POWERTRAIN CONTROL MODULE (PCM) - REDUCTANT QUALITY PERFORMANCE

P207F-00-REDUCTANT QUALITY PERFORMANCE

For a complete DIESEL EXHAUST FLUID DEF SYSTEM wiring diagram, **(refer to the Wiring Information)** .

Theory of Operation

The Diesel Exhaust Fluid (DEF) Quality Sensor is mounted to the DEF tank and is used to detect the concentration of the DEF. The DEF Quality Sensor shares information with the Powertrain Control Module (PCM) over the J1939 Data Link. This diagnostic monitors the DEF concentration, and the PCM will have the Electronic Vehicle Information Center (EVIC) display a warning message based on what the DEF Quality Sensor detects. “Incorrect DEF Detected See Dealer” will be displayed if the DEF Quality Sensor detects the DEF concentration has fallen below normal. “Service DEF System See Dealer” will be displayed if something other than a DEF concentration error has been detected, or if the sensor is unable to determine the DEF concentration value. Either message will be displayed when this monitor runs and fails in one trip, and the PCM will illuminate the MIL when the diagnostic runs and fails in two consecutive drive cycles. Once the monitor runs and fails, the PCM will then run the monitor continuously until a pass decision can be made. The PCM will turn off the MIL when the diagnostic runs and passes in three consecutive drive cycles, and will only turn off the EVIC message when the monitor runs and passes, or the PCM is reflashed. Clearing the code **will not** erase the message. It is possible for bubbles to be formed while filling the DEF tank. When these bubbles touch the DEF Quality sensor, the sensor can give a false reading of zero.

When Monitored and Set Conditions

When Monitored: This diagnostic runs continuously when the following conditions are met:

- 300 seconds after ignition-on or refill. Also, the DEF fluid temperature measured by both the DEF Quality/Temperature Sensor and the DEF Level/Temperature Sensor must be above 3°C (37°F). The Diagnostic is delayed at a temperature below 10°C (50°F) for 30 minutes before running and will be paused if the vehicle speed drops below 4.8 km/hr (3.0 mph) for 240 seconds.
- DEF fluid temperature measured by both the DEF Quality/Temperature Sensor and the DEF Level/Temperature Sensor must be above 3°C (37°F).

Set Conditions:

- The DEF Quality Sensor detects that the DEF concentration has fallen above or below a calibrated threshold.
- Another liquid other than DEF has been detected during the monitoring period.

Default Actions:

- The MIL will illuminate.
- The Diagnostic is delayed at a temperature below 10°C (50°F) for 30 minutes before running and will be paused if the vehicle speed drops below 4.8 km/hr (3.0 mph) for 240 seconds.
- The DEF Quality Sensor is unable to determine the DEF concentration value during the monitoring period.

Possible Causes
DIESEL EXHAUST FLUID LEVEL LOW
DEF DEGRADED, DILUTED, OR INCORRECT DEF
AIR BUBBLES ON DEF QUALITY SENSOR
DEF QUALITY SENSOR

Always perform the Pre-Diagnostic Troubleshooting procedure before proceeding. (Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

Diagnostic Test

1. **CHECK FOR ACTIVE DTC**

1. Ignition on, engine not running.
2. With the scan tool, read DTCs.

Is this DTC Active or Pending?

Yes

- Go To **2**

No

- Interview the customer to check if DEF was added to the tank between the time the EVIC message was displayed and the time the truck was brought into the shop. A poor DEF quality condition may have been remedied if the customer added the proper DEF between the time the DTC set and the time the truck was brought into the shop for repairs.
- If the customer did not add DEF as described above, perform the INTERMITTENT CONDITION diagnostic procedure.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

2. **CHECK THE DEF QUALITY**

1. Turn the ignition off.
2. Collect a sample of diesel exhaust fluid from the system.
3. Visually inspect the fluid for signs of contamination or debris.

NOTE: The Refractometer test is only done to test the general quality of the fluid. It will not identify any specific contaminants that may be present.

4. Test the quality of the DEF using the DEF/UREA Refractometer (16–5025) available through MoparEssentialTools.com . Then, ENTER EQUIPMENT CATALOG. Or call (855)-298-2687.

NOTE: The DEF should register between 31.0% and 49.3% using the Refractometer.

5. To test for hydrocarbons in the DEF tank use Hydroscopic test paper (223–44–863) available through MoparEssentialTools.com . Then, ENTER EQUIPMENT CATALOG. Or call (855)-298-2687. The test strip must come in contact with the DEF fluid in the tank in order to get a valid reading for hydrocarbons present in tank.
6. Remove the test paper from the package and inspect for color consistency. If the color is not consistent replace strip.
7. Disconnect the DEF fill pipe from tank and try to get a sample or remove the DEF tank.
8. Place the test paper directly into the fluid in the DEF tank. If the light blue paper turns dark blue, that is an indication that oil or hydrocarbon contamination is present.

Is the DEF quality within specification and free of debris, hydrocarbons, or other contamination?

Yes

- Go To **3**

No

- If the DEF fails the Refractometer quality test, but passes the Hydroscopic test paper test and shows no other signs of hydrocarbons or other contaminants: Just drain the fluid from the DEF tank and DEF lines. Then, replace it with fresh FCA-approved Diesel Exhaust Fluid (DEF).
- If the DEF fails the Hydroscopic test paper test or shows signs of other contaminants: Drain the Diesel Exhaust Fluid (DEF). Replace the DEF Tank, DEF Supply Pump Assembly, DEF Injector, DEF Supply Tube, DEF Filler Tube, and DEF Filler Cap in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

3. **CHECK FOR THE LOW DEF LEVEL DTC**

1. Ignition on, engine not running.
2. With the scan tool, read DTCs and check for the presence of P203F.

Is DTC P203F Active or Pending?

Yes

- Remove the tank and drain all fluid. If frozen, be sure to thoroughly thaw the tank before draining.
- Flush the tank thoroughly with .5 to 1 gallon of fresh DEF fluid and drain fluid back out.
- Reinstall the tank and add 3.5 to 5 gallons of fresh DEF.
- After DEF has been added to the DEF tank, operate the vehicle as outlined in the “When Monitored” section above to allow the P207F monitor to run.
- Then, Go To **4**

No

- Go To **5**

4. **RECHECK FOR AN CHECK FOR ACTIVE DTC**

1. Turn the ignition on, engine not running.
2. With the scan tool, View DTCs.

Is this DTC Active or Pending?

Yes

- Go To **5**

No

- Adding fresh DEF to the tank corrected the issue.
- Perform the POWERTRAIN VERIFICATION TEST.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

5. **CHECK THE DEF QUALITY SENSOR DATA INPUT**

1. Turn the ignition on.
2. Using the scan tool, navigate to Data Display>AFT DEF Quality Sensor.

Pickup: Is the concentration less than 22.5% or greater than 49.4%? Cab/Chassis: Is the concentration less than 27.5% or greater than 49.4%?

Yes

- If the cleaning procedure shown in Test Step 3 was not performed; Then, at this time perform the following procedure:
- Remove the tank and drain all fluid. If frozen, be sure to thoroughly thaw the tank before draining.
- Flush the tank thoroughly with 0.5 to 1.0 gallon of fresh Diesel Exhaust Fluid (DEF) and drain the fluid back out.
- Fill DEF tank with one gallon of fresh DEF fluid.
- Install DEF connectors and verify concentration with the scan tool.
- If the concentration reading is not in range, replace the DEF Quality Sensor in accordance with the Service Information..
- Reinstall the DEF tank and add 3.5 to 5 gallons of fresh DEF.
- After DEF has been added to the DEF tank, operate the vehicle as outlined in the “When Monitored” section above to allow the P207F monitor to run.
- If the DTC continues to set, replace the DEF Quality Sensor in accordance with the Service Information.
- Perform the POWERTRAIN VERIFICATION TEST.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No

- Go To **6**

6. **CHECK RELATED HARNESS CONNECTIONS**

1. Disconnect all PCM harness connectors.
2. Disconnect all related in-line harness connections (if equipped).
3. Disconnect the related component harness connectors.
4. Inspect harness connectors, component connectors, and all male and female terminals for the following conditions:
    - Proper connector installation.
    - Damaged connector locks.
    - Corrosion.
    - Other signs of water intrusion.
    - Weather seal damage (if equipped).
    - Bent terminals.
    - Overheating due to a poor connection (terminal may be discolored due to excessive current draw).
    - Terminals that have been pushed back into the connector cavity.
    - Check for spread terminals and verify proper terminal tension.

    Repair any conditions that are found.
5. Connect all PCM harness connectors. Be certain that all harness connectors are fully seated and the connector locks are fully engaged.
6. Connect all in-line harness connectors (if equipped). Be certain that all connectors are fully seated and the connector locks are fully engaged.
7. Connect all related component harness connectors. Be certain that all connectors are fully seated and the connector locks are fully engaged.
8. With the scan tool, erase DTCs.
9. Test drive or operate the vehicle in accordance with the when monitored and set conditions.
10. With the scan tool, read DTCs.

Did the DTC return?

Yes

- Replace and program the Powertrain Control Module (PCM) in accordance with the Service Information. (Refer to 08 - Electrical/8E - Electronic Control Modules/MODULE, Powertrain Control/Removal and Installation) .
- Perform the POWERTRAIN VERIFICATION TEST.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).

No

- The wiring or poor connection problem has been repaired.
- Perform the POWERTRAIN VERIFICATION TEST.(Refer to 28 - DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure).