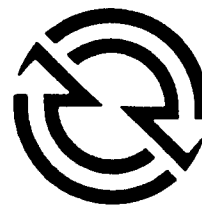


**DETROIT DIESEL**

DDEC I Troubleshooting Guide

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## **NOTICE:**

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DETROIT DIESEL ELECTRONIC CONTROLS

TABLE OF CONTENTS

PAGE

FORWARD .....	A
SAFETY NOTICE .....	B
SECTION 1. <u>HOW TO USE THIS BOOK</u> .....	1
SECTION 2. <u>BASIC KNOWLEDGE REQUIRED</u> .....	3
A. Electrical Circuits .....	3
B. Use of Digital Volt-Ohm Meter .....	3
C. Important Information .....	6
D. Explanation of Abbreviations/Terms .....	7
E. General Diagnostic Information .....	9
F. Diagnostic Code Memory (Clearing Codes) .....	10
SECTION 3. <u>TESTING THE DDEC SYSTEM</u> .....	11
A. Tools Needed to Diagnose the System .....	11
B. Reading the Diagnostic Codes .....	12
1. Using the "Check Engine" Light .....	12
2. Using the MPSI DDL Reader .....	13
3. Using the OTC Monitor 3 .....	13
C. PROM Replacement .....	14
D. Connector Checkout .....	19
SECTION 4. <u>TROUBLESHOOTING CHARTS</u> .....	20
A. The Diagnostic Procedure - Where to Start .....	20
B. Diagnostic Codes - What They Mean .....	20
C. Diagnostic Circuit Check .....	25

DETROIT DIESEL ELECTRONIC CONTROLS

TABLE OF CONTENTS (Cont'd.)

	<u>PAGE</u>
D. Customer Complaint Charts .....	32
Chart 1 - Customer Complaint .....	32
Chart 2 - No "Check Engine" Light .....	37
Chart 3 - No DDL Reader Readout And "Check Engine" Light Stays On .....	43
Chart 4 - No "Stop Engine" Light .....	49
Chart 5 - Engine Cranks But Will Not Start .....	55
Chart 6 - Power Take-Off Speed Adjust Not Operational .....	75
Chart 7 - Stop Engine Override Not Operational ...	85
Chart 8 - Two Speed Governor Switch Not Operational .....	87
Chart 9 - Jake Brake Not Operational .....	93
Chart 10 - "Stop Engine" Light Always On And No Codes .....	97
Chart 11 - Cruise Control Inoperative .....	101
Chart 12 - No "Cruise Enable" Light .....	113
Chart 13 - "Cruise Enable" Light Always On .....	119
Chart 14 - Poor Performance And No Codes .....	123
Chart 15 - Idle Shut-Down Feature Not Operational .	125
E. Diagnostic Code Charts .....	129
Code 12 - Power Take-Off Speed Adjust .....	129
Code 13 - Coolant Level Sensor - Low .....	135
Code 14 - Oil Temperature Sensor - Cold .....	139
Code 15 - Oil Temperature Sensor - Hot .....	145
Code 16 - Coolant Level Sensor - High .....	149
Code 21 - Throttle Position Sensor - High .....	155
Code 22 - Throttle Position Sensor - Low .....	161
Code 26 - Power Control Switch .....	171
Codes 311, 312, 313, 314, 315, 316, 317, 318 - Injector Response Time - Too Long.....	175
Codes 321, 322, 323, 324, 325, 326, 327, 328 - Injector Response Time - Too Short .....	199
Code 33 - Turbo Boost Pressure Sensor - High .....	201
Code 34 - Turbo Boost Pressure Sensor - Low .....	207
Code 35 - Oil Pressure Sensor - High .....	215
Code 36 - Oil Pressure Sensor - Low .....	221
Code 41 - Timing Reference Sensor .....	229
Code 42 - Synchronous Reference Sensor .....	239
Code 43 - Low Coolant .....	249
Code 44 - Oil Overtemperature .....	252
Code 45 - Low Oil Pressure .....	253
Code 46 - Low Battery Voltage .....	255

DETROIT DIESEL ELECTRONIC CONTROLS

TABLE OF CONTENTS (Cont'd.)

	<u>PAGE</u>
E. Diagnostic Code Charts (Cont'd.)	
Code 51 - Programmable Read Only Memory .....	265
Code 52 - ECM Analog to Digital Conversion Failure .	269
Code 53 - ECM TRS Circuitry Failure .....	271
Code 54 - Vehicle Speed Sensor Failure .....	273
Code 55 - TECL Loss of Data .....	279
Code 56 - ECM Injector Failure .....	285
Code 57 - Cruise Control Memory .....	287
Code 58 - Cruise Control Switches .....	291
5VM - Main 5 Volt Supply Diagnosis .....	321
5VR - Auxiliary 5 Volt Supply Diagnosis .....	329
APPENDIX .....	338
PROM IDENTIFICATION .....	338
ALPHABETIC INDEX .....	340
NUMERIC INDEX .....	342
WIRING DIAGRAMS .....	348

## SECTION 1

### HOW TO USE THIS BOOK

1. Sections 2 (Basic Knowledge Required) and 3 (Testing the DDEC Systems) should be read and understood completely.
2. If basic mechanical checks have been made, no trouble was found, and the problem is now believed to be in the DDEC System, turn to Section 4 - Troubleshooting Charts. Always start with the Diagnostic Circuit Check (DCC-1) on Page .
3. Use the charts to pinpoint the problem and perform repairs. The charts are in a three-column format. The first column lists the test steps to perform and in what sequence to perform them. The second column gives the list of possible results you may obtain, based on the steps performed. The third column indicates what to do next, based on your result.

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C2-7 Check ECM Connectors		
. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.	Terminals and connectors are okay.	Replace ECM.. Then go to C2-30.

4. The charts will always instruct you to clear the codes after all repair work is done, and confirm the repair (typically by running the engine and checking if the codes and/or symptoms have returned).



## SECTION 2

### BASIC KNOWLEDGE REQUIRED

Before using this manual, there are some areas that you should be familiar with. With this basic knowledge, you will have success using the diagnostic charts.

#### A. ELECTRICAL CIRCUITS

- . You should understand the theory of electricity and know the meaning of voltage and ohms. You should understand what happens in a circuit and an open or shorted wire. You should be able to read and understand a wiring diagram.
- . You should be able to use jumper wires to make circuit checks.

#### B. USE OF DIGITAL VOLT-OHM METER

- . You should be familiar with the digital volt-ohm meter. You should be able to measure voltage and resistance. You should be familiar with the controls of the meter and how to use it correctly.

Instructions for use of a typical digital volt-ohm meter are as follows:

##### Resistance Measurements

1. Connect the red test lead to the V- $\Omega$  (Volt-Ohm) input connector and the black lead to the com input connector on the meter.
2. Set the function/range switch to the desired  $\Omega$  position. If the magnitude of the resistance is not known, set the switch to the highest range, then reduce until a satisfactory reading is obtained.
3. If the resistance being measured is connected to a circuit, turn off the power to the circuit being tested (turn off ignition).
4. Connect the test leads to the circuit being measured. When measuring high resistance, be careful not to contact adjacent points, even if they are insulated. Some insulators have a relatively low insulation resistance which can affect the resulting measurement.
5. Read the resistance value on the digital display.



## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### Continuity Checks

In addition to measuring the specific resistance value of a circuit, some meters will also tell if a continuous electrical path exists. If a path exists, the circuit is said to have "continuity". (This continuity check can be used in any section of the DDEC Troubleshooting Guide where the test is looking for greater than, less than or equal to 5 ohms.) An open circuit (broken electrical path) would have  $\infty$  resistance and would not have continuity. To utilize this continuity feature of certain meters:

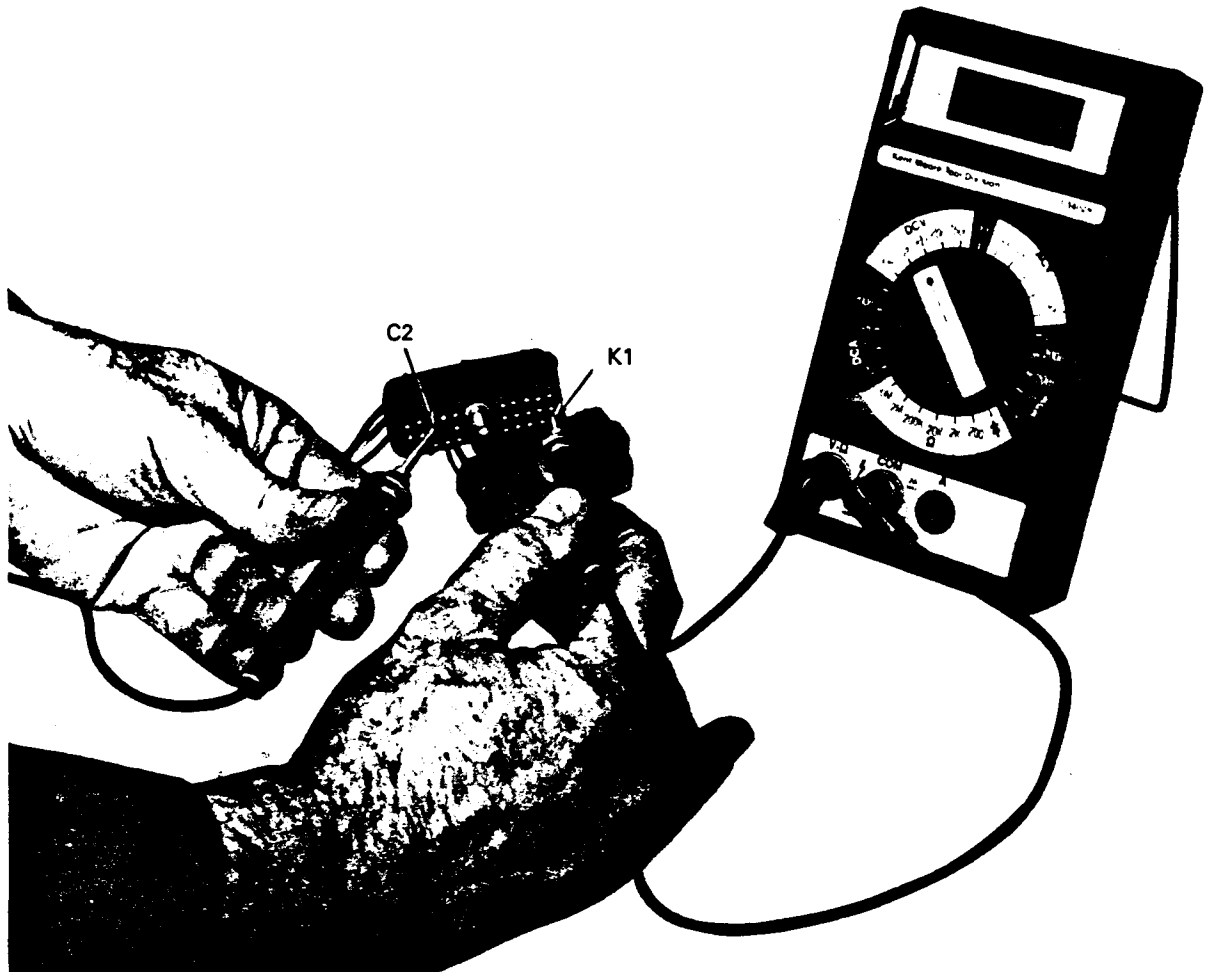
1. Place the function/range switch in any  $\Omega$  range.
2. Connect the red lead to the V- $\Omega$  connector and the black lead to the com connector on the meter. With the test leads separated or measuring an out-of-range resistance, the digital display will indicate "OL" (overlimit; some meters show "l+", "↑", or simply "l").
3. Put one test lead probe at one end of the wire or circuit to be tested. Use the other test lead to trace the circuit. When continuity is established, an  $\Omega$  symbol will appear in the upper left corner of the digital display. If contact in the wire is maintained long enough (about 1/4 of a second), the OL will disappear and the resistance value of the wire or circuit will appear next to the symbol.
4. If your VOM does not work in the manner described above, you must know how your VOM operates in order to use this troubleshooting guide.

## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### Voltage Measurements

1. Connect the red test lead to the V- $\Omega$  input connector and the black lead to the com input on the meter. If a DC-AC switch is present, make sure it is switched to the DC position.
2. Set the function/range switch to the desired volts position. If the magnitude of the voltage is not known, set the switch to a range which will be able to read most voltages seen on a vehicle. (Typically, a 20V range will do.) Then reduce the range until a satisfactory reading is obtained.
3. Connect the test leads to the circuit being measured. In the DDEC diagnostic procedures, voltage measurements are always given as being taken at pins, sockets, Battery + or ground. Following the voltage measurement point, the color test lead to be used is given in parenthesis (red is the V- $\Omega$  connection, and black is the com connection). Example: If the procedure says, "Take voltage reading at socket C2 (red lead) to socket K1 (black lead)", the hook-up would be as follows:



## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### C. IMPORTANT INFORMATION

The following items must be read and thoroughly understood before using this manual.

1. The engine and ignition should always be off before the harness connectors are disconnected or reconnected.
2. When disconnecting harness connectors, be sure that the pulling force is applied to the connectors themselves and not the wires extending from them.
3. After harness connectors are reconnected to the DDEC system, the computer diagnostics should be ignored and cleared.

## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### D. EXPLANATION OF ABBREVIATIONS/TERMS

- A/D - Analog to Digital: The computer inside the ECM uses an A/D converter to convert a sensor voltage into a number which the computer can work with.
- ATEC - Allison Transmission Electronic Controls
- BAT - Battery
- BSW - Brake Switch: Used in Cruise Control to determine whether the brake is depressed, thus disabling cruise.
- BOI - Beginning of Injection: The number of crank angle degrees, before Top Dead Center, that the ECM is requesting the injectors be turned on.
- CEL - "Check Engine" Light: Typically mounted on the instrument panel. It has two functions:

. It is used as a warning lamp to tell the driver that a problem has occurred, and that the vehicle should be taken in for service as soon as possible.

. It is used by the technician to read out "trouble codes" to help diagnose system problems.

As a light bulb check and system check the "Check Engine" light will come on for about 5 seconds when the ignition is turned "ON". If the CEL remains on, the self-diagnostic system has detected a problem. If the problem goes away the light will go out, but a trouble code will be stored in the ECM. (See General Diagnostic Information, Section 1E for details.)

- CELD - "Check Engine" Light Driver: The electronics inside the ECM which actually turns the CEL on and off.
- CKT - Circuit
- CLS - Coolant Level Sensor: monitors coolant level at the radiator tank top.
- COM - Common
- DDEC - Detroit Diesel Electronic Controls
- DDL - Diagnostic Data Link: The line (wire) over which the ECM communicates DDEC information about sensors, trouble codes, and injectors. This information can be read by a DDL Reader. (See Section 3B for details.)
- DREQ - Diagnostic Request Terminal: The pin on the DDL connector which must be grounded to obtain diagnostic codes (pin M).
- ECM - Electronic Control Module: The brains of DDEC. It reads the DDEC sensors and switches, calculates injector firing times and duration (using a built-in computer), and tells the EDU when to fire the injectors.
- EDU - Electronic Distributor Unit: Contains circuitry which "drives" the injectors (i.e., turns them on and off). The EDU controls the injectors based on signals sent to it from the ECM.

## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### D. EXPLANATION OF ABBREVIATIONS/TERMS (Cont'd.)

- EFPA - Electronic Foot Pedal Assembly: contains the Throttle Position Sensor.
- EUI - Electronic Unit Injector: replaces the Mechanical Unit Injector (MUI).
- ESOSW - Engine Select, Switch 0: used to tell the ECM the engine type (6V-92, 8V-92, 6L-71, or Series 60).
- ES1SW - Engine Select, Switch 1: used to tell the ECM the engine type (6V-92, 8V-92, 6L-71, or Series 60).
- GND - Ground: Battery -
- INJ - Injector (fuel)
- ISC - Idle Speed Control
- ISG - Idle Speed Governor
- LSG - Limiting Speed Governor
- OPS - Oil Pressure Sensor: monitors oil pressure at the main oil gallery.
- OTS - Oil Temperature Sensor: monitors oil temperature in the turbo oil supply line.
- PCSW - Power Control Switch
- PROM - Programmable Read Only Memory (engine calibration unit)
- PTOSA - Power Take-Off Speed Adjust Sensor
- PW - Pulsewidth: the amount of time in crank degrees that the ECM is requesting the injectors be turned on.
- RASW - Resume/Accel Switch (for cruise control)
- SEL - "Stop Engine" Light: typically mounted on the instrument panel. Its main function is to turn on and warn the driver when a potential engine damaging condition has been detected (low oil pressure, low coolant, or oil overtemperature). As a light bulb check & system check, the "Stop Engine" light will come on for about 5 seconds when the ignition turns on.
- SELD - "Stop Engine" Light Driver: the electronics inside the ECM which actually turns the SEL on and off.
- STEO - Stop Engine Override
- SRS - Synchronous Reference Sensor: detects when the first cylinder in the firing order is about to be fired.
- TBS - Turbo Boost Pressure Sensor: used to monitor turbo boost pressure. This sensor generates a voltage (from 0 to 5 volts) which is proportional to pressure.
- TD - Tachometer Driver: output of the ECM for tach. hook-up purposes.
- TECL - Transmission-Engine Communication Link: used for data communication if both ATEC and DDEC are present.
- TPS - Throttle Position Sensor: used to detect throttle request.
- TRS - Timing Reference Sensor: detects whenever any cylinder is about to be fired.
- TSG - Two Speed Governor Switch: detects when the vehicle is in top gear.
- VIN - Vehicle Identification Number
- VSG - Variable Speed Governor
- VSS - Vehicle Speed Sensor: used to detect vehicle (road) speed.

## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### E. GENERAL DIAGNOSTIC INFORMATION

When the Diagnostic Request terminal (pin M on the DDL connector) is grounded to pin A on the DDL connector, the diagnostic system will flash the yellow "Check Engine" light located in the cab. (More information on retrieving codes is given in Section 3B.) The light will be flashing a diagnostic code indicating the problem area.

As a bulb and system check, the "Check Engine" and "Stop Engine" lights will come on for 5 seconds when the ignition switch is first turned "on". The Cruise Enable light will also turn on for 5 seconds if a DDEC cruise control is present. If the Diagnostic Request terminal (DREQ) is then grounded, the "Check Engine" light will flash a Code 25 which indicates the self-diagnostic system is working and that no faults have been detected. A Code 25 consists of two flashes followed by a short pause, then five flashes in quick succession. After a longer pause, the code will repeat.

If the "Check Engine" light remains on, the self-diagnostic system has detected a fault. If the Diagnostic Request terminal is then grounded and the engine is not running, the trouble code will be flashed. If more than one fault has been detected, each diagnostic code will be flashed. Diagnostic codes will flash in numerical order (i.e., lowest number code first). The diagnostic code series will repeat as long as the diagnostic request terminal is grounded.

A diagnostic code indicates a problem in a given circuit (i.e., diagnostic Code 14 indicates a problem in the oil temperature sensor circuit. This includes the oil temperature sensor, connector, harness and Electronic Control Module (ECM). The procedure for finding the problem can be found in Diagnosis Chart Code 14. Similar charts are provided for each code. Remember, diagnosis should always begin at the Diagnostic Circuit Check (DCC-1). For an oil temperature sensor problem, it will quickly lead you to Chart 14 -- but first gets you to verify the code/symptom.

Since the self-diagnostics do not detect all possible faults, the absence of a code does not mean there are no problems in the system. If a DDEC problem is suspected, even in the absence of a code, go to DCC-1 anyway. This chart can lead you to other charts which can aid in the troubleshooting process -- where DDEC problems may occur but do not generate a code. Basic mechanical checks, however, are not covered in this guide.

## SECTION 2

### BASIC KNOWLEDGE REQUIRED

#### F. DIAGNOSTIC CODE MEMORY (Clearing Codes)

As mentioned previously, when a fault develops in the DDEC System, the "Check Engine" light will come on and a diagnostic code will be logged into the ECM memory. If the fault is intermittent (meaning that it comes and it goes), the "Check Engine" light will go out after the fault goes away. However, the diagnostic code will remain in the ECM memory until the battery voltage to ECM terminals 2F and 3F of the ECM connector is removed for ten (10) seconds or more. This can be done easily by removing the 5 amp. fuse (or circuit breaker) at the BAT + terminal between the ECM and the battery (see Notice below). This fuse should be unplugged any time that the diagnostic procedure asks to clear codes.

If a diagnostic code can be obtained when the "Check Engine" light is off, the stored code could be intermittent but still can be evaluated using the Diagnostic Circuit Check procedure.

Faults indicated by Diagnostic Code 14 require engine operation at part throttle for up to eight minutes before the "Check Engine" light will come on and a code is stored.

NOTICE: ECM MEMORY VOLTAGE BAT + MUST ALWAYS BE DISCONNECTED AND RECONNECTED WITH IGNITION OFF. THUS, ANYTIME A FUSE IS REMOVED TO CLEAR CODES, BE SURE THE VEHICLE IGNITION IS OFF. IF THIS PROCEDURE IS NOT FOLLOWED, DAMAGE TO THE ECM MAY RESULT.

## SECTION 3

### TESTING THE DDEC SYSTEM

#### A. TOOLS NEEDED TO DIAGNOSE THE SYSTEM

The following tools and equipment are required to properly diagnose a complete system:

- . Voltmeter and Ohmmeter: Use a digital volt-ohmmeter J-34029 or equivalent to measure voltage and resistance where required. A digital volt-meter must be used when specified in a procedure.
- . Test Light 6V: Must be used when specified in the procedure.
- . Jumper Wires: To bypass a circuit and to insert between special connectors. This will permit access to the connector terminals for circuit checking.
- . TRS/SRS Alignment Tool: J-34971.
- . Diagnostic Data Link (DDL) Readers: Either Microprocessor Systems, Inc.'s (MPSI) DDEC DDL Reader or Owatonna Tool Co.'s (OTC) Monitor 3.
- . PROM Removal Tool: For proper removal of the ECM PROM.

In addition, the tools listed below can be of aid in properly identifying problems, but are not required for this Troubleshooting Guide:

- . Tachometer: Either a crankshaft harmonic balance revolution pickup type or electronic coil trigger signal pickup type tachometer can be used for diagnosis.
- . Pressure Gauge: To monitor turbo boost pressure (for purposes of comparison with the DDEC, Turbo Boost Pressure Sensor).



## SECTION 3

### TESTING THE DDEC SYSTEM

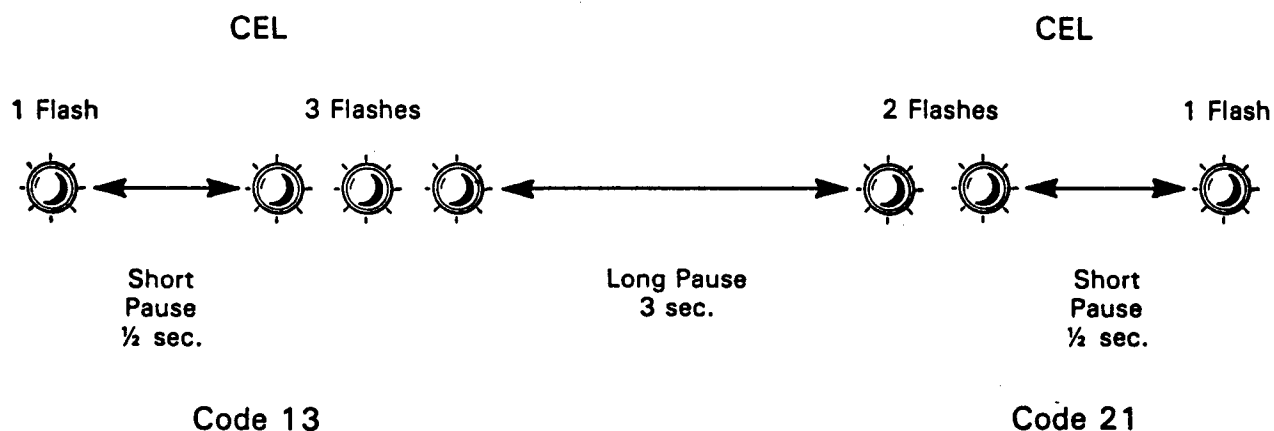
#### B. READING THE DIAGNOSTIC CODES

Note: If you turned here to begin diagnosis of a problem and already know how to read codes, turn to the Diagnostic Circuit Check (DCC-1), page .

##### 1. Using the "Check Engine" Light (CEL)

This Troubleshooting Guide is intended to be used with a DDEC DDL Reader. In certain instances, only the Reader can provide the information necessary for quick diagnosis of the problem. Should you just need to read out codes, however, and not have a Reader available, the following procedure will let you read out codes on the CEL:

- Turn ignition off.
- Jumper pin A to pin M on the 12 pin, DDL connector (typically located in the cab).
- Turn ignition on and observe the codes flashing out on the CEL.  
Example: code 13 and 21.



This will continue as long as the pins are jumpered with the ignition on.

## SECTION 3

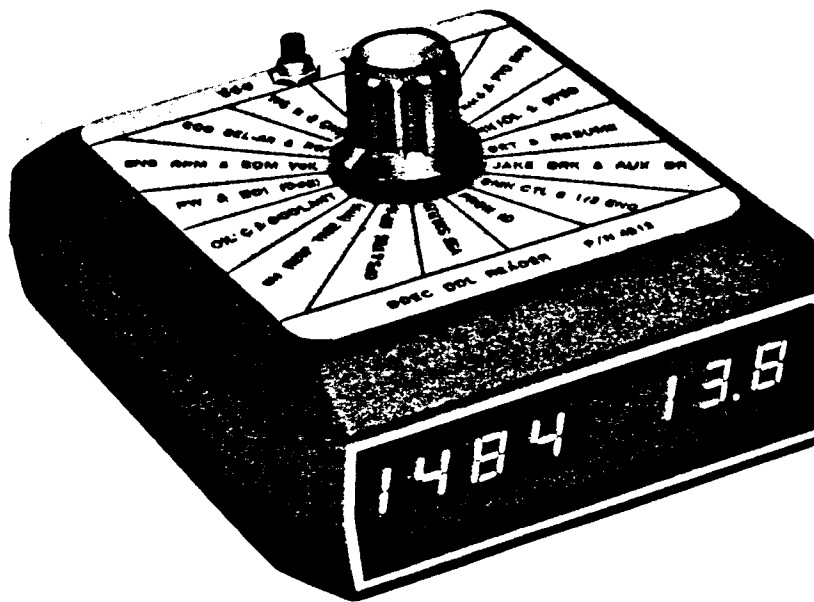
### TESTING THE DDEC SYSTEM

#### B. READING THE DIAGNOSTIC CODES (Cont'd.)

##### 2. Using the DDL Reader.

DDL Reader MPSI P/N 4812:

Proper use of this reader is described in the instruction manual supplied. This device is infinitely more useful in reading fault codes and diagnosing engine electronic faults than the Check Engine Light code process.



##### 3. ATEC/DDEC

- For an ATEC/DDEC installation where a mechanic is instructed to use a DDL scanner, it should be noted that this will affect the flow of throttle position information being sent to the transmission and thus affect transmission shifting. This change in data flow may cause a Code 66 in the transmission electronic control unit memory.
- It should also be understood that on this type of installation, utilizing a jumper wire for obtaining trouble codes on the check engine light will produce a Code 66 in the ATEC system.
- When engine diagnostics are complete, it will be necessary to clear the transmission ECU memory.

## SECTION 3

### TESTING THE DDEC SYSTEM

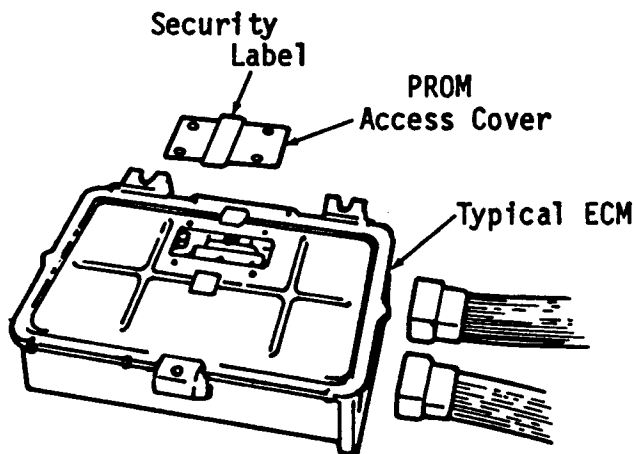
#### C. PROM REPLACEMENT

When the diagnostic procedure calls for the ECM to be replaced, the engine calibration unit (PROM) part number should first be checked to see that it is the proper PROM. If it is, the PROM should be removed from the defective ECM and installed in the new service ECM using the following procedure.

Diagnostic Code 51 indicates the PROM is installed improperly, or is defective. When Code 51 is obtained on a factory-installed ECM, the PROM should be replaced. When Code 51 is obtained on a service ECM, the PROM installation should be checked for bent pins or pins not fully seated in the socket. If the PROM is installed correctly and Code 51 is still logged, after it was initially cleared, it then should be replaced.

#### CALIBRATION UNIT (PROM) REPLACEMENT FROM ENGINE ECM

**Notice:** Ignition must be off when installing or removing the engine ECM connectors.

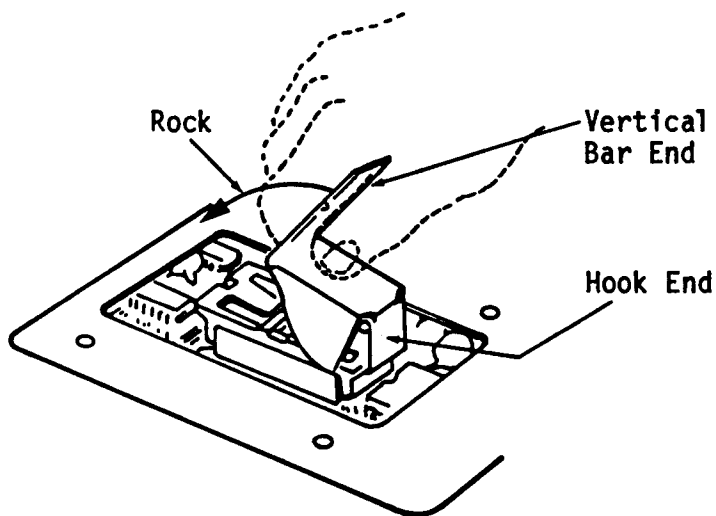


Mounting Hardware Not Illustrated. Configuration Will Vary With Application.

1. Disconnect connectors from the ECM.
2. Remove ECM mounting hardware.
3. Remove ECM from the vehicle.

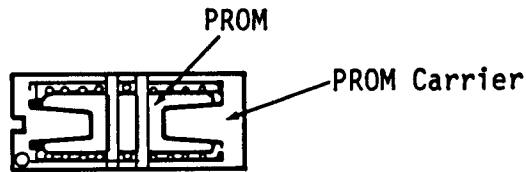
CALIBRATION UNIT (PROM) REPLACEMENT  
FROM ENGINE ECM (Cont'd.)

4. Turn ECM so the cover is facing up.
5. Remove four screws from the access cover.
6. Remove PROM access cover. Security label if affixed will be destroyed in the process.
7. Using the rocker-type PROM removal tool, engage one end of the PROM carrier with the hook end of the tool. Press on the vertical bar end of the tool and rock engaged end of the PROM carrier up as far as possible. Engage the opposite end of the PROM carrier in the same manner and rock this end up as far as possible. Repeat this process until the PROM carrier and PROM are free of the PROM socket. The PROM carrier with PROM in it should lift off of the PROM socket easily.



CALIBRATION UNIT (PROM) REPLACEMENT  
FROM ENGINE ECM (Cont'd.)

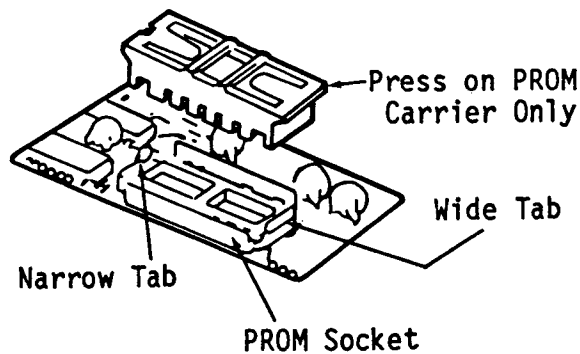
8. Take the new PROM, mounted in PROM carrier, out of its packaging and check the part number, making sure it represents the PROM chosen to replace the one removed.



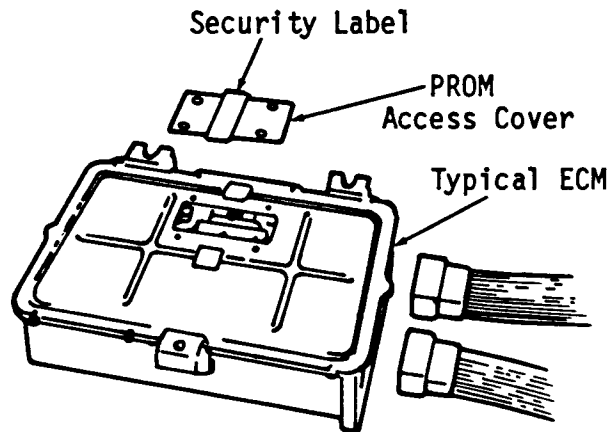
Notch in PROM referenced  
to Smaller Notch in Carrier


9. Position the new PROM carrier squarely over the PROM socket with the small notched end of the carrier aligned with the narrow tab on the socket. Press on the PROM carrier until it is firmly seated in the socket.

DO NOT press on PROM - ONLY CARRIER



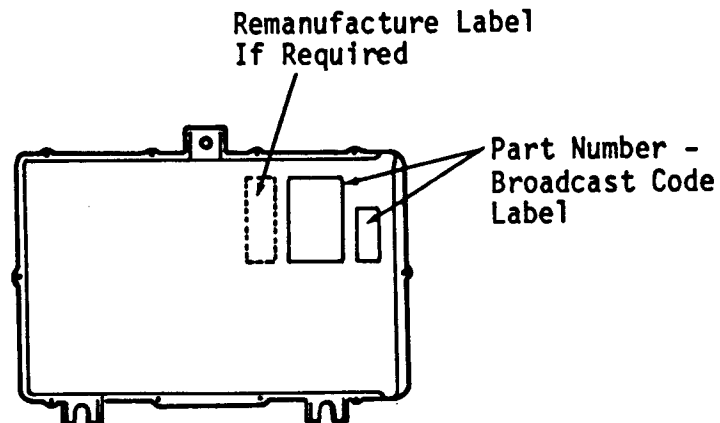
CALIBRATION UNIT (PROM) REPLACEMENT  
FROM ENGINE ECM (Cont'd.)



<b>NOTICE</b>	Warranty of this system may be VOID if seal is broken or removed by unauthorized personnel	SA 1951
		

10. Reposition access cover on the ECM.
11. Reinstall access cover fastning screws.
12. Replace a security label over access cover adjacent to original where possible as required.

CALIBRATION UNIT (PROM) REPLACEMENT  
FROM ENGINE ECM (Cont'd.)



13. Type the appropriate information on the Part Number - Broadcast Code Label, if a new label is required.
14. Remove old P/N - B/C label and attach new one, if a change in identification is required.
15. Reinstall the ECM in vehicle.
16. Connect the connectors to the ECM.
17. Turn ignition on.
18. Look for trouble code 51. If this occurs, the PROM is not fully seated, installed backwards, has bent pins, or is defective.
  - . If a trouble code does not occur, the PROM is installed properly.
  - . If it is necessary to remove the PROM, follow instructions in step "1" thru "7".
  - . If not fully seated, press firmly on carrier.
  - . If pins bend, remove PROM, straighten pins, and reinstall. If bent pins break or crack during straightening, discard PROM and replace it.
  - . If found defective, replace PROM.
  - . If installed backwards, REPLACE THE PROM.

Note: Any Time The PROM Is Installed Backwards And The Ignition Switch Turned On, The PROM Is Destroyed.

## SECTION 3

### TESTING THE DDEC SYSTEM

#### D. CONNECTOR CHECKOUT

All system connections are environmentally protected. These new connectors protect the terminations from the harsh corrosive engine compartment environment. This is important since most system signals are low voltage and corrosion could make them inoperative.

Before repairing or replacing any system component (i.e., harness, sensor, ECM, EDU, etc.) as indicated by the diagnostic charts, you should:

1. Disconnect the appropriate connector(s) associated with the suspected defective component and check for bent, broken, or dirty terminals or mating tabs. Clean, straighten, or replace as required.
2. If a problem was found, reconnect all connectors previously disconnected. Then recheck the system to see if the problem has been corrected.

NOTE: Don't probe the back of a connector or pierce the DDEC wiring for purposes of taking measurements. This can cause intermittent faults or system failures and may affect the DDEC warranty.



## SECTION 4

### TROUBLESHOOTING CHARTS

#### A. THE DIAGNOSTIC PROCEDURE - WHERE TO START

When diagnosing the cause for engine performance, fuel economy or exhaust system complaints, perform normal checks (non DDEC-equipped engine) before considering DDEC as the possible source of the problem.

When diagnosing the system, always start with the "Diagnostic Circuit Check" on Page . This will ultimately lead to other diagnostic charts, even in the cases where no codes were logged but a symptom(s) was noted. In fact, if no codes were recorded (but a symptom remains), the "Diagnostic Circuit Check" will refer you to the "Customer Complaint" Chart 1, which can identify fault trees to use based on the customer complaint.

NOTICE: Although there are many charts connected with diagnostics, only one chart (the "Diagnostic Circuit Check") is needed to determine that the system is operating properly. Normally, only two charts are necessary to find a problem.

#### B. DIAGNOSTIC CODES - WHAT THEY MEAN

The following pages give a brief description of each diagnostic code. Basic facts about these codes are given below:

- . Most problems must occur for a total of at least two (2) seconds before the "Check Engine" light comes on and a code is stored.
- . If a problem goes away, the "Check Engine" light will turn off. But the code will remain stored in the ECM.
- . Code 25 (a display of "NONE" on the DDL Reader) means no codes were stored at all).
- . Any stored code will be automatically erased if the problem doesn't occur again within the next 50 engine starts.

## SECTION 4

### TROUBLESHOOTING CHARTS

#### B. DIAGNOSTIC CODES - WHAT THEY MEAN (Cont'd.)

- Code 12 Power Take-Off Speed Adjust (PTOSA) - System on for 2 seconds with more than a full PTOSA speed request.
- Code 13 Coolant Level - System running for 2 seconds with a low sensor output.
- Code 14 Oil Temperature - Engine running for 8 minutes with a very cold (less than 0 degrees C) oil temperature indication.
- Code 15 Oil Temperature - Engine running for 2 seconds with a very hot (greater than 170 degrees C) oil temperature indication.
- Code 16 Coolant Level - System running for 2 seconds with a high sensor output.
- Code 21 Throttle Position - System running for 2 seconds with too high of a throttle position indicated.
- Code 22 Throttle Position - System running for 2 seconds with too low of a throttle position indicated.
- Code 25 No Codes - No faults have been detected by DDEC since the last time the codes were cleared.
- Code 26 Power Control Switch - Indicates that the power control switch has been used. This switch, when thrown, turns on both the "Stop Engine" and "Check Engine" lights. In addition, the engine will begin to "power down" (and eventually shut down) if the engine protection system is equipped with the optional shut-down feature.
- Codes 311, 312, 313, 314, 315, 316, 317, 318 - response time too long. The response time of the injector was longer than the maximum limit or the injector never responded at all. Oil temperature must be greater than 20 degrees C and battery voltage must be between 11 volts and 16 volts to log this code.
- Codes 321, 322, 323, 324, 325, 326, 327, 328 - response time too short. The response time of the injector was shorter than the minimum limit. Oil temperature must be greater than 20 degrees C and battery voltage must be between 11 volts and 16 volts to log this code.

## SECTION 4

### TROUBLESHOOTING CHARTS

#### B. DIAGNOSTIC CODES - WHAT THEY MEAN (Cont'd.)

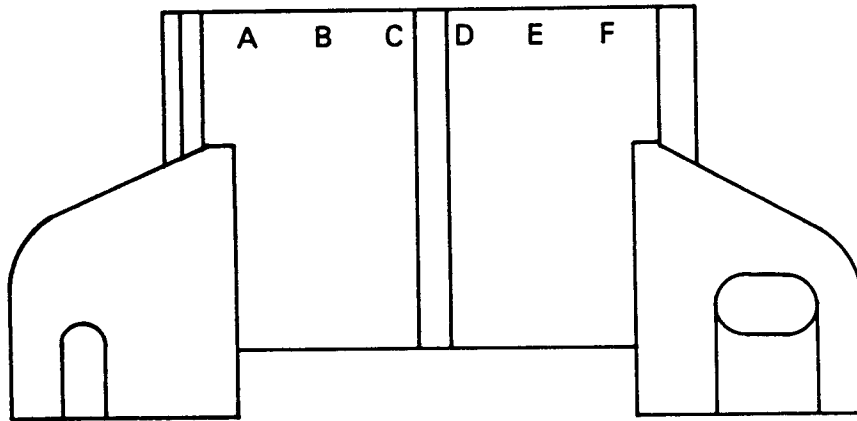
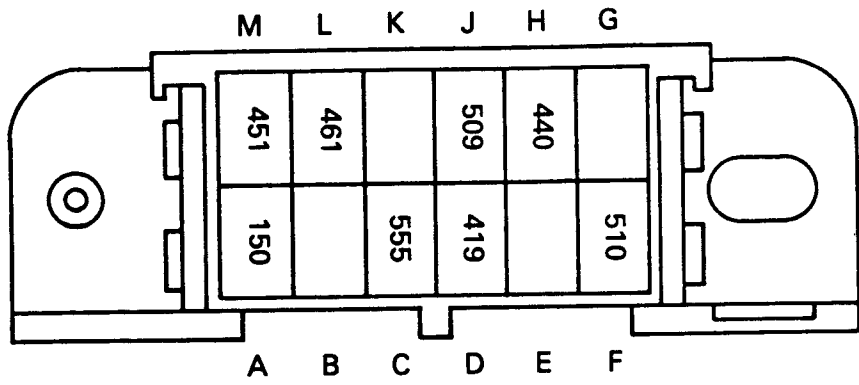
- Code 33 Turbo Boost Pressure - Engine idling (at less than 1000 RPM) for 2 seconds with a very high (greater than 197 KPa) turbo boost indication. Also, pulsewidth must be less than 10 degrees to log this code.
- Code 34 Turbo Boost Pressure - Engine running for 2 seconds (at greater than 300 RPM) with a very low (less than 19 KPa) turbo boost indication.
- Code 35 Oil Pressure - Engine running for 2 seconds with a very high (greater than 422 KPa) oil pressure indication. Must also have greater than 50 degrees C oil temperature and be at less than 1300 RPM to log this code.
- Code 36 Oil Pressure - Engine running for 2 seconds with a very low (less than 0 KPa) oil pressure indication. Must also have greater than 50 degrees C oil temperature and greater than 300 RPM to log this code.
- Code 41 Timing Reference Sensor Pulses Fault - The number of TRS pulses received per revolution was incorrect or completely missing. One pulse per cylinder per revolution is required.
- Code 42 Synchronous Pulses Fault - Did not receive an SRS pulse on every firing of the #1 cylinder.
- Code 43 Low Coolant - System running with low coolant for 7 seconds. This fault will cause both the "Stop Engine" and "Check Engine" light to turn on, and will power down (and eventually shut down) the engine if the engine protection system is equipped with the shutdown feature.
- Code 44 Oil Over Temperature - Oil temperature over a maximum limit (about 128 degrees C) for 7 seconds. Both the "Stop Engine" and "Check Engine" lights will turn on and will power down (and eventually shut down) the engine if the engine protection system is equipped with the shutdown feature. (NOTE: If the oil temperature is between 121 and 128 degrees C, no code will be logged, but the "Check Engine" light will come on after 2 seconds and power down the engine if equipped with the power down feature (but won't power it down as severely as with the 128 degrees C limit.)
- Code 45 Low Oil Pressure - Engine running with the oil pressure less than the limit (different limits at different RPM's) for 7 seconds. This fault will cause both the "Stop Engine" and "Check Engine" light to turn on, and will power down (and eventually shut down) the engine if the engine protection system is equipped with the shutdown feature.

## SECTION 4

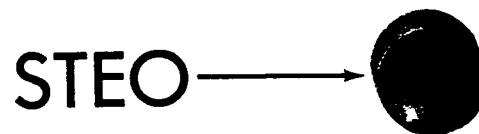
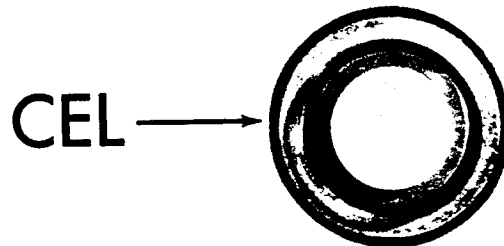
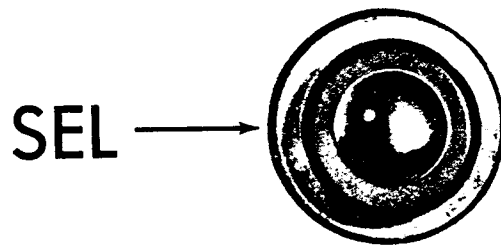
### TROUBLESHOOTING CHARTS

#### B. DIAGNOSTIC CODES - WHAT THEY MEAN (Cont'd.)

- Code 46 Low Battery Voltage - Engine running with low battery voltage (less than 10.0 volts at greater than 450 RPM).
- Code 51 PROM Error - Either the computer has found a memory error in the PROM or it cannot read intelligible information from the PROM. (Example: the PROM could be missing.)
- Code 52 ECM Failure - The ECM was unable to correctly convert sensor voltages into numbers for computer usage on two attempts.
- Code 53 ECM Failure - The ECM has detected a failure in its internal circuitry used to process the TRS signals.
- Code 54 Vehicle Speed Sensor (VSS) Failure - The DDEC system has detected a fault with the DDEC cruise control VSS. This fault may have been either a short, an open, or an inconsistency between the VSS speed reading, and an ECM calculated speed based on RPM and the injector pulsewidth.
- Code 55 TECL (Transmission Engine Communication Link) Failure - The DDEC system was communicating with the ATEC (Allison Transmission Electronic Controls) when it lost transmission from ATEC for more than one second.
- Code 56 ECM Failure - The ECM has detected a failure which causes it to turn on an injector(s) at the wrong time (or turning on an injector but never turning it off).
- Code 57 Bad Cruise Memory - A fault has been detected in the memory used to run DDEC's cruise control system. This fault could be either in the calibration PROM or in the RAM (Random Access Memory) inside the ECM.
- Code 58 Cruise Inputs Bad - An illegal cruise control switch combination has been detected. This can be due to either opens or shorts in the cruise control switch circuitry.



12 Pin DDL Connector  
P/N 12020043

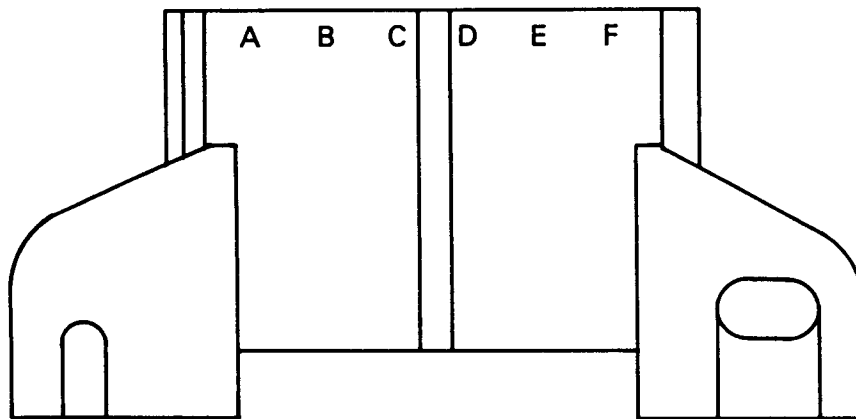
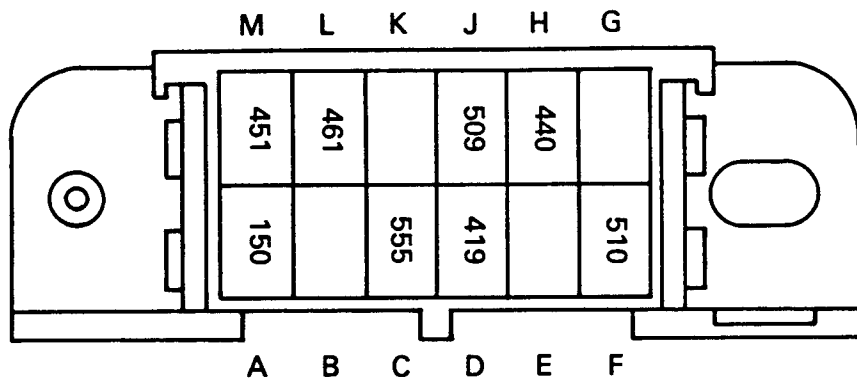


Dash Lights

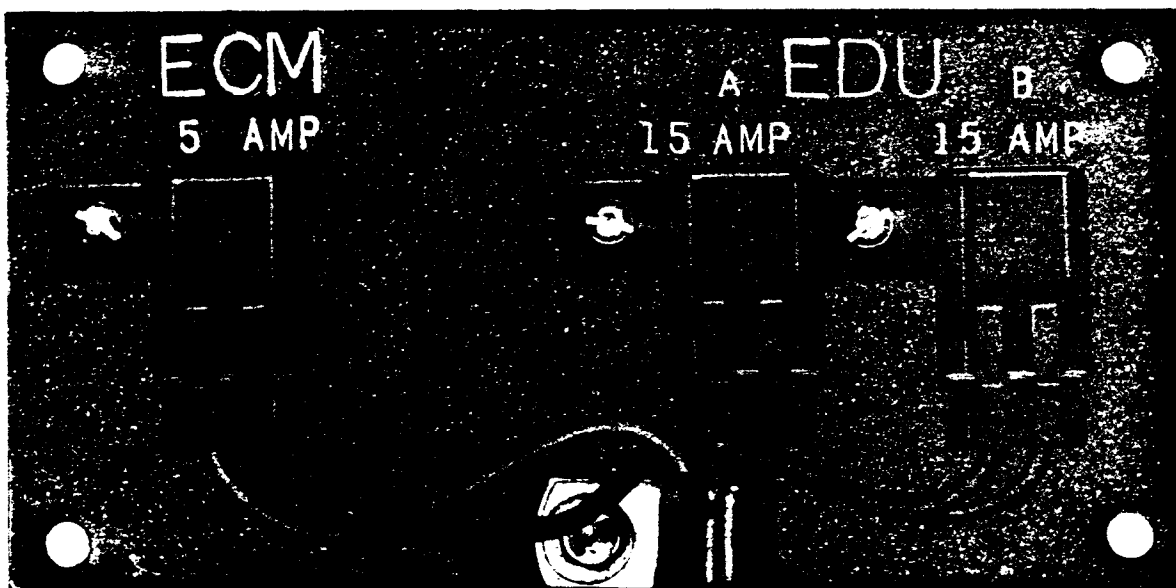
SECTION 4  
TROUBLESHOOTING CHARTS

C. DIAGNOSTIC CIRCUIT CHECK

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>DCC-1 Note "Check Engine" Light</u></p> <ul style="list-style-type: none"> <li>. Turn ignition on (engine not running).</li> <li>. Note status of "Check Engine" light.</li> </ul>	<p>Steady light. —————→</p> <p>Light goes on for up to 5 seconds and goes out. —————→</p> <p>Light is off. —————→</p> <p>Flashing light. —————→</p>	<p>→ Go to DCC-2 or DCC-3.</p> <p>→ Go to DCC-2 or DCC-3.</p> <p>→ Go to Customer Complaint Chart 2, page 37.</p> <p>→ Go to DCC-7.</p>
<p><u>DCC-2 Read Codes Using DDL Reader</u></p> <ul style="list-style-type: none"> <li>. Plug DDL Reader into the 12 pin DDL connector and read the codes by selecting the MALF CODES position on the selector switch.</li> </ul>	<p>Reads out codes or displays "NONE". —————→</p> <p>Does not read out codes but "Check Engine" light is always on. —————→</p> <p>Does not read out codes and the "Check Engine" light is not staying on. —————→</p>	<p>→ Go to DCC-4.</p> <p>→ Go to DCC-3.</p> <p>→ Refer to the troubleshooting section of the DDL Reader Instruction Manual. If you wish to continue diagnosis of the engine for now, go to DCC-3.</p>
<p><u>DCC-3 Read Codes Using the "Check Engine" Light</u></p> <ul style="list-style-type: none"> <li>. Unplug the DDL Reader.</li> <li>. Short pin A to pin M on the 12 pin DDL connector.</li> <li>. Read codes flashing out on the "Check Engine" light.</li> </ul>	<p>Flashes out codes. —————→</p> <p>"Check Engine" light is always on but doesn't flash out codes. —————→</p> <p>"Check Engine" light never comes on. —————→</p>	<p>→ Go to DCC-4.</p> <p>→ Go to Customer Complaint Chart 3, page 43.</p> <p>→ Go to Customer Complaint Chart 3, page 43.</p>



12 Pin DDL Connector  
P/N: 12020043



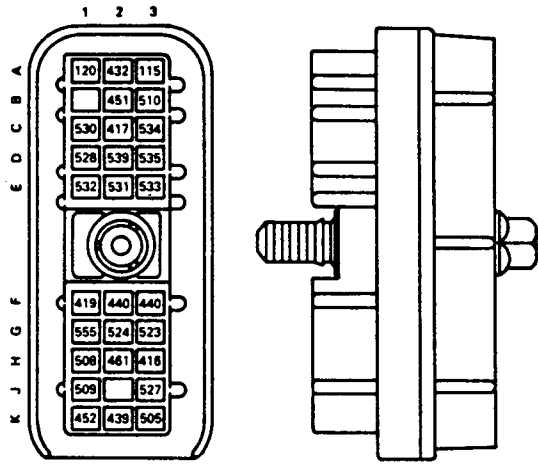
Power Panel

SECTION 4  
TROUBLESHOOTING CHARTS

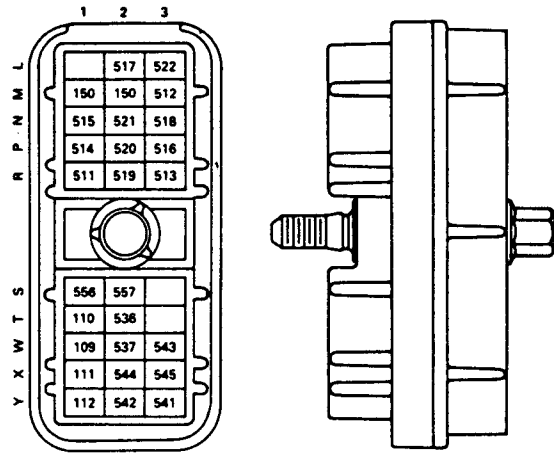
C. DIAGNOSTIC CIRCUIT CHECK (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>DCC-4 Follow Codes</p> <hr/> <ul style="list-style-type: none"> <li>. Note and record code(s).</li> </ul>	<p>Codes other than 14, 25 ("NONE" on DDL Reader), or 51. →</p> <p>Codes include 14, or 51. →</p> <p>Code 25 (reads out as "NONE" on DDL Reader). →</p>	<p>Go to DCC-5.</p> <p>Follow appropriate diagnostic charts for the code(s) received. (See Index on Page ii.)</p> <p>If drive complaint persists, go to Customer Complaint Chart 1, page 32.</p>
<p>DCC-5 Verify Code(s)</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. If a jumper was used between pins A and M of the 12 pin DDL connector, remove jumper.</li> <li>. Clear codes by pulling the 5 Amp, ECM fuse (waiting 10 seconds and then reinserting it), or by tripping the circuit breaker.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> </ul>	<p>"Check Engine" light stays on. →</p> <p>"Check Engine" light goes on for up to 5 seconds and goes out. →</p> <p>"Check Engine" light is erratic or intermittent. →</p>	<p>Read codes and follow appropriate diagnostic chart. (See Index on Page ii.)</p> <p>Go to DCC-6.</p> <p>Go to DCC-7.</p>

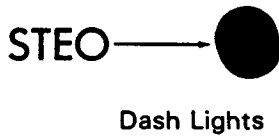
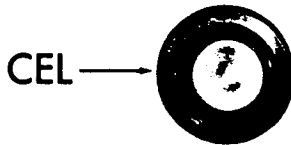
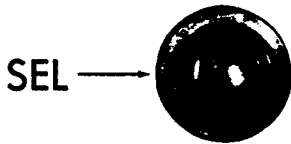




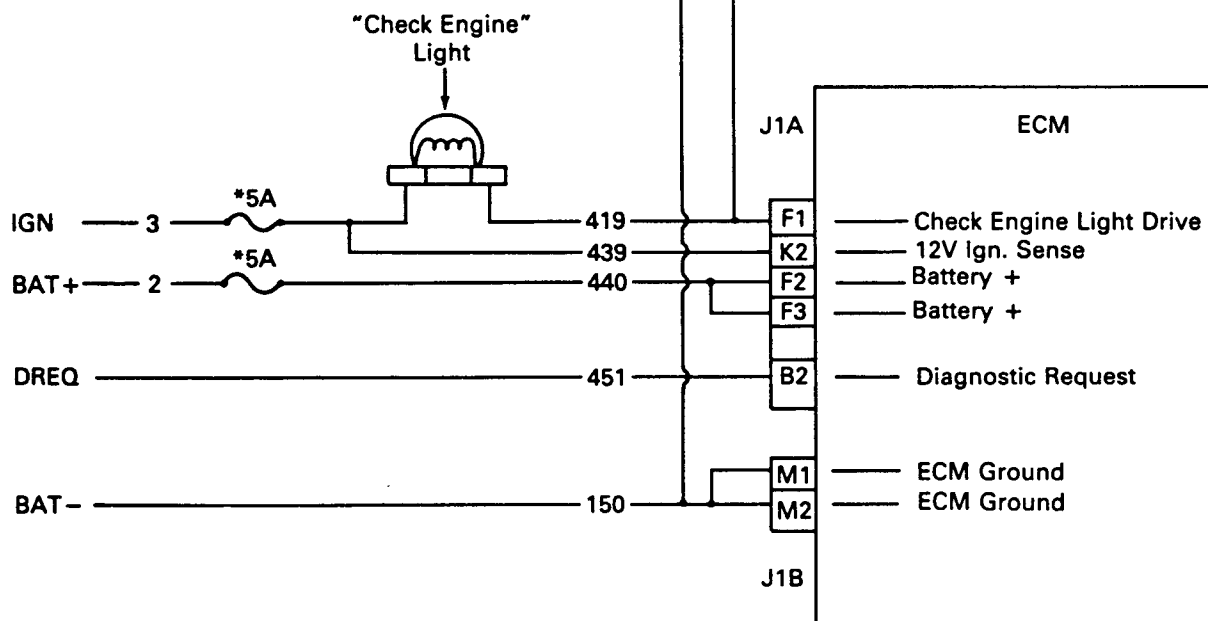
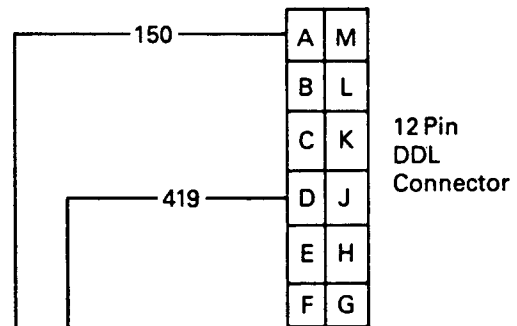
ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400



Check Engine, Diagnostic Request, and Ignition Circuits

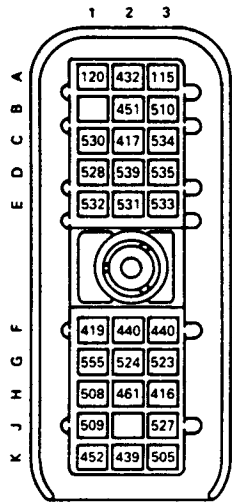


(\*Note: Some applications may have circuit breakers instead of fuses)

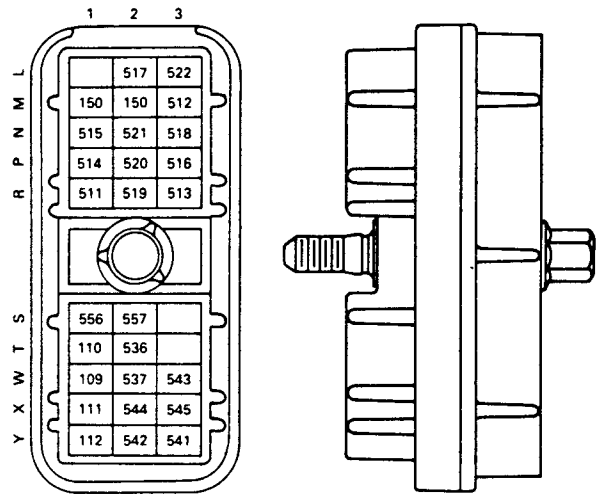
SECTION 4  
TROUBLESHOOTING CHARTS

C. DIAGNOSTIC CIRCUIT CHECK (Cont'd.)

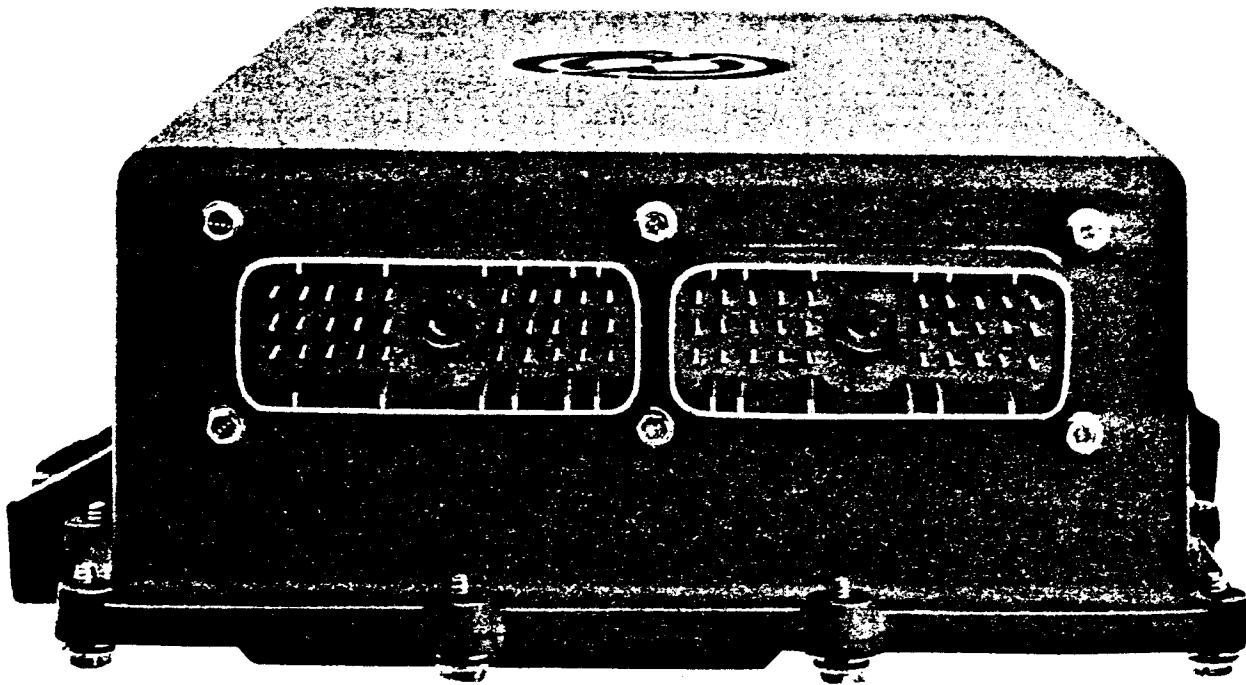
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>DCC-6</b> <u>Verify Code(s) with the Engine Running</u></p> <ul style="list-style-type: none"> <li>• Attempt to start the engine and wait until either the "Check Engine" light comes on or until the engine has been running warm for at least one minute at greater than 1000 RPM.</li> </ul>	<p>Engine will not start. —————&gt;</p> <p>"Check Engine" light is off. —————&gt;</p> <p>"Check Engine" light is on. —————&gt;</p> <p>"Check Engine" light is erratic or intermittent. —————&gt;</p>	<p>Go to Customer Complaint Chart 5, page 55.</p> <p>Previous codes should be considered intermittent. Go to Customer Complaint Chart 1, page 32.</p> <p>Read codes and follow appropriate diagnostic chart. (See Index on Page 11.)</p> <p>Go to DCC-7.</p>
<p><b>DCC-7</b> <u>Intermittent Check</u></p> <ul style="list-style-type: none"> <li>• Note whether flashing "Check Engine" light is reading Code 25 or if it's just erratic.</li> </ul>	<p>Flashing Code 25. —————&gt;</p> <p>Erratic or intermittent "Check Engine" light. —————&gt;</p>	<p>Go to DCC-8.</p> <p>Go to Customer Complaint Chart 1, page 32.</p>
<p><b>DCC-8</b> <u>Check for Short</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1A and J1B connectors at the ECM.</li> <li>• Read resistance between socket B2 on the J1A harness connector and socket M1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 500 ohms. —————&gt;</p> <p>Greater than 500 ohms. —————&gt;</p>	<p>The Diagnostic Request line (ckt #451) is shorted to ground (either ckt #150 or chassis ground). Repair short. Then go to DCC-30.</p> <p>Go to DCC-9.</p>



ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

C. DIAGNOSTIC CIRCUIT CHECK (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>DCC-9 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to DCC-30.</p> <p>→ Repair terminals/connectors. Then go to DCC-30.</p>
<p>DCC-30 Verify Repair</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Check Engine" light.</li> </ul>	<p>"Check Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Check Engine" light is flashing.</p> <p>"Check Engine" light comes on and stays on.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1.</p>

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 1 - CUSTOMER COMPLAINT

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C1-1 Diagnosis by Symptom <hr/> . Turn ignition off. . Go to appropriate chart based on engine symptom.	Engine cranks but will not start.	→ Go to Customer Complaint Chart 5, page 55.
	Poor performance and no codes.	→ Go to Customer Complaint Chart 14, page 123.
	Check engine light always on and no codes.	→ Go to Customer Complaint Chart 3, page 43.
	Intermittent "Check Engine" light and/or codes that can't be repeated, and no symptoms noted.	→ Go to C1-2.
	"Stop Engine" light does not turn on for 5 seconds and then turns off when the ignition is first turned on.	→ Go to Customer Complaint Chart 4, page 49.
	Power Take-Off Speed Adjust sensor doesn't work.	→ Go to Customer Complaint Chart 6, page 75.
	"Stop Engine" override switch (or button) doesn't work.	→ Go to Customer Complaint Chart 7, page 85.
	Two Speed Governor switch (top gear switch which limits RPM more in top gear than in lower gears) doesn't work.	→ Go to Customer Complaint Chart 8, page 87.
	Jake Brake, if tied into DDEC System, doesn't work.	→ Go to Customer Complaint Chart 9, page 93.

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 1 - CUSTOMER COMPLAINT

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>CI-1 Diagnosis by Symptom</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Go to appropriate chart based on engine symptom.</li> </ul>	<p>"Stop Engine" light always on and no codes. →</p> <p>Cruise Control inoperative. →</p> <p>No "Cruise Enable" light. →</p> <p>"Cruise Enable" light always on. →</p> <p>Idle Shutdown feature (if option is employed) not operational. →</p>	<p>Go to Customer Complaint Chart 10, page 97.</p> <p>Go to Customer Complaint Chart 11, page 101.</p> <p>Go to Customer Complaint Chart 12, page 113.</p> <p>Go to Customer Complaint Chart 13, page 119.</p> <p>Go to Customer Complaint Chart 15, page 125.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 1 - CUSTOMER COMPLAINT (Cont'd.)

C1-2 Diagnosis of an Intermittent

**NOTICE:** Do not use any other procedures in this manual (except for the suggestions listed below) when trying to solve an intermittent problem. Use of any other procedures for this kind of problem can result in the replacement of non-defective parts.

Many intermittent problems are caused by faulty electrical connectors or wiring. Diagnosis must include a careful inspection of the indicated circuit wiring and connectors. Example: An intermittent Code 35 (Oil Pressure Sensor High) should cause you to suspect a problem in the following areas associated with the Oil Pressure Sensor:

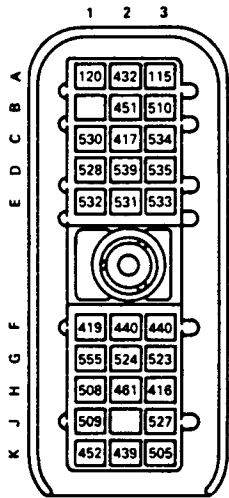
1. Wire #'s 530 (signal line), 527 (+5 Volt line) or 452 (ground line).
2. The Oil Pressure Sensor connector or ECM connector.
3. An intermittent in the Oil Pressure Sensor (least likely).

A good checklist to run through includes the following:

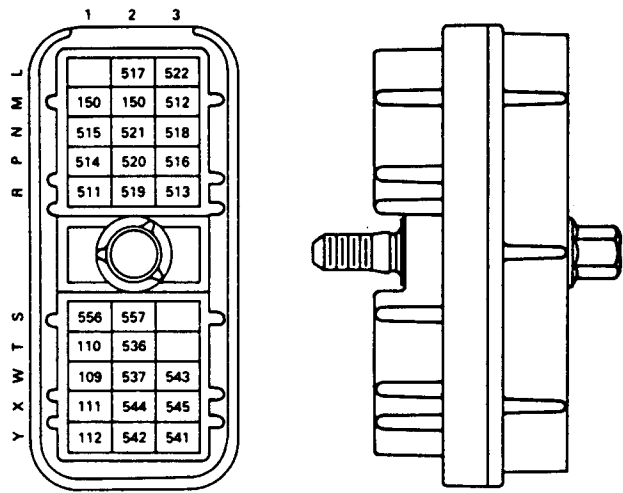
1. Check for poor mating of the connector halves or terminals not fully seated in the connector body "backed-out" terminals.
2. Look for improperly formed or damaged terminals. All connector terminals in the problem circuit should be carefully reformed to contact tension.
3. Electrical system interference caused by a defective relay, ECM driven solenoid, or a switch causing an electrical surge. Look for problems with the charging system (alternator, etc.). In certain cases, the problem can be made to occur when the faulty component is operated (as in the case of a relay).
4. Aeration in the fuel system causing intermittent codes 31X and 32X.

After repairs or adjustments have been made, clear the codes and confirm that the "Check Engine" light does not come on (except for the 5 second bulb check when the ignition is first turned on). Also, run the engine to see if that problem is cured. If the "Check Engine" light stays on, refer to the Diagnostic Circuit Check Chart (Page 25).

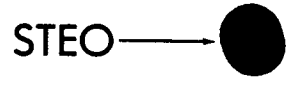
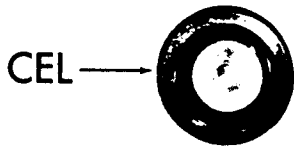
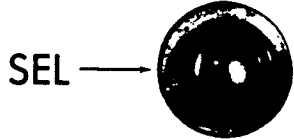




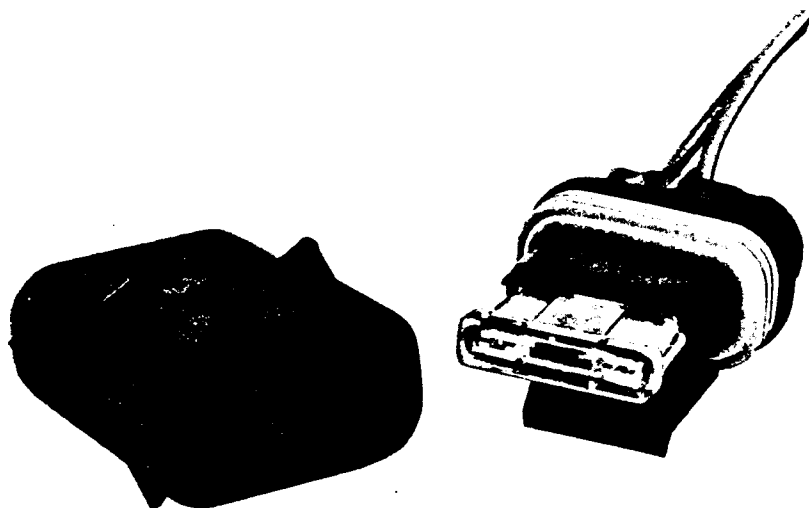
ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400



Dash Lights

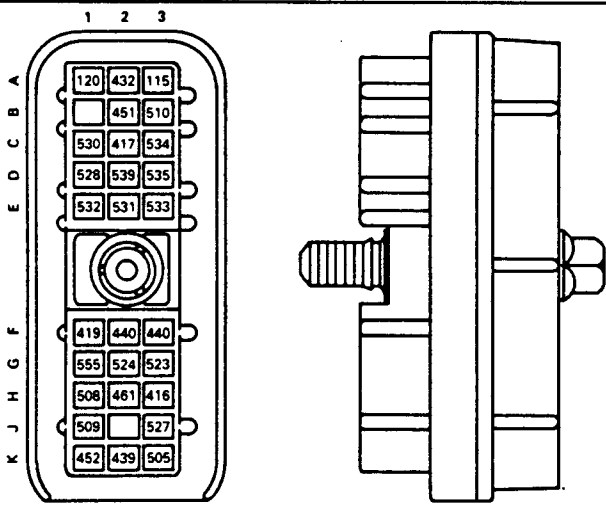


5 Amp Fuse

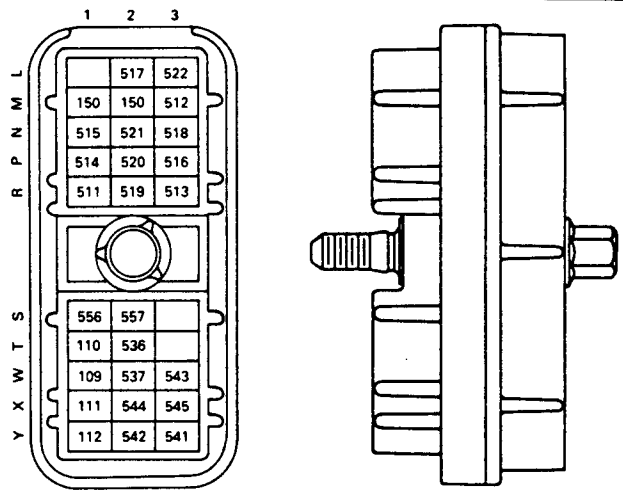
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 2 - NO "CHECK ENGINE" LIGHT (CEL)

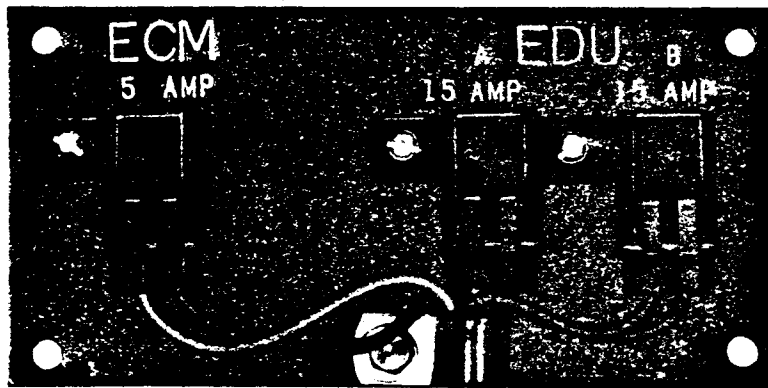
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C2-1 Try to Force CEL On</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B connectors at the ECM.</li> <li>. Install a jumper wire between socket F1 on the J1A harness connector and socket M1 on the J1B connector.</li> <li>. Turn the ignition on (engine not running).</li> <li>. Note the CEL status.</li> </ul>	<p>"Check Engine" light is still off. →</p> <p>"Check Engine" light is on. →</p>	<p>Go to C2-2.</p> <p>Go to C2-4.</p>
<p>C2-2 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts. →</p> <p>Greater than or equal to 11.5 volts. →</p>	<p>The 5 Amp, ignition fuse (or circuit breaker) is blown and/or the ignition line (ckt #439) is shorted to ground. Repair problem. Then go to C2-30.</p> <p>Go to C2-3.</p>
<p>C2-3 Bulb Check</p> <hr/> <ul style="list-style-type: none"> <li>. Remove CEL bulb and check whether it's burned out or otherwise damaged.</li> </ul>	<p>Bulb is okay. →</p> <p>Bulb is not okay. →</p>	<p>CEL Driver line (ckt #419) or ground line (ckt. #150 or 151) is open. Repair open. Then go to C2-30.</p> <p>Replace bulb. Then go to C2-30.</p>



ECM J1A Harness Connector  
P/N 12034398

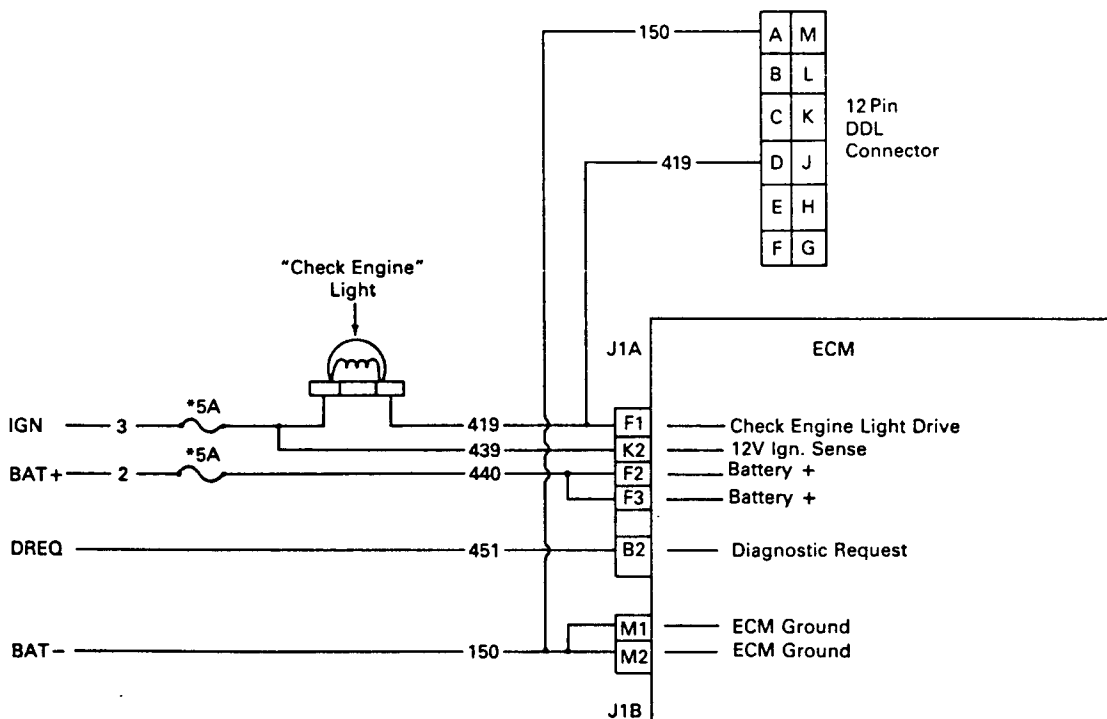


ECM J1B Harness Connector  
P/N 12034400



Power Panel

Check Engine, Diagnostic Request, and Ignition Circuits

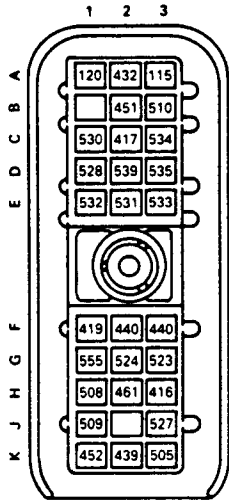


(\*Note: Some applications may have circuit breakers instead of fuses)

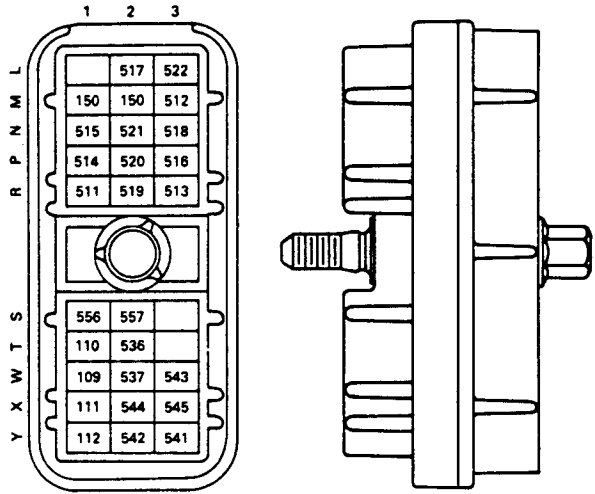
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 2 - NO "CHECK ENGINE" LIGHT (CEL) (Cont'd.)

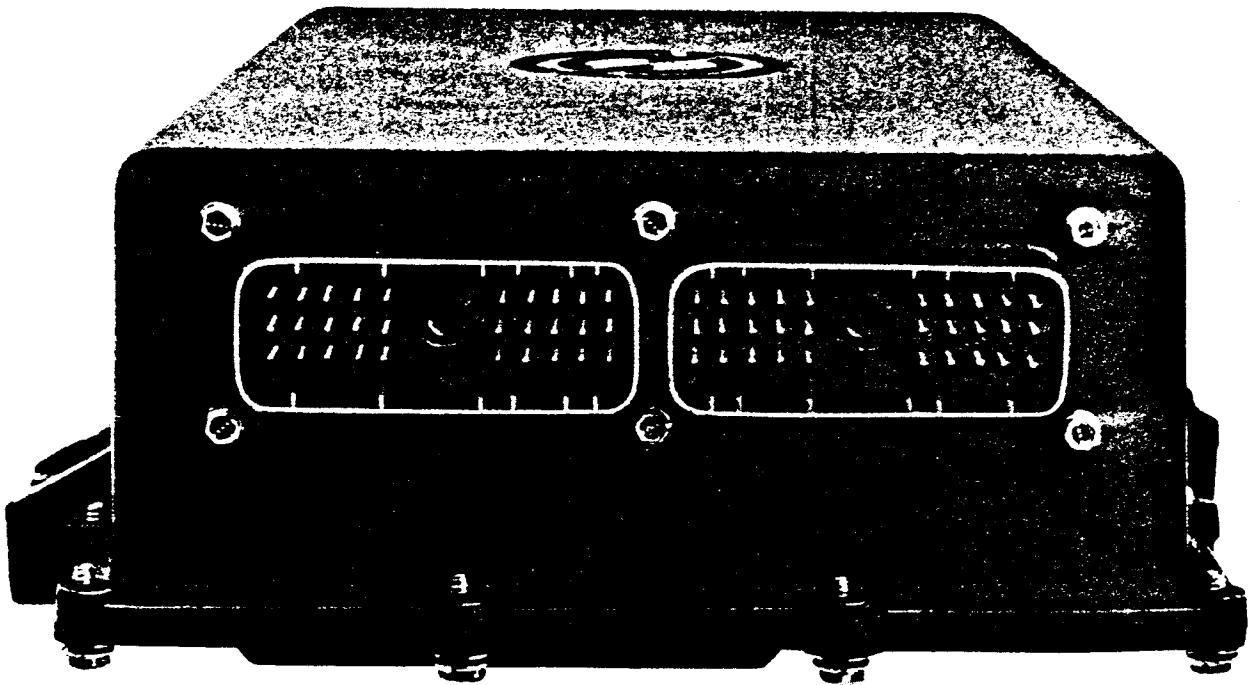
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C2-4 Check for Open</p> <hr/> <ul style="list-style-type: none"> <li>• Remove jumper wire.</li> <li>• Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts. —————→</p> <p>Greater than or equal to 11.5 volts. —————→</p>	<p>→ The ignition line (ckt #439) is open. Repair open. Then go to C2-30.</p> <p>→ Go to C2-5.</p>
<p>C2-5 Check for Bat +</p> <hr/> <ul style="list-style-type: none"> <li>• Read voltage on J1A harness connector, socket F2 (red lead) to a good ground (black lead).</li> <li>• Also read voltage on socket F3 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading. —————→</p> <p>Greater than or equal to 11.5 volts on both readings. —————→</p>	<p>→ Either the 5 Amp, ECM fuse (or circuit breaker) is blown and/or the Battery Power line(s) (ckt #440) has an open or short to ground. Repair problem. Then go to C2-30.</p> <p>→ Go to C2-6.</p>
<p>C2-6 Check for Ground</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect the J1B connector at the ECM.</li> <li>• Read voltage on J1A harness connector, socket F2 (red lead) to J1B connector, socket M1 (black lead).</li> <li>• Also read voltage on J1A harness connector, socket F2 (red lead) to J1B connector, socket M2 (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading. —————→</p> <p>Greater than or equal to 11.5 volts on both readings. —————→</p>	<p>→ Ground line(s) (ckt #150) has an open. Repair open. Then go to C2-30.</p> <p>→ Go to C2-7.</p>



ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400

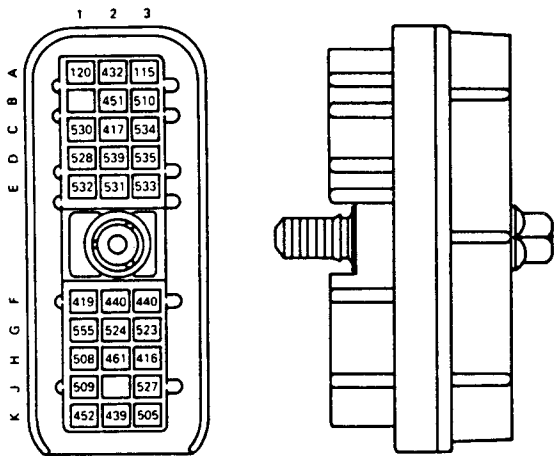


Electronic Control Module (ECM)

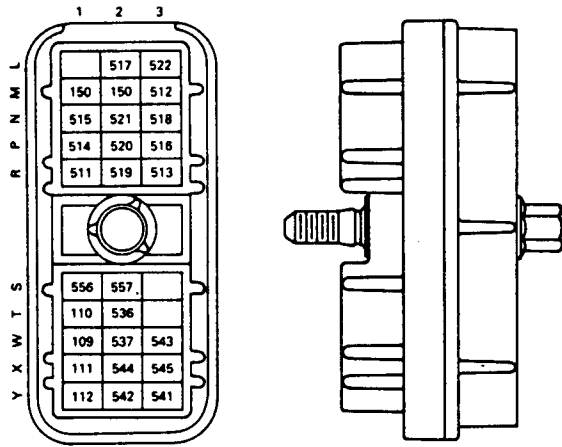
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 2 - NO "CHECK ENGINE" LIGHT (CEL) (Cont'd.)

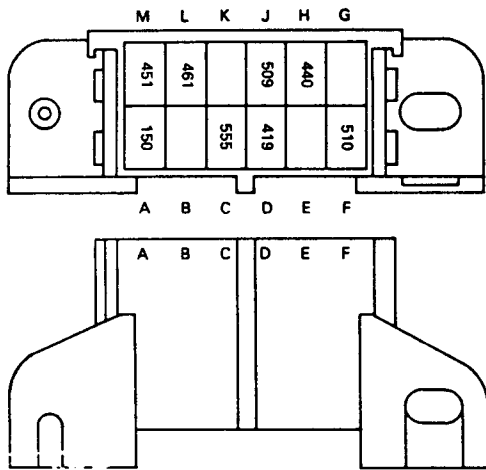
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C2-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to C2-30.</p> <p>→ Repair terminals/connectors. Then go to C2-30.</p>
<p>C2-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Check Engine" light.</li> </ul>	<p>"Check Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Check Engine" light does not come on at all.</p> <p>"Check Engine" light comes on and stays on.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1.</p>



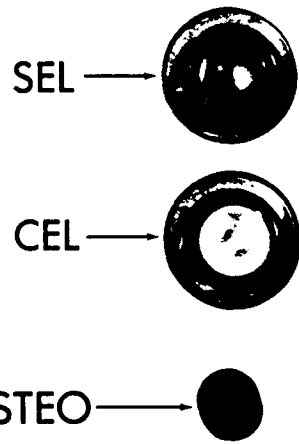
ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400

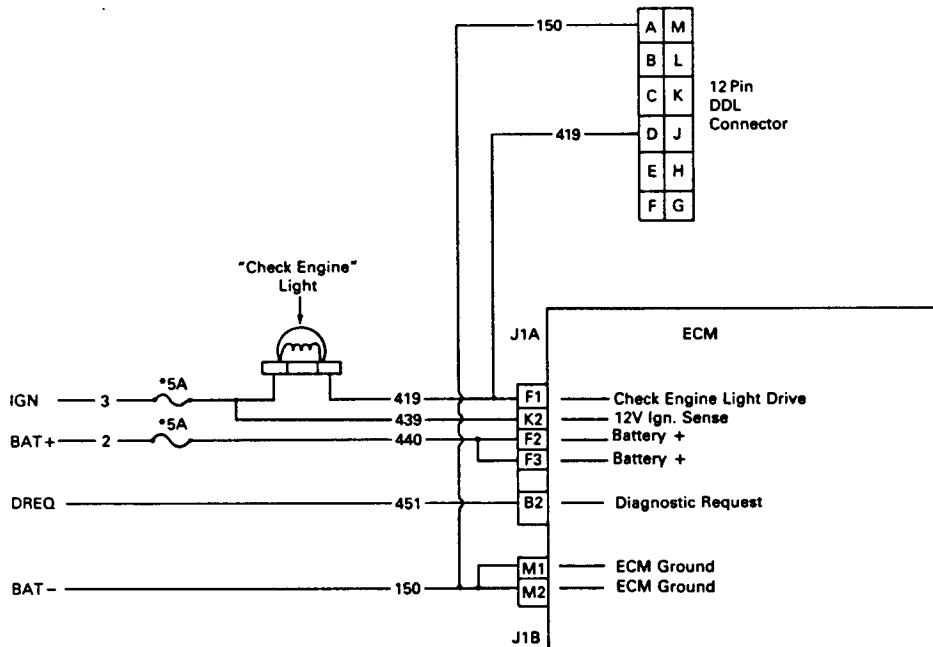


12 Pin DDL Connector  
P/N 12020043



Dash Lights

Check Engine, Diagnostic Request, and Ignition Circuits



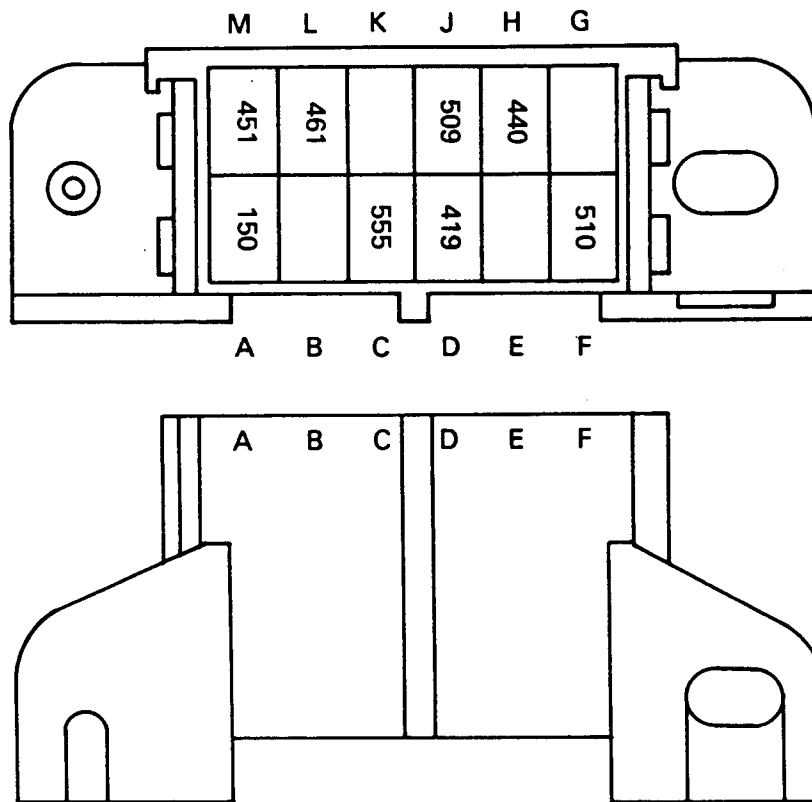
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

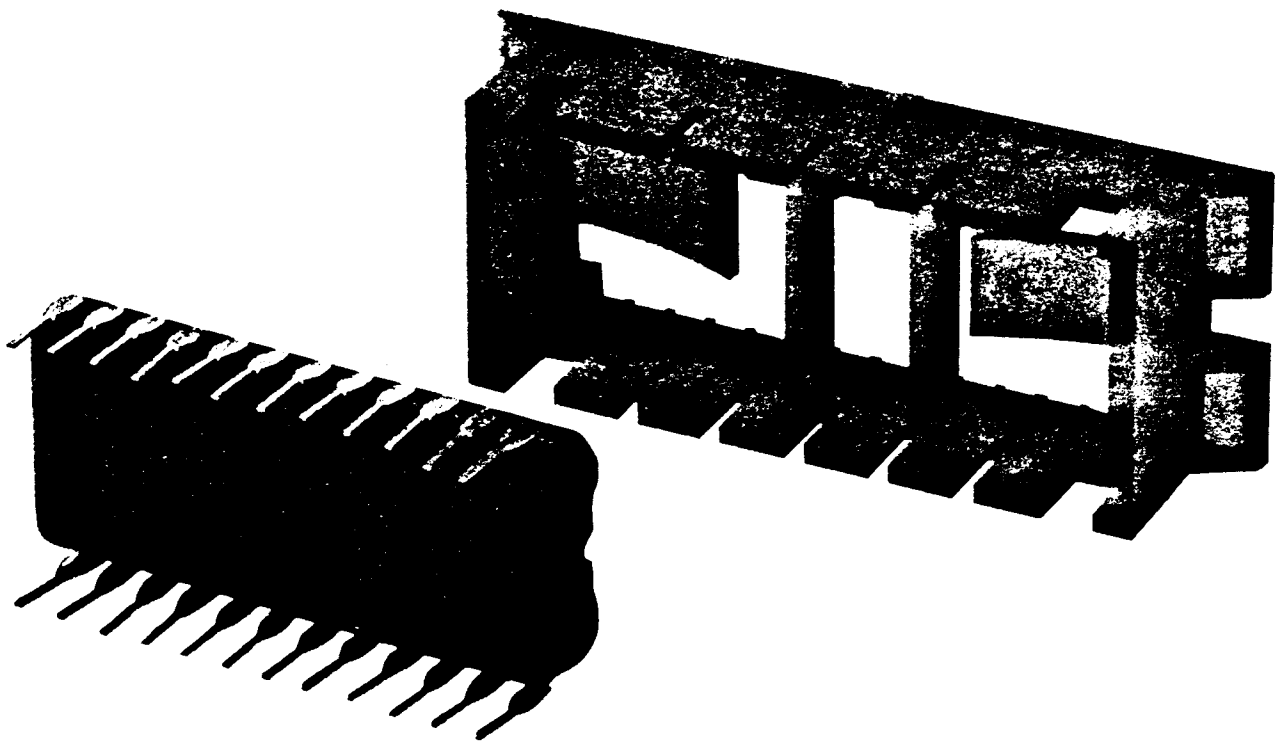
D. CHART 3 - NO DDL READER READOUT AND  
"CHECK ENGINE" LIGHT (CEL) STAYS ON

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C3-1 Determine "Check Engine" Light Status</u></p> <ul style="list-style-type: none"> <li>. Turn ignition on (engine not running) while at the same time observing the "Check Engine" light.</li> </ul>	<p>"Check Engine" light comes on and stays on.</p> <p>"Check Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Check Engine" light does not come on at all.</p>	<p>→ Go to C3-2.</p> <p>→ Go to C3-3.</p> <p>→ Go to Customer Complaint Chart 2, page 37.</p>
<p><u>C3-2 Check for Short</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Turn ignition on (engine not running) while at the same time observing the "Check Engine" light.</li> </ul>	<p>"Check Engine" light comes on and stays on.</p> <p>"Check Engine" light stays off.</p>	<p>→ CEL Driver line (ckt #419) is shorted to ground. Repair short. Then go to C3-30.</p> <p>→ Check ECM 5-amp. fuse:  <ul style="list-style-type: none"> <li>. OK - go to C3-4.</li> <li>. Blown - go to 46-5.</li> </ul> </p>
<p><u>C3-3 Check Diagnostic Request Line</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B connectors at the ECM.</li> <li>. Install a jumper wire between socket M2 on the J1B harness connector and socket B2 on the J1A harness connector.</li> <li>. Read resistance between pins A and M on the 12 Pin, DDL connector.</li> </ul>	<p>Greater than 5 ohms.</p> <p>Less than or equal to 5 ohms.</p>	<p>→ Diagnostic Request line (ckt #451) or ground line (ckt #150) is open. Repair open. Then go to C3-30.</p> <p>→ Go to C3-4.</p>





12 Pin DDL Connector  
P/N 12020043

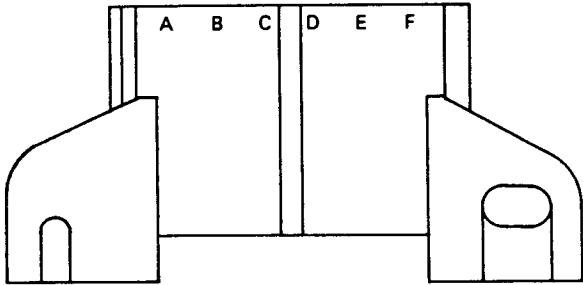
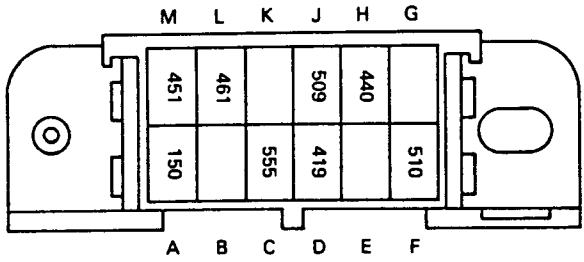


Calibration PROM

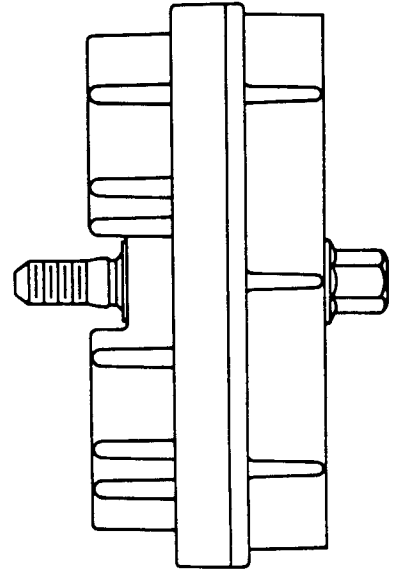
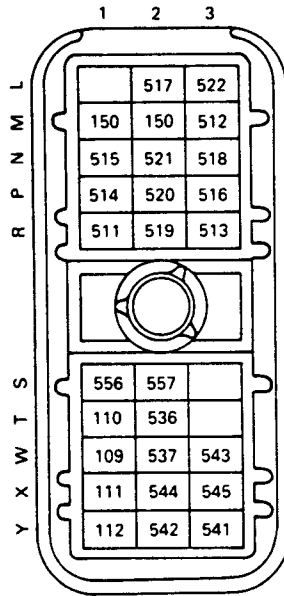
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 3 - NO DDL READER READOUT AND  
"CHECK ENGINE" LIGHT (CEL) STAYS ON (Cont'd.)

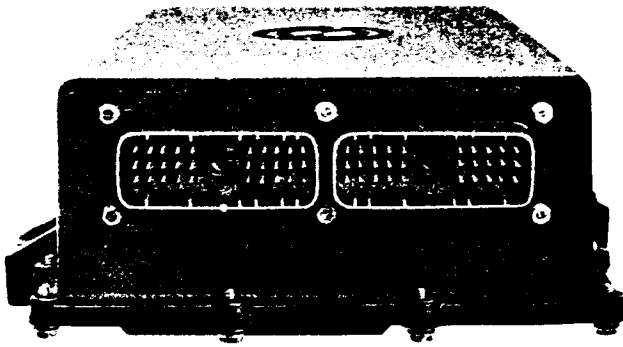
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>C3-4 PROM Damage Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove Calibration PROM per instructions in Section 3-C.</li> <li>. Check for proper insertion or damaged pins.</li> </ul>	<p>Appears to be okay. —————→</p> <p>Problem found. —————→</p>	<p>Go to C3-5.</p> <p>Go to C3-6.</p>
<p><b>C3-5 Check if Problem Recurs</b></p> <hr/> <ul style="list-style-type: none"> <li>. Reinsert PROM.</li> <li>. Reconnect J1A connector.</li> <li>. Clear codes.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> <li>. Turn ignition on.</li> </ul>	<p>"Check Engine" light remains on. —————→</p> <p>Code 51 (and any other codes). —————→</p> <p>Code 25. —————→</p> <p>Any other codes except Code 51. —————→</p>	<p>Disconnect J1A harness at ECM. Then go to C2-5.</p> <p>Replace PROM. Then go to C3-7.</p> <p>Go to C3-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p><b>C3-6 Attempt PROM Repair</b></p> <hr/> <ul style="list-style-type: none"> <li>. If possible, attempt to straighten pins on PROM.</li> <li>. Reinsert PROM.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>"Check Engine" light remains on. —————→</p> <p>Code 51 (and any other codes). —————→</p> <p>Code 25. —————→</p> <p>Any other codes except Code 51. —————→</p>	<p>Disconnect J1A harness at ECM. Then go to C2-5.</p> <p>Replace PROM. Then go to C3-7.</p> <p>Go to C3-30.</p> <p>Go to DCC-1 to service other codes.</p>



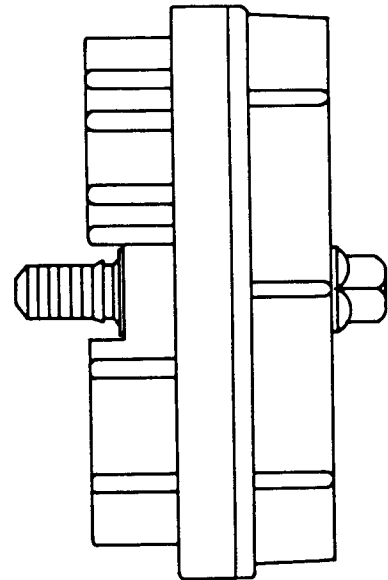
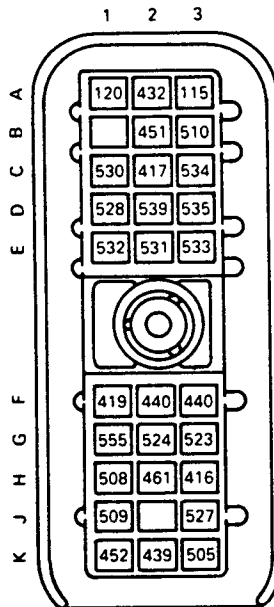
12 Pin DDL Connector  
P/N 12020043



ECM J1B Harness Connector  
P/N 12034400



Electronic Control Module (ECM)

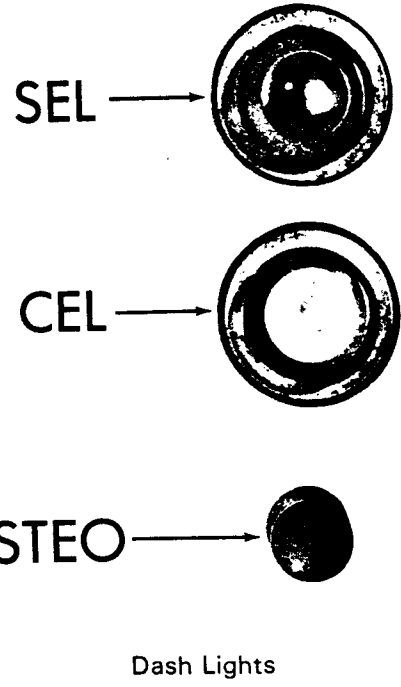
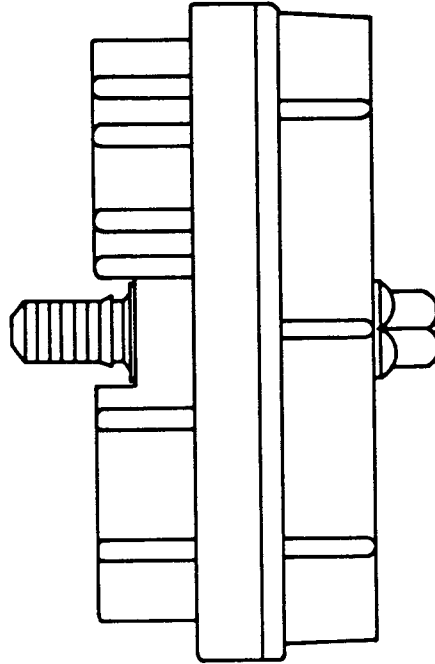
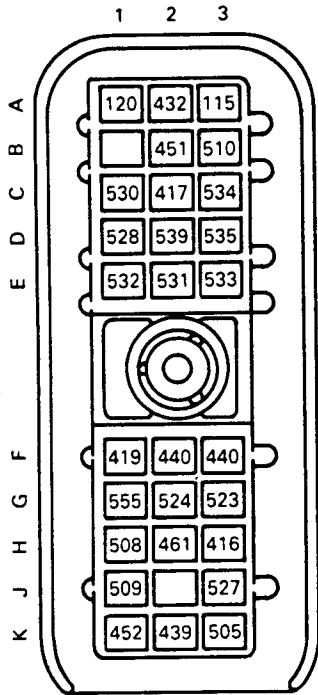


ECM J1A Harness Connector  
P/N 12034398

SECTION 4  
TROUBLESHOOTING CHARTS

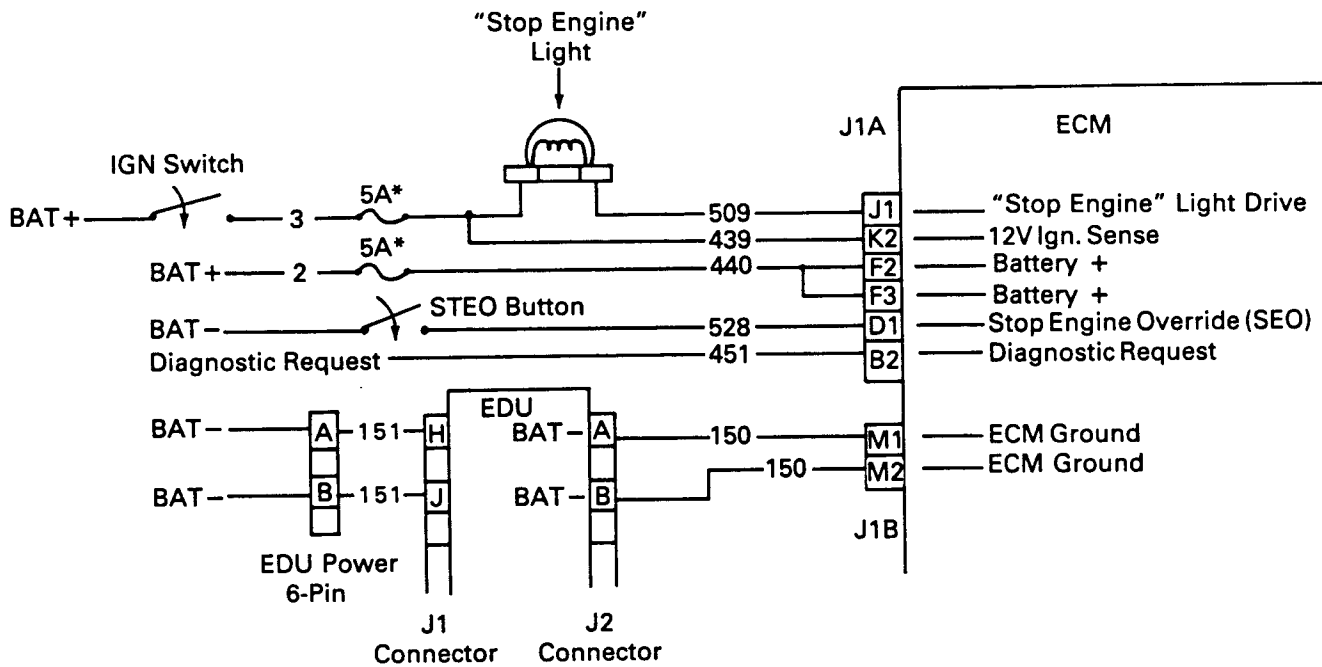
D. CHART 3 - NO DDL READER READOUT AND  
"CHECK ENGINE" LIGHT (CEL) STAYS ON (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C3-7 Check if Problem Recurs</p> <hr/> <ul style="list-style-type: none"> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Read codes.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>"Check Engine" light remains on. →</p> <p>Code 51 (and any other codes). →</p> <p>Code 25. →</p> <p>Any other codes except Code 51. →</p>	<p>Go to C3-8.</p> <p>Go to C3-8.</p> <p>Go to C3-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p>C3-8 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to C3-30.</p> <p>Repair terminals/connectors. Then go to C3-30.</p>
<p>C3-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until the "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>DDL Reader does not read out, or displays "NO DDL" and/or "Check Engine" light still won't flash out codes. →</p> <p>Code(s) other than Code 25 (or "NONE" on DDL Reader) received. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



ECM J1A Harness Connector  
P/N 12034398

Stop Engine Override, Stop Engine Light, Diagnostic Request and Ignition Circuits

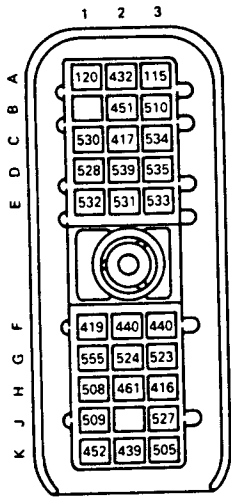


(\*Note: Some applications may have circuit breakers instead of fuses)

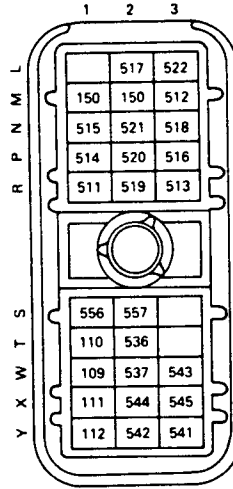
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 4 - NO "STOP ENGINE" LIGHT (SEL)

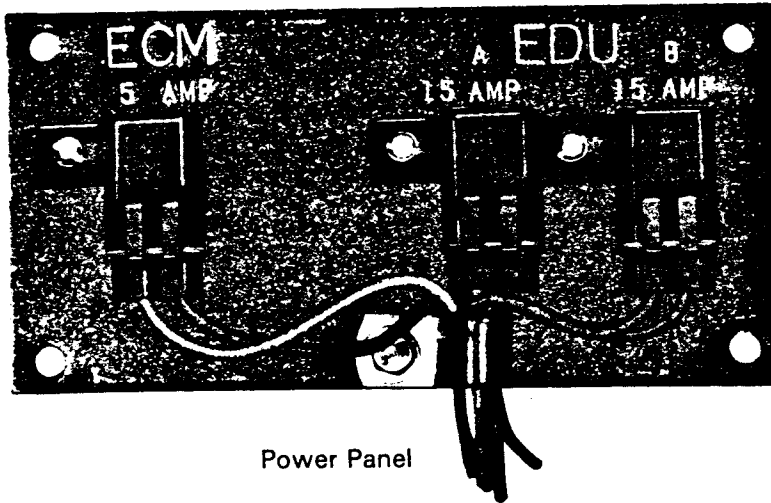
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C4-1 Try to Force SEL On</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Install a jumper wire between socket J1 on the J1A harness connector and a good ground.</li> <li>. Turn the ignition on (engine not running).</li> <li>. Note the "Stop Engine" light status.</li> </ul>	<p>"Stop Engine" light is still off.</p> <p>"Stop Engine" light is on.</p>	<p>→ Go to C4-2.</p> <p>→ Go to C4-4.</p>
<p>C4-2 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts.</p> <p>Greater than or equal to 11.5 volts.</p>	<p>→ The 5 Amp ignition fuse (or circuit breaker) is blown, and/or the ignition line (ckt #439) is shorted to ground. Repair problem. Then go to C4-30.</p> <p>→ Go to C4-3.</p>
<p>C4-3 Bulb Check</p> <hr/> <ul style="list-style-type: none"> <li>. Remove SEL bulb and check whether it's burned out or otherwise damaged.</li> </ul>	<p>Bulb is okay.</p> <p>Bulb is not okay.</p>	<p>→ SEL Driver line (ckt #509) is open. Repair open. Then go to C4-30.</p> <p>→ Replace bulb. Then go to C4-30.</p>



ECM J1A Harness Connector  
P/N 12034398

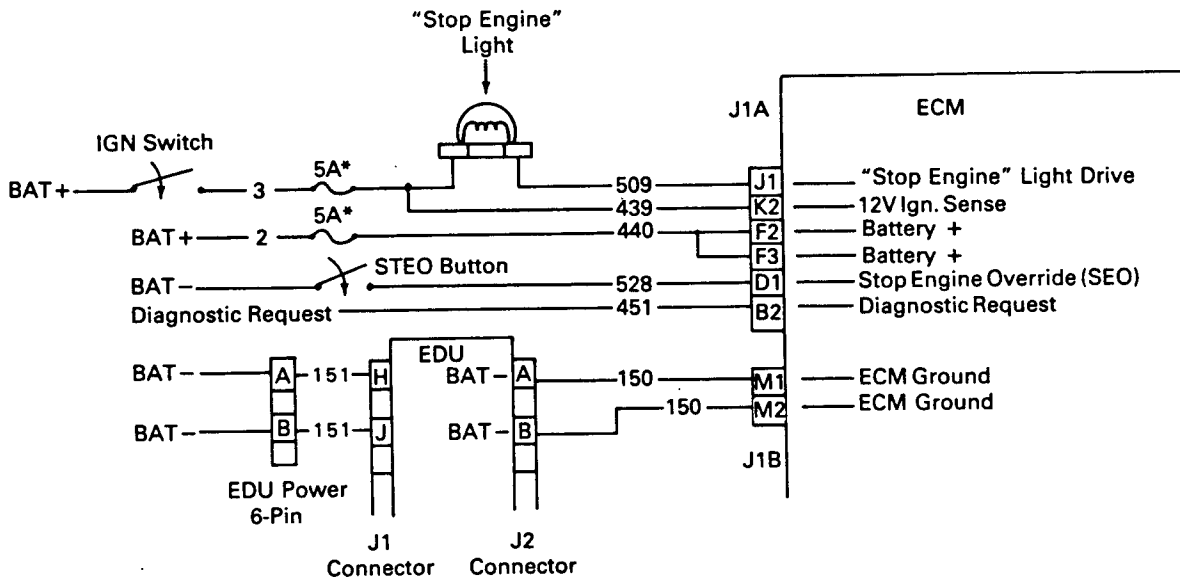


ECM J1B Harness Connector  
P/N 12034400



Power Panel

Stop Engine Override, Stop Engine Light, Diagnostic Request and Ignition Circuits



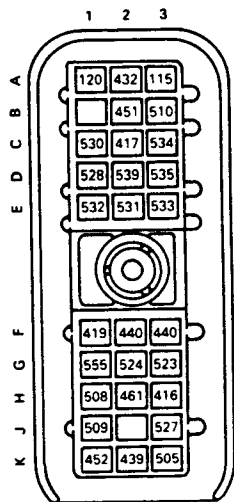
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

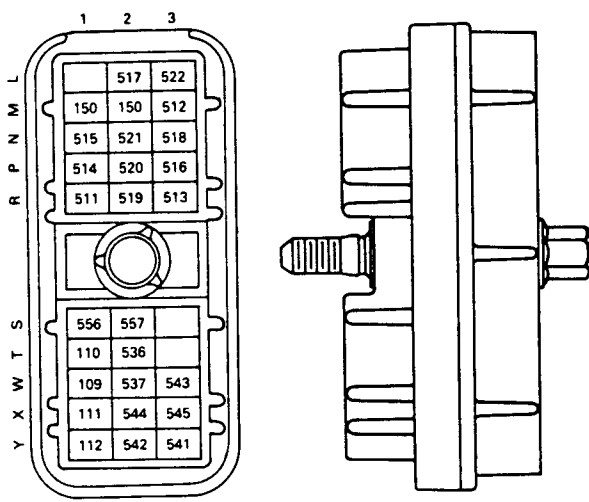
D. CHART 4 - NO "STOP ENGINE" LIGHT (SEL) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C4-4 Check for Open</p> <hr/> <ul style="list-style-type: none"> <li>• Remove jumper wire.</li> <li>• Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts. —————→</p> <p>Greater than or equal to 11.5 volts. —————→</p>	<p>→ The ignition line (ckt #439) is open. Repair open. Then go to C4-30.</p> <p>→ Go to C4-5.</p>
<p>C4-5 Check for Bat +</p> <hr/> <ul style="list-style-type: none"> <li>• Read voltage on J1A harness connector, socket F2 (red lead) to a good ground (black lead).</li> <li>• Also read voltage on socket F3 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading. —————→</p> <p>Greater than or equal to 11.5 volts on both readings. —————→</p>	<p>→ Either the 5 Amp ECM fuse (or circuit breaker) is blown, and/or the Battery Power line(s) (ckt #440) has an open or short to ground. Repair problem. Then go to C4-30.</p> <p>→ Go to C4-6.</p>
<p>C4-6 Check for Ground</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect the J1A connector at the ECM.</li> <li>• Read voltage on J1A harness connector, socket F2 (red lead) to J1B connector, socket M1 (black lead).</li> <li>• Also read voltage on J1A connector, socket F2 (red lead) to J1B connector, socket M2 (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading. —————→</p> <p>Greater than or equal to 11.5 volts on both readings. —————→</p>	<p>→ Ground line(s) (ckt #150) has an open. Repair open. Then go to C4-30.</p> <p>→ Go to C4-7.</p>

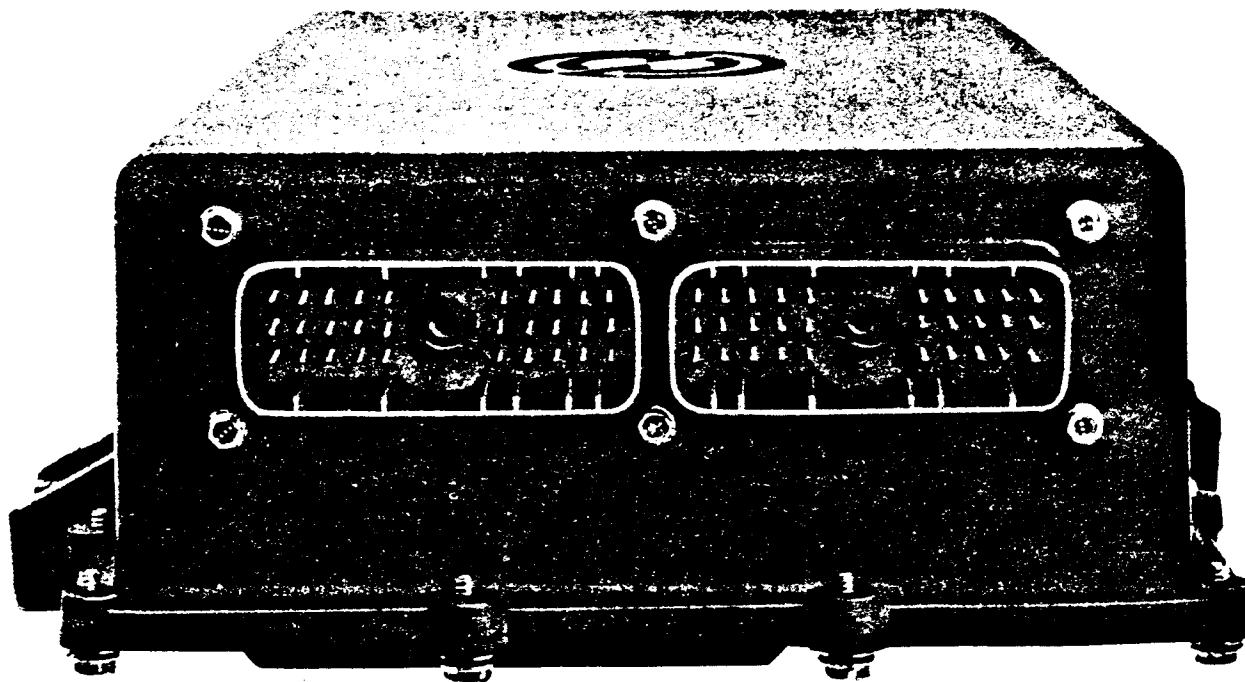




ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400

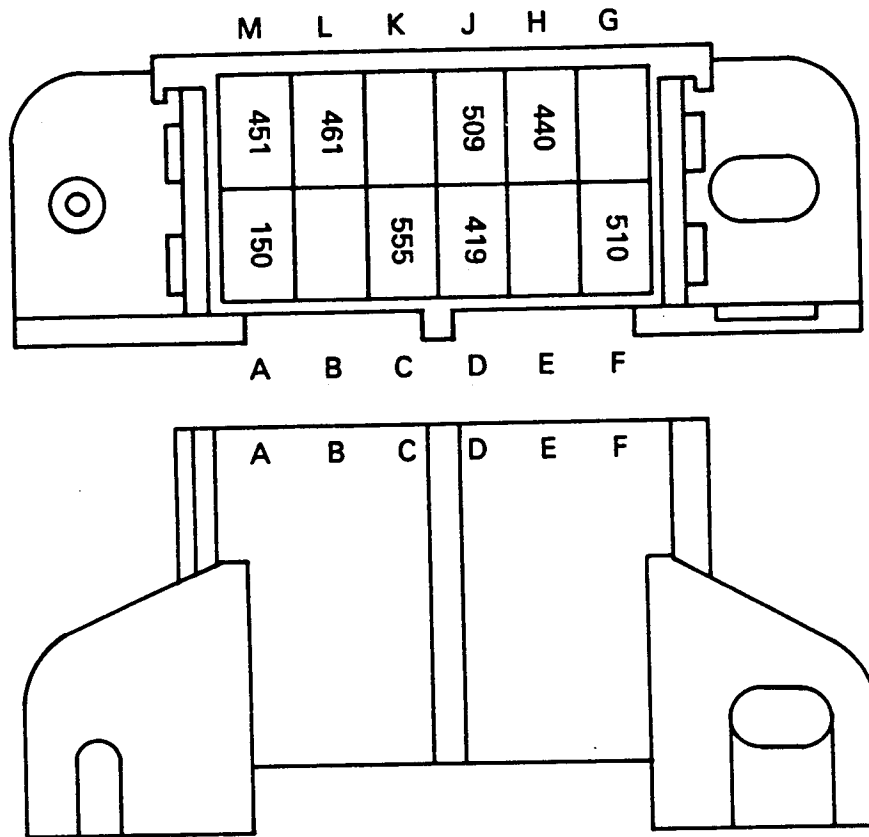


Electronic Control Module (ECM)

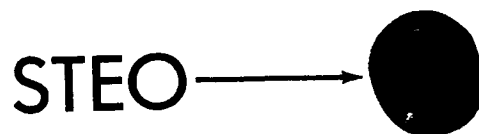
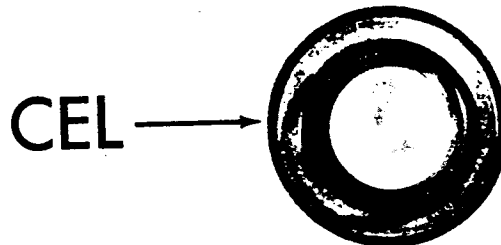
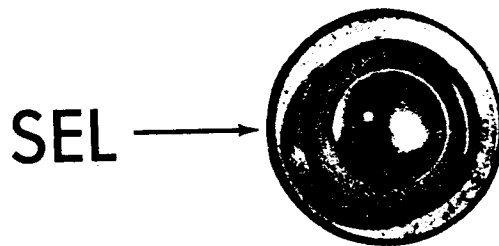
SECTION 4  
TROUBLESHOOTING CHARTS

CHART 4 - NO "STOP ENGINE" LIGHT (SEL) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C4-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to C4-30.</p> <p>→ Repair terminals/connectors. Then go to C4-30.</p>
<p>C4-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Stop Engine" light.</li> </ul>	<p>"Stop Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Stop Engine" light does not come on at all.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p>



12 Pin DDL Connector  
P/N 12020043

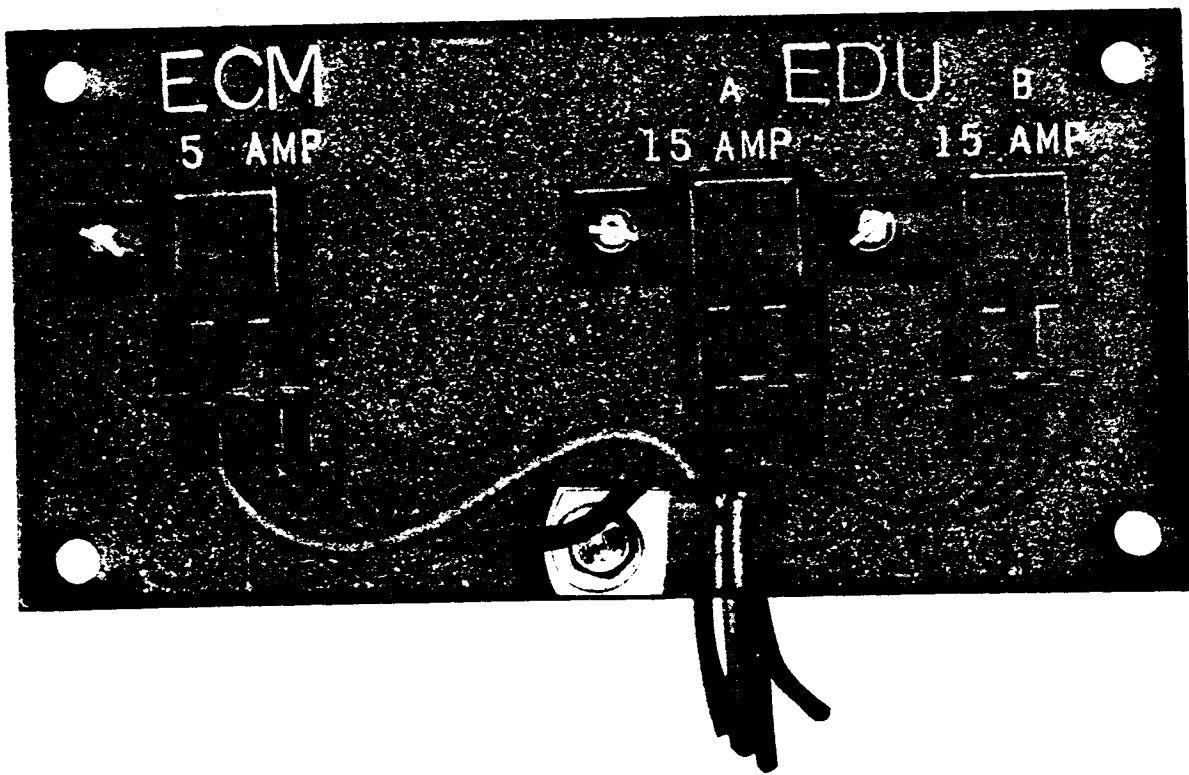


Dash Lights

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-1 <u>Observe "Check Engine" Light Status</u></p> <p>. Turn ignition on while observing the "Check Engine" light.</p>	<p>"Check Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Check Engine" light does not come on at all.</p> <p>"Check Engine" light comes on and stays on.</p>	<p>→ Go to C5-3.</p> <p>→ Go to Customer Complaint Chart 2, page 37.</p> <p>→ Go to C5-2.</p>
<p>C5-2 <u>Read Codes</u></p> <p>. Plug the DDL Reader into the 12 pin DDL connector and read codes.</p>	<p>DDL Reader reads "No DDL" or readout is blank</p> <p>Reads out codes.</p>	<p>→ Go to Customer Complaint Chart 3, page 43.</p> <p>→ Record codes and follow applicable chart. (Index on Page ii).</p>
<p>C5-3 <u>Check Fuel Supply</u></p> <p>. Check fuel supply.</p>	<p>Fuel supply okay.</p> <p>No fuel.</p>	<p>→ Go to C5-4.</p> <p>→ Refuel vehicle. Then go to C5-30.</p>

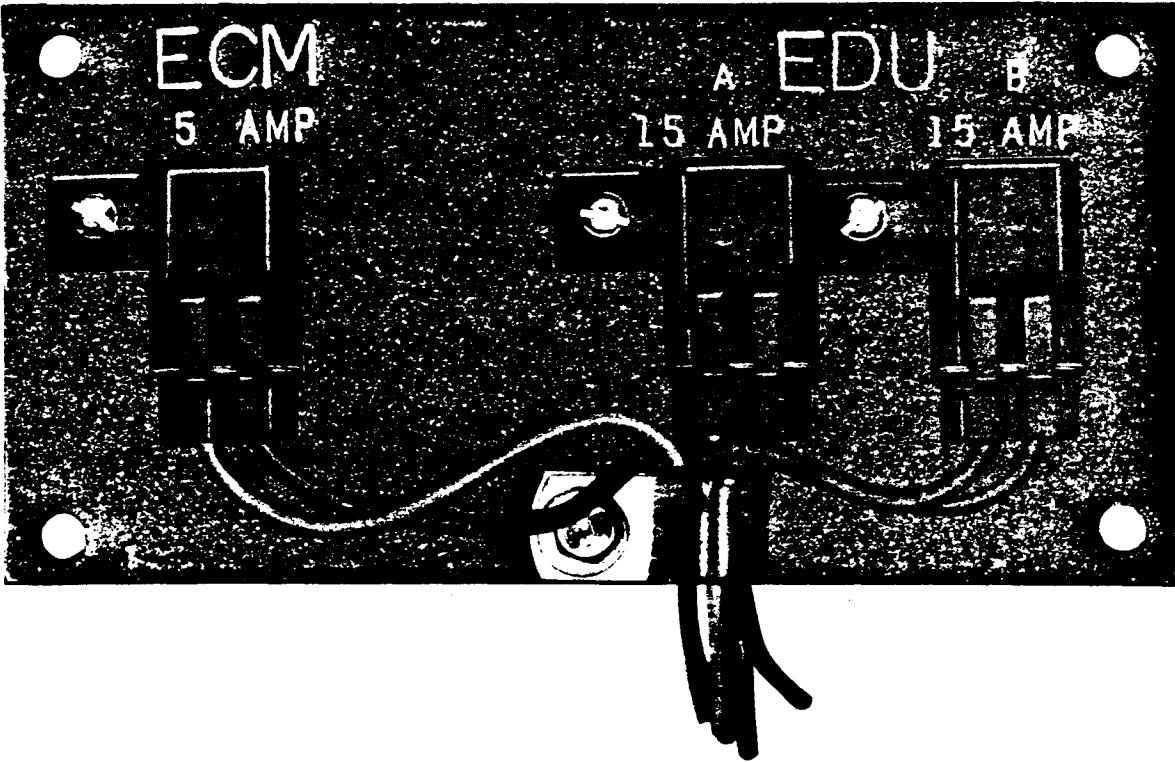


Power Panel

SECTION 4  
TROUBLESHOOTING CHARTS

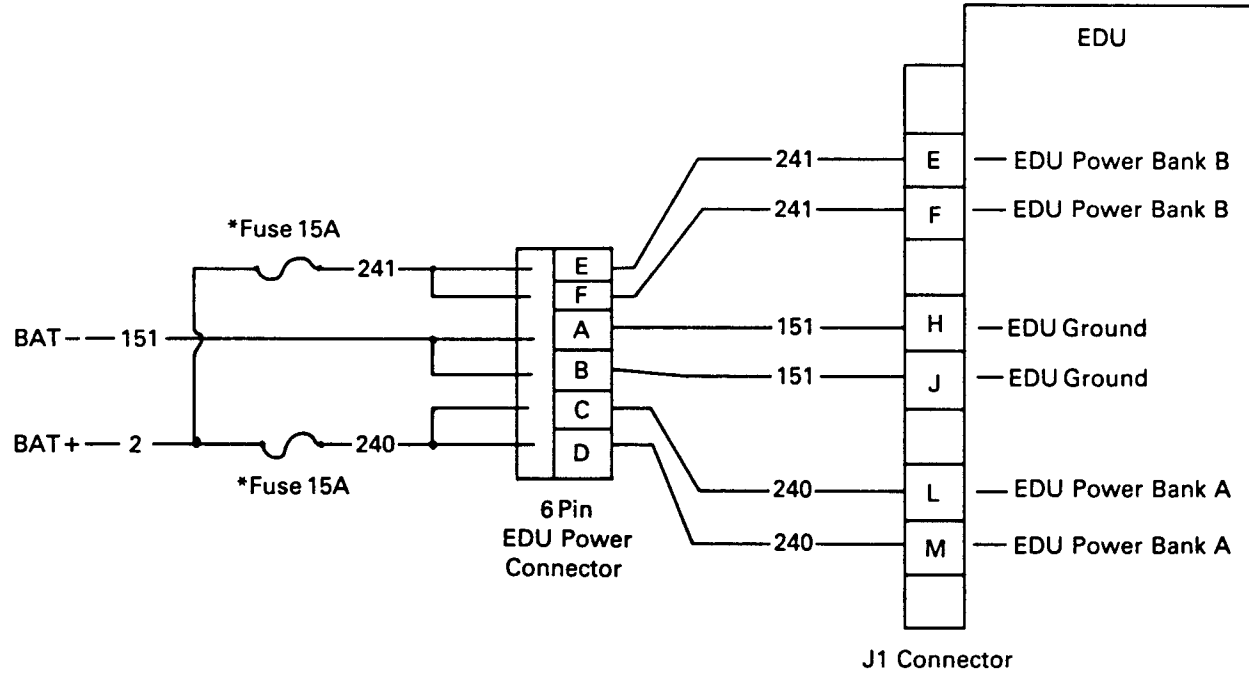
D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-4 <u>Check for Aerated Fuel</u></p> <ul style="list-style-type: none"> <li>. Loosen fuel return line.</li> <li>. Observe fuel flow out of line while cranking. (You can direct the fuel into a bucket.)</li> </ul>	<p>Flow is steady. —————→</p> <p>No flow or intermittent flow. —————→</p>	<p>→ Go to C5-5.</p> <p>→ Check fuel filter(s) and supply lines to determine cause of problem (refer to engine Service Manual for details).</p>
<p>C5-5 <u>Check for White Smoke</u></p> <ul style="list-style-type: none"> <li>. Reconnect fuel return line.</li> <li>. Look for white smoke coming out of the exhaust stack while cranking the engine.</li> </ul>	<p>White Smoke —————→</p> <p>No White Smoke —————→</p>	<p>→ Your problem appears to be with cylinder compression or restricted air intake. Refer to the engine Service Manual for details.</p> <p>→ Go to C5-6.</p>
<p>C5-6 <u>Check EDU Fuses or Circuit Breakers</u></p> <ul style="list-style-type: none"> <li>. Check both 15 amp. fuses or circuit breakers to the EDU.</li> </ul>	<p>Blown fuse(s) or open circuit breaker(s) —————→</p> <p>Both fuses or circuit breakers are okay. —————→</p>	<p>→ Go to C5-7.</p> <p>→ Go to C5-11.</p>



Power Panel

EDU Power and Ground Circuits



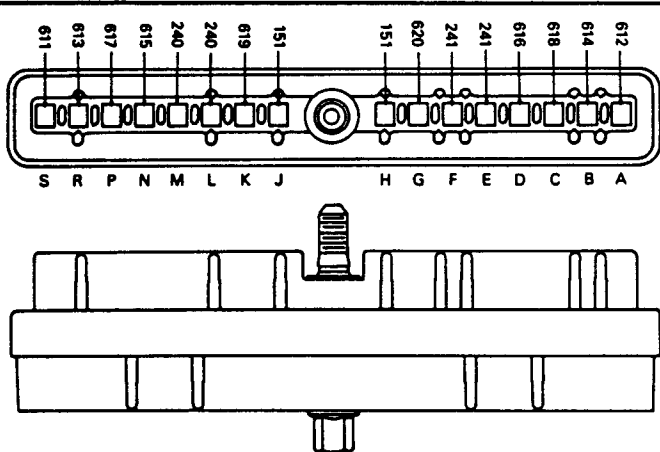
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

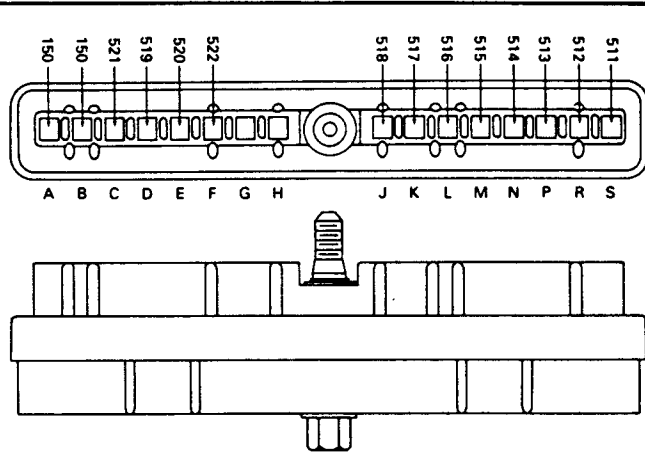
D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-7 <u>Check if Short to Ground Present</u></p> <ul style="list-style-type: none"> <li>. Replace blown fuse(s) or reset open circuit breaker(s)</li> <li>. Attempt to start engine</li> <li>. If engine starts, run engine for at least one minute</li> <li>. Turn ignition off</li> <li>. Check if fuse(s) or circuit breaker(s) has blown or opened up again</li> </ul>	<p>Fuse(s) or circuit breaker(s) still okay</p> <p>Blown/open EDU fuse(s) or circuit breaker(s)</p>	<p>→ No short is currently present. (Warning: if there is an intermittent short, this truck will shut down again if not repaired. Also note: fuse/circuit breaker(s) may have blown due to temporary reverse voltage at the battery.) Go to C5-30.</p> <p>→ Go to C5-8.</p>
<p>C5-8 <u>Check if EDU Power is Shorted to Ground</u></p> <ul style="list-style-type: none"> <li>. Disconnect the J1 connector at the EDU.</li> <li>. Replace the 15 Amp fuse(s) or reset the circuit breaker(s).</li> <li>. Check if fuse(s) or circuit breaker(s) has again blown or opened.</li> </ul>	<p>No, not blown or open.</p> <p>Yes, blown or open again.</p>	<p>→ Go to C5-9.</p> <p>→ Short to ground exists on EDU power line (either ckt #240 or #241). Repair short. Then go to C5-30.</p>

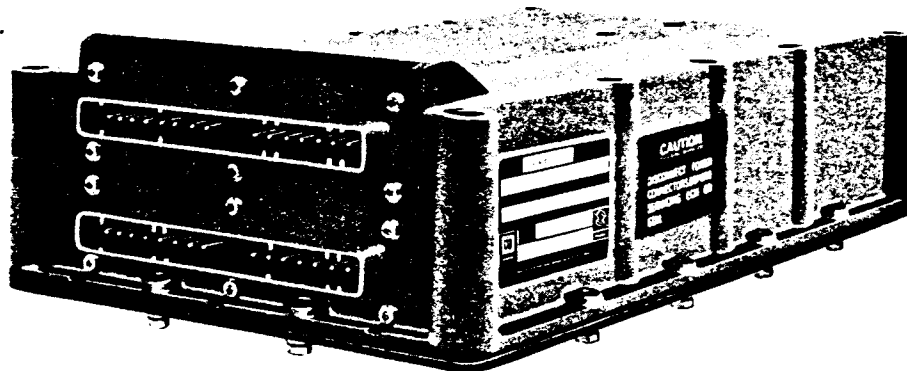




EDU J1 Harness Connector (Gray)  
P/N 12034382

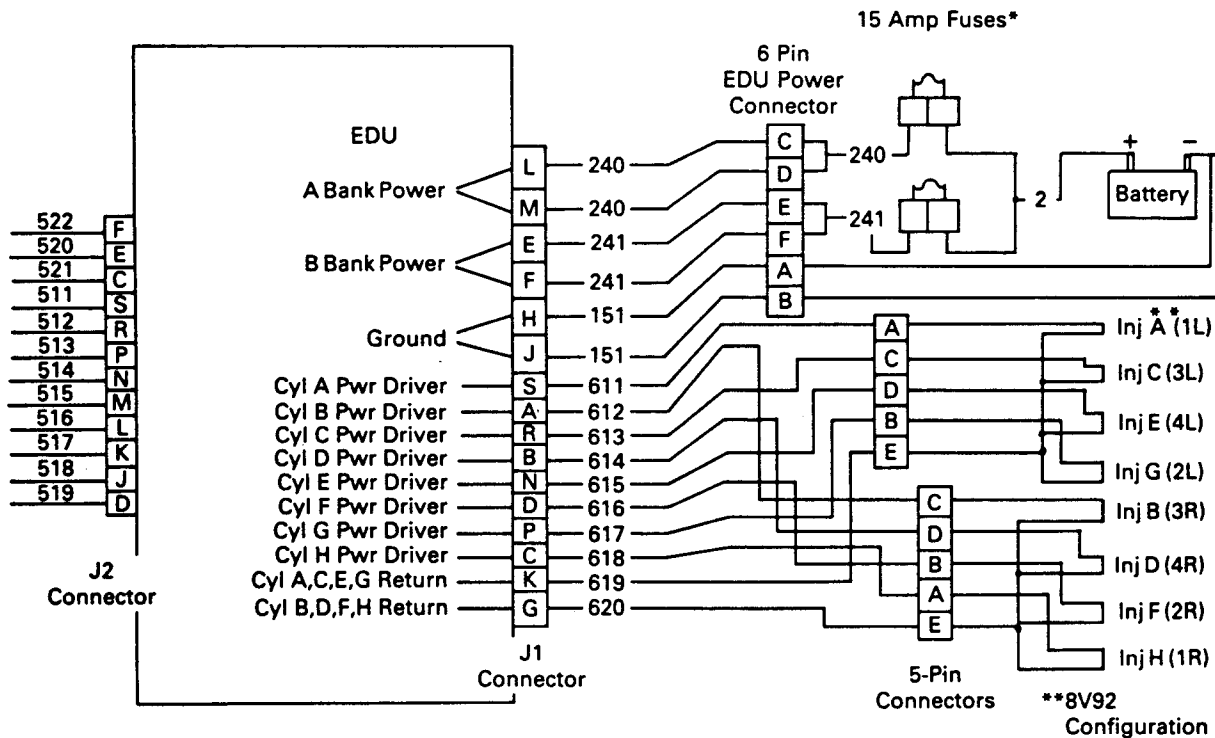


EDU J2 Harness Connector (Black)  
P/N 1203486



Electronic Distributor Unit (EDU)

ECM to EDU Injector Circuits,  
& Power and Ground

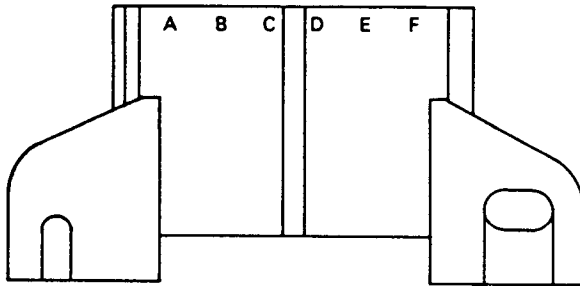
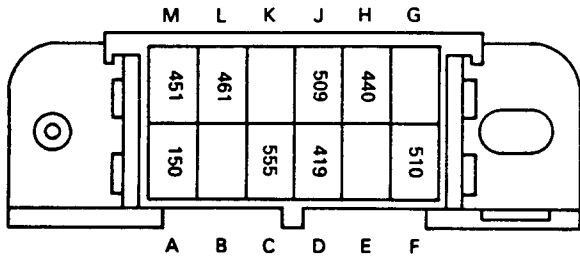


(\*Note: Some applications may have circuit breakers instead of fuses)

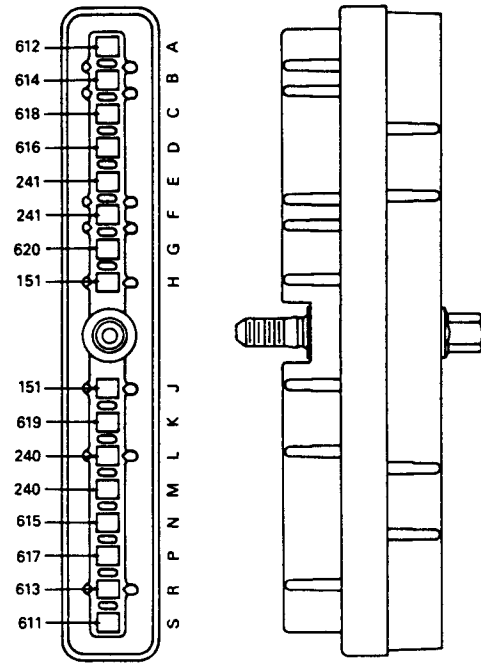
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-9 Check if Injector Drive or Return Lines are shorted to Ground</p> <hr/> <p>• Read resistance on the J1 harness connector, between the following sockets:</p> <ul style="list-style-type: none"> <li>- G to H</li> <li>- K to H</li> <li>- A to H</li> <li>- B to H</li> <li>- C to H</li> <li>- D to H</li> <li>- N to H</li> <li>- P to H</li> <li>- R to H</li> <li>- S to H</li> </ul>	<p>Greater than or equal to 10,000 ohms on all readings</p> <p>Less than 10,000 ohms on any reading.</p>	<p>→ Go to C5-10.</p> <p>→ Short to ground exists on line where resistance was less than 10,000 ohms. Repair short. Then go to C5-30.</p>
<p>C5-10 Check EDU Connectors</p> <hr/> <p>• Check all four connectors at the EDU (J1 and J2, harness and EDU side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</p>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace EDU. Then go to C5-30.</p> <p>→ Repair terminals/connectors. Then go to C5-30.</p>

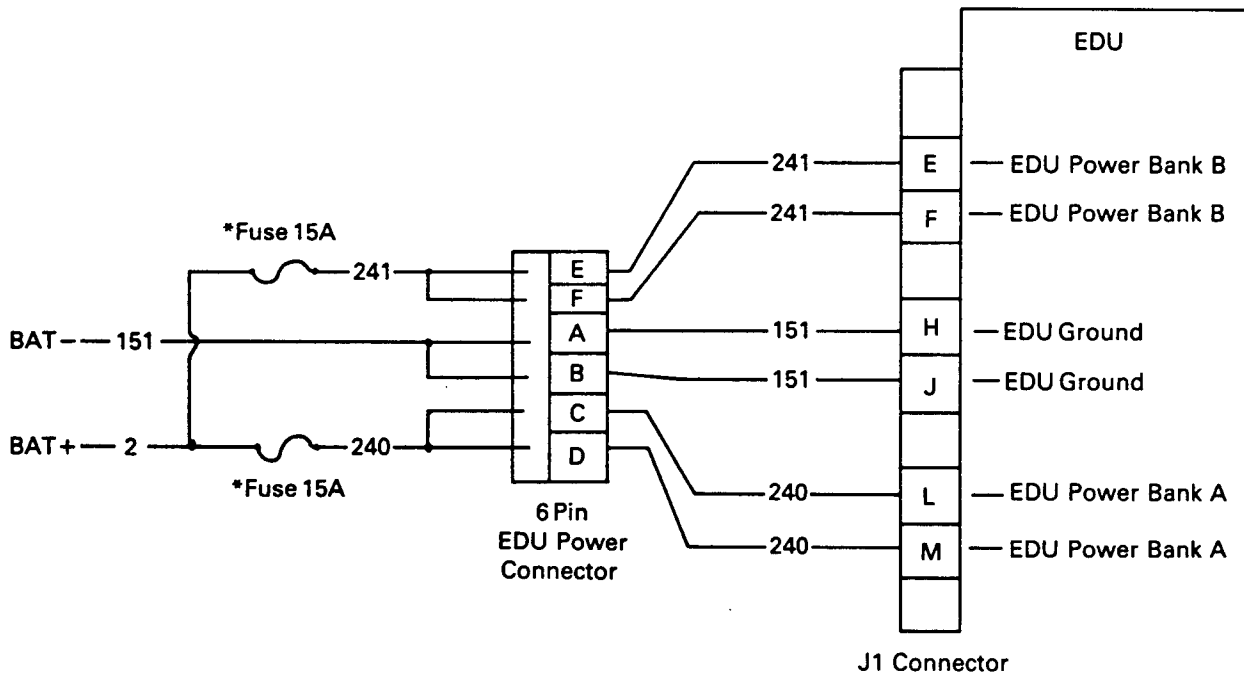


12 Pin DDL Connector  
P/N 12020043



EDU J1 Harness Connector (Gray)  
P/N 12034382

EDU Power and Ground Circuits



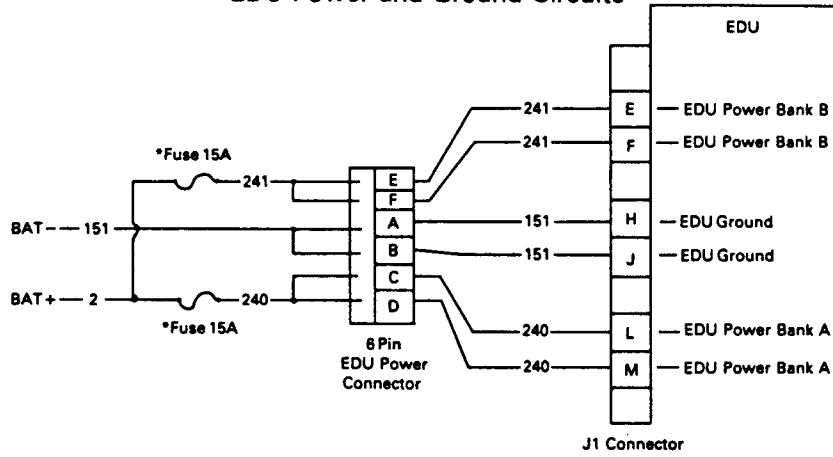
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

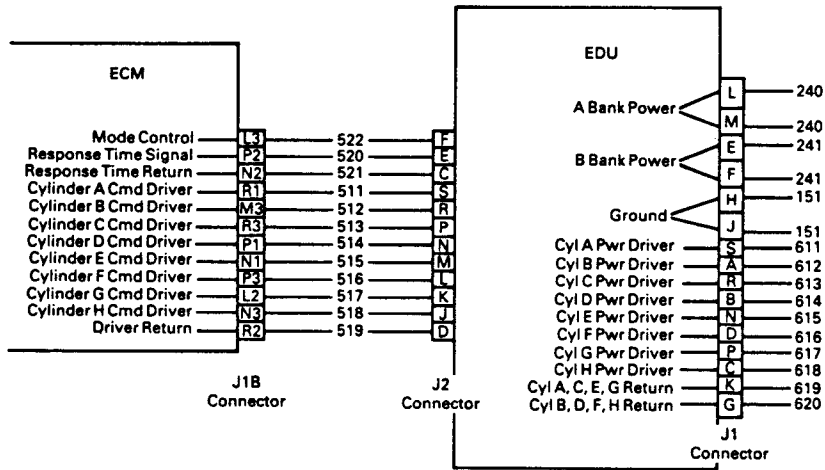
D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
C5-11 Check for Good SRS Signal		
<ul style="list-style-type: none"> <li>• Reconnect all ECM and EDU connectors.</li> <li>• Plug the DDL Reader into the 12 pin, DDL connector and select the SRS Recd position.</li> <li>• Crank engine while observing the SRS Recd display.</li> </ul>	<p>Display reads "YES".</p> <p>Display reads "NO" while cranking.</p>	<p>Go to C5-12.</p> <p>The SRS or TRS signal is not being received. This could be due to a number of problems. If the SRS/TRS has just been adjusted, it is most likely that the sensor gap is incorrect. (Refer to the engine service manual for details.) If the SRS/TRS gap has not been altered since the last engine start, then go to 42-1.</p>
C5-12 Check EDU Power		
<ul style="list-style-type: none"> <li>• Disconnect the J1 connector at the EDU.</li> <li>• Read voltage on the J1 harness connector, socket E (red lead) to socket H (black lead).</li> <li>• Also read voltage on sockets:               <ul style="list-style-type: none"> <li>- F to H</li> <li>- L to H</li> <li>- M to H</li> </ul> </li> </ul> <p>(Always attach black lead to socket H.)</p>	<p>Greater than or equal to 11.5 volts on all readings.</p> <p>Less than 11.5 volts on any reading.</p>	<p>Go to C5-14.</p> <p>Go to C5-13.</p>

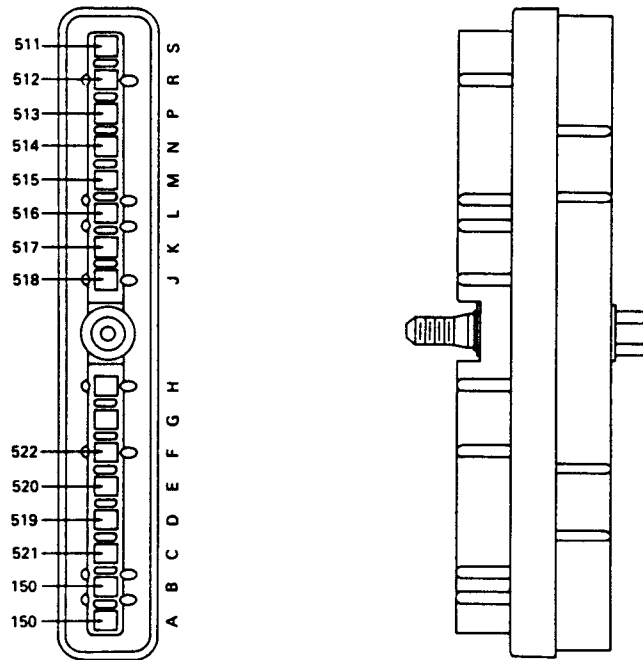
### EDU Power and Ground Circuits



(\*Note: Some applications may have circuit breakers instead of fuses)



### ECM to EDU and EDU Output Circuits

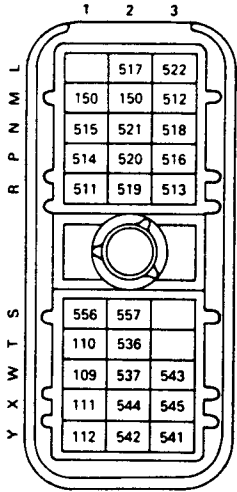


EDU J2 Harness Connector (Black)  
P/N 1203486

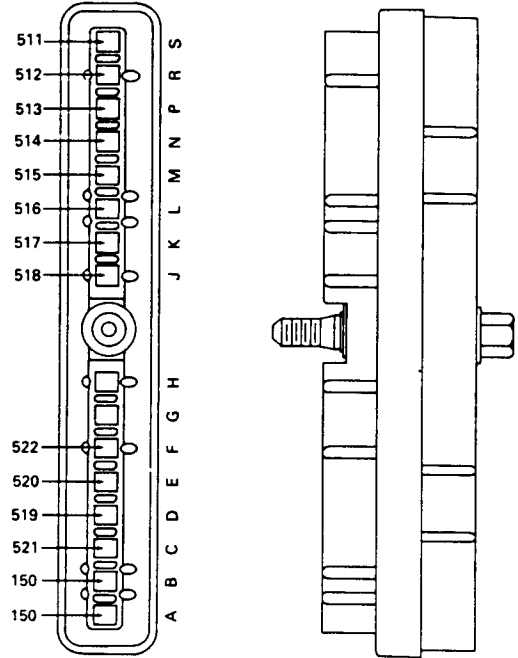
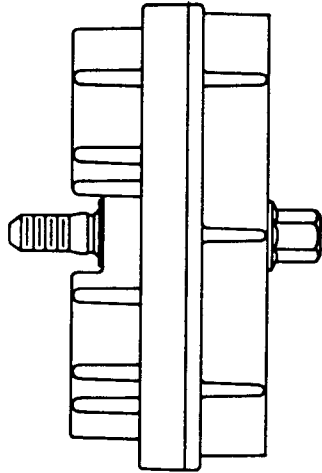
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

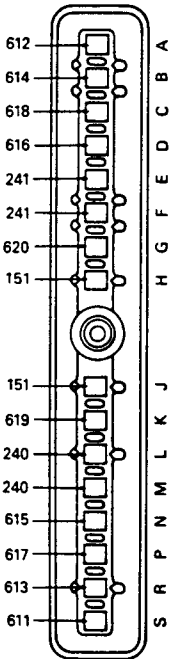
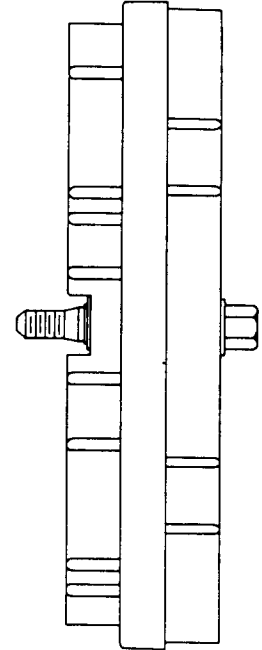
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>C5-13 Check Power at EDU Fuses or Circuit Breakers</b></p> <ul style="list-style-type: none"> <li>• Read voltage at both EDU fuses or circuit breakers, red lead on hot side (battery + side), and black lead at socket H of the J1 harness connector.</li> </ul>	<p>Greater than or equal to 11.5 volts on both readings.</p> <p>Less than 11.5 volts on any reading.</p>	<p>→ The EDU power line (ckt #240 or #241) is open between the fuses (or breakers) and the J1 harness connector. Repair open. Then go to C5-30.</p> <p>→ The main EDU power line (ckt #2) is either open or shorted to ground between the EDU fuses/circuit breakers and the battery + terminal. Repair open or short. Then go to C5-30.</p>
<p><b>C5-14 Check for Mode Control Signal</b></p> <ul style="list-style-type: none"> <li>• Disconnect the J2 connector at the EDU.</li> <li>• Install a jumper wire between socket A of J2 harness connector and socket H of the J1 harness connector.</li> <li>• Turn ignition on.</li> <li>• Read voltage at the J2 harness connector, socket F (red lead) to socket A (black lead).</li> </ul>	<p>Less than or equal to 2.5 volts.</p> <p>Greater than 2.5 volts.</p>	<p>→ Go to C5-15.</p> <p>→ Go to C5-18.</p>



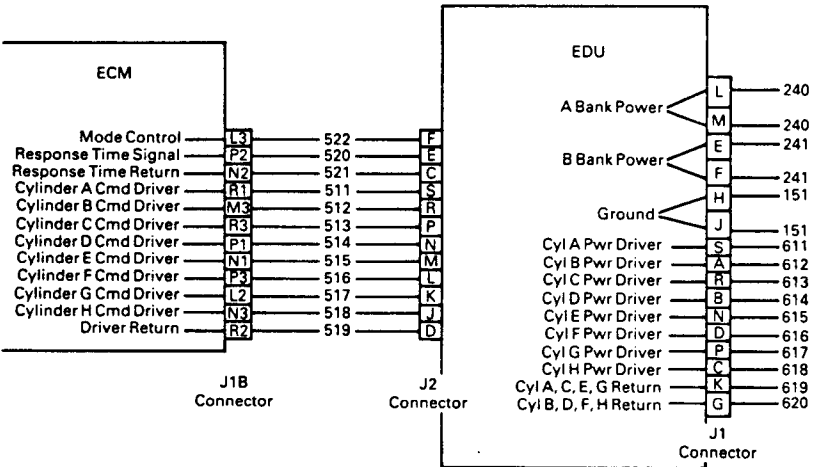
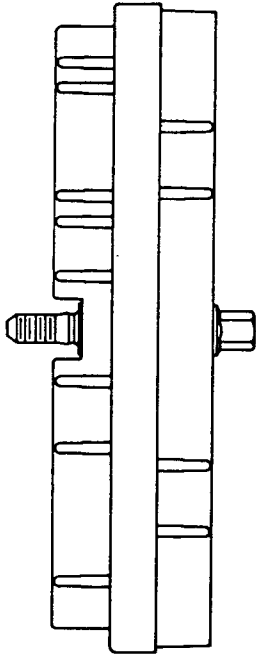
ECM J1B Harness Connector  
P/N 12034400



EDU J2 Harness Connector (Black)  
P/N 1203486

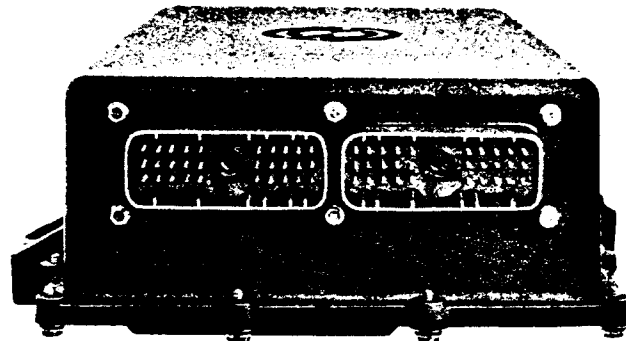


EDU J1 Harness Connector (Gray)  
P/N 12034382



ECM to EDU Injector Circuits

ECM to EDU  
and EDU Output Circuits



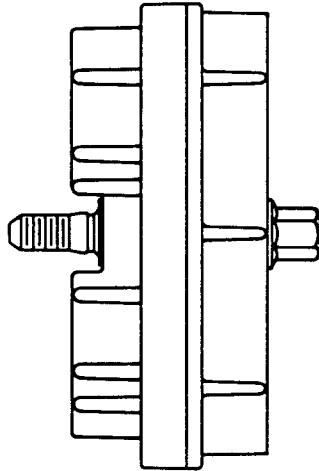
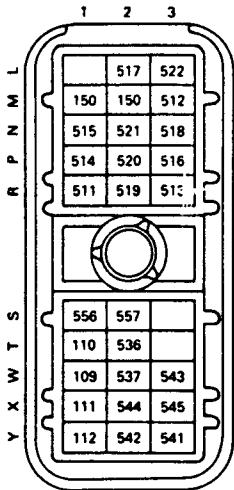
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

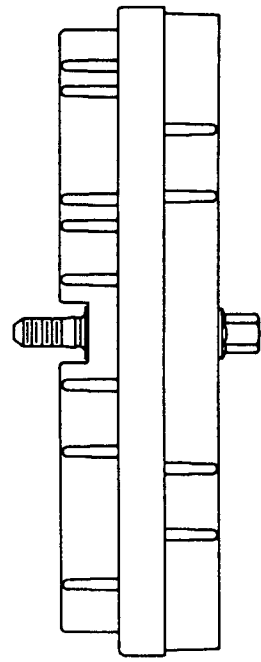
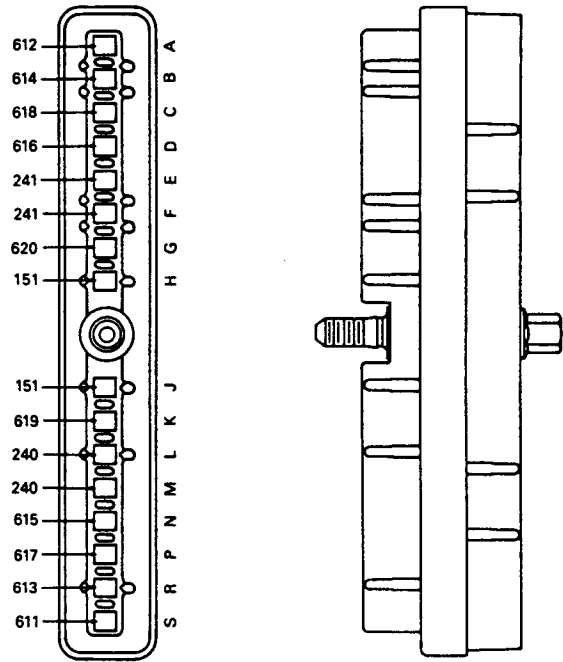
D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C5-15 Check for Open Mode Control Line</u></p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Disconnect the ECM, J1B connector.</li> <li>. Install a jumper wire between sockets L3 and R2 on the J1B harness connector.</li> <li>. Read resistance between sockets F and D on the EDU, J2 harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms or open. →</p>	<p>Go to C5-16.</p> <p>Mode Control line (ckt #522) is open. Repair open. Then go to C5-30.</p>
<p><u>C5-16 Check for Shorted Mode Control Line</u></p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Reconnect the J1 and J2 connectors to the EDU.</li> <li>. Read resistance between socket L3 and F2 on the J1B connector.</li> </ul>	<p>Less than or equal to 10,000 ohms short. →</p> <p>Greater than 10,000 ohms or open. →</p>	<p>Mode Control Line (ckt #522) is shorted to or ground (ckt #150). Repair short. Then go to C5-30.</p> <p>Go to C5-17.</p>
<p><u>C5-17 Check ECM and EDU Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM, J1B connector (both the harness and ECM side) for corrosion, and damaged or unseated pins or sockets.</li> <li>. Also do the same checks for the EDU, J2 connector.</li> </ul>	<p>Terminals and connectors are OKAY. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to C5-30.</p> <p>Repair terminals/connectors. Then go to C5-30.</p>



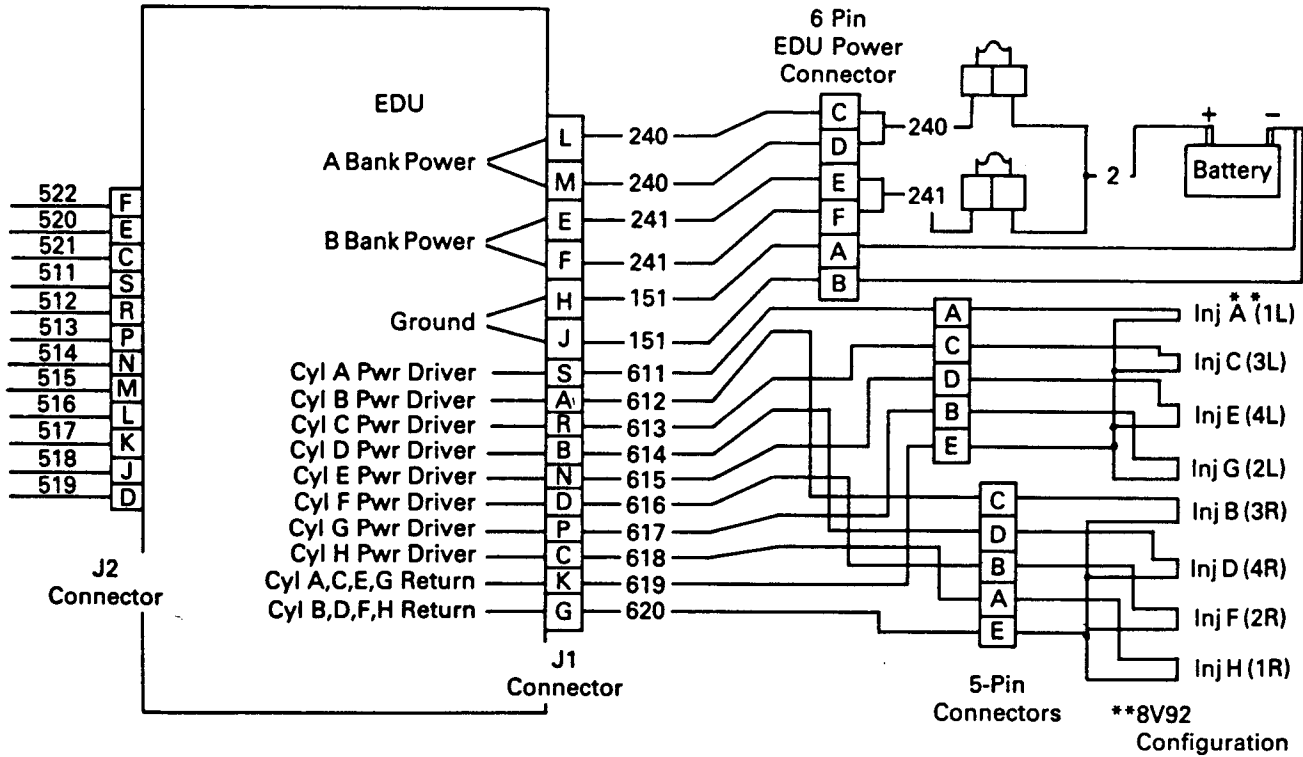


ECM J1B Harness Connector  
P/N 12034400



EDU J1 Harness Connector (Gray)  
P/N 12034382

15 Amp Fuses\*



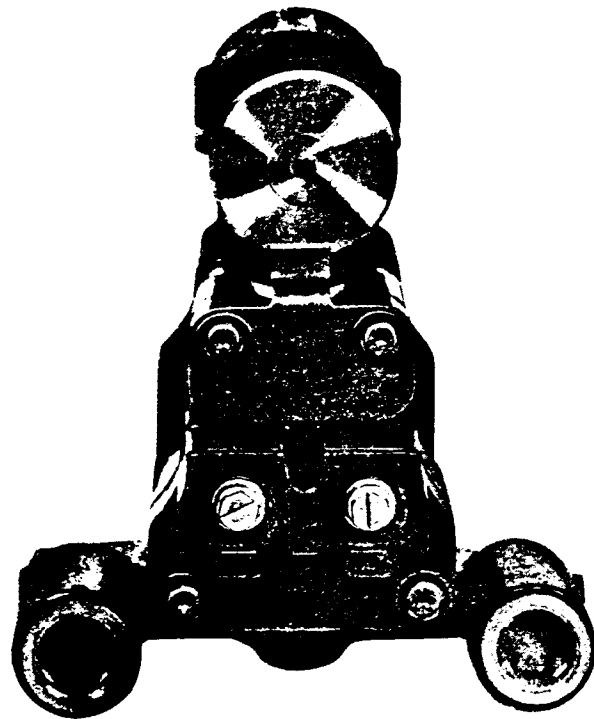
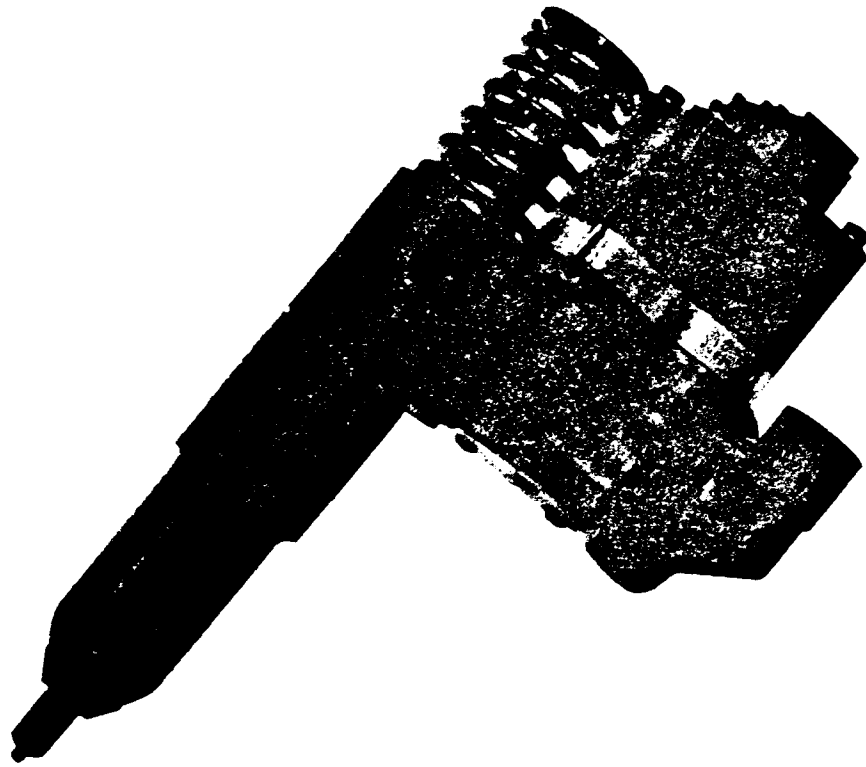
(\*Notes: Some applications may have circuit breakers instead of fuses. Also, wire numbers under the rocker arm cover may differ from those indicated above.)

ECM to EDU Injector Circuits,  
& Power and Ground

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-18 Check TRS</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect the ECM, J1B connector.</li> <li>. Read resistance between sockets T1 and W1 on the ECM, J1B harness connector.</li> </ul>	<p>Between 100 and 200 ohms. —————→</p> <p>Less than 100 ohms —————→</p> <p>Greater than 200 ohms.</p>	<p>Go to C5-19.</p> <p>Go to 41-2.</p> <p>Go to 41-3.</p>
<p>C5-19 Check SRS</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance between sockets X1 and Y1 on the ECM, J1B harness connector.</li> </ul>	<p>Between 100 and 200 ohms. —————→</p> <p>Less than 100 ohms —————→</p> <p>Greater than 200 ohms. —————→</p>	<p>Go to C5-20.</p> <p>Go to 42-2.</p> <p>Go to 42-3.</p>
<p>C5-20 Check if Injector Return Lines Open</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect the J1 connector at the EDU.</li> <li>. Read resistance between the following sockets on the J1 harness connector: <ul style="list-style-type: none"> <li>- A and G</li> <li>- B and G</li> <li>- D and G</li> <li>- N and K</li> <li>- R and K</li> <li>- S and K</li> </ul> </li> <li>. If you have an 8 cyl. engine, also read resistance between the following J1 harness connector sockets: <ul style="list-style-type: none"> <li>- C and G</li> <li>- P and K</li> </ul> </li> </ul>	<p>Less than or equal to 5 ohms for all readings. —————→</p> <p>Greater than 5 ohms on any or all readings. —————→</p>	<p>Go to C5-21.</p> <p>An open exists in one of the injector return lines (either ckt #619 or #620). Repair open. Then go to C5-30.</p>



Injector

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

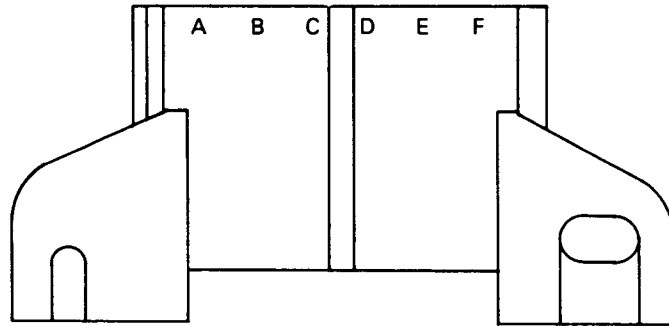
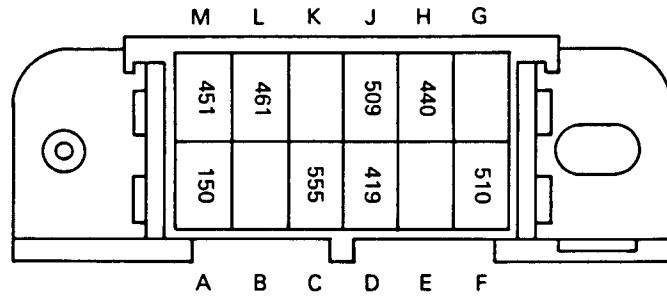
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-21 Check Injector Drive Pulses</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Unplug the DDL Reader.</li> <li>. Remove rocker arm cover(s).</li> <li>. Disconnect return wire from one injector (return wire has a white, plastic bead on it).</li> <li>. With a test light (6 volt works best), monitor this injector on the return side (where the wire was just removed) with respect to ground while cranking the engine. Also note if the light flashes at the same time as the start of plunger motion.</li> <li>. Reconnect the return wire.</li> <li>. Repeat the above procedure with all other injectors until all have been tested or until one test fails (no light or light and plunger motion don't coincide).</li> </ul>	<p>All tests pass. —————→</p> <p>Light not flashing for one or more tests. —————→</p> <p>Light and start of plunger motion don't coincide in at least one test. —————→</p>	<p>→ The problem does not appear to be in the DDEC system. Refer to the engine Service Manual for other possible causes of a no-start condition.</p> <p>→ Go to C5-10.</p> <p>→ Mechanical problem exists. Refer to the engine Service Manual for details.</p>



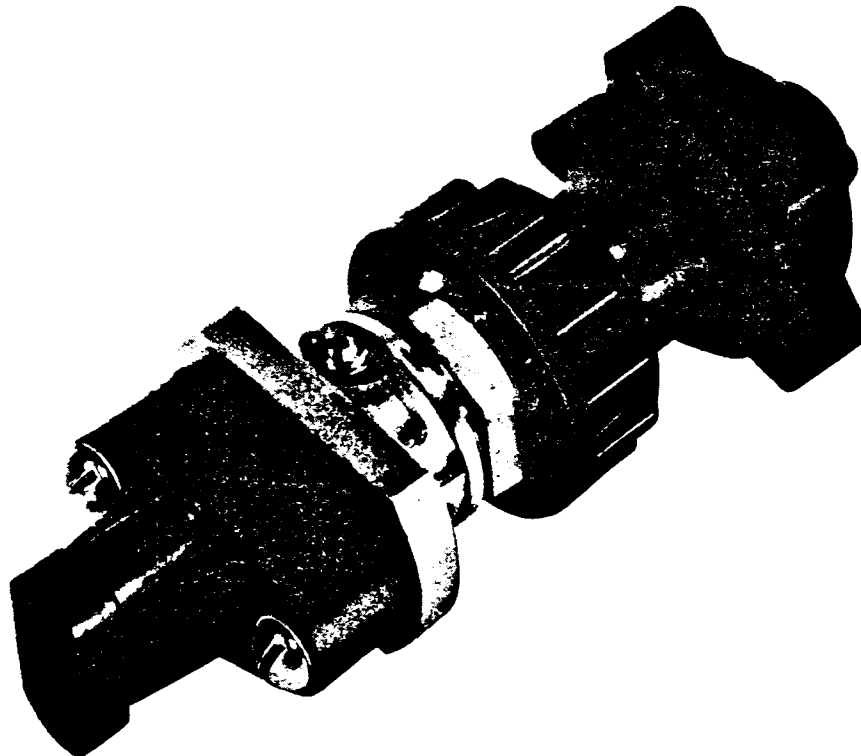
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 5 - ENGINE CRANKS BUT WILL NOT START (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C5-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Engine will not start.</p> <p>Engine starts and DDL Reader displays "NONE" (no codes).</p> <p>Engine starts and codes appear on the DDL Reader.</p>	<p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Repairs are complete.</p> <p>→ Go to DCC-1 to service these codes.</p>



12 Pin DDL Connector  
P/N 12020043



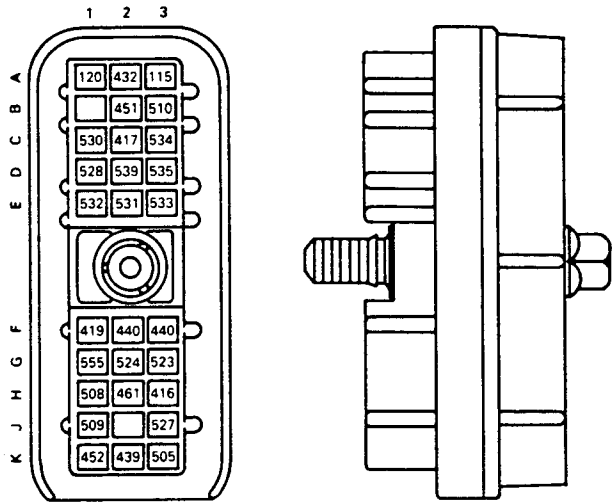
Power Take-Off Speed Adjust Sensor  
(PTOSA)

SECTION 4  
TROUBLESHOOTING CHARTS

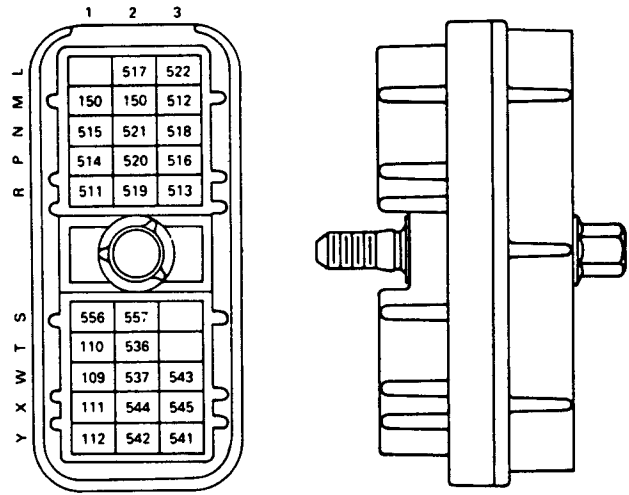
D. CHART 6 - POWER TAKE-OFF SPEED  
ADJUST (PTOSA) NOT OPERATIONAL

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C6-1 Check Throttle Position Sensor</p> <ul style="list-style-type: none"> <li>. Start and run engine.</li> <li>. Plug the DDL Reader into the 12 pin DDL connector.</li> <li>. Engine at no throttle.</li> <li>. Read Throttle % (TPS %) using the DDL Reader.</li> </ul>	<p>At 0 (%) throttle. —————→</p> <p>Greater than 0 (%) throttle. —————→</p>	<p>Go to C6-2</p> <p>Go to 21-4</p>
<p>C6-2 Check if ECM is Reading the PTOSA Sensor</p> <ul style="list-style-type: none"> <li>. Turn ignition on (engine not running).</li> <li>. Select the PTO RPM position on the DDL Reader.</li> <li>. Turn the PTOSA sensor from fully closed to fully open while observing the DDL Reader display.</li> </ul>	<p>DDL Reader display changes smoothly from idle (typically 500 RPM) to at least the top rated speed of the engine. —————→</p> <p>DDL Reader does not change at all or does not change smoothly. —————→</p>	<p>Go to C6-3</p> <p>Go to C6-7</p>
<p>C6-3 Check 12 Pin DDL Connector</p> <ul style="list-style-type: none"> <li>. Unplug the DDL Reader.</li> <li>. Turn ignition off.</li> <li>. Read resistance between pins A and M on the 12 pin DDL connector.</li> </ul>	<p>Less than 20,000 ohms. —————→</p> <p>Greater than or equal to 20,000 ohms. —————→</p>	<p>Go to C6-6</p> <p>Go to C6-4</p>

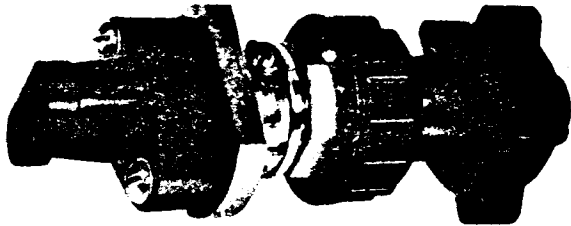




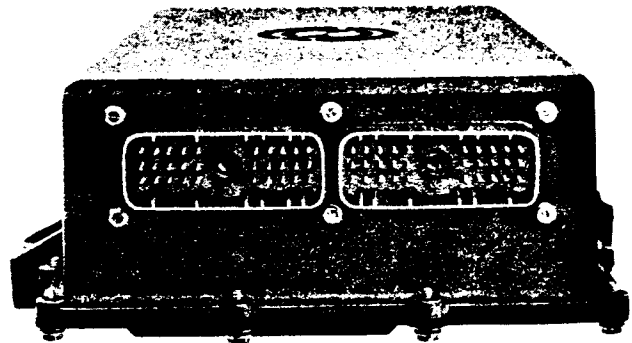
ECM J1A Harness Connector  
P/N 12034398



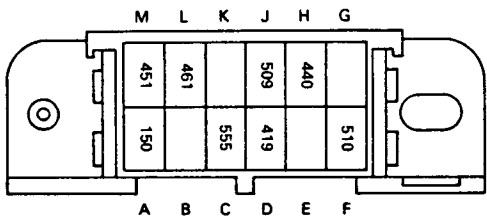
ECM J1B Harness Connector  
P/N 12034400



Power Take-Off Speed Adjust Sensor  
(PTOSA)

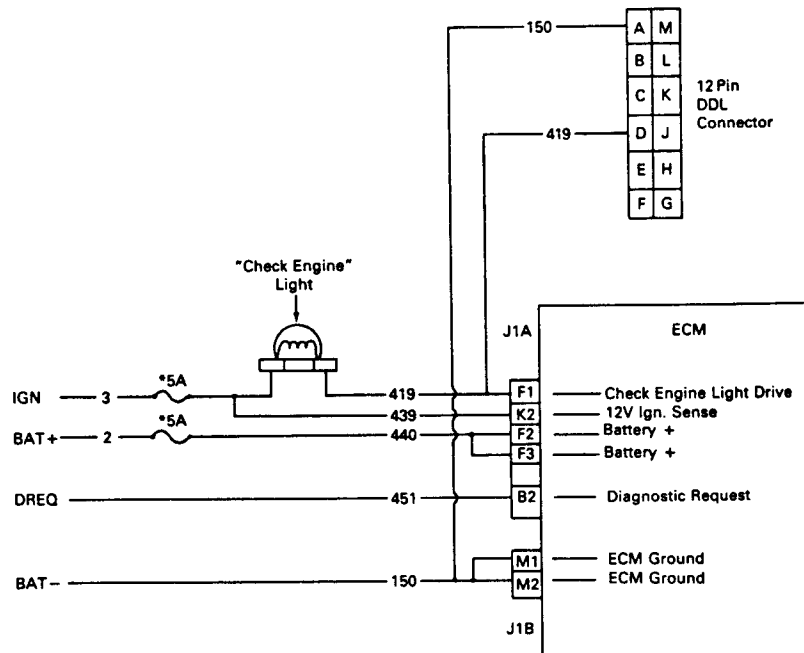


Electronic Control Module (ECM)



12 Pin DDL Connector  
P/N 12020043

Check Engine, Diagnostic Request, and Ignition Circuits

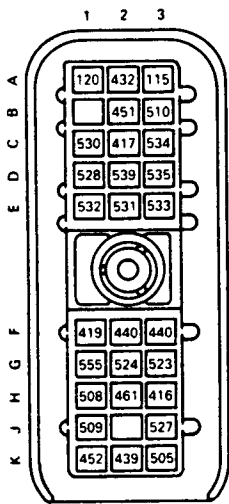


(\*Note: Some applications may have circuit breakers instead of fuses)

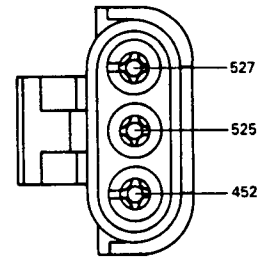
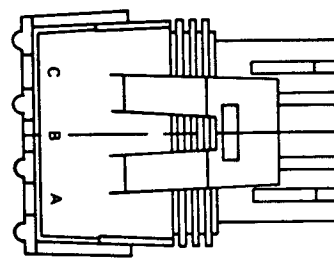
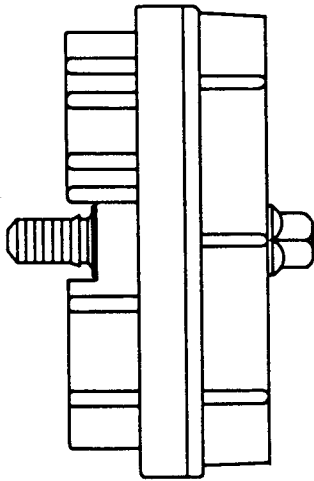
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 6 - POWER TAKE-OFF SPEED  
ADJUST (PTOSA) NOT OPERATIONAL (Cont'd.)

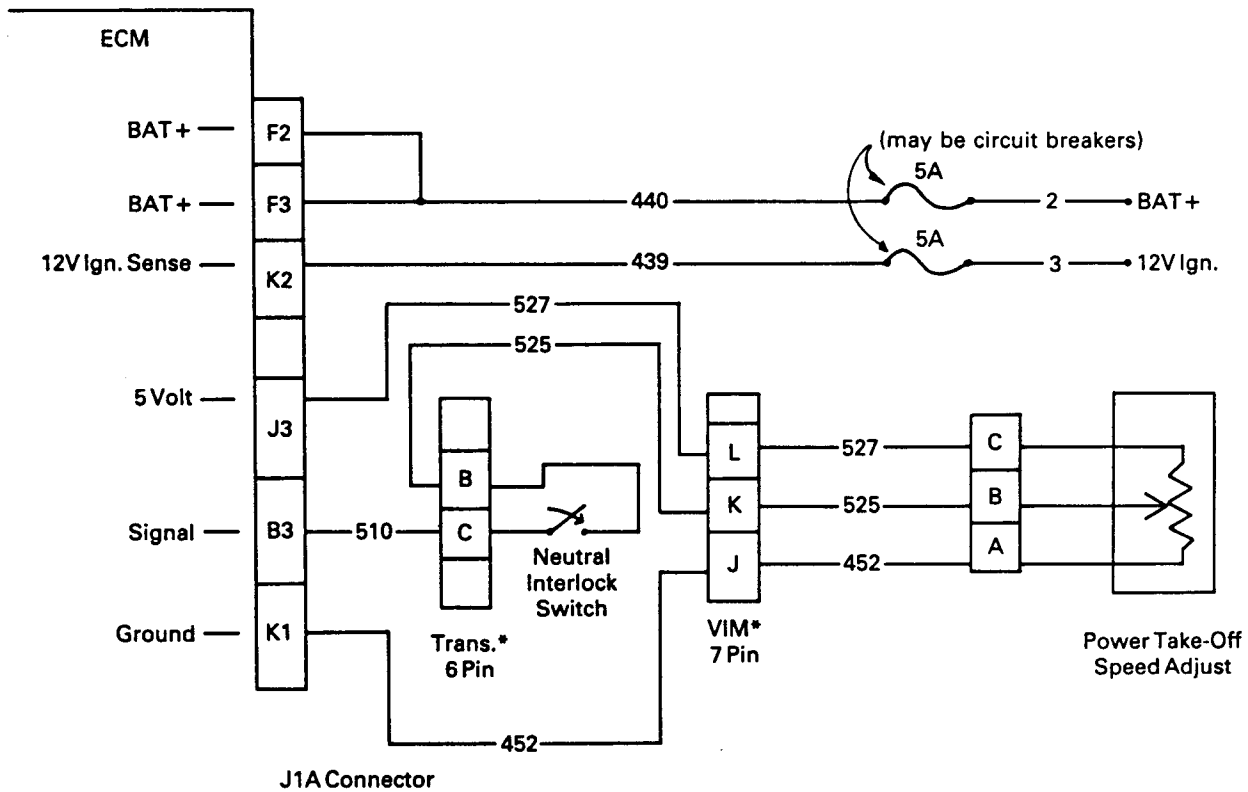
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C6-4 Verify Complaint</p> <hr/> <ul style="list-style-type: none"> <li>. Start and run engine at idle.</li> <li>. Turn the PTOSA sensor all the way down (counter-clockwise).</li> <li>. Slowly turn up the PTOSA sensor and observe whether RPM changes.</li> </ul>	<p>RPM is increasing. —————&gt;</p> <p>RPM does not increase. —————&gt;</p>	<p>Problem no longer exists. If problem cannot be recreated, return vehicle to service.</p> <p>Go to C6-5</p>
<p>C6-5 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace ECM. Then go to C6-30.</p> <p>Repair terminals/connectors. Then go to C6-30.</p>
<p>C6-6 Check for Short in DDL Connector or Harness</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect both the J1A and J1B connectors at the ECM.</li> <li>. Read resistance (again) between pins A and M on the 12 pin DDL connector.</li> </ul>	<p>Less than 20,000 ohms. —————&gt;</p> <p>Greater than or equal to 20,000 ohms or open. —————&gt;</p>	<p>Check for wet or corroded pins on 12 pin DDL connector. If no problem found, then a short exists between the Diagnostic Request line (ckt #451) and the ground line (ckt #150). Repair problem. then go to C6-30.</p> <p>Go to C6-5</p>



ECM J1A Harness Connector  
P/N 12034398



Power Take-Off Speed Adjust Harness Connector  
P/N 12015793



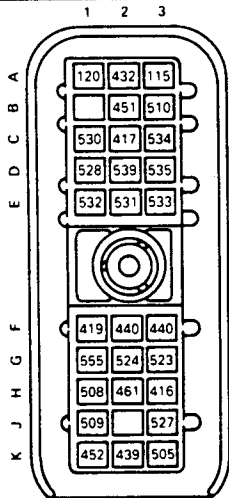
(\*Note: The Trans 6 Pin and VIM 7 Pin connectors are optional.  
Other Connectors may be substituted. See vehicle service  
manual for your particular hook-up.)

Power Take-Off Speed Adjust, Battery + and Ignition Circuits

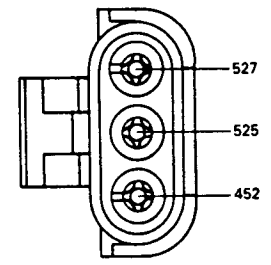
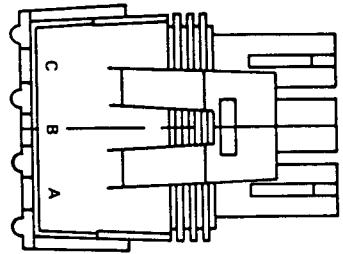
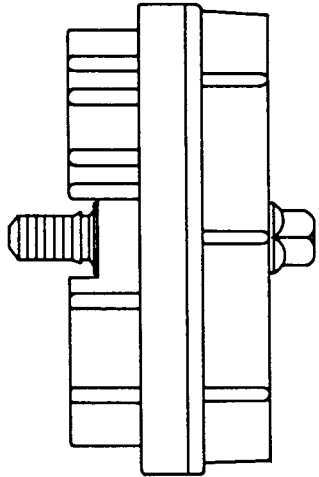
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 6 - POWER TAKE-OFF SPEED  
ADJUST (PTOSA) NOT OPERATIONAL (Cont'd.)

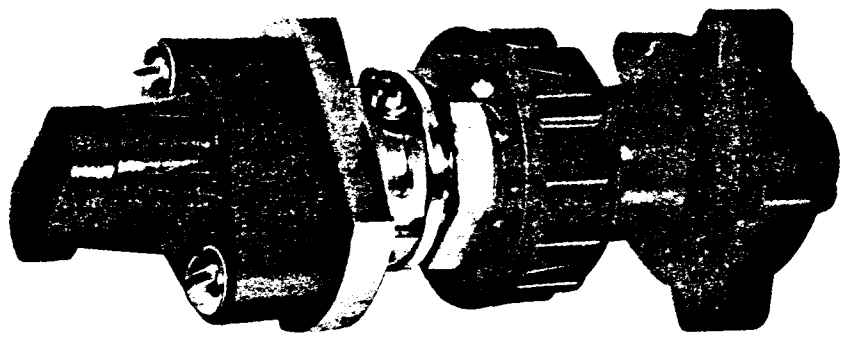
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C6-7 Check for Open</p> <ul style="list-style-type: none"> <li>. Turn the ignition off.</li> <li>. Make sure vehicle is in neutral.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Also disconnect the PTOSA sensor connector.</li> <li>. Install a jumper wire between pins A and B of the PTOSA sensor harness connector.</li> <li>. Read resistance between sockets B3 and K1 on the J1A harness connector.</li> </ul>	<p>Greater than 5 ohms or open. —————&gt;</p> <p>Less than or equal to 5 ohms. —————&gt;</p>	<p>&gt; Signal line (ckt #525), ground line (ckt #452) or the Neutral Interlock switch has an open. Repair open. Then go to C6-30.</p> <p>&gt; Go to C6-8.</p>
<p>C6-8 Check for +5 Volt Line Open</p> <ul style="list-style-type: none"> <li>. Move the jumper so that it is now between pins C and A of the PTOSA sensor harness connector.</li> <li>. Read resistance between sockets J3 and K1 on the J1A harness connector.</li> </ul>	<p>Greater than 5 ohms or open. —————&gt;</p> <p>Less than or equal to 5 ohms. —————&gt;</p>	<p>&gt; The +5 Volt line (ckt #527) is open. Repair open. Then go to C6-30.</p> <p>&gt; Go to C6-9.</p>



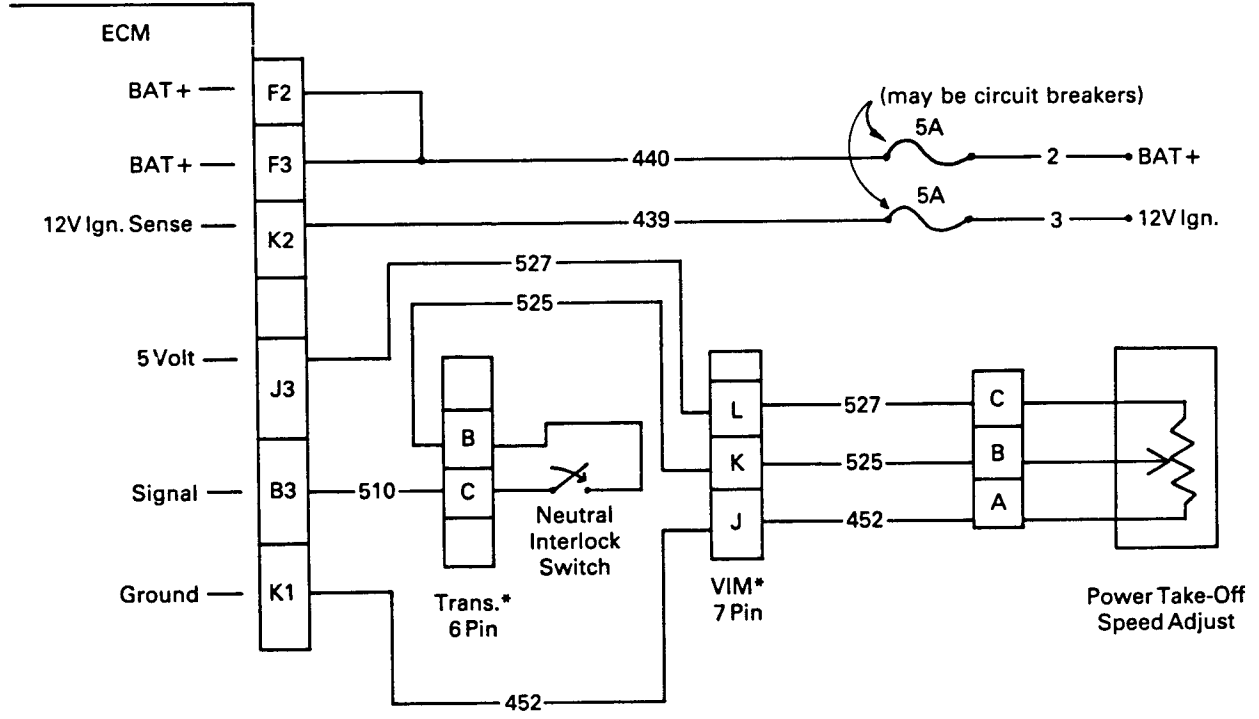
ECM J1A Harness Connector  
P/N 12034398



Power Take-Off Speed Adjust Harness Connector  
P/N 12015793



Power Take-Off  
Speed Adjust Sensor  
(PTOSA)



J1A Connector

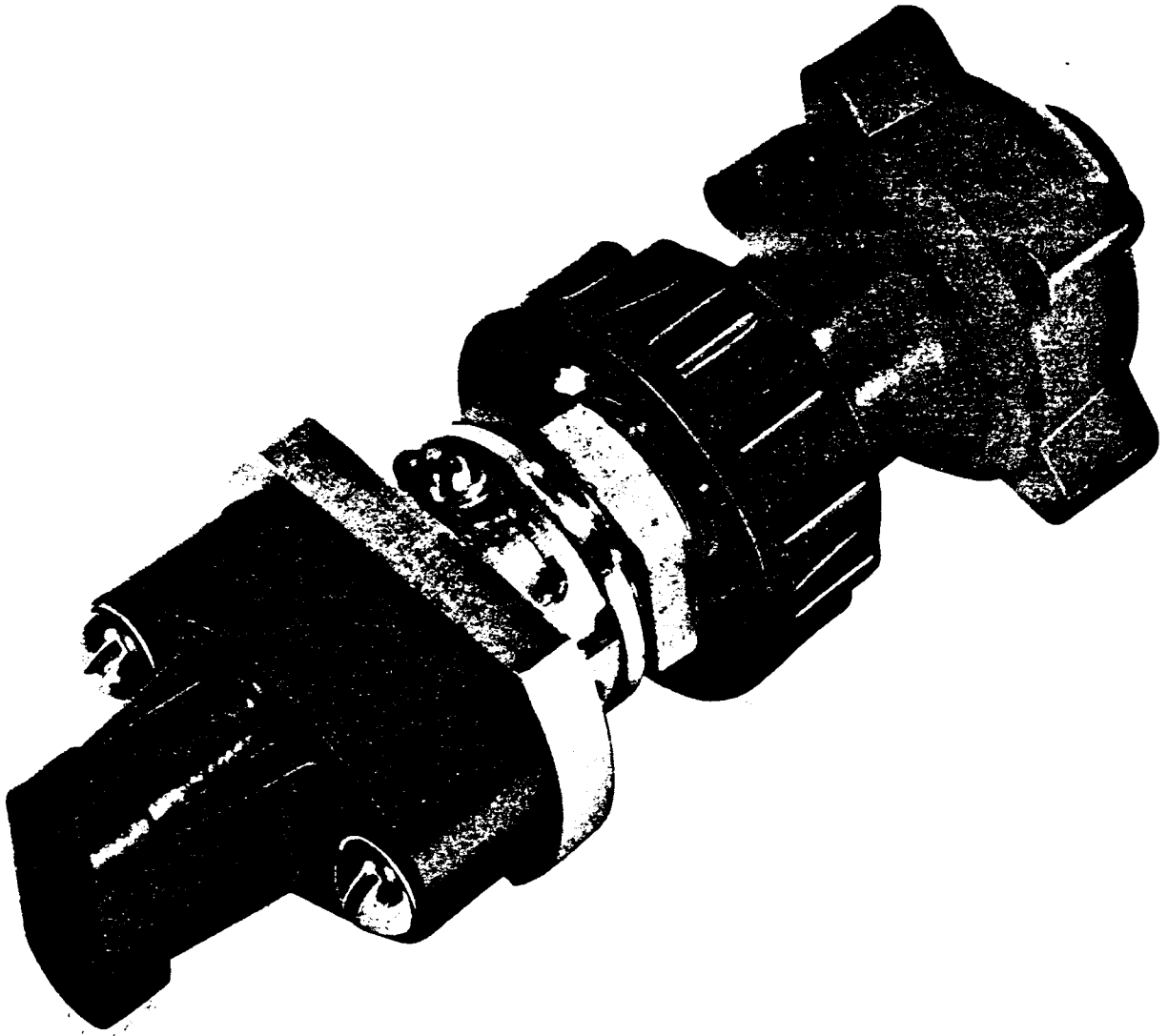
(\*Note: The Trans 6 Pin and VIM 7 Pin connectors are optional.  
Other Connectors may be substituted. See vehicle service  
manual for your particular hook-up.)

Power Take-Off Speed Adjust, Battery + and Ignition Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 6 - POWER TAKE-OFF SPEED  
ADJUST (PTOSA) NOT OPERATIONAL (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C6-9 Check for Short Between Signal and Ground</p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Read resistance between sockets B3 and K1 on the J1A harness connector.</li> <li>. Also read resistance between socket B3 and a good ground.</li> </ul>	<p>Both readings are greater than 10,000 ohms or open.</p> <p>Either reading is less than 10,000 ohms.</p>	<p>→ Go to C6-10.</p> <p>→ The signal line (ckt less #525) or the Neutral Interlock switch is shorted to ground (either ckt #452 or chassis ground). Repair short. Then go to C6-30.</p>
<p>C6-10 Check for Short Between +5 Volt Line and Ground</p> <ul style="list-style-type: none"> <li>. Read resistance between sockets J3 and K1 on the J1A harness connector.</li> <li>. Also read resistance between socket J3 and a good ground.</li> </ul>	<p>Both readings are greater than 10,000 ohms or open.</p> <p>Either reading is less than 10,000 ohms.</p>	<p>→ Go to C6-11.</p> <p>→ The +5 Volt line (ckt less #527) is shorted to ground (either ckt #452 or chassis ground). Repair short. Then go to C6-30.</p>
<p>C6-11 Check PTOSA Connectors</p> <ul style="list-style-type: none"> <li>. Inspect terminals at the PTOSA connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace PTOSA sensor. Then go to C6-30.</p> <p>→ Repair terminals/connectors. Then go to C6-30.</p>



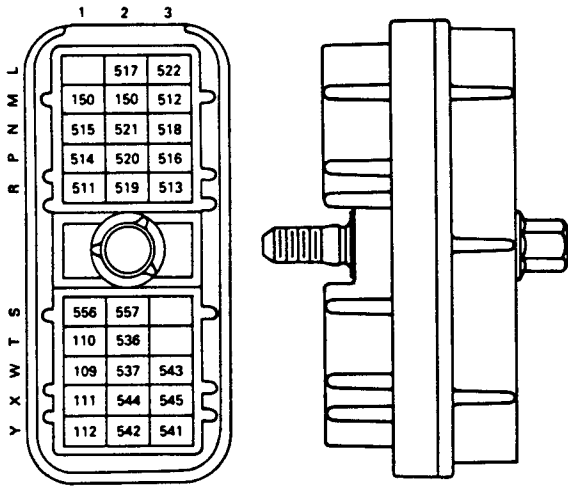
Power Take-Off Speed Adjust Sensor  
(PTOSA)

SECTION 4  
TROUBLESHOOTING CHARTS

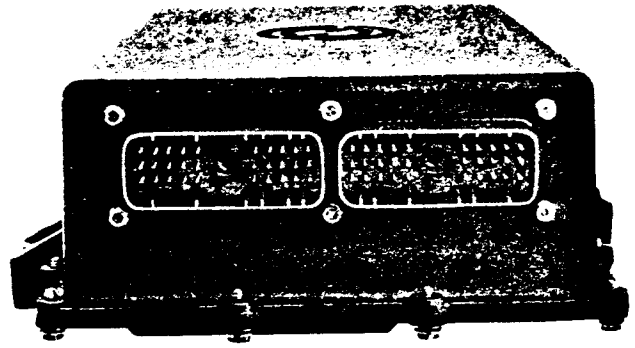
D. CHART 6 - POWER TAKE-OFF SPEED  
ADJUST (PTOSA) NOT OPERATIONAL (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C6-30 Verify Repairs</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start and run engine at idle.</li> <li>. Turn the PTOSA sensor all the way down (counter-clockwise).</li> <li>. Slowly turn up the PTOSA sensor and observe whether RPM changes.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>PTOSA sensor still does not work.</p> <p>PTOSA sensor works and DDL Reader displays "NONE" (no codes).</p> <p>PTOSA sensor works and codes appear on the DDL Reader.</p>	<p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Repairs are complete.</p> <p>→ Go to DCC-1 to service the codes.</p>

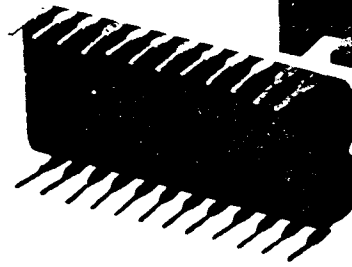
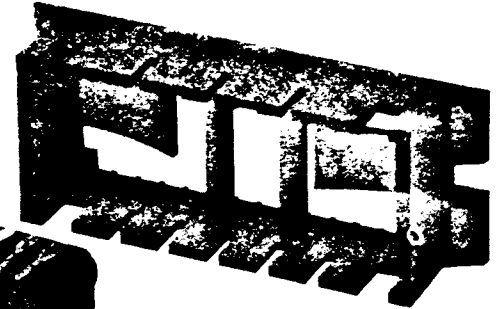




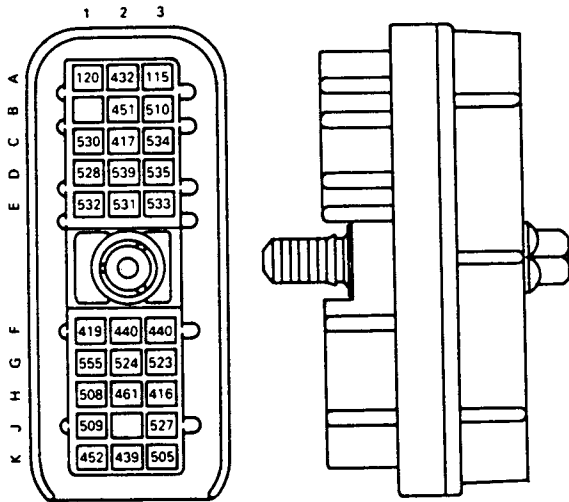
ECM J1B Harness Connector  
P/N 12034400



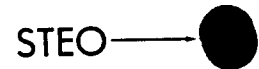
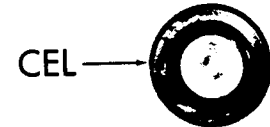
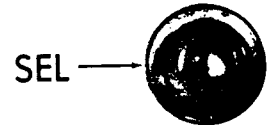
Electronic Control Module (ECM)



Calibration PROM

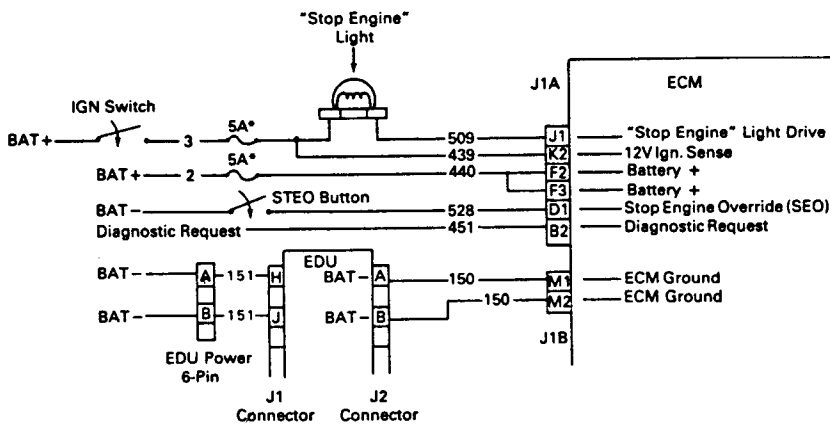


ECM J1A Harness Connector  
P/N 12034398

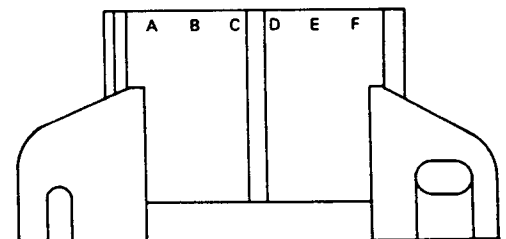
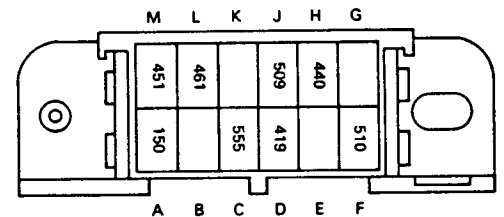


Dash Lights

Stop Engine Override, Stop Engine Light, Diagnostic Request and Ignition Circuits



(\*Note: Some applications may have circuit breakers instead of fuses)

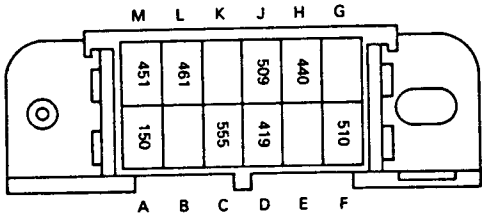


12 Pin DDL Connector  
P/N 12020043

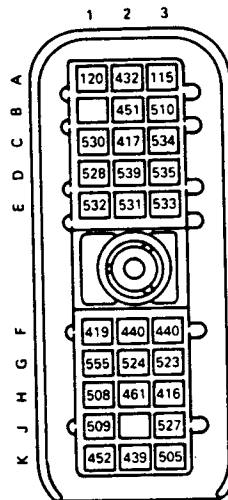
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 7 - STOP ENGINE OVERRIDE  
(STEO) NOT OPERATIONAL

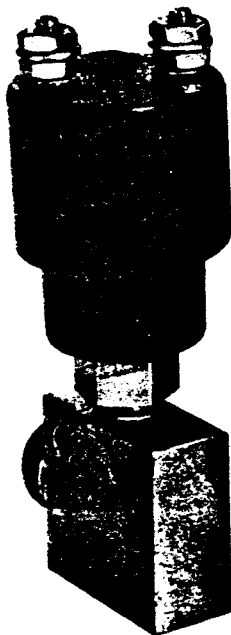
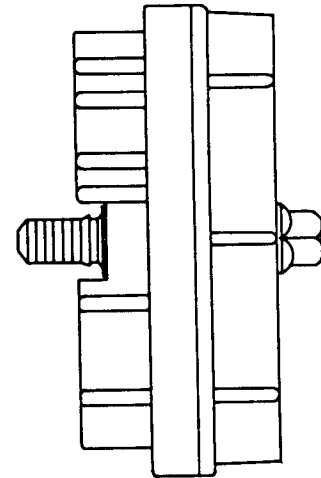
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C7-1 Check STEO Circuit</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition on.</li> <li>. Plug the DDL Reader into the 12-pin DDL connector and select the STEO position on the selector switch.</li> <li>. Press STEO button (or switch) while observing the display for STEO on the DDL Reader.</li> </ul>	<p>Display reads "ON". →</p> <p>Display reads "OFF" →</p>	<p>Go to C7-2.</p> <p>The Stop Engine Override line (ckt #528) or the STEO button/switch has an open in it and/or the STEO switch does not properly ground the STEO line when pressed. Repair problem. If no open found, go to C7-2. Then go to C7-30.</p>
<p>C7-2 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem(s) found. →</p>	<p>Replace PROM. If complaint persists, replace ECM. Then go to DCC-1 if any other DDEC related problems remain.</p> <p>Repair terminals/ connectors. Then go to DCC-1 if any other DDEC-related problems remain.</p>
<p>C7-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition on.</li> <li>. Press STEO button (or switch) while observing the display for STEO on the DDL Reader.</li> </ul>	<p>Display reads "ON". →</p> <p>Display reads "OFF". →</p>	<p>Repairs are complete. If any other DDEC-related problems remain, go to DCC-1.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p>



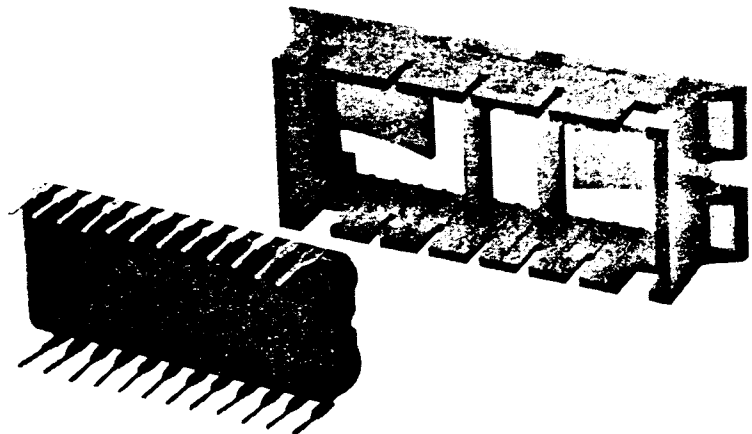
12 Pin DDL Connector  
P/N 12020043



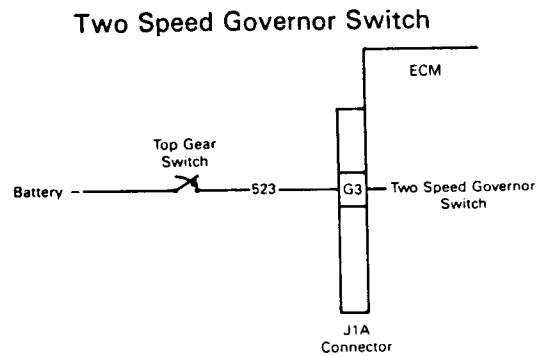
ECM J1A Harness Connector  
P/N 12034398



Two Speed Governor Switch  
(High Gear Switch)



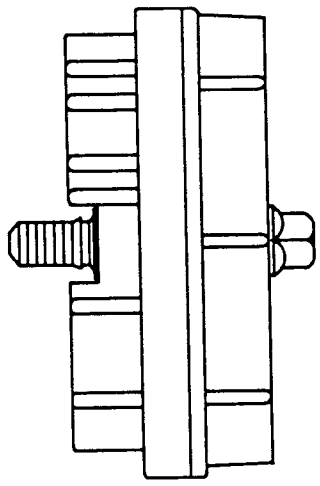
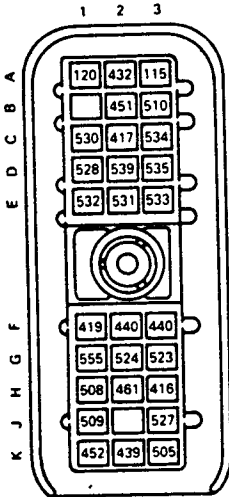
Calibration PROM



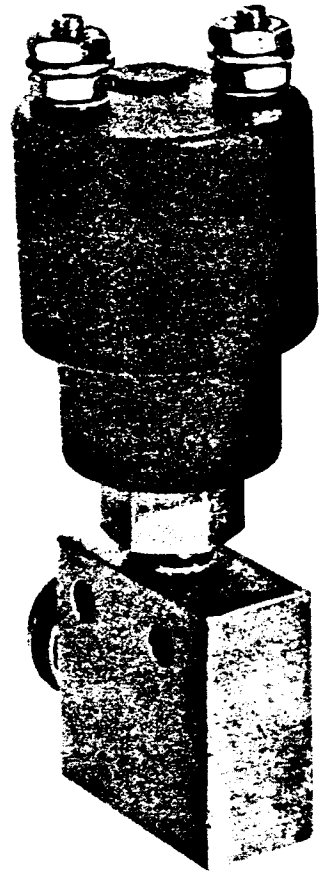
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 8 - TWO SPEED GOVERNOR  
(TSG) SWITCH NOT OPERATIONAL

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C8-1 Verify TSG Switch Operation</p> <ul style="list-style-type: none"> <li>. Turn ignition on.</li> <li>. Plug the DDL Reader into the 12 pin, DDL connector.</li> <li>. Select the TSG display on the DDL Reader.</li> <li>. Observe DDL Reader display while in lower gears.</li> <li>. Also shift to top gear and again observe the DDL Reader display.</li> </ul>	<p>DDL Reader reads "OFF" in lower gears and "OFF" in top gear. →</p> <p>DDL Reader reads "OFF" in lower gears and "ON" in top gear. →</p> <p>DDL Reader reads "ON" in lower gears and "ON" in top gear. →</p>	<p>Go to C8-2.</p> <p>Go to C8-5.</p> <p>Go to C8-6.</p>
<p>C8-2 Check for Open</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Shift to top gear.</li> <li>. Read resistance on socket G3 of the J1A harness connector to a good ground.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms. →</p>	<p>Go to C8-3.</p> <p>The Two Speed Governor line (ckt #523) or the TSG switch is open and/or the TSG switch is not properly grounding the TSG line. Repair, then go to C8-30.</p>
<p>C8-3 PROM Check</p> <ul style="list-style-type: none"> <li>. Replace PROM (per instructions in Section 3-C).</li> <li>. Turn ignition on.</li> <li>. Select the TSG display on the DDL Reader.</li> <li>. Shift to top gear.</li> <li>. Observe DDL Reader display.</li> </ul>	<p>DDL Reader reads "ON". →</p> <p>DDL Reader still reads "OFF". →</p>	<p>Go to C8-30.</p> <p>Go to C8-4.</p>

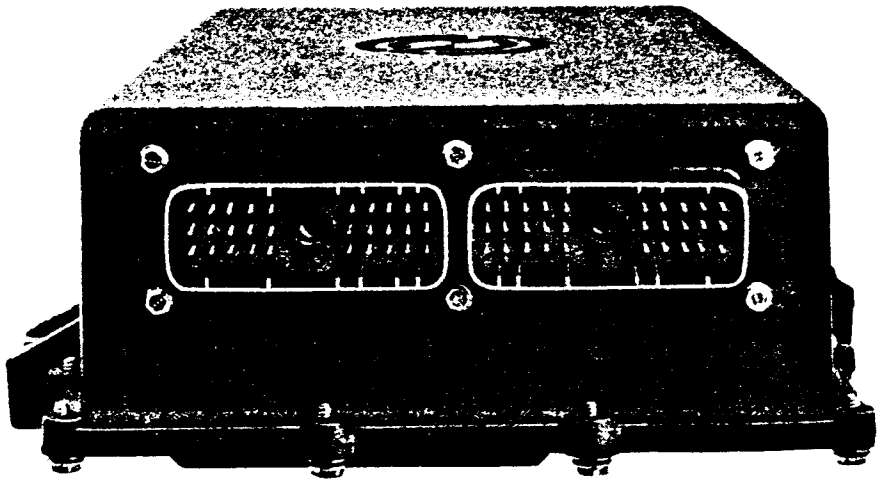
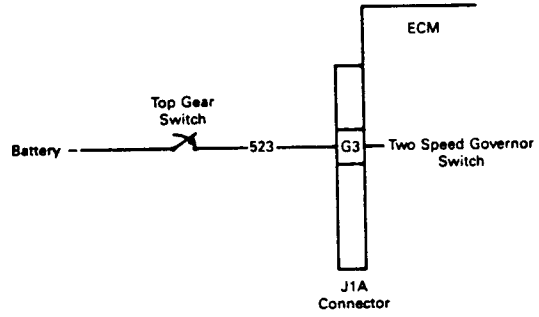


ECM J1A Harness Connector  
P/N 12034398



Two Speed Governor Switch  
(High Gear Switch)

Two Speed Governor Switch



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 8 - TWO SPEED GOVERNOR  
(TSG) SWITCH NOT OPERATIONAL (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C8-4 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to C8-30.</p> <p>→ Repair terminals/connectors. Then go to C8-30.</p>
<p>C8-5 Verify Complaint</p> <hr/> <ul style="list-style-type: none"> <li>• Drive vehicle while in lower gears and also when in top gear and note the top RPM achievable in all cases.</li> </ul>	<p>Top RPM is the same in top gear as in lower gears.</p> <p>Top RPM is lower in top gear than in lower gears.</p>	<p>→ Go to C8-3.</p> <p>→ Problem is no longer there. If you cannot recreate the problem, go to DCC-1 if any other DDEC problems exist.</p>
<p>C8-6 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1A connector at the ECM.</li> <li>• Shift to any gear except top gear.</li> <li>• Read resistance on socket G3 of the J1A harness connector to a good ground.</li> </ul>	<p>Less than or equal 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ The Two Speed Governor to line (ckt #523) or the TSG switch is shorted to ground. Repair short. Then go to C8-30.</p> <p>→ Go to C8-3.</p>

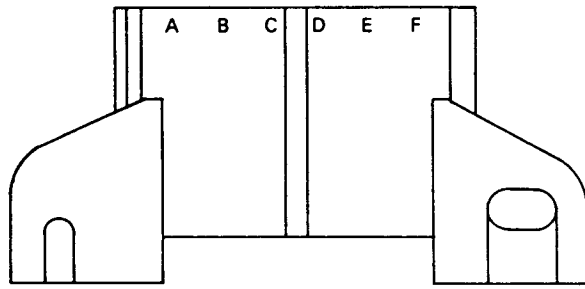
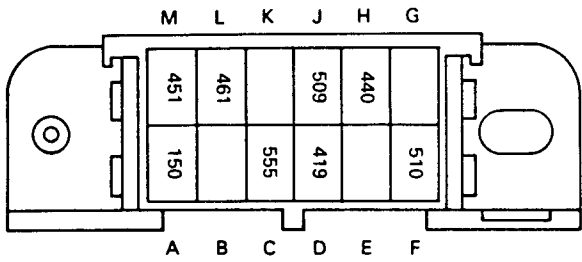


SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 8 - TWO SPEED GOVERNOR  
(TSG) SWITCH NOT OPERATIONAL (Cont'd.)

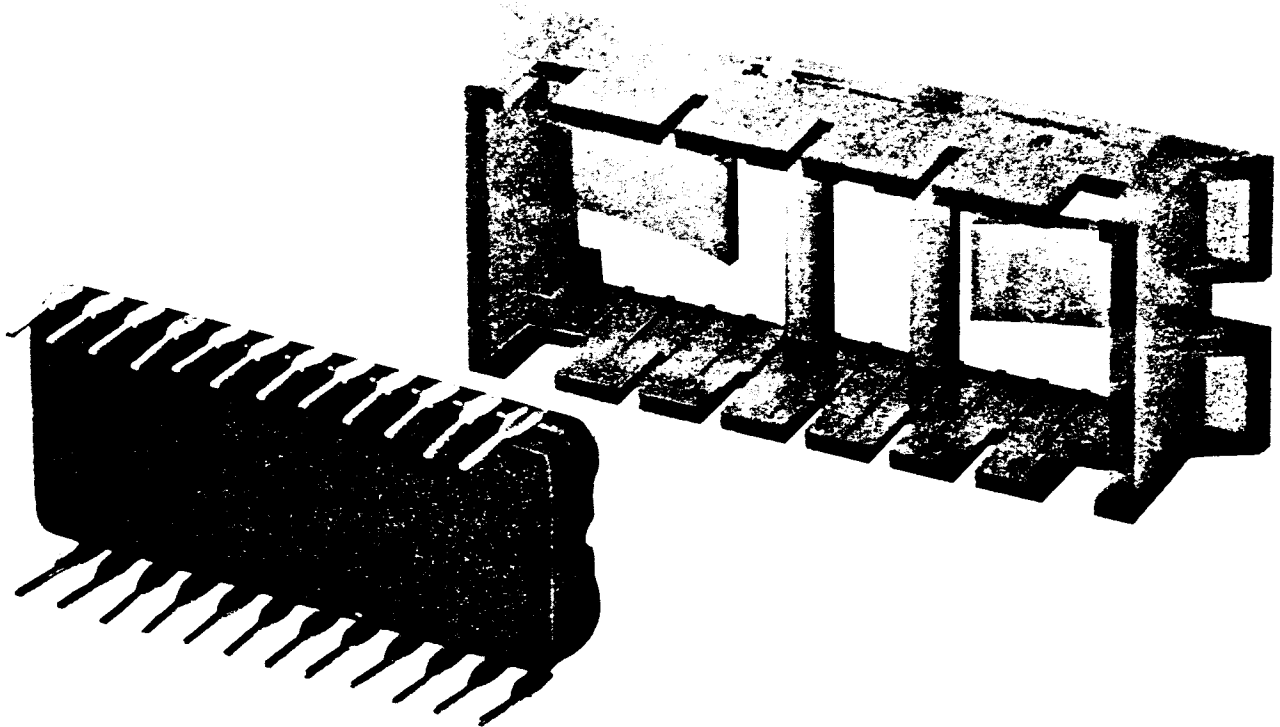
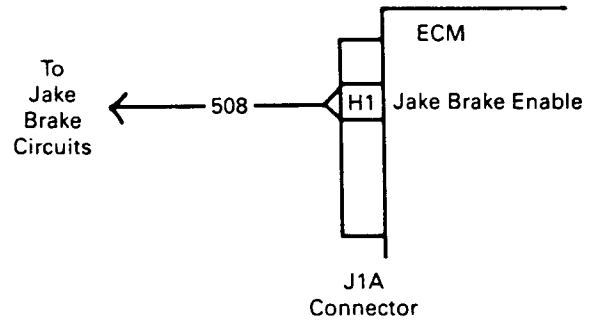
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C8-30 Verify Repairs</p> <ul style="list-style-type: none"> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Drive vehicle while in lower gears and also when in top gear and note the top RPM achievable in all cases.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Top RPM is the same in top gear as in lower gears.</p> <p>Top RPM is lower in top gear than in lower gears and DDL Reader reads "NONE" (no codes).</p> <p>Top RPM is lower in top gear than in lower gears and codes were logged.</p>	<p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Repairs are complete.</p> <p>→ Go to DCC-1 to service other codes.</p>





12 Pin DDL Connector  
P/N 12020043

Jake Brake Enable Circuit

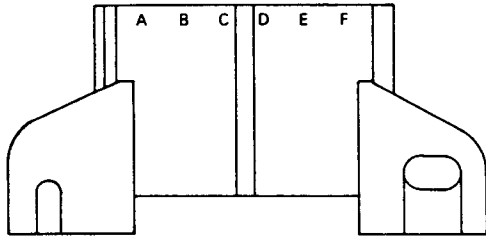
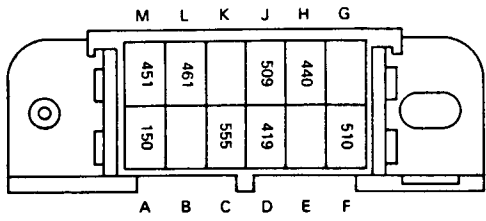


Calibration PROM

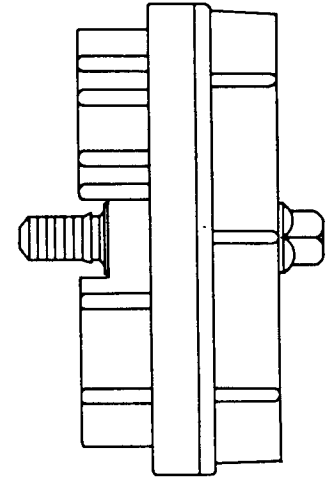
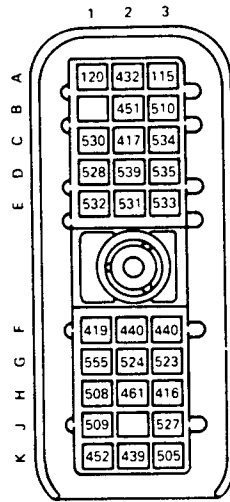
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 9 - JAKE BRAKE NOT OPERATIONAL

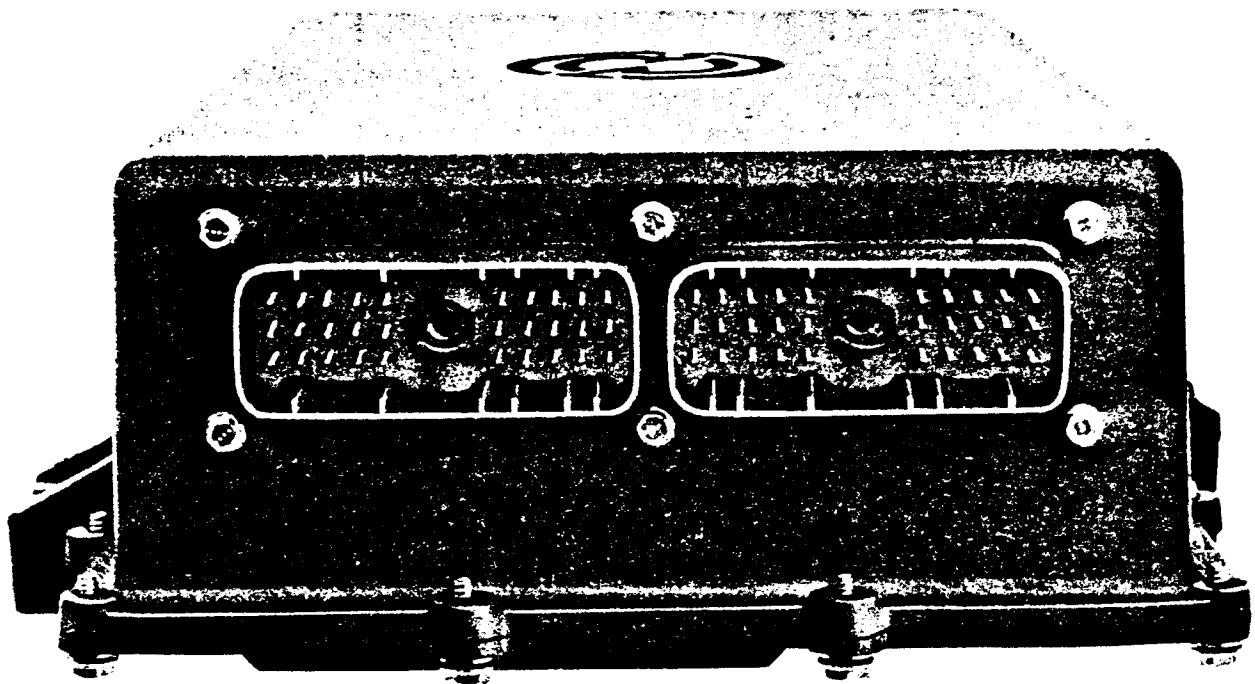
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C9-1 <u>Verify Jake Brake Enable Operation</u></p> <ul style="list-style-type: none"> <li>. Turn ignition on.</li> <li>. Plug the DDL Reader into the 12 pin DDL connector.</li> <li>. Select the Jake Brake display on the DDL Reader.</li> <li>. Start and run engine.</li> <li>. Rev up the engine and then quickly take your foot off the throttle while observing the DDL Reader display.</li> </ul>	<p>DDL Reader is always reading "OFF".</p> <p>DDL Reader reads "OFF" at first, then reads "ON" when foot is let off throttle.</p>	<p>→ Go to C9-2.</p> <p>→ The ECM is operating properly. Check for open in Jake Brake Enable line (ckt #508). If no problem is found, then the fault exists outside of the DDEC system. Refer to the manual for your engine brake system.</p>
<p>C9-2 <u>PROM Check</u></p> <ul style="list-style-type: none"> <li>. Replace PROM (per instructions in Section 3-C).</li> <li>. Turn ignition on.</li> <li>. Plug the DDL Reader into the 12 pin DDL connector.</li> <li>. Select the Jake Brake display on the DDL Reader.</li> <li>. Start and run engine.</li> <li>. Rev up the engine and then quickly take your foot off the throttle while observing the DDL Reader display.</li> </ul>	<p>DDL Reader is always reading "OFF".</p> <p>DDL Reader reads "OFF" at first, then reads "ON" when foot is let off throttle.</p> <p>DDL Reader is always reading "ON".</p>	<p>→ Go to C9-3.</p> <p>→ Repairs are complete. If any other DDEC problems remain, go to DCC-1.</p> <p>→ Go to C9-3.</p>



12 Pin DDL Connector  
P/N 12020043



ECM J1A Harness Connector  
P/N 12034398

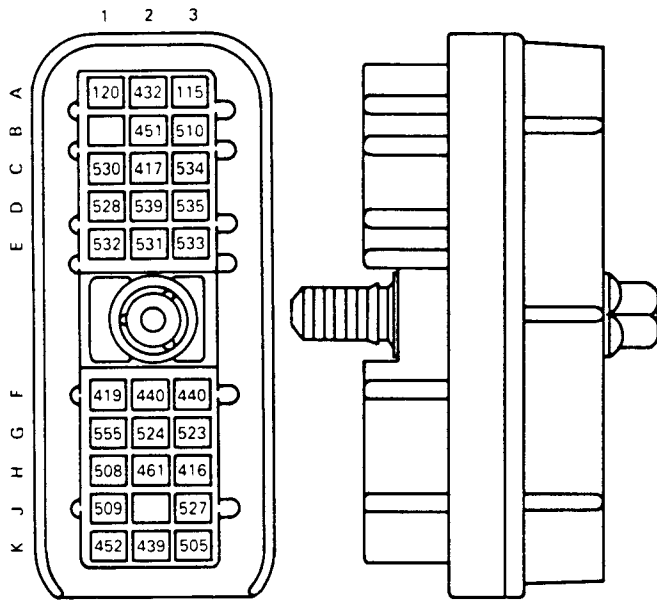


Electronic Control Module (ECM)

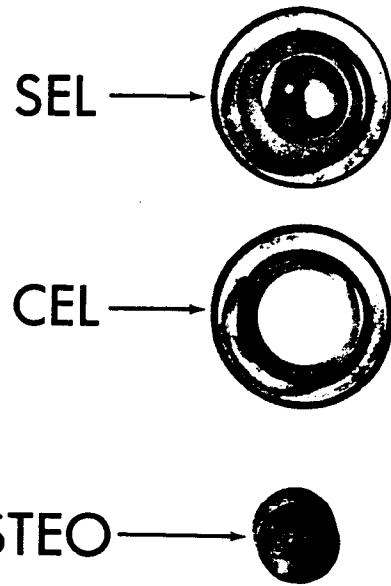
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 9 - JAKE BRAKE NOT OPERATIONAL (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C9-3 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to C9-30.</p> <p>→ Repair terminals/ connectors. Then go to C9-30.</p>
<p>C9-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Plug the DDL Reader into the 12 pin DDL connector.</li> <li>. Select the Jake Brake display on the DDL Reader.</li> <li>. Start and run engine.</li> <li>. Rev up the engine and then quickly take your foot off the throttle while observing the DDL Reader display.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader is always reading "OFF" or always reading "ON" when Jake Brake display is selected.</p> <p>DDL Reader reads "OFF" at first, then reads "ON" when foot is let off throttle (when Jake Brake display is selected). Also, no codes were logged (DDL Reader reads "NONE").</p> <p>DDL Reader reads "OFF" at first, then reads "ON" when foot is let off throttle (when Jake Brake display is selected). Also, codes were logged.</p>	<p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Repairs are complete.</p> <p>→ Go to DCC-1 to service other codes.</p>

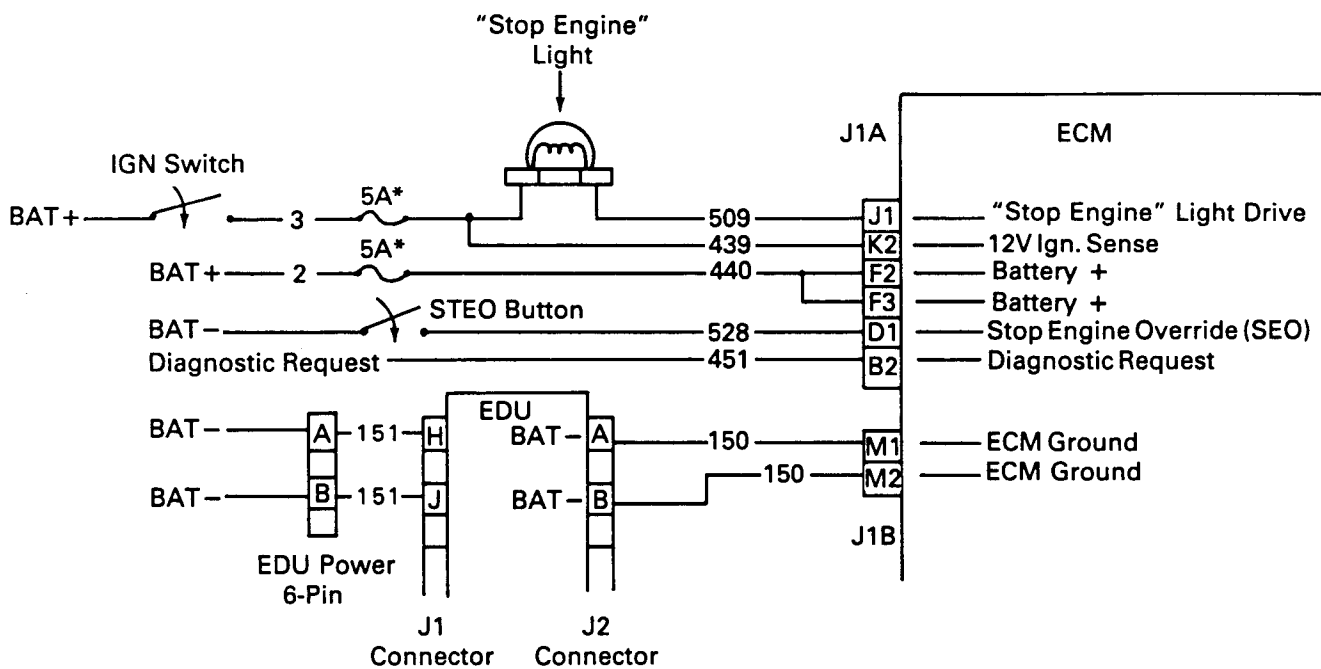


ECM J1A Harness Connector  
P/N 12034398



Dash Lights

Stop Engine Override, Stop Engine Light, Diagnostic Request and Ignition Circuits

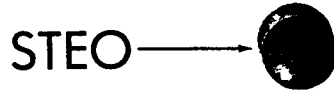
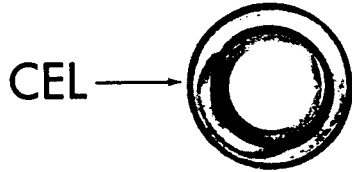
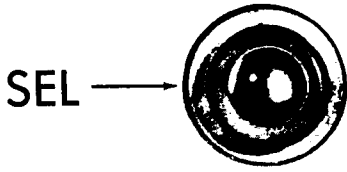


(\*Note: Some applications may have circuit breakers instead of fuses)

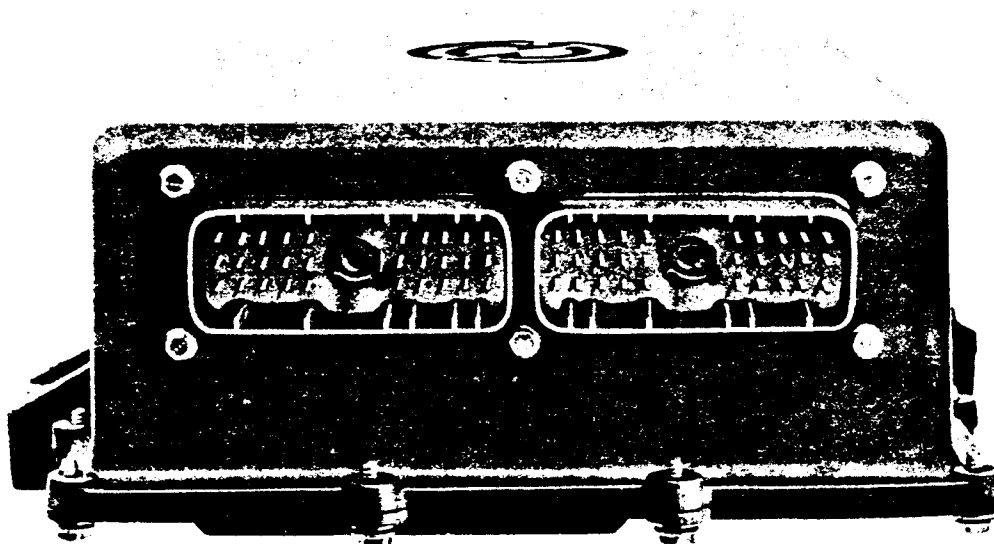
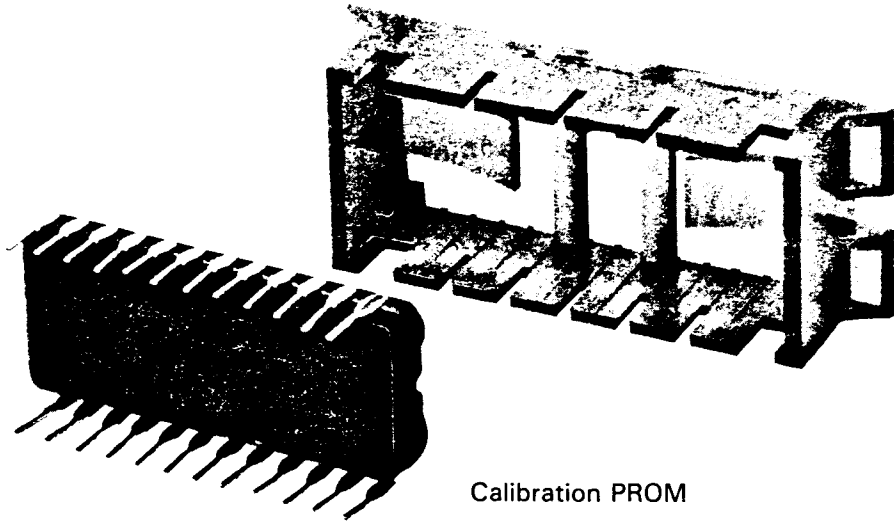
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 10 - "STOP ENGINE" LIGHT ALWAYS ON AND NO CODES

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C10-1 Determine "Stop Engine" Light Status</p> <ul style="list-style-type: none"> <li>• Turn ignition on (engine not running) while at the same time observing the "Stop Engine" light.</li> </ul>	<p>"Stop Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Stop Engine" light comes on and stays on.</p>	<p>→ This is the normal operation. Unless other problems exist, return to service.</p> <p>→ Go to C10-2.</p>
<p>C10-2 Check Engine For Short</p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1A harness connector at the ECM.</li> <li>• Turn ignition on (engine not running) while at the same time observing the "Stop Engine" light.</li> </ul>	<p>"Stop Engine" light comes on and stays on.</p> <p>"Stop Engine" light stays off.</p>	<p>→ "Stop Engine" light driver line (ckt #509) is shorted to ground. Repair short. Then go to C10-30.</p> <p>→ Go to C10-3.</p>
<p>C10-3 Check ECM Connectors</p> <ul style="list-style-type: none"> <li>• Check terminals at the ECM harness connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Go to C10-4.</p> <p>→ Repair terminals/connectors. Then go to C10-30.</p>



Dash Lights



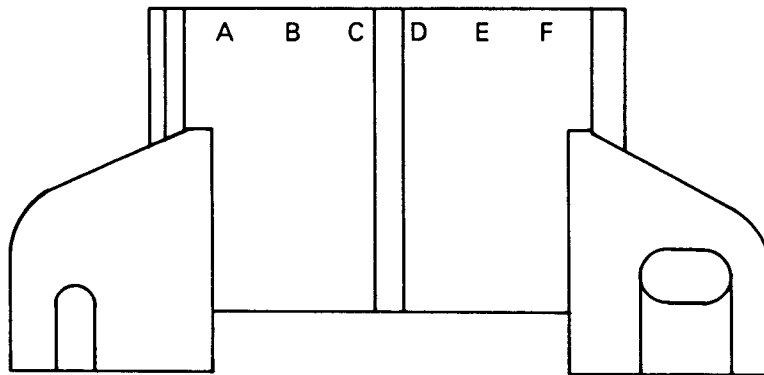
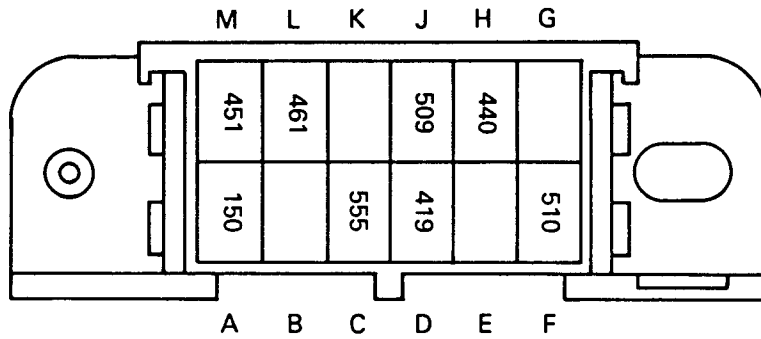
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 10 - "STOP ENGINE" LIGHT ALWAYS ON AND NO CODES (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C10-4 Replace PROM</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Replace PROM (with a correct PROM) per instructions in Section 3-C.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Stop Engine" light.</li> </ul>	<p>"Stop Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Stop Engine" light comes on and stays on.</p>	<p>→ Repairs are completed.</p> <p>→ Replace ECM. Then go to C10-30.</p>
<p>C10-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Stop Engine" light.</li> </ul>	<p>"Stop Engine" light comes on for up to 5 seconds, then goes out.</p> <p>"Stop Engine" light comes on and stays on.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p>



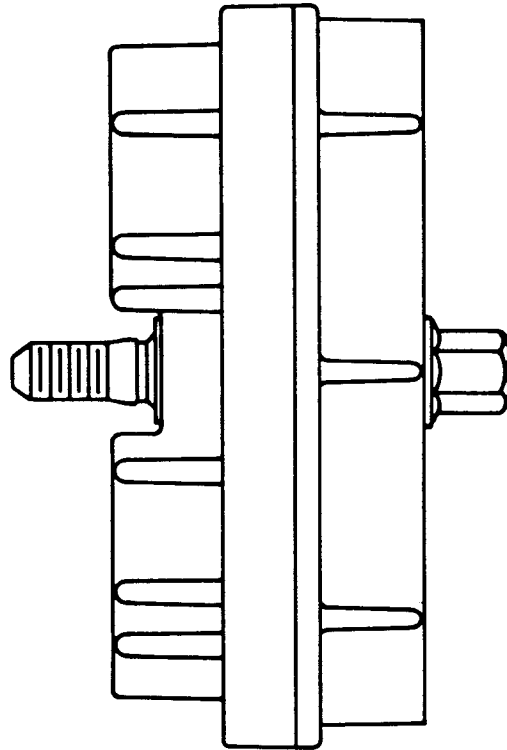
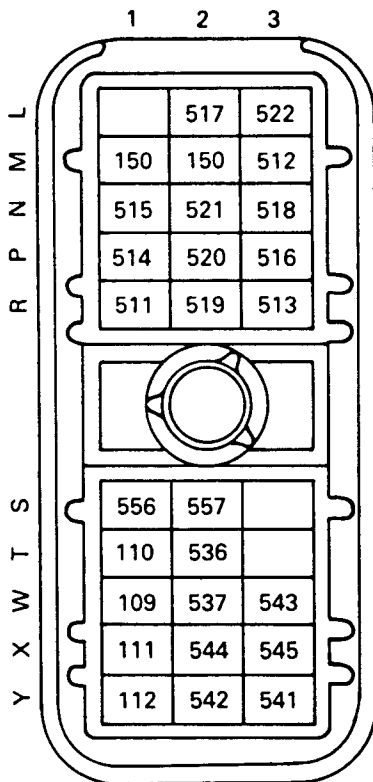


12 Pin DDL Connector  
P/N 12020043

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 11 - CRUISE CONTROL INOPERATIVE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C11-1 Determine Type of Cruise Control System</u></p> <ul style="list-style-type: none"> <li>. Check to see that this is a DDEC, cruise control system.</li> </ul>	<p>Yes. _____ →</p> <p>No. _____ →</p>	<p>Go to C11-2.</p> <p>This manual only includes diagnosis of the DDEC cruise control system. Refer to vehicle manufacturer's recommendations concerning your system.</p>
<p><u>C11-2 Determine "Cruise Enable" Light Status</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" _____ →</p> <p>light comes on for up to 5 seconds, then goes out.</p> <p>"Cruise Enable" _____ →</p> <p>light comes on and stays on.</p> <p>"Cruise Enable" _____ →</p> <p>light does not come on at all.</p>	<p>Go to C11-3.</p> <p>Go to C13-2.</p> <p>Go to C12-2.</p>
<p><u>C11-3 Check if Code 58</u></p> <ul style="list-style-type: none"> <li>. Plug DDL Reader into the 12-pin DDL connector.</li> <li>. Turn ignition on.</li> <li>. Turn the cruise control on/off switch to on.</li> <li>. Press and release SET switch.</li> <li>. Press and release RESUME switch.</li> <li>. Select "MALF CODES" for display using DDL Reader selector switch.</li> <li>. Read codes.</li> </ul>	<p>Code 58 (and any other codes). _____ →</p> <p>DDL Reader reads "NONE" (or any other codes, except code 58). _____ →</p>	<p>Go to 58-5.</p> <p>Go to C11-4.</p>

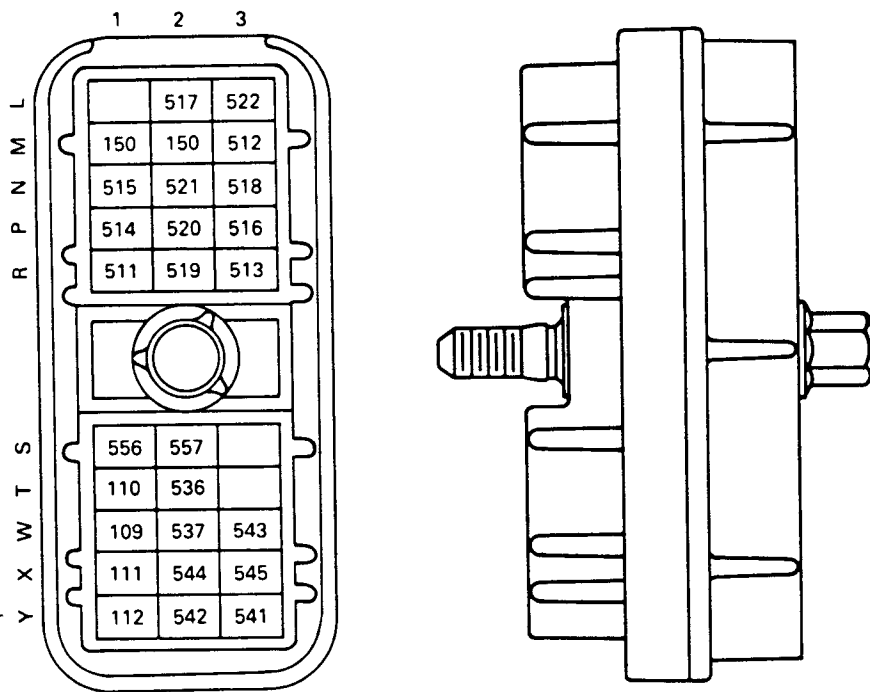


ECM J1B Harness Connector  
P/N 12034400

SECTION 4  
TROUBLESHOOTING CHARTS

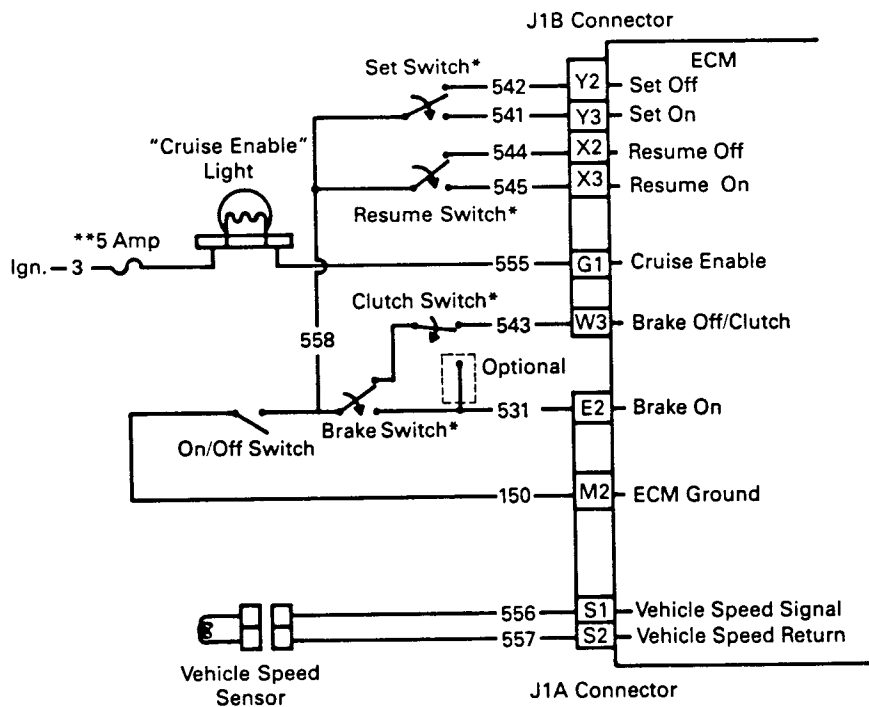
D. CHART 11 - CRUISE CONTROL INOPERATIVE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C11-4 Check if Cruise Control can be Enabled</u></p> <ul style="list-style-type: none"> <li>. Turn ignition on.</li> <li>. Select "SET &amp; RESUME" display using the DDL Reader selector switch.</li> <li>. Note the left side of the display.</li> <li>. Press and hold the SET switch while noting the left side of the display.</li> <li>. Release SET switch and again note left side of display.</li> </ul>	<p>Display goes from OFF--ON--OFF. —————&gt;</p> <p>Any other display. —————&gt;</p>	<p>Go to C11-5.</p> <p>Go to 58-5.</p>
<p><u>C11-5 Vehicle Speed Sensor Output Check</u></p> <ul style="list-style-type: none"> <li>. Turn cruise on/off switch to off.</li> <li>. Select "VSS STATUS" display using the DDL Reader selector switch.</li> <li>. Drive vehicle while noting display (vehicle must be moving).</li> </ul>	<p>Display reads "OFF". —————&gt;</p> <p>Display reads "RUNNING". —————&gt;</p>	<p>Go to C11-6.</p> <p>Go to 58-5.</p>
<p><u>C11-6 Resistance Check</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B harness connector.</li> <li>. Read resistance between sockets S1 and S2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 3,000 ohms. —————&gt;</p> <p>Greater than 3,000 ohms or open. —————&gt;</p>	<p>Go to C11-7.</p> <p>Go to C11-8.</p>



ECM J1B Harness Connector  
P/N 12034400

### Cruise Control Circuits

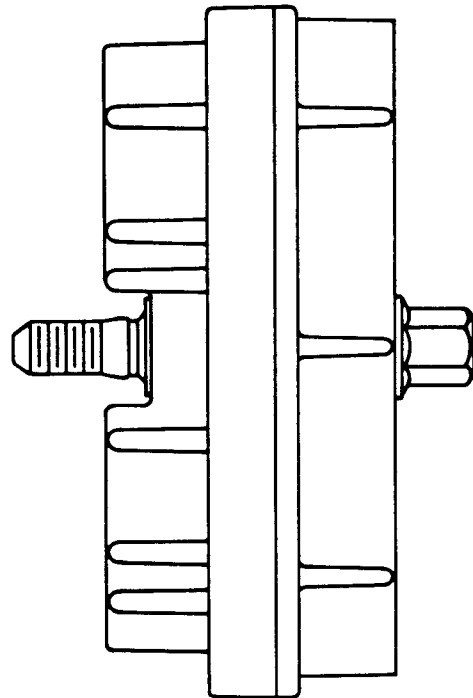
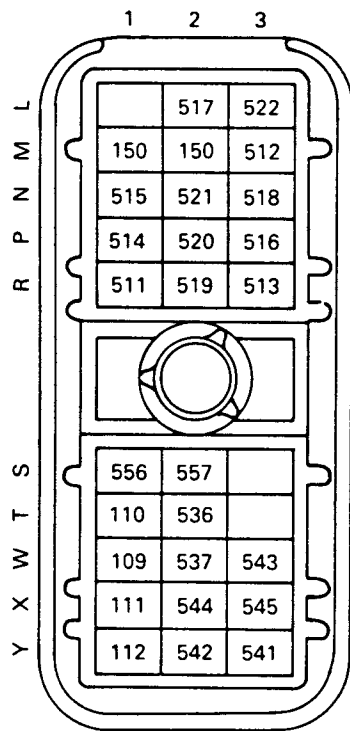


\*Note: All switches are shown in the "off" position.  
\*\*Note: (Some applications may have circuit breakers instead of fuses).

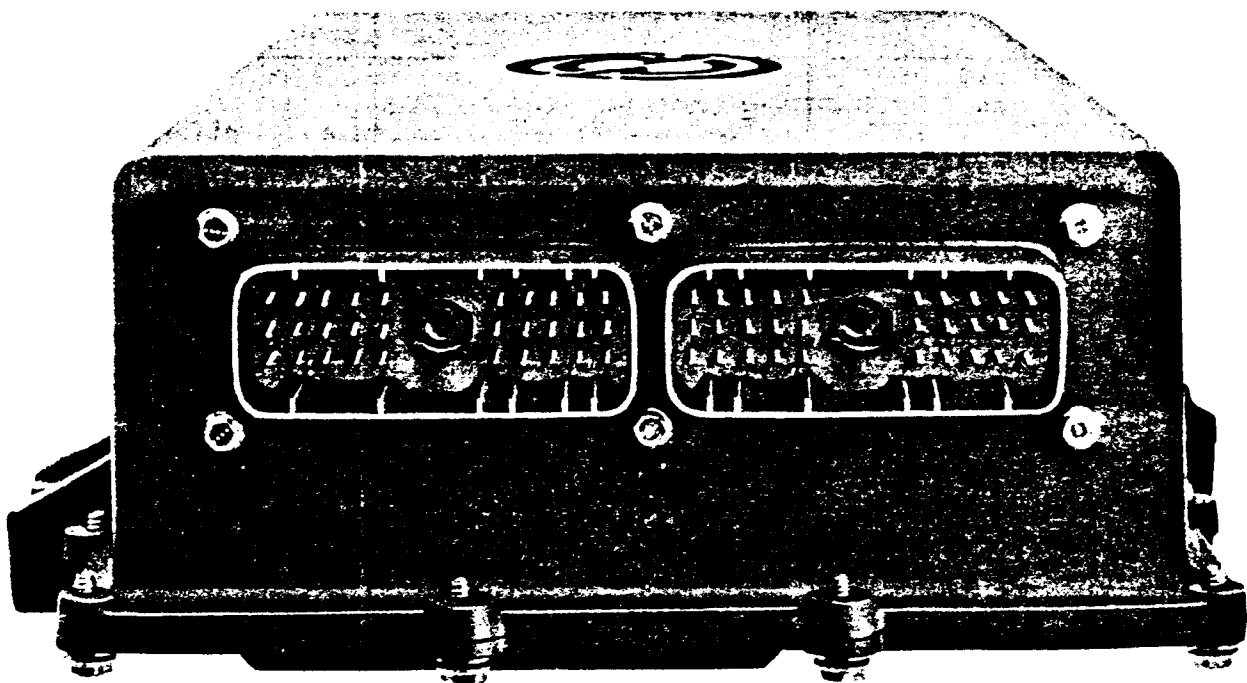
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 11 - CRUISE CONTROL INOPERATIVE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C11-7 Check for Short</u></p> <ul style="list-style-type: none"> <li>• Disconnect the Vehicle Speed Sensor (VSS) connector.</li> <li>• Again, read resistance between sockets S1 and S2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>VSS signal line (ckt #556) is shorted to the return line (ckt #557). Repair short. Then go to C11-30.</p> <p>Go to C11-9.</p>
<p><u>C11-8 Check for Open</u></p> <ul style="list-style-type: none"> <li>• Disconnect the VSS connector..</li> <li>• Install a jumper wire between the two sockets of the VSS harness connector.</li> <li>• Again, read resistance between sockets S1 and S2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to C11-9.</p> <p>VSS signal line (ckt #556) or return line (ckt #557) is open. Repair open. Then go to C11-30.</p>
<p><u>C11-9 Check Vehicle Speed Sensor</u></p> <ul style="list-style-type: none"> <li>• Read resistance of the Vehicle Speed Sensor.</li> </ul>	<p>Less than 50 ohms. —————&gt;</p> <p>From 50 to 3,000 ohms. —————&gt;</p> <p>Greater than 3,000 ohms or open. —————&gt;</p>	<p>Go to C11-10.</p> <p>Go to C11-11.</p> <p>Go to C11-10.</p>



ECM J1B Harness Connector  
P/N 12034400



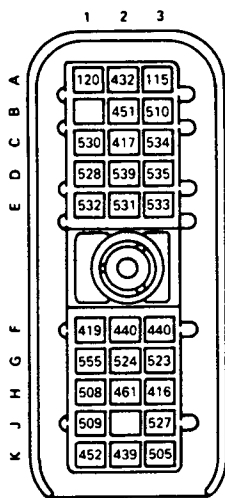
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

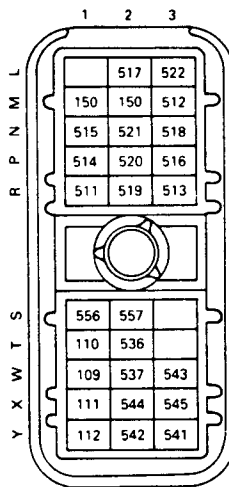
D. CHART 11 - CRUISE CONTROL INOPERATIVE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C11-10 Check VSS Connectors</u></p> <ul style="list-style-type: none"> <li>. Inspect terminals at the VSS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace VSS. Then go to C11-30.</p> <p>→ Repair terminals/connectors. Then go to C11-30.</p>
<p><u>C11-11 Vehicle Speed Mechanical Checks</u></p> <ul style="list-style-type: none"> <li>. Check if any metal, etc., is lodged between the VSS and the pulse wheel.</li> <li>. Check if sensor is loose.</li> <li>. Make sure VSS pulse wheel is in a fixed position relative to the mag. pick-up.</li> <li>. Check air gap between mag. pick-up and pulse wheel.</li> </ul>	<p>Okay. —————→</p> <p>Not okay. —————→</p>	<p>→ Go to C11-12.</p> <p>→ Repair. Then go to C11-30.</p>
<p><u>C11-12 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connector (J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace ECM. Then go to C11-30.</p> <p>→ Repair terminals/connectors. Then go to C11-30.</p>

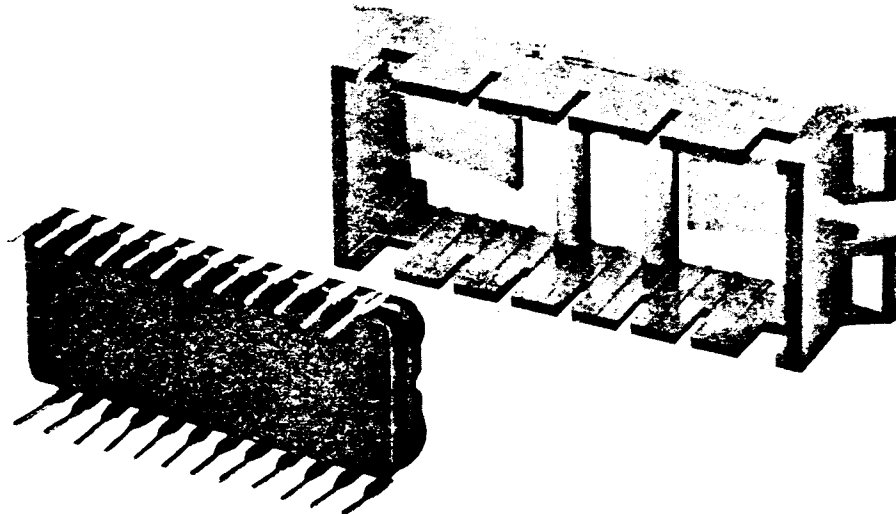




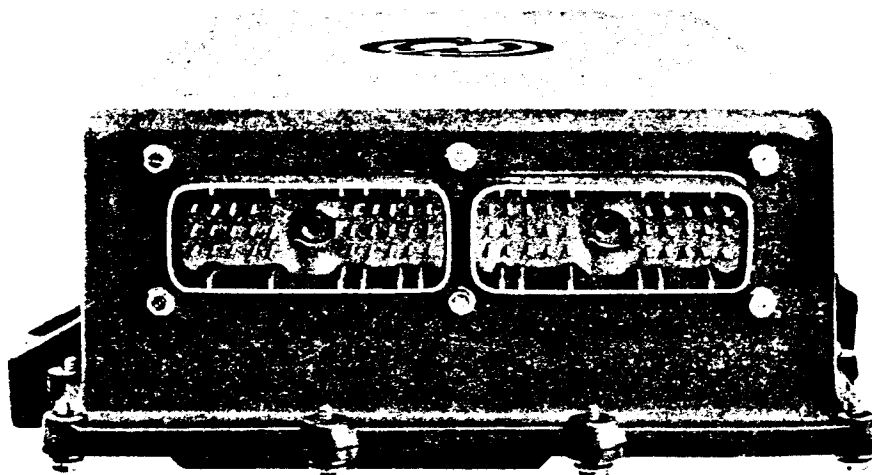
ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400



Calibration PROM



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 11 - CRUISE CONTROL INOPERATIVE (Cont'd.)

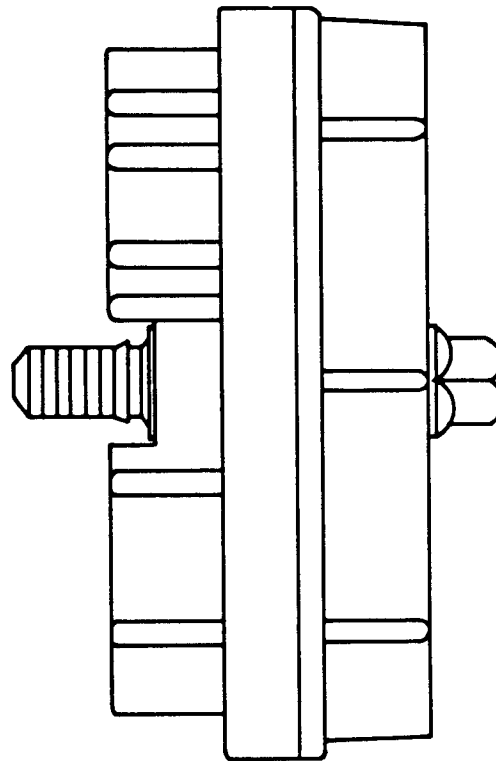
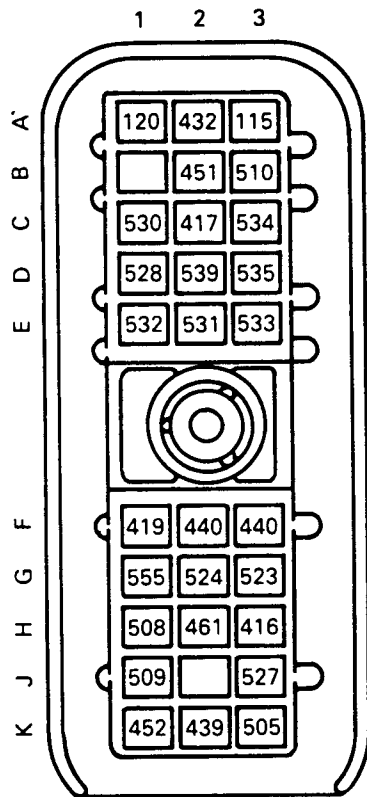
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C11-13 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Go to C11-14.</p> <p>→ Repair terminals/connectors. Then go to C11-30.</p>
<p>C11-14 PROM Damage Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove calibration PROM per instructions in Section 3-C.</li> <li>. Check for damaged pins.</li> <li>. Also check for proper PROM calibration number (see Appendix for details).</li> </ul>	<p>Appears to be okay and PROM number is correct.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to C11-30.</p> <p>→ Go to C11-15.</p>
<p>C11-15 Replace PROM</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Replace PROM (with a correct PROM) per instructions in Section 3-C.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Verify if cruise control now works by road testing it.</li> </ul>	<p>Cruise control now operative.</p> <p>Cruise control still inoperative.</p>	<p>→ Repairs are complete.</p> <p>→ Replace ECM. Then go to C11-30.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 11 - CRUISE CONTROL INOPERATIVE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C11-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Reinsert PROM if still out.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Verify if cruise control now works by road testing it.</li> </ul>	<p>Cruise control now operative. →</p> <p>Cruise control still inoperative. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p>

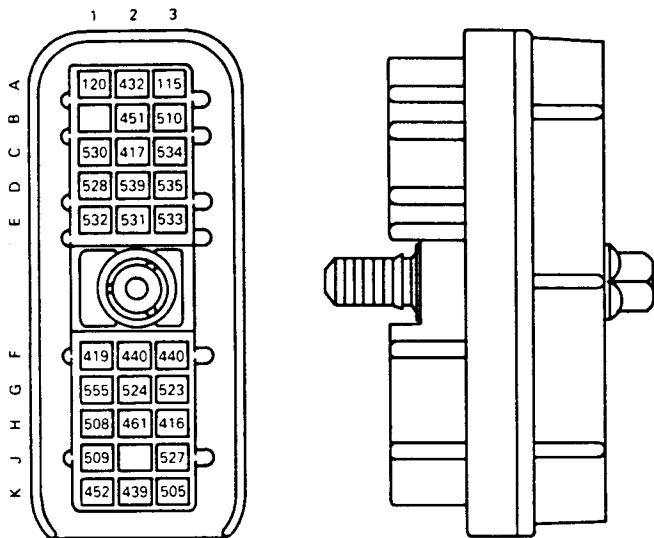


ECM J1A Harness Connector  
P/N 12034398

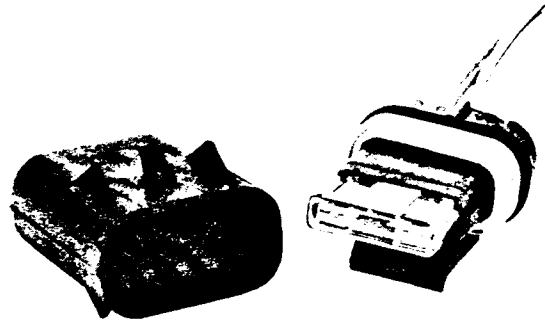
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 12 - NO "CRUISE ENABLE" LIGHT

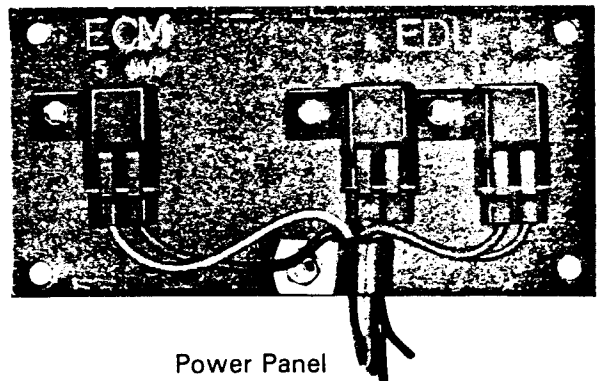
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C12-1 Determine "Cruise Enable" Light Status</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light does not come on at all.</p> <p>"Cruise Enable" light comes on for up to 5 seconds, then goes out.</p> <p>"Cruise Enable" light comes on and stays on.</p>	<p>→ Go to C12-2.</p> <p>→ Light is operational. If cruise control is inoperative. Go to C11-3.</p> <p>→ Go to C13-2.</p>
<p><u>C12-2 Try to Force "Cruise Enable" Light On</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A harness connector at the ECM.</li> <li>. Install a jumper wire between socket G1 on the J1A harness connector and a good ground.</li> <li>. Turn the ignition on (engine not running).</li> <li>. Note the "Cruise Enable" light status.</li> </ul>	<p>"Cruise Enable" light is still off.</p> <p>"Cruise Enable" light is on.</p>	<p>→ Go to C12-3.</p> <p>→ Go to C12-5.</p>
<p><u>C12-3 Bulb Check</u></p> <ul style="list-style-type: none"> <li>. Remove "Cruise Enable" light bulb and check whether it's burned out or otherwise damaged.</li> </ul>	<p>Bulb is okay.</p> <p>Bulb is not okay.</p>	<p>→ Go to C12-4.</p> <p>→ Replace bulb. Then go to C12-30.</p>



ECM J1A Harness Connector  
P/N 12034398

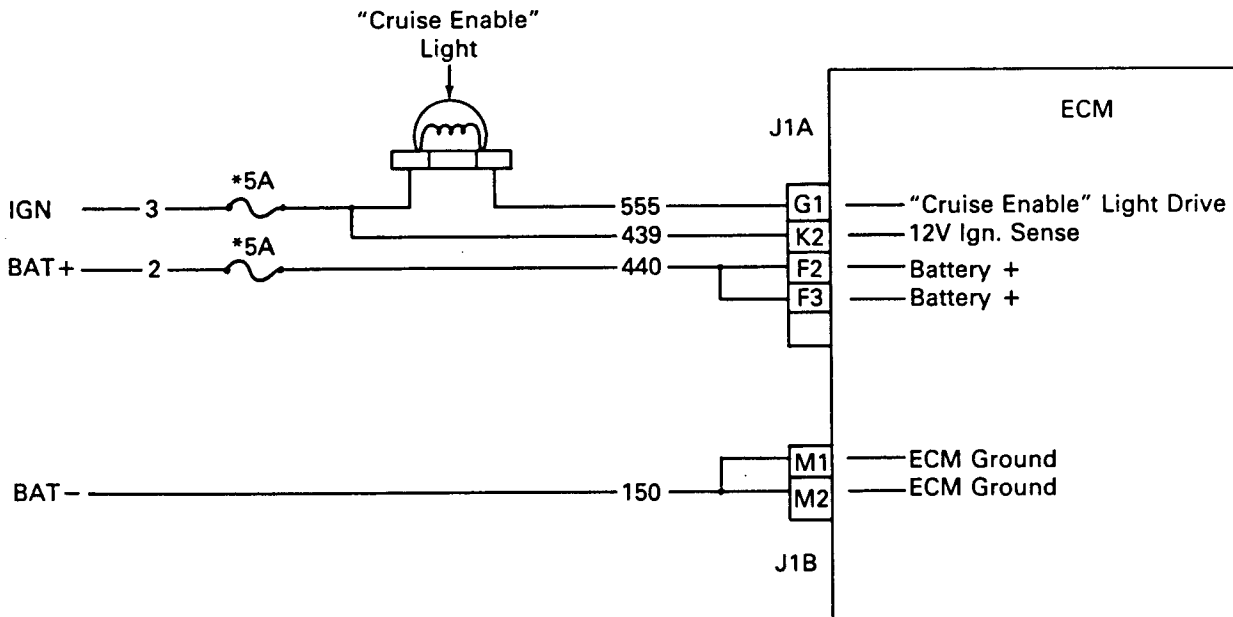


5 Amp Fuse



Power Panel

"Cruise Enable" and Ignition Circuits



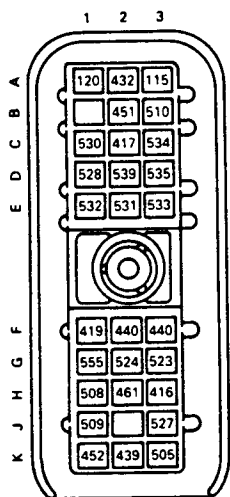
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

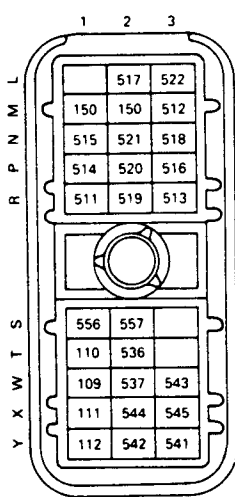
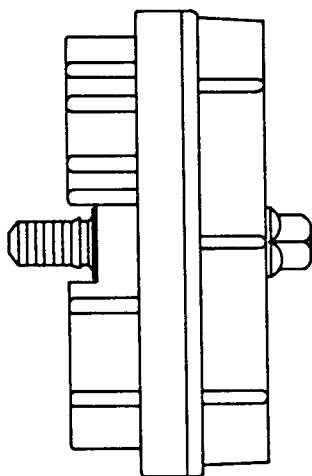
D. CHART 12 - NO "CRUISE ENABLE" LIGHT (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C12-4 Check for Short</p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts.</p> <p>Greater than or equal to 11.5 volts.</p>	<p>→ Either the 5 amp. ignition fuse is blown (or circuit breaker tripped) and/or the ignition line (ckt #439) is shorted to ground. Repair problem. Then go to C12-30.</p> <p>→ "Cruise Enable" light driver line (ckt #555) is open. Repair open. Then go to C12-30.</p>
<p>C12-5 Check for Open</p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Read voltage on J1A harness connector, socket K2 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts.</p> <p>Greater than or equal to 11.5 volts.</p>	<p>→ The ignition line (ckt #439) is open. Repair open. Then go to C12-30.</p> <p>→ Go to C12-6.</p>
<p>C12-6 Check for Bat +</p> <ul style="list-style-type: none"> <li>. Read voltage on J1A harness connector, socket F2 (red lead) to a good ground (black lead).</li> <li>. Also read voltage on socket F3 (red lead) to a good ground (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading.</p> <p>Greater than or equal to 11.5 volts on both readings.</p>	<p>→ Either the 5 amp. ECM fuse is blown (or circuit breaker tripped) and/or the Battery Power line(s) (ckt #440) has an open or short to ground. Repair problem. Then go to C12-30.</p> <p>→ Go to C12-7.</p>

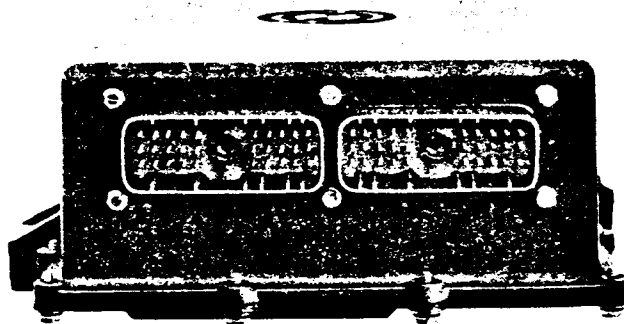
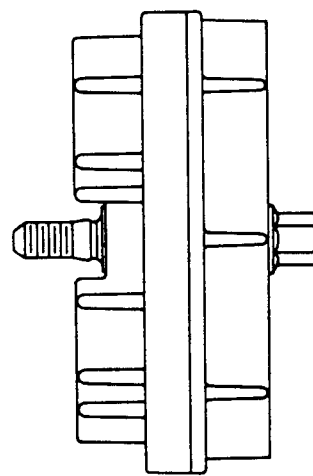




ECM J1A Harness Connector  
P/N 12034398

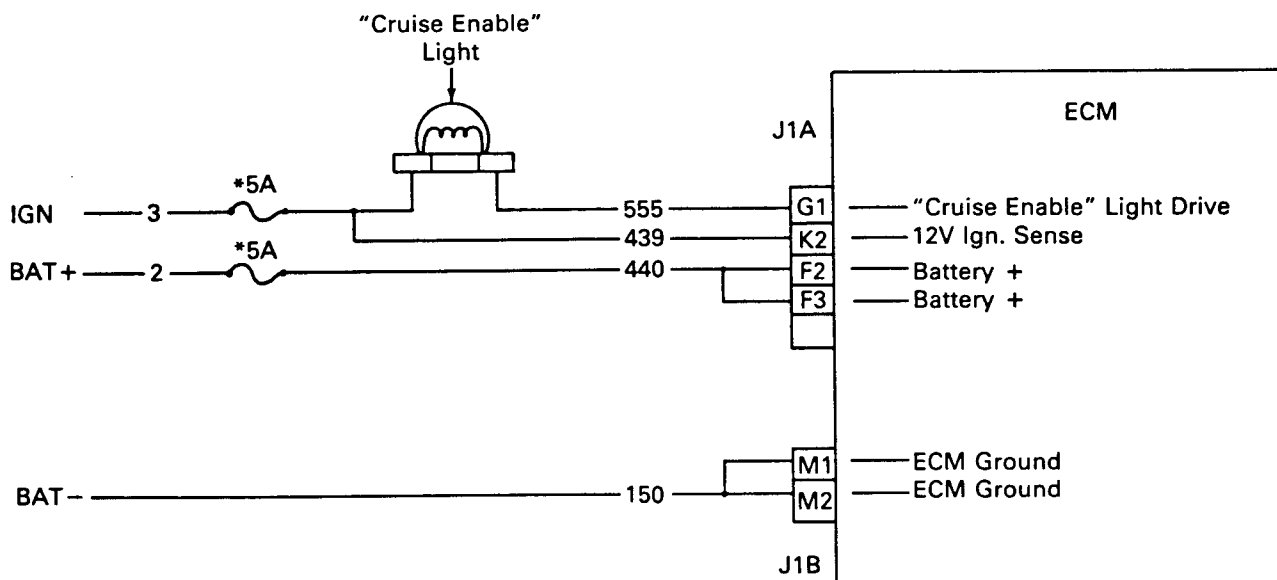


ECM J1B Harness Connector  
P/N 12034400



Electronic Control Module (ECM)

"Cruise Enable" and Ignition Circuits

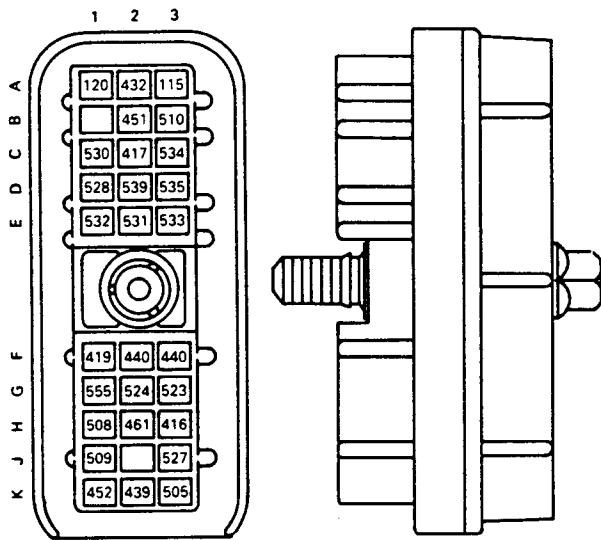


(\*Note: Some applications may have circuit breakers instead of fuses)

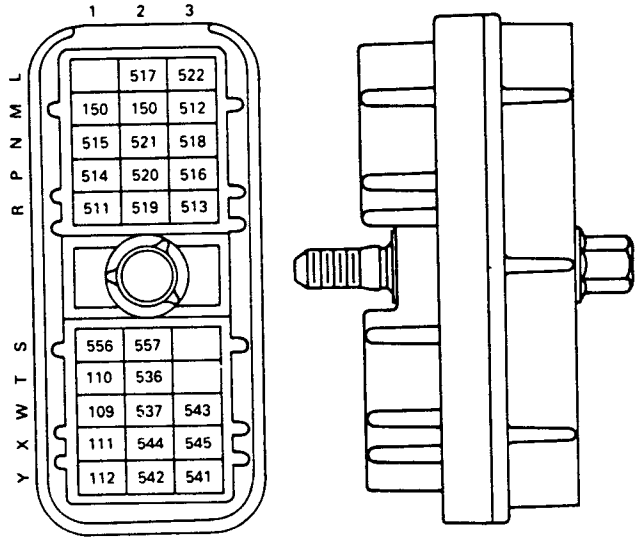
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 12 - NO "CRUISE ENABLE" LIGHT (Cont'd.)

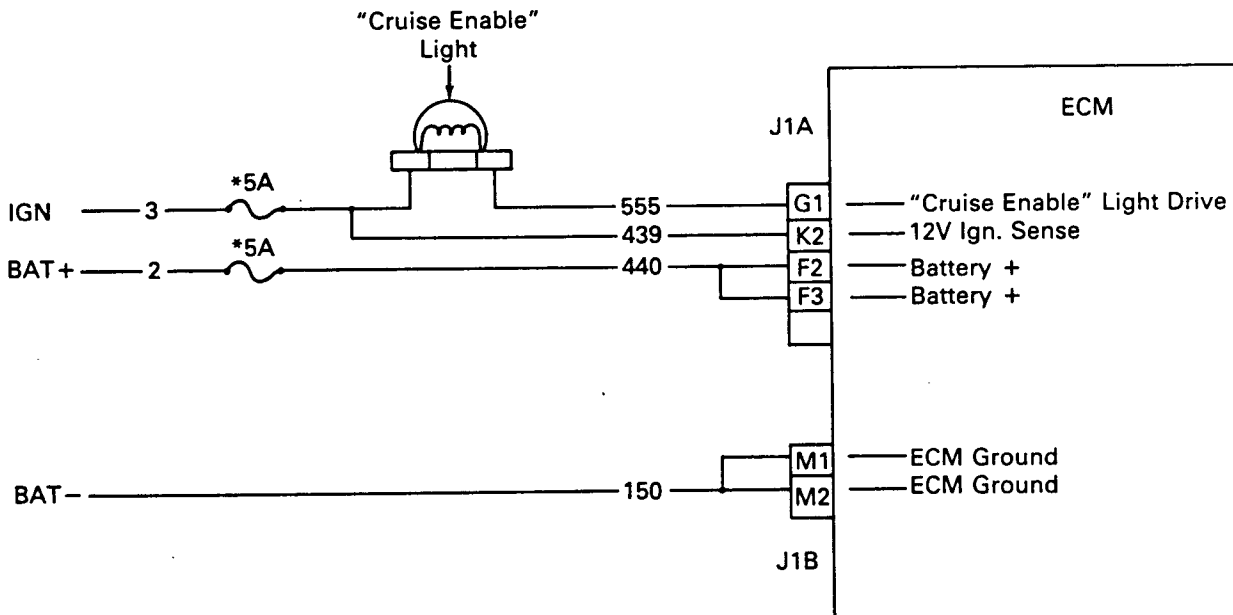
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C12-7 Check for Ground</p> <ul style="list-style-type: none"> <li>. Disconnect the J1B harness connector at the ECM.</li> <li>. Read voltage on J1A harness connector, socket F2 (red lead) to J1B harness connector, socket M1 (black lead).</li> <li>. Also read voltage on J1A harness connector, socket F2 (red lead) to J1B harness connector, socket M2 (black lead).</li> </ul>	<p>Less than 11.5 volts on either reading. —————→</p> <p>Greater than or equal to 11.5 volts on both readings. —————→</p>	<p>Ground line(s) (ckt #150) has an open. Repair open. Then go to C12-30.</p> <p>Go to C12-8.</p>
<p>C12-8 Check ECM Connectors</p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>Replace ECM. Then go to C12-30.</p> <p>Repair terminals/connectors. Then go to C12-30.</p>
<p>C12-30 Verify Repairs</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light comes on for up to 5 seconds, then goes out. —————→</p> <p>"Cruise Enable" light does not come on at all. —————→</p> <p>"Cruise Enable" light comes on and stays on. —————→</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1.</p>



ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400



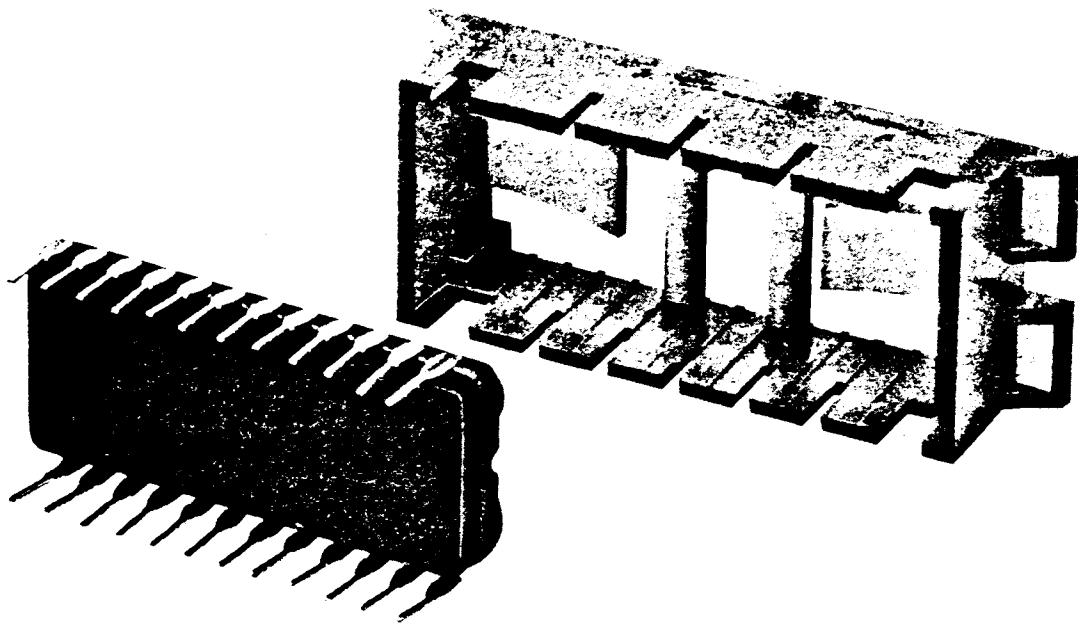
(\*Note: Some applications may have circuit breakers instead of fuses)

"Cruise Enable" and Ignition Circuits

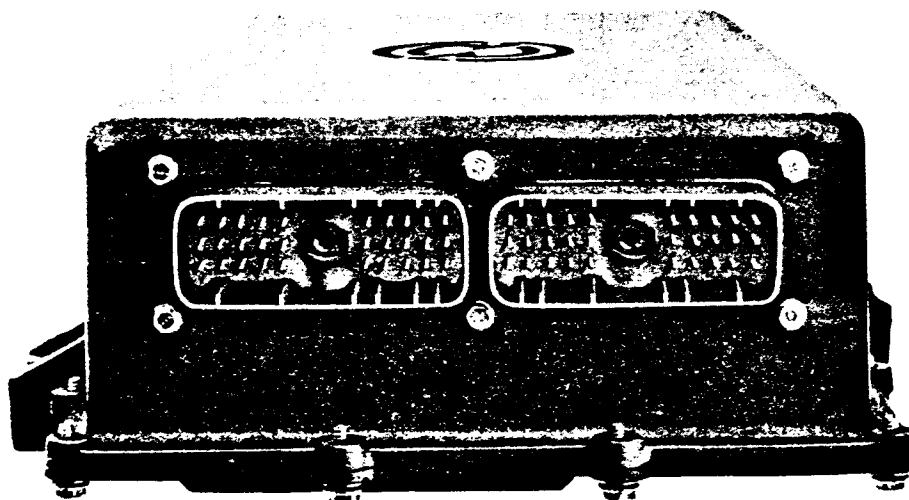
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 13 - "CRUISE ENABLE" LIGHT ALWAYS ON

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C13-1 Determine "Cruise Enable" Light Status</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light comes on and stays on. —————&gt;</p> <p>"Cruise Enable" light comes on for up to 5 seconds, then goes out. —————&gt;</p> <p>"Cruise Enable" light does not come on at all. —————&gt;</p>	<p>→ Go to C13-2.</p> <p>→ Light is operational. If cruise control is inoperative, go to C11-3.</p> <p>→ Go to C12-2.</p>
<p><u>C13-2 Check for Short</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A harness connector at the ECM.</li> <li>. Turn ignition on (engine not running) while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light comes on and stays on. —————&gt;</p> <p>"Cruise Enable" light stays off. —————&gt;</p>	<p>→ "Cruise Enable" light driver line (ckt #555) is shorted to ground. Repair short. Then go to C13-30.</p> <p>→ Go to C13-3.</p>
<p><u>C13-3 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>→ Go to C13-4.</p> <p>→ Repair terminals/connectors. Then go to C13-30.</p>



Calibration PROM



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 13 - "CRUISE ENABLE" LIGHT ALWAYS ON (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>C13-4 PROM Damage Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove calibration PROM per instructions in Section 3-C.</li> <li>. Check for damaged pins.</li> <li>. Also check for proper PROM calibration number (see Appendix for details).</li> </ul>	<p>Appears to be okay and PROM number is correct. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace ECM. Then go to C13-30.</p> <p>Go to C13-5.</p>
<p>C13-5 Replace PROM</p> <hr/> <ul style="list-style-type: none"> <li>. Replace PROM (with a correct PROM) per instructions in Section 3-C.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light comes on stays on. —————&gt;</p> <p>"Cruise Enable" light comes on for up to 5 seconds, then goes out. —————&gt;</p> <p>"Cruise Enable" light does not come on at all. —————&gt;</p>	<p>Replace ECM. Then go to C13-30.</p> <p>Repairs are complete.</p> <p>Go to C12-2.</p>
<p>C13-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Replace PROM if still out.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on while at the same time observing the "Cruise Enable" light.</li> </ul>	<p>"Cruise Enable" light comes on for up to 5 seconds, then goes out. —————&gt;</p> <p>"Cruise Enable" light is always on or does not come on at all. —————&gt;</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p>



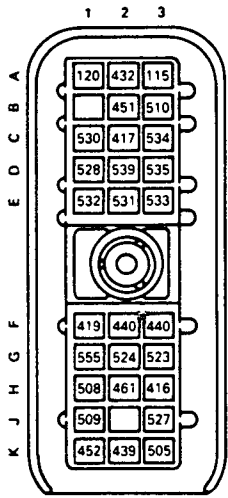
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 14 - POOR PERFORMANCE AND NO CODES

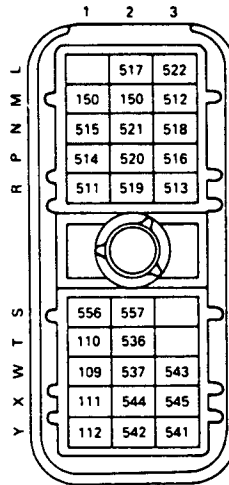
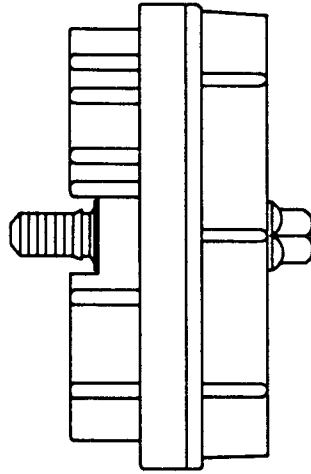
This is a helpful hints chart. It assumes that you have received no codes, have made all the basic mechanical checks first, could not find the problem, and now suspect the DDEC system to be at fault. Based on the particular symptom, here's what to look for:

SYMPTOM	WHAT TO LOOK FOR
1. Can't get full throttle/power.	<ul style="list-style-type: none"><li>- Miscalibrated Throttle Position Sensor (TPS). See Step 21-4 for TPS adjustment.</li><li>- Hose not connected to Turbo Boost Pressure Sensor (TBS).</li></ul>
2. Runs rough, misses and/or occasionally stalls.	<ul style="list-style-type: none"><li>- Proper gapping of Timing Reference &amp; Synchronous Reference Sensors (SRS and TRS). See Step 41-6 or 42-6 on how to check this.</li><li>- Loose battery power (ckt #440), ignition (ckt #439) or ground (ckt #150 or #151) wires.</li><li>- Check pulley pulse wheel: missing teeth, dented, or loose.</li><li>- Check power contribution from each cylinder using the cylinder cut-out feature described in DDL Reader instruction manual.</li></ul>
3. Engine idles high (after warm-up) or hangs during shift.	<ul style="list-style-type: none"><li>- Check calibration of the Throttle Position Sensor (TPS) using procedure in step 21-4. You may have a TPS, linkage or pedal problem.</li></ul>
4. Low road speed.	<ul style="list-style-type: none"><li>- Determine road speed specifications from vehicle manufacturer data. If road speed is less than specified and all mechanical (driveline, speedometer) checks are correct, then the PROM is suspect. Identify the requirements described in the Appendix and replace the PROM per instructions in Section 3-C.</li></ul>

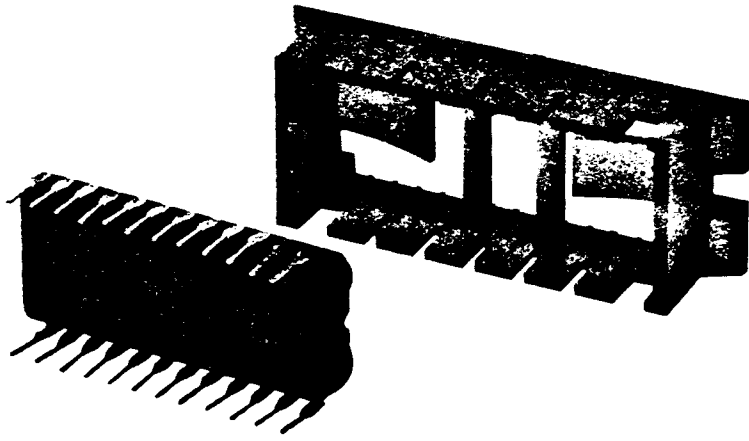
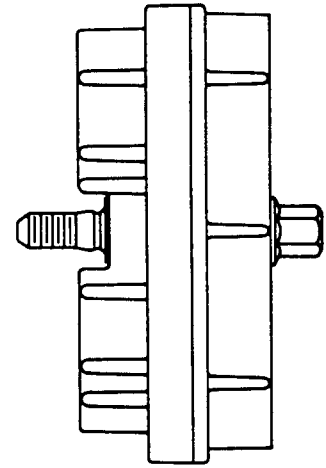




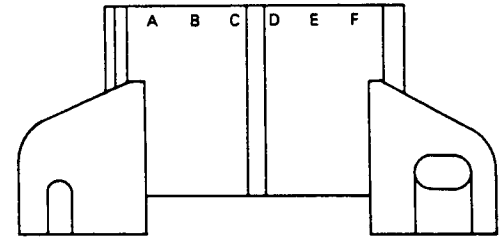
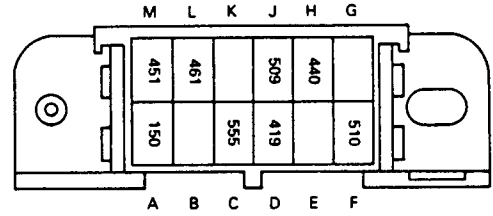
ECM J1A Harness Connector  
P/N 12034398



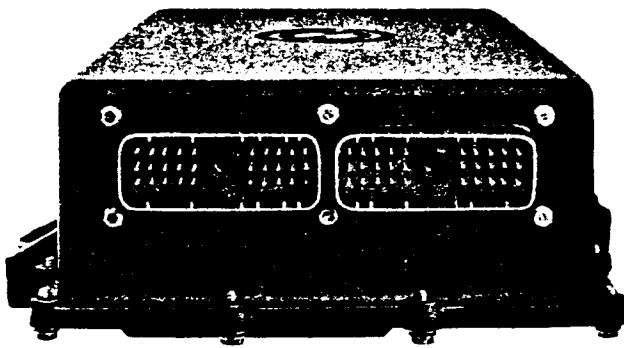
ECM J1B Harness Connector  
P/N 12034400



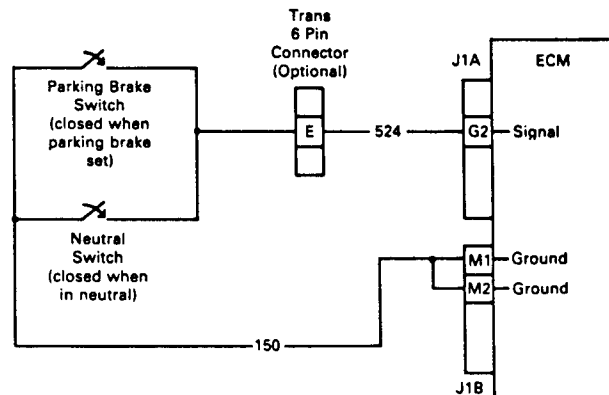
Calibration PROM



12 Pin DDL Connector  
P/N 12020043



Electronic Control Module (ECM)

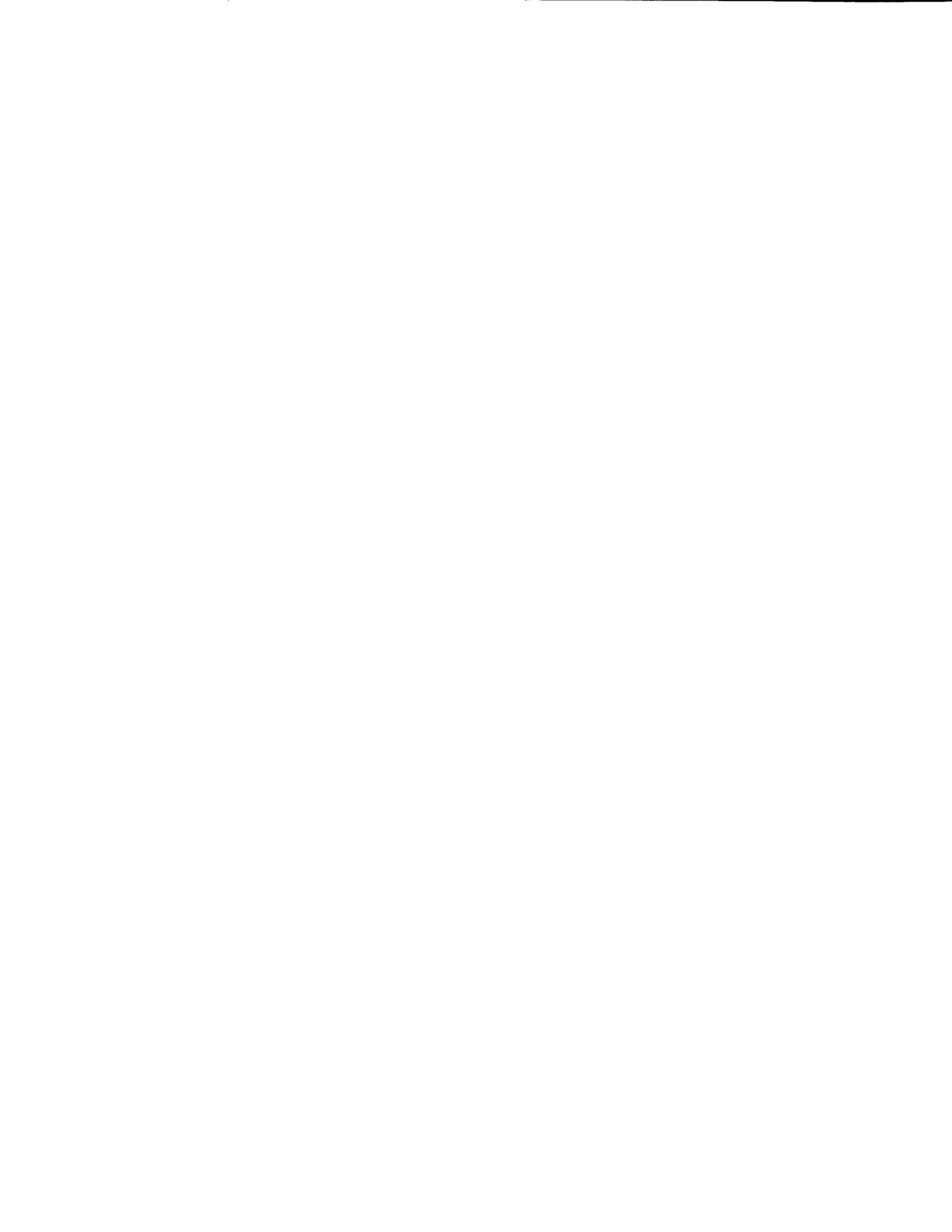


Idle Shut-Down Circuit

SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 15 - IDLE SHUTDOWN FEATURE (OPTIONAL) NOT OPERATIONAL (DOESN'T SHUT DOWN ENGINE AFTER 5 MINUTES OF IDLE)

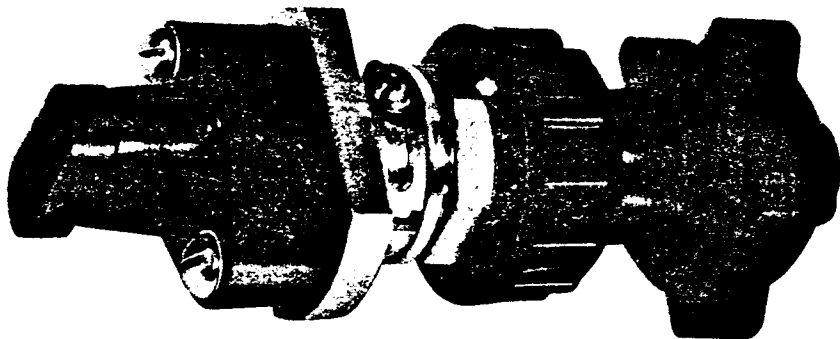
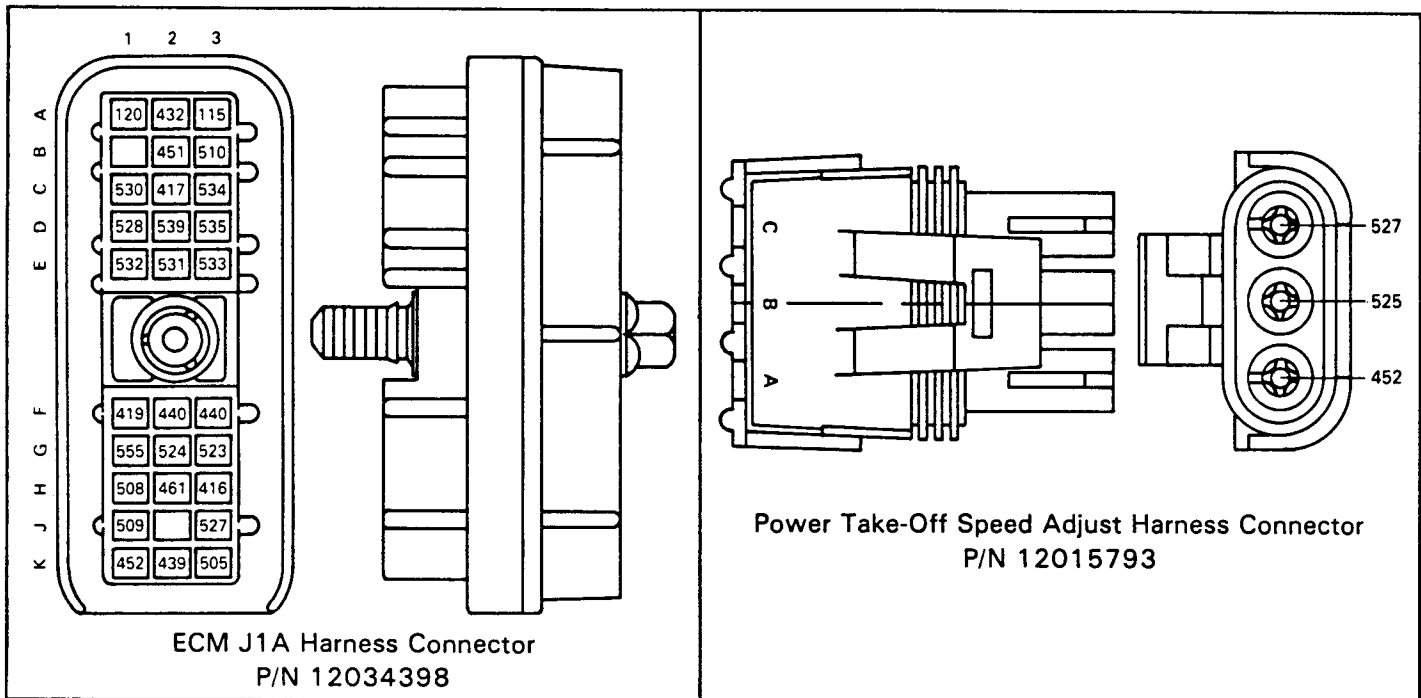
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>C15-1 Verify Operation of Switches</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Make sure vehicle is in neutral and apply parking brake.</li> <li>. Plug the DDL Reader into the 12-pin DDL connector.</li> <li>. Select Power Ctl. using the DDL Reader selector switch.</li> <li>. Turn ignition on and note the reader display.</li> </ul>	<p>Display reads "ON". →</p> <p>Display reads "OFF". →</p>	<p>Go to C15-2.</p> <p>The Power Control line (ckt #524) is open or the parking brake or neutral switch is open or not making contact. Repair open or replace switches as appropriate. (If no problem found, go to C15-3.) Then go to C15-30.</p>
<p><u>C15-2 Verify if Correct PROM</u></p> <ul style="list-style-type: none"> <li>. Refer to the Appendix to determine if you have the correct PROM for this feature.</li> </ul>	<p>Yes. →</p> <p>No. →</p>	<p>Go to C15-3.</p> <p>Replace PROM with correct PROM, using instructions in Section 3-C. Then go to C15-30.</p>
<p><u>C15-3 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM harness connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to C15-30.</p> <p>Repair terminals/connectors. Then go to C15-30.</p>



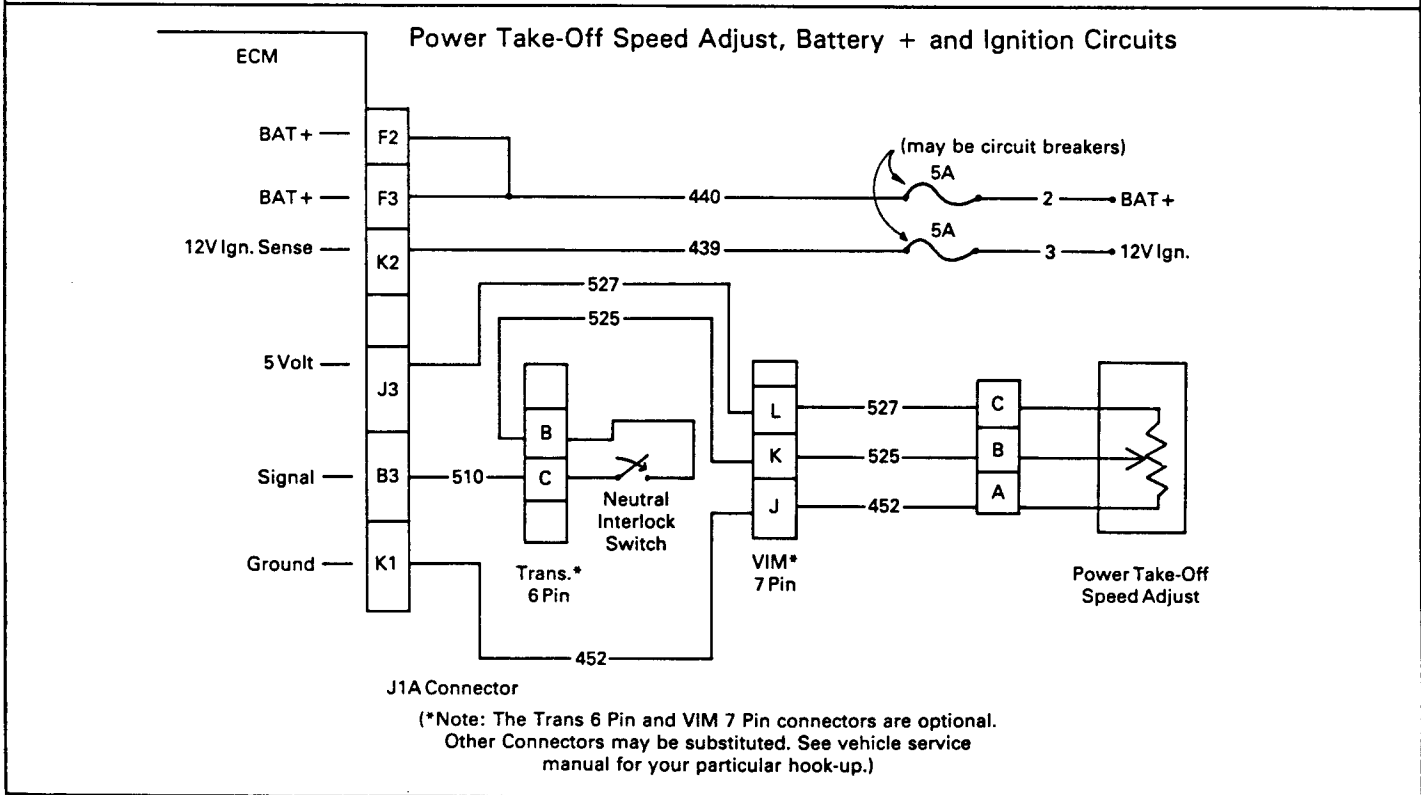
SECTION 4  
TROUBLESHOOTING CHARTS

D. CHART 15 - IDLE SHUTDOWN FEATURE (OPTIONAL) NOT OPERATIONAL (DOESN'T SHUT DOWN ENGINE AFTER 5 MINUTES OF IDLE) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>CT15-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Make sure vehicle is in neutral, and apply parking brake.</li> <li>. Start and run engine at idle.</li> <li>. Wait about 5 to 6 minutes and check that engine shuts down.</li> </ul>	<p>Engine shuts down. —————→</p> <p>Engine does not shut down. —————→</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p>



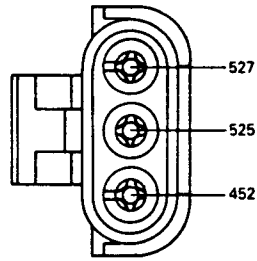
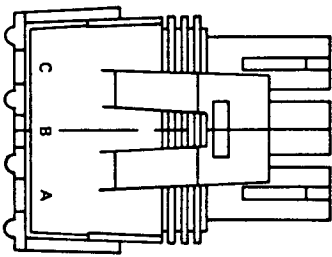
**Power Take-Off Speed Adjust Sensor (PTOSA)**



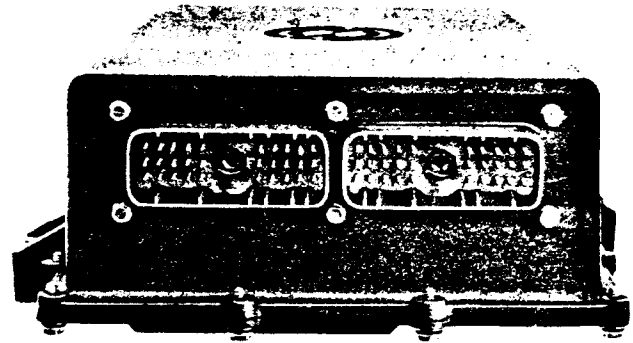
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 12 - POWER TAKE-OFF SPEED ADJUST (PTOSA) HIGH

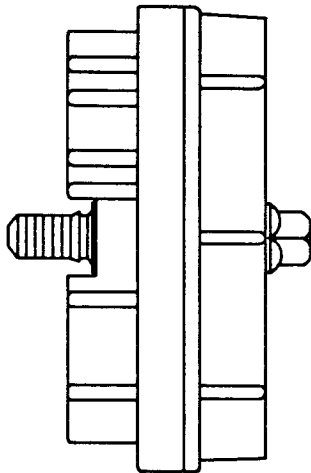
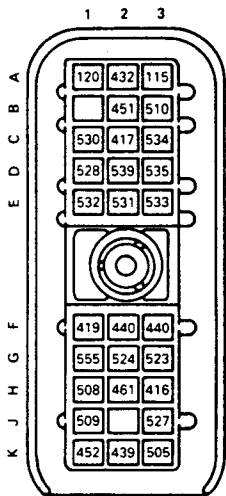
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>T2-1 Multiple Code Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 12?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 35, 36. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>→ Go to 12-2.</p> <p>→ Go to 5VR-1.</p> <p>→ Go to 12-2.</p>
<p><b>T2-2 Sensor Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Unplug the PTOSA sensor connector.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (or any other code except Code 12). —————→</p> <p>Code 12 (and any other codes). —————→</p>	<p>→ Go to 12-3.</p> <p>→ Go to 12-5.</p>
<p><b>T2-3 Ground Circuit Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Transmission in neutral.</li> <li>. Turn ignition off.</li> <li>. Install a jumper wire between pin A and pin B of the PTOSA harness connector.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets B3 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>→ Go to 12-4.</p> <p>→ Ground line (ckt #452) is open. Repair open. Then go to 12-30.</p>



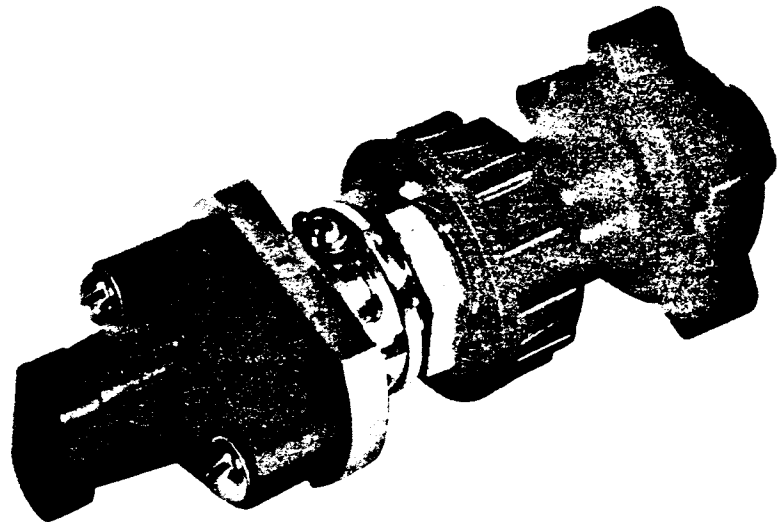
Power Take-Off Speed Adjust Harness Connector  
P/N 12015793



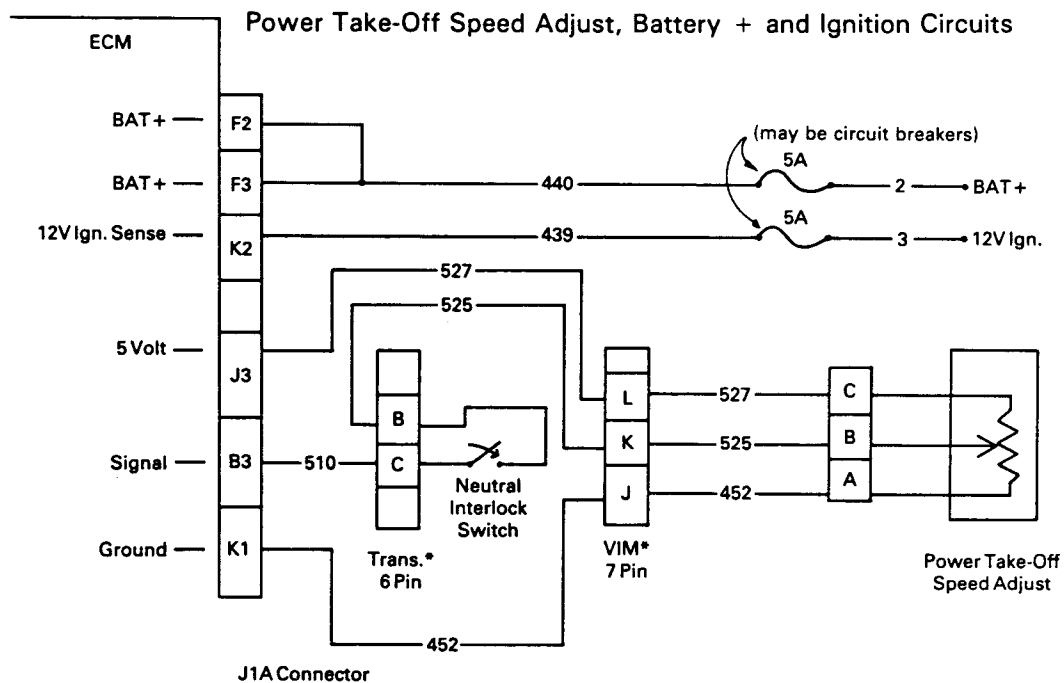
Electronic Control Module (ECM)



ECM J1A Harness Connector  
P/N 12034398



Power Take-Off Speed Adjust Sensor  
(PTOSA)



(\*Note: The Trans 6 Pin and VIM 7 Pin connectors are optional.  
Other Connectors may be substituted. See vehicle service  
manual for your particular hook-up.)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 12 - POWER TAKE-OFF SPEED ADJUST (PTOSA) HIGH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>T2-4 Check PTOSA Connectors</u></p> <p>Inspect terminals at the PTOSA connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</p>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace PTOSA sensor. Then go to 12-30.</p> <p>→ Repair terminals/connectors. Then go to 12-30.</p>
<p><u>T2-5 Check for Short to +5 Volt Line</u></p> <p>Read voltage on PTOSA harness connector, pin B (red lead) to pin A (black lead).</p>	<p>Greater than 1.0 volts.</p> <p>Less than or equal to 1.0 volts.</p>	<p>→ Signal line (ckt #510) is shorted to the +5 Volt line (ckt #527). Repair short. Then go to 12-30.</p> <p>→ Go to 12-6.</p>
<p><u>T2-6 Check ECM Connectors</u></p> <p>Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</p>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 12-30.</p> <p>→ Repair terminals/connectors. Then go to 12-30.</p>

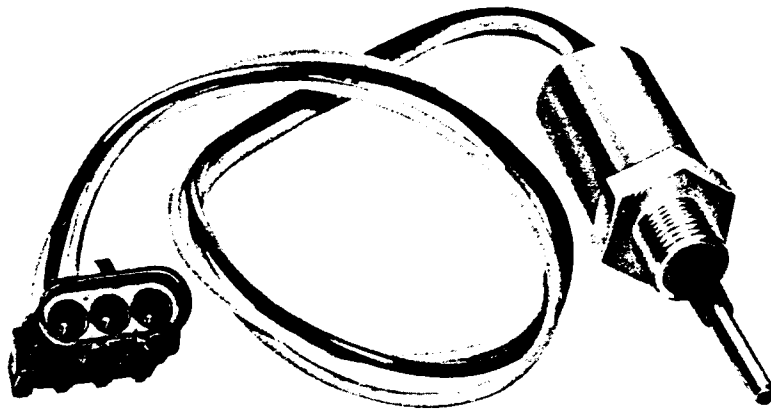




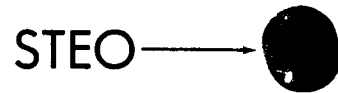
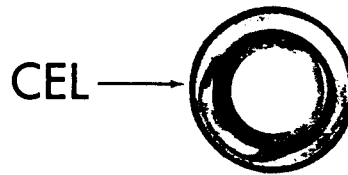
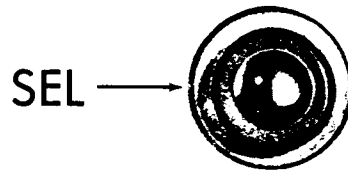
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 12 - POWER TAKE-OFF SPEED ADJUST (PTOSA) HIGH (Cont'd.)

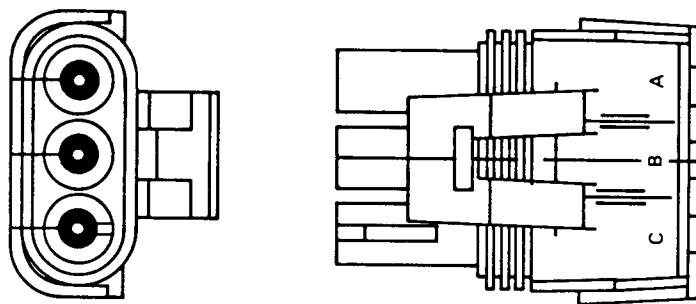
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>T2-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 12 (and any other codes).</p> <p>Any other codes except Code 12.</p>	<p>→ Repairs are complete.</p> <p>→ All System diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



Coolant Level Sensor



Dash Lights

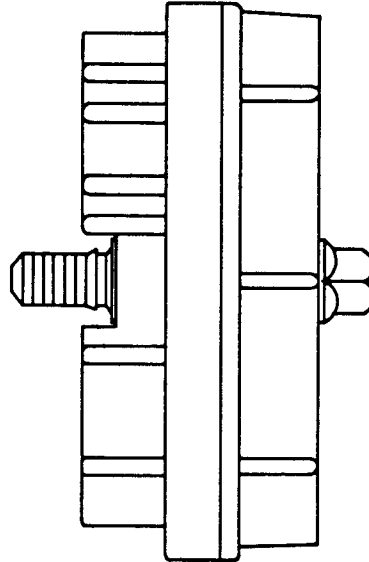
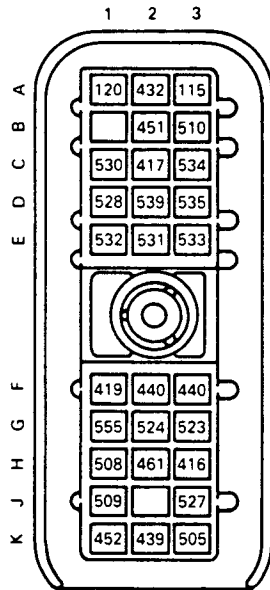


Coolant Level Sensor Harness Connector  
P/N 12015795

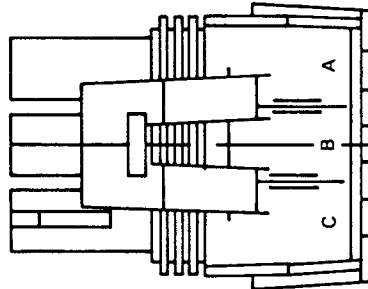
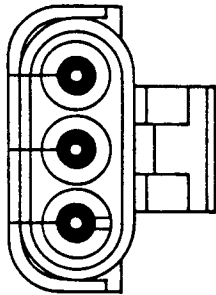
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 13 - COOLANT LEVEL SENSOR (CLS) LOW

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>T3-1 Sensor Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect CLS connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 16 (and any other codes except Code 13).</p> <p>Code 13 (and any other codes except Code 16).</p>	<p>→ Go to 13-2.</p> <p>→ Go to 13-3.</p>
<p><b>T3-2 Check CLS Connectors</b></p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the CLS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace CLS. Then go to 13-30.</p> <p>→ Repair terminals/ connectors. Then go to 13-30.</p>

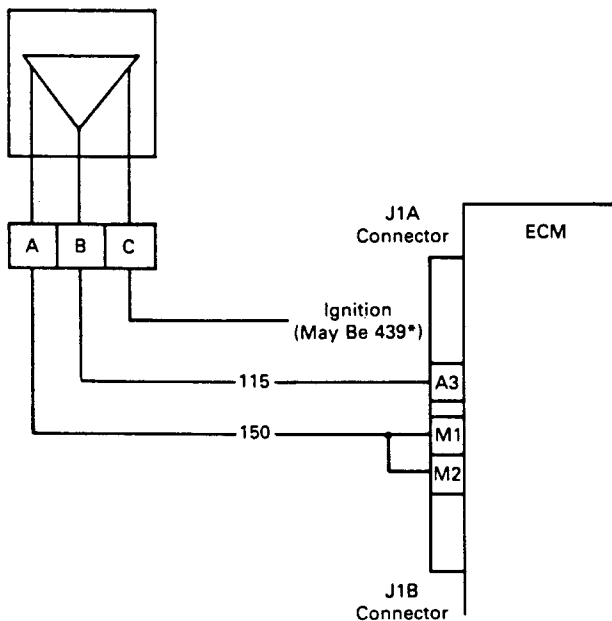


ECM J1A Harness Connector  
P/N 12034398

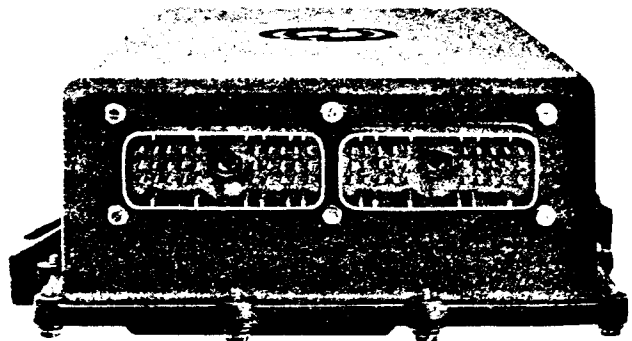


Coolant Level Sensor Harness Connector  
P/N 12015795

Coolant Level Sensor Circuit



(\*Note: If 439 used, wire goes to socket 2K of the J1A Connector)

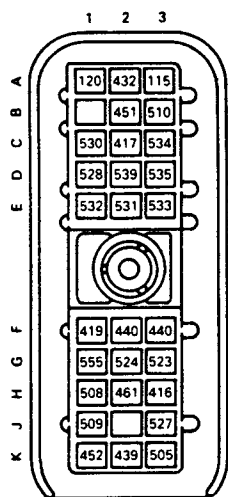


Electronic Control Module (ECM)

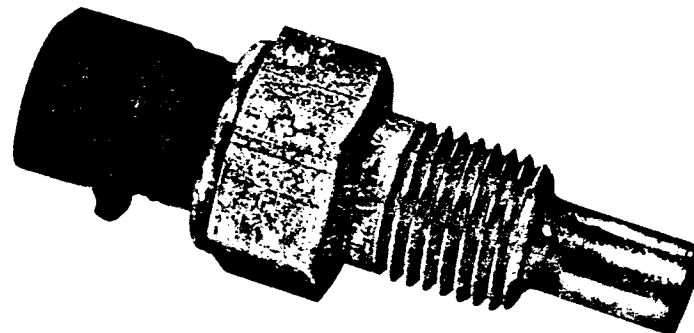
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 13 - COOLANT LEVEL SENSOR (CLS) LOW (Cont'd.)

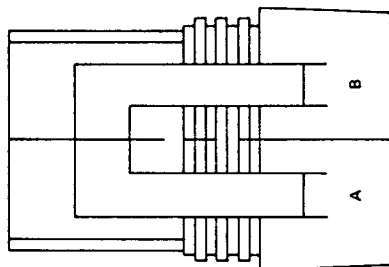
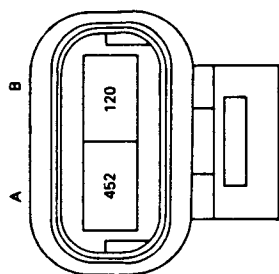
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>T3-3 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect J1A harness connector at the ECM.</li> <li>• Read resistance between sockets A and B on the CLS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Signal line (ckt #115) is shorted to the CLS ground line (ckt #150). Repair short. Then go to 13-30.</p> <p>→ Go to 13-4.</p>
<p>T3-4 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the ECM harness connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 13-30.</p> <p>→ Repair terminals/ connectors. Then go to 13-30.</p>
<p>T3-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Reconnect all connectors.</li> <li>• Clear codes.</li> <li>• Turn ignition on.</li> <li>• Note status of "Check Engine" light.</li> <li>• If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>• Stop engine.</li> <li>• Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 13 (and any other codes).</p> <p>Any other codes except Code 13.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



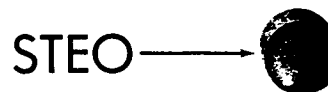
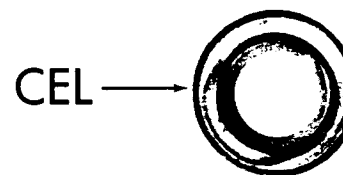
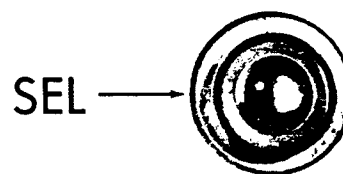
ECM J1A Harness Connector  
P/N 12034398



Oil Temperature Sensor  
(OTS)

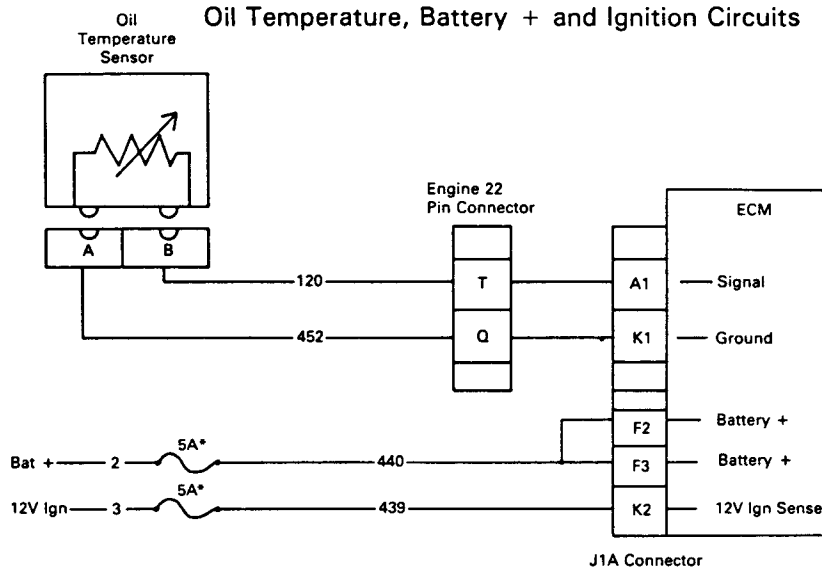


Oil Temperature Sensor Harness Connector  
P/N 12040753



Dash Lights

### Oil Temperature, Battery + and Ignition Circuits



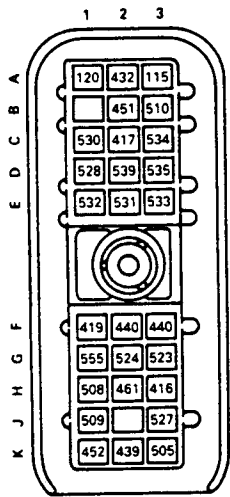
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

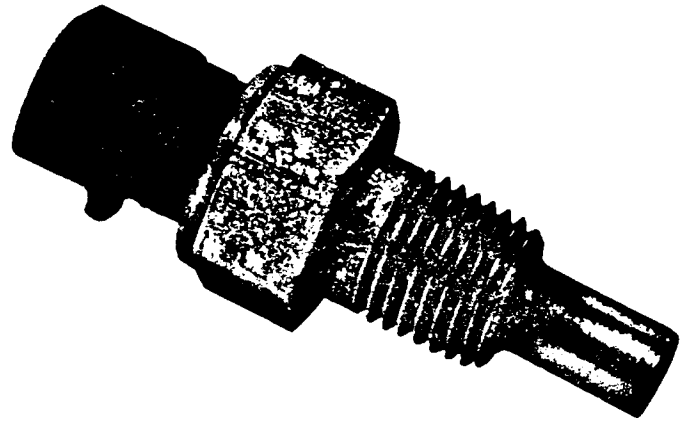
E. CODE 14 - OIL TEMPERATURE SENSOR (OTS) COLD

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>14-1 Multiple Code Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 14?</li> </ul>	<p>No other codes. —————&gt;</p> <p>Yes. Any or all of the following codes: 15, 21, 22, 33, 34. —————&gt;</p> <p>Yes, but none of the above. —————&gt;</p>	<p>→ Go to 14-2.</p> <p>→ Go to 5VM-1.</p> <p>→ Go to 14-2.</p>
<p><b>14-2 Sensor Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect OTS and install a jumper between the OTS harness connector sockets.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 15 (or any other codes except Code 14). —————&gt;</p> <p>Code 14 (and any other codes). —————&gt;</p>	<p>→ Go to 14-3.</p> <p>→ Go to 14-5.</p>
<p><b>14-3 Check for Short to +5 Volt Line</b></p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Disconnect J1A harness connector at the ECM.</li> <li>. Read resistance between sockets A1 and H3 on the J1A harness connector.</li> <li>. Also read resistance between sockets A1 and J3 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms on either reading. —————&gt;</p> <p>Greater than 10,000 ohms (or open) on both readings. —————&gt;</p>	<p>→ Signal line (ckt #120) is shorted to the +5 Volt line (ckt #416 or #527). Repair short. Then go to 14-30.</p> <p>→ Go to 14-4.</p>

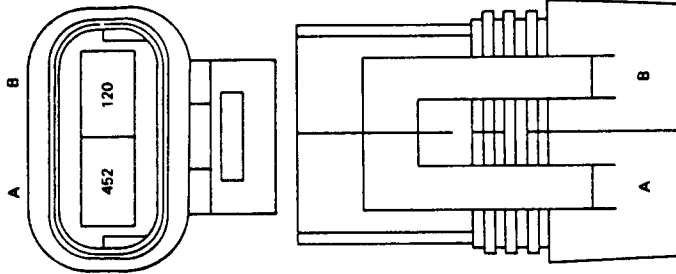




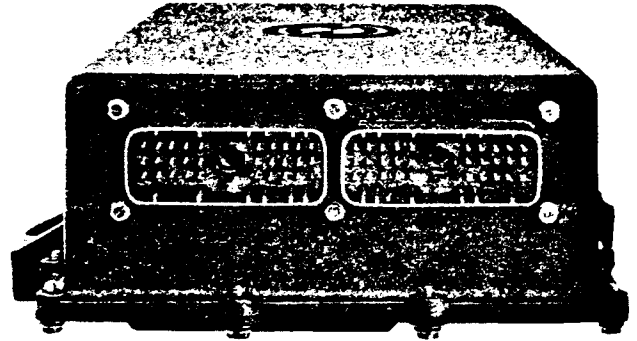
ECM J1A Harness Connector  
P/N 12034398



Oil Temperature Sensor  
(OTS)

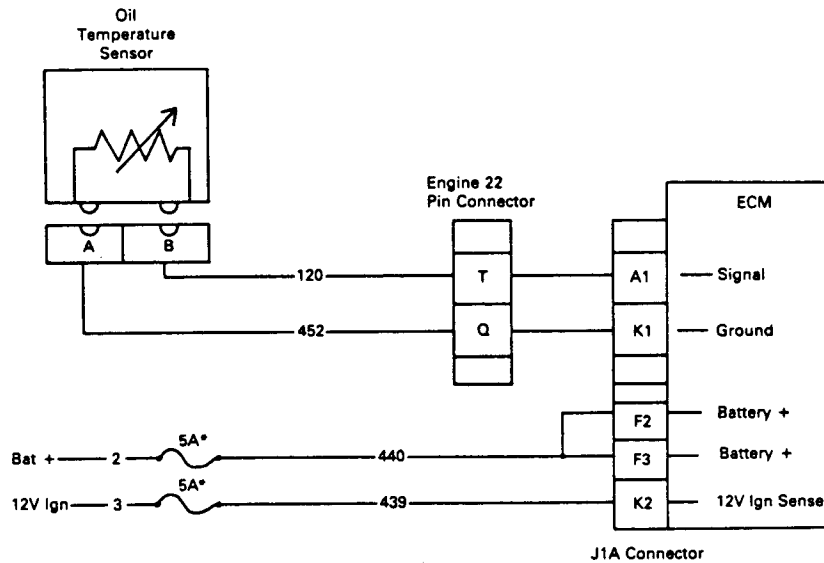


Oil Temperature Sensor Harness Connector  
P/N 12040753



Electronic Control Module (ECM)

Oil Temperature, Battery + and Ignition Circuits



(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 14 - OIL TEMPERATURE SENSOR (OTS) COLD (Cont'd.)

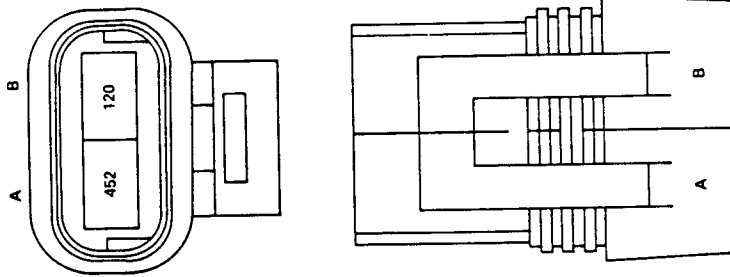
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>14-4 Check OTS Connectors</b></p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the OTS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace OTS. Then go to 14-30.</p> <p>Repair terminals/connectors. Then go to 14-30.</p>
<p><b>14-5 Open Line Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Leave jumper in place.</li> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets A1 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms or open. →</p>	<p>Go to 14-6.</p> <p>Signal line (ckt #120) or ground line (ckt #452) is open. Repair open. Then go to 14-30.</p>
<p><b>14-6 Check ECM Connectors</b></p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to 14-30.</p> <p>Repair terminal/connectors. Then go to 14-30.</p>



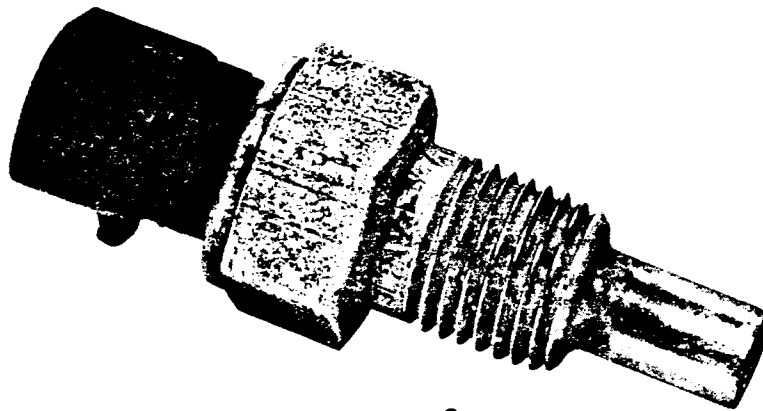
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 14 - OIL TEMPERATURE SENSOR (OTS) COLD (Cont'd.)

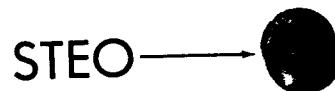
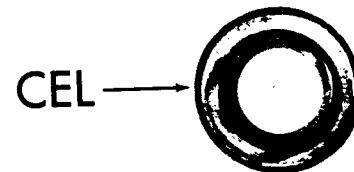
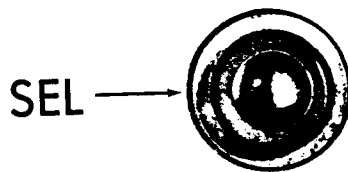
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>T4-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 8 minutes.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Code 14 (and any other codes). →</p> <p>Any other codes except Code 14. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



Oil Temperature Sensor Harness Connector  
P/N 12040753



Oil Temperature Sensor  
(OTS)

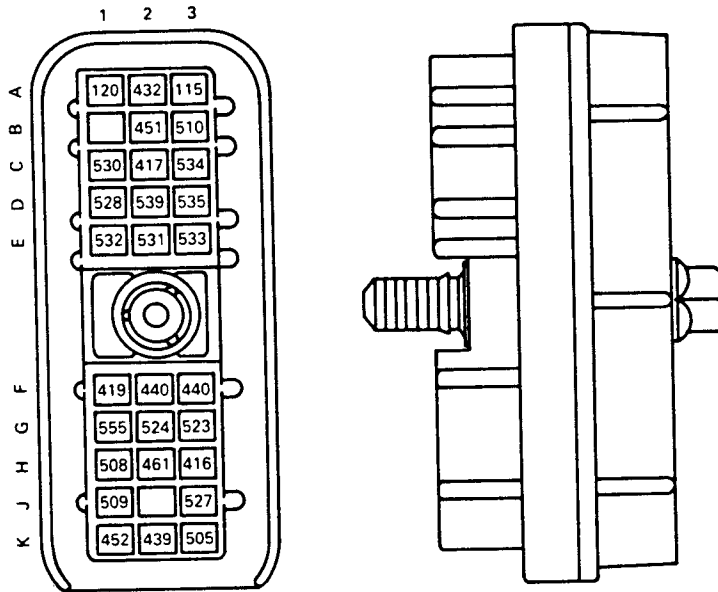


Dash Lights

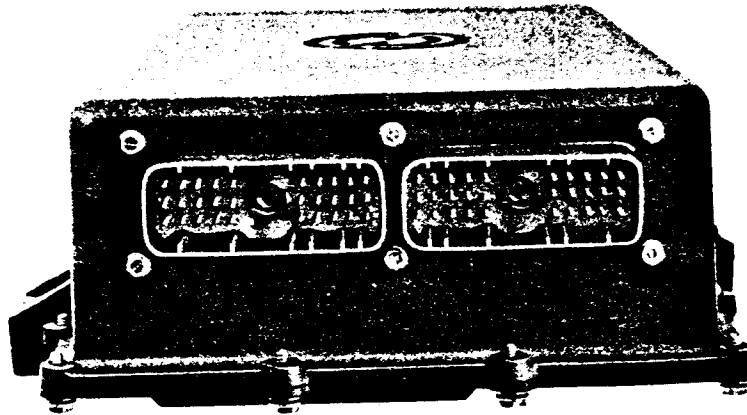
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 15 - OIL TEMPERATURE SENSOR (OTS) HOT

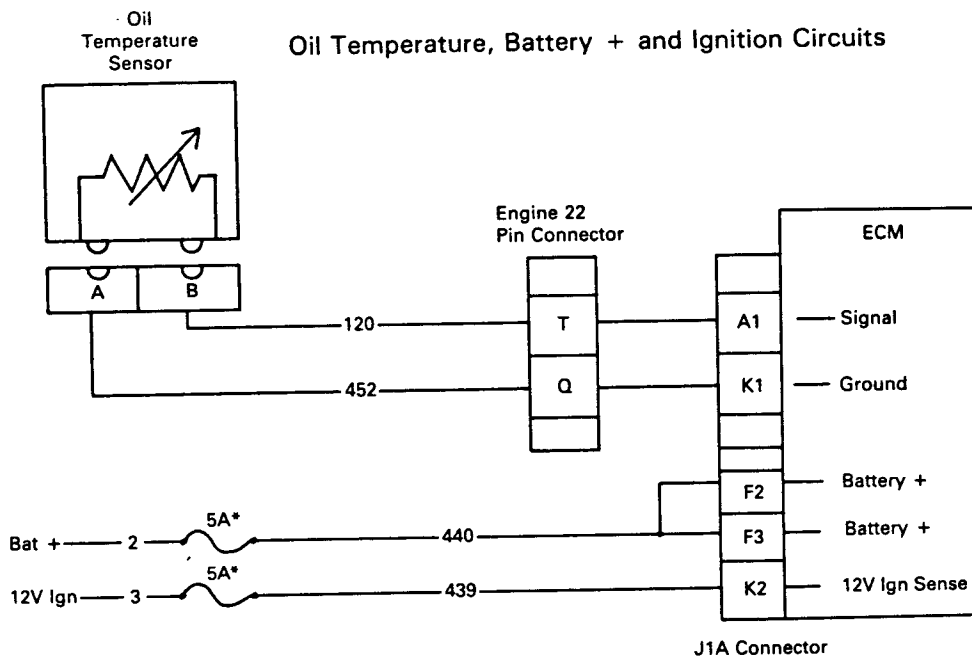
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>T5-1 Multiple Code Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 15?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 14, 21, 22, 33, 34. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>→ Go to 15-2.</p> <p>→ Go to 5VM-1.</p> <p>→ Go to 15-2.</p>
<p><b>T5-2 Sensor Check</b></p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect OTS connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 14 (or any other codes except Code 15). —————→</p> <p>Code 15 (and any other codes). —————→</p>	<p>→ Go to 15-3.</p> <p>→ Go to 15-4.</p>
<p><b>T5-3 Check OTS Connectors</b></p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the OTS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace OTS. Then go to 15-30.</p> <p>→ Repair terminals/connectors. Then go to 15-30.</p>



ECM J1A Harness Connector  
P/N 12034398



Electronic Control Module (ECM)



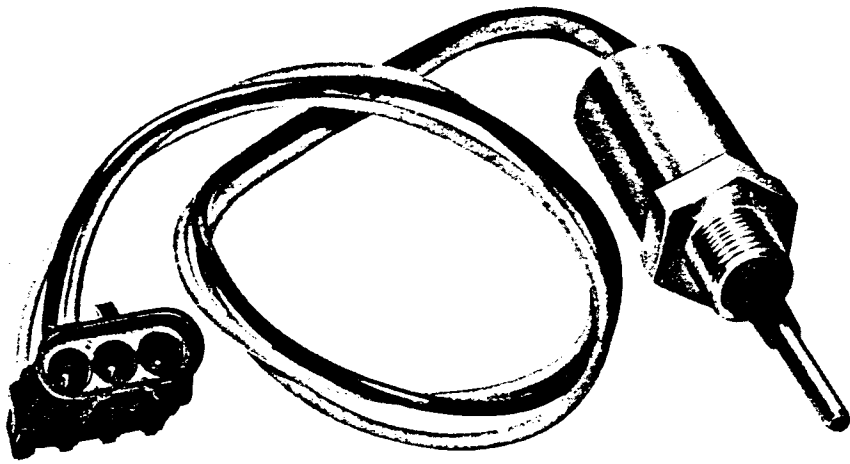
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

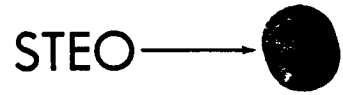
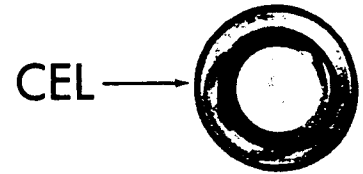
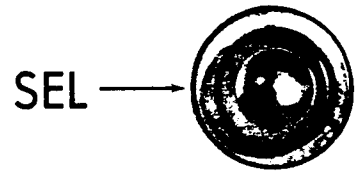
E. CODE 15 - OIL TEMPERATURE SENSOR (OTS) HOT (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>15-4 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets A1 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>—————&gt; Signal line (ckt #120) is shorted to the ground line (ckt #452). Repair short. Then go to 15-30.</p> <p>—————&gt; Go to 15-5.</p>
<p>15-5 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector sockets for corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>—————&gt; Replace ECM. Then go to 15-30.</p> <p>—————&gt; Repair terminals/connectors. Then go to 15-30.</p>
<p>15-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). —————&gt;</p> <p>Code 15 (and any other codes). —————&gt;</p> <p>Any other codes except Code 15. —————&gt;</p>	<p>—————&gt; Repairs are complete.</p> <p>—————&gt; All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>—————&gt; Go to DCC-1 to service other codes.</p>

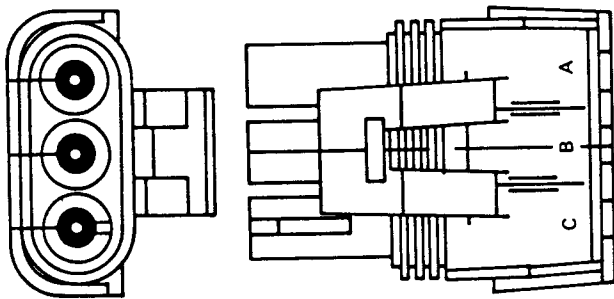




Coolant Level Sensor

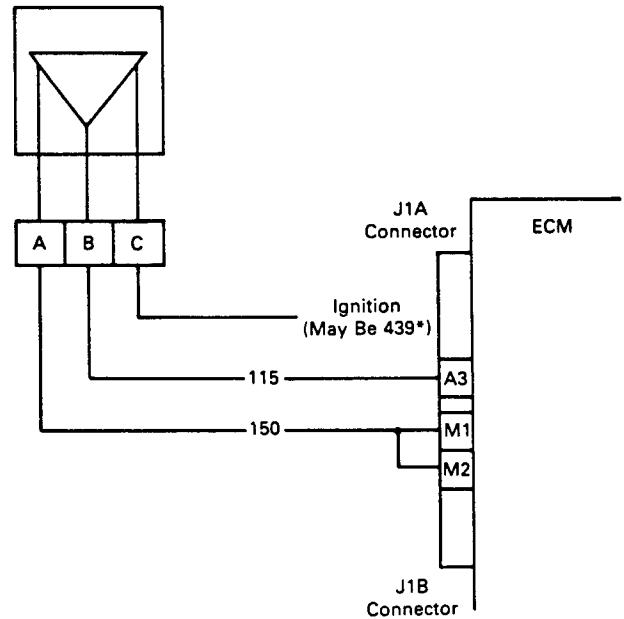


Dash Lights



Coolant Level Sensor Harness Connector  
P/N 12015795

Coolant Level Sensor Circuit

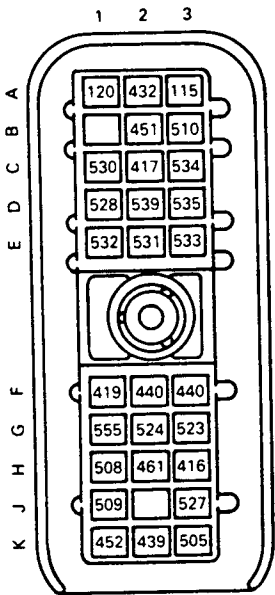


(\*Note: If 439 used, wire goes to socket 2K of the J1A Connector)

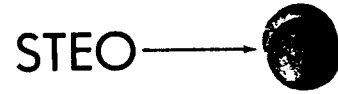
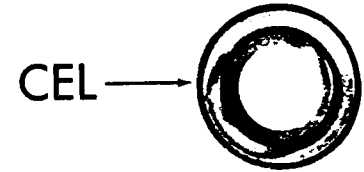
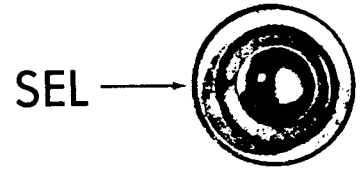
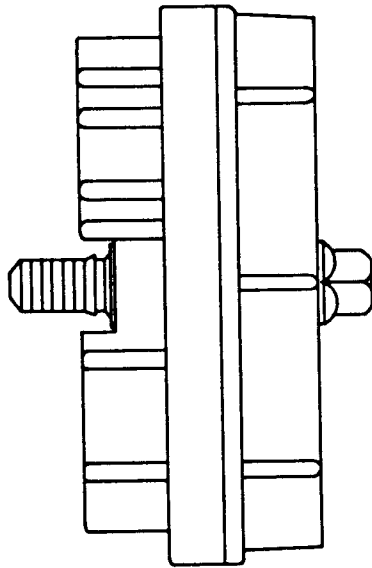
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 16 - COOLANT LEVEL SENSOR (CLS) HIGH

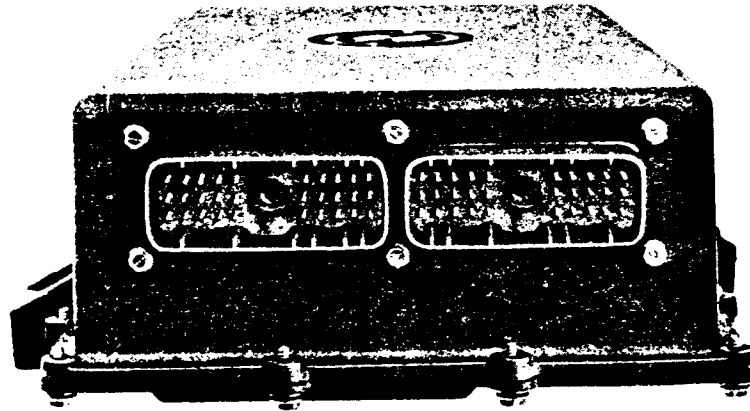
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>T6-1 Sensor Check</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect CLS Connector.</li> <li>. Install a jumper wire between sockets A and B of the CLS harness connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 13 (and any other codes except Code 16). →</p> <p>Code 16 (and any other codes except Code 13). →</p>	<p>→ Go to 16-2.</p> <p>→ Go to 16-4.</p>
<p><u>T6-2 Ground Circuit Check</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B harness connectors.</li> <li>. Read resistance between socket A3 on the J1A harness connector and socket M1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms or open. →</p>	<p>→ Go to 16-3.</p> <p>→ Either the CLS signal line (ckt. #115) or the CLS ground line is open. Repair open. Then go to 16-30.</p>
<p><u>T6-3 Check CLS Connectors</u></p> <ul style="list-style-type: none"> <li>. Inspect terminals at the CLS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>→ Replace CLS. Then go to 16-30.</p> <p>→ Repair terminals/ connectors. Then go to 16-30.</p>



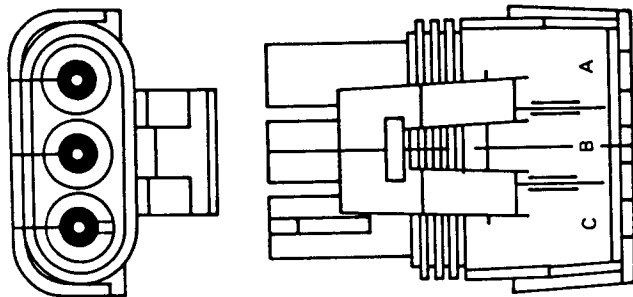
ECM J1A Harness Connector  
P/N 12034398



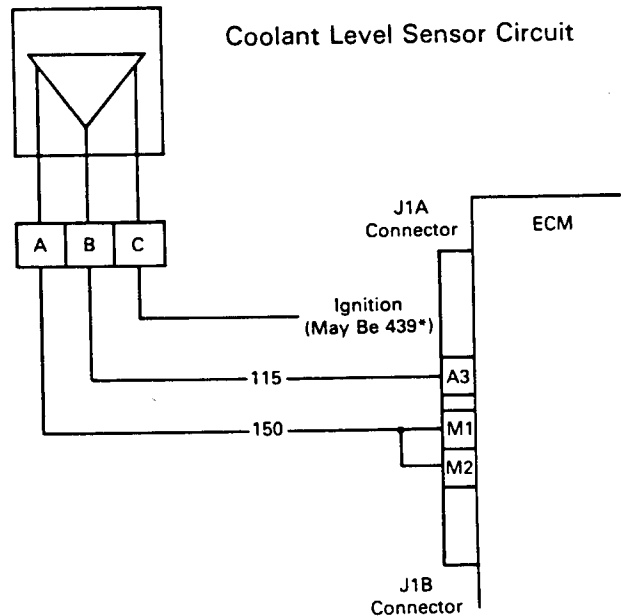
Dash Lights



Electronic Control Module (ECM)



Coolant Level Sensor Harness Connector  
P/N 12015795



(\*Note: If 439 used, wire goes to socket 2K of the J1A Connector)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 16 - COOLANT LEVEL SENSOR (CLS) HIGH (Cont'd.)

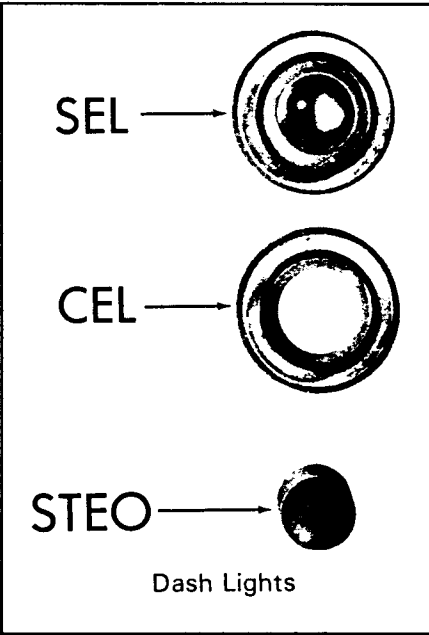
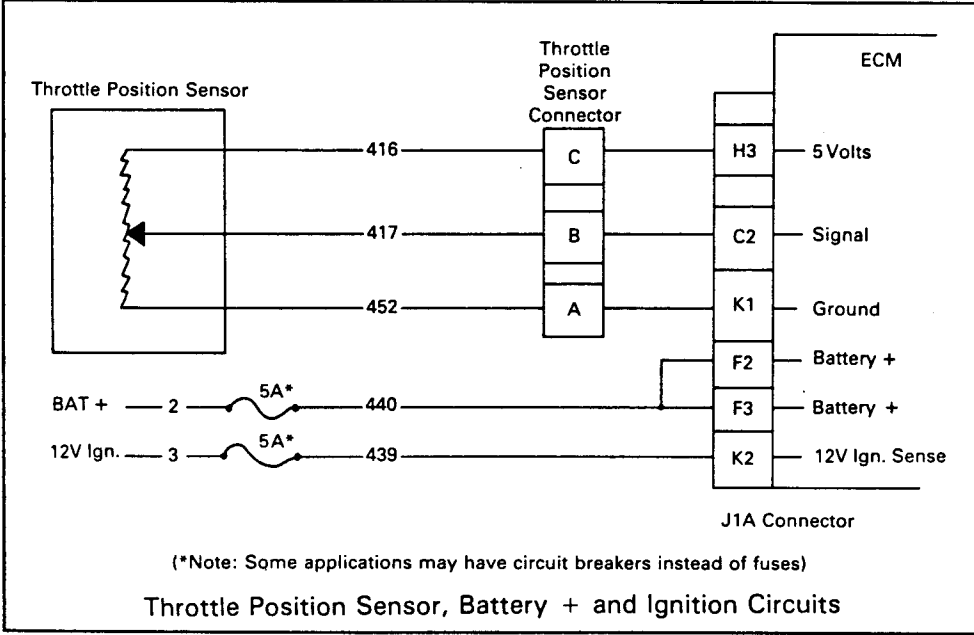
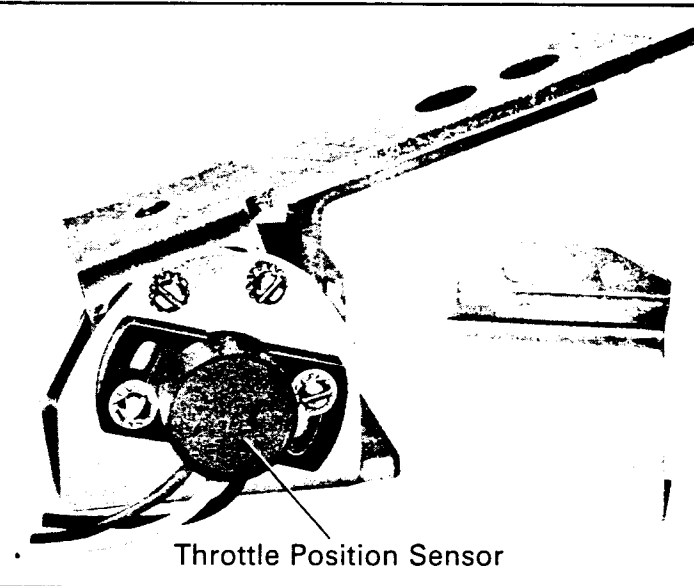
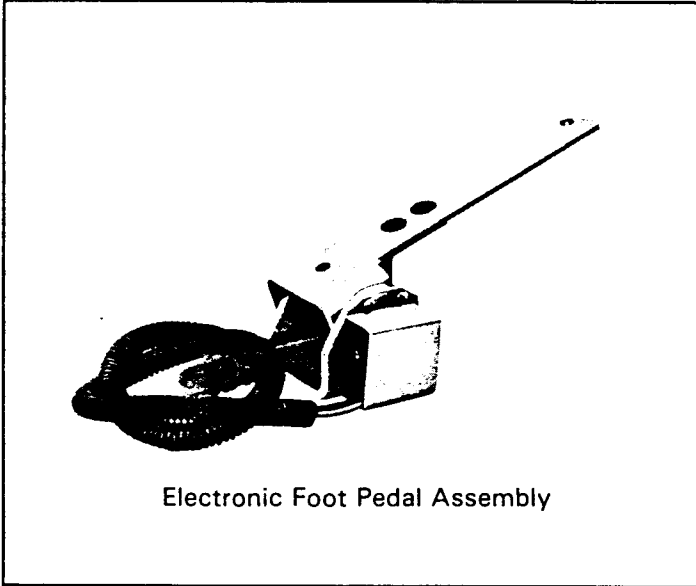
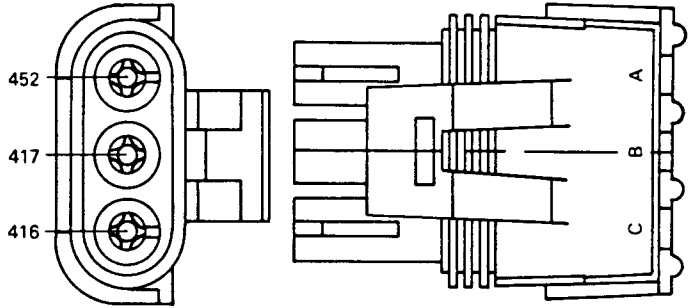
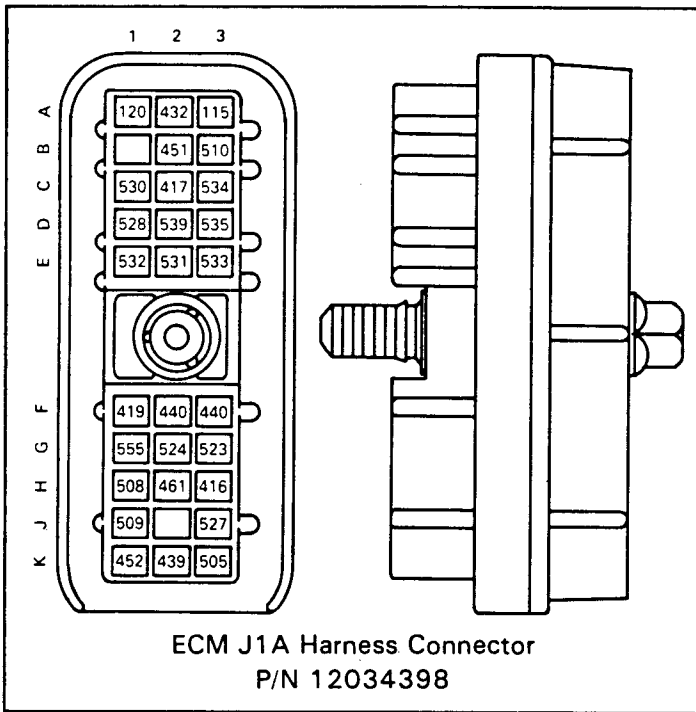
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>16-4 Check for Short to Ignition Line</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Remove jumper wire.</li> <li>• Disconnect J1A harness connector at the ECM.</li> <li>• Turn ignition off.</li> <li>• Read resistance on J1A harness connector between sockets A3 and K2.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Signal line (ckt #115) is shorted to the ignition line (ckt #439). Repair short. Then go to 16-30.</p> <p>→ Go to 16-5.</p>
<p><u>16-5 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 16-30.</p> <p>→ Repair terminals/ connectors. Then go to 16-30.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 16 - COOLANT LEVEL SENSOR (CLS) HIGH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>16-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 16 (and any other codes).</p> <p>Any other codes except Code 16.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>

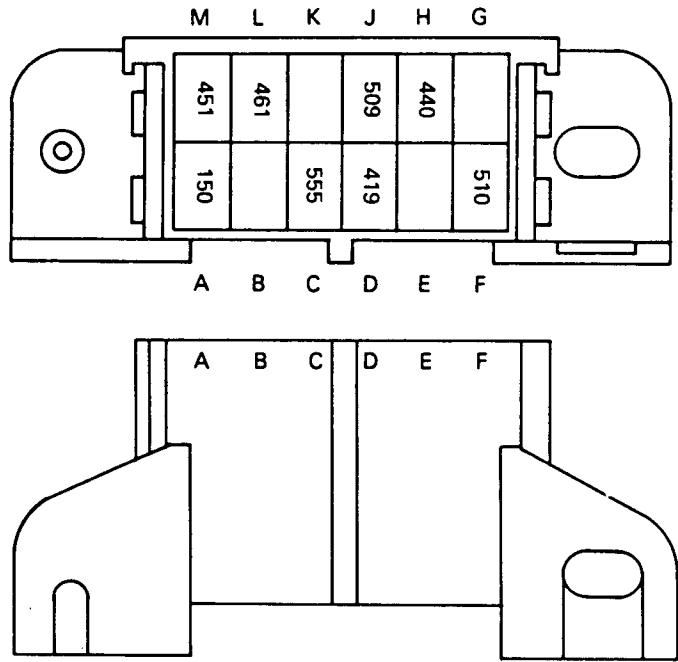


SECTION 4  
TROUBLESHOOTING CHARTS

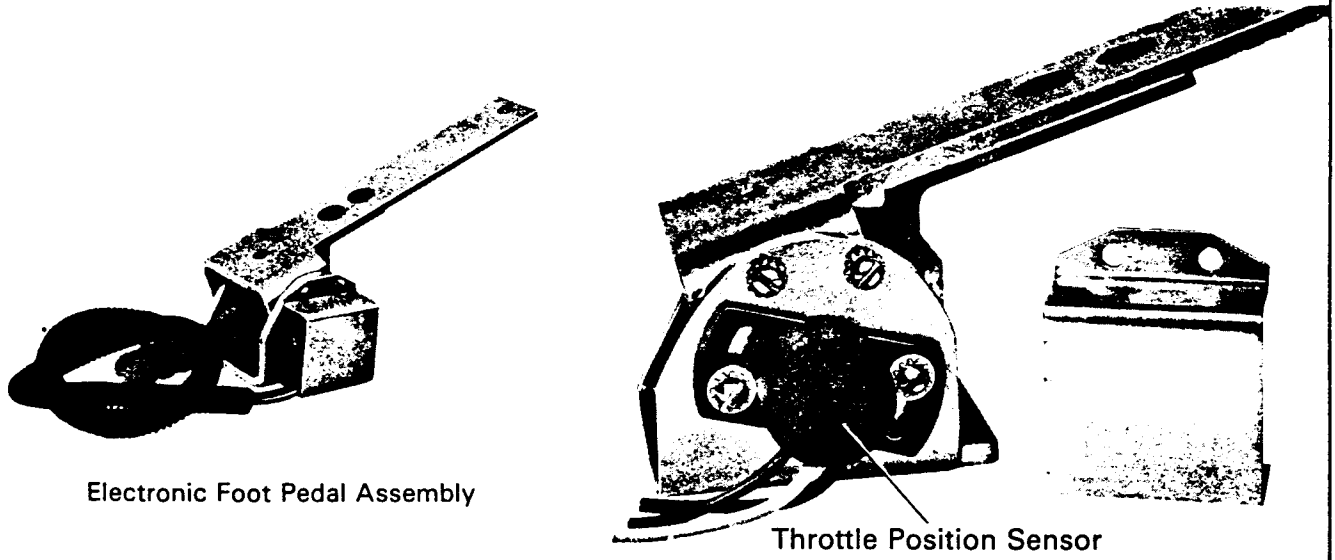
E. CODE 21 - THROTTLE POSITION SENSOR (TPS) HIGH

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>21-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 21?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 14, 15, 22, 33, 34. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>→ Go to 21-2.</p> <p>→ Go to 5VM-1.</p> <p>→ Go to 21-2.</p>
<p>21-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect TPS connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 22 (or any other code except Code 21). —————→</p> <p>Code 21 (and any other codes). —————→</p>	<p>→ Go to 21-3.</p> <p>→ Go to 21-7.</p>
<p>21-3 Ground Circuit Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Install a jumper wire between pins A and B of the TPS harness connector.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets C2 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>→ Go to 21-4.</p> <p>→ Ground line (ckt #452) is open. Repair open. Then go to 21-30.</p>



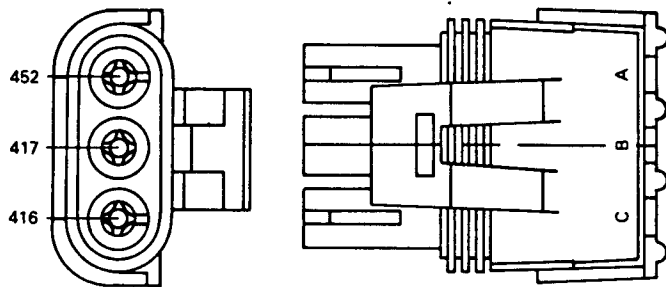


12 Pin DDL Connector  
P/N 12020043



Electronic Foot Pedal Assembly

Throttle Position Sensor

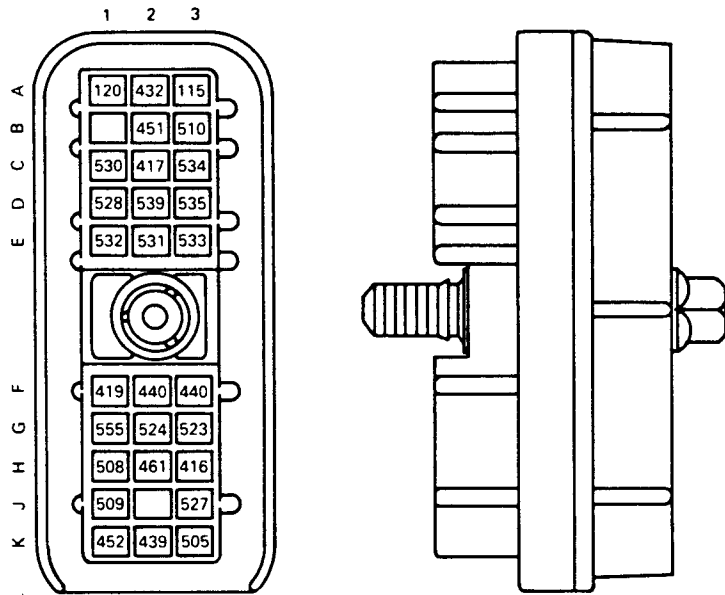


Throttle Position Sensor Harness Connector  
P/N 12015793

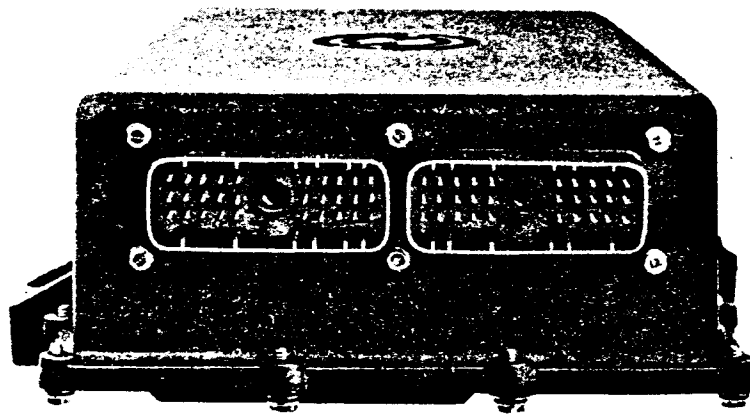
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 21 - THROTTLE POSITION SENSOR (TPS) HIGH (Cont'd.)

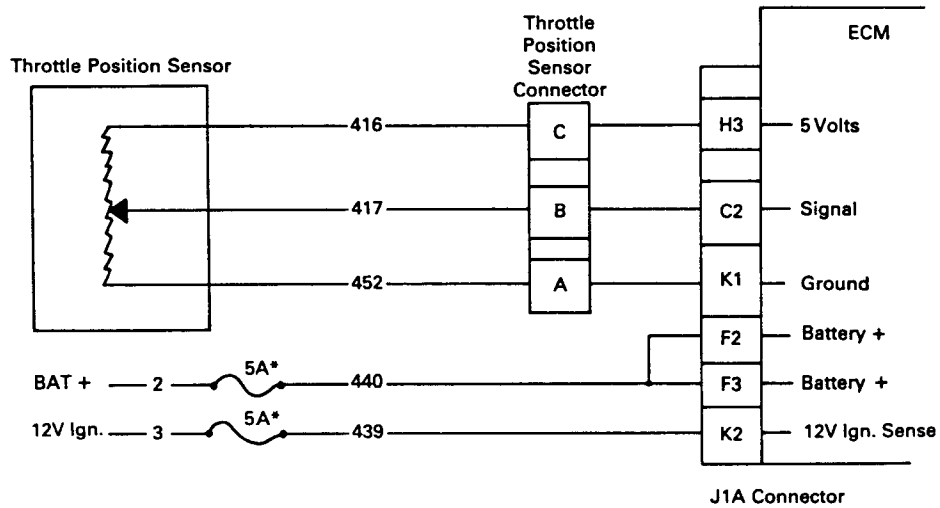
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>21-4 Check TPS Adjustment</u></p> <ul style="list-style-type: none"> <li>. Hook up DDL Reader to the 12 pin DDL connector and select Throttle Counts.</li> <li>. Read Throttle Counts at both no throttle and full throttle.</li> </ul>	<p>Getting 20-30 counts at no throttle and 200-235 counts at full throttle.</p> <p>Not getting the above readings.</p>	<p>→ Go to 21-6.</p> <p>→ Go to 21-5.</p>
<p><u>21-5 Attempt TPS Adjustment</u></p> <ul style="list-style-type: none"> <li>. Check for pedal or linkage interferences. If linkages appear okay, loosen the TPS screws and attempt to adjust for the correct no throttle reading (20-30 counts on the DDL Reader when the Throttle Counts position is selected).</li> </ul>	<p>Corrected problem so that Throttle Counts is correct.</p> <p>Could not correct the problem.</p>	<p>→ Go to 22-30.</p> <p>→ Go to 21-6.</p>
<p><u>21-6 Check TPS Connectors</u></p> <ul style="list-style-type: none"> <li>. Inspect terminals at the TPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace TPS. Then go to 21-30.</p> <p>→ Repair terminals/connectors. Then go to 21-30.</p>



ECM J1A Harness Connector  
P/N 12034398



Electronic Control Module (ECM)



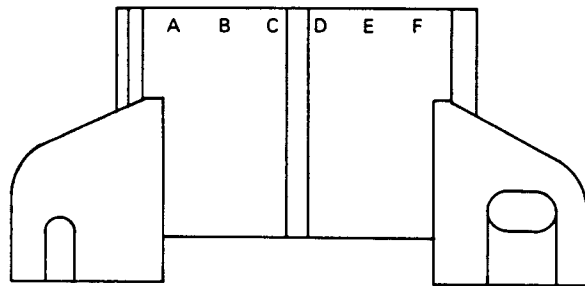
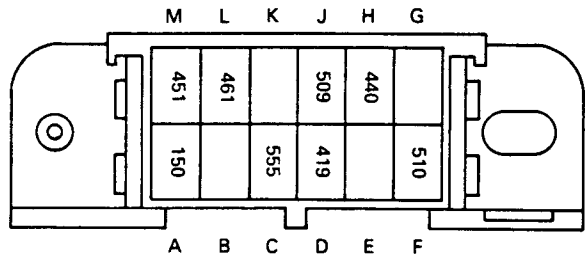
(\*Note: Some applications may have circuit breakers instead of fuses)

Throttle Position Sensor, Battery + and Ignition Circuits

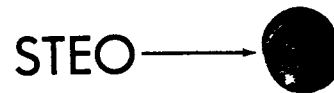
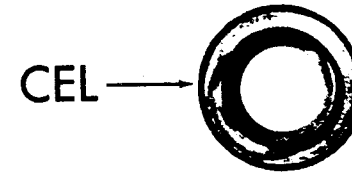
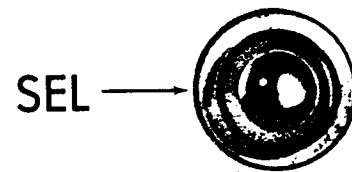
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 21 - THROTTLE POSITION SENSOR (TPS) HIGH (Cont'd.)

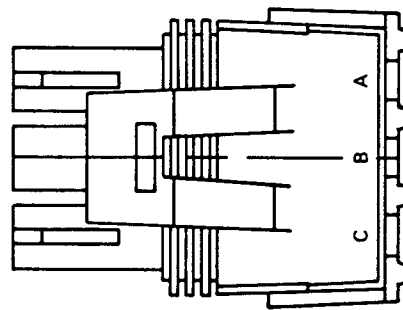
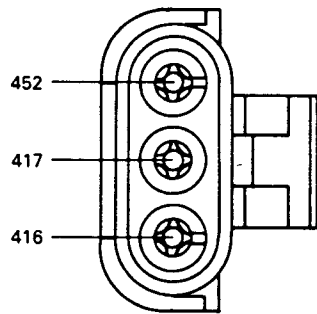
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>21-7 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition on.</li> <li>• Disconnect the J1A connector at the ECM.</li> <li>• Read resistance between C2 and H3 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Signal line (ckt #417) is shorted to the +5 Volt line (ckt #416). Repair short. Then go to 21-30.</p> <p>→ Go to 21-8.</p>
<p>21-8 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 21-30.</p> <p>→ Repair terminals/connectors. Then go to 21-30.</p>
<p>21-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Reconnect all connectors.</li> <li>• Clear codes.</li> <li>• Turn ignition on.</li> <li>• Note status of "Check Engine" light.</li> <li>• If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>• Stop engine.</li> <li>• Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 21 (and any other codes).</p> <p>Any other codes except Code 21.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



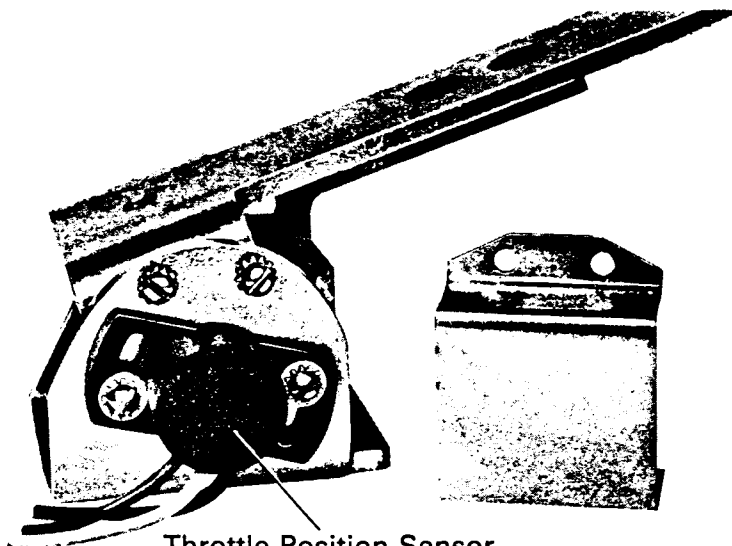
12 Pin DDL Connector  
P/N 12020043



Dash Lights



Throttle Position Sensor Harness Connector  
P/N 12015793



Throttle Position Sensor

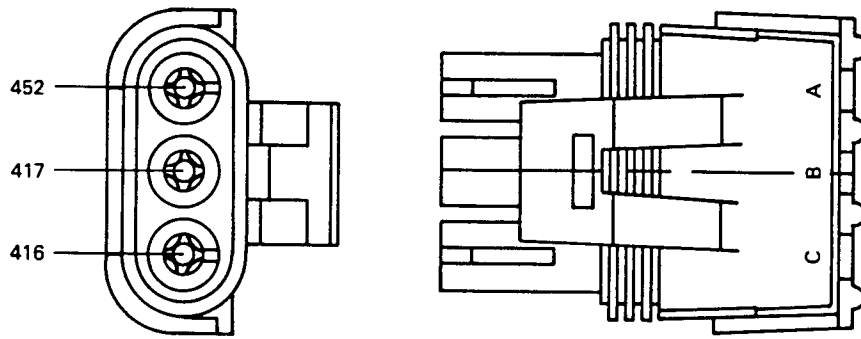


Electronic Foot Pedal Assembly

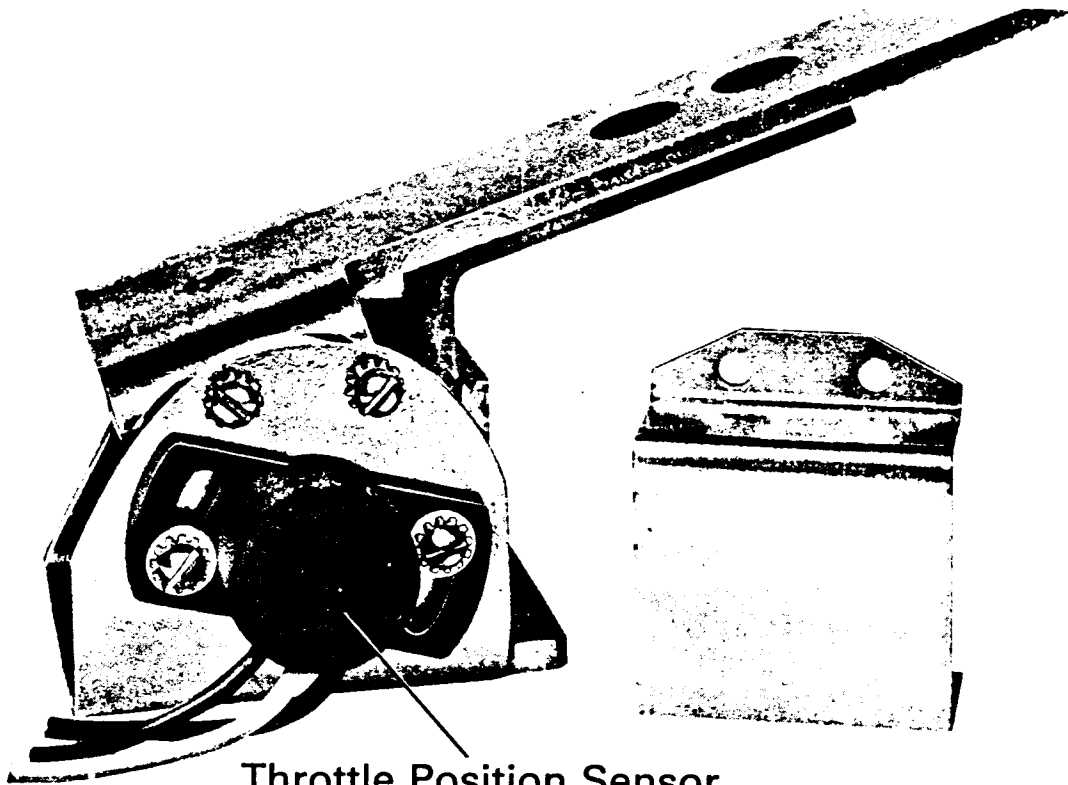
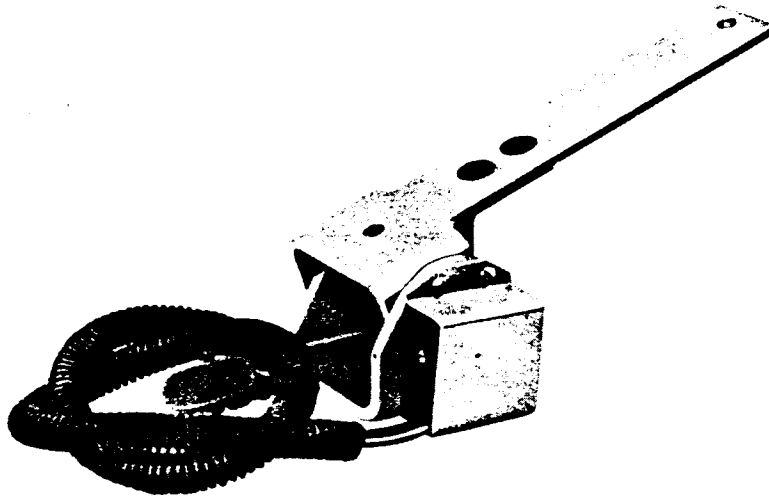
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 22 - THROTTLE POSITION SENSOR (TPS) LOW

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>22-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 22?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 14, 15, 21, 33, 34. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>→ Go to 22-2.</p> <p>→ Go to 5VM-1.</p> <p>→ Go to 22-2.</p>
<p>22-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect TPS connector.</li> <li>. Install a jumper wire between sockets B and C of the TPS harness connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 22 (and any other codes except Code 21). —————→</p> <p>Code 21 (and any other codes). —————→</p>	<p>→ Go to 22-6.</p> <p>→ Go to 22-3.</p>
<p>22-3 Check TPS Adjustment</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Reconnect TPS connector.</li> <li>. Hook up DDL Reader to the 12 pin DDL connector and select Throttle Counts.</li> <li>. Read Throttle Counts at both no throttle and full throttle.</li> </ul>	<p>Getting 20-30 counts at no throttle and 200-235 counts at full throttle. —————→</p> <p>Not getting the above readings. —————→</p>	<p>→ Go to 22-5.</p> <p>→ Go to 22-4.</p>



Throttle Position Sensor Harness Connector  
P/N 12015793

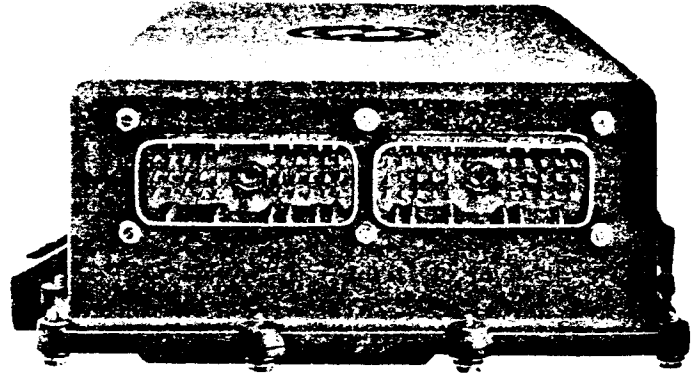
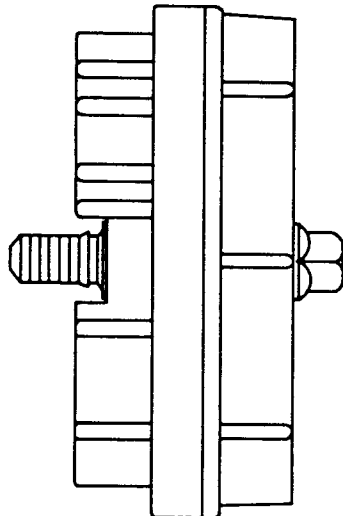
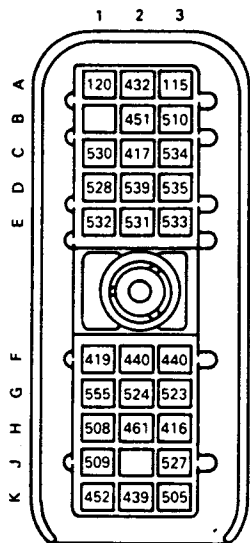


SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 22 - THROTTLE POSITION SENSOR (TPS) LOW (Cont'd.)

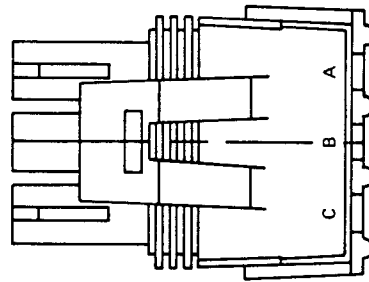
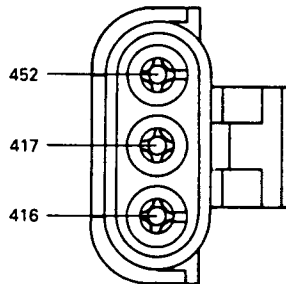
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>22-4 Attempt TPS Adjustment</p> <hr/> <ul style="list-style-type: none"> <li>. Check for pedal or linkage interferences. If linkages appear okay, loosen the TPS screws and attempt to adjust for the correct no throttle reading (20-30 counts on the DDL Reader when the Throttle Counts position is selected).</li> </ul>	<p>Corrected problem so that Throttle Counts is correct. —————&gt;</p> <p>Could not correct the problem. —————&gt;</p>	<p>Go to 22-30.</p> <p>Go to 22-5.</p>
<p>22-5 Check TPS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the TPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace TPS. Then go to 22-30.</p> <p>Repair terminals/connectors. Then go to 22-30.</p>
<p>22-6 Check for +5 Volts</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper.</li> <li>. Turn ignition on.</li> <li>. Read voltage on TPS harness connector, socket C (red lead) to socket A (black lead).</li> </ul>	<p>Between 4 to 6 volts. —————&gt;</p> <p>Less than 4 volts. —————&gt;</p> <p>Greater than 6 volts. —————&gt;</p>	<p>Go to 22-7.</p> <p>Go to 22-10.</p> <p>Go to 22-12.</p>



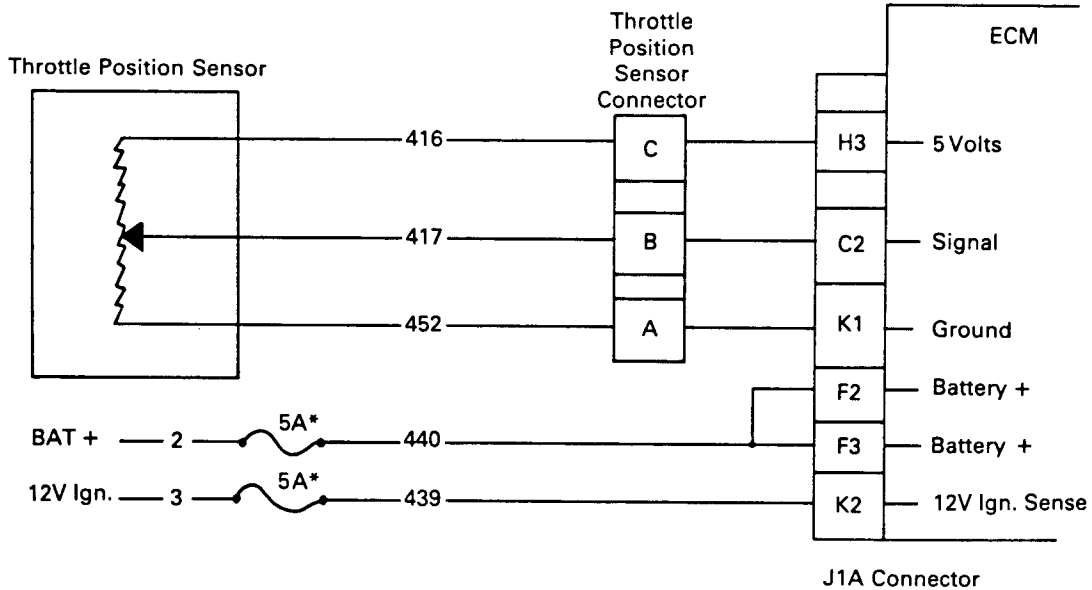


Electronic Control Module (ECM)

ECM J1A Harness Connector  
P/N 12034398



Throttle Position Sensor Harness Connector  
P/N 12015793



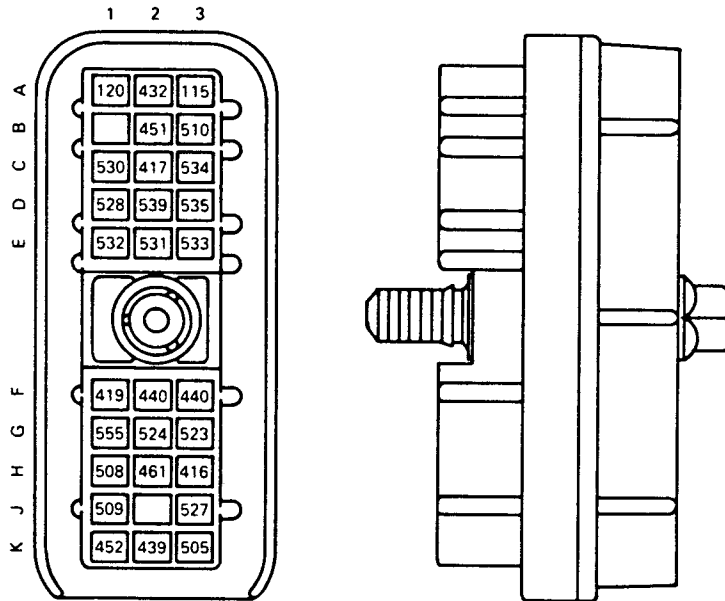
(\*Note: Some applications may have circuit breakers instead of fuses)

Throttle Position Sensor, Battery + and Ignition Circuits

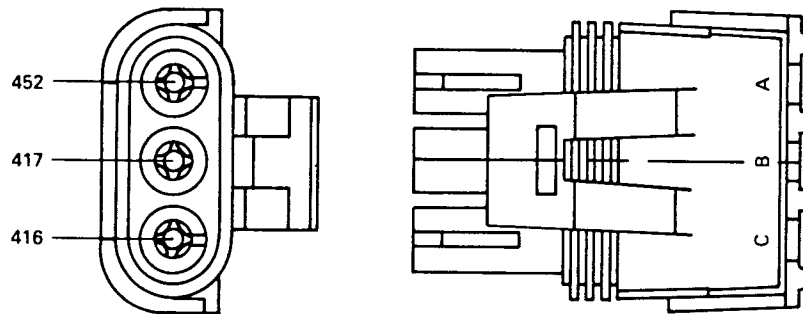
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 22 - THROTTLE POSITION SENSOR (TPS) LOW (Cont'd.)

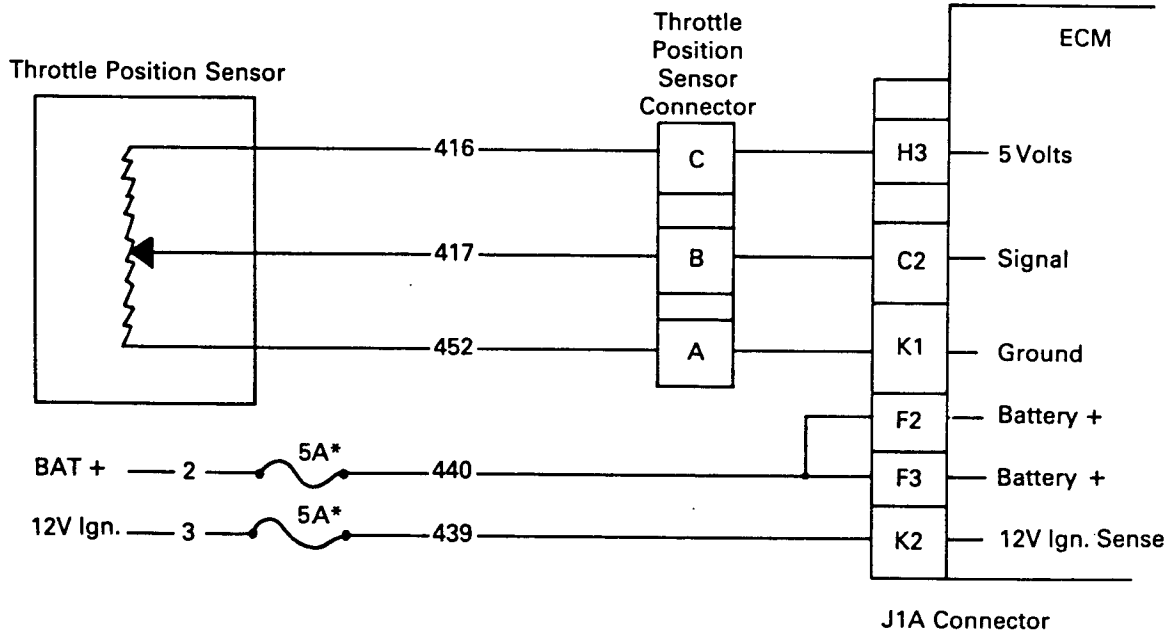
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>22-7 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect J1A connector at the ECM.</li> <li>• Read resistance between sockets A and B on the TPS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————→</p> <p>Greater than 10,000 ohms or open. —————→</p>	<p>→ Signal line (ckt #417) is shorted to the ground line (ckt #452). Repair short. Then go to 22-30.</p> <p>→ Go to 22-8.</p>
<p>22-8 Check for Signal Open</p> <hr/> <ul style="list-style-type: none"> <li>• Install a jumper wire between sockets A and B of the TPS harness connector.</li> <li>• Read resistance between sockets C2 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>→ Go to 22-9.</p> <p>→ Signal line (ckt #417) or ground line (ckt #452) is open. Repair open. Then go to 22-30.</p>
<p>22-9 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace ECM. Then go to 22-30.</p> <p>→ Repair terminals/connectors. Then go to 22-30.</p>



ECM J1A Harness Connector  
P/N 12034398



Throttle Position Sensor Harness Connector  
P/N 12015793



(\*Note: Some applications may have circuit breakers instead of fuses)

Throttle Position Sensor, Battery + and Ignition Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 22 - THROTTLE POSITION SENSOR (TPS) LOW (Cont'd.)

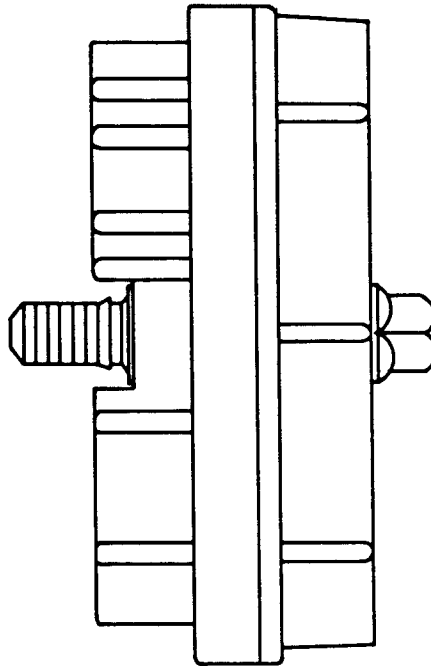
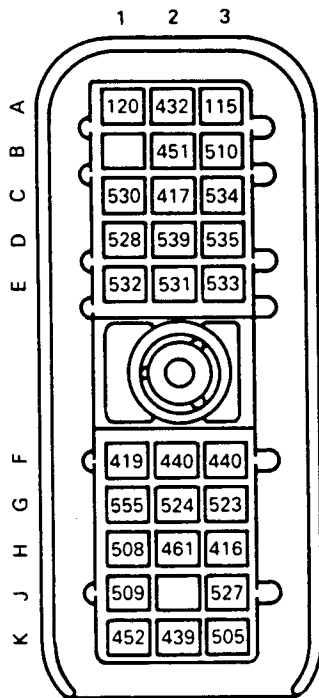
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>22-10 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect J1A connector at the ECM.</li> <li>• Read resistance between sockets A and C on the TPS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>The +5 Volt line (ckt #416) is shorted to the ground line (ckt #452). Repair short. Then go to 22-30.</p> <p>Go to 22-11.</p>
<p>22-11 Check for Open +5 Volt Line</p> <hr/> <ul style="list-style-type: none"> <li>• Install a jumper wire between sockets A and C of the TPS harness connector.</li> <li>• Read resistance between sockets H3 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to 22-9.</p> <p>The +5 Volt line (ckt #416) is open. Repair open. Then go to 22-30.</p>
<p>22-12 Check for Short to Battery +</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect J1A connector at the ECM.</li> <li>• Read resistance between sockets F2 and C2 on the J1A harness connector.</li> <li>• Also read resistance between sockets: F2 and F3 F2 and K2</li> </ul>	<p>All readings are greater than 10,000 ohms or open. —————&gt;</p> <p>Any reading is less than or equal to 10,000 ohms. —————&gt;</p>	<p>Go to 22-9.</p> <p>Short exists between sockets where less than 10,000 ohms resistance was read. Repair short. Then go to 22-30.</p>



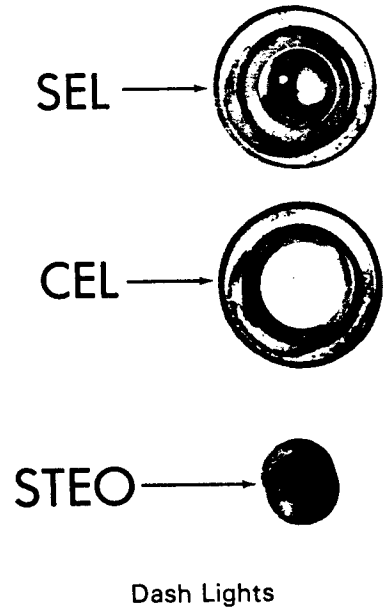
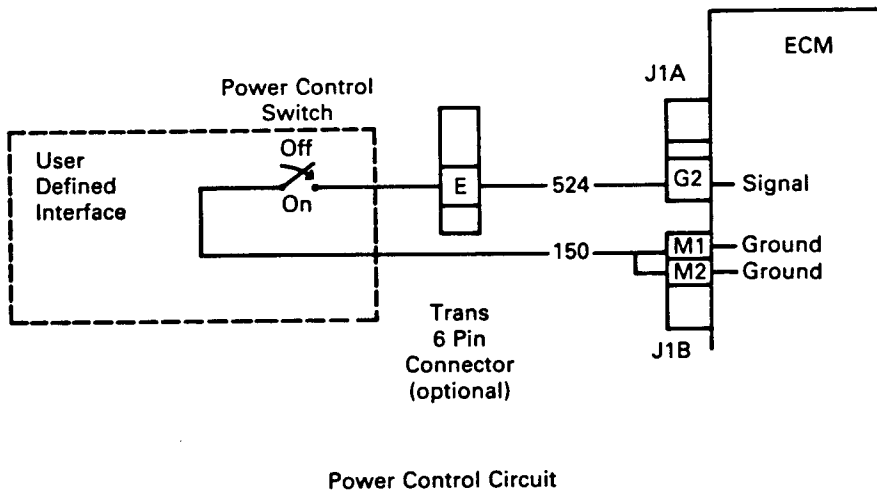
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 22 - THROTTLE POSITION SENSOR (TPS) LOW (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>22-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 22 (and any other codes).</p> <p>.Any other codes except Code 22.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



ECM J1A Harness Connector  
P/N 12034398

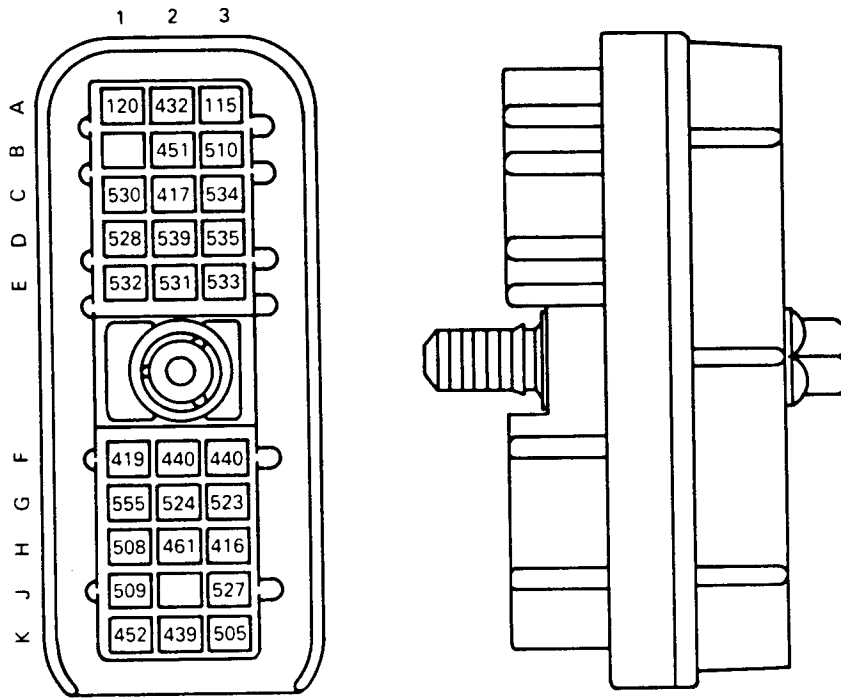


SECTION 4  
TROUBLESHOOTING CHARTS

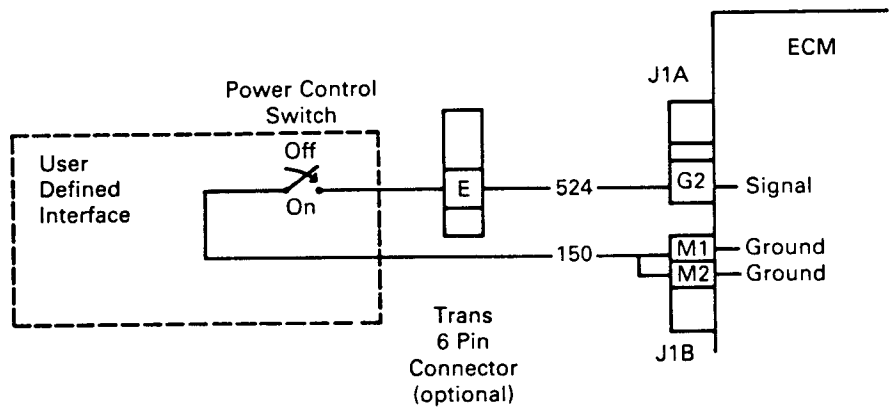
E. CODE 26 - POWER CONTROL SWITCH

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>26-1 Verify "Stop Engine" Light</p> <ul style="list-style-type: none"> <li>. Start engine and run for 1 minute or until the "Stop Engine" light comes on.</li> <li>. Stop the engine.</li> </ul>	<p>"Stop Engine" light turned on.</p> <p>"Stop Engine" light did not turn on.</p>	<p>→ Go to 26-2.</p> <p>→ Fault is currently not present. If you cannot get the fault to recur, you should still investigate why it happened in the first place. Go to 26-5.</p>
<p>26-2 Determine if User Add-On Device is Present</p> <ul style="list-style-type: none"> <li>. Find out whether there has been a user defined device attached to the Power Control Input (pin G2 on the ECM).</li> </ul>	<p>Yes.</p> <p>No.</p>	<p>→ Go to 26-3.</p> <p>→ Go to 26-4.</p>
<p>26-3 Check for Short</p> <ul style="list-style-type: none"> <li>. Turn off ignition switch.</li> <li>. Disconnect J1A connector at ECM.</li> <li>. Read resistance between socket G2 of the J1A harness connector and a good ground.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Signal line (ckt #524) is shorted to ground. Repair short. Then go to 26-30.</p> <p>→ Go to 26-4.</p>

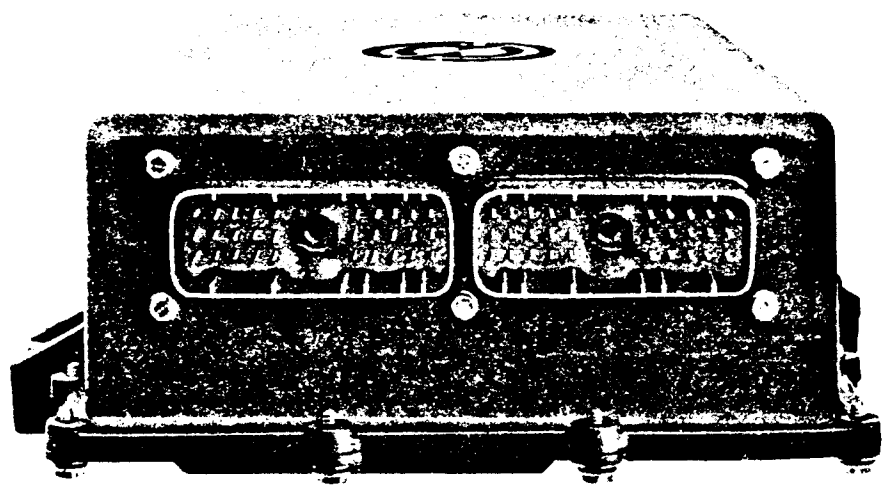




ECM J1A Harness Connector  
P/N 12034398



Power Control Circuit



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 26 - POWER CONTROL SWITCH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>26-4 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 26-30.</p> <p>→ Repair terminals/ connectors. Then go to 26-30.</p>
<p>26-5 Determine if User Add-On Device is Present</p> <hr/> <ul style="list-style-type: none"> <li>. Find out whether there has been a user defined device attached to the Power Control Input (pin G2 on the ECM).</li> </ul>	<p>Yes.</p> <p>No.</p>	<p>→ Go to 26-6.</p> <p>→ Clear codes and return to service.</p>
<p>26-6 Determine Nature of Fault</p> <hr/> <p>As mentioned previously, a user defined device can be attached to the Power Control Input. This way, when the add-on device detects a potentially engine-damaging problem, it grounds the Power Control Switch. This initiates DDEC's "Stop Engine" sequence which "powers down" the engine. Refer to vehicle manufacturer's specifications/recommendations concerning the add-on device.</p>		
<p>26-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start engine and run for 1 minute or until the "Stop Engine" light comes on.</li> <li>. Stop the engine.</li> </ul>	<p>"Stop Engine" light turned on.</p> <p>"Stop Engine" light is off.</p>	<p>→ Go to 26-2.</p> <p>→ Return unit to service.</p>

**TABLE 31X-1**

<b>Engine Type</b>					
	<b>Right Hand Rotation</b>				<b>Left Hand Rotation</b>
	<b>6V92</b>	<b>8V92</b>	<b>6L71</b>	<b>Series 60</b>	<b>6V92</b>
<b>Right or Rear Bank Codes</b>	312, 314, 316	312, 314, 316, 318	312, 314, 316	312, 314, 316	311, 313, 315
<b>Left or Front Bank Codes</b>	311, 313, 315	311, 313, 315, 317	311, 313, 315	311, 313, 315	312, 314, 316

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG

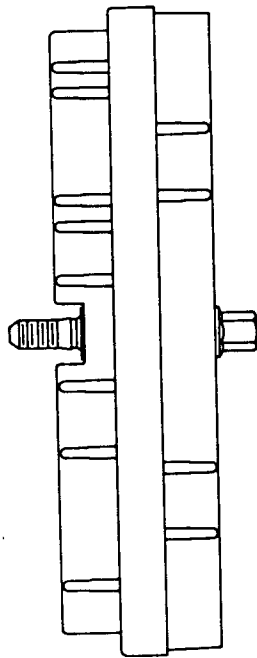
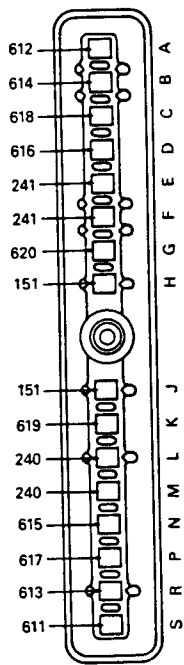
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-1 Non 31X Code Check</p> <hr/> <p>• Were there any other codes besides Code 31X?</p>	<p>Yes. _____</p> <p>No other codes. _____</p>	<p>→ Service other codes before proceeding to diagnose Code 31X.</p> <p>→ Go to 31-2.</p>
<p>31-2 Check for Multiple 31X Codes</p> <hr/> <p>• Note how many 31X Codes were logged.</p>	<p>Only one 31X Code. _____</p> <p>All 31X Codes were logged (six codes for a 6 cyl., eight codes for an 8 cyl.).</p> <p>All 31X Codes _____</p> <p>for one bank of injectors (refer to Table 31X-1 for codes relating to one bank).</p>	<p>→ Go to 31-3.</p> <p>Confirm failure for all 31X codes using step 31-3. If failures present, go to 31-14. If failures not present, see suggestions in 31-3.</p> <p>→ Confirm failure for bank using step 31-3. If failures present, go to 31-20. If failures not present, see suggestions in 31-3.</p>



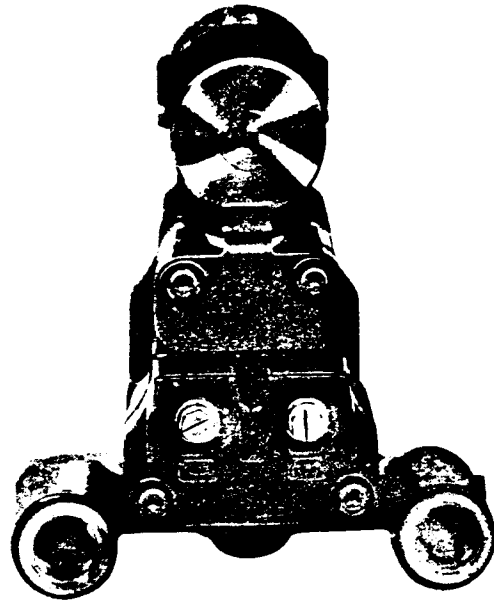
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

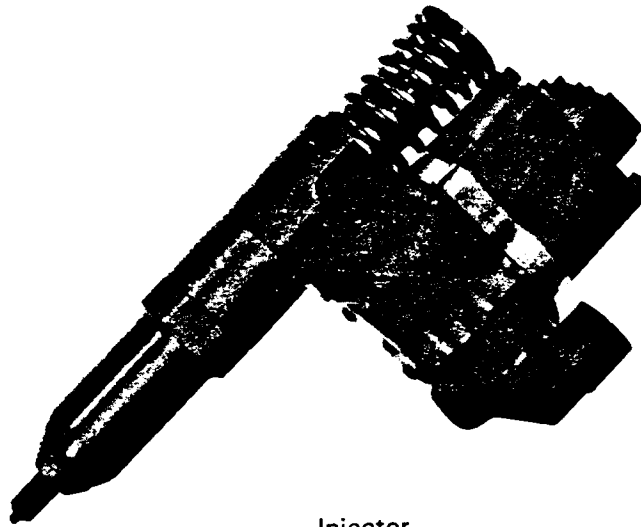
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT																											
<p>31-3 Confirm Failure</p> <hr/> <ul style="list-style-type: none"> <li>. Start and warm engine to operating temperature.</li> <li>. Plug in DDL Reader.</li> <li>. Select Inj. Resp. Time (MS) position on DDL.</li> <li>. Turn PTOSA off.</li> <li>. The DDL reads Inj. Resp. time in firing order sequence. Read the Inj. Resp. time thru several cycles. Response time is read on the right side of the display. The firing sequence is read on the left side of the display. See chart.</li> </ul> <p style="text-align: center;">Display</p> <hr/> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code Rec.</th> <th style="text-align: left;">Fire Seq.</th> <th style="text-align: left;">Resp. Time</th> </tr> </thead> <tbody> <tr><td>311</td><td>1</td><td>XXX</td></tr> <tr><td>312</td><td>2</td><td>XXX</td></tr> <tr><td>313</td><td>3</td><td>XXX</td></tr> <tr><td>314</td><td>4</td><td>XXX</td></tr> <tr><td>315</td><td>5</td><td>XXX</td></tr> <tr><td>316</td><td>6</td><td>XXX</td></tr> <tr><td>317</td><td>7</td><td>XXX</td></tr> <tr><td>318</td><td>8</td><td>XXX</td></tr> </tbody> </table> <hr/> <ul style="list-style-type: none"> <li>. Note response time of cylinder numbers in fault code.</li> </ul>	Code Rec.	Fire Seq.	Resp. Time	311	1	XXX	312	2	XXX	313	3	XXX	314	4	XXX	315	5	XXX	316	6	XXX	317	7	XXX	318	8	XXX	<p>Response time for code received is 0.79.</p> <p>Response time is not 0.79.</p>	<p>→ Failure is still present. Go to 31-4 for single failure. (See 31-2 for bank failure or all 31X codes.)</p> <p>→ Failure is no longer present. (It's intermittent.) If you still have a customer complaint along with Code 31X, look for the following possible problems:</p> <ol style="list-style-type: none"> <li>1. Sticky valve.</li> <li>2. Aeration in fuel.</li> <li>3. Low battery.</li> <li>4. Broken spring or armature on the injector.</li> <li>5. Problems in charging system (loose alternator belt, etc.) or bad grounds.</li> </ol>
Code Rec.	Fire Seq.	Resp. Time																											
311	1	XXX																											
312	2	XXX																											
313	3	XXX																											
314	4	XXX																											
315	5	XXX																											
316	6	XXX																											
317	7	XXX																											
318	8	XXX																											



EDU J1 Harness Connector (Gray)  
P/N 12034382



Injector



Injector

TABLE 31X-2

Code	Cyl	Display on DDL Reader to cutout indicated Cylinder		Engine Type					
				Right Hand Rotation				Left Hand Rotation	
				6V92	8V92	6L71	Series 60	6V92	
311	A	1	1	PW*	1L	1L	1	1	1R
312	B	2	2	PW	3R	3R	5	5	2L
313	C	3	3	PW	3L	3L	3	3	2R
314	D	4	4	PW	2R	4R	6	6	3L
315	E	5	5	PW	2L	4L	2	2	3R
316	F	6	6	PW	1R	2R	4	4	1L
317	G	7	7	PW	—	2L	—	—	—
318	H	8	8	PW	—	1R	—	—	—

TABLE 31X-3

X	J1 Socket	J1 Socket
1	S	K
2	A	G
3	R	K
4	B	G
5	N	K
6	D	G
7	P	K
8	C	G

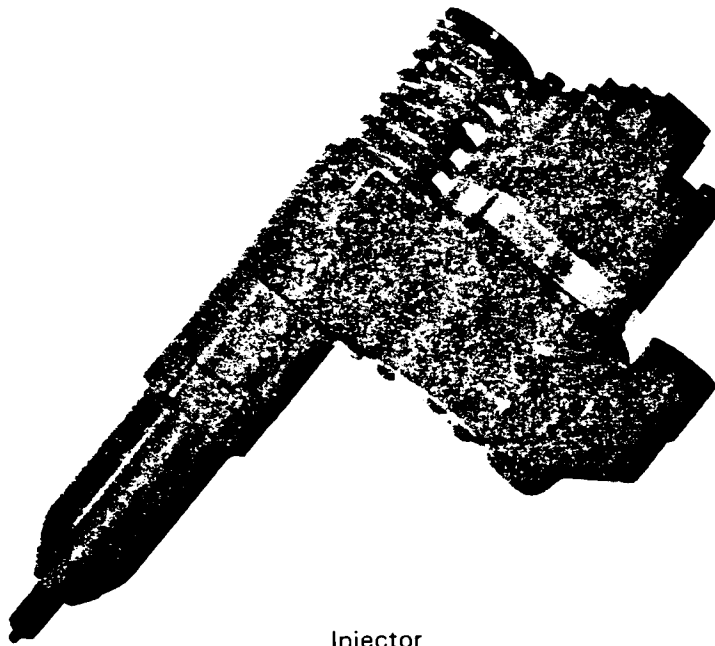
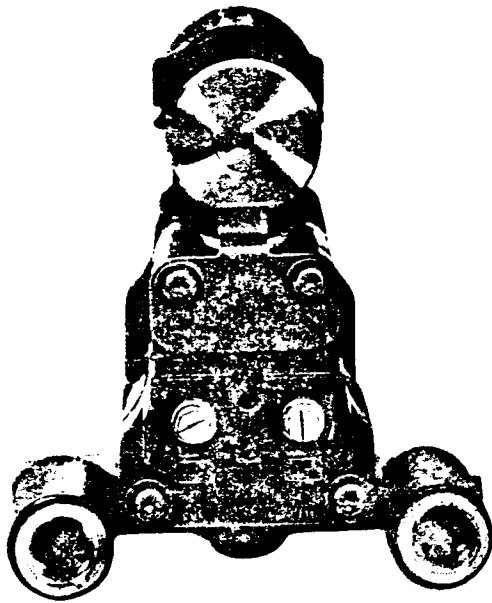
\*Note: PW is the Pulsewidth reading

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-4 Injector Resistance Check</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Unplug DDL Reader.</li> <li>. Disconnect the J1 connector at the EDU.</li> <li>. Referring to Table 31X-3, read resistance between the J1 harness connector sockets associated with the 31X Code received. (Example: Read resistance between sockets S and K for a Code 311.)</li> </ul>	<p>Greater than 5 ohms. —————→</p> <p>Less than or equal to 5 ohms. —————→</p>	<p>Go to 31-5.</p> <p>Go to 31-6.</p>
<p>31-5 Find Open</p> <ul style="list-style-type: none"> <li>. Referring to Table 31X-2, remove the rocker arm cover corresponding to the injector that's being pointed to by Code 31X.</li> <li>. Disconnect the two wires of the injector being pointed to.</li> <li>. Short these two wires together.</li> <li>. Again referring to Table 31X-3, read the resistance between the J1 harness connector sockets associated with the 31X code received.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms. —————→</p>	<p>Replace injector. Then to go to 31-30.</p> <p>Open exists in wires from which the resistance was just read. Repair open. Then go to 31-30.</p>





Injector

TABLE 31X-1

	Engine Type				
	Right Hand Rotation				Left Hand Rotation
	6V92	8V92	6L71	Series 60	6V92
Right or Rear Bank Codes	312, 314, 316	312, 314, 316, 318	312, 314, 316	312, 314, 316	311, 313, 315
Left or Front Bank Codes	311, 313, 315	311, 313, 315, 317	311, 313, 315	311, 313, 315	312, 314, 316

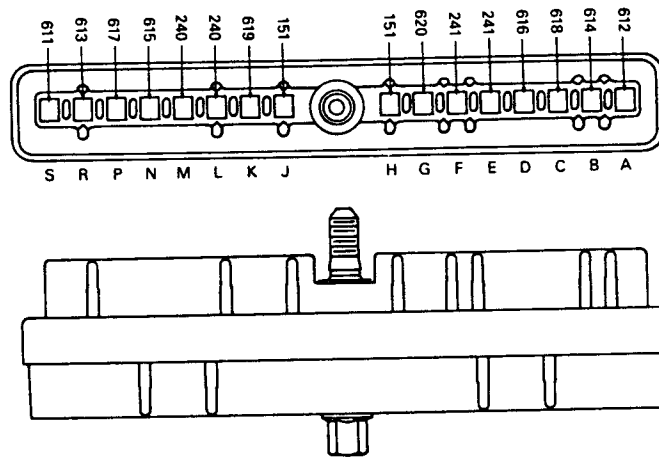
TABLE 31X-3

X	J1 Socket	to	J1 Socket
1	S		K
2	A		G
3	R		K
4	B		G
5	N		K
6	D		G
7	P		K
8	C		G

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

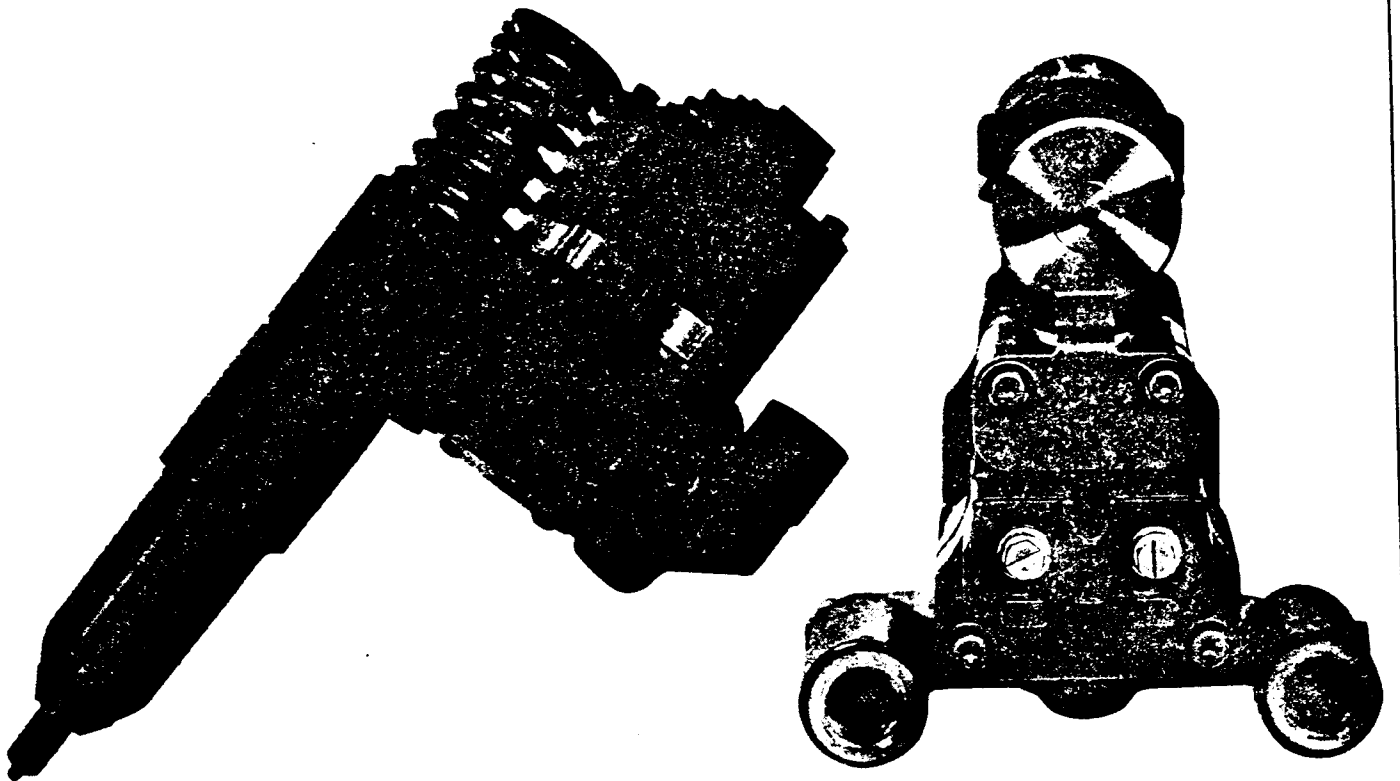
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-6 Check for Short to Return</p> <ul style="list-style-type: none"> <li>. Referring to Table 31X-1, remove the rocker arm cover corresponding to the injector that's being pointed to by Code 31X.</li> <li>. Disconnect the two wires of the injector being pointed to.</li> <li>. Again referring to Table 31X-3, read the resistance between the J1 harness connector sockets associated with the 31X Code received.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than or equal to 10,000 ohms.</p>	<p>→ A short exists between the wires where the resistance was just read. Repair short. Then go to 31-30.</p> <p>→ Go to 31-7.</p>
<p>31-7 Check for Short to Ground</p> <ul style="list-style-type: none"> <li>. Working with the injector that has its two wires disconnected, measure the resistance between the injector driveline (the disconnected wire with the white bead) and a good ground.</li> <li>. Also measure the resistance between one of the terminals of the injector (the injector with the disconnected wires) and a good ground.</li> </ul>	<p>Both readings are greater than or equal to 10,000 ohms.</p> <p>Resistance from injector drive line ground is less than 10,000 ohms.</p> <p>Resistance from injector to ground is less than 10,000 ohms.</p>	<p>→ Go to 31-8.</p> <p>→ Short exists between injector drive line (wire) and ground. Repair short. Then go to 31-30.</p> <p>→ Look for cause of short. If none can be found, replace injector. Then go to 31-30.</p>



EDU J1 Harness Connector (Gray)  
P/N 12034382

TABLE 31X-1

	Engine Type				
	Right Hand Rotation				Left Hand Rotation
	6V92	8V92	6L71	Series 60	6V92
Right or Rear Bank Codes	312, 314, 316	312, 314, 316, 318	312, 314, 316	312, 314, 316	311, 313, 315
Left or Front Bank Codes	311, 313, 315	311, 313, 315, 317	311, 313, 315	311, 313, 315	312, 314, 316

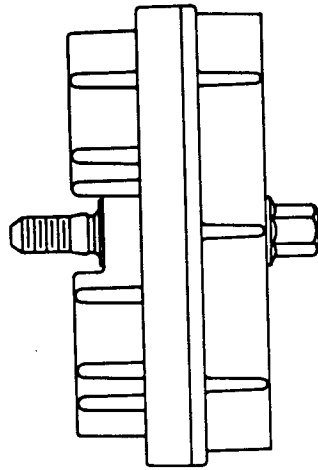
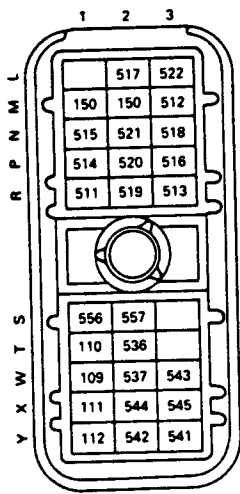


Injector

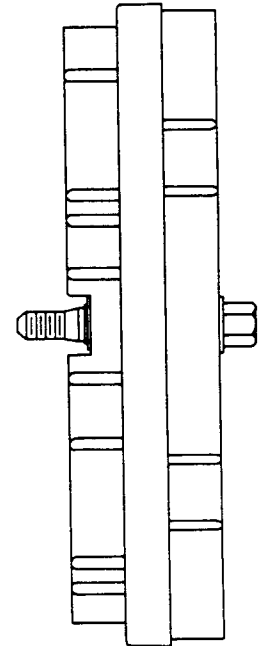
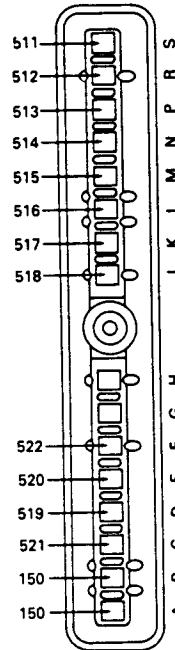
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-8 Check for Signal</p> <hr/> <ul style="list-style-type: none"> <li>. Reconnect the J1 connector to the EDU.</li> <li>. Looking at the injector with the disconnected wires, reattach the injector driveline (the wire without the plastic insulator).</li> <li>. With a 6-volt test light, monitor the injector on return side (where no wire is attached with respect to ground while cranking the engine).</li> </ul>	<p>Light flashes or is steady on. —————→</p> <p>No light. —————→</p>	<p>→ Go to 31-9.</p> <p>→ Go to 31-10.</p>
<p>31-9 Check Injector</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the injector driveline again.</li> <li>. Also disconnect the injector drive and return lines (wires) from another nearby injector.</li> <li>. Swap injectors and reattach all drive and injector wires.</li> <li>. Clear codes.</li> <li>. Restart engine and run until the "Check Engine" light comes on or has run warm for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader displays "NONE" (no codes) or any other codes except 31X. —————→</p> <p>Same 31X Code as before. —————→</p> <p>31X Code now points to nearby injector. (Refer to Table 31X-1 to see which code points to which cylinder.) —————→</p>	<p>→ Go to 31-30.</p> <p>→ Go to 31-12.</p> <p>→ Replace original suspect injector. Then go to 31-30.</p>



ECM J1B Harness Connector  
P/N 12034400



EDU J2 Harness Connector (Black)  
P/N 1203486

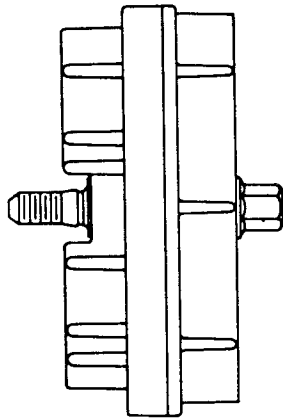
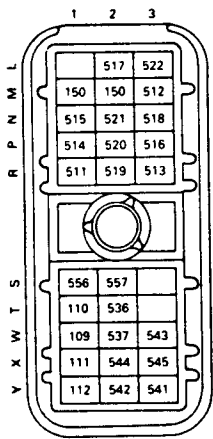
TABLE 31X-4

Code	J1B Socket	to	J2 Socket
311	R1		S
312	M3		R
313	R3		P
314	P1		N
315	N1		M
316	P3		L
317	L2		K
318	N3		J

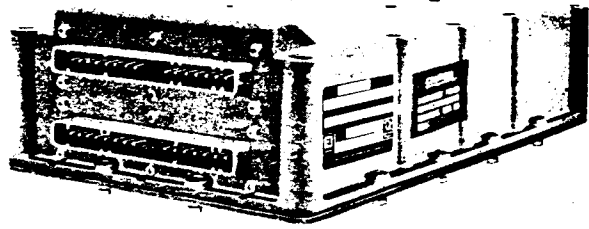
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

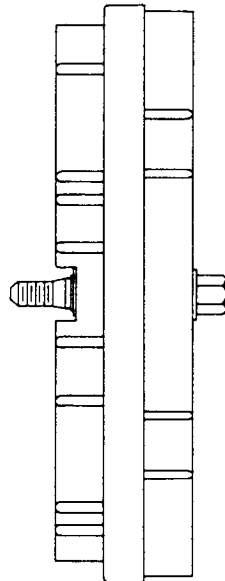
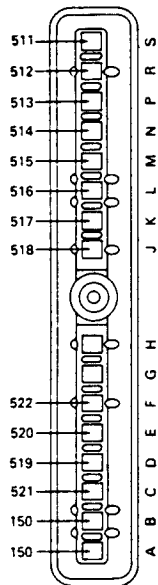
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-10 ECM/EDU Wiring Check</p> <ul style="list-style-type: none"> <li>• Disconnect the J2 connector at the EDU.</li> <li>• Also disconnect the J1B connector at the ECM.</li> <li>• Referring to Table 31X-4, install a jumper wire between socket R2 on the J1B harness connector and the J1B socket associated with the 31X Code received. (Example: For Code 314, install a jumper wire between sockets R2 and P1 on the J1B harness connector.)</li> <li>• Still referring to Table 31X-4, read the resistance between socket D on the J2 harness connector and the J2 socket associated with the 31X Code received. (Example: For Code 314, read resistance sockets D and N on the J2 harness connector.)</li> </ul>	<p>Greater than 5 ohms. —————→</p> <p>Less than or equal to 5 ohms. —————→</p>	<p>Open exists in wires from which resistance was just read. Repair open. Then go to 31-30.</p> <p>Go to 31-11.</p>



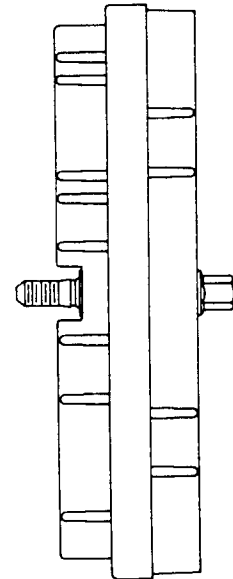
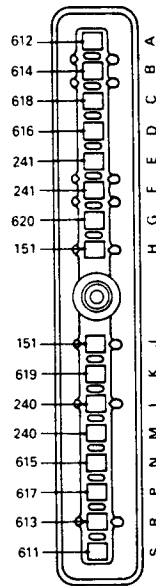
ECM J1B Harness Connector  
P/N 12034400



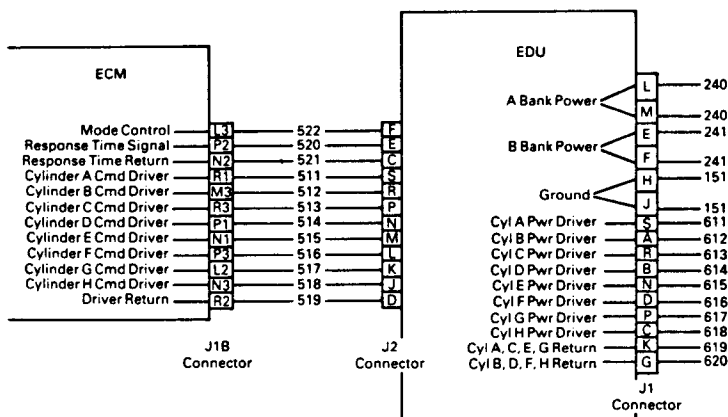
Electronic Distributor Unit (EDU)



EDU J2 Harness Connector (Black)  
P/N 1203486



EDU J1 Harness Connector (Gray)  
P/N 12034382



ECM to EDU  
and EDU Output Circuits

TABLE 31X-4

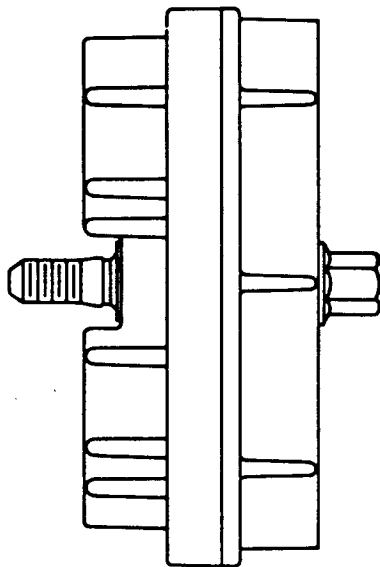
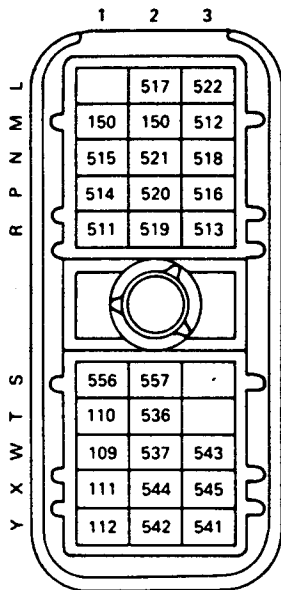
Code	J1B Socket	J2 Socket
311	R1	S
312	M3	R
313	R3	P
314	P1	N
315	N1	M
316	P3	L
317	L2	K
318	N3	J

SECTION 4  
TROUBLESHOOTING CHARTS

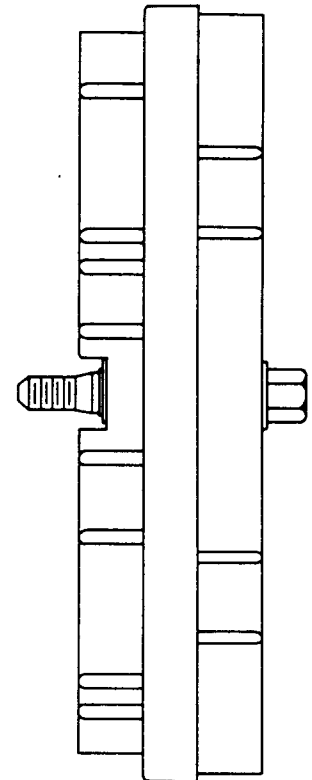
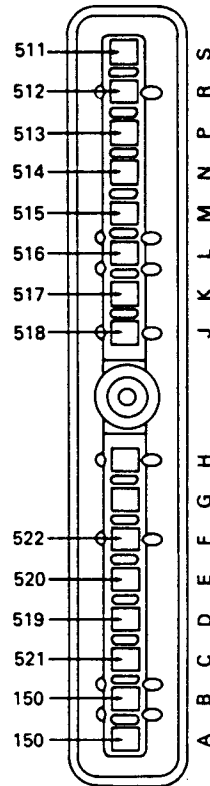
E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>31-11 Check for Short to Ground</u></p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Referring to Table 31X-4, read resistance from socket R2 on the J1B harness connector to the J1B socket associated with the 31X Code. (Example: This would be to socket P3 for Code 316.)</li> <li>. Also read the resistance from the same J1B socket (P3 in the example) to a good ground.</li> </ul>	<p>Both readings are greater than 10,000 ohms.</p> <p>Either reading is less than 10,000 ohms.</p>	<p>→ Go to 31-12.</p> <p>→ Short exists between wire just probed and either the return line (ckt #519) or ground. Repair short. Then go to 31-30.</p>
<p><u>31-12 Check EDU Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the EDU connectors (both J1 and J2) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Go to 31-13.</p> <p>→ Repair terminals/ connectors. Then go to 31-30.</p>
<p><u>31-13 Check EDU</u></p> <ul style="list-style-type: none"> <li>. Replace EDU.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start and run engine until warm. (Run for at least 1 minute.)</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader displays "NONE" (no codes).</p> <p>DDL Reader displays codes, but not Code 31X.</p> <p>Same 31X Code returns (and any other codes).</p> <p>Other 31X Codes, but not the same original 31X Code.</p>	<p>→ Return vehicle to service.</p> <p>→ Go to DCC-1.</p> <p>→ Go to 31-19.</p> <p>→ Go to 31-1.</p>

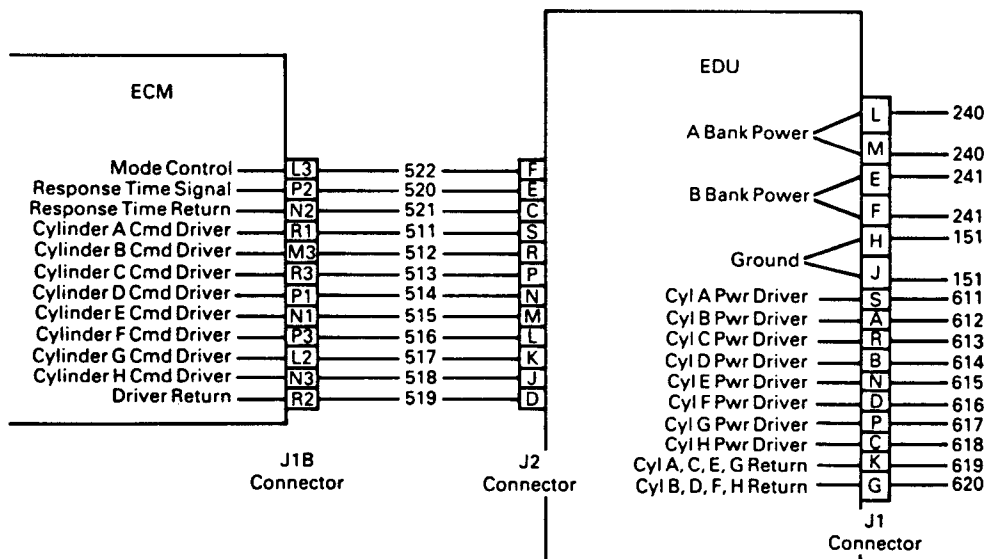




ECM J1B Harness Connector  
P/N 12034400



EDU J2 Harness Connector (Black)  
P/N 1203486

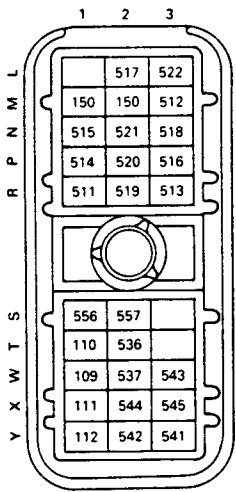


ECM to EDU  
and EDU Output Circuits

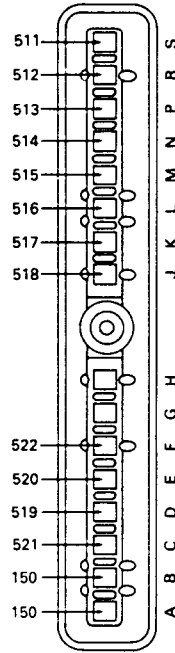
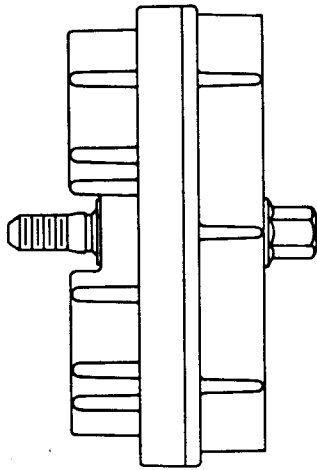
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

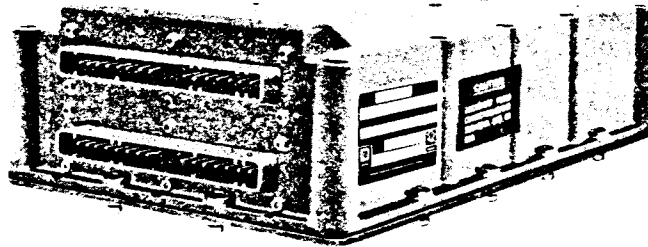
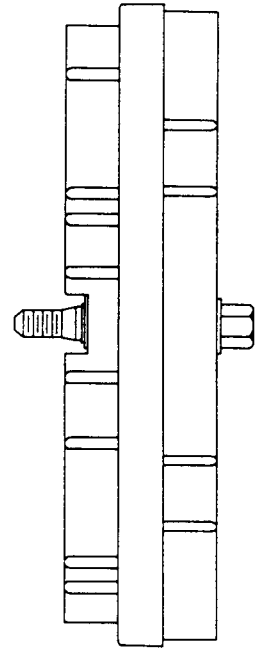
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>31-14 Check for Open</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1B connector at the ECM.</li> <li>• Also disconnect the J2 connector at the EDU.</li> <li>• Install a jumper wire between sockets E and C on the J2 harness connector.</li> <li>• Read resistance between sockets P2 and N2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms. →</p>	<p>Go to 31-15.</p> <p>Either the Response Time signal line (ckt #520) or the Response Time return line (ckt #521) is open. Repair open. Then go to 31-30.</p>
<p><u>31-15 Check for Short to Ground</u></p> <ul style="list-style-type: none"> <li>• Remove jumper wire.</li> <li>• Read resistance between socket P2 on the J1B connector and a good ground.</li> <li>• Also read resistance between socket N2 on the J1B harness connector and a good ground.</li> </ul>	<p>Either reading is less than or equal to 10,000 ohms. →</p> <p>Both readings are greater than 10,000 ohms. →</p>	<p>Either the Response Time signal line (ckt #520) or the Response Time return line (ckt #521) is shorted to ground. Repair short. Then go to 31-30.</p> <p>Go to 31-16.</p>
<p><u>31-16 Check for Open Mode Control Line</u></p> <ul style="list-style-type: none"> <li>• Install a jumper wire between sockets D and F on the J2 harness connector.</li> <li>• Read resistance between sockets L3 and R2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. →</p> <p>Greater than 5 ohms. →</p>	<p>Go to 31-17.</p> <p>The Mode Control line (ckt #522) is open. Repair open. Then go to 31-30.</p>



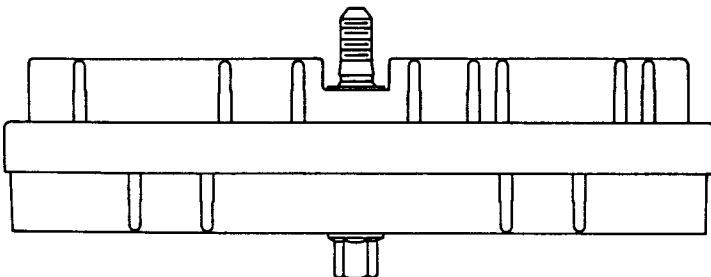
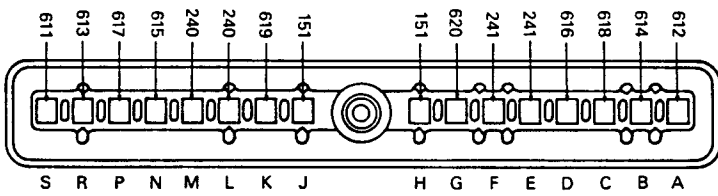
ECM J1B Harness Connector  
P/N 12034400



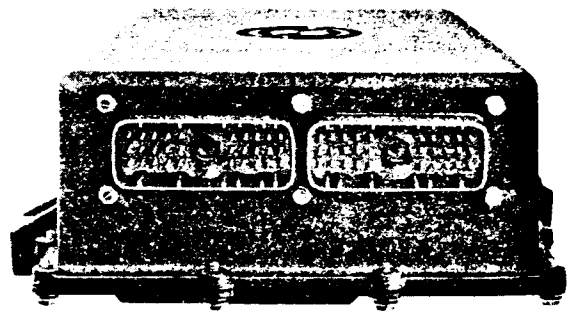
EDU J2 Harness Connector (Black)  
P/N 1203486



Electronic Distributor Unit (EDU)



EDU J1 Harness Connector (Gray)  
P/N 12034382

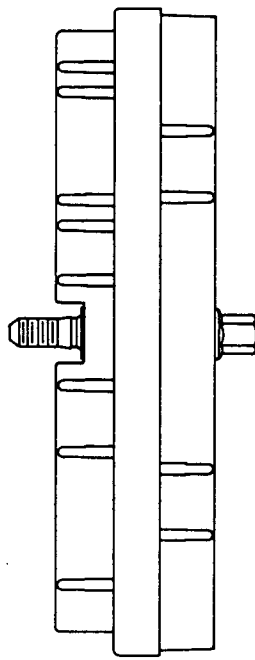
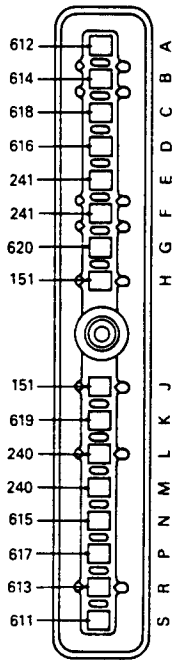


Electronic Control Module (ECM)

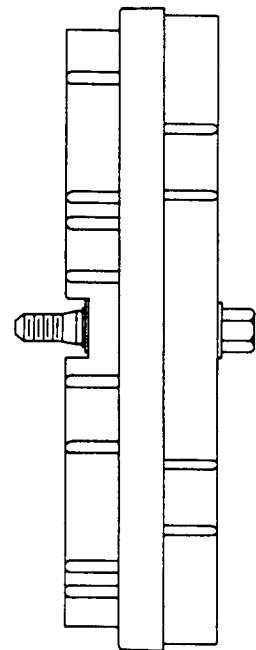
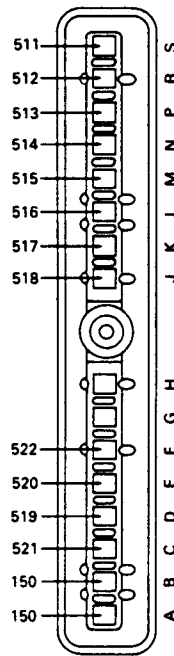
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

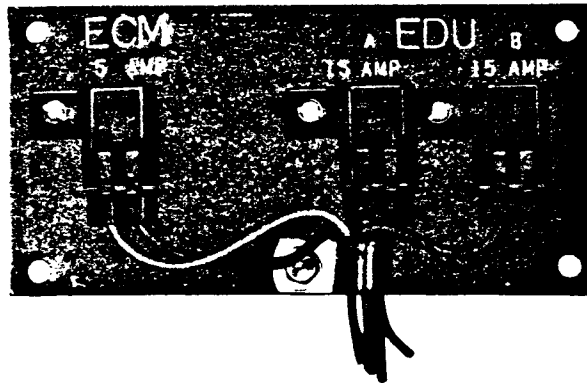
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-17 Check EDU Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the EDU connectors (both J1 and J2) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Go to 31-18.</p> <p>Repair terminals/ connectors. Then go to 31-30.</p>
<p>31-18 Check EDU</p> <hr/> <ul style="list-style-type: none"> <li>. Replace EDU.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start and run engine until warm. (Run for at least 1 minute.)</li> <li>. Stop engine</li> <li>. Read codes.</li> </ul>	<p>DDL Reader displays "NONE" (no codes). →</p> <p>DDL Reader displays codes, but not Code 31X. →</p> <p>All 31X Codes remain (and any other codes). →</p> <p>Only some 31X Codes remain. →</p>	<p>Return vehicle to service.</p> <p>Go to DCC-1.</p> <p>Go to 31-19.</p> <p>If all previous 31X Codes cannot be recreated, return to 31-1.</p>
<p>31-19 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Reinstall old EDU. (It was okay.)</li> <li>. Check terminals at the ECM connector (J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to 31-30.</p> <p>Repair terminals/ connectors. Then go to 31-30.</p>



EDU J1 Harness Connector (Gray)  
P/N 12034382

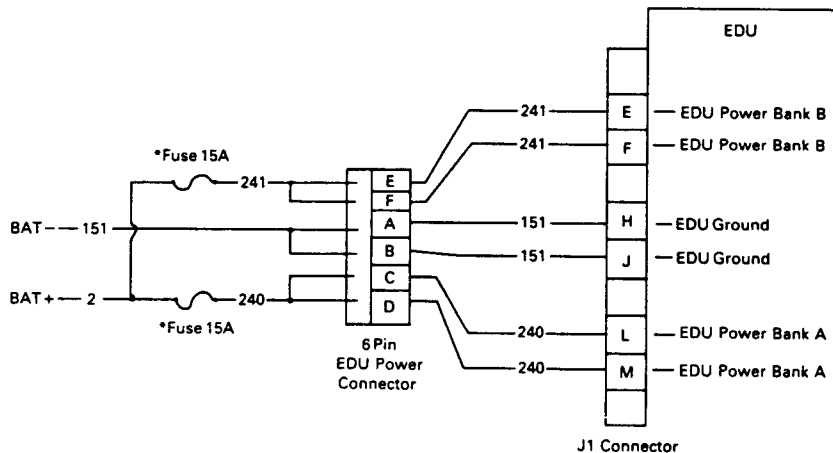


EDU J2 Harness Connector (Black)  
P/N 1203486



Power Panel

EDU Power and Ground Circuits

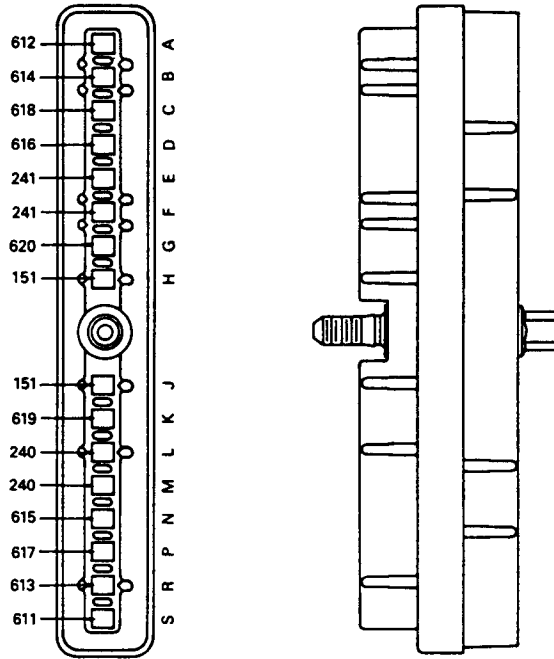


(\*Note: Some applications may have circuit breakers instead of fuses)

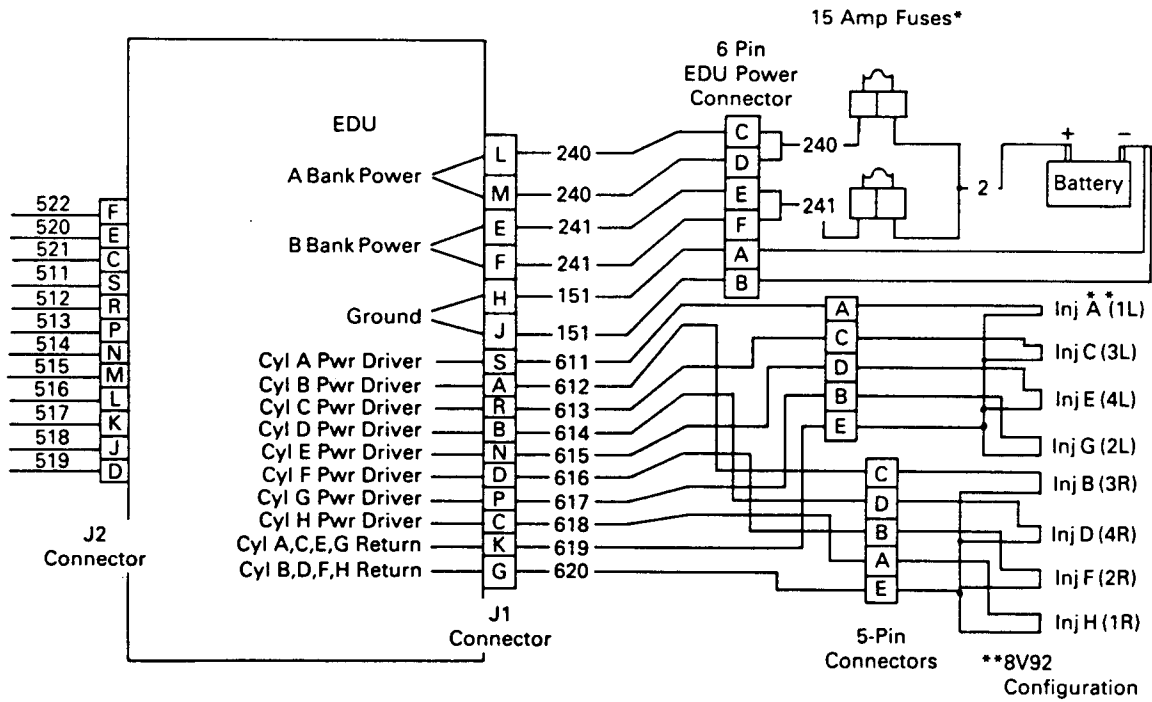
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-20 Check EDU Fuses</p> <hr/> <ul style="list-style-type: none"> <li>• Check both 15 Amp fuses to the EDU.</li> </ul>	<p>Fuse(s) blown. —————→</p> <p>Fuses are okay. —————→</p>	<p>→ Go to 31-21.</p> <p>→ Go to 31-23.</p>
<p>31-21 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Replace fuse(s).</li> <li>• Run engine to see if fuse(s) blows again.</li> </ul>	<p>Fuse(s) blown. —————→</p> <p>Fuses are okay. —————→</p>	<p>→ Turn ignition off. Then go to 31-22.</p> <p>→ Go to 31-30.</p>
<p>31-22 Check EDU Power</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect the J1 connector at the EDU.</li> <li>• Replace fuse(s).</li> <li>• Read voltage on socket E (red lead) to a good ground (black lead).</li> <li>• Also read voltage on sockets F, L and M (red lead) to a good ground.</li> </ul>	<p>Greater than or equal to 11.5 volts for each reading. —————→</p> <p>Less than 11.5 volts on any reading. —————→</p>	<p>→ Go to 31-23.</p> <p>→ Short exists between Bank A Power (ckt #240) or Bank B Power (ckt #241) and ground. Repair short. Then go to 31-30.</p>
<p>31-23 Check EDU Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the EDU connectors (both J1 and J2) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Go to 31-24.</p> <p>→ Repair terminals/ connectors. Then go to 31-30.</p>



EDU J1 Harness Connector (Gray)  
P/N 12034382



(\*Notes: Some applications may have circuit breakers instead of fuses. Also, wire numbers under the rocker arm cover may differ from those indicated above.)

ECM to EDU Injector Circuits,  
& Power and Ground

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-24 Check for Open</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1 connector at the EDU.</li> <li>. Read voltage on socket L or M (red lead) to socket H or J (black lead) of the EDU, J1 harness connector.</li> <li>. Also read voltage on socket E or F (red lead) to socket H or J (black lead) of the EDU harness connector.</li> </ul>	<p>Both readings are greater than or equal to 11.5 volts. —————→</p> <p>Either reading is less than 11.5 volts. —————→</p>	<p>Go to 31-25.</p> <p>Bank A Power (ckt #240) or Bank B Power (ckt #241) is open. Repair open. Then go to 31-30.</p>
<p>31-25 Check for Good Ground Line</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance between socket H of the J1 harness connector and a good ground.</li> <li>. Also read resistance between socket J of the J1 harness connector and a good ground.</li> </ul>	<p>Both readings are less than or equal to 5 ohms. —————→</p> <p>Either reading is greater than 5 ohms. —————→</p>	<p>Go to 31-26.</p> <p>Ground line (ckt #151) is open. Repair open. Then go to 31-30.</p>
<p>31-26 Check Return Line</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance between sockets S and K of the J1 harness connector.</li> <li>. Also read resistance between sockets A and G of the J1 harness connector.</li> </ul>	<p>Either reading is greater than 5 ohms. —————→</p> <p>Both readings are less than or equal to 5 ohms. —————→</p>	<p>Injector Driver Return Line (ckt #619 or #620) is open. Repair open. Then go to 31-30.</p> <p>Go to 31-18.</p>

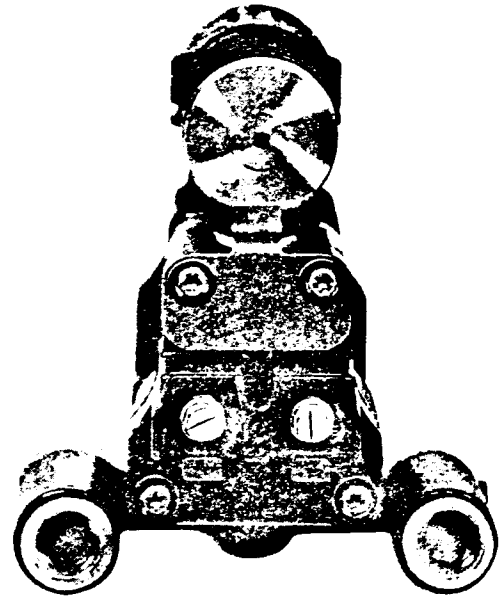
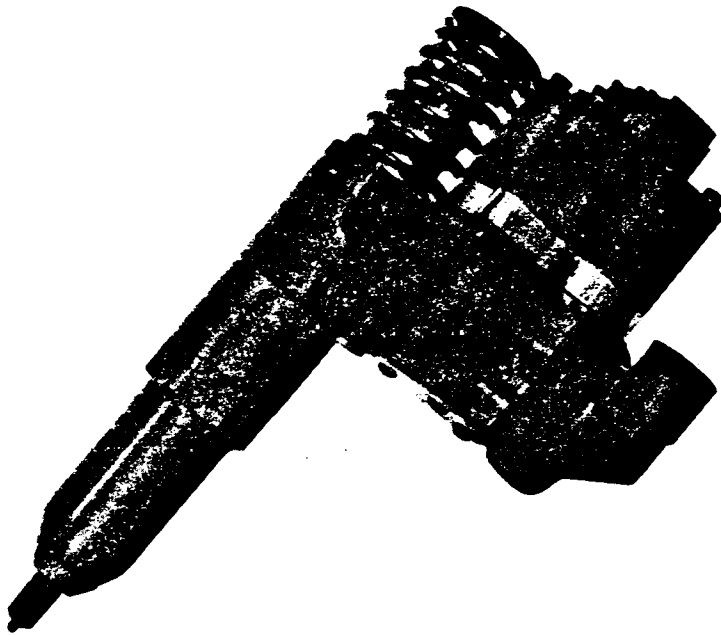




SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 31X (X=1 to 8) - INJECTOR RESPONSE TIME TOO LONG (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>31-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Code 31X (and any other codes). →</p> <p>Any other codes except Code 31X. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other Codes.</p>



Injector

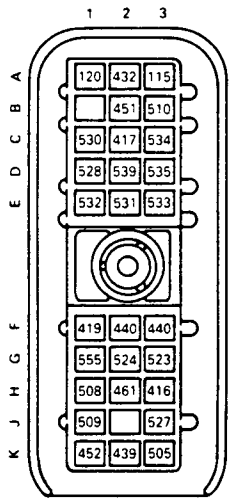
TABLE 32X-1

Code Received	Engine Type				
	Right Hand Rotation				Left Hand Rotation
	6V92	8V92	6L71	Series 60	6V92
321	1L	1L	1	1	1R
322	3R	3R	5	5	2L
323	3L	3L	3	3	2R
324	2R	4R	6	6	3L
325	2L	4L	2	2	3R
326	1R	2R	4	4	1L
327	—	2L	—	—	—
328	—	1R	—	—	—

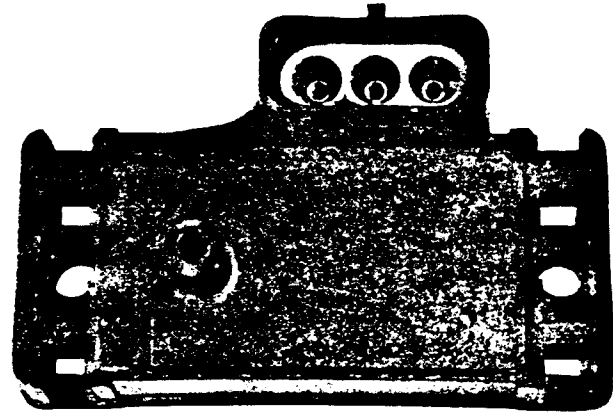
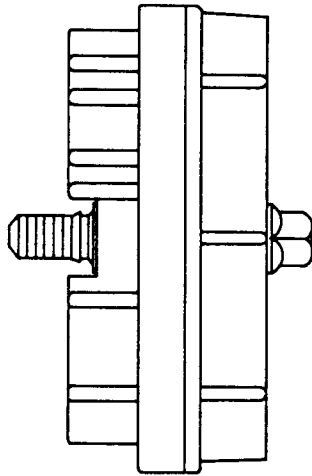
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 32X (X=1 to 8) - INJECTOR RESPONSE TIME TOO SHORT

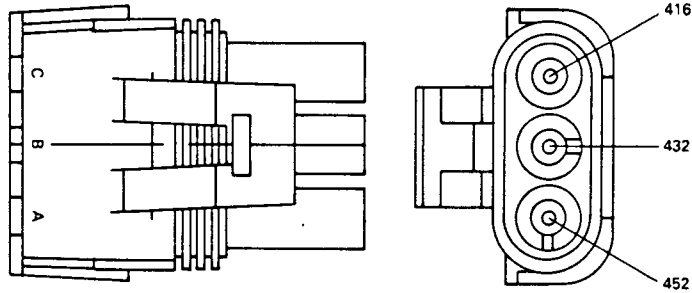
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>32-1 Check Injector</p> <hr/> <ul style="list-style-type: none"> <li>. Referring to Table 32X-1, note the cylinder associated with the code received.</li> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Remove the rocker arm cover.</li> <li>. Swap the injector from the cylinder being pointed to with an injector from another cylinder.</li> <li>. Restart engine and run until "Check Engine" light comes on or has run warm for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader _____ → displays "NONE (no codes) or any other codes except 32X.</p> <p>Same 32X _____ → Code as before.</p> <p>32X Code now _____ → points to nearby injector.</p>	<p>→ Problem may be intermittent. If you cannot get it to recur, go to DCC-1. Then check for problems in the charging system (loose alternator belt, etc.), bad ground(s) or fuel aeration.</p> <p>→ Check for intermittent open or short in injector drive and return wires at cylinder where original 32X Code pointed to. Repair, then go to 32-30.</p> <p>→ Replace original suspect injector. Then go to 32-30.</p>
<p>32-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads _____ → "NONE" (no codes).</p> <p>Code 32X (and any _____ → other codes).</p> <p>Any other codes _____ → except Code 32X.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



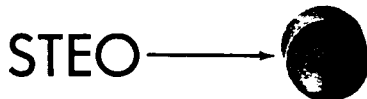
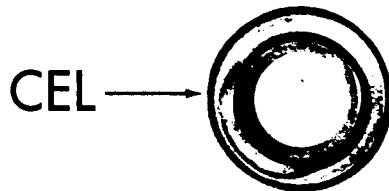
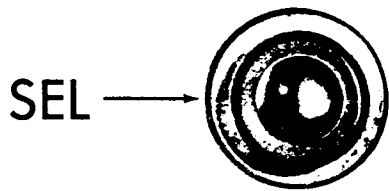
ECM J1A Harness Connector  
P/N 12034398



Turbo Boost Pressure Sensor (TBS)

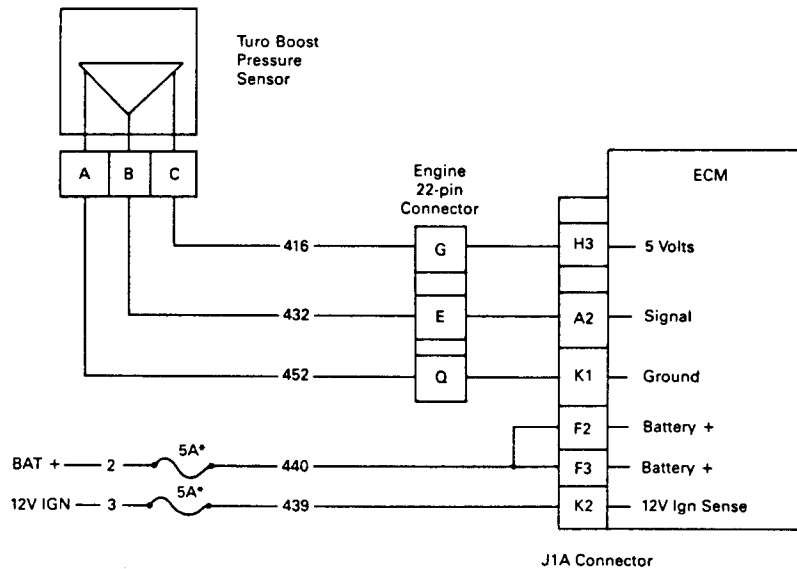


Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332



Dash Lights

Turbo Boost Pressure, Battery + and Ignition Circuits

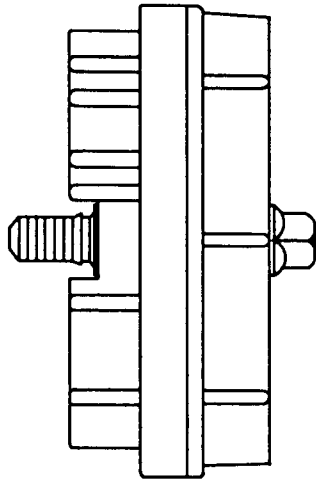
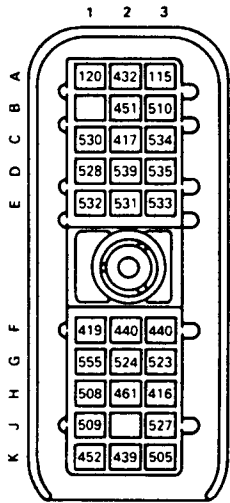


(\*Note: Some applications may have circuit breakers instead of fuses)

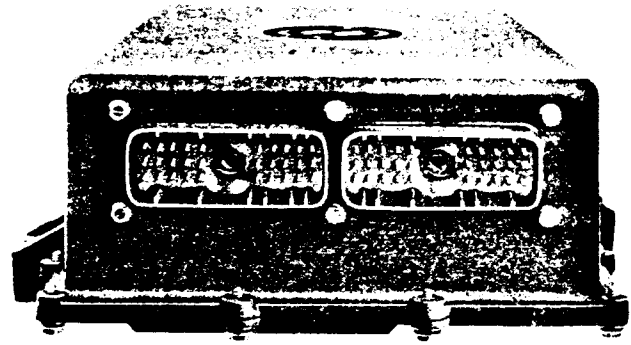
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 33 - TURBO BOOST PRESSURE SENSOR (TBS) HIGH

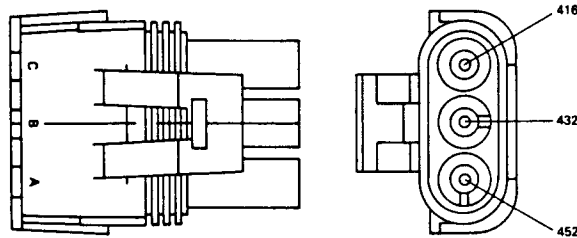
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>33-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other Codes besides Code 33?</li> </ul>	<p>No other Codes. —————→</p> <p>Yes. Any or all of the following Codes: 14, 15, 21, 22, 34. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>Go to 33-2.</p> <p>Go to 5VM-1.</p> <p>Go to 33-2.</p>
<p>33-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear Codes.</li> <li>. Disconnect TBS Connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 34 (and any other Codes except Code 33). —————→</p> <p>Code 33 (and any other Codes). —————→</p>	<p>Go to 33-3.</p> <p>Go to 33-5.</p>
<p>33-3 Ground Circuit Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Install a jumper wire between pins A and B of the TBS harness connector.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets A2 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>Go to 33-4.</p> <p>Ground line (ckt #452) is open. Repair open. Then go to 33-30.</p>



ECM J1A Harness Connector  
P/N 12034398

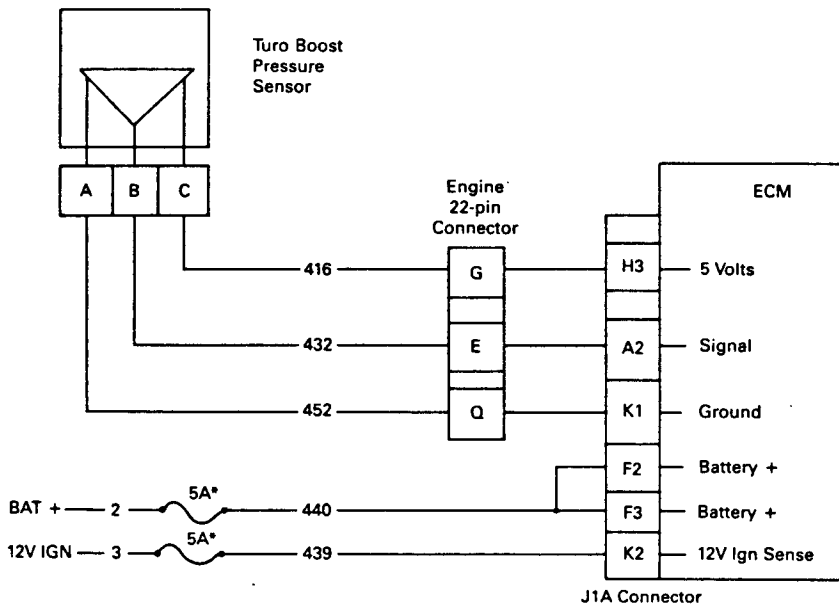


Electronic Control Module (ECM)

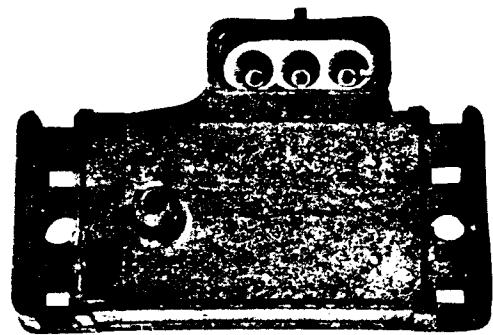


Turbo Boost Pressure Sensor  
Harness Connector  
P/N 12041332

Turbo Boost Pressure, Battery + and Ignition Circuits



(\*Note: Some applications may have circuit breakers instead of fuses)



Turbo Boost Pressure Sensor (TBS)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 33 - TURBO BOOST PRESSURE SENSOR (TBS) HIGH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>33-4 Check TBS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the TBS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace TBS. Then go to 33-30.</p> <p>Repair terminals/connectors. Then go to 33-30.</p>
<p>33-5 Check for Short to +5 Volt Line</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets H3 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. →</p> <p>Greater than 10,000 ohms or open. →</p>	<p>Signal line (ckt #432) is shorted to the +5 Volt line (ckt #416). Repair short. Then go to 33-30.</p> <p>Go to 33-6.</p>
<p>33-6 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to 33-30.</p> <p>Repair terminals/connectors. Then go to 33-30.</p>

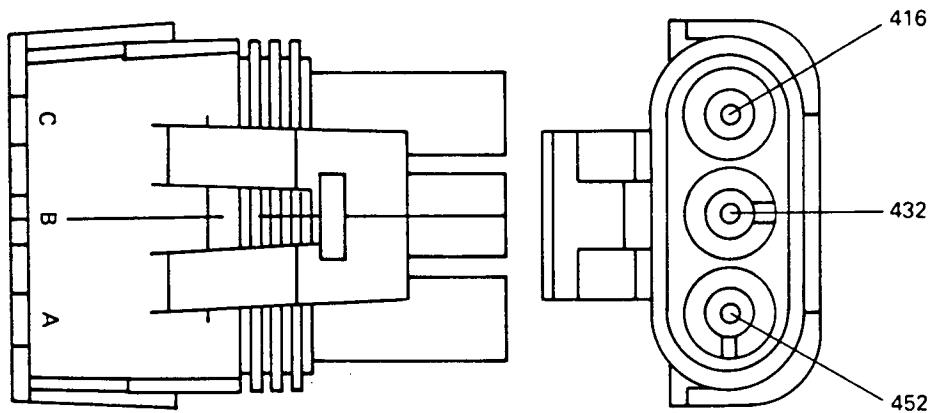




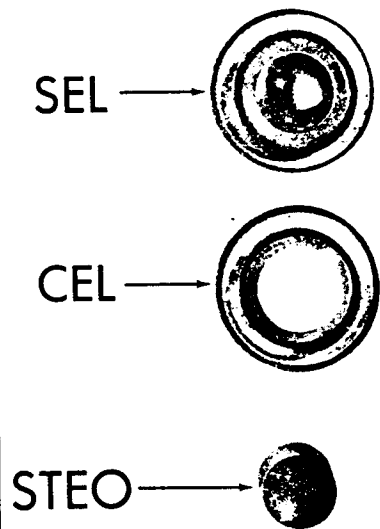
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 33 - TURBO BOOST PRESSURE SENSOR (TBS) HIGH (Cont'd.)

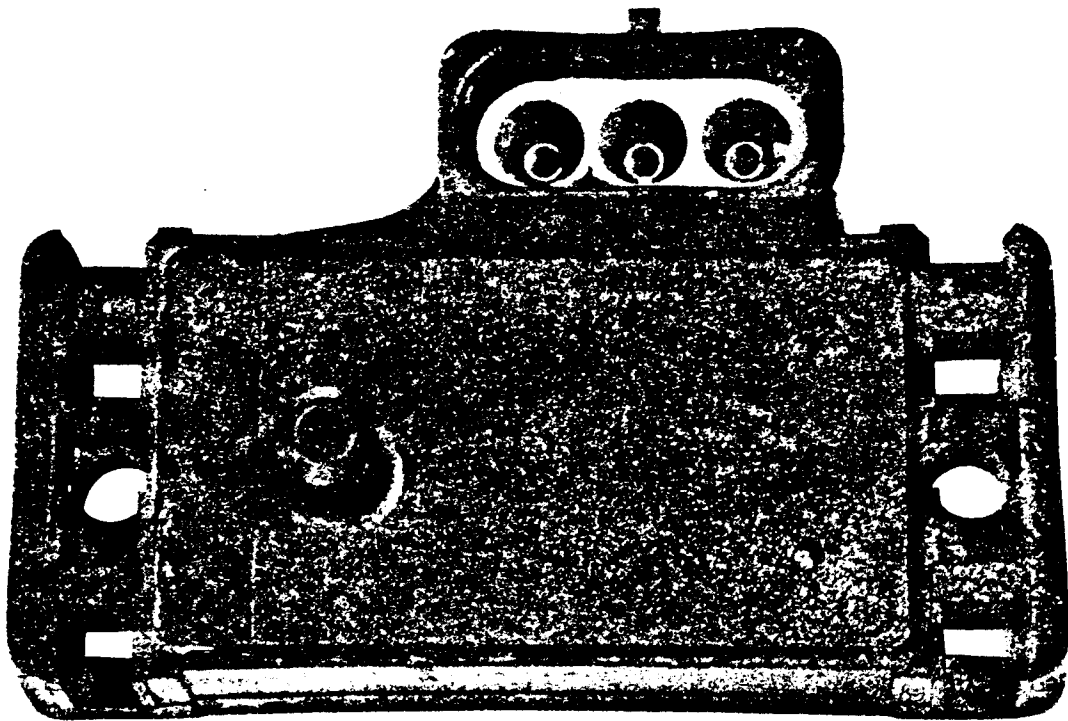
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>33-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Code 33 (and any other codes). →</p> <p>Any other codes except Code 33. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332



Dash Lights

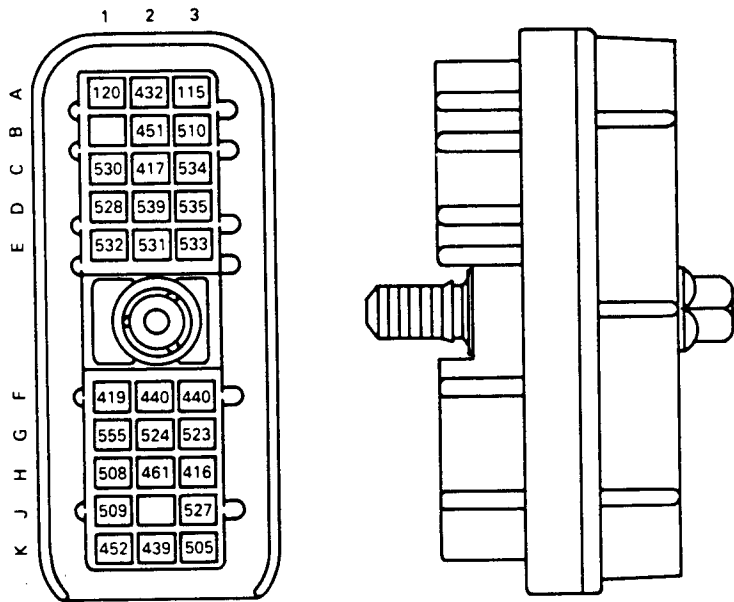


Turbo Boost Pressure Sensor (TBS)

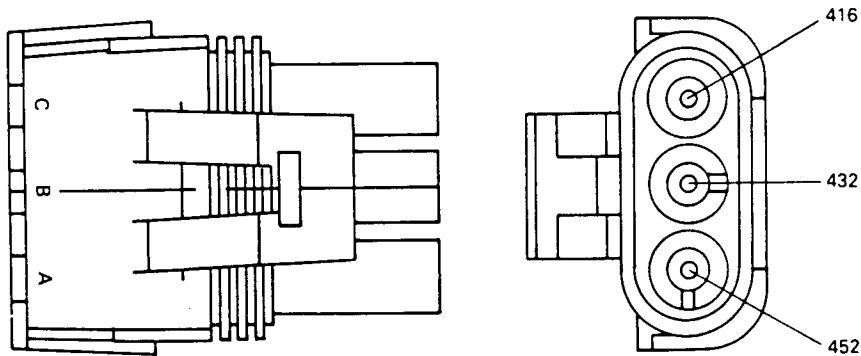
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 34 - TURBO BOOST PRESSURE SENSOR (TBS) LOW

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>34-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other Codes besides Code 34?</li> </ul>	<p>No other codes. —————&gt;</p> <p>Yes. Any or all of the following codes: 14, 15, 21, 22, 33. —————&gt;</p> <p>Yes, but none of the above. —————&gt;</p>	<p>Go to 34-2.</p> <p>Go to 5VM-1.</p> <p>Go to 34-2.</p>
<p>34-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect TBS connector.</li> <li>. Install a jumper wire between sockets B and C of the TBS harness connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until either the "Check Engine" light comes on or the engine has been running warm for at least one minute at greater than 1000 RPM.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 33 (and any other codes except Code 34). —————&gt;</p> <p>Code 34 (any any other codes). —————&gt;</p>	<p>Go to 34-3.</p> <p>Go to 34-4.</p>
<p>34-3 Check TBS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the TBS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace TBS. Then go to 34-30.</p> <p>Repair terminals/connectors. Then go to 34-30.</p>

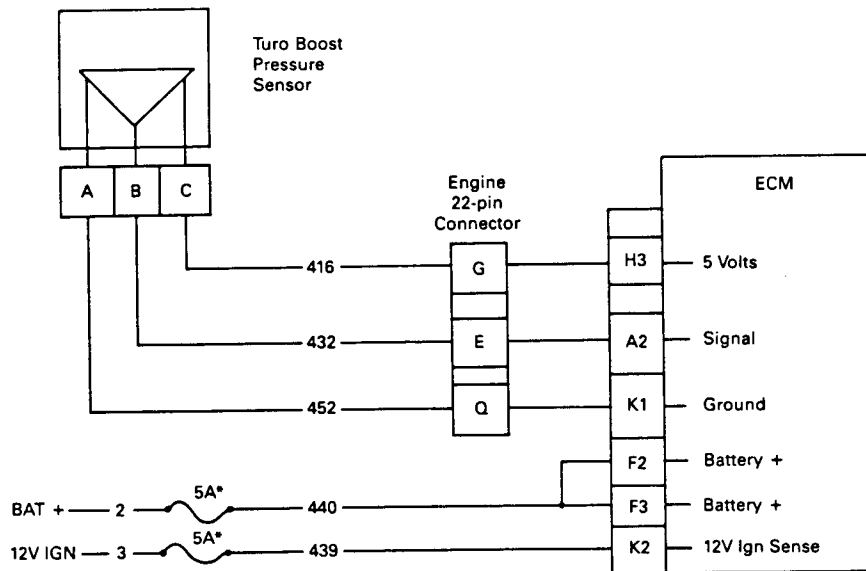


ECM J1A Harness Connector  
P/N 12034398



Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332

Turbo Boost Pressure, Battery + and Ignition Circuits



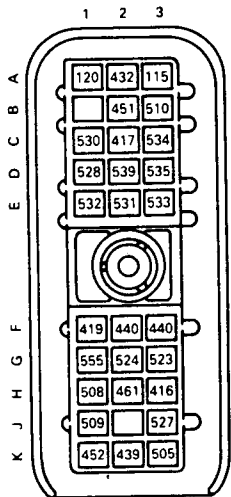
J1A Connector

(\*Note: Some applications may have circuit breakers instead of fuses)

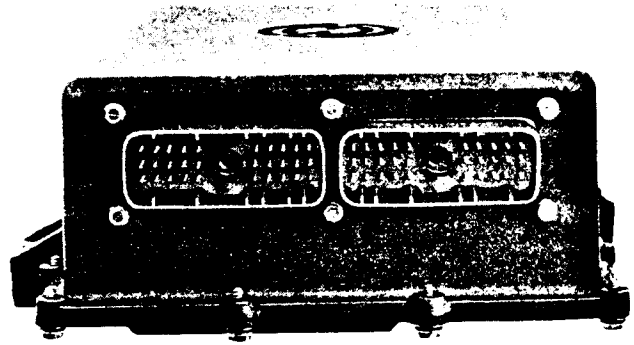
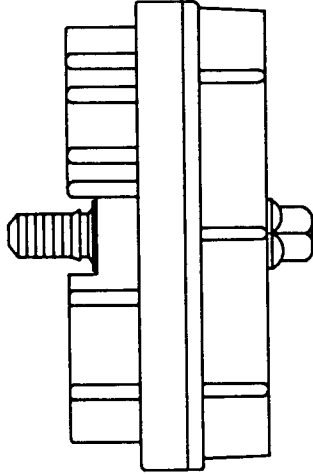
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 34 - TURBO BOOST PRESSURE SENSOR (TBS) LOW (Cont'd.)

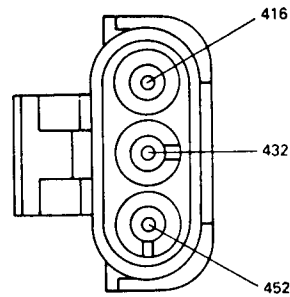
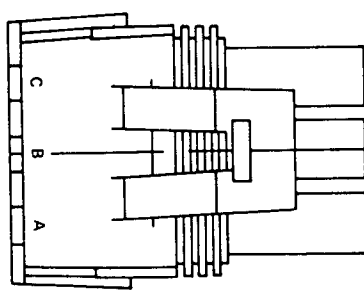
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>34-4 Check for +5 Volts</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper.</li> <li>. Turn ignition on.</li> <li>. Read voltage on TBS harness connector, pin C (red lead) to pin A (black lead).</li> </ul>	<p>Between 4 to 6 volts. —————&gt;</p> <p>Less than 4 volts. —————&gt;</p> <p>Greater than 6 volts. —————&gt;</p>	<p>Go to 34-5.</p> <p>Go to 34-8.</p> <p>Go to 34-10.</p>
<p>34-5 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between pins A and B on the TBS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>Signal line (ckt #432) is shorted to the ground line (ckt #452). Repair short. Then go to 34-30.</p> <p>Go to 34-6.</p>
<p>34-6 Check for Signal Open</p> <hr/> <ul style="list-style-type: none"> <li>. Install a jumper wire between pins A and B of the TBS harness connector.</li> <li>. Read resistance between sockets A2 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to 34-7.</p> <p>Signal line (ckt #432) or ground line (ckt #452) is open. Repair open. Then go to 34-30.</p>



ECM J1A Harness Connector  
P/N 12034398

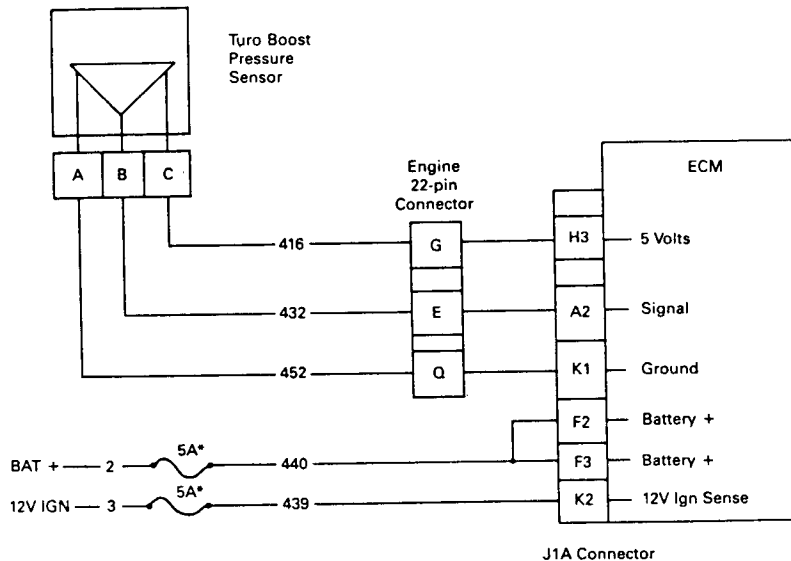


Electronic Control Module (ECM)



Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332

Turbo Boost Pressure, Battery + and Ignition Circuits



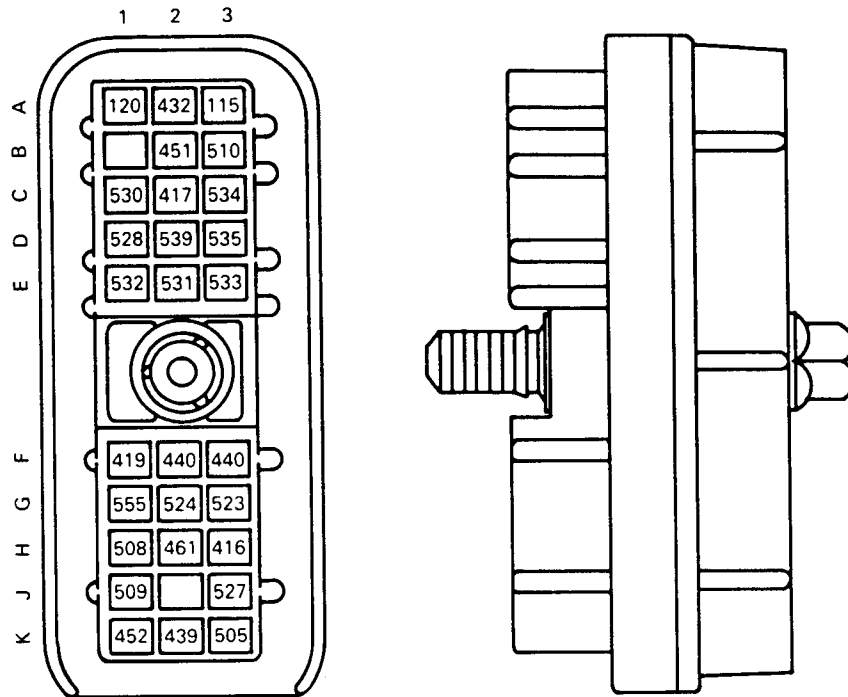
(\*Note: Some applications may have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 34 - TURBO BOOST PRESSURE SENSOR (TBS) LOW (Cont'd.)

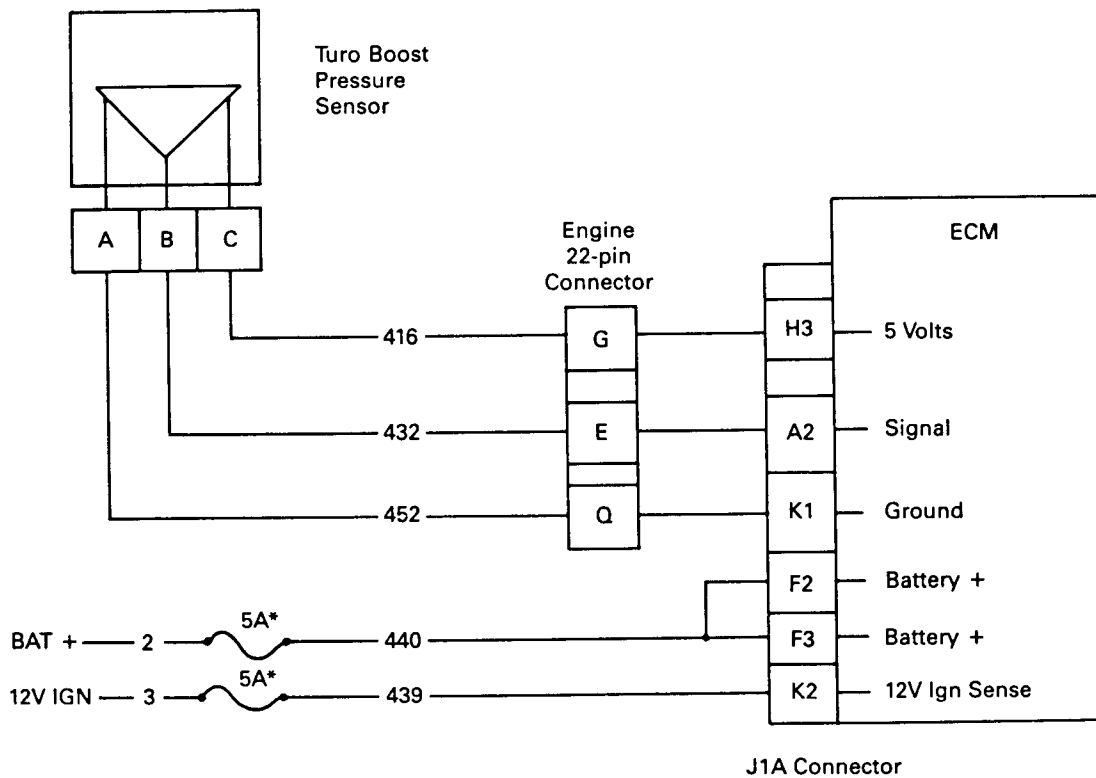
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>34-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace ECM. Then go to 34-30.</p> <p>Repair terminals/connectors. Then go to 34-30.</p>
<p>34-8 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between pins A and C on the TBS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>The +5 Volt line (ckt #416) is shorted to the ground (ckt #452). Repair short. Then go to 34-30.</p> <p>Go to 34-9.</p>
<p>34-9 Check for Open +5 Volt Line</p> <hr/> <ul style="list-style-type: none"> <li>. Install a jumper wire between pins A and C of the TBS harness connector.</li> <li>. Read resistance between sockets H3 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to 34-7.</p> <p>The +5 Volt line (ckt #416) is open. Repair open. Then go to 34-30.</p>





ECM J1A Harness Connector  
P/N 12034398

Turbo Boost Pressure, Battery + and Ignition Circuits

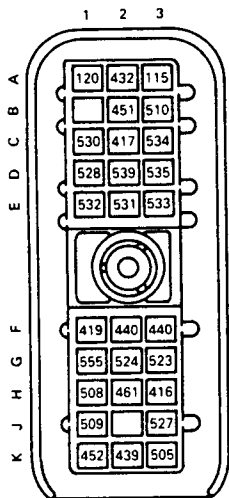


(\*Note: Some applications may have circuit breakers instead of fuses)

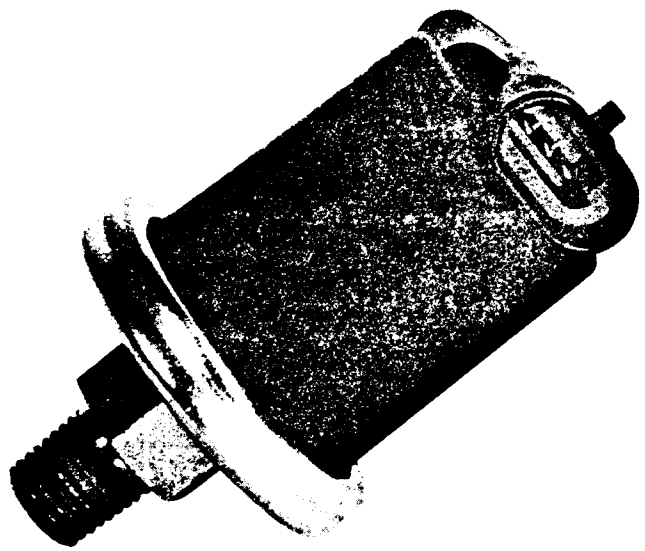
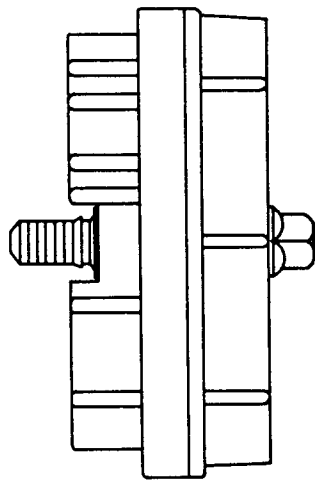
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 34 - TURBO BOOST PRESSURE SENSOR (TBS) LOW (Cont'd.)

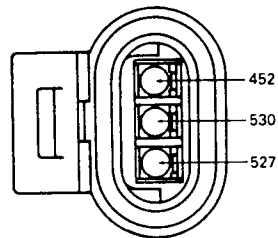
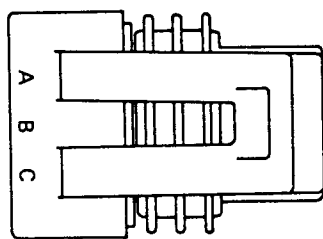
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>34-10 Check for Short to Battery +</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove 5 Amp ECM fuse.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets A2 and F2 on the J1A harness connector.</li> <li>. Also read resistance between sockets:               <ul style="list-style-type: none"> <li>A2 and F3</li> <li>A2 and K2</li> </ul> </li> </ul>	<p>All readings are greater than 10,000 ohms.</p> <p>Any reading is less than or equal to 10,000 ohms.</p>	<p>→ Go to 34-7.</p> <p>→ Short exists between sockets where less than 10,000 ohms resistance was read. Repair short and reinsert 5 Amp fuse. Then go to 34-30.</p>
<p>34-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 34 (and any other codes).</p> <p>Any other codes except Code 34.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



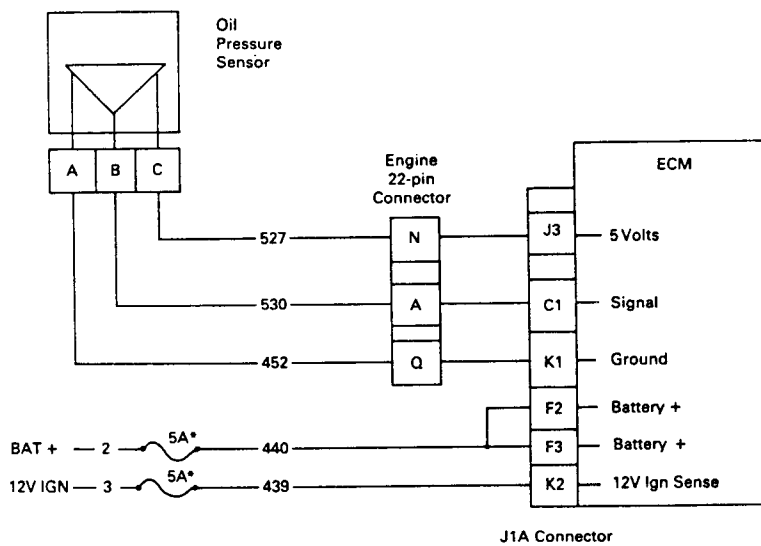
ECM J1A Harness Connector  
P/N 12034398



Oil Pressure Sensor (OPS)

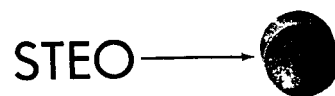
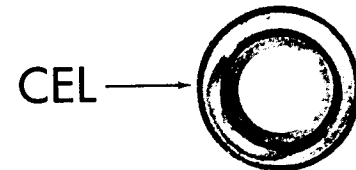
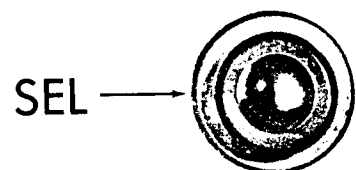


Oil Pressure Sensor Harness Connector  
P/N 12047909



(\*Note: Some applications have circuit breakers instead of fuses)

Oil Pressure, Battery + and Ignition Circuits

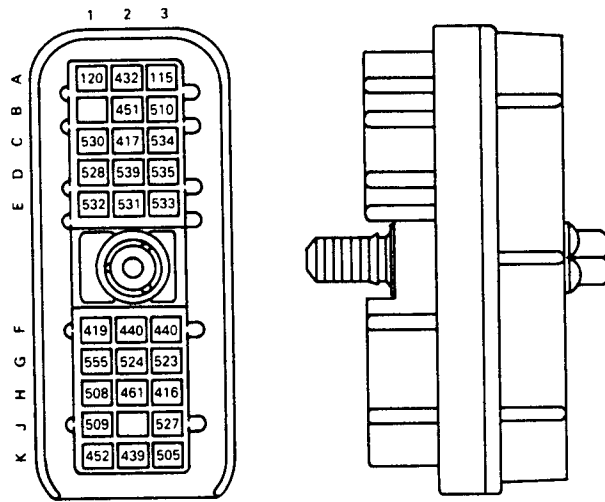


Dash Lights

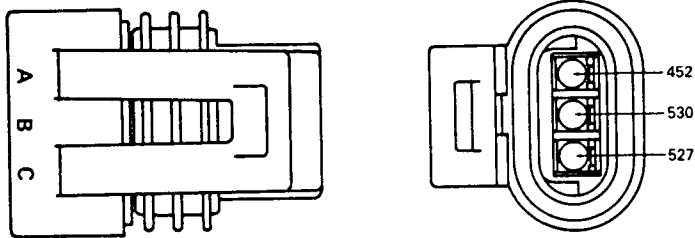
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 35 - OIL PRESSURE SENSOR (OPS) HIGH

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>35-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 35?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 12, 36. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>→ Go to 35-2.</p> <p>→ Go to 5VR-1.</p> <p>→ Go to 35-2.</p>
<p>35-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect OPS connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 36 (and any other codes except Code 35). —————→</p> <p>Code 35 (and any other codes). —————→</p>	<p>→ Go to 35-3.</p> <p>→ Go to 35-5.</p>
<p>35-3 Ground Circuit Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Install a jumper wire between pin A and pin B of the OPS harness connector.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets C1 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>→ Go to 35-4.</p> <p>→ Ground line (ckt #452) is open. Repair open. Then go to 35-30.</p>



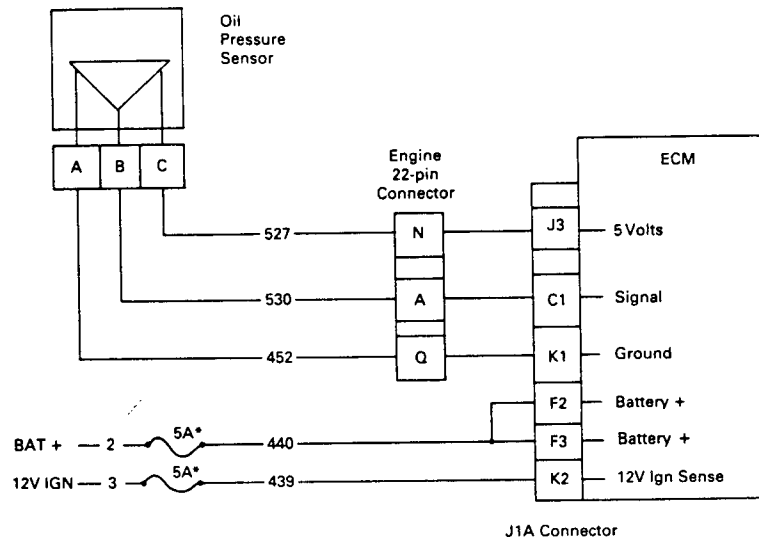
ECM J1A Harness Connector  
P/N 12034398



Oil Pressure Sensor Harness Connector  
P/N 12047909



Oil Pressure Sensor (OPS)



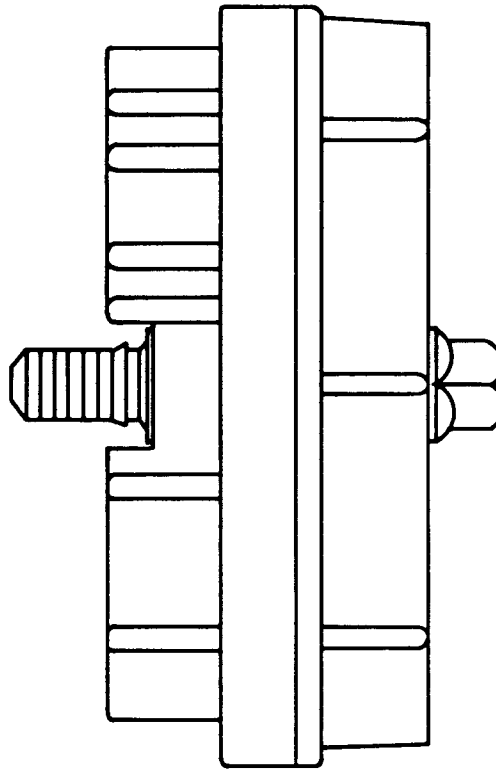
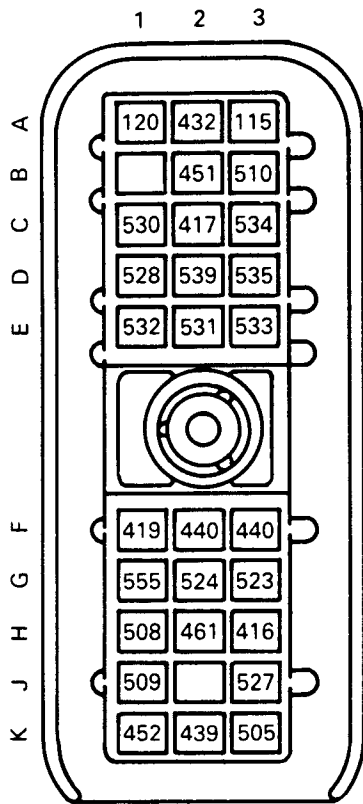
(\*Note: Some applications have circuit breakers instead of fuses)

Oil Pressure, Battery + and Ignition Circuits

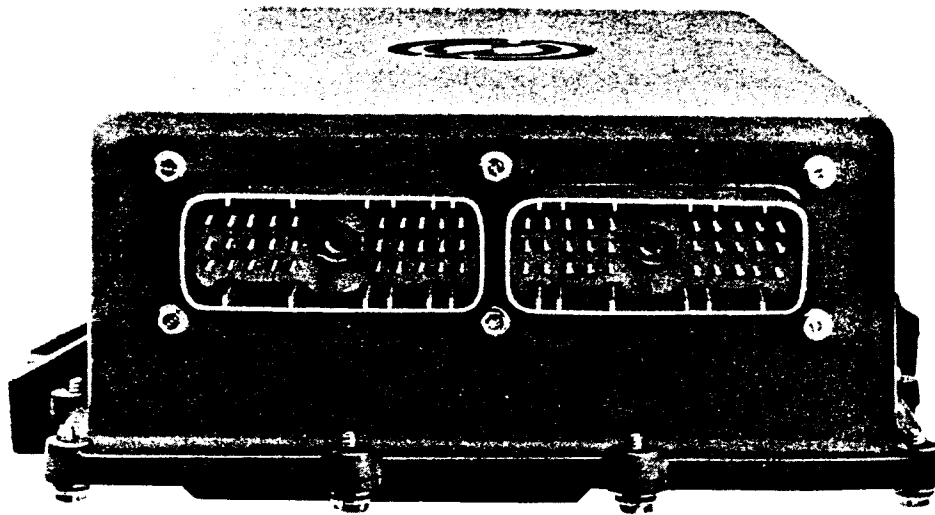
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 35 - OIL PRESSURE SENSOR (OPS) HIGH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>35-4 Check OPS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the OPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>→ Replace OPS. Then go to 35-30.</p> <p>→ Repair terminals/connectors. Then go to 35-30.</p>
<p>35-5 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets J3 and C1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. →</p> <p>Greater than 10,000 ohms or open. →</p>	<p>→ Signal line (ckt #530) is shorted to the +5 Volt line (ckt #527). Repair short. Then go to 35-30.</p> <p>→ Go to 35-6.</p>
<p>35-6 Check for Short to Battery +</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance between sockets C1 and F2 on the J1A harness connector.</li> <li>. Also read resistance between sockets: C1 and F3 C1 and K2</li> </ul>	<p>All readings are greater than 10,000 ohms. →</p> <p>Any reading is less than or equal to 10,000 ohms. →</p>	<p>→ Go to 35-7.</p> <p>→ Short exists between sockets were less than 10,000 ohms resistance was read. Repair short. Then go to 35-30.</p>



ECM J1A Harness Connector  
P/N 12034398



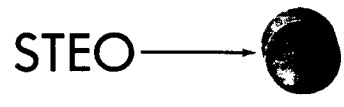
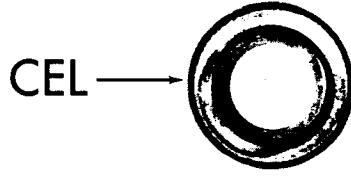
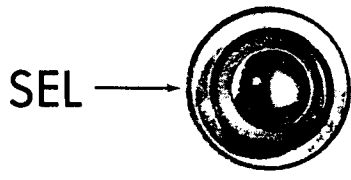
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

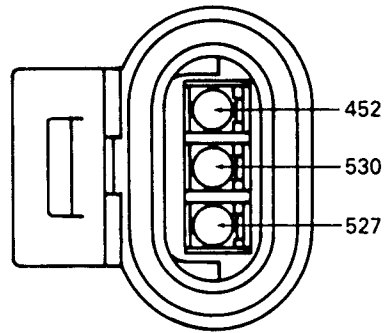
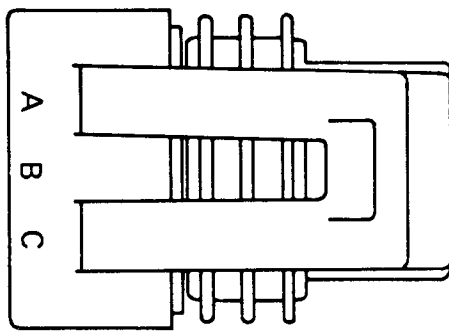
E. CODE 35 - OIL PRESSURE SENSOR (OPS) HIGH (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>35-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 35-30.</p> <p>→ Repair terminals/ connectors. Then go to 35-30.</p>
<p>35-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 35 (and any other codes).</p> <p>Any other codes except Code 35.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>

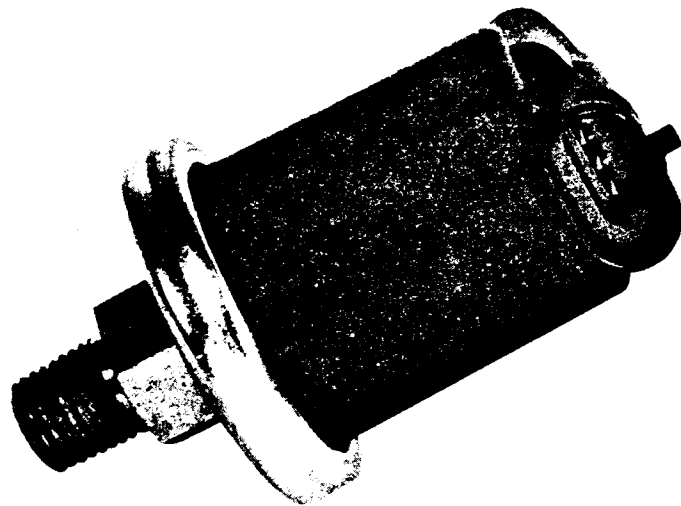




Dash Lights



Oil Pressure Sensor Harness Connector  
P/N 12047909

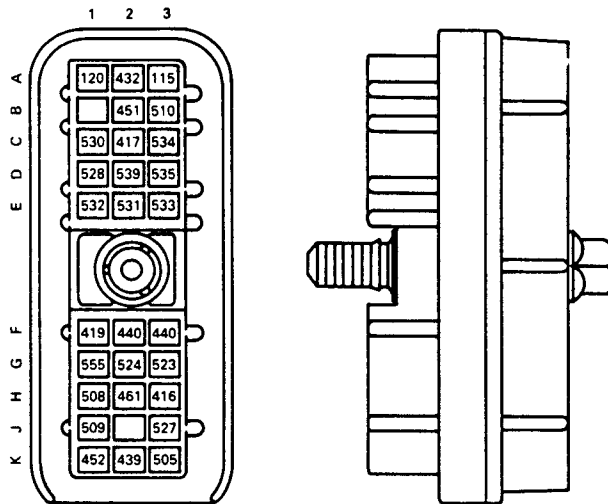


Oil Pressure Sensor (OPS)

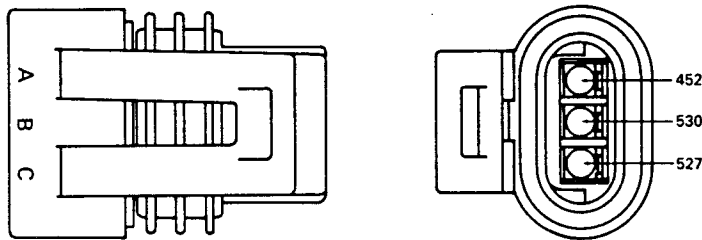
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 36 - OIL PRESSURE SENSOR (OPS) LOW

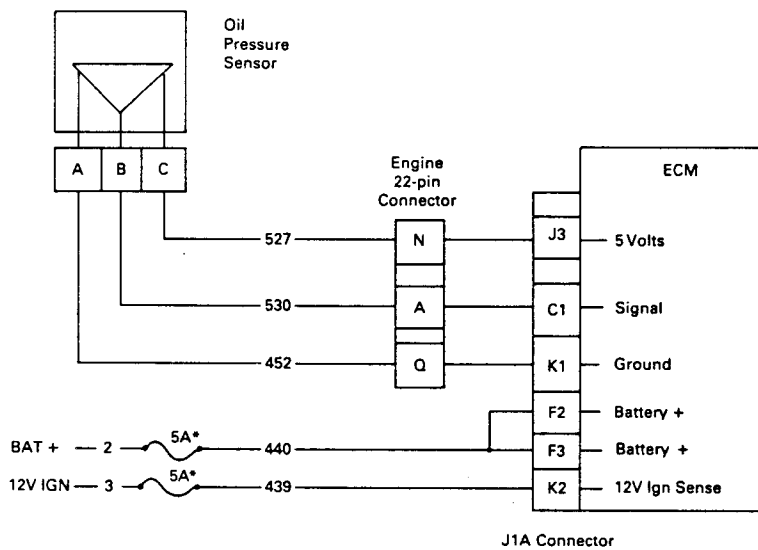
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>36-1 Multiple Code Check</p> <hr/> <ul style="list-style-type: none"> <li>. Were there any other codes besides Code 36?</li> </ul>	<p>No other codes. —————→</p> <p>Yes. Any or all of the following codes: 12, 35. —————→</p> <p>Yes, but none of the above. —————→</p>	<p>Go to 36-2.</p> <p>Go to 5VR-1.</p> <p>Go to 36-2.</p>
<p>36-2 Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Clear codes.</li> <li>. Disconnect OPS and install a jumper wire between sockets B and C of the OPS harness connector.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 35 (and any other codes except Code 36). —————→</p> <p>Code 36 (and any other codes). —————→</p>	<p>Go to 36-3.</p> <p>Go to 36-4.</p>
<p>36-3 Check OPS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the OPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>Replace OPS. Then go to 36-30.</p> <p>Repair terminals/connectors. Then go to 36-30.</p>



ECM J1A Harness Connector  
P/N 12034398



Oil Pressure Sensor Harness Connector  
P/N 12047909



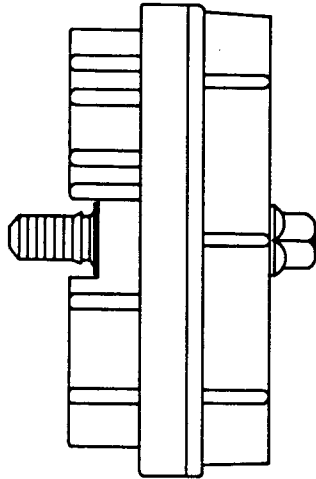
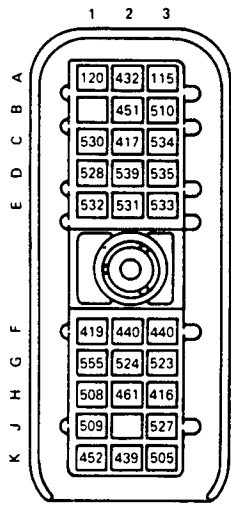
(\*Note: Some applications have circuit breakers instead of fuses)

Oil Pressure, Battery + and Ignition Circuits

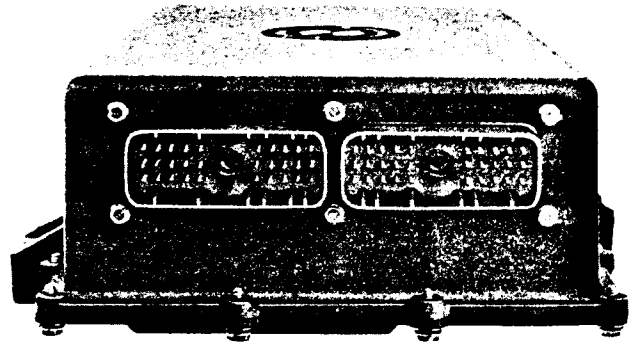
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 36 - OIL PRESSURE SENSOR (OPS) LOW (Cont'd.)

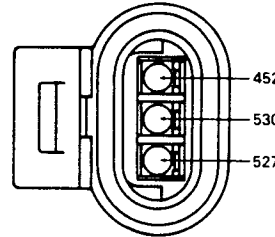
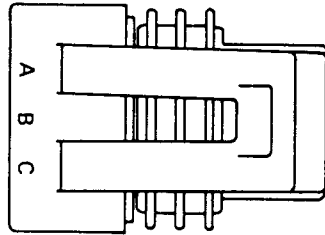
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>36-4 Check for +5 Volts</p> <hr/> <ul style="list-style-type: none"> <li>. Remove jumper.</li> <li>. Turn ignition on.</li> <li>. Read voltage on OPS harness connector, socket C (red lead) to socket A (black lead).</li> </ul>	<p>Between 4 to 6 volts. —————→</p> <p>Less than 4 volts. —————→</p> <p>Greater than 6 volts. —————→</p>	<p>Go to 36-5.</p> <p>Go to 36-8.</p> <p>Go to 36-10.</p>
<p>36-5 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets A and B on the OPS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————→</p> <p>Greater than 10,000 ohms or open. —————→</p>	<p>Signal line (ckt #530) is shorted to the ground line (ckt #452). Repair short. Then go to 36-30.</p> <p>Go to 36-6.</p>
<p>36-6 Check for Signal Open</p> <hr/> <ul style="list-style-type: none"> <li>. Install a jumper wire between sockets A and B of the OPS harness connector.</li> <li>. Read resistance between sockets C1 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms or open. —————→</p>	<p>Go to 36-7.</p> <p>Signal line (ckt #530) is open. Repair open. Then go to 36-30.</p>



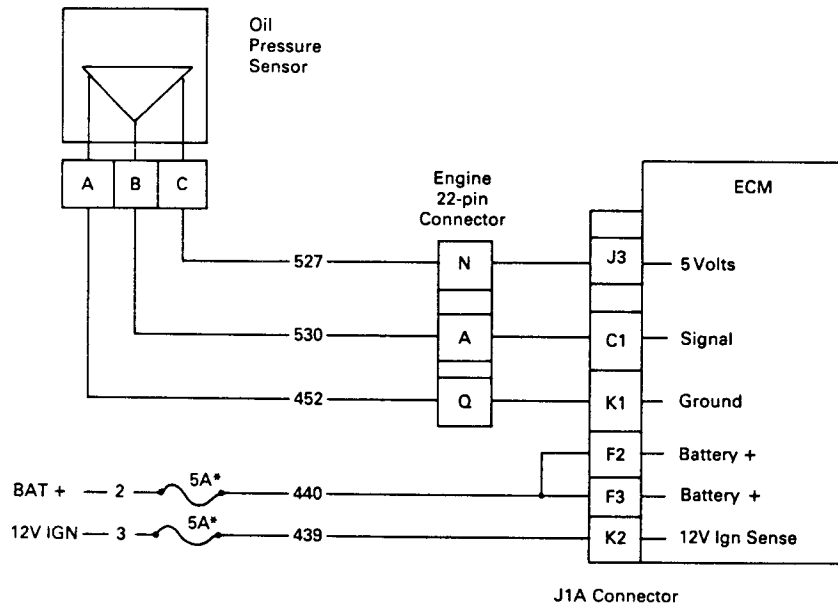
ECM J1A Harness Connector  
P/N 12034398



Electronic Control Module (ECM)



Oil Pressure Sensor Harness Connector  
P/N 12047909



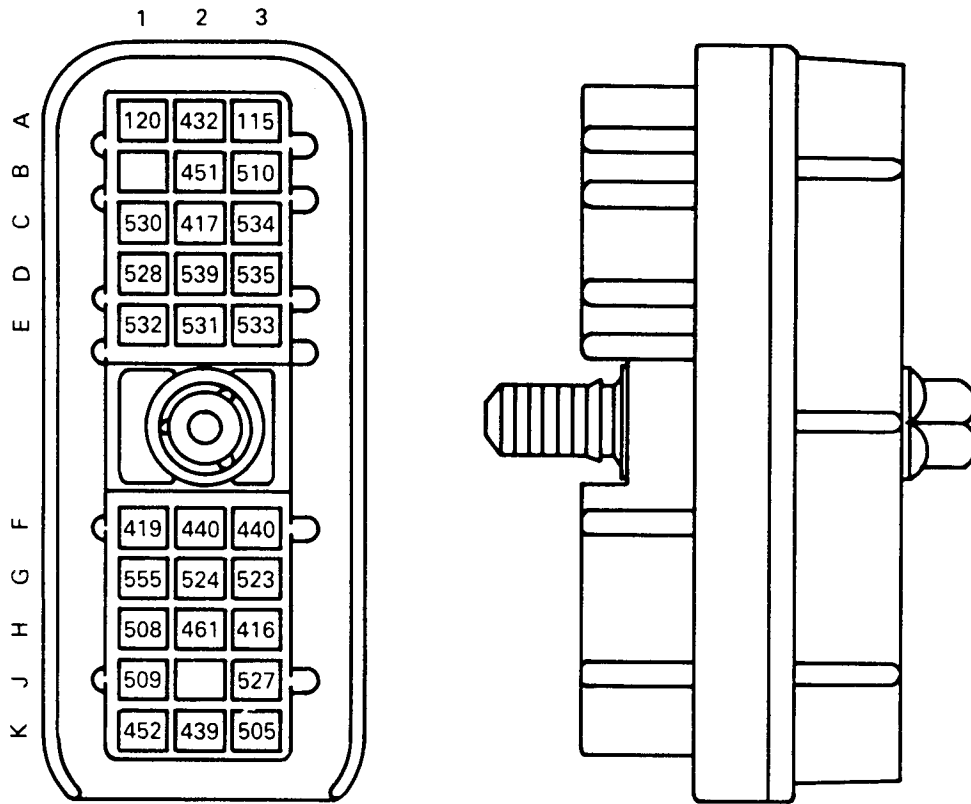
(\*Note: Some applications have circuit breakers instead of fuses)

Oil Pressure, Battery + and Ignition Circuits

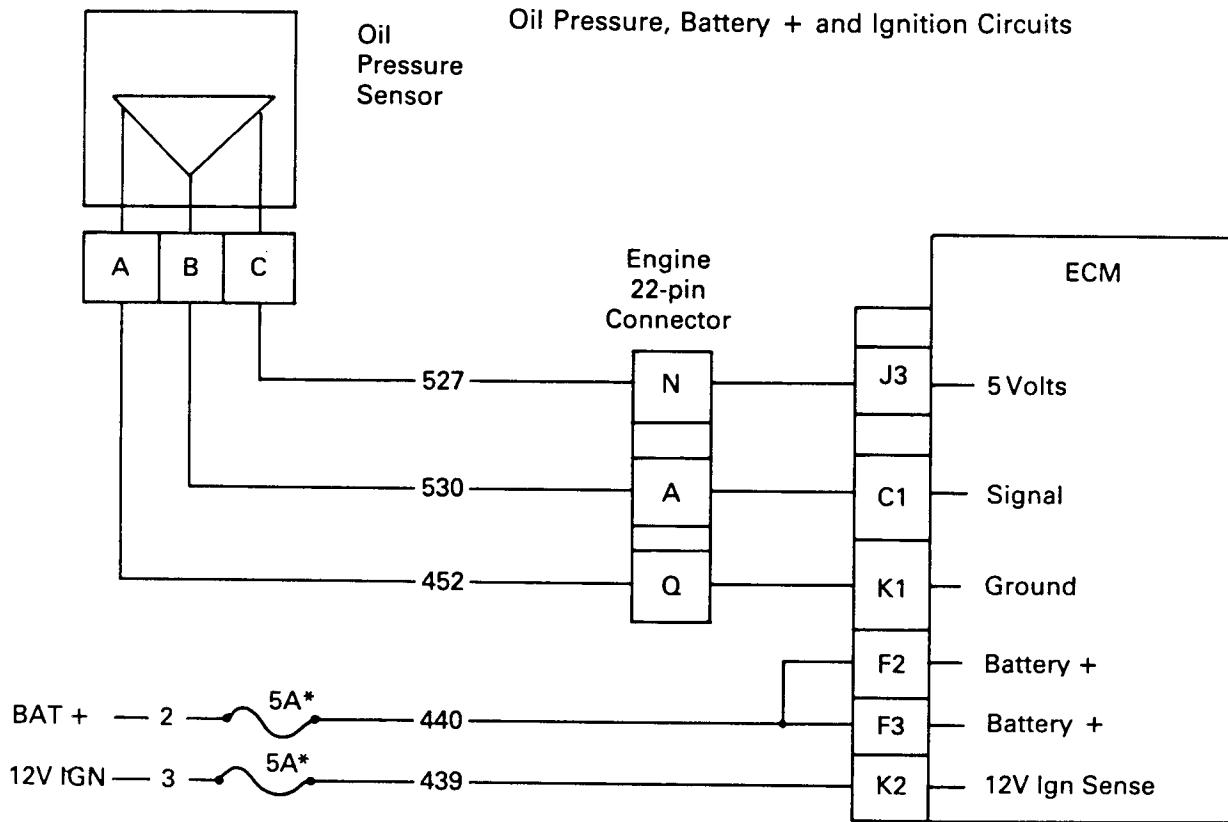
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 36 - OIL PRESSURE SENSOR (OPS) LOW (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>36-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 36-30.</p> <p>→ Repair terminals/connectors. Then go to 36-30.</p>
<p>36-8 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect J1A connector at the ECM.</li> <li>• Read resistance between sockets A and C on the OPS harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ The +5 Volt line (ckt #527) is shorted to the ground line (ckt #452). Repair short. Then go to 36-30.</p> <p>→ Go to 36-9.</p>
<p>36-9 Check for Open +5 Volt Line</p> <hr/> <ul style="list-style-type: none"> <li>• Install a jumper wire between sockets A and C of the OPS harness connector.</li> <li>• Read resistance between sockets J3 and K1 on the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms.</p> <p>Greater than 5 ohms or open.</p>	<p>→ Go to 36-7.</p> <p>→ The +5 Volt line (ckt #527) is open. Repair open. Then go to 36-30.</p>



ECM J1A Harness Connector  
P/N 12034398



J1A Connector

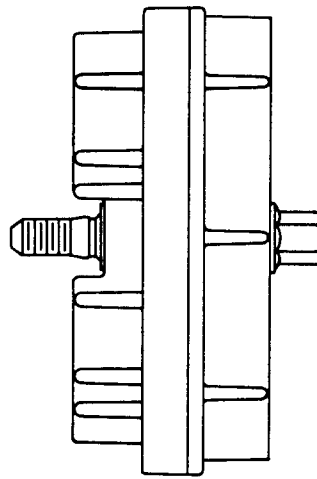
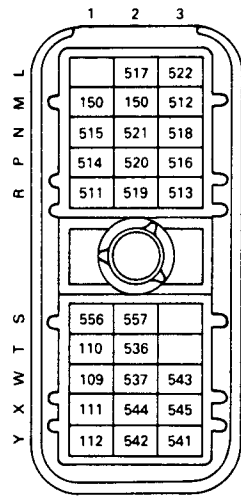
(\*Note: Some applications have circuit breakers instead of fuses)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 36 - OIL PRESSURE SENSOR (OPS) LOW (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>36-10 Check for Short to Battery +</p> <ul style="list-style-type: none"> <li>. Disconnect J1A connector at the ECM.</li> <li>. Read resistance between sockets C1 and F2 on the J1A harness connector.</li> <li>. Also read resistance between sockets:               <ul style="list-style-type: none"> <li>C1 and F3</li> <li>C1 and K2</li> </ul> </li> </ul>	<p>All readings are greater than 10,000 ohms.</p> <p>Any reading is less than or equal to 10,000 ohms.</p>	<p>→ Go to 36-7.</p> <p>→ Short exists between sockets were less than 10,000 ohms resistance was read. Repair short. Then go to 36-30.</p>
<p>36-30 Verify Repairs</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 36 (and any other codes).</p> <p>Any other codes except Code 36.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>

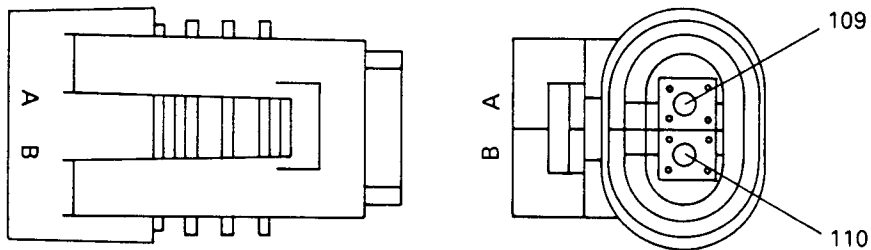




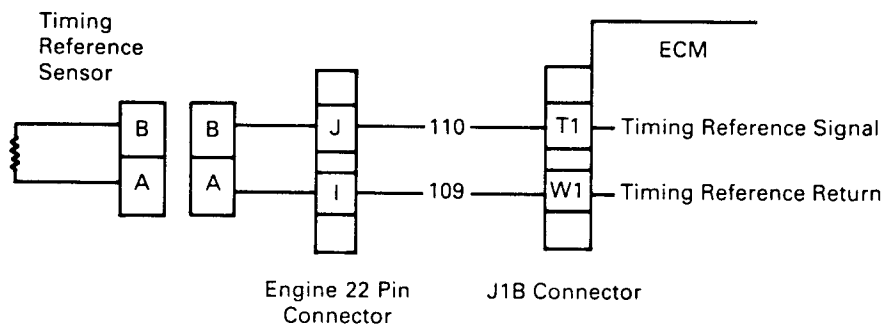
ECM J1B Harness Connector  
P/N 12034400



Timing Reference Sensor (TRS)  
(Also available with integrated connector)



Timing Reference Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)

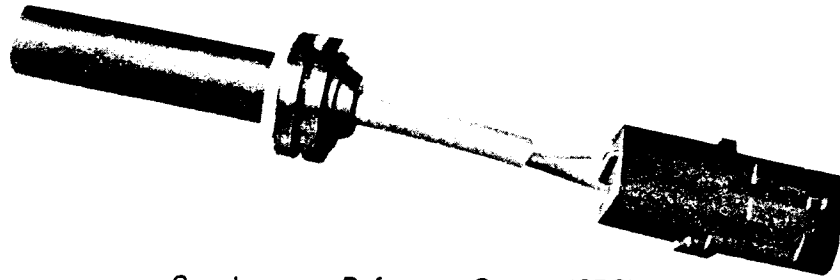


Timing Reference Sensor Circuit

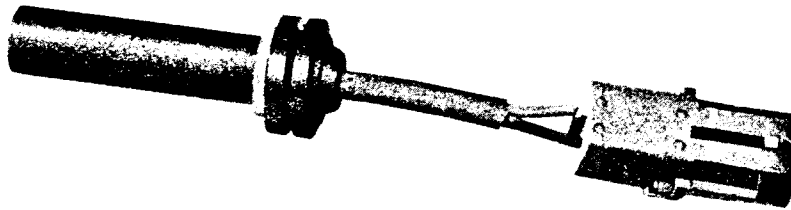
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 41 - TIMING REFERENCE SENSOR (TRS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>41-1 Resistance Check</p> <hr/> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect J1B connector at the ECM.</li> <li>• Read resistance between socket T1 and W1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 200 ohms. —————&gt;</p> <p>Greater than 200 ohms or open. —————&gt;</p>	<p>Go to 41-2.</p> <p>Go to 41-3.</p>
<p>41-2 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect TRS connector.</li> <li>• Read resistance between sockets T1 and W1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>Signal line (ckt #110) is shorted to the return line (ckt #109). Repair short. Then go to 41-30.</p> <p>Go to 41-4.</p>
<p>41-3 Open TRS Line Check</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect TRS connector and install a jumper wire between sockets A and B of the TRS harness connector.</li> <li>• Read resistance between sockets T1 and W1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open.</p>	<p>Go to 41-4.</p> <p>Signal line (ckt #110) or return line (ckt #109) is open. Repair open. Then go to 41-30.</p>

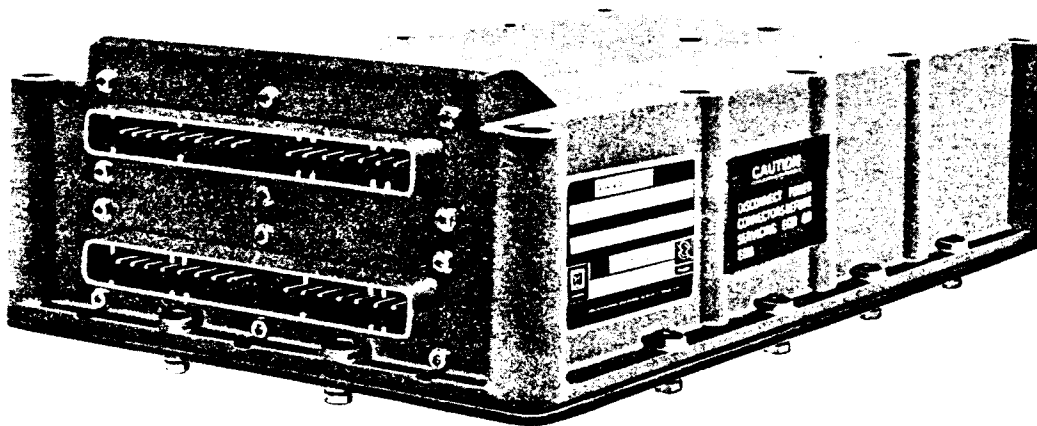


Synchronous Reference Sensor (SRS)



Timing Reference Sensor (TRS)

(Both Sensors also available with integrated connector)

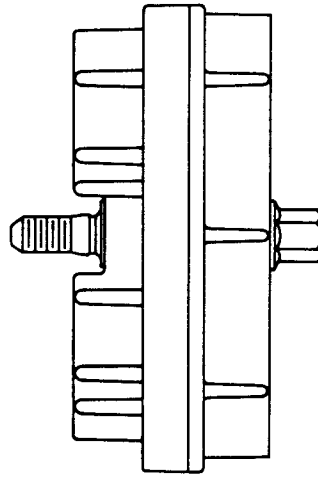
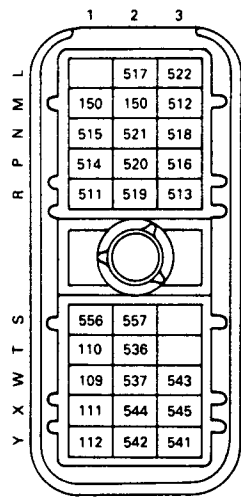


Electronic Distributor Unit (EDU)

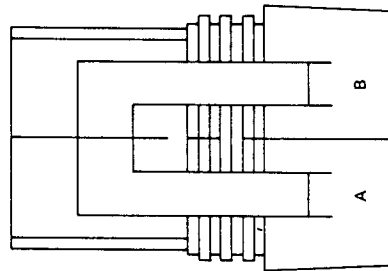
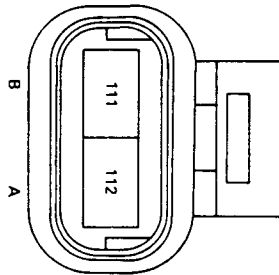
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 41 - TIMING REFERENCE SENSOR (TRS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>41-4 Check TRS Resistance</p> <hr/> <ul style="list-style-type: none"> <li>• Read resistance of the TRS (at the connector pins).</li> </ul>	<p>Less than 100 ohms. —————→</p> <p>From 100 to 200 ohms. —————→</p> <p>Greater than 200 ohms. —————→</p>	<p>Go to 41-12.</p> <p>Go to 41-5.</p> <p>Go to 41-12.</p>
<p>41-5 Check for SRS Code</p> <hr/> <ul style="list-style-type: none"> <li>• Was there also a Code 42?</li> </ul>	<p>Yes. —————→</p> <p>No. —————→</p>	<p>Go to 41-8.</p> <p>Go to 41-6.</p>
<p>41-6 Check TRS/SRS Gap</p> <hr/> <p>(Note: You'll probably have to remove at least the EDU and EDU cold plate to perform this check.)</p> <ul style="list-style-type: none"> <li>• Bar the engine until the TRS sensor is over a TRS "tooth" of the pulse wheel.</li> <li>• Tap the front of the camshaft rearward with a soft face hammer (to remove camshaft end play).</li> <li>• Install the SRS/TRS alignment tool (tool J-34971, see Service Bulletin for details) and check the gap.</li> </ul>	<p>Incorrect gap. —————→</p> <p>Gap setting is correct. —————→</p>	<p>Loosen the screw at the top of the TRS/SRS mounting bracket (don't touch the two screws that go into the block front end plate - they will affect engine timing). Adjust the TRS/SRS until the gap setting is correct. Tighten screw. (If problem returns, pulse wheel may be loose or bad.) Go to 41-30.</p> <p>Go to 41-7.</p>



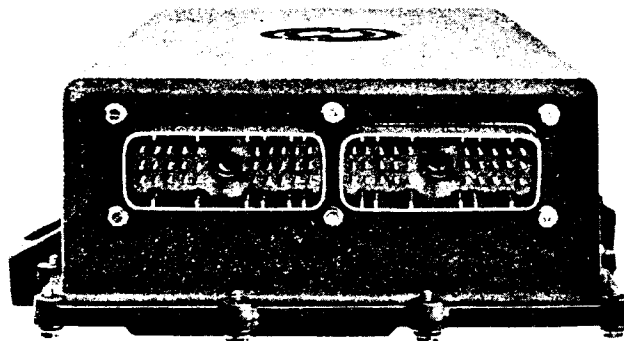
ECM J1B Harness Connector  
P/N 12034400



Synchronous Reference Sensor Harness Connector (Black)  
P/N 12040753  
(Optional 12015792)



Synchronous Reference Sensor (SRS)  
(Also available with integrated connector)

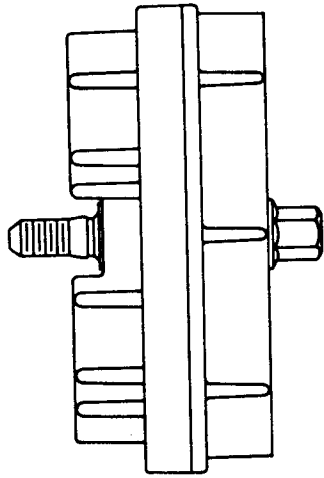
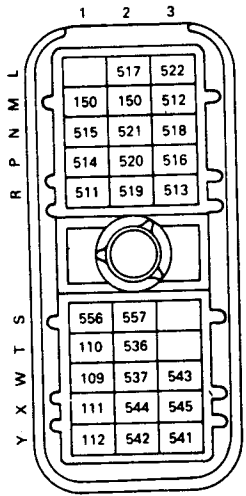


Electronic Control Module (ECM)

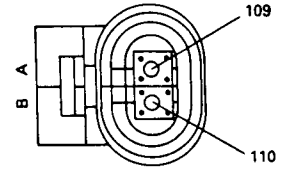
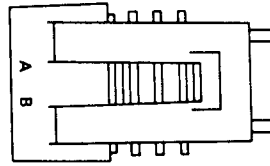
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 41 - TIMING REFERENCE SENSOR (TRS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>41-7 Check ECM Connectors</p> <hr/> <p>. Check ECM connector J1B (harness side and ECM side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</p>	<p>Connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace ECM. Then go to 41-30.</p> <p>→ Repair terminals/ connectors. Then go to 41-30.</p>
<p>41-8 SRS Resistance Check</p> <hr/> <p>. Read resistance between socket X1 and Y1 on the J1B harness connector.</p>	<p>Less than or equal to 200 ohms. —————→</p> <p>Greater than 200 ohms or open.</p>	<p>→ Go to 41-9.</p> <p>&gt; Go to 41-10.</p>
<p>41-9 Check for Short</p> <hr/> <p>. Disconnect SRS connector.          . Read resistance between sockets X1 and Y1 of the J1B harness connector.</p>	<p>Less than or equal to 10,000 ohms. —————→</p> <p>Greater than 10,000 ohms or open. —————→</p>	<p>→ Signal line (ckt #111) is shorted to the return line (ckt #112). Repair short. Then go to 41-30.</p> <p>→ Go to 41-11.</p>

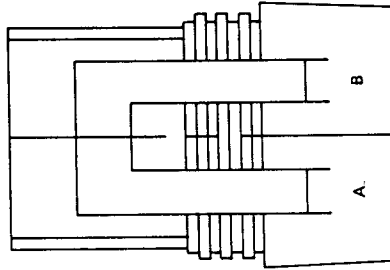
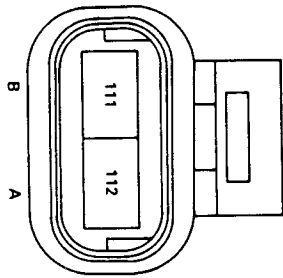
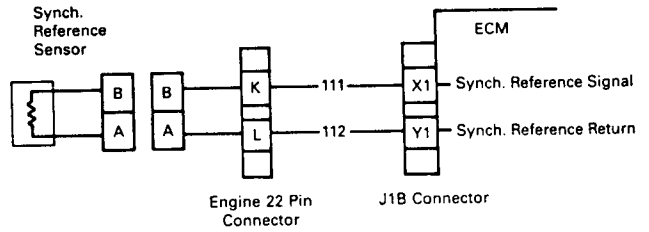


ECM J1B Harness Connector  
P/N 12034400



Timing Reference Sensor Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)

Synchronous Reference Sensor Circuit



Synchronous Reference Sensor Harness Connector (Black)  
P/N 12040753  
(Optional 12015792)



Synchronous Reference Sensor (SRS)  
(Also available with integrated connector)



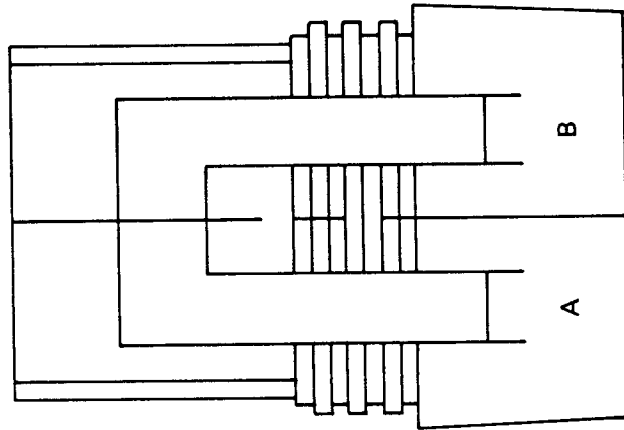
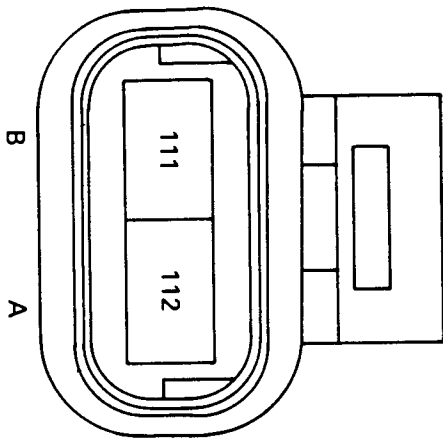
Timing Reference Sensor (TRS)  
(Also available with integrated connector)

SECTION 4  
TROUBLESHOOTING CHARTS

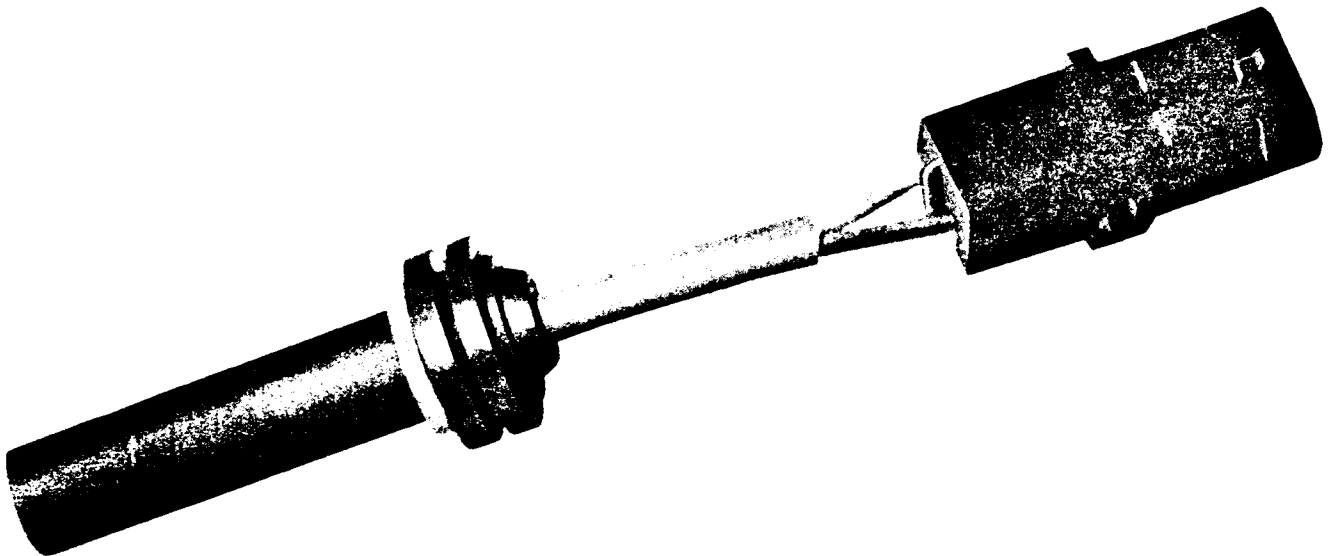
E. CODE 41 - TIMING REFERENCE SENSOR (TRS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>41-10 Open SRS Line Check</p> <hr/> <ul style="list-style-type: none"> <li>. Install a jumper wire between sockets A and B of the SRS harness connector.</li> <li>. Read resistance between sockets X1 and Y1 of the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms.</p> <p>Greater than 5 ohms or open.</p>	<p>→ Go to 41-11.</p> <p>→ Signal line (ckt #111) or return line (ckt #112) is open. Repair open. Then go to 41-30.</p>
<p>41-11 SRS Test</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance of the Synchronous Reference Sensor (at the connector pins).</li> </ul>	<p>Less than 100 ohms.</p> <p>From 100 to 200 ohms</p> <p>Greater than 200 ohms.</p>	<p>→ Go to 41-13.</p> <p>→ Go to 41-6.</p> <p>→ Go to 41-13.</p>
<p>41-12 Check TRS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check connectors at the TRS (both the harness side and the TRS side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace TRS. Then go to 41-14.</p> <p>→ Repair terminals/connectors. Then go to 41-30.</p>





Timing Reference Sensor Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)

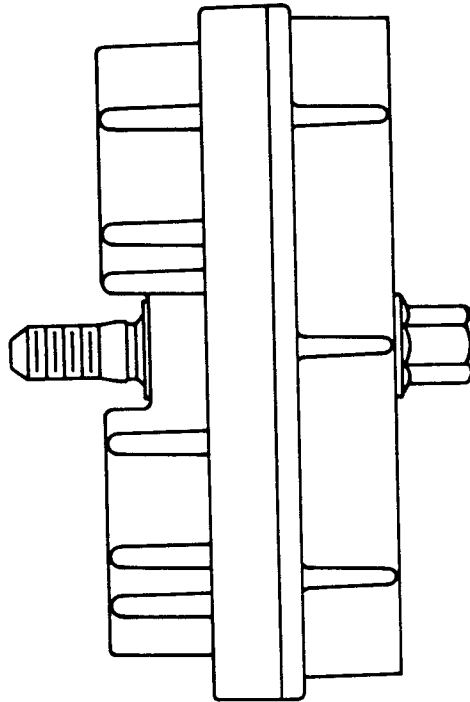
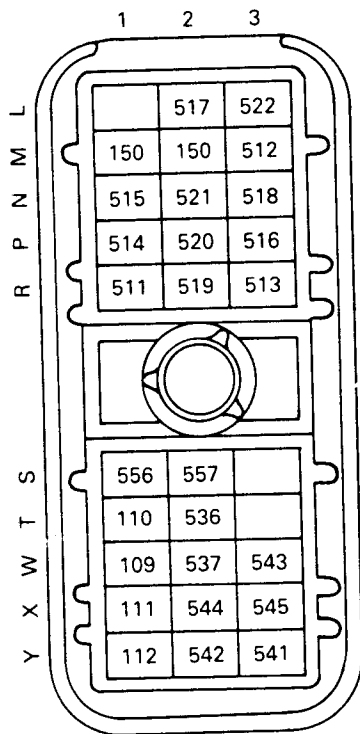


Synchronous Reference Sensor (SRS)  
(Also available with integrated connector)

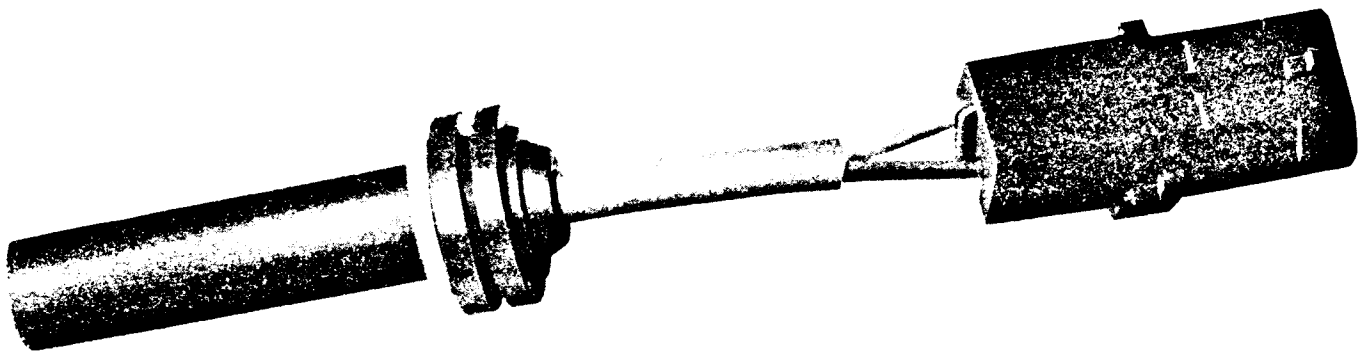
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 41 - TIMING REFERENCE SENSOR (TRS) (Cont'd.)

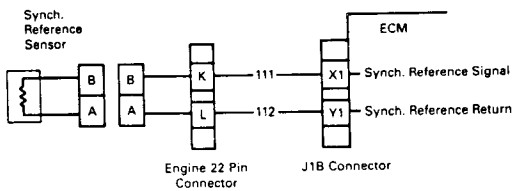
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>41-13 Check SRS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check connectors at the Synchronous Reference Sensor (both the harness side and the sensor side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>Replace Synchronous Reference Sensor. Then go to 41-14.</p> <p>Repair terminals/connectors. Then go to 41-30.</p>
<p>41-14 Verify SRS/TRS</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start and run engine until the "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). —————→</p> <p>Code 41 reappears (and any other code). —————→</p> <p>Code(s) other than Code 41 received. —————→</p>	<p>Repairs are complete.</p> <p>Go to 41-6.</p> <p>Go to DCC-1 to service other codes.</p>
<p>41-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start and run engine until the "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE (no codes)" —————→</p> <p>Code 41 reappears (and any other code). —————→</p> <p>Code(s) other than Code 41 received. —————→</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



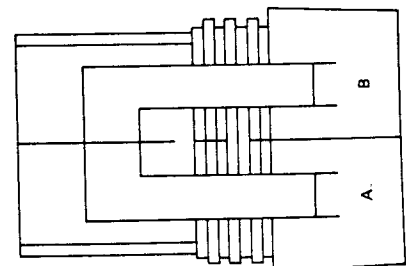
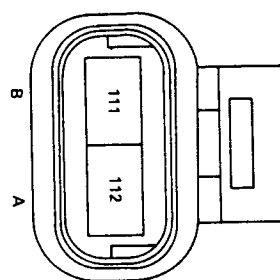
ECM J1B Harness Connector  
P/N 1203400



Synchronous Reference Sensor (SRS)  
(Also available with integrated connector)



Synchronous Reference Sensor Circuit

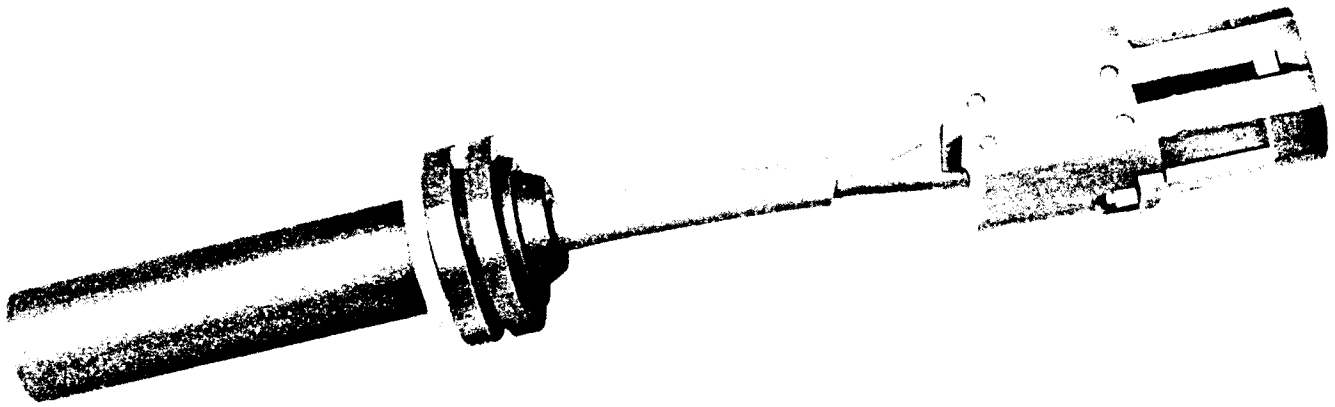


Synchronous Reference Sensor Harness Connector (Black)  
P/N 12040753  
(Optional 12015792)

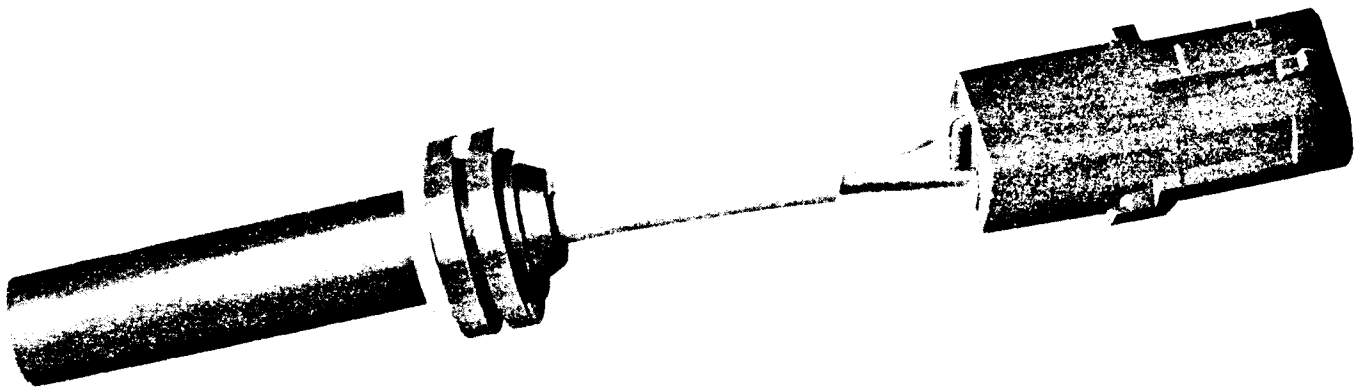
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 42 - SYNCHRONOUS REFERENCE SENSOR (SRS)

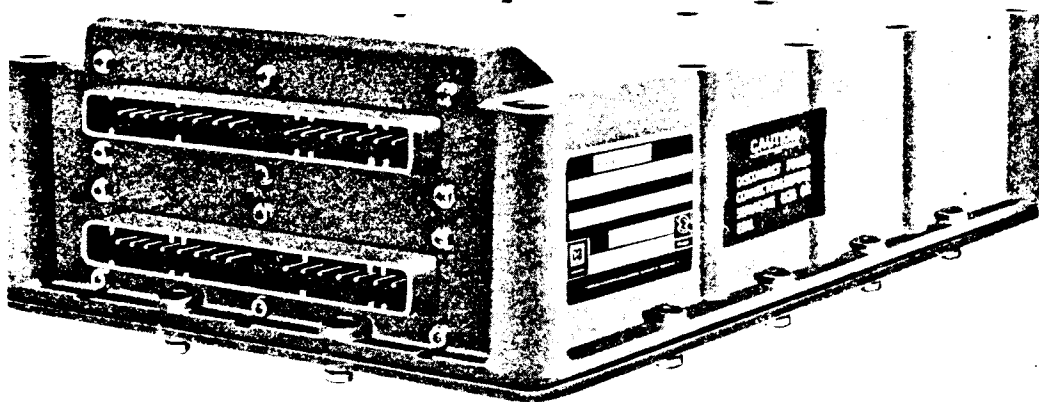
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>42-1 Resistance Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect J1B connector at the ECM.</li> <li>. Read the resistance between socket X1 and Y1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 200 ohms. —————&gt;</p> <p>Greater than 200 ohms or open. —————&gt;</p>	<p>Go to 42-2.</p> <p>Go to 42-3.</p>
<p>42-2 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect SRS connector.</li> <li>. Read resistance between sockets X1 and Y1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>Signal line (ckt #111) is shorted to the return line (ckt #112). Repair short. Then go to 42-30.</p> <p>Go to 42-4.</p>
<p>42-3 Open SRS Line Check</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect SRS connector and install a jumper wire between sockets A and B of the SRS harness connector.</li> <li>. Read resistance between sockets X1 and Y1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to 42-4.</p> <p>Signal line (ckt #111) or return line (ckt #112) is open. Repair open. Then go to 42-30.</p>



Timing Reference Sensor (TRS)  
(Also available with integrated connector)



Synchronous Reference Sensor (SRS)  
(Also available with integrated connector)

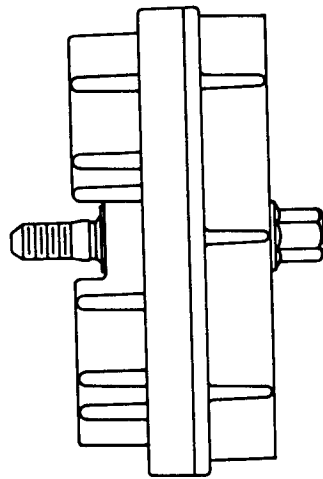
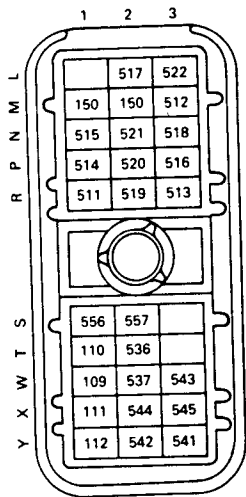


Electronic Distributor Unit (EDU)

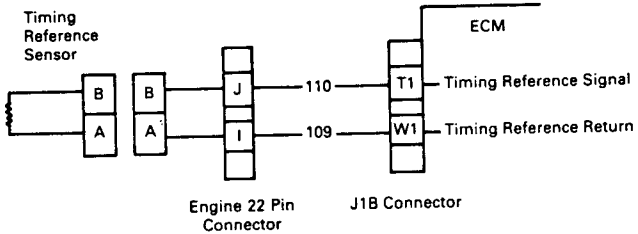
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 42 - SYNCHRONOUS REFERENCE SENSOR (SRS) (Cont'd.)

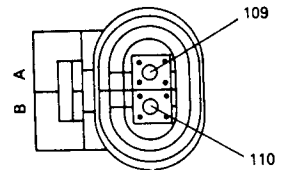
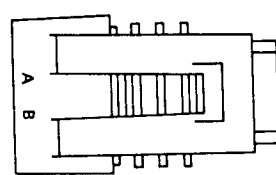
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>42-4 Check SRS Resistance</p> <hr/> <ul style="list-style-type: none"> <li>• Read resistance of the SRS (at the connector pins).</li> </ul>	<p>Less than 100 ohms. —————→</p> <p>From 100 to 200 ohms. —————→</p> <p>Greater than 200 ohms. —————→</p>	<p>Go to 42-12.</p> <p>Go to 42-8.</p> <p>Go to 42-12.</p>
<p>42-5 Check for TRS Code</p> <hr/> <ul style="list-style-type: none"> <li>• Was there also a Code 41?</li> </ul>	<p>Yes. —————→</p> <p>No.</p>	<p>Go to 42-8.</p> <p>Go to 42-6.</p>
<p>42-6 Check TRS/SRS Gap</p> <hr/> <p>(Note: You'll probably have to remove at least the EDU and EDU cold plate to perform this check.)</p> <ul style="list-style-type: none"> <li>• Bar the engine until the TRS sensor is over a TRS "tooth" of the pulse wheel.</li> <li>• Tap the front of the camshaft rearward with a soft face hammer (to remove camshaft end play).</li> <li>• Install the SRS/TRS alignment tool (tool J-34971, see Service Bulletin for details) and check the gap.</li> </ul>	<p>Incorrect gap —————→</p> <p>Gap setting is correct. —————→</p>	<p>Loosen the screw at the top of the TRS/SRS mounting bracket (don't touch the two screws that go into the block front end plate - they will affect engine timing). Adjust the TRS/SRS until the gap setting is correct. Tighten screw. (If problem returns, pulse wheel may be loose or bad.) Go to 42-30.</p> <p>Go to 42-7.</p>



ECM J1B Harness Connector  
P/N 12034400



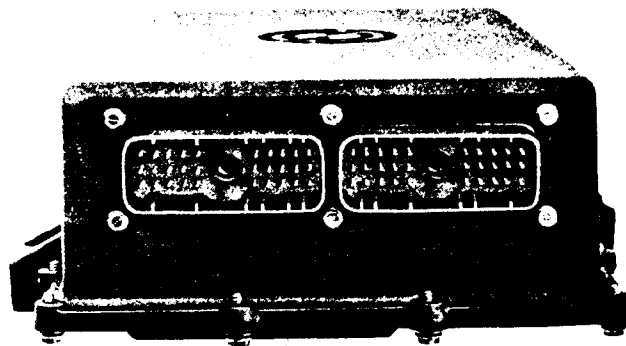
Timing Reference Sensor Circuit



Timing Reference Sensor Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)



Timing Reference Sensor (TRS)  
(Also available with integrated connector)



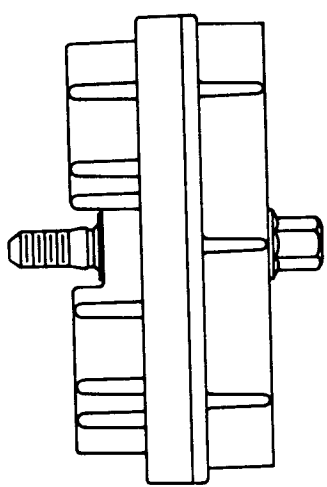
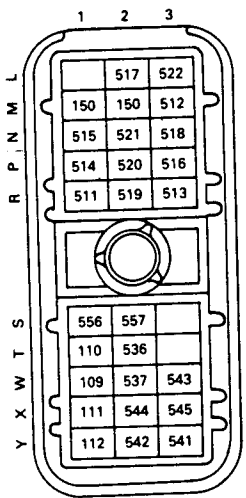
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

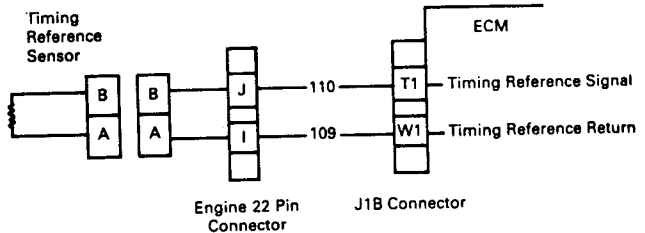
E. CODE 42 - SYNCHRONOUS REFERENCE SENSOR (SRS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>42-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check ECM connector J1B (harness side and ECM side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace ECM. Then go to 42-30.</p> <p>Repair terminals/ connectors. Then go to 42-30.</p>
<p>42-8 TRS Resistance Check</p> <hr/> <ul style="list-style-type: none"> <li>. Read resistance between socket T1 and W1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 200 ohms. —————&gt;</p> <p>Greater than 200 ohms or open. —————&gt;</p>	<p>Go to 42-9.</p> <p>Go to 42-10.</p>
<p>42-9 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect TRS connector.</li> <li>. Read resistance between sockets T1 and W1 of the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,000 ohms or open. —————&gt;</p>	<p>Signal line (ckt #110) is shorted to the return line (ckt #109). Repair short. Then go to 42-30.</p> <p>Go to 42-11.</p>

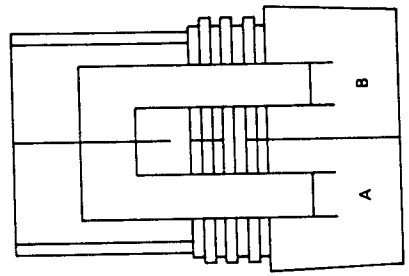
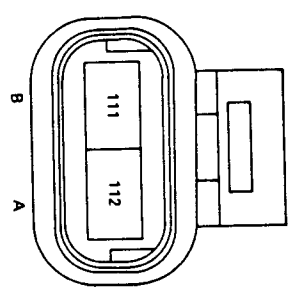




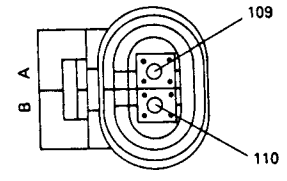
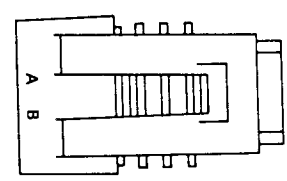
ECM J1B Harness Connector  
P/N 12034400



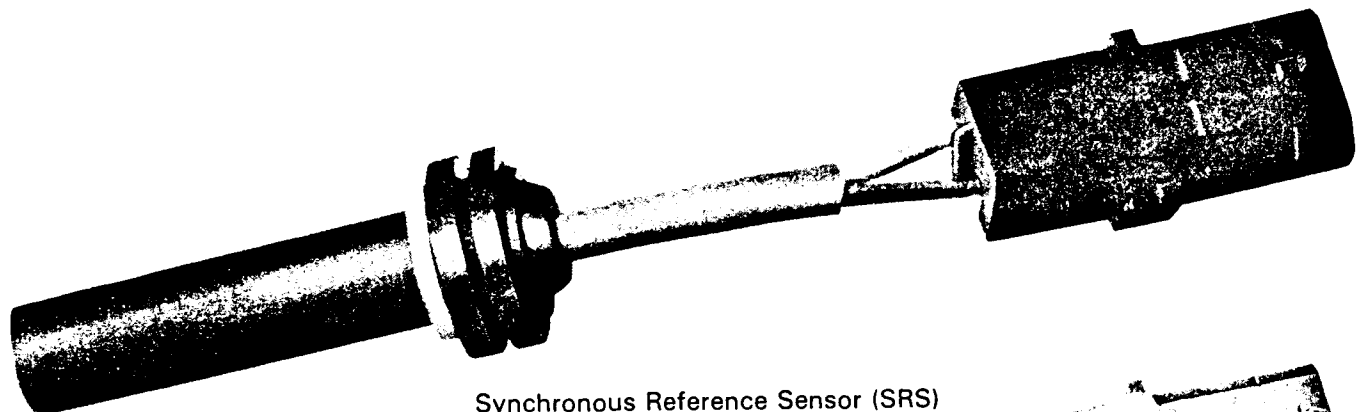
Timing Reference Sensor Circuit



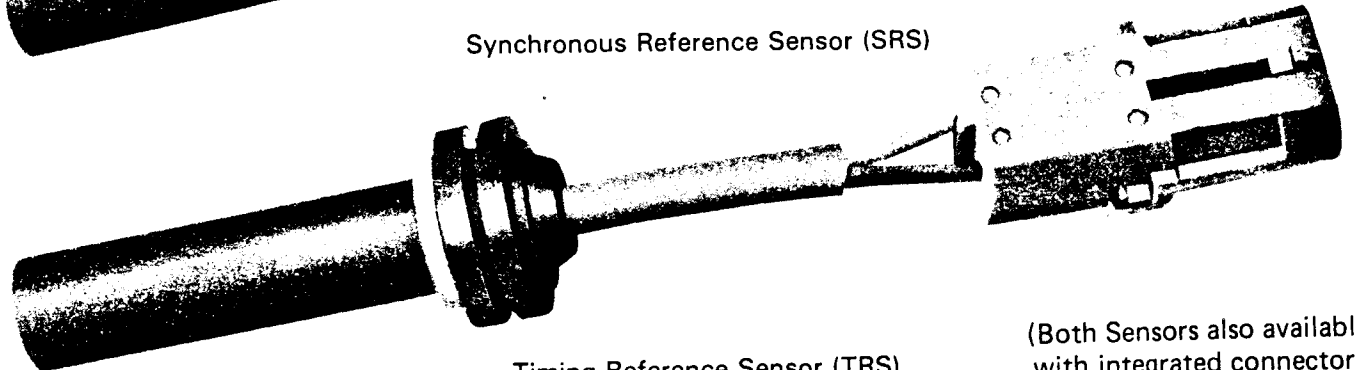
Synchronous Reference Sensor Harness Connector (Black)  
P/N 12040753  
(Optional 12015792)



Timing Reference Sensor Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)



Synchronous Reference Sensor (SRS)



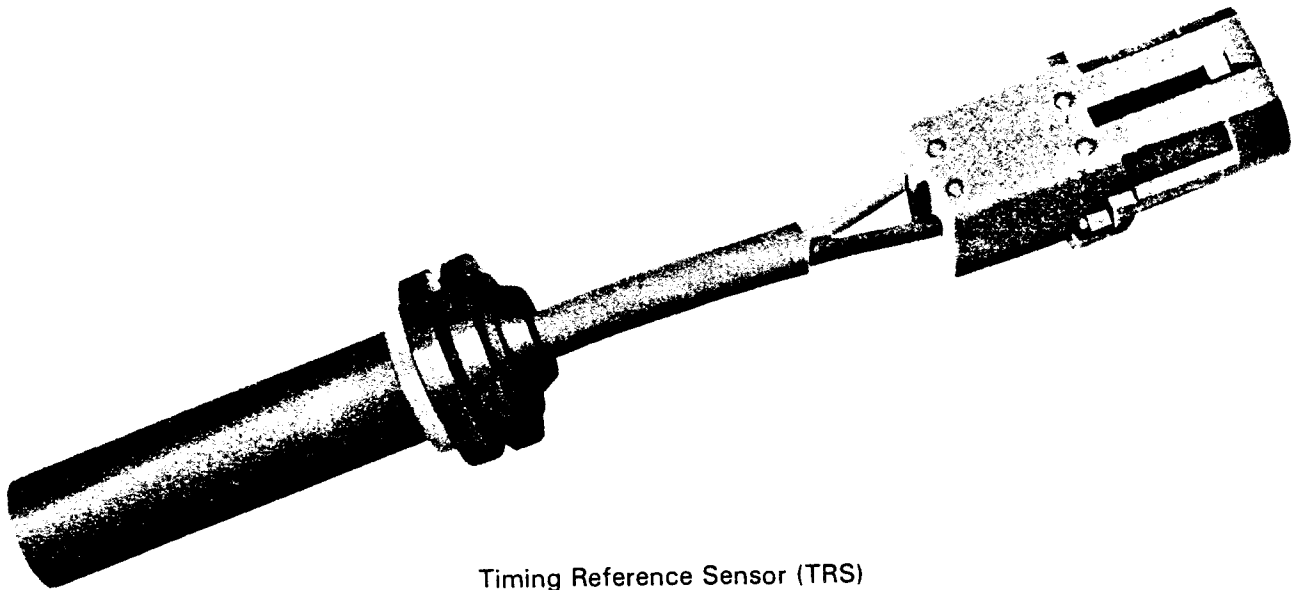
Timing Reference Sensor (TRS)

(Both Sensors also available with integrated connector)

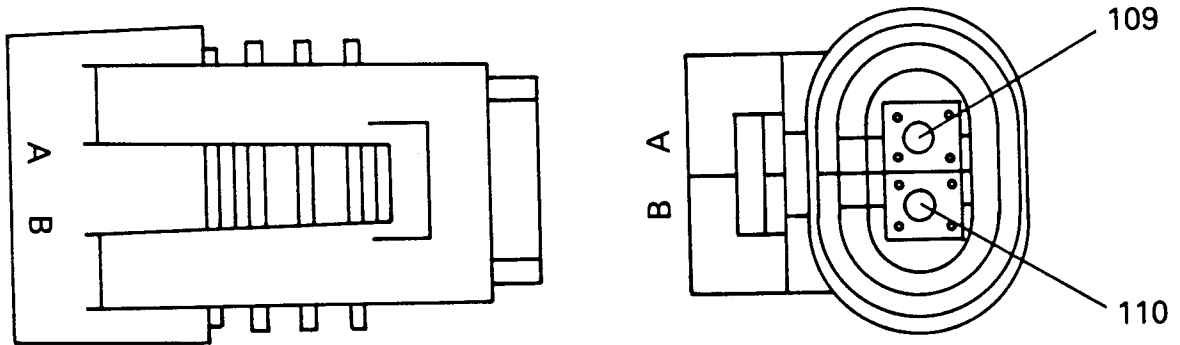
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 42 - SYNCHRONOUS REFERENCE SENSOR (SRS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>42-10 Open TRS Line Check</p> <hr/> <ul style="list-style-type: none"> <li>• Install a jumper wire between sockets A and B of the TRS harness connector.</li> <li>• Read resistance between sockets T1 and W1 of the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms.</p> <p>Greater than 5 ohms or open</p>	<p>→ Go to 42-11.</p> <p>→ Signal line (ckt #110) or return line (ckt #109) is open. Repair open. Then go to 42-30.</p>
<p>42-11 TRS Test</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect Timing Reference Sensor (TRS) (see code 41 for pin out).</li> <li>• Read resistance of the Timing Reference Sensor (at the connector pins).</li> </ul>	<p>Less than 100 ohms.</p> <p>From 100 to 200 ohms.</p> <p>Greater than 200 ohms.</p>	<p>→ Go to 42-13.</p> <p>→ Go to 42-6.</p> <p>→ Go to 42-13.</p>
<p>42-12 Check SRS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check connectors at the SRS (both the harness side and the SRS side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace SRS. Then go to 42-14.</p> <p>→ Repair terminals/ connectors. Then go to 42-30.</p>



Timing Reference Sensor (TRS)  
(Also available with integrated connector)

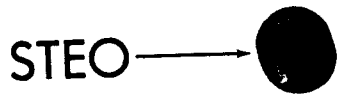
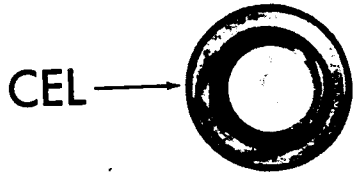
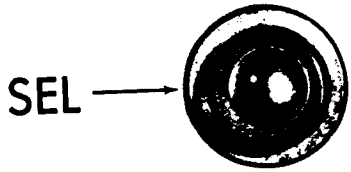


Timing Reference Sensor Harness Connector (Gray)  
P/N 12041411  
(Optional 12015378)

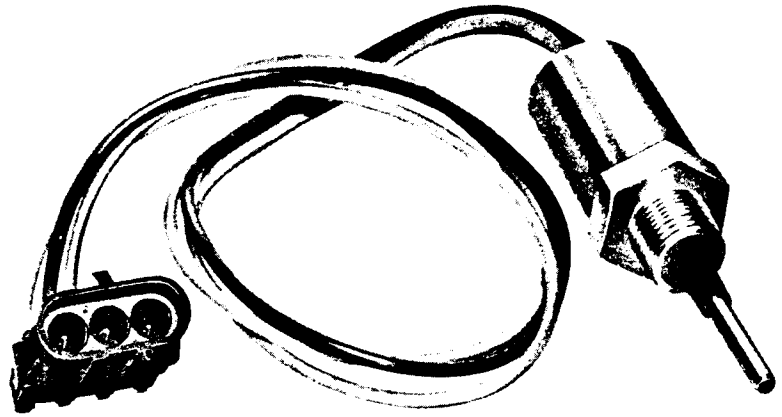
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 42 - SYNCHRONOUS REFERENCE SENSOR (SRS) (Cont'd.)

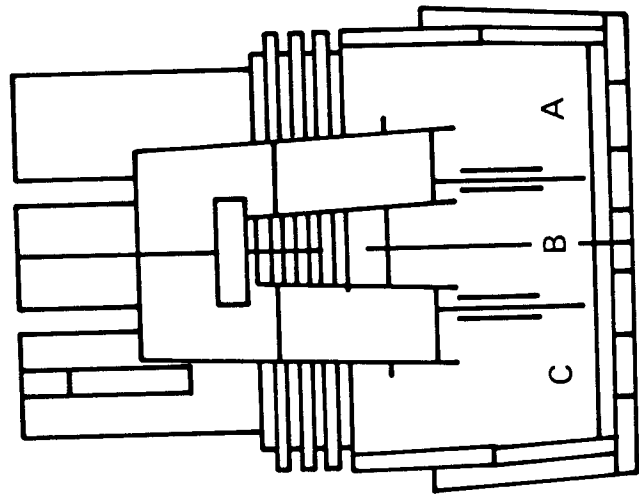
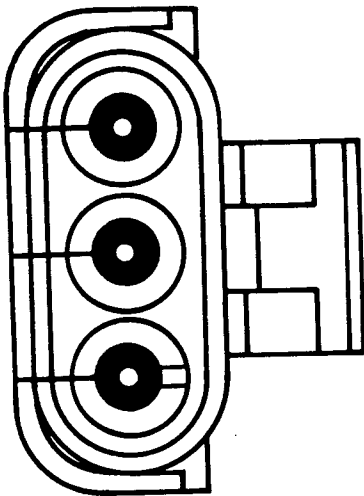
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>42-13 Check TRS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check connectors at the Timing Reference Sensor (both the harness side and Timing Ref. Sensor side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace Timing Reference Sensor. Then go to 42-14.</p> <p>Repair terminals/ connectors. Then go to 42-30.</p>
<p>42-14 Verify SRS/TRS</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Attempt to start and run engine until the "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). —————&gt;</p> <p>Code 42 reappears (and any other code) or no start. —————&gt;</p> <p>Code(s) other than Code 42 received. —————&gt;</p>	<p>Repairs are complete.</p> <p>Go to 42-6.</p> <p>Go to DCC-1 to service other codes.</p>
<p>42-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Attempt to start and run engine until the "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). —————&gt;</p> <p>Code 42 reappears (and any other code) or no start. —————&gt;</p> <p>Code(s) other than Code 42 received. —————&gt;</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



Dash Lights



Coolant Level Sensor

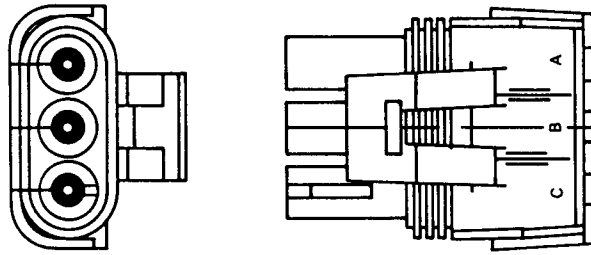


Coolant Level Sensor Harness Connector  
P/N 12015795

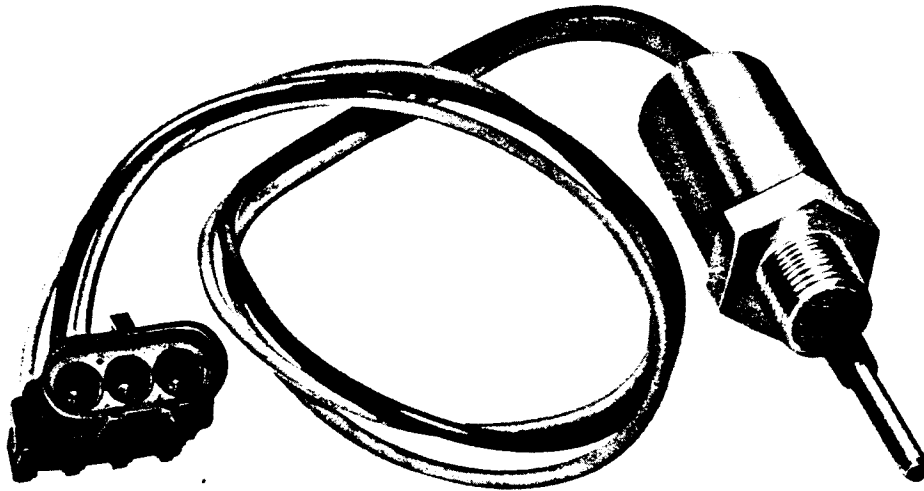
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 43 - LOW COOLANT

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>43-1 Multiple Code Check</p> <hr/> <p>. Were there any other codes besides Code 43?</p>	<p>Yes. _____</p> <p>No. _____</p>	<p>→ Service other codes first.</p> <p>→ Go to 43-2.</p>
<p>43-2 Check Coolant Level</p> <hr/> <p>. Check if coolant level is full.</p>	<p>Full _____</p> <p>Low _____</p>	<p>→ Go to 43-3.</p> <p>→ Determine cause for low coolant (see maintenance manual) and refill radiator, then go to 43-30.</p>
<p>43-3 Clean Coolant Level Sensor</p> <hr/> <p>. Turn ignition off (if not already off).</p> <p>. Disconnect CLS connector.</p> <p>. Unscrew CLS.</p> <p>. Wipe sensor clean with a clean rag.</p> <p>. Reinstall sensor and CLS connector.</p> <p>. Clear codes.</p> <p>. Start and run engine for 1 minute or until the "Stop Engine" light comes on.</p> <p>. Stop engine.</p> <p>. Read codes.</p>	<p>DDL Reader reads "NONE" (no codes). _____</p> <p>Code 43 reappears (and any other code). _____</p> <p>Code(s) other than 43 received. _____</p>	<p>→ Repairs are complete.</p> <p>→ Go to 43-4.</p> <p>→ Go to DCC-1 to service other codes.</p>

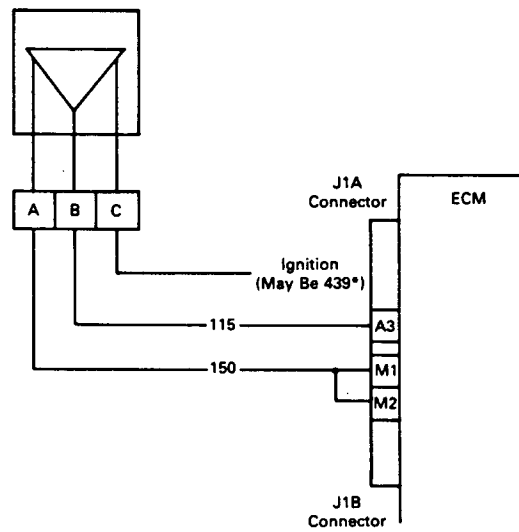


Coolant Level Sensor Harness Connector  
P/N 12015795



Coolant Level Sensor

Coolant Level Sensor Circuit



(\*Note: If 439 used, wire goes to socket 2K of the J1A Connector)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 43 - LOW COOLANT (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>43-4 Clean Coolant Level Sensor</p> <ul style="list-style-type: none"> <li>. Turn ignition off (if not already off).</li> <li>. Disconnect CLS connector.</li> <li>. Unscrew CLS.</li> <li>. Wipe sensor clean with a clean rag.</li> <li>. Reinstall sensor and CLS connector.</li> <li>. Clear codes.</li> <li>. Start and run engine until the "Stop Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Code 43 reappears (and any other code). →</p> <p>Code(s) other than 43 received. →</p>	<p>Repairs are complete.</p> <p>Replace coolant level sensor. Then go to 43-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p>43-30 Verify Repairs</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start and run engine until the "Stop Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Code 43 reappears (and any other codes) →</p> <p>Code(s) other than 43 received. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

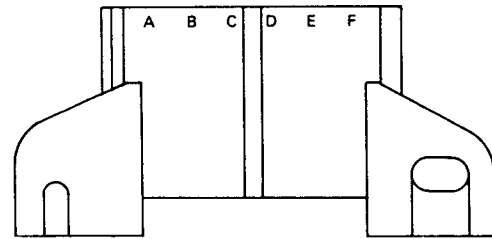
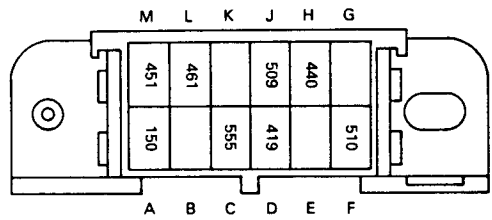
E. CODE 44 - OIL OVERTEMPERATURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
44-1 Multiple Code Check		
<hr/> . Were there any other codes besides Code 44?	Yes. _____ →	Service other codes first.
	No. _____ →	Code 44 indicates that there was an engine running condition at which the oil temperature was higher than it should have been (greater than 250 degrees F). Refer to the engine service manual to determine potential causes for high oil temperature.

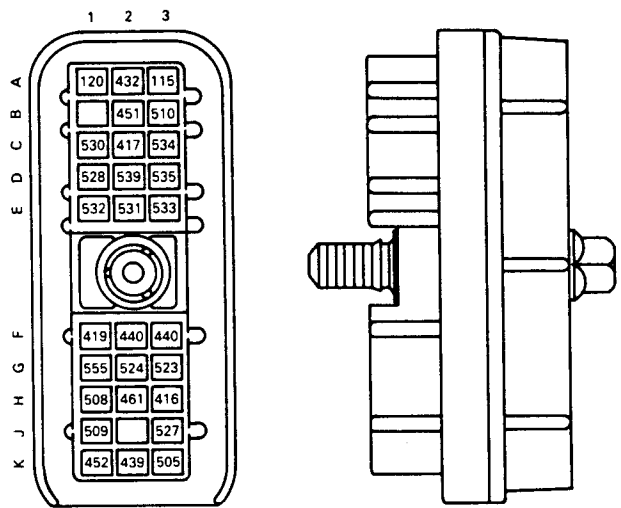
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 45 - LOW OIL PRESSURE

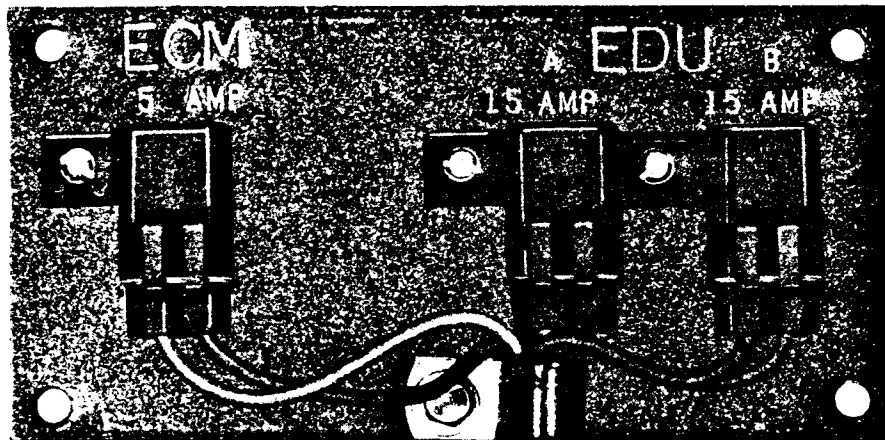
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
45-1 Multiple Code Check		
<p>• Were there any other codes besides Code 45?</p>	<p>Yes. _____</p> <p>No. _____</p>	<p>→ Service other codes first.</p> <p>→ Code 45 indicates that there was an engine running condition at which the oil pressure was lower than it should have been. Refer to the engine service manual to determine potential causes for low oil pressure.</p>



12 Pin DDL Connector  
P/N 12020043



ECM J1A Harness Connector  
P/N 12034398

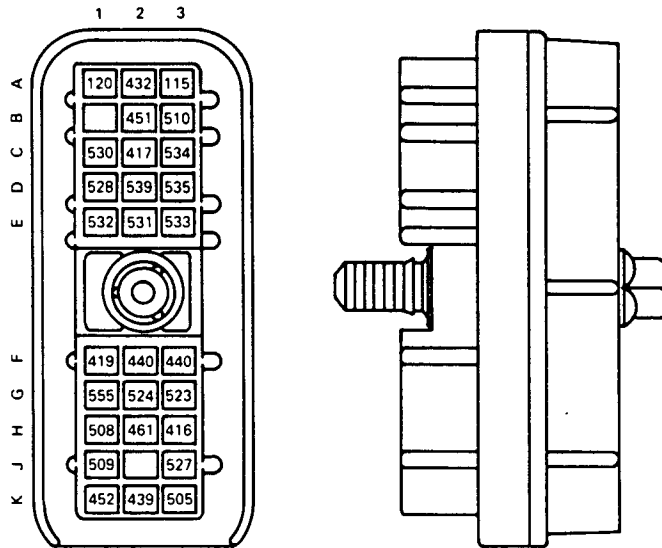


Power Panel

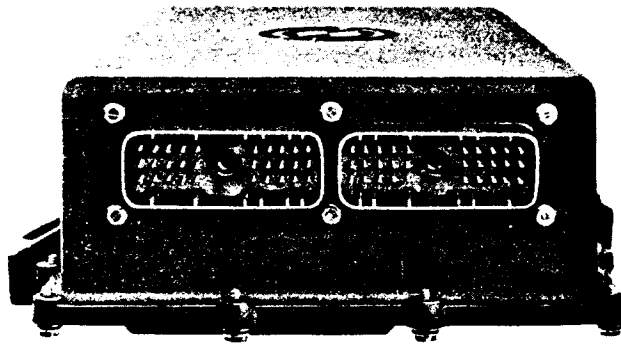
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 46 - LOW BATTERY VOLTAGE

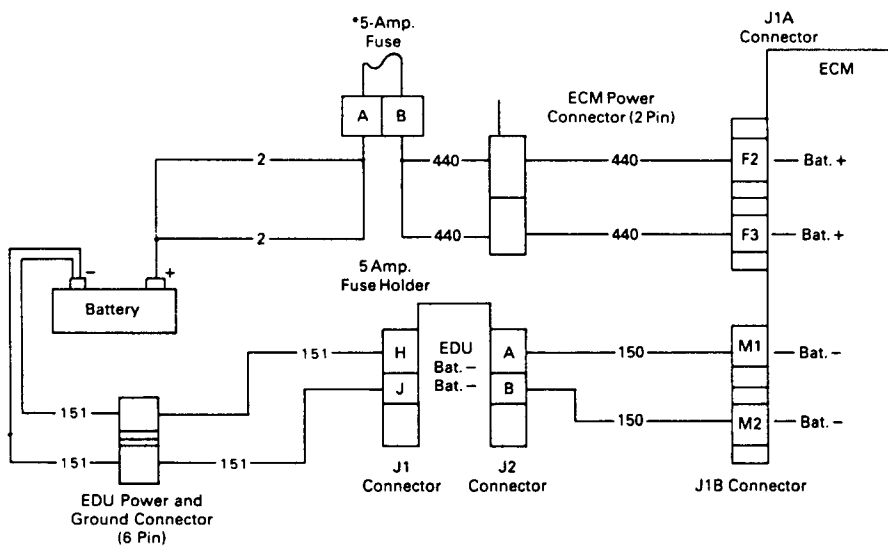
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>46-1 Battery Check</p> <hr/> <ul style="list-style-type: none"> <li>. Start and run engine.</li> <li>. Measure voltage on Battery + terminal (red lead) to Battery - terminal (black lead).</li> </ul>	<p>Less than or equal to 10.0 volts. —————→</p> <p>Greater than 10.0 volts. —————→</p>	<p>Service discharged battery.</p> <p>Go to 46-2.</p>
<p>46-2 Voltage Check at ECM</p> <hr/> <ul style="list-style-type: none"> <li>. Keep engine running.</li> <li>. Hook up DDL Reader to the 12 pin DDL connector and select ECM Voltage for display.</li> <li>. Observe ECM voltage reading on DDL Reader.</li> </ul>	<p>Less than or equal to 10.0 volts. —————→</p> <p>Greater than 10.0 volts or DDL Reader does not read out. (It may display "NO DDL".) —————→</p>	<p>Go to 46-3.</p> <p>Go to 46-9.</p>
<p>46-3 Voltage Check at ECM Harness</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Read voltage on socket F3 (red lead) of the J1A harness connector to a good ground (black lead).</li> </ul>	<p>Less than or equal to 11.5 volts. —————→</p> <p>Greater than 11.5 volts. —————→</p>	<p>Go to 46-4.</p> <p>Go to 46-9.</p>
<p>46-4 ECM Fuse Check</p> <hr/> <ul style="list-style-type: none"> <li>. Check 5 Amp ECM fuse (or circuit breaker) to see if blown or opened.</li> </ul>	<p>Fuse blown (or circuit breaker open). —————→</p> <p>Fuse (or circuit breaker) is okay. —————→</p>	<p>Go to 46-5.</p> <p>Go to 46-8.</p>



ECM J1A Harness Connector  
P/N 12034398



Electronic Control Module (ECM)



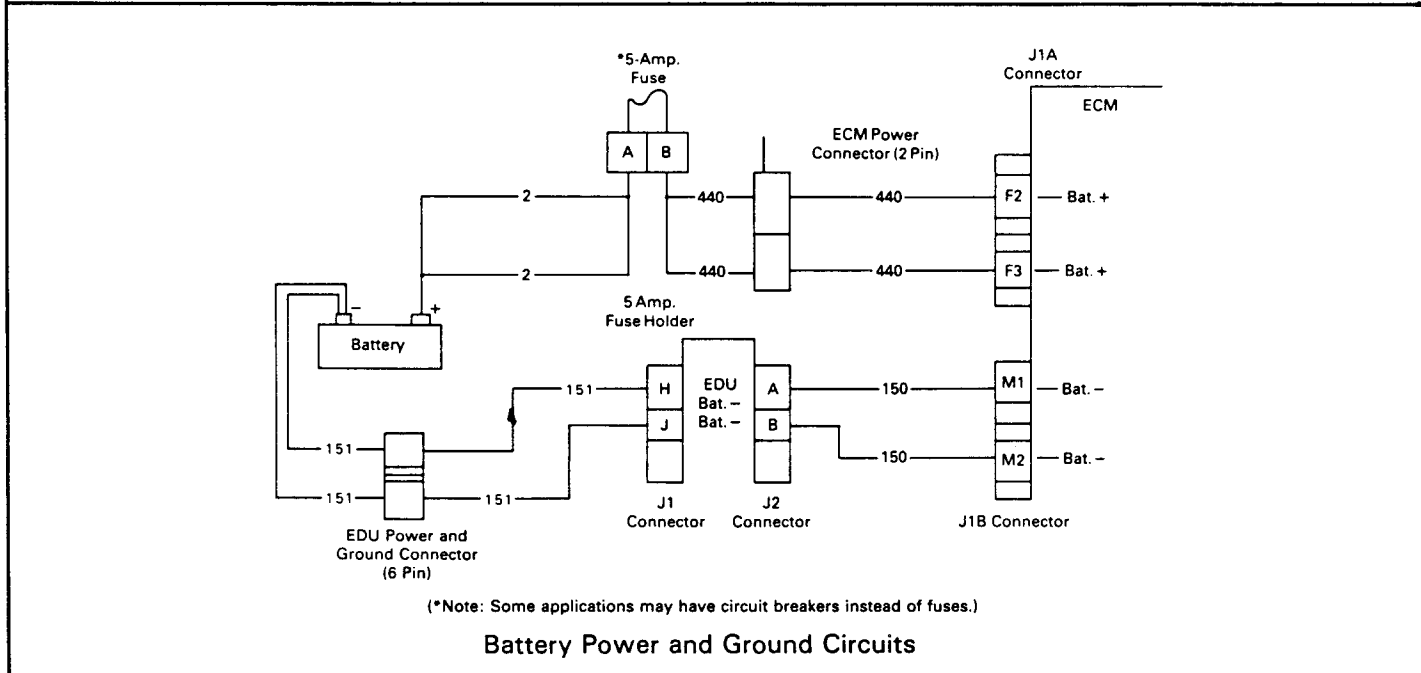
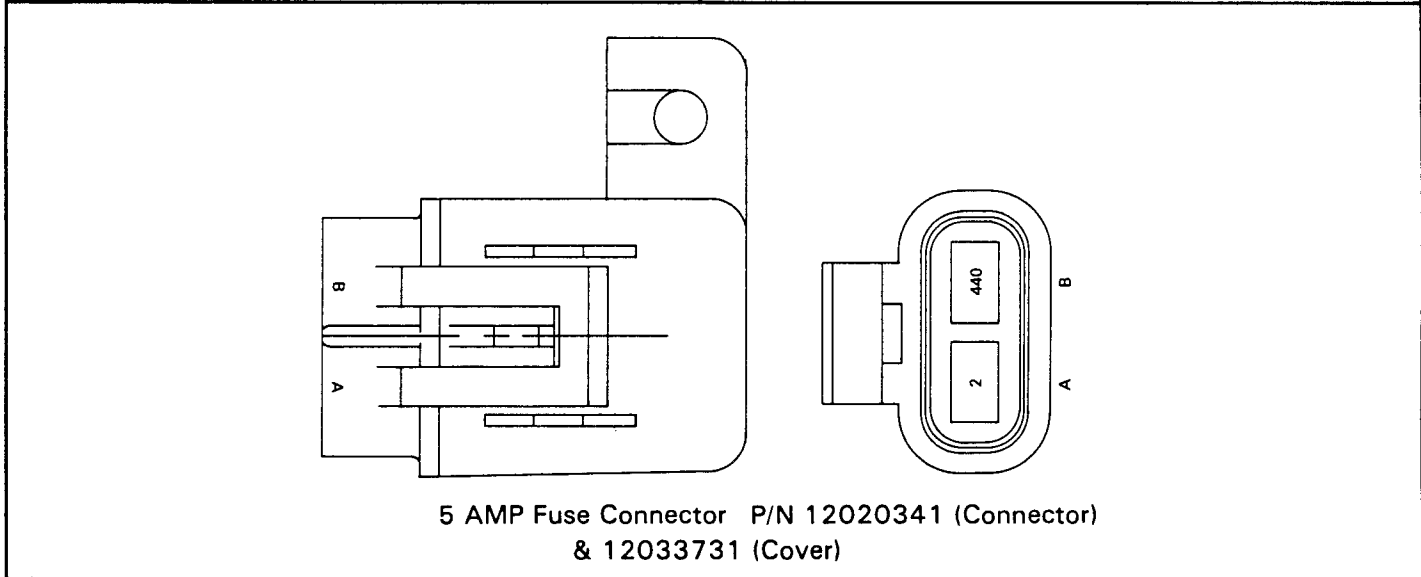
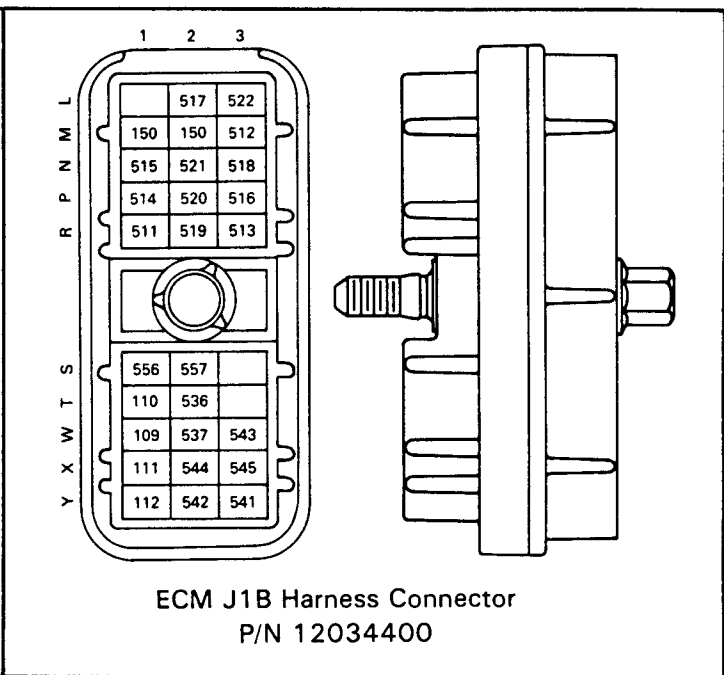
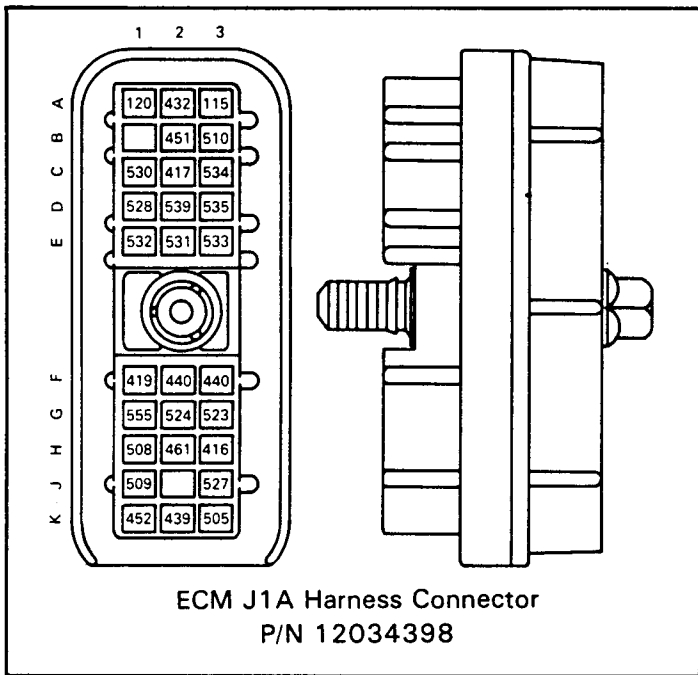
(\*Note: Some applications may have circuit breakers instead of fuses.)

Battery Power and Ground Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 46 - LOW BATTERY VOLTAGE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>46-5 <u>Check if ECM Fuse Blows Again</u></p> <ul style="list-style-type: none"> <li>. Without reconnecting the J1A connector, replace the 5 Amp fuse (or reset the circuit breaker).</li> <li>. Check if the ECM fuse (or circuit breaker) has blown again.</li> </ul>	<p>Fuse (or circuit breaker) is okay. →</p> <p>Fuse blown (or circuit breaker open). →</p>	<p>Go to 46-6.</p> <p>The Bat + line (ckt #440) is shorted to the ground. Repair short. Then go to 46-30.</p>
<p>46-6 <u>Check for Short in ECM</u></p> <ul style="list-style-type: none"> <li>. Reconnect the J1A connector.</li> <li>. Start and run engine for 1 minute or until engine stalls.</li> <li>. Stop engine and check if the 5 Amp ECM fuse (or circuit breaker) has blown again.</li> </ul>	<p>Fuse (or circuit breaker) is okay. →</p> <p>Fuse blown (or circuit breaker open). →</p>	<p>Go to 46-30.</p> <p>Go to 46-7.</p>
<p>46-7 <u>Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. →</p> <p>Problem found. →</p>	<p>Replace ECM. Then go to 46-30.</p> <p>Repair terminals/ connectors. Then go to 46-30.</p>

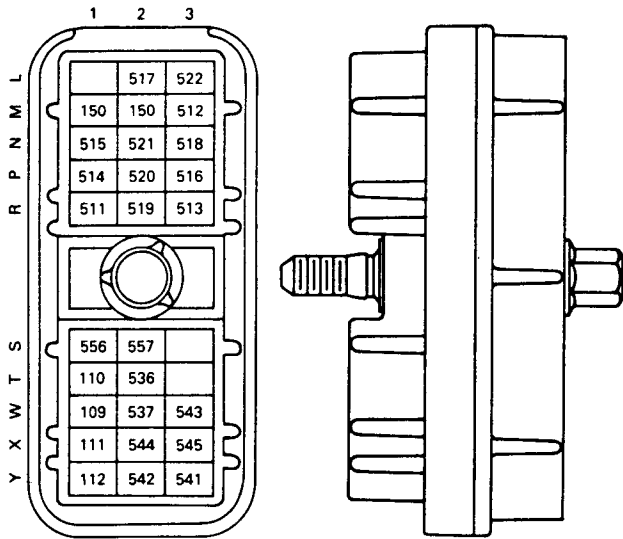


SECTION 4  
TROUBLESHOOTING CHARTS

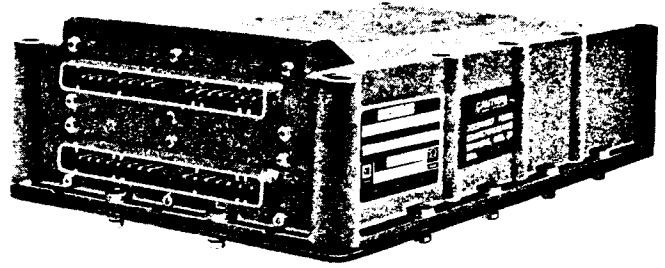
E. CODE 46 - LOW BATTERY VOLTAGE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>46-8 Check for Open in Battery + Line</p> <ul style="list-style-type: none"> <li>• Remove the 5 Amp ECM fuse (or circuit breaker).</li> <li>• Read voltage of socket A at the fuse holder (red lead) to a good ground (black lead).</li> </ul>	<p>Less than or equal to 11.5 volts.</p> <p>Greater than 11.5 volts.</p>	<p>→ The Battery + line near to the battery (ckt #2) is open, or a corroded connection exists at the Battery + terminal. Repair problem. Then go to 46-30.</p> <p>→ The Battery + line between the fuse holder and the ECM has an open, or the ECM power connector has a corroded connection. Repair problem. Then go to 46-30.</p>
<p>46-9 Ground Check at the ECM</p> <ul style="list-style-type: none"> <li>• Disconnect the J1B connector at the ECM.</li> <li>• Read voltage on socket F2 of the J1A harness connector (red lead) to socket M1 of the J1B harness connector (black lead).</li> <li>• Also read voltage on socket F3 of the J1A harness connector (red lead) to socket M2 of the J1B harness connector (black lead).</li> </ul>	<p>Less than or equal to 11.5 volts on either reading.</p> <p>Greater than 11.5 volts for both readings.</p>	<p>→ Go to 46-10.</p> <p>→ Go to 46-7.</p>

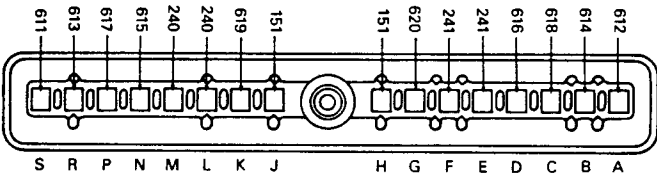




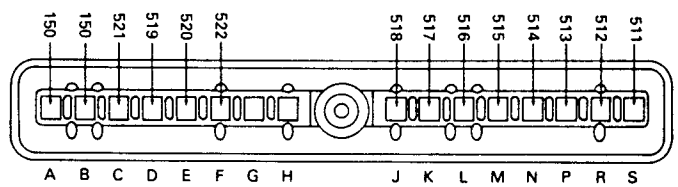
ECM J1B Harness Connector  
P/N 12034400



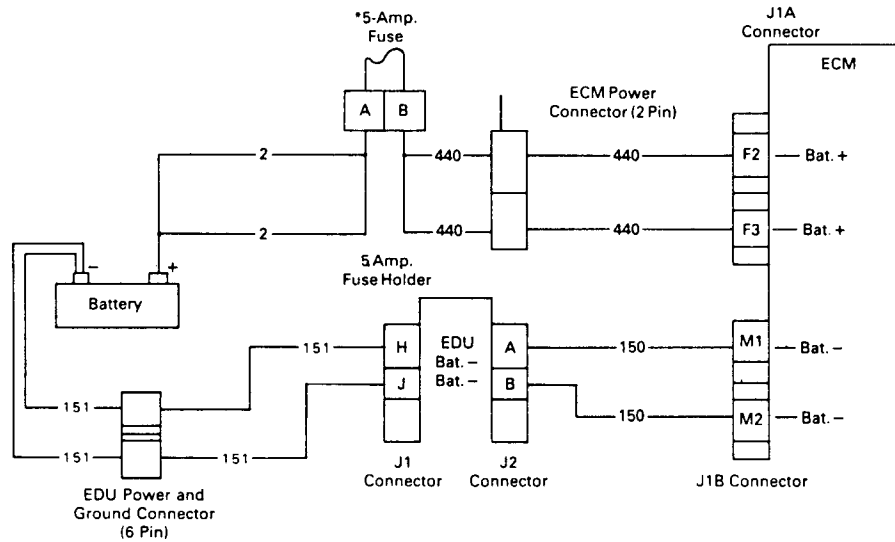
Electronic Distributor Unit (EDU)



EDU J1 Harness Connector (Gray)  
P/N 12034382



EDU J2 Harness Connector (Black)  
P/N 1203486



(\*Note: Some applications may have circuit breakers instead of fuses.)

Battery Power and Ground Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 46 - LOW BATTERY VOLTAGE (Cont'd.)

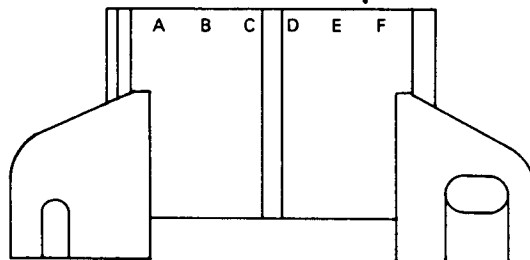
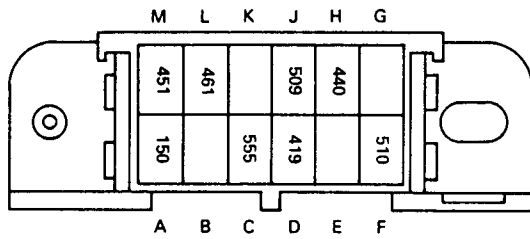
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>46-10 Ground Check at the EDU</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect the J1 connector at the EDU.</li> <li>• Read voltage at the Battery + terminal (red lead) to socket H or J of the J1 harness connector (black lead).</li> </ul>	<p>Less than or equal to 11.5 volts. —————&gt;</p> <p>Greater than 11.5 volts. —————&gt;</p>	<p>The ground line (wire) between the Battery - terminal and the EDU is open, or a corroded connection exists in EDU Power and Ground connector. Repair problem. Then go to 46-30.</p> <p>Go to 46-11.</p>
<p>46-11 Check Ckt #150</p> <hr/> <ul style="list-style-type: none"> <li>• Disconnect the J2 connector at the EDU.</li> <li>• Install a jumper wire between sockets A and B of the J2 harness connector.</li> <li>• Read resistance between sockets M1 and M2 of the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms. —————&gt;</p>	<p>Go to 46-12.</p> <p>The Battery - line (ckt #150) is open. Repair open. Then go to 46-30.</p>
<p>46-12 Check EDU Connectors</p> <hr/> <ul style="list-style-type: none"> <li>• Check terminals at the EDU connectors (both J1 and J2) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Replace EDU. Then go to 46-30.</p> <p>Repair terminals/connectors. Then go to 46-30.</p>



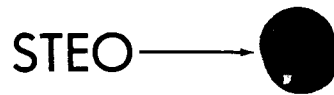
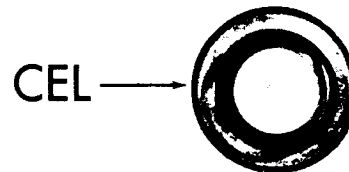
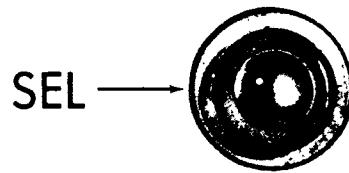
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 46 - LOW BATTERY VOLTAGE (Cont'd.)

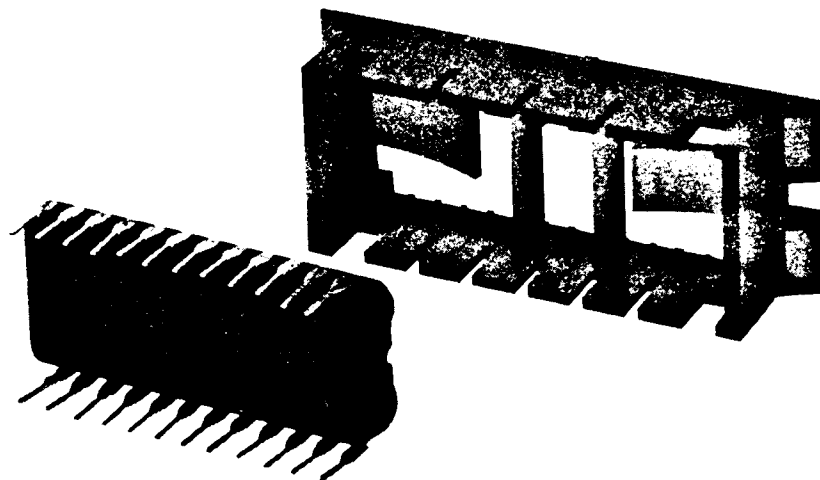
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>46-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 46 (and any other codes).</p> <p>Any other codes except Code 46.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



12 Pin DDL Connector  
P/N 12020043



Dash Lights

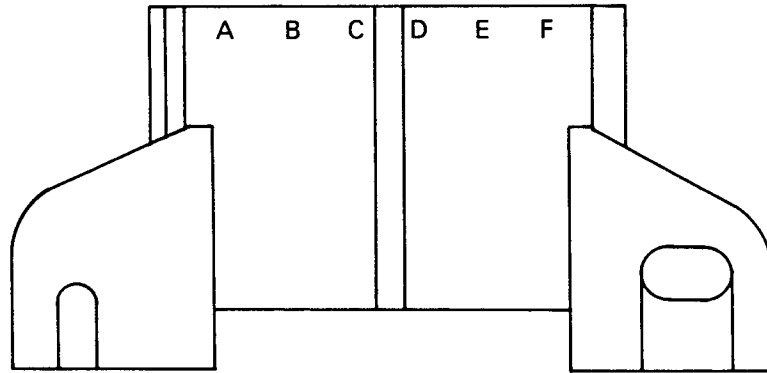
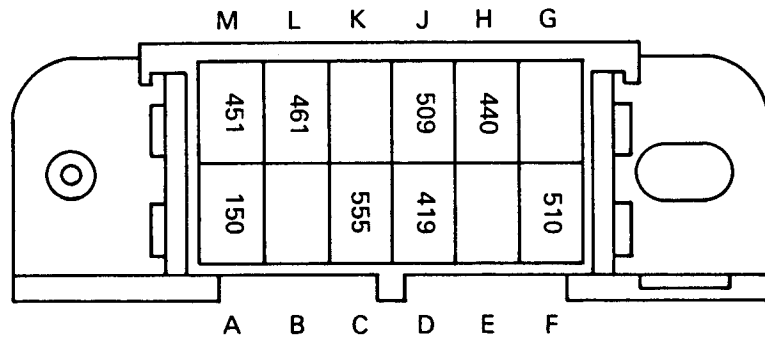


Calibration PROM

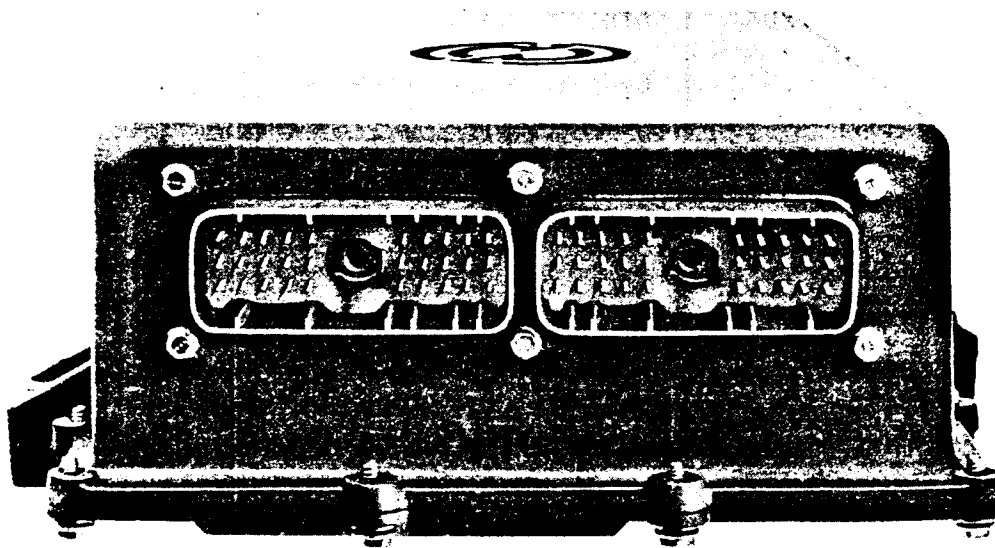
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 51 - CALIBRATION PROM

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>51-1 PROM Damage Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove Calibration PROM per instructions in Section 3-C.</li> <li>. Check for proper insertion or damaged pins.</li> </ul>	<p>Appears to be okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Go to 51-2.</p> <p>→ Go to 51-3.</p>
<p>51-2 Check if Code Recurs</p> <hr/> <ul style="list-style-type: none"> <li>. Reinsert PROM.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>Code 51 (and any other codes). —————→</p> <p>Code 25. —————→</p> <p>Any other codes except Code 51. —————→</p>	<p>→ Replace PROM. Then go to 51-4.</p> <p>→ Go to 51-30.</p> <p>→ Go to DCC-1 to service other codes.</p>
<p>51-3 Attempt PROM Repair</p> <hr/> <ul style="list-style-type: none"> <li>. If possible, attempt to straighten pins on PROM.</li> <li>. Reinsert PROM.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>Code 51 (and any other codes). —————→</p> <p>Code 25. —————→</p> <p>Any other codes except Code 51. —————→</p>	<p>→ Replace PROM. Then go to 51-4.</p> <p>→ Go to 51-30.</p> <p>→ Go to DCC-1 to service other codes.</p>



12 Pin DDL Connector  
P/N 12020043



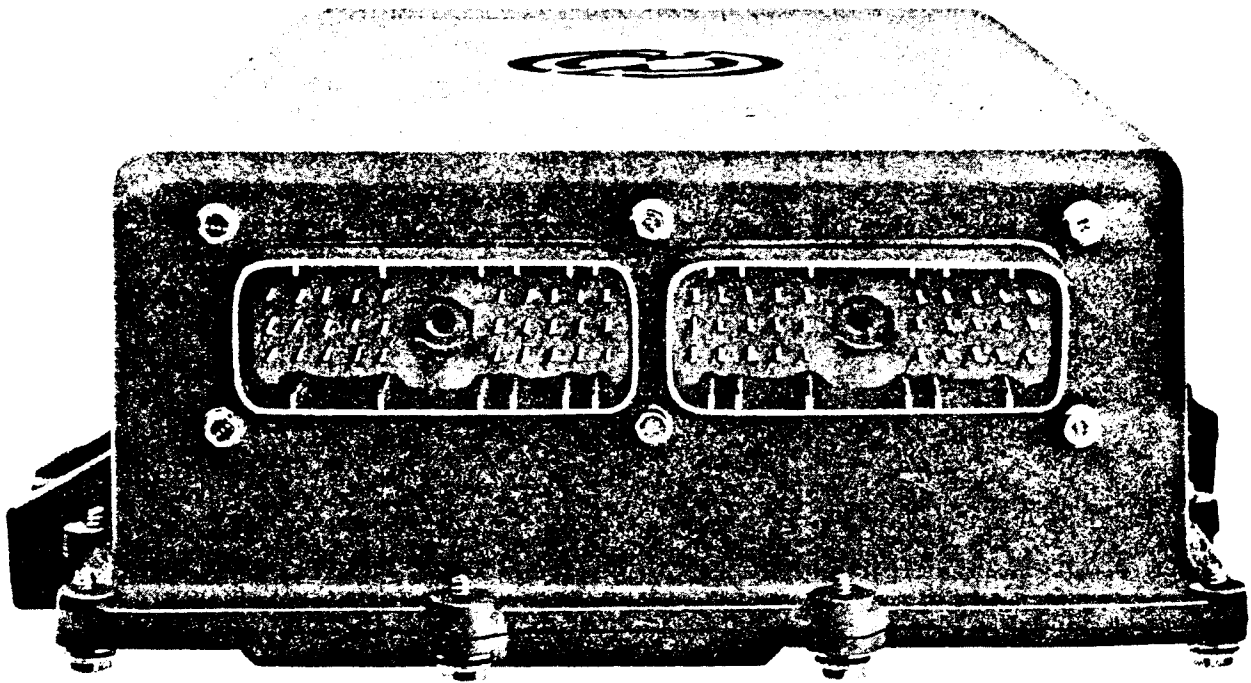
Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 51 - CALIBRATION PROM (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>51-4 Check if Code Recurs</p> <hr/> <ul style="list-style-type: none"> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>Code 51 (and any other codes). —————&gt;</p> <p>Code 25. —————&gt;</p> <p>Any other codes except Code 51. —————&gt;</p>	<p>→ Replace ECM. Then go to 51-30.</p> <p>→ Go to 51-30.</p> <p>→ Go to DCC-1 to service other codes.</p>
<p>51-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute. Stop engine.</li> <li>. Install a jumper wire between pins A and M of the 12 pin DDL connector, and read the codes flashing out on the "Check Engine" light.</li> </ul>	<p>Code 25. —————&gt;</p> <p>Code 51 (and any other codes). —————&gt;</p> <p>Any other codes except Code 51. —————&gt;</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



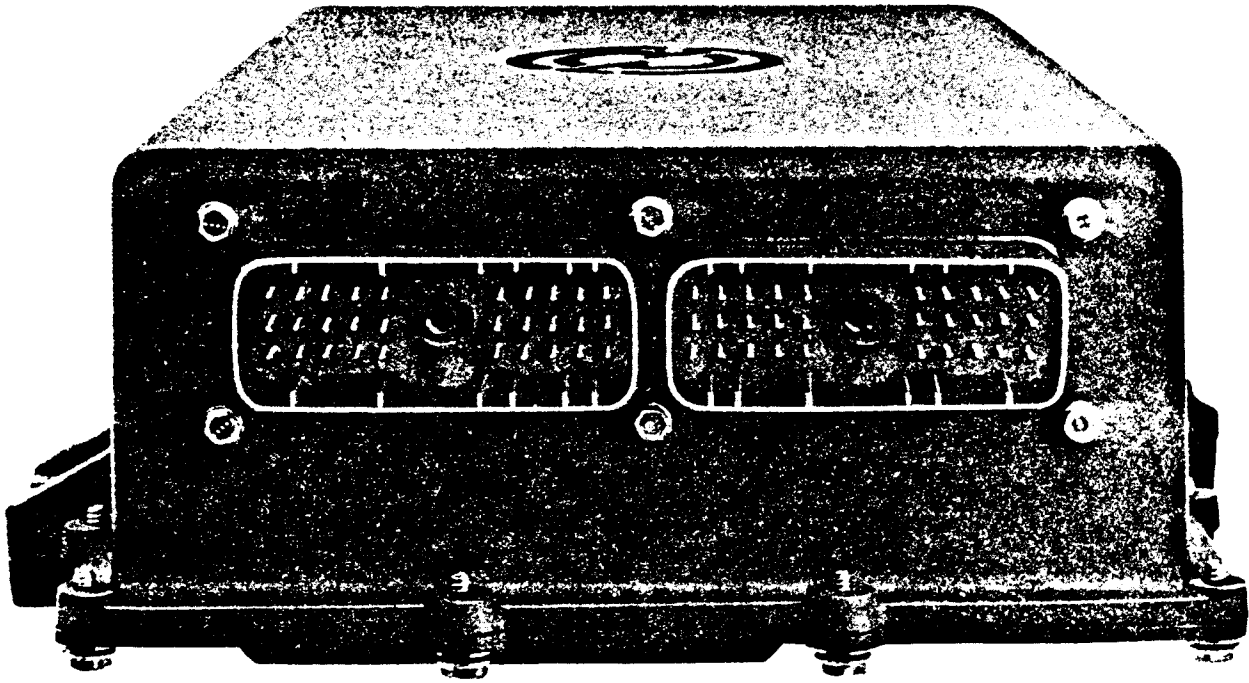


Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 52 - ECM-ANALOG TO DIGITAL CONVERSION FAILURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<ul style="list-style-type: none"><li>The ECM was unable to correctly convert sensor voltages into numbers for computer usage on two attempts.</li></ul>		Replace the ECM, then go to DCC-1.

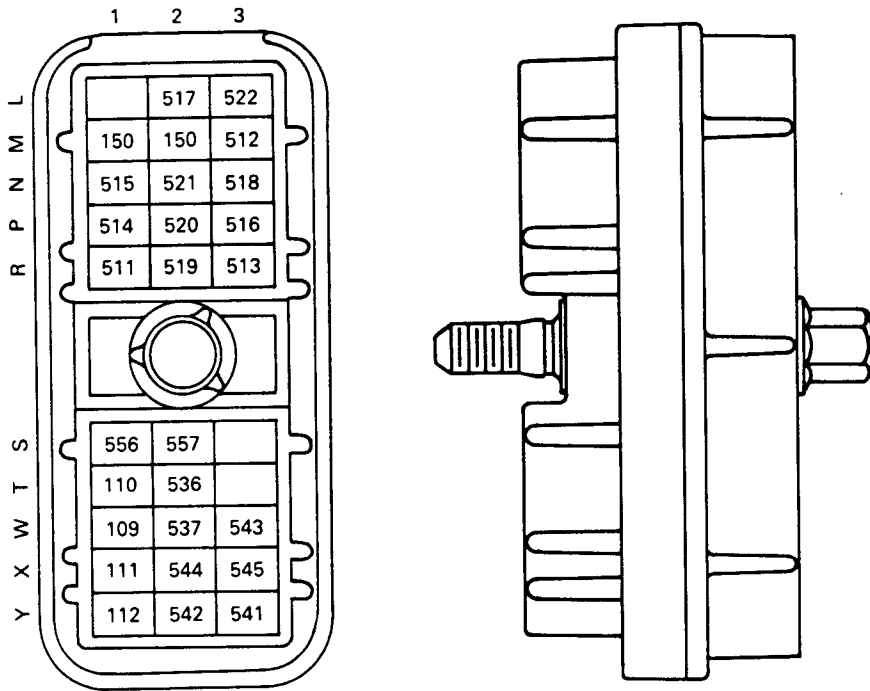


Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

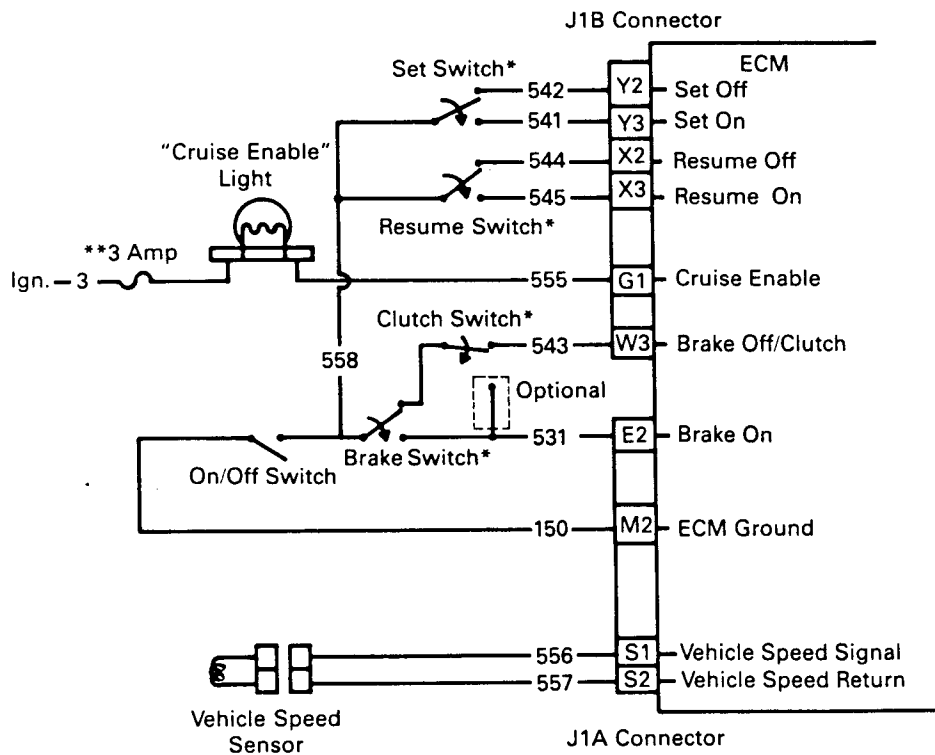
E. CODE 53 - ECM-TRS CIRCUITRY FAILURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<ul style="list-style-type: none"><li>The ECM has detected a failure in its internal circuitry used to process the TRS signals.</li></ul>		Replace the ECM. Then go to DCC-1.



ECM J1B Harness Connector  
P/N 12034400

Cruise Control Circuits



\*Note: All switches are shown in the "off" position.

\*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 54 - VEHICLE SPEED SENSOR (VSS)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>54-1 Resistance Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector.</li> <li>. Read resistance between sockets S1 and S2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 3,000 ohms. —————&gt;</p> <p>Greater than 3,000 ohms or open. —————&gt;</p>	<p>Go to 54-2.</p> <p>Go to 54-3.</p>
<p>54-2 Check for Short</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect the VSS connector.</li> <li>. Again, read resistance between sockets S1 and S2 on the J1B harness connector.</li> <li>. Also read resistance between sockets S1 and M1 and then between S2 and M1.</li> </ul>	<p>Less than or equal to 10,000 ohms on any reading. —————&gt;</p> <p>Greater than 10,000 ohms or open on all readings. —————&gt;</p>	<p>A wire is shorted:</p> <ul style="list-style-type: none"> <li>. Signal wire (#556) is shorted to return wire (#557), or</li> <li>. Signal wire (#556) is shorted to ground, or</li> <li>. Return wire (#557) is shorted to ground.</li> </ul> <p>Repair short. Then go to 54-30.</p> <p>Go to 54-4.</p>
<p>54-3 Check for Open</p> <hr/> <ul style="list-style-type: none"> <li>. Disconnect the VSS connector.</li> <li>. Install a jumper wire between sockets A and B on the VSS harness connector.</li> <li>. Again, read resistance between sockets S1 and S2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms —————&gt;</p> <p>Greater than 5 ohms or open. —————&gt;</p>	<p>Go to 54-4.</p> <p>Signal line (ckt #556) or return line (ckt #557) is open. Repair open. Then go to 54-30.</p>

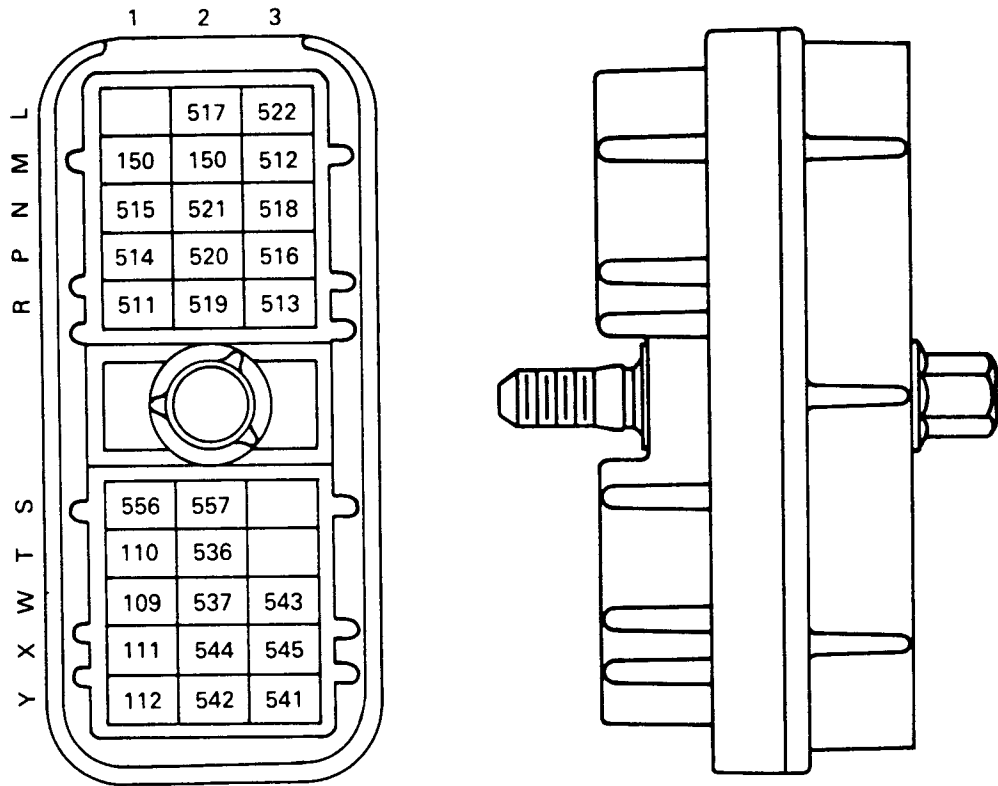


SECTION 4  
TROUBLESHOOTING CHARTS

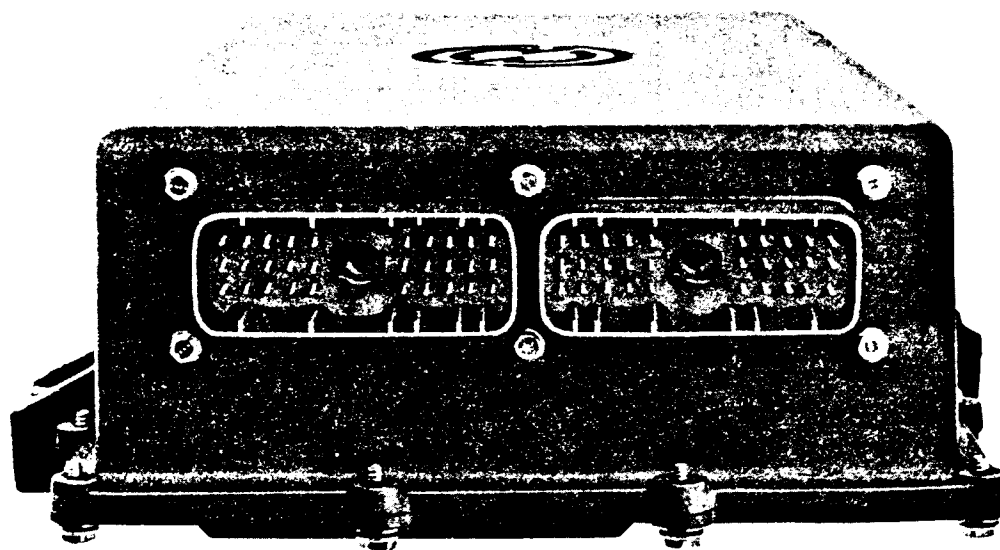
E. CODE 54 - VEHICLE SPEED SENSOR (VSS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>54-4 Check Vehicle Speed Sensor</u></p> <ul style="list-style-type: none"> <li>. Read resistance of the Vehicle Speed Sensor.</li> </ul>	<p>Less than 50 ohms. —————→</p> <p>From 50 to 3,000 ohms. —————→</p> <p>Greater than 3,000 ohms or open. —————→</p>	<p>→ Go to 54-5.</p> <p>→ Go to 54-6.</p> <p>→ Go to 54-5.</p>
<p><u>54-5 Check VSS Connectors</u></p> <ul style="list-style-type: none"> <li>. Inspect terminals at the VSS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace VSS. Then go to 54-30.</p> <p>→ Repair terminals/connectors. Then go to 54-30.</p>
<p><u>54-6 Vehicle Speed Mechanical Checks</u></p> <ul style="list-style-type: none"> <li>. Check if any metal, etc., is lodged between the VSS and the pulse wheel.</li> <li>. Check if sensor is loose.</li> <li>. Make sure VSS pulse wheel is in fixed position relative to mag. pickup.</li> <li>. Check air gap between mag. pickup and pulse wheel.</li> </ul>	<p>Okay. —————→</p> <p>Not okay. —————→</p>	<p>→ Go to 54-7.</p> <p>→ Repair. Then go to 54-30.</p>





ECM J1B Harness Connector  
P/N 12034400

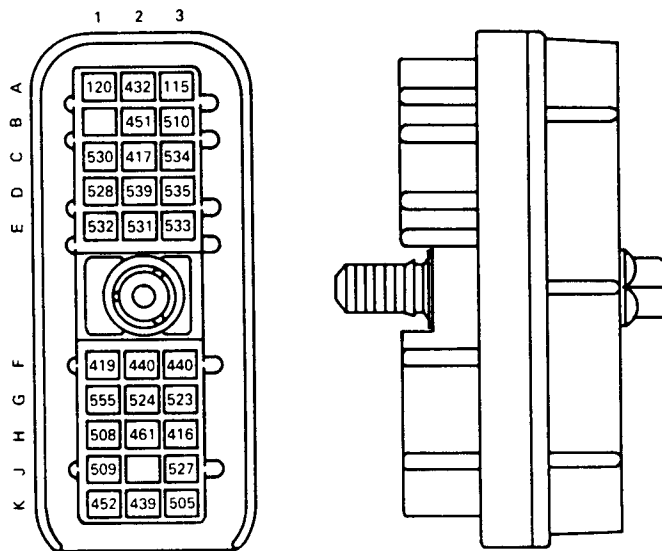


Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

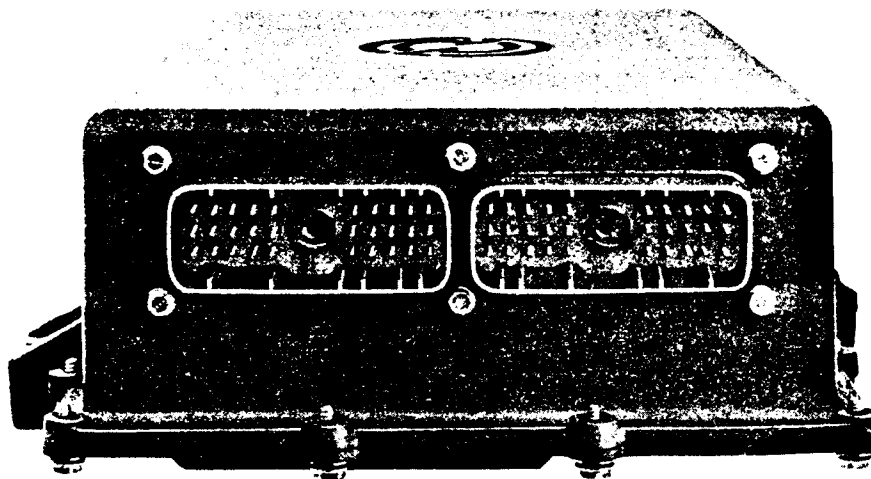
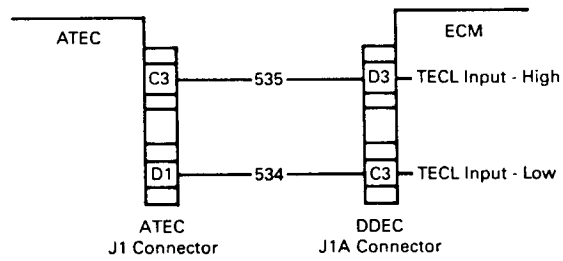
E. CODE 54 - VEHICLE SPEED SENSOR (VSS) (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>54-7 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 54-30.</p> <p>→ Repair terminals/connectors. Then go to 54-30.</p>
<p>54-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 54 (and any other codes).</p> <p>Any other codes except Code 54.</p>	<p>→ Repairs appear complete. (Note: the only way to completely verify the repair is by road testing it. If you drive it on the road and code 54 returns, please review this section from the first step to find the error.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



ECM J1A Harness Connector  
P/N 12034398

Transmission-Engine Communications Link Circuit

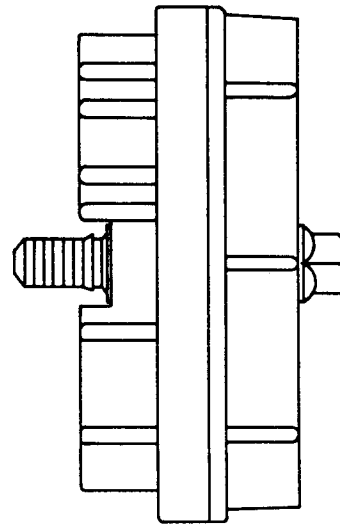
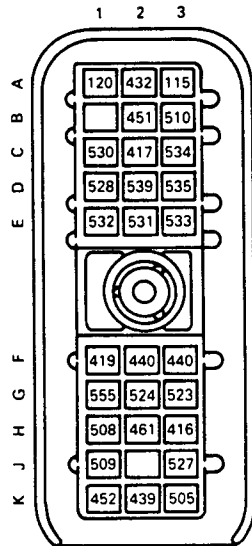


Electronic Control Module (ECM)

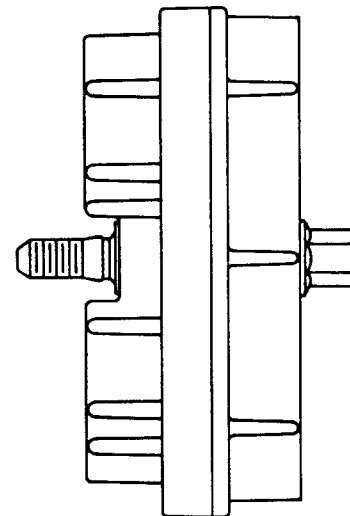
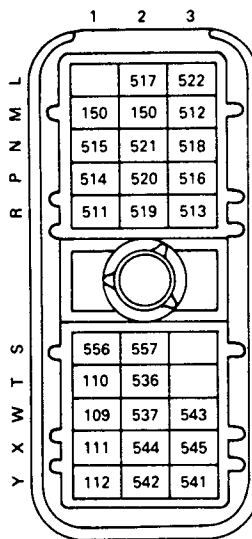
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 55 - TRANSMISSION-ENGINE COMMUNICATION LINK (TECL) LOSS OF DATA

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>55-1 Check Transmission Type</p> <p>. Check if the vehicle has the Allison Transmission Electronic Controls (ATEC).</p>	<p>Yes. _____</p> <p>No. _____</p>	<p>→ Go to 55-3.</p> <p>→ Go to 55-2.</p>
<p>55-2 Check ECM Connectors</p> <p>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</p>	<p>Terminals and _____ connectors are okay.</p> <p>Problem found. _____</p>	<p>→ Replace ECM. Then go to 55-30.</p> <p>→ Repair terminals/connectors. Then go to 55-30.</p>
<p>55-3 Check for Open</p> <p>. Turn ignition off.</p> <p>. Disconnect the ATEC, J1 harness connector.</p> <p>. Install a jumper wire between sockets C3 and D1 on the ATEC, J1 harness connector.</p> <p>. Disconnect the ECM, J1A connector.</p> <p>. Read resistance between sockets C3 and D3 on the DDEC, J1A harness connector (if possible, try to shake the harness while measuring resistance).</p>	<p>Always less than _____ or equal to 5 ohms.</p> <p>Greater than 5 _____ ohms or open at any time.</p>	<p>→ Go to 55-4.</p> <p>→ TECL Input-High wire (ckt #535) or TECL Input-Low wire (ckt #534) is open. Repair open. Then go to 55-30.</p>

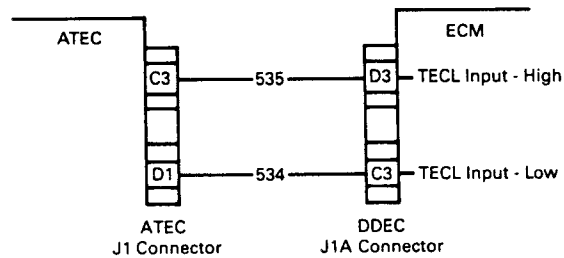


ECM J1A Harness Connector  
P/N 12034398



ECM J1B Harness Connector  
P/N 12034400

Transmission-Engine Communications Link Circuit



SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 55 - TRANSMISSION-ENGINE COMMUNICATION LINE (TECL) LOSS OF DATA (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>55-4 Check for Short Between TECL Signal Lines</u></p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Again, read resistance between sockets C3 and D3 at the J1A harness connector (if possible, shake harness while measuring resistance).</li> </ul>	<p>Less than or equal to 10,000 ohms at any time.</p> <p>Always greater than 10,000 ohms.</p>	<p>→ TECL Input-High wire (ckt #535) is shorted to TECL Input-Low wire (ckt #534). Repair short. Then go to 55-30.</p> <p>→ Go to 55-5.</p>
<p><u>55-5 Check for Short Between TECL-High and Ground</u></p> <ul style="list-style-type: none"> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Read resistance between D3 of the J1A harness connector and M1 of the J1B harness connector (if possible, shake harness while measuring resistance).</li> </ul>	<p>Less than or equal to 10,000 ohms at any time.</p> <p>Always greater than 10,000 ohms.</p>	<p>→ TECL Input-High wire (ckt #535) is shorted to ground (ckt #150). Repair short. Then go to 55-30.</p> <p>→ Go to 55-6.</p>
<p><u>55-6 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connectors (J1A) for damage, corrosion, and unseated pins or sockets.</li> <li>. Repeat the same checks on the ATEC, J1 connectors.</li> </ul>	<p>Problem found.</p> <p>Terminals and connectors are okay.</p>	<p>→ Repair terminals/connectors. Then go to 55-30.</p> <p>→ Replace the ATEC ECM. Then go to 55-30.</p>

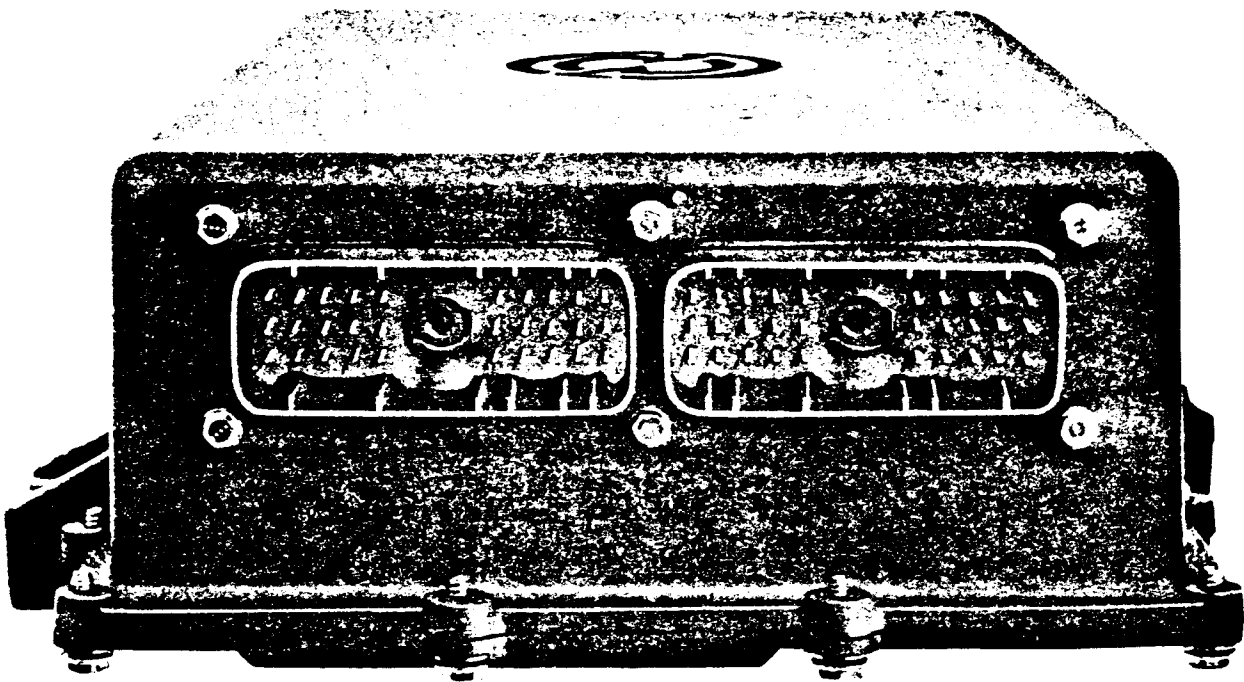


SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 55 - TRANSMISSION-ENGINE COMMUNICATION LINK (TECL) LOSS OF DATA (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
55-30 Verify Repairs		
<ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Unplug the DDL Reader if still plugged in.</li> <li>. Start and run engine until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE (no codes). →</p> <p>Code 55 (and any other codes). →</p> <p>Any other codes except Code 55. →</p>	<p>Repairs appear complete. (Note: the only way to completely verify the repair is by road testing it. If you drive it on the road and code 55 returns, repeat the last step prior to 55-30.)</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



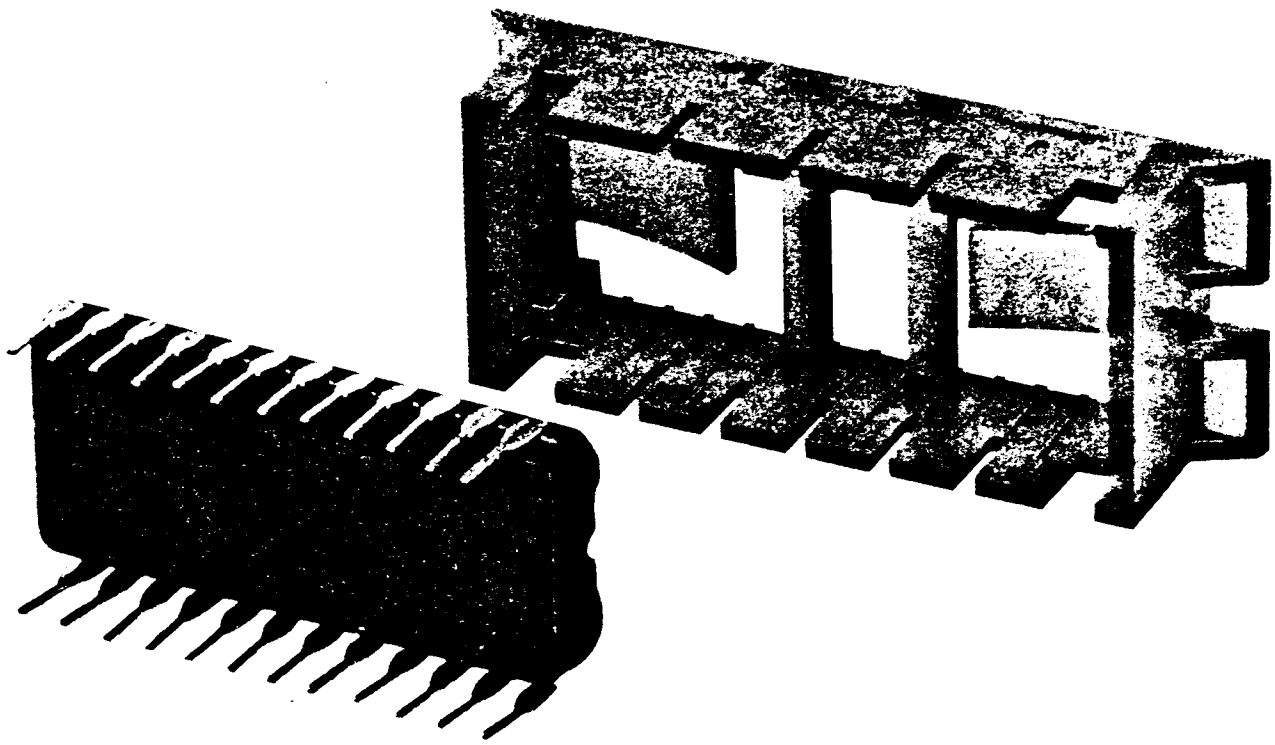


Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 56 - ECM-INJECTOR COMMAND FAILURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<ul style="list-style-type: none"><li>The ECM has detected a failure which causes it to turn on an injector(s) at the wrong time (or turning on an injector but never turning it off).</li></ul>		Replace the ECM, then go to DCC-1.

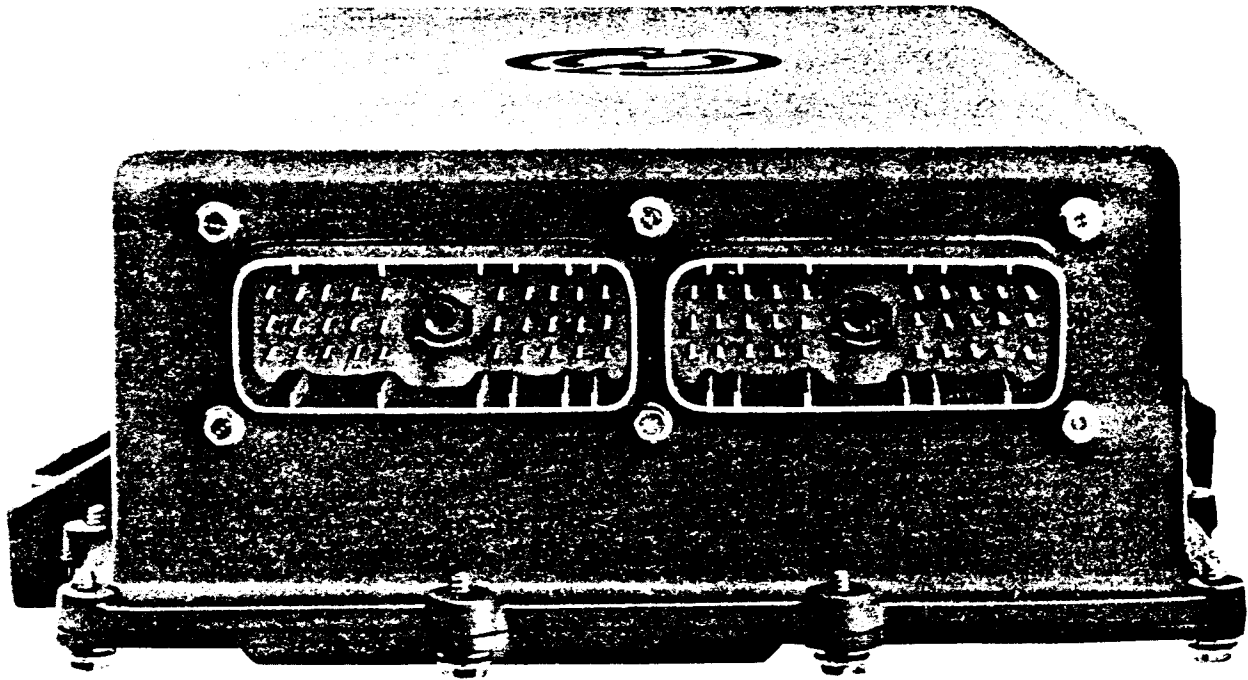


Calibration PROM

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 57 - CRUISE CONTROL MEMORY FAILURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>57-1 PROM Damage Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove Calibration PROM per instructions in Section 3-C.</li> <li>. Check for proper insertion or damaged pins.</li> </ul>	<p>Appears to be Okay. —————&gt;</p> <p>Problem found. —————&gt;</p>	<p>Go to 57-2.</p> <p>Go to 57-3.</p>
<p>57-2 Check if Code Recurs</p> <hr/> <ul style="list-style-type: none"> <li>. Reinsert PROM.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Read codes.</li> </ul>	<p>Code 57 (and any other codes). —————&gt;</p> <p>Code 25. —————&gt;</p> <p>Any other codes except Code 57. —————&gt;</p>	<p>Replace PROM. Then go to 57-4.</p> <p>Go to 57-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p>57-3 Attempt PROM Repair</p> <hr/> <ul style="list-style-type: none"> <li>. If possible, attempt to straighten pins on PROM.</li> <li>. Reinsert PROM.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Read codes.</li> </ul>	<p>Code 57 (and any other codes). —————&gt;</p> <p>Code 25. —————&gt;</p> <p>Any other codes except Code 57. —————&gt;</p>	<p>Replace PROM per instructions in Section 3-C. Then go to 57-4.</p> <p>Go to 57-30.</p> <p>Go to DCC-1 to service other codes.</p>

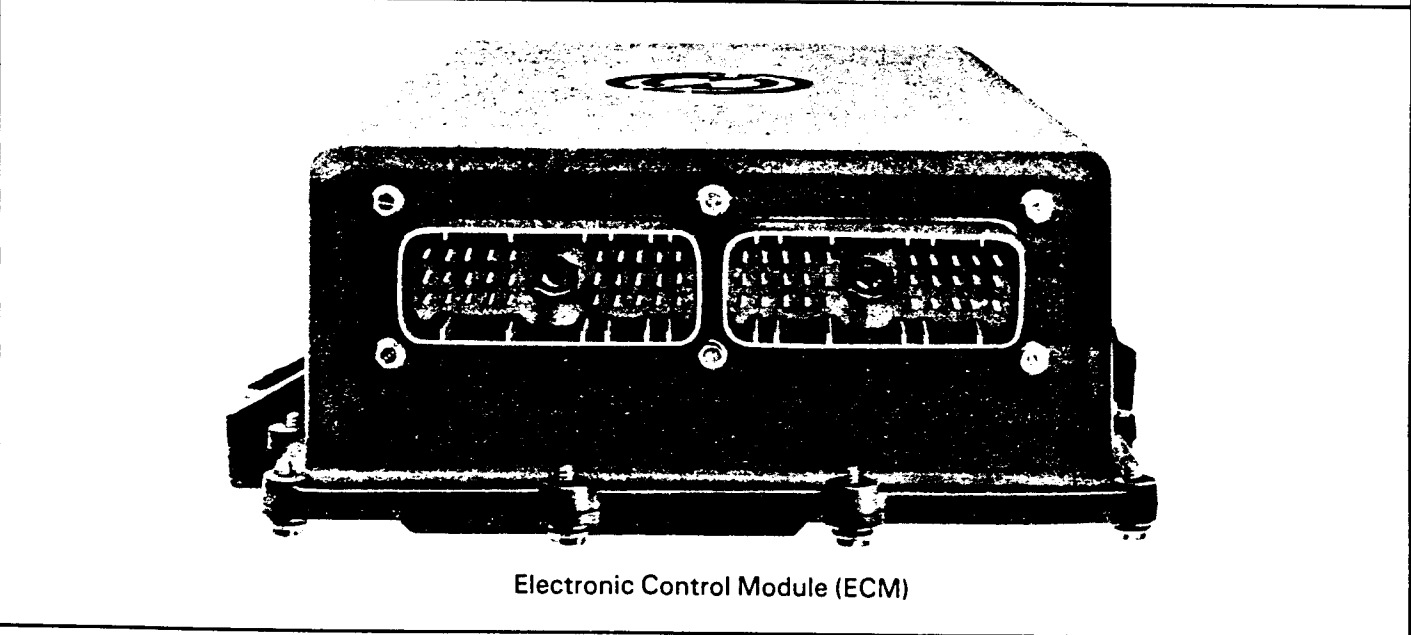
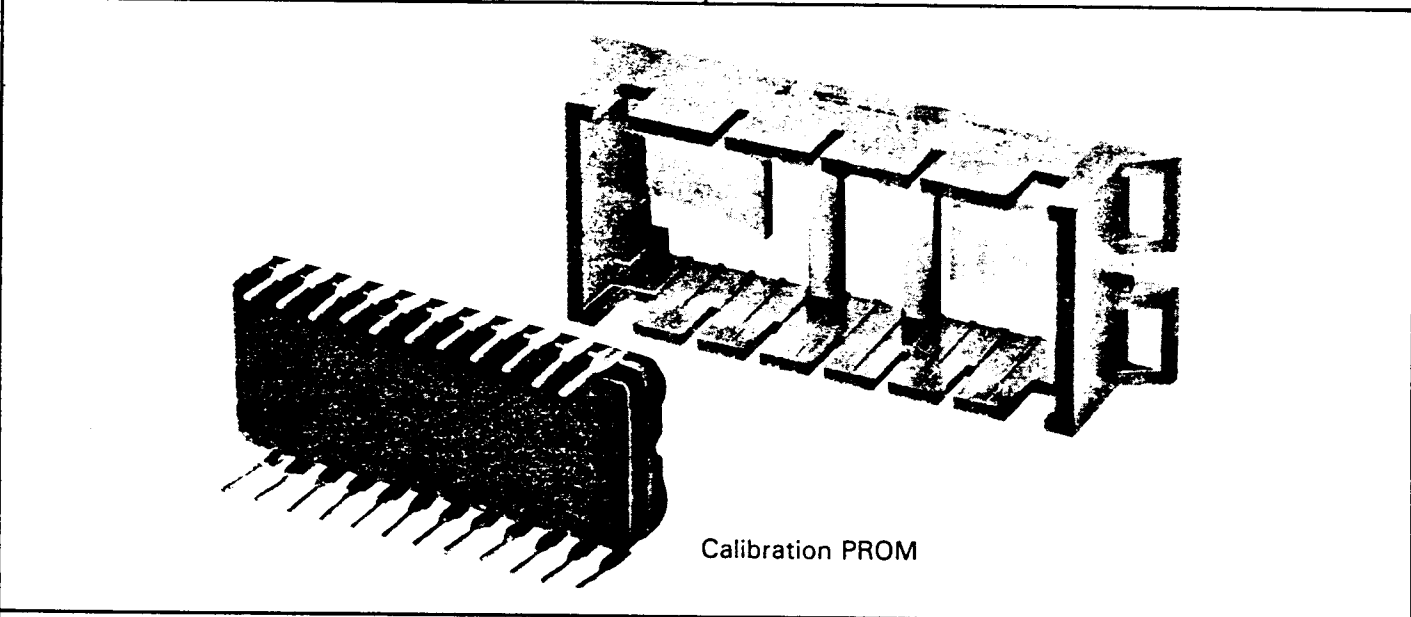
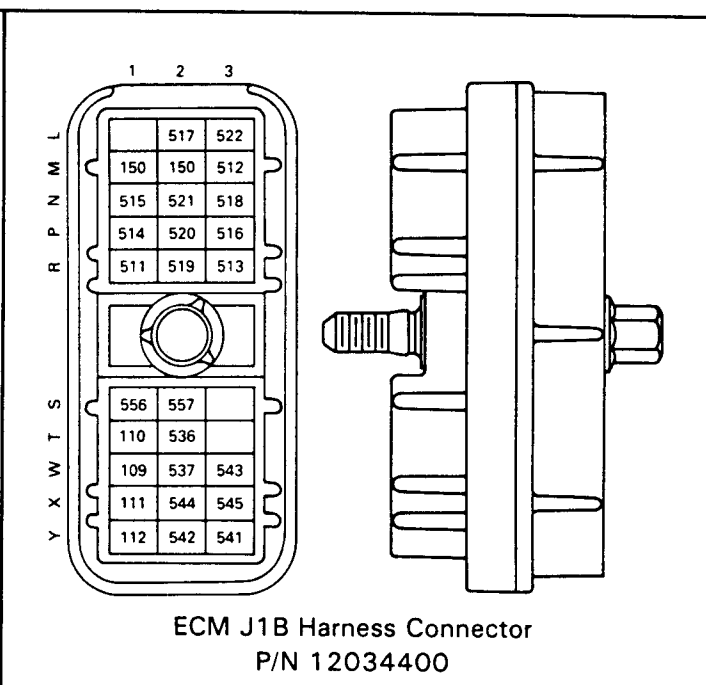
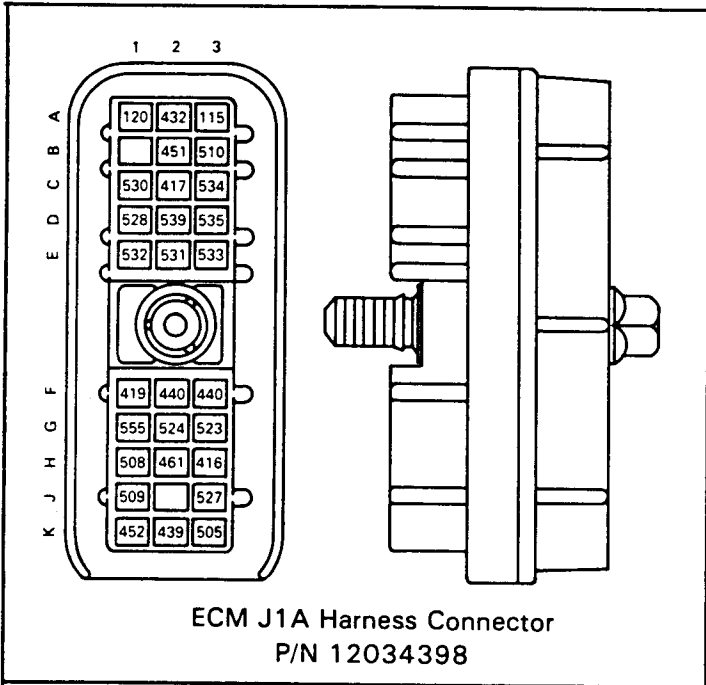


Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 57 - CRUISE CONTROL MEMORY FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>57-4 Check if Code Recurs</p> <hr/> <ul style="list-style-type: none"> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Read codes.</li> </ul>	<p>Code 57 (and _____ any other codes). →</p> <p>Code 25. _____ →</p> <p>Any other codes _____ except Code 57. →</p>	<p>Replace ECM. Then go to 57-30.</p> <p>Go to 57-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p>57-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>Code 25. _____ →</p> <p>Code 57 (and _____ any other codes). →</p> <p>Any other codes _____ Except Code 57. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>58-1 Determine Type of Cruise Control System</u></p> <ul style="list-style-type: none"> <li>• Check to see that this is a DDEC, cruise control system.</li> </ul>	<p>Yes. _____ →</p> <p>No. _____ →</p>	<p>Go to 58-5.</p> <p>Go to 58-2.</p>
<p><u>58-2 PROM Damage Check</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Remove Calibration PROM per instructions in Section 3-C.</li> <li>• Check for proper insertion or damaged pins.</li> </ul>	<p>Appears to be okay. _____ →</p> <p>Problem found. _____ →</p>	<p>Go to 58-4.</p> <p>Go to 58-3.</p>
<p><u>58-3 Attempt PROM Repair</u></p> <ul style="list-style-type: none"> <li>• If possible, attempt to straighten pins on PROM.</li> <li>• Reinsert PROM.</li> <li>• Clear codes.</li> <li>• Turn ignition on.</li> <li>• Read codes.</li> </ul>	<p>Code 58 (and _____ any other codes). _____ →</p> <p>Code 25. _____ →</p> <p>Any other codes except Code 58.</p>	<p>Replace PROM per instructions in Section 3-C. Then go to 58-4.</p> <p>Go to 58-30.</p> <p>Go to DCC-1 to service other codes.</p>
<p><u>58-4 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>• Check terminals at the ECM connectors (both J1A and J1B) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Problem found. _____ →</p> <p>Terminals and connectors are okay. _____ →</p>	<p>Repair terminals/connectors. Then go to 58-30.</p> <p>Replace ECM. Then go to 58-30.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

CRUISE CONTROL  
QUICK-CHECK TABLES

Table I

Checkout of On/Off Switch & Wiring (Ignition "On", Engine Not Running)

<u>Step</u>	<u>On/Off Switch Status</u>	<u>DDL Rdr Display Selected</u>	<u>SET Switch</u>	<u>RESUME Switch</u>	<u>DDL Rdr Display Readout</u>	<u>Okay?</u>	<u>If you get this display, then go to:</u>	
1	OFF	SET & RESUME	OFF	OFF	OP OP	Yes	Table I, Step 2	
					OFF OFF	No		58-6
					any other	No		Table III
-----								
2	ON	SET & RESUME	OFF	OFF	OFF OFF	Yes	Table II	
					OP OP	No		58-7
					any other	No		Table III

Table II

Checkout of Brake and Clutch Switches & Wiring (Ignition "On", Engine Not Running)

<u>Step</u>	<u>On/Off Switch Status</u>	<u>DDL Rdr Display Selected</u>	<u>Brake Pedal</u>	<u>Clutch Pedal (if any)</u>	<u>DDL Rdr Display Readout</u>	<u>Okay?</u>	<u>If you get this display, then go to:</u>	
1	ON	BRK/CL	OFF	OFF	OFF	Yes	Table II, Step 2	
					ON	No		58-8
					CL	No		58-9
					SH	No		58-10
-----								
2	ON	BRK/CL	OFF	ON (if no cl. sw., skip to Step 3)	OFF	No	58-11	
					ON*	No*		58-10*
					CL	Yes		Table II, Step 3
					SH	No		58-11, then 58-10
-----								
3	ON	BRK/CL	ON	OFF	OFF	No	58-12	
					ON	Yes		Table III
					CL	No		58-13
					SH	No		58-14

\*Note: This will be the normal readout if the clutch three-wire switch is used. If you have a three-wire clutch switch and get this readout, continue to Table II, Step 3.

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
58-5	Checkout of Cruise Control Switches & Wiring	

To speed up the checkout of cruise control switches, Quick-Check tables have been developed. These tests are all to be run with the ignition on but the engine not running. Also, a DDL Reader must be plugged into the 12 pin, DDL connector. All three Quick-Check Tables (Tables I and II on the facing page, and Table III on the following pages) must be gone through to completely check out the cruise control switches and wiring. But the maximum number of Quick-Check steps you'll ever need to perform is  $2 + 3 + 3 = 8$  steps.

Example:

Taking Table I, step 1, you would do the following:

1. Ignition on, engine off, DDL Reader plugged in.
2. Depress cruise control On/Off switch to On (then release).
3. Select the "SET & RESUME" position on the DDL Reader.
4. Depress both the SET switch and RESUME switch to Off (then release).
5. Observe the DDL Reader display. If, for example, it shows "OFF OFF" (not correct), you would proceed to step 58-6. If it instead shows "OP OP" (okay), you would proceed to Table I, step II.
6. If you were directed to 58-6, always create the exact same condition(s) which led you to 58-6 (steps 2. and 3. here) before taking a resistance reading.

SECTION 4  
TROUBLESHOOTING CHARTS

E. CRUISE CONTROL QUICK-CHECK TABLES (Cont'd.)

Table III

Checkout of SET and RESUME Switches & Wiring

<u>Step</u>	<u>On/Off Switch Status</u>	<u>DDL Rdr Display Selected</u>	<u>SET Switch</u>	<u>RESUME Switch</u>	<u>DDL Rdr Display Readout</u>	<u>Okay?</u>	<u>If you get this display, then go to:</u>
1	ON	SET & RESUME	OFF	OFF	OFF OFF	Yes	Table III, Step 2
					OFF ON	No	58-15
					OFF SH	No	58-16
					OFF OP	No	58-17
					ON OFF	No	58-18
					ON ON	No	58-18, then 58-15
					ON SH	No	58-18, then 58-16
					ON OP	No	58-18, then 58-17
					SH OFF	No	58-19
					SH ON	No	58-19, then 58-15
					SH SH	No	58-19, then 58-16
					SH OP	No	58-19, then 58-17
					OP OFF	No	58-20
					OP ON	No	58-20, then 58-15
					OP SH	No	58-20, then 58-16
					OP OP	No	58-20, then 58-17
					2	ON	SET & RESUME
OFF ON	Yes	Table III, Step-3					
OFF SH	No	58-22					
OFF OP	No	58-23					
ON OFF	No	58-18, then 58-21					
ON ON	No	58-18					
ON SH	No	58-18, then 58-22					
ON OP	No	58-18, then 58-23					
SH OFF	No	58-19, then 58-21					
SH ON	No	58-19					
SH SH	No	58-19, then 58-22					
SH OP	No	58-19, then 58-23					
OP OFF	No	58-20, then 58-21					
OP ON	No	58-20					
OP SH	No	58-20, then 58-22					
OP OP	No	58-20, then 58-23					

SECTION 4  
TROUBLESHOOTING CHARTS

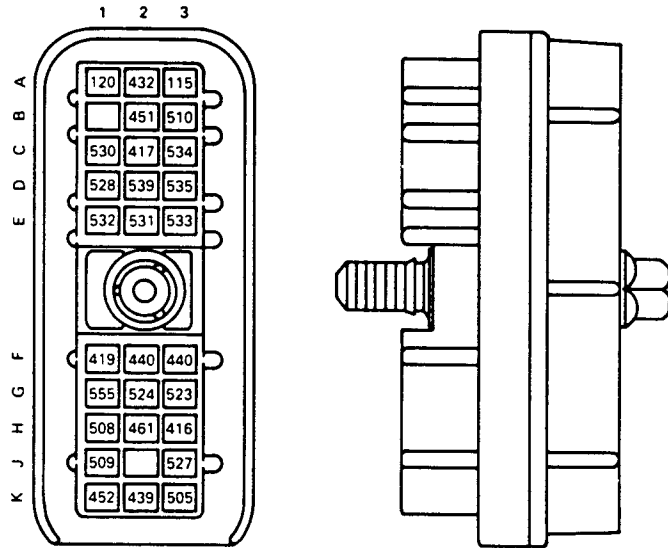
E. CRUISE CONTROL QUICK-CHECK TABLES (Cont'd.)

Table III

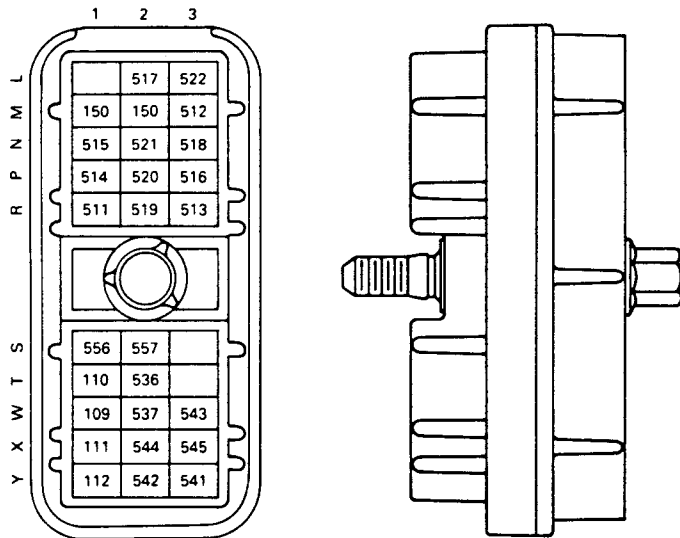
Checkout of SET and RESUME Switches & Wiring

<u>Step</u>	<u>On/Off Switch Status</u>	<u>DDL Rdr Display Selected</u>	<u>SET Switch</u>	<u>RESUME Switch</u>	<u>DDL Rdr Display Readout</u>	<u>Okay?</u>	<u>If you get this display, then go to:</u>
3	ON	SET & RESUME	ON	OFF	OFF OFF	No	58-24
					OFF ON	No	58-24, then 58-15
					OFF SH	No	58-24, then 58-16
					OFF OP	No	58-24, then 58-17
					ON OFF	Yes	58-27*
					ON ON	No	58-15
					ON SH	No	58-16
					ON OP	No	58-17
					SH OFF	No	58-25
					SH ON	No	58-25, then 58-15
					SH SH	No	58-25, then 58-16
					SH OP	No	58-25, then 58-17
					OP OFF	No	58-26
					OP ON	No	58-26, then 58-15
					OP SH	No	58-26, then 58-16
					OP OP	No	58-26, then 58-17

\*Note: Don't go to 58-27 if referred here from Step 58-6. Instead, go back to Results column of 58-6.

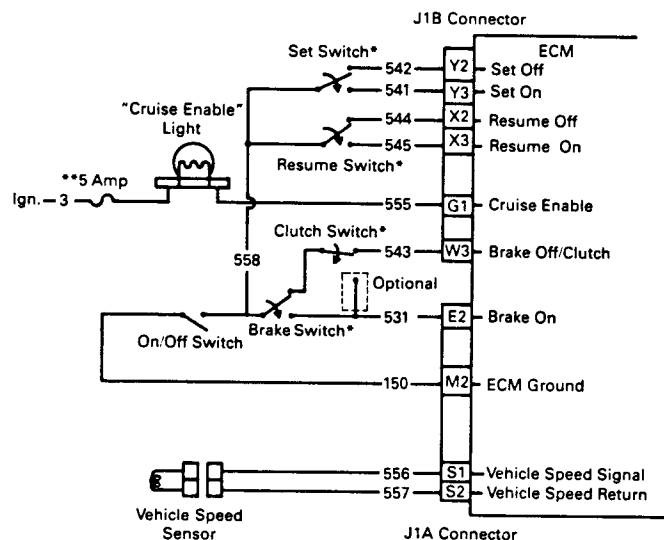


ECM J1A Harness Connector P/N 12034398



ECM J1B Harness Connector P/N 12034400

### Cruise Control Circuits

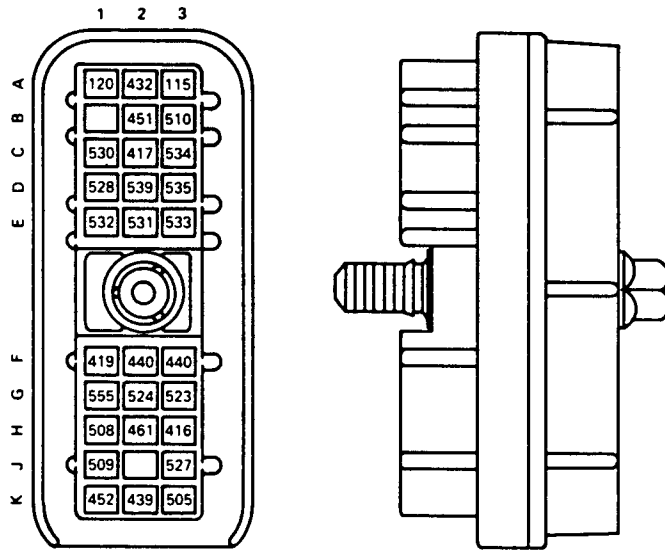


\*Note: All switches are shown in the "off" position.  
 \*\*Note: (Some applications may have circuit breakers instead of fuses).

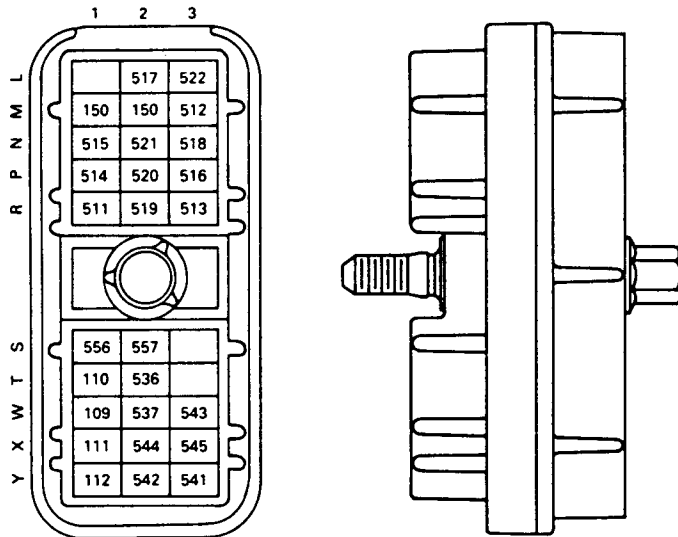
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>58-6 Check for Short at the On/Off Circuit</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1B connector at the ECM.</li> <li>• Read resistance between sockets M1 and Y2 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Run through steps of Table II and Table III. If any display received is not okay, go to step indicated. If Table II &amp; III pass, either the on/off switch is shorted or a short to ground exists in the on/off wire (ckt #558). Repair short or replace switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p><u>58-7 Check for Open at the On/Off Circuit</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1B connector at the ECM.</li> <li>• Turn on the Cruise On/Off switch.</li> <li>• Read resistance between sockets M1 and Y2 on the J1B harness connector.</li> </ul>	<p>Greater than 5 ohms or open.</p> <p>Less than or equal to 5 ohms.</p>	<p>→ Either the On/Off switch is open or an open exists in the On/Off wire (ckt #558). Repair short or replace switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p><u>58-8 Check for Short at the Brake Switch</u></p> <ul style="list-style-type: none"> <li>• Turn ignition off.</li> <li>• Disconnect the J1A and J1B connectors at the ECM.</li> <li>• Turn on the Cruise On/Off switch.</li> <li>• Read resistance between socket E2 on the J1A harness connector and socket M1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Brake or Clutch switch is shorted. Replace faulty switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>

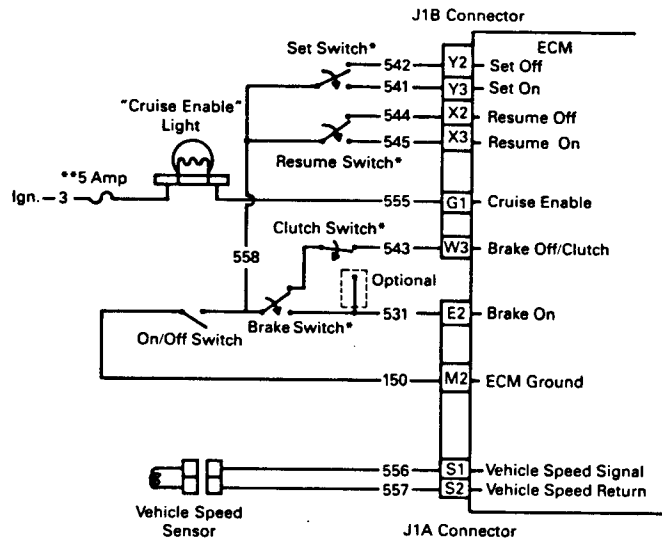


ECM J1A Harness Connector P/N 12034398



ECM J1B Harness Connector P/N 12034400

### Cruise Control Circuits



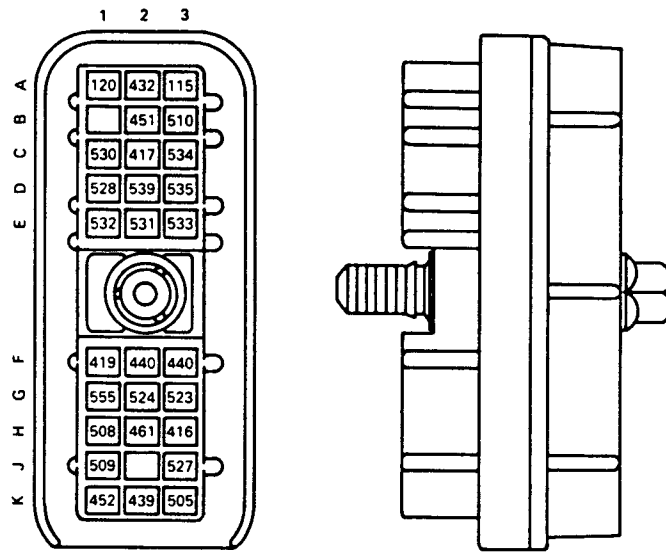
\*Note: All switches are shown in the "off" position.  
 \*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

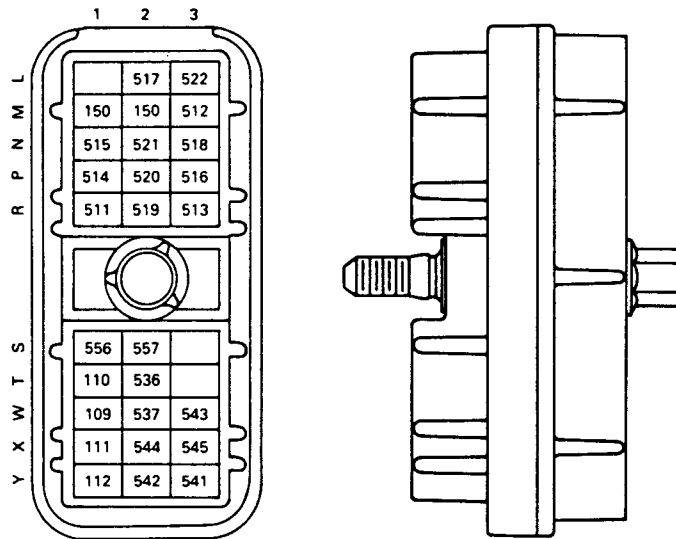
E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-9 <u>Check for Open at the On/Off Circuit</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between sockets M1 and W3 on the J1B harness connector.</li> </ul>	<p>Greater than _____ 5 ohms or open.</p> <p>Less than or _____ equal to 5 ohms.</p>	<p>→ Either the Brake switch, or Clutch switch is open or an open exists in the Brake Off/Clutch wire (ckt #543). Repair open or replace bad switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p>58-10 <u>Check for Short at the Brake on Circuit</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B connectors at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between socket E2 on the J1A harness connector and socket M1 on the J1B harness connector.</li> </ul>	<p>Less than or equal _____ to 10,000 ohms</p> <p>Greater than _____ 10,000 ohms or open</p>	<p>→ Either the Brake or Clutch switch is shorted or a short to ground (ckt #150) exists in the Brake On wire (ckt #531). Repair short or replace switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>



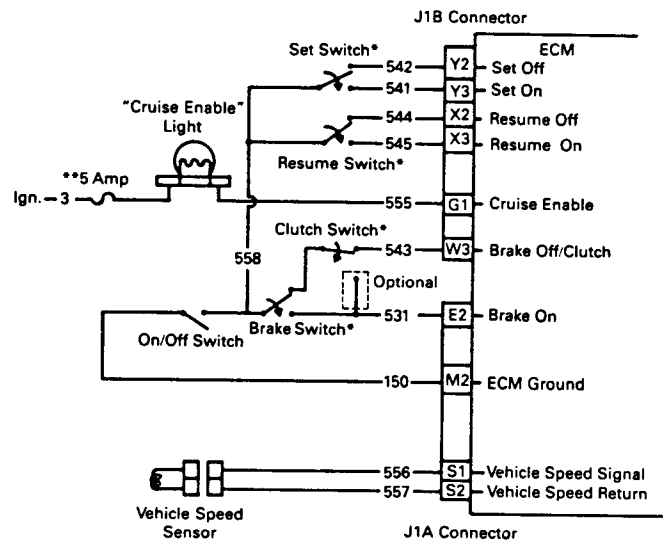


ECM J1A Harness Connector P/N 12034398



ECM J1B Harness Connector P/N 12034400

### Cruise Control Circuits

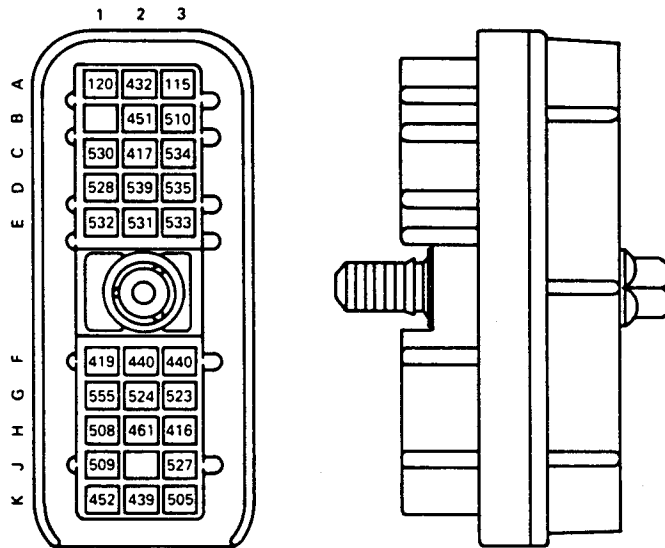


\*Note: All switches are shown in the "off" position.  
 \*\*Note: (Some applications may have circuit breakers instead of fuses).

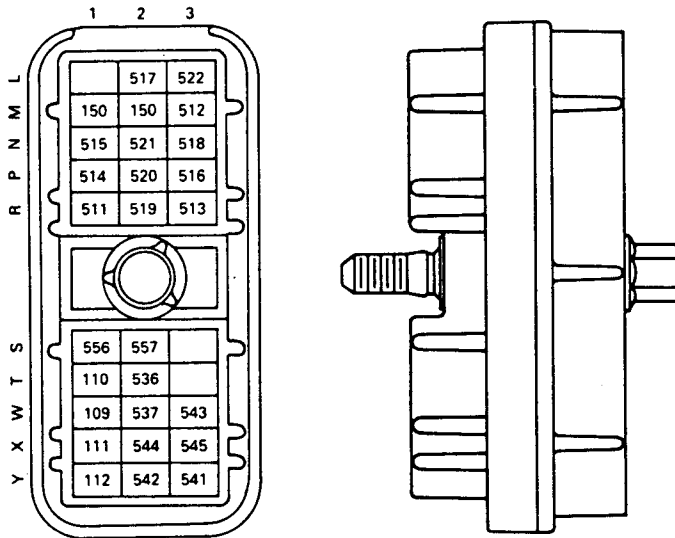
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>58-11 Check for Bad Contact or Short at Clutch Ckt.</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold clutch pedal to the floor.</li> <li>. Read resistance between sockets M1 and W3 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Check if bad mechanical contact between the Clutch switch and the Clutch. If okay, then either the Clutch switch is shorted or a short to ground exists in the Brake Off/Clutch wire (ckt #543). Repair bad contact or short, or replace switch. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p><u>58-12 Check for Bad Contact or Brake Switch</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B connectors at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold brake pedal to the floor.</li> <li>. Read resistance between socket E2 on the J1A harness connector and socket M1 on the J1B harness connector.</li> <li>. Also read resistance between sockets W3 and M1 on the J1B harness connector.</li> </ul>	<p>E2 to M1 reads greater than 10,000 ohms or open and W3 to M1 reads less than or equal to 5 ohms.</p> <p>E2 to M1 reads less than or equal to 10,000 ohms and W3 to M1 reads greater than 5 ohms.</p> <p>Any other combination of readings.</p>	<p>→ Determine brake switch operation:</p> <ul style="list-style-type: none"> <li>- Air operated <ul style="list-style-type: none"> <li>.. Be sure brake switch is mounted in brake air supply circuit, and no kinks or air leaks exist.</li> </ul> </li> <li>- Mechanical <ul style="list-style-type: none"> <li>.. Check switch actuator for correct alignment and/or sticking.</li> </ul> </li> </ul> <p>. Test Switch operation:</p> <ul style="list-style-type: none"> <li>- Refer to vehicle, OEM manual for switch details.</li> </ul> <p>. When repairs are complete, go to 58-30.</p> <p>→ Go to 58-27.</p> <p>→ Replace Brake switch. Then go to 58-30.</p>

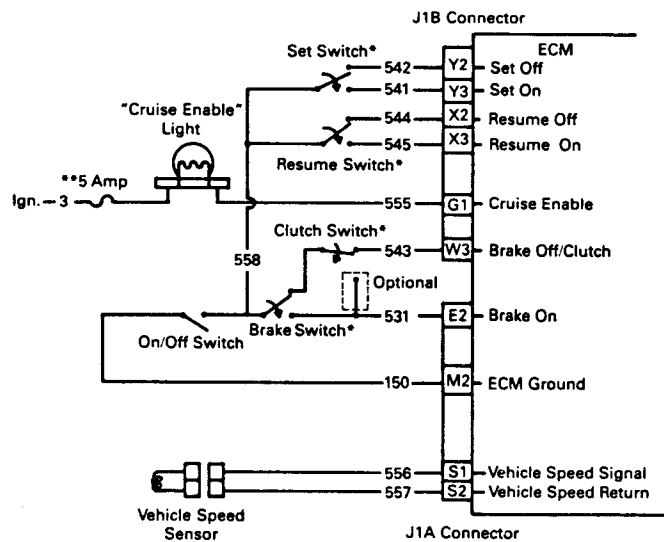


ECM J1A Harness Connector P/N 12034398



ECM J1B Harness Connector P/N 12034400

### Cruise Control Circuits



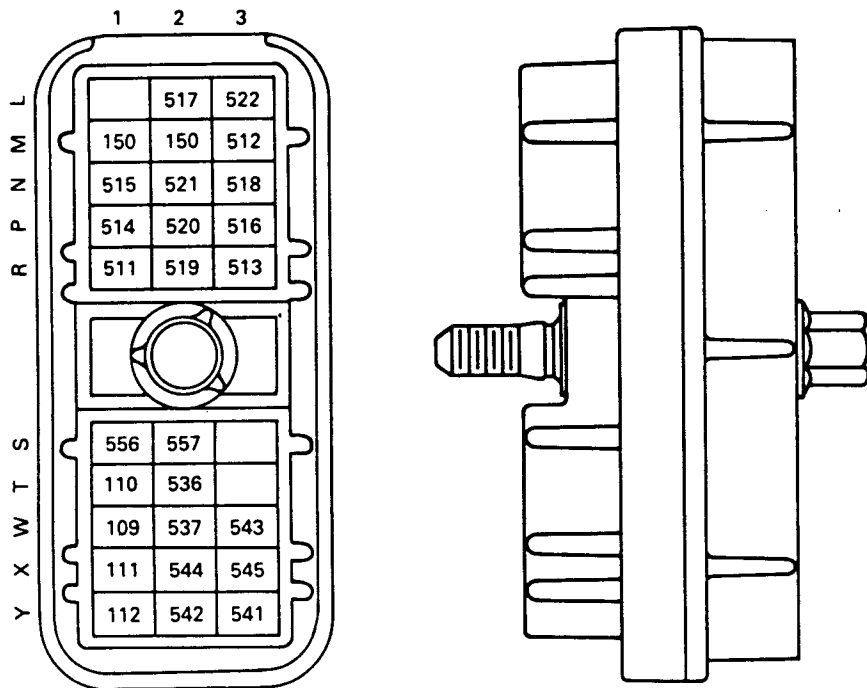
\*Note: All switches are shown in the "off" position.

\*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

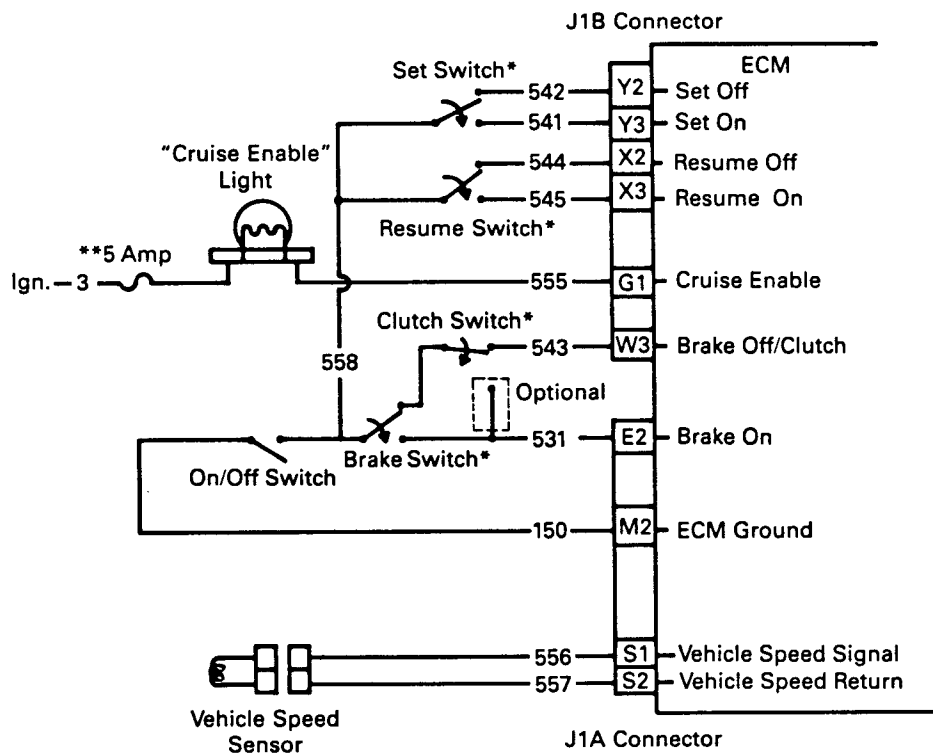
E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-13 Check for Open at the Brake Off/Clutch Ckt.</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A and J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold brake pedal to the floor.</li> <li>. Read resistance between socket E2 on the J1A harness connector and M1 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————&gt;</p> <p>Greater than 5 ohms. —————&gt;</p>	<p>Go to 58-27.</p> <p>Either the Brake switch or the Brake On wire (ckt #531) is open. Repair open or replace switch. Then go to 58-30.</p>
<p>58-14 Check for Bad Contact or Short at Clutch Ckt.</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold clutch pedal to the floor.</li> <li>. Read resistance between sockets M1 and W3 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms. —————&gt;</p> <p>Greater than 10,00 ohms or open. —————&gt;</p>	<p>Check if bad mechanical contact between the clutch switch and the clutch. If okay, then either the Clutch switch is shorted or a short to ground exists in the Brake Off/Clutch wire (ckt #543). Repair bad contact or short, or replace switch. Then go to 58-30.</p> <p>Go to 58-27.</p>



ECM J1B Harness Connector  
P/N 12034400

### Cruise Control Circuits

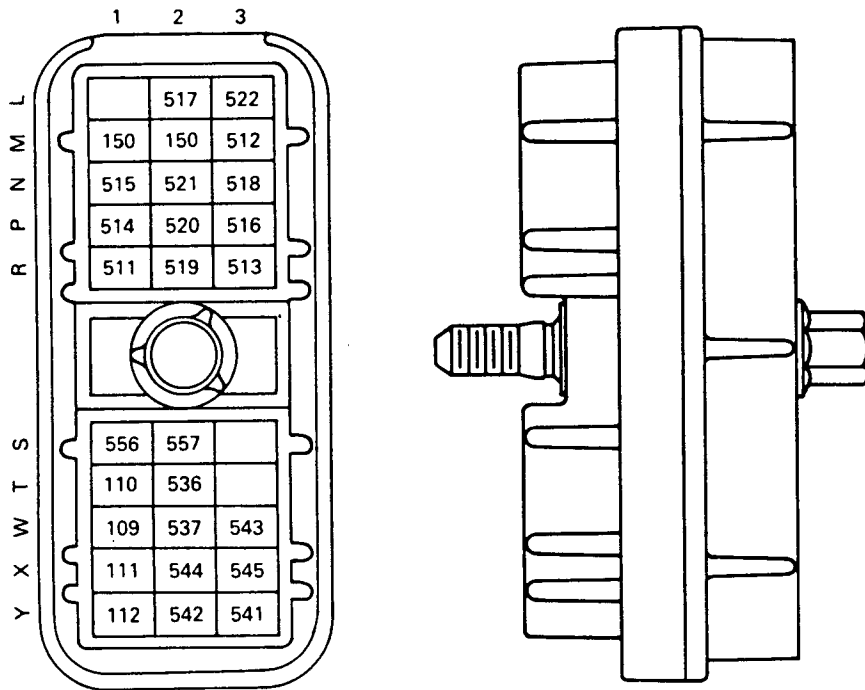


\*Note: All switches are shown in the "off" position.  
\*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

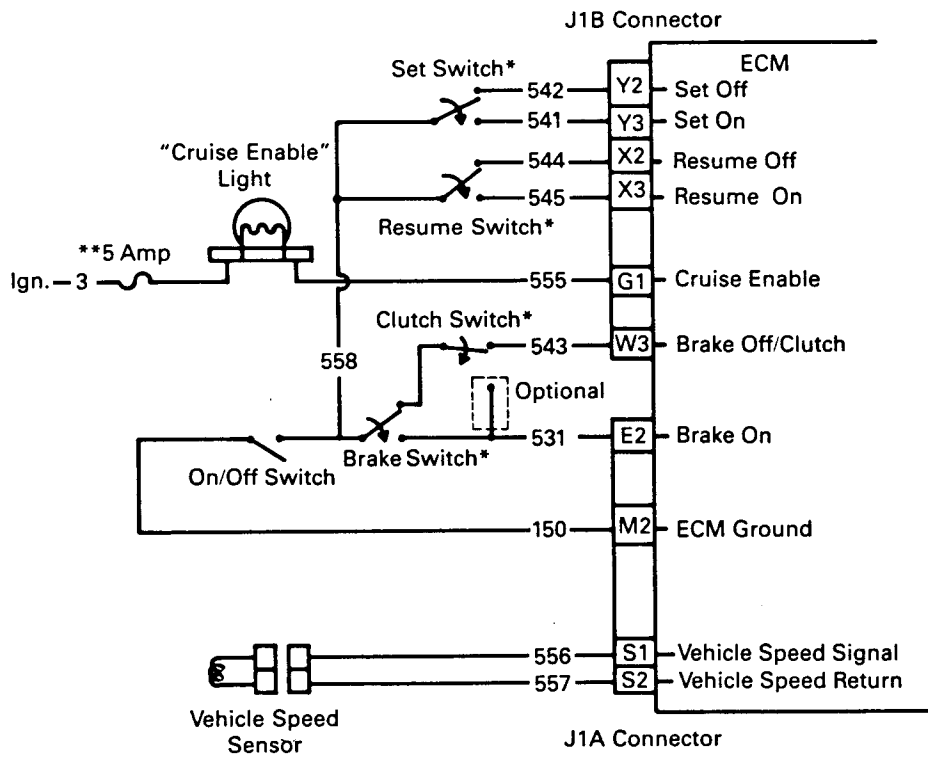
E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><b>58-15 Check for Shorted or Miswired Resume Switch</b></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between sockets M1 and X3 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Resume switch is shorted or miswired. Rewire or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p><b>58-16 Check for Short at the Resume On Circuit</b></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between sockets M1 and X3 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,000 ohms or open.</p>	<p>→ Either the Resume switch is shorted or a short to ground exists in the Resume On wire (ckt #545). Repair short or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>



ECM J1B Harness Connector  
P/N 12034400

Cruise Control Circuits



\*Note: All switches are shown in the "off" position.

