

6SE568 MAY 2006

# Troubleshooting Guide

**DDEC® VI  
MBE4000**

**DETROIT DIESEL**  
**CORPORATION**



Detroit Diesel Corporation  
13400 Outer Drive, West / Detroit, Michigan 48239-4001  
Telephone: 313-592-5000  
Fax: 313-592-8176  
<http://www.detroitdiesel.com>

**NOTE:**

Additional copies of this troubleshooting manual may be purchased from Detroit Diesel Corporation Distributors. See your yellow pages - under Engines, Diesel.

Detroit Diesel®, DDC® and the spinning arrows design are registered trademarks of Detroit Diesel Corporation. Printed in U.S.A.  
DDEC® is a registered trademark of Detroit Diesel Corporation.

All other trademarks are the property of their respective owners.

All information subject to change without notice.

6SE568 0605 Copyright © 2006 DETROIT DIESEL CORPORATION. All rights reserved.


---


**CALIFORNIA  
Proposition 65 Warning**

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

## ENGINE EXHAUST

Consider the following before servicing engines:

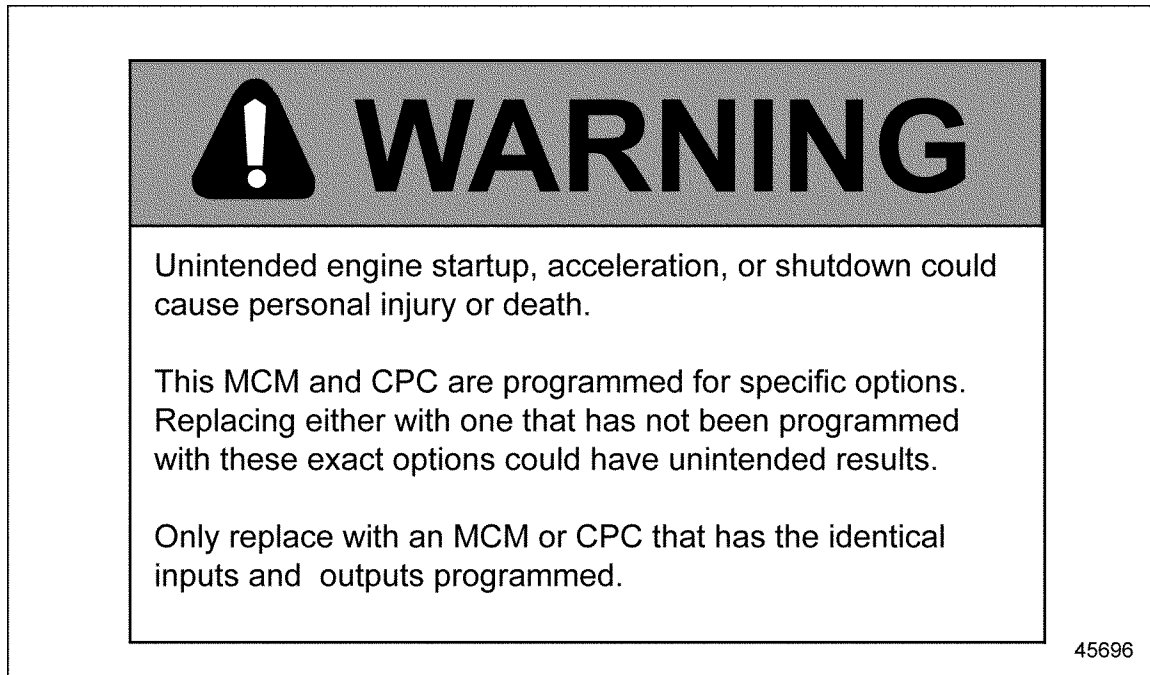
 <b>WARNING:</b> <b>PERSONAL INJURY</b>
<p><b>Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> <b>Always start and operate an engine in a well ventilated area.</b></li><li><input type="checkbox"/> <b>If operating an engine in an enclosed area, vent the exhaust to the outside.</b></li><li><input type="checkbox"/> <b>Do not modify or tamper with the exhaust system or emission control system.</b></li></ul>

 <b>WARNING:</b> <b>HOT EXHAUST</b>
<p><b>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.</b></p>

## TRADEMARK INFORMATION

DDC®, Detroit Diesel®, DDEC®, Diagnostic Link®, Optimized Idle®, Optimized Idle®, Pro-Link®, and Series 60® are registered trademarks of Detroit Diesel Corporation. All other trademarks used are the property of their respective owners.

## MCM/CPC WARNING



**Figure 1 MCM/CPC Replacement Warning**

## SOFTWARE UPGRADES

### NOTE:

These engines are equipped with DaimlerChrysler software. This software generally assures optimal engine performance. The installation of software upgrades may cause minor changes in features and engine performance.

### ABSTRACT

This manual provides instruction for troubleshooting the 2007 Electronic Controls engines. Specifically covered in this manual are troubleshooting and repair steps that apply to DDEC VI.

## SAFETY INSTRUCTIONS

To reduce the chance of personal injury and/or property damage, the instructions contained in this Troubleshooting Manual must be carefully observed. Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the engine.

If part replacement is necessary, the part must be replaced with one of the same part number or with an equivalent part number. Do not use a replacement part of lesser quality. The service procedures recommended and described in this manual are effective methods of performing repair. Some of these procedures require the use of specially designed tools. Accordingly, anyone who intends to use a replacement part, procedure or tool which is not recommended, must first determine that neither personal safety nor the safe operation of the engine will be jeopardized by the replacement part, procedure or tool selected.

It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during repair, or the possibility that improper repair may damage the engine or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exhaustive, because it is impossible to warn personnel of the possible hazardous consequences that might result from failure to follow these instructions.

## **A LETTER TO THE TECHNICIANS**

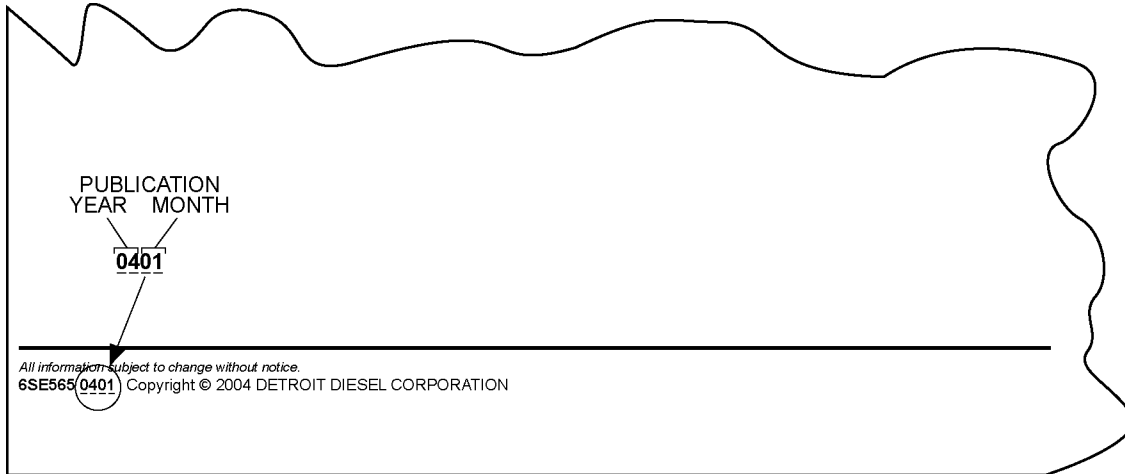
Technicians today are required to have computer skills, excellent comprehension of the written word and possess an extensive diagnostic understanding of the various technological systems and components. Technicians today must perform at a higher level of efficiency and competency than their predecessors and at the same time furnish professional quality support.

As the leader in engine computer systems and technology, Detroit Diesel Corporation remains focused on providing excellence in products, service support and training. As products become more and more advanced, technicians must become specialized in multiple areas. This manual is designed with that thought in mind. The DDEC VI MBE900 and MBE4000 Troubleshooting Guide will provide you with concentrated information that will allow you to excel in DDEC VI technology.

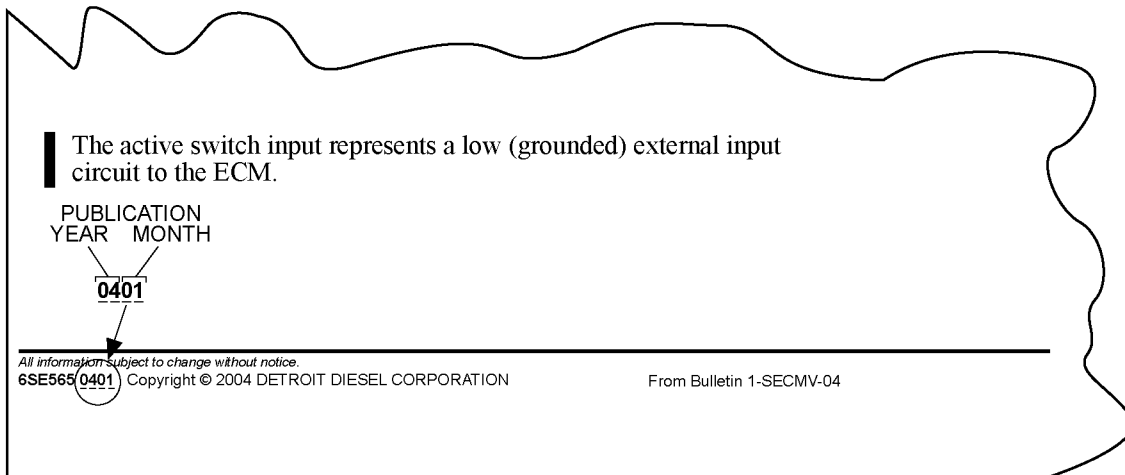
## REVISION NOTIFICATION

Modifications to this manual are announced in the form of Service Information Bulletins. The bulletins include attachment pages and are posted on the DDC extranet.

Revisions to this manual will be sent marked with a revision bar (see Example 2). Sections containing revisions will have added information in the page footer (compare Examples 1 and 2).



Example 1 - Unchanged Pages



Example 2 - Changed Pages

# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	
1.1	OVERVIEW .....	1-3
1.2	SCOPE AND USE OF THIS GUIDE .....	1-4
1.3	SAFETY PRECAUTIONS .....	1-6
<b>2</b>	<b>DDEC VI SYSTEM</b>	
2.1	DDEC VI SYSTEM--HOW IT WORKS .....	2-3
2.2	MOTOR CONTROL MODULE .....	2-4
2.3	COMMON POWERTRAIN CONTROLLER .....	2-13
2.4	WIRES AND WIRING .....	2-25
2.5	CONDUIT AND LOOM .....	2-39
2.6	TAPE AND TAPING .....	2-40
2.7	SENSORS .....	2-41
2.8	INSTRUMENT PANEL LAMPS .....	2-54
<b>3</b>	<b>SPN 27 - EGR VALVE POSITION CIRCUIT FAULT</b>	
3.1	SPN 27/FMI 3 .....	3-3
3.2	SPN 27/FMI 4 .....	3-4
3.3	SPN 27/FMI 0/1/2/14 .....	3-5
<b>4</b>	<b>SPN 84 – VEHICLE SPEED SENSOR</b>	
4.1	SPN 84/FMI 3 .....	4-3
4.2	SPN 84/FMI 4 .....	4-4
<b>5</b>	<b>SPN 86 – ADAPTIVE CRUISE CONTROL FAULT</b>	
5.1	SPN 86/FMI 14 .....	5-3
<b>6</b>	<b>SPN 91 – ACCELERATOR PEDAL SENSOR FAULT</b>	
6.1	SPN 91/FMI 2 .....	6-3
6.2	SPN 91/FMI 3 .....	6-4
6.3	SPN 91/FMI 4 .....	6-6
<b>7</b>	<b>SPN 100 — ENGINE OIL PRESSURE OUTSIDE NORMAL OPERATING RANGE</b>	
7.1	SPN 100/FMI 1 .....	7-3
7.2	SPN 100/FMI 2 .....	7-5
7.3	SPN 100/FMI 3 .....	7-6
7.4	SPN 100/FMI 4 .....	7-8
7.5	SPN 100/FMI 14 .....	7-10
<b>8</b>	<b>SPN 103 – TURBO NO REVOLUTION</b>	
8.1	SPN 103/FMI 0 .....	8-3
8.2	SPN 103/FMI 1 .....	8-4
8.3	SPN 103/FMI 3 .....	8-5
8.4	SPN 103/FMI 4 .....	8-7
8.5	SPN 103/FMI 7 .....	8-9

<b>9</b>	<b>SPN 110 — COOLANT TEMPERATURE ABOVE OR BELOW NORMAL OPERATING RANGE</b>	
9.1	SPN 110/FMI 0 .....	9-3
9.2	SPN 110/FMI 2 .....	9-4
9.3	SPN 110/FMI 3 .....	9-5
9.4	SPN 110/FMI 4 .....	9-7
9.5	SPN 110/FMI 14 .....	9-9
<b>10</b>	<b>SPN 111 – COOLANT LEVEL OUTSIDE NORMAL OPERATING RANGE</b>	
10.1	SPN 111/FMI 1 .....	10-5
10.2	SPN 111/FMI 3 .....	10-7
10.3	SPN 111/FMI 4 .....	10-9
<b>11</b>	<b>SPN 158 — BATTERY CHARGING FAULT</b>	
11.1	SPN 158/FMI 0 .....	11-3
11.2	SPN 158/FMI 1 .....	11-4
11.3	SPN 158/FMI 2 .....	11-6
<b>12</b>	<b>SPN 168 – BATTERY VOLTAGE OUTSIDE NORMAL OPERATING RANGE</b>	
12.1	SPN 168/FMI 0 .....	12-3
12.2	SPN 168/FMI 1 .....	12-4
<b>13</b>	<b>SPN 174 – SUPPLY FUEL TEMPERATURE FAULT</b>	
13.1	SPN 174/FMI 3 .....	13-3
13.2	SPN 174/FMI 4 .....	13-5
<b>14</b>	<b>SPN 175 – ENGINE OIL TEMPERATURE OUTSIDE NORMAL RANGE</b>	
14.1	SPN 175/FMI 2 .....	14-3
14.2	SPN 175/FMI 3 .....	14-5
14.3	SPN 175/FMI 4 .....	14-7
<b>15</b>	<b>SPN 411 — EGR DIFFERENTIAL PRESSURE OR DELTA P SENSOR CIRCUIT OUTSIDE OF NORMAL OPERATING RANGE</b>	
15.1	SPN 411/FMI 0 .....	15-3
15.2	SPN 411/FMI 1 .....	15-5
15.3	SPN 411/FMI 3 .....	15-6
15.4	SPN 411/FMI 4 .....	15-7
<b>16</b>	<b>SPN 558 - IDLE VALIDATION SWITCH</b>	
16.1	SPN 558/FMI 1 .....	16-3
16.2	SPN 558/FMI 3 .....	16-3
16.3	SPN 558/FMI 4 .....	16-5
<b>17</b>	<b>SPN 599 - CRUISE CONTROL SWITCHES NOT FUNCTIONING PROPERLY</b>	
17.1	SPN 599/FMI 12 .....	17-3



<b>18</b>	<b>SPN 601 - CRUISE CONTROL SWITCHES NOT FUNCTIONING PROPERLY</b>	
18.1	SPN 601/FMI 12 .....	18-3
<b>19</b>	<b>SPN 609 - MCM FAULT (ERRONEOUS DATA)</b>	
19.1	SPN 609/FMI 12 .....	19-3
19.2	SPN 609/FMI 14 .....	19-4
<b>20</b>	<b>SPN 615 - ELECTROSTATIC OIL SEPARATOR OUTSIDE OF NORMAL OPERATING RANGE</b>	
20.1	SPN 615/FMI 3 .....	20-3
20.2	SPN 615/FMI 4 .....	20-4
<b>21</b>	<b>SPN 615 - INTAKE AIR DELTA PRESSURE OUTSIDE OF NORMAL OPERATING RANGE</b>	
21.1	SPN 615/FMI 3 .....	21-3
21.2	SPN 615/FMI 4 .....	21-5
<b>22</b>	<b>SPN 625 - CAN FAULT</b>	
22.1	SPN 625/FMI 2, 9, 10, 13, 14 .....	22-3
22.2	SPN 625/FMI 4 .....	22-5
<b>23</b>	<b>SPN 636 — CRANKSHAFT POSITION SENSOR OUTSIDE OF NORMAL OPERATING CONDITIONS</b>	
23.1	SPN 636/FMI 1 .....	23-3
23.2	SPN 636/FMI 3 .....	23-5
23.3	SPN 636/FMI 4 .....	23-7
23.4	SPN 636/FMI 7 .....	23-9
23.5	SPN 636/FMI 8 .....	23-10
<b>24</b>	<b>SPN 651 – INJECTOR #1 NOT OPERATING NORMALLY</b>	
24.1	SPN 651/FMI 5 .....	24-3
24.2	SPN 651/FMI 10 .....	24-5
<b>25</b>	<b>SPN 652 – INJECTOR #2 NOT OPERATING NORMALLY</b>	
25.1	SPN 652/FMI 5 .....	25-3
25.2	SPN 652/FMI 10 .....	25-5
<b>26</b>	<b>SPN 653 – INJECTOR #3 NOT OPERATING NORMALLY</b>	
26.1	TROUBLESHOOTING SPN 653/FMI 5 .....	26-3
26.2	TROUBLESHOOTING SPN 653/FMI 10 .....	26-5
<b>27</b>	<b>SPN 654 – INJECTOR #4 NOT OPERATING NORMALLY</b>	
27.1	TROUBLESHOOTING SPN 654/FMI 5 .....	27-3
27.2	TROUBLESHOOTING SPN 654/FMI 10 .....	27-5
<b>28</b>	<b>SPN 655 – INJECTOR #5 NOT OPERATING NORMALLY</b>	
28.1	SPN 655/FMI 5 .....	28-3
28.2	SPN 655/FMI 10 .....	28-5
<b>29</b>	<b>SPN 656 – INJECTOR #6 NOT OPERATING NORMALLY</b>	
29.1	SPN 656/FMI 5 .....	29-3

29.2	SPN 656/FMI 10 .....	29-5
<b>30</b>	<b>SPN 701 - CONSTANT THROTTLE VALVE (AUX PWM #7) NOT OPERATING NORMALLY</b>	
30.1	SPN 701/FMI 3 .....	30-3
30.2	SPN 701/FMI 4 .....	30-4
30.3	SPN 701/FMI 5 .....	30-6
<b>31</b>	<b>SPN 704 - WASTEGATE VALVE CONTROL (AUX PWM #10)</b>	
31.1	SPN 704/FMI 3 .....	31-3
31.2	SPN 704/FMI 4 .....	31-4
31.3	SPN 704/FMI 5 .....	31-6
<b>32</b>	<b>SPN 706 - ELECTRONIC PROPORTIONING VALVE CONTROL #2 NOT OPERATING NORMALLY</b>	
32.1	SPN 706/FMI 3 .....	32-3
32.2	SPN 706/FMI 4 .....	32-5
32.3	SPN 706/FMI 5 .....	32-7
<b>33</b>	<b>SPN 709 - SINGLE-SPEED FAN (LOW-SIDE DIGITAL OUTPUT #3) FAULT</b>	
33.1	SPN 709/FMI 3 .....	33-3
33.2	SPN 709/FMI 4 .....	33-5
33.3	SPN 709/FMI 5 .....	33-6
<b>34</b>	<b>SPN 710 - ELECTRONIC PROPORTIONING VALVE 1 (ENTRY SHUTOFF FLAP) NOT OPERATING NORMALLY</b>	
34.1	SPN 710/FMI 3 .....	34-3
34.2	SPN 710/FMI 4 .....	34-4
34.3	SPN 710/FMI 5 .....	34-6
<b>35</b>	<b>SPN 729 - GRID HEATER NOT OPERATING NORMALLY</b>	
35.1	SPN 729/FMI 3 .....	35-3
35.2	SPN 729/FMI 4 .....	35-5
<b>36</b>	<b>SPN 723 — CAMSHAFT POSITION SENSOR FAULT</b>	
36.1	SPN 723/FMI 3 .....	36-3
36.2	SPN 723/FMI 4 .....	36-5
36.3	SPN 723/FMI 8 .....	36-6
36.4	SPN 723/FMI 14 .....	36-7
<b>37</b>	<b>SPN 975 - TWO-SPEED FAN (AUX PWM #6) FAULT</b>	
37.1	SPN 975/FMI 3 .....	37-3
37.2	SPN 975/FMI 4 .....	37-5
37.3	SPN 975/FMI 5 .....	37-6
<b>38</b>	<b>SPN 1172 -TURBO COMPRESSOR IN TEMP HIGH OR LOW</b>	
38.1	SPN 1172/FMI 3 .....	38-3
38.2	SPN 1172/FMI 4 .....	38-5

<b>39</b>	<b>SPN 1176 - TURBO COMPRESSOR INLET PRESSURE OUTSIDE NORMAL RANGE</b>	
39.1	SPN 1176/FMI 3 .....	39-3
39.2	SPN 1176/FMI 4 .....	39-5
<b>40</b>	<b>SPN 1636 – INTAKE MANIFOLD TEMPERATURE OUTSIDE OF NORMAL OPERATING RANGE</b>	
40.1	SPN 1636 /FMI 2 .....	40-3
40.2	SPN 1636/FMI 3 .....	40-4
40.3	SPN 1636/FMI 4 .....	40-6
40.4	SPN 1636/FMI 14 .....	40-7
<b>41</b>	<b>SPN 2791 – EGR VALVE (AUX PWM #1) FAILED OR OPEN CIRCUIT</b>	
41.1	SPN 2791/FMI 3 .....	41-3
41.2	SPN 2791/FMI 4 .....	41-5
41.3	SPN 2791/FMI 5 .....	41-6
<b>42</b>	<b>SPN 3510 — ACCELERATOR PEDAL SUPPLY OUTSIDE OF NORMAL OPERATING RANGE</b>	
42.1	SPN 3510/FMI 2 .....	42-3
42.2	SPN 3510/FMI 3 .....	42-5
42.3	SPN 3510/FMI 4 .....	42-6
<b>43</b>	<b>SPN 3563 – INTAKE MANIFOLD PRESSURE OUTSIDE NORMAL RANGE</b>	
43.1	SPN 3563/FMI 0/1/2 .....	43-3
43.2	SPN 3563/FMI 3 .....	43-6
43.3	SPN 3563/FMI 4 .....	43-8
<b>44</b>	<b>SPN 3659 — ELECTRONIC UNIT PUMP #1 NOT OPERATING NORMALLY</b>	
44.1	SPN 3659/FMI 5 .....	44-3
44.2	SPN 3659/FMI 10 .....	44-5
<b>45</b>	<b>SPN 3660 - ELECTRONIC UNIT PUMP #2 NOT OPERATING NORMALLY</b>	
45.1	SPN 3660/FMI 5 .....	45-3
45.2	SPN 3660/FMI 10 .....	45-5
<b>46</b>	<b>SPN 3661 - ELECTRONIC UNIT PUMP #3 NOT OPERATING NORMALLY</b>	
46.1	SPN 3661/FMI 5 .....	46-3
46.2	SPN 3661/FMI 10 .....	46-5
<b>47</b>	<b>SPN 3662 - ELECTRONIC UNIT PUMP #4 NOT OPERATING NORMALLY</b>	
47.1	SPN 3662/FMI 5 .....	47-3
47.2	SPN 3662/FMI 10 .....	47-5

<b>48</b>	<b>SPN 3663 - ELECTRONIC UNIT PUMP #5 NOT OPERATING NORMALLY</b>	
48.1	SPN 3663/FMI 5 .....	48-3
48.2	SPN 3663/FMI 10 .....	48-5
<b>49</b>	<b>SPN 3664 - ELECTRONIC UNIT PUMP #6 NOT OPERATING NORMALLY</b>	
49.1	SPN 3664/FMI 5 .....	49-3
49.2	SPN 3664/FMI 10 .....	49-5
<b>50</b>	<b>CPC DIGITAL OUTPUTS SPN/FMI</b>	
50.1	CPC DIGITAL OUTPUT FAULT CODES .....	50-3
50.2	TROUBLESHOOTING THE CPC DIGITAL OUTPUTS .....	50-3

---

# 1 INTRODUCTION

Section	Page
1.1 OVERVIEW .....	1-3
1.2 SCOPE AND USE OF THIS GUIDE .....	1-4
1.3 SAFETY PRECAUTIONS .....	1-6



## 1.1 OVERVIEW

Detroit Diesel Corporation is the world leader in diesel engines and diesel engine electronics. DDC has made technological leaps in engine performance and fuel economy. Today, we build the most dependable electronically controlled diesel engine in the industry.

2007 Electronic Controls provides two industry standard serial data links: SAE Standards J1587 and J1939. SAE Standard J1587 provides two way communications for the diagnostic equipment and vehicle displays. SAE Standard J1939 provides control data to other vehicle systems such as transmissions and traction control devices.

As the leader in engine computer systems and technology, Detroit Diesel Corporation remains focused on providing excellence in products, service support and training. As products become more and more advanced, today's technicians must become specialized in multiple areas. This manual is designed with that thought in mind.

Our goal at Detroit Diesel is to be the most customer focused and most responsive engine manufacturer in the world.

## 1.2 SCOPE AND USE OF THIS GUIDE

The first half of the manual contain mechanical troubleshooting procedures. The second half contains instructions for troubleshooting the electronic controls.

This manual is divided into numbered chapters. Each chapter begins with a table of contents. Pages and illustrations are numbered consecutively within each chapter.

Information can be located by using the table of contents at the front of the manual or the table of contents at the beginning of each chapter.

Instructions to "Contact Detroit Diesel Customer Service Center" indicate that at the time of this publication, all known troubleshooting checks have been included. Review any recent Service Information Bulletins (SIB) or Service Information letters before calling.

It is also suggested that other DDC outlets be contacted. e.g. if you are a dealer or user, contact your closest DDC Distributor.

Ensure you have the engine serial number when you call. The phone number for Detroit Diesel Customer Service Center is 313-592-5800.

Instructions in this manual may suggest replacing a non DDC component. It may be required to contact the supplier of the component, e.g. truck manufacturer for a TPS concern, to obtain approval to replace the component.

**Important:** To ensure you receive updates to this manual should the need arise, you must fill out the Information Card in the front of this manual. Service Information Bulletins are issued via the DDC extranet. Visit DDCDIRECT at [www.accessfreightliner.com](http://www.accessfreightliner.com).

### **NOTE:**

It is absolutely **critical** that you understand the EGR system to be qualified to offer any type of proper diagnostics. Do not **waste time** trying to troubleshoot a DDC product, you are not qualified to troubleshoot. Your company may incur wasted labor hours. If you are qualified to perform a troubleshooting task and have spent more than one hour on that task, **STOP**, and contact the Detroit Diesel Customer Support Center at (313) 592-5800. Once you have discussed your options with a customer support center person, you can perform the required tests and evaluations. Please keep in contact with your customer support person. Doing so allows you to stay on track.

### 1.2.1 Mechanical Troubleshooting

Each chapter has a fault as the title (i.e. Excessive White Smoke). The next level within the chapter is the probable cause/symptom of the fault. Following this are the resolution and verification of the resolution. The mechanical troubleshooting should be used before the electronic troubleshooting.



## 1.2.2 Electronic Troubleshooting

The 2007 Electronic Controls system allows for an increased processor speed and increased memory.

Instructions for repair in this manual are generic. For example, "Repair Open" is used to advise the technician that a particular wire has been determined to be broken. In some cases it may not be best to try and locate the open. It may be that the best repair technique is to replace a complete harness. The technician should make the determination of the proper repair, with the best interest of the customer in mind.

Instructions to check terminals and connectors should include checking for proper contact tension. Using a mating terminal, a modest force should be required to remove a terminal from its mate. Replace terminals with poor tension.


After completing any repair, always clear fault codes that may have been generated during the troubleshooting process.


### **NOTE:**


Be aware that troubleshooting in this manual is mostly concerned with DDEC related codes. Codes associated with other components, e.g. transmissions, ECUs, ABS, etc. can be found in the related publication.

### 1.3 SAFETY PRECAUTIONS

The following safety precautions must be observed when working on a Detroit Diesel engine:

 <b>WARNING:</b> <b>PERSONAL INJURY</b>
<p><b>Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> <b>Always start and operate an engine in a well ventilated area.</b></li><li><input type="checkbox"/> <b>If operating an engine in an enclosed area, vent the exhaust to the outside.</b></li><li><input type="checkbox"/> <b>Do not modify or tamper with the exhaust system or emission control system.</b></li></ul>

 <b>WARNING:</b> <b>HOT EXHAUST</b>
<p><b>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.</b></p>

 <b>WARNING:</b> <b>PERSONAL INJURY</b>
<p><b>To avoid injury from accidental engine startup while servicing the engine, disconnect/disable the starting system.</b></p>

All engine installations, especially those within enclosed spaces, should be equipped with an exhaust discharge pipe so that exhaust gases are delivered into the outside air.

 **WARNING:**

**PERSONAL INJURY**

**To avoid injury from the sudden release of a high-pressure hose connection, wear a face shield or goggles. Bleed the air from the air starter system before disconnecting the air supply hose.**

### 1.3.1 Ether Start

The DDEC Ether Start System is a fully-automatic engine starting fluid system used to assist a DDEC equipped diesel engine in cold starting conditions. The amount of ether is properly controlled to optimize the starting process and prevent engine damage. DDEC will control ether injection using standard sensors to control the ether injection hardware.

 **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:**

**FIRE AND TOXICITY**

To avoid personal injury, spray the fluid from the bottom of the valve into an appropriate container. The engine starting fluid used in DDEC Ether Start Systems contains extremely flammable and toxic substances.