PowerTech™ 8.1L Diesel Engines Level 9 Electronic Fuel System With Denso High Pressure Common Rail

COMPONENT TECHNICAL MANUAL

PowerTech™ 8.1 L Diesel Engines Level 9 Electronic Fuel System With HPCR

CTM255 15FEB11 (ENGLISH)

PREVIEW - YOUFIXTHIS.COM

For complete service information also see:

PowerTech™ 8.1 L Diesel Engines Base Engine	CTM86
OEM Engine Accessories	CTM67
Alternators and Starter Motors	CTM77
Application List (English)	CTM106819

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

Download full manual at youfixthis.com

Contents

Section 01—General
Group 000—Safety
Group 001—Engine Identification
Group 002—Fuels, Lubricants, and Coolant

Section 02—Repair and Adjustments
Group 090—Electronic Fuel System Repair and Adjustments
Group 110—Electronic Engine Control Repair and Adjustment

Section 03—Theory Of Operation
Group 130—Electronic Fuel System Operation
Group 140—Electronic Control System Operation

Section 04—Diagnostics
Group 150—Observable Diagnostics and Tests
Group 160—Trouble Code Diagnostics and Tests

Section 05—Tools
Group 170—Electronic Fuel/Control System Repair Tools and Other Materials
Group 180—Diagnostic Service Tools

Section 06—Specifications
Group 200—Repair Specifications
Group 210—Diagnostic Specifications

PREVIEW - YOUFIXTHIS.COM

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.

COPYRIGHT © 2011
DEERE & COMPANY
Moline, Illinois
All rights reserved.
A John Deere ILLUSTRUCTION ® Manual
Previous Editions
Copyright © 2006,2010

Download full manual at youfixthis.com

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

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.



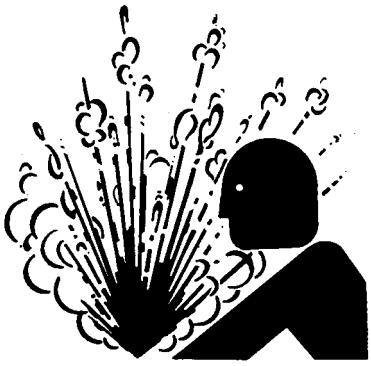
TS1356 —UN—18MAR92

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

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

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine Model Designation

JOHN DEERE ENGINE MODEL—6081

John Deere engine model designation includes number of cylinders, displacement in liters, aspiration, user code, and application code. For example:

6081 HRW01 Engine

6 ..... Number of cylinders
8.1 ..... Liter designation
H ..... Aspiration code
RW ..... User code
01 ..... Application Code

Aspiration Code

D ..... Naturally aspirated
T ..... Turbocharged, no aftercooling
A ..... Turbocharged and water-to-air aftercooled
H ..... Turbocharged and air-to-air aftercooled

User Factory Code

AT ..... Agritalia srl (Vittoria, Sicily, Italy)
CQ ..... S.L.C. Horizontina (Brazil)
DW ..... John Deere Davenport Works
F ..... OEM (Outside Equipment Manufacturers)
FF ..... Kernersville Deere-Hitachi (North Carolina)
FG ..... Goldoni S.P.A. (Modena, Italy)
FM ..... Marine Engines
H ..... John Deere Harvester Works
KV ..... John Deere Commercial Worksite Products (Knoxville TN)
L ..... John Deere Werke—Mannheim, Germany
LA ..... Hohn Deere Werke—Mannheim, Germany (eng. with Bosch VP44 Injection Pump)
LV ..... John Deere Commercial Products (Augusta, Georgia)
N ..... John Deere Des Moines Works
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
T ..... John Deere Dubuque Works
T8 ..... Cameco—Deere (Thibodaux, Louisiana)
TJ ..... Timberjack—Deere (Sweden/Finland/Canada)
YC ..... John Deere Lialian Harvester Co. Limited (China)
Z ..... John Deere Werke Zweibrucken (Germany)

Application Code

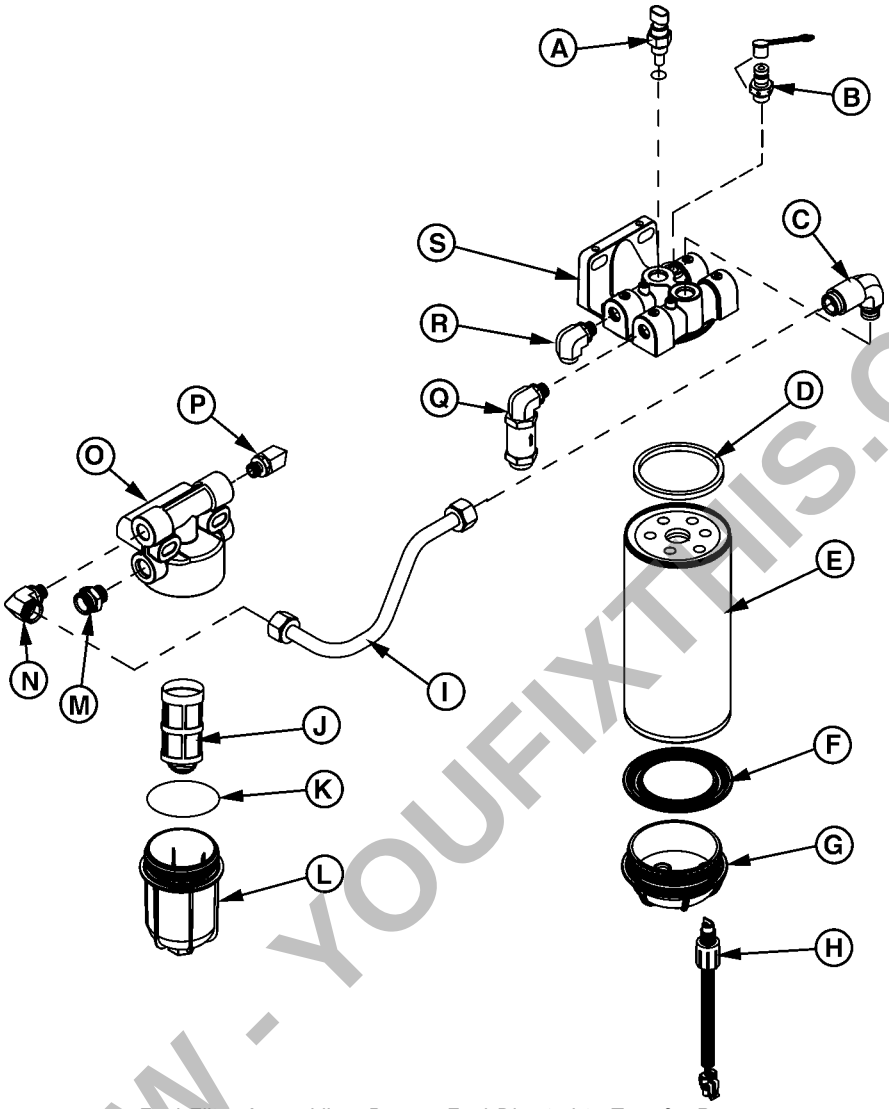
001, etc. ..... See later in this Group

RG,RG34710,1021 -19-23OCT97-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Fuel Filter Assemblies (—246269)