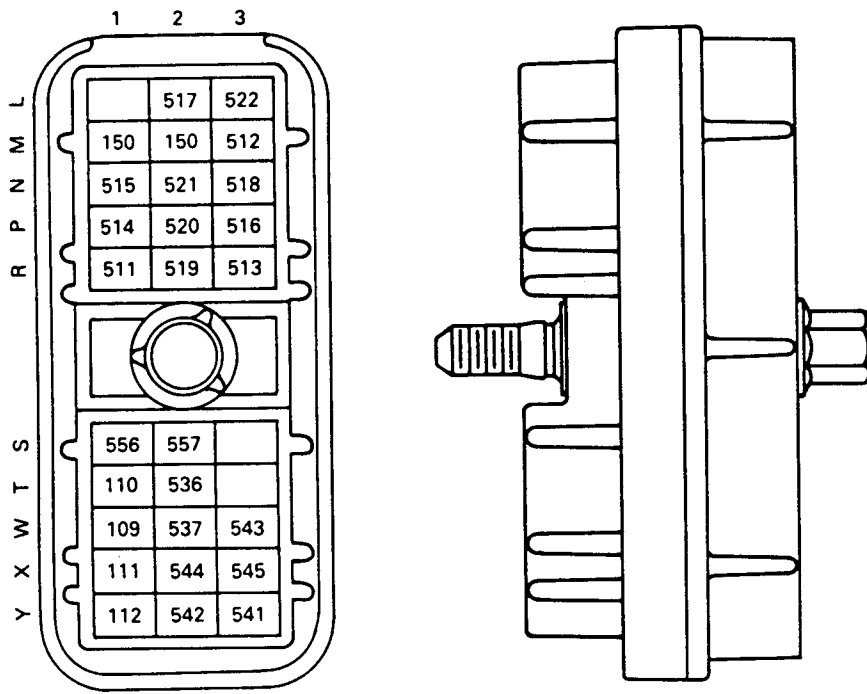
\*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

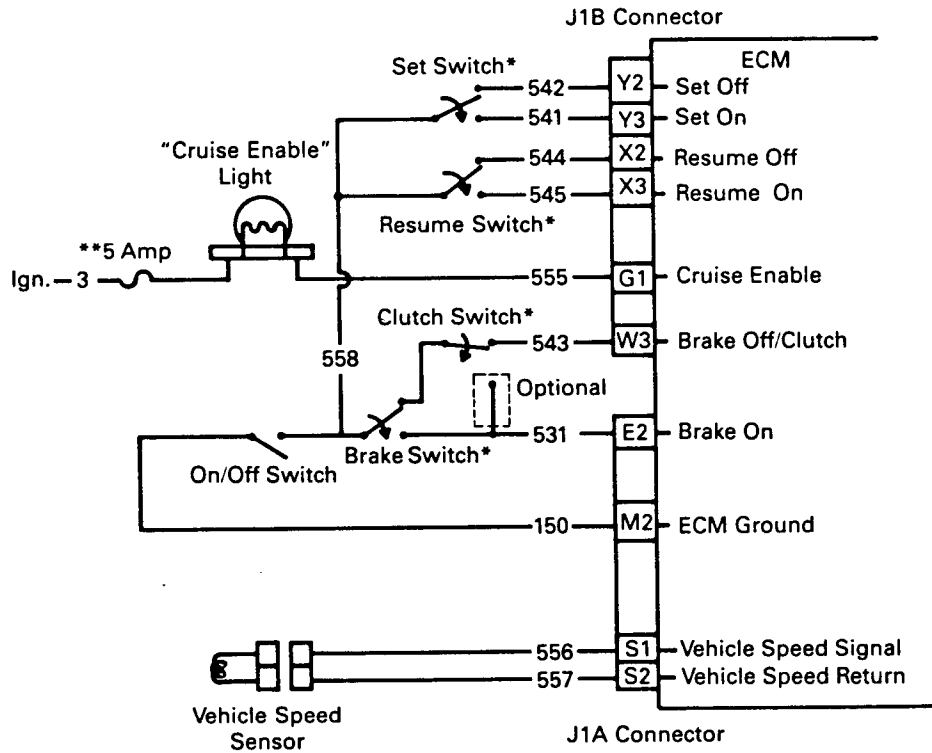
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-17 Check for Open at the Resume Off Circuit</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between sockets M1 and X2 on the J1B harness connector.</li> </ul>	<p>Greater than 5 ohms or open.</p> <p>Less than or equal to 5 ohms.</p>	<p>→ Either the Resume switch is open or an open exists in the Resume Off wire (ckt #544). Repair open or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p>58-18 Check for Shorted or Miswired Set Switch</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Read resistance between sockets M1 and Y3 on the J1B harness connector.</li> </ul>	<p>Less than or equal to 10,000 ohms.</p> <p>Greater than 10,00 ohms or open.</p>	<p>→ Set switch is shorted or miswired. Rewire or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>





ECM J1B Harness Connector  
P/N 12034400

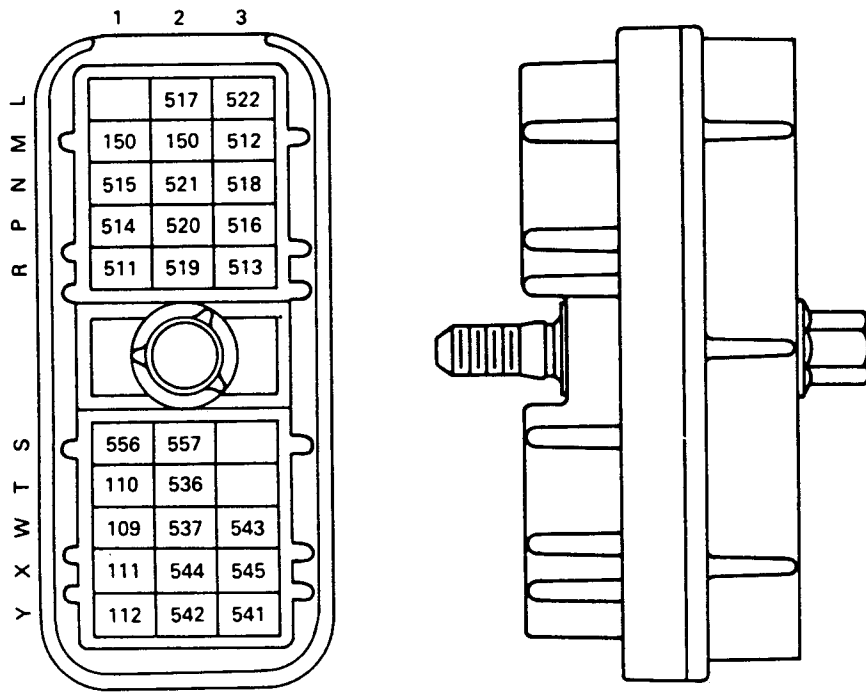
Cruise Control Circuits



\*Note: All switches are shown in the "off" position.

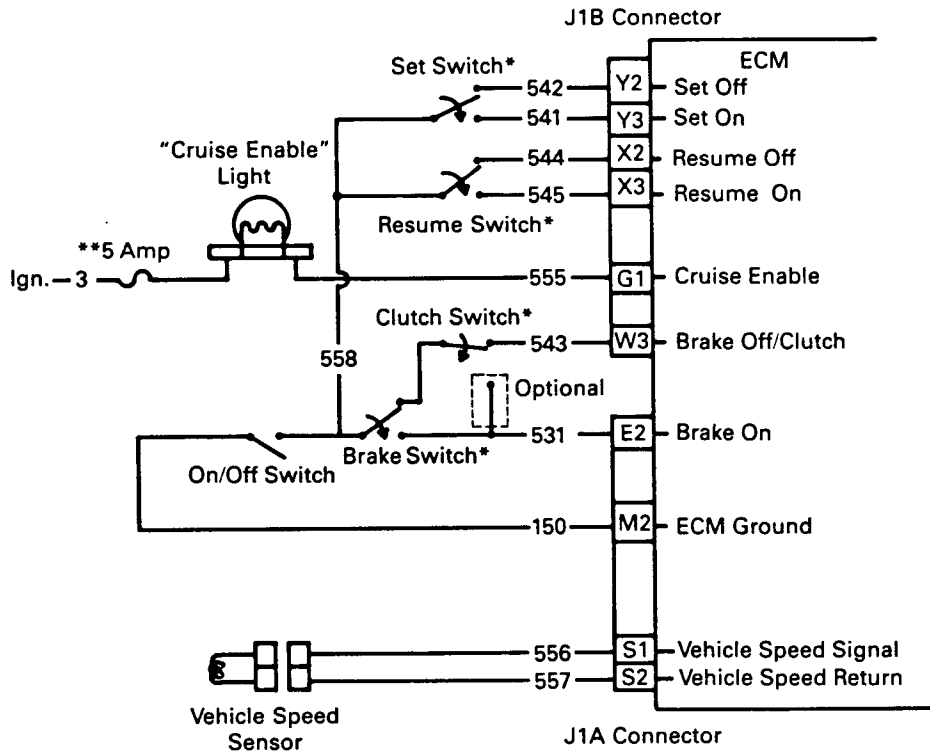
\*\*Note: (Some applications may have circuit breakers instead of fuses).





ECM J1B Harness Connector  
P/N 12034400

Cruise Control Circuits

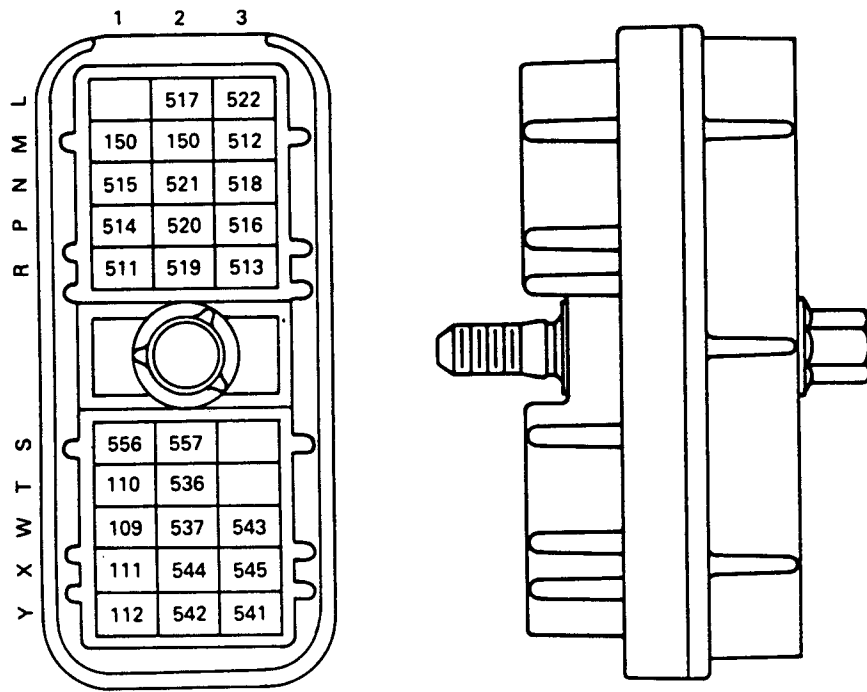


\*Note: All switches are shown in the "off" position.  
\*\*Note: (Some applications may have circuit breakers instead of fuses).

SECTION 4  
TROUBLESHOOTING CHARTS

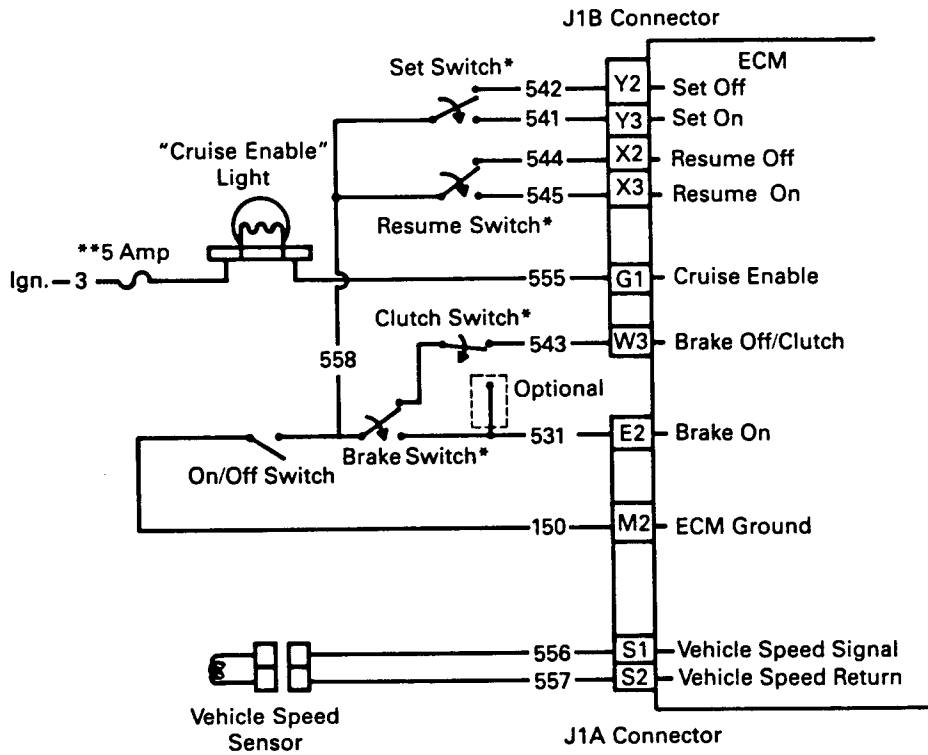
E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-21 Check for Bad Contact or Miswired Resume Switch</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold the Resume switch.</li> <li>. Read resistance between sockets M1 and X3 on the J1B harness connector.</li> </ul>	<p>Greater than _____ 5 ohms or open.</p> <p>Less than or _____ equal to 5 ohms.</p>	<p>→ Resume switch is not making contact or miswired. Rewire or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>
<p>58-22 Check for Short at the Resume Off Circuit</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1B connector at the ECM.</li> <li>. Turn on the Cruise On/Off switch.</li> <li>. Press and hold the Resume switch.</li> <li>. Read resistance between sockets M1 and X2 on the J1B harness connector.</li> </ul>	<p>Less than or _____ equal to 10,000 ohms.</p> <p>Greater than _____ 10,000 ohms or open.</p>	<p>→ Either the Resume switch is shorted or a short to ground exists in the Resume Off wire (ckt #544). Repair short or replace switch as appropriate. Then go to 58-30.</p> <p>→ Go to 58-27.</p>



ECM J1B Harness Connector  
P/N 12034400

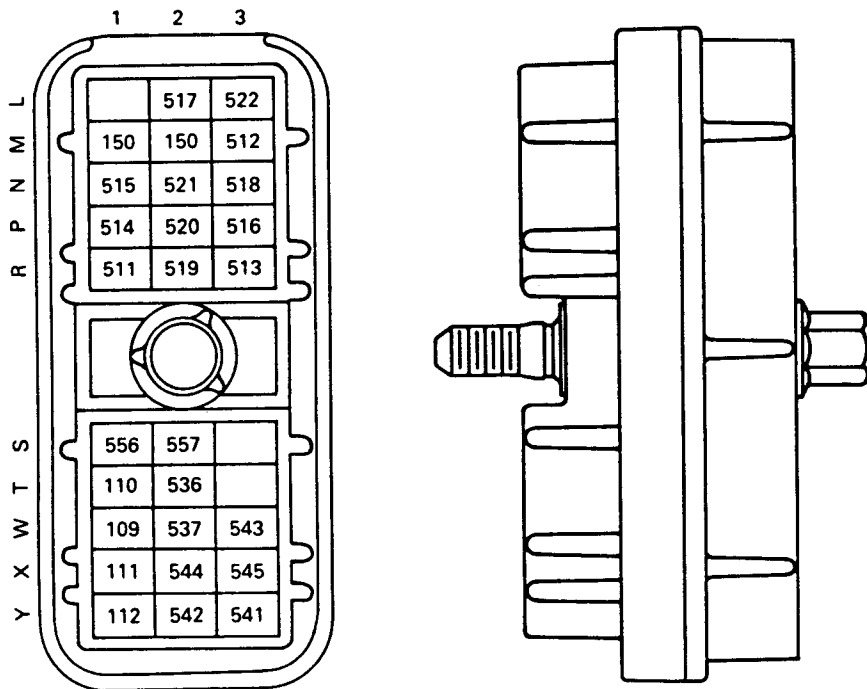
Cruise Control Circuits



\*Note: All switches are shown in the "off" position.

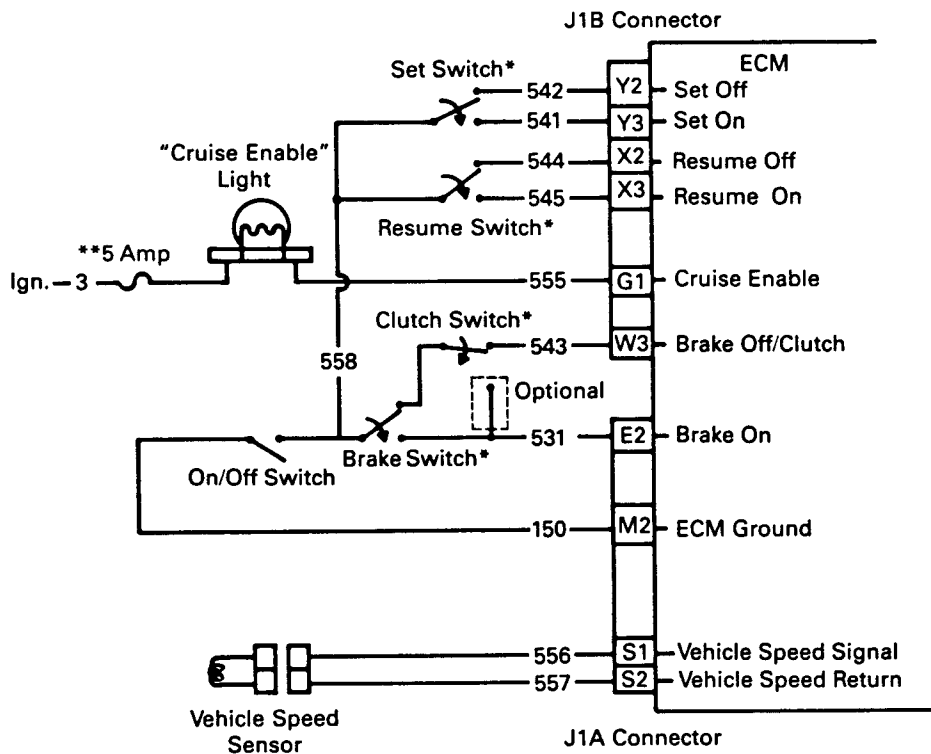
\*\*Note: (Some applications may have circuit breakers instead of fuses).





ECM J1B Harness Connector  
P/N 12034400

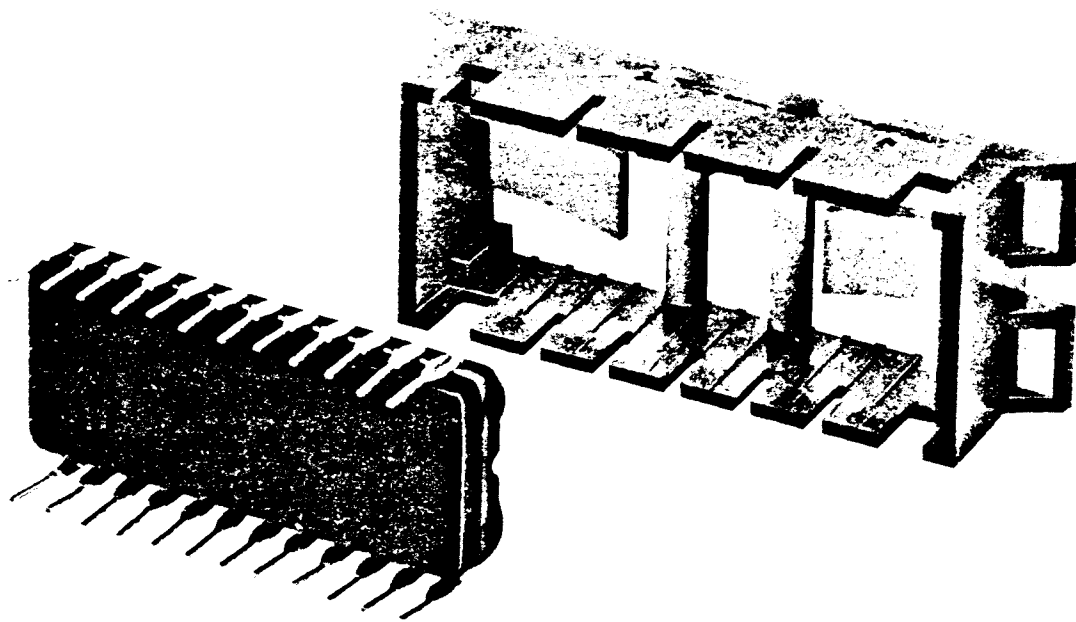
### Cruise Control Circuits



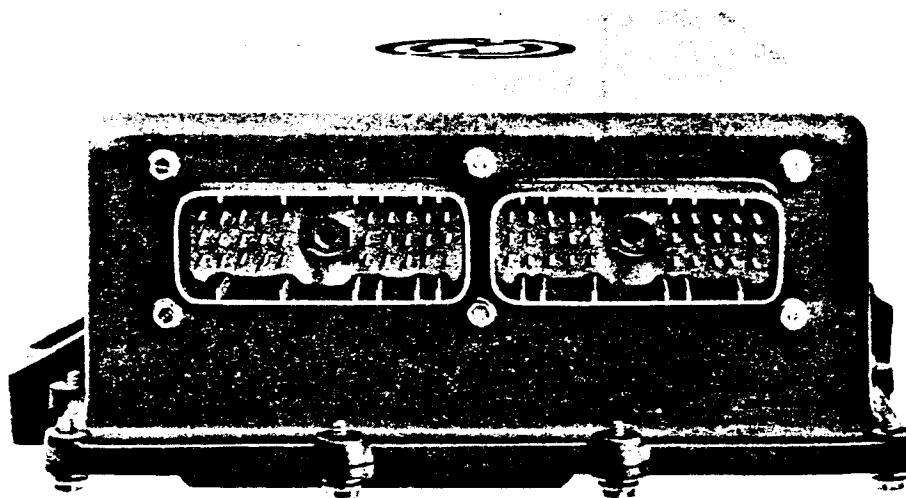
\*Note: All switches are shown in the "off" position.  
\*\*Note: (Some applications may have circuit breakers instead of fuses).







Calibration PROM



Electronic Control Module (ECM)

SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

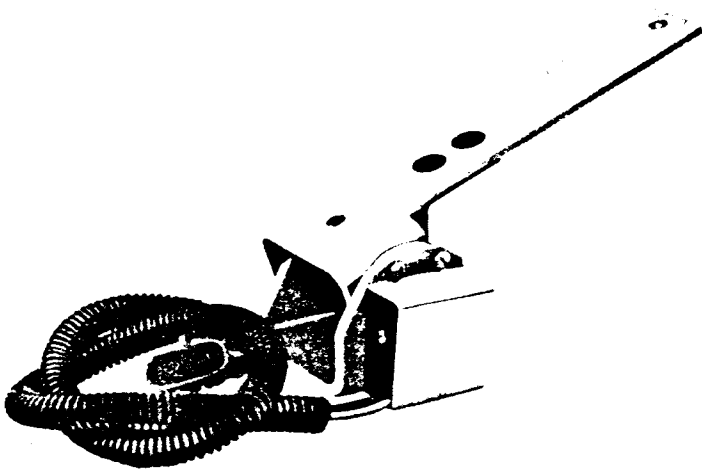
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-27 Check ECM Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Check terminals at all four connectors at the ECM (J1A and J1B, both the harness side and the ECM side) for corrosion, damaged or unseated pins or sockets, or bad contacts.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Go to 58-28.</p> <p>→ Repair terminals/connectors. Then go to 58-30.</p>
<p>58-28 PROM Damage Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Remove calibration PROM per instructions in Section 3-C.</li> <li>. Check for damaged pins.</li> <li>. Also check for proper PROM calibration (see Appendix for details).</li> </ul>	<p>Appears to be okay and PROM number is correct. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace ECM. Then go to 58-30.</p> <p>→ Repair or replace PROM per instructions in Section 3-C. Then go to 58-30.</p>



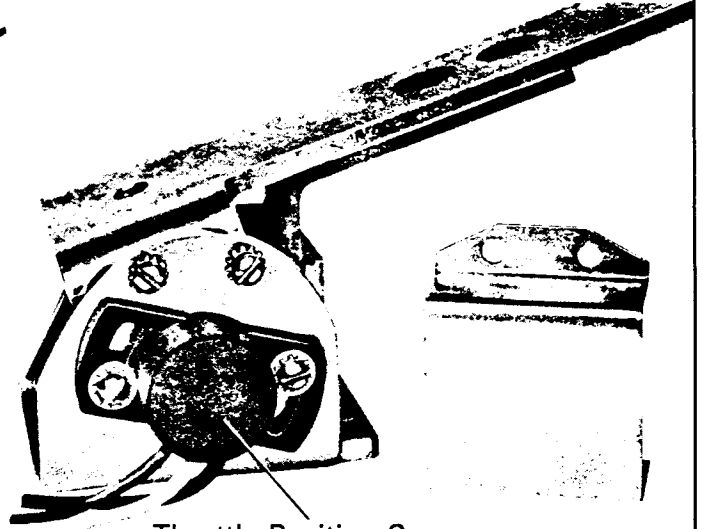
SECTION 4  
TROUBLESHOOTING CHARTS

E. CODE 58 - CRUISE CONTROL SWITCH FAILURE (Cont'd.)

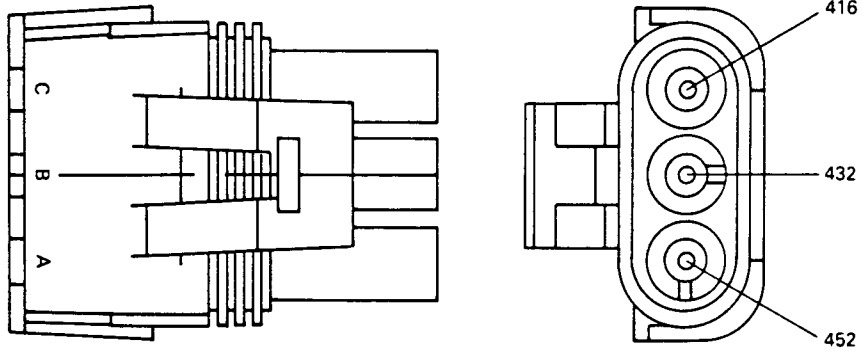
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>58-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Turn ignition on.</li> <li>. Note status of "Check Engine" light.</li> <li>. If "Check Engine" light does not stay on, start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Stop engine.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Code 58 (and any other codes).</p> <p>Any other codes except Code 58.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



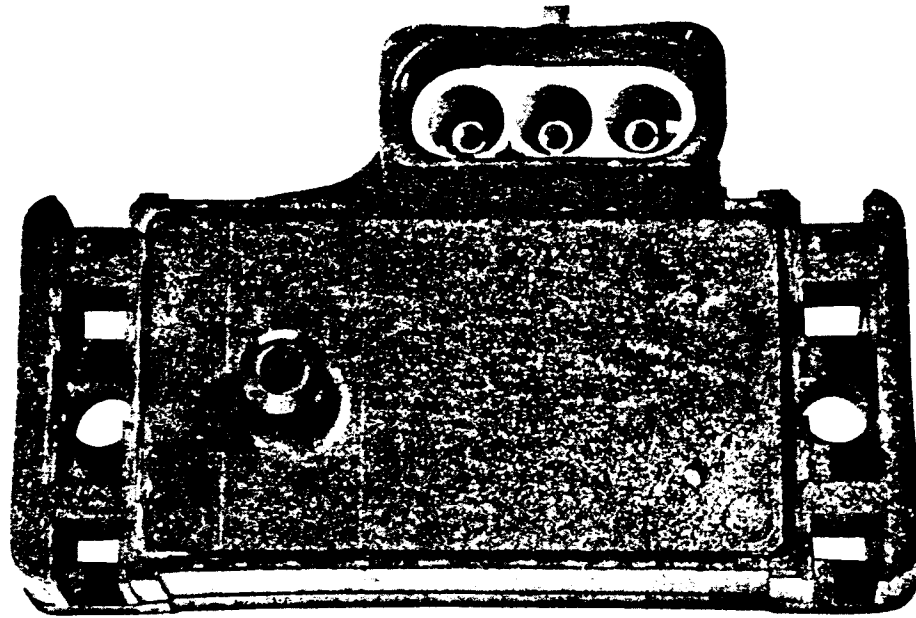
Electronic Foot Pedal Assembly



Throttle Position Sensor



Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332

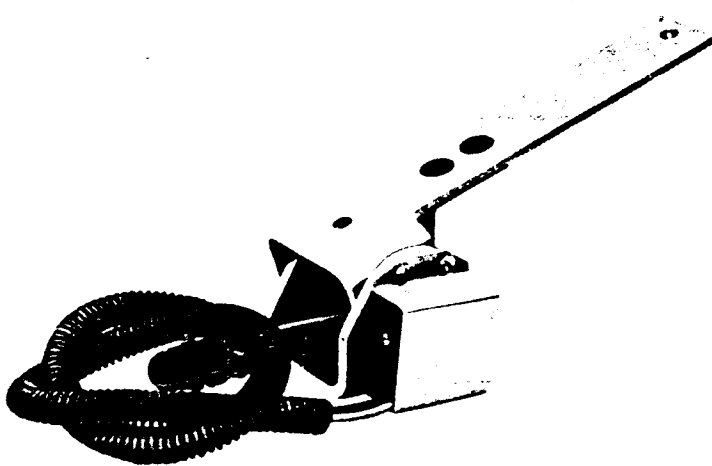


Turbo Boost Pressure Sensor (TBS)

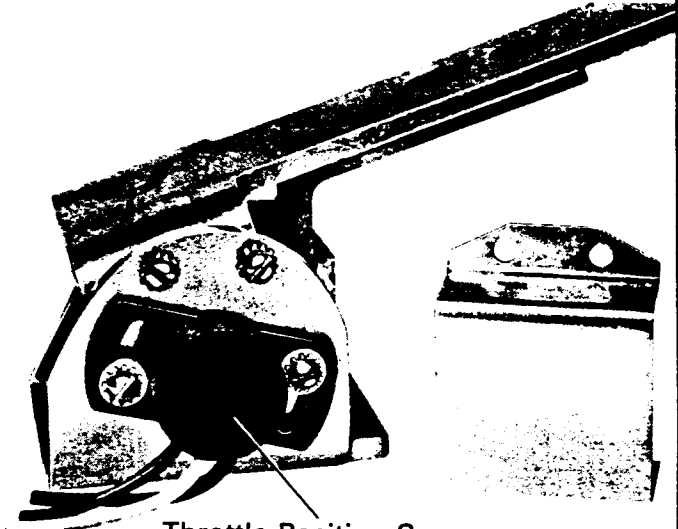
SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VM - MAIN +5 VOLT SUPPLY

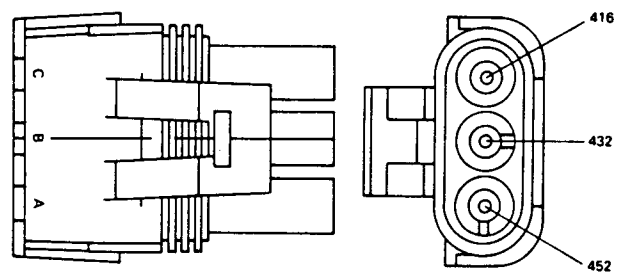
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VM-1 Check for Low Battery Voltage</p> <p>. Was there also a Code 46?</p>	<p>Yes. —————→</p> <p>No. —————→</p>	<p>→ Go to 46-1.</p> <p>→ Go to 5VM-2.</p>
<p>5VM-2 Check for +5 Volts</p> <p>. Turn ignition off.</p> <p>. Disconnect the Turbo Boost Pressure Sensor (TBS).</p> <p>. Turn ignition on.</p> <p>. Read voltage on the TBS harness connector, pin C (red lead) to pin A (black lead).</p>	<p>Less than 4.8 volts. —————→</p> <p>Greater than 5.4 volts. —————→</p> <p>Between 4.8 and 5.4 volts. —————→</p>	<p>→ Go to 5VM-5.</p> <p>→ Go to 5VM-10.</p> <p>→ Go to 5VM-3.</p>
<p>5VM-3 Turbo Boost Pressure Sensor (TBS) Check</p> <p>. Turn ignition off.</p> <p>. Reconnect the Turbo Boost Pressure Sensor (TBS).</p> <p>. Disconnect the Throttle Position Sensor (TPS).</p> <p>. Turn ignition on.</p> <p>. Read voltage on the TPS harness connector, socket C (red lead) to socket A (black lead).</p>	<p>Less than 4.8 volts or greater than 5.4 volts. —————→</p> <p>Between 4.8 and 5.4 volts. —————→</p>	<p>→ Go to 5VM-4.</p> <p>→ Go to 5VM-9.</p>
<p>5VM-4 Check TBS Connectors</p> <p>. Inspect terminals at the TBS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</p>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace TBS. Then go to 5VM-30.</p> <p>→ Repair terminals/connectors. Then go to 5VM-30.</p>



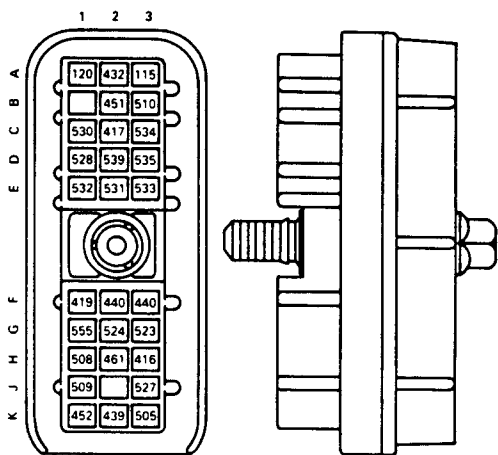
Electronic Foot Pedal Assembly



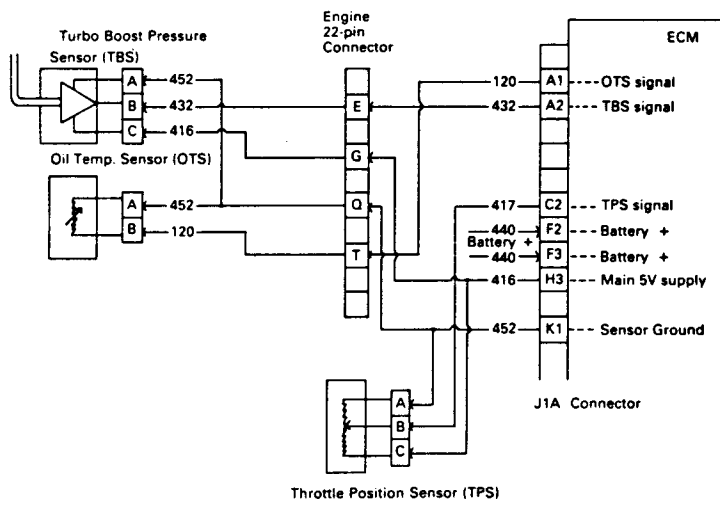
Throttle Position Sensor



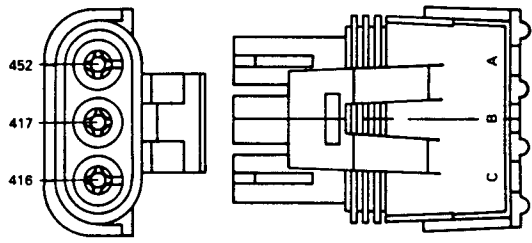
Throttle Position Sensor Harness Connector  
P/N 12015793



ECM J1A Harness Connector  
P/N 12034398



Turbo Boost Pressure, Oil Temperature, and Throttle Position Sensor Circuits



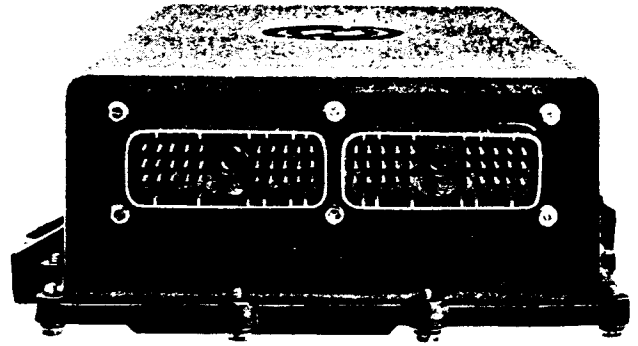
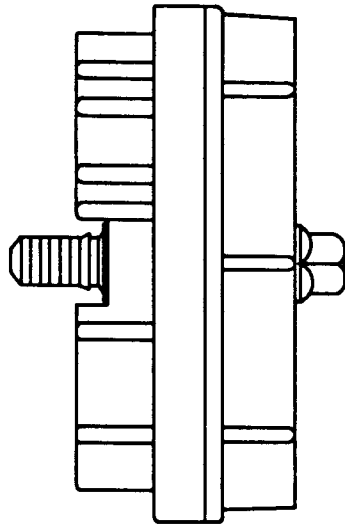
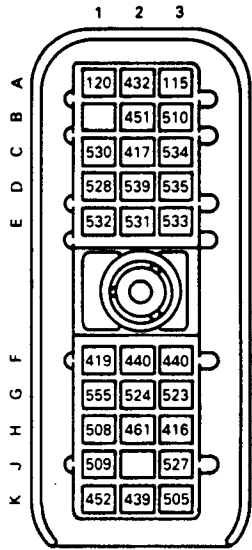
Throttle Position Sensor Harness Connector  
P/N 12015793

SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VM - MAIN +5 VOLT SUPPLY (Cont'd.)

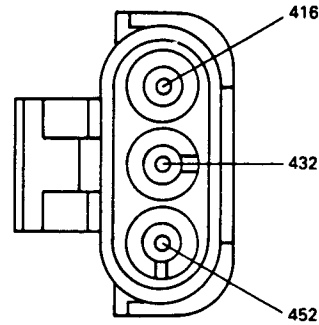
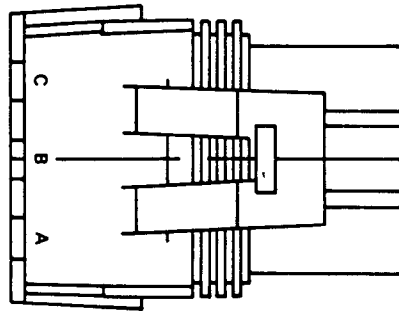
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>5VM-5 Throttle Position Sensor (TPS) Check</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the TPS.</li> <li>. Turn ignition on.</li> <li>. Read voltage on the TPS harness connector, pin C (red lead) to pin A (black lead).</li> </ul>	<p>Less than 4.8 volts or greater than 5.4 volts.</p> <p>Between 4.8 and 5.4 volts.</p>	<p>→ Go to 5VM-7.</p> <p>→ Go to 5VM-6.</p>
<p><u>5VM-6 Check TPS Connectors</u></p> <ul style="list-style-type: none"> <li>. Inspect terminals at the TPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace TPS. Then go to 5VM-30.</p> <p>→ Repair terminals/connectors. Then go to 5VM-30.</p>
<p><u>5VM-7 Check for +5 Volt Open</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Install a jumper wire between pins A and C of the TBS harness connector.</li> <li>. Read resistance between sockets H3 and K1 of the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms.</p> <p>Greater than 5 ohms.</p>	<p>→ Go to 5VM-8.</p> <p>→ The +5 Volt line (ckt #416) or ground line (ckt #452) is open. Repair open. Then go to 5VM-30.</p>



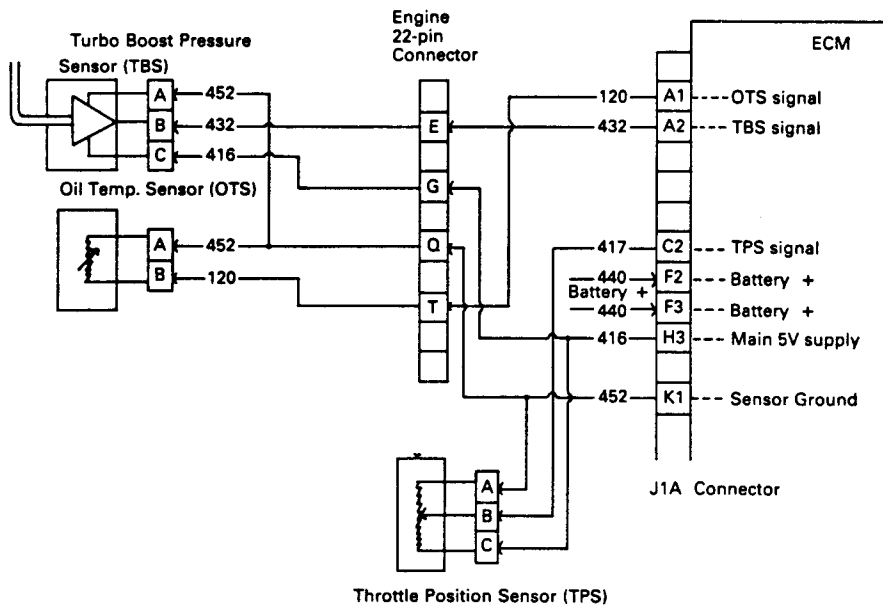


Electronic Control Module (ECM)

ECM J1A Harness Connector  
P/N 12034398



Turbo Boost Pressure Sensor Harness Connector  
P/N 12041332



Turbo Boost Pressure, Oil Temperature, and Throttle  
Position Sensor Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VM - MAIN +5 VOLT SUPPLY (Cont'd.)

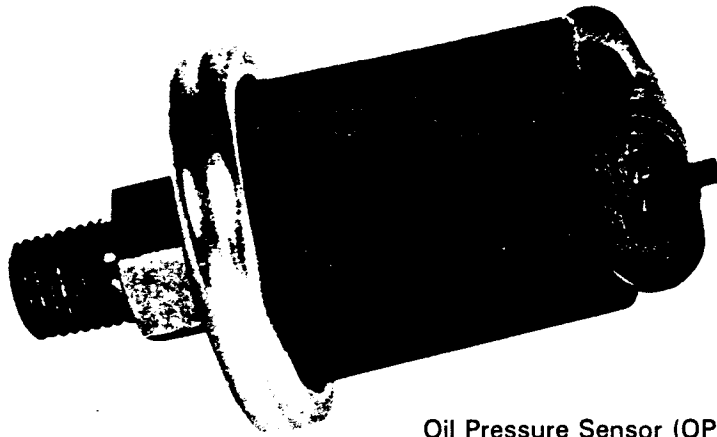
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p><u>5VM-8 Check for Short to Ground</u></p> <ul style="list-style-type: none"> <li>. Remove jumper wire.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Read resistance between pins A and C of the TBS harness connector.</li> <li>. Also read resistance between pin C of the TBS harness connector and a good ground.</li> </ul>	<p>Both readings are greater than 10,000 ohms or open.</p> <p>Either reading is less than or equal to 10,000 ohms.</p>	<p>→ Go to 5VM-9.</p> <p>→ The +5 Volt line (ckt #416) is shorted to either sensor ground (ckt #452) or the chassis ground. Repair short. Then go to 5VM-30.</p>
<p><u>5VM-9 Check ECM Connectors</u></p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 5VM-30.</p> <p>→ Repair terminals/connectors. Then go to 5VM-30.</p>
<p><u>5VM-10 Check for Short to Battery +</u></p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Read voltage on the TBS harness connector, socket C (red lead) to socket A (black lead).</li> </ul>	<p>Less than or equal to 0.5 volts.</p> <p>Greater than 0.5 volts.</p>	<p>→ Go to 5VM-30.</p> <p>→ The +5 Volt line (ckt #416) is shorted to battery + or battery + line (ckt #440). Repair short. Then go to 5VM-30.</p>



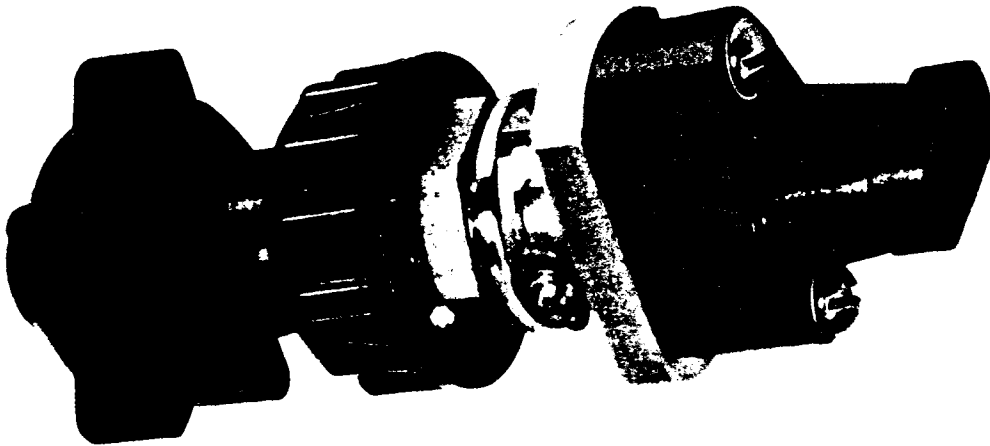
SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VM - MAIN +5 VOLT SUPPLY (Cont'd.)

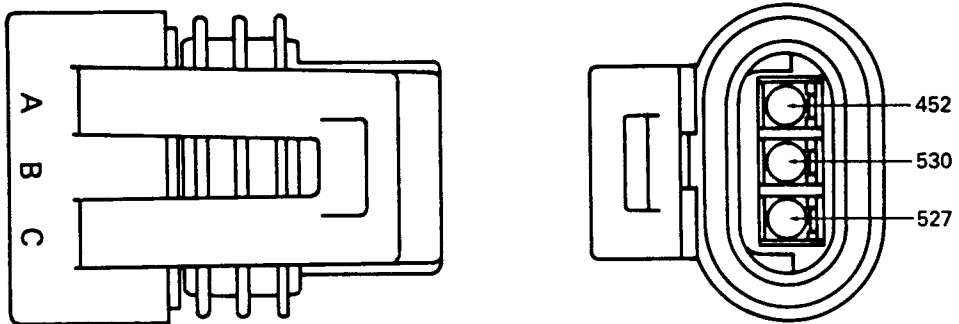
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VM-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes).</p> <p>Codes which brought you to Chart 5VM are still there.</p> <p>Any codes except those which brought you to Chart 5VM.</p>	<p>→ Repairs are complete.</p> <p>→ All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>→ Go to DCC-1 to service other codes.</p>



Oil Pressure Sensor (OPS)



Power Take-Off Speed Adjust Sensor  
(PTOSA)

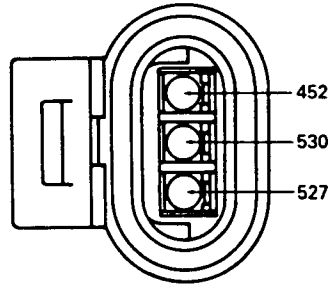
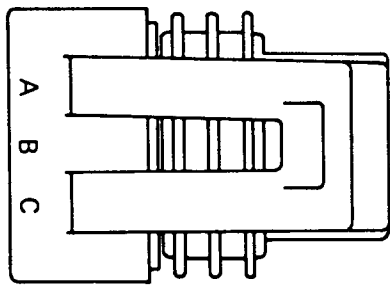


Oil Pressure Sensor Harness Connector  
P/N 12047909

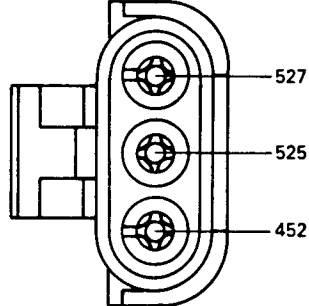
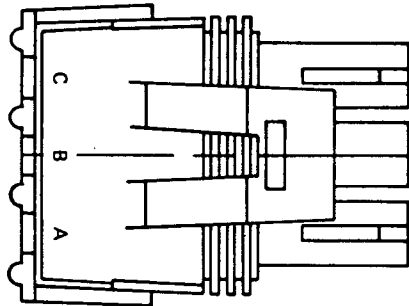
SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VR - AUXILIARY +5 VOLT SUPPLY

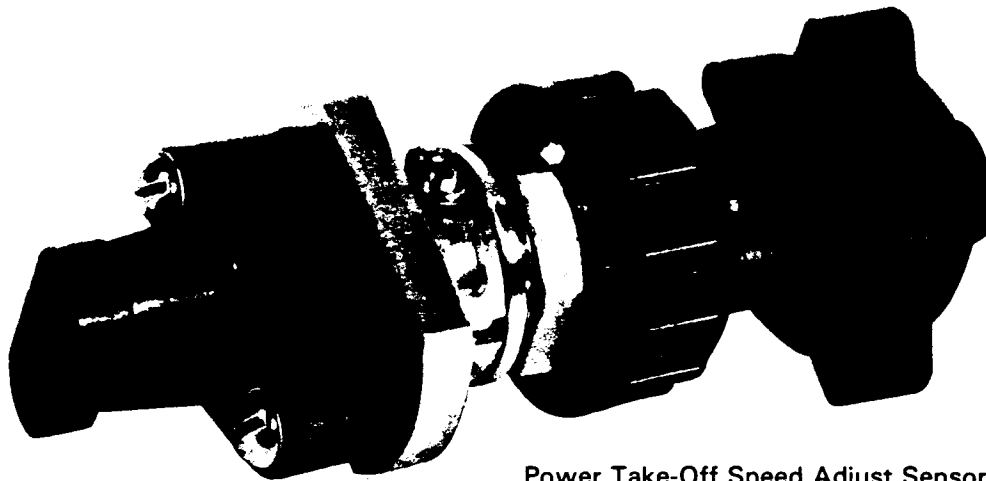
STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VR-1 Check for Low Battery Voltage</p> <hr/> <p>. Was there also a Code 46?</p>	<p>Yes. _____</p> <p>No. _____</p>	<p>→ Go to 46-1.</p> <p>→ Go to 5VR-2.</p>
<p>5VR-2 Check for +5 Volts</p> <hr/> <p>. Turn ignition off.</p> <p>. Disconnect the Oil Pressure Sensor (OPS).</p> <p>. Turn ignition on.</p> <p>. Read voltage on the OPS harness connector, socket C (red lead) to socket A (black lead).</p>	<p>Less than 4.8 _____ volts.</p> <p>Greater than 5.4 _____ volts.</p> <p>Between 4.8 and 5.4 _____ volts.</p>	<p>→ Go to 5VR-6.</p> <p>→ Go to 5VR-11.</p> <p>→ Go to 5VR-3.</p>
<p>5VR-3 Check if There is a PTOSA Sensor</p> <hr/> <p>. Does the engine have a Power Takeoff Speed Adjust (PTOSA) Sensor?</p>	<p>No. _____</p> <p>Yes. _____</p>	<p>→ Go to 5VM-1.</p> <p>→ Go to 5VR-4.</p>



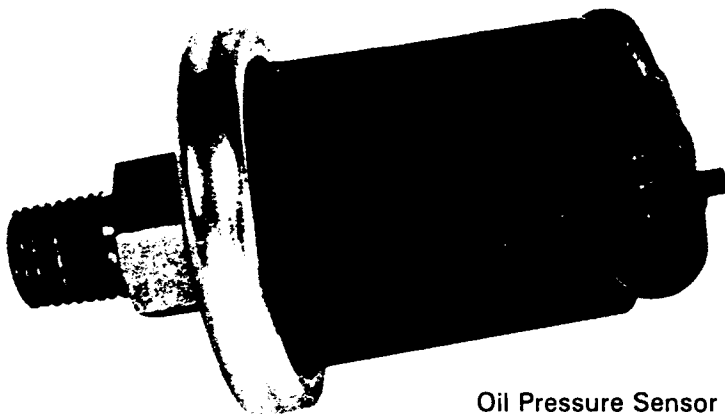
Oil Pressure Sensor Harness Connector  
P/N 12047909



Throttle Position Sensor Harness Connector  
P/N 12015793



Power Take-Off Speed Adjust Sensor  
(PTOSA)



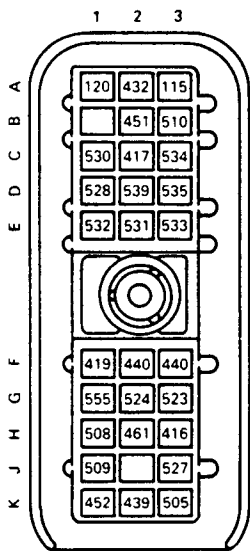
Oil Pressure Sensor (OPS)

SECTION 4  
TROUBLESHOOTING CHARTS

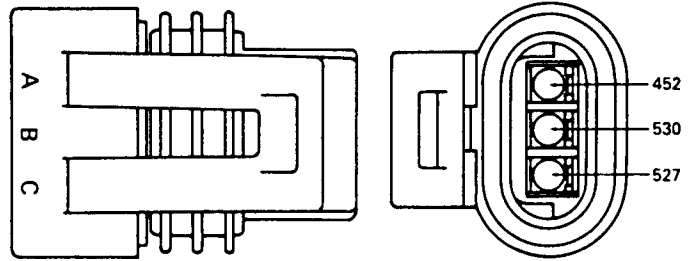
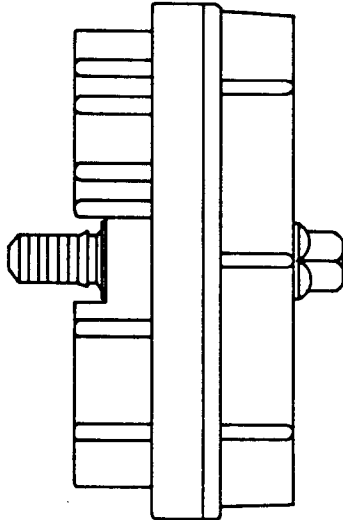
E. 5VR - AUXILIARY +5 VOLT SUPPLY (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VR-4 Oil Pressure Sensor (OPS) Check - Using the PTOSA Sensor</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect the Oil Pressure Sensor (OPS).</li> <li>. Disconnect the PTOSA Sensor.</li> <li>. Turn ignition on.</li> <li>. Read voltage on the PTOSA Sensor harness connector, socket C (red lead) to socket A (black lead).</li> </ul>	<p>Less than 4.8 volts or greater than 5.4 volts. —————→</p> <p>Between 4.8 and 5.4 volts. —————→</p>	<p>→ Go to 5VR-5.</p> <p>→ Go to 5VM-1.</p>
<p>5VR-5 Check OPS Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the OPS connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>→ Replace OPS. Then go to 5VR-30.</p> <p>→ Repair terminals/ connectors. Then go to 5VR-30.</p>
<p>5VR-6 Check if There is a PTOSA Sensor</p> <hr/> <ul style="list-style-type: none"> <li>. Does the engine have a Power Take-Off Speed Adjust (PTOSA) Sensor?</li> </ul>	<p>Yes. —————→</p> <p>No. —————→</p>	<p>→ Go to 5VR-7.</p> <p>→ Go to 5VR-9.</p>

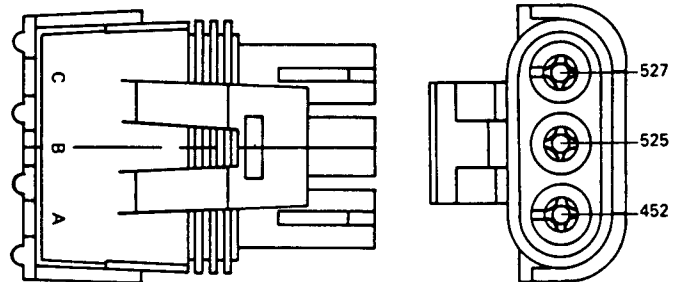




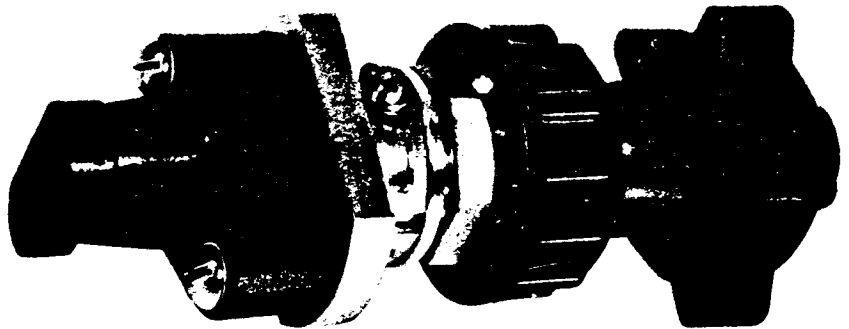
ECM J1A Harness Connector  
P/N 12034398



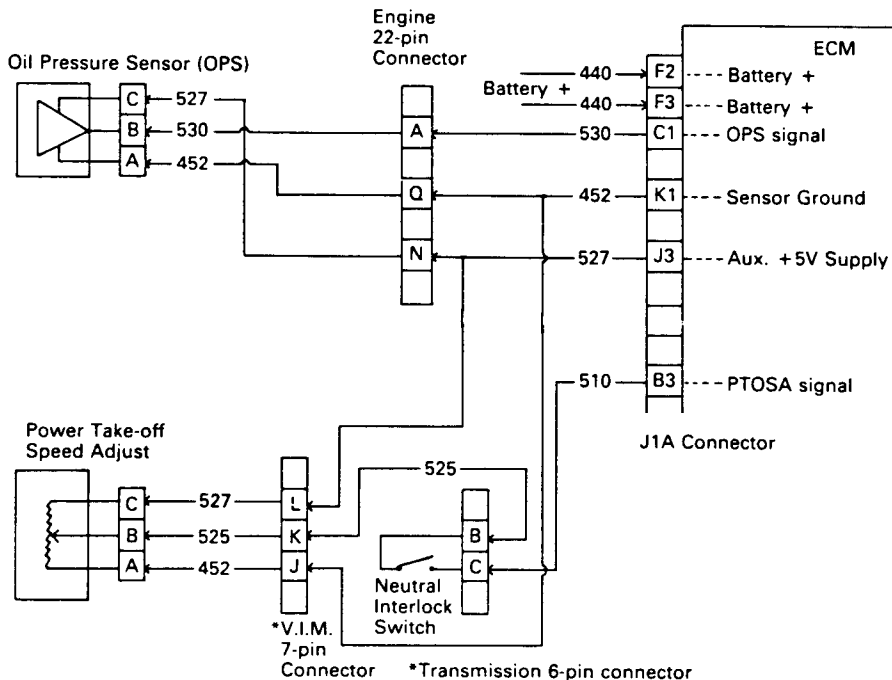
Oil Pressure Sensor Harness Connector  
P/N 12047909



Throttle Position Sensor Harness Connector  
P/N 12015793



Power Take-Off Speed Adjust Sensor  
(PTOSA)



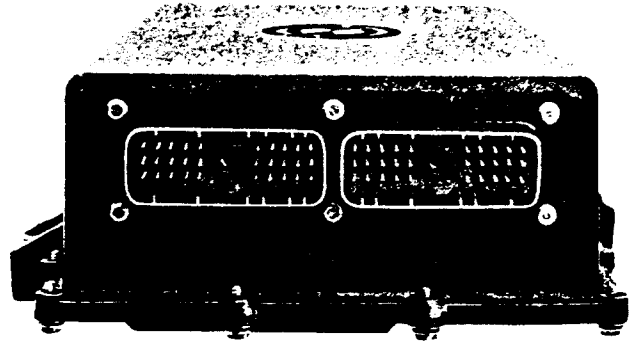
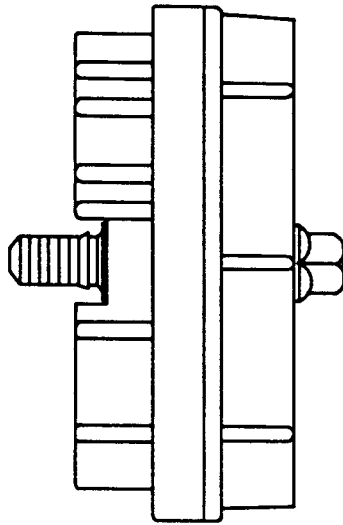
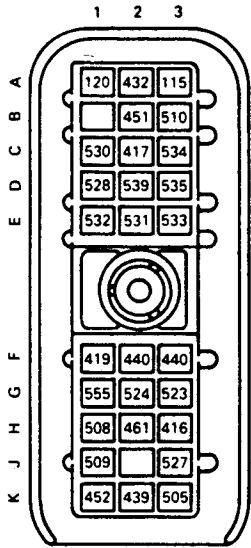
(\*Note: The Trans 6 pin and VIM 7 Pin connectors are optional. Other connectors may be substituted. See Vehicle Service Manual for your particular hook-up.)

Oil Pressure and Power Take-Off Speed Adjust Sensor Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

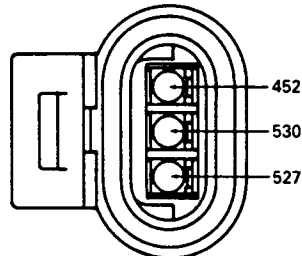
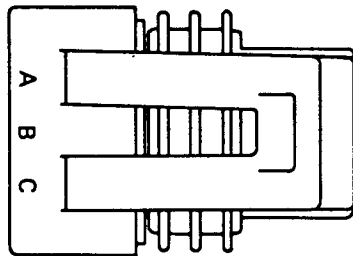
E. 5VR - AUXILIARY +5 VOLT SUPPLY (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VR-7 PTOSA Sensor Check</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the PTOSA Sensor connector.</li> <li>. Turn ignition on.</li> <li>. Read voltage on the PTOSA Sensor harness connector, pin C (red lead) to pin A (black lead).</li> </ul>	<p>Less than 4.8 volts. —————→</p> <p>Between 4.8 and 5.4 volts. —————→</p>	<p>Go to 5VR-9.</p> <p>Go to 5VR-8.</p>
<p>5VR-8 Check PTOSA Sensor Connectors</p> <hr/> <ul style="list-style-type: none"> <li>. Inspect terminals at the PTOSA Sensor connectors (sensor side and harness side) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay. —————→</p> <p>Problem found. —————→</p>	<p>Replace PTOSA. Then go to 5VR-30.</p> <p>Repair terminals/connectors. Then go to 5VR-30.</p>
<p>5VR-9 Check for +5 Volt Open</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Install a jumper wire between sockets A and C of the OPS harness connector.</li> <li>. Read resistance between sockets C1 and K1 of the J1A harness connector.</li> </ul>	<p>Less than or equal to 5 ohms. —————→</p> <p>Greater than 5 ohms. —————→</p>	<p>Go to 5VR-10.</p> <p>The +5 Volt line (ckt #527) is open. Repair open. Then go to 5VR-30.</p>

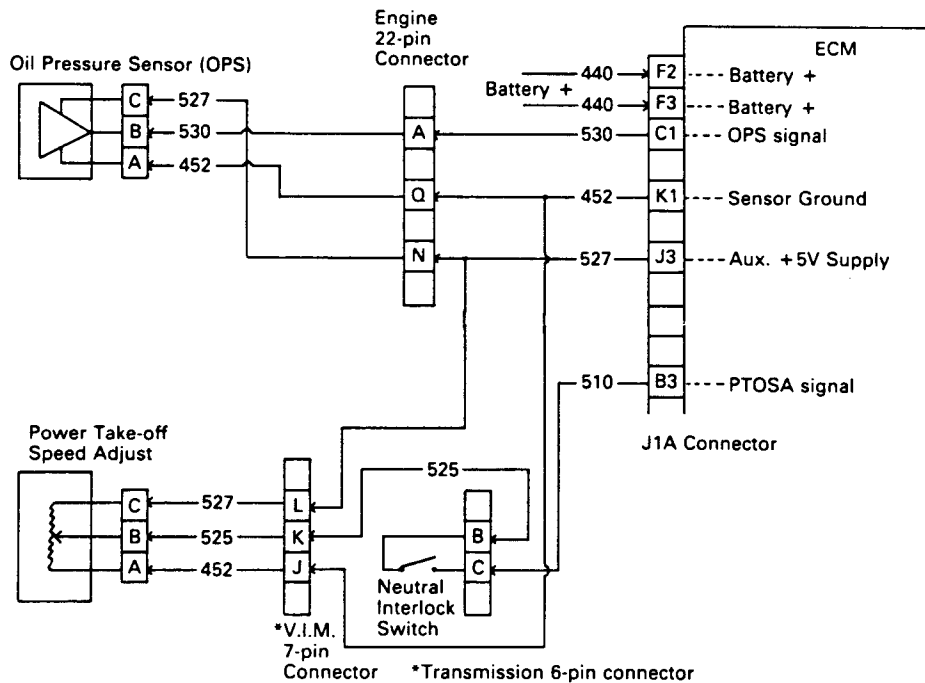


Electronic Control Module (ECM)

ECM J1A Harness Connector  
P/N 12034398



Oil Pressure Sensor Harness Connector  
P/N 12047909



(\*Note: The Trans 6 pin and VIM 7 Pin connectors are optional. Other connectors may be substituted. See Vehicle Service Manual for your particular hook-up.)

Oil Pressure and Power Take-Off Speed Adjust Sensor Circuits

SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VR - AUXILIARY +5 VOLT SUPPLY (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VR-10 Check for Short to Ground</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Disconnect the J1A connector at the ECM.</li> <li>. Read resistance between sockets C and A of the OPS harness connector.</li> <li>. Also read resistance between socket C of the OPS harness connector and a good ground.</li> </ul>	<p>Both readings are greater than 10,000 ohms or open.</p> <p>Either reading is less than or equal to 10,000 ohms.</p>	<p>→ Go to 5VM-1.</p> <p>→ The +5 Volt line (ckt #527) is shorted to either the sensor ground (ckt #452) or to chassis ground. Repair short. Then go to 5VR-30.</p>
<p>5VR-11 Check for Short to Battery +</p> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Read voltage on the OPS harness connector, socket C (red lead) to socket A (black lead).</li> </ul>	<p>Less than or equal to 0.5 volts.</p> <p>Greater than 0.5 volts.</p>	<p>→ Go to 5VR-12.</p> <p>→ The +5 Volt line (ckt #527) is shorted to battery + or battery + line (ckt #440). Repair short. Then go to 5VR-30.</p>
<p>5VR-12 Check ECM Connectors</p> <ul style="list-style-type: none"> <li>. Check terminals at the ECM connector (J1A) for damage, corrosion, and unseated pins or sockets.</li> </ul>	<p>Terminals and connectors are okay.</p> <p>Problem found.</p>	<p>→ Replace ECM. Then go to 5VR-30.</p> <p>→ Repair terminals/connectors. Then go to 5VR-30.</p>



SECTION 4  
TROUBLESHOOTING CHARTS

E. 5VR - AUXILIARY +5 VOLT SUPPLY (Cont'd.)

STEP/SEQUENCE	RESULT	WHAT TO DO NEXT
<p>5VR-30 Verify Repairs</p> <hr/> <ul style="list-style-type: none"> <li>. Turn ignition off.</li> <li>. Reconnect all connectors.</li> <li>. Clear codes.</li> <li>. Start engine and run until "Check Engine" light comes on or for 1 minute.</li> <li>. Read codes.</li> </ul>	<p>DDL Reader reads "NONE" (no codes). →</p> <p>Codes which brought you to Chart 5VR are still there. →</p> <p>Any codes except those which brought you to Chart 5VR. →</p>	<p>Repairs are complete.</p> <p>All system diagnostics are complete. Please review this section from the first step to find the error.</p> <p>Go to DCC-1 to service other codes.</p>

## APPENDIX

### PROM IDENTIFICATION

Using the DDL Reader, select PROM ID position. It will display six different sets of information. The meaning of this information is as follows:

Display	What it Means
1-XXXXXX	This six digit display is the manufacturer's identification.
2-XXXX	EPA certification number.
3-XXX	Customer specified horsepower setting.
4-XXXX	Speed and Droop information.

No Load

DDL Display 4-3022

Multiply these two digits by 10 and add to 1500 to obtain PROM No Load RPM. In this case,  $10 \times 30 = 300$ .  $300 + 1500 = 1800$  RPM - NL.

Idle

DDL Display 4-3022

Multiply this digit by 25 and add to 500 to obtain idle RPM. In this case,  $2 \times 25 = 50$ .  $50 + 500 = 550$  RPM Idle.

Droop

DDL Display 4-3022

Multiply this digit by 25 to obtain speed droop. In this case,  $2 \times 25 = 50$ . Droop is 50 RPM.

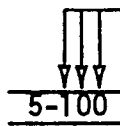
APPENDIX - (Cont'd.)

PROM IDENTIFICATION

Display	What it Means
---------	---------------

5-XXX Road Speed Limit

DDL Display



Multiply this number by 2 and add to 1600 to obtain PROM road speed. In this case,  $2 \times 100 = 200 + 1600 = 1800$ . The road speed is 1800 RPM.

XXXXXXXX Option Identification

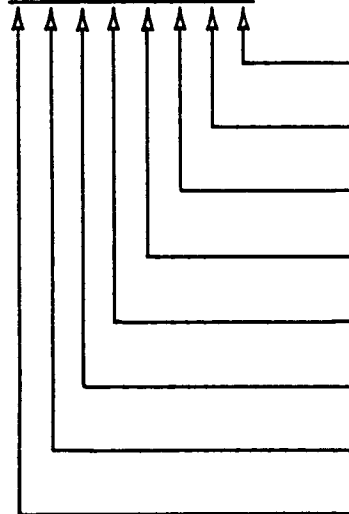
This display will contain only ones (1) and/or zeroes (0).

0, means option is not present.

1, means option is present.

Typical DDL Display

1 0 1 1 0 0 0 1



0 = Stop Engine Warning; 1 = Shutdown.

Two-speed Governor.

Bus Door Interlock.

Five Minute Idle Shutdown.

Vehicle Speed Sensor (VSS).

Road Speed Governor.

Cruise Control.

Transmission Engine Communication Link (TECL).



## ALPHABETICAL INDEX

<u>Circuit Number</u>	<u>Description</u>
<u>VEHICLE INTERFACE</u>	
527	AUXILIARY SENSOR - POWER
2	BATTERY - POSITIVE
419	CHECK ENGINE LIGHT - DRIVE
555	CRUISE ACTIVE LIGHT - DRIVE
558	CRUISE CONTROL - SWITCHED
544	CRUISE RESUME - OFF
545	CRUISE RESUME - ON
542	CRUISE SET - OFF
541	CRUISE SET - ON
461	DIAGNOSTIC DATA LINK
451	DIAGNOSTIC REQUEST - SIGNAL
536	DISCRETE ACTUATOR DRIVE
150	ECM GROUND
440	ECM POWER - FUSED
505	ELECTRONIC TACH - DRIVE
508	ENGINE BRAKE - DRIVE
539	ENGINE SELECT #0
537	ENGINE SELECT #1
532	ENGINE TO TRANS DATA LINK - LOW
533	ENGINE TO TRANS DATA LINK - HIGH
523	HIGH GEAR SWITCH
3	IGNITION FUSED
439	IGNITION SWITCHED
416	MAIN SENSOR - POWER
525	NEUTRAL INTERLOCK SWITCH
524	POWER CONTROL SWITCH
510	POWER TAKE-OFF SPEED CONTROL - SIGNAL
452	SENSOR GROUND
509	STOP ENGINE LIGHT - DRIVE
528	STOP ENGINE OVERRIDE SWITCH
417	THROTTLE POSITION SENSOR - SIGNAL
535	TRANS TO ENGINE DATA LINK - HIGH
534	TRANS TO ENGINE DATA LINK - LOW
543	VEHICLE BRAKE/CLUTCH SWITCH
531	VEHICLE BRAKE SWITCH
557	VEHICLE SPEED SENSOR - RETURN
556	VEHICLE SPEED SENSOR - SIGNAL

## ALPHABETICAL INDEX

Circuit  
Number

Description

### ELECTRONIC DISTRIBUTOR UNIT-INPUT CONNECTOR

511	INJ. A, COMMAND - DRIVE
512	INJ. B, COMMAND - DRIVE
513	INJ. C, COMMAND - DRIVE
514	INJ. D, COMMAND - DRIVE
515	INJ. E, COMMAND - DRIVE
516	INJ. F, COMMAND - DRIVE
517	INJ. G, COMMAND - DRIVE
518	INJ. H, COMMAND - DRIVE
519	INJ. COMMAND - DRIVE RETURN
522	MODE CONTROL - DRIVE
521	RESPONSE TIME FEEDBACK RETURN
520	RESPONSE TIME FEEDBACK - SIGNAL

### ELECTRONIC DISTRIBUTOR UNIT-OUTPUT CONNECTOR

151	BATTERY - NEGATIVE
240	EDU BANK A FUSED POWER
241	EDU BANK B FUSED POWER
611	INJ. A, POWER - DRIVE
612	INJ. B, POWER - DRIVE
613	INJ. C, POWER - DRIVE
614	INJ. D, POWER - DRIVE
615	INJ. E, POWER - DRIVE
616	INJ. F, POWER - DRIVE
617	INJ. G, POWER - DRIVE
618	INJ. H, POWER - DRIVE
619	INJ. A-C-E-G - RETURN
620	INJ. B-D-F-H - RETURN

### SENSOR INTERFACE - ENGINE

527	AUXILIARY SENSOR - POWER
115	COOLANT LEVEL SENSOR - SIGNAL
416	MAIN SENSOR - POWER
530	OIL PRESSURE SENSOR - SIGNAL
120	OIL TEMPERATURE SENSOR - SIGNAL
452	SENSOR GROUND
112	SYNC REFERENCE SENSOR RETURN
111	SYNC REFERENCE SENSOR SIGNAL
109	TIMING REFERENCE SENSOR - RETURN
110	TIMING REFERENCE SENSOR - SIGNAL
432	TURBO BOOST PRESSURE SENSOR - SIGNAL

NUMERICAL INDEX

Circuit Number	Description	From	To	To	To
2	BATTERY - POSITIVE	SK-9634, F7	G17, H17, J17		
3	IGNITION FUSED	SK-9568, I38	H38		
109	TIMING REFERENCE SENSOR - RETURN	SK-9568, G16	SK-9635, C21	SK-9633, D18	I32 or I23
110	TIMING REFERENCE SENSOR - SIGNAL	SK-9568, G16	SK-9635, C21	SK-9633, D18	I32 or I23
111	SYNC REFERENCE SENSOR SIGNAL	SK-9568, G16	SK-9635, C21	SK-9633, D18	G32 or G23
112	SYNC REFERENCE SENSOR RETURN	SK-9568, G16	SK-9635, C21	SK-9633, D18	G32 or G23
115	COOLANT LEVEL SENSOR - SIGNAL	SK-9568, G18	SK-9635, C21	C28	
120	OIL TEMPERATURE SENSOR - SIGNAL	SK-9568, G18	SK-9635, C21	SK-9633, D18	G40
150	ECM GROUND	SK-9635, H20	SK-9568, C59, E51, E82, G16, G47 and G70		
		and SK-9635, H20	SK-9635, C21	SK-9633, C18	
		and SK-9635, H20	SK-9635, C29		
151	BATTERY - NEGATIVE	SK-9634, C7 and D7	C23	SK-9570, H39 (6V92 LH) SK-9569, H39 (6V92 RH) SK-9572, G20 (Series 60) SK-9571, H39 (6I71) SK-9632, H43 (8V92)	
240	EDU BANK A FUSED POWER	SK-9634, H15	C23	SK-9570, H39 (6V92 LH) SK-9569, H39 (6V92 RH) SK-9572, G20 (Series 60) SK-9571, H39 (6I71) SK-9632, H43 (8V92)	

NUMERICAL INDEX

Circuit Number	Description	From	To	To	To	
241	EDU BANK B FUSED POWER	SK-9634, J15	C23	SK-9570, H39 (6V92 LH) SK-9569, H39 (6V92 RH) SK-9572, G20 (Series 60) SK-9571, H39 (6I71) SK-9632, H43 (8V92)		
416	MAIN SENSOR - POWER	SK-9568, G18 and SK-9568, G18	D36 SK-9635, C21	SK-9633, D18	D30	
417	THROTTLE POSITION SENSOR - SIGNAL	SK-9568, G18	D36			
419	CHECK ENGINE LIGHT - DRIVE	SK-9568, G18	D51 and J47			
432	TURBO BOOST PRESSURE SENSOR - SIGNAL	SK-9568, G18	SK-9635, C21	SK-9633, D18	D30	
439	IGNITION SWITCHED	Ignition Sw. and Ignition Sw.	SK-9568, D82, G18 and I37 (maybe D51) SK-9635, C28			
440	ECM POWER - FUSED	SK-9634, G15	F23	SK-9568, B8	G18 (maybe D51)	
451	DIAGNOSTIC REQUEST - SIGNAL	SK-9568, G18	D51			
452	SENSOR GROUND	SK-9568, G18 and SK-9568, G18	D35 and I57 SK-9635, C21	SK-9633, D18	D30, F39, I39	
461	DIAGNOSTIC DATA LINK	SK-9568, G18	D51			
505	ELECTRONIC TACH - DRIVE	SK-9568, G18	I70			
508	ENGINE BRAKE - DRIVE	SK-9568, G18	I70			

NUMERICAL INDEX

Circuit Number	Description	From	To	To	To
509	STOP ENGINE LIGHT - DRIVE	SK-9568, G18	D51 and J47		
510	POWER TAKE-OFF SPEED CONTROL - SIGNAL	SK-9568, G18	D51 and E59		
511	INJ. A, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
512	INJ. B, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
513	INJ. C, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
514	INJ. D, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
515	INJ. E, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
516	INJ. F, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
517	INJ. G, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
518	INJ. H, COMMAND - DRIVE	SK-9568, G16	SK-9635, H20		
519	INJ. COMMAND - DRIVE RETURN	SK-9568, G16	SK-9635, H20		
520	RESPONSE TIME FEEDBACK - SIGNAL	SK-9568, G16	SK-9635, H20		
521	RESPONSE TIME FEEDBACK RETURN	SK-9568, G16	SK-9635, H20		
522	MODE CONTROL - DRIVE	SK-9568, G16	SK-9635, H20		
523	HIGH GEAR SWITCH	SK-9568, G18	C59		
524	POWER CONTROL SWITCH	SK-9568, G18	G70		
525	NEUTRAL INTERLOCK SWITCH	SK-9568, E59	H56		
527	AUXILIARY SENSOR - POWER	SK-9568, G18 and SK-9568, G18	I56 SK-9635, C21	SK-9633, D18	I39

NUMERICAL INDEX

Circuit Number	Description	From	To	To	To
528	STOP ENGINE OVERRIDE SWITCH	SK-9568, G18	H47		
530	OIL PRESSURE SENSOR - SIGNAL	SK-9568, G18	SK-9635, C21	SK-9633, D18	I40
531	VEHICLE BRAKE SWITCH	SK-9568, G18	H82		
532	ENGINE TO TRANS DATA LINK - LOW	SK-9568, G18	ATEC ECM (if applicable)		
533	ENGINE TO TRANS DATA LINK - HIGH	SK-9568, G18	ATEC ECM (if applicable)		
534	TRANS TO ENGINE DATA LINK - LOW	SK-9568, G18	ATEC ECM (if applicable)		
535	TRANS TO ENGINE DATA LINK - HIGH	SK-9568, G18	ATEC ECM (if applicable)		
536	DISCRETE ACTUATOR DRIVE	SK-9568, G16	Currently Unused		
537	ENGINE SELECT #1	SK-9568, G16	SK-9635, C21	SK-9633, D18	
539	ENGINE SELECT #0	SK-9568, G18	SK-9635, C21	SK-9633, D18	
541	CRUISE SET - ON	SK-9568, G16	G82		
542	CRUISE SET - OFF	SK-9568, G16	G82		
543	VEHICLE BRAKE/CLUTCH SWITCH	SK-9568, G16	I81		
544	CRUISE RESUME - OFF	SK-9568, G16	F82		
545	CRUISE RESUME - ON	SK-9568, G16	F82		
555	CRUISE ACTIVE LIGHT -DRIVE	SK-9568, G18	C82 and D51		
556	VEHICLE SPEED SENSOR - SIGNAL	SK-9568, G16	B83		
557	VEHICLE SPEED SENSOR - RETURN	SK-9568, G16	B83		
558	CRUISE CONTROL - SWITCHED	SK-9568, E83	F83, G83, I83		

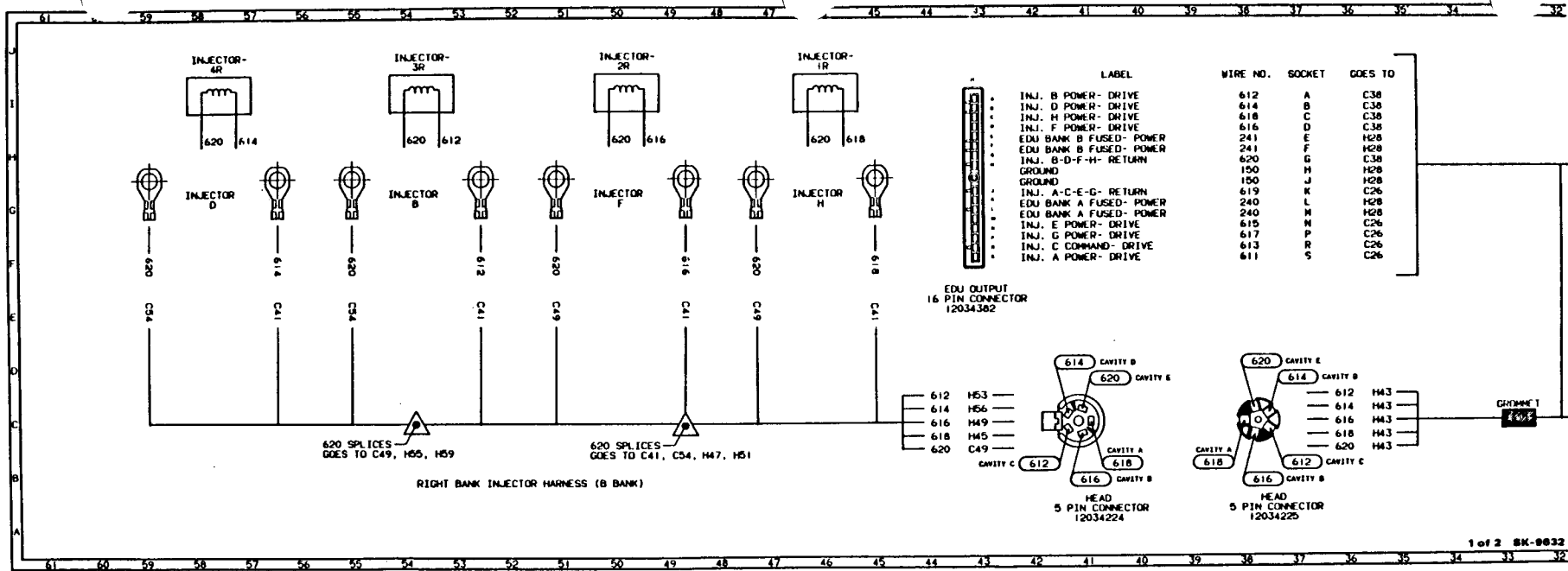
NUMERICAL INDEX

Circuit Number	Description	From	To	To	To
611	INJ. A, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C34		C38	H41
		SK-9569, H39 (6V92 RH) to C22		C19	H13
		SK-9572, G20 (Ser 60) to H42			
		SK-9571, H39 (6I71) to C34		C38	H41
		SK-9632, H43 (8V92) to C26		C23	H17
612	INJ. B, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C22		C19	H10
		SK-9569, H39 (6V92 RH) to C34		C37	H49
		SK-9572, G20 (Ser 60) to H27			
		SK-9571, H39 (6I71) to C23		C19	H10
		SK-9632, H43 (8V92) to C38		C41	H53
613	INJ. C, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C34		C38	H45
		SK-9569, H39 (6V92 RH) to C22		C19	H6
		SK-9572, G20 (Ser 60) to H35			
		SK-9571, H39 (6I71) to C34		C38	H49
		SK-9632, H43 (8V92) to C26		C23	H10
614	INJ. D, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C22		C19	H6
		SK-9569, H39 (6V92 RH) to C34		C37	H45
		SK-9572, G20 (Ser 60) to H23			
		SK-9571, H39 (6I71) to C23		C19	H13
		SK-9632, H43 (8V92) to C38		C41	H56
615	INJ. E, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C34		C38	H49
		SK-9569, H39 (6V92 RH) to C22		C19	H10
		SK-9572, G20 (Ser 60) to H38			
		SK-9571, H39 (6I71) to C34		C38	H45
		SK-9632, H43 (8V92) to C26		C23	H6
616	INJ. F, POWER - DRIVE	SK-9570, H39 (6V92 LH) to C22		C19	H13
		SK-9569, H39 (6V92 RH) to C34		C37	H41
		SK-9572, G20 (Ser 60) to H31			
		SK-9571, H39 (6I71) to C23		C19	H6
		SK-9632, H43 (8V92) to C38		C41	H49

NUMERICAL INDEX

Circuit Number	Description	From	To	To	To	
617	INJ. G, POWER - DRIVE	SK-9632, H43 (8V92) to C26		C23	H13	
618	INJ. H, POWER - DRIVE	SK-9632, H43 (8V92) to C38		C41	H45	
619	INJ. A-C-E-G - RETURN	SK-9570, H39 (6V92 LH) to C34		C38	H43, H47, H51	
		SK-9569, H39 (6V92 RH) to C22		C19		H8, H12, H15
		SK-9572, G20 (Ser 60) to H37, H41, H45				
		SK-9571, H39 (6I71) to C34		C37	H43, H47, H51	
		SK-9632, H43 (8V92) to C26		C23	H8, H12, H15 and H19	
620	INJ. B-D-F-H - RETURN	SK-9570, H39 (6V92 LH) to C22		C19	H8, H12, H16	
		SK-9569, H39 (6V92 RH) to C34		C37		H43, H47, H51
		SK-9572, G20 (Ser 60) to H26, H30, H33				
		SK-9571, H39 (6I71) to C23		C19	H8, H12, H15	
		SK-9632, H43 (8V92) to C38		C37	H47, H51, H55 and H59	



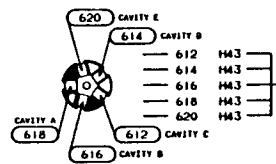
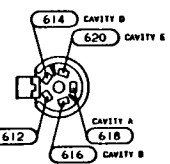


**LABEL**

- INJ. B POWER- DRIVE
- INJ. D POWER- DRIVE
- INJ. H POWER- DRIVE
- INJ. F POWER- DRIVE
- EDU BANK B FUSED- POWER
- EDU BANK B FUSED- POWER
- INJ. B-D-F-H- RETURN
- GROUND
- GROUND
- INJ. A-C-E-G- RETURN
- EDU BANK A FUSED- POWER
- EDU BANK A FUSED- POWER
- INJ. E POWER- DRIVE
- INJ. G POWER- DRIVE
- INJ. C COMMAND- DRIVE
- INJ. A POWER- DRIVE

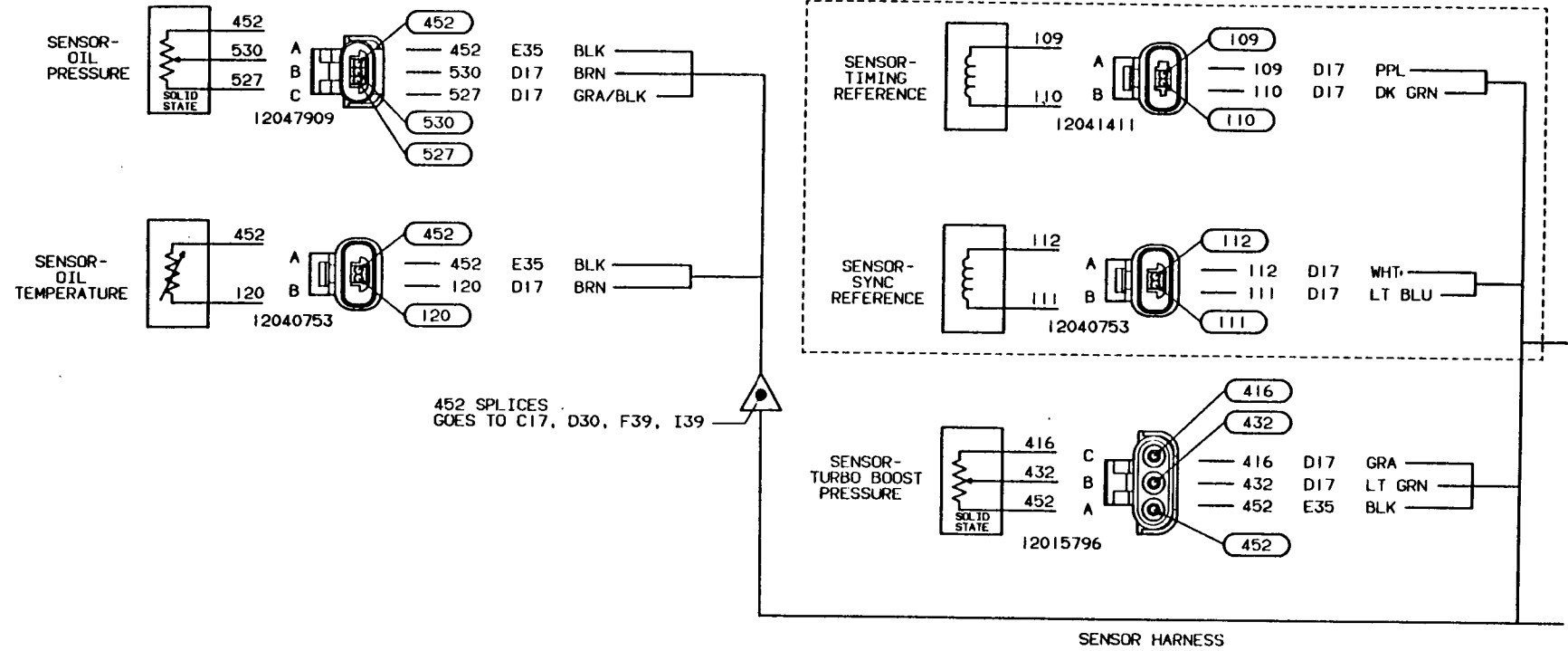
WIRE NO.	SOCKET	GOES TO
612	A	C38
614	B	C38
618	C	C38
616	D	C38
241	E	H28
241	F	H28
620	G	C38
150	H	H28
150	J	H28
619	K	C26
240	L	H28
240	M	H28
615	N	C26
617	P	C26
613	R	C26
611	S	C26

- 612 H53
- 614 H56
- 616 H49
- 618 H45
- 620 C49





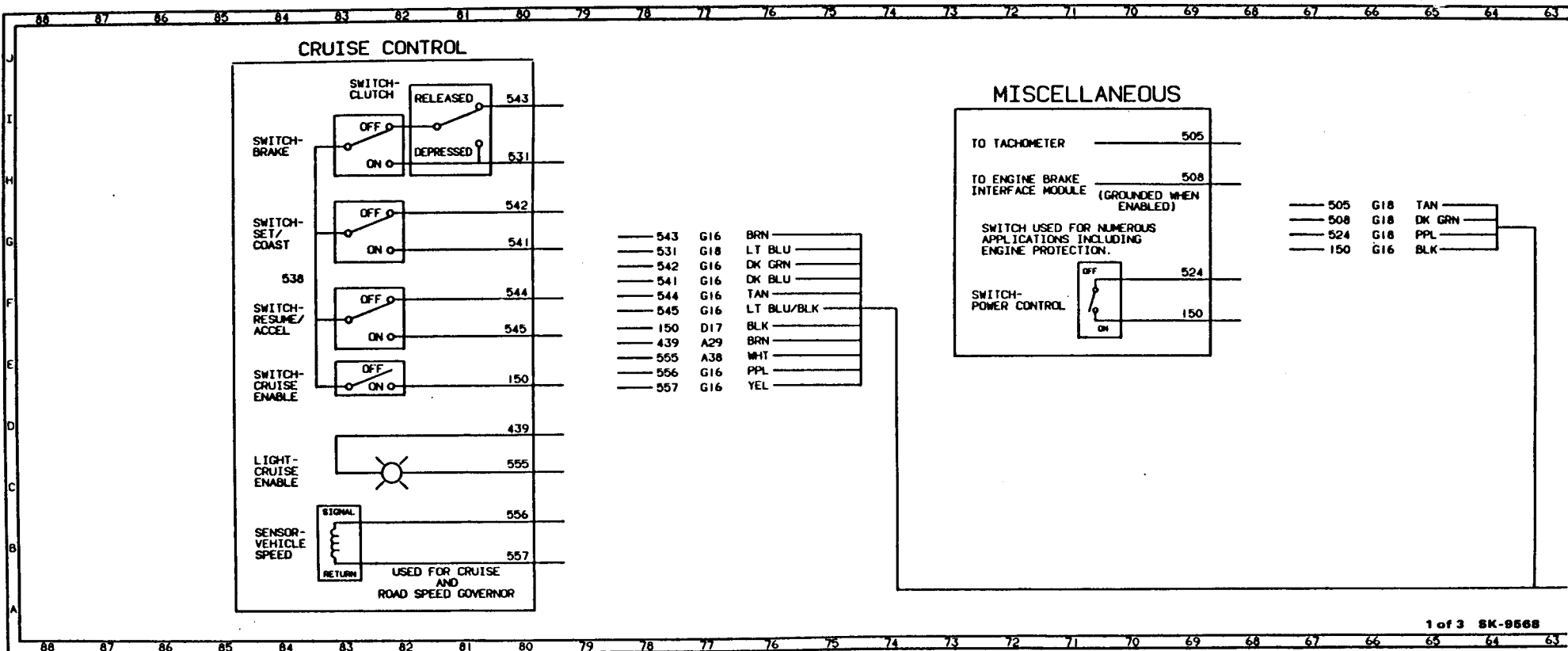
# ENGINE SENSORS

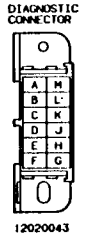
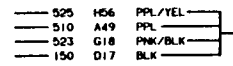
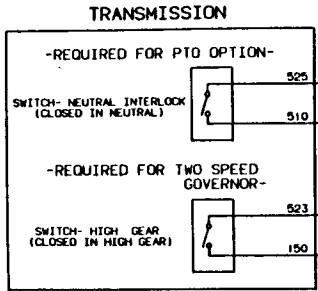
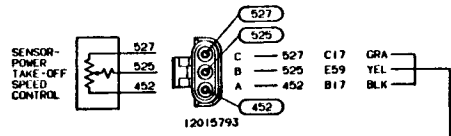






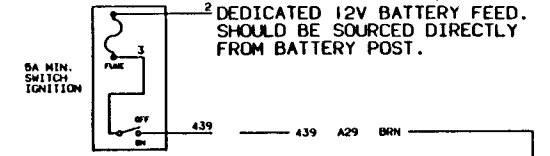
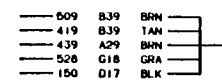
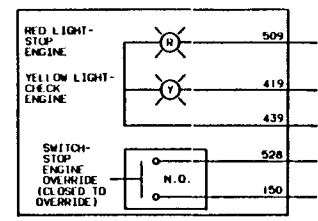






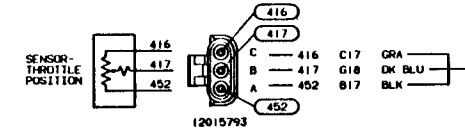
LABEL	WIRE NO.	SOCKET	COLOR	GOES TO
ECM GROUND (ATEC DIAGNOSTIC REQUEST- SIGNAL)	150	A	BLK	D17
CRUISE ENABLE LIGHT- DRIVE	955	B	WHT	A38
CHECK ENGINE LIGHT- DRIVE	419	D	TAN	B39
(ATEC DIAGNOSTIC DATA LINK)	-	E	-	-
POWER TAKE-OFF SPEED CONTROL- DRIVE	510	F	PPL	A49
-	-	G	-	-
IGNITION OR ECM POWER- FUSED	439-440	H	PNK	A29 GR A19
STOP ENGINE LIGHT- DRIVE	509	J	BRN	B39
-	-	K	-	-
DIAGNOSTIC DATA LINK	461	L	GRN	G18
DIAGNOSTIC REQUEST- SIGNAL	451	M	WHT/BLK	G18

510 SPLICES GOES TO D51, E59 G18



DEDICATED 12V BATTERY FEED. SHOULD BE SOURCED DIRECTLY FROM BATTERY POST.

MUST PROVIDE IGNITION FEED IN RUN AND CRANK POSITION. NO ACCESSORY SHOULD BE SOURCED FROM THIS LINE.



509 SPLICES GOES TO D50, G18, J47  
419 SPLICES GOES TO D50, G18, J47

955 SPLICES GOES TO C82, D51





