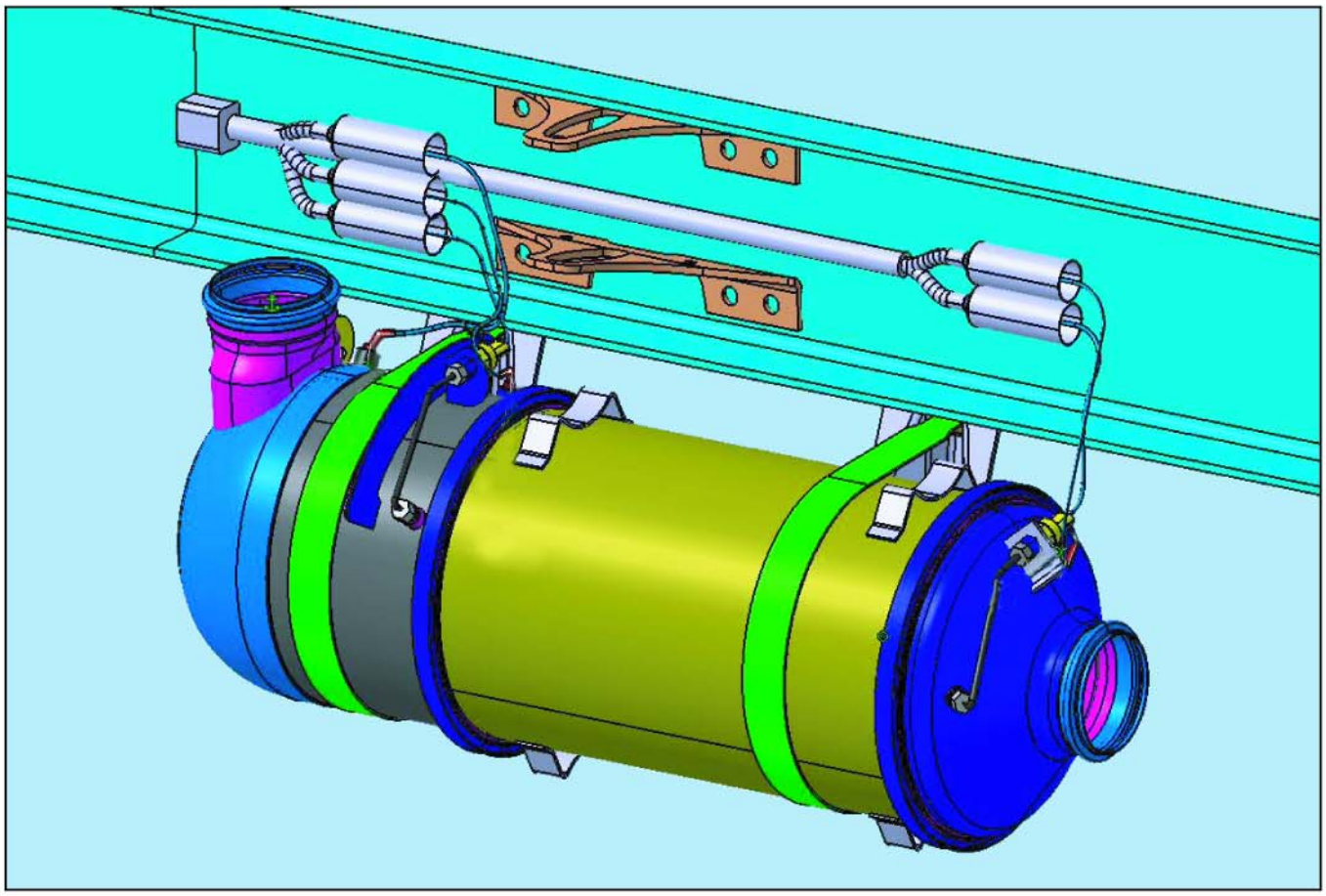
PRELIMINARY

DETROIT DIESEL

# Aftertreatment System Technician's Guide



*Components* *Modes* *Troubleshooting*

PRELIMINARY

# ATTENTION

This document is a guideline for qualified personnel. It explains the operation of the Aftertreatment System (ATS) for Detroit Diesel Corporation Series 60, MBE 900, and MBE 4000 engines. Detroit Diesel Corporation makes no representations or warranties regarding the information contained in this document. The information contained in this document may not be complete and is subject to change without notice.

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# 1 OVERVIEW OF AFTERTREATMENT SYSTEM

Detroit Diesel Corporation continues its efforts to reduce exhaust emissions. Two primary exhaust gas constituents are oxides of nitrogen (NOx) and particulate matter (PM). Diesel particulate emissions are a mixture of both solid and liquid material. NOx emission reduction can be achieved by lowering combustion temperature. However, this increases particulate emissions. Therefore, when low NOx levels are achieved, an Aftertreatment Device (ATD) can be used to simultaneously reduce particulate emissions. Particulate filter technology has been demonstrated to be very effective in the control of particulate emissions.

**NOTE:**
**Safety is of paramount importance and this subject is addressed in Chapter 2. It is very important that all users of this manual review and become familiar with the issue of safety.**

**NOTE:**
**The primary components/concepts of the Aftertreatment System (ATS) are defined in the Glossary at the end of this manual and all users are encouraged to review this information.**

## 1.1 SYSTEM DESCRIPTION/OPERATION

The Detroit Diesel particulate filter substrate (core) is comprised of ceramic material. The substrate consists of channels that run the full length, and are blocked off at alternate ends to force the exhaust through the porous walls. The channels are coated with platinum washcoat material that acts as a catalyst, enhancing the oxidation process. As the porous walls collect particulates and the exhaust temperature reaches the appropriate level, oxidation of the collected particulate matter starts to occur. This is a process called “Regeneration.” The key to successful regeneration is high exhaust temperature for an extended period of time. Without adequate temperatures for regeneration, the filter will continue to trap particulates and eventually plug. In order to avoid plugging, Detroit Diesel has designed an actively regenerated ATS. See Figure 1-1 for a schematic of the ATS and See Figure 1-2 for a cutaway view of the filter core.

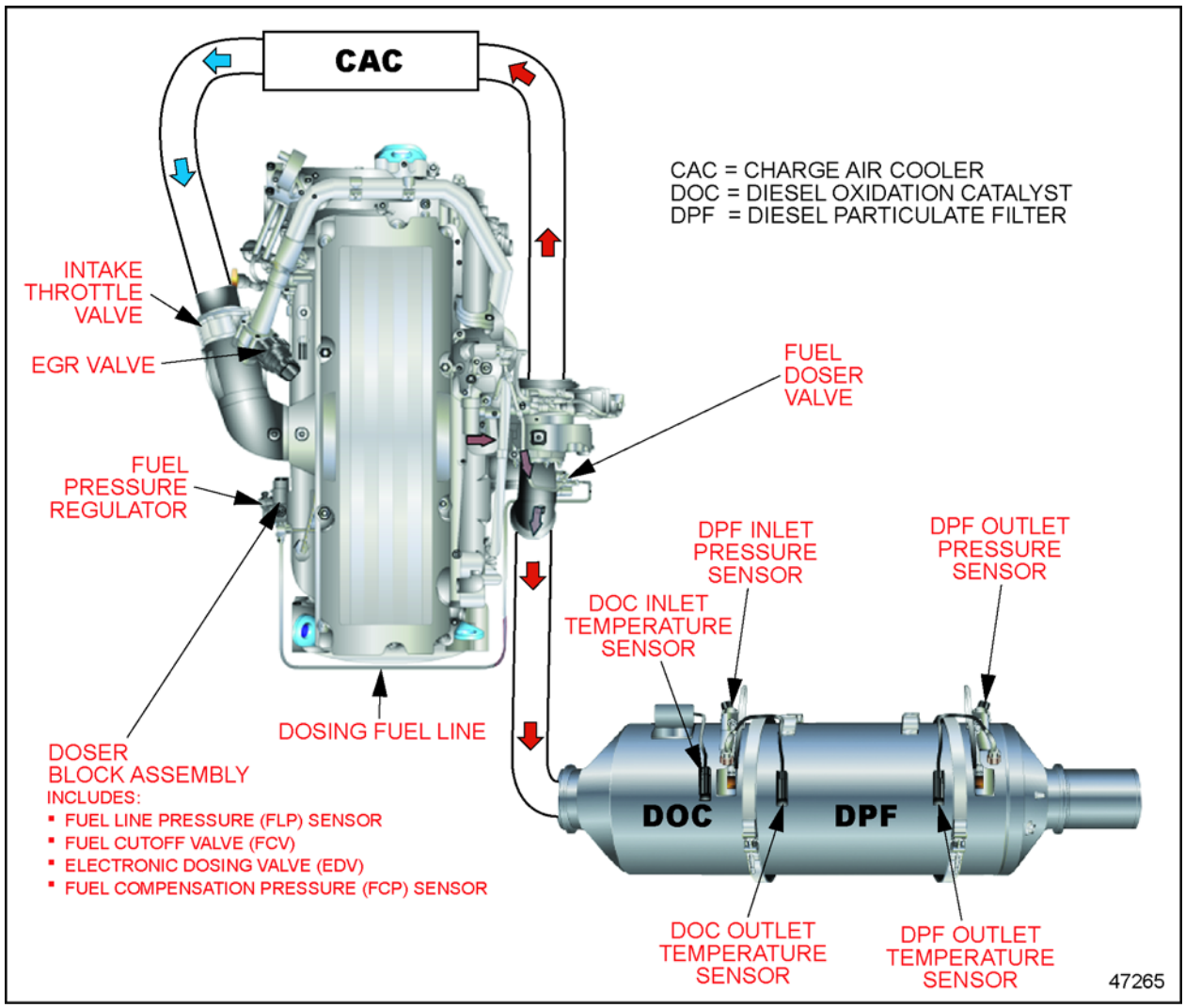



**Figure 1-1 Aftertreatment System Schematic**

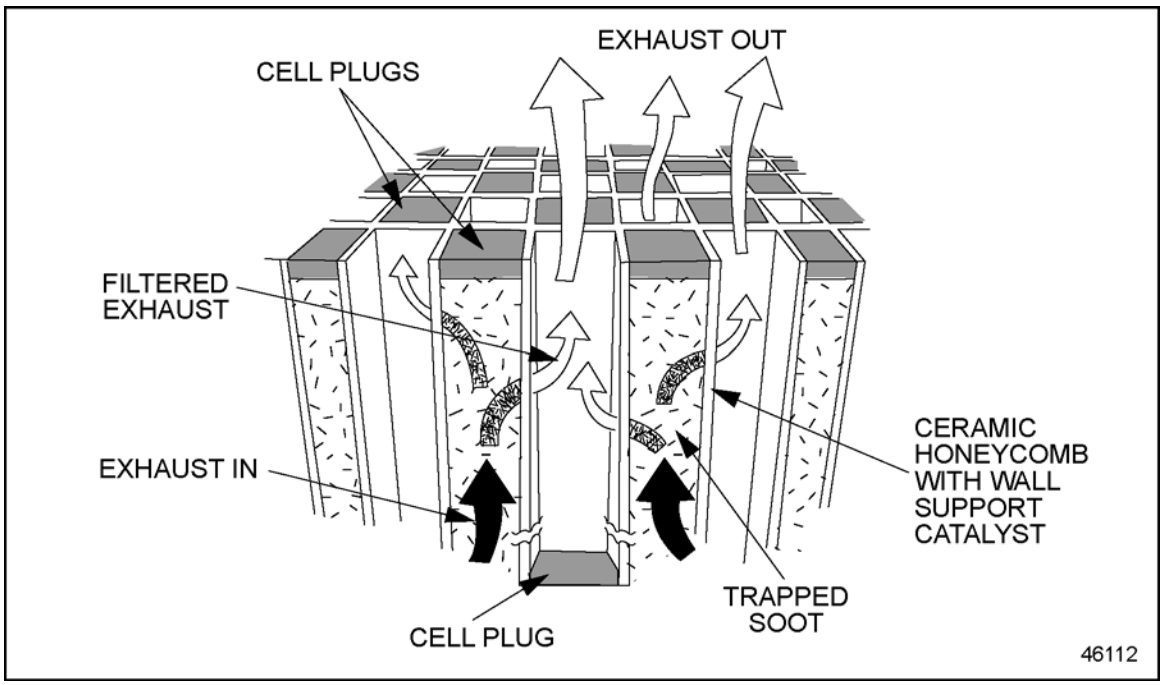



**Figure 1-2 Diesel Particulate Filter Core Cutaway View**

## 1.1.1 OPERATING REQUIREMENTS

Oxidation of the particulate matter is the key to filter performance. This requires that the catalyzing agent (platinum coated passages) are providing optimum enhancement to the oxidation process. The following requirements must be met, otherwise the ATD warranty may be compromised:

- □ Use Ultra-Low Sulfur Fuel (ULSF) with 15 ppm sulfur content or less, based on ASTM D2622 test procedure
- □ Do not use fuel blended with used lube oil
- □ Do not use biodiesel or biodiesel blended fuels.
- □ Lube oil must have a sulfated ash level less than 1.0 wt %; currently referred to as CJ-4 oil.

| **NOTICE:** |
| --- |
| Not following the operating requirements may result in damage to the ATD or accelerated ash plugging of the diesel particulate filter. |

## 1.1.2 MAINTENANCE

There is a need to periodically remove accumulated ash, derived from engine lube oil, from the filter. This ash does not oxidize in the filter during the regeneration process and must be removed through a cleaning procedure. All Detroit Diesel ATD equipped engines will illuminate a dashboard warning lamp indicating the need for ash cleaning. Refer to Section4.1.9

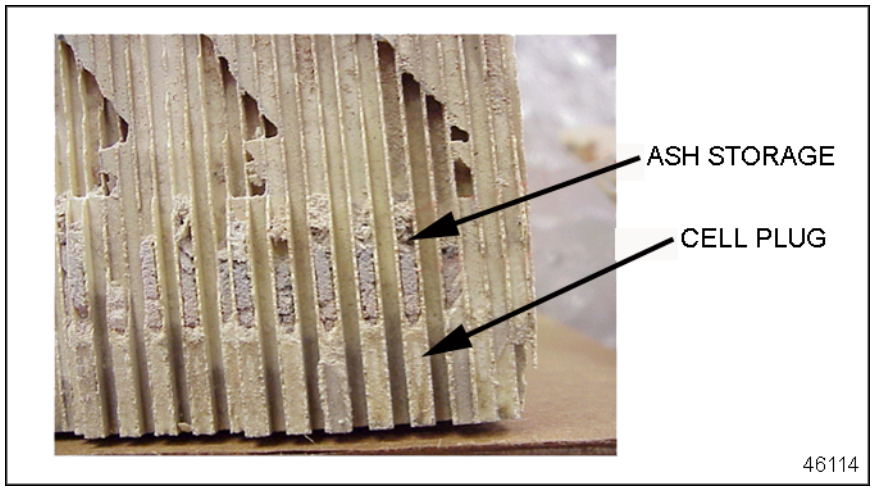



**Figure 1-3 Ash Accumulation in Particulate Filter**

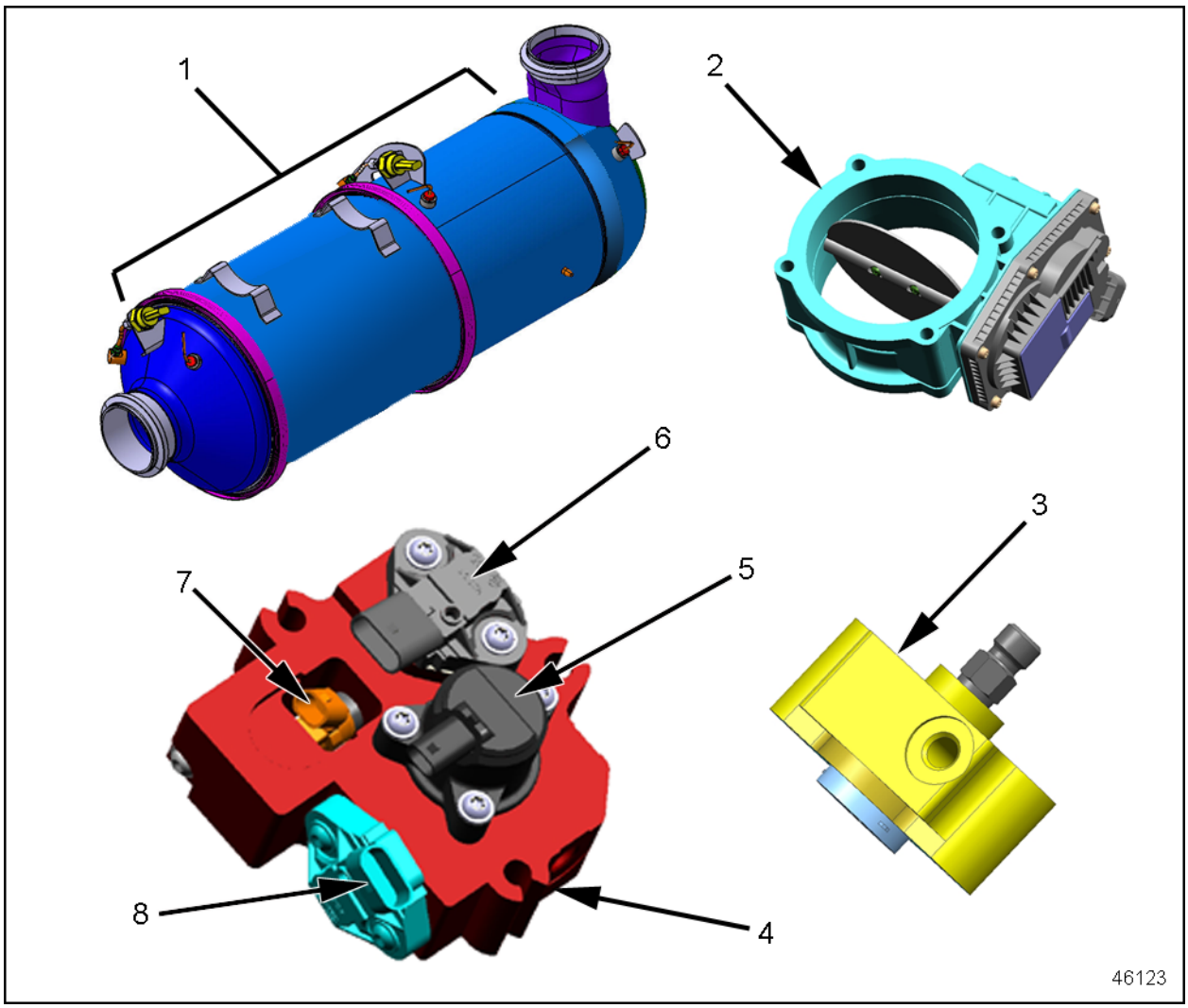
## 1.1.3 SERVICE RECORD

It is mandatory that customers or distributors maintain a proper record of the particulate filter servicing and cleaning. This record is an agent to warranty considerations. The record must include information such as:

- □ Date of cleaning or replacement
- □ Vehicle mileage at the time of cleaning or replacement
- □ Particulate filter part number and serial number

## 1.2 COMPONENTS

The ATS is comprised of the following components: See Figure 1-4 for a graphic of the major ATS components.




1. Aftertreatment Device
2. Intake Throttle Valve
3. Fuel Doser Valve
4. Doser Block Assembly
5. Fuel Cutoff Valve
6. Fuel Line Pressure Sensor
7. Electronic Dosing Valve
8. Fuel Compensation Pressure Sensor

**Figure 1-4 Components of Aftertreatment System**

These components are Listed in Table 1-1:

| Component | Description |
|---|---|
| Aftertreatment Device | An engine exhaust device that contains a DOC and a DPF along with several pressure and temperature sensors that work in conjunction to reduce particulate emissions from the engine. |
| Intake Throttle Valve | Electronically controlled valve that will open or close in order to control a proper temperature at the face of the DOC during regeneration. |
| Fuel Doser Valve | Coolant cooled valve used to deliver fuel into the exhaust stream to maintain the proper temperature across the DOC during regeneration. |
| Doser Block Assembly | Assembly that houses the Fuel Cutoff Valve (FCV), Fuel Compensation Pressure (FCP) Sensor, Electronic Dosing Valve (EDV) and the Fuel Line Pressure (FLP) Sensor. |
| Fuel Cutoff Valve | Controls fuel flow into the Doser Block Assembly. |
| Fuel Line Pressure Sensor | Pressure sensor used to diagnose abnormal conditions in fuel pressure after fuel exits the Doser Block Assembly. |
| Electronic Dosing Valve | Pulse Width Modulation (PWM) controlled valve used to deliver the correct amount of fuel to the FDV in order to maintain the proper temperature across the DOC during regeneration. |
| Fuel Compensation Pressure Sensor | Monitors fuel pressure into the Doser Block Assembly in order to properly deliver the correct amount of fuel delivered via the Electronic Dosing Valve. |

**Table 1-1 ATS Component Descriptions**

The ATD, specifically the diesel particulate filter, contains two warning caution labels for safety purposes. See Figure 1-5 for the External and Internal Hot Surfaces caution label and see Figure 1-6 for the Heavy ATD caution label. These two labels are attached to the ATD.

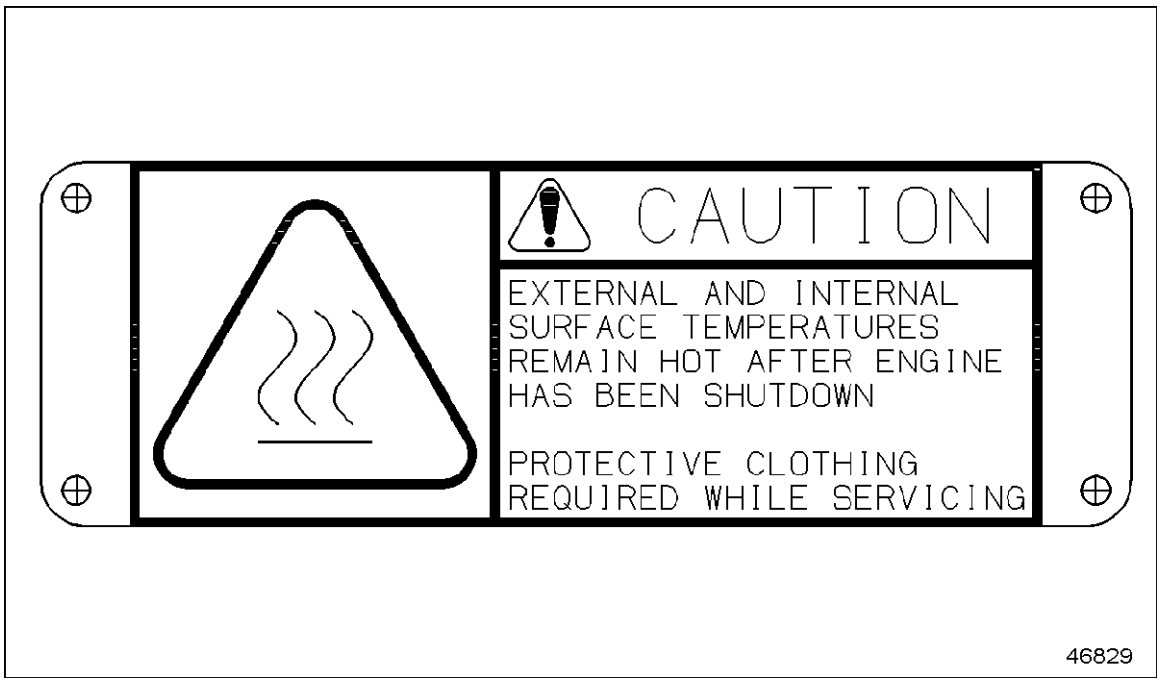



**Figure 1-5 Hot Surfaces External and Internal Caution Label**

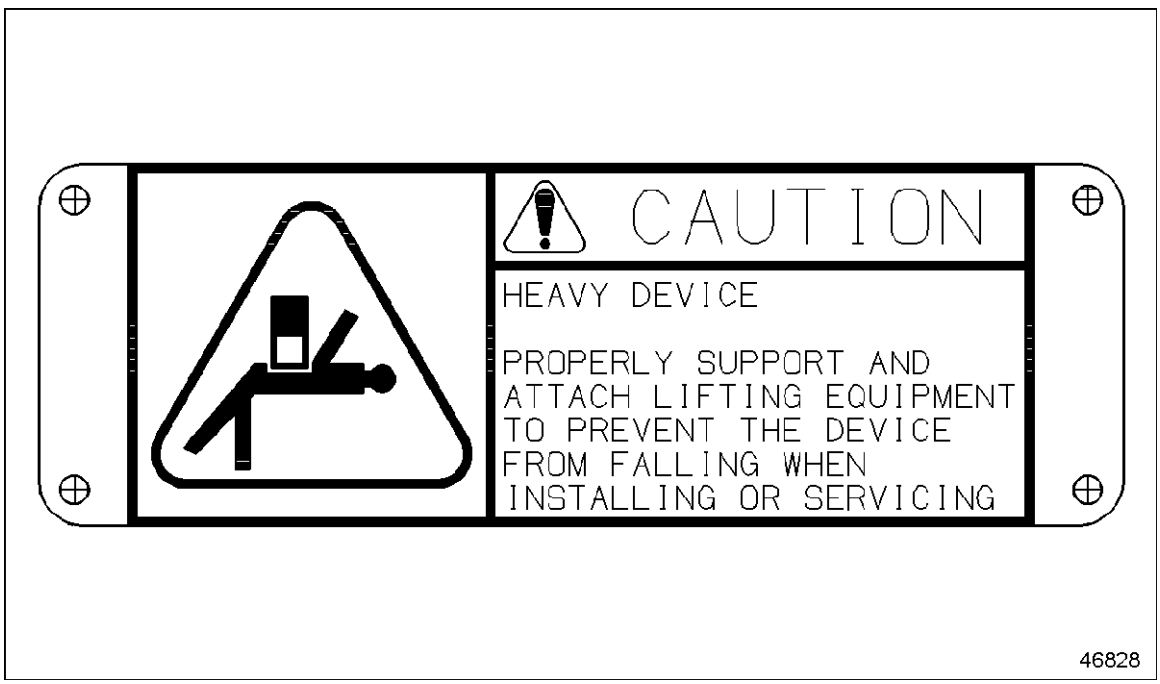



**Figure 1-6 Heavy After-Treatment Device Caution Label**

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# 2 SAFETY

The service procedures recommended by Detroit Diesel Corporation and described in this Technicians Guide are effective methods of performing service and repairs. Some of these procedures may require the use of tools specially designed for this purpose.

Accordingly, anyone who intends to use a replacement part, service procedure or tool that is not recommended by Detroit Diesel Corporation must first determine that neither their safety nor the safe operation of the engine will be jeopardized by the replacement part, service procedure or tool selected.

This technician's guide contains various work procedures that must be carefully observed in order to reduce the risk of personal injury during service or repair or the possibility that improper service or repair may damage the Aftertreatment Device (ATD) components or render the unit or engine unsafe. It is also important to understand that these work procedures are not exhaustive, because it is impossible for Detroit Diesel Corporation to warn of all the possible hazardous consequences that might result from failure to follow these instructions.

A service technician can be severely injured if caught in the pulleys, belts or rotating parts of an engine that is accidentally started. To avoid personal injury, observe the following precautions before starting to work on the engine, no matter what task is being performed.

Disconnect the battery from the starting system by removing one or both of the battery cables (disconnect negative [ground] cable first). With the electrical circuit disrupted, accidental contact with the starter button will not produce an engine start.

## 2.1 GENERAL SAFETY PRECAUTIONS TO OBSERVE WHEN WORKING ON THE SYSTEM

The following safety measures are essential when servicing components of the Aftertreatment System (ATS).

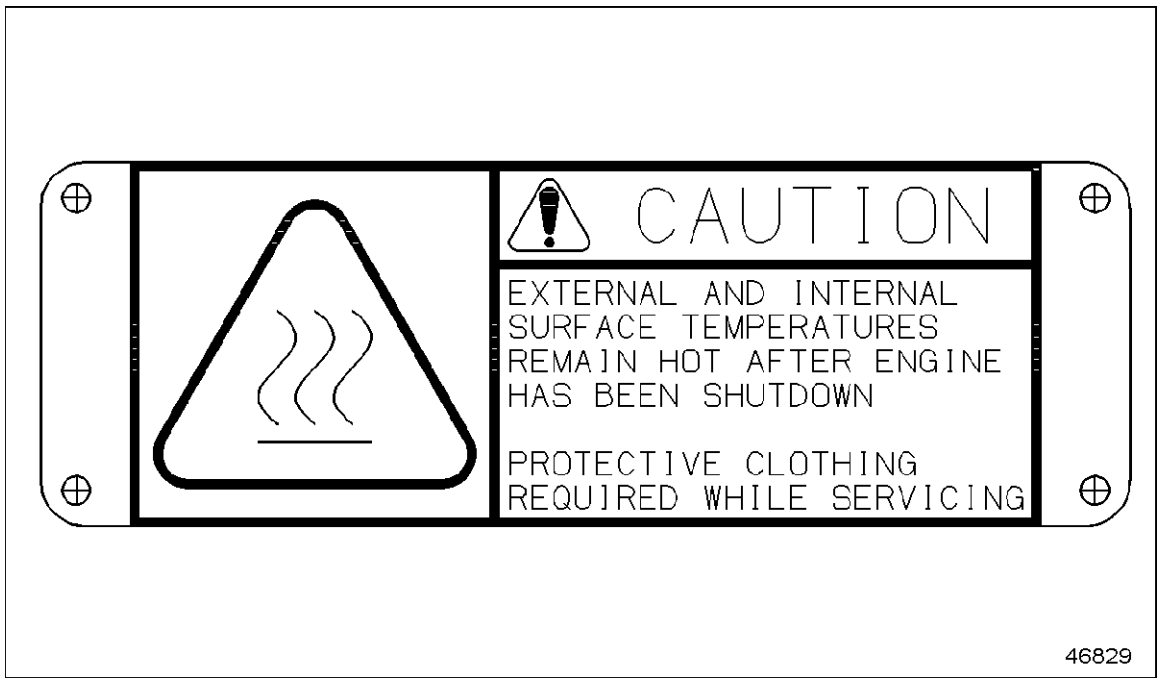



**Figure 2-1 Hot Surfaces External and Internal Caution Label**

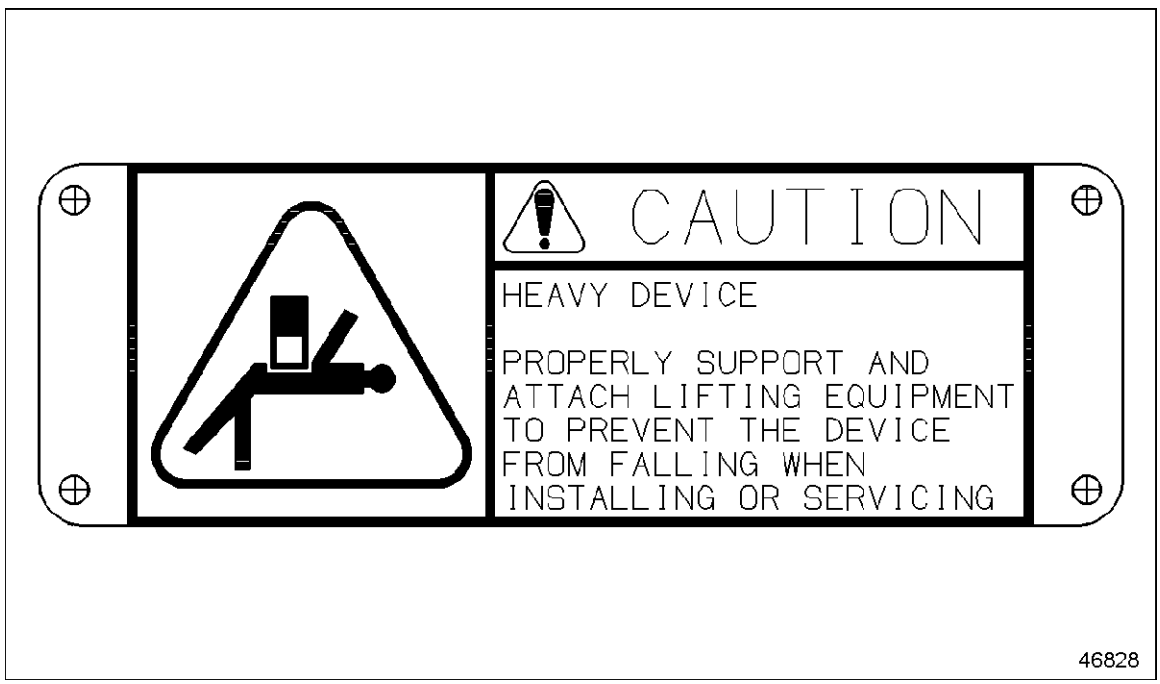



**Figure 2-2 Heavy Aftertreatment Device Caution Label**

## 2.1.1 EXHAUST (START/RUN ENGINE)

Before starting and running the engine, adhere to the following safety precautions:

**⚠ CAUTION:**

**EXHAUST FUMES**

**To avoid injury or injury to bystanders from fumes, engine or vehicle fuel system service operations should be performed in a well ventilated area.**

**⚠ WARNING:**

**HOT EXHAUST**

**During stationary regeneration the exhaust gases will be extremely HOT and could cause a fire if directed at combustible materials. Ensure that the vehicle is in a well ventilated area and do not park where the exhaust will discharge in a manner that could create a fire.**

**⚠ WARNING:**

**PERSONAL INJURY**

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

- **Always start and operate an engine in a well ventilated area.**
- **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **Do not modify or tamper with the exhaust system or emission control system.**

**WARNING:**

**PERSONAL INJURY**

**To avoid injury, never remove any engine component while the engine is running.**

## 2.1.2 ITEMS UNDER TENSION

To avoid injury from an item under tension, adhere to the following safety precautions:

**WARNING:**

**EYE INJURY**

**To avoid injury from flying parts when working with components under spring tension, wear adequate eye protection (face shield or safety goggles).**

## 2.1.3 WORK PLACE

To avoid injury from slipping and falling, organize your work area and keep it clean.

**WARNING:**

**PERSONAL INJURY**

**To avoid injury from slipping and falling, immediately clean up any spilled liquids.**

Eliminate the possibility of a fall by:

- Wiping up oil spills
- Keeping tools and parts off the floor

A fall could result in a serious injury.

## 2.1.4 FLUIDS AND PRESSURE

Be extremely careful with fluids under pressure.

**WARNING:**

**FIRE AND TOXICITY**

**Some pressurized fluid may be trapped in the system. To avoid personal injury, loosen all connections slowly to avoid contact with fluid. When required, spray fluid into a proper container. The engine starting fluid used in DDEC Ether Start Systems contains extremely flammable and toxic substances.**

**WARNING:**

**PERSONAL INJURY**

**To avoid injury from penetrating fluids, do not put your hands in front of fluid under pressure. Fluids under pressure can penetrate skin and clothing.**

Fluids under pressure can have enough force to penetrate the skin. These fluids can infect a minor cut or opening in the skin. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can result without immediate medical treatment.

### 2.1.5 GLASSES

Select appropriate safety glasses for the job. It is especially important to wear safety glasses when using tools such as hammers, chisels, pullers or punches.

**CAUTION:**

**EYE INJURY**

**To avoid injury from flying debris, wear a face shield or goggles.**

### 2.1.6 FIRE

Keep a charged fire extinguisher within reach. Be sure you have the correct type of extinguisher for the situation. The correct fire extinguisher types are listed in Table 2-1.

| Fire Extinguisher | Work Environment |
|---|---|
| Type A | Wood, Paper, Textile and Rubbish |
| Type B | Flammable Liquids |
| Type C | Electrical Equipment |

**Table 2-1 The Correct Type of Fire Extinguisher**

**WARNING:**

**FIRE**

**To avoid injury from fire caused by heated diesel-fuel vapors:**

- **Keep those people who are not directly involved in servicing away from the engine.**
- **Stop the engine immediately if a fuel leak is detected.**
- **Do not smoke or allow open flames when working on an operating engine.**
- **Wear adequate protective clothing (face shield, insulated gloves and apron, etc.).**
- **To prevent a buildup of potentially volatile vapors, keep the engine area well ventilated during operation.**

## 2.1.7 BATTERIES

Electrical storage batteries give off highly flammable hydrogen gas when charging and continue to do so for some time after receiving a steady charge.

**WARNING:**

**Battery Explosion and Acid Burn**

**To avoid injury from battery explosion or contact with battery acid, work in a well ventilated area, wear protective clothing, and avoid sparks or flames near the battery. If you come in contact with battery acid:**

- **Flush your skin with water.**
- **Apply baking soda or lime to help neutralize the acid.**
- **Flush your eyes with water.**
- **Get medical attention immediately.**

Always disconnect the battery cable before working on the engine.

## 2.1.8 CLOTHING

Make sure that safe work clothing fits and it is in good condition. Use work shoes that are sturdy and rough soled. Bare feet, sandals or sneakers are not acceptable foot wear when adjusting and/or servicing an engine. Do not wear rings, wrist watches, bracelets, necklaces and loose fitting clothing that could catch on moving parts causing serious injury.

**WARNING:**

**PERSONAL INJURY**

**To avoid injury when working near or on an operating engine, remove loose items of clothing and jewelry. Tie back or contain long hair that could be caught in any moving part causing injury.**

**WARNING:**

**PERSONAL INJURY**

**To avoid injury when working on or near an operating engine, wear protective clothing, eye protection, and hearing protection.**

## 2.1.9 AIR

Observe the following caution when using compressed air.

**WARNING:**

**EYE INJURY**

**To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.**

# 3 MECHANICAL TROUBLESHOOTING

Troubleshooting the Aftertreatment System (ATS) performance involves both mechanical and electrical diagnostics. Mechanical diagnostics is addressed here and electrical diagnostics is addressed in Chapter 6. Mechanical component troubleshooting procedures are listed in Table3-1.

**NOTE:**
Table 3-1 is for future use during the 2007 model year, and not for use during the demonstration period.

During the demonstration period, the following applies:

- If the vehicle is emitting a high amount of black smoke, the Aftertreatment Device (ATD) must be removed, Refer to Section 4.1.1 and returned to Detroit Diesel for investigation. For return instructions, contact the Detroit Diesel Customer Support Center at 313–592–5800.
- If the Amber Warning Lamp (AWL) or Red Stop Lamp (RSL) illuminates, utilize the engine diagnostic software. Refer to Chapter 6 to identify the proper Suspect Parameter Number (SPN) code and associated diagnostic procedure, Listed in Table 6-1.
- If the Diesel Particulate Filter (DPF) lamp illuminates, Refer to section 5.3 for information on stationary regeneration.
- Any other problems or issues should be referred to the Detroit Diesel Customer Support Center at 313–592–5800.

| Component | Complaint (Symptoms) | Cause(s) | Corrective Action |
|---|---|---|---|
| DPF | Exhaust pipe emits black smoke | DPF failure | Replace DPF. Refer to Section4.1.1 |
| | High back pressure | Plugged DPF inlet channel, sensor failure, DPF failure | Refer to Section4.1.8 and inspect DPF |
| | After 10 minutes of regen the engine dropped to Idle | Plugged DPF inlet channel, sensor failure, DPF failure | Refer to Section4.1.8 and inspect DPF |
| Intake Throttle Valve | Intake throttle valve does not activate<br>- engine will not dose | Motor failure due to over current | Use MARC tool to slew the throttle. Make sure power is getting to the throttle. |
| | Throttle does not activate | Throttle connector tab or pin sheared off | Replace intake throttle valve. Refer to Section4.2.1 |
| | No functional throttle | Defective or harness connector failure | Use MARC tool to slew the throttle. Make sure power is getting to the throttle. |
| | Throttle stuck closed<br>- engine does not start (stuck fully closed)<br>- loss of HP (stuck partially closed) | Broken weld/foreign objects/excessive soot | Replace intake throttle valve if no foreign objects found. Refer to Section4.2.1 |
| | Throttle stuck open<br>- engine will not dose | - Water intrusion in gear box<br>- gear failure<br>- foreign object | Make sure power is getting to throttle<br>Check connector<br>Use MARC tool to slew throttle |
| Doser | High DOC and/or DPF temp. w/o active regen | Fuel cutoff valve leaking fuel | |
| | Low temp. during regen or no temp. rise | Nozzle plugged | |
| | External leak seen or broken fuel line fault | Doser leak | |
| | Fluctuation of DOC temp. during regen | Fluctuation in the amount of fuel injected | |
| | Excessive smoke during dosing (any smoke) | Leaking doser gasket | |
| | ATD temp rising rapidly during stationary regen | Harness connection for the fuel cutoff valve was connected to the doser injector control valve and the doser injector control valve harness was connected to the fuel cutoff valve | Reposition connectors to proper components. Refer to Section4.3.1 |

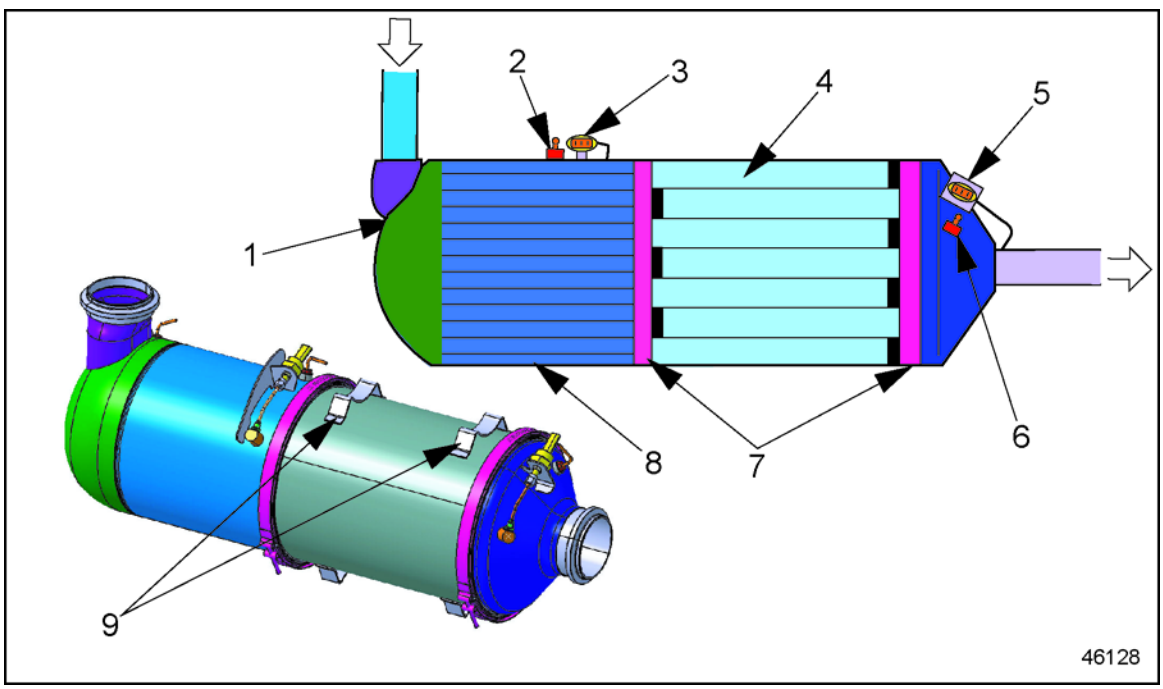
**Table 3-1 Component Troubleshooting**

# 4 REPAIR OR REPLACEMENT OF COMPONENTS

Following are procedures to repair or replace the Aftertreatment System (ATS) components.

## 4.1 AFTERTREATMENT DEVICE

See Figure 4-1 for a picture of the Aftertreatment Device (ATD), that is composed of a Diesel Oxidation Catalyst (DOC) and a Diesel Particulate Filter (DPF).




1. DOC Inlet Temperature Sensor
2. DOC Outlet Temperature Sensor
3. DPF Inlet Pressure Sensor
4. Diesel Particulate Filter
5. DPF Outlet Pressure Sensor
6. DPF Outlet Temperature Sensor
7. V-Band Clamps
8. Diesel Oxidation Catalyst
9. Lifting Brackets

**Figure 4-1 Aftertreatment Device**

These components are Listed in Table 4-1

| Component | Description |
|---|---|
| DOC Inlet Temperature Sensor | Measures exhaust gas temperatures entering the DOC. |
| DOC Outlet Temperature Sensor | Measures exhaust gas temperatures exiting the DOC. |
| DPF Inlet Pressure Sensor | Measures exhaust gas pressures entering the DPF. |
| Diesel Particulate Filter | A device installed on a diesel engine system that captures and reduces particulate matter (PM) from the exhaust gas. |
| DPF Outlet Pressure Sensor | Measures exhaust gas pressures exiting the DPF. |
| DPF Outlet Temperature Sensor | Measures exhaust gas temperatures exiting the DPF. |
| Diesel Oxidation Catalyst | A flow through device located at the ATD inlet that enhances the oxidation of hydrocarbons in order to reduce particulate emissions. |

**Table 4-1 ATD Component Descriptions**

### 4.1.1 AFTERTREATMENT DEVICE REMOVAL

Be advised that the ATD may be horizontally or vertically mounted depending on the vehicle chassis configuration. See Figure 4-2 for a typical mounting view of the ATD. To remove the ATD, a suitable lifting or holding device is required. For example, removing a horizontally mounted ATD from the underside of a vehicle chassis, requires a suitable transmission jack (vertical mounts require an alternate accommodation). Additionally, depending on ground clearance, it may be necessary to jack up the vehicle. It may also be necessary to remove a body panel to gain access to the ATD location. In some cases, it may be desirable to remove only the DPF section of the ATD and this is shown in Section 4.1.12. During the demonstration period, Detroit Diesel Corporation will require the complete ATD be removed and returned. The following describes this procedure:

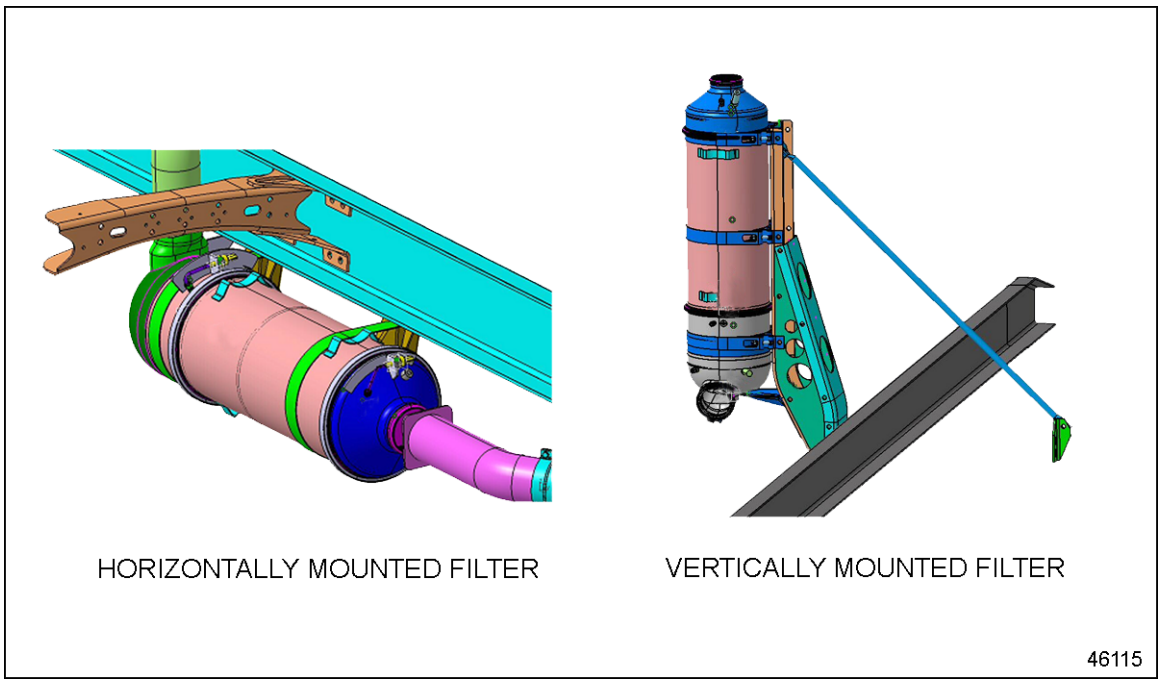



**Figure 4-2 Typical Mounting Views of an Aftertreatment Device**

**CAUTION:**

**To avoid injury from hot surfaces, allow engine to cool before removing any component. Wear protective gloves.**

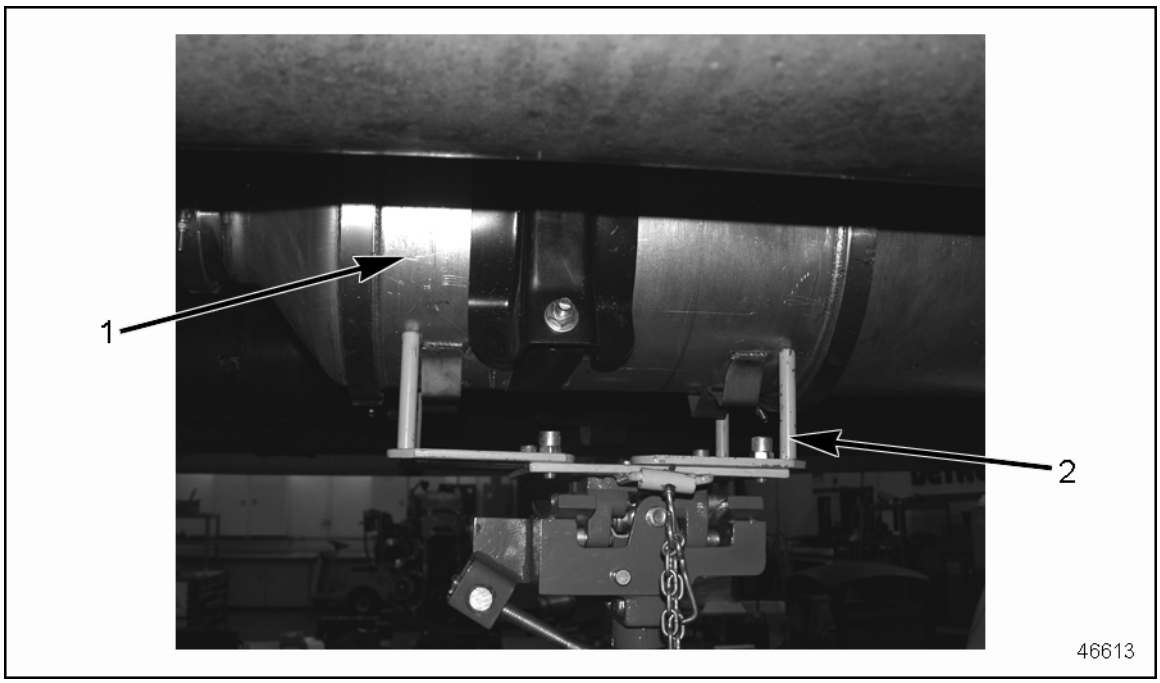
**WARNING:**

**PERSONAL INJURY**

**To avoid injury when removing or installing a heavy engine component, ensure the component is properly supported and securely attached to an adequate lifting device to prevent the component from falling.**

1. If necessary, remove body panel(s) or other obstruction and jack up vehicle.
2. Center lifting device in position underneath ATD. See Figure 4-3.

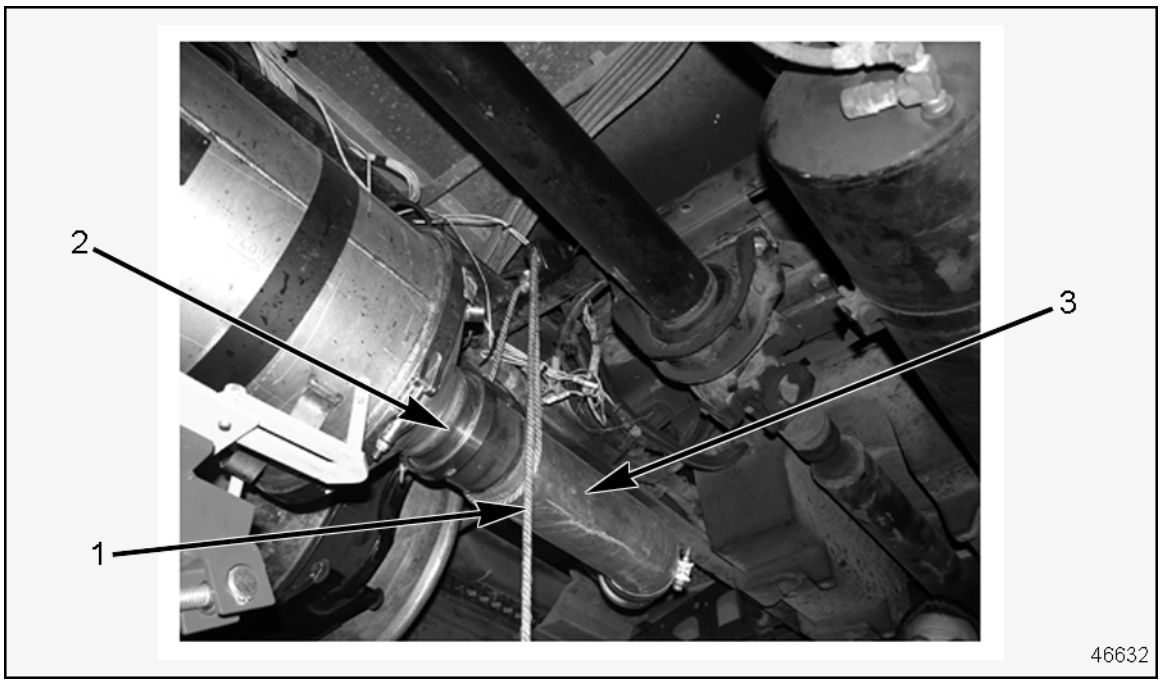
 




1. ATD
2. Lifting Device

**Figure 4-3 Lifting Device**

3. Disconnect 5 sensors from ATD.
4. Support exhaust pipe assembly with rope sling. See Figure 4-4.




1. Rope Sling
2. Marmon Clamp
3. Exhaust Pipe Assembly

**Figure 4-4 Rope Sling**

5. Remove rear marmon clamp at connection between ATD outlet and exhaust pipe. See Figure 4-4.
6. Remove front marmon clamp at connection between ATD inlet and turbocharger exhaust pipe.

**WARNING:**

**EYE INJURY**

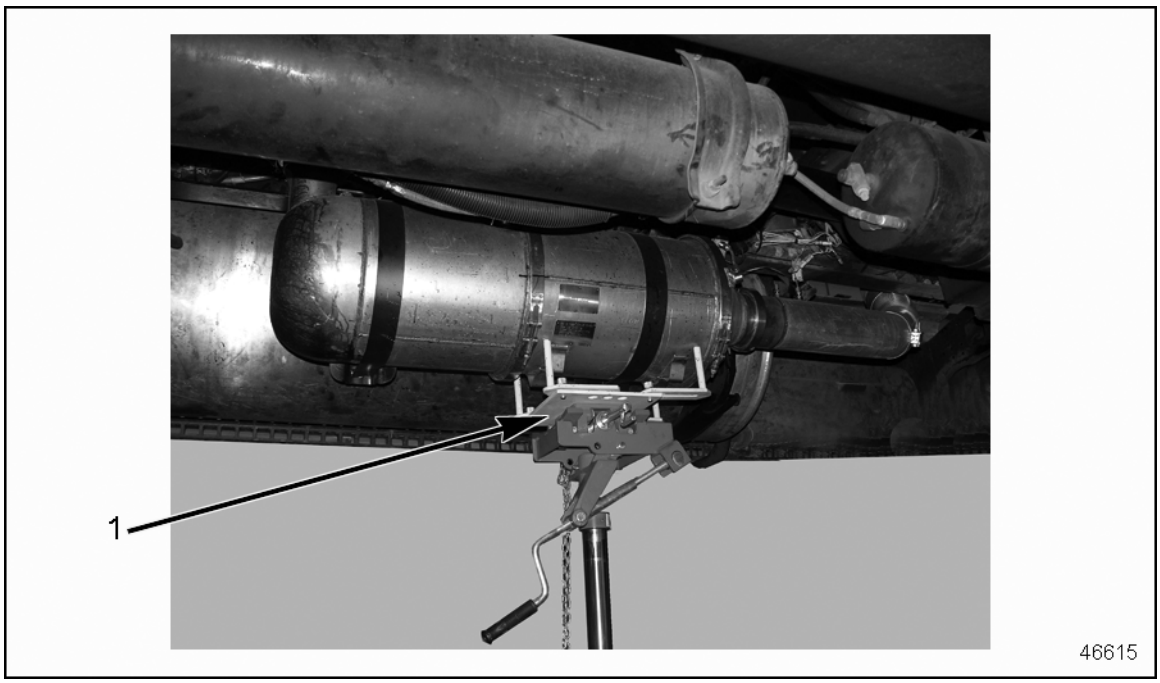
**To avoid injury from flying parts when working with components under spring tension, wear adequate eye protection (face shield or safety goggles).**

**NOTICE:**

The DPF is fragile. Take special care when handling the DPF as it could be damaged or destroyed by dropping or sudden impact.

7. Carefully loosen both ATD support straps (they are under spring tension). Before removing support straps, ensure lifting device is centered and supporting ATD as it contains fragile components that could be damaged. See Figure 4-5.




1. Lifting Device

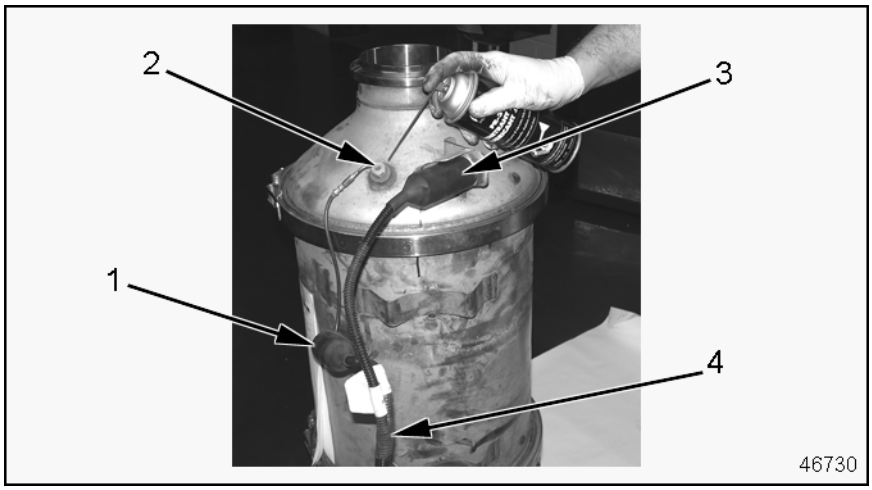
**Figure 4-5 Lifting Device-Centered**

8. Secure ATD to lifting device with security chain and proceed to lower ATD from vehicle.
9. Remove security chain.

## 4.1.2 TEMPERATURE SENSOR REMOVAL

Following is a typical removal of a temperature sensor:

1. Slide boot covering temperature sensor electrical connection out of the way. See Figure 4-6




1. Temperature Sensor Electrical Connection
2. Temperature Sensor Nut
3. Pressure Sensor Electrical Connection
4. ATD Sensor Harness

**Figure 4-6 Temperature Sensor Removal**

2. Slide white locking tab on electrical connection into unlock position
3. Separate electrical connection by pulling apart.
4. Loosen temperature sensor nut [use lubricant (non-graphite based) if necessary] and remove temperature sensor probe from ATD.

### 4.1.3 INSTALLATION OF TEMPERATURE SENSOR

Following is a typical installation of a temperature sensor:

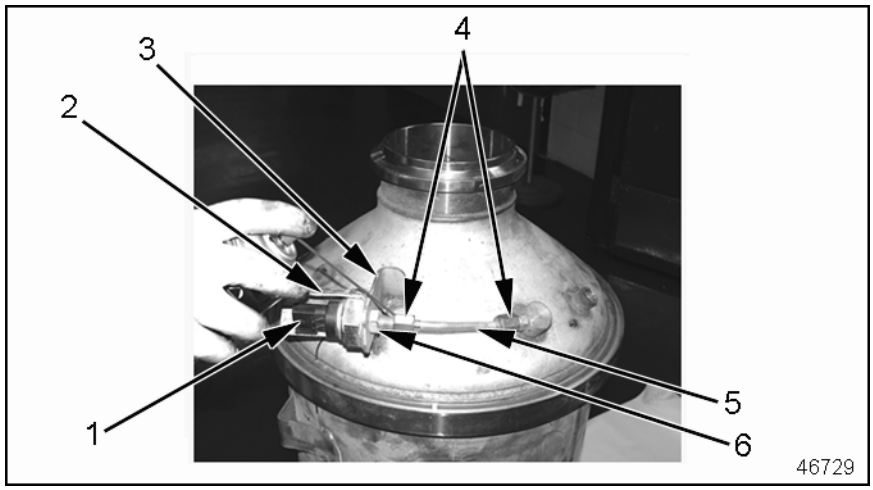
1. Place temperature sensor probe in ATD and tighten in place with temperature sensor nut; torque to 35-39 Nm (26-29 lb ft).
2. Make electrical connection and slide white locking tab into lock position
3. Slide boot over temperature sensor electrical connection..

### 4.1.4 PRESSURE SENSOR REMOVAL

Following is a typical removal of a pressure sensor:

1. With boot out of the way, slide white locking tab on connector into unlock position and separate electrical connection.




1. Pressure Sensor Assembly
2. Heat Shield
3. Flange
4. Tubing Nuts
5. Pressure Line
6. Bulkhead Nut

**Figure 4-7 Pressure Sensor Removal**

2. Loosen two tubing nuts [use lubricant (non-graphite based) if necessary] and remove pressure line. Check pressure line for blockage or other obstruction and clean as necessary.
3. Loosen bulkhead nut and remove pressure sensor assembly from flange.
4. Note position of heat shield for subsequent installation.

## 4.1.5 INSTALLATION OF PRESSURE SENSOR

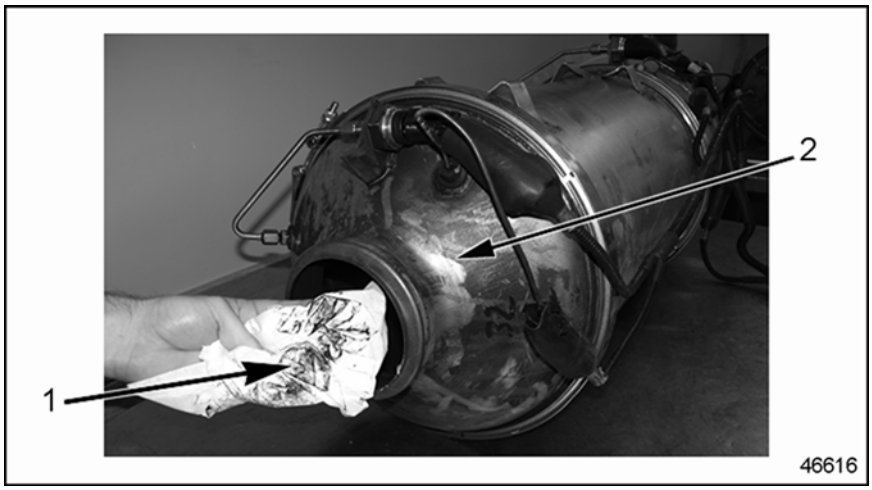
Following is a typical installation of a pressure sensor:

1. Position pressure sensor assembly on flange and ensure that heat shield is in proper orientation. Secure assembly with bulkhead nut; torque to 20-25 Nm (15-18 lb ft).
2. Make electrical connection and slide white locking tab into lock position.
3. Place pressure line in position and secure with two tubing nuts: torque to 15-17 Nm (11-13 lb ft)
4. Slide boot over electrical connection.

## 4.1.6 PRELIMINARY INSPECTION

The primary means of inspection on a Diesel Particulate Filter (DPF) core is to perform a white rag inspection of the outlet side.

1. Using a clean white rag or shop cloth, reach inside the device and wipe the inside face of the DPF outlet section
2. Inspect rag, for indications of soot. See Figure 4-8.




1. Indications of Soot on Rag
2. Outlet Section

**Figure 4-8 Indications of Soot**

3. If soot is found, the ATD should be replaced; contact the Detroit Diesel Customer Support Center at 313–592–5800 for further direction.
4. If no soot is found, disassemble the ATD and continue the inspection process.Refer to Section4.1.7 for disassembly instructions.

## 4.1.7 DISASSEMBLY

Following is the procedure to disassemble the ATD: See Figure 4-1.

1. Place ATD on suitable work surface. See Figure 4-9.

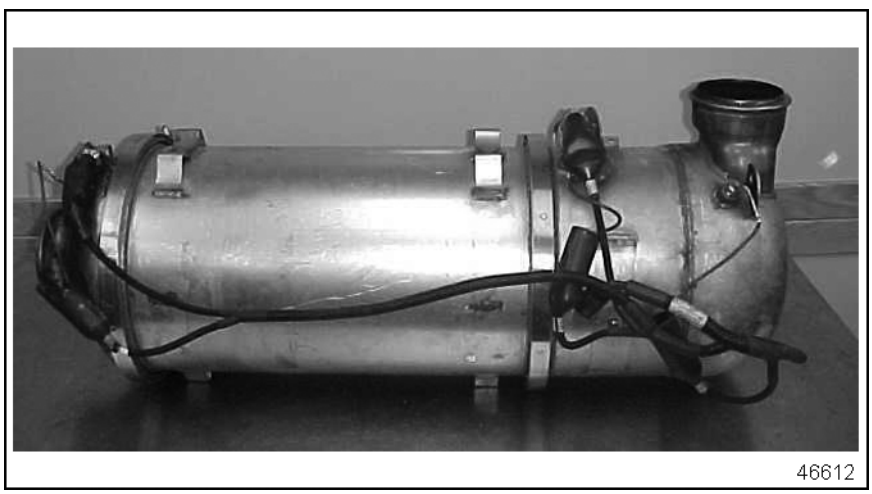
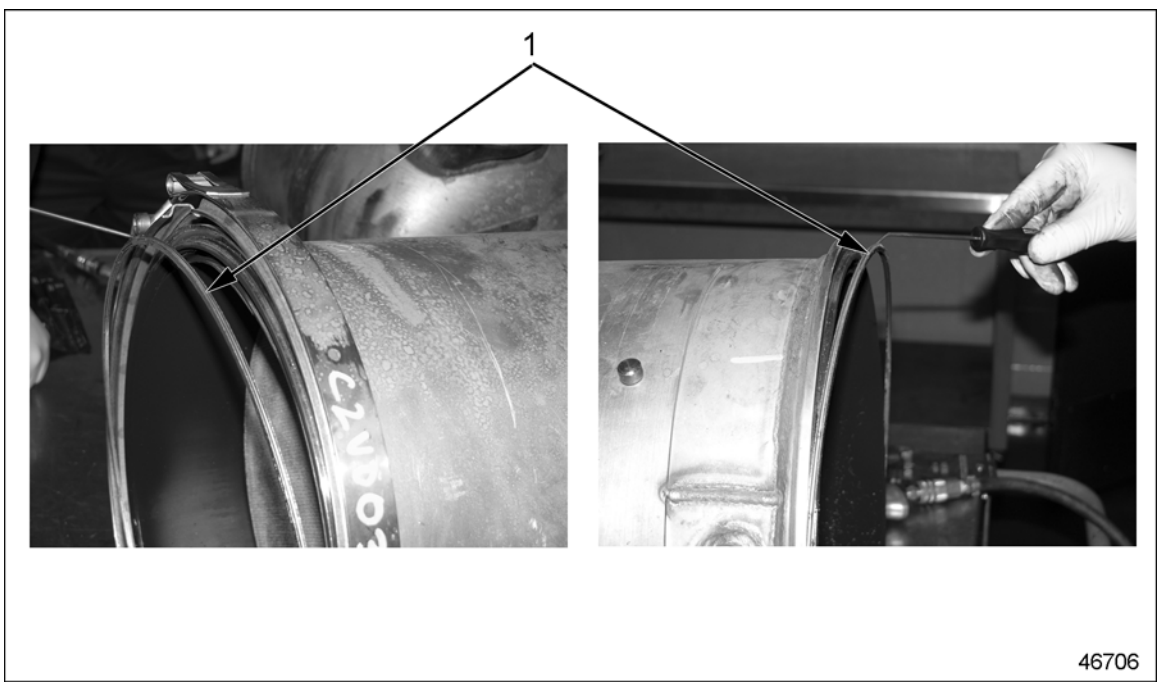



**Figure 4-9 ATD on Work Bench**

2. Loosen both V-band clamps and position out of the way.
3. Carefully separate the three sections from each other. See Figure 4-10


**Figure 4-10 Sections Separated**

4. Remove graphite gaskets and discard. See Figure 4-11



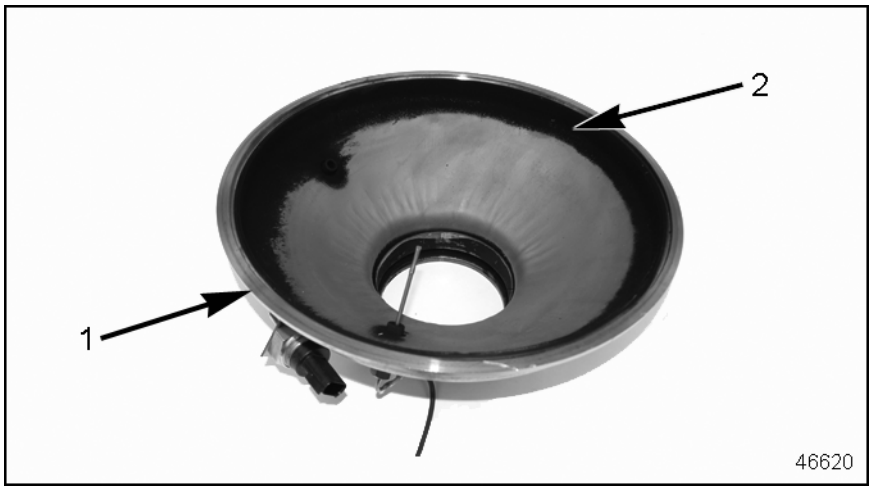

1. Graphite Gaskets

**Figure 4-11 Graphite Gaskets Removed**

## 4.1.8 INSPECTION

The following instructions should be used for detailed inspection of the ATD:

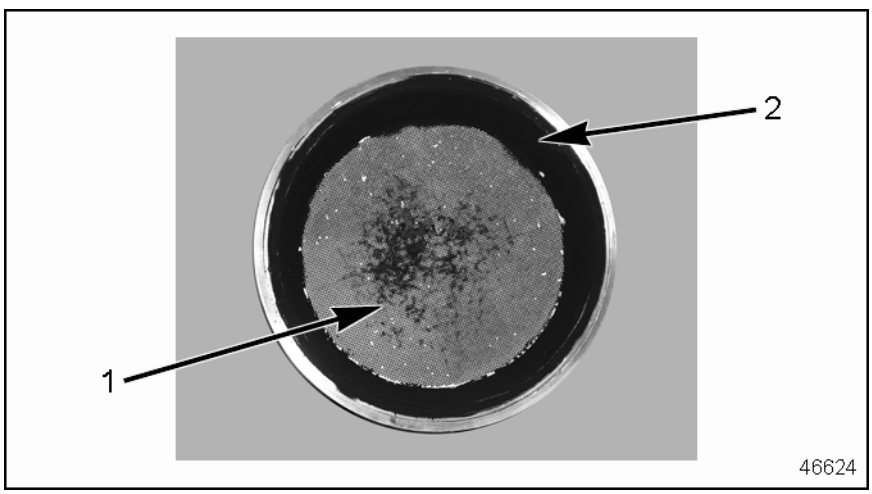
1. Inspect outlet section for evidence of soot residue. See Figure 4-12. If soot residue is found, ATD should be replaced; contact the Detroit Diesel Customer Support Center at 313–592–5800 for further direction.




1. Outlet Section 2. Soot

**Figure 4-12 Evidence of Soot-Outlet Section**

2. Inspect DPF outlet face for evidence of soot residue. See Figure 4-13. If soot residue is found, ATD should be replaced; contact the Detroit Diesel Customer Support Center at 313–592–5800 for further direction.




1. Outlet Face 2. Soot

**Figure 4-13 Evidence of Soot-DPF Outlet Face**

3. If no soot is found in step 1 or 2, DPF should be considered serviceable. Follow instructions for DPF cleaning, if needed.

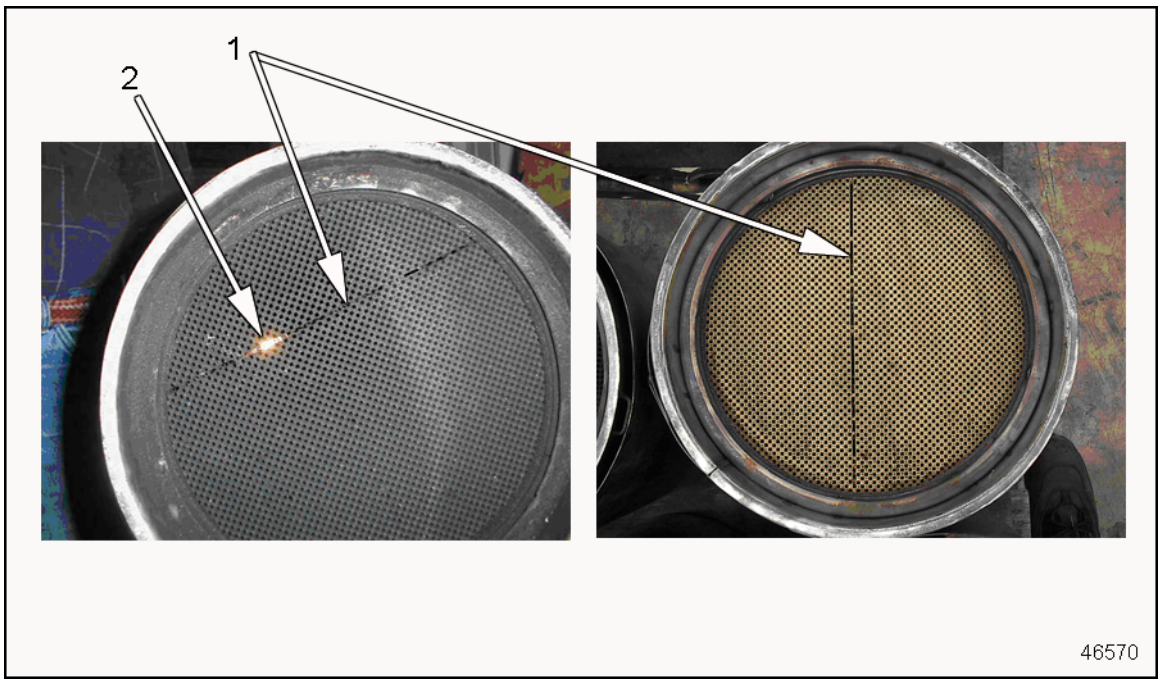
 

4. Inspect inlet face for plugging. If DPF is plugged, ATD should be replaced; contact the Detroit Diesel Customer Support Center at 313–592–5800 for further direction.

**NOTE:**
The most important means to qualify a failed or damaged filter is by visual inspection of the substrate. Additional failure modes detectable by visual inspection are: exotherm, substrate fractures, cell fusion, and cell damage. Diesel particulate filters that exhibit these conditions are also considered unusable, uncleanable, and may fail to perform correctly in their application. See Figure 4-14 for exotherm failure. If these failure modes are detected during inspection of the ATD, Contact Detroit Diesel Customer Support Center at 313–592–5800 for further direction.


**Figure 4-14 Exotherm Condition**

This failure mode is also known as a “burn through”. The substrate shown here has experienced an exotherm. See Figure 4-14 . The face of the filter has been partially melted, and the cell structure has been converted to molten ceramic. Less destructible exotherms may not be visible without further inspection. Filters that have experienced an exotherm are non-serviceable.
If the DPF is suspect for this condition, contact Detroit Diesel Customer Support Center at 313–592–5800 for further direction.

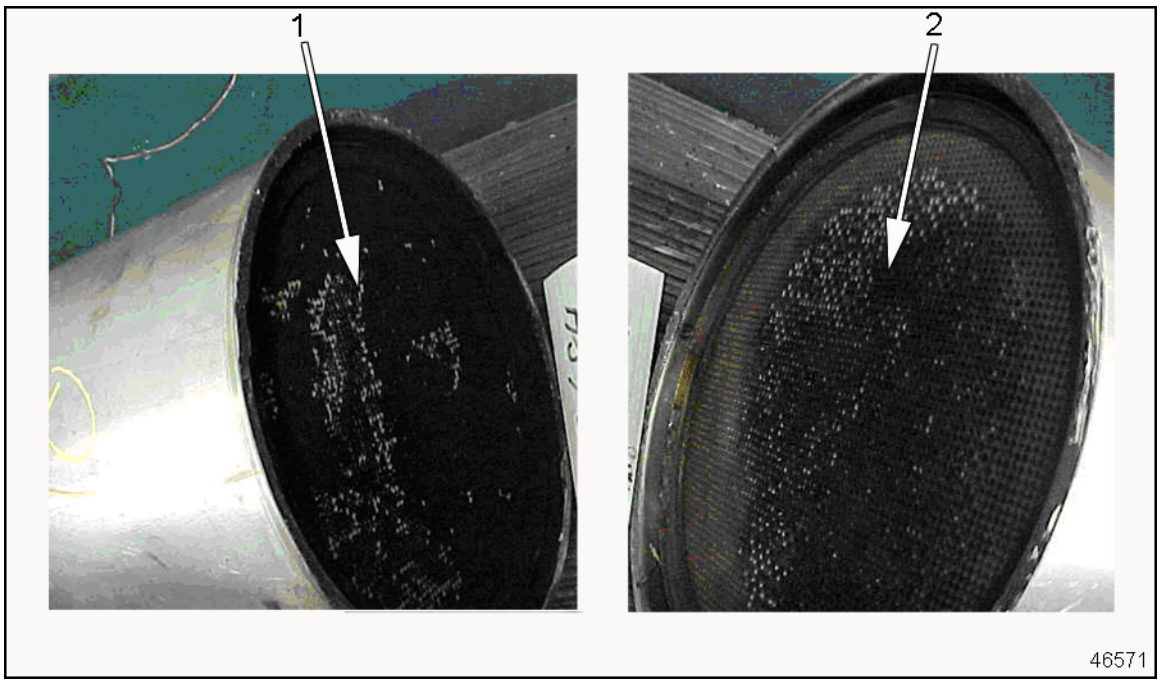



1. Fractures
2. Flashlight Beam

**Figure 4-15 Substrate Fractures Condition**

The DPF's shown here have experienced substrate fractures, which have split the ceramic filter material down the center. See Figure 4-15. DPF's may also exhibit more sporadic fracturing that can occur in a less geometric fashion. A flashlight can be used to highlight the condition and may be visible through the cracked DPF substrate. The conditions described here will result in a filter that is non-serviceable. If the DPF is suspect for this condition, contact Detroit Diesel Customer Support Center at 313–592–5800 for further direction.

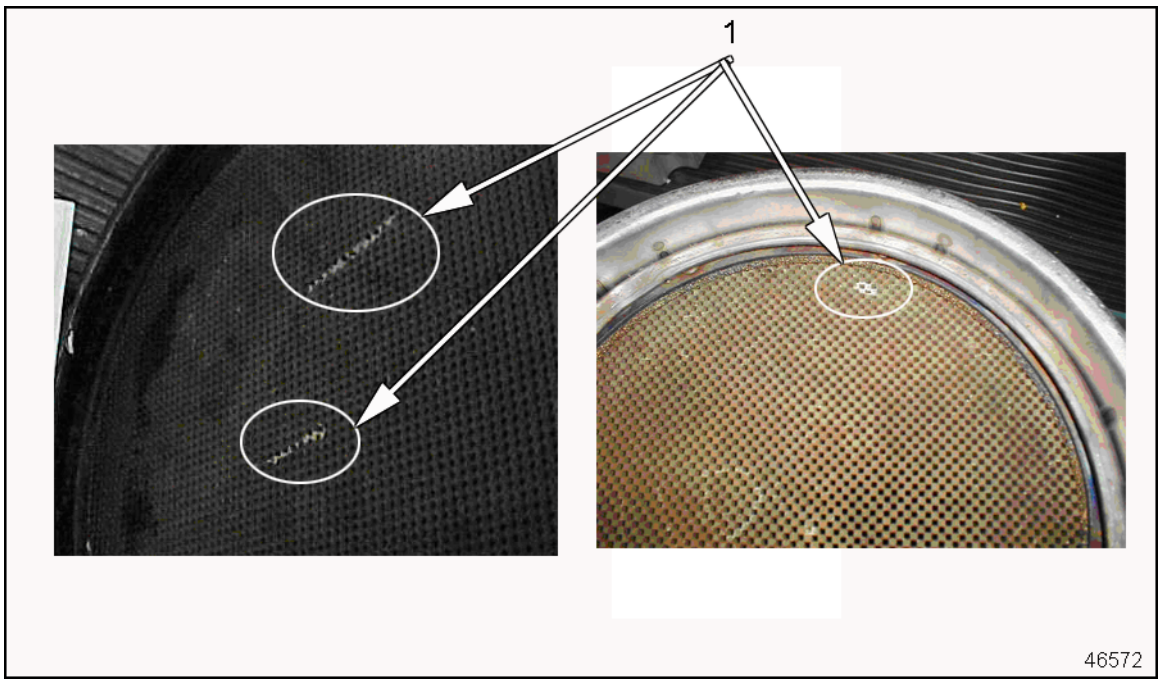
 




1. Inlet Face
2. Outlet Face

**Figure 4-16 Cell Fusion Condition**

This condition is indicative of a DPF that has fused or broken channels that may allow the outlet face to be heavily coated with soot (this failure can be captured by the rag test as well). See Figure 4-16. This failure mode may also appear as black spotting or blotching patterns on the outlet face. In most cases, the filter is no longer capturing soot and should be replaced. If the DPF is suspect for this condition, contact Detroit Diesel Customer Support Center at 313–592–5800 for further direction.




1. Damaged Cells

**Figure 4-17 Cell Damage Condition**

Generally the cell damage shown, See Figure 4-17 is considered minor and will not affect the filter's integrity or its ability to correctly capture and regenerate soot. If there is substantial cell damage causing the plugs to fall out or become disabled, then the filter may be compromised. Inspection of the DPF outlet face as described previously, will indicate a system failure. If the DPF is suspect for this condition, contact the Detroit Diesel Customer Support Center at 313–592–5800 for further direction.

## 4.1.9 CLEANING

There are two stages to the cleaning process to remove ash that has accumulated in the DPF. Stage 1 is a compressed air ash removal and stage 2 is a remanufactured exchange program.

Stage 1 - Compressed Air Ash Removal - This cleaning can be performed at a service shop in combination with other scheduled maintenance. The process requires the DPF to be regenerated on the vehicle prior to its removal. This regeneration burns off any combustible soot remaining in the filter, helping to improve cleaning efficiency. After regeneration, the DPF is cooled and removed from the vehicle. The DPF can now be connected to a pressurized air cleaning system that flushes out loose ash particles. The estimated time for stage 1 cleaning is 2 to 3 hours.

Stage 2 - Remanufactured Exchange Program - When more rigorous cleaning is required, stage 2 offers a proprietary washing process for ash removal that is only available with Detroit Diesel Particulate Filters. Because of the necessary time, equipment, and facilities required to complete this type of cleaning, it will be made available as a genuine Detroit Diesel Remanufactured Product.

1. During the demonstration period, all necessary cleaning will be performed by Detroit Diesel. If you suspect your DPF is in need of cleaning, contact the Detroit Diesel Customer Support Center at 313–592–5800.

## 4.1.10 ASSEMBLY

Following is the procedure to assemble the ATD: See Figure 4-1.

1. On a work surface, position the three sections of the ATD.
2. Wipe down outlet section with suitable cleaning fluid
3. Install new graphite gaskets. See Figure 4-18


1. Graphite Gasket

**Figure 4-18 Graphite Gasket Installation**

4. Join the three sections and slide the V-band clamps in position.
5. Tighten the V-band clamps; torque to 16-18 Nm (12-13 lb ft).

## 4.1.11 INSTALLATION

The ATD is installed as follows:

1. If necessary, remove body panel(s) or other obstruction and jack up vehicle.
2. Secure ATD to lifting device with security chain.
3. Raise ATD into position under vehicle and align between turbocharger exhaust and exhaust pipe assembly. Use rope sling to support exhaust pipe assembly.

**WARNING:**

**EYE INJURY**

**To avoid injury from flying parts when working with components under spring tension, wear adequate eye protection (face shield or safety goggles).**

4. Position support straps (they are under spring tension) around ATD. Tighten support straps to snug fit. Remove security chain from ATD.
5. Install front marmon clamp at connection between ATD inlet and turbocharger exhaust pipe. Tighten marmon clamp to snug fit.
6. Install rear marmon clamp at connection between ATD outlet and exhaust pipe. Tighten marmon clamp to snug fit.
7. Torque marmon clamps to 6.8 Nm (60 in lb) and support straps to 41 Nm (30 lb ft).
8. Plug in sensor harness at 10-pin connector at vehicle chassis.
9. Lower lifting device and remove from under vehicle.
10. If necessary, lower vehicle and replace body panel(s) or other removed component.

## 4.1.12 DPF REMOVAL

Following is the procedure to remove the DPF:

1. If necessary, remove body panel(s) or other obstruction and jack up vehicle.
2. Move a suitable support, such as a transmission jack with fixture attached, and jack it up into position underneath the DPF. See Figure 4-19

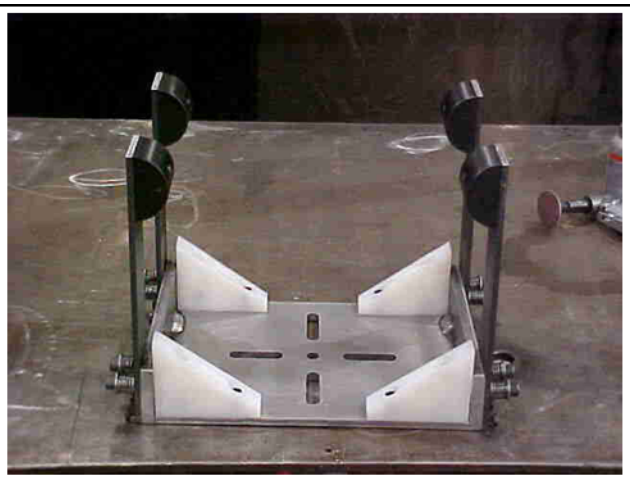



**Figure 4-19 Jack Fixture**

3. Loosen two V-band clamps and position to the side and out of the way.

| **WARNING:** |
| --- |
| **EYE INJURY** |
| **To avoid injury from flying parts when working with components under spring tension, wear adequate eye protection (face shield or safety goggles).** |

| **NOTICE:** |
| --- |
| The DPF is fragile. Take special care when handling the DPF as it could be damaged or destroyed by dropping or sudden impact. |

4. Carefully loosen the support strap (under spring tension) that surrounds the DPF. Ensure that the DPF is resting securely on the support to avoid damage.
5. Lower the support and slide the DPF out from under the vehicle.

**NOTE:**
To determine the condition of the DPF and possible subsequent action, refer to the following: Figure 4-14, Figure 4-15, Figure 4-16, and Figure 4-17.

### 4.1.13 INSTALLATION

Following is the procedure to install the DPF:

**NOTE:**
Prior to installation, remove and replace (with new) the graphite gaskets from the DPF.

1. Place the DPF on the support, slide underneath the vehicle, and raise into position.
2. Position the support strap around the DPF and tighten to a snug fit.
3. Position the two V-bands onto the DPF and tighten; torque to 16–18 Nm (12–13 lb ft).
4. Lower the support and slide out from under the vehicle.
5. If necessary, lower vehicle and replace body panel(s) or other removed component.

## 4.2 INTAKE THROTTLE VALVE

See Figure 4-20 for a picture of the intake throttle valve.

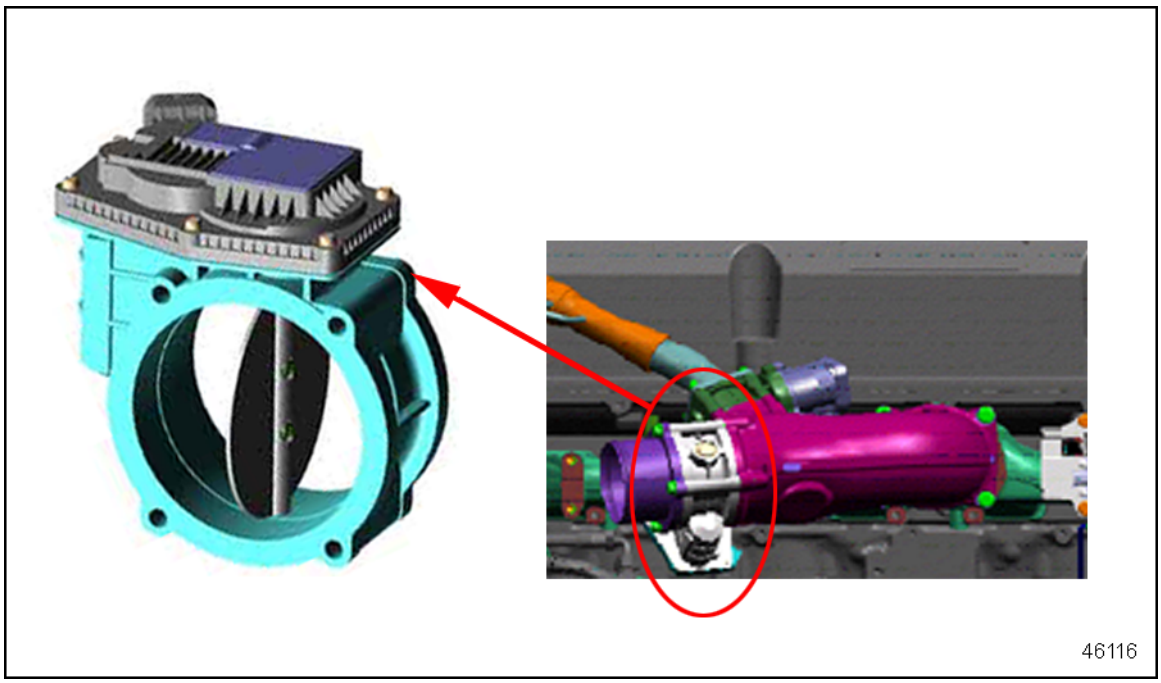


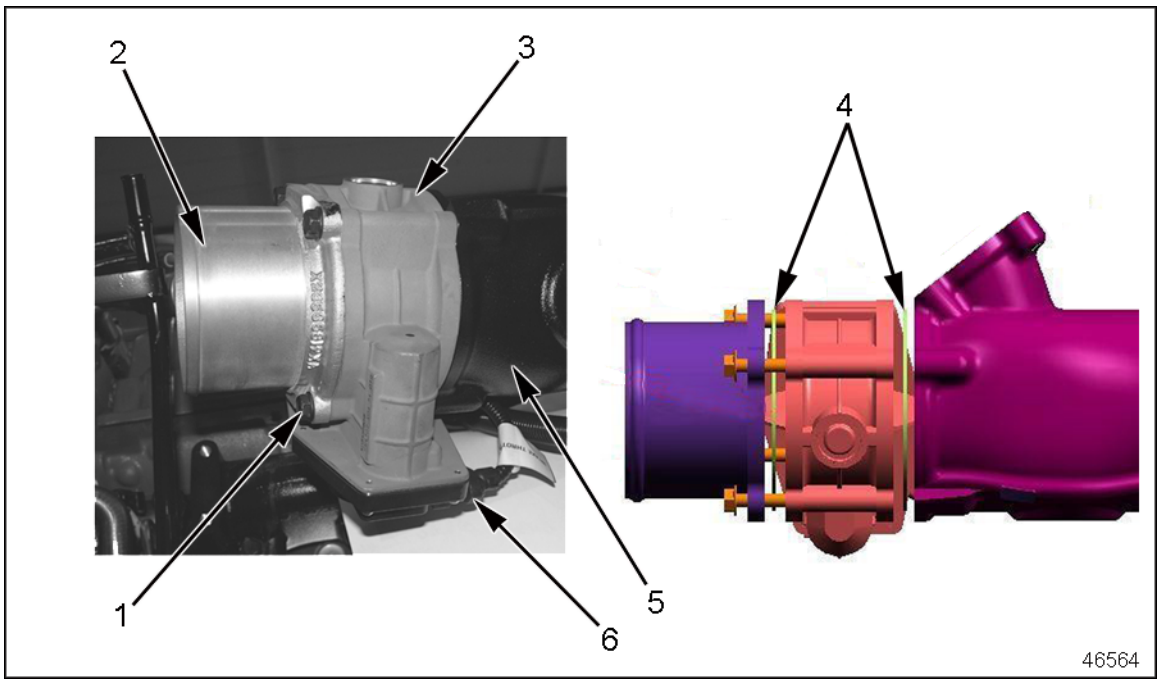

**Figure 4-20 Intake Throttle Valve Location**

### 4.2.1 REMOVAL

The intake throttle valve is located on the left side of the engine and removal is as follows:

1. Disconnect electrical connector at back of intake throttle valve. See Figure 4-21.




1. Bolt (qty. 4)
2. Adapter
3. Intake Throttle Valve
4. Seal Rings
5. Intake Manifold Elbow
6. Electrical Connector

**Figure 4-21 Removal of Intake Throttle Valve**

2. Remove four bolts connecting intake throttle valve to adapter and intake manifold elbow.
3. Remove intake throttle valve.
4. Remove seal rings and discard.

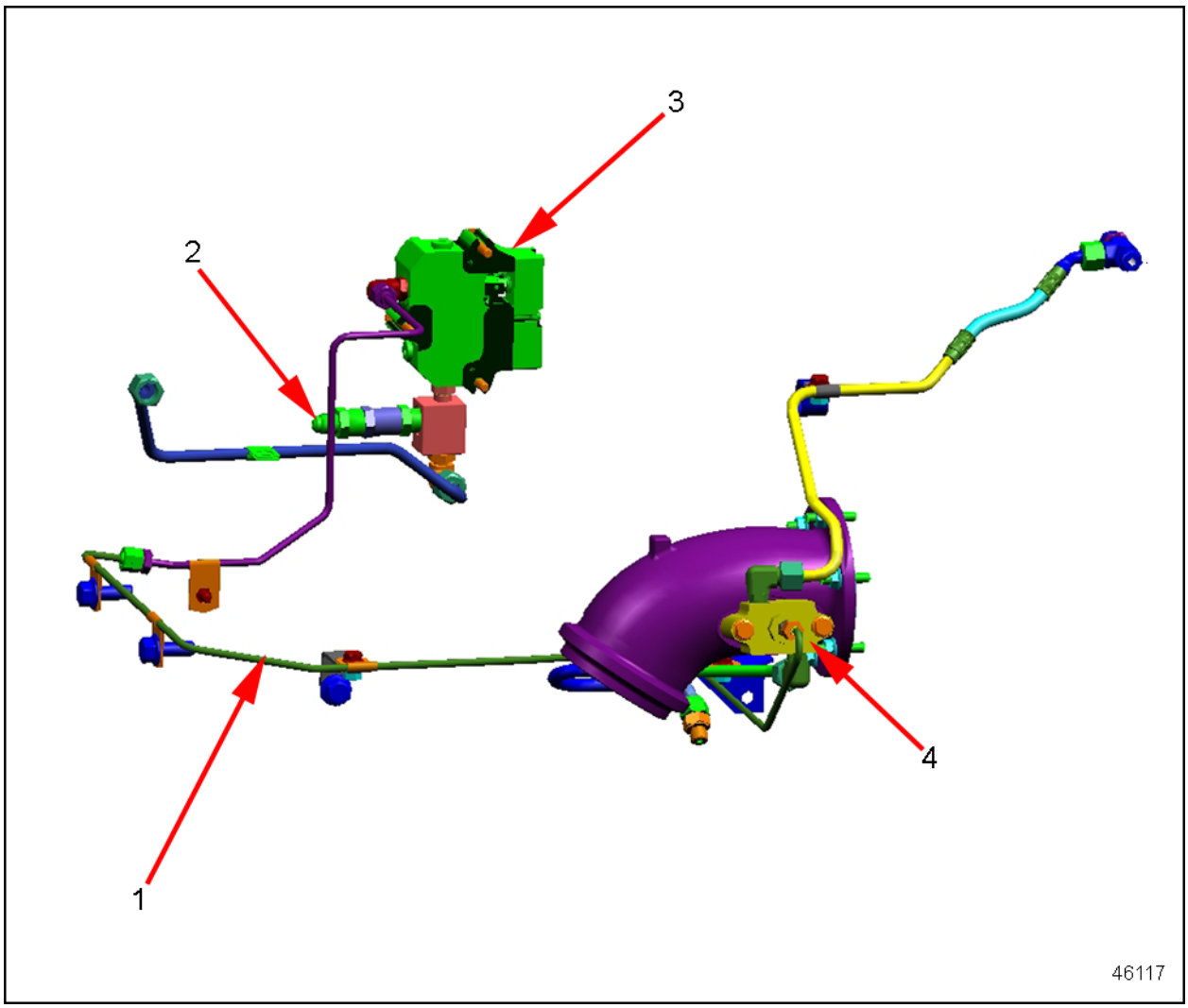
### 4.2.2 INSTALLATION

The intake throttle valve is installed as follows:

1. Position intake throttle valve in place between adapter and intake manifold elbow. See Figure 4-21.
2. Place new seal rings in position as shown.
3. Install and tighten four bolts; torque to 30 Nm (23 lb ft).
4. Connect electrical connector at back of intake throttle valve.

## 4.3 DOSER BLOCK ASSEMBLY/FUEL DOSER VALVE

See Figure 4-22 for a view of the Doser Block Assembly/Fuel Doser Valve and related components.



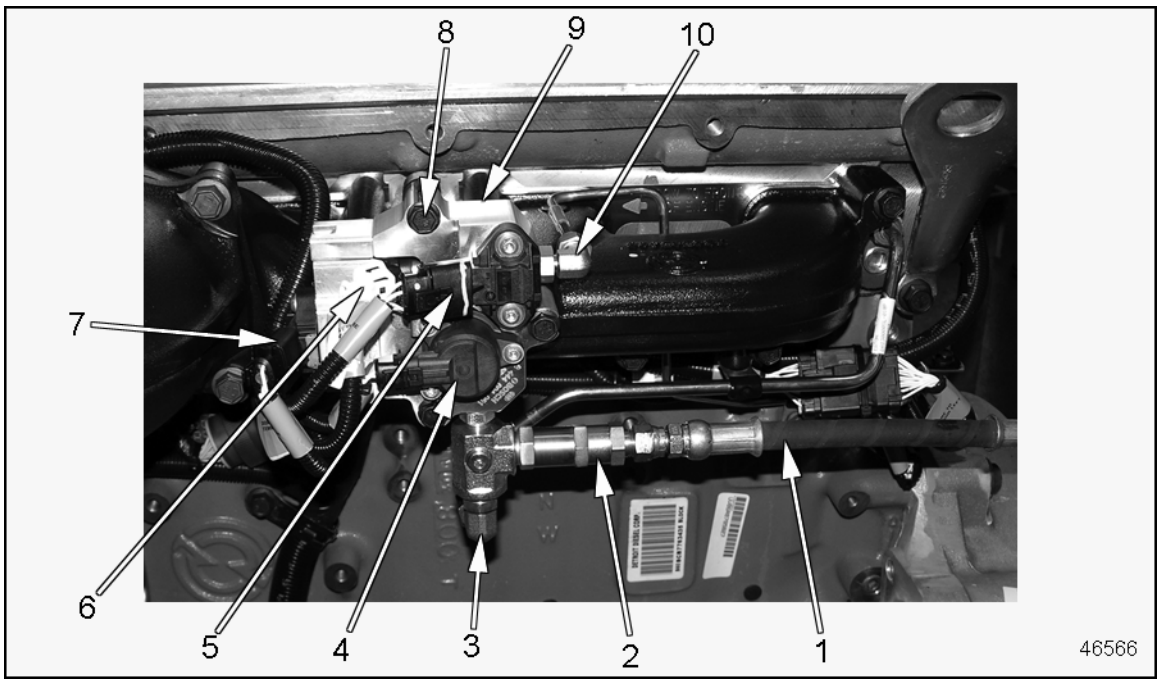

1. Dosing Fuel Line
2. Fuel Pressure Regulator
3. Doser Block Assembly
4. Fuel Doser Valve

**Figure 4-22 Doser Block Assembly/Fuel Doser Valve**

## 4.3.1 REMOVAL OF DOSER BLOCK ASSEMBLY

The Doser Block Assembly and related parts are located on the left side of the engine. See Figure 4-23 for a left side view of the engine that contains the Doser Block Assembly, Fuel Pressure Regulator, and additional fuel lines.




1. Fuel Return Line
2. Fuel Pressure Regulator
3. Fuel Line
4. Fuel Cutoff Valve
5. Fuel Line Pressure Sensor
6. Electronic Dosing Valve
7. Fuel Compensation Pressure Sensor
8. Bolts (qty. 3)
9. Doser Block Assembly
10. Dosing Fuel Line

**Figure 4-23 Left Side of Engine – Doser Block Assembly and Related Parts**

Remove as follows:

1. Place drip pan below engine to collect fuel.
2. Disconnect fuel return line from fuel pressure regulator.See Figure 4-23.
3. Disconnect fuel line leading from junction block (located at bottom of Doser Block Assembly) to the cylinder head.
4. Disconnect the dosing fuel line from the Doser Block Assembly.
5. Unplug connector(s) (making note of their respective positions) to: Fuel Cutoff Valve (FCV), Fuel Line Pressure Sensor (FLP) Sensor, Fuel Compensation Pressure Sensor (FCP) Sensor, and Electronic Dosing Valve (EDV).
6. Loosen three bolts and remove the Doser Block Assembly.

## 4.3.2 INSTALLATION OF DOSER BLOCK ASSEMBLY

The Doser Block Assembly is installed as follows:

1. Install Doser Block Assembly using three bolts; torque bolts to 30-38 Nm (22-28 lb ft) See Figure 4-23.

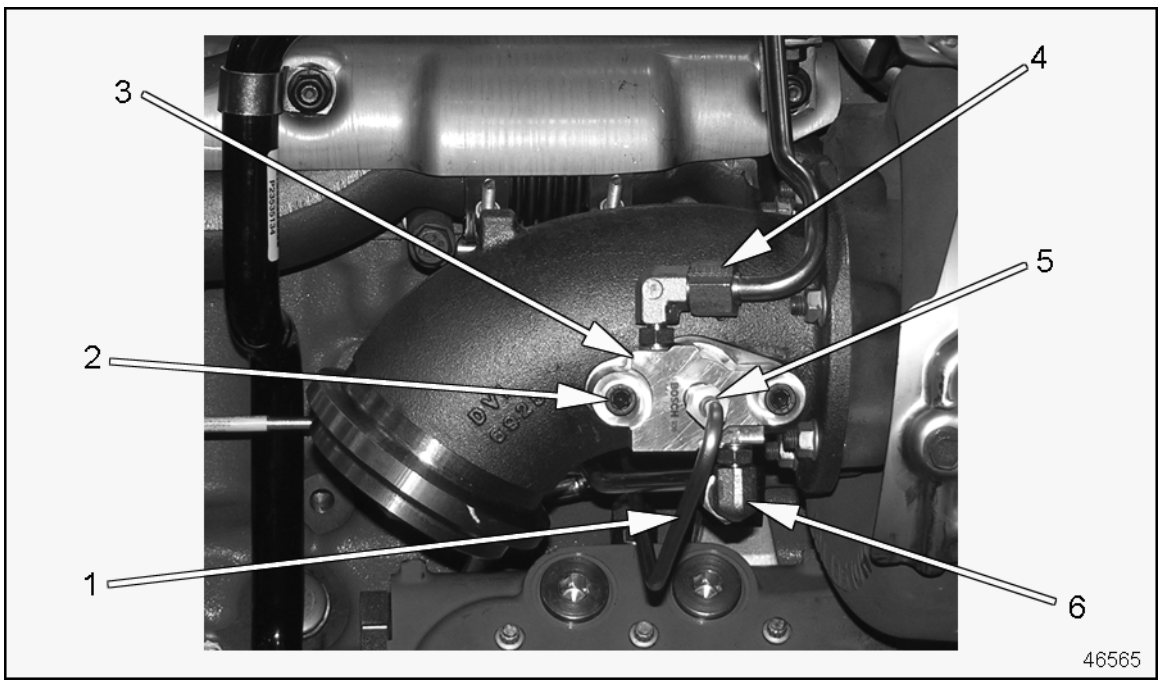
2. Plug in connectors to: FCV , FLP Sensor, FCP Sensor, and EDV.

**NOTE:**
It is very important that the proper connectors be plugged into the correct valves/sensors in order to avoid system malfunction.

3. Connect dosing fuel line.
4. Connect fuel line.
5. Connect fuel return line to fuel pressure regulator.
6. Tighten all connections securely.

### 4.3.3 REMOVAL OF FUEL DOSER VALVE

As shown below, the Fuel Doser Valve (FDV) and related parts are located on the right side of the engine and removal is as follows: See Figure 4-24 for a right side view of the engine that contains the FDV, water lines, and the dosing fuel line.




1. Dosing Fuel Line
2. Allen Screws (qty. 2)
3. Fuel Doser Valve
4. Coolant Out
5. Injection Nozzle
6. Coolant In

**Figure 4-24 Right Side of Engine – Fuel Doser Valve and Related Parts**

1. Disconnect dosing fuel line from injection nozzle. See Figure 4-24.
2. To remove the FDV, engine coolant must be drained.

3. Following draining of coolant, disconnect in and out coolant lines.
4. Loosen two Allen screws and remove the FDV.
5. With removal of the FDV will come removal of a gasket, a shielding pot, and a second gasket. The gaskets are to be discarded and the shielding pot is to be retained.

### 4.3.4 INSTALLATION OF FUEL DOSER VALVE

The FDV is installed as follows:

1. With a new gasket, the shielding pot, and second new gasket in place, position the FDV and fasten with two Allen screws; torque each Allen screw to 20 Nm (15 lb ft) and then tighten a second time to 40 Nm (30 lb ft).
2. Connect in and out coolant lines and torque to 33-35 Nm (24-26 lb ft).
3. Connect dosing fuel line to injection nozzle and torque to 16-20 Nm (12-15 lb ft).

# 5 REGENERATION STRATEGY

The following describes the regeneration strategy for the Detroit Diesel aftertreatment system.

## 5.1 PASSIVE REGENERATION

## 5.2 ACTIVE REGENERATION

## 5.3 STATIONARY REGENERATION

Regeneration of the Aftertreatment Device (ATD) is fundamental for the oxidation of soot. This process happens during the normal operation cycle of the vehicle; it can occur both passively and actively. Regardless of this, the operator will see no difference in vehicle performance or vehicle control. If the ATD is not capable of completing regeneration due to duty cycle constraints or other restrictions, a stationary regeneration may need to occur. The driver will be notified of the need for a stationary regeneration by illumination of the Diesel Particulate Filter (DPF) lamp. Refer to Table 5-1. If the driver continues to operate the vehicle without a regeneration, additional measures will be taken to protect the engine and ATD device from damage, up to and including engine shutdown. Described below are the activities that occur during the stationary regeneration process.

The sequence of indicator lamp(s) is detailed below:

1. The DPF lamp will be illuminated one day of engine operation prior to any forced engine protection measures being taken. Once this lamp is lit, the stationary regeneration process should be initiated.
2. If no DPF regeneration occurs within 24 hours of initial DPF lamp illumination, the DPF lamp will begin blinking and the Amber Warning Lamp (AWL) will illuminate. Refer to Table 5-1 This will be accompanied by a 25% engine torque reduction.
3. If stationary regeneration is still not initiated, a standard engine shutdown sequence will occur. All of the following dashboard lamps will be present, blinking DPF lamp, solid AWL, and solid Red Stop Lamp (RSL). Refer to Table 5-1 Once this engine shutdown sequence is completed, a stationary regeneration must occur to continue vehicle operation.

**WARNING:**

**HOT EXHAUST**

**During stationary regeneration the exhaust gases will be extremely HOT and could cause a fire if directed at combustible materials. Ensure that the vehicle is in a well ventilated area and do not park where the exhaust will discharge in a manner that could create a fire.**

The procedure will take 20 to 40 minutes (depends on the amount of soot accumulated in the filter) and an operator must be present during the process. Prior to activation of a regeneration the engine electronics will ensure the following safety conditions have been met:

- □ The engine must be at idle
- □ The parking brake must be set to park
- □ The transmission must be set to neutral
- □ The clutch pedal cannot be depressed
- □ The vehicle speed must be at zero

**NOTE:**
Upon every new ignition cycle, DDEC must see a change of state on the parking brake, clutch pedal, transmission, and vehicle accelerator, before a stationary regeneration can be initiated. This process can easily be accomplished by cycling each of the aforementioned items.

The following describes the cycling process:

1. Parking brake - set the parking brake, release the parking brake, and then re-set the parking brake.
2. Transmission - put vehicle into gear and then return the transmission to the neutral position.
3. Clutch Pedal - depress and release the clutch pedal.
4. Accelerator - with vehicle in neutral, depress and release the accelerator.

**NOTE:**
If any of these conditions are not met during the stationary regeneration, the process will be cancelled. In the event the process must be cancelled, depress the regeneration button a second time.

The regeneration process is as follows:

1. Obtain regeneration button (J-47384) and plug into the vehicle 9 pin diagnostic port, located on the driver side lower rear door opening.
2. Depress and hold the button for four seconds. See Figure 5-1

3. Engine speed will increase to 1600 rpm and exhaust temperatures will rise up to acceptable dosing levels. A flash sequence of the DPF lamp will be shown to let the user know that the request for stationary regeneration has been initiated.
4. After achieving the required exhaust temperatures, dosing will occur.
5. The driver MUST stay with the vehicle throughout the regeneration process.
6. At conclusion of regeneration, the engine speed will return to idle.
7. You may now remove the regeneration button from the 9-pin diagnostic port.


**Figure 5-1 Regeneration Button**

With completion of regeneration, the following observations should be made:

1. The exhaust temperature lamp will remain illuminated until the exhaust outlet temperature is below 743°F or the vehicle speed exceeds 32 mph.
2. The DPF lamp will turn off, along with all other associated warning lamps.

## 5.3.1 INSTRUMENT PANEL LAMPS

The instrument panel lamps are listed in Table 5-1.

| Lamp | Lamp Name | Description | Results |
|---|---|---|---|
|  | Amber Warning Lamp (AWL) | Indicates a fault with the engine controls. | Vehicle can be driven to end of shift. Call for service. |
|  | Red Stop Lamp (RSL) | Indicates a major engine fault that may result in engine damage<br>Engine derate and / or shutdown sequence will be initiated. | Move the vehicle to the nearest safe location and shutdown the engine. Call for service |
|  | DPF Regeneration Lamp | Solid yellow indicates a stationary regeneration is required.<br>Blinking yellow, derate, and/or shutdown are possible as soot load continues to increase.<br>Lamp will shut off during regeneration. | Lamp solid - stationary regeneration required.<br>Lamp flashing - stationary regeneration required immediately. |
|  | High Exhaust Temperature Lamp (HET) | This is an information indicator. Indicates exhaust temperature is above a preset limit and the unit is operating at low vehicle speed. Lamp is yellow. | Vehicle can be driven. |
|  | Malfunction Indicator Lamp (MIL) | Yellow lamp Indicates a failure of an Emission Control device. May illuminate at the same time as the Amber Warning Lamp | Vehicle can be driven to end of the shift. Call for service |

**Table 5-1 Instrument Panel Lamps**

# 6 ELECTRONIC TROUBLESHOOTING

If there is no physical evidence of mechanical failure, a failure of an electronic nature should be considered. This would include a faulty sensor or sensor hardware related concern. You are advised to consult the DDEC VI Series 60 Troubleshooting Guide (6SE567) for troubleshooting exhaust back pressure sensor codes.

## 6.1 DIAGNOSTIC CODES

This section supports the Aftertreatment System (ATS) fault codes recorded during EGR engine operation. A Diagnostic Trouble Code (DTC) is generated when a condition exists that prevents the ATS from operating at peak efficiency. The codes can be for engine protection or performance.

Per SAE standards, the Suspect Parameter Number (SPN) and Failure Mode Identifier (FMI) define what kind of failure occurred.

### 6.1.1 SHUTDOWN-ENGINE PROTECTION FAULT CODE

A shutdown-engine protection DTC is activated when an engine operating condition exists that can cause immediate damage to the engine and the engine should be shut down until the condition is corrected to prevent additional damage.

### 6.1.2 DERATE-ENGINE PROTECTION FAULT CODE

A derate-engine protection DTC is activated when an engine operating condition exists that can cause engine damage if left unattended. The engine slowly loses power so that the operator knows to correct the condition to prevent additional damage. However; if damage is not imminent, the operator can override the shutdown and limp to safety to correct the problem. All codes for the ATS are derate engine protection codes as listed in Table 6-1.

### 6.1.3 PERFORMANCE FAULT CODES

A performance fault code is activated when specific conditions occur within a given amount of time that the calibration determines is not “normal”.

| SPN Code Number | FMI | Code Description |
|---|---|---|
| 3050 | 0 | Engine Air Flow Out of Range Low |
| 3050 | 1 | Active Regen Temp Out of Range Low |
| 3242 | 3 | DOC Inlet Temperature Circuit Failed High |
| 3242 | 4 | DOC Inlet Temperature Circuit Failed Low |
| 3242 | 10 | DOC Inlet Temperature Sensor Stuck |
| 3242 | 14 | DPF / DOC Inlet Temperature Sensors — Failed Self-Test |
| 3246 | 0 | Supplemental Fuel Source Detected |
| 3246 | 3 | DPF Outlet Temperature Circuit Failed High |
| 3246 | 4 | DPF Outlet Temperature Circuit Failed Low |
| 3246 | 10 | DPF Outlet Temperature Sensor Stuck |
| 3250 | 0 | EDV Failed Self Test |
| 3250 | 3 | DPF Inlet Temperature Circuit Failed High |
| 3250 | 4 | DPF Inlet Temperature Circuit Failed Low |
| 3250 | 10 | DPF Inlet Temperature Sensor Stuck |
| 3251 | 0 | DPF Pressure Out of Range High |
| 3251 | 1 | DPF Pressure Out of Range Low |
| 51 | 3 | Intake Air Throttle Circuit Failed High |
| 51 | 4 | Intake Air Throttle Circuit Failed Low |
| 3471 | 1 | EDV Failed Self-Test |
| 3471 | 3 | Electronic Dosing Valve Driver Circuit Failed High |
| 3471 | 4 | Electronic Dosing Valve Driver Circuit Failed Low |
| 3471 | 5 | Electronic Dosing Valve Driver Circuit Open |
| 3480 | 1 | Doser Fuel Pressure to Low |
| 3480 | 3 | Doser Fuel Pressure Sensor Circuit Failed High |
| 3480 | 4 | Doser Fuel Pressure Sensor Circuit Failed Low |
| 3480 | 3 | Doser Fuel Pressure (DFP) Sensor — Open Circuit |
| 3480 | 4 | Doser Fuel Pressure (DFP) Sensor — Short to Ground |
| 3480 | 14 | Doser FPS Failed Self Test |
| 3480 | 14 | FDV Failed Self Test |
| 3482 | 0 | Dosing Unit Self-Test Pressure Failure / High |
| 3482 | 1 | Dosing Unit Self-Test Pressure Failure / Low |
| 3482 | 3 | Fuel Cutoff Valve (FCV) Sensor — Failed High |
| 3482 | 4 | Fuel Cutoff Valve (FCV) Sensor — Short to Ground |
| 3482 | 5 | Fuel Cutoff Valve (FCV) Sensor — Open Circuit |
| 3482 | 7 | FCV Failed Self Test |

| SPN Code Number | FMI | Code Description |
|---|---|---|
| 3556 | 0 | Electronic Dosing Valve Over Fueling |
| 3556 | 1 | Electronic Dosing Valve Insufficient Fueling |
| 3609 | 2 | DPF Inlet Pressure Sensor — Drifted High / In Range Fault |
| 3609 | 2 | DPF Inlet Pressure Sensor — Drifted High / In Range Fault |
| 3609 | 2 | DPF Inlet Pressure Sensor — Drifted Low / In Range Fault |
| 3609 | 2 | DPF Inlet Pressure Sensor — Drifted Low / In Range Fault |
| 3609 | 3 | DPF Inlet Pressure Circuit Failed High |
| 3609 | 4 | DPF Inlet Pressure Circuit Failed Low |
| 3609 | 10 | DPF Inlet Pressure Sensor — Stuck |
| 3610 | 2 | DPF Outlet Pressure Sensor — Drifted High / In Range Fault |
| 3610 | 2 | DPF Outlet Pressure Sensor — Drifted High / In Range Fault |
| 3610 | 2 | DPF Outlet Pressure Sensor — Drifted Low / In Range Fault |
| 3610 | 2 | DPF Outlet Pressure Sensor — Drifted Low / In Range Fault |
| 3610 | 3 | DPF Outlet Pressure Circuit Failed High |
| 3610 | 4 | DPF Outlet Pressure Circuit Failed Low |
| 3610 | 10 | DPF Outlet Pressure Sensor — Stuck |
| 3610 | 14 | DPF Outlet  Pressure Sensor Plausibility Error |
| 3XXX | 3 | FCP Sensor Short to Power |
| 3XXX | 4 | FCP Sensor Open Short to Ground |

**Table 6-1 Aftertreatment System Codes**

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# 7 SPN 3050 ENGINE AIR FLOW ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3050 indicates the following:

- FMI 0 drifted low
- FMI 1 drifted low

## 7.1 TROUBLESHOOTING SPN 3050/FMI 0

This diagnostic condition is typically engine air flow out of range low.

### 7.1.1 CHECK FOR ENGINE AIR FLOW OUT OF RANGE LOW

Perform the following steps to check for engine air flow out of range low.

1. Connect DDDL, turn ignition switch ON.
2. Check for multiple Diagnostic Trouble Codes (DTC)
   [a] If multiple DTC's are present in addition to 3050 FMI 0, repair them first; Refer to Section 7.1.1.1 to verify repairs.
3. If only 3050 FMI 0 is present, go to step 4.
4. Visually inspect exhaust pipes for damage (kinked or crushed)
   [a] If found, repair as necessary; REFER TO ?
   [b] If OK, go to step 5.
5. Visually inspect the Afterreatment Device (ATD) for physical damage (dents, cracks)
   [a] If found, remove and repair as necessary; Refer to Section 4.1.1 Refer to Section 7.1.1.1 to verify repairs.
   [b] If OK, go to step 6.
6. Monitor DPF Inlet Pressure and DPF Outlet Pressure.
7. Start engine and increase speed to 1200 RPM.
8. Is DPF Inlet Pressure within .5 psi of DPF Outlet Pressure
   [a] If yes, go to step 9.

[b] If no, repeat steps 1 through 8; if same results are given contact the Detroit Diesel Customer Support Center at 313–592–5800.

9. Turn engine off.
10. Remove the ATD and visually inspect outlet face for debris or damage. Also inspect the DPF inlet face for debris or damage and repair as necessary; Refer to Section 4.1.1 Refer to Section 7.1.1.1 to verify repairs.

### 7.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center at 313–592–5800.

## 7.2 TROUBLESHOOTING SPN 3050/FMI 1

This diagnostic condition is typically Active Regen Temp Out of Range Low.

### 7.2.1 CHECK FOR ACTIVE REGEN TEMP OUT OF RANGE LOW

Perform the following steps to check for Active Regen Temp out of range low.

1. Visually inspect the Aftertreatment Device (ATD) for physical damage (dents, cracks).
   [a] If found, remove and repair as necessary; Refer to Section 4.1.1 Refer to Section 7.2.1.1 to verify repairs.
   [b] If OK, go to step 2.
2. Connect DDDL.
3. Check for multiple DTC's.
   [a] If multiple DTC's are present in addition to 3050 FMI 1, repair them first; Refer to Section 7.2.1.1 to verify repairs.
   [b] If only 3050 FMI 1 is present, go to step 4.
4. Perform Dosing Unit self test
   [a] If result is Pass, go to step 5.
   [b] If result is Fail, replace Dosing Unit, Refer to Section 4.3.1 Refer to Section 7.2.1.1 to verify repairs.

5. Monitor DOC Inlet Temperature and DPF Inlet Temperature.
6. Start engine and increase speed to 1200 RPM.
7. Is DPF Inlet Temperature at least 50 degrees higher than DOC Inlet Temperature
   [a] If yes, repeat steps 1 through 5; if same results are given, contact the Detroit Diesel Customer Support Center at 313–592–5800.
   [b] If no, go to step 8.
8. Remove the ATD and visually inspect outlet face for debris or damage. Also inspect the DPF inlet face for debris or damage and repair as necessary; Refer to Section 4.1.1 Refer to Section 7.2.1.1 to verify repairs.

### 7.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 8 SPN 3242 DOC INLET TEMPERATURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3242 indicates the following:

- □ FMI 3 open circuit
- □ FMI 4 short to ground circuit
- □ FMI 10 sensor stuck
- □ FMI 14 special instructions

## 8.1 TROUBLESHOOTING SPN 3242/FMI 3

This diagnostic condition is typically Diesel Oxidation Catalyst (DOC) Inlet Temperature Sensor open circuit.

### 8.1.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Turn vehicle ignition switch ON.
2. Plug in the DDR.
3. Read active codes.
   [a] If fault 3242 03 is active in addition to 3250 03 and 3246 03, repair open ground circuit between pin 88 of the 120-pin Motor Control Module (MCM) connector and the DOC, DPF temperature sensors. Refer to Section 8.1.2.1 to verify repairs.
   [b] If only fault code 3242 03 is active, Refer to Section 8.1.2 to check for open circuit.

### 8.1.2 CHECK FOR OPEN CIRCUIT

Perform the following steps for DOC Inlet Temperature Sensor open circuit:

1. Disconnect the DOC Inlet Temperature Sensor.
2. Check resistance between pin 1 and pin 2 of the DOC Inlet Temperature Sensor. Refer to Table 8-1 for acceptable resistance.

| Temperature °C (°F) | Resistance ohms |
|---|---|
| 0 (32) | 202.50 |
| 25 (77) | 221.60 |
| 100 (212) | 277.90 |
| 600 (1112) | 619.80 |
| 850 (1562) | 768.81 |

**Table 8-1 ATD Temperature Sensor Resistance Chart**

[a] If resistance is out of range, replace the DOC Inlet Temperature Sensor, Refer to Section 8.1.2.1. Refer to Section 4.1.2.

[b] If resistance is within range, go to step 3.

3. Turn ignition ON.
4. Measure voltage between pin 1 and pin 2 of the DOC Inlet Temperature Sensor connector.
   [a] If the voltage is between 2.75 and 3.25 volts, Refer to Section 8.1.2.1 to verify repairs.
   [b] If the voltage is less than 2.75 volts, go to step 5.
5. Measure voltage between pin 2 of DOC Inlet Temperature Sensor connector and ground.
   [a] If the voltage is between 2.75 and 3.25 volts, then repair open in wire between pin 88 of the 120-pin MCM connector and pin 1 of the DOC Inlet Temperature Sensor connector. Refer to Section 8.1.2.1 to verify repairs.
   [b] If the voltage is less 2.75 volts, then repair open in wire between pin 2 of the DOC Inlet Temperature Sensor connector and pin 89 of the 120-pin MCM connector. Refer to Section 8.1.2.1 to verify repairs.

### 8.1.2.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 8.2 TROUBLESHOOTING SPN 3242/FMI 4

This diagnostic condition is typically DOC Inlet Temperature Sensor short to ground circuit.

### 8.2.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for DOC Inlet Temperature Sensor short to ground circuit:

1. Disconnect the DOC Inlet Temperature Sensor.
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance across pins 1 and 2 of the DOC Inlet Temperature Sensor connector.
   [a] If resistance is less than 5 ohms, repair the short between the 120-pin MCM connector wires 88 and 89. Refer to Section 8.2.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
4. Measure the resistance between pin 1 of the DOC Inlet Temperature Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the DOC Inlet Temperature Sensor harness connector and ground. Refer to Section 8.2.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 5.
5. Measure the resistance between pin 2 of the DOC Inlet Temperature Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 2 of the DOC Inlet Temperature Sensor harness connector and ground. Refer to Section 8.2.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, Refer to Section 8.2.1.1 to verify repairs.

#### 8.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 8.3 TROUBLESHOOTING SPN 3242/FMI 10

This diagnostic condition is typically DOC Inlet Temperature Sensor stuck.

### 8.3.1 CHECK FOR TEMPERATURE SENSOR STUCK

Perform the following steps for DOC Inlet Temperature Sensor stuck:

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor and record DOC Inlet Temperature parameter.
4. Start the engine and idle for 1 minute.
5. Monitor and record DOC Inlet Temperature parameter after 1 minute of idle time.
6. Increase engine to 1200 rpm, monitor and record DOC Inlet Temperature parameter after 1 minute.
7. Compare DOC Inlet Temperatures that were recorded during steps 3 thru 6.
8. Did the DOC in temperature increase at least 20 degree's between each of the measurements?
   [a] If yes, repeat steps 3 thru 8. If same results are given, contact Detroit Diesel Customer Center at 313–592–5800.
   [b] If no, inspect the DOC Inlet Temperature sensor electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DOC Inlet Temperature sensor, Refer to Section 4.1.2. Refer to Section 8.3.1.1 to verify repairs.

#### 8.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 8.4 TROUBLESHOOTING SPN 3242/FMI 14

This diagnostic condition is typically DPF Inlet, Outlet and DOC Inlet Temperature Sensors failed self test.

**NOTE:**
Prior to performing this diagnostic procedure, the engine must have a minimum of a 2 hour soak (cool down).

### 8.4.1 CHECK FOR FAILED SELF TEST

Perform the following steps for DPF Inlet, Outlet and DOC Inlet Temperature Sensors failed self test,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor DOC Inlet, DPF Inlet and DPF Outlet Temperature parameters.
4. Are any of the temperature readings greater or less than 20 degrees F of the other 2 sensors?
   [a] If yes, inspect the suspect temperature sensors electrical connector for corrosion, bent or spread pins and repair as necessary. If no repairs are necessary, replace the suspect temperature sensor, Refer to Section 4.1.2. Refer to Section 8.4.1.1 to verify repairs.
   [b] If no, go to step 5.
5. Prepare DDDL for snapshot.
6. Start the engine and idle for 30 seconds; TURN ENGINE OFF.
7. Review DOC Inlet, DPF Inlet and DPF Outlet Temperature parameters on snapshot.
8. Are any of the temperature readings greater or less than 6 degrees F of the other 2 sensors?
   [a] If yes, inspect the suspect temperature sensors electrical connector for corrosion, bent or spread pins and repair as necessary. If no repairs are necessary, replace the suspect temperature sensor, Refer to Section 4.1.2. Refer to Section 8.4.1.1 to verify repairs.
   [b] If no, repeat steps 3 thru 6, If same results are given, contact Detroit Diesel Customer Center at 313–592–5800.

#### 8.4.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 9 SPN 3246 DPF OUTLET TEMPERATURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3246 indicates the following:

- □ FMI 0 out of range high
- □ FMI 3 open circuit
- □ FMI 4 short to ground circuit
- □ FMI 10 sensor stuck

## 9.1 TROUBLESHOOTING SPN 3246/FMI 0

This diagnostic condition is typically DPF Outlet Temperature to high.

### 9.1.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Check for multiple codes
   [a] If multiple aftertreatment codes are present, repair them first. Refer to Section 9.1.1.1 to verify repairs.
   [b] If only SPN 3246 FMI 0 is present, go to step 2.
2. Disconnect DPF inlet and DPF outlet temperature sensors.
3. Visually inspect connectors for corrosion, bent, spread or damaged pins.
   [a] If found, repair suspect connector. Refer to Section 9.1.1.1 to verify repairs.
   [b] If OK, go to step 4.
4. Measure the resistance between pins 1 and 2 of the DPF inlet and DPF outlet temperature sensors. Refer to Table 9-1 for acceptable resistance.

| Temperature °C (°F) | Resistance ohms |
|---|---|
| 0 (32) | 202.50 |
| 25 (77) | 221.60 |
| 100 (212) | 277.90 |
| 600 (1112) | 619.80 |
| 850 (1562) | 768.81 |

**Table 9-1 ATD Temperature Sensor Resistance Chart**

[a] If resistance is not within limits, replace suspect sensor. Refer to Section 9.1.1.1 to verify repairs.

[b] If resistance is within specifications, repeat steps 2 through 4. If same results are given, contact the Detroit Diesel Customer Support Center (313–592–5800) for further assistance.

### 9.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 9.2 TROUBLESHOOTING SPN 3246/FMI 3

This diagnostic condition is typically DPF Outlet Temperature Sensor open circuit.

### 9.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Turn vehicle ignition switch ON.
2. Plug in the Diagnostic Data Reader (DDR).
3. Read active codes.
   [a] If fault 3246 03 is active in addition to 3250 03 and 3246 03, repair open ground circuit between pin 88 of the 120-pin MCM connector and the DOC, DPF temperature sensors. Refer to Section 9.2.2.1 to verify repairs.
   [b] If only fault code 3246 03 is active, Refer to Section 9.2.2. to check for open circuit.

## 9.2.2 CHECK FOR OPEN CIRCUIT

Perform the following steps for DPF Outlet Temperature Sensor open circuit:

1. Disconnect the DPF Outlet Temperature Sensor.
2. Check resistance between pin 1 and pin 2 of the DPF Outlet Temperature Sensor. Refer to in Table 9-2 for acceptable resistance.

| Temperature °C (°F) | Resistance ohms |
|---|---|
| 0 (32) | 202.50 |
| 25 (77) | 221.60 |
| 100 (212) | 277.90 |
| 600 (1112) | 619.80 |
| 850 (1562) | 768.81 |

**Table 9-2 ATD Temperature Sensor Resistance Chart**

   [a] If resistance is out of range, replace the DPF Outlet Temperature Sensor, Refer to Section 4.1.2. Refer to Section 9.2.2.1 to verify repairs.

   [b] If resistance is within range, go to step 3.

3. Turn ignition ON.
4. Measure voltage between pin 1 and pin 2 of the DPF Outlet Temperature Sensor connector.
   [a] If the voltage is between 2.75 and 3.25 volts, Refer to Section 9.2.2.1 to verify repairs.
   [b] If the voltage is less than 2.75 volts, go to step 5.
5. Measure voltage between pin 2 of DPF Outlet Temperature Sensor connector and ground.
   [a] If the voltage is between 2.75 and 3.25 volts, then repair open in wire between pin 88 of the 120-pin MCM connector and pin 1 of the DPF Outlet Temperature Sensor connector. Refer to Section 9.2.2.1 to verify repairs.
   [b] If the voltage is less 2.75 volts, then repair open in wire between pin 2 of the DPF Outlet Temperature Sensor connector and pin 89 of the 120-pin MCM connector. Refer to Section 9.2.2.1 to verify repairs.

### 9.2.2.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.

[b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 9.3 TROUBLESHOOTING SPN 3246/FMI 4

This diagnostic condition is typically DPF Outlet Temperature Sensor short to ground circuit.

## 9.3.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for DPF Outlet Temperature Sensor short to ground circuit,

1. Disconnect the DPF Outlet Temperature Sensor .
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance across pins 1 and 2 of the DPF Outlet Temperature Sensor connector.
   [a] If resistance is less than 5 ohms, repair the short between the 120-pin MCM connector wires 115 and 88. Refer to Section 9.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
4. Measure the resistance between pin 1 of the DPF Outlet Temperature Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the DPF Outlet Temperature Sensor harness connector and ground. Refer to Section 9.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 5.
5. Measure the resistance between pin 2 of the DPF Outlet Temperature Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 2 of the DPFOutlet Temperature Sensor harness connector and ground. Refer to Section 9.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, Refer to Section 9.3.1.1 to verify repairs.

### 9.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.

[b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 9.4 TROUBLESHOOTING SPN 3246/FMI 10

This diagnostic condition is typically DPF Outlet Temperature Sensor stuck.

## 9.4.1 CHECK FOR TEMPERATURE SENSOR STUCK

Perform the following steps for DPF Outlet Temperature Sensor stuck,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor and record DPF Outlet Temperature parameter.
4. Start the engine and idle for 1 minute.
5. Monitor and record DPF Outlet Temperature parameter after 1 minute of idle time.
6. Increase engine to 1200 rpm, monitor and record DPF Outlet Temperature parameter after 1 minute.
7. Compare DPF Outlet temperatures that were recorded during steps 3 thru 6.
8. Did the DPF Outlet temperature increase at least 20 degree's between each of the measurements?
   [a] If yes, repeat steps 3 thru 8. If same results are given, contact Detroit Diesel Customer Center at 313–592–5800.
   [b] If no, inspect the DPF Outlet Temperature sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Outlet Temperature Sensor, Refer to Section 4.1.2. Refer to Section 9.4.1.1 to verify repairs.

### 9.4.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 10 SPN 3250 DPF INLET TEMPERATURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3250 indicates the following:

- □ FMI 0 EDV failed self test
- □ FMI 3 open circuit
- □ FMI 4 short to ground circuit
- □ FMI 10 sensor stuck

## 10.1 TROUBLESHOOTING SPN 3250/FMI 0

This diagnostic condition is typically Electronic Dosing Valve (EDV) Sensor failed self test.

### 10.1.1 CHECK FOR FAILED SELF TEST

Perform the following steps for EDV failed self test.

1. Turn ignition On.
2. Monitor DOC Inlet and DOC Outlet temperatures.
   [a] If DOC Outlet is 250 degrees higher than DOC Inlet, go to step 3.
   [b] If DOC Outlet is within 50 degrees of DOC Inlet, go to step 4.
3. Disconnect DOC Outlet temperature sensor and inspect harness connector for corrosion, damage, bent, or spread pins.
   [a] If corrosion, damage, bent, or spread pins are found, repair connector.Refer to Section 10.1.1.1 to verify repairs.
   [b] If no damage is found, replace Outlet Temperature Sensor. Refer to Section 4.1.2. Refer to Section 10.1.1.1 to verify repairs.
4. Start engine.
5. Monitor DOC Inlet and DOC Outlet temperatures for 5 minutes at 1000 rpm.
   [a] If DOC Outlet is 250 degrees higher than DOC Inlet, go to step 6.

[b] If DOC Outlet is within 100 degrees of DOC Inlet, clear codes; troubleshooting complete.

6. Check Doser Block Assembly electrical connections; for wiring schematic Refer to Appendix B, for proper pin out.

   [a] If pin outs are OK, replace Doser Block Assmebly. Refer to section 4.3.1 Refer to Section 10.1.1.1 to verify repairs.

#### 10.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.

   [a] If no codes are logged, troubleshooting is complete.

   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 10.2 TROUBLESHOOTING SPN 3250/FMI 3

This diagnostic condition is typically DPF Inlet Temperature Sensor open circuit.

### 10.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes:

1. Turn vehicle ignition switch ON.
2. Plug in the DDR.
3. Read active codes.

   [a] If fault 3250 03 is active in addition to 3242 03 and 3246 03, repair open ground circuit between pin 88 of the 120-pin MCM connector and the DOC, DPF temperature sensors. Refer to Section 10.2.2.1 to verify repairs.

   [b] If only fault code 3250 03 is active, Refer to Section 10.2.2 to check for open circuit.

### 10.2.2 CHECK FOR OPEN CIRCUIT

Perform the following steps for DPF Inlet Temperature Sensor open circuit:

1. Disconnect the DPF Inlet Temperature Sensor.
2. Check resistance between pin 1 and pin 2 of the DPF Inlet Temperature Sensor. Refer to in Table 10-1 for acceptable resistance.

| Temperature °C (°F) | Resistance ohms |
|---|---|
| 0 (32) | 202.50 |
| 25 (77) | 221.60 |
| 100 (212) | 277.90 |
| 600 (1112) | 619.80 |
| 850 (1562) | 768.81 |

**Table 10-1 ATD Temperature Sensor Resistance Chart**

[a] If resistance is out of range, replace the DPF Inlet Temperature Sensor, Refer to Section 4.1.2

[b] If resistance is within range, go to step 3.

3. Turn ignition ON.
4. Measure voltage between pin 1 and pin 2 of the DPF Inlet Temperature Sensor connector.

[a] If the voltage is between 2.75 and 3.25 volts, Refer to Section 10.2.2.1 to verify repairs.

[b] If the voltage is less than 2.75 volts, go to step 5.

5. Measure voltage between pin 2 of DPF Inlet Temperature Sensor connector and ground.

[a] If the voltage is between 2.75 and 3.25 volts, then repair open in wire between pin 88 of the 120-pin MCM connector and pin 1 of the DPF Inlet Temperature Sensor connector. Refer to section 10.2.2.1 to verify repairs.

[b] If the voltage is less 2.75 volts, then repair open in wire between pin 2 of the DPF Inlet Temperature Sensor connector and pin 29 of the 120-pin MCM connector. Refer to section 10.2.2.1 to verify repairs.

### 10.2.2.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.

[a] If no codes are logged, troubleshooting is complete.

[b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 10.3 TROUBLESHOOTING SPN 3250/FMI 4

This diagnostic condition is typically DPF Inlet Temperature Sensor short to ground circuit.

### 10.3.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for DPF Inlet Temperature Sensor short to ground circuit,

1. Disconnect the DPF Inlet Temperature Sensor .
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance across pins 1 and 2 of the DPF Inlet Temperature Sensor connector.
   [a] If resistance is less than 5 ohms, repair the short between the 120-pin MCM connector wires 29 and 88. Refer to Section 10.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
4. Measure the resistance between pin 1 of the DPF Inlet Temperature Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the DPF Inlet Temperature Sensor harness connector and ground. Refer to Section 10.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 5.
5. Measure the resistance between pin 2 of the DPF Inlet Temperature Sensor harness connector and ground..
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 2 of the DPF Inlet Temperature Sensor harness connector and ground. Refer to Section 10.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, Refer to Section 10.3.1.1 to verify repairs.

#### 10.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 10.4 TROUBLESHOOTING SPN 3250/FMI 10

This diagnostic condition is typically DPF Inlet Temperature Sensor stuck.

## 10.4.1 CHECK FOR TEMPERATURE SENSOR STUCK

Perform the following steps for DPF Inlet Temperature Sensor stuck,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor and record DPF Inlet Temperature parameter.
4. Start the engine and idle for 1 minute.
5. Monitor and record DPF Inlet Temperature parameter after 1 minute of idle time.
6. Increase engine to 1200 rpm, monitor and record DPF Inlet Temperature parameter after 1 minute.
7. Compare DPF Inlet temperatures that were recorded during steps 3 thru 6.
8. Did the DPF Inlet temperature increase at least 20 degree's between each of the measurements?
   [a] If yes, repeat steps 3 thru 8. If same results are given, contact Detroit Diesel Customer Support Center at 313–592–5800.
   [b] If no, inspect the DPF Inlet Temperature sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Inlet Temperature Sensor, Refer to Section 4.1.2. Refer to Section 10.4.1.1 to verify repairs.

### 10.4.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 11 SPN 3251 DPF PRESSURE ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3251 indicates the following:

- FMI 0 drifted high
- FMI 1 drifted low

## 11.1 TROUBLESHOOTING SPN 3251/FMI 0

This diagnostic condition is typically DPF Pressure out of range high.

### 11.1.1 CHECK FOR DPF PRESSURE OUT OF RANGE HIGH

Perform the following steps for DPF Pressure out of range high.

1. Visually inspect exhaust system after the Aftertreatment Device (ATD) for physical damage and repair as necessary. Refer to Section 11.1.1.1 to verify repairs.
2. Connect DDDL and check for multiple codes. If any codes other than SPN 3251 FMI 0 are detected, service them first.
3. Using DDDL, monitor DPF Inlet pressure and DPF Outlet pressure.
4. Start engine and increase speed to 1400 rpm.
5. Is DPF Inlet pressure greater than DPF Outlet pressure by 0.4 psi?
   [a] If yes, go to step 6.
   [b] If no, repeat steps 1 thru 4 and if results are the same, contact Detroit Diesel Customer Support Center at 313–592–5800.
6. Turn engine OFF, remove DPF Inlet pressure and DPF Outlet pressure sensors and pressure lines, Refer to Section 4.1.4.
7. Inspect DPF pressure lines for kinks, plugging, etc.
   [a] If plugged clean DPF lines.
   [b] If OK, go to step 8.
8. Reinstall DPF lines and sensors, Refer to Section 4.1.5.

9. Start engine.
10. Using DDDL, perform stationary regeneration refer to section 5.3.
11. After regeneration, is DPF Inlet pressure greater than DPF Outlet pressure by 0.4 psi?
    [a] If yes, go to step 12.
    [b] If no, repairs complete.
12. Contact Detroit Diesel Customer Support Center at 313–592–5800 for DPF filter replacement authorization.

#### 11.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 11.2 TROUBLESHOOTING SPN 3251/FMI 1

This diagnostic condition is typically DPF Pressure out of range low.

### 11.2.1 CHECK FOR DPF OUT OF RANGE LOW

Perform the following steps for DPF Pressure out of range low.

1. Visually inspect ATD V band clamps for physical damage, looseness, exhaust leaks and if found, repair as necessary. Refer to Section 11.2.1.1 to verify repairs.
2. Connect DDDL and check for multiple codes. If any codes other than SPN 3251 FMI 1 are detected, service them first.
3. Using DDDL, monitor DPF Inlet pressure and DPF Outlet pressure.
4. Start engine and increase speed to 1400 rpm.
5. Is DPF Inlet pressure greater than DPF Outlet pressure by 0.2 psi?
   [a] If yes, go to ?????.
   [b] If no, go to step 6.
6. Turn engine OFF, remove DPF Inlet pressure and DPF Outlet pressure sensors and pressure lines, Refer to Section 4.1.4.

7. Inspect DPF pressure lines for kinks, plugging, cracks, leaks, looseness, etc.
   [a] If found, repair or replace DPF pressure lines. Refer to Section 11.2.1.1 to verify repairs.
   [b] If OK, go to step 8.
8. Remove ATD exhaust outlet pipe.
9. Visually inspect ATD outlet for soot and also inspect rear of DPF for physical damage. If found, Contact Detroit Diesel Customer Support Center at 313–592–5800 for DPF filter replacement authorization.

### 11.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 12 SPN 51 INTAKE THROTTLE VALVE ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 51 indicates the following:

- FMI 3 open circuit
- FMI 4 short to ground circuit

## 12.1 TROUBLESHOOTING SPN 51/FMI 3

This diagnostic condition is typically Intake Throttle Valve open circuit (failed high).

### 12.1.1 CHECK FOR OPEN CIRCUIT

Perform the following steps for Intake Throttle Valve open circuit:

1. Disconnect Intake Throttle Valve connector.
2. Turn the ignition switch to the ON position.
3. Measure the voltage between pins 2 and 3 of the Intake Throttle Valve harness connector.
   [a] If the voltage is between 4.5 and 5.5 volts, go to step 5.
   [b] If the voltage is less than 4.5 volts, go to step 4.
4. Measure the voltage between pin 3 of the Intake Throttle Valve Sensor harness connector and ground.
   [a] If the voltage is between 4.5 and 5.5 volts, repair the open circuit between pin 2 of the Intake Throttle Valve Sensor harness connector and and pin 103 of the MCM 120-pin connector. Refer to Section 12.1.1.1 to verify repairs.
   [b] If the voltage is less than 4.5 volts, repair the open circuit between pin 3 of the Intake Throttle Valve Sensor harness connector and pin 117 of the MCM 120-pin connector. Refer to Section 12.1.1.1 to verify repairs.
5. Turn the ignition to the OFF position.
6. Disconnect the 120-pin MCM connector.
7. Measure the resistance between pin 1 of the Intake Throttle Valve harness connector and pin 90 of the MCM connector.

[a] If the resistance is greater than 3 ohms, repair the open circuit between pin 1 of the Intake Throttle Valve harness connector and pin 90 of the MCM connector. Refer to Section12.1.1.1 to verify repairs.

[b] If the resistance is less than 3 ohms, replace the Intake Throttle Valve. Refer to Section 4.2 Refer to Section 12.1.1.1 to verify repairs.

### 12.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 12.2 TROUBLESHOOTING SPN 51/FMI 4

This diagnostic condition is typically Intake Throttle Valve short to ground (failed low).

### 12.2.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for Intake Throttle Valve short to ground circuit,

1. Disconnect the Intake Throttle Valve.
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance between pin 1 and 3 of the Intake Throttle Valve .
   [a] If resistance is less than 5 ohms, repair the short between the 120-pin MCM connector wires 90 and 117. Refer to Section 12.2.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 3
4. Measure the resistance between pin 2 and 3 of the Intake Throttle Valve .
   [a] If resistance is less than 5 ohms, repair the short circuit between the 120-pin MCM connector wires 103 and 117. Refer to Section 12.2.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
5. Measure the resistance between pin 1 of the Intake Throttle Valve and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the Intake Throttle Valve harness connector and ground. Refer to Section 12.2.1.1 to verify repairs.

[b] If resistance is greater than 5 ohms, go to step 6

6. Measure the resistance between pin 3 of the Intake Throttle Valve and ground.

   [a] If the resistance is less than 5 ohms, repair the short circuit between pin 3 of the Intake Throttle Valve harness connector and ground. Refer to Section 12.2.1.1 to verify repairs.

   [b] If the resistance is greater than 5 ohms, replace the Intake Throttle Valve, Refer to Section 4.2. Refer to Section 12.2.1.1 to verify repairs.

### 12.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.

   [a] If no codes are logged, troubleshooting is complete.

   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 13 SPN 3471 ELECTRONIC DOSING VALVE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3471 indicates the following:

- FMI 1 failed self test
- FMI 3 short to power
- FMI 4 short to ground circuit
- FMI 5 open circuit

## 13.1 TROUBLESHOOTING SPN 3471/FMI 1

This diagnostic condition is typically Electronic Dosing Valve (EDV) Sensor failed self test.

### 13.1.1 CHECK FOR FAILED SELF TEST

Perform the following steps for EDV failed self test.

1. Visually inspect Doser Block Assembly fuel lines for external leaks.
   [a] If external leaks are present, repair as necessary.
   [b] If no external leaks are present, replace the Doser Block Assembly; Refer to Section 4.3.1 Refer to Section 13.1.1.1 to verify repairs.

#### 13.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 13.2 TROUBLESHOOTING SPN 3471/FMI 3

This diagnostic condition is typically EDV short to power.

## 13.2.1 CHECK FOR SHORT TO POWER

Perform the following steps for EDV short to power,

1. Disconnect the EDV connector
2. Turn the ignition switch to the ON position.
3. Measure the voltage between pin 1 of the EDV connector and ground.
   [a] If the voltage is greater than 4.5 volts, repair short to power between pin 1 of the EDV connector and pin 65 of the 120 pin MCM connector. Refer to Section 13.2.1.1 to verify repairs.
   [b] If voltage is less than 4.5 volts, go to step 4.
4. Turn the ignition switch to the OFF position.
5. Disconnect the 120 pin MCM connector.
6. Measure the resistance between pin 1 and pin 2 of the EDV connector.
   [a] If the resistance is less than 5 ohms, repair short between EDV connector and pins 1 and 2 and the 120 pin MCM connector pins 64 and 65. Refer to Section 13.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, Refer to Section 13.2.1.1 to verify repairs.

### 13.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 13.3 TROUBLESHOOTING SPN 3471/FMI 4

This diagnostic condition is typically EDV Sensor short to ground.

### 13.3.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for EDV Sensor short to ground circuit,

1. Disconnect the EDV Sensor.
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance between pin 1 of the EDV Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the EDV Sensor harness connector and ground. Refer to Section 13.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
4. Measure the resistance between pin 2 of the EDV Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 2 of the EDV Sensor harness connector and ground. Refer to Section 13.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, Refer to Section 13.3.1.1 to verify repairs.

#### 13.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 13.4 TROUBLESHOOTING SPN 3471/FMI 5

This diagnostic condition is typically EDV Sensor open circuit.

### 13.4.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Turn vehicle ignition switch ON.
2. Plug in the DDR.
3. Read active codes.
   [a] If fault 3482 05 is active in addition to 3471 05, repair open circuit between pin 64 of the 120-pin MCM connector and the EDV and Fuel Cutoff Valve (FCV) sensors. Refer to Section 13.4.2.1 to verify repairs.

[b] If only fault code 3471 05 is active, Refer to Section 13.4.2 to check for open circuit.

## 13.4.2 CHECK FOR OPEN CIRCUIT

Perform the following steps for EDV Sensor open circuit:

1. Disconnect the EDV Sensor.
2. Measure the resistance across pins 1 and pin 2 of the EDV Sensor.
   [a] If resistance is greater than 20 ohms, replace the EDV Sensor. Refer to Section 4.3 Refer to Section 13.4.2.1 to verify repairs.
   [b] If resistance is less than 20 ohms, go to step 3.
3. Turn the ignition switch to the ON position.
4. Measure voltage between pins 1 and pin 2 of the EDV Sensor harness connector.
   [a] If the voltage is between 11.5 and 12.5 volts, Refer to Section 13.4.2.1 to verify repairs.
   [b] If the voltage is less than 11.5 volts, go to step 5.
5. Measure voltage between pin 2 of the EDV Sensor harness connector and ground.
   [a] If the voltage is between 11.5 and 12.5 volts, then repair the open circuit between pin 1 of the EDV Sensor harness connector and pin 65 of the 120-pin MCM connector. Refer to Section 13.4.2.1 to verify repairs.
   [b] If the voltage is less 4.5 volts, then repair open circuit between pin 2 of the EDV Sensor harness connector and pin 64 of the 120-pin MCM connector. Refer to Section 13.4.2.1 to verify repairs.

### 13.4.2.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 14 SPN 3480 FUEL LINE PRESSURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3480 indicates the following:

- □ FMI 1 drifted low
- □ FMI 14 failed self test

## 14.1 TROUBLESHOOTING SPN 3480/FMI 1

This diagnostic condition is typically Low Line Pressure During Doser Unit Self Test.

### 14.1.1 CHECK DOSER SELF TEST

Perform the following steps for Low Line Pressure During Doser Unit Self Test,

1. Visually inspect Dosing Unit fuel lines for damage (kinks, leaks, etc.)
   [a] If found repair/replace fuel line(s) as necessary. Refer to Section 14.1.1.1 to verify repairs.
   [b] If OK, go to step 2.
2. Connect DDDL.
3. Start engine.
4. Perform Dosing Unit self test.
5. Is code 3480 FMI 1 still present?
   [a] If yes, go to step 6.
   [b] If no, repeat steps 1 thru 5: if same results are found, contact the Detroit Diesel Customer Support Center at 313–592–5800.
6. Shut engine OFF.
7. Remove Fuel Doser Valve (FDV).Refer to Section 4.3
8. Perform FDV manual pressure test. REFER TO TBD.
9. Does FDV pass manual pressure test?
   [a] If yes, replace Doser Block Assembly. Refer to Section 4.3

[b] If no, Replace FDV. Refer to Section 4.3

#### 14.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 14.2 TROUBLESHOOTING SPN 3480/FMI 14

This diagnostic condition is typically Fuel Doser Valve (FDV) Sensor failed self test.

### 14.2.1 CHECK FOR FAILED SELF TEST

Perform the following steps for FDV failed self test.

1. Visually inspect Doser Block Assembly fuel lines for external leaks.
   [a] If external leaks are present, repair as necessary.
   [b] If no external leaks are present, replace the FDV; Refer to Section 4.3.3 Refer to Section 14.2.1.1 to verify repairs.

#### 14.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 15 SPN 714 FUEL CUTOFF VALVE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 714 indicates the following:

- □ FMI 1 failed self test
- □ FMI 3 short to power
- □ FMI 4 short to ground circuit
- □ FMI 5 open circuit

## 15.1 TROUBLESHOOTING SPN 714/FMI 1

This diagnostic condition is typically Fuel Cutoff Valve (FCV) Sensor failed self test.

### 15.1.1 CHECK FOR FAILED SELF TEST

Perform the following steps for FCV failed self test.

1. Visually inspect Doser Block Assembly fuel lines for external leaks.
   [a] If external leaks are present, repair as necessary.
   [b] If no external leaks are present, replace the Doser Block Assembly; Refer to Section 4.3.1 Refer to Section 15.1.1.1 to verify repairs.

#### 15.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 15.2 TROUBLESHOOTING SPN 714/FMI 3

This diagnostic condition is typically FCV short to power.

## 15.2.1 CHECK FOR SHORT TO POWER

Perform the following steps for check for short to power,

1. Disconnect the FCV connector
2. Turn the ignition switch to the ON position.
3. Measure the voltage between pin 1 of the FCV connector and ground.
   [a] If the voltage is greater than 4.5 volts, repair short to power between pin 1 of the FCV connector and pin 69 of the 120 pin MCM connector. Refer to Section 15.2.1.1 to verify repairs.
   [b] If voltage is less than 4.5 volts, go to step 4.
4. Turn the ignition switch to the OFF position.
5. Disconnect the 120 pin MCM connector.
6. Measure the resistance between pin 1 and pin 2 of the FCV connector.
   [a] If the resistance is less than 5 ohms, repair short between FCV connector and pins 1 and 2 and the 120 pin MCM connector pins 64 and 69. Refer to Section 15.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, Refer to Section 15.2.1.1 to verify repairs.

### 15.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 15.3 TROUBLESHOOTING SPN 714/FMI 4

This diagnostic condition is typically FCV Sensor short to ground.

### 15.3.1 CHECK FOR SHORT TO GROUND CIRCUIT

Perform the following steps for FCV Sensor short to ground circuit,

1. Disconnect the FCV Sensor.
2. Disconnect the 120-pin MCM connector.
3. Measure the resistance between pin 1 of the FCV Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 1 of the FCV Sensor harness connector and ground. Refer to Section 15.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, go to step 4.
4. Measure the resistance between pin 2 of the FCV Sensor harness connector and ground.
   [a] If resistance is less than 5 ohms, repair the short circuit between pin 2 of the FCV Sensor harness connector and ground. Refer to Section 15.3.1.1 to verify repairs.
   [b] If resistance is greater than 5 ohms, Refer to Section 15.3.1.1 to verify repairs.

#### 15.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 15.4 TROUBLESHOOTING SPN 714/FMI 5

This diagnostic condition is typically Fuel Cutoff Valve (FCV) Sensor open circuit.

### 15.4.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Turn vehicle ignition switch ON.
2. Plug in the DDR.
3. Read active codes.
   [a] If fault 3471 05 is active in addition to 3482 05, repair open circuit between pin 64 of the 120-pin MCM connector and the EDV and FCV sensors. Refer to Section 15.4.2.1 to verify repairs

 

[b] If only fault code 3482 05 is active, Refer to Section 15.4.2 to check for open circuit.

## 15.4.2 CHECK FOR OPEN CIRCUIT

Perform the following steps for FCV Sensor open circuit:

1. Disconnect the FCV Sensor.
2. Measure the resistance across pins 1 and pin 2 of the FCV Sensor.
   [a] If resistance is greater than 20 ohms, replace the FCV Sensor. Refer to Section 4.3.
   [b] If resistance is less than 20 ohms, go to step 3.
3. Turn the ignition switch to the ON position.
4. Measure voltage between pins 1 and pin 2 of the FCV Sensor harness connector.
   [a] If the voltage is between 11.5 and 12.5 volts, Refer to Section 15.4.2.1 to verify repairs.
   [b] If the voltage is less than 11.5 volts, go to step 5.
5. Measure the voltage between pin 2 of the FCV Sensor harness connector and ground.
   [a] If the voltage is between 11.5 and 12.5 volts, repair the open circuit between pin 1 of the FCV Sensor harness connector and pin 69 of the 120-pin MCM connector. Refer to Section 15.4.2.1 to verify repairs
   [b] If the voltage is less 11.5 volts, repair open circuit between pin 2 of the FCV Sensor harness connector and pin 64 of the 120-pin MCM connector. Refer to Section 15.4.2.1 to verify repairs

### 15.4.2.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 16 SPN 3609 DPF INLET PRESSURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3609 indicates the following:

- □ FMI 2 erratic data
- □ FMI 3 short to power
- □ FMI 4 open short to ground
- □ FMI 10 sensor stuck

## 16.1 TROUBLESHOOTING SPN 3609/FMI 2

This diagnostic condition is typically DPF Inlet Pressure Sensor drifted low.

### 16.1.1 CHECK FOR SENSOR DRIFTED LOW

Perform the following steps for DPF Inlet Pressure Sensor drifted low,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor DPF Inlet Pressure and Barometric Pressure parameter.
4. Is the DPF Inlet Pressure reading within 0.4 psi of Barometric pressure?
   [a] If yes, go to step 7.
   [b] If no, go to step 5.
5. Remove DPF Inlet Pressure sensor, Refer to Section 4.1.4.
6. Check pressure line for leaks, or blockage.
   [a] If pressure line is blocked, clean as necessary; Refer to Section 16.1.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Inlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the Inlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.

7. Start the engine and idle for 1 minute.
8. Monitor DPF Inlet Pressure parameter after 1 minute of idle time.
   [a] If DPF Inlet Pressure is above 3.5 psi, go to step 10.
   [b] If DPF Inlet Pressure is below 3.5 psi, go to step 9.
9. Remove DPF Inlet Pressure sensor tube and check pressure line for leaks, or blockage.
   [a] If pressure line is blocked, clean as necessary Refer to Section 16.1.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Inlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the Inlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.
10. Increase engine speed to 1400 rpm, and monitor DPF Inlet Pressure parameter for 1 minute.
   [a] If DPF Inlet Pressure is above 3.8 psi, repeat steps 2 thru 10 and if same results are given, contact Detroit Diesel Customer Support Center at 313–592–5800
   [b] If DPF Inlet Pressure is below 3.8 psi, go to step 11.
11. Remove DPF Inlet Pressure sensor tube and check pressure line for leaks, or blockage.
   [a] If pressure line is blocked, clean as necessary Refer to Section 16.1.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Inlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the Inlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.

### 16.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 16.2 TROUBLESHOOTING SPN 3609/FMI 3

This diagnostic condition is typically DPF Inlet Pressure Sensor short to power.

## 16.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes.

1. Check for multiple codes.
   [a] If SPN 3610 FMI 3 and SPN 3609 FMI 3 are present, repair open in circuit between MCM pin 114 and pins 1 of the DPF pressure sensors. Refer to Section 16.2.1.1 to verify repairs.
   [b] If only 3609 FMI 3 is present go to step 2.
2. Disconnect DPF Inlet Pressure Sensor connector.
3. Measure the resistance between pins 1 and 2 of the DPF Inlet Pressure Sensor.
   [a] If the resistance is greater than 130 ohms, replace the DPF Inlet Pressure Sensor. Refer to Section 4.1.4 Refer to Section 16.2.1.1 to verify repairs.
   [b] If the resistance is less than 130 ohms, go to step 4.
4. Turn the ignition switch to the ON position.
5. Measure the voltage between pins 1 and 3 of the DPF Inlet Pressure Sensor harness connector.
   [a] If the voltage is less than 4.5 volts, repair open circuit between MCM pin 114 and DPF Inlet Pressure Sensor pin 1. Refer to Section 16.2.1.1 to verify repairs.
   [b] If the voltage is greater than 4.5 volts, go to step 6.
6. Turn the ignition switch to the OFF position.
7. Disconnect the 120 pin MCM connector.
8. Measure the resistance across pins 2 and 3 of the DPF Inlet Pressure Sensor connector.
   [a] If the resistance is less than 5 ohms, repair the short between the 120 pin MCM connector wires 85 and 118. Refer to Section 16.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair short to power on circuit between the 120 pin MCM connector pin 118 and the DPF Inlet Pressure Sensor connector pin 2.

### 16.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.

[a] If no codes are logged, troubleshooting is complete.

[b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 16.3 TROUBLESHOOTING SPN 3609/FMI 4

This diagnostic condition is typically DPF Inlet Pressure Sensor open short to ground.

### 16.3.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Check for multiple codes.
   [a] If SPN 3609 FMI 4 and SPN 3610 FMI 4 are present, repair open in circuit between MCM pin 85 and pins 3 of the DPF Inlet Pressure Sensors Refer to Section 16.3.1.1 to verify repairs.
   [b] If only SPM 3609 FMI 4 is present go to step 2.
2. Disconnect DPF Inlet Pressure Sensor connector.
3. Measure the resistance between the DPF Inlet Pressure Sensor pins 2 and 3.
   [a] If the resistance is greater than 150 ohms, replace the DPF Inlet Pressure Sensor. Refer to Section 4.1.4 Refer to Section 16.3.1.1 to verify repairs.
   [b] If the resistance is less than 150 ohms, go to step 4.
4. Turn the ignition switch to the ON position.
5. Measure the voltage between the DPF Inlet Pressure Sensor pins 1 and 3.
   [a] If the voltage is greater than 4.75 volts, go to step 7.
   [b] If the voltage is less than 4.75 volts, go to step 6.
6. Measure the voltage between the DPF Inlet Pressure Sensor pin 3 and ground.
   [a] If the voltage is greater than 4.75 volts, repair the open circuit between MCM pin 114 and DPF Inlet Pressure sensor pin 1. Refer to Section 16.3.1.1 to verify repairs.
   [b] If the voltage is less than 4.75 volts, repair the open circuit between MCM pin 85 and DPF Inlet Pressure sensor pin 3. Refer to Section 16.3.1.1 to verify repairs.
7. Turn ignition switch to the OFF position.
8. Disconnect the 120 pin MCM connector.
9. Measure the resistance between the DPF Inlet Pressure Sensor harness connector pin 1 and 2.
   [a] If the resistance is less than 5 ohms, repair the short in wires between MCM 120 pin connector pins 114 and 118 and DPF Inlet Pressure Sensor harness connector pins 1 and 2. Refer to Section 16.3.1.1 to verify repairs.

[b] If the resistance is greater than 5 ohms, repair the open circuit between the DPF Inlet Pressure Sensor harness connector pin 2 and the 120 pin MCM connector pin 118.

#### 16.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 16.4 TROUBLESHOOTING SPN 3609/FMI 10

This diagnostic condition is typically DPF Inlet Pressure Sensor stuck.

### 16.4.1 CHECK FOR PRESSURE SENSOR STUCK

Perform the following steps for DPF Inlet Pressure Sensor stuck,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor DPF Inlet Pressure and Barometric Pressure parameter.
4. Is the DPF Inlet Pressure reading within 0.6 of Barometric Pressure?
   [a] If yes, go to step 7.
   [b] If no, go to step 5.
5. Remove DPF Inlet Pressure sensor, Refer to Section 4.1.4.
6. Check pressure line for blockage.
   [a] If pressure line tube is blocked, clean as necessary. Refer to Section 16.4.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Inlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Inlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.4.1.1 to verify repairs.
7. Start the engine and idle for 1 minute.
8. Monitor and record DPF Inlet Pressure parameter after 1 minute of idle time.

9. Increase engine to 1200 rpm, monitor and record DPF Inlet Pressure parameter after 1 minute.
10. Compare DPF Inlet Pressures that were recorded during steps 7 thru 9.
11. Did the DPF Inlet Pressure change at least 0.5 psi between each of the measurements?
    [a] If yes, repeat steps 5 thru 9. If same results are given, contact the Detroit Diesel Customer Support Center (313–592–5800).
    [b] If no, inspect the DPF Inlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Inlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.4.1.1 to verify repairs.

### 16.4.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 17 SPN 3610 DPF OUTLET PRESSURE SENSOR ABOVE OR BELOW NORMAL OPERATING RANGE

SPN 3610 indicates the following:

- □ FMI 2 erratic data
- □ FMI 3 short to power
- □ FMI 4 open short to ground
- □ FMI 10 sensor stuck.
- □ FMI 14 special instructions

## 17.1 TROUBLESHOOTING SPN 3610/FMI 2

This diagnostic condition is typically DPF Outlet Pressure Sensor drifted low.

### 17.1.1 CHECK FOR SENSOR DRIFTED LOW

Perform the following steps for DPF Outlet Pressure Sensor drifted low,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor DPF Outlet Pressure and Barometric Pressure parameter.
4. Is the DPF Outlet Pressure reading within 0.4 psi of Barometric pressure?
   [a] If yes, go to step 7.
   [b] If no, go to step 5.
5. Remove DPF Outlet Pressure sensor, Refer to Section 4.1.4.
6. Check pressure line for leaks, or blockage.
   [a] If pressure line is blocked, clean as necessary Refer to Section 16.1.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Outlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary,

 

replace the Outlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.

7. Start the engine and idle for 1 minute.
8. Monitor DPF Outlet Pressure parameter after 1 minute of idle time.
   [a] If DPF Outlet Pressure is above 3.5 psi, go to step 10.
   [b] If DPF Outlet Pressure is below 3.5 psi, go to step 9.
9. Remove DPF Outlet Pressure sensor and check pressure line for leaks, or blockage. Refer to Section 4.1.4
   [a] If pressure line is blocked, clean as necessary Refer to Section 16.1.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Outlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the Outlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.
10. Increase engine speed to 1400 rpm, and monitor DPF Outlet Pressure parameter for 1 minute.
    [a] If DPF Outlet Pressure is above 3.8 psi, repeat steps 2 thru 10 and if same results are given, contact Detroit Diesel Customer Support Center at 313–592–5800
    [b] If DPF Outlet Pressure is below 3.8 psi, go to step 11.
11. Remove DPF Outlet Pressure sensor and check pressure line for leaks, or blockage, Refer to Section 4.1.4
    [a] If pressure line is blocked, clean as necessary Refer to Section 16.1.1.1 to verify repairs.
    [b] If DPF Outlet Pressure sensor tube is OK, inspect DPF Outlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the Outlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 16.1.1.1 to verify repairs.

### 17.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

# 17.2 TROUBLESHOOTING SPN 3610/FMI 3

This diagnostic condition is typically DPF Outlet Pressure Sensor short to power.

## 17.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes.

1. Check for multiple codes.
   [a] If SPN 3609 FMI 3 and SPN 3610 FMI 3 are present, repair open in circuit between MCM pin 114 and pins 1 of the DPF pressure sensors. Refer to Section 17.2.1.1 to verify repairs.
   [b] If only 3610 FMI 3 is present go to step 2.
2. Disconnect DPF Outlet Pressure Sensor connector.
3. Measure the resistance between pins 1 and 2 of the DPF Outlet Pressure Sensor.
   [a] If the resistance is greater than 130 ohms, replace the DPF Outlet Pressure Sensor. Refer to Section 4.1.4 Refer to Section 17.2.1.1 to verify repairs.
   [b] If the resistance is less than 130 ohms, go to step 4.
4. Turn the ignition switch to the ON position.
5. Measure the voltage between pins 1 and 3 of the DPF Outlet Pressure Sensor harness connector.
   [a] If the voltage is less than 4.5 volts, repair open circuit between MCM pin 114 and DPF Outlet Pressure Sensor pin 1. Refer to Section 17.2.1.1 to verify repairs.
   [b] If the voltage is greater than 4.5 volts, go to step 6.
6. Turn the ignition switch to the OFF position.
7. Disconnect the 120 pin MCM connector.
8. Measure the resistance across pins 2 and 3 of the DPF Outlet Pressure Sensor connector.
   [a] If the resistance is less than 5 ohms, repair the short between the 120 pin MCM connector wires 30 and 85. Refer to Section 17.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair short to power on circuit between the 120 pin MCM connector pin 30 and the DPF Outet Pressure Sensor connector pin 2.

### 17.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.

[a] If no codes are logged, troubleshooting is complete.

[b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 17.3 TROUBLESHOOTING SPN 3610/FMI 4

This diagnostic condition is typically DPF Outlet Pressure Sensor open short to ground.

### 17.3.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Check for multiple codes.
   [a] If SPN 3610 FMI 4 and SPN 3609 FMI 4 are present, repair open in circuit between MCM pin 85 and pins 3 of the DPF Outlet Pressure Sensors Refer to Section 17.3.1.1 to verify repairs.
   [b] If only SPM 3610 FMI 4 is present go to step 2.
2. Disconnect DPF Outlet Pressure Sensor connector.
3. Measure the resistance between the DPF Outlet Pressure Sensor pins 2 and 3.
   [a] If the resistance is greater than 150 ohms, replace the DPF Outlet Pressure Sensor. Refer to Section 4.1.4 Refer to Section 17.3.1.1 to verify repairs.
   [b] If the resistance is less than 150 ohms, go to step 4.
4. Turn the ignition switch to the ON position.
5. Measure the voltage between the DPF Outlet Pressure Sensor pins 1 and 3.
   [a] If the voltage is greater than 4.75 volts, go to step 7.
   [b] If the voltage is less than 4.75 volts, go to step 6.
6. Measure the voltage between the DPF Outlet Pressure Sensor pin 3 and ground.
   [a] If the voltage is greater than 4.75 volts, repair the open circuit between MCM pin 114 and DPF Outlet Pressure sensor pin 1. Refer to Section 17.3.1.1 to verify repairs.
   [b] If the voltage is less than 4.75 volts, repair the open circuit between MCM pin 85 and DPF Outlet Pressure sensor pin 3. Refer to Section 17.3.1.1 to verify repairs.
7. Turn ignition switch to the OFF position.
8. Disconnect the 120 pin MCM connector.
9. Measure the resistance between the DPF Outlet Pressure Sensor harness connector pin 1 and 2.
   [a] If the resistance is less than 5 ohms, repair the short in wires between MCM 120 pin connector pins 114 and 30 and DPF Outlet Pressure Sensor harness connector pins 1 and 2. Refer to Section 17.3.1.1 to verify repairs.

[b] If the resistance is greater than 5 ohms, repair the open circuit between the DPF Outlet Pressure Sensor harness connector pin 2 and the 120 pin MCM connector pin 30.

#### 17.3.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 17.4 TROUBLESHOOTING SPN 3610/FMI 10

This diagnostic condition is typically DPF Outlet Pressure Sensor stuck.

### 17.4.1 CHECK FOR PRESSURE SENSOR STUCK

Perform the following steps for DPF Outlet Pressure Sensor stuck,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor DPF Outlet Pressure and Barometric Pressure parameter.
4. Is the DPF Outlet Pressure reading within 0.6 of Barometric Pressure?
   [a] If yes, go to step 6.
   [b] If no, go to step 5.
5. Remove DPF Outlet Pressure sensor, Refer to Section 4.1.4. and check pressure line for blockage.
   [a] If pressure line is blocked, clean as necessary. Refer to section 17.4.1.1 to verify repairs.
   [b] If pressure line is OK, inspect DPF Outlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Outlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 17.4.1.1 to verify repairs.
6. Start the engine and idle for 1 minute.
7. Monitor and record DPF Outlet Pressure parameter after 1 minute of idle time.

8. Increase engine to 1200 rpm, monitor and record DPF Outlet Pressure parameter after 1 minute.
9. Compare DPF Outlet Pressures that were recorded during steps 7 thru 9.
10. Did the DPF Outlet Pressure change at least 0.5 psi between each of the measurements?
    [a] If yes, repeat steps 5 thru 9. If same results are given, contact the Detroit Diesel Customer Support Center (313–592–5800).
    [b] If no, inspect the DPF Outlet Pressure sensors electrical connector for corrosion, bent or spread pins, and repair as necessary. If no repairs are necessary, replace the DPF Outlet Pressure sensor, Refer to Section 4.1.4. Refer to Section 17.4.1.1 to verify repairs.

### 17.4.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
    [a] If no codes are logged, troubleshooting is complete.
    [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 17.5 TROUBLESHOOTING SPN 3610/FMI 14

This diagnostic condition is typically DPF Outlet Pressure Sensor failed self test/erratic data.

### 17.5.1 CHECK FOR FAILED SELF TEST/ERRATIC DATA

Perform the following steps for DPF Outlet Pressure Sensor failed self test/erratic data,

1. Connect DDDL.
2. Turn ignition switch to the ON position.
3. Monitor Barometric Pressure, DPF Inlet Pressure and DPF Outlet Pressure.
4. Are the DPF Inlet Pressure and DPF Outlet Pressure within 0.4 psi of the Barometric reading?
    [a] If no, replace the sensor that is not within the specification listed above,. Refer to Section 4.1.4. Refer to Section 17.5.1.1 to verify repairs.
    [b] If yes, go to step 5.
5. Start the engine and idle; monitor DPF Inlet and Outlet Pressure's.

6. Are either of the pressures greater than 4.5 psi?.
   [a] If yes, go to step 8.
   [b] If no, go to step 7.
7. Are either of the pressures less than 3.5 psi?.
   [a] If yes, go to step 8.
   [b] If no, repeat steps 4 thru 7. If same results are given, contact the Detroit Diesel Customer Support Center (313–592–5800).
8. Turn the engine OFF.
9. Inspect the suspect sensor's pressure line for damage (i.e. leaks, cracks, kinks, looseness, etc.)
   [a] If damage is found, replace the suspect pressure line. Refer to Section 4.1.4. Refer to Section 17.5.1.1 to verify repairs.
   [b] If OK, go to step 10.
10. Remove suspect pressure sensor, Refer to Section 4.1.4.
11. Inspect sensors pressure line for obstruction.
    [a] If obstruction is found, clean or replace pressure line, Refer to Section 4.1.4. Refer to Section 17.5.1.1 to verify repairs.
    [b] If no obstruction is found, replace the suspect pressure sensor, Refer to Section 4.1.4. Refer to Section 17.5.1.1 to verify repairs.

### 17.5.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 18 SPN 94 FUEL COMPENSATION PRESSURE SENSOR CIRCUIT FAULT

SPN 94 indicates the following:

- FMI 3 short to power
- FMI 4 open short to ground

## 18.1 TROUBLESHOOTING SPN 94 FMI 3

This diagnostic condition is typically Fuel Compensation Pressure (FCP) Sensor short to power.

### 18.1.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes:

1. Check for multiple codes.
   [a] If SPN 94 FMI 3 and SPN 4407 FMI 3 are present, repair open in circuit between MCM pin 104 and pins 1 of the fuel pressure sensors. Refer to Section 18.1.1.1 to verify repairs.
   [b] If only SPN 94 FMI 3 is present, go to step 2.
2. Disconnect FCP sensor connector.
3. Disconnect the 120 pin MCM connector.
4. Measure the resistance across pins 3 and 4 of the FLP sensor connector.
   [a] If the resistance is less than 5 ohms, repair the short between the 120 pin MCM connector wires 82 and 84. Refer to Section 18.1.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair the short to power on circuit between the 120 pin MCM connector pin 84 and the FCP sensor connector pin 4. Refer to Section 18.1.1.1 to verify repairs.

#### 18.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.

2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 18.2 TROUBLESHOOTING SPN 94 FMI 4

This diagnostic condition is typically FCP Sensor open short to ground.

### 18.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Check for multiple codes.
   [a] If SPN 94 FMI 4 and SPN 4407 FMI 4 are present, repair open in circuit between MCM pin 82 and pins 3 of the fuel pressure sensors. Refer to Section 18.2.1.1 to verify repairs.
   [b] If only SPN 94 FMI 4 is present, go to step 2.
2. Disconnect the FCP sensor.
3. Measure the resistance between FCP sensor pin 1 and 4.
   [a] If resistance is greater than 150 ohms, replace the Doser Block Assembly. Refer to Section 4.3.1 Refer to Section 18.2.1.1 to verify repairs.
   [b] If resistance is less than 150 ohms, go to step 4.
4. Measure the resistance between FCP sensor pins 1 and 3.
   [a] If resistance is greater than 150 ohms, replace the Doser Block Assembly. Refer to Section 4.3.1 Refer to Section 18.2.1.1 to verify repairs.
   [b] If resistance is less than 150 ohms, go to step 5.
5. Turn the ignition switch to the ON position.
6. Measure the voltage between FCP sensor pins 1 and 3.
   [a] If the voltage is greater than 4.75 volts, go to step 8.
   [b] If the voltage is less than 4.75 volts, go to step 7.
7. Measure the voltage between FCP sensor pin 3 and ground.
   [a] If the voltage is greater than 4.75 volts, repair open circuit between MCM pin 104 and FCP sensor pin 1. Refer to Section 18.2.1.1 to verify repairs.
   [b] If the voltage is less than 4.75 volts, repair open circuit between MCM pin 82 and FCP sensor pin 3. Refer to Section 18.2.1.1 to verify repairs.

8. Turn the ignition switch to the OFF position.
9. Measure the resistance between FCP sensor harness connector pins 1 and 4.
   [a] If the resistance is less than 5 ohms, repair short in wires between MCM 120 pin connector pins 104 and 84 and FCP sensor harness connector pins 1 and 4. Refer to Section 18.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair open circuit between the FCP sensor harness connector pin 4 and the 120 pin MCM connector pin 84.

### 18.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# 19 SPN 3719 SOOT LEVEL ABOVE NORMAL

SPN 3719 indicates the following:

- FMI 0 soot level very high
- FMI 16 soot level high

## 19.1 TROUBLESHOOTING SPN 3719 FMI 0

This diagnostic condition is typically soot level very high.

### 19.1.1 PERFORM STATIONARY REGENERATION

Perform the following step:

Perform a stationary regeneration, refer to section 5.3.

## 19.2 TROUBLESHOOTING SPN 3719 FMI 16

This diagnostic condition is typically soot level high.

### 19.2.1 PERFORM STATIONARY REGENERATION

Perform the following step:

Perform a stationary regeneration, refer to section 5.3.

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# 20 SPN 4407 FUEL LINE PRESSURE SENSOR CIRCUIT FAULT

SPN 4407 indicates the following:

- FMI 3 short to power
- FMI 4 open short to ground

## 20.1 TROUBLESHOOTING SPN 4407/FMI 3

This diagnostic condition is typically Fuel Line Pressure (FLP) Sensor short to power.

### 20.1.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes:

1. Check for multiple codes.
   [a] If SPN 4407 FMI 3 and SPN 94 FMI 3 are present, repair open in circuit between MCM pin 104 and pins 1 of the fuel pressure sensors. Refer to Section 20.1.1.1 to verify repairs.
   [b] If only SPN 4407 FMI 3 is present, go to step 2.
2. Disconnect FLP sensor connector.
3. Disconnect the 120 pin MCM connector.
4. Measure the resistance across pins 3 and 4 of the FLP sensor connector.
   [a] If the resistance is less than 5 ohms, repair the short between the 120 pin MCM connector wires 82 and 111. Refer to Section 20.1.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair the short to power on circuit between the 120 pin MCM connector pin 111 and the FLP sensor connector pin 4. Refer to Section 20.1.1.1 to verify repairs.

#### 20.1.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.

2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

## 20.2 TROUBLESHOOTING SPN 4407/FMI 4

This diagnostic condition is typically FLP Sensor open short to ground.

### 20.2.1 CHECK FOR MULTIPLE CODES

Perform the following steps to check for multiple codes,

1. Check for multiple codes.
   [a] If SPN 4407 FMI 4 and SPN 94 FMI 4 are present, repair open in circuit between MCM pin 82 and pins 3 of the fuel pressure sensors. Refer to Section 20.2.1.1 to verify repairs.
   [b] If only SPN 4407 FMI 4 is present, go to step 2.
2. Disconnect the FLP sensor.
3. Measure the resistance between FLP sensor pin 1 and 4.
   [a] If resistance is greater than 150 ohms, replace the Doser Block Assembly. Refer to Section 4.3.1 Refer to Section 20.2.1.1 to verify repairs.
   [b] If resistance is less than 150 ohms, go to step 4.
4. Measure the resistance between FLP sensor pins 1 and 3.
   [a] If resistance is greater than 150 ohms, replace the Doser Block Assembly. Refer to Section 4.3.1 Refer to Section 20.2.1.1 to verify repairs.
   [b] If resistance is less than 150 ohms, go to step 5.
5. Turn the ignition switch to the ON position.
6. Measure the voltage between FLP sensor pins 1 and 3.
   [a] If the voltage is greater than 4.75 volts, go to step 8.
   [b] If the voltage is less than 4.75 volts, go to step 7.
7. Measure the voltage between FLP sensor pin 3 and ground.
   [a] If the voltage is greater than 4.75 volts, repair open circuit between MCM pin 104 and FLP sensor pin 1. Refer to Section 20.2.1.1 to verify repairs.
   [b] If the voltage is less than 4.75 volts, repair open circuit between MCM pin 82 and FLP sensor pin 3. Refer to Section 20.2.1.1 to verify repairs.

8. Turn the ignition switch to the OFF position.
9. Measure the resistance between FLP sensor harness connector pins 1 and 4.
   [a] If the resistance is less than 5 ohms, repair short in wires between MCM 120 pin connector pins 104 and 111 and FLP sensor harness connector pins 1 and 4. Refer to Section 20.2.1.1 to verify repairs.
   [b] If the resistance is greater than 5 ohms, repair open circuit between the FLP sensor harness connector pin 4 and the 120 pin MCM connector pin 111.

### 20.2.1.1 Verify Repairs

Perform the following steps to verify repairs.

1. Turn vehicle ignition OFF and reconnect all connectors.
2. Turn vehicle ignition ON, clear all codes.
3. Start and run the engine for one minute. Stop the engine.
4. Check for codes.
   [a] If no codes are logged, troubleshooting is complete.
   [b] If other codes are logged, review this section to find the error. If no error is found, contact the Detroit Diesel Customer Support Center (313–592–5800).

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# APPENDIX A: LIST OF ACRONYMS

| | |
|---|---|
| ATD | Aftertreatment Device |
| AWL | Amber Warning Lamp |
| DTC | Diagnostic Trouble Code |
| DFP | Doser Fuel Pressure |
| DPF | Diesel Particulate Filter |
| DOC | Diesel Oxidation Catalyst |
| EDV | Electronic Dosing Valve |
| FCV | Fuel Cutoff Valve |
| FDV | Fuel Doser Valve |
| FMI | Failure Mode Indicator |
| FPS | Fuel Pressure Sensor |
| HET | High Exhaust Temperature Lamp |
| MCM | Motor Control Module (DDEC VI Two-box system) |
| MIL | Malfunction Indicator Lamp |
| PM | Particulate Matter |
| PWM | Pulse Width Modulation |
| RSL | Red Stop Lamp |
| SPN | Suspect Parameter Number |

# APPENDIX B: DDEC VI WIRING SCHEMATICS

- DDEC VI (CPC) Vehicle Interface Harness
- DDEC VI (MCM - C Sample) EGR Engine Harness

## 18-PIN CONNECTOR #1

1/1 TWO-SPEED AXLE
1/2 PARK BRAKE INTERLOCK
1/3 IDLE VALIDATION SWITCH 2 (THROTTLE ACTIVE)
1/4 THROTTLE POSITION SENSOR GND
1/5 DPF REGENERATION ACTIVE LAMP
1/6 IDLE VALIDATION SWITCH 1 (IDLE ACTIVE)
1/7 THROTTLE POSITION SENSOR
1/8 THROTTLE POSITION SENSOR SUPPLY
1/9 TACHOMETER
1/10 STOP ENGINE / AUX SHUTDOWN #1
1/11 LIMITER 0 / LIMITING TORQUE CURVE
1/12 SET / COAST ENABLE
1/13 MIL LAMP
1/14 CRUISE CONTROL ENABLE
1/15 STOP ENGINE OVERRIDE
1/16 RESUME / ACCEL ENABLE
1/17 SPARE
1/18 RUN START

## 18-PIN CONNECTOR #2

2/1 MAIN BATTERY (+12V)
2/2 MAIN BATTERY GROUND
2/3 IGNITION
2/4 K-LINE
2/5 J1587+
2/6 J1587-
2/7 SERVICE BRAKE RELEASED SWITCH
2/8 REMOTE THROTTLE SELECT SWITCH
2/9 REMOTE VSG SWITCH
2/10 AMBER WARNING LAMP
2/11 LIM 1 / FAST IDLE / ALT ROAD SPEED LIMIT / ALT ETC
2/12 A/C STATUS
2/13 FAN OVERRIDE
2/14 ENGINE BRAKE LOW
2/15 ENGINE BRAKE MEDIUM
2/16 J1939-
2/17 J1939 SHIELD
2/18 J1939+

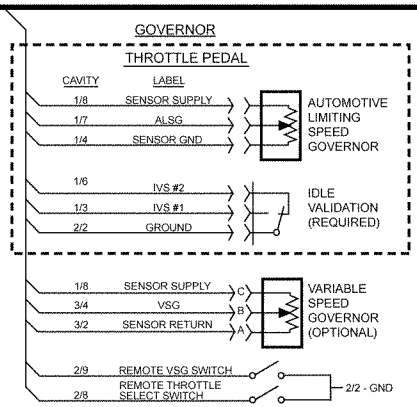
## 21-PIN CONNECTOR #3

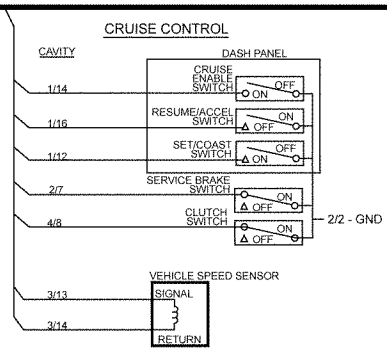
3/1 OI THERMOSTAT
3/2 SENSOR RETURN
3/3 SENSOR SUPPLY
3/4 VSG
3/5 SPARE
3/6 SPARE
3/7 SPARE
3/8 SPARE
3/9 AGS 2 BACKUP LAMP
3/10 AGS 2 TRANS TEMP LAMP
3/11 LOW COOLANT LEVEL SENSOR
3/12 AGS 2 CHECK TRANS LAMP
3/13 VEHICLE SPEED (+)
3/14 VEHICLE SPEED (-)
3/15 AMBIENT AIR TEMPERATURE SENSOR
3/16 RED STOP LAMP
3/17 OI ALARM
3/18 SPARE
3/19 NOT USED
3/20 NOT USED
3/21 NOT USED

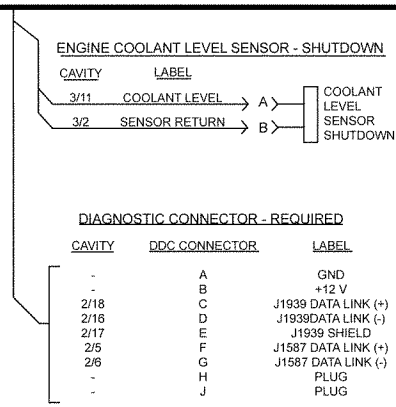
## 18-PIN CONNECTOR #4

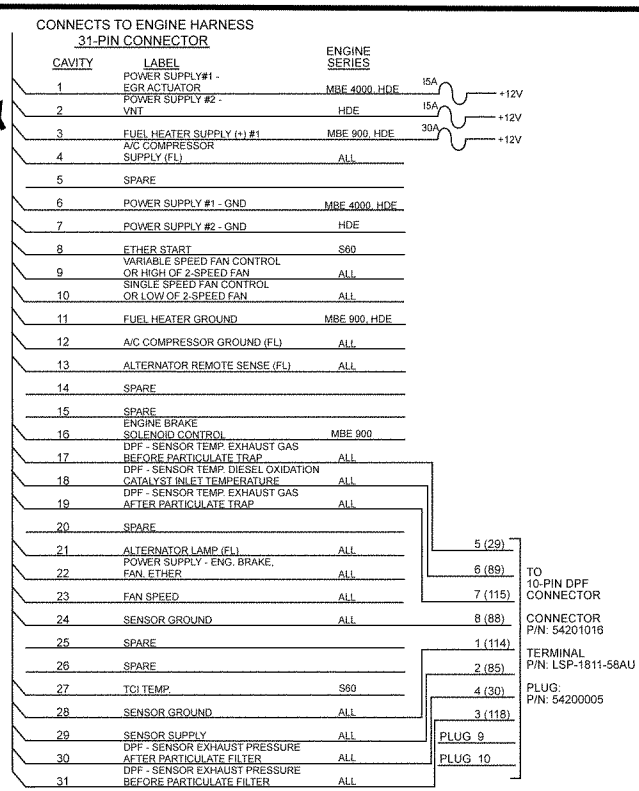
4/1 ENGINE CAN (-)
4/2 ENGINE CAN SHIELD
4/3 ENGINE CAN (+)
4/4 SPARE
4/5 SPARE
4/6 WAIT TO START LAMP (GRID HEATER)
4/7 VEHICLE POWER SHUTDOWN
4/8 CLUTCH RELEASED
4/9 OI ACTIVE LAMP
4/10 SPARE
4/11 SPARE
4/12 VEHICLE SPEED OUTPUT
4/13 SPARE
4/14 SPARE
4/15 SPARE
4/16 NEUTRAL SWITCH
4/17 DPF REGENERATION SWITCH
4/18 HOOD TILT SWITCH

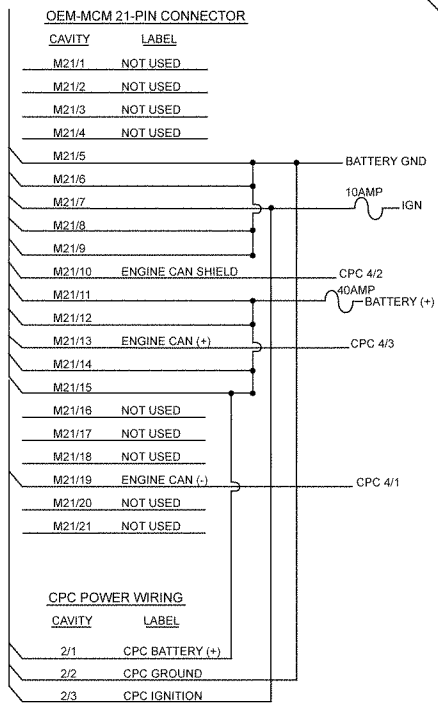
PRELIMINARY

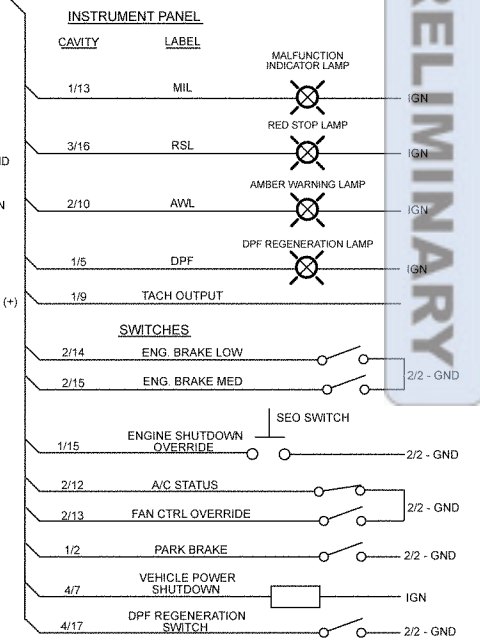



PRELIMINARY

# DDEC VI (CPC)
# VEHICLE INTERFACE HARNESS

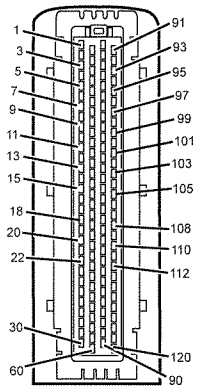
46314

# MCM (C SAMPLE) WIRING DIAGRAM

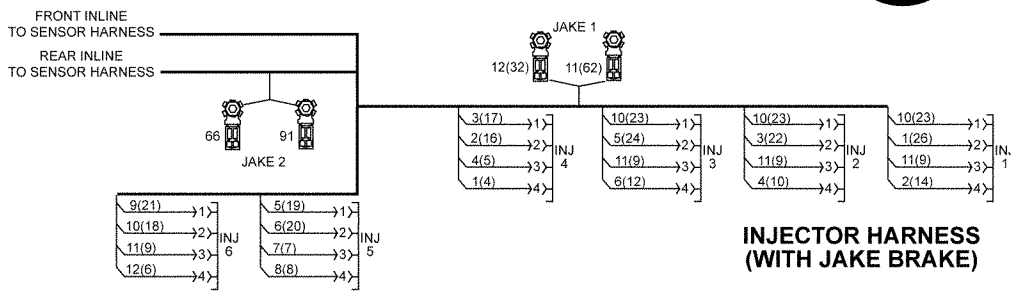
## DDC RESPONSIBILITY

| PIN NO. | DESCRIPTION |
|---|---|
| 1 | Not Used |
| 2 | Not Used |
| 3 | Not Used |
| 4 | Spill Control Valve (cyl 4)-pin 4 |
| 5 | Spill Control Valve Common (cyl 4, 5, 6)-pin 3 |
| 6 | Spill Control Valve (cyl 6)-pin 4 |
| 7 | Not Used |
| 8 | Spill Control Valve (cyl 5)-pin 4 |
| 9 | Not Used |
| 10 | Spill Control Valve (cyl 2)-pin 4 |
| 11 | Spill Control Valve Common (cyl 1, 2, 3)-pin 3 |
| 12 | Spill Control Valve (cyl 3)-pin 4 |
| 13 | Not Used |
| 14 | Spill Control Valve (cyl 1)-pin 4 |
| 15 | Not Used |
| 16 | Needle Control Valve (cyl 4)-pin 2 |
| 17 | Needle Control Valve Common (cyl 4, 5, 6)-pin 1 |
| 18 | Needle Control Valve (cyl 6)-pin 2 |
| 19 | Not Used |
| 20 | Needle Control Valve (cyl 5)-pin 2 |
| 21 | Not Used |
| 22 | Needle Control Valve (cyl 2)-pin 2 |
| 23 | Needle Control Valve Common (cyl 1, 2, 3)-pin 1 |
| 24 | Needle Control Valve (cyl 3)-pin 2 |
| 25 | Not Used |
| 26 | Needle Control Valve (cyl 1)-pin 2 |
| 27 | Not Used |
| 28 | Not Used |
| 29 | DOC Outlet Temp Sensor |
| 30 | DPF Outlet Pressure Sensor |
| 31 | Not Used |
| 32 | Jake 1 |
| 33 | Two-speed Fan or Variable-speed Fan |
| 34 | Not Used |
| 35 | Wastegate |
| 36 | Not Used |
| 37 | Not Used |
| 38 | Ground |
| 39 | Not Used |
| 40 | Not Used |
| 41 | Not Used |
| 42 | CKP/TRS(-) |
| 43 | CKP/TRS(+) |
| 44 | CMP/SRS(-) |
| 45 | CMP/SRS(+) |
| 46 | Not Used |
| 47 | Fan Speed |
| 48 | Not Used |
| 49 | Not Used |
| 50 | Sensor Ground |
| 51 | Turbo Speed Sensor |
| 52 | Sensor Ground |
| 53 | Not Used |
| 54 | Engine Oil Pressure Sensor |
| 55 | Sensor Ground |
| 56 | Not Used |
| 57 | Not Used |
| 58 | Sensor Power Supply |
| 59 | Not Used |
| 60 | EGR Valve Position |

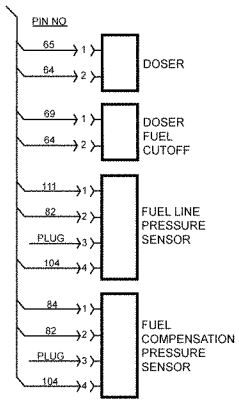
| PIN NO. | DESCRIPTION |
|---|---|
| 61 | EGR Valve |
| 62 | Power Supply |
| 63 | Not Used |
| 64 | Power Supply |
| 65 | Doser |
| 66 | Jake 2 |
| 67 | Ground |
| 68 | Not Used |
| 69 | Fuel Cutoff Valve |
| 70 | Ether Start |
| 71 | Not Used |
| 72 | Not Used |
| 73 | Not Used |
| 74 | VNT CAN (-) |
| 75 | VNT CAN (+) |
| 76 | Not Used |
| 77 | Supply Fuel Temperature Sensor |
| 78 | Not Used |
| 79 | Not Used |
| 80 | Not Used |
| 81 | Not Used |
| 82 | Sensor Power Supply |
| 83 | EGR Temperature Sensor |
| 84 | Fuel Compensation Pressure Sensor |
| 85 | Sensor Power Supply |
| 86 | Turbo Compressor InTemp Sensor |
| 87 | Intake Manifold Pressure Sensor |
| 88 | Sensor Ground |
| 89 | DOC Inlet Temp Sensor |
| 90 | Sensor Position Intake Air Throttle Valve |
| 91 | Power Supply |
| 92 | Not Used |
| 93 | Power Supply |
| 94 | Not Used |
| 95 | Not Used |
| 96 | Not Used |
| 97 | Not Used |
| 98 | Single-Speed Fan or Two-Speed Fan |
| 99 | Not Used |
| 100 | Intake Air Throttle (+) |
| 101 | Intake Air Throttle (-) |
| 102 | Sensor Ground |
| 103 | Sensor Ground |
| 104 | Sensor Ground |
| 105 | Sensor Ground |
| 106 | Intake Air Temperature Sensor |
| 107 | Not Used |
| 108 | Engine Oil Temperature Sensor |
| 109 | EGR Delta Pressure Sensor |
| 110 | Engine Coolant Temperature Sensor |
| 111 | Fuel Line Pressure Sensor |
| 112 | Turbo Compressor Out Temp Sensor |
| 113 | Not Used |
| 114 | Sensor Ground |
| 115 | DPF Outlet Temp Sensor |
| 116 | Not Used |
| 117 | Sensor Power Supply |
| 118 | DPF Inlet Pressure Sensor |
| 119 | Not Used |
| 120 | Not Used |

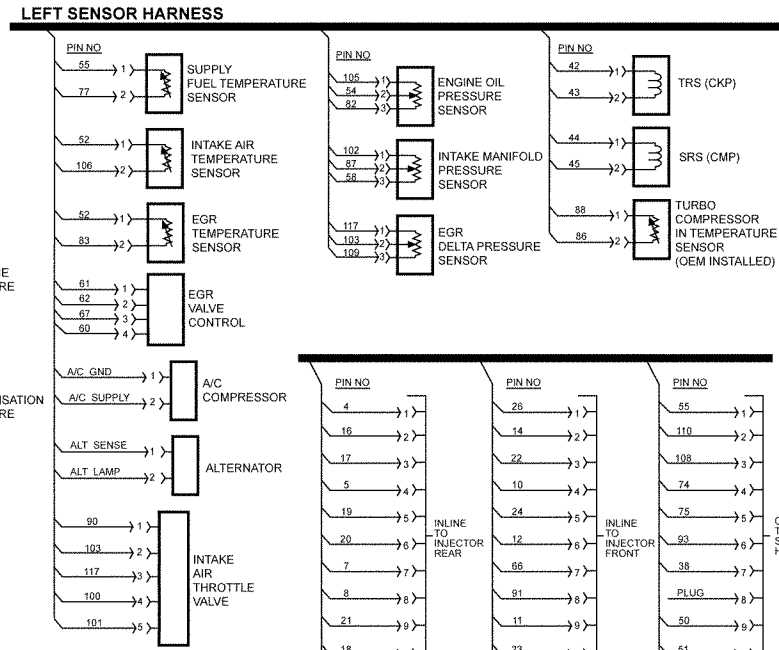


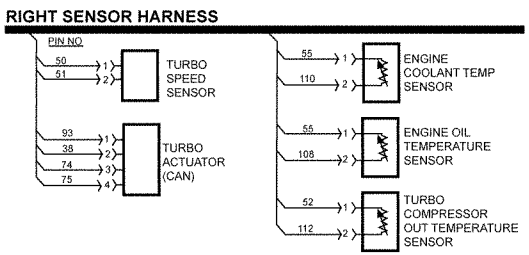
120-PIN CONNECTOR



INJECTOR HARNESS (WITH JAKE BRAKE)

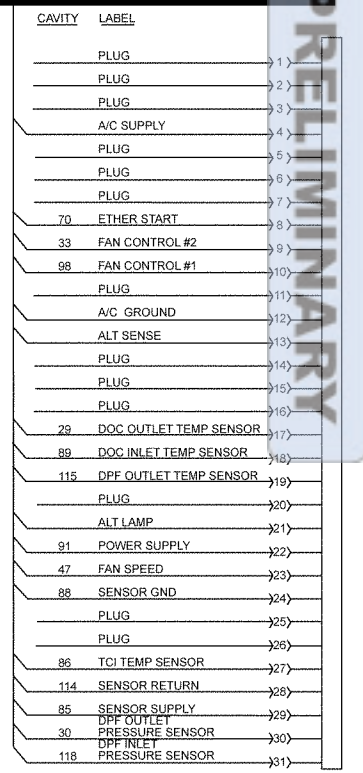









PRELIMINARY

PRELIMINARY

# DDEC VI SERIES 60 MCM (C SAMPLE) EGR ENGINE HARNESS

46557

The MCM has a 120–pin connector Engine Harness which is factory installed. It also has a 21–pin connector which is the responsibility of the OEM. The pinouts for the 120–pin connector for the MBE 4000 engine are Listed in Table B-1, listed in Table B-2, listed in Table B-3, and listed in Table B-4.

| Pin | Function | Connector |
|---|---|---|
| 1 | NC | |
| 2 | NC | |
| 3 | NC | |
| 4 | Electronic Unit Pump (cyl 4) – pin 2 | |
| 5 | Electronic Unit Pump Common (cyl 4) – pin 1 | |
| 6 | Electronic Unit Pump (cyl 6) – pin 2 | |
| 7 | Electronic Unit Pump Common (cyl 6)1 – pin 1 | |
| 8 | Electronic Unit Pump (cyl 5) – pin 2 | |
| 9 | Electronic Unit Pump Common (cyl 5) – pin 1 | |
| 10 | Electronic Unit Pump (cyl 2) – pin 2 | |
| 11 | Electronic Unit Pump Common (cyl 2) – pin 1 | |
| 12 | Electronic Unit Pump (cyl 3) – pin 2 | |
| 13 | Electronic Unit Pump Common (cyl 3) – pin 1 | |
| 14 | Electronic Unit Pump (cyl 1) – pin 2 | |
| 15 | Electronic Unit Pump Common (cyl 1) – pin 1 | |
| 16 | Injector (cyl 4) – pin 2 | |
| 17 | Injector Common (cyl 4) – pin 1 | |
| 18 | Injector (cyl 6) – pin 2 | |
| 19 | Injector Common (cyl 6) – pin 1 | |
| 20 | Injector (cyl 5) – pin 2 | |
| 21 | Injector Common (cyl 5) – pin 1 | |
| 22 | Injector (cyl 2) – pin 2 | |
| 23 | Injector Common (cyl 2) – pin 1 | |
| 24 | Injector (cyl 3) – pin 2 | |
| 25 | Injector Common (cyl 3) – pin 1 | |
| 26 | Injector (cyl 1) – pin 2 | |
| 27 | Injector Common (cyl 1) – pin 1 | |
| 28 | NC | |
| 29 | DOC Outlet Temp Sensor | |
| 30 | DPF Outlet Pressure Sensor | |

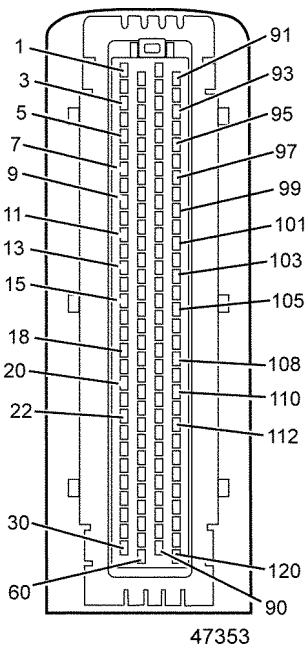



**Table B-1 MCM Connector – MBE 4000 (1 of 4) – C Sample**

| Pin | Function | Connector |
|---|---|---|
| 31 | NC | |
| 32 | Constant Throttle Valve | |
| 33 | Two-speed Fan or Variable Speed Fan | |
| 34 | NC | |
| 35 | Wastegate | |
| 36 | NC | |
| 37 | NC | |
| 38 | Ground | |
| 39 | Electrostatic Oil Separator | |
| 40 | NC | |
| 41 | Grid Heater | |
| 42 | NC | |
| 43 | CKP (+) | |
| 44 | NC | |
| 45 | CMP (+) | |
| 46 | NC | |
| 47 | Fan Speed | |
| 48 | CMP (-) | |
| 49 | NC | |
| 50 | Sensor Ground | |
| 51 | Turbo Speed Sensor | |
| 52 | Sensor Ground | |
| 53 | NC | |
| 54 | Engine Oil Pressure Sensor | |
| 55 | Sensor Ground | |
| 56 | NC | |
| 57 | NC | |
| 58 | Sensor Power Supply | |
| 59 | NC | |
| 60 | EGR Throttle Position | |

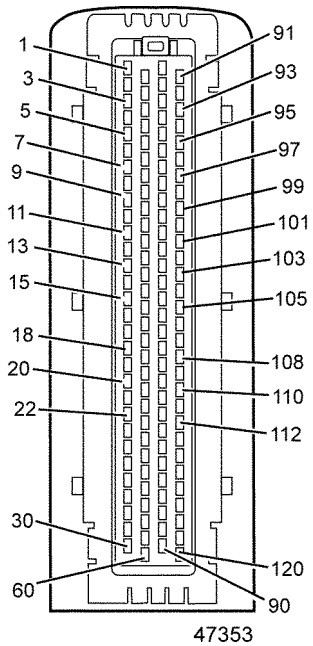



**Table B-2 MCM Connector – MBE 4000 (2 of 4) – C Sample**

| Pin | Function | Connector |
|---|---|---|
| 61 | EGR Valve | |
| 62 | Power Supply | |
| 63 | NC | |
| 64 | Power Supply | |
| 65 | Doser | |
| 66 | EPV2 (Entry Connecting Flap) | |
| 67 | Ground | |
| 68 | NC | |
| 69 | Fuel Cutoff Valve | |
| 70 | NC | |
| 71 | NC | |
| 72 | NC | |
| 73 | CKP (-) | |
| 74 | NC | |
| 75 | NC | |
| 76 | NC | |
| 77 | Supply Fuel Temperature Sensor | |
| 78 | NC | |
| 79 | Grid Heater | |
| 80 | NC | |
| 81 | NC | |
| 82 | Sensor Power Supply | |
| 83 | NC | |
| 84 | Fuel Compensation Pressure Sensor | |
| 85 | Sensor Power Supply | |
| 86 | Turbo Compressor Temperature Sensor | |
| 87 | Intake Manifold Pressure Sensor | |
| 88 | Sensor Ground | |
| 89 | DOC Inlet Temp Sensor | |
| 90 | Intake Air Throttle Position | |

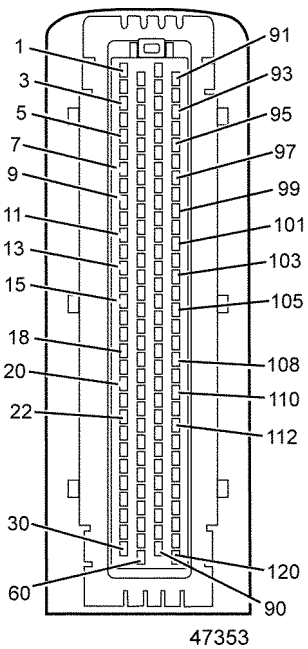



**Table B-3 MCM Connector – MBE 4000 (3 of 4) – C Sample**

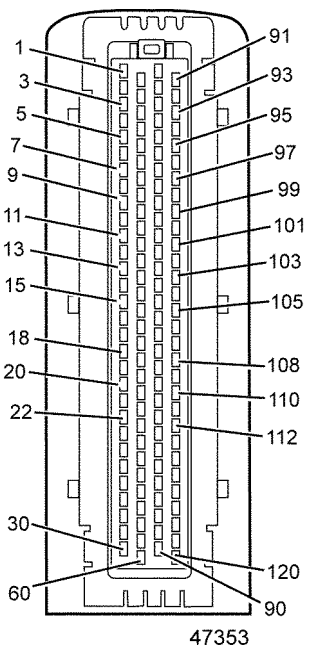
| Pin | Function | Connector |
|---|---|---|
| 91 | Power Supply |  |
| 92 | High Tech Grid Heater | |
| 93 | Power Supply | |
| 94 | NC | |
| 95 | Ground | |
| 96 | EPV1 (Entry Shutoff Flap) | |
| 97 | NC | |
| 98 | Single-speed Fan or Two-speed Fan | |
| 99 | NC | |
| 100 | Intake Air Throttle Valve 5 kHz (+) | |
| 101 | Intake Air Throttle Valve 5 kHz (-) | |
| 102 | Sensor Ground | |
| 103 | Sensor Ground | |
| 104 | Sensor Ground | |
| 105 | Sensor Ground | |
| 106 | Intake Air Temperature Sensor | |
| 107 | Electrostatic Oil Separator | |
| 108 | Engine Oil Temperature Sensor | |
| 109 | Intake Air Delta P Sensor | |
| 110 | Engine Coolant Temp Sensor | |
| 111 | Fuel Line Pressure Sensor | |
| 112 | NC | |
| 113 | NC | |
| 114 | Sensor Ground | |
| 115 | DPF Outlet Temp Sensor | |
| 116 | NC | |
| 117 | Sensor Power Supply | |
| 118 | DPF Inlet Pressure Sensor | |
| 119 | Intake Manifold Sensor | |
| 120 | Turbo Compressor Pressure Sensor | |



**Table B-4 MCM Connector – MBE 4000 (4 of 4) – C Sample**

The MCM has a 120–pin connector Engine Harness which is factory installed. It also has a 21–pin connector which is the responsibility of the OEM. The pinouts for the 120–pin connector for the MBE 900 engine are listed in Table B-5, listed in Table B-6, listed in Table B-7, and listed in Table B-8 .

| Pin | Function | Connector |
|---|---|---|
| 1 | NC | |
| 2 | NC | |
| 3 | NC | |
| 4 | Electronic Unit Pump (cyl 4) – pin 2 | |
| 5 | Electronic Unit Pump Common (cyl 4) – pin 1 | |
| 6 | Electronic Unit Pump (cyl 6) – pin 2 | |
| 7 | Electronic Unit Pump Common (cyl 6)1 – pin 1 | |
| 8 | Electronic Unit Pump (cyl 5) – pin 2 | |
| 9 | Electronic Unit Pump Common (cyl 5) – pin 1 | |
| 10 | Unit Pump (cyl 2) – pin 2 | |
| 11 | Electronic Unit Pump Common (cyl 2) – pin 1 | |
| 12 | Electronic Unit Pump (cyl 3) – pin 2 | |
| 13 | Electronic Unit Pump Common (cyl 3) – pin 1 | |
| 14 | Electronic Unit Pump (cyl 1) – pin 2 | |
| 15 | Electronic Unit Pump Common (cyl 1) – pin 1 | |
| 16 | Injector (cyl 4) – pin 2 | |
| 17 | Injector Common (cyl 4) – pin 1 | |
| 18 | Injector (cyl 6) – pin 2 | |
| 19 | Injector Common (cyl 6) – pin 1 | |
| 20 | Injector (cyl 5) – pin 2 | |
| 21 | Injector Common (cyl 5) – pin 1 | |
| 22 | Injector (cyl 2) – pin 2 | |
| 23 | Injector Common (cyl 2) – pin 1 | |
| 24 | Injector (cyl 3) – pin 2 | |
| 25 | Injector Common (cyl 3) – pin 1 | |
| 26 | Injector (cyl 1) – pin 2 | |
| 27 | Injector Common (cyl 1) – pin 1 | |
| 28 | NC | |
| 29 | DOC Outlet Temp Sensor | |
| 30 | DPF Outlet Pressure Sensor | |

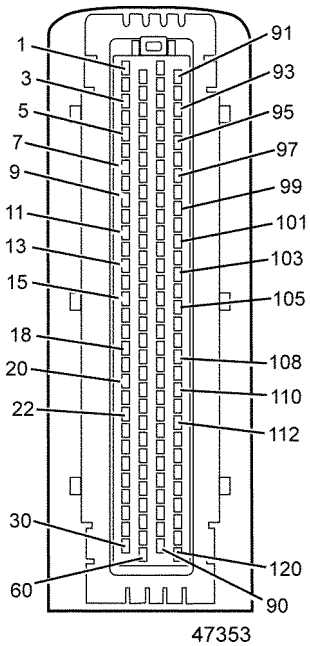



**Table B-5 MCM Connector – MBE 900 (1 of 4) – C Sample**

| Pin | Function | Connector |
|---|---|---|
| 31 | NC | |
| 32 | Constant Throttle Valve | |
| 33 | Two-speed Fan or Variable Speed Fan | |
| 34 | NC | |
| 35 | NC | |
| 36 | NC | |
| 37 | NC | |
| 38 | Ground | |
| 39 | Electrostatic Oil Separator | |
| 40 | NC | |
| 41 | Grid Heater | |
| 42 | NC | |
| 43 | CKP (+) | |
| 44 | NC | |
| 45 | CMP (+) | |
| 46 | NC | |
| 47 | Fan Speed | |
| 48 | CMP (-) | |
| 49 | NC | |
| 50 | Sensor Ground | |
| 51 | Turbo Speed Sensor | |
| 52 | Sensor Ground | |
| 53 | NC | |
| 54 | Engine Oil Pressure Sensor | |
| 55 | Sensor Ground | |
| 56 | NC | |
| 57 | Water-in-Fuel Sensor | |
| 58 | Sensor Power Supply | |
| 59 | NC | |
| 60 | EGR Throttle Position | |

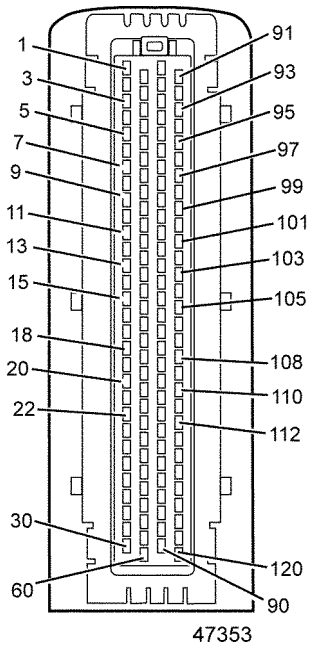



**Table B-6 MCM Connector – MBE 900 (2 of 4) – C Sample**

| Pin | Function | Connector |
|---|---|---|
| 61 | EGR Valve | |
| 62 | Power Supply | |
| 63 | NC | |
| 64 | Power Supply | |
| 65 | Doser | |
| 66 | NC | |
| 67 | Ground | |
| 68 | NC | |
| 69 | Fuel Cutoff Valve | |
| 70 | NC | |
| 71 | NC | |
| 72 | NC | |
| 73 | CKP (-) | |
| 74 | Wastegate CAN (-) | |
| 75 | Wastegate CAN (+) | |
| 76 | NC | |
| 77 | Supply Fuel Temperature Sensor | |
| 78 | NC | |
| 79 | Grid Heater | |
| 80 | NC | |
| 81 | NC | |
| 82 | Sensor Power Supply | |
| 83 | NC | |
| 84 | Fuel Compensation Pressure Sensor | |
| 85 | Sensor Power Supply | |
| 86 | Turbo Pressure/Temperature Sensor | |
| 87 | Intake Manifold Pressure Sensor | |
| 88 | Sensor Ground | |
| 89 | DOC Inlet Temp Sensor | |
| 90 | Intake Air Throttle Position | |

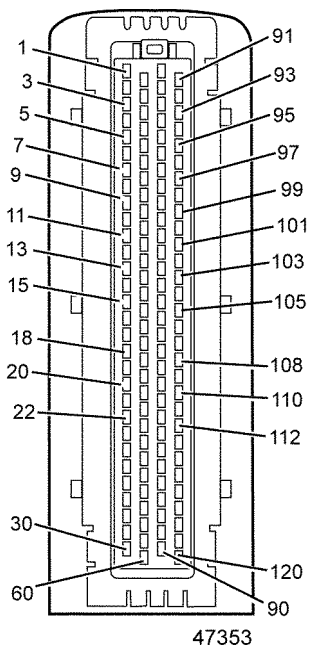



**Table B-7 MCM Connector – MBE 900 (3 of 4) – C Sample**

| Pin | Function | Connector |
|---|---|---|
| 91 | Power Supply | |
| 92 | High Tech Grid Heater | |
| 93 | Power Supply | |
| 94 | NC | |
| 95 | Ground | |
| 96 | Exhaust Brake | |
| 97 | NC | |
| 98 | Single-speed Fan or Two-speed Fan | |
| 99 | NC | |
| 100 | Intake Air Throttle 5 kHz (+) | |
| 101 | Intake Air Throttle 5 kHz (-) | |
| 102 | Sensor Ground | |
| 103 | Sensor Ground | |
| 104 | Sensor Ground | |
| 105 | Sensor Ground | |
| 106 | Intake Manifold Pressure Sensor | |
| 107 | Diagnostic Electrostatic Oil Separator | |
| 108 | Engine Oil Temperature Sensor | |
| 109 | EGR Delta Pressure Sensor | |
| 110 | Engine Coolant Temp Sensor | |
| 111 | Fuel Line Pressure Sensor | |
| 112 | Intake Air Temperature Sensor | |
| 113 | NC | |
| 114 | Sensor Ground | |
| 115 | DPF Outlet Temp Sensor | |
| 116 | NC | |
| 117 | Sensor Power Supply | |
| 118 | DPF Inlet Pressure Sensor | |
| 119 | NC | |
| 120 | Turbo Compressor Temperature Sensor | |

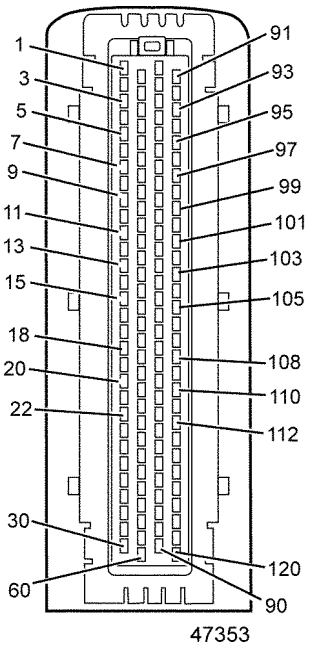



**Table B-8 MCM Connector – MBE 900 (4 of 4) – C Sample**

# GLOSSARY

**Aftertreatment Device (ATD)** — An engine exhaust device that contains a DOC and a DPF along with several pressure and temperature sensors that work in conjunction to reduce particulate emissions from the engine.

**Aftertreatment System (ATS)** — A group of components that replaces the traditional muffler and significantly reduces particulate emissions. The system consists of an ATD, FDV, Intake Throttle Valve, and Doser Block Assembly.

**Ash** — The unburnable solids that remain after soot regeneration. This is primarily composed of Calcium, Zinc, Sulfur, and Phosphrous (usually white to light gray in color).

**Active Regeneration** — A controlled re-action by the engine system to elevate the exhaust temperature to the point where soot can be oxidized.

**Derate** — A reduction in torque necessary to protect the engine and/or ATD from damage.

**Diesel Oxidation Catalyst (DOC)** — A flow through device located at the ATD inlet that enhances the oxidation of hydrocarbons in order to reduce particulate emissions.

**Diesel Particulate Filter (DPF)** — A device installed on a diesel engine system that captures and reduces particulate matter (PM) from the exhaust gas.

**DOC Inlet Temperature Sensor** — Measures exhaust gas temperatures entering the DOC.

**DOC Outlet Temperature Sensor** — Measures exhaust gas temperatures exiting the DOC.

**Doser Block Assembly** — Assembly that houses the Fuel Cutoff Valve (FCV), Fuel Compensation Pressure (FCP) Sensor, Electronic Dosing Valve (EDV), and the Fuel Line Pressure (FLP) Sensor.

**Dosing Fuel Line** — Line that carries fuel from the Doser Block Assembly to the FDV.

**DPF Inlet Pressure Sensor** — Measures exhaust gas pressures entering the DPF.

**DPF Outlet Pressure Sensor** — Measures exhaust gas pressures exiting the DPF.

**DPF Outlet Temperature Sensor** — Measures exhaust gas temperatures exiting the DPF.

| | |
|---|---|
| **Electronic Dosing Valve (EDV)** | Pulse Width Modulation (PWM) controlled valve used to deliver the correct amount of fuel to the FDV in order to maintain the proper temperature across the DOC during regeneration. |
| **Fuel Compensation Pressure (FCP) Sensor** | Monitors fuel pressure into the Doser Block Assembly in order to properly deliver the correct amount of fuel delivered via the EDV. |
| **Fuel Cutoff Valve (FCV)** | Controls fuel flow into the Doser Block Assembly. |
| **Fuel Doser Valve (FDV)** | Coolant cooled valve used to deliver fuel into the exhaust stream to maintain the proper temperature across the DOC during regeneration. |
| **Fuel Line Pressure (FLP) Sensor** | Pressure sensor used to diagnose abnormal conditions in fuel pressure after fuel exits the Doser Block Assembly. |
| **Injection Nozzle** | Part of the FDV; injects fuel into the exhaust stream to increase temperature for regeneration. |
| **Intake Throttle Valve** | Electronically controlled valve that will open or close in order to control a proper temperature at the face of the DOC during regeneration. |
| **Oxidation** | A chemical reaction that uses heat to convert trapped particulate matter into a gaseous state and a remaining ash component. |
| **Particulate Matter (PM)** | Particles that are formed when diesel fuel is combusted. These particles (soot) are composed of sulfate particulates and Soluble Organic Fractions (SOF) that includes heavy hydrocarbons. |
| **Passive Regeneration** | Oxidation of trapped particulate matter in the ATD without the aid of active regeneration. |
| **Soot** | A dark powdery deposit of unburned fuel residues mainly composed of carbon. |
| **Stationary Regeneration** | A manually initiated active regeneration that is performed on a parked vehicle. |
| **Substrate** | Core material used in diesel particulate filters that is made of ceramic, or sintered metal. |