Fuel Filter Assemblies, Bypass Fuel Directed to Transfer Pump

A—Temperature Sensor
B—Diagnostic Port
C—Pressure Relief Valve
D—Gasket
E—Final Fuel Filter Element
F—O-ring
G—Water Separator Bowl
H—Water in Fuel Sensor
I— Fuel Line
J— Primary Fuel Filter
K—O-ring
L—Primary Fuel Filter Bowl
M—Fitting
N—Fitting
O—Primary Fuel Filter Header
P—Fitting
Q—Check Valve
R—Fitting
S—Final Fuel Filter Header

Continued on next page

RG41165,0000039 -19-21DEC00-1/2

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Remove and Install Fuel Filter Head (—246269)

Remove Fuel Filter Head

1. Clean exterior of the final fuel filter/water separator assembly.

CAUTION: Fuel in filter may be under pressure. Open valve on bottom of water separator bowl to relieve pressure prior to removing filter.

2. Drain water and contaminants from water separator bowl into a suitable container.
3. Disconnect WIF sensor connector from bottom of filter.
4. Remove filter element using suitable filter wrench.
5. Disconnect fuel lines from inlet (A) and outlet (B) ports.
6. Disconnect fuel line fitting (C) from pressure relief valve.
7. Remove 2 capscrews (D) from filter head and remove head from mounting bracket on engine.

Install Fuel Filter Head

1. Loosely install filter head to filter mounting bracket. Do not tighten cap screws.
2. Loosely connect fuel lines to fuel filter inlet and outlet ports. Do not tighten.
3. Tighten filter head to mounting bracket on engine to specification.

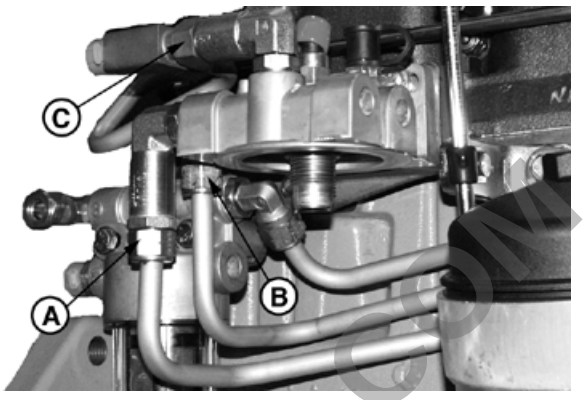
	Specification
Fuel Filter Head to Mounting Bracket Cap Screws—Torque	40 N·m (30 lb-ft.)

4. Tighten fuel lines on the final filter inlet and outlet ports to specification.

	Specification
Fuel Lines—Torque	27 N·m (20 lb-ft.)

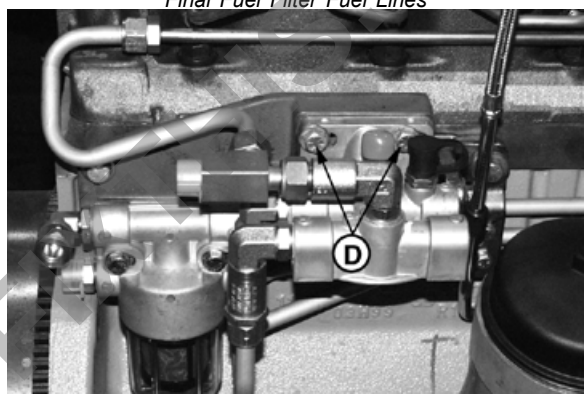
5. Connect and tighten fuel line to pressure relief valve to specification.

	Specification
Fuel Line - Attach to Final Fuel Filter Relief Valve—Torque	27 N·m (20 lb-ft.)



RG12280A —UN—22APR02

Final Fuel Filter Fuel Lines



RG12281A —UN—22APR02

Filter Head Cap Screws

A—Fuel Inlet Line
B—Fuel Outlet Line
C—Relief Valve
D—Filter Head Cap Screws

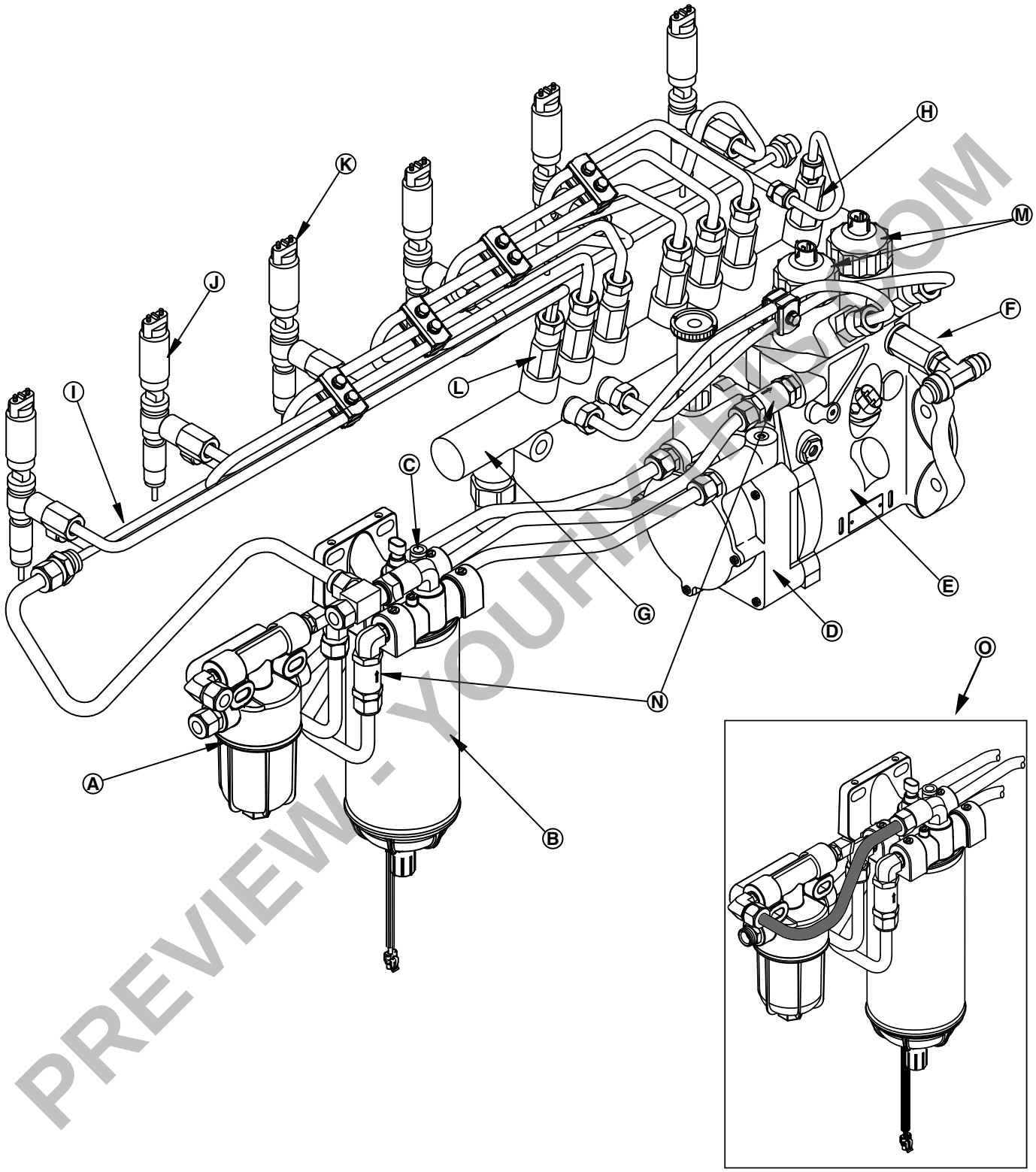
6. Lubricate gasket and install filter element onto base. Tighten 3/4 turn after packing contacts base.
7. Make sure that drain valve is closed on the bottom of the filter element.
8. Connect WIF sensor connector.
9. Bleed the fuel system. See BLEED THE FUEL SYSTEM (—246269) in Section 04, Group 150 later in this manual.

