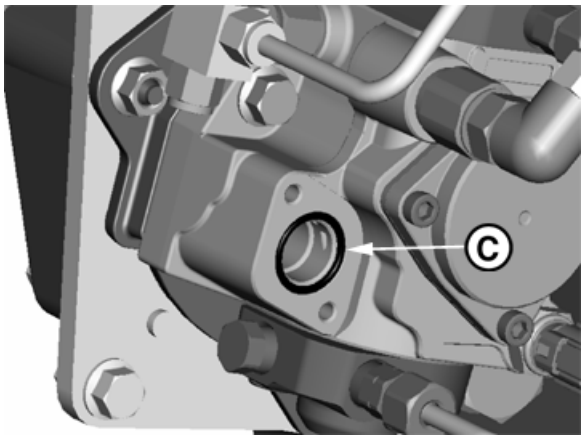
Remove Suction Control Valve Assembly

A—Suction Control Valve Wire Connector

B—Suction Control Valve Retaining Bolts

RE38635,000013D -19-06OCT08-1/6

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



RG15102 —UN—01SEP06

Suction Control Valve-to-Pump Housing O-Ring

C—O-Ring

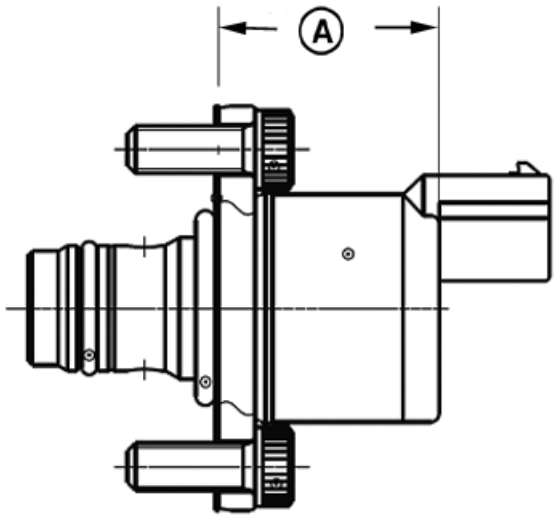
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RE38635,000013D -19-06OCT08-2/6

NOTE: If the length of the new valve is not 27.6 mm, it is the incorrect valve for the 4.5L & 6.8L pump.

8. Verify the overall reference length of the valve to be 27.6 mm (1.09 in.)

A—27.6 mm (1.09 in.)



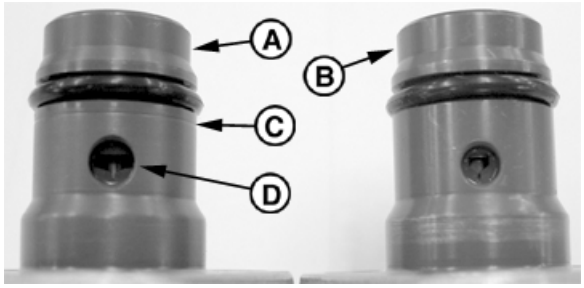
RG15103 —UN—01SEP06

Reference Length of Valve

RE38635,000013D -19-06OCT08-3/6

9. In addition to checking length of the valve, a visual check can be made to determine if the correct valve is in the kit. As shown, the 9L valve (A) has a groove (C) on the valve body. The 4.5L/6.8L valve (B) has none. Additionally, the valve for the 9L has a different port geometry (D) than the valve for the 4.5L/6.8L.

A—9L Valve
B—4.5L/6.8L Valve
C—Groove on Valve Body
D—Port Geometry



RG15156 —UN—13NOV06

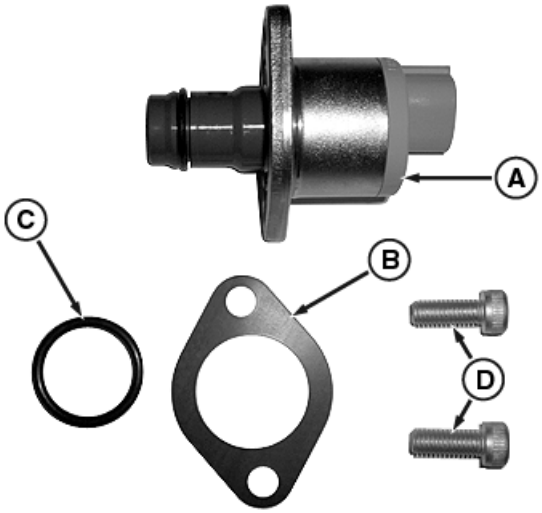
RE38635,000013D -19-06OCT08-4/6

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

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

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

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



RG14877A —UN—01OCT08

4.5L/6.8L Suction Control Kit

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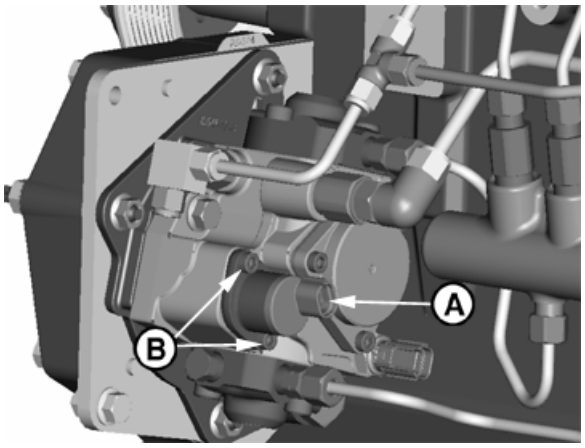
RE38635,000013D -19-06OCT08-5/6

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

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

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

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



RG15101 —UN—01SEP06

Install Suction Control Valve Assembly

A—Suction Control Valve Wire Connector

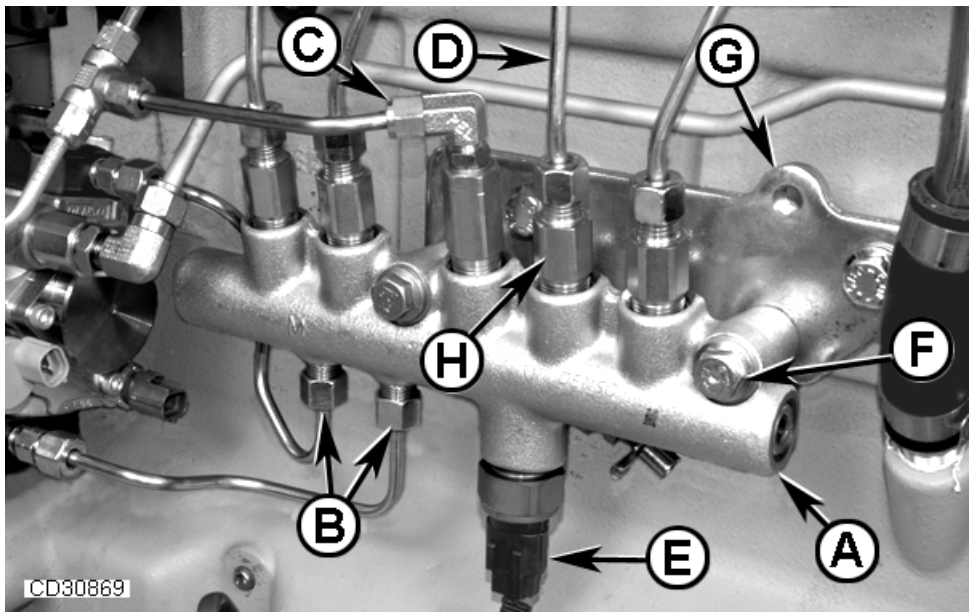
B—Suction Control Valve Retaining Bolts

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

RE38635,000013D -19-06OCT08-6/6

Remove and Install High Pressure Common Rail

Remove High Pressure Common Rail



CD30869 —UN—07SEP06

Remove High Pressure Common Rail (HPCR)

A—High Pressure Common Rail (HPCR)
B—Pump-to-rail high pressure line
C—Leak-off line
D—High pressure delivery line
E—Pressure sensor
F—Cap screw
G—Bracket
H—Flow damper

⚠ CAUTION: Wait a minimum of 15 minutes after engine is stopped before disconnecting any high pressure fuel lines.

1. Disconnect pressure sensor wiring harness.
2. Disconnect leak-off line (C) from elbow fitting.
3. Remove pump-to-rail high pressure lines (B)
4. Remove high pressure delivery lines (D) from rail. Do not remove flow damper (H).
5. Loosen cap screw (F), then remove the high pressure common rail (A) from engine.

Install High Pressure Common Rail

1. Install bracket (G) on engine (if previously removed). Install high pressure common rail on bracket then tighten cap screw to specification.

Specification

High pressure common rail bracket to engine—Torque..... 70 N·m (52 lb-ft)

High pressure common rail to bracket—Torque..... 70 N·m (52 lb-ft)

2. Install high pressure delivery lines (D). Tighten to specification.

Specification

High pressure delivery lines to rail—Torque..... 30 N·m (22 lb-ft)

3. Install pump-to-rail high pressure lines (B). Tighten to specification.

Specification

Pump-to-rail high pressure lines—Torque..... 30 N·m (22 lb-ft)

4. Connect leak-off line (C) to elbow fitting. Tighten tube nut until seated on fitting shoulder.
5. Connect wiring harness to pressure sensor (E).
6. Bleed fuel system.

RG41183,00000D3 -19-07SEP06-1/1

Remove and Install Flow Dampers

CAUTION: Wait a minimum of 15 minutes after engine is stopped before disconnecting any high pressure fuel lines.

Remove Flow Dampers

IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

1. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the faulty flow damper.
2. Using a backup wrench on flow damper, loosen fuel line fitting (A).

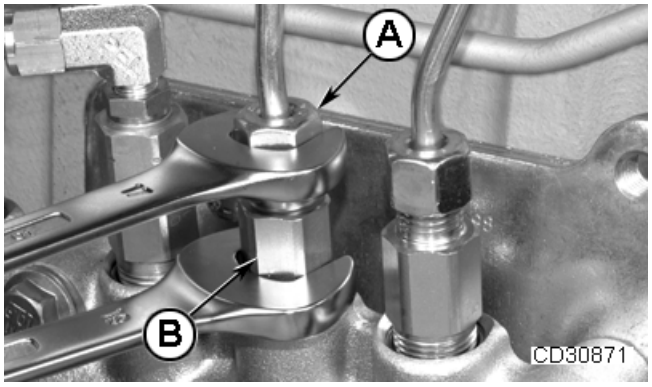
IMPORTANT: Do NOT bend or force lines out of the way.

3. Loosen fuel line fitting on injector inlet connector. The line does not need to be removed.
4. Remove flow damper (B) keeping internal components (C) together.

IMPORTANT: Make sure magnet is clean before using.

5. Remove orifice plate (E) from inside flow damper bore using a clean magnet (D).
6. Replace complete flow damper as an assembly.

A—Fuel line fitting
B—Flow damper
C—Internal Components
D—Magnet
E—Orifice Plate



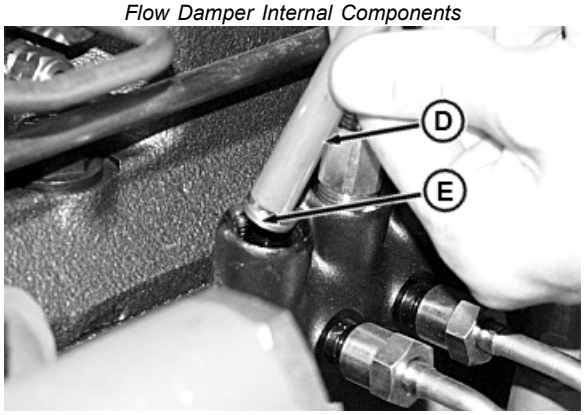
CD30871 —UN—07SEP06

Remove flow damper



RG11760A —UN—11SEP09

Flow Damper Internal Components



RG11761A —UN—11SEP09

Removing Orifice Plate

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RG41183,00000D4 -19-22JAN07-1/2

Install Flow Dampers

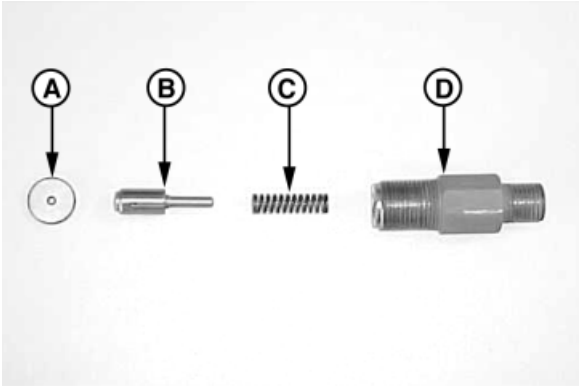
IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

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

Specification	
Flow damper—Torque	176 N·m (130 lb-ft)

3. Using a backup wrench, connect high pressure injection line to flow damper and to injector inlet connector. Tighten to specification.

Specification	
High pressure injection line at both ends—Torque	30 N·m (22 lb-ft)



RG11845A —UN—31AUG01

Flow Damper Exploded View

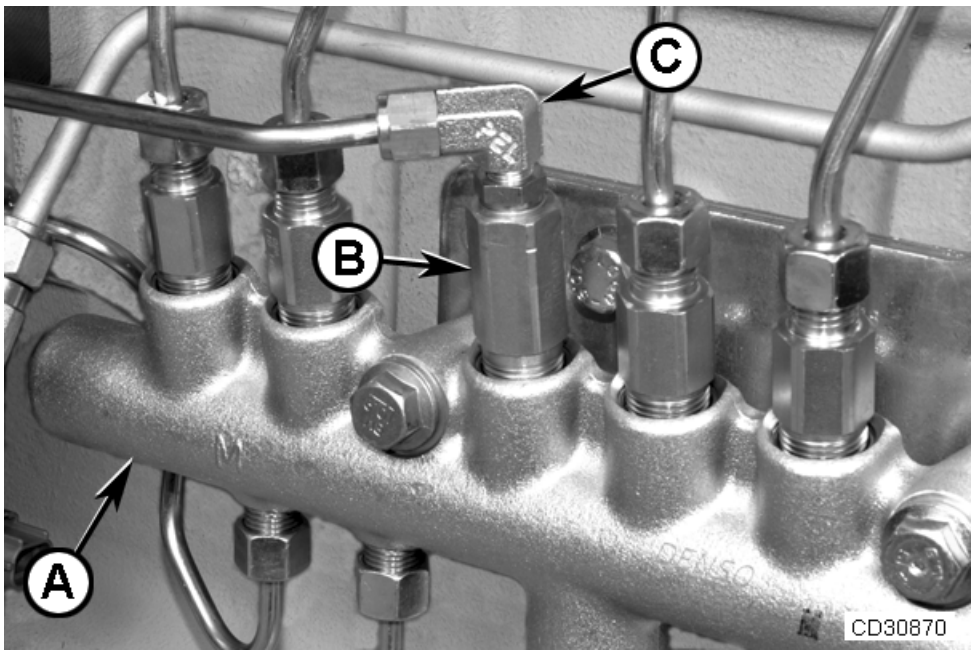
A—Orifice Plate
B—Piston
C—Spring
D—Flow Damper Body

4. Bleed fuel system.

RG41183,00000D4 -19-22JAN07-2/2

Remove and Install Pressure Limiter

Remove Pressure Limiter



CD30870 —UN—07SEP06

Remove/Install Fuel Pressure Limiter

A—High Pressure Common Rail (HPCR) **B—Fuel pressure limiter** **C—Leak-off Line Fitting**

CAUTION: Wait a minimum of 15 minutes after engine is stopped before disconnecting any high pressure fuel lines.

IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

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

IMPORTANT: Clean magnet prior to removing pressure limiter.

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

Install Pressure Limiter

IMPORTANT: Do NOT reuse the pressure limiter once removed from the rail. Install a new one.

1. Install pressure limiter (B) into common rail (A). Tighten to specification.

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

2. Install leak-off line fitting (C) to pressure limiter using a backup wrench. Orient fitting to be in line with leak-off line then tighten nut to specification.

Specification	
High Pressure Common Rail Leak-off Line Fitting—Torque	6 N·m (11 lb-ft)

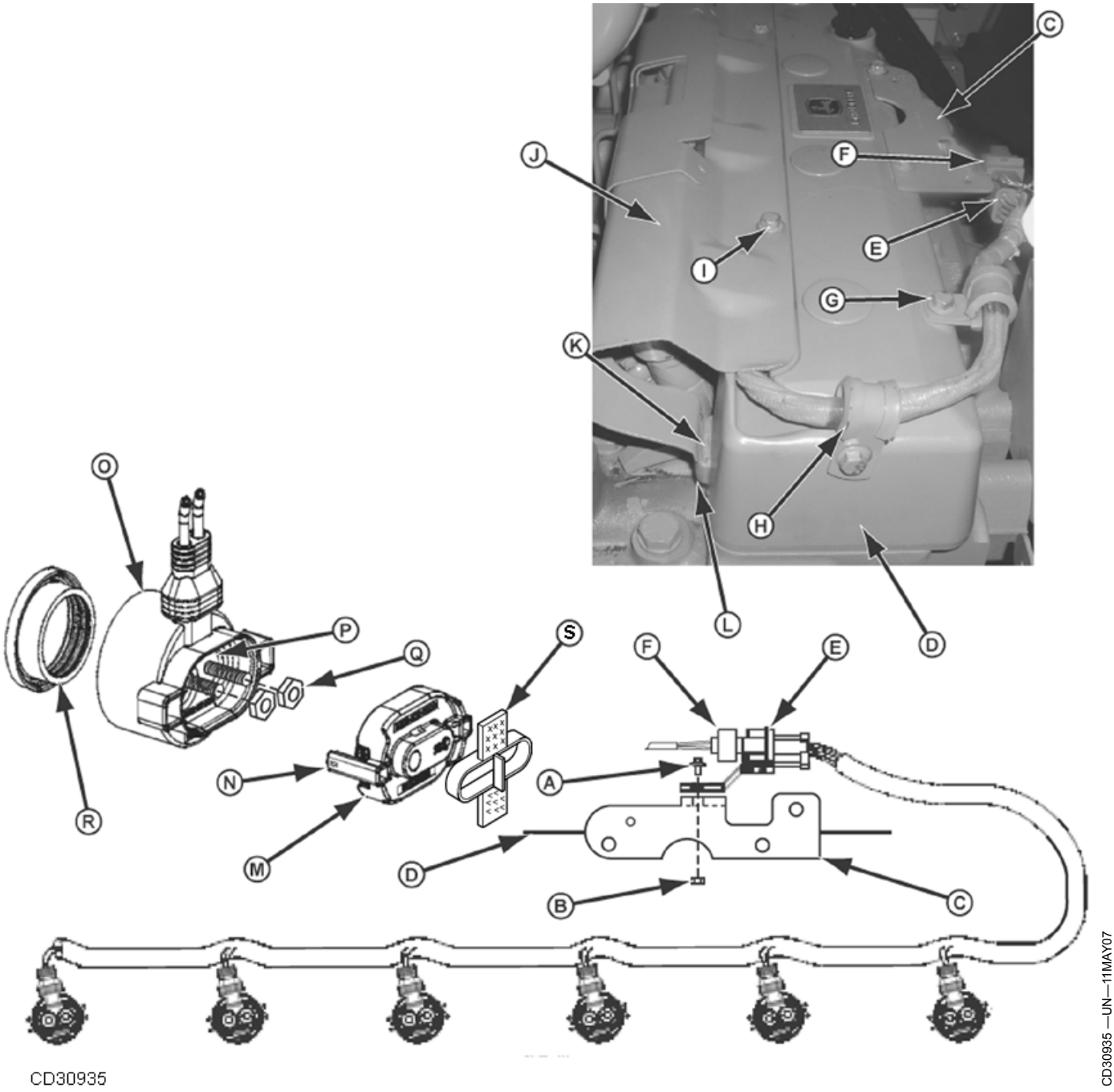
3. Connect leak-off line then tighten tube nuts until seated on fitting shoulder.
4. Bleed fuel system.

RG41183,00000D5 -19-19DEC06-1/1

Remove and Install Fuel Injection Wire Harness Assembly

Removal Procedures

NOTE: It is not necessary to remove the wiring harness for the valve lash service.



Fuel Injection Wire Harness Assembly

A—Capscrew
B—Nut
C—Bracket
D—Valve Cover
E—Fuel Injection Wire Harness Assembly Connector
F—Engine Wire Harness Assembly Connector
G—Capscrew
H—P-clamp
I— Capscrew
J—EI Cover
K—Cover Tabs
L—Valve Cover Slot
M—Stud Connector Dust Cap
N—Tab
O—Injector Stud Connector Body
P—EI Terminal
Q—EI Terminal Nut
R—Seal
S—Identification Tag (if present)

Continued on next page

DB92450,000005A -19-26SEP07-1/4

1. Remove capscrew (A) and nut (B) from bracket (C) attached to valve cover (D), and retain for installation.
2. Unplug fuel injection wire harness assembly connector (E) from engine wire harness assembly connector (F).
3. Remove 2 each capscrews (G) from securing 2 each P-clamps (H) to valve cover, and retain for installation.
4. Remove 2 each P-clamps (H) from fuel injector wire harness assembly, and retain for installation.
5. Remove 3 each capscrews (I), attaching EI cover (J) to valve cover, and retain for installation.
6. Lift EI cover, until EI cover tabs (K) have cleared valve cover slots (L), and remove and retain for installation.
7. Remove connector stud dust cap (M).

NOTE: The stud connector dust cap is not reusable. Always install new one once removed from injector.

NOTE: Some injectors may have an identification tag (S) clipped on dust cap (M). This tag is needed for identification during the engine assembly at the factory. If present, it can be also used when servicing the engine. If you cannot ensure that the identification tag match the proper injector, discard it.

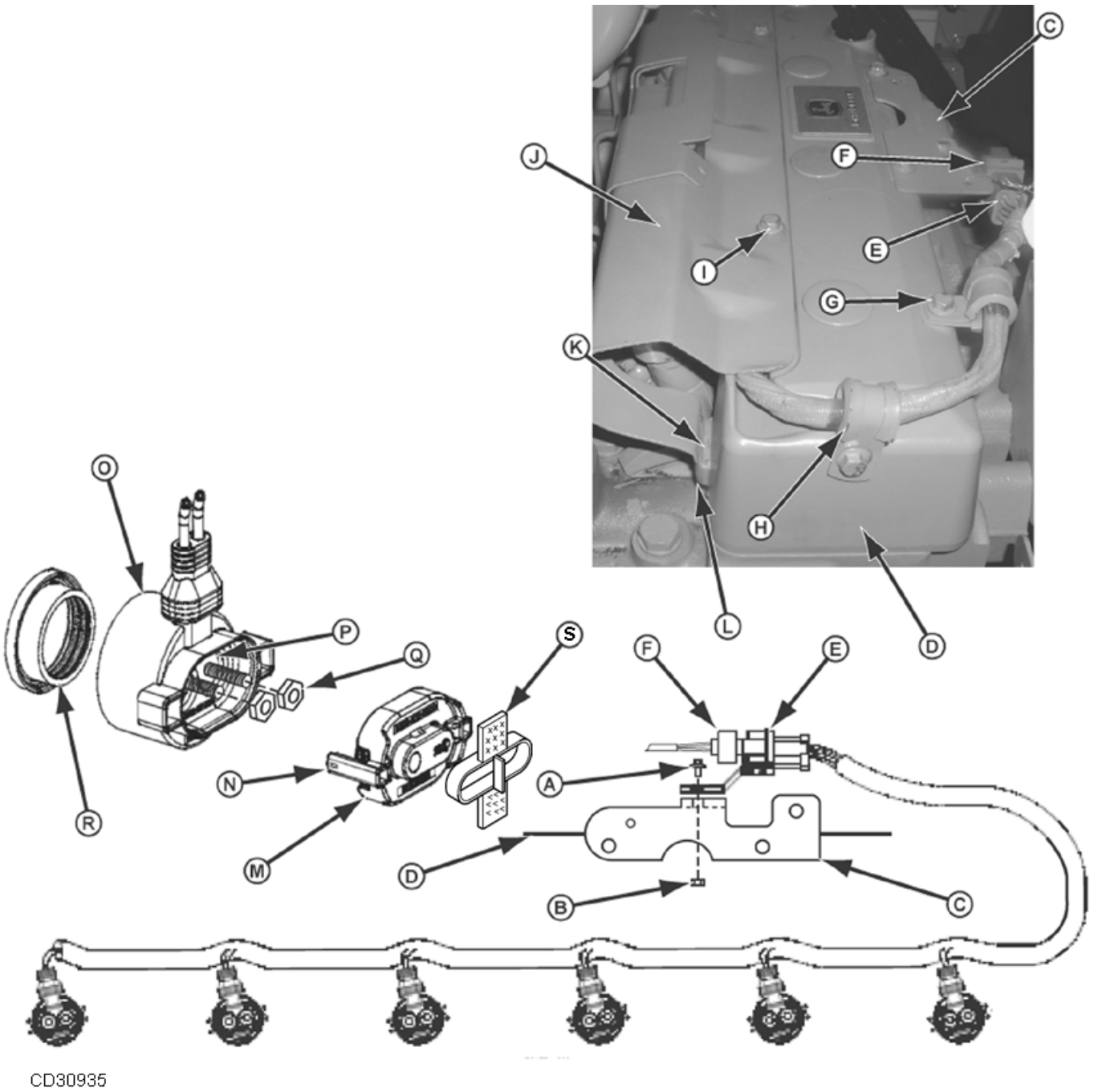
   a. Insert small tool, such as an O-ring pick, into the rectangular hole in one of the tabs (N) of the Injector stud cap assembly.
   b. Gently pull tab away from body, until that side of cap can be rocked up beyond tab-locked position.
   c. On opposite side of the injector stud cap assembly, repeat step b.
   d. Remove cap from injector stud connector body (O).
   e. Unscrew EI terminal nuts (Q), 2 each per EI, from EI terminals (P), and retain for installation.

NOTE: If a leaking seal (R), is the problem, defective seals can be removed and replaced individually, without removing the entire wire harness assembly. In this case, do only those steps that enable the removal and replacement of the damaged seals.

8. Lift injector stud connector body off EI. Seal (R) and injector stud connector body are removed as one piece.
9. Remove and discard Fuel injection wire harness assembly.

Continued on next page

Installation Procedures



Fuel Injection Wire Harness Assembly

A—Capscrew
B—Nut
C—Bracket
D—Valve Cover
E—Fuel Injection Wire Harness Assembly Connector
F—Engine Wire Harness Assembly Connector
G—Capscrew
H—P-clamp
I— Capscrew
J—Heat Shield
K—Cover Tabs
L—Valve Cover Slot
M—Stud Connector Dust Cap
N—Tab
O—Injector Stud Connector Body
P—EI Terminal
Q—EI Terminal Nut
R—Seal
S—Identification Tag (if present)

1. Using a new fuel injection wire harness assembly, and with each seal (R) inserted into each injector stud connector body (O), Place each wire assembly injector stud connector body, over each EI terminal (P).
2. Apply light coat of loctite 222 to injector terminal nut threads (Q), retained from removal procedure, and Install two EI terminal nuts onto two EI terminals on each EI. Torque to specification.

Specification

Injector Terminal Nut—Torque..... 2.2 ± 0.2 N·m (19.5 ± 1.8 lb-in)

Continued on next page

DB92450,000005A -19-26SEP07-3/4

3. Install a new dust cap (M) on each injector.
4. Attach P-clamps (H), retained in removal procedure, onto wire harness assembly.
5. Fasten P-clamps to valve cover (D), using capscrews (G). Torque capscrews to specification.

Specification

Capscrew—Torque..... 12.0 ± 1.0 N·m (106.0 ± 9.0 lb-in)

6. Insert tabs (K) of heat shield (J) into slots (L) of valve cover.
7. Fasten heat shield to valve cover, using capscrews (I), retained from removal procedure. Torque capscrews to specification.

Specification

Capscrew—Torque..... 12.0 ± 1.0 N·m (106.0 ± 9.0 lb-in)

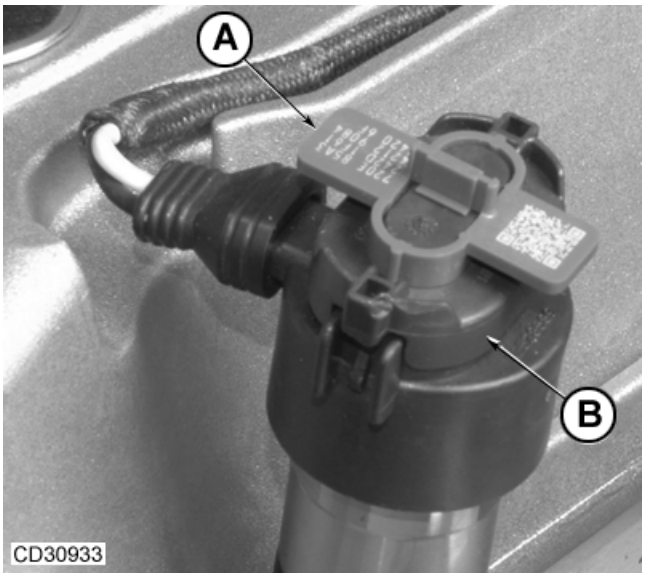
8. Connect fuel injection wire harness assembly connector (E) to engine fuel injection connector (F).
9. Using capscrew (A) and nut (B), retained from removal procedure, fasten fuel injection wire harness assembly connector to bracket (C), attached to valve cover. Torque capscrew and nut to specification.

Specification

Capscrew—Torque..... 25.0 ± 5.0 N·m (18.4 ± 3.7 lb-ft)

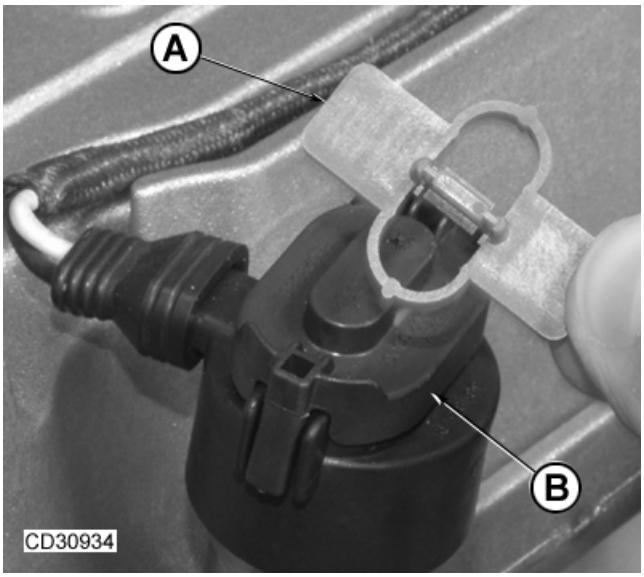
DB92450,000005A -19-26SEP07-4/4

Injector Identification Tag Information



CD30933 —UN—04MAY07

Identification tag clipped on dust cap



CD30934 —UN—04MAY07

Identification tag removed

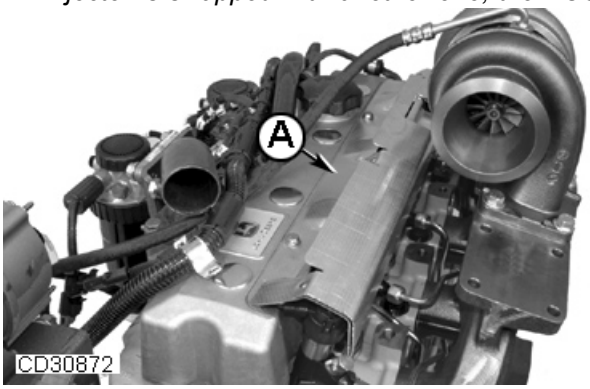
A—Identification Tag **B—Dust Cap**

NOTE: Some injectors may have an identification tag (A) clipped on the dust cap (B). This tag identifies the injector serial number and performance data used to program the ECU at the factory. When present, the tag must be kept with the respective injector. If you cannot ensure that the identification tag match the proper injector, discard tag.

CD03523,0000195 -19-25MAY07-1/1

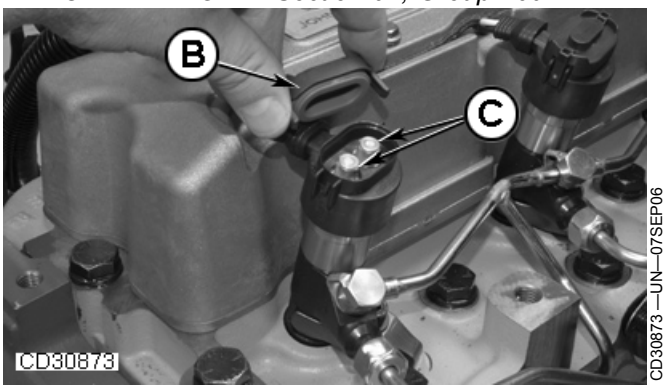
Remove Electronic Injector (EI)

NOTE: Injector and engine cylinder are matched in the ECU database. If a new injector is installed or injector is swapped with another one, the ECU must be updated with the new information using Service ADVISOR. See ELECTRONIC INJECTOR CALIBRATION in Section 04, Group 160.



CD30872 —UN—07SEP06

Remove heat shield



CD30873 —UN—07SEP06

Remove cap seal and nuts

A—Heat shield **B—Stud connector dust cap** **C—Terminal nuts**

IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

1. Remove heat shield (A).
2. Remove stud connector cap seal (B). To disengage locking tab, insert a small tool into top opening of the cap assembly. While pressing down on the tool, lift up on the cap assembly. Repeat action for opposite tab.

NOTE: The stud connector dust cap is not reusable. Always install a new one once removed from injector.

3. Remove terminal nuts (C).

Continued on next page

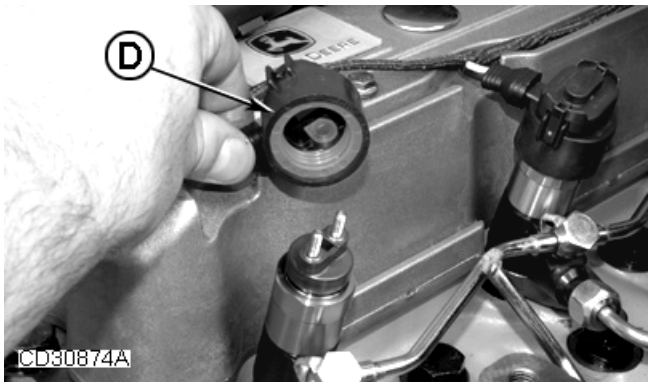
RE38635,0000041 -19-30AUG07-1/3

4. Remove wiring harness (D) from injector.

CAUTION: Wait a minimum of 15 minutes after engine is stopped before disconnecting any high pressure fuel lines.

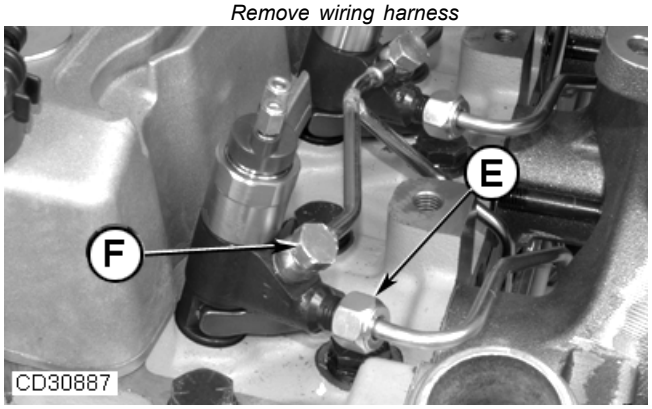
5. Remove high pressure fuel line (E).
6. Remove fuel leak-off line banjo fitting bolt (F).

D—Wiring harness
E—High pressure fuel line
F—Leak-off banjo fitting bolt



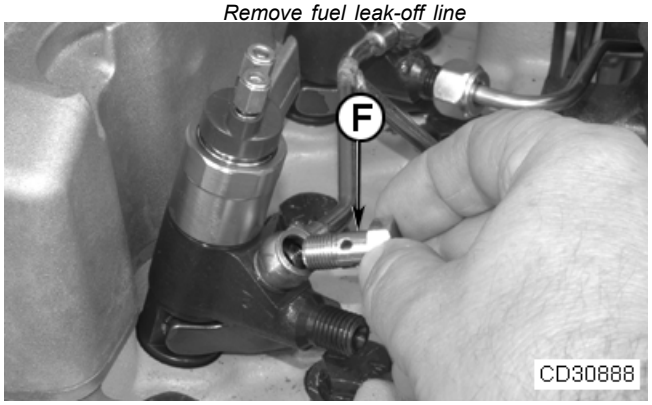
CD30874A —UN—25SEP06

Remove wiring harness



CD30887 —UN—25SEP06

Remove fuel leak-off line



CD30888 —UN—25SEP06

Remove banjo fitting bolt

Continued on next page

RE38635,0000041 -19-30AUG07-2/3

NOTE: It is not necessary to remove the complete fuel leak-off line.

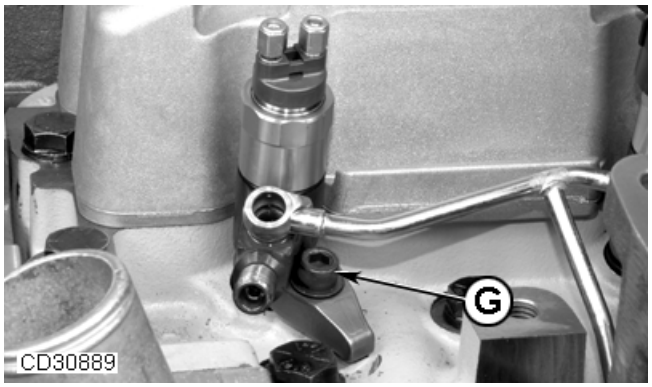
7. Remove hold down clamp screw (G).

IMPORTANT: When removing electronic injector, do not twist at the top of the injector which may result in solenoid damage.

8. Using the clamp (H), turn injector counter clockwise until injector fuel inlet (I) is between rocker arm cover and fuel leak-off line.
9. Remove the dual banjo sealing washer (J).
10. Install the clamp upside down as shown (K), then push down at the end of the clamp to help injector to come out.
11. Immediately cover all openings in cylinder head and in injector.

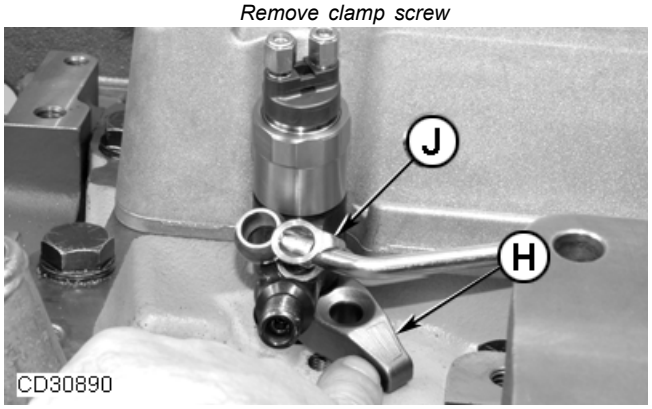
NOTE: Electronic injector cannot be serviced nor tested for opening pressure as it is controlled electronically. If any component of the injector fails, the entire injector must be replaced.

G—Hold down clamp screw
H—Injector clamp
I— Injector fuel inlet
J— Dual banjo sealing washer
K—Injector clamp upside down



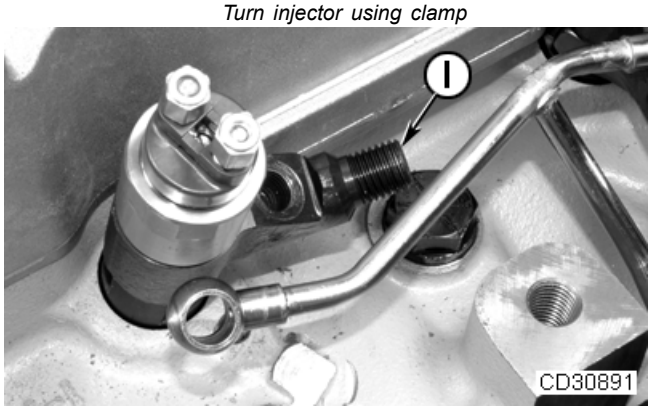
CD30889 —UN—25SEP06

Remove clamp screw



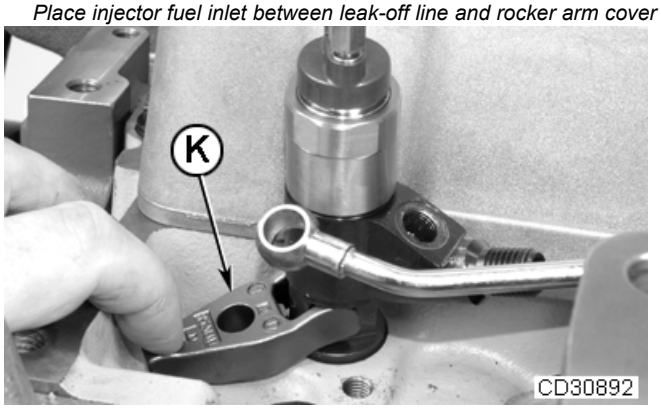
CD30890 —UN—25SEP06

Turn injector using clamp



CD30891 —UN—25SEP06

Place injector fuel inlet between leak-off line and rocker arm cover



CD30892 —UN—25SEP06

Pull out injector using clamp upside down

RE38635,0000041 -19-30AUG07-3/3

Clean Electronic Injector (EI) Bore

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

RG40854,0000118 -19-22JAN07-1/1

Clean Electronic Injector (EI) Orifice

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

RG40854,0000117 -19-22JAN07-1/1

Clean Electronic Injector (EI) Body

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

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

RG40854,0000116 -19-22JAN07-1/1

Inspect Electronic Injector (EI) Body

1. Inspect electronic injector body to see that it is not scratched or scored.
2. If electronic injector is scratched or scored, replace electronic injector.

RG40854,0000115 -19-22JAN07-1/1

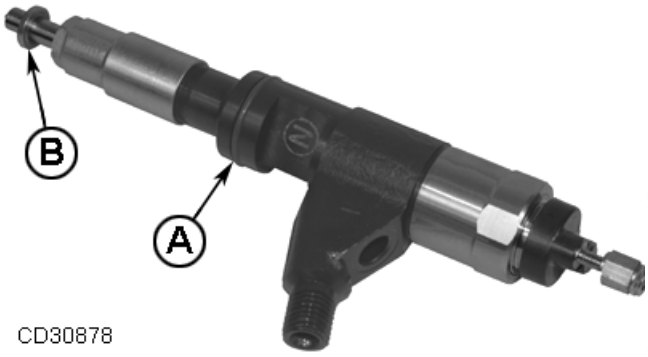
Install Electronic Injector (EI)

NOTE: When servicing injectors it is important to complete the injector calibration procedure using Service ADVISOR. Each injector has a specific calibration and this information can be obtained by scanning the bar code on the service injector box and downloading the injector information from the John Deere Custom Performance™ web site. An alternative for obtaining the fuel calibration data from Custom Performance is to use the part number and injector serial number stamped on the injector. ECU can also be directly loaded with the 30 digits code of the identification tag, if present.

If the ECU is not programmed with the correct information for each injector and the correct cylinder that it is in then engine performance and emissions will be affected.

NOTE: Write down the injector part number and serial number for future reference.

IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.



Replace seal and O-ring

A—O-ring **B—Combustion sealing washer**

1. Replace O-ring (A) and combustion sealing washer (B).
2. Lubricate O-ring with petroleum grease.



Install injector

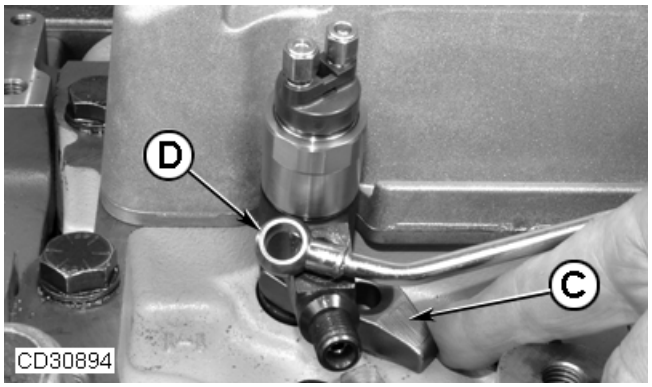
3. Carefully insert injector into bore until it 'pops' into place.

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RE38635,0000042 -19-06AUG07-1/4

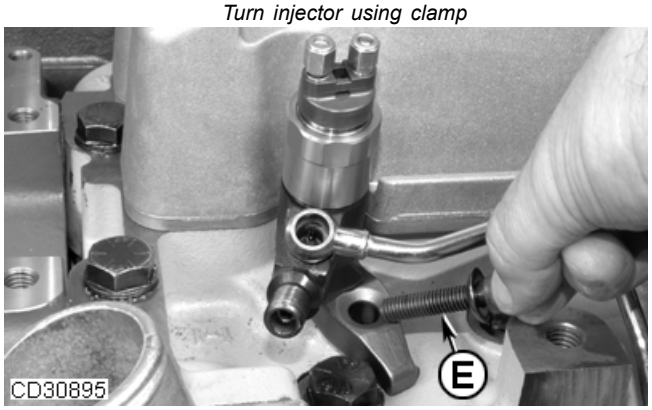
4. Using the clamp (C), turn injector clockwise until in line with the fuel leak-off line banjo bore (D).
5. Dip hold down clamp screw with spherical washer (E) in engine oil. Install screw then hand tighten.
6. Install banjo fitting bolt with new dual banjo sealing washers (F). Hand tighten at this stage.
7. Install high pressure fuel line (G). Hand tighten fitting nut.

C—Injector clamp
D—Fuel leak-off line
E—Clamp screw with spherical washer
F—Dual banjo sealing washer
G—High pressure fuel line



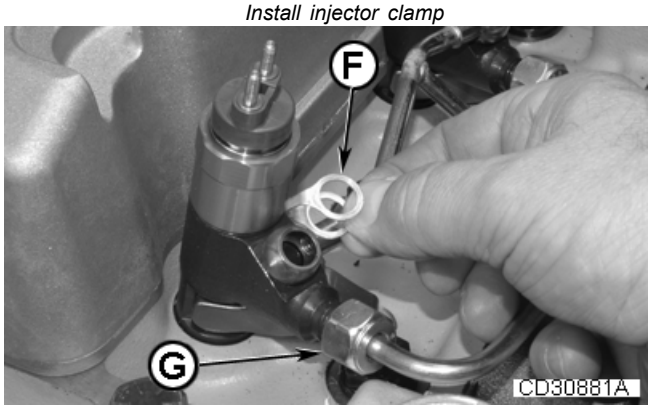
CD30894 —UN—25SEP06

Turn injector using clamp



CD30895 —UN—25SEP06

Install injector clamp

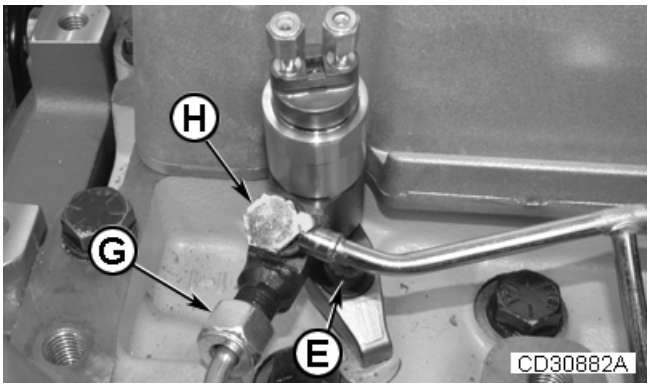


CD30881A —UN—25SEP06

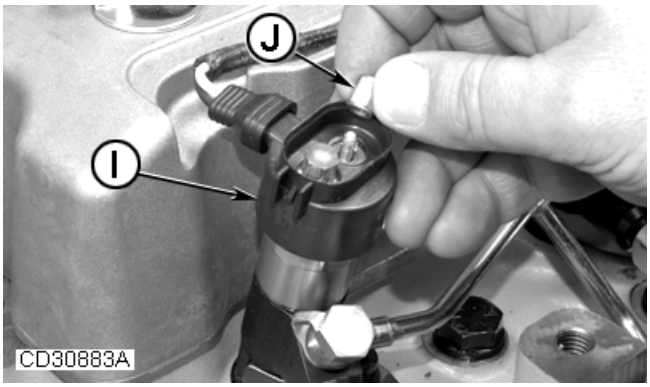
Install dual banjo sealing washer

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RE38635,0000042 -19-06AUG07-2/4



Tighten connections



Install wiring harness

E—Clamp screw
G—High pressure fuel line
H—Leak-off banjo screw
I— Wiring harness
J— Terminal nut

8. Tighten injector clamp (E) to specification.

Electronic Injector—Specification

Clamp screw—Torque.....15 N·m (11 lb-ft)
Torque Turn ..... 90 degree

9. Tighten fuel leak-off banjo screw (H) to specification.

Specification

Fuel leak-off banjo screw—Torque..... 25 N·m (18 lb-ft)

10. Tighten high pressure fuel line (G) to specification at both ends.

Specification

High pressure fuel line—Torque..... 30 N·m (22 lb-ft)

11. Install wiring harness (I) onto injector studs.

IMPORTANT: Do NOT use red or blue LOCTITE on solenoid studs. Bonding strength is too high for small studs, making future removal impossible without twisting off stud.

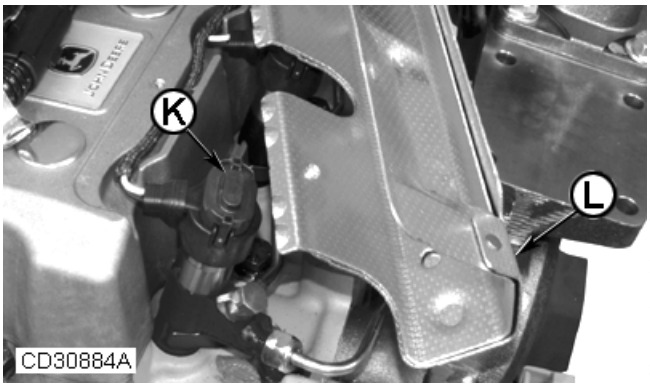
12. Apply LOCTITE 222 Small Thread Locker (PM38653) into injector nuts (J). Install and tighten nuts to specification.

Specification

Injector nut—Torque..... 2 N·m (1.5 lb-ft)

Continued on next page

RE38635,0000042 -19-06AUG07-3/4



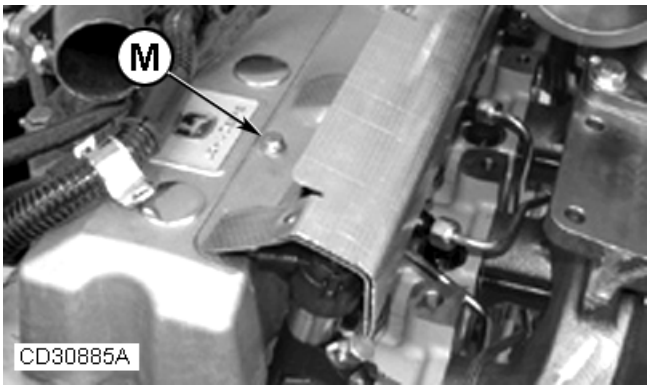
Install cap seal

K—Stud connector dust cap **L—Heat shield**

13. Install a new dust cap (K) on injector connector.
14. Install heat shield (L). Tighten cap screw (M) to specification.

Specification

Heat shield cap screw—Torque..... 10 N·m (7 lb-ft)



Install heat shield

M—Heat shield cap screw

15. Calibrate the ECU for proper electronic injector fueling. See ELECTRONIC INJECTOR CALIBRATION in Section 04, Group 160.

RE38635,0000042 -19-06AUG07-4/4

Remove and Install Fuel Leak-Off Line

NOTE: The fuel leak-off line is composed of several portions which can be serviced separately.

Lower portions between rail and high pressure pump

1. Remove leak off line portion concerned
2. Check and replace parts as necessary.
3. Install parts then tighten tube nut until seated on fitting shoulder.

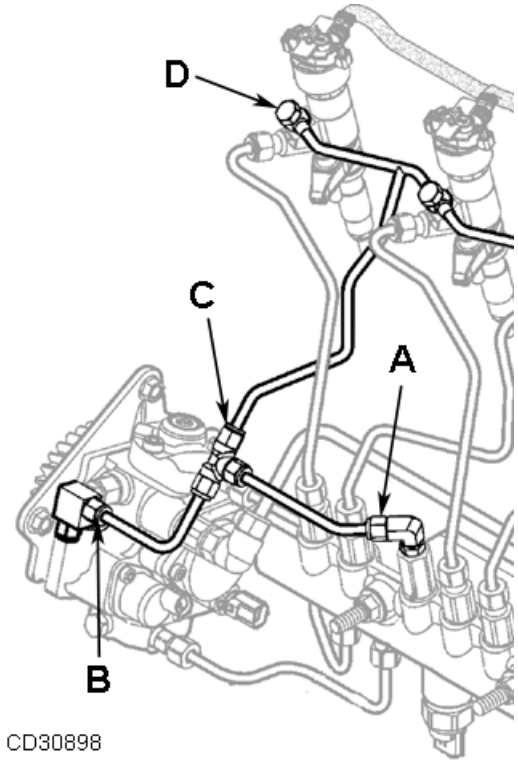
Upper portion between T-fitting (C) and injector (D)

1. Disconnect fuel leak-off from T-fitting (C) and from injectors (D).
2. Remove the upper portion of leak-off line (E).
3. Check and replace parts as necessary.
4. Install banjo fitting bolt (G) with new dual banjo sealing washers (F) at each injector port.
5. Tighten fuel leak-off banjo bolt to specification.

Specification	
Fuel leak-off banjo bolt—Torque	25 N·m (18 lb-ft)

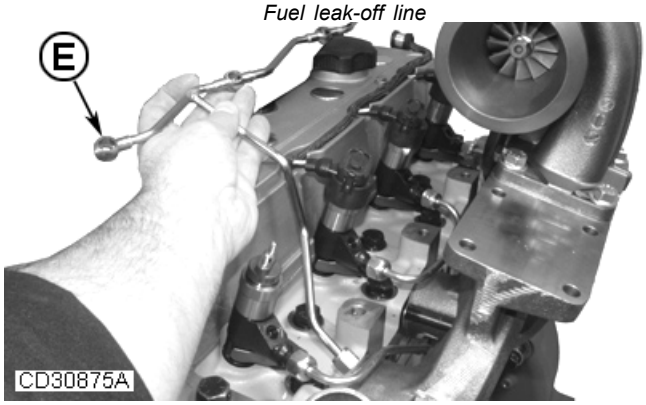
6. Install leak-off line in T-fitting connection (C) then tighten tube nut until tube nut seated on fitting shoulder.

A—Rail connection
B—High pressure pump connection
C—T-fitting
D—Injector connection
E—Upper portion of leak-off line
F—Dual banjo sealing washer
G—Leak-off banjo fitting bolt



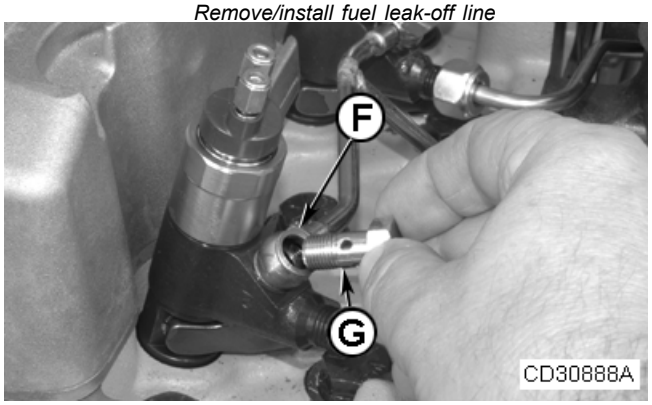
CD30898 —UN—09OCT06

Fuel leak-off line



CD30875A —UN—09OCT06

Remove/install fuel leak-off line

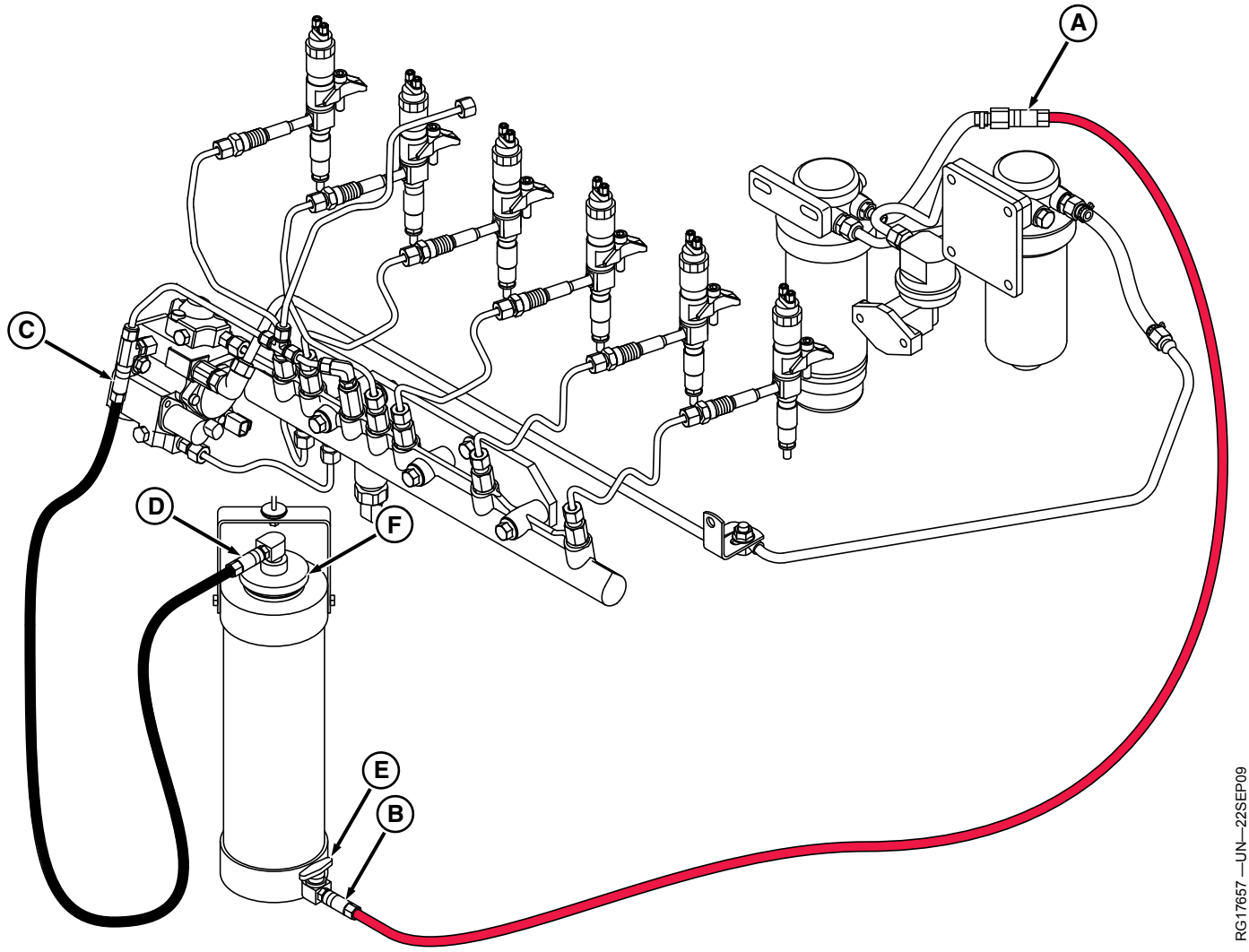


CD30888A —UN—09OCT06

Install dual banjo sealing washer and banjo fitting bolt

CD03523,000017B -19-30MAY07-1/1

Clean Electronic injectors (In Engine)



Clean Electronic Injectors In-Engine

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

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

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

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

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

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

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

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

   Shut-off engine.

Continued on next page

MK41968,0000042 -19-21OCT09-1/2

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

    Disconnect kit hoses and adapters.

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

MK41968,0000042 -19-21OCT09-2/2

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, protect the ECU from high-current damage as follows:

1. **Disconnect ECU-to-vehicle frame ground connection.**
2. **Disconnect all other connectors from ECU.**
3. **Connect welder ground close to welding point and make sure ECU and other electrical components are not in the ground path.**

NOTE: For diagnosis and testing of the electronic engine control and sensors, refer to Section 04, Group 160, TROUBLE CODE DIAGNOSTICS AND TESTS.

NOTE: The sealed ECU assembly is the system component LEAST likely to fail. Before replacing, make sure that it is isolated and identified as the defective component.

The ECU is not repairable. If it is found to be defective, replace ECU.

The wiring connectors for the ECU are repairable. See REPAIR CINCH FLEX BOX CONNECTOR later in this Group.



CD30896 —UN—05OCT06

Engine Control Unit, Level 16

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

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

CD03523,0000179 -19-30AUG07-1/1

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

High Pressure Washing

IMPORTANT: DO NOT OPEN ENGINE CONTROL UNIT.

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

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

1. **Disconnect ECU-to-vehicle frame ground connection.**
2. **Disconnect all other connectors from ECU.**
3. **Connect welder ground close to welding point and make sure ECU and other electrical components are not in the ground path.**

NOTE: For diagnosis and testing of the electronic engine control and sensors, refer to Section 04, Group 160, TROUBLE CODE DIAGNOSTICS AND TESTS.

NOTE: The sealed ECU assembly is the system component LEAST likely to fail. Before replacing, make sure that it is isolated and identified as the defective component.

The ECU is not repairable. If it is found to be defective, replace ECU.

The wiring connectors for the ECU are repairable. See REPAIR CINCH FLEX BOX CONNECTOR later in this Group.



CD30896

CD30896 —UN—05OCT06

Engine Control Unit, Level 16

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

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

DM59778,0000017 -19-06JUN07-1/1

Remove and Install Engine Control Unit (ECU) on Engine (Optional Equipment)

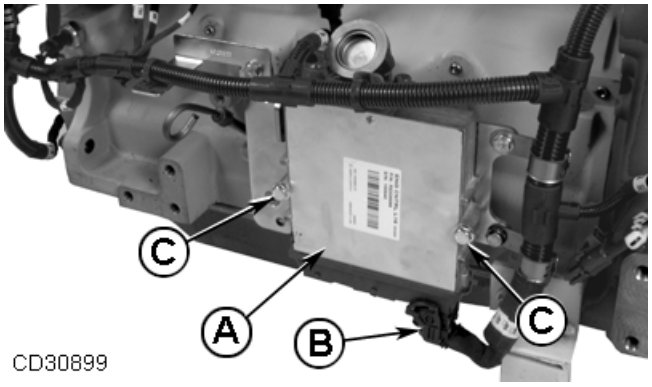
NOTE: Engine Control Unit (ECU) can be mounted on engine or remotely installed on the machine.

1. Disconnect wiring harness (B) from ECU (A).
2. Remove ECU from bracket.
3. Install ECU with vent plug (D) oriented towards bracket baffle (E). Tighten cap screws (C) to specification.

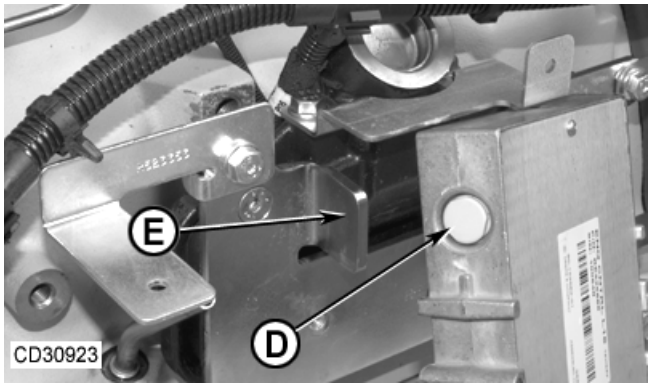
Specification

ECU cap screw—Torque.....15 N·m (11 lb-ft)

A—Engine Control Unit (ECU)
B—Wiring harness
C—Cap screw
D—Vent plug
E—Bracket baffle



CD30899 —UN—10OCT06

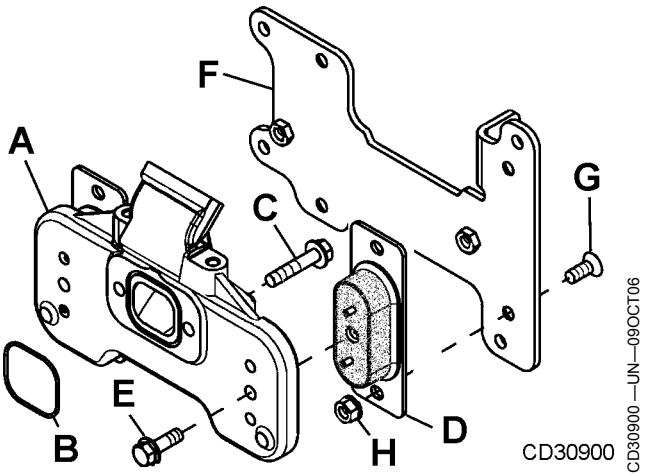


CD30923 —UN—17OCT06

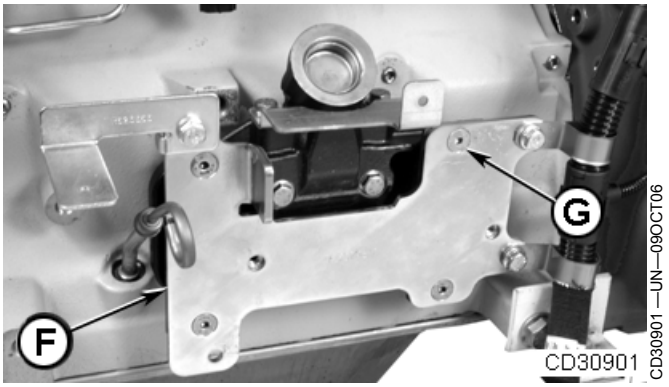
ECU Installation

CD03523,000017C -19-17OCT06-1/1

Remove and Install Adaptation Parts for Engine Control Unit (ECU) Mounted on Engine (Optional Equipment)



ECU adaptation parts



Remove/install ECU bracket

NOTE: Depending on engine configuration, adapter (A) can be used as a filler neck.

1. Remove wiring harness clamping from bracket (F).
2. Remove bracket (F).
3. Remove adapter (A)/isolator (D) assembly.
4. Replace parts as necessary. Tighten isolator cap screws (E) to specification.

Specification

Isolator-to-adapter cap screws—Torque ..... 35 N·m (26 lb-ft)

5. Install adapter (A)/isolator (D) assembly with a new O-ring (B) on cylinder block. Tighten cap screw (C) to specification.

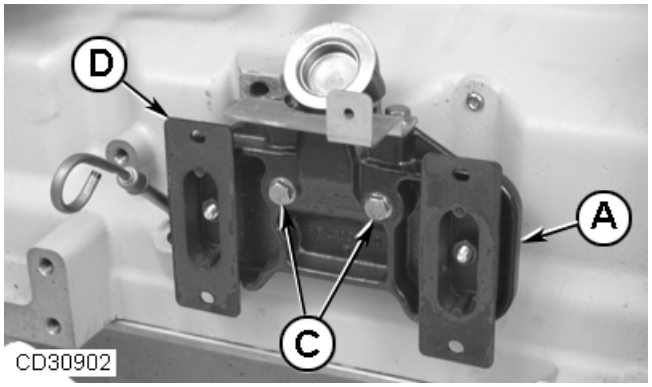
Specification

Adapter/isolator assembly-to-cylinder block cap screws—Torque ..... 40 N·m (30 lb-ft)

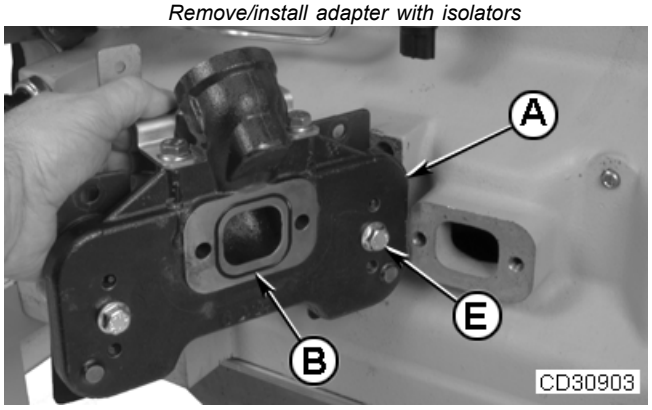
6. Install bracket (F) on adapter. Tighten nuts (H) to specification.

Specification

ECU bracket-to-adapter nuts—Torque ..... 35 N·m (26 lb-ft)



Remove/install adapter with isolators



Install o-ring on ECU adapter/isolator assembly

A—Adapter
B—O-ring
C—Adapter-to-cylinder block cap screw
D—Isolator
E—Isolator-to-adapter cap screw
F—ECU bracket
G—ECU bracket-to-isolator screw
H—Nut

CD03523,000017D -19-15FEB07-1/1

Remove and Install Engine Coolant Temperature (ECT) Sensor

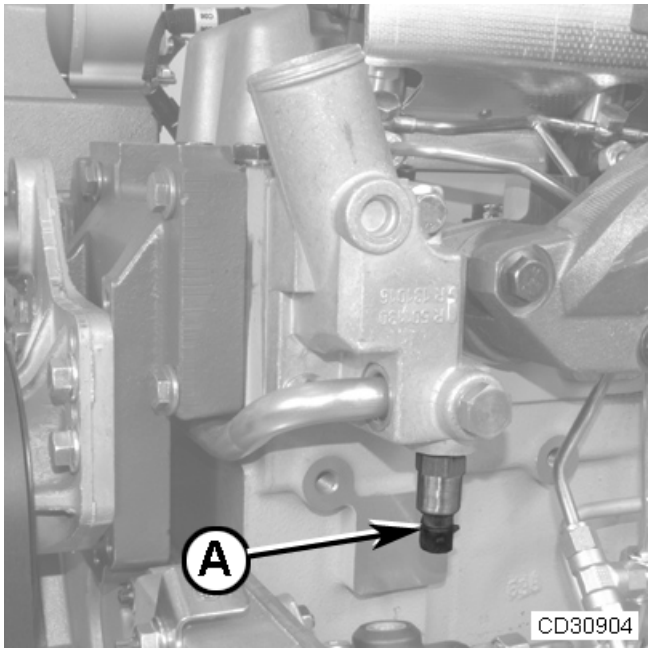
NOTE: For an expanded component location drawing, see COMPONENT LOCATION 1for 4.5L COMPONENT LOCATION 7for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect ECT sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor in thermostat housing. Tighten to specifications.

Specification	
Coolant temperature sensor (in thermostat cover)—Torque	10 N·m (7 lb-ft)

4. Reconnect sensor wiring connection.

A—Engine coolant temperature sensor



CD30904 —UN—12OCT06

Engine Coolant Temperature Sensor

CD03523,000017E -19-18APR08-1/1

Remove and Install Fuel Temperature Sensor

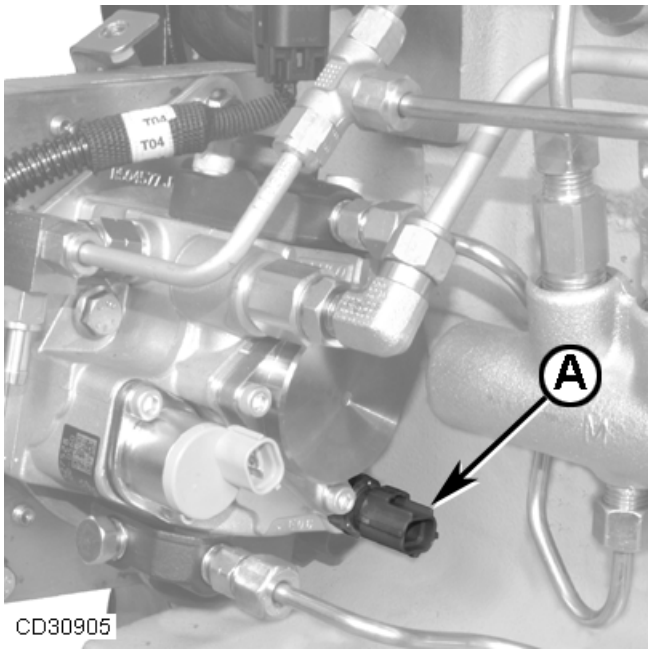
NOTE: For an expanded component location drawing, see COMPONENT LOCATION 2for 4.5L COMPONENT LOCATION 6for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect fuel temperature sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor in high pressure pump. Tighten to specifications.

Specification	
Fuel temperature sensor (in high pressure pump)—Torque	10 N·m (7 lb-ft)

4. Reconnect sensor wiring connection.

A—Fuel temperature sensor



CD30905 —UN—12OCT06

Fuel Temperature Sensor

CD03523,000017F -19-18APR08-1/1

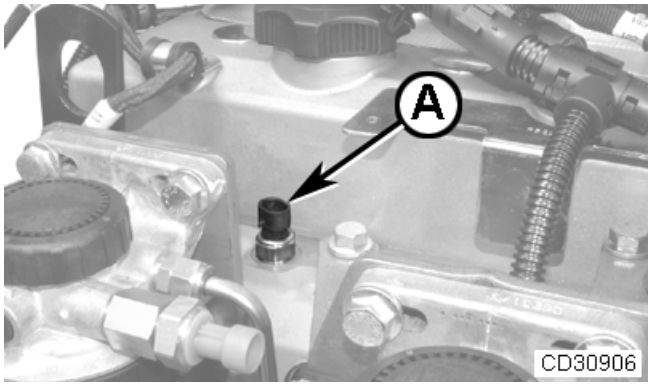
Remove and Install Manifold Air Temperature (MAT) Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION 4for 4.5L COMPONENT LOCATION 8for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect manifold air temperature sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with PM37418 High Temperature Grease and install sensor in cylinder head. Tighten to specifications.

Specification	
Manifold air temperature sensor (in cylinder head)—Torque	10 N·m (7 lb-ft)

4. Reconnect sensor wiring connection.



CD30906 —UN—12OCT06

Manifold Air Temperature Sensor

A—Manifold air temperature sensor

CD03523,0000180 -19-18APR08-1/1

Remove and Install Oil Pressure Sensor

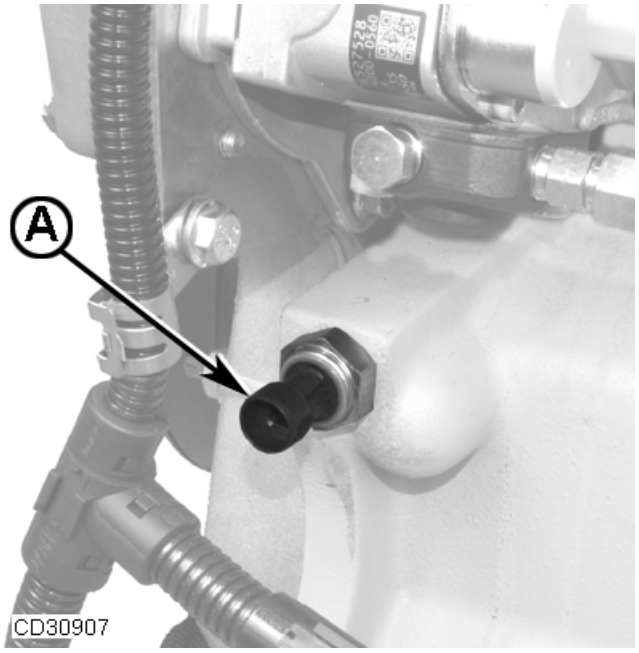
NOTE: For an expanded component location drawing, see COMPONENT LOCATION 1for 4.5L COMPONENT LOCATION 5for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect oil pressure sensor (A) wiring connector and remove sensor.
2. Replace sensor if necessary.
3. Coat sensor threads with TY9370 Thread Lock (Medium Strength) and install sensor in cylinder block. Tighten to specifications.

Specification	
Oil pressure sensor (in cylinder block)—Torque	10 N·m (7 lb-ft)

4. Reconnect sensor wiring connection.

A—Oil pressure sensor



CD30907 —UN—12OCT06

Oil Pressure Sensor

CD03523,0000181 -19-18APR08-1/1

Remove and Install Fuel Rail Pressure Sensor

CAUTION: Wait a minimum of 15 minutes after engine is stopped before removing the fuel rail pressure sensor.

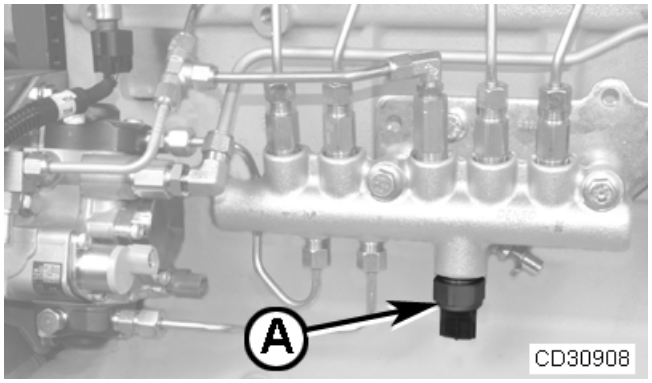
IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

NOTE: For an expanded component location drawing, see COMPONENT LOCATION 3for 4.5L COMPONENT LOCATION 5for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect fuel pressure sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.

IMPORTANT: Do NOT reuse the fuel rail pressure sensor once removed from the rail. Install a new one.

3. Coat new sensor threads with a small amount of TY6333 High Temperature Grease and install sensor in fuel rail. Tighten to specifications.



CD30908 —UN—12OCT06

Fuel Rail Pressure Sensor

A—Fuel rail pressure sensor

Specification	
Fuel rail pressure sensor (in fuel rail)—Torque	100 N·m (74 lb-ft)

4. Reconnect sensor wiring connection.
5. Bleed fuel system.

CD03523,0000186 -19-18APR08-1/1

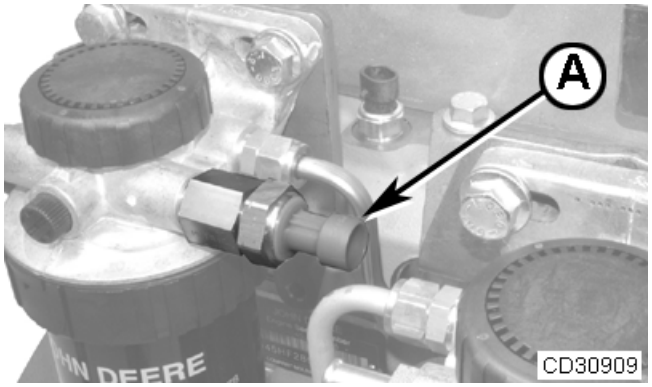
Remove and Install Fuel Transfer Pump Pressure Sensor

IMPORTANT: Perform the following steps in a clean environment. Keep work area clean so no dirt or debris enters the fuel system which may cause injector failure.

NOTE: For an expanded component location drawing, see COMPONENT LOCATION 4for 4.5L COMPONENT LOCATION 4for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect fuel pressure sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor in fuel filter base. Tighten to specifications.

Specification	
Fuel transfer pump pressure sensor (in fuel filter base)—Torque	10 N·m (7 lb-ft)



CD30909 —UN—12OCT06

Fuel Transfer Pump Pressure Sensor

A—Fuel transfer pump pressure sensor

4. Reconnect sensor wiring connection.
5. Bleed fuel system.

CD03523,0000182 -19-18APR08-1/1

Remove and Install Crankshaft Position Sensor

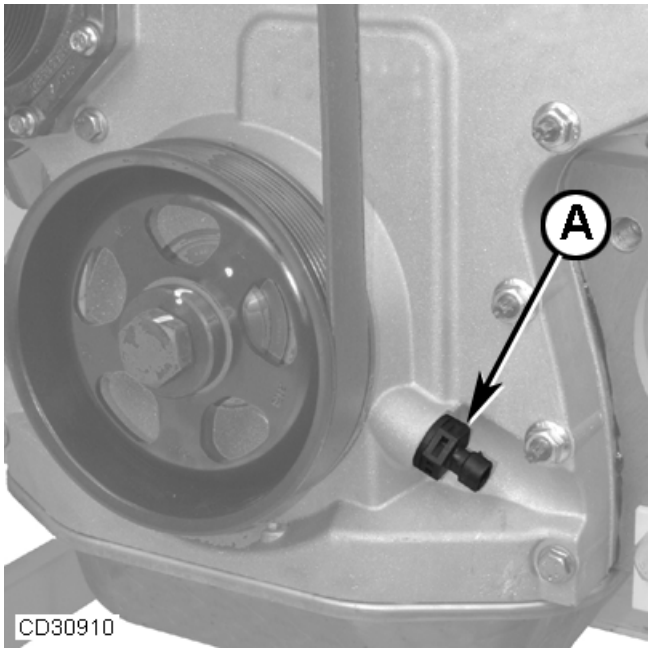
NOTE: For an expanded component location drawing, see COMPONENT LOCATION 3for 4.5L COMPONENT LOCATION DIAGRAM 7for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect crankshaft position sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor in timing gear cover. Tighten to specifications.

Specification	
Crankshaft position sensor (in timing gear cover)—Torque	15 N·m (11 lb-ft)

4. Reconnect sensor wiring connection.

A—Crankshaft position sensor



CD30910 —UN—12OCT06

Crankshaft Position Sensor

CD03523,0000183 -19-18APR08-1/1

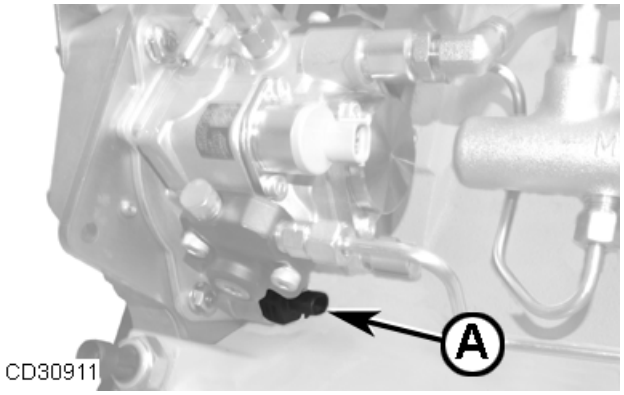
Remove and Install Pump Position Sensor

NOTE: For an expanded component location drawing, see COMPONENT LOCATION 2for 4.5L COMPONENT LOCATION DIAGRAM 6for 6.8L in Section 03, Group 140 of this manual.

1. Disconnect pump position sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Coat new sensor O-ring with TY6333 High Temperature Grease and install sensor in high pressure pump adapter plate. Tighten to specifications.

Specification	
Pump position sensor (in high pressure pump adapter plate)—Torque	15 N·m (11 lb-ft)

4. Reconnect sensor wiring connection.



CD30911 —UN—12OCT06

Pump Position Sensor

A—Pump position sensor

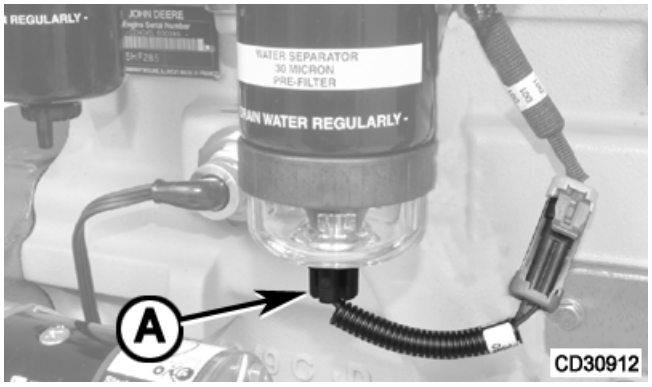
CD03523,0000184 -19-18APR08-1/1

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

NOTE: For an expanded component location drawing, see COMPONENT LOCATION DIAGRAM 4 for 4.5L COMPONENT LOCATION DIAGRAM 4for 6.8L in Section 03, Group 140 of this manual.

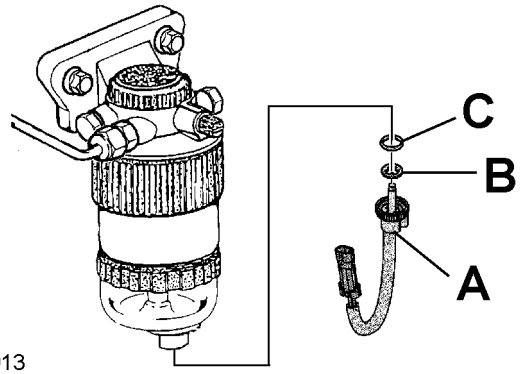
1. Disconnect water-in-fuel sensor (A) wiring connector and remove sensor.
2. Replace parts as necessary.
3. Install sensor in fuel filter then hand tighten.
4. Reconnect sensor wiring connection.

A—Water-In-Fuel sensor
B—Sealing washer
C—O-ring



CD30912 —UN—12OCT06

Water-In-Fuel Sensor



CD30913

CD30913 —UN—12OCT06

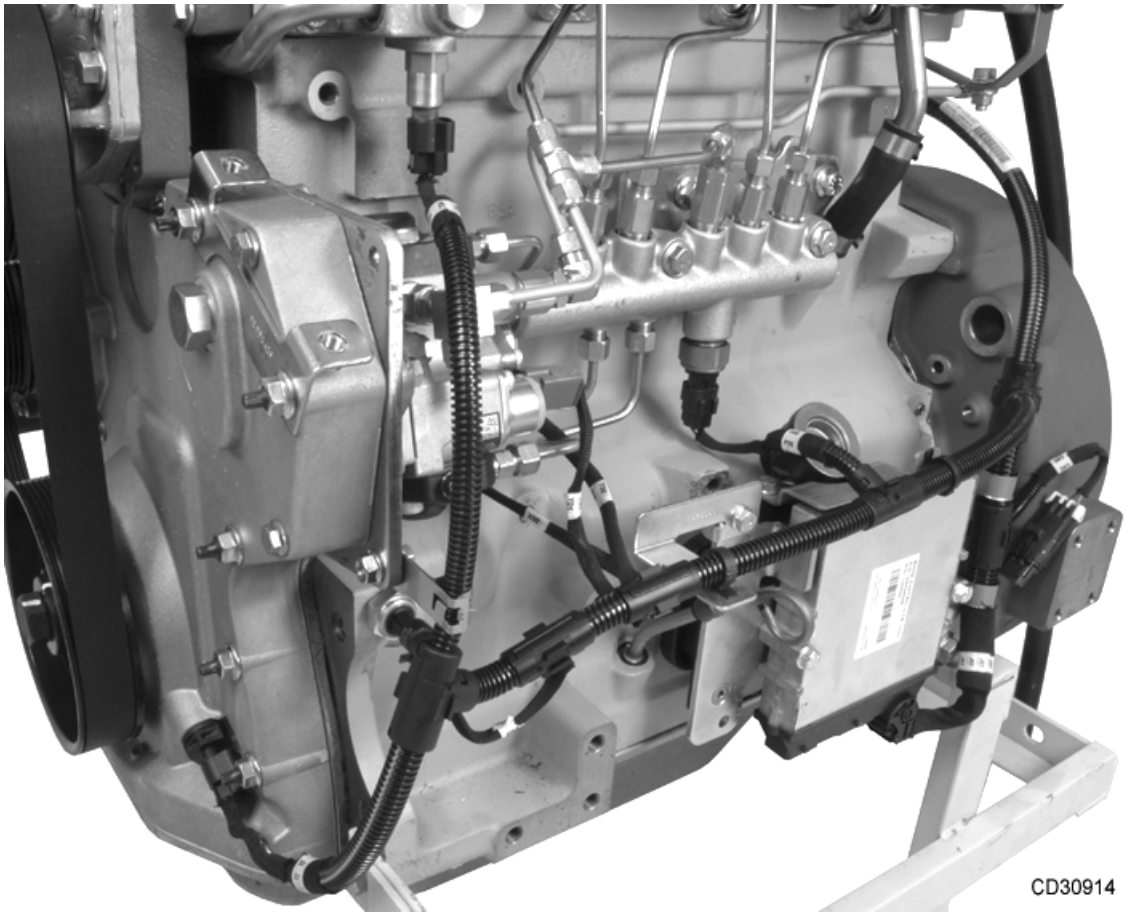
Water-In Fuel Sensor (removed)

CD03523,0000185 -19-18APR08-1/1

Install Wiring Harness for Engine Mount ECU

Harness Routing on Left Side of Engine

NOTE: The procedure below is for engine mount ECU harness provided by the engine factory.

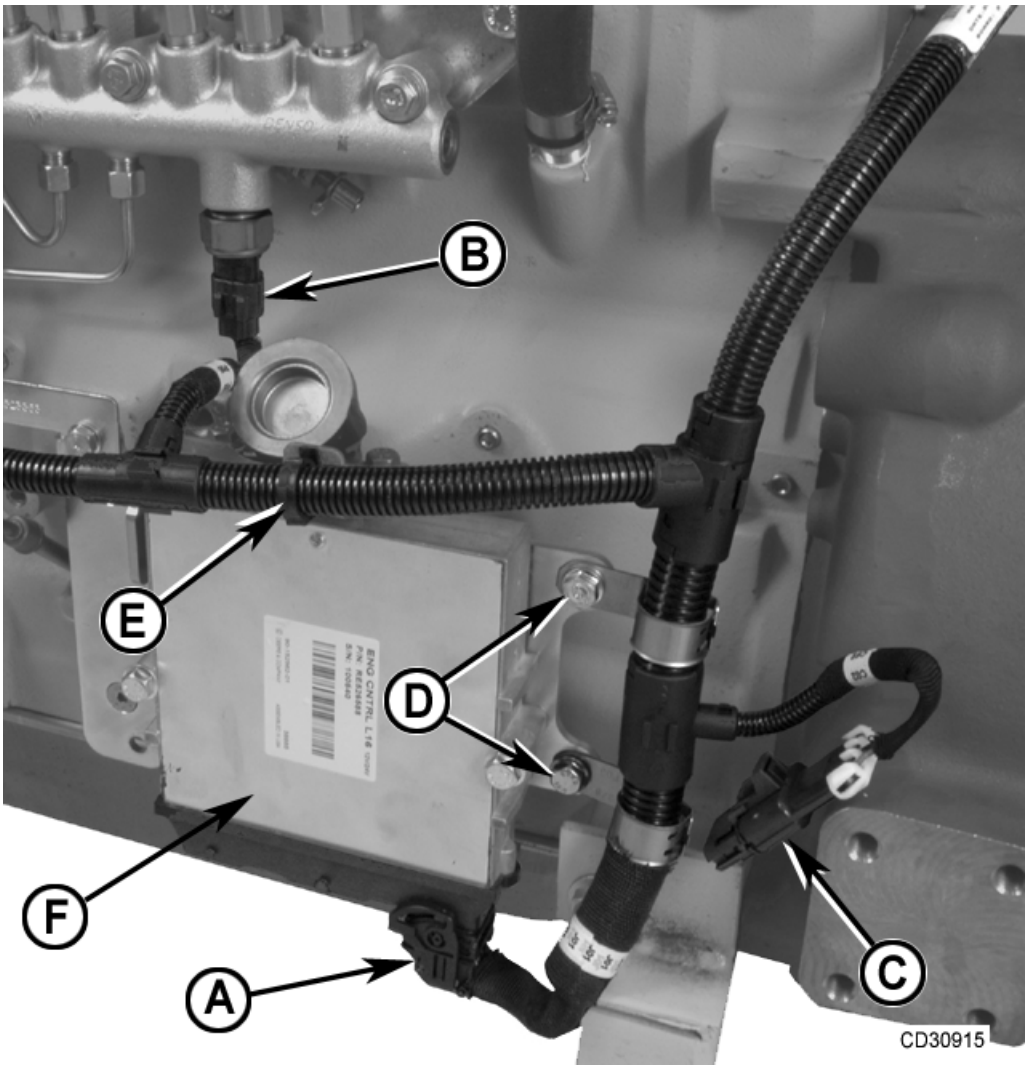


CD30914 —UN—17OCT06

Harness Routing on Left Side of Engine

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CD03523,0000188 -19-16OCT06-1/8



CD30915 —UN—17OCT06

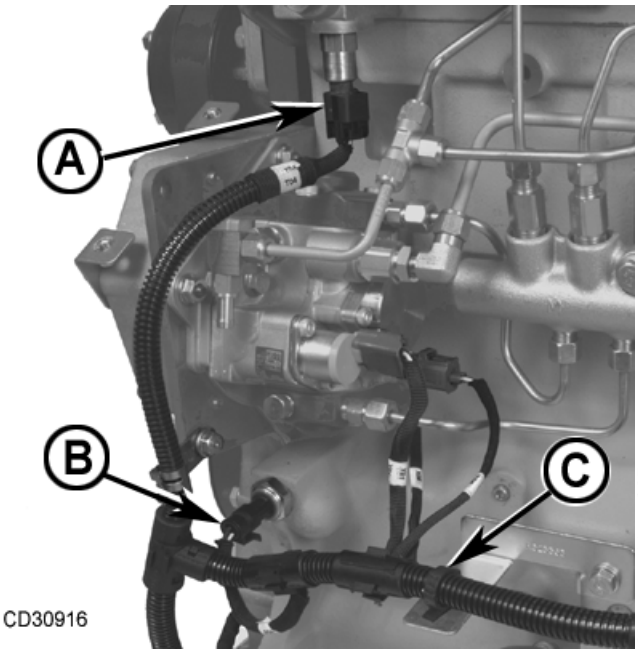
Harness Routing on Left Rear Side of Engine

A—ECU connector (J01)
B—Fuel rail pressure connector (P05)
C—Auxiliary power connector (C02)
D—Wiring harness to ECU bracket attachment
E—Harness clip
F—ECU

1. Route and connect engine harness at engine left, rear side, as shown, and as follows:
   a. Install ECU connector (A).
   b. Connect fuel rail pressure sensor (B).
   c. Attach wiring harness to ECU bracket (D).
   d. Insert harness clip (E) into harness mounting bracket.

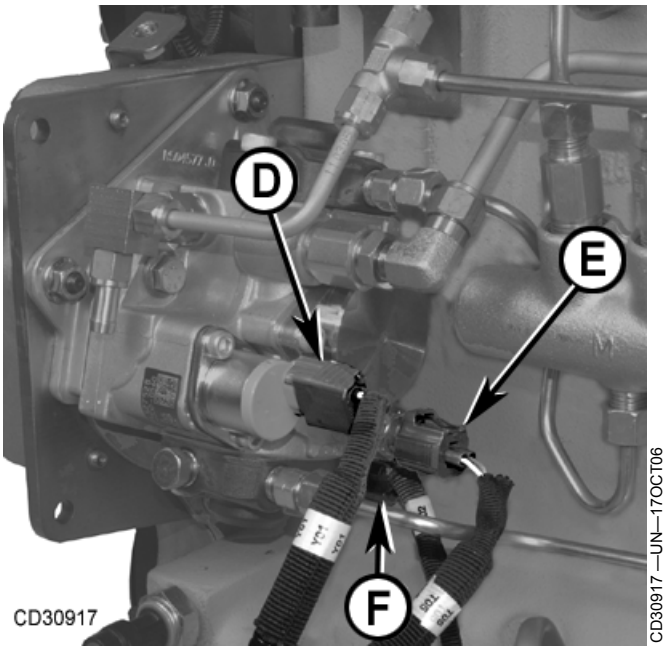
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CD03523,0000188 -19-16OCT06-2/8



Harness Routing on Left Front Side of Engine

A—Coolant temperature connector (T04)
B—Oil pressure connector (P04)
C—Harness clip
D—Suction control valve connector (Y01)



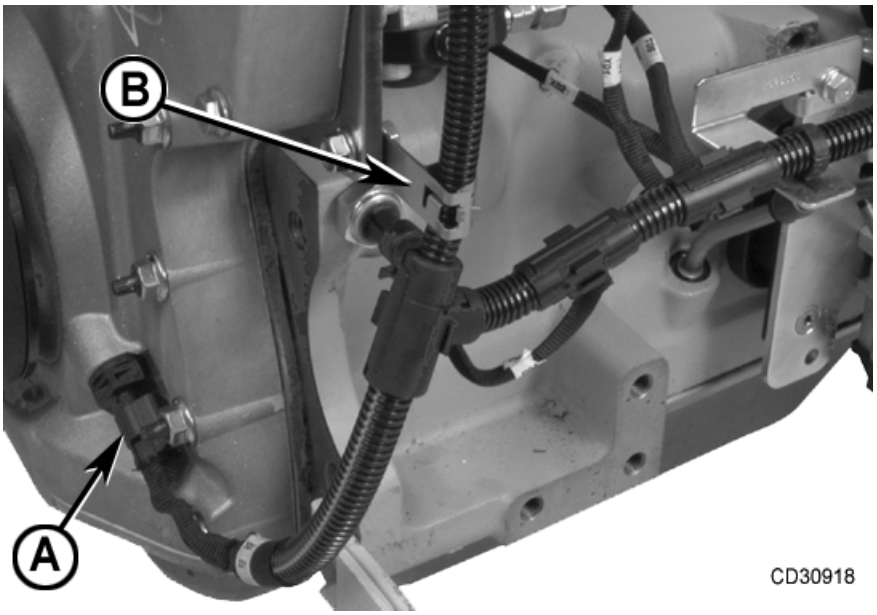
Harness Routing at High Pressure Pump Area

E—Fuel temperature connector (T05)
F—Pump position connector (X02)

2. Route and connect harness at left, front side, as shown, and as follows:
   a. Connect coolant temperature sensor (A).
   b. Connect oil pressure sensor (B).
   c. Insert harness clip (C) into harness mounting bracket.
   d. Connect suction control valve sensor (D).
   e. Connect fuel temperature sensor (E).
   f. Connect pump position sensor (F).

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CD03523,0000188 -19-16OCT06-3/8



CD30918 —UN—17OCT06

Harness Routing at Front of Engine

A—Engine crankshaft connector (X01)

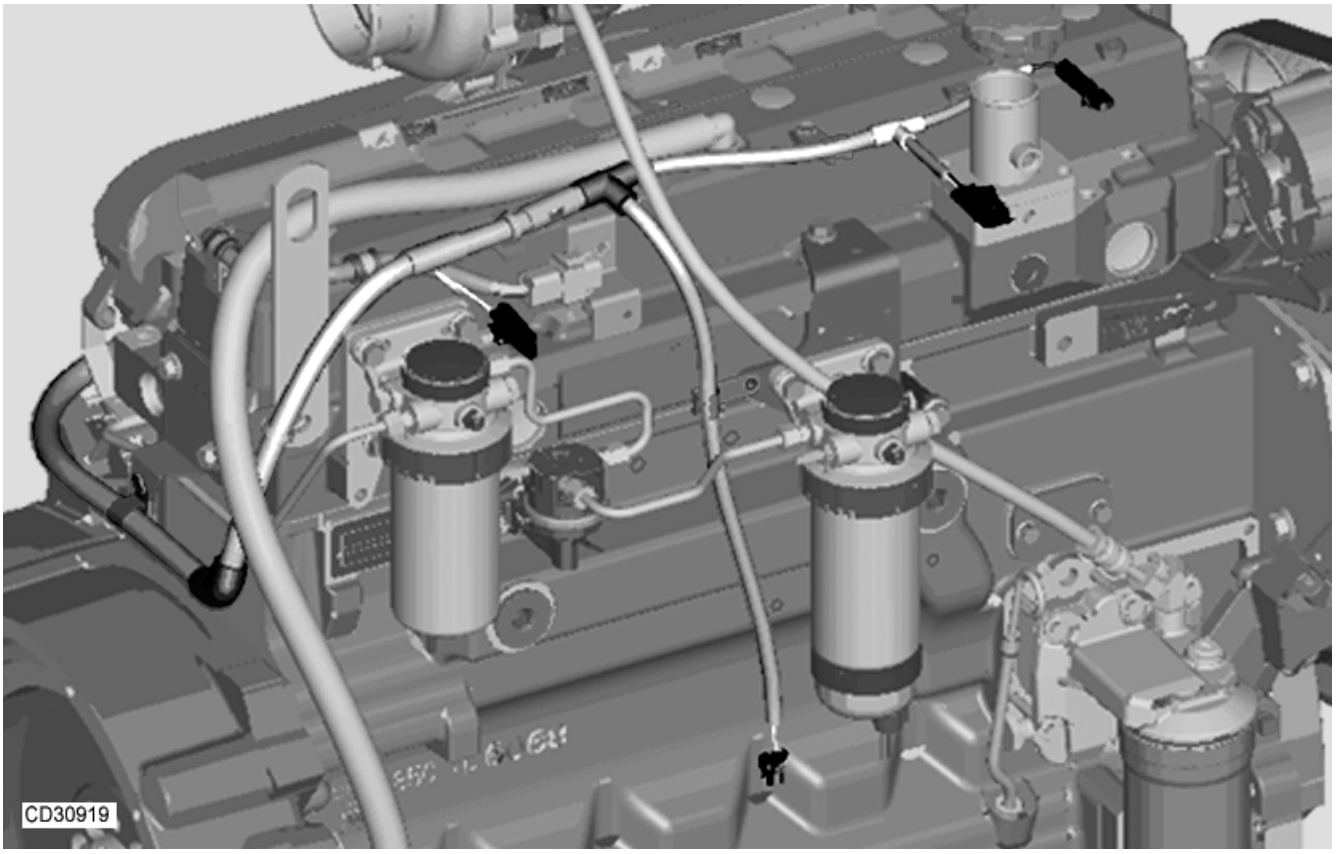
B—Wiring harness-to-front plate attachment

g. Connect engine crankshaft sensor (A).

h. Attach wiring harness to engine front plate(B).

CD03523,0000188 -19-16OCT06-4/8

Harness Routing on Right Side of Engine

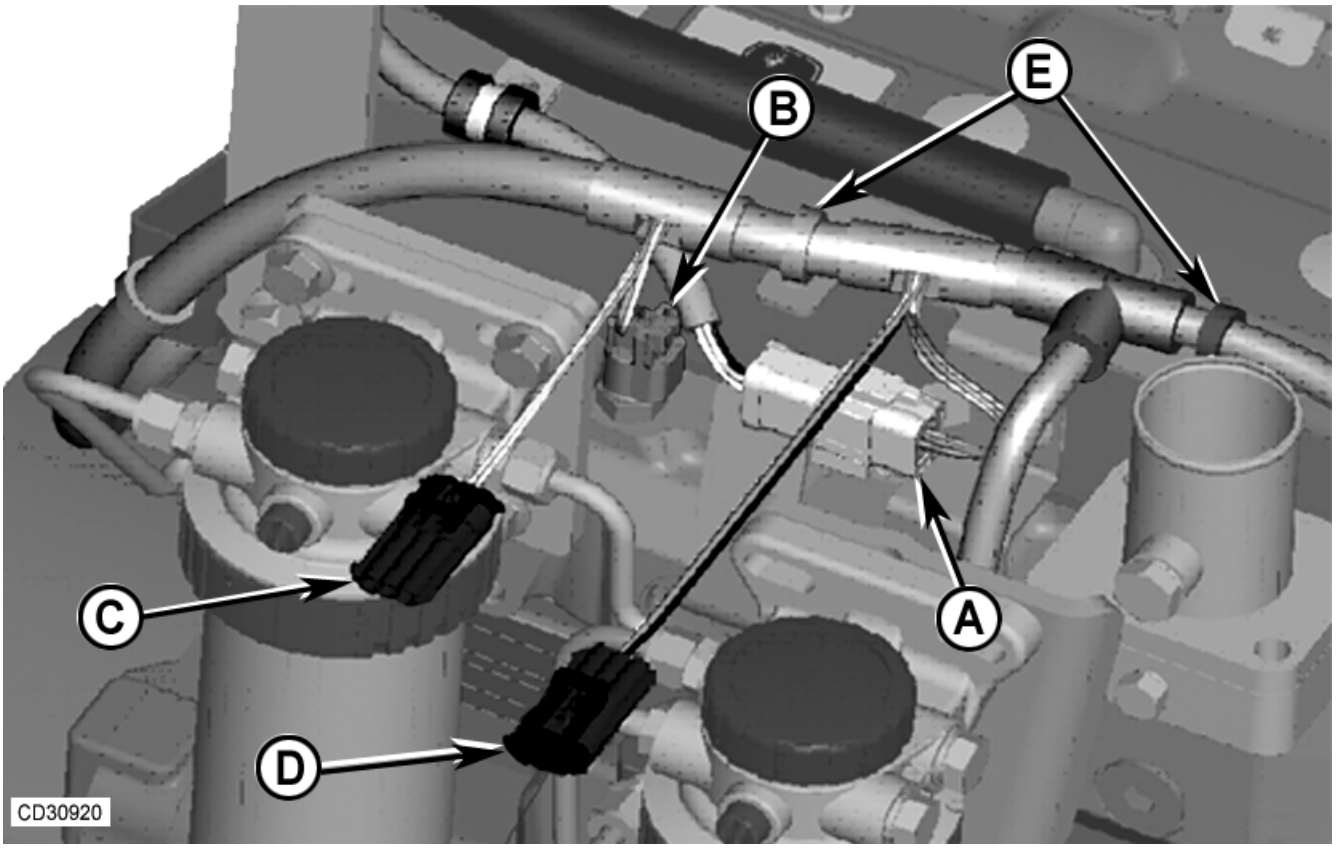


CD30919 —UN—17OCT06

Harness Routing on Right Side of Engine

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CD03523,0000188 -19-16OCT06-5/8



CD30920 —UN—17OCT06

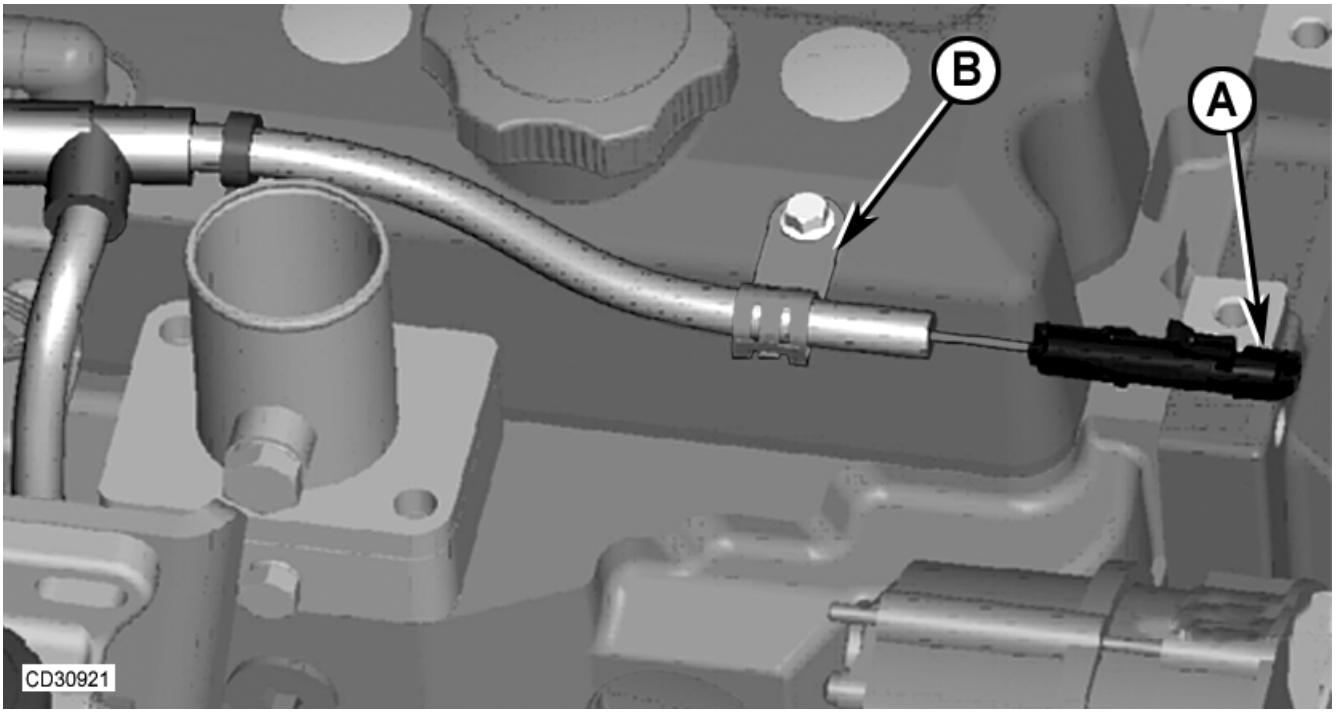
Harness Routing on Right Rear Side of Engine

A—Fuel injector connector (C01)
B—Manifold air temperature connector (T02)
C—Fuel pressure connector (P03) - Optional equipment
D—Air heater connector (C03) - Vehicle installation
E—Harness clips

1. Route and connect engine harness at engine right, rear side, as shown, and as follows:
   a. Connect engine harness to fuel injector connector (A).
   b. Connect manifold air temperature (MAT) sensor (B).
   c. Fuel pressure sensor option: connect fuel pressure connector (C) to fuel pressure sensor jumper harness.
   d. Connect air heater connector (D) to vehicle connection.
   e. Insert wiring harness clips (E) into harness mounting bracket.

Continued on next page

CD03523,0000188 -19-16OCT06-6/8



CD30921 —UN—17OCT06

Harness Routing on Right Front Side of Engine

A—Alternator excitation connector (C06)

B—Wiring harness-to-rocker arm cover attachment

2. Route and connect engine harness at engine right, front side, as shown, and as follows:
   a. Connect alternator excitation connector (A) to alternator harness.
   b. Attach wiring harness to rocker arm cover (B).

CD03523,0000188 -19-16OCT06-7/8



CD30922 —UN—17OCT06

Connect Water-in-Fuel Sensor

A—Water-in-fuel sensor (D01)

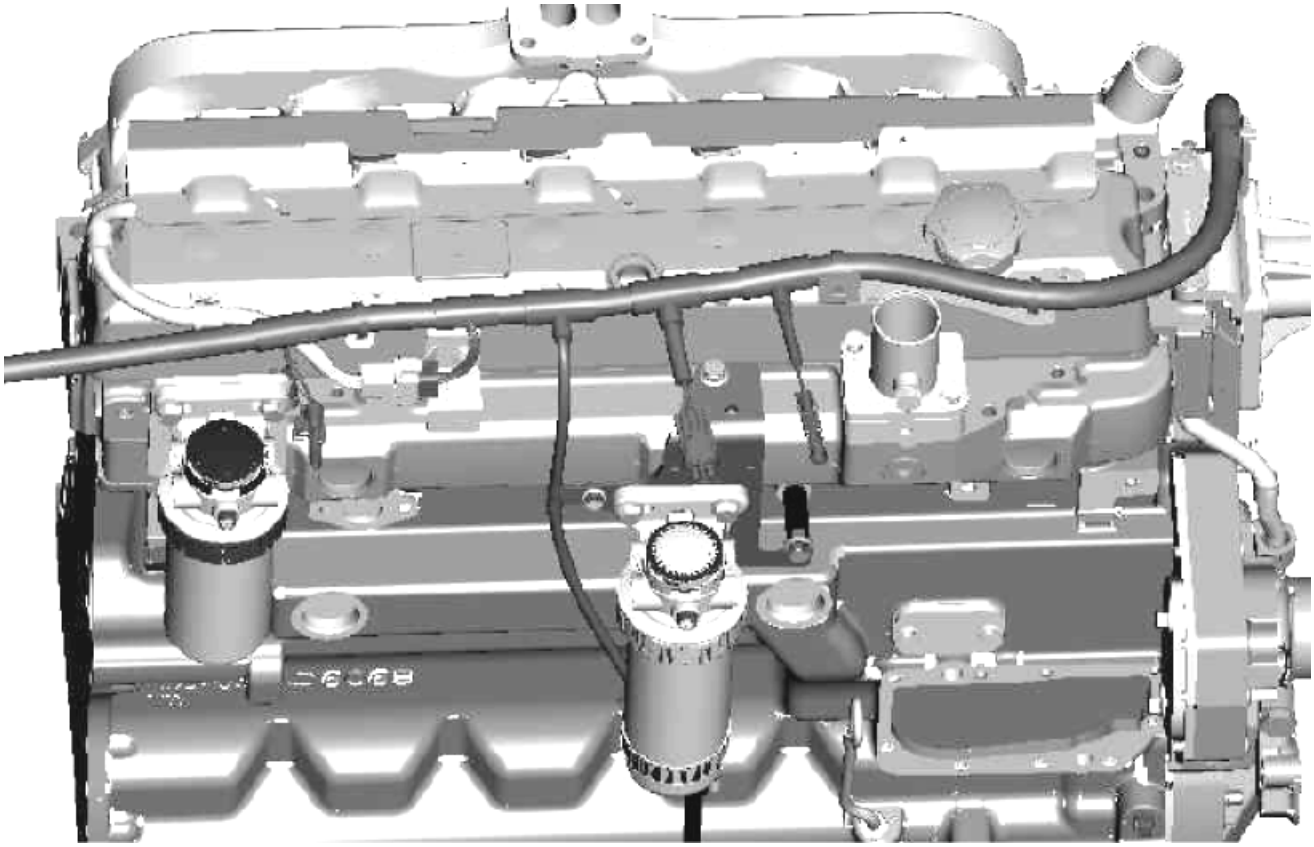
3. Connect water-in-fuel sensor (A).

CD03523,0000188 -19-16OCT06-8/8

Install Wiring Harness for Remote ECU

Harness Routing on Right Side of Engine

NOTE: The procedure below is for remote harness provided by the engine factory.

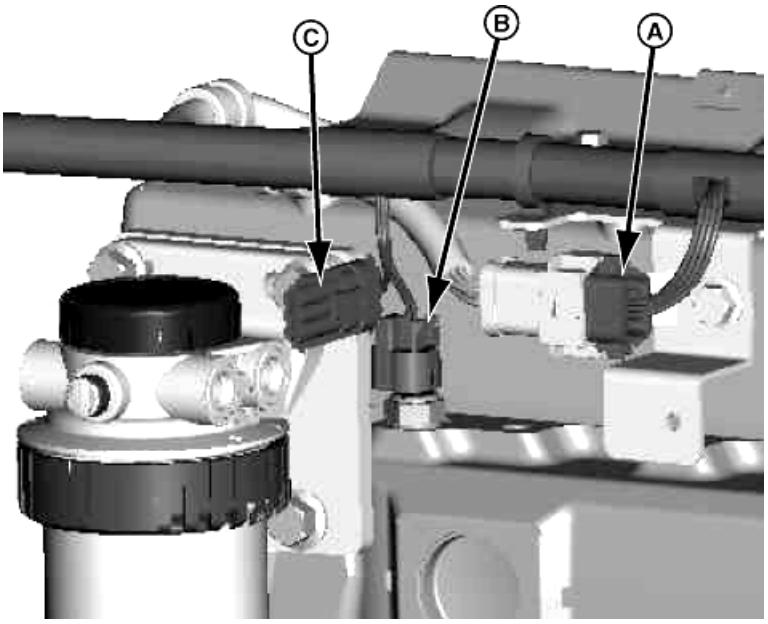


RG14817 —UN—04APR06

Harness Routing on Right Side of Engine

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CD03523,0000187 -19-17JAN07-1/11



RG14818 —UN—04APR06

Harness Connectors on Right Rear Side of Engine

A—Fuel injector harness connector (C01)

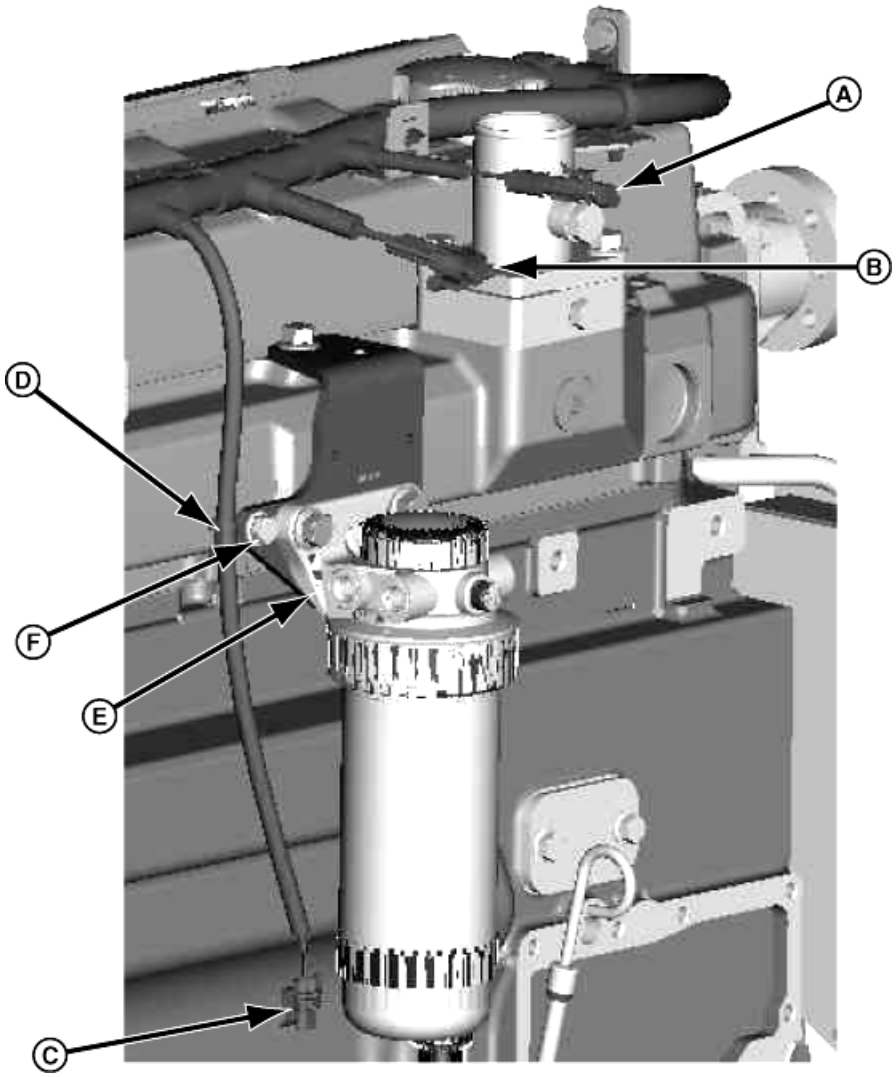
B—Manifold air temperature sensor connector (T02)

C—Fuel pressure sensor connector (P03)

1. Connect engine harness to engine right, rear side, as shown, and as follows:
   a. Attach fuel injector harness connector (A).
   b. Attach manifold air temperature (MAT) sensor connector (B) to manifold air temperature sensor.
   c. Fuel pressure sensor option: Attach fuel pressure sensor connector (C) to fuel pressure sensor jumper harness.

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CD03523,0000187 -19-17JAN07-2/11



RG14819 —UN—04APR06

Harness Connection, Engine Right Side, Primary Filter Area

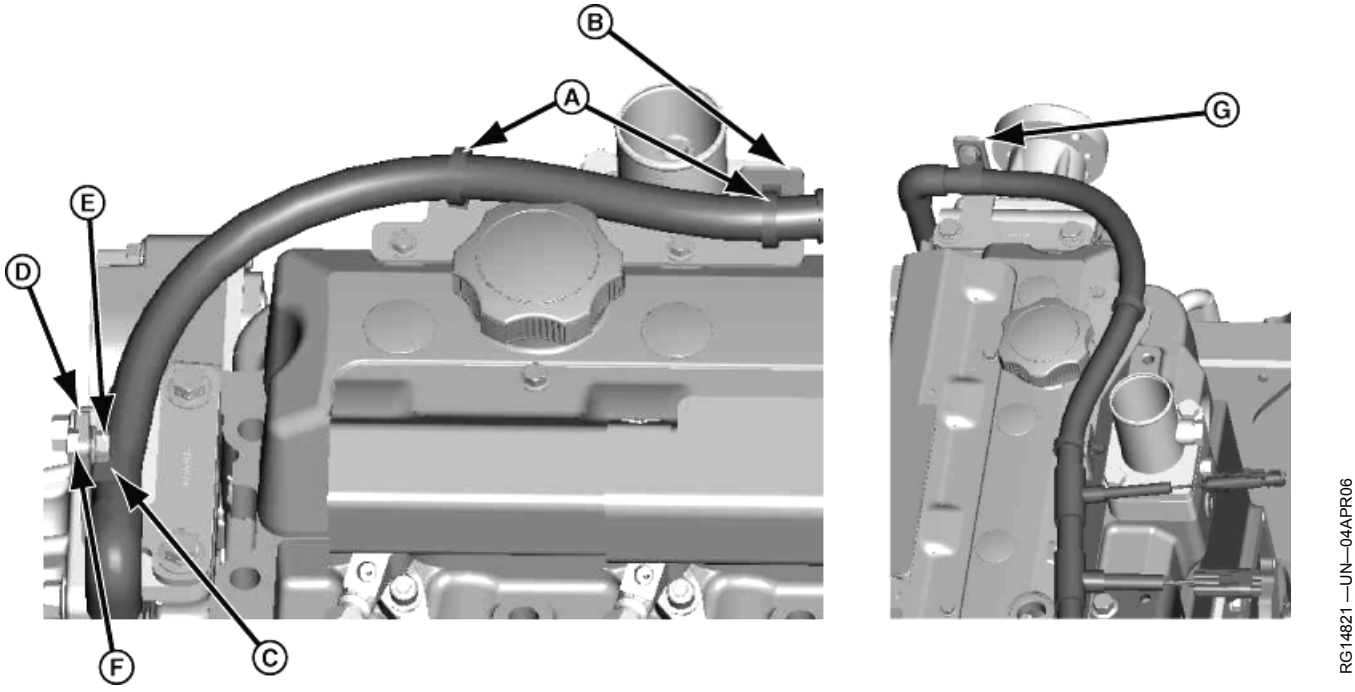
A—Alternator Excitation Connector (C06)
B—Air Heater Connector (C03)
C—Water in Fuel Sensor Connector (D01)
D—P-Clamp
E—Filter Bracket
F—M8 Cap screw

2. Connect engine harness to primary filter area, as shown, and as follows:
   a. Connect alternator excitation connector (A) to alternator excitation jumper harness.
   b. Connect air heater connector (B) to customer connection.
   c. Connect water in fuel (WIF) connector (C) to WIF lead on primary fuel filter.

Continued on next page

CD03523,0000187 -19-17JAN07-3/11

Harness Routing at Front of Engine



RG14821 —UN—04APR06

Harness Routing at Front of Engine

A—Harness Clips
B—Harness Mounting Bracket Near Air Intake
C—P-Clamp
D—Harness Mounting Bracket, Engine Front
E—M8 Cap screw
F—M8 Nut

1. For 6.8L engine, connect engine harness to front of engine, as shown, and as follows:

   a. Insert harness clips (A) into harness mounting bracket (B).

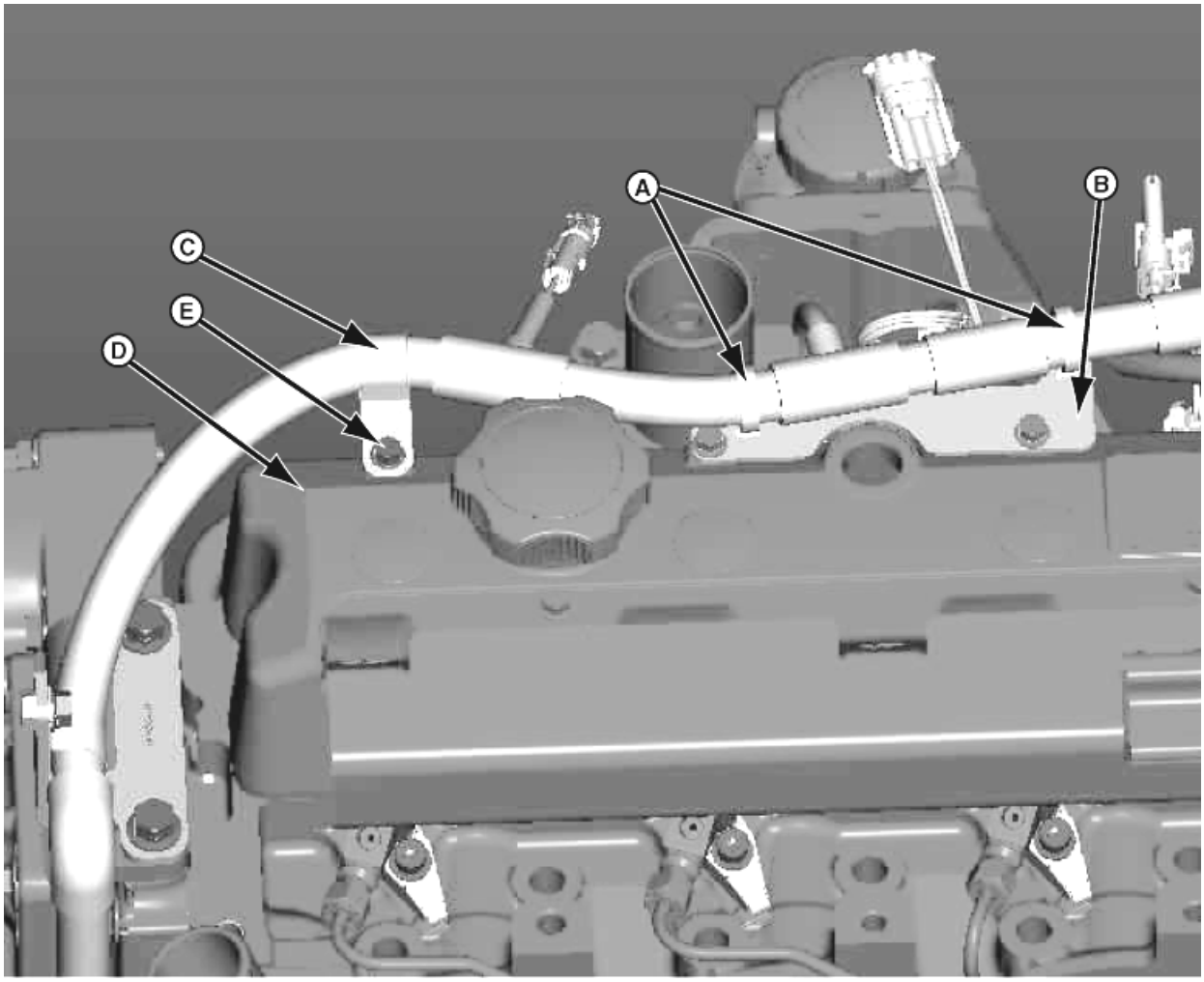
   b. Attach p-clamp (C) on engine harness to harness mounting bracket (D), by inserting cap screw (E) through p-clamp and harness mounting bracket into nut (F). Torque cap screw and nut according to specification.

Specification

Cap screw and nut—Torque	30 N·m (22 lb-ft)

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CD03523,0000187 -19-17JAN07-4/11



RG14822 —UN—04APR06

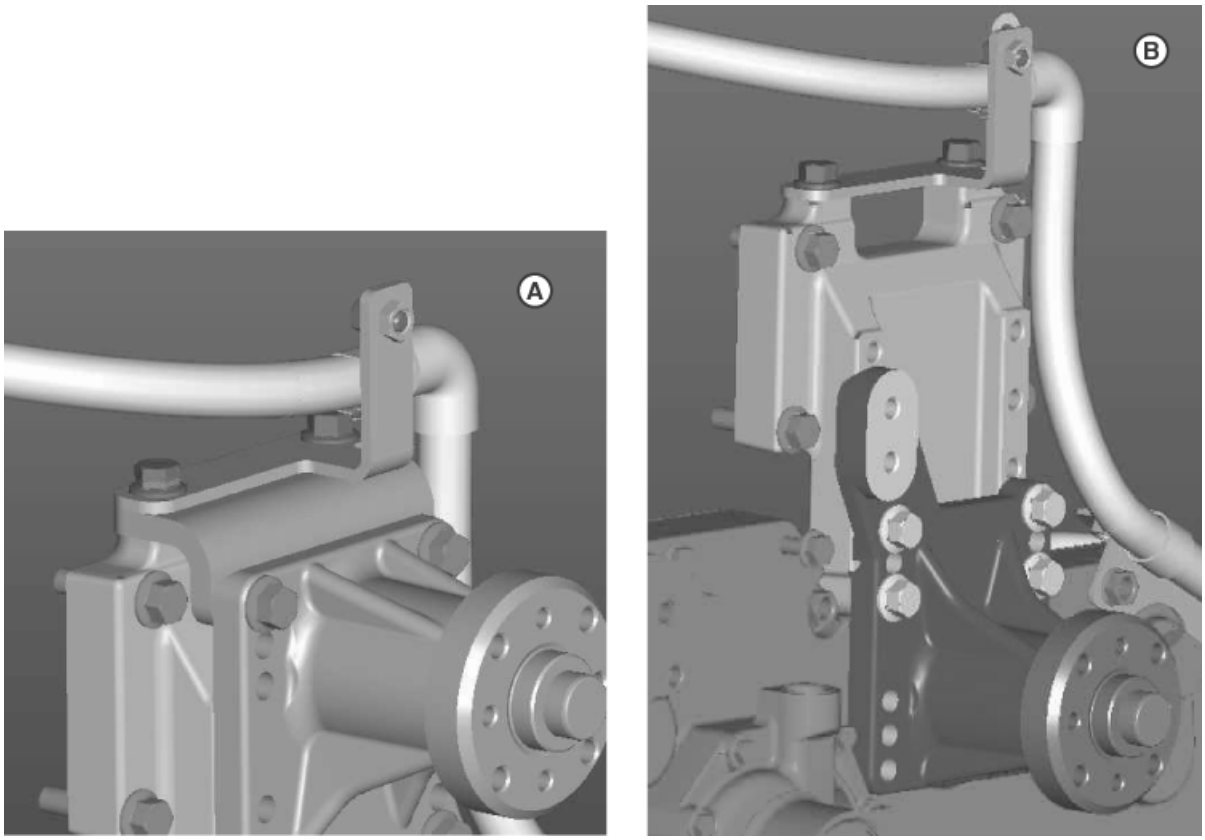
4.5L Harness Routing near Air Intake

A—Harness Clip
B—Engine Harness Mounting Bracket, Near Air Intake
C—P-clamp
D—Rocker Arm Cover
E—M6 Capscrew

2. For 4.5L engine, connect engine harness to front of engine, as shown, and as follows:
   a. Insert harness clips (A) into harness mounting bracket (B). Attach P-clamp (C) to rocker arm cover (D) by inserting capscrew (E) through P-clamp into rocker arm cover.

Continued on next page

CD03523,0000187 -19-17JAN07-5/11



RG14823 —UN—04APR06

Elevation of Engine Harness

A—Harness bracket on top of fan bracket, for 402 mm fan height

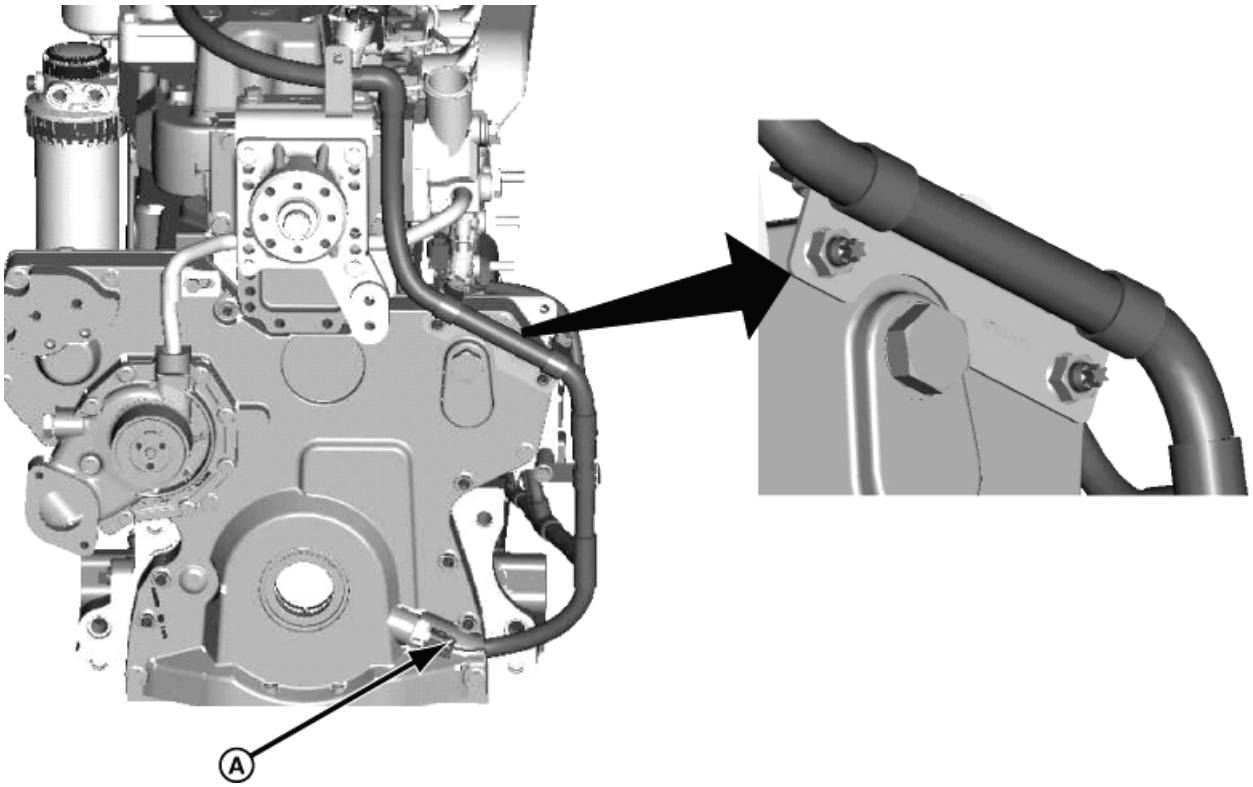
B—Harness bracket on top of fan support casting, for fan heights less than 402 mm, or with aluminum fan bracket option

b. Prior to tightening cap screw and nut, position engine harness height to allow for fan height - 402 mm (A) or other (B), as shown. Torque capscrew according to specification.

	Specification
Cap screw—Torque	10 N·m (7 lb-ft)

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CD03523,0000187 -19-17JAN07-6/11



RG14826 —UN—04APR06

Harness Routing across Front of Engine

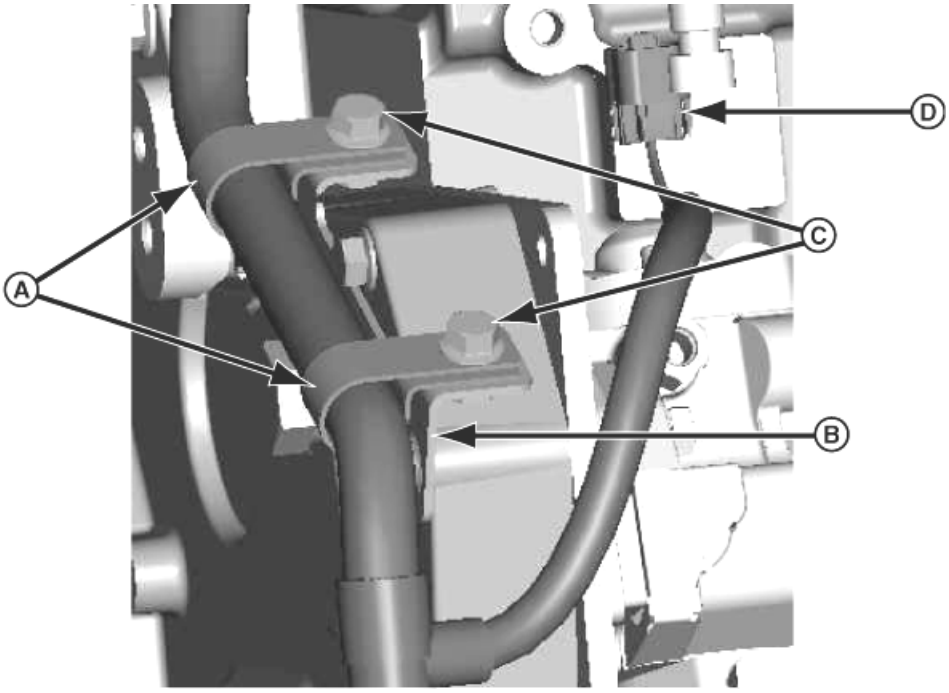
A—Engine Crankshaft Sensor Connector

c. Route engine harness across front of engine, as shown.

d. Attach engine crankshaft sensor connector (A) to engine crankshaft sensor.

Continued on next page

CD03523,0000187 -19-17JAN07-7/11



RG14824 —UN—04APR06

Harness Routing at Right Front of Engine

A—P-Clamps

B—Engine Harness Mounting Bracket, Front, Right Side

C—M8 Capscrew

D—Engine Coolant Temperature Sensor Connector (D)

3. Attach engine harness to right, front of engine, as shown, and as follows:
   a. Attach P-clamps (A) to engine harness.
   b. Align P-clamp holes with holes in mounting bracket (B). Push clamps and harness toward engine, as much as possible to have maximum clearance between harness and fan belt.
   c. Insert cap screws (C) through P-clamps and into mounting bracket. Torque cap screw according to specification.

Specification

cap screw—Torque..... 30 N·m (22 lb-ft)

   d. Attach engine coolant temperature sensor connector (D) to engine coolant temperature sensor.

Continued on next page

CD03523,0000187 -19-17JAN07-8/11

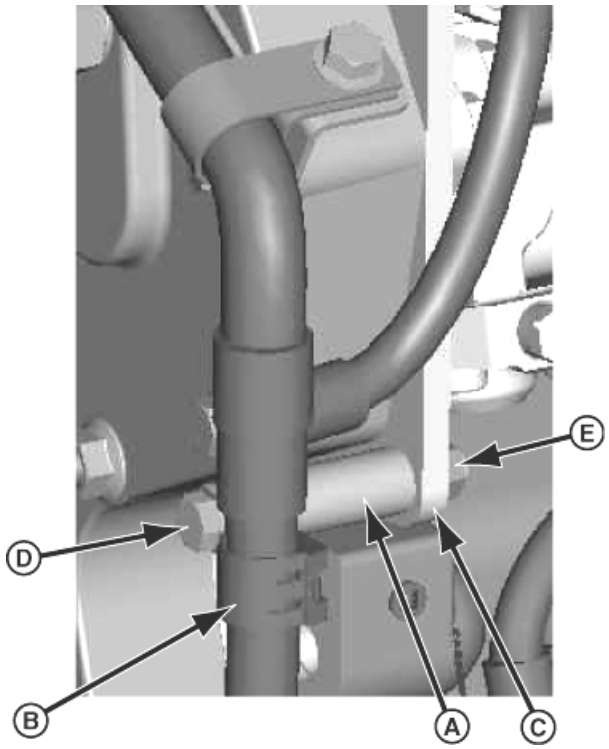
e. Position spacer (A) between harness clamp (B) and front plate (C), as shown.

f. Insert cap screw (D) through harness clamp, spacer, and front plate. Torque nut according to specification.

