O: Water in Fuel (WIF) Sensor

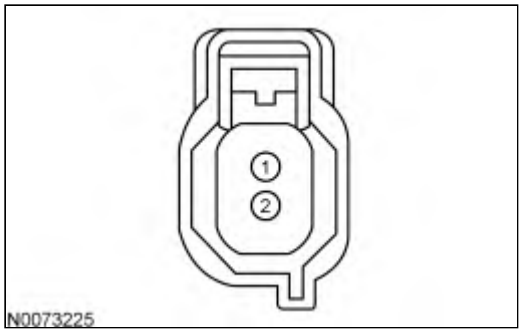
Note: *Regeneration may occur during normal operation. During regeneration, diagnostic procedures may display biased values. If a regeneration occurs during diagnostic procedures, allow the process to complete before continuing diagnostics.*

This pinpoint test is intended to diagnose the following:

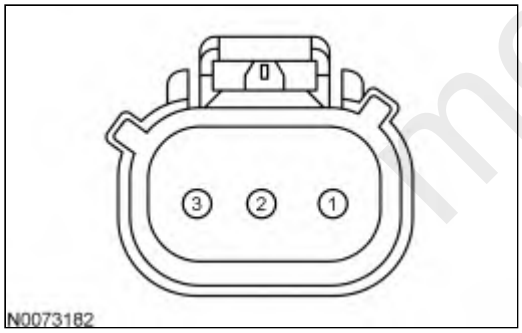
- fuel system contamination
- harness circuits: GND, SIGRTN, WIF and VPWR
- WIF sensor (9T321)