RG41165,0000038 -19-16APR02-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Fuel System Operation



Fuel System, Single Filter Type (—246269)

Continued on next page

RG41221,000000B -19-25FEB09-1/3

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

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 8.1 L Diesel Engines Base Engine Manual (CTM 86). Group 150 is divided into two areas: diagnosing malfunctions and test procedures. The diagnosing malfunctions area is further divided into the following headings, containing the following observable symptoms:

NOTE: Follow the diagnostic procedure of an active or stored DTC before pursuing any observable diagnostic procedure.

NOTE: To diagnose observable symptoms on engines with a mechanical fuel system, see 8.1 L Diesel Engines Mechanical Fuel Systems Manual (CTM 243).

- (E) Diagnosing General Engine Malfunctions:
  - E1 - Engine Cranks/Won't Start
  - E2 - Engine Misfires/Runs Irregularly
  - E3 - Engine Does Not Develop Full Power
  - E4 - Engine Emits Excessive White Exhaust Smoke
  - E5 - Engine Emits Excessive Black or Gray Exhaust Smoke
  - E6 - Engine Will Not Crank
  - E7 - Engine Idles Poorly
  - E8 - Abnormal Engine Noise
- (F) Diagnosing Fuel System Malfunctions:
  - F1 - Fuel supply system check
  - F2 - Excessive fuel consumption
  - F3 - Fuel in oil
- (D) Diagnosing Diagnostic Software Malfunctions:
  - D1 - ECU Does Not Communicate With DST or SERVICE ADVISOR™
  - D2 - Diagnostic Gauge Does Not Communicate With ECU
- (A) Intake Air Heater Check

Procedures for diagnosing some of the above symptoms are formatted such that a test or repair is recommended, then based on the results another test or repair is recommended. Other symptoms are formatted in a symptom-problem-solution format. In these symptoms, the problems are arranged in the most likely or easiest to check first. Symptoms arranged in both formats refer to testing procedures in the second part of this section. The second part of this section manual contains the following testing procedures:

- Fuel System Testing Procedures:
  - Check Fuel Supply Quality
  - Test for Air in Fuel
  - Check Fuel Supply Pressure
  - Check for Restricted Fuel Return Line
  - Bleed the Fuel System
  - Restarting Engine That Has Run Out Of Fuel
  - Check and Adjust High Pressure Fuel Pump Static Timing
- Electrical Concepts
- Using a Digital Multimeter
- Electrical Circuit Malfunctions
- Troubleshooting Circuit Malfunctions

SERVICE ADVISOR is a trademark of Deere & Company

DPSG,RG40854,512 -19-06MAR00-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

List of Diagnostic Trouble Codes (DTCs) on ECU

List of SPN/FMI Codes

SPN	FMI	2-Dig/3-Dig	Description
000028	03		Throttle Voltage High
	04		Throttle Voltage Low
000029	03		Throttle Voltage High
	04		Throttle Voltage Low
	14		Throttle Voltage Out of Range
000084	09	197	Vehicle Speed Invalid or Missing
000091	03	13	Throttle Voltage High
	04	14	Throttle Voltage Low
	08	15	PWM Throttle Abnormal Pulse Width
	09	27	Throttle Invalid
	14		Throttle Voltage Out of Range
000094	03	50/127	Fuel Rail Pressure Input Voltage High
	04	51/129	Fuel Rail Pressure Input Voltage Low
	10	71/171	Fuel Rail Pressure Loss Detected
	17	72/172	Fuel Rail Pressure Not Developed
000097	00		Water in Fuel Continuously Detected
	03	76/176	Water in Fuel Signal Voltage High
	04	76/176	Water in Fuel Signal Voltage Low
	16	75/175	Water in Fuel Detected
	31		Water in Fuel Detected
000100	01	65	Engine Oil Pressure Extremely Low
	03		Engine Oil Pressure Input Voltage High
	04		Engine Oil Pressure Input Voltage Low
	16		Engine Oil Pressure Above Normal at 0 RPM
	18	64	Engine Oil Pressure Moderately Low
000102	03		Manifold Air Pressure Input Voltage High
	04		Manifold Air Pressure Input Voltage Low
000105	03	23	Manifold Air Temperature Input Voltage High
	04	24	Manifold Air Temperature Input Voltage Low
	16	66	Manifold Air Temperature Moderately High
000107	00		Air Filter Differential Pressure
000110	00	63	Engine Coolant Temperature Extremely High
	03	25	Engine Coolant Temperature Input Voltage High
	04	26	Engine Coolant Temperature Input Voltage Low
	15		Engine Coolant Temperature High Least Severe
	16	62	Engine Coolant Temperature Moderately High
	31		Engine Coolant Temperature High
000111	01	61	Engine Coolant Level Low
000158	17	84	ECU Power Down Error
000160	02	88	Wheel Speed Input Noise
000171	03		Ambient Air Temperature Voltage OOR high
	04		Ambient Air Temperature Voltage OOR low
000174	00		Fuel Temperature High Most Severe
	03	37	Fuel Temperature Input Voltage High
	04	38	Fuel Temperature Input Voltage Low
	16	80/81	Fuel Temperature High Moderately Severe
000189	00		Engine Speed Derate
000190	00		Engine Overspeed Extreme

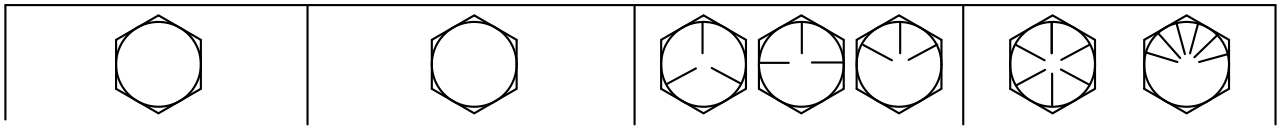
Continued on next page

RG,RG34710,1563 -19-07APR03-1/5

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

Unified Inch Bolt and Screw Torque Values

TS1671 —UN—01MAY03



Bolt or	SAE Grade 1				SAE Grade 2[a]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
Screw	Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]	
Size	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in	N·m	lb-in
1/4	3,7	33	4,7	42	6	53	7,5	66	9,5	84	12	106	13,5	120	17	150
													N·m	lb-ft	N·m	lb-ft
5/16	7,7	68	9,8	86	12	106	15,5	137	19,5	172	25	221	28	20.5	35	26
									N·m	lb-ft	N·m	lb-ft				
3/8	13,5	120	17,5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N·m	lb-ft	N·m	lb-ft	N·m	lb-ft								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N·m	lb-ft														
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

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

[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, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C zinc flake coating.
[c]"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B zinc flake coating.

TORQ1 -19-24APR03-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Articulated Dump Trucks - ECU Terminal Identification

ECU Terminal Function	ECU Terminal #	Connector Terminal #
Battery Power	B1, B2	Battery (+)
Battery Power, Switched	E3	IGN, fault lamp, warning lamp
CAN High, CAN Low	L1, L2	Accessible in several connectors on engine harness.
Crankshaft Position Sensor Input	W1	B
Crankshaft Position Sensor Return	W2	A
Cylinders 1, 2, and 3 EI 90 V Supply	A2	8
Cylinder 1 EI Control	E1	1
Cylinder 2 EI Control	F1	2
Cylinder 3 EI Control	H1	3
Cylinders 4, 5, and 6 EI 90 V Supply	A1	7
Cylinder 4 EI Control	F2	4
Cylinder 5 EI Control	E2	5
Cylinder 6 EI Control	G1	6
Engine Coolant Temperature Input	X2	G
Fuel Rail Pressure Sensor 5V Supply	R3	3
Fuel Rail Pressure Sensor Input	R1	2
Fuel Rail Pressure Sensor Return	P3	1
Fuel Temperature Input	X3	G
Manifold Air Temperature Input	Y2	G
Oil Pressure Input	T2	S
PCV 1 Return	K3	PCV1
PCV 2 Return	K2	PCV2
PCV's Supply Voltage	J1	B+
Pump Position Sensor Input	X1	G+
Pump Position Sensor Return	W3	G-
PWM Throttle Input	R2	4 (Accel. Pedal)
Sensor Return 1 and 2	N3 and P2	(Coolant Temp, Fuel Temp., Manifold Air Temp., Water-in-Fuel) — (Oil Pressure Sensor)
Sensor 5V Supply (Excitation) 1	N1	4 (Accel. Pedal via Resistor)
Sensor 5V Supply (Excitation) 2	P1	+ (Oil Pressure Sensor)
System Ground	C2, C3	Battery (—)
Water In Fuel Input	Y3	G

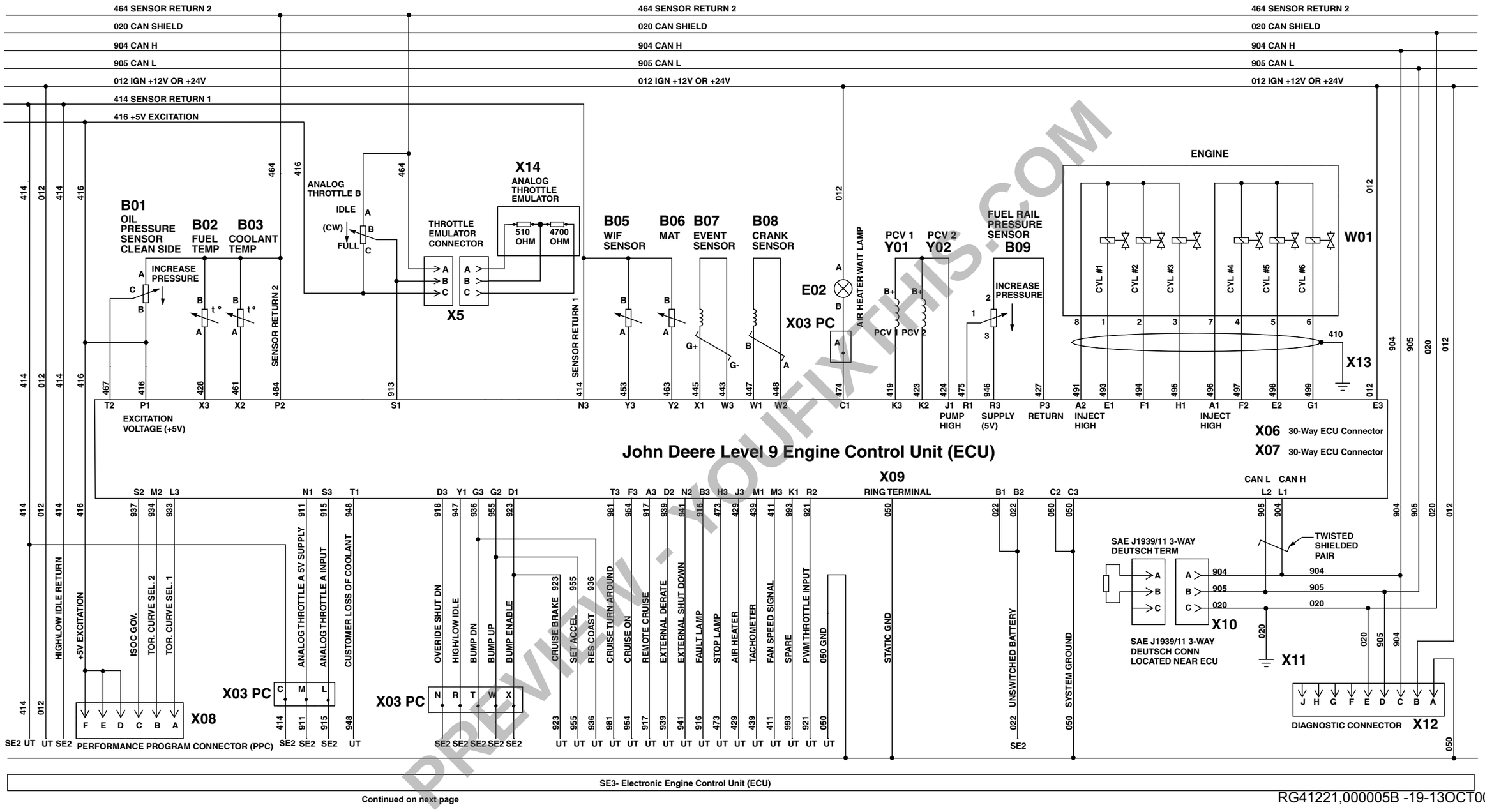
RG41221,000000D -19-02AUG02-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Electronic Control System Wiring Diagram

RG11345 —19—24OCT01



RG41221,000005B -19-13OCT00-1/2

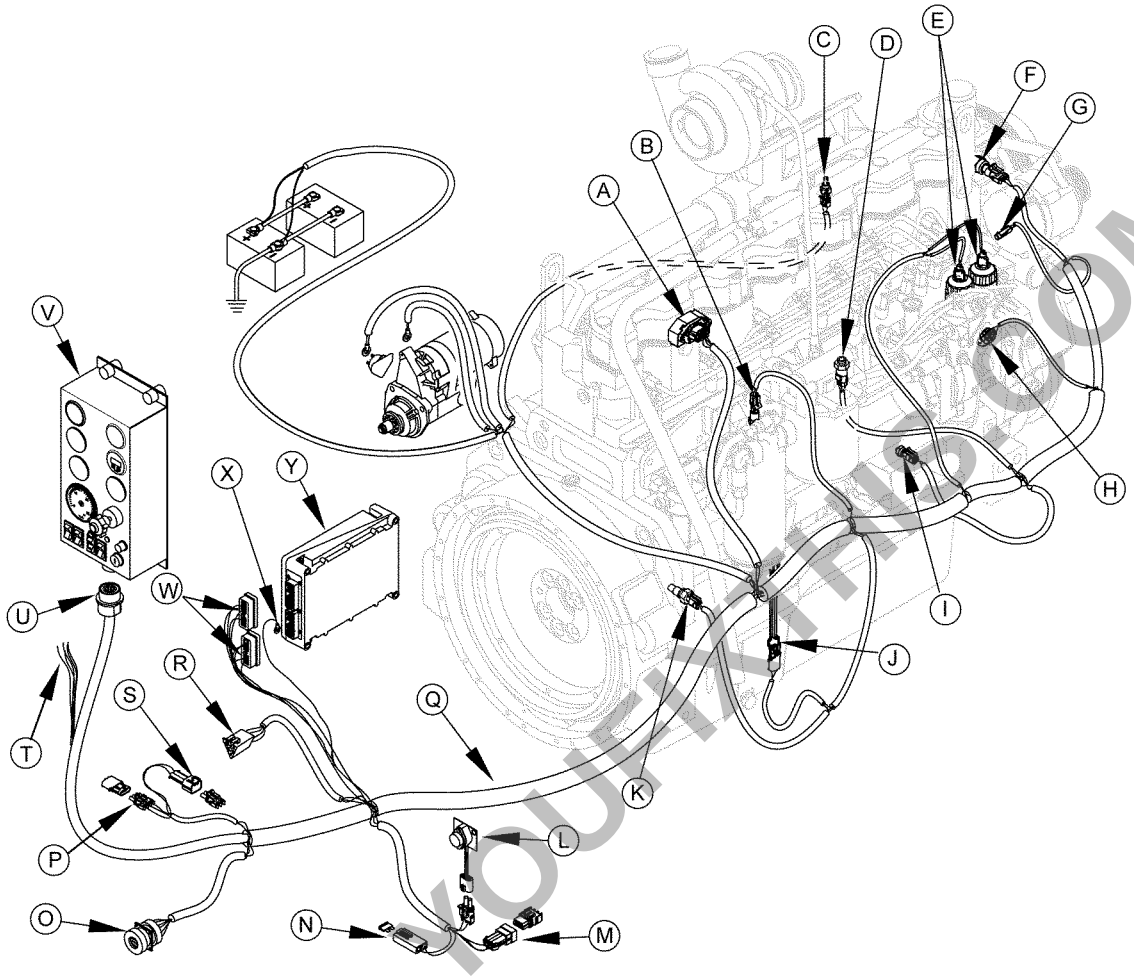
PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Electronic Engine Control System and Sensors



RG14305 —UN—14JUL05

A—Electronic Injector (EI) Wiring Harness Connector
B—Fuel Temperature Sensor
C—Manifold Air Temperature Sensor (MAT)
D—Fuel Rail Pressure Sensor
E—Pump Control Valves (PCVs)
F—Engine Coolant Temperature Sensor (ECT)
G—Alternator Ignition Connector
H—Pump Position Sensor
I— Oil Pressure Sensor
J—Water In Fuel (WIF) Sensor Harness
K—Crankshaft Position Sensor
L—Transient Voltage Protection (TVP) Module
M—Performance Program Connector
N—Main System Fuse (10A)
O—CAN Diagnostic Connector
P—Secondary Analog Throttle Connector
Q—Engine Wiring Harness
R—SAE 1939 CAN Connector
S—Remote On/Off Connector
T—Unterminated Wires
U—Instrument Panel Connector
V—Optional Instrument Panel
W—ECU Connectors
X—System Ground
Y—Engine Control Unit

RG41183,0000091 -19-06DEC00-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

- Limit maximum fuel for operation on multiple power curves
- Provide all-speed governing
- Provide self-diagnosis on the control system
- Store trouble codes in memory

The ECU connects to the wiring harness through two 30-way ECU connectors. Each connectors is marked by terminal numbers.

The ECU is comprised of the following subsystems:

Analog/Digital Converters

This portion of the ECU converts the analog voltage signals from the various sensors into digital signals that the central processing unit can “understand”.

Central Processing Unit (CPU)

The central processing unit performs the mathematical computations and logical functions that are necessary in controlling injection fuel quantity and injection timing. The CPU communicates its desired fuel quantity and timing to the high pressure fuel pump and EIs and it controls the self diagnostic system.

Memory

The ECU contains 3 different types of memory:

— Random Access Memory - RAM

The RAM is like the working desk top of the ECU. Data from the various sensors and the results of various calculations are temporarily stored in RAM. Information in RAM is lost when battery voltage to the ECU is removed.

— Read Only Memory - ROM

The ROM contains programmed information. Information in ROM can only be read, not changed. ROM information is retained when battery voltage is removed.

— Electrical Erasable Programmable Read Only Memory - EEPROM

The EEPROM contains information programmed in at the factory including engine specific data, and application data. Information in the EEPROM is retained when battery voltage is removed.

