

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

The MIL (Service Engine Soon) will be "ON" if an emission malfunction exists. If the malfunction clears, the lamp will go "OFF" and the DTC will be stored in the PCM. Any DTCs stored will be cleared if no problem recurs within 50 engine starts.

Important

- All DTCs with the sign * are transmission related DTCs and have descriptions, diagnostic charts are in SECTION 10A (4L60E)/10B (4L80E). Remember, always start with the lowest numerical engine DTC first. When diagnosing some engine DTCs, other transmission symptoms can occur.

DTC NUMBER AND NAME	SECTION	DTC NUMBER AND NAME	SECTION
DTC 13 - Engine Shutoff Solenoid Circuit Fault	3	DTC 23 - Accelerator Pedal Position 1 Circuit Range Fault	3
DTC 14 - Engine Coolant Temperature (ECT) Sensor Circuit Low (High Temperature Indicated)	3	*DTC 24 - Vehicle Speed Sensor Circuit Low (Output Speed Signal)	10A (4L60E) 10B (4L80E)
DTC 15 - Engine Coolant Temperature (ECT) Sensor Circuit High (Low Temperature Indicated)	3	DTC 25 - Accelerator Pedal Position 2 Circuit High	3
DTC 16 - Vehicle Speed Sensor Buffer Fault	3	DTC 26 - Accelerator Pedal Position 2 Circuit Low	3
DTC 17 - High Resolution Circuit Fault	3	DTC 27 - Accelerator Pedal Position 2 Circuit Range Fault	3
DTC 18 - Pump Cam Reference Pulse Error	3	*DTC 28 - Trans Range Pressure Switch Circuit	10A (4L60E) 10B (4L80E)
DTC 19 - Crankshaft Position Reference Error	3	DTC 29 - Glow Plug Relay Fault	3
DTC 21 - Accelerator Pedal Position 1 Circuit High	3	DTC 31 - EGR Control Pressure/Baro Sensor Circuit Low (High Vacuum)	3
DTC 22 - Accelerator Pedal Position 1 Circuit Low	3	DTC 32 EGR Circuit Error	3

3-34 DRIVEABILITY AND EMISSIONS (DIESEL)

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

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DTC NUMBER AND NAME	SECTION	DTC NUMBER AND NAME	SECTION
DTC 33 - EGR Control Pressure/Baro Sensor Circuit High	3	DTC 47 - Intake Air Temperature Sensor Circuit Low (High Temp Indicated)	3
DTC 34 - Injection Timing Stepper Motor Fault	3	DTC 48 - Intake Air Temperature Sensor Circuit High (Low Temp Indicated)	3
DTC 35 - Injection Pulse Width Error (Response Time Short)	3	DTC 49 - Service Throttle Soon Lamp Circuit Fault	3
DTC 36 - Injection Pulse Width Error (Response Time Long)	3	DTC 51 - PROM Error	3
*DTC 37 - TCC Brake Switch Stuck "ON"	10A (4L60E) 10B (4L80E)	*DTC 52 - System Voltage High Long	10A (4L60E) 10B (4L80E)
*DTC 38 - TCC Brake Switch Stuck "OFF"	10A (4L60E) 10B (4L80E)	*DTC 53 - System Voltage High	10A (4L60E) 10B (4L80E)
*DTC 39 - TCC Stuck "OFF"	10B (4L80E)	DTC 56 - Injection Pump Calibration Resistor Error	3
DTC 41 - Brake Switch Circuit Fault	3	DTC 57 - PCM 5 Volt Shorted	3
DTC 42 - Fuel Temperature Circuit Low (High Temp Indicated)	3	*DTC 58 - Trans Fluid Temp Circuit Low	10A (4L60E) 10B (4L80E)
DTC 43 - Fuel Temperature Circuit High (Low Temp Indicated)	3	*DTC 59 - Trans Fluid Temp Circuit High	10A (4L60E) 10B (4L80E)
DTC 44 - EGR Pulse Width Error	3	DTC 61 - Turbo Boost Sensor Circuit High	3
DTC 45 - EGR Vent Error	3	DTC 62 - Turbo Boost Sensor Circuit Low	3
DTC 46 - Malfunction Indicator Lamp Circuit Fault	3		

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

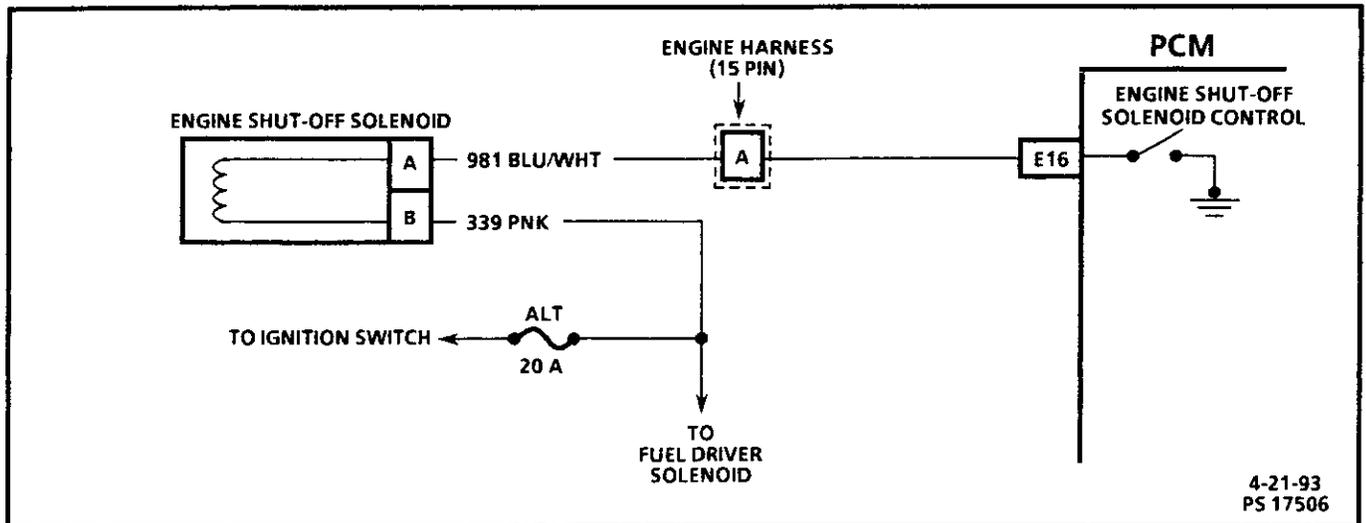
The MIL (Service Engine Soon) will be "ON" if an emission malfunction exists. If the malfunction clears, the lamp will go "OFF" and the DTC will be stored in the PCM. Any DTCs stored will be cleared if no problem recurs within 50 engine starts.

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DTC NUMBER AND NAME	SECTION	DTC NUMBER AND NAME	SECTION
DTC 63 - Accelerator Pedal Position 3 Circuit High	3	*DTC 82 - 1-2 Shift Solenoid Circuit	10A (4L60E) 10B (4L80E)
DTC 64 - Accelerator Pedal Position 3 Circuit Low	3	*DTC 83 - TCC Pwm Solenoid Circuit	10B (4L80E)
DTC 65 - Accelerator Pedal Position 3 Circuit Range Fault	3	*DTC 84 - Accelerator Pedal Position Circuit Fault	10B (4L80E)
*DTC 66 - 3-2 Control Solenoid Circuit	10A (4L60E)	*DTC 85 - Undefined Ratio Error	10B (4L80E)
*DTC 67 - TCC Solenoid Circuit	10A (4L60E)	*DTC 86 - Low Ratio Error	10B (4L80E)
*DTC 68 - Trans Component Slipping	10A (4L60E) 10B (4L80E)	*DTC 87 - High Ratio Error	10B (4L80E)
*DTC 69 - TCC Stuck "ON"	10A (4L60E) 10B (4L80E)	DTC 88 - TDC Offset Error	3
DTC 71 - Set/Coast Switch Fault	3	DTC 91 - Cylinder Balance Fault #1 Cyl	3
*DTC 72 - Vehicle Speed Sensor Circuit Loss (Output Speed Signal)	10A (4L60E) 10B (4L80E)	DTC 92 - Cylinder Balance Fault #2 Cyl	3
*DTC 73 - Pressure Control Solenoid Circuit	10A (4L60E) 10B (4L80E)	DTC 93 - Cylinder Balance Fault #3 Cyl	3
*DTC 74 - Trans Input Speed Sensor Circuit	10B (4L80E)	DTC 94 - Cylinder Balance Fault #4 Cyl	3
*DTC 75 - System Voltage Low	10A (4L60E) 10B (4L80E)	DTC 95 - Cylinder Balance Fault #5 Cyl	3
DTC 76 - Resume/Accel Switch Fault	3	DTC 96 - Cylinder Balance Fault #6 Cyl	3
DTC 78 - Wastegate Solenoid Fault	3	DTC 97 - Cylinder Balance Fault #7 Cyl	3
*DTC 79 - Trans Fluid Overtemp	10A (4L60E)	DTC 98 - Cylinder Balance Fault #8 Cyl	3
*DTC 81 - 2-3 Shift Solenoid Circuit	10A (4L60E) 10B (4L80E)	DTC 99 - Accelerator Pedal Position 2 (5 Volt Reference Fault)	3

3-36 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 13

ENGINE SHUTOFF SOLENOID CIRCUIT FAULT

Circuit Description:

When the ignition switch is in the "OFF" position, the engine shutoff solenoid is in the "No Fuel" position. By providing a ground path, the PCM energizes the solenoid which then allows fuel to pass into the injection pump.

DTC 13 Will Set When: No ignition voltage on terminal "E16" when PCM is requesting engine shutoff solenoid "ON."

Action Taken (PCM will default to): A current and history DTC 13 will be stored.

DTC 13 Will Clear When: The fault condition(s) no longer exist.

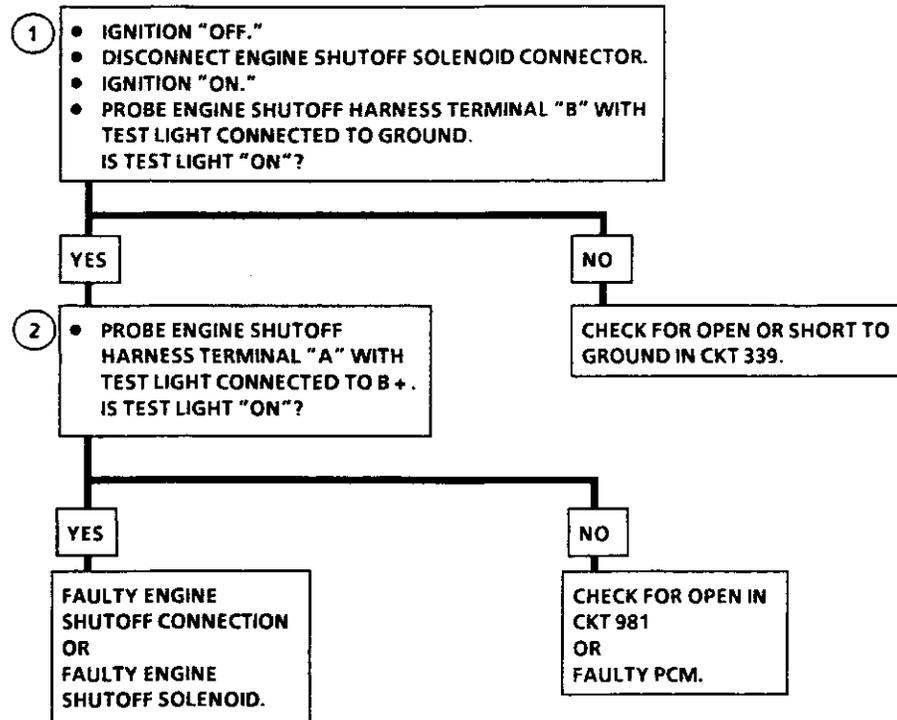
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. Check for open circuit from ignition switch to the solenoid.
2. Check CKT 981 from solenoid to PCM for open.

Diagnostic Aids: An open in CKT 981 or 339 will cause a DTC 13.

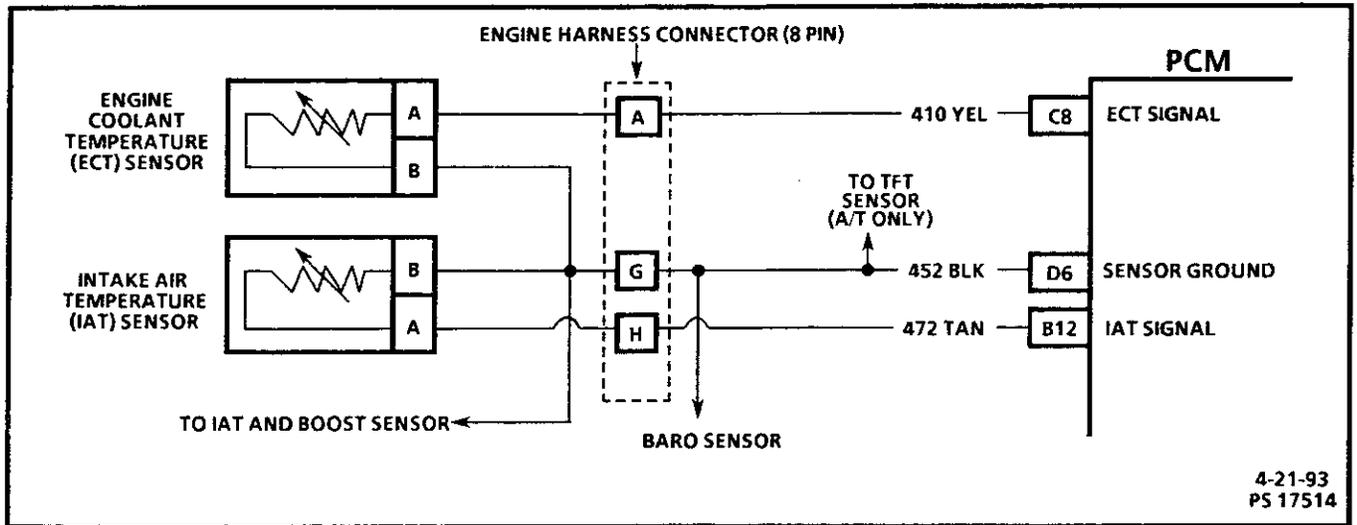
Also a no start condition will exist.

DTC 13
ENGINE SHUTOFF SOLENOID
CIRCUIT FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-38 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 14

ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT LOW (HIGH TEMPERATURE INDICATED)

Circuit Description:

The Engine Coolant Temperature (ECT) sensor is a thermistor that controls signal voltage to the PCM. When the engine is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As the engine warms, sensor resistance becomes less and voltage drops.

DTC 14 Will Set When: Engine coolant temperature greater than 151°C (304°F) for 2 seconds.

Action Taken (PCM will default to): The PCM will default to 77°C (171°F) and to fast idle.

DTC 14 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 14 is a hard failure or an intermittent condition.
2. This test will determine if CKT is shorted to ground.

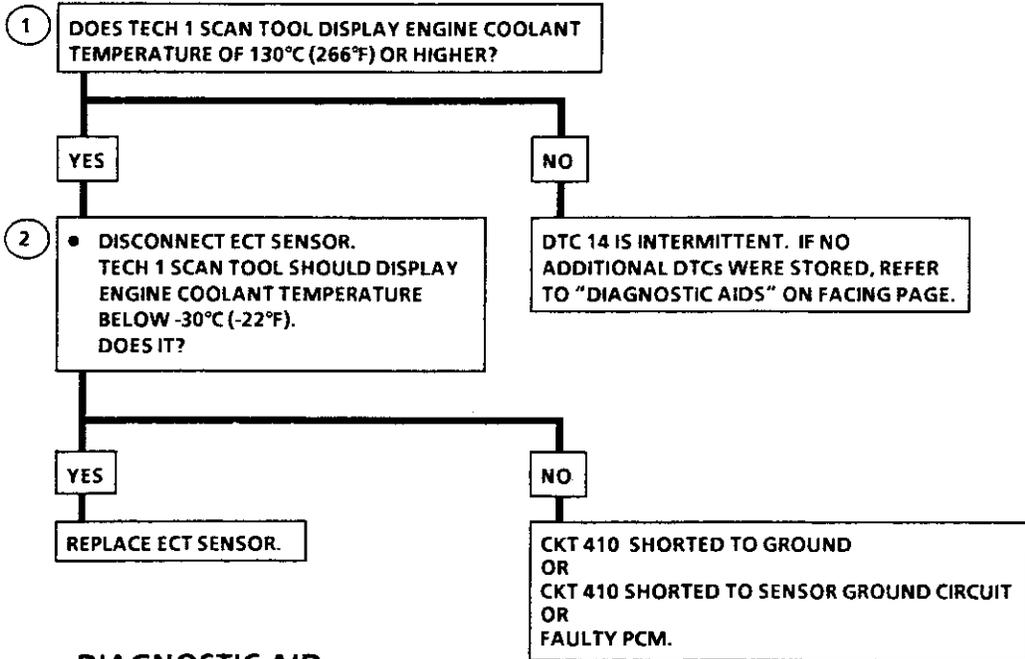
Diagnostic Aids: Check harness routing for a potential short to ground.

After engine is started, the coolant temperature should rise steadily to about 85°C (185°F).

The PCM default value will flash on the data screen intermittently.

DTC 14

ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT LOW (HIGH TEMPERATURE INDICATED)

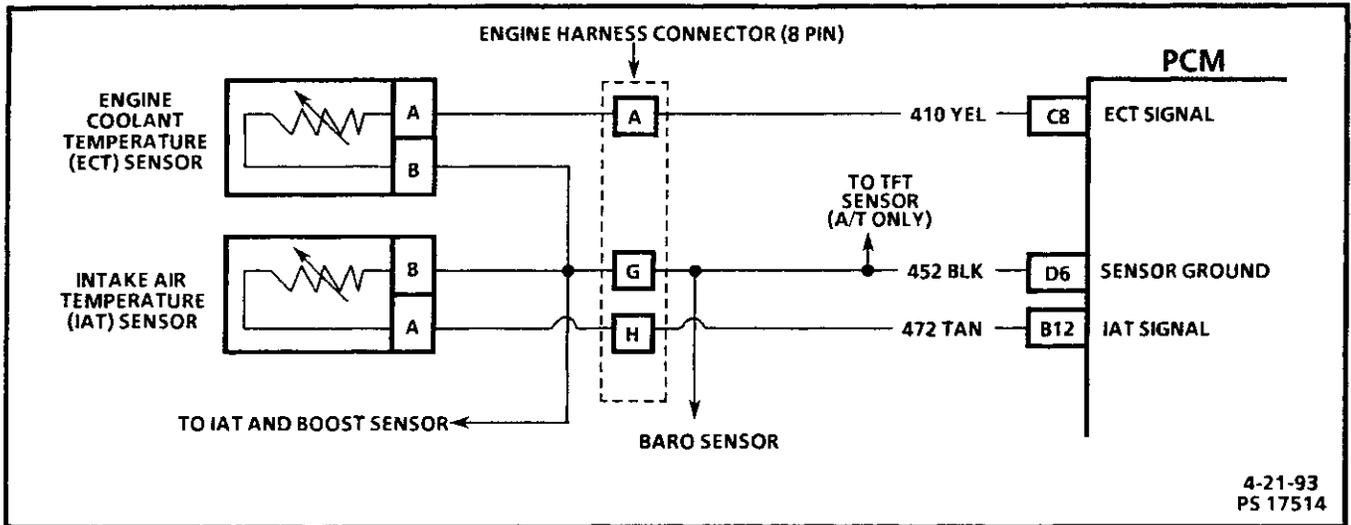


DIAGNOSTIC AID

ENGINE COOLANT TEMPERATURE SENSOR		
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)		
°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-40 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 15

ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT HIGH (LOW TEMPERATURE INDICATED)

Circuit Description:

The Engine Coolant Temperature (ECT) sensor is a thermistor that controls signal voltage to the PCM. When the engine is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As the engine warms, the sensor resistance becomes less and the voltage drops.

DTC 15 Will Set When:

- Engine coolant temperature less than -36°C (-33°F).
- Engine running for at least 8 minutes.

Action Taken (PCM will default to): The PCM will default to 77°C (171°F) and fast idle.

DTC 15 Will Clear When: The fault condition(s) no longer exist.

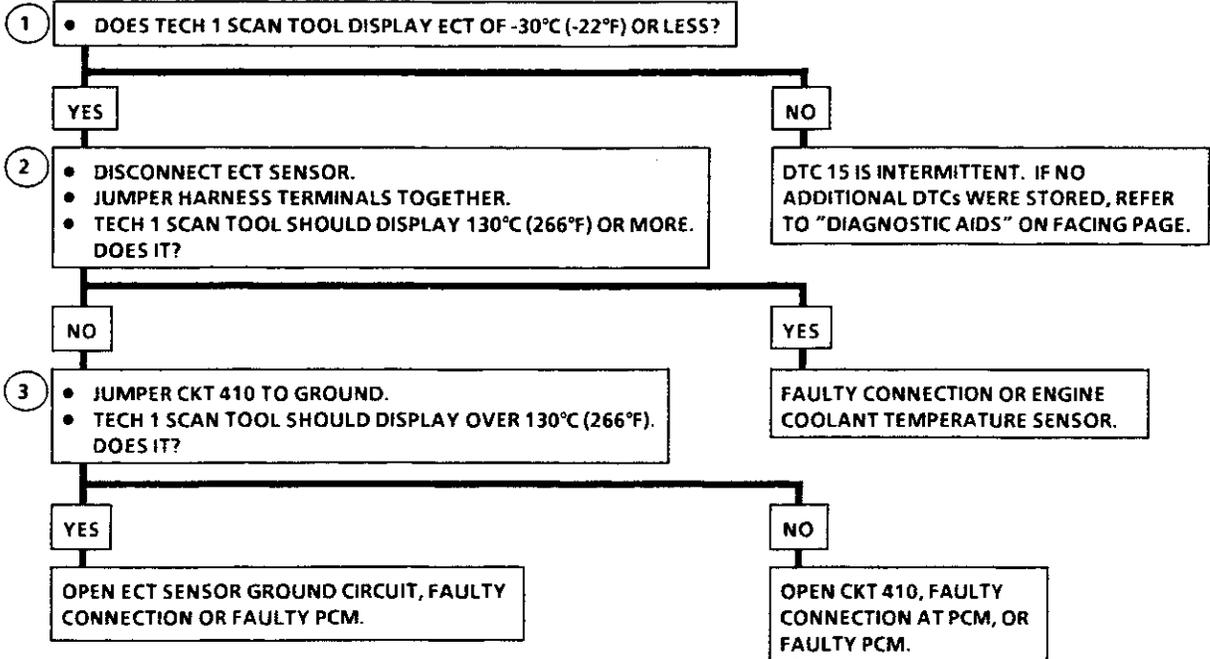
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This test determines if DTC 15 is a hard failure or an intermittent condition.
2. This test will determine if CKT 410 is shorted to ground.
3. This test will determine if CKT 410 is open, or a faulty PCM.

Diagnostic Aids: Check harness routing for a potential short to ground. After engine is started, the ECT temperature should rise steady to about 85°C (185°F). The default value will flash intermittently on the data screen.

DTC 15

ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT HIGH (LOW TEMPERATURE INDICATED)

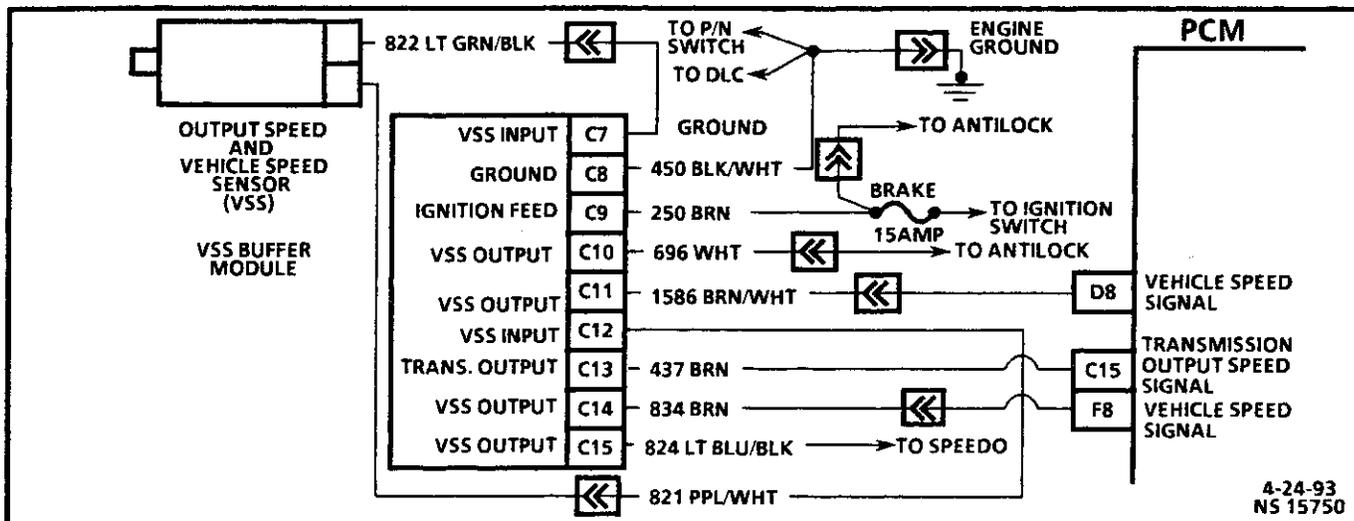


DIAGNOSTIC AID

ENGINE COOLANT TEMPERATURE SENSOR		
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)		
°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-42 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 16

VEHICLE SPEED SIGNAL BUFFER FAULT

Circuit Description:

The speed sensor circuit consists of a magnetic induction type sensor, a vehicle speed sensor buffer module and wiring. Gear teeth pressed on the output shaft induce an alternating current in the sensor. This signal is transmitted to the buffer. The buffer compensates for various axle ratios and converts the signal into a square wave for use by the speedometer, cruise control, antilock brake and PCM. The buffer sends two different signals to the PCM. The CKT 437 circuit relays the transmission output speed which is used to control shift points, line pressure, TCC, DTC 24 and DTC 72. The CKT 817 circuit relays the vehicle speed which is used to control engine operating functions and DTC 16. When DTC 24 or 72 is set, second gear only at maximum line pressure will occur.

DTC 16 Will Set When:

- Greater than 20 mph.
- 1000 to 4400 RPM.
- CKT 817 open or grounded.
- All conditions must be met for 2 seconds.

Action Taken (PCM will default to): No cruise control or fuel cutoff.

DTC 16 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This tests for B+ at VSS buffer.
2. This tests for proper ground path for vehicle speed sensor signal buffer.
3. This tests for vehicle speed sensor signal buffer signal to PCM.

4. This tests for a signal from VSS buffer to the PCM.

Diagnostic Aids: Check connections at VSS buffer and PCM. Refer to "4L80E or 4L60E Diagnostic Trouble Codes," Section "10" if DTC 24 or DTC 72 is also set.

DTC 16
VEHICLE SPEED SIGNAL
BUFFER FAULT

- INSTALL TECH 1.
- RECORD, THEN CLEAR DTC(s).
- RAISE DRIVE WHEELS.
- ENGINE OPERATING.
- TRANSMISSION IN ANY DRIVE RANGE.

WITH DRIVE WHEELS ROTATING, DOES "VEHICLE SPEED" INCREASE WITH DRIVE WHEEL SPEED INCREASE?

NO

YES

1

- TRANSMISSION IN PARK.
- BACKPROBE VSS BUFFER MODULE HARNESS CONNECTOR TERMINAL "C9" WITH A TEST LIGHT TO GROUND.

IS TEST LIGHT "ON"?

PROBLEM IS INTERMITTENT. REFER TO "DIAGNOSTIC AIDS."

YES

NO

2

- BACKPROBE VSS BUFFER MODULE HARNESS CONNECTOR TERMINAL "C9" TO TERMINAL "C8" WITH A TEST LIGHT.

IS TEST LIGHT "ON"?

REPAIR OPEN IGNITION FEED CIRCUIT TO VSS BUFFER MODULE.

YES

NO

3

- BACKPROBE VSS BUFFER MODULE HARNESS CONNECTOR TERMINAL "C7" TO TERMINAL "C12" WITH J 39200 DVM ON A/C SCALE.
- TRANSMISSION IN ANY DRIVE RANGE WITH DRIVE WHEELS ROTATING.

DOES VOLTAGE INCREASE ON J 39200 DVM WITH DRIVE WHEEL SPEED INCREASE?

REPAIR OPEN GROUND CIRCUIT FROM VSS BUFFER MODULE.

YES

NO

4

DOES TECH 1 DISPLAY TRANS OUTPUT SPEED (MPH) INCREASE WITH DRIVE WHEEL SPEED INCREASE?

CHECK CKTs 821 OR 822 FOR OPEN SHORT TO GROUND OR FAULTY CONNECTIONS. IF OK, REPLACE VSS.

YES

NO

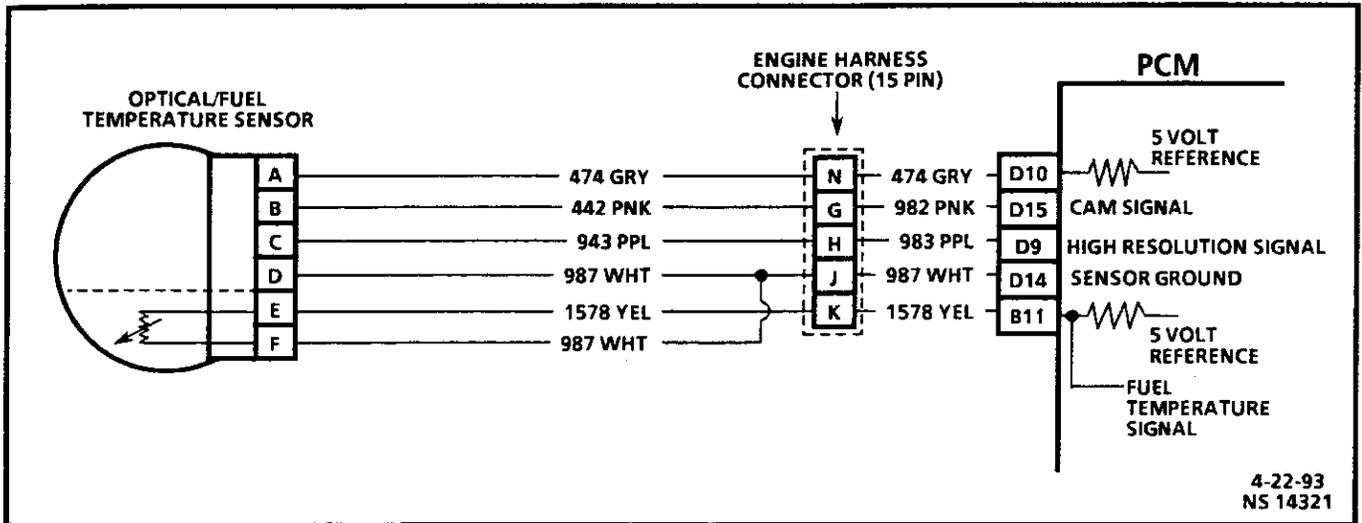
CHECK CKT 834 FOR OPEN, SHORT, OR FAULTY CONNECTIONS AT VSS SIGNAL BUFFER CONNECTOR AND PCM CONNECTOR. IF OK, REPLACE PCM.

CHECK VSS BUFFER CONNECTIONS. IF OK, REPLACE VSS BUFFER.

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(s) AND VERIFY PROPER OPERATION.

3-44 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 17

HIGH RESOLUTION CIRCUIT FAULT

Circuit Description:

The high resolution sensor provides a signal to the PCM by counting pulses on the sensor disk located in the injection pump. The high resolution is one of the most important inputs by the PCM for fuel control and timing.

DTC 17 Will Set When: 8 cam reference pulses without and increase in high resolution counts (internal to PCM).

Action Taken (PCM will default to): Backup fuel.

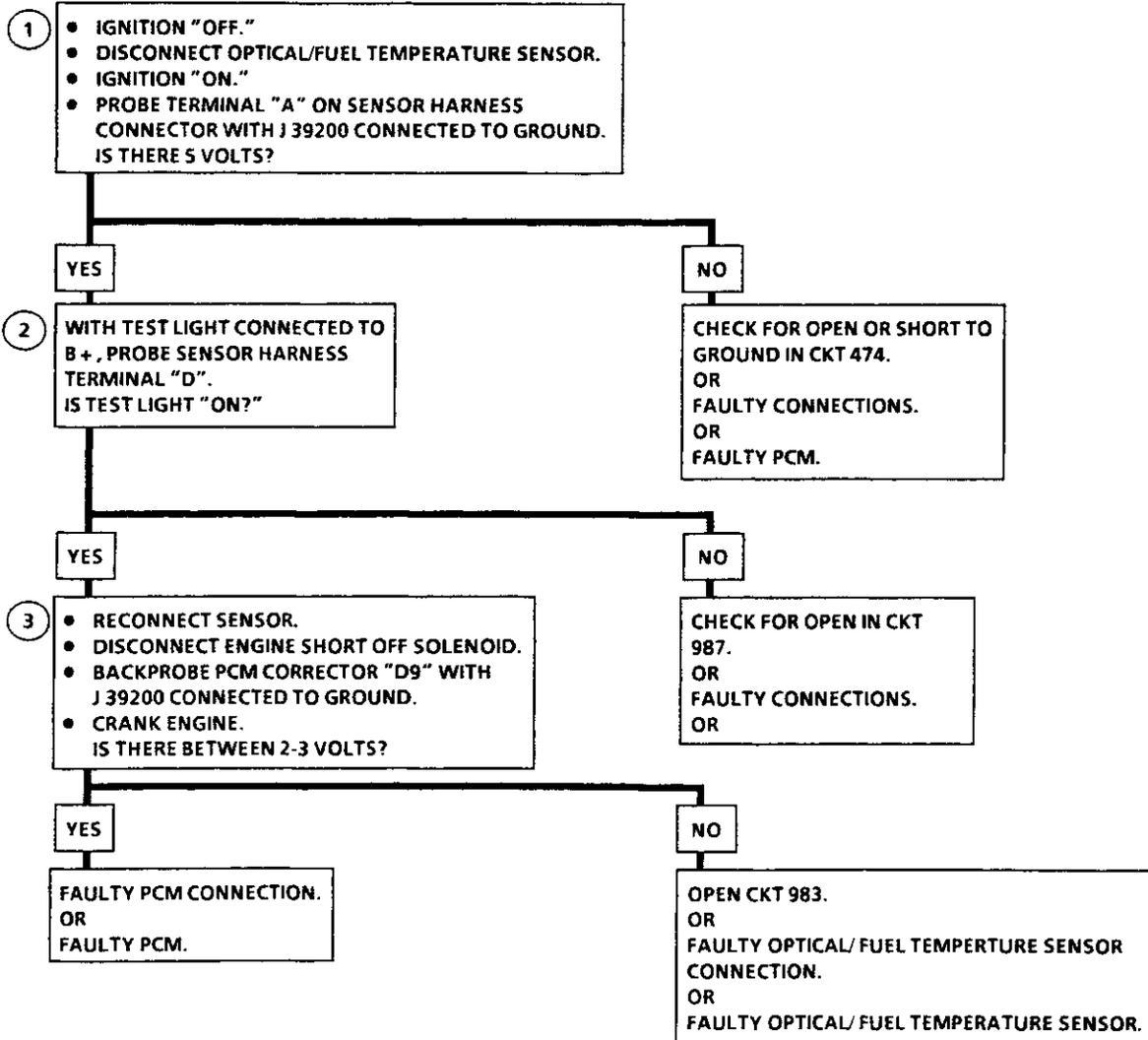
DTC 17 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if there is a 5 volt reference.
2. This step checks the ground circuit.
3. This step will check to see if the sensor is sending a signal back to the PCM.

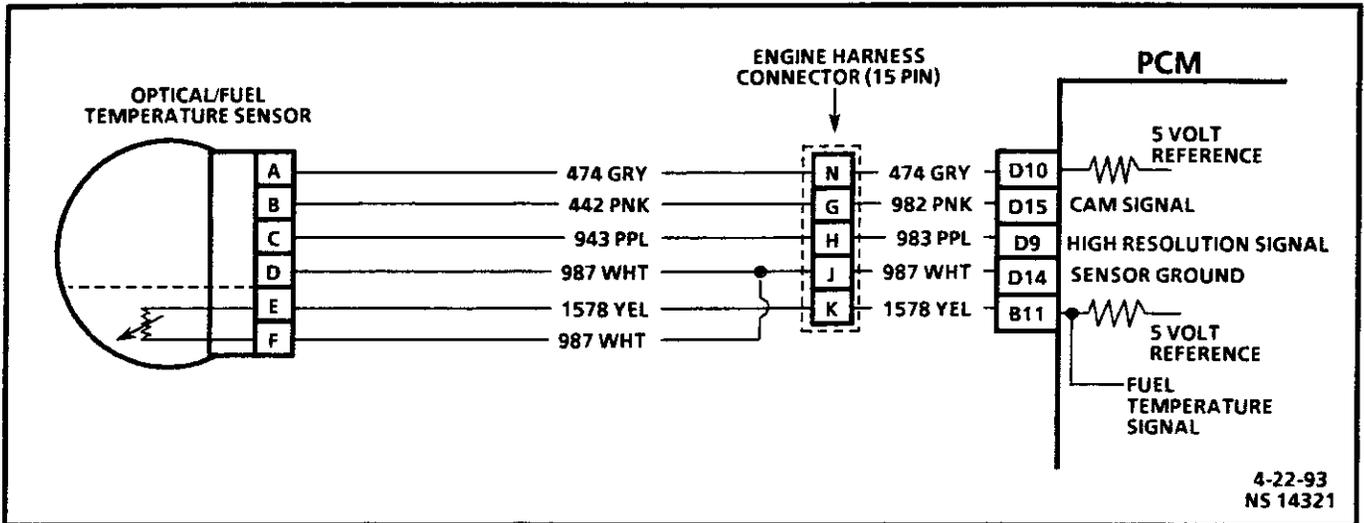
Diagnostic Aids: When PCM is in backup fuel, fast idle and poor performance problems will exist. If DTC 18 is also stored, there is a possible problem with CKTs 474 or 987. It is possible DTC 17 may set if there is air in the fuel system, refer to SECTION 4.

**DTC 17
HIGH RESOLUTION
CIRCUIT FAULT**



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-46 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 18

PUMP CAM REFERENCE PULSE ERROR

Circuit Description:

The high resolution sensor also provides a Pump Cam signal to the PCM by counting pulses on the sensor disk located in the injection pump. The Pump Cam reference pulse is one of the most important inputs by the PCM for timing and start of injection.

DTC 18 Will Set When: 8 cam reference pulses missed for every crankshaft position pulse.

Action Taken (PCM will default to): Backup fuel.

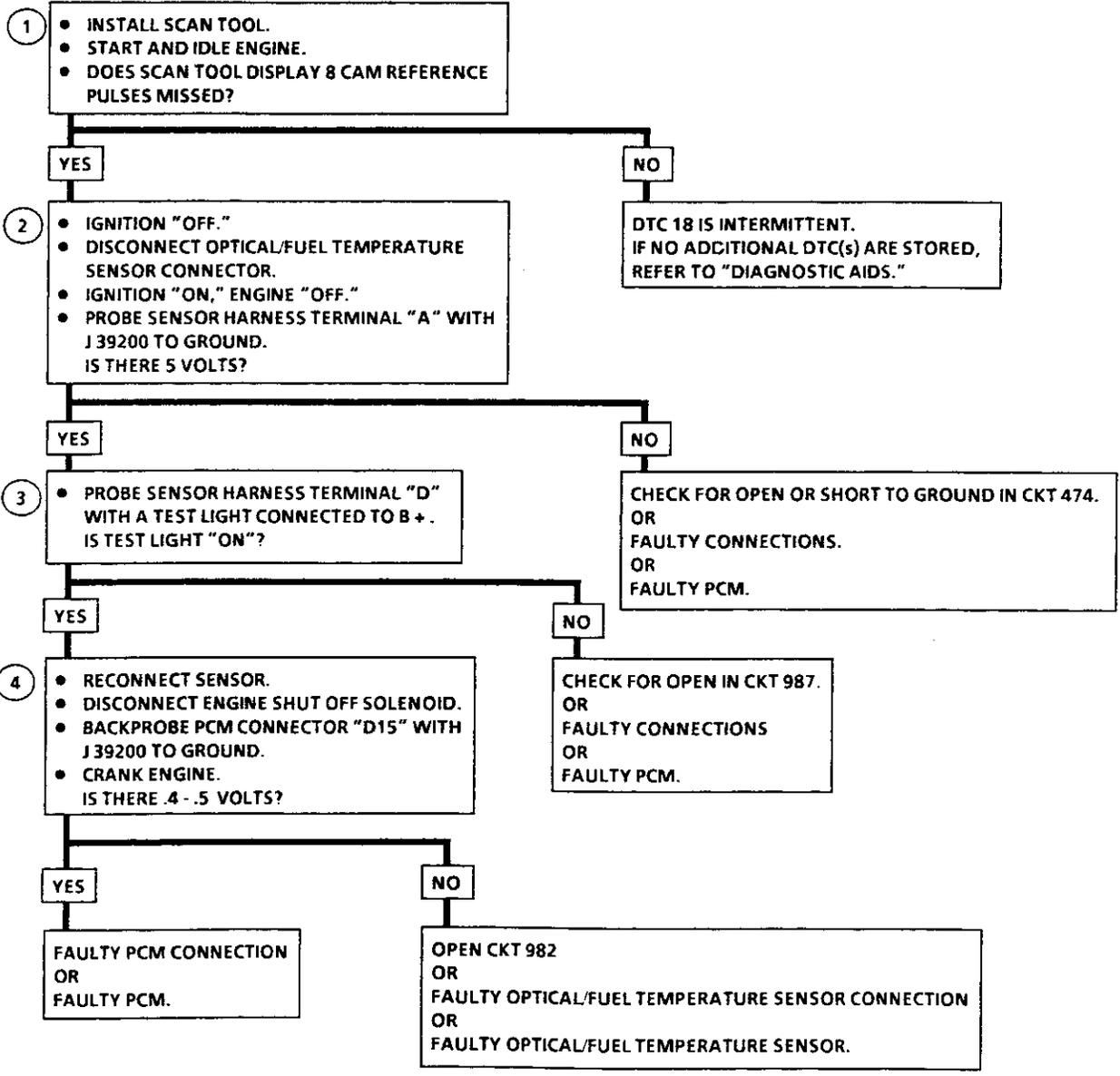
DTC 18 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if it is the result of a hard failure or intermittent.
2. This step checks 5 volt reference circuits.
3. This step checks ground circuit.
4. This step checks to see if the optical/fuel temperature sensor is sending a signal to the PCM and to check CKT 982 for an open.

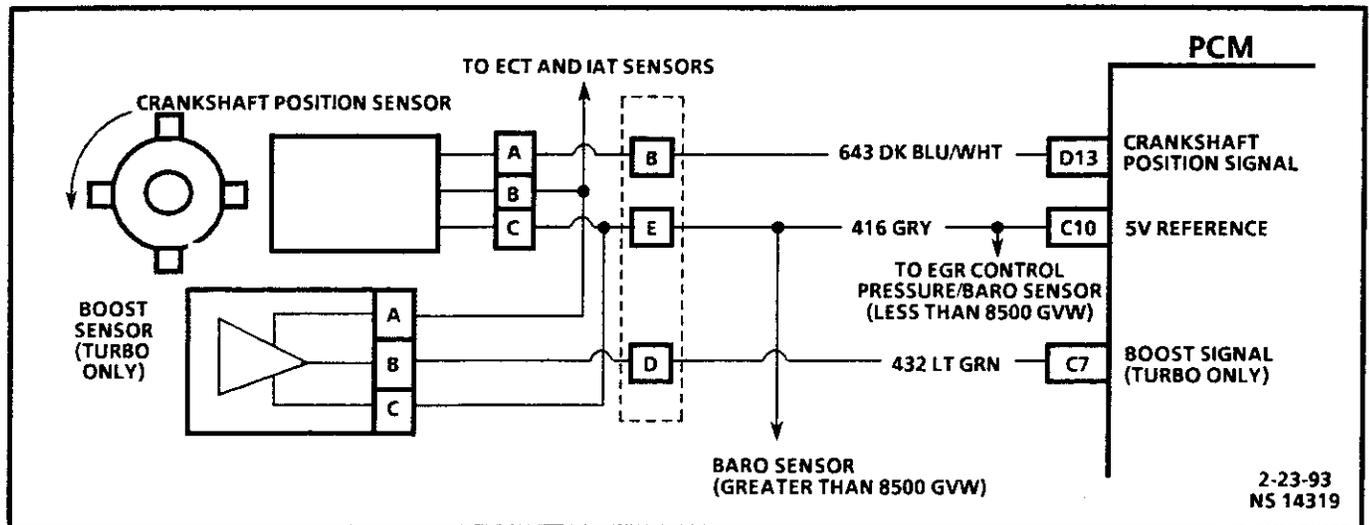
Diagnostic Aids: When the PCM is in backup fuel, rough idle and poor performance problems will exist. If DTC 17 is stored, there is a possible problem with CKTs 474 or 987.

**DTC 18
PUMP CAM REFERENCE
PULSE ERROR**



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-48 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 19

CRANKSHAFT POSITION REFERENCE ERROR

Circuit Description:

The crankshaft position sensor is a magnetic induction type sensor that monitors crankshaft position and speed. There are four teeth 90° apart on the front of the crankshaft sprocket that induce an alternating current in the sensor which is transmitted to the PCM.

DTC 19 Will Set When: 8 crankshaft position pulses missed for every cam reference pulse.

Action Taken (PCM will default to): Backup fuel.

DTC 19 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

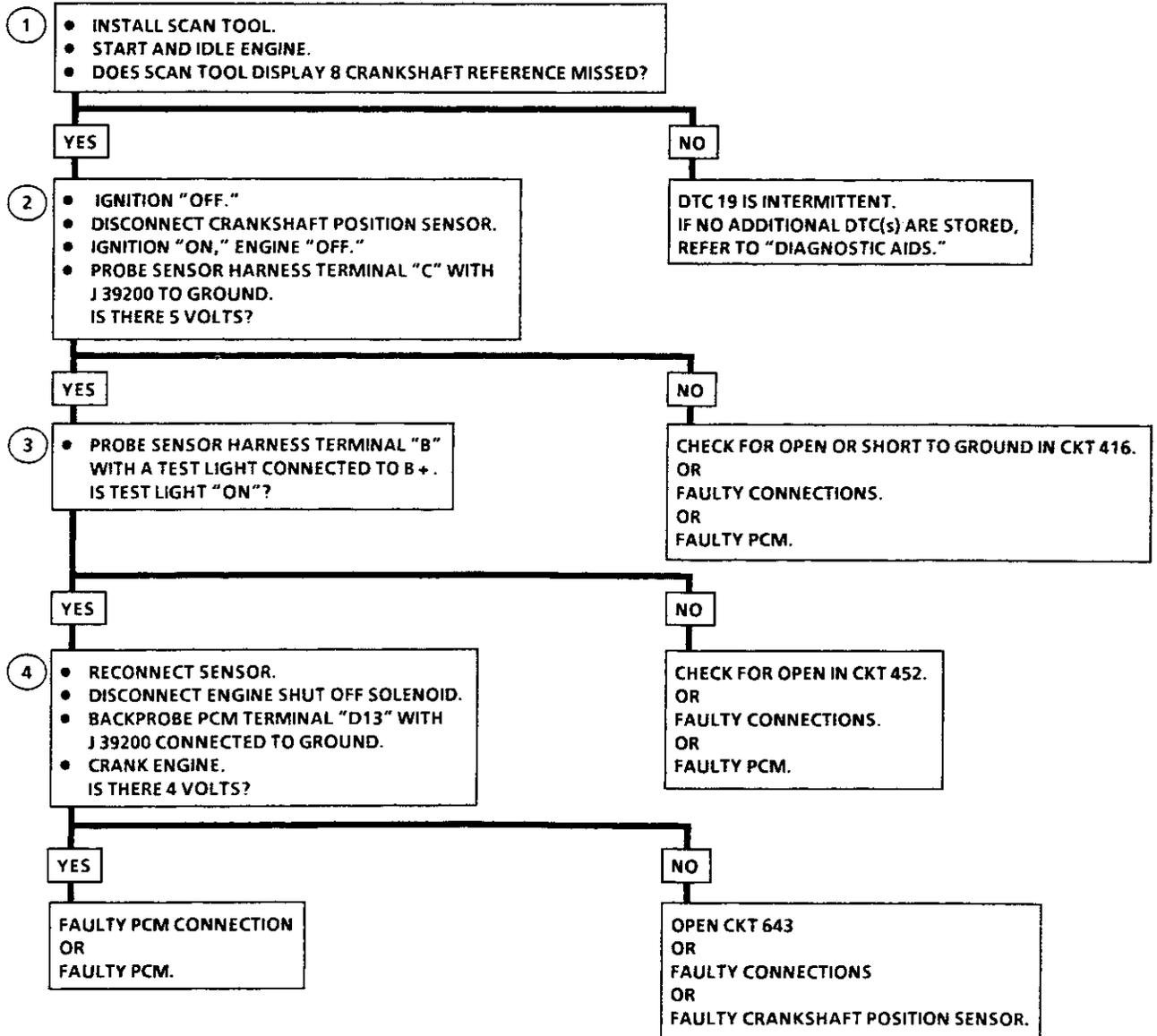
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 19 is the result of a hard failure or an intermittent condition.
2. This step checks the 5 volt reference.
3. This step checks the ground circuit.
4. This step checks the sensor and harness wiring.

Diagnostic Aids: When PCM is in backup fuel, fast idle and poor performance will exist.

Check for good connection at crankshaft position sensor and at PCM.

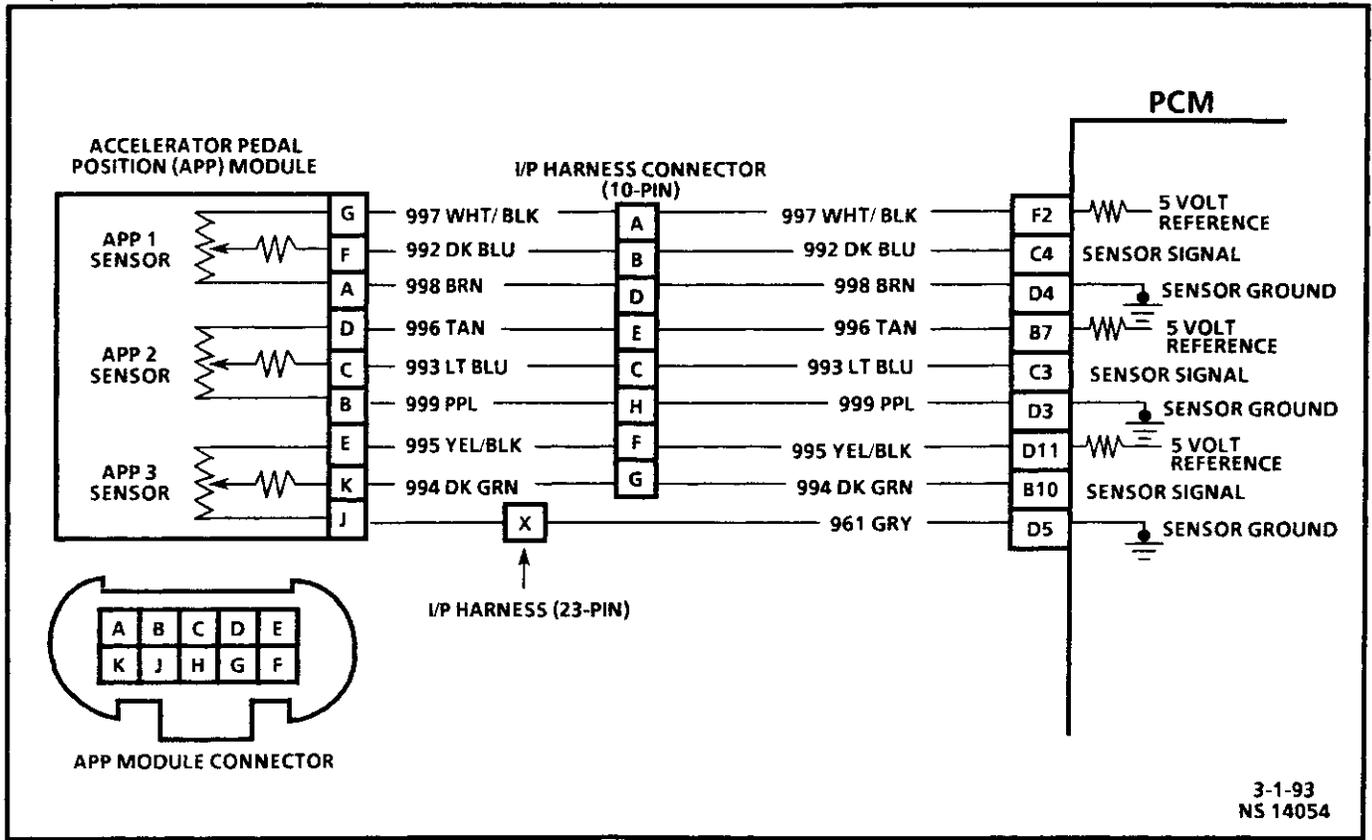
DTC 19 CRANKSHAFT POSITION REFERENCE ERROR



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(s) AND VERIFY PROPER OPERATION.

3-50 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 21

ACCELERATOR PEDAL POSITION (APP) 1 CIRCUIT HIGH

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 21 Will Set When: Voltage is greater than 4.75 volts for 2 seconds on APP 1 sensor.

Action Taken (PCM will default to): The input from APP 1 sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one sensor malfunctioning. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC 21 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 21 is the result of a hard failure or an intermittent condition.
2. This step checks the PCM and wiring.
3. This will check for an open in ground CKT 998.

Diagnostic Aids: A scan tool reads APP 1 position in volts. Should read about .45 to .95 volt with throttle closed and ignition "ON" or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

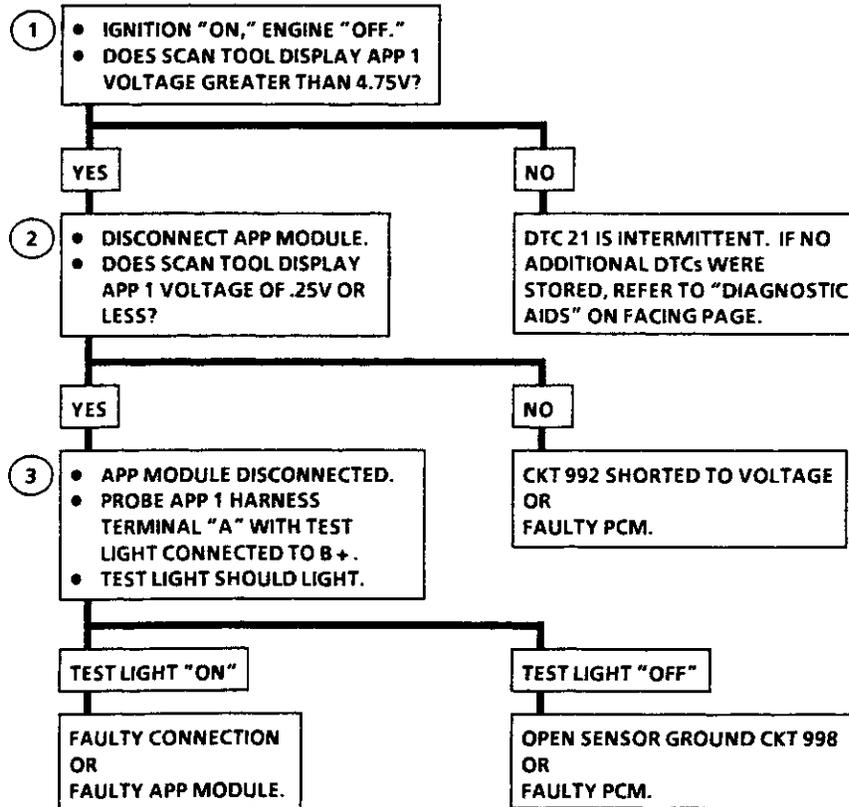
Also, 90% pedal travel is acceptable for correct APP operation.

Scan APP 1 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about .74 volt when throttle was closed to about 3.7 volt when throttle is held at Wide Open Throttle (WOT) position.

A DTC 21 will result if CKT 998 is open or CKT 992 is shorted to voltage.

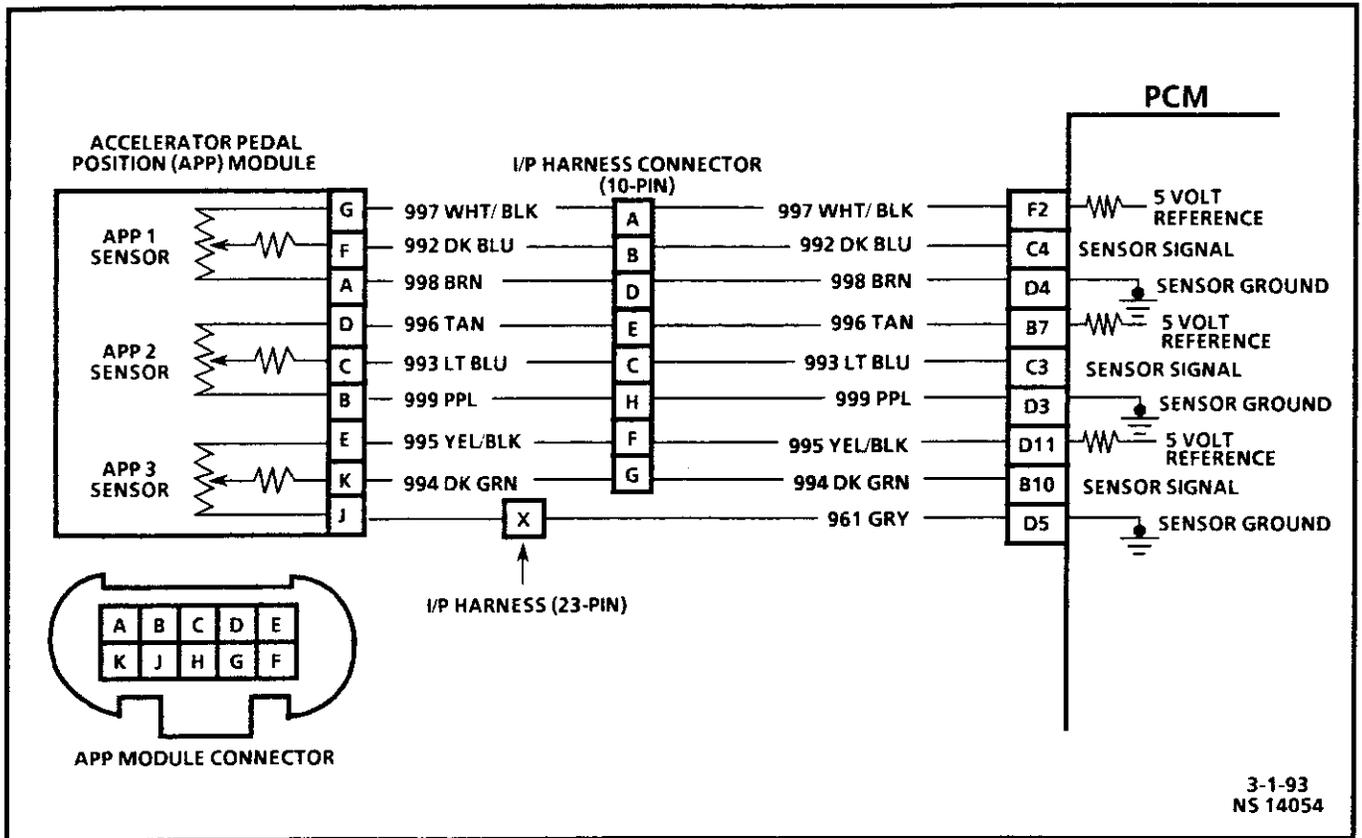
Refer to "Intermittent" in SECTION 2.

DTC 21
ACCELERATOR PEDAL POSITION (APP) 1
CIRCUIT HIGH



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
 REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-52 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 22

ACCELERATOR PEDAL POSITION (APP) 1 CIRCUIT LOW

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 22 Will Set When: Voltage is less than .25 volt for 2 seconds on APP 1 sensor.

Action Taken (PCM will default to): The input from APP 1 sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one sensor malfunctioning. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC 22 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 22 is the result of a hard failure or an intermittent condition.
2. This step checks the PCM and wiring.
3. This step will determine if there is a faulty connection or sensor.
4. This step will check the ground circuit.

Diagnostic Aids: A scan tool reads APP 1 position in volts. Should read about .45 to .95 volt with throttle

closed and ignition "ON" or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

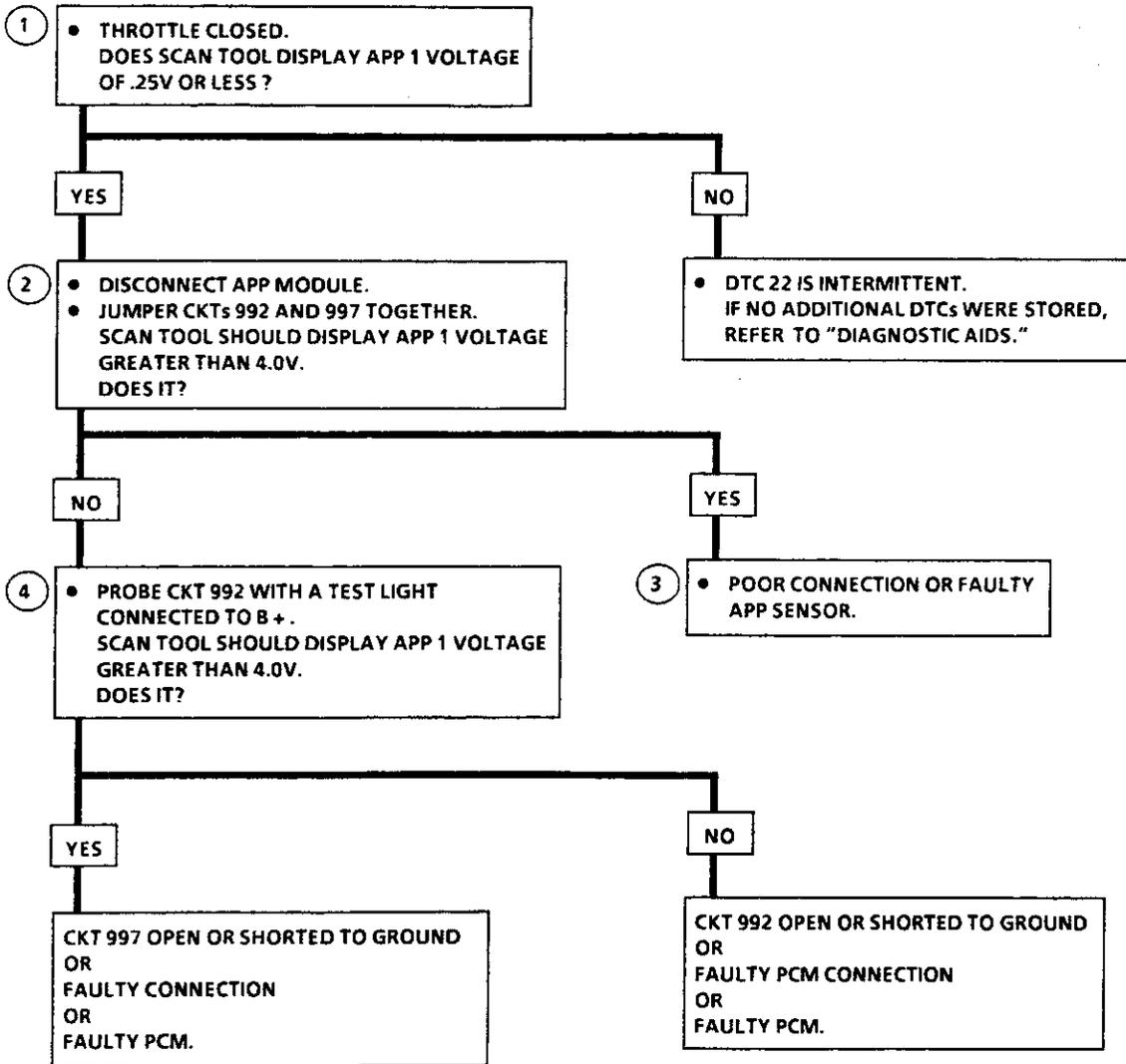
Also, 90% pedal travel is acceptable for correct APP operation.

Scan TP sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about .74 volt when throttle is closed to about 3.7 volts when throttle is held at Wide Open Throttle (WOT) position.

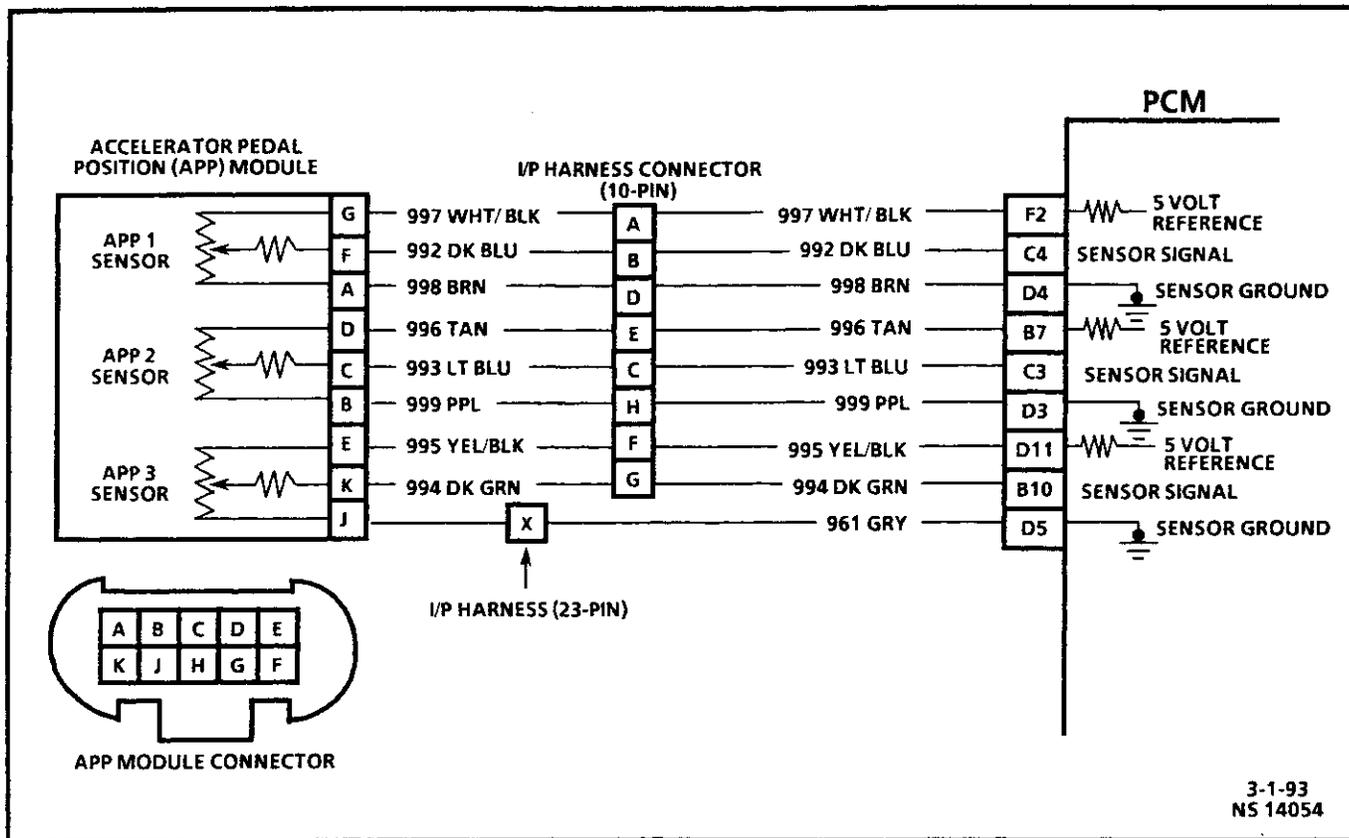
A DTC 22 will result if circuit is open.

3-1-93
NS 14054

DTC 22 ACCELERATOR PEDAL POSITION (APP) 1 CIRCUIT LOW



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.



3-1-93
NS 14054

DTC 23

ACCELERATOR PEDAL POSITION (APP) 1 CIRCUIT RANGE FAULT

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently.

DTC 23 Will Set When: PCM has recognized a "skewed" (mis-scaled) sensor. The PCM compares all three sensors to each other and determines if there is a 6% difference between APP 1 and APP 2 and a 10% difference to APP 3.

Action Taken (PCM will default to): The input from APP 1 sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will turn "ON" the "Service Throttle Soon" lamp and limit power. If a third APP malfunction is present, the "Service Throttle Soon" lamp will be "ON" and only allow the engine to operate at idle.

DTC 23 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if there is a good 5 volt reference.
2. This step will check for an open in the ground circuit.

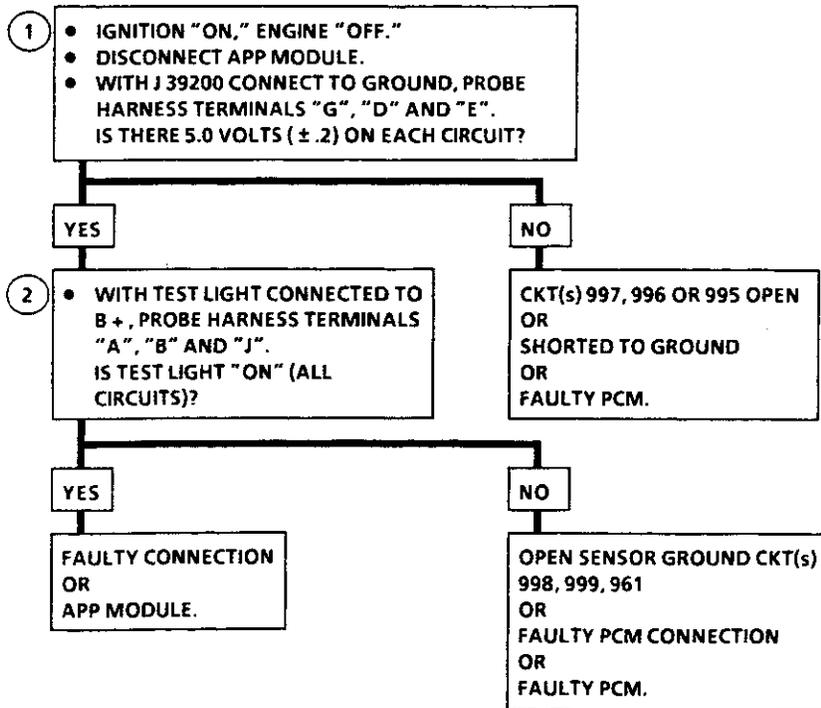
Diagnostic Aids: A scan tool reads APP 1 position in volts. Should read about .45 to .95 volt with throttle

closed and ignition "ON" or at idle. Voltage should increase at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

Also, 90% pedal travel is acceptable for correct APP operation.

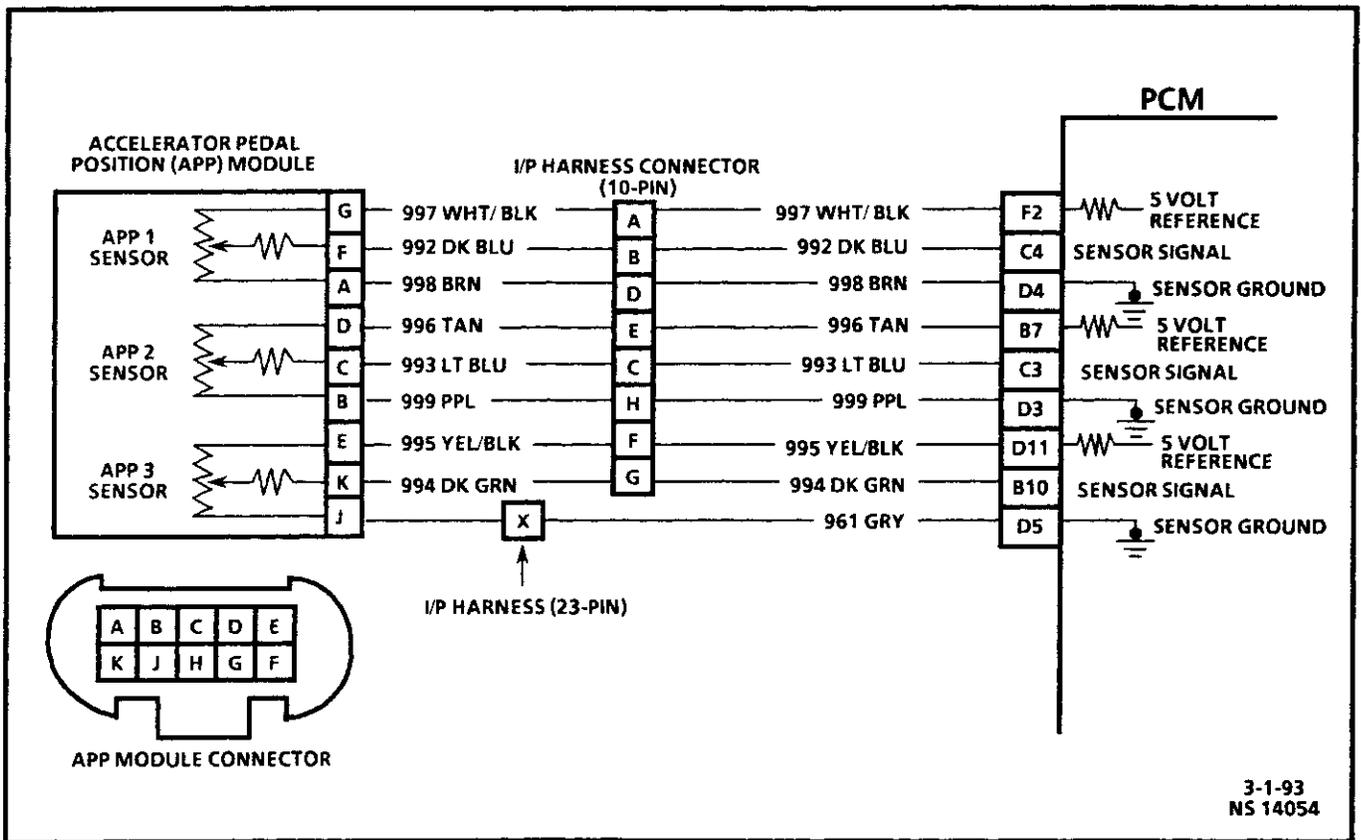
Scan APP 1 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about .74 volt when throttle was closed to over about 3.7 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 23
ACCELERATOR PEDAL POSITION (APP) 1
CIRCUIT RANGE FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
 REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-56 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 25

ACCELERATOR PEDAL POSITION (APP) 2 CIRCUIT HIGH

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 25 Will Set When: Voltage is greater than 4.75 volts for 2 seconds on APP 2 sensor.

Action Taken (PCM will default to): The input from APP 2 sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 25 is a hard failure or an intermittent condition.
2. This will check for an open in ground CKT 999.
3. This step checks the PCM and wiring.

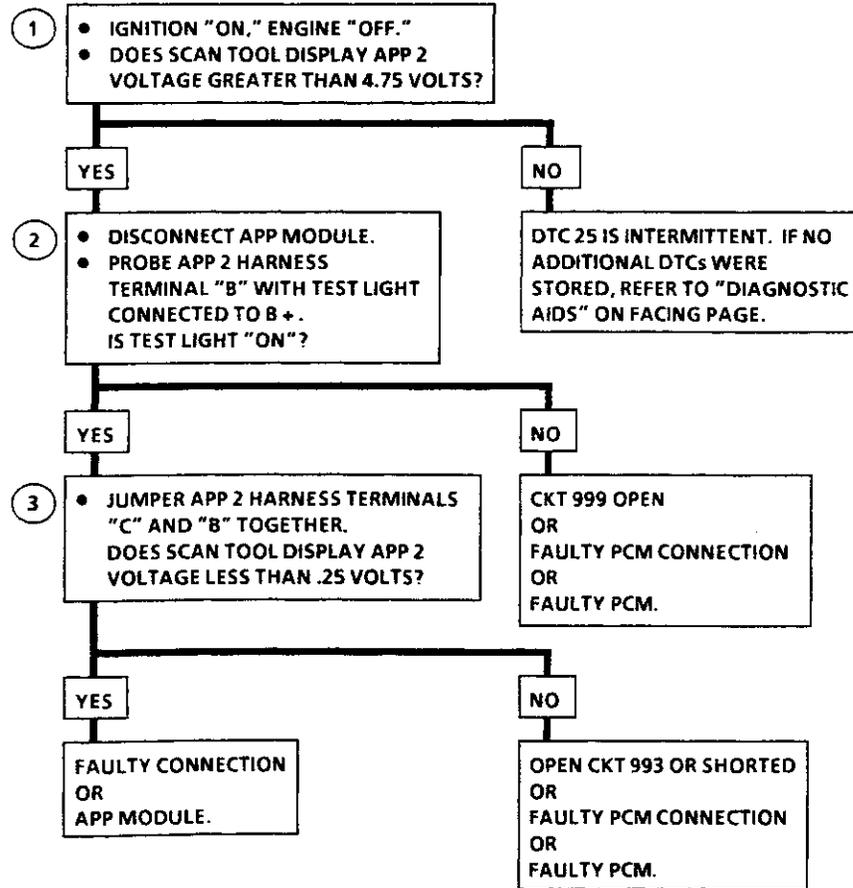
Diagnostic Aids: A Tech 1 scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward WOT.

Also, 90% pedal travel is acceptable for correct APP operation.

Refer to SECTION 2 for "Intermittents."

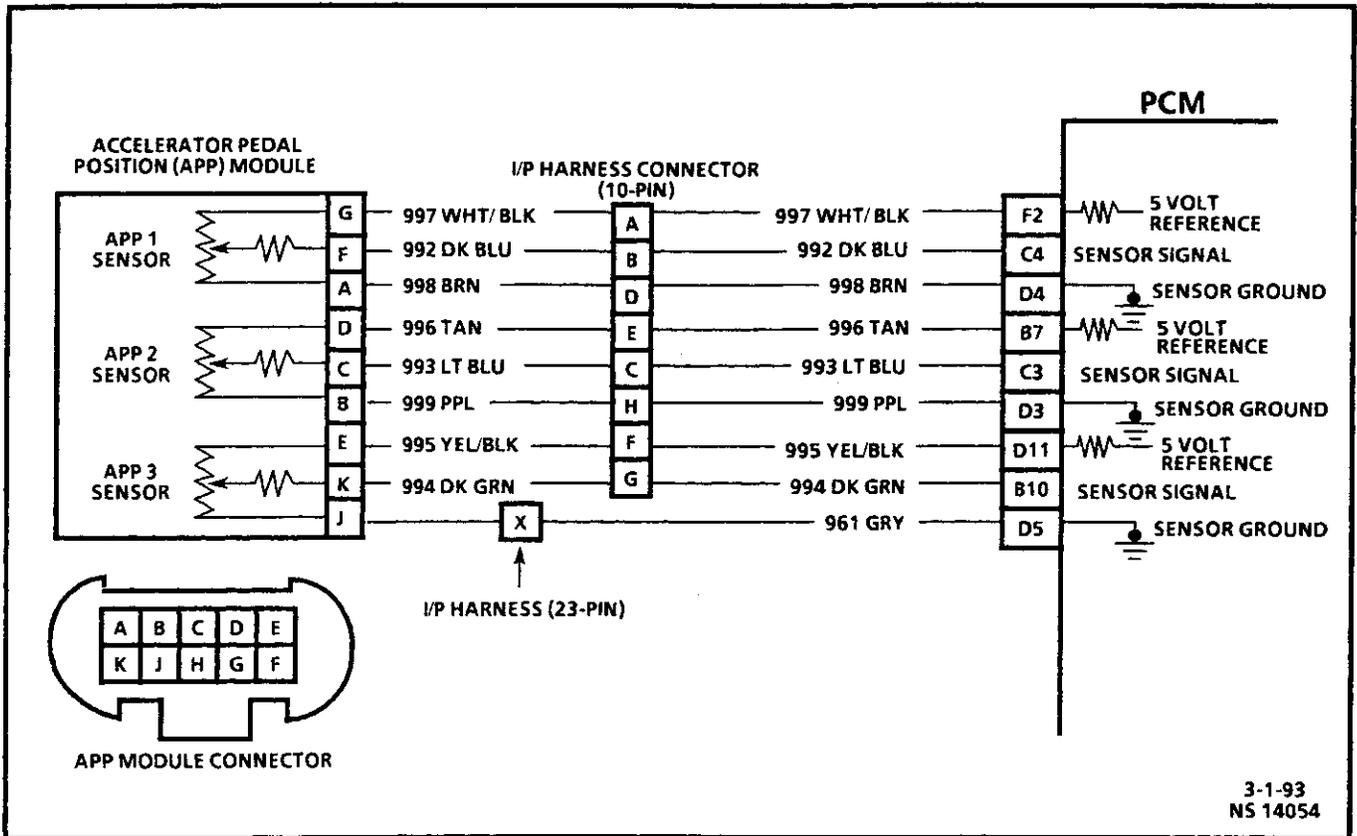
Scan APP 2 signal while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 25 ACCELERATOR PEDAL POSITION (APP) 2 CIRCUIT HIGH



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-58 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 26

ACCELERATOR PEDAL POSITION (APP) 2 CIRCUIT LOW

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 26 Will Set When: Voltage is less than .25 volt for 2 seconds on APP 1 sensor.

Action Taken (PCM will default to): The input from the sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC 26 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 26 is the result of a hard failure or an intermittent condition.
2. This step checks the PCM and wiring.
3. This will check the PCM and CKT 993.

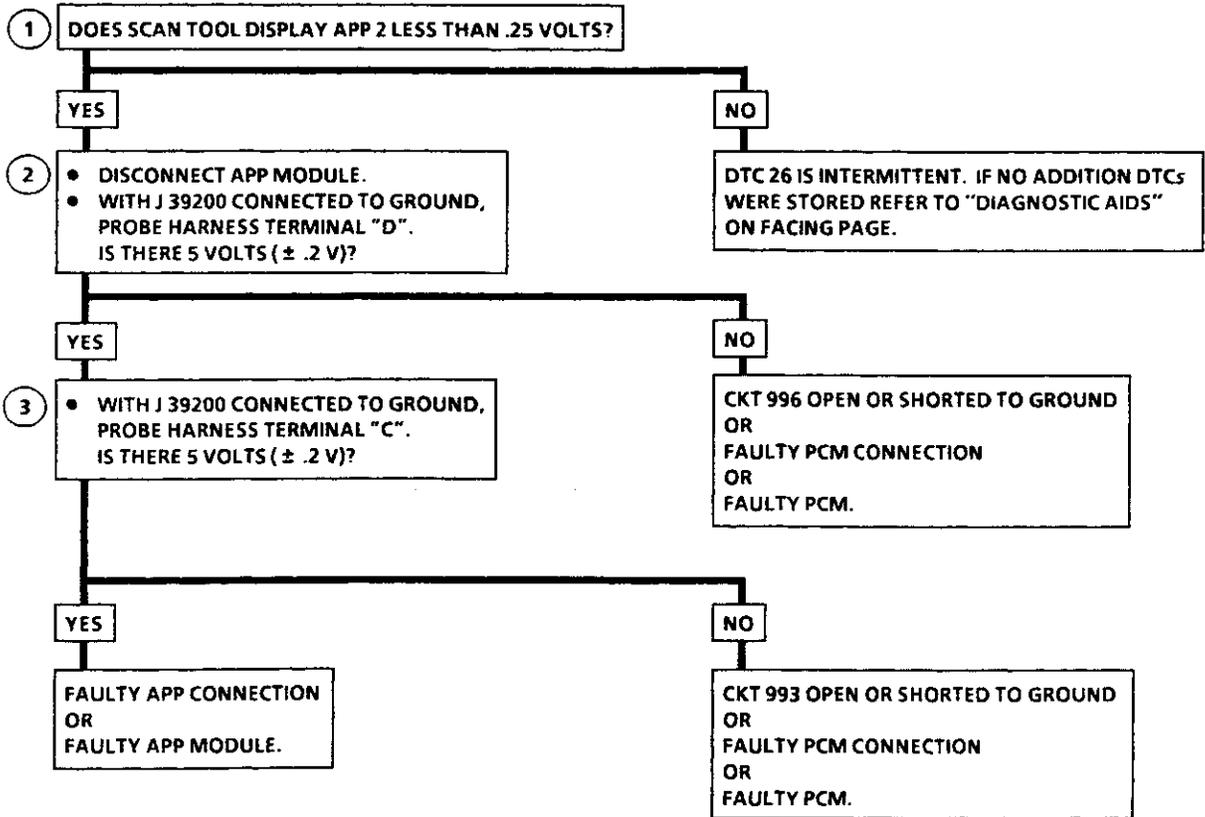
Diagnostic Aids: A Tech 1 scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward WOT.

An open or short to ground in CKT 996 or 993 will result in a DTC 26.

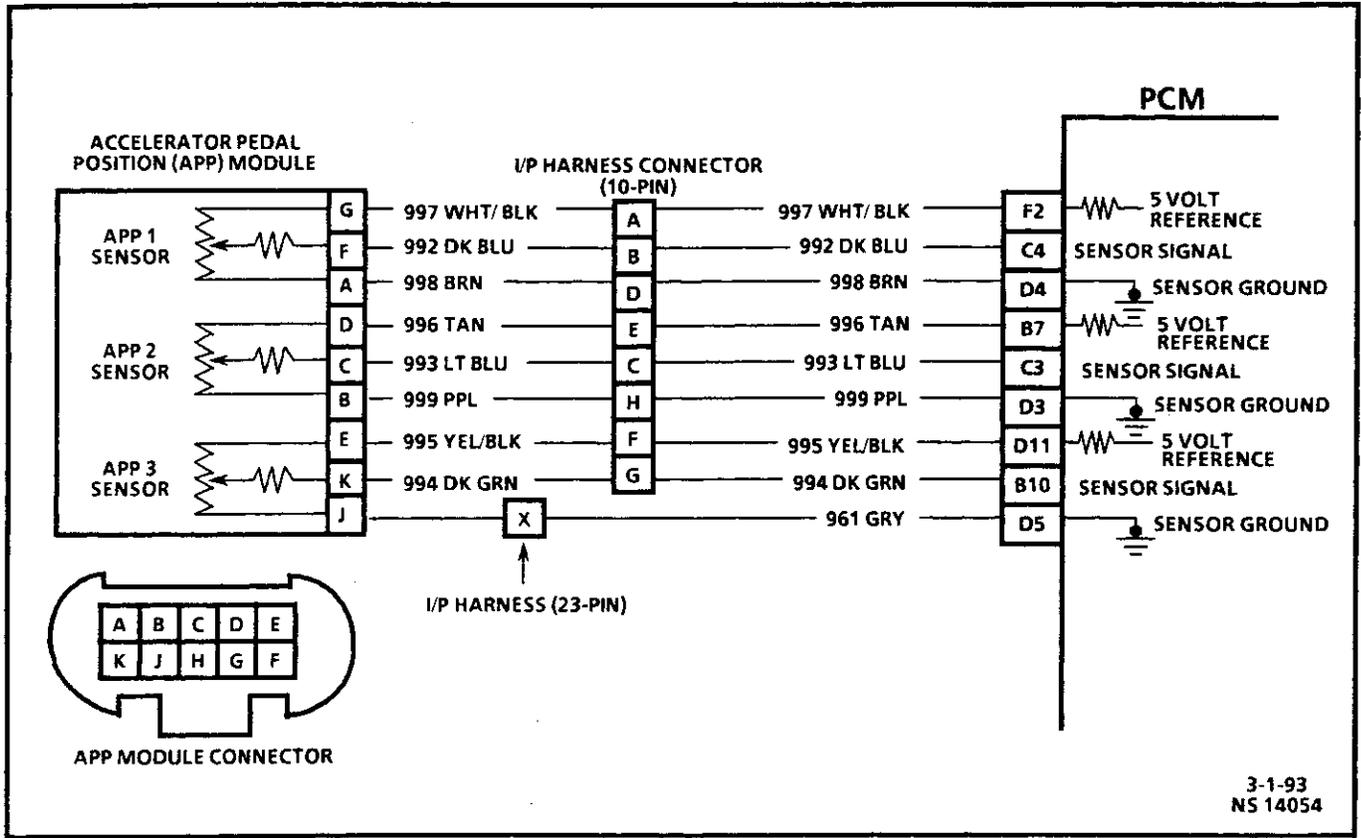
Refer to SECTION 2 for "Intermittents."

Scan APP 2 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 26 ACCELERATOR PEDAL POSITION (APP) 2 CIRCUIT LOW



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.



3-1-93
NS 14054

DTC 27

ACCELERATOR PEDAL POSITION (APP) 2 CIRCUIT RANGE FAULT

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 27 Will Set When: PCM has recognized a "skewed" (mis-scaled) sensor. The PCM compares all three sensors to each other (percentage to voltage chart) and determines if there is a 6% difference between APP 1 and APP 2 and a 10% difference to APP 3.

Action Taken (PCM will default to): The input from APP 2 sensor is ignored. A current and history DTC will set but it will not turn on the "Service Throttle Soon" lamp. Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present, the PCM will then turn "ON" the "Service Throttle Soon" lamp and limit power. If a third APP malfunction is present, the "Service Throttle Soon" lamp will be "ON" and will only allow the engine to operate at idle.

DTC 27 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if there is a good 5 volt reference.
2. This step will check for an open in the ground circuits.

Diagnostic Aids: A Tech 1 scan tool reads APP 2 position in volts and should read about 4.5 volts with throttle closed and ignition "ON" or at idle. Voltage

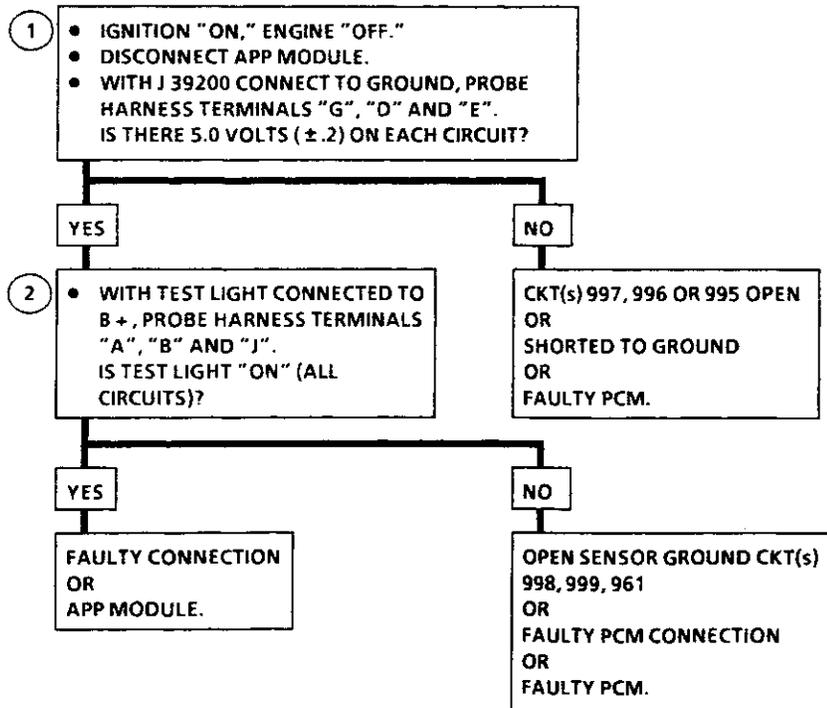
should decrease at a steady rate as throttle is moved toward WOT.

Also, 90% pedal travel is acceptable for correct APP operation.

Refer to SECTION 2 for "Intermittents."

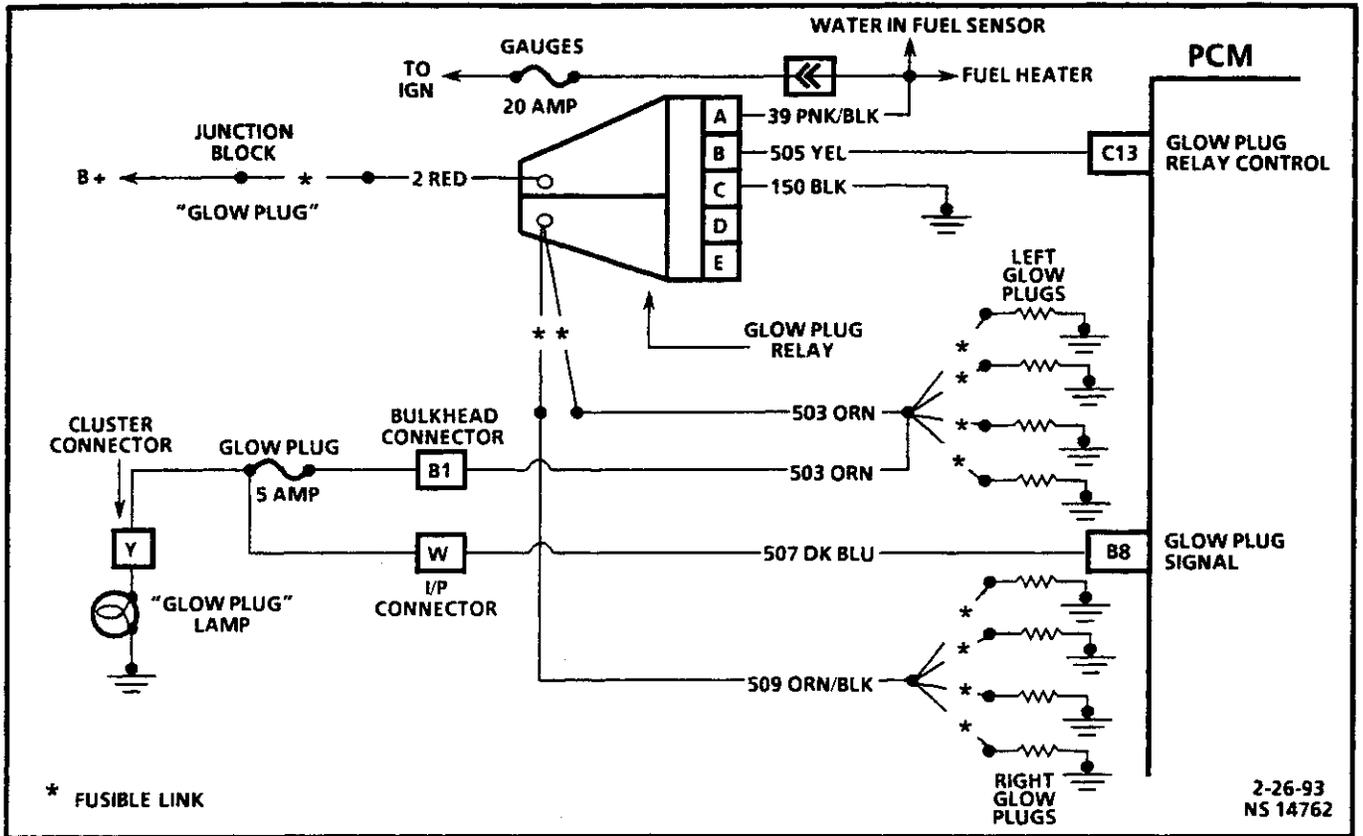
Scan APP 2 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.5 volts when throttle was closed to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 27
ACCELERATOR PEDAL POSITION (APP) 2
CIRCUIT RANGE FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
 REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-62 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 29

GLOW PLUG RELAY CIRCUIT FAULT

Circuit Description:

The glow plug system is used to assist in providing the heat required to begin combustion during engine starting at cold ambient temperatures. The glow plugs are heated before and during cranking, as well as initial engine operation. The PCM controls the glow plugs by sending a B+ signal.

DTC 29 Will Set When:

- Glow plugs commanded "ON" and "glow plug volts" is less than .8 volt.
- OR
- Glow plugs "OFF" and "glow plug volts" is greater than .8 volt.
- OR
- "System voltage" exceeds "glow plug volts" by 2 volts.

Action Taken (PCM will default to): Hard start.

DTC 29 Will Clear When: The fault condition(s) no longer exist.

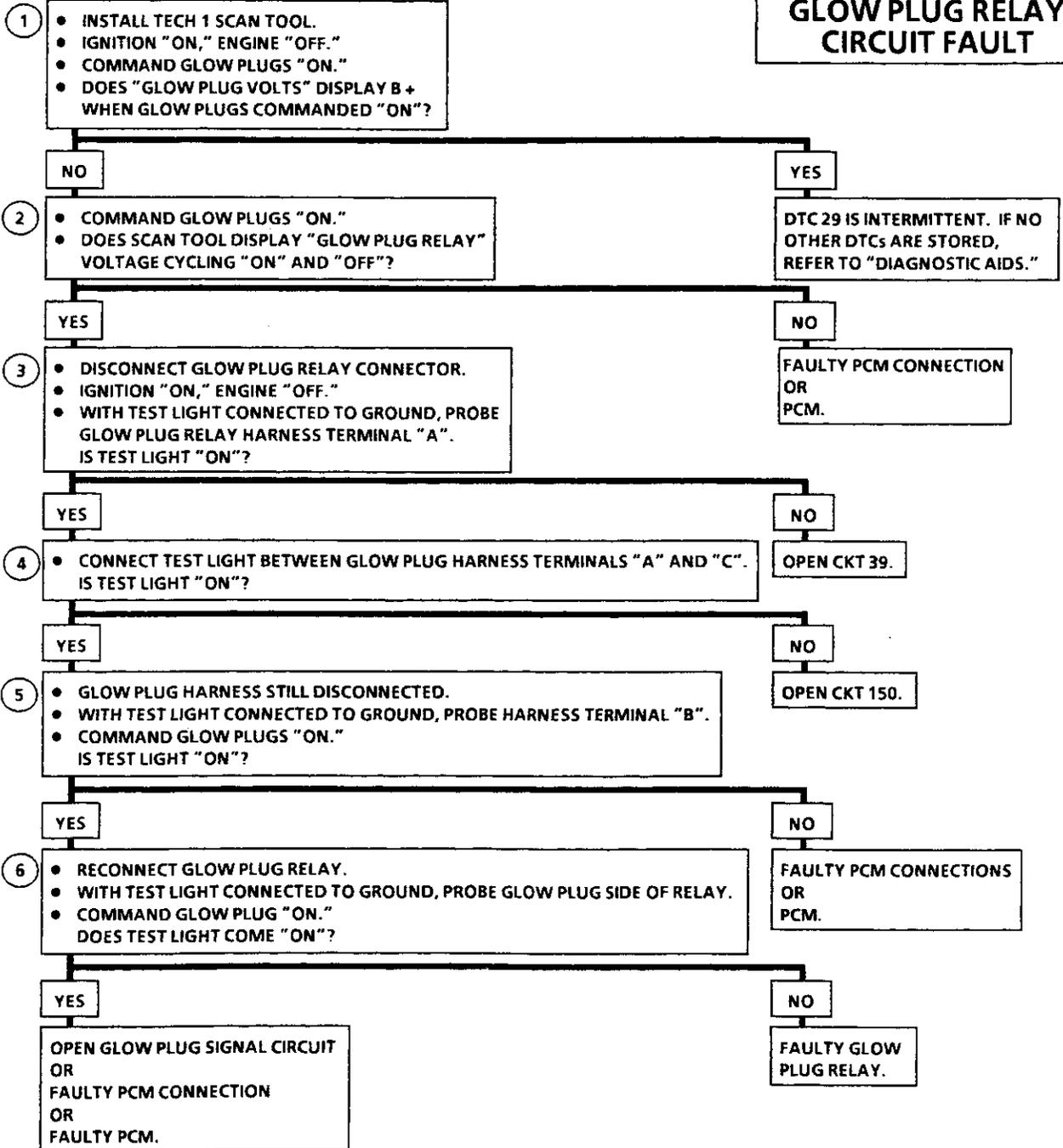
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 29 is a hard failure.
2. The Tech 1 scan tool may not display system voltage. The important thing is that the PCM is cycling voltage "ON" and "OFF" indicating that the PCM is OK.
3. This step will check relay feed circuit.
4. This step will check relay ground.

5. This step will determine if CKT 505 is open.
6. This step will check relay and wiring.

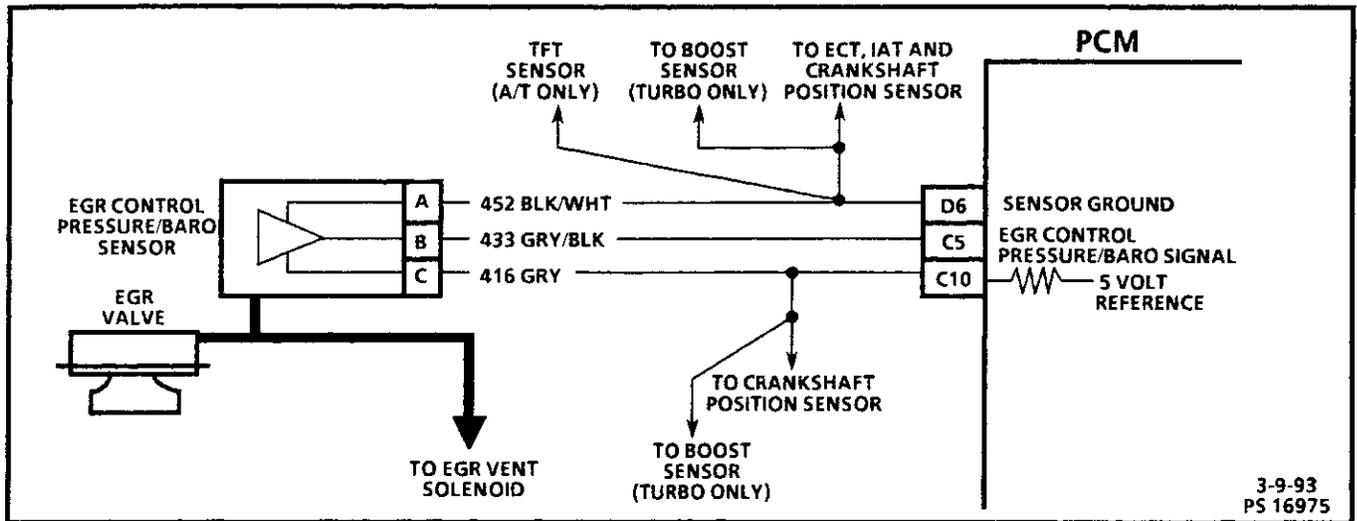
Diagnostic Aids: If glow plug relay was stuck in the "ON" position, check for proper operation of glow plugs, refer to SECTION 7. When glow plugs are commanded "ON" by the Tech 1, an internal PCM timer protects the glow plugs from damage by cycling them "ON" for 3 seconds and the "OFF" for 12 seconds.

**DTC 29
GLOW PLUG RELAY
CIRCUIT FAULT**



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-64 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 31

EGR CONTROL PRESSURE/BARO SENSOR CIRCUIT LOW (HIGH VACUUM)

Circuit Description:

A MAP sensor is used to monitor the amount of vacuum in the EGR circuit. It senses the actual vacuum in the EGR vacuum line and sends a signal back to the PCM. The signal is compared to the EGR duty cycle calculated by the PCM.

DTC 31 Will Set When: Actual EGR pressure is less than 15 kPa for 2 seconds.

Action Taken (PCM will default to): The PCM will shut down the EGR system.

DTC 31 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" the "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

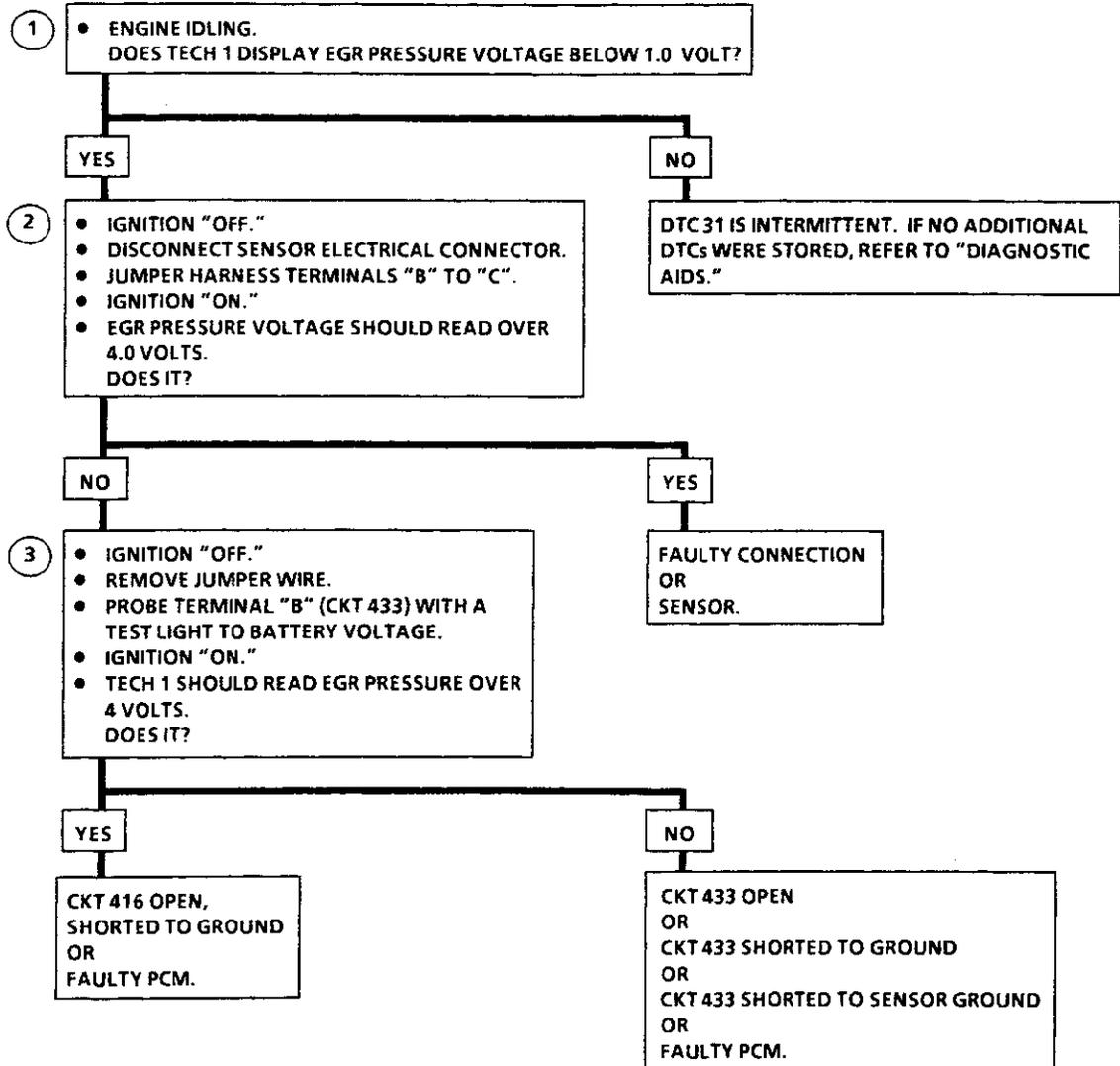
1. This step determines if DTC 31 is a hard failure or an intermittent condition.
2. Jumpering harness terminals "B" to "C" (5 volts to signal circuit) will determine if the sensor is at fault, or if there is a problem with the PCM or wiring.
3. The Tech 1 scan tool may not display 5 volts. The important thing is that the PCM recognized the voltage as more than 4 volts, indicating that the PCM and CKT 433 are OK.

Diagnostic Aids: With the ignition "ON" and the engine stopped, the EGR pressure is equal to atmospheric pressure with the signal voltage being high. The information is used by the PCM as an indication of vehicle altitude. Comparison of this reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same $\pm .4$ volt.

An intermittent open in CKT 433 or CKT 416 will result in a DTC 31.

DTC 31

EGR CONTROL PRESSURE/BARO SENSOR CIRCUIT LOW (HIGH VACUUM)



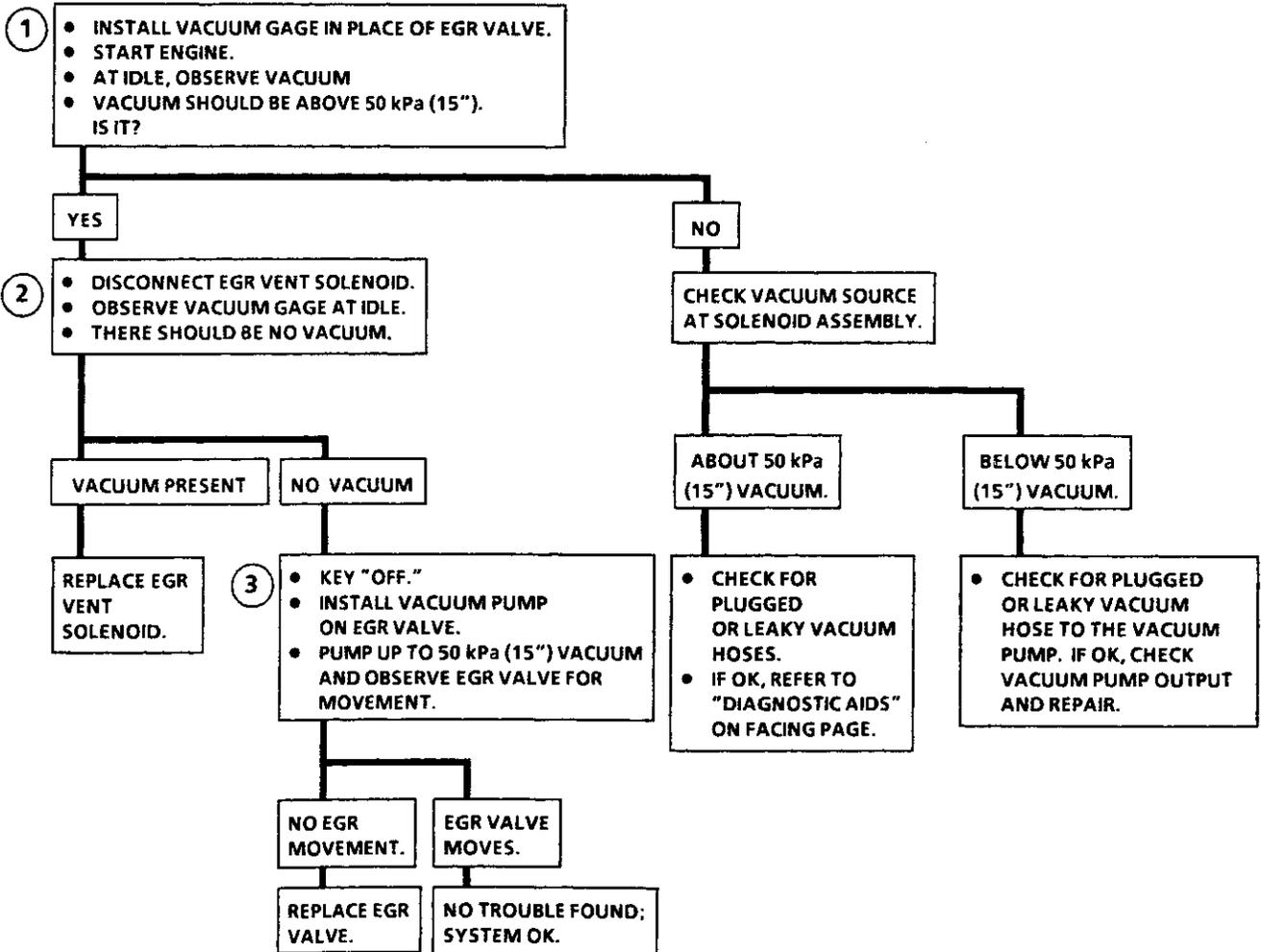
IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

DTC 32 EGR CIRCUIT ERROR



IMPORTANT:

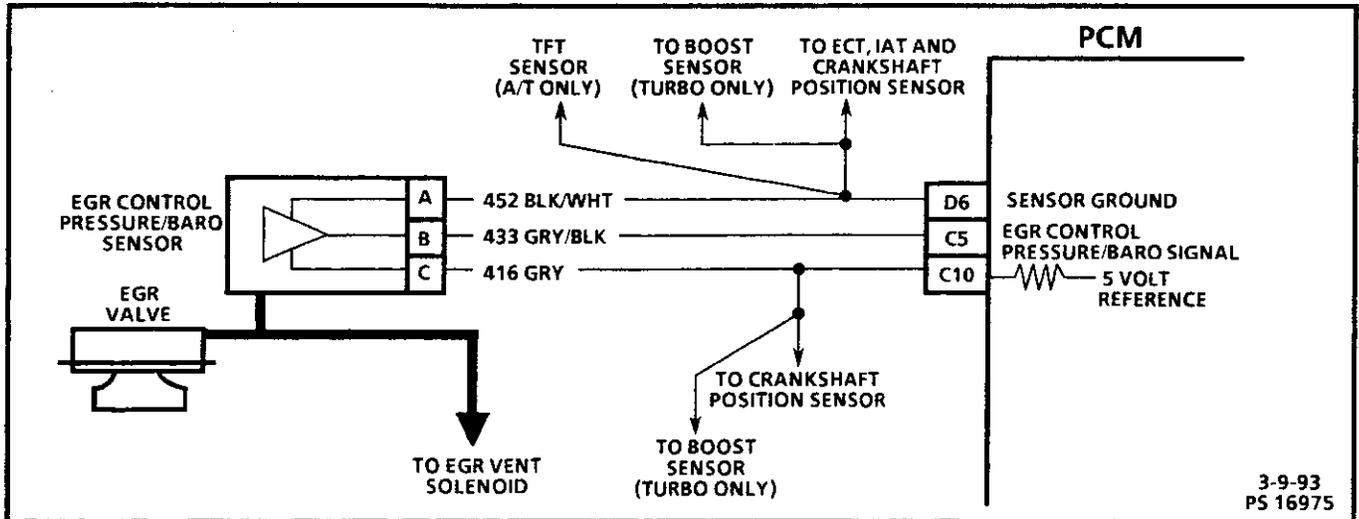
THE PCM WILL SHUT DOWN THE EGR SYSTEM IN 15 SECONDS. TO PROPERLY DIAGNOSIS EGR SYSTEM, IGNITION SHOULD BE CYCLED "ON" AND "OFF" BEFORE EACH PROCEDURE.



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(s) AND VERIFY PROPER OPERATION.

3-68 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 33

EGR CONTROL PRESSURE/BARO SENSOR CIRCUIT HIGH (LOW VACUUM)

Circuit Description:

A EGR control pressure/BARO sensor is used to monitor the amount of vacuum in the EGR circuit. It senses the actual vacuum in the EGR vacuum line and sends a signal back to the PCM. The signal is compared to the EGR duty cycle calculated by the PCM.

DTC 33 Will Set When:

- EGR vent "OFF."
- Desired EGR is less than 60 kPa from EGR pressure.

Action Taken (PCM will default to): PCM will shut off EGR system.

DTC 33 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 33 is a hard failure or an intermittent condition.
2. This step simulates conditions for a DTC 31. If the PCM recognizes the change, the PCM and CKT 433 and CKT 416 are OK.

Diagnostic Aids: With the ignition "ON" and the engine stopped, the manifold pressure is equal to atmospheric pressure with the signal voltage being high. This information is used by the PCM as an indicator of vehicle altitude.

Comparison of the reading with a known good vehicle with the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same \pm .4 volt.

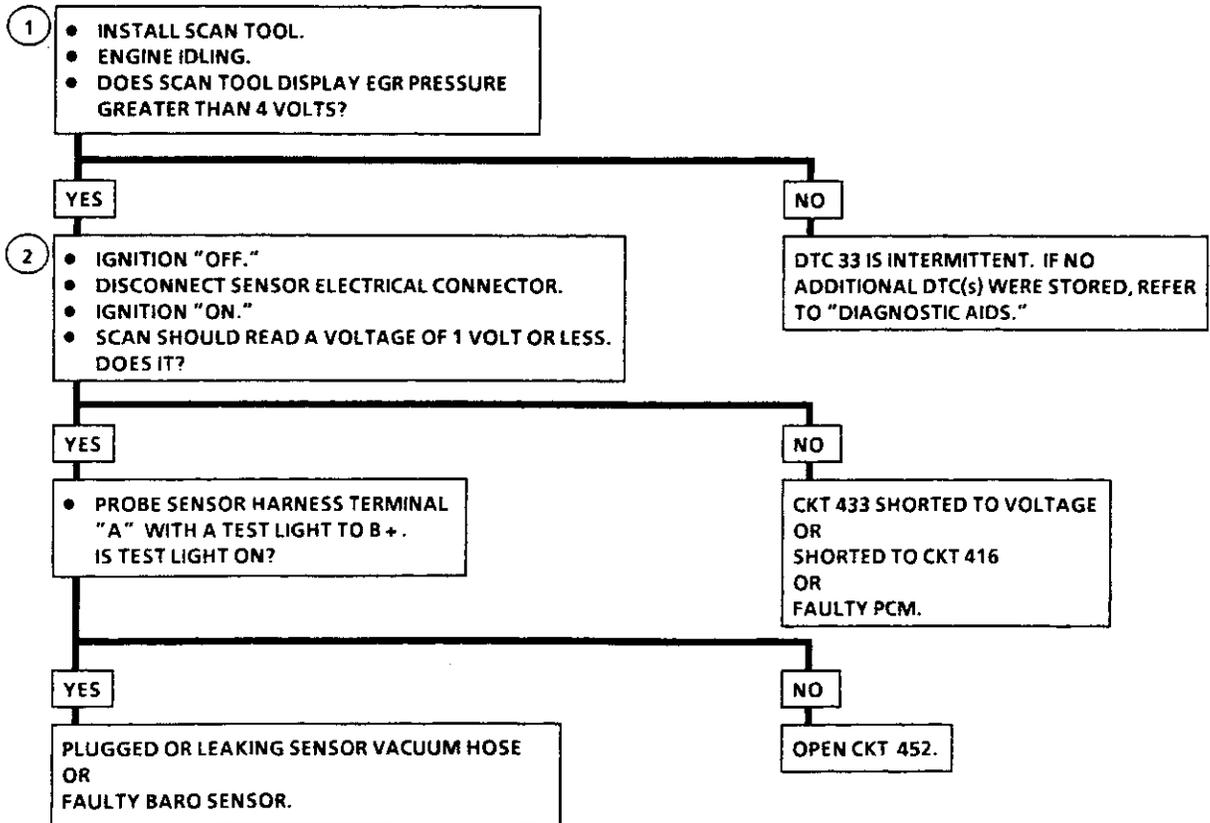
A DTC 33 will result if CKT 452 is open or if CKT 433 is shorted to voltage or to CKT 416.

If DTC 33 is intermittent, refer to SECTION 2.

NOTICE: Make sure electrical connector remains securely fastened.

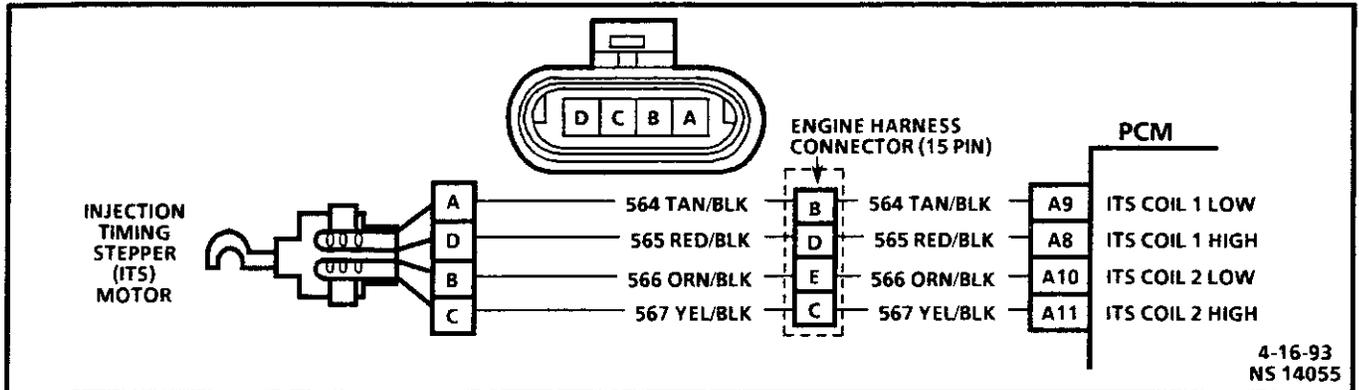
- Refer to "EGR Control Pressure/BARO Sensor Output Check" for further diagnosis.

DTC 33 EGR CONTROL PRESSURE/BARO SENSOR CIRCUIT HIGH (LOW VACUUM)



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-70 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 34

INJECTION TIMING STEPPER (ITS) MOTOR CIRCUIT FAULT

Circuit Description:

The PCM controls injection timing with the injection timing stepper motor. To increase injection timing the PCM extends the stepper motor. To retard injection timing the PCM retracts the stepper motor.

DTC 34 Will Set When:

- Engine operating at steady RPM.
- A 5° difference between measured and desired injection timing for 20.8 seconds.

Action Taken (PCM will default to): None.

DTC 34 Will Clear When: The fault condition(s) no longer exist.

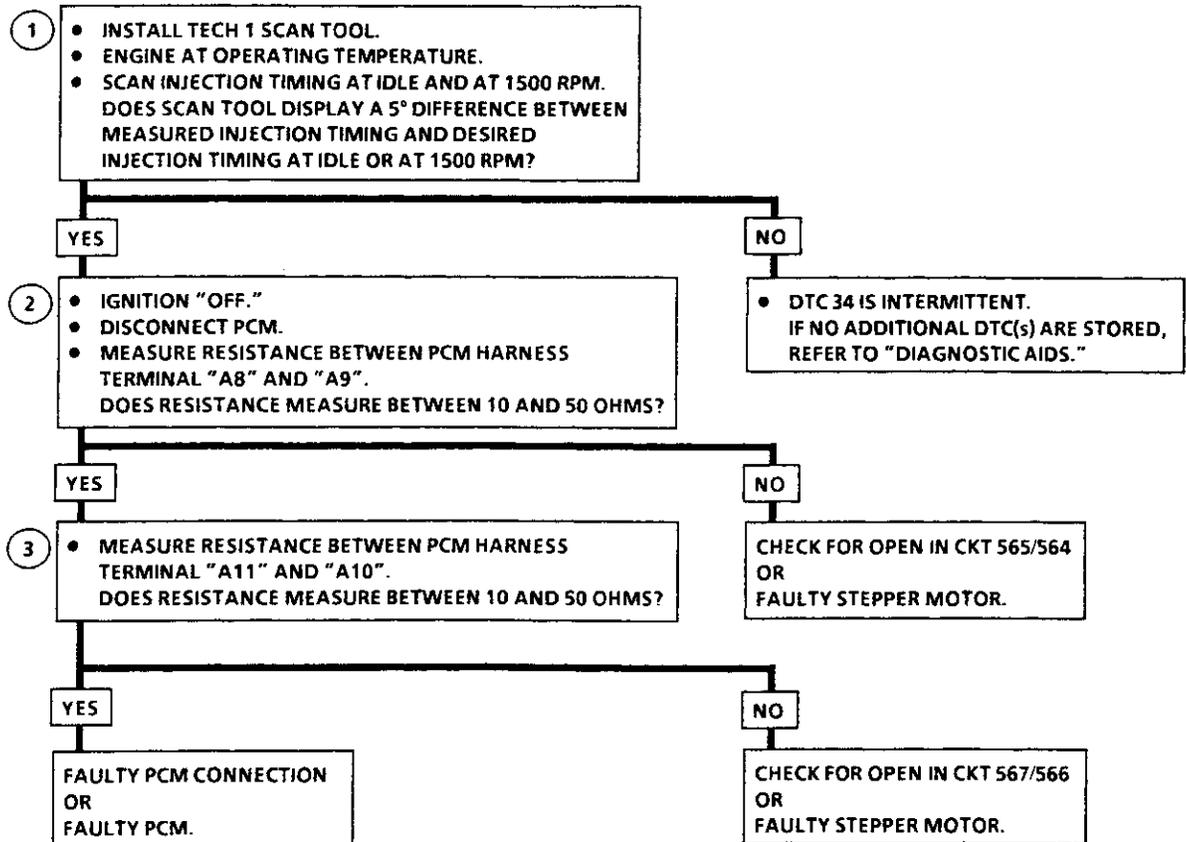
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 34 is a hard failure or an intermittent.
2. This step checks for an open or short in CKTs 564 and 565.
3. This step checks for an open or short in CKTs 566 and 567.

Diagnostic Aids: A hard start and possible poor performance condition might exist.

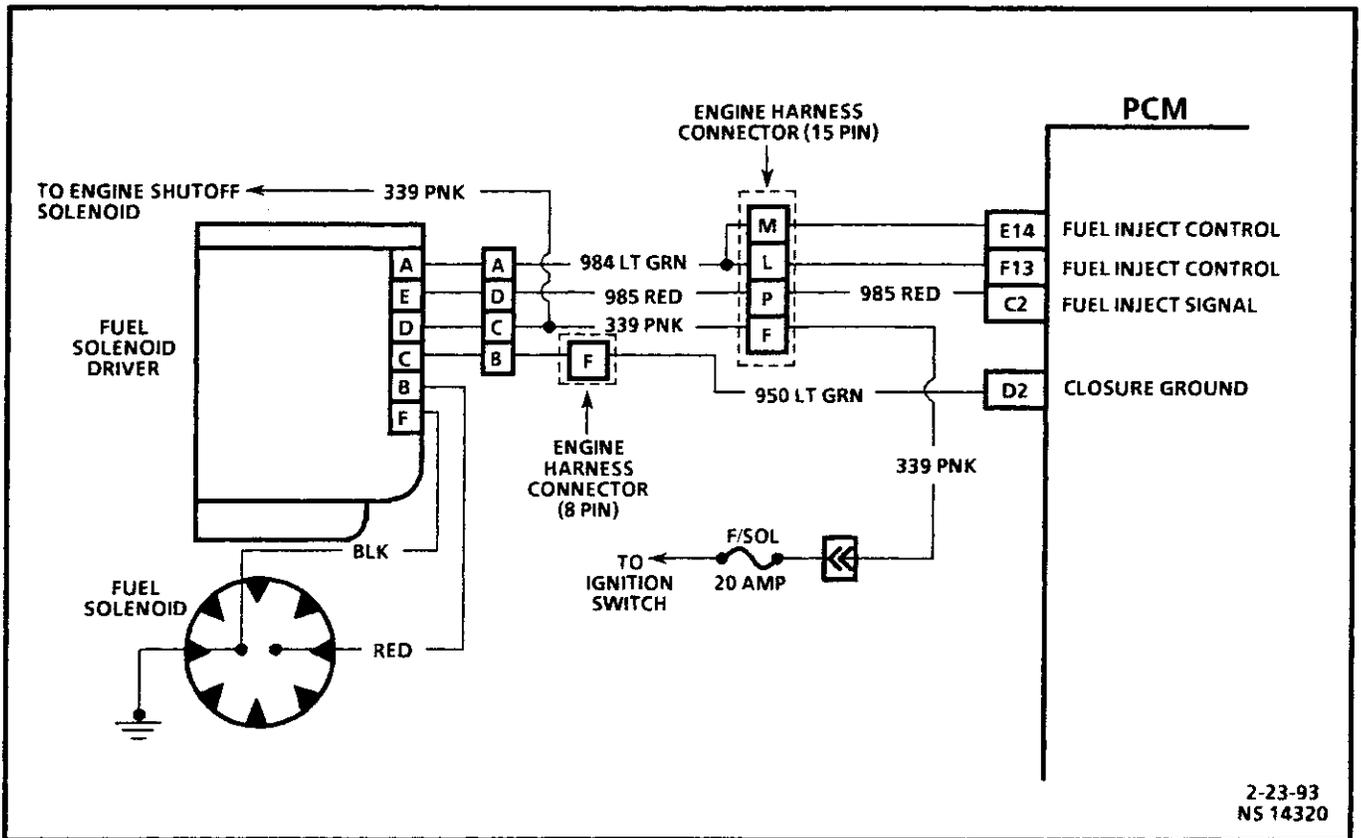
Measured injection timing will freeze at the point of the fault.

DTC 34 INJECTION TIMING STEPPER (ITS) MOTOR CIRCUIT FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-72 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 35

INJECTION PULSE WIDTH ERROR (RESPONSE TIME SHORT)

Circuit Description:

The fuel injector driver receives an inject command signal from the PCM and provides a current regulated output to the fuel solenoid that controls injection. It also returns an injection pulse width signal back to the PCM to inform it when the fuel solenoid has actually seated. This injection pulse width signal is measured in micro seconds.

DTC 35 Will Set When:

- Battery voltage greater than 10 volts.
- Engine coolant temperature greater than 20°C (68°F).
- Injection pulse width less than 1.5 milliseconds.

Action Taken (PCM will default to): Fixed injection pulse width valve.

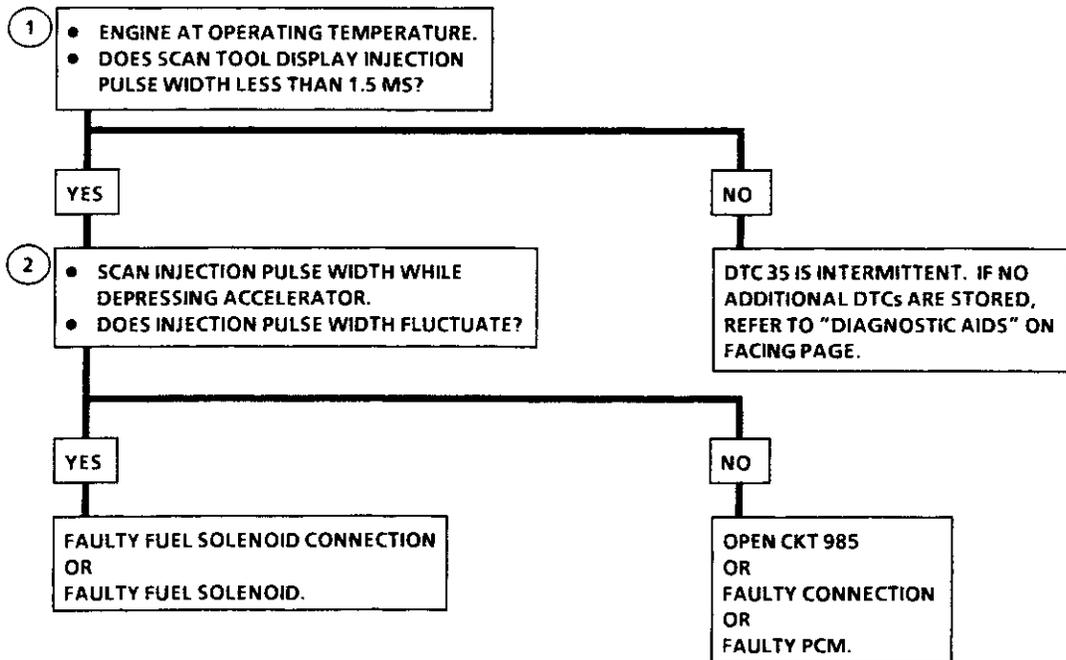
DTC 35 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 35 is the result of a hard failure or an intermittent.
2. This will check CKT 985 for an open.

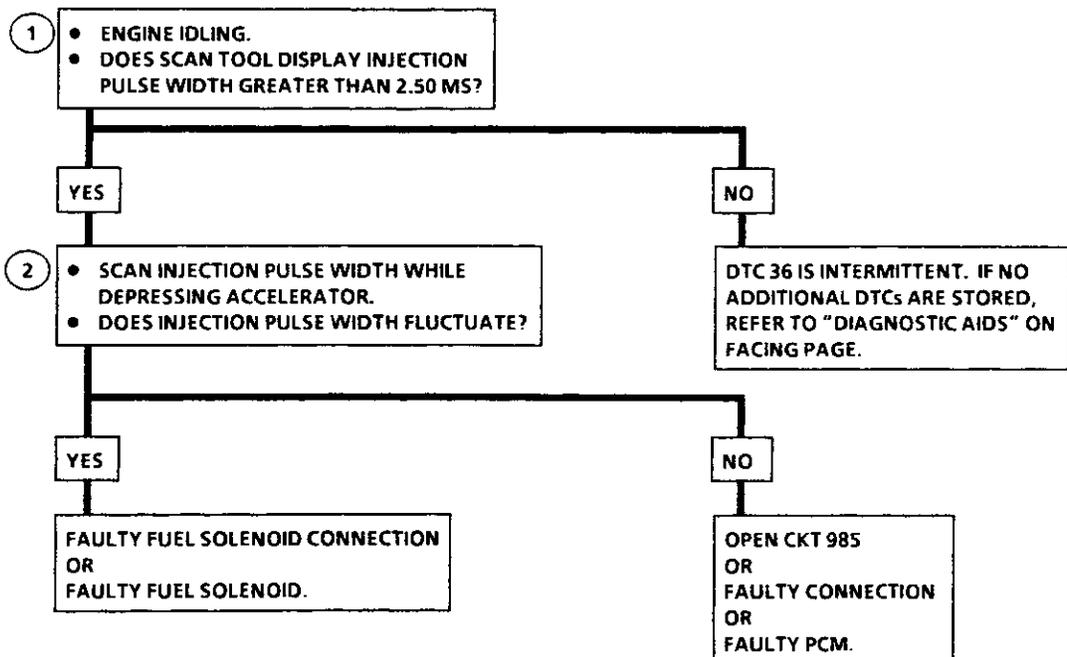
Diagnostic Aids: The injection pulse width will fluctuate slightly when throttle is depressed.

DTC 35
INJECTION PULSE WIDTH ERROR
(RESPONSE TIME SHORT)



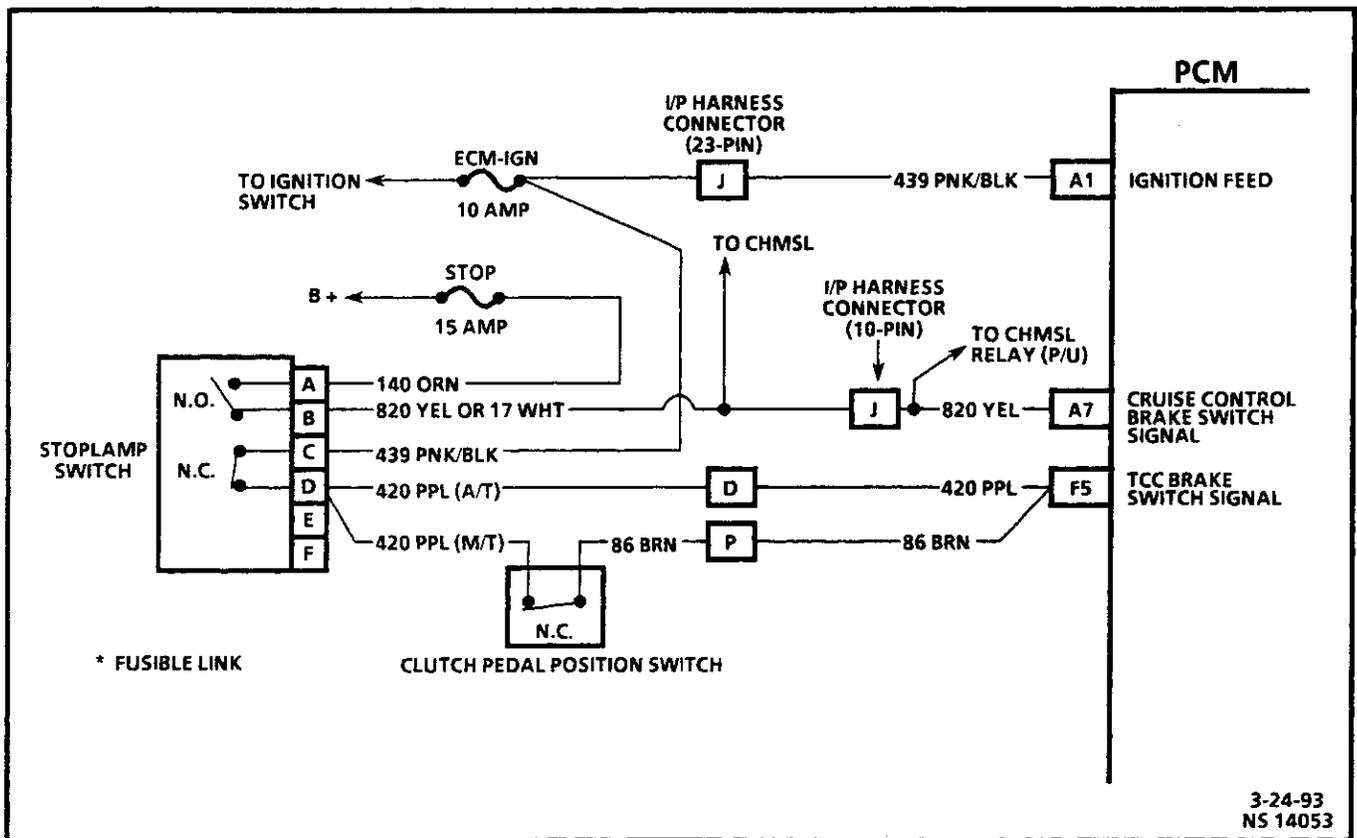
IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

DTC 36
INJECTION PULSE WIDTH ERROR
(RESPONSE TIME LONG)



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-76 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 41

BRAKE SWITCH CIRCUIT FAULT

Circuit Description:

The TCC normally closed brake switch supplies a B+ signal on CKT 420 to the PCM. The circuit is opened when the brakes are applied.

The stop lamp/cruise control normally open brake switch supplies a B+ signal on CKT 820 to the PCM when the brake is applied.

DTC 41 Will Set When:

- Vehicle on decel.
- TCC and cruise control brake switches are not toggling "open" and "closed," during 6 brake applications on same ignition cycle.

Action Taken (PCM will default to): An incorrect brake signal can affect TCC, fourth gear operation, in hot mode and cruise control.

DTC 41 Will Clear When: The fault condition(s) no longer exist.

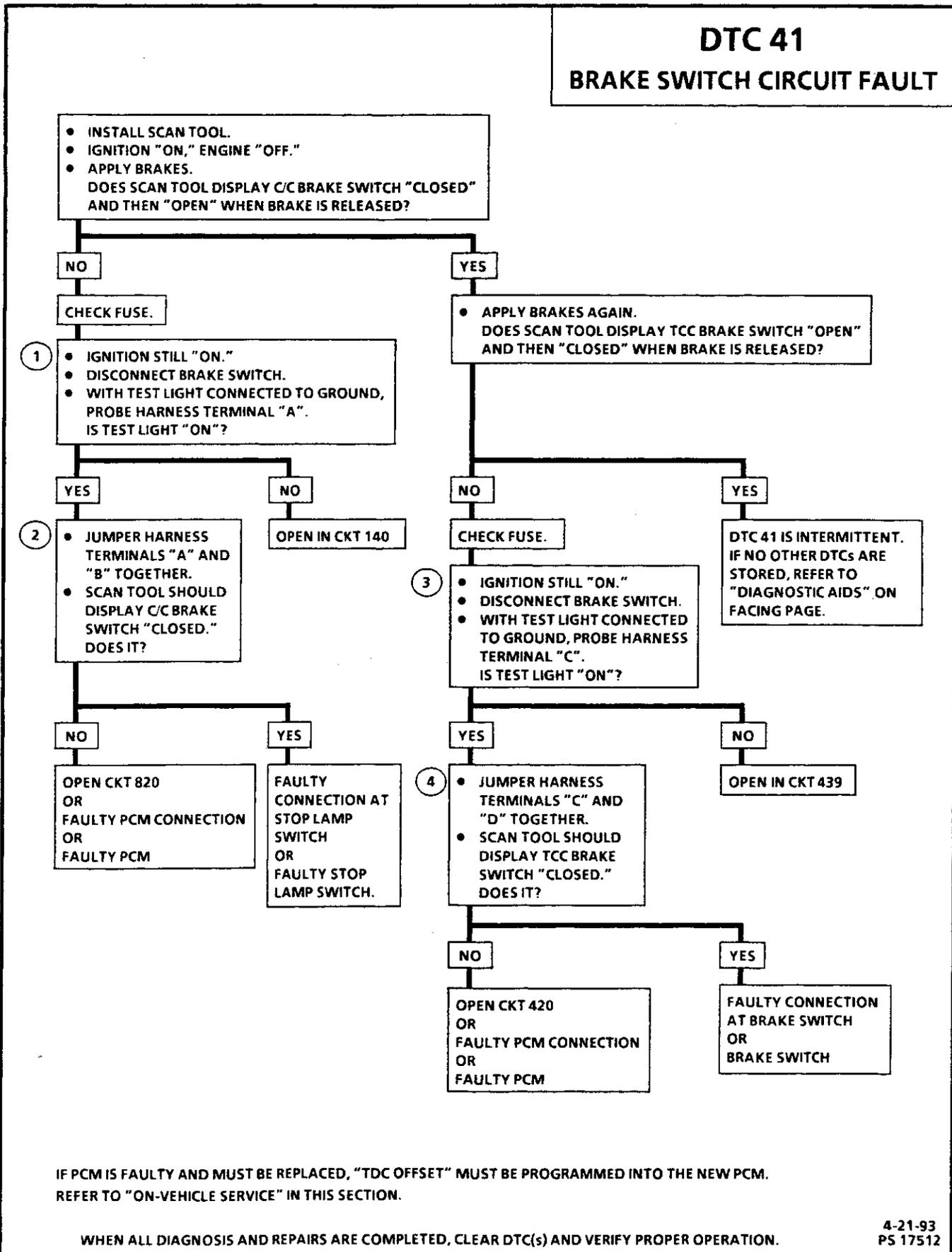
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This test checks for voltage at brake switch.
2. This test simulates brake switch closed or brakes "OFF."
3. This test checks for ignition feed to TCC brake switch.
4. This test checks CKT 420 and simulates brakes being applied.

Diagnostic Aids:

- Refer to "PCM Intermittent Diagnostic Trouble Codes or Performance."
- Check customer driving habits and/or unusual traffic conditions (i.e. stop and go expressway traffic).

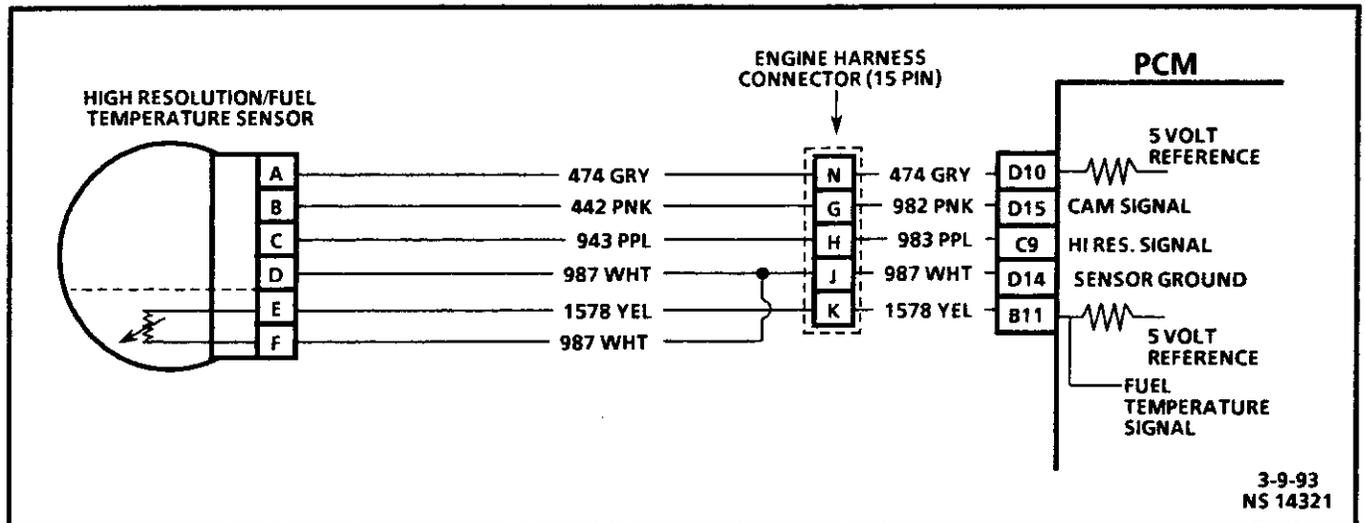
DTC 41 BRAKE SWITCH CIRCUIT FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(S) AND VERIFY PROPER OPERATION.

3-78 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 42

FUEL TEMPERATURE CIRCUIT LOW (HIGH TEMPERATURE INDICATED)

Circuit Description:

The fuel temperature sensor is a thermistor that controls signal voltage to the PCM. When the fuel is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As fuel warms, sensor resistance becomes less and voltage drops. The fuel temperature sensor is integrated with the optical sensor.

DTC 42 Will Set When: Fuel temperature greater than 102°C (215°F) for 2 seconds.

Action Taken (PCM will default to): Poor idle quality during hot conditions.

DTC 42 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

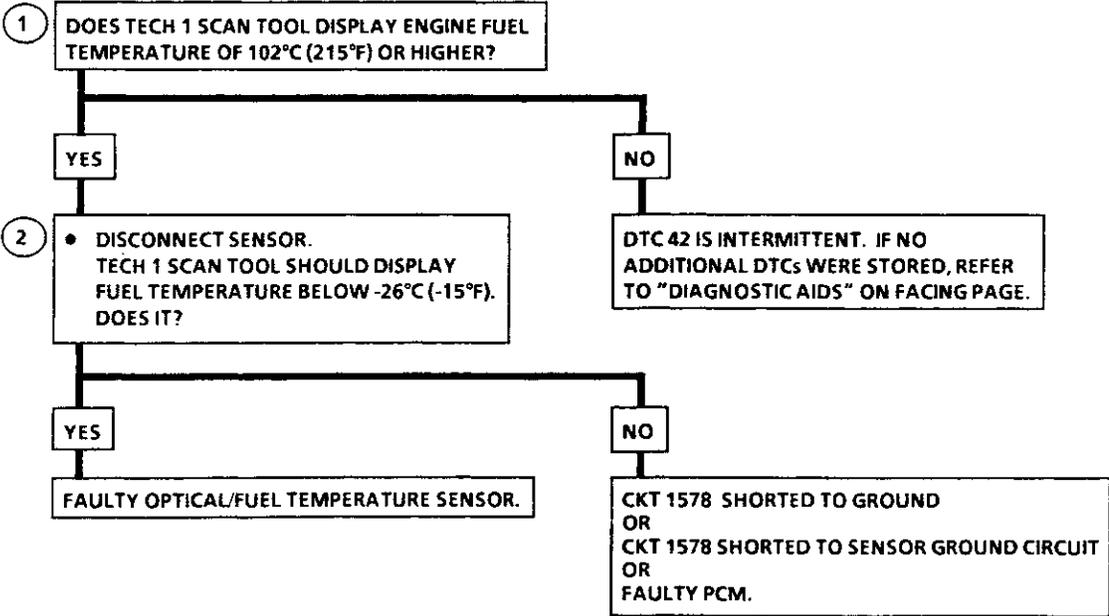
1. This step determines if DTC 42 is a hard failure or an intermittent condition.
2. This test will determine if CKT 1578 is shorted to ground.

Diagnostic Aids: A scan tool reads fuel temperature in degrees centigrade. After engine is started, the fuel temperature should rise steadily.

A faulty connection, or an open in CKTs 1578 or 987 will result in a DTC 43.

The "Temperature To Resistance Value" scale at the right may be used to test the fuel sensor at various temperature levels to evaluate the possibility of a "skewed" (mis-scaled) sensor.

DTC 42
FUEL TEMPERATURE CIRCUIT LOW
(HIGH TEMPERATURE INDICATED)

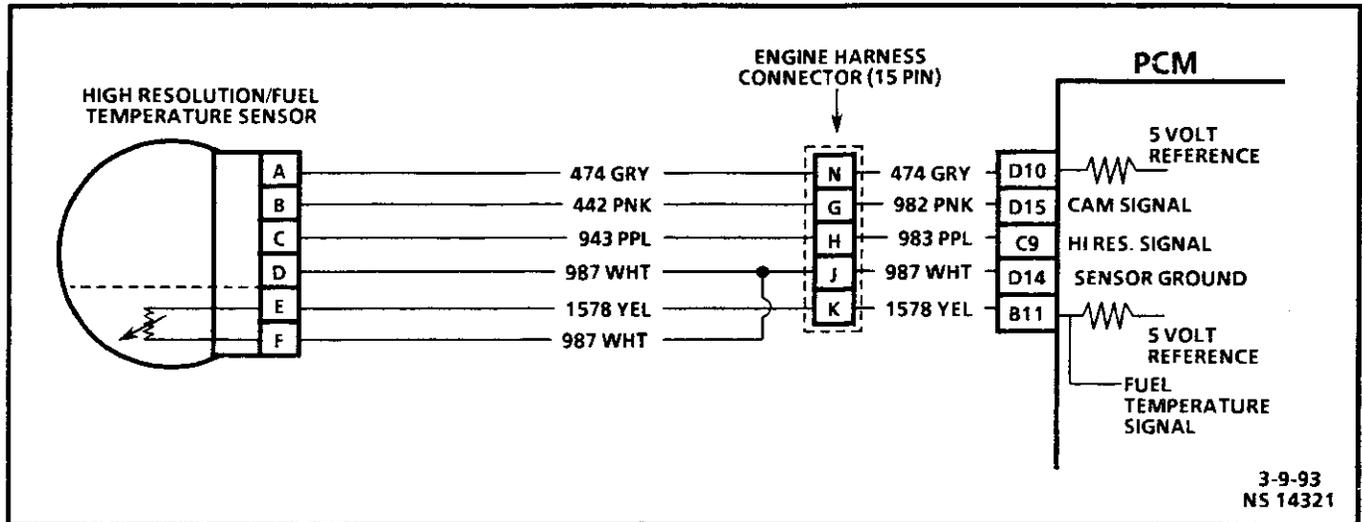


DIAGNOSTIC AID

FUEL TEMPERATURE SENSOR		
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)		
°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-80 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 43

FUEL TEMPERATURE CIRCUIT HIGH (LOW TEMPERATURE INDICATED)

Circuit Description:

The fuel temperature sensor is a thermistor that controls signal voltage to the PCM. When the fuel is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As fuel warms, sensor resistance becomes less and voltage drops. The fuel temperature sensor is integrated with the optical sensor.

DTC 43 Will Set When:

- Fuel temperature less than -14°C (6°F).
- Engine running for at least 2 minutes.

Action Taken (PCM will default to): Poor idle quality during hot conditions.

DTC 43 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 43 is a hard failure or an intermittent condition.
2. This test simulates a DTC 42. If the PCM recognizes the low signal voltage (high temp) the PCM and wiring are OK.
3. This test will determine if CKT 1578 is open. There should be 5 volts at sensor connector if measured with J 39200-DVM. This will determine if there is a wiring problem or a faulty PCM.

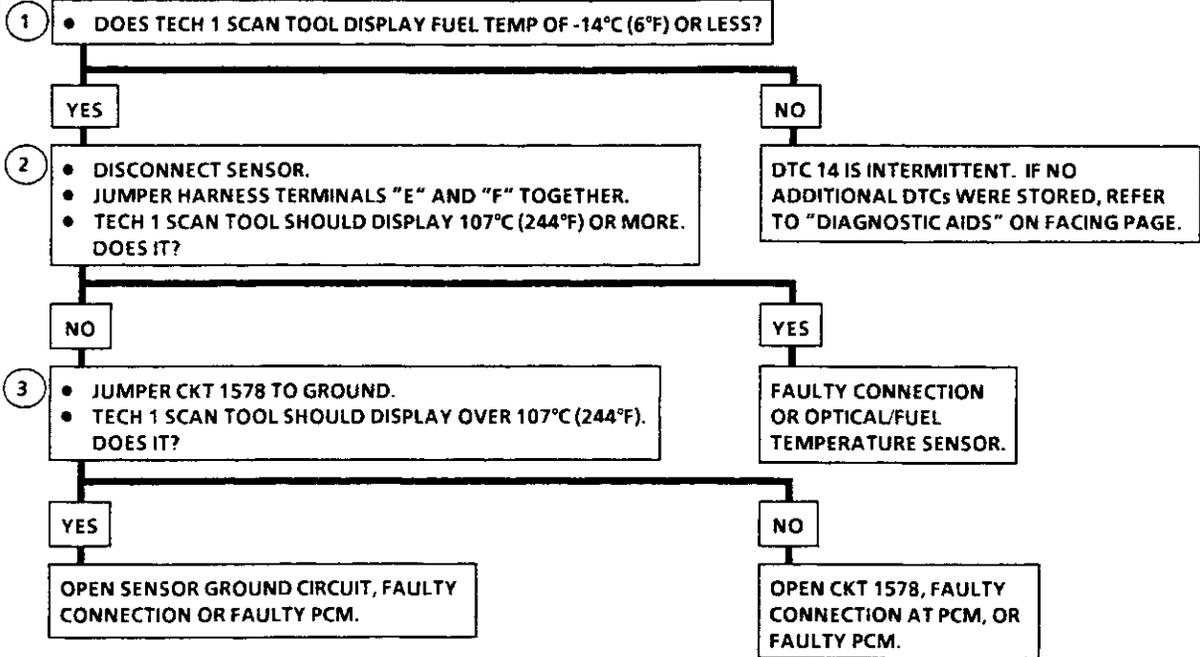
Diagnostic Aids: A scan tool reads fuel temperature in degrees centigrade. After engine is started, the temperature should rise steadily.

A faulty connection, or an open in CKTs 1578 or 987 will result in a DTC 43.

The "Temperature To Resistance Value" scale at the right may be used to test the fuel sensor at various temperature levels to evaluate the possibility of a "skewed" (mis-scaled) sensor.

DTC 43

FUEL TEMPERATURE CIRCUIT HIGH (LOW TEMPERATURE INDICATED)



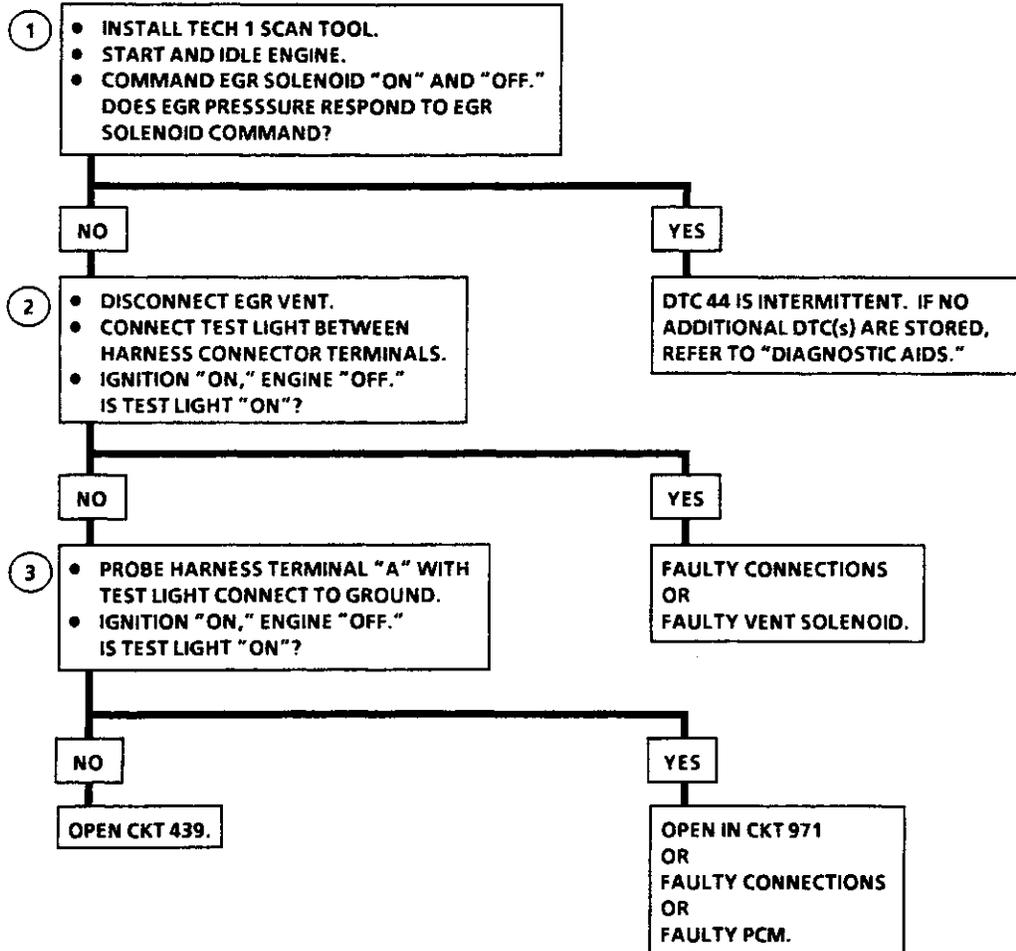
DIAGNOSTIC AID

FUEL TEMPERATURE SENSOR		
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)		
°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

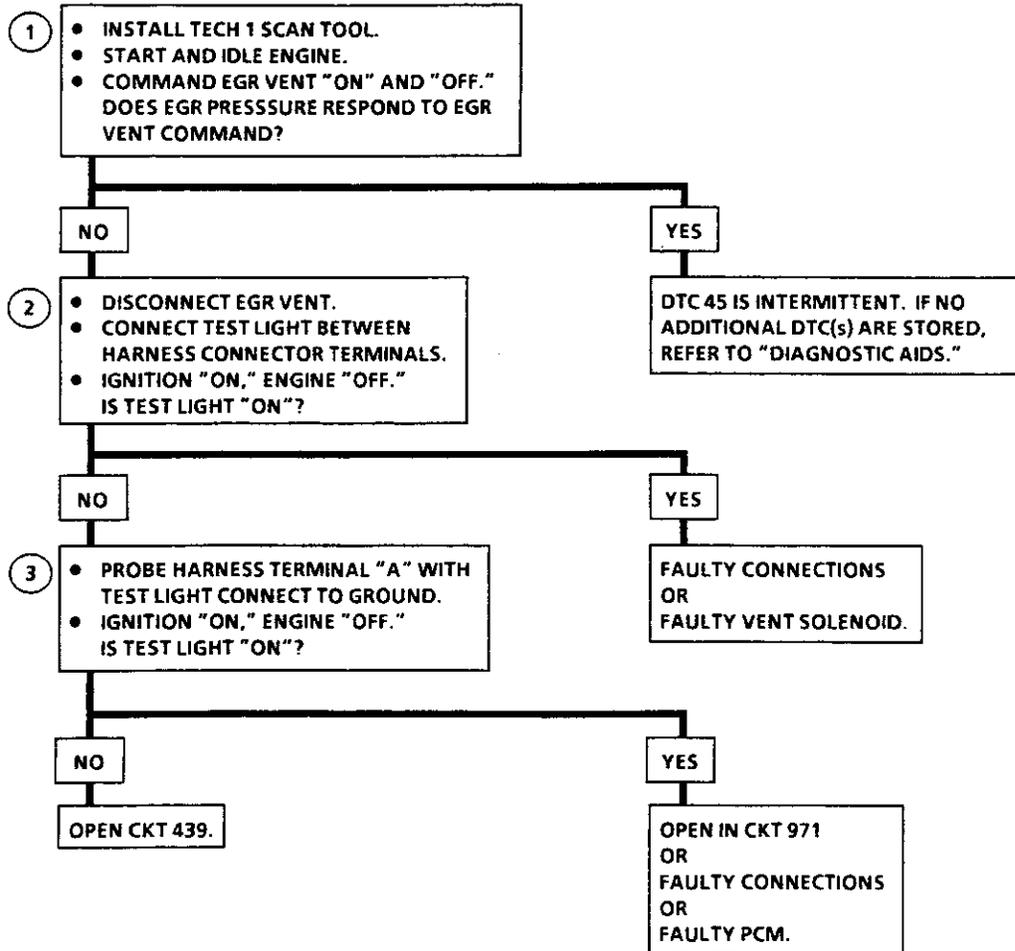
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(S) AND VERIFY PROPER OPERATION.

DTC 44
EGR PULSE WIDTH ERROR

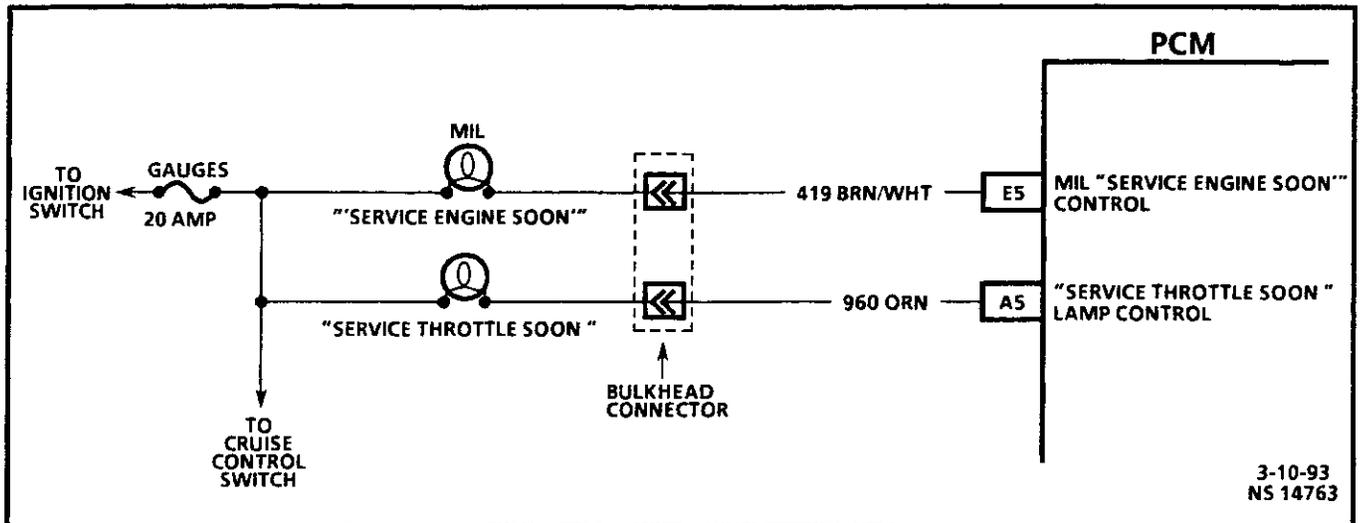


IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

**DTC 45
EGR VENT ERROR**



3-86 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 46

MIL "SERVICE ENGINE SOON" CIRCUIT FAULT

Circuit Description:

There should always be a MIL "Service Engine Soon" when the ignition is "ON" and the engine stopped. The PCM will control the MIL and turn it "ON" by providing a ground path.

DTC 46 Will Set When: No ignition voltage on Terminal "E5" when PCM is requesting MIL "ON."

Action Taken (PCM will default to): No MIL.

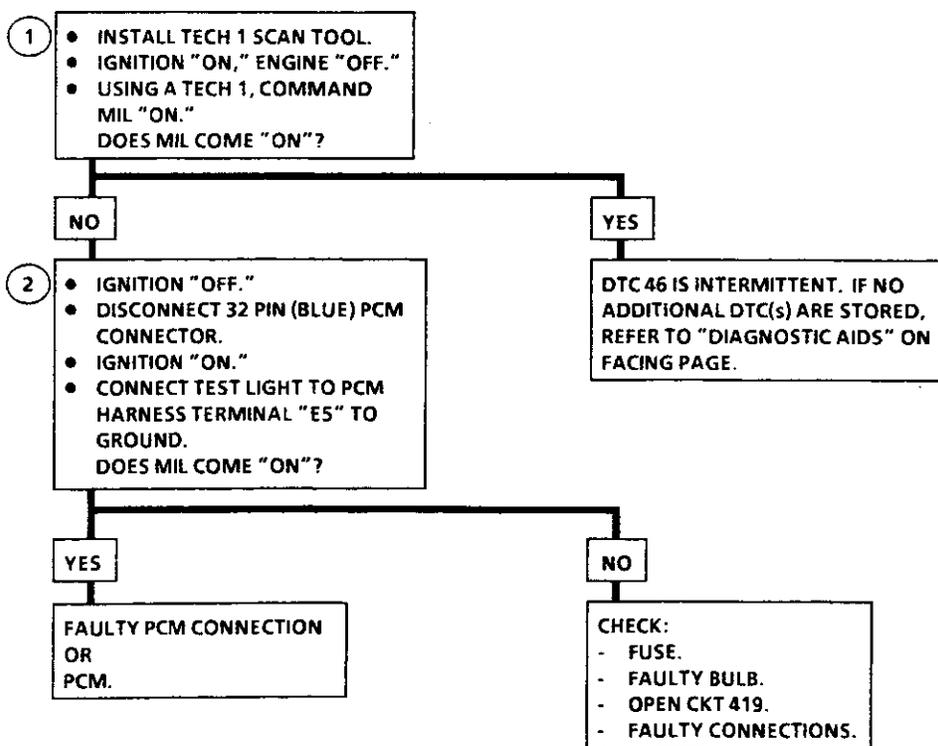
DTC 46 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This test checks the ability of the PCM to command the MIL.
2. This test will determine if there is an open in ignition feed circuit.

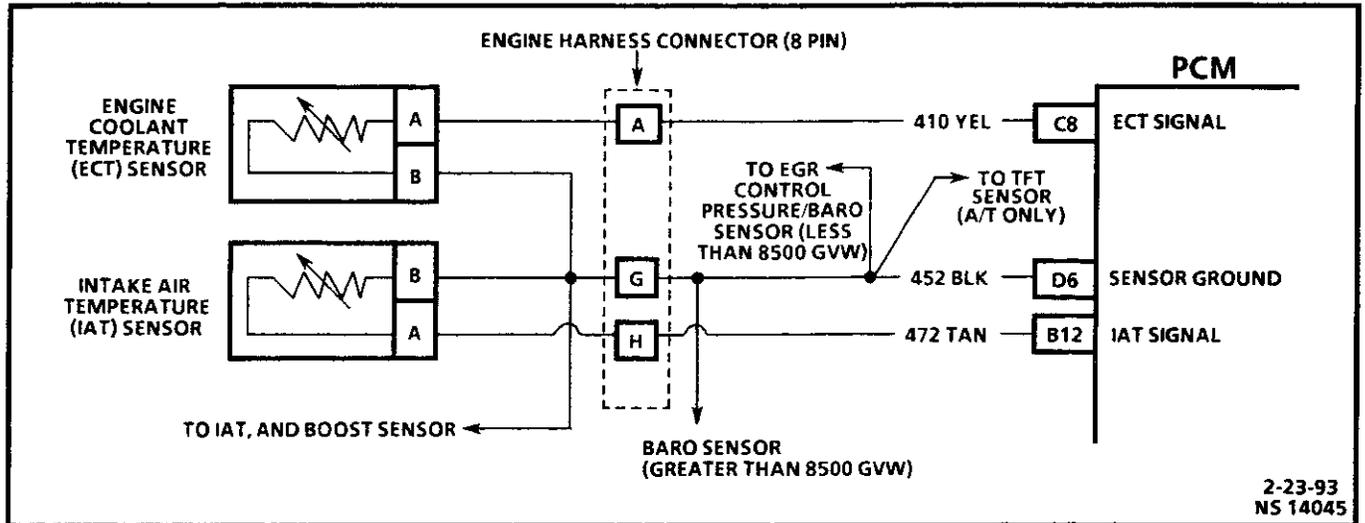
Diagnostic Aids: Check for faulty bulb or fuse. An open in CKT 419 will cause a DTC 46 to set.

DTC 46 MIL "SERVICE ENGINE SOON" CIRCUIT FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-88 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 47

INTAKE AIR TEMPERATURE (IAT) CIRCUIT LOW (HIGH TEMPERATURE INDICATED)

Circuit Description:

The intake air temperature sensor is a thermistor that controls signal voltage to the PCM. When the air is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As air warms, sensor resistance becomes less and voltage drops.

DTC 47 Will Set When:

- Engine coolant temperature less than 38°C (100°F).
- Intake air temperature is greater than 96°C (205°F) for 2 seconds.

Action Taken (PCM will default to): Poor performance during cold operation.

DTC 47 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 47 is a hard failure or an intermittent condition.
2. This test will determine if CKT 472 is shorted to ground.

Diagnostic Aids: Check harness routing for a potential short to ground in CKT 472.

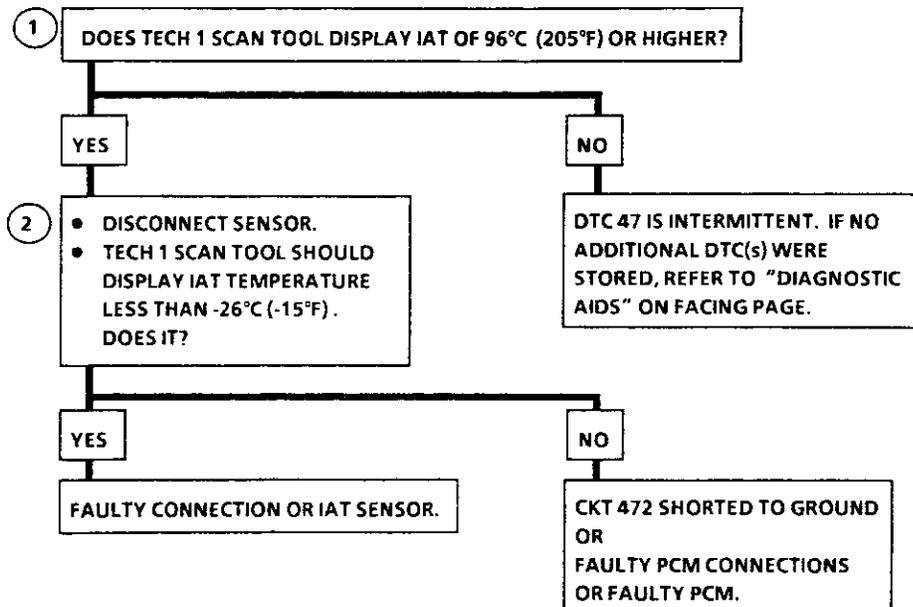
Tech 1 scan tool displays intake air temperature in degrees centigrade.

Refer to "Intermittents" in SECTION 2.

The "Temperature to Resistance Value" scale at the right may be used to test the intake air temperature sensor at various temperature levels to evaluate the possibility of a "skewed" (mis-scaled) sensor. A "skewed" sensor could result in poor driveability complaints.

DTC 47

INTAKE AIR TEMPERATURE (IAT) CIRCUIT LOW (HIGH TEMPERATURE INDICATED)



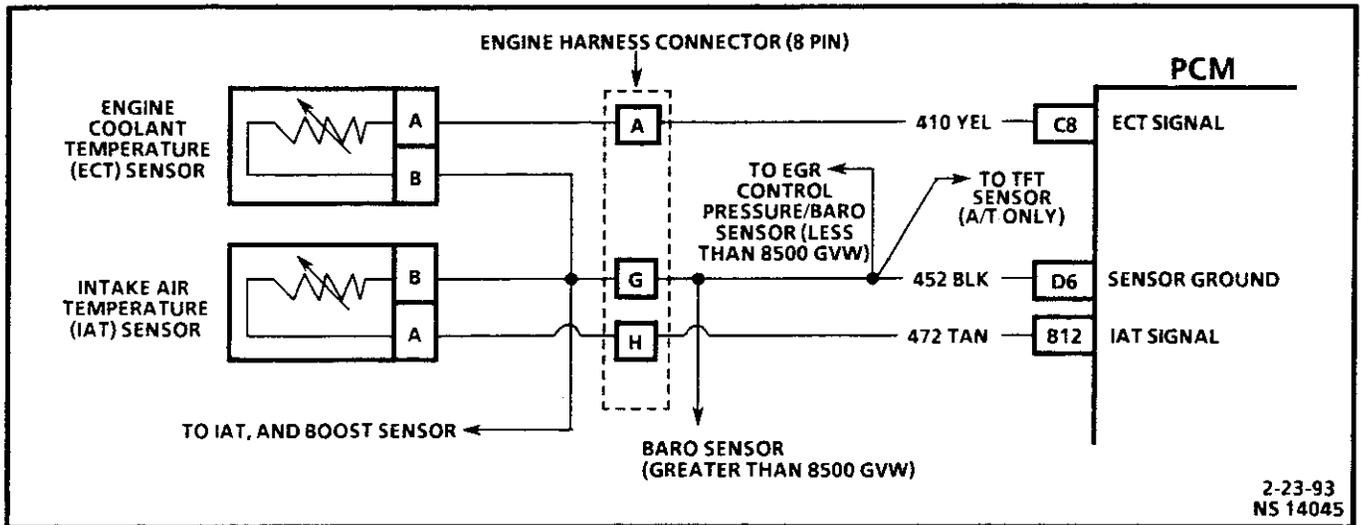
DIAGNOSTIC AID

INTAKE AIR TEMPERATURE SENSOR		
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)		
°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(S) AND VERIFY PROPER OPERATION.

3-90 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 48

INTAKE AIR TEMPERATURE (IAT) CIRCUIT HIGH (LOW TEMPERATURE INDICATED)

Circuit Description:

The intake air temperature sensor is a thermistor that controls signal voltage to the PCM. When the air is cold, the sensor resistance is high, therefore the PCM will see high signal voltage. As air warms, sensor resistance becomes less and voltage drops.

DTC 48 Will Set When: Intake air temperature less than -38°C (-39°F) for 2 minutes.

Action Taken (PCM will default to): Possible poor performance during cold operation.

DTC 48 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 48 is a hard failure or an intermittent condition.
2. This test will determine if circuit is shorted to ground.
3. This step will determine if there is a wiring problem or a faulty PCM.

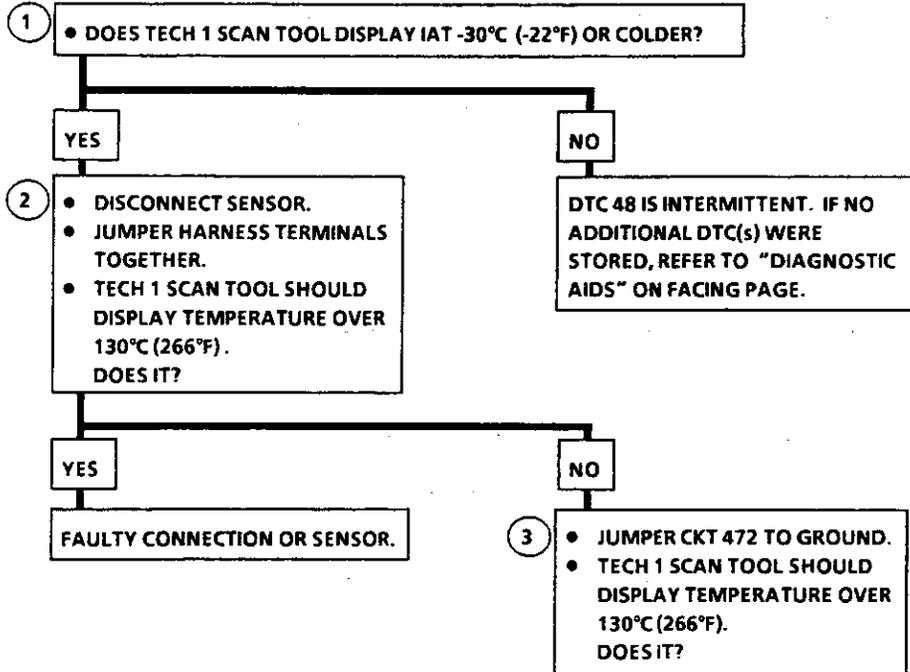
Diagnostic Aids: Check harness routing for a potential short to ground in CKT 472.

Tech 1 scan tool displays intake air temperature in degrees centigrade.

Refer to "Intermittents" in SECTION 2.

The "Temperature to Resistance Value" scaled at the right may be used to test the engine coolant sensor at various temperature levels to evaluate the possibility of a "skewed" (mis-scaled) sensor. A "skewed" sensor could result in poor driveability complaints.

DTC 48 INTAKE AIR TEMPERATURE (IAT) CIRCUIT HIGH (LOW TEMPERATURE INDICATED)



DIAGNOSTIC AID

INTAKE AIR TEMPERATURE SENSOR

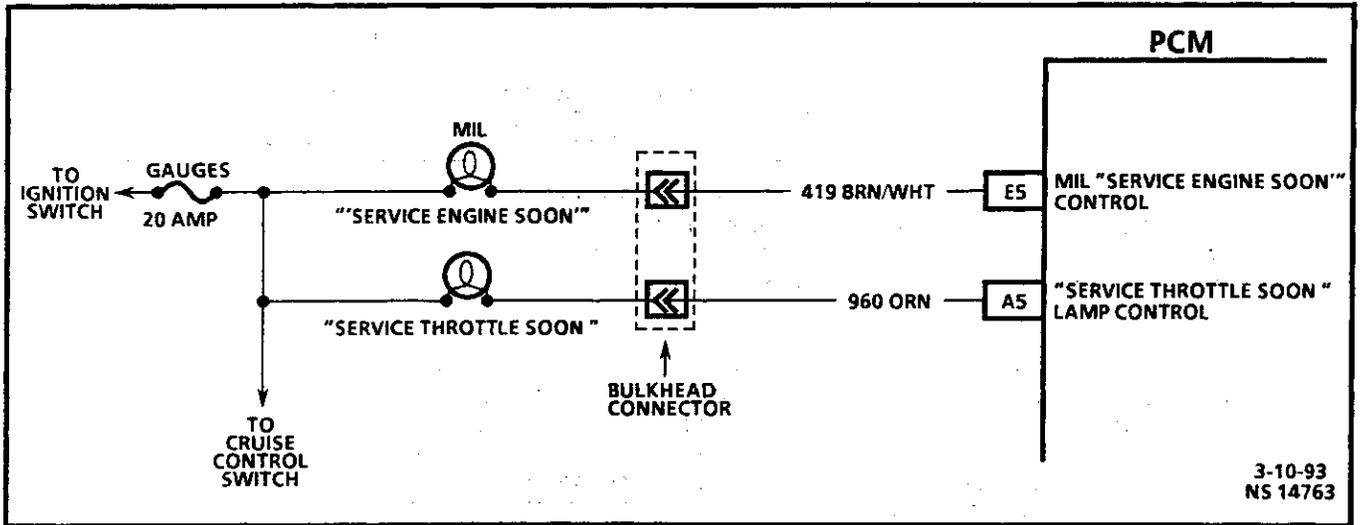
TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)

°C	°F	OHMS
100	212	177
90	194	241
80	176	332
70	158	467
60	140	667
50	122	973
45	113	1188
40	104	1459
35	95	1802
30	86	2238
25	77	2796
20	68	3520
15	59	4450
10	50	5670
5	41	7280
0	32	9420
-5	23	12300
-10	14	16180
-15	5	21450
-20	-4	28680
-30	-22	52700
-40	-40	100700

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETED, CLEAR DTC(s) AND VERIFY PROPER OPERATION.

3-92 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 49

"SERVICE THROTTLE SOON" LAMP CIRCUIT FAULT

Circuit Description:

There should be a "Service Throttle Soon" lamp when the ignition is "ON" and the engine "OFF" for 2 seconds. The PCM will control the "Service Throttle Soon" and turn it "ON" by providing a ground path.

DTC 49 Will Set When: No ignition voltage on Terminal "A5" when PCM is requesting "Service Throttle Soon" lamp "ON."

Action Taken (PCM will default to): DTC 49 will not turn "ON" the MIL, but will set a current and history DTC.

DTC 49 Will Clear When: The fault condition(s) no longer exist.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This test checks the ability of the PCM to command the STS lamp.
2. This test will determine if there is an open in ignition feed circuit.

Diagnostic Aids: Check for faulty bulb or fuse. An open in CKT 960 will cause a DTC 49 to set.

3-94 DRIVEABILITY AND EMISSIONS (DIESEL)

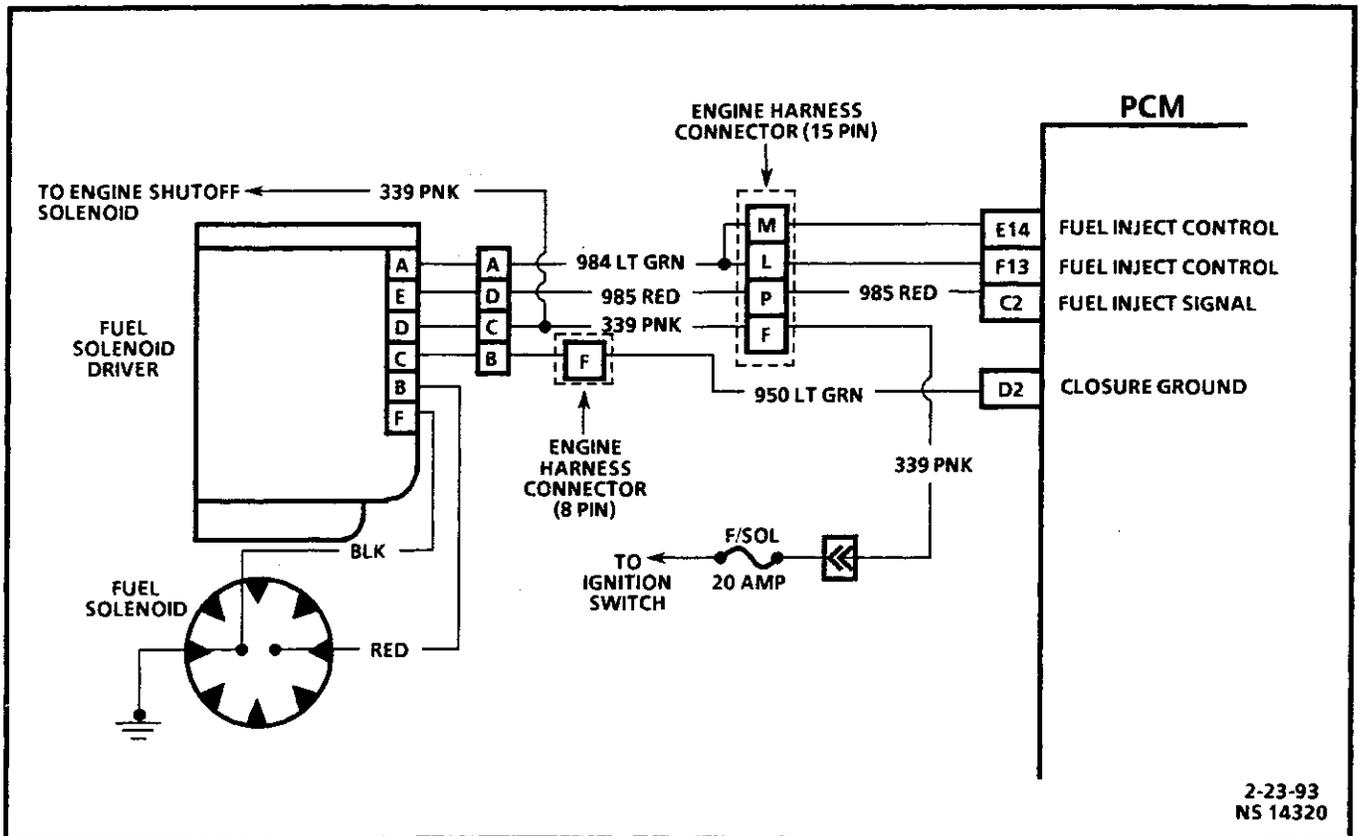
BLANK

DTC 51
PROM ERROR
(FAULTY OR INCORRECT PROM)

CHECK THAT ALL PINS ARE FULLY INSERTED IN THE SOCKET. IF OK, REPLACE PROM, CLEAR MEMORY AND RECHECK. IF DTC 51 REAPPEARS, REPLACE PCM.

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-96 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 56

INJECTION PUMP CALIBRATION RESISTOR ERROR

Circuit Description:

The PCM uses a calibrated resistor mounted internally in the injection pump to determine fuel rates. The resistor value is stored in the PCM memory. If the PCM memory has been disturbed or the PCM has been replaced, the PCM will relearn the resistor value on the next ignition cycle.

DTC 56 Will Set When: PCM has lost its memory and is unable to read a resistor value on CKT 960 on the next ignition cycle. Possible poor performance problem.

Action Taken (PCM will default to): A current and history DTC will store and turn "ON" the MIL. The PCM will default to the lowest fuel table.

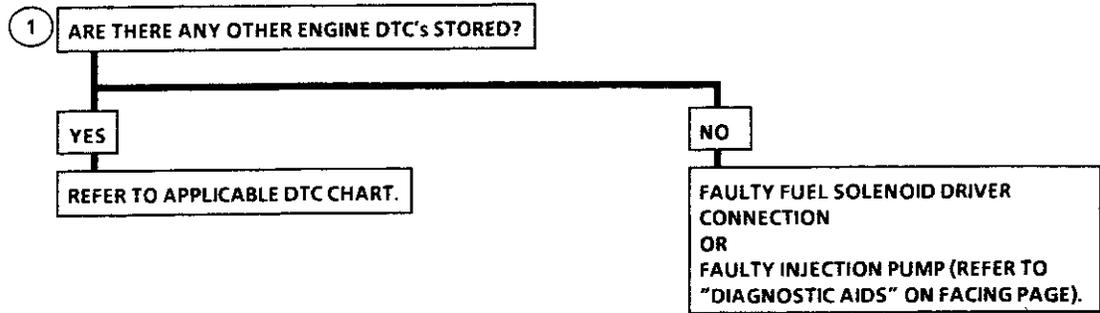
DTC 56 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 56 is a hard failure.

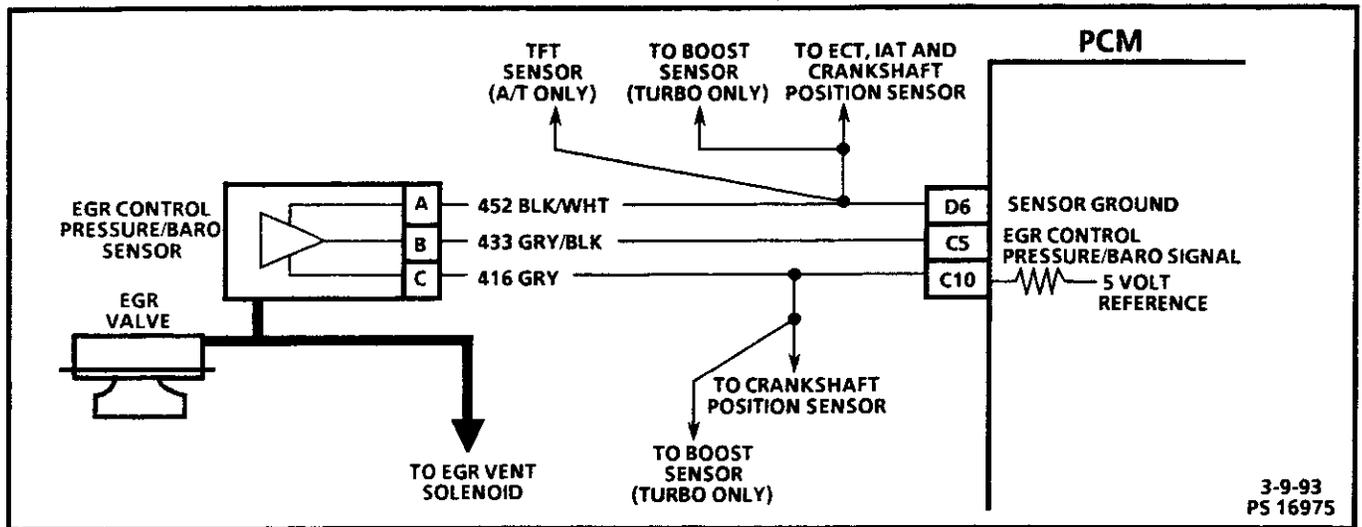
Diagnostic Aids: Check connection at fuel injector driver. Clear DTC, and cycle ignition. If DTC clears, treat condition as an intermittent.

DTC 56
INJECTION PUMP CALIBRATION
RESISTOR ERROR



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-98 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 57

PCM 5 VOLT SHORTED

Circuit Description:

The 5 volt reference is a non-varying calculated voltage.

DTC 57 Will Set When: 5 volt reference is less than 1 volt.

Action Taken (PCM will default to): Backup fuel, no EGR and no turbo boost.

DTC 57 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

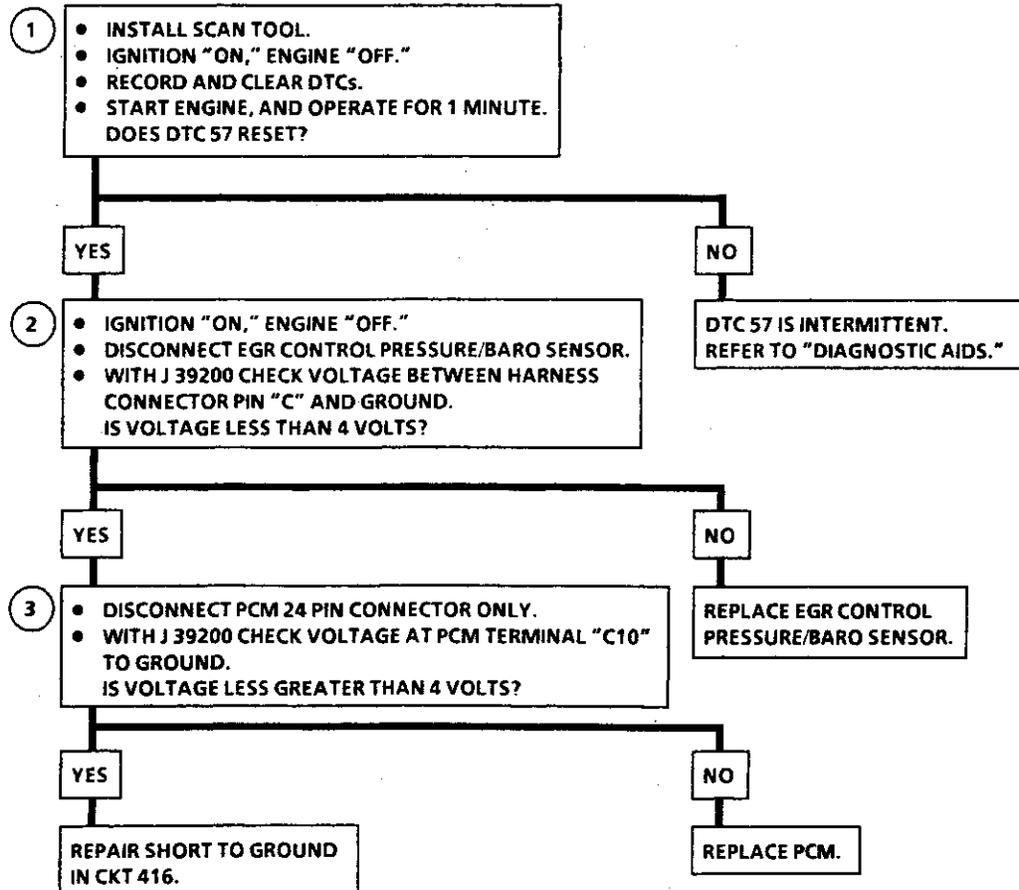
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. Checks to confirm that a DTC is still present.
2. Checks to determine if there is a 5 volt reference from the PCM.
3. Checks to determine if there is a short-to-ground in CKT 416, or a short-to-ground in the PCM.

Diagnostic Aids: During the time the failure is present, the setting of additional DTCs may result.

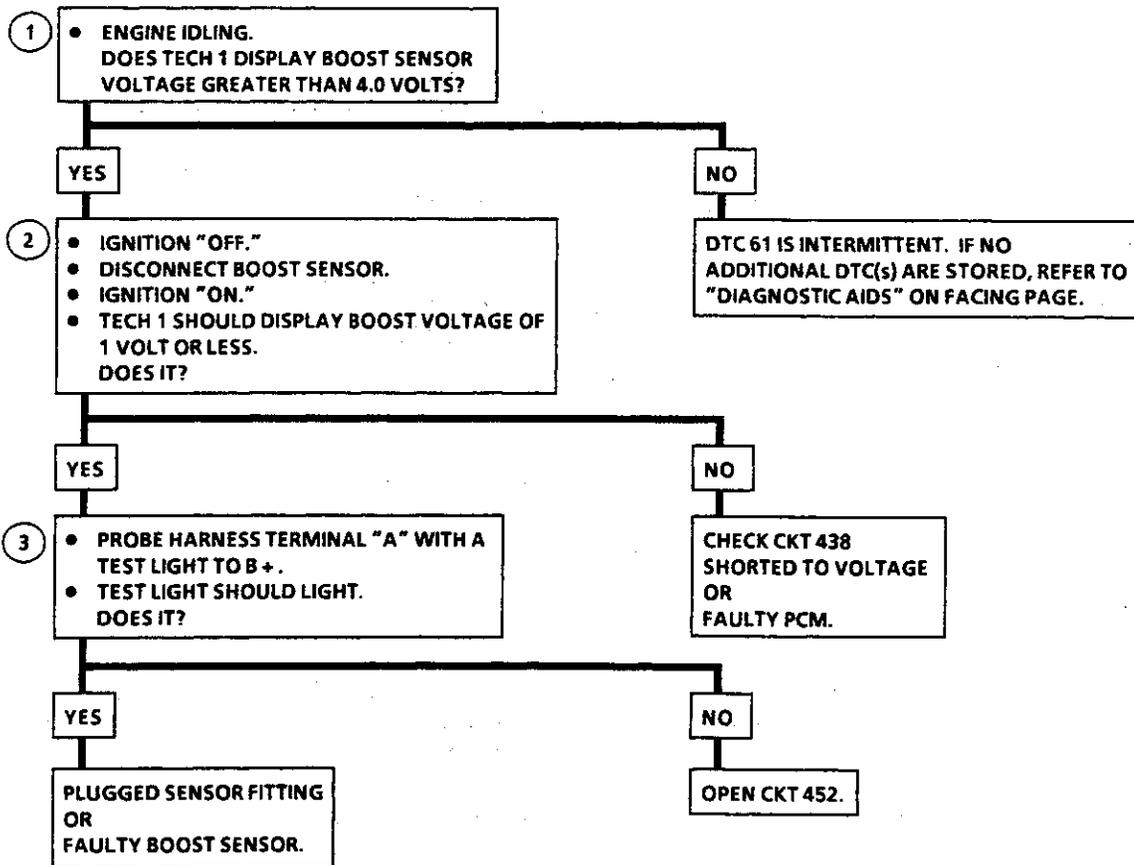
3-9-93
PS 16975

**DTC 57
PCM 5 VOLT SHORTED**



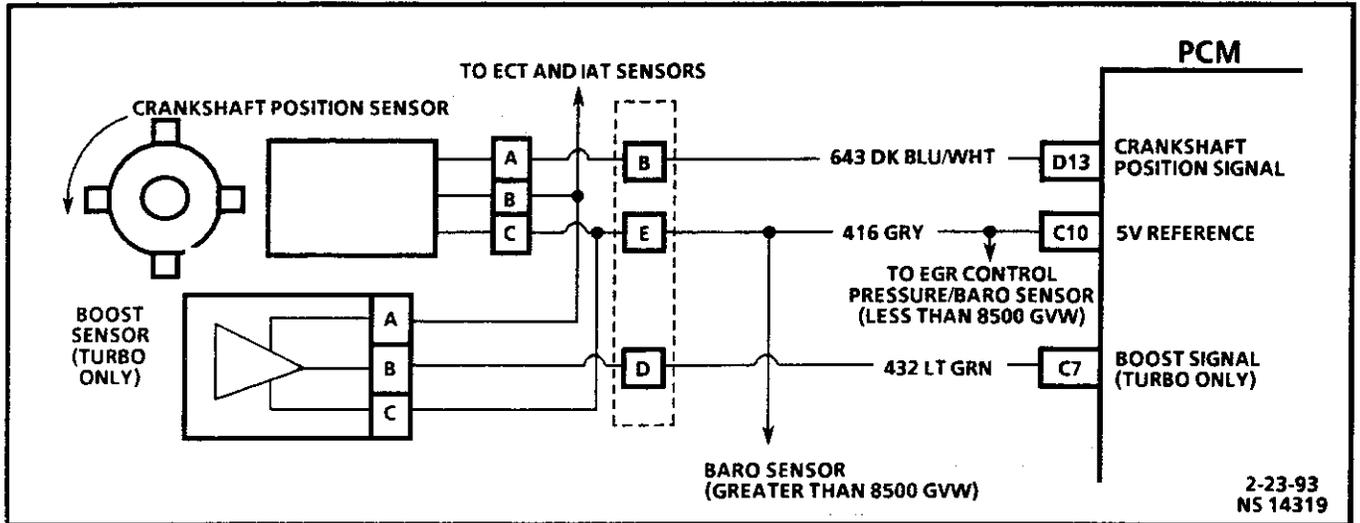
IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

DTC 61 TURBO BOOST SENSOR CIRCUIT HIGH



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-102 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 62

TURBO BOOST SENSOR CIRCUIT LOW

Circuit Description:

The PCM sends a 5 volt reference signal to the boost sensor. As manifold pressure changes, the electrical resistance of the boost sensor also changes. By monitoring the sensor output voltage, the PCM detects how much pressure is being produced by the turbocharger in the intake manifold. The PCM uses the boost sensor to control turbo boost and fuel at different loads.

DTC 62 Will Set When: Boost signal voltage less than .8 volt.

Action Taken (PCM will default to): No turbo boost and limited fuel.

DTC 62 Will Clear When: The fault condition(s) no longer exist.

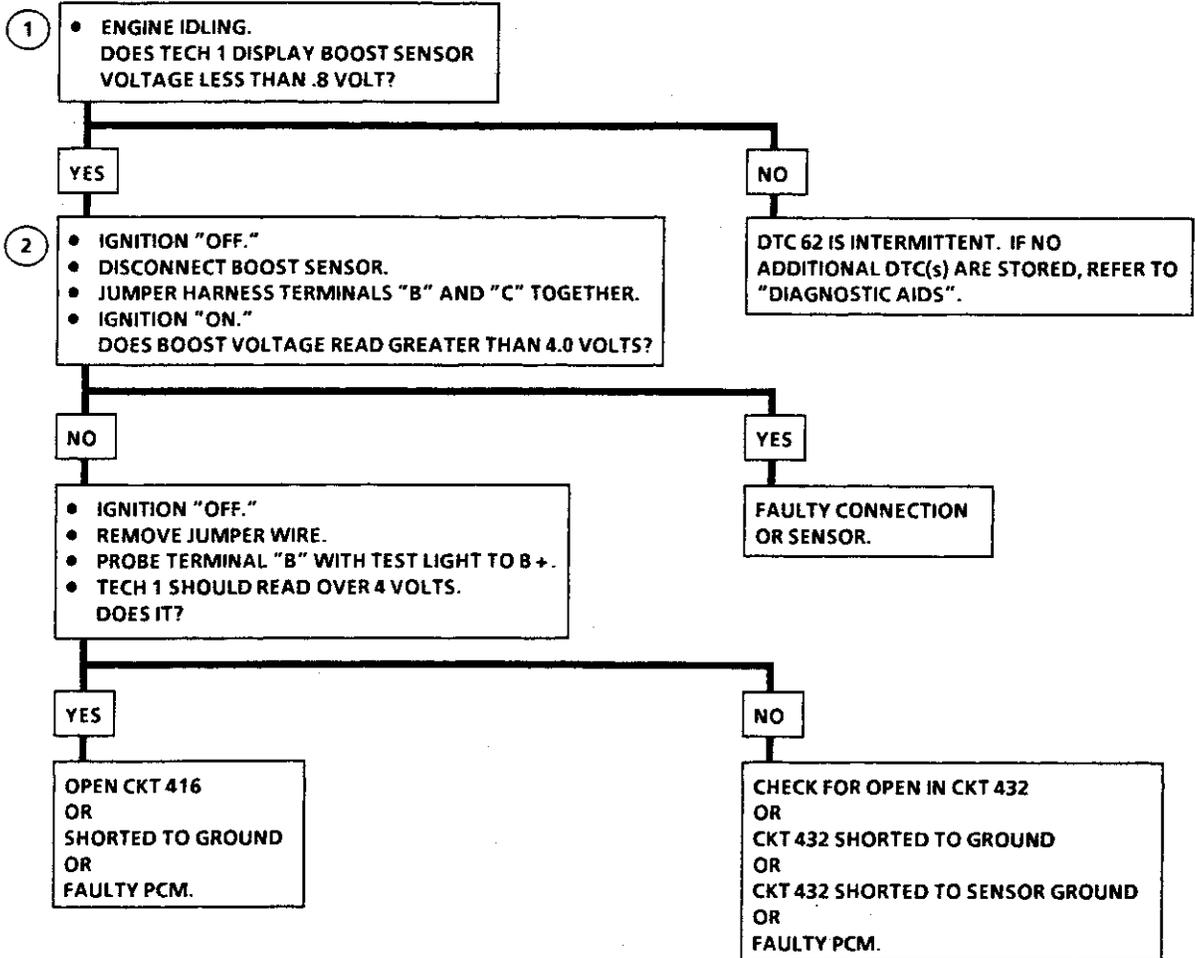
DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 62 is the result of a hard failure or an intermittent condition.
2. This step simulates conditions for a DTC 61. If the PCM recognizes the change, the PCM and CKT 416 and CKT 432 are OK.

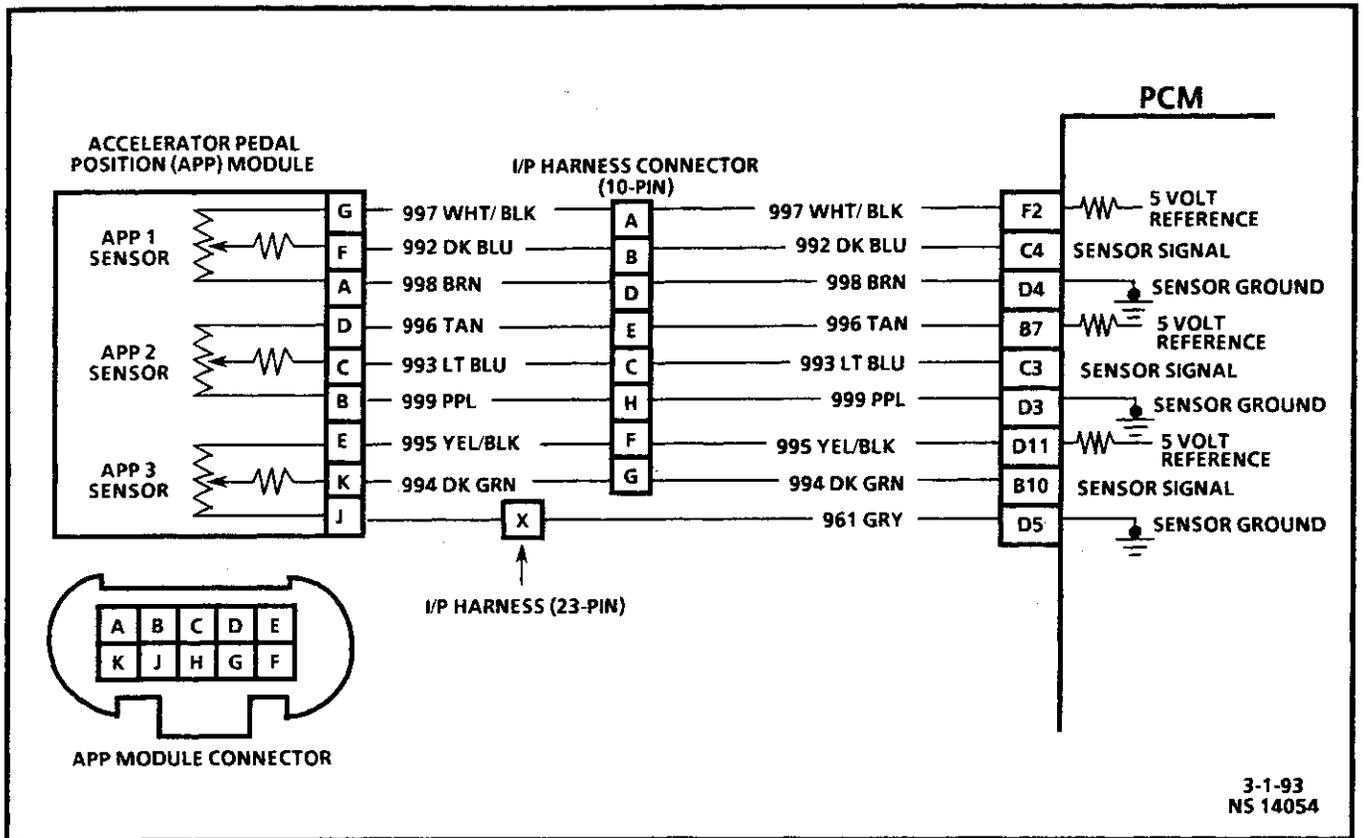
Diagnostic Aids: With the ignition "ON" and the engine stopped, boost pressure is equal to atmospheric pressure with the signal voltage being high.

Comparison of this reading with a known good vehicle using the same sensor is a good way to check accuracy of a "suspect" sensor. Readings should be the same $\pm .4$ volt.

DTC 62 TURBO BOOST SENSOR CIRCUIT LOW



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.



DTC 63

ACCELERATOR PEDAL POSITION (APP) 3 CIRCUIT HIGH

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 63 Will Set When: Voltage is greater than 4.75 volts for 2 seconds on APP 3 sensor.

Action Taken (PCM will default to): The input from APP 3 sensor is ignored. A current and history DTC will set but it will not turn "ON" the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

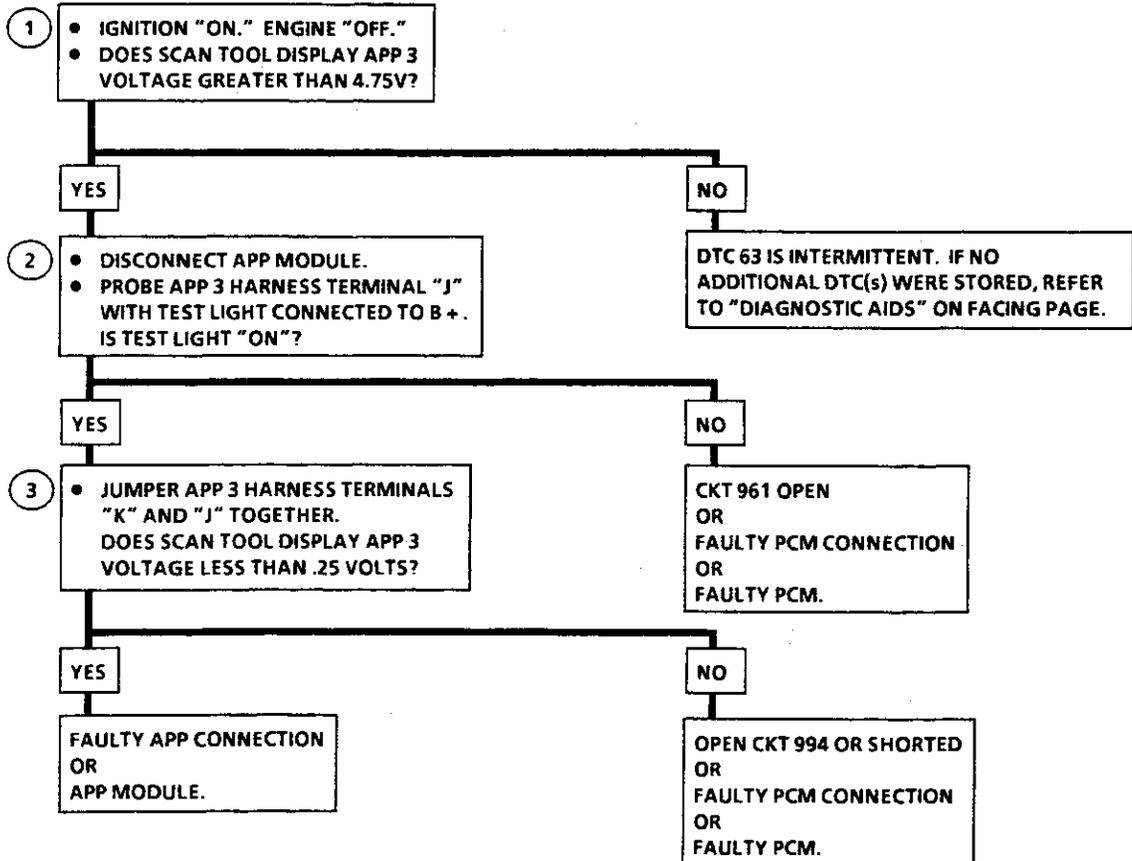
1. This step will determine if DTC 63 is the result of a hard failure or an intermittent condition.
2. This step checks the PCM and wiring.
3. This will check for an open in ground CKT 994 and PCM.

Diagnostic Aids: A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

Also, 90% pedal travel is acceptable for correct APP operation.

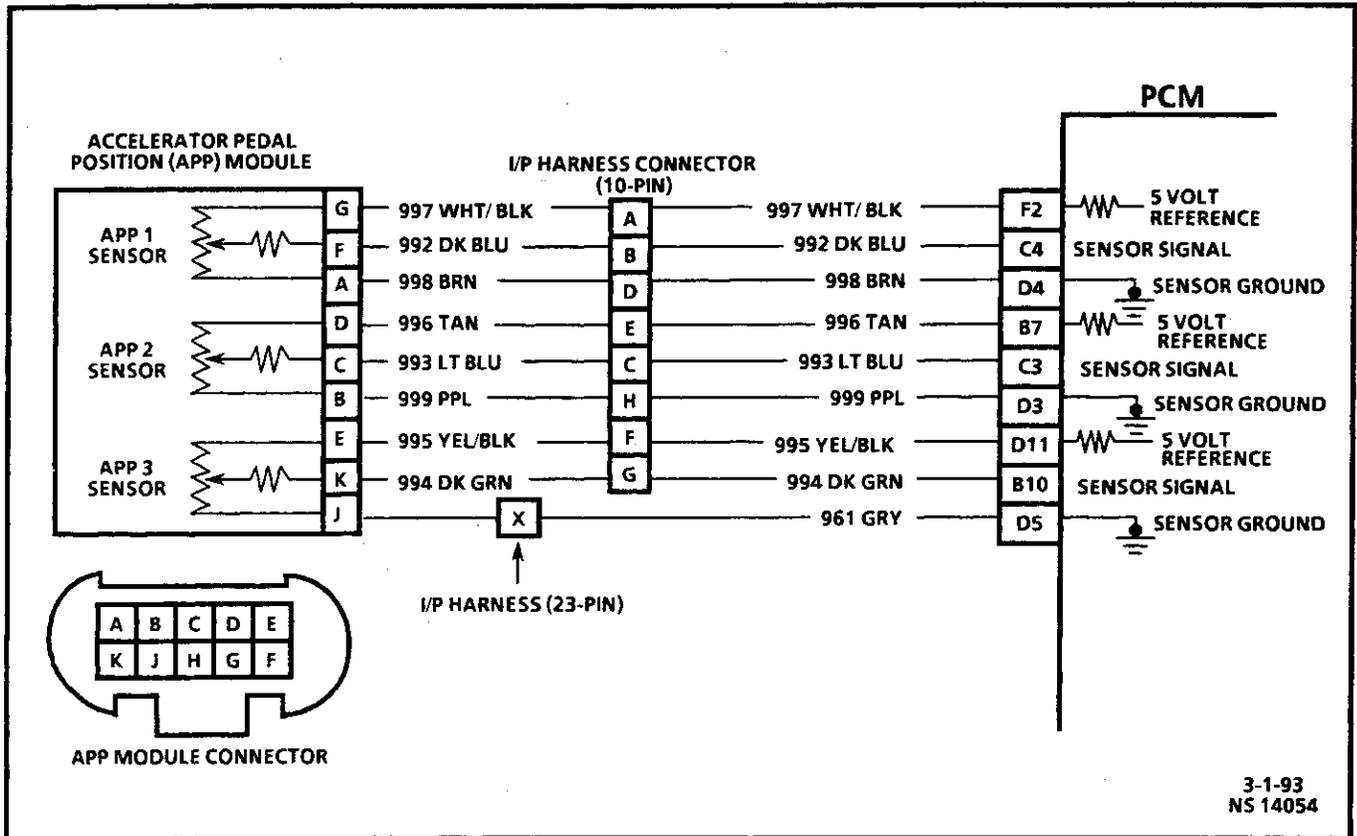
Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 63 ACCELERATOR PEDAL POSITION (APP) 3 CIRCUIT HIGH



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-106 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 64

ACCELERATOR PEDAL POSITION (APP) 3 CIRCUIT LOW

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 64 Will Set When: Voltage is less than .25 volt for 2 seconds on APP 3 sensor.

Action Taken (PCM will default to): The input from APP 3 sensor is ignored. A current and history DTC will set but it will not turn "ON" the "Service Throttle Soon" lamp. The throttle will operate normally as long as there is only one malfunction present. If two different APP sensors have a malfunction, the "Service Throttle Soon" lamp will light and the PCM will limit power. If three APP sensors have a malfunction present, the "Service Throttle Soon" lamp will light and the PCM will only allow the engine to operate at idle.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if DTC 64 is the result of a hard failure or an intermittent condition.
2. This step checks the PCM and wiring.
3. This will check the PCM and CKT 994.

Diagnostic Aids: A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT) position.

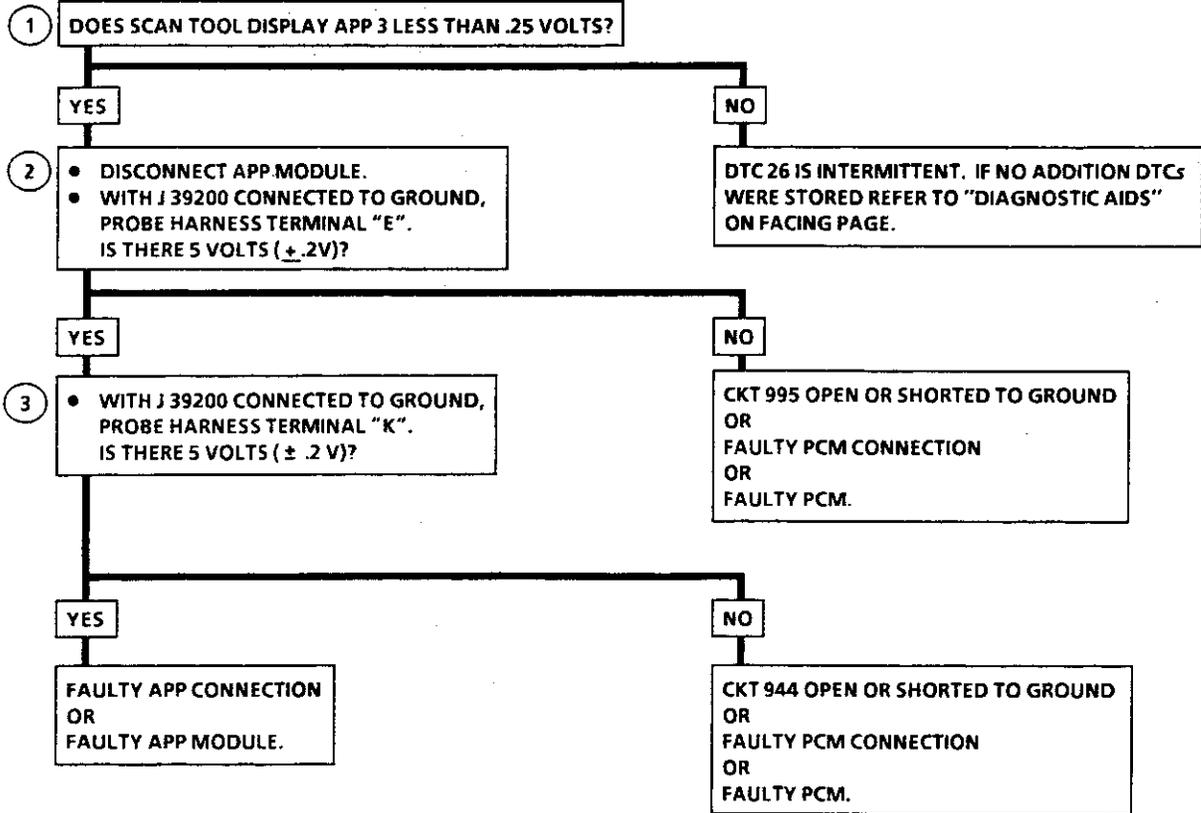
Also, 90% pedal travel is acceptable for correct APP operation.

Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

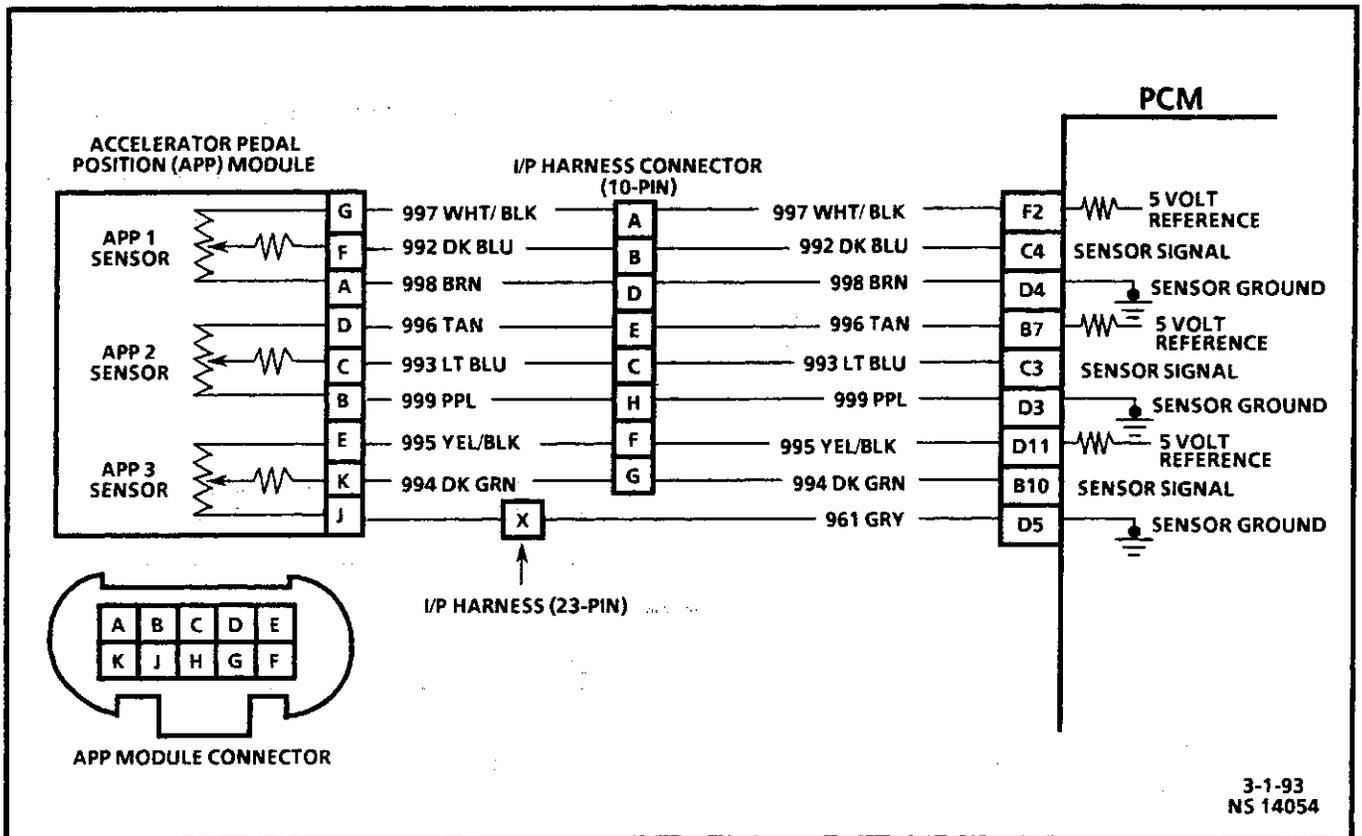
A DTC 64 will result if CKT 995 is open or CKT 994 is shorted to ground.

Refer to "Intermittents," in SECTION 2.

DTC 64
ACCELERATOR PEDAL POSITION (APP) 3
CIRCUIT LOW



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.



3-1-93
NS 14054

DTC 65

ACCELERATOR PEDAL POSITION (APP) 3 CIRCUIT RANGE FAULT

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently.

DTC 65 Will Set When: PCM has recognized a "skewed" (mis-scaled) sensor. The PCM compares all three sensors to each other (percentage to voltage chart) and determines if there is a 6% difference between APP 1 and APP 2 and a 10 difference to APP 3.

Action Taken (PCM will default to): The input from APP 3 sensor is ignored. A current and history DTC will set but it will not turn "ON" a "Service Throttle Soon" lamp. Throttle will operate normally as long as there is only one malfunction present. If there are two APP malfunctions present the PCM will then turn "ON" the "Service Throttle Soon" lamp and limit power. If a third APP malfunction is present the "Service Throttle Soon" lamp will be "ON" and only allow the engine to operate at idle.

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

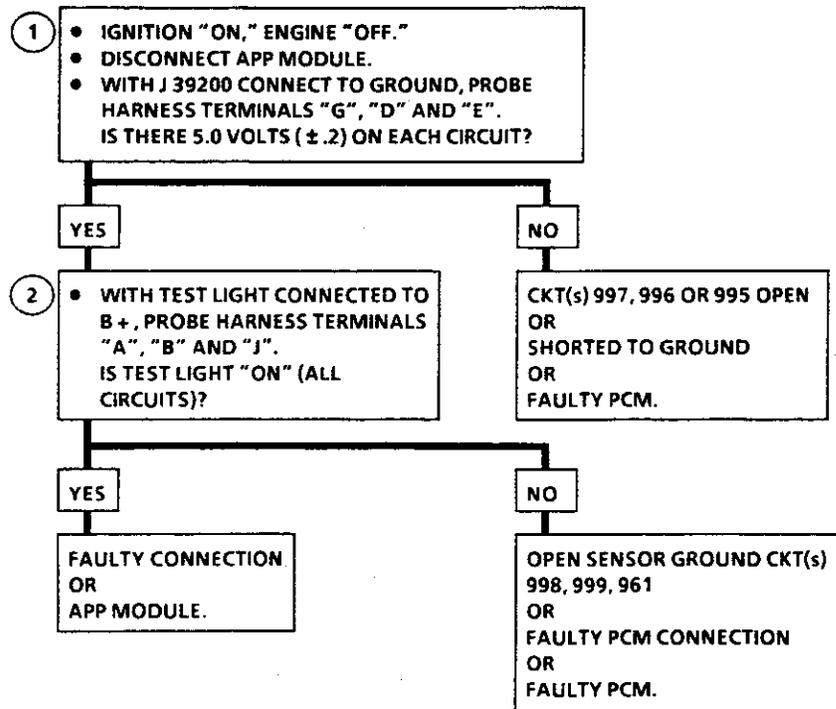
1. This step determines if there is a good 5 volt reference.
2. This step will check the ground circuits.

Diagnostic Aids: A scan tool reads APP 3 position in volts. Should read about 4.0 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

Also, 90% pedal travel is acceptable for correct APP operation.

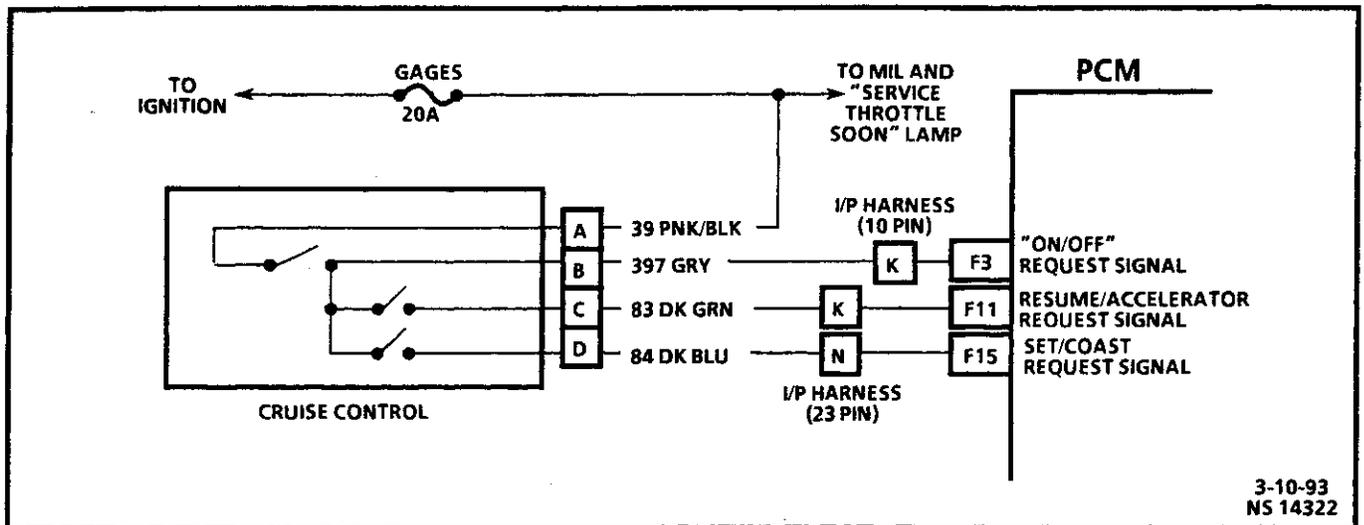
Scan APP 3 sensor while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.0 volts when throttle was closed to about 2.0 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 65
ACCELERATOR PEDAL POSITION (APP) 3
CIRCUIT RANGE FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
 REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-110 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 71

SET/COAST SWITCH FAULT

Circuit Description:

The cruise "ON/OFF," "set/coast" and "resume/accel" switches are inputs to the fuel control portion of the PCM. These inputs allow the PCM to control and hold a requested speed. CKT 84 supplies ignition voltage to the PCM when set/coast is depressed.

DTC 71 Will Set When:

- Cruise control "ON."
- Ignition voltage on Terminal "F15" for more than 20 seconds.

Action Taken (PCM will default to): The PCM will disallow all cruise inputs. TCC shift schedules may be affected.

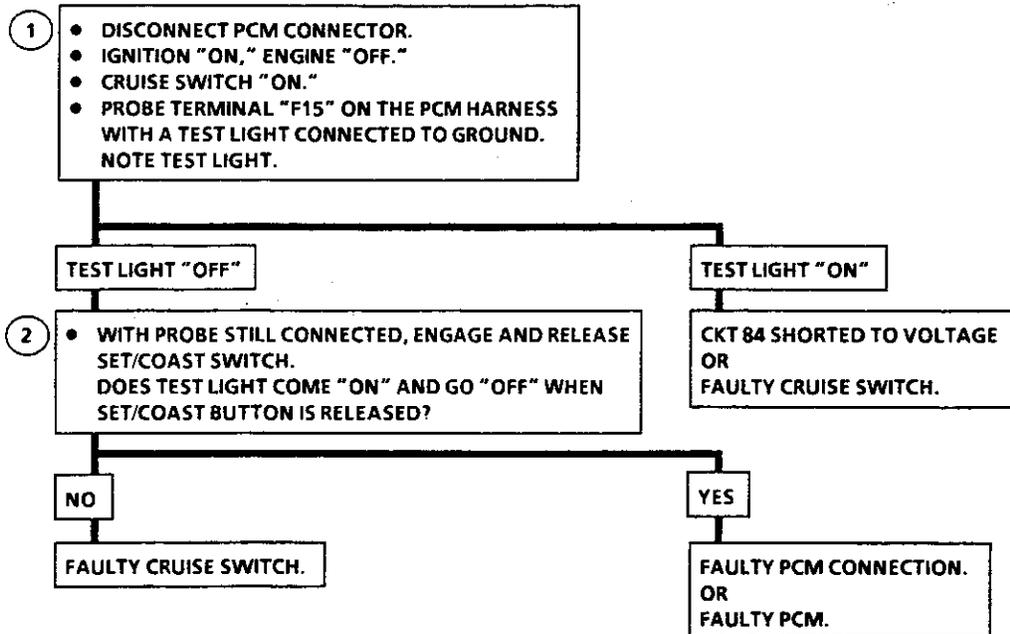
DTC 71 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if the cruise control switch is OK.
2. This step determines if the PCM or switch is at fault.

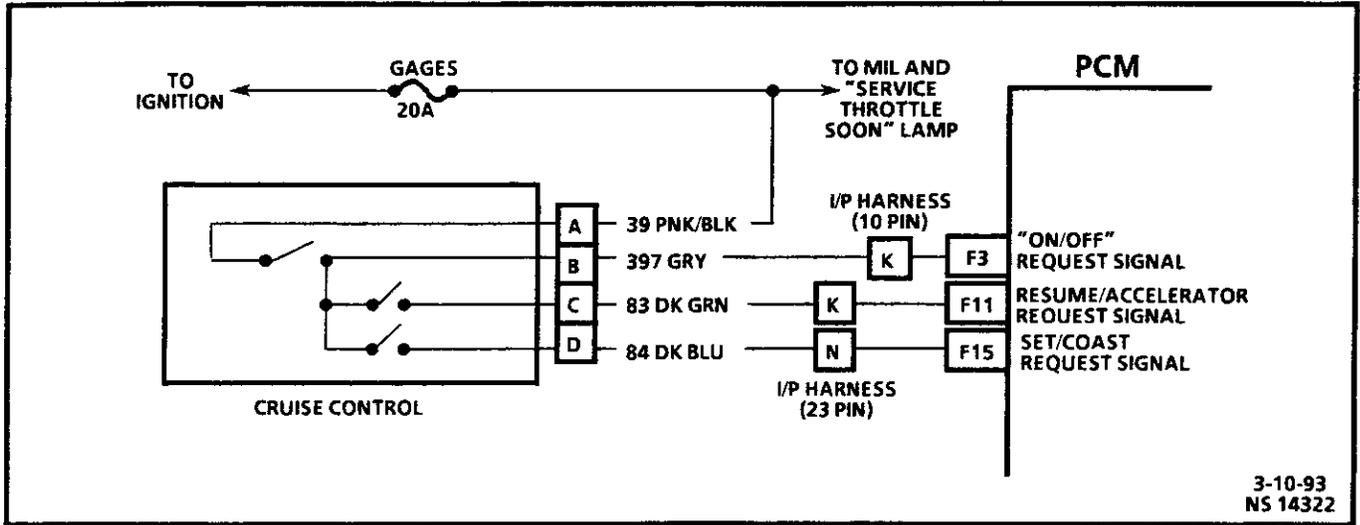
Diagnostic Aids: Check for a set/coast switch stuck in the engage position or CKT 84 shorted to voltage.

**DTC 71
SET/COAST SWITCH FAULT**



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-112 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 76

RESUME/ACCEL SWITCH FAULT

Circuit Description:

The cruise "ON/OFF," "set/coast" and "resume/accel" switches are inputs to the fuel control portion of the PCM. These inputs allow the PCM to control and hold a requested speed. CKT 83 supplies ignition voltage to the PCM.

DTC 76 Will Set When:

- Cruise control "ON."
- Ignition voltage on Terminal "F11" for more than 20 seconds.

Action Taken (PCM will default to): The PCM will disallow all cruise inputs. TCC shift schedules may be affected.

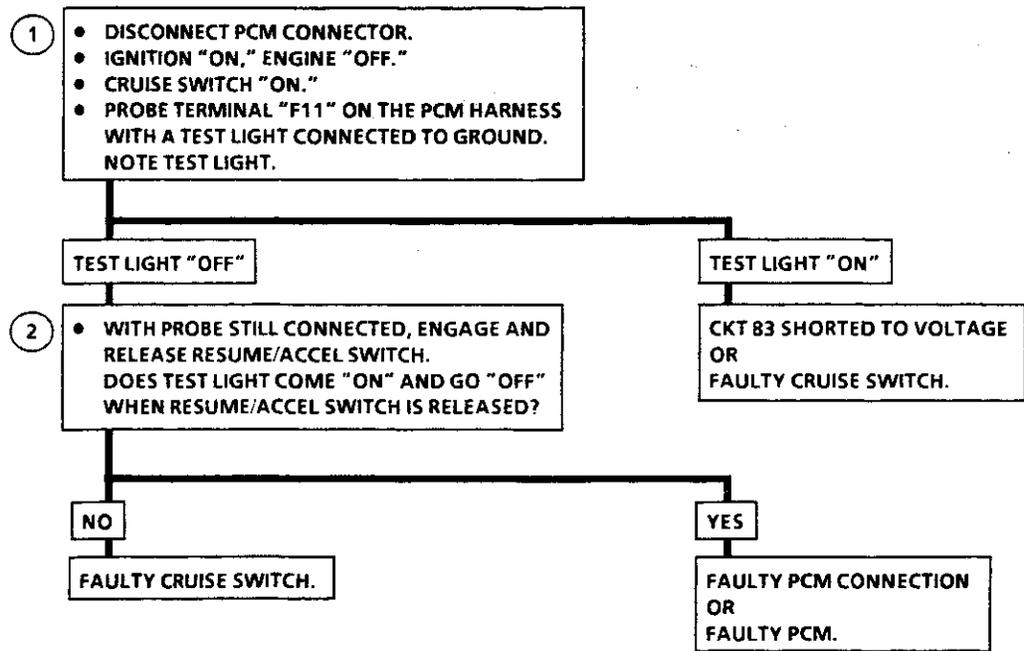
DTC 76 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if CKT 83 is shorted to voltage.
2. This step determines if the PCM or switch is at fault.

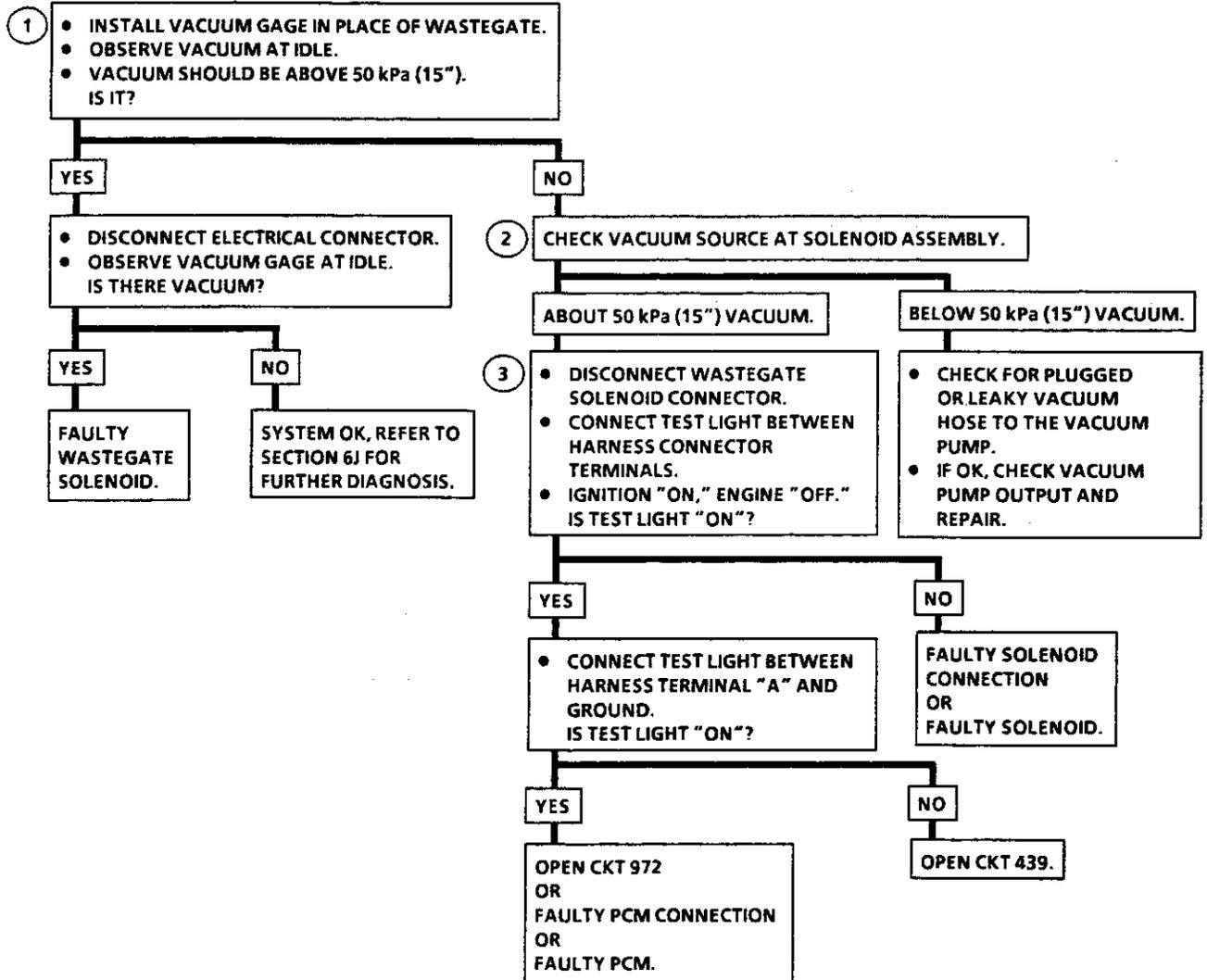
Diagnostic Aids: Check for a set/coast switch stuck in the engage position or CKT 83 shorted to voltage.

**DTC 76
RESUME/ACCEL SWITCH FAULT**



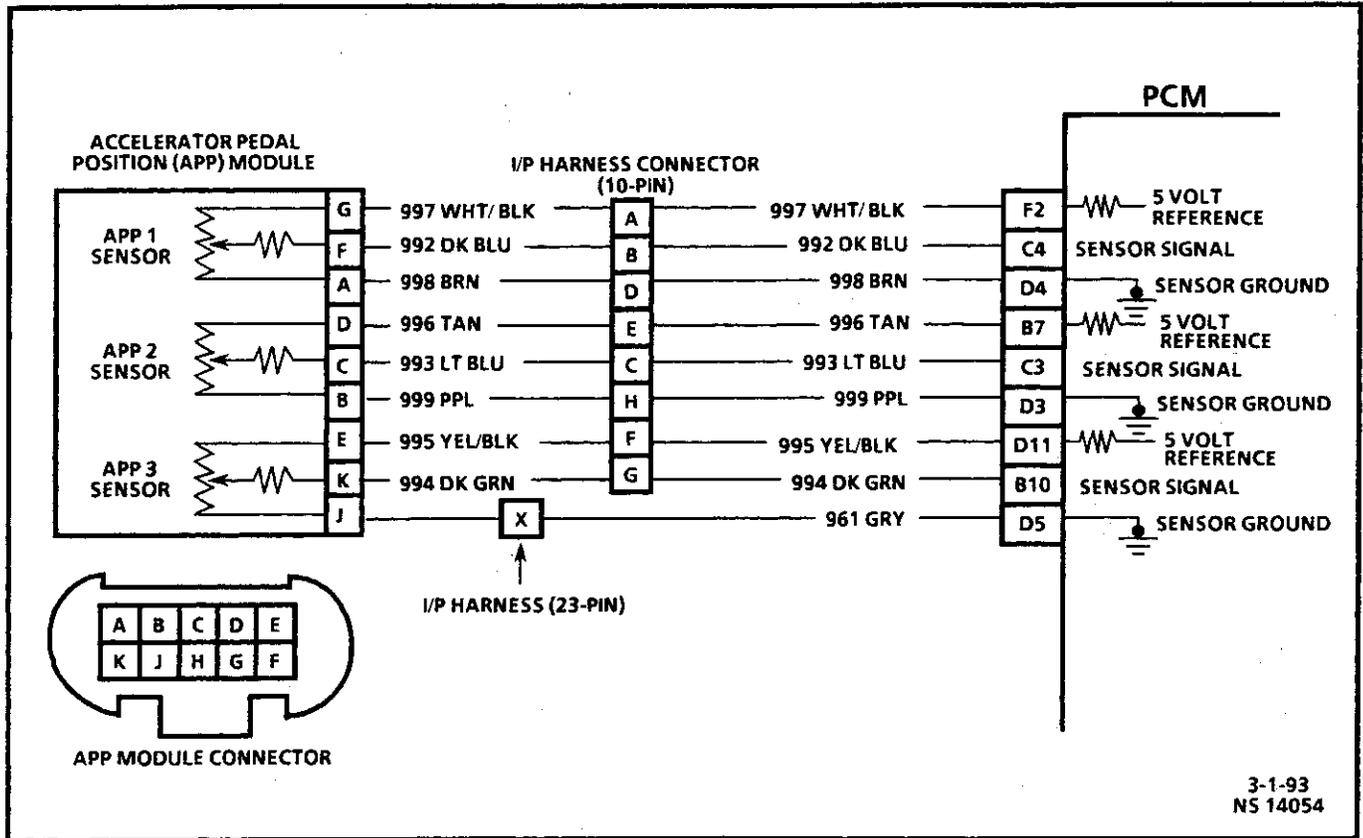
IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

**DTC 78
WASTEGATE SOLENOID FAULT**



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM. REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

3-116 DRIVEABILITY AND EMISSIONS (DIESEL)



DTC 84

ACCELERATOR PEDAL POSITION (APP) CIRCUIT FAULT

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator position. There are three sensors located within the APP module that are scaled differently.

DTC 84 Will Set When: PCM has recognized an intermittent APP fault and there are no other current APP faults stored.

Action Taken (PCM will default to): When DTC 84 is set, a current and history DTC will set, but will not light the "Service Throttle Soon" lamp, and the vehicle will operate at limited power.

DTC 84 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step determines if DTC 84 is a hard failure or an intermittent condition.

Diagnostic Aids: Check for faulty connections at APP module, PCM and I/P connector.

DTC 84
ACCELERATOR PEDAL POSITION (APP)
CIRCUIT FAULT

- ①
- CHECK COMPLETE APP HARNESS FOR INTERMITTENT SHORTS OR OPENS.
 - IF OK, REPLACE APP MODULE.
 - IF DTC RESETS, REPLACE PCM.

IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.

DTC 88
TDC OFFSET ERROR

DTC 88
TDC OFFSET ERROR

THIS DTC INDICATES THERE IS A PUMP TIMING PROBLEM.

- THIS DTC WILL SET IF TDC OFFSET IS GREATER THAN $\pm 2.0^\circ$, OR THE PCM HAS LOST MEMORY (TDC OFFSET IS STORED IN PCM MEMORY).
- CHECK INJECTION PUMP TIMING, IF OK, REFER TO "ON-VEHICLE SERVICE" TDC OFFSET.

DTC 91 CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 91 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #1.
- DTC 91 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

DTC 92 CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 92 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #2.
- DTC 92 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

DTC 93 CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 93 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #3.
- DTC 93 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

DTC 94 CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 94 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #4.
- DTC 94 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

CONT'D

DTC 95
CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 95 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #5.
- DTC 95 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

DTC 96
CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 96 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #6.
- DTC 96 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

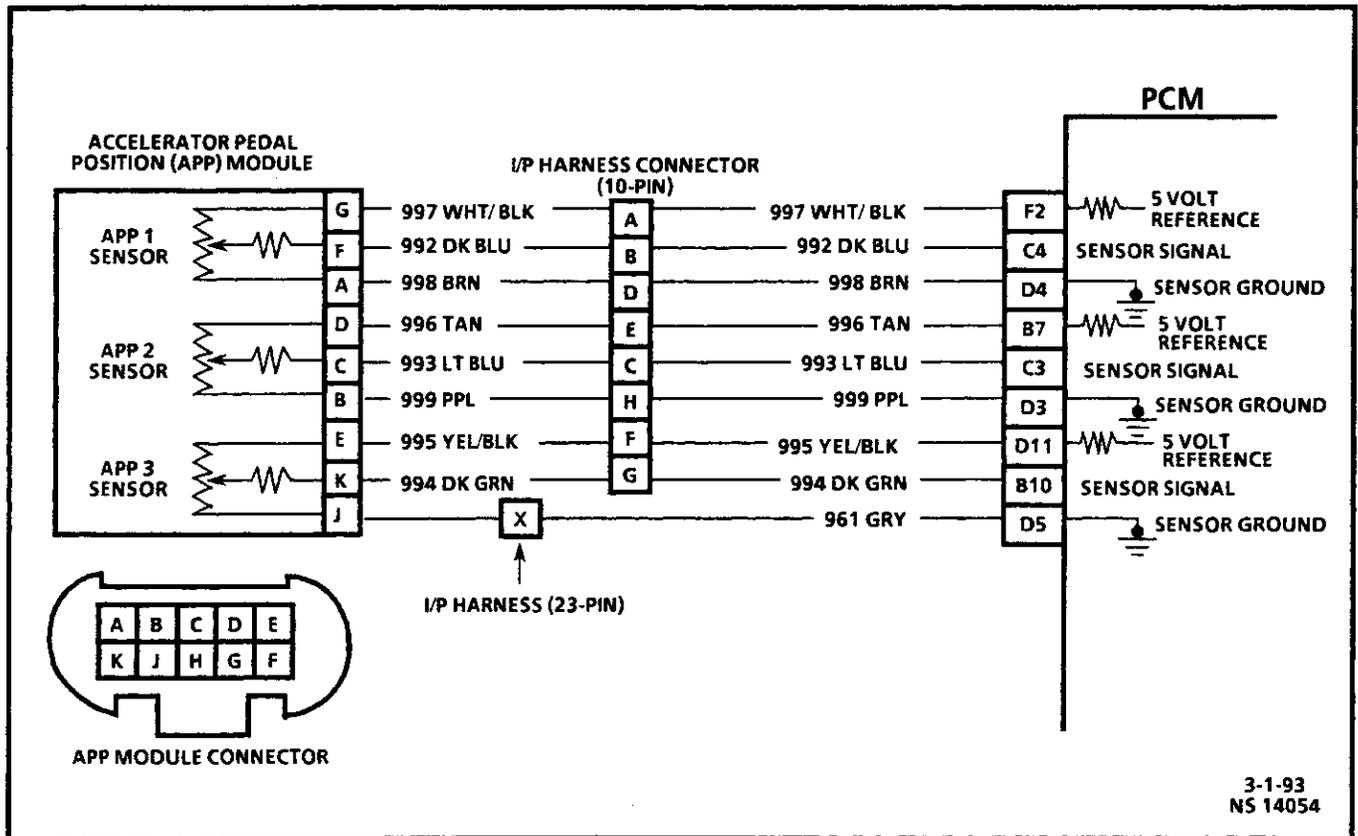
DTC 97
CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 97 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #7.
- DTC 97 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

DTC 98
CYLINDER BALANCE FAULT

- IF ANY OTHER DTC(s) ARE STORED, DIAGNOSE THEM FIRST.
- DTC 98 INDICATES THERE IS A POSSIBLE MECHANICAL ERROR WITH CYLINDER #8.
- DTC 98 WILL NOT TURN ON THE MIL, BUT WILL BE STORED AS A CURRENT AND HISTORY DTC.

BLANK



DTC 99

ACCELERATOR PEDAL POSITION (APP) 2 5 VOLT REFERENCE FAULT

Circuit Description:

The Accelerator Pedal Position (APP) module provides a voltage signal that changes relative to accelerator pedal position. There are three sensors located within the APP module that are scaled differently.

DTC 99 Will Set When: Reference voltage on APP 2 below 4.8 volts for 2 seconds.

Action Taken (PCM will default to): If DTC 99 is present, the PCM will turn "ON" the "Service Throttle Soon" lamp and limit power.

DTC 99 Will Clear When: The fault condition(s) no longer exist, and the ignition switch is cycled "OFF" then "ON."

DTC Chart Test Description: Number(s) below refer to circled number(s) on the diagnostic chart.

1. This step will determine if there is a good 5 volt reference.

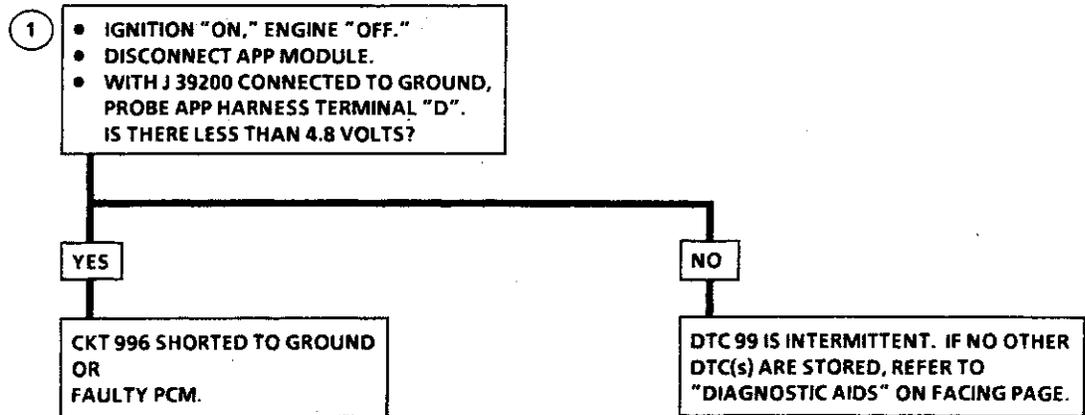
Diagnostic Aids: A Tech 1 scan tool reads APP 2 position in volts. It should read about 4.5 volts with throttle closed and ignition "ON" or at idle. Voltage should decrease at a steady rate as throttle is moved toward Wide Open Throttle (WOT).

A short to ground in CKT 996 will result in a DTC 99.

Refer to SECTION 2 for "Intermittents."

Scan APP 2 signal while depressing accelerator pedal with engine stopped and ignition "ON." Display should vary from about 4.5 volts when throttle was closed, to about 1.5 volts when throttle is held at Wide Open Throttle (WOT) position.

DTC 99
ACCELERATOR PEDAL POSITION (APP) 2
5 VOLT REFERENCE FAULT



IF PCM IS FAULTY AND MUST BE REPLACED, "TDC OFFSET" MUST BE PROGRAMMED INTO THE NEW PCM.
REFER TO "ON-VEHICLE SERVICE" IN THIS SECTION.