Water In Fuel (WIF) Sensor Connector

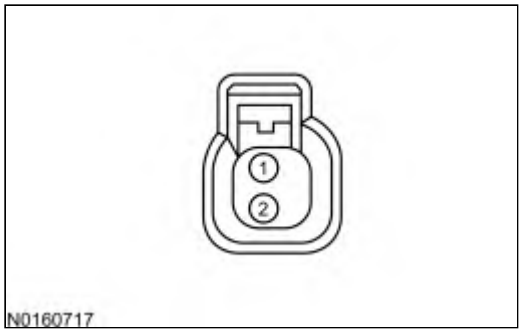
A



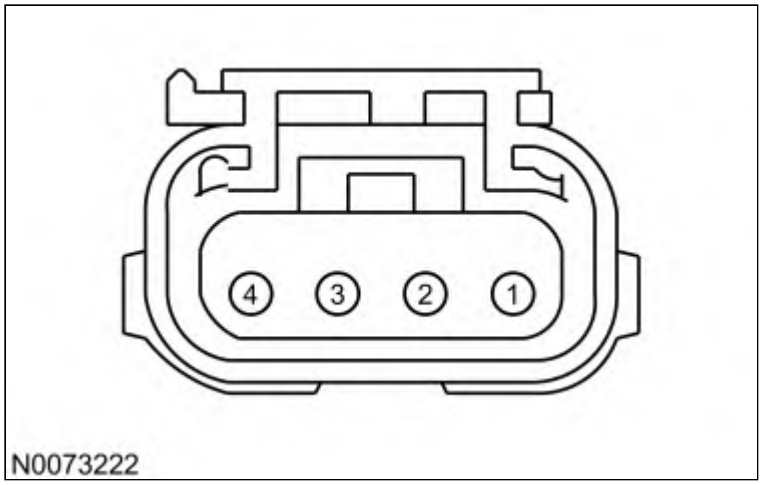
B



C



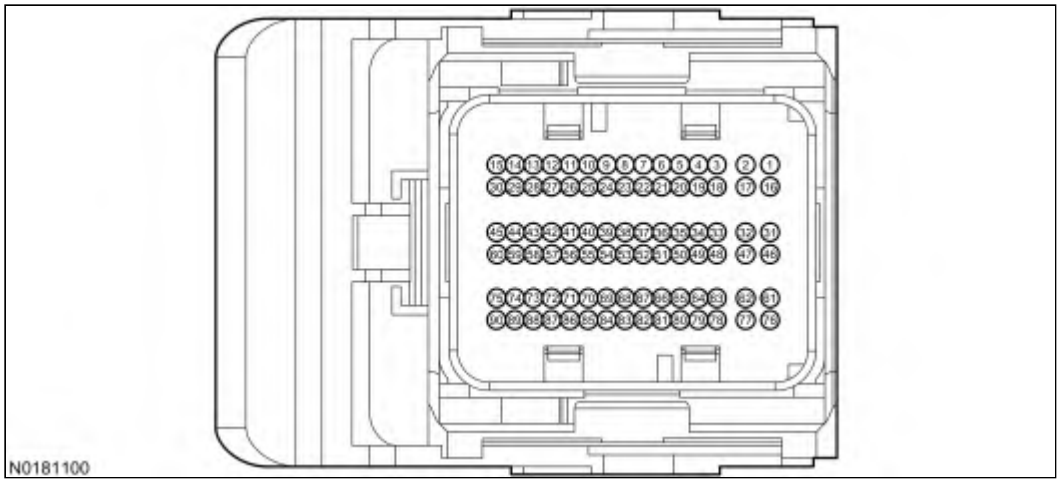
D



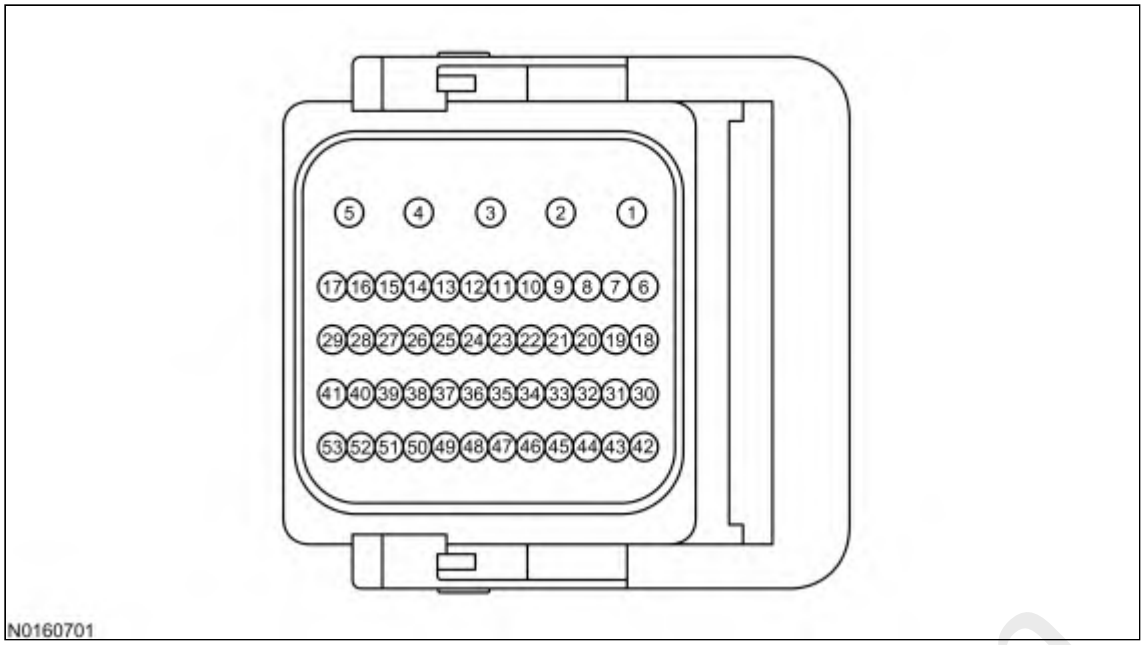
Vehicle	Connector	Pin	Circuit
F-650 / F-750	A	1 2	SIGRTN WIF
F-Series Super Duty	B	2 1 3	SIGRTN WIF GND
Transit	C	2 1	SIGRTN WIF
All other vehicles	D	1 2 3 4	SIGRTN WIF GND VPWR

Powertrain Control Module-B (PCM-B) Connector

A



B


5 4 3 2 1
17 16 15 14 13 12 11 10 9 8 7 6
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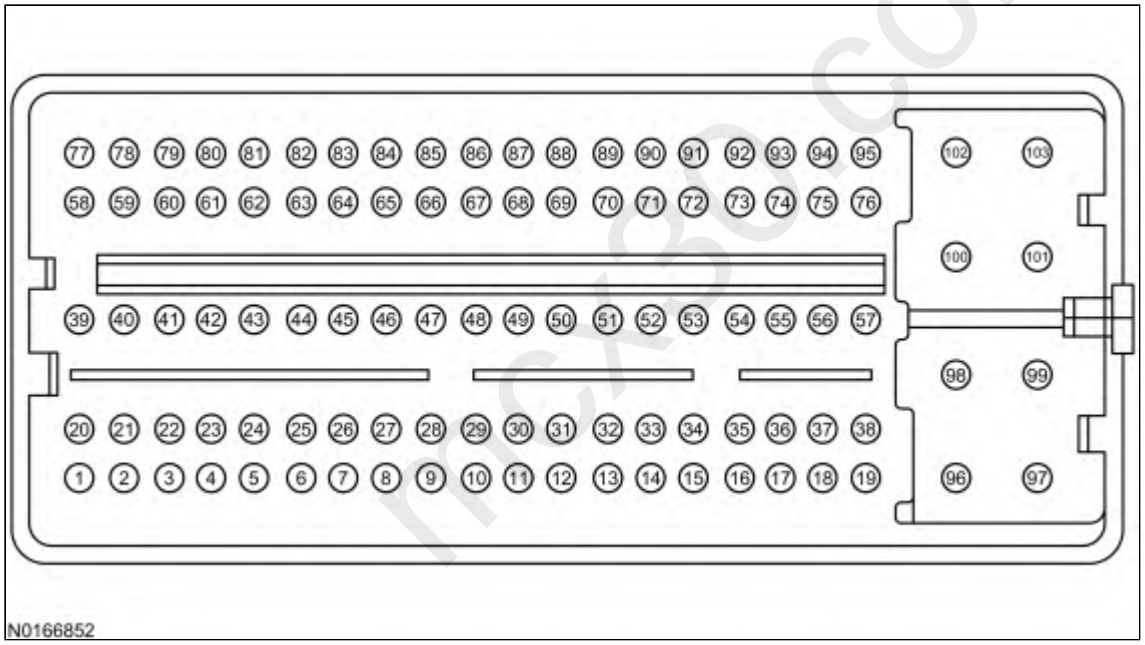
N0160701

C


77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76
39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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98 99
96 97
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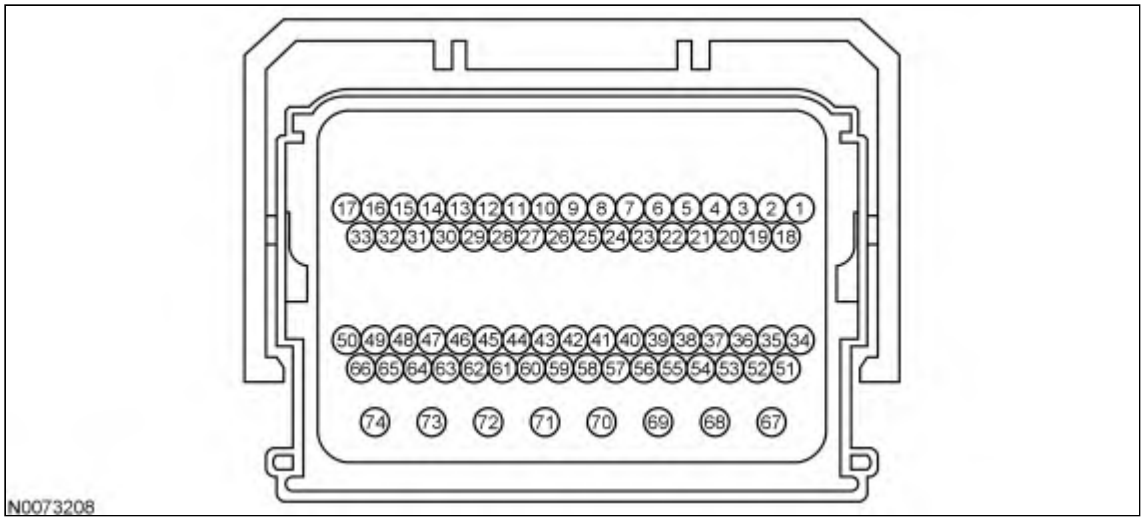
D



Vehicle	Connector	Pin	Circuit
F-Series Super Duty	A	27 42	SIGRTN WIF
Transit	B	35 31	SIGRTN WIF
Transit Connect	C	16 35	SIGRTN WIF
All other vehicles	D	44 24	SIGRTN WIF

O1 PRELIMINARY DIAGNOSIS
Are DTCs P1140, P2264, P2266, P2267 or P2269 present or is the Water In Fuel message indicated on the cluster?

Yes	GO to O2.
No	Unable to duplicate the condition. CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the concern. REPAIR as necessary. RETURN to Section 3, Symptom Charts for further direction.

O2 CHECK FOR WATER OR CONTAMINANTS IN THE FUEL

Note: *The fuel sample should fill the 0.95 L (1 quart) clear container half full. Flow out of the fuel drain should be a steady stream. Insufficient flow may indicate a fuel drain restriction or contaminants blocking the fuel drain. Repair as necessary.*

Note: *Inspect the fuel sample in the clear container. The fuel sample should be clear, not cloudy. Some water and contaminants may be present in the fuel sample if the fuel filter has not been replaced recently. If water in the fuel is present, the water will separate from the fuel and condense in the bottom of the clear container. Contaminants may appear in the form of sludge, dirt or metallic corrosion particles in the fuel sample. If the fuel sample is cloudy, the fuel is aerated or emulsified with water. If the fuel sample is emulsified, replace the fuel filters.*

- Open the fuel conditioning module drain valve and fill the clear container until it is half full.
- Close the drain valve.
- Inspect the fuel sample for water or contaminants.

Is water or contaminants present in the fuel sample in the clear container?

Yes	GO to O3.

No	For F150, GO to O4. For all others, GO to O5.

O3 CHECK 2 ADDITIONAL FUEL SAMPLES FOR WATER IN THE FUEL

Note: *The presence of high pressure fuel system or fuel injector DTCs may indicate high pressure fuel system damage.*

Note: *Checking 2 additional fuel samples for water will determine if the fuel system has water contamination in the fuel tank.*

- Ignition ON, engine running.
- Ignition OFF.
- Open the fuel conditioning module drain valve and fill the clear container until it is half full.
- Close the drain valve.
- Ignition ON, engine running.
- Ignition OFF.
- Open the fuel conditioning module drain valve and fill the clear container until it is half full.
- Close the drain valve.
- Inspect the fuel sample for water.

Is water present in the final fuel sample in the clear container?

Yes	CARRY OUT the Diesel Fuel System Contamination Repair/Flushing procedure. REFER to the Workshop Manual Section 310-00, Fuel System, General Procedures. GO to O11.
No	For F150, GO to O4. For all others, GO to O5.

O4 CHECK THE VOLTAGE TO THE WIF SENSOR

- WIF Sensor connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) WIF Sensor Connector, Harness Side	(-) WIF Sensor Connector, Harness Side
VPWR	GND

Is the voltage greater than 10.5 V?

Yes	GO to O5.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

O5 CHECK THE CIRCUITS FOR AN OPEN

- Ignition OFF.
- WIF Sensor connector disconnected.
- PCM-B connector disconnected.
- Measure the resistance between:

(+) WIF Sensor Connector, Harness Side	(-) PCM-B Connector, Harness Side
WIF	WIF
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	GO to O6.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

O6 CHECK THE WIF CIRCUIT FOR A SHORT

- Measure the resistance between:

(+) WIF Sensor Connector, Harness Side	(-) WIF Sensor Connector, Harness Side
WIF	SIGRTN

- Measure the resistance between:

(+) WIF Sensor Connector, Harness Side	(-)
WIF	Ground

Are the resistances greater than 10K ohms?

Yes	GO to O7.
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

O7 CHECK THE WIF CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.
- Measure the voltage between:

(+) WIF Sensor Connector, Harness Side	(-)
WIF	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	For F150, F-Series Super Duty and Transit Connect, GO to O8. For all others, GO to O11.

O8 CHECK THE WIF SENSOR RESISTANCE

- Ignition OFF.
- WIF Sensor connector disconnected.
- Measure the resistance between:

(+) WIF Sensor Connector, Component Side	(-) WIF Sensor Connector, Component Side
WIF	SIGRTN

Is the resistance between 795 and 815 K ohms?

Yes	GO to O10.
No	GO to O9.

O9 CHECK THE WIF SENSOR FOR ANY CONTAMINATION

Note: *Any contamination or metallic particles on the WIF sensor pins may cause a short between the pin.*

- Ignition OFF.
- Remove the WIF sensor.
- Check the WIF sensor pins for contamination.
- Clean the WIF sensor pins as necessary.
- Do not install the WIF sensor.
- Measure the resistance between:

(+) WIF Sensor Connector, Component Side	(-) WIF Sensor Connector, Component Side
WIF	SIGRTN

Is the resistance between 795 and 815 K ohms?

Yes	GO to O10.
No	INSTALL a new WIF sensor. Refer to the Workshop Manual Section 310-01, Fuel Tank and Lines. CARRY OUT the Reset And Clear The Specified Function Water In Fuel Counter on the scan tool. REFER to Section 2, Clear The Continuous Diagnostic Trouble Codes (DTCs) And Reset The Emission Monitors Information in The Powertrain Control Module (PCM). Clear the PCM DTCs. REPEAT the self-test.

O10 CHECK THE WIF VOLTAGE PID

- Install the WIF sensor.
- WIF Sensor connector disconnected.
- PCM-B connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the WFS_V (VOLT) PID.
- Record the PID value.
- WIF Sensor connector connected.
- Record the PID value.

Is the voltage between 3.4 and 3.6 V disconnected and 3.0 and 3.4 V connected?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.
No	CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the concern. REPAIR as necessary.

O11 CHECK THE WATER IN FUEL INDICATOR FOR CORRECT OPERATION

Note: *The PCM must detect water in fuel during engine idle at least 4 consecutive times to set DTCs P1140, P2264 or P2269 and to illuminate the WIF indicator. The PCM monitors the WIF sensor for 15 seconds at idle. Each time the PCM checks for water in fuel it must detect a change in the vehicle speed before it will check for water in fuel again.*

Note: *In this step the vehicle needs to be driven enough so the PCM can detect a change to the vehicle speed. Alternatively, the PCM also determines WIF during non-idle operation of the vehicle. The vehicle has to be driven at above*

30 KM/H (19 MPH) for 4 minutes to complete the monitoring in non-idle operation.

Note: *Any contamination or metallic particles on the WIF sensor pins may cause a short between the pins.*

- Ignition OFF.
- Remove the WIF sensor.
- Check the WIF sensor pins for contamination.
- Clean the WIF sensor pins as necessary.
- Install the WIF sensor.
- PCM-B connector connected.
- WIF Sensor connector connected.
- Clear the PCM DTCs.
- Ignition OFF.
- Ignition ON, engine running.
- Idle the engine for 15 seconds and then drive the vehicle. Repeat this 6 times.

Is the Water In Fuel message displayed in the instrument cluster message center?

Yes	INSTALL a new WIF sensor. REFER to the Workshop Manual Section 310-01, Fuel Tank and Lines. CARRY OUT the Reset And Clear The Specified Function Water In Fuel Counter on the scan tool. REFER to Section 2, Clear The Continuous Diagnostic Trouble Codes (DTCs) And Reset The Emission Monitors Information in The Powertrain Control Module (PCM). Clear the PCM DTCs. REPEAT the self-test.
No	The system is operating correctly at this time.