Specification

Nut for spacer installation—Torque..... 40 N·m (30 lb-ft)

A—Spacer
B—Harness Clamp
C—Front Plate
D—M8 Capscrew
E—M8 Nut



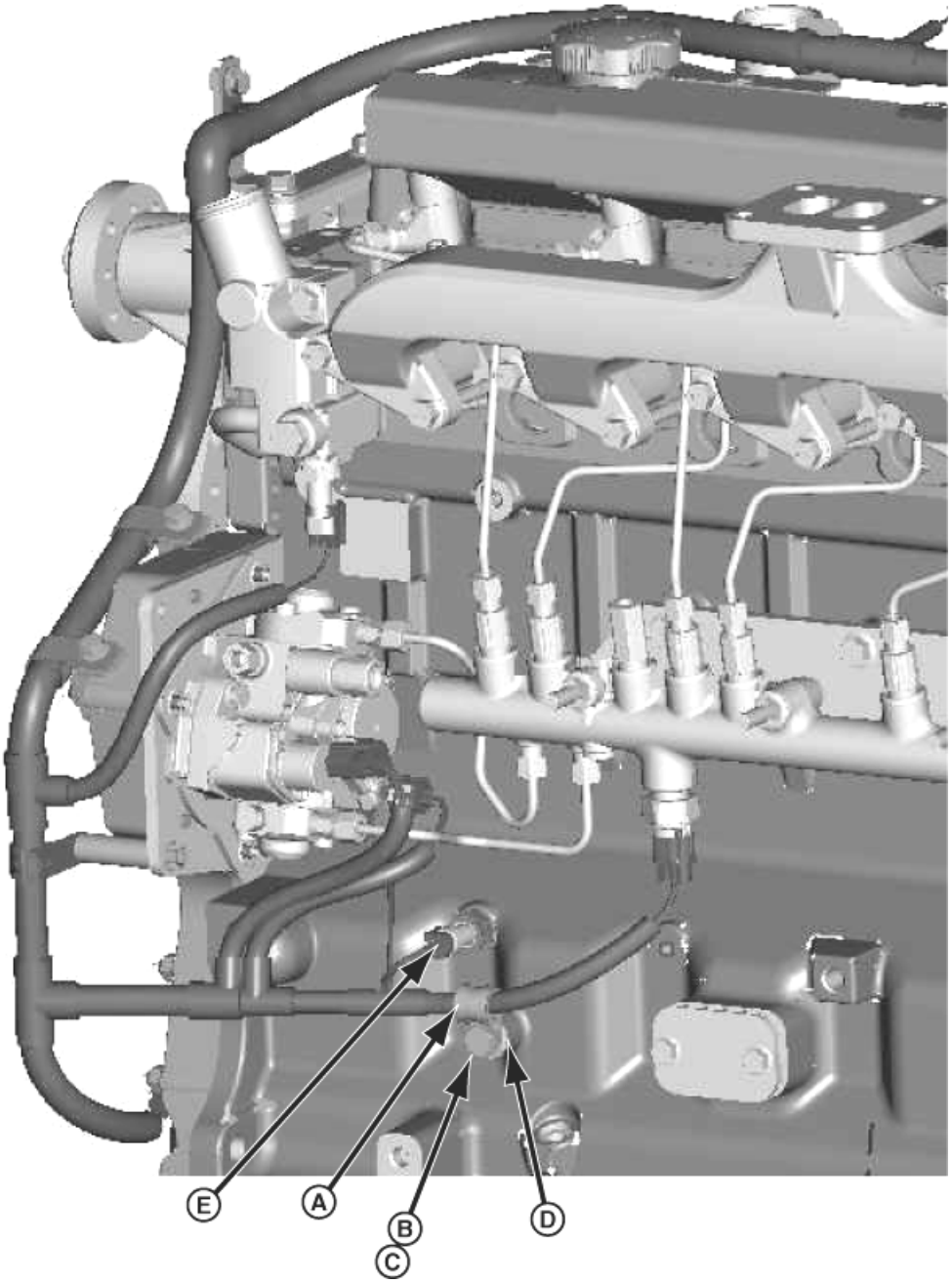
RG14825 —UN—04APR06

Spacer Installation

Continued on next page

CD03523,0000187 -19-17JAN07-9/11

Harness Routing at Left Side of Engine



RG14827 —UN—04APR06

Harness Routing at Left Side of Engine

A—P-Clamp
B—Flat Washer
C—M10 cap screw
D—Mounting Hole in Block
E—Oil Pressure Sensor Connector (P04)

1. Install P-clamp (A) on Engine Harness, and insert capscrew (C) through flat washer (B) and P-clamp and into threaded mounting hole in block (D). Torque capscrew according to specification.

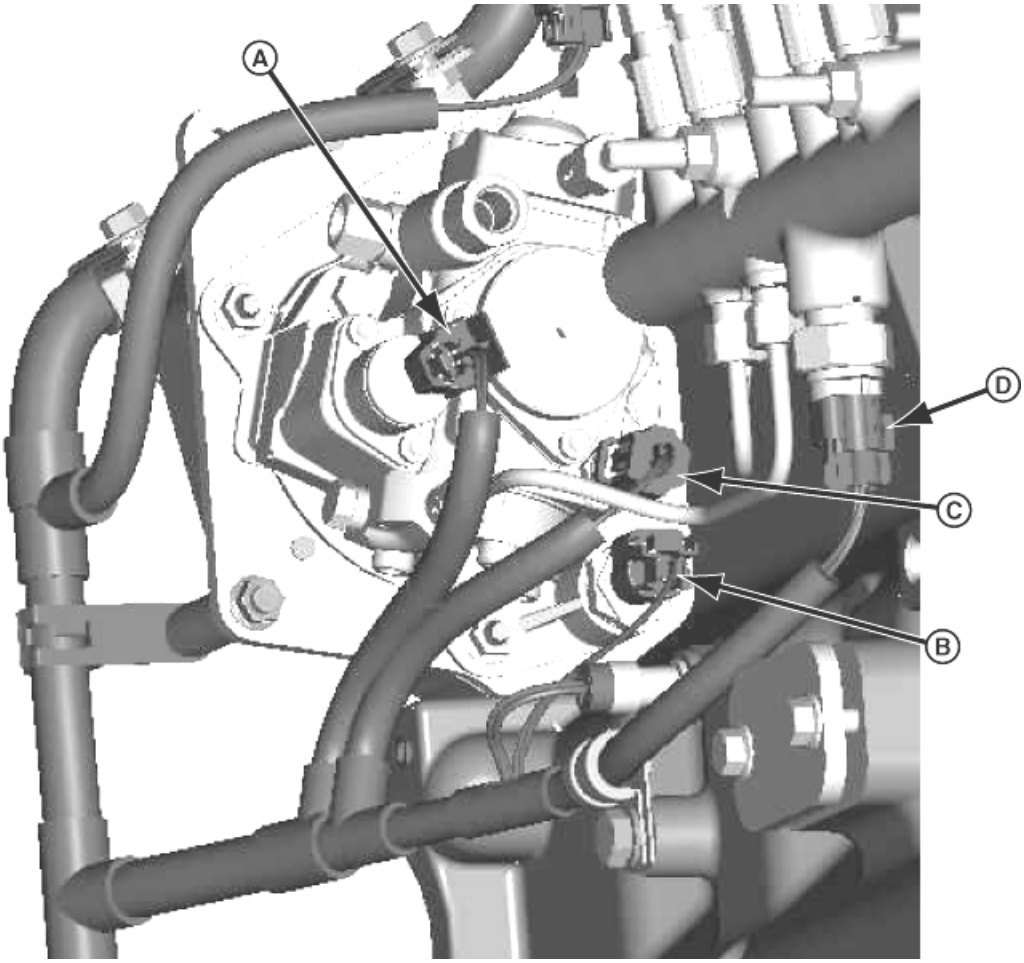
Specification

Cap screw—Torque..... 70 N·m (52 lb-ft)

2. Attach oil pressure connector (E) to oil pressure sensor.

Continued on next page

CD03523,0000187 -19-17JAN07-10/11



RG14828 —UN—04APR06

Harness Routing at High Pressure Pump and Rail Area

A—Suction Control Valve Connector (Y01)
B—Pump Position Sensor Connector (X02)
C—Fuel Temperature Sensor Connector
D—Rail Pressure Sensor Connector (P02)

3. Route engine harness and attach fuel high pressure pump and rail connectors, as shown, and as follows:
   a. Attach suction control valve connector (A) to control valve.
   b. Attach pump position sensor connector (B) to pump position sensor.
   c. Attach fuel temperature sensor connector (C) to fuel temperature sensor.
   d. Attach fuel rail pressure sensor connector (D) to fuel rail pressure sensor.

CD03523,0000187 -19-17JAN07-11/11

Connectors

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

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

Certain precautions are required when working with connectors.

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

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

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

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

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

DB92450,0000048 -19-15OCT07-1/1

Connector Repair

Exposure to extreme weather conditions, excessive vibration, and changing environments make it important to apply the proper techniques in repairing a connector to keep an application running properly. Problems can arise from broken wires, corroded or dirty terminals, and bent or broken terminals. Wear and tear on terminals can cause a poor electrical connection between the terminal pairs.

Connector repair typically requires extracting the terminal from the connector shell, inserting a wire seal, crimping a new terminal onto a wire, and inserting the terminal back into the connector shell. If a connector shell needs replaced, all the terminals have to be extracted and inserted into the new shell. Different style connectors require specific tools and procedures for that connector. While there are many styles of connectors, certain practices can be applied to all connectors.

Some general guideline lines to follow are:

- Before removing a terminal, first label or record where the wire attaches.
- Before crimping a new terminal to a wire, make sure the wire is long enough to fit into the connector without straining it. Do not try stretching the wire longer by pulling it through the harness. It may be necessary to splice a new wire to the existing wire.
  - Use a Heat Shrinkable Insulated Splice for splicing wires together. Recommended part is JDP PM05240 for wire gauges 10-12 and PM05220 for smaller wires.
  - If a non heat shrinkable splice is used, apply heat shrink tubing over the splice to protect the wire from moisture and other contaminants.
- If applicable, apply the proper seal before crimping the wire onto the terminal.
- For a connector to function properly, the wire must be properly attached, or crimped, to the terminal.
  - Too loose of a crimp will allow the wire to pull out of the terminal and to tight of a crimp will cause the wire to break away from the terminal. A simple test is to gently pull on the wire to make sure it is securely crimped to the terminal.
  - On many terminals, the wire is crimped in two places, once around the insulation, and once around the bare metal. Visually inspect each crimp for proper alignment.
- When inserting a terminal into the connector housing, you should be able to feel it 'Lock' into place. Gently push and pull on the wire and make sure the terminal stays locked into the connector housing.
- Do not use excessive force when removing or inserting terminals into a connector housing.
- Make sure there is enough slack in the wires to account for vibration when the application is running.

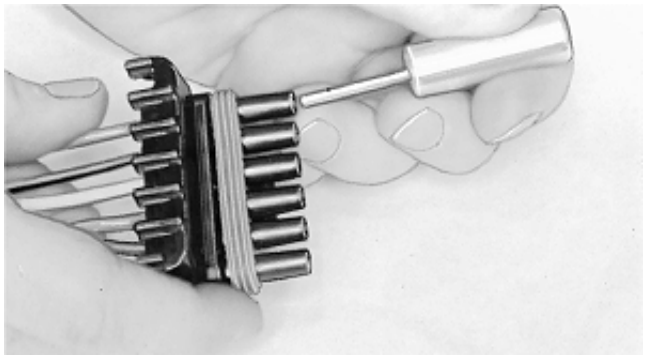
NOTE: For information on inspecting connectors, see TERMINAL TEST in Section 04, Group 160 later in this manual.

NOTE: For repair procedures on specific manufacturers connectors, see the Connector Repair sections in this section of the manual.

DB92450,0000049 -19-24AUG09-1/1

Repair WEATHERPACK™ Connector

1. Disconnect WEATHERPACK™ connector. Remove the tie bands and tape.
2. Open the secondary lock on the back of the connector.
3. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
4. Insert [1]JDG364 Extraction Tool over terminal contact in connector body. Extraction tool needs to be fully seated to unlock terminal tangs from the connector body. When tool is seated, gently pull the wire from the back of the connector. If the wire(s) or terminal(s) are being repaired, go to step 5. If the wires and terminals are OK and only the connector is being replaced, go to step 9.
5. Using [2] JDG145 Universal Electrical Pliers, cut off wire directly behind the terminal seal crimp. If any part of the seal is still on the wire, dispose of it.



TS0128 —UN—23AUG88

6. Using [2] JDG145 Universal Electrical Pliers, strip 6 mm (1/4 in.) insulation from end of wire.

WEATHERPACK is a trademark of Packard Electric

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

DB92450,000004A -19-15OCT07-1/4

7. Select correct size of seal. Slide the seal over the wire insulation with the smaller diameter side facing the end of the wire. Small diameter side of seal should line up with the outer edge of the insulation.

IMPORTANT: The seal must fit snug over the cable insulation without a gap between the cable seal and the insulation.

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

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



TS0136 —UN—23AUG88

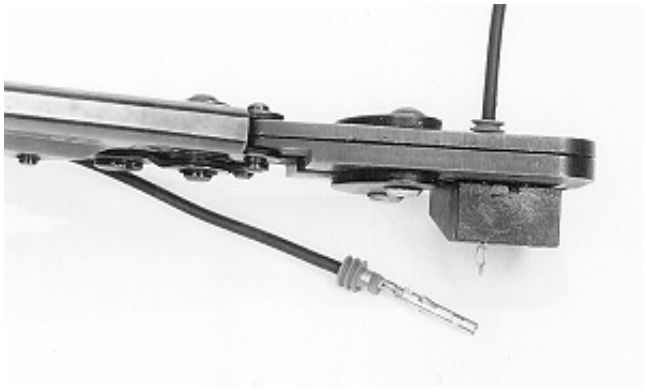
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DB92450,000004A -19-15OCT07-2/4

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

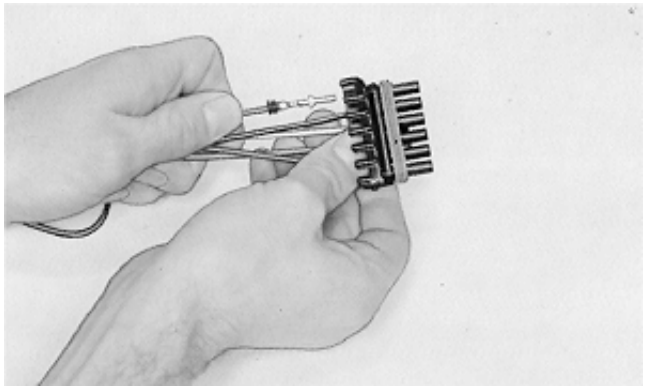
DB92450,000004A -19-15OCT07-3/4

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.

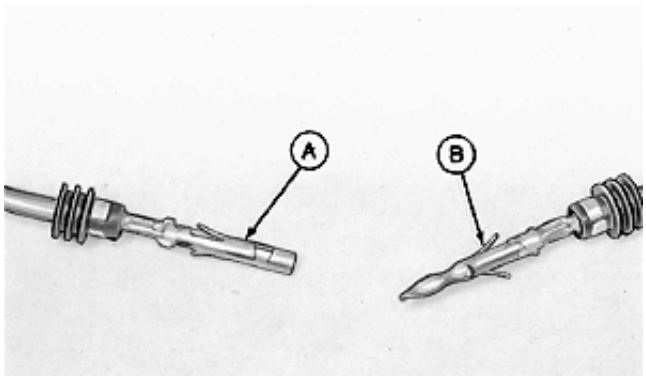
NOTE: Connector bodies are "keyed" for correct terminals. Be sure terminals are correctly aligned.

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**

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

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.



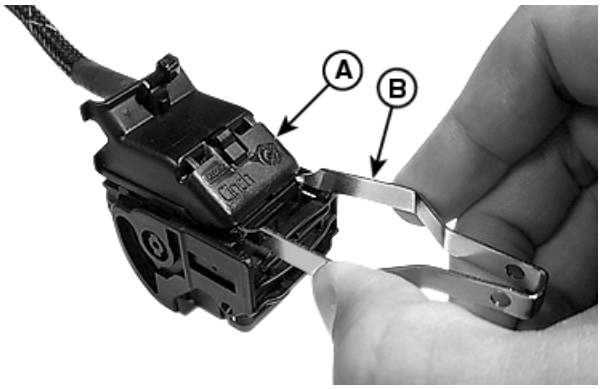
RG14592 —UN—01DEC05

Rotate lock 90 Degrees

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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).

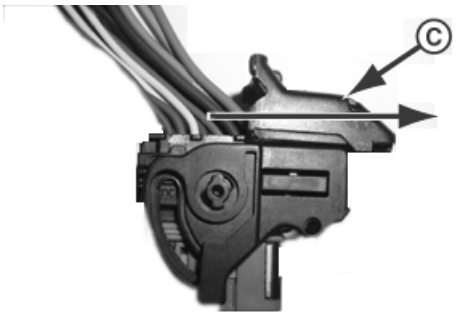


RG15123 —UN—13JUN07

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.

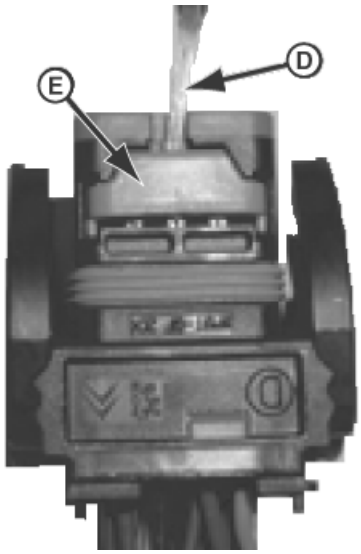


RG14581 —UN—21NOV05

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.



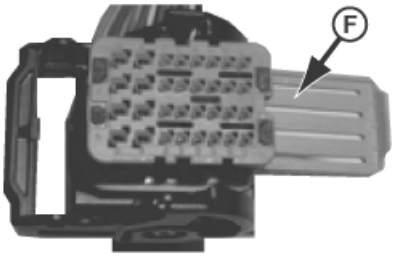
RG14582 —UN—21NOV05

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.

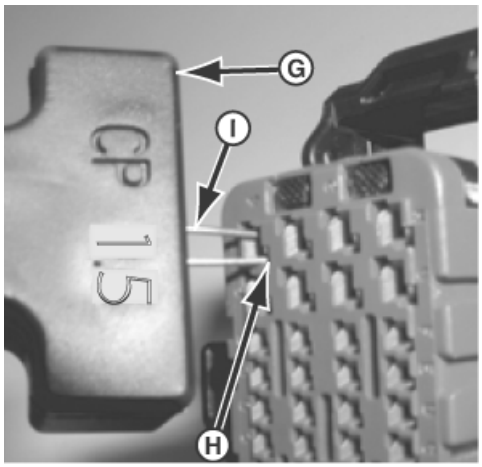


RG14583 —UN—01DEC05

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.



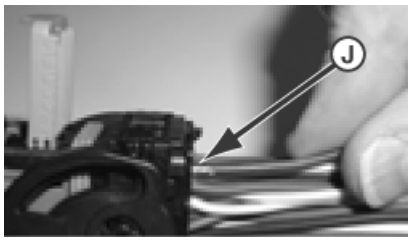
RG14595 —UN—21NOV05

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

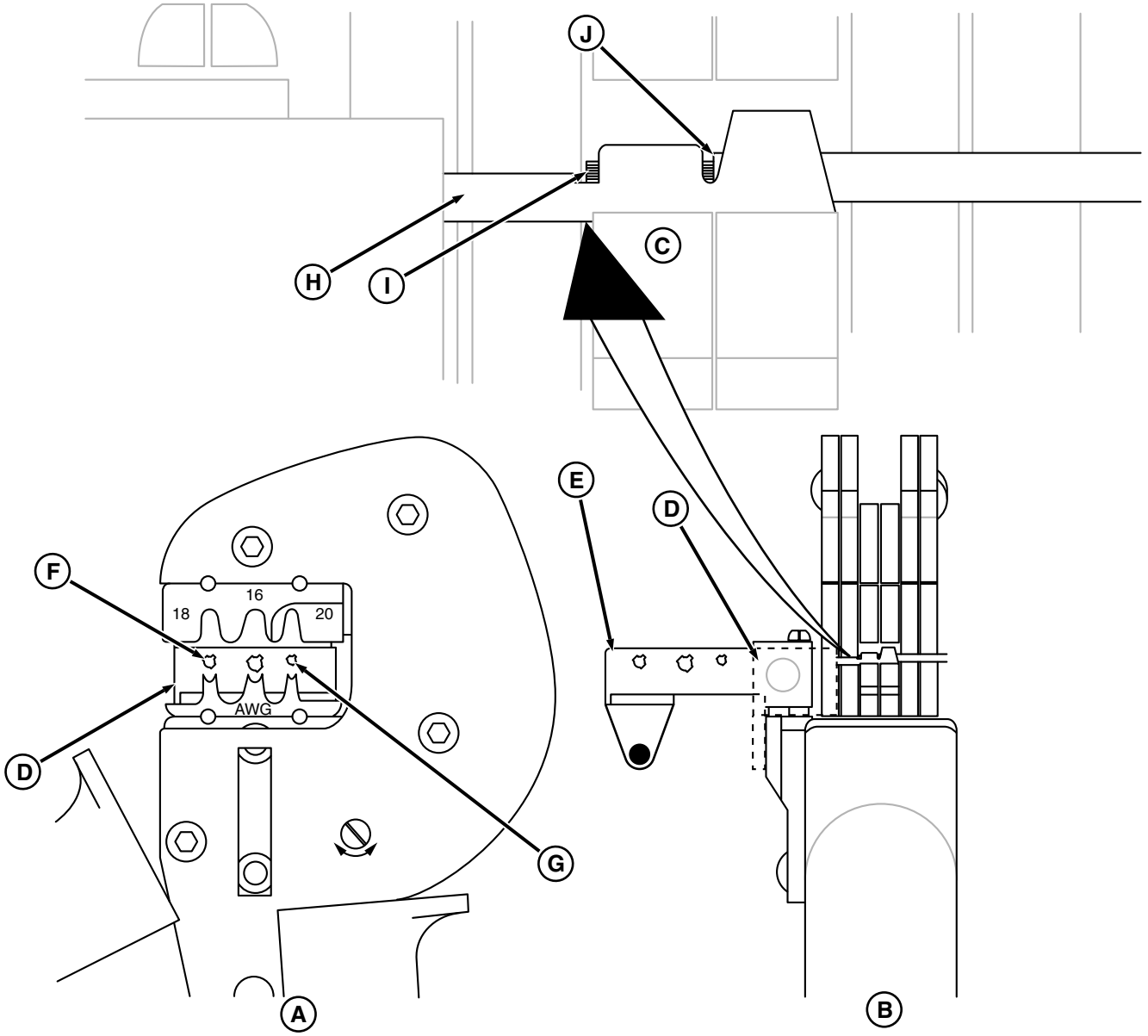


Remove Terminal and Wire

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

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

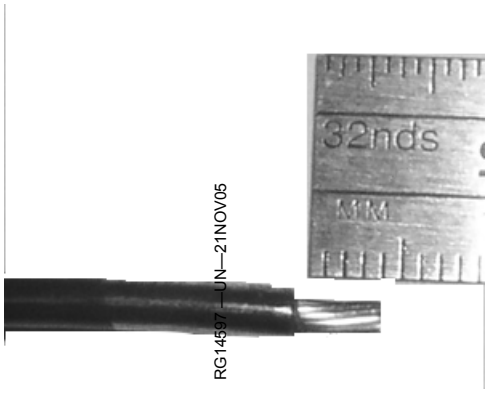


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RG41183,00000E9 -19-01OCT08-11/16

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

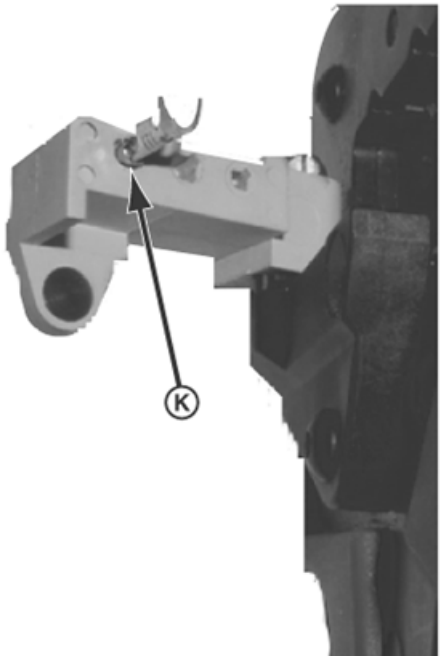
NOTE: The above figure is intended to only illustrate crimper and wire-loading elements. Its callouts relate only to its own legend, and not to the callouts in the procedural steps.

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.

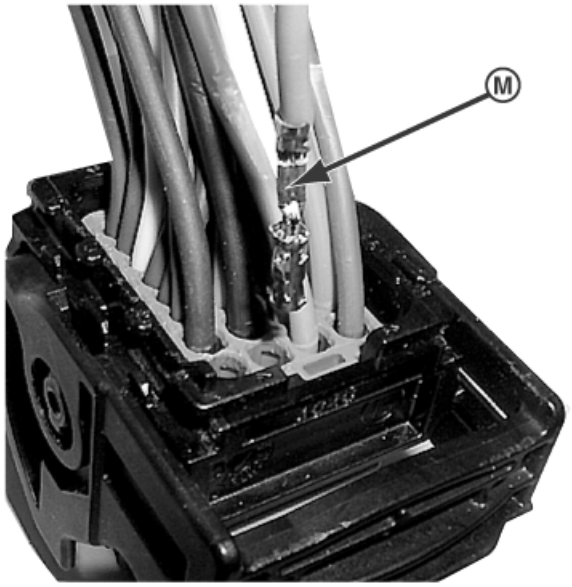


RG14588 —UN—01DEC05

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

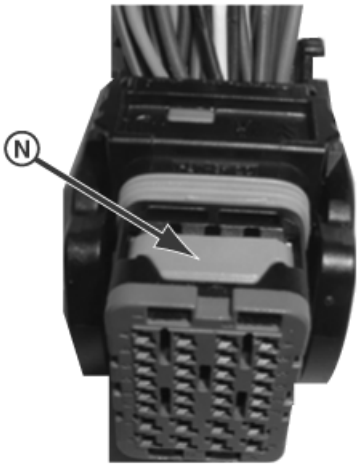
Correct Position For Terminal Insertion

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

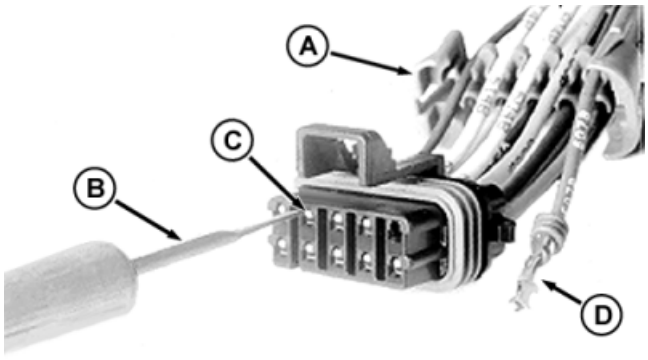
RG41183,00000E9 -19-01OCT08-16/16

Repair METRI-PACK Connectors*(Push Type)*

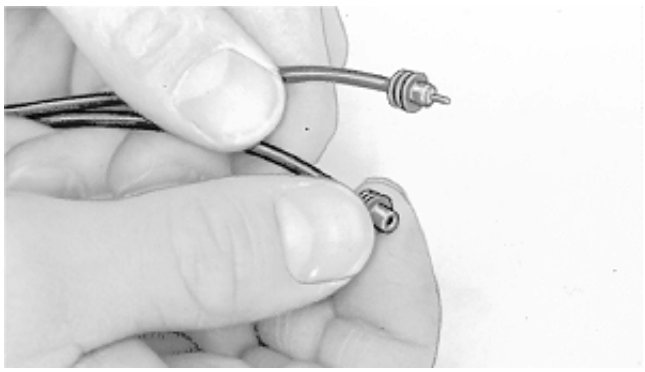
1. Disconnect the METRI-PACK connector. Remove the tie bands and tape.
2. Remove secondary lock (A).
3. Identify wire color/number to the connector cavity. Make sure each wire goes back to the correct cavity location.
4. Insert [1]JDG776 or JDG777 Terminal Extraction Tool (B) into connector cavity (C)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

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

Continued on next page

DB92450,000004B -19-27JUL07-1/2

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.

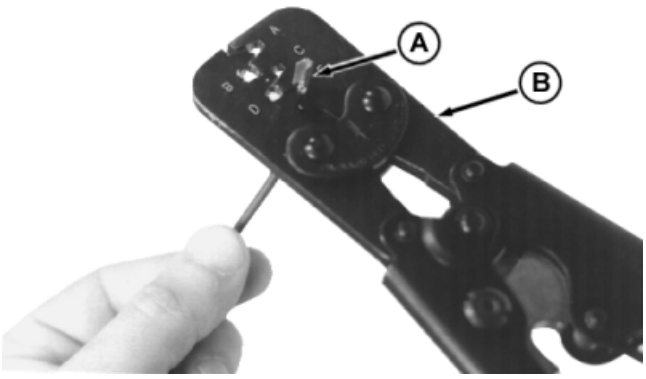
NOTE: Cable seals are color coded for three sizes of wire:

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

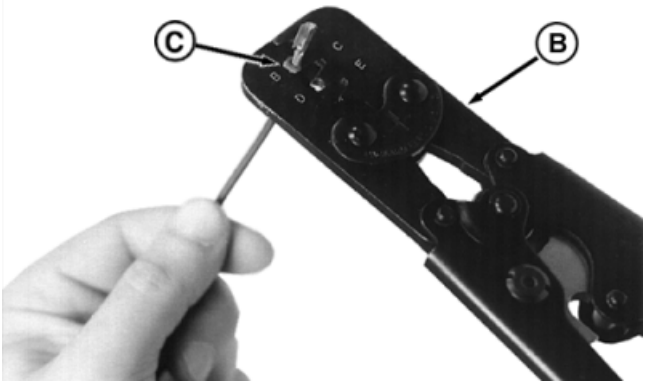
Crimp contact (A) on wire with a “W” type crimp using JDG865 Crimping Tool (B).

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



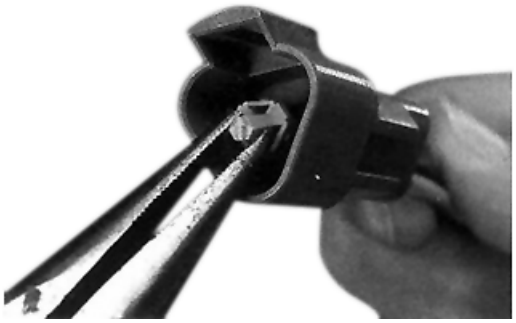
RW77140A —UN—15MAR02

DB92450,000004B -19-27JUL07-2/2

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.

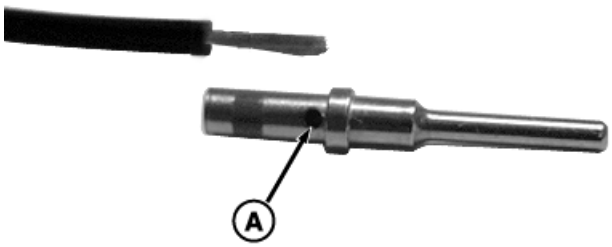


RG15046 —UN—26JUN07

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



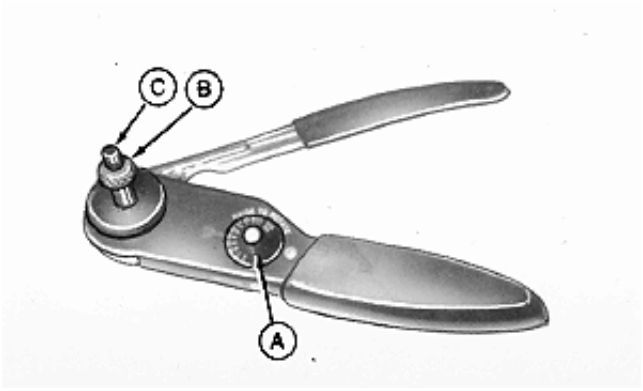
RG15070 —UN—26JUN07

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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

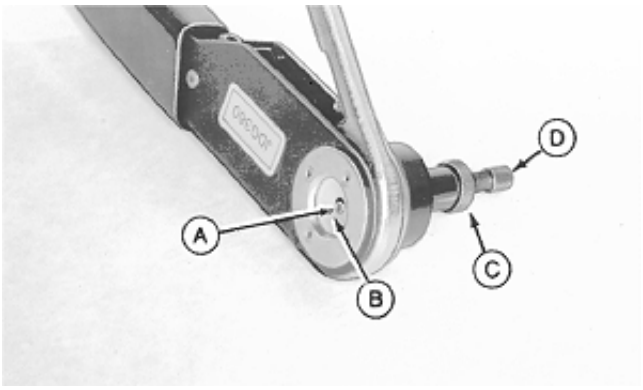
DM59778,000000A -19-15OCT07-5/9

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

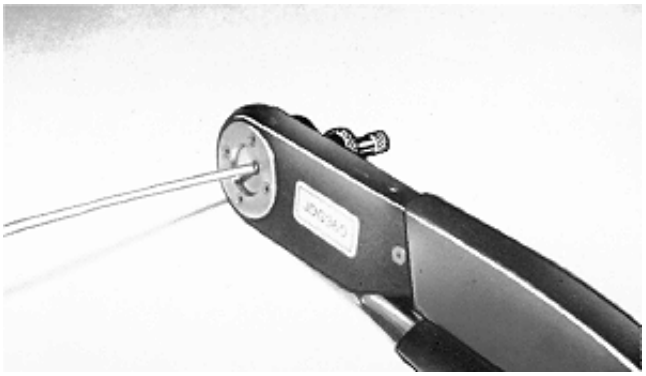
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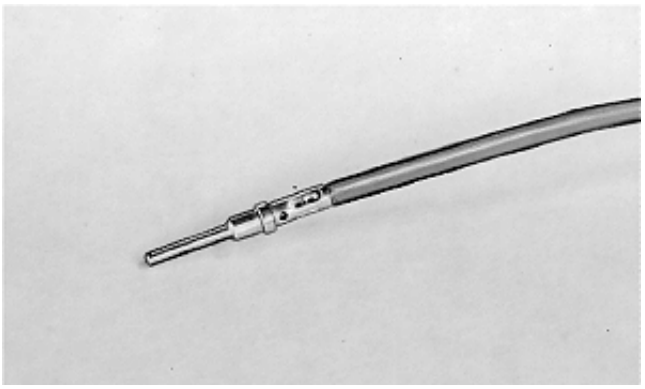
11. Insert wire in terminal and crimp until handle contacts stop.

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.



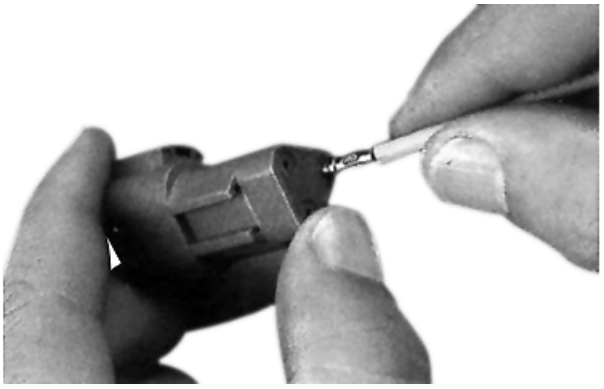
TS118 —UN—23AUG88



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.



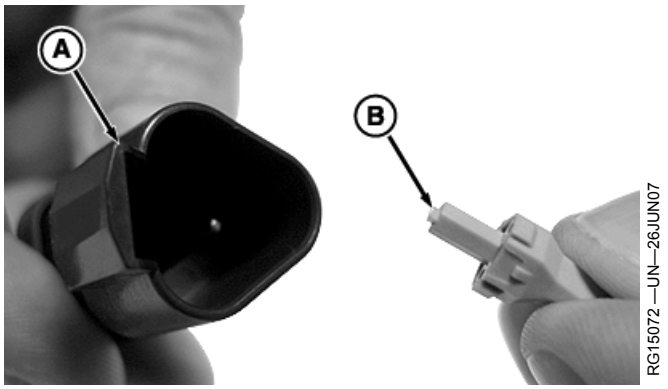
RG15071 —UN—26JUN07

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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**

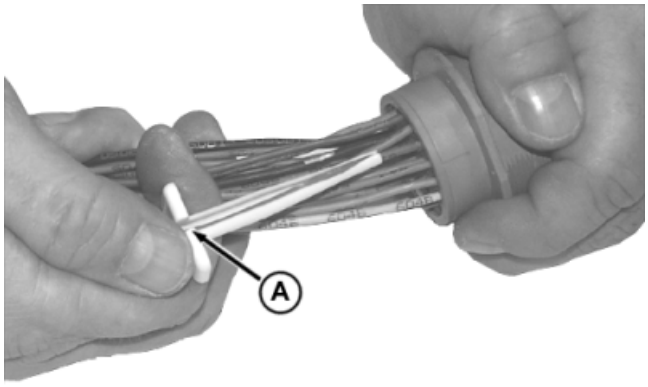


RG15072 —UN—26JUN07

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.

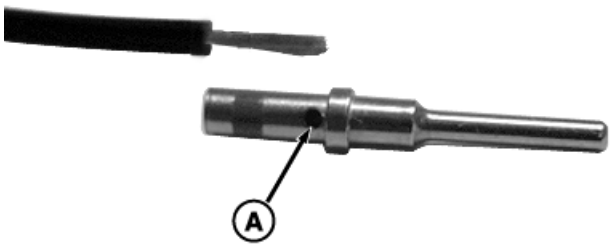
[1]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[2]Included in JT07195B Electrical Repair Tool Kit and JDG359 DEUTSCH Electrical Repair Kit
[3]Included in JDG359 DEUTSCH Electrical Repair Kit
[4]Included in JT07195B Electrical Repair Tool Kit

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



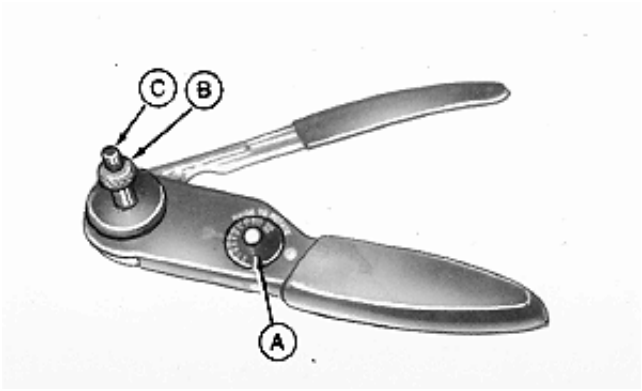
RG15070 —UN—26JUN07

[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

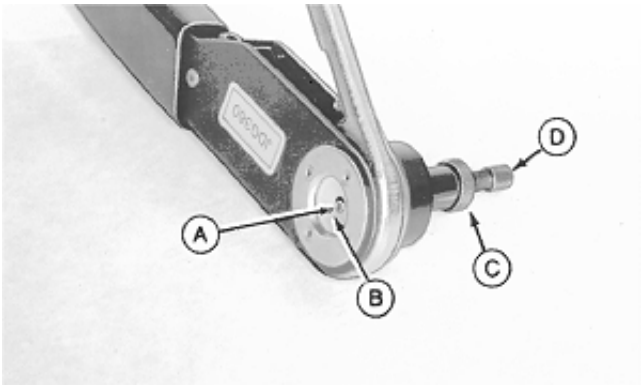
RG40854,00000CB -19-15OCT07-3/5

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

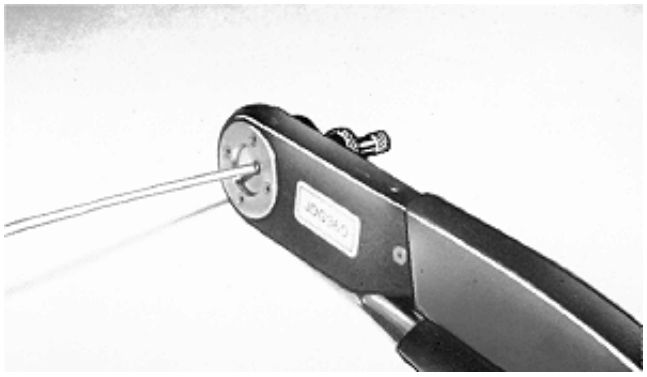
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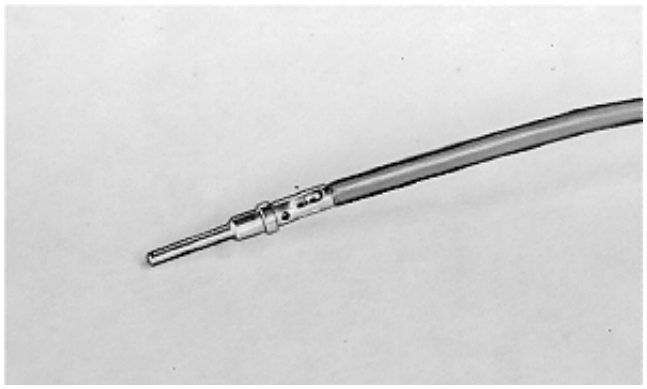
13. Insert wire in terminal and crimp until handle contacts stop.

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

Section 03
Theory Of Operation

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Group 130
Electronic Fuel System Operation

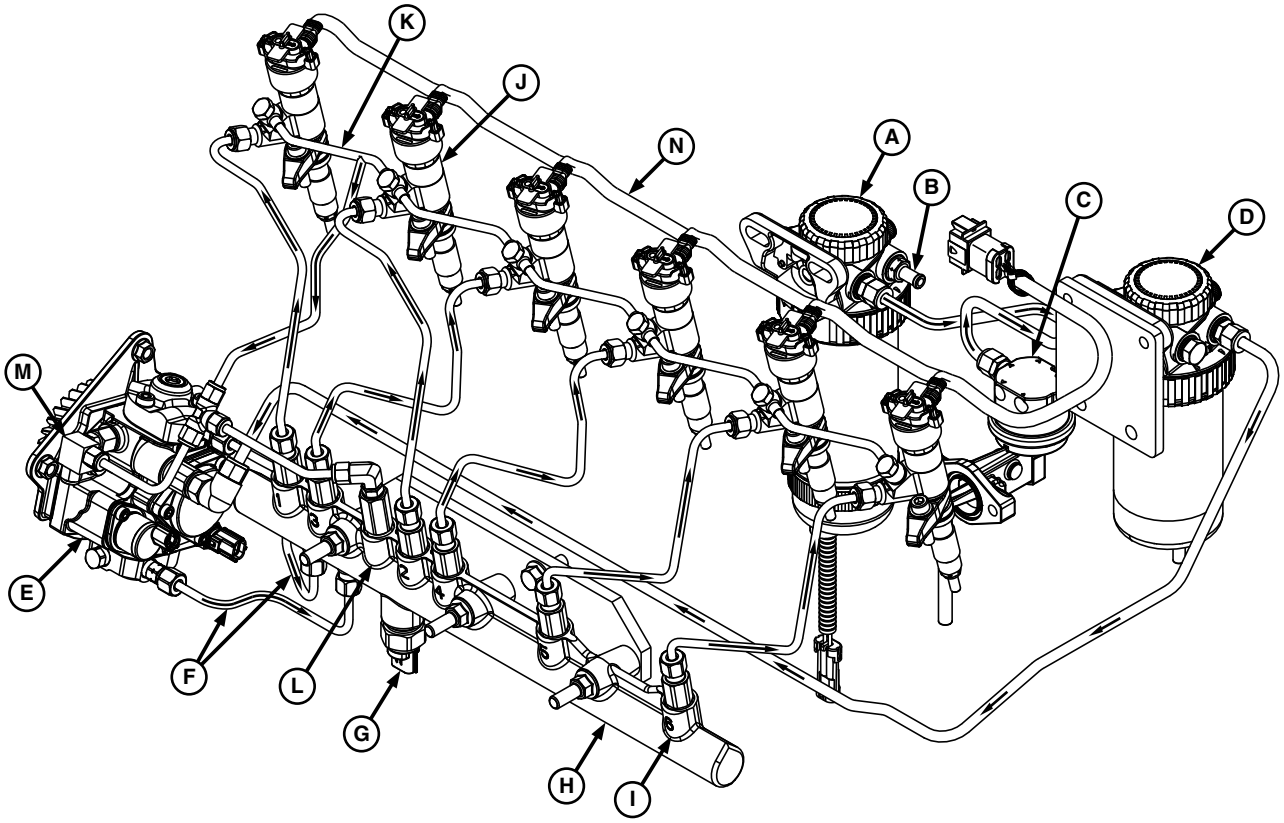
About This Group

In this group, the fuel system information is described in the following categories:

- Fuel System Operation
- Pre-filter Operation
- Fuel Transfer Pump Operation
- Final Fuel Filter Operation
- High Pressure Fuel Pump Operation
- High Pressure Common Rail (HPCR)
- Electronic Injector (EI) Operation
  - EI - No Injection
  - EI - Begin Injection
  - EI - Ending Injection

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Fuel System Operation



Fuel System Operation

A—Pre-Filter (Fuel)
B—Fuel Inlet
C—Fuel Transfer Pump (Mechanical)
D—Final Fuel Filter
E—High Pressure Fuel Pump
F—High Pressure Fuel Lines
G—Fuel Rail Pressure Sensor
H—High Pressure Common Rail (HPCR)
I— Flow Damper
J—Electronic Injector (EI)
K—Fuel Leak-off Line
L—Pressure Limiter
M—Overflow Orifice
N—Wiring Harness

Low Pressure Fuel

The fuel transfer pump (C) draws fuel from the fuel tank through the prefilter (A), and sends it through the final fuel filter (D) on its way to the high pressure fuel pump (E). The type and location of the prefilter and the fuel transfer pump may vary depending on application requirements.

High Pressure Fuel

This pump is timed consistent with the engine timing to ensure correct fuel delivery amount for optimum cylinder firing. The high pressure fuel pump raises fuel pressure to the required amount for injection. This high-pressure fuel is routed through the pressurized fuel lines (F) and into the High Pressure Common Rail (HPCR) (H). HPCR evenly distributes fuel to all of the Electronic Injectors (EIs) (J) through the flow dampers (I). The HPCR uses flow dampers to regulate a constant pressure to the EIs. EIs produce measured amounts of fuel into their respective cylinders to be fired.

Leak Off Fuel

If excess fuel pressure develops in the HPCR, the pressure limiter (L) opens and bleeds off fuel through the fuel leak-off line back to the tank. Excess fuel in the high pressure fuel pump exits the overflow orifice (M) and is routed back to tank through the fuel leak-off line (K).

The Engine Control Unit (ECU) (A) sends a signal in specific sequence to each EI. This controls the volume of fuel, the timing of delivery, and the rate of delivery for each EI. Once the fuel enters the EI, the high pressure overcomes the nozzle valve allowing the fuel to spray into the respective cylinder. Excess fuel from the nozzle routes through the fuel return line (K) and back to the fuel tank. On some applications the fuel goes through a fuel cooler prior to returning to the fuel tank.

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Prefilter Operation

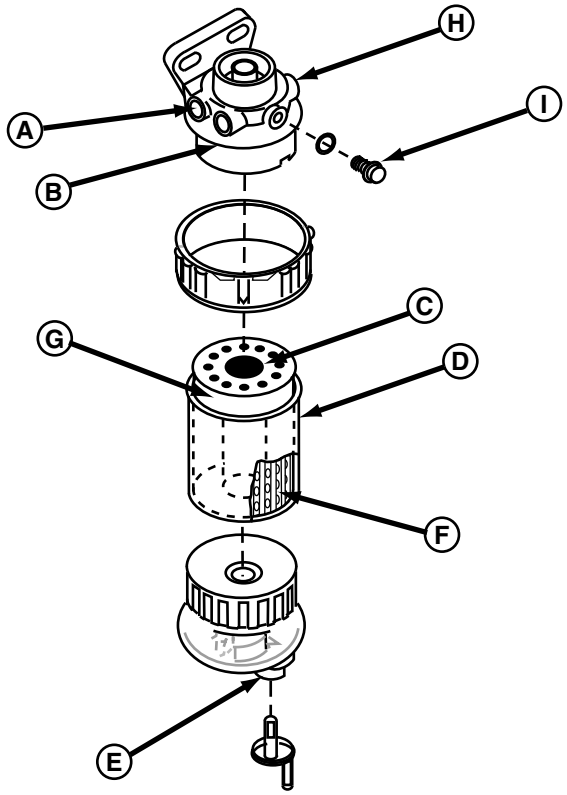
The primary fuel filter is positioned to protect the fuel transfer pump from coarse contaminants, which could damage, clog, or get stuck in, its diaphragm.

Fuel enters the filter through inlet (A) at filter head (B), and flows down through the tube (C) in the center of the canister (D). Water and the heavier fuel contaminants settle to the bottom of the canister, and from there, they pass into the water/sediment bowl (E). Water can be drained off, and contaminants removed, from the bowl, without removing the filter assembly.

Fuel flows up a passage (F) between the outside of the filter element and the inside of the canister, and up through the 30-micron particle filter element (G) and out of the holes in the filter element. From there, fuel exits through the outlet (H) at the filter head.

Air can be bled from this part of the fuel system by loosening the plug (I) in the front of the filter head.

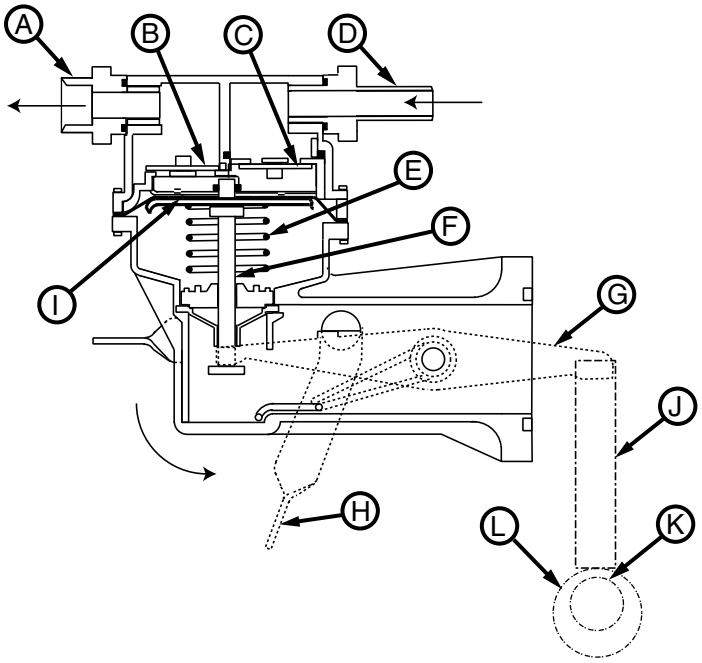
A—Fuel Inlet
B—Filter Head
C—Tube
D—Canister
E—Water/Sediment Bowl
F—Passage Between Filter and Canister
G—Filter Element
H—Fuel Outlet
I— Bleed Screw



Primary (Pre) Fuel Filter

RE38635,0000132 -19-08SEP06-1/1

Mechanical Fuel Transfer Pump Operation



RG9119A —UN—29MAR05

Fuel Transfer Pump

A—Fuel Outlet
B—Outlet Check Valve
C—Inlet Check Valve
D—Fuel Inlet
E—Return Spring
F—Rod
G—Lever Arm
H—Hand Primer Lever
I— Diaphragm
J— Push Rod
K—Eccentric Lobe
L—Engine Camshaft

The mechanical fuel transfer pump is operated by an eccentric lobe (K) on the engine camshaft (L). A push rod (J), positioned between the lobe and the pump's lever (G), is moved up and down, once every engine revolution, corresponding with the lobe's eccentricity. This action moves the lever arm on the transfer pump up and down. As the push rod side of the lever goes up, the lever's opposite side goes down. As the opposite side goes down, it pulls down the rod (F), the diaphragm (I) attached to the rod is also pulled down, and return spring (E) is compressed. Suction pressure from the diaphragm opens the inlet check valve (C), and draws fuel into the chamber above the diaphragm. As the eccentric lobe is turned past its peak height, return spring decompresses, pushing the diaphragm back into its original position. As the diaphragm is returned to its original position, the increased volume of fuel in the chamber above the diaphragm pushes shut the inlet check valve, and opens the outlet check valve, allowing fuel into the fuel outlet chamber. As this sequence is repeated, fuel pressure is developed in the fuel outlet chamber, causing fuel to exit the transfer pump and flow into the final filter.

As the camshaft lobe rotates to the low side, return spring (E) forces diaphragm upward. The resulting fuel pressure closes the inlet check valve and opens outlet check valve (B), delivering fuel through outlet (A) to the final fuel filter.

A hand primer lever (H) is provided for manually forcing fuel through the system to bleed air from the fuel filter, lines, etc.

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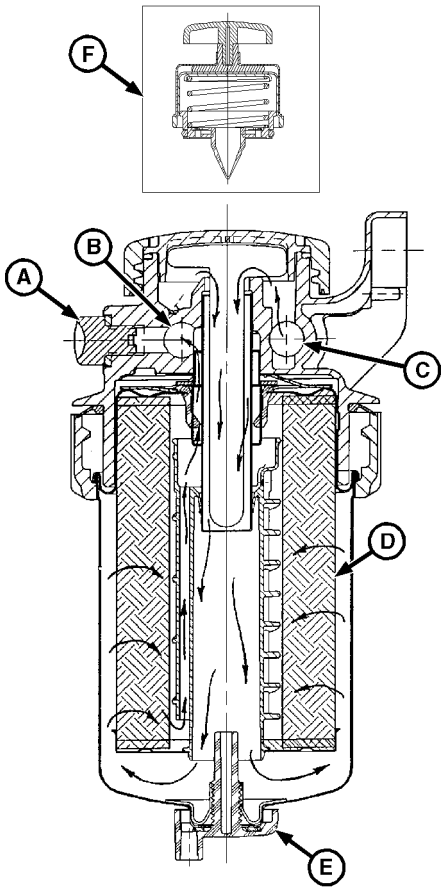
Final Fuel Filter Operation

Fuel enters the filter at inlet (C), flows through filter element (D) and exits through outlet (B) to the fuel injection pump. The 2-micron filter element is housed in a sediment bowl attached to the base with a threaded retaining ring.

Since water and contaminants settle at the bottom of the sediment bowl, a drain plug (E) is provided. On some options, a water bowl is attached to the bottom of the sediment bowl.

Air in the system can be expelled through the air vent when bleed screw (A) is loosened. Optional priming pump (F) draws fuel from the fuel tank to fill the filter bowl when the filter element is changed. The priming pump also supplies fuel from the filter to the injection pump.

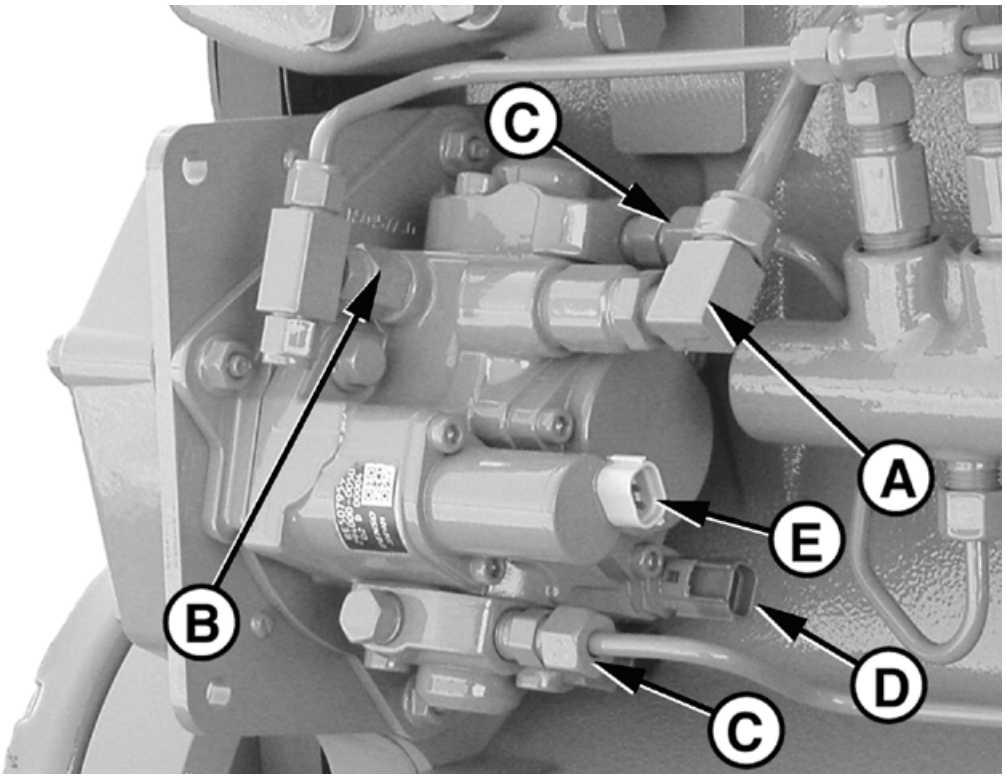
A—Bleed Screw
B—Fuel Outlet
C—Fuel Inlet
D—Filter Element
E—Drain Plug
F—Primer Pump



RG9090 —UN—27MAR98

RE38635,0000133 -19-08SEP06-1/1

Type 1 High Pressure Fuel Pump Operation



RG12465B —UN—18JUN02

A—Fuel Inlet
B—Overflow Valve
C—Fuel Outlets
D—Fuel Temperature Sensor
E—Suction Control Valve Solenoid

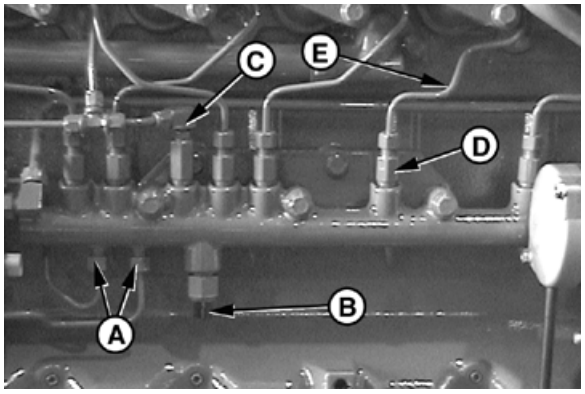
The high pressure common rail engine uses the Denso HP3 high pressure fuel pump. Filtered fuel enters the high pressure pump through the fuel inlet (A). Once fuel passes through the inlet, it goes through a fuel inlet filter and continues through an internal transfer pump. Fuel is then routed either to lubricate the pump crankcase or to the Suction Control Valve (E). The ECU supplies the suction control valve current when it is time to release fuel to the high pressure common rail. For more information on the Suction Control Valve Solenoid, see SUCTION CONTROL VALVE in Group 140 of this manual. There is one chamber on the top of the pump and another chamber on the bottom of the pump. Fuel in each chamber is pressurized when the pump camshaft rotates. Excess fuel leaves the pump through the overflow valve (B), so it can return to the fuel tank.

A fuel temperature sensor (D) is included on the pump to measure the fuel temperature in the pump housing. For more fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 later in this manual.

RG40854,0000154 -19-01FEB08-1/1

High Pressure Common Rail (HPCR) Operation

High pressure fuel is delivered to the high pressure common rail (HPCR) through two high pressure pump delivery lines (A). The high pressure common rail delivery lines (E) transport the fuel to the Electronic Injectors (EIs). The fuel rail pressure sensor (B) detects the fuel pressure inside the rail. The Engine Control Unit (ECU) uses this sensor to monitor the fuel pressure to determine the timing of the suction control valve on the high pressure fuel pump. For more information on the fuel rail pressure sensor, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 later in this manual. If an abnormally high pressure is generated within the HPCR, the pressure limiter (C) opens to release the excess pressure and drain fuel back to the tank. The flow dampers (D) are used to control the maximum fuel flow to the EIs and prevent damage if the EI should fail, or if a high pressure leak develops, by shutting off fuel flow to the failed EI.



RG12459C —UN—18JUN02

A—High Pressure Pump Delivery Lines
B—Fuel Rail Pressure Sensor
C—Pressure Limiter
D—Flow Damper
E—High Pressure Common Rail Delivery Lines

RG40854,0000153 -19-30AUG07-1/1

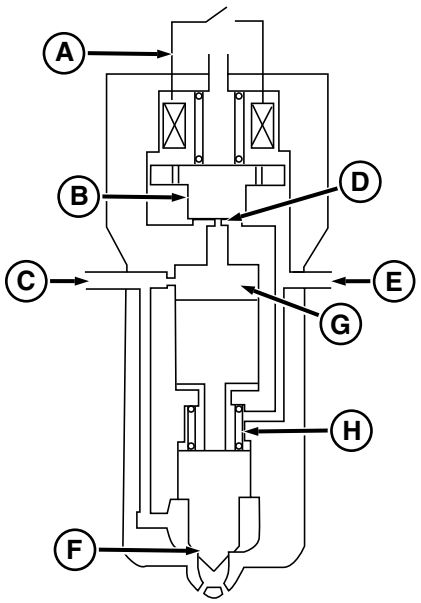
Electronic Injector (EI) Operation

NOTE: For schematics graphics, reference Section 6 Group 210 ECU Engine Schematics later in this group.

The electronic injectors (EIs) are located in the engine's cylinder head and are electronically controlled by the ECU. The amount of fuel delivered to the cylinder is controlled by the length of time current is supplied to the two-way electromagnetic valve (TWV) on each EI. The ECU sends signals in specific sequence to each EI. This controls the volume of fuel, and the timing of delivery for each EI.

EI - No Injection

Fuel from the HPCR enters the EI at the fuel inlet (C). When no current is supplied to the TWV (A), the valve spring (H) and the hydraulic pressure of the fuel in the control chamber (G) cause the hydraulic piston to push the needle down and close the nozzle. This holds the high pressure fuel from the common rail inside the nozzle until injection.



RG11556A —UN—16FEB01

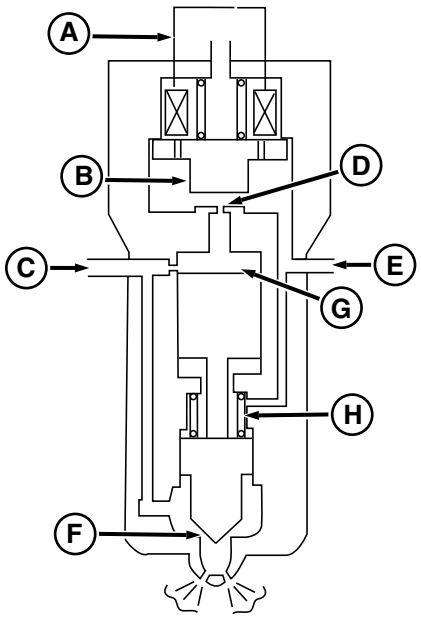
No/Ending Injection

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring

RE38635,0000134 -19-08SEP06-1/3

EI - Begin Injection

Injection begins when current is supplied from the ECU to the TWV (A). The electromagnetic force pulls the solenoid valve (B) up, causing the orifice seat (D) to open. The fuel in the control chamber (G) flows out of the injector to the fuel leak-off (E) line. Fuel is then routed back to the fuel tank. As the fuel exits the injector, the force is removed from the hydraulic piston, the nozzle needle lifts, allowing fuel through the nozzle (F) to start the injection process.



RG11557A —UN—26FEB01

Begin Injection

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring

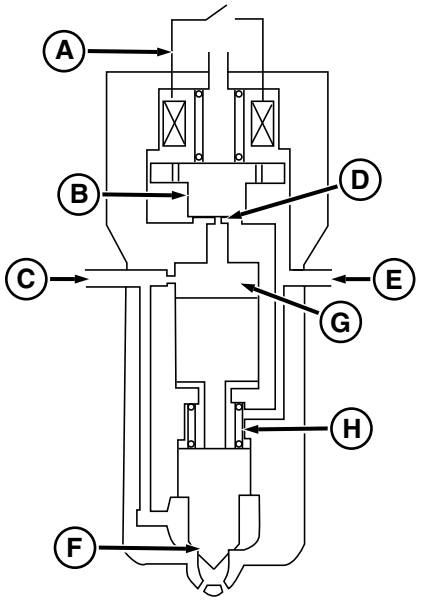
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RE38635,0000134 -19-08SEP06-2/3

EI - Ending Injection

Injection ends when the current is removed from the TWV (A). The solenoid valve (B) closes causing fuel to fill the control chamber (G). The valve spring and the hydraulic force from the fuel in the control chamber cause the hydraulic piston to push the needle down and close the nozzle. At this time the injection is complete.

A—Two-Way Valve (TWV)
B—Solenoid Valve
C—Fuel Inlet
D—Orifice Seat
E—Fuel Leakoff
F—Nozzle
G—Control Chamber
H—Valve Spring

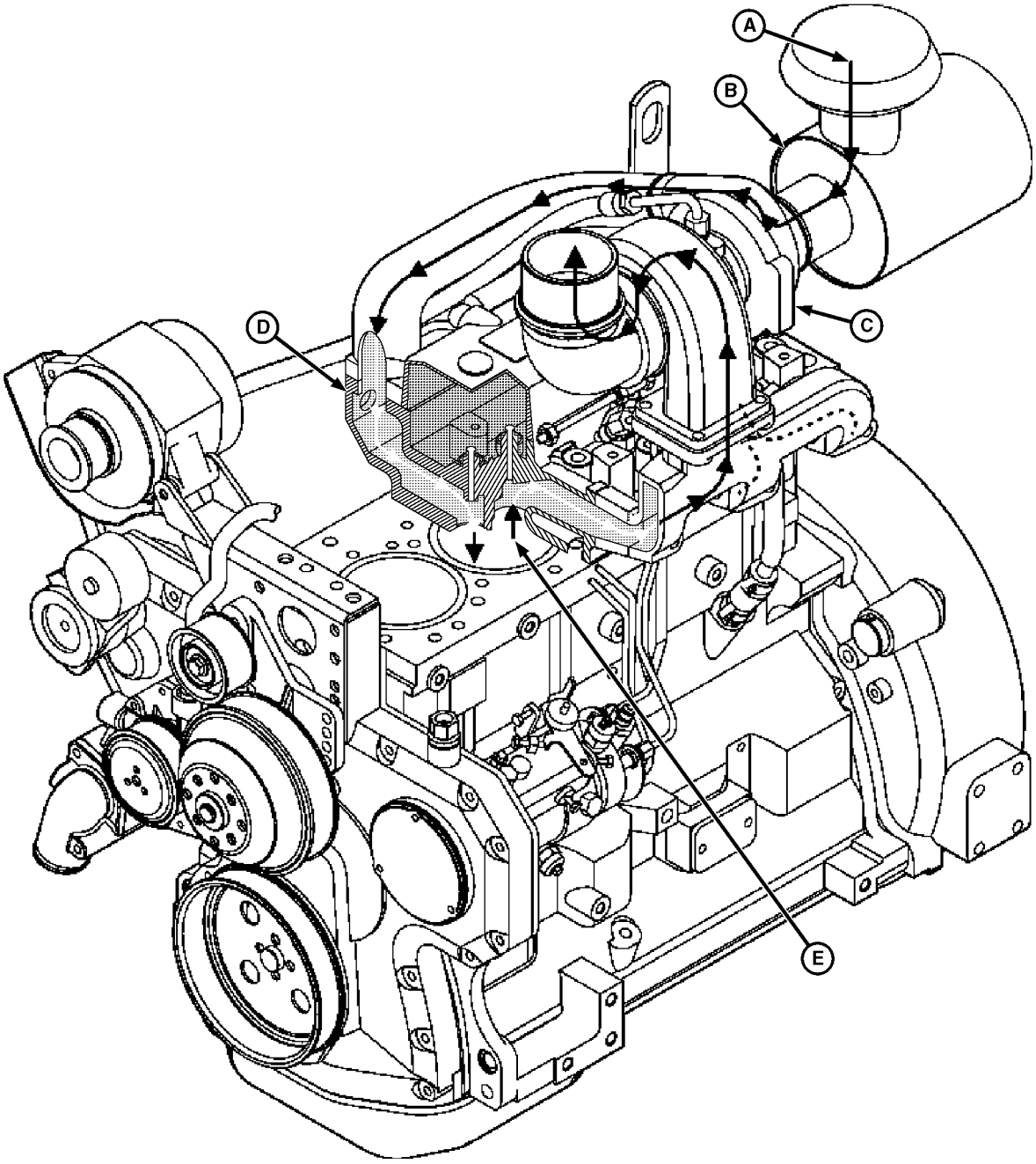


RG11556A —UN—16FEB01

No/Ending Injection

RE38635,0000134 -19-08SEP06-3/3

Air Intake and Exhaust System Operation



RG12438 —UN—25NOV03

How Air Intake and Exhaust Systems Work - Two Valve Head Shown

A—Outside Intake Air
B—Air Cleaner
C—Turbocharger
D—Intake Side of Cylinder Head
E—Exhaust

Engine suction draws dust-laden outside air (A) through an air inlet stack into the air cleaner (B). Air is filtered through dry type primary and secondary (safety) filter elements in the air cleaner canister. Clean air travels through the air intake hose to the turbocharger (C) and into the intake side of the cylinder head (D).

Exhaust (E), drives the turbocharger to deliver a larger quantity of air to meet the engine requirements than what could be delivered under naturally aspirated (non-turbocharged) conditions.

On some engines, 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.

Continued on next page

RG19661,0000239 -19-22MAY07-1/2

PowerTech E™ engines are not equipped with an exhaust gas recirculation (EGR) system or a variable geometry turbocharger (VGT) but do meet meet Tier 3/Stage IIIA emission levels. Sensors in the intake and exhaust system monitor operating conditions and provide information to the engine control unit.

RG19661,0000239 -19-22MAY07-2/2

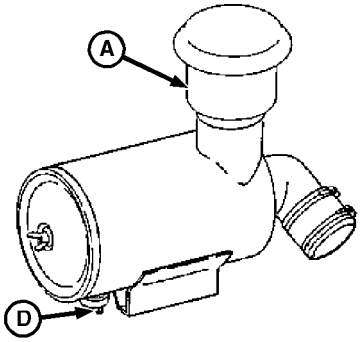
Air Cleaner Operation

Under suction generated by the engine, unfiltered air flows through air inlet tube (A) and is forced into a high-speed centrifugal motion by tilted fins in the element. By this circulating action most of the dust and dirt particles are separated from the air and collected in the dust unloading valve (D).

The remaining dirt is removed as the air flows through the primary element (C) and the secondary (safety) filter (B) before being drawn into the engine.

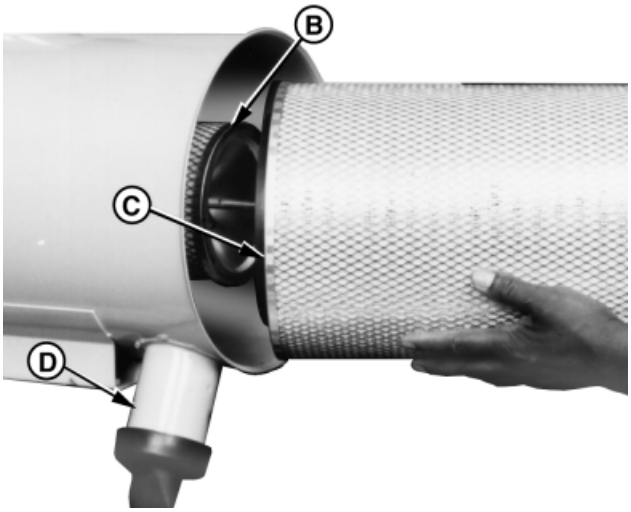
The secondary (safety) filter ensures that, should primary element fail, no unfiltered air is drawn into the engine.

A—Air Inlet Tube
B—Secondary (Safety) Filter
C—Primary Element
D—Dust Unloading Valve



RG9097 —UN—27MAR98

Air Cleaner Assembly



RG7766B —UN—10NOV97

Air Cleaner Primary and Secondary Elements

RG,110,JW7672 -19-24NOV97-1/1

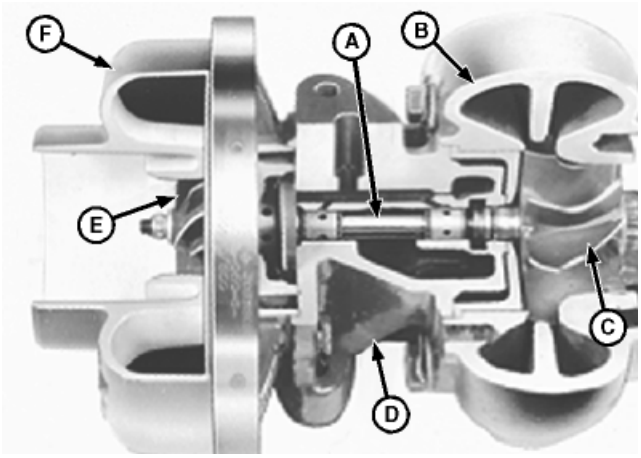
Turbocharger Operation

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.

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.



RG9098 —UN—27MAR98

Turbocharger Components

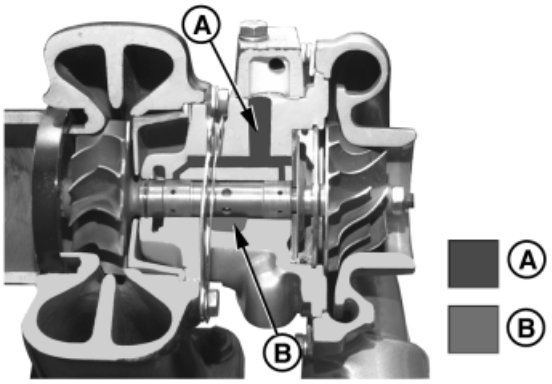
A—Shaft
B—Turbine Housing
C—Turbine Wheel
D—Center Housing
E—Compressor Wheel
F—Compressor Housing

RG,110,JW7669 -19-24NOV97-1/1

How the Turbocharger Is Lubricated

Engine oil under pressure from the engine lubrication system is pumped through a passage in the bearing housing and directed to the bearings, thrust plate, and thrust sleeve. Oil is sealed from the compressor and turbine by a piston ring at both ends of the bearing housing.

The turbocharger contains two floating bearings. These bearings have clearance between the bearing OD and the housing bore as well as clearance between the bearing ID and the shaft OD. These clearances are lubricated by the oil supply pressure oil (A) and the bearings are protected by a cushion of oil. Discharge oil (B) drains by gravity from the bearing housing to the engine crankcase.



RG8099 —UN—18NOV97

Turbocharger Pressure and Discharge Oil

A—Pressure Oil
B—Discharge Oil

RG,110,JW7668 -19-23MAY00-1/1

About This Group

In this Group, the electronic control system is described in the following categories:

- Electronic Control System Terminology
- Electronic Control System Operation
- Component Location
- Engine Control Unit (ECU)
- Controller Area Network (CAN)
- Monitoring Engine Parameters
- Measuring Temperature
- Engine Control Unit (ECU) Temperature Sensor
- Engine Coolant Temperature (ECT) Sensor
- Fuel Temperature Sensor
- Intake Manifold Air Temperature
- Turbo Turbine Inlet Temperature
- Measuring Pressure
- Barometric Air Pressure (BAP) Sensor
- Fuel Rail Pressure Sensor
- Fuel Transfer Pump Pressure Sensor (optional)
- Manifold Air Pressure Sensor (optional)
- Oil Pressure Sensor
- Measuring Speed
- Crank Position Sensor
- Pump Position Sensor
- Throttle Descriptions
- CAN Throttle
- Pulse Width Modulated (PWM) Throttle
- Analog Throttle
- Digital Multi-State Throttle
- Dual-state Throttle
- Tri-state Throttle
- Ramp Throttle
- Throttle Adjustments
- Throttle Offsets
- Self-Calibration
- Combination Throttle
- Marine Throttle
- Engine Derate and Shutdown Protection
- Electronic Injector (EI) Wiring Harness Connector
- Intake Air Heater Operation (optional)
- Torque Curve Selection
- Governor Droop Mode Selection
- Suction Control Valve
- Water in Fuel (WIF) Sensor
- Engine Coolant Level Switch (optional)
- Cruise Control Operation
- Power Supply #1
- Power Supply #2
- Power Supply #3

DM80898,0000128 -19-18DEC06-1/1

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.
CAN	Controller Area Network. The network on vehicles that allows communication between controllers.
Circuit Power	This is power supplied to a device for use by its internal component circuits.
Crank Sensor	Used to determine the angular position and velocity of the crankshaft in the 360° field of rotation.
Digital	A signal which consists of only two levels of voltage — usually 0 volts (low) to 24 volts (high).
DTC	Diagnostic Trouble Code. This is a code that is stored in the ECU's memory when it detects a problem in the electronic control system. There are two types of codes: Active and Stored. These codes are displayed on monitor panels and can be recalled by the service tool.
ECT	Engine Coolant Temperature.The temperature of the engine coolant.
ECU	Engine Control Unit. Computer that controls the fuel, air, and ignition systems on the engine.
EI	An Electronic Injector that is regulated by the ECU to control the proper amount of fuel.
FMI	Failure Mode Identifier. The second part of a two-part code that identifies control system diagnostic trouble codes according to the J1939 standard. This two-digit code identifies the type of failure that has occurred. The first half of the code is the Suspect Parameter Number (SPN).
H-Bridge	Circuits in the ECU set up in an H-configuration. This allows for current to be reversed to drive DC motors forward and reverse.
HPCR	High Pressure Common Rail. A device that distributes high pressure fuel to the injectors.
Input	This identifies a signal as an input to a device or controller.
J1939	The Society of Automotive Engineers (SAE) standard for communication between the electronic controllers on heavy-duty vehicles, both on- and off-highway.
JDCP	John Deere Custom Performance Program allows the customer to select software features and feature combinations prior to loading the software into the ECU. It is also one way by which embedded software is managed and updated in controllers without removal of the controller from the machine.
JDPS	John Deere Power Systems.
MAP	Manifold Air Pressure. The pressure of the air in the intake manifold, sometimes referred to as "boost" pressure.
MAT	Manifold Air Temperature. The temperature of the air in the intake manifold.
Meter Zero	This is the value the multi-meter reads in the ohm position, when the meter lead tips are held together.
OOR	Out-of-Range. The signal received by the ECU is out of the expected range of the device.
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.

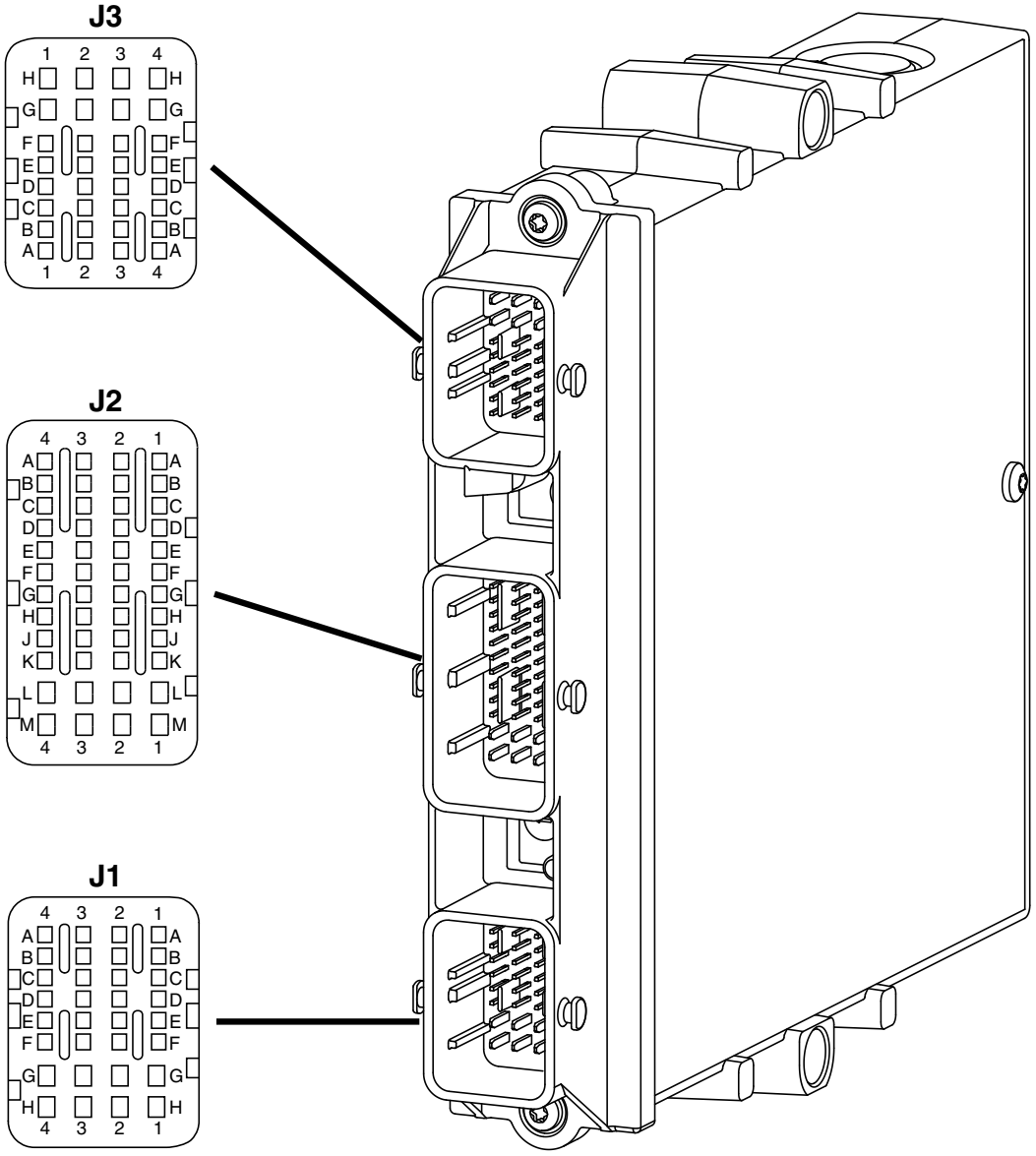
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DM80898,0000121 -19-17MAR09-1/2

Output	This identifies a signal as an output from a device or controller.
Pin	A style of terminal that makes the electrical connection to a connector. Also called a male terminal.
PROM	Programmable, Read-Only Memory. A computer chip within the ECU that contains the calibration information for the engine control system.
Pump Position Sensor	The sensor used to identify the cylinder that is on the compression stroke.
PWM	Pulse Width Modulation. A digital electronic signal of a fixed frequency. The on-time of the signal is increased or decreased (modulated) to indicate a change in condition.
RAM	Random Access Memory. The portion of the computer memory within the ECU that is used when the ECU is running. All data in this memory is lost when the ECU is “OFF”.
Socket	A style of terminal that makes the electrical connection to a connector. Also called a female terminal or receptacle.
Suction Control Valve	Suction Control Valve regulates the amount of fuel that the high pressure fuel pump supplies the HPCR.
SDS	Software Delivery System. Used by JDPS to maintain software and programming records.
Sensor	Device used by the ECU to monitor various engine parameters.
SPN	Suspect Parameter Number. The first half of a two-part code that identifies control system diagnostic trouble codes according to the J1939 Standard. The SPN identifies the system or component that has the failure. The second half of the code is the Failure Mode Identifier (FMI).
TDC	Top Dead Center. Point of uppermost piston travel.
Throttle Rate	How quickly the ECU changes the engine fuel rate in response to a throttle increase signal. Throttle rate has no impact on deceleration.
Trim Options	Options that can be enabled or disabled in the ECU programming, such as throttle selection, torque adjustment, governor gains, derates and shutdowns, etc.
TWV	Two-Way Valve. A component in the Electronic Injector (EI).
WIF	Water In Fuel. The WIF sensor sends a signal to the ECU when water is detected in the fuel.

DM80898,0000121 -19-17MAR09-2/2

Electronic 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 Mode 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.

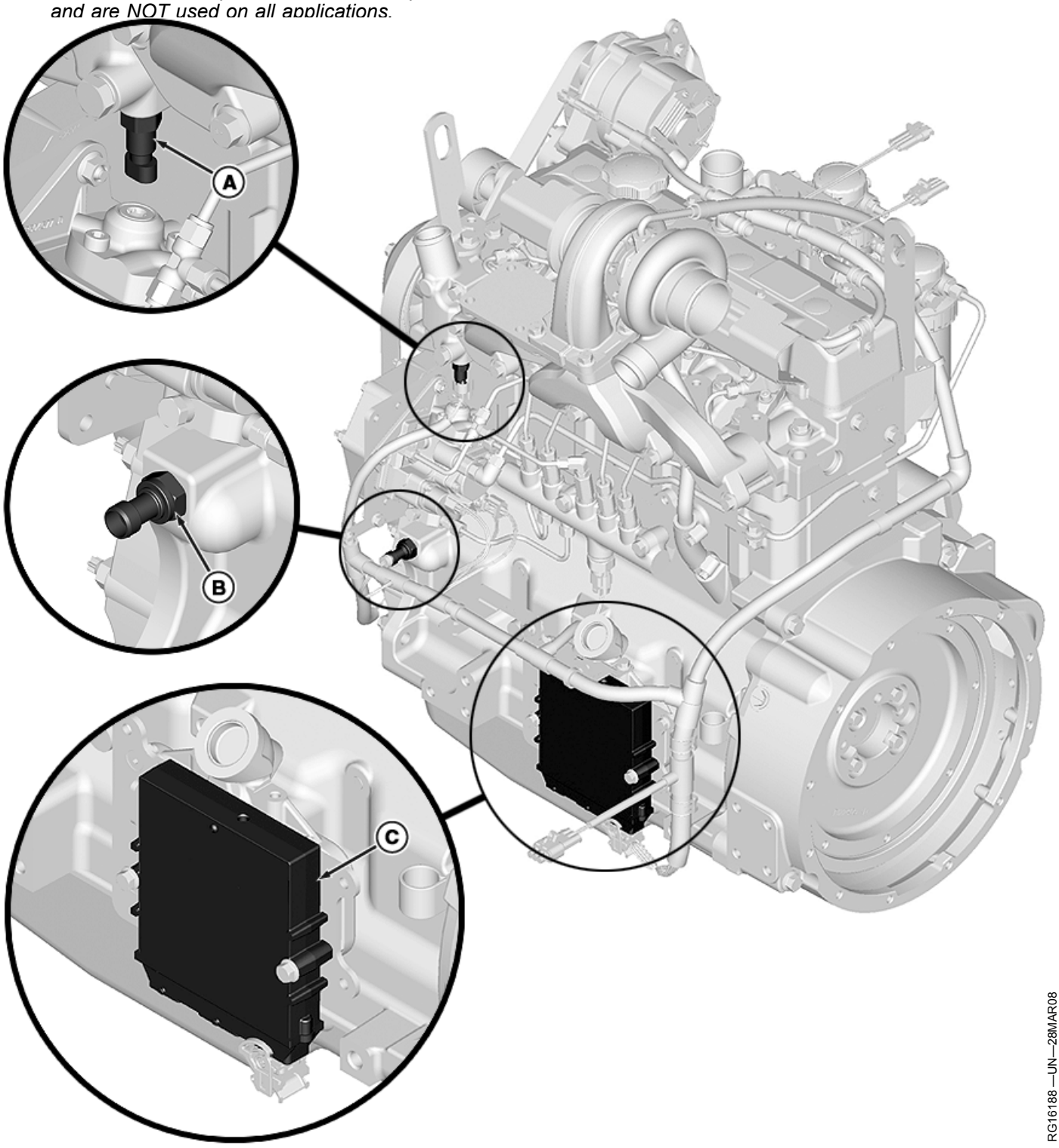
Engine Running Mode

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.

DM80898,00000F4 -19-06OCT08-2/2

Component Location Diagram 1

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



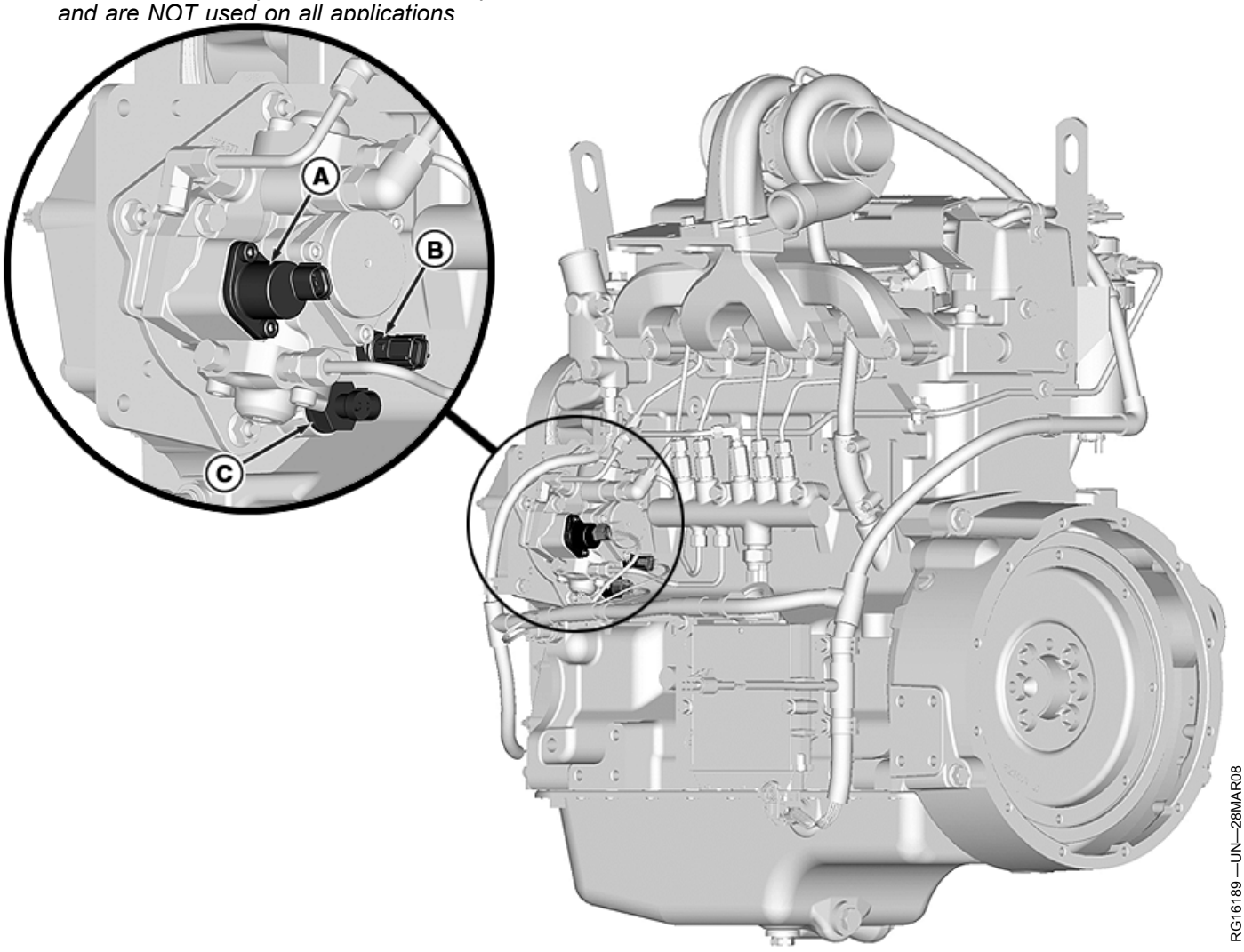
4.5L Engine

A—Coolant Temperature Sensor B—Oil Pressure Sensor C—ECU

BK53208,000007A -19-31MAR08-1/1

Component Location Diagram 2

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



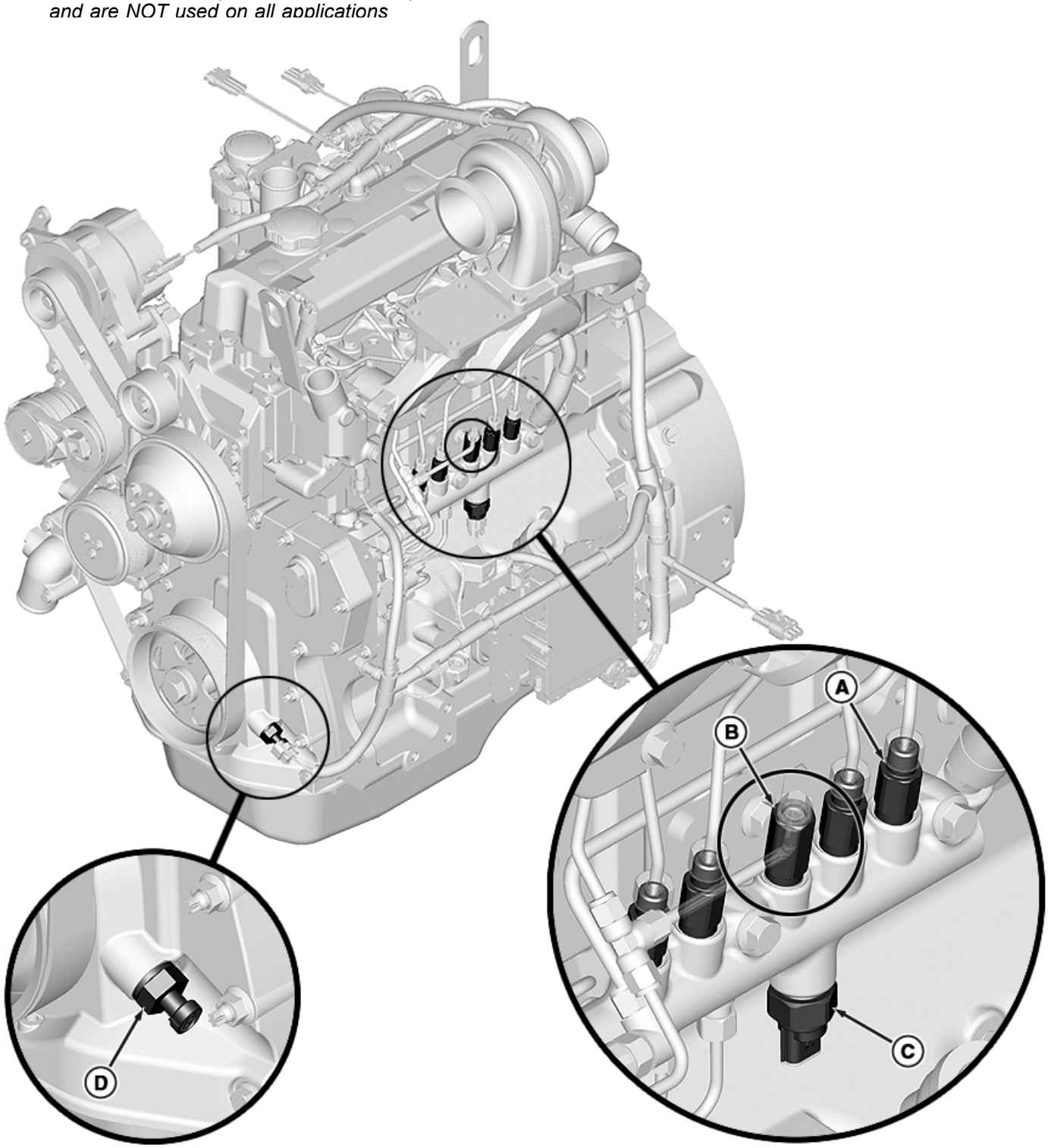
4.5L Engine

A—Suction Control Valve **B—Fuel Temperature Sensor** **C—Pump Position Sensor**

BK53208,000007B -19-31MAR08-1/1

Component Location Diagram 3

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



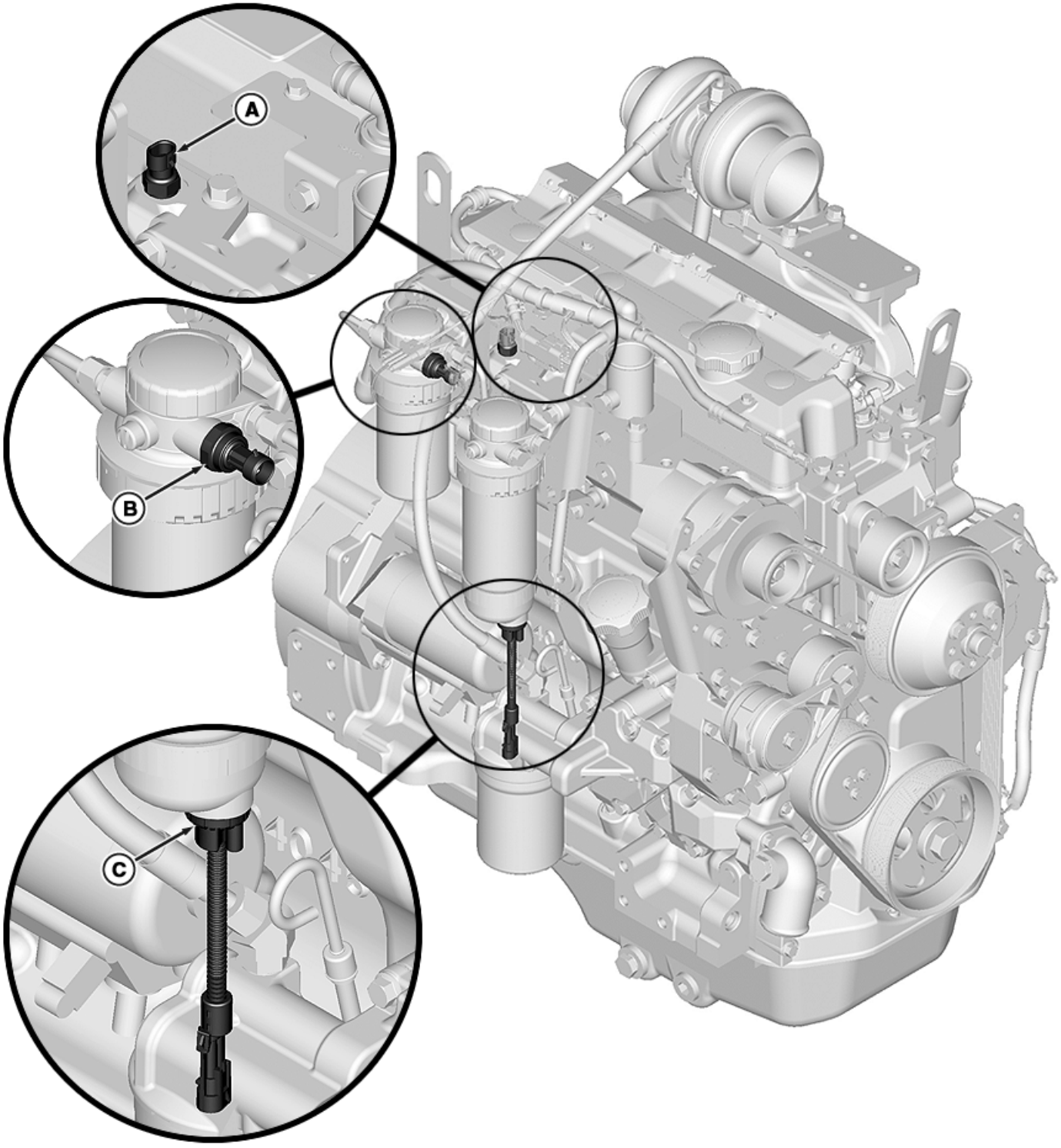
4.5L Engine

A—Fuel Limiter **B—Pressure Limiter** **C—Fuel Rail Pressure Sensor** **D—Crank Position Sensor**

BK53208,000007C -19-31MAR08-1/1

Component Location Diagram 4

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



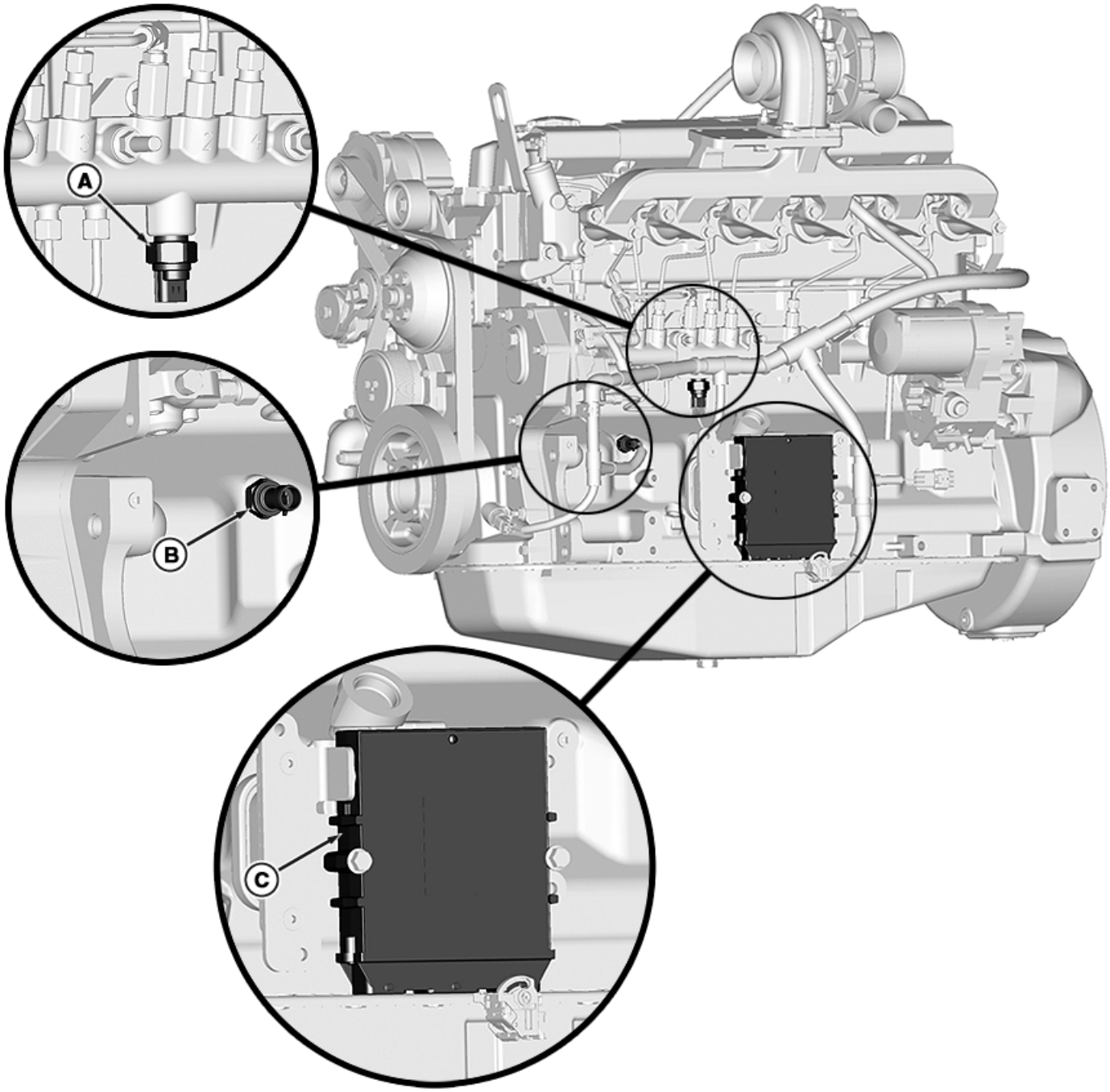
4.5L Engine

A—Manifold Air Temperature (MAT) Sensor **B—Low Pressure Fuel Sensor** **C—Water-In-Fuel (WIF) Sensor**

BK53208,000007D -19-31MAR08-1/1

Component Location Diagram 5

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



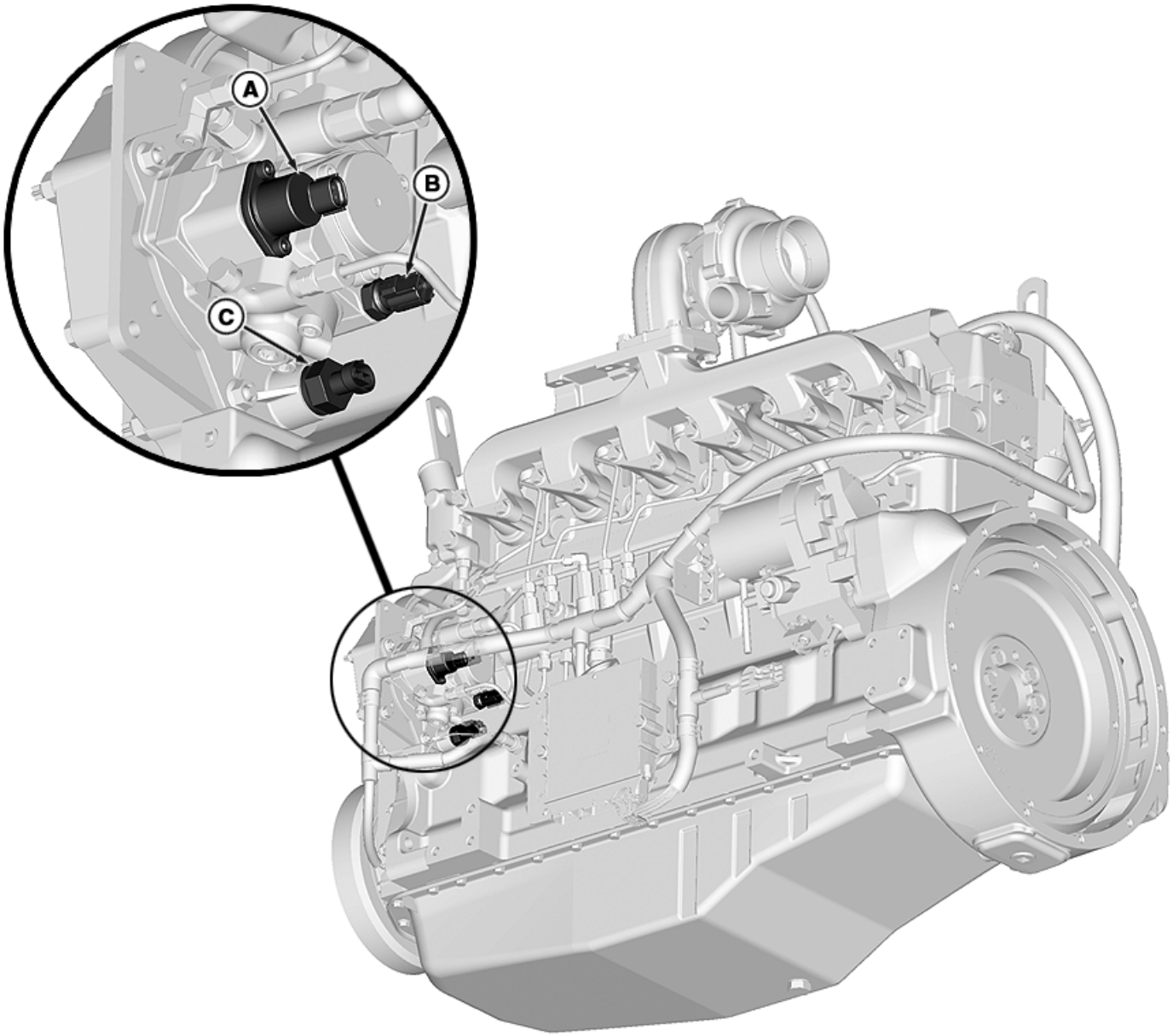
6.8L Engine

A—Fuel Rail Pressure Sensor **B—Oil Pressure Sensor** **C—ECU**

BK53208,000007E -19-31MAR08-1/1

Component Location Diagram 6

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



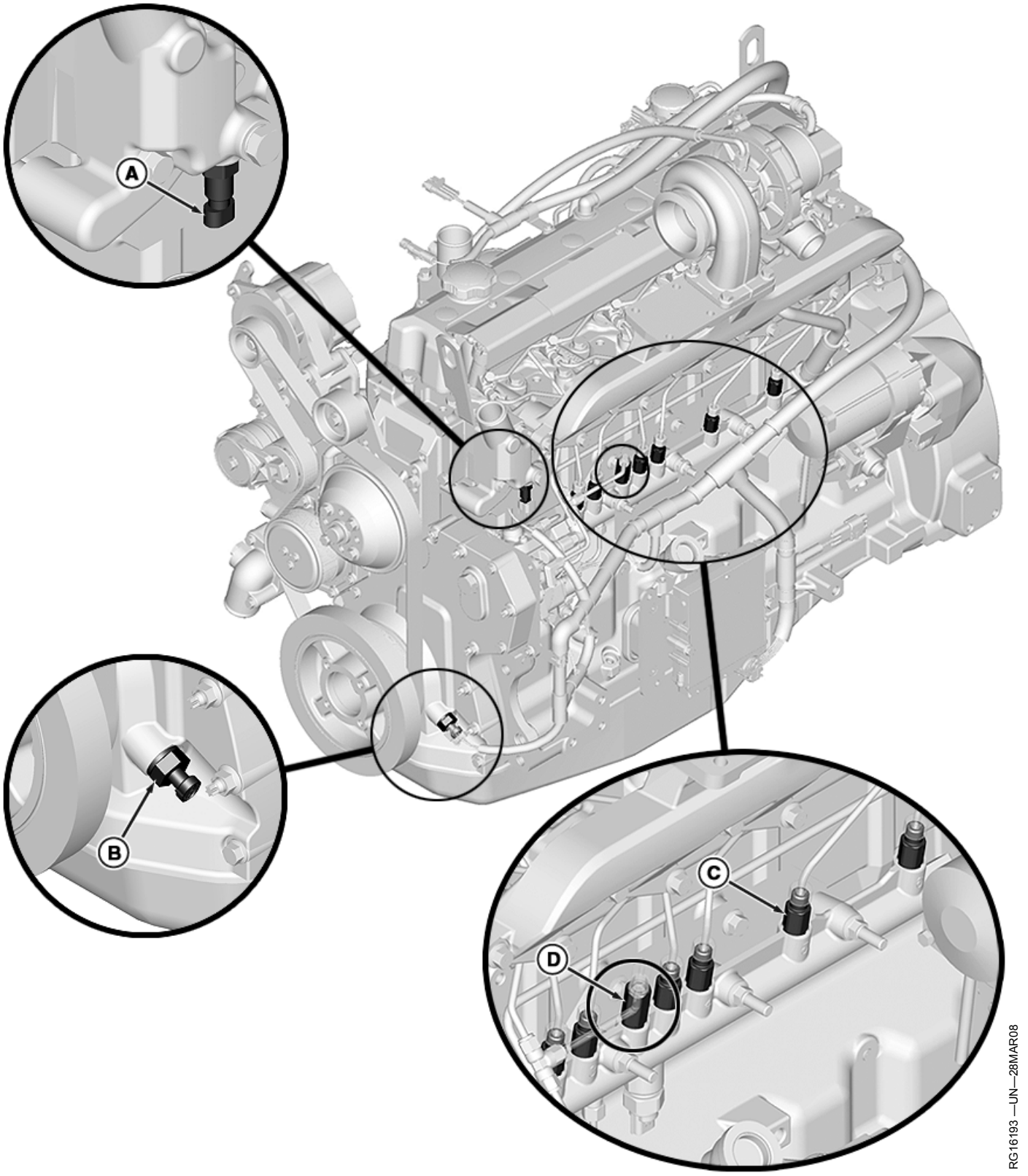
6.8L Engine

A—Suction Control Valve **B—Fuel Temperature Sensor** **C—Pump Position Sensor**

BK53208,000007F -19-31MAR08-1/1

Component Location Diagram 7

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



6.8L Engine

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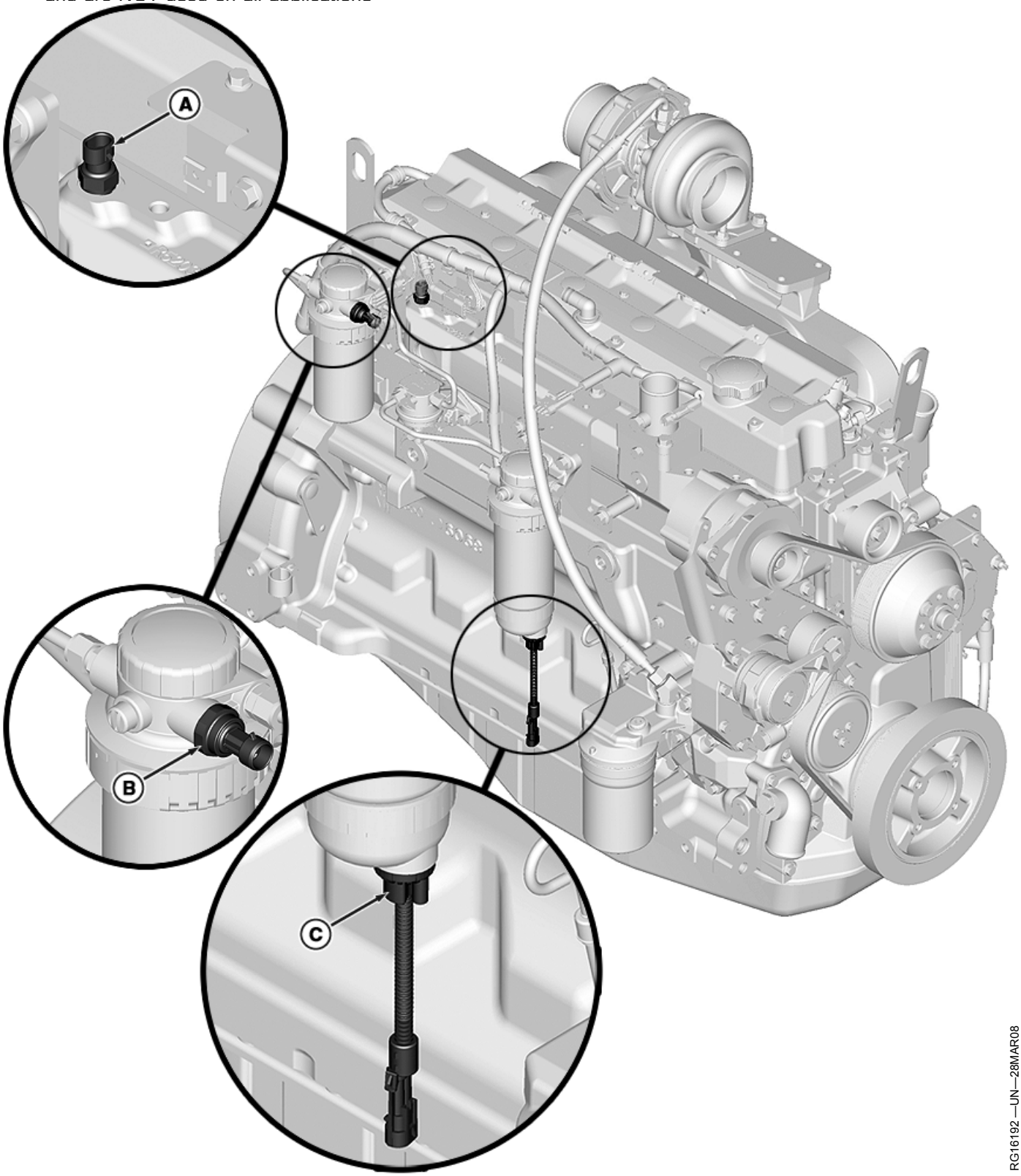
BK53208,0000080 -19-31MAR08-1/2

A—Coolant Temperature Sensor **B—Crank Position Sensor** **C—Fuel Limiter** **D—Pressure Limiter**

BK53208,0000080 -19-31MAR08-2/2

Component Location Diagram 8

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



6.8L Engine

Continued on next page

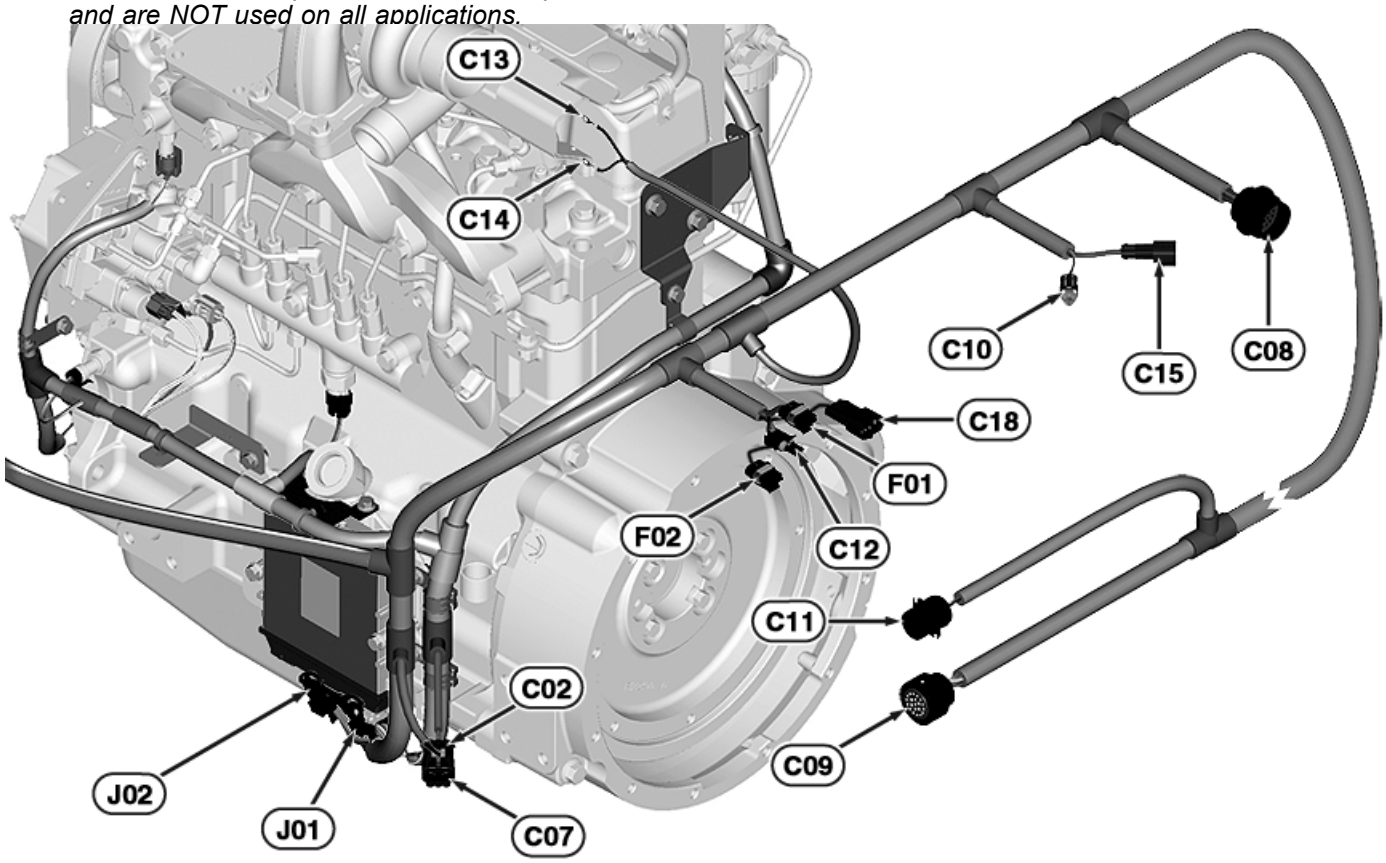
BK53208,0000081 -19-31MAR08-1/2

A—Manifold Air Temperature (MAT) Sensor **B—Low Pressure Fuel Sensor** **C—Water-In-Fuel (WIF) Sensor**

BK53208,0000081 -19-31MAR08-2/2

Component Location Diagram 9

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



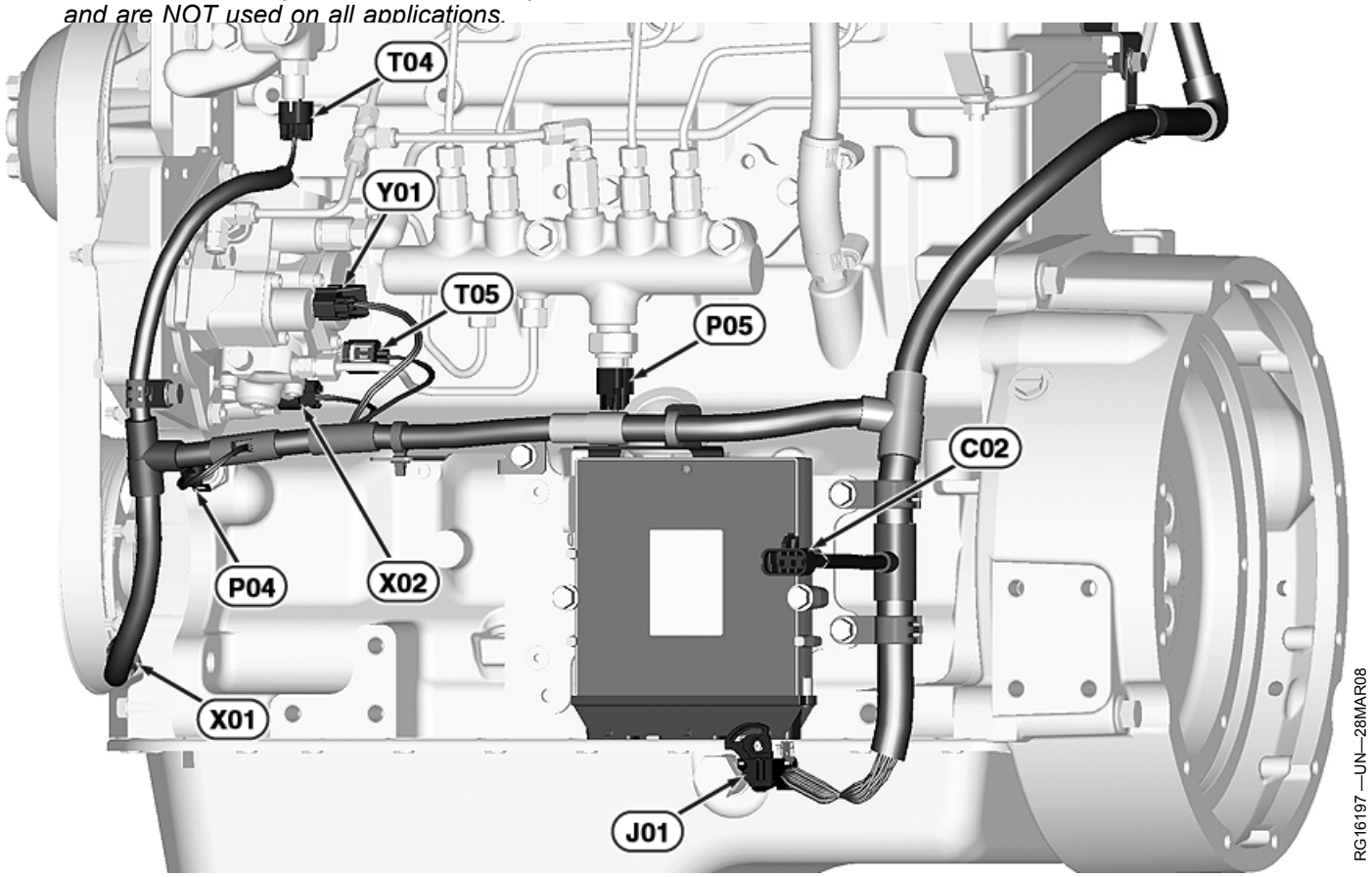
4.5L Engine

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
C18— Fuel Heater Connector
F01— Fuse, 30 Amp
F02— Fuse, 20 Amp
J01— ECU Harness Connector, Black Face
J02— ECU Harness Connector, Red Face

BK53208,0000082 -19-31MAR08-1/1

Component Location Diagram 10

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



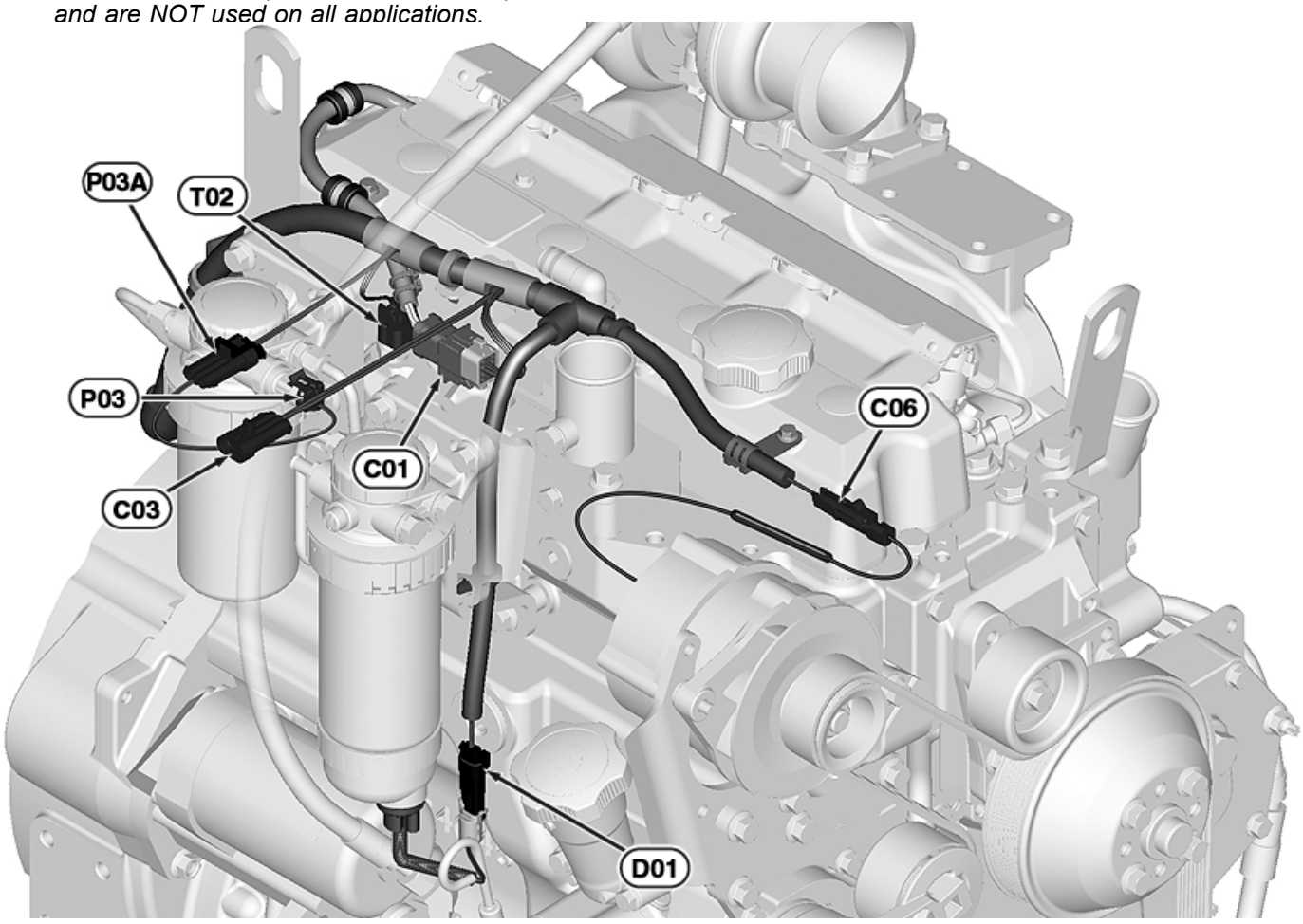
4.5L Engine

C02— Accessory Connector A
J01— ECU Harness Connector, Black Face
P04— Oil Pressure Sensor Connector
P05— Fuel Rail Pressure Sensor Connector
T04— Coolant Temperature Sensor Connector
T05— Fuel Temperature Sensor Connector
X01— Crank Position Sensor Connector
X02— Pump Position Sensor Connector
Y01— Suction Control Valve Connector

BK53208,0000083 -19-31MAR08-1/1

Component Location Diagram 11

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



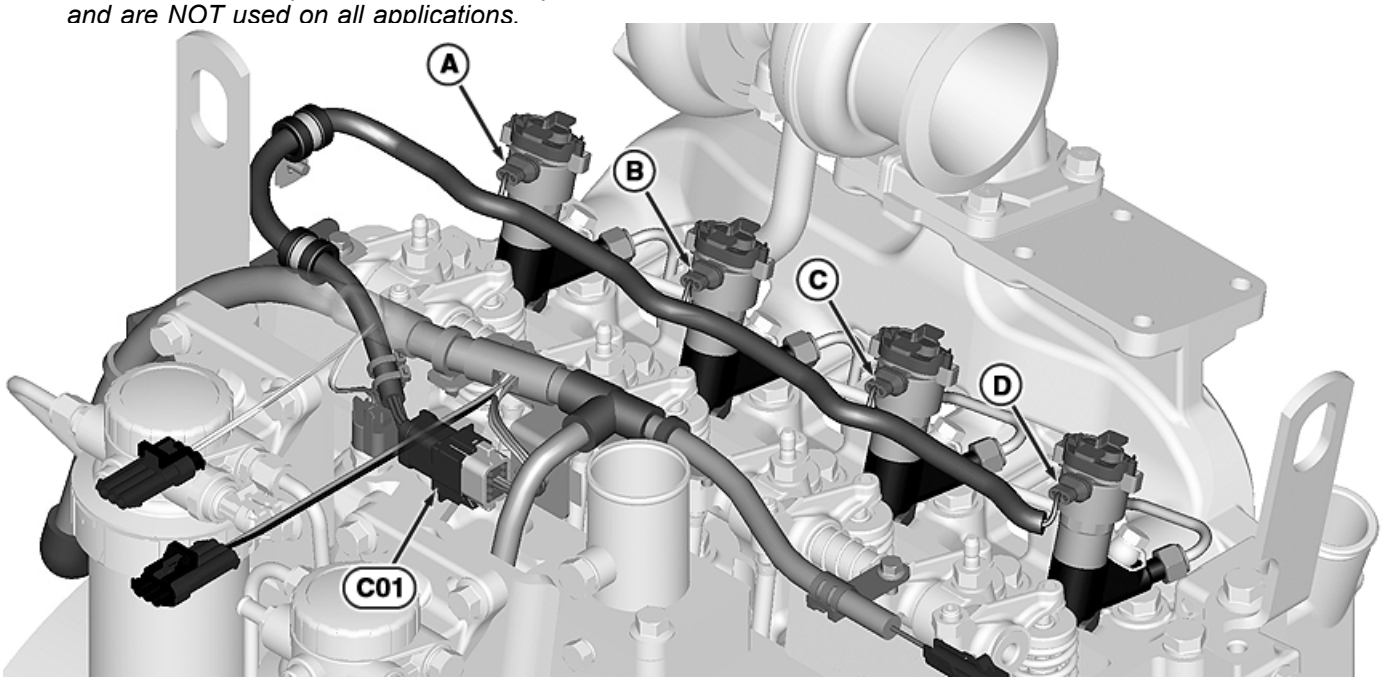
4.5L Engine

C01— Fuel Injector Connector
C03— Air Heater Connector
C06— Alternator Excitation
D01— Water-In-Fuel Sensor Connector
P03— Low Pressure Fuel Sensor Connector
P03A— Low Pressure Fuel Sensor Interconnect
T02— Manifold Air Temperature Sensor Connector

BK53208,0000084 -19-31MAR08-1/1

Component Location Diagram 12

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



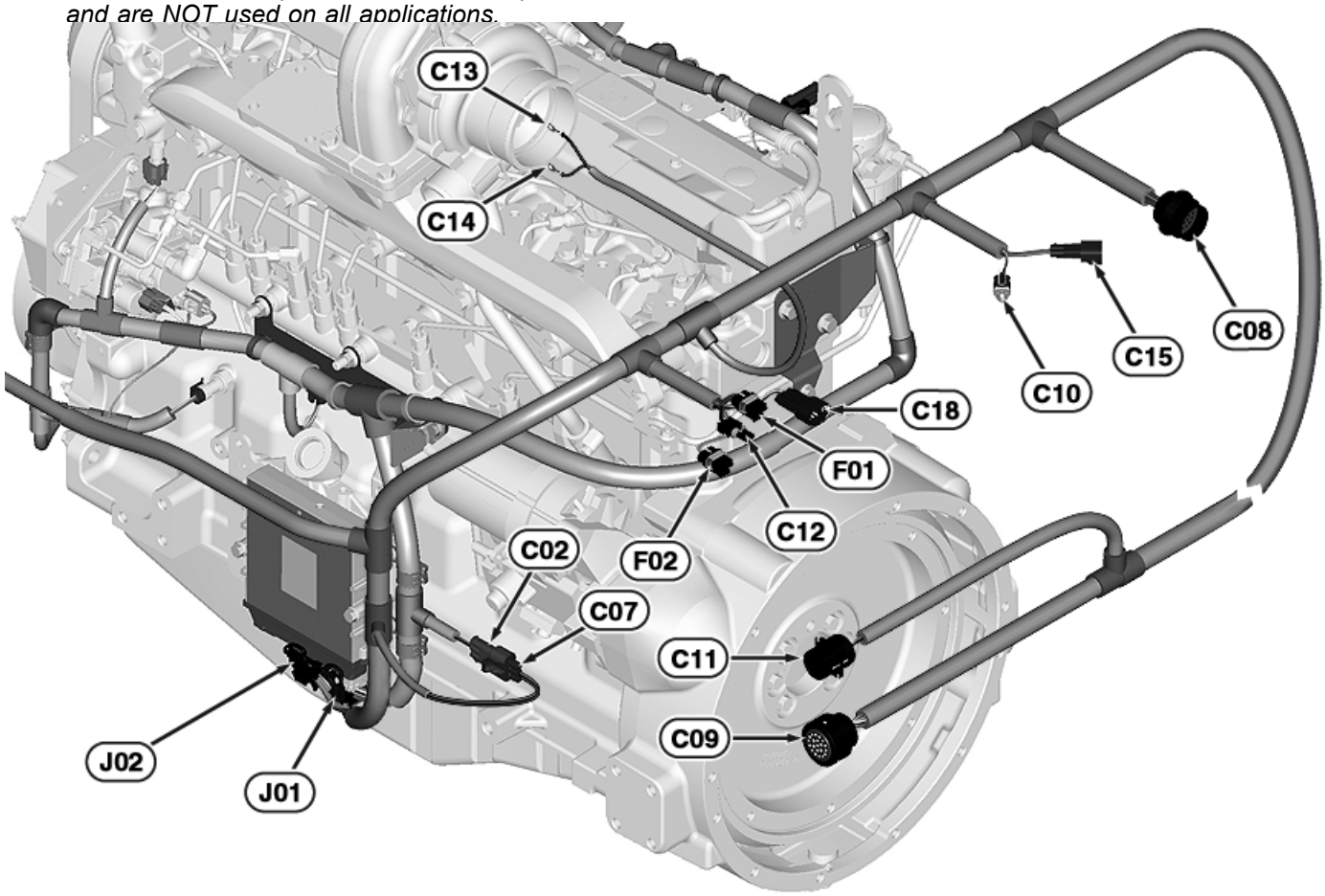
4.5L Engine

A—Cylinder #4
B—Cylinder #3
C—Cylinder #2
C01— Fuel Injector Connector
D—Cylinder #1

BK53208,0000085 -19-31MAR08-1/1

Component Location Diagram 13

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



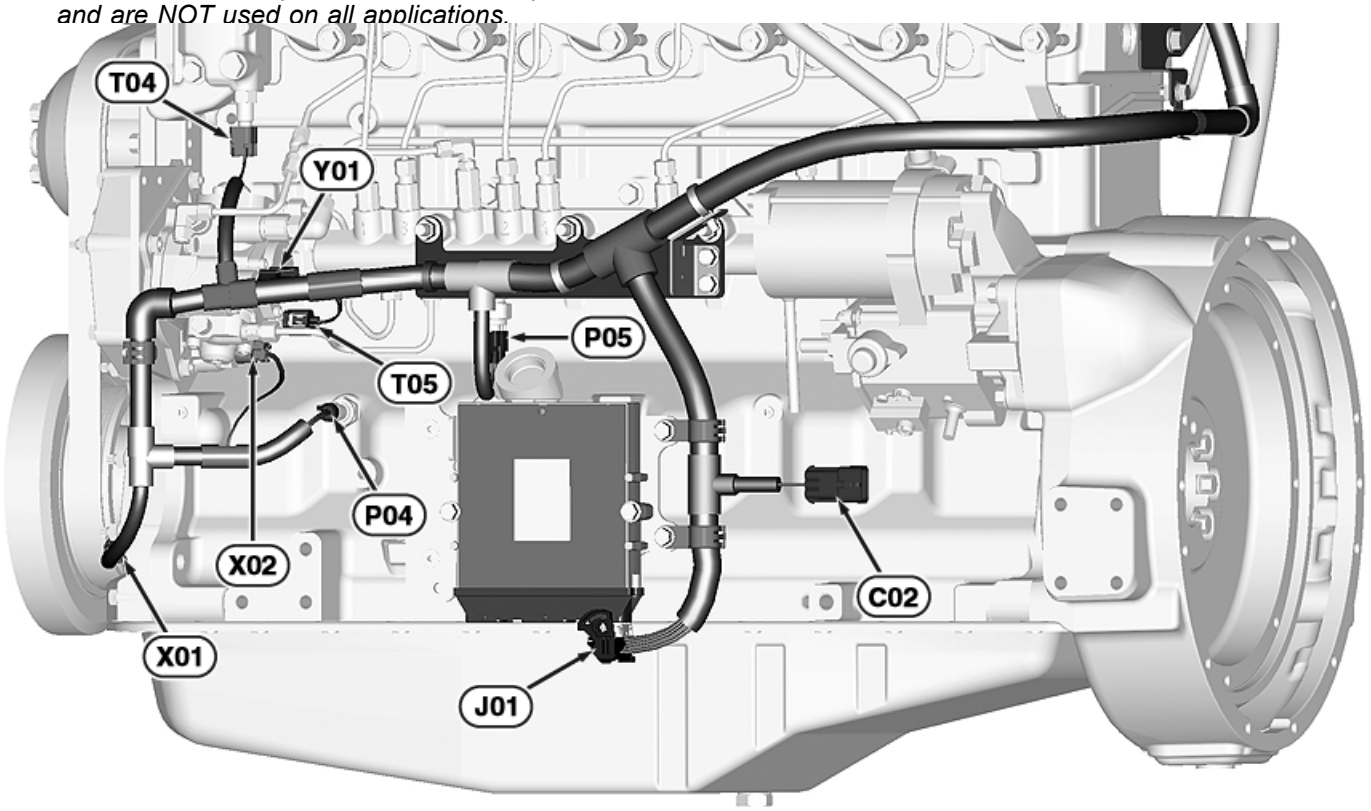
6.8L Engine

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
C18— Fuel Heater Connector
F01— Fuse, 30 Amp
F02— Fuse, 20 Amp
J01— ECU Harness Connector, Black Face
J02— ECU Harness Connector, Red Face

BK53208,0000086 -19-31MAR08-1/1

Component Location Diagram 14

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



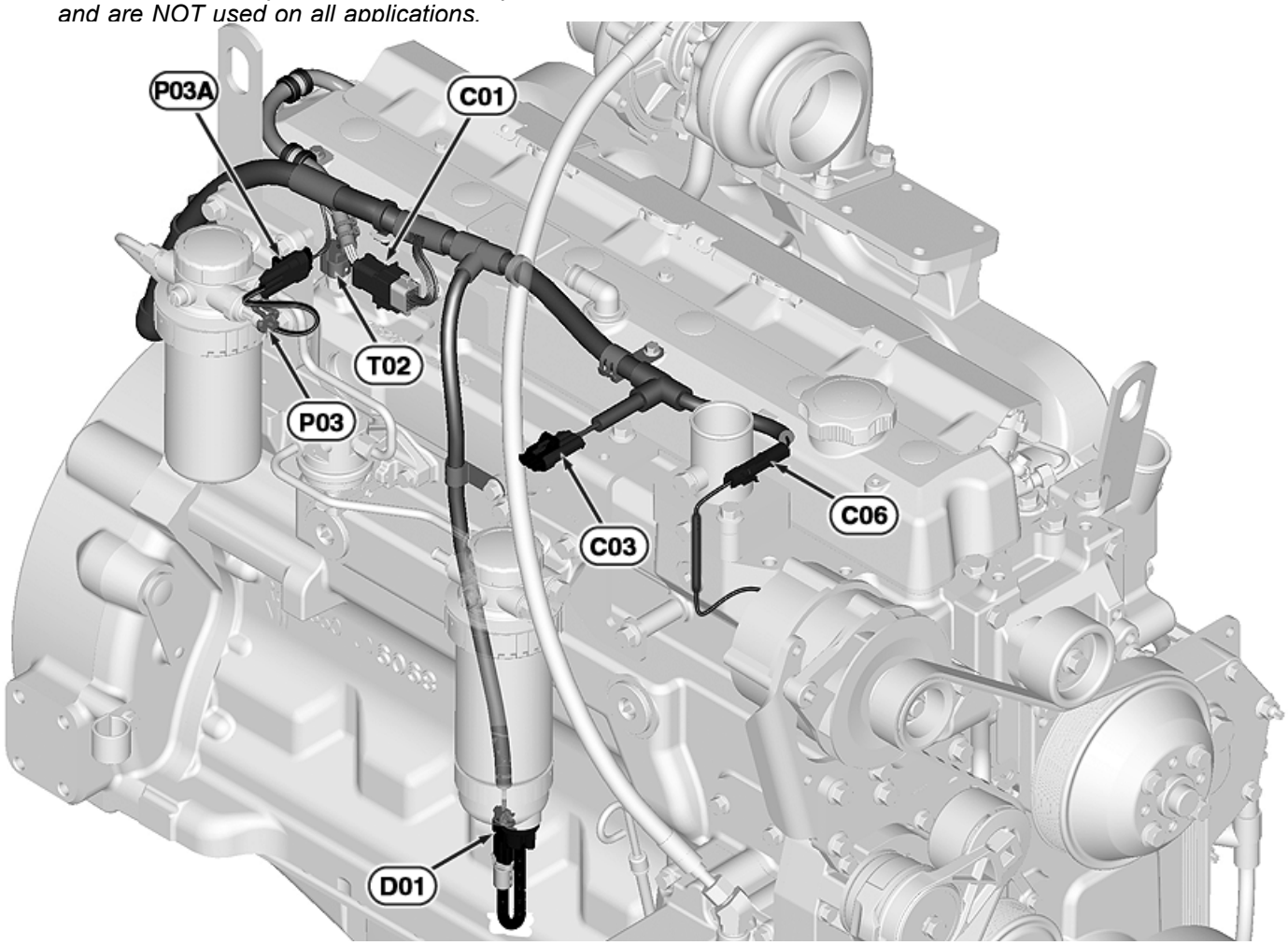
6.8L Engine

C02— Accessory Connector A
J01— ECU Harness Connector, Black Face
P04— Oil Pressure Sensor Connector
P05— Fuel Rail Pressure Sensor Connector
T04— Coolant Temperature Sensor Connector
T05— Fuel Temperature Sensor Connector
X01— Crank Position Sensor Connector
X02— Pump Position Sensor Connector
Y01— Suction Control Valve Connector

BK53208,0000087 -19-31MAR08-1/1

Component Location Diagram 15

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



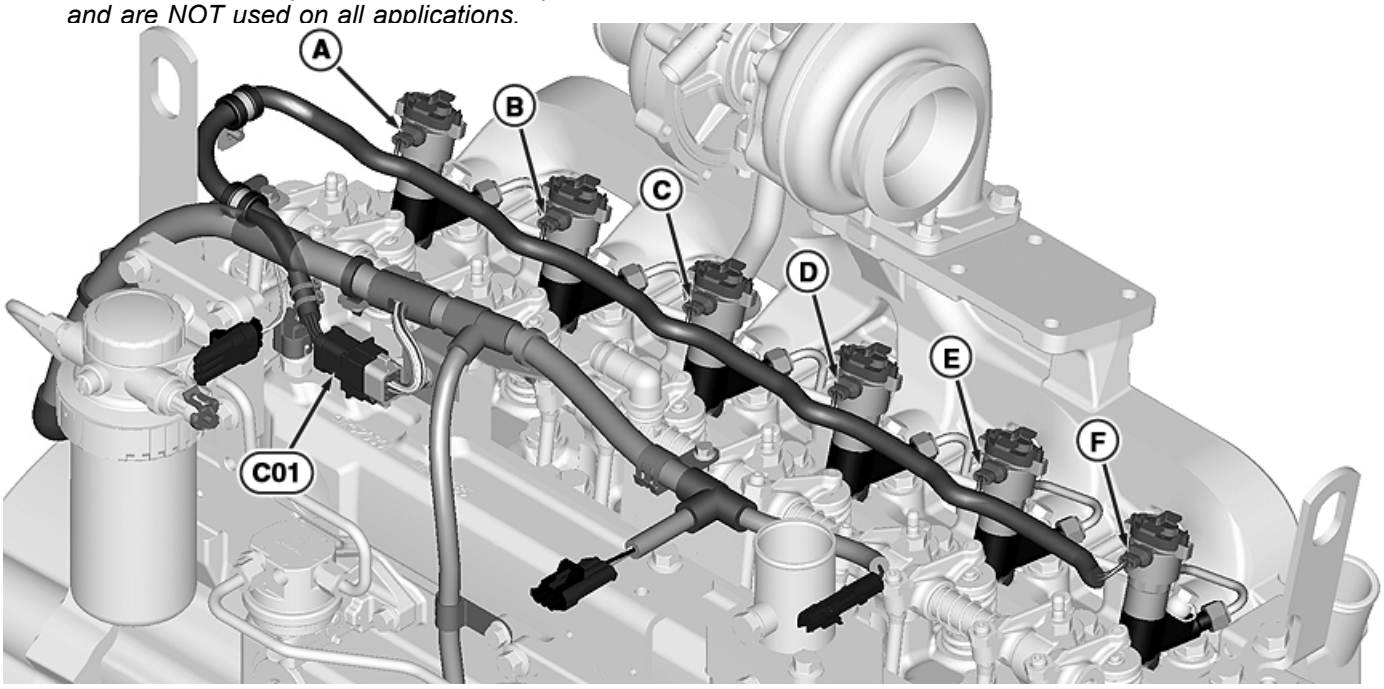
6.8L Engine

C01— Fuel Injector Connector
C03— Air Heater Connector
C06— Alternator Excitation
D01— Water-In-Fuel Sensor Connector
P03— Low Pressure Fuel Sensor Connector
P03A— Low Pressure Fuel Sensor Interconnect
T02— Manifold Air Temperature Sensor Connector

BK53208,0000088 -19-31MAR08-1/1

Component Location Diagram 16

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

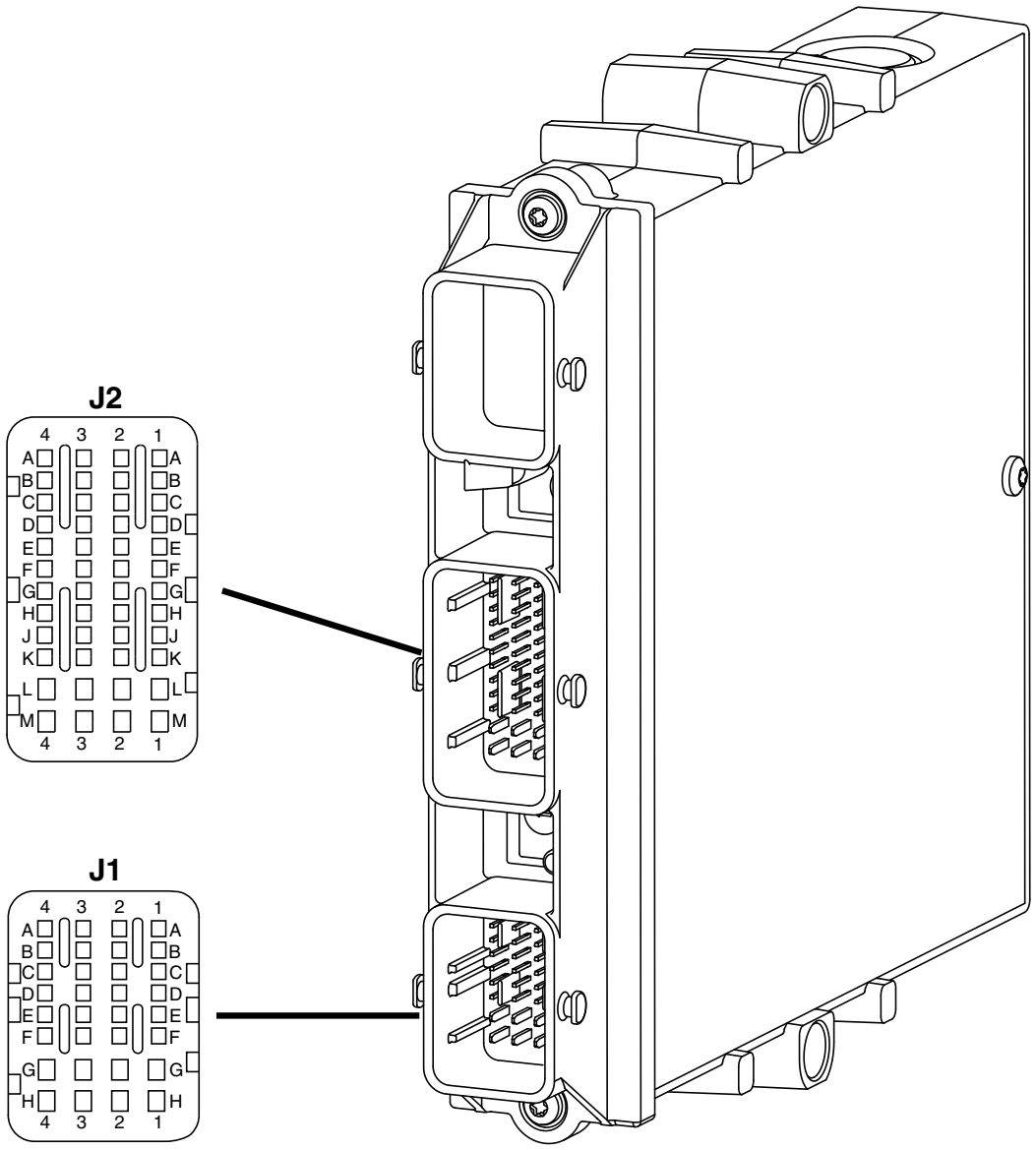


6.8L Engine

A—Cylinder #6
B—Cylinder #5
C—Cylinder #4
C01— Fuel Injector Connector
D—Cylinder #3
E—Cylinder #2
F—Cylinder #1

BK53208,0000089 -19-31MAR08-1/1

Engine Control Unit (ECU)



Engine Control Unit (ECU)

J1— 32 pin connector - black insert

J2— 48 pin connector - brown insert

DM80898,000011F -19-18DEC06-1/1

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:

- Engine Control Unit (ECU) Temperature
- Engine Coolant Temperature (ECT)
- Fuel Temperature
- Intake Manifold Air Temperature (MAT)
- Barometric Air Pressure (BAP)
- Fuel Rail Pressure
- Throttle Position
- Fuel Transfer Pump Pressure (optional)
- Manifold Air Pressure (MAP–optional)
- Oil Pressure
- Crank Position
- Pump Position
- Water in Fuel (WIF)
- Throttle Position
- Power Supply #1
- Power Supply #2
- Power Supply #3
- External Derate Commands
- External Shutdown Commands

DM80898,00000F6 -19-22MAY07-1/1

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.

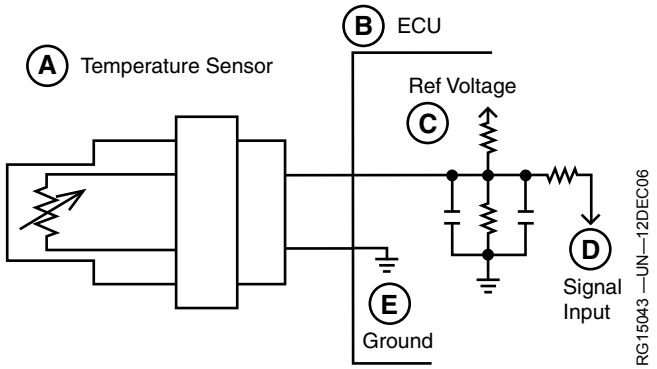


Figure 1

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 earlier in this Group.

DB92450,000000F -19-15OCT07-1/1

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. In addition, the air heater operation is driven off of the fuel temperature. If the temperature of the fuel drops below specification, the air heater will turn on for a predetermine length of time.

For more information on how temperature sensors operate, see MEASURING TEMPERATURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION 2for 4.5L COMPONENT LOCATION 6for 6.8L earlier in this Group.

For more air heater information, see INTAKE AIR HEATER OPERATION later in this Group.

DM80898,00000F7 -19-18APR08-1/1

Intake Manifold Air Temperature (MAT)

The MAT sensor is located on the air intake manifold. The ECU uses this sensor to measure the temperature of the air in the intake manifold. The MAT helps the ECU calculate the correct fueling for the engine. The 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 4for 4.5L COMPONENT LOCATION 8for 6.8L earlier in this Group.

DM80898,0000439 -19-18APR08-1/1

Turbo Turbine Inlet Temperature

There is no turbo turbine temperature sensor. This temperature is calculated by the ECU. The ECU uses the following parameters to create the model based temperature:

- Manifold Air Pressure
- Timing base on the crank position or the pump position sensor
- Fuel Rail Pressure
- Engine Speed
- Fresh Air to Fuel Ratio
- A software filter to represent a time delay for component heat up rate.

The ECU also uses this temperature for engine protection purposes.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

RG41221,00002A8 -19-15OCT07-1/1

Measuring Pressure

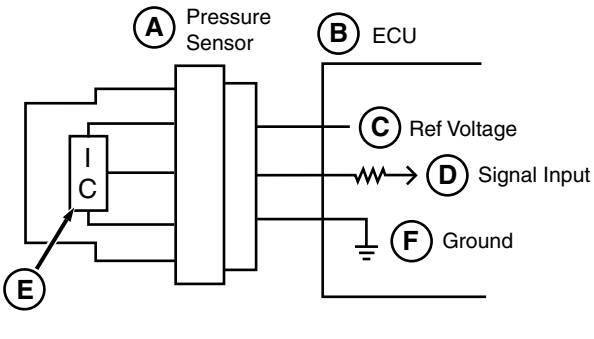
All engine pressure sensors (A) are 3-wire devices. As pressure changes, output changes. The ECU (B) supplies the sensor with a reference voltage (C) and ground (F). It monitors the output voltage from the sensor signal output wire (D). As the pressure changes, it causes the input to the ECU to change.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

There are many types of devices, and depending on the circuitry (E) in the device, the ECU determines how to process the input signal.

If the input value is near the expected value, then the ECU assumes everything is functioning properly. If the value is above or below the expected value, the ECU will set the appropriate diagnostic trouble code (DTC).

The ECU has the ability to derate the engine power, engine speed, or shut down the engine in an attempt to protect the engine and its components. If certain pressures exceed the threshold, the ECU will enable the engine protection.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.



Typical Pressure Sensor Schematic

A—Pressure Sensor
B—ECU
C—Ref Voltage
D—Signal Input
E—IC (Integrated Circuit)
F—Ground

For more information on DTC's, see DIAGNOSTIC TROUBLE CODES LIST in Section 4, Group 160.

RG40854,00000E5 -19-04JAN08-1/1

Barometric Air Pressure (BAP) Sensor

The BAP sensor is located internal to the ECU. This sensor cannot be repaired or replaced without replacing the entire ECU. This sensor is used to determine the pressure of the ambient air at the mounting location of the ECU. This helps the ECU determine the air density for calculating the correct air/fuel ratio.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

RG41221,00002A9 -19-15OCT07-1/1

Fuel Rail Pressure Sensor

The fuel rail pressure sensor sends a pressure equivalent signal to the ECU. The ECU monitors fuel pressure to control the amount and timing of fuel being transferred from the high pressure fuel pump to the high pressure common rail (HPCR). The ECU uses this signal input to determine if fuel rail pressure is adequate for the current operating condition. The ECU will command more or less fuel from the high pressure fuel pump by altering the signal to the suction control valve. The ECU also uses this sensor to determine if there is an electronic injector problem by measuring the drop of pressure every time the engine injects fuel to a specific cylinder. This sensor is used for engine protection.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

For more information on the suction control valve, see SUCTION CONTROL VALVE later in this Group.

DB92450,0000015 -19-30AUG07-1/1

Fuel Transfer Pump Pressure Sensor

The fuel pressure sensor sends a pressure equivalent signal to the ECU. The ECU monitors fuel pressure to determine if fuel is continuously passing through the low pressure side of the fuel system, or if there is a leak or blockage in it.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,0000420 -19-27AUG07-1/1

Manifold Air Pressure (MAP) Sensor

The ECU uses manifold absolute pressure to help calculate the amount of airflow into the engine. The MAP sensor also supplies the ECU with a direct measurement of turbo boost.

The ECU computes what MAP should be based on engine operating conditions and turbo speed. If the actual value of MAP from the sensor is significantly different for the current operating conditions the ECU will default to a MAP model and set DTC 000102.02.

The most probable causes of this error are boost air leaks and air intake restrictions.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,0000422 -19-15OCT07-1/1

Oil Pressure Sensor

The oil pressure sensor sends an oil pressure equivalent signal to the ECU. The ECU uses this signal to determine if engine oil pressure is adequate for the current operating conditions. The ECU monitors oil pressure for engine protection purposes.

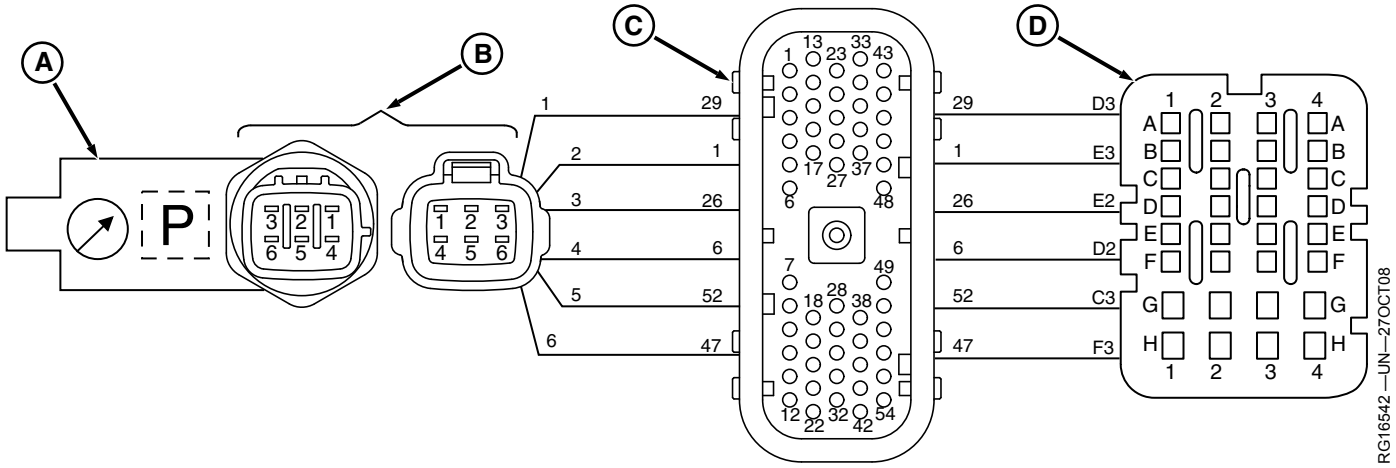
For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DB92450,0000016 -19-15OCT07-1/1

Dual Fuel Rail Pressure Sensor (Redundant ECU Applications)



Dual Fuel Rail Pressure Sensor

A—Dual Fuel Rail Pressure Sensor

B—P05 Sensor Connector

C—Switch Box Connector

D—J01 ECU or Redundant ECU Connector

The dual fuel rail pressure sensor sends two redundant pressure equivalent signals to the ECU. The ECU monitors fuel pressure to control the amount and timing of fuel being transferred from the high pressure fuel pump to the high pressure common rail (HPCR). The ECU uses this signal input to determine if fuel rail pressure is adequate for the current operating condition. The ECU will command more or less fuel from the high pressure fuel pump by altering the signal to the suction control valve. The ECU also uses this sensor to determine if there is an electronic injector problem by measuring the drop of pressure every time the engine injects fuel to a specific cylinder. This sensor is used for engine protection.

For more information on how pressure sensors operate, see MEASURING PRESSURE earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

NOTE: The Dual Fuel Rail Pressure Sensor is used on a limited number of engines and is in the same location as the common Fuel Rail Pressure sensor.

For more information on the suction control valve, see SUCTION CONTROL VALVE later in this Group.

BB78437,0000150 -19-28OCT08-1/1

Measuring Speed

The camshaft position sensor measures engine speed by detecting the rotating teeth of a timing wheel mounted on the front of the camshaft drive gear. It can also measure the position of the rotation of the engine because it can detect a gap in teeth of the timing wheel where two of the teeth have been removed. This gap corresponds to top-dead-center of piston #1.

The sensor uses a coil wound around a magnet to create a voltage signal. As the tooth in the timing wheel passes directly under the sensor, the magnetic field is pulled towards the tooth. As the tooth passes the sensor, the magnetic field moves back toward the sensor. This creates a voltage in the coil that is sent to the ECU. By monitoring the frequency of these signals, the ECU calculates the component speed. When the gap in the teeth of the timing wheel is detected, the ECU interprets this change in the voltage pattern to be top-dead-center.

RG40854,00000E8 -19-15OCT07-1/1

Crank Position Sensor

It is an inductive type pickup sensor that detects teeth on the crankshaft timing gear. The ECU uses the crank position input to determine engine speed and the angular position of the crankshaft in its 360° field of rotation. The crankshaft timing gear is composed of 45 evenly-spaced teeth. There is a 3-tooth section with no notches. The 3-tooth section helps the ECU determine when cylinder #1 is at Top-Dead-Center (TDC).

The ECU uses the inputs of both the crank position and pump position sensors to precisely control the timing and duration of fuel injection.

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 SPEED earlier in this Group.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

RG41221,00002AF -19-30AUG07-1/1

Pump Position Sensor

It is an inductive type pickup sensor that detects teeth on the upper idler gear. The upper idler gear is composed of 12 evenly-spaced notches with one additional notch offset to tell the ECU that cylinder #1 is approaching Top-Dead-Center.

If there is a problem with the Pump Position Sensor, the ECU will use the Crank Position Sensor to determine engine timing. This may require prolonged engine cranking to start the engine.

For more information on how speed sensors operate, see MEASURING SPEED earlier in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

DM80898,00000FB -19-30AUG07-1/1

Throttle Descriptions

John Deere engines can accept several types of throttle inputs and in several different connection schemes depending on the application. Types of throttles are:

- Analog
- Digital
- Pulse Width Modulated (PWM)
- CAN (messages on the CAN bus)

More than one throttle can be enabled at a time in the ECU software. For finer control of engine speed, a combination throttle can be enabled in the ECU software (discussed later in this group).

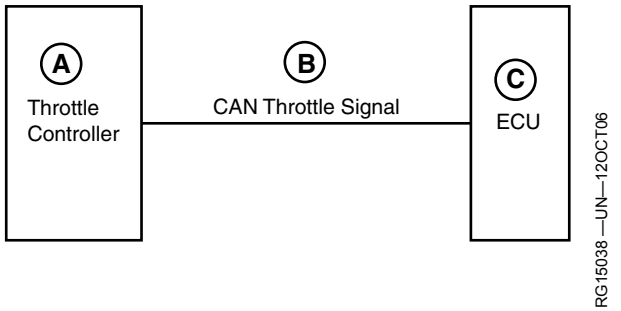
A description of each type follows later in this group.

DM80898,0000003 -19-15OCT07-1/1

CAN Throttle

CAN (Controller Area Network) throttle is information of the desired throttle position that is sent to the ECU by another controller over the CAN bus.

A—Throttle Controller
B—CAN Throttle Signal
C—ECU



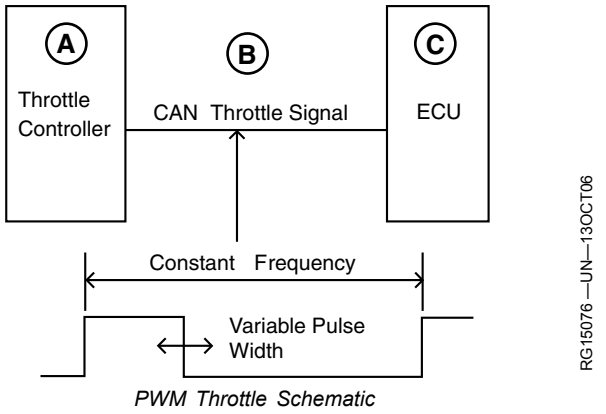
CAN Throttle Schematic

DM80898,0000045 -19-15OCT07-1/1

Pulse-Width-Modulated (PWM) Throttle

The PWM throttle signal is sent to the ECU by another controller. The PWM signal is a square wave signal with a constant frequency. The pulse width of the signal varies to indicate the desired throttle opening.

A—Throttle Controller
B—CAN Bus Throttle Signal
C—ECU



PWM Throttle Schematic

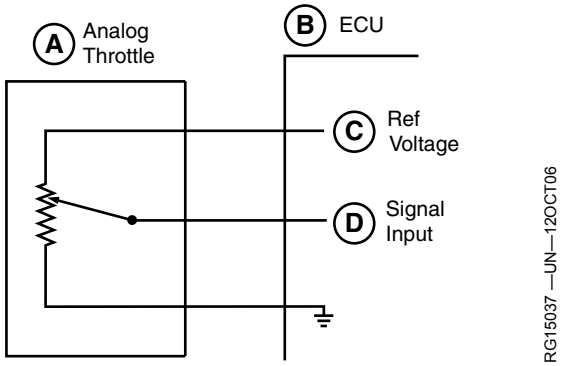
DM80898,000012A -19-15OCT07-1/1

Analog Throttle

An analog throttle uses a variable resistor (potentiometer) to supply voltage to the ECU. A reference voltage is sent to the throttle by the ECU. The resistance changes as the throttle position changes. In turn, input voltage to the ECU will vary according to the throttle position. The input voltage is monitored by the ECU which responds by sending out the appropriate control signals according to its programming.

A second analog throttle can also be enabled with the first (primary) analog throttle if that option has been set in the ECU software.

A—Analog Throttle
B—ECU
C—Reference Voltage
D—Signal Input



Position Sensor

RG41221,00002B7 -19-15OCT07-1/1

Digital Multi-State Throttle

The multi-state throttle is used when a few fixed engine speeds are desired. There are three types of multi-state throttles:

- Dual-State Throttle - See DUAL-STATE THROTTLE later in this Group.
- Tri-State Throttle - See TRI-STATE THROTTLE later in this Group.
- Ramp Throttle - See RAMP THROTTLE later in this Group.

DM80898,0000046 -19-15OCT07-1/1

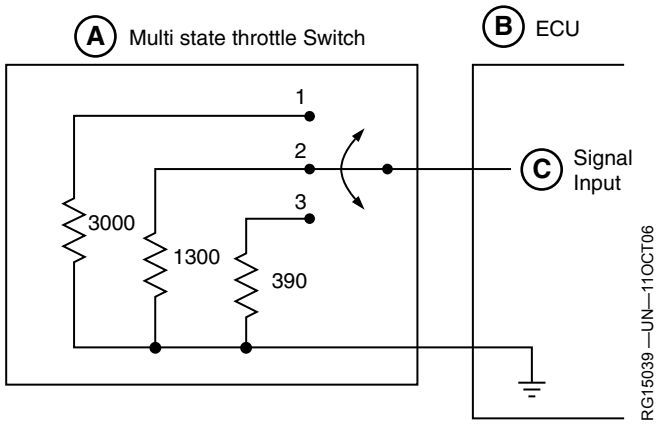
Dual-State Throttle

The dual-state throttle is used on applications that use two fixed engine speeds. The available positions are “Low Idle” (turtle) and “High Idle” (rabbit). The standard tri-state detent switch may be replaced with a 2-position detent switch with only the “turtle/low” and “rabbit/high” position resistance settings.

The switch uses two different resistors to change the voltage returned to the ECU. The ECU uses an internal conversion table to convert the voltage to a specific engine speed. When the switch is in the low idle position, the current is routed through a 390-ohm resistor. High idle position uses a 3000-ohm resistor.

If the panel has an analog throttle then the engine speed can be adjusted when the dual state throttle switch is in the low idle position.

NOTE: The three-position multi-state throttle switch may be used. The middle position is ignored.



Dual-State Throttle Switch Schematic

A—Multi state throttle switch
B—ECU
C—Signal input

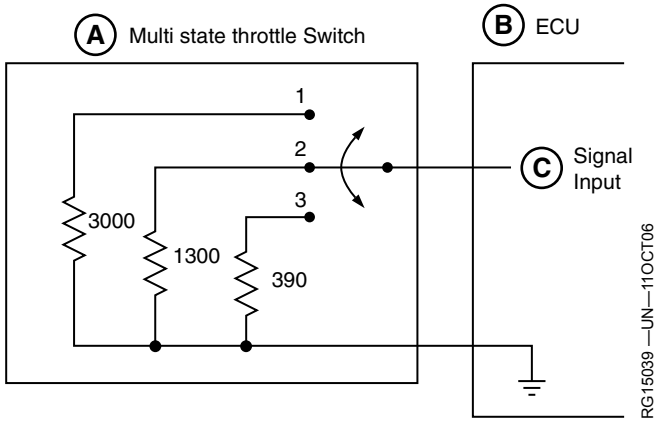
DM80898,0000047 -19-15OCT07-1/1

Tri-State Throttle

The digital tri-state (or “3-state”) throttle works similar to the dual-state throttle. This throttle uses a switch with three positions: minimum throttle (turtle–3), maximum throttle (Adj–2), and fast idle (rabbit–1). In the minimum throttle position, engine RPM defaults to a speed that has been set in the ECU according to the needs of the application. The fast idle (no-load) position speed is set in the ECU according to the needs of the application. In the maximum (Adj–2) throttle position, engine speed can be set within a range programmed into the ECU.

The switch uses three different resistors to change the voltage returned to the ECU. When the switch is in the minimum throttle position, current is routed through a 390-ohm resistor. The maximum throttle position uses a 1300-ohm resistor and the fast idle position uses a 3000-ohm resistor.

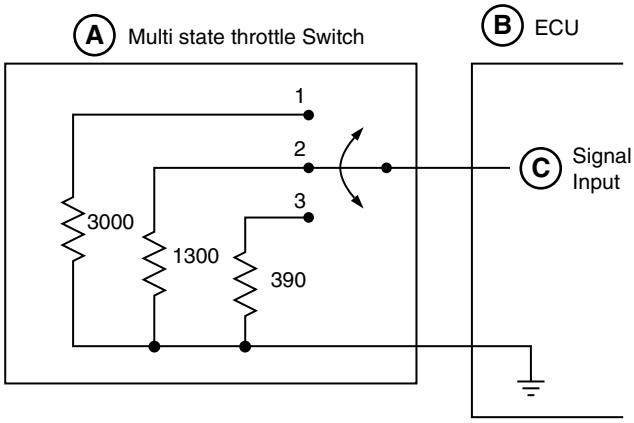
To change engine speed, the tri-state throttle must be in the Adj position and the “Bump Enable” switch must be in the “enable up” or “enable down” position while the “Idle Select” switch is held in the increase (+) or the decrease (–) position.



A—Multi-State throttle
B—ECU
C — Signal Input

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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

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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.

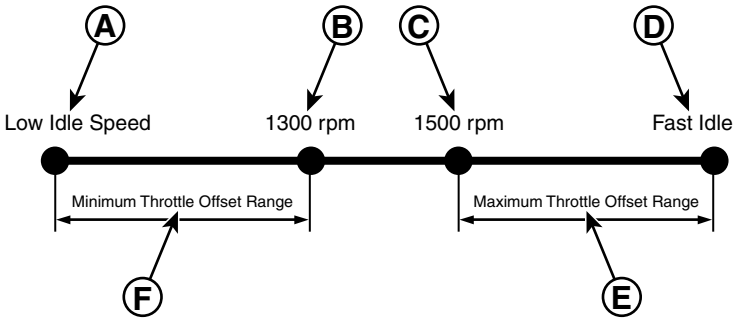
- **Idle Recovery:** When a throttle OOR condition is detected, only the OOR throttle input will be considered 0%. If the input becomes valid again after the OOR condition, the OOR throttle must be returned to low idle position (0% throttle) before the output of the throttle is allowed to increase above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

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Throttle Offsets

Minimum Throttle Offset



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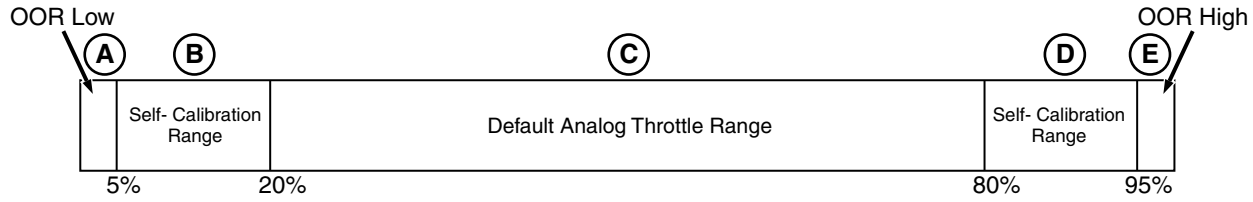
The Minimum Throttle Offset is used to pre-set the low speed idle bump. The number entered into the field on the Trim Page will be the rpm increase from the standard factory setting of the idle speed. This offset will apply to all active throttles. The maximum setting for the Minimum Throttle Offset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

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Combination Throttle

The combination throttle is the use of two or more throttle controls on an application to give coarse/fine/extra fine control. A maximum of 3 throttles may be combined. Normally, only two are used.

If the combination throttle is enabled, a master and a secondary throttle are selected. An additional third throttle can be selected as part of the combination. Each throttle can only be used once in the combination series (i.e.The Primary Analog Throttle selected as the master throttle cannot be selected as the second or third throttle in the combination).

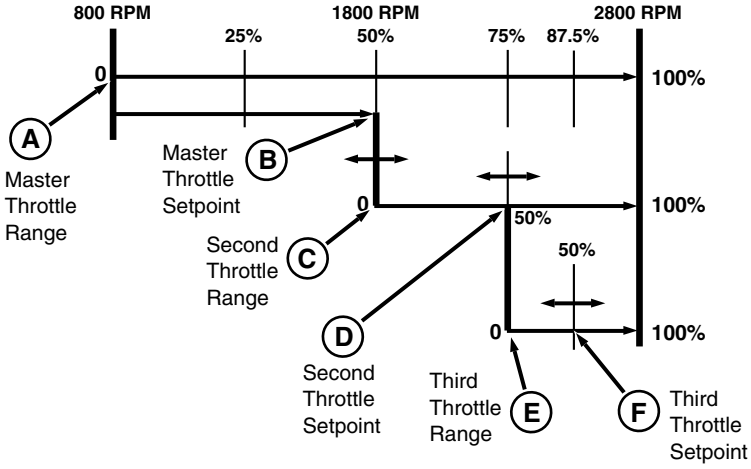
Any type of throttle can be used in the combination. Currently, the only OEM throttle types used are 2-state, 3-state, ramp, and analog. PWM and CAN throttles can be used but are not currently configured for use within the software.

The ECU uses inputs from all enabled throttles to set engine speed. If a combination throttle with 2 throttles is enabled, and a third throttle is enabled, the ECU will look at the input from the combination throttle and compare it to the third throttle. The engine speed will then be set to whichever one is highest.

The basic role of the throttle controls is to act as accelerators. This means that, as the throttle input increases, the engine speed increases. The master throttle always functions in this fashion.

While not common, there are throttle controls that function as decelerators. This means as the throttle input increases, the engine speed decreases. However, this function is not compatible with 3-state throttles.

The combination throttle operates in the following fashion: each throttle has an available throttle range of 0-100% (low idle to high idle speed), and as each throttle is added to the master, a finer resolution in engine speed is defined (see figure below).



A—Master Throttle Range
B—Master Throttle Setpoint
C—Second Throttle Range
D—Second Throttle Setpoint
E—Third Throttle Range
F—Third Throttle Setpoint

DM80898,0000005 -19-15OCT07-1/1

Marine Throttle

The marine engine has two dual throttle options:

- Dual throttles with transfer control
- Engine synchronization control.

To operate either option requires a variation of the marine transition harness. Which variation depends on feature configuration(s). Both options cannot operate simultaneously. Operation of each option is described as follows:

Dual-Throttle Transfer Control

This feature allows throttle control from one of two locations: the wheelhouse, or a secondary (auxiliary) station. when the ECU is initialized at key ON, throttle control defaults to the station selected via the trim options and is set up in the ECU during programming.

To change throttle control location during engine operation, the station select push-button switch at the requesting throttle is held engaged. The indicator lamp will briefly flash, indicating the throttle control transfer has started. The push-button is held engaged until the station indicator lamp is solid, indicating that throttle control transfer has been successful.

For transfer of throttle control to be successful, the position of the requested throttle must be within 2% of the active throttle position. For example, if the ECU is sampling a throttle command of 55% at the active throttle, then the ECU must receive a throttle command between 53% and 57% at the requesting throttle. If the requesting throttle is not within 2% (approximately 33 rpm) of the active throttle, the lamp flashes on and off. If the station select push-button switch is held engaged and the operator moves the requesting throttle to within 2%, transfer will occur. The lamp will go from flashing to solid and the switch at the requesting throttle can be released.

If the requesting throttle position is outside normal operating range, its lamp momentarily lights, then shuts off and remains off. If the switch contacts of both throttles are simultaneously closed, the ECU selects the “highest priority location”, which has been designated during ECU programming, via trim options.

At key ON, a test of the lamps at the throttle station(s) will occur. If any lamp does not briefly come on, replace the bulb. The lamp test will occur only if the key has been OFF for at least 30 seconds.

Engine Synchronization Control

The Engine Sync feature is selected via trim options and is set up in the ECU during programming. This feature allows the synchronous operation of two engines through a two-throttle, lead-follow system; one ECU is programmed as the Lead, and the other as the Follower. When the system is successfully engaged, the follower ECU runs off the lead ECU’s signal. On engines that also have the dual throttle option described above, auxiliary throttle location input is automatically deselected when the engine synchronization is in operation.

In order to enable this system, the following three criteria must be met and sustained for at least two seconds:

1. Both engines must be running at greater than, or equal to, 975 rpm.
2. The engines must be running to within 100 rpm, or less, of each other.
3. The individual throttle commands of each ECU must be within 5% of each other’s value.

When the synchronous throttle switch is turned on with the initial criteria met, the throttle station lamp comes on. If at least one of the three criteria is not met, the throttle station lamp flashes on and off until the failing condition has been corrected.

When engine synchronization is successful, the ECU will have automatically disabled the tachometer of the follower engine and will have set each engine to isochronous governor operation. When an engine is above or below engine rpm demand, its governor sends a signal back to the engine’s ECU and the ECU makes the appropriate adjustment.

During large demands for acceleration or deceleration, it is normal for the synchronization system to shut down. Synchronous operation may, at any time, be re-enabled, as long as the initial criteria are met.

At key ON, a test of the lamps at the throttle station(s) will occur. If any lamp does not briefly come on, replace the bulb. The lamp test will occur only if the key as been OFF for at least 30 seconds.

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Engine Derate and Shutdown Protection

The Engine Control Unit (ECU) will decrease the amount of fuel that is delivered to the engine (fuel derate), set the engine to a certain speed (speed derate), or shut the engine down when sensor inputs exceed normal operating ranges. A Diagnostic Trouble Code (DTC) always accompanies a derate.

See OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual for derate specifications per application.

There are three ECU engine protection options:

- **No Protection**– Engine ECU's with "No Protection" do not derate or shut down the engine if a fault occurs. The standard fault lamp will illuminate when a "Warning" fault is detected by the ECU, and the standard stop-engine lamp will illuminate when a "Shutdown" fault is detected. The engine operator is responsible for reducing engine speed and power when a "Warning" fault exists and for shutting down the engine when a "Shutdown" fault exists.
- **Engine Derate Protection WITHOUT Shutdown**– In addition to illuminating the standard fault indicating lights, the ECU will derate the engine when certain "Warning" faults are detected (depending on application). It is the responsibility of the operator to decide if it is necessary to shut down the engine.
- **Engine Derate Protection with Shutdown**– In addition to illuminating the standard fault indicating lights, the ECU will derate the engine when certain "Warning" and "Shutdown" faults are detected (depending on application). If a DTC that requires shutdown is set, the ECU will severely derate the engine and shut down the engine either immediately or in 30 seconds, depending on the shutdown timer setting in the ECU. If the fault has a 30-second shutdown delay, and the problem is corrected within the 30-second delay period, the power will increase at a rate determined by the fault, until full power is reached.

NOTE: CAN wait-to-start enables the CAN bus messages for shutdown and for wait-to-start. Disabling this feature disables both the wait-to-start broadcast and the shutdown broadcast.

Shutdown Override

NOTE: Holding the shutdown override switch continuously "ON" will not reset the 30-second timer.

Shutdowns can be overridden for 30 seconds at a time. This can be used to move a vehicle to a safe location. Each time the switch is pushed, the shutdown timer is reset to 30 seconds and the engine will run in a derated power mode.

Similarly, if the key switch is turned off, the engine Shutdown feature will be reset, but when restarted only 30 seconds of running is allowed until the engine will shut down again. Engine will remain in shutdown mode until fault condition has been corrected.

External Derate

Wiring in provided on the engine harness for additional switches that control engine derate. These additional external switches can provide an additional level of engine control. The external switch type and derate rate are selectable:

- **External Derate Enable:** When enabled with an active external derate circuit, the external derate feature will derate the engine when activated by an external device.
- **External Derate Input:** Input can range from ground to 24V, depending on application battery voltage. Either a normally open switch, or normally closed switch is used for the external derate input.
- **External Derate Rate:** Three external derate rates are available: 20% derate over 10 minutes, 20% derate over 1 minute, and 50% derate over 1 minute. Each provides a linear derate of engine power over the time selected. Derates are based on the 100% torque curve value, so operation below the derated power level is still possible.

NOTE: External Derate is not compatible with cruise control.

External Shutdown

Wiring is provided on the engine harness for additional engine shutdown switches. Either a normally-open or normally-closed switch can be used for the external shutdown input. When enabled and the external shutdown circuit is activated, the ECU will shut down the engine. Features include:

- **External Shutdown Timer:** The external shutdown timer can be set for either immediate shutdown, or a 30-second delayed shutdown. If the shutdown switch returns to normal before the end of the 30-second delay, the engine will resume normal running.
- **Override External Shutdown at Engine Start:** Some external shutdowns must be overridden when starting the engine. When enabled, the ECU will disable external shutdowns during engine startup.
- **Override External Shutdown Time:** Once the engine switches to "Run" mode (reaches low idle), the ECU will continue to disengage external shutdown for the time that has been selected. Three override times are available: 5 seconds, 30 seconds, and 1 minute.

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Electronic Injector (EI) Wiring Harness Connector

The EI wiring harness connector is located near Cylinder #1. This connector provides voltage and a ground from the ECU to the EI wiring harness internal to the cylinder head carrier.

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

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Intake Air Heater Operation

The Intake Air Heater function is not included on all engines. The intake air heater is used to increase intake manifold air temperature to improve cold starting. When the operator turns the key from “OFF” to “ON”, the ECU calculates the fuel, determines if the temperature is below the set point, turns on the “Air Heater Indicator” light on the dash, and energizes the air heater relay. The air heater relay will in turn energize the air heater coils located in the intake manifold. The ECU will keep the air heater relay energized for an amount of time that is determined by the measured temperature. When the ECU has determined that the preheat time is adequate, it will turn off the “Air Heater Indicator” light and de-energize the air heater relay. If the operator turns the ignition from “ON” to “START” at this time, the engine will crank and start.

If the operator turns the key from “START” to “ON” without waiting for the “Air Heater Indicator” light to turn off, the ECU will de-energize the air heater relay and a key-off/key-on cycle is required before preheating is allowed again.

Anytime the engine cranks but does not start, a key-off/key-on cycle will be required before preheating is allowed again.

For application specific information on air heater times vs. temperatures, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

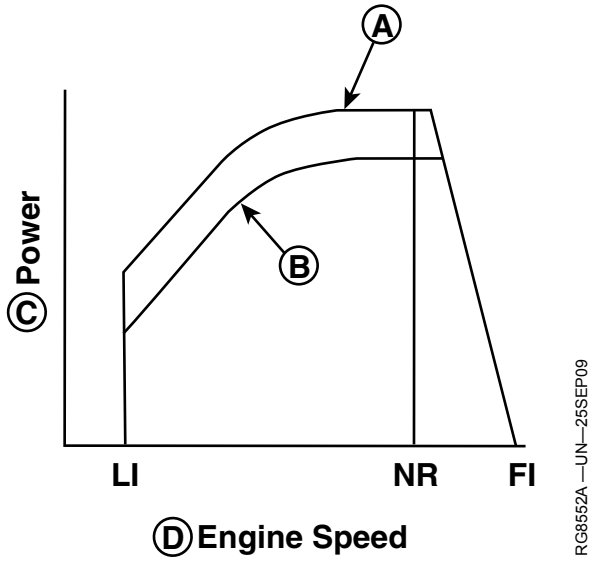
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Torque Curve Selection

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

Suction Control Valve

The Suction Control Valve is located on the high pressure fuel pump. The ECU sends an electronic signal to the Suction Control Valve through the solenoid to regulate the delivery of fuel to the High Pressure Common Rail (HPCR). When the Suction Control Valve is energized, fuel is allowed into the pumping chamber of the high pressure fuel pump. The pressurized fuel is then sent to the high pressure common rail (HPCR). The ECU varies the ON-time of this signal to ensure the proper amount of fuel is available.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

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Water in Fuel (WIF) Sensor

The water in fuel (WIF) sensor is located on the bottom of the final fuel filter in the water separator bowl. When water is detected in the fuel, a signal is sent to the ECU. The WIF sensor uses the resistance of fuel and water in the fuel system along with the principle that water is a better conductor then fuel. If water is present, the voltage will be lower. The ECU monitors this for engine protection purposes.

For more information on engine protection and derate programs, see ENGINE DERATE AND SHUTDOWN PROTECTION later in this Group.

For more information on sensor locations, see COMPONENT LOCATION earlier in this Group.

RG41221,00000A8 -19-15OCT07-1/1

Cruise Control Operation

The ECU is available with and without the cruise control function. It is an off-road cruise control that maintains constant engine speed under varying load conditions. This function is especially intended for field applications where an operator faces the need to turn the vehicle around at the end of each row. This cruise control allows the driver to use the throttle and/or brake to turn the vehicle around. When ready to resume field operations, the operator brings the engine speed above 1300 rpm and activates the Cancel/Resume function again to resume cruise speed. An internal timer gives the operator one minute to complete the turnaround maneuver.

The cruise control has the normal functions of:

- Cruise control power “ON” or “OFF”
- “Set” or “Bump Up” engine speed
- “Resume” or “Bump Down” engine speed
- Vehicle brake or clutch pedal to disengage cruise control

On 12-volt ECUs, the engine speed can be set from two different locations. The primary location would normally be in the cab of the vehicle and is used to set a constant engine speed while the vehicle is being driven. The secondary cruise control is normally used in a location that provides PTO speed control and is used with the engine in “neutral” or out of gear. Both locations have the normal cruise control functions.

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

Power Supply #1

John Deere engine active sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors for just one power supply and return to handle. To keep critical components from being affected by shorts in other components there are several sets of power supply voltages and returns.

The following sensors use Power Supply #1:

- Fuel Rail Pressure Sensor

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Power Supply #2

John Deere engine active sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors for just one power supply and return to handle. To keep critical components from being affected by shorts in other components there are several sets of power supply voltages and returns.

This supply has 2 separate fused outputs–one output is on J1 and the other on J2. The following sensors use Power Supply #2:

NOTE: Some sensors are not available or are optional for certain applications. The sensors in the following list may not all be available on this engine.

Fused Output 1

- Secondary Analog Throttle
- Multi-State Throttle
- Droop/ Isochronous Governor Switch
- Fan Speed (some applications)
- Override Shutdown (some applications)

Fused Output 2

- Oil Pressure Sensor
- Fuel Pressure Sensor (some applications)
- Manifold Air Pressure (some applications)

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Power Supply #3

John Deere engine active sensors must have 5 volts and sensor return (ground) supplied to them to function properly. There are too many sensors for just one power supply and return to handle. To keep critical components from being affected by shorts in other components there are several sets of power supply voltages and returns.

The following sensors use Power Supply #3:

NOTE: Some sensors are not available or are optional for certain applications. The sensors in the following list may not all be available on this engine.

- Primary Analog Throttle Sensor
- Remote Throttle (some applications)
- PTO Speed (some applications)

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Section 04
Diagnostics

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About This Group

This section of the manual contains necessary information for observable diagnostics and fuel-related test procedures. Use this information in conjunction with the base engine manual.

NOTE: Follow the diagnostic procedure of an active or stored DTC before pursuing any observable diagnostic procedure.

- E1 - Engine Cranks/Won't Start
- E2 - Engine Misfires/Runs Irregularly
- E3 - Engine Does Not Develop Full Power
- E4 - Engine Emits Excessive White Exhaust Smoke
- E5 - Engine Emits Excessive Black Or Gray Exhaust Smoke
- E6 - Engine Will Not Crank
- E7 - Engine Idles Poorly
- E8 - Abnormal Engine Noise
- E9 - Analog Throttle (A) Will Not Respond
- E10 - Analog Throttle (B) Will Not Respond

- F1 - Low Pressure Fuel Supply System Test
- F2 - High Pressure Fuel Supply System Test
- F3 - Excessive Fuel Consumption
- F4 - Fuel in Oil

- D1 - ECU Does Not Communicate With SERVICE ADVISOR™
- D2 - Diagnostic Gauge Does Not Communicate With ECU
- D5 - ECU Does Not Program With Service ADVISOR

- A1 - Intake Air Heater Check

- Fuel System Procedures:
  - Check Fuel Supply Quality
  - Test for Air in Fuel
  - Check for Restricted Fuel Leak-off Line
  - Bleed the Fuel System
  - Check and Adjust High Pressure Fuel Pump Static Timing
- Intake and Exhaust System Procedures:
  - Excessive Engine Crankcase Pressure (Blow-By) Test

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E1 - Engine Cranks/Won't Start

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E1 - Engine Cranks/Won't Start Diagnostic Procedure

Additional References:

NOTE: This procedure should be followed if engine cranks, but will not start. If the engine will not crank, see E6 - ENGINE WILL NOT CRANK to diagnose the cranking system.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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1 Preliminary Checks	1. Verify sufficient fuel in fuel tank.	
	2. Verify that any remote switch used to shut down engine is in the RUN position.	
	3. Check for major intake air restriction.	
	4. Check for major exhaust restriction.	
	5. Check battery state of charge.	
	6. Verify engine cranking speed is adequate to start engine. See TEST ENGINE CRANKING SPEED in Section 04, Group 150 of the base engine manual for minimum cranking speed specification.	**YES:** Problem fixed.
	Does engine start?	**NO:** GO TO 2

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2 Attempt to Connect to ECU with Service ADVISOR	1. Ignition ON, engine OFF.	
	2. Attempt to connect to ECU with Service ADVISOR.	**YES:** GO TO 3
	Were you able to connect to ECU with Service ADVISOR?	**NO:** Discontinue this test and perform test D1.

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3 Check for Active DTCs	Are there any active DTCs?	**YES:** Discontinue this test and perform test for the active DTC. **NO:** GO TO 4

DN22556,0000285 -19-06AUG10-5/17

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 in Section 04, Group 160 later in this manual. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Clear stored DTCs. 3. Crank engine for 15 seconds. Are there any stored or active DTCs after cranking engine?	**YES:** Discontinue this test and perform test for the stored or active DTC. **NO:** GO TO 5

DN22556,0000285 -19-06AUG10-6/17

5 Harness Diagnostic Mode Test	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Were any active DTCs generated during Harness Diagnostic Mode Test?	**YES:** Discontinue this test and perform test for the active DTC. **NO:** GO TO 6

DN22556,0000285 -19-06AUG10-7/17

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Use fuel that has known-good quality for the test. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 7

DN22556,0000285 -19-06AUG10-8/17

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 8

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8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Did engine start?	**YES:** Problem fixed. **NO:** GO TO 9

Continued on next page

DN22556,0000285 -19-06AUG10-10/17

9 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 • Engine Speed Indicated by Crankshaft Sensor • Engine Speed Indicated by Camshaft Sensor • Crankshaft Position Signal Improper Pattern Indicator • Camshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Noise Indicator • Camshaft Position Signal Noise Indicator 2. Crank engine for 15 seconds. 3. Replay recording and review the recorded data points. Did the data points indicate the following while the engine is cranking at a steady speed? *NOTE: When engine first begins cranking, the data points may not indicate these values. Ignore data point values until engine has rotated at least two full revolutions.* • Crankshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Camshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Engine Speed Indicated by Crankshaft Sensor - The actual cranking speed (nearly same as camshaft position sensor speed). • Engine Speed Indicated by Camshaft Sensor - The actual cranking speed (nearly same as crank position sensor speed). • Crankshaft Position Signal Improper Pattern Indicator - 0 • Camshaft Position Signal Improper Pattern Indicator - 0 • Crankshaft Position Signal Noise Indicator - 0 • Camshaft Position Signal Noise Indicator - 0	**YES:** GO TO 1 **NO:** GO TO 10

DN22556,0000285 -19-06AUG10-11/17

10 Check for Crank Sensor Pattern Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Crank engine for 30 seconds. 5. Ignition OFF, engine OFF. 6. Reconnect crank sensor. Did engine start?	**YES:** Perform diagnostic procedure for 000637.02 as though DTC were active. **NO:** GO TO 11

Continued on next page

DN22556,0000285 -19-06AUG10-12/17

11 Check for Pump Position Pattern Problem	1. Verify crank sensor is reconnected. 2. Disconnect pump position sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Crank engine for 30 seconds. 5. Clear DTCs. 6. Ignition OFF, engine OFF. 7. Reconnect pump position sensor. Did engine start?	**YES:** Perform diagnostic procedure for 000636.02 as though DTC were active. **NO:** GO TO 12

DN22556,0000285 -19-06AUG10-13/17

12 Service ADVISOR Compression Test	*NOTE: Service ADVISOR Cylinder Electronic Compression Test determines the relative compression between cylinders. A problem that causes low compression in all cylinders is not detected by this test. An engine with low compression in all cylinders will sound and feel different while cranking than an engine with good compression due to a lack of cranking speed fluctuation.* 1. Perform Cylinder Electronic Compression Test in Service ADVISOR. 2. Listen and feel for cranking speed fluctuation during the Cylinder Electronic Compression Test and compare against another engine, if available. Did Cylinder Electronic Compression Test results indicate a significant difference between cylinders or did engine crank as though compression were low in all cylinders?	**YES:** Perform compression test using mechanical gauge. **NO:** GO TO 13

DN22556,0000285 -19-06AUG10-14/17

13 Inspect Valve Train	1. Ignition OFF, engine OFF. 2. Remove rocker arm cover. 3. Inspect valve train for obvious damage or valves that are out of adjustment. 4. Rotate engine using JDG820 Flywheel Turning Tool while observing valve train for proper operation. 5. Set engine at #1 TDC of compression stroke using JDE81-4 Timing Pin. 6. Verify intake and exhaust valves are closed on #1 cylinder. 7. Remove timing pin and turning tool. Were any problems found?	**YES:** Engine starts. Problem fixed. **NO:** Reinstall rocker arm cover. GO TO 14

DN22556,0000285 -19-06AUG10-15/17

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

DN22556,0000285 -19-06AUG10-16/17

15 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. Did engine start?	**YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,0000285 -19-06AUG10-17/17

E2 - Engine Misfires/Runs Irregularly

DN22556,0000286 -19-06AUG10-1/16

E2 - Engine Misfires/Runs Irregularly Diagnostic Procedure

DN22556,0000286 -19-06AUG10-2/16

1 Check for Active DTCs	Were you referred to this test while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test. GO TO 2

DN22556,0000286 -19-06AUG10-3/16

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.	**YES:** Problem fixed.
	Does disabling or switching off these devices temporarily restore engine performance?	**NO:** GO TO 3

DN22556,0000286 -19-06AUG10-4/16

3 Misfire and Cutout Test	1. Perform Cylinder Misfire Test in Service ADVISOR.	
	2. Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle.	**YES:** GO TO 5
	Is each cylinder's contribution within 10 percent of each of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cutout Test?	**NO:** GO TO 4

DN22556,0000286 -19-06AUG10-5/16

4 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR.	**YES:** Check compression with mechanical gauge.
	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)?	**NO:** Replace injector(s) in cylinder(s) with low contribution.

DN22556,0000286 -19-06AUG10-6/16

5 Check for Air in Fuel	Perform TEST FOR AIR IN FUEL procedure, found later in this group.	**YES:** Problem fixed.
	Is engine performance restored?	**NO:** GO TO 6

DN22556,0000286 -19-06AUG10-7/16

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group.	**YES:** Problem fixed.
	Is engine performance restored?	**NO:** GO TO 7

Continued on next page

DN22556,0000286 -19-06AUG10-8/16

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

DN22556,0000286 -19-06AUG10-9/16

8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

DN22556,0000286 -19-06AUG10-10/16

9 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 • Engine Speed Indicated by Crankshaft Sensor • Engine Speed Indicated by Camshaft Sensor • Crankshaft Position Signal Improper Pattern Indicator • Camshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Noise Indicator • Camshaft Position Signal Noise Indicator 2. Operate engine at speed and load where problem occurs. 3. Replay recording and review the recorded data points. Did the data points indicate the following with engine running? • Crankshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Camshaft Position Signal Status – Value should be 16 at 0 rpm, 63 with engine cranking (below 400 rpm), and 47 with engine running above 400 rpm. • Engine Speed Indicated by Crankshaft Sensor - The actual cranking speed (nearly same as camshaft position sensor speed). • Engine Speed Indicated by Camshaft Sensor - The actual cranking speed (nearly same as crank position sensor speed). • Crankshaft Position Signal Improper Pattern Indicator - 0 • Camshaft Position Signal Improper Pattern Indicator - 0 • Crankshaft Position Signal Noise Indicator - 0 • Camshaft Position Signal Noise Indicator - 0	**YES:** GO TO 13 **NO:** GO TO 10

DN22556,0000286 -19-06AUG10-11/16

10 Check for Crankshaft Position Pattern Problem	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Operate engine at speed and load where problem occurs. 5. Ignition OFF, engine OFF. 6. Reconnect crank sensor. Was engine performance restored?	**YES:** Perform diagnostic procedure for 000637.02 as though DTC were active. **NO:** GO TO 11

Continued on next page

DN22556,0000286 -19-06AUG10-12/16

11 Check for Camshaft Position Pattern Problem	1. Verify crank sensor is reconnected. 2. Disconnect pump position sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Operate engine at speed and load where problem occurs. 5. Ignition OFF, engine OFF. 6. Reconnect pump position sensor. Was engine performance restored?	**YES:** Perform diagnostic procedure for 000636.02 as though DTC were active. **NO:** GO TO 12

DN22556,0000286 -19-06AUG10-13/16

12 Check Throttle	1. Engine running at speed where misfire or irregular running occurs. 2. Throttle held at a steady position. 3. Monitor Throttle Position data point in Service ADVISOR. Does Throttle Position data point indicate throttle signal is changing by more than 3 percent?	**YES:** Check for throttle circuit problem. **NO:** GO TO 13

DN22556,0000286 -19-06AUG10-14/16

13 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors fix rough running?	**YES:** Problem Fixed **NO:** GO TO 14

DN22556,0000286 -19-06AUG10-15/16

14 Reprogram ECU	Download latest payload and reprogram ECU. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,0000286 -19-06AUG10-16/16

E3 - Engine Does Not Develop Full Power

DN22556,0000287 -19-24OCT09-1/22

E3 - Engine Does Not Develop Full Power Diagnostic Procedure

DN22556,0000287 -19-24OCT09-2/22

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.

DN22556,0000287 -19-24OCT09-3/22

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 in Section 04, Group 160 later in this manual. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Were any active DTCs generated during Harness Diagnostic Mode Test?	 **YES:** Discontinue this test and perform test for the active DTC. **NO:** GO TO 3

DN22556,0000287 -19-24OCT09-4/22

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 the engine has changed. • Auxiliary drives with abnormally high loads. • Hydraulic system problems causing high engine loads. • Engine is otherwise overloaded. Is engine performance restored?	 **YES:** Problem fixed. **NO:** GO TO 4

DN22556,0000287 -19-24OCT09-5/22

4 Exhaust Check	Operate engine under the conditions where the low power complaint occurs. Does the engine produce excessive blue, white, or black exhaust smoke?	**YES:** Blue smoke - Check for internal engine damage. Perform EXCESSIVE ENGINE CRANKCASE PRESSURE (BLOW-BY) TEST. **YES:** White smoke - Perform test E4 - ENGINE EMITS EXCESSIVE WHITE EXHAUST. **YES:** Black smoke - Perform test E5 - ENGINE EMITS EXCESSIVE BLACK OR GRAY EXHAUST. **NO:** GO TO 5

Continued on next page

DN22556,0000287 -19-24OCT09-6/22

5 Check for Misfire	Does engine misfire or run irregularly?	**YES:** Perform test E2 - ENGINE MISFIRES/RUNS IRREGULARLY **NO:** GO TO 6

DN22556,0000287 -19-24OCT09-7/22

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.

DN22556,0000287 -19-24OCT09-8/22

7 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

DN22556,0000287 -19-24OCT09-9/22

8 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

DN22556,0000287 -19-24OCT09-10/22

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

DN22556,0000287 -19-24OCT09-11/22

10 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors restore engine performance?	**YES:** Problem Fixed **NO:** GO TO 11

DN22556,0000287 -19-24OCT09-12/22

11 Charge Air System Analysis	Perform CHARGE AIR SYSTEM DIAGNOSTIC PROCEDURE found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 12

DN22556,0000287 -19-24OCT09-13/22

12 Check Turbocharger	Inspect turbocharger for damage. Was a problem found?	**YES:** Fix problem, recheck engine performance. **NO:** GO TO 13

Continued on next page

DN22556,0000287 -19-24OCT09-14/22

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 (TURBOCHARGED ENGINES) in Section 04, Group 150 of the base engine manual. Was a problem found?	**YES:** Fix problem, recheck engine performance. **NO:** GO TO 14

DN22556,0000287 -19-24OCT09-15/22

14 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 15

DN22556,0000287 -19-24OCT09-16/22

15 Valve Clearance Check	Perform CHECK AND ADJUST VALVE CLEARANCE procedure in Section 02, Group 020 of the base engine manual. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 16

DN22556,0000287 -19-24OCT09-17/22

16 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. Does Engine Load at Current Speed data point indicate a value of 95 percent or more?	 **YES:** GO TO 17 **NO:** ECU is limiting engine power. Open DTAC case.

DN22556,0000287 -19-24OCT09-18/22

17 Check Fuel Rail Pressure Sensor	1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Disconnect ECU J1 connector. 4. Perform TERMINAL TEST on rail pressure sensor connector and J1 connector. 5. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J1-E3). 6. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J1-D3). 7. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J1-E2). Were TERMINAL TEST results good and all resistance measurements less than 10 ohms?	 **YES:** GO TO 18 **NO:** Fix problem. Retest engine performance.

DN22556,0000287 -19-24OCT09-19/22

18 Replace Fuel Rail Pressure Sensor	1. Replace fuel rail pressure sensor. *NOTE: Verify that the replacement fuel rail pressure sensor is the correct part number for the 6.8L/4.5L engine.* 2. Reconnect all electrical connectors. 3. Retest engine performance. Is engine performance restored?	 **YES:** Problem fixed. **NO:** GO TO 19

Continued on next page

DN22556,0000287 -19-24OCT09-20/22

19 Check on Dynamometer	Check engine power on a certified dynamometer, if possible. Does engine develop rated power on dynamometer?	**YES:** Engine is operating as designed. **NO:** GO TO 20 **NO:** Engine cannot be tested on a dynamometer. Open DTAC case.

DN22556,0000287 -19-24OCT09-21/22

20 Replace Injectors	*NOTE: For injector replacement instructions, see REMOVE ELECTRONIC INJECTOR (EI) and INSTALL ELECTRONIC INJECTOR (EI) in section 2, group 090 earlier in this manual.* Replace injectors. Does engine develop rated power on dynamometer?	 **YES:** Problem fixed. **NO:** Open DTAC case.

DN22556,0000287 -19-24OCT09-22/22

E4 - Engine Emits Excessive White Exhaust

DN22556,0000288 -19-06AUG10-1/11

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 4.5L/6.8L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04 of the base engine manual.

DN22556,0000288 -19-06AUG10-2/11

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. GO TO 2

DN22556,0000288 -19-06AUG10-3/11

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 9 **NO:** Not sure if fuel or coolant. Perform steps 3-9. Open DTAC case if no problem found.

DN22556,0000288 -19-06AUG10-4/11

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

DN22556,0000288 -19-06AUG10-5/11

4 Misfire and Cutout Test	*NOTE: If white smoke is decreased substantially when a cylinder is cutout, the white smoke is likely caused by a misfire of that cylinder.* 1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle. Is each cylinder's contribution within 10 percent of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cutout Test?	**YES:** GO TO 6 **NO:** GO TO 5

Continued on next page

DN22556,0000288 -19-06AUG10-6/11

5 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR. Is compression in the cylinder(s) with low contribution identified in Step 4 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**YES:** Recheck compression with mechanical gauge. Determine cause of low compression. **NO:** Replace injector(s) in cylinders with low contribution.

DN22556,0000288 -19-06AUG10-7/11

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.

DN22556,0000288 -19-06AUG10-8/11

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.

DN22556,0000288 -19-06AUG10-9/11

8 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure. Is white smoke still present?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000288 -19-06AUG10-10/11

9 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.

DN22556,0000288 -19-06AUG10-11/11

E5 - Engine Emits Excessive Black or Gray Exhaust

DB92450,0000031 -19-06AUG10-1/12

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 4.5L/6.8L - L1 - EXCESSIVE OIL CONSUMPTION in Section 04, of the Base Engine Manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 24V ECU WIRING DIAGRAM 2

located in Section 06, Group 210 later in this manual.

For more information on charge air system test, see CHARGE AIR SYSTEM later in this Group.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 later in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

DB92450,0000031 -19-06AUG10-2/12

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. GO TO 2

DB92450,0000031 -19-06AUG10-3/12

2 Harness Diagnostic Mode Test	1. Ignition ON, engine OFF.	
	2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Discontinue this test and perform test for the active DTC.
	Were any active DTCs generated during Harness Diagnostic Mode Test?	**NO:** GO TO 3

Continued on next page

DB92450,0000031 -19-06AUG10-4/12

3 Check Charge Air System	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.

DB92450,0000031 -19-06AUG10-5/12

4 Check Turbocharger	Inspect turbocharger for damage.	**YES:** Fix problem, recheck engine performance.
	Was a problem found?	**NO:** GO TO 5

DB92450,0000031 -19-06AUG10-6/12

5 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 (TURBOCHARGED ENGINES) in Section 04, Group 150 of the Base Engine Manual.	**YES:** GO TO 6
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

DB92450,0000031 -19-06AUG10-7/12

6 Cutout Test	Perform Cylinder Cutout Test in Service ADVISOR and watch for a decease in exhaust smoke when each cylinder is cut out.	**YES:** Replace injector in the affected cylinder and recheck for black smoke.
	Did smoke decrease substantially when a cylinder was cut-out?	**NO:** GO TO 7

DB92450,0000031 -19-06AUG10-8/12

7 Fuel Quality	Perform CHECK FUEL SUPPLY QUALITY procedure found later in this section.	**YES:** GO TO 8
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

DB92450,0000031 -19-06AUG10-9/12

8 Reprogram ECU	Reprogram ECU with latest payload, if not already performed during this procedure.	**YES:** GO TO 9
	Is black smoke still present when engine is operated under conditions where black smoke was observed?	**NO:** Problem fixed.

Continued on next page

DB92450,0000031 -19-06AUG10-10/12

9 Check Fuel Rail Pressure Sensor	1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Disconnect ECU J1 connector. 4. Perform TERMINAL TEST on rail pressure sensor connector and J1 connector. 5. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J1-E3). 6. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J1-D3). 7. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J1-E2). Were TERMINAL TEST results good and all resistance measurements less than 10 ohms?	**YES:** GO TO 10 **NO:** Fix problem. Retest engine performance.

DB92450,0000031 -19-06AUG10-11/12

10 Replace Fuel Rail Pressure Sensor	1. Replace fuel rail pressure sensor. *NOTE: Verify that the replacement fuel rail pressure sensor is the correct part number for the 6.8L/4.5L engine.* 2. Reconnect all electrical connectors. 3. Retest engine performance. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

DB92450,0000031 -19-06AUG10-12/12

E6 - Engine Will Not Crank

DN22556,000028A -19-12OCT07-1/15

E6 - Engine Will Not Crank Diagnostic Procedure

Control Unit Response:
The ECU is not part of the engine cranking circuit.

Additional References:

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 3, 5
- see 4.5L 24V ECU WIRING DIAGRAM 3, 5
- see 6.8L 12V ECU WIRING DIAGRAM 3, 5
- see 6.8L 24V ECU WIRING DIAGRAM 3, 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 later in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

DN22556,000028A -19-12OCT07-2/15

1 Preliminary Checks	1. Inspect batteries, stater motor, starter solenoid, starter relay, and single point ground for loose connections, corroded terminals, or cables that are not connected.	
	2. Check fuse F01.	
	3. Verify that any remote switch used to shut down engine is in the RUN position.	
	4. If application has no remote switches, verify that remote switch jumper at connector C15 is present.	**YES:** Fix problem. GO TO 13
	Were any problems found?	**NO:** GO TO 2

DN22556,000028A -19-12OCT07-3/15

2 Check Battery State of Charge	1. Ignition OFF, engine OFF.	
	2. Measure battery terminal voltage.	**YES:** GO TO 3
	Is the voltage greater than 12.2V for 12V systems or 24.4V for 24V systems?	**NO:** Recharge or replace batteries. GO TO 13

DN22556,000028A -19-12OCT07-4/15

3 Check Battery Voltage While Attempting Crank	1. Ignition ON, engine OFF for 30 seconds.	
	2. Monitor battery terminal voltage.	
	3. Hold key switch in start position for 3 seconds.	**YES:** GO TO 5
	Is the voltage greater than 11V for 12V systems or 22V for 24V systems while attempting to crank engine?	**NO:** GO TO 4

Continued on next page

DN22556,000028A -19-12OCT07-5/15

4 Load Test Batteries	1. Ignition OFF, engine OFF.	
	2. Load test batteries.	**YES:** Check for internal starter problem Check for hydro locked or seized engine, or load not disengaged.
	Do batteries pass load test?	**NO:** Recharge or replace batteries. GO TO 13

DN22556,000028A -19-12OCT07-6/15

5 Check Starter Relay Battery Supply Voltage	1. Ignition OFF, engine OFF.	
	2. Measure the voltage from the starter relay battery voltage supply terminal to single point ground.	**YES:** GO TO 6
	Is the voltage within 1V of battery terminal voltage?	**NO:** Fix problem. GO TO 13

DN22556,000028A -19-12OCT07-7/15

6 Check Voltage at Starter Relay Coil	*NOTE: Some applications may have safety switches or other interlocks which interrupt the starter relay control circuit (high side or ground). Consult equipment manufacturer's information to determine if application has any starter interlocks.*	
	1. Monitor the voltage between the starter relay coil high side terminal (wire between key switch and relay) and single point ground.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 7
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** GO TO 11

DN22556,000028A -19-12OCT07-8/15

7 Check Starter Relay Coil Ground	1. Monitor the voltage between the starter relay coil high side terminal and starter relay coil ground terminal.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 8
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** Fix open ground circuit. GO TO 13

DN22556,000028A -19-12OCT07-9/15

8 Check Starter Relay Output Voltage	1. Monitor the voltage between the starter relay output terminal and single point ground.	
	2. Hold key switch in start position for 3 seconds.	**YES:** GO TO 9
	Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**NO:** Replace starter relay. GO TO 13

Continued on next page

DN22556,000028A -19-12OCT07-10/15

9 Check Starter Solenoid Control Circuit	*NOTE: Some gear-reduction type starter motors may have an additional starter relay located near the starter motor which controls the voltage supplied to the starter solenoid. Consult stater motor manufacturer for more information.* 1. Monitor the voltage between the starter solenoid "S" terminal and single point ground. 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** GO TO 10 **NO:** Fix open circuit between starter relay output and starter solenoid. GO TO 13

DN22556,000028A -19-12OCT07-11/15

10 Check Starter Cables	1. Monitor the voltage between the starter solenoid battery terminal and starter ground terminal (large cable connections). 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** Remove and bench test stater motor and starter solenoid. **NO:** Check starter cables for poor connections or high resistance. GO TO 13

DN22556,000028A -19-12OCT07-12/15

11 Check Key Switch Voltage Supply	1. Ignition OFF, engine OFF. 2. Measure the voltage between the key switch battery supply terminal and single point ground. Is the voltage within 2V of battery terminal voltage?	**YES:** GO TO 12 **NO:** Fix open circuit between key switch and battery positive terminal. GO TO 13

DN22556,000028A -19-12OCT07-13/15

12 Check Key Switch	1. Monitor the voltage between the key switch start terminal and single point ground. 2. Hold key switch in start position for 3 seconds. Is the voltage within 2V of battery terminal voltage while attempting to crank engine?	**YES:** Fix open circuit between key switch and starter relay coil high side terminal. GO TO 13 **NO:** Replace key switch. GO TO 13

DN22556,000028A -19-12OCT07-14/15

13 Verification	Attempt to crank engine. Does engine crank?	**YES:** Problem fixed. **NO:** GO TO 1

DN22556,000028A -19-12OCT07-15/15

E7 - Engine Idles Poorly

DB92450,0000061 -19-28OCT09-1/14

E7 - Engine Idles Poorly Diagnostic Procedure

DB92450,0000061 -19-28OCT09-2/14

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. GO TO 2

DB92450,0000061 -19-28OCT09-3/14

2 Items Possibly Mistaken As Poor Idle Quality	Check for the following items which may be mistaken for poor idle quality: • Engine accessories such as A/C clutch or fan drives cycling on and off. • Alterations to the engine and/or machine harness such as radios or non-John-Deere accessories. Does disabling or switching off these devices temporarily restore engine performance?	 **YES:** Problem fixed. **NO:** GO TO 3

DB92450,0000061 -19-28OCT09-4/14

3 Cutout Test	Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle. Does the sound of the engine change equally when each injector is disabled during the Cylinder Cutout Test?	**YES:** GO TO 5 **NO:** GO TO 4

DB92450,0000061 -19-28OCT09-5/14

4 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR. Is compression in the cylinder(s) with low contribution identified in Step 3 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**YES:** Check compression with mechanical gauge. **NO:** Replace injector(s) in cylinder(s) with low contribution. Recheck idle quality.

DB92450,0000061 -19-28OCT09-6/14

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

DB92450,0000061 -19-28OCT09-7/14

6 Low Pressure Fuel Supply System Test	Perform F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 7

Continued on next page

DB92450,0000061 -19-28OCT09-8/14

7 High Pressure Fuel Supply System Test	Perform F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 8

DB92450,0000061 -19-28OCT09-9/14

8 Check Fuel Quality	Perform procedure CHECK FUEL SUPPLY QUALITY, found later in this group. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 9

DB92450,0000061 -19-28OCT09-10/14

9 Check Throttle	1. Throttle at low idle position. 2. Monitor Throttle Position data point in Service ADVISOR. Does Throttle Position data point indicate throttle signal is changing by more than 3 percent?	 **YES:** Check for throttle circuit problem. **NO:** GO TO 10

DB92450,0000061 -19-28OCT09-11/14

10 Clean Injectors	Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) in Section 2 Group 90 of this manual. Run engine. Did cleaning the injectors restore engine performance?	 **YES:** Problem Fixed **NO:** GO TO 11

DB92450,0000061 -19-28OCT09-12/14

11 Check Valve Adjustment	Perform valve adjustment. Is engine performance restored?	**YES:** Problem fixed. **NO:** GO TO 12

DB92450,0000061 -19-28OCT09-13/14

12 Reprogram ECU	Download latest payload and reprogram ECU. Is engine performance restored?	**YES:** Problem fixed. **NO:** Open DTAC case.

DB92450,0000061 -19-28OCT09-14/14

E8 - Abnormal Engine Noise

Symptom	Problem	Solution
E8 - Abnormal Engine Noise	Air in Fuel	Perform procedure TEST FOR AIR IN FUEL later in this section.
	Worn main or connecting rod bearings	Determine bearing clearance. See CYLINDER BLOCK, LINERS, PISTONS, AND RODS SPECIFICATIONS in Section 06, Group 200 or CRANKSHAFT, MAIN BEARINGS, AND FLYWHEEL SPECIFICATIONS in Section 06, Group 200 of the base engine manual.
	Excessive crankshaft end play	Check crankshaft end play. See CHECK CRANKSHAFT END PLAY in Section 02, Group 040 of the base engine manual.
	Loose main bearing caps	Check bearing clearance; replace bearings and bearing cap screws as required. See CRANKSHAFT, MAIN BEARINGS, AND FLYWHEEL SPECIFICATIONS in Section 06, Group 200 of the base engine manual.
	Worn connecting rod bushings and piston pins	Inspect piston pins and bushings. See INSPECT PISTON PINS AND BUSHINGS in Section 02, Group 030 of the base engine manual.
	Scored pistons	Inspect pistons. See INSPECT PISTON PINS AND BUSHINGS in Section 02, Group 030 of the base engine manual.
	Worn timing gears or excess back lash	Check timing gear back lash. See MEASURE CAMSHAFT END PLAY and MEASURE TIMING GEAR BACKLASH in Section 02, Group 050 of the base engine manual.
	Excessive valve clearance	Check and adjust valve clearance. See CHECK AND ADJUST VALVE CLEARANCE in Section 02, Group 020 of the base engine manual.
	Worn camshaft	Inspect camshaft. See VISUALLY INSPECT CAMSHAFT in Section 02, Group 050 of the base engine manual.

Continued on next page

Symptom	Problem	Solution
	Worn rocker arm shaft(s)	Inspect rocker arm shafts. See DISASSEMBLE AND INSPECT ROCKER ARM SHAFT ASSEMBLY in Section 02, Group 020 of the base engine manual.
	Insufficient engine lubrication	See 4.5L/6.8L - L2 - ENGINE OIL PRESSURE LOW in Section 04, Group 150 of the base engine manual.
	Turbocharger noise	See TURBOCHARGER INSPECTION in Section 02, Group 080 of the base engine manual.

DN22556,000028C -19-12OCT07-2/2

E9 - Primary Analog Throttle Does Not Respond

DN22556,000028D -19-12OCT07-1/8

E9 - Primary Analog Throttle Does Not Respond

DN22556,000028D -19-12OCT07-2/8

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Are there any active DTC codes?	**YES:** Troubleshoot those codes first. **NO:** GO TO 2

DN22556,000028D -19-12OCT07-3/8

2 Low Pressure Fuel Test	Perform low pressure fuel test, see F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST later in this Section. Did test pass?	**YES:** GO TO 3 **NO:** Return to F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST procedure and perform tests.

DN22556,000028D -19-12OCT07-4/8

3 High Pressure Fuel Test	Perform high pressure fuel test, see F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST later in this Section. Did test pass?	**YES:** GO TO 4 **NO:** Return to F2 - HIGH PRESSURE FUEL SYSTEM CHECK procedure and perform tests.

DN22556,000028D -19-12OCT07-5/8

4 Throttle Response Test	1. Ignition ON, Engine ON. 2. Adjust throttle to different speed points. Did engine respond to throttle movement?	**YES:** Problem fixed, return to service. **NO:** GO TO 5

Continued on next page

DN22556,000028D -19-12OCT07-6/8

5 Reprogram ECU	1. Download latest ECU software payload file.	
	2. Program ECU and ensure the correct throttle options are set on the trim page as you start the programming sequence.	**YES:** GO TO 6
	Was programming successful?	**NO:** Repeat this step. If ECU will still not program, see D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 4 Group 160 later in this manual.

DN22556,000028D -19-12OCT07-7/8

6 Throttle Response Test	1. Ignition ON, Engine ON.	
	2. Adjust throttle to different speed points.	**YES:** Problem fixed, return to service.
	Did engine respond to throttle movement?	**NO:** Start a DTAC case.

DN22556,000028D -19-12OCT07-8/8

E10 - Secondary Analog Throttle Does Not Respond

DN22556,000028E -19-12OCT07-1/7

E10 - Secondary Analog Throttle Does Not Respond

DN22556,000028E -19-12OCT07-2/7

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

DN22556,000028E -19-12OCT07-3/7

2 Primary Analog Throttle Test	Perform primary analog throttle test, see E9 - PRIMARY ANALOG THROTTLE DOES NOT RESPOND later in this Section. Did test pass?	**YES:** GO TO 3 **NO:** Return to F1 procedure and perform tests.

DN22556,000028E -19-12OCT07-4/7

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

DN22556,000028E -19-12OCT07-5/7

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 D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 4 Group 160 later in this manual.

Continued on next page

DN22556,000028E -19-12OCT07-6/7

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.

DN22556,000028E -19-12OCT07-7/7

F1 - Low Pressure Fuel Supply System Test

DN22556,000028F -19-03JUN08-1/36

F1 – Low Pressure Fuel Supply System Test Diagnostic Procedure

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 4.5L 12V ECU WIRING DIAGRAM 2, 4.5L 12V ECU WIRING DIAGRAM 7
- see 4.5L 24V ECU WIRING DIAGRAM 2, 4.5L 24V ECU WIRING DIAGRAM 7
- see 6.8L 12V ECU WIRING DIAGRAM 2, 6.8L 12V ECU WIRING DIAGRAM 7
- see 6.8L 24V ECU WIRING DIAGRAM 2, 6.8L 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.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur. See TERMINAL TEST for information on use.

DN22556,000028F -19-03JUN08-2/36

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

DN22556,000028F -19-03JUN08-3/36

2 Preliminary Check	**CAUTION: DO NOT PRESSURIZE THE FUEL TANK! Doing this causes the seal on the front of the high pressure pump to rupture. When such a rupture occurs, fuel passes around the seal, and fills the engine crankcase. This condition causes severe damage to the engine and requires replacement of the high pressure pump.** *NOTE: There are two different low pressure fuel pump options: mechanical pump or 2-wire electric pump. The mechanical pump and electric pump systems may also have an option low pressure fuel pressure sensor in the secondary fuel filter outlet.* 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. Check engine performance. **NO:** Engine has mechanical pump GO TO 3 **NO:** Engine has 2-wire electric pump. GO TO 14

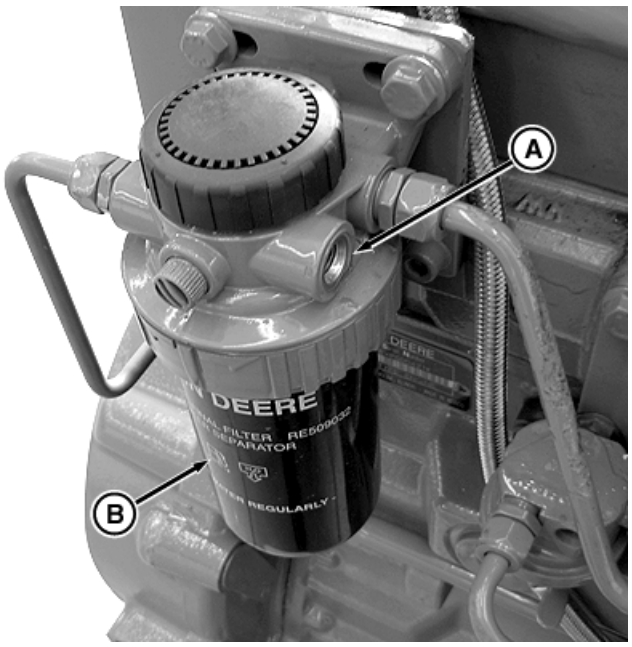
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DN22556,000028F -19-03JUN08-4/36

3 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. See REPLACE FUEL FILTER ELEMENT (PRIMARY OR FINAL) in Group 02, Section 090.	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 4
	Was an abnormal amount of water or contaminants present in the drained fuel?	**NO:** GO TO 4

DN22556,000028F -19-03JUN08-5/36

4 Fuel Pressure Check	a. With low pressure fuel sensor: Remove low pressure fuel sensor and adaptor fitting from the secondary filter (B). b. Without low pressure fuel sensor: Remove plug from secondary filter (B).	



RG15384 —UN—03AUG07

Low Pressure Fuel System Gauge Test Port

A—Plug or Sensor Location
B—Secondary Fuel Filter

1. Install pressure gauge from Universal Pressure Kit JT05412 in location (A) where plug or sensor was removed using an M12 x 1.5 fitting. *NOTE: Some non-OEM engines may use a different secondary filter head which requires standard (SAE) fittings. Verify thread size and pitch before inserting adaptor.*	
2. Ignition ON, engine CRANKING or running at low idle.	**YES:** GO TO 7
Is the fuel pressure 30 kPa (4.4 psi) or above?	**NO:** GO TO 5

Continued on next page

DN22556,000028F -19-03JUN08-6/36

5 Temporary Fuel Supply Check	1. Ignition OFF, engine OFF. 2. Disconnect fuel inlet line from the primary fuel filter. 3. Install a hose on filter housing fuel inlet port and place other end of hose in a container of clean fuel. 4. Ignition ON, engine CRANKING or running at low idle. Is the fuel pressure 30 kPa (4.4 psi) or above?	**YES:** Check for pinched, restricted or loose fittings on fuel lines between the tank and the primary fuel filter. Repair and GO TO 6 **NO:** Replace low pressure fuel pump. GO TO 6

DN22556,000028F -19-03JUN08-7/36

6 Recheck Fuel Pressure	1. Ignition OFF, engine OFF. 2. Reconnect fuel inlet line from fuel tank. 3. Bleed air from fuel system. 4. Ignition ON, engine CRANKING or running at low idle. Is the fuel pressure 30 kPa (4.4 psi) or above?	**YES:** GO TO 7 **NO:** Check for broken or worn camshaft or other mechanical problem that would effect pump performance.

DN22556,000028F -19-03JUN08-8/36

7 Check for Restriction	Check for restriction in fuel line between secondary filter outlet and high pressure pump inlet. Was line restricted?	**YES:** Fix problem. GO TO 8 **NO:** GO TO 8

DN22556,000028F -19-03JUN08-9/36

8 Check for Low Pressure Fuel Sensor	Does the engine have a low pressure fuel sensor?	**YES:** GO TO 9 **NO:** Remove gauge, bleed fuel system. Low pressure fuel system is operating correctly.

Continued on next page

DN22556,000028F -19-03JUN08-10/36

9 Check Sensor Accuracy	1. Ignition ON, engine cranking or running at low idle. 2. Record reading on fuel pressure gauge. 3. Ignition OFF, engine OFF. 4. Remove fuel pressure gauge and reinstall low pressure fuel sensor. 5. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR. 6. Ignition ON, engine cranking or running at low idle. Is the fuel pressure that was indicated by the gauge within 30 kPa (4 psi) of the Low Pressure Fuel - Actual Pressure data point?	**YES:** Low pressure fuel system is functioning correctly. **NO:** GO TO 10

DN22556,000028F -19-03JUN08-11/36

10 Low Pressure Fuel Sensor Atmospheric Pressure Check	1. Remove low pressure fuel sensor and reconnect sensor to wire harness. 2. Ignition ON, engine OFF. 3. Monitor Low Pressure Fuel - Actual Pressure data point. Does the Low Pressure Fuel - Actual Pressure data point indicate 0 kPa (0 psi) within +/- 7 kPa (1 psi)?	**YES:** GO TO 12 **NO:** GO TO 11

DN22556,000028F -19-03JUN08-12/36

11 Barometric Pressure Check	Monitor Barometric Air Pressure and compare it to the actual barometric pressure reading for the ambient condition. Is the datapoint within 10 kPa (1.5 psi) of the actual barometric pressure?	**YES:** GO TO 12 **NO:** Perform procedure for 000108.02 as though DTC was active.

DN22556,000028F -19-03JUN08-13/36

12 Low Pressure Fuel Sensor Harness Checks	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector and low pressure fuel sensor connector. 3. Perform TERMINAL TEST on J1 and low pressure fuel sensor connectors. 4. On the harness, measure the resistance between the ECU fuel pressure signal (J1-B3) and fuel pressure connector signal (P03-3). 5. On the harness, measure the resistance between the ECU fuel pressure return (J1-D2) and fuel pressure connector return (P03-1). 6. On the harness, measure the resistance between the ECU fuel pressure 5V supply (J1-F3) and fuel pressure connector 5V supply (P03-2). Were TERMINAL TEST results good and were all resistance measurements less than 10 ohms?	**YES:** Replace low pressure fuel sensor. GO TO 13 **NO:** Fix problem. GO TO 13

Continued on next page

DN22556,000028F -19-03JUN08-14/36

13 Recheck Fuel Pressure

1. Reinstall low pressure fuel sensor, if removed.
2. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR.
3. Ignition ON, engine cranking or running at low idle.

Is the fuel pressure that was indicated by the gauge within 30 kPa (4 psi) of the Low Pressure Fuel - Actual Pressure?

YES: Low pressure fuel system is functioning correctly.

NO: Verify accuracy of pressure gauge. Open DTAC case if DTC 000094.17 is being generated.

DN22556,000028F -19-03JUN08-15/36

14 Check for Pump Operation with Electric Pump

NOTE: The voltage supply for the electric fuel pump may an ignition source on some applications or the voltage may be supplied by a relay that is controlled by the ECU on other applications. The ECU provides the high side for the relay coil with engine running. The ECU also energizes the relay for a programmable time (typically 60 seconds) to prime the fuel system if ignition is ON and engine is not running. For 24V models, a resistor in the wire harness is used to limit voltage supplied to the pump.

1. Ignition OFF, engine OFF for at least 5 seconds.
2. Ignition ON, engine OFF.
3. Feel or listen for fuel pump running within 60 seconds of ignition ON.

Does low pressure fuel pump run?

YES: GO TO 24

NO: GO TO 15

DN22556,000028F -19-03JUN08-16/36

15 Check Pump Power Supply

1. Ignition OFF, engine OFF.
2. Disconnect low pressure fuel pump 2-wire electrical connector.
3. Ignition ON, engine OFF.
4. Within 60 seconds of ignition ON - on the harness, measure the voltage between the pump power (A) and ground (B).

Is the voltage within 2V of battery terminal voltage?

YES: Replace low pressure fuel pump. GO TO 14

NO: With ignition supplied pump - Repair open ignition or ground circuit. GO TO 14

NO: With ECU controlled relay - GO TO 16

DN22556,000028F -19-03JUN08-17/36

16 Check Pump Terminals and Ground

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on pump 2-way connector.
3. On the harness, measure the resistance between the pump connector ground (B) and single point ground.

Are TERMINAL TEST results good and is the resistance less than 10 ohms?

NO: GO TO 17

NO: Fix problem. GO TO 14

Continued on next page

DN22556,000028F -19-03JUN08-18/36

17 Check Relay Supply Voltage	*NOTE: Consult application service information for location of relay.*	
	On the harness, measure the voltage between the low pressure fuel pump relay battery supply and single point ground.	**YES:** GO TO 18
	Is voltage within 2V of battery terminal voltage?	**NO:** Fix problem. GO TO 14

DN22556,000028F -19-03JUN08-19/36

18 Check Relay Coil Ground	On the harness, measure the resistance between the low pressure fuel pump relay coil ground and single point ground.	**YES:** GO TO 19
	Is the resistance less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,000028F -19-03JUN08-20/36

19 Check Wire Harness Continuity - Relay to Pump	On the harness, measure the resistance between the low pressure fuel pump relay output and low pressure fuel pump 2-way connector terminal A.	**YES:** GO TO 20
	Is the resistance less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,000028F -19-03JUN08-21/36

20 Check Relay Control Voltage	1. Ignition ON, engine OFF.	
	2. Within 60 seconds of ignition ON - on the harness, measure the voltage between the low pressure fuel pump relay coil high side and single point ground.	**YES:** Replace low pressure fuel pump relay. GO TO 14
	Is the voltage within 2V of battery terminal voltage?	**NO:** GO TO 21

DN22556,000028F -19-03JUN08-22/36

21 Check Terminals and Continuity	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J2 connector.	
	3. Perform TERMINAL TEST J2-M3.	
	4. On the harness, measure the resistance between the ECU low pressure fuel pump relay control (J2-M3) and the low pressure fuel pump relay coil high side terminal.	**YES:** GO TO 22
	Are TERMINAL TEST results good and is the resistance less than 10 ohms?	**NO:** Fix problem. GO TO 14

Continued on next page

DN22556,000028F -19-03JUN08-23/36

22 Reprogram ECU		
	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Reprogram ECU with the latest payload.	
	4. Ignition OFF, engine OFF for 5 seconds.	
	5. Ignition ON, engine OFF.	
	6. Within 60 seconds of ignition ON - on the harness, measure the voltage between the low pressure fuel pump relay coil high side and single point ground.	**YES:** GO TO 14
	Is voltage within 2V of battery terminal voltage?	**NO:** GO TO 23

DN22556,000028F -19-03JUN08-24/36

23 Replace ECU		
	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Within 60 seconds of ignition ON - on the harness, measure the voltage between the low pressure fuel pump relay coil high side and single point ground.	**YES:** GO TO 14
	Is voltage within 2V of battery terminal voltage?	**NO:** Open DTAC case.

DN22556,000028F -19-03JUN08-25/36

24 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. See REPLACE FUEL FILTER ELEMENT (PRIMARY OR FINAL) in Group 02, Section 090.	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 25
	Was an abnormal amount of water or contaminants present in the drained fuel?	**NO:** GO TO 25

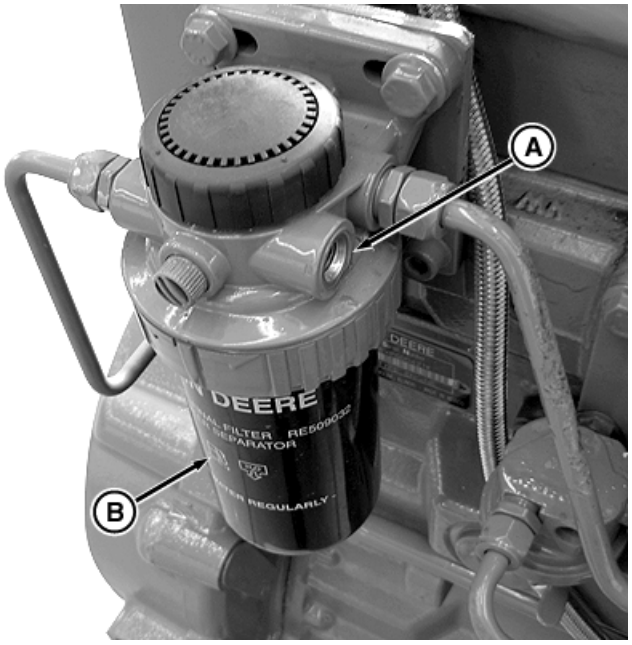
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DN22556,000028F -19-03JUN08-26/36

25 Fuel Pressure Check

a. With low pressure fuel sensor: Remove low pressure fuel sensor and adaptor fitting from the secondary filter (B).

b. Without low pressure fuel sensor: Remove plug from secondary filter (B).



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Low Pressure Fuel System Gauge Port

A—Plug or Sensor Location
B—Secondary Fuel Filter

1. Install pressure gauge from Universal Pressure Kit JT05412 in location (A) where plug or sensor was removed using an M12 x 1.5 fitting.

NOTE: Some non-OEM engines may use a different secondary filter head which requires standard (SAE) fittings. Verify thread size and pitch before inserting adaptor.

2. Ignition ON, engine OFF.

Is the fuel pressure 30 kPa (4.4 psi) or above with low pressure pump running?

YES: GO TO 28

NO: GO TO 26

DN22556,000028F -19-03JUN08-27/36

26 Temporary Fuel Supply Check

1. Ignition OFF, engine OFF.
2. Disconnect fuel inlet line from the primary fuel filter.
3. Install a hose on filter housing fuel inlet port and place other end of hose in a container of clean fuel.
4. Ignition ON, engine OFF

Is the fuel pressure 30 kPa (4.4 psi) or above with low pressure pump running?

YES: Check for pinched, restricted or loose fittings on fuel lines between the tank and the primary fuel filter. Repair and GO TO 27

NO: Replace low pressure fuel pump. GO TO 27

Continued on next page

DN22556,000028F -19-03JUN08-28/36

27 Recheck Fuel Pressure	1. Ignition OFF, engine OFF. 2. Reconnect fuel inlet line from fuel tank. 3. Bleed air from fuel system. 4. Ignition ON, engine OFF. Is the fuel pressure 30 kPa (4.4 psi) or above with low pressure pump running?	**YES:** GO TO 28 **NO:** Verify fuel pressure gauge accuracy. Open DTAC case.

DN22556,000028F -19-03JUN08-29/36

28 Check for Restriction	Check for restriction in fuel line between secondary filter outlet and high pressure pump inlet. Was line restricted?	**YES:** Fix problem. GO TO 29 **NO:** GO TO 29

DN22556,000028F -19-03JUN08-30/36

29 Check for Low Pressure Fuel Sensor	Does the engine have a low pressure fuel sensor?	**YES:** GO TO 30 **NO:** Remove gauge, bleed fuel system. Low pressure fuel system is operating correctly.

DN22556,000028F -19-03JUN08-31/36

30 Check Sensor Accuracy	1. Ignition ON, engine OFF. 2. Record reading on fuel pressure gauge with low pressure fuel pump running. 3. Ignition OFF, engine OFF. 4. Remove fuel pressure gauge and reinstall low pressure fuel sensor. 5. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR. 6. Ignition ON, engine OFF. Is the fuel pressure that was indicated by the gauge within 30 kPa (4 psi) of the Low Pressure Fuel - Actual Pressure data point?	**YES:** Low pressure fuel system is functioning correctly. **NO:** GO TO 31

DN22556,000028F -19-03JUN08-32/36

31 Low Pressure Fuel Sensor Atmospheric Pressure Check	1. Ignition OFF, engine OFF. 2. Remove low pressure fuel sensor and reconnect sensor to wire harness. 3. Disconnect low pressure fuel pump 2-wire connector to prevent pump from operating. 4. Ignition ON, engine OFF. 5. Monitor Low Pressure Fuel - Actual Pressure data point. Does the Low Pressure Fuel - Actual Pressure data point indicate 0 kPa (0 psi) within +/- 7 kPa (1 psi)?	**YES:** GO TO 33 **NO:** GO TO 32

Continued on next page

DN22556,000028F -19-03JUN08-33/36

32 Barometric Air Pressure Check	Monitor Barometric Air Pressure and Manifold Air Pressure - Absolute data points.	**YES:** GO TO 33
	Are the two data points within 10 kPa (1.5 psi) of each other?	**NO:** Perform procedure for 000108.02 as though DTC was active.

DN22556,000028F -19-03JUN08-34/36

33 Low Pressure Fuel Sensor Harness Checks	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector and low pressure fuel sensor connector.	
	3. Perform TERMINAL TEST on J1 and low pressure fuel sensor connectors.	
	4. On the harness, measure the resistance between the ECU fuel pressure signal (J1-B3) and fuel pressure connector signal (P03-3).	
	5. On the harness, measure the resistance between the ECU fuel pressure return (J1-D2) and fuel pressure connector return (P03-1).	
	6. On the harness, measure the resistance between the ECU fuel pressure 5V supply (J1-F3) and fuel pressure connector 5V supply (P03-2).	**YES:** Replace low pressure fuel sensor. GO TO 34
	Were TERMINAL TEST results good and were all resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 34

DN22556,000028F -19-03JUN08-35/36

34 Recheck Fuel Pressure	1. Reinstall low pressure fuel sensor, if removed.	
	2. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR.	
	3. Ignition ON, engine cranking or running at low idle.	**YES:** Low pressure fuel system is functioning correctly.
	Is the fuel pressure that was indicated by the gauge within 30 kPa (4 psi) of the Low Pressure Fuel - Actual Pressure data point?	**NO:** Verify accuracy of pressure gauge. Open DTAC case if DTC 000094.17 is being generated.

DN22556,000028F -19-03JUN08-36/36

F2 - High Pressure Fuel Supply System Test

BK34394,0000031 -19-20JUN08-1/26

F2 - High Pressure Fuel Supply System Test Diagnostic Procedure

Additional References:
For fuel system operation information, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

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

IMPORTANT: Thoroughly clean all fuel lines, fittings, and components prior to making any disconnections or connections to prevent debris from entering the fuel system, which can damage engine and components.

IMPORTANT: Do NOT plug or restrict the fuel leak-off (return) line in an attempt to diagnose the fuel system. This practice will damage the high pressure pump.

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

BK34394,0000031 -19-20JUN08-2/26

1 Check for Active DTCs	Were you referred to this High Pressure Fuel System Check while performing the diagnostic procedures for a diagnostic trouble code (DTC)?	**YES:** GO TO 2 **NO:** Check for and resolve any active DTCs prior to performing this test. GO TO 2

Continued on next page

BK34394,0000031 -19-20JUN08-3/26

2 Preliminary Fuel System Checks	Has test F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST found earlier in this group been performed?	**YES:** GO TO 3 **NO:** Perform test F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST prior to performing test F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST

BK34394,0000031 -19-20JUN08-4/26

3 Engine Start Status	Does engine start?	**YES:** GO TO 18 **NO:** GO TO 4

BK34394,0000031 -19-20JUN08-5/26

4 Check Fuel Rail Pressure	1. Monitor Fuel Rail Pressure - Actual data point in Service ADVISOR.	**YES:** GO TO 11
	2. Ignition ON, engine cranking.	**NO:** With electric low pressure fuel pump and low pressure fuel sensor GO TO 5
	Is the fuel rail pressure - actual 20 MPa (2900 psi) or above with engine cranking?	**NO:** All others GO TO 6

BK34394,0000031 -19-20JUN08-6/26

5 Check High Pressure Fuel Pump	*NOTE: This check is used to verify that the high pressure pump is rotating and capable of delivering fuel to the rail when the engine is cranking. The suction at the high pressure pump inlet will draw the low pressure fuel system into a negative pressure (partial vacuum) if the high pressure pump is rotating and low pressure pump is not operating.* 1. Ignition OFF, engine OFF. 2. Ignition ON, engine OFF 30 seconds to cause low pressure fuel pump to prime system. 3. Ignition OFF, engine OFF. 4. Disconnect fuel low pressure fuel pump 2-way connector. 5. Ignition ON, engine OFF. 6. Monitor Low Pressure Fuel - Actual Pressure data point in Service ADVISOR. 7. Crank engine for 30 seconds.	**YES:** Reconnect low pressure fuel pump. GO TO 7
	Does Low Pressure Fuel - Actual Pressure decrease while cranking engine to a negative pressure value of -2 kPa to -10 kPa (-3 psi to -14 psi)?	**NO:** Check for high pressure fuel pump shaft failure, debris at pump inlet, or stuck closed suction control valve.

Continued on next page

BK34394,0000031 -19-20JUN08-7/26

6 Check High Pressure Fuel Pump	1. Remove secondary fuel filter inlet line and place end of line in a container suitable for diesel fuel. 2. Disconnect fuel leak-off return to tank line at “T” on high pressure pump. 3. Install a hose to “T”. 4. Place other end of hose in a container suitable for diesel fuel. 5. Crank engine for 30 seconds. Is fuel flow from leak-off at least 50 mL (2 oz.)?	**YES:** Reinstall fuel lines and bleed air from system. GO TO 7 **NO:** Check for high pressure fuel pump shaft failure, debris at pump inlet, or stuck closed suction control valve.

BK34394,0000031 -19-20JUN08-8/26

7 Pressure Limiter Test	**CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.** **If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.** *NOTE: For pressure limiter replacement, see REMOVE AND INSTALL PRESSURE LIMITER in Section 02, Group 090 earlier in this manual.* 1. Ignition OFF, engine OFF for at least 5 minutes to permit rail pressure to decrease. 2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter. 3. Disconnect fuel return line from the pressure limiter valve. DO NOT remove the pressure limiter valve from fuel rail. 4. Cap the return line fitting that was originally connected to the pressure limiter. DO NOT cap the pressure limiter. 5. Connect a temporary fuel line to the pressure limiter outlet and route to a suitable container for diesel fuel. 6. Ignition ON, engine cranking for 20 seconds. 7. Check temporary fuel line for fuel flow through pressure limiter with engine cranking. Is fuel flow through the pressure limiter present?	**YES:** Replace pressure limiter valve and retest fuel rail pressure. **NO:** Reinstall return line. GO TO 8

Continued on next page

BK34394,0000031 -19-20JUN08-9/26

8 Injector Leak-off Check	1. Ignition OFF, engine OFF. 2. Disconnect injector fuel leak-off line at fuel return tee and cap tee. 3. Connect a clear hose to the injector leak off line, routing the other end into a suitable container for diesel fuel. 4. Ignition ON, engine cranking for 20 seconds. Is fuel flow from injector leak-off line: • 4045 Engine - greater than 72 mL (2.4 oz.) during 20 seconds of engine cranking?	**YES:** Measure flow from each injector leak-off line. Replace injector(s) with flow greater than 25 mL (0.8 oz.) during 20 seconds of engine cranking and retest rail pressure.
	• 6068 Engine - greater than 111 mL (3.7 oz.) during 20 seconds of engine cranking?	**NO:** GO TO 9

BK34394,0000031 -19-20JUN08-10/26

9 Check for Stuck or Leaking Injector with Compression Test	*NOTE: For Compression Test information, see Cylinder Electronic Compression Test Instructions earlier in this manual.* 1. Perform Cylinder Electronic Compression Test in Service ADVISOR. 2. Compare compression between cylinders.	**YES:** Replace injector in cylinder with higher compression and retest fuel rail pressure.
	Does one cylinder have 10 percent or higher compression than the other cylinders?	**NO:** GO TO 10

BK34394,0000031 -19-20JUN08-11/26

10 Replace High Pressure Fuel Pump	Replace high pressure fuel pump and suction control valve.	**YES:** Problem fixed.
	Is the fuel rail pressure - actual 20 MPa (2900 psi) or above with engine cranking or running?	**NO:** Replace injectors. Open DTAC case if fuel rail pressure is still below 20 MPa (2900 psi).

BK34394,0000031 -19-20JUN08-12/26

11 Check Fuel Rail Pressure Sensor	*NOTE: High resistance in the fuel rail pressure sensor circuit can cause the ECU to incorrectly determine fuel rail pressure is higher than actual fuel rail pressure.* 1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Ignition ON, engine cranking.	**YES:** GO TO 12
	Did engine start?	**NO:** GO TO 13

Continued on next page

BK34394,0000031 -19-20JUN08-13/26

12 Check Fuel Rail Pressure Sensor Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Disconnect ECU J1 connector. 4. Perform TERMINAL TEST on rail pressure sensor connector and J1 connector. 5. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J1-E3). 6. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J1-D3). 7. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J1-E2). Were TERMINAL TEST results good and all resistance measurements less than 10 ohms?	**YES:** Replace fuel rail pressure sensor. **NO:** Fix problem. Verify engine starts.

BK34394,0000031 -19-20JUN08-14/26

13 Check for Fuel Rail Pressure DTC	Verify fuel rail pressure sensor is still disconnected. Is DTC 000157.03 active?	**YES:** Cause of no-start is not the high pressure fuel system. Reconnect sensor and return to original procedure. **NO:** GO TO 14

BK34394,0000031 -19-20JUN08-15/26

14 Check Fuel Rail Pressure Sensor Circuit Continuity	1. Ignition OFF, engine OFF. 2. Disconnect fuel rail pressure sensor connector P05. 3. Disconnect ECU J1 connector. 4. Perform TERMINAL TEST on rail pressure sensor connector and J1 connector. 5. On the harness, measure the resistance between the rail pressure sensor signal (P05-1) and the ECU rail pressure signal (J1-E3). 6. On the harness, measure the resistance between the rail pressure sensor 5V supply (P05-3) and the ECU 5V supply (J1-D3). 7. On the harness, measure the resistance between the rail pressure sensor return (P05-2) and the ECU return (J1-E2). Were TERMINAL TEST results good and all resistance measurements less than 10 ohms?	**YES:** GO TO 15 **NO:** Fix problem.

BK34394,0000031 -19-20JUN08-16/26

15 Check for Shorted Fuel Rail Pressure Sensor Circuits	1. On the harness, measure the resistance between the ECU rail pressure signal (J1-E3) and single point ground. 2. On the harness, measure the resistance between the ECU 5V supply (J1-D3) and single point ground. 3. On the harness, measure the resistance between the ECU return (J1-E2) and single point ground. Were all resistance measurements greater than 10k ohms?	**YES:** GO TO 16 **NO:** Fix problem.

Continued on next page

BK34394,0000031 -19-20JUN08-17/26

16 Check for Wire to Wire Short	On the harness, measure the resistance between the ECU rail pressure signal (J1-E3) and all other terminals in the J1 connector. Were all resistance measurements greater than 10k ohms?	**YES:** GO TO 17 **NO:** Fix problem.

BK34394,0000031 -19-20JUN08-18/26

17 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage from the ECU rail pressure signal (J1-E3) to single point ground. 3. On the harness, measure the voltage from the ECU 5V supply (J1-D3) to single point ground. 4. On the harness, measure the voltage from the ECU rail pressure return (J1-E2) to single point ground. 5. Ignition OFF, engine OFF. Were all voltage measurements less than 0.5V?	 **YES:** Replace ECU. **NO:** Fix problem.

Continued on next page

BK34394,0000031 -19-20JUN08-19/26

18 Suction Control Valve and Pressure Limiter Check

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

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

NOTE: For pressure limiter replacement, see REMOVE AND INSTALL PRESSURE LIMITER in Section 02, Group 090 earlier in this manual.

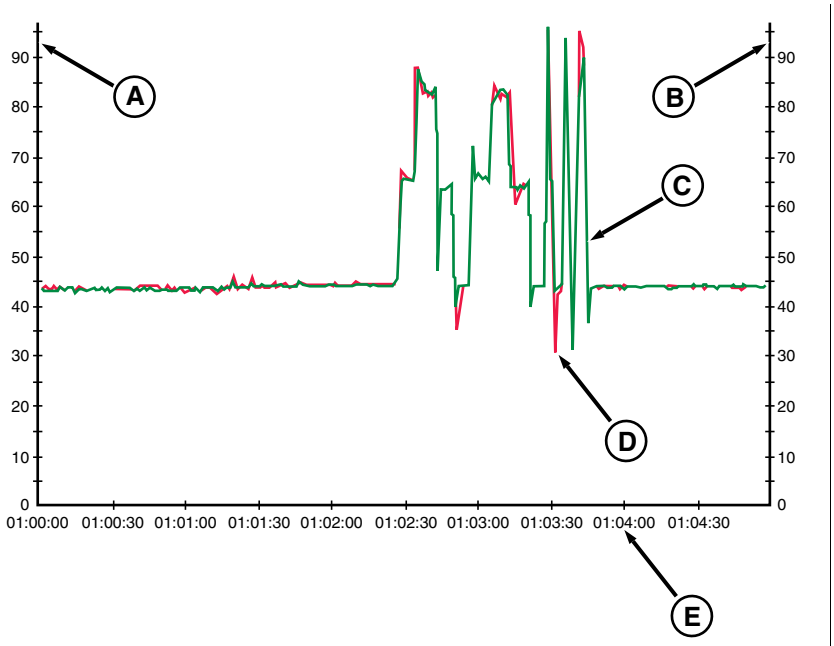
NOTE: A sticking suction control valve (suction control valve) causes low power, DTC 001347.07, and black smoke. The suction control valve may only stick intermittently, and usually occurs after the engine is at low idle for a period of time and throttle is then advanced. If the suction control valve sticks open, the fuel rail pressure will rapidly increase to 220 MPa (32,000 psi) or more, causing the pressure limiter to open. Fuel rail pressure is then limited to approximately 50 MPa (7250 psi) with the pressure limiter open. Shutting the engine down and restarting should reset the pressure limiter and temporarily restore performance. The sticking suction control valve may also fail such that it causes fuel rail pressure to be erratic resulting in poor performance and possibly generating DTC 001347.07.

1. Ignition OFF, engine OFF for at least 5 minutes to permit rail pressure to decrease.
2. Thoroughly clean all fuel lines, fittings, components, and chamfered area around the pressure limiter.
3. Disconnect fuel return line from the pressure limiter valve. DO NOT remove the pressure limiter valve from fuel rail.
4. Cap the return line fitting that was originally connected to the pressure limiter. DO NOT cap the pressure limiter.
5. Connect a temporary fuel line to the pressure limiter outlet and route to a suitable container for diesel fuel.
6. Ignition ON, engine OFF.
7. Using the graph feature in SERVICE ADVISOR, record the following data points:
   - Fuel Rail Pressure - Actual
   - Fuel Rail Pressure – Desired
8. Start engine and operate at low idle for two minutes.

NOTE: If any fuel flow is present through pressure limiter; discontinue test, replace pressure limiter, and return to this step.

9. Snap throttle several times.
10. Operate engine at speed and load where problem occurs.
11. Compare graph of Fuel Rail Pressure - Actual and Fuel Rail Pressure - Desired to those shown in the examples below.

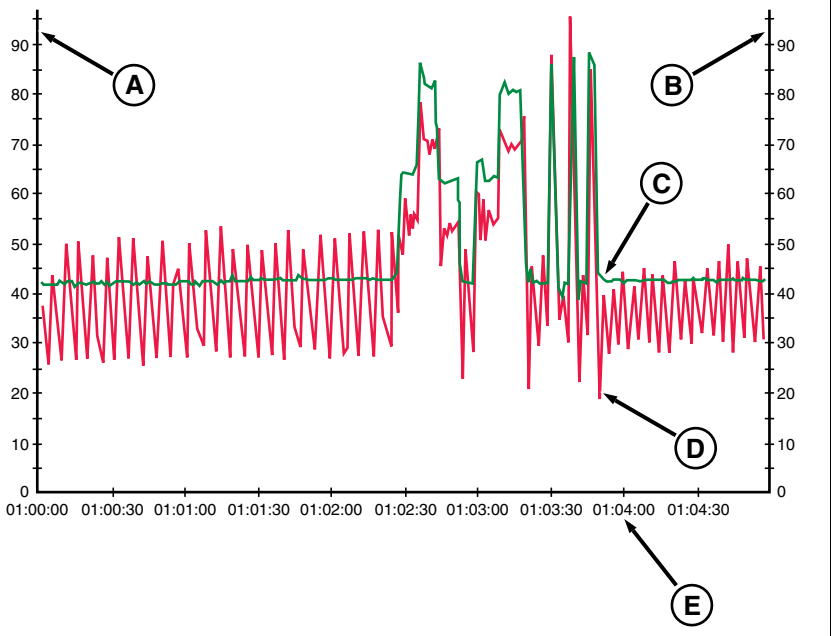
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RG15365 —UN—25JUL07

Good Suction Control Valve.

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)

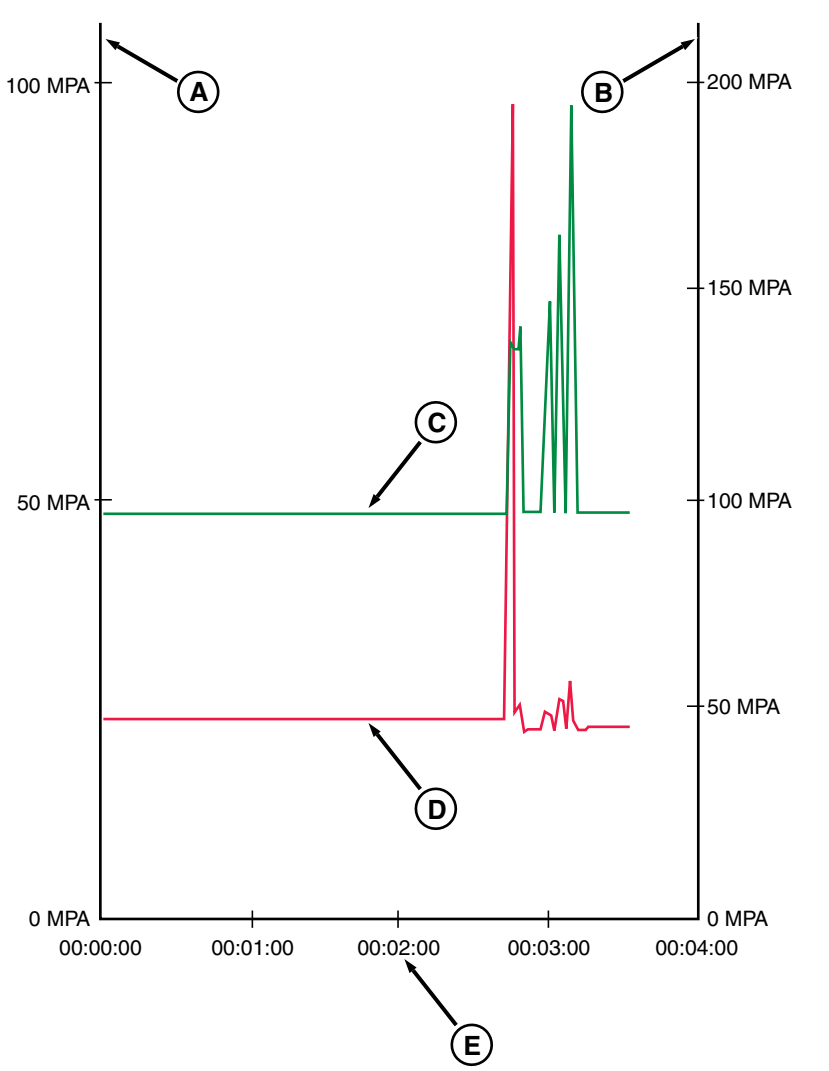


RG15366 —UN—25JUL07

Sticking Suction Control ValveCausing Erratic Rail Pressure

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)

Continued on next page



RG15372 —UN—26JUL07

Sticking Suction Control Valve Causing Pressure Limiter to Open. Note Difference in Pressure Scales.

A—Fuel Rail Pressure - Desired scale (MPa)
B—Fuel Rail Pressure - Actual scale (MPa)
C—Fuel Rail Pressure - Desired (Green)
D—Fuel Rail Pressure - Actual (Red)
E—Time Scale (HH:MM:SS)

Is the graph that is generated similar to the examples of a sticking suction control valve or was any fuel flow present through pressure limiter?

YES: Replace suction control valve and pressure limiter. Reprogram ECU with latest payload.

NO: GO TO 19

Continued on next page

BK34394,0000031 -19-20JUN08-22/26

19 Injector Leak-off Check

1. Ignition OFF, engine OFF.
2. Disconnect injector fuel leak-off line at tee and cap tee.

NOTE: Do NOT cap the injector leak-off line.

3. Connect a clear hose to the injector leak off line, routing the other end into a suitable container for diesel fuel.
4. Start engine and operate at 800 rpm.

Is fuel flow from injector leak-off line:

- 4045 Engine - greater than 216 mL (7.3 oz.) per minute? — **YES:** Measure flow from each injector leak-off line. Replace injector(s) with flow greater than 60 mL (2 oz.) per minute and retest engine performance.
- 6068 Engine - greater than 333 mL (11.3 oz.) per minute? — **NO:** Reinstall fuel return line. GO TO 20

BK34394,0000031 -19-20JUN08-23/26

20 High Pressure Fuel Pump Overflow Orifice Test

1. Ignition OFF, engine OFF.
2. Disconnect the fuel leak-off line between the tee coming from the injector and fuel rail leak-off lines, and the high pressure fuel pump overflow orifice fitting.
3. Connect a clear hose to the overflow orifice, routing the other end into a suitable container for diesel fuel. — **YES:** Verify that low pressure fuel system pressure is within specifications. If OK, replace high pressure fuel pump. GO TO 21
4. Start engine and operate at 800 rpm. — **NO:** No fuel flow is present. Replace high pressure fuel pump. GO TO 21

Is fuel flow through overflow orifice greater than 333 mL (11.3 oz.) per minute? — **NO:** Fuel flow present and within specification. Reinstall fuel return line. GO TO 21

BK34394,0000031 -19-20JUN08-24/26

21 Misfire and Cutout Test

1. Perform Cylinder Misfire Test in Service ADVISOR.
2. Perform Cylinder Cutout Test in Service ADVISOR with engine at low idle. — **YES:** High pressure fuel system is operating correctly. Return to original procedure.

Is each cylinder's contribution within 10 percent of the others during the Cylinder Misfire Test and does the sound of the engine change equally when each injector is disabled during the Cylinder Cutout Test? — **NO:** GO TO 22

Continued on next page

BK34394,0000031 -19-20JUN08-25/26

22 Check Compression	Perform Cylinder Electronic Compression Test in Service ADVISOR. Is compression in the cylinder(s) with low contribution identified in Step 21 also at least 10 percent less than the other cylinders (compression is low and contribution is low in the same cylinder)?	**YES:** Check compression with mechanical gauge. **NO:** Replace injector(s) in cylinder(s) with low contribution.

BK34394,0000031 -19-20JUN08-26/26

F3 - Excessive Fuel Consumption

NOTE: Contact your local John Deere representative for your engine's fuel consumption specifications.

Symptom	Problem	Solution
F3 - Excessive Fuel Consumption	Diagnostic trouble codes	Resolve active diagnostic trouble codes.
	Poor fuel quality	Drain fuel and replace with quality fuel of the proper grade.
	Engine overloaded	Reduce engine load
	Air cleaner restricted or dirty	Replace air cleaner element as required.
	Compression too low	Determine cause of low compression and repair as required.
	Leaks in fuel supply system	Locate source of leak and repair as required.
	Improper valve clearance.	Adjust valves. See CHECK AND ADJUST VALVE CLEARANCE in the Base Engine Manual.
	Fuel injectors defective.	If testing indicates a possible faulty injector, remove and inspect injectors. See REMOVE ELECTRONIC INJECTOR (EI) and INSTALL ELECTRONIC INJECTOR (EI) in Section 2, Group 090 of this manual.
	Low engine temperature.	Coolant temperature too low. Check thermostat. See INSPECT THERMOSTAT AND TEST OPENING TEMPERATURE in the Base Engine Manual.
	Check for ECU Software Updates	Reprogram ECU with latest payload.

DN22556,0000290 -19-30AUG07-1/1

F4 - Fuel in Oil

DB92450,0000027 -19-06AUG10-1/8

F4 - Fuel in Oil Diagnostic Procedure

DB92450,0000027 -19-06AUG10-2/8

1 Oil Contamination Test	*NOTE: Hydraulic oil leaking into the engine crankcase from a hydraulic pump may be mistaken as fuel in the oil. Laboratory analysis can be used to determine if the contaminate is fuel or hydraulic oil.* 1. Check for an increase in engine oil level and a decrease in oil viscosity (oil is too thin). 2. Submit oil sample to laboratory to identify contaminant, if uncertain. Is the contaminant fuel?	**YES:** GO TO 2 **NO:** Perform test for identified contaminant.

DB92450,0000027 -19-06AUG10-3/8

2 Check for Restricted Fuel Return Lines	Perform CHECK FOR RESTRICTED FUEL LEAK-OFF LINE test in this group. Did return fuel system pass test?	**YES:** GO TO 3 **NO:** Repair problem. GO TO 3

DB92450,0000027 -19-06AUG10-4/8

3 Check High Pressure Pump Front Seal	*NOTE: For removal and installation procedures, see REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP, Section 02, Group 090 in this manual.* Remove high pressure pump and check for seal damage. Is there evidence of seal damage?	**YES:** Replace high pressure pump. **NO:** Reinstall pump. GO TO 4

DB92450,0000027 -19-06AUG10-5/8

4 Check for Black Smoke	Does engine emit gray or black exhaust smoke?	**YES:** Perform E5 - ENGINE EMITS EXCESSIVE BLACK OR GRAY EXHAUST. **NO:** GO TO 5

DB92450,0000027 -19-06AUG10-6/8

5 Check Engine Performance	1. Perform Cylinder Misfire Test in Service ADVISOR. 2. Perform Cylinder Cutout Test in Service ADVISOR. Do test results indicate low contribution from a single cylinder?	**YES:** Replace injector for that cylinder. **NO:** GO TO 6

Continued on next page

DB92450,0000027 -19-06AUG10-7/8

6 Check Injectors	1. Remove injectors. 2. Check for damaged injector O-rings or combustion sealing washers. Was any damage observed?	 **YES:** Replaced damaged components. **NO:** Open DTAC case.

DB92450,0000027 -19-06AUG10-8/8

D1 - ECU Does Not Communicate with Service ADVISOR

DN22556,0000292 -19-10SEP07-1/27

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 D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 04, Group 160 later in this manual.

For tool identification, see ELECTRONIC SYSTEM DIAGNOSTIC TOOLS in Section 05, Group 180 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

DN22556,0000292 -19-10SEP07-2/27

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. • Try to connect using a different adaptor or different type of adaptor, if available. • Try to connect using a different PC, if available. Does Service ADVISOR now connect to the original ECU?	**YES:** Determine which cable or adaptor is defective and replace, if applicable. **NO:** No other application available to verify equipment. GO TO 2 **NO:** Service ADVISOR connected to ECU on a different application. GO TO 2 **NO:** Service ADVISOR would not connect to ECU on a different application and you have narrowed down problem to PC. Open DTAC case.

DN22556,0000292 -19-10SEP07-3/27

2 Check Adaptor Type	Are you using an EDL adaptor?	**YES:** GO TO 3 **NO:** PDM GO TO 5

DN22556,0000292 -19-10SEP07-4/27

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. Is the EDL green power light ON steady?	**YES:** GO TO 4 **NO:** GO TO 6

DN22556,0000292 -19-10SEP07-5/27

4 Check for Red Error Light - EDL	1. For USB connection, attach the USB cable to the EDL and the PC. 2. Open Service ADVISOR and attempt to connect to the ECU. Is the EDL red error indicator light ON?	**YES:** Replace EDL. GO TO 25 **NO:** EDL with USB GO TO 8 **NO:** EDL with Bluetooth GO TO 9

Continued on next page

DN22556,0000292 -19-10SEP07-6/27

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

DN22556,0000292 -19-10SEP07-7/27

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

DN22556,0000292 -19-10SEP07-8/27

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

DN22556,0000292 -19-10SEP07-9/27

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. 2. Reattempt to connect Service ADVISOR to the ECU. Did amber data transfer light flash ON briefly or is the amber light ON continuous?	**YES:** Amber light flashed ON briefly. GO TO 11 **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

DN22556,0000292 -19-10SEP07-10/27

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

DN22556,0000292 -19-10SEP07-11/27

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.

DN22556,0000292 -19-10SEP07-12/27

11 Check Engine Operation	Attempt to start engine.	**YES:** GO TO 12
	Does engine start?	**NO:** GO TO 13

DN22556,0000292 -19-10SEP07-13/27

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

DN22556,0000292 -19-10SEP07-14/27

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

DN22556,0000292 -19-10SEP07-15/27

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

DN22556,0000292 -19-10SEP07-16/27

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

DN22556,0000292 -19-10SEP07-17/27

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

DN22556,0000292 -19-10SEP07-18/27

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

DN22556,0000292 -19-10SEP07-19/27

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

DN22556,0000292 -19-10SEP07-20/27

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

DN22556,0000292 -19-10SEP07-21/27

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

DN22556,0000292 -19-10SEP07-22/27

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

DN22556,0000292 -19-10SEP07-23/27

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

DN22556,0000292 -19-10SEP07-24/27

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

DN22556,0000292 -19-10SEP07-25/27

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.

DN22556,0000292 -19-10SEP07-26/27

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

DN22556,0000292 -19-10SEP07-27/27

D2 - ECU Does Not Communicate with Diagnostic Gauge or Gauge Displays CAN Bus Error

DN22556,0000293 -19-12OCT07-1/8

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 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 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.

DN22556,0000293 -19-12OCT07-2/8

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

DN22556,0000293 -19-12OCT07-3/8

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

DN22556,0000293 -19-12OCT07-4/8

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.

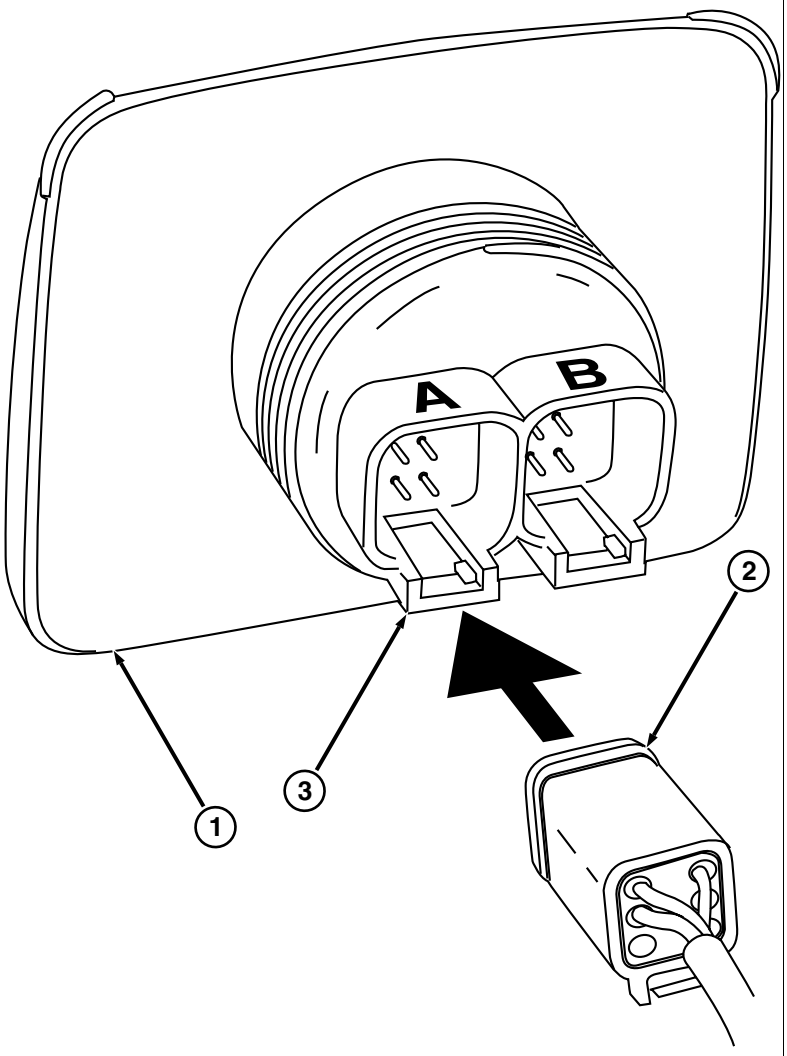
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DN22556,0000293 -19-12OCT07-5/8

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

DN22556,0000293 -19-12OCT07-6/8

5 Check CAN Wiring Continuity to Diagnostic Connector	1. Disconnect diagnostic gauge 6-way connector containing the CAN wires. 2. On the harness, measure the resistance between the diagnostic gauge 6-way connector terminal 2 and 9-pin diagnostic connector C11-C. 3. On the harness, measure the resistance between the diagnostic gauge 6-way connector terminal 3 and 9-pin diagnostic connector C11-D. Are both resistance measurements less than 10 ohms?	**YES:** Replace diagnostic gauge. GO TO 6 **NO:** Fix CAN wiring. GO TO 6

DN22556,0000293 -19-12OCT07-7/8

6 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. 4. Check diagnostic gauge operation. Does diagnostic gauge display engine information?	**YES:** Problem fixed. **NO:** GO TO 1

DN22556,0000293 -19-12OCT07-8/8

D5 - ECU Does Not Program With Service ADVISOR

JB81757,0000007 -19-30AUG07-1/7

D5 - 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 D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 04, Group 160 later in this manual.

JB81757,0000007 -19-30AUG07-2/7

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

JB81757,0000007 -19-30AUG07-3/7

2 Communication Error Message	Does an error message appear in Service ADVISOR indicating “Error Communicating and Programming the ECU”?	**YES:** GO TO 3 **NO:** Perform steps indicated in error message. Consult WebHelpR in Service ADVISOR help menu.

JB81757,0000007 -19-30AUG07-4/7

3 Check for New ECU	Are you attempting to program a new replacement ECU?	**YES:** GO TO 4 **NO:** Attempting to reprogram the original ECU. GO TO 5

Continued on next page

JB81757,0000007 -19-30AUG07-5/7

4 Parameters	Were you able to successfully retrieve the parameters from the old ECU when prompted in Service ADVISOR?	**YES:** Consult WebHelpR in Service ADVISOR help menu. **NO:** Old ECU is available and operational. GO TO 5 **NO:** Old ECU is not available or is not operational. Consult WebHelpR in Service ADVISOR help menu.

JB81757,0000007 -19-30AUG07-6/7

5 Check for Service Advisor Communication	*NOTE: A live connection in Service ADVISOR cannot be obtained with a new ECU until it has been programmed.* 1. Ignition OFF, engine OFF. 2. Connect old or original ECU to wire harness. 3. Ignition ON, engine OFF.	**YES:** Attempting to reprogram original ECU. Replace original ECU.
	4. Attempt to connect to ECU (live connection) using Service ADVISOR.	**YES:** Attempting to program a new ECU. Consult WebHelpR in Service ADVISOR help menu.
	Does Service ADVISOR connect to the old or original ECU?	**NO:** Discontinue test D5 and start test D1.

JB81757,0000007 -19-30AUG07-7/7

A1 - Intake Air Heater Check

RG41221,00002C6 -19-12OCT07-1/17

A1 - Intake Air Heater Check Diagnostic Procedure

Related Information:
A relay controlled by the ECU provides the voltage supply to intake air heating element. The heating element is grounded to the intake manifold.
The ECU supplies a high side output to the intake air heater relay coil to energize the relay.
The ECU uses fuel temperature to determine if the intake air heater relay should be energized.
A wait to start lamp controlled by the ECU is illuminated to signal the operator to not crank the engine until the ECU has completed the preheating cycle.

Control Unit Response:
The engine may not start or may require extended crank times in cold weather if the intake air heater does not operate.

Additional References:
For further intake air heater information, see INTAKE AIR HEATER OPERATION in Section 03, Group 140 earlier in this manual.
For application specific information on intake air heater preheat time versus fuel temperature, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2, 4.5L 12V ECU WIRING DIAGRAM 6
- see 4.5L 24V ECU WIRING DIAGRAM 2, 4.5L 24V ECU WIRING DIAGRAM 6
- see 6.8L 12V ECU WIRING DIAGRAM 2, 6.8L 12V ECU WIRING DIAGRAM 6
- see 6.8L 24V ECU WIRING DIAGRAM 2, 6.8L 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: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

RG41221,00002C6 -19-12OCT07-2/17

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. GO TO 2

RG41221,00002C6 -19-12OCT07-3/17

2 Check Intake Air Heater Fuse	Measure the voltage between the intake air heater relay battery supply terminal (large cable) and single point ground. Is the voltage within 1V of battery terminal voltage?	**YES:** GO TO 3 **NO:** Check intake air heater supply fuse or repair open circuit between battery and relay. GO TO 3

Continued on next page

RG41221,00002C6 -19-12OCT07-4/17

3 Check Wait to Start Lamp	1. Ignition OFF, engine OFF.	
	2. Disconnect fuel temperature sensor to cause ECU to energize intake air heater relay at next key cycle.	
	NOTE: Ignore DTC 000174.03 which will be generated due to fuel temperature sensor being disconnected.	
	3. Ignition ON, engine OFF.	**YES:** GO TO 4
	4. Observe if wait to start lamp is illuminated for several seconds and is then extinguished.	**NO:** Diagnose lamp circuit and verify ECU is programmed for intake air heater.
	Does the wait to start lamp illuminate and then go out?	**NO:** Application does not have a wait to start lamp. GO TO 4

RG41221,00002C6 -19-12OCT07-5/17

4 Check Voltage at Heating Element	1. Ignition OFF, engine OFF.	
	2. Verify fuel temperature sensor is still disconnected.	
	3. Monitor the voltage between the heating element connection in intake manifold and single point ground	**YES:** GO TO 10
	4. Ignition ON, engine OFF.	**NO:** Voltage is always near 0V. GO TO 5
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON and then drops to near 0V?	**NO:** Voltage is always within 5V of battery terminal voltage. Check for stuck intake air heater relay.

RG41221,00002C6 -19-12OCT07-6/17

5 Check Intake Air Heater Relay Control	1. Ignition OFF, engine OFF.	
	2. Monitor voltage between intake air heater relay coil high side terminal and single point ground.	
	3. Ignition ON, engine OFF.	**YES:** GO TO 6
	Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?	**NO:** GO TO 8

RG41221,00002C6 -19-12OCT07-7/17

6 Check Intake Air Heater Relay Ground	1. Ignition OFF, engine OFF.	
	2. Measure the resistance between the intake air heater relay coil low side terminal and single point ground.	**YES:** GO TO 7
	Is resistance less than 10 ohms?	**NO:** Fix open ground circuit.

Continued on next page

RG41221,00002C6 -19-12OCT07-8/17

7 Check Intake Air Heater Relay

1. Monitor the voltage between the intake air heater output terminal and single point ground.
2. Ignition ON, engine OFF.

Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?

YES: Repair open circuit between intake air heater relay output and intake air heater.

NO: Replace intake air heater relay.

RG41221,00002C6 -19-12OCT07-9/17

8 Check Terminals

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1-H4.
4. On the harness, measure the resistance between the ECU intake air heater relay control (J1-H4) and the intake air heater relay coil high side terminal.

Were TERMINAL TEST results good and resistance less than 10 ohms?

YES: GO TO 9

NO: Fix problem. Recheck heater operation.

RG41221,00002C6 -19-12OCT07-10/17

9 Reprogram ECU

1. Reinstall all connectors except fuel temperature sensor.
2. Download latest payload and reprogram ECU.

NOTE: Verify Starting Aids (Intake Air Heater) is enabled in the Trimmable Options page during the reprogramming process.

3. Monitor voltage between intake air heater relay coil high side terminal and single point ground.
4. Ignition ON, engine OFF.

Is the voltage within 5V of battery terminal voltage for several seconds after ignition is ON?

YES: Problem fixed.

NO: Replace ECU. Recheck heater operation.

RG41221,00002C6 -19-12OCT07-11/17

10 Check Heating Element Resistance

NOTE: Normal heating element resistance at room temperature is much less than 1 ohm. The resistance increases significantly when the heating element is hot.

1. Ignition OFF, engine OFF.
2. Verify heating element connection is tight and free from corrosion.
3. At the intake air heating element, measure the resistance between the heating element power connection and single point ground.

Is the resistance less than 2 ohms?

YES: GO TO 11

NO: Replace heating element. Recheck heater operation.

Continued on next page

RG41221,00002C6 -19-12OCT07-12/17

11 Fuel Temperature Accuracy Check	1. Reconnect fuel temperature sensor connector.	
	2. Ignition ON, engine OFF	
	3. Monitor Fuel Temperature data point in Service ADVISOR.	**YES:** Intake air heater system is functioning correctly.
	Does the Fuel Temperature data point indicate the actual fuel temperature near the sensor within 5°C (9°F)?	**NO:** GO TO 12

RG41221,00002C6 -19-12OCT07-13/17

12 Check Fuel Temperature Circuit	*NOTE: For fuel temperature sensor replacement instructions, see REMOVE AND INSTALL FUEL TEMPERATURE SENSOR in Section 02, Group 110 earlier in this manual.*	
	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector and fuel temperature sensor connector T05.	
	3. Perform TERMINAL TEST on J1-F4, J1-D2, and fuel temperature sensor connector.	
	4. On the harness, measure the resistance between the ECU fuel temperature signal (J1-F4) and the fuel temperature sensor connector signal (T05-1).	
	5. On the harness, measure the resistance between the ECU reference (J1-D2) and the fuel temperature sensor connector reference (T05-2).	**YES:** Replace fuel temperature sensor. GO TO 13
	Are TERMINAL TEST results good and are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 13

RG41221,00002C6 -19-12OCT07-14/17

13 Recheck Fuel Temperature Accuracy	1. Reconnect fuel temperature sensor connector.	
	2. Ignition ON, engine OFF	
	3. Monitor Fuel Temperature data point in Service ADVISOR.	**YES:** Intake air heater system is functioning correctly.
	Does the Fuel Temperature data point indicate actual fuel temperature within 5°C (9°F)?	**NO:** GO TO 14

RG41221,00002C6 -19-12OCT07-15/17

14 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Download latest payload and reprogram ECU.	
	NOTE: Verify Starting Aids (Intake Air Heater) is enabled in the Trimmable Options page during the reprogramming process.	
	4. Ignition ON, engine OFF	
	5. Monitor Fuel Temperature data point in Service ADVISOR.	**YES:** Problem fixed.
	Does the Fuel Temperature data point indicate actual fuel temperature within 5°C (9°F)?	**NO:** GO TO 15

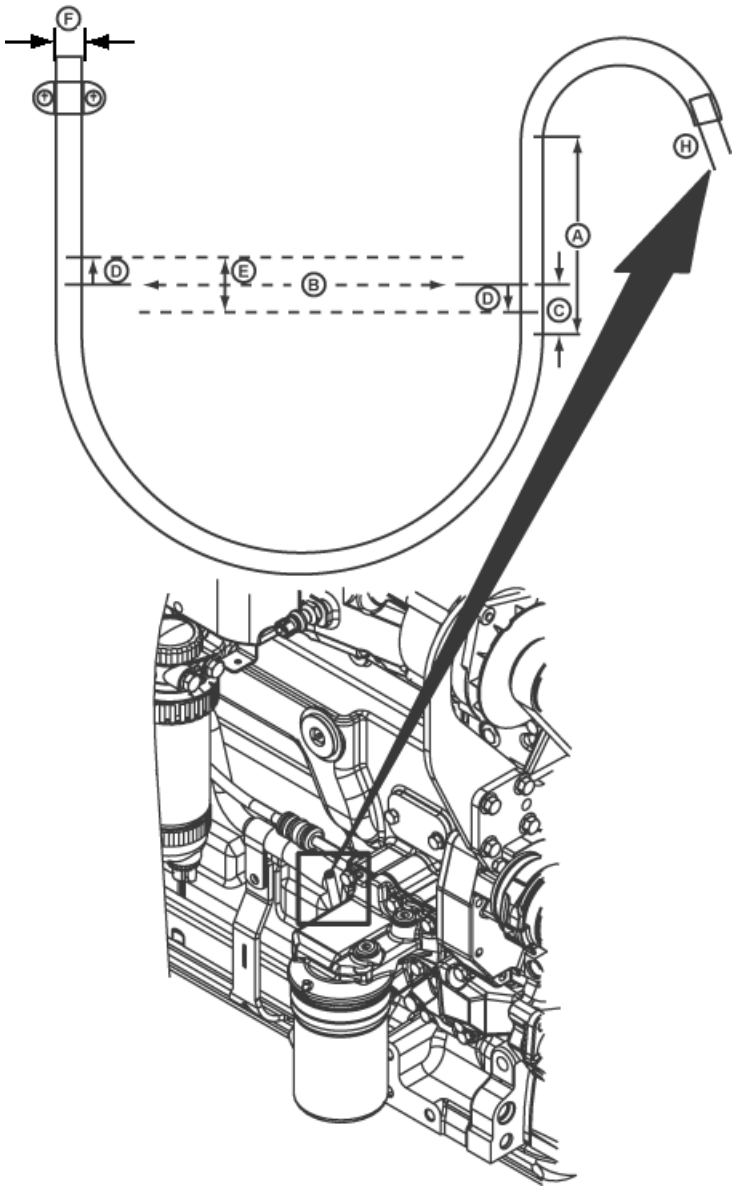
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RG41221,00002C6 -19-12OCT07-16/17

15 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF	
	4. Monitor Fuel Temperature data point in Service ADVISOR.	**YES:** Intake air heater system is functioning correctly.
	Does the Fuel Temperature data point indicate actual fuel temperature within 5°C (9°F)?	**NO:** Open DTAC case.

RG41221,00002C6 -19-12OCT07-17/17

Excessive Engine Crankcase Pressure (Blow-By) Test



RG15141 —UN—19DEC06

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 25.4 mm (1.0 in.) Each Side
E—Max. Allow. Total Vertical Fluid Travel 50.8 mm (2.0 in.) Both Sides
F—9.53 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: piston rings, valve guides, or sealing ring in the turbocharger. As blow-by increases, crankcase pressure also increases. Measuring crankcase pressure is the best way to determine whether or not there is excess leakage past the piston rings, valve guides, or turbocharger seal.

NOTE: the following items are required

- *A small amount of 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.*

Continued on next page

DB92450,0000022 -19-16APR08-1/5

Excessive Engine Crankcase Pressure (Blow-By) Diagnostic Procedure

DB92450,0000022 -19-16APR08-2/5

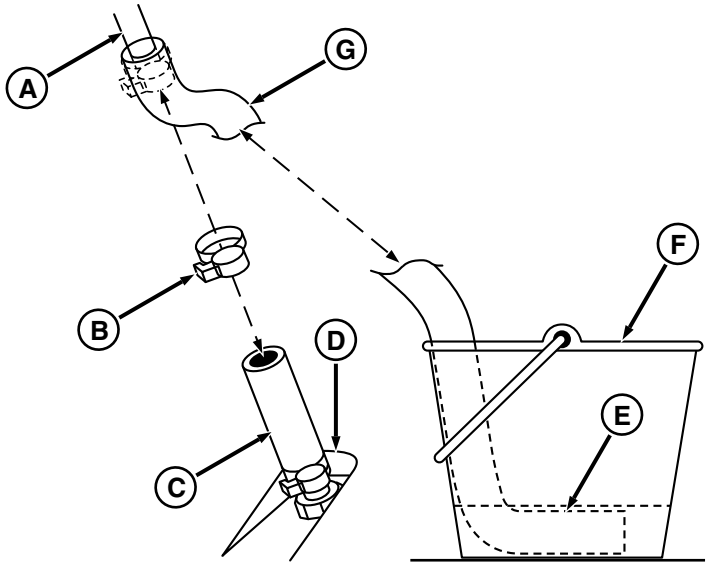
1 Measure Crankcase Pressure Test	Before doing the test: 1. Ensure that crankcase vent tube is open to the atmosphere. 2. Remove dipstick and attach tubing (F) to dipstick tube (H). 3. Attach other end of tubing to a fixed panel, brace, or other firm surface, forming a “U”, as shown above. On both sides, 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.

Continued on next page

DB92450,0000022 -19-16APR08-3/5

❷ Turbocharger Test

1. On turbocharger oil return rigid tubing (A) side of turbocharger oil return flexible tubing (C), remove and retain clamp (B), and remove end of flexible tubing from end of turbocharger oil return rigid tubing.



RG15142 —UN—10MAR08

Remove Turbocharger Oil Return Flexible Hose

A—Turbocharger Oil Return Rigid Tubing
B—Clamp
C—Turbocharger Oil Return Flexible Tubing
D—Crankcase
E—Water, 3.8 Liters (1.0 gallon)
F—19 Liter (5-gallon) Bucket
G—Test Flexible Tubing

2. Plug or cap open end of turbocharger oil return flexible tubing (C).
3. Obtain 19-liter (5-gallon) bucket (F), and place on ground or floor, near turbocharger oil drain line.
4. Measure outer dimension of rigid tubing (A), and obtain length of flexible tubing (G), of same inner dimension as rigid tubing outer dimension, and of sufficient length to place between rigid tubing and bucket as follows:
   a. Attach one end of flexible tubing to open end of rigid tubing.
   b. Secure flexible tubing to rigid tubing using clamp, from step 1.
   c. Place other end of flexible tubing in bucket.
5. Pour approximately 3.8 liters (1.0 gallons) of water (E) into bucket. Bucket-end of flexible tubing must be completely submerged.
6. Check that crankcase engine oil level is full.
7. Using John-Deere-approved oil test kit, obtain an engine oil sample, and send off for oil scan analysis.

NOTE: This test should not exceed 3 minutes without shutting engine down. Then check engine oil level, and refill if necessary. Pour out bucket contents, and refill with 3.8 liters (1.0 gallons) of water.

8. Perform crankcase pressure test, as follows:
   a. Ignition ON, engine ON. Let engine stabilize, at low idle, and observe total fluid travel for both sides (E).
   b. If possible, slowly load the engine. If not possible, slowly advance idle. Stop at 25% load, or approximate idle increase, and allow engine to stabilize. When engine is stabilized, observe total fluid travel for both sides.
   c. Increase load, or advance idle and stop every, additional 25%. When engine is stabilized, observe total fluid travel for both sides.
   d. Continue to as near as possible to full load, or to high idle. When engine is stabilized, and observe total fluid travel for both sides.
9. Monitor oil level in bucket to avoid oil spills.
10. Check for bubbles appearing in bucket.

Continued on next page

	11. When test is completed: *NOTE: If engine blow-by is found, to determine area of engine, remove head, and examine rings and valve guides, see CYLINDER HEAD AND VALVES (TWO-VALVE HEAD ENGINES) in Section 02, Group 020 of 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 REMOVE TURBOCHARGER INSTALL TURBOCHARGERin Section 02, Group 080 of the base engine manual and verify problem is resolved. **NO:** To locate engine blow-by, see TEST ENGINE COMPRESSION PRESSURE in Section 04, Group 150 of the base engine manual. (If possible, do compression test with digital gauge.)

DB92450,0000022 -19-16APR08-5/5

Check Fuel Supply Quality

DN22556,0000295 -19-10SEP07-1/8

Check Fuel Supply Quality Diagnostic Procedure

Additional References:
Fuel samples can be analyzed in a laboratory for contamination and ratings. See TESTING DIESEL FUEL in Group 01, Section 002, for more information.

DN22556,0000295 -19-10SEP07-2/8

1 Low Pressure Fuel System Check	Has Low Pressure Fuel System Check been performed?	**YES:** GO TO 5 **NO:** GO TO 2

DN22556,0000295 -19-10SEP07-3/8

2 Check Fuel in Filters	1. Ignition OFF, engine OFF. 2. Drain primary and secondary filter into a clean container. 3. Check for water, dirt, or other contaminants in the drained fuel. Is an abnormal amount of water or contaminants present in the drained fuel?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,0000295 -19-10SEP07-4/8

3 Check Fuel Supply	Check fuel in tank for water or contaminants. Is an abnormal amount of water or contaminants present in the fuel?	**YES:** Inspect fuel tank for cause of contamination. Drain and replace fuel in tank with known good fuel. GO TO 4 **NO:** GO TO 4

DN22556,0000295 -19-10SEP07-5/8

4 Replace Fuel Filters	*NOTE: For fuel filter replacement and priming instructions, see REPLACE FUEL FILTER ELEMENT (PRIMARY OR FINAL) in Group 02, Section 90 earlier in this manual.* 1. Drain fuel from primary filter inlet line. 2. Replace primary and secondary fuel filters. 3. Bleed air from fuel system. See BLEED THE FUEL SYSTEM later in this section. 4. Start engine and check performance. Does engine start and have good performance?	 **YES:** Problem solved. **NO:** Fuel in tank was NOT replaced. GO TO 5 **NO:** Fuel in tank was replaced.qq GO TO 6

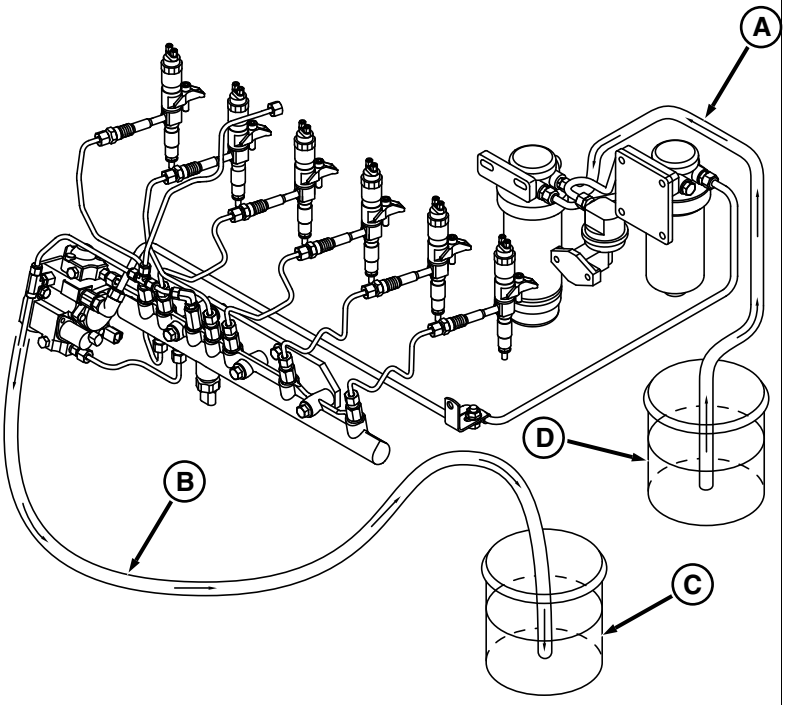
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DN22556,0000295 -19-10SEP07-6/8

5 Temporary Known Good Fuel Supply Installation

NOTE: Use a clean hose and fresh fuel that has known-good quality in a clean container for this step. Do not use fuel from the fuel tank.

1. Ignition OFF, engine OFF.
2. Disconnect fuel inlet line from the primary fuel filter.
3. Install a hose on primary filter housing fuel inlet port and place other end of hose in a container of at least 3.8L (1 gal) of clean fuel.



RG15381 —UN—07AUG07

Temporary Fuel Supply

A—Temporary Fuel Supply Hose at Primary Filter Inlet
B—Temporary Fuel Return Hose
C—Contaminated Fuel
D—Known Good Fuel

4. Disconnect fuel line between secondary filter outlet and high pressure pump inlet.
5. Reposition fuel line and place high pressure pump inlet end in a 3.8L (1 gal) or larger container suitable for diesel fuel.
6. Reconnect fuel line to secondary filter outlet.
7. Ignition ON, engine OFF for 60 seconds.
8. Ignition OFF, engine OFF.
9. Repeat steps 7-8 until 1.9L (1/2 gal) of new fuel has been pulled into the fuel system.
10. Reinstall fuel line between secondary filter and high pressure pump.

IF OK: GO TO 6

Continued on next page

DN22556,0000295 -19-10SEP07-7/8

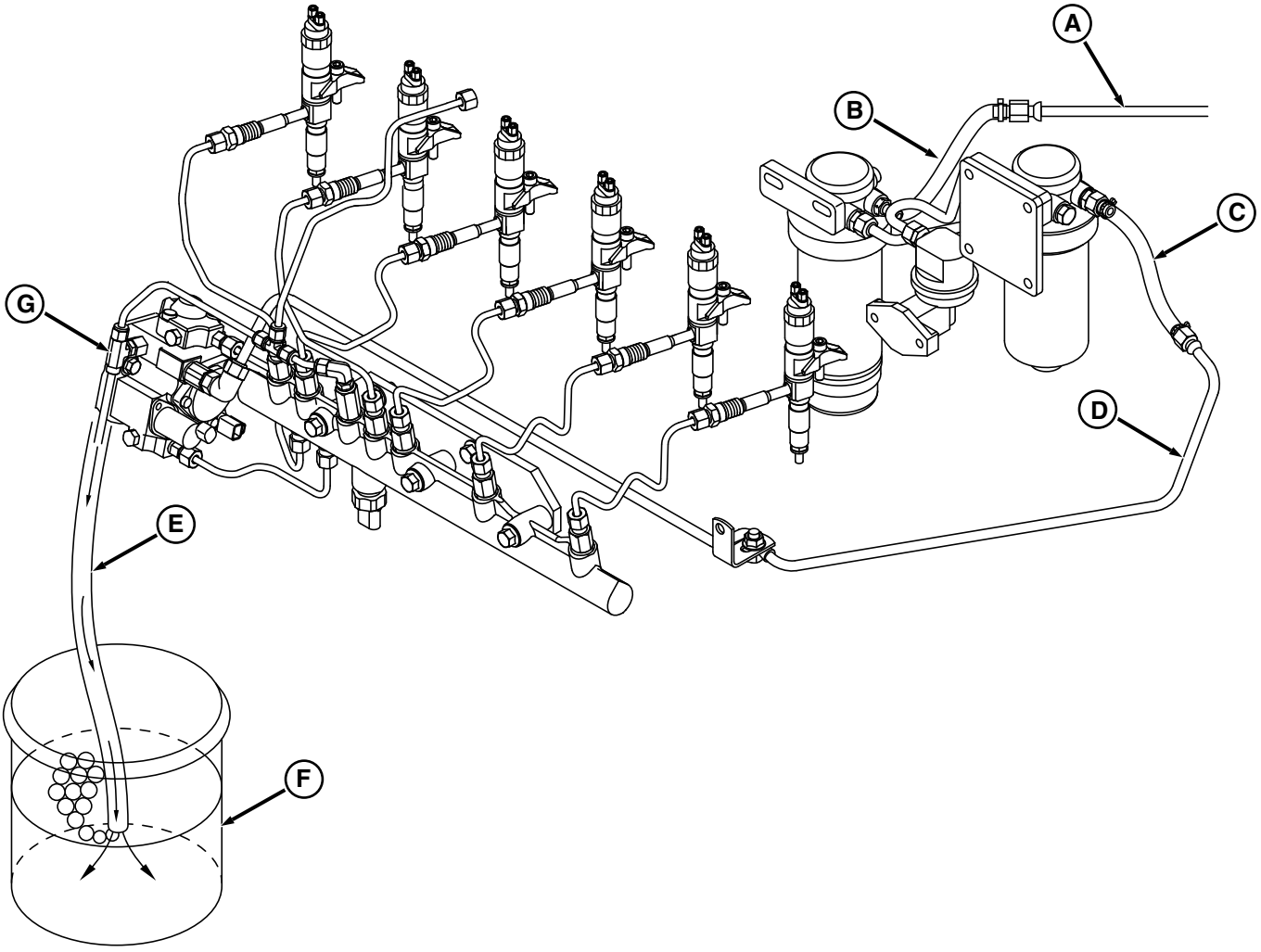
6 Purge Fuel System	1. Disconnect fuel return line and place in a 3.8L (1 gal) or larger container suitable for diesel fuel. a. If engine starts, start engine and operate at low idle until at least 1.9L (1/2 gal) of return fuel is present in container. Add additional fuel to the temporary fuel supply container if necessary. b. If engine does not start, crank engine for 20 second intervals with 2 minutes between intervals, cycling ignition OFF between crank intervals. Repeat until at least 1.9L (1/2 gal) of return fuel is present in the container or until engine starts. 2. Ignition OFF, engine OFF. 3. Reconnect fuel lines. 4. Check engine performance. Does engine start and have good performance?	**YES:** Problem fixed. **NO:** Fuel quality is not the cause of the problem.

DN22556,0000295 -19-10SEP07-8/8

Test for Air in Fuel

To check for air in the fuel system, follow the procedure below.

1. Preliminary checks:
   - Check for loose fittings between fuel tank and fuel supply pump.
   - Check for loose fittings on the fuel cooler, if applicable.
   - Make sure primary filter element is on tight and gasket is intact.
   - Check for damaged fuel pick-up tube in tank.
   - Check for low fuel level in tank.
   - Check for foaming in tank. Foaming strongly suggests air leaking past injectors. If there is foaming, inspect the injector hold down clamp torque, O-rings and seals. See REMOVE ELECTRONIC INJECTOR (EI) and INSTALL ELECTRONIC INJECTOR (EI) in Section 2 of this manual.
   - Air may enter system when engine is turned off. Verify lines are properly tightened between the secondary filter and the high pressure fuel pump and between high pressure fuel pump leak-off port and cylinder head.



RG15382 —UN—07AUG07

Test for Air in Fuel (Mechanical Pump Shown, Electric Pump is Similar)

A—Fuel Supply Line from Tank
B—Clear Fuel Line at Primary Filter Inlet
C—Clear Fuel Line at Secondary Filter Outlet
D—Fuel Line Between Secondary Filter Outlet and High Pressure Pump Inlet
E—Clear Plastic Hose
F—Container with Clean Fuel
G—Fuel Leak-Off "T"

2. Check for air in fuel system:
   a. Disconnect the return-to-tank line from the leak-off fuel T-connector (G). The location of the T-connector may vary by application.
   b. Install a clear plastic hose (E) with proper fittings from JT03513C, Fuel Supply System Test Kit, between the T-connector and the return-to-tank line, OR submerge hose in a container of clean fuel (F), as shown.

Continued on next page

DN22556,0000296 -19-07AUG07-1/2

c. Start engine. Run engine for 1 minute at 1500 rpm. Observe hose and container (if used) for bubbles. Stop engine.
d. If bubbles were present in the return fuel, go to the next step to determine source of the air. Reconnect fuel lines.

3. Check for air in fuel tank supply line:
   a. Disconnect the fuel tank supply line (A) at fuel transfer pump inlet.
   b. Install a clear plastic hose (B) with proper fittings between the fuel tank supply line and the fuel transfer pump inlet.
   c. Operate engine and check for air bubbles in hose. If bubbles are present, check for loose or damaged fuel pickup tube, fuel supply lines or hoses.
   d. If no problem was found, go to the next step. Reconnect fuel lines.
4. Check for air in the high pressure pump fuel supply line:

CAUTION: Do NOT disconnect high pressure fuel pump OUTLET line between high pressure pump and fuel rail.

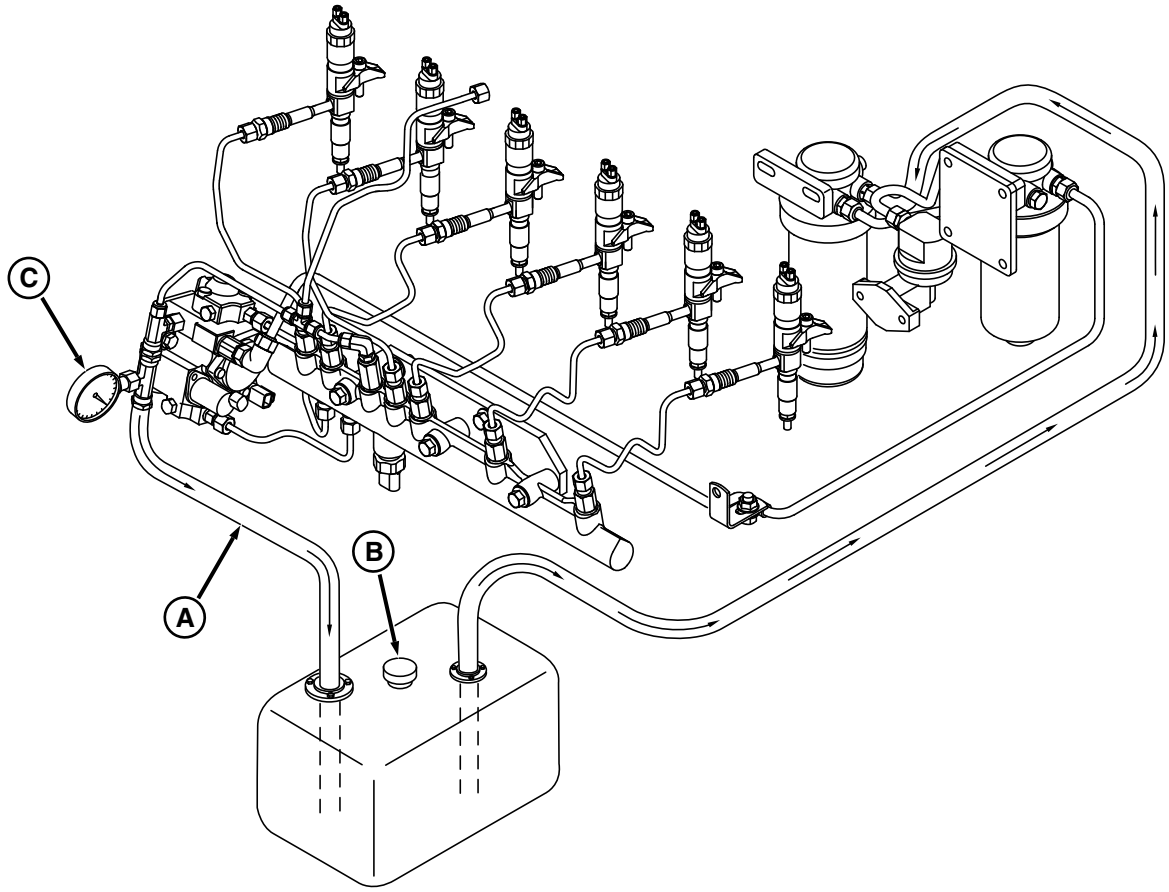
   a. Disconnect the line between the secondary filter outlet and the high pressure fuel pump inlet.
   b. Install a clear plastic hose (C) with proper fittings between the secondary filter outlet and the high pressure pump.
   c. Bleed air from the fuel system. See BLEED THE FUEL SYSTEM later in this section.
   d. Operate engine and check for air bubbles in hose. If bubbles are present, check for damaged primary filter head or gasket, and for loose or damaged primary filter.
5. Check for other causes of air in return line:
   a. Check fuel cooler for air leaks, if applicable.
   b. If source of air was not found, combustion gas may be leaking into the fuel return of one or more injectors. Inspect the injector hold down clamp torque, O-rings and seals. See REMOVE ELECTRONIC INJECTOR (EI) and INSTALL ELECTRONIC INJECTOR (EI) in Section 2 of this manual. Reconnect fuel lines.

DN22556,0000296 -19-07AUG07-2/2

Check for Restricted Fuel Leak-off Line

This check will determine if the fuel leak-off line is restricted or not designed correctly for the application.

1. Check all leak-off lines and ensure there are no kinked or pinched lines.
2. Install ("T"-in) pressure gauge (C) capable of accurately reading 20 kPa (2.9 psi) in fuel leak-off line (A) using 1/2 in. - 24 UNS fittings at fuel leak-off "T" as shown.



RG15383 —UN—07AUG07

Measuring Fuel Leak-Off System Pressure

A—Fuel Leak-Off Line to Tank **B—Fuel Tank Cap** **C—Pressure Gauge**

3. Do NOT remove fuel tank cap (B) at this time.
4. Operate engine under various conditions from low idle to governed rpm under load.
5. Determine if pressure gauge exceeds 20 kPa (2.9 psi) at any time.
6. Remove fuel tank cap (B) if pressure gauge exceeds 20 kPa (2.9 psi) and recheck leak-off system pressure.
7. If leak-off pressure is now less than 20 kPa (2.9 psi) with fuel cap removed, inspect tank vent. If pressure does not decrease with fuel cap removed, locate source of restriction in fuel leak-off line.

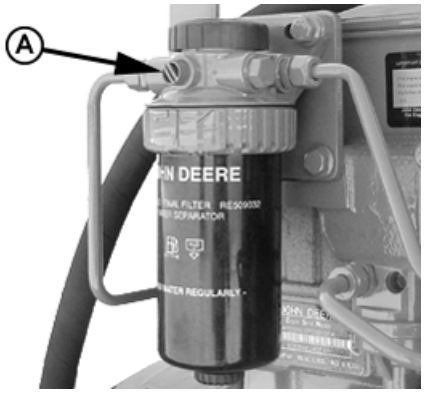
DN22556,0000298 -19-06AUG07-1/1

Bleed the Fuel System

CAUTION: If the engine has been run out of fuel, or after you have serviced the fuel filters, DO NOT PRESSURIZE THE FUEL TANK to prime the fuel system! Doing this causes the seal on the front of the high pressure pump to rupture. When such a rupture occurs, fuel passes around the seal, and fills the engine crankcase. This condition causes severe damage to the engine and requires replacement of the high pressure pump.

NOTE: A fuel system always must be bled, after the engine has been run out of fuel, fuel filters have been serviced, or the fuel system has been opened.

Any time the fuel system has been opened for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.



RG15147 —UN—08NOV06

Final Fuel Filter

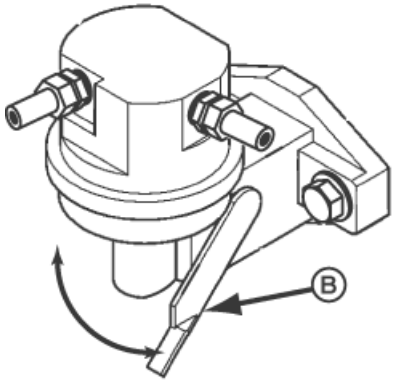
A—Bleed Vent Screw

DN22556,0000299 -19-08AUG07-1/2

CAUTION: Do not crack any fuel lines to bleed the fuel system. This fuel system is sensitive to fuel contamination.

1. On the final fuel filter header, by hand, turn the air bleed vent screw (A) counter-clockwise, two full turns.
2. Operate fuel transfer pump primer lever (B), or primer button on fuel filter (if equipped), until fuel flows out of bleed vent screw.
3. Hand-tighten bleed vent screw (clockwise) securely.
4. Continue operating primer until pumping action is not felt.
5. Start engine and check for leaks.

If engine does not start, see F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST and F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST, earlier in this group.



RG15155 —UN—13NOV06

Fuel Transfer Pump

B—Primer Lever

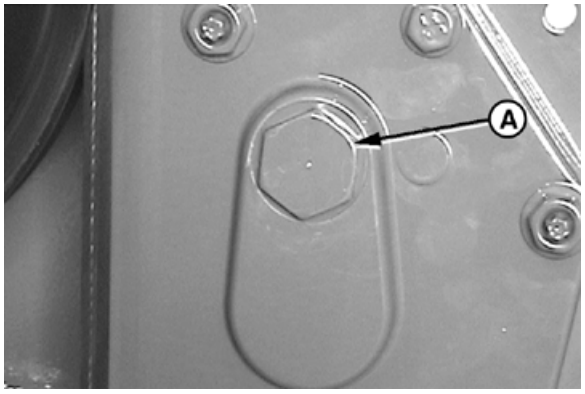
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Check and Adjust High Pressure Fuel Pump Static Timing

1. Rotate engine to #1 cylinder top dead center with JDG820 Flywheel Turning Tool until JDE81-4 Timing Pin engages timing hole in flywheel.
2. Remove screw (A) for window on high pressure pump gear. A marked line on the gear (B) should be visible through the window.
3. If pump timing is incorrect, see REMOVE AND INSTALL HIGH PRESSURE FUEL PUMP in Group 02, Section 090 earlier in this manual.

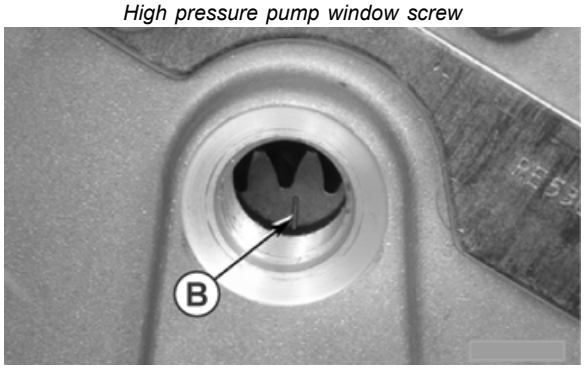
A—High Pressure Pump Gear Window Screw

B—High Pressure Pump Gear Timing Mark



RG12464A —UN—14JUN02

High pressure pump window screw



RG15158 —UN—20NOV06

High pressure pump gear timing mark

DN22556,000029A -19-08AUG07-1/1

Charge Air System

DN22556,00006C8 -19-12OCT07-1/9

Charge Air System Diagnostic

DN22556,00006C8 -19-12OCT07-2/9

1 Visual Inspection	1. Check for loose hose clamps. 2. Inspect air filter for damage or blockage that would restrict air flow or permit unfiltered air to flow into the engine. 3. Remove inlet air pipes and check for dirt tracks from unfiltered air. 4. Check for soft inlet air hoses which may collapse between air cleaner and turbo compressor inlet. 5. Inspect charge air cooler for debris or other blockage which would reduce the external cooling air flow through the cooling fins. 6. Check engine cooling fan and fan drive. Was a problem found?	**YES:** Fix problem. GO TO 2. **NO:** GO TO 2.

DN22556,00006C8 -19-12OCT07-3/9

2 Check for Internal Air Flow Restriction	Check for evidence of oil or other or other contamination in charge air cooler which would reduce internal air flow through the cooler's tubes. Is oil or other contamination present in the charge air cooler?	**YES:** GO TO 3 **NO:** GO TO 4

DN22556,00006C8 -19-12OCT07-4/9

3 Clean Charge Air Cooler	1. Remove charge air cooler. 2. Use John Deere Coolant System Cleaner PMCC2638, or equivalent, per the cleaner instructions to clean the oil residue from the CAC. 3. Use compressed air to completely dry the inside of the CAC. Could oil or other contamination be removed from the charge air cooler?	**YES:** Reinstall charge air cooler. GO TO 4. **NO:** Replace charge air cooler. GO TO 4.

DN22556,00006C8 -19-12OCT07-5/9

4 Turbo Compressor–Side Evaluation	1. Without removing turbocharger, examine compressor housing and blades for damage. (See TURBOCHARGER INSPECTION, Section 02, Group 080 in base engine manual.) 2. Remove the compressor outlet tube to the charge air cooler. Check for debris from the compressor housing and blades, and for oil leaking from the seal of compressor housing shaft. 3. Spin turbine. Turbine should spin freely without noise or binding. Was damage, debris, or leaking oil found or does turbine bind or scrape when spinning?	**YES:** GO TO 5 **NO:** GO TO 6

Continued on next page

DN22556,00006C8 -19-12OCT07-6/9

5 Remove and Inspect Turbo	1. Remove turbocharger. (See REMOVE TURBOCHARGER in section 02, Group 080 of base engine manual.)	
	2. Inspect for debris or oil. (See TURBOCHARGER INSPECTION in Section 02, Group 080 of base engine manual.)	**YES:** Replace turbocharger. (See INSTALL TURBOCHARGER in section 02, Group 080 of base engine manual.) Then remove, clean, and reinstall charge air cooler, and GO TO 6.
	Was there debris or oil in the compressor outlet to the charge air cooler?	**NO:** GO TO 6.

DN22556,00006C8 -19-12OCT07-7/9

6 Charge Air Cooling System Check	*NOTE: This procedure requires fabrication of caps for the inlet and outlet of charge air cooler outlet. Constructions of one of the caps requires the ability to receive and seal a supply air line,*	
	1. At the intake manifold, remove charge air cooler outlet tube, and cap outlet tube.	
	2. At the turbocharger, remove charge air cooler inlet tube, and cap inlet tube.	
	3. Install a supply air line to the charge air system.	
	4. Slowly pressurize the charge air system to 206.85 kPa (30 psi), and maintain this pressure.	
	5. Using soapy water, check the charge air system joints for air leaks.	**YES:** Repair or replace leaking components. GO TO 7.
	Were any joint leaks found?	**NO:** Keep air supply line connected. GO TO 7.

DN22556,00006C8 -19-12OCT07-8/9

7 Charge Air Cooler Check	1. With air supply line to charge air cooler still connected, shut off the air supply.	
	2. Measure how much time elapses for air pressure to reach 0 kPa (0 psi).	**YES:** Charge air system is operating correctly.
	Was the time to reach 0 kPa (0 psi) greater than 60 seconds?	**NO:** Replace charge air cooler.

DN22556,00006C8 -19-12OCT07-9/9

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 APPLICATION 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 normally made in the harness connector. Measurements made on the ECU itself will specifically call that out.

DN22556,00001D4 -19-30AUG07-1/1

Change Fan Speed Table

For instructions on connecting to Service ADVISOR, see earlier in this Group.

This test is used to select between the Normal and Alternate fan speed tables. This test is currently developed for use on ONLY the D series Excavators and Swing machines.

There are two selections, 1 for Normal fan speed table and 2 for Alternate fan speed table. You can toggle between the tables by rerunning the test.

Performing the Change Fan Speed Table Test

1. Ignition ON, Engine OFF.
2. Select Change Fan Speed Table Test in Service ADVISOR.
3. Follow instruction given by the diagnostic software.

DN22556,0000006 -19-19NOV08-1/1

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. Select Communication Error Test in Service ADVISOR.
3. Follow instruction given by the diagnostic software.

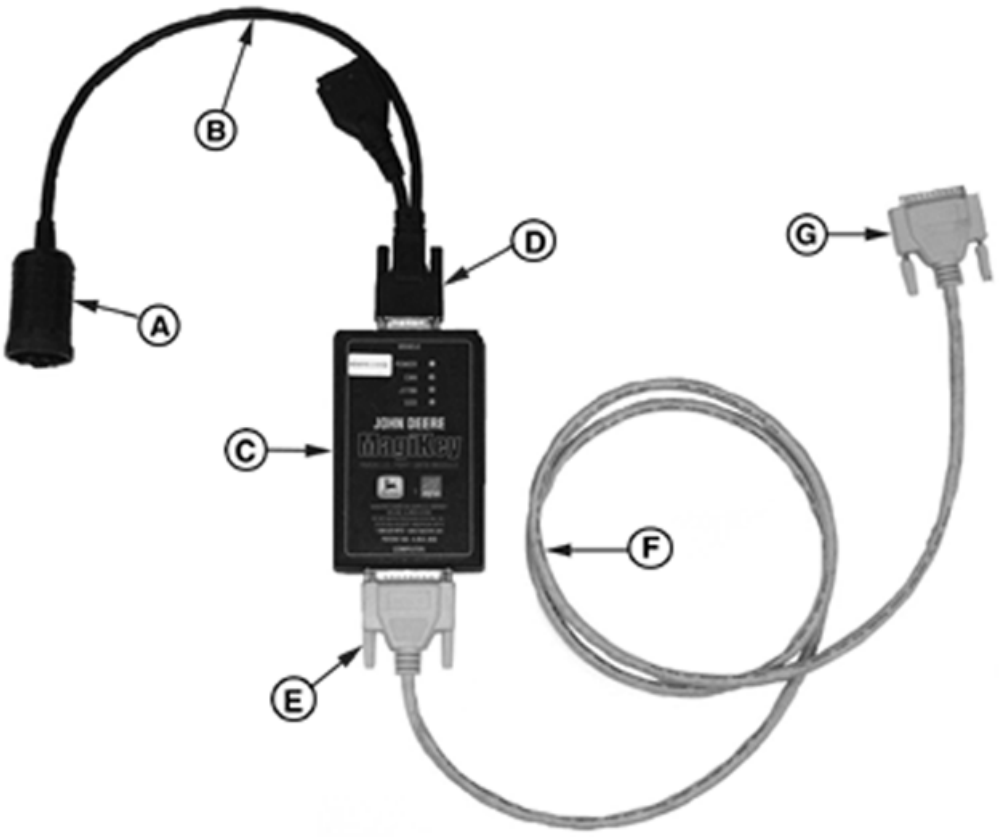
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Connecting to Service ADVISOR

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 PC 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—PC 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 PC with Service ADVISOR installed.
6. Key ON, engine off or running.

Continued on next page

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.

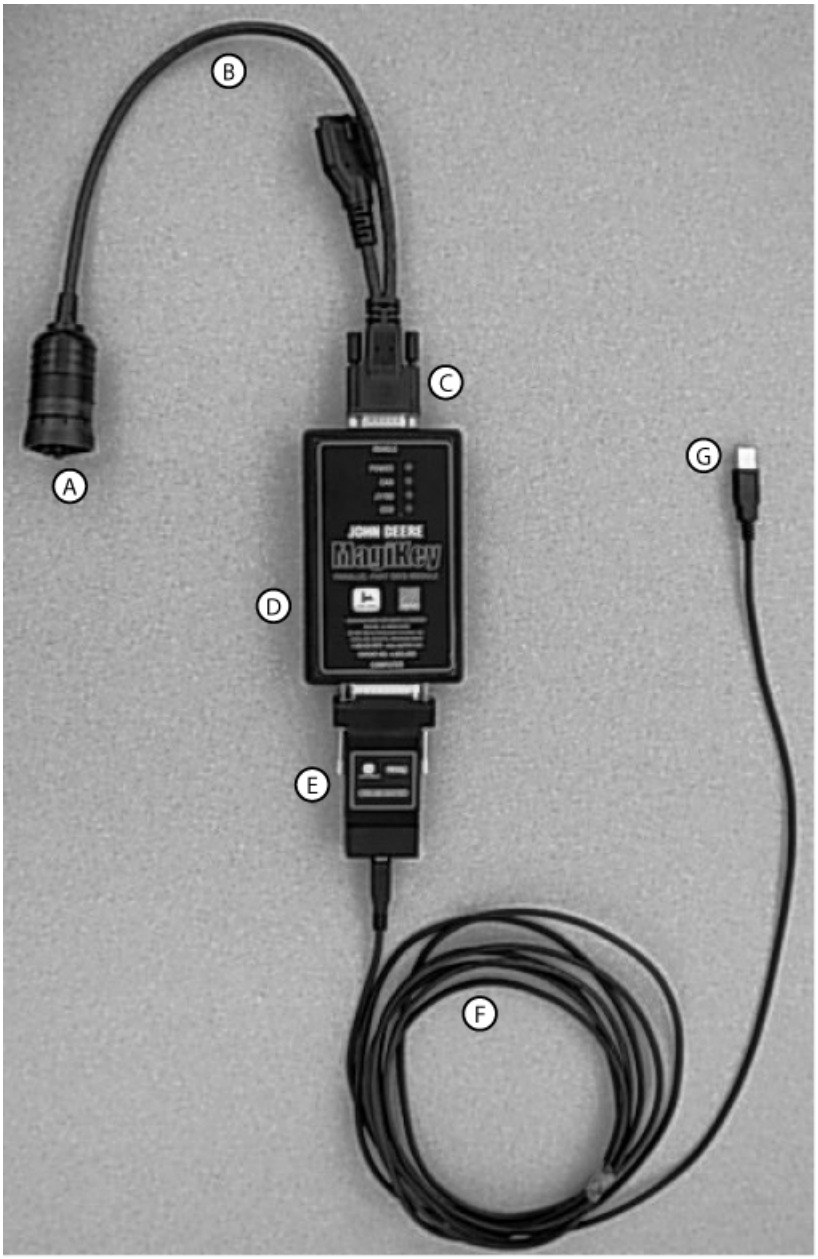
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DM59778,000007B -19-03AUG10-2/6

Connecting to Service ADVISOR with PDM Adaptor and USB Adaptor

The Parallel Data Module (PDM) adapter is used to provide communication between the PC and the ECU.

The USB adapter is used to permit the PDM to connect to a USB port on the PC.



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—PC 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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DM59778,000007B -19-03AUG10-3/6

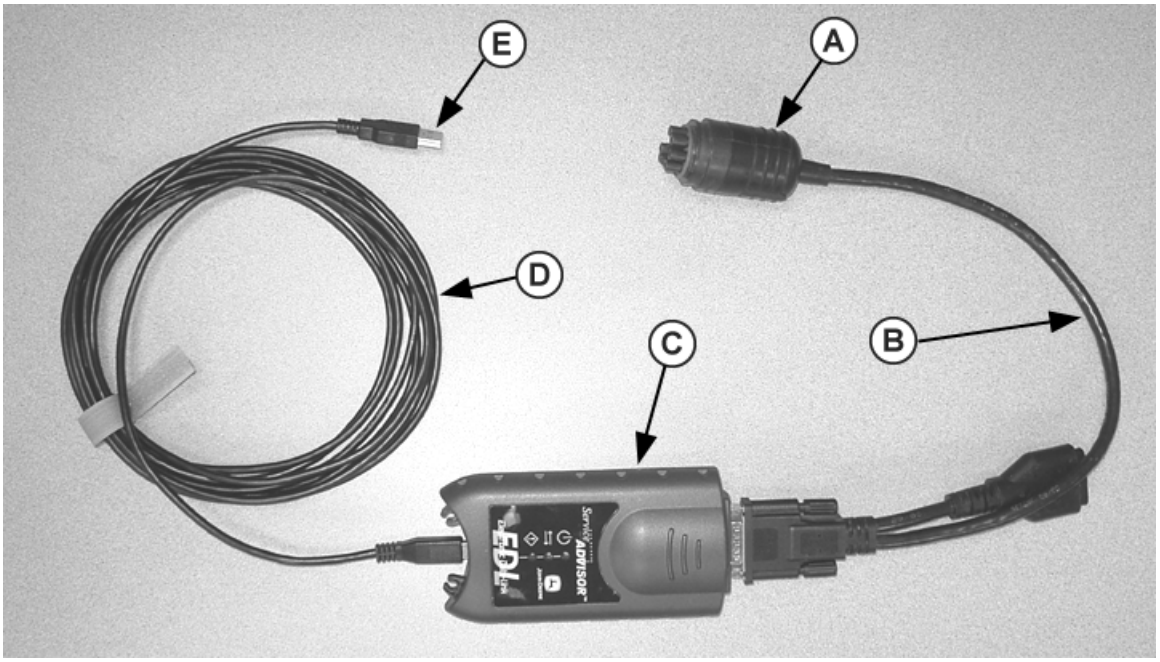
4. Connect the USB adaptor (E) to the PDM module.
5. Connect the USB cable (F) to the USB adapter.
6. Connect the USB cable PC connector (G) to the USB port on the PC.
7. Key ON, engine off or running.
8. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
9. Select Parallel Data Module (PDM) with USB Adapter as the current adapter in the Select Readings Adapter box.
10. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
11. Press the Connect button after selecting the engine model.
12. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
13. When finished, replace the dust cap on the diagnostic connector.

Continued on next page

DM59778,000007B -19-03AUG10-4/6

Connecting to Service ADVISOR with EDL Adaptor using USB Cable

The Electronic Data Link (EDL) adapter is used to provide communication between the PC 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 PC with Service ADVISOR

The EDL is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

DS10117 ECU Communication Hardware Kit contains the EDL and cables necessary to connect Service ADVISOR to the ECU.

Instructions for connecting Service ADVISOR to the ECU:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable (B) to the diagnostic connector on the engine harness.
3. Connect the other end of the John Deere Controller Cable to the EDL (C).
4. Connect the USB cable (D) to the EDL.
5. Connect the other end of the USB cable to the PC 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 PC and the ECU using Bluetooth wireless communications. The PC must have a Bluetooth adaptor or be Bluetooth capable for this feature to work.

The EDL is connected to the engine ECU through the diagnostic connector. The diagnostic connector is a 9-pin circular connector with a square mounting flange and a dust cap. The location of the diagnostic connector may vary depending on application. On OEM engines, the connector is located near the ECU on the engine wiring harness.

Continued on next page

DS10117 ECU Communication Hardware Kit contains the EDL and cables necessary to connect Service ADVISOR to the ECU.

Instructions for connecting Service ADVISOR to the ECU using Bluetooth wireless:

1. Locate diagnostic connector on engine and remove dust cap.
2. Connect John Deere Controller Cable to the diagnostic connector on the engine harness.
3. Connect the other end of the John Deere Controller Cable to the EDL.
4. Key ON, engine off or running.
5. Start Service ADVISOR and select Connect to Model(s) from the Readings menu, or press the connect icon on the toolbar.
6. Select Electronic Data Link (EDL) using Bluetooth as the current adapter in the Select Readings Adapter box.
7. Select the engine model. Press the Change Models button in this box to see a list of engine models if the engine model is not listed.
8. Press the Connect button after selecting the engine model.
9. If Service ADVISOR does not connect, see D1 - ECU DOES NOT COMMUNICATE WITH SERVICE ADVISOR diagnostic procedure in Group 150 of this manual.
10. When finished, replace the dust cap on the diagnostic connector.

DM59778,000007B -19-03AUG10-6/6

Control Unit Information and Overview Test

This test gathers specific information from the ECU and puts 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 display the new data.

Exit:
Selecting this option exits the test.

Print:
Selecting this option allows to print the data now or save it to a file and print it later, see Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions in this section.

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
- Other data to be collected that is listed in the ControlUnitInformation.ini file
- Active and Stored trouble codes at the time test data is taken

To perform the test:

1. In Service ADVISOR select **Interactive Tests** from the Short Cut bar.
2. Select **Control Unit Information and Overview**.
3. The test automatically starts to gather information then display it on the screen.
4. At the end of the data gathering, the following options are available: Refresh, Exit, or Print.

DN22556,00006A8 -19-03AUG10-1/1

Cylinder Cutout Test Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR in Section 04, Group 160.

The Cylinder Cutout Test is used to aid in identifying a cylinder that is having a problem or to help in diagnosing mechanical or intermittent problems. During the test, the Engine Control Unit (ECU) disables the cylinder that the technician selects while the engine is running. Ideally the test would be performed while operating the vehicle under the conditions that the problem occurs especially if the engine is loaded. At the end of test, a results page can be displayed for diagnostic purposes. The Cylinder Cutout Test cannot determine if an engine is developing low power. The test is only a guide to help determine if there is a problem in a cylinder. The results alone should not be used as a conclusive reason for replacing parts. Other information such as the results of a Cylinder Electronic Compression Test, Cylinder Misfire Test, and other engine diagnostic procedures should be used along with this test information to accurately determine the source of the engine problem.

1. Ensure that the battery and starter are in good working condition.
2. Ignition ON, engine running.
3. Warm engine to normal operating temperature, 85°—97 °C (185°—207 °F).
4. Check for Diagnostic Trouble Codes (DTCs) and address any active codes.

NOTE: The ECU does not allow the test to run if there is an active DTC related to the crankshaft or camshaft position signal or if the coolant temperature is out of normal operating range. If the engine goes into an overspeed condition while running test, the test stops.

5. Select Cylinder Cutout Test in the Interactive Tests shortcut bar of Service ADVISOR.
6. Click on the “Active” button under the cylinder number to be cut out and then click on “Initiate”.

NOTE: You can cut out only one cylinder at a time, but you can test all cylinders before proceeding to the Results page.

7. Observe engine operation closely during the test, especially the engine sound and any vibrations. If the sound or vibration does not change with a cylinder cut out, that cylinder probably has issues. If the sound or vibration changes or increases with a cylinder cut out, that cylinder is probably contributing normally. If the engine is loaded, you may detect a slight change in engine RPM, especially in the first 1 or 2 seconds of the test. The governor quickly responds and regains any lost engine speed. The active data points displayed are: Current Fuel Rate, Engine Speed, Manifold Air Pressure - Actual, and Engine Load at Current Speed.
8. Elapsed Time is displayed at the bottom of the screen. Click on the Restore button to stop the test
9. Repeat the procedure for each cylinder to be cutout by using the instructions in steps 6, 7, and 8. Try to run each test for approximately the same amount of time.
10. Click on the “Results” button to view the test results.
11. The results data points displayed are: Average Desired Fuel, Engine Speed, Manifold Air Pressure, and Engine Load at Current Speed.

NOTE: Run this test at least 3 times to ensure repeatable, accurate results.

The best analysis is obtained by observing the engine during the cutout test. An increase in engine sound or vibration (as in a “miss” or “misfire”) would indicate that the cylinder being cutout was contributing to the total engine operation and probably is ok. The governor on the engine corrects the engine speed to compensate for the cutout cylinder very quickly, so it is difficult to see an rpm change. If the cylinder being cutout does not make a significant difference to the engine sound or vibration, then the cylinder is probably not working.

If the engine vibration or sound slightly changes when the cylinder is cutout, the cylinder is working but not to the full potential. To confirm this diagnostic, perform a Cylinder Misfire Test and Cylinder Electronic Compression Test to help confirm the cylinder has a problem.

If the sound is better with a cylinder cutout, this cylinder is probably firing at the wrong time. This may be due to a damaged injector or a bad electrical connection between the ECU and injector. If the results of the Cylinder Cutout Test and Cylinder Misfire Test lead to the same cylinder and the Cylinder Electronic Compression Test checks good for that cylinder, then the injector wiring or injector is probably bad. If this is the case, first check the electrical connections, looking for shorts or damaged wires. Then if no problems are found, replace faulty injector.

Compare the values from cylinder to cylinder displayed on the results screen to further evaluate each cylinders contribution to the engine operation.

In the sample report below, Cylinder 1 injector was disconnected prior to the test. The Average Desired Fuel results show that the ECU did cutout Cylinder 1 during the test. Cylinder 1 data points do not show enough change to verify that the cylinder was not working, but the sound or vibration observable did indicate that the engine definitely has a miss.

Continued on next page

	Average Desired Fuel	Engine Speed	Manifold Air Pressure	Engine Load
Cyl1				
Initial	1.54 oz./min.	1000 rpm	0.4 psi	10.5 percent
Average	1.53 oz./min.	1003 rpm	0.4 psi	10.9 percent
Cyl2				
Initial	1.51 oz./min.	999 rpm	0.5 psi	11.4 percent
Average	1.96 oz./min.	1000 rpm	0.5 psi	13.2 percent
Cyl3				
Initial	1.54 oz./min.	1004 rpm	0.5 psi	10.0 percent
Average	1.93 oz./min.	1000 rpm	0.4 psi	13.1 percent
Cyl4				
Initial	1.54 oz./min.	1006 rpm	0.5 psi	10.3 percent
Average	1.80 oz./min.	999 rpm	0.5 psi	12.8 percent
Cyl5				
Initial	1.50 oz./min.	1007 rpm	0.5 psi	11.6 percent
Average	1.83 oz./min.	999 rpm	0.5 psi	12.9 percent
Cyl6				
Initial	1.50 oz./min.	1000 rpm	0.5 psi	11.1 percent
Average	1.98 oz./min.	1000 rpm	0.5 psi	13.3 percent

SS01820,00002D1 -19-30JUN10-2/2

Cylinder Electronic Compression Test Instructions

For instructions on connecting to Service ADVISOR, see Connecting to Service ADVISOR earlier 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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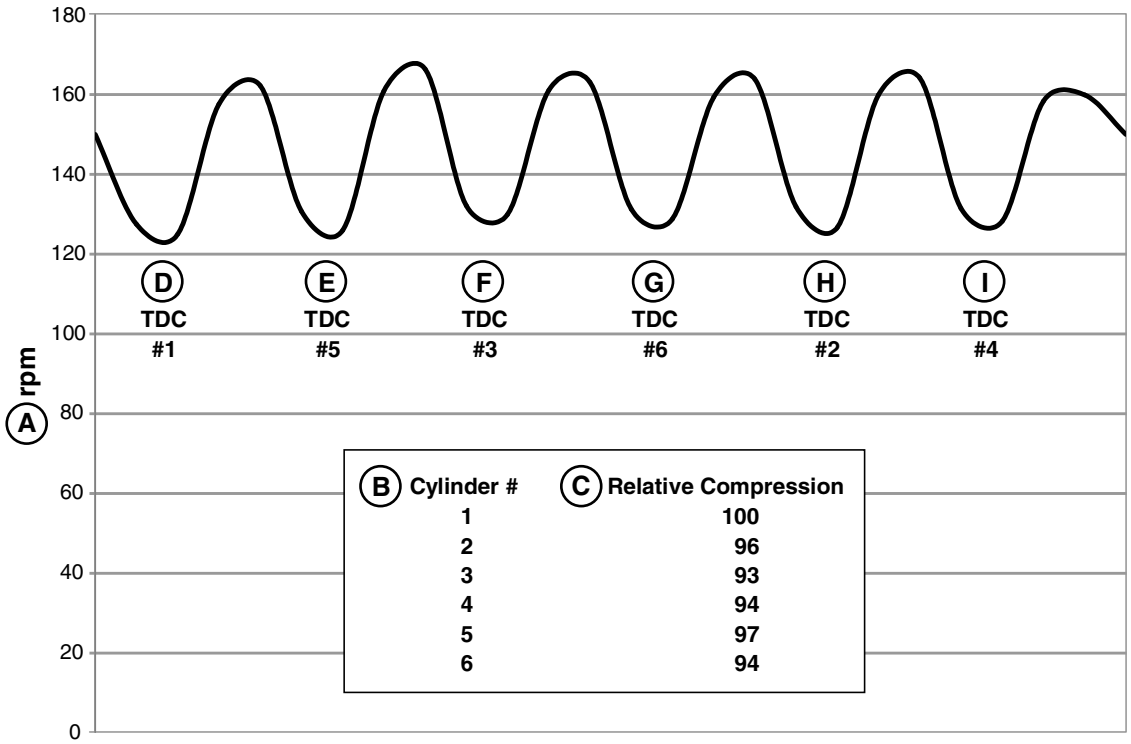


Figure 1
Cranking Speed and Typical Cylinder Electronic Compression Test Results when All Cylinders have Similar Compression.

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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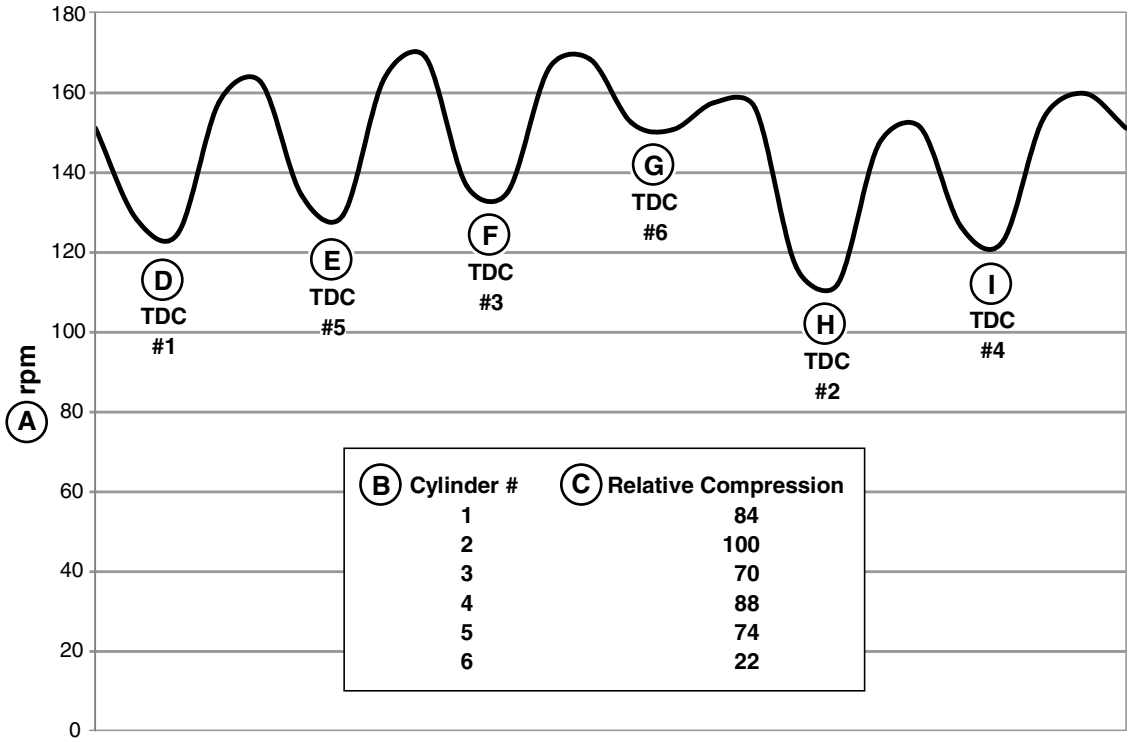


Figure 2
Cranking Speed and Typical Cylinder Electronic Compression Test Results When One Cylinder has Low Compression (Cylinder #6).

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.

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Be aware that the compression test can provide inconclusive results if the engine is coupled to a high-inertia load through a rubber coupling or long shaft. The shaft or coupling acts as a torsional spring while the engine is being cranked. Thus the engine cranking speed fluctuations due to cylinder compression are not as evident. It may be necessary to temporarily disconnect the engine from the coupling or shaft to perform the compression test.

Before executing the Cylinder Electronic Compression Test

- Warm engine to normal operating temperature.
- Repair the cause of any Diagnostic Trouble Codes (DTCs) if possible.

  NOTE: The ECU does not allow the test to run if there is an active engine timing error code (any 637 code), the engine cranking speed is below 100 rpm, coolant temperature is below -30 °C (-22 °F) or above 200 °C (392 °F).

- Ensure that the battery and starter are in good working condition

Performing the Cylinder Electronic Compression Test:

1. Ignition ON, Engine OFF.
2. Select Cylinder Electronic Compression Test in the Interactive Tests shortcut bar in Service ADVISOR.

Cylinder	Relative Compression
1	81
2	100
3	99
4	80
5	14
6	17

RG18411 —UN—11MAY10

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 Interactive Tests shortcut bar.
6. Follow instruction given by the diagnostic software. The software instructs the user to move the throttle from slow idle position to wide open throttle position, then back to slow idle position once for each cylinder tested. The throttle movement triggers the ECU to accelerate the engine with a fixed amount of fuel.

Results shown represent each cylinder's performance as a percentage in relation to the average of all cylinders. If any cylinder is above or below the average by more than 10%, it indicates the cylinder is contributing either too much (above average) or not enough (below average) in relation to the average engine performance.

Service ADVISOR displays the test results and whether the test was successful. These results and the Cylinder Electronic Compression and Cylinder Cutout Test results should be compared to help determine if there is a problem in a specific cylinder.

NOTE: Run this test at least three times to ensure repeatable, accurate results.

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Diagnostic Gauge Active DTC Viewing Instructions

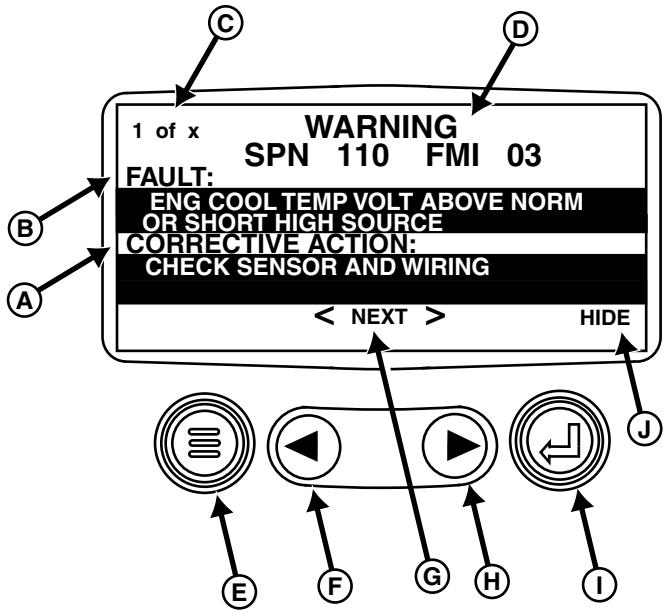
NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

IMPORTANT: Ignoring active trouble codes can result in severe engine damage. Refer to the trouble shooting procedures later in this section for fixing active DTCs.

A Diagnostic Trouble Code (DTCs) is set when an operating condition is not within a specified range. This is an indicator to the operator that a problem area needs to be corrected. The diagnostic gauge alerts the operator when a DTC is active by turning on a warning light and changing to the WARNING screen showing information about the DTC. The warning screen is described below.



RG14794 —UN—15MAY07

Figure 1. Active Code Diagnostic Screen

A—Corrective Action
B—Diagnostic Code Description
C—Current and Total number of Active Codes
D—SPN (Suspect Parameter Number) FMI (Failure Mode Identifier) Diagnostic Code
E—Menu Key
F—Left/Up Scroll Key
G—Next
H—Right/Down Scroll Key
I— Enter Key
J— Hide

1. When the diagnostic gauge receives a diagnostic trouble code, the engine parameter screen is replaced with the "Warning" screen. See figure 1.
2. Display features for the Active Codes Diagnostic Screen are described below:
   - SPN/FMI code (D). Refers to the trouble shooting diagnostic procedure.
   - Name of diagnostic code (B) referenced in manual.
   - A brief description for corrective action (A).
   - The word "NEXT" (G) indicates there are more fault codes to be viewed.
   - Two SCROLL KEYS (F,H) are used to cycle through the codes.
   - "1 of x" (C) indicates the current diagnostic code displayed of the total number.
   - To hide (J) this screen and return to the parameter display screen, press the "Enter" Key (I). Pressing the Enter Key again returns to the warning screen.

NOTE: To refresh active DTCs, you must return to the 1-UP or 4-UP screen.

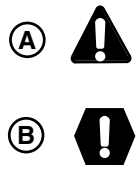
3. To return to the Main Menu screen, press the menu button (E), shown in figure 4.

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DB92450,000005F -19-18APR08-1/2

4. The parameter display screen displays one of the following icons when a DTC is active. See figure 2. An amber light sets when a DTC becomes active and a red light sets when the engine has derated or shutdown.

RG14795 —UN—14MAY07



A—Warning **B—Engine Derate or Shutdown**

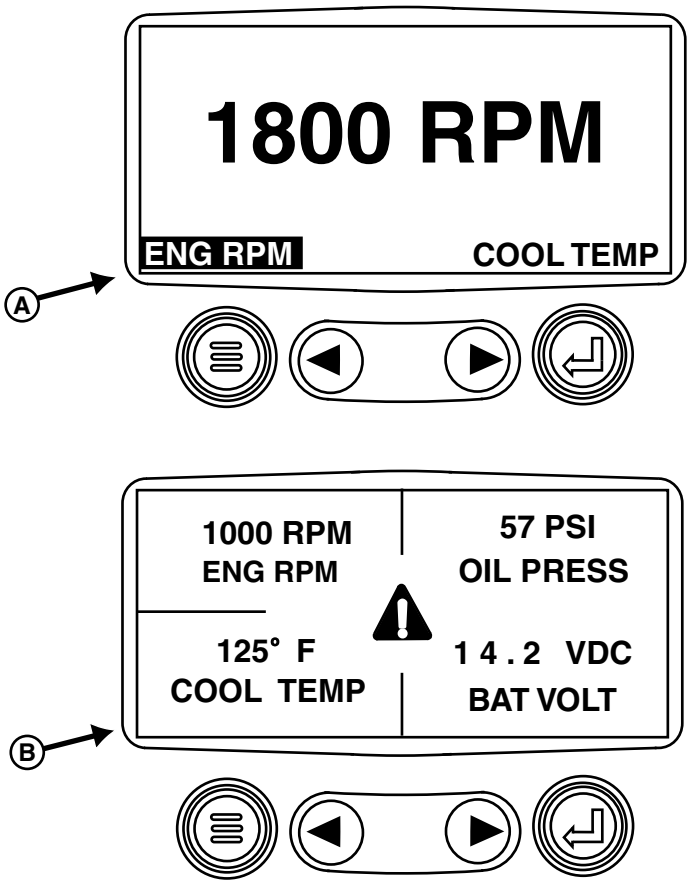
Figure 2. Icons Indicates a Fault Warning, Engine Derate, or Shutdown

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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.



RG14784 —UN—14MAY07

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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DM59778,0000008 -19-06AUG10-1/2

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.

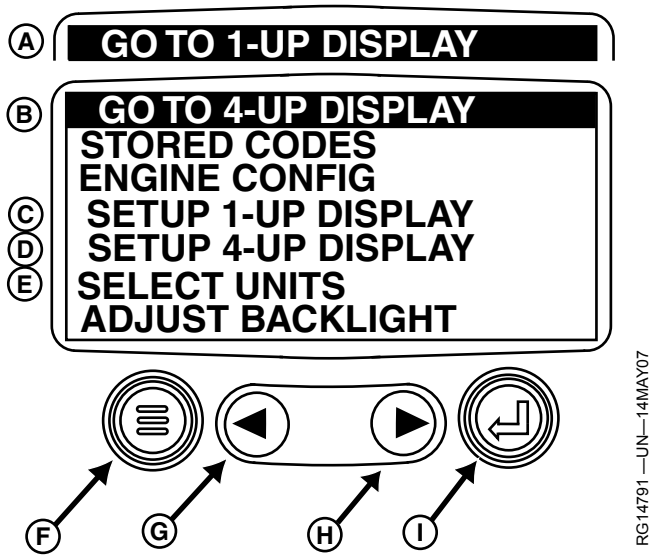


Figure 2. Main Menu.

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

   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.

DM59778,0000008 -19-06AUG10-2/2

Diagnostic Gauge Stored DTC Clearing Instructions

NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

Procedure for clearing stored diagnostic codes on Power View diagnostic gauge.

1. Turn power to diagnostic gauge OFF.
2. Turn power to diagnostic gauge ON. As soon as screen backlight comes on, simultaneously press and hold MENU (C) and ENTER (F) keys. See figure 1.
3. If successful, the screen shown in figure 1 will appear.

NOTE: If the screen in figure 1 does not appear, repeat step 2. This may take several attempts due to the short timing window.

4. Select CLEAR FAULT CODES (A). Press ENTER (F) key.

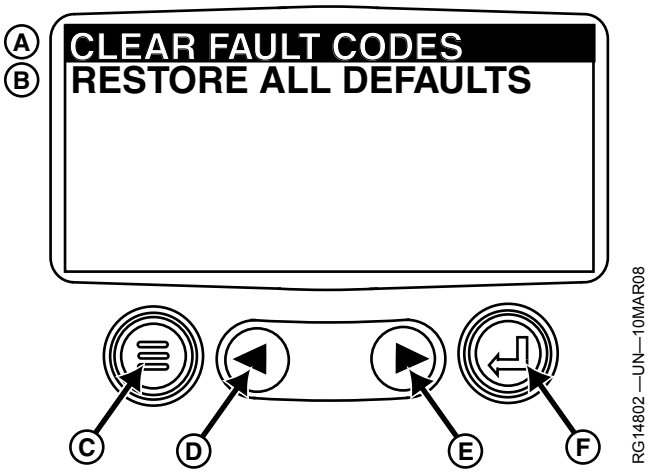


Figure 1. Clear Stored Fault Codes Screen

A—Clear Fault Codes
B—Restore All Defaults
C—Menu Key
D—Left/Up Scroll Key
E—Right/Down Scroll Key
F—Enter Key

DB92450,0000061 -19-18APR08-1/2

5. Screen shows stored fault codes have been cleared. See figure 2.
6. Cycle power to the diagnostic gauge again for normal operation.

A—Cleared All Fault Codes

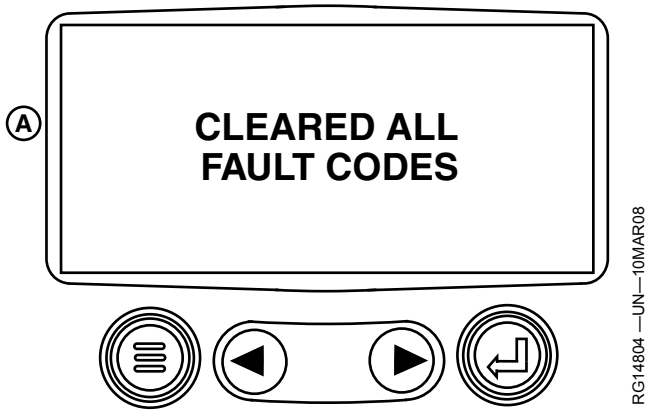


Figure 2. Clear All Fault Codes Screen

DB92450,0000061 -19-18APR08-2/2

Diagnostic Gauge Stored DTC Viewing Instructions

NOTE: For complete Power View operating instructions, refer to the Operator's Manual, associated with this application.

NOTE: The engine does not need to be running to navigate the diagnostic gauge screens.

NOTE: For more information fault codes, see DIAGNOSTIC TROUBLE CODES LIST later in this section of the manual.

Stored Diagnostic Trouble Codes (DTCs) are a history of DTCs that were once active. When a DTC becomes inactive, it is saved as a 'STORED' code. Stored codes can be reviewed and used as a trouble shooting aid in diagnosing intermittent problems and in range operating conditions. A count is kept of how many times a code has been active. Stored codes can be cleared from the diagnostic gauge. See DIAGNOSTIC GAUGE STORED DTC CLEARING INSTRUCTIONS later in this section of the manual. Instructions for viewing stored codes are described below.

1. Press MENU KEY (B). Main menu is displayed. See figure 1.
2. Using the SCROLL KEYS (C,D), navigate the menu until STORED CODES (A) is highlighted. Press the ENTER KEY (E).
3. REQUESTING FAULT CODES will momentarily be displayed on the display screen.

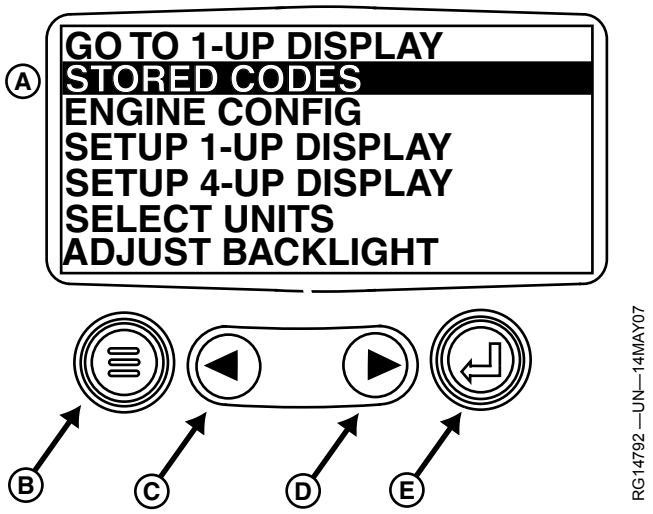
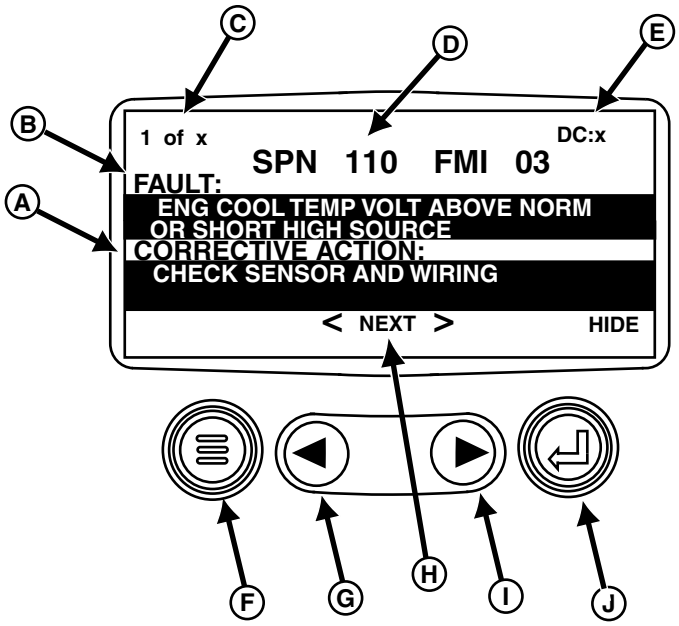


Figure 1. Main Menu

A—Stored Codes
B—Menu Key
C—Left/Up Scroll Key
D—Right/Down Scroll Key
E—Enter Key

4. A new screen showing stored code information appears. See figure 2. If there are no stored fault codes, "No Stored Fault Codes" screen is momentarily displayed. Power View then returns to main menu display. Press the MENU KEY (E) to get back to the parameter display screen.

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 Trouble Code Designations

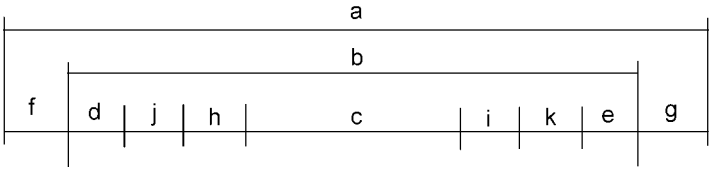
SPN/FMI CODES

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.

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19	**Received Network Data In Error**Any failure that is detected when the data received via the network is found substituted with the "error indicator" value (i.e. FE (16), see J1939/71). This type of failure is associated with received network data. The component used to measure the real world signal is wired directly to the module sourcing the data to the network and not to the module receiving the data via the network. This type of fault may or may not be directly associated with the value of general broadcast information.
20-30	**Reserved for SAE Assignment**
31	**Not Available or Condition Exists**Used to indicate that the FMI is not available or that the condition that is identified by the SPN exists. When no applicable FMI exists for the reported SPN, FMI 31 can be used. Also in cases when the reported SPN name has the failure information in it, FMI 31 can be used to indicated that the condition reported by the SPN exists. This type of fault may or may not be directly associated with the value of general broadcast information.

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Diagnostic Trouble Code List

The following chart is the list of DTCs that are covered in this manual.

DTC	Description
000028.03	Digital Throttle Signal Out of Range High
000028.04	Digital Throttle Signal Out of Range Low
000028.14	Digital Throttle Inhibited
000029.03	Secondary Analog Throttle Signal Out of Range High
000029.04	Secondary Analog Throttle Signal Out of Range Low
000029.14	Secondary Analog Throttle Inhibited
000091.03	Primary Analog Throttle Signal Out of Range High
000091.04	Primary Analog Throttle Signal Out of Range Low
000091.14	Primary Analog Throttle Inhibited
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
000105.00	Manifold Air Temperature Signal Extremely High
000105.03	Manifold Air Temperature Signal Out of Range High
000105.04	Manifold Air Temperature Signal Out of Range Low
000105.15	Manifold Air Temperature Signal Slightly High
000105.16	Manifold Air Temperature Signal Moderately High
000107.00	Air Filter Restriction Switch Activated
000108.02	Barometric Air Pressure Signal Invalid
000110.00	Coolant Temperature Signal Extremely High
000110.03	Coolant Temperature Signal Out of Range High
000110.04	Coolant Temperature Signal Out of Range Low
000110.15	Coolant Temperature Signal Slightly High
000110.16	Coolant Temperature Signal Moderately High
000157.03	Fuel Rail Pressure Signal Out of Range High
000157.04	Fuel Rail Pressure Signal Out of Range Low
000157.10	Fuel Rail Pressure Loss Detected
000157.17	Fuel Rail Pressure Not Developed
000158.17	ECU Power Down Error
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
000190.00	Engine Speed Extremely High
000190.16	Engine Speed Moderately High
000569.03	Rear Axle Differential Lock Signal Out of Range High
000569.04	Rear Axle Differential Lock 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

Continued on next page

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 Rresistance
000636.08	Camshaft Position Signal Missing
000636.10	Camshaft Position Signal Rate of Change Abnormal
000637.02	Crankshaft Position Signal InvalidEngine Timing Sensor 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
000651.02	Injector #1 Part # Data Invalid
000651.05	Injector #1 Circuit Has High Resistance
000651.06	Injector #1 Circuit Has Low Resistance
000651.07	Injector #1 Not Responding
000651.13	Injector #1 Calibration Fault
000652.02	Injector #2 Part # Data Invalid
000652.05	Injector #2 Circuit Has High Resistance
000652.06	Injector #2 Circuit Has Low Resistance
000652.07	Injector #2 Not Responding
000652.13	Injector #2 Calibration Fault
000653.02	Injector #3 Part # Data Invalid
000653.05	Injector #3 Circuit Has High Resistance
000653.06	Injector #3 Circuit Has Low Resistance
000653.07	Injector #3 Not Responding
000653.13	Injector #3 Calibration Fault
000654.02	Injector #4 Part # Data Invalid
000654.05	Injector #4 Circuit Has High Resistance
000654.06	Injector #4 Circuit Has Low Resistance
000654.07	Injector #4 Not Responding
000654.13	Injector #4 Calibration Fault
000655.02	Injector #5 Part # Data Invalid
000655.05	Injector #5 Circuit Has High Resistance
000655.06	Injector #5 Circuit Has Low Resistance
000655.07	Injector #5 Not Responding
000655.13	Injector #5 Calibration Fault
000656.02	Injector #6 Part # Data Invalid
000656.05	Injector #6 Circuit Has High Resistance
000656.06	Injector #6 Circuit Has Low Resistance
000656.07	Injector #6 Not Responding
000656.13	Injector #6 Calibration Fault
000676.03	Cold Start Aid Signal Received When Not Expected
000676.05	Cold Start Aid Circuit Has High Resistance
000898.09	Engine Speed CAN Message Invalid
000970.31	External Shutdown Switch Activated
001075.05	Low Pressure Fuel Pump Circuit Has High Resistance
001075.06	Low Pressure Fuel Pump Circuit Has Low Resistance
001109.31	Approaching Engine Protection Shutdown
001110.31	Engine Protection Shutdown Active
001136.00	ECU Temperature Signal Extremely High

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001136.16	ECU Temperature Signal Moderately High
001321.05	Engine Starter Solenoid Lockout Rely Drive Circuit Has High Resistance
001321.06	Engine Starter Solenoid Lockout Rely Drive Circuit Has Low Resistance
001321.30	Engine Starter Solenoid Lockout Rely Drive Circuit Reserved for SAE Assignment
001347.03	Suction Control Valve Signal Out of Range High
001347.05	Suction Control Valve Circuit Has High Resistance
001347.07	Fuel Rail Pressure Actual to Desired Mismatch
001569.31	Engine in Power Derate Condition
002000.13	Incorrect ECU for Application
002023.09	No CAN Message From Source Address 23
002071.09	No CAN Message From Source Address 71
003509.03	Sensor Supply #1 Voltage Out of Range High
003509.04	Sensor Supply #1 Voltage Out of Range Low
003510.03	Sensor Supply #2 Voltage Out of Range High
003510.04	Sensor Supply #2 Voltage Out of Range Low
003511.03	Sensor Supply #3 Voltage Out of Range High
003511.04	Sensor Supply #3 Voltage Out of Range Low
524037.02	MFWD Switch Circuit Invalid
524223.03	Rear Axle Differential Lock Signal Out of Range High
524225.31	Engine Start Protection Bypass Detected
524235.03	MFWD Solenoid Signal Out of Range High
524235.04	MFWD Solenoid Signal Out of Range Low

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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.



Digital Multimeter

RG11126 —UN—08JUN07

Instructions for measuring resistance 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 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

Electrical Circuit Concepts

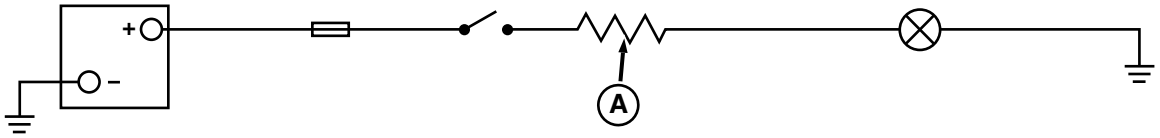
Tests include making measurements of voltage and resistance, as well as checking for open circuits and short circuits. An understanding of Voltage (volts), Current (amps), Resistance (ohms), Open circuit, and Short circuit is required to properly diagnose electrical problems.

Circuit Malfunctions

There are four major circuit malfunctions, High-resistance circuit, Open circuit, Grounded circuit, and Shorted circuit.

1. **High Resistance Circuit:**

RG9891 —UN—03MAR08



High Resistance Circuit

A—Unwanted Resistance

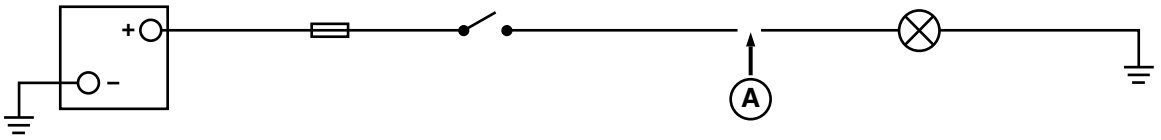
A circuit having unwanted resistance (A) that causes a voltage drop and reduces current flow.

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DN22556,000003E -19-29JUN10-1/6

2. **Open Circuit:**

RG9892 —UN—03MAR08



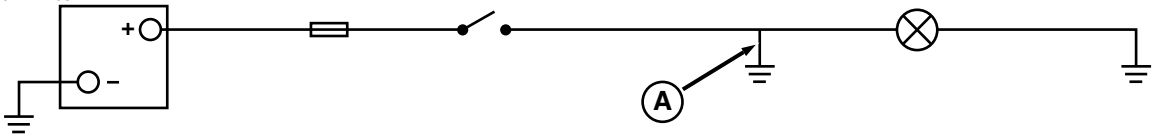
Open Circuit

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

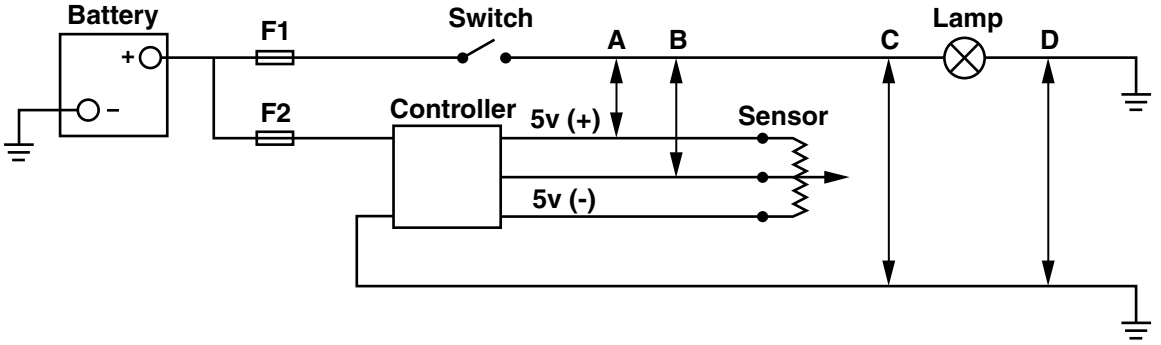


Grounded Circuit

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).

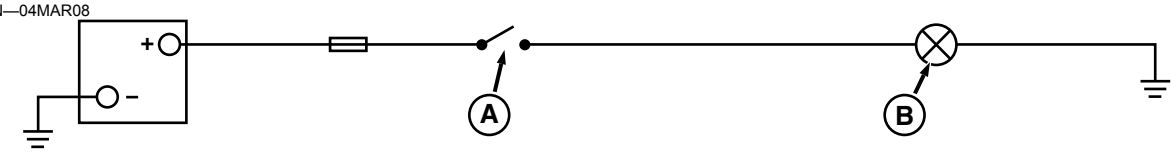
NOTE: The ground to ground type of short does not create an observable malfunction. Therefore, no further explanation for trouble shooting is necessary.

Continued on next page

DN22556,000003E -19-29JUN10-2/6

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.

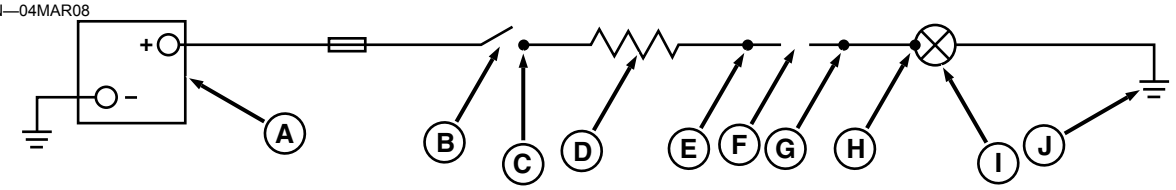
Example: A component may not operate before disconnecting an electrical connection, but it operates after reconnecting the connector.

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 -19-29JUN10-3/6

Electrical Circuit — Malfunction Troubleshooting

RG9896 —UN—04MAR08



Troubleshooting Circuit Malfunctions

A—Battery
B—Switch
C—Component Terminal
D—Unwanted Resistance
E—Circuit Connector
F—Open Circuit
G—Circuit Connector
H—Component Terminal
I— Load (Lamp)
J— Ground

1. **High Resistance Circuit:**

   A “High Resistance” circuit can result in slow, dim or no component operation (for example: loose, corroded, dirty, or oily terminals, gauge of wire too small or broken strands of wire).

2. **Open Circuit:**

   An “Open” circuit results in no component operation because the circuit is incomplete (for example: broken wire, terminals disconnected, open protective device, or open switch).

   Do the following to isolate the location of a “High Resistance” or “Open” circuit:

   a. With the controlling switch (B) closed (on) and the load (I) connected into the circuit, check for proper voltage at a location easily accessible between (C) and (H).

   - If voltage is low, move toward the voltage source (A) to locate the point of voltage drop.
   - If voltage is correct, move toward the load (I) and ground terminal (J) to locate the voltage drop.

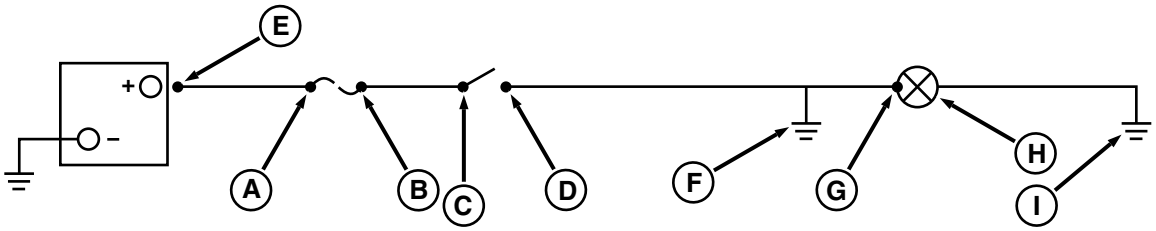
   NOTE: The example shows high resistance (D) between (C) and (E) and the open circuit (F) between (E) and (G).

   b. Repair the circuit as required.

   c. Perform Verification Procedure after completing the repair.

Continued on next page

DN22556,000003E -19-29JUN10-4/6



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).

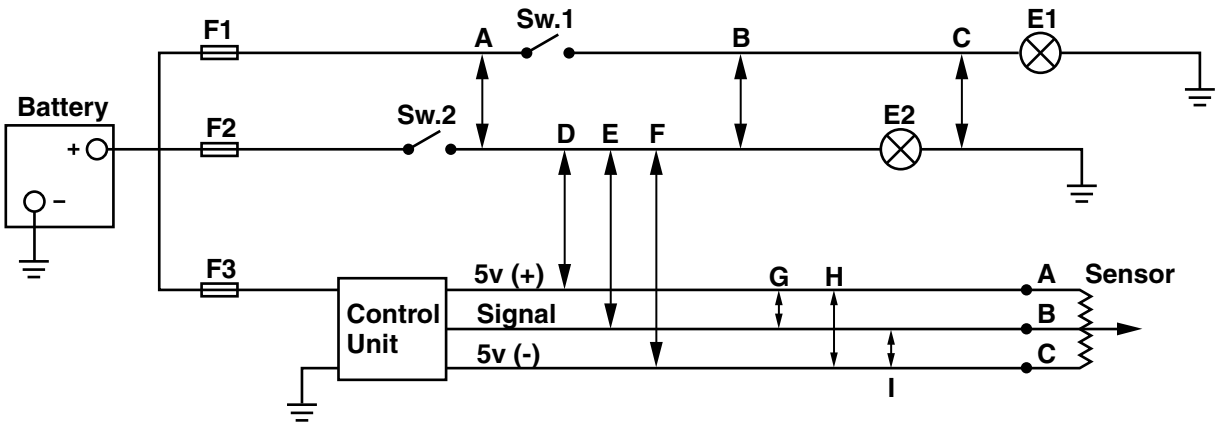
- If there is continuity, there is a grounded circuit between (D) and (G). Repair the circuit.

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 -19-29JUN10-5/6



4. **Shorted Circuit:**

Machines equipped with several electronic control devices contain wiring harnesses that can become shorted by one of the following ways shown above.

1. Battery wire from fuse (F1) is shorted at (A) to another battery wire after switch (Sw.2).
   - Result: Lamp (E2) is on all of the time.
2. Battery wire from fuse (F1) is shorted at (B) to another battery wire after switches (Sw.1 & 2).
   - Result: Both lamps (E1 & E2) operate on either switch (Sw. 1 or 2).
3. Battery wire from fuse (F1) is shorted at (C) to a ground wire.
   - Result: Fuse (F1) opens after closing switch (Sw. 1)
4. Battery wire from switch (Sw. 2) is shorted at (D) to a regulated voltage wire.
   - Result: The sensor signal voltage is distorted.[1]
5. Battery wire from switch (Sw. 2) is shorted at (E) to the sensor signal voltage wire.
   - Result: The sensor signal is distorted.[1]
6. Battery wire from switch (Sw. 2) is shorted at (F) to the sensor ground wire.
   - Result: Fuse (F2) opens after closing switch (Sw. 2) and the sensor signal is distorted.[1]
7. Controller regulated voltage wire is shorted at (G) to the sensor signal voltage wire.
   - Result: The sensor signal is distorted.
8. Controller regulated voltage wire is shorted at (H) to the sensor ground wire.
   - Result: The sensor signal is distorted.[1]
9. Sensor voltage wire is shorted at (I) to the sensor ground wire.
   - Result: The sensor signal is distorted.[1]

Do the following to isolate a "Shorted Circuit:"

a. Review the machine electrical schematic to identify the circuits for the component that does not operate.

b. Disconnect the components at each end of the circuits, to single out the affected wires.

c. To prevent damage to connector terminals, obtain mating connector terminals from repair parts. DO NOT force meter probes into connector terminals.

d. Connect the meter leads across two of the affected circuits. The meter should show no continuity between the two circuits. Repeat the check across another combination of two circuits until all affected circuits have been checked.

e. Then, connect a meter lead to each affected circuit one at a time and touch the other meter leads to all terminals in the connector. The meter should show no continuity between any two circuits.
Example: A 37 pin connector contains three wires to a sensor. With one meter probe attached to each of the three wires, one at a time, touch the other meter probe to the remaining 36 wires. If there is continuity between any two wires, the circuit is shorted. Repair the circuit.

f. Alternate Method to Check for Shorted Circuit. With the components disconnected at each end of the suspected circuits, turn on the key switch. Connect one meter lead to a good frame ground. With the other meter probe, touch each of the suspected circuits one at a time. If there is a voltage reading, the circuit is shorted to another voltage wire. Repair the circuit.

g. Repair the "Shorted Circuit" as follows:

- Wires not in a loom: Wrap individual wires with electrical tape or replace the damaged wire and band as required.
- Wires in a loom: If hot spots exist in shorted area of the harness, replace the harness. If hot sports are not noticeable, install a new wire of proper gauge between the last two connections. Use tie bands to secure the wire to outside of the harness.

h. Perform Verification Procedure after completing the repair.

[1]The sensor signal voltage goes out of range and a fault code may be restored. The control unit may shut down or provide limited operation for its function.

DN22556,000003E -19-29JUN10-6/6

Electronic Injector - Calibration Information

Purpose:

The purpose of this test in place the proper injector information in the ECU for each injector weather 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.

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 this group. 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 this group.

RG41183,00000FD -19-03AUG10-1/1

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 “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.

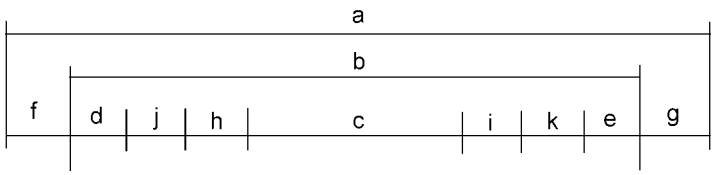
9. Next screen says to turn the Ignition OFF for 90 seconds then back ON. Wait 10 seconds, then press “OK” button.
10. The Next screen says “Calibration was successfully completed”, if it was. If you want to run it again select “Yes”. Select “No” to exit the calibration. Select the “Print” button to print the test results.

For more information on printing see, Interactive Tests and Calibration Results — Printing, Exporting, or Saving Instructions in this group.

SS01820,00002DF -19-03AUG10-1/1

Failure Mode Indicator Designations

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 ECM commands it to low. Broadcast of data value is substituted with the "error indicator" value.
04	**Value Out of Range Low (OORL)** A voltage signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose voltage remains at a low level when the ECM commands it to high. Broadcast of data value is substituted with the "error indicator" value.
05	**Current Below Normal** A current signal, data or otherwise, is below the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains off when the ECM commands it on. Broadcast of data value is substituted with the "error indicator" value.
06	**Current Above Normal** A current signal, data or otherwise, is above the predefined limits that bound the range. Broadcast of data value is substituted with the "error indicator" value. Any signal external to an electronic control module whose current remains on when the ECM commands it off. Broadcast of data value is substituted with the "error indicator" value.
07	**Mechanical System not Responding or Out of Adjustment** Any fault that is detected as the result of an improper mechanical adjustment or an improper response or action of a mechanical system that, with a reasonable confidence level, is not caused by an electronic or electrical system failure. This type of fault may or may not be directly associated with the value of general broadcast information.

Continued on next page

08	**Abnormal Frequency or Pulse Width or Period**To be considered in cases of FMI 4 and 5. Any frequency or PWM signal that is outside the predefined limits which bound the signal range for frequency or duty cycle (outside region b of the signal range). Also if the signal is an ECM output, any signal whose frequency or duty cycle is not consistent with the signal which is emitted. Broadcast of data value is substituted with the "error indicator" value.
09	**Abnormal Update Rate**Any failure that is detected when receipt of data via the data link or as input from a smart actuator or smart sensor is not at the update rate expected or required by the ECM (outside region c of the signal range). Also any error that causes the ECM not to send information at the rate required by the system. This type of fault may or may not be directly associated with the value of general broadcast information.
10	**Abnormal Rate of Change**Any data, exclusive of the abnormalities covered by FMI 2, that is considered valid but whose data is changing at a rate that is outside the predefined limits that bound the rate of change for a properly functioning system (outside region c of the signal range). Broadcast of data values is continued as normal.
11	**Root Cause Not Known**It has been detected that a failure has occurred in a particular subsystem but the exact nature of the fault is not known. Broadcast of data value is substituted with the "error indicator" value.
12	**Bad Intelligent Device or Component**Inconsistency of data indicates that a device with some internal intelligence, such as a controller, module, smart sensor or smart actuator, is not properly functioning. This data may be internal to a module or external from a data link message or from various system responses. Broadcast of data value is substituted with the "error indicator" value. This error is to include all internal controller trouble codes that cannot be caused by connections or systems external to the controller.
13	**Out of Calibration**A failure that can be identified to be the result of not being properly calibrated. This may be the case for a subsystem which can identify that the calibration attempting to be used by the controller is out of date. Or it may be the case that the mechanical subsystem is determined to be out of calibration. This failure mode does not relate to a signal range.
14	**Special Instructions**SPNs 611 through 615 are defined as "System Diagnostic Codes" and are used to identify failures that cannot be tied to a specific field-replaceable component. Specific subsystem fault isolation is the goal of any diagnostic system, but for various reasons this cannot always be accomplished. These SPNs allow the manufacturer some flexibility to communicate non-"specific component" diagnostic information. Because SPN 611-615 use the standard SPN/FMI format, it allows the use of standard diagnostic tools, electronic dashboards, satellite systems and other advanced devices that scan Parameter Groups containing the SPN/FMI formats. Because manufacturer-defined codes are not desirable in terms of standardization, the use of these codes should only occur when diagnostic information cannot be communicated as a specific component and failure mode. This failure mode does not relate to the signal range, and may or may not be directly associated with the value of general broadcast information.
15	**Data Valid but Above Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
16	**Data Valid but Above Normal Operating Range—-Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is above what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
17	**Data Valid but Below Normal Operating Range—Slight Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined slight level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
18	**Data Valid but Below Normal Operating Range—Moderate Level**The signal communicating information is within a defined acceptable and valid range, but the real world condition is below what would be considered normal as determined by the predefined moderate level limits for that particular message of the real world condition. Broadcast of data values is continued as normal.
19	**Received Network Data In Error**Any failure that is detected when the data received via the network is found substituted with the "error indicator" value (i.e. FE (16), see J1939/71). This type of failure is associated with received network data. The component used to measure the real world signal is wired directly to the module sourcing the data to the network and not to the module receiving the data via the network. This type of fault may or may not be directly associated with the value of general broadcast information.
20-30	**Reserved for SAE Assignment**
31	**Not Available or Condition Exists**Used to indicate that the FMI is not available or that the condition that is identified by the SPN exists. When no applicable FMI exists for the reported SPN, FMI 31 can be used. Also in cases when the reported SPN name has the failure information in it, FMI 31 can be used to indicated that the condition reported by the SPN exists. This type of fault may or may not be directly associated with the value of general broadcast information.

WL30140,0000041 -19-18APR08-2/2

Fuel Rail Cap and Plug Kit

For instructions on connecting to Service ADVISOR, see earlier in this Group.

Engine Applications:

All JDPS diesel engines that have High Pressure Common Rail (HPCR) fuel systems.

Tool Use:

- This tool is used to determine which cylinder is causing a no start condition because the high pressure fuel system can not build pressure.

IMPORTANT: Ensure the area you are working in is free from debris. Any debris getting into the fuel system will cause problems.

Tool Use Instructions:

1. Ignition OF, Engine OFF.

IMPORTANT: Ensure engine has not been cranked for at least 5 minutes to let the rail pressure drop to a safe level.

NOTE: Test one fuel line at a time.

2. Loosen the line at both ends.
3. Disconnect the line at the fuel rail end only.
4. Using JDG10760, “Cap” the fuel rail outlet and “Plug” the disconnected end of the chosen line.
5. Tighten the chosen line at the injector feed tube.
6. Try starting the engine; if it starts you have found the bad cylinder. See troubleshooting procedure below.
7. If engine still does not start, remove cap and pug. Reinstall the chosen line to specification. Select another line to test.
8. If none of the injectors are the problem for the no start follow the Engine Cranks/Won’t Start procedure in this manual.

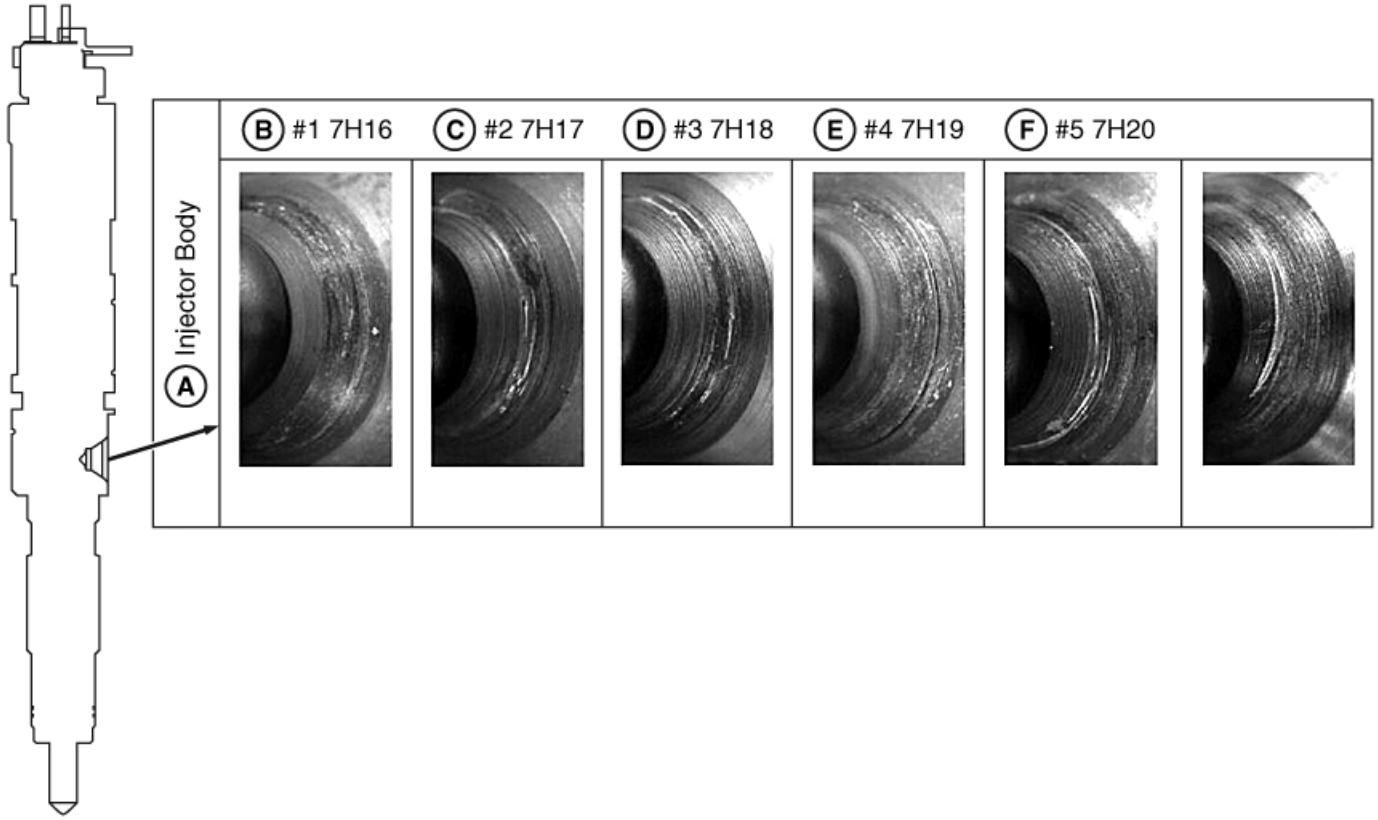
NOTE: Note: It is very uncommon for more than one cylinder to be bad causing a no start; however, that could be a possibility.

Troubleshooting Procedure:

1. Remove the fuel feed tube of the cylinder causing the no start.
2. Inspect the fuel feed tub and fuel inlet on injector for galling.
3. If galling is indicated on fuel feed tube only, replace fuel feed tube and try starting again.
4. If galling is indicated at the injector fuel inlet replace injector and fuel feed tube and try restarting again.

Continued on next page

Examples of galling are shown in the graphic below for different injectors.



DN22556,0000002 -19-25NOV08-2/2

Harness Diagnostic Mode Test

NOTE: Before running this test, ensure you have saved all Snapshot Captures and Recordings. For more information see SNAPSHOT INSTRUCTIONS earlier 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 run 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 will be aborted and the engine will start. Test Operation: The ECU continuously monitors all the sensors for normal operation while power is applied to the ECU. During the Harness Diagnostic Mode Test, the ECU will set up and trigger some special tests, also. These are tests that the ECU can not perform while the engine is running. When the 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. If the ECU determines the values are good, it will store them as the last good values, but 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 will store the code and display it at the end of the test.

Test Procedures:

1. Select HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. A screen appears with a list of all the ECU codes (active and stored).
2. Press “Next” to start the test, “Cancel” to exit the test, or “Print” to print a list of the codes. After pressing “Next” follow the directions on the screen.
3. At the end of the test, another list of codes will be presented. **Currently this screen does not update properly**. Do NOT compare this list with the initial list to see if there are any additional codes.
4. Go the Diagnostic Trouble Codes tab in Service ADVISOR and select the “Refresh” button. Compare these codes to the original list going into the Harness Diagnostic Mode Test.
5. Go to those DTC(s) displayed and troubleshoot them to fix the problem(s), 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 and manipulate the wiring harness to see if the code reappears. If it does, check the harness and connector for problems.

DN22556,000005C -19-18APR08-1/1

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.

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Internal Data Monitor — Instructions

Internal Data Monitor (IDM) is a feature in Service ADVISOR that is used for recording multiple data points monitored by the Engine Control Unit (ECU) at a selectable sample rate. The number of data points selected for recording and the sample rate that is selected determines the length of the recording. These recordings are stored internally in the ECU RAM memory and then uploaded to Service ADVISOR.

Selecting Data Points: To select a data point, place the cursor over the name of the data point and click. To select more than one data point hold down the Ctrl key on the keyboard and click on the data points to be recorded. A maximum of 32 data points may be selected.

NOTE: If you make a mistake and do not hold the Ctrl key down, you must go back and re-select all other data points you selected. You can un-select a data point by holding down the Ctrl key and clicking on the data point.

Select Sampling Rate: Choose desired sample rate from the drop-down menu.

NOTE: The sample rate is how often the ECU gathers the information and stores it. Selecting 5 ms (5 milliseconds or 0.005 seconds) means every 5 ms the ECU takes and stores data. Selecting 1000 ms (1 second) means every 1000 ms the ECU gathers and stores data. The faster the sample rate more often the data is taken, reducing the available recording time. The number of data points selected also affects recording time.

Start Trigger Modes:

- **One Time** – This mode records the data points selected at the selected sample rate selected until the allocated ECU RAM memory is full or user clicks “Stop”.
- **Continuous** – This mode records the selected data points until the user clicks “Stop” to stop the recording session.

  NOTE: If the estimated recording time is exceeded and the allocated ECU RAM memory is full the data collected starts over writing the oldest data in that allocated memory area

- **Internal** – This mode allows the user to record the selected data points triggered by selected data point value(s). You can set a trigger using One Data Point or Two Data Points. Select the data point(s) you want to use as start trigger(s) from the drop-down list. There are three start trigger conditions: Equal Too, Greater Than, and Less Than. Also there is a user-defined trigger value. The options allow a maximum of two different data points to control start triggering. If the Two Data Point start trigger is selected there is a selection for an operand of either an And or an Or between the two. Here is an example using two start trigger data points: Engine RPM Greater Than 1000 rpm And Engine Load Less Than 50%. The recording begins when both data point trigger values are met.

Stop Trigger Modes of Internal Start Trigger Mode:

- **One Time** – In this mode the recording stops when the allocated ECU RAM memory is full or user clicks “Stop”.
- **Continuous** – In this mode the recording stops when the user selects the “Stop” button.

  NOTE: If the estimated recording time is exceeded and the allocated ECU RAM memory is full the data collected starts over writing the oldest data in that allocated memory area

- **Internal** – In this mode the recording stops when triggered by the selected stop data point value(s). You can set a trigger using One Data Point or Two Data Points. Select the data point(s) you want to use as stop trigger(s) from the drop-down list. There are three stop trigger conditions: Equal Too, Greater Than, and Less Than. Also there is a user-defined trigger value. The options allow a maximum of two different data points to control stop triggering. If the Two Data Point stop trigger is selected there is a selection for an operand of either an And or an Or between the two. Here is an example using two stop trigger data points: Engine rpm Greater Than 1000 rpm, Or Engine Load Less Than 50%. The recording stops when both data point trigger values are met or “Cancel” is selected.

IMPORTANT: Recordings made with IDM are stored temporarily in the ECU RAM memory, so if a power interruption occurs while the recording is being made or downloading it to Service ADVISOR, the recording is lost.

Set Up Procedure:

1. Connect Service ADVISOR, see Connecting To Service ADVISOR in Section 04, Group 160.
2. Select Internal Data Monitor on the Service ADVISOR Interactive Tests shortcut bar.
3. Select the data points you want to record and click the “Next” button to continue.
4. The different start trigger modes for recording IDM data are shown below.

One Time:

1. Select the start trigger mode One Time. Select the desired sampling rate then click “Next” to continue.
2. Ensure the data points you selected are displayed on the screen. Click “Next” to continue.

NOTE: The software estimates the recording length and displays it on the screen.

Continued on next page

3. Click “Start” to begin recording. Once the recording is complete or user clicks “Stop”, Service ADVISOR automatically begins to upload the recording from the ECU to the computer used to connect to the ECU.
4. Once Service ADVISOR has completed the upload, the screen displays the name and location of the recording. As an example: C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files\IDM_RG6090M123456_20100518_200637.zip, where IDM_RG6090M123456_20100518_200637.zip is the name and C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files is the location This is the default location.
5. Select “Yes” or “No” to run this test again.

NOTE: You are required to re-enter your previous selections or enter new selections to run the test again. The software does not automatically remember your previous selections.

See Recording Playback in this procedure to play a recording.

Continuous:

1. Select the start trigger mode Continuous. Select the desired sampling rate then click “Next” to continue.
2. Ensure the data points you selected are displayed on the screen. Click “Next” to continue.

NOTE: The software estimates the recording length and display it on the screen.

3. Click “Start” to begin recording. The recording stops when the “Stop” button is pressed. Once the recording is complete, Service ADVISOR automatically begins to upload the recording from the ECU to the computer used to connect to the ECU.
4. Once Service ADVISOR has completed the upload the screen displays the name and location of the recording. As an example: C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files\IDM_RG6090M123456_20100518_200637.zip. Where IDM_RG6090M123456_20100518_200637.zip is the name and C:\Documents and Settings\All Users\Application Data\Service ADVISOR\Recording-Files is the location. This is the default location.
5. Select “Yes” or “No” to run this test again.

NOTE: You are required to re-enter your previous selections or enter new selections to run the test again. The software does not automatically remember your previous selections.

See Recording Playback in this procedure to play a recording.

Internal:

1. Select the start trigger mode Internal. Select the desired sampling rate then click “Next” to continue.
2. In the pull down menu “Select number of start triggers”, select One Data Point or Two Data Points.
3. In the “Select trigger options for data point 1” use the pull down menu to select the data point that is to be designated as the start trigger. Then select the condition from the pull down menu and enter a trigger value.
4. If two data point start triggers are selected, in the “Select trigger options for data point 2” use the pull down menu to select the data point that is to be designated as the start trigger. Then select the condition from the pull down menu and enter a trigger value. Enter the operand And/Or based on your desired trigger mode.
5. Click “Next” to continue to the next screen.

NOTE: If you selected One Time or Continuous start triggering skip to step 11.

6. Select the stop trigger mode from the pull down menu and click “Next”.

NOTE: See Stop Trigger Modes of Internal Start Trigger Mode above for specific information about stop trigger modes.

7. In the pull down menu “Select number of stop triggers”, select One Data Point or Two Data Points.
8. In the “Select trigger options for data point 1” use the pull down menu to select the data point that is to be designated as the stop trigger. Then select the condition from the pull down menu and enter a trigger value.
9. If two data point start triggers are selected, in the “Select trigger options for data point 2” use the pull down menu to select the data point that is to be designated as the stop trigger. Then select the condition from the pull down menu and enter a trigger value. Enter the operand And/Or based on your desired trigger mode.
10. Click “Next” to continue setup.

NOTE: The software will estimate the recording length and display it on the screen.

11. Confirm the data points you selected and the recording setup displayed on the screen are correct. Click “Next” to continue or “Back” to make changes.
12. Click “Start” to begin the recording. When all trigger(s) that were configured are met, the recording begins and records until the stop trigger(s) settings are met or the memory is full or “Stop” or “Cancel” is selected, depending on the type of stop trigger you selected.

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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: Where Engine Serial Number is the 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.

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.

   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.

6. Verify the part number and serial number displayed is the one you put in.
7. If the information is correct click the “Download Selected” button.
8. If it is not correct click the “Search Again” button and repeat starting with step 5.

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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
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.
Cold Start Aid Enabled	ON/OFF	Indicates if cold start aid is enabled by ECU.
Cold Start Aid Status		Indicates if cold start aid relay is on.
Cold Start Aid Time Remaining	Sec	Amount of remaining fuel system priming time.
Cold Start Aid Wait Lamp	ON/OFF	Indicates if cold start aid wait lamp is on.
Coolant Temperature	degC (degF)	Temperature indicated by coolant temperature sensor.
Coolant Temperature Input Voltage	Volts	Input voltage measured by the ECU.
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 Speed Governor Curve		The mode selected is dependent on the application. See APPLICATION SPECIFICATIONS in Section 06, Group 210 of this manual.
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).
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.
Fan Speed - Actual	rev/m	Current fan speed indicated by sensor.
Fan Speed - Desired	rev/m	Fan speed commanded by ECU.
Fan State	ON/OFF	Indicates if fan is commanded ON or OFF.
Fuel Rail Pressure - Actual	MPa (psi)	Pressure indicated by the fuel rail pressure sensor.
Fuel Rail Pressure - Desired	MPa (psi)	Fuel rail pressure commanded by ECU.

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Parameter	Units Metric (Eng)	Description
Fuel Rail Pressure Input Voltage	Volts	Input voltage measured by the ECU.
Fuel System Part Number		The part number for the fuel system used on the engine.
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 Temperature	degC (degF)	Fuel temperature value.
Fuel Temperature Input Voltage	Volts	Fuel Temperature Sensor voltage to the ECU.
Fuel Usage Rate	L/hr (gal/hr)	Current rate of fuel usage.
Low Pressure Fuel - Actual Pressure	kPa (psi)	Pressure indicated by low pressure fuel sensor.
Low Pressure Fuel 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 #1 Voltage	Volts	Voltage of ECU 5 volt power supply #1.
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.
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.
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

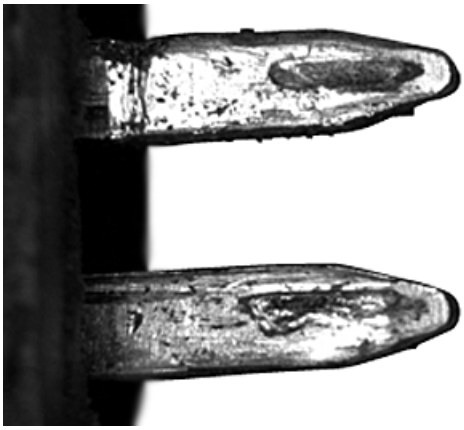
- Remove connector back shell to gain access to wire insertion end of connector, if applicable.
- Gently pull on each wire in the connector.

Replace terminal if wire end pulls out of the terminal.

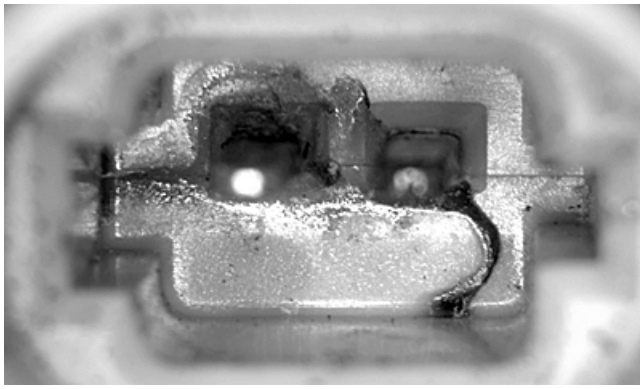
Terminal Tips

- 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.

Continued on next page



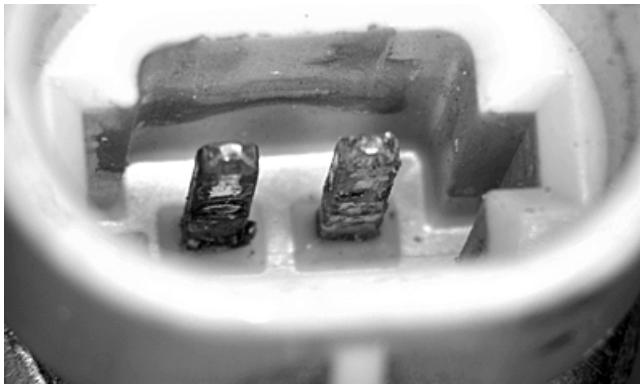
RG16614 —UN—25NOV08



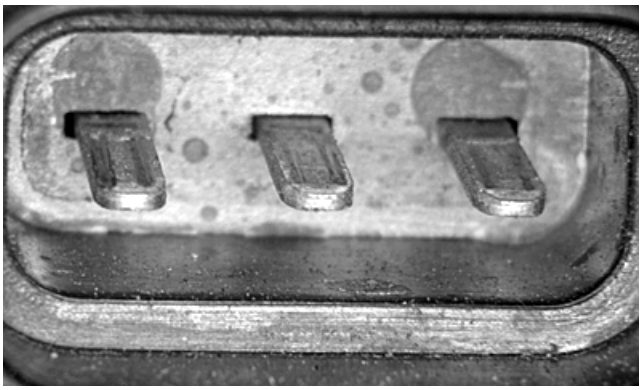
RG16615 —UN—25NOV08



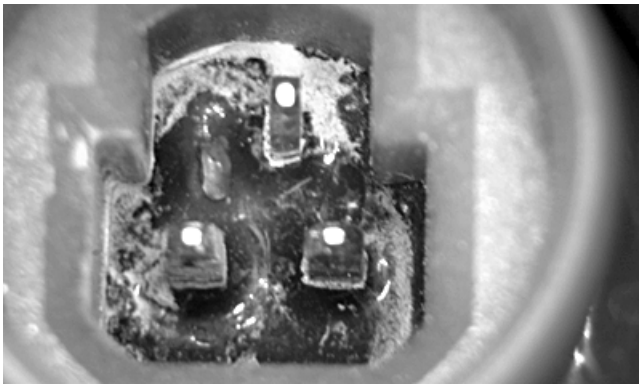
RG16616 —UN—25NOV08



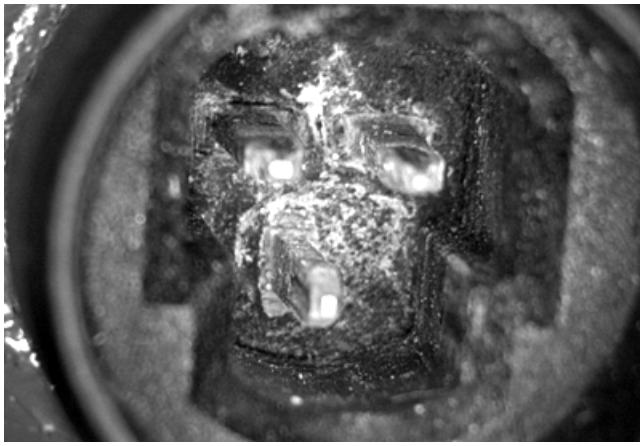
RG16617 —UN—25NOV08



RG16618 —UN—25NOV08



RG16621 —UN—25NOV08



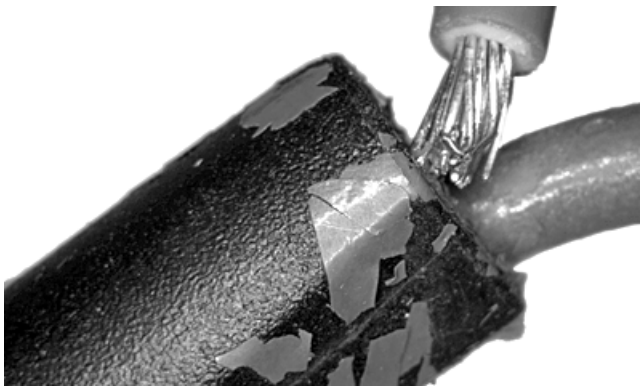
RG16623 —UN—25NOV08

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DN22556,0000056 -19-14MAY10-2/3



RG16624 —UN—25NOV08



RG16619 —UN—25NOV08

DN22556,0000056 -19-14MAY10-3/3

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

000028.03 — Digital Throttle Signal Out of Range High

Digital throttle voltage is above the high voltage specification.

BB78437,000011D -19-21AUG08-1/15

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 input voltage increases above its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope if there are more than one throttle set up in the Trim Options.

Additional References:
For more digital throttle information, see DIGITAL MULTI STATE THROTTLE, see DUAL-STATE THROTTLE, see TRI-STATE THROTTLE, or see RAMP THROTTLE in Section 03, Group 140 earlier in this manual, depending on the type of digital throttle employed on the application.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 6
- see 4.5L 24V ECU WIRING DIAGRAM 6
- see 6.8L 12V ECU WIRING DIAGRAM 6
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

BB78437,000011D -19-21AUG08-2/15

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

Continued on next page

BB78437,000011D -19-21AUG08-3/15

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

BB78437,000011D -19-21AUG08-4/15

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

BB78437,000011D -19-21AUG08-5/15

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

BB78437,000011D -19-21AUG08-6/15

5 Control Panel Resistance Check	1. Set the digital 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

BB78437,000011D -19-21AUG08-7/15

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

BB78437,000011D -19-21AUG08-8/15

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

BB78437,000011D -19-21AUG08-9/15

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

Continued on next page

BB78437,000011D -19-21AUG08-10/15

9 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the digital throttle harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 10

BB78437,000011D -19-21AUG08-11/15

10 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 11
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 12

BB78437,000011D -19-21AUG08-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 000028.03 reappear when engine operating point was reached?	**NO:** GO TO 10 and confirm operating point.

BB78437,000011D -19-21AUG08-13/15

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.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

BB78437,000011D -19-21AUG08-14/15

13 Software Updates	1. Download latest ECU payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace digital throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000028.03 active?	**NO:** Problem fixed, bad ECU program.

BB78437,000011D -19-21AUG08-15/15

000028.04 — Digital Throttle Signal Out of Range Low

Digital throttle voltage is below the low voltage specification.

BB78437,000011E -19-05JUN08-1/19

000028.04 — Digital Throttle Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000028.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The digital throttle input voltage decreases below its low voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope if there is 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 digital throttle employed on the application.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 6
- see 4.5L 24V ECU WIRING DIAGRAM 6
- see 6.8L 12V ECU WIRING DIAGRAM 6
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- Panel connector terminal - Yellow/Purple

Continued on next page

BB78437,000011E -19-05JUN08-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000028.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

BB78437,000011E -19-05JUN08-3/19

2 Check Digital Throttle Wiring	1. Ignition OFF, engine OFF. 2. Check wiring connections on digital throttle. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

BB78437,000011E -19-05JUN08-4/19

3 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect connector C09 on the control panel. 3. 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 4

BB78437,000011E -19-05JUN08-5/19

4 Check for DTC 00028.04	1. Ignition ON, Engine OFF. 2. Refresh codes. Is DTC 00028.04 still an active DTC?	**YES:** GO TO 7 **NO:** GO TO 5

BB78437,000011E -19-05JUN08-6/19

5 Check for DTC 00028.03	Is DTC 00028.03 now an active DTC with harness connector C09 still disconnected?	**YES:** Replace digital throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 6

Continued on next page

BB78437,000011E -19-05JUN08-7/19

6 Check for Intermittent Short to Ground	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.	**YES:** Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did the 000028.04 code toggle between active and stored?	**NO:** Replace throttle switch. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000011E -19-05JUN08-8/19

7 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J02 connector.	
	3. Perform TERMINAL TEST on J02-B4 and J02-G3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 8

BB78437,000011E -19-05JUN08-9/19

8 Check Digital Throttle Circuit Continuity	1. On the harness, measure the resistance between ECU J02-G3 and harness connector C09-S.	
	2. On the harness, measure the resistance between ECU J02-B4 and harness connector C09-R.	**YES:** GO TO 9
	Were both resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000011E -19-05JUN08-10/19

9 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J02-B4 and single point ground.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was the resistance less than 100k ohms?	**NO:** GO TO 10

BB78437,000011E -19-05JUN08-11/19

10 Check for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Measure the resistance between ECU J02-B4 and all other terminals in the ECU harness connectors J01, J02 and J03.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Was any measurement less than 100k ohms?	**NO:** GO TO 11

Continued on next page

BB78437,000011E -19-05JUN08-12/19

11 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.

Did the 000028.04 code toggle between active and stored?

YES: Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: Replace ECU. Recheck for DTC.

BB78437,000011E -19-05JUN08-13/19

12 Check for Intermittent Short to Ground

1. Ignition ON, engine OFF.
2. Monitor DTCs in Service ADVISOR while gently wiggling the wiring harness between harness connector C09 and ECU J02 connector.

Did the 000028.04 code toggle between active and stored?

YES: Locate and repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 13

BB78437,000011E -19-05JUN08-14/19

13 Check Snapshot Information

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 00028.04 now active?

YES: GO TO 2

NO: GO TO 14

BB78437,000011E -19-05JUN08-15/19

14 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect harness connector C09.
3. Perform TERMINAL TEST on C09.
4. Disconnect ECU J02 connector.
5. Perform TERMINAL TEST on J02-G3 and J02-B4.

Were Terminal Test results good?

YES: GO TO 15

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000011E -19-05JUN08-16/19

15 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 00028.04 now active?

YES: GO TO 2

NO: GO TO 16

Continued on next page

BB78437,000011E -19-05JUN08-17/19

16 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 00028.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 17

BB78437,000011E -19-05JUN08-18/19

17 Software Updates	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,000011E -19-05JUN08-19/19

000028.14 — Digital Throttle Inhibited

Throttle voltage is above or below the specification.

This code is just an informative code telling you that the digital throttle is either above or below the Out Of Range specification.

To get the engine to change speed you must either set the throttle to the minimum position then increase it or cycle the ignition key to off then back on.

This is a safety feature used to keep the engine from running away when not commanded to after a throttle problem.

BB78437,0000132 -19-06JUN08-1/1

000029.03 — Secondary Analog Throttle Signal Out of Range High

Throttle voltage is above the high voltage specification.

DN22556,000049E -19-03JUN08-1/20

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 its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more secondary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Auxiliary connector terminal C08 - Yellow/Purple

Continued on next page

DN22556,000049E -19-03JUN08-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000029.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,000049E -19-03JUN08-3/20

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

DN22556,000049E -19-03JUN08-4/20

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

DN22556,000049E -19-03JUN08-5/20

4 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

DN22556,000049E -19-03JUN08-6/20

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.

DN22556,000049E -19-03JUN08-7/20

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

DN22556,000049E -19-03JUN08-8/20

7 Secondary Analog Throttle Circuit Resistance Check	On the harness, measure the resistance between the secondary analog throttle connector power (terminal C) and signal (terminal B).	**YES:** GO TO 8
	Is resistance less than 10 ohms?	**NO:** GO TO 10

DN22556,000049E -19-03JUN08-9/20

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

DN22556,000049E -19-03JUN08-10/20

9 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors.	
	2. On the harness, measure the resistance between the signal (terminal J2-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.

DN22556,000049E -19-03JUN08-11/20

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

DN22556,000049E -19-03JUN08-12/20

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.

DN22556,000049E -19-03JUN08-13/20

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.

DN22556,000049E -19-03JUN08-14/20

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

DN22556,000049E -19-03JUN08-15/20

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

DN22556,000049E -19-03JUN08-16/20

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

DN22556,000049E -19-03JUN08-17/20

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

DN22556,000049E -19-03JUN08-18/20

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

DN22556,000049E -19-03JUN08-19/20

18 Software Updates	1. Download latest payload and reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace secondary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is 000029.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,000049E -19-03JUN08-20/20

000029.04 — Secondary Analog Throttle Signal Out of Range Low

Throttle voltage is below the low voltage specification.

DN22556,000049F -19-13JAN09-1/23

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 its low voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more secondary analog throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 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
- Auxiliary connector terminal C08 - Yellow/Purple

Continued on next page

DN22556,000049F -19-13JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR 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

DN22556,000049F -19-13JAN09-3/23

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

DN22556,000049F -19-13JAN09-4/23

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

DN22556,000049F -19-13JAN09-5/23

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

DN22556,000049F -19-13JAN09-6/23

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

DN22556,000049F -19-13JAN09-7/23

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

DN22556,000049F -19-13JAN09-8/23

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

DN22556,000049F -19-13JAN09-9/23

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-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

DN22556,000049F -19-13JAN09-10/23

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:** Reconnect all connectors. GO TO 1 **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,000049F -19-13JAN09-11/23

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-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

DN22556,000049F -19-13JAN09-12/23

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

DN22556,000049F -19-13JAN09-13/23

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).	**YES:** GO TO 13
	Is resistance less than 10 ohms?	**NO:** GO TO 14

DN22556,000049F -19-13JAN09-14/23

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

DN22556,000049F -19-13JAN09-15/23

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.

DN22556,000049F -19-13JAN09-16/23

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.	**YES:** Repair wiring for all measurements less than 100 ohms. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the resistance less than 100 ohms on any terminal?	**NO:** Reconnect all connectors. GO TO 1

Continued on next page

DN22556,000049F -19-13JAN09-17/23

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

DN22556,000049F -19-13JAN09-18/23

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

DN22556,000049F -19-13JAN09-19/23

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

DN22556,000049F -19-13JAN09-20/23

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

DN22556,000049F -19-13JAN09-21/23

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

DN22556,000049F -19-13JAN09-22/23

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.

DN22556,000049F -19-13JAN09-23/23

000029.14 — Secondary Analog Throttle Inhibited

Throttle voltage is above or below the specification.

This code is just an informative code telling you that the secondary analog throttle is either above or below the Out Of Range specification.

To get the engine to change speed you must either set the throttle to the minimum position then increase it or cycle the ignition key to off then back on.

This is a safety feature used to keep the engine from running away when not commanded to after a throttle problem.

DN22556,00004A0 -19-03JUN08-1/1

000084.31 — ECU Calculated Vehicle Speed and CAN Vehicle Speed Mismatch

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000003 -19-06APR09-1/1

000091.03 — Primary Analog Throttle Signal Out of Range High

Throttle voltage is above the high voltage specification.

DN22556,00004A1 -19-13JAN09-1/20

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 its high voltage specification.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For more Primary Analog Throttle information, see ANALOG THROTTLE in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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 connector terminal - Yellow/Purple

Continued on next page

DN22556,00004A1 -19-13JAN09-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000091.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00004A1 -19-13JAN09-3/20

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

DN22556,00004A1 -19-13JAN09-4/20

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

DN22556,00004A1 -19-13JAN09-5/20

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

DN22556,00004A1 -19-13JAN09-6/20

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 Were the resistance measurements within specifications?	**YES:** GO TO 6 **NO:** Replace primary analog throttle potentiometer. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

DN22556,00004A1 -19-13JAN09-7/20

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. Is resistance greater than 10 ohms?	**YES:** Repair open terminal A wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 7

DN22556,00004A1 -19-13JAN09-8/20

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). Is resistance less than 10 ohms?	**YES:** GO TO 8 **NO:** GO TO 10

DN22556,00004A1 -19-13JAN09-9/20

8 Terminal Test	1. Disconnect ECU connector J2.	
	2. Perform TERMINAL TEST on the ECU J2 connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

Continued on next page

DN22556,00004A1 -19-13JAN09-10/20

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.

DN22556,00004A1 -19-13JAN09-11/20

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

DN22556,00004A1 -19-13JAN09-12/20

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.

DN22556,00004A1 -19-13JAN09-13/20

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.

DN22556,00004A1 -19-13JAN09-14/20

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

DN22556,00004A1 -19-13JAN09-15/20

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

DN22556,00004A1 -19-13JAN09-16/20

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

DN22556,00004A1 -19-13JAN09-17/20

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

DN22556,00004A1 -19-13JAN09-18/20

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

DN22556,00004A1 -19-13JAN09-19/20

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.

DN22556,00004A1 -19-13JAN09-20/20

000091.04 — Primary Analog Throttle Signal Out of Range Low

Throttle voltage is below the low voltage specification.

DN22556,00004A2 -19-13JAN09-1/23

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 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.

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 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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 - Yellow/Purple

Continued on next page

DN22556,00004A2 -19-13JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR 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

DN22556,00004A2 -19-13JAN09-3/23

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

DN22556,00004A2 -19-13JAN09-4/23

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

DN22556,00004A2 -19-13JAN09-5/23

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

DN22556,00004A2 -19-13JAN09-6/23

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

DN22556,00004A2 -19-13JAN09-7/23

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

DN22556,00004A2 -19-13JAN09-8/23

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

DN22556,00004A2 -19-13JAN09-9/23

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

DN22556,00004A2 -19-13JAN09-10/23

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:** Reconnect all connectors. GO TO 1 **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00004A2 -19-13JAN09-11/23

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

DN22556,00004A2 -19-13JAN09-12/23

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

DN22556,00004A2 -19-13JAN09-13/23

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

DN22556,00004A2 -19-13JAN09-14/23

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

DN22556,00004A2 -19-13JAN09-15/23

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.

DN22556,00004A2 -19-13JAN09-16/23

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.	**YES:** Repair wiring for all measurements less than 100 ohms. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is the resistance less than 100 ohms on any terminal?	**NO:** Reconnect all connectors. GO TO 1

Continued on next page

DN22556,00004A2 -19-13JAN09-17/23

16 Occurrence Count Check	Review stored information and look at occurrence count for 000091.04.	**YES:** GO TO 17
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 18

DN22556,00004A2 -19-13JAN09-18/23

17 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 18

DN22556,00004A2 -19-13JAN09-19/23

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

DN22556,00004A2 -19-13JAN09-20/23

19 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes.	**YES:** Replace primary analog throttle. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did 000091.04 reappear when engine operating point was reached?	**NO:** GO TO 18

DN22556,00004A2 -19-13JAN09-21/23

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

Continued on next page

DN22556,00004A2 -19-13JAN09-22/23

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.

DN22556,00004A2 -19-13JAN09-23/23

000091.14 — Primary Analog Throttle Inhibited

Throttle voltage is above or below the specification.

This code is just an informative code telling you that the primary analog throttle is either above or below the Out Of Range specification.

To get the engine to change speed you must either set the throttle to them minimum position then increase it or cycle the ignition key to off then back on.

This is a safety feature used to keep the engine from running away when not commanded to after a throttle problem.

DN22556,00004A4 -19-03JUN08-1/1

000094.03 — Low Pressure Fuel Signal Out of Range High

The low pressure fuel pump pressure input voltage exceeds the sensor's high voltage specification.

BB78437,000012D -19-13JAN09-1/22

000094.03 — Low Pressure Fuel Signal Out of Range Low 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 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 PRESSUREin 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 small terminal - Orange/Green

Continued on next page

BB78437,000012D -19-13JAN09-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000094.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

BB78437,000012D -19-13JAN09-3/22

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF 2. Disconnect low pressure fuel sensor connector P03. 3. Ignition ON, Engine OFF 4. Refresh codes. Did 000094.03 go to stored and 000094.04 become active?	**YES:** GO TO 3 **NO:** GO TO 7

BB78437,000012D -19-13JAN09-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the low pressure fuel sensor and harness connector P03. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

BB78437,000012D -19-13JAN09-5/22

4 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P03-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 5 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012D -19-13JAN09-6/22

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P03-2 (+) and P03-1 (-). Is the voltage greater than 5.5V?	**YES:** Discontinue this test and perform tests for DTC 003510.03 as though DTC was active. **NO:** GO TO 6

Continued on next page

BB78437,000012D -19-13JAN09-7/22

6 Check for DTC 000094.03 with Sensor Reconnected	1. Ignition OFF, engine OFF. 2. Reconnect P03. 3. Ignition ON, engine OFF. 4. Refresh DTCs. Is DTC 000094.03 still active?	**YES:** Replace low pressure fuel sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

BB78437,000012D -19-13JAN09-8/22

7 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J03 connector. 3. Perform Terminal Test on J03-H4, J03-H3, and J03-C2. Were Terminal Test results good?	**YES:** GO TO 8 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012D -19-13JAN09-9/22

8 Check Low Pressure Fuel Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J03-H3 and low pressure fuel sensor connector P03-1. 2. On the harness, measure the resistance between ECU J03-H4 and low pressure fuel sensor connector P03-2. 3. On the harness, measure the resistance between ECU J03-C2 and low pressure fuel sensor connector P03-3. Were all resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012D -19-13JAN09-10/22

9 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. Measure the voltage between ECU J03-C2 and single point ground. Is the voltage greater than 0.5V?	**YES:** Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

Continued on next page

BB78437,000012D -19-13JAN09-11/22

10 ECU J03 Disconnected Code Change Test	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 0000094.03.* 1. ECU connector J03 still disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Is DTC 000094.03 still active?	**YES:** GO TO 14 **NO:** GO TO 11

BB78437,000012D -19-13JAN09-12/22

11 Check Signal Circuit for Wire-Wire Short	1. Ignition OFF, engine OFF. 2. Disconnect ECU connectors J01 and J02. 3. Measure the resistance between J03-C2 and all other terminals in ECU harness connectors J01, J02 and J03. Were any measurements less than 100k ohms?	**YES:** Locate wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

BB78437,000012D -19-13JAN09-13/22

12 Check for Intermittent Short to Voltage	1. Reconnect all electrical connectors. 2. Ignition ON, engine OFF. 3. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector. *NOTE: The Low Pressure Fuel Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.* Was the source of the intermittent short to voltage found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 13

BB78437,000012D -19-13JAN09-14/22

13 Check for Active DTC 000094.03	Refresh DTCs Is DTC 000094.03 still active?	**YES:** Recheck measurements. GO TO 2 **NO:** Problem is intermittent. Contact DTAC for support.

BB78437,000012D -19-13JAN09-15/22

14 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Reconnect all connectors. 4. Ignition ON, engine OFF. Is DTC 000094.03 still active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

Continued on next page

BB78437,000012D -19-13JAN09-16/22

15 Check for Intermittent Short to Voltage

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between MAP sensor and ECU J03 connector.

NOTE: The Fuel Low Pressure Fuel Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.

Was the source of the intermittent short to voltage found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 16

BB78437,000012D -19-13JAN09-17/22

16 Check Snapshot Information

1. Review snapshot information stored in step 1.
2. Operate engine under conditions where DTC became active.

Is DTC 000094.03 now active?

YES: GO TO 2

NO: GO TO 17

BB78437,000012D -19-13JAN09-18/22

17 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect low pressure fuel sensor connector P03.
3. Perform Terminal Test on P03.
4. Disconnect ECU J03 connector.
5. Perform Terminal Test on J03-H3, J03-H4, and J03-C2.

Were Terminal Test results good?

YES: GO TO 18

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012D -19-13JAN09-19/22

18 Get More Information

1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.
2. Operate the engine under the conditions specified by the operator.

Is DTC 000094.03 now active?

YES: GO TO 2

NO: GO TO 19

BB78437,000012D -19-13JAN09-20/22

19 Check DTAC Solutions

Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000094.03.

Were any applicable solutions found?

YES: Perform steps identified in DTAC solution.

NO: GO TO 20

BB78437,000012D -19-13JAN09-21/22

20 Software Updates

Check Custom Performance for possible ECU software updates.

Is a later version of ECU software available?

YES: Reprogram ECU with latest version of software.

NO: Contact DTAC for support.

BB78437,000012D -19-13JAN09-22/22

000094.04 — Low Pressure Fuel Signal Out of Range Low

The Low Pressure Fuel Input Voltage drops below the sensor's low voltage specification.

BB78437,000012E -19-13JAN09-1/23

000094.04 — Low Pressure Fuel Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
000094.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Low Pressure Fuel Input Voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for the low pressure fuel signal.

Alarm Level:
Warning

Control Unit Response:
ECU's will operate normally.

Additional References:
For sensor location see COMPONENT LOCATION in Section 3 Group 140.

For more 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Low Fuel Pressure Sensor P03 - Purple/Gray

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BB78437,000012E -19-13JAN09-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 000094.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

BB78437,000012E -19-13JAN09-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect low pressure fuel sensor connector P03. 3. Perform a TERMINAL TEST on connector P03. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

BB78437,000012E -19-13JAN09-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P03-1 and single point ground. Is the resistance less than 5 ohms?	**YES:** GO TO 4 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012E -19-13JAN09-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between low pressure fuel sensor signal P03-3 and return P03-1. Is resistance less than 10k ohms?	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

BB78437,000012E -19-13JAN09-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between P03-2 (+) and P03-1 (-). Is the voltage between 4.5V and 5.5V?	**YES:** GO TO 6 **NO:** Voltage is less than 4.5V, GO TO 10 **NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

Continued on next page

BB78437,000012E -19-13JAN09-7/23

6 Check for DTC 000094.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF. 2. On the harness, install flex probes on low pressure fuel sensor connector terminals P03-2 and P03-3. 3. Connect jumper wire between flex probes. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.03 now an active DTC?	**YES:** GO TO 7 **NO:** GO TO 11

BB78437,000012E -19-13JAN09-8/23

7 Reconnect Sensor and Check for DTC 000094.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P03. 3. Reconnect low pressure fuel sensor connector P03. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.04 an active DTC?	**YES:** Replace low pressure fuel sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

BB78437,000012E -19-13JAN09-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between low pressure fuel sensor and ECU J03 connector. *NOTE: The low pressure fuel input voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

BB78437,000012E -19-13JAN09-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in low pressure fuel sensor connector P03. 3. Replace low pressure fuel sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 000094.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

Continued on next page

BB78437,000012E -19-13JAN09-11/23

10 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 11

BB78437,000012E -19-13JAN09-12/23

11 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J03. 3. Perform a TERMINAL TEST on terminals J03-H4, J03-H3, and J03-C2. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

BB78437,000012E -19-13JAN09-13/23

12 Check Circuit Continuity	On the harness, measure the resistance between the following ECU J01 connector terminals and low pressure fuel sensor P03 connector terminals: • J03-H3 to P03-1 • J03-H4 to P03-2 • J03-C2 to P03-3 Were all resistance measurements less than 10 ohms?	 **YES:** GO TO 13 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,000012E -19-13JAN09-14/23

13 Check for Signal Shorted to Ground	On the harness, measure the resistance between ECU J03-C2 and single point ground. Is the resistance less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 14

BB78437,000012E -19-13JAN09-15/23

14 Check for Wire-Wire Short	1. Disconnect ECU connectors J01 and J02. 2. Verify low pressure fuel sensor connector P03 is still disconnected. 3. On the harness, measure the resistance between J03-C2 and all other terminals in ECU connectors J01, J02, and J03. Were all resistance measurements greater than 100k ohms?	 **YES:** GO TO 15 **NO:** Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

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BB78437,000012E -19-13JAN09-16/23

15 Reconnect and Check for DTC 000094.04	1. Reconnect all electrical connectors. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is DTC 000094.04 still active?	**YES:** Recheck procedure. GO TO 2 **NO:** Problem is intermittent. Contact DTAC for support.

BB78437,000012E -19-13JAN09-17/23

16 Check for Intermittent Wiring Problem	1. Ignition ON, engine OFF. 2. Monitor Low Pressure Fuel Input Voltage data point in Service ADVISOR while gently wiggle wire harness between low pressure fuel sensor and ECU J03 connector. *NOTE: The low pressure fuel input voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 17

BB78437,000012E -19-13JAN09-18/23

17 Check Snapshot Information	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 000094.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

BB78437,000012E -19-13JAN09-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect low pressure fuel sensor connector P03. 3. Perform TERMINAL TEST on P03. 4. Disconnect ECU J03 connector. 5. Perform TERMINAL TEST on terminals J03-C2, J03-H3, and J03-H4. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

BB78437,000012E -19-13JAN09-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 000094.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

Continued on next page

BB78437,000012E -19-13JAN09-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 000094.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

BB78437,000012E -19-13JAN09-22/23

21 Software Updates	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,000012E -19-13JAN09-23/23

000094.17 — Low Pressure Fuel Signal Slightly Low

The ECU detects a low pressure fuel - actual pressure below specification.

DN22556,0000623 -19-13JAN09-1/18

000094.17 — Low Pressure Fuel Signal Slightly Low Diagnostic Procedure

Troubleshooting Sequence:
000094.17

Related Information:
The ECU detects the low pressure system pressure is slightly low.

Alarm Level:
Warning

Control Unit Response:
The ECU will try to maintain the engine operating envelope.

Additional References:
For more fuel transfer pump pressure sensor information, see FUEL TRANSFER PUMP PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.
For more information on pressure sensors, see MEASURING PRESSURE in Section 3 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Low Pressure Fuel Sensor P03 - Purple/Red

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DN22556,0000623 -19-13JAN09-2/18

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 000094.17 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

DN22556,0000623 -19-13JAN09-3/18

2 Fuel Level Check	1. Ignition OFF, Engine OFF. 2. Check for fuel in the tank, gage could be bad. Does the tank have fuel in it?	**YES:** GO TO 3 **NO:** Put quality fuel in tank. GO TO 1

DN22556,0000623 -19-13JAN09-4/18

3 Filter Replacement	1. Replace fuel filters. *NOTE: Ensure the o-ring on the primary filter comes off with the old one and put a new o-ring on the new filter.* 2. Ignition ON, Engine ON. 3. Refresh codes Is 000094.17 active?	**YES:** GO TO 4 **NO:** Replace low pressure fuel sensor. GO TO 1

DN22556,0000623 -19-13JAN09-5/18

4 Fuel System Check	Check fuel system, see F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 4 Group 150 earlier in this manual. Did check pass?	**YES:** GO TO 5 **NO:** See F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 4 Group 150 earlier in this manual.

DN22556,0000623 -19-13JAN09-6/18

5 DTC Code Check	1. Ignition ON, Engine ON. 2. Refresh Codes. Is 000094.17 active?	**YES:** GO TO 6 **NO:** Problem fixed.

DN22556,0000623 -19-13JAN09-7/18

6 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the low pressure fuel sensor harness connector. Were any problems found?	**YES:** Repair problem. GO TO 1. **NO:** GO TO 7

Continued on next page

DN22556,0000623 -19-13JAN09-8/18

7 **Mechanical Pressure Check**	1. Install a mechanical gage, using a “T”, in line with the output of the low pressure fuel pump.	
	2. Crank or run engine.	**YES:** Pressure checks good. GO TO 1
	Is the fuel pressure greater than 30 kPa (4.35psi)	**NO:** GO TO 8

DN22556,0000623 -19-13JAN09-9/18

8 **Mechanical Pump Check**	1. Replace fuel transfer pump, see REMOVE FUEL TRANSFER PUMP in Section 2 Group 90 earlier in this manual.	
	2. Crank or run engine.	**YES:** Pressure checks good. GO TO 1
	Is the fuel pressure greater than 30 kPa (4.35psi)?	**NO:** GO TO 9

DN22556,0000623 -19-13JAN09-10/18

9 **Occurrence Count Check**	Review stored information and look at occurrence count for 0000094.17.	**YES:** GO TO 10
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 11

DN22556,0000623 -19-13JAN09-11/18

10 **Terminal Test**	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the low pressure fuel sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 11

DN22556,0000623 -19-13JAN09-12/18

11 **Time Between Occurrences Check**	Compare last occurrence engine hours against current engine hours.	**YES:** Return application to service.
	Is difference greater than 50 hours?	**YES:** GO TO 12

DN22556,0000623 -19-13JAN09-13/18

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

Continued on next page

DN22556,0000623 -19-13JAN09-14/18

13 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 2
	Did 000094.17 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,0000623 -19-13JAN09-15/18

14 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect low pressure fuel pressure sensor connector and ECU connector J1 (black face).	
	3. Perform TERMINAL TEST on the low pressure fuel pressure sensor harness connector and ECU J1 connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 15

DN22556,0000623 -19-13JAN09-16/18

15 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, Engine ON.	
	3. Refresh codes.	**YES:** GO TO 16.
	Is 000094.17 active?	**NO:** Problem fixed.

DN22556,0000623 -19-13JAN09-17/18

16 Software Updates	1. Download latest ECU software using Service ADVISOR.	
	2. Reprogram ECU.	
	3. Ignition ON, Engine ON.	
	4. Refresh codes.	**YES:** Replace ECU. GO TO 1
	Is 000094.17 active?	**NO:** Problem fixed, bad ECU program.

DN22556,0000623 -19-13JAN09-18/18

000097.03 — Water In Fuel Signal Out of Range High

The Water In Fuel input voltage exceeds the sensor's high voltage specification.

DN22556,00004A7 -19-14JAN09-1/19

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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

DN22556,00004A7 -19-14JAN09-2/19

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 000097.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00004A7 -19-14JAN09-3/19

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.

DN22556,00004A7 -19-14JAN09-4/19

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

DN22556,00004A7 -19-14JAN09-5/19

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.

DN22556,00004A7 -19-14JAN09-6/19

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

DN22556,00004A7 -19-14JAN09-7/19

6 Terminal Test	1. Disconnect ECU connectors J1 and J2.	
	2. Perform TERMINAL TEST on ECU connectors J1 and J2.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 7

DN22556,00004A7 -19-14JAN09-8/19

7 Terminal to Terminal Resistance Check	On the harness, measure the resistance between the ECU connector signal (terminal J1-B2) and all other ECU harness connector terminals.	**YES:** Look for pinched or melted harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR
	Were any resistance less than 100 ohms?	**NO:** Reconnect all connectors. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00004A7 -19-14JAN09-9/19

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.	**YES:** GO TO 9
	Was the resistance less than 5 ohms?	**NO:** GO TO 10.

DN22556,00004A7 -19-14JAN09-10/19

9 Harness Return Wire Resistance Check	On the harness, measure the resistance between the WIF sensor harness connector return (terminal B) and ECU J1 connector return (terminal J1-D2).	**YES:** GO TO 10
	Was the resistance less than 5 ohms?	**NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00004A7 -19-14JAN09-11/19

10 Harness Signal Wire Resistance Check	On the harness, measure the resistance between the WIF sensor harness connector signal (terminal A) and ECU connector J1 signal (terminal J1-B2).	**YES:** GO TO 11
	Was the resistance less than 5 ohms?	**NO:** Repair open wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

DN22556,00004A7 -19-14JAN09-12/19

11 ECU Resistance Check	On the ECU, measure the resistance between return (terminal J1-D2) and signal (terminal J1-B2).	**YES:** Reconnect all connectors and GO TO 2.
	Was the resistance between 6M and 7M ohms?	**NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00004A7 -19-14JAN09-13/19

12 Occurrence Count Check	Review stored information and look at occurrence count for 000097.03.	**YES:** GO TO 13
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 14

DN22556,00004A7 -19-14JAN09-14/19

13 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect WIF sensor connector.	
	3. Perform TERMINAL TEST on the WIF sensor harness connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 14

DN22556,00004A7 -19-14JAN09-15/19

14 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 15 **NO:** GO TO 16

DN22556,00004A7 -19-14JAN09-16/19

15 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace WIF sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Did 000097.03 reappear when engine operating point was reached?	**NO:** GO TO 14

DN22556,00004A7 -19-14JAN09-17/19

16 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect WIF sensor connector and ECU connector J1.	
	3. Perform TERMINAL TEST on the WIF sensor harness connector and ECU connector J1.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 17

Continued on next page

DN22556,00004A7 -19-14JAN09-18/19

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.

DN22556,00004A7 -19-14JAN09-19/19

000097.04 — Water In Fuel Signal Out of Range Low

The Water In Fuel Input Voltage drops below the sensor's low voltage specification.

DN22556,00004A8 -19-14JAN09-1/19

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 Input Voltage drops below the minimum threshold. The voltage is lower than what is physically possible for the Water In Fuel sensor to achieve.

Alarm Level:
Warning

Control Unit Response:
The ECU's will continue to work normally.

Additional References:
For further Water In Fuel sensor information, see WATER IN FUEL (WIF) SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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

DN22556,00004A8 -19-14JAN09-2/19

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

DN22556,00004A8 -19-14JAN09-3/19

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 5

DN22556,00004A8 -19-14JAN09-4/19

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

DN22556,00004A8 -19-14JAN09-5/19

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.

DN22556,00004A8 -19-14JAN09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF 2. 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 6

Continued on next page

DN22556,00004A8 -19-14JAN09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the WIF sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** Reconnect all connectors and GO TO 2.

DN22556,00004A8 -19-14JAN09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1. 2. Measure the resistance between the return (terminal B) and signal (terminal A) in the Water In Fuel sensor harness connector. Was the resistance less than 100 ohms?	 **YES:** GO TO 8 **NO:** GO TO 9.

DN22556,00004A8 -19-14JAN09-9/19

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.

DN22556,00004A8 -19-14JAN09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-B2) 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.

DN22556,00004A8 -19-14JAN09-11/19

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

DN22556,00004A8 -19-14JAN09-12/19

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

Continued on next page

DN22556,00004A8 -19-14JAN09-13/19

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

DN22556,00004A8 -19-14JAN09-14/19

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 000097.04 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,00004A8 -19-14JAN09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the Water In Fuel sensor and surrounding areas.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00004A8 -19-14JAN09-16/19

15 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 16

DN22556,00004A8 -19-14JAN09-17/19

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.

Continued on next page

DN22556,00004A8 -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,00004A8 -19-14JAN09-19/19

000097.16 — Water In Fuel Detected

The ECU detects water in the fuel.

DN22556,00004A9 -19-14JAN09-1/13

000097.16 — Water In Fuel Detected Diagnostic Procedure

Troubleshooting Sequence:
000097.16

Related Information:
The ECU detects water in fuel.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 50 percent.

Additional References:
For more water in fuel sensor information, see WATER IN FUEL (WIF) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Coolant temperature sensor T04 - Purple/Gray

Continued on next page

DN22556,00004A9 -19-14JAN09-2/13

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 000097.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 6

DN22556,00004A9 -19-14JAN09-3/13

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the water in fuel sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 3

DN22556,00004A9 -19-14JAN09-4/13

3 WIF Sensor Check	1. Drain all fuel and water from the water separator bowl on the bottom of the final fuel filter into a suitable container for fuel. 2. Wipe off the end of the WIF sensor with a clean dry rag. 3. On the WIF sensor, measure resistance between signal (terminal A) and return (terminal B). Is the resistance between 200k and 240k ohms?	**YES:** GO TO 4 **NO:** Replace WIF sensor. GO TO 1

DN22556,00004A9 -19-14JAN09-5/13

4 Check for Engine Related Causes	Check the following items that can cause the water in fuel sensor to trip: • Water and debris in the filter water separator bowl. • Dirty tip of sensor, clean with clean dry cloth. • Water in fuel tank. • Loose fuel tank cap. • Missing or damaged fuel tank cap seal. • Water in fuel source. • If application was washed with a high pressure washer be sure to let connector sit and dry off. Was cause of water in fuel determined?	**YES:** Repair problem. GO TO 1. **NO:** GO TO 5

DN22556,00004A9 -19-14JAN09-6/13

5 Fuel Quality Check	Preform fuel quality check, see CHECK FUEL SUPPLY QUALITY in Section 4 Group 150. Did the fuel pass the quality check?	**YES:** GO TO 8 **NO:** See CHECK FUEL SUPPLY QUALITY in Section 4 Group 150.

Continued on next page

DN22556,00004A9 -19-14JAN09-7/13

6 Occurrence Count Check	Review stored information and look at occurrence count for 0000097.16.	**YES:** GO TO 7
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 8

DN22556,00004A9 -19-14JAN09-8/13

7 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the coolant sensor harness connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 8

DN22556,00004A9 -19-14JAN09-9/13

8 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

DN22556,00004A9 -19-14JAN09-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace WIF sensor. GO TO 1
	Did 000097.16 reappear when engine operating point was reached?	**NO:** GO TO 8

DN22556,00004A9 -19-14JAN09-11/13

10 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Disconnect coolant temperature sensor connector and ECU connector J1.	
	3. Perform TERMINAL TEST on the coolant 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 11

Continued on next page

DN22556,00004A9 -19-14JAN09-12/13

11 Software Updates	1. Download latest ECU software payload, reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000097.16 active?	**YES:** Replace WIF sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, return to service.

DN22556,00004A9 -19-14JAN09-13/13

000100.01 — Engine Oil Pressure Signal Extremely Low

The ECU senses the Engine Oil Pressure to be extremely low.

DN22556,00004AA -19-14JAN09-1/11

000100.01 — Engine Oil Pressure Signal Extremely Low Diagnostic Procedure

Trouble Shooting Sequence:
000100.01

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Oil pressure sensor P04 - Purple/Red

Continued on next page

DN22556,00004AA -19-14JAN09-2/11

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. Ignition ON, Engine ON. 5. Refresh Codes. Did 000100.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 9

DN22556,00004AA -19-14JAN09-3/11

2 Measure Engine Oil Pressure With External Gauge	1. Ignition OFF, Engine OFF. 2. Attach a pressure gauge to an available gallery hole on the engine. See CHECK ENGINE OIL PRESSURE in base engine manual, Section 04, Group 150. 3. Ignition ON, Engine ON. 4. Record pressure reading from pressure gauge. 5. Monitor the Engine Oil Pressure using Service ADVISOR. *NOTE: Pressure readings can be indicated in Atmosphere or Absolute. To convert from Atmosphere to Absolute, add 14 PSI (100kPa)* Is the pressure gauge value approximately the same as the Service ADVISOR value?	**YES:** Engine oil pressure sensor is OK. Diagnose problem why engine has low oil pressure. Refer to 4.5L/6.8L - L2 - ENGINE OIL PRESSURE LOW in the base engine manual base engine manual, Section 04, Group 150 for further assistance. **NO:** GO TO 3

DN22556,00004AA -19-14JAN09-4/11

3 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 8 **NO:** GO TO 4

DN22556,00004AA -19-14JAN09-5/11

4 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. Were any defects found?	**YES:** Replace defective part. GO TO 8 **NO:** GO TO 5

Continued on next page

DN22556,00004AA -19-14JAN09-6/11

5 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 6
	Is the voltage between 0.3 and 0.7 volts?	**NO:** Replace engine oil pressure sensor. GO TO 8

DN22556,00004AA -19-14JAN09-7/11

6 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. Monitor the DTC codes from within Service ADVISOR.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J1. Diagnose and fix harness problem. GO TO 8
	Did 000100.04 become active?	**NO:** Problem with ECU. GO TO 7

DN22556,00004AA -19-14JAN09-8/11

7 Check ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Ignition ON, Engine ON.	**YES:** Replace ECU. GO TO 8
	Is 000100.01 still active?	**NO:** Verify problem is fixed. GO TO 8

Continued on next page

DN22556,00004AA -19-14JAN09-9/11

8 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** Problem not found. Recheck wiring, connectors, and engine operation. GO TO 1
	Did DTC 000100.01 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00004AA -19-14JAN09-10/11

9 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.

DN22556,00004AA -19-14JAN09-11/11

000100.04 — Engine Oil Pressure Signal Out of Range Low

The Engine Oil Pressure input voltage drops below the sensors low voltage specification.

DN22556,00004AC -19-14JAN09-1/21

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:
ECU's will operate normally.

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Oil pressure sensor P04 - Purple/Red

Continued on next page

DN22556,00004AC -19-14JAN09-2/21

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 000100.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

DN22556,00004AC -19-14JAN09-3/21

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform a TERMINAL TEST on the engine oil pressure sensor harness connector. 3. Inspect harness for melted or pinched areas near the engine oil pressure sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,00004AC -19-14JAN09-4/21

3 Sensor Short to Ground Test	Measure the resistance from signal (terminal C) to chassis ground on the engine oil pressure sensor. Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,00004AC -19-14JAN09-5/21

4 Sensor Internal Short Test	Measure the resistance between return (terminal A) and signal (terminal C) on the engine oil pressure sensor. Was the resistance value less than 100 ohms?	**YES:** Replace sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 5

DN22556,00004AC -19-14JAN09-6/21

5 Harness Resistance Check	Measure the resistance between the return (terminal A) and signal (terminal C) in the engine oil pressure sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 6 **NO:** GO TO 9

DN22556,00004AC -19-14JAN09-7/21

6 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1. 2. Perform TERMINAL TEST on the ECU J1 harness connector. 3. Measure the resistance between the return (terminal A) and signal (terminal C) in the engine oil pressure sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** GO TO 8.

Continued on next page

DN22556,00004AC -19-14JAN09-8/21

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:** Reconnect ECU connector. GO TO 2.

DN22556,00004AC -19-14JAN09-9/21

8 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-A3) on the ECU. 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.

DN22556,00004AC -19-14JAN09-10/21

9 Harness Resistance Check	Measure the resistance between the return (terminal A) and power (terminal B) in the engine oil pressure sensor harness connector. Was the resistance between 50k and 150k ohms?	**YES:** Reconnect all connectors and GO TO 2. **NO:** GO TO 10

DN22556,00004AC -19-14JAN09-11/21

10 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1. 2. Perform TERMINAL TEST on the ECU J1 harness connector. 3. Measure the resistance between the power (terminal B) in the engine oil pressure sensor harness connector and power (terminal J1-F3). 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.

DN22556,00004AC -19-14JAN09-12/21

11 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-F3) on the ECU. Was the resistance between 50k and 150k ohms?	**YES:** Reconnect ECU connector and GO TO 2. **NO:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Continued on next page

DN22556,00004AC -19-14JAN09-13/21

12 Occurrence Count Check	Review stored information and look at occurrence count for 000100.04.	**YES:** GO TO 13
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 14

DN22556,00004AC -19-14JAN09-14/21

13 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 14

DN22556,00004AC -19-14JAN09-15/21

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

DN22556,00004AC -19-14JAN09-16/21

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 000100.04 reappear when engine operating point was reached?	**NO:** GO TO 14

DN22556,00004AC -19-14JAN09-17/21

16 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the engine oil pressure sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 17

DN22556,00004AC -19-14JAN09-18/21

17 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine oil pressure 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 18

Continued on next page

DN22556,00004AC -19-14JAN09-19/21

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. Is 000100.04 active?	**YES:** GO TO 19. **NO:** GO TO 17.

DN22556,00004AC -19-14JAN09-20/21

19 Software Updates	1. Check custom performance for possible software updates. If new software is available, reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000100.04 active?	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Problem fixed, bad ECU program.

DN22556,00004AC -19-14JAN09-21/21

000100.18 — Engine Oil Pressure Signal Moderately Low

The ECU senses the Engine Oil Pressure to be moderately low.

DM59778,0000004 -19-14JAN09-1/11

000100.18 — Engine Oil Pressure Signal Moderately Low Diagnostic Procedure

Trouble Shooting Sequence:
000100.18

Related Information:
The ECU senses a lower than expected engine oil pressure.
The engine must be running for the code to be set.
The warning value set point is dependent on engine speed.
001569.31 is also set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional references:
For further oil pressure sensor information, see OIL PRESSURE SENSOR in Section 03, Group 140, earlier in this manual.
For further pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Oil pressure sensor P04 - Purple/Red

Continued on next page

DM59778,0000004 -19-14JAN09-2/11

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. Ignition ON, Engine ON. 5. Refresh Codes. Did 000100.18 reappear active?	**YES:** GO TO 2 **NO:** GO TO 9

DM59778,0000004 -19-14JAN09-3/11

2 Measure Engine Oil Pressure With External Gauge	1. Ignition OFF, Engine OFF. 2. Attach a pressure gauge to an available gallery hole on the engine. See CHECK ENGINE OIL PRESSURE in base engine manual, Section 04, Group 150. 3. Ignition ON, Engine ON. 4. Record pressure reading from pressure gauge. 5. Monitor the Engine Oil Pressure using Service ADVISOR. *NOTE: Pressure readings can be indicated in Atmosphere or Absolute. To convert from Atmosphere to Absolute, add 14 PSI (100kPa)* Is the pressure gauge value approximately the same as the Service ADVISOR value?	**YES:** Engine oil pressure sensor is OK. Diagnose problem why engine has low oil pressure. Refer to 4.5L/6.8L - L2 - ENGINE OIL PRESSURE LOW in the base engine manual base engine manual, Section 04, Group 150 for further assistance. **NO:** GO TO 3

DM59778,0000004 -19-14JAN09-4/11

3 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 8 **NO:** GO TO 4

DM59778,0000004 -19-14JAN09-5/11

4 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. Were any defects found?	**YES:** Replace defective part. GO TO 8 **NO:** GO TO 5

Continued on next page

DM59778,0000004 -19-14JAN09-6/11

5 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 6
	Is the voltage between 0.3 and 0.7 volts?	**NO:** Replace engine oil pressure sensor. GO TO 8

DM59778,0000004 -19-14JAN09-7/11

6 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. Monitor the DTC codes from within Service ADVISOR.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J1. Diagnose and fix harness problem. GO TO 8
	Did 000100.04 become active?	**NO:** Problem with ECU. GO TO 7

DM59778,0000004 -19-14JAN09-8/11

7 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Ignition ON, Engine ON.	**YES:** Replace ECU. GO TO 8
	Is 000100.18 still active?	**NO:** Verify problem is fixed. GO TO 8

Continued on next page

DM59778,0000004 -19-14JAN09-9/11

8 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** Problem not found. Recheck wiring, connectors, and engine operation. GO TO 1
	Did DTC 000100.18 reappear as active with engine running?	**NO:** Problem fixed.

DM59778,0000004 -19-14JAN09-10/11

9 Review Stored Code and 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.

DM59778,0000004 -19-14JAN09-11/11

000100.31 — Engine Oil Pressure Detected with Engine Stopped

The ECU senses an engine oil pressure when engine speed is zero.

DM59778,0000005 -19-14JAN09-1/10

000100.31 — Engine Oil Pressure Detected with Engine Stopped Diagnostic Procedure

Trouble Shooting Sequence:
000100.04
000100.31

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
• Oil pressure sensor P04 - Purple/Red

Continued on next page

DM59778,0000005 -19-14JAN09-2/10

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

DM59778,0000005 -19-14JAN09-3/10

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

DM59778,0000005 -19-14JAN09-4/10

3 Check Oil Pressure Sensor Ground Wire	1. Ignition OFF, Engine OFF. 2. Measure the resistance from sensor harness connector terminal A 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 J1. Look for loose wire crimps or terminal connections within mating connectors. GO TO 7

DM59778,0000005 -19-14JAN09-5/10

4 Check Oil Pressure Sensor Signal Wire	1. Ignition ON, Engine OFF. 2. In harness, measure voltage between signal (terminal C) and ground (terminal A) 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

DM59778,0000005 -19-14JAN09-6/10

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

DM59778,0000005 -19-14JAN09-7/10

6 Check ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR 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

DM59778,0000005 -19-14JAN09-8/10

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 with engine running?	**NO:** Problem fixed.

Continued on next page

DM59778,0000005 -19-14JAN09-9/10

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.

DM59778,0000005 -19-14JAN09-10/10

000105.00 — Manifold Air Temperature Signal Extremely High

The ECU senses the Manifold Air Temperature to be extremely high.

Continued on next page

DN22556,0000540 -19-14JAN09-1/13

000105.00 — Manifold Air Temperature Signal Extremely High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00
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 manifold air temperature at or above 91° C (196° F) on OEM engines.
The engine has to be running for the code to be set.
001569.31 is set when this code is active and engine has not shut down.
001110.31 is set if the shutdown feature is enabled. The engine has to be running for 3 minutes before the code is set.
001109.31 is set 30 seconds before the ECU shuts down the engine.

Alarm Level:
STOP

Control Unit Response:
Maximum engine power is derated up to 60 percent.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
• Intake manifold air temperature sensor T02 - 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 000105.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,0000540 -19-14JAN09-3/13

2 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 AND INSTALL AIR INTAKE PIPE in base engine manual, Section 02, Group 080. • Restricted, dirty, or damaged charge air cooler. Refer to VEHICLE MAINTENANCE MANUAL for more information. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Damaged cooling fan shroud. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,0000540 -19-14JAN09-4/13

3 Terminal Test	*NOTE: From here on through the manual, the manifold air temperature will be referred to as MAT* 1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

DN22556,0000540 -19-14JAN09-5/13

4 Check Intake Manifold Air Temperature Sensor	1. Remove MAT sensor. See REMOVE AND INSTALL MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

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5 Check Intake Manifold Air Temperature Sensor Operation	1. With MAT sensor removed from engine, reconnect MAT sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor 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:** MAT sensor is OK. Diagnose engine air intake cooling system. GO TO 8 **NO:** MAT sensor has already been replaced. GO TO 6 **NO:** Replace MAT sensor. GO TO 10

DN22556,0000540 -19-14JAN09-7/13

6 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 MAT sensor connector. 3. Ignition ON, Engine OFF. 4. Monitor DTCs from within Service ADVISOR. Did 105.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Recheck air intake system. GO TO 1 **NO:** GO TO 7

DN22556,0000540 -19-14JAN09-8/13

7 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 J1. 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 J1. Diagnose and fix harness problem. GO TO 10 **NO:** Replace ECU. GO TO 10

DN22556,0000540 -19-14JAN09-9/13

8 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See TEST FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER INSPECTION in base engine manual, Section 02, Group 080. Was cause of high manifold air temperature determined?	**YES:** Repair problem. GO TO 10. **NO:** GO TO 9

Continued on next page

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9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Verify air intake system and related parameters are functioning properly. GO TO 1
	Is 000105.00 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,0000540 -19-14JAN09-11/13

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 air intake system. GO TO 1
	Did DTC 000105.00 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,0000540 -19-14JAN09-12/13

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.

DN22556,0000540 -19-14JAN09-13/13

000105.03 — Manifold Air Temperature Signal Out of Range High

The Manifold Air Temperature Input Voltage exceeds the sensor's high voltage specification.

DN22556,0000541 -19-14JAN09-1/19

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 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 manifold air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default manifold air temperature of 60° C (140° F).

Additional References:
For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Intake manifold air temperature sensor T02 - Purple/Gray

Continued on next page

DN22556,0000541 -19-14JAN09-2/19

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 000105.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,0000541 -19-14JAN09-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on manifold air temperature sensor harness connector. 3. Inspect harness for melted or pinched areas near the manifold air temperature sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,0000541 -19-14JAN09-4/19

3 Sensor Open Test	Measure the resistance between terminal A and terminal B on the 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

DN22556,0000541 -19-14JAN09-5/19

4 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the manifold air temperature sensor harness connector. Was the resistance between 1k and 3k ohms?	**YES:** GO TO 5 **NO:** GO TO 6.

DN22556,0000541 -19-14JAN09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J1-C2) 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

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6 **Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal B) in the 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.

DN22556,0000541 -19-14JAN09-8/19

7 **Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J1-C2) in the ECU connector and the signal (terminal A) in the 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

DN22556,0000541 -19-14JAN09-9/19

8 **Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J1-D2) in the ECU connector and the return (terminal B) in the 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

DN22556,0000541 -19-14JAN09-10/19

9 **ECU Resistance Check**	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-C2) 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.

DN22556,0000541 -19-14JAN09-11/19

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

DN22556,0000541 -19-14JAN09-12/19

11 **Terminal Test**	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the 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

DN22556,0000541 -19-14JAN09-13/19

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

DN22556,0000541 -19-14JAN09-14/19

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

DN22556,0000541 -19-14JAN09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the 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

DN22556,0000541 -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the manifold air temperature 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 16

DN22556,0000541 -19-14JAN09-17/19

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

DN22556,0000541 -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,0000541 -19-14JAN09-19/19

000105.04 — Manifold Air Temperature Signal Out of Range Low

The Manifold Air Temperature Input Voltage drops below the sensor's low voltage specification.

DN22556,0000542 -19-14JAN09-1/19

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 Manifold Air Temperature Input Voltage drops below the sensor's low voltage specification. This corresponds to a temperature that is higher than what is physically possible for manifold air temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default manifold air temperature of 60° C (140° F).

Additional References:
For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Intake manifold air temperature sensor T02 - Purple/Gray

Continued on next page

DN22556,0000542 -19-14JAN09-2/19

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 000105.04 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,0000542 -19-14JAN09-3/19

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

DN22556,0000542 -19-14JAN09-4/19

3 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on manifold air temperature sensor harness connector.
3. Inspect harness for melted or pinched areas near the manifold air temperature sensor.

Were any problems found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 4

DN22556,0000542 -19-14JAN09-5/19

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.

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5 Terminal Test

1. Ignition OFF, Engine OFF
2. Perform TERMINAL TEST on the manifold air 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

DN22556,0000542 -19-14JAN09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the manifold air temperature sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** Reconnect all connectors and GO TO 2.

DN22556,0000542 -19-14JAN09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1. 2. Measure the resistance between the return (terminal B) and signal (terminal A) in the manifold air temperature sensor harness connector. Was the resistance less than 100 ohms?	 **YES:** GO TO 8 **NO:** GO TO 9.

DN22556,0000542 -19-14JAN09-9/19

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.

DN22556,0000542 -19-14JAN09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-C2) 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.

DN22556,0000542 -19-14JAN09-11/19

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

DN22556,0000542 -19-14JAN09-12/19

11 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the 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

DN22556,0000542 -19-14JAN09-13/19

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

DN22556,0000542 -19-14JAN09-14/19

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 000105.04 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,0000542 -19-14JAN09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the 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

DN22556,0000542 -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the manifold air temperature 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 16

DN22556,0000542 -19-14JAN09-17/19

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.

Continued on next page

DN22556,0000542 -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,0000542 -19-14JAN09-19/19

000105.15 — Manifold Air Temperature Signal Slightly High

The ECU senses the Manifold Air Temperature to be above specification.

DN22556,0000543 -19-14JAN09-1/13

000105.15 — Manifold Air Temperature Signal Slightly High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00
000105.15

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses an manifold air temperature of 88° C (190° F) on OEM engines.
The engine has to be running for the code to be set.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to run normally.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Intake manifold air temperature sensor T02 - Purple/Gray

Continued on next page

DN22556,0000543 -19-14JAN09-2/13

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 000105.15 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,0000543 -19-14JAN09-3/13

2 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 AND INSTALL AIR INTAKE PIPE in base engine manual, Section 02, Group 080. • Restricted, dirty, or damaged charge air cooler. Refer to VEHICLE MAINTENANCE MANUAL for more information. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Damaged cooling fan shroud. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,0000543 -19-14JAN09-4/13

3 Terminal Test	*NOTE: From here on through the manual, the manifold air temperature will be referred to as MAT* 1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

DN22556,0000543 -19-14JAN09-5/13

4 Check Manifold Air Temperature Sensor	1. Remove MAT sensor. See REMOVE AND INSTALL MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

DN22556,0000543 -19-14JAN09-6/13

5 Check Manifold Air Temperature Sensor Operation	1. With MAT sensor removed from engine, reconnect MAT sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor 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:** MAT sensor is OK. Diagnose engine air intake cooling system. GO TO 8 **NO:** MAT sensor has already been replaced. GO TO 6 **NO:** Replace MAT sensor. GO TO 10

DN22556,0000543 -19-14JAN09-7/13

6 Check Signal Wire In Harness	1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Ignition ON, Engine OFF. 4. Monitor DTCs from within Service ADVISOR. Did 105.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Recheck air intake system. GO TO 1 **NO:** GO TO 7

DN22556,0000543 -19-14JAN09-8/13

7 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 J1. 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 J1. Diagnose and fix harness problem. GO TO 10 **NO:** Replace ECU. GO TO 10

DN22556,0000543 -19-14JAN09-9/13

8 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See TEST FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER INSPECTION in base engine manual, Section 02, Group 080. Was cause of high manifold air temperature determined?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 9

Continued on next page

DN22556,0000543 -19-14JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Verify air intake system and related parameters are functioning properly. GO TO 1
	Is 000105.15 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,0000543 -19-14JAN09-11/13

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 air intake system. GO TO 1
	Did DTC 000105.15 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,0000543 -19-14JAN09-12/13

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.

DN22556,0000543 -19-14JAN09-13/13

000105.16 — Manifold Air Temperature Signal Moderately High

The ECU senses the Manifold Air Temperature to be moderately high.

DN22556,00004BC -19-14JAN09-1/13

000105.16 — Manifold Air Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
000110.00
000105.16

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:
The ECU senses a Manifold Air Temperature of 89.5° C (193° F) on OEM engines.
The engine has to be running for the code to be set.
001569.31 is set when this code is active.

Alarm Level:
Warning

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further manifold air temperature sensor information, see INTAKE MANIFOLD AIR TEMPERATURE (MAT) 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
• Manifold air temperature sensor T02 - Purple/Gray

Continued on next page

DN22556,00004BC -19-14JAN09-2/13

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 000105.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,00004BC -19-14JAN09-3/13

2 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 AND INSTALL AIR INTAKE PIPE in base engine manual, Section 02, Group 080. • Restricted, dirty, or damaged charge air cooler. Refer to VEHICLE MAINTENANCE MANUAL for more information. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Damaged cooling fan shroud. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,00004BC -19-14JAN09-4/13

3 Terminal Test	*NOTE: From here on through the manual, the Manifold Air Temperature will be referred to as MAT* 1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Perform TERMINAL TEST on the harness and sensor connector. 4. Inspect surrounding area for pinched or melted wires. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 10 **NO:** GO TO 4

DN22556,00004BC -19-14JAN09-5/13

4 Check Manifold Air Temperature Sensor	1. Remove MAT sensor. See REMOVE AND INSTALL MANIFOLD AIR TEMPERATURE (MAT) SENSOR in Section 02, Group 110 earlier in this manual. 2. Inspect engine housing, sensor housing, and O-ring for defects. Were any defects found?	**YES:** Replace defective part. GO TO 10 **NO:** GO TO 5

Continued on next page

DN22556,00004BC -19-14JAN09-6/13

5 Check Manifold Air Temperature Sensor Operation	1. With MAT sensor removed from engine, reconnect MAT sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor 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:** MAT sensor is OK. Diagnose engine air intake cooling system. GO TO 8 **NO:** MAT sensor has already been replaced. GO TO 6 **NO:** Replace MAT sensor. GO TO 10

DN22556,00004BC -19-14JAN09-7/13

6 Check Signal Wire In Harness	1. Ignition OFF, Engine OFF. 2. Disconnect the MAT sensor connector. 3. Ignition ON, Engine OFF. 4. Monitor DTCs from within Service ADVISOR. Did 105.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Recheck air intake system. GO TO 1 **NO:** GO TO 7

DN22556,00004BC -19-14JAN09-8/13

7 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 J1. 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 J1. Diagnose and fix harness problem. GO TO 10 **NO:** Replace ECU. GO TO 10

DN22556,00004BC -19-14JAN09-9/13

8 Check for Engine Related Causes	Check the following items that can cause high manifold air temperature: • Test for leaks. See TEST FOR INTAKE AIR LEAKS in base engine manual, Section 04, Group 150. • Malfunctioning turbocharger compressor. See TURBOCHARGER INSPECTION in base engine manual, Section 02, Group 080. Was cause of high manifold air temperature determined?	**YES:** Repair problem. GO TO 10. **NO:** GO TO 9

Continued on next page

DN22556,00004BC -19-14JAN09-10/13

9 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	
	2. Reconnect all connectors and sensors.	
	3. Monitor DTCs in Service ADVISOR.	
	4. Let engine run for 3 minutes and refresh codes.	**YES:** Problem not fixed. Verify air intake system and related parameters are functioning properly. GO TO 1
	Is 000105.16 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,00004BC -19-14JAN09-11/13

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 air intake system. GO TO 1
	Did DTC 000105.16 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00004BC -19-14JAN09-12/13

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.

DN22556,00004BC -19-14JAN09-13/13

000107.00 — Air Filter Restriction Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU detects restriction in the air filter.

BB78437,000011F -19-06AUG10-1/18

000107.00 — Air Filter Restriction Switch Activated Diagnostic Procedure

Troubleshooting Sequence:
000107.00

When DTC is Displayed:
When ever the engine is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have an air filter restriction detection switch. When this feature is programmed into the ECU, the ECU will derate the engine when the switch is activated.
The air filter restriction switch is located on the clean side of the air filter. The switch is activated when the air is restricted through the air filter.

Alarm Level:
Warning

Control Unit Response:
If the code is set, the ECU will derate the engine by 50% full power.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For more information on engine derate specifications, see OEM ENGINES - DERATE SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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BB78437,000011F -19-06AUG10-2/18

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 000107.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

BB78437,000011F -19-06AUG10-3/18

2 Check Air Filter	Check air filter and dust valve. Check for any restrictions in inlet tube and filter system. See AIR CLEANER 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

BB78437,000011F -19-06AUG10-4/18

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

BB78437,000011F -19-06AUG10-5/18

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

BB78437,000011F -19-06AUG10-6/18

5 Check Switch Operation	1. Ignition OFF, Engine OFF. 2. Test air filter restriction switch for proper operation. See TEST AIR FILTER RESTRICTION INDICATOR SWITCH 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

BB78437,000011F -19-06AUG10-7/18

6 Check Harness

Step 1.

1. Ignition ON, Engine ON.
2. Refresh codes from within Service ADVISOR.
3. Record if 000107.00 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 000107.00 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

BB78437,000011F -19-06AUG10-8/18

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

BB78437,000011F -19-06AUG10-9/18

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, Nand 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

BB78437,000011F -19-06AUG10-10/18

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 10

Continued on next page

BB78437,000011F -19-06AUG10-11/18

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

BB78437,000011F -19-06AUG10-12/18

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

BB78437,000011F -19-06AUG10-13/18

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

BB78437,000011F -19-06AUG10-14/18

13 Reprogram ECU

1. Download latest ECU software payload and reprogram ECU. See Engine Control Unit (ECU) — Reprogramming Instructions 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 000107.00 still active?

YES: Problem not fixed. Recheck steps at beginning of procedure. GO TO 1

NO: Verify problem is fixed. GO TO 15

BB78437,000011F -19-06AUG10-15/18

14 Check ECU

NOTE: For ECU connector pinouts, see ELECTRONIC 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

BB78437,000011F -19-06AUG10-16/18

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 000107.00 reappear as active with engine running?	**NO:** Problem fixed.

BB78437,000011F -19-06AUG10-17/18

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.

BB78437,000011F -19-06AUG10-18/18

000108.02 — Barometric Air Pressure Signal Invalid

The ECU receives an invalid pressure from the barometric air pressure sensor.

DN22556,00004BE -19-14JAN09-1/6

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 air 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.

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 4.5L 12V ECU WIRING DIAGRAMS
- see 4.5L 24V ECU WIRING DIAGRAMS
- see 6.8L 12V ECU WIRING DIAGRAMS
- see 6.8L 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.

DN22556,00004BE -19-14JAN09-2/6

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTC list. Is 000108.02 error code active?	**YES:** GO TO 2 **NO:** GO TO 4

Continued on next page

DN22556,00004BE -19-14JAN09-3/6

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.

DN22556,00004BE -19-14JAN09-4/6

3 Reprogram ECU	Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR 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.

DN22556,00004BE -19-14JAN09-5/6

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.

DN22556,00004BE -19-14JAN09-6/6

000110.00 — Coolant Temperature Signal Extremely High

The ECU senses the Coolant Temperature to be extremely high.

Continued on next page

DN22556,00004BF -19-14JAN09-1/13

000110.00 — Coolant Temperature Signal Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000110.00

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 coolant temperature at or above 113° C (235° F) on OEM engines with peak power above or equal to 75%.
The ECU senses a coolant temperature at or above 116° C (241° F) on OEM engines with peak power below 75%.
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.
001110.31 is set if the shutdown feature is enabled.
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 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 flex probes. Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green
• Coolant temperature sensor T04 - Purple/Gray

Continued on next page
DN22556,00004BF -19-14JAN09-2/13

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 000110.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,00004BF -19-14JAN09-3/13

2 Preliminary Check of Cooling System	Visually inspect cooling system components. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070 • Inspect radiator cap for failure. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,00004BF -19-14JAN09-4/13

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

DN22556,00004BF -19-14JAN09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL 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

DN22556,00004BF -19-14JAN09-6/13

5 Check Coolant Temperature Sensor Operation	1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.	
	2. Ignition ON, Engine OFF.	
	3. Monitor the Coolant Temperature from within Service ADVISOR.	**YES:** Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8
	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

DN22556,00004BF -19-14JAN09-7/13

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.	**YES:** Wire harness OK. GO TO 8
	Did 110.03 become active?	**NO:** GO TO 7

DN22556,00004BF -19-14JAN09-8/13

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 J1.	
	3. Ignition ON, Engine OFF.	
	4. Monitor the DTC codes from within Service ADVISOR.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J1. Diagnose and fix harness problem. GO TO 10
	Did 000110.03 become active?	**NO:** Replace ECU. GO TO 10

DN22556,00004BF -19-14JAN09-9/13

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 4.5L/6.8L - C1 - ENGINE COOLANT TEMPERATURE ABOVE NORMAL in base engine manual, Section 04, Group 150.	**YES:** Repair problem. GO TO 10
	Was cause of high coolant temperature determined?	**NO:** GO TO 9

Continued on next page

DN22556,00004BF -19-14JAN09-10/13

9 Reprogram ECU	Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1
	Is 000110.00 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,00004BF -19-14JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000110.00 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00004BF -19-14JAN09-12/13

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.

DN22556,00004BF -19-14JAN09-13/13

000110.03 — Coolant Temperature Signal Out of Range High

The Coolant Temperature Input Voltage exceeds the sensor's high voltage specification.

DN22556,00004C0 -19-14JAN09-1/19

000110.03 — Coolant Temperature Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
000110.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Coolant Temperature Input Voltage increases above the sensor's high voltage specification. This corresponds to a temperature that is lower than what is physically possible for engine coolant temperature.

Alarm Level:
Warning

Control Unit Response:
The ECU uses a default coolant temperature of 90° C (194° F).

Additional References:
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For further 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Coolant temperature sensor T04 - Purple/Gray

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DN22556,00004C0 -19-14JAN09-2/19

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 000110.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004C0 -19-14JAN09-3/19

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

DN22556,00004C0 -19-14JAN09-4/19

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

DN22556,00004C0 -19-14JAN09-5/19

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.

DN22556,00004C0 -19-14JAN09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J1-C4) 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

DN22556,00004C0 -19-14JAN09-7/19

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.

DN22556,00004C0 -19-14JAN09-8/19

7	**Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J1-C4) 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

DN22556,00004C0 -19-14JAN09-9/19

8	**Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J1-D2) 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

DN22556,00004C0 -19-14JAN09-10/19

9	**ECU Resistance Check**	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-C4) 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.

DN22556,00004C0 -19-14JAN09-11/19

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

DN22556,00004C0 -19-14JAN09-12/19

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

DN22556,00004C0 -19-14JAN09-13/19

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

DN22556,00004C0 -19-14JAN09-14/19

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 000110.03 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,00004C0 -19-14JAN09-15/19

14 Sensor Temperature Test	1. Ignition OFF, Engine OFF	
	2. Check temperature of the coolant sensor and surrounding ares.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is everything hot?	**NO:** GO TO 15

DN22556,00004C0 -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the coolant sensor harness connector and ECU J1 connector.	**YES:** Fix problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

DN22556,00004C0 -19-14JAN09-17/19

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 1.
	Is 000110.03 active?	**NO:** GO TO 17

Continued on next page

DN22556,00004C0 -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,00004C0 -19-14JAN09-19/19

000110.04 — Coolant Temperature Signal Out of Range Low

The Coolant Temperature Input Voltage drops below the sensor's low voltage specification.

DN22556,00004C1 -19-14JAN09-1/19

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 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 coolant temperature of 90° C (194° F).

Additional References:
For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Coolant temperature sensor T04 - Purple/Gray

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DN22556,00004C1 -19-14JAN09-2/19

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 000110.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004C1 -19-14JAN09-3/19

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

DN22556,00004C1 -19-14JAN09-4/19

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

DN22556,00004C1 -19-14JAN09-5/19

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.

Continued on next page

DN22556,00004C1 -19-14JAN09-6/19

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

DN22556,00004C1 -19-14JAN09-7/19

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:** Reconnect all connectors and GO TO 2.

DN22556,00004C1 -19-14JAN09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1.	
	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.

DN22556,00004C1 -19-14JAN09-9/19

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.

DN22556,00004C1 -19-14JAN09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-C4) 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.

DN22556,00004C1 -19-14JAN09-11/19

10 Occurrence Count Check	Review stored information and look at occurrence count for 000110.04.	**YES:** GO TO 11
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 12

Continued on next page

DN22556,00004C1 -19-14JAN09-12/19

11 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 12

DN22556,00004C1 -19-14JAN09-13/19

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

DN22556,00004C1 -19-14JAN09-14/19

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 000110.04 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,00004C1 -19-14JAN09-15/19

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

DN22556,00004C1 -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the engine coolant temperature 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 16

Continued on next page

DN22556,00004C1 -19-14JAN09-17/19

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.

DN22556,00004C1 -19-14JAN09-18/19

17 Software Updates		
	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,00004C1 -19-14JAN09-19/19

000110.15 — Coolant Temperature Signal Slightly High

The ECU senses the Coolant Temperature to be slightly above specification.

DN22556,00004C2 -19-14JAN09-1/13

000110.15 — Coolant Temperature Signal Slightly High Diagnostic Procedure

Troubleshooting Sequence:
000110.15

Related Information:
The ECU senses a 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 engine 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Coolant temperature sensor T04 - Purple/Gray

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DN22556,00004C2 -19-14JAN09-2/13

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

DN22556,00004C2 -19-14JAN09-3/13

2 Preliminary Check of Cooling System	Visually inspect cooling system components. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070 • Inspect radiator cap for failure. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,00004C2 -19-14JAN09-4/13

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

DN22556,00004C2 -19-14JAN09-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL 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

DN22556,00004C2 -19-14JAN09-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the Coolant Temperature from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor. GO TO 10

DN22556,00004C2 -19-14JAN09-7/13

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

DN22556,00004C2 -19-14JAN09-8/13

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 J1.
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 J1. Diagnose and fix harness problem. GO TO 10

NO: Replace ECU. GO TO 10

DN22556,00004C2 -19-14JAN09-9/13

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 4.5L/6.8L - 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

DN22556,00004C2 -19-14JAN09-10/13

9 Reprogram ECU	Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1
	Is 000110.15 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,00004C2 -19-14JAN09-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000110.15 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00004C2 -19-14JAN09-12/13

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.

DN22556,00004C2 -19-14JAN09-13/13

000110.16 — Coolant Temperature Signal Moderately High

The ECU senses the Coolant Temperature to be moderately high.

DN22556,00004C3 -19-18JUL08-1/13

000110.16 — Coolant Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
00110.16

Related Information:

The ECU senses a coolant temperature of 111° C (232° F) on OEM engines greater than or equal to 75% of peak power.
The ECU senses a coolant temperature of 114° C (237° F) on OEM engines less than 75% of peak power.
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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Coolant temperature sensor T04 - Purple/Gray

Continued on next page

DN22556,00004C3 -19-18JUL08-2/13

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

DN22556,00004C3 -19-18JUL08-3/13

2 Preliminary Check of Cooling System	Visually inspect cooling system components. • Remove any blockage on or near radiator. • Inspect radiator hoses for signs of leakage or cracks. • Loose cooling fan belt. See CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in base engine manual, Section 02, Group 070. • Malfunctioning cooling fan. See INSPECT AND INSTALL FAN ASSEMBLY in base engine manual, Section 02, Group 070 • Inspect radiator cap for failure. • Check radiator coolant is filled to proper level. • Inspect cooling fan shroud for damage. • Excessively high ambient air temperature. Were any problems found?	**YES:** Fix problem(s). GO TO 10 **NO:** GO TO 3

DN22556,00004C3 -19-18JUL08-4/13

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

DN22556,00004C3 -19-18JUL08-5/13

4 Check Coolant Temperature Sensor	1. Remove coolant temperature sensor. See REMOVE AND INSTALL 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

DN22556,00004C3 -19-18JUL08-6/13

5 Check Coolant Temperature Sensor Operation

1. With coolant sensor removed from engine, reconnect coolant temperature sensor to its harness connector.
2. Ignition ON, Engine OFF.
3. Monitor the Coolant Temperature from within Service ADVISOR.
4. If necessary, let the sensor cool down to the ambient temperature.

Does the sensor reading closely match the ambient temperature?

YES: Coolant temperature sensor is OK. Diagnose engine cooling system. GO TO 8

NO: Coolant temperature sensor has already been replaced. GO TO 6

NO: Replace coolant temperature sensor. GO TO 10

DN22556,00004C3 -19-18JUL08-7/13

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

DN22556,00004C3 -19-18JUL08-8/13

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 J1.
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 J1. Diagnose and fix harness problem. GO TO 10

NO: Replace ECU. GO TO 10

DN22556,00004C3 -19-18JUL08-9/13

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 4.5L/6.8L - 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

DN22556,00004C3 -19-18JUL08-10/13

9 Reprogram ECU	Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in this section of the manual.	**YES:** Problem not fixed. Verify cooling system and related parameters are functioning properly. GO TO 1
	Is 000110.16 still active?	**NO:** Verify problem is fixed. GO TO 10

DN22556,00004C3 -19-18JUL08-11/13

10 Verification	1. Ignition OFF, Engine OFF.	
	2. Reconnect all connectors, hoses, sensors, etc.	
	3. Ignition ON, Engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Let engine run for 3 minutes.	
	6. Refresh DTCs.	
	7. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000110.16 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,00004C3 -19-18JUL08-12/13

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.

DN22556,00004C3 -19-18JUL08-13/13

000111.01 — Coolant Level Extremely Low

The ECU detects a low engine coolant level.

DN22556,00004C5 -19-04JUN08-1/9

000111.01 — Coolant Level Extremely Low Diagnostic Procedure

NOTE: OEM engines are programmed using trimmable features. The customer had the option to install a "Normally Open" or a "Normally Closed" engine coolant level switch. The ECU's software must correlate the type of switch being used to properly protect the engine. For more information on trimmable features, see JOHN DEERE TRIMMABLE OPTIONS earlier in this Group.

Related Information:
The loss of coolant switch is not submerged into coolant causing the ECU to sense continuity to ground on the loss of coolant temperature input circuit.

The engine coolant level switch is a trimmable option. Depending on the engine, if this option is selected, the engine can support both normally open and normally closed switches. This is defined during ECU programming.

Alarm Level:
STOP

Control Unit Response:
The ECU will derate 50% per minute until the engine is running at 50% of full power. 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 information on non-OEM applications, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

Additional References:

For wiring information related to other applications, see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green

DN22556,00004C5 -19-04JUN08-2/9

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 000111.01 reappear active?	**YES:** GO TO 2 **NO:** GO TO 7

DN22556,00004C5 -19-04JUN08-3/9

2 Connection Check	**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.** Perform a preliminary inspection of the ECU connectors and the engine coolant level switch connector looking for dirty, damaged, or poorly positioned terminals. Are there any problems with the wiring or connectors?	**YES:** Repair faulty connection(s). **NO:** GO TO 3

Continued on next page

DN22556,00004C5 -19-04JUN08-4/9

3 Coolant Level Check	**CAUTION: 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.** • Check the coolant level. Is the coolant level at proper level?	**YES:** GO TO 4 **NO:** Determine cause of low coolant level, repair problem, refill coolant, and retest.

DN22556,00004C5 -19-04JUN08-5/9

4 Loss of Coolant Temperature Switch Test	1. Ignition OFF 2. Disconnect loss of coolant switch connector. 3. Ignition ON, engine OFF 4. Using the ECU diagnostic software, read DTCs. Did 000111.01 reoccur?	**YES:** Short to ground in loss of coolant temperature switch input circuit. **NO:** GO TO 5

DN22556,00004C5 -19-04JUN08-6/9

5 Loss of Coolant Temperature Switch (Normally Closed) Test	1. Ignition OFF 2. Loss of coolant switch still disconnected. 3. Install a jumper wire between terminal A in the loss of coolant switch connector on the engine harness and a good chassis ground. 4. Ignition ON, engine OFF 5. Using the ECU diagnostic software, read DTCs. Did 000111.01 reoccur?	**YES:** Faulty coolant level switch (normally closed) **NO:** GO TO 6

DN22556,00004C5 -19-04JUN08-7/9

6 Loss of Coolant Temperature Switch (Normally Open) Test	1. Ignition OFF 2. Loss of coolant switch still disconnected. 3. Disconnect ECU connector #J2. 4. Using a multimeter, measure resistance between terminal A in the coolant level switch connector and terminal G4 in the ECU connector #2 on the engine harness. Is the resistance 5 ohms or less?	**YES:** Faulty coolant level switch (normally open) **NO:** Open in loss of coolant temperature switch input circuit. OR Faulty ECU

Continued on next page

DN22556,00004C5 -19-04JUN08-8/9

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.

DN22556,00004C5 -19-04JUN08-9/9

000157.03 — Fuel Rail Pressure Signal Out of Range High

The Fuel Rail Pressure Input Voltage exceeds the sensor's high voltage specification.

DN22556,00004C6 -19-14JAN09-1/31

000157.03 — Fuel Rail Pressure Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003509.03
000157.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Rail Pressure Input Voltage corresponds to a pressure that is higher than what is physically possible for fuel rail pressure.

Alarm Level:
STOP

NOTE: The alarm level is warning for redundant ECU applications.

Control Unit Response:
The ECU will derate the engine until it is running at 50% of full power.

The ECU will command the high pressure fuel pump to a default pressure of 200 MPa (2000 bar) (29,000 psi).

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel rail pressure sensor P05 - Blue/Orange

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DN22556,00004C6 -19-14JAN09-2/31

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will 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 000157.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 23

DN22556,00004C6 -19-14JAN09-3/31

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector. Were any problems found?	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1 **NO:** GO TO 3

DN22556,00004C6 -19-14JAN09-4/31

3 Measure and Record Sensor Resistances	1. Ignition OFF, Engine OFF 2. Measure the following resistances on the sensor to verify they are within range. 3. Between signal (terminal 1) and ground (terminal 2) on the sensor (should be between 8k ohms and 17k ohms). 4. Between signal (terminal 1) and power (terminal 3) on the sensor (should be between 1k ohms and 3k ohms). 5. Between ground (terminal 2) and power (terminal 3) on the sensor (should be between 10k ohms and 15k ohms) Are all resistances within range?	**YES:** GO TO 4 **NO:** Remove and replace sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor, and GO TO 1

DN22556,00004C6 -19-14JAN09-5/31

4 Fuel Rail Pressure Input To Ground Test	1. Ignition OFF, Engine OFF 2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor harness connector. Is the resistance between 250k and 270k ohms?	**YES:** GO TO 5 **NO:** GO TO 8

Continued on next page

DN22556,00004C6 -19-14JAN09-6/31

5 Fuel Rail Pressure Input To Supply Test	1. Ignition OFF, Engine OFF	
	2. Measure the resistance between signal (terminal 1) and power (terminal 3) on the sensor harness connector.	**YES:** GO TO 6
	Is the resistance between 140k and 160k ohms?	**NO:** GO TO 12

DN22556,00004C6 -19-14JAN09-7/31

6 Fuel Rail Pressure Ground To Supply Test	1. Ignition OFF, Engine OFF	
	2. Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor harness connector.	**YES:** GO TO 7
	Is the resistance between 90k and 120k ohms?	**NO:** GO TO 16

DN22556,00004C6 -19-14JAN09-8/31

7 Fuel Rail Pressure Ground To Supply Voltage Test	1. Ignition ON, Engine OFF	
	2. Measure the voltage between ground (terminal 2) and input signal (terminal 3) on the sensor harness connector.	**YES:** Reconnect all connectors and GO TO 1
	Is the voltage below 5.5 volt	**NO:** GO TO 20

DN22556,00004C6 -19-14JAN09-9/31

8 ECU and ECU Connector Terminal Test	Perform a terminal test on ECU connectors (J1), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 9

DN22556,00004C6 -19-14JAN09-10/31

9 Fuel Rail Pressure Ground Wire Test	1. Disconnect ECU connector J1	
	2. Measure the resistance between J1-E2 and sensor connector ground (terminal 2).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 10

DN22556,00004C6 -19-14JAN09-11/31

10 Fuel Rail Input Wire Test	Measure the resistance between J1-E3 and sensor connector signal (terminal 1).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 11

Continued on next page

DN22556,00004C6 -19-14JAN09-12/31

11 ECU Input To Ground Test	Measure the resistance between ECU J1- E2 to J1-E3	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 250k to 270k ohms?	**NO:** Remove and Replace ECU

DN22556,00004C6 -19-14JAN09-13/31

12 ECU and ECU Connector Terminal Test	Perform a terminal test on ECU connectors (J1), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 13

DN22556,00004C6 -19-14JAN09-14/31

13 Fuel Rail Pressure Power Wire Test	1. Disconnect ECU connector J1	
	2. Measure the resistance between J1-D3 and sensor connector power (terminal 3).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 14

DN22556,00004C6 -19-14JAN09-15/31

14 Fuel Rail Input Wire Test	Measure the resistance between J1-E3 and sensor connector signal (terminal 1) on the sensor harness connector.	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 15

DN22556,00004C6 -19-14JAN09-16/31

15 ECU Input To Supply Test	Measure the resistance between ECU J1- E3 to J1-D3	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 140k to 160k ohms?	**NO:** Remove and replace ECU

DN22556,00004C6 -19-14JAN09-17/31

16 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J1), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 17

Continued on next page

DN22556,00004C6 -19-14JAN09-18/31

17 Fuel Rail Pressure Power Wire Test	1. Disconnect ECU connector J1	
	2. Measure the resistance between J1-D3 and sensor connector power (terminal 3).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 18

DN22556,00004C6 -19-14JAN09-19/31

18 Fuel Rail Ground Wire Test	Measure the resistance between J1-E2 and sensor connector ground (terminal 2).	**YES:** Repair open wire, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance greater than 5 ohms	**NO:** GO TO 19

DN22556,00004C6 -19-14JAN09-20/31

19 ECU Ground To Supply Test	Measure the resistance between ECU J1- D3 to J1-E2	**YES:** Reconnect connectors, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is the resistance between 90k to 120k ohms?	**NO:** Remove and replace ECU

DN22556,00004C6 -19-14JAN09-21/31

20 ECU and ECU Connector Terminal Test	Perform a TERMINAL TEST on ECU connectors (J1), and ECU terminals.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Are there any problems with the connector terminals or ECU terminals?	**NO:** GO TO 21

DN22556,00004C6 -19-14JAN09-22/31

21 Fuel Rail Pressure Input Shorted To High Voltage	1. Ignition OFF Engine OFF	
	2. Disconnect all ECU connectors.	
	3. Measure the resistance between J1-E3 and all other terminals in the other ECU connectors.	**YES:** Repair short in wiring and GO TO 1
	Were any readings less than 5 ohms?	**NO:** GO TO 22

DN22556,00004C6 -19-14JAN09-23/31

22 Wiring Harness Check	Look for pinched or melted wiring	**YES:** Repair wiring, and GO TO 1
	Was a wiring problem found?	**NO:** Remove and replace ECU

Continued on next page

DN22556,00004C6 -19-14JAN09-24/31

23 Occurrence Count Check	Review stored information and look at occurrence count	**YES:** GO TO 24
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 25

DN22556,00004C6 -19-14JAN09-25/31

24 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** GO TO 25

DN22556,00004C6 -19-14JAN09-26/31

25 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found. If a certain operating point exists when error occurs then GO TO 26
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 28

DN22556,00004C6 -19-14JAN09-27/31

26 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 27
	Did 157.03 reappear when engine operating point was reached?	**NO:** GO TO 25

DN22556,00004C6 -19-14JAN09-28/31

27 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J1.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** Remove and replace Sensor

DN22556,00004C6 -19-14JAN09-29/31

28 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J1.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Were any problems found?	**NO:** GO TO 29

Continued on next page

DN22556,00004C6 -19-14JAN09-30/31

29 Software Updates	1. Check custom performance for possible software updates. If new software is available, reprogram ECU using Service Advisor.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service Advisor and GO TO 1
	Is 000157.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00004C6 -19-14JAN09-31/31

000157.04 — Fuel Rail Pressure Signal Out of Range Low

The Fuel Rail Pressure Input Voltage drops below the sensor's low voltage specification.

DN22556,00004C7 -19-14JAN09-1/21

000157.04 — Fuel Rail Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003509.04
000157.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Fuel Rail Pressure Input Voltage corresponds to a pressure that is lower than what is physically possible for fuel rail pressure.

Alarm Level:
STOP

NOTE: The alarm level is warning for redundant ECU applications.

Control Unit Response:
The ECU will derate the engine until it is running at 50% of full power.

The ECU will command the high pressure fuel pump to a default pressure of 200 MPa (2000 bar) (29,000 psi).

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

DN22556,00004C7 -19-14JAN09-2/21

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 Codes. Did 000157.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00004C7 -19-14JAN09-3/21

2 Supply Voltage Test	1. Ignition ON, Engine OFF 2. Monitor Sensor Supply #1 Voltage using Service ADVISOR Is the voltage above 4.5 volts?	**YES:** GO TO 3 **NO:** GO TO 9

DN22556,00004C7 -19-14JAN09-4/21

3 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on fuel rail pressure sensor connector. Were any problems found?	**YES:** Repair problem, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** GO TO 4

DN22556,00004C7 -19-14JAN09-5/21

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 1) and ground (terminal 2), (between 8k ohms and 17k ohms). 4. Between signal (terminal 1) and power (terminal 3), (between 1k ohms and 3k ohms). 5. Between ground (terminal 2) and power (terminal 3), (between 10k ohms and 15k ohms) Are all resistances within range?	**YES:** GO TO 5 **NO:** Remove and replace sensor, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR, and GO TO 1

DN22556,00004C7 -19-14JAN09-6/21

5 Fuel Rail Pressure Input to Ground Test	1. Ignition OFF, Engine OFF 2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor harness connector. Is the resistance between 240k and 270k ohms?	**YES:** GO TO 6 **NO:** GO TO 8

Continued on next page

DN22556,00004C7 -19-14JAN09-7/21

6 Fuel Rail Pressure Power to Ground Test	Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor harness connector. Is the resistance between 90k and 120k?	**YES:** Reconnect all connectors and GO TO 1 **NO:** GO TO 7

DN22556,00004C7 -19-14JAN09-8/21

7 Fuel Rail Pressure Power to Ground Short Test	1. Disconnect ECU connector J1. 2. Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor connector. Is the resistance 5 ohms or less?	 **YES:** Repair shorted wire, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1. **NO:** Check for pinched or melted wiring, repair, and reconnect all connectors and GO TO 1.

DN22556,00004C7 -19-14JAN09-9/21

8 Fuel Rail Pressure Signal to Ground Short Test	1. Disconnect ECU connector J1. 2. Measure the resistance between signal (terminal 1) and ground (terminal 2) on the sensor connector. Is the resistance 5 ohms or less?	 **YES:** Repair shorted wire, run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1 **NO:** Check for pinched or melted wiring, repair, and reconnect all connectors and GO TO 1.

DN22556,00004C7 -19-14JAN09-10/21

9 Fuel Rail Pressure Open and Short Test	Measure the resistance between ground (terminal 2) and power (terminal 3) on the sensor connector. Is the resistance near 0 ohms (shorted)? Is the resistance near infinity (open)?	**YES:** If (shorted) GO TO 10 **YES:** If (open) GO TO 11 **NO:** Reconnect connectors and GO TO 1.

Continued on next page

DN22556,00004C7 -19-14JAN09-11/21

10 Wiring Harness Short Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect all ECU connectors.	
	3. Measure the resistance between J1-D3 and all other terminals in the other ECU connectors	**YES:** Repair wiring (short) and GO TO 1
	Were any readings less than 5 ohms?	**NO:** Check for pinched or melted wiring and repair then GO TO 1

DN22556,00004C7 -19-14JAN09-12/21

11 Wiring Harness Power Wire Resistance Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J1.	
	3. Measure the resistance between J1-D3 and the power (terminal 3) in the Rail Pressure Sensor connector	**YES:** GO TO 12
	Was the reading less than 5 ohms?	**NO:** Repair wiring and GO TO 1.

DN22556,00004C7 -19-14JAN09-13/21

12 Wiring Harness Ground Wire Resistance Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J1.	
	3. Measure the resistance between J1-E3 and the ground (terminal 2) in the Rail Pressure Sensor connector	**YES:** Reconnect connectors and GO TO 1
	Was the reading less than 5 ohms?	**NO:** Repair wiring and GO TO 1.

DN22556,00004C7 -19-14JAN09-14/21

13 Occurrence Count Check	Review stored information and look at occurrence count	**YES:** GO TO 14
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 15

DN22556,00004C7 -19-14JAN09-15/21

14 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1
	Were any problems found?	**NO:** GO TO 15

Continued on next page

DN22556,00004C7 -19-14JAN09-16/21

15 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found. If a certain operating point exists when error occurs then GO TO 16
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**NO:** GO TO 18

DN22556,00004C7 -19-14JAN09-17/21

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 17
	Did 157.04 reappear when engine operating point was reached?	**NO:** GO TO 15

DN22556,00004C7 -19-14JAN09-18/21

17 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J1.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1
	Were any problems found?	**NO:** Remove and replace Sensor

DN22556,00004C7 -19-14JAN09-19/21

18 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on fuel rail pressure sensor connector and ECU connector J1.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1
	Were any problems found?	**NO:** GO TO 19

DN22556,00004C7 -19-14JAN09-20/21

19 Software Updates	1. Check custom performance for possible software updates. If new software is available, reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Replace Sensor, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR and GO TO 1
	Is 000157.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00004C7 -19-14JAN09-21/21

000157.10 — Fuel Rail Pressure Loss Detected

The ECU detects a sudden decrease in fuel pressure while the engine is not injecting or pumping.

DN22556,00004C8 -19-06AUG10-1/12

000157.10 — Fuel Rail Pressure Loss Detected Diagnostic Procedure

Trouble Shooting Sequence:
All 000094 Codes
000157.10

Related Information:
The ECU detects a sudden decrease in fuel rail pressure while engine is not injecting or pumping fuel. This usually occurs when the engine is shifted from high idle to low idle. The engine may run normal when no load is applied to engine.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
Additional References:
For further fuel rail pressure sensor information, see FUEL RAIL 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 further fuel system information, See FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.
For further high pressure fuel system information, See HIGH PRESSURE COMMON RAIL (HPCR) OPERATION in Section 03, Group 130 earlier in this manual.
For more information on injectors, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

DN22556,00004C8 -19-06AUG10-2/12

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 000157.10 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004C8 -19-06AUG10-3/12

2 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the fuel rail pressure sensor connector. 3. Disconnect ECU connector J1. 4. Perform TERMINAL TEST on both harness and sensor connectors. Are there any problems with the wiring or connectors?	**YES:** Repair problem. GO TO 9 **NO:** GO TO 3

DN22556,00004C8 -19-06AUG10-4/12

3 Fuel Lines/Fittings Leakage Test	1. Ignition ON, Engine ON. 2. Inspect all fuel lines and fittings for leakage. Pay close attention to the high pressure lines between the high pressure fuel pump and injectors. Is there any fuel leakage present?	**YES:** Tighten loose fitting to proper specification or replace faulty fuel line and retest. GO TO 9 **NO:** GO TO 4

Continued on next page

DN22556,00004C8 -19-06AUG10-5/12

4 Pressure Limiter Test	**CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.** **If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.** **CAUTION: Fuel in the high pressure common rail is under extremely high pressure. Do NOT start this procedure until the engine has been turned OFF for at least 5 minutes.** 1. Ignition OFF, Engine OFF. 2. Let engine sit 5 minutes with cranking or running to relieve fuel pressure. 3. Disconnect fuel line from pressure limiter valve on high pressure common rail. 4. Ignition ON, Engine ON. 5. Observe the pressure limiter valve for fuel leakage. Is fuel present at the pressure limiter valve?	**YES:** Faulty fuel pressure limiter valve. Replace pressure limiter valve. See REMOVE AND INSTALL PRESSURE LIMITER in Section 02, Group 090 earlier in this manual. GO TO 9 **NO:** GO TO 5

DN22556,00004C8 -19-06AUG10-6/12

5 Faulty Electronic Injector Test	1. Ignition OFF, Engine OFF. 2. Disconnect leak-off line at each electronic injector. 3. Ignition ON, Engine ON. 4. Connect Service ADVISOR, perform the Cylinder Cutout Test. See Cylinder Cutout Test Instructions in this section of the manual. Do any cylinders show a slight misfire?	**YES:** Replace suspected injector on cylinder. Calibrate new injector. See Electronic Injector Calibration Information in this section of the manual. GO TO 9 **NO:** GO TO 6

Continued on next page

DN22556,00004C8 -19-06AUG10-7/12

6 Injector Calibration

1. Ignition ON, Engine OFF.
2. Connect Service ADVISOR. Select INJECTOR CALIBRATION. See Electronic Injector Calibration Information in this section of the manual. See INSTALL ELECTRONIC INJECTOR (EI) and REMOVE ELECTRONIC INJECTOR (EI) in Section 02, group 090 earlier in this manual.
3. Verify each injector is in the right cylinder by matching the serial number from the calibration table.

Do the serial numbers of the injectors correspond to the proper cylinder?

YES: GO TO 7

NO: Install injector in proper cylinder. See INSTALL ELECTRONIC INJECTOR (EI) and REMOVE ELECTRONIC INJECTOR (EI) in Section 02, group 090 earlier in this manual. GO TO 9

NO: Injectors's serial number not in calibration table. Calibrate new injector. GO TO 9

DN22556,00004C8 -19-06AUG10-8/12

7 Reprogram ECU

Check with Custom Performance for possible software updates.

Is there an update available?

YES: ECU has already been reprogrammed. GO TO 8

YES: Reprogram ECU using Service ADVISOR. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. GO TO 9

NO: GO TO 8

DN22556,00004C8 -19-06AUG10-9/12

8 Replace Sensor

1. Skip this step if it has already has been performed.
2. Ignition OFF, Engine OFF.
3. Replace fuel rail pressure sensor. See REMOVE AND INSTALL FUEL RAIL PRESSURE SENSOR in Section 02, Group 110 earlier in this manual.
4. Ignition ON, Engine ON. Cycle engine from high RPMs to Low RPMs.
5. Monitor DTC codes with Service ADVISOR.

Is DTC 157.10 still active?

YES: Contact dealer or open DTAC case.

NO: GO TO 9

DN22556,00004C8 -19-06AUG10-10/12

9 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. Cycle engine from high RPMS to Low RPMS.

Did DTC 000157.10 reappear as active with engine running?

YES: GO TO 1

NO: Problem fixed.

Continued on next page

DN22556,00004C8 -19-06AUG10-11/12

10 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. 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.

DN22556,00004C8 -19-06AUG10-12/12

000157.17 — Fuel Rail Pressure Not Developed

The ECU detects low fuel rail pressure after cranking the engine for approximately 3 seconds.

DN22556,00004C9 -19-14JAN09-1/15

000157.17 — Fuel Rail Pressure Not Developed Diagnostic Procedure

Trouble Shooting Sequence:
All 000094 Codes
All 001347 Codes
000157.17

Related Information:
The ECU does not detect 1000 kPa (1450 psi) of fuel rail pressure after cranking the engine for approximately 3 seconds.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For further fuel rail pressure sensor information, see FUEL RAIL 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 further fuel system information, See FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.
For further high pressure fuel system information, See HIGH PRESSURE COMMON RAIL (HPCR) OPERATION in Section 03, Group 130 earlier in this manual.
For more information on injectors, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel rail pressure sensor P05 - Blue/Orange

Continued on next page

DN22556,00004C9 -19-14JAN09-2/15

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 000157.17 reappear active?	**YES:** GO TO 2 **NO:** GO TO 13

DN22556,00004C9 -19-14JAN09-3/15

2 Preliminary Check	Has the fuel system been recently opened or the fuel tank ran dry prior to this code setting?	**YES:** Bleed the fuel system. See BLEED THE FUEL SYSTEM in Section 04, Group 150 earlier in this manual. GO TO 12 **NO:** GO TO 3

DN22556,00004C9 -19-14JAN09-4/15

3 Fuel Lines/Fittings Leaking Test	1. Ignition ON, Engine ON. 2. Inspect all fuel lines and fittings for leakage. Were any problems found?	**YES:** Repair fuel line. GO TO 12 **NO:** GO TO 4

DN22556,00004C9 -19-14JAN09-5/15

4 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect the fuel rail pressure sensor connector. 3. Perform TERMINAL TEST on both harness and sensor connector. Are there any problems with the wiring or connector?	**YES:** Repair problem. GO TO 12 **NO:** GO TO 5

DN22556,00004C9 -19-14JAN09-6/15

5 Check Harness	1. Ignition ON, Engine OFF. 2. Monitor the DTC codes from within Service ADVISOR. Did 000157.03 become active?	**YES:** Harness OK. Check fuel system. GO TO 8 **NO:** GO TO 6

Continued on next page

DN22556,00004C9 -19-14JAN09-7/15

6 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000157.03* 1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J1 from ECU. 3. Ignition ON, Engine OFF. 4. Monitor the DTC codes from within Service ADVISOR. Did 000157.03 become active?	**YES:** Perform TERMINAL TEST on ECU connector J1. Inspect harness for damage. GO TO 12 **NO:** Problem with ECU GO TO 7

DN22556,00004C9 -19-14JAN09-8/15

7 Reprogram ECU	Check with Custom Performance for possible software updates. Is there an update available?	**YES:** ECU has already been reprogrammed. Replace ECU. GO TO 12 **YES:** Reprogram ECU using Service ADVISOR. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR in Section 04, Group 160 earlier in this manual. GO TO 12 **NO:** Replace ECU. GO TO 12

DN22556,00004C9 -19-14JAN09-9/15

8 Check Low Pressure Fuel - Actual Pressure	1. Reconnect all connectors. 2. Ignition ON, Engine ON. 3. From Service ADVISOR, read Low Pressure Fuel - Actual Pressure. Is the fuel pressure grater than 30 kPa (4.4 psi)?	**YES:** GO TO 9 **NO:** Check fuel system. For further information on checking fuel system, see F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 04, Group 150 earlier in this manual.

Continued on next page

DN22556,00004C9 -19-14JAN09-10/15

9 Check Fuel Rail Pressure Sensor	1. Ignition OFF, Engine OFF.	
	2. Remove fuel rail pressure sensor. See REMOVE AND INSTALL FUEL RAIL PRESSURE SENSOR in section 02, Group 110 earlier in this manual.	**YES:** Fix defected part. GO TO 12
	3. Inspect engine housing, sensor housing, and O-ring for defects.	**NO:** Replace fuel rail pressure sensor. See REMOVE AND INSTALL FUEL RAIL PRESSURE SENSOR in Section 02, Group 110 earlier in this manual. GO TO 12
	Were any defects found?	**NO:** Fuel rail pressure sensor has been replaced. GO TO 10

DN22556,00004C9 -19-14JAN09-11/15

10 Check High Pressure Fuel Supply System	Verify that the high pressure rail system is working properly. See F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST in group 04, Section 150 earlier in this manual.	**YES:** Repair problem as described in F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST. GO TO 12
	Were any problems found?	**NO:** No problem found. GO TO 11

DN22556,00004C9 -19-14JAN09-12/15

11 Check Injectors	Remove rocker arm cover. Check for loose Electronic Injector (EI) clamps and fuel leaking into the area under the valve.	**YES:** See F4 - FUEL IN OIL in Section 04, Group 150 earlier in this manual. Repair problem. GO TO 12
	Is fuel leaking around the injector area?	**NO:** GO TO 1

DN22556,00004C9 -19-14JAN09-13/15

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. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000157.17 reappear as active starting engine?	**NO:** Problem fixed.

Continued on next page

DN22556,00004C9 -19-14JAN09-14/15

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. 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.

DN22556,00004C9 -19-14JAN09-15/15

000158.17 — ECU Power Down Error

The ECU is unable to complete proper power down procedures after detecting that ignition is OFF.

DN22556,00004CA -19-06SEP07-1/4

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) in Section 03, Group 140 earlier in this manual.

DN22556,00004CA -19-06SEP07-2/4

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

DN22556,00004CA -19-06SEP07-3/4

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.

DN22556,00004CA -19-06SEP07-4/4

000160.02 — Vehicle Speed Signal Invalid

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000004 -19-06APR09-1/1

000171.03 — Ambient Air Temperature Out of Range High

For troubleshooting procedure please see the application troubleshooting manual.

RG40049,00001DD -19-02NOV09-1/1

000171.04 — Ambient Air Temperature Out of Range Low

For troubleshooting procedure please see the application troubleshooting manual.

RG40049,00001DE -19-02NOV09-1/1

000174.00 — Fuel Temperature Signal Extremely High

The ECU senses a fuel temperature above specification.

Continued on next page

DN22556,00004CB -19-14JAN09-1/16

000174.00 — Fuel Temperature Signal Extremely High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00
000105.00 or 000105.16
000174.00

When DTC is Displayed:
When the engine is on and the error is active.

Related Information:

NOTE: OEM engines are programmed using trimmable features. The customer had the option to choose an engine shutdown feature. If this feature was programmed into the ECU, the ECU will shut the engine down if this code sets. If the shutdown feature was not selected, a standard derate will be activated.

The ECU senses a fuel temperature of 100° C (212° F) on OEM engines.
The engine has to running for 3 minutes for the code to set. 001569.31 is set when this code is active and engine has not shut down.
001110.31 is set if the shutdown feature is enabled.
The engine has to be running for 3 minutes before the code is set.
001109.31 is set 30 seconds before the ECU shuts down the engine.

Alarm Level:
Stop

Control Unit Response:
Maximum engine power is derated up to 20 percent.

Additional References:
For further fuel temperature sensor information, see FUEL TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.
For further temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
• Fuel temperature sensor T05 - Blue/Orange

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DN22556,00004CB -19-14JAN09-2/16

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. 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 000174.00 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,00004CB -19-14JAN09-3/16

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 13 **NO:** GO TO 3

DN22556,00004CB -19-14JAN09-4/16

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 13

DN22556,00004CB -19-14JAN09-5/16

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 13 **NO:** GO TO 5

DN22556,00004CB -19-14JAN09-6/16

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 13 **NO:** GO TO 6

Continued on next page

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6 Check Fuel Temperature Sensor Operation	1. With fuel sensor removed from engine, reconnect fuel temperature sensor to its harness connector.	
	2. Ignition ON, Engine OFF.	
	3. Monitor the Fuel Temperature from within Service ADVISOR.	**YES:** Fuel temperature sensor is OK. Diagnose engine fuel system. GO TO 9
	4. If necessary, let the sensor cool down to the ambient temperature.	**NO:** Fuel temperature sensor has already been replaced. GO TO 7
	Does the sensor reading closely match the ambient temperature?	**NO:** Replace fuel temperature sensor. GO TO 13

DN22556,00004CB -19-14JAN09-8/16

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 DTCs from within Service ADVISOR.	**YES:** Wire harness is OK. Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1
	Did 174.03 become active?	**NO:** GO TO 8

DN22556,00004CB -19-14JAN09-9/16

8 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000174.03*	
	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connector J1.	
	3. Ignition ON, Engine OFF.	
	4. Monitor the DTC codes from within Service ADVISOR.	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J1. Diagnose and fix harness problem. GO TO 13
	Did 174.03 become active?	**NO:** Replace ECU. GO TO 13

DN22556,00004CB -19-14JAN09-10/16

9 Restricted Fuel Leak-off Line Test	Check for restricted fuel leak-off line. See CHECK FOR RESTRICTED FUEL LEAK-OFF LINE in Section 04, Group 150 earlier in this manual.	**YES:** Determine cause of restriction. Fix problem. GO TO 13
	Is fuel restriction found?	**NO:** GO TO 10

Continued on next page

DN22556,00004CB -19-14JAN09-11/16

10 Fuel Supply Pressure Test	Determine the fuel supply pressure. See F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 04, Group 150 earlier in this manual. Is the fuel pressure below specification?	**YES:** Determine cause of low supply pressure. See F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 04, Group 150 earlier in this manual. Fix problem. GO TO 13 **NO:** GO TO 11

DN22556,00004CB -19-14JAN09-12/16

11 Overflow Valve Test	1. Ignition OFF, Engine OFF. 2. Remove the fuel line form the high pressure fuel pump overflow valve. 3. Connect one end of a clear line to the high pressure fuel pump overflow valve and direct the other end to a suitable container for diesel fuel. 4. Ignition ON, Engine ON. Is fuel flow present from the overflow valve?	**YES:** GO TO 12 **NO:** Faulty high pressure fuel pump overflow valve. Fix problem. GO TO 13

DN22556,00004CB -19-14JAN09-13/16

12 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR 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 cooling and fuel system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 13

DN22556,00004CB -19-14JAN09-14/16

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 000105.00 reappear as active with engine running?	**YES:** Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1 **NO:** Problem fixed.

Continued on next page

DN22556,00004CB -19-14JAN09-15/16

14 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.

DN22556,00004CB -19-14JAN09-16/16

000174.03 — Fuel Temperature Signal Out of Range High

The Fuel temperature Input Voltage exceeds the sensor's high voltage specification.

DN22556,00004CC -19-14JAN09-1/19

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 xx° C (xxx° F).

Additional References:
For more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel temperature sensor T05 - Blue/Orange

Continued on next page

DN22556,00004CC -19-14JAN09-2/19

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 000174.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004CC -19-14JAN09-3/19

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

DN22556,00004CC -19-14JAN09-4/19

3 Sensor Open Test	Measure the resistance between terminal 1 and terminal 2 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

DN22556,00004CC -19-14JAN09-5/19

4 Harness Resistance Check	Measure the resistance between the return (terminal 2) and signal (terminal 1) in the fuel sensor harness connector. Was the resistance between 1k and 3k ohms?	**YES:** GO TO 5 **NO:** GO TO 6.

DN22556,00004CC -19-14JAN09-6/19

5 Terminal to Terminal Resistance Check	1. Disconnect all ECU connectors. 2. Measure the resistance between the signal (terminal J1-F4) 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

DN22556,00004CC -19-14JAN09-7/19

6 **Harness Return Wire Resistance Check**	Measure the resistance between the return (terminal 2) 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.

DN22556,00004CC -19-14JAN09-8/19

7 **Harness Signal Wire Resistance Check ECU Disconnected**	Measure the resistance between the signal (terminal J1-F4) in the ECU connector and the signal (terminal 1) 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

DN22556,00004CC -19-14JAN09-9/19

8 **Harness Return Wire Resistance Check ECU Disconnected**	Measure the resistance between the return (terminal J1-D2) in the ECU connector and the return (terminal 2) 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

DN22556,00004CC -19-14JAN09-10/19

9 **ECU Resistance Check**	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-F4) 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.

DN22556,00004CC -19-14JAN09-11/19

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

DN22556,00004CC -19-14JAN09-12/19

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. Were any problems found?	 **YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

DN22556,00004CC -19-14JAN09-13/19

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

DN22556,00004CC -19-14JAN09-14/19

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

DN22556,00004CC -19-14JAN09-15/19

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

DN22556,00004CC -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the fuel temperature sensor, harness and connector also ECU J1 and connector.	**YES:** Repair problem, Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 16

DN22556,00004CC -19-14JAN09-17/19

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 000174.03 active?	**NO:** GO TO 15.

Continued on next page

DN22556,00004CC -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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 000174.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,00004CC -19-14JAN09-19/19

000174.04 — Fuel Temperature Signal Out of Range Low

The Fuel Temperature Input Voltage drops below the sensor's low voltage specification.

DN22556,00004CD -19-14JAN09-1/19

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 more temperature sensor information, see MEASURING TEMPERATURE in Section 03, Group 140 earlier in this manual.

For more 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel temperature sensor T05 - Blue/Orange

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DN22556,00004CD -19-14JAN09-2/19

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 000174.04 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00004CD -19-14JAN09-3/19

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

DN22556,00004CD -19-14JAN09-4/19

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

DN22556,00004CD -19-14JAN09-5/19

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.

DN22556,00004CD -19-14JAN09-6/19

5 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 6

Continued on next page

DN22556,00004CD -19-14JAN09-7/19

6 Harness Resistance Check	Measure the resistance between the return (terminal B) and signal (terminal A) in the fuel temperature sensor harness connector. Was the resistance less than 100 ohms?	**YES:** GO TO 7 **NO:** Reconnect all connectors and GO TO 2.

DN22556,00004CD -19-14JAN09-8/19

7 Harness Resistance Check ECU Disconnected	1. Disconnect ECU connector J1. 2. Measure the resistance between the return (terminal B) and signal (terminal A) in the fuel temperature sensor harness connector. Was the resistance less than 100 ohms?	 **YES:** GO TO 8 **NO:** GO TO 9.

DN22556,00004CD -19-14JAN09-9/19

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.

DN22556,00004CD -19-14JAN09-10/19

9 ECU Resistance Check	Measure the resistance between the return (terminal J1-D2) and signal (terminal J1-C2) 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.

DN22556,00004CD -19-14JAN09-11/19

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

DN22556,00004CD -19-14JAN09-12/19

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

Continued on next page

DN22556,00004CD -19-14JAN09-13/19

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

DN22556,00004CD -19-14JAN09-14/19

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 000174.04 reappear when engine operating point was reached?	**NO:** GO TO 12

DN22556,00004CD -19-14JAN09-15/19

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

DN22556,00004CD -19-14JAN09-16/19

15 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the fuel temperature 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 16

DN22556,00004CD -19-14JAN09-17/19

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.

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DN22556,00004CD -19-14JAN09-18/19

17 Software Updates	1. Check custom performance for possible software updates. If new software is available, 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.

DN22556,00004CD -19-14JAN09-19/19

000174.16 — Fuel Temperature Signal Moderately High

The ECU senses the Fuel Temperature above specification.

DN22556,00004CE -19-05JUN08-1/16

000174.16 — Fuel Temperature Signal Moderately High Diagnostic Procedure

Trouble Shooting Sequence:
000110.00 or 000110.16
000105.00 or 000105.16
000174.16

Related Information:
The ECU senses a fuel temperature of 95° C (203° F) on OEM engines.
The engine has to running for 3 minutes for the code to set.

Alarm Level:
Warning

Control Unit Response:
The ECU will operate normally.

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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel temperature sensor T05 - Blue/Orange

Continued on next page

DN22556,00004CE -19-05JUN08-2/16

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 000174.16 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,00004CE -19-05JUN08-3/16

2 Fuel Level	Is the fuel level less than a quarter full?	**YES:** Add more fuel. GO TO 13 **NO:** GO TO 3

DN22556,00004CE -19-05JUN08-4/16

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 13

DN22556,00004CE -19-05JUN08-5/16

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 13 **NO:** GO TO 5

DN22556,00004CE -19-05JUN08-6/16

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 13 **NO:** GO TO 6

Continued on next page

DN22556,00004CE -19-05JUN08-7/16

6 Check Fuel Temperature Sensor Operation	1. With fuel sensor removed from engine, reconnect fuel temperature sensor to its harness connector. 2. Ignition ON, Engine OFF. 3. Monitor the Fuel Temperature from within Service ADVISOR. 4. If necessary, let the sensor cool down to the ambient temperature. Does the sensor reading closely match the ambient temperature?	**YES:** Fuel temperature sensor is OK. Diagnose engine fuel system. GO TO 9 **NO:** Fuel temperature sensor has already been replaced. GO TO 7 **NO:** Replace fuel temperature sensor. GO TO 13

DN22556,00004CE -19-05JUN08-8/16

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 DTCs from within Service ADVISOR. Did 174.03 become active?	**YES:** Wire harness is OK. Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1 **NO:** GO TO 8

DN22556,00004CE -19-05JUN08-9/16

8 Check ECU	*NOTE: Several new DTCs will appear in this step. Ignore all DTCs except for 000174.03* 1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J1. 3. Ignition ON, Engine OFF. 4. Monitor the DTC codes from within Service ADVISOR. Did 174.03 become active?	**YES:** Problem in harness. Perform TERMINAL TEST on ECU connector J1. Diagnose and fix harness problem. GO TO 13 **NO:** Replace ECU. GO TO 13

DN22556,00004CE -19-05JUN08-10/16

9 Restricted Fuel Leak-off Line Test	Check for restricted fuel leak-off line. See CHECK FOR RESTRICTED FUEL LEAK-OFF LINE in Section 04, Group 150 earlier in this manual. Is fuel restriction found?	**YES:** Determine cause of restriction. Fix problem. GO TO 13 **NO:** GO TO 10

Continued on next page

DN22556,00004CE -19-05JUN08-11/16

10 Fuel Supply Pressure Test	Determine the fuel supply pressure. See F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 04, Group 150 earlier in this manual. Is the fuel pressure below specification?	**YES:** Determine cause of low supply pressure. See F1 - LOW PRESSURE FUEL SUPPLY SYSTEM TEST in Section 04, Group 150 earlier in this manual. Fix problem. GO TO 13 **NO:** GO TO 11

DN22556,00004CE -19-05JUN08-12/16

11 Overflow Valve Test	1. Ignition OFF, Engine OFF. 2. Remove the fuel line form the high pressure fuel pump overflow valve. 3. Connect one end of a clear line to the high pressure fuel pump overflow valve and direct the other end to a suitable container for diesel fuel. 4. Ignition ON, Engine ON. Is fuel flow present from the overflow valve?	**YES:** GO TO 12 **NO:** Faulty high pressure fuel pump overflow valve. Fix problem. GO TO 13

DN22556,00004CE -19-05JUN08-13/16

12 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See D5 - ECU DOES NOT PROGRAM WITH SERVICE ADVISOR 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 cooling and fuel system and related parameters are functioning properly. GO TO 1 **NO:** Verify problem is fixed. GO TO 13

DN22556,00004CE -19-05JUN08-14/16

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 000105.16 reappear as active with engine running?	**YES:** Problem not fixed. Verify cooling and fuel system and related parameters are functioning properly. GO TO 1 **NO:** Problem fixed.

Continued on next page

DN22556,00004CE -19-05JUN08-15/16

14 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.

DN22556,00004CE -19-05JUN08-16/16

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.

DN22556,00004CF -19-07AUG07-1/1

000190.00 — Engine Speed Extremely High

The ECU detects that engine speed exceeds the maximum rpm.

BB78437,0000120 -19-06AUG10-1/12

000190.00 — Engine Speed Extremely High Diagnostic Procedure

Troubleshooting Sequence:
000190.00

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects that engine speed exceeds the maximum rpm allowed.

Alarm Level:
Warning

Control Unit Response:
The ECU stops fuel flow to the high pressure common rail (HPCR), by turning off the suction control valve on the high pressure fuel pump.

Additional References:
For more fuel system information, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

BB78437,0000120 -19-06AUG10-2/12

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

BB78437,0000120 -19-06AUG10-3/12

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

BB78437,0000120 -19-06AUG10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

BB78437,0000120 -19-06AUG10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 4.5L/6.8L - 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.

BB78437,0000120 -19-06AUG10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF. 2. Run Cylinder Electronic Compression Test and record values. 3. Run Cylinder Misfire Test and record values. 4. Run Cylinder Cutout Test and record values. Do these tests all point to a problem in a particular cylinder?	**YES:** Replace injector in the suspected cylinder. GO TO 6 **NO:** GO TO 7

BB78437,0000120 -19-06AUG10-7/12

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.

BB78437,0000120 -19-06AUG10-8/12

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.

BB78437,0000120 -19-06AUG10-9/12

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

BB78437,0000120 -19-06AUG10-10/12

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.

BB78437,0000120 -19-06AUG10-11/12

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.

BB78437,0000120 -19-06AUG10-12/12

000190.16 — Engine Speed Moderately High

The ECU detects that engine speed exceeds the maximum rpm.

BB78437,0000121 -19-06AUG10-1/12

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.

BB78437,0000121 -19-06AUG10-2/12

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

BB78437,0000121 -19-06AUG10-3/12

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

BB78437,0000121 -19-06AUG10-4/12

3 Oil Level Check	Check application oil level Is oil level low?	**YES:** GO TO 4 **NO:** GO TO 5

Continued on next page

BB78437,0000121 -19-06AUG10-5/12

4 Turbo Oil Seal Leak Test	1. Check for leaking oil seal on turbocharger, see 4.5L/6.8L - L1 - EXCESSIVE OIL CONSUMPTION in Section 4 Group 150 of the Base Engine manual.	
	2. Fill oil to proper level. Ignition ON, Engine ON.	
	3. Reconnect Service ADVISOR, if disconnected.	
	4. Run engine to highest load point you can for 5 minutes.	
	5. Refresh codes.	**YES:** GO TO 5
	Is 000190.16 still active?	**NO:** Problem fixed.

BB78437,0000121 -19-06AUG10-6/12

5 Cylinder Testing	1. Ignition ON, Engine OFF.	
	2. Run Cylinder Electronic Compression Test and record values.	
	3. Run Cylinder Misfire Test and record values.	
	4. Run Cylinder Cutout Test and record values.	**YES:** Replace injector in the suspected cylinder. GO TO 6
	Do these tests all point to a problem in a particular cylinder?	**NO:** GO TO 7

BB78437,0000121 -19-06AUG10-7/12

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.	**YES:** Start a DTAC case.
	Is 000190.16 still active?	**NO:** Problem fixed.

BB78437,0000121 -19-06AUG10-8/12

7 Occurrence Count Check	Review stored information and look at occurrence count for 000190.16.	**YES:** GO TO 8
	Is occurrence recorded in step 1 greater than 5?	**NO:** Return application to service.

BB78437,0000121 -19-06AUG10-9/12

8 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

Continued on next page

BB78437,0000121 -19-06AUG10-10/12

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.

BB78437,0000121 -19-06AUG10-11/12

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.

BB78437,0000121 -19-06AUG10-12/12

000237.02 — VIN Security Data Invalid

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000005 -19-06APR09-1/1

000237.13 — VIN Option Code Security Data Conflict

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000006 -19-06APR09-1/1

000237.31 — VIN Security Data Missing

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000007 -19-06APR09-1/1

000569.03 — Rear Axle Differential Lock Signal Out of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000615 -19-24MAY07-1/1

000569.04 — Rear Axle Differential Lock Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000616 -19-24MAY07-1/1

000611.03 — Injector Shorted to Voltage Source

The ECU detects that injector wiring is shorted to a voltage source.

DN22556,00004D9 -19-14JAN09-1/18

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects that injector wiring is shorted to a voltage source.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by either the injector high side wiring or injector low side wiring being shorted to a voltage source.

Alarm Level:
Stop

Control Unit Response:
The ECU will attempt to control the engine in a normal manner. Engine may run poorly or stall, depending on the location of short.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 C01 - Yellow/Purple

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DN22556,00004D9 -19-14JAN09-2/18

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000611.03 reappear active?

YES: GO TO 2

NO: GO TO 12

DN22556,00004D9 -19-14JAN09-3/18

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 8-way injector connector between engine harness and injector harness.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Is DTC 000611.03 still active?

NOTE: Ignore DTCs for high resistance in all injector circuits that may now be active because of this test.

YES: GO TO 5

NO: GO TO 3

DN22556,00004D9 -19-14JAN09-4/18

3 Injector 8-Way Connector Terminal Test

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on injector harness to engine harness 8-way connectors.

Were any problems found?

YES: Fix problem. GO TO 11

NO: GO TO 4

DN22556,00004D9 -19-14JAN09-5/18

4 Check Injector Harness for Short to Voltage Source

1. Ignition ON, engine OFF.
2. On the injector harness, measure the voltage between the each terminal of the 8-way connector (male pin terminals) and single point ground.

Was any voltage measurement greater than 0.5V?

YES: Fix problem. GO TO 11

NO: Inspect injector harness for damage. If none found, GO TO 5

Continued on next page

DN22556,00004D9 -19-14JAN09-6/18

5 ECU Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector. 3. Perform TERMINAL TEST on J1 connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 6

DN22556,00004D9 -19-14JAN09-7/18

6 Check Engine Harness for Open Circuit	On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector and the 8-way injector connector: • Terminal J1-G1 to 8-way terminal 7 • Terminal J1-G2 to 8-way terminal 8 • Terminal J1-A1 to 8-way terminal 4 (only with 6.8L) • Terminal J1-B1 to 8-way terminal 2 (only with 6.8L) • Terminal J1-C1 to 8-way terminal 6 • Terminal J1-D1 to 8-way terminal 3 • Terminal J1-E1 to 8-way terminal 1 • Terminal J1-F1 to 8-way terminal 5 Are all resistance readings less than 10 ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 11

DN22556,00004D9 -19-14JAN09-8/18

7 Check Engine Harness for Short to Voltage Source	1. Reconnect engine harness to injector harness 8-way 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

DN22556,00004D9 -19-14JAN09-9/18

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	**YES:** GO TO 9
	Are all resistance readings greater than 1k ohms?	**NO:** Fix problem. GO TO 11

DN22556,00004D9 -19-14JAN09-10/18

9 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 10
	Did DTC 000611.03 reappear active?	**NO:** Problem fixed.

DN22556,00004D9 -19-14JAN09-11/18

10 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000611.03 reappear active?	**NO:** Problem fixed.

DN22556,00004D9 -19-14JAN09-12/18

11 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000611.03 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004D9 -19-14JAN09-13/18

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

DN22556,00004D9 -19-14JAN09-14/18

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

DN22556,00004D9 -19-14JAN09-15/18

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 8-way 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

DN22556,00004D9 -19-14JAN09-16/18

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

DN22556,00004D9 -19-14JAN09-17/18

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.

DN22556,00004D9 -19-14JAN09-18/18

000611.04 — Injector Shorted to Ground

The ECU detects that injector wiring is shorted to ground.

DN22556,00004DA -19-11APR08-1/20

000611.04 — Injector Shorted to Ground Diagnostic Procedure

Troubleshooting Sequence:
000611.04

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects that injector wiring is shorted to ground.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a short to ground of injector high side or low side wiring, or by an injector coil that is shorted to ground.

Alarm Level:
Stop

Control Unit Response:
The ECU will not permit the engine to operate when this DTC is active.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Fuel injector C01 - Yellow/Purple

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DN22556,00004DA -19-11APR08-2/20

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000611.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,00004DA -19-11APR08-3/20

2 Check for DTC Change with Injector Harness Disconnected	**⚠ CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** *NOTE: See FUEL SYSTEM COMPONENTS located in Section 02, Group 90 earlier in this manual for component locations.* 1. Ignition OFF, engine OFF. 2. Disconnect 8-way injector connector between engine harness and injector harness. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 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

DN22556,00004DA -19-11APR08-4/20

3 Injector 8-Way Connector Terminal Test	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on injector harness to engine harness 8-way connectors. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 4

DN22556,00004DA -19-11APR08-5/20

4 Check Injector Harness for Short to Ground	On the injector harness (male pin terminals), measure the resistance between each terminal of the 8-way connector and single point ground. Are all resistance readings greater than 1k ohms?	**YES:** Inspect injector harness for damage. If none found, GO TO 7 **NO:** GO TO 5

Continued on next page

DN22556,00004DA -19-11APR08-6/20

5 Inspect Injector Harness	1. Remove injector heat shield.	
	2. Inspect injector harness for damage that would cause a short to ground.	**YES:** Replace injector harness. GO TO 13
	Were any problems found?	**NO:** GO TO 6

DN22556,00004DA -19-11APR08-7/20

6 Check Injector Coils for Short to Ground	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.*	
	1. Remove injector connector dust caps and terminal nuts from all injectors. 2. Lift injector connectors away from injector studs. 3. On each injector, measure the resistance between all injector studs and single point ground.	**YES:** Replace injector harness. GO TO 13
	Are all resistance readings greater than 1k ohms?	**NO:** Replace injector(s) having less than 1k ohms of resistance to ground. GO TO 13

DN22556,00004DA -19-11APR08-8/20

7 ECU Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J1 connector. 3. Perform TERMINAL TEST on J1	**YES:** Fix problem. GO TO 13
	Were any problems found?	**NO:** GO TO 8

DN22556,00004DA -19-11APR08-9/20

8 Check Engine Harness for Correct Pin Out	On the engine harness, measure the resistance between the following injector circuit terminals in the J1 connector and the 8-way injector connector: • Terminal J1-G1 to 8-way terminal 7 • Terminal J1-G2 to 8-way terminal 8 • Terminal J1-A1 to 8-way terminal 4 (only with 6.8L) • Terminal J1-B1 to 8-way terminal 2 (only with 6.8L) • Terminal J1-C1 to 8-way terminal 6 • Terminal J1-D1 to 8-way terminal 3 • Terminal J1-E1 to 8-way terminal 1 • Terminal J1-F1 to 8-way terminal 5	**YES:** GO TO 9
	Are all resistance readings less than 10 ohms?	**NO:** Fix problem. GO TO 13

Continued on next page

DN22556,00004DA -19-11APR08-10/20

9 Check Engine Harness for Short to Ground

1. Reconnect engine harness to injector harness 8-way connector.
2. On the harness, measure the resistance between injector voltage supply 1 (J1-G1) and single point ground.
3. On the harness, measure the resistance between injector voltage supply 2 (J1-G2) and single point ground.

Are all resistance readings greater than 1k ohms?

YES: GO TO 10

NO: Fix problem. GO TO 13

DN22556,00004DA -19-11APR08-11/20

10 Check Engine Harness for Wire-to-Wire Short

1. On the harness, measure the resistance between injector voltage supply 1 (J1-G1) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1
2. On the harness, measure the resistance between injector voltage supply 2 (J1-G2) and all other terminals in the J1 connector EXCEPT the following terminals:
   - J1-A1
   - J1-B1
   - J1-C1
   - J1-D1
   - J1-E1
   - J1-F1

Are all resistance readings greater than 1k ohms?

YES: GO TO 11

NO: Fix problem. GO TO 13

DN22556,00004DA -19-11APR08-12/20

11 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: GO TO 12

NO: Problem fixed.

DN22556,00004DA -19-11APR08-13/20

12 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000611.04 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

Continued on next page

DN22556,00004DA -19-11APR08-14/20

13 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor DTCs in Service ADVISOR. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000611.04 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004DA -19-11APR08-15/20

14 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 15 **NO:** GO TO 16

DN22556,00004DA -19-11APR08-16/20

15 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh codes. Did 000611.04 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 16

DN22556,00004DA -19-11APR08-17/20

16 Terminal Test and Harness Inspection	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector and 8-way injector harness connector (if not already performed). 3. Inspect engine wire harness and injector harness carefully for damage which may cause an intermittent short to ground. Were any problems found?	**YES:** Fix problem. GO TO 13 **NO:** GO TO 17

DN22556,00004DA -19-11APR08-18/20

17 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000611.04 active with engine running?	**YES:** GO TO 1. **NO:** GO TO 18

Continued on next page

DN22556,00004DA -19-11APR08-19/20

18 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Refresh DTCs. Is 000611.04 active with engine running?	**YES:** GO TO 1 **NO:** Problem fixed or conditions to generate 000611.04 have not been duplicated.

DN22556,00004DA -19-11APR08-20/20

000627.01 — All Injector Circuits Have High Resistance

The ECU detects that all injector circuits have high resistance.

JB81757,000000C -19-14JAN09-1/18

000627.01— All Injector Circuits Have High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000627.01

When DTC is Displayed:
The engine is cranking or running and the error condition is active. The DTC is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in all injector circuits.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few additional ohms of resistance in the injector circuits.
This DTC can also be caused by a low ECU voltage supply.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner, but the engine may not run due to low injector current.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 C01 - Yellow/Purple

Continued on next page

JB81757,000000C -19-14JAN09-2/18

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000627.01 reappear active?

YES: GO TO 2

NO: GO TO 12

JB81757,000000C -19-14JAN09-3/18

2 Check Unswitched Battery Voltage

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

JB81757,000000C -19-14JAN09-4/18

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 injector harness 8-way connector is fully attached to engine 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

JB81757,000000C -19-14JAN09-5/18

4 Injector 8-Way Connector Terminal Test

Perform TERMINAL TEST on injector harness to engine harness 8-way connectors.

Were any problems found?

YES: Fix problem. GO TO 11

NO: GO TO 5

JB81757,000000C -19-14JAN09-6/18

5 Check Injector #1 Circuit for High Resistance

On the injector harness 8-way connector (male pin terminals), measure the resistance between injector voltage supply (terminal 7) 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

JB81757,000000C -19-14JAN09-7/18

6 ECU Terminal Test	Perform TERMINAL TEST on J1 connector. Were any problems found?	**YES:** Fix problem. GO TO 11 **NO:** GO TO 7

JB81757,000000C -19-14JAN09-8/18

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 8-way injector connector: • Terminal J1-G1 to 8-way terminal 7 • Terminal J1-G2 to 8-way terminal 8 • Terminal J1-A1 to 8-way terminal 4 (only with 6.8L) • Terminal J1-B1 to 8-way terminal 2 (only with 6.8L) • Terminal J1-C1 to 8-way terminal 6 • Terminal J1-D1 to 8-way terminal 3 • Terminal J1-E1 to 8-way terminal 1 • Terminal J1-F1 to 8-way terminal 5 Are all resistance readings less than 2 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 11

JB81757,000000C -19-14JAN09-9/18

8 Check Injector Circuits for High Resistance	1. Reconnect engine harness to injector harness 8-way 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 (only with 6.8L) • Terminal J1-G1 to J1-D1 • Terminal J1-G1 to J1-E1 • Terminal J1-G2 to J1-A1 (only with 6.8L) • 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

JB81757,000000C -19-14JAN09-10/18

9 Reprogram ECU	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** GO TO 10 **NO:** Problem fixed.

Continued on next page

JB81757,000000C -19-14JAN09-11/18

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

JB81757,000000C -19-14JAN09-12/18

11 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000627.01 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

JB81757,000000C -19-14JAN09-13/18

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

JB81757,000000C -19-14JAN09-14/18

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

JB81757,000000C -19-14JAN09-15/18

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 8-way 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

JB81757,000000C -19-14JAN09-16/18

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

JB81757,000000C -19-14JAN09-17/18

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.

JB81757,000000C -19-14JAN09-18/18

000627.18 — Injector Power Supply Voltage Out of Range Low

The ECU detects a voltage below specification on ECU battery supply terminals.

BB78437,0000122 -19-05JUN08-1/17

000627.18 — ECU Injector Power Supply Voltage Out of Range Low Diagnostic Procedure

Related Information:
The ECU detects that its 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 battery supply terminals and three internally-connected ground terminals.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
If ECU battery voltage supply is too low, injectors may not operate.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

BB78437,0000122 -19-05JUN08-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Start engine and operate at speeds above 1200 rpm. Did 000627.18 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

Continued on next page

BB78437,0000122 -19-05JUN08-3/17

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.	**YES:** GO TO 3
	Is voltage greater than 13V for 12V applications or 26V for 24V applications with engine running?	**NO:** Fix application charging system problem. GO TO 9

BB78437,0000122 -19-05JUN08-4/17

3 Check Unswitched Battery Voltage	Monitor Unswitched Battery Voltage data point in Service ADVISOR with engine running.	**YES:** GO TO 7
	Is the voltage greater than 12.5V for 12V systems or 25V for 24V systems?	**NO:** GO TO 4

BB78437,0000122 -19-05JUN08-5/17

4 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J2 connector.	
	3. Perform TERMINAL TEST on J2.	**YES:** Fix problem. GO TO 9
	Where any problems found?	**NO:** GO TO 5

BB78437,0000122 -19-05JUN08-6/17

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.	**YES:** GO TO 6
	Are all voltage measurements within 1V of battery terminal voltage?	**NO:** Fix problem in ECU battery supply or ground circuits. GO TO 9

BB78437,0000122 -19-05JUN08-7/17

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.	**YES:** GO TO 7
	Are all resistance measurements less than 2 ohms?	**NO:** Fix problem. GO TO 9

Continued on next page

BB78437,0000122 -19-05JUN08-8/17

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.

BB78437,0000122 -19-05JUN08-9/17

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.

BB78437,0000122 -19-05JUN08-10/17

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.

BB78437,0000122 -19-05JUN08-11/17

10 Further Review of Snapshot Information	Review stored information collected in step 1 Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** Fix problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

BB78437,0000122 -19-05JUN08-12/17

11 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh codes. Did 000627.18 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 12

Continued on next page

BB78437,0000122 -19-05JUN08-13/17

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. Is the minimum Battery Voltage data point recorded during the check within 1V of battery terminal voltage?	**YES:** GO TO 13 **NO:** Repair source of intermittent high resistance in ECU battery supply and ground. GO TO 9

BB78437,0000122 -19-05JUN08-14/17

13 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST of single point ground stud. 3. Perform TERMINAL TEST of ECU battery supply fuse holder. 4. Perform TERMINAL TEST at battery terminals. 5. Perform TERMINAL TEST on the ECU J2 connector. 6. Inspect engine wire harness for damage which may cause an intermittent open circuit. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 14

BB78437,0000122 -19-05JUN08-15/17

14 Reconnect and Retest	1. Reconnect all connectors. 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:** GO TO 15

BB78437,0000122 -19-05JUN08-16/17

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.

BB78437,0000122 -19-05JUN08-17/17

000629.12 — ECU EEPROM Error

The ECU detects an internal problem.

DN22556,00004DD -19-05JUN08-1/5

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.

DN22556,00004DD -19-05JUN08-2/5

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 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 2 **NO:** Recharge application batteries or determine cause of low ECU voltage. GO TO 2

DN22556,00004DD -19-05JUN08-3/5

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

DN22556,00004DD -19-05JUN08-4/5

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.

DN22556,00004DD -19-05JUN08-5/5

000629.13 — ECU Boot Block Error

The ECU detects an internal problem.

JB81757,000000D -19-05AUG07-1/4

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.

JB81757,000000D -19-05AUG07-2/4

1 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Disconnect Service ADVISOR. 3. Ignition OFF, engine OFF for 5 minutes. 4. Ignition ON, engine OFF. 5. Connect Service ADVISOR Did 000629.13 reappear active?	**YES:** GO TO 2 **NO:** Problem fixed.

JB81757,000000D -19-05AUG07-3/4

2 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Disconnect Service ADVISOR. 4. Ignition OFF, engine OFF for 5 minutes. 5. Ignition ON, engine OFF. 6. Connect Service ADVISOR Did 000629.13 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

JB81757,000000D -19-05AUG07-4/4

000636.02 — Camshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) on the camshaft position sensor input.

DN22556,00004DE -19-05JUN08-1/22

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 sensor signal.

The extra pulses may be caused by electromagnetic interference or by a sensor signal wire that is shorted to some other signal wire.

Wiring problems such as loose terminals or water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crank sensor input to determine camshaft and pump position.
If a crank sensor DTC accompanies 000636.02, the engine cannot be started and will stall if running until at least one of the two codes is repaired.

Additional References:
For more pump position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 24V ECU WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use 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
- Pump position sensor X02 - Purple/Gray

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DN22556,00004DE -19-05JUN08-2/22

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

DN22556,00004DE -19-05JUN08-3/22

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.

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

DN22556,00004DE -19-05JUN08-4/22

3 Test Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect pump position sensor.
3. Perform TERMINAL TEST on pump position sensor and connector.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 4

DN22556,00004DE -19-05JUN08-5/22

4 Inspect Target

1. Remove pump position sensor.
2. Using mirror, visually inspect webs on rear face of upper idler gear through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris on webs and rear face of gear.

YES: Fix problem. GO TO 19

Were any problems found?

NO: GO TO 5

Continued on next page

DN22556,00004DE -19-05JUN08-6/22

5 Inspect Pump Position Sensor	*NOTE: See REMOVE AND INSTALL PUMP POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of pump position sensor for damage due to contact with upper idler gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 19
	Does sensor appear damaged due to contact with gear?	**NO:** GO TO 6

DN22556,00004DE -19-05JUN08-7/22

6 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A).	**YES:** Reinstall camshaft position sensor. Do not reconnect to harness. GO TO 7
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace camshaft position sensor. GO TO 19

DN22556,00004DE -19-05JUN08-8/22

7 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 8

DN22556,00004DE -19-05JUN08-9/22

8 Check for Shorted to Ground Sensor Return	On the harness, measure the resistance between the ECU connector camshaft position sensor return (J1-E4) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 19

DN22556,00004DE -19-05JUN08-10/22

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 (J1-A4) and the camshaft position sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

DN22556,00004DE -19-05JUN08-11/22

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

DN22556,00004DE -19-05JUN08-12/22

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 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 19

NO: GO TO 12

DN22556,00004DE -19-05JUN08-13/22

12 Check for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. On the harness, measure the resistance between the ECU J1 connector camshaft position sensor signal (J1-A4) and all other terminals in the J1 and J2 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 13

NO: Fix problem. GO TO 19

DN22556,00004DE -19-05JUN08-14/22

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.

Were any problems found?

YES: Replace camshaft position sensor wiring with twisted pair or repair problem. GO TO 19

NO: GO TO 14

DN22556,00004DE -19-05JUN08-15/22

14 Check Wire Harness Routing

Examine routing of camshaft position sensor wiring between camshaft position sensor and ECU.

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?

YES: Reroute camshaft position sensor wires away from device. GO TO 19

NO: GO TO 15

DN22556,00004DE -19-05JUN08-16/22

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 000636.02 reappear active with engine running?

YES: GO TO 16

NO: Repair alternator problem. GO TO 19

Continued on next page

DN22556,00004DE -19-05JUN08-17/22

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

DN22556,00004DE -19-05JUN08-18/22

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.

DN22556,00004DE -19-05JUN08-19/22

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.

DN22556,00004DE -19-05JUN08-20/22

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.

DN22556,00004DE -19-05JUN08-21/22

20 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. 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

DN22556,00004DE -19-05JUN08-22/22

000636.05 — Camshaft Position Circuit Has High Resistance

The ECU detects high resistance in the camshaft position sensor circuit.

DN22556,00004DF -19-14JAN09-1/14

000636.05 — Camshaft Position Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000636.05

Related Information:
The ECU detects high resistance or an open circuit in the camshaft position circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000636.08 may also be active when engine is running.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Camshaft position sensor X02 - Purple/Gray

DN22556,00004DF -19-14JAN09-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect camshaft position sensor.	
	3. Perform TERMINAL TEST on camshaft position sensor and connector.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

DN22556,00004DF -19-14JAN09-3/14

2 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** GO TO 3 **NO:** Remove camshaft position sensor. GO TO 11

DN22556,00004DF -19-14JAN09-4/14

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

DN22556,00004DF -19-14JAN09-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J1-A4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 5 **NO:** Fix problem. GO TO 12

DN22556,00004DF -19-14JAN09-6/14

5 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU J1 connector camshaft position sensor signal (J1-A4) and all other terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	 **YES:** GO TO 6 **NO:** Fix problem. GO TO 12

DN22556,00004DF -19-14JAN09-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the ECU J1 connector camshaft position sensor signal (J1-A4) and single point ground. Is voltage less than 0.5V?	 **YES:** GO TO 7 **NO:** Fix problem.. GO TO 12

DN22556,00004DF -19-14JAN09-8/14

7 Check for Intermittent Open Circuit	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 8 **NO:** Recheck for intermittent open circuit. GO TO 1

Continued on next page

DN22556,00004DF -19-14JAN09-9/14

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

DN22556,00004DF -19-14JAN09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

DN22556,00004DF -19-14JAN09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00004DF -19-14JAN09-12/14

11 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with upper idler gear Does sensor appear damaged due to contact with gear?	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 2 **NO:** Replace camshaft position sensor. GO TO 12

DN22556,00004DF -19-14JAN09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000636.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004DF -19-14JAN09-14/14

000636.06 — Camshaft Position Circuit Has Low Resistance

The ECU detects low resistance in the camshaft position sensor circuit.

DN22556,00004E0 -19-14JAN09-1/16

000636.06 — Camshaft Position Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000636.06

Related Information:
The ECU detects low resistance or a short to ground in the camshaft position circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000636.08 may also be active when engine is running.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Camshaft position sensor X02 - Purple/Gray

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DN22556,00004E0 -19-14JAN09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect camshaft position sensor connector. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 now an active DTC?	**YES:** Remove camshaft position sensor. GO TO 13 **NO:** GO TO 2

DN22556,00004E0 -19-14JAN09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Disconnect camshaft position sensor. 3. Perform TERMINAL TEST on camshaft position sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 14 **NO:** GO TO 3

DN22556,00004E0 -19-14JAN09-4/16

3 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 4 **NO:** Remove camshaft position sensor. GO TO 13

DN22556,00004E0 -19-14JAN09-5/16

4 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on connector J1. Were any problems found?	**YES:** Fix problem. GO TO 14 **NO:** GO TO 5

DN22556,00004E0 -19-14JAN09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J1-A4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	**YES:** GO TO 6 **NO:** Fix problem. GO TO 14

DN22556,00004E0 -19-14JAN09-7/16

6 Check for Wire-to-Wire Short	1. Verify camshaft position sensor is disconnected. 2. On the harness, measure the resistance between ECU J1 connector camshaft position sensor signal (J1-A4) and return (J1-E4). Is the resistance greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 14

Continued on next page

DN22556,00004E0 -19-14JAN09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU J1 connector camshaft position sensor signal (J1-A4) and single point ground.	**YES:** GO TO 8
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

DN22556,00004E0 -19-14JAN09-9/16

8 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector.	
	2. On the harness, measure the resistance between the ECU J1 connector camshaft position sensor signal (J1-A4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 9
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 14

DN22556,00004E0 -19-14JAN09-10/16

9 Check for Intermittent Shorted Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 10
	Did 000636.06 reappear active?	**NO:** Recheck for intermittent shorted circuit. GO TO 1

DN22556,00004E0 -19-14JAN09-11/16

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

DN22556,00004E0 -19-14JAN09-12/16

11 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 12
	Did 000636.06 reappear active?	**NO:** Problem fixed.

DN22556,00004E0 -19-14JAN09-13/16

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000636.06 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004E0 -19-14JAN09-14/16

13 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with upper idler gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14
	Does sensor appear damaged due to contact with gear?	**NO:** Replace camshaft position sensor. GO TO 14

DN22556,00004E0 -19-14JAN09-15/16

14 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did 000636.06 reappear active?	**NO:** Problem fixed.

DN22556,00004E0 -19-14JAN09-16/16

000636.08 — Camshaft Position Signal Missing

The ECU does not detect the camshaft position sensor input.

DN22556,00004E1 -19-14JAN09-1/21

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 sensor signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the sensor wiring.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crank sensor input to determine camshaft and camshaft position.
If a crank sensor DTC accompanies 000636.08, the engine cannot be started and will stall if running until at least one of the two codes is repaired.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Camshaft position sensor X02 - Purple/Gray

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DN22556,00004E1 -19-14JAN09-2/21

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Start or crank engine. 5. Refresh DTCs. Did 000636.08 reappear active with engine running or cranking?	**YES:** GO TO 2 **NO:** GO TO 19

DN22556,00004E1 -19-14JAN09-3/21

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 or 000636.06 active?	**YES:** Discontinue test for 000636.08 and perform test for 000636.05 or 000636.06. **NO:** GO TO 3

DN22556,00004E1 -19-14JAN09-4/21

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL PUMP POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect camshaft position sensor connector. 3. Verify camshaft position sensor installation torque. Was camshaft position sensor fully threaded into mounting hole?	**YES:** GO TO 4 **NO:** Torque sensor to specified value. GO TO 18

DN22556,00004E1 -19-14JAN09-5/21

4 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Disconnect camshaft position sensor. 3. Perform TERMINAL TEST on camshaft position sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 18 **NO:** GO TO 5

DN22556,00004E1 -19-14JAN09-6/21

5 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 6 **NO:** Remove camshaft position sensor. GO TO 17

Continued on next page

DN22556,00004E1 -19-14JAN09-7/21

6 Check for Recent Mechanical Repair	Has an internal engine repair requiring removal of upper idler gear been performed just prior to 000636.08 appearing?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,00004E1 -19-14JAN09-8/21

7 Inspect Target	1. Remove camshaft position sensor. 2. Verify that webs are visible through the camshaft position sensor mounting hole as engine is rotated. *NOTE: Webs on upper idler gear would not be visible if gear or thrust washer were installed incorrectly.* Are webs on upper idler gear visible?	 **YES:** GO TO 8 **NO:** Fix mechanical problem, GO TO 18

DN22556,00004E1 -19-14JAN09-9/21

8 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	 **YES:** Fix problem. GO TO 18 **NO:** GO TO 9

DN22556,00004E1 -19-14JAN09-10/21

9 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J1-A4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 10 **NO:** Fix problem. GO TO 18

DN22556,00004E1 -19-14JAN09-11/21

10 Check for Wire-to-Wire Short	1. Verify camshaft position sensor is disconnected. 2. On the harness, measure the resistance between ECU J1 connector camshaft position sensor signal (J1-A4) and return (J1-E4). Is the resistance greater than 1k ohms?	 **YES:** GO TO 11 **NO:** Fix problem.. GO TO 18

DN22556,00004E1 -19-14JAN09-12/21

11 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU J1 connector camshaft position sensor signal (J1-A4) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 12 **NO:** Fix problem.. GO TO 18

Continued on next page

DN22556,00004E1 -19-14JAN09-13/21

12 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector.	
	2. On the harness, measure the resistance between the ECU J1 connector camshaft position sensor signal (J1-A4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 13
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 18

DN22556,00004E1 -19-14JAN09-14/21

13 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU J1 connector camshaft position sensor signal (J1-A4) and single point ground.	**YES:** GO TO 14
	Is the voltage less than 0.5V?	**NO:** Fix problem. GO TO 18

DN22556,00004E1 -19-14JAN09-15/21

14 Replace camshaft Position Sensor	Has camshaft position sensor been replaced during this diagnostic procedure?	**YES:** GO TO 15 **NO:** Remove Camshaft position sensor. GO TO 17

DN22556,00004E1 -19-14JAN09-16/21

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 000636.08 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E1 -19-14JAN09-17/21

16 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000636.08 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E1 -19-14JAN09-18/21

17 Inspect Camshaft Position Sensor	Examine tip of camshaft position sensor for damage due to contact with upper idler gear	**YES:** Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 18
	Does sensor appear damaged due to contact with gear?	**NO:** Replace camshaft position sensor. GO TO 18

Continued on next page

DN22556,00004E1 -19-14JAN09-19/21

18 Verification	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine ON.	**YES:** GO TO 1
	Did 000636.08 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E1 -19-14JAN09-20/21

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

DN22556,00004E1 -19-14JAN09-21/21

000636.10 — Camshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern on the camshaft position sensor input.

DN22556,00004E2 -19-14JAN09-1/25

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) on the camshaft position sensor input.
Inadvertently swapping the camshaft position sensor harness connector with the crank sensor harness connector may cause this DTC along with 000637.10.
Wiring problems such as loose terminals and water in connectors may also cause this DTC.
A loose crankshaft timing wheel may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
Prolonged cranking time may be required to start the engine.
The ECU will use the crank sensor input to determine camshaft and camshaft position.
If a crank sensor DTC accompanies 000636.10, the engine cannot be started and will stall if running until at least one of the two codes is repaired.

Additional References:
For more camshaft position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Camshaft position sensor X02 - Purple/Gray

Continued on next page

DN22556,00004E2 -19-14JAN09-2/25

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

DN22556,00004E2 -19-14JAN09-3/25

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000636.05 or 000636.06 now active?	**YES:** Discontinue test for 000636.10 and perform test for 000636.05 or 000636.06. **NO:** GO TO 3

DN22556,00004E2 -19-14JAN09-4/25

3 Check for Loose Crank Sensor Timing Wheel	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Attempt to start engine. 6. Operate engine for one minute through rpm range and monitor DTCs, if engine started. 7. Ignition OFF, engine OFF. 8. Reconnect crank sensor. Did engine start and run without generating 000636.10?	**YES:** Crankshaft timing wheel may be loose. Repair per instructions in base engine manual. **NO:** GO TO 4

Continued on next page

DN22556,00004E2 -19-14JAN09-5/25

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.

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

DN22556,00004E2 -19-14JAN09-6/25

5 Check for Loose Sensor

NOTE: See REMOVE AND INSTALL PUMP POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor connector.
3. Verify camshaft position sensor installation torque.

Was camshaft position sensor fully threaded into mounting hole?

YES: GO TO 6

NO: Torque sensor to specified value. GO TO 22

DN22556,00004E2 -19-14JAN09-7/25

6 Test Sensor Terminals

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on camshaft position sensor and connector.

Were any problems found?

YES: Fix problem. GO TO 22

NO: GO TO 7

DN22556,00004E2 -19-14JAN09-8/25

7 Inspect Target

1. Remove camshaft position sensor.
2. Using mirror, visually inspect webs on rear face of upper idler gear through the sensor mounting hole as engine is rotated. Look for burs, chips, or debris on webs and rear face of gear.

Were any problems found?

YES: Fix problem. GO TO 22

NO: GO TO 8

DN22556,00004E2 -19-14JAN09-9/25

8 Inspect Sensor

Examine tip of camshaft position sensor for damage due to contact with upper idler gear

Does sensor appear damaged due to contact with gear?

YES: Replace camshaft position sensor. Determine cause if replacement sensor also becomes damaged. GO TO 22

NO: GO TO 9

Continued on next page

DN22556,00004E2 -19-14JAN09-10/25

9 Check Sensor Resistance	On the camshaft position sensor, measure the resistance between the signal (B) and return (A). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Reinstall camshaft position sensor. Do not reconnect to harness. GO TO 10 **NO:** Replace camshaft position sensor. GO TO 22

DN22556,00004E2 -19-14JAN09-11/25

10 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	 **YES:** Fix problem. GO TO 22 **NO:** GO TO 11

DN22556,00004E2 -19-14JAN09-12/25

11 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU connector camshaft position sensor return (J1-E4) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 12 **NO:** Fix problem. GO TO 22

DN22556,00004E2 -19-14JAN09-13/25

12 Check Sensor Circuit Resistance	*NOTE: Verify that camshaft position sensor signal and return wires are in the specified connector cavities (not swapped).* 1. On the harness, measure the resistance between ECU camshaft position sensor signal (J1-A4) and the camshaft position sensor connector signal (B). 2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A). Are both resistance measurements less than 10 ohms?	 **YES:** GO TO 13 **NO:** Fix problem. GO TO 22

DN22556,00004E2 -19-14JAN09-14/25

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 connector camshaft position sensor signal (J1-A4) and the camshaft position sensor return (J1-E4) while gently moving wire harness. Is resistance greater than 1k ohms?	 **YES:** GO TO 14 **NO:** Fix problem. GO TO 22

DN22556,00004E2 -19-14JAN09-15/25

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

Continued on next page

DN22556,00004E2 -19-14JAN09-16/25

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.	**YES:** Fix problem. GO TO 22
	Were any intermittent wiring problems found?	**NO:** GO TO 16

DN22556,00004E2 -19-14JAN09-17/25

16 Check for Wire-to-Wire Short	1. Ignition OFF, engine OFF.	
	2. On the harness, measure the resistance between the ECU J1 connector camshaft position sensor signal (J1-A4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 17
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 22

DN22556,00004E2 -19-14JAN09-18/25

17 Check Sensor Resistance at ECU	1. Reconnect camshaft position sensor connector.	
	2. On the harness, measure the resistance between ECU J1 connector camshaft position sensor signal (J1-A4) and return (J1-E4).	**YES:** GO TO 18
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Fix problem. GO TO 22

DN22556,00004E2 -19-14JAN09-19/25

18 Inspect Sensor Wiring	Examine camshaft position sensor wiring between the camshaft position sensor and the ECU. Check for the following:	
	• Verify that camshaft position sensor signal and return wires are twisted together throughout the harness.	
	• Verify that no physical damage to camshaft position sensor signal and ground wires is evident.	**YES:** Replace camshaft position sensor wiring with twisted pair or repair problem. GO TO 22
	Were any problems found?	**NO:** GO TO 19

DN22556,00004E2 -19-14JAN09-20/25

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

Continued on next page

DN22556,00004E2 -19-14JAN09-21/25

20 Reprogram ECU		
	1. Ignition OFF, engine OFF.	
	2. Reinstall ECU connectors.	
	3. Download latest ECU payload and reprogram ECU.	**YES:** GO TO 21
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E2 -19-14JAN09-22/25

21 Replace ECU		
	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	**YES:** Open DTAC case.
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E2 -19-14JAN09-23/25

22 Verification		
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine ON.	
	4. Monitor DTCs in Service ADVISOR.	
	5. Refresh DTCs.	
	6. Operate engine through normal speed and load.	**YES:** GO TO 1
	Did DTC 000636.10 reappear active with engine running?	**NO:** Problem fixed.

DN22556,00004E2 -19-14JAN09-24/25

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

DN22556,00004E2 -19-14JAN09-25/25

000637.02 — Crankshaft Position Signal Invalid

The ECU detects excessive noise (extra pulses) on the crank sensor input.

DN22556,00004E3 -19-05JUN08-1/22

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 crank sensor signal.
The extra pulses may be caused by electromagnetic interference or by a sensor signal wire that is shorted to some other signal wire.
Wiring problems such as loose terminals and water in connectors may also cause this DTC.

Alarm Level:
Warning

Control Unit Response:
The ECU will use the camshaft position sensor input to determine piston position.
Prolonged cranking time may be required to start the engine.
If a camshaft position sensor DTC accompanies 000637.02, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 24V ECU WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

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DN22556,00004E3 -19-05JUN08-2/22

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

DN22556,00004E3 -19-05JUN08-3/22

2 Check Speed Sensor Data Points	1. Monitor the following Data Points in Service ADVISOR: • Crankshaft Position Signal Noise Indicator • Crankshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Missing Indicator • Crankshaft Position Signal Status 2. Operate engine through normal speed and load ranges. 3. Switch ON and OFF any electrical devices on the application. **CAUTION: Use caution when working near rotating components.** 4. Gently wiggle wire harness between crank sensor and ECU. *NOTE: The three Crankshaft Position Signal Indicator data points will indicated 0% if recent crankshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Crankshaft Position Signal Status has a value of 47 if the crankshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a crankshaft position signal problem is detected. These data points can be used to locate intermittent problems with the crankshaft position signal which are too brief to cause a DTC to become active.* *NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5ms.* 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 19 **YES:** Some device on application causes the noise. Open DTAC case. **NO:** GO TO 3

DN22556,00004E3 -19-05JUN08-4/22

3 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 19 **NO:** GO TO 4

DN22556,00004E3 -19-05JUN08-5/22

4 Inspect Target	1. Remove crank sensor. 2. Visually inspect timing wheel teeth for damage or debris as engine is rotated. Were any problems found?	**YES:** Fix problem. GO TO 19 **NO:** GO TO 5

Continued on next page

DN22556,00004E3 -19-05JUN08-6/22

5 Inspect Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor replacement instructions.*	
	Examine tip of crank sensor for damage due to contact with timing wheel	**YES:** Replace crank 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

DN22556,00004E3 -19-05JUN08-7/22

6 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B).	**YES:** Reinstall crank sensor. Do not reconnect to harness. GO TO 7
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Replace crank sensor. GO TO 19

DN22556,00004E3 -19-05JUN08-8/22

7 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 19
	Were any problems found?	**NO:** GO TO 8

DN22556,00004E3 -19-05JUN08-9/22

8 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU connector crank sensor return (J1-D4) and single point ground.	**YES:** GO TO 9
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 19

DN22556,00004E3 -19-05JUN08-10/22

9 Check Sensor Circuit Resistance	*NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 19

DN22556,00004E3 -19-05JUN08-11/22

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

DN22556,00004E3 -19-05JUN08-12/22

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 moving wire harness.	
	3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently moving wire harness.	**YES:** Fix problem. GO TO 19
	Were any intermittent wiring problems found?	**NO:** GO TO 12

DN22556,00004E3 -19-05JUN08-13/22

12 Check for Wire-to-Wire Short	1. Ignition OFF, engine OFF.	
	2. On the harness, measure the resistance between the ECU J1 connector crank sensor signal (J1-B4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 13
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 19

DN22556,00004E3 -19-05JUN08-14/22

13 Check Sensor Wiring	Examine crank sensor wiring between the crank sensor and the ECU. Check for the following:	
	• Verify that crank sensor signal and return wires are twisted together throughout the harness.	
	• Verify that no physical damage to crank sensor signal and return wires is evident.	**YES:** Replace crank sensor wiring with twisted pair or repair problem. GO TO 19
	Were any problems found?	**NO:** GO TO 14

DN22556,00004E3 -19-05JUN08-15/22

14 Check Wire Harness Routing	Examine routing of crank sensor wiring between crank sensor and ECU.	**YES:** Reroute crank sensor wires away from device. GO TO 19
	Is crank sensor wiring routed near sources of strong electric or magnetic fields such as 2-way radio antenna, alternator, inverter, a.c. generator, or other similar device on the application?	**NO:** GO TO 15

DN22556,00004E3 -19-05JUN08-16/22

15 Check for Alternator Noise	1. Disconnect negative battery cable.	
	2. Disconnect alternator positive output cable and insulate cable terminal.	
	3. Disconnect all other alternator connectors.	
	4. Reconnect negative battery cable.	
	5. Reconnect ECU and sensor connectors.	
	6. Ignition ON, engine ON.	**YES:** GO TO 16
	Did DTC 000637.02 reappear active with engine running?	**NO:** Repair alternator problem. GO TO 19

Continued on next page

DN22556,00004E3 -19-05JUN08-17/22

16 Replace Crank Position Sensor	Has crank sensor been replaced during this procedure?	**YES:** GO TO 17 **NO:** Replace crank sensor. GO TO 19

DN22556,00004E3 -19-05JUN08-18/22

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.

DN22556,00004E3 -19-05JUN08-19/22

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.

DN22556,00004E3 -19-05JUN08-20/22

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.

DN22556,00004E3 -19-05JUN08-21/22

20 Review Snapshot Information	1. Retrieve snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	**YES:** Found a possible problem. Repair possible problem. 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

DN22556,00004E3 -19-05JUN08-22/22

000637.05 — Crankshaft Position Circuit Has High Resistance

The ECU detects high resistance in the crank sensor circuit.

DN22556,00004E4 -19-14JAN09-1/14

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 crank sensor circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000637.08 may also be active when engine is running.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.
For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Crank position sensor X01 - Purple/Gray

DN22556,00004E4 -19-14JAN09-2/14

1 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect crank sensor.	
	3. Perform TERMINAL TEST on crank sensor and connector.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 2

Continued on next page

DN22556,00004E4 -19-14JAN09-3/14

2 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B).	**YES:** GO TO 3
	Is the resistance between 2500 ohms and 3500 ohms?	**NO:** Remove crank sensor. GO TO 11

DN22556,00004E4 -19-14JAN09-4/14

3 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 12
	Were any problems found?	**NO:** GO TO 4

DN22556,00004E4 -19-14JAN09-5/14

4 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 5
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 12

DN22556,00004E4 -19-14JAN09-6/14

5 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector.	
	2. On the harness, measure the resistance between the ECU J1 connector crank sensor signal (J1-B4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 6
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 12

DN22556,00004E4 -19-14JAN09-7/14

6 Check for Short to Voltage	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU J1 connector crank sensor signal (J1-B4) and single point ground.	**YES:** GO TO 7
	Is voltage less than 0.5V?	**NO:** Fix problem. GO TO 12

DN22556,00004E4 -19-14JAN09-8/14

7 Check for Intermittent Open Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did 000637.05 reappear active?	**NO:** Recheck for intermittent open circuit. GO TO 1

Continued on next page

DN22556,00004E4 -19-14JAN09-9/14

8 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 9 **NO:** Remove crank sensor. GO TO 11

DN22556,00004E4 -19-14JAN09-10/14

9 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 10 **NO:** Problem fixed.

DN22556,00004E4 -19-14JAN09-11/14

10 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,00004E4 -19-14JAN09-12/14

11 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with timing wheel Does sensor appear damaged due to contact with timing wheel?	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 12 **NO:** Replace crank sensor. GO TO 12

DN22556,00004E4 -19-14JAN09-13/14

12 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.05 reappear active?	 **YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004E4 -19-14JAN09-14/14

000637.06 — Crankshaft Position Circuit Has Low Resistance

The ECU detects low resistance in the crank sensor circuit.

JB81757,0000005 -19-14JAN09-1/16

000637.06 — Crankshaft Position Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
000637.06

Related Information:
The ECU detects low resistance or a short to ground in the crank sensor circuit during the Harness Diagnostic Mode Test in Service ADVISOR.

Alarm Level:
Warning

Control Unit Response:
DTC 000637.08 may also be active when engine is running.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Crank position sensor X01 - Purple/Gray

JB81757,0000005 -19-14JAN09-2/16

1 Check for DTC Change with Sensor Disconnected	1. Ignition ON, engine OFF. 2. Disconnect crank sensor connector. 3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 000637.05 now an active DTC?	**YES:** Remove crank sensor. GO TO 13 **NO:** GO TO 2

Continued on next page

JB81757,0000005 -19-14JAN09-3/16

2 Test Sensor Terminals	1. Ignition OFF, engine OFF.	
	2. Disconnect crank sensor.	
	3. Perform TERMINAL TEST on crank sensor and connector.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 3

JB81757,0000005 -19-14JAN09-4/16

3 Check Sensor Resistance	On the crank 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 crank sensor. GO TO 13

JB81757,0000005 -19-14JAN09-5/16

4 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 5

JB81757,0000005 -19-14JAN09-6/16

5 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 6
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

JB81757,0000005 -19-14JAN09-7/16

6 Check for Wire-to-Wire Short	1. Verify crank sensor is disconnected.	
	2. On the harness, measure the resistance between ECU J1 connector crank sensor signal (J1-B4) and return (J1-D4).	**YES:** GO TO 7
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

JB81757,0000005 -19-14JAN09-8/16

7 Check for Short to Ground of Sensor Signal	On the harness, measure the resistance between ECU J1 connector crank sensor signal (J1-B4) 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

JB81757,0000005 -19-14JAN09-9/16

8 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector.	
	2. On the harness, measure the resistance between the ECU J1 connector crank sensor signal (J1-B4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 9
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 14

JB81757,0000005 -19-14JAN09-10/16

9 Check for Intermittent Shorted Circuit	1. Ignition OFF, engine OFF.	
	2. Reconnect all electrical connectors.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 10
	Did 000637.06 reappear as active?	**NO:** Recheck for intermittent shorted circuit. GO TO 1

JB81757,0000005 -19-14JAN09-11/16

10 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 11
		NO: Remove crank sensor. GO TO 13

JB81757,0000005 -19-14JAN09-12/16

11 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine OFF.	
	3. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 12
	Did 000637.06 reappear active?	**NO:** Problem fixed. GO TO 14

JB81757,0000005 -19-14JAN09-13/16

12 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did 000637.06 reappear active?	**NO:** Problem fixed.

JB81757,0000005 -19-14JAN09-14/16

13 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with timing wheel	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 14
	Does sensor appear damaged due to contact with timing wheel?	**NO:** Replace crank sensor. GO TO 14

Continued on next page

JB81757,0000005 -19-14JAN09-15/16

14 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine OFF. 4. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000637.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

JB81757,0000005 -19-14JAN09-16/16

000637.07 — Crankshaft and Camshaft Position Signals Out of Sync

The ECU detects that the camshaft position and crank sensor inputs are not in sync with each other.

DN22556,00004E6 -19-05JUN08-1/17

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 pump position sensor signal is not correctly timed relative to the crank sensor signal.
This DTC may be caused by incorrect upper idler gear timing or by a damaged 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 crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more pump position sensor information, see PUMP POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 24V ECU WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Crank position sensor X01 - Purple/Gray

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DN22556,00004E6 -19-05JUN08-2/17

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

DN22556,00004E6 -19-05JUN08-3/17

2 Check for Recent Mechanical Repair	Has an internal engine repair requiring timing gear removal been performed just prior to DTC 000637.07 appearing and does the DTC reappear repeatedly after refreshing active DTCs with engine running?	**YES:** Check crankshaft to upper idler gear timing. GO TO 14 **NO:** GO TO 3

DN22556,00004E6 -19-05JUN08-4/17

3 Check for Loose Crank Sensor Timing Wheel	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor and secure connector away from rotating components. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Attempt to start engine. 6. Operate engine for one minute through rpm range and monitor DTCs, if engine started. 7. Ignition OFF, engine OFF. 8. Reconnect crank sensor. Did engine start, run, and have good performance?	**YES:** Crankshaft timing wheel may be loose. Repair per instructions in base engine manual. **NO:** GO TO 4

Continued on next page

DN22556,00004E6 -19-05JUN08-5/17

4 Check Speed Sensor Data Points

1. Monitor the following Data Points in Service ADVISOR:
   - Camshaft Position Signal Noise Indicator
   - Camshaft Position Signal Improper Pattern Indicator
   - Camshaft Position Signal Status
   - Engine Speed Indicated by Camshaft Position Sensor
   - Crankshaft Position Signal Noise Indicator
   - Crankshaft Position Signal Improper Pattern Indicator
   - Crankshaft Position Signal Status
   - Engine Speed Indicated by Crankshaft Position Sensor
2. Operate engine through normal speed and load.
3. Switch ON and OFF any electrical devices on the application.

CAUTION: Use caution when working near rotating components.

4. Gently wiggle wire harness between speed sensors and ECU.

NOTE: The Crankshaft Position Signal Noise Indicator and Camshaft Position Signal Noise Indicator have a value of 0 if the signal is good. The value will temporarily increase if noise is detected in the sensor signal. The Crankshaft Position Signal Improper Pattern Indicator and Camshaft Position Signal Improper Pattern Indicator are 0 if recent sensor signal patterns were good. The value will increase if errors in the signal pattern are detected and will count down to 0 once the signal pattern is error-free. The Camshaft Position Signal Status and Crankshaft Position Signal Status has a value of 47 with engine speed above 400 rpm if the crank sensor signal is good. The value will be something other than 47 if a sensor signal problem is detected. These data points can be used to locate intermittent problems with the crank sensor signal which are too brief to cause a DTC to become active.

YES: Engine wiring problem. Repair problem. GO TO 14

NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.

YES: Some device on application causes the noise. Open DTAC case.

Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?

NO: GO TO 5

DN22556,00004E6 -19-05JUN08-6/17

5 Test Crank Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect crank sensor.
3. Perform TERMINAL TEST on crank sensor and connector.

YES: Fix problem. GO TO 14

Were any problems found?

NO: GO TO 6

DN22556,00004E6 -19-05JUN08-7/17

6 Test Camshaft Position Sensor Terminals

1. Ignition OFF, engine OFF.
2. Disconnect camshaft position sensor.
3. Perform TERMINAL TEST on camshaft position sensor and connector.

YES: Fix problem. GO TO 14

Were any problems found?

NO: GO TO 7

Continued on next page

DN22556,00004E6 -19-05JUN08-8/17

7 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 14
	Were any problems found?	**NO:** GO TO 8

DN22556,00004E6 -19-05JUN08-9/17

8 Check Camshaft Position Sensor Circuit Resistance	*NOTE: Verify that camshaft position sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU camshaft position sensor signal (J1-A4) and the camshaft position sensor connector signal (B).	
	2. On the harness, measure the resistance between ECU camshaft position sensor return (J1-E4) and the camshaft position sensor connector return (A).	**YES:** GO TO 9
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00004E6 -19-05JUN08-10/17

9 Check Crank Position Sensor Circuit Resistance	*NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 14

DN22556,00004E6 -19-05JUN08-11/17

10 Check for Intermittent Short Between Signal and Return	1. Crank sensor and camshaft position sensors are disconnected.	
	2. On the harness, measure the resistance between the ECU connector crank sensor signal (J1-B4) and the crank sensor return (J1-D4) while gently moving harness.	
	3. On the harness, measure the resistance between the ECU connector camshaft position sensor signal (J1-A4) and the camshaft position sensor return (J1-E4) while gently moving harness.	**YES:** GO TO 11
	Is resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 14

Continued on next page

DN22556,00004E6 -19-05JUN08-12/17

11 Check for Intermittent Short Between Signal and Ground

1. Crank sensor and camshaft position sensors are disconnected.
2. On the harness, measure the resistance between the ECU connector crank sensor signal (J1-B4) and single point ground while gently moving harness.
3. On the harness, measure the resistance between the ECU connector camshaft position sensor signal (J1-A4) and single point ground while gently moving harness.

Is resistance greater than 1k ohms?

YES: GO TO 12

NO: Fix problem. GO TO 14

DN22556,00004E6 -19-05JUN08-13/17

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.

DN22556,00004E6 -19-05JUN08-14/17

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.

DN22556,00004E6 -19-05JUN08-15/17

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.

DN22556,00004E6 -19-05JUN08-16/17

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

DN22556,00004E6 -19-05JUN08-17/17

000637.08 — Crankshaft Position Signal Missing

The ECU does not detect the crank sensor input.

DN22556,00004E7 -19-14JAN09-1/21

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 crank sensor signal when engine is cranking or running.
This DTC can be caused by an open or shorted circuit in the sensor wiring.

Alarm Level:
Warning

Control Unit Response:
The ECU will use the camshaft position sensor input to determine piston position.
Prolonged cranking time may be required to start the engine.
If a camshaft position sensor DTC accompanies 000637.08, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Crank position sensor X01 - Purple/Gray

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DN22556,00004E7 -19-14JAN09-2/21

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

DN22556,00004E7 -19-14JAN09-3/21

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

DN22556,00004E7 -19-14JAN09-4/21

3 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Verify crank sensor installation torque. Was crank sensor fully threaded into mounting hole?	**YES:** GO TO 4 **NO:** Torque sensor to specified value. GO TO 18

DN22556,00004E7 -19-14JAN09-5/21

4 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Disconnect crank sensor. 3. Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 18 **NO:** GO TO 5

DN22556,00004E7 -19-14JAN09-6/21

5 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Do not reconnect sensor to harness. GO TO 6 **NO:** Remove crank sensor. GO TO 17

Continued on next page

DN22556,00004E7 -19-14JAN09-7/21

6 Check for Recent Mechanical Repair	Has an internal engine repair requiring removal of timing wheel been performed just prior to DTC 000637.08 appearing?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,00004E7 -19-14JAN09-8/21

7 Inspect Target	1. Remove crank sensor.	
	2. Verify that timing wheel teeth are visible through the crank sensor mounting hole as engine is barred.	**YES:** GO TO 8
	Are teeth on timing wheel visible?	**NO:** Fix mechanical problem, GO TO 18

DN22556,00004E7 -19-14JAN09-9/21

8 Test ECU Terminals	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 18
	Were any problems found?	**NO:** GO TO 9

DN22556,00004E7 -19-14JAN09-10/21

9 Check Sensor Circuit Resistance	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 10
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 18

DN22556,00004E7 -19-14JAN09-11/21

10 Check for Wire-to-Wire Short	1. Verify crank sensor is disconnected.	
	2. On the harness, measure the resistance between ECU J1 connector crank sensor signal (J1-B4) and return (J1-D4).	**YES:** GO TO 11
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 18

DN22556,00004E7 -19-14JAN09-12/21

11 Check for Short to Ground of Signal	On the harness, measure the resistance between ECU J1 connector crank sensor signal (J1-B4) and single point ground.	**YES:** GO TO 12
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 18

Continued on next page

DN22556,00004E7 -19-14JAN09-13/21

12 Check for Wire-to-Wire Short	1. Disconnect ECU J2 connector.	
	2. On the harness, measure the resistance between the ECU J1 connector crank sensor signal (J1-B4) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 13
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 18

DN22556,00004E7 -19-14JAN09-14/21

13 Check for Short to Voltage Source	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the ECU J1 connector crank sensor signal (J1-B4) and single point ground.	**YES:** GO TO 14
	Is the voltage less than 0.5V?	**NO:** Fix problem. GO TO 18

DN22556,00004E7 -19-14JAN09-15/21

14 Replace Crank Sensor	Has crank sensor been replaced during this diagnostic procedure?	**YES:** GO TO 15 **NO:** Remove crank sensor. GO TO 17

DN22556,00004E7 -19-14JAN09-16/21

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.

DN22556,00004E7 -19-14JAN09-17/21

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.

DN22556,00004E7 -19-14JAN09-18/21

17 Inspect Crank Sensor	Examine tip of crank sensor for damage due to contact with timing wheel	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 18
	Does sensor appear damaged due to contact with timing wheel?	**NO:** Replace crank sensor. GO TO 18

Continued on next page

DN22556,00004E7 -19-14JAN09-19/21

18 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all electrical connectors. 3. Ignition ON, engine ON. Did DTC 000637.08 reappear active with engine running?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004E7 -19-14JAN09-20/21

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

DN22556,00004E7 -19-14JAN09-21/21

000637.10 — Crankshaft Position Signal Rate of Change Abnormal

The ECU detects an improper pattern on the crank sensor input.

DN22556,00004E8 -19-14JAN09-1/24

000637.10 — Crankshaft Position Signal Rate of Change Abnormal Diagnostic Procedure

Troubleshooting Sequence:
000637.08
000637.10

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects an improper pattern (pulses missing) on the crank sensor input.
Swapping the camshaft position sensor harness connector with the crank position sensor harness connector may cause this DTC along with 000636.10.
Wiring problems such as loose terminals and 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 pump position sensor input to determine piston position.
If a camshaft position sensor DTC accompanies 000637.10, the engine cannot be started and will stall if running until at least one of the two codes is repaired.
Maximum engine power is derated up to 50 percent.

Additional References:
For more crank sensor information, see CRANK POSITION SENSOR in Section 03, Group 140 earlier in this manual.

For more information on speed sensors, see MEASURING SPEED in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Crank position sensor X01 - Purple/Gray

Continued on next page

DN22556,00004E8 -19-14JAN09-2/24

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

DN22556,00004E8 -19-14JAN09-3/24

2 Check for Open or Shorted Sensor Circuit	1. Ignition ON, engine OFF. 2. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is DTC 000637.05 or 000637.06 now an active DTC?	**YES:** Discontinue test for 000637.10 and perform test for 000637.05 or 000637.06. **NO:** GO TO 3

DN22556,00004E8 -19-14JAN09-4/24

3 Check Speed Sensor Data Points	1. Monitor the following Data Points in Service ADVISOR: • Crankshaft Position Signal Noise Indicator • Crankshaft Position Signal Improper Pattern Indicator • Crankshaft Position Signal Missing Indicator • Crankshaft Position Signal Status 2. Operate engine through normal speed and load ranges. 3. Switch ON and OFF any electrical devices on the application. **CAUTION: Use caution when working near rotating components.** 4. Gently wiggle wire harness between crank sensor and ECU. *NOTE: The three Crankshaft Position Signal Indicator data points will indicated 0% if recent crankshaft position signal patterns were good. The percentage will increase if errors in the signal pattern are detected and will count down to 0% once the signal pattern is error-free. The Crankshaft Position Signal Status has a value of 47 if the crankshaft position signal is good with engine speed above 400 rpm. The value will be something other than 47 if a crankshaft position signal problem is detected. These data points can be used to locate intermittent problems with the crankshaft position signal which are too brief to cause a DTC to become active.* *NOTE: Internal Data Monitor in Service ADVISOR may also be used to locate intermittent speed sensor circuit problems. See INTERNAL DATA MONITOR (IDM) earlier in this group for more information on using this feature. Select the data points defined earlier in this step and set sample rate to 5 ms.* Were you able to find some mode of operation or an intermittent wiring problem which causes the Speed Sensor Data Points to indicate a signal problem?	**YES:** Engine wiring problem. Repair problem. GO TO 21 **YES:** Some device on application causes the noise. Open DTAC case. **NO:** GO TO 4

Continued on next page

DN22556,00004E8 -19-14JAN09-5/24

4 Check for Loose Sensor	*NOTE: See REMOVE AND INSTALL CRANKSHAFT POSITION SENSOR in Section 02, Group 110 earlier in this manual for sensor torque specifications.* 1. Ignition OFF, engine OFF. 2. Disconnect crank sensor connector. 3. Verify crank sensor installation torque. Was crank sensor fully threaded into mounting hole?	**YES:** GO TO 5 **NO:** Torque sensor to specified value. GO TO 21

DN22556,00004E8 -19-14JAN09-6/24

5 Test Sensor Terminals	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on crank sensor and connector. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 6

DN22556,00004E8 -19-14JAN09-7/24

6 Inspect Target	1. Remove crank 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

DN22556,00004E8 -19-14JAN09-8/24

7 Inspect Sensor	Examine tip of crank sensor for damage due to contact with timing wheel Does sensor appear damaged due to contact with timing wheel?	**YES:** Replace crank sensor. Determine cause if replacement sensor also becomes damaged. GO TO 21 **NO:** GO TO 8

DN22556,00004E8 -19-14JAN09-9/24

8 Check Sensor Resistance	On the crank sensor, measure the resistance between the signal (A) and return (B). Is the resistance between 2500 ohms and 3500 ohms?	**YES:** Reinstall crank sensor. Do not reconnect to harness. GO TO 9 **NO:** Replace crank sensor. GO TO 21

DN22556,00004E8 -19-14JAN09-10/24

9 Test ECU Terminals	1. Disconnect ECU J1 connector. 2. Perform TERMINAL TEST on J1. Were any problems found?	**YES:** Fix problem. GO TO 21 **NO:** GO TO 10

Continued on next page

DN22556,00004E8 -19-14JAN09-11/24

10 Check for Shorted Sensor Return	On the harness, measure the resistance between the ECU connector crank sensor return (J1-D4) and single point ground.	**YES:** GO TO 11
	Is the resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 21

DN22556,00004E8 -19-14JAN09-12/24

11 Check Sensor Circuit Resistance	*NOTE: Verify that crank sensor signal and return wires are in the specified connector cavities (not swapped).*	
	1. On the harness, measure the resistance between ECU crank sensor signal (J1-B4) and the crank sensor connector signal (A).	
	2. On the harness, measure the resistance between ECU crank sensor return (J1-D4) and the crank sensor connector return (B).	**YES:** GO TO 12
	Are both resistance measurements less than 10 ohms?	**NO:** Fix problem. GO TO 21

DN22556,00004E8 -19-14JAN09-13/24

12 Check for Intermittent Short Between Signal and Return	1. Verify crank sensor is disconnected.	
	2. On the harness, measure the resistance between the ECU connector crank sensor signal (J1-B4) and the crank sensor return (J1-D4).	**YES:** GO TO 13
	Is resistance greater than 1k ohms?	**NO:** Fix problem. GO TO 21

DN22556,00004E8 -19-14JAN09-14/24

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.	**YES:** Fix problem. GO TO 21
	Were any problems found?	**NO:** GO TO 14

DN22556,00004E8 -19-14JAN09-15/24

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 moving wire harness.	
	3. Measure the voltage from ECU ignition (J2-B2) to ECU ground (J2-L2) while gently moving wire harness.	**YES:** Fix problem. GO TO 21
	Were any intermittent wiring problems found?	**NO:** GO TO 15

Continued on next page

DN22556,00004E8 -19-14JAN09-16/24

15 Check for Wire-to-Wire Short

1. Ignition OFF, engine OFF.
2. On the harness, measure the resistance between the ECU J1 connector crank sensor signal (J1-B4) and all other terminals in the J1 and J2 connectors.

Are all resistance measurements greater than 1k ohms?

YES: GO TO 16

NO: Fix problem. GO TO 21

DN22556,00004E8 -19-14JAN09-17/24

16 Check Sensor Resistance at ECU

1. Reconnect crank sensor connector.
2. On the harness, measure the resistance between ECU J1 connector crank sensor signal (J1-B4) and return (J1-D4).

Is the resistance between 2500 ohms and 3500 ohms?

YES: GO TO 17

NO: Fix problem. GO TO 21

DN22556,00004E8 -19-14JAN09-18/24

17 Inspect Crank Sensor Wiring

Examine crank sensor wiring between the crank sensor and the ECU. Check for the following:

- Verify that crank sensor signal and return wires are twisted together throughout the harness.
- Verify that no physical damage to crank sensor signal and return wires is evident.

Were any problems found?

YES: Replace crank sensor wiring with twisted pair or repair problem. GO TO 21

NO: GO TO 18

DN22556,00004E8 -19-14JAN09-19/24

18 Replace Crank Sensor

Has crank sensor been replaced during this procedure?

YES: GO TO 19

NO: Replace crank sensor. GO TO 21

DN22556,00004E8 -19-14JAN09-20/24

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.

DN22556,00004E8 -19-14JAN09-21/24

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

DN22556,00004E8 -19-14JAN09-22/24

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.

DN22556,00004E8 -19-14JAN09-23/24

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

DN22556,00004E8 -19-14JAN09-24/24

000640.31 — External Derate Commanded

For troubleshooting procedures please see the application troubleshooting manual.

RG40049,00001D6 -19-30OCT09-1/1

000647.05 — Engine Fan Drive Circuit Has High Resistance

For troubleshooting procedure please see the application troubleshooting manual.

RG40049,00001D9 -19-30OCT09-1/1

000647.31 — Engine Fan Drive Manual Purge Switch Active Too Long

For troubleshooting procedure please see the application troubleshooting manual.

RG40049,00001DA -19-02NOV09-1/1

000651.02 — Injector #1 Part Number Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #1.

DN22556,00004EF -19-06AUG10-1/14

000651.02 — Injector #1 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000651.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004EF -19-06AUG10-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004EF -19-06AUG10-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,00004EF -19-06AUG10-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

DN22556,00004EF -19-06AUG10-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

DN22556,00004EF -19-06AUG10-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000651.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

DN22556,00004EF -19-06AUG10-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

DN22556,00004EF -19-06AUG10-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000651.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004EF -19-06AUG10-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000651.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

Continued on next page

DN22556,00004EF -19-06AUG10-10/14

9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

DN22556,00004EF -19-06AUG10-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000651.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

DN22556,00004EF -19-06AUG10-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

DN22556,00004EF -19-06AUG10-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000651.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004EF -19-06AUG10-14/14

000651.05 — Injector #1 Circuit Has High Resistance

The ECU detects high resistance in the cylinder #1 electronic injector circuit.

DN22556,00004F0 -19-14JAN09-1/16

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #1 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #1 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 C01 - Yellow/Purple

Continued on next page

DN22556,00004F0 -19-14JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000651.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004F0 -19-14JAN09-3/16

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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield. 3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 3

DN22556,00004F0 -19-14JAN09-4/16

3 Check Injector Harness Resistance	On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 7) and injector #1 low side control (terminal 1). Is resistance less than 2 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,00004F0 -19-14JAN09-5/16

4 Check Injector Coil Resistance	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector heat shield. 2. Inspect injector harness for damage. 3. Remove injector #1 connector dust cap. Do not remove terminals from injector. 4. On the injector, measure the resistance between the two injector studs. *NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.* Is the resistance less than 2 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

Continued on next page

DN22556,00004F0 -19-14JAN09-6/16

5 ECU Terminal Test	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1 connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 6

DN22556,00004F0 -19-14JAN09-7/16

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 8-way connector (terminal 1)..	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 8-way connector (terminal 7).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00004F0 -19-14JAN09-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

DN22556,00004F0 -19-14JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

DN22556,00004F0 -19-14JAN09-10/16

9 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000651.05 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004F0 -19-14JAN09-11/16

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

DN22556,00004F0 -19-14JAN09-12/16

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

DN22556,00004F0 -19-14JAN09-13/16

12 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #1, and 8-way injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

DN22556,00004F0 -19-14JAN09-14/16

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.

DN22556,00004F0 -19-14JAN09-15/16

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

DN22556,00004F0 -19-14JAN09-16/16

000651.06 — Injector #1 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #1 electronic injector circuit.

DN22556,00004F1 -19-14JAN09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #1 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

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1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF.	
	NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.	
	2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.	
	3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 2
	Did 000651.06 reappear active?	**NO:** GO TO 11

DN22556,00004F1 -19-14JAN09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	Did DTC 000651.05, high injector #1 resistance, become active?	**YES:** GO TO 3
	NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.	**NO:** GO TO 5

DN22556,00004F1 -19-14JAN09-4/17

3 Injector Harness Terminal Test and Inspection	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.	
	3. Remove injector heat shield.	
	4. Inspect injector harness for damage.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 4

Continued on next page

DN22556,00004F1 -19-14JAN09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector #1 connector dust cap and terminal nuts. 2. Lift injector #1 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #1 control (terminal 1) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,00004F1 -19-14JAN09-6/17

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

DN22556,00004F1 -19-14JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short	1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #1 control (terminal J1-E1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

DN22556,00004F1 -19-14JAN09-8/17

7 Check Engine Harness for Short to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage between the ECU injector #1 control (terminal J1-E1) and single point ground. Is voltage greater than 0.5V?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 8

DN22556,00004F1 -19-14JAN09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000651.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

Continued on next page

DN22556,00004F1 -19-14JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

DN22556,00004F1 -19-14JAN09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000651.06 reappear active?	**NO:** Problem fixed.

DN22556,00004F1 -19-14JAN09-12/17

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

DN22556,00004F1 -19-14JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000651.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

DN22556,00004F1 -19-14JAN09-14/17

13 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!**	
	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #1, and 8-way injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

Continued on next page

DN22556,00004F1 -19-14JAN09-15/17

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.

DN22556,00004F1 -19-14JAN09-16/17

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

DN22556,00004F1 -19-14JAN09-17/17

000651.07 — Injector #1 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #1.

DN22556,00004F2 -19-04MAR08-1/13

000651.07 — Injector #1 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000651.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #1 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #1 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F2 -19-04MAR08-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000651.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,00004F2 -19-04MAR08-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #1 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement, see REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

DN22556,00004F2 -19-04MAR08-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #1?	**YES:** Replace injector #1. GO TO 11 **NO:** GO TO 4

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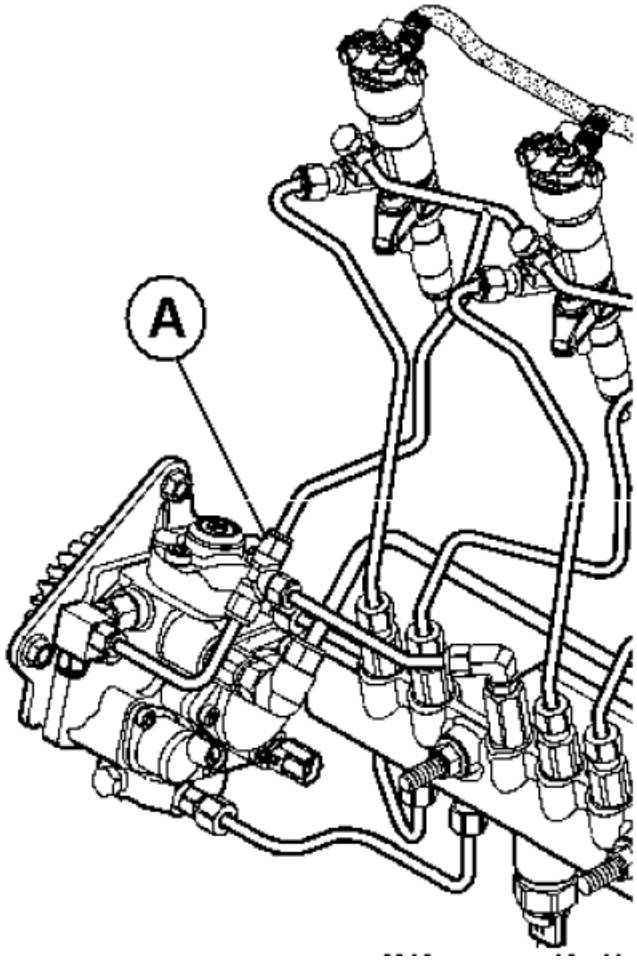
DN22556,00004F2 -19-04MAR08-5/13

4 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



RG14958 —UN—31MAY07

A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

4.5L—Volume.....0.6 L (20 oz)

Specification

6.8L—Volume.....0.7 L (24 oz)

Is the collected amount more than the specification?

YES: Replace injector #1. GO TO 11

NO: GO TO 5

DN22556,00004F2 -19-04MAR08-6/13

5 Occurrence Count Check

Review stored information and look at occurrence count for 000651.07.

Is occurrence recorded in step 1 greater than 5?

YES: GO TO 6

NO: GO TO 7

Continued on next page

DN22556,00004F2 -19-04MAR08-7/13

6 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #1?	**YES:** Replace injector #1. GO TO 11 **NO:** GO TO 8

DN22556,00004F2 -19-04MAR08-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 8

DN22556,00004F2 -19-04MAR08-9/13

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

DN22556,00004F2 -19-04MAR08-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000651.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004F2 -19-04MAR08-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 11 **NO:** Replace ECU, GO TO 11

DN22556,00004F2 -19-04MAR08-12/13

11 DTC Check	Ignition ON, Engine Idling. Is 000651.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

DN22556,00004F2 -19-04MAR08-13/13

000651.13 — Injector #1 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,00004F3 -19-06AUG10-1/9

000651.13 — Injector #1 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000651.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F3 -19-06AUG10-2/9

1 QR Code Input Method Check	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00004F3 -19-06AUG10-3/9

2 Verification and Reentry of QR Code	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,00004F3 -19-06AUG10-4/9

3 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,00004F3 -19-06AUG10-5/9

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

DN22556,00004F3 -19-06AUG10-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,00004F3 -19-06AUG10-7/9

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

DN22556,00004F3 -19-06AUG10-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,00004F3 -19-06AUG10-9/9

000652.02 — Injector #2 Part Number Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #2.

DN22556,00004F4 -19-06AUG10-1/14

000652.02 — Injector #2 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000652.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F4 -19-06AUG10-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004F4 -19-06AUG10-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,00004F4 -19-06AUG10-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

DN22556,00004F4 -19-06AUG10-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

DN22556,00004F4 -19-06AUG10-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000652.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

DN22556,00004F4 -19-06AUG10-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

DN22556,00004F4 -19-06AUG10-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000652.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004F4 -19-06AUG10-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

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DN22556,00004F4 -19-06AUG10-10/14

9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

DN22556,00004F4 -19-06AUG10-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

DN22556,00004F4 -19-06AUG10-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

DN22556,00004F4 -19-06AUG10-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000652.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004F4 -19-06AUG10-14/14

000652.05 — Injector #2 Circuit Has High Resistance

The ECU detects a High resistance in the cylinder #2 electronic injector circuit.

DN22556,00004F5 -19-14JAN09-1/16

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #2 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #2 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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DN22556,00004F5 -19-14JAN09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000652.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,00004F5 -19-14JAN09-3/16

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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield. 3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 3

DN22556,00004F5 -19-14JAN09-4/16

3 Check Injector Harness Resistance	With 6.8L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 7) and injector #2 low side control (terminal 2). With 4.5L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #2 low side control (terminal 6). Is resistance less than 2 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,00004F5 -19-14JAN09-5/16

4 Check Injector Coil Resistance	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector heat shield. 2. Inspect injector harness for damage. 3. Remove injector #2 connector dust cap. Do not remove terminals from injector. 4. On the injector, measure the resistance between the two injector studs. *NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.* Is the resistance less than 2 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

Continued on next page

DN22556,00004F5 -19-14JAN09-6/16

5 ECU Terminal Test	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 6

DN22556,00004F5 -19-14JAN09-7/16

6 Check Engine Harness Resistance	With 6.8L:	
	1. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-B1) and the injector harness 8-way connector (terminal 2).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 8-way connector (terminal 7).	
	Are both resistance readings less than 2 ohms?	
	With 4.5L:	
	3. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-C1) and the injector harness 8-way connector (terminal 6)	
	4. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 8-way connector (terminal 8).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00004F5 -19-14JAN09-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

DN22556,00004F5 -19-14JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000652.05 reappear active?	**NO:** Problem fixed.

Continued on next page

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9 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000652.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004F5 -19-14JAN09-11/16

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

DN22556,00004F5 -19-14JAN09-12/16

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

DN22556,00004F5 -19-14JAN09-13/16

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 8-way injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 13

DN22556,00004F5 -19-14JAN09-14/16

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.

DN22556,00004F5 -19-14JAN09-15/16

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

DN22556,00004F5 -19-14JAN09-16/16

000652.06 — Injector #2 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #2 electronic injector circuit.

DN22556,00004F6 -19-14JAN09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #2 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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

DN22556,00004F6 -19-14JAN09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000652.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,00004F6 -19-14JAN09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000652.05, high injector #2 resistance, become active?

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

YES: GO TO 3

NO: GO TO 5

DN22556,00004F6 -19-14JAN09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.
3. Remove injector heat shield.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

DN22556,00004F6 -19-14JAN09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* With 6.8L: 1. Remove injector #2 connector dust cap and terminal nuts. 2. Lift injector #2 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #2 control (terminal 2) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms? With 4.5L: 4. Remove injector #2 connector dust cap and terminal nuts. 5. Lift injector #2 connector away from injector studs. 6. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #2 control (terminal 6) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,00004F6 -19-14JAN09-6/17

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

DN22556,00004F6 -19-14JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short	With 6.8L: 1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-B1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms? With 4.5L: 3. Disconnect ECU J2 connector. 4. On the harness, measure the resistance between the ECU injector #2 control (terminal J1-C1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

Continued on next page

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7 Check Engine Harness for Short to Voltage Source	With 6.8L:	
	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?	
	With 4.5L:	
	3. Ignition ON, engine OFF.	
	4. On the harness, measure the voltage between the ECU injector #2 control (terminal J1-C1) and single point ground.	**YES:** Fix problem. GO TO 10
	Is voltage greater than 0.5V?	**NO:** GO TO 8

DN22556,00004F6 -19-14JAN09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 9
	Did DTC 000652.06 reappear active?	**NO:** Problem fixed.

DN22556,00004F6 -19-14JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000652.06 reappear active?	**NO:** Problem fixed.

DN22556,00004F6 -19-14JAN09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000652.06 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004F6 -19-14JAN09-12/17

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

DN22556,00004F6 -19-14JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000652.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

DN22556,00004F6 -19-14JAN09-14/17

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 8-way injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

DN22556,00004F6 -19-14JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000652.06 reappear active with engine running?	**NO:** GO TO 15.

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15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000652.06 reappear active with engine running?	**NO:** Replace injector #2. GO TO 10

DN22556,00004F6 -19-14JAN09-17/17

000652.07 — Injector #2 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #2.

DN22556,00004F7 -19-06AUG10-1/13

000652.07 — Injector #2 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000652.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #2 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #2 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F7 -19-06AUG10-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000652.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,00004F7 -19-06AUG10-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #2 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement, see REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

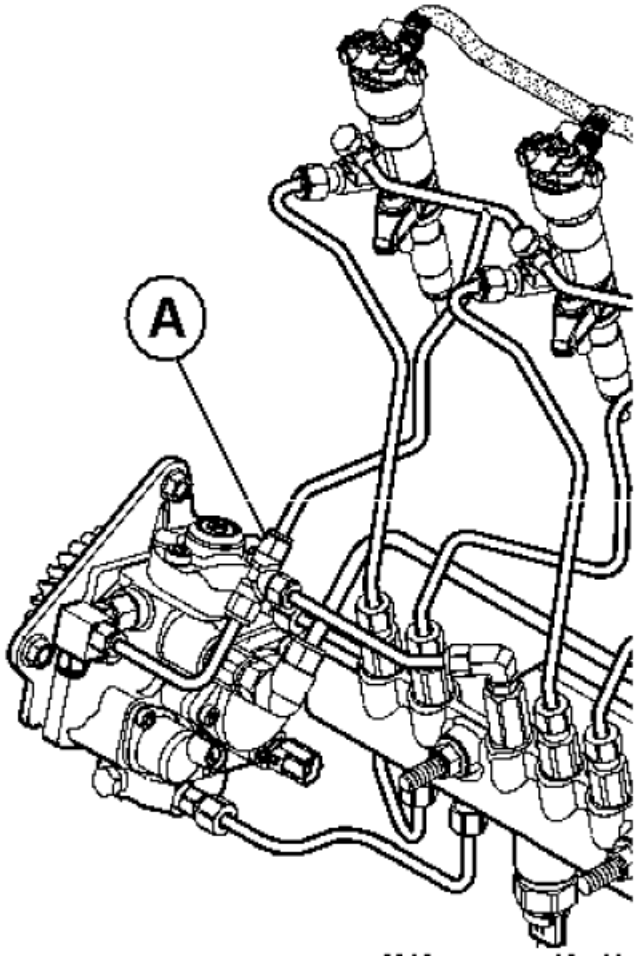
DN22556,00004F7 -19-06AUG10-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #2?	**YES:** Replace injector #2. GO TO 11 **NO:** GO TO 4

Continued on next page

DN22556,00004F7 -19-06AUG10-5/13

4 Injector Flow Rate Test	1. Ignition OFF, Engine OFF. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** 2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.	



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A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel. 4. Ignition ON, Engine Idling. 5. Collect fuel for 2 minutes. 6. Measure the amount of fuel collected in the container.	**YES:** Replace injector #2. GO TO 11
Specification 4.5L—Volume.....0.6 L (20 oz)	
Specification 6.8L—Volume.....0.7 L (24 oz)	
Is the collected amount more than the specification?	**NO:** GO TO 5

DN22556,00004F7 -19-06AUG10-6/13

5 Occurrence Count Check	Review stored information and look at occurrence count for 000652.07.	**YES:** GO TO 6
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 7

Continued on next page

DN22556,00004F7 -19-06AUG10-7/13

6 Misfire Test	1. Ignition ON, Engine OFF.	
	2. Perform Cylinder Cutout Test and record results.	
	3. Perform Cylinder Misfire Test and record results.	**YES:** Replace injector #2. GO TO 11
	Do tests confirm a bad injector #2?	**NO:** GO TO 8

DN22556,00004F7 -19-06AUG10-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours.	**YES:** Return application to service.
	Is the difference greater than 50 hours?	**NO:** GO TO 8

DN22556,00004F7 -19-06AUG10-9/13

8 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 9 **NO:** GO TO 10

DN22556,00004F7 -19-06AUG10-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** GO TO 2
	Did 000652.07 reappear when engine operating point was reached?	**NO:** GO TO 8

DN22556,00004F7 -19-06AUG10-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR.	**YES:** GO TO 11
	Was reprogramming successful?	**NO:** Replace ECU, GO TO 11

DN22556,00004F7 -19-06AUG10-12/13

11 DTC Check	Ignition ON, Engine Idling.	**YES:** Start a DTAC case.
	Is 000652.07 active?	**NO:** Problem fixed.

DN22556,00004F7 -19-06AUG10-13/13

000652.13 — Injector #2 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,00004F8 -19-06AUG10-1/9

000652.13 — Injector #2 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000652.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F8 -19-06AUG10-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00004F8 -19-06AUG10-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,00004F8 -19-06AUG10-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,00004F8 -19-06AUG10-5/9

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

DN22556,00004F8 -19-06AUG10-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,00004F8 -19-06AUG10-7/9

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

DN22556,00004F8 -19-06AUG10-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,00004F8 -19-06AUG10-9/9

000653.02 — Injector #3 Part Number Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #3.

DN22556,00004F9 -19-06AUG10-1/14

000653.02 — Injector #3 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000653.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004F9 -19-06AUG10-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004F9 -19-06AUG10-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,00004F9 -19-06AUG10-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

DN22556,00004F9 -19-06AUG10-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

DN22556,00004F9 -19-06AUG10-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000653.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

DN22556,00004F9 -19-06AUG10-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

DN22556,00004F9 -19-06AUG10-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000653.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004F9 -19-06AUG10-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000653.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

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DN22556,00004F9 -19-06AUG10-10/14

9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

DN22556,00004F9 -19-06AUG10-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000653.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

DN22556,00004F9 -19-06AUG10-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

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12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000653.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004F9 -19-06AUG10-14/14

000653.05 — Injector #3 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #3 electronic injector circuit.

DN22556,00004FA -19-14JAN09-1/16

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #3 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #3 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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

DN22556,00004FA -19-14JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000653.05 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00004FA -19-14JAN09-3/16

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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield.
3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

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3 Check Injector Harness Resistance

With 6.8L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 7) and injector #3 low side control (terminal 3).

With 4.5L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #3 low side control (terminal 5).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

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4 Check Injector Coil Resistance

NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.

1. Remove injector heat shield.
2. Inspect injector harness for damage.
3. Remove injector #3 connector dust cap. Do not remove terminals from injector.
4. On the injector, measure the resistance between the two injector studs.

NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace injector. GO TO 9

Continued on next page

DN22556,00004FA -19-14JAN09-6/16

5 Terminal Test	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 6

DN22556,00004FA -19-14JAN09-7/16

6 Check Engine Harness Resistance	With 6.8L:	
	1. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-D1) and the injector harness 8-way connector (terminal 3)..	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 8-way connector (terminal 7).	
	Are both resistance readings less than 2 ohms?	
	With 4.5L:	
	3. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-F1) and the injector harness 8-way connector (terminal 5)	
	4. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 8-way connector (terminal 8).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00004FA -19-14JAN09-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000653.05 reappear active?	**NO:** Problem fixed.

DN22556,00004FA -19-14JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000653.05 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004FA -19-14JAN09-10/16

9 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004FA -19-14JAN09-11/16

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

DN22556,00004FA -19-14JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000653.05 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 12

DN22556,00004FA -19-14JAN09-13/16

12 Terminal Test	**CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!** 1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector, injector #3, and 8-way injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 13

DN22556,00004FA -19-14JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000653.05 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 14.

DN22556,00004FA -19-14JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000653.05 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #3. GO TO 9

DN22556,00004FA -19-14JAN09-16/16

000653.06 — Injector #3 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #3 electronic injector circuit.

DN22556,00004FB -19-14JAN09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #3 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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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1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000653.06 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,00004FB -19-14JAN09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000653.05, high injector #3 resistance, become active? *NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.*	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,00004FB -19-14JAN09-4/17

3 Injector Harness Terminal Test and Inspection	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. 3. Remove injector heat shield. 4. Inspect injector harness for damage. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 4

Continued on next page

DN22556,00004FB -19-14JAN09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* With 6.8L: 1. Remove injector #3 connector dust cap and terminal nuts. 2. Lift injector #3 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #3 control (terminal 3) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms? With 4.5L: 4. Remove injector #3 connector dust cap and terminal nuts. 5. Lift injector #3 connector away from injector studs. 6. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #3 control (terminal 5) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,00004FB -19-14JAN09-6/17

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

DN22556,00004FB -19-14JAN09-7/17

6 Check Engine Harness for Wire-to-Wire Short	With 6.8L: 1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-D1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms? With 4.5L: 3. Disconnect ECU J2 connector. 4. On the harness, measure the resistance between the ECU injector #3 control (terminal J1-F1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

Continued on next page

DN22556,00004FB -19-14JAN09-8/17

7 Check Engine Harness for Short to Voltage Source	With 6.8L:	
	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?	
	With 4.5L:	
	3. Ignition ON, engine OFF.	
	4. On the harness, measure the voltage between the ECU injector #3 control (terminal J1-F1) and single point ground.	**YES:** Fix problem. GO TO 10
	Is voltage greater than 0.5V?	**NO:** GO TO 8

DN22556,00004FB -19-14JAN09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 9
	Did DTC 000653.06 reappear active?	**NO:** Problem fixed.

DN22556,00004FB -19-14JAN09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000653.06 reappear active?	**NO:** Problem fixed.

DN22556,00004FB -19-14JAN09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000653.06 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004FB -19-14JAN09-12/17

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

DN22556,00004FB -19-14JAN09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000653.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

DN22556,00004FB -19-14JAN09-14/17

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 8-way injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

DN22556,00004FB -19-14JAN09-15/17

14 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000653.06 reappear active with engine running?	**NO:** GO TO 15.

DN22556,00004FB -19-14JAN09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000653.06 reappear active with engine running?	**NO:** Replace injector #3. GO TO 10

DN22556,00004FB -19-14JAN09-17/17

000653.07 — Injector #3 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #3.

DN22556,00004FC -19-04MAR08-1/13

000653.07 — Injector #3 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000653.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #3 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #3 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004FC -19-04MAR08-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000653.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,00004FC -19-04MAR08-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #3 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement, see REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

DN22556,00004FC -19-04MAR08-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #3?	**YES:** Replace injector #3. GO TO 11 **NO:** GO TO 4

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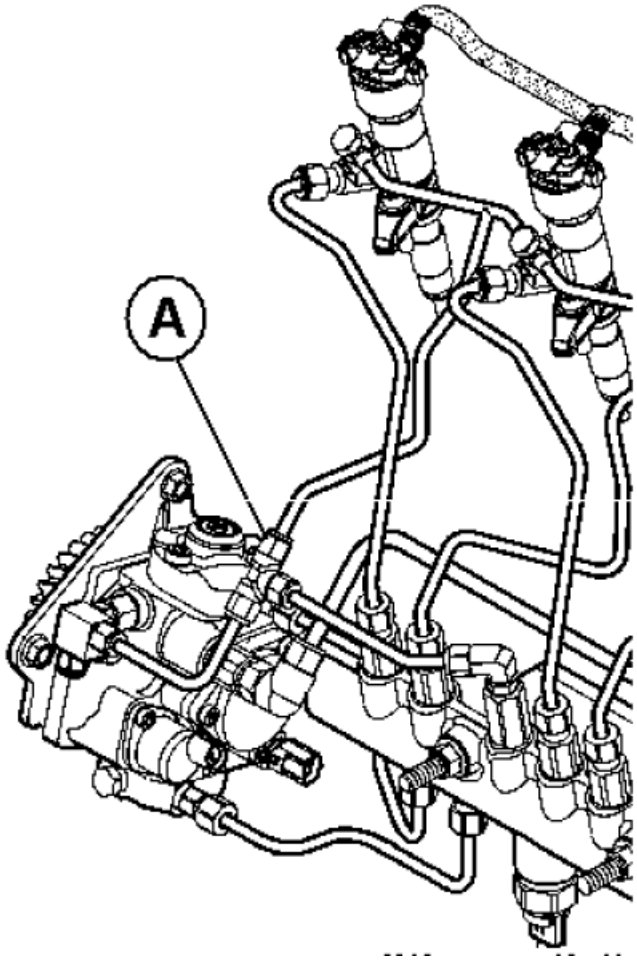
DN22556,00004FC -19-04MAR08-5/13

4 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



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A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

4.5L—Volume.....0.6 L (20 oz)

Specification

6.8L—Volume.....0.7 L (24 oz)

Is the collected amount more than the specification?

YES: Replace injector #3. GO TO 11

NO: GO TO 5

DN22556,00004FC -19-04MAR08-6/13

5 Occurrence Count Check

Review stored information and look at occurrence count for 000653.07.

Is occurrence recorded in step 1 greater than 5?

YES: GO TO 6

NO: GO TO 7

Continued on next page

DN22556,00004FC -19-04MAR08-7/13

6 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #3?	**YES:** Replace injector #3. GO TO 11 **NO:** GO TO 8

DN22556,00004FC -19-04MAR08-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 8

DN22556,00004FC -19-04MAR08-9/13

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

DN22556,00004FC -19-04MAR08-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000653.07 reappear when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004FC -19-04MAR08-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 11 **NO:** Replace ECU, GO TO 11

DN22556,00004FC -19-04MAR08-12/13

11 DTC Check	Ignition ON, Engine Idling. Is 000653.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

DN22556,00004FC -19-04MAR08-13/13

000653.13 — Injector #3 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,00004FD -19-06AUG10-1/9

000653.13 — Injector #3 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000653.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004FD -19-06AUG10-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,00004FD -19-06AUG10-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,00004FD -19-06AUG10-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,00004FD -19-06AUG10-5/9

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

DN22556,00004FD -19-06AUG10-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,00004FD -19-06AUG10-7/9

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

DN22556,00004FD -19-06AUG10-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,00004FD -19-06AUG10-9/9

000654.02 — Injector #4 Part Number Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #4.

DN22556,00004FE -19-06AUG10-1/14

000654.02 — Injector #4 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000654.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,00004FE -19-06AUG10-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,00004FE -19-06AUG10-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,00004FE -19-06AUG10-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

DN22556,00004FE -19-06AUG10-5/14

❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

DN22556,00004FE -19-06AUG10-6/14

5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000654.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

DN22556,00004FE -19-06AUG10-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

DN22556,00004FE -19-06AUG10-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000654.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004FE -19-06AUG10-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

Continued on next page

DN22556,00004FE -19-06AUG10-10/14

9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

DN22556,00004FE -19-06AUG10-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

DN22556,00004FE -19-06AUG10-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

DN22556,00004FE -19-06AUG10-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000654.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,00004FE -19-06AUG10-14/14

000654.05 — Injector #4 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #4 electronic injector circuit.

DN22556,00004FF -19-14JAN09-1/16

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #4 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #4 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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

DN22556,00004FF -19-14JAN09-2/16

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000654.05 reappear active?

YES: GO TO 2

NO: GO TO 10

DN22556,00004FF -19-14JAN09-3/16

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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield.
3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.

Were any problems found?

YES: Fix problem. GO TO 9

NO: GO TO 3

DN22556,00004FF -19-14JAN09-4/16

3 Check Injector Harness Resistance

With 6.8L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #4 low side control (terminal 4).

With 4.5L - On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 7) and injector #4 low side control (terminal 3).

Is resistance less than 2 ohms?

YES: GO TO 5

NO: GO TO 4

DN22556,00004FF -19-14JAN09-5/16

4 Check Injector Coil Resistance

NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.

1. Remove injector heat shield.
2. Inspect injector harness for damage.
3. Remove injector #4 connector dust cap. Do not remove terminals from injector.
4. On the injector, measure the resistance between the two injector studs.

NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.

Is the resistance less than 2 ohms?

YES: Replace injector wire harness. GO TO 9

NO: Replace injector. GO TO 9

Continued on next page

DN22556,00004FF -19-14JAN09-6/16

5 ECU Terminal Test	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 6

DN22556,00004FF -19-14JAN09-7/16

6 Check Engine Harness Resistance	With 6.8L:	
	1. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-A1) and the injector harness 8-way connector (terminal 4)..	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 8-way connector (terminal 8).	
	Are both resistance readings less than 2 ohms?	
	With 4.5L:	
	3. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-D1) and the injector harness 8-way connector (terminal 3)	
	4. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G1) and the injector harness 8-way connector (terminal 7).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

DN22556,00004FF -19-14JAN09-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000654.05 reappear active?	**NO:** Problem fixed.

DN22556,00004FF -19-14JAN09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000654.05 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,00004FF -19-14JAN09-10/16

9 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.05 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,00004FF -19-14JAN09-11/16

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

DN22556,00004FF -19-14JAN09-12/16

11 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000654.05 reappear active when engine operating point was reached?	**YES:** GO TO 1 **NO:** GO TO 12

DN22556,00004FF -19-14JAN09-13/16

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 8-way injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 13

DN22556,00004FF -19-14JAN09-14/16

13 Reconnect and Retest	1. Reconnect all connectors. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000654.05 reappear active with engine running?	**YES:** GO TO 1. **NO:** GO TO 14.

DN22556,00004FF -19-14JAN09-15/16

14 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine ON. 3. Refresh DTCs. Did 000654.05 reappear active with engine running?	**YES:** GO TO 1 **NO:** Replace injector #4. GO TO 9

DN22556,00004FF -19-14JAN09-16/16

000654.06 — Injector #4 Circuit Has Low Resistance

The ECU detects a Low resistance in the cylinder #4 electronic injector circuit.

DN22556,0000500 -19-20MAY09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #4 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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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DN22556,0000500 -19-20MAY09-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF.	
	NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.	
	2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.	
	3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 2
	Did 000654.06 reappear active?	**NO:** GO TO 11

DN22556,0000500 -19-20MAY09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	Did DTC 000654.05, high injector #4 resistance, become active?	**YES:** GO TO 3
	NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.	**NO:** GO TO 5

DN22556,0000500 -19-20MAY09-4/17

3 Injector Harness Terminal Test and Inspection	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.	
	3. Remove injector heat shield.	
	4. Inspect injector harness for damage.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 4

Continued on next page

DN22556,0000500 -19-20MAY09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* With 6.8L: 1. Remove injector #4 connector dust cap and terminal nuts. 2. Lift injector #4 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #4 control (terminal 4) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms? With 4.5L: 4. Remove injector #4 connector dust cap and terminal nuts. 5. Lift injector #4 connector away from injector studs. 6. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #4 control (terminal 3) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,0000500 -19-20MAY09-6/17

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

DN22556,0000500 -19-20MAY09-7/17

6 Check Engine Harness for Wire-to-Wire Short	With 6.8L: 1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-A1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms? With 4.5L: 3. Disconnect ECU J2 connector. 4. On the harness, measure the resistance between the ECU injector #4 control (terminal J1-D1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

Continued on next page

DN22556,0000500 -19-20MAY09-8/17

7 Check Engine Harness for Short to Voltage Source	With 6.8L: 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? With 4.5L: 3. Ignition ON, engine OFF. 4. On the harness, measure the voltage between the ECU injector #4 control (terminal J1-D1) and single point ground. Is voltage greater than 0.5V?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 8

DN22556,0000500 -19-20MAY09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

DN22556,0000500 -19-20MAY09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000500 -19-20MAY09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000654.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

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DN22556,0000500 -19-20MAY09-12/17

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

DN22556,0000500 -19-20MAY09-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 1
	Did 000654.06 reappear active when engine operating point was reached?	**NO:** GO TO 13

DN22556,0000500 -19-20MAY09-14/17

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 8-way injector harness connector.	**YES:** Fix problem. GO TO 10
	Were any problems found?	**NO:** GO TO 14

DN22556,0000500 -19-20MAY09-15/17

14 Reconnect and Retest	1. Reconnect all connectors.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1.
	Did 000654.06 reappear active with engine running?	**NO:** GO TO 15.

DN22556,0000500 -19-20MAY09-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON.	
	3. Refresh DTCs.	**YES:** GO TO 1
	Did 000654.06 reappear active with engine running?	**NO:** Replace injector #4. GO TO 10

DN22556,0000500 -19-20MAY09-17/17

000654.07 — Injector #4 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #4.

DN22556,0000501 -19-06AUG10-1/13

000654.07 — Injector #4 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000654.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #4 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #4 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000501 -19-06AUG10-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000654.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,0000501 -19-06AUG10-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #4 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement, see REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

DN22556,0000501 -19-06AUG10-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #4?	**YES:** Replace injector #4. GO TO 11 **NO:** GO TO 4

Continued on next page

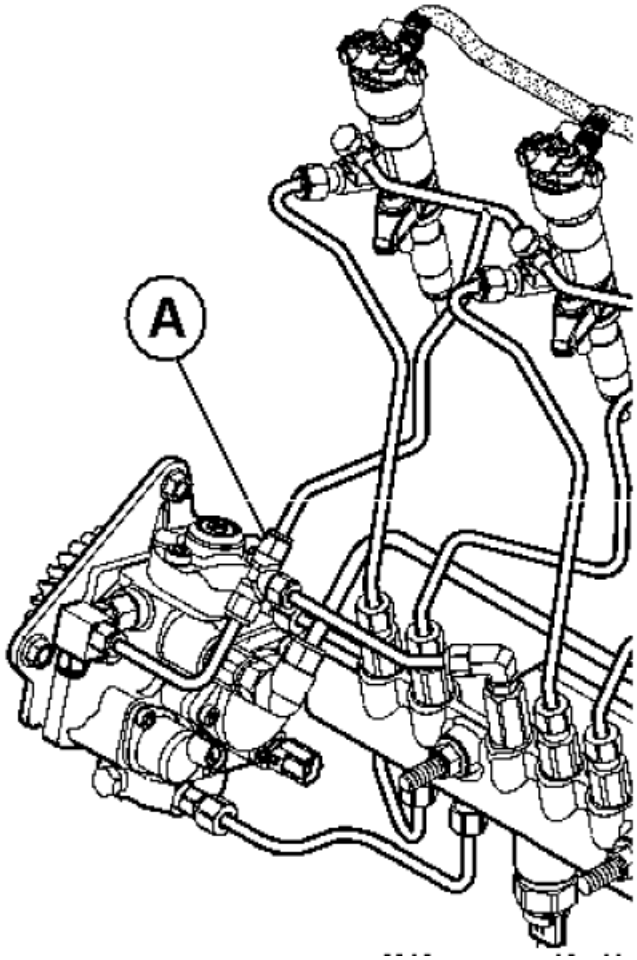
DN22556,0000501 -19-06AUG10-5/13

4 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



RG14958 —UN—31MAY07

A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

4.5L—Volume.....0.6 L (20 oz)

Specification

6.8L—Volume.....0.7 L (24 oz)

Is the collected amount more than the specification?

YES: Replace injector #4. GO TO 11

NO: GO TO 5

Continued on next page

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5 Occurrence Count Check	Review stored information and look at occurrence count for 000654.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

DN22556,0000501 -19-06AUG10-7/13

6 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #4?	 **YES:** Replace injector #4. GO TO 11 **NO:** GO TO 8

DN22556,0000501 -19-06AUG10-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 8

DN22556,0000501 -19-06AUG10-9/13

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

DN22556,0000501 -19-06AUG10-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000654.07 reappear when engine operating point was reached?	 **YES:** GO TO 2 **NO:** GO TO 8

DN22556,0000501 -19-06AUG10-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 11 **NO:** Replace ECU, GO TO 11

DN22556,0000501 -19-06AUG10-12/13

11 DTC Check	Ignition ON, Engine Idling. Is 000654.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

DN22556,0000501 -19-06AUG10-13/13

000654.13 — Injector #4 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,0000502 -19-10SEP07-1/9

000654.13 — Injector #5 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000654.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000502 -19-10SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,0000502 -19-10SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,0000502 -19-10SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,0000502 -19-10SEP07-5/9

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

DN22556,0000502 -19-10SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,0000502 -19-10SEP07-7/9

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

DN22556,0000502 -19-10SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,0000502 -19-10SEP07-9/9

000655.02 — Injector #5 Part Number Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #5.

DN22556,0000503 -19-06AUG10-1/14

000655.02 — Injector #5 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000655.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000503 -19-06AUG10-2/14

❶ **Part Number Input Method Check**	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,0000503 -19-06AUG10-3/14

❷ **Part Number Check**	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,0000503 -19-06AUG10-4/14

❸ **Part Verification**	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

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❹ **Physical Verification of Part Number**	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

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5 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000655.02 active?	**YES:** GO TO 6 **NO:** Problem fixed, return application to service.

DN22556,0000503 -19-06AUG10-7/14

6 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 7 **NO:** Check payload and try again.

DN22556,0000503 -19-06AUG10-8/14

7 Input Injector Data Again	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate and type in the required information. 3. Select Next. 4. Select Submit. 5. Select OK. 6. Select No. 7. Refresh codes. Is 000655.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,0000503 -19-06AUG10-9/14

8 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000655.02 active?	**YES:** GO TO 9 **NO:** Problem fixed, return application to service.

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9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

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10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000655.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

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11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

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12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000655.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,0000503 -19-06AUG10-14/14

000655.05 — Injector #5 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #5 electronic injector circuit.

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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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #5 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #5 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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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DN22556,0000504 -19-20MAY09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000655.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

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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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield. 3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 3

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3 Check Injector Harness Resistance	On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #5 low side control (terminal 5). Is resistance less than 2 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

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4 Check Injector Coil Resistance	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector heat shield. 2. Inspect injector harness for damage. 3. Remove injector #5 connector dust cap. Do not remove terminals from injector. 4. On the injector, measure the resistance between the two injector studs. *NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.* Is the resistance less than 2 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

Continued on next page

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5 Terminal Test

CAUTION: Injectors are supplied with 90V. Electric shock hazard if ignition is ON!

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

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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 8-way connector (terminal 5).
2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 8-way connector (terminal 8).

Are both resistance readings less than 2 ohms?

YES: GO TO 7

NO: Fix problem. GO TO 9

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7 Reprogram ECU

NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Download latest ECU payload and reprogram ECU.
4. Ignition ON, engine OFF.
5. Refresh DTCs.
6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000655.05 reappear active?

YES: GO TO 8

NO: Problem fixed.

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8 Replace ECU

1. Ignition OFF, engine OFF.
2. Replace ECU.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000655.05 reappear active?

YES: Open DTAC case.

NO: Problem fixed.

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9 Verification

NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000655.05 reappear active?

YES: GO TO 1

NO: Problem fixed.

Continued on next page

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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

DN22556,0000504 -19-20MAY09-12/16

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

DN22556,0000504 -19-20MAY09-13/16

12 Terminal Test	1. Ignition OFF, engine OFF	
	2. Perform TERMINAL TEST on the ECU J1 connector, injector #5, and 8-way injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

DN22556,0000504 -19-20MAY09-14/16

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.

DN22556,0000504 -19-20MAY09-15/16

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

DN22556,0000504 -19-20MAY09-16/16

000655.06 — Injector #5 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #5 electronic injector circuit.

DN22556,0000505 -19-20MAY09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #5 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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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DN22556,0000505 -19-20MAY09-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000655.06 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,0000505 -19-20MAY09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield. 3. Ignition ON, engine OFF. 4. Refresh DTCs 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.05, high injector #5 resistance, become active? *NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.*	**YES:** GO TO 3 **NO:** GO TO 5

DN22556,0000505 -19-20MAY09-4/17

3 Injector Harness Terminal Test and Inspection	1. Ignition OFF, engine OFF. 2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. 3. Remove injector heat shield. 4. Inspect injector harness for damage. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 4

Continued on next page

DN22556,0000505 -19-20MAY09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector #5 connector dust cap and terminal nuts. 2. Lift injector #5 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #5 control (terminal 5) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,0000505 -19-20MAY09-6/17

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

DN22556,0000505 -19-20MAY09-7/17

6 Check Engine Harness for Wire-to-Wire Short	1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #5 control (terminal J1-F1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

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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

DN22556,0000505 -19-20MAY09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

Continued on next page

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9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,0000505 -19-20MAY09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000655.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,0000505 -19-20MAY09-12/17

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

DN22556,0000505 -19-20MAY09-13/17

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

DN22556,0000505 -19-20MAY09-14/17

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 8-way injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

Continued on next page

DN22556,0000505 -19-20MAY09-15/17

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.

DN22556,0000505 -19-20MAY09-16/17

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

DN22556,0000505 -19-20MAY09-17/17

000655.07 — Injector #5 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #5.

DN22556,0000506 -19-06AUG10-1/13

000655.07 — Injector #5 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000655.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #5 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #5 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000506 -19-06AUG10-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000655.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,0000506 -19-06AUG10-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #5 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement, see REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

DN22556,0000506 -19-06AUG10-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #5?	**YES:** Replace injector #5. GO TO 11 **NO:** GO TO 4

Continued on next page

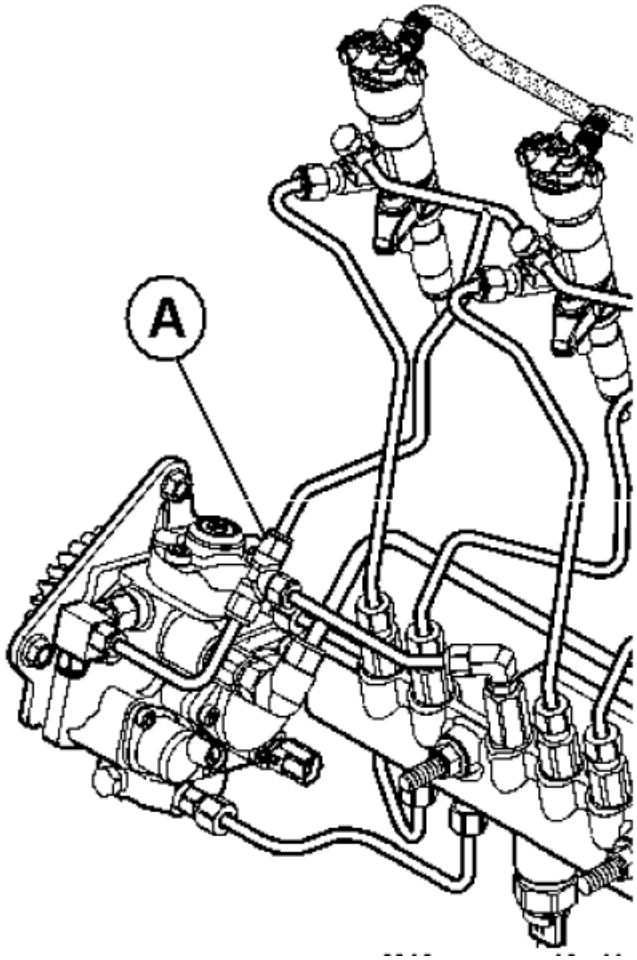
DN22556,0000506 -19-06AUG10-5/13

4 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



RG14958 —UN—31MAY07

A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

4.5L—Volume.....0.6 L (20 oz)

Specification

6.8L—Volume.....0.7 L (24 oz)

Is the collected amount more than the specification?

YES: Replace injector #5. GO TO 11

NO: GO TO 5

Continued on next page

DN22556,0000506 -19-06AUG10-6/13

5 Occurrence Count Check	Review stored information and look at occurrence count for 000655.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

DN22556,0000506 -19-06AUG10-7/13

6 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #5?	 **YES:** Replace injector #5. GO TO 11 **NO:** GO TO 8

DN22556,0000506 -19-06AUG10-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 8

DN22556,0000506 -19-06AUG10-9/13

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

DN22556,0000506 -19-06AUG10-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000655.07 reappear when engine operating point was reached?	 **YES:** GO TO 2 **NO:** GO TO 8

DN22556,0000506 -19-06AUG10-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 11 **NO:** Replace ECU, GO TO 11

DN22556,0000506 -19-06AUG10-12/13

11 DTC Check	Ignition ON, Engine Idling. Is 000655.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

DN22556,0000506 -19-06AUG10-13/13

000655.13 — Injector #5 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,0000507 -19-06AUG10-1/9

000655.13 — Injector #5 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000655.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000507 -19-06AUG10-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,0000507 -19-06AUG10-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,0000507 -19-06AUG10-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,0000507 -19-06AUG10-5/9

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

DN22556,0000507 -19-06AUG10-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,0000507 -19-06AUG10-7/9

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

DN22556,0000507 -19-06AUG10-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,0000507 -19-06AUG10-9/9

000656.02 — Injector #6 Part # Data Invalid

The ECU detects an incorrect injector part number was installed or calibrated into cylinder #6.

DN22556,0000508 -19-06AUG10-1/14

000656.02 — Injector #6 Part Number Invalid Diagnostic Procedure

Troubleshooting Sequence:
000656.02

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect injector part number was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,0000508 -19-06AUG10-2/14

1 Part Number Input Method Check	Was the part number typed in manually?	**YES:** GO TO 2 **NO:** GO TO 8

DN22556,0000508 -19-06AUG10-3/14

2 Part Number Check	1. Select Injector Calibration in Service ADVISOR. 2. Check the part number on the injector data sheet against the one displayed. Are the part numbers the same?	 **YES:** GO TO 3 **NO:** GO TO 4

DN22556,0000508 -19-06AUG10-4/14

3 Part Verification	Verify with parts department that the injector that was installed is the correct one for the application. Is the injector the correct one?	**YES:** GO TO 5 **NO:** Remove injector and order proper injector.

DN22556,0000508 -19-06AUG10-5/14

4 Physical Verification of Part Number	1. Remove injector from engine, see REMOVE ELECTRONIC INJECTOR (EI) in Section 2 Group 090 earlier in this manual. 2. Compare the inscribed part number against the datasheet and ordered injector. Is the injector the proper one for the application?	 **YES:** Start a DTAC case. **NO:** Remove injector and order proper one.

Continued on next page

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5 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000656.02 active?

YES: GO TO 6

NO: Problem fixed, return application to service.

DN22556,0000508 -19-06AUG10-7/14

6 ECU Programming Check

1. Download the latest ECU software payload.
2. Reprogram ECU.

Was the ECU programming successful?

YES: GO TO 7

NO: Check payload and try again.

DN22556,0000508 -19-06AUG10-8/14

7 Input Injector Data Again

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate and type in the required information.
3. Select Next.
4. Select Submit.
5. Select OK.
6. Select No.
7. Refresh codes.

Is 000656.02 active?

YES: Start a DTAC case.

NO: Problem fixed, return application to service.

DN22556,0000508 -19-06AUG10-9/14

8 Automatic Input of Injector Data

1. Select Injector Calibration in Service ADVISOR.
2. Select the injector to calibrate.
3. Select the sequence number of the injector file downloaded from the list of injectors.
4. Select Next.
5. Select Submit.
6. Select OK.
7. Select No.
8. Refresh codes.

Is 000656.02 active?

YES: GO TO 9

NO: Problem fixed, return application to service.

Continued on next page

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9 Download 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 file?	**YES:** GO TO 10 **NO:** Contact John Deere Custom Performance.

DN22556,0000508 -19-06AUG10-11/14

10 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000656.02 active?	**YES:** GO TO 11 **NO:** Problem fixed, return application to service.

DN22556,0000508 -19-06AUG10-12/14

11 ECU Programming Check	1. Download the latest ECU software payload. 2. Reprogram ECU. Was the ECU programming successful?	**YES:** GO TO 12 **NO:** Check payload and try again.

DN22556,0000508 -19-06AUG10-13/14

12 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector file downloaded from the list of injectors. 4. Select Next. 5. Select Submit. 6. Select OK. 7. Select No. 8. Refresh codes. Is 000656.02 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, return application to service.

DN22556,0000508 -19-06AUG10-14/14

000656.05 — Injector #6 Circuit Has High Resistance

The ECU detects an high resistance in the cylinder #6 electronic injector circuit.

DN22556,0000509 -19-20MAY09-1/16

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects high resistance in the cylinder #6 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by an open circuit or by a few ohms of additional series resistance anywhere in the injector #6 circuit.
An open circuit in the injector high voltage supply may also cause active DTCs indicating high resistance in this and other injector circuits.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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

DN22556,0000509 -19-20MAY09-2/16

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). *NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.* 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did 000656.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 10

DN22556,0000509 -19-20MAY09-3/16

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 8-way injector connector between engine harness and injector harness. Do not remove the injector heat shield. 3. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 3

DN22556,0000509 -19-20MAY09-4/16

3 Check Injector Harness Resistance	On the injector harness (male pin terminals), measure the resistance between injector high voltage supply (terminal 8) and injector #6 low side control (terminal 6). Is resistance less than 2 ohms?	**YES:** GO TO 5 **NO:** GO TO 4

DN22556,0000509 -19-20MAY09-5/16

4 Check Injector Coil Resistance	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector heat shield. 2. Inspect injector harness for damage. 3. Remove injector #6 connector dust cap. Do not remove terminals from injector. 4. On the injector, measure the resistance between the two injector studs. *NOTE: Contact injector studs or injector harness terminals with meter test leads for this measurement, not terminal nuts. Terminal nuts are installed with thread locking agent which may affect the resistance measurement.* Is the resistance less than 2 ohms?	**YES:** Replace injector wire harness. GO TO 9 **NO:** Replace injector. GO TO 9

Continued on next page

DN22556,0000509 -19-20MAY09-6/16

5 ECU Terminal Test	1. Disconnect ECU J1 connector.	
	2. Perform TERMINAL TEST on J1.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 6

DN22556,0000509 -19-20MAY09-7/16

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 8-way connector (terminal 6).	
	2. On the harness, measure the resistance between the ECU high voltage supply (terminal J1-G2) and the injector harness 8-way connector (terminal 8).	**YES:** GO TO 7
	Are both resistance readings less than 2 ohms?	**NO:** Fix problem. GO TO 9

DN22556,0000509 -19-20MAY09-8/16

7 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	
	6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 8
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

DN22556,0000509 -19-20MAY09-9/16

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Open DTAC case.
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

DN22556,0000509 -19-20MAY09-10/16

9 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector terminal installation instructions.*	
	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	
	5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).	
	6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** GO TO 1
	Did DTC 000656.05 reappear active?	**NO:** Problem fixed.

Continued on next page

DN22556,0000509 -19-20MAY09-11/16

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

DN22556,0000509 -19-20MAY09-12/16

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

DN22556,0000509 -19-20MAY09-13/16

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 8-way injector harness connector.	**YES:** Fix problem. GO TO 9
	Were any problems found?	**NO:** GO TO 13

DN22556,0000509 -19-20MAY09-14/16

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.

DN22556,0000509 -19-20MAY09-15/16

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

DN22556,0000509 -19-20MAY09-16/16

000656.06 — Injector #6 Circuit Has Low Resistance

The ECU detects a low resistance in the cylinder #6 electronic injector circuit.

DN22556,000050A -19-20MAY09-1/17

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 is also displayed during the Harness Diagnostic Mode Test in Service ADVISOR, provided fuel rail pressure is below 5 MPa (725 psi).

Related Information:
The ECU detects low resistance in the cylinder #6 electronic injector circuit.
The ECU has two internally-connected terminals which provide a shared high voltage supply to all the injectors. The ECU switches the low side (ground) to control each individual injector.
This DTC can be caused by a wire-to-wire short. A short between the low side wiring of two injectors will cause active DTCs indicating low resistance in both injectors.
This DTC can also be caused by an injector that has low coil resistance (coil windings are shorted together).

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.

Additional References:
For further electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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

DN22556,000050A -19-20MAY09-2/17

1 Read DTCs and Store Snapshot Information

1. Ignition ON, engine OFF.

NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.

2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh DTCs.
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).

NOTE: Fuel Rail Pressure - Actual must be below 5 MPa (725 psi) or the Harness Diagnostic Mode Test results will be invalid.

6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did 000656.06 reappear active?

YES: GO TO 2

NO: GO TO 11

DN22556,000050A -19-20MAY09-3/17

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 8-way injector connector between engine harness and injector harness. Do not remove injector heat shield.
3. Ignition ON, engine OFF.
4. Refresh DTCs
5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi).
6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Did DTC 000656.05, high injector #6 resistance, become active?

YES: GO TO 3

NO: GO TO 5

NOTE: Ignore DTCs for high resistance in the other injector circuits that may now be active because of this test.

DN22556,000050A -19-20MAY09-4/17

3 Injector Harness Terminal Test and Inspection

1. Ignition OFF, engine OFF.
2. Perform TERMINAL TEST on engine harness and injector harness 8-way connectors.
3. Remove injector heat shield.
4. Inspect injector harness for damage.

Were any problems found?

YES: Fix problem. GO TO 10

NO: GO TO 4

Continued on next page

DN22556,000050A -19-20MAY09-5/17

4 Check Injector Harness for Wire to Wire Short	*NOTE: See REMOVE ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for connector dust cap removal instructions.* 1. Remove injector #6 connector dust cap and terminal nuts. 2. Lift injector #6 connector away from injector studs. 3. On the injector harness 8-way connector (male pin terminals), measure the resistance between injector #6 control (terminal 6) and all other terminals in the 8-way connector. Are all resistance readings greater than 1k ohms?	**YES:** Replace injector. GO TO 10 **NO:** Replace injector harness. GO TO 10

DN22556,000050A -19-20MAY09-6/17

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

DN22556,000050A -19-20MAY09-7/17

6 Check Engine Harness for Wire-to-Wire Short	1. Disconnect ECU J2 connector. 2. On the harness, measure the resistance between the ECU injector #6 control (terminal J1-C1) and all terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 7 **NO:** Fix problem. GO TO 10

DN22556,000050A -19-20MAY09-8/17

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

DN22556,000050A -19-20MAY09-9/17

8 Reprogram ECU	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Download latest ECU payload and reprogram ECU. 4. Ignition ON, engine OFF. 5. Refresh DTCs. 6. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 7. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** GO TO 9 **NO:** Problem fixed.

Continued on next page

DN22556,000050A -19-20MAY09-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** Open DTAC case. **NO:** Problem fixed.

DN22556,000050A -19-20MAY09-11/17

10 Verification	*NOTE: See INSTALL ELECTRONIC INJECTOR (EI) in Section 02, Group 90 earlier in this manual for injector for injector terminal installation instructions.* 1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Refresh DTCs. 5. Verify Fuel Rail Pressure - Actual data point is below 5 MPa (725 psi). 6. Perform HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Did DTC 000656.06 reappear active?	**YES:** GO TO 1 **NO:** Problem fixed.

DN22556,000050A -19-20MAY09-12/17

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

DN22556,000050A -19-20MAY09-13/17

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

DN22556,000050A -19-20MAY09-14/17

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 8-way injector harness connector. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

Continued on next page

DN22556,000050A -19-20MAY09-15/17

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.

DN22556,000050A -19-20MAY09-16/17

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

DN22556,000050A -19-20MAY09-17/17

000656.07 — Injector #6 Not Responding

The fuel rail pressure does not drop at the injection of fuel to cylinder #6.

DN22556,000050B -19-06AUG10-1/13

000656.07 — Injector #6 Not Responding Diagnostic Procedure

Troubleshooting Sequence:
000656.07

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU does not detects a drop in fuel rail pressure when cylinder #6 injects fuel.

Alarm Level:
Warning

Control Unit Response:
Engine will run rough and misfire since the injector in cylinder #6 is not injecting fuel.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,000050B -19-06AUG10-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Ignition ON, Engine ON. 5. Refresh Codes. Did 000656.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

Continued on next page

DN22556,000050B -19-06AUG10-3/13

❷ Fuel Line Inspection	1. Ignition ON, Engine ON. **CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.** **CAUTION: Escaping fluid under pressure can penetrate skin causing serious injury. Avoid the hazard be relieving pressure before disconnecting hydraulic or other high pressure lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately. Any fluids injected into the skin must be surgically removed within hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, USA.** 2. Check for injector #6 fuel supply line leak. 3. Ignition OFF, Engine OFF. 4. Check for over bent/pinched or cracked fuel line between the rail and the injector. **IMPORTANT: If a cracked line is found and if fuel is spraying out of it replace flow damper also. For flow damper replacement see, REMOVE AND INSTALL FLOW DAMPERS in Section 2 Group 090.** Were any problems found?	**YES:** Repair problem. GO TO 11 **NO:** GO TO 3

DN22556,000050B -19-06AUG10-4/13

❸ Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #6?	**YES:** Replace injector #6. GO TO 11 **NO:** GO TO 4

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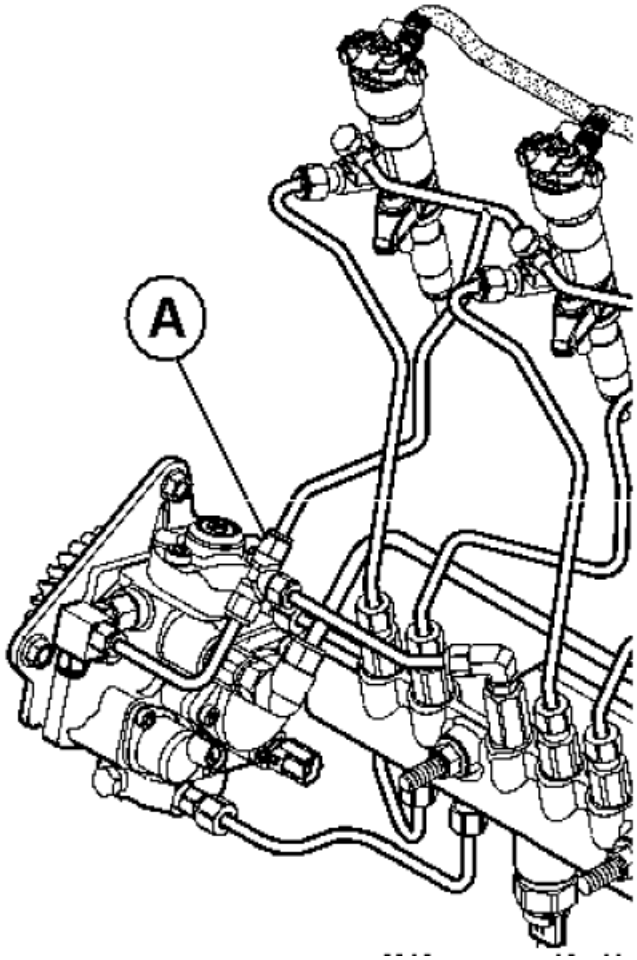
DN22556,000050B -19-06AUG10-5/13

4 Injector Flow Rate Test

1. Ignition OFF, Engine OFF.

CAUTION: Fuel lines may be under high pressure. Use extreme caution while opening fuel lines. Let the engine sit for several minutes after cranking or running prior to opening fuel lines.

2. Disconnect the fuel leak off line at the High Pressure Pump “T” connector.



RG14958 —UN—31MAY07

A—Leak off line "T" fitting

3. Place leak off line into a container suitable for fuel.
4. Ignition ON, Engine Idling.
5. Collect fuel for 2 minutes.
6. Measure the amount of fuel collected in the container.

Specification

4.5L—Volume.....0.6 L (20 oz)

Specification

6.8L—Volume.....0.7 L (24 oz)

Is the collected amount more than the specification?

YES: Replace injector #6.
GO TO 11

NO: GO TO 5

Continued on next page

DN22556,000050B -19-06AUG10-6/13

5 Occurrence Count Check	Review stored information and look at occurrence count for 000656.07. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 6 **NO:** GO TO 7

DN22556,000050B -19-06AUG10-7/13

6 Misfire Test	1. Ignition ON, Engine OFF. 2. Perform Cylinder Cutout Test and record results. 3. Perform Cylinder Misfire Test and record results. Do tests confirm a bad injector #6?	 **YES:** Replace injector #6. GO TO 11 **NO:** GO TO 8

DN22556,000050B -19-06AUG10-8/13

7 Time Between Occurrences Check	Compare last occurrence engine hours with current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 8

DN22556,000050B -19-06AUG10-9/13

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

DN22556,000050B -19-06AUG10-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 000656.07 reappear when engine operating point was reached?	 **YES:** GO TO 2 **NO:** GO TO 8

DN22556,000050B -19-06AUG10-11/13

10 Reprogram ECU	Download latest ECU software payload and reprogram ECU using Service ADVISOR. Was reprogramming successful?	**YES:** GO TO 11 **NO:** Replace ECU, GO TO 11

DN22556,000050B -19-06AUG10-12/13

11 DTC Check	Ignition ON, Engine Idling. Is 000656.07 active?	**YES:** Start a DTAC case. **NO:** Problem fixed.

DN22556,000050B -19-06AUG10-13/13

000656.13 — Injector #6 Calibration Fault

The ECU detects an incorrect QR Code was calibrated into the ECU.

DN22556,000050C -19-10SEP07-1/9

000656.13 — Injector #6 Calibration Fault Diagnostic Procedure

Troubleshooting Sequence:
000656.13

When DTC is Displayed:
During an injector programming event.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to run the engine normally.

Related Information:
The ECU detects an incorrect QR Code was programmed into the ECU. The engine performance may be drastically effected. The engine will also be out of compliance with Tier 3 emission requirements.

Additional References:
For more electronic injector information, see ELECTRONIC INJECTOR (EI) OPERATION in Section 03, Group 130 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

DN22556,000050C -19-10SEP07-2/9

1	**QR Code Input Method Check**	Was the QR code typed in manually?	**YES:** GO TO 2 **NO:** GO TO 3

DN22556,000050C -19-10SEP07-3/9

2	**Verification and Reentry of QR Code**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Check the written code against the one displayed. 4. Type it back in again. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 3

DN22556,000050C -19-10SEP07-4/9

3	**Automatic Input of Injector Data**	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the sequence number of the injector installed from the list. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 4

Continued on next page

DN22556,000050C -19-10SEP07-5/9

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

DN22556,000050C -19-10SEP07-6/9

5 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** GO TO 6

DN22556,000050C -19-10SEP07-7/9

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

DN22556,000050C -19-10SEP07-8/9

7 Automatic Input of Injector Data	1. Select Injector Calibration in Service ADVISOR. 2. Select the injector to calibrate. 3. Select the serial number of the injector file downloaded from the list of injectors. Did the ECU accept the QR code?	 **YES:** Problem fixed. **NO:** Start a DTAC case.

DN22556,000050C -19-10SEP07-9/9

000676.03 — Cold Start Aid Signal Received When Not Expected

The ECU detects the cold start aid relay output is high when the ECU is not energizing the relay.

BB78437,0000123 -19-26SEP08-1/18

000676.03 — Cold Start Aid Signal Received When Not Expected Diagnostic Procedure

Troubleshooting Sequence:
000676.03

When DTC is Displayed:
The ECU is commanding the cold start aid relay OFF but is detecting that the cold start aid relay is energized.

Related Information:
The ECU supplies a high side output to the cold start aid relay coil to energize the relay. The ECU monitors the output of the relay to determine if the relay is energized.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
Engine performance may be affected if glow plugs are powered with engine at operating temperature.

Additional References:
For further cold start aid information, see GLOW PLUG OPERATION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 24V ECU WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

BB78437,0000123 -19-26SEP08-2/18

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF for at least 30 seconds. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh DTCs. Did 000676.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 12

Continued on next page

BB78437,0000123 -19-26SEP08-3/18

2 Check Cold Start Aid Relay Output Voltage

NOTE: The cold start aid relay has four studs. The two smaller studs are connected to the relay coil. One of the large studs is connected to the battery voltage supply. The other large stud is the relay output which is connected to the glow plugs.

1. Ignition ON, engine OFF for at least 30 seconds.
2. Verify that the ECU cold start aid relay output sense terminal C05 is on the cold start aid relay output stud and not the cold start aid relay battery supply terminal.
3. Measure the voltage from the cold start aid relay output terminal to single point ground.

Is the cold start aid relay output terminal voltage greater than 1V?

YES: GO TO 3

NO: GO TO 5

BB78437,0000123 -19-26SEP08-4/18

3 Check for Energized Cold Start Aid Relay

Measure voltage from cold start aid relay coil high side terminal (C04) to single point ground.

Is voltage greater than 1V?

YES: GO TO 6

NO: GO TO 4

BB78437,0000123 -19-26SEP08-5/18

4 Check for Stuck Cold Start Aid Relay Contacts

1. Remove cold start aid fuse located in a sealed fuse holder near alternator output terminal.
2. Measure the voltage from the cold start aid relay output terminal (C05) to single point ground.

Is voltage greater than 1V?

YES: Repair short to voltage source in cold start aid relay output wiring. GO TO 11

NO: Replace cold start aid relay. GO TO 11

BB78437,0000123 -19-26SEP08-6/18

5 Check Cold Start Aid Relay Output Sense Wiring

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TEST on J1.
4. Measure the resistance between ECU cold start aid relay output sense (J1-A4) and cold start aid relay output terminal (C05).

Are Terminal Test results good and is resistance less than 10 ohms?

YES: GO TO 9

NO: Fix problem. GO TO 11

BB78437,0000123 -19-26SEP08-7/18

6 Check Cold Start Aid Relay Control Circuit

1. Ignition OFF, engine OFF.
2. Disconnect ECU J1 connector.
3. Perform TERMINAL TESTon J1.
4. Measure the resistance between ECU cold start aid relay control (J1-F4) and cold start aid relay coil high side terminal (C04).

Are Terminal Test results good and is resistance less than 10 ohms?

YES: Do not reconnect J1. GO TO 7

NO: Fix problem. GO TO 11

Continued on next page

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7 Check Cold Start Aid Relay Control Circuit for Short to Voltage	1. Ignition ON, engine OFF.	
	2. Measure the voltage from cold start aid relay coil high side terminal (C04) to single point ground.	**YES:** Repair short to voltage of cold start aid control circuit. GO TO 11
	Is the voltage greater than 1V?	**NO:** GO TO 8

BB78437,0000123 -19-26SEP08-9/18

8 Check Cold Start Aid Relay Control Circuit for Wire to Wire Short	1. Ignition OFF, engine OFF.	
	2. Remove cold start aid relay coil high side terminal (C04) from cold start aid relay.	
	3. Measure resistance between ECU cold start aid relay control (J1-F4) and all other terminals in the J1 connector.	**YES:** GO TO 9
	Are all resistance values greater than 1k ohms?	**NO:** Fix problem. GO TO 11

BB78437,0000123 -19-26SEP08-10/18

9 Reprogram ECU	1. Ignition OFF, engine OFF.	
	2. Reconnect all connectors.	
	3. Download latest ECU payload and reprogram ECU.	
	4. Ignition ON, engine OFF for at least 30 seconds.	
	5. Refresh DTCs.	**YES:** GO TO 10
	Did DTC 000676.03 reappear active?	**NO:** Problem fixed.

BB78437,0000123 -19-26SEP08-11/18

10 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Ignition ON, engine OFF for at least 30 seconds.	
	4. Refresh DTCs.	**YES:** Open DTAC case.
	Did DTC 000676.03 reappear active?	**NO:** Problem fixed.

BB78437,0000123 -19-26SEP08-12/18

11 Verification	1. Ignition OFF, engine OFF for 10 seconds.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF for at least 30 seconds.	
	4. Refresh DTCs.	**YES:** GO TO 2
	Did DTC 000676.03 reappear active?	**NO:** Problem fixed.

Continued on next page

BB78437,0000123 -19-26SEP08-13/18

12 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Fix problem if found. GO TO 11
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 13 **NO:** GO TO 14

BB78437,0000123 -19-26SEP08-14/18

13 Engine Error Operating Point Test	1. Ignition ON, engine ON	
	2. Set engine to operating point of failure and refresh DTCs.	**YES:** GO TO 2
	Did 000676.03 reappear active when engine operating point was reached?	**NO:** GO TO 14

BB78437,0000123 -19-26SEP08-15/18

14 Terminal Test and Harness Inspection	1. Ignition OFF, engine OFF.	
	2. Perform TERMINAL TESTon the ECU J1 connector and cold start aid relay.	
	3. Inspect wiring harness for damage which could cause intermittent short to voltage source or wire to wire shorts.	**YES:** Fix problem. GO TO 11
	Were any problems found?	**NO:** Reconnect all connectors. GO TO 15

BB78437,0000123 -19-26SEP08-16/18

15 Check for Intermittent Stuck Relay Contacts	1. Disconnect fuel temperature sensor to cause ECU to energize cold start aid relay at next key cycle.	
	2. Ignition ON, engine OFF for at least 30 seconds.	
	3. Refresh DTCs.	
	Did 000676.03 reappear active?	**YES:** Relay contacts may be stuck. GO TO 2
	NOTE: Cycle ignition OFF for 10 seconds and repeat sub-steps 2-3 several times to cycle relay contacts, if 000676.03 does not reappear active.	**NO:** GO TO 16

BB78437,0000123 -19-26SEP08-17/18

16 Reprogram ECU	1. Download latest ECU payload and reprogram ECU.	
	2. Ignition ON, engine ON for at least 30 seconds.	
	3. Refresh DTCs.	**YES:** GO TO 2
	Did 000676.03 reappear active?	**NO:** Problem fixed or conditions necessary to duplicate 000676.03 not met.

BB78437,0000123 -19-26SEP08-18/18

000676.05 — Cold Start Aid Circuit Has High Resistance

The ECU detects the cold start aid relay output is low when the ECU is energizing the relay.

BB78437,0000124 -19-06JUN08-1/17

000676.05 — Cold Start Aid Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
000676.05

When DTC is Displayed:
The ECU is commanding the cold start aid relay ON but is detecting that the cold start aid relay is not energized.
This DTC will become stored when the ECU commands the cold start aid relay OFF.
The brief length of time that DTC is active may cause DTC to only be shown as a stored DTC.

Related Information:
The ECU uses fuel temperature to determine if cold start aid relay should be energized.
The ECU supplies a high side control to the cold start aid relay to energize the relay. The ECU monitors the output of the relay to determine if cold start aid relay is energized.
This DTC may be caused by wiring problems including an open cold start aid relay control circuit or an open circuit between the relay output and the ECU.
This DTC may also be caused by a defective cold start aid relay or a blown or missing cold start aid fuse.

Alarm Level:
Warning

Control Unit Response:
The ECU will attempt to control the engine in a normal manner.
The engine may require extended crank time or may not start in low ambient temperatures if glow plugs are not powered.

Additional References:
For further cold start aid information, see cold start aid OPERATION in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 24V ECU WIRING DIAGRAM 1

located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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BB78437,0000124 -19-06JUN08-2/17

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Disconnect fuel temperature sensor connector to cause the ECU to attempt to energize the cold start aid relay at next key cycle. *NOTE: Ignore DTC 000174.03 which will be generated due to fuel temperature sensor being disconnected.* 5. Clear DTCs. 6. Ignition OFF, engine OFF for 10 seconds. 7. Ignition ON, engine OFF. 8. Refresh DTCs. Did 000676.05 reappear active or stored?	**YES:** GO TO 2 **NO:** GO TO 11

BB78437,0000124 -19-06JUN08-3/17

2 Check Cold Start Aid Relay Voltage Supply	1. Ignition OFF, engine OFF. 2. Measure the voltage from the cold start aid relay battery voltage supply terminal (cable between alternator output and cold start aid relay) to single point ground. Is voltage within 1V of battery terminal voltage?	**YES:** GO TO 3 **NO:** Check for blown or missing cold start aid fuse, loose connections, or open circuit. Fix problem. GO TO 10

BB78437,0000124 -19-06JUN08-4/17

3 Check Cold Start Aid Relay Output Voltage	1. Verify fuel temperature sensor is still disconnected. 2. Ignition ON, engine OFF. Cold Start Aid relay should be energized for approximately 15 seconds. 3. Measure voltage from cold start aid relay output terminal (C05) to single point ground while ECU is attempting to energize relay. Is voltage within 5V of battery terminal voltage?	**YES:** GO TO 4 **NO:** GO TO 5

BB78437,0000124 -19-06JUN08-5/17

4 Check Relay Output Sense Wiring	1. Ignition OFF, engine OFF. 2. Disconnect ECU J1 connector. 3. Perform TERMINAL TEST on J1. 4. Measure the resistance between ECU cold start aid relay output sense (J1-A4) and cold start aid relay output sense terminal (C05). Are Terminal Test results good and is resistance less than 10 ohms?	**YES:** GO TO 8 **NO:** Fix problem. GO TO 10

Continued on next page

BB78437,0000124 -19-06JUN08-6/17

5 Check Cold Start Aid Relay Coil Ground Circuit

1. Ignition OFF, engine OFF.
2. Measure the resistance between the cold start aid relay control coil low side terminal (C03) and single point ground.

Is resistance less than 2 ohms?

YES: GO TO 6

NO: Fix problem. GO TO 10

BB78437,0000124 -19-06JUN08-7/17

6 Check Cold Start Aid Relay Operation

1. Ignition OFF, engine OFF.
2. Disconnect relay high side control terminal (C04) from relay stud.
3. Attach a fused jumper wire between the cold start aid relay battery supply terminal and the relay high side control stud.
4. Measure voltage from cold start aid relay output terminal to single point ground.

Is the voltage at relay output within 5V of battery terminal voltage?

YES: Remove jumper wire. GO TO 7

NO: Replace cold start aid relay. GO TO 10

BB78437,0000124 -19-06JUN08-8/17

7 Check Relay Control Wiring

1. Disconnect ECU J1 connector.
2. Perform TERMINAL TEST on J1.
3. Measure the resistance between ECU cold start aid relay control (J1-F4) and cold start aid relay coil high side control terminal (C04).

Are Terminal Test results good and is resistance less than 2 ohms?

YES: GO TO 8

NO: Fix problem. GO TO 10

BB78437,0000124 -19-06JUN08-9/17

8 Reprogram ECU

1. Ignition OFF, engine OFF.
2. Reconnect all connectors except fuel temperature sensor.
3. Download latest ECU payload and reprogram ECU.
4. Clear DTCs.
5. Ignition OFF, engine OFF for 10 seconds.
6. Ignition ON, engine OFF.
7. Refresh DTCs.

Did DTC 000676.05 reappear active or stored?

YES: GO TO 9

NO: Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

Continued on next page

BB78437,0000124 -19-06JUN08-10/17

9 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 3. Ignition ON, engine OFF. 4. Clear DTCs. 5. Ignition OFF, engine OFF for 10 seconds. 6. Ignition ON, engine OFF. 7. Refresh DTCs. Did DTC 000676.05 reappear active or stored?	**YES:** Open DTAC case. **NO:** Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

BB78437,0000124 -19-06JUN08-11/17

10 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors except fuel temperature sensor. 3. Ignition ON, engine OFF. 4. Clear DTCs. 5. Ignition OFF, engine OFF for 10 seconds. 6. Ignition ON, engine OFF. 7. Refresh DTCs. Did DTC 000676.05 reappear active or stored?	**YES:** GO TO 2 **NO:** Problem fixed. Reconnect fuel temperature sensor and clear DTCs.

BB78437,0000124 -19-06JUN08-12/17

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

BB78437,0000124 -19-06JUN08-13/17

12 Engine Error Operating Point Test	1. Ignition ON, engine ON 2. Set engine to operating point of failure and refresh DTCs. Did 000676.05 reappear active when engine operating point was reached?	**YES:** GO TO 2 **NO:** GO TO 13

BB78437,0000124 -19-06JUN08-14/17

13 Terminal Test	1. Ignition OFF, engine OFF 2. Perform TERMINAL TEST on the ECU J1 connector, cold start aid relay, and cold start aid voltage supply circuit including fuse. Were any problems found?	**YES:** Fix problem. GO TO 10 **NO:** GO TO 14

Continued on next page

BB78437,0000124 -19-06JUN08-15/17

14 Reconnect and Retest	1. Reconnect all connectors except fuel temperature sensor. 2. Ignition ON, engine OFF. 3. Clear DTCs. 4. Ignition OFF, engine OFF for 10 seconds. 5. Ignition ON, engine OFF. 6. Refresh DTCs. Did 000676.05 reappear active or stored?	**YES:** GO TO 2. **NO:** GO TO 15.

BB78437,0000124 -19-06JUN08-16/17

15 Reprogram ECU	1. Download latest ECU payload and reprogram ECU. 2. Ignition ON, engine OFF. 3. Clear DTCs. 4. Ignition OFF, engine OFF for 10 seconds. 5. Ignition ON, engine OFF. 6. Refresh DTCs. Did 000676.05 reappear active or stored?	**YES:** GO TO 2 **NO:** Problem fixed or conditions necessary to duplicate 000676.05 not met. Reconnect fuel temperature sensor and clear DTCs.

BB78437,0000124 -19-06JUN08-17/17

000898.09 — Engine Speed CAN Message Invalid

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,0000125 -19-06JUN08-1/1

000970.31 — External Shutdown Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU has shutdown the engine due the external shutdown switch being activated.

BB78437,0000126 -19-06AUG10-1/16

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.

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 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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BB78437,0000126 -19-06AUG10-2/16

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

BB78437,0000126 -19-06AUG10-3/16

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

BB78437,0000126 -19-06AUG10-4/16

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

BB78437,0000126 -19-06AUG10-5/16

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

BB78437,0000126 -19-06AUG10-6/16

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

BB78437,0000126 -19-06AUG10-7/16

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

BB78437,0000126 -19-06AUG10-8/16

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

BB78437,0000126 -19-06AUG10-9/16

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

BB78437,0000126 -19-06AUG10-10/16

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

BB78437,0000126 -19-06AUG10-11/16

10 Check ECU Harness for Shorted Wire	1. Ignition OFF, Engine OFF.	**YES:** Fix shorted wire in ECU harness. GO TO 13
	2. On ECU harness connector C08, measure resistance from terminal K to each terminal of C08.	**NO:** ECU has not been reprogrammed. GO TO 11
	Were any measurements less than 100 ohms?	**NO:** ECU has been reprogrammed. GO TO 12

BB78437,0000126 -19-06AUG10-12/16

11 Reprogram ECU	1. Download latest ECU software payload and reprogram ECU. See Engine Control Unit (ECU) — Reprogramming Instructions 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 000970.31 still active?	**NO:** Verify problem is fixed. GO TO 13

BB78437,0000126 -19-06AUG10-13/16

12 Check ECU	*NOTE: For ECU connector pinouts, see ELECTRONIC 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.	**YES:** Problem not found. Reconnect all connectors. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.
	Is the measurement between 30K and 80K?	**NO:** Replace ECU. GO TO 13

BB78437,0000126 -19-06AUG10-14/16

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.	**YES:** GO TO 1
	Did DTC 000970.31 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

BB78437,0000126 -19-06AUG10-15/16

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.

BB78437,0000126 -19-06AUG10-16/16

000971.31 — External Derate Switch Activated

NOTE: For additional information refer to the application troubleshooting manual.

The ECU has derated the engine due to the external fuel derate switch being activated.

RG40049,00001E0 -19-02NOV09-1/16

000971.31 — External Derate Switch Activated Diagnostic Procedure

Troubleshooting Sequence:
000971.31

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
OEM applications can be programmed with trim options. The customer has the option to have an external derate switch. When this feature is programmed into the ECU, the ECU will derate the engine when the switch is activated.

Alarm Level:
Warning

Control Unit Response:
If the code is set, the ECU will derate the engine by a certain percentage of full power depending on the trim option selected.

Additional References:
For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

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 4.5L 12V ECU WIRING DIAGRAM 5
- see 4.5L 24V ECU WIRING DIAGRAM 5
- see 6.8L 12V ECU WIRING DIAGRAM 5
- see 6.8L 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.

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RG40049,00001E0 -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 Codes. Did 000970.31 reappear active?	**YES:** GO TO 2 **NO:** GO TO 14

RG40049,00001E0 -19-02NOV09-3/16

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

RG40049,00001E0 -19-02NOV09-4/16

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

RG40049,00001E0 -19-02NOV09-5/16

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

RG40049,00001E0 -19-02NOV09-6/16

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

RG40049,00001E0 -19-02NOV09-7/16

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

RG40049,00001E0 -19-02NOV09-8/16

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

RG40049,00001E0 -19-02NOV09-9/16

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

RG40049,00001E0 -19-02NOV09-10/16

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

RG40049,00001E0 -19-02NOV09-11/16

10 Check ECU Harness for Shorted Wire	1. Ignition OFF, Engine OFF.	**YES:** Fix shorted wire in ECU harness. GO TO 13
	2. On ECU harness connector C08, measure resistance from terminal J to each terminal of C08.	**NO:** ECU has not been reprogrammed. GO TO 11
	Were any measurements less than 100 ohms?	**NO:** ECU has been reprogrammed. GO TO 12

RG40049,00001E0 -19-02NOV09-12/16

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.	**YES:** Problem not fixed. Recheck steps at beginning of procedure. GO TO 1
	Is 000971.31 still active?	**NO:** Verify problem is fixed. GO TO 13

RG40049,00001E0 -19-02NOV09-13/16

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.	**YES:** Problem not found. Reconnect all connectors. GO TO 1 Confirm findings looking closely at connectors, wiring, and terminal numbers used for measurements.
	Is the measurement between 30K and 80K?	**NO:** Replace ECU. GO TO 13

RG40049,00001E0 -19-02NOV09-14/16

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.	**YES:** GO TO 1
	Did DTC 000971.31 reappear as active with engine running?	**NO:** Problem fixed.

Continued on next page

RG40049,00001E0 -19-02NOV09-15/16

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.

RG40049,00001E0 -19-02NOV09-16/16

001069.31 — Tire Size Invalid

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000008 -19-06APR09-1/1

001075.05 — Low Pressure Fuel Pump Circuit Has High Resistance

The ECU detects high resistance in the low pressure fuel pump control circuit.

JB81757,0000008 -19-10SEP07-1/12

001075.05 — Low Pressure Fuel Pump Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
001075.05

When DTC is Displayed:
The ignition is ON, ECU low pressure fuel pump output is OFF, and the error condition is active.

Related Information:
The ECU detects high resistance (open circuit) in the low pressure fuel pump (transfer pump) control circuit.

This DTC may also be set if the low pressure fuel pump control circuit is shorted to a voltage source.

ECU supplies a high side output to energize the low pressure fuel pump relay. The ECU switches the output OFF if ignition is ON for 60 seconds and engine is not running. The ECU will only check for high resistance in the low pressure fuel pump relay control circuit when the low pressure fuel pump relay control output is OFF and ignition is ON.

Alarm Level:
Warning

Control Unit Response:
ECU will attempt to operate in a normal manner.

Additional References:

NOTE: Consult application manual for more information on low pressure fuel pump system.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 7
- see 4.5L 24V ECU WIRING DIAGRAM 7
- see 6.8L 12V ECU WIRING DIAGRAM 7
- see 6.8L 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: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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JB81757,0000008 -19-10SEP07-2/12

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. Ignition OFF, engine OFF for at least 5 seconds. 5. Ignition ON, engine OFF. 6. Wait 60 seconds for ECU to switch off low pressure fuel pump output. Did 001075.05 reappear active 60 seconds after ignition was cycled from OFF to ON?	**YES:** GO TO 2 **NO:** GO TO 10

JB81757,0000008 -19-10SEP07-3/12

2 Check Relay	*NOTE: Consult application manual for information on relay and wire harness.* 1. Ignition OFF, engine OFF. 2. Inspect terminals at low pressure fuel pump relay connector. 3. Check for open circuit in low pressure fuel pump relay control coil. 4. Check for open circuit in low pressure fuel pump relay ground wire. Did you find an open ground circuit, shorted or open low pressure fuel pump relay coil, or a terminal problem?	**YES:** Fix problem. GO TO 9 **NO:** Do not reconnect relay connector. GO TO 3

JB81757,0000008 -19-10SEP07-4/12

3 Test ECU Terminals	1. Ignition OFF, engine OFF. 2. Disconnect ECU J2 connector. 3. Perform TERMINAL TEST on J2. Were any problems found?	**YES:** Fix problem. GO TO 9 **NO:** GO TO 4

JB81757,0000008 -19-10SEP07-5/12

4 Check Relay Control Circuit	On the harness, measure the resistance between ECU low pressure fuel pump control output (terminal J2-M3) and the high side of the low pressure fuel pump relay connector. Is the resistance less than 10 ohms?	**YES:** GO TO 5 **NO:** Fix problem. GO TO 9

JB81757,0000008 -19-10SEP07-6/12

5 Check Harness for Short to Voltage Source	1. Ignition ON, engine OFF. 2. On the harness, measure the voltage from the ECU J2 connector low pressure fuel pump relay control (terminal J2-M3) to single point ground. Is voltage less than 0.5V?	**YES:** GO TO 6 **NO:** Fix problem. GO TO 9

Continued on next page

JB81757,0000008 -19-10SEP07-7/12

6 Check Harness 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 J2 connector low pressure fuel pump relay control (terminal J2-M3) and all other terminals in the J1 and J2 connectors.	**YES:** GO TO 7
	Are all resistance measurements greater than 1k ohms?	**NO:** Fix problem. GO TO 9

JB81757,0000008 -19-10SEP07-8/12

7 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. Wait 60 seconds for ECU to switch off low pressure fuel pump output.	**YES:** GO TO 8
	Did 001075.05 reappear active 60 seconds after ignition was cycled from OFF to ON?	**NO:** Problem fixed.

JB81757,0000008 -19-10SEP07-9/12

8 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	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. Wait 60 seconds for ECU to switch off low pressure fuel pump output.	**YES:** Open DTAC case.
	Did 001075.05 reappear active 60 seconds after ignition was cycled from OFF to ON?	**NO:** Problem fixed.

JB81757,0000008 -19-10SEP07-10/12

9 Verification	1. Ignition OFF, engine OFF for at least 5 seconds.	
	2. Reconnect all connectors.	
	3. Ignition ON, engine OFF.	
	4. Wait 60 seconds for ECU to switch off low pressure fuel pump output.	**YES:** GO TO 1
	Did 001075.05 reappear active 60 seconds after ignition was cycled from OFF to ON?	**NO:** Problem fixed.

Continued on next page

JB81757,0000008 -19-10SEP07-11/12

10 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

JB81757,0000008 -19-10SEP07-12/12

001075.06 — Low Pressure Fuel Pump Circuit Has Low Resistance

The ECU detects low resistance in the low pressure fuel pump control circuit.

JB81757,0000009 -19-14APR08-1/11

001075.06 — Low Pressure Fuel Pump Circuit Has Low Resistance Diagnostic Procedure

Troubleshooting Sequence:
001075.06

When DTC is Displayed:
The ignition is ON, the ECU low pressure fuel pump output is ON, and the error condition is active.

Related Information:
The ECU detects low resistance (short to ground) in the low pressure fuel pump (transfer pump) control circuit.

ECU supplies a high side output to energize the low pressure fuel pump relay. The ECU switches the output OFF if ignition is ON for 60 seconds and engine is not running. The ECU will only check for low resistance in the low pressure fuel pump relay control circuit when the low pressure fuel pump relay control output is ON.

Alarm Level:
Warning

Control Unit Response:
ECU will attempt to operate in a normal manner.

Additional References:

NOTE: Consult application manual for more information on low pressure fuel pump system.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 7
- see 4.5L 24V ECU WIRING DIAGRAM 7
- see 6.8L 12V ECU WIRING DIAGRAM 7
- see 6.8L 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: 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

JB81757,0000009 -19-14APR08-2/11

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 OFF, engine OFF for at least 5 seconds. 5. Ignition ON, engine OFF. Did 001075.06 reappear active within 60 seconds of ignition ON?	**YES:** GO TO 2 **NO:** GO TO 9

JB81757,0000009 -19-14APR08-3/11

2 Check Relay	*NOTE: Consult application manual for information on relay and wire harness.* 1. Ignition OFF, engine OFF. 2. Disconnect low pressure fuel pump relay coil connector. 3. Inspect relay terminals. 4. Check for a shorted (low resistance) low pressure fuel pump relay control coil. Is low pressure fuel pump relay coil shorted?	**YES:** Replace relay. GO TO 8 **NO:** Do not reconnect relay connector. GO TO 3

JB81757,0000009 -19-14APR08-4/11

3 Test ECU Terminals	1. Disconnect ECU J2 connector. 2. Perform TERMINAL TEST on J2. Were any problems found?	**YES:** Fix problem. GO TO 8 **NO:** GO TO 4

JB81757,0000009 -19-14APR08-5/11

4 Check Harness for Short to Ground	On the harness, measure the resistance between ECU low pressure fuel pump control output (terminal J2-M3) and single point ground. Is the resistance greater than 1k ohms?	**YES:** GO TO 5 **NO:** Fix problem. GO TO 8

JB81757,0000009 -19-14APR08-6/11

5 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 J2 connector low pressure fuel pump relay control (J2-M3) and all other terminals in the J1 and J2 connectors. Are all resistance measurements greater than 1k ohms?	**YES:** GO TO 6 **NO:** Fix problem. GO TO 8

Continued on next page

JB81757,0000009 -19-14APR08-7/11

6 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. Did 001075.06 reappear active within 60 seconds of ignition ON?	**YES:** GO TO 7 **NO:** Problem fixed.

JB81757,0000009 -19-14APR08-8/11

7 Replace ECU	1. Ignition OFF, engine OFF. 2. Replace ECU. 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. Did 001075.06 reappear active within 60 seconds of ignition ON?	**YES:** Open DTAC case. **NO:** Problem fixed.

JB81757,0000009 -19-14APR08-9/11

8 Verification	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Ignition OFF, engine OFF for at least 5 seconds. 5. Ignition ON, engine OFF. Did 001075.06 reappear active within 60 seconds of ignition ON?	**YES:** GO TO 1 **NO:** Problem fixed.

JB81757,0000009 -19-14APR08-10/11

9 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

JB81757,0000009 -19-14APR08-11/11

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.

BB78437,0000127 -19-06JUN08-1/3

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.

BB78437,0000127 -19-06JUN08-2/3

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.

BB78437,0000127 -19-06JUN08-3/3

001110.31 — Engine Protection Shutdown Active

The ECU has shutdown the engine due to a operating condition out of range.

BB78437,0000128 -19-06JUN08-1/3

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.

BB78437,0000128 -19-06JUN08-2/3

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.

BB78437,0000128 -19-06JUN08-3/3

001136.00 — ECU Temperature Signal Extremely High

The ECU detects its internal temperature above specification.

DN22556,0000514 -19-14JAN09-1/9

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) MAINTENANCEin 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 4.5L 12V ECU WIRING DIAGRAMS
- see 4.5L 24V ECU WIRING DIAGRAMS
- see 6.8L 12V ECU WIRING DIAGRAMS
- see 6.8L 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

DN22556,0000514 -19-14JAN09-2/9

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

DN22556,0000514 -19-14JAN09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) Maintenance in Section 02, Group 110 earlier in this manual.* 1. Ignition OFF, Engine OFF. 2. Make the following checks: • Remove any items that are restricting the air flow around the ECU. • Remove dirt and debris from the ECU. Be cautious not to damage the connectors or strike ECU housing. Do not use a pressure wash to clean the ECU. • Verify the ECU is not mounted near high temperature components or in the path of high temperature air flow. Do any of the above conditions exist?	**YES:** Correct environment. GO TO 6 **NO:** GO TO 3

DN22556,0000514 -19-14JAN09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

DN22556,0000514 -19-14JAN09-5/9

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

DN22556,0000514 -19-14JAN09-6/9

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

DN22556,0000514 -19-14JAN09-7/9

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.

DN22556,0000514 -19-14JAN09-8/9

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.

DN22556,0000514 -19-14JAN09-9/9

001136.16 — ECU Temperature Signal Moderately High

The ECU detects an internal temperature above specification.

DN22556,0000515 -19-14JAN09-1/9

001136.16 — ECU Temperature Signal Moderately High Diagnostic Procedure

Troubleshooting Sequence:
All xxxxxx.06 codes
000611.04
001136.00

Related Information:
The ECU senses an internal ECU temperature of 125° C (257° F) on OEM engines.

Alarm Level:
Warning

Control Unit Response:
The ECU will continue to operate normally.

Additional References:
For further ECU information, see ENGINE CONTROL UNIT (ECU) MAINTENANCE in Section 02, Group 110 earlier in this manual.
For further ECU temperature sensor information, see ENGINE CONTROL UNIT (ECU) TEMPERATURE SENSOR in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAMS
- see 4.5L 24V ECU WIRING DIAGRAMS
- see 6.8L 12V ECU WIRING DIAGRAMS
- see 6.8L 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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DN22556,0000515 -19-14JAN09-2/9

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

DN22556,0000515 -19-14JAN09-3/9

2 Check Physical Environment	*NOTE: For Proper ECU mounting, see ENGINE CONTROL UNIT (ECU) Maintenance in Section 02, Group 110 earlier in this manual.* 1. Ignition OFF, Engine OFF. 2. Make the following checks: • Remove any items that are restricting the air flow around the ECU. • Remove dirt and debris from the ECU. Be cautious not to damage the connectors or strike ECU housing. Do not use a pressure wash to clean the ECU. • Verify the ECU is not mounted near high temperature components or in the path of high temperature air flow. Do any of the above conditions exist?	**YES:** Correct environment. GO TO 6 **NO:** GO TO 3

DN22556,0000515 -19-14JAN09-4/9

3 Direct Sunlight	Is the ECU in direct sunlight?	**YES:** Shade the ECU. GO TO 6 **NO:** GOT TO 4

DN22556,0000515 -19-14JAN09-5/9

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 001136.16 still active?	**YES:** Bad sensor in ECU. 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

DN22556,0000515 -19-14JAN09-6/9

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 in ECU. Replace ECU. GO TO 6
	Is 001136.16 still active?	**NO:** Recheck physical environment. GO TO 1

DN22556,0000515 -19-14JAN09-7/9

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 001136.16 reappear as active with engine running?	**NO:** Problem fixed.

DN22556,0000515 -19-14JAN09-8/9

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.

DN22556,0000515 -19-14JAN09-9/9

001321.05 — Starter Solenoid Lockout Relay Drive Circuit Has High Resistance

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000620 -19-06JUN08-1/1

001321.06 — Starter Solenoid Lockout Relay Drive Circuit Has Low Resistance

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000621 -19-06JUN08-1/1

001321.30 — Starter Solenoid Lockout Relay Drive Circuit Fault

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000622 -19-06JUN08-1/1

001347.03 — Suction Control Valve Signal Out of Range High

ECU detects high current in the suction control valve return wire.

DN22556,000051B -19-14JAN09-1/15

001347.03 — Suction Control Valve Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
001347.03

When DTC is Displayed:
The engine is cranking or running, during Harness Diagnostic Mode Test, at key ON ECU startup process and the error condition is active.

Alarm Level:
Warning

Control Unit Response:
The ECU will not be able to control the high pressure pump suction control valve.

Related Information:
Typically this means that there is a short to power in the suction control valve circuit. The engine will probably not start because the valve is shut off when power is applied to it.

Additional References:
For more suction control valve information, see SUCTION CONTROL VALVE in Section 03, Group 140 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Suction control valve Y01 – Brown/Purple

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DN22556,000051B -19-14JAN09-2/15

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 earlier in this Group.
3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group.
4. Refresh Codes.

Did 001347.03 reappear active?

YES: GO TO 2

NO: GO TO 7

DN22556,000051B -19-14JAN09-3/15

2 Voltage Measurement With Ignition Key OFF

1. Monitor and write down the Unswitched Battery Voltage displayed on Service ADVISOR.
2. Ignition OFF, Engine OFF.
3. Disconnect the high pressure fuel pump suction control valve connector.
4. On the harness, measure the voltage between Drive + (terminal 1) and Drive - (terminal 2)

Does the voltage equal battery voltage ± 2v?

YES: GO TO 3

NO: GO TO 4

DN22556,000051B -19-14JAN09-4/15

3 Wiring Check

1. Ignition OFF, Engine OFF.
2. Disconnect all ECU connectors.
3. On the ECU harness, measure the voltage between Drive - (terminal J1-H2) and all other terminals in all ECU connectors.

NOTE: The battery is connected to J2 – L1, J2 – L4, J2 – M1, and J2 – M4.

Does the voltage equal battery voltage ± 2v?

YES: Short in suction control valve supply wire with terminal that measured same voltage.

NO: GO TO 2

DN22556,000051B -19-14JAN09-5/15

4 Voltage Measurement With Ignition Key ON

1. Ignition ON, Engine OFF.
2. On the harness, measure the voltage between Drive + (terminal 1) and Drive - (terminal 2)

Does the voltage equal battery voltage ± 2v?

YES: GO TO 5

NO: GO TO 6

DN22556,000051B -19-14JAN09-6/15

5 Wiring Check

1. Ignition OFF, Engine OFF.
2. Disconnect all ECU connectors.
3. Ignition ON, Engine OFF.
4. On the ECU harness, measure the voltage between Drive - (terminal J1-H2) and all other terminals in all ECU connectors.

NOTE: The battery is connected to J2 – L1, J2 – L4, J2 – M1, and J2 – M4. Ignition is connected to J2 – B2.

Does any measurement equal battery voltage ± 2v?

YES: Short in suction control valve supply wire with terminal that measured same voltage.

NO: GO TO 4

Continued on next page

DN22556,000051B -19-14JAN09-7/15

6 ECU Drive Circuit Resistance Check	On the ECU, measure the resistance between Drive + (terminal J1-H1) and Drive - (terminal J1-H2). Is the resistance infinite ohms?	**YES:** Start a DTAC case. **NO:** Replace ECU. GO TO 1

DN22556,000051B -19-14JAN09-8/15

7 Occurrence Count Check	Review stored information and look at occurrence count for 001347.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 8 **NO:** GO TO 9

DN22556,000051B -19-14JAN09-9/15

8 Terminal Test	1. Ignition OFF, Engine OFF 2. Perform TERMINAL TEST on the suction control valve harness connector. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

DN22556,000051B -19-14JAN09-10/15

9 Review Engine Hours	Compare Engine Hourmeter of last occurrence of the snapshot capture data with the current engine hours. Is the difference greater than 50 hours?	**YES:** Return application to service. **NO:** GO TO 10

DN22556,000051B -19-14JAN09-11/15

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:** Repair problem if found. **YES:** If a certain operating point exists when error occurs then GO TO 11 **NO:** GO TO 12

DN22556,000051B -19-14JAN09-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON 2. Set engine to operating point of failure and refresh codes Did 001347.03 reappear when engine operating point was reached?	 **YES:** Replace high pressure fuel pump suction control valve. GO TO 1 **NO:** GO TO 10

Continued on next page

DN22556,000051B -19-14JAN09-13/15

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure fuel pump suction control valve connector and ECU J1 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 13

DN22556,000051B -19-14JAN09-14/15

13 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Ignition ON, Engine OFF.	
	4. Refresh codes.	**YES:** Start a DTAC Case.
	Is 001347.03 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,000051B -19-14JAN09-15/15

001347.05 — Suction Control Valve Circuit Has High Resistance

The ECU is unable to match the measured pump current with the commanded pump current.

DN22556,000051C -19-14JAN09-1/19

001347.05 — Suction Control Valve Circuit Has High Resistance Diagnostic Procedure

Troubleshooting Sequence:
001347.03
001347.05

When DTC is Displayed:
The engine is cranking or running, during Harness Diagnostic Mode Test, at key ON ECU startup process and the error condition is active.

Alarm Level:
Warning

Control Unit Response:
The ECU will not be able to control the high pressure pump suction control valve.

Related Information:
Typically this means that there is a short to ground or an open in the high pressure fuel pump suction control valve circuit. The engine will probably not start because the valve is wide open which will cause maximum pressure which will trip the pressure relief valve on the rail.

Additional References:
For more suction control valve information, see SUCTION CONTROL VALVE in Section 03, Group 140 earlier in this manual.

For more information on the fuel system, see FUEL SYSTEM OPERATION in Section 03, Group 130 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 1
- see 4.5L 24V ECU WIRING DIAGRAM 1
- see 6.8L 12V ECU WIRING DIAGRAM 1
- see 6.8L 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
- Suction control valve Y01 – Brown/Purple

Continued on next page

DN22556,000051C -19-14JAN09-2/19

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Cycle the ignition key OFF then ON. 5. Refresh Codes. Did 001347.05 reappear active?	**YES:** GO TO 2 **NO:** GO TO 11

DN22556,000051C -19-14JAN09-3/19

2 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the high pressure fuel pump suction control valve connector. 3. Perform TERMINAL TEST on the suction control valve harness connector. Were any problems found?	**YES:** Repair problem. GO TO 2 **NO:** GO TO 3

DN22556,000051C -19-14JAN09-4/19

3 Valve Resistance Check	On the Suction Control Valve, measure the resistance between drive + (terminal 1) and drive - (terminal 2). **Specification** Suction Control Valve Coil—Resistance..... 2.5 ± 1.0 ohms Is the measurement within specification?	**YES:** GO TO 4 **NO:** Replace suction control valve. GO TO 1

DN22556,000051C -19-14JAN09-5/19

4 Short to Ground Wiring Check	On the harness, measure the resistance between: • drive + (terminal 1) and drive - (terminal 2). • drive + (terminal 1) and application single point ground. **Specification** Total resistance—Resistance.....Less than 10 ohms? Are values within specification?	**YES:** GO TO 5 **NO:** GO TO 8

DN22556,000051C -19-14JAN09-6/19

5 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the ECU connector J1. 3. Perform TERMINAL TEST on connector ECU J1. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 6

Continued on next page

DN22556,000051C -19-14JAN09-7/19

6 Short to Ground Wiring, ECU Disconnected Check	On the harness, measure the resistance between: • drive + (terminal 1) and drive - (terminal 2). • drive + (terminal 1) and application single point ground. Is either measurement less than 1000 ohms?	**YES:** Repair shorted wire that measured less than 1000 ohms. GO TO 1 **NO:** GO TO 7

DN22556,000051C -19-14JAN09-8/19

7 ECU Drive Circuit Resistance Check	On the ECU, measure the resistance between Drive + (terminal J1-H1) and Drive - (terminal J1-H2). Is the resistance infinite ohms?	**YES:** Start a DTAC case. **NO:** Replace ECU. GO TO 1

DN22556,000051C -19-14JAN09-9/19

8 Terminal Test	1. Ignition OFF, Engine OFF 2. Disconnect the ECU connector J1. 3. Perform TERMINAL TEST on connector ECU J1. Were any problems found?	**YES:** Repair problem. GO TO 1 **NO:** GO TO 9

DN22556,000051C -19-14JAN09-10/19

9 Open Wiring Check	On the harness, measure the resistance between: • suction control valve drive + (terminal 1) and ECU drive + (terminal J1-H1). • suction control valve drive - (terminal 2) and ECU drive - (terminal J1-H2). Is either measurement greater than 10 ohms?	**YES:** Repair open wire that measured greater than 10 ohms. GO TO 1 **NO:** GO TO 10

DN22556,000051C -19-14JAN09-11/19

10 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR. 2. Cycle the ignition key OFF then ON. 3. Refresh codes. Is 001347.05 active?	**YES:** Start a DTAC Case. **NO:** Problem fixed, faulty ECU program.

DN22556,000051C -19-14JAN09-12/19

11 Occurrence Count Check	Review stored information and look at occurrence count for 001347.05. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 12 **NO:** GO TO 13

Continued on next page

DN22556,000051C -19-14JAN09-13/19

12 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the suction control valve harness connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 14

DN22556,000051C -19-14JAN09-14/19

13 Review Engine Hours	Compare engine hours of last occurrence of the snapshot capture data with the current engine hours.	**YES:** Return application to service.
	Is the difference greater than 50 hours?	**NO:** GO TO 14

DN22556,000051C -19-14JAN09-15/19

14 Further Review of Snapshot Information	Review stored information collected in step 1	**YES:** Repair problem if found.
	Does stored information lead to a possible problem or is there a certain operating point where error occurs?	**YES:** If a certain operating point exists when error occurs then GO TO 15 **NO:** GO TO 16

DN22556,000051C -19-14JAN09-16/19

15 Engine Error Operating Point Test	1. Ignition ON, Engine ON	
	2. Set engine to operating point of failure and refresh codes	**YES:** Replace high pressure fuel pump suction control valve. GO TO 1
	Did 001347.05 reappear when engine operating point was reached?	**NO:** GO TO 14

DN22556,000051C -19-14JAN09-17/19

16 Terminal Test	1. Ignition OFF, Engine OFF	
	2. Perform TERMINAL TEST on the high pressure fuel pump suction control valve connector and ECU J1 connector.	**YES:** Repair problem. GO TO 1
	Were any problems found?	**NO:** GO TO 17

DN22556,000051C -19-14JAN09-18/19

17 Software Updates	1. Download latest software, reprogram ECU using Service ADVISOR.	
	2. Cycle the ignition key OFF then ON.	
	3. Refresh codes.	**YES:** Start a DTAC Case.
	Is 001347.05 active?	**NO:** Problem fixed, faulty ECU program.

DN22556,000051C -19-14JAN09-19/19

001347.07 — Fuel Rail Pressure Actual to Desired Mismatch

The ECU detects fuel rail pressure 5 MPa (725 psi) above or below the expected pressure.

DN22556,000051D -19-20MAY09-1/7

001347.07 — Fuel Rail Pressure Actual to Desired Mismatch Diagnostic Procedure

Troubleshooting Sequence:
000094.17
000157.03 or 000157.04 or 001349.03 or 1349.04
001349.02
000157.10
001347.03
001347.05
001347.07

When DTC is Displayed:
The engine is cranking or running and the error condition is active.

Related Information:
The ECU detects fuel rail pressure 5 MPa (725 psi) above or below the expected pressure.
Engine could miss or run rough.
Engine may have low power.
Engine may have black smoke.

Alarm Level:
Warning

Control Unit Response:
The ECU will command the high pressure fuel pump to increase or decrease the amount of fuel supplied to the HPCR.

Additional References:
For more fuel rail pressure sensor information, see FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on pressure sensors, 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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
- Fuel rail pressure sensor P05 – Blue/Orange

Continued on next page

DN22556,000051D -19-20MAY09-2/7

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. Ignition ON, Engine ON. 5. Refresh Codes. Did 001347.07 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

DN22556,000051D -19-20MAY09-3/7

2 Fuel Rail Pressure Sensor Voltage Check	*NOTE: Engine OFF for at least 15 minutes to ensure fuel rail pressure has dropped to 0.0 kPa (0.0 psi).* Monitor the following data points: • Fuel Rail Pressure Input Voltage **Specification** Fuel Rail Pressure Sensor Output—Voltage.....0.9 - 1.1 V • Fuel Rail Pressure - Actual **Specification** Fuel Rail Pressure—Pressure.....0.0 kPa (0.0 psi) Are all values within specifications?	**YES:** GO TO 5 **NO:** GO TO 3

DN22556,000051D -19-20MAY09-4/7

3 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect fuel rail pressure sensor connector. 3. Perform TERMINAL TEST on fuel rail pressure sensor, harness and connector. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 4

Continued on next page

DN22556,000051D -19-20MAY09-5/7

4 Fuel Rail Pressure Sensor Resistance Checks	On the fuel rail pressure sensor, make the following resistance measurements. • between signal (terminal 1) and return (terminal 2). **Specification** Fuel Rail Pressure Sensor—Resistance.....8k - 16.4k ohms • between signal (terminal 1) and supply (terminal 3). **Specification** Fuel Rail Pressure Sensor—Resistance.....1k - 3k ohms • between all terminals and sensor body. **Specification** Fuel Rail Pressure Sensor—Resistance.....infinite ohms Are all measurements within specification.	**YES:** GO TO 5 **NO:** Replace rail pressure sensor. GO TO 1

DN22556,000051D -19-20MAY09-6/7

5 High Pressure Fuel System Check	Perform F2 - HIGH PRESSURE FUEL SUPPLY SYSTEM TEST in Group 150 earlier in this Section. Did test pass?	**YES:** Problem fixed. Had bad Suction Control Valve. **NO:** Start a DTAC case.

DN22556,000051D -19-20MAY09-7/7

001349.02 — Fuel Rail Pressure Signals Mismatch

The ECU detects a difference in the two fuel rail pressure readings

Continued on next page

BB78437,0000151 -19-28OCT08-1/23

001349.02 — Fuel Rail Pressure Signals Mismatch Diagnostic Procedure

Troubleshooting Sequence:
000157.03 or 157.04 or 001349.03 or 1349.04
001349.02

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a difference in the two redundant rail pressure signals of 15 MPa (2176 psi) or greater.**Alarm Level:** WARNING

Additional References:
For more Dual Fuel Rail Pressure Sensor information, see DUAL FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 6.8L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000151 -19-28OCT08-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.02 reappear active?	**YES:** GO TO 2 **NO:** GO TO 17

BB78437,0000151 -19-28OCT08-3/23

2 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Fuel Rail Pressure Sensor connector P05. 3. Perform TERMINAL TEST on connector P05 and Dual Fuel Rail Pressure Sensor. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

Continued on next page

BB78437,0000151 -19-28OCT08-4/23

3 Check for Voltage at Sensor Connector	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between the following points at the Dual Fuel Rail Pressure Connector and single point ground: • P05-1 • P05-2 • P05-6	**YES:** GO TO 9
	Were all voltage measurements above 4.95 volts?	**NO:** GO TO 4

BB78437,0000151 -19-28OCT08-5/23

4 Terminal Test	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU J01 connector.	
	3. Perform TERMINAL TEST on terminals J01-D3, J01-E3, and J01-F3.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 5

BB78437,0000151 -19-28OCT08-6/23

5 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J01-D3 and Dual Fuel Rail Pressure Sensor P05-1. • ECU J01-E3 and Dual Fuel Rail Pressure Sensor P05-2. • ECU J01-F3 and Dual Fuel Rail Pressure Sensor P05-6.	**YES:** GO TO 6
	Were all resistance measurements less than 10 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000151 -19-28OCT08-7/23

6 Check for Signal Shorted to Ground	On the harness, measure the resistance between the following points and single point ground: • ECU J01-D3 • ECU J01-E3 • ECU J01-F3	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any resistance measurements less than 100k ohms?	**NO:** GO TO 7

Continued on next page

BB78437,0000151 -19-28OCT08-8/23

7 Check for Wire-Wire Short

1. Ignition OFF, engine OFF.
2. Disconnect ECU connector J02.
3. Measure the resistance between the terminal(s) with the low voltage from Step 3 and all other terminals in the ECU harness connectors J01, J02.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Was any measurement less than 100k ohms?

NO: GO TO 8

BB78437,0000151 -19-28OCT08-9/23

8 Check for Intermittent Short to Ground

1. Ignition OFF, engine OFF.
2. Reconnect all connectors.
3. Ignition ON, engine OFF.
4. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J01 connector.

NOTE: Both voltages will decrease to approximately 0V when the sensor circuit is shorted to ground.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Was the source of the intermittent short to ground found?

NO: Recheck Measurements. GO TO 2

BB78437,0000151 -19-28OCT08-10/23

9 Check for Voltage at Sensor Connector

1. Ignition ON, engine OFF.
2. On the harness, measure the voltage between the following points at the Dual Fuel Rail Pressure Connector and single point ground:
   - P05-3
   - P05-4
   - P05-5

YES: GO TO 14

Were all voltage measurements below 0.5 volts?

NO: GO TO 10

BB78437,0000151 -19-28OCT08-11/23

10 Terminal Test

1. Ignition OFF, engine OFF.
2. Disconnect ECU J01 connector.
3. Perform TERMINAL TEST on terminals J01-D2, J01-C3, and J01-E2.

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

Were any problems found?

NO: GO TO 11

Continued on next page

BB78437,0000151 -19-28OCT08-12/23

11 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J01-E2 and Dual Fuel Rail Pressure Sensor P05-3. • ECU J01-D2 and Dual Fuel Rail Pressure Sensor P05-4. • ECU J01-C3 and Dual Fuel Rail Pressure Sensor P05-5. Were all resistance measurements less than 10 ohms?	**YES:** GO TO 12 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000151 -19-28OCT08-13/23

12 Check for Wire-Wire Short	1. Ignition OFF, engine OFF. 2. Disconnect ECU connectors J01 and J02. 3. Measure the resistance between the terminal(s) with the high voltage from Step 9 and all other terminals in the ECU harness connectors J01 and J02. Was any measurement less than 100k ohms?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 13

BB78437,0000151 -19-28OCT08-14/23

13 Check for Intermittent Short to Voltage	1. Ignition OFF, engine OFF. 2. Reconnect all connectors. 3. Ignition ON, engine OFF. 4. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J01 connector. *NOTE: Both voltages will increase to approximately 5V when the sensor circuit is shorted to voltage.* Was the source of the intermittent short to voltage found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Recheck Measurements. GO TO 9

BB78437,0000151 -19-28OCT08-15/23

14 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J01 connector. 3. Perform TERMINAL TEST on terminals J01-D2, J01-C3, J01-D3, J01-E3, J01-F3 and J01-E2. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 15

Continued on next page

BB78437,0000151 -19-28OCT08-16/23

15 Check Sensor Circuit Continuity	On the harness, measure the resistance between: • ECU J01-D3 and Dual Fuel Rail Pressure Sensor P05-1. • ECU J01-E3 and Dual Fuel Rail Pressure Sensor P05-2. • ECU J01-E2 and Dual Fuel Rail Pressure Sensor P05-3. • ECU J01-D2 and Dual Fuel Rail Pressure Sensor P05-4. • ECU J01-C3 and Dual Fuel Rail Pressure Sensor P05-5. • ECU J01-F3 and Dual Fuel Rail Pressure Sensor P05-6 Were all resistance measurements less than 10 ohms?	**YES:** GO TO 16 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000151 -19-28OCT08-17/23

16 Replace Dual Fuel Rail Pressure Sensor	1. Replace the Dual Fuel Rail Pressure Sensor and reconnect all connectors. 2. Check for the DTC 001349.02 under the conditions where it was previously active. Is the problem gone?	**YES:** Problem Solved. **NO:** Replace ECU.

BB78437,0000151 -19-28OCT08-18/23

17 Check for Intermittent Short	1. Ignition ON, engine OFF. 2. Monitor the Fuel Rail Pressure and Redundant Fuel Rail Pressure Input Voltage data points in Service ADVISOR while gently wiggle wire harness between Dual Fuel Rail Pressure Sensor and ECU J01 connector. *NOTE: Both voltages will decrease to approximately 0V when the sensor circuit is shorted to ground and increase to approximately 5V when the sensor circuit is shorted to voltage.* Was the source of the intermittent short found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 18

BB78437,0000151 -19-28OCT08-19/23

18 Check Snapshot Information	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.02 now active?	**YES:** GO TO 2 **NO:** GO TO 19

Continued on next page

BB78437,0000151 -19-28OCT08-20/23

19 Terminal Test		
	1. Ignition OFF, engine OFF.	
	2. Disconnect Dual Fuel Rail Pressure Sensor connector P05.	
	3. Perform Terminal Test on P05.	
	4. Disconnect ECU J01 connector.	
	5. Perform TERMINAL TEST on terminals J01-D2, J01-C3, J01-D3, J01-E3, J01-F3 and J01-E2.	**YES:** GO TO 20
	Were Terminal Test results good?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000151 -19-28OCT08-21/23

20 Get More Information		
	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs.	
	2. Operate the engine under the conditions specified by the operator.	**YES:** GO TO 2
	Is DTC 001349.02 now active?	**NO:** GO TO 21

BB78437,0000151 -19-28OCT08-22/23

21 Check DTAC Solutions		
	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.02.	**YES:** Perform steps identified in DTAC solution.
	Were any applicable solutions found?	**NO:** Contact DTAC for support.

BB78437,0000151 -19-28OCT08-23/23

001349.03 — Redundant Fuel Rail Pressure Signal Out of Range High

The Redundant Fuel Rail Pressure Signal exceeds the sensor's high voltage specification.

Continued on next page

BB78437,0000152 -19-28OCT08-1/22

001349.03 — Redundant Fuel Rail Pressure Signal Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003510.03
001349.03
When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Redundant Fuel Rail Pressure Input Voltage corresponds to a pressure that is higher than what is physically possible for fuel rail pressure.

Alarm Level:
WARNING

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Dual Fuel Rail Pressure sensor information, see DUAL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For more information on engine protection, see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 03, Group 140 earlier in this manual.

For derate and shutdown values see APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 6.8L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For more information on connector and terminal testing see TERMINAL TEST in Section 04, Group 160 earlier in this manual.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000152 -19-28OCT08-2/22

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 15

Continued on next page

BB78437,0000152 -19-28OCT08-3/22

2 Sensor Disconnected Test	1. Ignition OFF, Engine OFF	
	2. Disconnect Dual Rail Pressure sensor connector P05.	
	3. Ignition ON, Engine OFF	
	4. Refresh codes.	**YES:** GO TO 3
	Did 001349.03 go to stored and 001349.04 become active?	**NO:** GO TO 7

BB78437,0000152 -19-28OCT08-4/22

3 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Perform a TERMINAL TEST on connector P05.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 4

BB78437,0000152 -19-28OCT08-5/22

4 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P05-4 and single point ground.	**YES:** GO TO 5
	Is the resistance less than 5 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000152 -19-28OCT08-6/22

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF.	
	2. On the harness, measure the voltage between P05-6 (+) and P05-4 (-).	**YES:** Discontinue this test and perform tests for DTC 003510.03 as though DTC was active.
	Is the voltage greater than 5.5V?	**NO:** GO TO 6

BB78437,0000152 -19-28OCT08-7/22

6 Check for DTC 001349.03 with Sensor Reconnected	1. Ignition OFF, engine OFF.	
	2. Reconnect P05.	
	3. Ignition ON, engine OFF.	
	4. Refresh DTCs.	**YES:** Replace Dual Rail Pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is DTC 001349.03 still active?	**NO:** GO TO 12

Continued on next page

BB78437,0000152 -19-28OCT08-8/22

7 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect ECU J01 connector. 3. Perform Terminal Test on J01-F3, J01-D2, and J01-C3. Were Terminal Test results good?	**YES:** GO TO 8 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000152 -19-28OCT08-9/22

8 Check Dual Rail Pressure Sensor Circuit Continuity	1. On the harness, measure the resistance between ECU J01-D2 and Dual Rail Pressure sensor connector P05-4. 2. On the harness, measure the resistance between ECU J01-F3 and Dual Rail Pressure sensor connector P05-6. 3. On the harness, measure the resistance between ECU J01-C3 and Dual Rail Pressure sensor connector P05-5. Were all resistance measurements less than 10 ohms?	**YES:** GO TO 9 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000152 -19-28OCT08-10/22

9 Check for Short to Voltage	1. Ignition ON, engine OFF. 2. Measure the voltage between ECU J01-C3 and single point ground. Is the voltage greater than 0.5V?	**YES:** Locate and repair short to voltage in sensor signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 10

BB78437,0000152 -19-28OCT08-11/22

10 ECU J01 Disconnected Code Change Test	*NOTE: Many new error codes will appear in the next step. Disregard all codes except 0001349.03.* 1. ECU connector J01 still disconnected. 2. Ignition ON, Engine OFF. 3. Refresh codes. Is DTC 001349.03 still active?	**YES:** GO TO 14 **NO:** GO TO 11

Continued on next page

BB78437,0000152 -19-28OCT08-12/22

11 Check Signal Circuit for Wire-Wire Short	1. Ignition OFF, engine OFF.	
	2. Disconnect ECU connector J02.	
	3. Measure the resistance between J01-C3 and all other terminals in ECU harness connectors J01 and J02.	**YES:** Locate wire-wire short. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any measurements less than 100k ohms?	**NO:** GO TO 12

BB78437,0000152 -19-28OCT08-13/22

12 Check for Intermittent Short to Voltage	1. Reconnect all electrical connectors.	
	2. Ignition ON, engine OFF.	
	3. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Rail Pressure sensor and ECU J01 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Redundant Fuel Rail Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 13

BB78437,0000152 -19-28OCT08-14/22

13 Check for Active DTC 001349.03	Refresh DTCs	**YES:** Recheck measurements. GO TO 2
	Is DTC 001349.03 still active?	**NO:** Problem is intermittent. Contact DTAC for support.

BB78437,0000152 -19-28OCT08-15/22

14 Replace ECU	1. Ignition OFF, engine OFF.	
	2. Replace ECU.	
	3. Reconnect all connectors.	
	4. Ignition ON, engine OFF.	**YES:** Contact DTAC for support.
	Is DTC 001349.03 still active?	**NO:** Problem fixed.

BB78437,0000152 -19-28OCT08-16/22

15 Check for Intermittent Short to Voltage	1. Ignition ON, engine OFF.	
	2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Rail Pressure sensor and ECU J01 connector.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	NOTE: The Redundant Fuel Rail Pressure Input Voltage will increase to approximately 5V when the sensor circuit is shorted to a voltage source.	
	Was the source of the intermittent short to voltage found?	**NO:** GO TO 16

Continued on next page

BB78437,0000152 -19-28OCT08-17/22

16 Check Snapshot Information	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.03 now active?	**YES:** GO TO 2 **NO:** GO TO 17

BB78437,0000152 -19-28OCT08-18/22

17 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Rail Pressure sensor connector P05. 3. Perform Terminal Test on P05. 4. Disconnect ECU J01 connector. 5. Perform Terminal Test on J01-D2, J01-F3, and J01-C3. Were Terminal Test results good?	**YES:** GO TO 18 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000152 -19-28OCT08-19/22

18 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 001349.03 now active?	**YES:** GO TO 2 **NO:** GO TO 19

BB78437,0000152 -19-28OCT08-20/22

19 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.03. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 20

BB78437,0000152 -19-28OCT08-21/22

20 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,0000152 -19-28OCT08-22/22

001349.04 — Redundant Fuel Rail Pressure Signal Out of Range Low

The Redundant Fuel Rail Pressure Input Voltage drops below the sensor's low voltage specification.

Continued on next page

BB78437,0000153 -19-28OCT08-1/23

001349.04 — Redundant Fuel Rail Pressure Signal Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003510.04
001349.04

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The Redundant Fuel Rail Pressure Input Voltage drops below the sensor's low voltage specification. The voltage corresponds to a pressure that is lower than what is physically possible for the redundant fuel rail pressure signal.

Alarm Level:
WARNING

Additional References:
For more pressure sensor information, see MEASURING PRESSURE in Section 03, Group 140 earlier in this manual.

For more Dual Fuel Rail Pressure Sensor information, see DUAL FUEL RAIL PRESSURE SENSOR in Section 03, Group 140 earlier in this manual.

For wiring information:
- see REDUNDANT ECU OPTION 6.8L WIRING DIAGRAMS
located in Section 06, Group 210 later in this manual.

For further information on connector and terminal testing see TERMINAL TEST earlier in this Group.

IMPORTANT: When directed to run the HARNESS DIAGNOSTIC MODE TEST the engine temperature should be above freezing. It is recommended that the engine temperature be at least room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
- ECU small terminal - Orange/Blue
- ECU large terminal - Orange/Green
- Dual Fuel Rail Pressure Sensor P05 - Blue/Orange

BB78437,0000153 -19-28OCT08-2/23

1 Read DTCs and Store Snapshot Information	1. Ignition ON, engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR earlier in this Group. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS earlier in this Group. 4. Refresh Codes. Did 001349.04 reappear active?	**YES:** GO TO 2 **NO:** GO TO 16

Continued on next page

BB78437,0000153 -19-28OCT08-3/23

2 Terminal Test	1. Ignition OFF, Engine OFF.	
	2. Disconnect Dual Fuel Rail Pressure sensor connector P05.	
	3. Perform a TERMINAL TEST on connector P05.	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Were any problems found?	**NO:** GO TO 3

BB78437,0000153 -19-28OCT08-4/23

3 Check Sensor Return Circuit Continuity	On the harness, measure the resistance between P05-4 and single point ground.	**YES:** GO TO 4
	Is the resistance less than 5 ohms?	**NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000153 -19-28OCT08-5/23

4 Check for Shorted Signal Circuit	On the harness, measure the resistance between Dual Fuel Rail Pressure sensor signal P05-5 and return P05-4.	**YES:** Repair short to ground or wire-wire short of signal circuit. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	Is resistance less than 10k ohms?	**NO:** GO TO 5

BB78437,0000153 -19-28OCT08-6/23

5 Check Sensor 5V Supply	1. Ignition ON, engine OFF.	**YES:** GO TO 6
	2. On the harness, measure the voltage between P05-6 (+) and P05-4 (-).	**NO:** Voltage is less than 4.5V, GO TO 10
	Is the voltage between 4.5V and 5.5V?	**NO:** Voltage is greater than 5.5V, discontinue this test and perform tests for DTC 003510.03 as though DTC were active.

BB78437,0000153 -19-28OCT08-7/23

6 Check for DTC 001349.03 with Signal Shorted to 5V	1. Ignition OFF, engine OFF.	
	2. On the harness, install flex probes on Dual Fuel Rail Pressure sensor connector terminals P05-5 and P05-6.	
	3. Connect jumper wire between flex probes.	
	4. Ignition ON, engine OFF.	
	5. Refresh DTCs.	**YES:** GO TO 7
	Is DTC 001349.03 now an active DTC?	**NO:** GO TO 11

Continued on next page

BB78437,0000153 -19-28OCT08-8/23

7 Reconnect Sensor and Check for DTC 001349.04	1. Ignition OFF, engine OFF. 2. Remove flex probes from P05. 3. Reconnect Dual Fuel Rail Pressure sensor connector P05. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 001349.04 an active DTC?	**YES:** Replace Dual Fuel Rail Pressure sensor. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 8

BB78437,0000153 -19-28OCT08-9/23

8 Check for Intermittent Problem	1. Ignition ON, engine OFF. 2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Fuel Rail Pressure sensor and ECU J01 connector. *NOTE: The Redundant Fuel Rail Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.* Was the source of the intermittent problem found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 9

BB78437,0000153 -19-28OCT08-10/23

9 Replace Sensor and Terminals	1. Ignition OFF, engine OFF. 2. Replace terminals in Dual Fuel Rail Pressure sensor connector P05. 3. Replace Dual Fuel Rail Pressure sensor. 4. Ignition ON, engine OFF. 5. Refresh DTCs. Is DTC 001349.04 active?	**YES:** Contact DTAC for support. **NO:** Problem fixed.

BB78437,0000153 -19-28OCT08-11/23

10 Check for DTC 003510.04	Is DTC 003510.04 active?	**YES:** Discontinue this test. Perform test for DTC 003510.04. **NO:** GO TO 11

BB78437,0000153 -19-28OCT08-12/23

11 Terminal Test	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J01. 3. Perform a TERMINAL TEST on terminals J01-F3, J01-D2, and J01-C3. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 12

Continued on next page

BB78437,0000153 -19-28OCT08-13/23

12 Check Circuit Continuity

On the harness, measure the resistance between the following ECU J01 connector terminals and Dual Fuel Rail Pressure sensor P05 connector terminals:

- J01-D2 to P05-4
- J01-F3 to P05-6
- J01-C3 to P05-5

Were all resistance measurements less than 10 ohms?

YES: GO TO 13

NO: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000153 -19-28OCT08-14/23

13 Check for Signal Shorted to Ground

On the harness, measure the resistance between ECU J01-C3 and single point ground.

Is the resistance less than 100k ohms?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 14

BB78437,0000153 -19-28OCT08-15/23

14 Check for Wire-Wire Short

1. Disconnect ECU connector J02.
2. Verify Dual Fuel Rail Pressure sensor connector P05 is still disconnected.
3. On the harness, measure the resistance between J01-C3 and all other terminals in ECU connectors J01 and J02.

Were all resistance measurements greater than 100k ohms?

YES: GO TO 15

NO: Fix wire-wire short in harness. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

BB78437,0000153 -19-28OCT08-16/23

15 Reconnect and Check for DTC 001349.04

1. Reconnect all electrical connectors.
2. Ignition ON, engine OFF.
3. Refresh DTCs.

Is DTC 001349.04 still active?

YES: Recheck procedure. GO TO 2

NO: Problem is intermittent. Contact DTAC for support.

BB78437,0000153 -19-28OCT08-17/23

16 Check for Intermittent Wiring Problem

1. Ignition ON, engine OFF.
2. Monitor Redundant Fuel Rail Pressure Input Voltage data point in Service ADVISOR while gently wiggling wire harness between Dual Fuel Rail Pressure sensor and ECU J01 connector.

NOTE: The Redundant Fuel Rail Pressure Input Voltage will decrease to approximately 0V when the sensor circuit is open or shorted to ground.

Was the source of the intermittent problem found?

YES: Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.

NO: GO TO 17

Continued on next page

BB78437,0000153 -19-28OCT08-18/23

17 Review Snapshot Instruction	1. Review snapshot information stored in step 1. 2. Operate engine under conditions where DTC became active. Is DTC 001349.04 now active?	**YES:** GO TO 2 **NO:** GO TO 18

BB78437,0000153 -19-28OCT08-19/23

18 Terminal Test	1. Ignition OFF, engine OFF. 2. Disconnect Dual Fuel Rail Pressure sensor connector P05. 3. Perform TERMINAL TEST on P05. 4. Disconnect ECU J01 connector. 5. Perform TERMINAL TEST on terminals J01-C3, J01-D2, and J01-F3. Were Terminal Test results good?	**YES:** GO TO 19 **NO:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR

BB78437,0000153 -19-28OCT08-20/23

19 Get More Information	1. Talk to the operator who has observed the problem firsthand, if possible, to obtain more information on the conditions when the problem occurs. 2. Operate the engine under the conditions specified by the operator. Is DTC 001349.04 now active?	**YES:** GO TO 2 **NO:** GO TO 20

BB78437,0000153 -19-28OCT08-21/23

20 Check DTAC Solutions	Search DTAC solutions in Service Advisor for known issues which may cause an intermittent DTC 001349.04. Were any applicable solutions found?	**YES:** Perform steps identified in DTAC solution. **NO:** GO TO 21

BB78437,0000153 -19-28OCT08-22/23

21 ECU Reprogram	Check Custom Performance for possible ECU software updates. Is a later version of ECU software available?	**YES:** Reprogram ECU with latest version of software. **NO:** Contact DTAC for support.

BB78437,0000153 -19-28OCT08-23/23

001569.31 — Engine in Power Derate Condition

The ECU detects a condition that requires an engine power derate.

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 derates see ENGINE DERATE AND SHUTDOWN PROTECTION in Section 3 Group 140 earlier in this manual.

DN22556,000051E -19-30AUG07-1/1

001638.09 — Hydraulic Oil Temperature Erratic

For troubleshooting procedure please see the application troubleshooting manual.

RG40049,00001DF -19-02NOV09-1/1

001639.01 — Fan Speed Signal Extremely Low

For troubleshooting procedures please see the application troubleshooting manual.

RG40049,00001DB -19-30OCT09-1/1

001639.16 — Fan Speed Signal Moderately High

For troubleshooting procedures please see the application troubleshooting manual.

RG40049,00001DC -19-30OCT09-1/1

002000.13 — Incorrect ECU for Application

For troubleshooting procedures please see the application troubleshooting manual.

BB78437,000013F -19-11JUL08-1/1

002003.09 — No CAN Message Received From Source Address 3

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000009 -19-06APR09-1/1

002004.09 — No CAN Message Received From Source Address 4

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000000F -19-04MAY09-1/1

002023.09 — No CAN Message From Source Address 23

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000061E -19-06JUN08-1/1

002033.09 — No CAN Message Received From Source Address 33

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000000A -19-06APR09-1/1

002033.14 — Incorrect CAN Message Received From Source Address 33

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000000B -19-06APR09-1/1

002033.19 — Synchronizing Problem with Source Address 33

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000000C -19-06APR09-1/1

002057.09 — No CAN Message Received From Source Address 57

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000011 -19-10AUG09-1/1

002071.09 — No CAN Message From Source Address 71

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000061F -19-06JUN08-1/1

003509.03 — Sensor Supply #1 Voltage Out of Range High

The ECU detects a supply voltage above specification on a ECU 5 volt supply circuit.

DN22556,0000626 -19-20MAY09-1/12

003509.03 — Sensor Supply #1 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003509.03

When DTC is Displayed:
When ever the ignition is on and the error is active.

Related Information:
The ECU detects a supply voltage greater than 5.26 volts on the Sensor Supply #1 circuit.

The output from this supply comes out of J1 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #1 Voltage:
Manifold Air Pressure Sensor.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more sensor supply #1 information, see SENSOR SUPPLY #1 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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

Continued on next page

DN22556,0000626 -19-20MAY09-2/12

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 in Section 04, Group 160 earlier in this manual. 3. Write down all DTCs and their occurrence count. If any DTCs have snapshot capture or snapshot recording information, save the information. For instructions on saving and using snapshot information, see SNAPSHOT INSTRUCTIONS in Section 04, Group 160 earlier in this manual. 4. Refresh Codes. Did 003509.03 reappear active?	**YES:** GO TO 2 **NO:** GO TO 5

DN22556,0000626 -19-20MAY09-3/12

2 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J1. *NOTE: New error codes will appear in the next step. Disregard all codes except for 003509.03* 3. Ignition ON, Engine OFF. 4. Refresh codes. Is 003509.03 still active?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 3

DN22556,0000626 -19-20MAY09-4/12

3 Wiring Harness Short to Battery Check	1. Ignition OFF, Engine OFF. 2. Measure voltage from power terminal (J1-A4) 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

DN22556,0000626 -19-20MAY09-5/12

4 Wiring Harness Check	1. Disconnect all ECU connectors. 2. Measure resistance from power terminal (J1-A4) on the ECU harness connector to all other terminals of J1 and J2 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

DN22556,0000626 -19-20MAY09-6/12

5 Occurrence Count Check	Review stored information and look at occurrence count for 003509.03.	**YES:** GO TO 6
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 7

DN22556,0000626 -19-20MAY09-7/12

6 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 ECU connectors. GO TO 7

DN22556,0000626 -19-20MAY09-8/12

7 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 8
		NO: GO TO 9

DN22556,0000626 -19-20MAY09-9/12

8 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003509.03 reappear when engine operating point was reached?	**NO:** GO TO 7

DN22556,0000626 -19-20MAY09-10/12

9 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003509.03 active?	**NO:** GO TO 10

DN22556,0000626 -19-20MAY09-11/12

10 Software Updates	1. Check Custom Performance for possible software updates. If new software is available, reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003509.03 active?	**NO:** Problem fixed, bad ECU program.

DN22556,0000626 -19-20MAY09-12/12

003509.04 — Sensor Supply #1 Voltage Out of Range Low

The ECU detects a supply voltage below specification on a ECU 5 volt supply circuit.

DN22556,0000627 -19-14JAN09-1/15

003509.04 — Sensor Supply #1 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003509.04

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 #1 circuit.

Output from this supply comes from J1 of the ECU.

Alarm Level:
Warning

Sensors Using Sensor Supply #1 Voltage:
Manifold Air Pressure Sensor.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #1 information, see SENSOR SUPPLY #1 in Section 03, Group 140 earlier in this manual.

NOTE: The wiring diagrams provided are for a typical John Deere supplied OEM harness. Wire number, colors, and jumper connectors do not apply to all applications.

For wiring information:
- see 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Continued on next page

DN22556,0000627 -19-14JAN09-2/15

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 003509.04 reappear active?	**YES:** GO TO 22 **NO:** GO TO 8

DN22556,0000627 -19-14JAN09-3/15

2 Disconnect Related Components	*NOTE: New codes will appear as sensors are disconnected. Disregard all codes except 3509.04.* Part 1 1. Ignition OFF, Engine OFF. 2. Disconnect one of the related sensors/components listed below. • *Manifold Air Pressure Sensor* 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #1 Voltage in Service ADVISOR. 5. Refresh codes. Has 003509.04 moved to the stored list?	**YES:** GO TO 3 **NO:** GO TO Part 2.
	Part 2 Have all related sensors from step 1 been disconnected and 003509.04 still active?	**YES:** GO TO 6 **NO:** GO TO Part 1, Step 1.

DN22556,0000627 -19-14JAN09-4/15

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

DN22556,0000627 -19-14JAN09-5/15

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

DN22556,0000627 -19-14JAN09-6/15

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.

DN22556,0000627 -19-14JAN09-7/15

6 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J1. *NOTE: Many new codes will appear in the next step. Disregard all codes except 3509.04.* 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #1 Voltage in Service ADVISOR. 5. Refresh codes. Is 003509.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 7

DN22556,0000627 -19-14JAN09-8/15

7 Harness Resistance Check With ECU Disconnected	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J2. 3. Measure the resistance between signal (terminal J1-A4) in the ECU harness connector, to all other terminals in the ECU harness connectors J1 and J2. 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

DN22556,0000627 -19-14JAN09-9/15

8 Occurrence Count Check	Review stored information and look at occurrence count for 003509.04. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 9 **NO:** GO TO 10

DN22556,0000627 -19-14JAN09-10/15

9 Harness Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connector J1. Inspect harness wiring for pinched or melted wires. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 10

Continued on next page

DN22556,0000627 -19-14JAN09-11/15

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

DN22556,0000627 -19-14JAN09-12/15

11 Engine Error Operating Point Test	1. Ignition ON, Engine ON.	**YES:** Repair problem if found. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.
	2. Set engine to operating point of failure and refresh codes.	**YES:** GO TO 2
	Did 003509.04 reappear when engine operating point was reached?	**NO:** GO TO 10

DN22556,0000627 -19-14JAN09-13/15

12 Retest	1. Ignition ON, Engine OFF.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	
	3. Refresh codes.	**YES:** GO TO 2
	Is 003509.04 active?	**NO:** GO TO 13

DN22556,0000627 -19-14JAN09-14/15

13 Software Updates	1. Check Custom Performance for possible software updates. If new software is available, reprogram ECU using Service ADVISOR.	
	2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR.	**YES:** Start a DTAC case.
	Is 003509.04 active?	**NO:** Problem fixed, bad ECU program.

DN22556,0000627 -19-14JAN09-15/15

003510.03 — Sensor Supply #2 Voltage Out of Range High

The ECU detects a supply voltage above specification on a ECU 5 volt supply circuit.

DN22556,0000628 -19-14JAN09-1/13

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 J2.

Alarm Level:
Warning

Sensors Using Sensor Supply #2 Voltage from ECU connector J1:
Manifold Air Pressure (optional).
Low Pressure Fuel Pressure (optional).
Oil Pressure Sensor.
Sensors Using Sensor Supply #2 Voltage from ECU connector J2:
Secondary Analog Throttle.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #2 information, see SENSOR 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 4.5L 12V ECU WIRING DIAGRAM 2 and 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 2 and 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 2 and 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 24V ECU WIRING DIAGRAM 2 and 6.8L 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

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DN22556,0000628 -19-14JAN09-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR 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 6

DN22556,0000628 -19-14JAN09-3/13

2 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 3 **NO:** GO TO 4

DN22556,0000628 -19-14JAN09-4/13

3 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connectors J1 and J2. 3. Connect ECU Programming Harness. *NOTE: New error codes will appear in the next step. Disregard all codes except for 003510.03* 4. Turn Programming Harness Key Switch to ON. 5. Refresh codes. Is 003510.03 still active?	**YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO 4

DN22556,0000628 -19-14JAN09-5/13

4 Wiring Harness Short to Battery Check	1. Turn Programming Harness Key Switch to OFF and wait for the red LED to turn OFF. 2. Remove ECU Programming Harness. 3. Look for voltage on Sensor Power Supply #2 Terminal on ECU harness connectors. • Measure voltage from power terminal (J1-A1) on the ECU harness connector to chassis ground. • Measure voltage from power terminal (J2-G2) on the ECU harness connector to chassis ground. Was either 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

DN22556,0000628 -19-14JAN09-6/13

5 Wiring Harness Check	Look for shorted wires from Sensor Power Supply #2 to other wires in harness. • Measure resistance from power terminal (J1-A1) on the ECU harness connector to all other terminals of J1 and J2 on the ECU harness. • Measure resistance from power terminal (J2-G2) on the ECU harness connector to all other terminals of J1 and J2 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.

DN22556,0000628 -19-14JAN09-7/13

6 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 7 **NO:** GO TO 8

DN22556,0000628 -19-14JAN09-8/13

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 abetter visual inspection. Were any problems found?	**YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 8

DN22556,0000628 -19-14JAN09-9/13

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. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** If a certain operating point exists when error occurs, GO TO 9 **NO:** GO TO 10

DN22556,0000628 -19-14JAN09-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point of failure and refresh codes. Did 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 8

Continued on next page

DN22556,0000628 -19-14JAN09-11/13

10 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 11

DN22556,0000628 -19-14JAN09-12/13

11 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.

DN22556,0000628 -19-14JAN09-13/13

003510.04 — Sensor Supply #2 Voltage Out of Range Low

The ECU detects a supply voltage below specification on a ECU 5 volt supply circuit.

DN22556,0000629 -19-14JAN09-1/16

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 both ECU connectors, J1 (black face) and J2 (brown face).

Alarm Level:
Warning

Sensors Using Sensor Supply #2 Voltage from ECU connector J1:
Oil Pressure Sensor.
Manifold Air Pressure (optional).
Low Pressure Fuel Pressure (optional).
Sensors Using Sensor Supply #2 Voltage from ECU connector J2:
Secondary Analog Throttle.

Control Unit Response:
The ECU will try to operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #2 information, see SENSOR 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 4.5L 12V ECU WIRING DIAGRAM 2 and 4.5L 12V ECU WIRING DIAGRAM 4
- see 4.5L 24V ECU WIRING DIAGRAM 2 and 4.5L 24V ECU WIRING DIAGRAM 4
- see 6.8L 12V ECU WIRING DIAGRAM 2 and 6.8L 12V ECU WIRING DIAGRAM 4
- see 6.8L 24V ECU WIRING DIAGRAM 2 and 6.8L 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 oom temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JT07328 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

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DN22556,0000629 -19-14JAN09-2/16

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 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

DN22556,0000629 -19-14JAN09-3/16

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. • *Oil Pressure Sensor* • *Secondary Analog Throttle*. • *Low Pressure Fuel Pressure (optional)*. • *Manifold Air Pressure (optional)*. 3. Ignition ON, Engine OFF. 4. Monitor Sensor Supply #2 Voltage in Service ADVISOR. 5. 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.

DN22556,0000629 -19-14JAN09-4/16

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

Continued on next page

DN22556,0000629 -19-14JAN09-5/16

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

DN22556,0000629 -19-14JAN09-6/16

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.

DN22556,0000629 -19-14JAN09-7/16

6 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,0000629 -19-14JAN09-8/16

7 No Load Sensor Supply Voltage Check	1. Ignition OFF, Engine OFF. 2. Disconnect ECU connectors J1 and J2. 3. Connect ECU Programming Harness. *NOTE: Many new codes will appear in the next steps. Disregard all codes except 3510.04.* 4. Turn Programming Harness Key Switch to ON. 5. Refresh codes. Is 003510.04 still active?	 **YES:** Replace ECU. Run HARNESS DIAGNOSTIC MODE TEST. **NO:** GO TO 8

Continued on next page

DN22556,0000629 -19-14JAN09-9/16

8 Harness Resistance Check With ECU Disconnected	1. Turn Programming Harness Key Switch to OFF and wait for red LED to turn OFF.	
	2. Disconnect ECU Programming Harness.	
	NOTE: Signal wire for Sensor Supply #2 comes from both ECU connectors, J1 and J2.	
	3. Look for shorted wires from Sensor Supply #2 to other wires in ECU harness. • Measure resistance from power (terminal J1-A1) of ECU harness connector to all other terminals of harness connectors J1 and J2 • Measure resistance from power (terminal J2-G2) of ECU harness connector to all other terminals of harness connectors J1 and J2	**YES:** Check for melted or pinched wire in harness and repair. Run HARNESS DIAGNOSTIC MODE TEST.
	Were any of the measurements less than 10 ohms?	**NO:** Reconnect all connectors. GO TO 2

DN22556,0000629 -19-14JAN09-10/16

9 Occurrence Count Check	Review stored information and look at occurrence count for 003510.04.	**YES:** GO TO 10
	Is occurrence recorded in step 1 greater than 5?	**NO:** GO TO 11

DN22556,0000629 -19-14JAN09-11/16

10 Harness Check	1. Ignition OFF, Engine OFF.	
	2. Disconnect ECU connectors. 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 10

DN22556,0000629 -19-14JAN09-12/16

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

DN22556,0000629 -19-14JAN09-13/16

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 003510.04 reappear when engine operating point was reached?	**NO:** GO TO 11

Continued on next page

DN22556,0000629 -19-14JAN09-14/16

13 Retest	1. Ignition ON, Engine OFF. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. 3. Refresh codes. Is 003510.04 active?	**YES:** GO TO 2 **NO:** GO TO 14

DN22556,0000629 -19-14JAN09-15/16

14 Software Updates	1. Check Custom Performance for possible software updates. If new software is available, reprogram ECU using Service ADVISOR. 2. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. Is 003510.04 active?	**YES:** Start a DTAC case. **NO:** Problem fixed, bad ECU program.

DN22556,0000629 -19-14JAN09-16/16

003511.03 — Sensor Supply #3 Voltage Out of Range High

The ECU detects a supply voltage above specification on a ECU 5 volt supply circuit.

DN22556,000062A -19-14APR08-1/13

003511.03 — Sensor Supply #3 Voltage Out of Range High Diagnostic Procedure

Troubleshooting Sequence:
003511.03

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 #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 operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #3 information, see SENSOR 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

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DN22556,000062A -19-14APR08-2/13

1 Read DTCs and Store Snapshot Information	1. Ignition ON, Engine OFF. *NOTE: When DTCs are cleared Snapshot information for ALL DTCs will also be cleared.* 2. Connect Service ADVISOR, see CONNECTING TO SERVICE ADVISOR 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

DN22556,000062A -19-14APR08-3/13

2 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 3 **NO:** GO TO 4

DN22556,000062A -19-14APR08-4/13

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

DN22556,000062A -19-14APR08-5/13

4 Wiring Harness Short to Battery Check	1. Turn Programming Harness Key Switch to OFF and wait for the red LED to turn OFF. 2. Remove ECU Programming Harness. 3. 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 wires in harness and repair wiring. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** GO TO **5**

Continued on next page

DN22556,000062A -19-14APR08-6/13

5 Wire Harness Check	Measure resistance from power terminal (J2-A3) on the ECU harness connector to all other terminals of J1 and J2 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.

DN22556,000062A -19-14APR08-7/13

6 Occurrence Count Check	Review stored information and look at occurrence count for 003511.03. Is occurrence recorded in step 1 greater than 5?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,000062A -19-14APR08-8/13

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. Were any problems found?	 **YES:** Repair problem. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **NO:** Reconnect all connectors. GO TO 8

DN22556,000062A -19-14APR08-9/13

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. Run HARNESS DIAGNOSTIC MODE TEST in Service ADVISOR. **YES:** If a certain operating point exists when error occurs, GO TO 9 **NO:** GO TO 10

DN22556,000062A -19-14APR08-10/13

9 Engine Error Operating Point Test	1. Ignition ON, Engine ON. 2. Set engine to operating point of failure and refresh codes. Did 003511.03 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 8

DN22556,000062A -19-14APR08-11/13

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

Continued on next page

DN22556,000062A -19-14APR08-12/13

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.

DN22556,000062A -19-14APR08-13/13

003511.04 — Sensor Supply #3 Voltage Out of Range Low

The ECU detects a supply voltage below specification on a ECU 5 volt supply circuit.

DN22556,000062B -19-21AUG08-1/16

003511.04 — Sensor Supply #3 Voltage Out of Range Low Diagnostic Procedure

Troubleshooting Sequence:
003511.04

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 #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 operate normally. Engine performance may be affected.

Additional References:
For more Sensor Supply #3 information, see SENSOR 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 4.5L 12V ECU WIRING DIAGRAM 2
- see 4.5L 24V ECU WIRING DIAGRAM 2
- see 6.8L 12V ECU WIRING DIAGRAM 2
- see 6.8L 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 room temperature 20° C (68° F). This test is located in Service ADVISOR.

IMPORTANT: Do not force probes into connector terminals or damage will result. Use JDG10466 Connector Adapter Test Kit to make measurements in connectors. This will ensure that terminal damage does not occur.

Flex probe information:
• ECU small terminal - Orange/Blue
• ECU large terminal - Orange/Green

Continued on next page

DN22556,000062B -19-21AUG08-2/16

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 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

DN22556,000062B -19-21AUG08-3/16

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.

DN22556,000062B -19-21AUG08-4/16

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

DN22556,000062B -19-21AUG08-5/16

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

DN22556,000062B -19-21AUG08-6/16

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.

DN22556,000062B -19-21AUG08-7/16

6 ECU Programming Harness Availability	Is the ECU programming harness available for use?	**YES:** GO TO 7 **NO:** GO TO 8

DN22556,000062B -19-21AUG08-8/16

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

DN22556,000062B -19-21AUG08-9/16

8 Harness Resistance Check With ECU Disconnected	1. Turn Programming Harness Key Switch to OFF and wait for red LED to turn OFF. 2. Disconnect ECU Programming Harness. 3. Disconnect ECU connector J1. 4. Measure resistance from signal (terminal J2-A3) of ECU harness connector to all other terminals of harness connectors J1 and J2. 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

DN22556,000062B -19-21AUG08-10/16

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

DN22556,000062B -19-21AUG08-11/16

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

DN22556,000062B -19-21AUG08-12/16

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

DN22556,000062B -19-21AUG08-13/16

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

DN22556,000062B -19-21AUG08-14/16

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

DN22556,000062B -19-21AUG08-15/16

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.

DN22556,000062B -19-21AUG08-16/16

523792.04 — EPGDS LTC Pump Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

RG40049,00001D7 -19-02NOV09-1/1

524099.11 — EPGDS LTC Pump Blockage

For troubleshooting procedures please see the application troubleshooting manual.

RG40049,00001D8 -19-02NOV09-1/1

524037.02 — MFWD Switch Circuit Fault

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000617 -19-24MAY07-1/1

524223.03 — Rear Axle Differential Lock Circuit Fault

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000618 -19-24MAY07-1/1

524225.31 — Engine Start Protection Bypass Detected

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,0000619 -19-24MAY07-1/1

524235.03 — MFWD Solenoid Signal Out of Range High

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000061A -19-06JUN08-1/1

524235.04 — MFWD Solenoid Signal Out of Range Low

For troubleshooting procedures please see the application troubleshooting manual.

DN22556,000061B -19-06JUN08-1/1

Section 05
Tools

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Group 180—Diagnostic Service Tools

Electronic System Diagnostic Tools 05-180-1

Repair and Adjustment Tools

NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC).

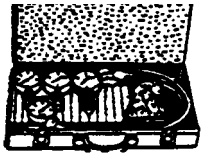
SERVICEGARD is a trademark of Deere & Company

RE38635,0000137 -19-18MAR09-1/10

Universal Pressure Test Kit JT05470

Used for testing engine oil pressure, intake manifold pressure (turbo boost), and fuel transfer pump pressure.

RG5162 —UN—23AUG88



Universal Pressure Test Kit

RE38635,0000137 -19-18MAR09-2/10

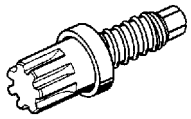
NOTE: JT05470 contains SAE adapters and one Metric adapter (M12x1.5 mm) that can be used to test the fuel transfer pump pressure. FKM10002 contains a set of SAE adpaters and a set of Metric adapters.

RE38635,0000137 -19-18MAR09-3/10

Flywheel Turning Tool..... JDG820

Used to rotate engine flywheel to lock engine at “TDC” to check high pressure fuel pump timing. Use on flywheels with 129 teeth and 29.9 mm flywheel housing guide bore.

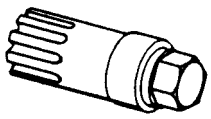
RG7056 —UN—17JUN05



RE38635,0000137 -19-18MAR09-4/10

Flywheel Turning Tool.....JDE83

Used to rotate engine flywheel to lock engine at “TDC” to check high pressure fuel pump timing. Use on flywheels with 142 teeth and 26.5 mm flywheel housing guide bore.



RG6251 —UN—22JUL92

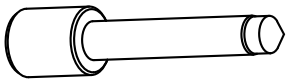
Flywheel Turning Tool

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RE38635,0000137 -19-18MAR09-5/10

Timing Pin..... JDG1571

Used to lock engine at TDC.



RG12031 —UN—20DEC01

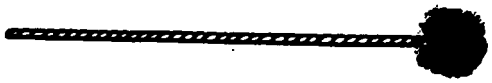
Timing Pin

RE38635,0000137 -19-18MAR09-6/10

Thread Cleaning Brush.....D17030BR

RG5099 —UN—23AUG88

Used to clean threads in cylinder head.

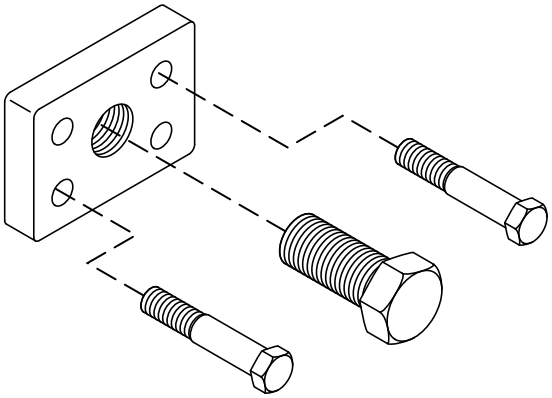


Thread Cleaning Brush

RE38635,0000137 -19-18MAR09-7/10

High Pressure Pump Drive Gear Puller..... JDG1560

Remove drive gear from tapered shaft on Denso HP4 high pressure fuel pump.



RG15110A —UN—01OCT08

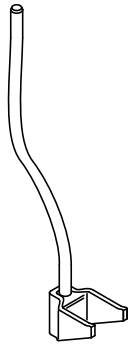
Fuel Pump Drive Gear Puller

Continued on next page

RE38635,0000137 -19-18MAR09-8/10

Injector Removal Tool JDG1652A

Used to remove electronic injector from cylinder head.



RG12410 —UN—19JUN02

Injector Removal Tool

RE38635,0000137 -19-18MAR09-9/10

Fuel Rail Plug and Cap Kit JDG10760

Used to cap off fuel rail and plug corresponding line to determine if an injector is leaking and causing no rail pressure to be developed.



RG16331 —UN—22OCT08

Fuel Rail Plug and Cap Kit

RE38635,0000137 -19-18MAR09-10/10

Connector Repair Tools

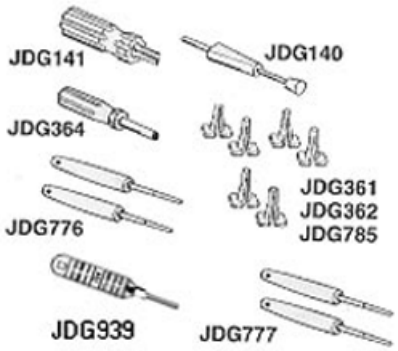
NOTE: Order tools according to information given in the U.S. SERVICEGARD™ Catalog or from the European Microfiche Tool Catalog (MTC).

SERVICEGARD is a trademark of Deere & Company

RE38635,0000138 -19-25MAY07-1/8

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.

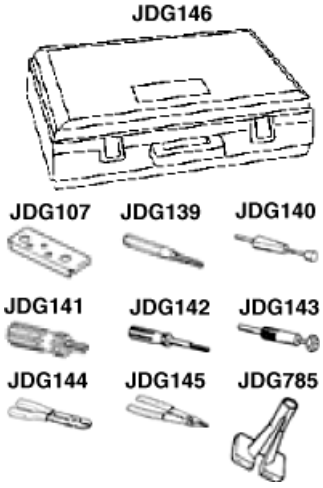


RG14535 —UN—17OCT05

RE38635,0000138 -19-25MAY07-2/8

Technician's Electrical Repair Kit..... JDG155

This kit is assembled with the most commonly used terminal extraction tools used to repair wiring harnesses on John Deere applications. This kit includes the following: **JDG107** - Holding Plate, **JDG139** - Sure-Seal terminal insertion tool, **JDG140** - CPC and Metrimate terminal extraction tool, **JDG141** - CPC Blade Type terminal extraction tool, **JDG142** - Mate-N-Lock terminal extraction tool, **JDG143** - Mate-N-Lock terminal extraction tool, **JDG144** - Universal Crimping Pliers, **JDG145** - Electrician's Pliers, **JDG146** - Carrying Case, and **JDG785** - Deutsch 6-8 gauge terminal extraction/insertion tool.



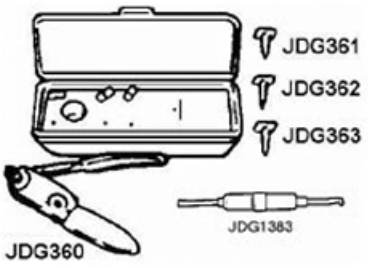
RG14805 —UN—21MAR06

Continued on next page

RE38635,0000138 -19-25MAY07-3/8

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.

RE38635,0000138 -19-25MAY07-4/8

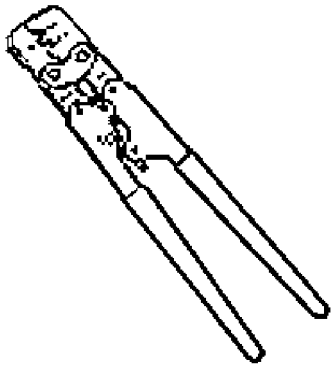
Flex Box Terminal Repair Kit JDG1744

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** - Jaw Set for Crimper (3 Pieces), **JDG1868** - Terminal Extraction Tool, **JDG1869** - Connector Cover Unlock Tool (Set of Two).

RE38635,0000138 -19-25MAY07-5/8

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

Continued on next page

RE38635,0000138 -19-25MAY07-6/8

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.

RE38635,0000138 -19-25MAY07-7/8

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

RE38635,0000138 -19-25MAY07-8/8

Other Materials (Consumables)

Number	Name	Use
TY6333 (U.S.)	High Temperature Moly Grease	Sensor O-rings.
PM37418 (U.S.) PM38621 (Canadian) 242 (LOCTITE®)	Thread Lock and Sealer, medium strength (6 ml)	Applied to screw threads
AT66865 (U.S.)	Lubricant	Insulate electrical connectors.

LOCTITE is a registered trademark of Loctite Corp.

RE38635,0000139 -19-29MAY07-1/1

Electronic System Diagnostic Tools

NOTE: Order tools (non-ECU communication parts and kits) according to information given in the U.S. SERVICEGARD™ Catalog or in the European Microfiche Tool Catalog (MTC) unless otherwise noted.

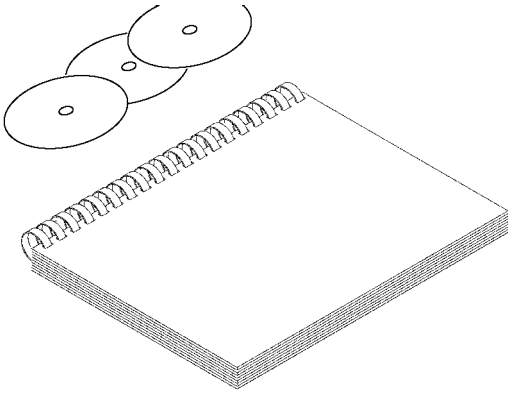
NOTE: ECU communication parts and kits are available from John Deere Distribution Service Center (DSC). **United States and Canadian Agricultural dealers DO NOT ORDER without first contacting your Branch or TAM.**

SERVICEGARD is a trademark of Deere & Company.

CD03523,0000196 -19-08JUN07-1/7

ECU Communication Software.....

Please refer to your John Deere Dealer website for information on obtaining the latest version of software.

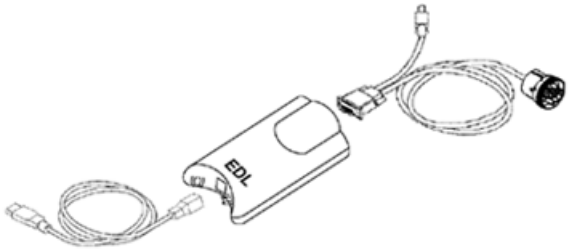


RG8554 —UN—17OCT05

CD03523,0000196 -19-08JUN07-2/7

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.

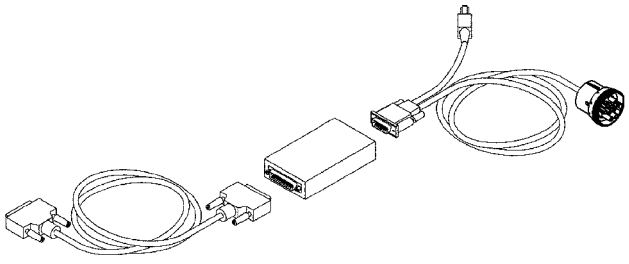


RG11747B —UN—19OCT05

CD03523,0000196 -19-08JUN07-3/7

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

Continued on next page

CD03523,0000196 -19-08JUN07-4/7

NOTE: ECU Communications Kit DS10023 can no longer be purchased. It will be supported on applications up to and including Tier III.

CD03523,0000196 -19-08JUN07-5/7

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.



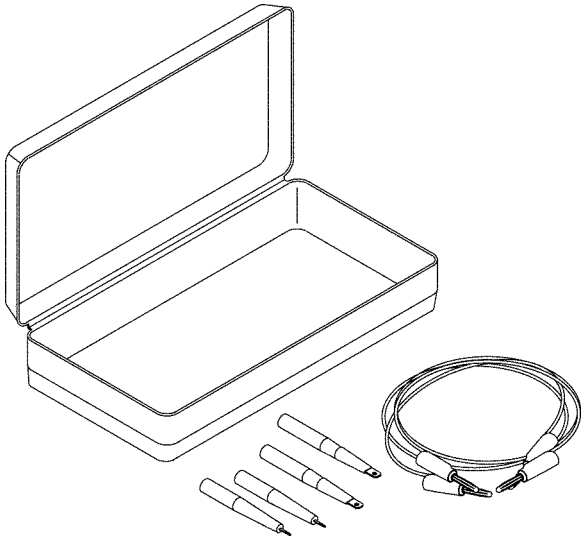
RG11126 —UN—08JUN07

JT07306 - Digital Multimeter

CD03523,0000196 -19-08JUN07-6/7

Connector Adapter Test 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.



RG8803 —UN—26NOV97

JT07328

CD03523,0000196 -19-08JUN07-7/7

Section 06
Specifications

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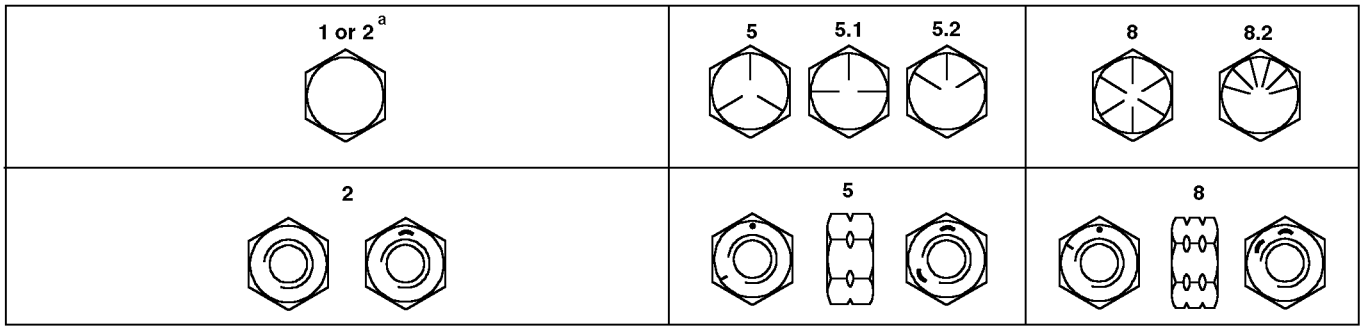
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Unified Inch Bolt and Cap Screw Torque Values



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.

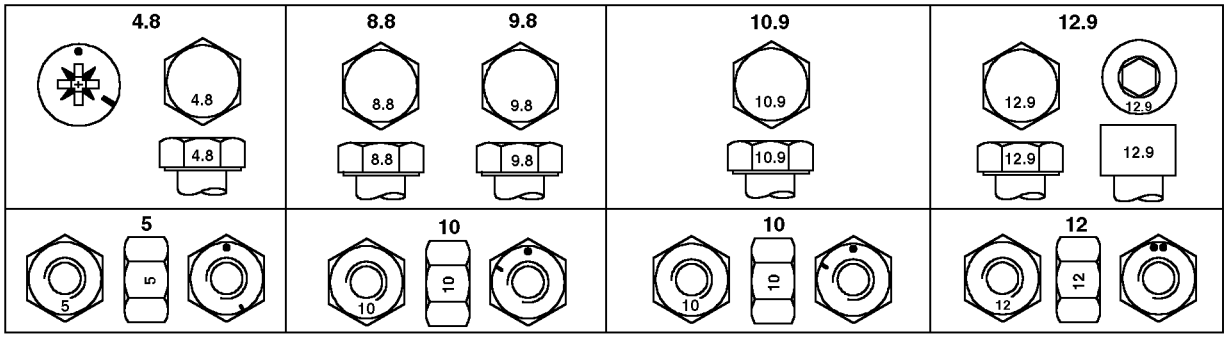
Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

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.

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Metric Bolt and Cap Screw Torque Values



Top, Property Class and Head Markings; Bottom, Property Class and Nut Markings

	Class 4.8		Class 8.8 or 9.8		Class 10.9		Class 12.9	
Size	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**	**Lubricated[a] N·m(lb-ft)**	**Dry[b] N·m(lb-ft)**
M6	4.7 (3.5)	6 (4.4)	9 (6.6)	11.5 (8.5)	13 (9.5)	16.5 (12.2)	15.5 (11.5)	19.5 (14.5)
M8	11.5 (8.5)	14.5 (10.7)	22 (16)	28 (20.5)	32 (23.5)	40 (29.5)	37 (27.5)	47 (35)
M10	23 (17)	29 (21)	43 (32)	55 (40)	63 (46)	80 (59)	75 (55)	95 (70)
M12	40 (29.5)	50 (37)	75 (55)	95 (70)	110 (80)	140 (105)	130 (95)	165 (120)
M14	63 (46)	80 (59)	120 (88)	150 (110)	175 (130)	220 (165)	205 (150)	260 (190)
M16	100 (74)	125 (92)	190 (140)	240 (175)	275 (200)	350 (255)	320 (235)	400 (300)
M18	135 (100)	170 (125)	265 (195)	330 (245)	375 (275)	475 (350)	440 (325)	560 (410)
M20	190 (140)	245 (180)	375 (275)	475 (350)	530 (390)	675 (500)	625 (460)	790 (580)
M22	265 (195)	330 (245)	510 (375)	650 (480)	725 (535)	920 (680)	850 (625)	1080 (800)
M24	330 (245)	425 (315)	650 (480)	820 (600)	920 (680)	1150 (850)	1080 (800)	1350 (1000)
M27	490 (360)	625 (460)	950 (700)	1200 (885)	1350 (1000)	1700 (1250)	1580 (1160)	2000 (1475)
M30	660 (490)	850 (625)	1290 (950)	1630 (1200)	1850 (1350)	2300 (1700)	2140 (1580)	2700 (2000)
M33	900 (665)	1150 (850)	1750 (1300)	2200 (1625)	2500 (1850)	3150 (2325)	2900 (2150)	3700 (2730)
M36	1150 (850)	1450 (1075)	2250 (1650)	2850 (2100)	3200 (2350)	4050 (3000)	3750 (2770)	4750 (3500)

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.*

[b] *"Dry" means plain or zinc plated without any lubrication.*

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

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Electronic Fuel System Repair and Adjustment Specifications

Item	Measurement	Specification
Fuel Filter Mounting Bracket-to-Cylinder Head Cap Screws	Torque	70 N·m (52 lb-ft)
Fuel Filter Base-to-Bracket Cap Screws	Torque	50 N·m (37 lb-ft)
Fittings, Plugs or Accessories-to-Fuel Filter Base	Torque	10 N·m (7 lb-ft)
Inlet and Outlet Fitting-to-Fuel Transfer Pump	Torque	10 N·m (7 lb-ft)
Fuel Transfer Pump Cap Screws	Torque	30 N·m (22 lb-ft)
Electronic Fuel Transfer Pump Cap Screws	Torque	50 N·m (37 lb-ft)
High Pressure Fuel Pump to Adapter Plate	Torque	40 N·m (29.5 lb-ft)
High Pressure Fuel Pump Gear Nut	Torque	70 N·m (52 lb-ft)
Pump Position Sensor-to-adapter plate	Torque	15 N·m (11 lb-ft)
Fuel Supply Elbow Fitting Nut-to-High Pressure Pump	Torque	20 N·m (15 lb-ft)
Fuel Leak-off Fitting Nut-to-High Pressure Pump	Torque	15 N·m (11 lb-ft)
High Pressure Fuel Pump Adapter Plate-to-Engine Front Plate	Torque	40 N·m (30 lb-ft)
High Pressure Fuel Lines (both ends)	Torque	30 N·m (22 lb-ft)
Plug to access Gear Timing Mark	Torque	50 N·m (37 lb-ft)
Suction Control Valve-to-Pump Housing	Torque	10 N·m (7 lb-ft)
High Pressure Common Rail Bracket to Engine	Torque	70 N·m (52 lb-ft)
High Pressure Common Rail to Bracket	Torque	70 N·m (52 lb-ft)
High Pressure Delivery Lines to Rail	Torque	30 N·m (22 lb-ft)
High Pressure Delivery Lines to Pump	Torque	30 N·m (22 lb-ft)
Flow Damper	Torque	176 N·m (130 lb-ft)
High Pressure Injector Line (both ends)	Torque	30 N·m (22 lb-ft)
Pressure Limiter	Torque	176 N·m (130 lb-ft)
High Pressure Common Rail Leak Off Line	Torque	6 N·m (4 lb-ft), (53 lb-in.)
Injector Terminal Nut	Torque	2.2 N·m (19.5 lb-in.)
Injector Connector	Torque	2.2 N·m (19.5 lb-in.)
Rocker Arm Cover	Torque	10 N·m (7 lb-in.)

Continued on next page

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Item	Measurement	Specification
Side Feed Tube Fitting, First Torque	Torque	5 N·m (3.7 lb-ft) (44 lb-in.)
Electronic Injector Clamp Screw	Torque	47 N·m (35 lb-ft)
Side Feed Tube Fitting, Second Torque	Torque	35 N·m (26 lb-ft)
HPCR Delivery Line	Torque	27 N·m (20 lb-ft)
Injector Solenoid Wire Retaining Nut	Torque	2 N·m (1.5 lb-ft) (18 lb-in.)
Heat Shield Cylinder Head Cap Screw	Torque	60 N·m (44 lb-ft)
Heat Shield-to-Rocker Arm Cover	Torque	10 N·m (7 lb-ft)
Suction Control Valve to Pump Housing	Torque	9 N·m (7 lb-in.)

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Electronic Engine Control Repair and Adjustment Specifications

Item	Measurement	Specification
ECU-to-Bracket	Torque	15 N•m (11 lb-ft)
ECU Isolator-to-Adapter	Torque	35 N•m (26 lb-ft)
Adapter/Isolator assembly-to-Cylinder Block	Torque	40 N•m (30 lb-ft)
ECU Bracket to Adapter	Torque	35 N•m (26 lb-ft)
Engine Coolant Temperature Sensor	Torque	10 N•m (7 lb-ft)
Fuel Temperature Sensor	Torque	10 N•m (7 lb-ft)
EGR Exhaust Temperature Sensor	Torque	60 N•m (44 lb-ft)
Charge Air Cooler Outlet Temperature Sensor	Torque	10 N•m (7 lb-ft)
Manifold Air Temperature (MAT) Sensor	Torque	10 N•m (7 lb-ft)
Oil Pressure Sensor	Torque	10 N•m (7 lb-ft)
Fuel Rail Pressure Sensor	Torque	100 N•m (74 lb-ft)
Fuel Transfer Pump Pressure Sensor	Torque	10 N•m (7 lb-ft)
Manifold Air Pressure (MAP) Sensor	Torque	10 N•m (7 lb-ft)
Crankshaft Position Sensor	Torque	15 N•m (11 lb-ft)
Pump Position Sensor	Torque	15 N•m (11 lb-ft)
Turbo Speed Sensor	Torque	12 N•m (9 lb-ft)
Turbo Inlet Compressor Temperature Sensor	Torque	10 N•m (7 lb-ft)
Water in Fuel (WIF) Sensor	Torque	14 N•m (10 lb-ft)
Glow Plugs	Torque	15 N•m (11 lb-ft)

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Fuel System Diagnostic Specifications

Item	Measurement	Specification
Minimum Low Pressure Fuel - Actual Pressure	Cranking	30 kPa (0.3 bar) (4.4 psi)
	Running (Low Idle)	40 kPa (0.4 bar) (5.8 psi)
Minimum Fuel Rail Pressure	Cranking	20 MPa (200 bar) (2900 psi)
	Running (Low Idle)	35 MPa (350 bar) (5076 psi)

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Application Specifications

Below is an overview of the specifications listed for applications in the next few pages.

- **OEM Engines**
  - Torque Curve Selection - See OEM ENGINES - TORQUE CURVE SELECTION later in this Group.
  - Governor Mode Selection - See OEM ENGINES - GOVERNOR MODE SELECTION later in this Group.
  - Electronic Control System Wiring Diagrams - See OEM ENGINES - WIRING DIAGRAMS later in this Group.
  - John Deere Instrument Panel/Engine Start Components Electrical Wiring Diagram - See OEM ENGINES - OEM INSTRUMENT PANEL / ENGINE START COMPONENTS ELECTRICAL WIRING DIAGRAM later 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 Status. (Customer Trim Option)	000107.00	Air Filter Restriction Switch Activated.	50%
Crankshaft Position Signal Improper Pattern Indicator, Crankshaft Position Signal Missing Indicator, Crankshaft Position Signal Noise Indicator, Crankshaft Position Signal Status	000637.02 000637.08 000637.10	Noise or Invalid Signal, Missing Signal, Abnormal Signal Rate of Change.	50%
Coolant Level Switch. (Customer Trim Option)	000111.01	Engine Coolant Level Low Switch Activated	50%
Coolant Temperature for 4.5L. Peak Power Level Above 88kw(118hp).	000110.16	111°C (232°F)	20%
Coolant Temperature for 4.5L.Peak Power Under 88kw (118hp).	000110.16	114°C (237°F)	20%
Coolant Temperature for 6.8L. Peak Power Above 132kw (178hp).	000110.16	111°C (232°F)	20%
Coolant Temperature for 6.8L.Peak. Power Under 132kw (178hp).	000110.16	114°C (237°F)	20%
Coolant Temperature for 4.5L. Peak Power. Level Above 88kw(118hp).	000110.00	113°C (235°F)	60%
Coolant Temperature for 4.5L.Peak Power Under 88kw (118hp).	000110.00	116°C (241°F)	60%
Coolant Temperature for 6.8L. Peak Power Above 132kw (178hp).	000110.00	113°C (235°F)	60%
Coolant Temperature for 6.8L.Peak Power Under 132kw (178hp)	000110.00	116°C (241°F)	60%
Fuel Temperature.	000174.00	100°C (212°F)	20%
Manifold Air Temperature (MAT).	000105.16	89.5°C (193°F)	20%
Manifold Air Temperature (MAT).	000105.00	91°C (196°F)	60%
Engine Oil Pressure.	000100.18	Less than 1kPa (0.14): 770 rpm. Less than 132kPa (19psi): 775 rpm Less than 212kPa (31psi): 1500 rpm: Less than 256kPa (37psi): 2000 rpm. Less than 291kPa (42psi): 2500 rpm	20%
Engine Oil Pressure.	000100.01	Less than 1kPa (0.14psi): 770 rpm Less than 118kPa (17psi): 775 rpm Less than 205kPa (29psi): 1500 rpm Less than 240kPa (35psi): 2000 rpm	60%
Fuel Rail Pressure	000157.03 000157.04	Out of Range Code Detected.	50%
Water In Fuel	000097.16	Water Detected	50%

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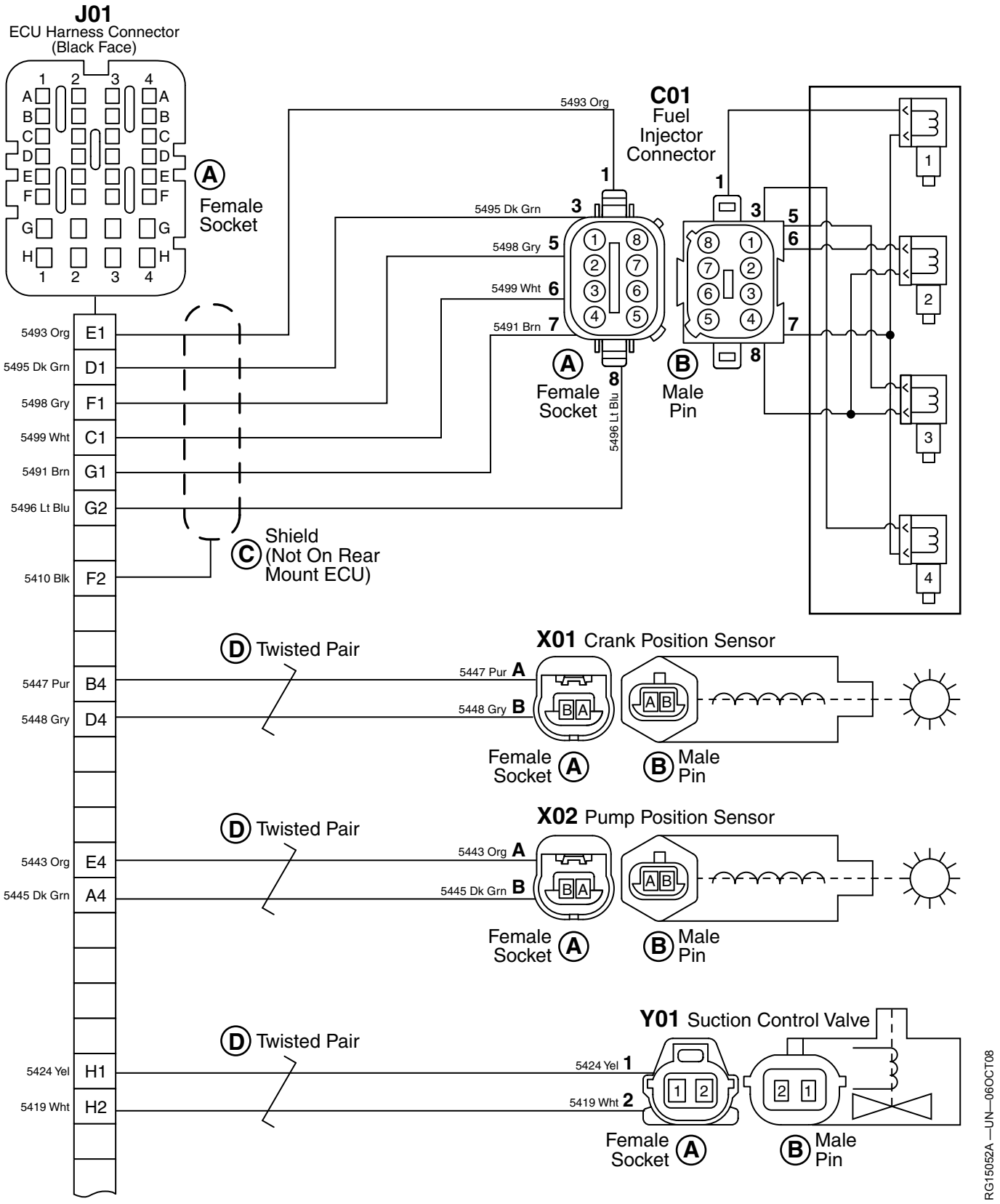
OEM Engines - Air Heater Specifications

NOTE: Preheat time has an additional 5 seconds after the light turns off.

	-Air Heater Operation - OEM	
Fuel Temperature	Preheat Time	Reheat Time
-20°C (-4°F)	30 sec.	20 sec
-15°C (5°F)	20 sec.	20 sec
-10°C (14°F)	15 sec.	15 sec
-5°C (23°F)	10 sec.	10 sec
0°C (32°F)	0 sec	0 sec

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4.5L 12V ECU Wiring Diagram 1



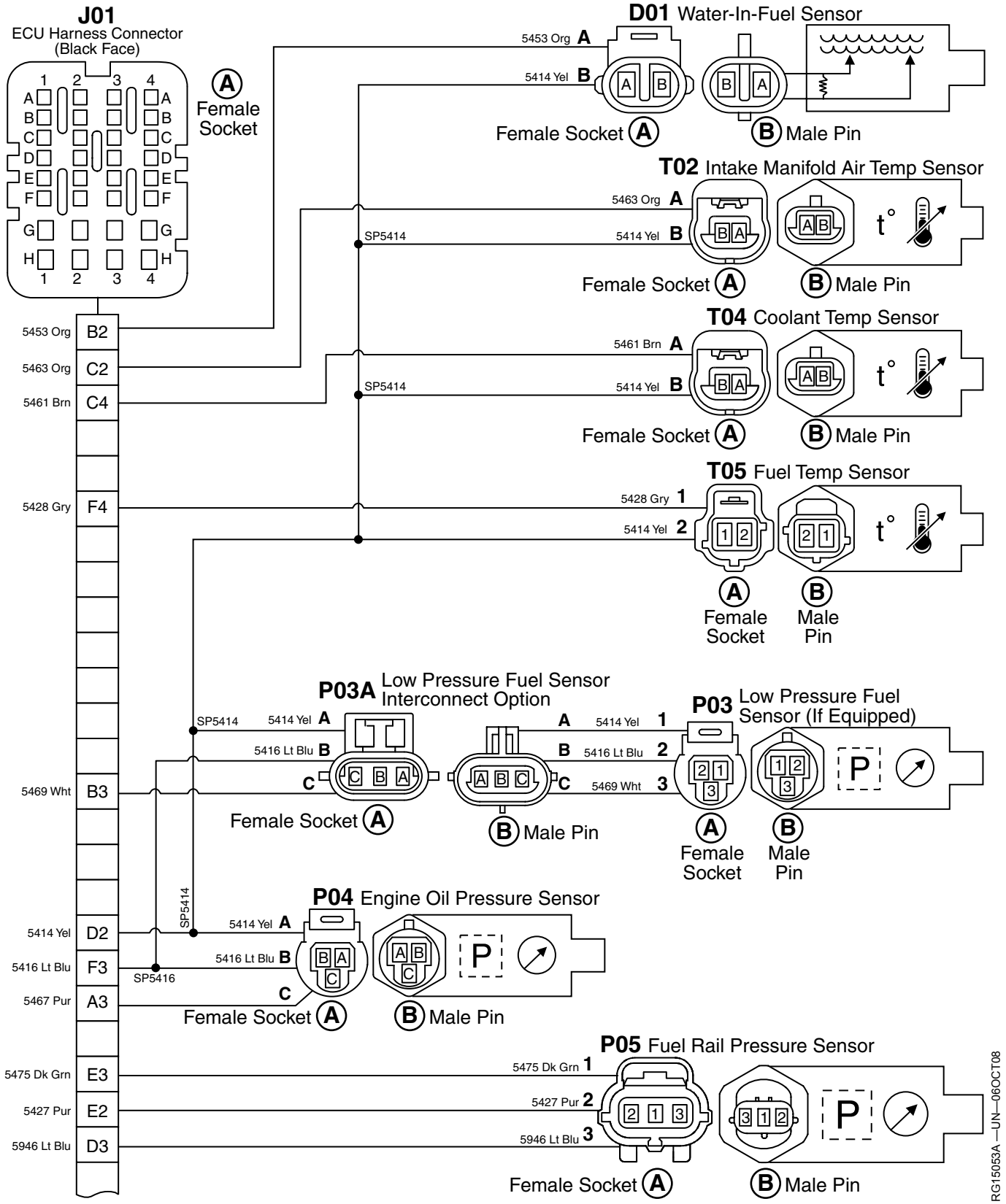
4.5 Liter 12 Volt ECU Wiring Diagram 1 (PTE)

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A—Female Socket
B—Male Pin
C—Shield (Not On Rear Mount ECU)
D—Twisted Pair
C01— Fuel Injector Connector
J01— ECU Harness Connector (Black Face)
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B4—[5447 Purple] Crank Position Pulse
J1-C1—[5499 White] Injector #2 Inject Pulse
J1-D1—[5495 Dark Green] Injector #4 Inject Pulse
J1-D4—[5448 Gray] Crank Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #3 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-G1—[5491 Brown] Injector #1 & #4 Power
J1-G2—[5496 Light Blue] Injector #2 & #3 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crank Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

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4.5L 12V ECU Wiring Diagram 2



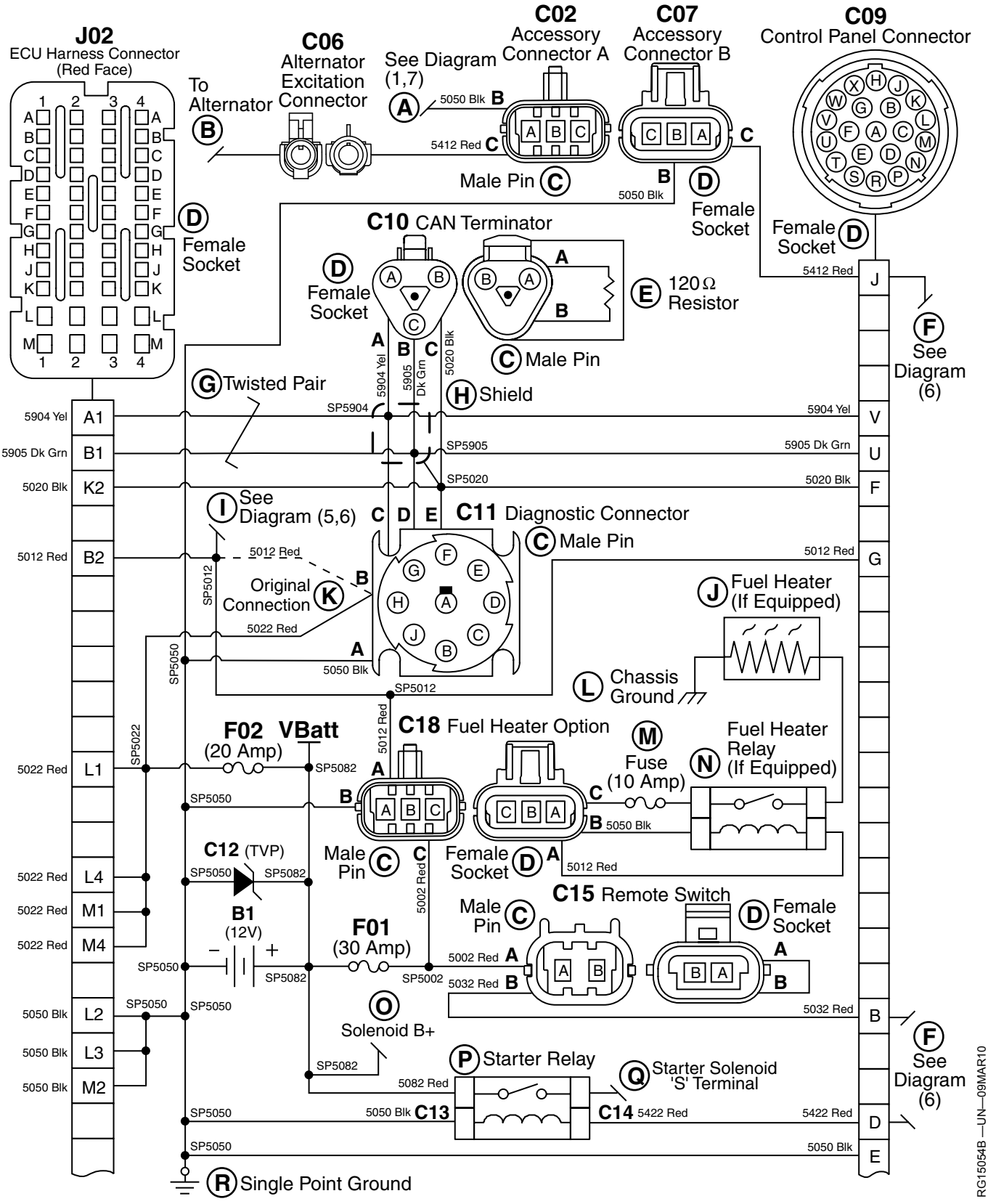
4.5 Liter 12 Volt ECU Wiring Diagram 2 (PTE)

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A—Female Socket
B—Male Pin
D01— Water In Fuel Sensor
J01— ECU Harness Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414A Yellow] 5 Volt Power Supply #2B Return
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Fuel Rail Pressure Signal
J1-F3—[5416A Light Blue] 5 Volt Power Supply #2B Positive
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P03A— Low Pressure Fuel Sensor Interconnect Option
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

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4.5L 12V ECU Wiring Diagram 3



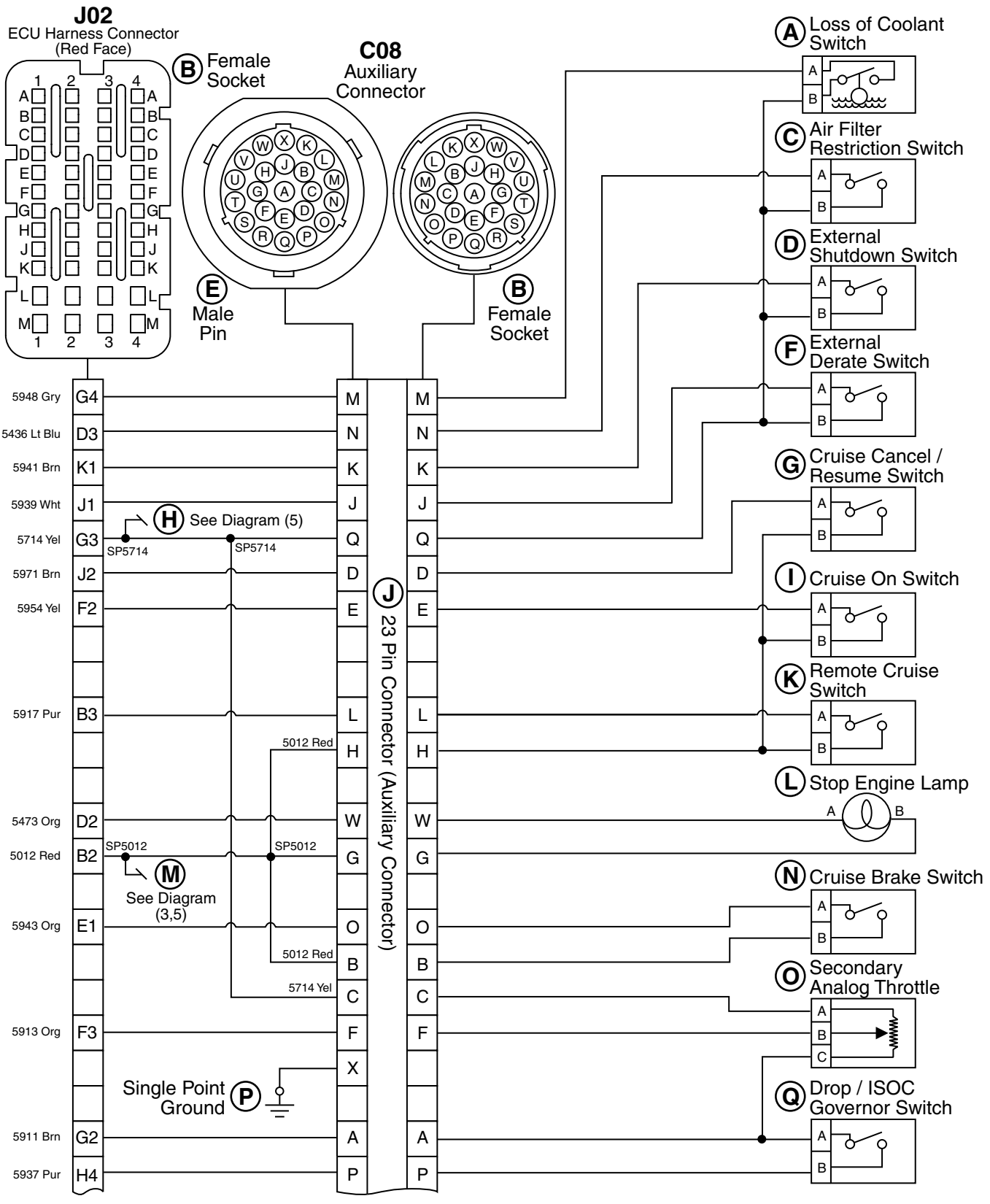
4.5 Liter 12 Volt ECU Wiring Diagram 3 (PTE)

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A—See Diagram (6)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (5)
G—Twisted Pair
H—Shield
I— See Diagram (4,5)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—12 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Control
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

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4.5L 12V ECU Wiring Diagram 4



4.5 Liter 12 Volt ECU Wiring Diagram 4 (PTE)

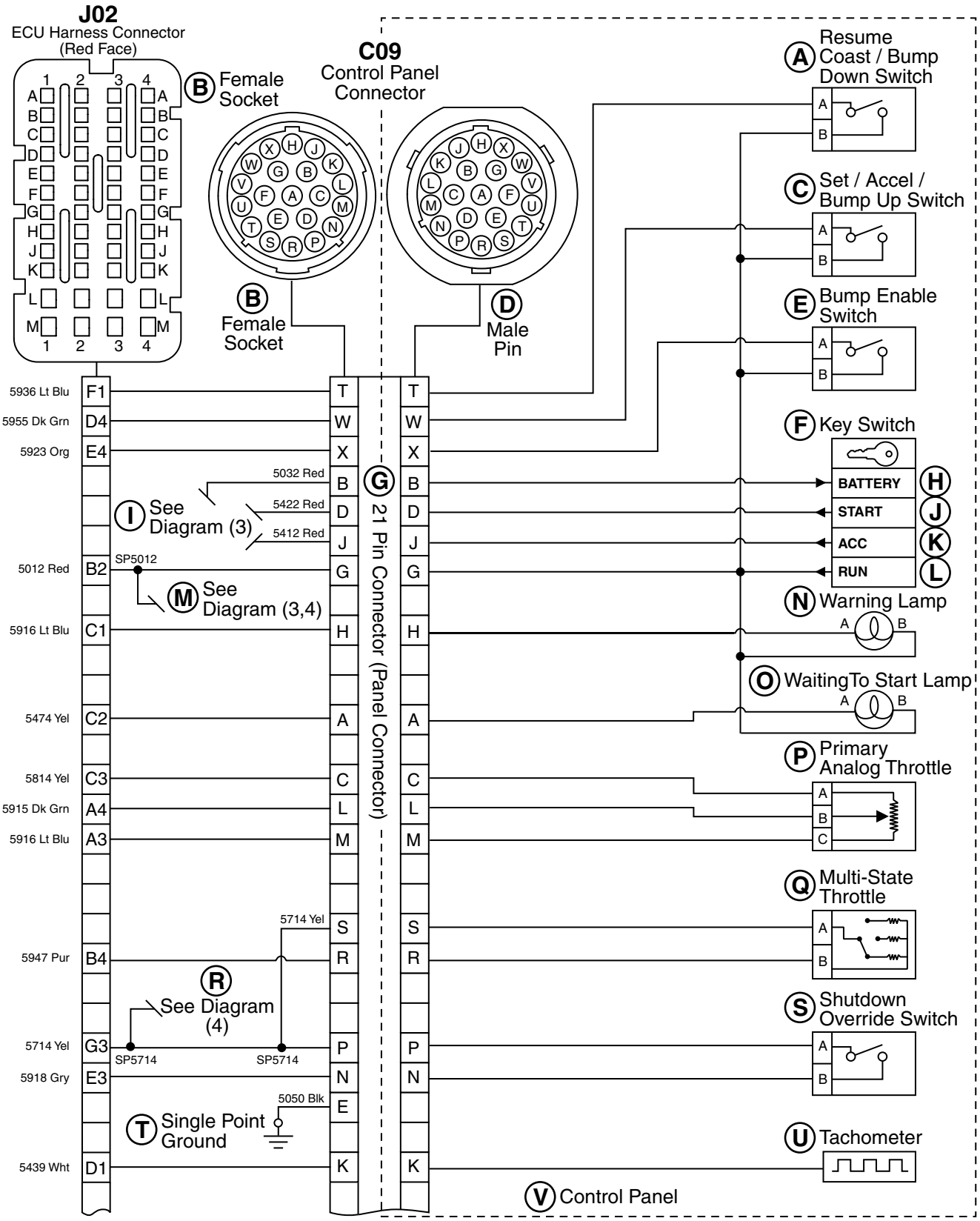
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A—Loss of Coolant Switch
B—Female Socket
C—Air Filter Restriction Switch
D—External Shutdown Switch
E—Male Pin
F—External Derate Switch
G—Cruise Cancel/Resume Switch
H—See Diagram (5)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (3,5)
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 #2A Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #2A Negative
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

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4.5L 12V ECU Wiring Diagram 5



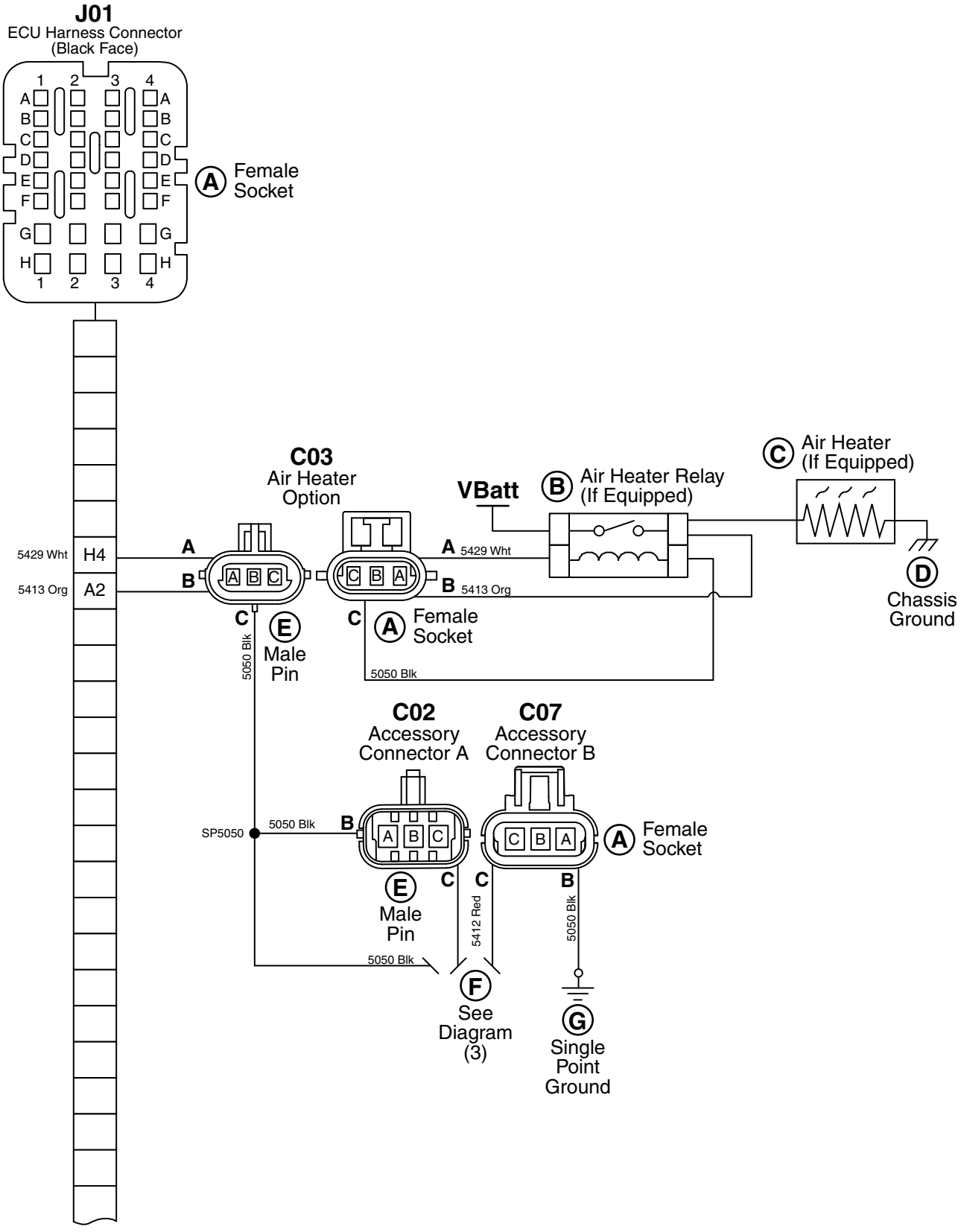
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A—Resume Coast/Bump Down Switch
B—Female Socket
C—Set Accel/Bump Up Switch
D—Male Pin
E—Bump Enable Switch
F—Key Switch
G—21 Pin Connector (Panel Connector)
H—Battery
I— See Diagram (3)
J—Start
K—Accessory
L—Run
M—See Diagram (3,4)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (4)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Negative
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 #2A Negative

DB92450,0000041 -19-06OCT08-2/2

4.5L 12V ECU Wiring Diagram 6



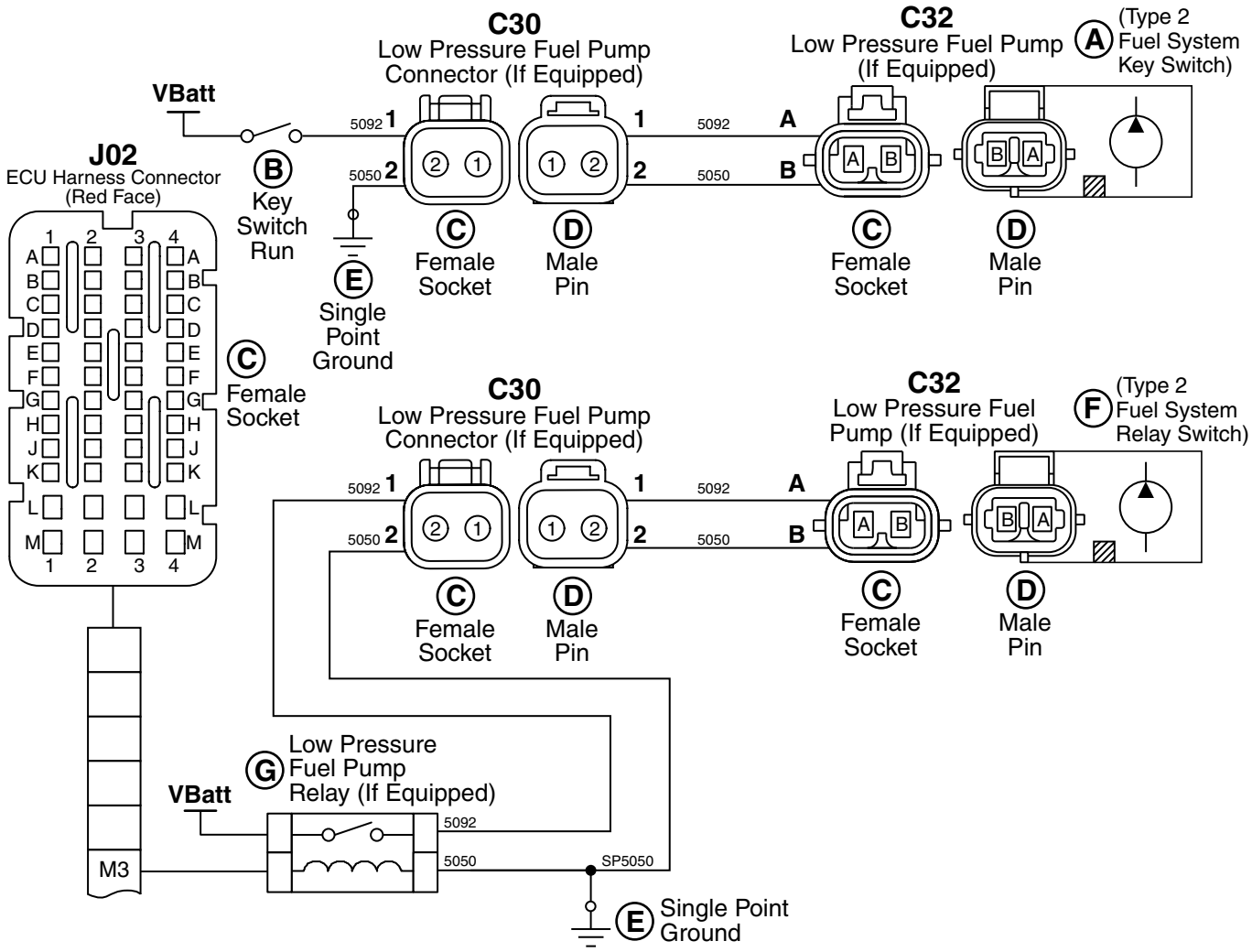
4.5 Liter 12 Volt ECU Wiring Diagram 6 (PTE)

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A—Female Socket
B—Air Heater Relay (If Equipped)
C—Air Heater (If Equippedl)
D—Chassis Ground
E—Male Pin
F—See Diagram (3)
G—Single Point Ground
C02— Accessory Connector A
C03— Air Heater Option
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-A2—[5413 Orange] Air Heater Relay Status
J1-H4—[5429 White] Air Heater Relay Control
VBatt—Battery Positive

DB92450,000003C -19-06OCT08-2/2

4.5L 12V ECU Wiring Diagram 7

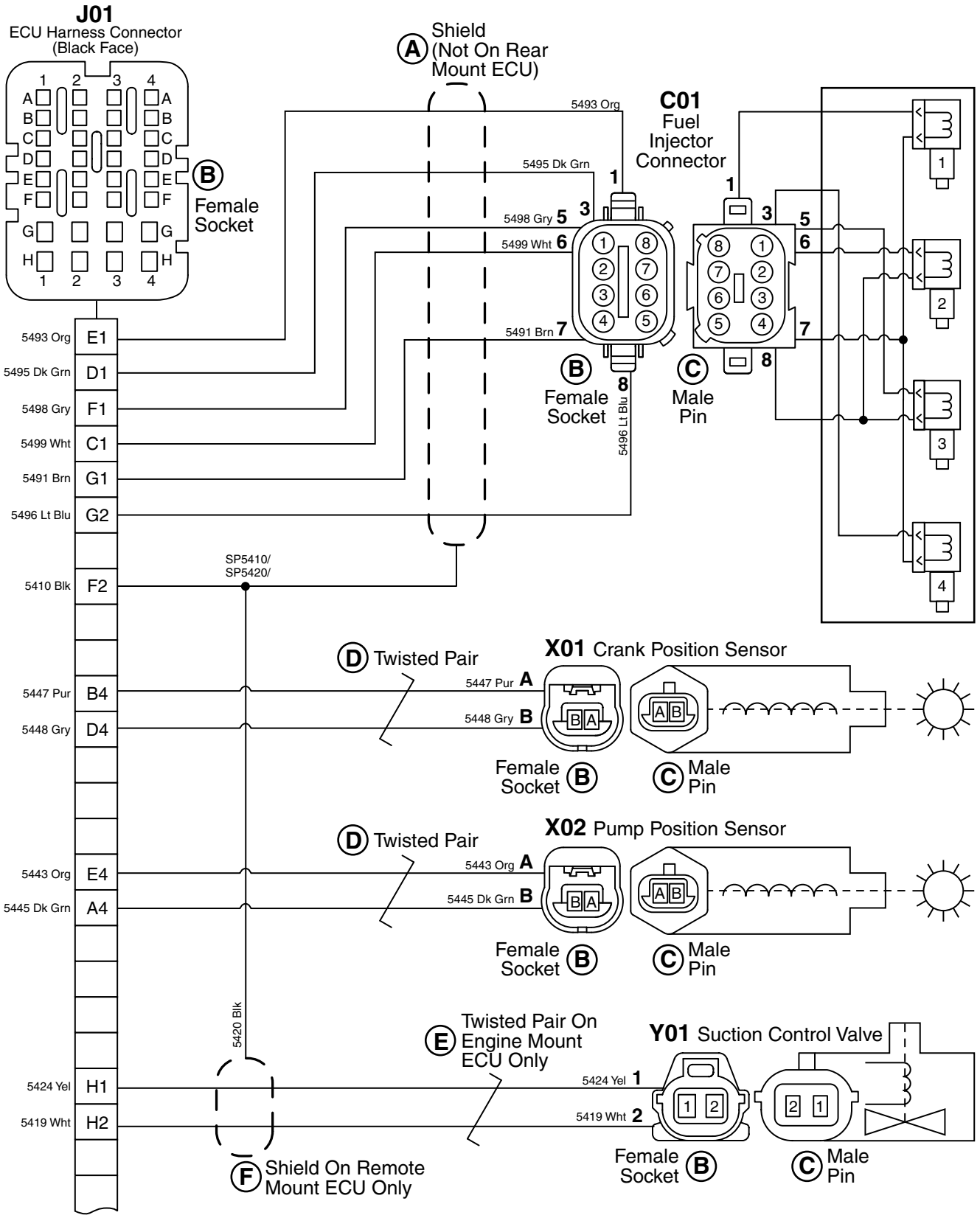


4.5 Liter 12 Volt ECU Wiring Diagram 7 (PTE)

A—(Type 2 Fuel System, Key Switch)
B—Key Switch Run
C—Female Socket
D—Male Pin
E—Single Point Ground
F—(Type 2 Fuel System, Relay Switch)
G—Low Pressure Fuel Pump Relay (If Equipped)
C30— Low Pressure Fuel Pump Connector (If Equipped)
C32— Low Pressure Fuel Pump (If Equipped)
J02— ECU Harness Connector (Red Face)
J2-M3—Low Pressure Fuel Pump Relay Drive
VBatt—Battery Positive

DB92450,000003B -19-06OCT08-1/1

4.5L 24V ECU Wiring Diagram 1



4.5 Liter 24 Volt ECU Wiring Diagram 1 (PTE)

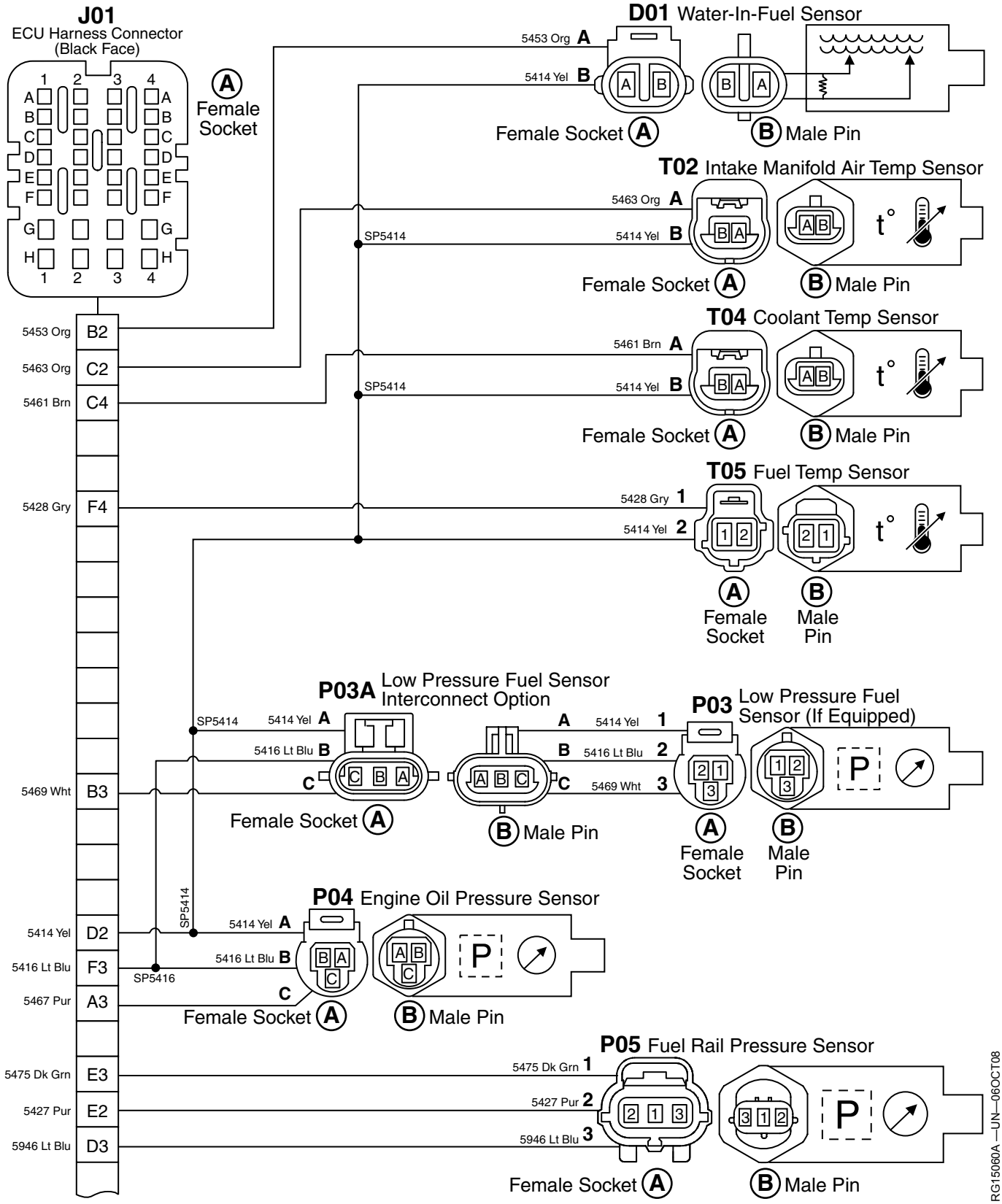
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DB92450,0000052 -19-06OCT08-1/2

A—Shield (Not On Rear Mount ECU)
B—Female Socket
C—Male Pin
D—Twisted Pair
E—Twisted Pair On Engine Mount ECU Only
F—Shield on Remote Mount ECU Only
G—Twisted Pair on Engine Mount ECU Only
C01— Fuel Injector Connector
J01— ECU Harness Connector (Black Face)
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B4—[5447 Purple] Crank Position Pulse
J1-C1—[5499 White] Injector #2 Inject Pulse
J1-D1—[5495 Dark Green] Injector #4 Inject Pulse
J1-D4—[5448 Gray] Crank Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #3 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-G1—[5491 Brown] Injector #1 & #4 Power
J1-G2—[5496 Light Blue] Injector #2 & #3 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crank Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

DB92450,0000052 -19-06OCT08-2/2

4.5L 24V ECU Wiring Diagram 2



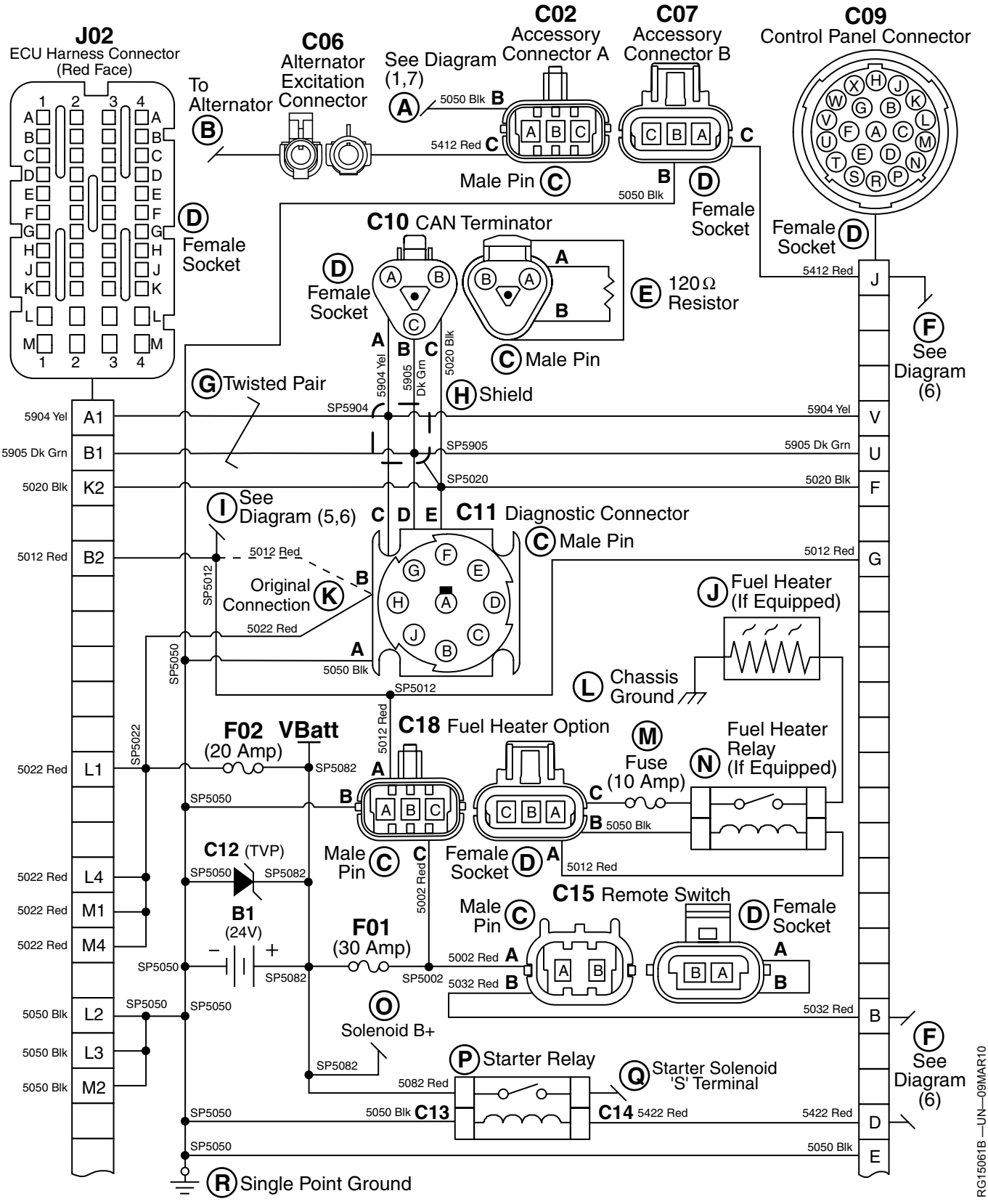
4.5 Liter 24 Volt ECU Wiring Diagram 2 (PTE)

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A—Female Socket
B—Male Pin
D01— Water In Fuel Sensor
J01— ECU Harness Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414A Yellow] 5 Volt Power Supply #2B Return
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Fuel Rail Pressure Signal
J1-F3—[5416A Light Blue] 5 Volt Power Supply #2B Positive
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P03A— Low Pressure Fuel Sensor Interconnect Option
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

DB92450,0000053 -19-06OCT08-2/2

4.5L 24V ECU Wiring Diagram 3



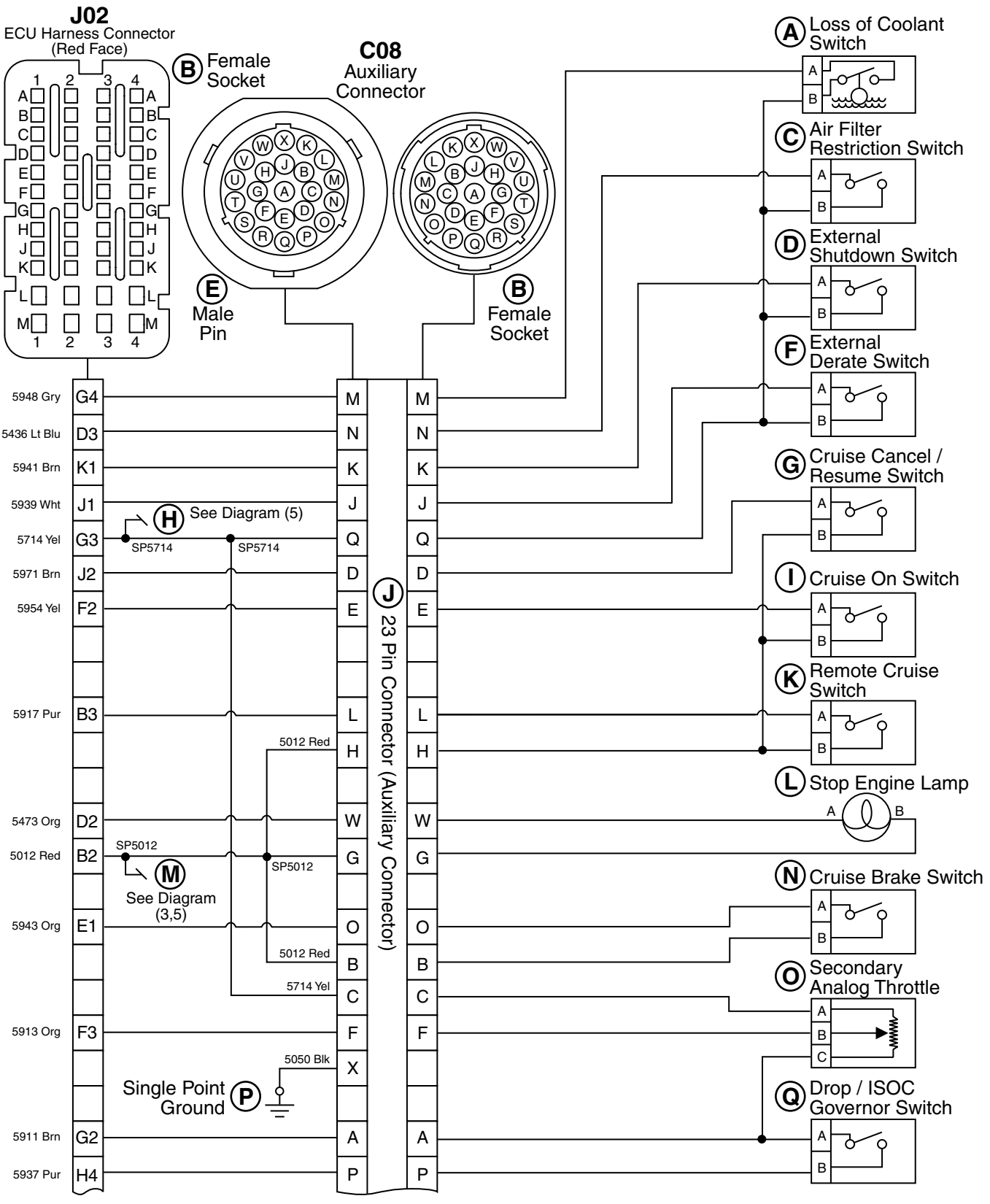
4.5 Liter 24 Volt ECU Wiring Diagram 3 (PTE)

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A—See Diagram (6)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (5)
G—Twisted Pair
H—Shield
I— See Diagram (4,5)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—24 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Control
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

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4.5L 24V ECU Wiring Diagram 4



4.5 Liter 24 Volt ECU Wiring Diagram 4 (PTE)

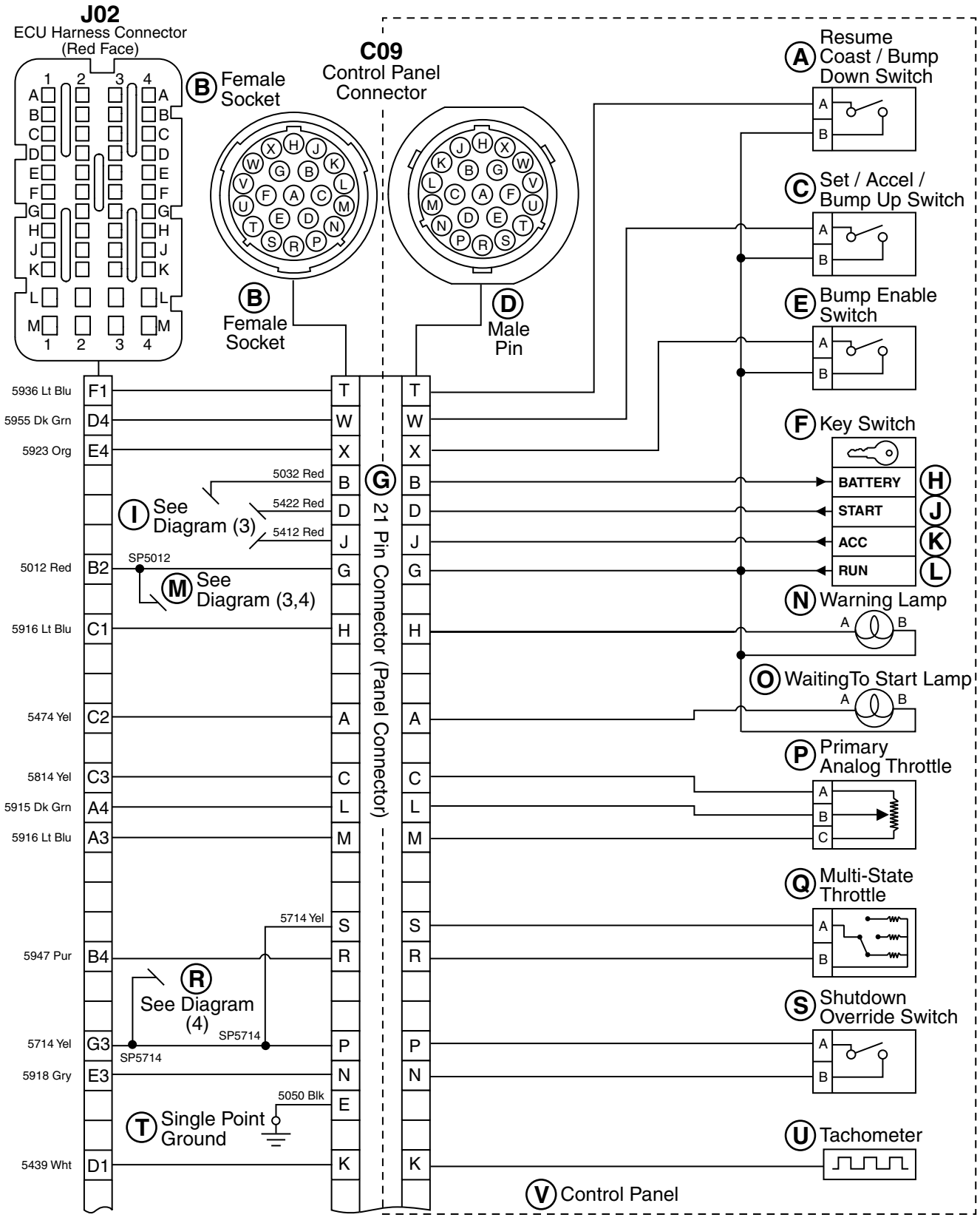
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A—Loss of Coolant Switch
B—Female Socket
C—Air Filter Restriction Switch
D—External Shutdown Switch
E—Male Pin
F—External Derate Switch
G—Cruise Cancel/Resume Switch
H—See Diagram (5)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (3,5)
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 #2A Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #2A Negative
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

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4.5L 24V ECU Wiring Diagram 5



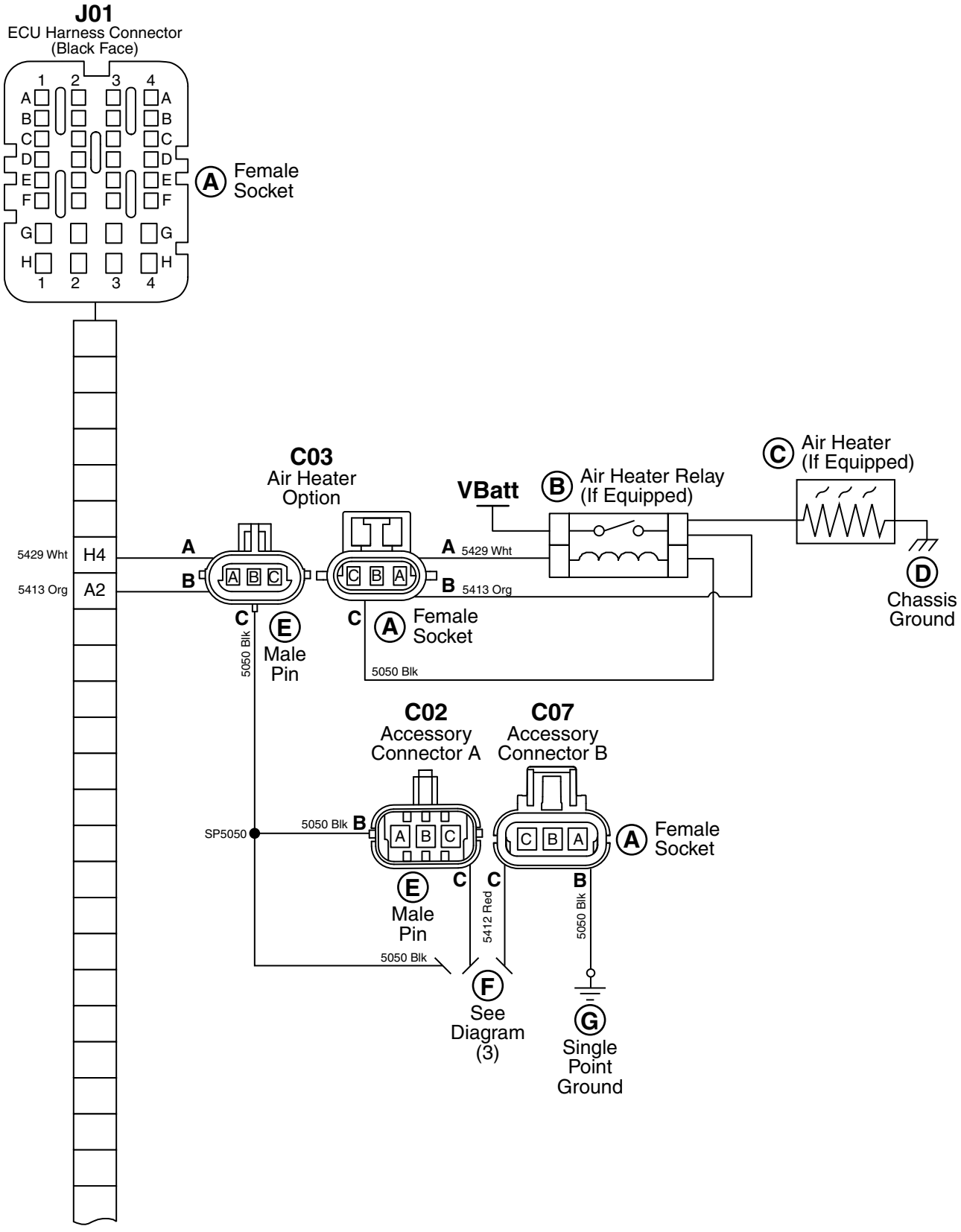
4.5 Liter 24 Volt ECU Wiring Diagram 5 (PTE)

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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 (3)
J—Start
K—Accessory
L—Run
M—See Diagram (3,4)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (4)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Negative
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 #2A Negative

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4.5L 24V ECU Wiring Diagram 6



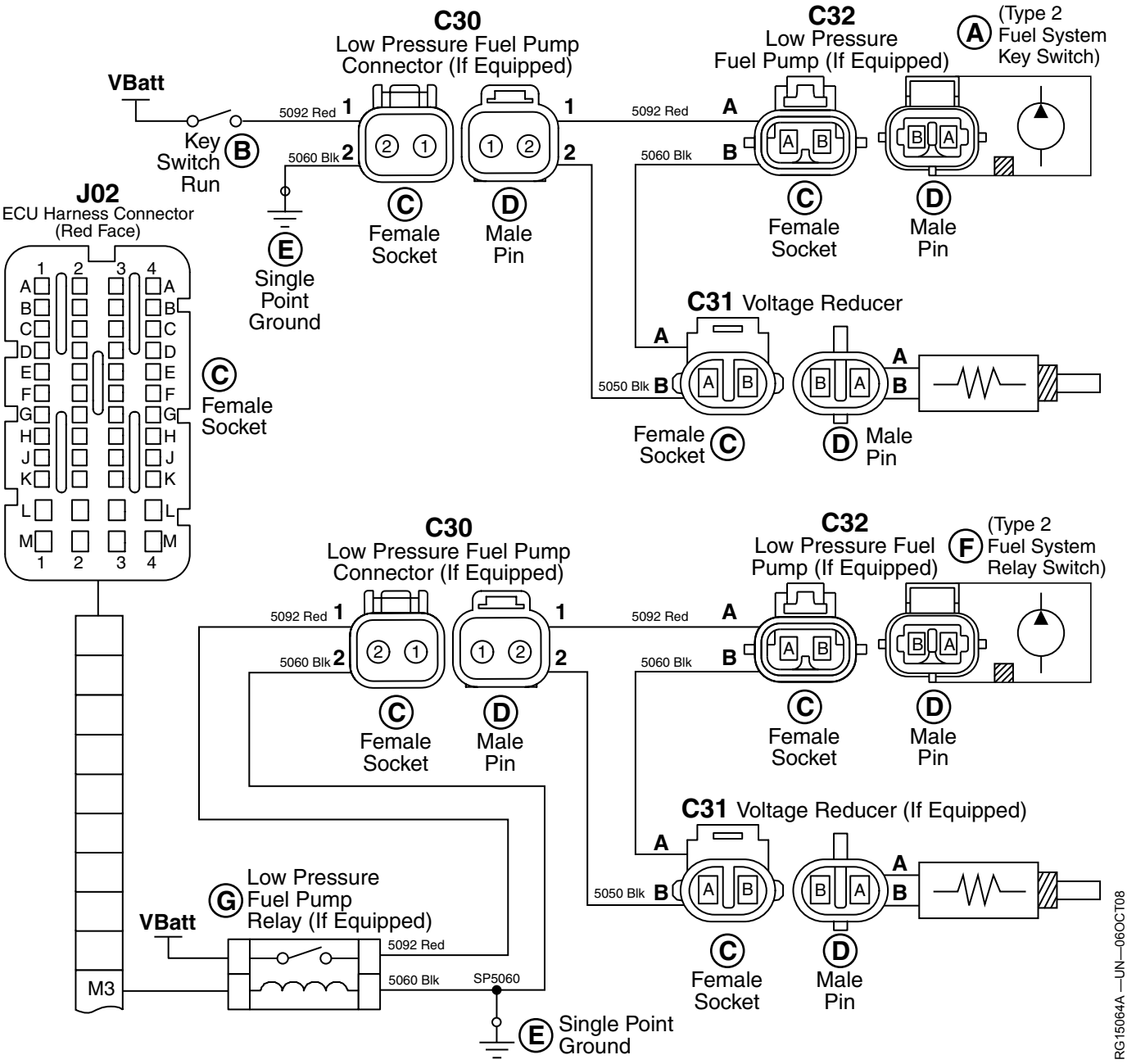
4.5 Liter 24 Volt ECU Wiring Diagram 6 (PTE)

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A—Female Socket
B—Air Heater Relay (If Equipped)
C—Air Heater (If Equipped)
D—Chassis Ground
E—Male Pin
F—See Diagram (3)
G—Single Point Ground
C02— Accessory Connector A
C03— Air Heater Option
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-A2—[5413 Orange] Air Heater Relay Status
J1-H4—[5429 White] Air Heater Relay Control
VBatt—Battery Positive

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4.5L 24V ECU Wiring Diagram 7

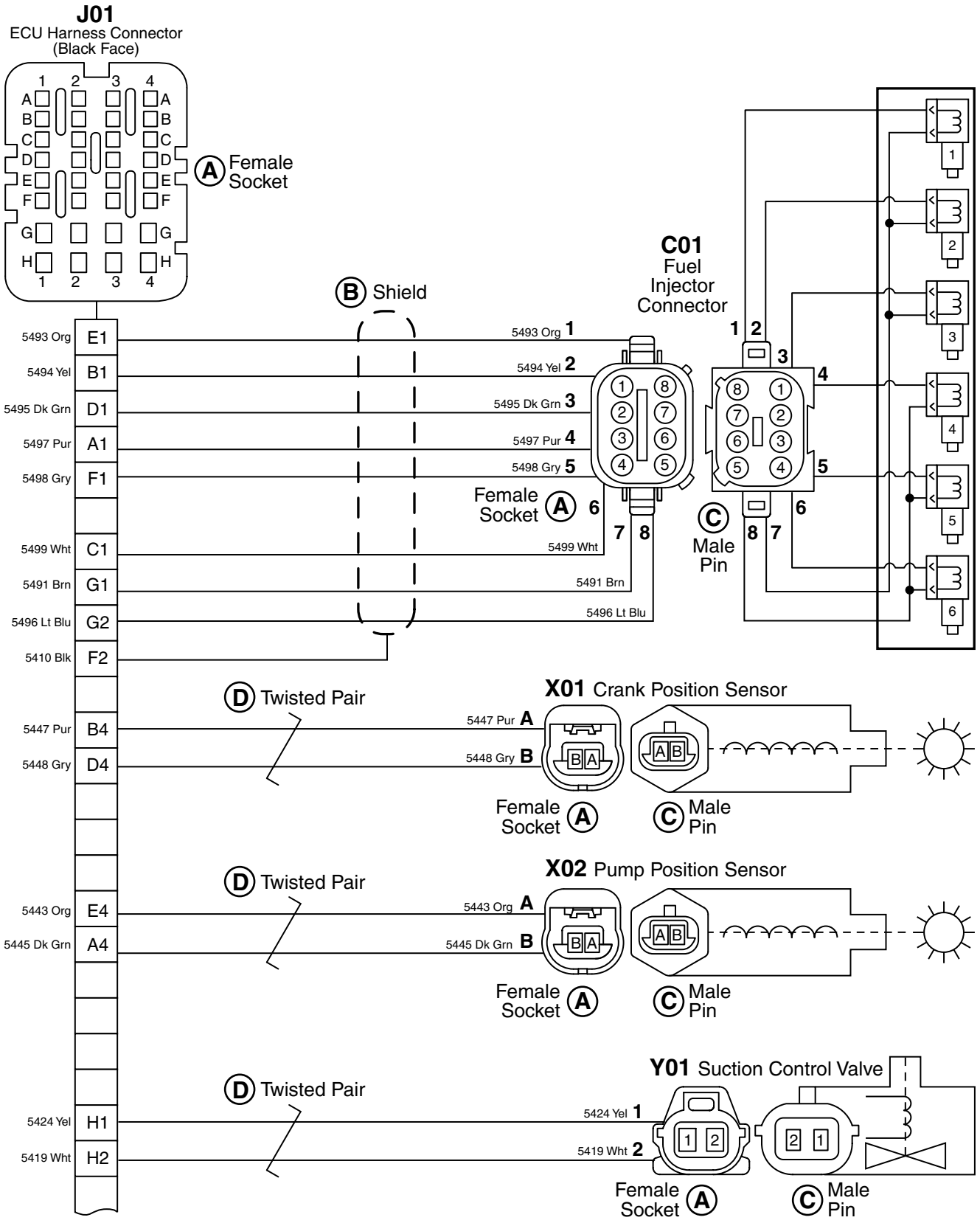


4.5 Liter 24 Volt ECU Wiring Diagram 7 (PTE)

A—(Type 2 Fuel System, Key Switch)
B—Key Switch Run
C—Female Socket
D—Male Pin
E—Single Point Ground
F—(Type 2 Fuel System, Relay Switch)
G—Low Pressure Fuel Pump Relay (If Equipped)
C30— Low Pressure Fuel Pump Connector (If Equipped)
C31— Voltage Reducer (If Equipped)
C32— Low Pressure Fuel Pump (If Equipped)
J02— ECU Harness Connector (Red Face)
J2-M3—Low Pressure Fuel Pump Relay Drive
VBatt—Battery Positive

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6.8L 12V ECU Wiring Diagram 1



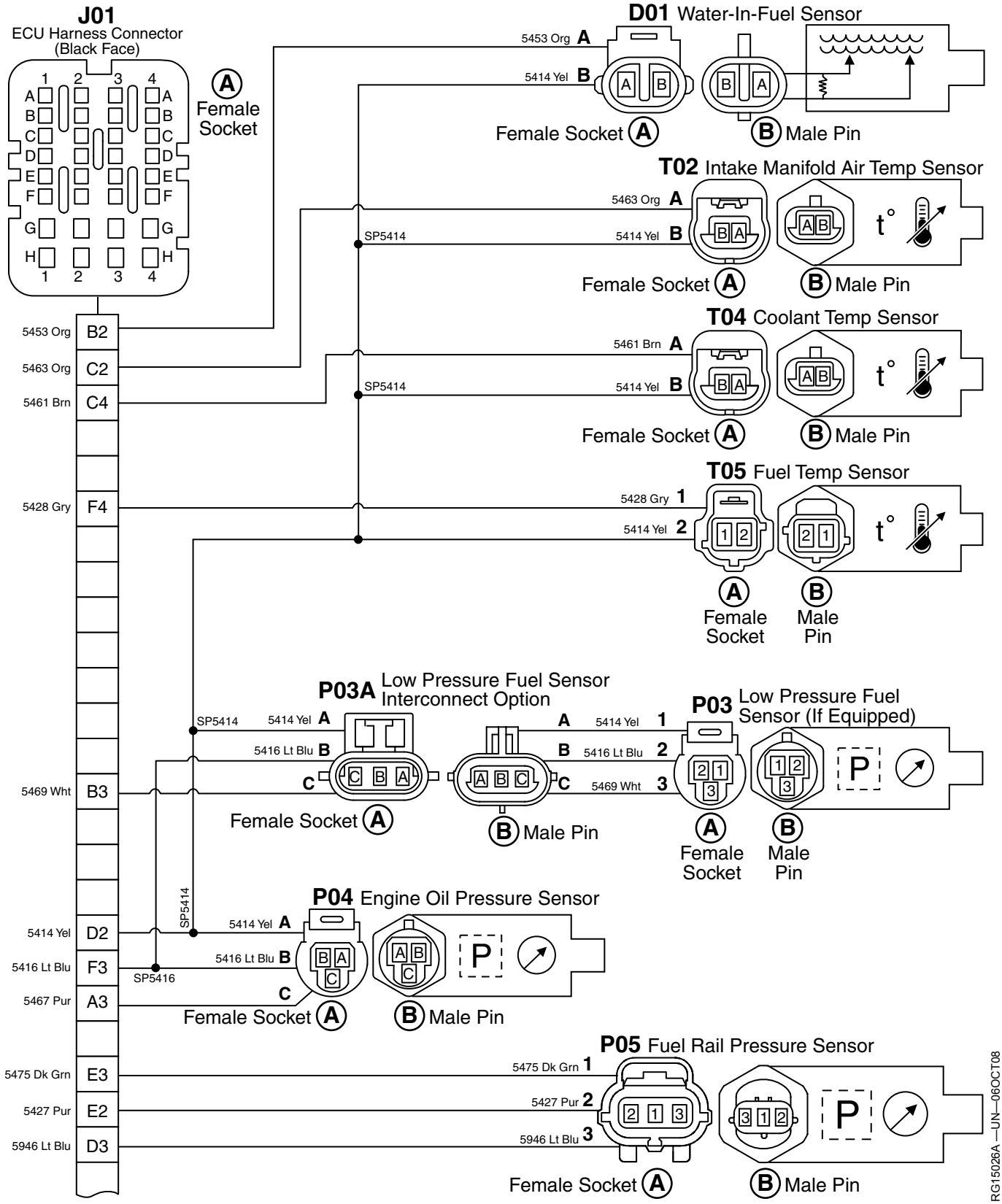
6.8 Liter 12 Volt ECU Wiring Diagram 1 (PTE)

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A—Female Socket
B—Shield
C—Male Pin
D—Twisted Pair
C01— Fuel Injector Connector
J01— ECU Harness Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-B4—[5447 Purple] Crank Position Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D4—[5448 Gray] Crank Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-G1—[5491 Brown] Injector #1& #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4& #5 & #6 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crank Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

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6.8L 12V ECU Wiring Diagram 2



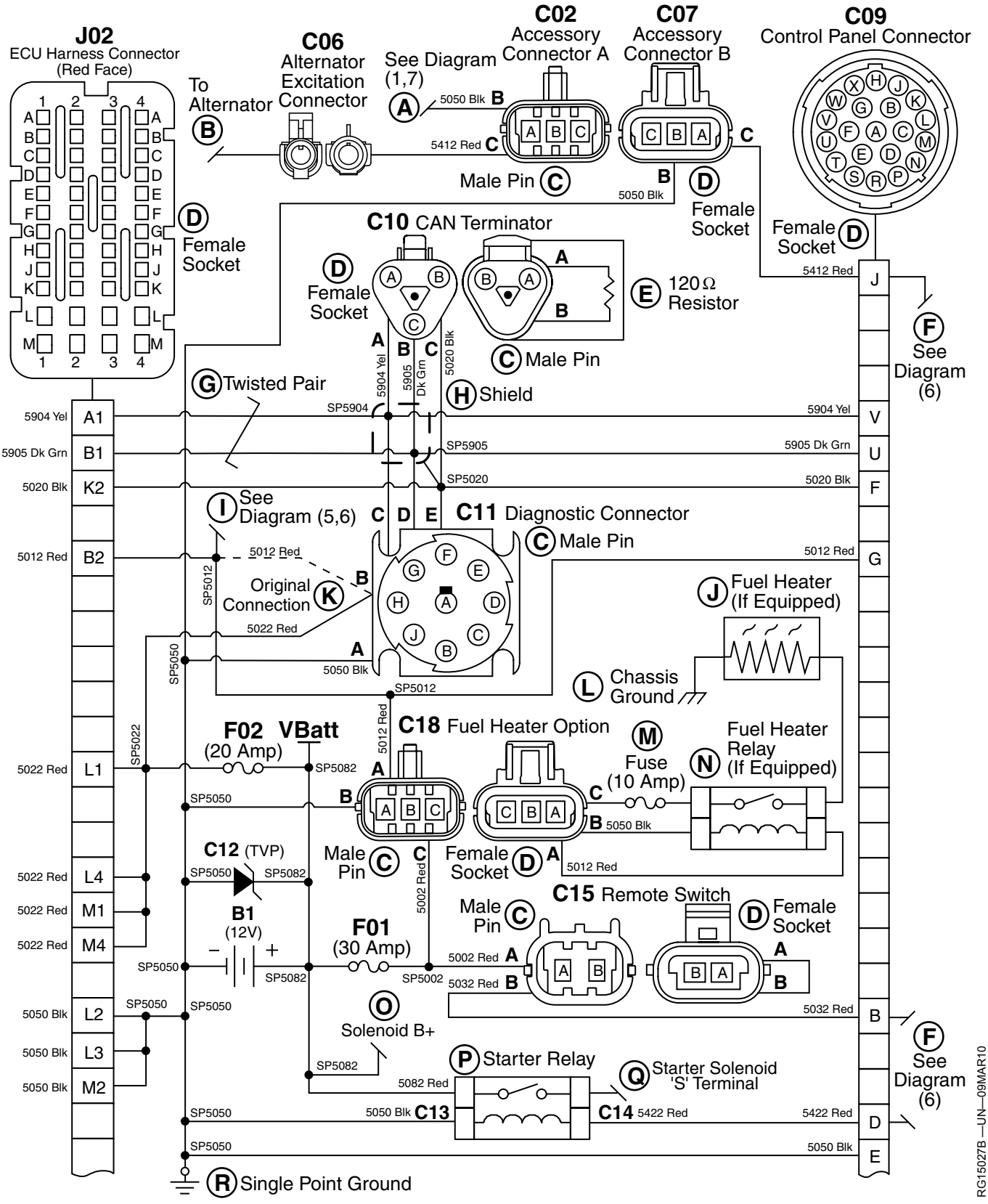
6.8 Liter 12 Volt ECU Wiring Diagram 2 (PTE)

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A—Female Socket
B—Male Pin
D01— Water In Fuel Sensor
J01— ECU Harness Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414A Yellow] 5 Volt Power Supply #2B Return
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Fuel Rail Pressure Signal
J1-F3—[5416A Light Blue] 5 Volt Power Supply #2B Positive
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P03A— Low Pressure Fuel Pressure Sensor Interconnect Option
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

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6.8L 12V ECU Wiring Diagram 3



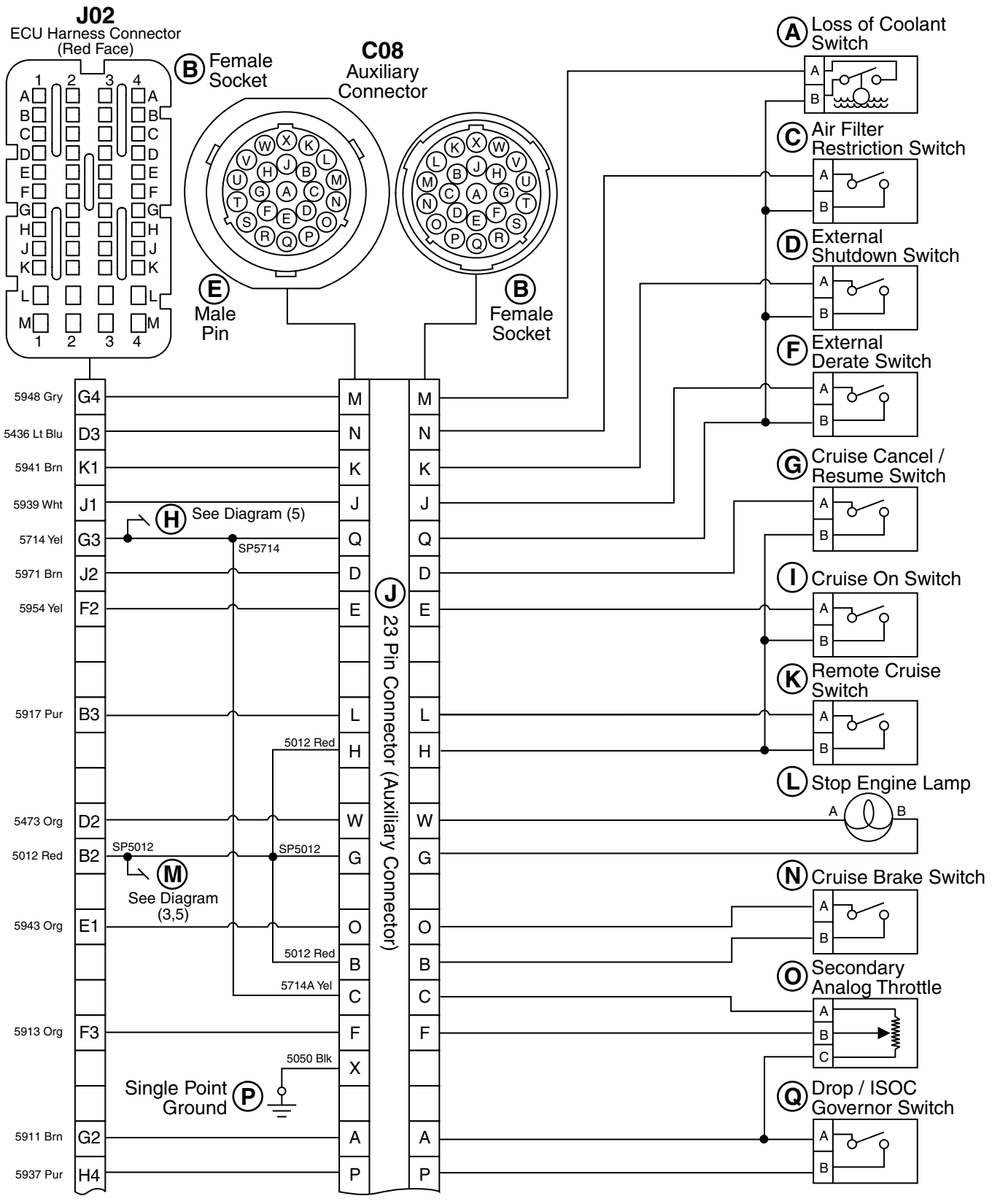
6.8 Liter 12 Volt ECU Wiring Diagram 3 (PTE)

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A—See Diagram (6)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (5)
G—Twisted Pair
H—Shield
I— See Diagram (4,5)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—12 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Drive
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

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6.8L 12V ECU Wiring Diagram 4



6.8 Liter 12 Volt ECU Wiring Diagram 4 (PTE)

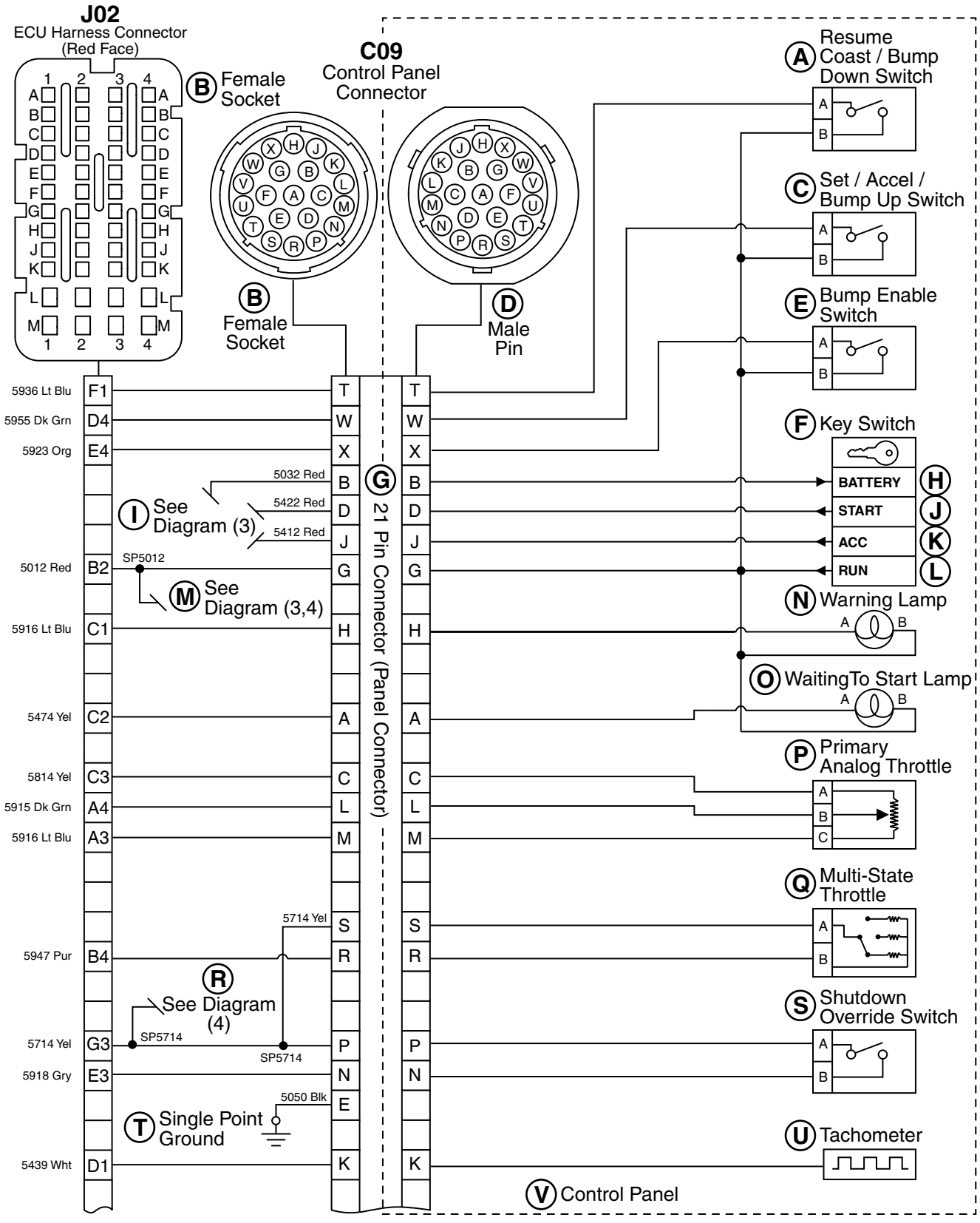
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DB92450,0000047 -19-06OCT08-1/2

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 (5)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (3,5)
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 #2A Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #2A Negative
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

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6.8L 12V ECU Wiring Diagram 5



6.8 Liter 12 Volt ECU Wiring Diagram 5 (PTE)

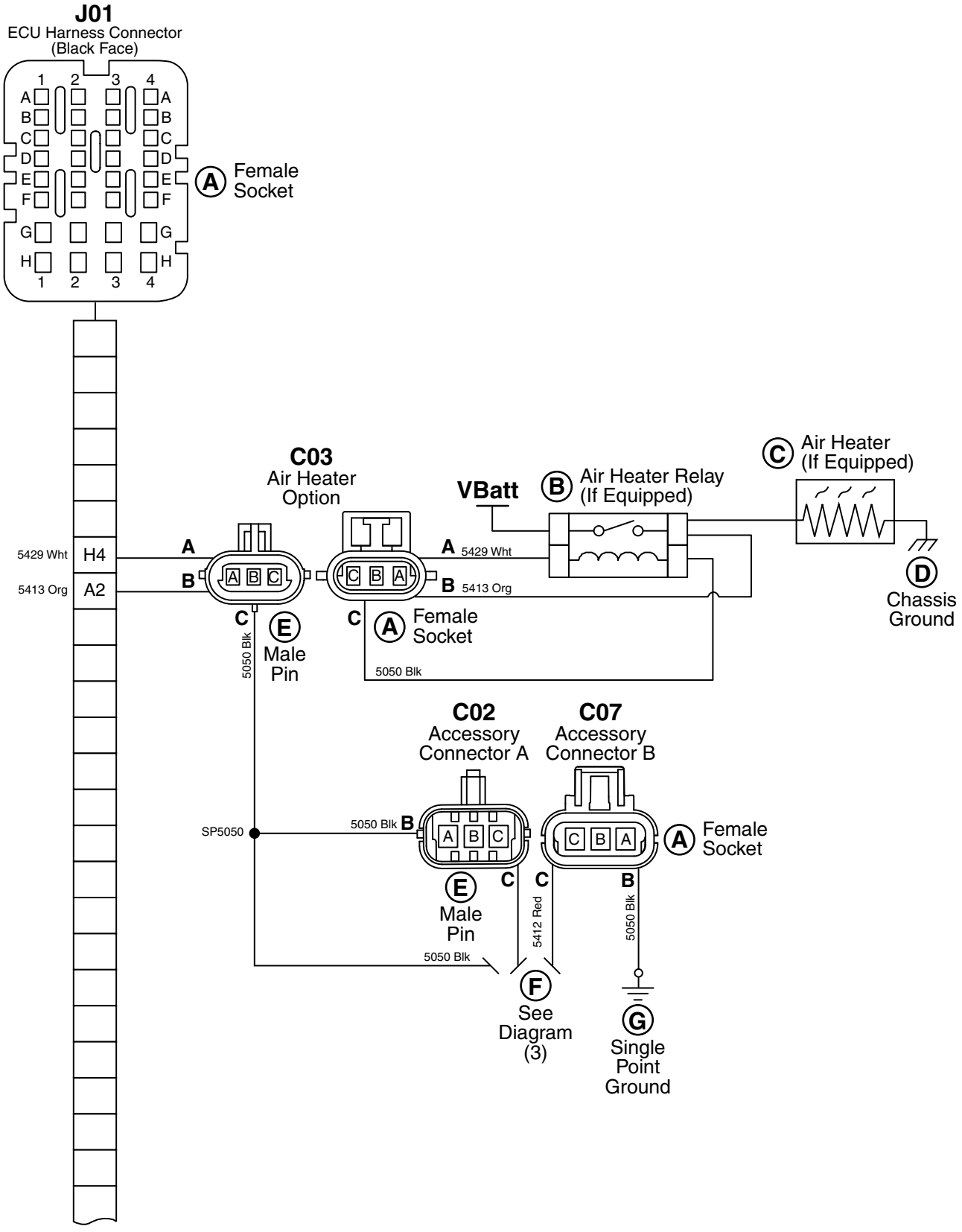
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DB92450,0000048 -19-06OCT08-1/2

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 (3)
J—Start
K—Accessory
L—Run
M—See Diagram (3,4)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (4)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Negative
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 #2A Negative

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6.8L 12V ECU Wiring Diagram 6



6.8 Liter 12 Volt ECU Wiring Diagram 6 (PTE)

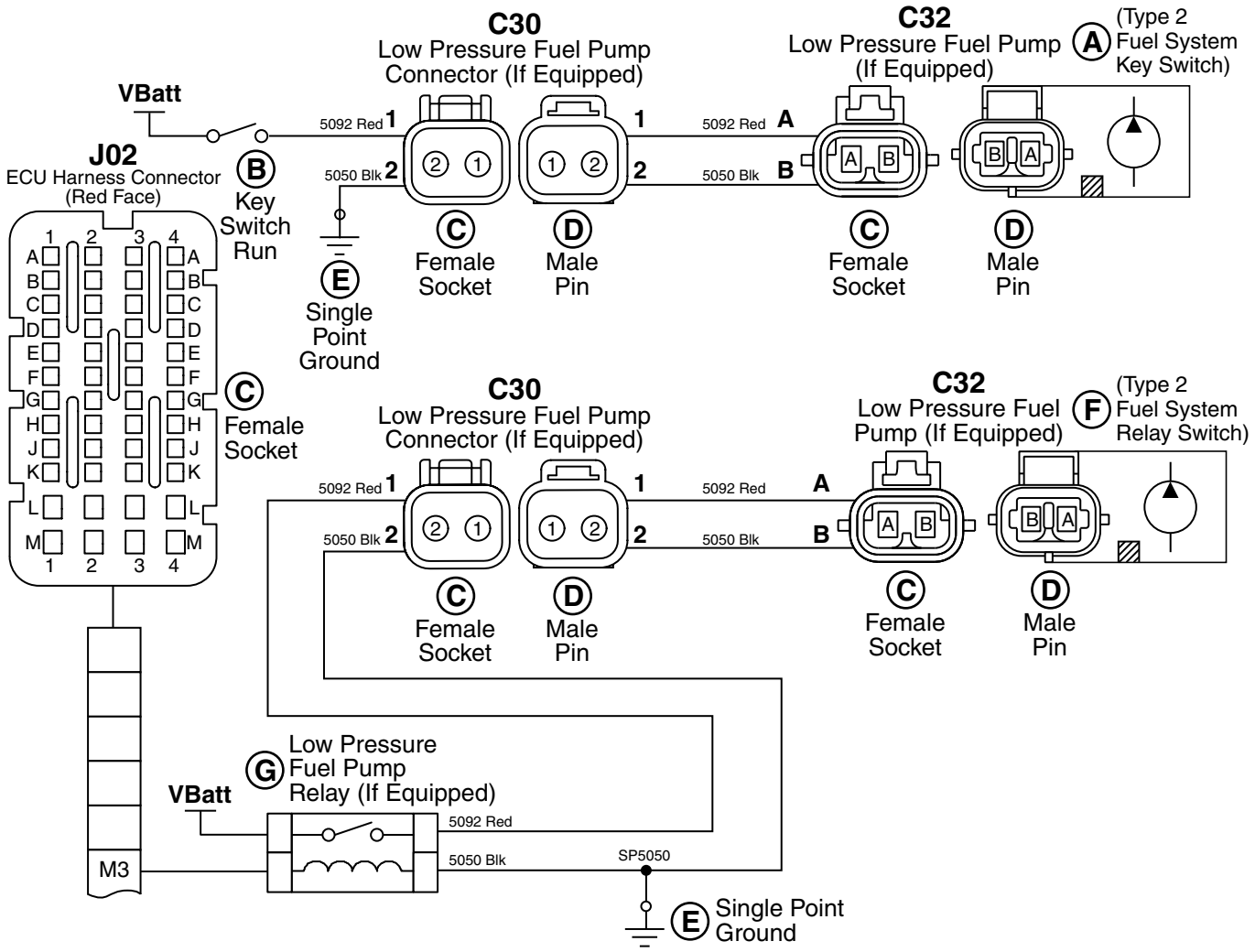
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DB92450,0000043 -19-06OCT08-1/2

A—Female Socket
B—Air Heater Relay (If Equipped)
C—Air Heater (If Equipped)
D—Chassis Ground
E—Male Pin
F—See Diagram (3)
G—Single Point Ground
C02— Accessory Connector A
C03— Air Heater Option
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-A2—[5413 Orange] Air Heater Relay Status
J1-H4—[5429 White] Air Heater Relay Drive
VBatt—Battery Positive

DB92450,0000043 -19-06OCT08-2/2

6.8L 12V ECU Wiring Diagram 7

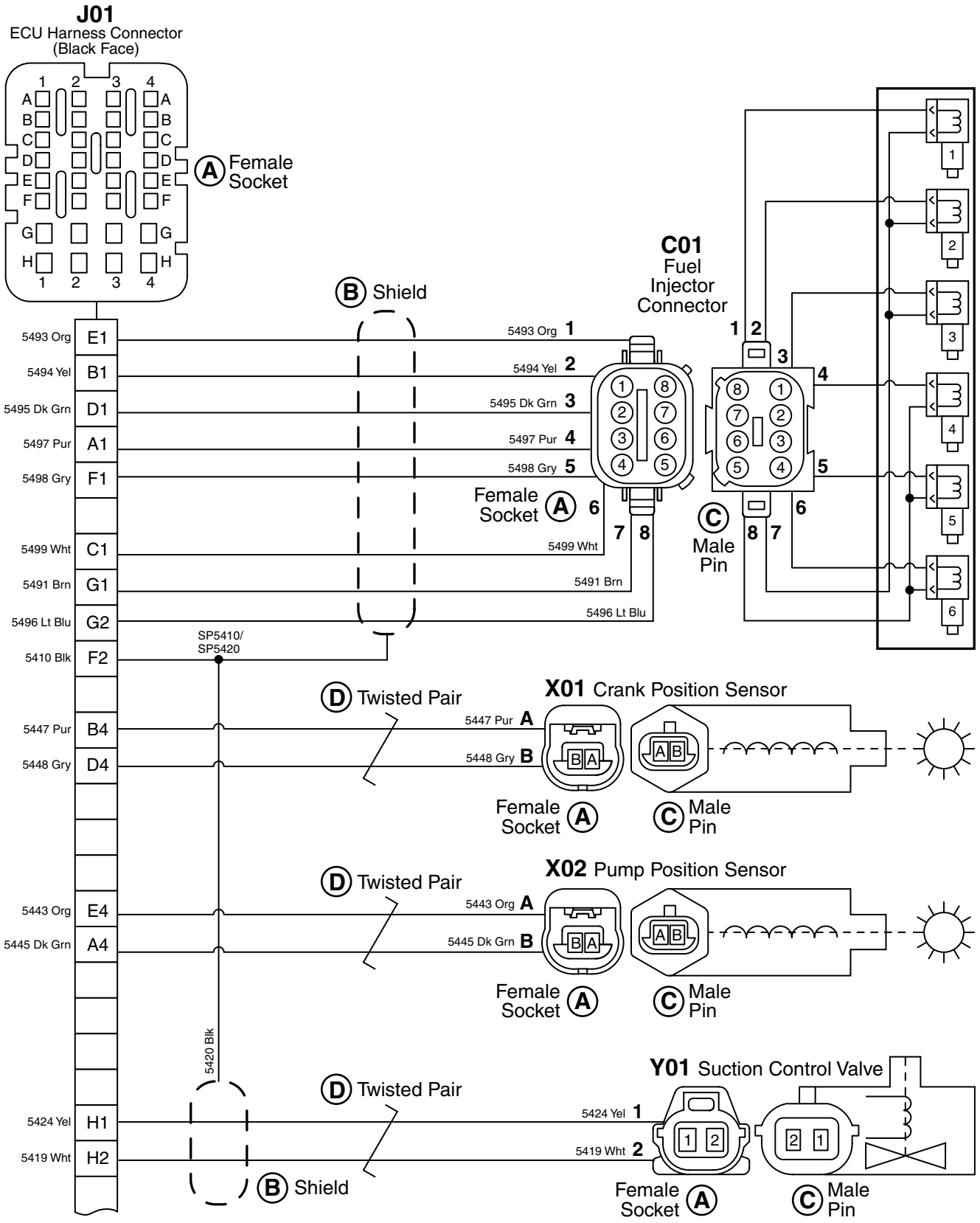


6.8 Liter 12 Volt ECU Wiring Diagram 7 (PTE)

A—(Type 2 Fuel System, Key Switch)
B—Key Switch Run
C—Female Socket
D—Male Pin
E—Single Point Ground
F—(Type 2 Fuel System, Relay Switch)
G—Low Pressure Fuel Pump Relay (If Equipped)
C30— Low Pressure Fuel Pump Connector (If Equipped)
C32— Low Pressure Fuel Pump (If Equipped)
J02— ECU Harness Connector (Red Face)
J2-M3—Low Pressure Fuel Pump Relay Drive
VBatt—Battery Positive

DB92450,0000042 -19-06OCT08-1/1

6.8L 24V ECU Wiring Diagram 1



6.8 Liter 24 Volt ECU Wiring Diagram 1 (PTE)

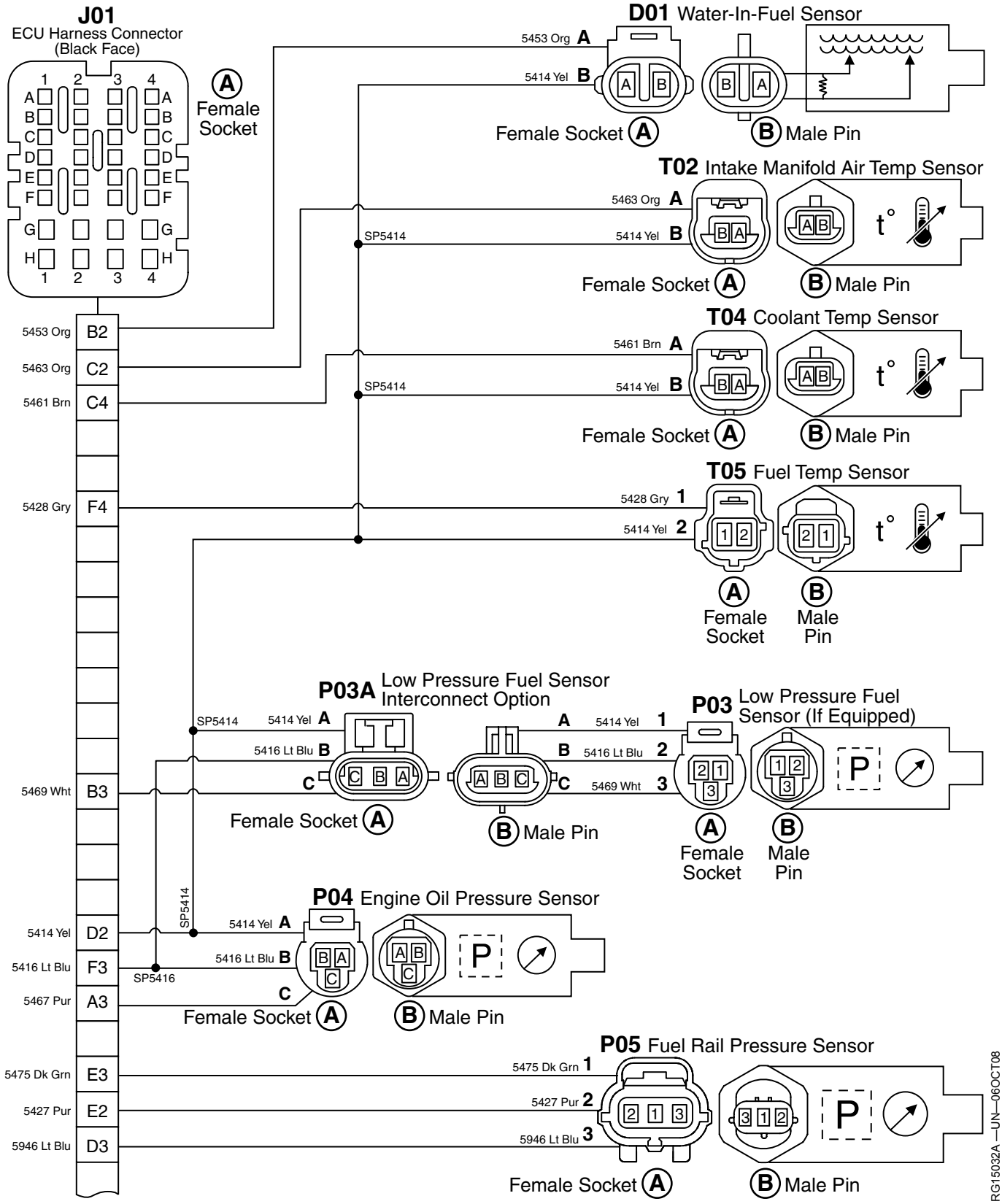
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DB92450,000004B -19-06OCT08-1/2

A—Female Socket
B—Shield
C—Male Pin
D—Twisted Pair
C01— Fuel Injector Connector
J01— ECU Harness Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-B4—[5447 Purple] Crank Position Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D4—[5448 Gray] Crank Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-G1—[5491 Brown] Injector #1& #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4& #5 & #6 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crank Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

DB92450,000004B -19-06OCT08-2/2

6.8L 24V ECU Wiring Diagram 2



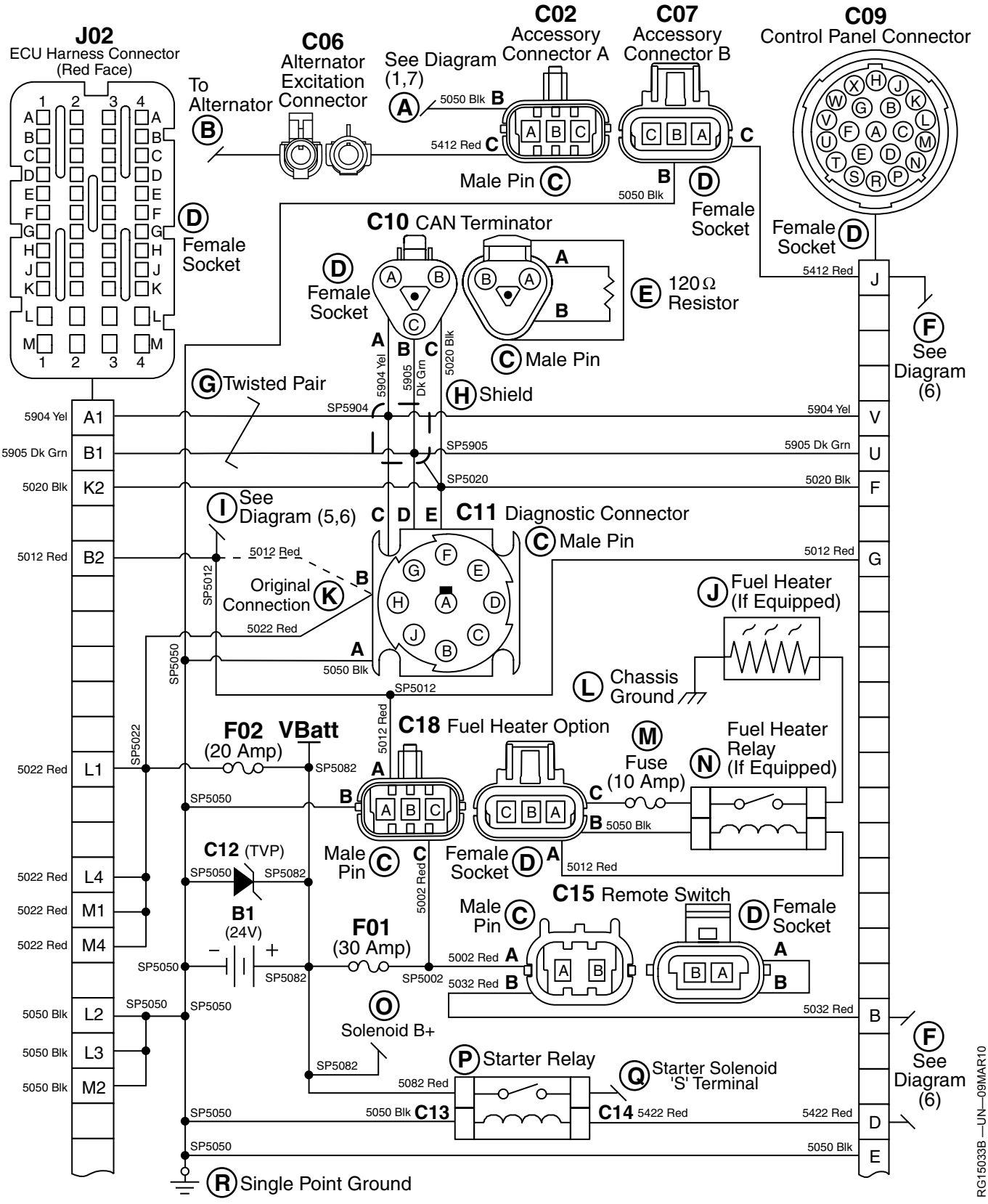
6.8 Liter 24 Volt ECU Wiring Diagram 2 (PTE)

Continued on next page

A—Female Socket
B—Male Pin
D01— Water In Fuel Sensor
J01— ECU Harness Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414A Yellow] 5 Volt Power Supply #2B Return
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Fuel Rail Pressure Signal
J1-F3—[5416A Light Blue] 5 Volt Power Supply #2B Positive
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P03A— Low Pressure Fuel Sensor Interconnect Option
P04— Engine Oil Pressure Sensor
P05— Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

DB92450,000004C -19-06OCT08-2/2

6.8L 24V ECU Wiring Diagram 3



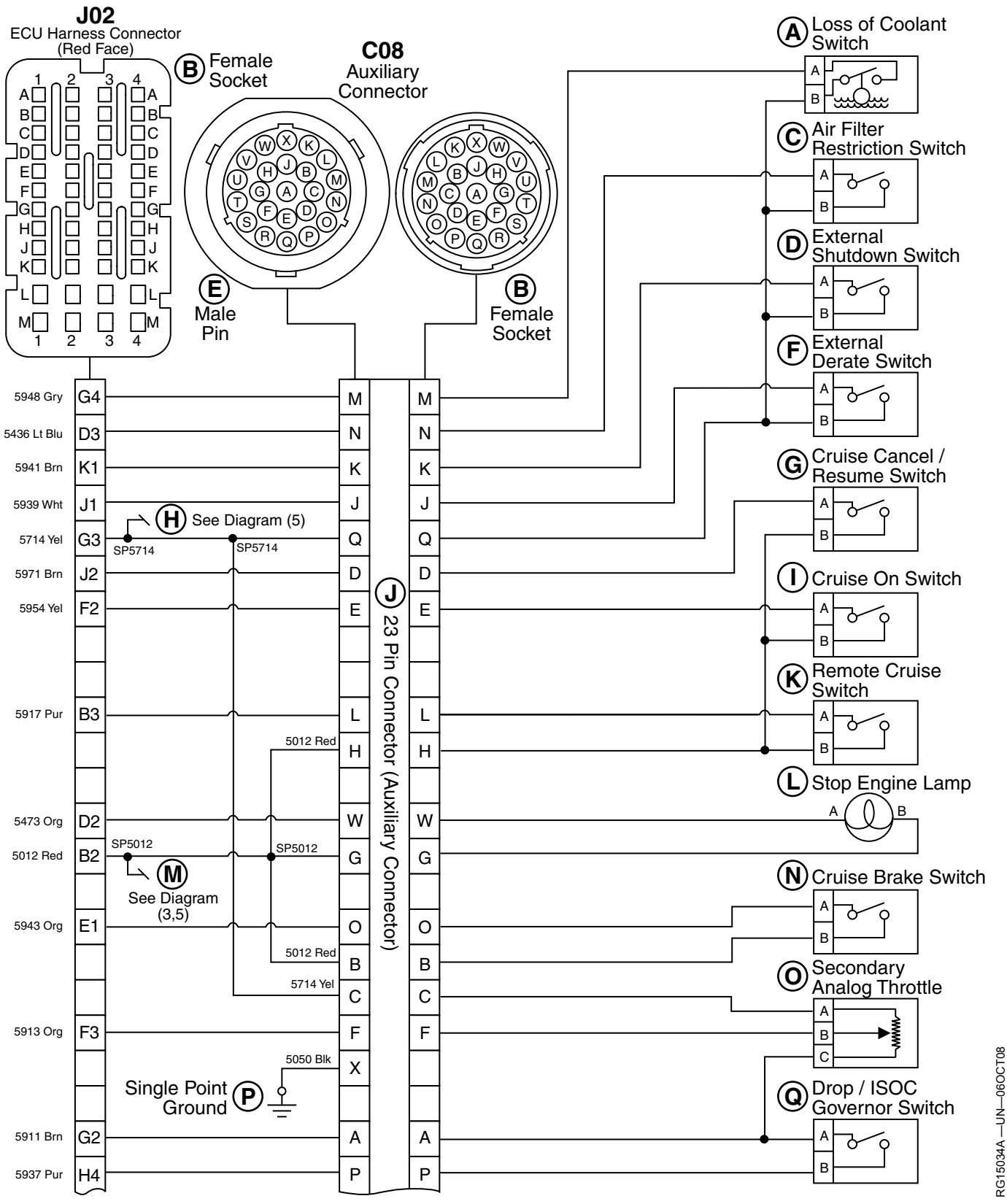
6.8 Liter 24 Volt ECU Wiring Diagram 3 (PTE)

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A—See Diagram (6)
B—To Alternator
C—Male Pin
D—Female Socket
E—120 Ω Resister
F—See Diagram (5)
G—Twisted Pair
H—Shield
I— See Diagram (4,5)
J— Fuel Heater (If Equipped)
K—Original Connection. See Instruction for Update
L—Chassis Ground
M—Fuse (10 Amp)
N—Fuel Heater Relay (If Equipped)
O—Solenoid B+
P—Starter Relay
Q—Starter Solenoid 'S' Terminal
R—Single Point Ground
B1—24 Volt
C02— Accessory Connector A
C06— Alternator Excitation Connector
C07— Accessory Connector B
C09— Control Panel Connector
C10— CAN Terminator
C11— Diagnostic Connector
C12— Transient Voltage Protection (TVP)
C13— Starter Relay Coil Return
C14— Starter Relay Coil Drive
C15— Remote Switch
C18— Fuel Heater Option
F01— 30 Amp
F02— 20 Amp
J02— ECU Harness Connector (Red Face)
J2-A1—[5904A Yellow] CAN High
J2-B1—[5905A Dark Green] CAN Low
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-K2—[5020A Black] CAN Shield
J2-L1—[5022A Red] Battery Positive
J2-L2—[5050A Black] Battery Negative
J2-L3—[5050B Black] Battery Negative
J2-L4—[5022B Red] Battery Positive
J2-M1—[5022C Red] Battery Positive
J2-M2—[5050C Black] Battery Negative
J2-M4—[5022D Red] Battery Positive
VBatt—Battery Positive

DB92450,000004D -19-09MAR10-2/2

6.8L 24V ECU Wiring Diagram 4



6.8 Liter 24 Volt ECU Wiring Diagram 4 (PTE)

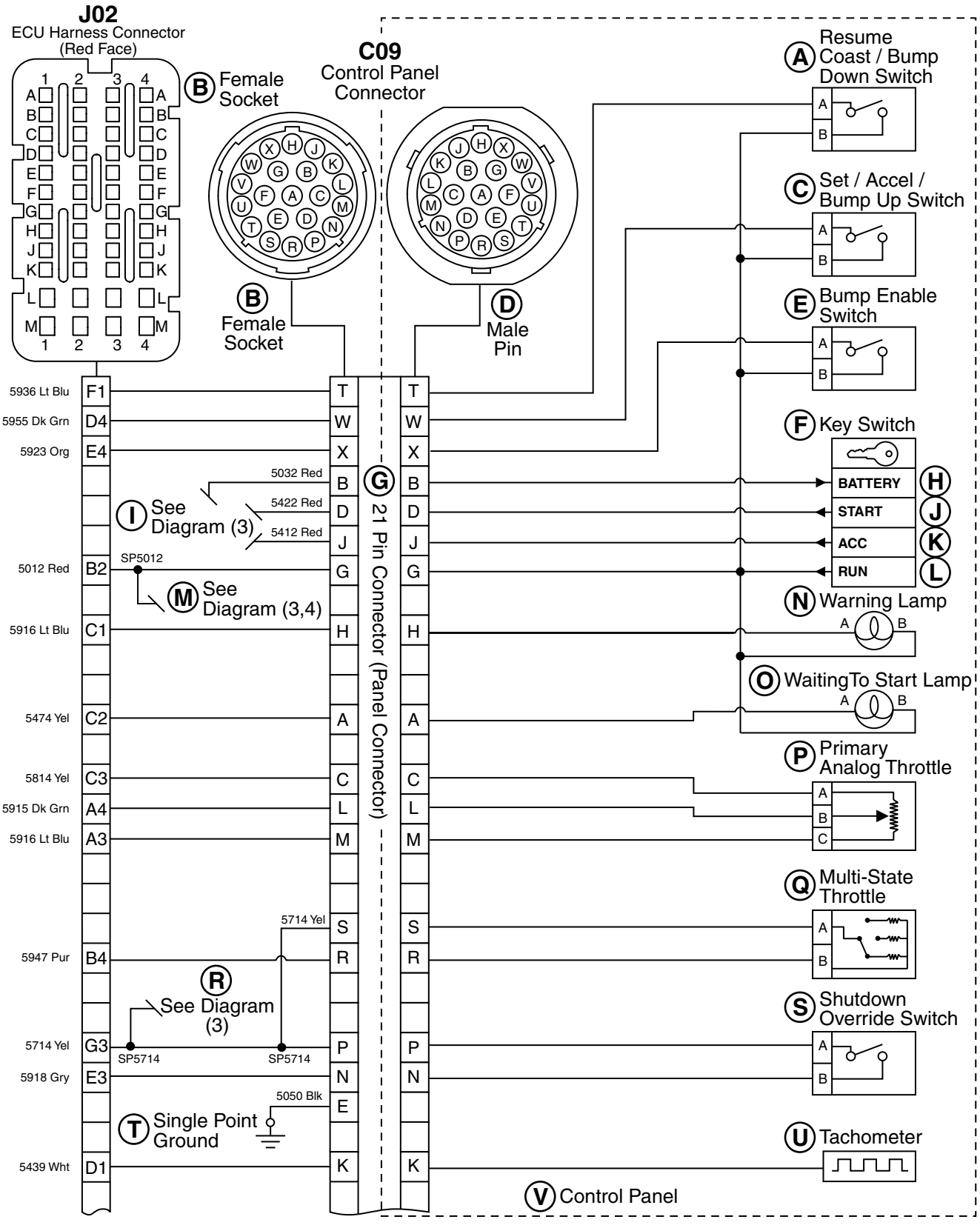
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DB92450,000004E -19-06OCT08-1/2

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 (5)
I— Cruise On Switch
J— 23 Pin Connector (Auxiliary Connector)
K—Remote Cruise Switch
L—Stop Engine Lamp
M—See Diagram (3,5)
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 #2A Positive
J2-G3—[5714A Yellow] 5 Volt Power Supply #2A Negative
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

DB92450,000004E -19-06OCT08-2/2

6.8L 24V ECU Wiring Diagram 5



6.8 Liter 24 Volt ECU Wiring Diagram 5 (PTE)

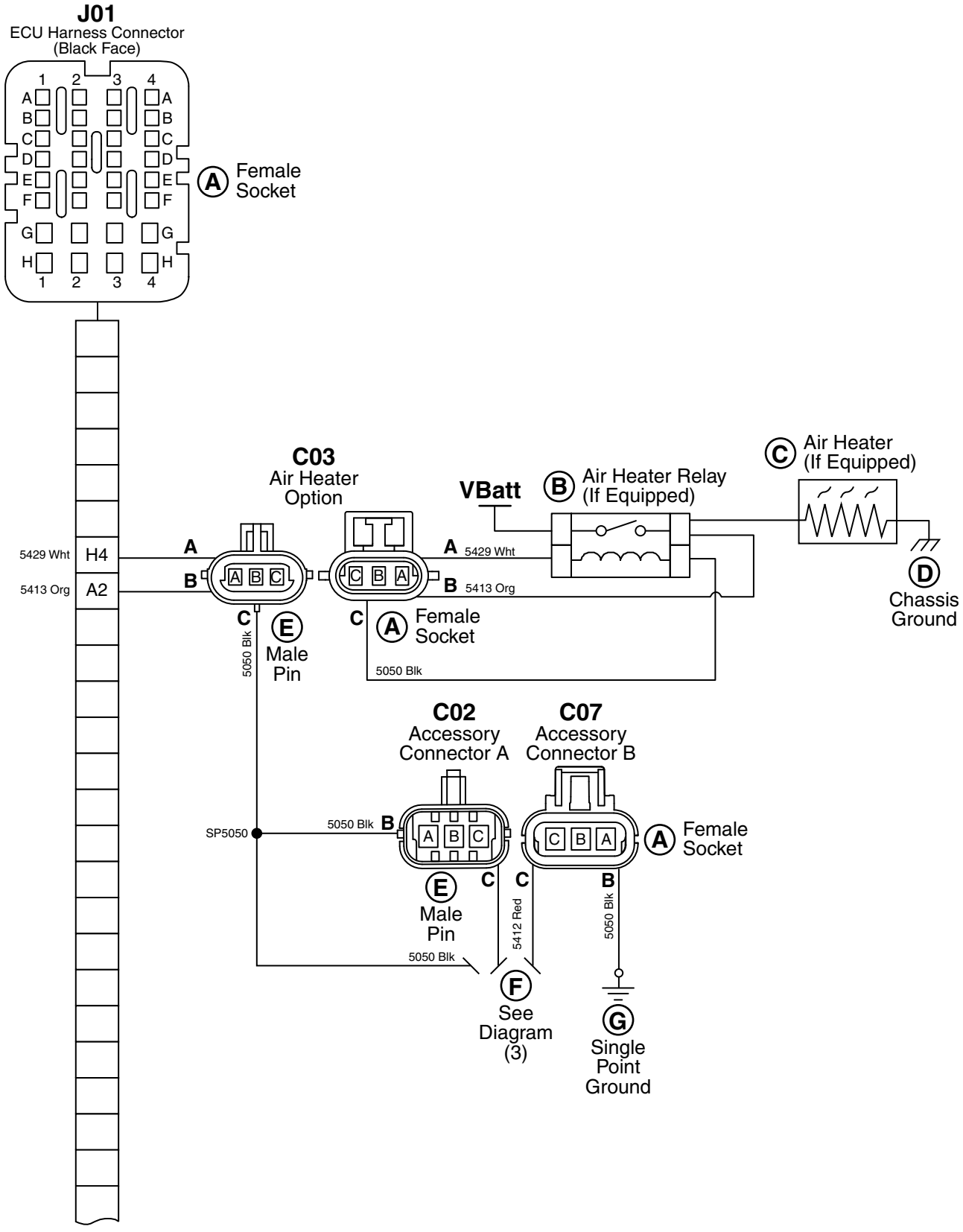
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DB92450,000004F -19-06OCT08-1/2

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 (3)
J— Start
K—Accessory
L—Run
M—See Diagram (3,4)
N—Warning Lamp
O—Wait to Start Lamp
P—Primary Analog Throttle
Q—Multi-State Throttle
R—See Diagram (4)
S—Shutdown Override Switch
T—Single Point Ground
U—Tachometer
V—Control Panel
C09— Control Panel Connector
J02— ECU Harness Connector (Red Face)
J2-A3—[5616 Light Blue] 5 Volt Power Supply #3 Positive
J2-A4—[5915 Dark Green] Primary Analog Throttle Signal
J2-B2—[5012A Red] Ignition Key Start/Run Switch
J2-B4—[5947 Purple] Mulitstate Throttle Signal
J2-C1—[5916 Light Blue] Warning Lamp Drive Return
J2-C2—[5474 Yellow] Wait To Start Lamp Drive Return
J2-C3—[5814 Yellow] 5 Volt Power Supply #3 Negative
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 #2A Negative

DB92450,000004F -19-06OCT08-2/2

6.8L 24V ECU Wiring Diagram 6



6.8 Liter 24 Volt ECU Wiring Diagram 6 (PTE)

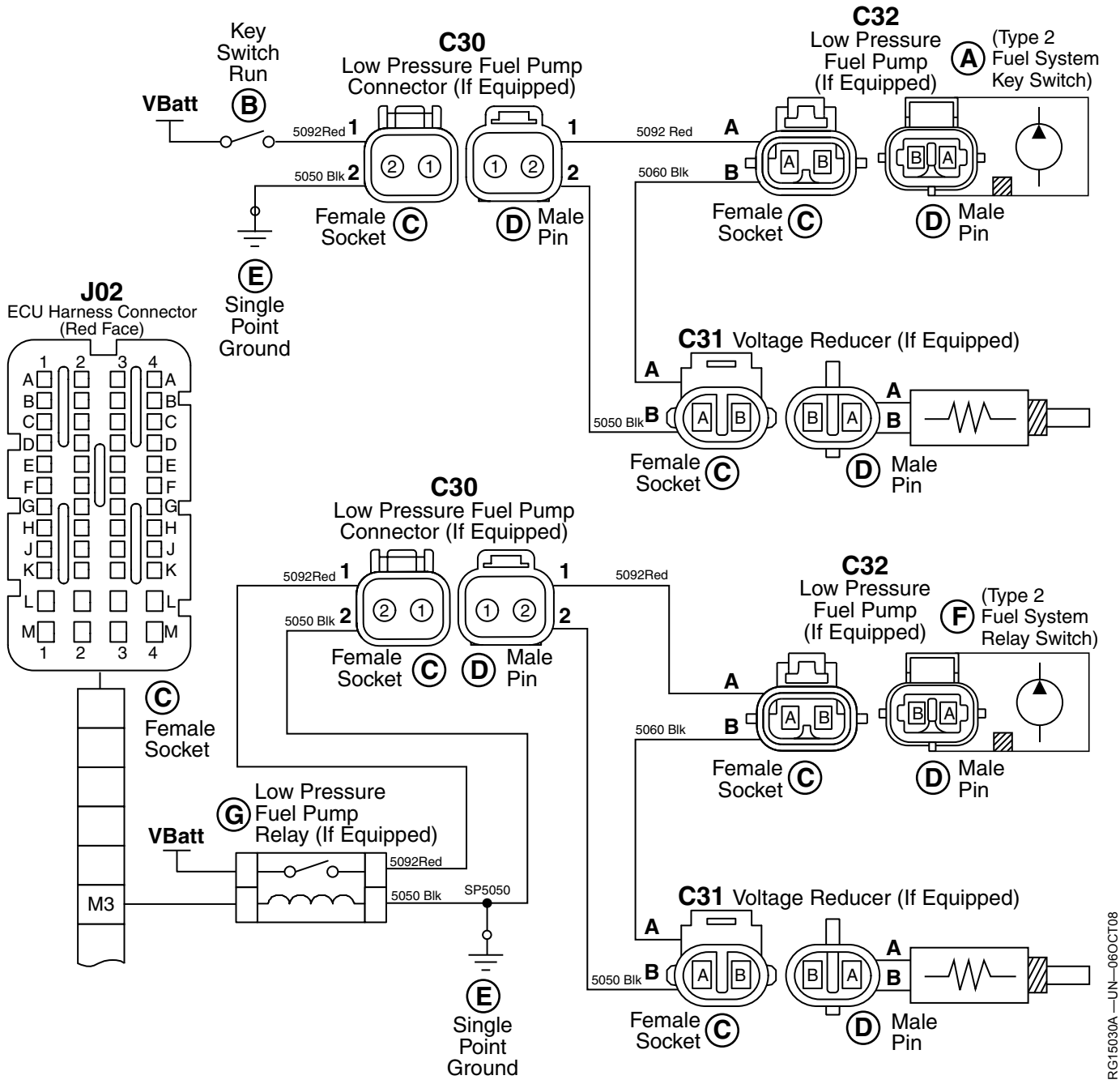
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DB92450,000004A -19-06OCT08-1/2

A—Female Socket
B—Air Heater Relay (If Equipped)
C—Air Heater (If Equipped)
D—Chassis Ground
E—Male Pin
F—See Diagram (3)
G—Single Point Ground
C02— Accessory Connector A
C03— Air Heater Option
C07— Accessory Connector B
J01— ECU Harness Connector (Black Face)
J1-A2—[5413 Orange] Air Heater Relay Status
J1-H4—[5429 White] Air Heater Relay Drive
VBatt—Battery Positive

DB92450,000004A -19-06OCT08-2/2

6.8L 24V ECU Wiring Diagram 7



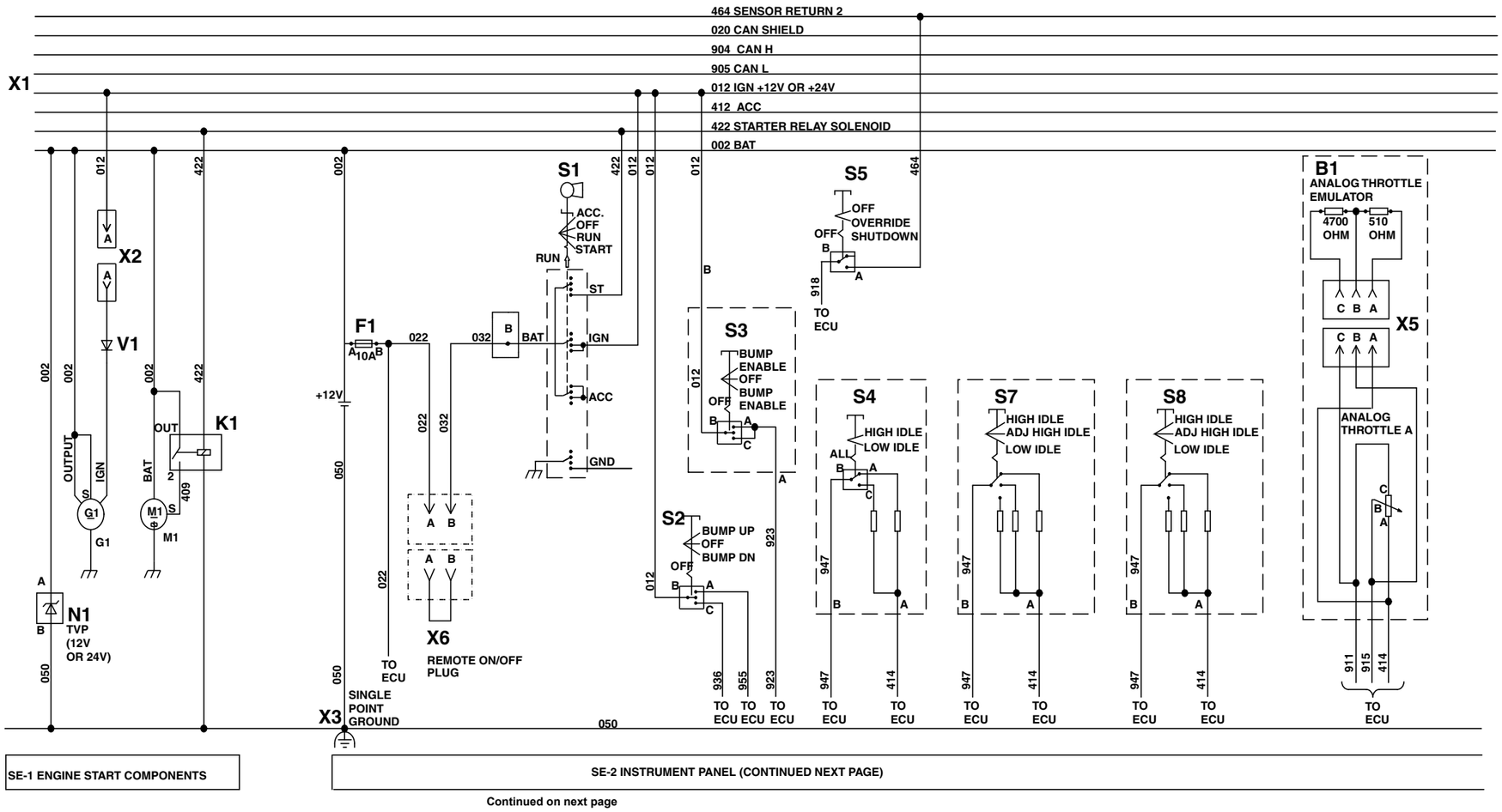
6.8 Liter 24 Volt ECU Wiring Diagram 7 (PTE)

A—(Type 2 Fuel System, Key Switch)
B—Key Switch Run
C—Female Socket
D—Male Pin
E—Single Point Ground
F—(Type 2 Fuel System, Relay Switch)
G—Low Pressure Fuel Pump Relay (If Equipped)
C30— Low Pressure Fuel Pump Connector (If Equipped)
C31— Voltage Reducer (If Equipped)
C32— Low Pressure Fuel Pump (If Equipped)
J02— ECU Harness Connector (Red Face)
J2-M3—Low Pressure Fuel Pump Relay Drive
VBatt—Battery Positive

DB92450,0000049 -19-06OCT08-1/1

OEM Instrument Panel / Engine Start Components Electrical Wiring Diagram

RG12288 —19—23AUG02



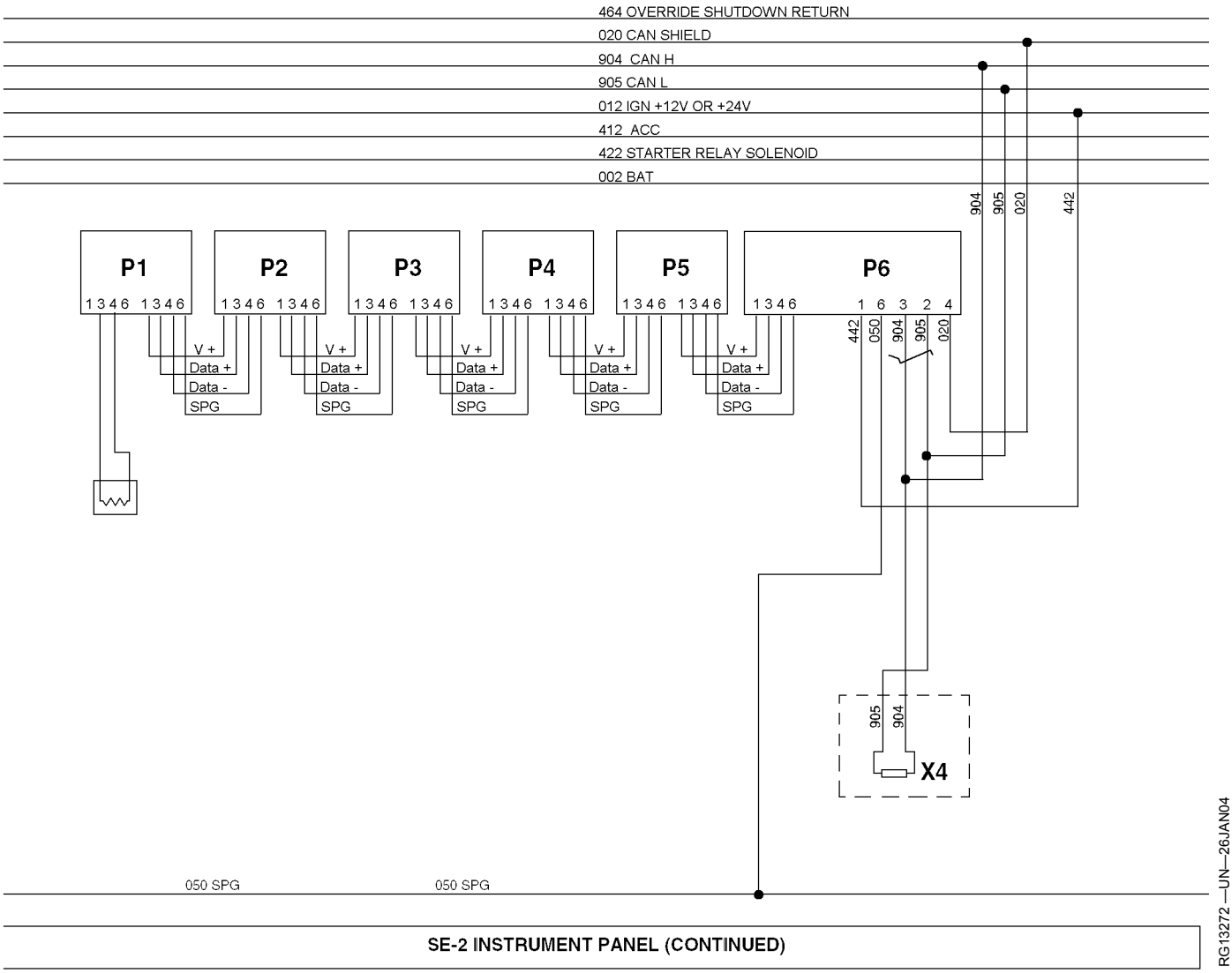
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DN22556,0000465 -19-29JUN07-1/2

B1—Analog Throttle Emulator
E1—Back Light Regulator (24V) or Plug (12V)
F1—Fuse (10 Amp)
F2—Fuse (5 Amp)
G1—Alternator
K1—Starter Relay
M1—Starter Motor
N1—Transient Voltage Protector
N2—Voltage Regulator (for 24V Operation)
P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
S1—Ignition Key Switch
S2—Speed Select Switch (Momentary)
S3—Bump Enable Switch (Momentary
S4—Dual State Throttle Switch
S5—Override Shutdown Switch (Momentary)
S6—Dimmer Control or Jumper Plug
S7—Tri-state Throttle Switch
S8—Ramp Throttle Switch
V1—Diode
X1—Vehicle Harness Connector
X2—Alternator Harness Connector
X3—Single Point Ground
X4—CAN Terminator
X5—Analog Throttle Connector
X6—Remote On/Off Plug

DN22556,0000465 -19-29JUN07-2/2

OEM Instrument Panel / Engine Start Components Electrical Wiring Diagram - Continued



OEM Instrument Panel Wiring Diagram

P1—Optional Gauge
P2—Optional Gauge
P3—Oil Pressure Gauge
P4—Coolant Temperature Gauge
P5—Tachometer Display
P6—Hourmeter/Diagnostic Meter
X4—CAN Terminator

DN22556,0000466 -19-12JUL07-1/1

4.5L Wire Splice Location Diagrams

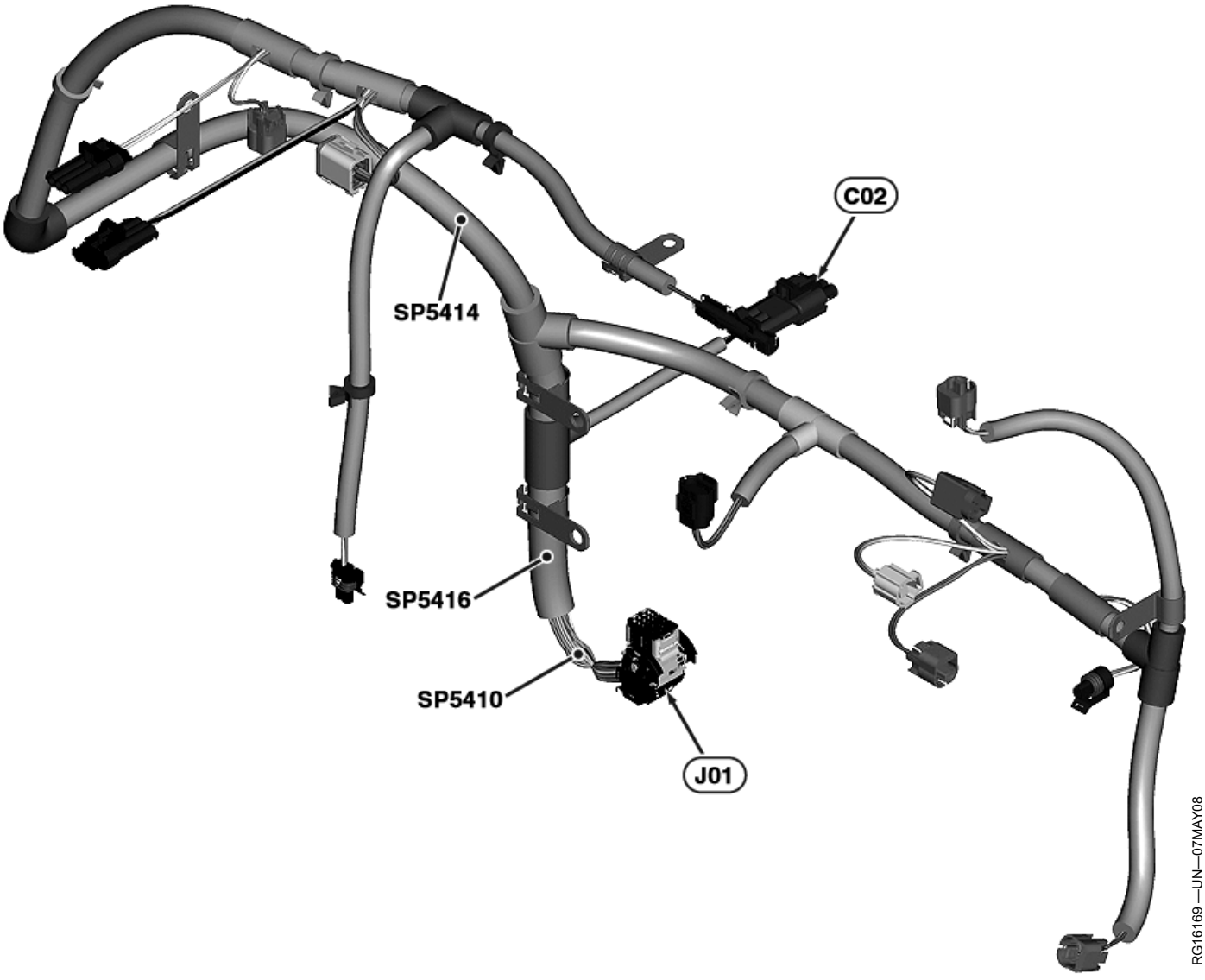
Wire harness splice location diagrams for 4.5L PTE engine applications

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
8436 8437	RE529501	J01 Engine Harness
8459 8461 8468 8470	RE529823	J01 Engine Harness
8458 8460 8467 8469	RE530425	J01 Engine Harness
84AH 84AM	RE535458	J01 Engine Harness
8481	RE534613	J01 Engine Harness
84AC	RE534359	J01 Engine Harness
84AP	RE537837	Engine Harness for Dual ECU
9114	RE536599	J2 OEM Harness
9113 9123	RE53601	J2 OEM Harness
	RE528590 RE530105	Fuel Injection Harness



Splice Locations for Wire Harness RE529501, Option Codes 8436, and 8437

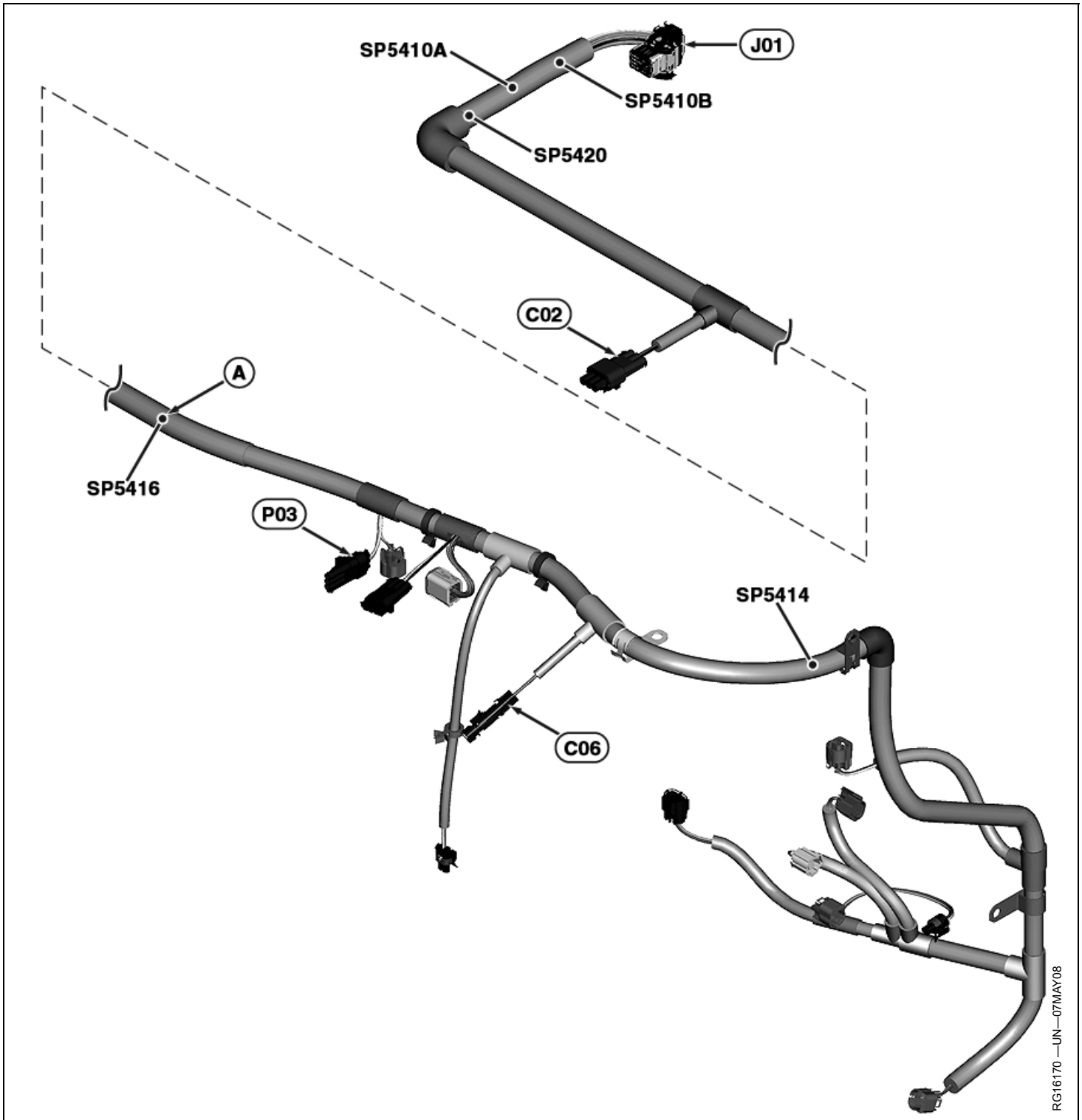
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DM59778,00000BC -19-08MAY08-1/11

C02— Accessory Connector A
J01— ECU Harness Connector (Black Face)
SP5010—Splice 5010
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-2/11

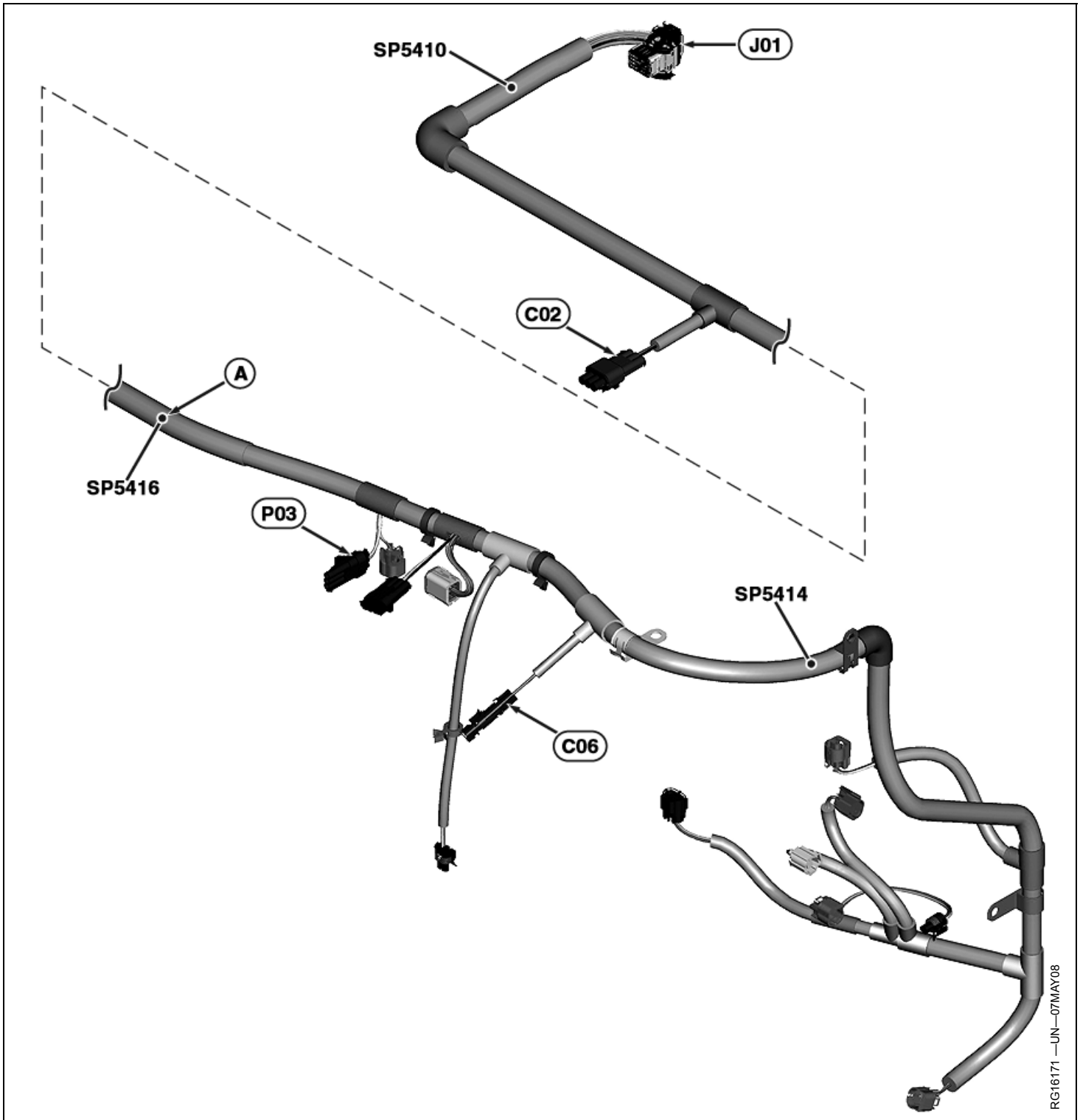


Splice Locations for Wire Harness RE529823, Option Codes 8459, 8461, 8468 and 8470

A—Splice 5416 Located 250mm (9.8in) from T-Junction to P03
C02— Accessory Connector A
C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
P03— Low Pressure Fuel Sensor
SP5010A—Splice 5010A
SP5010B—Splice 5010B
SP5020—Splice 5020
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-3/11

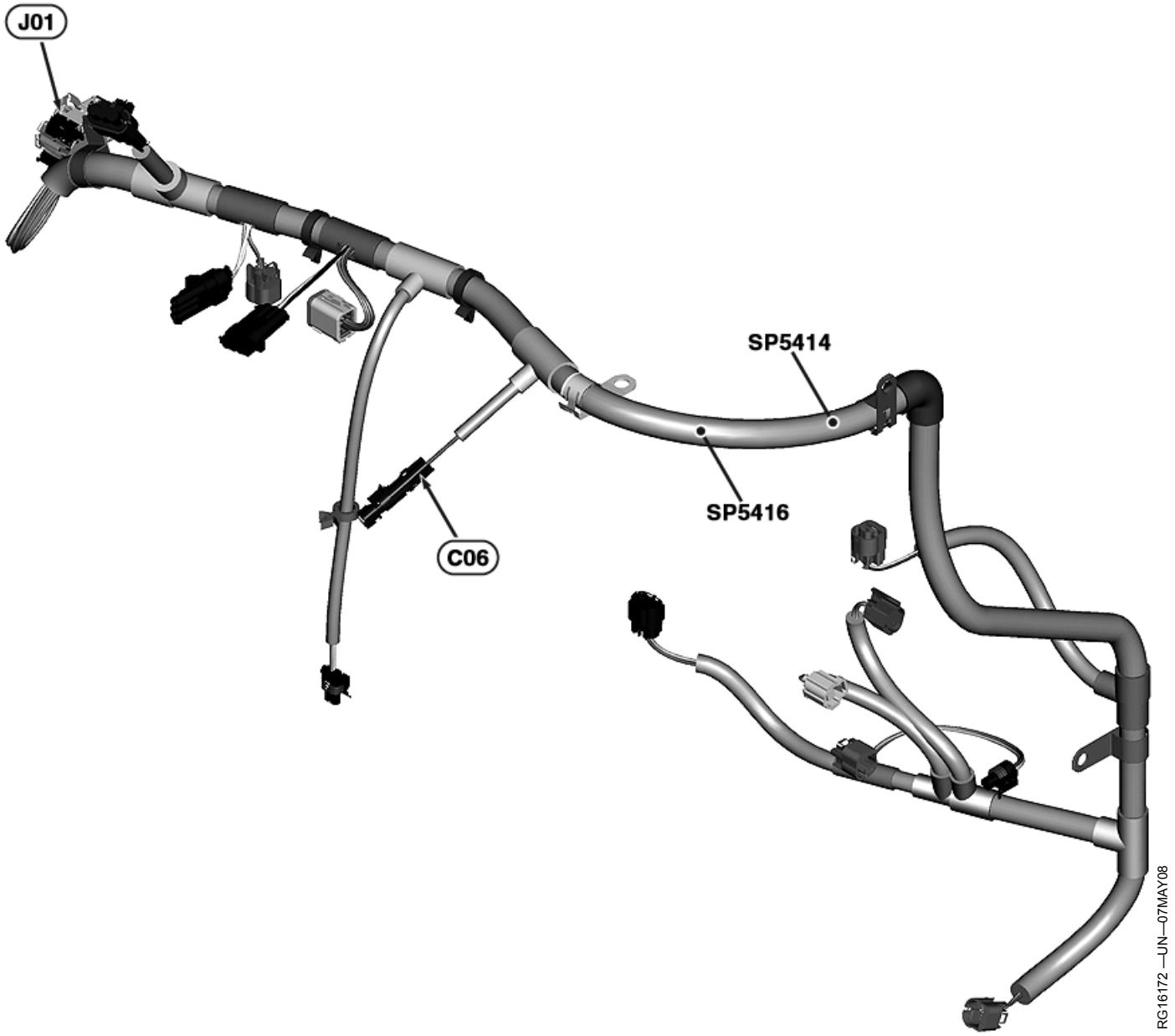


Splice Locations for Wire Harness RE530425, Option Codes 8458, 8460, 8467 and 8469

A—Splice 5416 Located 250mm (9.8in) from T-Junction to P03
C02— Accessory Connector A
C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
P03— Low Pressure Fuel Sensor
SP5010—Splice 5010
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-4/11

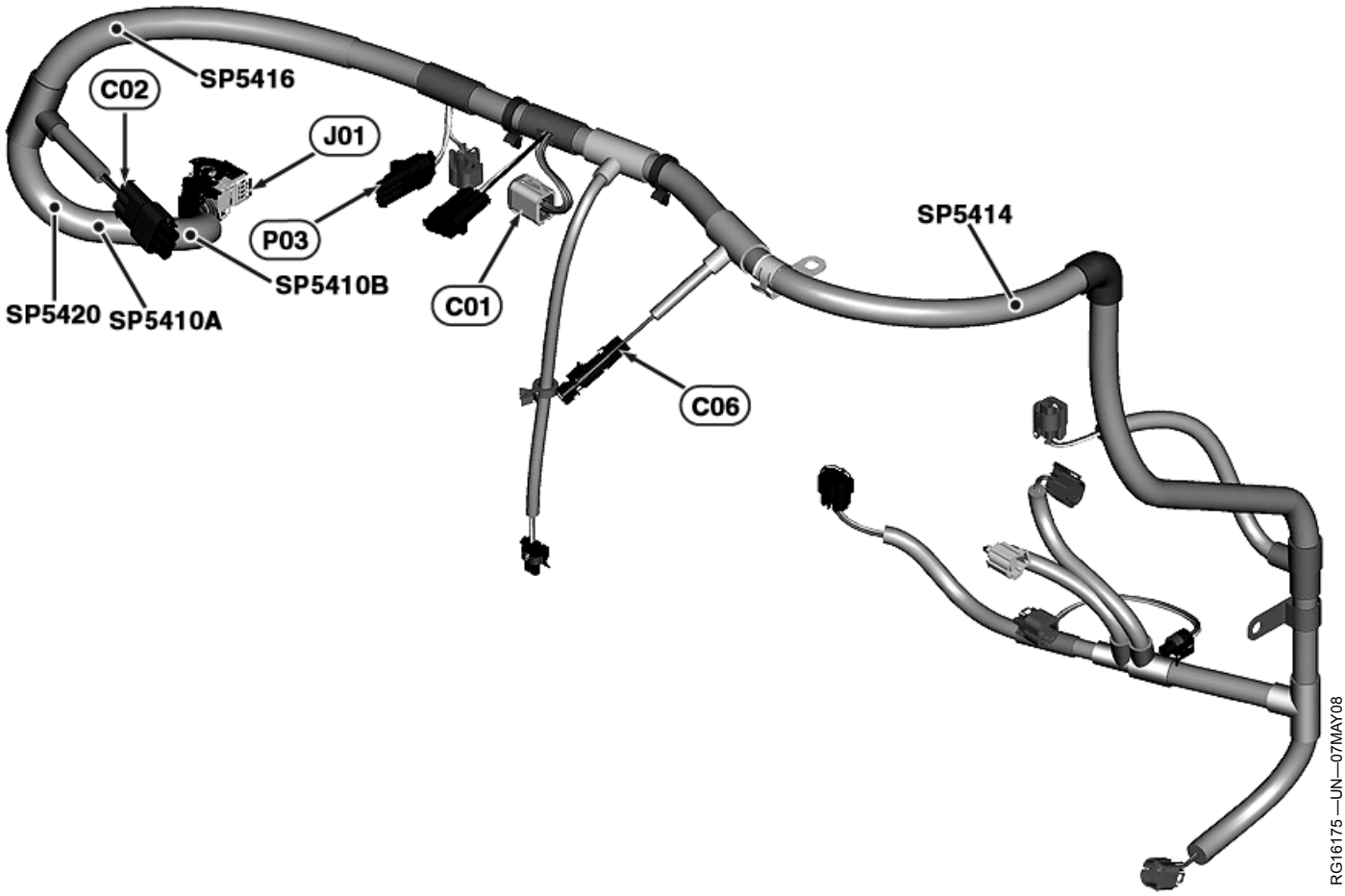


Splice Locations for Wire Harness RE535458, Option Codes 84AH, and 84AM

C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-5/11

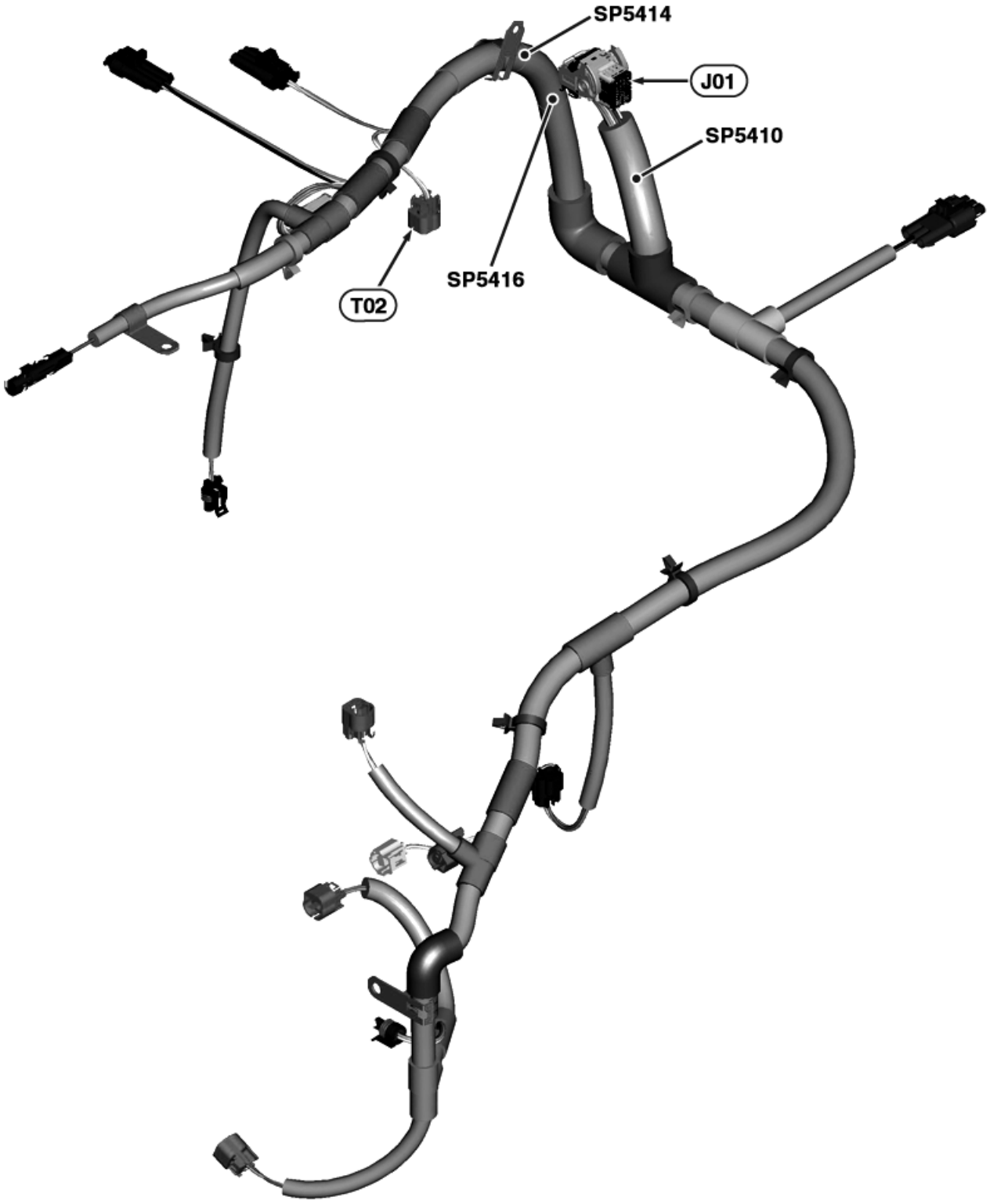


Splice Locations for Wire Harness RE534613 Option Code 8481

C02— Accessory Connector A
C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
P03— Low Pressure Fuel Sensor
SP5010A—Splice 5010A
SP5010B—Splice 5010B
SP5020—Splice 5020
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-6/11



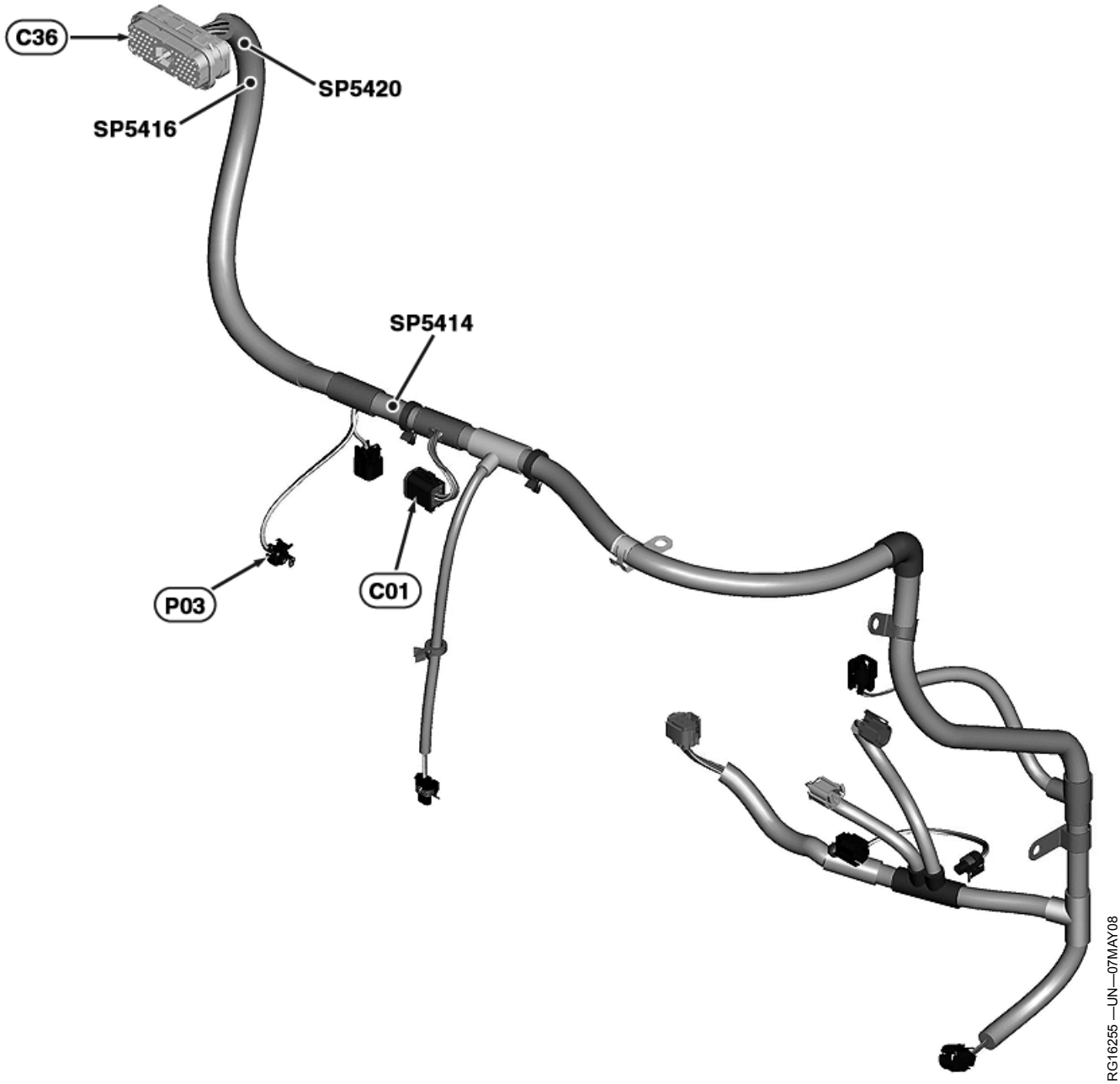
RG16176 —UN—07MAY08

Splice Locations for Wire Harness RE534359 Option Code 84AC

J01— ECU Harness Connector (Black Face)
T02— Intake Manifold Air Temperature Sensor
SP5010—Splice 5010
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BC -19-08MAY08-7/11

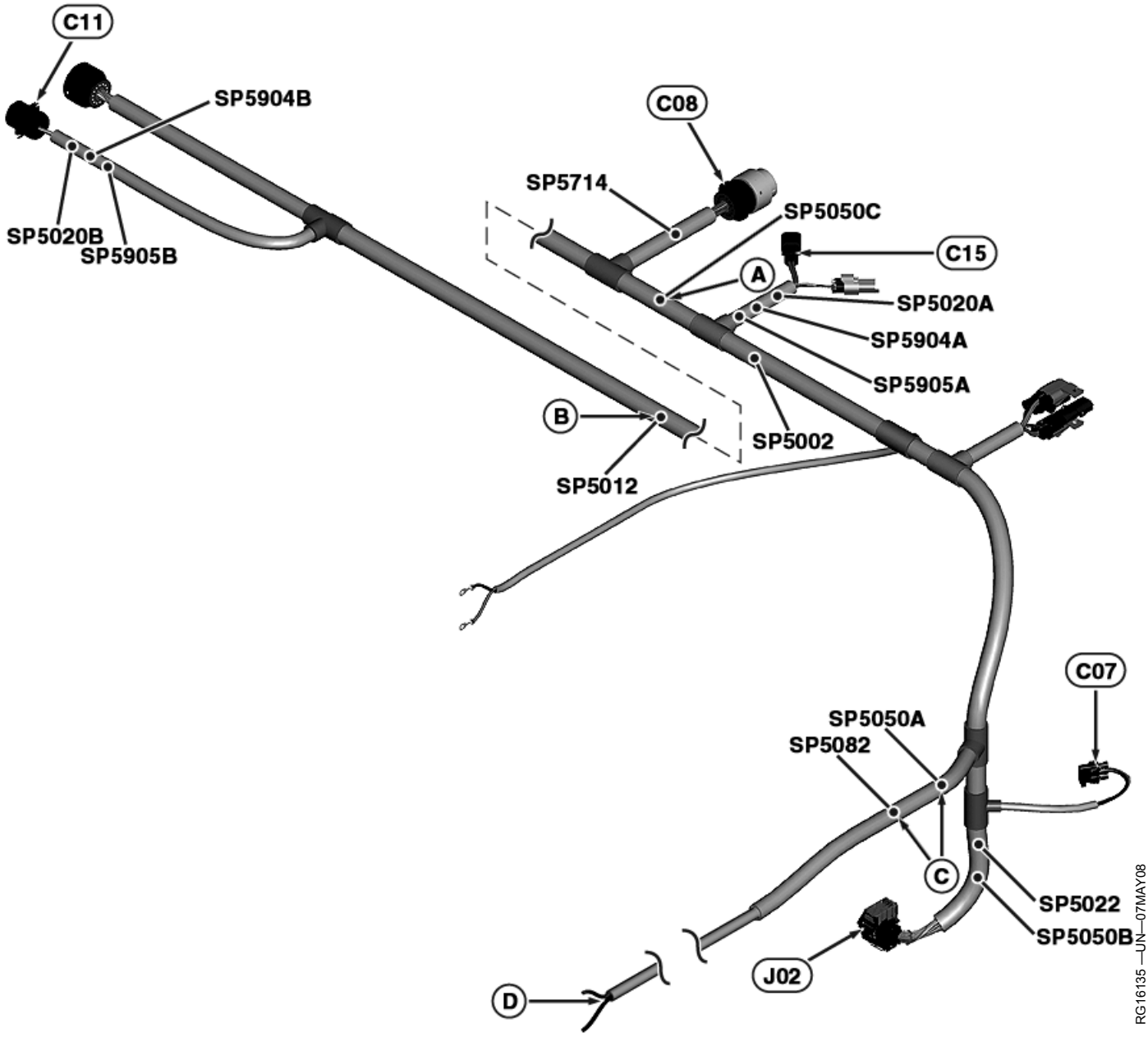


Splice Locations for Wire Harness RE537837, Option Code 84AP

C01— Fuel Injector Connector
C36— Switch Box Harness Connector
P03— Low Pressure Fuel Sensor
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420

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DM59778,00000BC -19-08MAY08-8/11

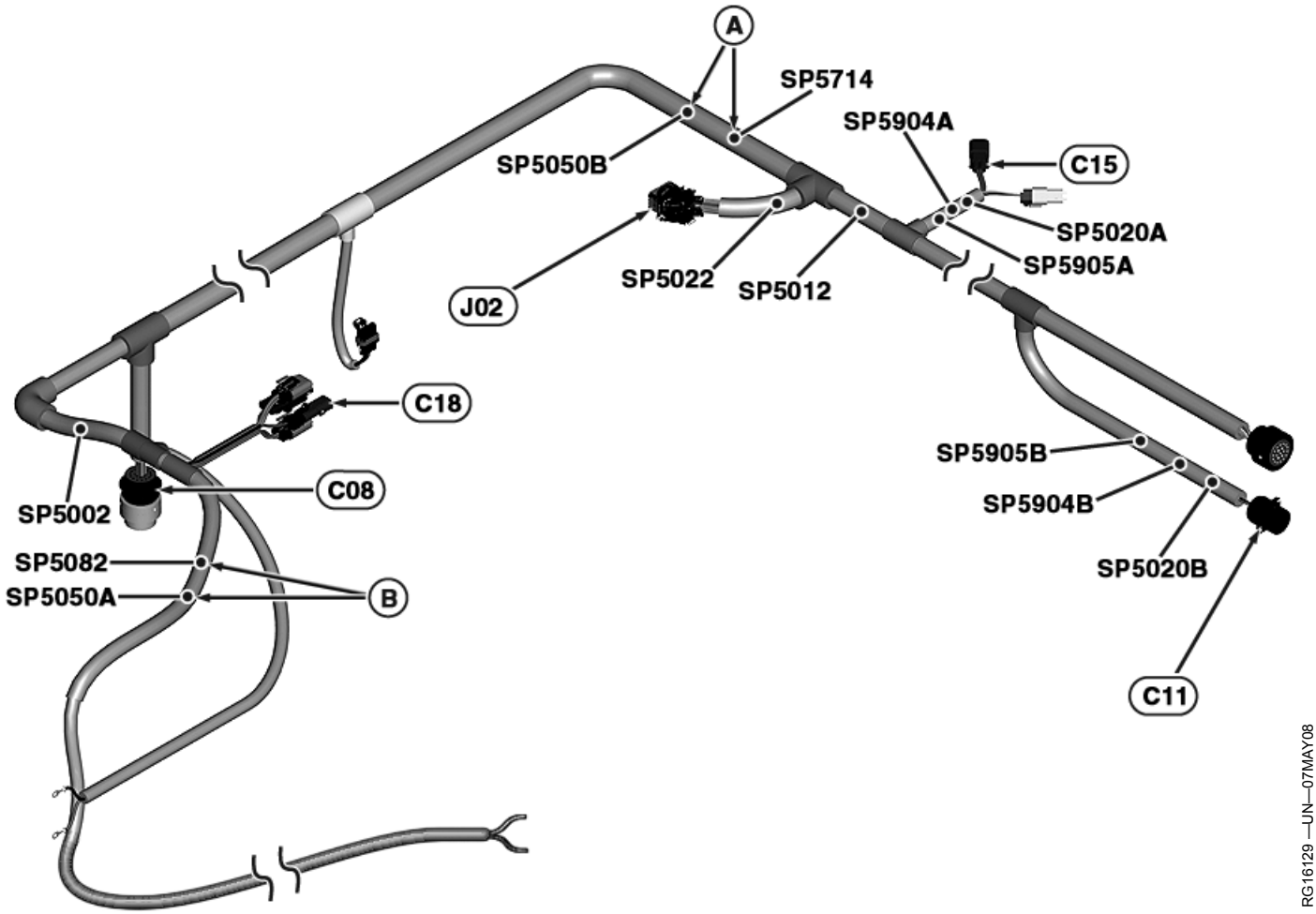


Splice Locations for Wire Harness RE536599, Option Code 9114

A—Splice 5050C Located Within 100mm (3.9in) from Harness T-Junction to C15
B—Splice 5012 Located 594mm (23.4in) From Harness T-Junction to C11
C—Splice 5050A and 5082 Located Within 200mm (7.9in) from Harness T-Junction to Unterminated Power Wires
D—Unterminated Power Wires
C07— Accessory Connector B
C08— Auxiliary Connector
C11— Diagnostic Connector
C15— Remote Switch Connector
J02— ECU Harness Connector (Red Face)
SP5002—Splice 5002
SP5012—Splice 5012
SP5020A—Splice 5020A
SP5020B—Splice 5020B
SP5022—Splice 5022
SP5050A—Splice 5050A
SP5050B—Splice 5050B
SP5050C—Splice 5050C
SP5082—Splice 5082
SP5714—Splice 5714
SP5904A—Splice 5904A
SP5904B—Splice 5904B
SP5905A—Splice 5905A
SP5905B—Splice 5905B

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DM59778,00000BC -19-08MAY08-9/11



Splice Locations for Wire Harness RE536601, Option Codes 9113 and 9123

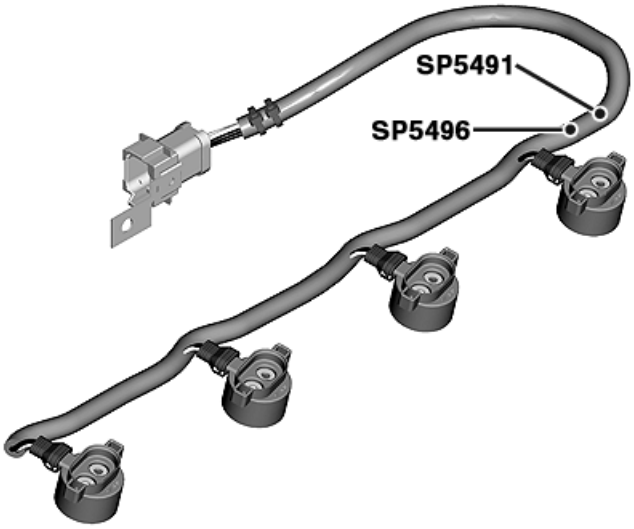
A—Splice 5050B and 5714 Located Within 200mm (7.9in) from Harness T-Junction to J02
B—Splice 5050A and 5082 Located Within 200mm (7.9in) from Harness T-Junction to C18
C08— Auxiliary Connector
C11— Diagnostic Connector
C15— Remote Switch Connector
C18— Fuel Heater Option Connector
J02— ECU Harness Connector (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

Continued on next page

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SP5491—Splice 5491

SP5496—Splice 5496



Splice Locations for Wire Harness RE528590 and RE530105. Fuel Injection Harness

DM59778,00000BC -19-08MAY08-11/11

6.8L Wire Splice Location Diagrams

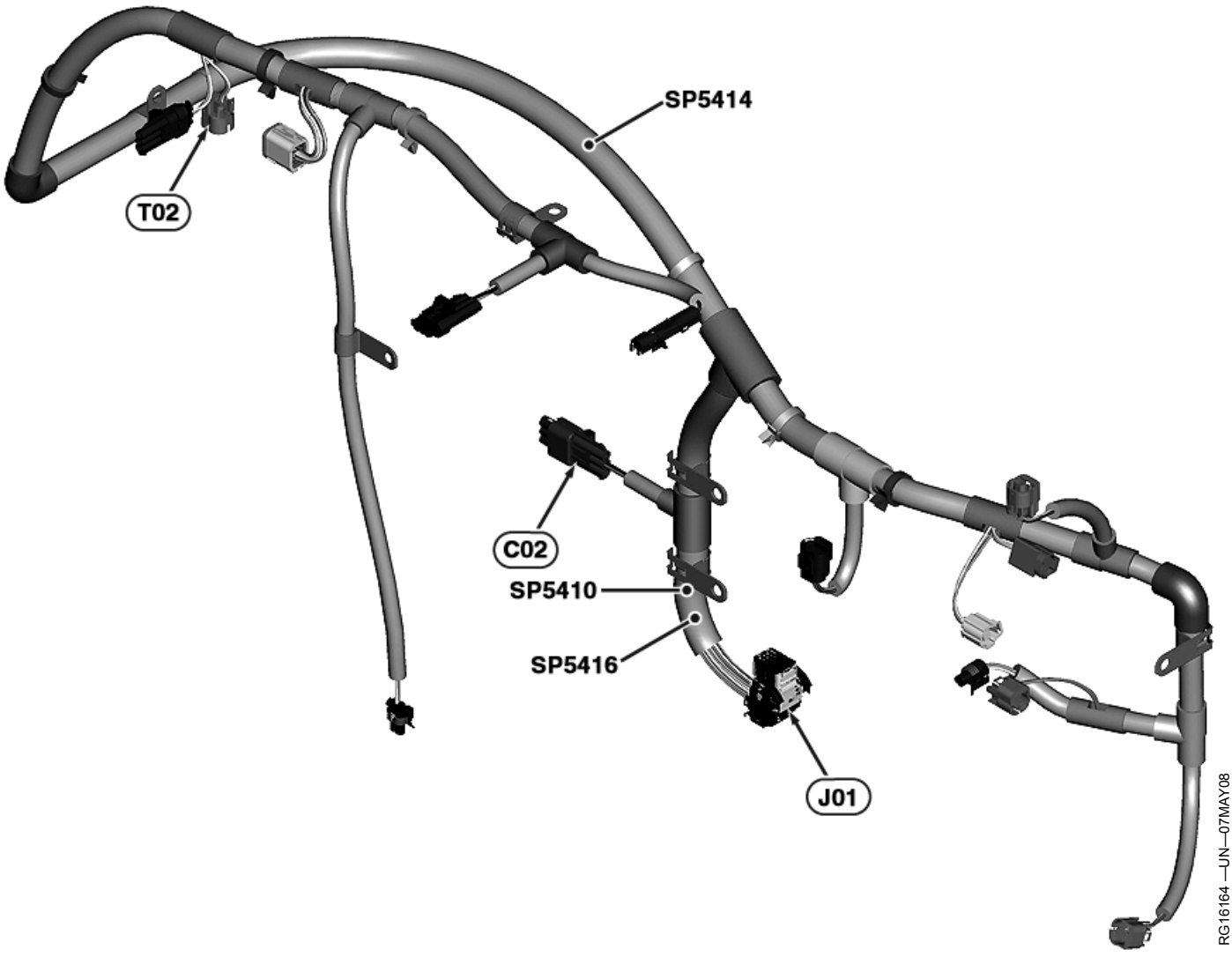
Wire harness splice location diagrams for 6.8L PTE engine applications

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
8438 8439	RE52809	J01 Engine Harness
8453 8455 8464 8466	RE529862	J01 Engine Harness
8452 8454 8463 8465 8475	RE530424	J01 Engine Harness
84AJ	RE537841	Engine Harness for Dual ECU
9112	RE536600	J2 OEM Harness
9113 9123	RE53601	J2 OEM Harness
	RE528609 RE530106	Fuel Injection Harness

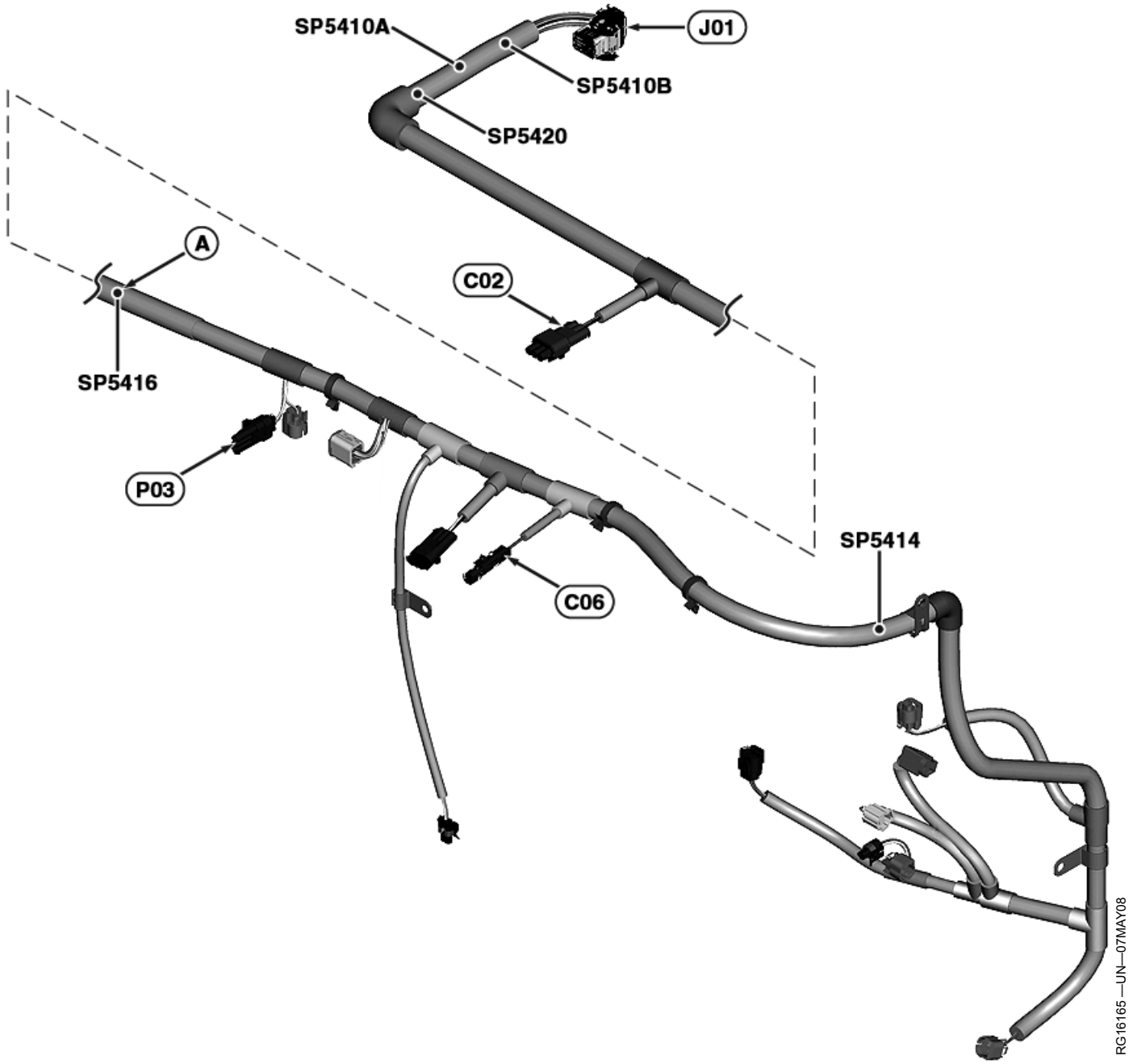


Splice Locations for Wire Harness RE528509, Option Codes 8438, and 8439

C02— Accessory Connector A
J01— ECU Harness Connector (Black Face)
T02— Intake Manifold Air Temperature Sensor
SP5010—Splice 5010
SP5414—Splice 5414
SP5416—Splice 5416

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DM59778,00000BD -19-08MAY08-1/7

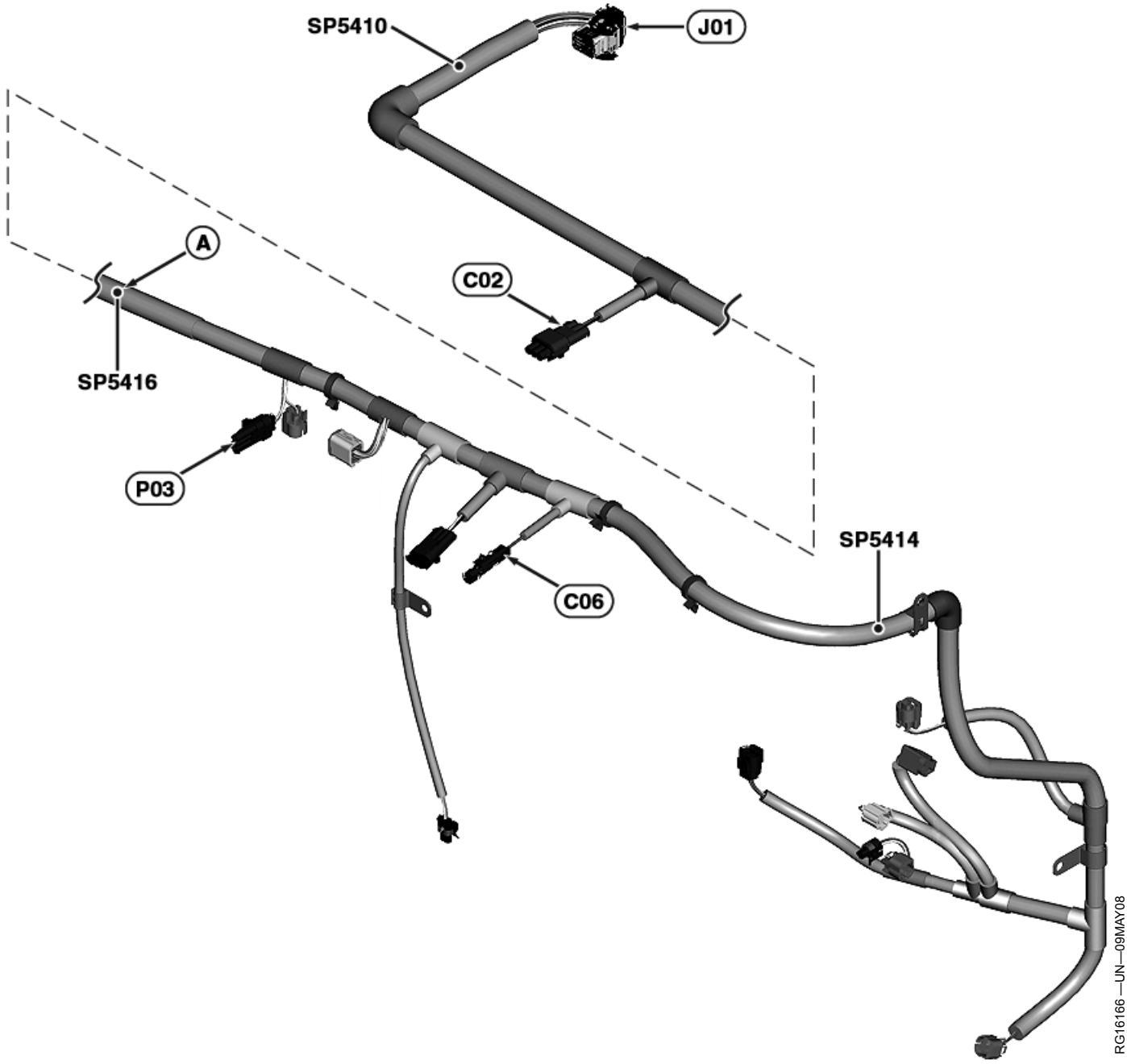


Splice Locations for Wire Harness RE5229862, Option Codes 8453, 8455. 8464, and 8466

A—Splice 5416 Located 200mm (7.9in) from T-Junction to P03
C02— Accessory Connector A
C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
P03— Low Pressure Fuel Sensor
SP5010A—Splice 5010A
SP5010B—Splice 5010B
SP5020—Splice 5020
SP5414—Splice 5414
SP5416—Splice 5416

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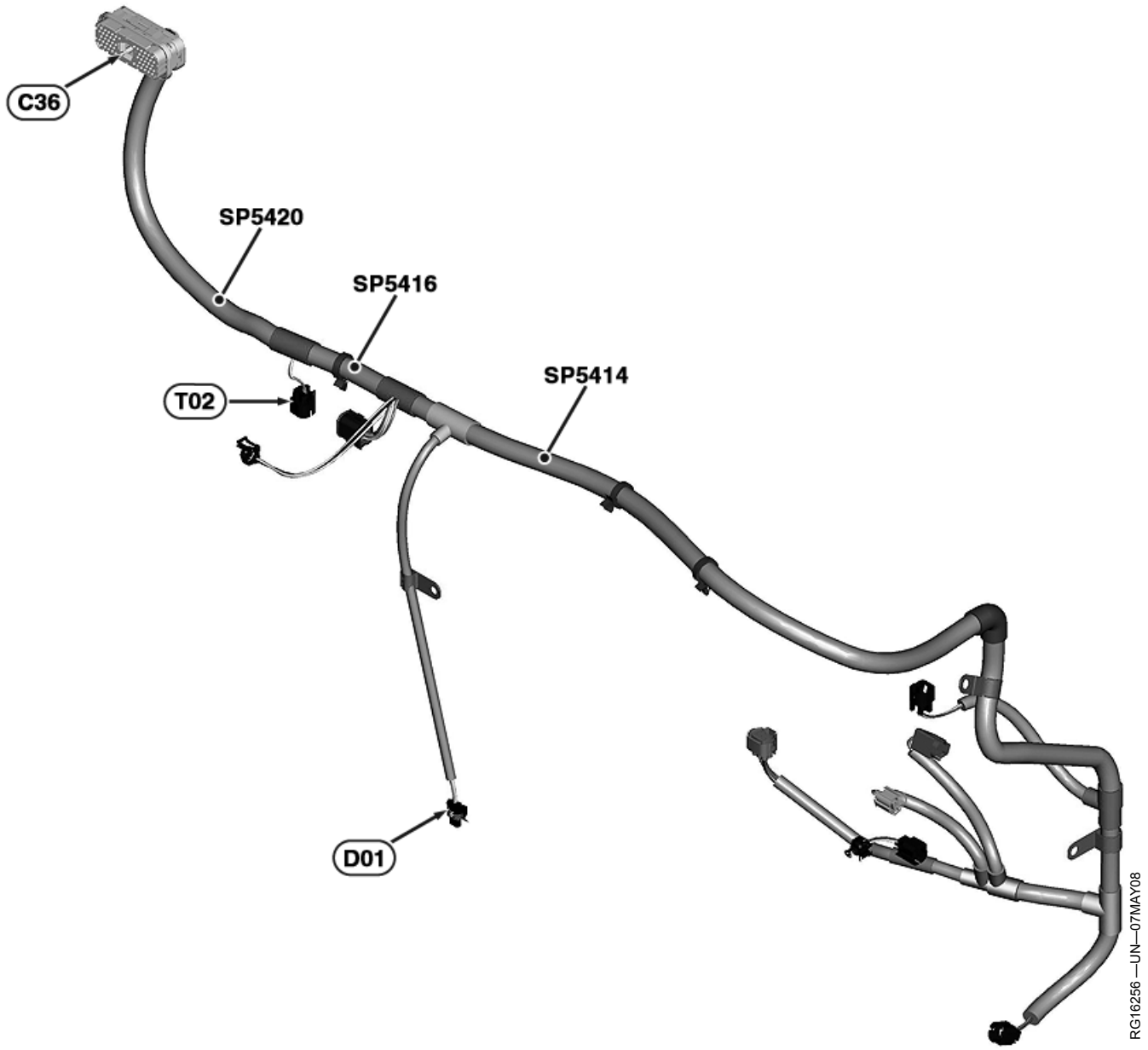


Splice Locations for Wire Harness RE530424, Option Codes 8452, 8454. 8463, 8465, and 8475

A—Splice 5416 Located 200mm (7.9in) from T-Junction to P03
C02— Accessory Connector A
C06— Alternator Excitation
J01— ECU Harness Connector (Black Face)
P03— Low Pressure Fuel Sensor
SP5010—Splice 5010
SP5414—Splice 5414
SP5416—Splice 5416

Continued on next page

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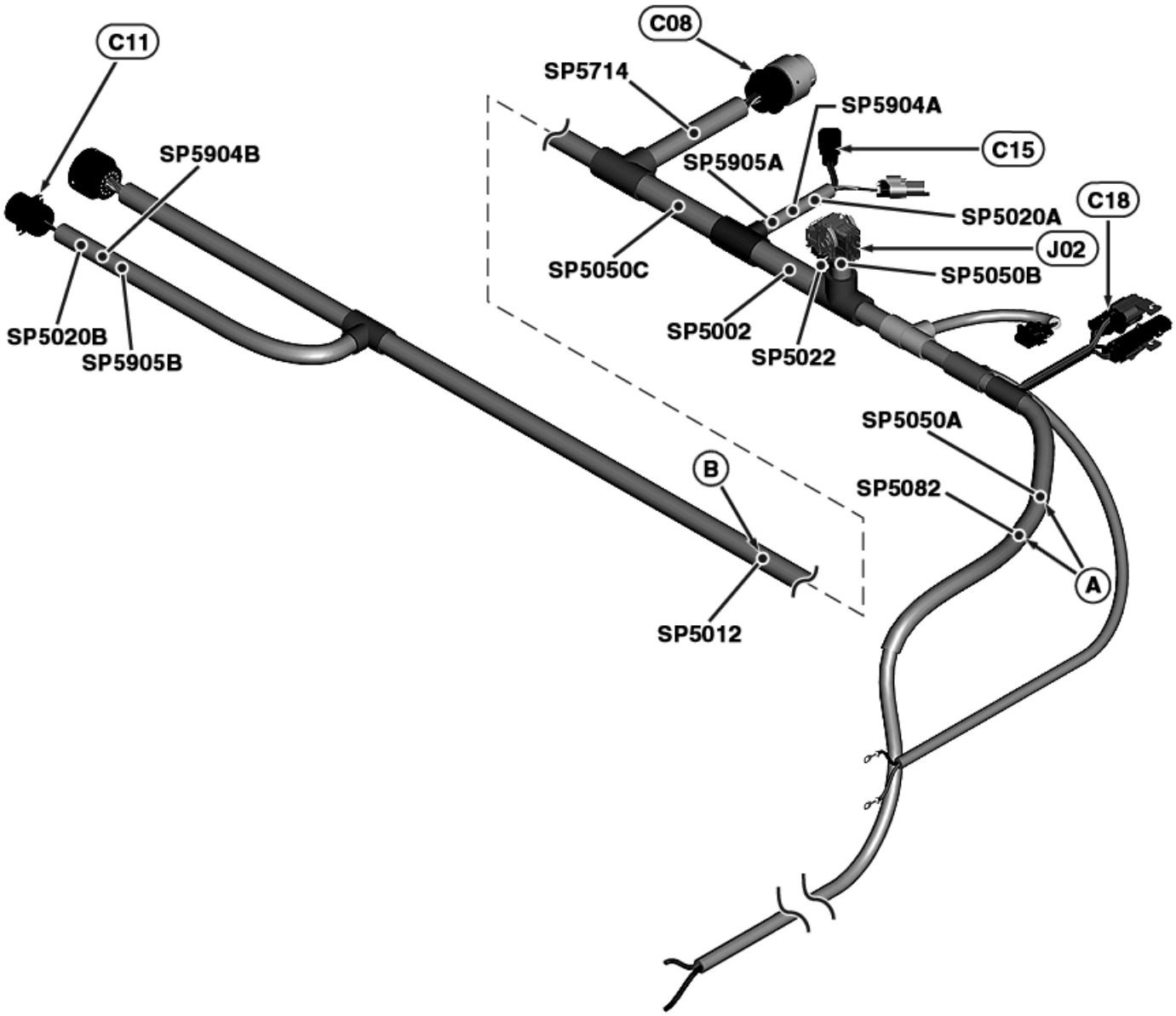


Splice Locations for Wire Harness RE537841, Option Code 84AJ

C36— Switch Box Harness Connector
D01— Water In Fuel Sensor
T02— Intake Manifold Air Temperature Sensor
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5420

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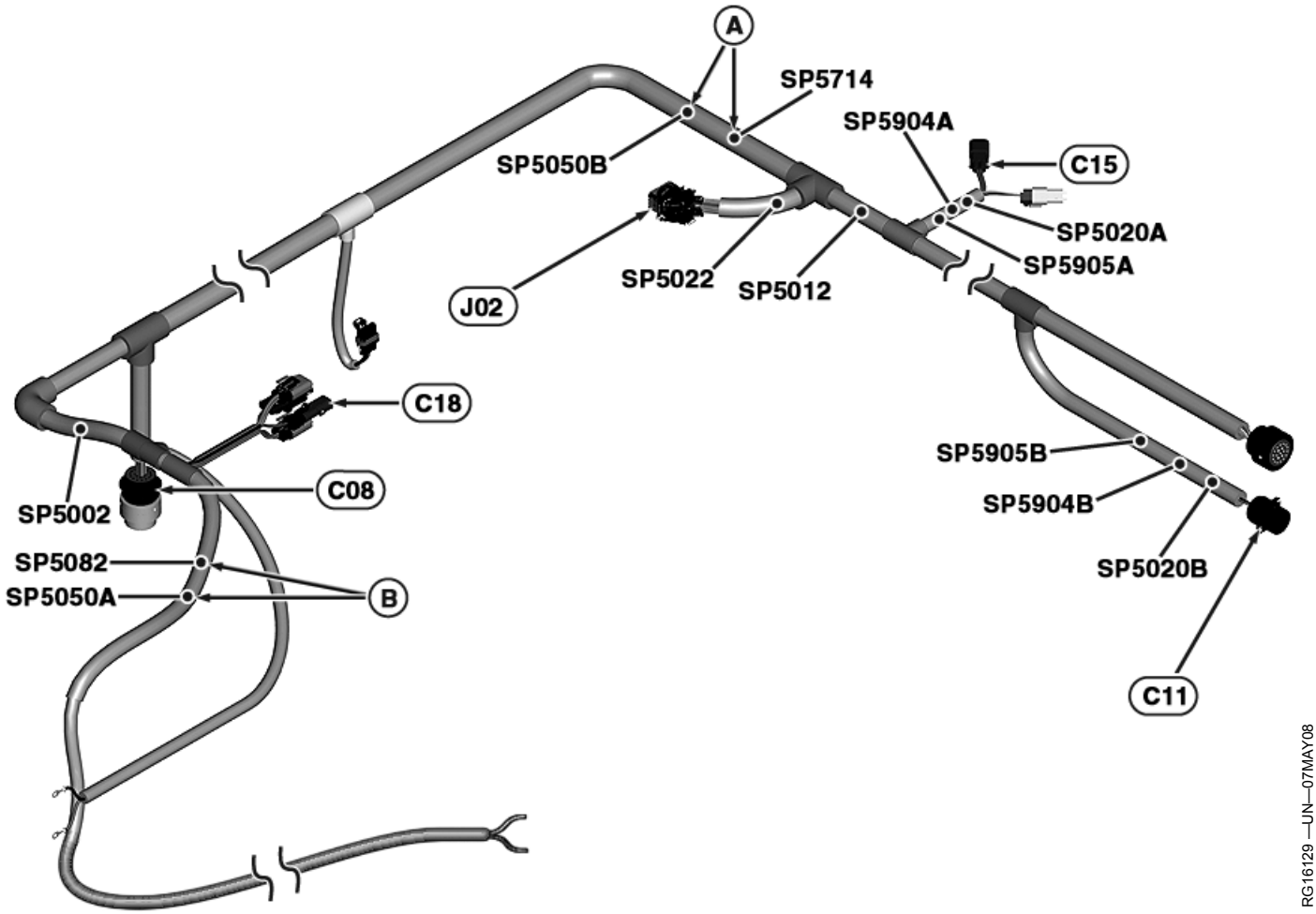


Splice Locations for Wire Harness RE536600, Option Code 9112

A—Splice 5050A and 5082 Located Within 200mm (7.9in) from Harness T-Junction to C18
B—Splice 5012 Located 594mm (23.4in) from Harness T-Junction to C09 and C11
C08— Auxiliary Connector
C11— Diagnostic Connector
C15— Remote Switch
C18— Fuel Heater Option Connector
J02— ECU Harness Connector (Red Face)
SP5002—Splice 5002
SP5012—Splice 5012
SP5020A—Splice 5020A
SP5020B—Splice 5020B
SP5022—Splice 5022
SP5050A—Splice 5050A
SP5050B—Splice 5050B
SP5050C—Splice 5050C
SP5082—Splice 5082
SP5714—Splice 5714
SP5904A—Splice 5904A
SP5904B—Splice 5904B
SP5905A—Splice 5905A
SP5905B—Splice 5905B

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Splice Locations for Wire Harness RE536601, Option Codes 9113 and 9123

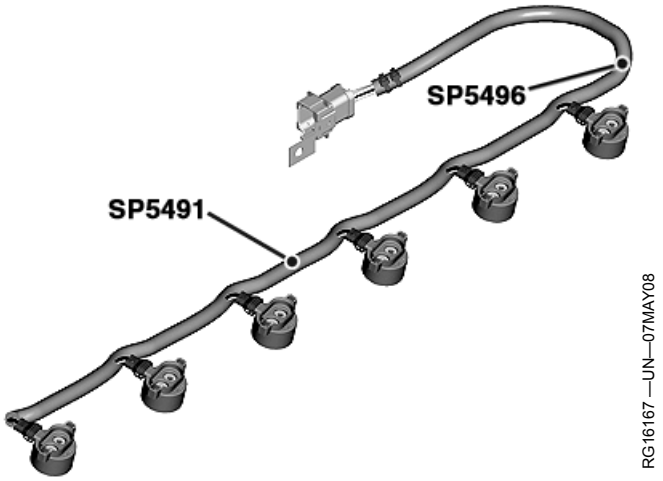
A—Splice 5050B and 5714 Located Within 200mm (7.9in) from Harness T-Junction to J02
B—Splice 5050A and 5082 Located Within 200mm (7.9in) from Harness T-Junction to C18
C08— Auxiliary Connector
C11— Diagnostic Connector
C15— Remote Switch Connector
C18— Fuel Heater Option Connector
J02— ECU Harness Connector (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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SP5491—Splice 5491

SP5496—Splice 5496

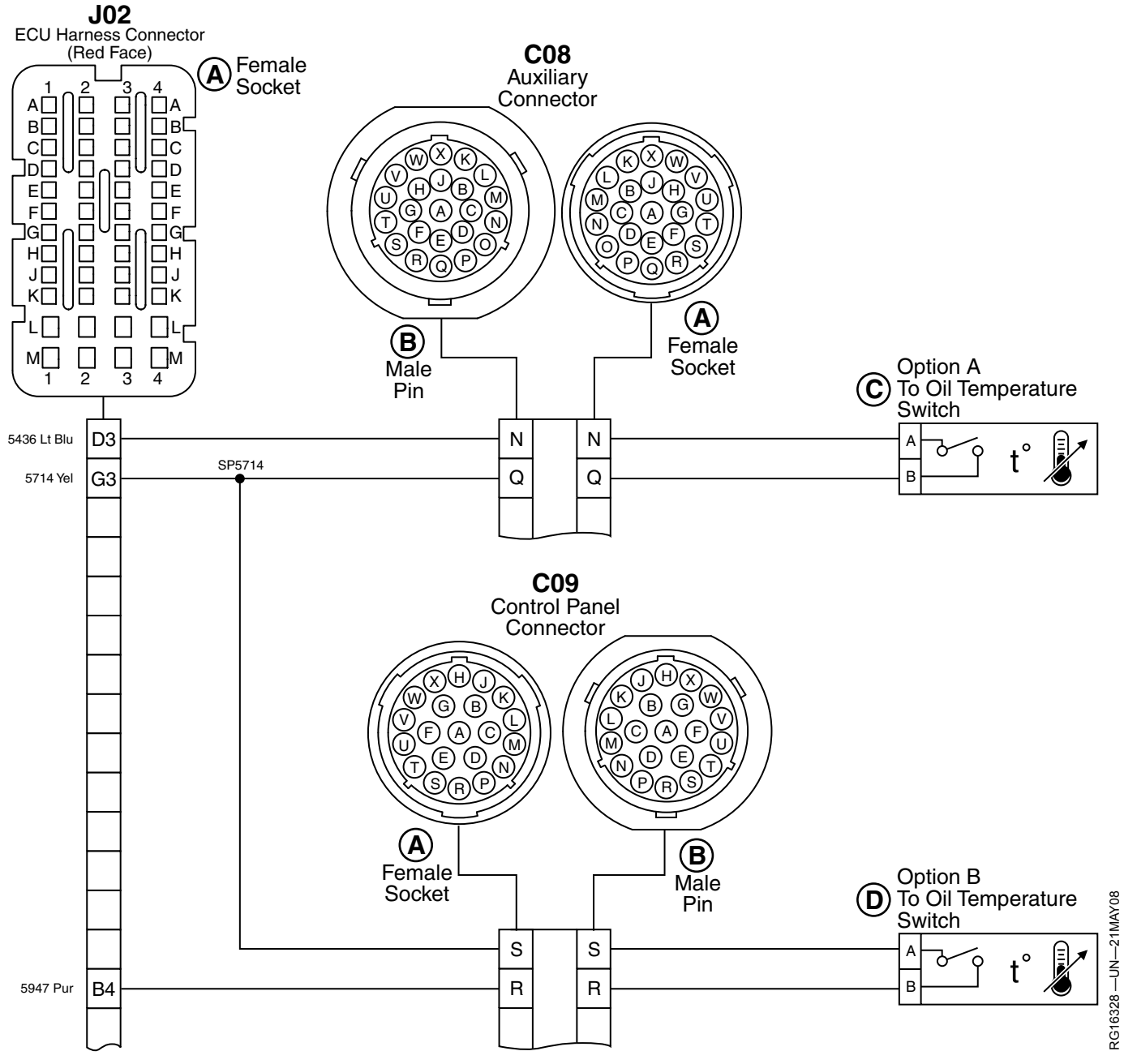


Splice Locations for Wire Harness RE528609 and RE530106. Fuel Injection Harness

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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.



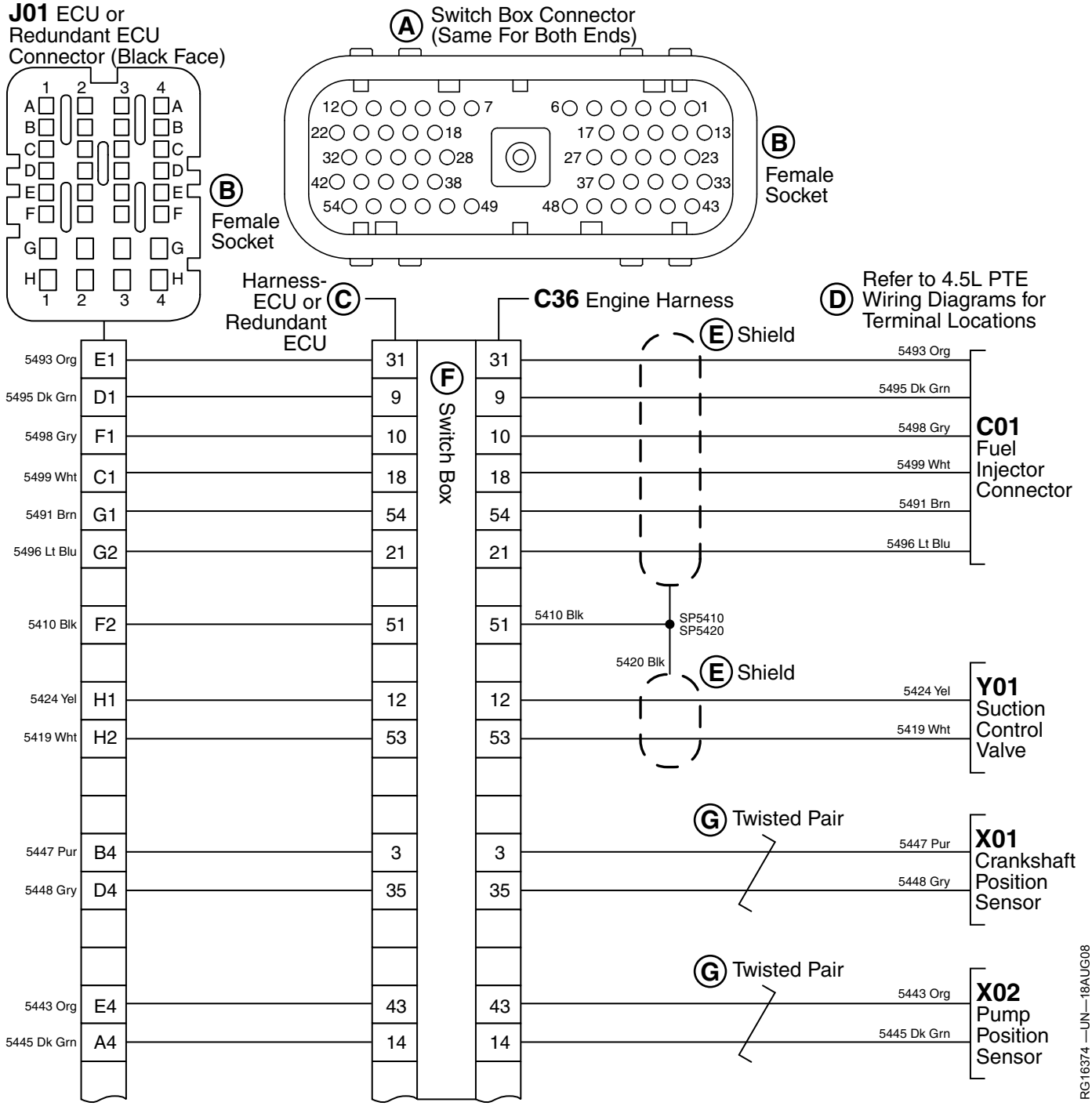
Oil Temperature Switch Wiring Option

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

DM59778,00000C4 -19-19MAY08-1/1

Redundant ECU Option 4.5L Wiring Diagrams

4.5L PTE Redundant ECU Wiring Diagram 1



4.5L PTP Redundant ECU Wiring Diagram 1

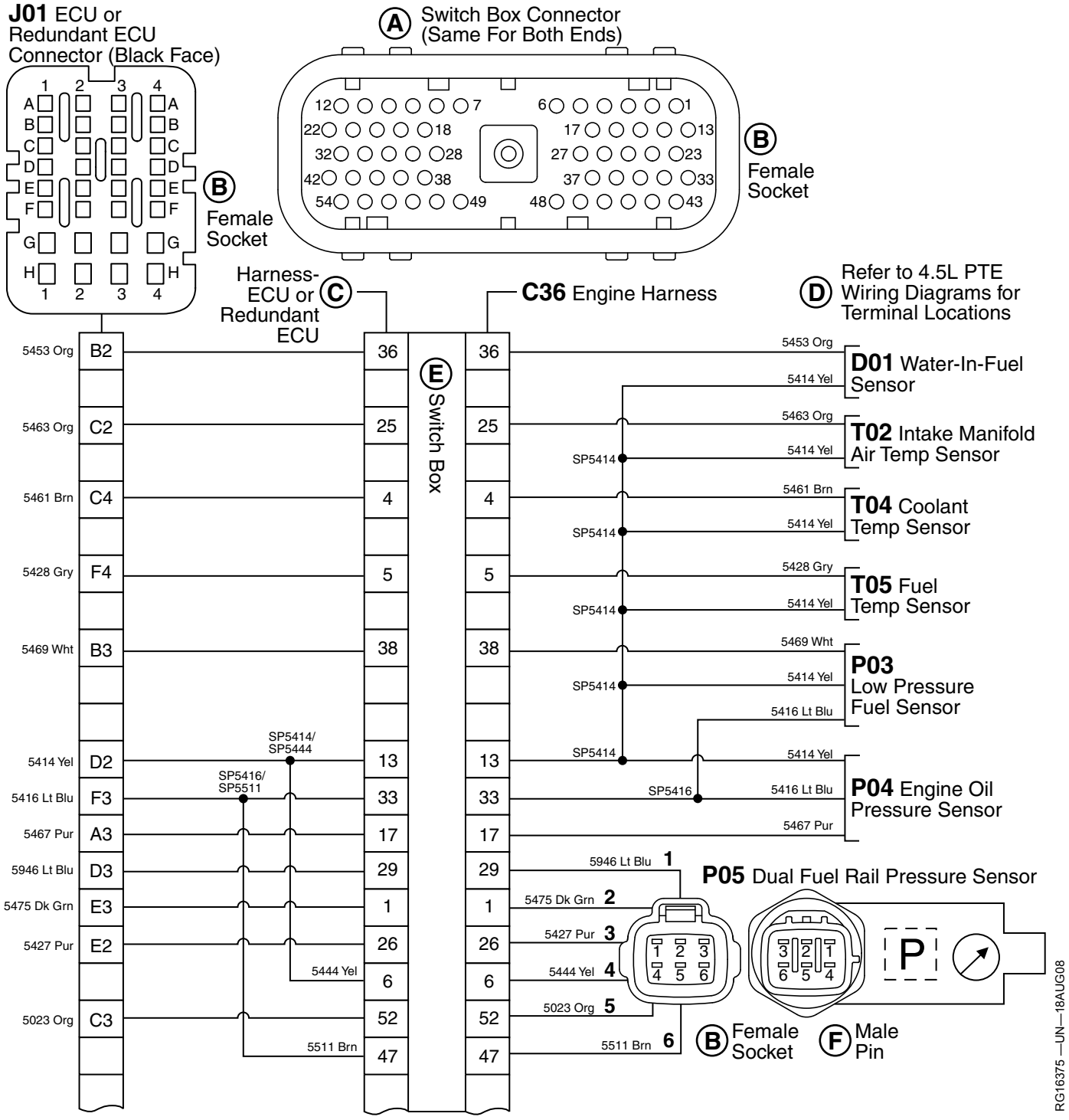
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DM59778,00000C6 -19-18AUG08-1/4

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 4.5L PTE Wiring Diagrams for Terminal Locations
E—Shield
F—Switch Box
G—Twisted Pair
C01— Fuel Injector Connector
C36— Engine Harness
J01— ECU or Redundant ECU Connector (Black Face)
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B4—[5447 Purple] Crankshaft Position Pulse
J1-C1—[5499 White] Injector #2 Inject Pulse
J1-D1—[5495 Dark Green] Injector #4 Inject Pulse
J1-D4—[5448 Gray] Crankshaft Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #3 Inject Pulse
J1-G1—[5491 Brown] Injector #1 & #4 Power
J1-G2—[5496 Light Blue] Injector #2 & #3 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crankshaft Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

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4.5L PTE Redundant ECU Wiring Diagram 2



4.5L PTP Redundant ECU Wiring Diagram 2

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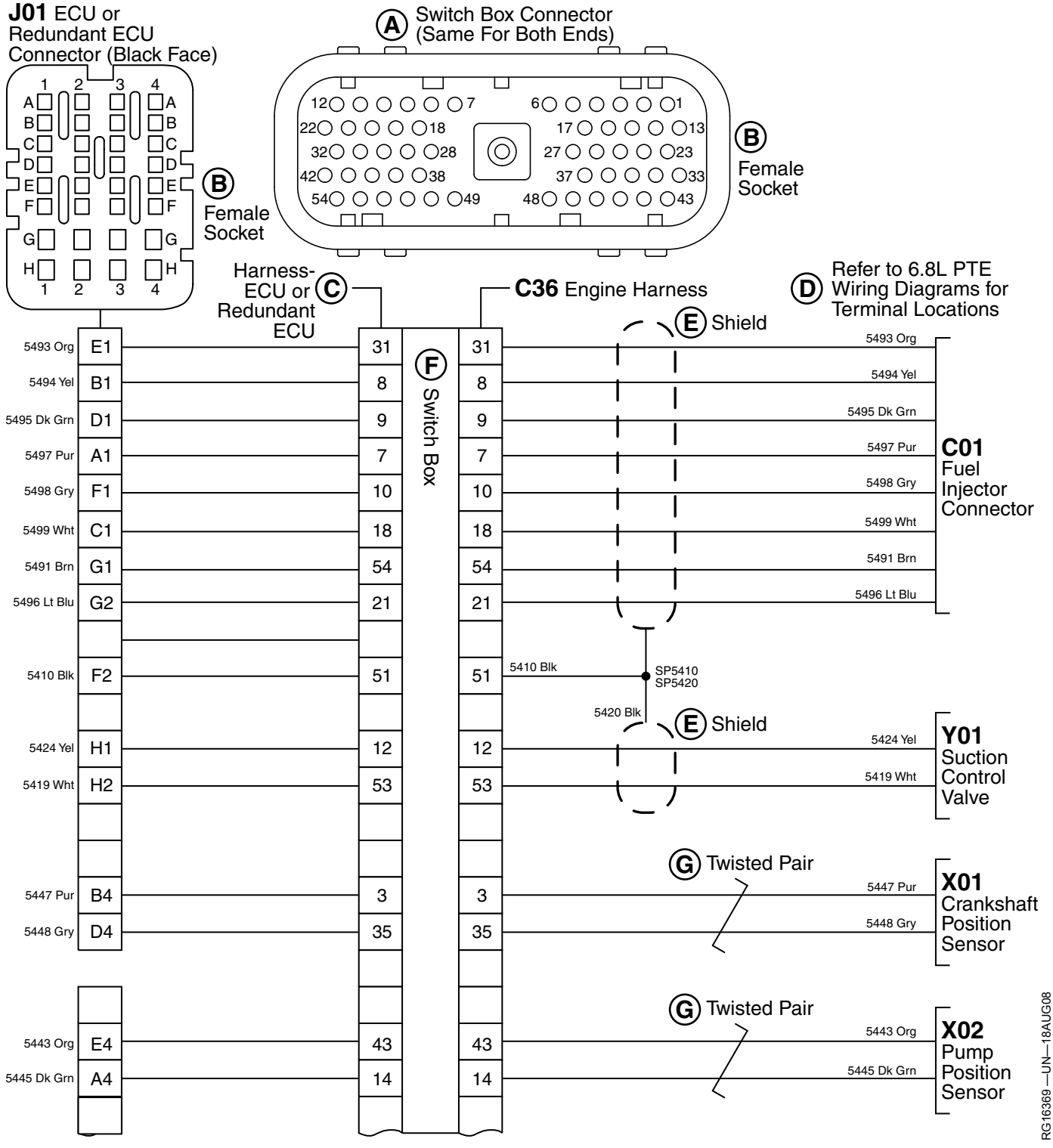
DM59778,00000C6 -19-18AUG08-3/4

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 6.8L PTE Wiring Diagrams for Terminal Locations
E—Switch Box
F—Male Pin
C36— Engine Harness
D01— Water In Fuel Sensor
J01— ECU or Redundant ECU Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C3—[5023 Orange] Redundant Fuel Rail Pressure Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414 Yellow] 5 Volt Power Supply #2B Return (Splice to 5444)
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Primary Fuel Rail Pressure Signal
J1-F3—[5416 Light Blue] 5 Volt Power Supply #2B Positive (Splice to 5511)
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P04— Engine Oil Pressure Sensor
P05— Dual Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

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Redundant ECU Option 6.8L Wiring Diagrams

6.8L PTE Redundant ECU Wiring Diagram 1



6.8L PTP Redundant ECU Wiring Diagram 1

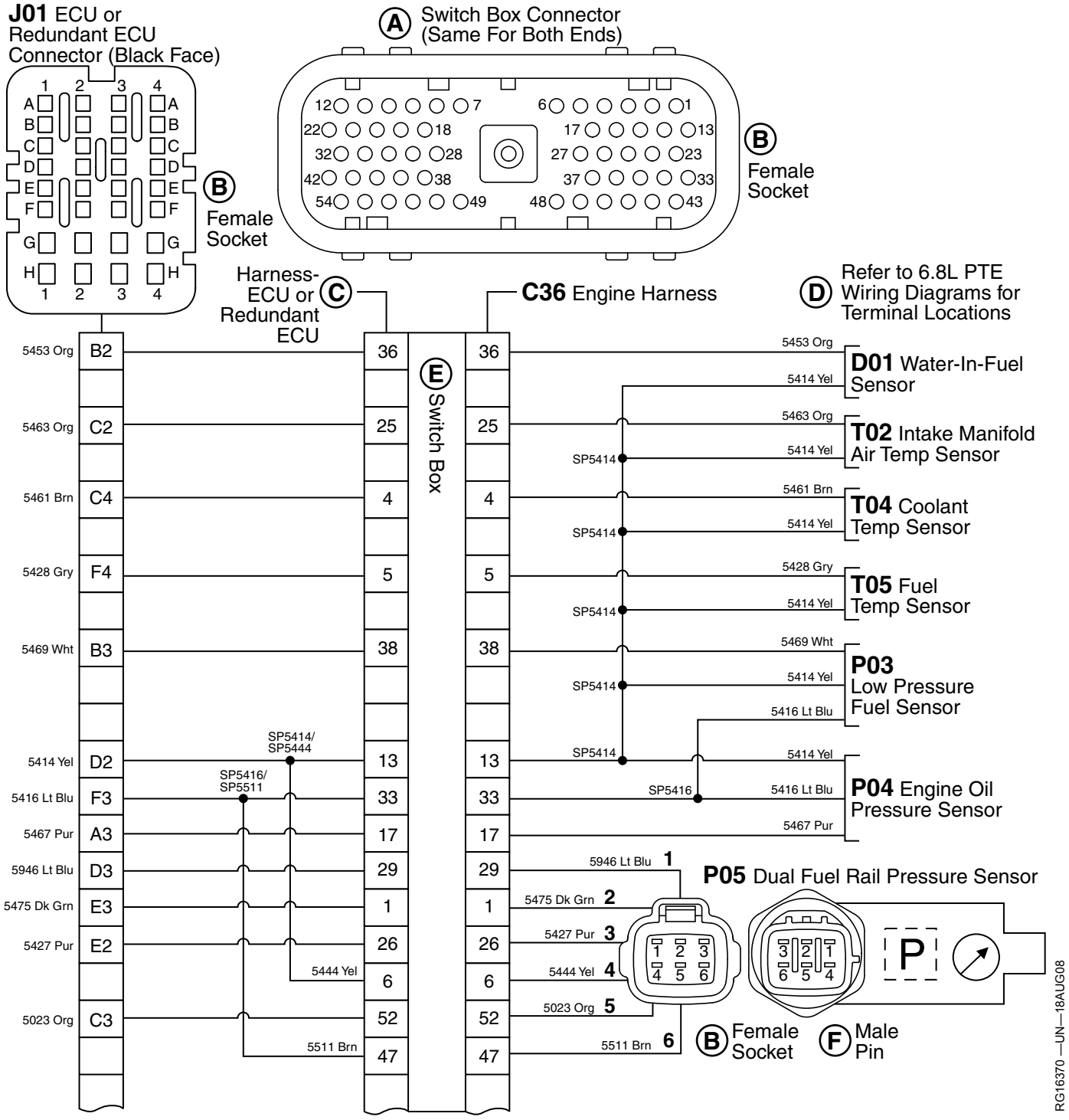
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DM59778,00000CA -19-18AUG08-1/4

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 6.8L PTE Wiring Diagrams for Terminal Locations
E—Shield
F—Switch Box
G—Twisted Pair
C01— Fuel Injector Connector
C36— Engine Harness
J01— ECU or Redundant ECU Connector (Black Face)
J1-A1—[5497 Purple] Injector #4 Inject Pulse
J1-A4—[5445 Dark Green] Pump Position Pulse
J1-B1—[5494 Yellow] Injector #2 Inject Pulse
J1-B4—[5447 Purple] Crankshaft Position Pulse
J1-C1—[5499 White] Injector #6 Inject Pulse
J1-D1—[5495 Dark Green] Injector #3 Inject Pulse
J1-D4—[5448 Gray] Crankshaft Position Return
J1-E1—[5493 Orange] Injector #1 Inject Pulse
J1-E4—[5443 Orange] Pump Position Return
J1-F1—[5498 Gray] Injector #5 Inject Pulse
J1-F2—[5410A Black] Wiring Shield
J1-G1—[5491 Brown] Injector #1& #2 & #3 Power
J1-G2—[5496 Light Blue] Injector #4& #5 & #6 Power
J1-H1—[5424 Yellow] HP Pump Suction Control Valve High Drive
J1-H2—[5419 White] HP Pump Suction Control Valve Low Drive
X01 — Crankshaft Position Sensor
X02— Pump Position Sensor
Y01— Suction Control Valve

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6.8L PTE Redundant ECU Wiring Diagram 2



6.8L PTP Redundant ECU Wiring Diagram 2

Continued on next page

A—Switch Box Connector (Same For Both Ends)
B—Female Socket
C—Harness - ECU or Redundant ECU
D—Refer to 6.8L PTE Wiring Diagrams for Terminal Locations
E—Switch Box
F—Male Pin
C36— Engine Harness
D01— Water In Fuel Sensor
J01— ECU or Redundant ECU Connector (Black Face)
J1-A3—[5467 Purple] Engine Oil Pressure Signal
J1-B2—[5453 Orange] Water In Fuel Signal
J1-B3—[5469 White] Fuel Pressure Signal
J1-C2—[5463 Orange] Intake Manifold Air Temperature Signal
J1-C3—[5023 Orange] Redundant Fuel Rail Pressure Signal
J1-C4—[5461 Brown] Coolant Temperature Signal
J1-D2—[5414 Yellow] 5 Volt Power Supply #2B Return (Splice to 5444)
J1-D3—[5946 Lt Blue] 5 Volt Power Supply #1 Positive
J1-E2—[5427 Orange] 5 Volt Power Supply #1 Return
J1-E3—[5475 Dark Green] Primary Fuel Rail Pressure Signal
J1-F3—[5416 Light Blue] 5 Volt Power Supply #2B Positive (Splice to 5511)
J1-F4—[5428 Gray] Fuel Temperature Signal
P03— Low Pressure Fuel Sensor (If Equipped)
P04— Engine Oil Pressure Sensor
P05— Dual Fuel Rail Pressure Sensor
T02— Intake Manifold Air Temperature Sensor
T04— Coolant Temperature Sensor
T05— Fuel Temperature Sensor

DM59778,00000CA -19-18AUG08-4/4

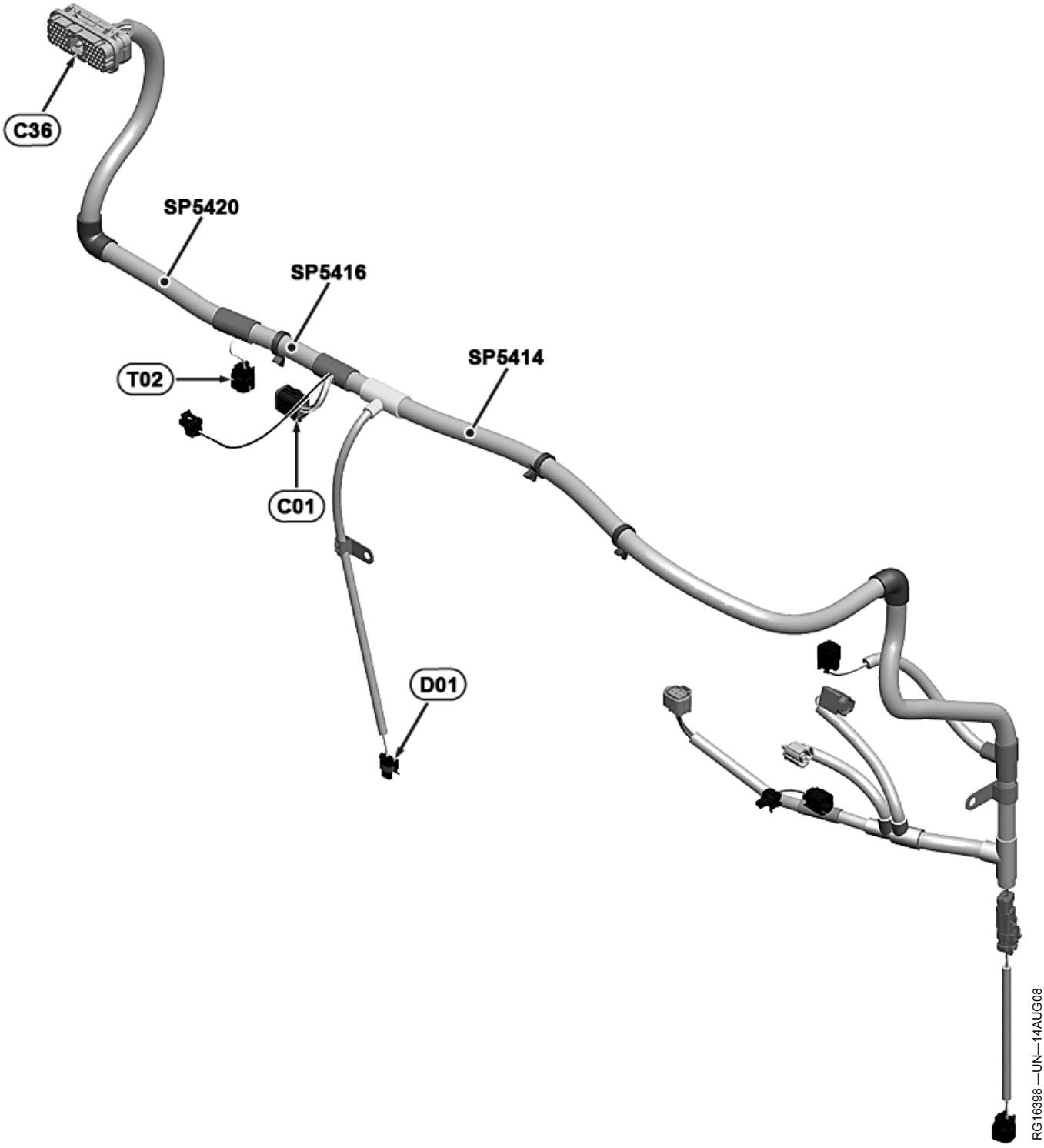
Redundant ECU Option Wire Splice Location Diagrams

NOTE: The option code for the application can be found on the Option Code Label located near the top of the engine block.

NOTE: The harness diagrams provided are for a typical John Deere supplied OEM harness.

Refer to applications manual for other harness wiring diagrams.

Wire harness splice location diagram for 4.5L PTE redundant ECU engine applications



Splice Locations for Wire Harness RE537841, Option Code 84AJ

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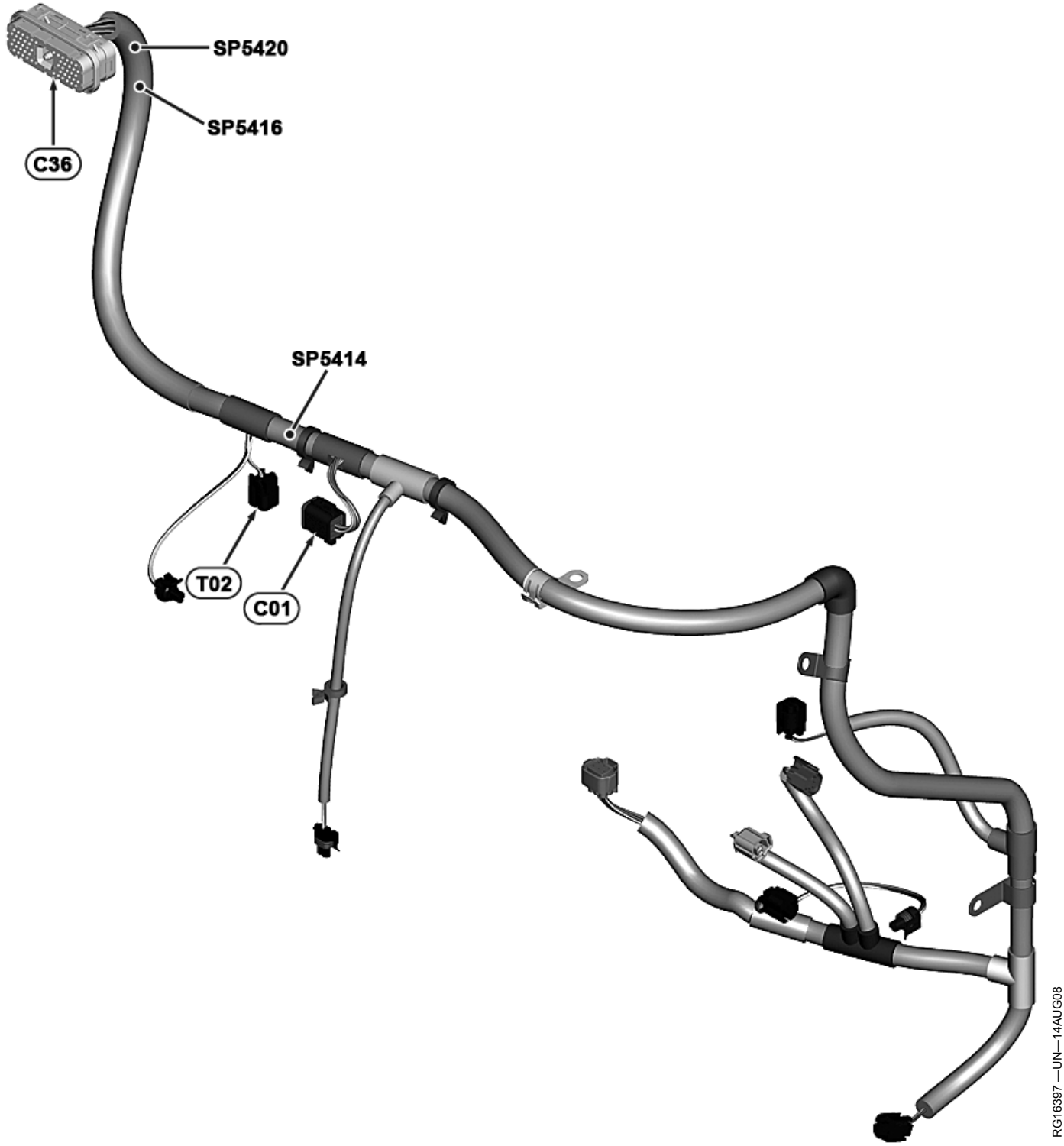
DM59778,00000C7 -19-14AUG08-1/3

C01— Fuel Injector Connector
C36— Switch Box Engine Harness Connector
D01— Water In Fuel Sensor
T02— Intake Manifold Air Temperature Sensor
SP5420—Splice 5410/5420
SP5414—Splice 5414
SP5416—Splice 5416

Continued on next page

DM59778,00000C7 -19-14AUG08-2/3

Wire harness splice location diagram for 6.8L PTE redundant ECU engine applications



Splice Locations for Wire Harness RE537837, Option Code 84AP

C01— Fuel Injector Connector
C36— Switch Box Engine Harness Connector
T02— Intake Manifold Air Temperature Sensor
SP5414—Splice 5414
SP5416—Splice 5416
SP5420—Splice 5410/5420

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