RG41221,0000023 -19-09OCT00-2/2

Controlled Area Network (CAN)

The CAN buss is a high-speed open interconnect network for electronic systems on on-highway and off-road vehicles and stationary equipment. It allows electronic systems to communicate with each other through a standard architecture of electronic signals over shielded twisted-pair wires. Engines can communicate with throttles, transmissions and brakes. Vehicles can communicate with trailers. Agricultural and construction equipment can communicate with implements and accessories. Stationary equipment can communicate with controllers or other networked equipment. Information on the network can be displayed to the operator on a virtual terminal (instrument 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 in two different locations on the engine wiring harness. A round Deutsch 9-pin connector is provided primarily for service/diagnostic purposes. A Deutsch 3-pin wedge connector, intended for customer computer interface, has also been provided.

Just about any type of information can be communicated over the CAN Bus. Depending on the application, information like throttle position, application requested derates and or engine protection, displaying engine information on vehicle displays, ect., is transferred between vehicle controllers.

CAN also allows diagnostic software like the Diagnostic Scan Tool (DST) and SERVICE ADVISOR™ to communicate with our engine controller. All of the information viewed through the software is transferred from the controller via the CAN Bus.

SERVICE ADVISOR is a trademark of Deere & Company

RG41221,0000248 -19-16AUG01-1/1

Pilot Injection

Pilot injection is a small amount of fuel that is injected just prior to normal injection. The benefits of pilot injection are reduced combustion noise, improved cold starting, and reduced white smoke. Pilot injection is turned on by the ECU when coolant temperature is below 70°C (158°F).

Pilot injection will turn off 10 minutes after engine start or when coolant temperature exceeds 70°C.

Also, if engine speed drops below 700 rpm when low idle speed is 800 rpm, pilot injection is turned on. This helps prevent detonation that can occur at very low speeds.

WL30140,0000018 -19-04AUG05-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

F2 - Excessive Fuel Consumption

Symptom	Problem	Solution
Excessive Fuel Consumption	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.

DPSG,RG40854,666 -19-25MAY00-1/1

F3 - Fuel in Oil

Symptom	Problem	Solution
Fuel in Oil	Faulty high pressure fuel pump front seal	Replace front seal.

DPSG,RG40854,667 -19-25MAY00-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Data Parameters on Diagnostic Tools

Following is a list of the ECU data parameters that can be read on the Diagnostic Scan Tool (DST) or SERVICE ADVISOR™. The DST consists of a Windows (’95 or ’98 or 2000) or NT compatible computer and JDIS121 - ECU Communication Hardware Kit available from John Deere. Included in the list below is a brief description of each parameter, the range of possible readings, and each parameter’s unit of measurement. Depending on application, not all parameters may be available.

Parameter	Units	Description
Analog Throttle A Input Voltage	volts	The return voltage to ECU from analog throttle A position sensor (potentiometer) ECU.
Analog Throttle B Input Voltage	volts	The return voltage to ECU from analog throttle B position sensor (potentiometer) to ECU.
Analog Throttle C Input Voltage	volts	The return voltage to ECU from analog throttle C position sensor (potentiometer) to ECU.
Battery Voltage, Switched	volts	Voltage at IGN terminal.
Battery Voltage, Unwitched	volts	Voltage at the battery.
Brake Hydraulic Temperature	°C	Temperature of brake fluid.
Brake Pressure Sensor Input Voltage	volts	The return voltage to ECU from brake pressure sensor.
Commanded Power	kW	ECU calculates horsepower based on engine fueling.
Commanded Torque	Nm	ECU calculates torque based on engine fueling.
Crankshaft Position Improper Pattern Indicator	%	A "0" reading means that there is NO improper pattern. Between 0—100, the crank pattern becomes progressively more improper. When 100 is reached, a trouble code is set.
Crankshaft Position Input Noise Indicator	%	A "0" reading means that there is NO noise. Between 0—100, crank noise becomes progressively worse. When 100 is reached, a trouble code is set.
Crankshaft Position Sensor	rpm	The speed of the crank shaft.
Crankshaft Position Status	1-15	When status is 15, the ECU is receiving ALL of the signal. When the status is below 15, it means that the ECU is not receiving all of the signal.
Cruise Accelerate Switch	N/A[a]	The cruise accelerate function has been activated. This should increase the speed at which cruise is set.
Cruise Brake Switch	N/A[a]	The cruise brake function has been activated. This will cancel the cruise when the brake is applied until operator resumes operation.
Cruise Clutch Switch	N/A[a]	The cruise clutch function has been activated. This will cancel the cruise when the clutch is applied until operator resumes operation.
Cruise Coast Switch	N/A[a]	The cruise coast function has been activated. This should decrease the speed at which cruise is set.
Cruise Control Active	N/A[a]	Confirms that cruise is ON/OFF depending on the operators command.
Cruise Control State	N/A[a]	Confirms that the function chosen by the operator is activated: hold, accelerate, coast, resume, set, throttle override.
Cruise Control On/Off Switch	N/A[a]	The operator has turn the cruise ON/OFF.

[a] *N/A = Not Applicable*

Parameter	Units	Description
Cruise Resume Switch	N/A[a]	The cruise resume function has been activated. This will reset the cruise to the speed at which cruise was at prior to using the brake or clutch.
Cruise Set Switch	N/A[a]	The cruise set function has been activated. This should lock the current engine speed in when switch is activated.
Desired Speed Governor Curve	Curve #	The mode selected is dependent on the application. See APPLICATION SPECIFICATIONS in Section 06, Group 210 later in this manual.
ECU Boot Block Part Number	Part #	Part number for the Engine Control Unit (ECU) boot block.
ECU Configuration File Part Number	Part #	Part number for the configuration file in the ECU.
ECU EOL Data Part Number	Part #	Part number for the data programmed into the ECU at the end of the assembly line. EOL = End of Line
ECU Part Number	Part #	Part number for the Engine Control Unit (ECU) hardware.
ECU Serial Number	Serial #	Serial number for the Engine Control Unit (ECU).
ECU Software Assembly Part Number	Part #	Part number for the Engine Control Unit (ECU) software assembly.
ECU Software Part Number	Part #	Part number for the Engine Control Unit (ECU) operating software.

Continued on next page

RG,RG34710,1560 -19-08APR03-1/3

PREVIEW - YOUFIXTHIS.COM
Download full manual at youfixthis.com

3 Applications Related DTCs Test	*NOTE: For wiring and theory of operation, see T10 - PWM THROTTLE ABNORMAL PULSE WIDTH supporting information.* If PWM throttle signal originates from another controller, check that controller for related DTCs.	**Controller reports no throttle related DTCs:** GO TO 4 **Controller does report a throttle related DTC:** Refer to diagnostic procedures for controller AND Repair cause of throttle related DTC AND Retest

RG41221,0000085 -19-17APR02-5/8

4 Open in PWM Throttle Signal Wire Test	*NOTE: For wiring and theory of operation, see T10 - PWM THROTTLE ABNORMAL PULSE WIDTH supporting information.* 1. Ignition OFF. 2. Disconnect both 30-way ECU connectors. Inspect ECU pins and connector terminals. 3. Obtain wiring information for this application and determine the source of the PWM throttle signal. 4. Disconnect the connector that outputs the PWM throttle signal. 5. Using a multimeter, measure the resistance between: • Terminal R2 of the ECU connector and the originating PWM throttle signal terminal.	**5 ohms or less:** GO TO 5 **Greater than 5 ohms:** Open in PWM throttle signal wire.

RG41221,0000085 -19-17APR02-6/8

5 Short in PWM Circuit Test	*NOTE: For wiring and theory of operation, see T10 - PWM THROTTLE ABNORMAL PULSE WIDTH supporting information.* 1. Ignition OFF. 2. ECU connectors and the other signal source controller still disconnected. 3. Using a multimeter measure resistance between terminal R2 in the harness end of the ECU connector and: • All other terminals in that connector. • A good chassis ground.	**All measurements greater than 2k ohms:** GO TO 6 **Any measurement less than 2k ohms:** Short in PWM circuit.

Continued on next page

RG41221,0000085 -19-17APR02-7/8

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

000097.04 — Water in Fuel Input Voltage Low

Input voltage in the sensor circuit drops to a level that is outside its normal operating range. Because this circuit is designed to see a voltage drop as resistance to ground decreases, the probable cause of this fault is low resistance to ground (grounded input circuit).

RG41221,000008B -19-17APR02-1/9

000097.04 Water In Fuel Signal Voltage Low Diagnostic Procedure

RG41221,000008B -19-17APR02-2/9

❶ **Visual Inspection of Connectors and Wiring**	**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.** *NOTE: For wiring and theory of operation, see DTC 000097.04 WATER IN FUEL INPUT VOLTAGE LOW supporting information.* Without disconnecting, visually inspect the ECU connectors and the WIF sensor connector for contamination, damage, or poor positioning. Check wiring for damage.	**No problem found:** GO TO ❷ **Problem found:** Repair and retest.

RG41221,000008B -19-17APR02-3/9

❷ **Intermittent Fault Test**	*NOTE: For wiring and theory of operation, see DTC 000097.04 WATER IN FUEL INPUT VOLTAGE LOW supporting information.* 1. Use the diagnostic gage on the instrument panel or connect and start the DST or SERVICE ADVISOR™. For instructions on connecting to the DST or SERVICE ADVISOR™, see CONNECTING TO DIAGNOSTIC SCAN TOOL (DST) OR SERVICE ADVISOR™ earlier in this Group. 2. Ignition ON, engine OFF. 3. Make note of any DTCs, then clear all DTCs. 4. Ignition OFF. Wait 30 seconds. 5. Ignition ON, engine OFF. 6. Read DTCs.	**000097.04 reoccurs:** GO TO ❸ **000097.04 does not reoccur:** Manipulate the harness wiring while monitoring the error codes. If code returns, note where in the harness that the error occured. GO TO ❸ If code does not return and no other codes are present, see INTERMITTENT FAULT DIAGNOSTICS earlier in this Group.

SERVICE ADVISOR is a trademark of Deere & Company

Continued on next page

RG41221,000008B -19-17APR02-4/9

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

6 "Harness Input Wiring Open?" Test

NOTE: For wiring and theory of operation information, see DTC 000110.03 ENGINE COOLANT TEMPERATURE INPUT VOLTAGE HIGH supporting information.

1. Ignition OFF.
2. Disconnect the circuit's 30-pin connector from the ECU. Inspect connector and ECU pins.
3. Sensor still disconnected.
4. Use a multimeter and JT07328 Connector Adapter Test Kit to check continuity of the sensor's input wiring in the harness.

Near zero ohms:
Input wiring OK. Remove and test ECU.

GO TO 9

Significantly above zero ohms:
Open or high resistance in input wiring. Repair and retest.

RG41221,0000096 -19-18APR02-8/12

7 "Ground Circuit Open?" Test

NOTE: For wiring and theory of operation information, see DTC 000110.03 ENGINE COOLANT TEMPERATURE INPUT VOLTAGE HIGH supporting information.

1. Ignition OFF.
2. Sensor still disconnected.
3. Use a multimeter and JT07328 Connector Adapter Test Kit to check resistance from the return terminal in the sensor connector to a good chassis ground.

Near zero ohms:
Ground circuit OK. Reconnect and retest.

Significantly above zero ohms:
Open or high resistance in ground circuit.

GO TO 8

RG41221,0000096 -19-18APR02-9/12

8 "Harness Ground Wiring Open?" Test

NOTE: For wiring and theory of operation information, see DTC 000110.03 ENGINE COOLANT TEMPERATURE INPUT VOLTAGE HIGH supporting information.

1. Ignition OFF.
2. Sensor still disconnected.
3. Disconnect the circuit's 30-pin connector from the ECU. Inspect connector and ECU pins.
4. Use a multimeter and JT07328 Connector Adapter Test Kit to check continuity of the sensor's ground wiring in the harness.

Near zero ohms:
Wiring OK. Remove and test ECU.

GO TO 10

Significantly above zero ohms:
Open or high resistance in ground wiring. Repair and retest.

Continued on next page

RG41221,0000096 -19-18APR02-10/12

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

000523.09 — Gear Selection Invalid

The ECU does not receive vehicle gear selection information or it is invalid.

Gear Selection

- Self Propelled Forage Harvester: The SPFH controller transmits the vehicle gear selection to the ECU over the CAN bus.
- Articulated Dump Truck: The TCU controller transmits ETC2 (electronic transmission controller #2) message to the ECU over the CAN bus.

The ECU uses this information to select the correct governor curve mode.

DTC 000523.09 will set if:

- The ECU does not receive vehicle gear selection information or it is invalid.

SERVICE ADVISOR is a trademark of Deere & Company

If DTC 000523.09 sets, the following will occur:

- The ECU limits engine speed to 1650 rpm in transport mode (SPFH).
- The ECU defaults to Torque Parameter 0 (Dump Truck).
- DTC 000639.13 may also be present. If so, diagnose it first.

If DTC 000523.09 sets:

- Using the DST or SERVICE ADVISOR™, monitor DTCs on the active code display parameter.
- Check to see if any other controllers on the machine have any active or stored CAN or vehicle related DTCs. If they do, go to the appropriate diagnostic procedure in the SPFH test manual.

RG41221,0000053 -19-23SEP02-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

9 "Input Circuit Wiring Grounded?" Test	*NOTE: For wiring and theory of operation information, see DTC 000637.08 CRANKSHAFT POSITION INPUT MISSING supporting information.*	
	1. Ignition OFF, sensor still disconnected.	
	2. Remove the circuit's 30-pin connector from the ECU. Inspect connector terminals and ECU pins.	**1M ohms or more:** Input not grounded. Check for wire-to-wire short.
		GO TO 10
	3. Using a multimeter, measure resistance between the input terminal in the sensor connector and a good chassis ground.	**Less than 1M ohms:** Input wire shorted (low resistance) to ground. Repair and retest.

RG41221,00000A9 -19-01APR02-11/14

10 "Input Circuit Wiring Shorted in Harness?" Test	*NOTE: For wiring and theory of operation information, see DTC 000637.08 CRANKSHAFT POSITION INPUT MISSING supporting information.*	
	1. Ignition OFF, sensor still disconnected.	
	2. The circuit's 30-pin connector still disconnected from the ECU.	**1M ohms or more:** Harness input wiring OK. Remove and test ECU.
		GO TO 12
	3. Using a multimeter, measure resistance between the input terminal in the sensor connector and all other terminals in the ECU connectors.	**Less than 1M ohms:** Input wire shorted (low resistance) wire-to-wire in harness wiring. Repair and retest.

RG41221,00000A9 -19-01APR02-12/14

11 ECU "Return Circuit Open?" Test	*NOTE: For wiring and theory of operation information, see DTC 000637.08 CRANKSHAFT POSITION INPUT MISSING supporting information.*	
	1. ECU removed.	**Near zero ohms:** ECU OK. Reinstall and retest.
	2. Using a multimeter, measure resistance between the sensor's return pin and C2 or C3 (system ground) pin in the ECU.	**More than 2 ohms:** Faulty ECU. Replace and retest.

RG41221,00000A9 -19-01APR02-13/14

12 ECU "Input Circuit Open?" Test	*NOTE: For wiring and theory of operation information, see DTC 000637.08 CRANKSHAFT POSITION INPUT MISSING supporting information.*	**Between 10K and 25K ohms:** ECU OK. Reinstall and retest.
	1. ECU removed.	**Less than 10K ohms:** Faulty ECU. Replace and retest.
	2. Using a multimeter, measure resistance between the input pin and pin C2 or C3 (ECU system ground) in the ECU.	**More than 25K ohms:** Faulty ECU. Replace and retest.

RG41221,00000A9 -19-01APR02-14/14

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

000654.07 — Cylinder #4 EI Fuel Delivery Failure

The fuel rail pressure does drop at the injection of fuel to EI #4.

RG41221,00000E1 -19-18OCT10-1/9

000654.07 Cylinder #4 EI Fuel Delivery Failure Diagnostic Procedure

RG41221,00000E1 -19-18OCT10-2/9

1 Visual Inspection of Connectors and Wiring	**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.** *NOTE: For wiring and theory of operation information, see DTC 000654.07 CYLINDER #4 EI FUEL DELIVERY FAILURE supporting information.* Visually inspect ECU connectors and the injector harness connector (located at the side of the cylinder head) for contamination, damage, or poor positioning. Check wiring for damage.	**No problem found:** GO TO 2 **Problem found:** Repair and retest.

RG41221,00000E1 -19-18OCT10-3/9

2 EI Fuel Line Restriction Test	*NOTE: For wiring and theory of operation information, see DTC 000654.07 CYLINDER #4 EI FUEL DELIVERY FAILURE supporting information.* Check fuel lines for restrictions between HPCR and the fuel inlet at EI #4.	**No restrictions found:** GO TO 3 **Restrictions found:** Repair or replace fuel line and retest

RG41221,00000E1 -19-18OCT10-4/9

3 Flow Limiter Test	*NOTE: For wiring and theory of operation information, see DTC 000654.07 CYLINDER #4 EI FUEL DELIVERY FAILURE supporting information.* 1. Ignition ON, engine running under condition that sets code. 2. Using the ECU diagnostic software, verify that DTC 000654.07 is an ACTIVE code. 3. Listen to flow limiter that corresponds to EI #4 while turning ignition OFF. *NOTE: It is very difficult to distinguish the difference between EI #4 and the other 5 flow limiters clicking. Make sure EI #4 makes the click. It will take 5-30 seconds for the ball to reseat.*	**Flow damper clicks:** GO TO 4 **Flow damper does not click:** Faulty flow limiter. Replace flow limiter and retest. See REMOVE AND INSTALL FLOW LIMITERS in Section 02, Group 090 earlier in this manual.

RG41221,00000E1 -19-18OCT10-5/9

4 Fuel Fitting Leakage Test	*NOTE: For wiring and theory of operation information, see DTC 000654.07 CYLINDER #4 EI FUEL DELIVERY FAILURE supporting information.* Check the high pressure fuel supply line fitting at the fuel inlet connector for cracks and leaks. If this connection is faulty, fuel leakage should be visible.	**No cracks found:** Perform CLEAN ELECTRONIC INJECTORS (IN ENGINE) located in section 02, Group 90. GO TO 5 **Cracks found:** Replace fuel fitting or fuel line and retest.

Continued on next page

RG41221,00000E1 -19-18OCT10-6/9

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

001347.07 — Fuel Rail Pressure Incorrect

The ECU detects fuel rail pressure above or below the expected pressure.

RG41221,00000BC -19-21FEB08-1/11

001347.07 Fuel Rail Pressure Incorrect Diagnostic Procedure

IMPORTANT: If DTC 001347.07 is accompanied with DTC 001347.05, 000094.03, DTC 000094.04, or DTC 000094.10, follow that diagnostic procedure first.

RG41221,00000BC -19-21FEB08-2/11

1 Visual Inspection of Connectors and Wiring	**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.** *NOTE: For wiring and theory of operation information, see DTC 001347.07 FUEL RAIL PRESSURE CONTROL ERROR supporting information.* Without disconnecting, visually inspect the ECU connectors and the rail pressure sensor connector for contamination, damage, or poor positioning. Check wiring for damage.	**No problem found:** GO TO 2 **Problem found:** Repair and retest.

RG41221,00000BC -19-21FEB08-3/11

2 Fuel Rail Pressure Sensor Test	*NOTE: For wiring and theory of operation information, see DTC 001347.07 FUEL RAIL PRESSURE CONTROL ERROR supporting information.* 1. Ignition OFF. 2. Disconnect the fuel rail pressure sensor connector. 3. Try starting the engine.	**Engine starts:** Faulty fuel rail pressure sensor. Replace and retest. **Engine won't start:** GO TO 3

Continued on next page

RG41221,00000BC -19-21FEB08-4/11

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine Sensor Torque Specifications

Item	Measurement	Specification
Crankshaft Position Sensor	Torque	14 N·m (10 lb-ft)
Water-in-Fuel Sensor	Torque	3 N·m (30 lb-in)
Fuel Temperature Sensor	Torque	10 N·m (7 lb-ft)
Engine Coolant Sensor	Torque	10 N·m (7 lb-ft)
Manifold Air Temperature Sensor	Torque	10 N·m (7 lb-ft)
Oil Pressure Sensor	Torque	9 N·m (6.5 lb-ft)
Fuel Rail Pressure Sensor	Torque	98 N·m (72.3 lb-ft)

RG41221,0000057 -19-29AUG01-1/1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 25 of 742 pages

The full manual includes:

- All 742 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

John Deere Power Systems PowerTech™ 8.1L Technical Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual