TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 SYSTEM COVERAGE 1
1.2 SIX-STEP TROUBLESHOOTING PROCEDURE 1

2.0 IDENTIFICATION OF SYSTEM 1

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION 1

3.1 GENERAL DESCRIPTION 1
3.2 FUNCTIONAL OPERATION 1
3.2.1 On-Board Diagnostics 1
3.2.2 PCM Operating Modes 2
3.2.3 Monitored Circuits 3
3.2.4 SKIS Overview 4
3.2.5 SKIS Operation 4
3.3 DIAGNOSTIC TROUBLE CODES 5
3.3.1 Hard Code 5
3.3.2 Intermittent Code 5
3.3.3 Reset Counter 5
3.3.4 Diagnostic Trouble Codes (DRBIII®) 6
3.3.5 Handling No Trouble Code Problems 6
3.4 USING THE DRBIII® 6
3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN 6
3.5.1 DRBIII® Does Not Power Up 7
3.5.2 Display is Not Visible 7

4.0 SYSTEM COMPONENT LOCATIONS 8

4.1 POWERTRAIN, BODY AND TRANS CONTROL MODULES 8
4.2 CONTROLS & SOLENOIDS 9
4.3 DATA LINK CONNECTORS 14
4.4 SENSORS 14
4.5 FUEL SYSTEM 19
4.6 RELAYS 20
4.7 SWITCHES 21

5.0 DISCLAIMERS, SAFETY, WARNINGS 23

5.1 DISCLAIMERS 23
5.2 SAFETY 23
5.2.1 Technician Safety Information 23
5.2.2 Vehicle Preparation for Testing 23
5.2.3 Servicing Sub-Assemblies 23
5.2.4 DRBIII® Safety Information 23
5.3 WARNINGS AND CAUTIONS 24
5.3.1 Road Test Warnings 24
5.3.2 Vehicle Damage Cautions 24
5.3.3 Electronic Pinion Factor Warning 25

7.0 DIAGNOSTIC INFORMATION AND PROCEDURES 27

7.1 GENERAL TROUBLESHOOTING 27

TABLE OF CONTENTS - CONTINUED

TROUBLE CODE TESTS

DTC TEST CHECKING THE SYSTEM FOR DIAGNOSTIC TROUBLE CODES (DTCS) 28
TC-1A REPAIRING - NO CAM SIGNAL AT PCM 34
TC-5A REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW 42
TC-6A REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH 48
TC-10A REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT 56
TC-11A REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY 62
TC-15A REPAIRING - SPEED CONTROL SOLENOID CIRCUITS 70
TC-16A REPAIRING - A/C CLUTCH RELAY CIRCUIT 78
TC-17A REPAIRING - EGR SOLENOID CIRCUIT 84
TC-18A REPAIRING - EVAP PURGE SOLENOID CIRCUIT 90
TC-19A REPAIRING - INJECTOR #3 CONTROL CIRCUIT 94
TC-20A REPAIRING - INJECTOR #2 CONTROL CIRCUIT 100
TC-21A REPAIRING - INJECTOR CONTROL CIRCUIT 106
TC-25A REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS 116
TC-26A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE LOW . .132
TC-27A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE HIGH. .136
TC-30A REPAIRING - ECT SENSOR VOLTAGE TOO LOW 140
TC-31A REPAIRING - ECT SENSOR VOLTAGE TOO HIGH 144
TC-32A REPAIRING - 1/1 O2S STAYS AT CENTER 148
TC-35A REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL 152
TC-36A REPAIRING - MAP SENSOR VOLTAGE TOO LOW. 158
TC-37A REPAIRING - MAP SENSOR VOLTAGE TOO HIGH 162
TC-39A REPAIRING - NO CHANGE IN MAP FROM START TO RUN 168
TC-40A REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM 172
TC-41A REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT. 184
TC-42A REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT. 190
TC-43A REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT. 196
TC-44A REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM 202
TC-48A REPAIRING - PCM FAILURE EEPROM WRITE DENIED AND PCM FAILURE SRI MILE NOT STORED 208
TC-57A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE LOW 210
TC-58A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH 214
TC-59A REPAIRING - KNOCK SENSOR CIRCUIT 220
TC-60A REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE. 224
TC-61A REPAIRING - INJECTOR #4 CONTROL CIRCUIT 230
TC-62A REPAIRING - 1/1 O2S SHORTED TO VOLTAGE. 236
TC-65A REPAIRING - 2/1 O2S STAYS AT CENTER 240
TC-66A REPAIRING - 2/1 O2S SHORTED TO VOLTAGE. 244
TC-69A REPAIRING - INJECTOR #5 CONTROL CIRCUIT 248
TC-70A REPAIRING - INJECTOR #6 CONTROL CIRCUIT 254
TC-76A REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT. 260
TC-77A REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT. 266
TC-82A REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT 272
TC-87A REPAIRING - SPEED CONTROL SWITCH ALWAYS LOW 280
TC-88A REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT 284
TC-90A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO HIGH 290
TC-91A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO LOW 294
TC-92A REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT 298

TABLE OF CONTENTS - Continued

TC-93A REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT 304
TC-101A REPAIRING - FUEL PUMP RELAY CONTROL CIRCUIT. 310
TC-103A REPAIRING - 1/1 O2S HEATER FAILURE 316
TC-105A REPAIRING - 1/2 O2S HEATER FAILURE 320
TC-114A REPAIRING - PARK/NEUTRAL SWITCH STUCK IN PARK OR IN GEAR 324
TC-115A REPAIRING - POWER STEERING SWITCH FAILURE 330
TC-118A REPAIRING - 1/1 FUEL SYSTEM RICH 332
TC-119A REPAIRING - 1/1 FUEL SYSTEM LEAN 336
TC-120A REPAIRING - 2/1 FUEL SYSTEM RICH 340
TC-121A REPAIRING - 2/1 FUEL SYSTEM LEAN 344
TC-124A REPAIRING - 2/1 O2S HEATER FAILURE 348
TC-125A REPAIRING - 2/2 O2S HEATER FAILURE 352
TC-126A REPAIRING - 1/2 O2S SHORTED TO VOLTAGE. 356
TC-127A REPAIRING - 2/2 O2S SHORTED TO VOLTAGE. 360
TC-129A REPAIRING - 1/2 O2S STAYS AT CENTER 364
TC-130A REPAIRING - 2/2 O2S STAYS AT CENTER 368
TC-132A REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP. . . .372
TC-145A REPAIRING - VACUUM LEAK FOUND (IAC FULLY SEATED) 378
TC-146A REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW 380
TC-153A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW 386
TC-154A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH 392
TC-155A REPAIRING - 1/1 O2S VOLTAGE SHORTED TO GROUND 398
TC-156A REPAIRING - 1/2 O2S VOLTAGE SHORTED TO GROUND 400
TC-157A REPAIRING - INTERMITTENT LOSS OF CMP OR CKP. 402
TC-181A REPAIRING - 2/1 O2S VOLTAGE SHORTED TO GROUND 406
TC-182A REPAIRING - 2/2 O2S VOLTAGE SHORTED TO GROUND 408
TC-216A REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT. 410
TC-217A REPAIRING - SHORT RUNNER VALVE CIRCUIT 416
TC-226A REPAIRING - NO PCI BUS MESSAGE RECEIVED FROM SKIM. .420
TC-232A REPAIRING - INVALID OR WRONG KEY MESSAGE FROM SKIM 424

SENTRY KEY IMMOBILIZER SYSTEM
SK IDENTIFYING SKIM PROBLEMS 428
SK-1A IDENTIFYING SENTRY KEY IMMOBILIZER SYSTEM PROBLEMS. 429
SK-2A REPAIRING - EMS STATUS FAILURE 434
SK-3A REPAIRING - ROLLING CODE FAILURE 438
SK-4A REPAIRING - SERIAL LINK EXTERNAL FAULT. 442
SK-5A REPAIRING - TRANSPONDER COMMUNICATION FAILURE. 446
SK-6A REPAIRING - TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE. 450
SK-7A REPAIRING - TRANSPONDER ID MISMATCH 454
SK-8A REPAIRING - TRANSPONDER RESPONSE MISMATCH 458
SK-9A REPAIRING - VIN MISMATCH 462

TABLE OF CONTENTS - Continued

NO TROUBLE CODE TESTS

NTC-1A NO TROUBLE CODE TEST MENU 466
NTC-3A CHECKING THE PCM POWER AND GROUND CIRCUITS 468
NTC-4A CHECKING THE ENGINE VACUUM 470
NTC-5A CHECKING THE FUEL DELIVERY 472
NTC-6A CHECKING THE ENGINE COOLANT TEMP SENSOR 476
NTC-7A CHECKING THE THROTTLE POSITION SENSOR 478
NTC-8A CHECKING MAP SENSOR 480
NTC-9A CHECKING THE AUTO SHUTDOWN RELAY. 482
NTC-10A CHECKING THE OXYGEN SENSOR SWITCHING 488
NTC-11A CHECKING THE OXYGEN SENSOR HEATER 494
NTC-12A CHECKING IDLE AIR CONTROL MOTOR 498
NTC-13A CHECKING THE ENGINE MECHANICAL SYSTEMS 500
NTC-14A CHECKING THE TIMING BELT ALIGNMENT 502
NTC-17A CHECKING THE EVAPORATIVE EMISSION SYSTEMS 504
NTC-19A CHECKING THE INTAKE AIR TEMP SENSOR 508
NTC-20A CHECKING - PARK/NEUTRAL SWITCH FAILURE 510
NTC-21A CHECKING OIL PRESSURE SENDING UNIT 514
NTC-26A CHECKING THE A/C SYSTEM 520
NTC-27A CHECKING RADIATOR FANS 524

SPEED CONTROL TESTS

SC-1A CHECKING SPEED CONTROL OPERATION. 532
SC-2A CHECKING SPEED CONTROL ON/OFF SWITCH. 542
SC-3A CHECKING SPEED CONTROL RESUME SWITCH. 546
SC-4A CHECKING THE BRAKE SWITCH SENSE. 548
SC-5A CHECKING FOR A SPEED CONTROL DENIED MESSAGE. 552

CHARGING TESTS

CH-1A CHARGING SYSTEM NO CODE TEST 554

NO START TESTS

NS-SEL NO START SELECTION MENU 560
NS-1A QUALIFYING A NO START CONDITION. 562
NS-2A CHECKING FUEL SYSTEM 572
NS-3A CHECKING THE ENGINE MECHANICAL SYSTEMS 576
NS-4A REPAIRING LOW FUEL PRESSURE 578
NS-5A CHECKING THE FUEL PUMP 580
NS-6A REPAIRING A ″NO RESPONSE″ CONDITION 586
NS-7A CHECKING THE IDLE AIR CONTROL MOTOR OPERATION. 592
NS-8A REPAIRING A START AND STALL CONDITION. 594
NS-9A REPAIRING A NO CRANK CONDITION 596

VERIFICATION TEST

VER-1A NO START VERIFICATION 602
VER-2A ROAD TEST VERIFICATION 603
VER-3A CHARGING VERIFICATION 605
VER-4A SPEED CONTROL VERIFICATION 606

TABLE OF CONTENTS - Continued

8.0 MAINTENANCE AND SERVICE INFORMATION 609

8.1 PROGRAMMING THE POWERTRAIN CONTROL MODULE 609
8.2 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE 609
8.3 PROGRAMMING IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE 609

9.0 SPECIFICATIONS 610

9.1 FUEL SYSTEM RELEASE PROCEDURE (GASOLINE). 610

10.0 SCHEMATIC DIAGRAMS 611

10.1 ENGINE CONTROLS (1999) 611

11.0 RECOMMENDED TOOLS AND EQUIPMENT 612

12.0 GLOSSARY OF TERMS. 612

NOTES

1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose powertrain control module (PCM) problems; they are no start, diagnostic trouble code, and no trouble code problems for the PCM. The diagnostics in this manual are based on the trouble condition or symptom being present at the time of diagnosis.

When repairs are required, refer to the appropriate volume of the service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. READ THE GENERAL INFORMATION SECTIONS IN THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE TROUBLE CODE. It is recommended that you review the entire manual to become familiar with new or revised diagnostic procedures.

This book reflects many suggested changes from readers of past issues. After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 System Coverage

This diagnostic procedures manual covers the 1999 300M equipped with the 2.7L or 3.5L engine.

1.2 Six-Step Troubleshooting Procedure

Diagnosis of the powertrain control module (PCM) is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

The powertrain control module (PCM) is located in the left front engine compartment.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 General Description

These SFI engine systems have the latest in technical advances. The on-board diagnostics incorporated with the powertrain control module are intended to assist the field technician in repairing vehicle problems by the quickest means.

3.2 Functional Operation

3.2.1 On-Board Diagnostics

The PCM has been programmed to monitor many different circuits of the fuel injection system. This monitoring is called ‘‘on-board diagnosis.’’

Certain criteria must be met for a trouble code to be entered into the PCM memory. The criteria may be a range of: engine temperature, and/or input voltage to the PCM. If all of the criteria for monitoring a system or circuit are met and a problem is sensed, then a trouble code will be stored in the PCM.

It is possible that a trouble code for a monitored circuit may not be entered into the PCM memory even though a malfunction has occurred. This may happen when the monitoring criteria have not been met.

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input voltage is not within specifications and other trouble code criteria are met, a trouble code will be stored in the PCM memory.

3.2.2 PCM Operating Modes

As input signals to the powertrain control module (PCM) change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for wide open throttle. There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two types of engine control operation: **open loop** and **closed loop**.

In open loop operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In closed loop operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

Ignition Switch On (Engine Off) Mode

When the ignition switch activates the fuel injection system, the following actions occur:

1. The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
2. The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM modifies fuel strategy based on this input.

When the key is in the ‘‘on’’ position and the engine is not running (zero rpm), the auto shutdown relay and fuel pump relay are not energized. Therefore, voltage is not supplied to the fuel pump, ignition coil, and fuel injectors.

Engine Start-up Mode - This is an open loop mode. The following actions occur when the starter motor is engaged:

1. The auto shutdown and fuel pump relays are energized. If the PCM does not receive the camshaft and crankshaft signal within approximately one second, these relays are de-energized.
2. The PCM energizes all fuel injectors until it determines crankshaft position from the camshaft and crankshaft signals. The PCM determines crankshaft position within one engine revolution. After the crankshaft position has been determined, the PCM

energizes the fuel injectors injectors in sequence. The PCM adjusts the injector pulse width and synchronizes the fuel injectors by controlling the fuel injectors' ground paths.

3. Once the engine idles within 64 rpm of its target engine speed, the PCM compares the current MAP sensor value with the value received during the ignition switch on (zero rpm) mode. A diagnostic trouble code is written to PCM memory if a minimum difference between the two values is not found.

Once the auto shutdown and fuel pump relays have been energized, the PCM determines the fuel injector pulse width based on the following:

– engine coolant temperature

– manifold absolute pressure

– intake air temperature

– engine revolutions

– throttle position

The PCM determines the spark advance based on the following:

– engine coolant temperature

– crankshaft position

– camshaft position

– intake air temperature

– manifold absolute pressure

– throttle position

Engine Warm-Up Mode - This is an open loop mode. The PCM adjusts injector pulse width and controls injector synchronization by controlling the fuel injectors' ground paths. The PCM adjusts ignition timing and engine idle speed. The PCM adjusts the idle speed by controlling the idle air control motor and spark advance.

Cruise or Idle Mode - When the engine is at normal operating temperature, this is a closed loop mode.

Part Throttle Mode - This is a closed loop mode. The PCM recognizes an increase in throttle position and a decrease in manifold vacuum as engine load increases. In response, the PCM increases the injector pulse width to meet the increased load. The A/C compressor may be de-energized for a short period of time.

Closed Throttle Mode - This is a closed loop mode. The PCM recognizes a decrease in throttle position and an increase in manifold vacuum as engine load decreases. In response, the PCM decreases the injector pulse width to meet the decreased load. Full injector shut off may be obtained during high speed deceleration.

Wide Open Throttle Mode - This is an open loop mode. The throttle position sensor notifies the PCM of a wide open throttle condition. Once a wide open throttle is sensed, the PCM de-energizes the A/C compressor clutch relay for 15 seconds.

3.2.3 Monitored Circuits

The PCM is able to monitor and identify most driveability related trouble conditions. Some circuits are directly monitored through PCM feedback circuitry. In addition, the PCM monitors the voltage

state of some circuits and compares those states with expected values. Other systems are monitored indirectly when the PCM conducts some type of a rationality test to identify problems.

Although most subsystems of the powertrain control module are either directly or indirectly monitored, there may be occasions when diagnostic trouble codes are not immediately identified.

For a trouble code to set, specific conditions must be met and unless these conditions are encountered, a code will not set. For example, the Speed Control Solenoid Circuit trouble code will not set unless the system is active (speed control is turned on, the brake is off, and vehicle speed greater than 55 kph/35 mph).

When a trouble code identifying a problem in an emission related system is set, the Check Engine lamp in the dash will turn on. Conversely, any other trouble code will set without illuminating the Check Engine lamp.

3.2.4 SKIS Overview

The Sentry Key Immobilizer System (SKIS) is an immobilizer system designed to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip, engine controller and body controller. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is ‘‘Valid’’ the SKIM sends a PCI Bus message to the engine controller indicating the presence of a valid ignition key.

3.2.5 SKIS Operation

When ignition power is supplied to SKIM, the SKIM performs an internal self-test. After the self-test is completed, the SKIM energizes the antenna (this activates the transponder chip) and sends an encrypted message to the transponder chip. This encrypted message is generated using the following:

Secret Key - This is an electronically stored value (identification number) that is unique to each SKIS. The secret key is stored in the SKIM, PCM and all ignition key transponders.

Challenge - This is a random number that is generated by the SKIM at each ignition key cycle.

The secret key and challenge are plugged into an algorithm that encrypts the message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by SKIM. After responding to the coded message, the transponder sends a transponder I.D. message to the SKIM. The SKIM compares the transponder I.D. to the available valid key codes in SKIM memory (8 key maximum). After validating the key the SKIM sends a PCI Bus message called a ‘‘Seed Request’’ to the engine controller then waits for a engine controller response. If the engine controller does not respond, the SKIM will send the seed request again. After three failed attempts the SKIM will stop sending the seed request and store a trouble code. If the engine controller sends a seed response, the SKIM sends a valid/invalid key message to the engine controller. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number

Seed - This is a random number that is generated by the PCM at each ignition key cycle.

The VIN and seed are plugged into a rolling code algorithm that encrypts the ‘‘valid/invalid key’’ message. The engine controller uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for an EMS status message from the engine controller. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code stored.

The SKIS incorporates an indicator lamp located on the dash. The lamp receives switched ignition voltage and is hardwired to the body controller. The lamp is actuated when the SKIM sends a PCI

Bus message to the body controller requesting the lamp on. The body controller then provides the ground for the lamp. The SKIM will request lamp operation for the following:

- bulb check at ignition on
- to alert the vehicle operator to a SKIS malfunction

For all faults except transponder faults and VIN mismatch, the lamp remains on steady. In the event of a transponder fault the light flashes at the rate of 1 Hz (once per second). If a fault is present the lamp will remain on or flashing for the complete ignition cycle.

3.3 Diagnostic Trouble Codes

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of trouble codes as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRB. This procedure begins in the DTC TEST - Checking the System for Diagnostic Trouble Codes. This will direct you to the specific test(s) that must be performed.

3.3.1 Hard Code

A diagnostic trouble code that comes back within one cycle of the ignition key is a ‘‘hard’’ code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the trouble code is a hard code at the beginning of each test. When it is not a hard code, an ‘‘intermittent’’ test must be performed.

Some codes will not set with just the ignition key on. Comparing these to non-emission codes, they will seem like an intermittent. These codes require a set of parameters to be performed, this is called a ‘‘TRIP’’. Some DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These codes require three successful, no failures, TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the code.

3.3.2 Intermittent Code

A diagnostic trouble code that is not there every time powertrain control module checks the circuit is an ‘‘intermittent’’ code. Most intermittent codes are caused by wiring or connector problems. Defects that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that cause them. The following checks may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.

3.3.3 Reset Counter

The reset counter counts the number of times the vehicle has been started since codes were last set, erased, or the battery was disconnected. The reset counter will count up to 255 start counts.

The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRB as STARTS since set.

When there are no trouble codes stored in memory, the DRB will display ‘‘NO TROUBLE CODES FOUND’’ and the reset counter will show ‘‘STARTS since clear = XXX.’’ This screen also shows Global Good Trips.

3.3.4 Diagnostic Trouble Codes (DRBIII®)

For diagnostic trouble codes covered in this manual see the menu, **DTC TEST**, at section 7.1 General Troubleshooting.

3.3.5 Handling No Trouble Code Problems

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to Section 8.0 for more information on programming the above modules.

For ABS and Airbag System:

ACTION:

1. Enter correct VIN and Mileage in PCM.
2. Erase codes in ABS and Airbag modules.

After reading Section 3.0 (System Description and Functional Operation), you should have a better understanding of the theory and operation of the on-board diagnostics, and how this relates to the diagnosis of a vehicle that may have a driveability-related symptom or complaint.

The ‘‘No Code’’ system is broken down into three test methods:

- No Code Complete Test
- No Code Quick Individual Test
- No Code Quick Symptom Test

3.4 Using the DRBIII®

Refer to the DRB user’s guide for instructions and assistance with reading trouble codes, erasing trouble codes, and other DRB functions.

3.5 DRBIII® Error Messages and Blank Screen

Under normal operation, the DRB will display one of only two error messages:

- User-Requested WARM Boot or User-Requested COLD Boot

This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
   and the application screen.
Press F4 when done noting information.
```

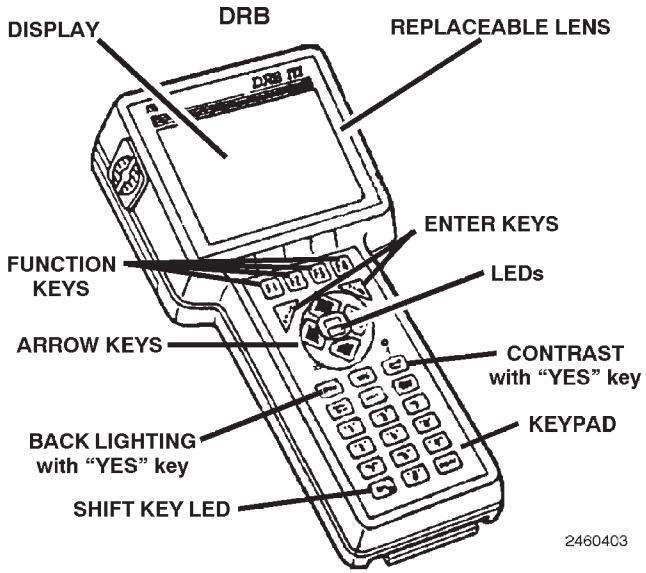
3.5.1 DRBIII® Does Not Power Up

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRB.

If all connections are proper between the DRB and the vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRB may be the result of a faulty cable or vehicle wiring. For a blank screen, refer to the appropriate body diagnostics manual.

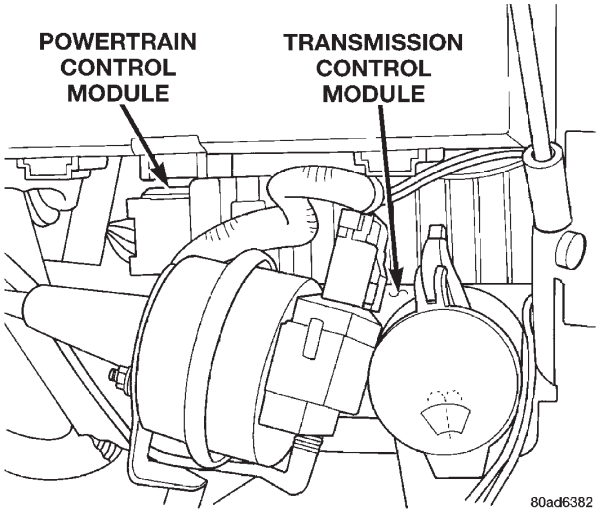
3.5.2 Display is Not Visible

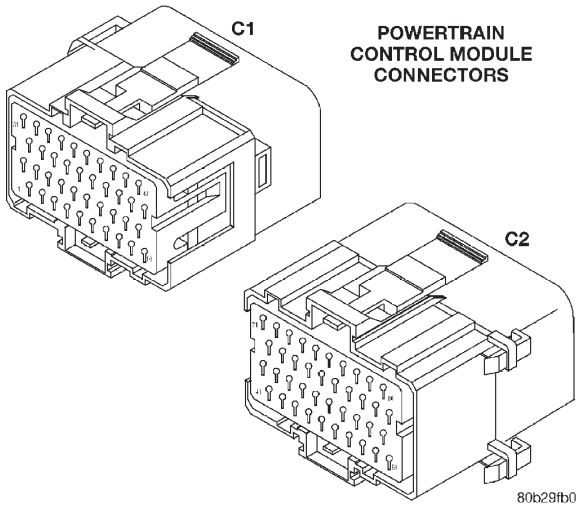
Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



4.0 SYSTEM COMPONENT LOCATIONS

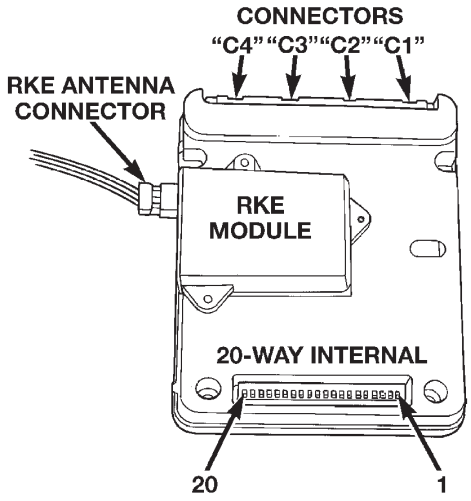
4.1 Powertrain, Body and Trans Control Modules



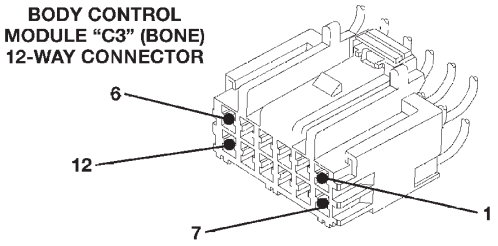


CAV	COLOR	FUNCTION
1	K94 TN/LG	Ignition Coil #4 Driver
2	K93 TN/OR	Ignition Coil #3 Driver
3	K92 TN/PK	Ignition Coil #2 Driver
4	K96 TN/LB	Ignition Coil #6 Driver
5	V32 YL/RD	Speed Control Power Supply
6	A142 DG/OR	Auto Shutdown Relay Output
7	K13 YL/WT	Injector #3 Driver
8	K20 DG	Generator Field Driver
10	Z12 BK/TN	Power Ground
11	K91 TN/RD	Ignition Coil #1 Driver
13	K11 WT/DB	Injector #1 Driver
14	K58 BR/DB	Injector #6 Driver
15	K38 GY	Injector #5 Driver
16	K14 LB/BR	Injector #4 Driver
17	K12 TN/WT	Injector #2 Driver (2.7L)
17	K12 TN	Injector #2 Drive (3.5L)
18	K236 GY/PK	Short Runner Valve Solenoid Control (3.5L)
20	F15 DB/WT	Fused Ignition Switch Output
21	K95 TN/DG	Ignition Coil #5 Driver
24	K42 DB/LG	Knock Sensor Return (3.5L)
25	K45 BK/VT	Knock Sensor Signal
26	K2 TN/BK	Engine Coolant Temp Sensor Signal
27	K127 BK/OR	Oxygen Sensor Ground
29	K241 LG/RD	Heated O2 Sensor 2/1 Signal
30	K41 BK/DG	Heated O2 Sensor 1/1 Signal
31	K90 TN/WT	Start Relay Control
32	K24 GY/BK	Crank Position Sensor Signal
33	K44 TN/YL	Camshaft Position Sensor Signal
34	K235 LG/PK	EGR Position Sensor Signal
35	K22 OR/DB	Throttle Position Sensor Signal
36	K1 DG/RD	MAP Sensor Signal
37	K21 BK/RD	Intake Air Temperature Signal
39	K36 VT/RD	Manifold Tuning Valve Solenoid Ctrl (3.5L)

CAV	COLOR	FUNCTION
40	K35 GY/YL	EGR Solenoid Control
41	V37 RD/LG	Speed Control Switch Signal
42	C18 DB	A/C Pressure Signal
43	K4 BK/LB	Sensor Ground
44	K7 OR	8-Volt Supply
45	K10 DB/LG	Power Steering Press Sw Sense
46	A14 RD/WT	Fused B (+)
47	Z11 BK/WT	Signal Ground
48	K40 YL/BK	Idle Air Control #3 Driver
49	K60 YL/BK	Idle Air Control #2 Driver
50	Z12 BK/TN	Power Ground
51	K141 TN/WT	Heated 02 Sensor 1/2 Signal
53	K341 PK/WT	Heated 02 Sensor 2/2 Signal
55	C24 DB/PK	Low Speed Rad Fan Rly Ctrl
56	V36 TN/RD	Speed Control Vacuum Solenoid Ctrl
57	K39 GY/RD	Idle Air Control #1 Driver
58	K59 VT/BK	Idle Air Control #4 Driver
59	D25 YL/VT	(J1850) PCI Bus
61	K6 VT/WT	5-Volt Supply
62	K29 WT/PK	Brake Switch Sense
63	T10 YL/DG	Torque Management Request Sense
64	C28 DB/OR	A/C Comp Clutch Rly Control
65	D21 PK	SCI Transmit
66	G7 WT/OR	Vehicle Speed Sensor Signal
67	K51 DB/YL	Auto Shutdown Relay Control
68	K52 PK/BK	Proportional Purge Solenoid Control
69	C27 DB/LG	Hi Speed Rad Fan Relay Control
70	K108 DG/LG	PWM Purge Sense
71	K71 WT/RD	EATX RPM Signal
74	K31 BR	Fuel Pump Relay Control
75	D20 LG	SCI Receive
76	T41 BK/PK	Park Neutral Position Switch Sense
80	V35 LG/RD	Speed Control Vent Solenoid Ctrl



80b099ee

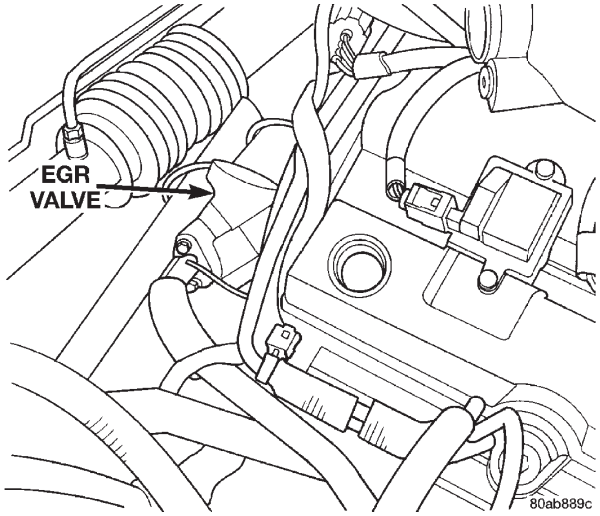


CAV	COLOR	FUNCTION
1	YL/VT	PCI BUS (PCM)
2	YL/VT	PCI BUS (ABS)
3	TN/RD	WIPER PARK SWITCH SENSE
4	RD/WT	WIPER ON OFF RELAY CONTROL
5	VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
7	YL/VT	PCI BUS (TCM)
9	BR/YL	HEADLAMP WASHER RELAY CONTROL
10	DB/GY	SENSOR GROUND
12	VT	WIPER HIGH LOW RELAY CONTROL

80b11938

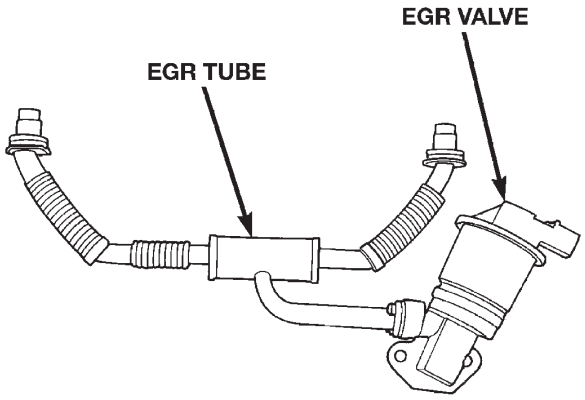
4.2 Controls & Solenoids

2.7L

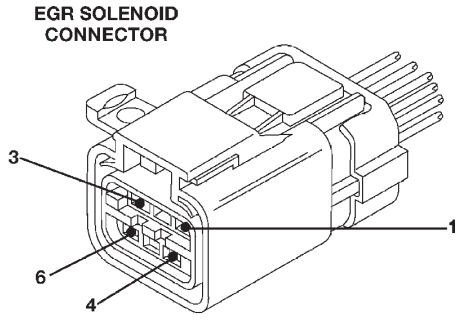


80ab889c

3.5L



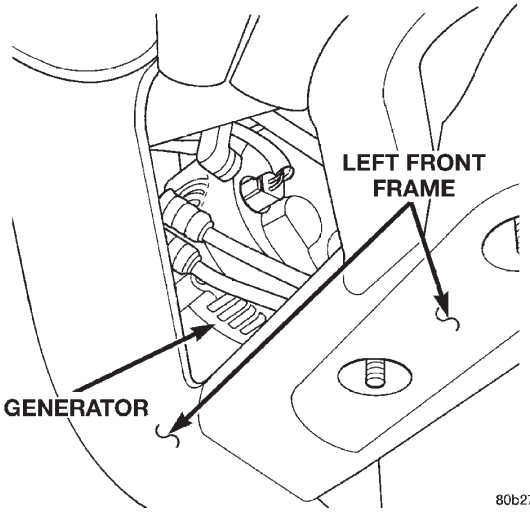
80ad62ab



CAV	COLOR	FUNCTION
1	LG/PK	EGR SENSOR SIGNAL
2	VT/WT	5-VOLT SUPPLY
3	BK/LB	SENSOR GROUND
4	GY/YL	EGR SOLENOID CONTROL
6	OR/DG	ASD RELAY OUTPUT

80b09870

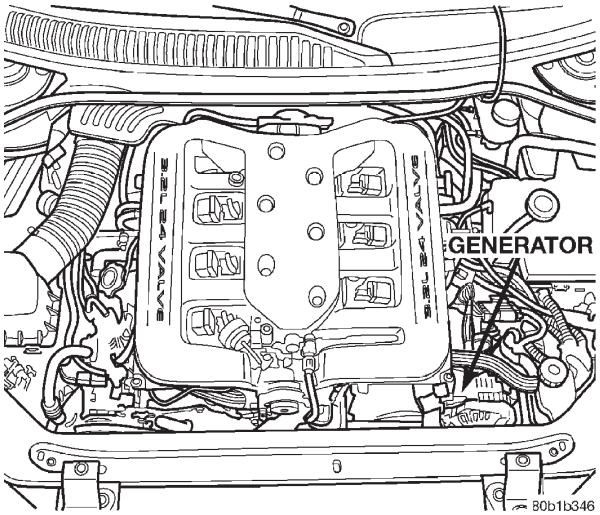
2.7L



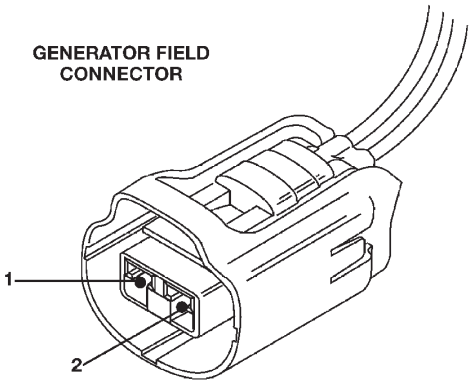
80b27d18

4.2 Controls & Solenoids (continued)

3.5L



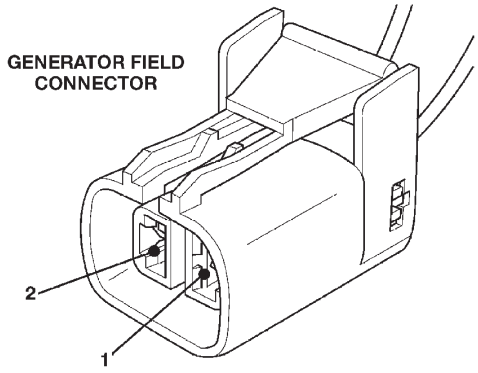
2.7L



CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

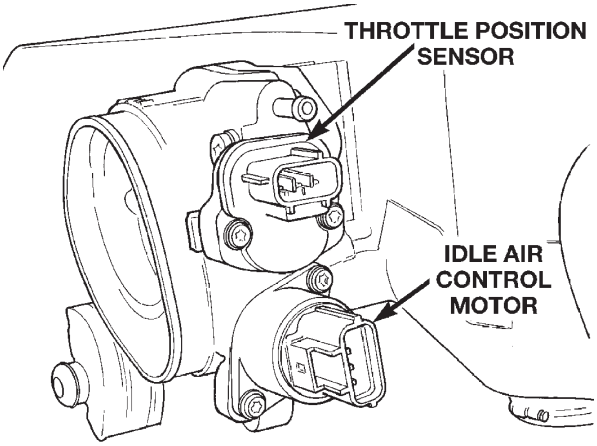
80b27c91

3.5L



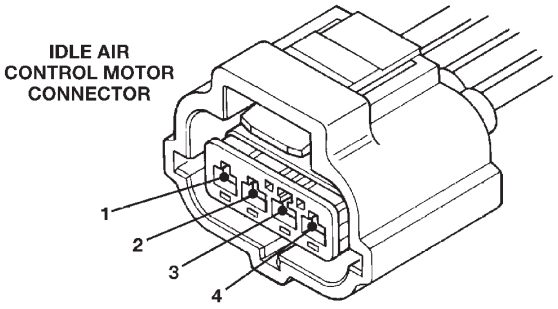
CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

80b1b348



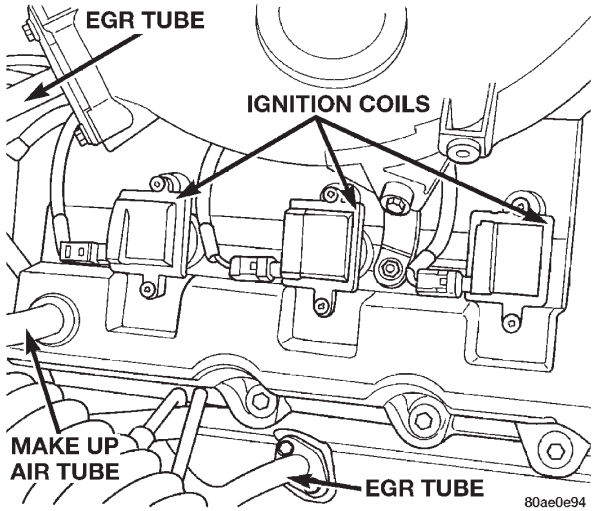
80ad629f

2.7L



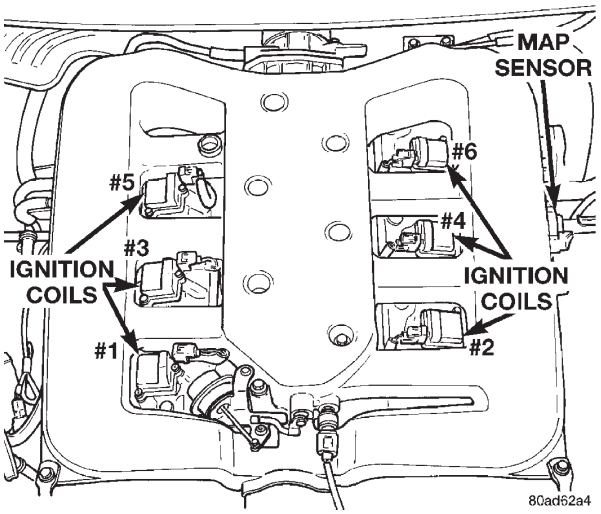
CAV	COLOR	FUNCTION
1	GY/RD	IDLE AIR CONTROL #1 DRIVER
2	YL/BK	IDLE AIR CONTROL #2 DRIVER
3	YL/BK	IDLE AIR CONTROL #3 DRIVER
4	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6efff



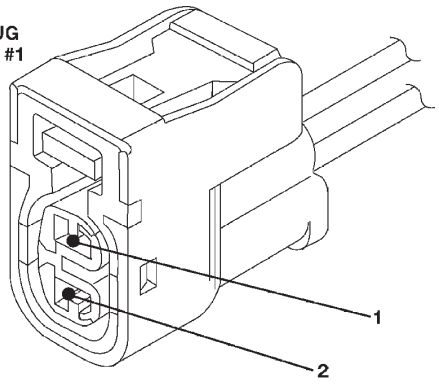
80ae0e94

3.5L



80ad62a4

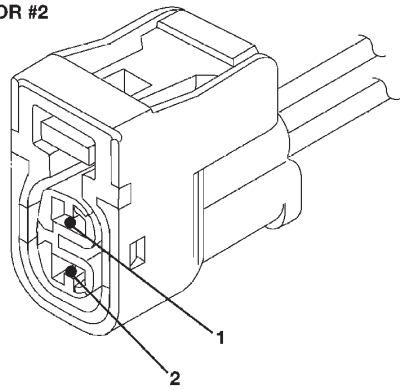
COIL ON PLUG CONNECTOR #1



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD RELAY FEED
2	TN/RD	COIL ON PLUG DRIVER #1

80b57445

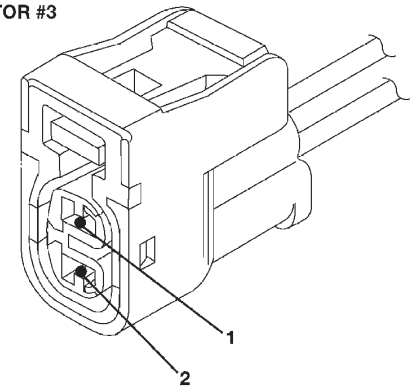
COIL ON PLUG CONNECTOR #2



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/PK	COIL ON PLUG DRIVER #2

80b27cbc

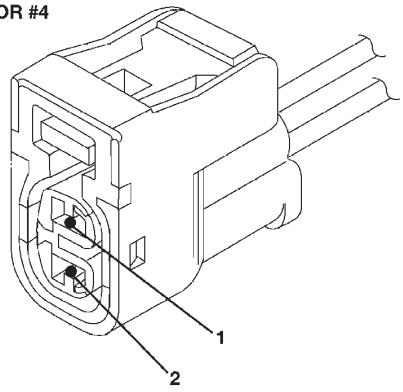
COIL ON PLUG CONNECTOR #3



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/OR	COIL ON PLUG DRIVER #3

80b27ccd

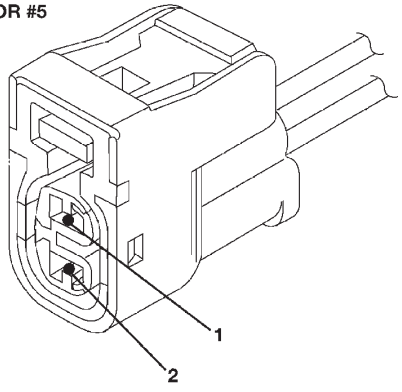
COIL ON PLUG CONNECTOR #4



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LG	COIL ON PLUG DRIVER #4

80b27cd4

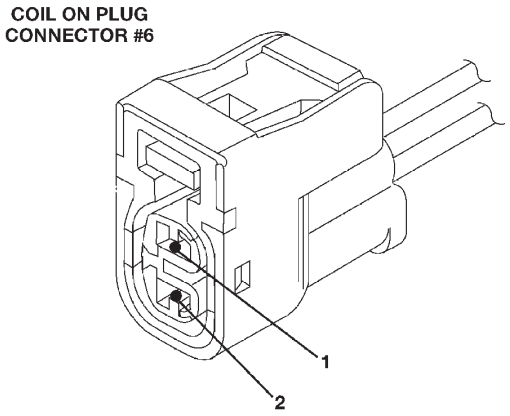
COIL ON PLUG CONNECTOR #5



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/DG	COIL ON PLUG DRIVER #5

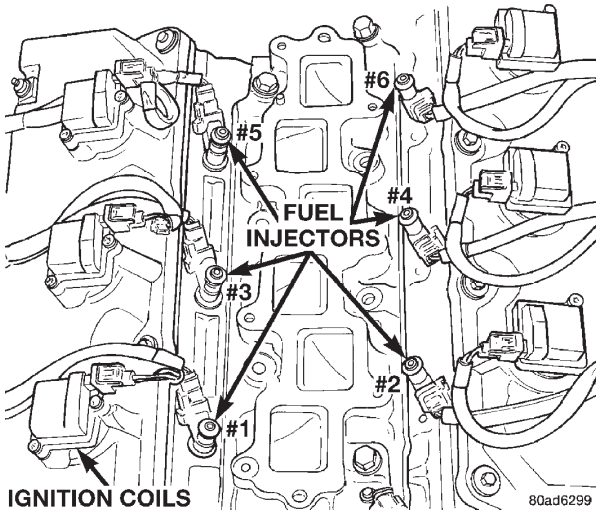
80b27cd7

4.2 Controls & Solenoids (continued)



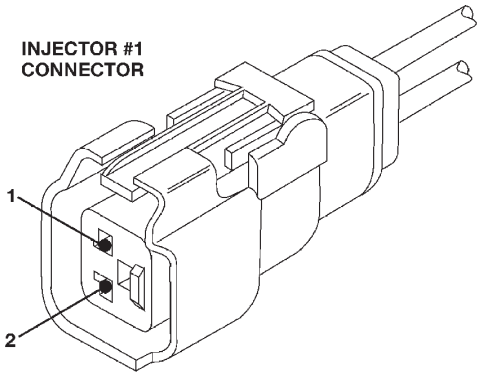
CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LB	COIL ON PLUG DRIVER #6

80b27cd9



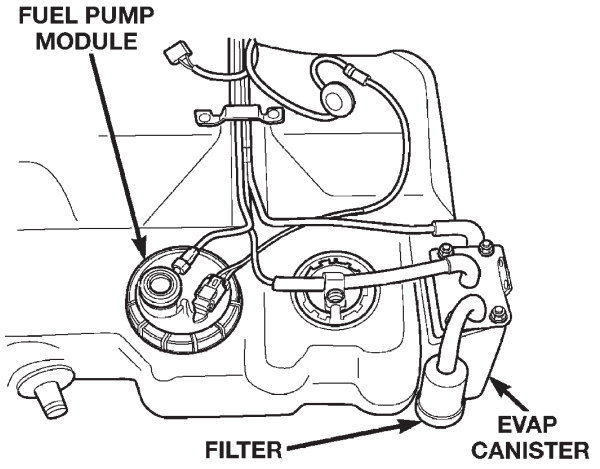
80ad6299

Typical



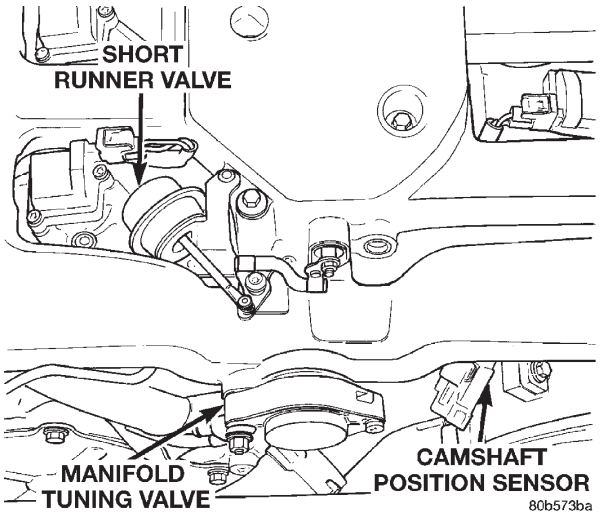
CAV	COLOR	FUNCTION
1	WT/DB	INJECTOR #1 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b09847



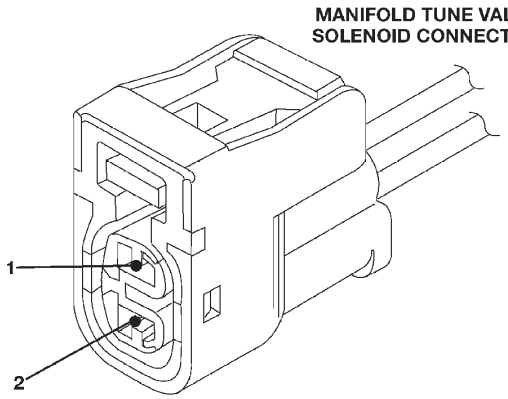
80b573fe

3.5L



80b573ba

3.5L

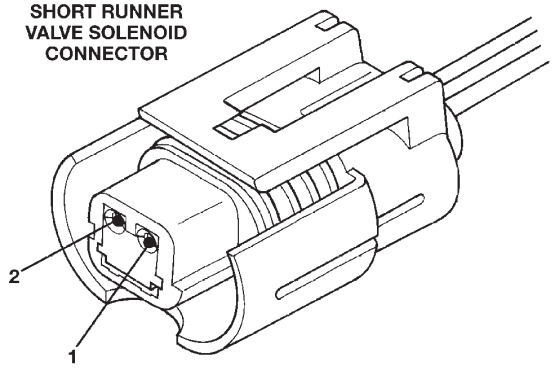


CAV	COLOR	FUNCTION
1	VT/RD	MTV SOLENOID CONTROL
2	DG/LG	ASD RELAY OUTPUT

80b09856

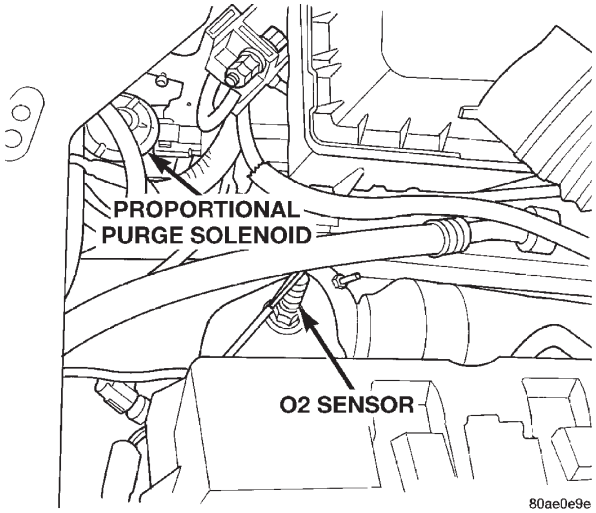
3.5L

SHORT RUNNER VALVE SOLENOID CONNECTOR



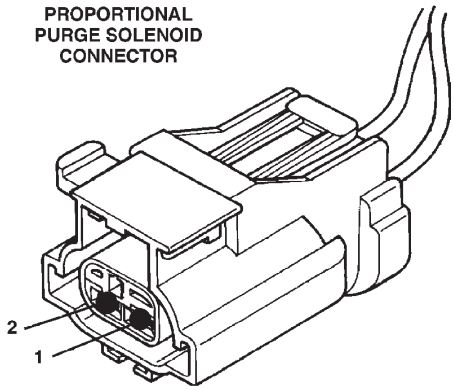
CAV	COLOR	FUNCTION
1	GY/PK	SRV SOLENOID CONTROL
2	OR/DG	ASD RELAY OUTPUT

80b4fb55



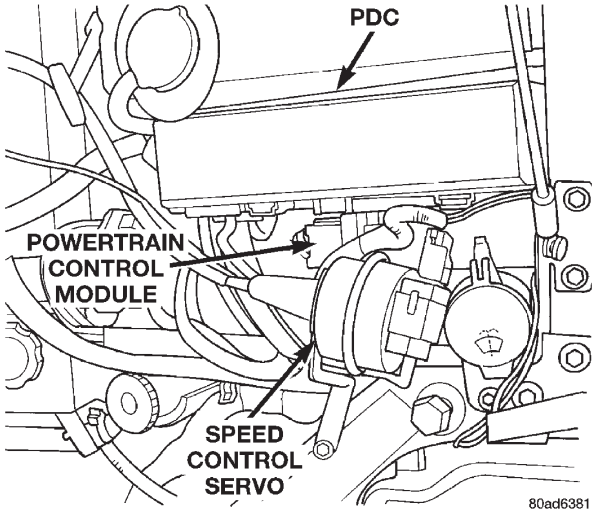
80ae0e9e

PROPORTIONAL PURGE SOLENOID CONNECTOR



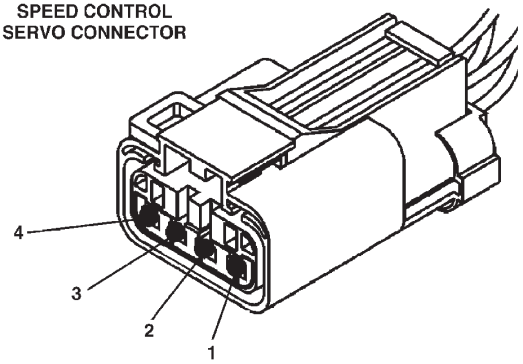
CAV	COLOR	FUNCTION
1	PK/BK	PROPORTIONAL PURGE SOLENOID CONTROL
2	DG/LG	PWM PURGE SENSE

80b27d16



80ad6381

SPEED CONTROL SERVO CONNECTOR

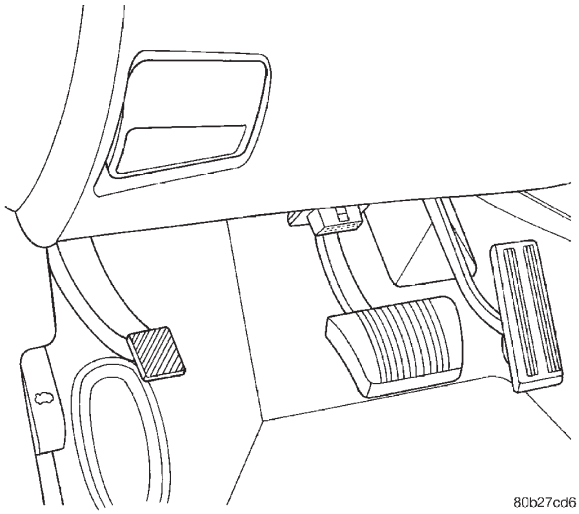


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

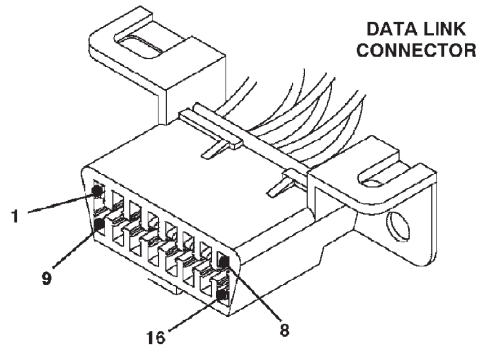
80b4b84c

4.3 Data Link Connectors

LH BODY



80b27cd6



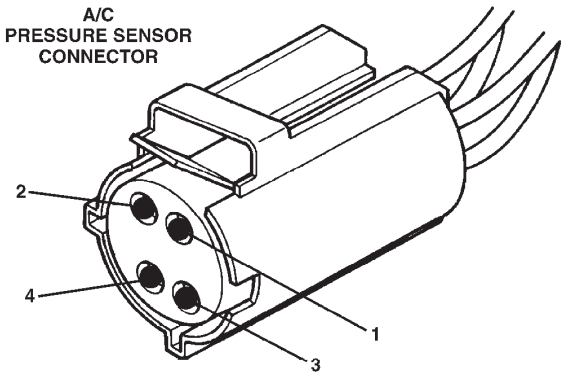
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
2	YL/VT	PCI BUS	8	RD/WT	FUSED IGN SW OUTPUT
4	BK	GROUND	14	PK/BK	SCI RECEIVE (TCM)
5	BK/LG	GROUND	16	PK	FUSED B(+)
6	LG	SCI RECEIVE (PCM)			
7	DB	SCI TRANSM T (TCM)			

80b5eff8

4.4 Sensors

2.7L

The A/C pressure sensor is located in the high pressure line, near the A/C compressor. The connector is a gray connector.

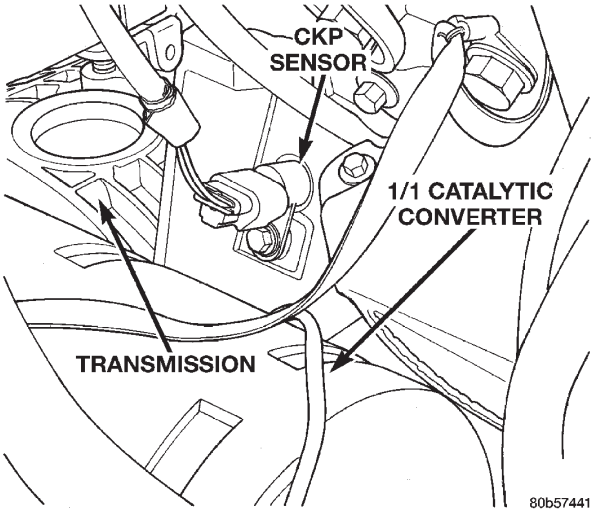


CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	VT/WT	5-VOLT SUPPLY
3	DB	A/C PRESSURE SIGNAL

80b09845

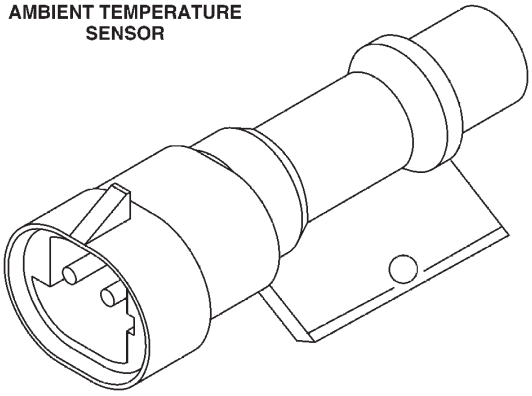
3.5L

The A/C pressure sensor is located in the high pressure line, near the A/C condensor. The connector is a gray connector.



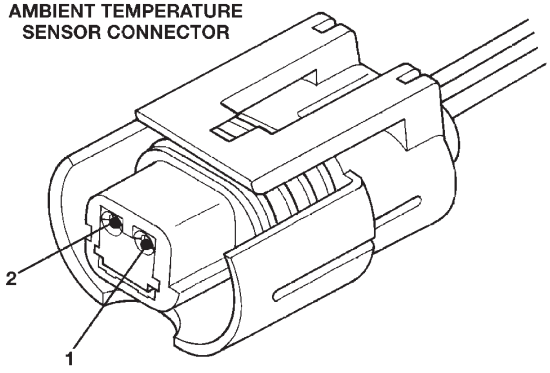
80b57441

AMBIENT TEMPERATURE SENSOR



80a0754a

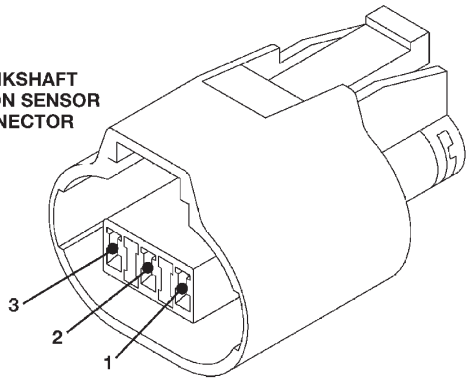
AMBIENT TEMPERATURE SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	VT/LG	AMBIENT TEMP SENSOR SIGNAL
2	DB/GY	SENSOR GROUND

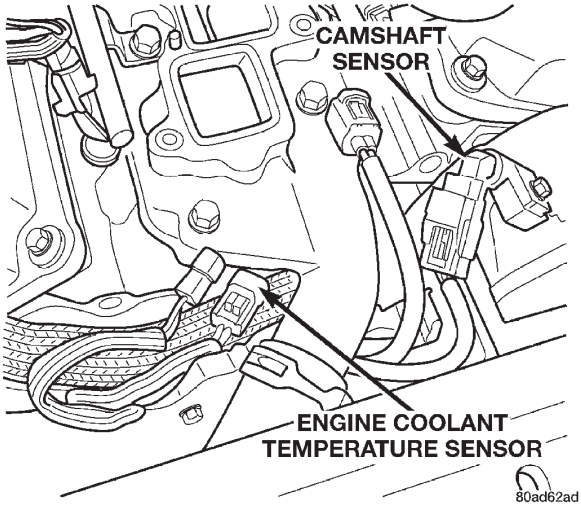
80b6eff6

CRANKSHAFT POSITION SENSOR CONNECTOR



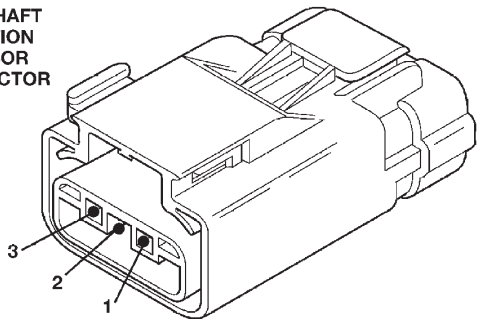
CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL 5V
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c63



80ad62ad

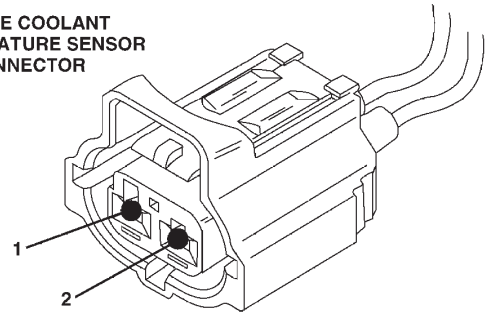
CAMSHAFT POSITION SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	OR	8-VOLT SUPPLY
2	BK/LB	SENSOR GROUND
3	TN/YL	CMP SENSOR SIGNAL 5V

80b27c67

ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR

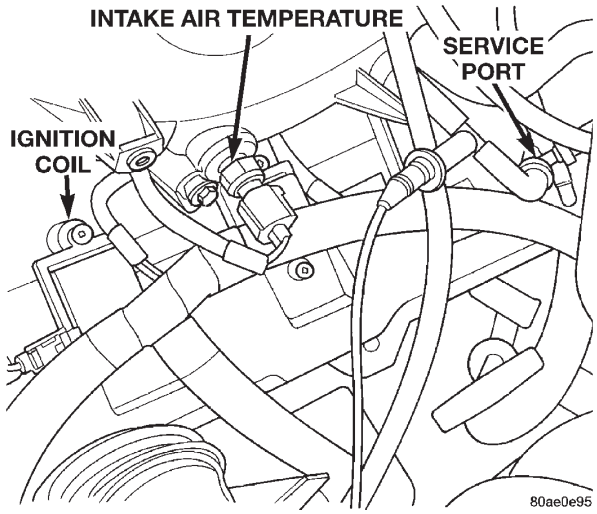


CAV	COLOR	FUNCTION
1	TN/BK	ECT SENSOR SIGNAL
2	BK/LB	SENSOR GROUND

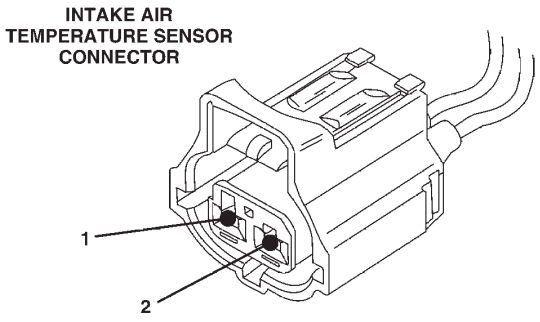
80b09853

4.4 Sensors (continued)

2.7L



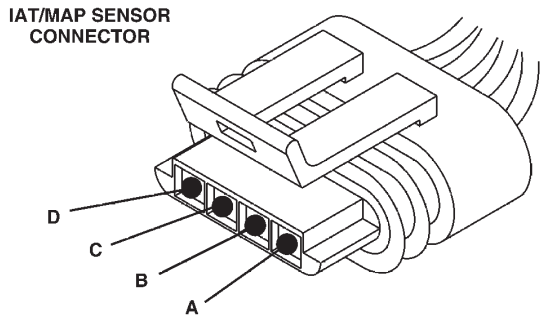
2.7L



CAV	COLOR	FUNCTION
1	BK/RD	IAT SIGNAL
2	BK/LB	SENSOR GROUND

80a9b3c4

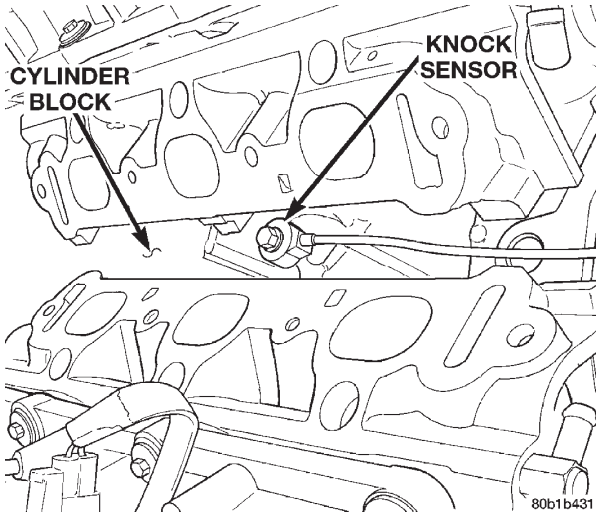
3.5L



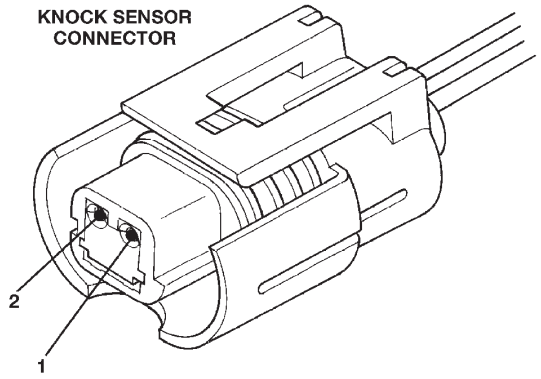
CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

2.7L



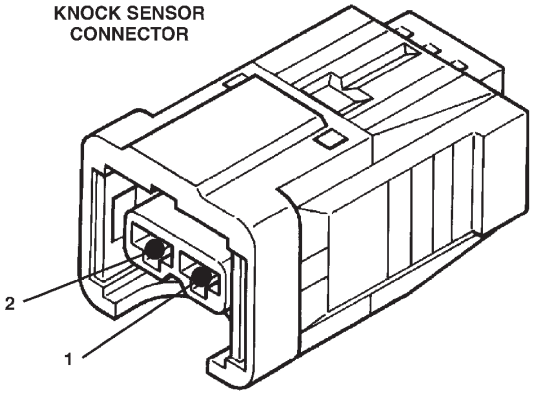
2.7L



CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	BK/VT	KNOCK SENSOR SIGNAL

80b09868

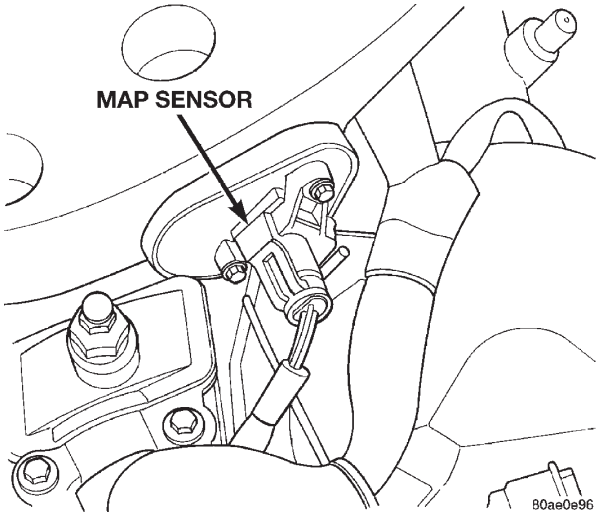
3.5L



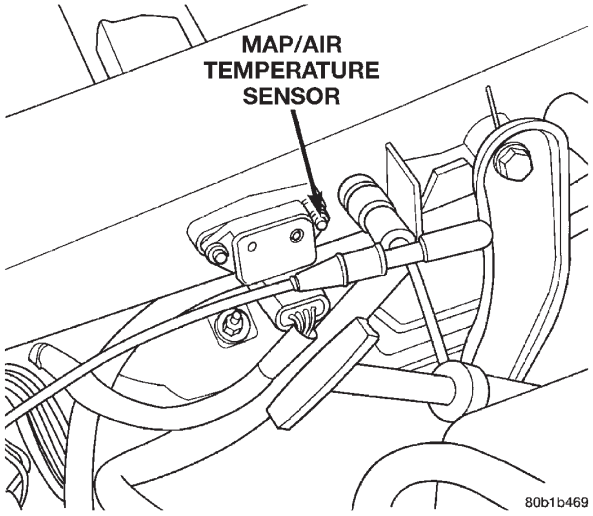
CAV	COLOR	FUNCTION
1	BK/VT	KNOCK SENSOR RETURN
2	DB/LG	KNOCK SENSOR SIGNAL

80b09869

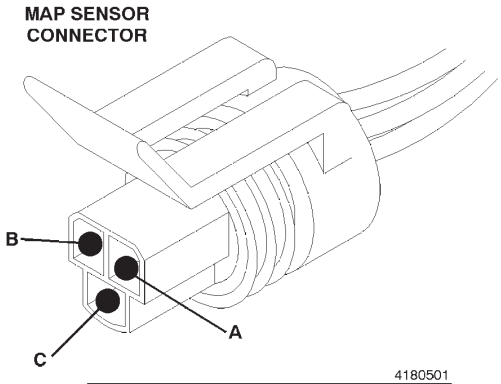
2.7L



3.5L

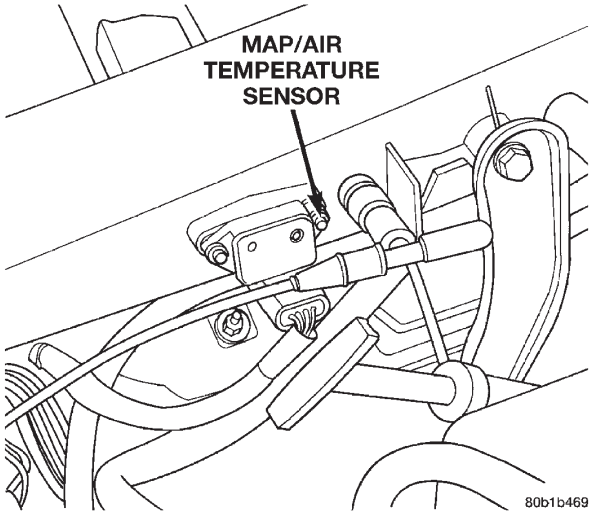


2.7L

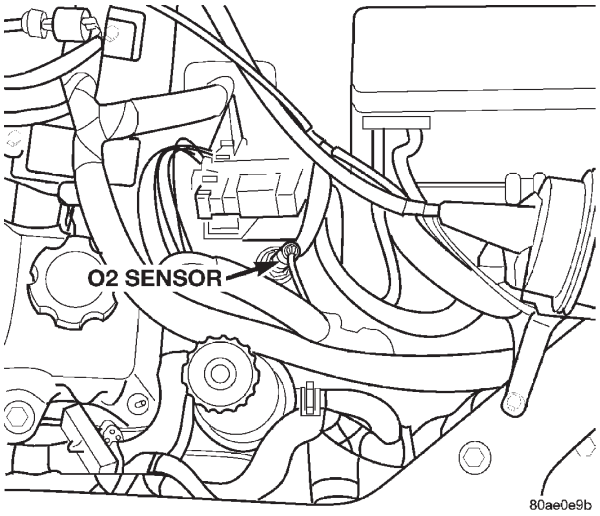


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

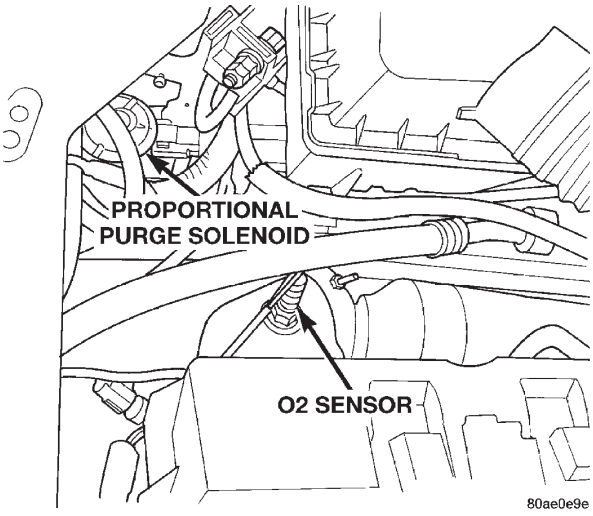
3.5L



2/1

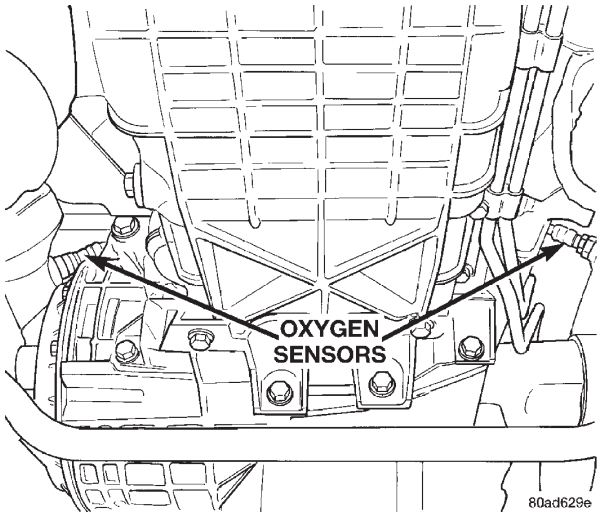


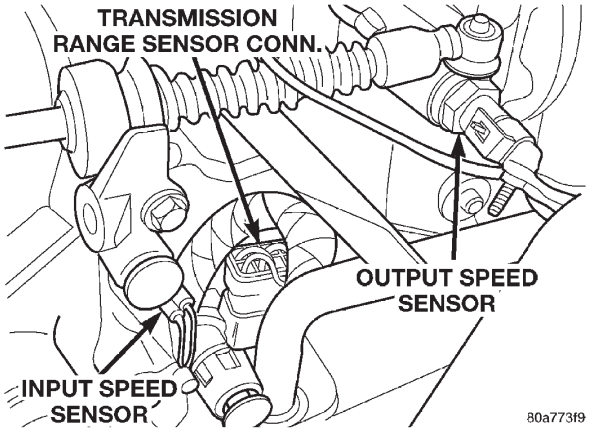
1/1



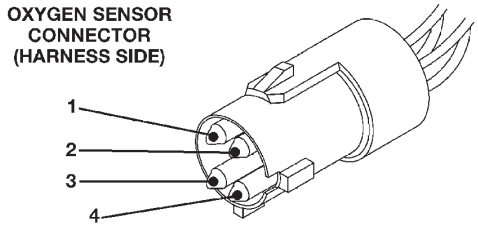
4.4 Sensors (continued)

1/2 and 2/2



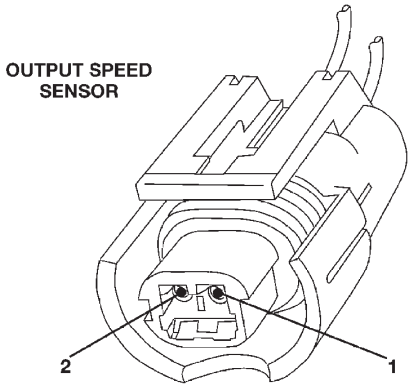


all 02



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

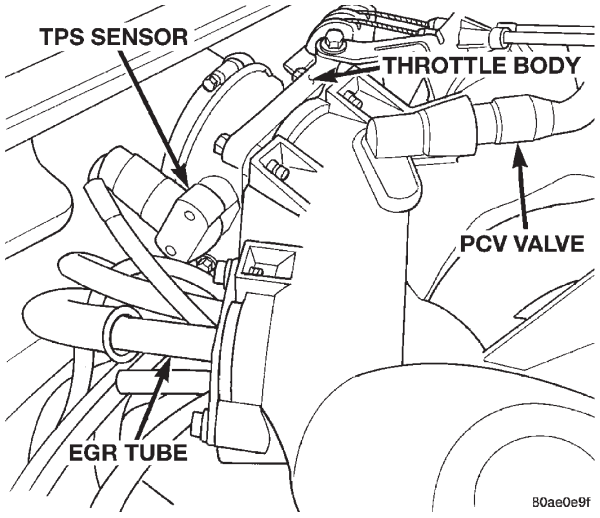
80b1b45e



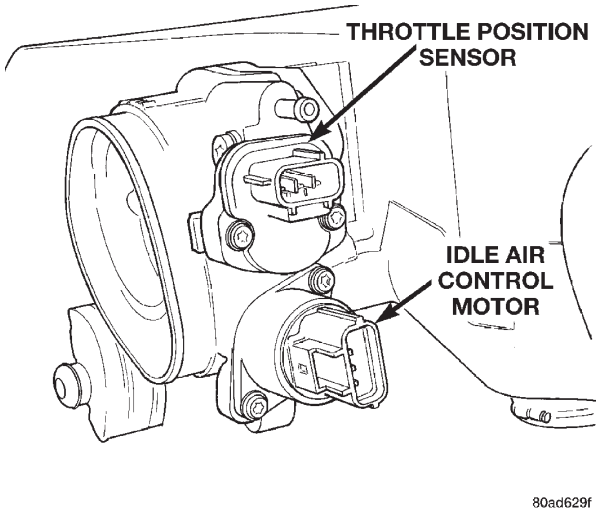
CAV	COLOR	FUNCTION
1	DB/BK	SPEED SENSOR GROUND
2	LG/WT	SPEED SENSOR SIGNAL

80b2b62f

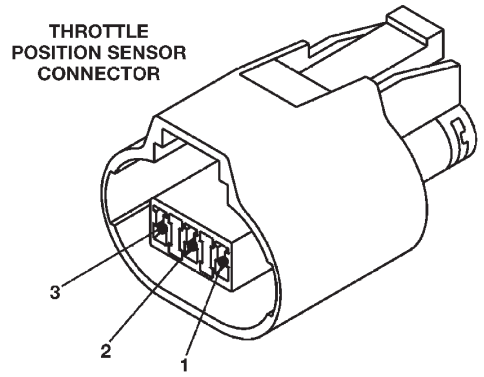
2.7L



3.5L



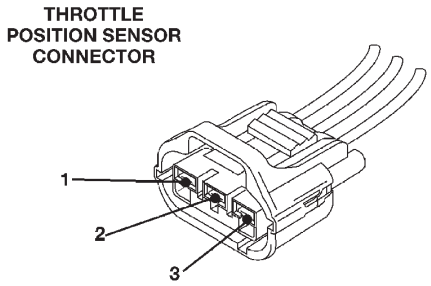
2.7L



CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

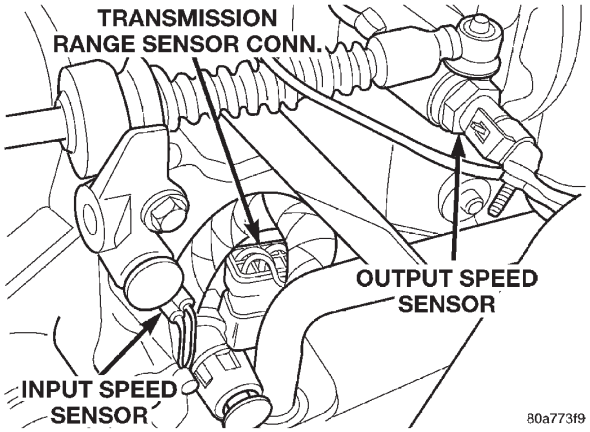
80b27c72

3.5L

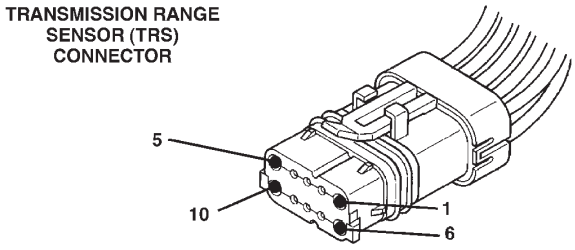


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b04fa9



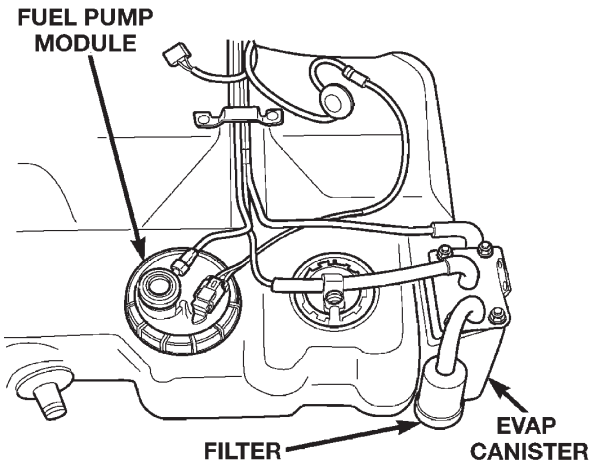
80a773f9



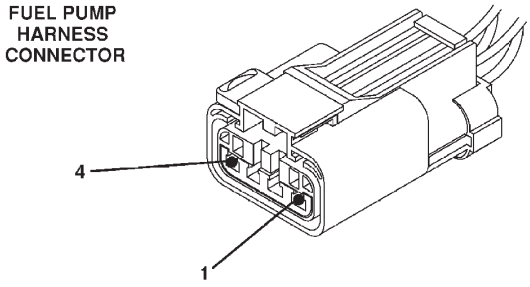
CAV	COLOR	FUNCTION
1	WT	FUSED IGNITION SWITCH OUTPUT
3	DB/BK	SPEED SENSOR GROUND
4	VT/PK	TRANSMISSION TEMP SENSOR SIGNAL
5	BK/WT	PNP SWITCH SENSE
6	VT/BK	REVERSE LAMP SENSE
7	LG/BK	TRS T1 SENSE
8	VT	TRS T3 SENSE
9	VT/WT	TRS T42 SENSE
10	BK/YL	TRS T41 SENSE

80b27c16

4.5 Fuel System



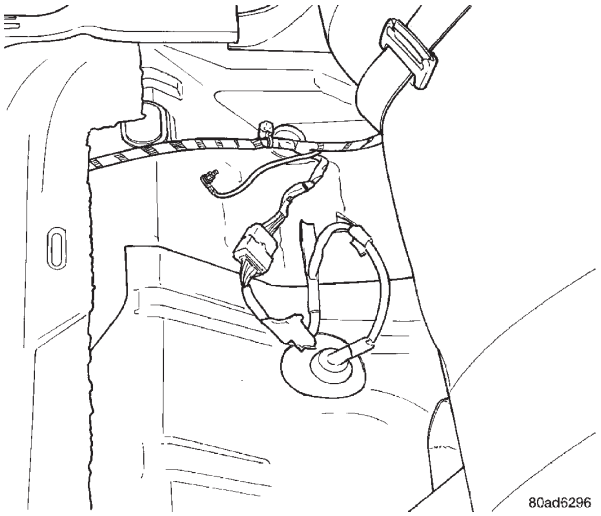
80b573fe



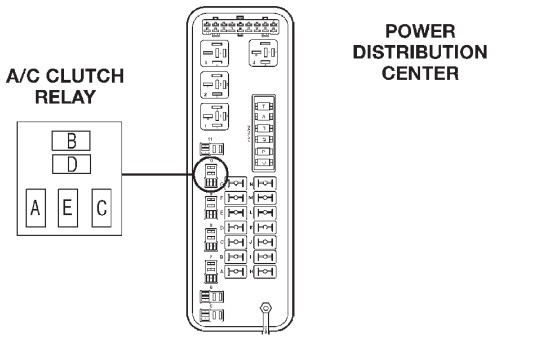
CAV	COLOR	FUNCTION
1	BK	GROUND (FUEL PUMP)
2	BK/LG	GROUND (SENSOR)
3	DB	FUEL LEVEL SENSOR SIGNAL
4	DG/WT	FUEL PUMP RELAY OUTPUT

80b6eff7

4.5 Fuel System (continued)

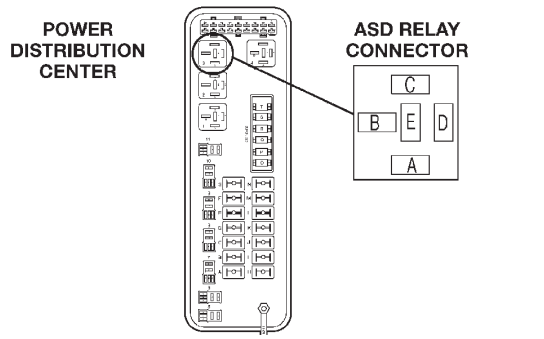


4.6 Relays



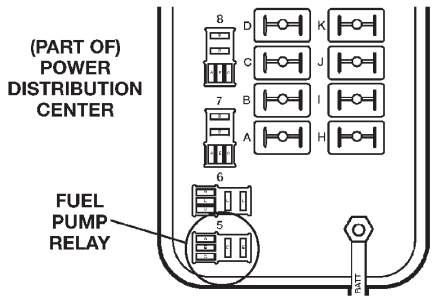
CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/OR	A/C COMP CLUTCH RELAY CONTROL
D (87)	DB/BK	A/C CLUTCH RELAY OUTPUT

80b4fb2e



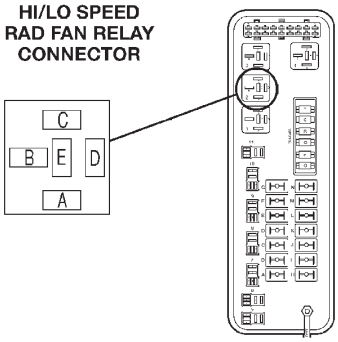
CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f



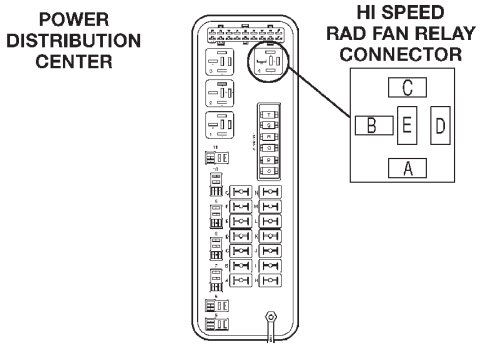
CAV	COLOR	FUNCTION
A(86)	DB/WT	FUSED IGNITION SWITCH OUTPUT
B(30)	RD	FUSED B(+)
C(85)	BR	FUEL PUMP RELAY CONTROL
D(87)	DG/WT	FUEL PUMP RELAY OUTPUT

80b4fb4e



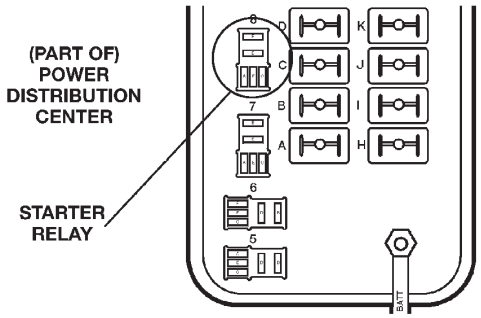
CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/PK	LO SPEED RAD FAN RELAY CONTROL
D (87)	TN	LO SPEED RAD FAN RELAY OUTPUT

80b46bf8



CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/BR	FUSED B(+)
C (85)	DB/LG	HI SPEED RAD FAN RELAY CONTROL
D (87)	LG	HI SPEED RAD FAN RELAY OUTPUT

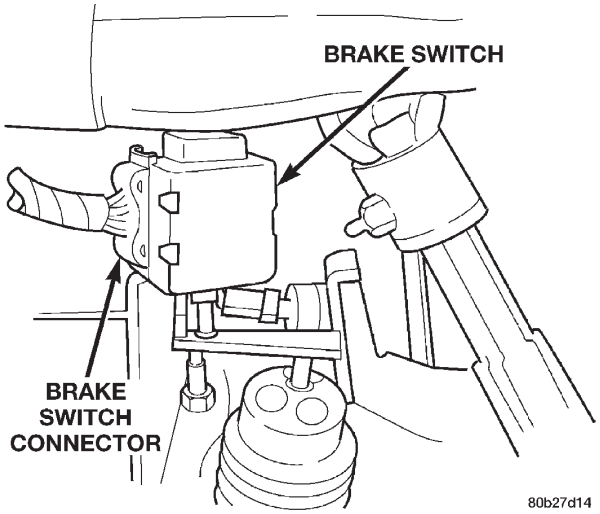
80b4fb2f



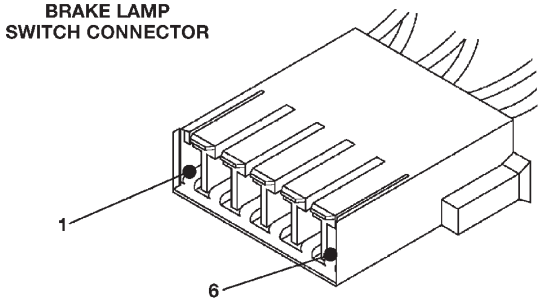
CAV	COLOR	FUNCTION
A(86)	YL	IGNITION SWITCH OUTPUT (SWITCH)
B(30)	RD	FUSED B(+)
C(85)	TN/WT	STARTER RELAY CONTROL
D(87)	LG	STARTER RELAY OUTPUT

80b573bb

4.7 Switches

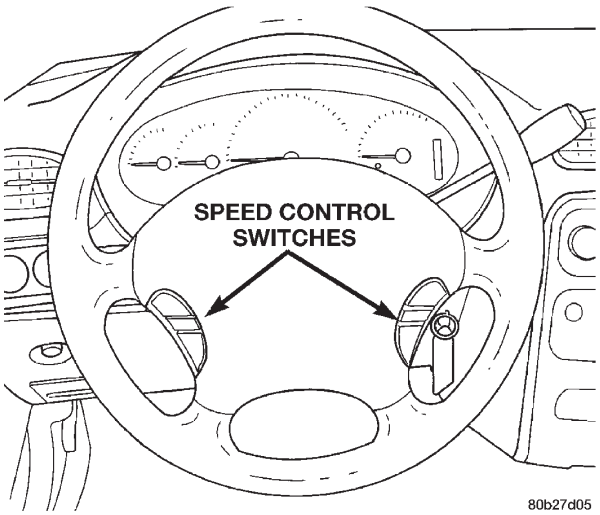


80b27d14

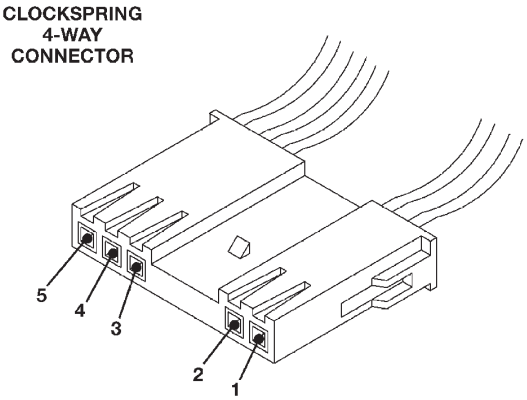


CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12



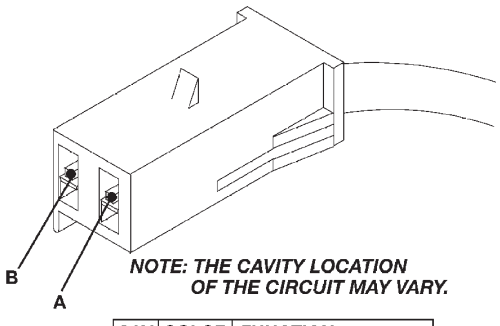
80b27d05



CAV	COLOR	FUNCTION
1	RD/LG	S/C SWITCH SIGNAL
2	BK/LB	SENSOR GROUND
3	BK/RD	HORN RELAY CONTROL

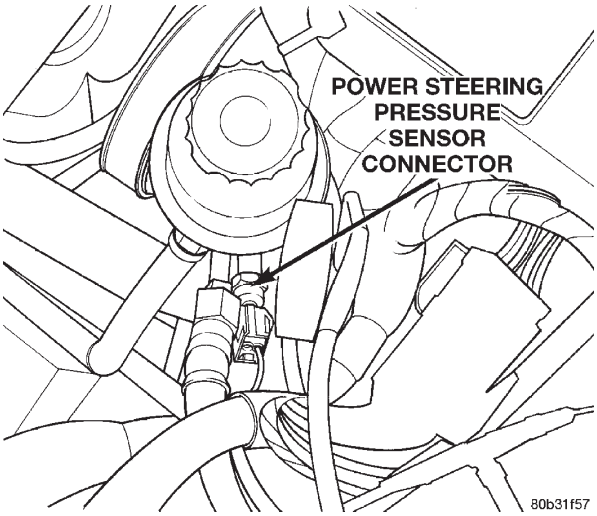
80b27c97

4.7 Switches (continued)



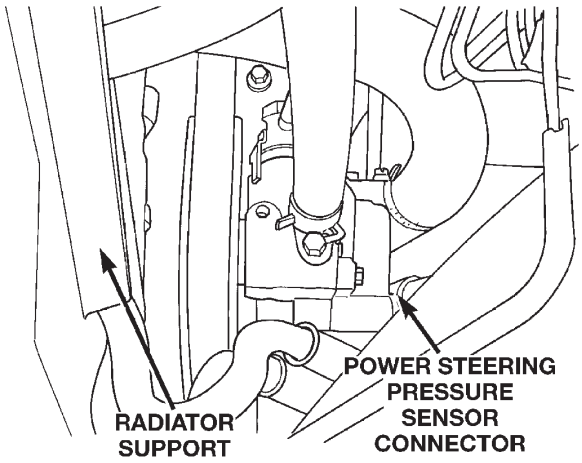
CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

80b4fb57

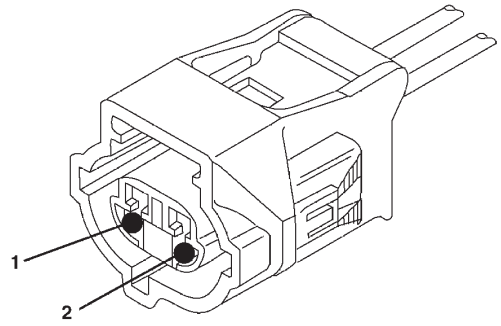


80b31f57

3.5L

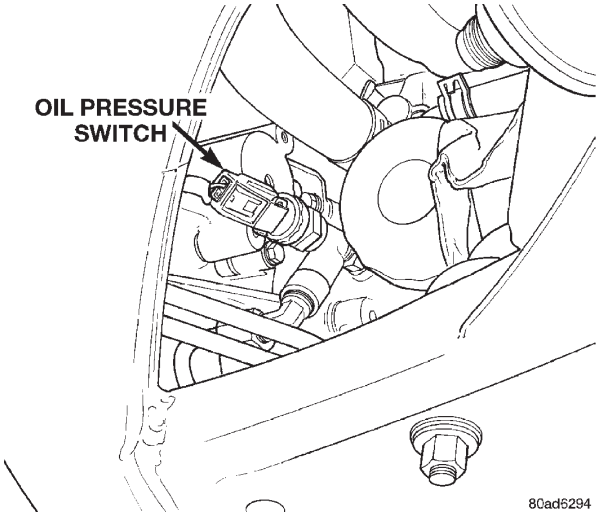


80b31f58

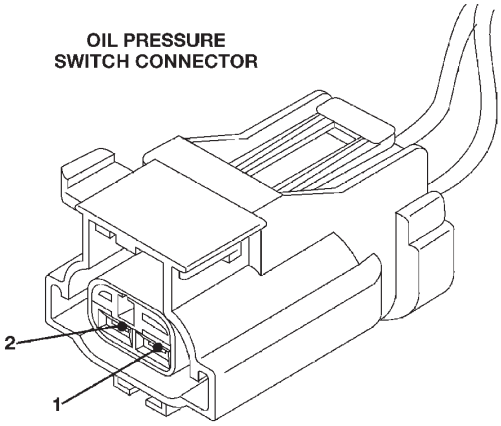


CAV	COLOR	FUNCTION
2	DB/LG	POWER STEERING PRESSURE SW SENSE

80b09846



80ad6294



CAV	COLOR	FUNCTION
1	GY	OIL PRESSURE SWITCH SIGNAL

80b09877

5.0 DISCLAIMERS, SAFETY, WARNINGS

5.1 Disclaimers

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

5.2 Safety

5.2.1 Technician Safety Information

WARNING: Engines produce carbon monoxide that is odorless, causes slower reaction time, and can lead to serious injury. When the engine is operating, keep service areas WELL VENTILATED or attach the vehicle exhaust system to the shop exhaust removal system.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in General Information Section 9.0 (Specifications) or in service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

5.2.2 Vehicle Preparation for Testing

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

5.2.3 Servicing Sub-Assemblies

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system sub-components may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

5.2.4 DRBIII® Safety Information

WARNING: Exceeding the limits of the DRBIII® multimeter is dangerous. It can expose you to serious or possibly fatal injury. Carefully read and understand the cautions and the specification limits.

Follow the vehicle manufacturer's service specifications at all times.

- Do not use the DRB if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.

- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100F -50 - 600C

* Ohms cannot be measured if voltage is present.
Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRB away from spark plug or coil wires to avoid measuring error from outside interference.

5.3 Warnings and Cautions

5.3.1 Road Test Warnings

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read the DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.

5.3.2 Vehicle Damage Cautions

Before disconnecting any control module, make sure the ignition is ‘‘off’’. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

5.3.3 Electronic Pinion Factor Warning

The pinion factor must be set for all new transmission control modules. If the pinion factor is not set or if it is set incorrectly, any speed-related accessories will not operate or will operate inaccurately. This includes the speedometer, speed control, rolling door locks, and other devices that are operated by the powertrain and body control modules. For instructions on setting the pinion factor, see the appropriate transmission diagnostic manual or the service manual.

NOTES

7.1 GENERAL TROUBLESHOOTING

SBEC III 02 SENSOR CONFIGURATION

JA/JX 2.0L SOHC	1/1	UPSTREAM
JA/JX 2.0L SOHC	1/2	DOWNSTREAM
JA/JX 2.4L DOHC	1/1	UPSTREAM
JA/JX 2.4L DOHC	1/2	DOWNSTREAM
JA/JX 2.5L V-6	1/1	UPSTREAM
JA/JX 2.5L V-6	1/2	DOWNSTREAM
300M 2.7L V-6	1/1	RIGHT BANK UP
300M 2.7L V-6	1/2	RIGHT BANK DOWN
300M 2.7L V-6	2/1	LEFT BANK UP
300M 2.7L V-6	2/2	LEFT BANK DOWN
300M 3.5L V-6	1/1	RIGHT BANK UP
300M 3.5L V-6	1/2	RIGHT BANK DOWN
300M 3.5L V-6	2/1	LEFT BANK UP
300M 3.5L V-6	2/2	LEFT BANK DOWN
GS 2.4L DOHC	1/1	UPSTREAM
GS 2.4L DOHC	1/2	DOWNSTREAM
GS 3.0L V-6	1/1	UPSTREAM
GS 3.0L V-6	1/2	DOWNSTREAM
GS 3.3L V-6	1/1	UPSTREAM
GS 3.3L V-6	1/2	DOWNSTREAM
GS 3.8L V-6	1/1	UPSTREAM
GS 3.8L V-6	1/2	DOWNSTREAM
PL 2.0L DOHC	1/1	UPSTREAM
PL 2.0L DOHC	1/2	DOWNSTREAM
PL 2.0L SOHC	1/1	UPSTREAM
PL 2.0L SOHC	1/2	DOWNSTREAM

80b5cc94

DTC TEST | **CONTINUED - CHECKING THE SYSTEM FOR DIAGNOSTIC TROUBLE CODES (DTCs)**

NOTE: The battery must be fully charged for any test in this manual.

1. Attempt to start the engine. Crank for up to 10 seconds if necessary.
2. Connect the DRB to the data link connector. Write down the trouble codes that are displayed.
3. If the DRB screen displays ‘‘No Response’’, go to **TEST NS-6A.**
4. If the DRB screen is blank or has a DRB message, go to **General Information Section 3.5** in this manual.
5. If **trouble code messages** are displayed, refer to the trouble code list below and on the next page for the appropriate test.
6. If there are **no trouble codes** displayed, refer to one of the following:

For Immobilizer problems SK-1A
For Driveability problems NTC-1A
For No Start problems . . . . . .NS-SEL
For Speed Control problems SC-1A
For Charging problems. CH-1A

NOTE: The test numbers for these trouble codes were derived from the decimal codes as set in the PCM. Therefore, some test numbers will be missing because all codes are not applicable to the vehicles covered in this manual.

TROUBLE CODE NAME DRBIII®	TEST #	HEX CODE	SCAN TOOL
1/1 Fuel system lean	TC-119	77	P0171
1/1 Fuel system Rich	TC-118	76	P0172
1/1 O2S heater failure	TC-103	67	P0135
1/1 O2S shorted to ground	TC-155	9B	P0131
1/1 O2S shorted to voltage	TC-62	3E	P0132
1/1 O2S stays at center	TC-32	20	P0134
1/2 O2S heater failure	TC-105	69	P0141
1/2 O2S shorted to ground	TC-156	9C	P0137
1/2 O2S shorted to voltage	TC-126	7E	P0138
1/2 O2S stays at center	TC-129	81	P0140
2/1 Fuel system lean	TC-121	79	P0174
2/1 Fuel system rich	TC-120	78	P0175
2/1 O2S heater failure	TC-124	7C	P0155
2/1 O2S shorted to ground	TC-181	B5	P0151
2/1 O2S shorted to voltage	TC-65	42	P0152
2/1 O2S stays at center	TC-66	41	P0154
2/2 O2S heater failure	TC-125	7D	P0161
2/2 O2S shorted to ground	TC-182	B6	P0157
2/2 O2S shorted to voltage	TC-127	7F	P0158
2/2 O2S stays at center	TC-130	82	P0160
5 volt supply output too low	TC-146	92	P1496
A/C Clutch relay circuit	TC-16	10	P0545
A/C pressure sensor volts too high	TC-90	5A	P1598
A/C pressure sensor volts too low	TC-91	5B	P1599
Ambient/Batt temp sen volts too high	TC-154	9A	P1492
Ambient/Batt temp sen volts too low	TC-153	99	P1493

DTC TEST CONTINUED - CHECKING THE SYSTEM FOR DIAGNOSTIC TROUBLE CODES (DTCs)

TROUBLE CODE NAME DRBIII®	TEST #	HEX CODE	SCAN TOOL
Auto shutdown relay control circuit	TC-10	0A	P1388
Barometric pressure out of range	TC-60	3C	P0106
Battery temp sensor volts out of limit	**	47	N/A
Charging system voltage too high	TC-6	6	P1594
Charging system voltage too low	TC-5	5	P1682
ECT sensor voltage too high	TC-30	1F	P0117
ECT sensor voltage too low	TC-31	1E	P0118
EGR solenoid circuit	TC-17	11	P0403
Engine is cold too long	**	21	P1281
EVAP purge solenoid circuit	TC-18	12	P0443
Fuel pump relay control circuit	TC-101	65	P1282
Generator field not switching properly	TC-11	0B	P0622
High speed fan control relay circuit	TC-93	5D	P1489
Idle air control motor circuits	TC-25	19	P0505
Ignition coil #1 primary circuit	TC-43	2B	P0351
Ignition coil #2 primary circuit	TC-42	2A	P0352
Ignition coil #3 primary circuit	TC-41	29	P0353
Ignition coil #4 primary circuit	TC-76	4C	P0354
Ignition coil #5 primary circuit	TC-77	4D	P0355
Ignition coil #6 primary circuit	TC-216	D8	P0356
Injector #1 control circuit	TC-21	15	P0201
Injector #2 control circuit	TC-21	14	P0202
Injector #3 control circuit	TC-21	13	P0203
Injector #4 control circuit	TC-21	3D	P0204
Injector #5 control circuit	TC-21	45	P0205
Injector #6 control circuit	TC-21	46	P0206
Intake air temp sensor voltage high	TC-58	3A	P0113
Intake air temp sensor voltage low	TC-57	39	P0112
Intake manifold short runner solenoid CKT	TC-217	D9	P1288
Intermittent loss of CMP or CKP	TC-157	9D	P1391
Internal Controller Failure	**	2	P0601
Knock sensor circuit	TC-59	3B	P0325
Low speed fan control relay circuit	TC-92	5C	P1490
Manifold tune valve control circuit	TC-88	58	P1289
MAP sensor volts too high	TC-37	25	P0108
MAP sensor volts too low	TC-36	24	P0107
No ASD relay output voltage at PCM	TC-44	2C	P1380
No cam signal at PCM	TC-1	1	P0340
No PCI bus message from body control module	**	61	P1695
No PCI bus message received from SKIM	TC-226	E2	N/A
No PCI bus message from TCM	**	60	P1698
No change in MAP from start to run	TC-39	27	P1297
No crank reference signal at PCM	TC-40	28	P0320
No PCI bus message from MIC	**	E1	P1687
No vehicle speed sensor signal	TC-35	23	P0500
P/N switch stuck in park or in gear	TC-114	72	P1899
PCM failure EEPROM write denied	TC-49	31	P1698
PCM failure SPI communications	**	44	P0600
PCM failure SRI mile not stored	TC-48	30	P1697

TROUBLE CODE NAME DRBIII®	TEST #	HEX CODE	SCAN TOOL
Power steering switch failure	TC-115	73	P0551
Spd ctrl pwr rly, or s/c 12v driver ckt	TC-82	52	P1683
Speed control solenoid circuits	TC-15	0F	P1595
Speed control switch always low	TC-87	57	P1597
Throttle position sensor voltage high	TC-27	1B	P0123
Throttle position sensor voltage low	TC-26	1A	P0122
TPS voltage does not agree with MAP	TC-132	84	P0121
Vacuum leak found (IAC fully seated)	TC-145	91	P1299
Wrong or invalid key MSG received from SKIM	TC-232	E8	P1685

DTC TEST **CONTINUED - CHECKING THE SYSTEM FOR DIAGNOSTIC TROUBLE CODES (DTCS)**

For a BATTERY TEMP SENSOR VOLTS OUT OF LIMIT trouble code, replace the Powertrain control module and perform **Verification TEST VER-2A.**

For an EATX CONTROLLER DTC PRESENT trouble code, use the Transmission diagnostic manual, with the DRB read transmission DTC's.

For an ENGINE IS COLD TOO LONG trouble code, the engine does not warm to 80°C (176°F) while driving for at least 20 minutes after a start. See the service manual for cooling system repair (Thermostat).

For an INTERNAL CONTROLLER FAILURE, replace the Powertrain control module and perform **Verification TEST VER-2A.**

For a NO PCI BUS MESSAGE FROM BODY CONTROL MODULE, or MIC BUS message trouble code, use the appropriate body diagnostic manual for testing and repair.

For a NO PCI BUS MESSAGE FROM TCM trouble code, use the appropriate Trans diagnostic manual for testing and repair. Look for code 19 or a no response.

For a PCM FAILURE SPI COMMUNICATIONS trouble code, replace the Powertrain control module and perform **Verification TEST VER-2A.**

NOTES

TEST TC-1A REPAIRING - NO CAM SIGNAL AT PCM

Perform TEST DTC Before Proceeding

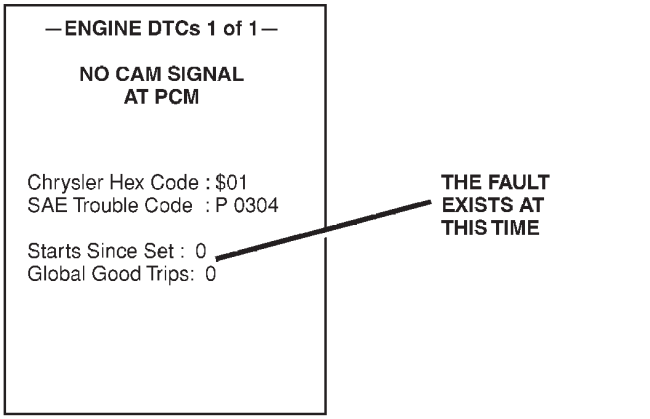


FIG. 1

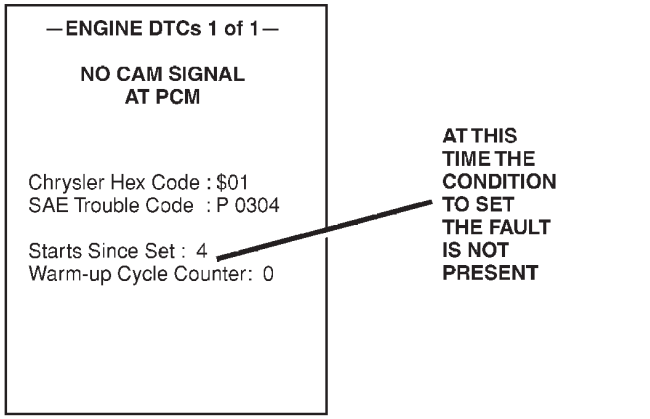


FIG. 2

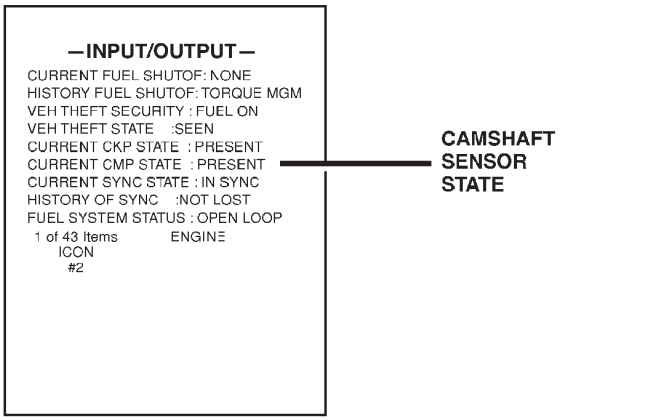
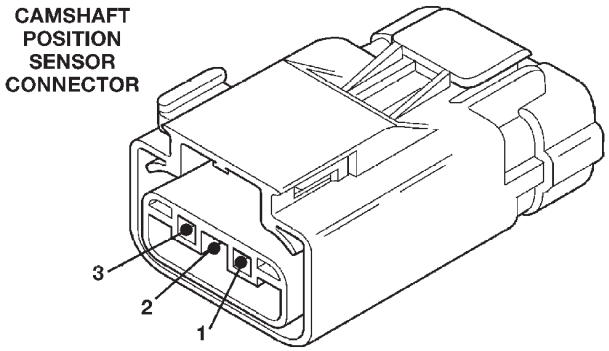


FIG. 3



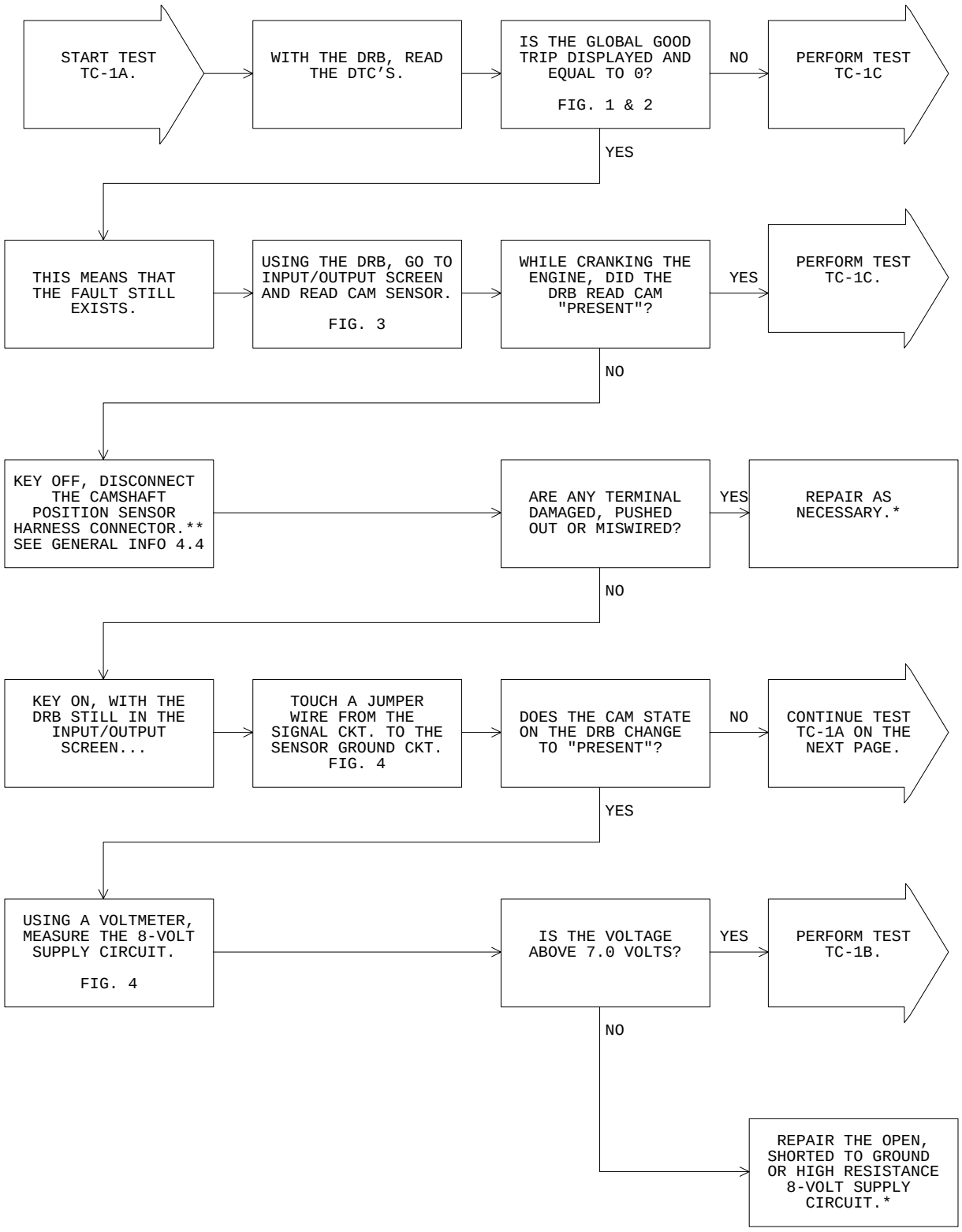
CAV	COLOR	FUNCTION
1	OR	8-VOLT SUPPLY
2	BK/LB	SENSOR GROUND
3	TN/YL	CMP SENSOR SIGNAL 5V

80b27c67

FIG. 4

TEST TC-1A — REPAIRING - NO CAM SIGNAL AT PCM

Perform TEST DTC Before Proceeding

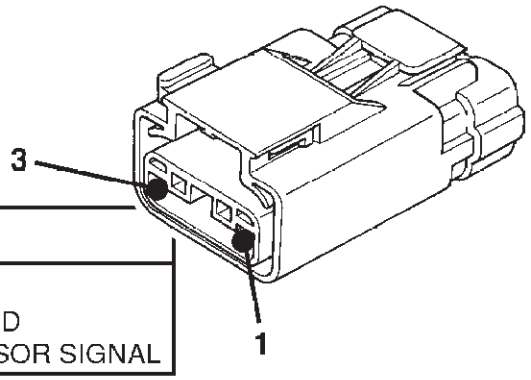


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

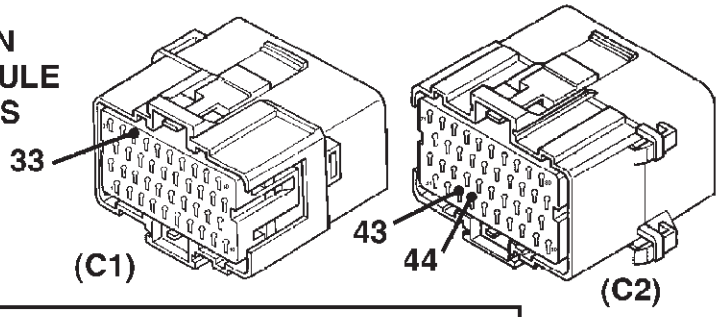
TEST TC-1A CONTINUED - REPAIRING NO CAM SIGNAL AT PCM

CAMSHAFT POSITION SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	OR	8-VOLT SUPPLY
2	BK/LB	SENSOR GROUND
3	TN/YL	CAMSHAFT SENSOR SIGNAL

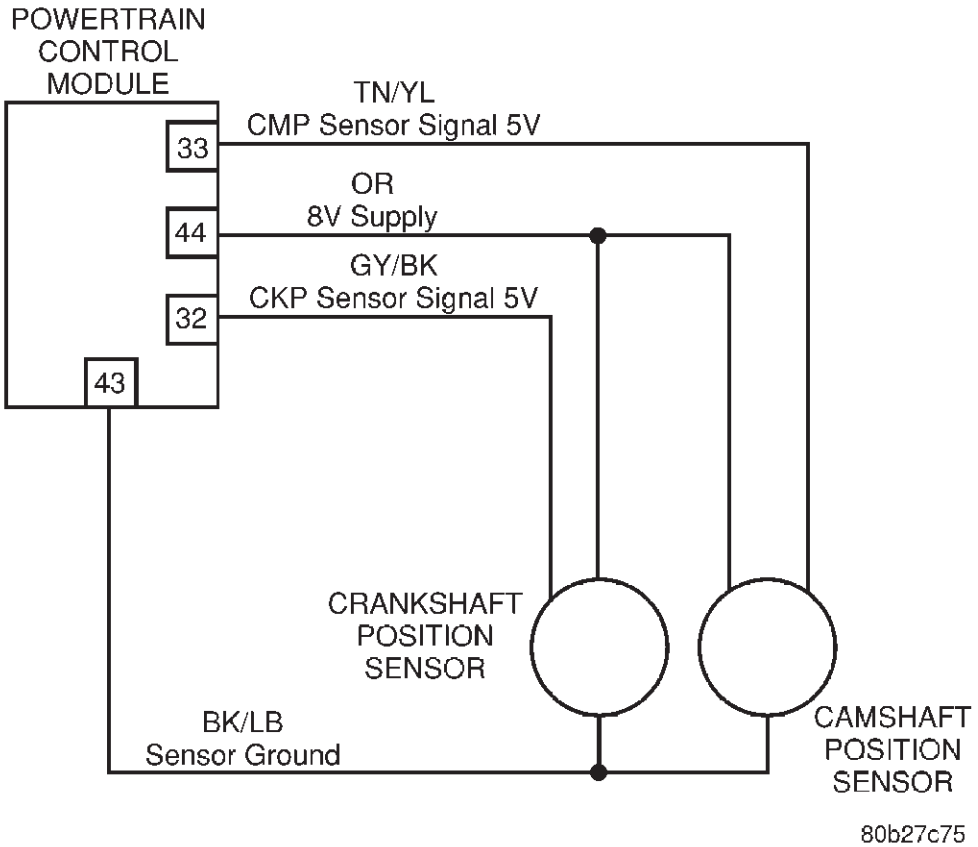
POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
33	TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
44	OR	8-VOLT SUPPLY

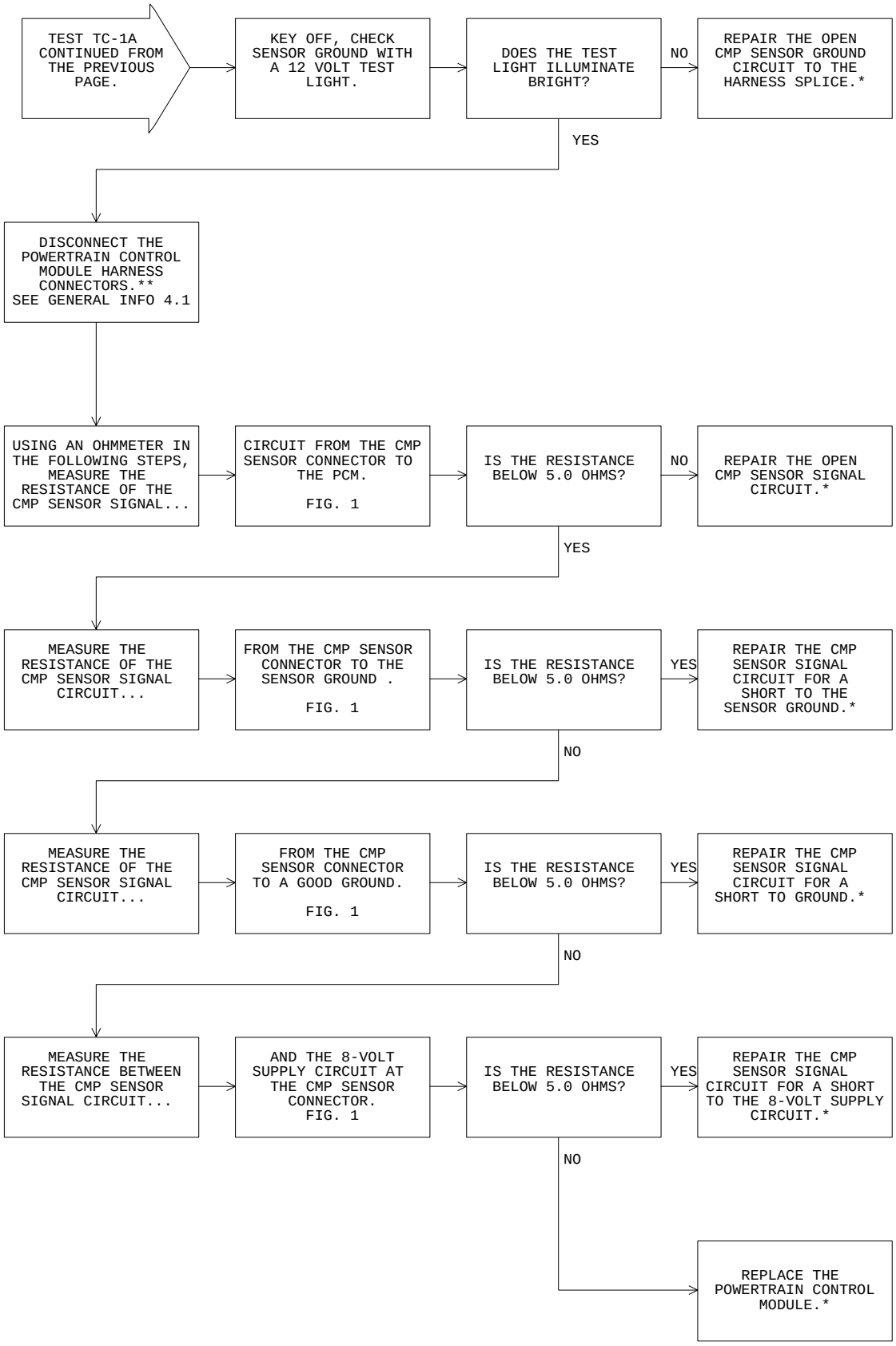
80b27c69

FIG. 1



80b27c75

TEST TC-1A CONTINUED - REPAIRING - NO CAM SIGNAL AT PCM



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-1B | **REPAIRING - NO CAM SIGNAL AT PCM**

Perform TEST TC-1A Before Proceeding

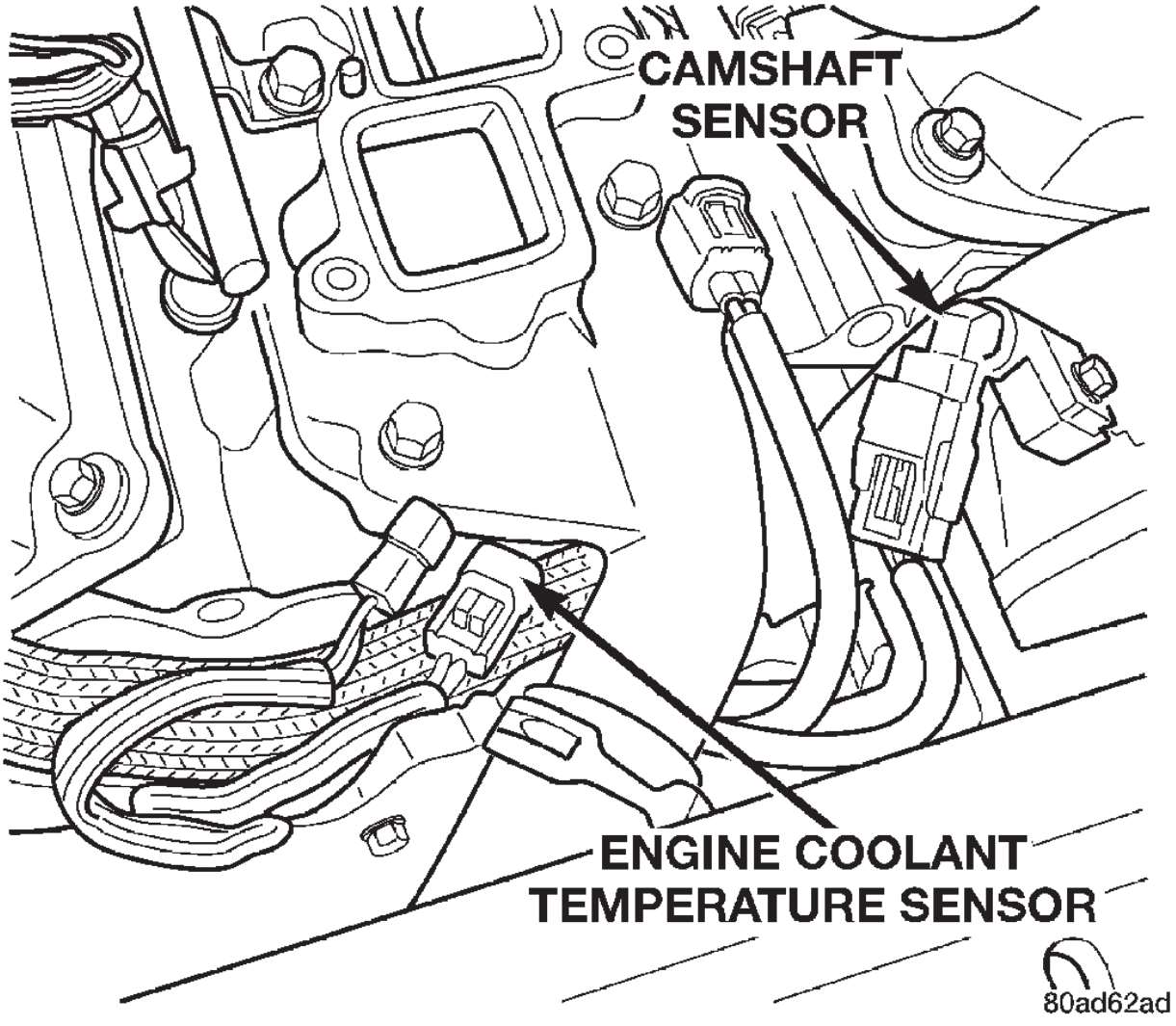
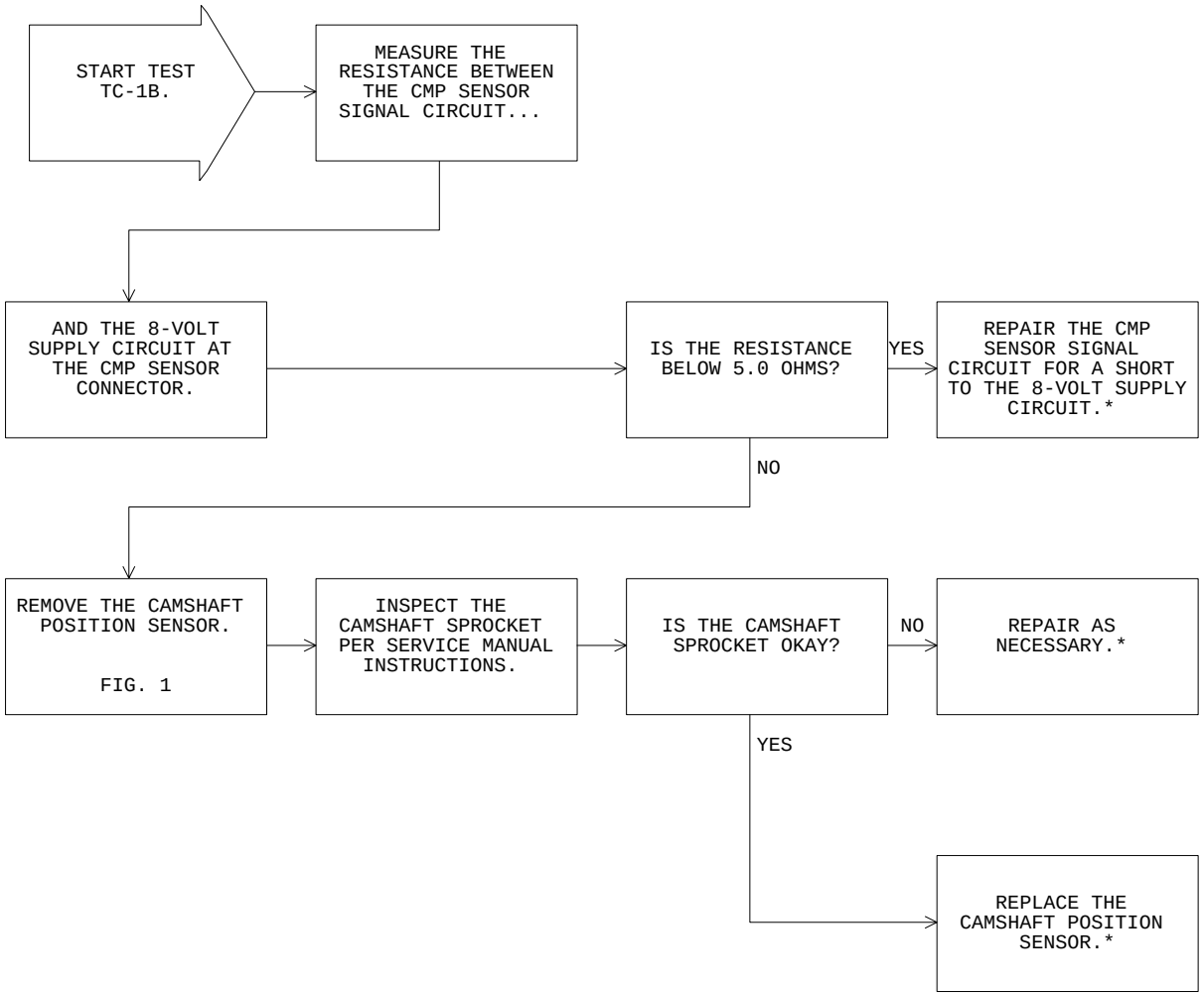


FIG. 1

TEST TC-1B REPAIRING - NO CAM SIGNAL AT PCM

Perform TEST TC-1A Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-1C REPAIRING - NO CAM SIGNAL AT PCM

Perform TEST TC-1A Before Proceeding

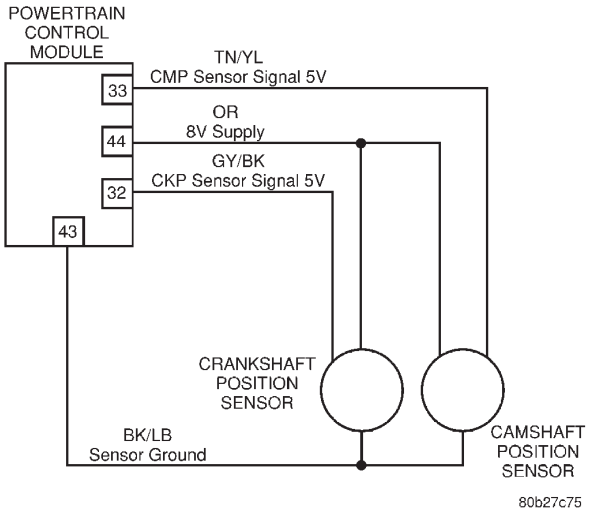


FIG. 1

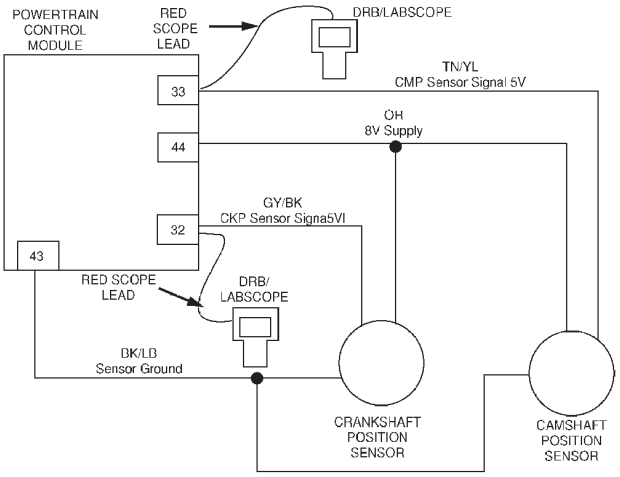


FIG. 3

Name of Code: No Cam Signal at PCM

When Monitored: During engine cranking, after 32 crank position signals.

Set Condition: No signal from the cam position sensor is present with crank signal.

Theory of Operation: The cam position sensor is a hall effect-type sensor used to detect the camshaft position. The powertrain control module provides the sensor with a 8-volt source, 5-volt pull-up, and a sensor ground. The sensor signal is created by the slots cut in the camshaft sprocket passing under the sensor. When a slot is under the sensor, the signal is high (5V). When the metal between the slots is under the sensor, the signal is low (0.3V).

Possible causes:
- Open 8-volt supply circuit
- Open sensor ground
- Open or shorted signal circuit
- Excessive clearance between the sensor and sprocket
- Damaged sprocket
- Failed sensor
- Failed PCM

805dd866

FIG. 2

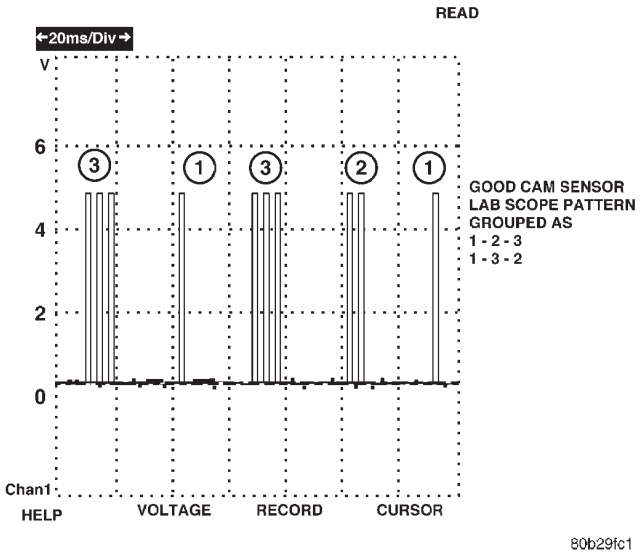
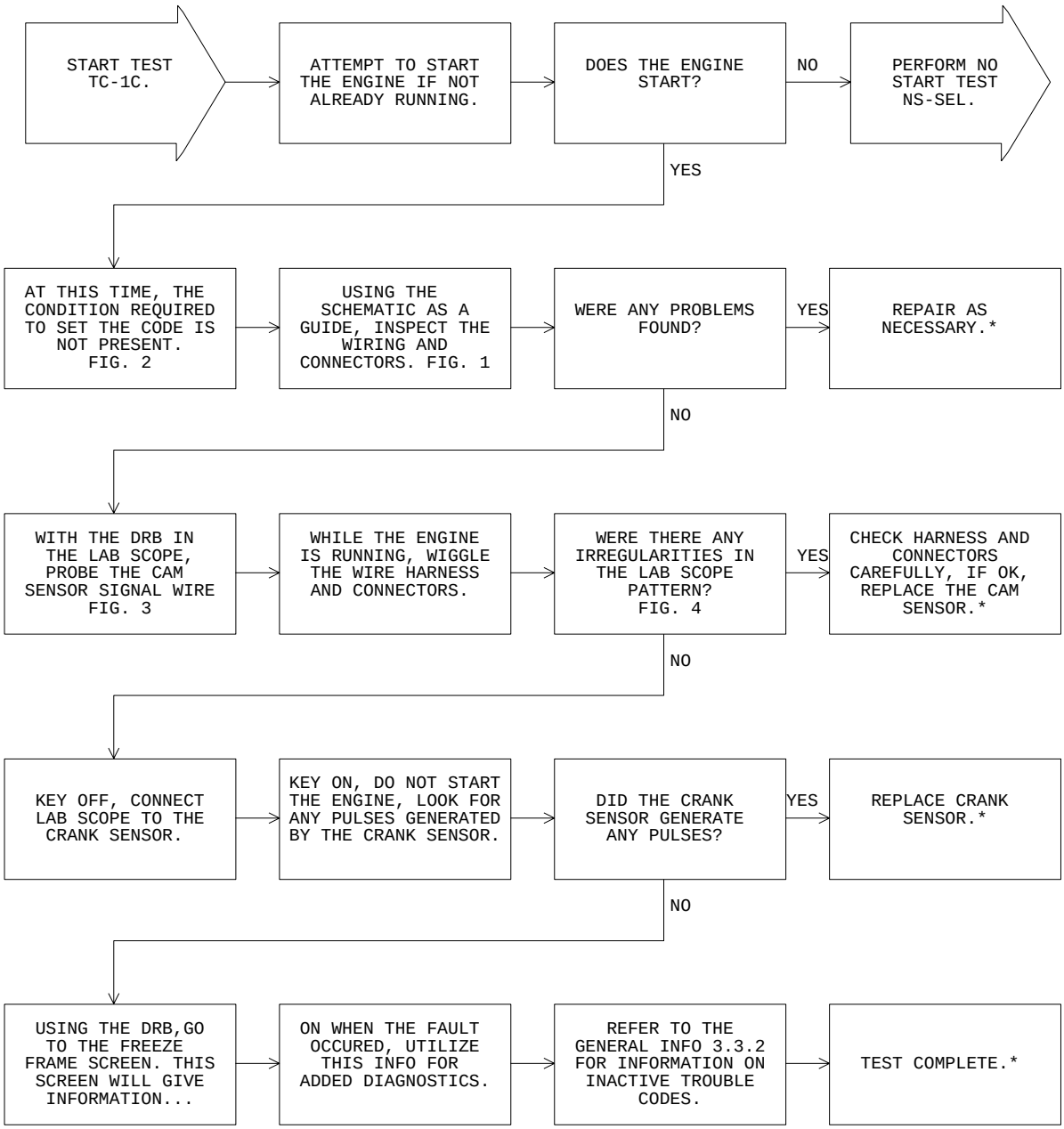


FIG. 4

TEST TC-1C REPAIRING - NO CAM SIGNAL AT PCM

Perform TEST TC-1A Before Proceeding



Perform Verification TEST VER-2A.	*****Check connectors - Clean / repair as necessary.***

TEST TC-5A REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

Name of code: Charging System Voltage Too Low

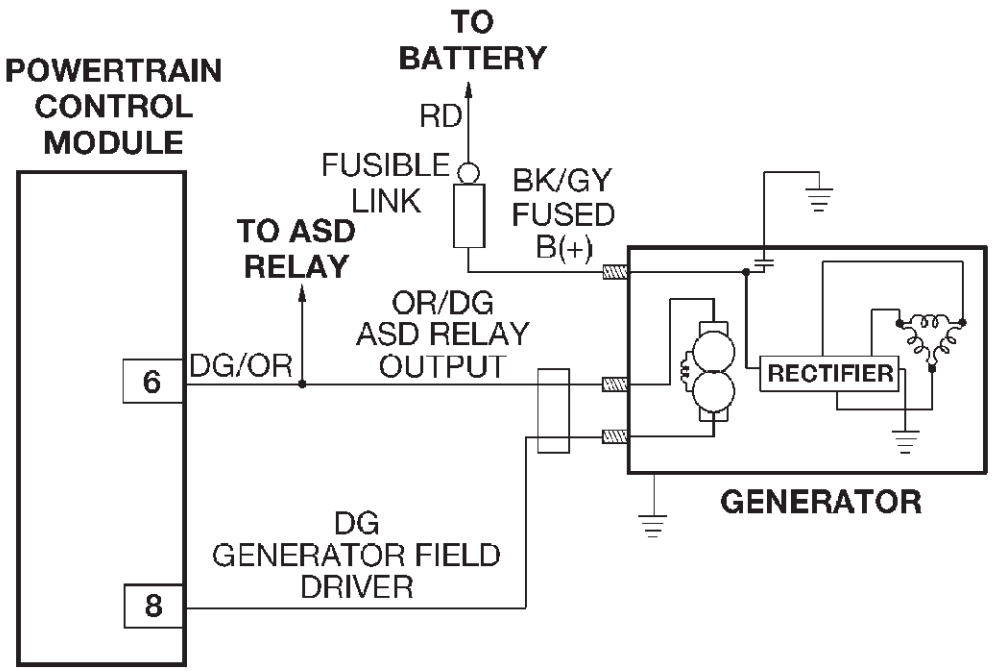
When monitored: With the ignition key on and the engine running above 1152 RPM.

Set condition: With no other charging system codes set. The battery sensed voltage is 1 volt below the charging goal for 25 seconds. The PCM senses the battery voltage, turns off the field driver and senses the battery voltage again. If the voltages are the same the code is set.

Theory of operation: The PCM tries to maintain a system voltage between 13.4 volts and 14.8 volts. The voltage determined by the PCM as the final goal for the charging system is called "control" voltage. This control voltage is determined from the battery temp sensor (ambient sensor). The control voltage is compared to the sensed voltage continuously during running. If the sensed voltage is less than the control voltage the PCM will supply more ground to the field circuit. If the sensed voltage is more than the control voltage the PCM will supply less ground to the field circuit.

Possible causes:
- Defects in generator drive belt or adjustment
- High resistance between battery B(+) and generator B(+)
- High resistance between battery B(-) and generator B(-)
- PCM failure
- Connector terminals
- Connector wires
- High field circuit resistance (in generator)
- High resistance between battery B(+) and PDC B(+)

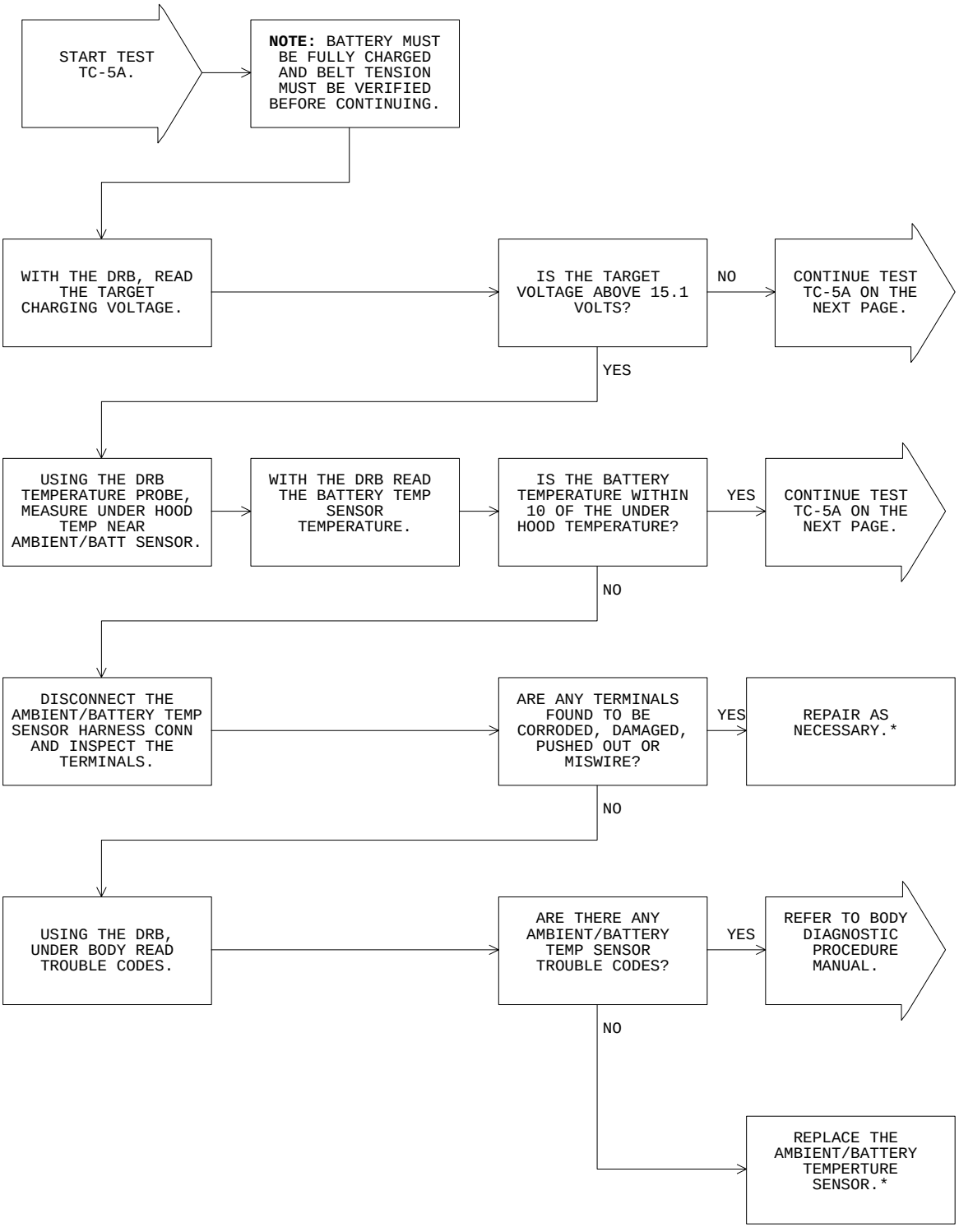
80b27d24



80b4b84b

TEST TC-5A REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

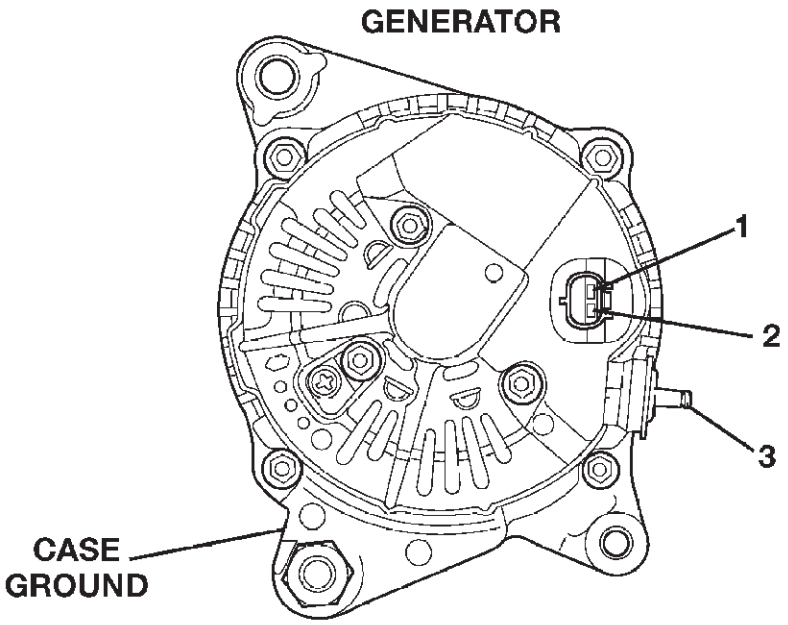


Perform Verification TEST VER-3A.

Check connectors - Clean / repair as necessary.

TEST TC-5A CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW

2.7L

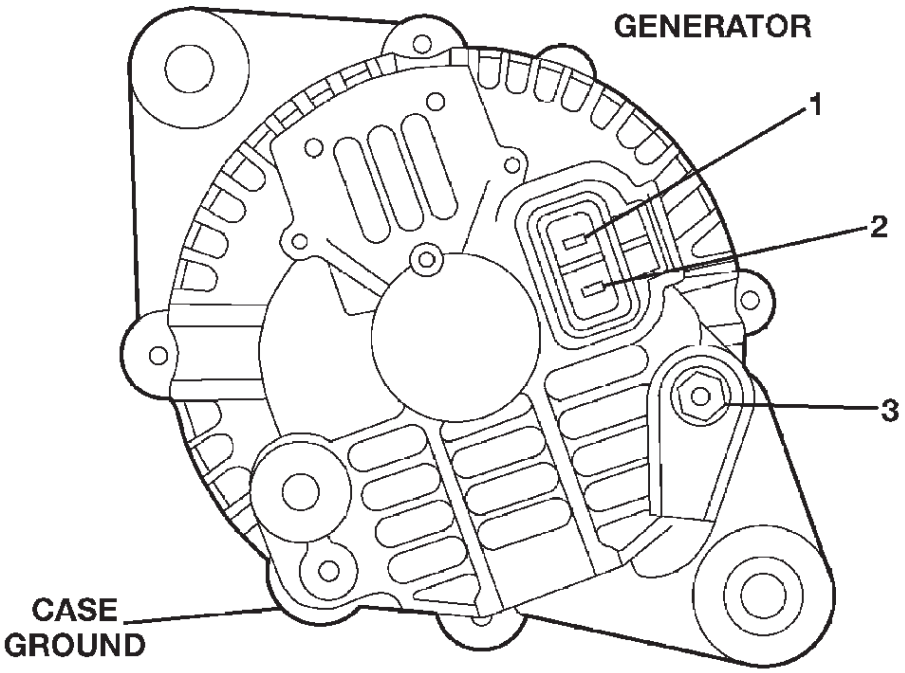


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

80b6eff9

FIG. 1

3.5L

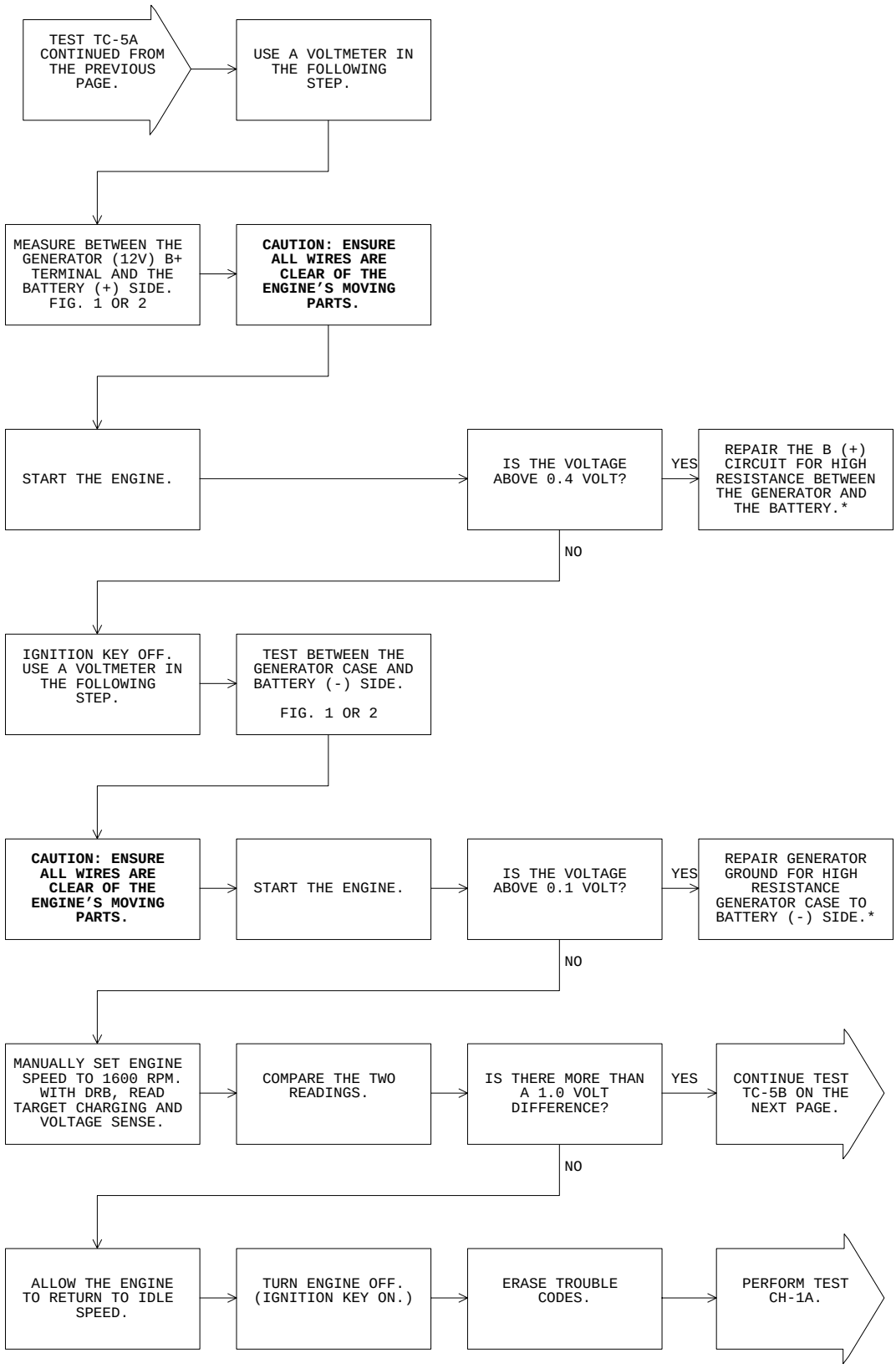


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

80b6effa

FIG. 2

TEST TC-5A CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW



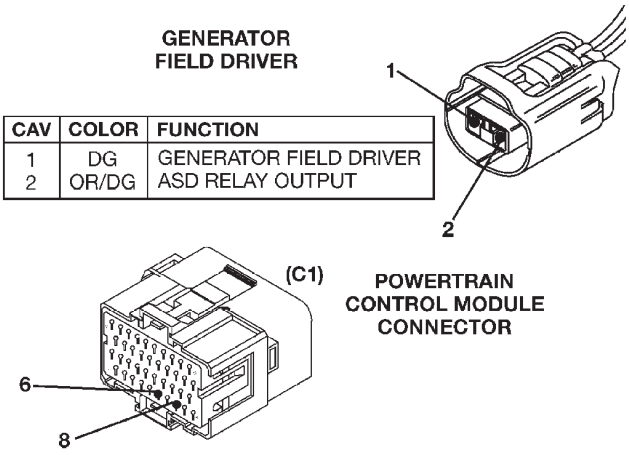
Perform Verification TEST VER-3A.

Check connectors - Clean / repair as necessary.

TEST TC-5B REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

2.7L

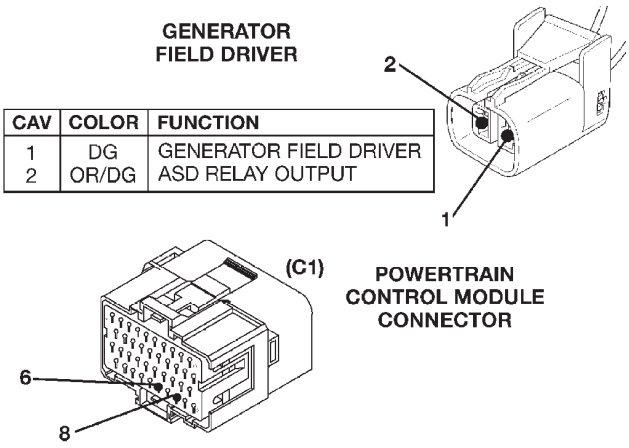


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
8	DG	GENERATOR FIELD DRIVER

FIG. 1

3.5L

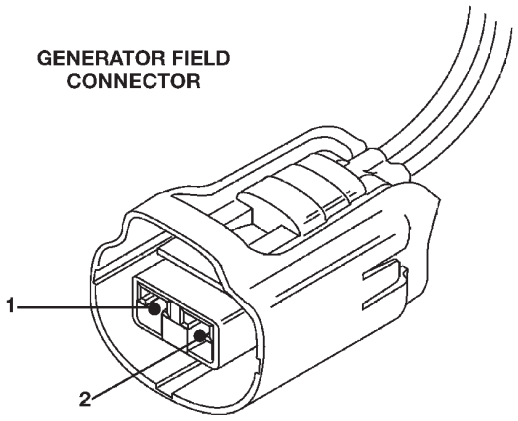


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
8	DG	GENERATOR FIELD DRIVER

FIG. 2

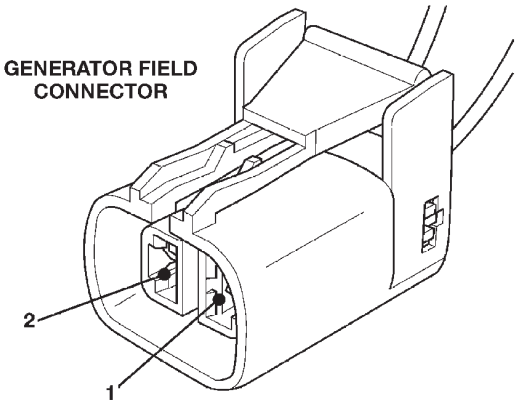
2.7L



CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

FIG. 3

3.5L

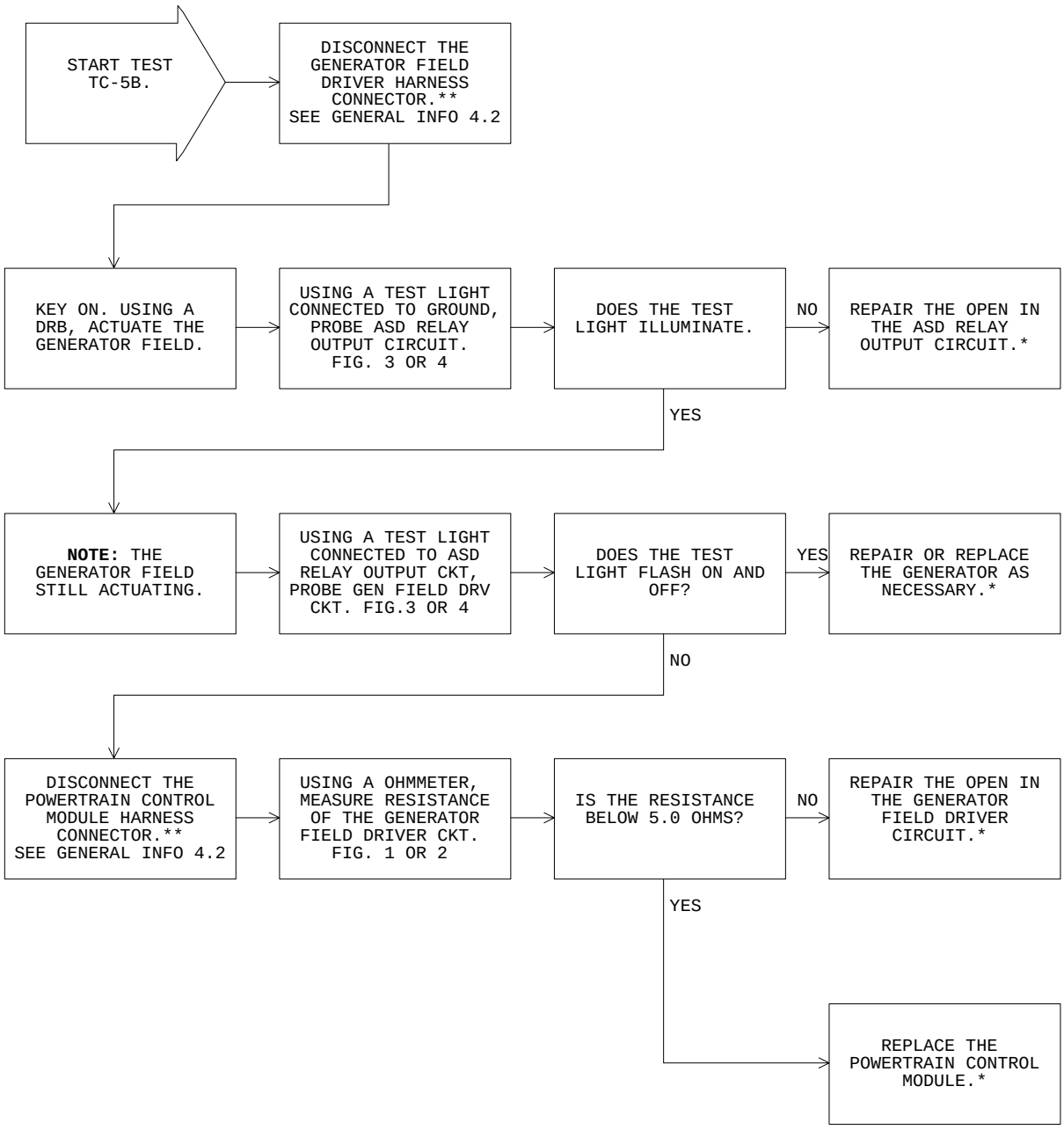


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

FIG. 4

TEST TC-5B REPAIRING - CHARGING SYSTEM VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-3A.

Check connectors - Clean / repair as necessary.

TEST TC-6A REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding

Name of code: Charging System Voltage Too High

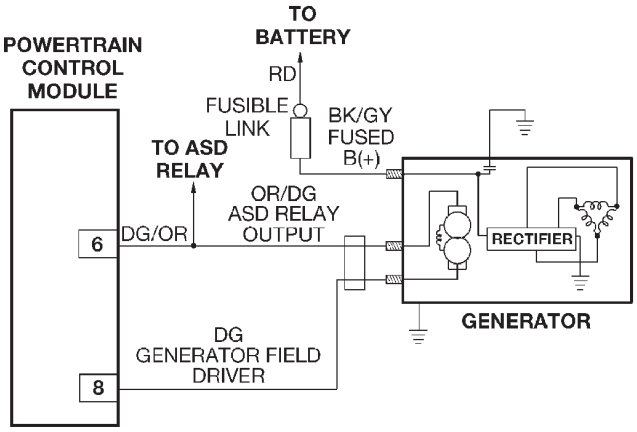
When monitored: With the ignition key on and the engine speed greater than 380 RPM.

Set condition: When the PCM regulates the generator field and there are no detected field problems but the voltage output does not decrease.

Theory of operation: The PCM tries to maintain a system voltage between 13.4 volts and 14.8 volts. The voltage determined by the PCM as the final goal for the charging system is called "control" voltage. This control voltage is determined from the battery temp sensor (ambient sensor). The control voltage is compared to the sensed voltage continuously during running. The PCM controls battery voltage by energizing and de-energizing the alternator field winding. When the battery voltage falls below a setpoint voltage, the generator field winding is energized until the battery voltage exceeds a setpoint voltage.

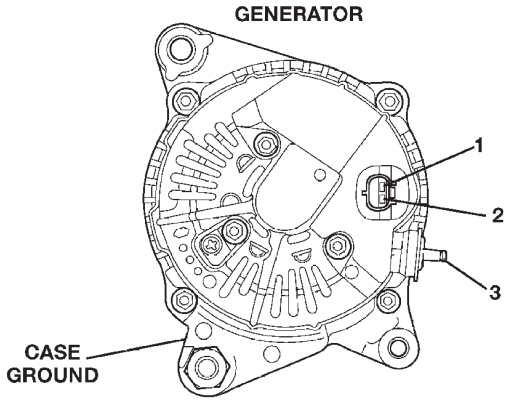
Possible causes:
- Generator internal short
- Generator field driver short to ground
- PCM failure

80b27d25



80b4b84b

2.7L

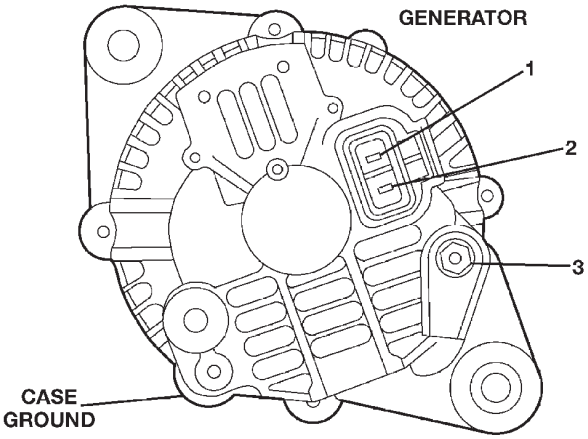


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

80b6eff9

FIG. 1

3.5L



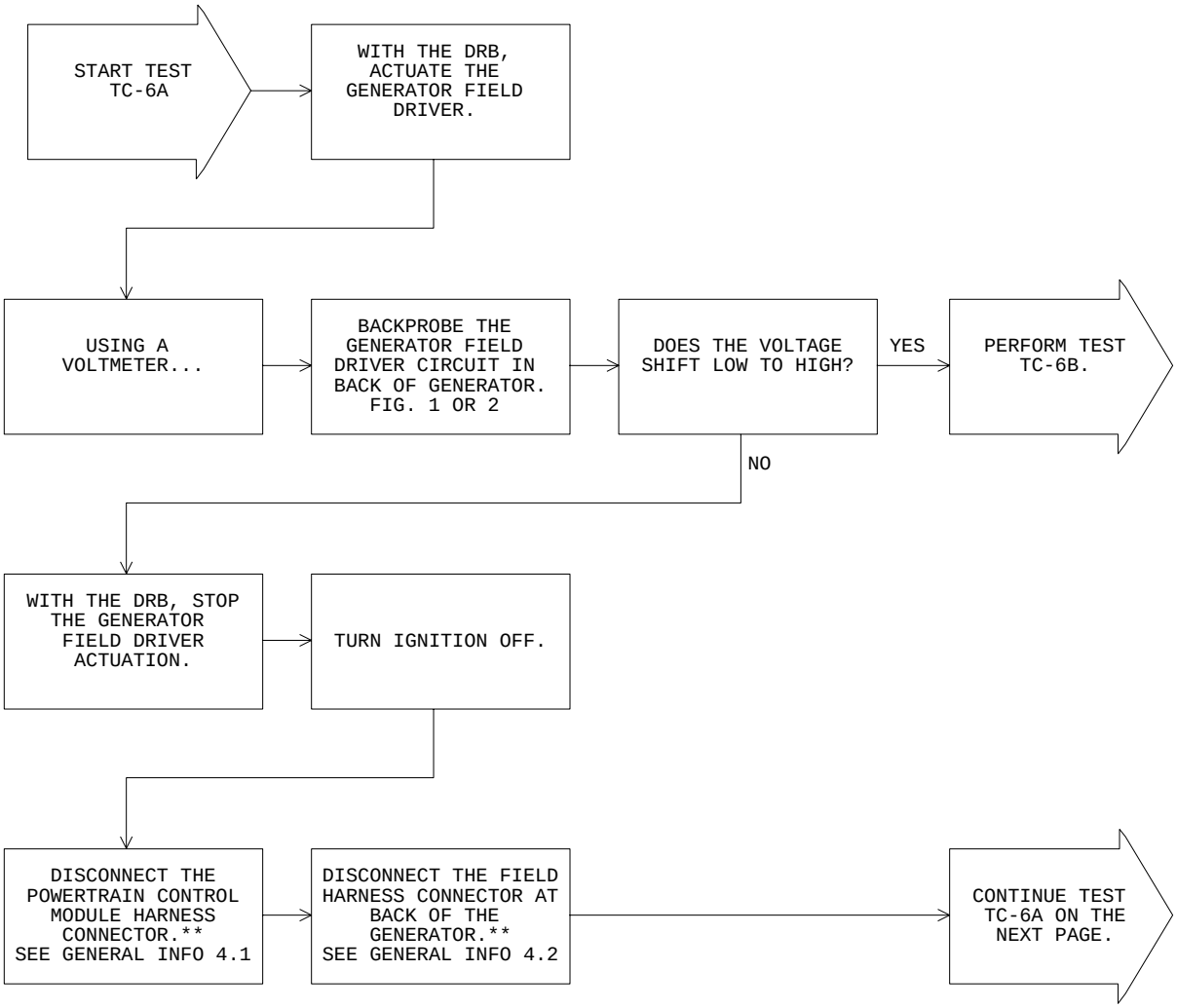
CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

80b6effa

FIG. 2

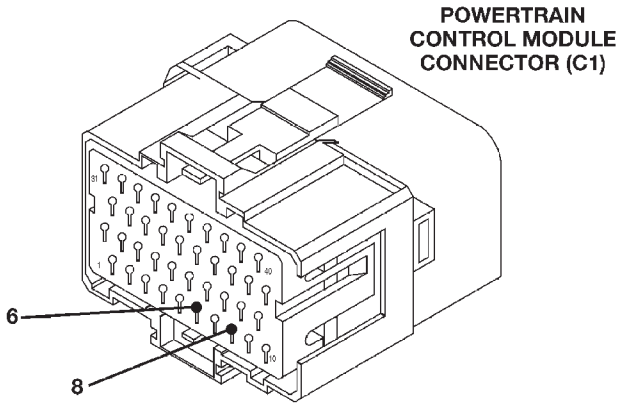
TEST TC-6A REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-3A.	*****Check connectors - Clean / repair as necessary.***

TEST TC-6A CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

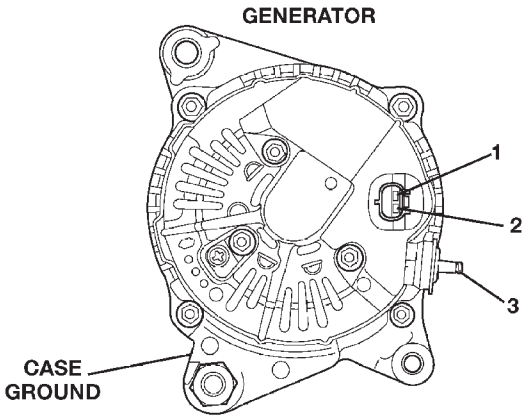


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
8	DG	GENERATOR FIELD DRIVER

80b1b347

FIG. 1

2.7L

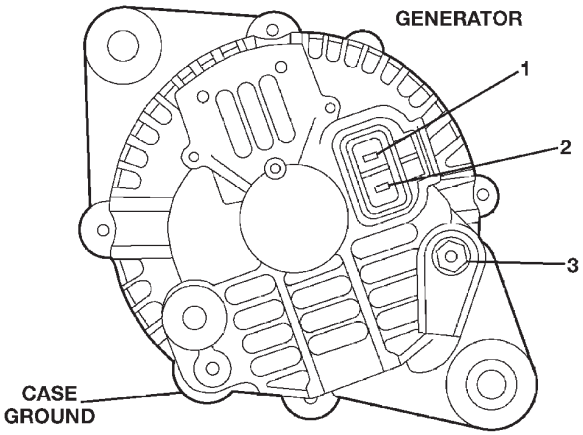


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

80b6eff9

FIG. 2

3.5L

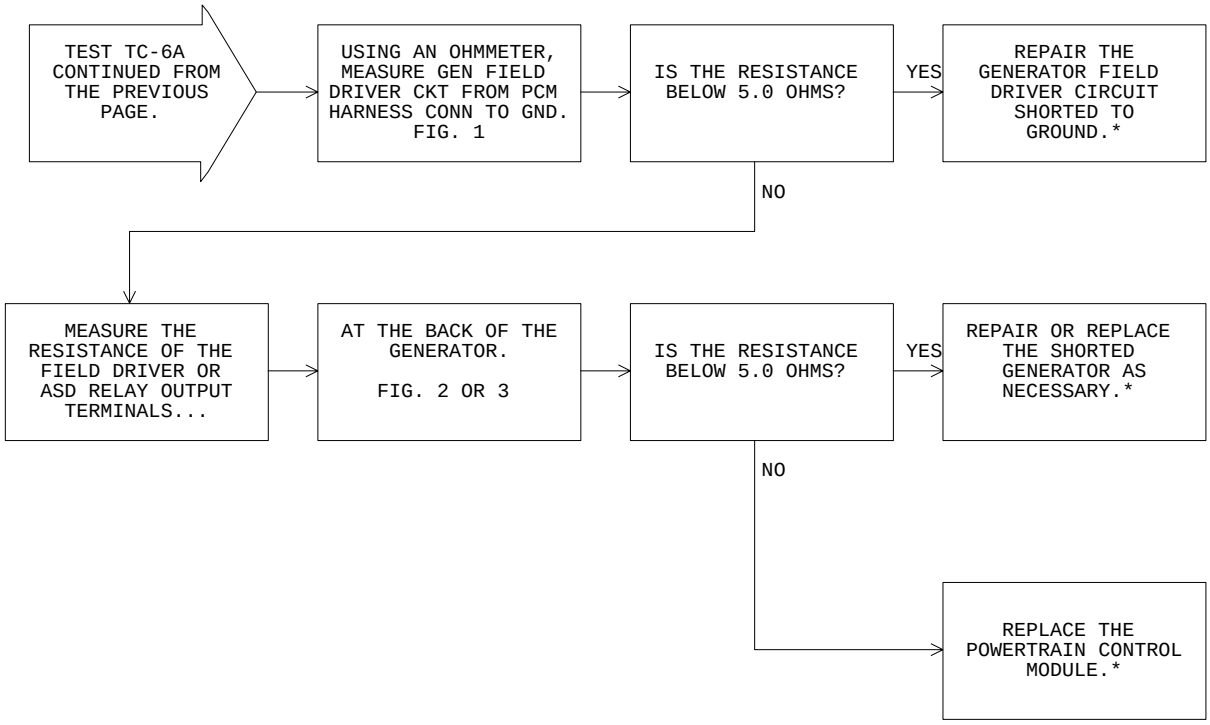


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

80b6effa

FIG. 3

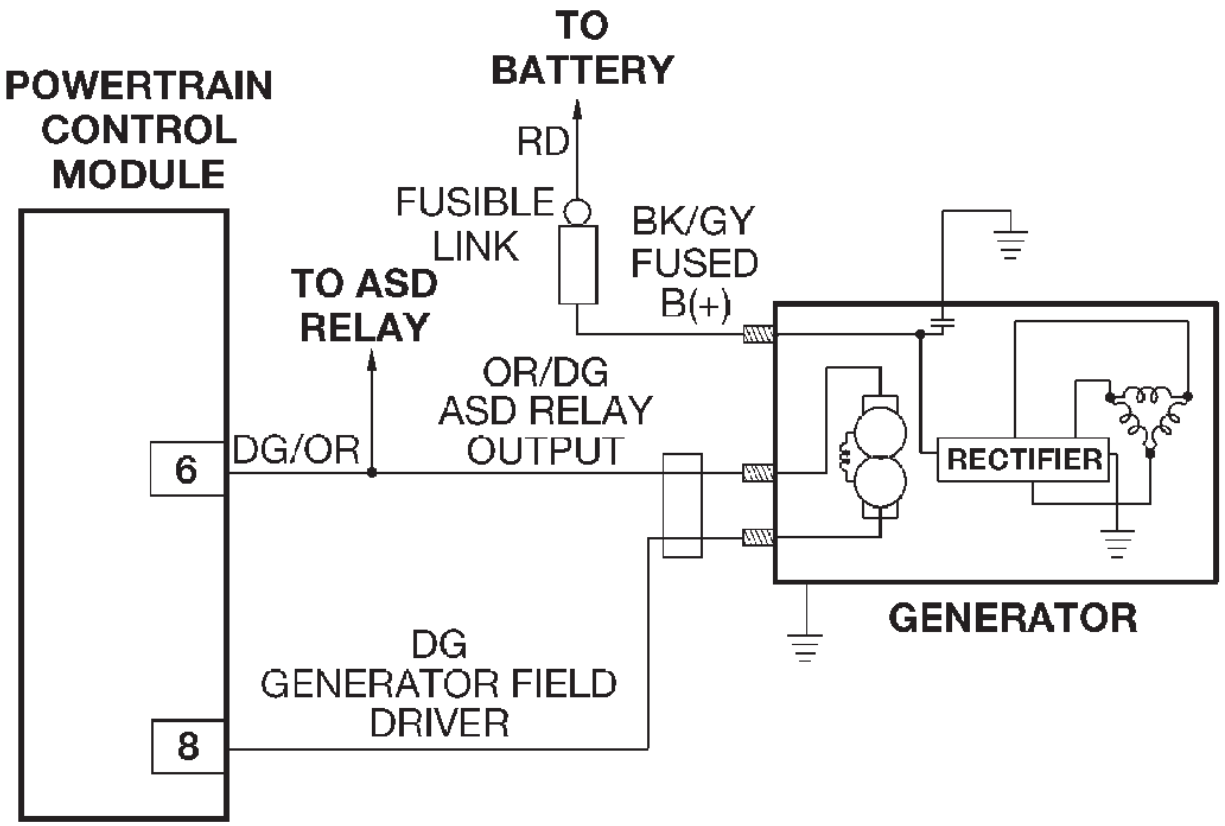
TEST TC-6A CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH



***Perform Verification TEST VER-3A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-6B REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

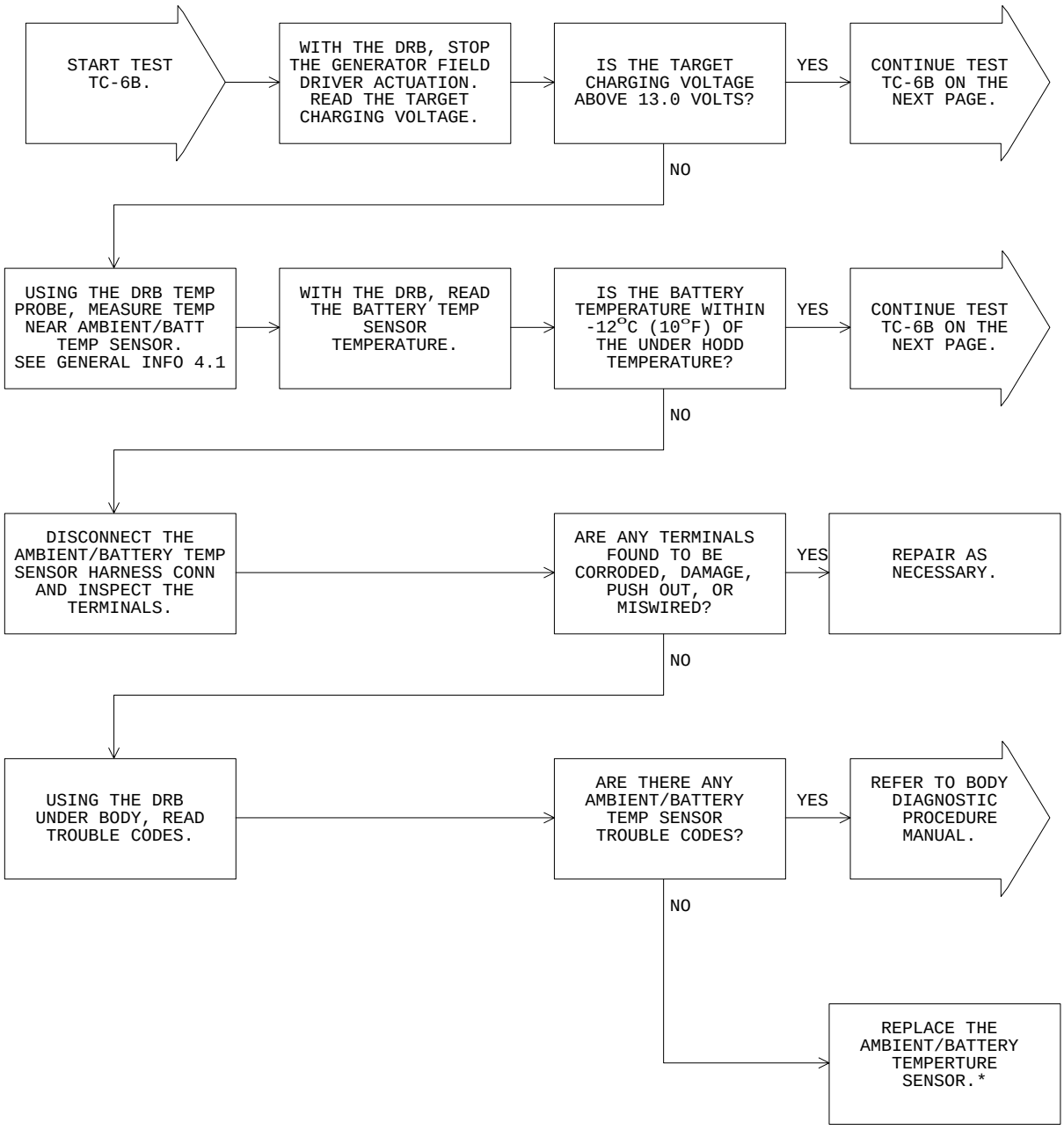
Perform TEST TC-6A Before Proceeding



80b4b84b

TEST TC-6B REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

Perform TEST TC-6A Before Proceeding



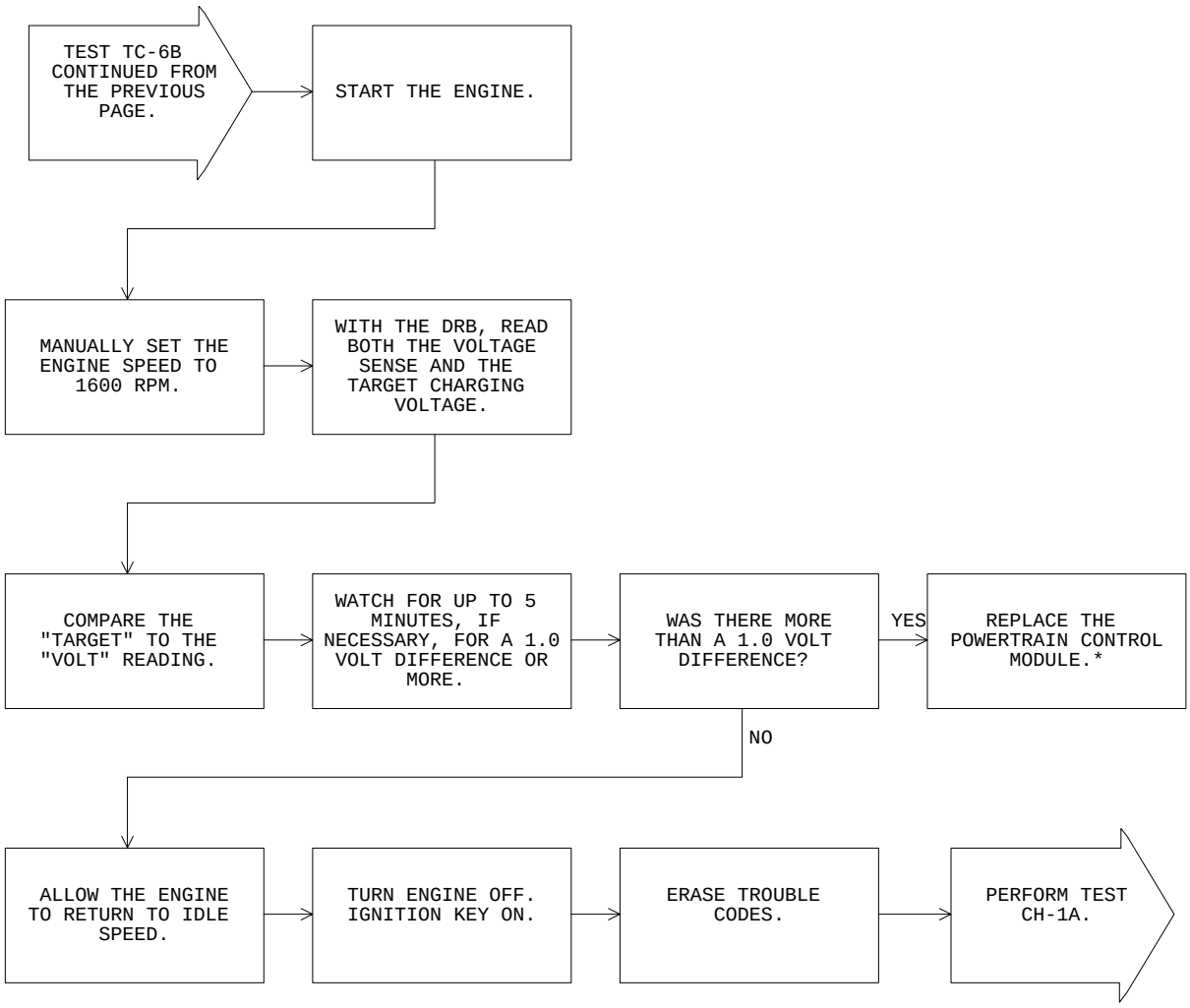
***Perform Verification TEST VER-3A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-6B CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

NOTES

TEST TC-6B CONTINUED - REPAIRING - CHARGING SYSTEM VOLTAGE TOO HIGH

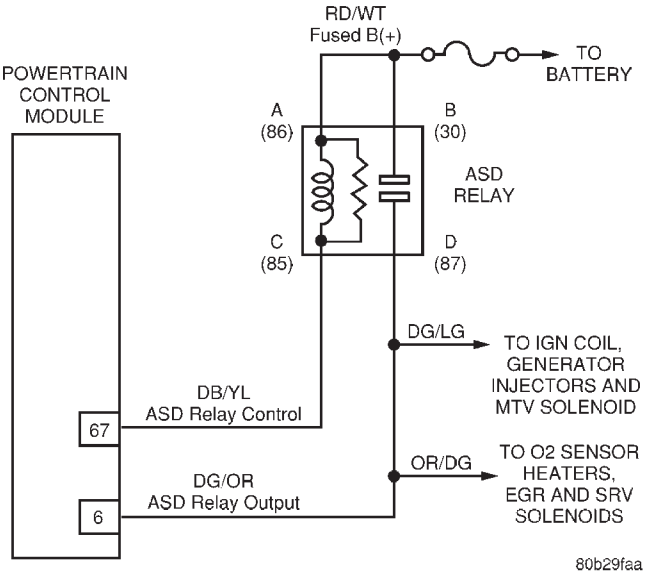


***Perform Verification TEST VER-3A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-10A REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: Auto Shutdown Relay Control Circuit

When monitored: With the ignition key on and battery voltage greater than 10 volts.

Set condition: An open or shorted condition is detected in the auto shutdown relay control circuit.

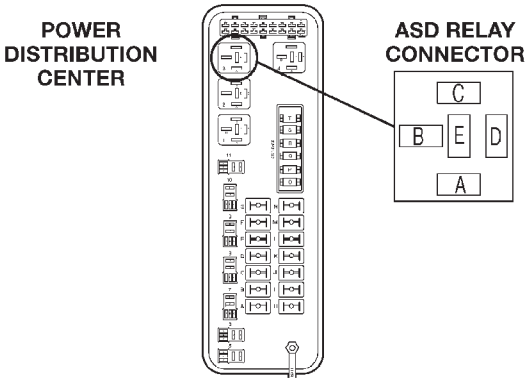
Theory of operation: The automatic shutdown relay (ASD) controls the 12-volt source to the fuel injectors, ignition coil(s), oxygen sensor heaters, SRV, MTV, EGR, and the generator. The relay is located in the power distribution center (PDC). One side of the relay control coil is supplied with 12 volts when the ignition switch is turned to the "run" position. The circuit is completed when the other side of the relay coil is grounded by the powertrain control module (PCM). The PCM grounds the relay when the ignition switch is in either the run or crank position and engine RPM is detected. If engine RPM is not detected, the PCM will remove the ASD relay control circuit ground.

Possible causes:

- Relay coil open or shorted
- Fused ignition switch output circuit open
- Auto shutdown relay control circuit open or shorted
- Inoperative circuit driver in powertrain control module
- PCM failure
- Connector terminals
- Connector wire

80b243c5

FIG. 1



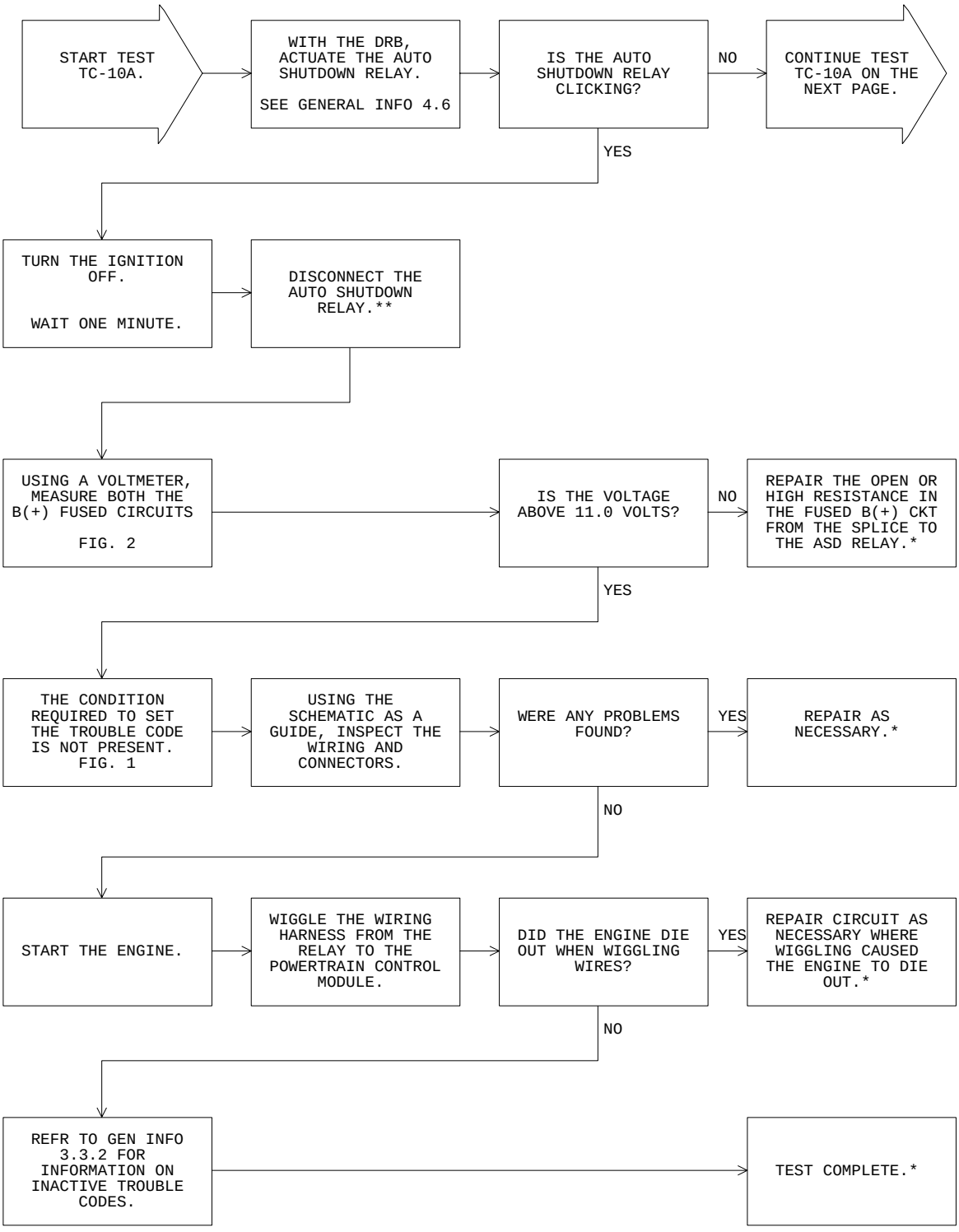
CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f

FIG. 2

TEST TC-10A REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT

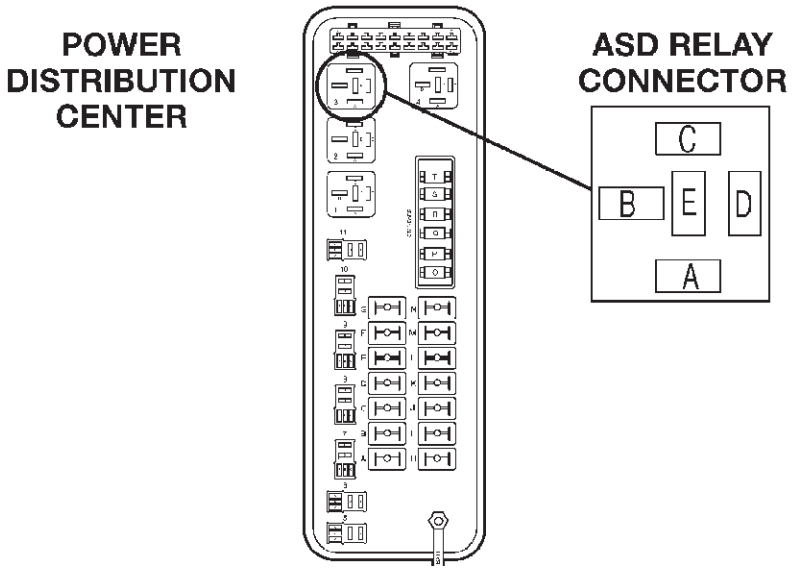
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

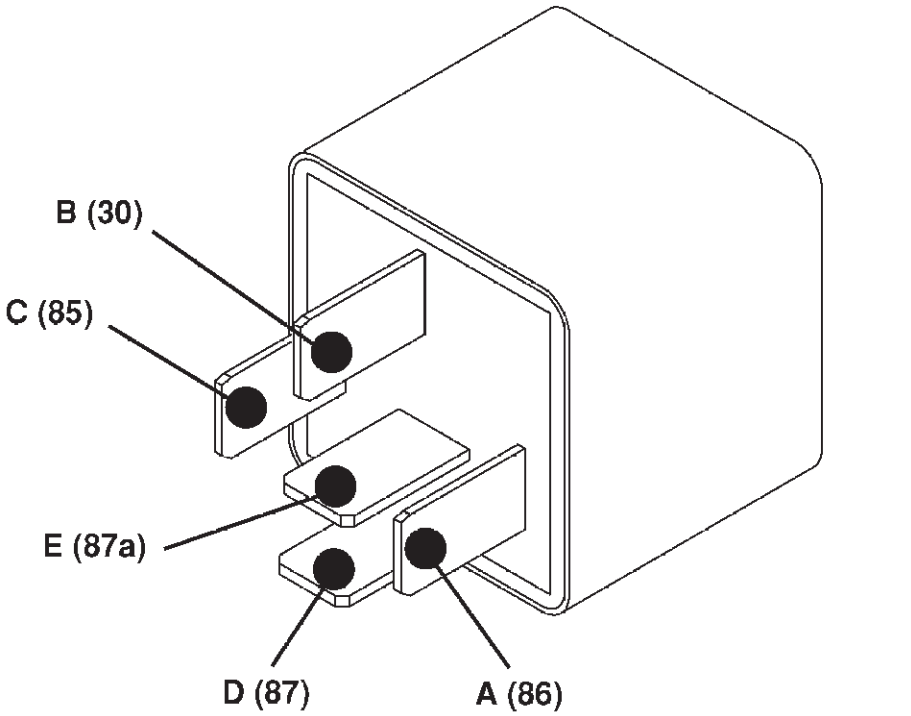
TEST TC-10A CONTINUED - REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT



CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f

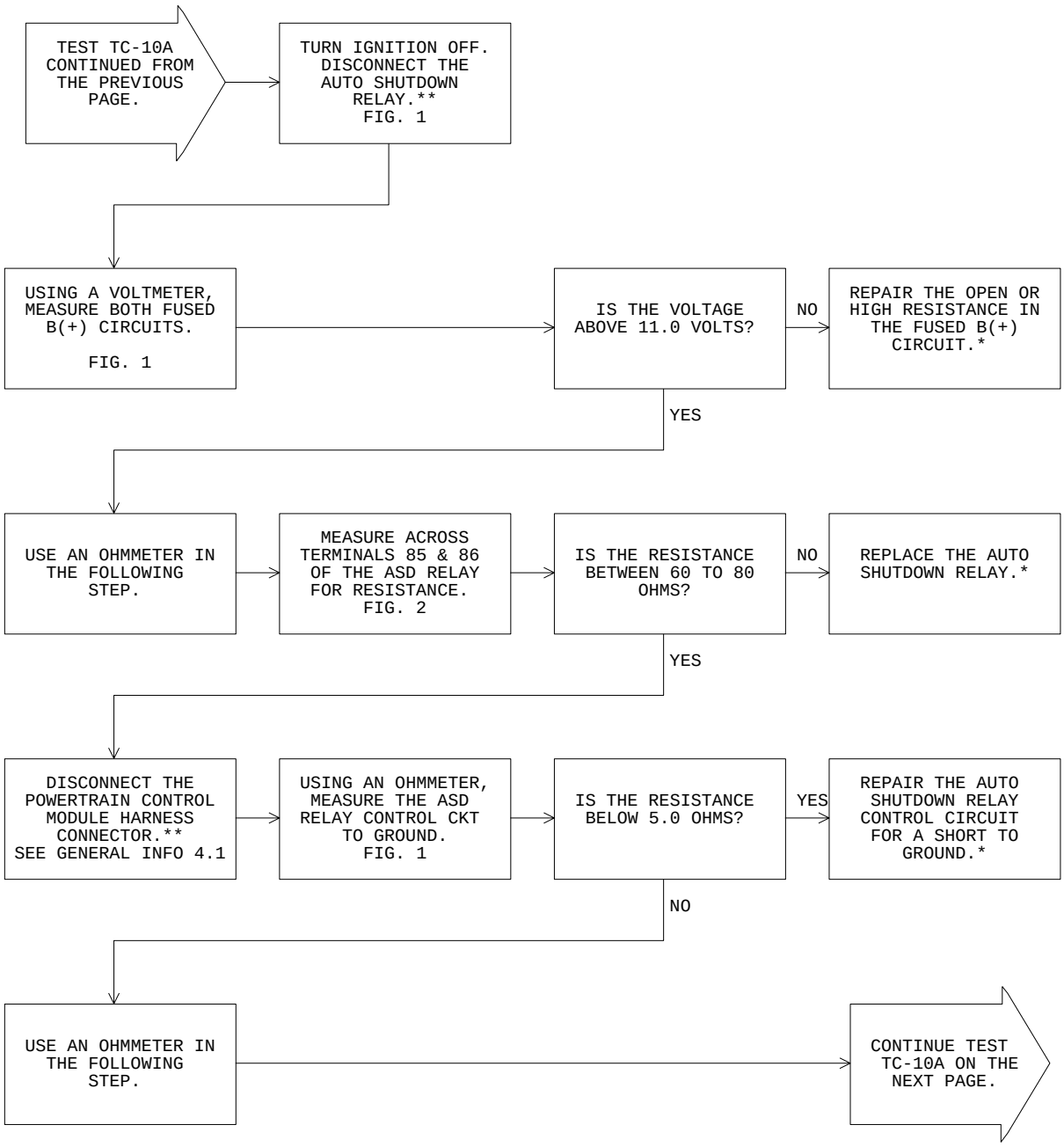
FIG. 1



80b4fa4e

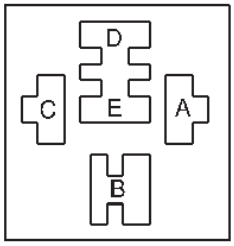
FIG. 2

TEST TC-10A CONTINUED - REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT



Perform Verification TEST VER-2A.

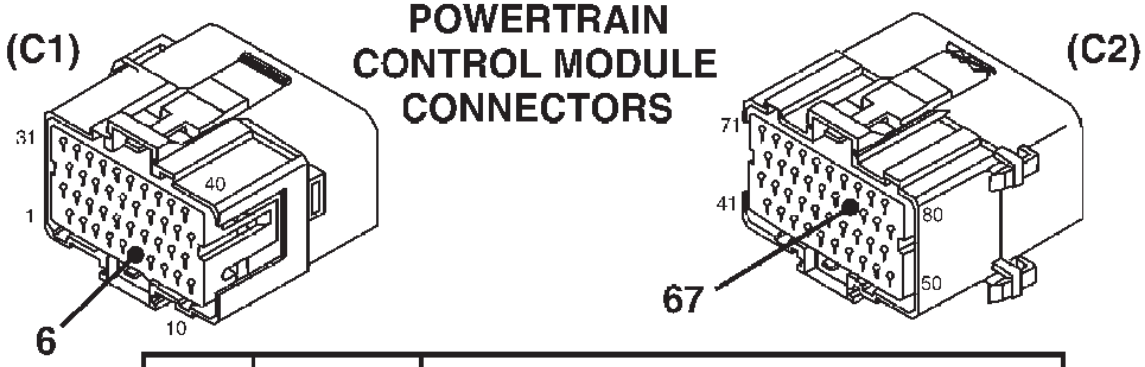
****Check connectors - Clean / repair as necessary.***



AUTO SHUTDOWN RELAY (IN PDC)

CAV	COLOR	FUNCTION
A(86)	RD/WT	FUSED B(+)
B(30)	RD/WT	FUSED B(+)
C(85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D(87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTORS

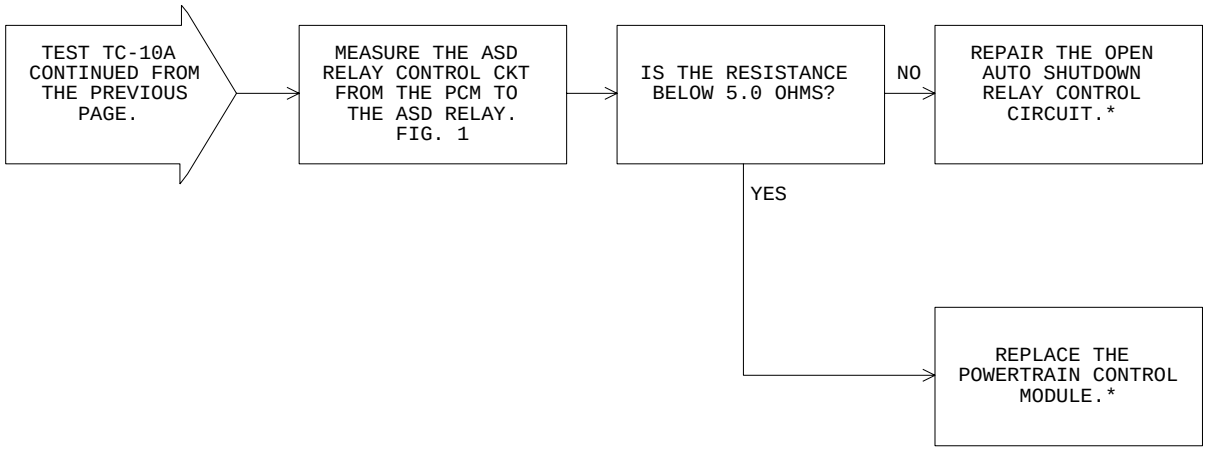


CAV	COLOR	FUNCTION
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT
67	DB/YL	AUTO SHUTDOWN RELAY CONTROL

80b29f38

FIG. 1

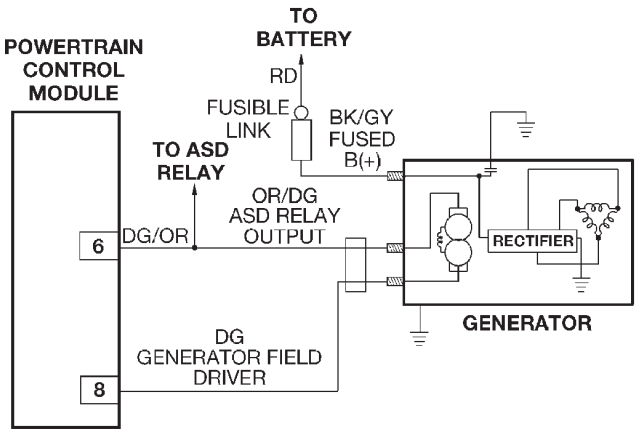
TEST TC-10A CONTINUED - REPAIRING - AUTO SHUTDOWN RELAY CONTROL CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-11A REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

Perform TEST DTC Before Proceeding



80b4b84b

Name of code: Generator Field Not Switching Properly

When monitored: With the ignition key on and the engine running.

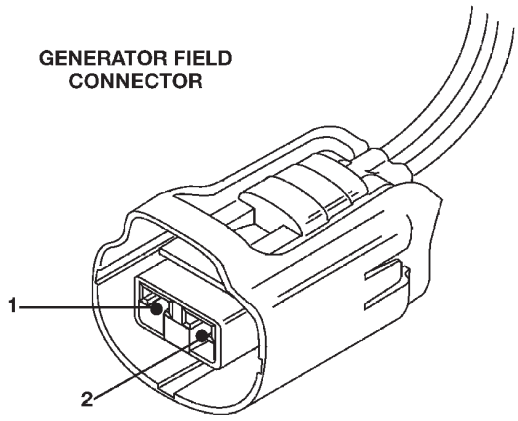
Set condition: When the PCM tries to regulate the generator field with no result during monitoring.

Theory of operation: The PCM tries to maintain a system voltage between 12.9 volts and 15.0 volts. The voltage determined by the PCM as the final goal for the charging system is called "control" voltage. This control voltage is determined from the battery temp sensor (ambient sensor). The control voltage is compared to the sensed voltage continuously during running. If the sensed voltage is less than the control voltage, the PCM will supply more ground to the field circuit. If the sensed voltage is more than the control voltage, the PCM will supply less ground to the field circuit.

Possible causes:
- Field driver circuit open or shorted
- Generator internal open or short
- PCM failed

2360602

2.7L

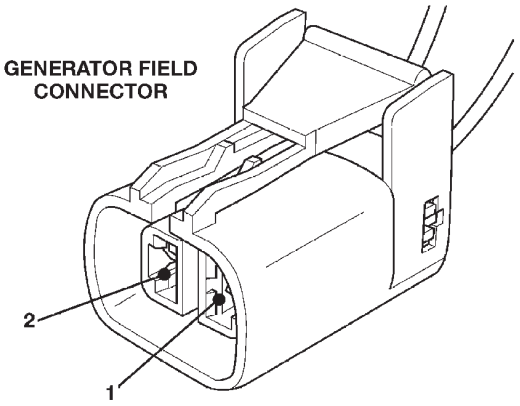


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

80b27c91

FIG. 1

3.5L



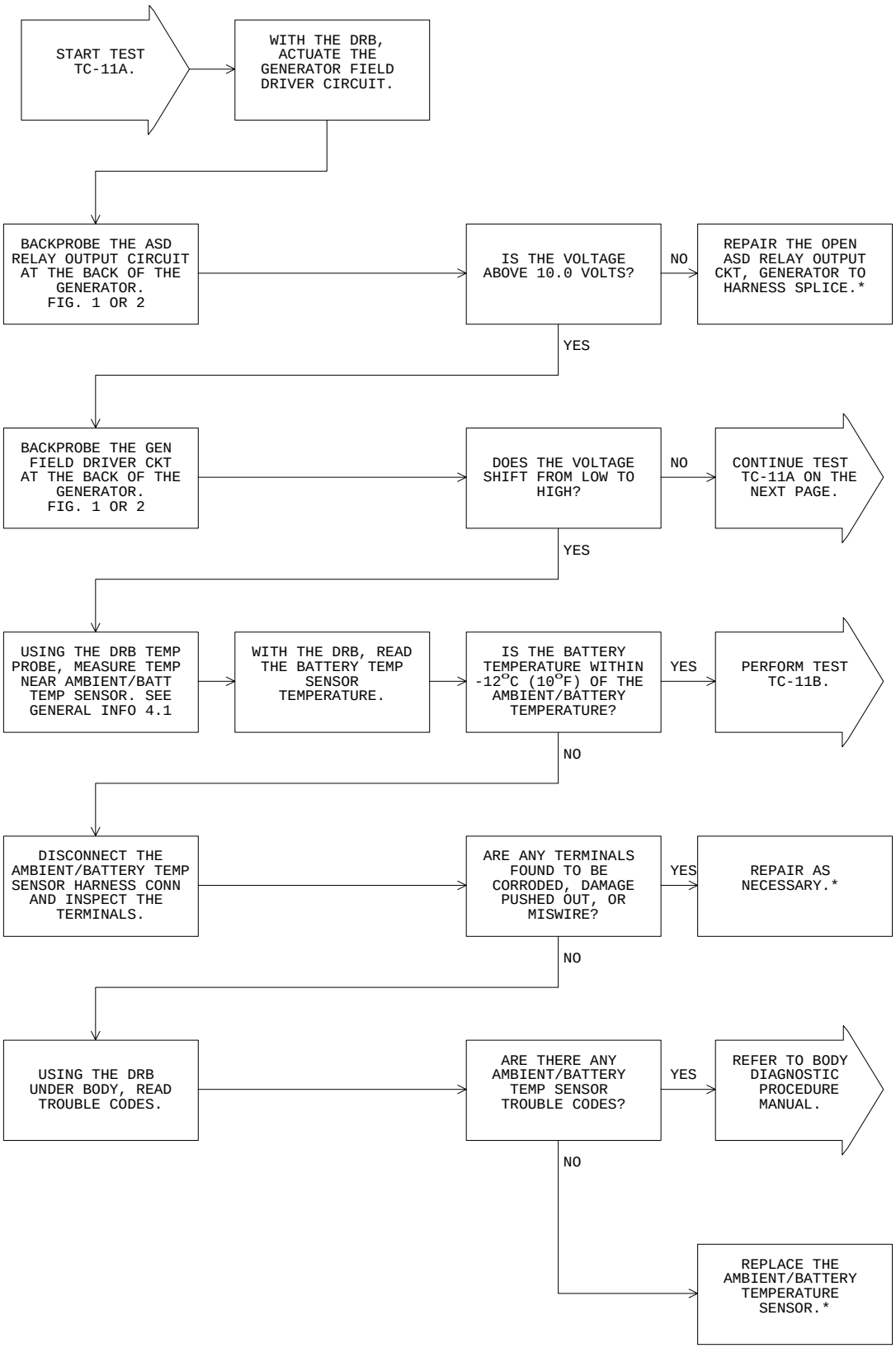
CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

80b1b348

FIG. 2

TEST TC-11A REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

Perform TEST DTC Before Proceeding



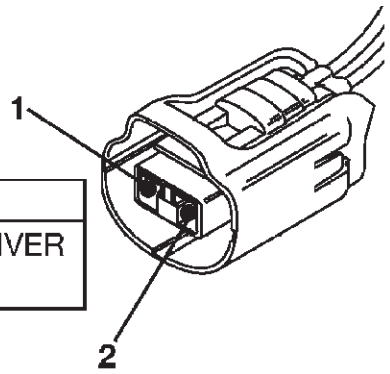
Perform Verification TEST VER-3A.

*****Check connectors - Clean / repair as necessary.***

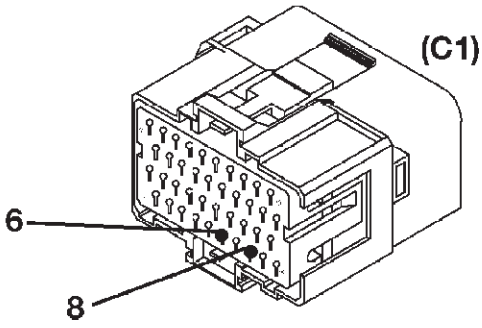
TEST TC-11A CONTINUED - REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

2.7L

GENERATOR FIELD DRIVER



CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT



POWERTRAIN CONTROL MODULE CONNECTOR

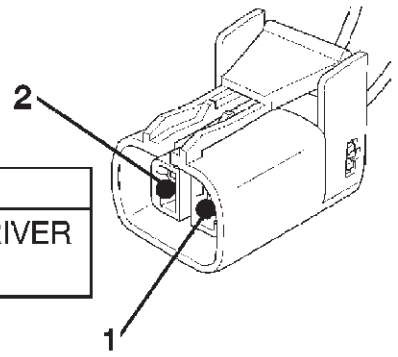
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
8	DG	GENERATOR FIELD DRIVER

80b6effb

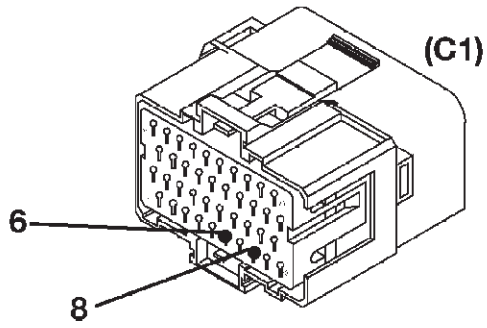
FIG. 1

3.5L

GENERATOR FIELD DRIVER



CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT



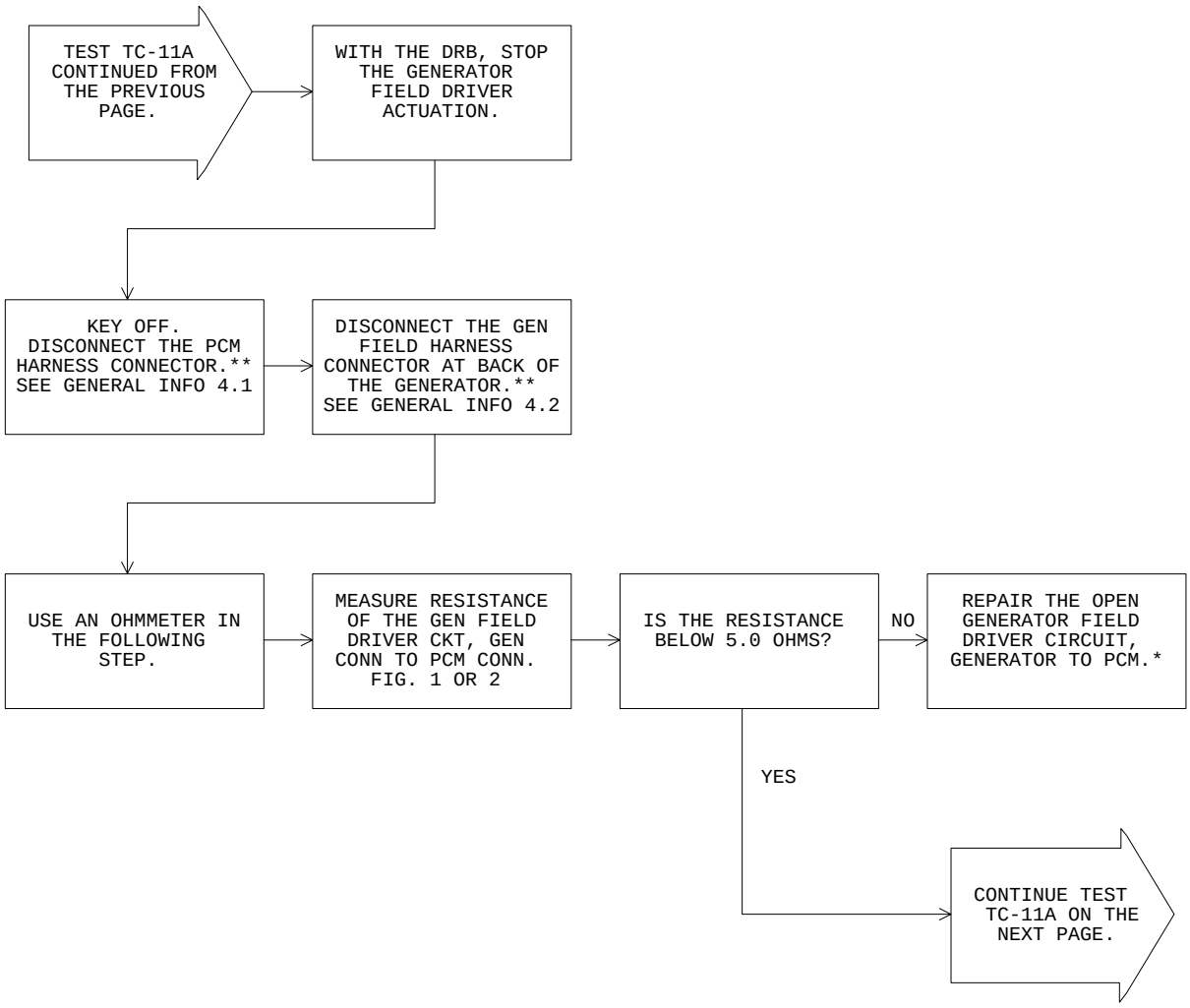
POWERTRAIN CONTROL MODULE CONNECTOR

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
8	DG	GENERATOR FIELD DRIVER

80b1b349

FIG. 2

TEST TC-11A CONTINUED - REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

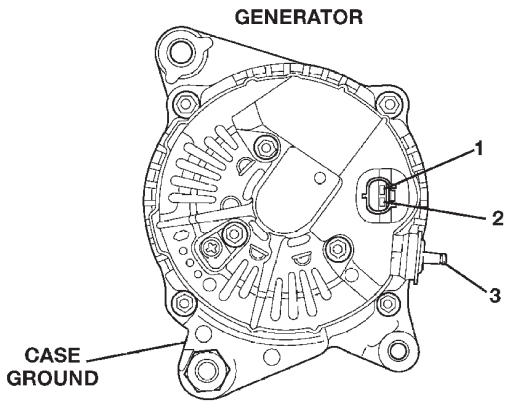


Perform Verification TEST VER-3A.

Check connectors - Clean / repair as necessary.

TEST TC-11A CONTINUED - REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

2.7L

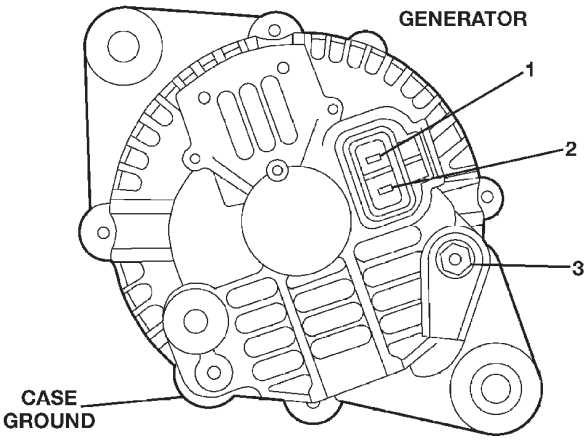


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

80b6eff9

FIG. 1

3.5L

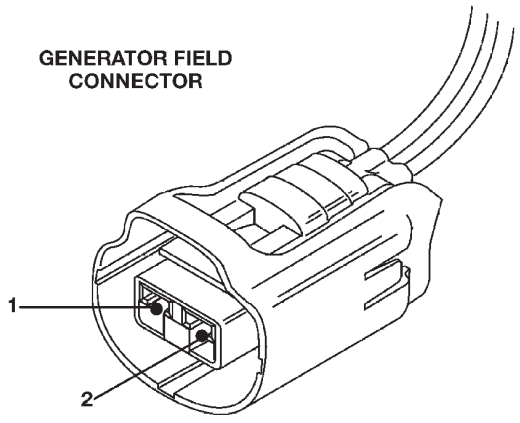


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

80b6effa

FIG. 2

2.7L

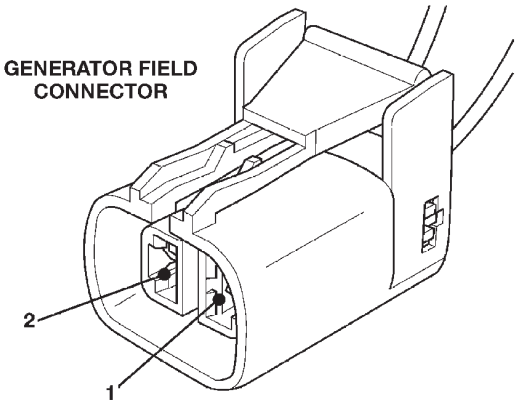


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

80b27c91

FIG. 3

3.5L

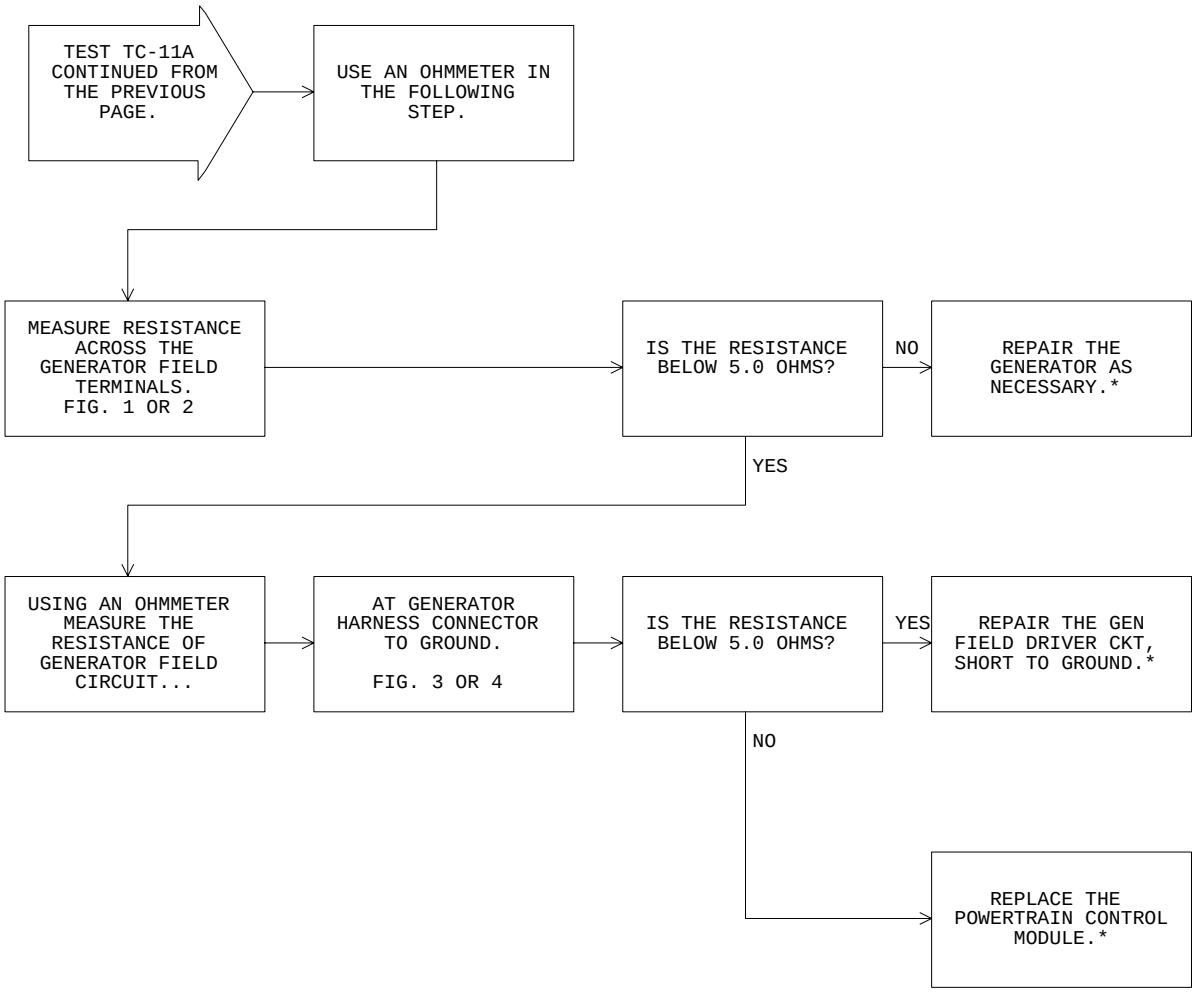


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT

80b1b348

FIG. 4

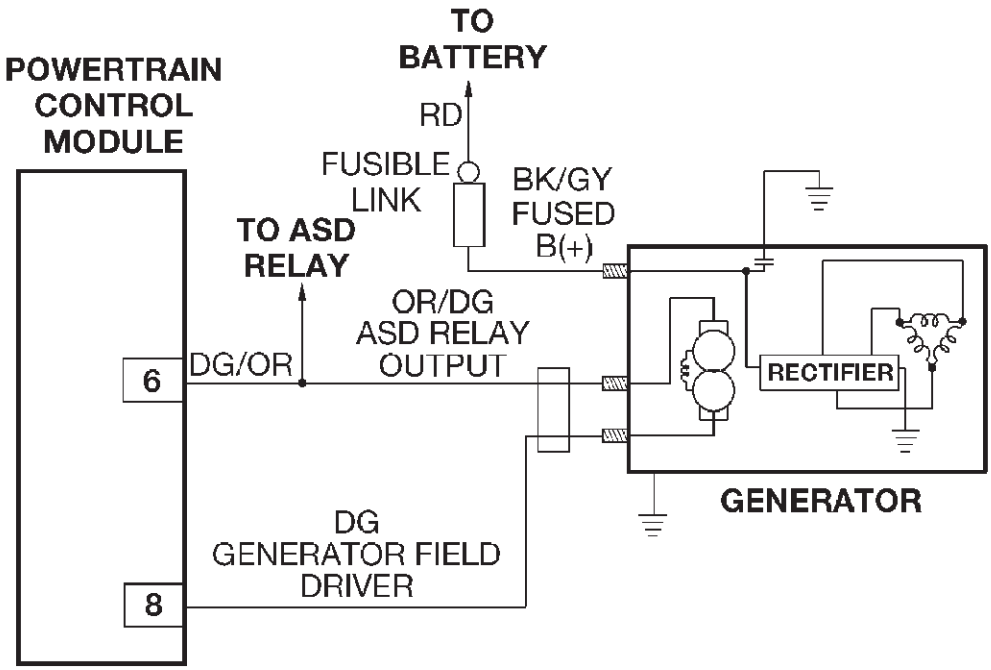
TEST TC-11A CONTINUED - REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY



***Perform Verification TEST VER-3A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-11B REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

Perform TEST TC-11A Before Proceeding



80b4b84b

Name of code: Generator Field Not Switching Properly

When monitored: With the ignition key on and the engine running.

Set condition: When the PCM tries to regulate the generator field with no result during monitoring.

Theory of operation: The PCM tries to maintain a system voltage between 12.9 volts and 15.0 volts. The voltage determined by the PCM as the final goal for the charging system is called "control" voltage. This control voltage is determined from the battery temp sensor (ambient sensor). The control voltage is compared to the sensed voltage continuously during running. If the sensed voltage is less than the control voltage, the PCM will supply more ground to the field circuit. If the sensed voltage is more than the control voltage, the PCM will supply less ground to the field circuit.

Possible causes:

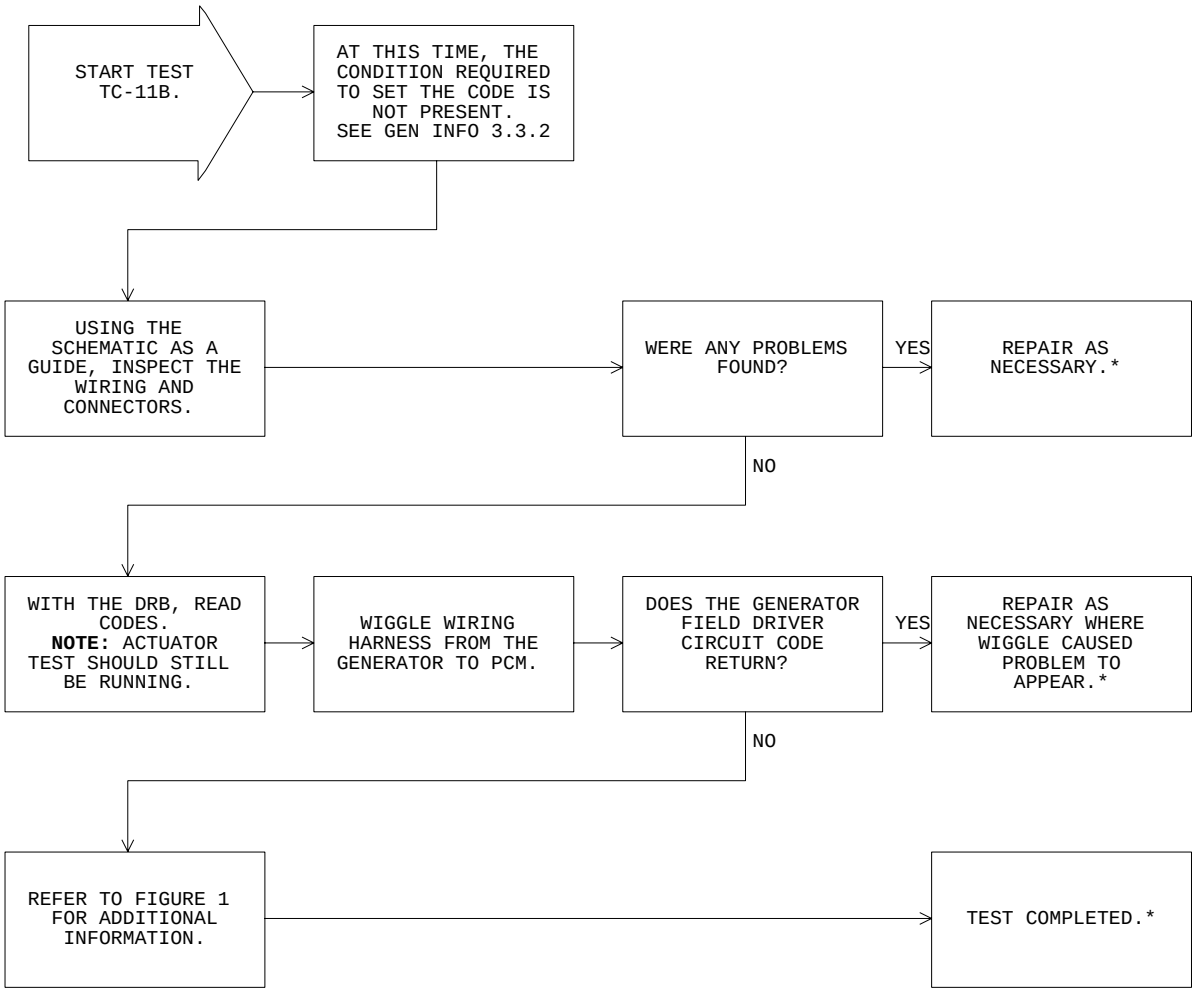
> Field driver circuit open or shorted
> Generator internal open or short
> PCM failed

2360602

FIG. 1

TEST TC-11B REPAIRING - GENERATOR FIELD NOT SWITCHING PROPERLY

Perform TEST TC-11A Before Proceeding

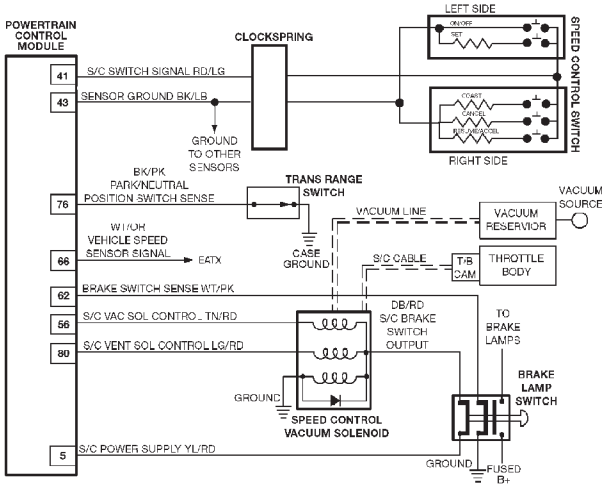


***Perform Verification TEST VER-3A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-15A REPAIRING - SPEED CONTROL SOLENOID CIRCUITS

Perform TEST DTC Before Proceeding



80b4fab1

Name of code: Speed Control Solenoid Circuits

When monitored: With the ignition key on, speed control switch on, and the Set switch pressed, vehicle in drive gear moving between 45-165 kmh (30-100 mph).

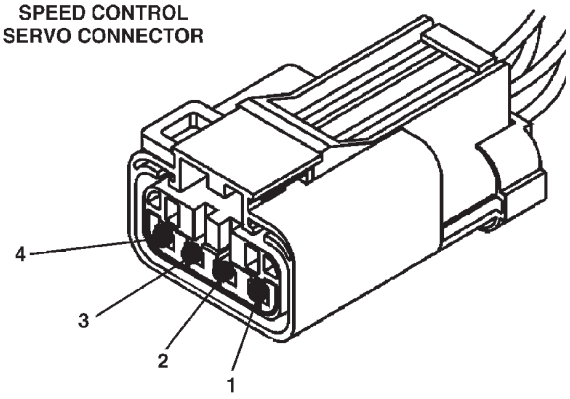
Set condition: The powertrain control module actuates the vacuum and vent solenoids but they do not respond.

Theory of operation: Speed Control is activated when the set switch is pressed and the vehicle is moving forward at a speed between 45-165 kmh (30-100 mph), with the transmission gear selector in D, or Autostick 3rd or 4th. The PCM locks in a set speed. Then the PCM energizes the vacuum solenoid to open the throttle, and actuates the vent solenoid to close the throttle. These actuations are dependent on power supplied to the servo from the PCM through the brake switch. The system is deactivated by pressing CANCEL, ON/OFF switch OFF, braking, or vehicle speed falling below the minimum. Reactivation can be done by repeating the previous steps or pressing RESUME with the vehicle speed greater than 40 kmh (25 mph).

Possible causes:
- Solenoid control circuit open or shorted
- Vacuum or vent solenoid shorted or open
- Open or shorted speed control power supply circuit
- PCM failure

80b3c531

SPEED CONTROL SERVO CONNECTOR

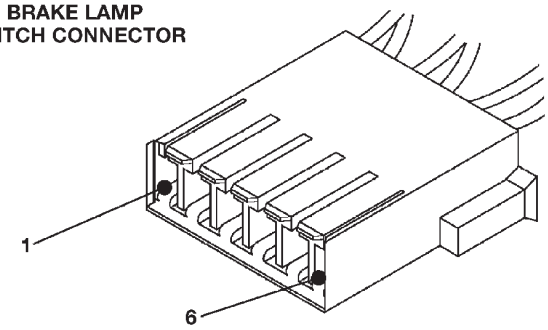


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1

BRAKE LAMP SWITCH CONNECTOR

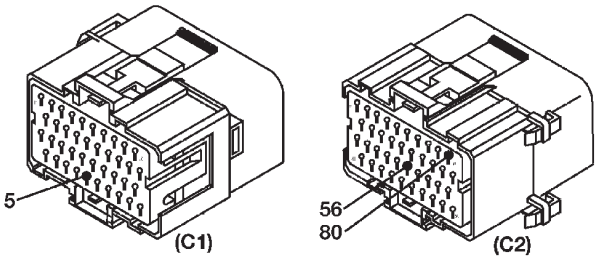


CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12

FIG. 2

POWERTRAIN CONTROL MODULE CONNECTORS



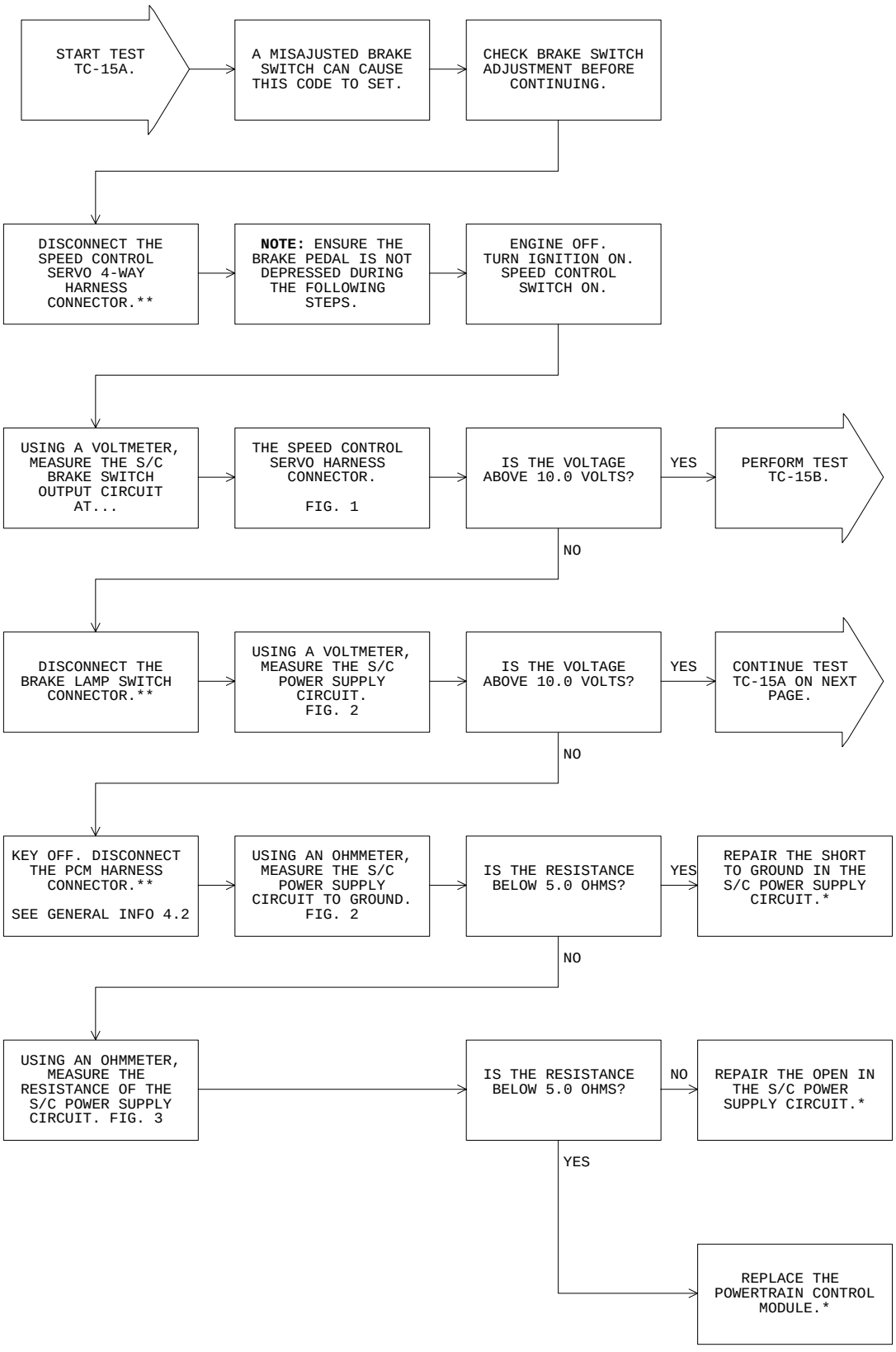
CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

80b4b84f

FIG. 3

TEST TC-15A REPAIRING - SPEED CONTROL SOLENOID CIRCUITS

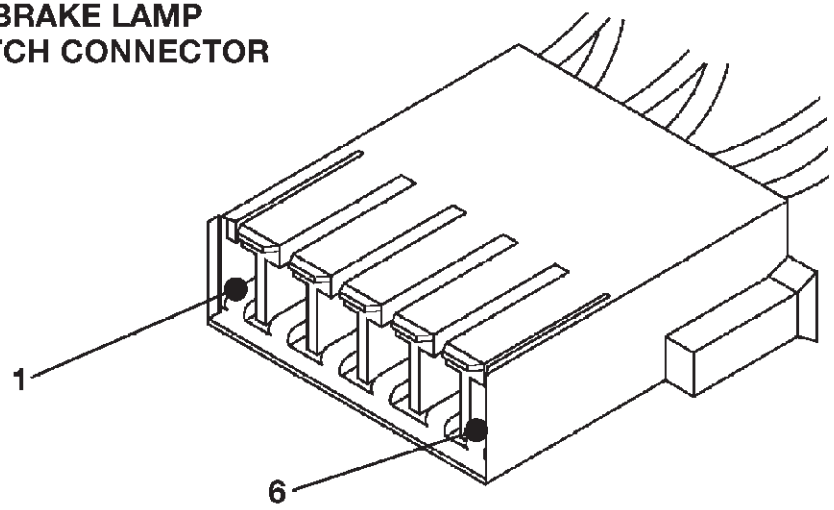
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-4A.

Check connectors - Clean / repair as necessary.

BRAKE LAMP SWITCH CONNECTOR

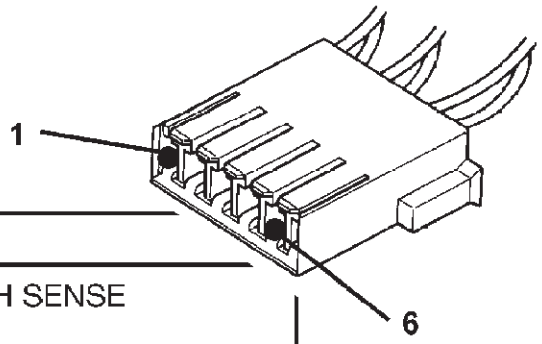


CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12

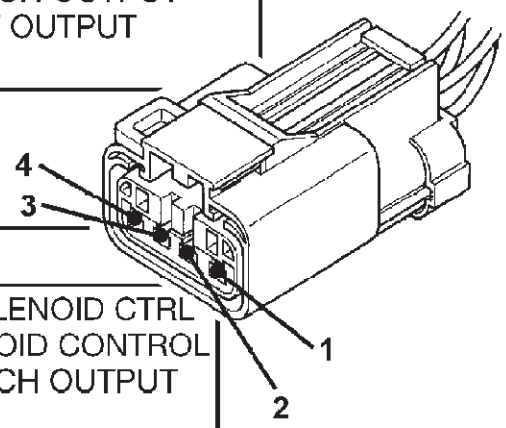
FIG. 1

BRAKE LAMP SWITCH CONNECTOR



CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SW OUTPUT
6	PK/DB	FUSED B (+)

SPEED CONTROL SERVO CONNECTOR

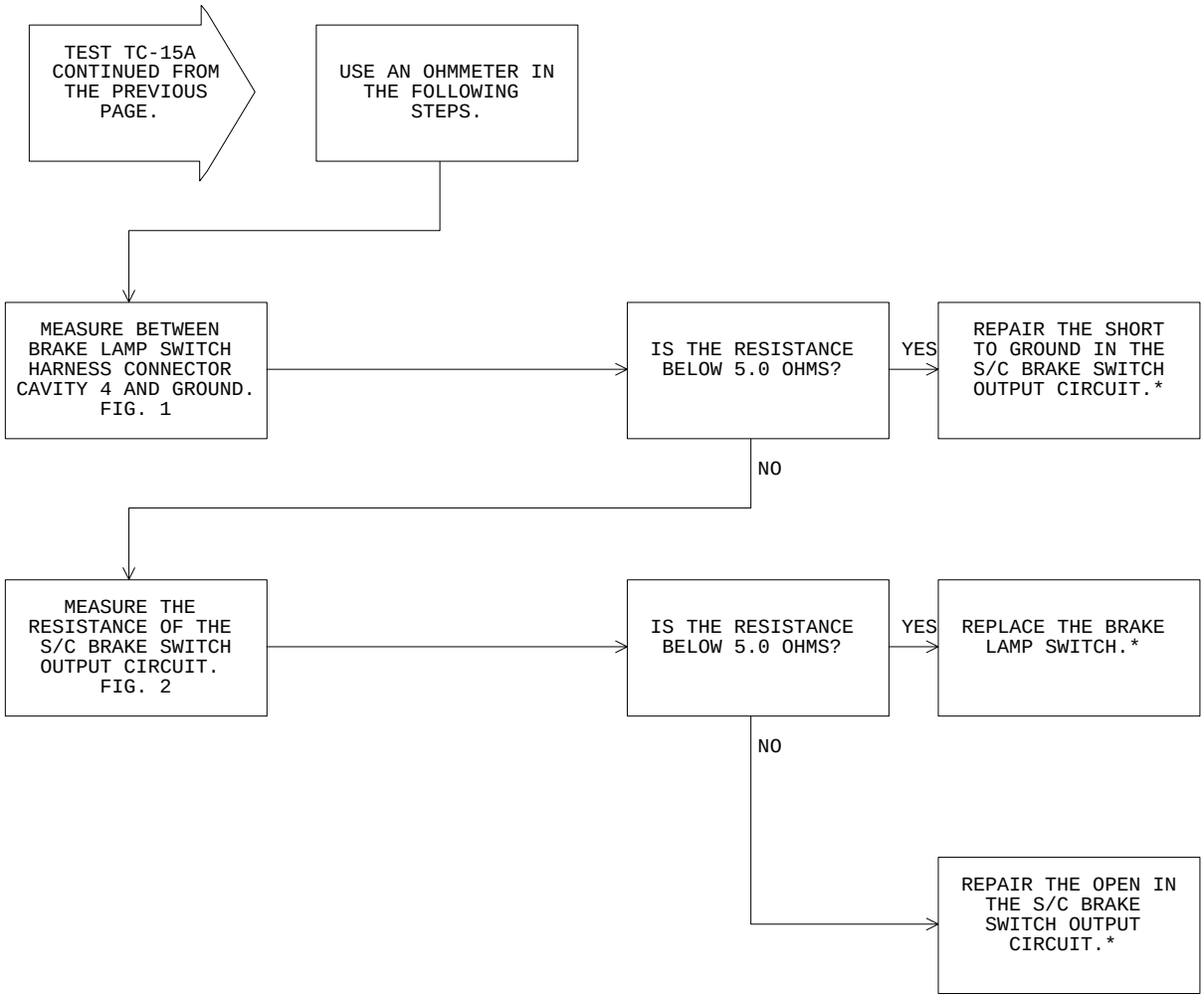


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CTRL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84d

FIG. 2

TEST TC-15A CONTINUED - REPAIRING - SPEED CONTROL SOLENOID CIRCUITS



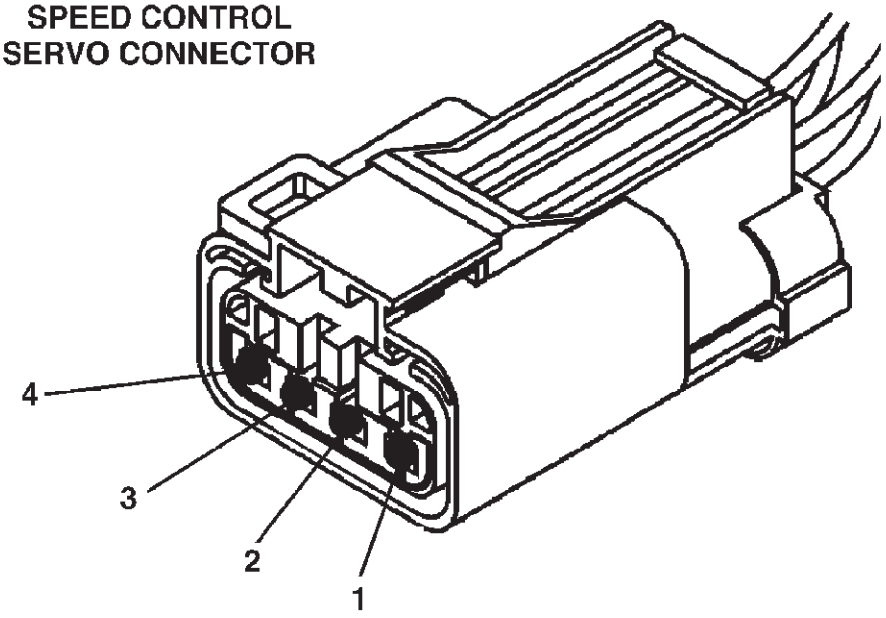
***Perform Verification TEST VER-4A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-15B REPAIRING - SPEED CONTROL SOLENOID CIRCUITS

Perform TEST TC-15A Before Proceeding

SPEED CONTROL SERVO CONNECTOR

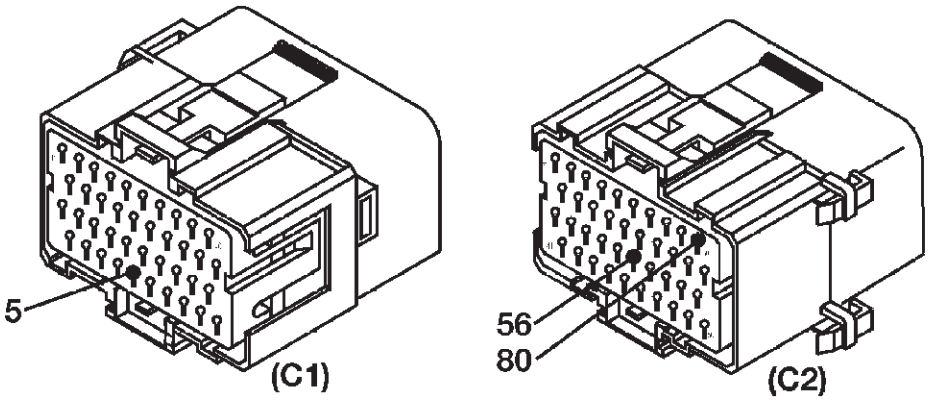


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1

POWERTRAIN CONTROL MODULE CONNECTORS



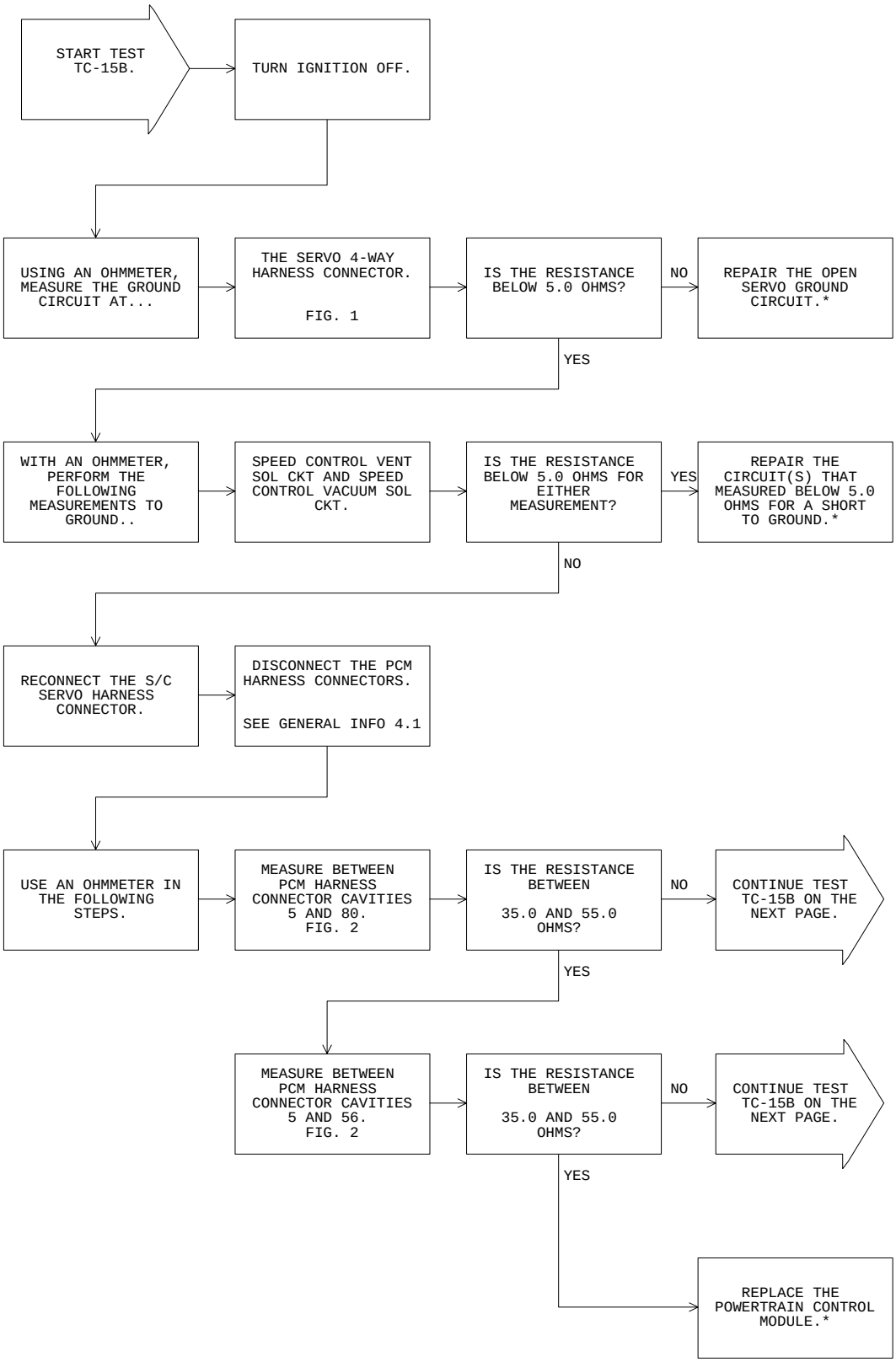
CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

80b4b84f

FIG. 2

TEST TC-15B REPAIRING - SPEED CONTROL SOLENOID CIRCUITS

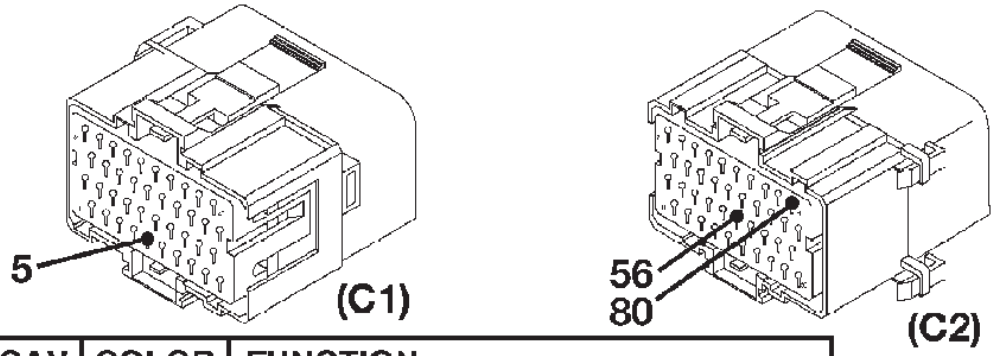
Perform TEST TC-15A Before Proceeding



Perform Verification TEST VER-4A.

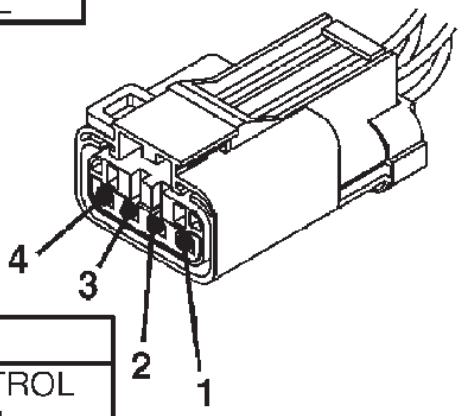
*****Check connectors - Clean / repair as necessary.***

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

SPEED CONTROL SERVO CONNECTOR

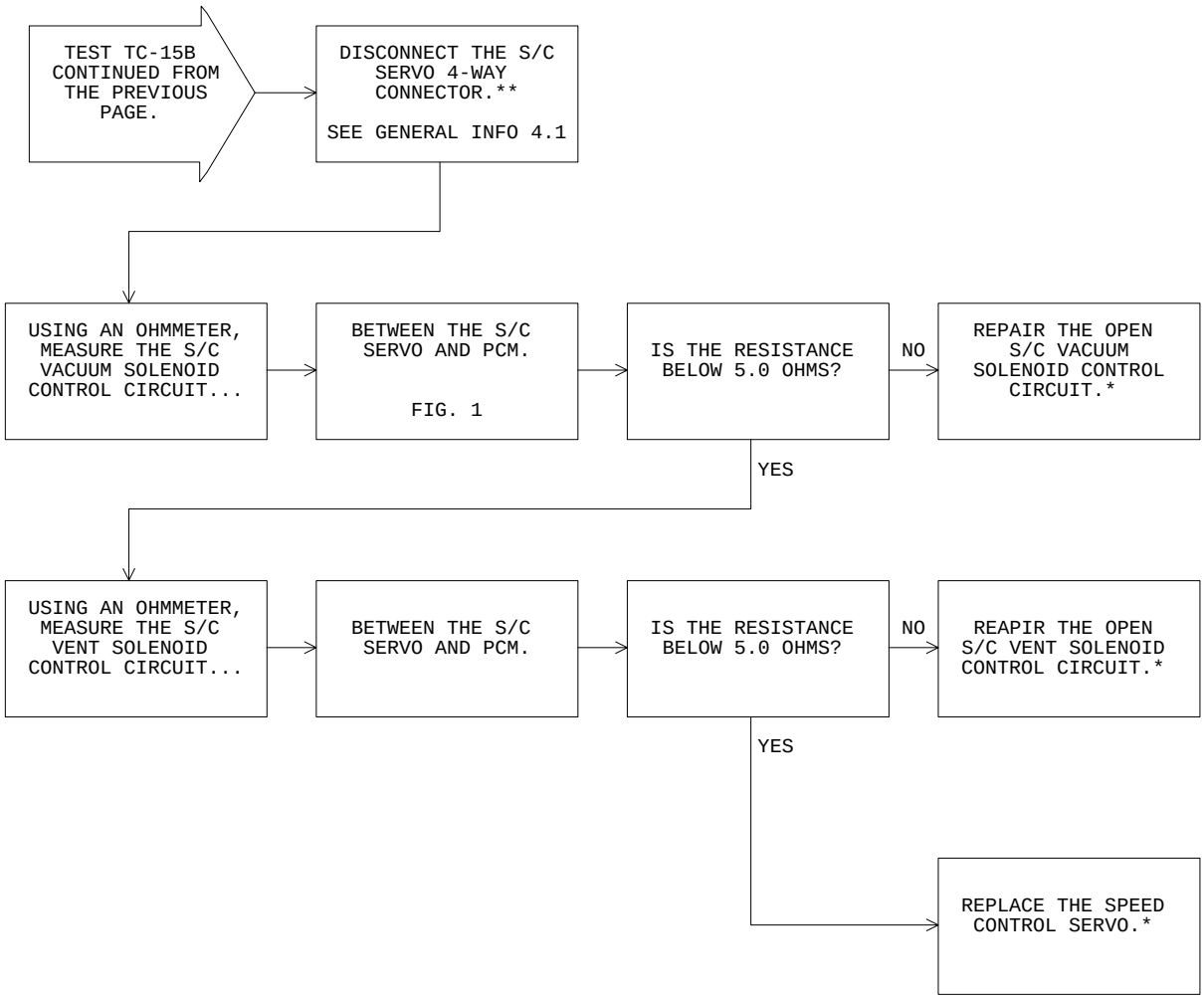


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84e

FIG. 1

TEST TC-15B CONTINUED - REPAIRING - SPEED CONTROL SOLENOID CIRCUITS

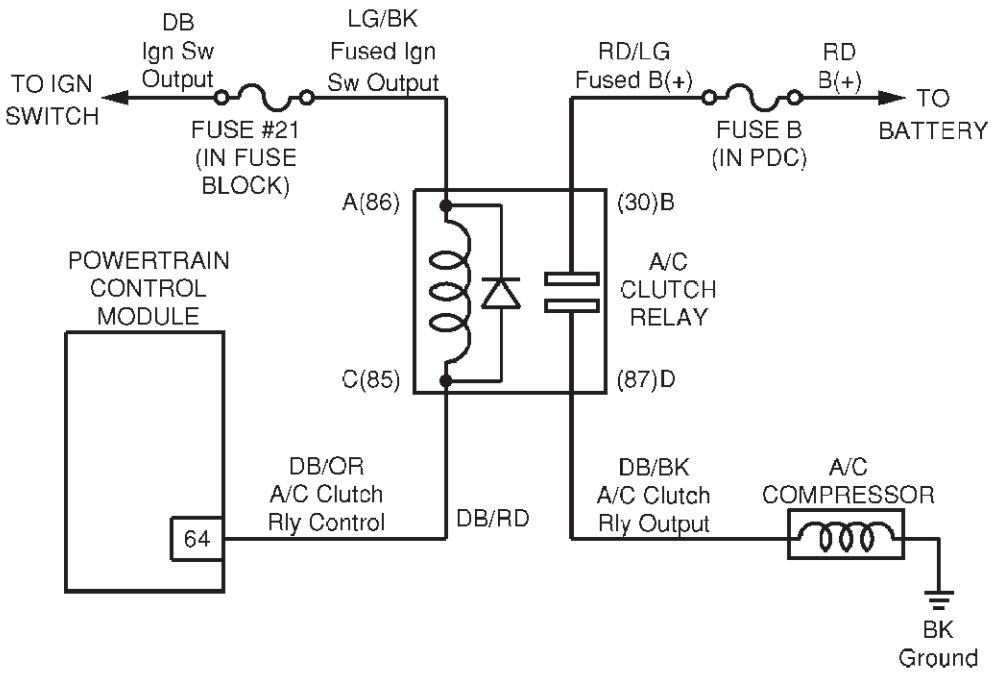


Perform Verification TEST VER-4A.

Check connectors - Clean / repair as necessary.

TEST TC-16A REPAIRING - A/C CLUTCH RELAY CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: A/C Clutch Relay Circuit

When monitored: With the ignition key in the run position and battery voltage above 10 volts.

Set condition: An open or shorted condition is detected in the A/C clutch relay control circuit.

Theory of operation: The A/C compressor clutch relay controls the 12-volt source for the A/C clutch. The relay is located in the power distribution center. One side of the relay control coil is supplied with 12 volts when the ignition switch is turned to the run position. The circuit is completed when the other side of the relay coil is grounded by the powertrain control module (PCM). When A/C is requested, the PCM adjusts the idle speed to accommodate the A/C compressor load on the engine. The PCM grounds the relay control circuit after the PCM receives an A/C request and adjustment of the idle speed has been implemented.

Possible causes:

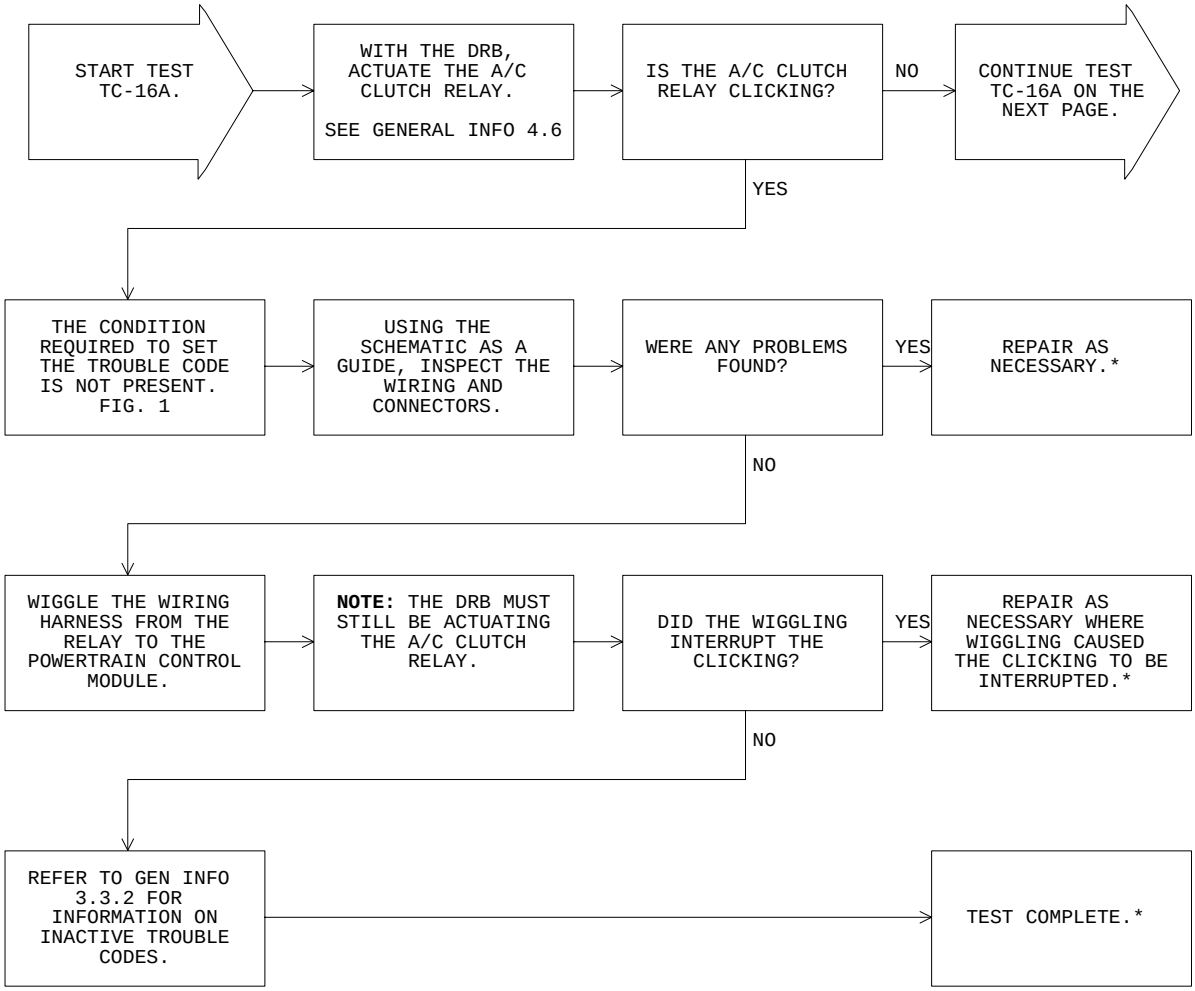
> Relay coil open or shorted
> Fused ignition switch output circuit open
> Compressor clutch relay control circuit open or shorted
> Inoperative circuit driver in powertrain control module

4000606

FIG. 1

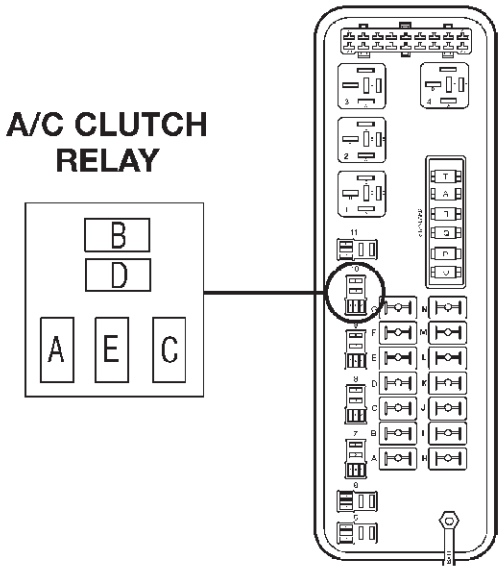
TEST TC-16A REPAIRING - A/C CLUTCH RELAY CIRCUIT

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-2A.**	****Check connectors - Clean / repair as necessary.**

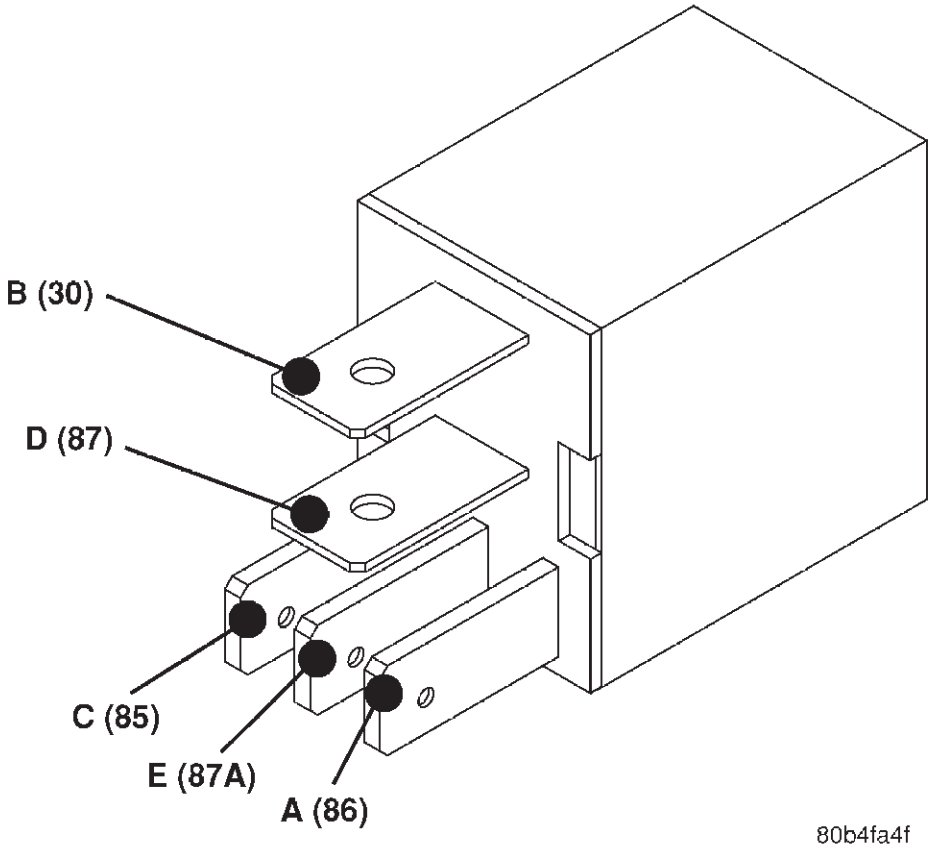
TEST TC-16A CONTINUED - REPAIRING - A/C CLUTCH RELAY CIRCUIT



CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/OR	A/C COMP CLUTCH RELAY CONTROL
D (87)	DB/BK	A/C CLUTCH RELAY OUTPUT

80b4fb2e

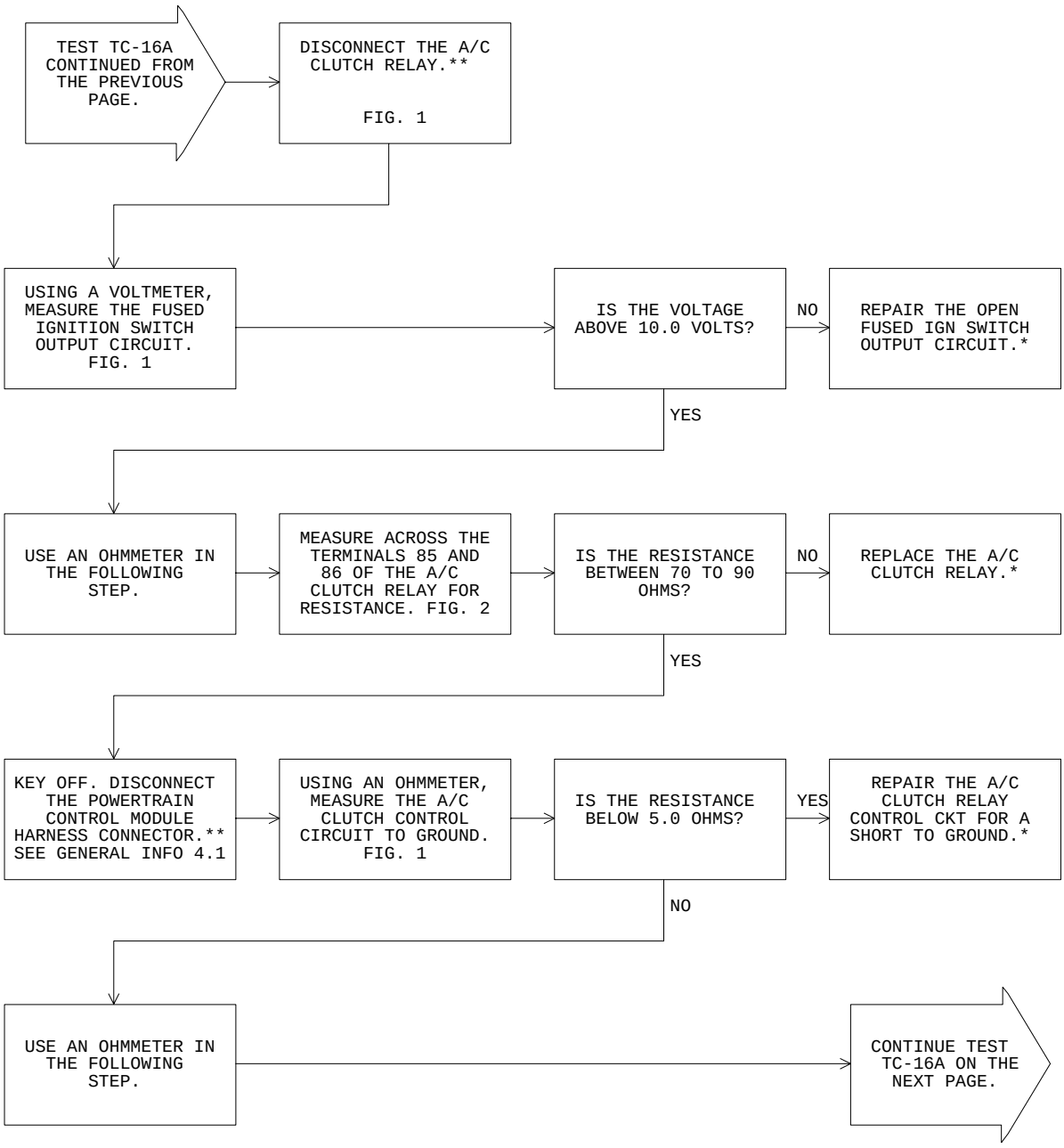
FIG. 1



80b4fa4f

FIG. 2

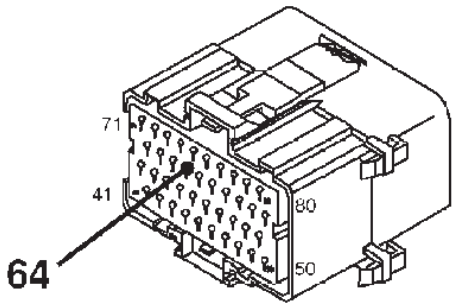
TEST TC-16A CONTINUED - REPAIRING - A/C CLUTCH RELAY CIRCUIT



Perform Verification TEST VER-2A.

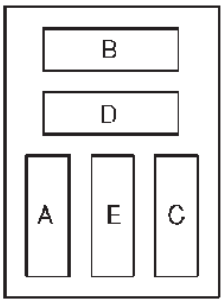
****Check connectors - Clean / repair as necessary.***

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
64	DB/OR	A/C CMP CLUTCH RELAY CONTROL

A/C CMP CLUTCH RELAY CONNECTOR (IN PDC)

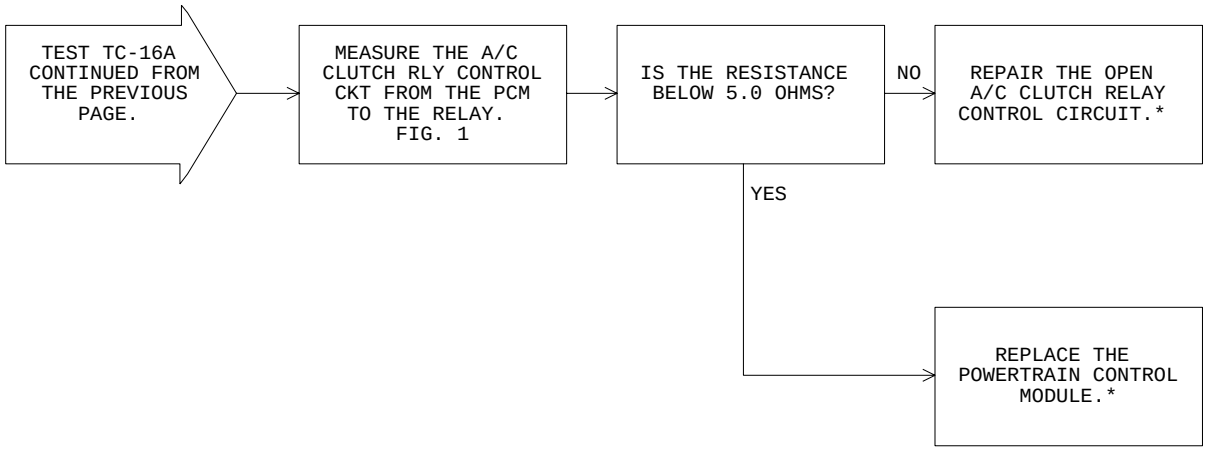


CAV	COLOR	FUNCTION
A	LG/BK	FUSED IGNITION SWITCH OUTPUT
B	RD/LG	FUSED B(+)
C	DB/OR	A/C CMP CLUTCH RELAY CONTROL
D	DB/BK	A/C CMP CLUTCH RELAY OUTPUT

80b6effc

FIG. 1

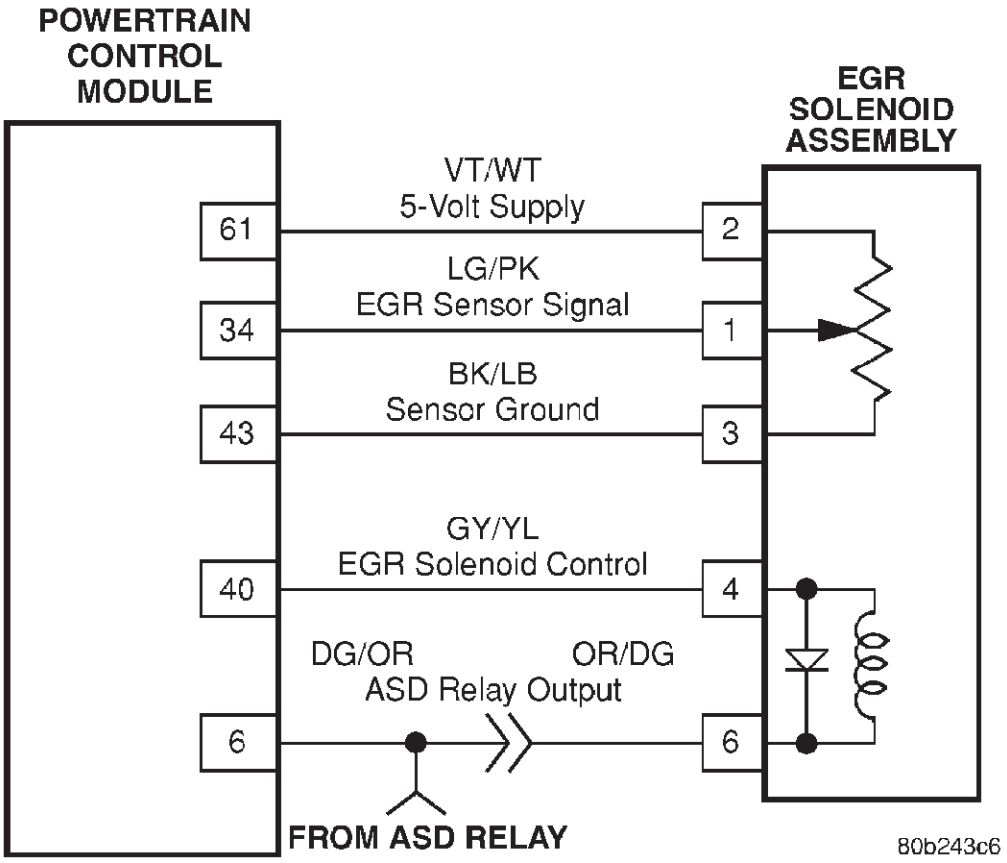
TEST TC-16A CONTINUED - REPAIRING - A/C CLUTCH RELAY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-17A REPAIRING - EGR SOLENOID CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: EGR Solenoid Circuit

When monitored: With the ignition key on and engine running and battery voltage greater than 10.4 volts.

Set condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM.

Theory of operation: The EGR solenoid is actuated by the PCM when the engine is at normal operating temperature. Throttle position sensor shows other than idle or WOT and MAP is in mid operating range. The PCM looks at current flow when actuating the solenoid.

Possible causes:

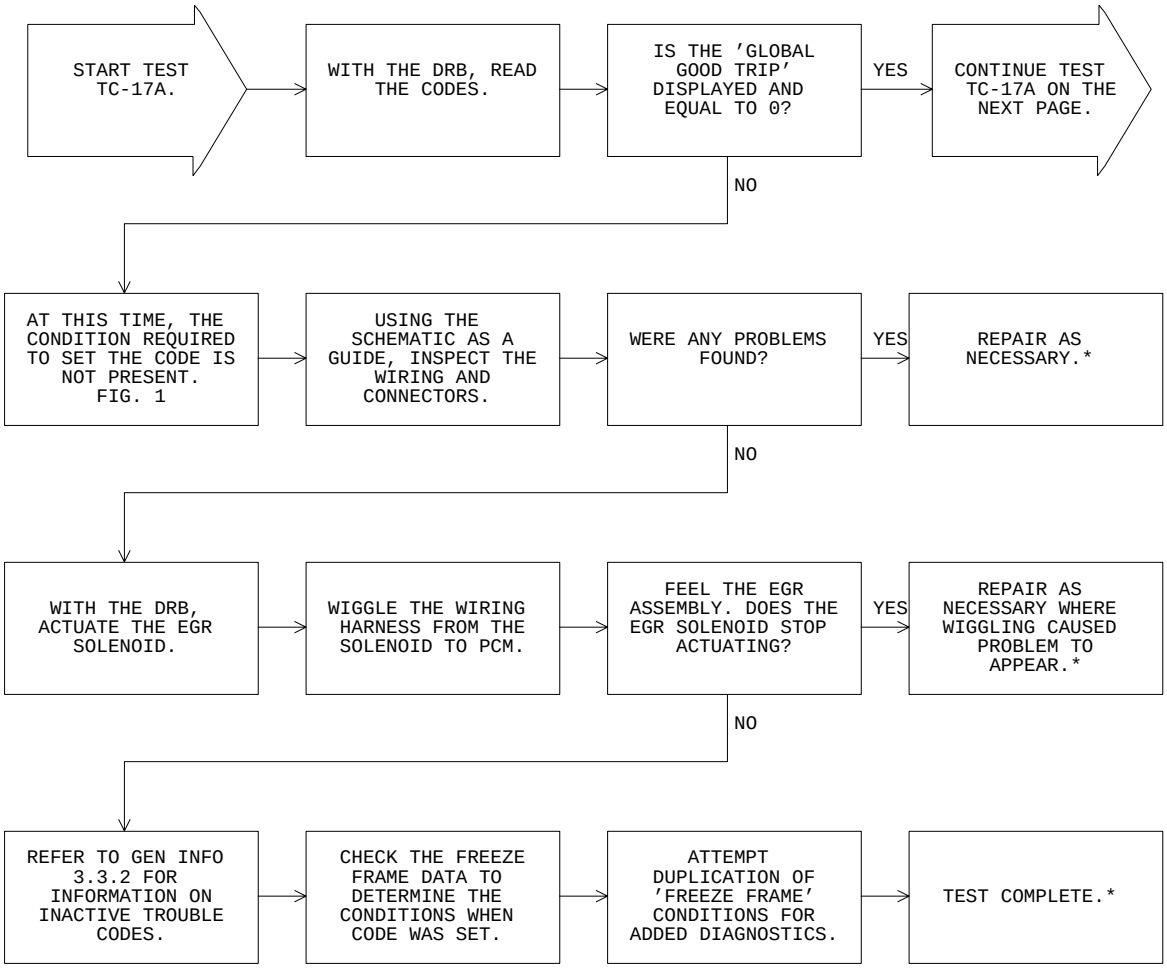
> Open or shorted control circuit
> Open ASD relay output circuit
> Open or shorted solenoid coil
> Powertrain control module failure
> Connector terminals
> Connector wires

80b4fac4

FIG. 1

TEST TC-17A REPAIRING - EGR SOLENOID CIRCUIT

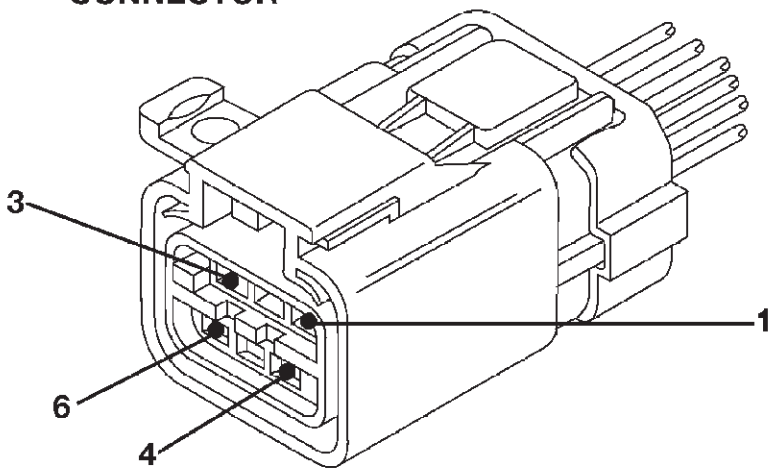
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

EGR SOLENOID CONNECTOR

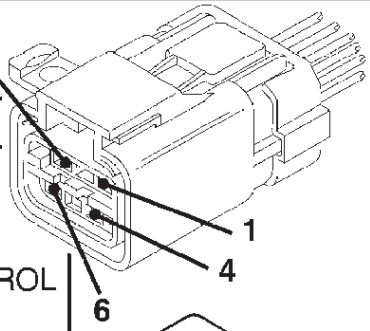


CAV	COLOR	FUNCTION
1	LG/PK	EGR SENSOR SIGNAL
2	VT/WT	5-VOLT SUPPLY
3	BK/LB	SENSOR GROUND
4	GY/YL	EGR SOLENOID CONTROL
6	OR/DG	ASD RELAY OUTPUT

80b09870

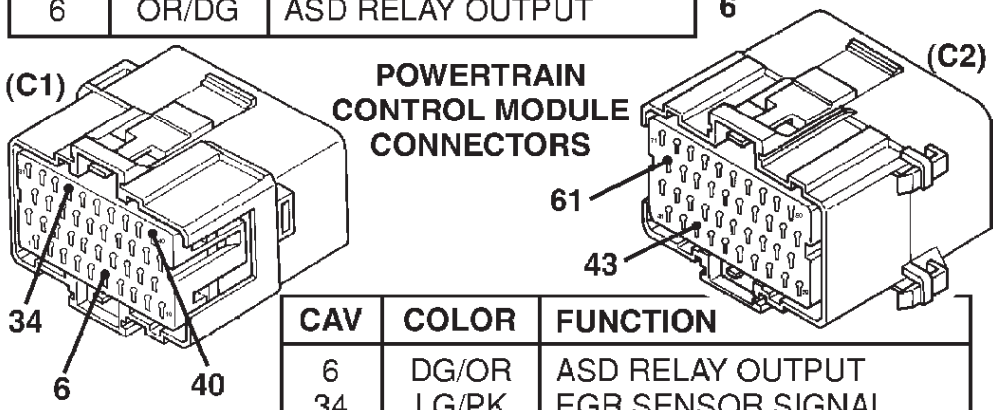
FIG. 1

EGR SOLENOID ASSEMBLY CONNECTOR



CAV	COLOR	FUNCTION
1	LG/PK	EGR SENSOR SIGNAL
2	VT/WT	5-VOLT SUPPLY
3	BK/LB	SENSOR GROUND
4	GY/YL	EGR SOLENOID CONTROL
6	OR/DG	ASD RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTORS

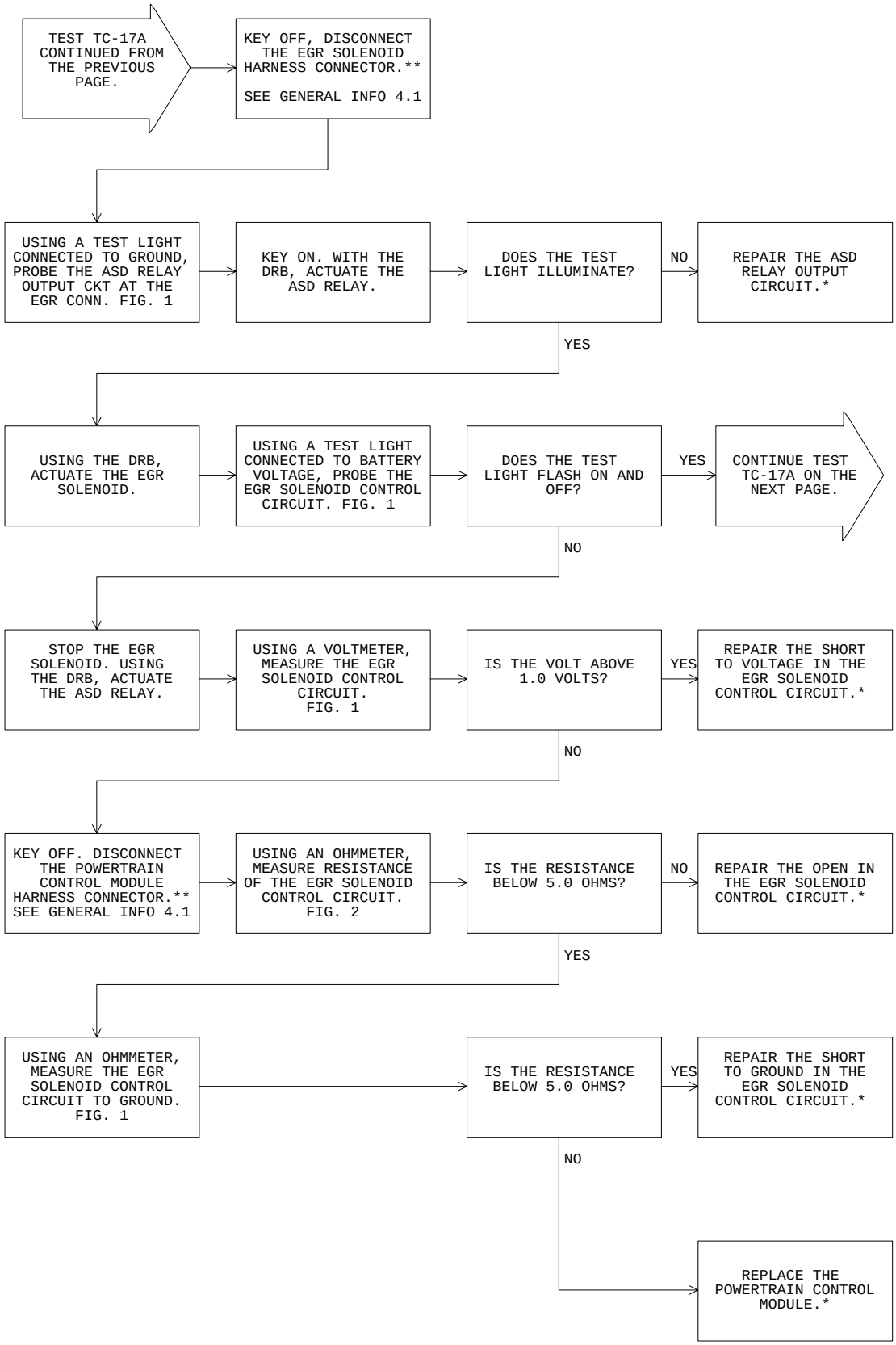


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
34	LG/PK	EGR SENSOR SIGNAL
40	GY/YL	EGR SOLENOID CONTROL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

80b09871

FIG. 2

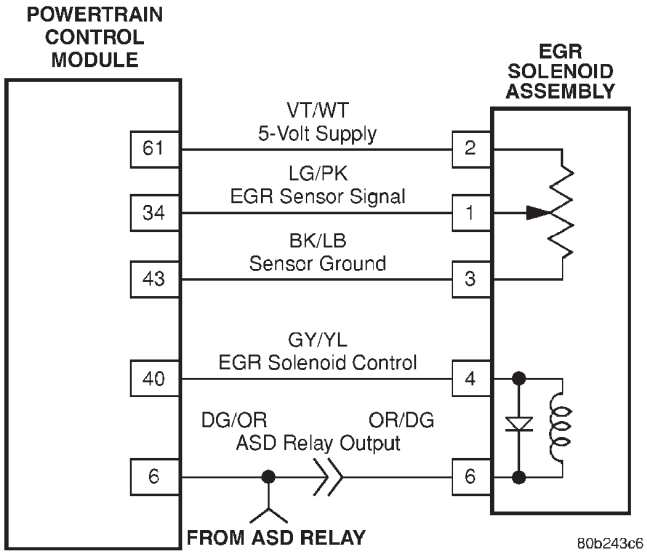
TEST TC-17A CONTINUED - REPAIRING - EGR SOLENOID CIRCUIT

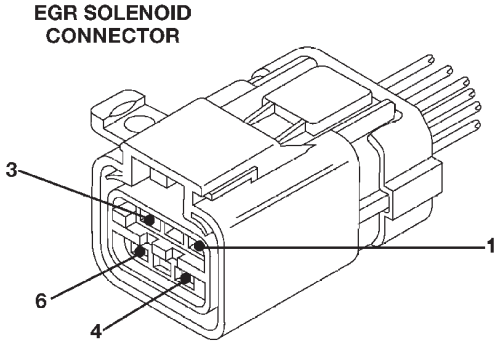


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-17A CONTINUED - REPAIRING - THE EGR SOLENOID CIRCUIT

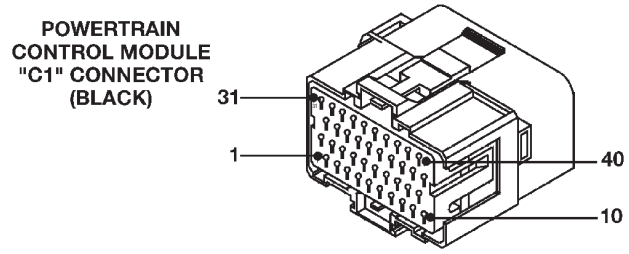




CAV	COLOR	FUNCTION
1	LG/PK	EGR SENSOR SIGNAL
2	VT/WT	5-VOLT SUPPLY
3	BK/LB	SENSOR GROUND
4	GY/YL	EGR SOLENOID CONTROL
6	OR/DG	ASD RELAY OUTPUT

80b09870

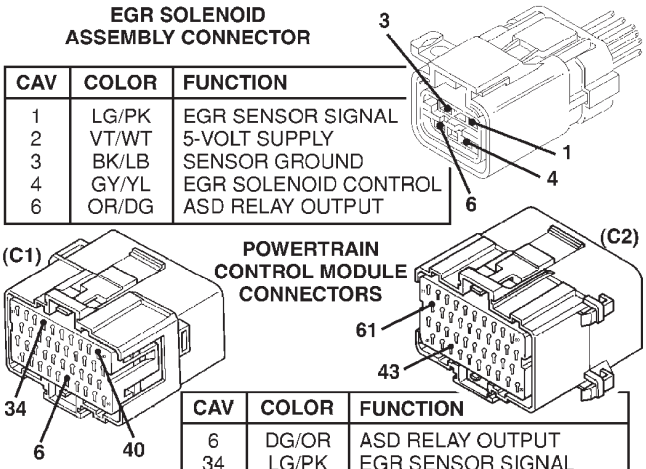
FIG. 1



CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RC	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RC	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL
17	TN	INJECTOR #2 DRIVER (3.5L)			CNTRL (3.5L)
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 2



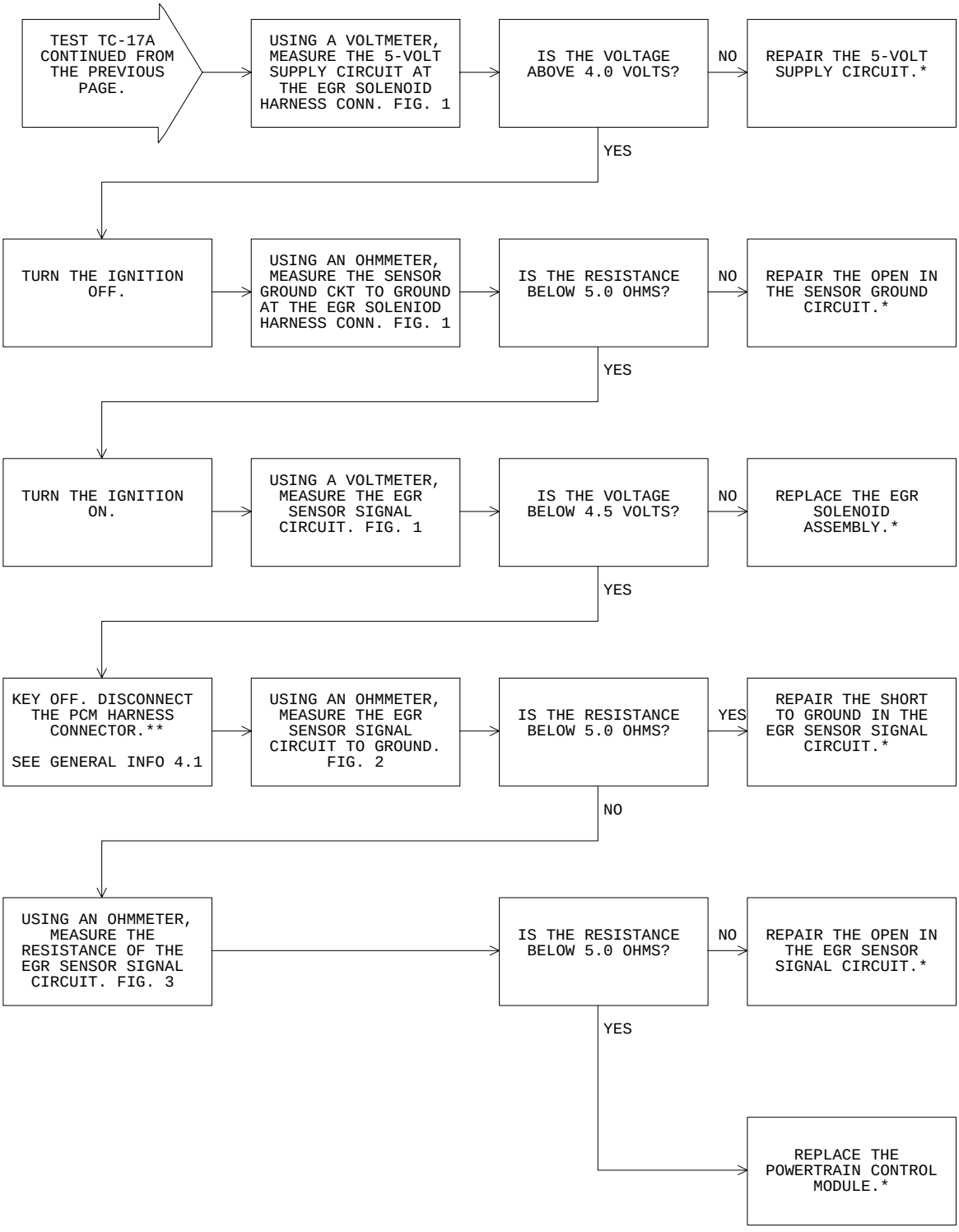
CAV	COLOR	FUNCTION
1	LG/PK	EGR SENSOR SIGNAL
2	VT/WT	5-VOLT SUPPLY
3	BK/LB	SENSOR GROUND
4	GY/YL	EGR SOLENOID CONTROL
6	OR/DG	ASD RELAY OUTPUT

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
34	LG/PK	EGR SENSOR SIGNAL
40	GY/YL	EGR SOLENOID CONTROL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

80b09871

FIG. 3

TEST TC-17A CONTINUED - REPAIRING - THE EGR SOLENOID CIRCUIT

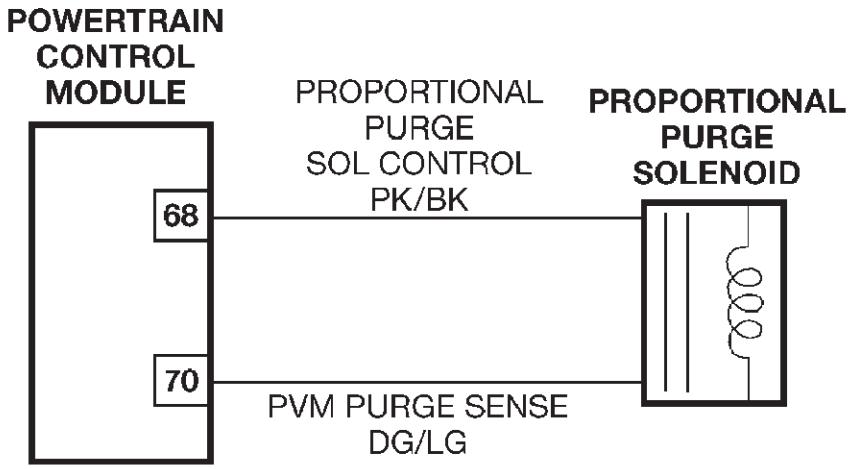


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-18A REPAIRING - EVAP PURGE SOLENOID CIRCUIT

Perform TEST DTC Before Proceeding



80b4fac3

Name of code: Proportional Purge Solenoid Circuit

When Monitored: With the ignition key on and the engine running.

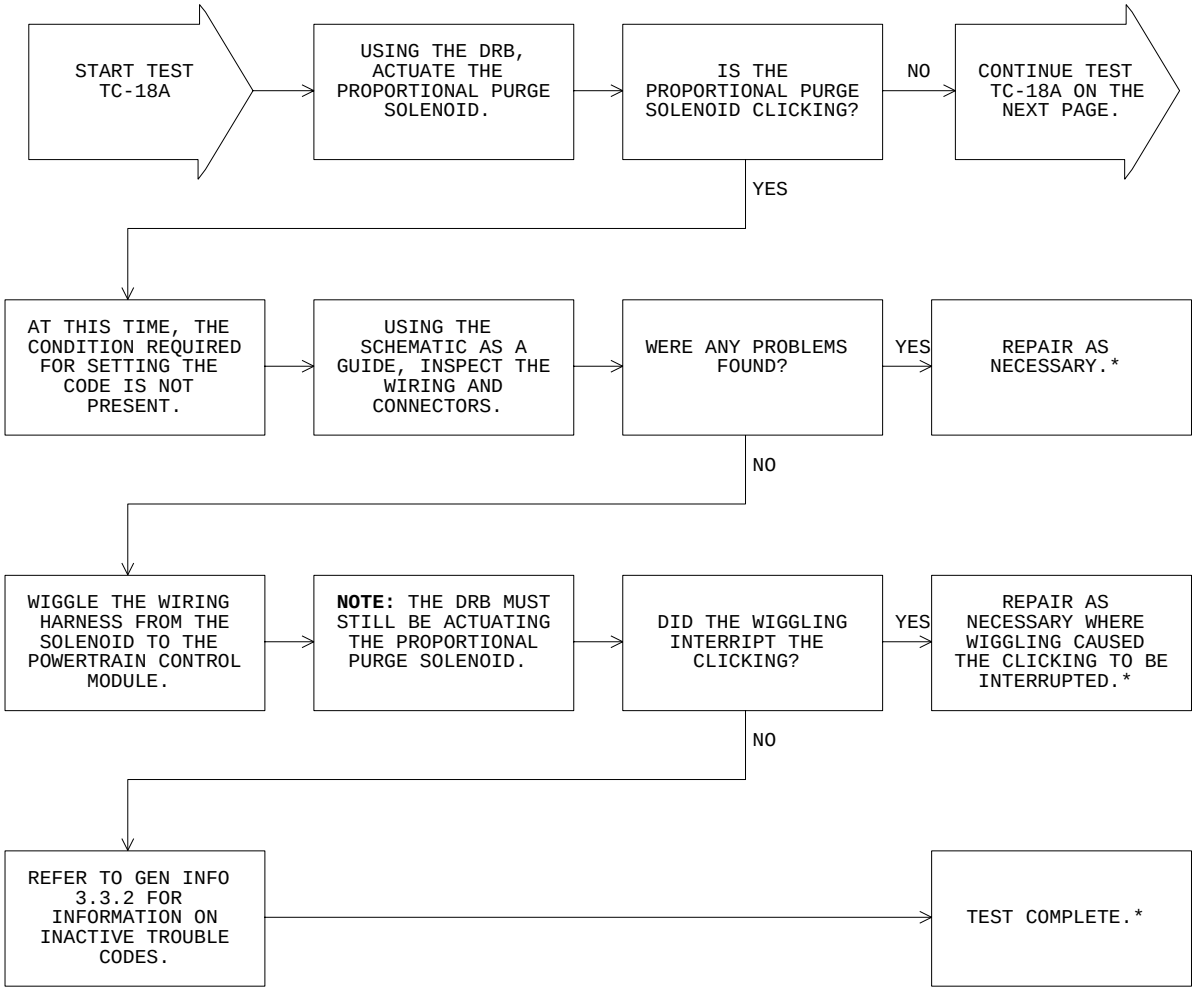
Set Condition: After the arming conditions are satisfied: not powering down, not already in limp-in, time since the last solenoid activation > 72 micro seconds. The powertrain control module will set a trouble code if the actual state of the solenoid does not match the intended state. The Proportional Purge Solenoid (PPS) operates at a frequency of 200 Hz and is controlled by an engine controller circuit that senses the current being applied to the PPS and then adjusts that current to achieve the desired purge flow. The PPS controls the purge rate of fuel vapors from the vapor canister and fuel tank to the engine intake manifold.

Possible causes:
- Open or shorted control circuit
- Open fused ignition switch output circuit
- Open or shorted solenoid control coil
- Powertrain control module failure
- Connector terminals
- Connector wires

80b01d55

TEST TC-18A REPAIRING - EVAP PURGE SOLENOID CIRCUIT

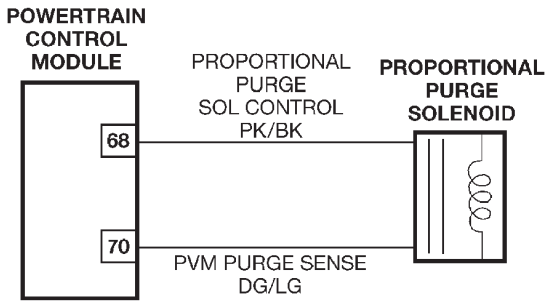
Perform TEST DTC Before Proceeding



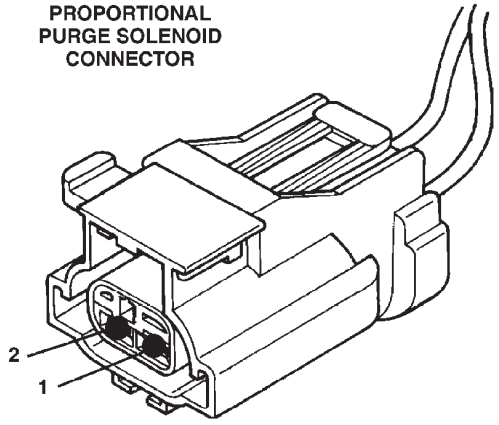
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-18A CONTINUED - REPAIRING - EVAP PURGE SOLENOID CIRCUIT



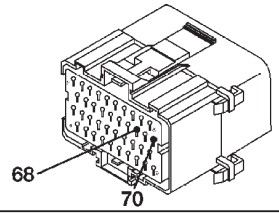
80b4fac3



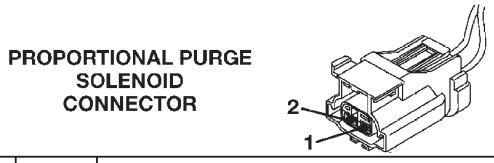
CAV	COLOR	FUNCTION
1	PK/BK	PROPORTIONAL PURGE SOLENOID CONTROL
2	DG/LG	PWM PURGE SENSE

80b27d16

FIG. 1



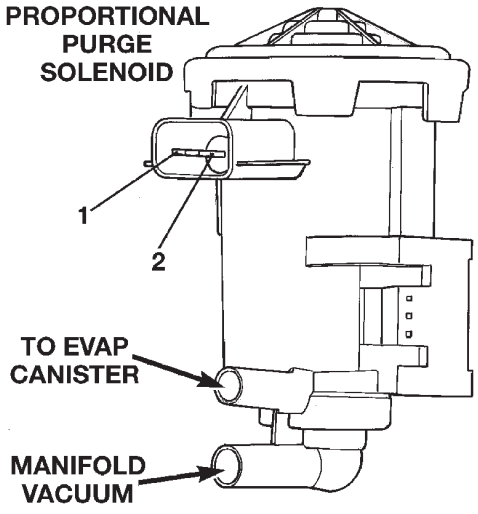
CAV	COLOR	FUNCTION
68	PK/BK	PROPORTIONAL PURGE SOLENOID CONTROL
70	DG/LG	PWM PURGE SENSE



CAV	COLOR	FUNCTION
1	PK/BK	PROPORTIONAL PURGE SOLENOID CONTROL
2	DG/LG	PWM PURGE SENSE

80b27d17

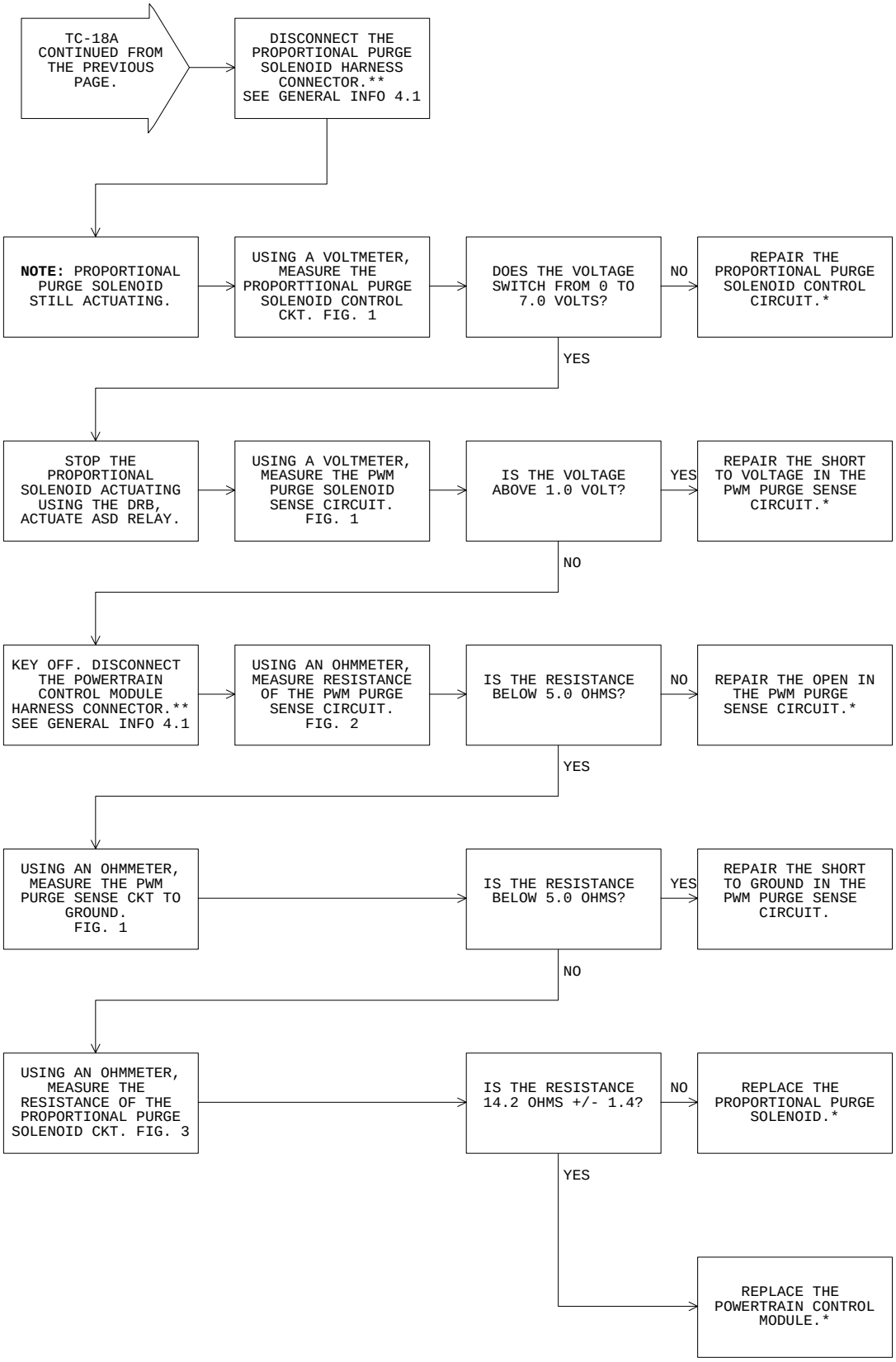
FIG. 2



80b57439

FIG. 3

TEST TC-18A CONTINUED - REPAIRING - EVAP PURGE SOLENOID CIRCUIT

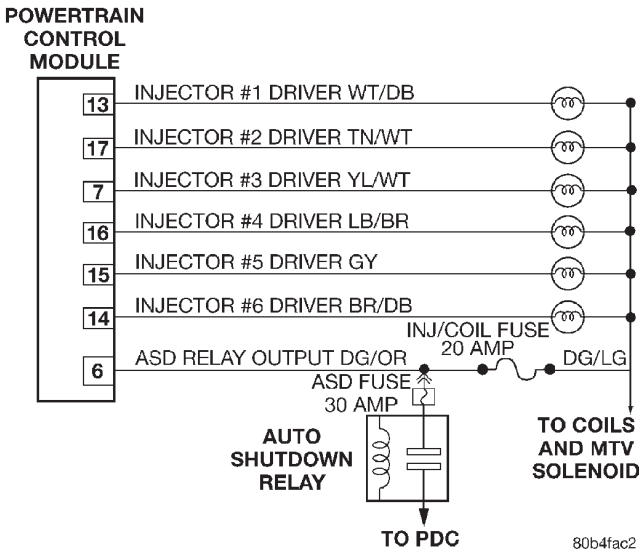


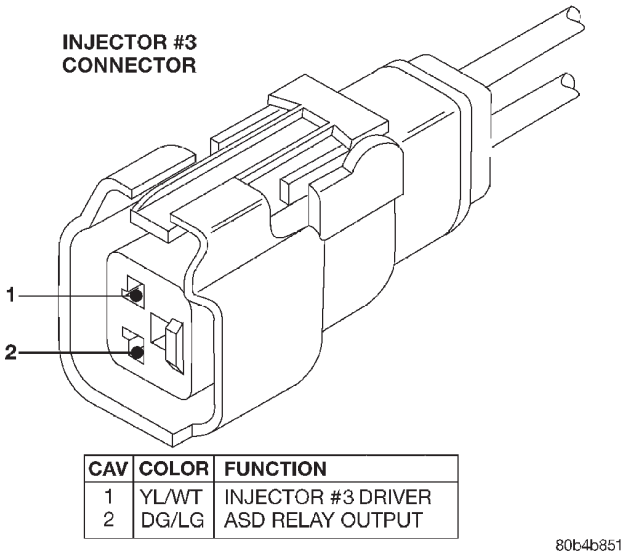
Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-19A REPAIRING - INJECTOR #3 CONTROL CIRCUIT

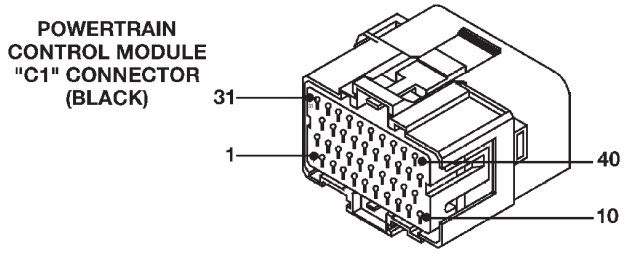
Perform TEST TC-21A Before Proceeding





CAV	COLOR	FUNCTION
1	YL/WT	INJECTOR #3 DRIVER
2	DG/LG	ASD RELAY OUTPUT

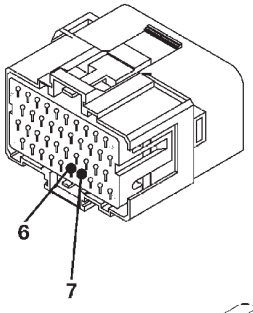
FIG. 1



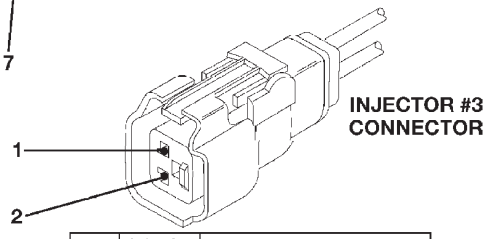
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (2.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/1 SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/1 SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSITION SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 2



CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
7	YL/WT	INJECTOR #3 DRIVER

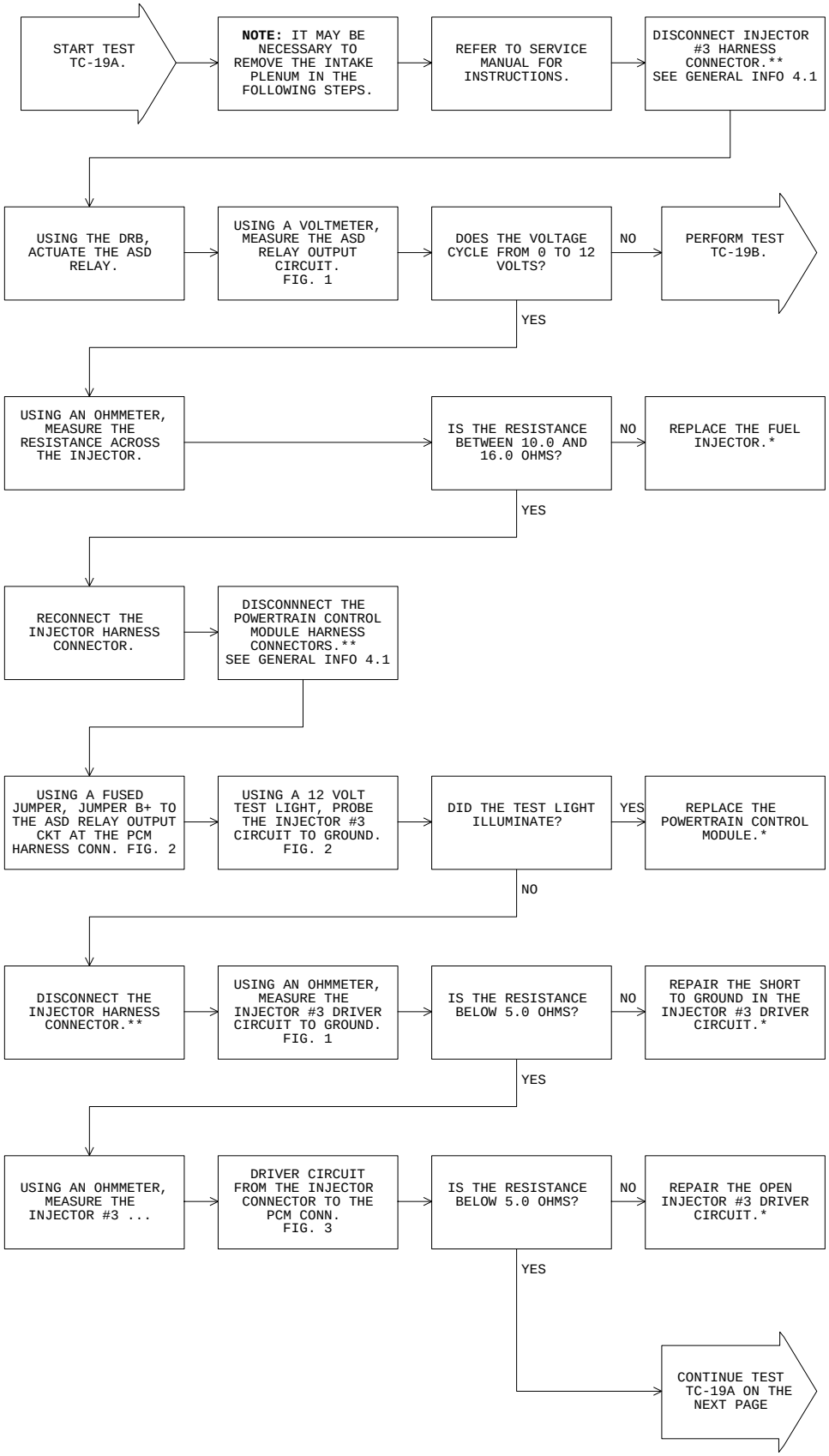


CAV	COLOR	FUNCTION
1	YL/WT	INJECTOR #3 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 3

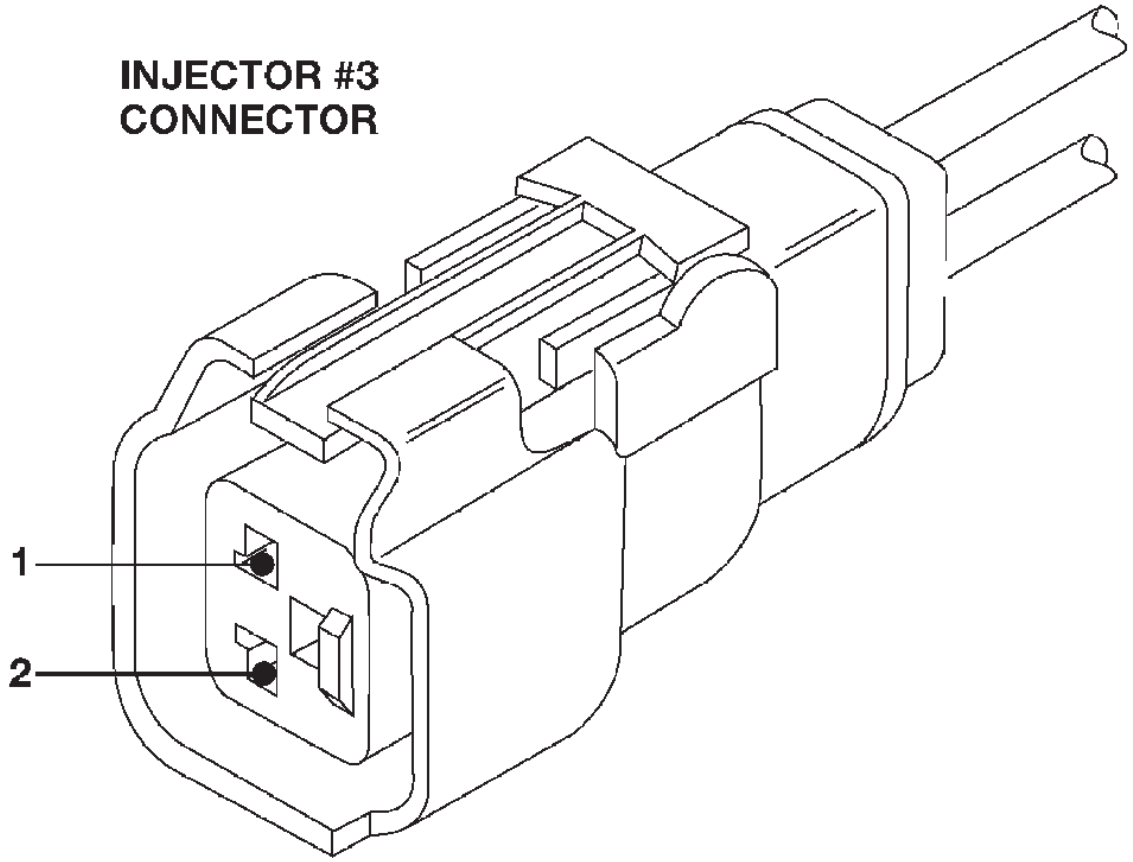
TEST TC-19A REPAIRING - INJECTOR #3 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

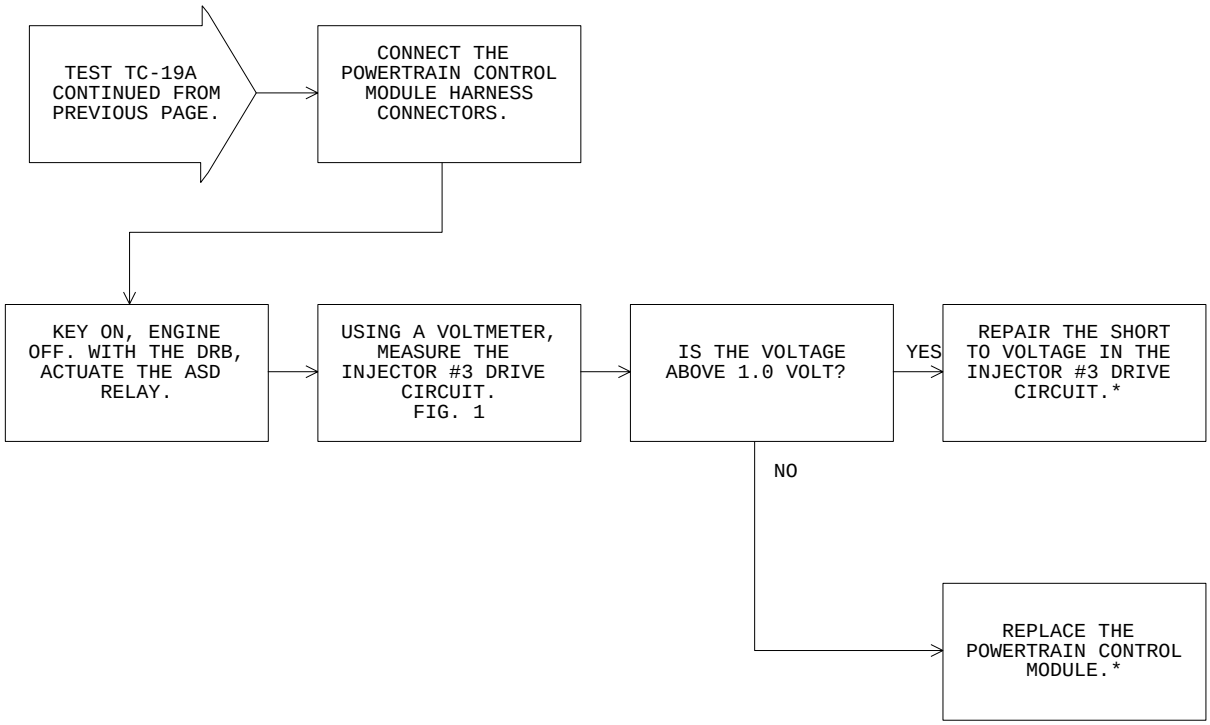


CAV	COLOR	FUNCTION
1	YL/WT	INJECTOR #3 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b4b851

FIG. 1

TEST TC-19A CONITINUED - REPAIRING - INJECTOR #3 CONTROL CIRCUIT

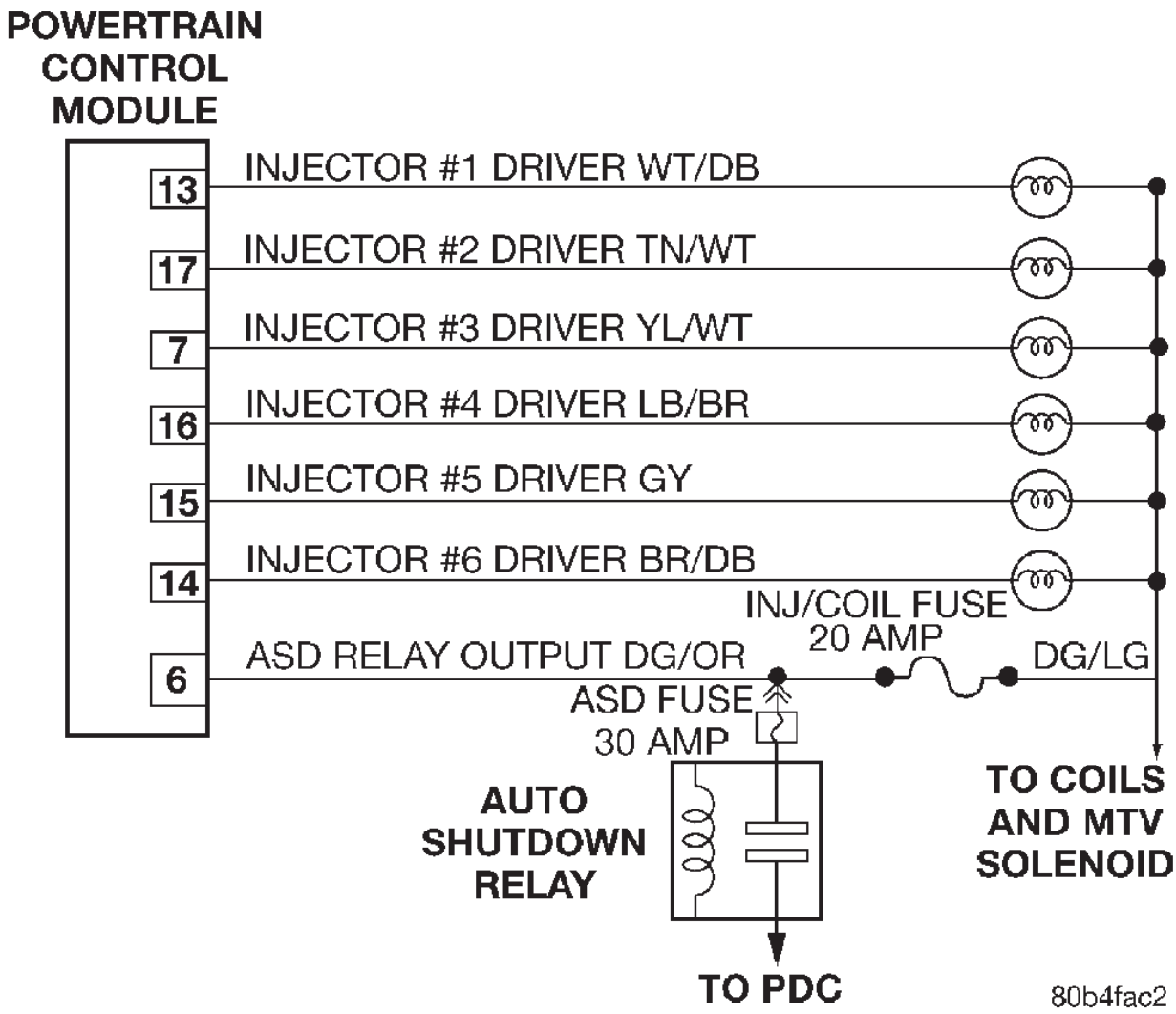


***Perform Verification TEST VER-2A.**

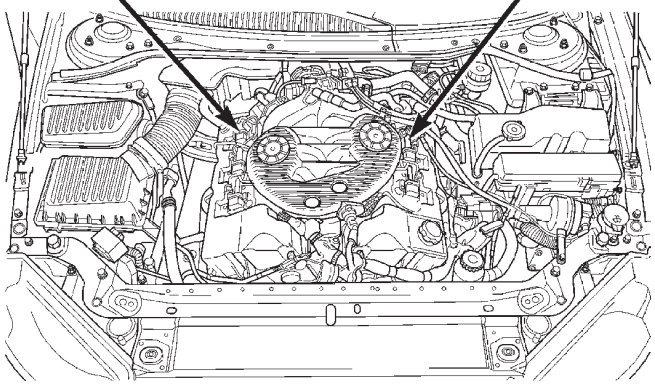
****Check connectors - Clean / repair as necessary.**

TEST TC-19B REPAIRING - INJECTOR #3 CONTROL CIRCUIT

Perform TEST TC-19A Before Proceeding



2.7L

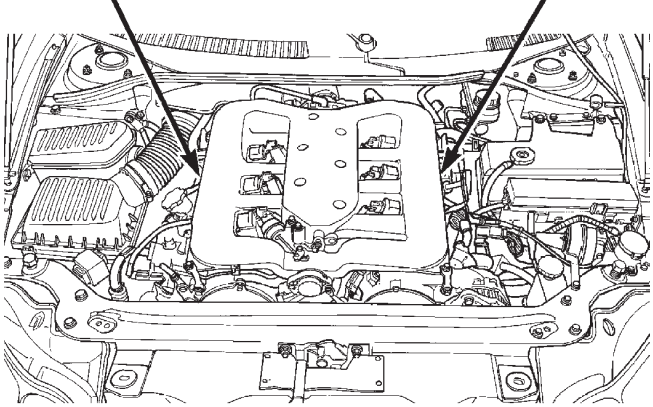


NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

3.5L



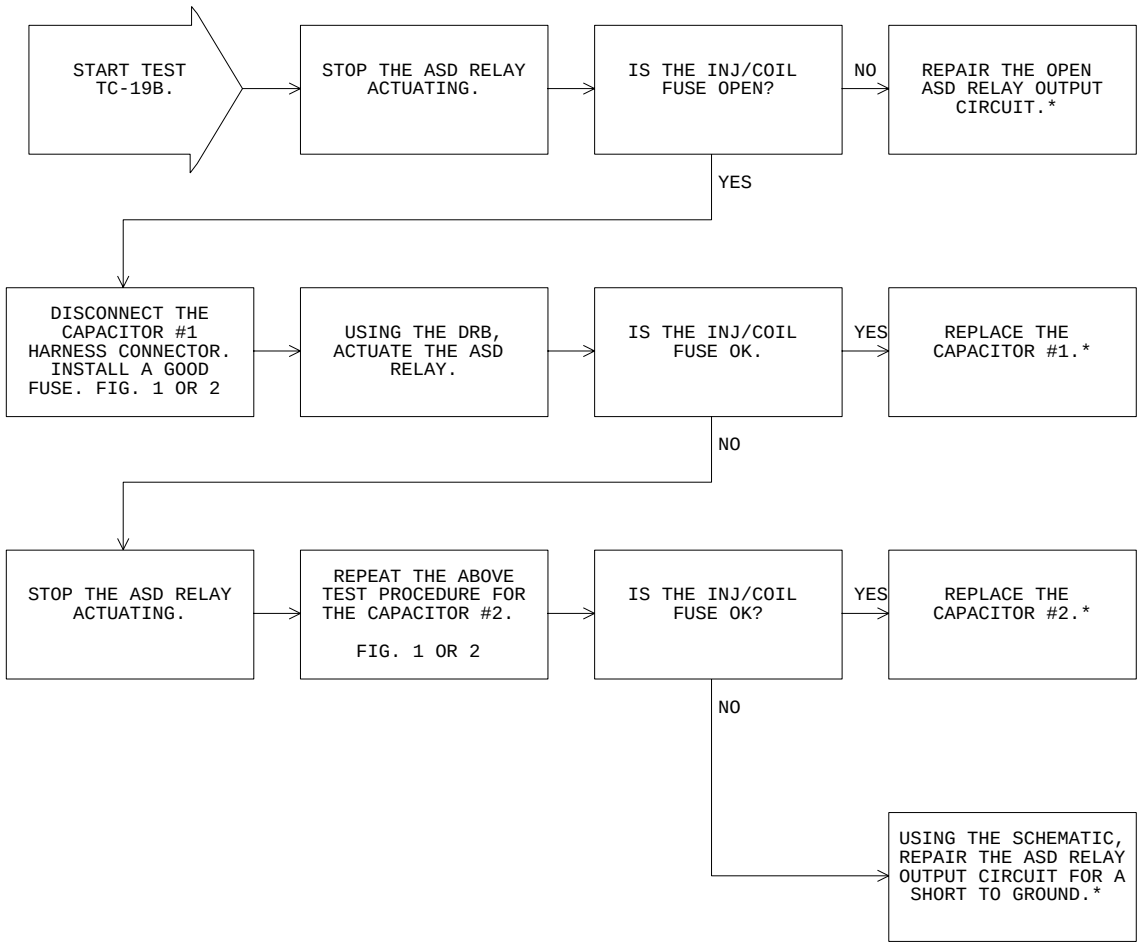
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-19B REPAIRING - INJECTOR #3 CONTROL CIRCUIT

Perform TEST TC-19A Before Proceeding

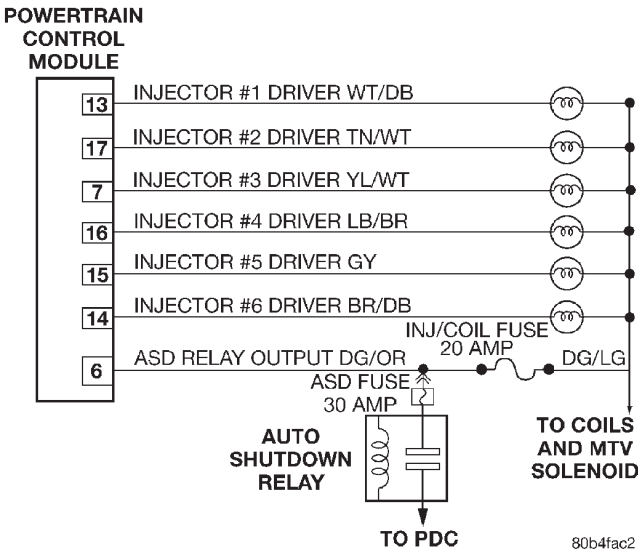


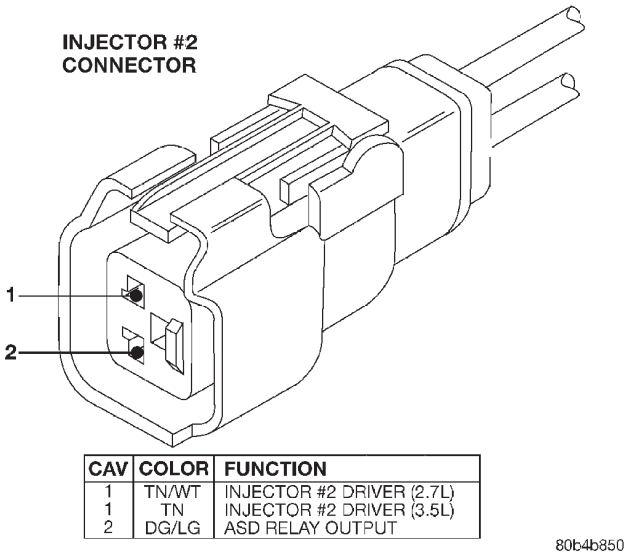
Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-20A REPAIRING - INJECTOR #2 CONTROL CIRCUIT

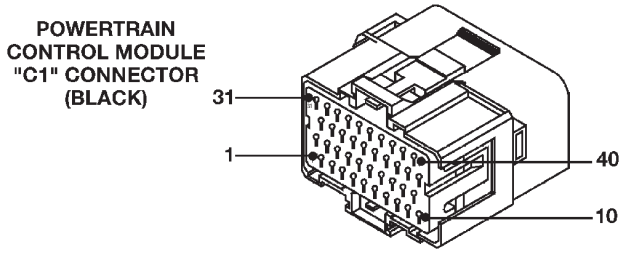
Perform TEST TC-21A Before Proceeding





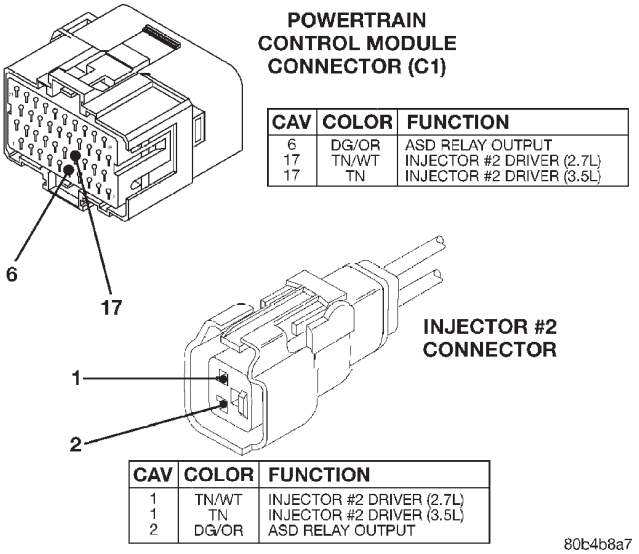
CAV	COLOR	FUNCTION
1	TN/WT	INJECTOR #2 DRIVER (2.7L)
1	TN	INJECTOR #2 DRIVER (3.5L)
2	DG/LG	ASD RELAY OUTPUT

FIG. 1



CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (2.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RC	HEATED 02 SENS 2/1 SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/1 SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSITION SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RC	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

FIG. 2



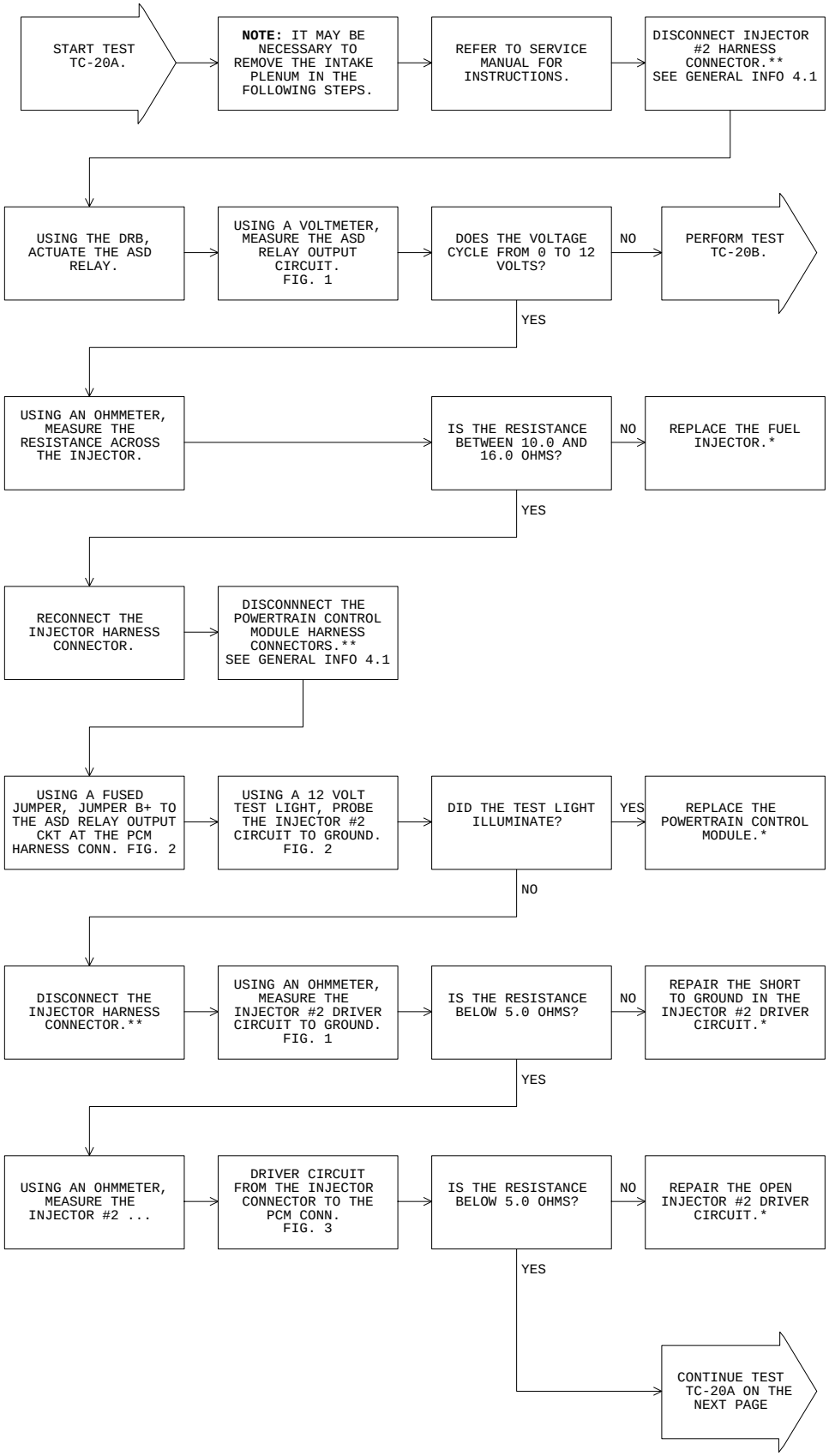
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
17	TN/WT	INJECTOR #2 DRIVER (2.7L)
17	TN	INJECTOR #2 DRIVER (3.5L)

CAV	COLOR	FUNCTION
1	TN/WT	INJECTOR #2 DRIVER (2.7L)
1	TN	INJECTOR #2 DRIVER (3.5L)
2	DG/OR	ASD RELAY OUTPUT

FIG. 3

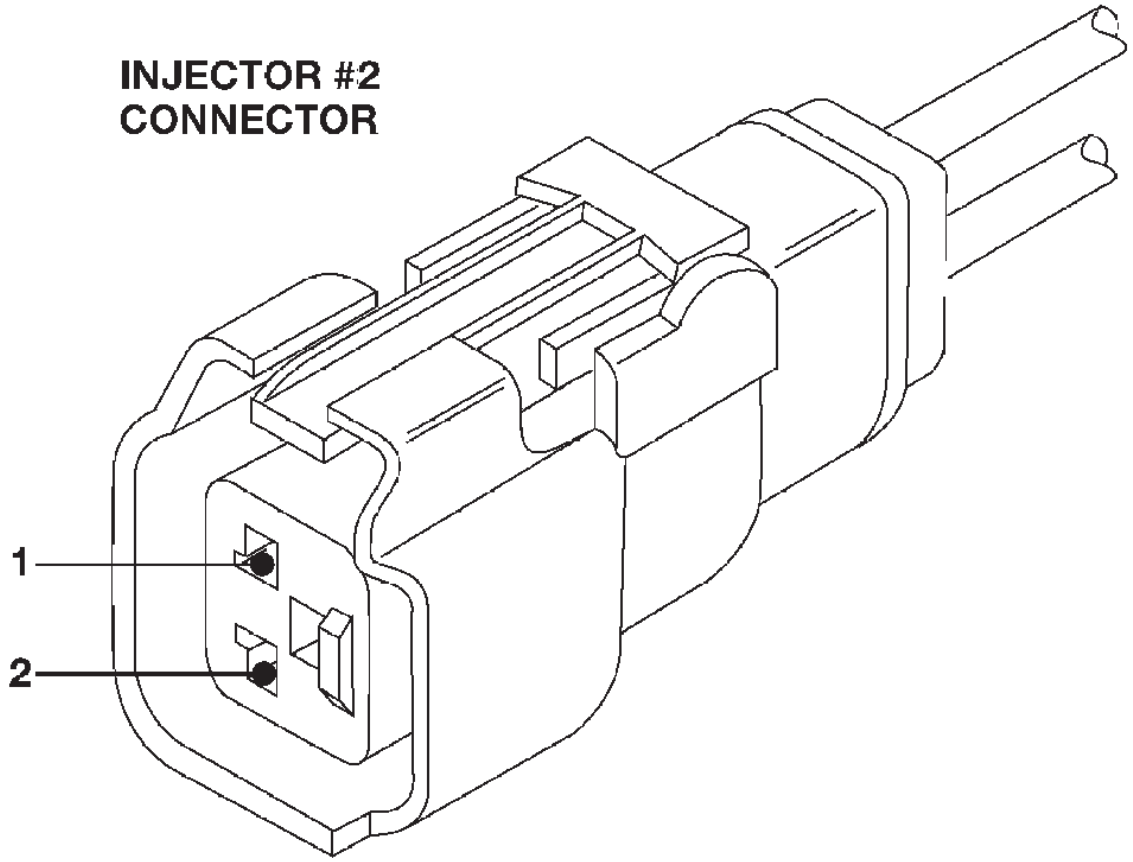
TEST TC-20A REPAIRING - INJECTOR #2 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

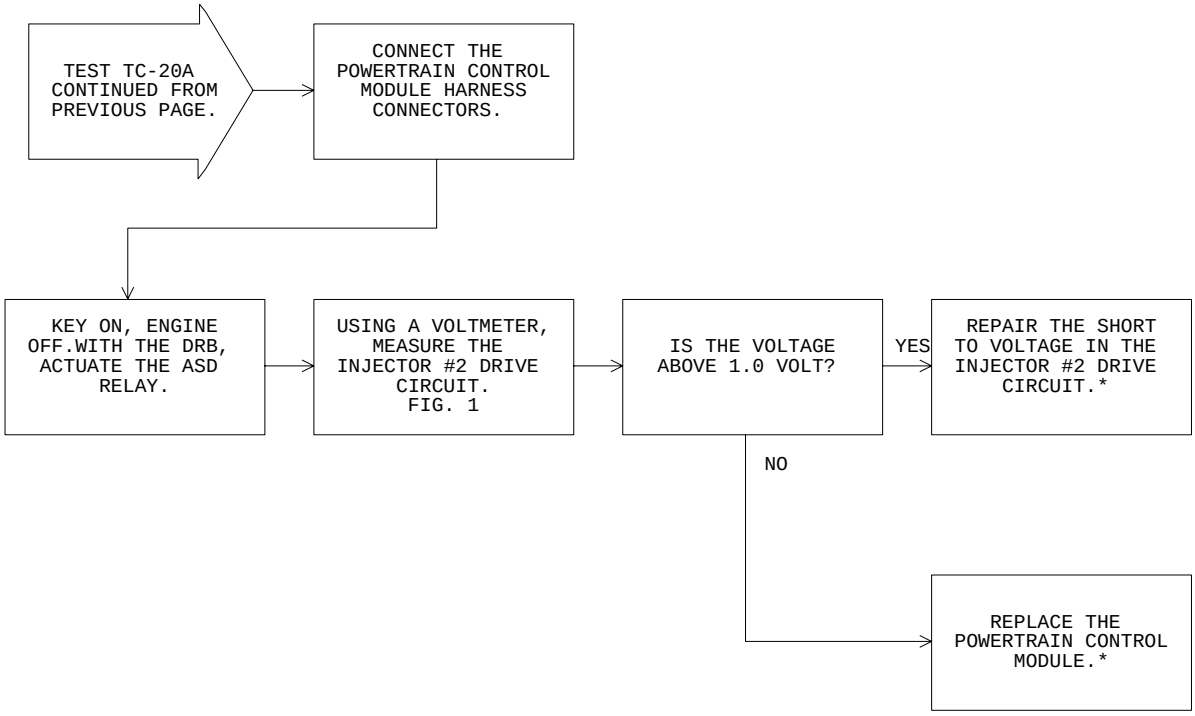


CAV	COLOR	FUNCTION
1	TN/WT	INJECTOR #2 DRIVER (2.7L)
1	TN	INJECTOR #2 DRIVER (3.5L)
2	DG/LG	ASD RELAY OUTPUT

80b4b850

FIG. 1

TEST TC-20A CONTINUED - REPAIRING - INJECTOR #2 CONTROL CIRCUIT

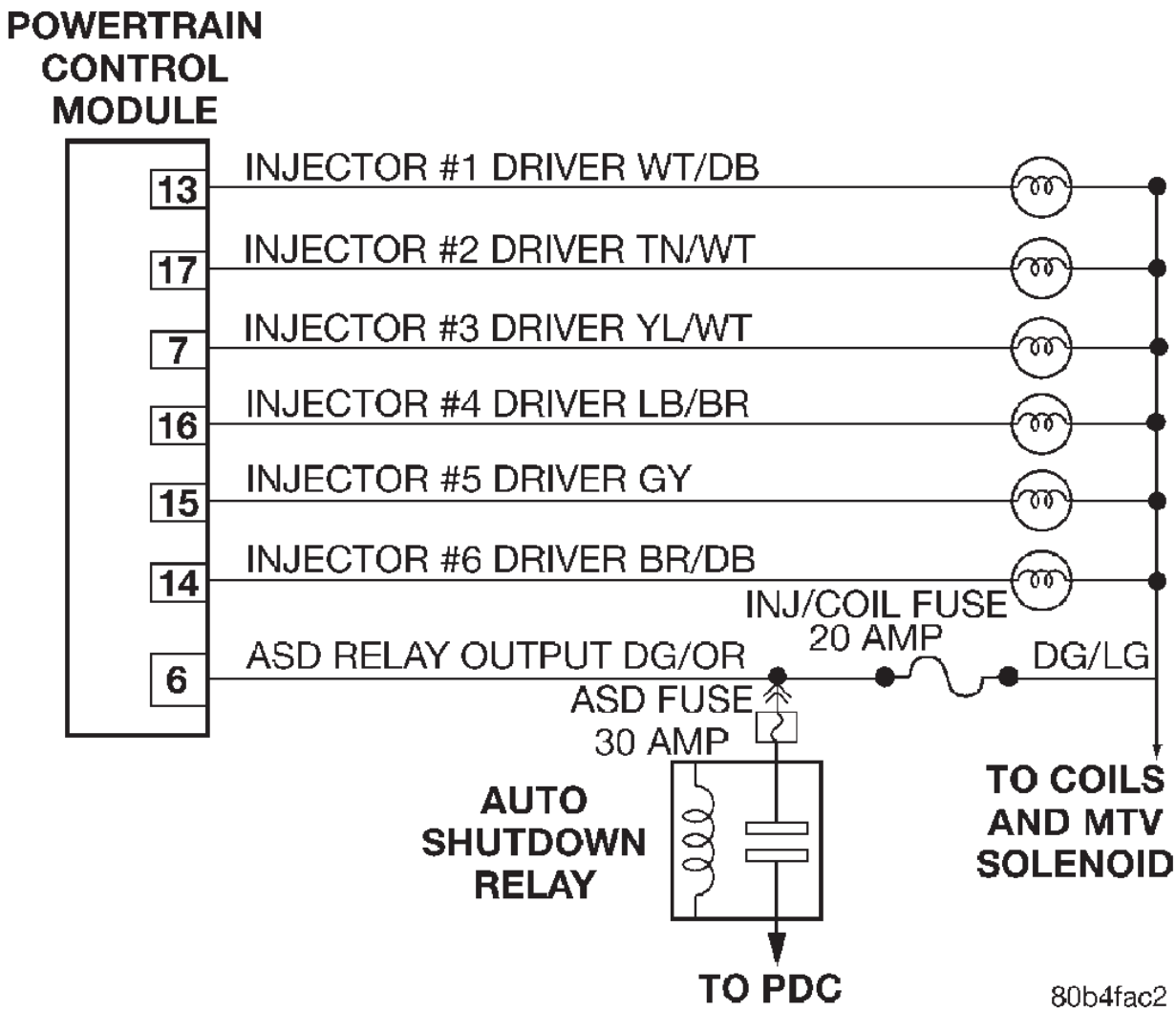


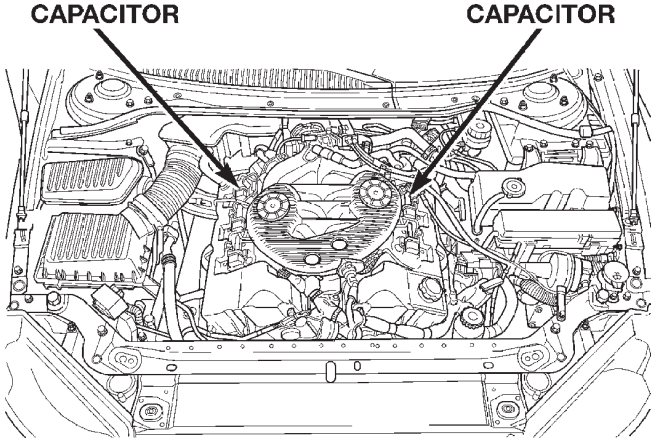
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-20B REPAIRING - INJECTOR #2 CONTROL CIRCUIT

Perform TEST TC-20A Before Proceeding

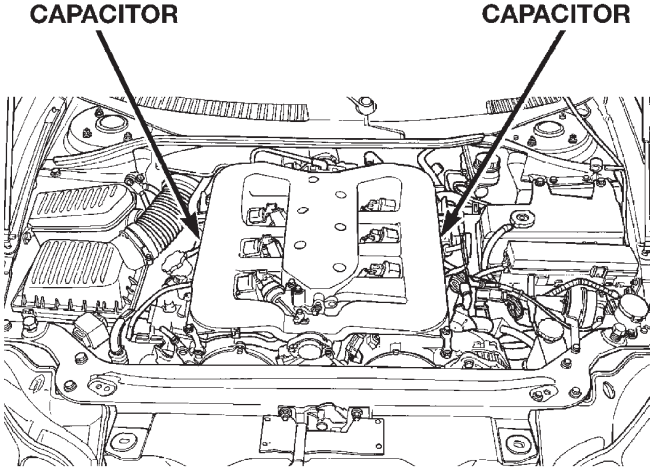




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1



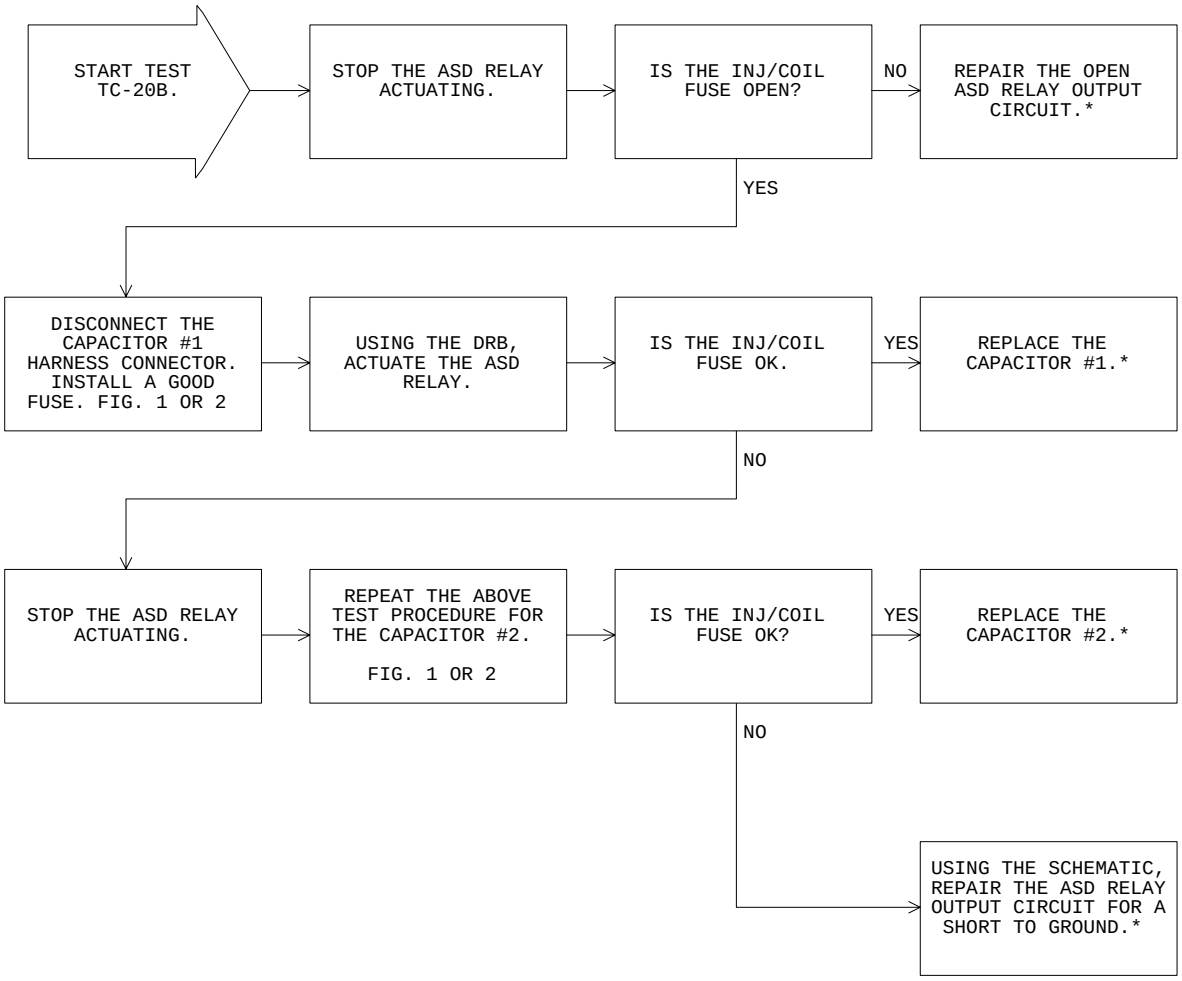
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-20B REPAIRING - INJECTOR #2 CONTROL CIRCUIT

Perform TEST TC-20A Before Proceeding

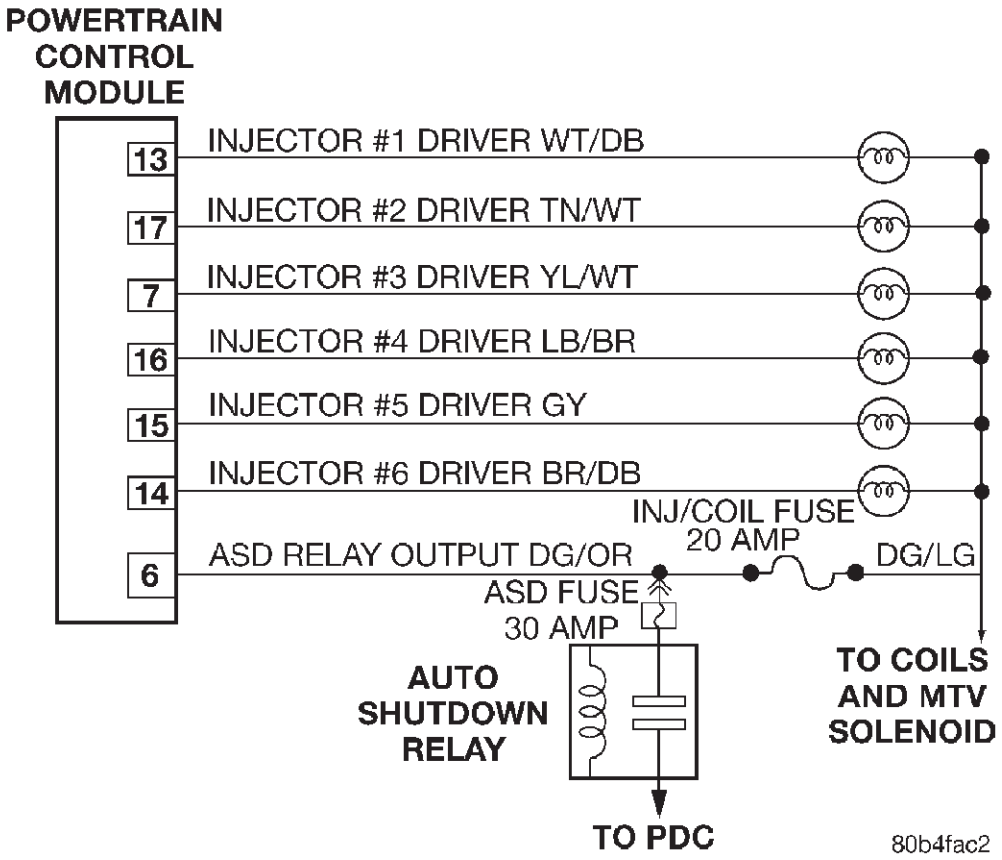


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-21A REPAIRING - INJECTOR CONTROL CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: Injector Control Circuit

When monitored: With battery voltage greater than 12 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

Theory of operation: Fuel injectors are high-impedance solenoids controlled by the PCM. Battery voltage is supplied by the ASD relay. The injector on time (pulse width) is controlled by the amount of time the PCM grounds the injector control circuit. By varying this time, more or less fuel is allowed to flow through the injector.

Possible causes:

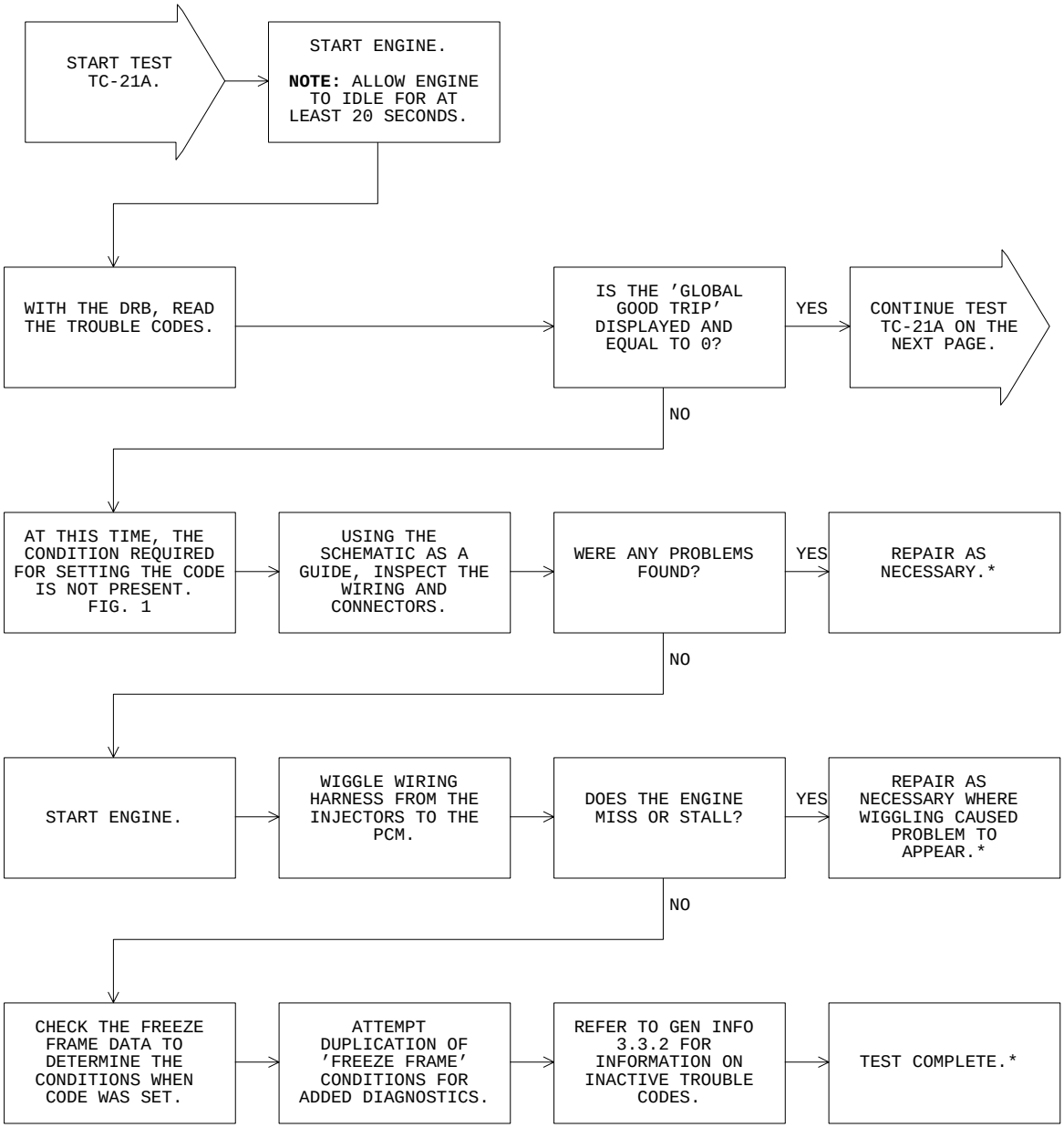
> Open or shorted injector driver circuit
> Open injector
> Open ASD supply at injector
> PCM failure
> Connector terminals
> Connector wires

0880305

FIG. 1

TEST TC-21A REPAIRING - INJECTOR CONTROL CIRCUIT

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

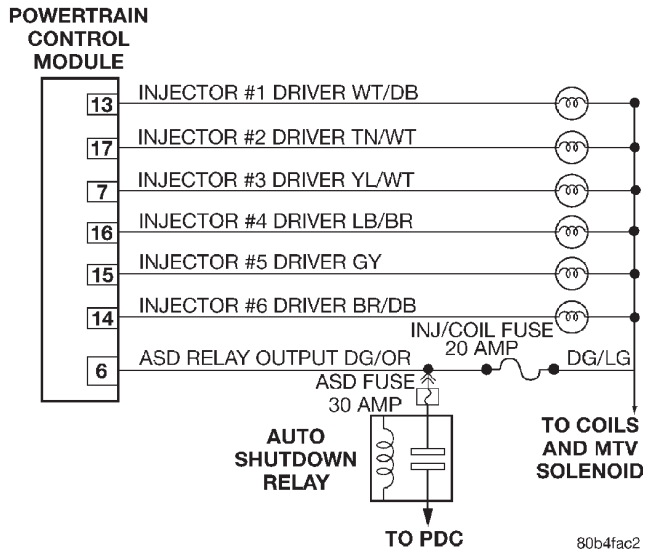
NOTES

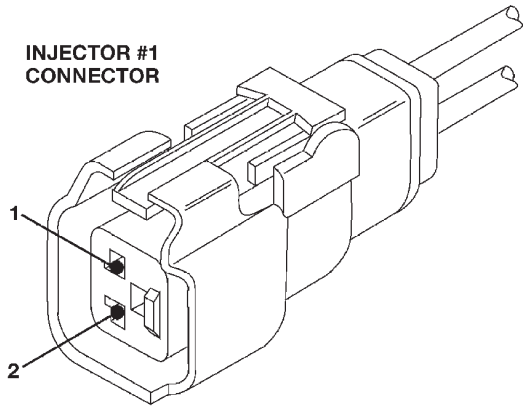
Refer to the chart below and perform the diagnostic test that corresponds to the trouble code displayed on the DRBIII®.

TROUBLE CODE	DIAGNOSTIC TEST
INJECTOR #1 CONTROL CIRCUIT	TC-21B
INJECTOR #2 CONTROL CIRCUIT	TC-20A
INJECTOR #3 CONTROL CIRCUIT	TC-19A
INJECTOR #4 CONTROL CIRCUIT	TC-61A
INJECTOR #5 CONTROL CIRCUIT	TC-69A
INJECTOR #6 CONTROL CIRCUIT	TC-70A

TEST TC-21B REPAIRING - INJECTOR #1 CONTROL CIRCUIT

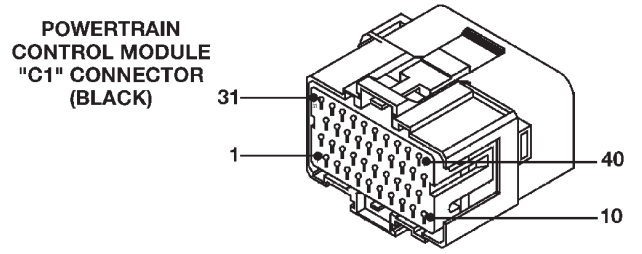
Perform TEST TC-21A Before Proceeding





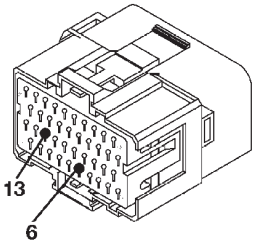
CAV	COLOR	FUNCTION
1	WT/DB	INJECTOR #1 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 1



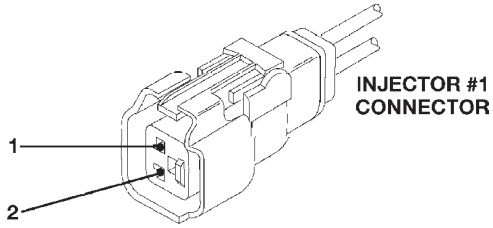
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (2.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RC	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RC	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

FIG. 2



POWERTRAIN CONTROL MODULE CONNECTOR (C1)

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
13	WT/DB	INJECTOR #1 DRIVER

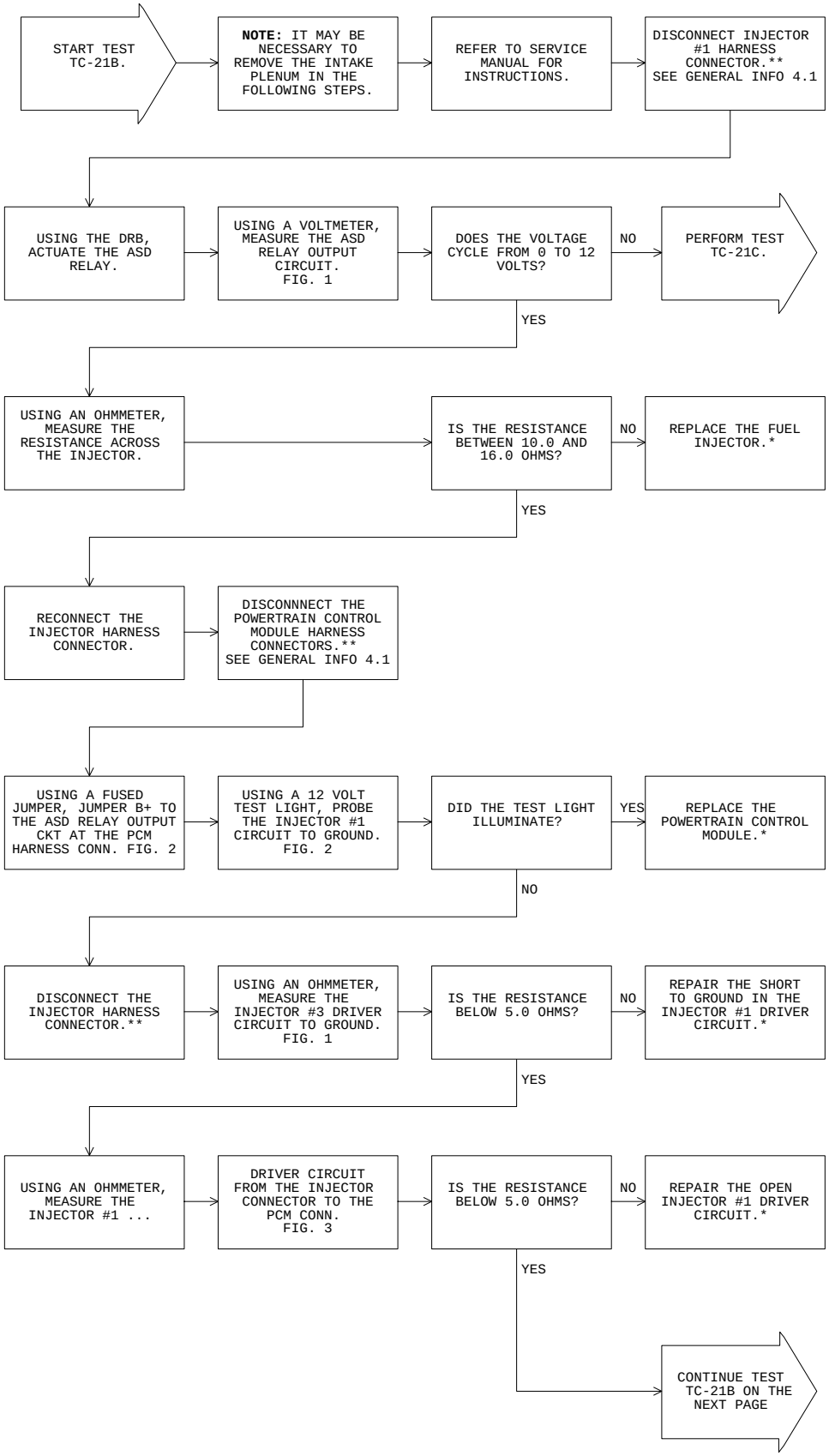


CAV	COLOR	FUNCTION
1	WT/DB	INJECTOR #1 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 3

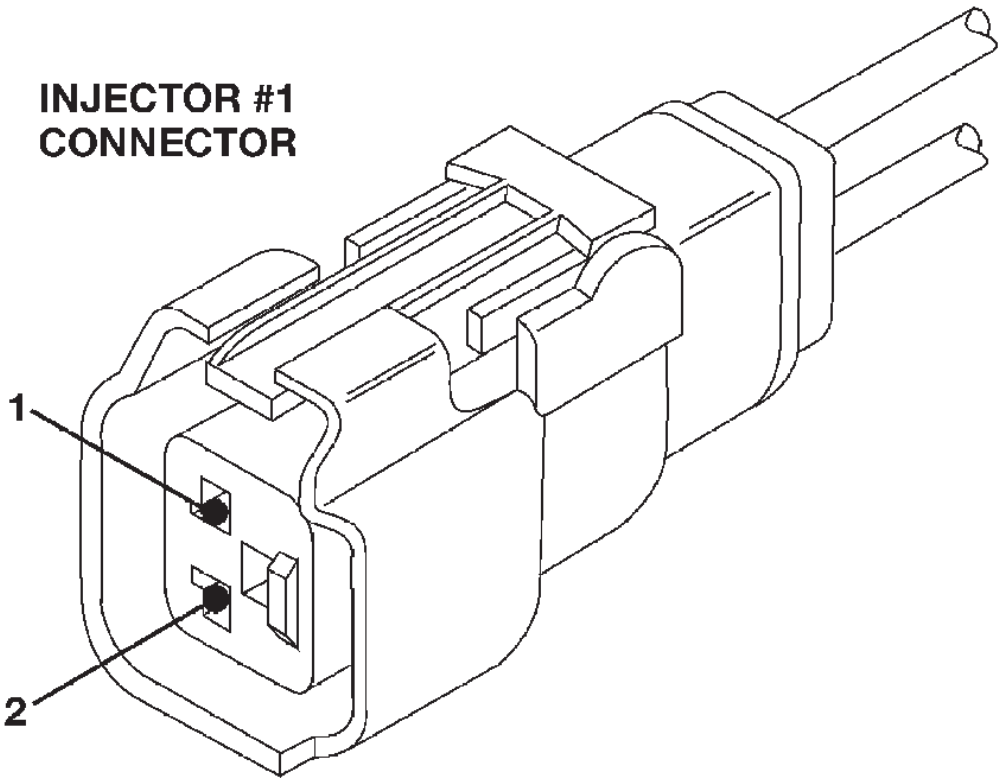
TEST TC-21B REPAIRING - INJECTOR #1 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

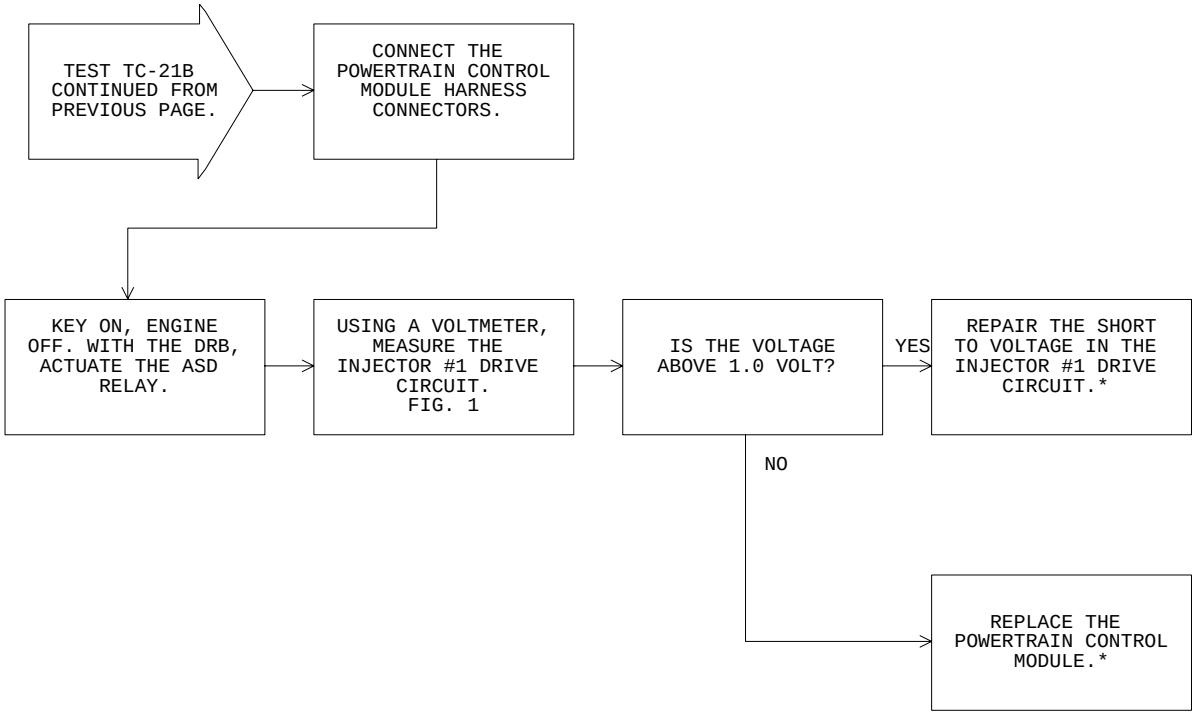


CAV	COLOR	FUNCTION
1	WT/DB	INJECTOR #1 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b09847

FIG. 1

TEST TC-21B CONTINUED - REPAIRING - INJECTOR #1 CONTROL CIRCUIT

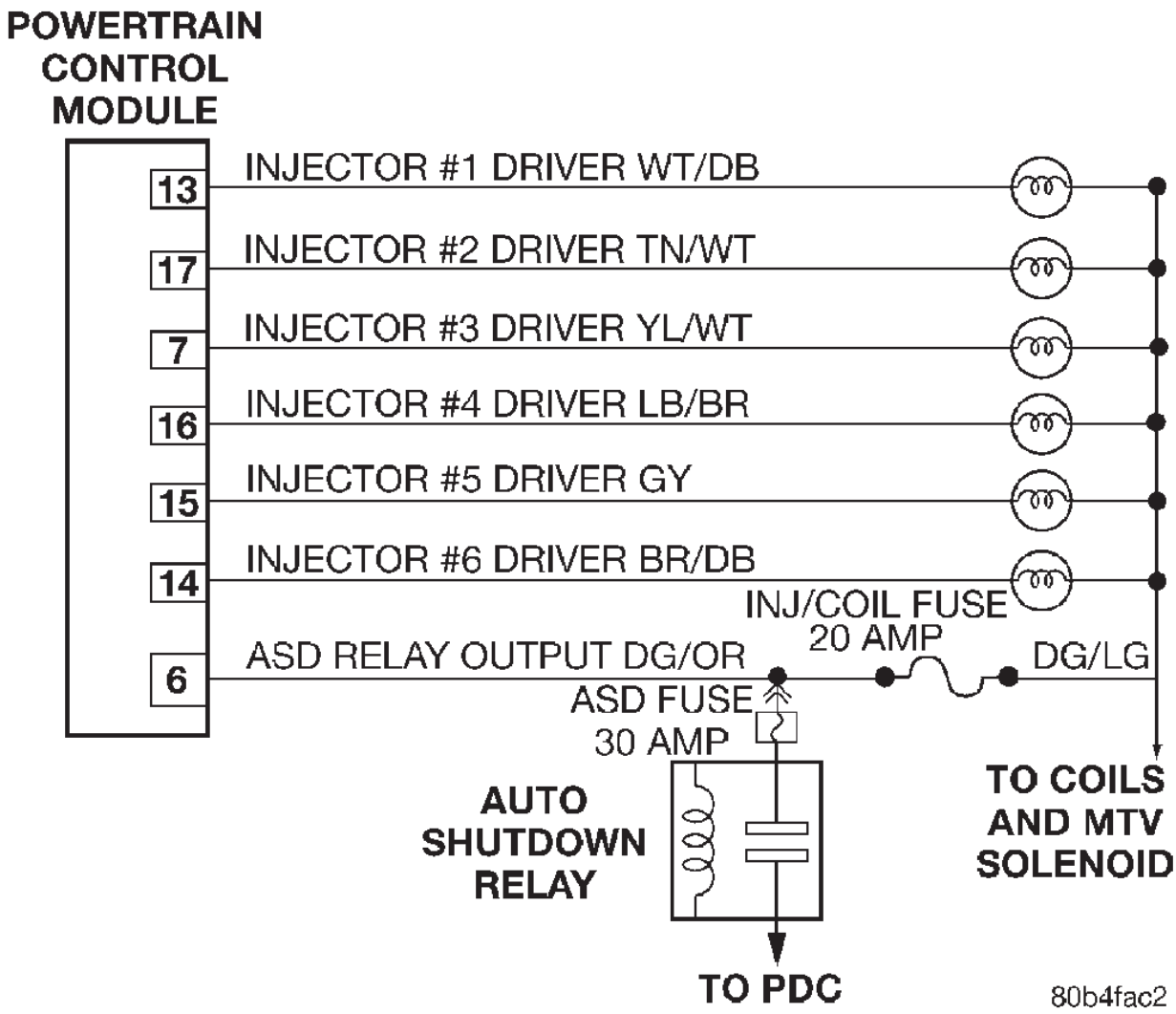


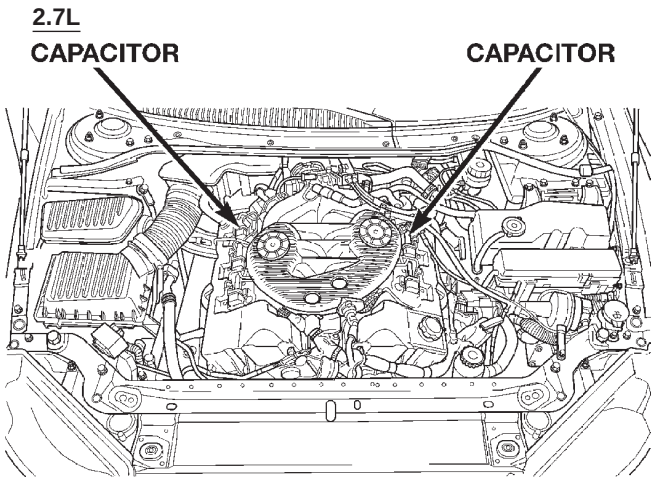
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-21C REPAIRING - INJECTOR #1 CONTROL CIRCUIT

Perform TEST TC-21B Before Proceeding

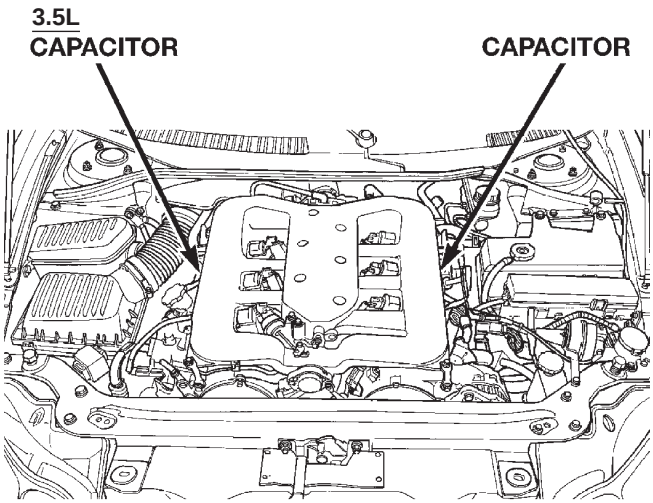




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1



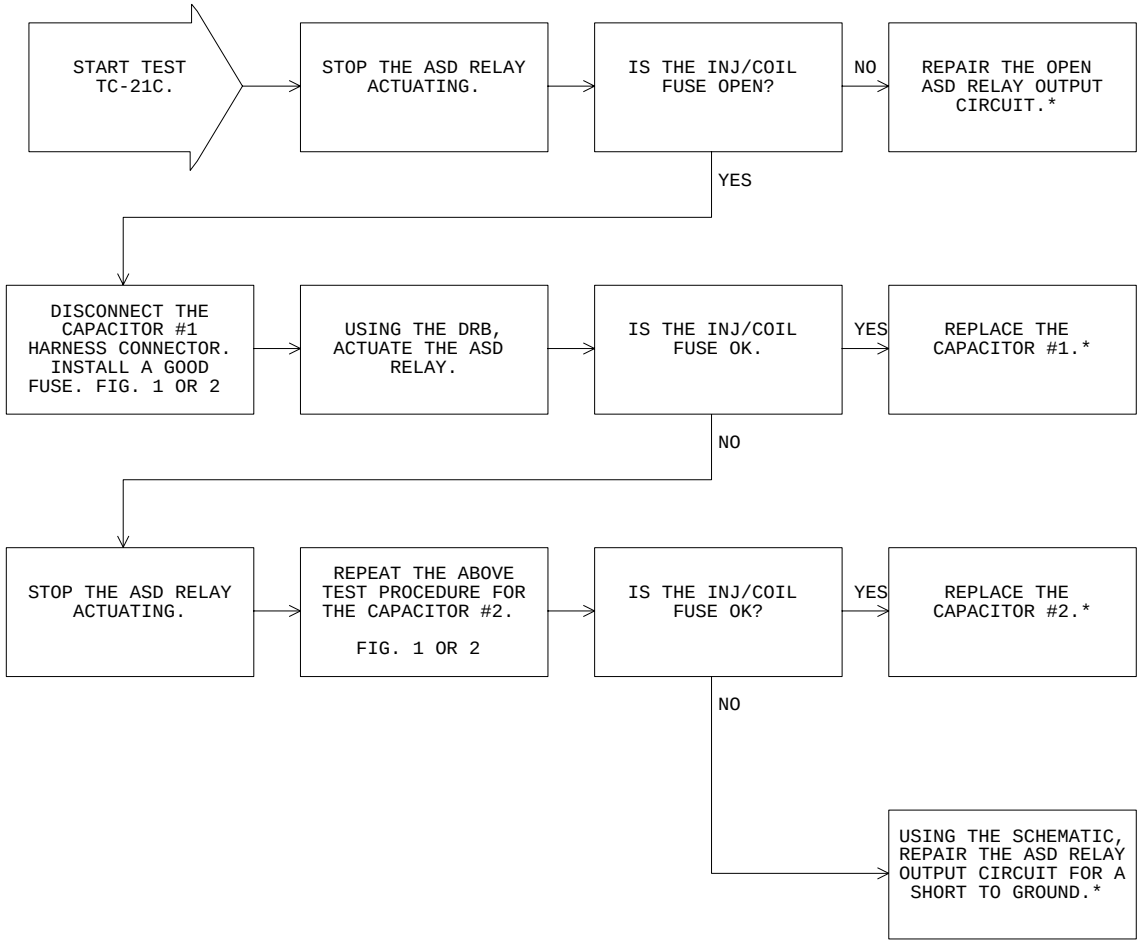
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-21C REPAIRING - INJECTOR #1 CONTROL CIRCUIT

Perform TEST TC-21B Before Proceeding



Perform Verification TEST VER-2A.	*****Check connectors - Clean / repair as necessary.***

TEST TC-25A REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

Perform TEST DTC Before Proceeding

Name of code: Idle Air Control Motor Circuits

When monitored: At key on and battery voltage greater than 11.5 volts.

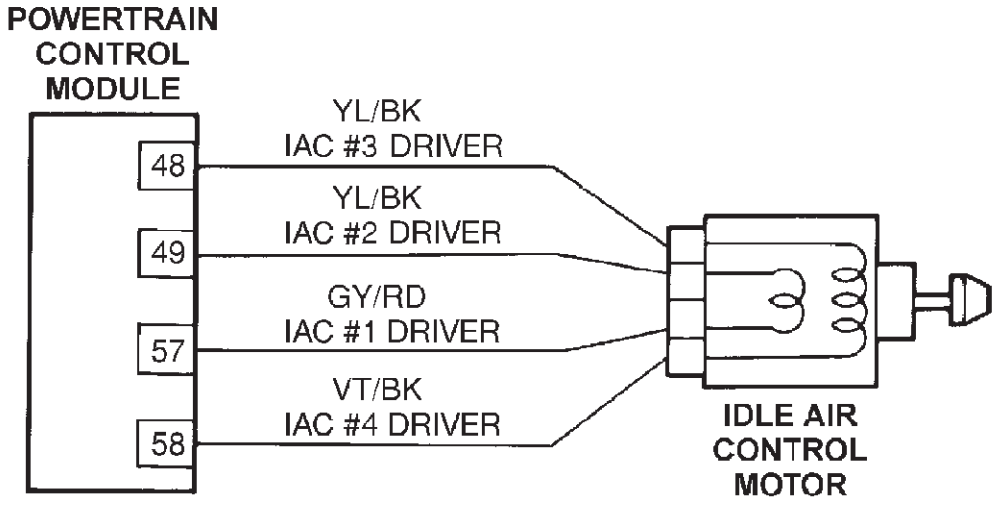
Set condition: The PCM senses a short to ground or battery voltage on any of the four IAC driver circuits for 2.75 seconds while the IAC motor is active.

Theory of operation: The idle air control motor is used by the PCM to help regulate idle speed. The motor controls the amount of air allowed to bypass the throttle blade. The PCM controls the motor using four driver circuits to position the stepper motor.

Possible causes:
- Driver circuit shorted to ground
- Driver circuit shorted to battery
- Driver circuits shorted together
- Failed PCM
- Shorted IAC motor
- Connector terminals
- Connector wires

80aa4ba1

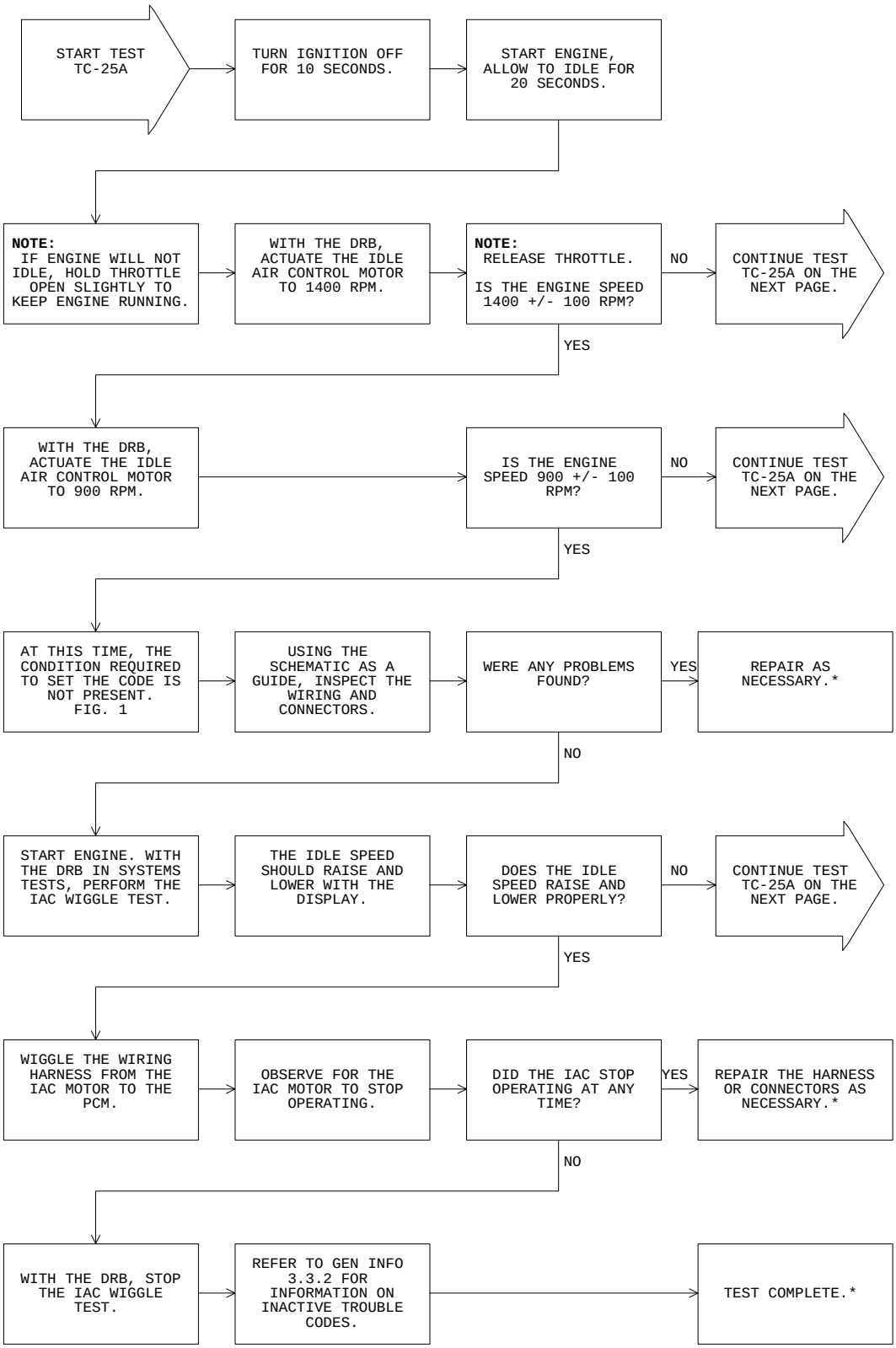
FIG. 1



80b6effe

TEST TC-25A REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

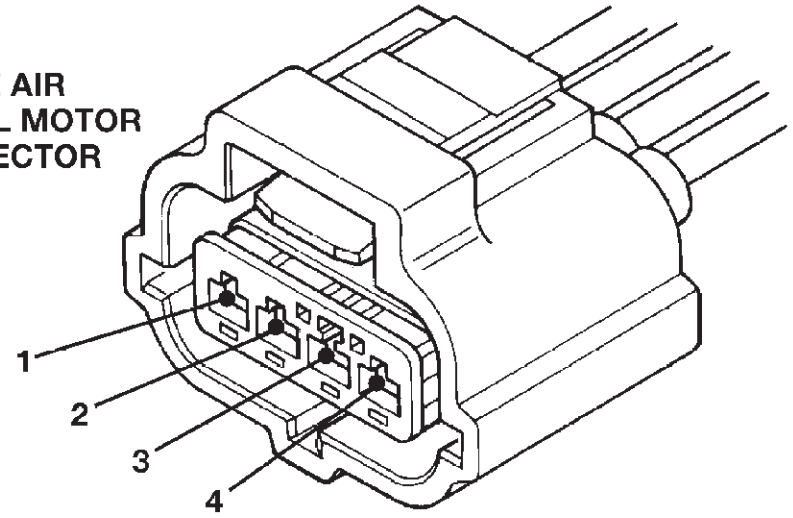
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

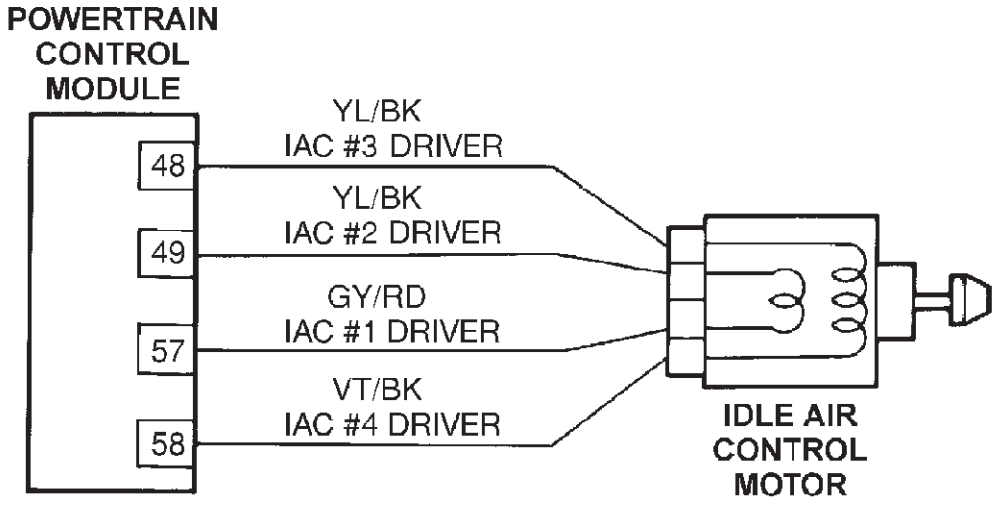
*****Check connectors - Clean / repair as necessary.***

TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



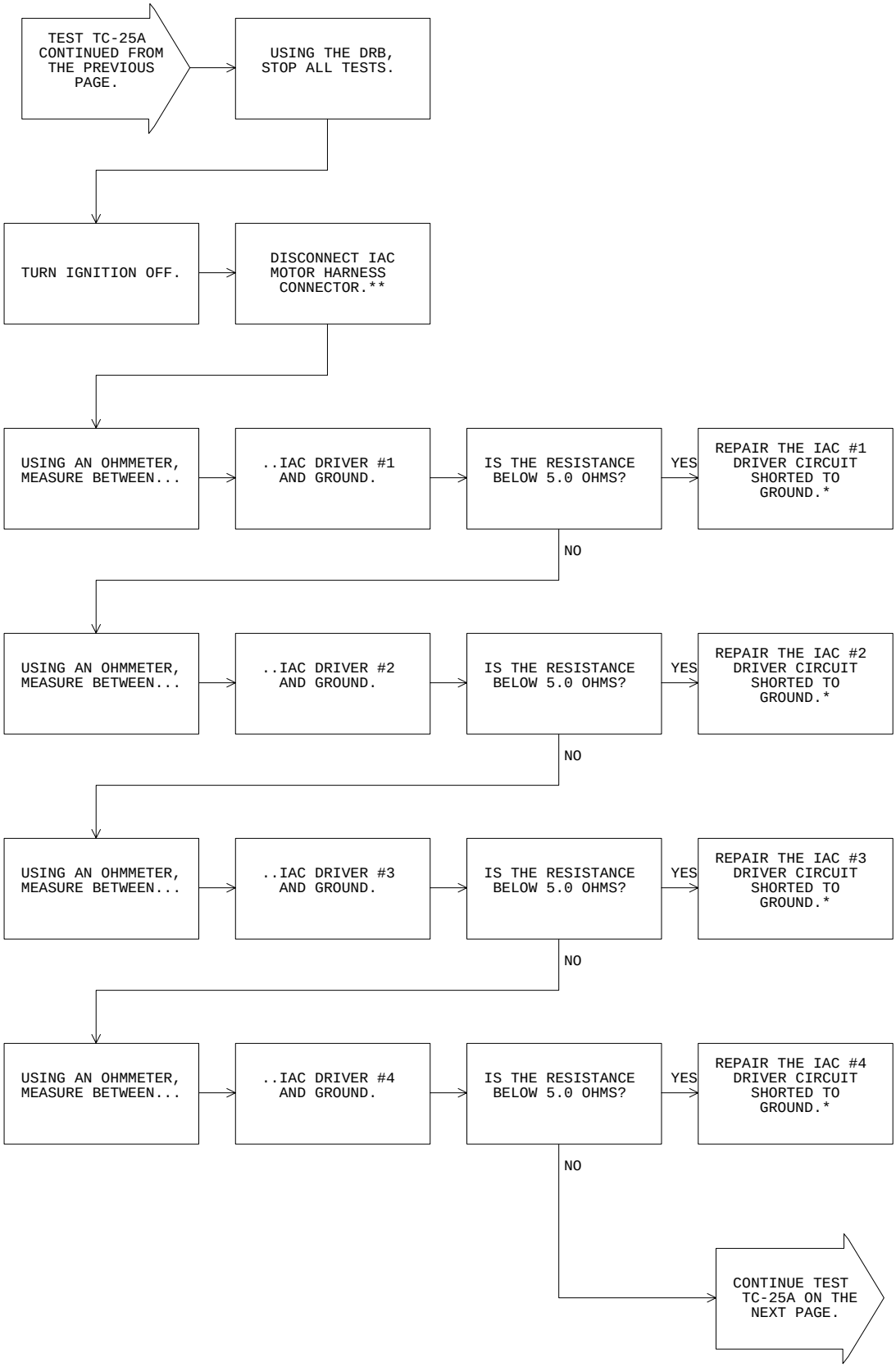
CAV	COLOR	FUNCTION
1	GY/RD	IDLE AIR CONTROL #1 DRIVER
2	YL/BK	IDLE AIR CONTROL #2 DRIVER
3	YL/BK	IDLE AIR CONTROL #3 DRIVER
4	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6efff



80b6effe

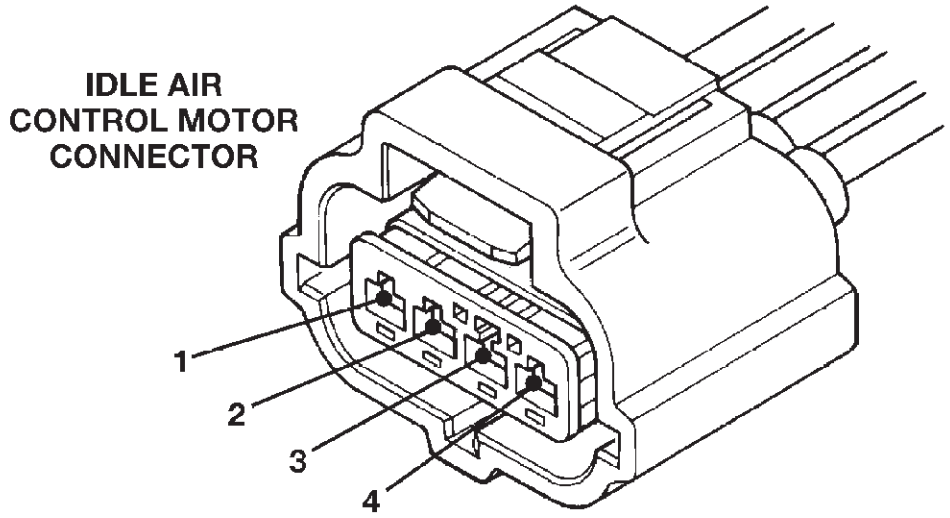
TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



***Perform Verification TEST VER-2A.**

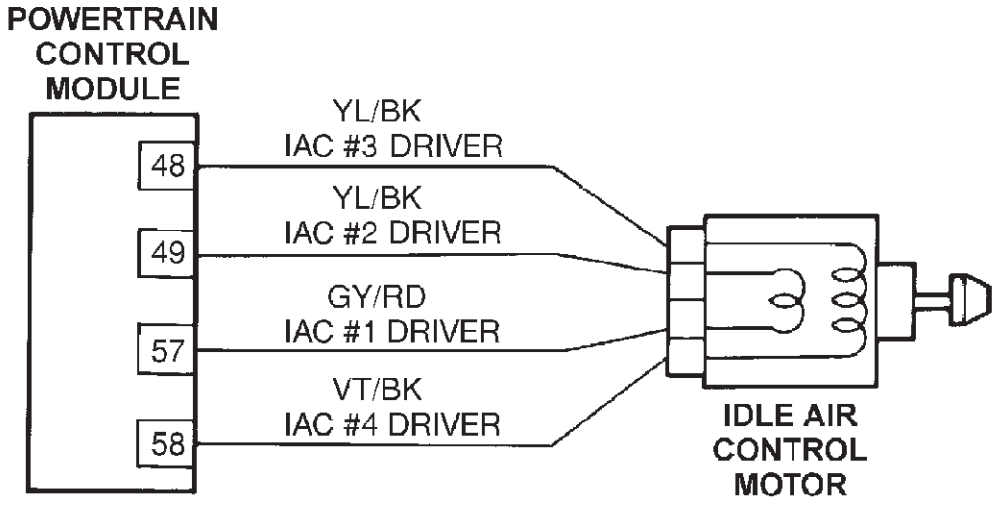
****Check connectors - Clean / repair as necessary.**

TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



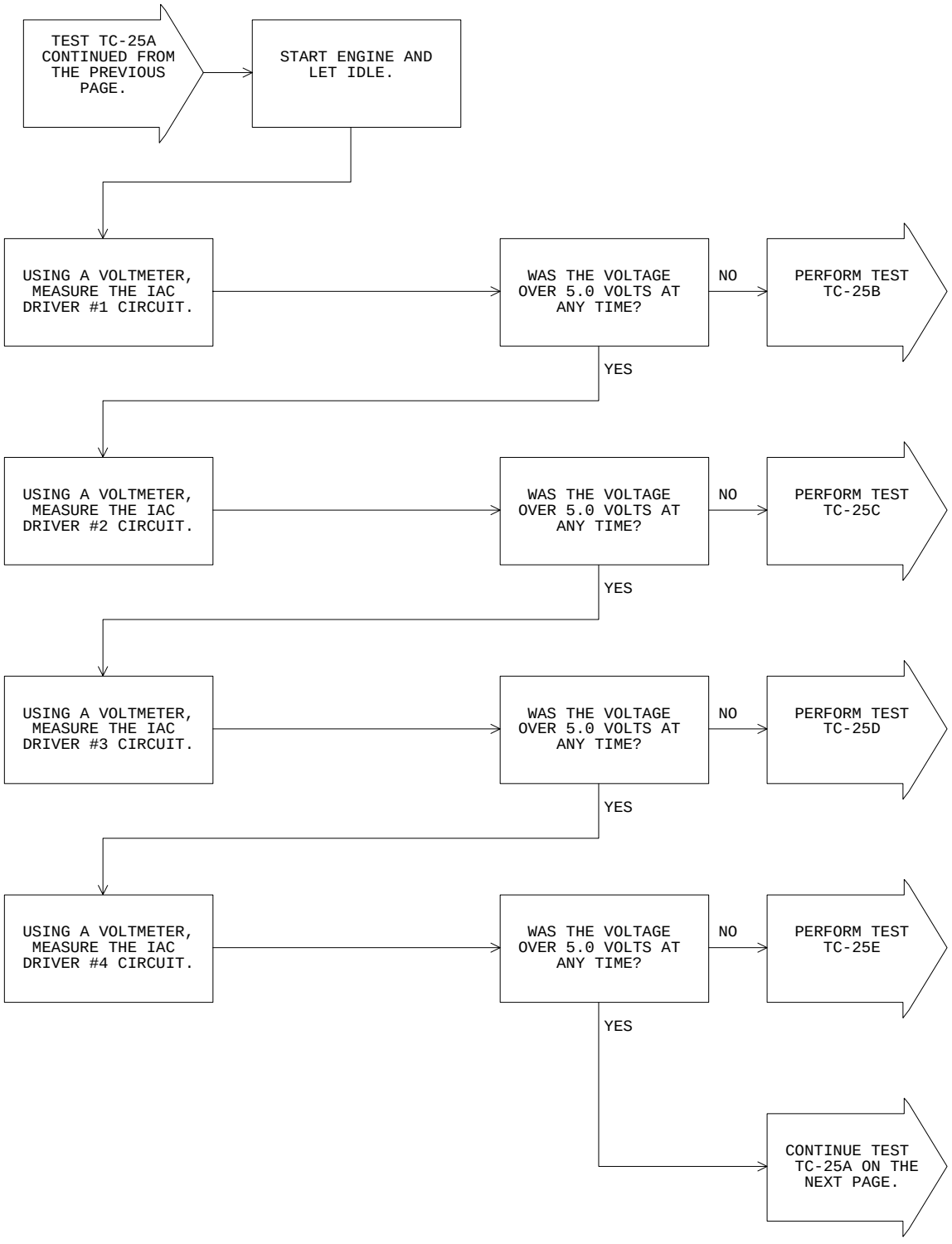
CAV	COLOR	FUNCTION
1	GY/RD	IDLE AIR CONTROL #1 DRIVER
2	YL/BK	IDLE AIR CONTROL #2 DRIVER
3	YL/BK	IDLE AIR CONTROL #3 DRIVER
4	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6efff



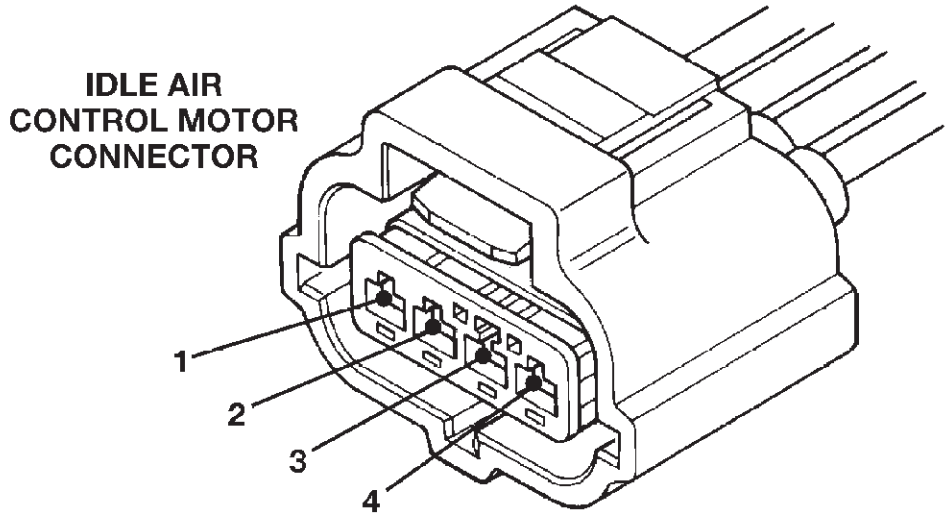
80b6effe

TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



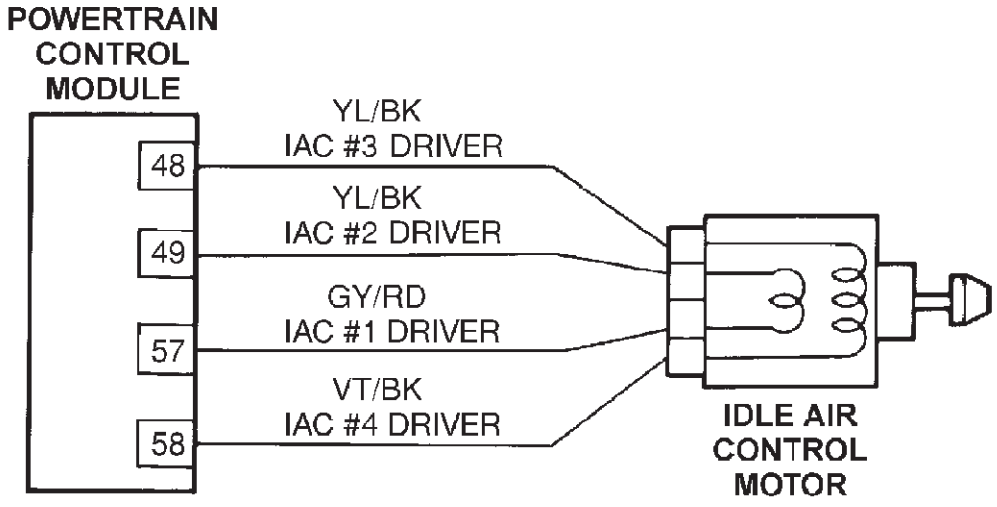
***Perform Verification TEST VER-2A.**	****Check connectors - Clean / repair as necessary.**

TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



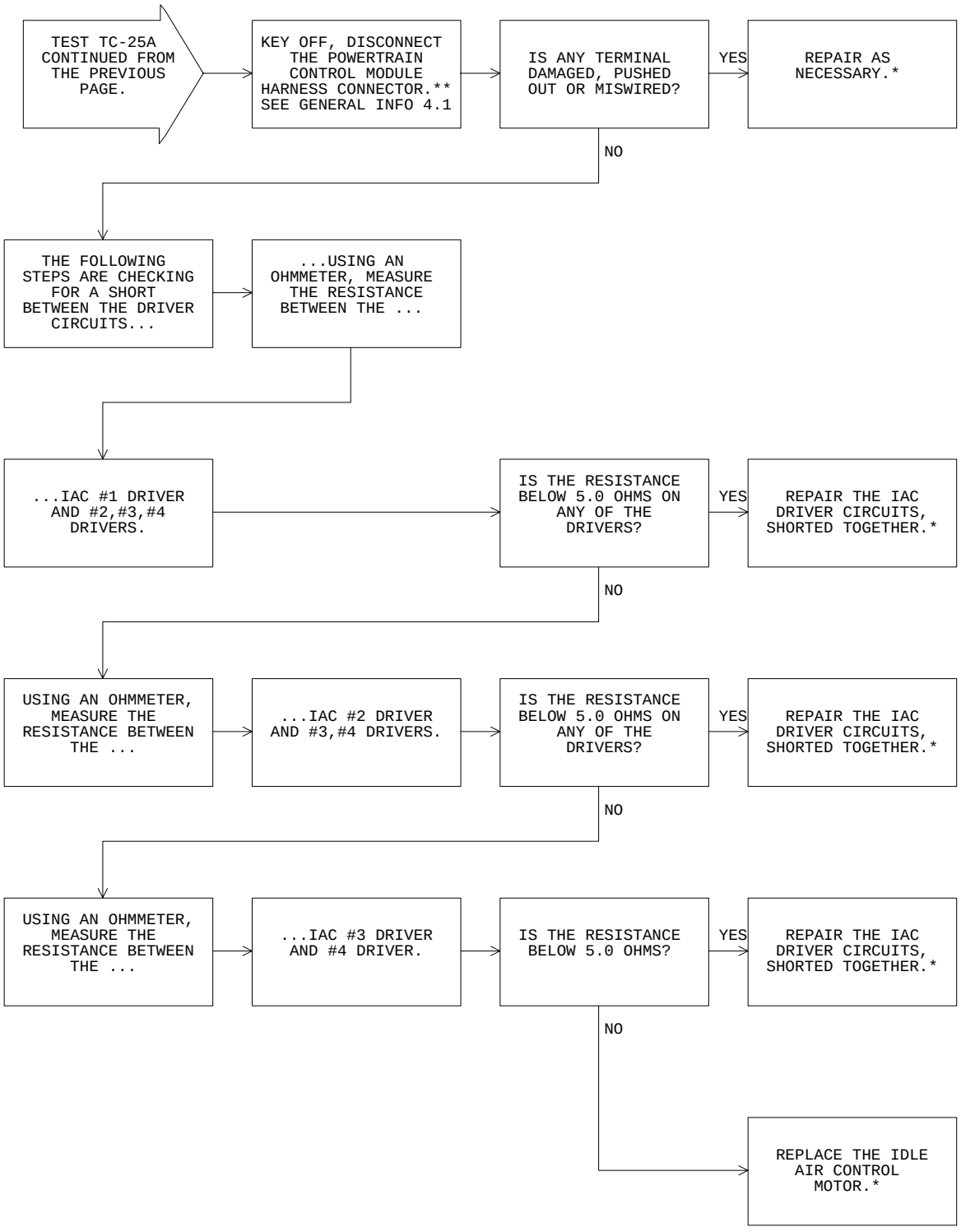
CAV	COLOR	FUNCTION
1	GY/RD	IDLE AIR CONTROL #1 DRIVER
2	YL/BK	IDLE AIR CONTROL #2 DRIVER
3	YL/BK	IDLE AIR CONTROL #3 DRIVER
4	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6efff



80b6effe

TEST TC-25A CONTINUED - REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS



Perform Verification TEST VER-2A.

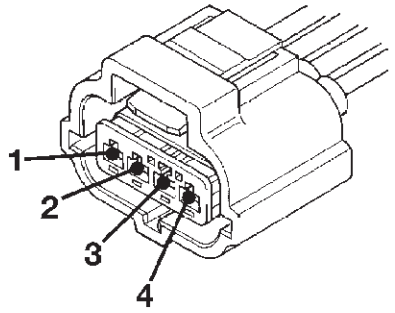
Check connectors - Clean / repair as necessary.

TEST TC-25B REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

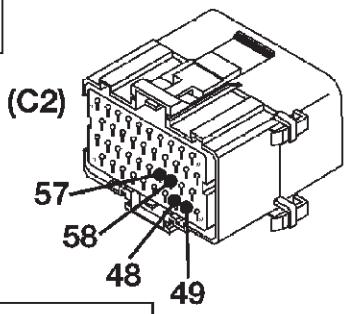
Perform TEST TC-25A Before Proceeding

IDLE AIR CONTROL MOTOR CONNECTOR

CAV	COLOR	FUNCTION
1	GY/RD	IAC MOTOR #1 DRIVER
2	YL/BK	IAC MOTOR #2 DRIVER
3	YL/BK	IAC MOTOR #3 DRIVER
4	VT/BK	IAC MOTOR #4 DRIVER



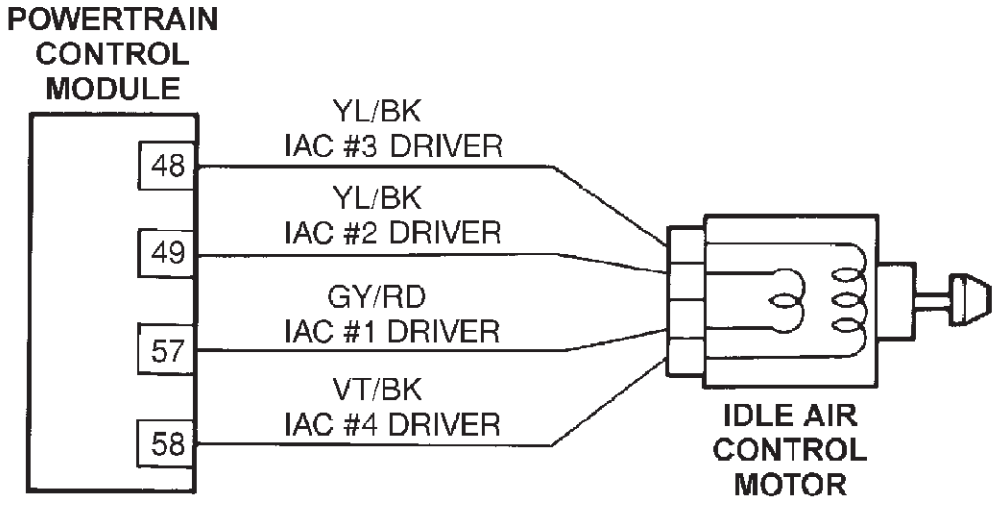
POWERTRAIN CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
48	YL/BK	IDLE AIR CONTROL #3 DRIVER
49	YL/BK	IDLE AIR CONTROL #2 DRIVER
57	GY/RD	IDLE AIR CONTROL #1 DRIVER
58	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6f000

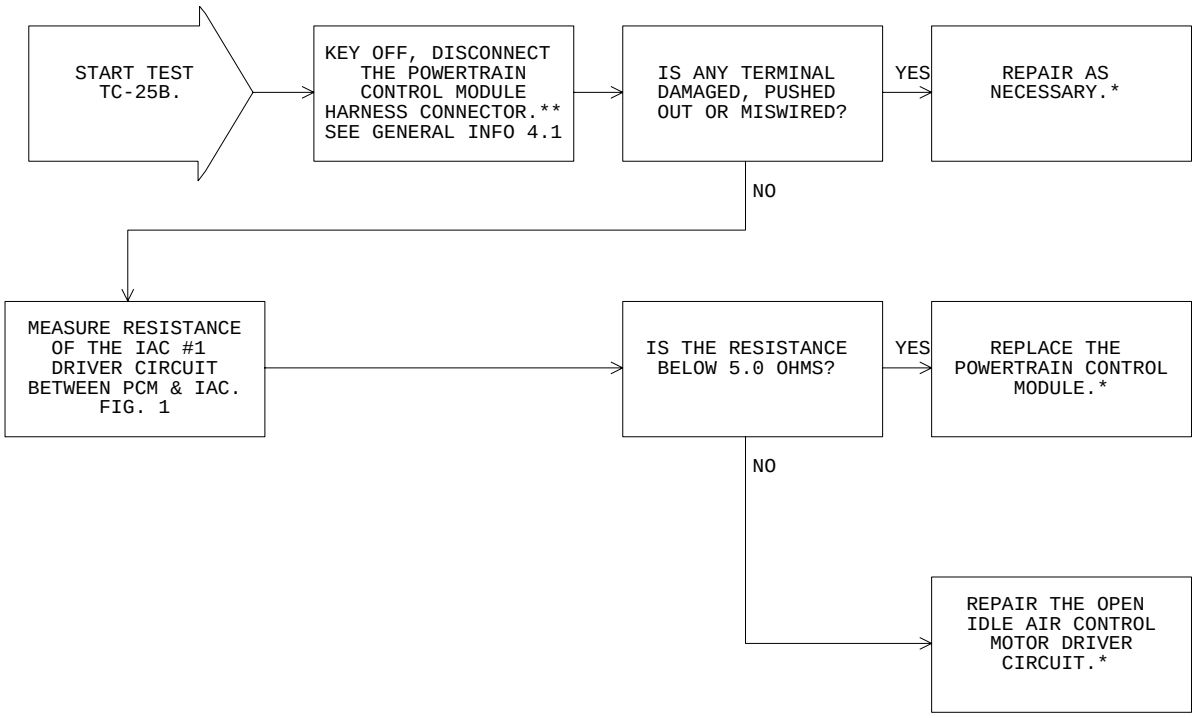
FIG. 1



80b6effe

TEST TC-25B REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

Perform TEST TC-25A Before Proceeding



***Perform Verification TEST VER-2A.**

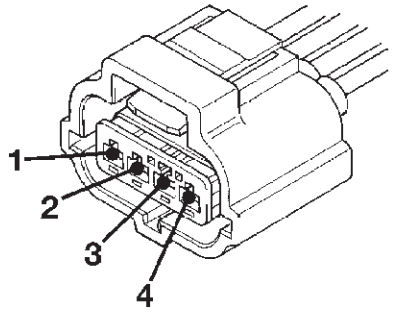
****Check connectors - Clean / repair as necessary.**

TEST TC-25C REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

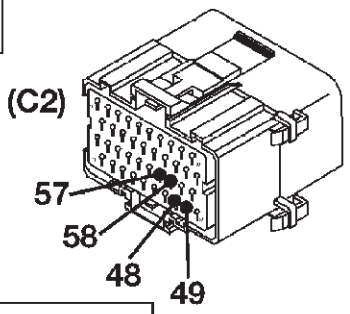
Perform TEST TC-25A Before Proceeding

IDLE AIR CONTROL MOTOR CONNECTOR

CAV	COLOR	FUNCTION
1	GY/RD	IAC MOTOR #1 DRIVER
2	YL/BK	IAC MOTOR #2 DRIVER
3	YL/BK	IAC MOTOR #3 DRIVER
4	VT/BK	IAC MOTOR #4 DRIVER



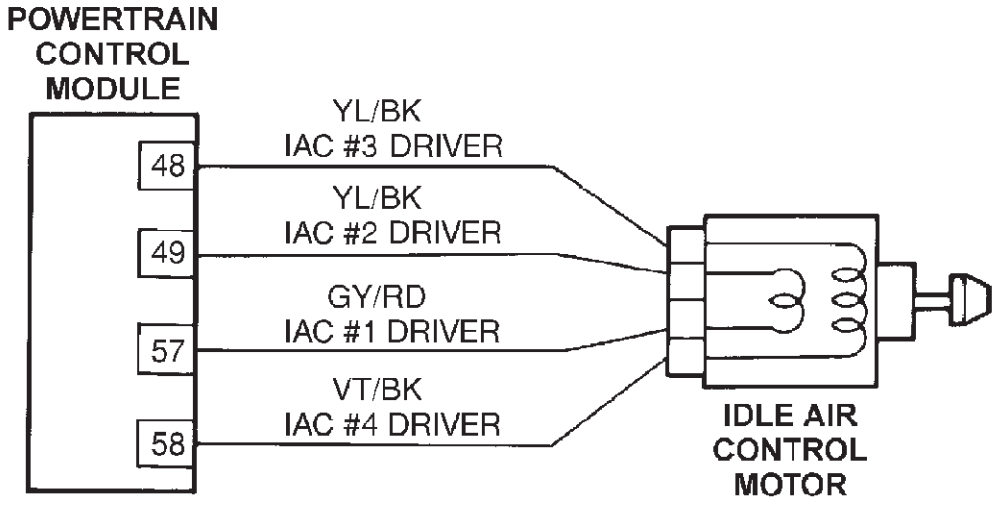
POWERTRAIN CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
48	YL/BK	IDLE AIR CONTROL #3 DRIVER
49	YL/BK	IDLE AIR CONTROL #2 DRIVER
57	GY/RD	IDLE AIR CONTROL #1 DRIVER
58	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6f000

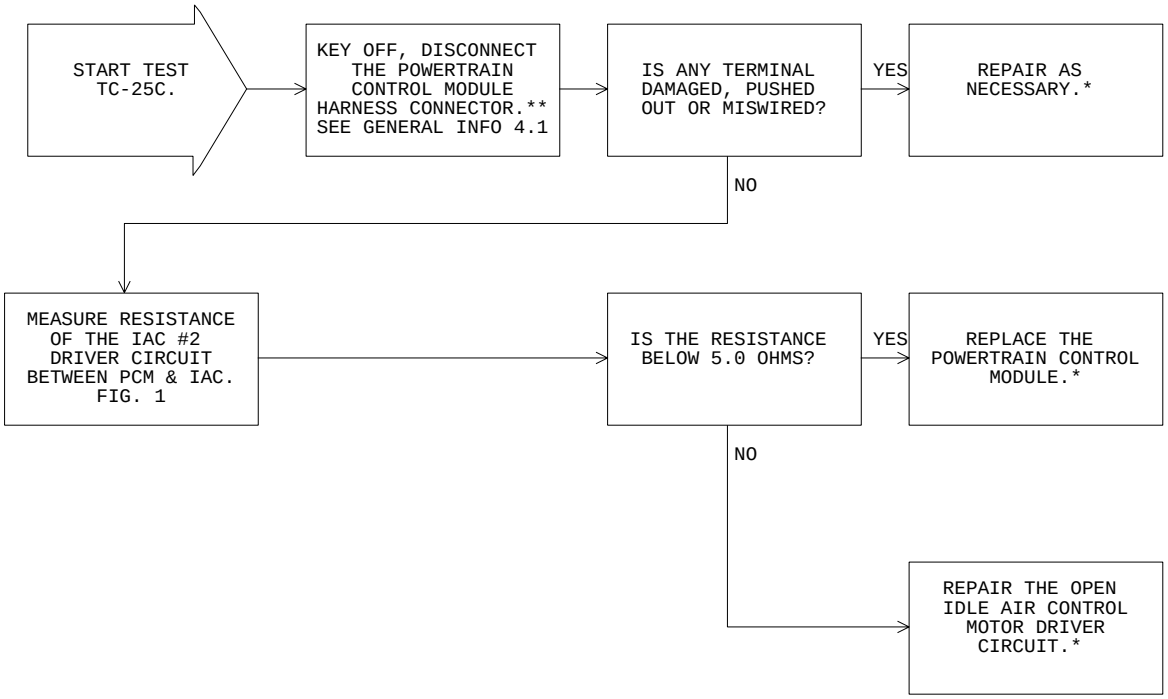
FIG. 1



80b6effe

TEST TC-25C REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

Perform TEST TC-25A Before Proceeding



Perform Verification TEST VER-2A.

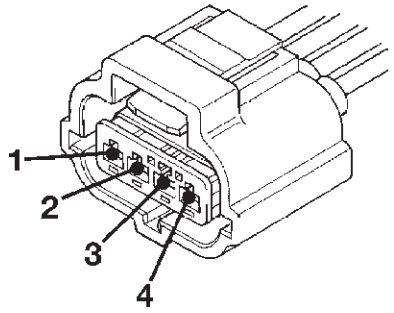
***Check connectors - Clean / repair as necessary.**

TEST TC-25D REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

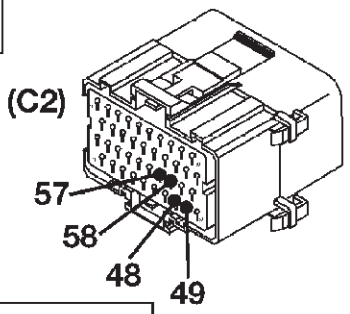
Perform TEST TC-25A Before Proceeding

IDLE AIR CONTROL MOTOR CONNECTOR

CAV	COLOR	FUNCTION
1	GY/RD	IAC MOTOR #1 DRIVER
2	YL/BK	IAC MOTOR #2 DRIVER
3	YL/BK	IAC MOTOR #3 DRIVER
4	VT/BK	IAC MOTOR #4 DRIVER



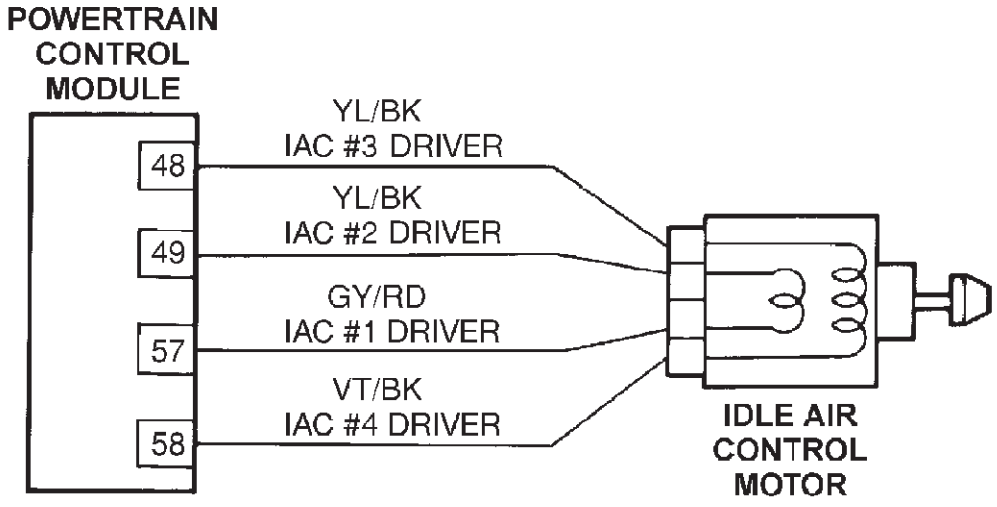
POWERTRAIN CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
48	YL/BK	IDLE AIR CONTROL #3 DRIVER
49	YL/BK	IDLE AIR CONTROL #2 DRIVER
57	GY/RD	IDLE AIR CONTROL #1 DRIVER
58	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6f000

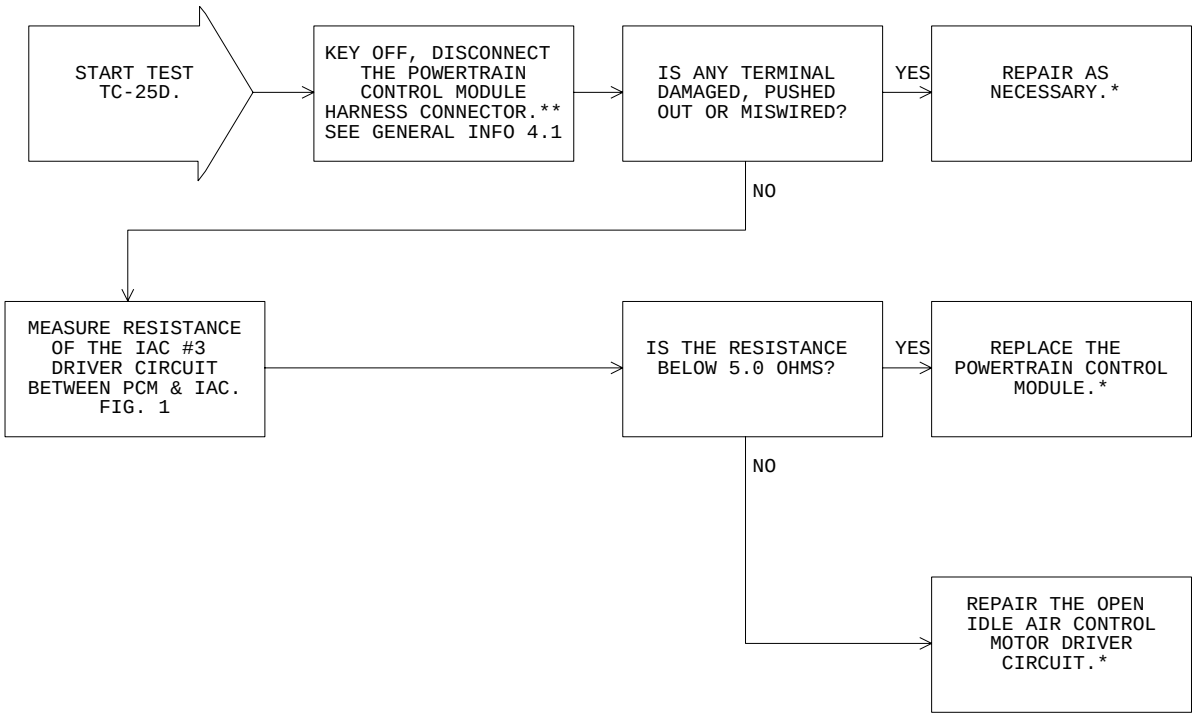
FIG. 1



80b6effe

TEST TC-25D REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

Perform TEST TC-25A Before Proceeding



***Perform Verification TEST VER-2A.**

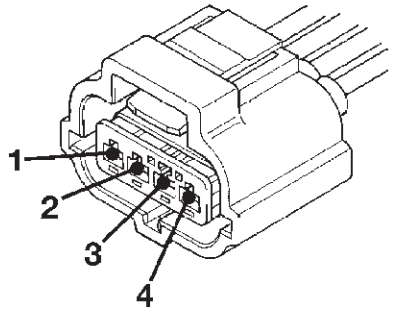
****Check connectors - Clean / repair as necessary.**

TEST TC-25E REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

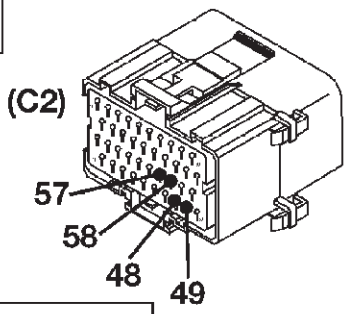
Perform TEST TC-25A Before Proceeding

IDLE AIR CONTROL MOTOR CONNECTOR

CAV	COLOR	FUNCTION
1	GY/RD	IAC MOTOR #1 DRIVER
2	YL/BK	IAC MOTOR #2 DRIVER
3	YL/BK	IAC MOTOR #3 DRIVER
4	VT/BK	IAC MOTOR #4 DRIVER



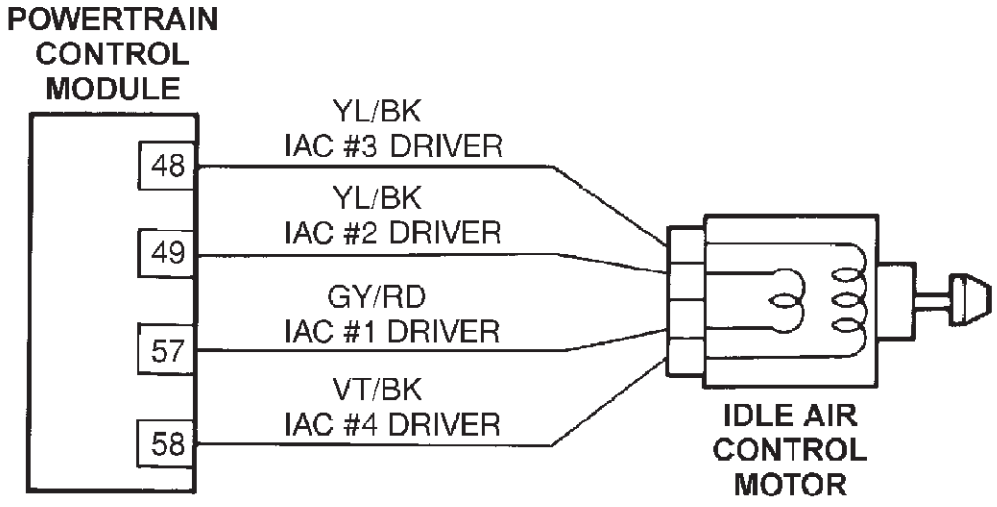
POWERTRAIN CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
48	YL/BK	IDLE AIR CONTROL #3 DRIVER
49	YL/BK	IDLE AIR CONTROL #2 DRIVER
57	GY/RD	IDLE AIR CONTROL #1 DRIVER
58	VT/BK	IDLE AIR CONTROL #4 DRIVER

80b6f000

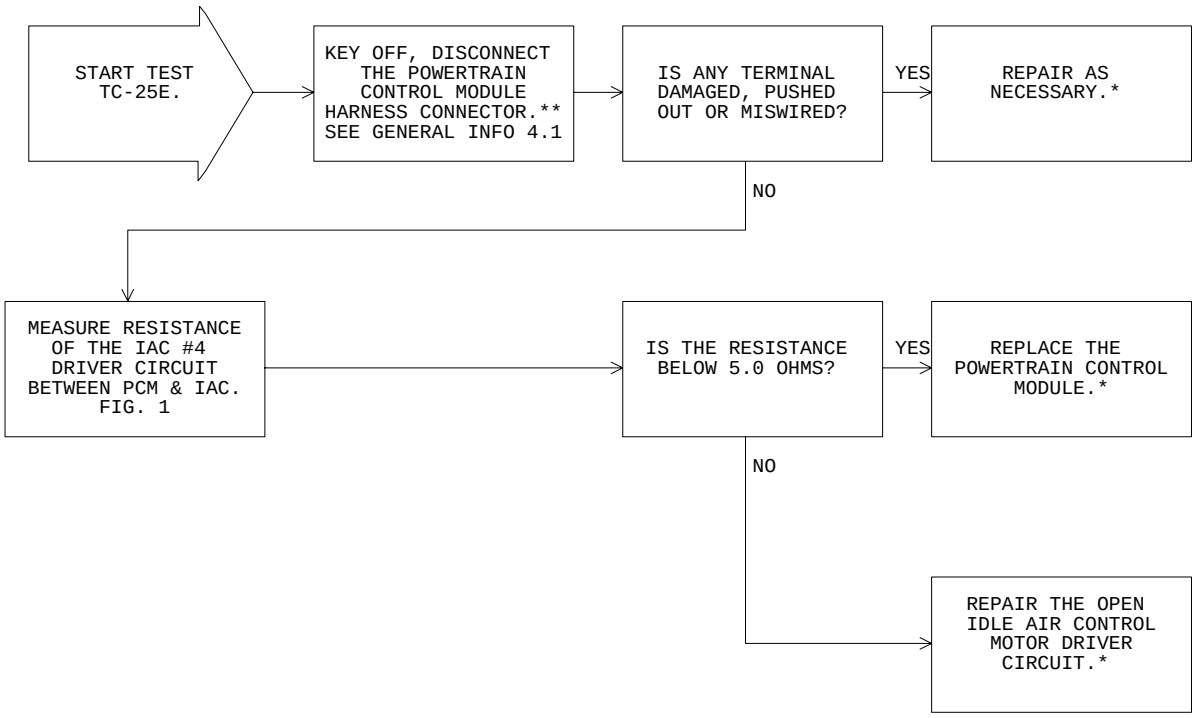
FIG. 1



80b6effe

TEST TC-25E REPAIRING - IDLE AIR CONTROL MOTOR CIRCUITS

Perform TEST TC-25A Before Proceeding

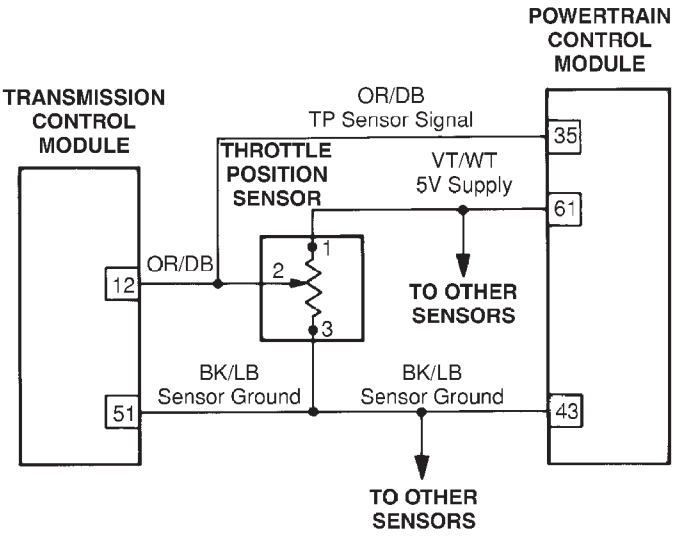


Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-26A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE LOW

Perform TEST DTC Before Proceeding



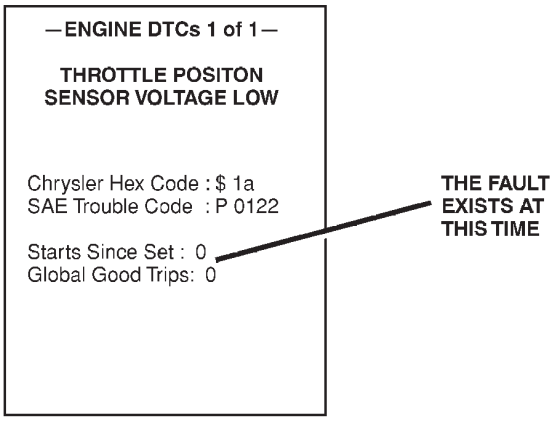


FIG. 1

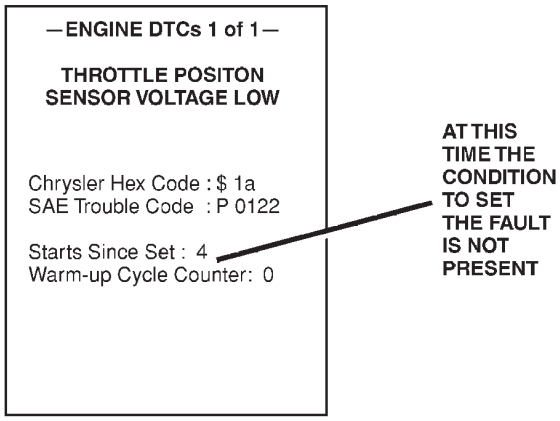


FIG. 2

Name of code: Throttle Position Sensor Voltage Low

When monitored: With the ignition on.

Set condition: The TP sensor voltage at PCM cavity 35 goes below 0.2 volt for 0.7 seconds.

Theory of operation: The throttle position sensor contains a potentiometer that is operated by the throttle blade shaft. As the throttle plate rotates, the TP sensor provides a variable 0 to 5-volt signal to PCM cavity 35. The voltage is directly proportional to throttle angle. When the throttle is fully open, the voltage is high. With this signal, the PCM can determine precise throttle position under all operating conditions. The TP sensor receives a 5-volt supply from PCM cavity 61. The sensor ground is provided by PCM cavity 43.

Possible causes:

> Sensor signal circuit shorted to ground
> Throttle position sensor failure
> Loss of 5-volt supply
> PCM failure
> Connector terminals
> Connector wires

80b27ca2

FIG. 3

TYPICAL

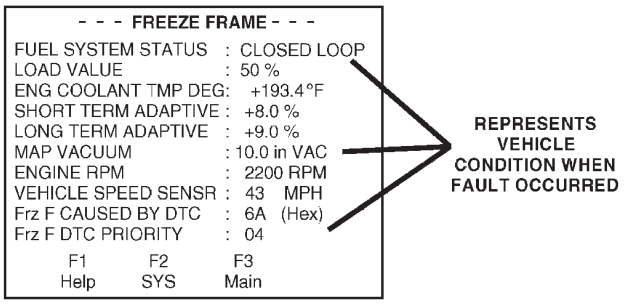
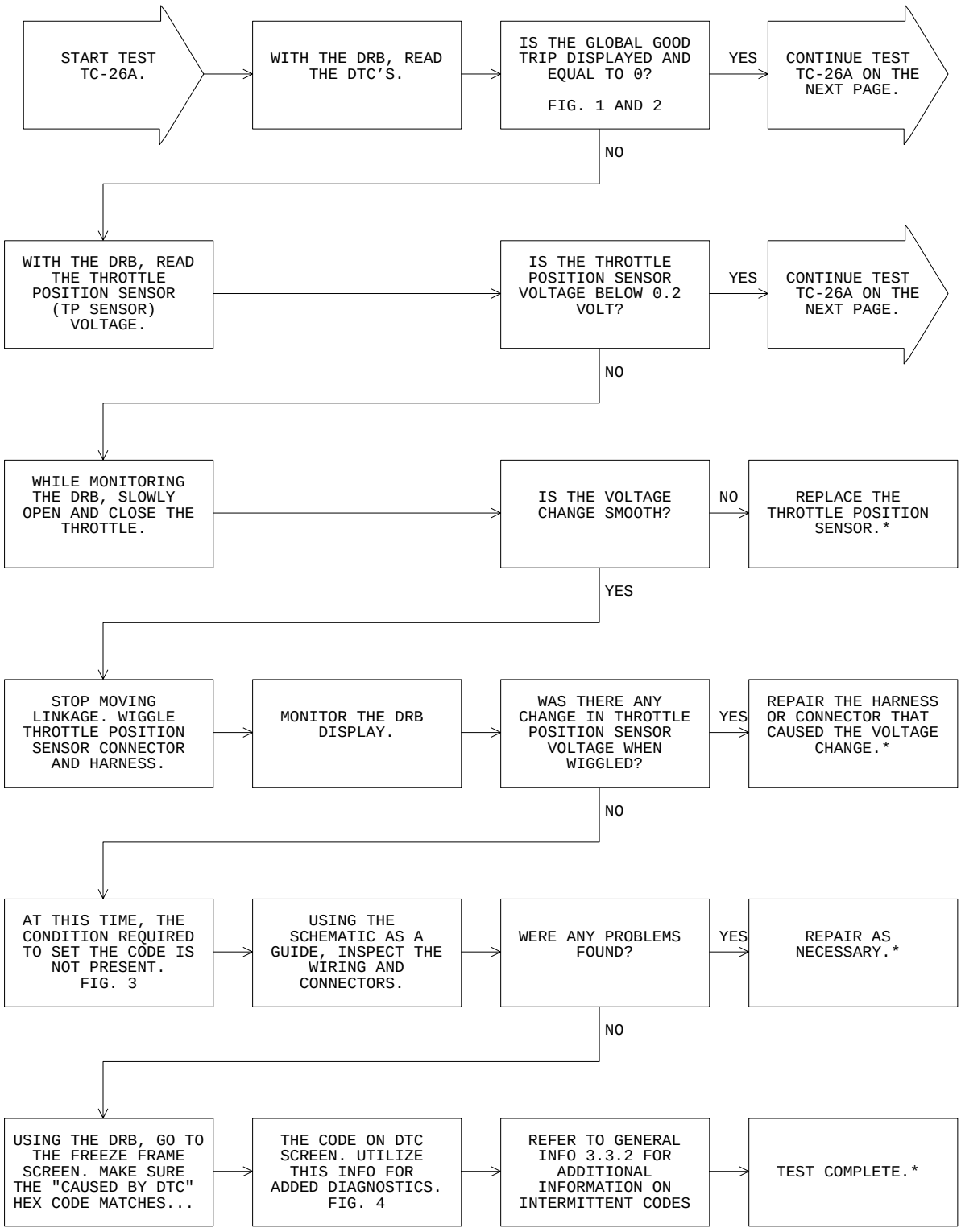


FIG. 4

TEST TC-26A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE LOW

Perform TEST DTC Before Proceeding

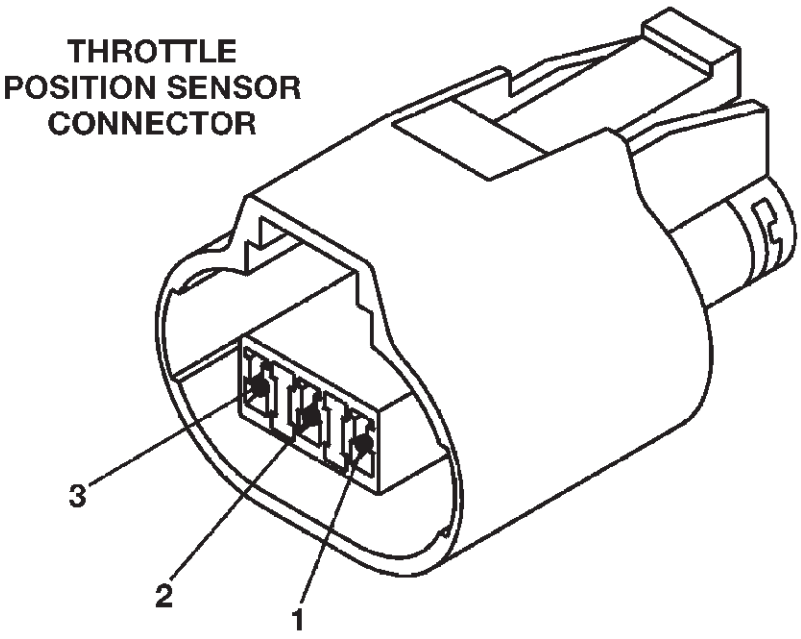


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-26A CONTINUED - REPAIRING - THROTTLE POSITION SENSOR VOLTAGE LOW

2.7L

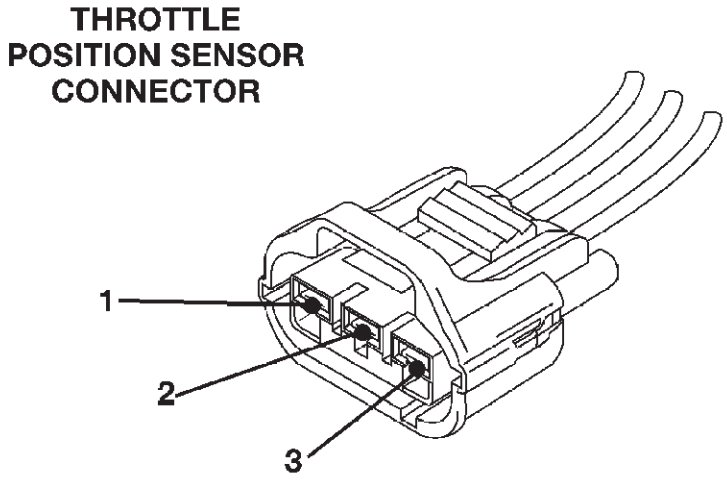


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b27c72

FIG. 1

3.5L

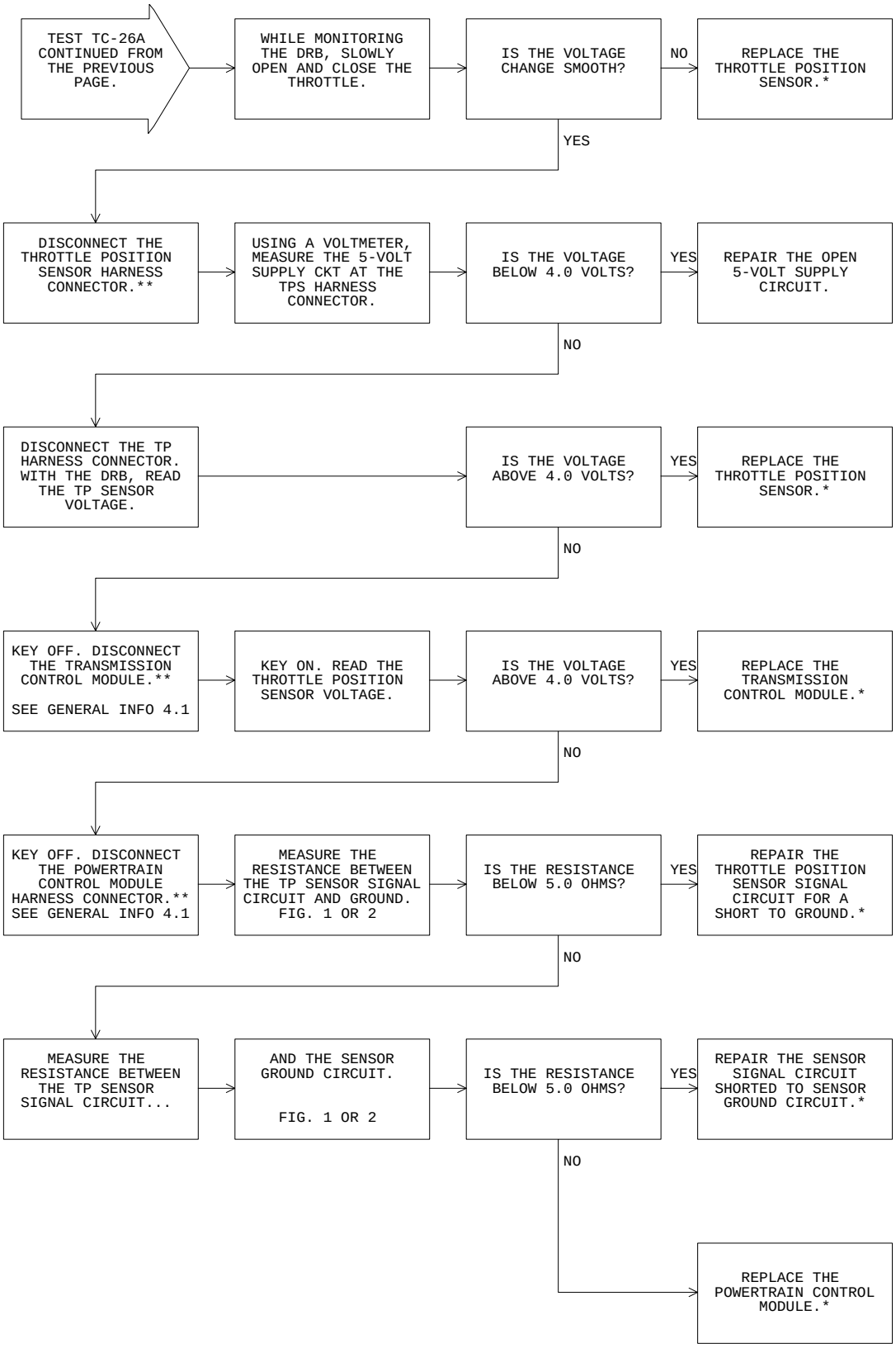


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b04fa9

FIG. 2

TEST TC-26A CONTINUED - REPAIRING - THROTTLE POSITION SENSOR VOLTAGE LOW

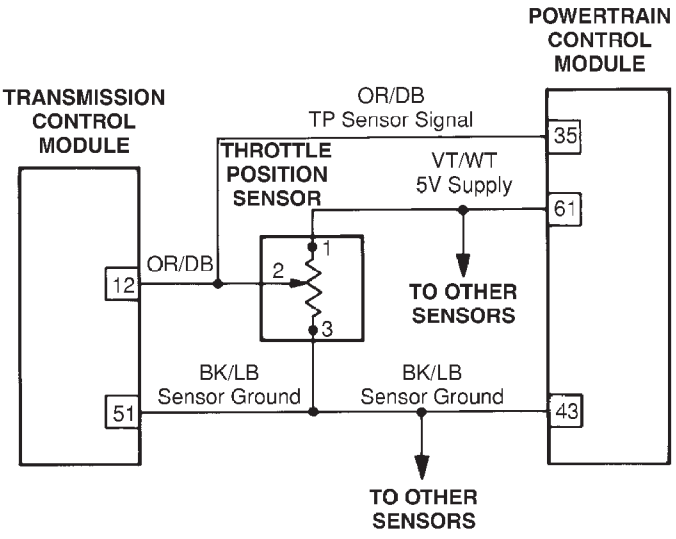


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-27A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE HIGH

Perform TEST DTC Before Proceeding



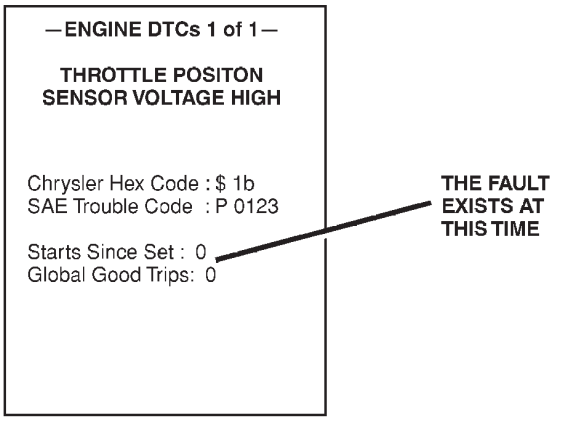


FIG. 1

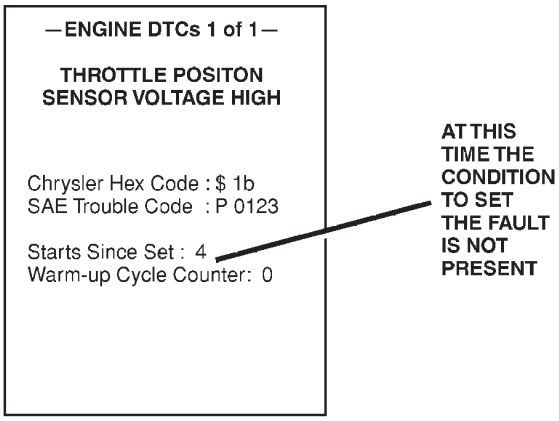


FIG. 2

Name of code: Throttle Position Sensor Voltage High
When monitored: With the ignition on.

Set condition: The TP sensor voltage at PCM cavity 35 goes above 4.5 volts for 0.7 seconds.

Theory of operation: The throttle position sensor contains a potentiometer that is operated by the throttle blade shaft. As the throttle plate rotates, the TP sensor provides a variable 0 to 5-volt signal to PCM cavity 35. The voltage is directly proportional to throttle angle. When the throttle plate is at rest, the voltage is low. When the throttle is fully open, the voltage is high. With this signal, the PCM can determine precise throttle position under all operating conditions. The TP sensor receives a 5-volt supply from PCM cavity 61. The sensor ground is provided by PCM cavity 43.

Possible causes:
> Sensor signal circuit open
> Throttle position sensor failure
> Sensor ground circuit open
> PCM failure
> Connector terminals
> Connector wires

80b27ca3

FIG. 3

TYPICAL

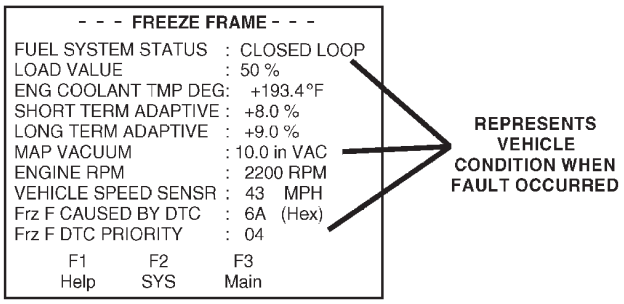
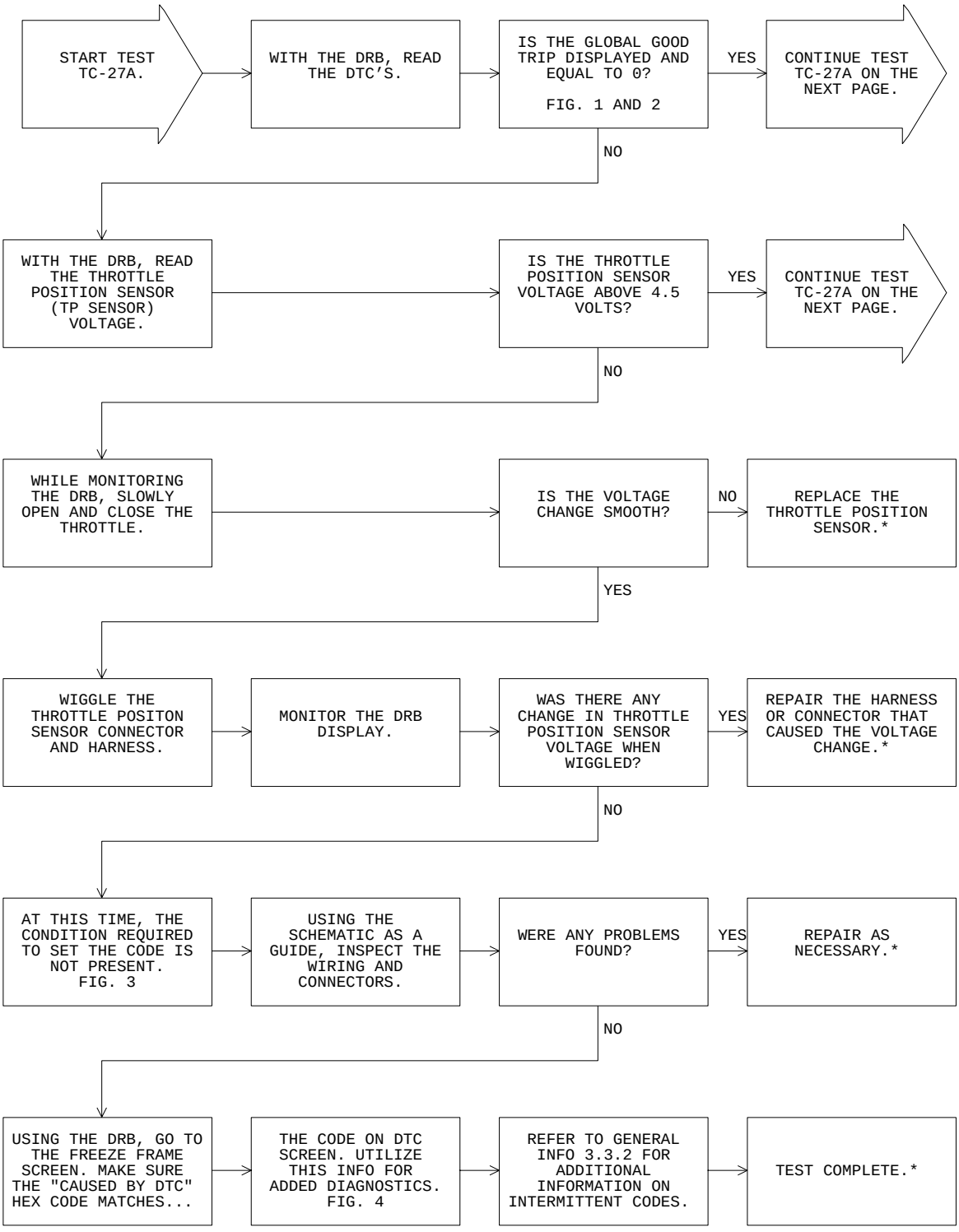


FIG. 4

TEST TC-27A REPAIRING - THROTTLE POSITION SENSOR VOLTAGE HIGH

Perform TEST DTC Before Proceeding

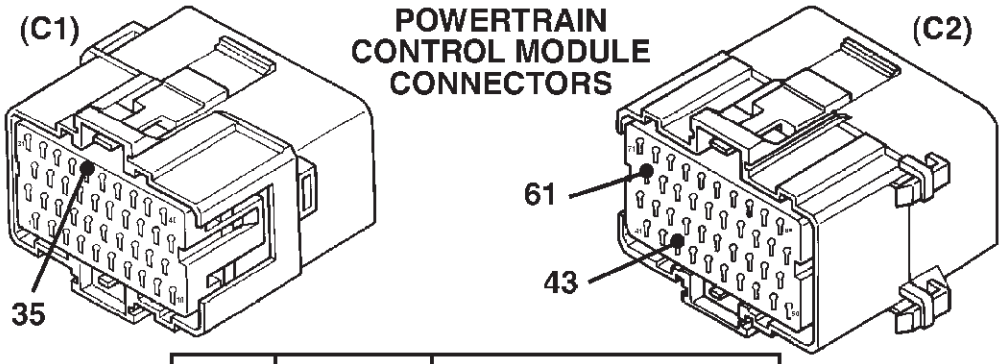


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

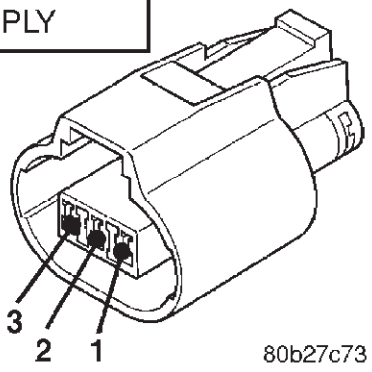
TEST TC-27A CONTINUED - REPAIRING THROTTLE POSITION SENSOR VOLTAGE HIGH

2.7L



CAV	COLOR	FUNCTION
35	OR/DB	TP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

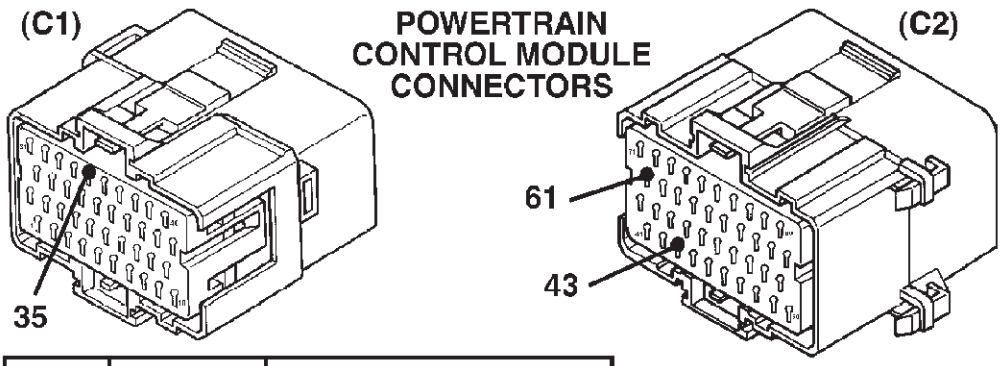
THROTTLE POSITION SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

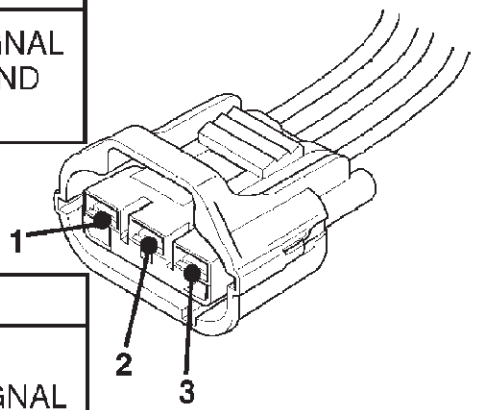
FIG. 1

3.5L



CAV	COLOR	FUNCTION
35	OR/DB	TP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

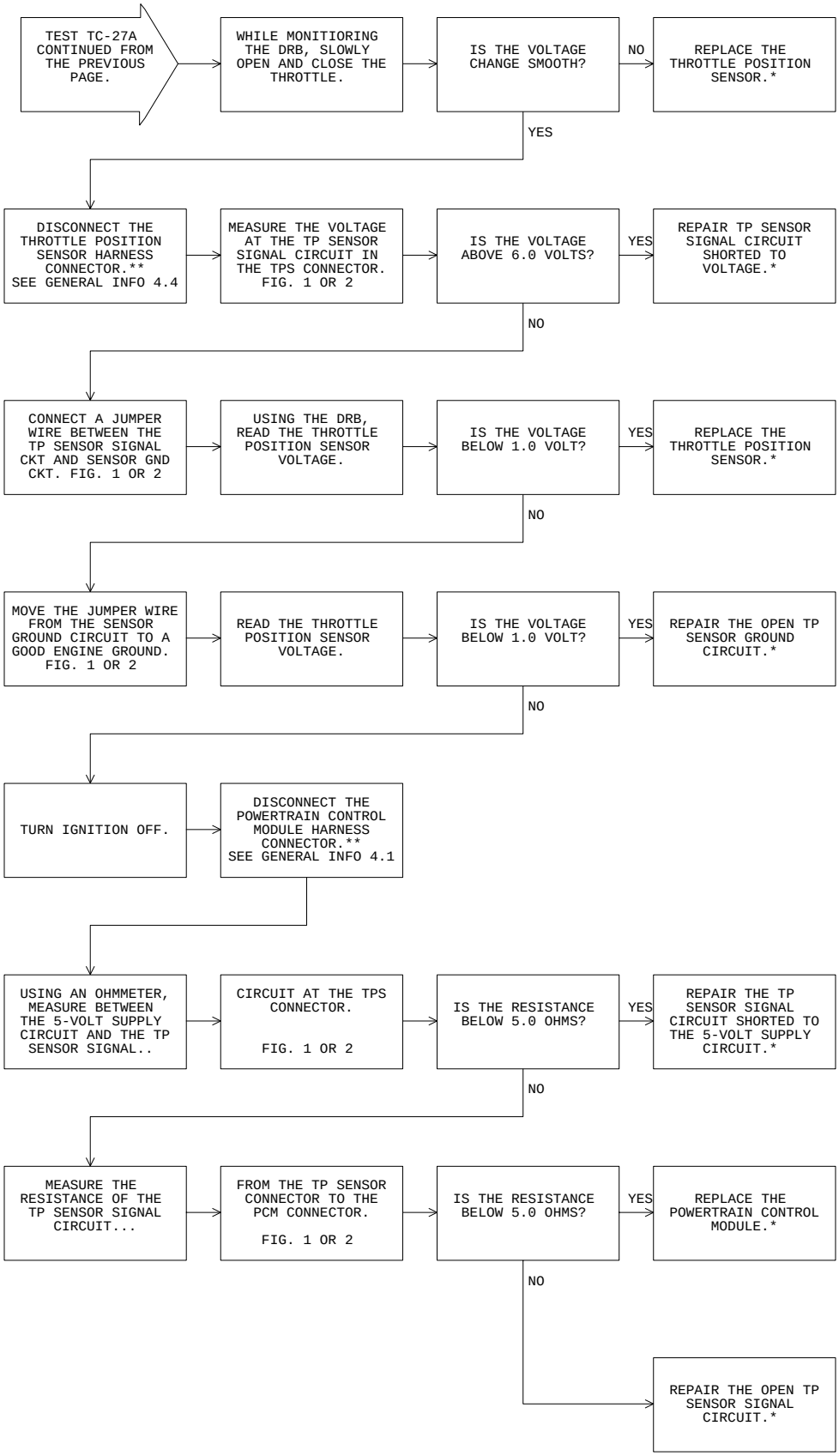
THROTTLE POSITION SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

FIG. 2

TEST TC-27A CONTINUED - REPAIRING - THROTTLE POSITION SENSOR VOLTAGE HIGH

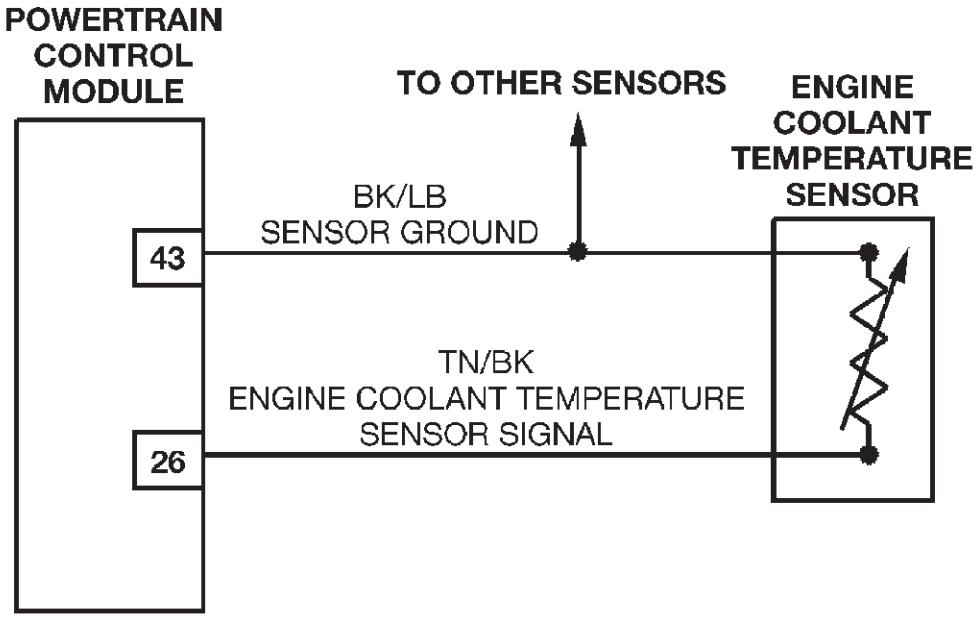


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-30A REPAIRING - ECT SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding



Name of code: ECT Sensor Voltage Too Low

When monitored: With the ignition on.

Set condition: The engine coolant temperature sensor circuit voltage at PCM cavity 26 goes below .5 volt for more than 3 seconds.

Theory of operation: The engine coolant temperature sensor is a negative temperature coefficient (NTC) thermistor-type sensor (resistance varies inversely with temperature). This means at cold temperatures its resistance is high so the voltage signal will be high. As coolant temperature increases, resistance decreases and the voltage will be low. This allows the sensor to provide an analog voltage signal (0 to 5-volt) to PCM cavity 26.

To make the sensor more accurate at cold and hot temperatures, the 5-volt signal passes through a 10,000 ohm resistor or through a 1,000 ohm resistor connected in parallel with the 10,000 ohm resistor, which has a calculated resistance value of 909 ohms. If the engine is cold (below 125°F), the 5-volt supply to the engine coolant temperature sensor is fed only through the 10,000 ohm resistor inside the PCM. If the engine is warm (above 125°F), the 5-volt supply to the engine coolant temperature sensor is fed through both resistors.

Possible causes:

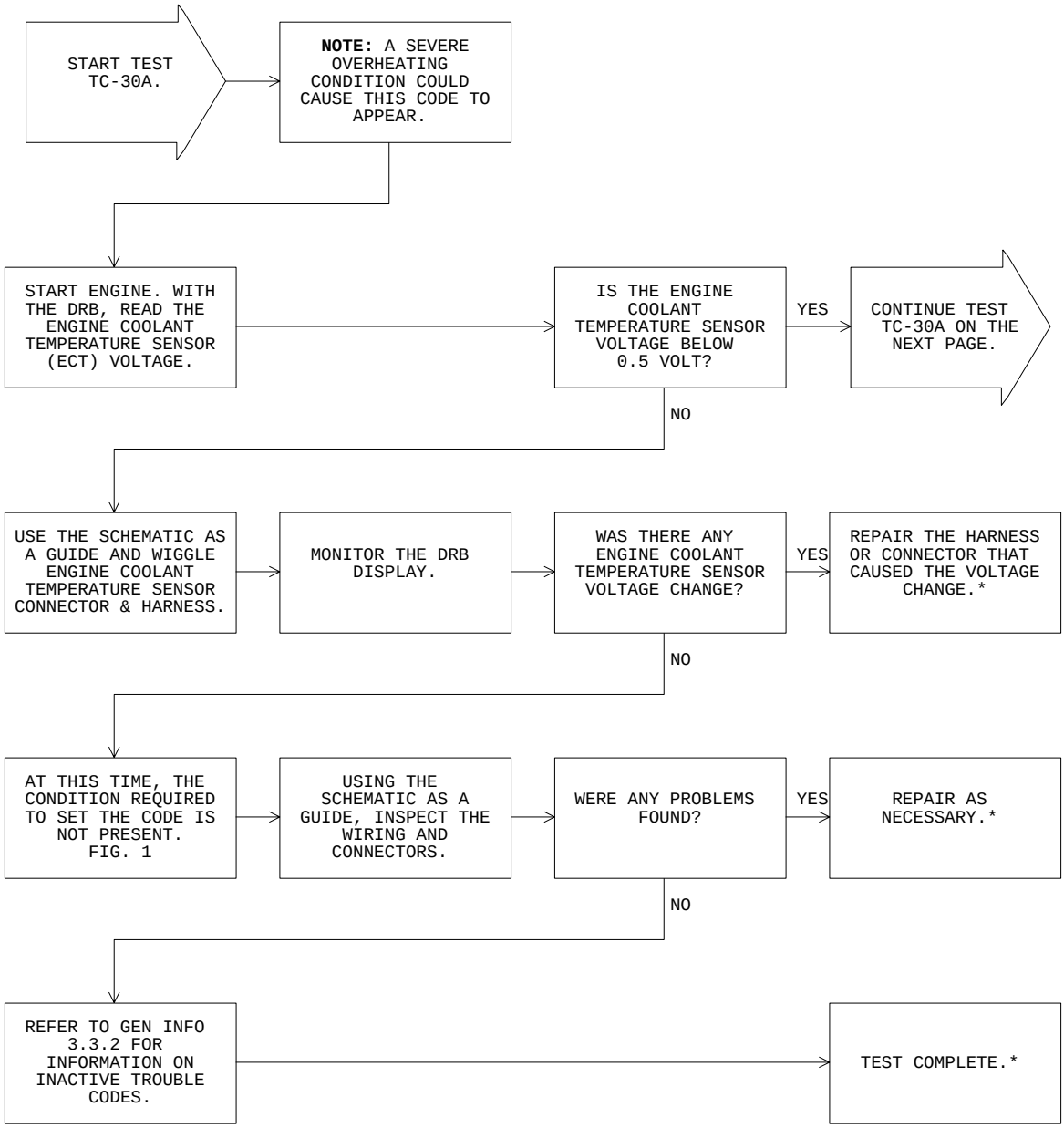
> Sensor signal shorted to ground
> Sensor internally shorted
> PCM failure
> Connector terminals
> Connector wires

2610204

FIG. 1

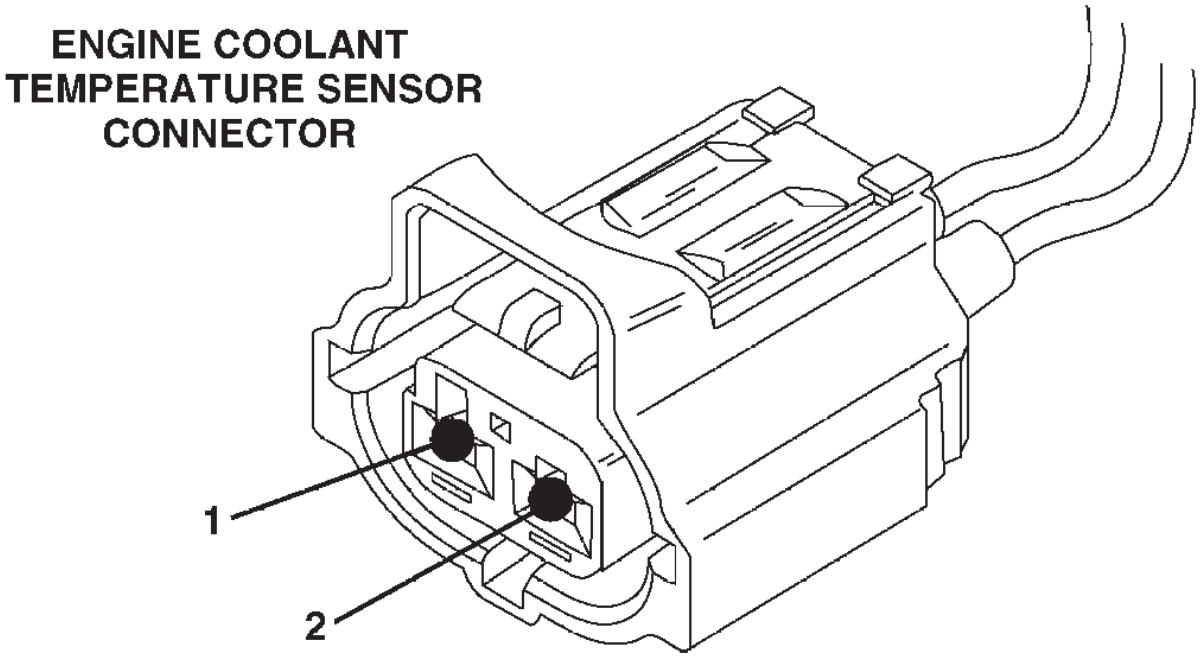
TEST TC-30A REPAIRING - ECT SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

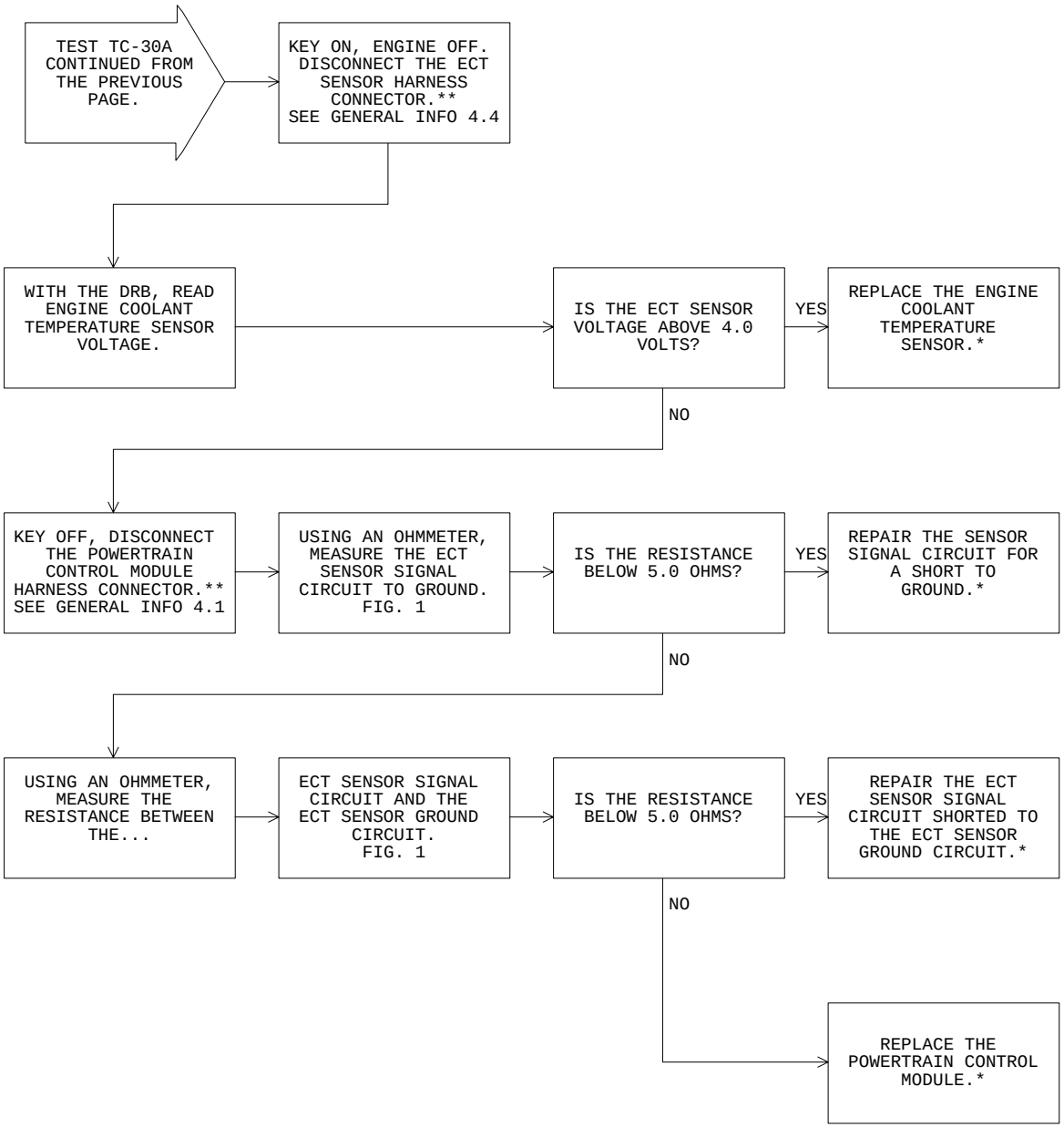


CAV	COLOR	FUNCTION
1	TN/BK	ECT SENSOR SIGNAL
2	BK/LB	SENSOR GROUND

80b09853

FIG. 1

TEST TC-30A CONTINUED - REPAIRING - ECT SENSOR VOLTAGE TOO LOW

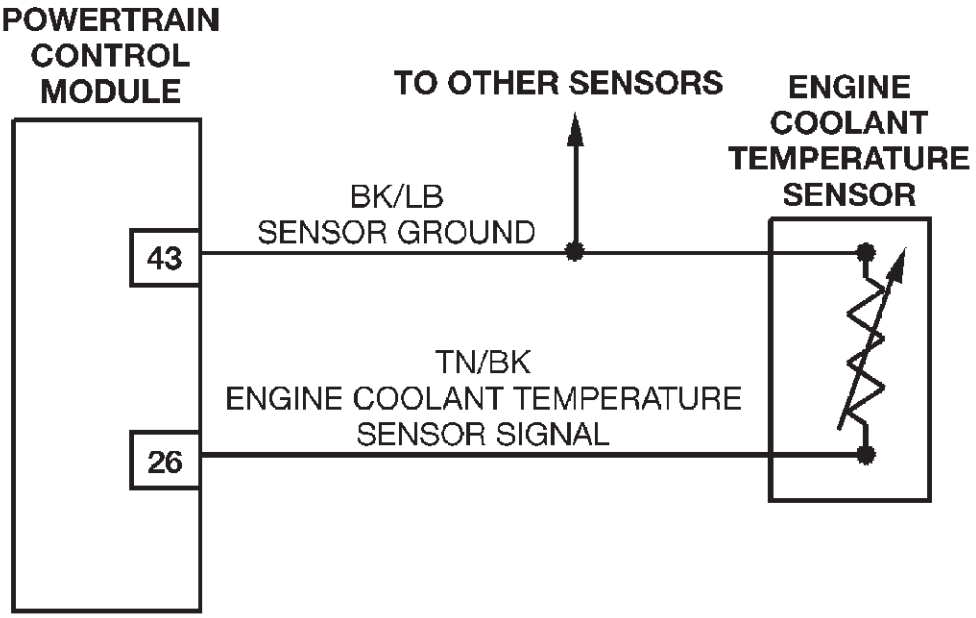


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-31A REPAIRING - ECT SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding



Name of code: ECT Sensor Voltage Too High

When monitored: With the ignition on.

Set condition: The engine coolant temperature sensor circuit voltage at PCM cavity 26 goes above 4.9 volts for more than 3 seconds.

Theory of operation: The engine coolant temperature sensor is a negative temperature coefficient (NTC) thermistor-type sensor (resistance varies inversely with temperature). This means at cold temperatures its resistance is high so the voltage signal will be high. As coolant temperature increases, resistance decreases and the voltage will be low. This allows the sensor to provide an analog voltage signal (0 to 5-volt) to PCM cavity 26.

To make the sensor more accurate at cold and hot temperatures, the 5-volt signal passes through a 10,000 ohm resistor or through a 1,000 ohm resistor connected in parallel with the 10,000 ohm resistor, which has a calculated resistance value of 909 ohms. If the engine is cold (below 125°F), the 5-volt supply to the engine coolant temperature sensor is fed only through the 10,000 ohm resistor inside the PCM. If the engine is warm (above 125°F), the 5-volt supply to the engine coolant temperature sensor is fed through both resistors.

Possible causes:

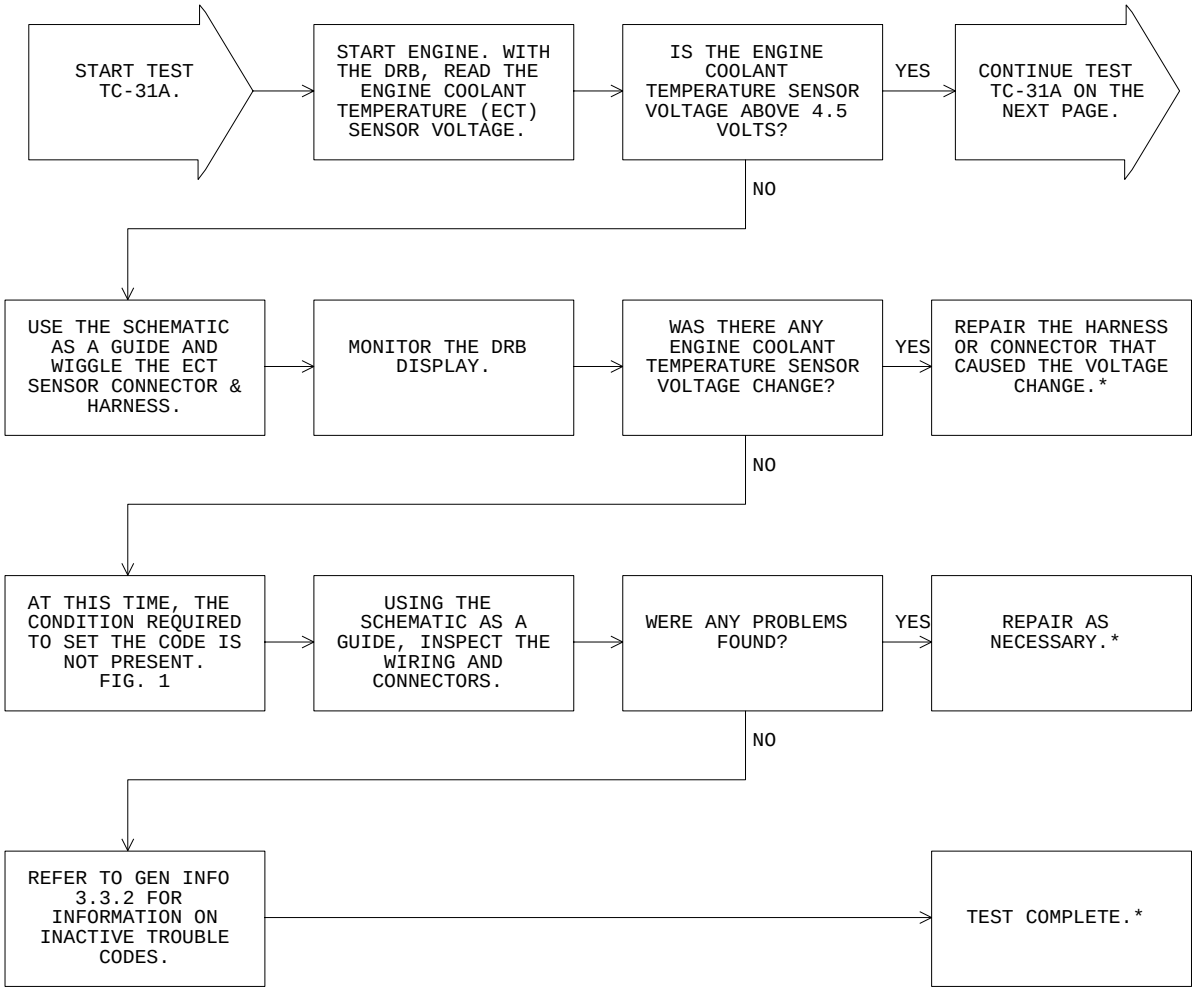
> Sensor signal circuit open
> Sensor internally open
> Sensor ground circuit open
> PCM failure
> Connector terminals
> Connector wires

2610203

FIG. 1

TEST TC-31A REPAIRING - ECT SENSOR VOLTAGE TOO HIGH

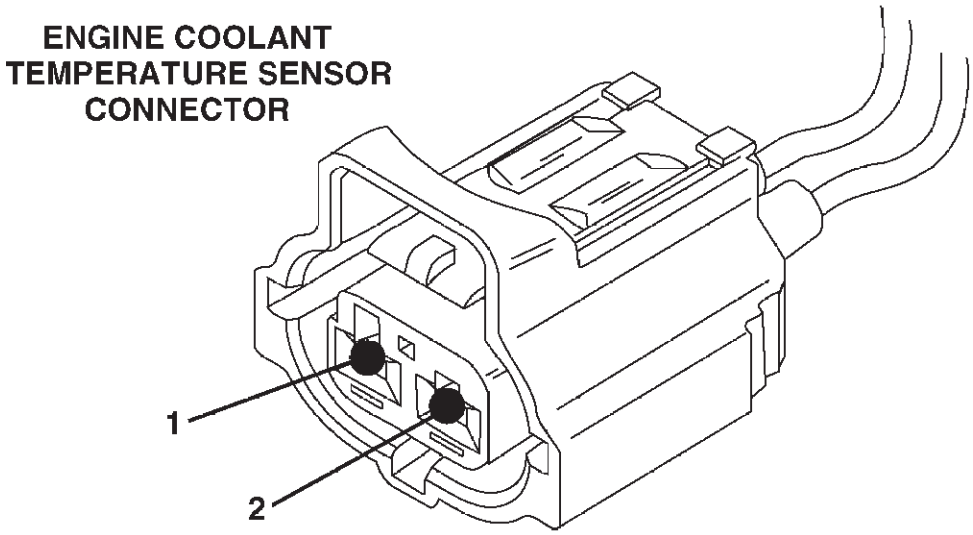
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

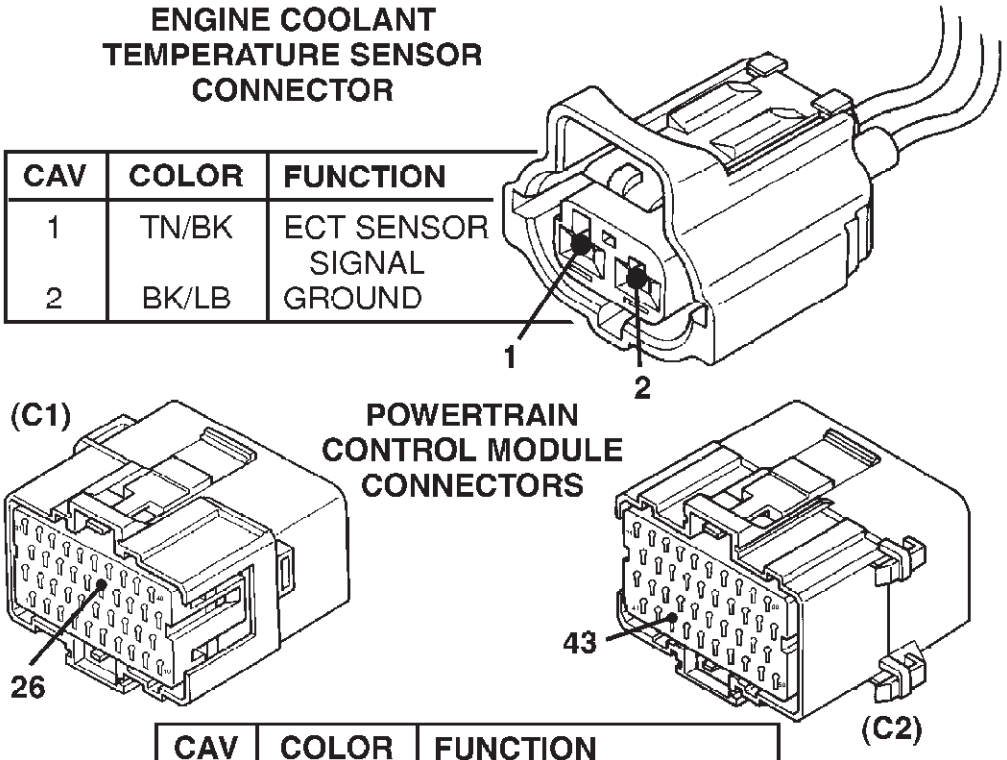
TEST TC-31A CONTINUED - REPAIRING - ECT SENSOR VOLTAGE TOO HIGH



CAV	COLOR	FUNCTION
1	TN/BK	ECT SENSOR SIGNAL
2	BK/LB	SENSOR GROUND

80b09853

FIG. 1



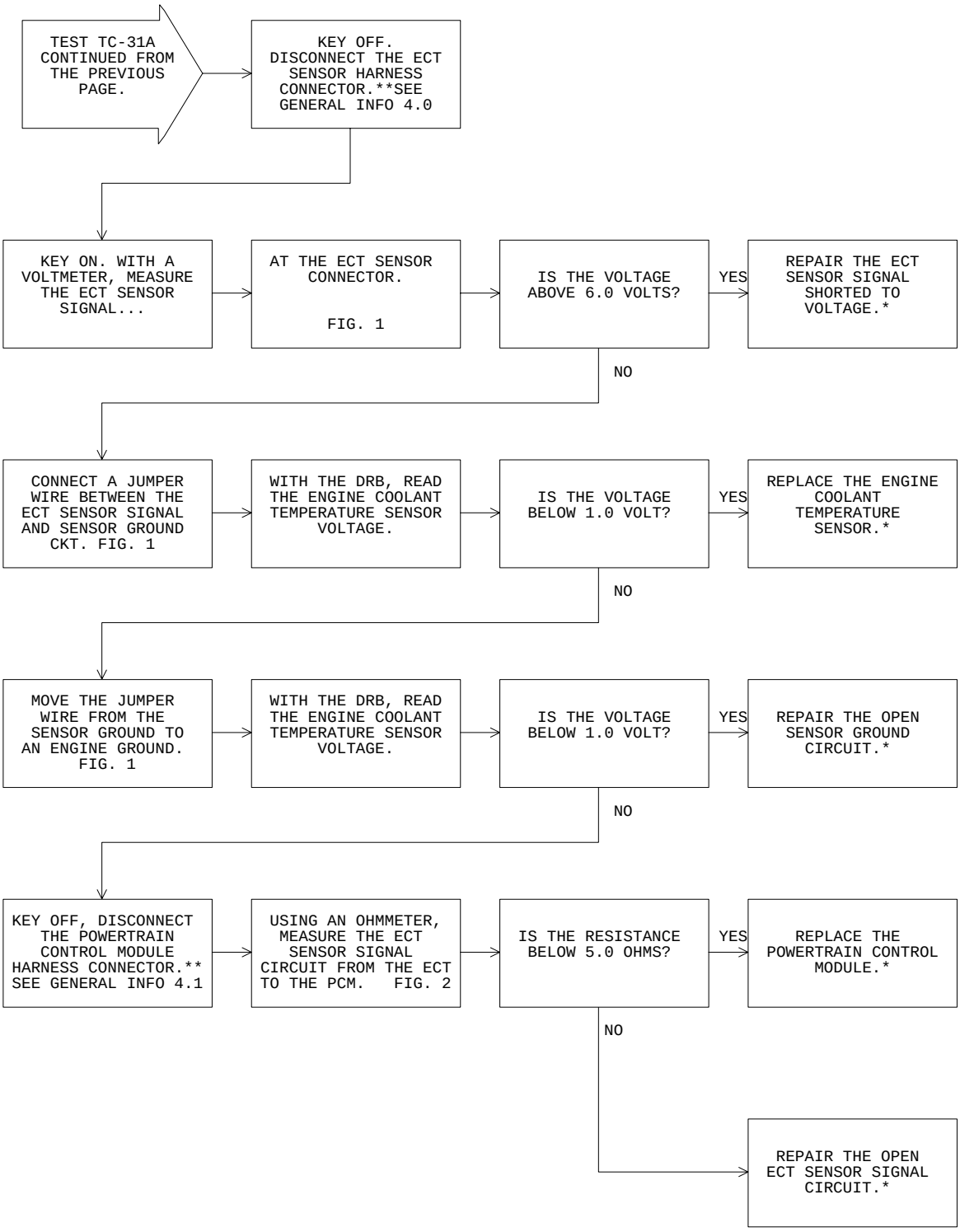
CAV	COLOR	FUNCTION
1	TN/BK	ECT SENSOR SIGNAL
2	BK/LB	GROUND

CAV	COLOR	FUNCTION
26	TN/BK	ECT SENSOR SIGNAL
43	BK/LB	SENSOR GROUND

80b09866

FIG. 2

TEST TC-31A CONTINUED - REPAIRING - ECT SENSOR VOLTAGE TOO HIGH



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-32A REPAIRING - 1/1 O2S STAYS AT CENTER

Perform TEST DTC Before Proceeding

1/1 RIGHT BANK UP

Name of code: 02 Sensor Stays at Center

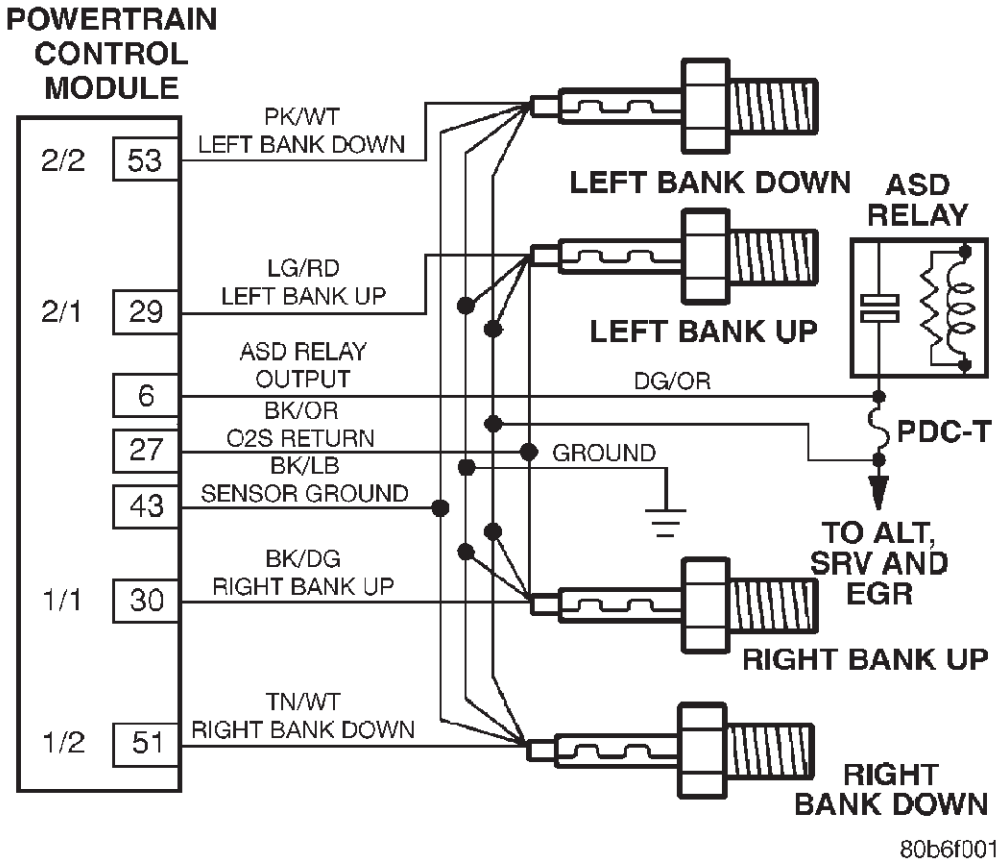
When monitored: With the engine running for more than 2 minutes and engine temperature greater than 170°.

Set condition: The oxygen sensor signal voltage is between 0.35 volt and 0.55 volt for 1.5 minutes.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this 02 sensor. The sensor detects exhaust gas content by a galvanic reation within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this 02 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be approximately 1 volt. When oxygen content is high (lean mixture), the voltage signal will be low, approximately 0.1 volt.

Possible causes:
- > Sensor output wire open
- > 02 sensor failure
- > Powertrain control module failure
- > Dirt/moisture/grease causing voltage tracking in connector
- > Connector wires

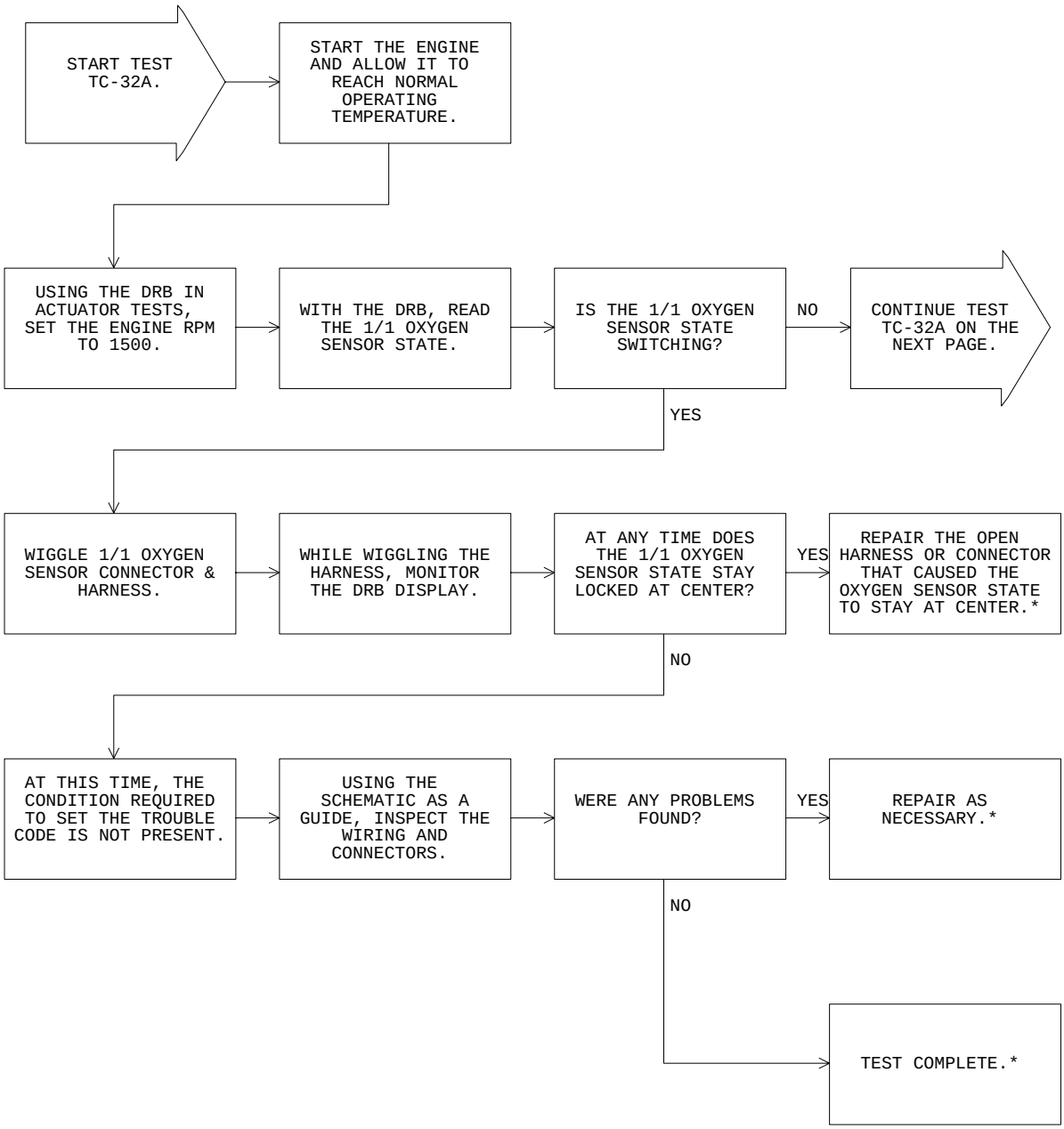
80b2439c



80b6f001

TEST TC-32A REPAIRING - 1/1 O2S STAYS AT CENTER

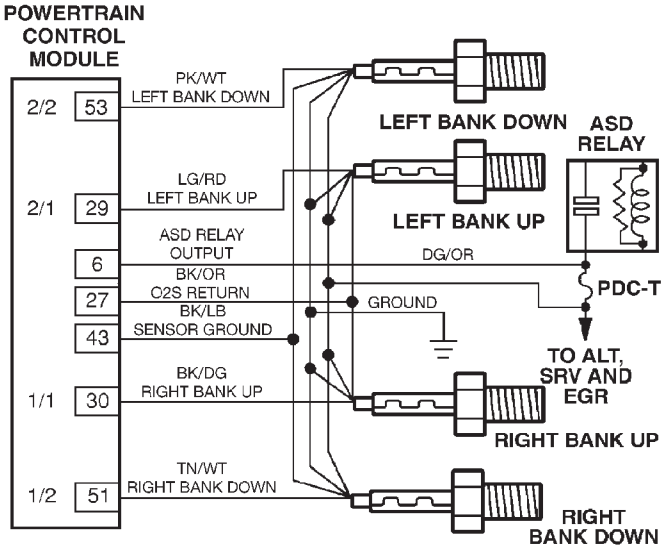
Perform TEST DTC Before Proceeding



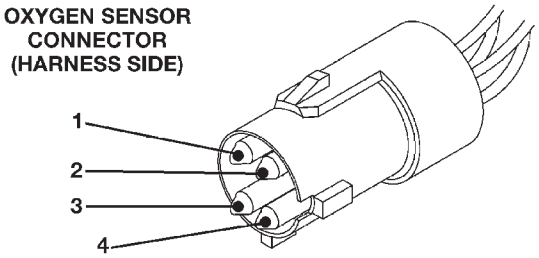
Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-32A CONTINUED - REPAIRING - 1/1 O2S STAYS AT CENTER



1/1 RIGHT BANK UP

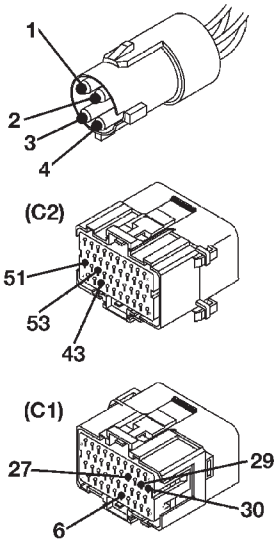


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

1/1 RIGHT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

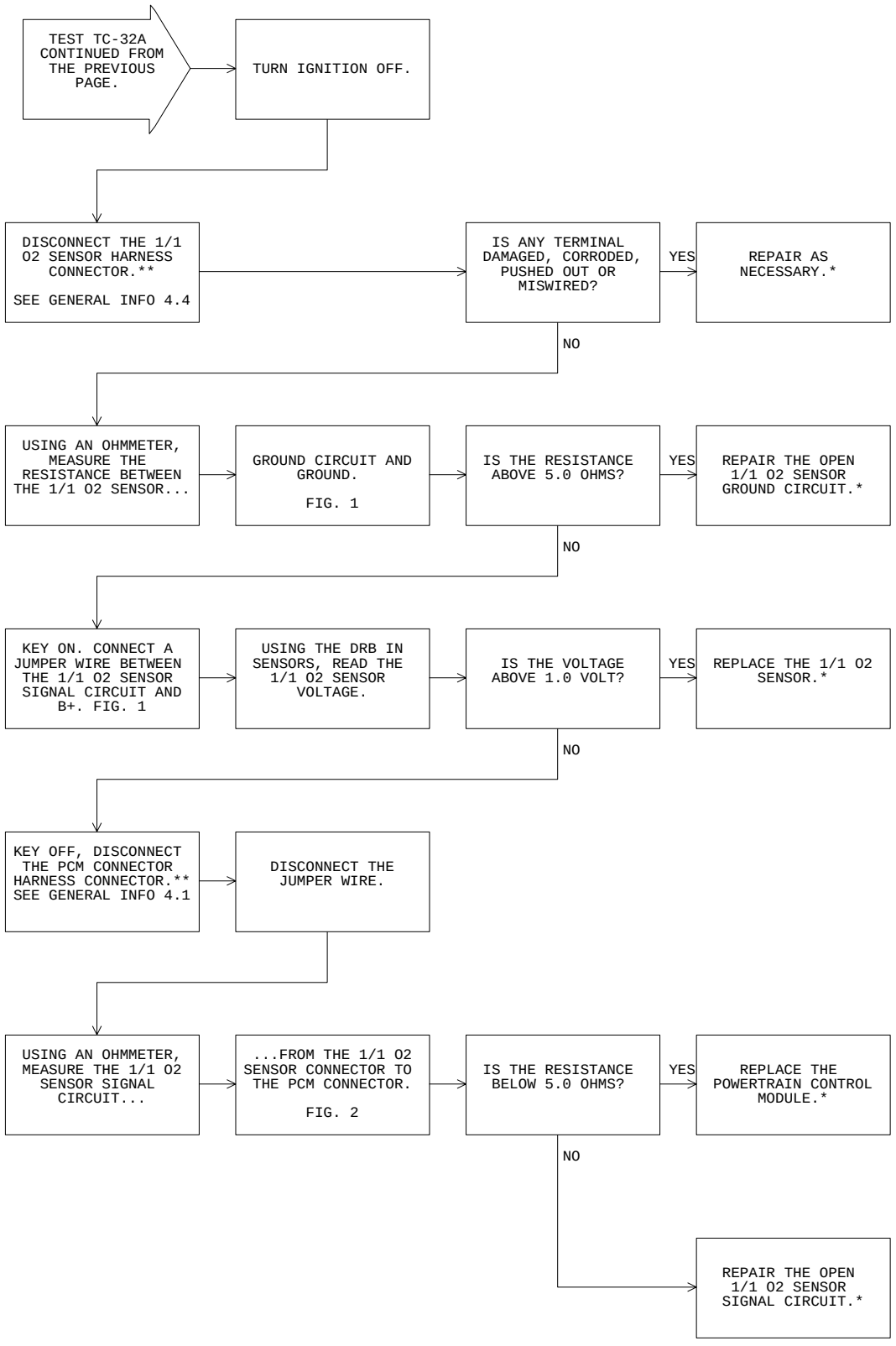
POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

FIG. 2

TEST TC-32A CONTINUED - REPAIRING - 1/1 O2S STAYS AT CENTER

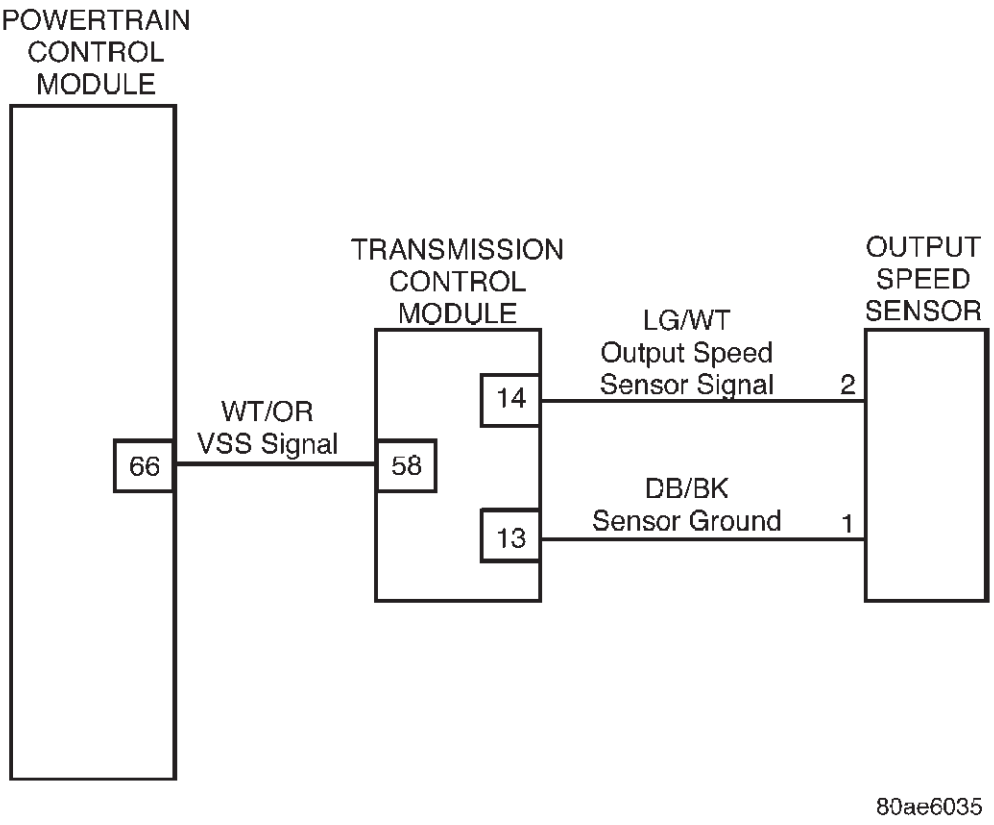


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-35A REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL

Perform TEST DTC Before Proceeding



Name of code: No Vehicle Speed Sensor Signal

When monitored: With the engine running, transmission not in park or neutral, brakes not applied, engine rpm greater than 1500.

Set condition: No signal from the vehicle speed sensor (TCM) is present for more than 11 seconds for 2 consecutive trips.

Theory of operation: The vehicle speed sensor signal is provided to the PCM by the TCM. The signal is calculated by the TCM based on the output speed sensor signal and the speedometer pinion factor. The PCM provides a 5-volt pull-up signal from cavity 66 to TCM cavity 58. The sensor signal is created by the TCM alternating the signal from 5V to 0.3V.

Possible causes:

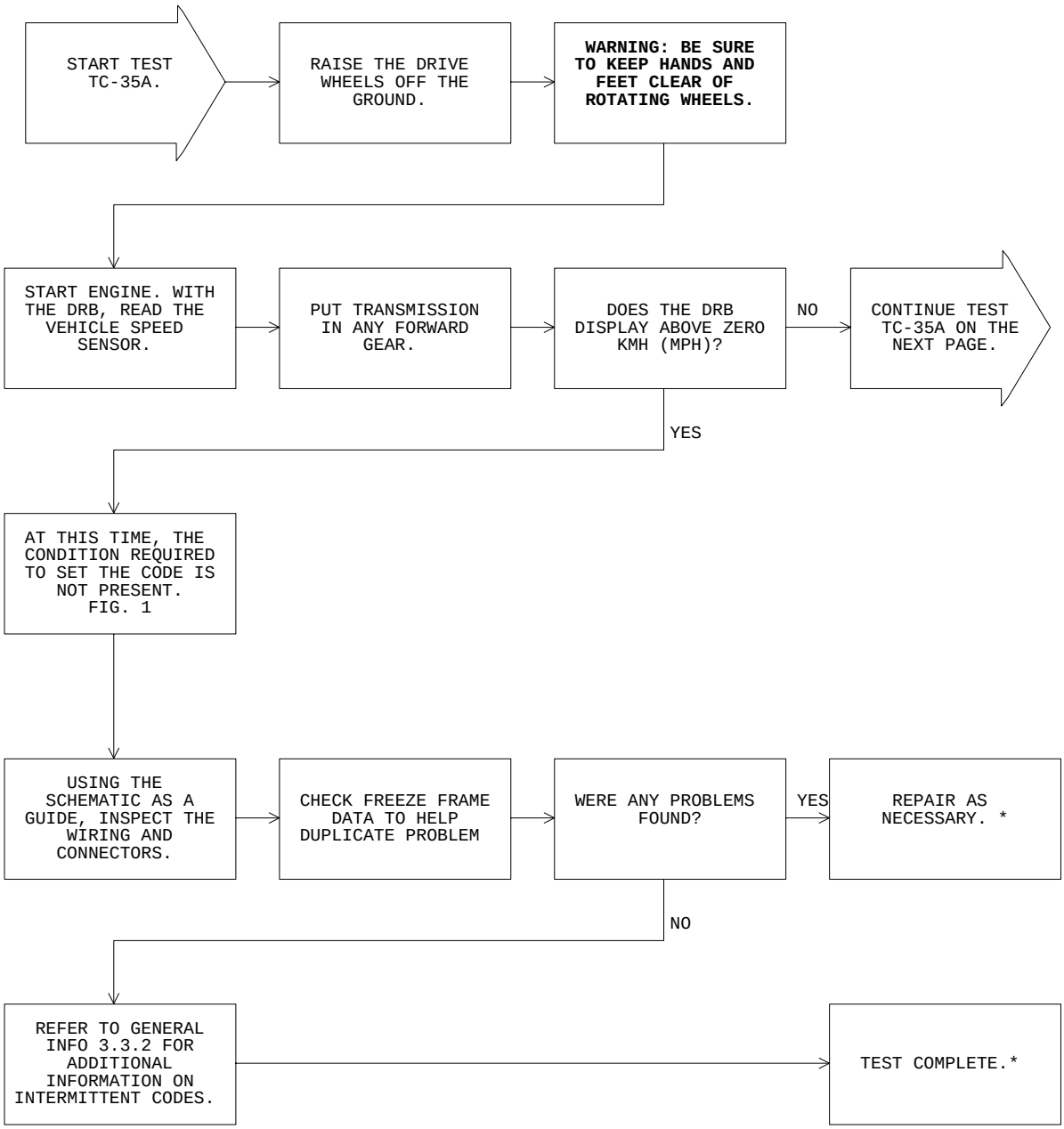
> Open or shorted signal circuit
> Speedometer pinion factor not programmed
> Output speed sensor circuit problem
> Failed PCM
> Failed TCM

80b17177

FIG. 1

TEST TC-35A REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

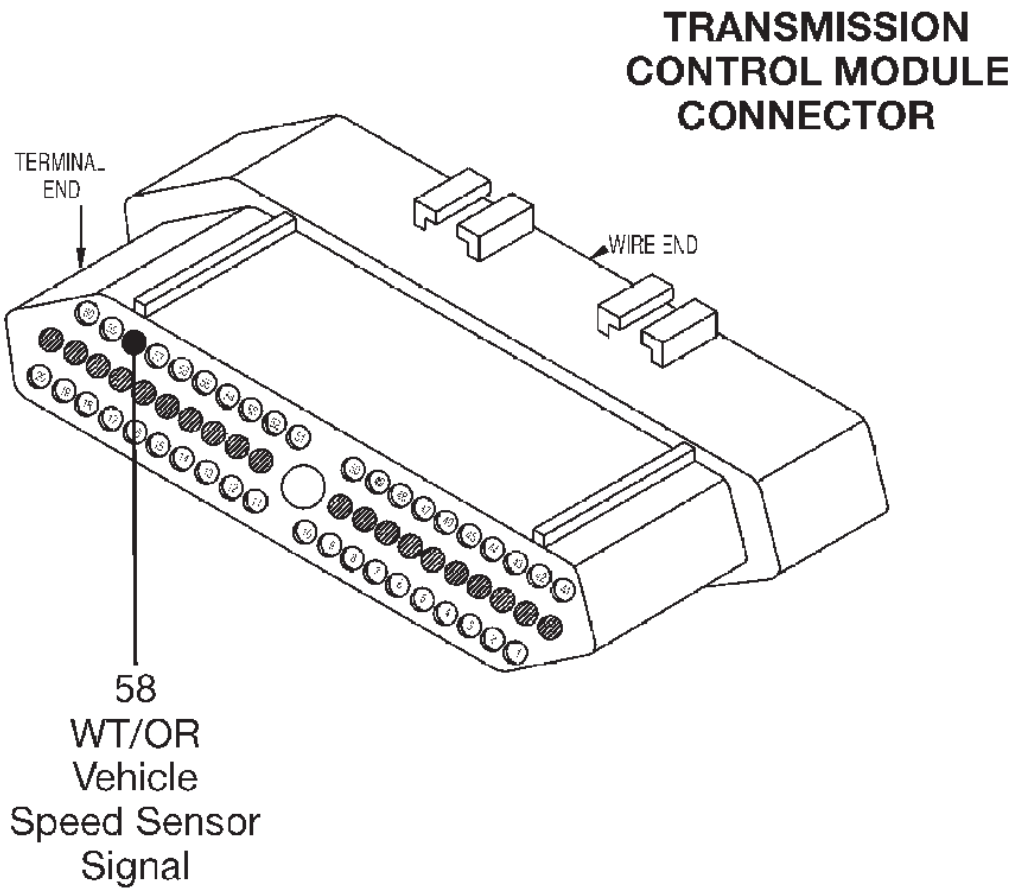
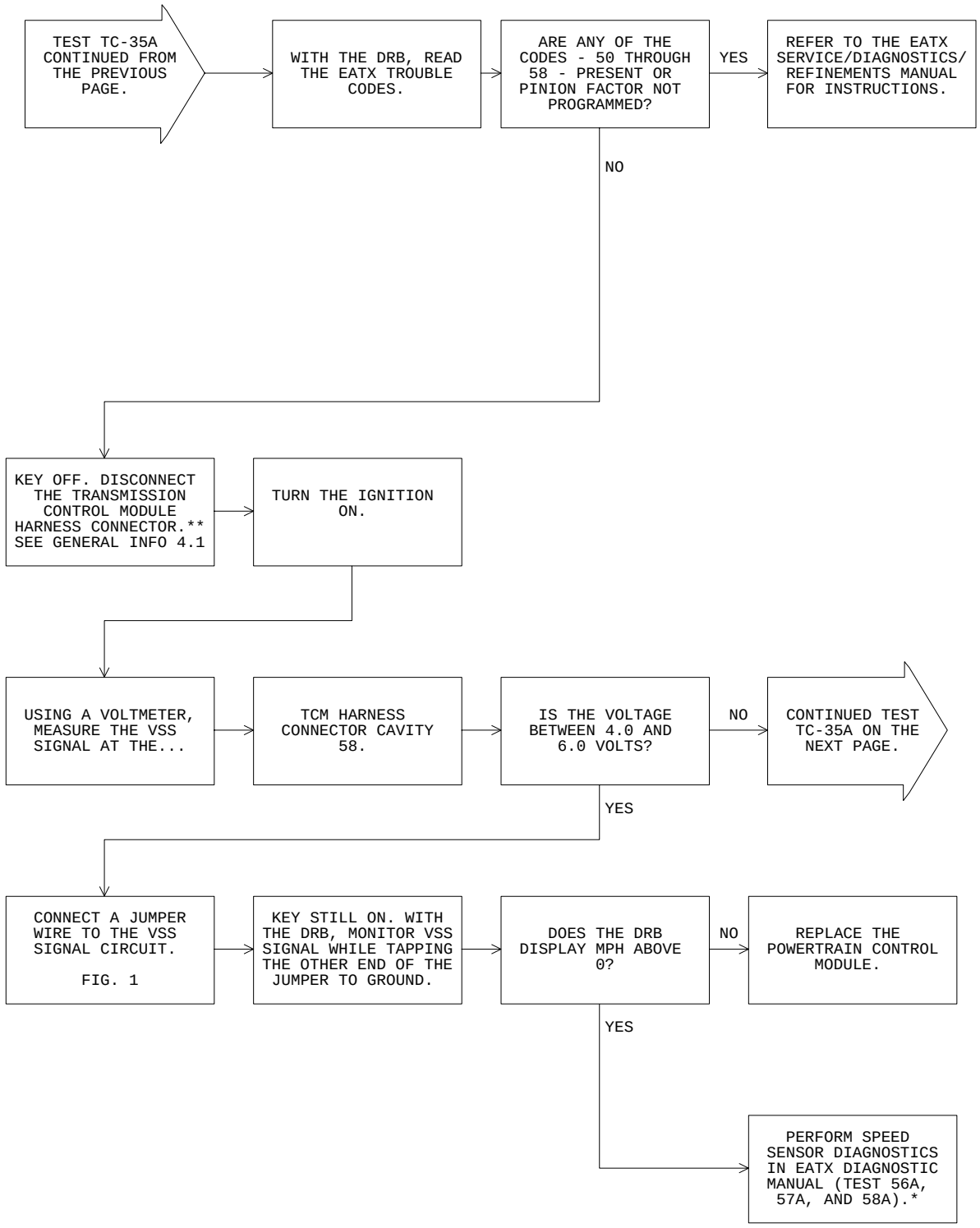

TRANSMISSION
CONTROL MODULE
CONNECTOR
TERMINAL END
WIRE END
58
WT/OR
Vehicle
Speed Sensor
Signal
805e2a4d

FIG. 1

TEST TC-35A CONTINUED - REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL

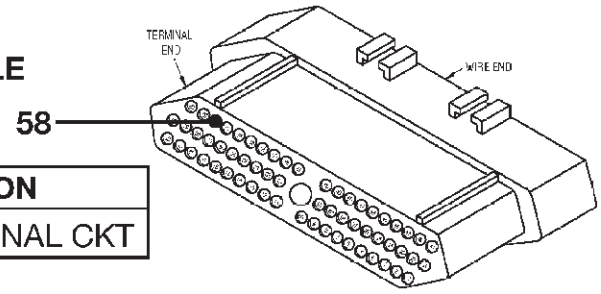


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

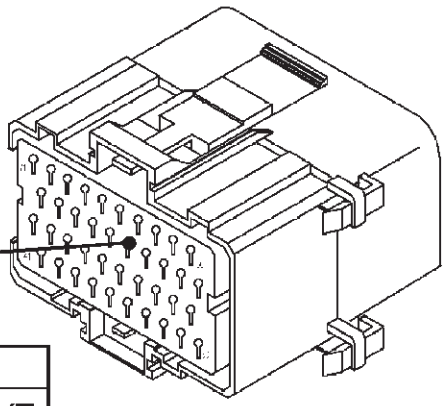
TEST TC-35A CONTINUED - REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL

TRANSMISSION CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
58	WT/OR	VSS SIGNAL CKT

POWERTRAIN CONTROL MODULE CONNECTOR (C2)

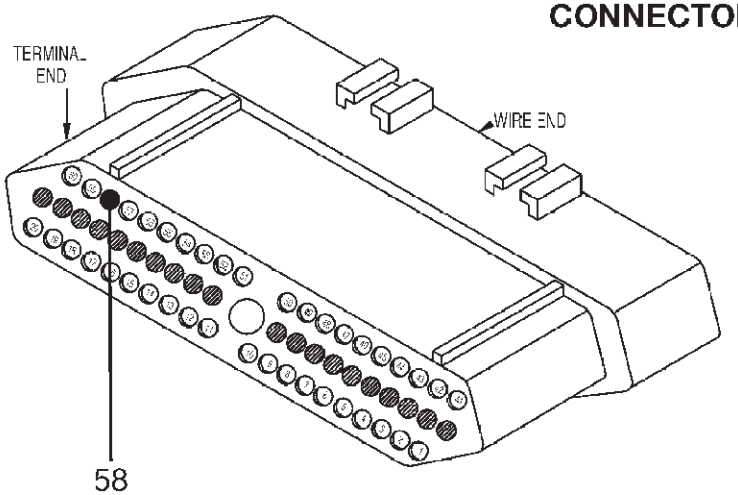


CAV	COLOR	FUNCTION
66	WT/OR	VSS SIGNAL CKT

80b27c13

FIG. 1

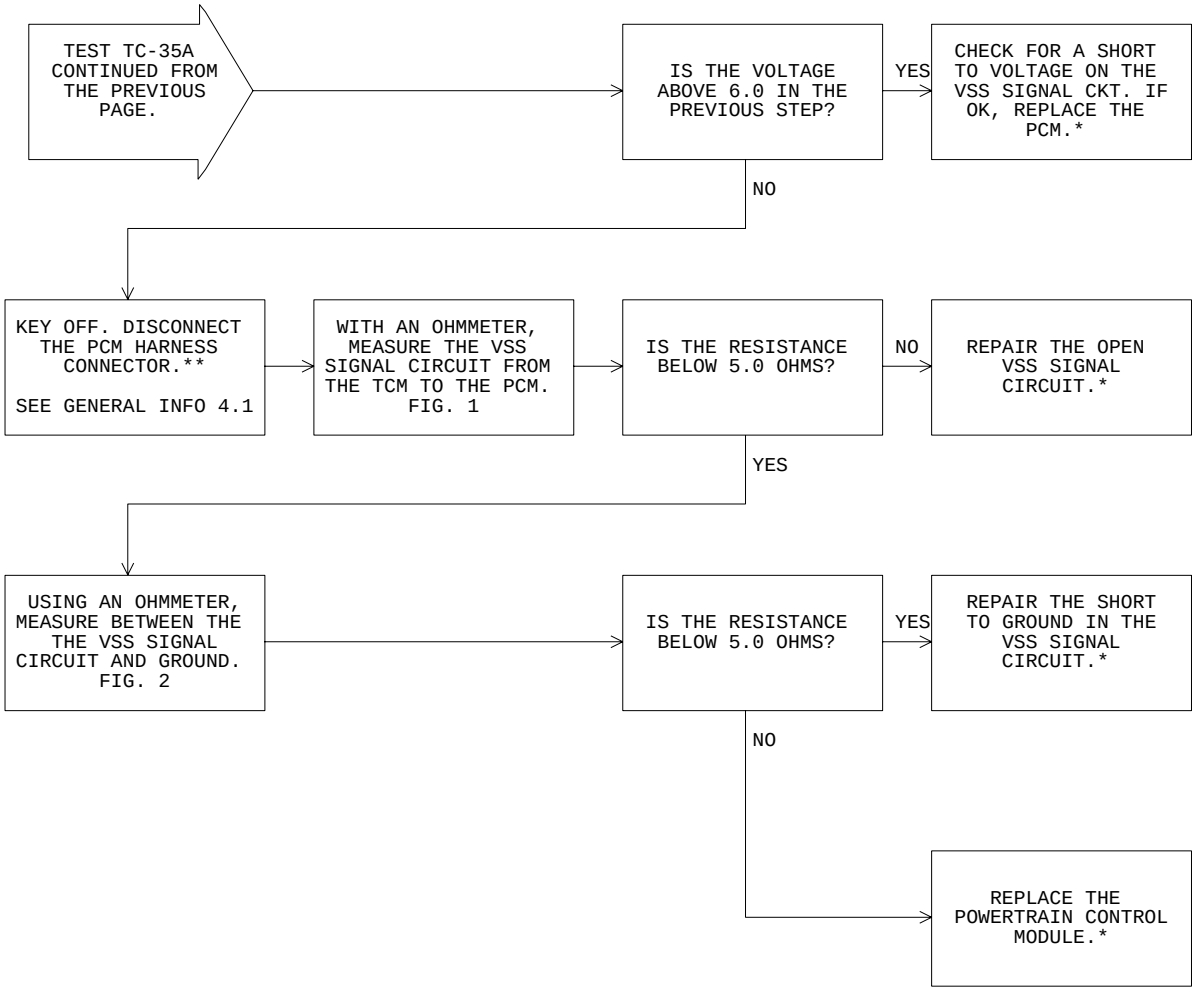
TRANSMISSION CONTROL MODULE CONNECTOR



805e2a4d

FIG. 2

TEST TC-35A CONTINUED - REPAIRING - NO VEHICLE SPEED SENSOR SIGNAL



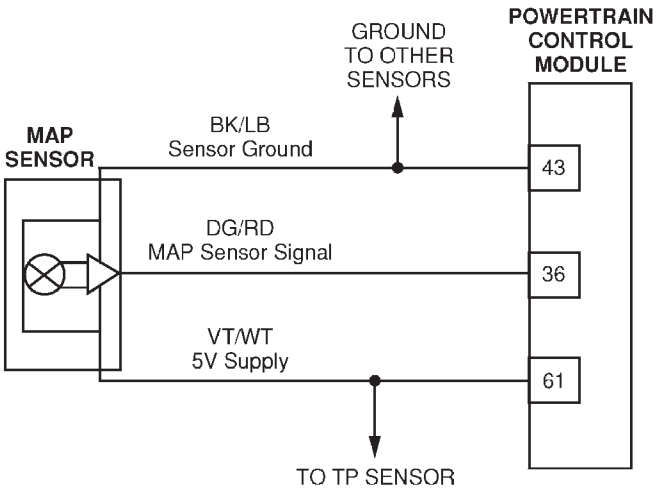
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

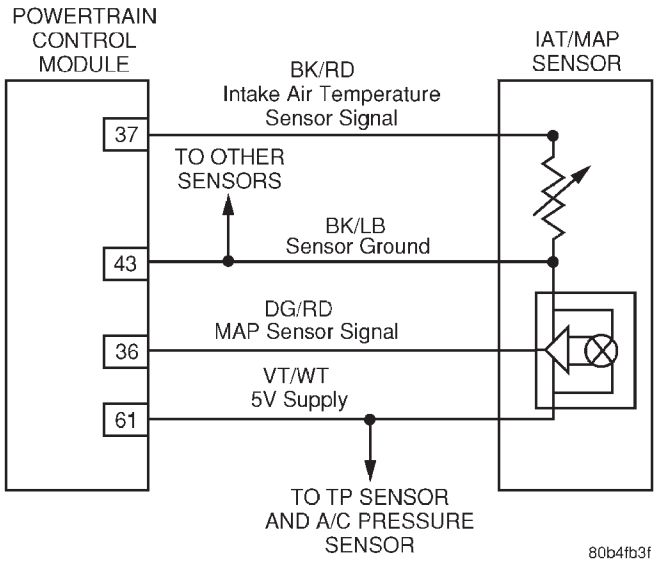
TEST TC-36A REPAIRING - MAP SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

2.7L



3.5L



Name of code: MAP Sensor Voltage Too Low

When monitored: With engine rpm above 600 but less than 3500 and the TP sensor less than 1.2 volt.

Set condition: The MAP sensor signal voltage is below 1.2 volts at start, or below .04 volt for 2.0 seconds with engine running.

Theory of operation: This sensor measures manifold absolute pressure and ambient barometric pressure within the manifold. It provides a 0 to 5-volt signal to PCM cavity 36. The MAP sensor puts out a low voltage signal (0.5 to 1.8 volts) at idle when the manifold vacuum is high, and a higher voltage signal (3.9 to 4.8 volts) at deep throttle when the manifold vacuum is low. The MAP receives a 5-volt supply from PCM cavity 61; voltage may vary from 4.8 to 5.1 volts. The sensor ground is provided by PCM cavity 43.

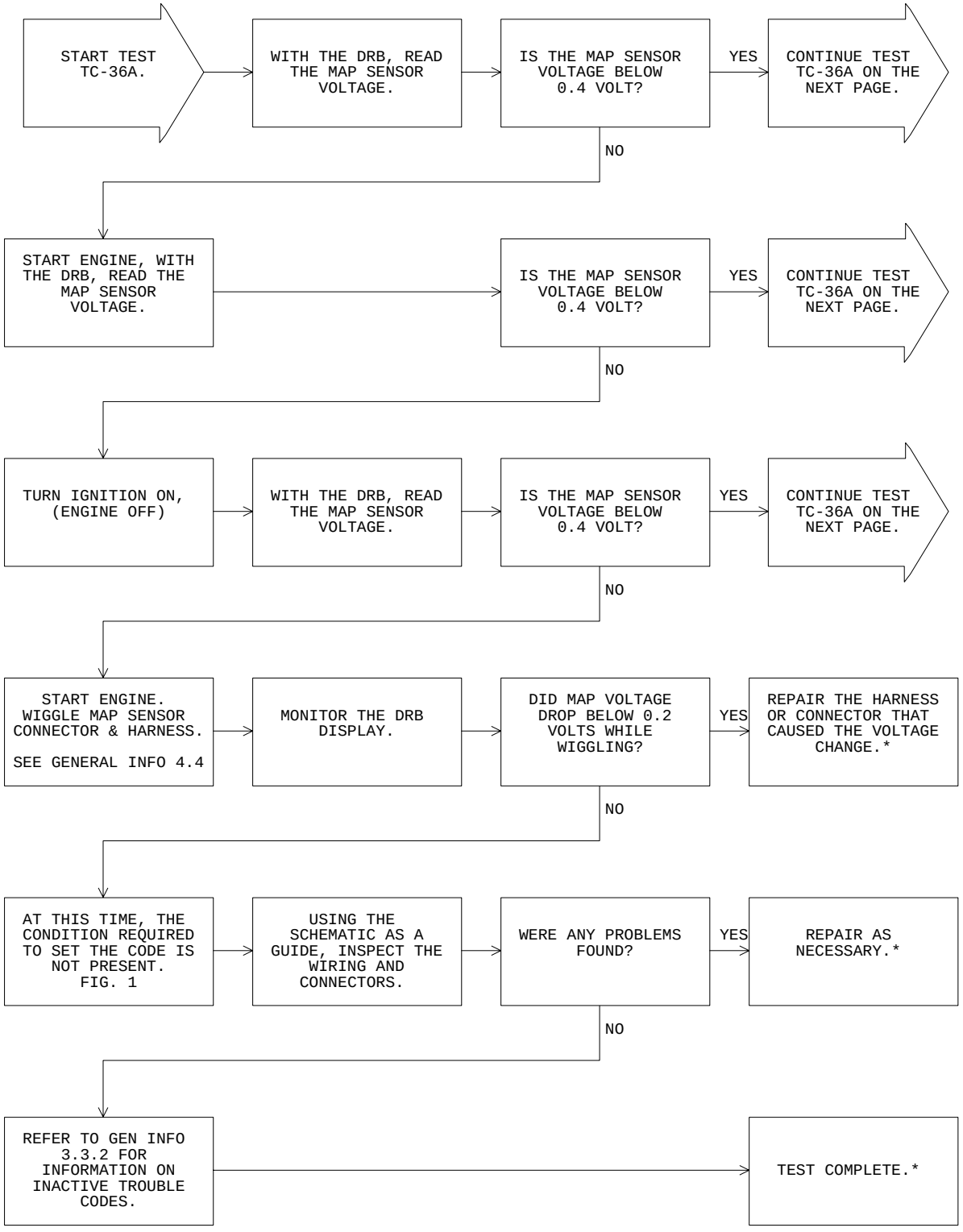
Possible causes:
- Open 5-volt supply circuit
- Signal circuit shorted to the ground
- Failed sensor
- PCM failure
- Connector terminals
- Connector wires

80b27d23

FIG. 1

TEST TC-36A REPAIRING - MAP SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

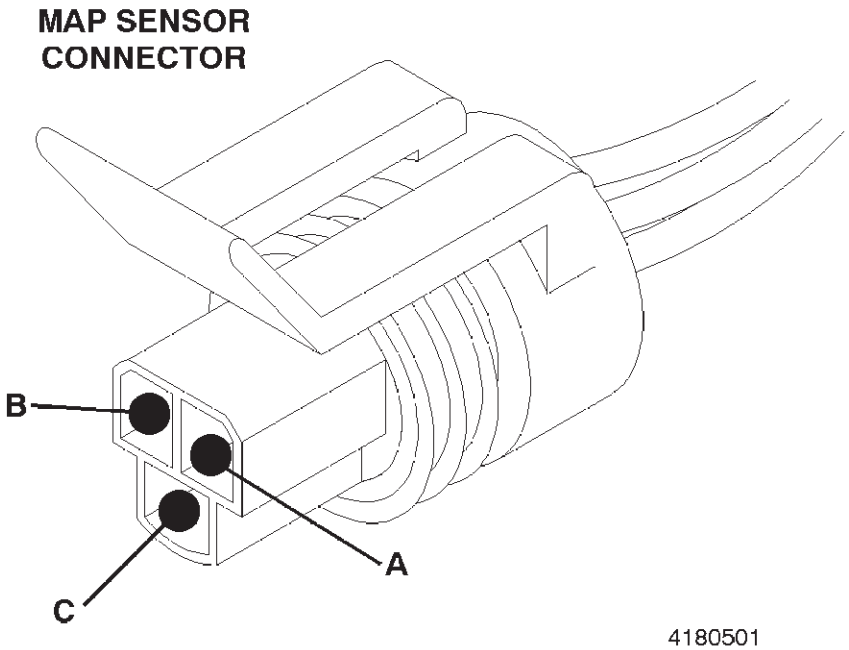


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-36A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO LOW

2.7L

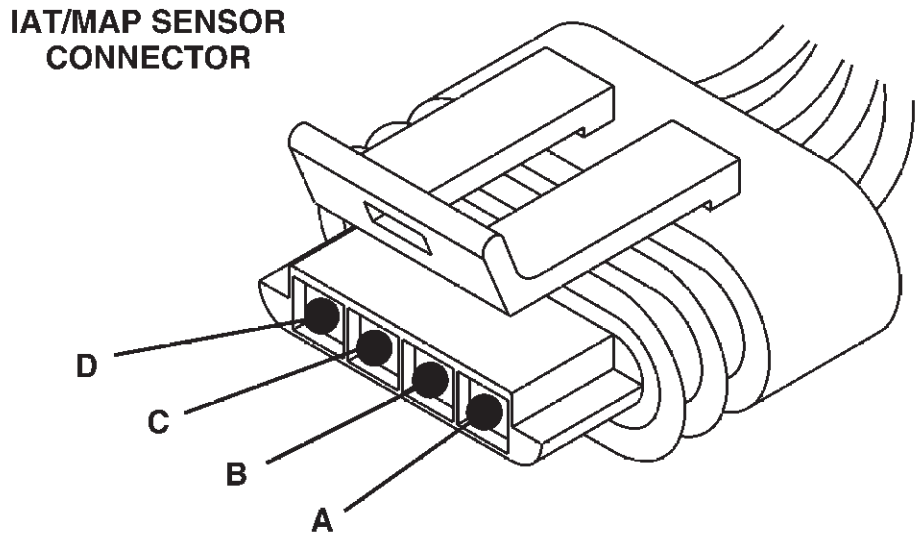


4180501

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 1

3.5L

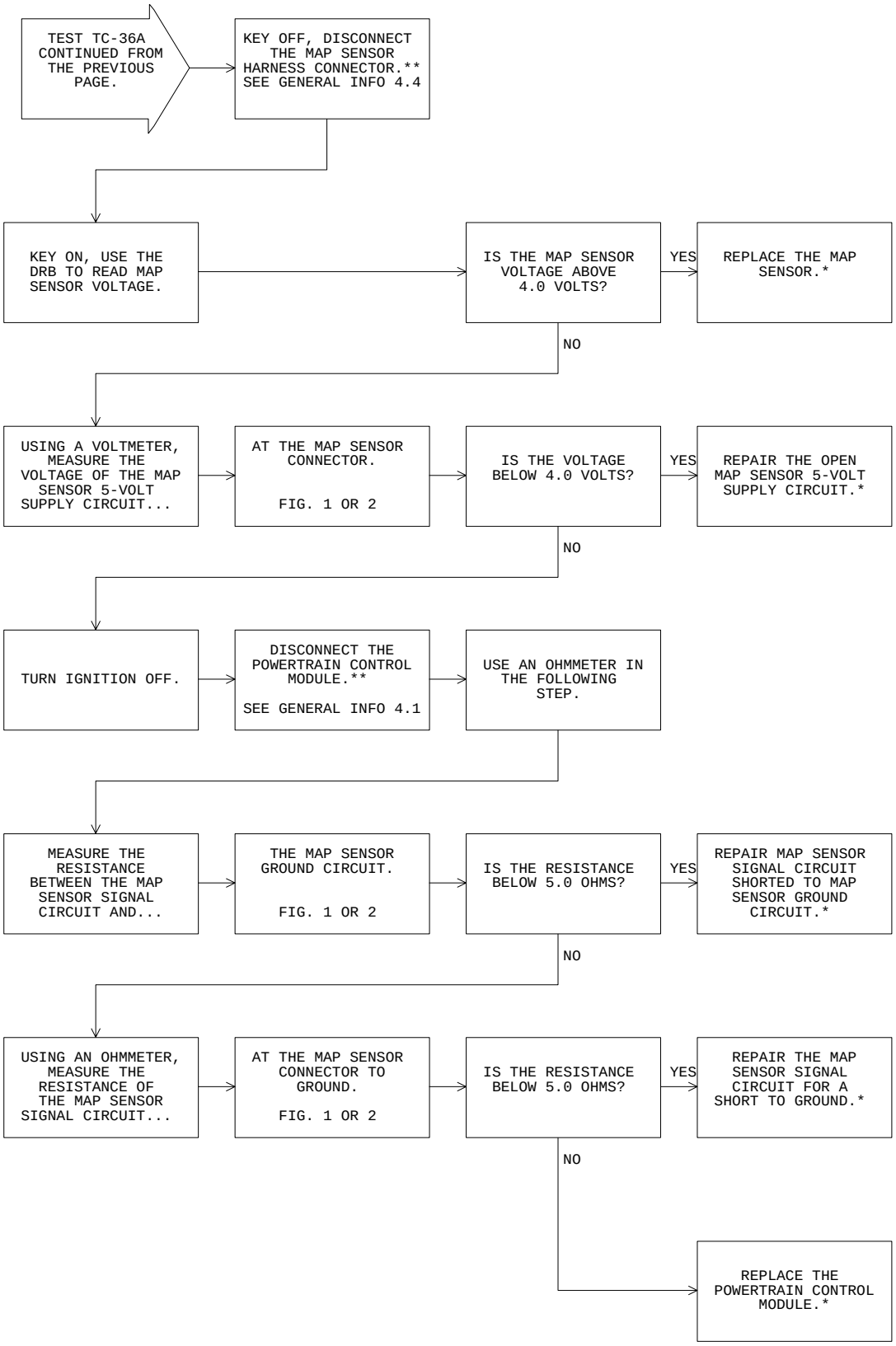


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

TEST TC-36A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO LOW



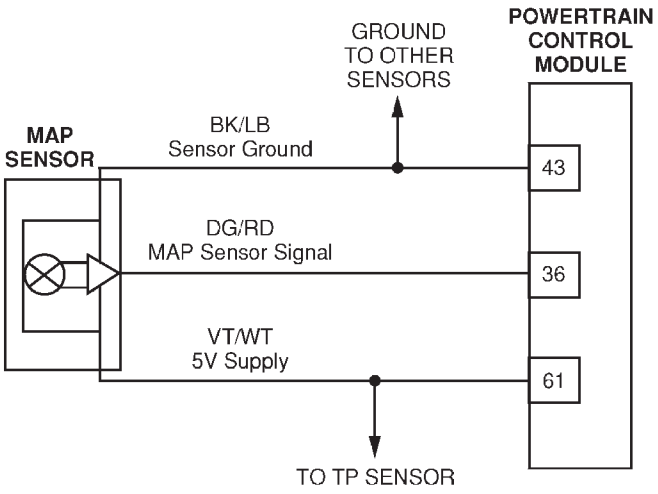
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

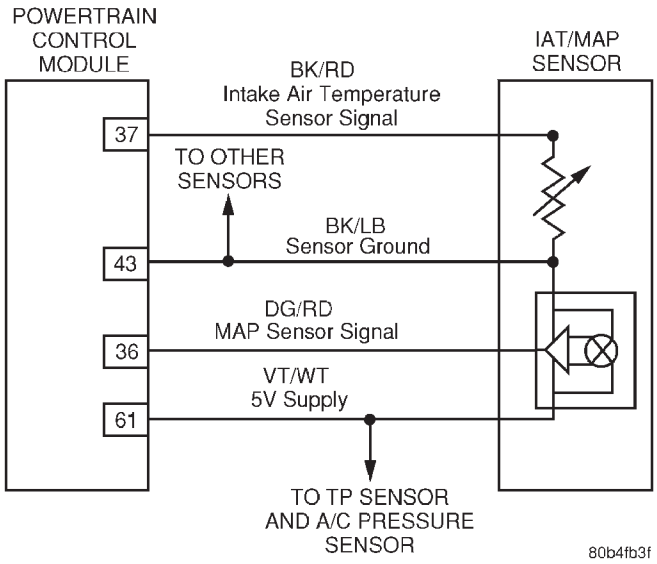
TEST TC-37A REPAIRING - MAP SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding

2.7L



3.5L



Name of code: MAP Sensor Voltage Too High

When monitored: With engine rpm above 600 but less than 3500 and the TP sensor voltage less than 1 volt.

Set condition: The MAP sensor signal voltage is greater than 4.9 volts at start or with the engine running for 2.0 seconds.

Theory of operation: This sensor measures manifold absolute pressure and ambient barometric pressure within the manifold. It provides a 0 to 5-volt signal to PCM cavity 36. The MAP sensor puts out a low voltage signal (0.5 to 1.8 volts) at idle when the manifold vacuum is high, and a higher voltage signal (3.9 to 4.8 volts) at deep throttle when the manifold is low. The MAP receives a 5-volt supply from PCM cavity 61; voltage may vary from 4.8 to 5.1 volts. The sensor ground is provided by PCM cavity 43.

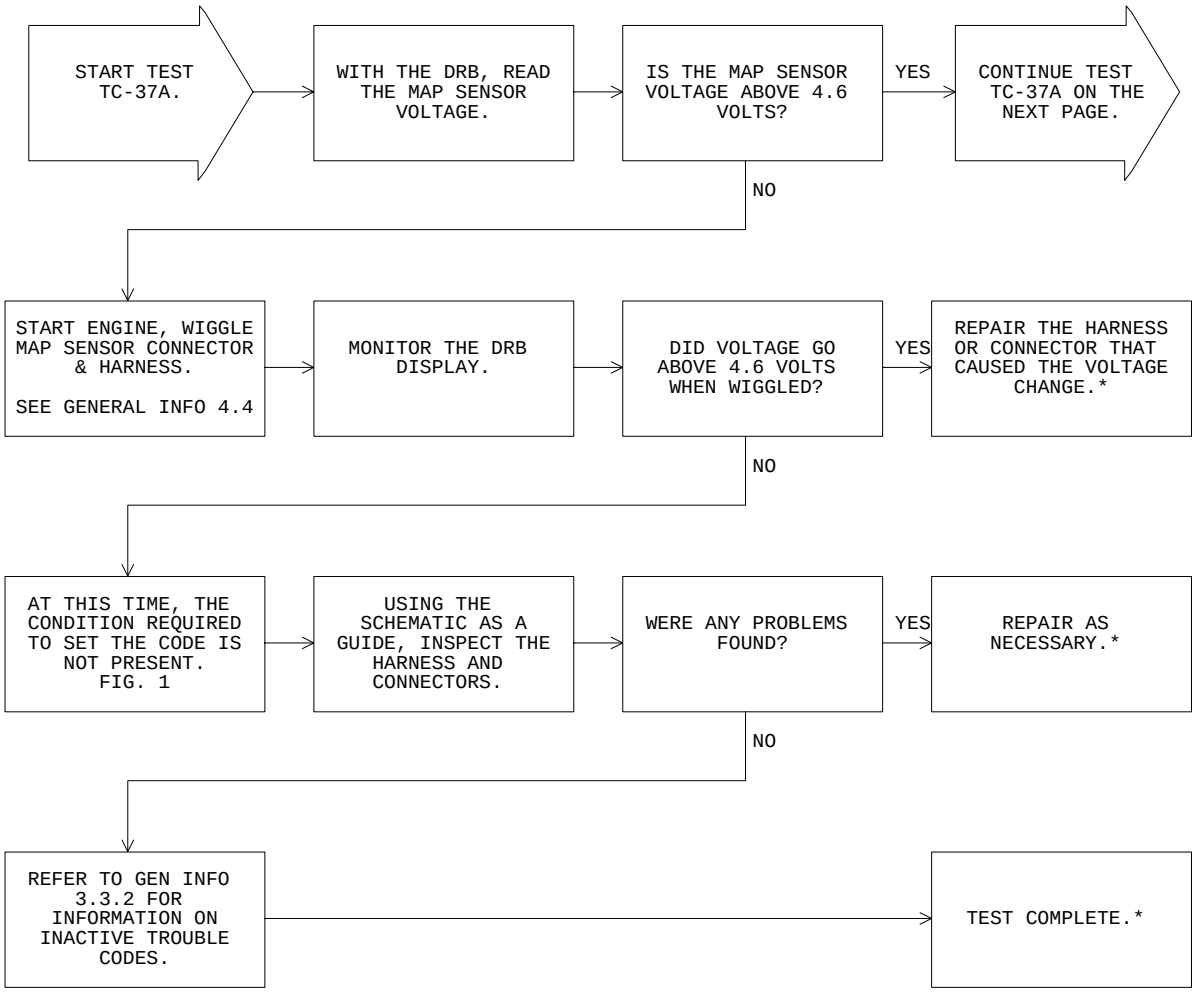
Possible causes:
- Signal circuit open
- Sensor open internally
- Sensor ground circuit
- Sensor signal circuit shorted to voltage
- PCM failure
- Connector terminals
- Connector wires

80b27d26

FIG. 1

TEST TC-37A REPAIRING - MAP SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding

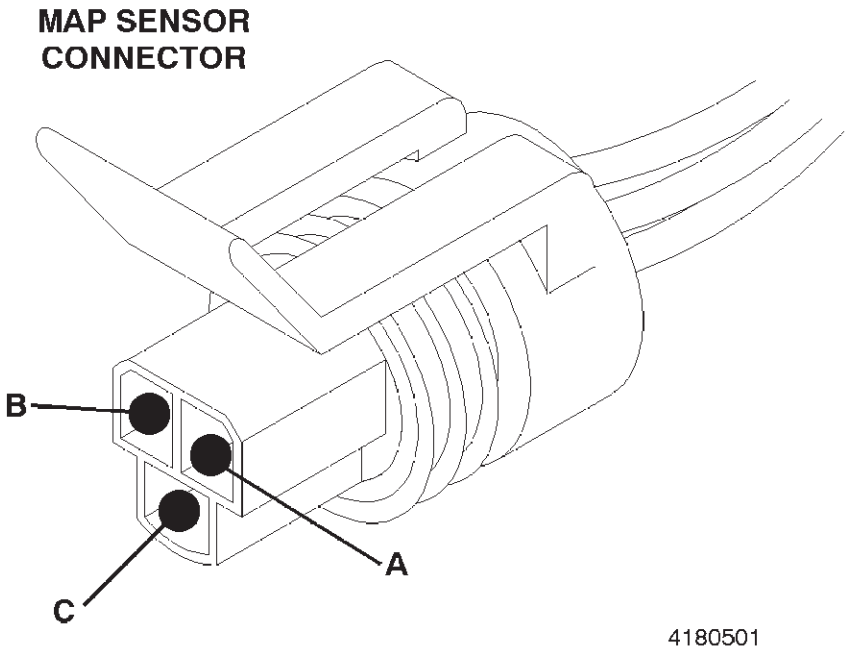


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-37A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO HIGH

2.7L

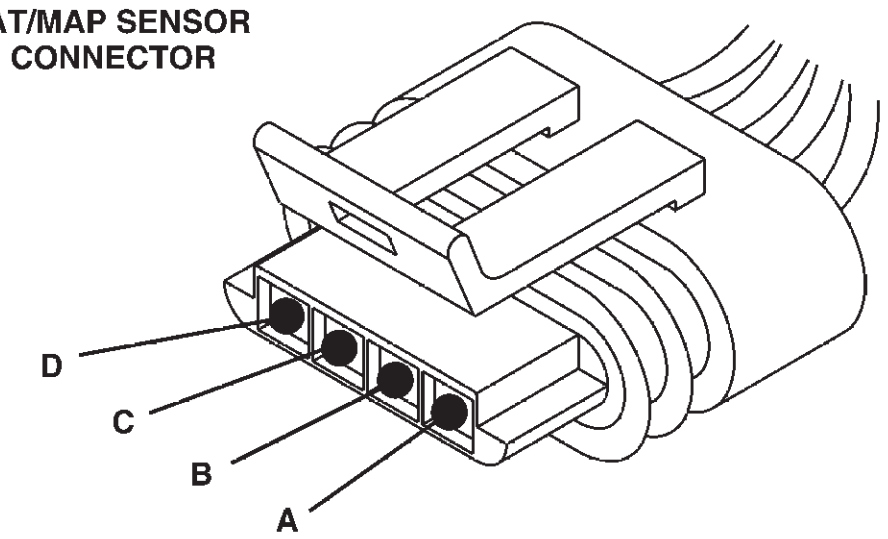


4180501

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 1

3.5L

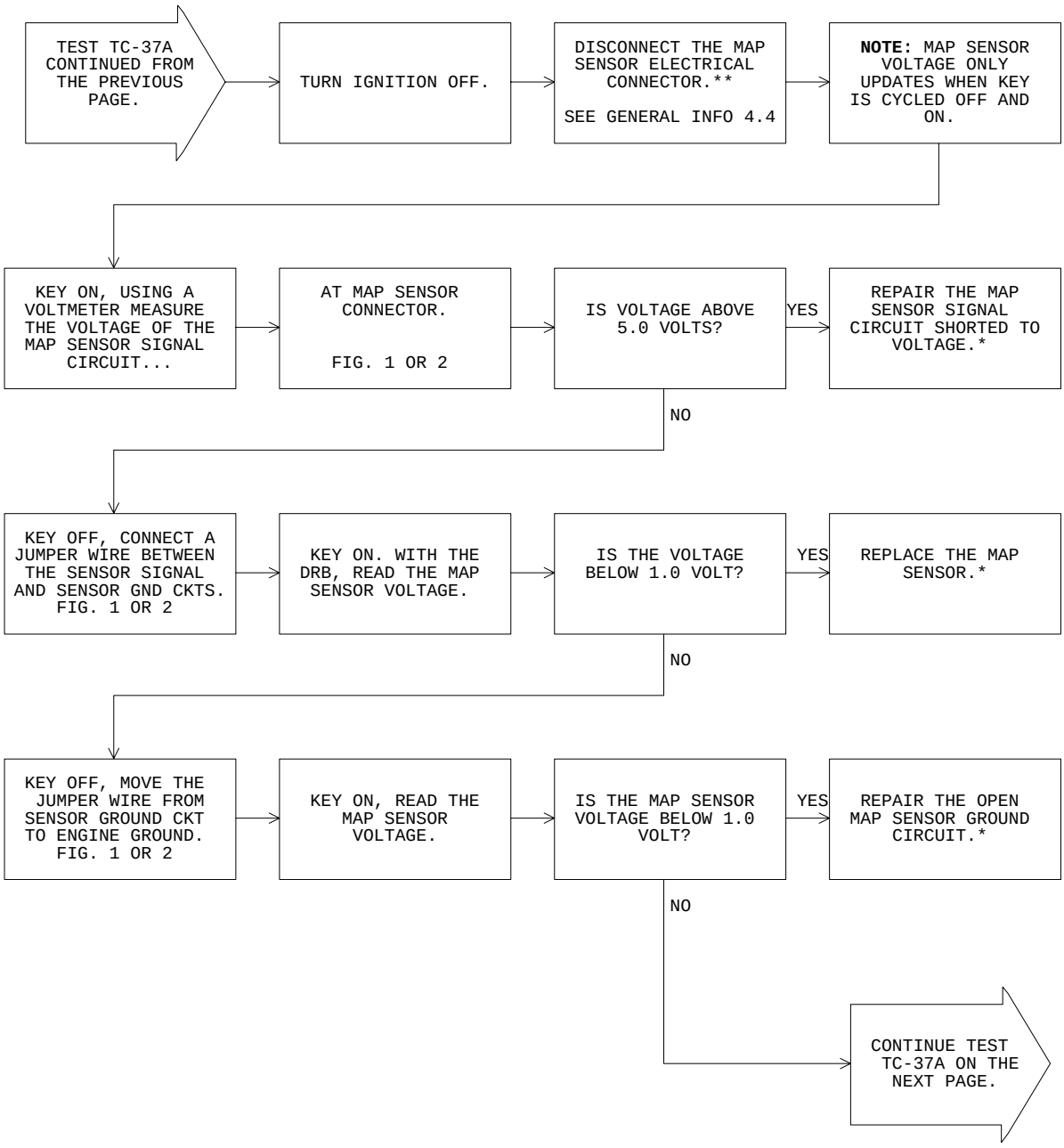


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

TEST TC-37A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO HIGH



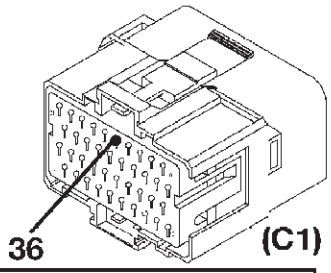
Perform Verification TEST VER-2A.

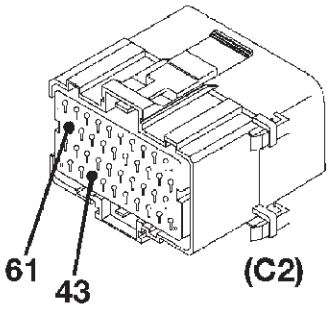
****Check connectors - Clean / repair as necessary.***

TEST TC-37A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO HIGH

2.7L

POWERTRAIN CONTROL MODULE CONNECTORS

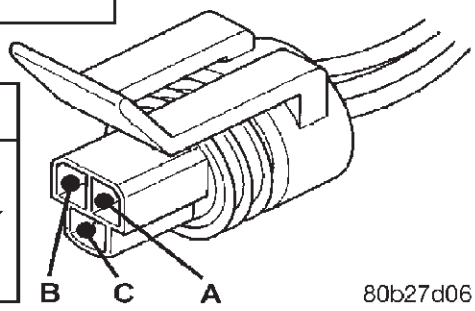




CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP SENSOR CONNECTOR

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

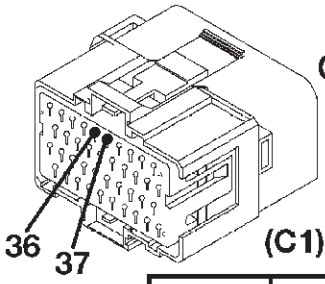


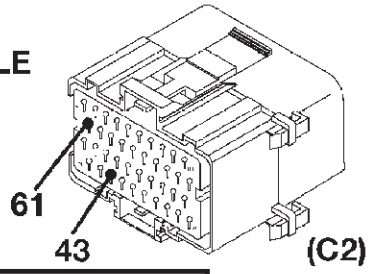
80b27d06

FIG. 1

3.5L

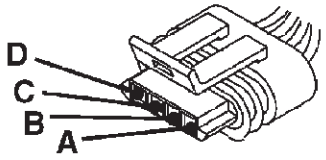
POWERTRAIN CONTROL MODULE CONNECTORS





CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
37	BK/RD	IAT SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP / INTAKE AIR TEMP SENSOR CONNECTOR

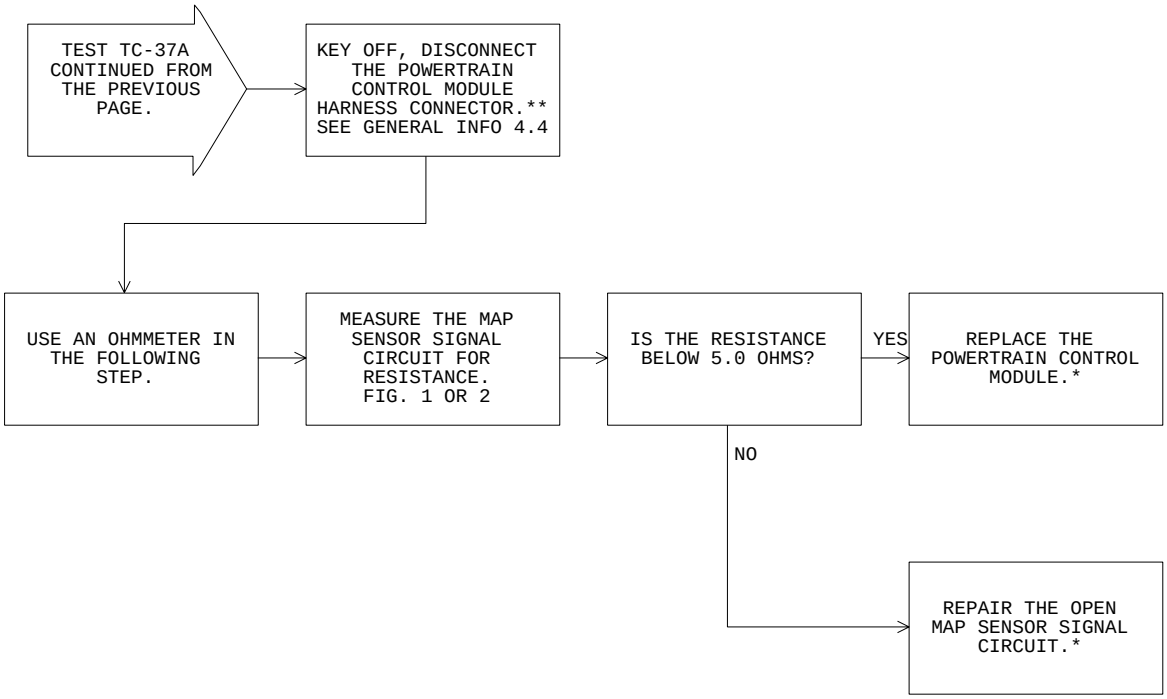


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SIGNAL
C	VT/WT	5-VOLT SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80b27d07

FIG. 2

TEST TC-37A CONTINUED - REPAIRING - MAP SENSOR VOLTAGE TOO HIGH



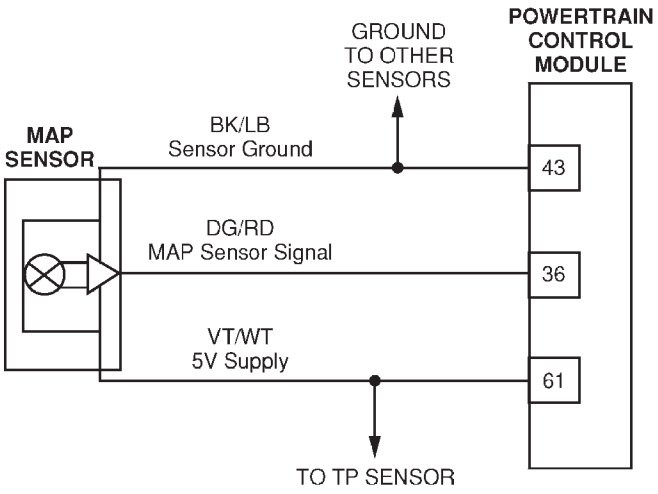
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

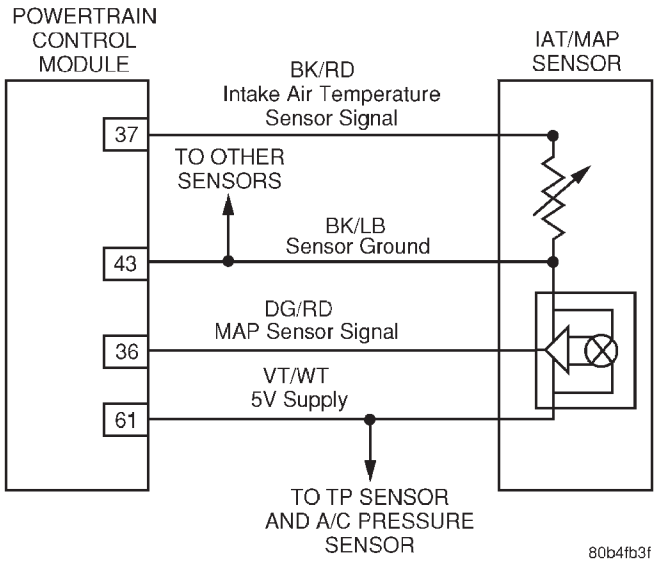
TEST TC-39A REPAIRING - NO CHANGE IN MAP FROM START TO RUN

Perform TEST DTC Before Proceeding

2.7L



3.5L



Name of code: No Change in MAP From Start to Run

When monitored: With engine rpm above 400 but less than 1500 and the throttle body at closed throttle.

Set condition: Too small a difference is seen between barometric pressure at ignition on and manifold vacuum (engine running) for 1.76 seconds.

Theory of operation: This sensor measures manifold absolute pressure and ambient barometric pressure within the manifold. It provides a 0 to 5-volt signal to PCM cavity 36. The MAP sensor puts out a low voltage signal (0.5 to 1.8 volts) at idle when the manifold vacuum is high, and a higher voltage signal (3.9 to 4.8 volts) at deep throttle when the manifold vacuum is low. The MAP receives a 5-volt supply from PCM cavity 61; voltage may vary from 4.8 to 5.1 volts. The sensor ground is provided by PCM cavity 43.

Possible causes:

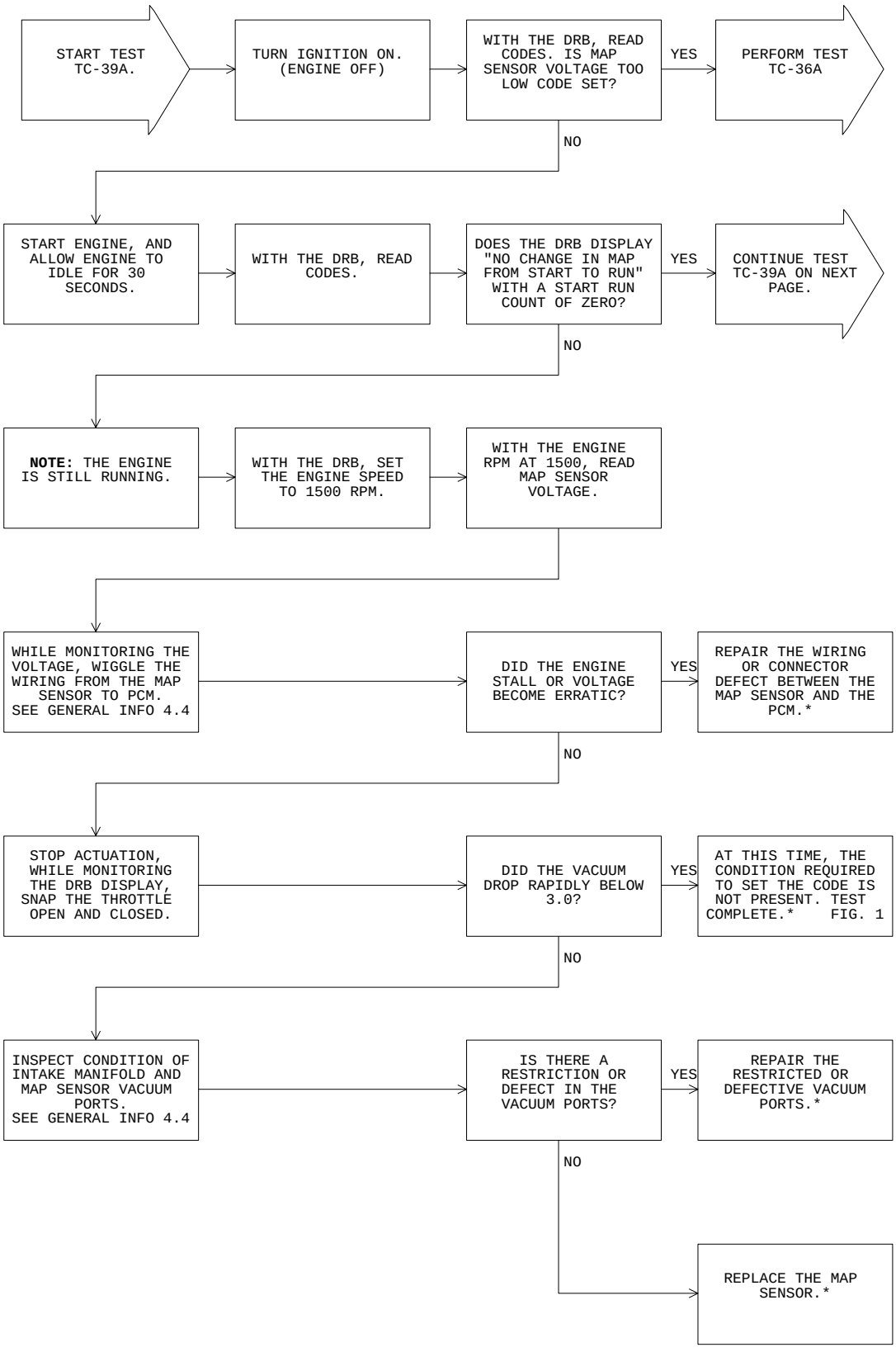
- Restricted or leaking vacuum/pressure to MAP sensor
- Ice in sensor or passage
- Failed sensor
- PCM failure
- Connector terminals
- Connector wires

2620103

FIG. 1

TEST TC-39A REPAIRING - NO CHANGE IN MAP FROM START TO RUN

Perform TEST DTC Before Proceeding

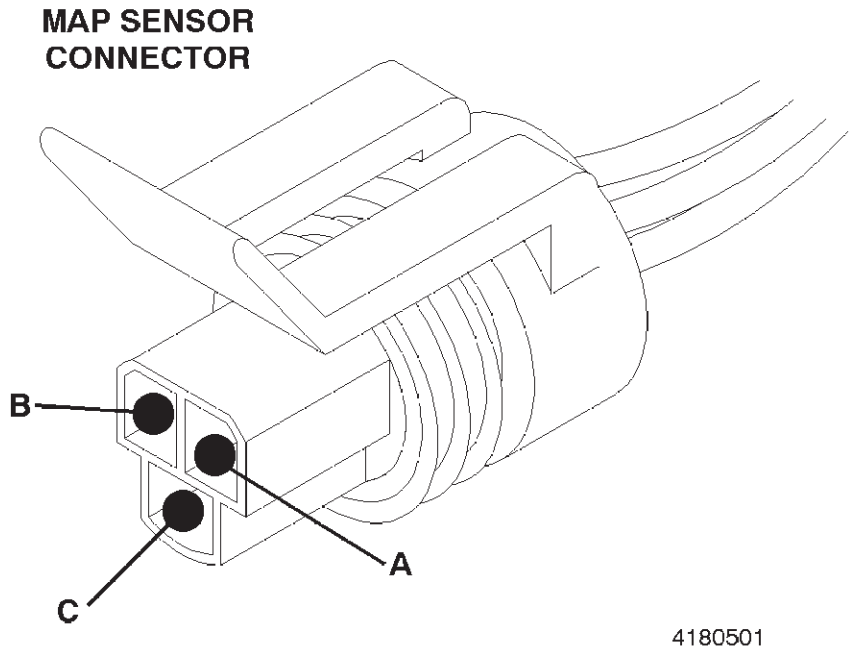


Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-39A CONTINUED - REPAIRING - NO CHANGE IN MAP FROM START TO RUN

2.7L

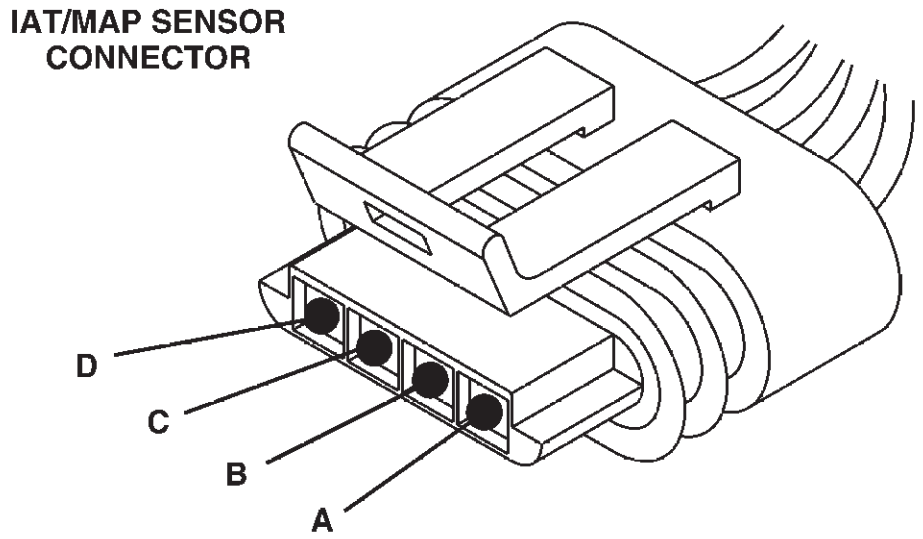


4180501

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 1

3.5L

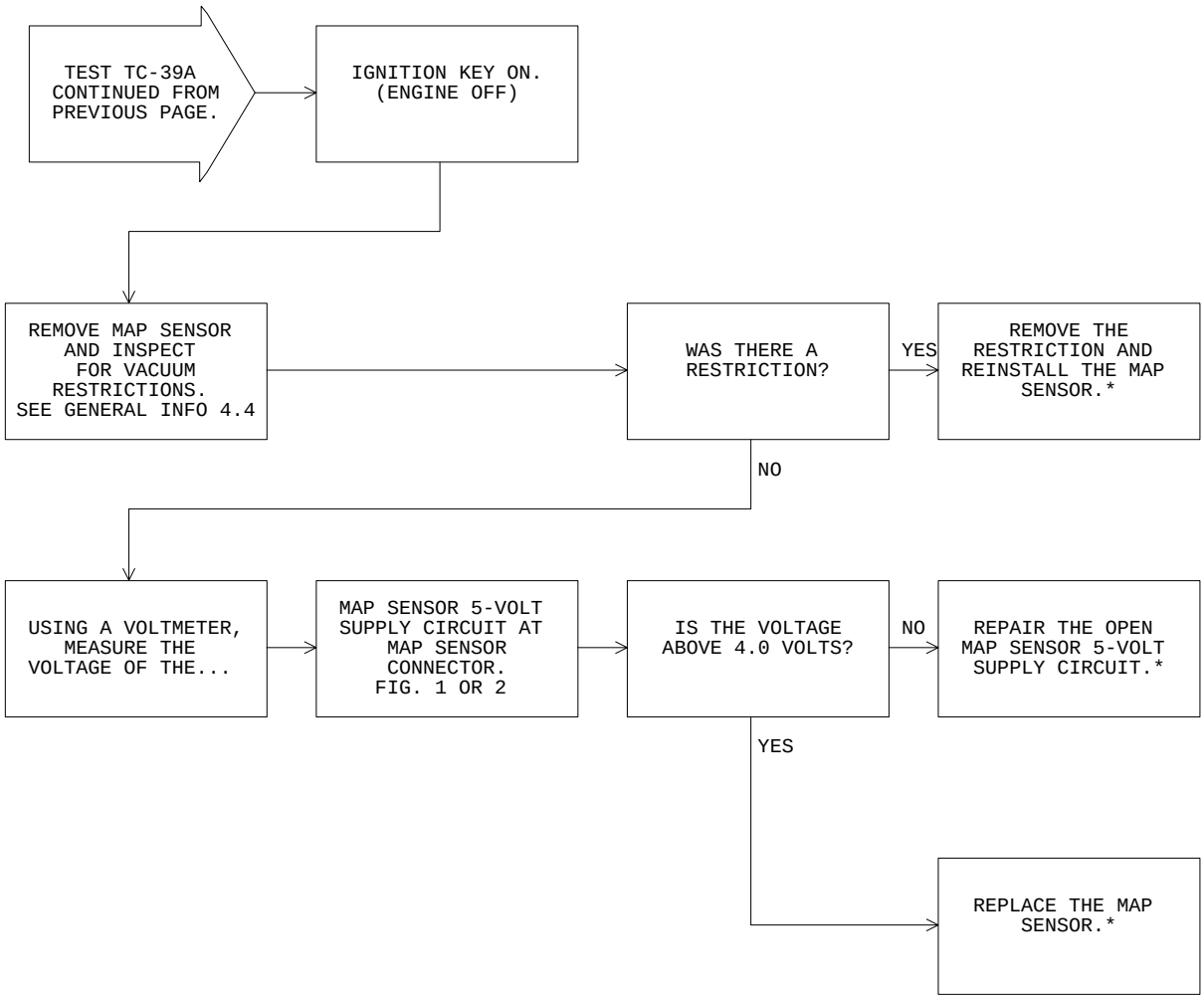


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

TEST TC-39A CONTINUED - REPAIRING - NO CHANGE IN MAP FROM START TO RUN



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-40A REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST DTC Before Proceeding

Name of code: No Crank Reference Signal at PCM

When monitored: With the ignition in either the start or run position and battery voltage between 4-15 volts.

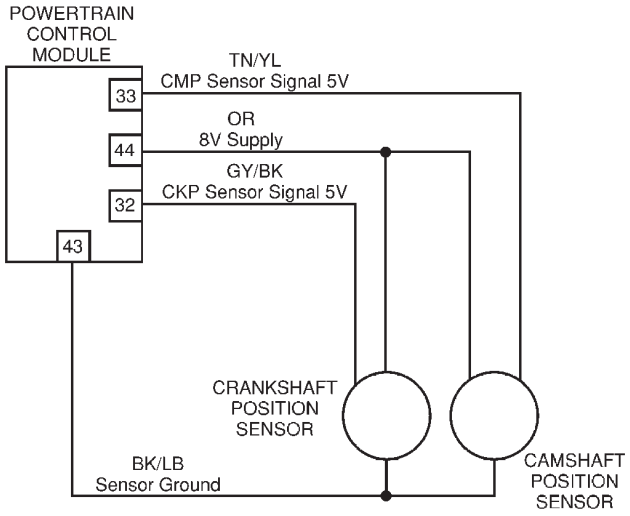
Set condition: No crankshaft position sensor signal is detected when engine vacuum is present or cam signals are present.

Theory of operation: The crankshaft position sensor is a hall-effect type sensor used to detect the crankshaft's speed and position. The PCM supplies 8 volts and a sensor ground to the CKP sensor. The crankshaft position sensor signal circuit has a 5-volt pull-up from the PCM. The sensor signal is created by the slots cut in the flywheel passing under the sensor. When a slot is under the sensor, the signal is high (5v). When the metal between the slots is under the sensor, the signal is low (0.3v).

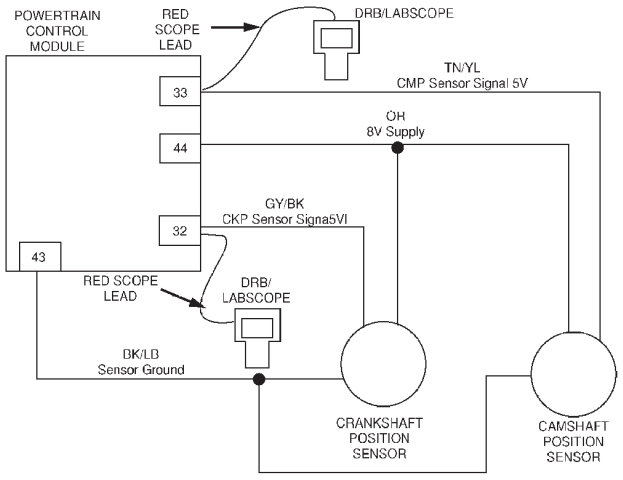
Possible causes:

- Open or shorted 8-volt supply circuit
- Open sensor ground
- Open or shorted signal circuit
- Excessive clearance between the sensor and flywheel
- Damaged flywheel
- Failed sensor
- Failed PCM

2660406

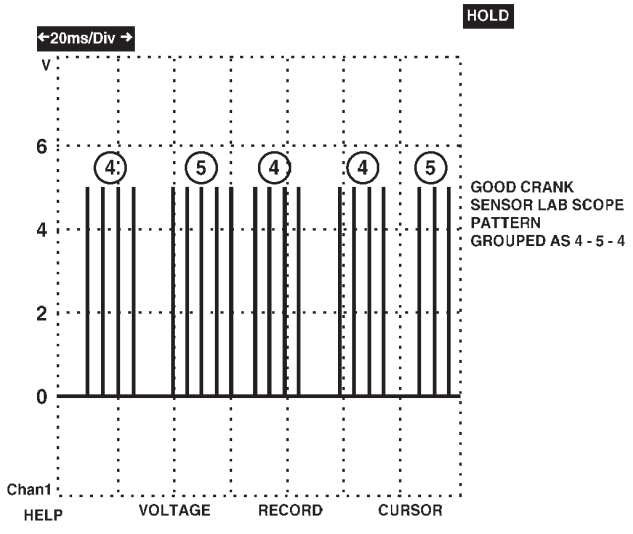


80b27c75



80b29fa9

FIG. 1

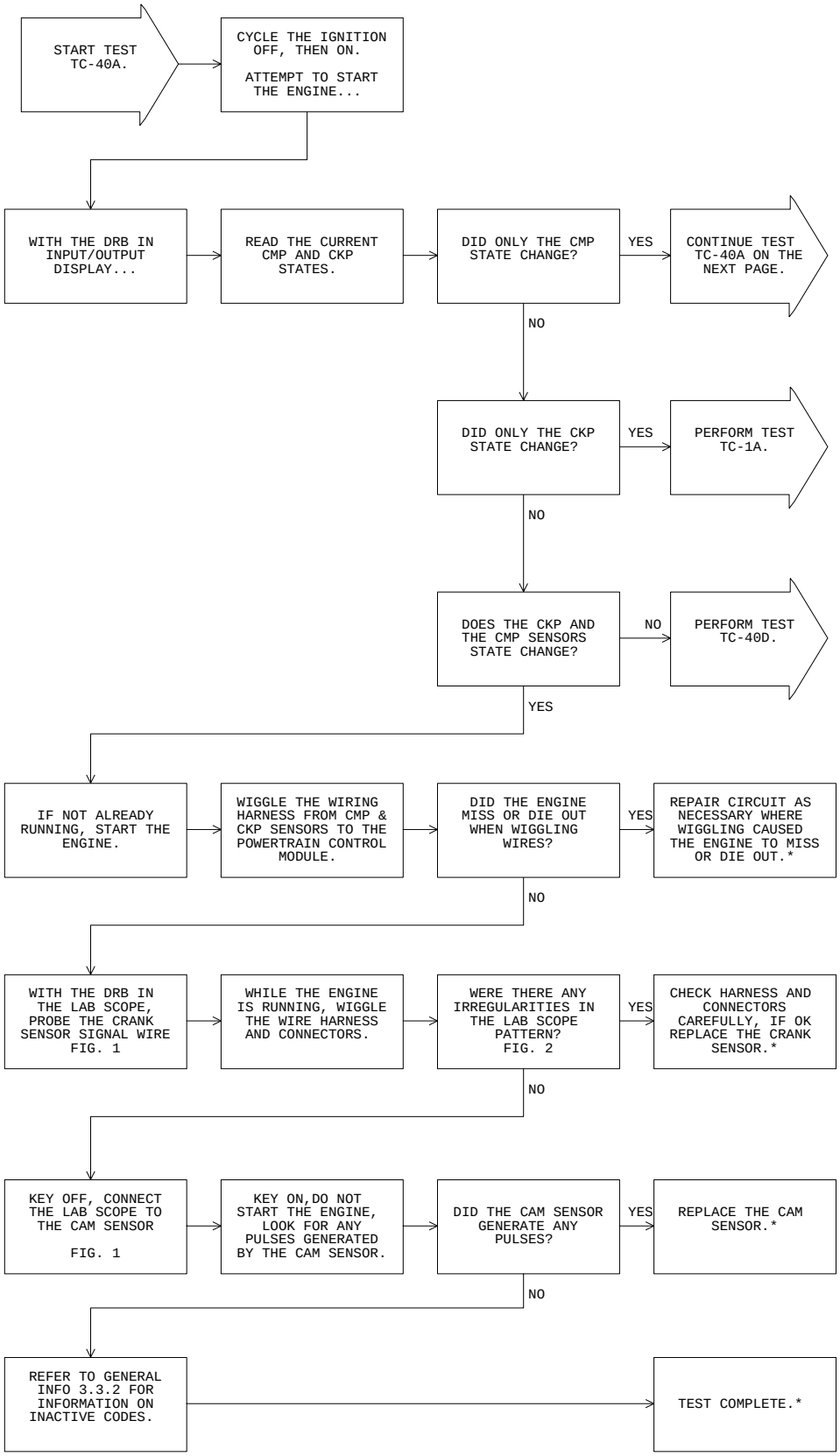


80b29fc0

FIG. 2

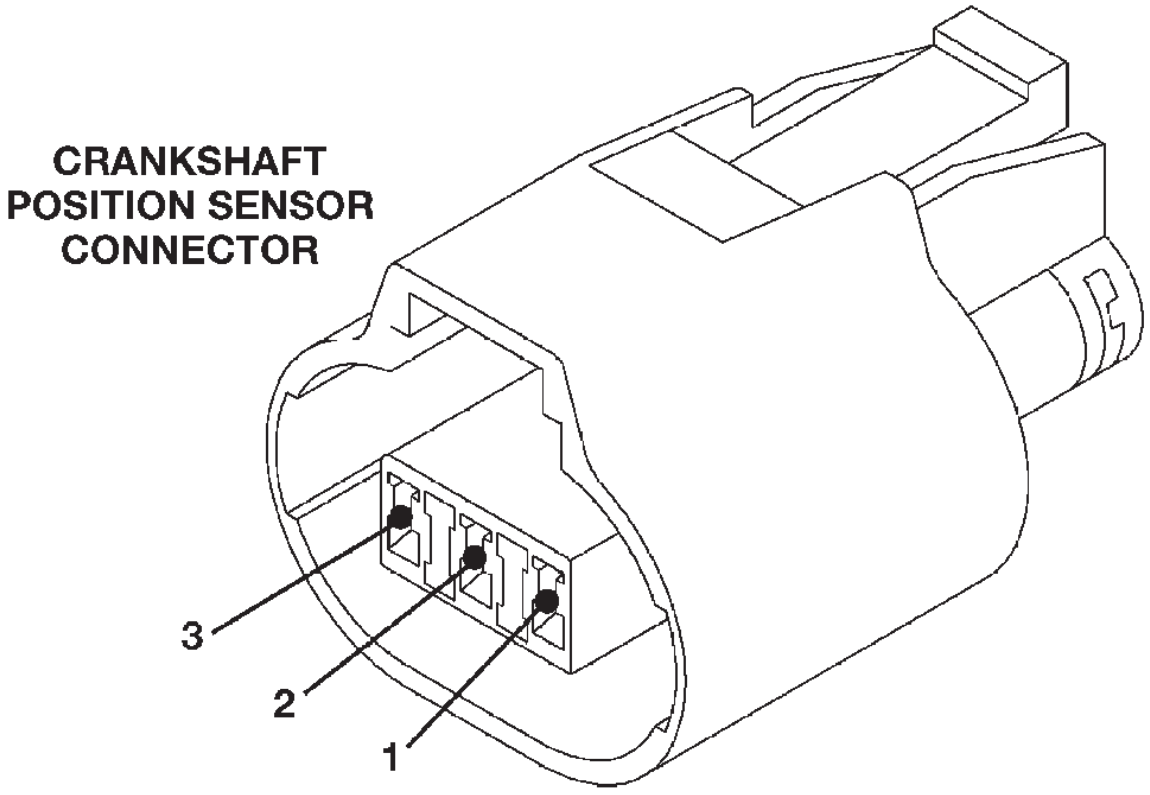
TEST TC-40A REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

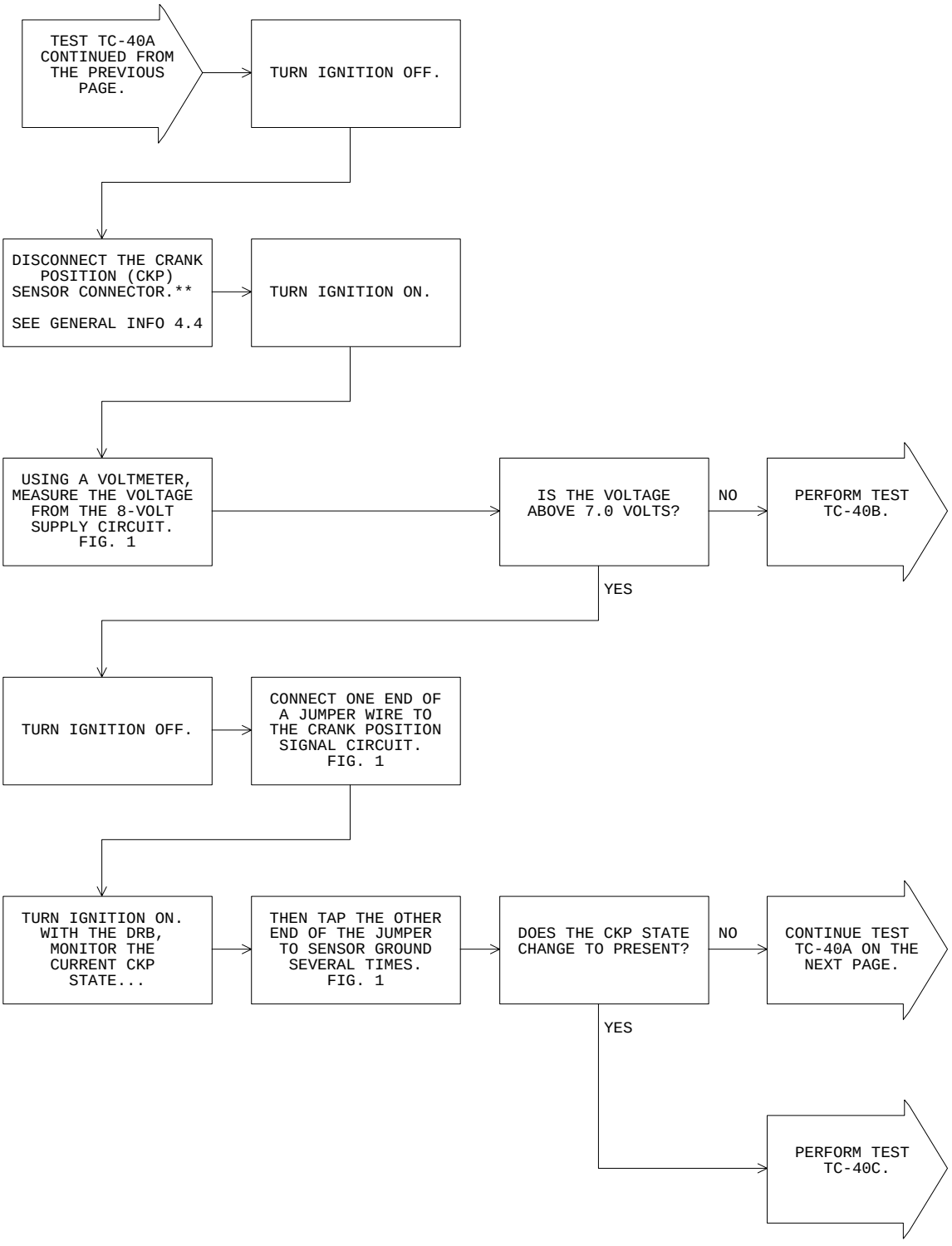


CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL 5V
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c63

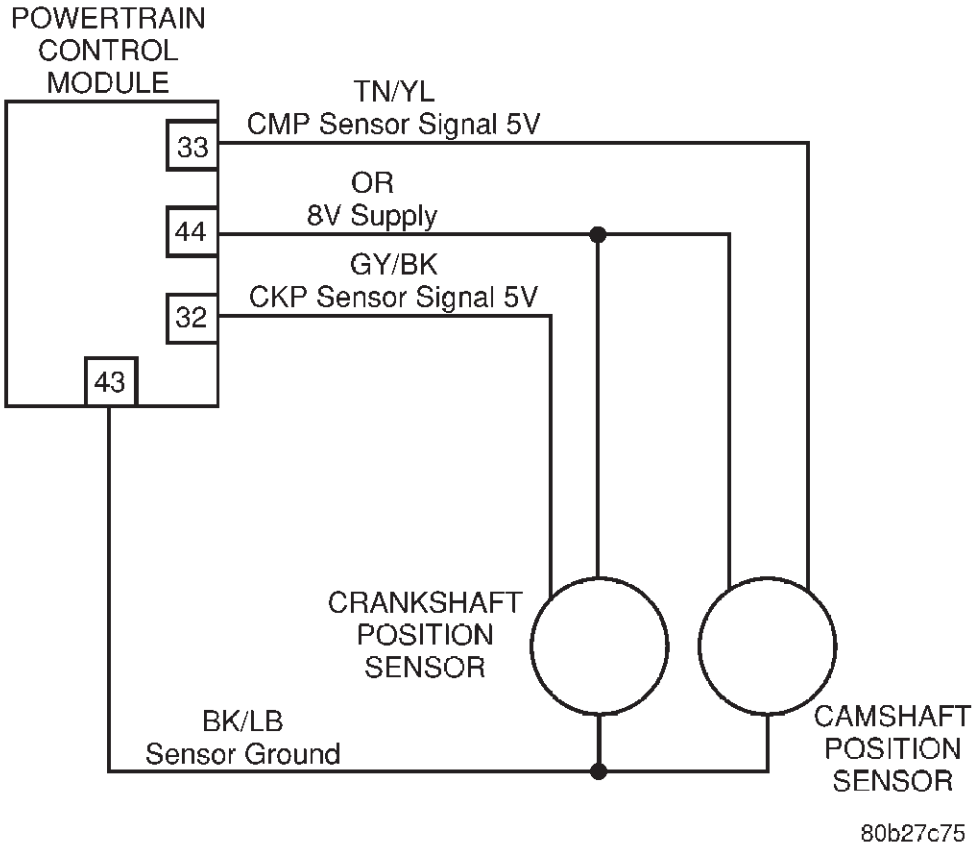
FIG. 1

TEST TC-40A CONTINUED - REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

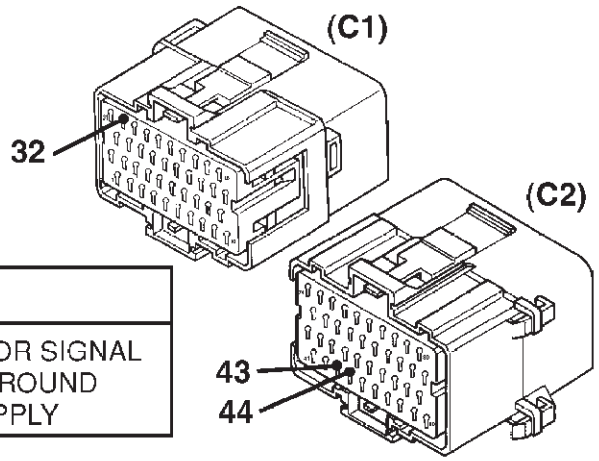


*Perform Verification TEST VER-2A.	**Check connectors - Clean / repair as necessary.

TEST TC-40A CONTINUED - REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

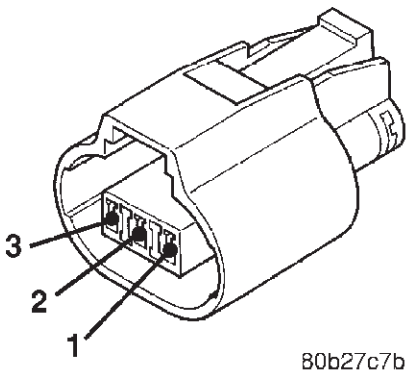


POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
32	GY/BK	CKP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
44	OR	8-VOLT SUPPLY

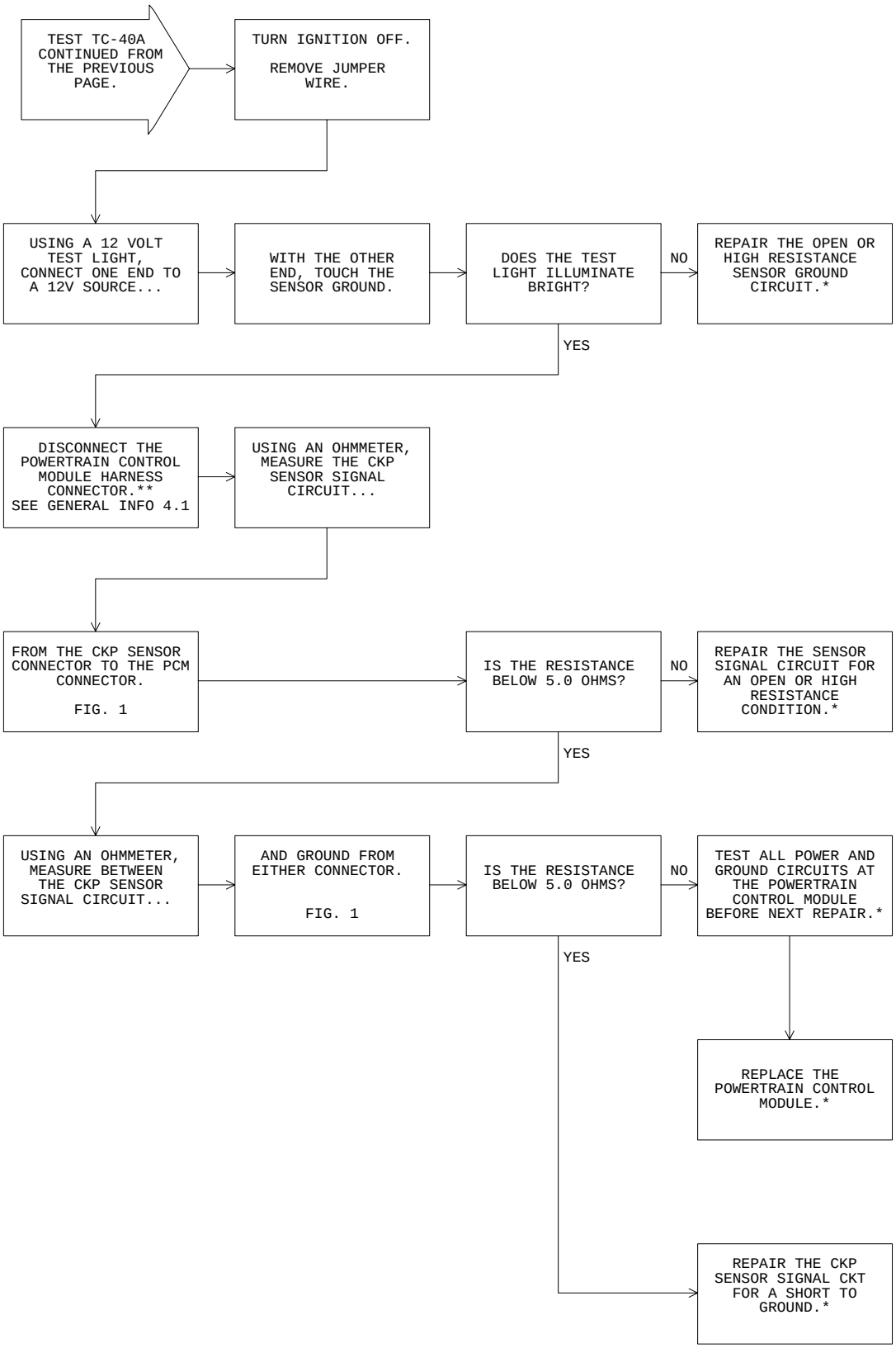
CRANKSHAFT POSITION SENSOR CONNECTOR



CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

FIG. 1

TEST TC-40A CONTINUED - REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM



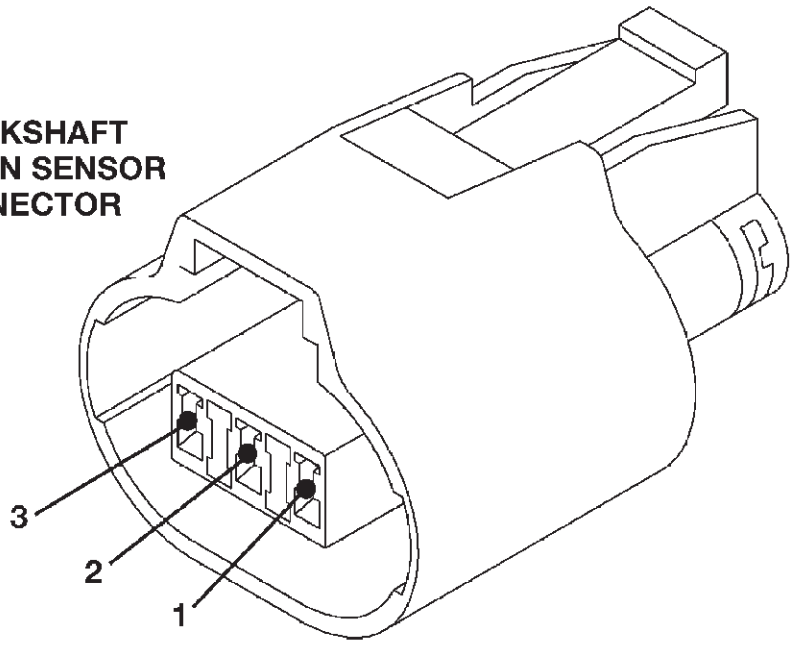
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-40B REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST TC-40A Before Proceeding

CRANKSHAFT POSITION SENSOR CONNECTOR

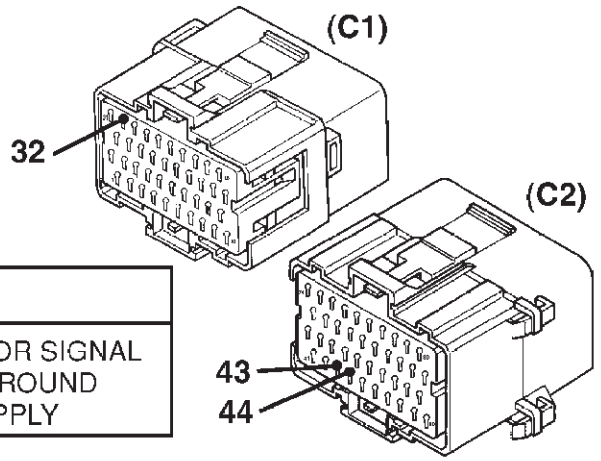


CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL 5V
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c63

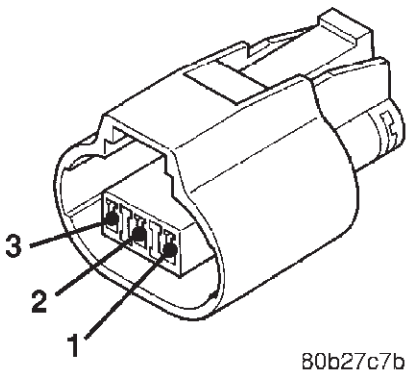
FIG. 1

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
32	GY/BK	CKP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
44	OR	8-VOLT SUPPLY

CRANKSHAFT POSITION SENSOR CONNECTOR



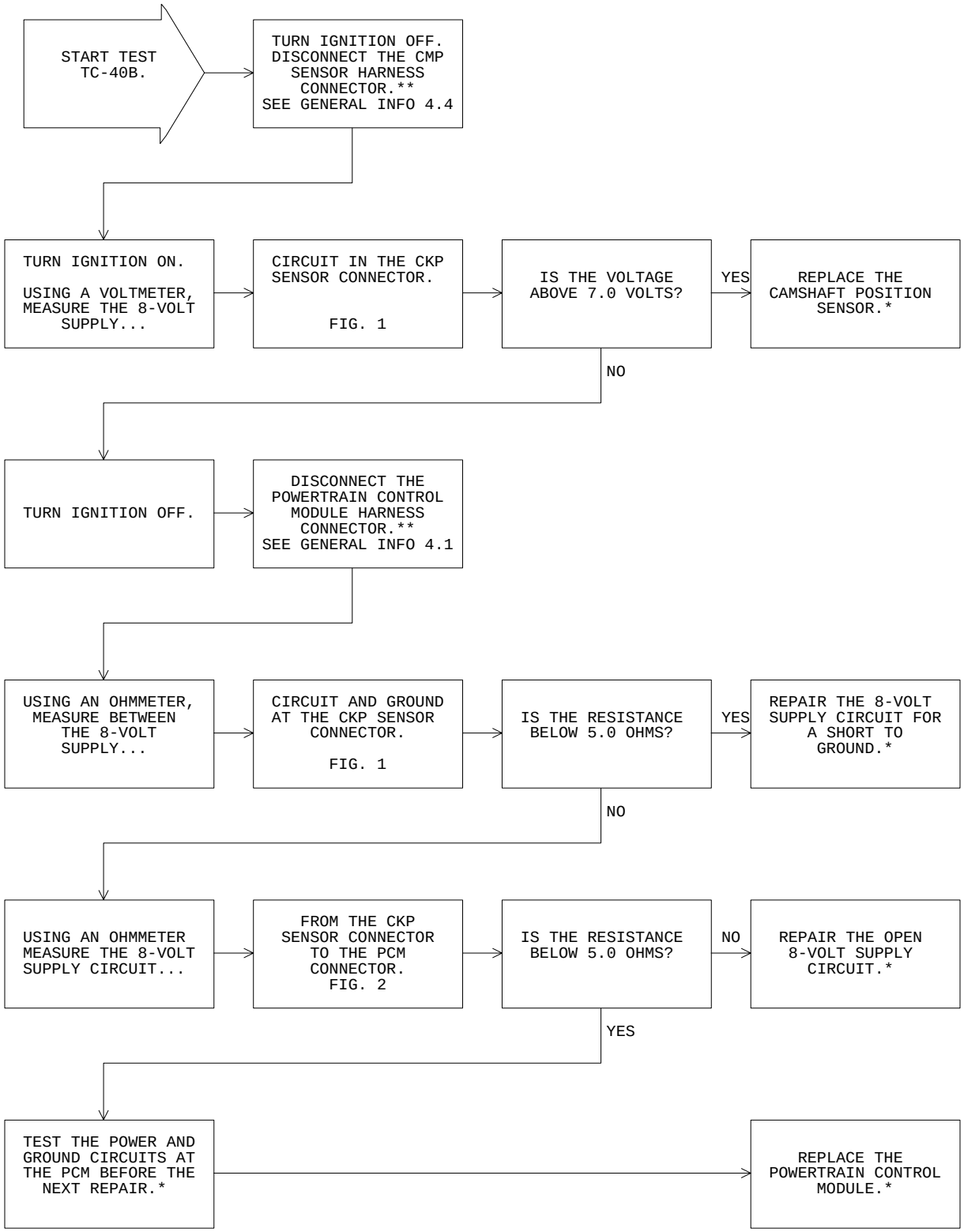
CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c7b

FIG. 2

TEST TC-40B REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST TC-40A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-40C REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

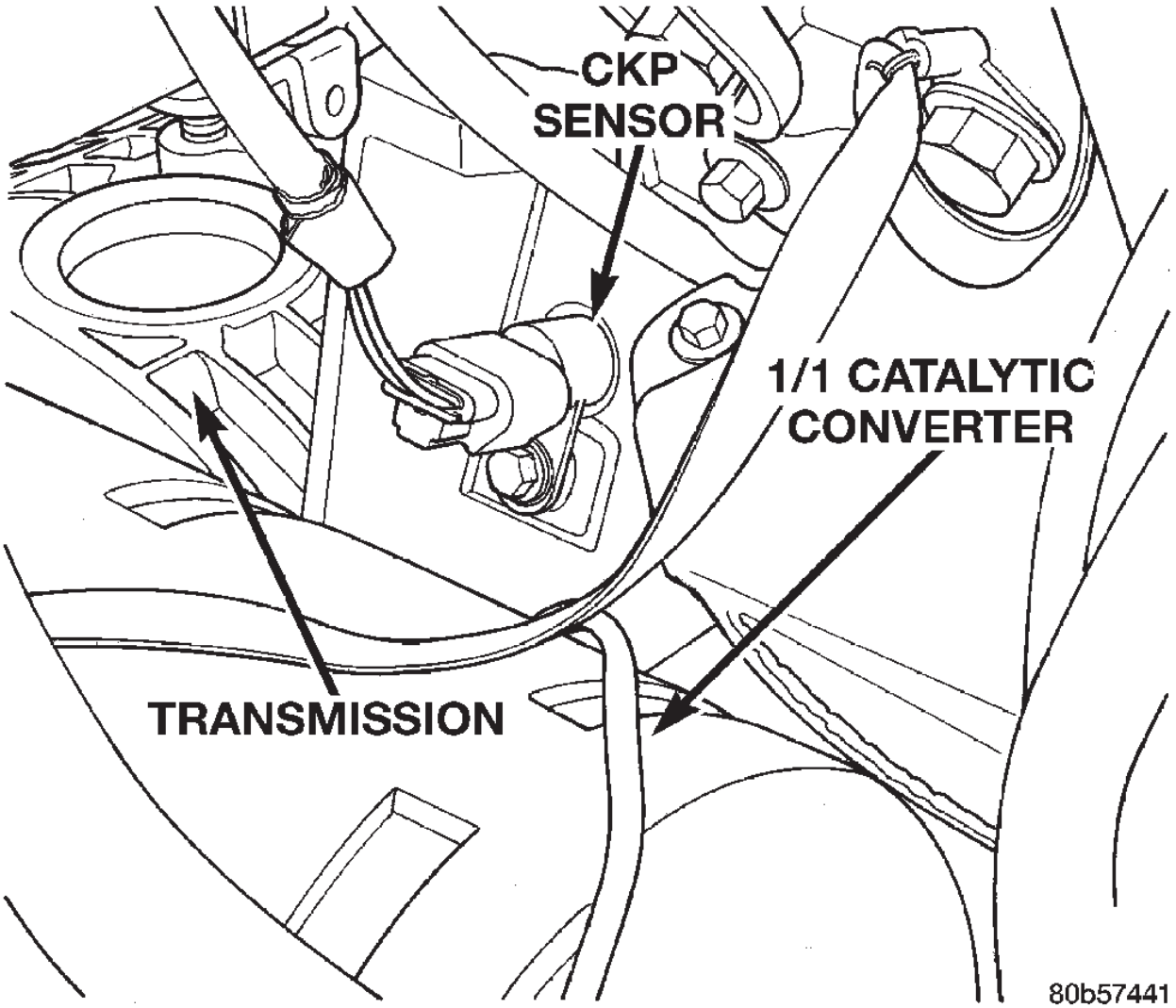
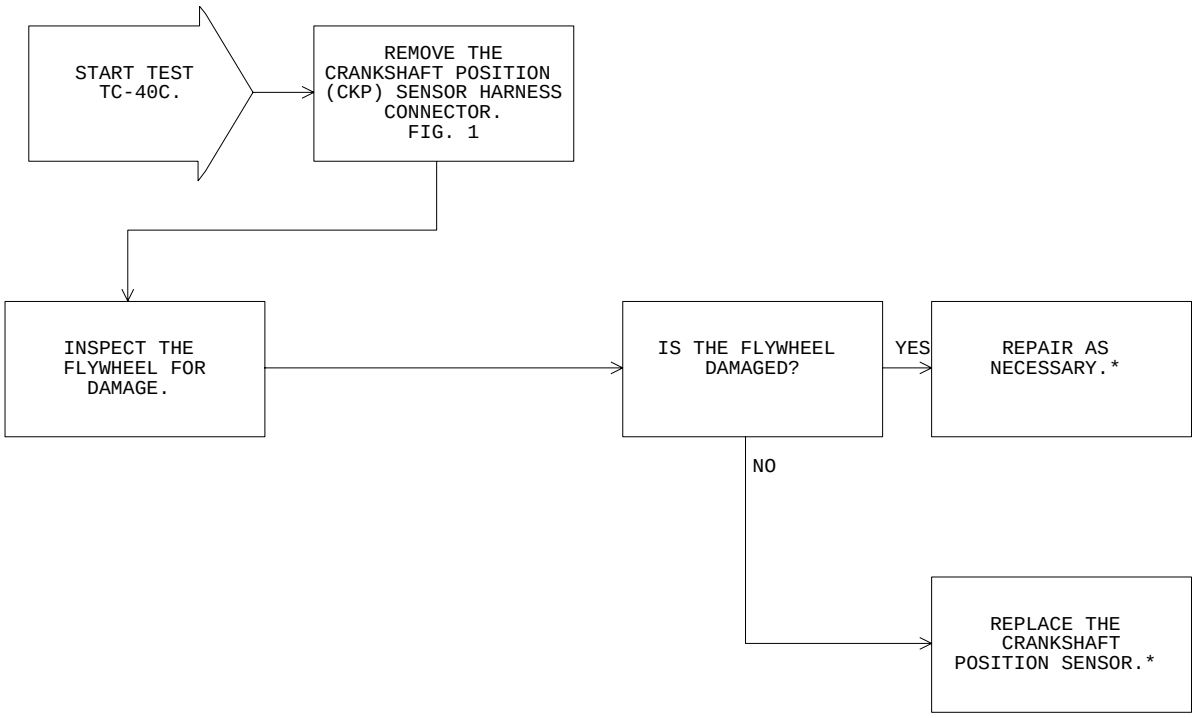


FIG. 1

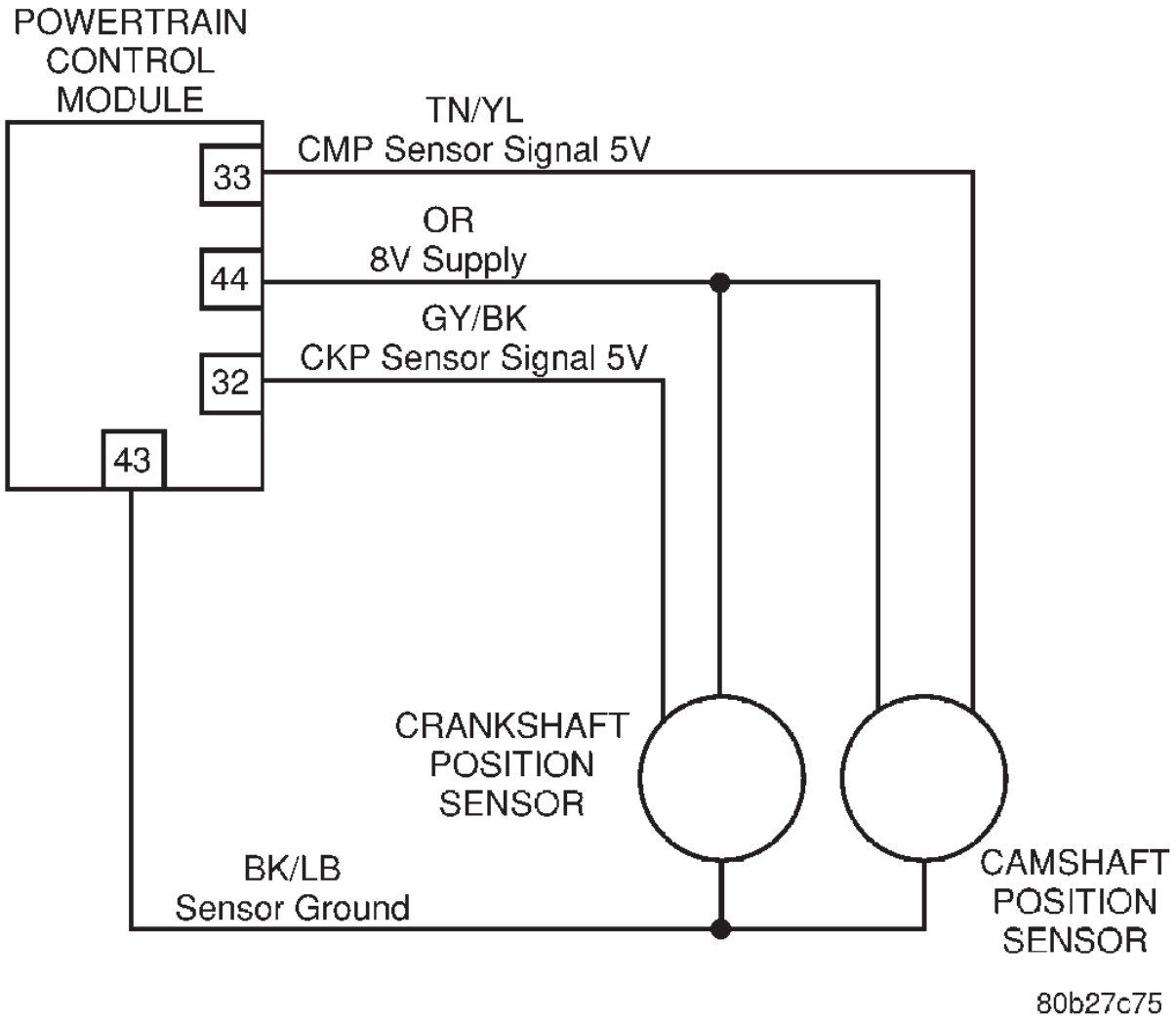
TEST TC-40C REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM



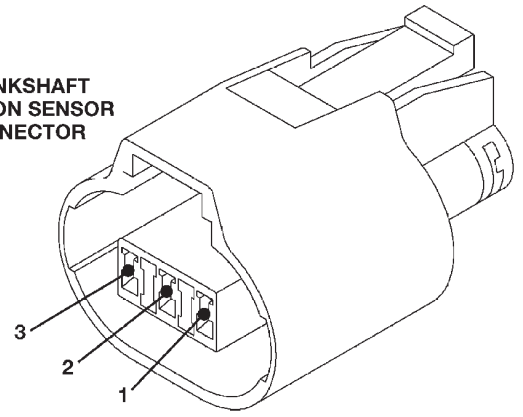
***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-40D REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST TC-40A Before Proceeding



CRANKSHAFT POSITION SENSOR CONNECTOR

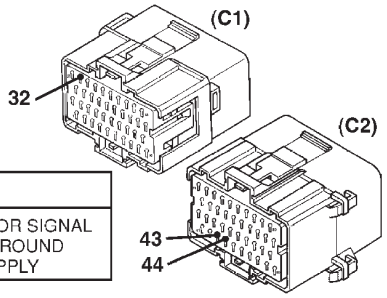


CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL 5V
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c63

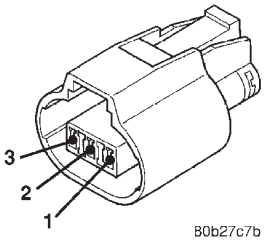
FIG. 1

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
32	GY/BK	CKP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
44	OR	8-VOLT SUPPLY

CRANKSHAFT POSITION SENSOR CONNECTOR



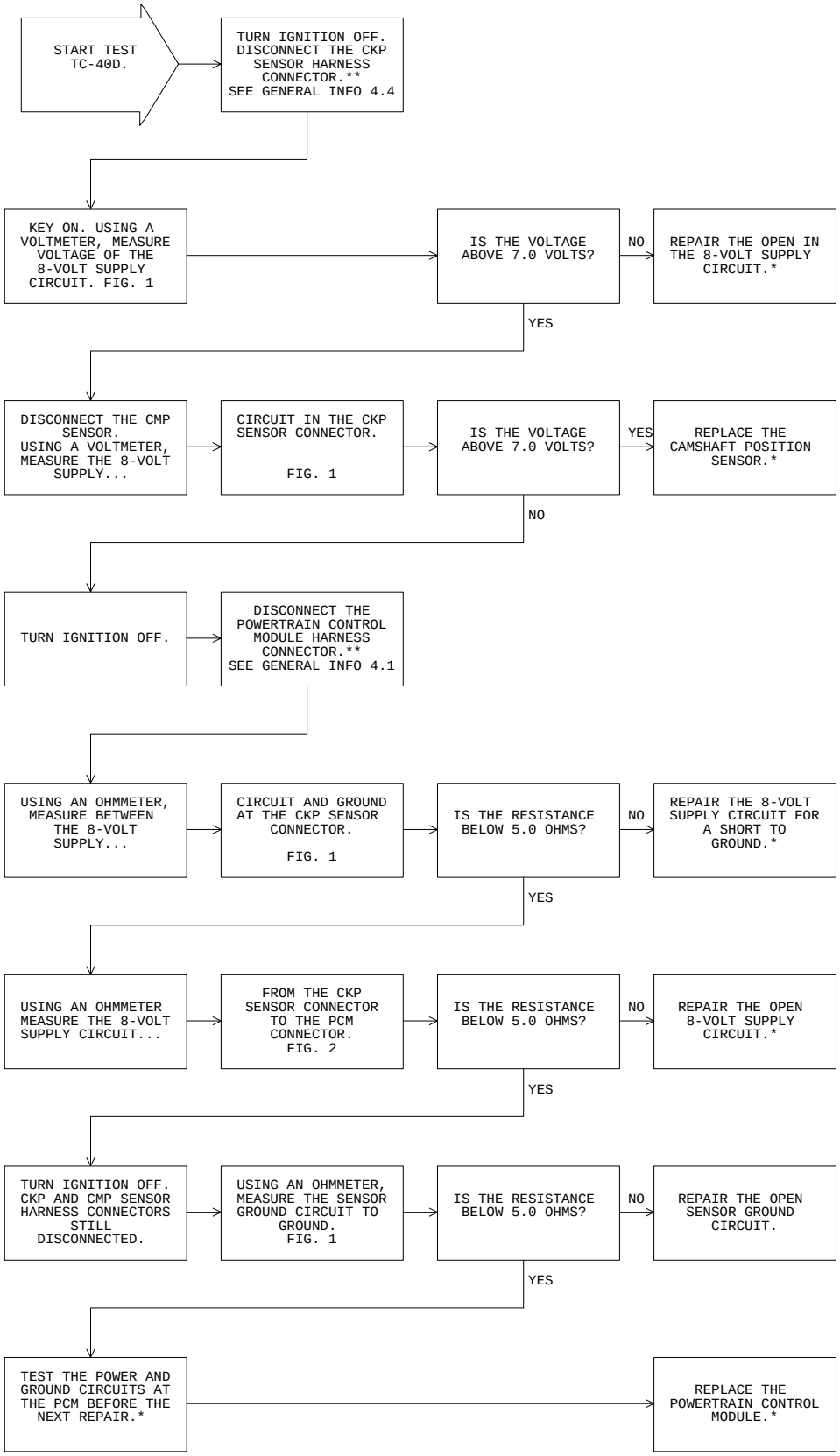
CAV	COLOR	FUNCTION
1	GY/BK	CKP SENSOR SIGNAL
2	BK/LB	SENSOR GROUND
3	OR	8-VOLT SUPPLY

80b27c7b

FIG. 2

TEST TC-40D REPAIRING - NO CRANK REFERENCE SIGNAL AT PCM

Perform TEST TC-40A Before Proceeding

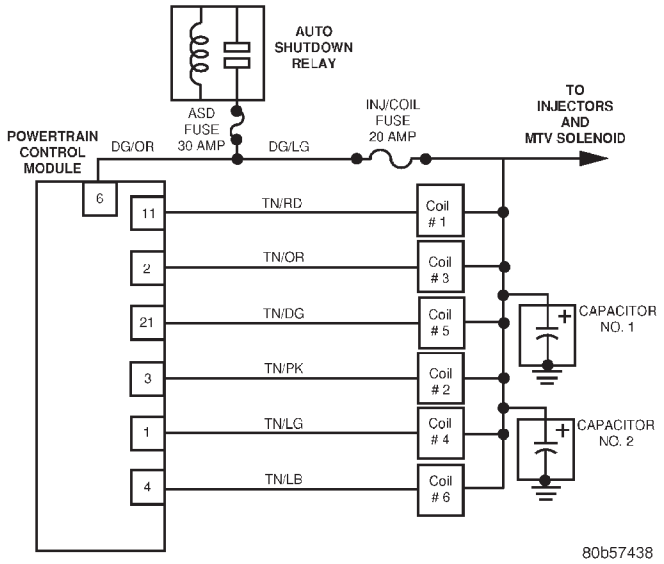


Perform Verification TEST VER-2A.

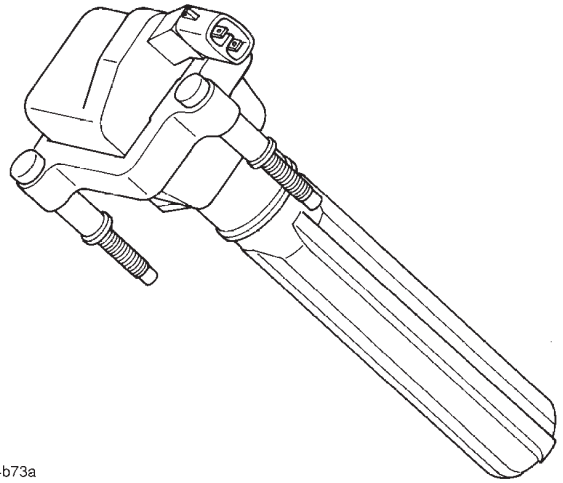
***Check connectors - Clean / repair as necessary.**

TEST TC-41A REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding



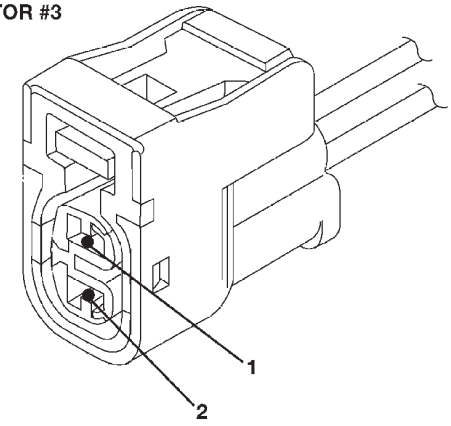
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #3

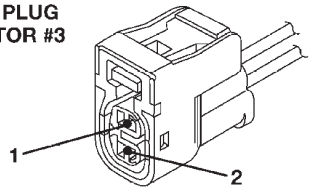


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/OR	COIL ON PLUG DRIVER #3

80b27ccd

FIG. 2

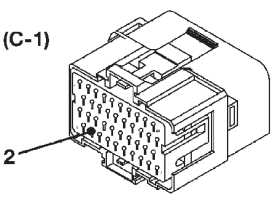
COIL ON PLUG CONNECTOR #3



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/OR	COIL ON PLUG DRIVER #3

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

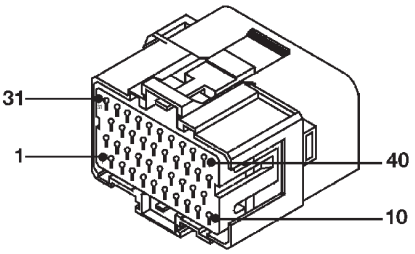


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cd2

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)



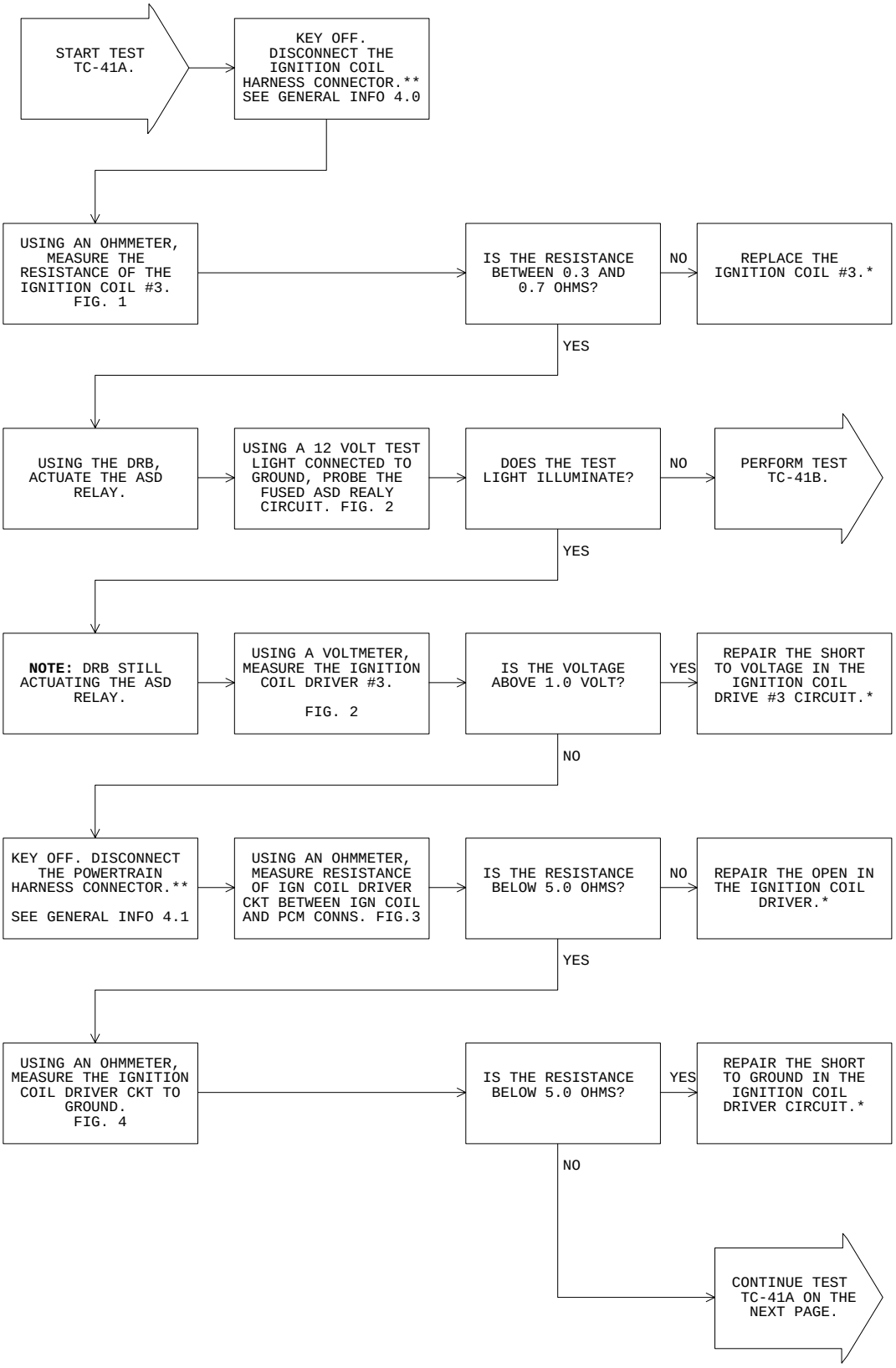
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

TEST TC-41A REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding

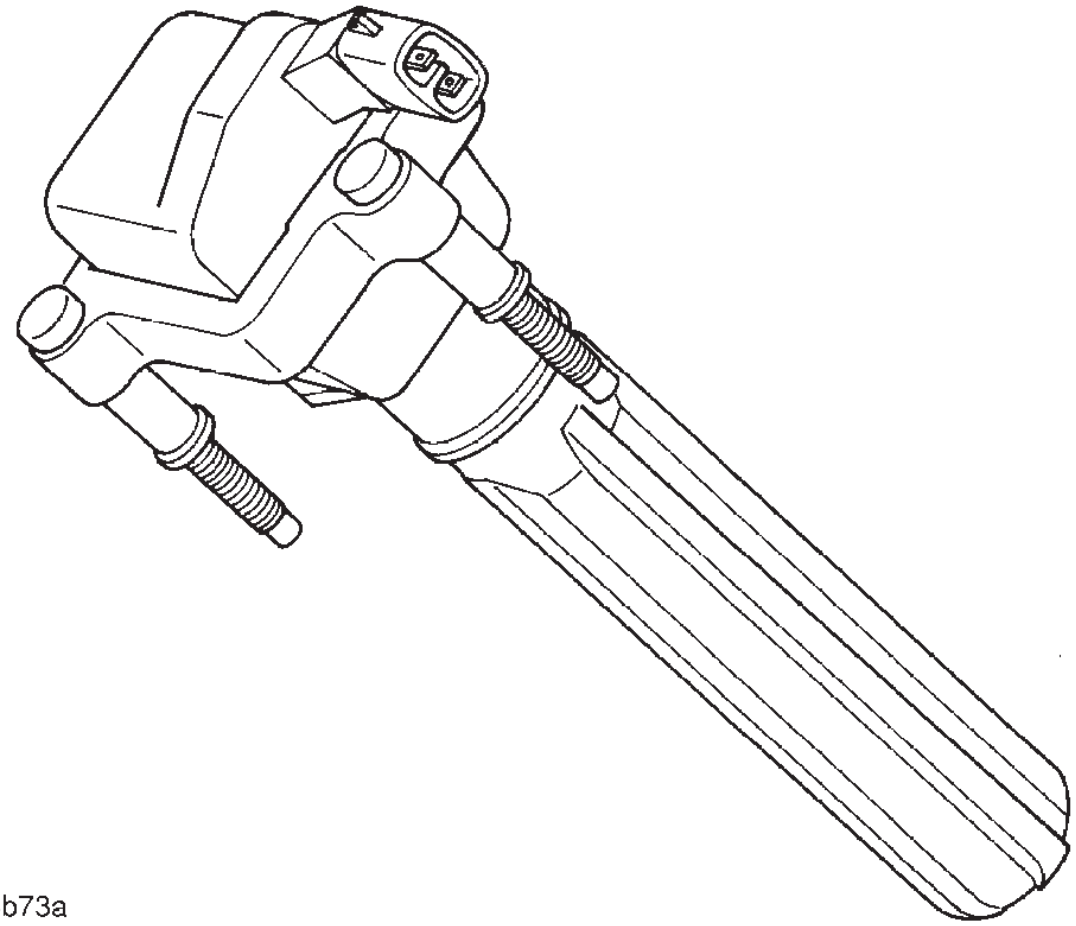


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-41A CONTINUED - REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT

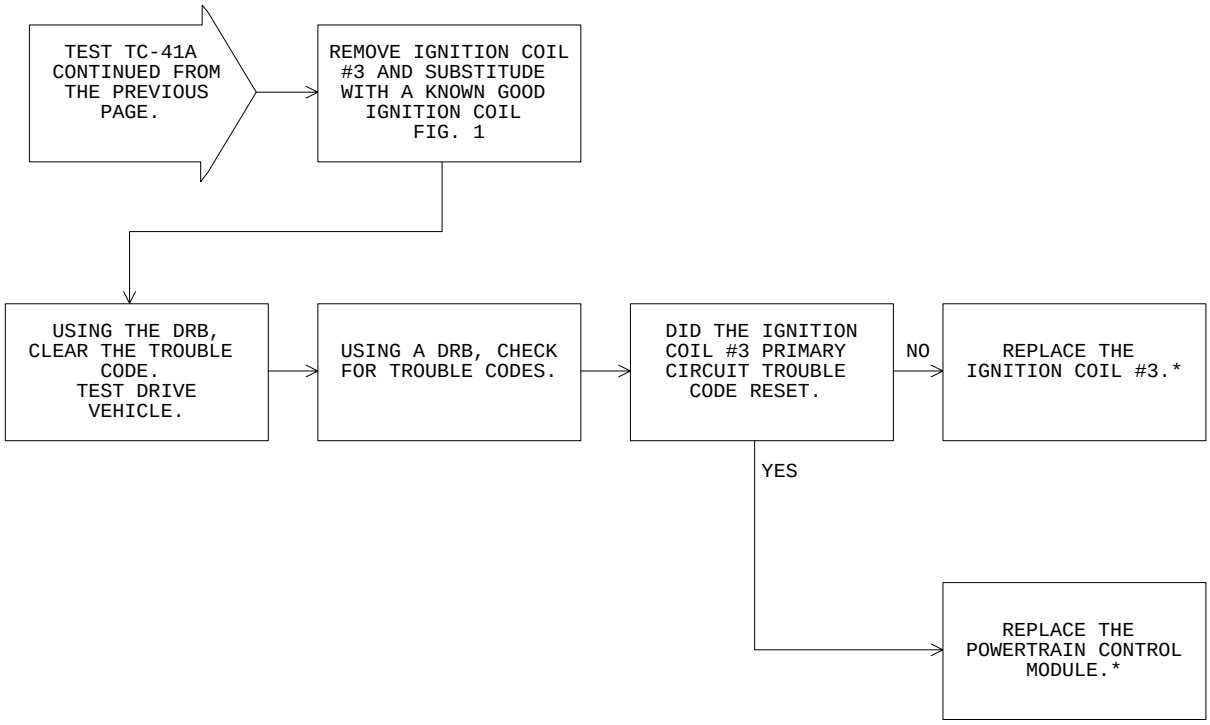
COIL ON PLUG TYPICAL



80b4b73a

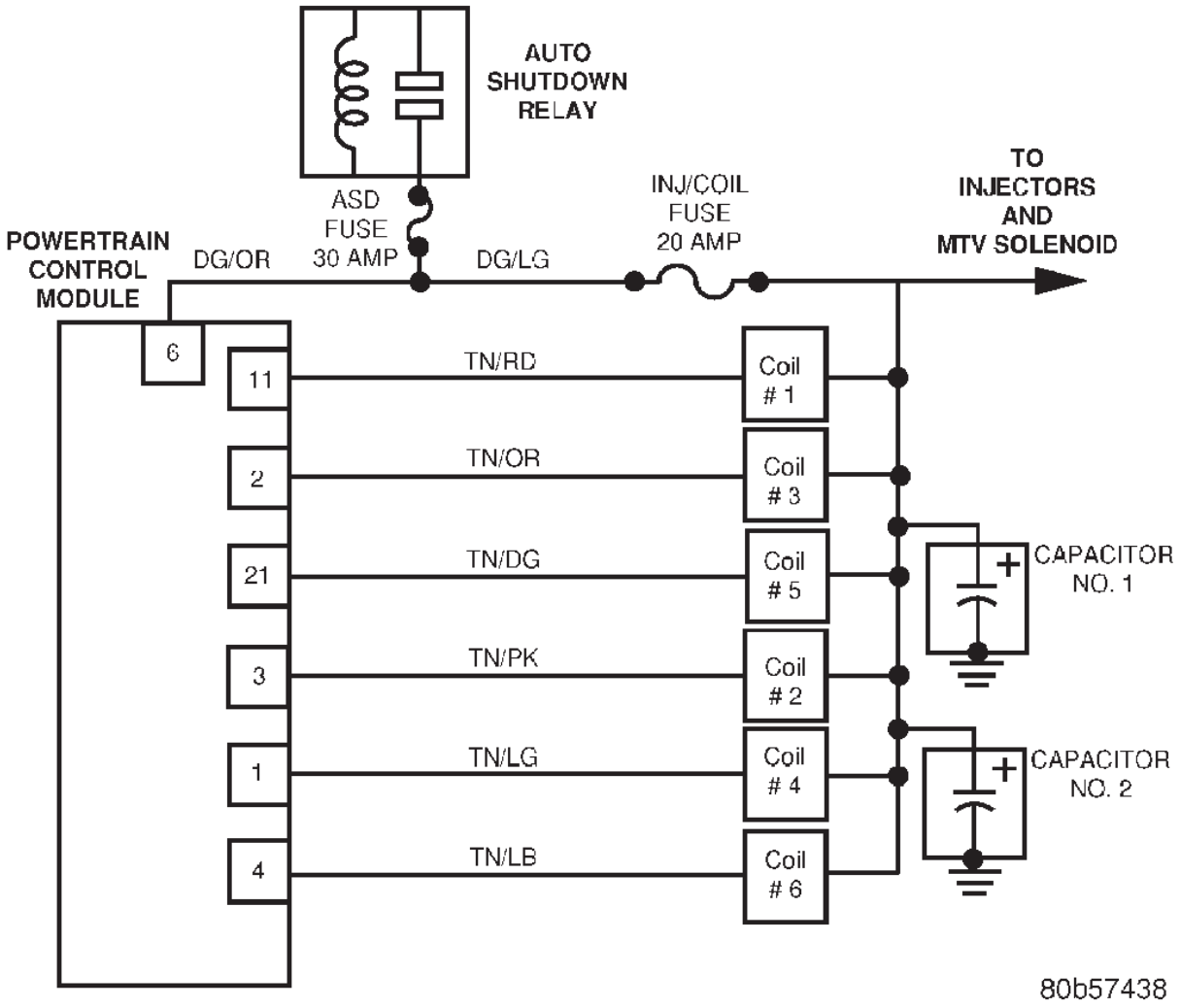
FIG. 1

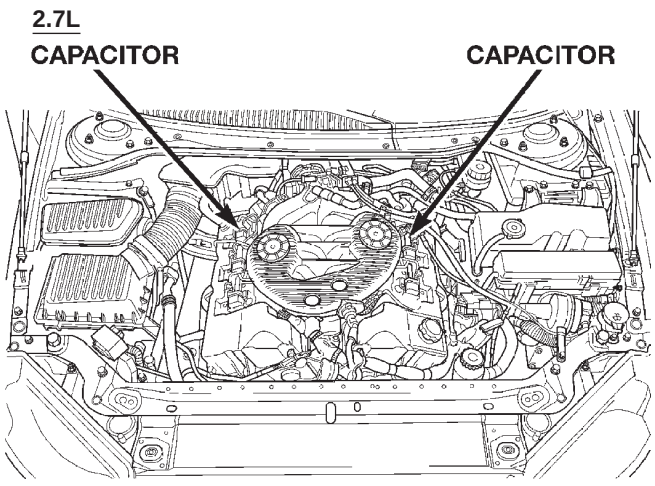
TEST TC-41A CONTINUED - REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-41B CONTINUED - REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT

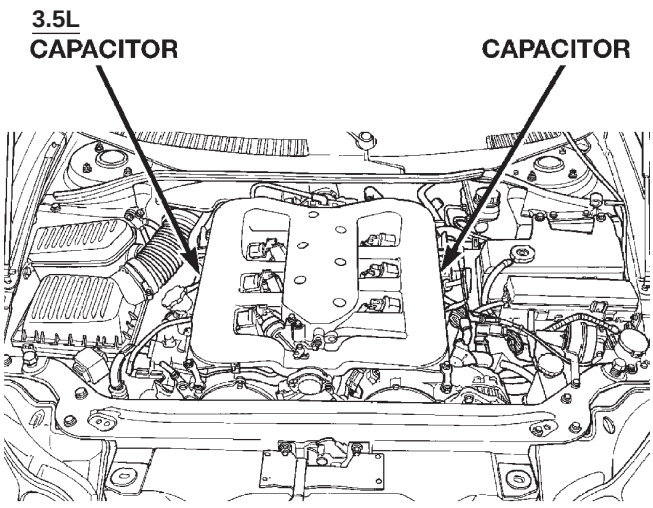




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

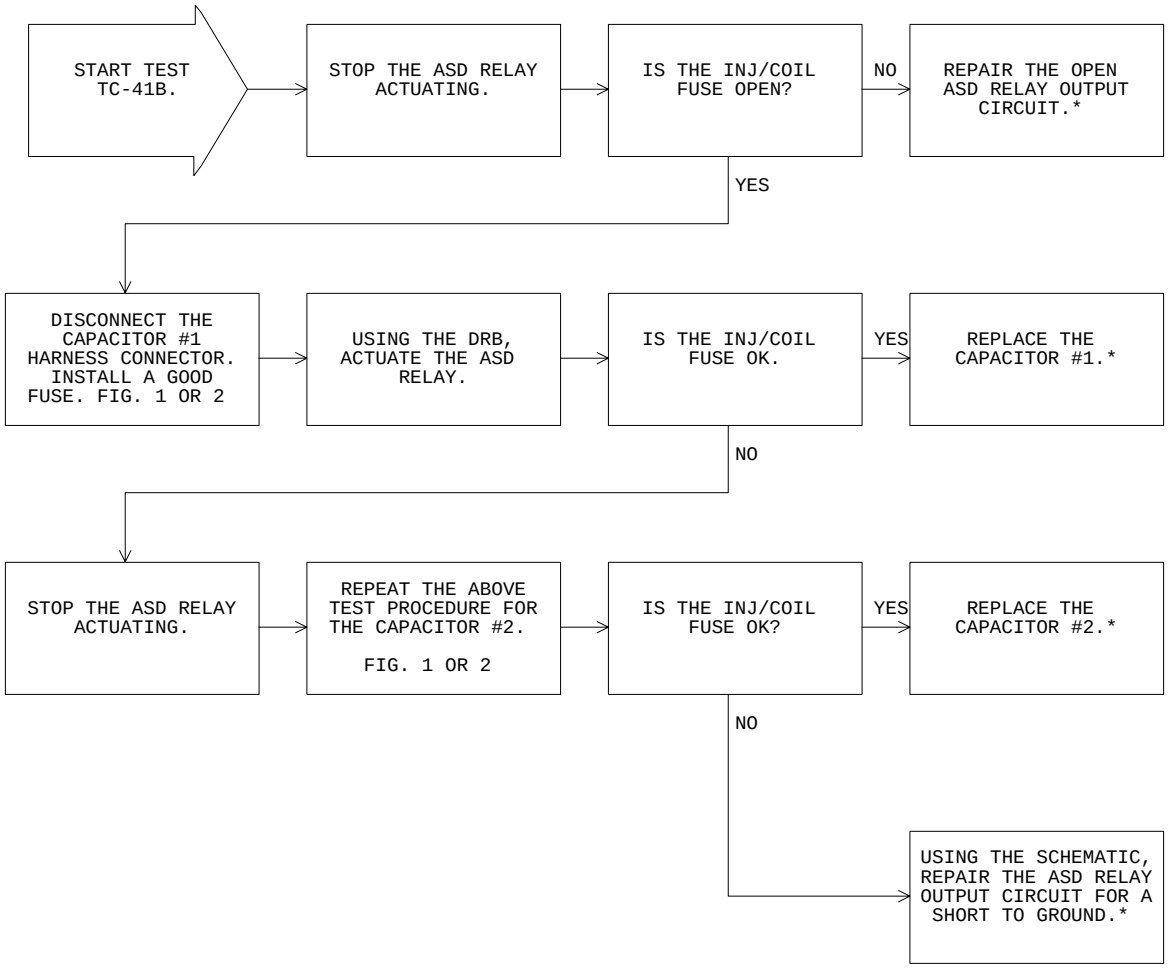


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

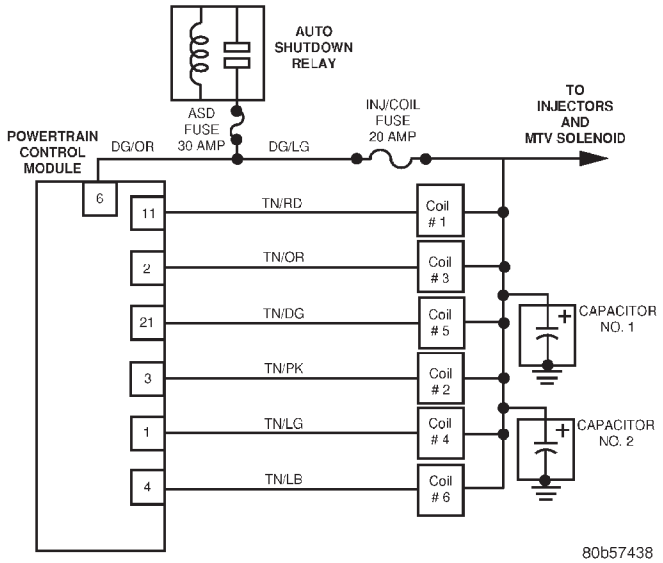
TEST TC-41B CONTINUED - REPAIRING - IGNITION COIL #3 PRIMARY CIRCUIT



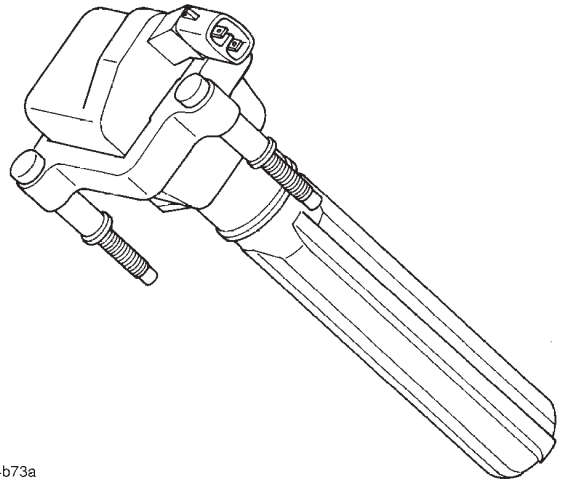
***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-42A REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding



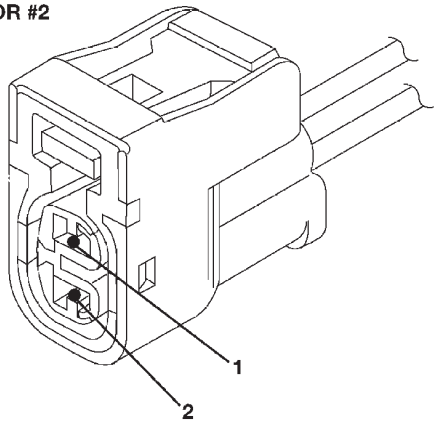
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #2

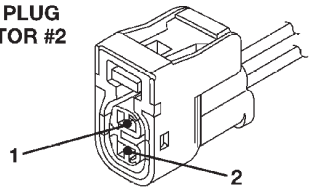


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/PK	COIL ON PLUG DRIVER #2

80b27cbc

FIG. 2

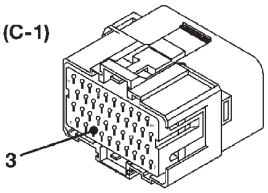
COIL ON PLUG CONNECTOR #2



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/PK	COIL ON PLUG DRIVER #2

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

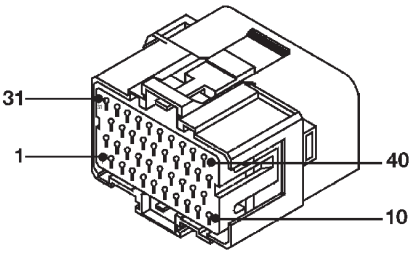


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cc2

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)



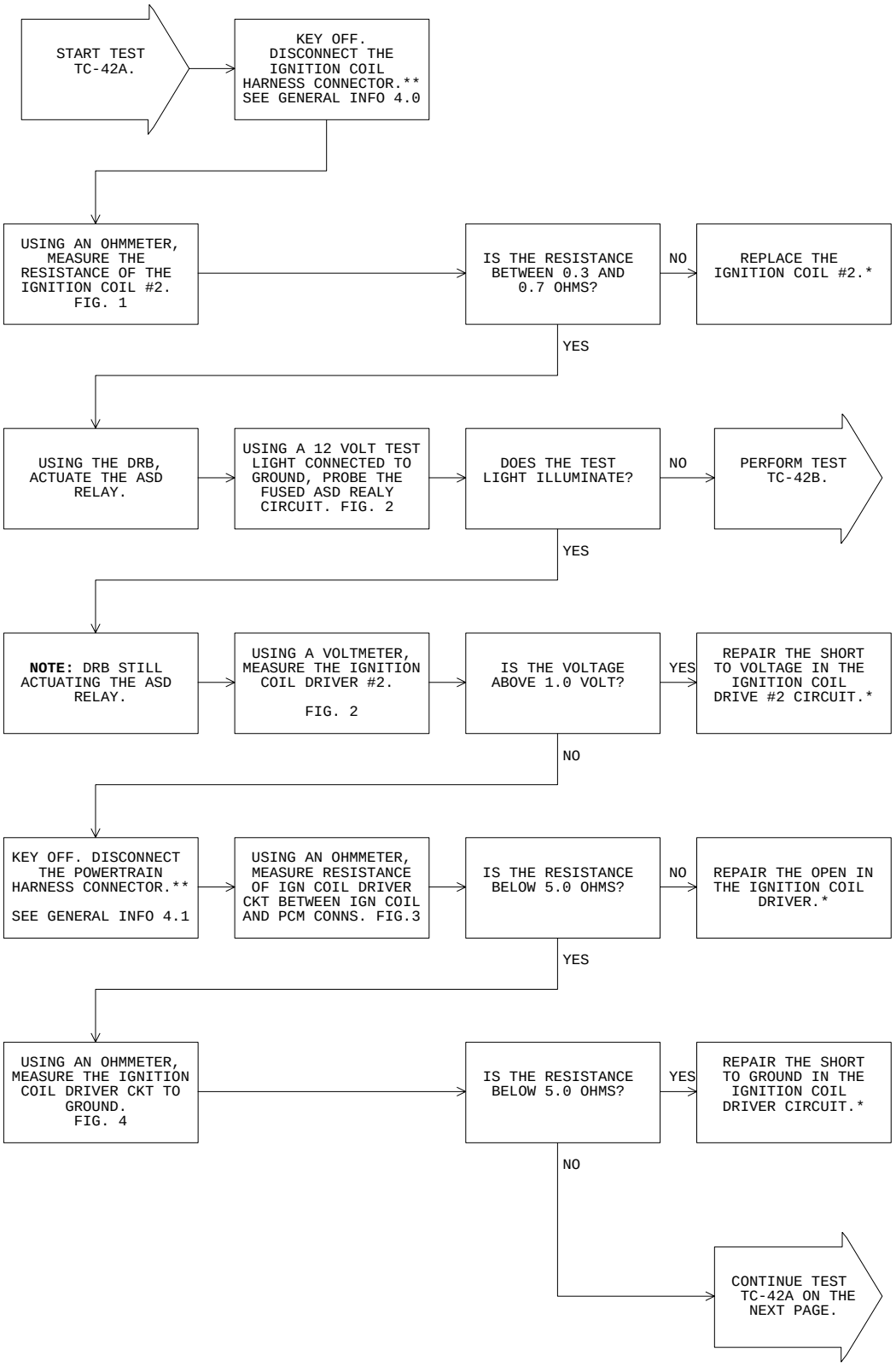
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

TEST TC-42A REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding

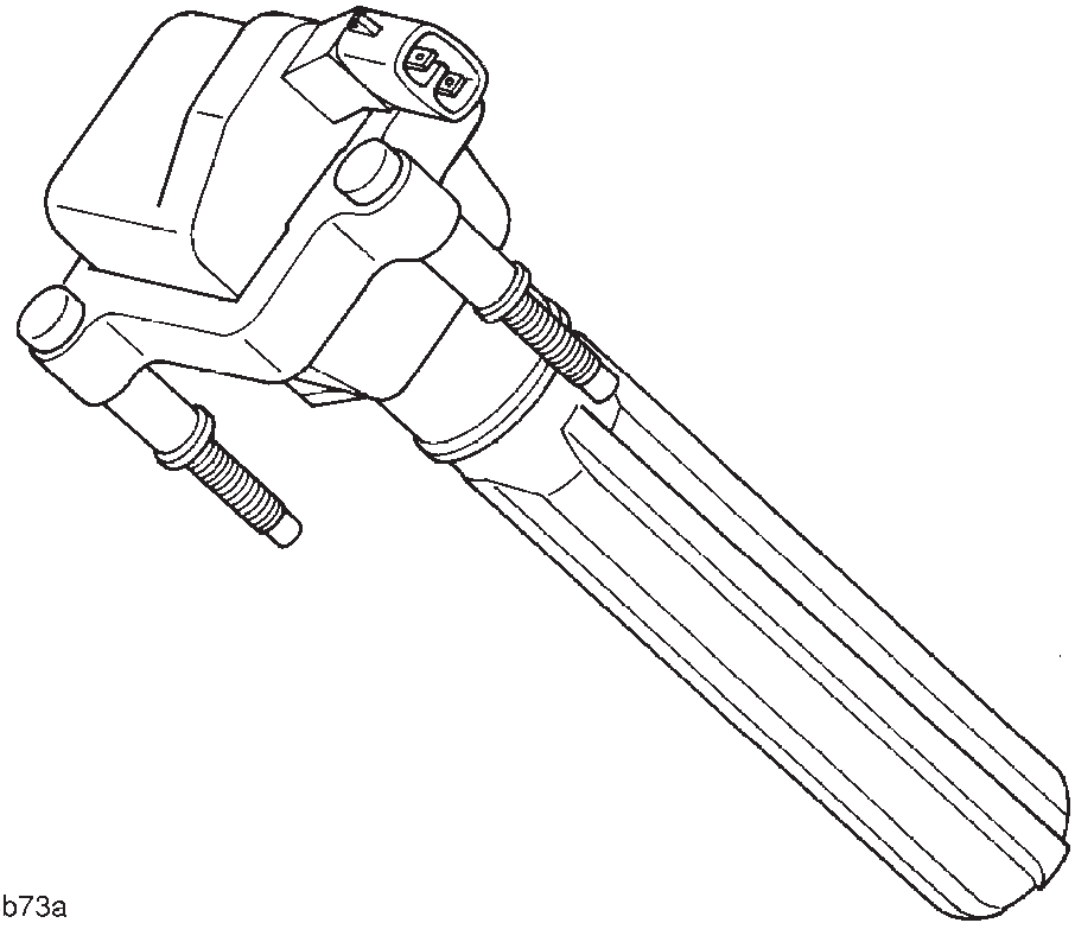


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-42A CONTINUED - REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT

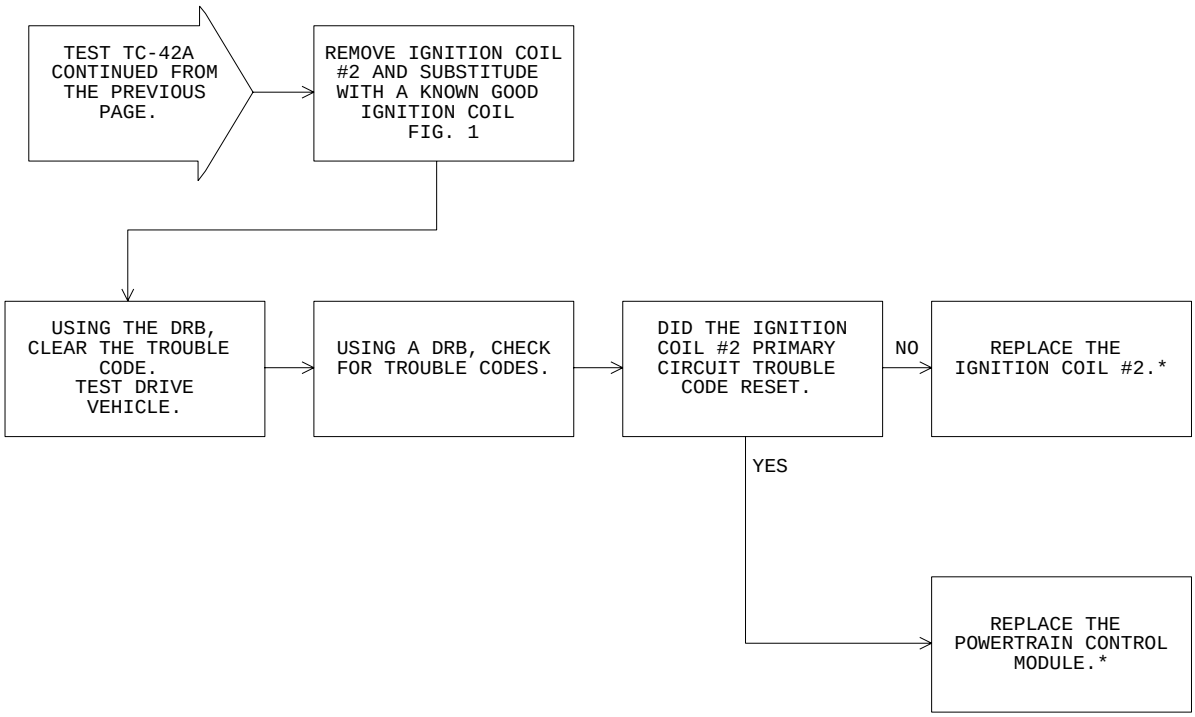
COIL ON PLUG
TYPICAL



80b4b73a

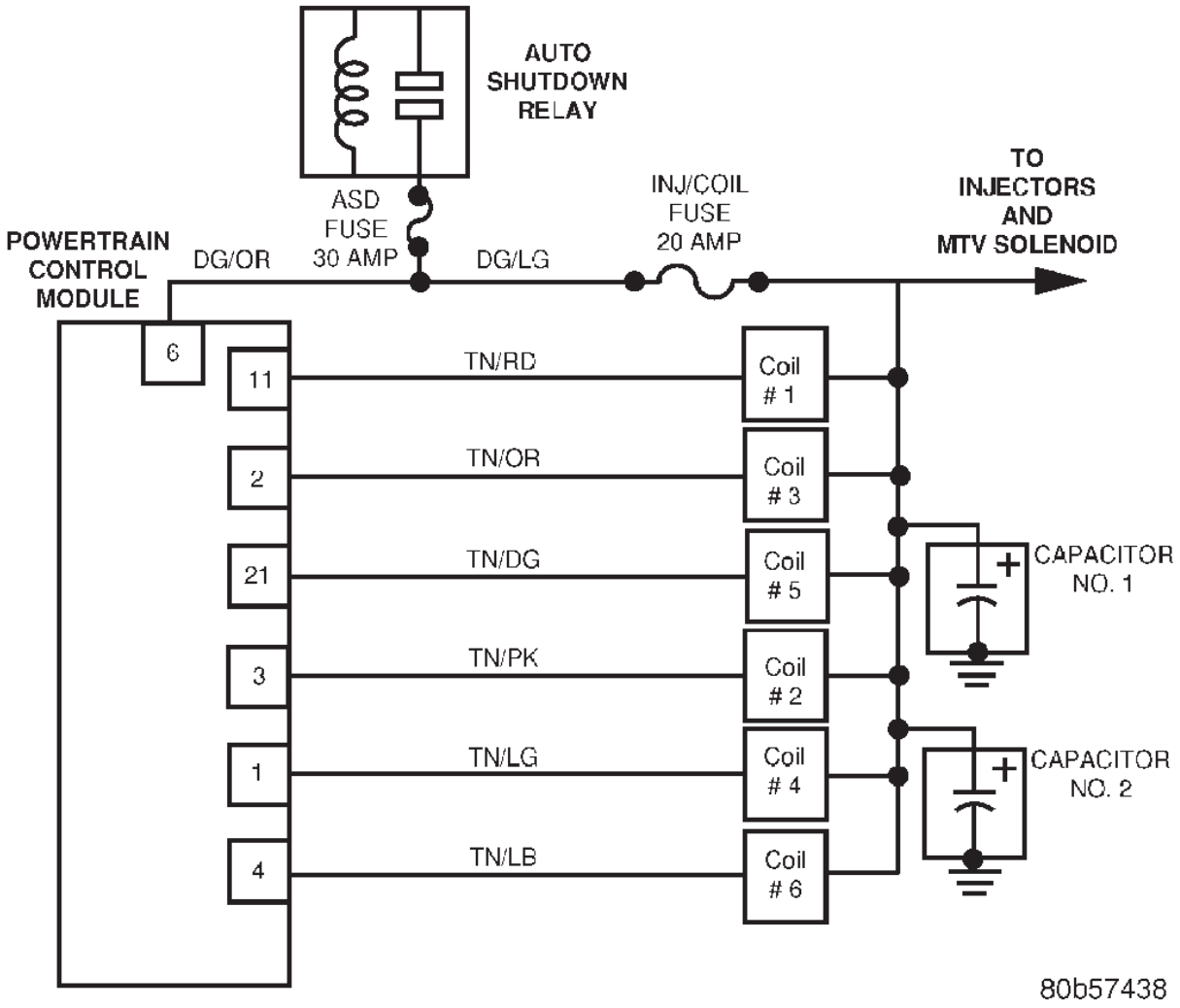
FIG. 1

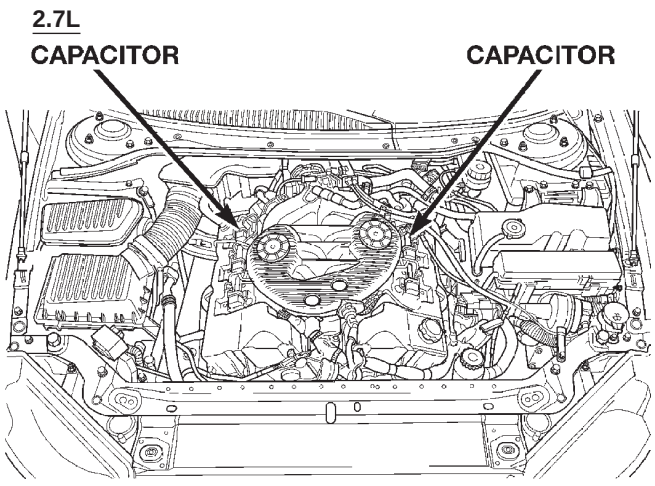
TEST TC-42A CONTINUED - REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-42B CONTINUED - REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT

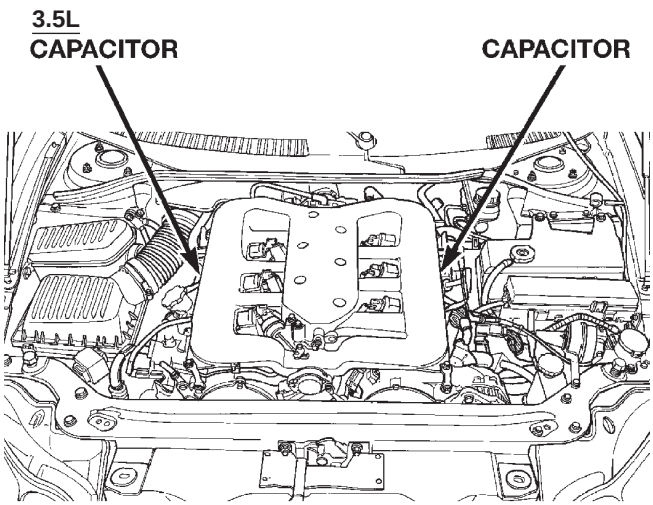




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

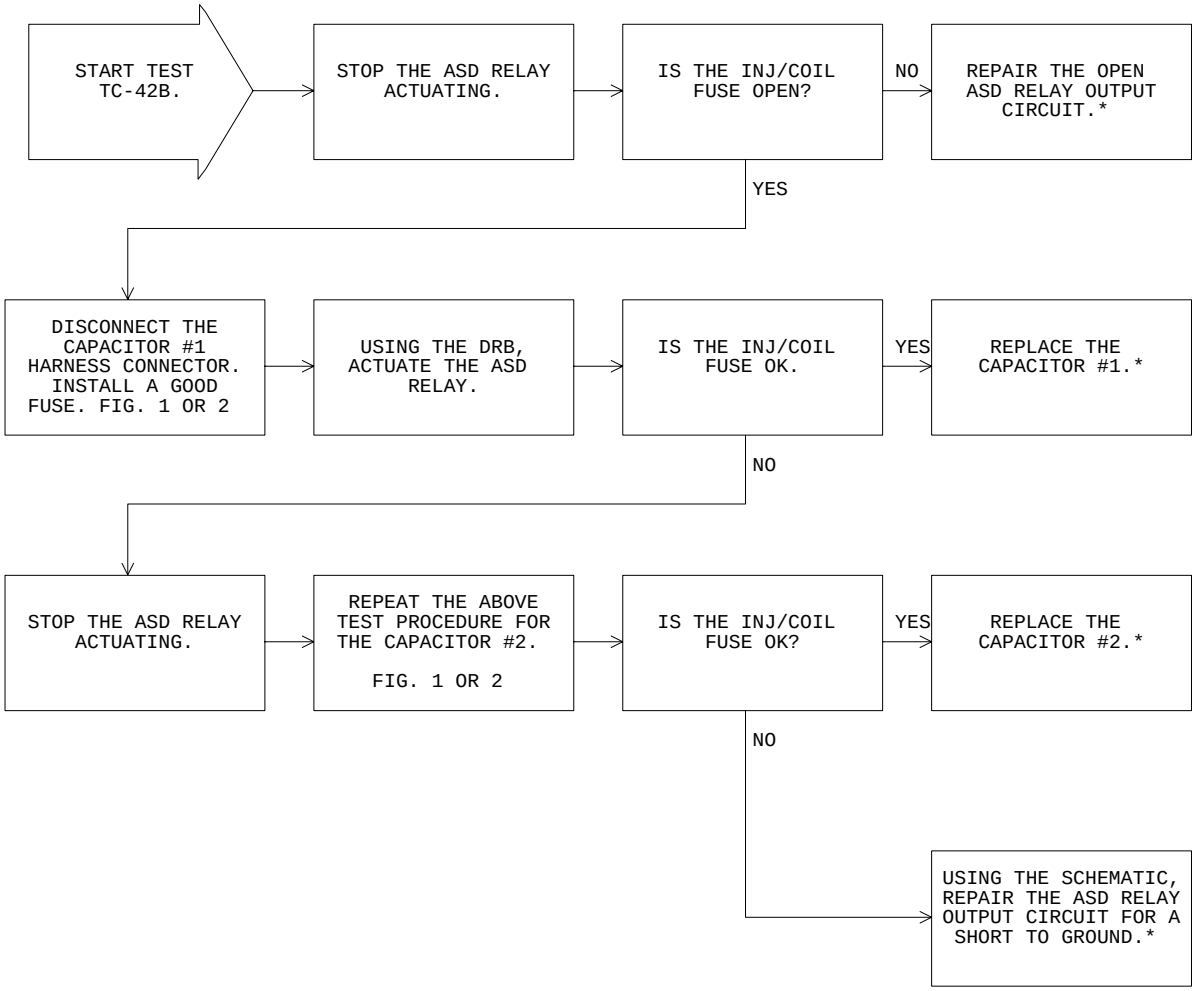


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

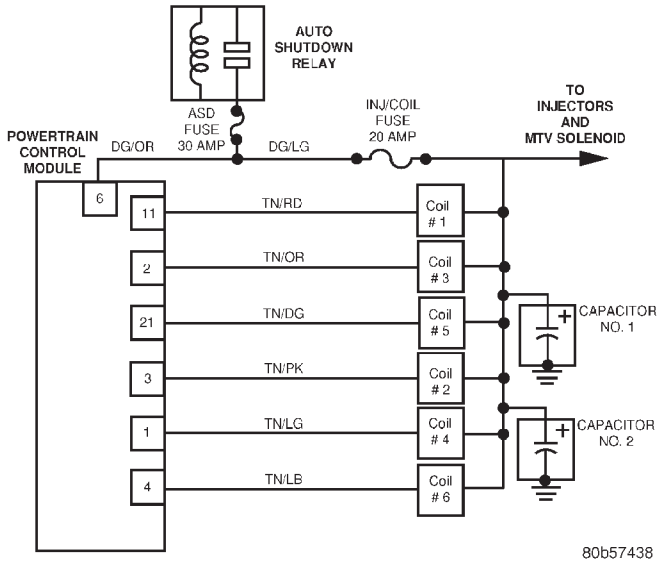
TEST TC-42B CONTINUED - REPAIRING - IGNITION COIL #2 PRIMARY CIRCUIT



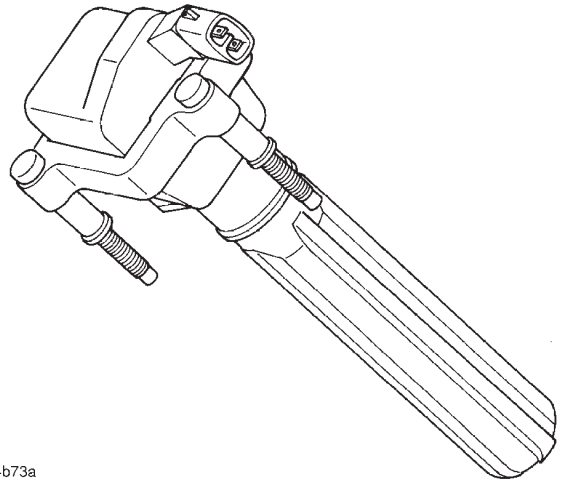
***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-43A REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding



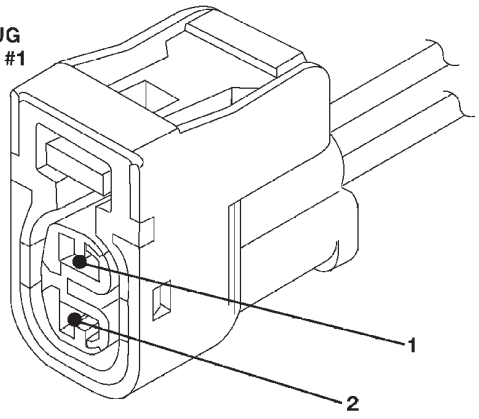
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #1

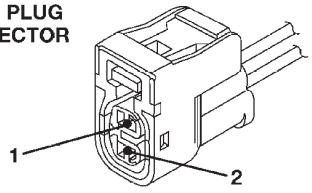


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD RELAY FEED
2	TN/RD	COIL ON PLUG DRIVER #1

80b57445

FIG. 2

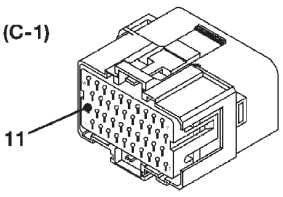
COIL ON PLUG #1 CONNECTOR



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/RD	COIL ON PLUG DRIVER #1

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

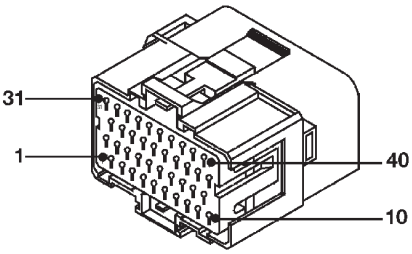


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cbf

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)



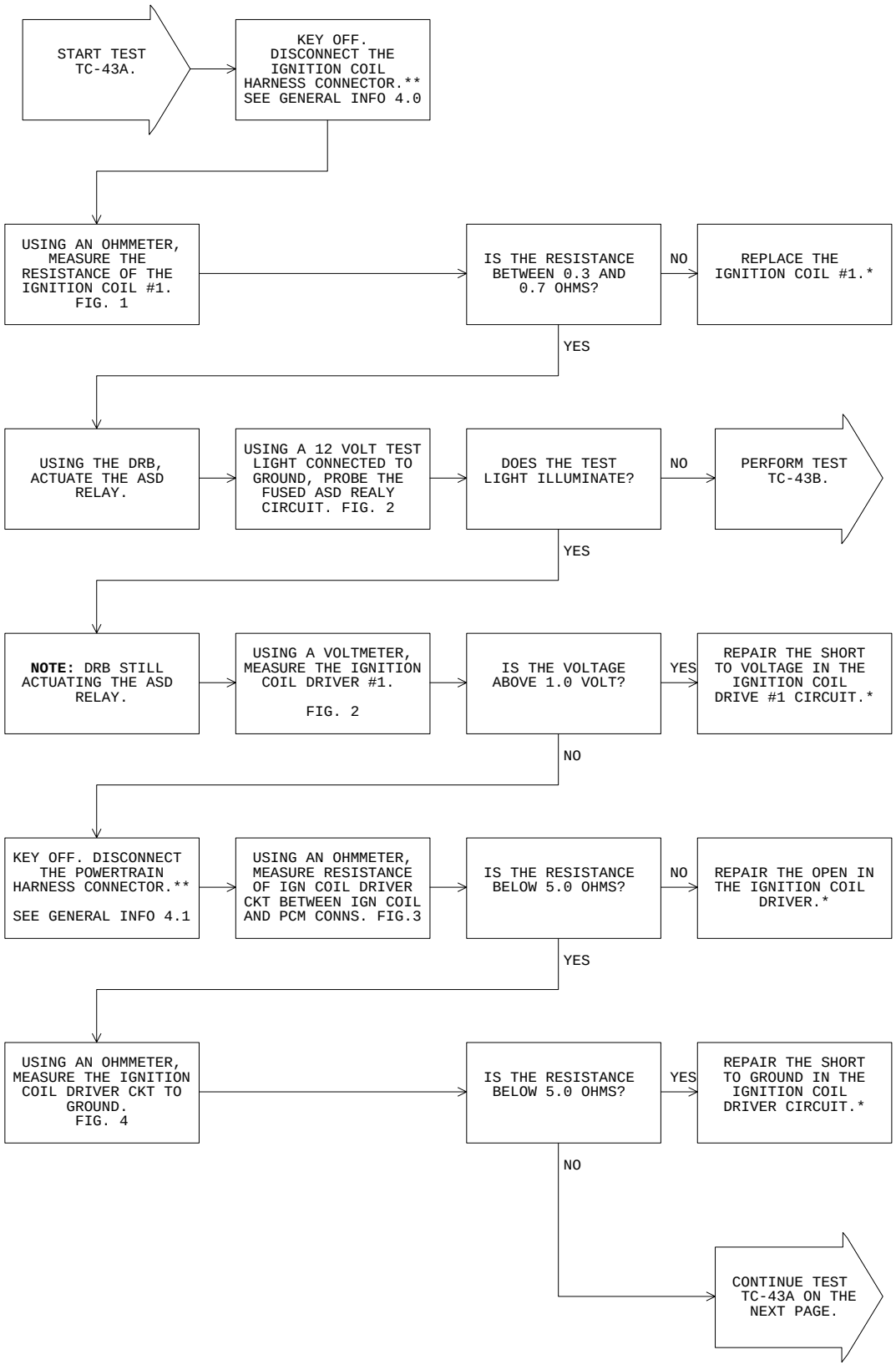
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/- SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/- SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

TEST TC-43A REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding

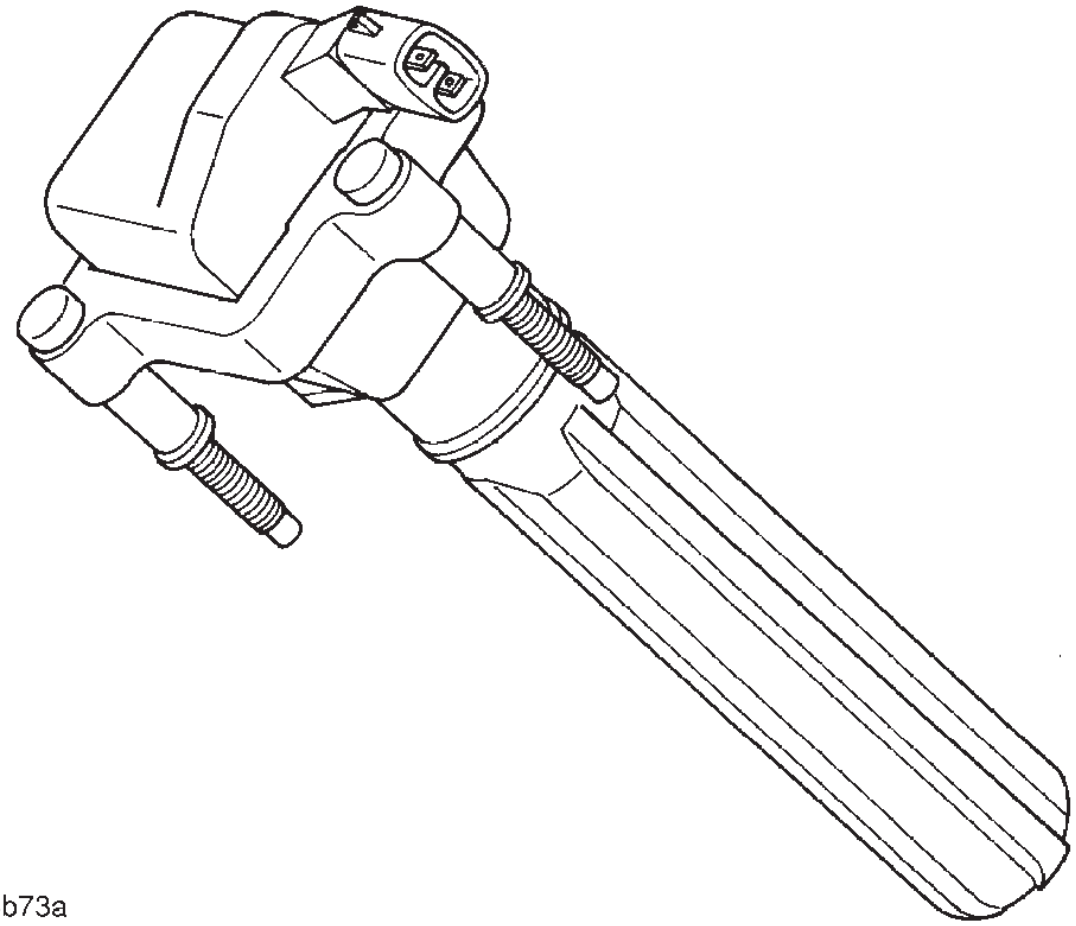


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-43A CONTINUED - REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT

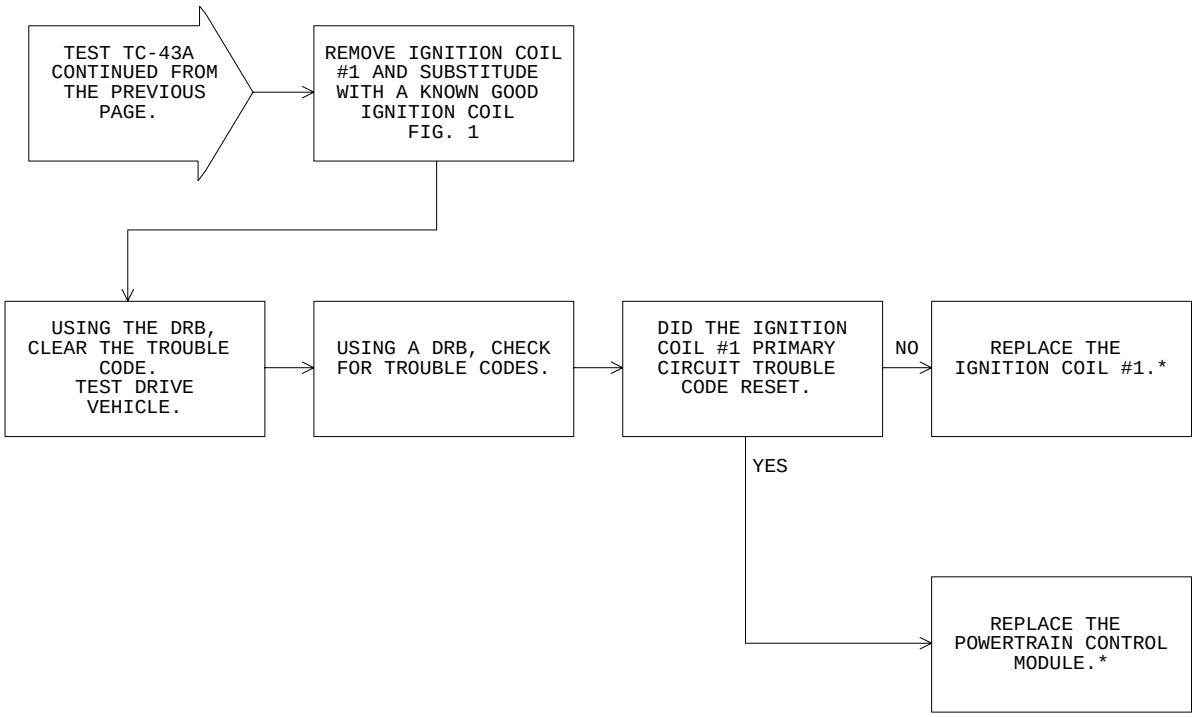
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

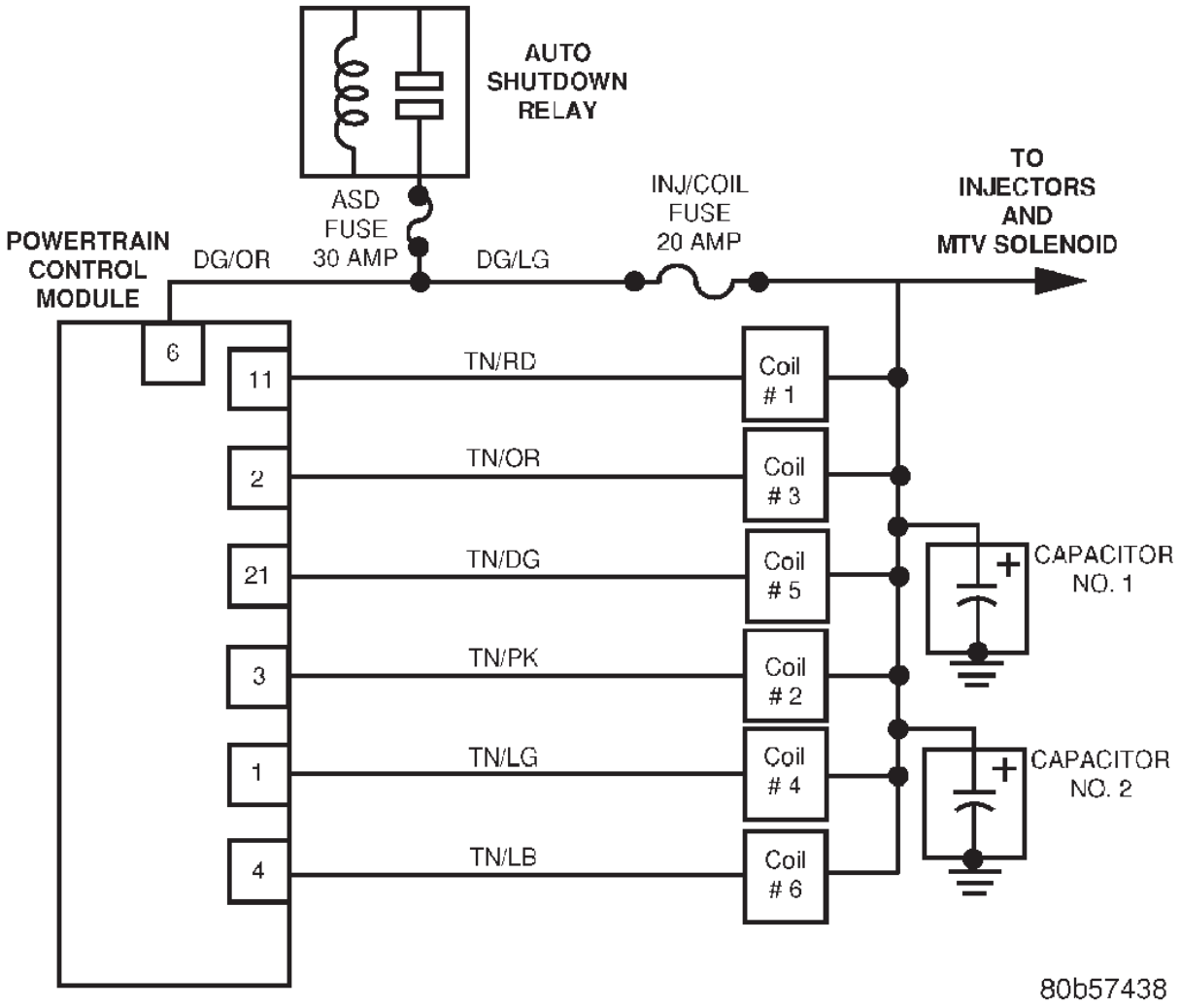
TEST TC-43A CONTINUED - REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT

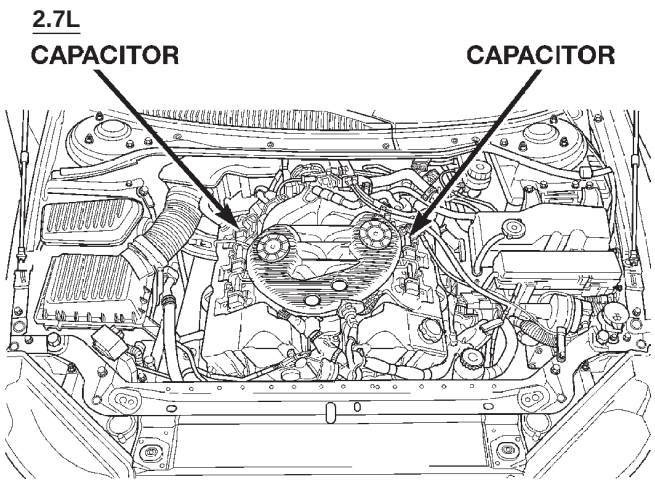


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-43B CONTINUED - REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT

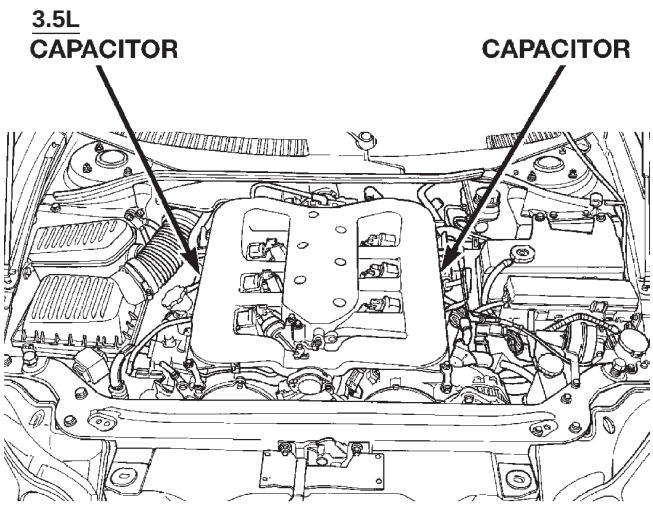




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

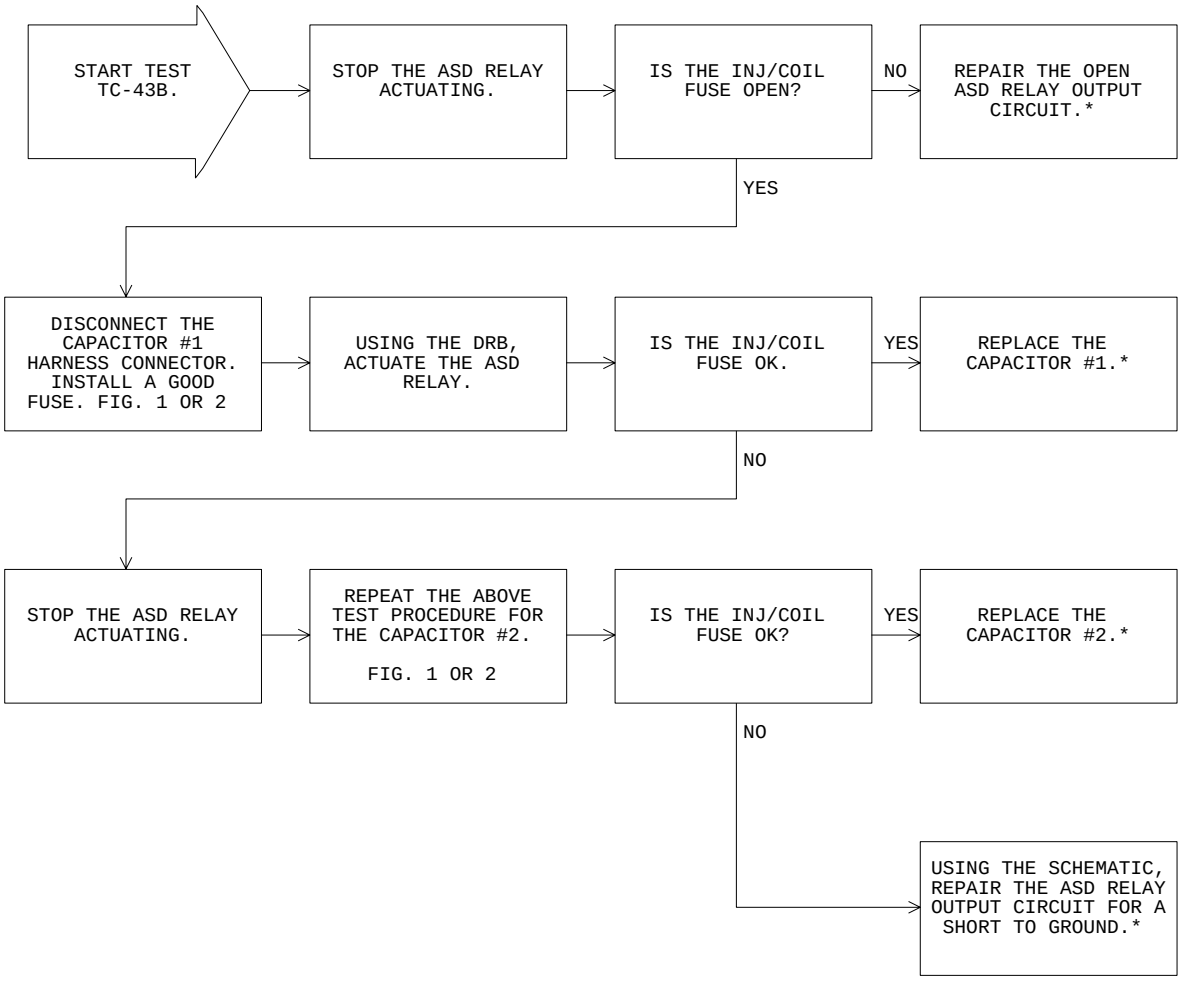


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

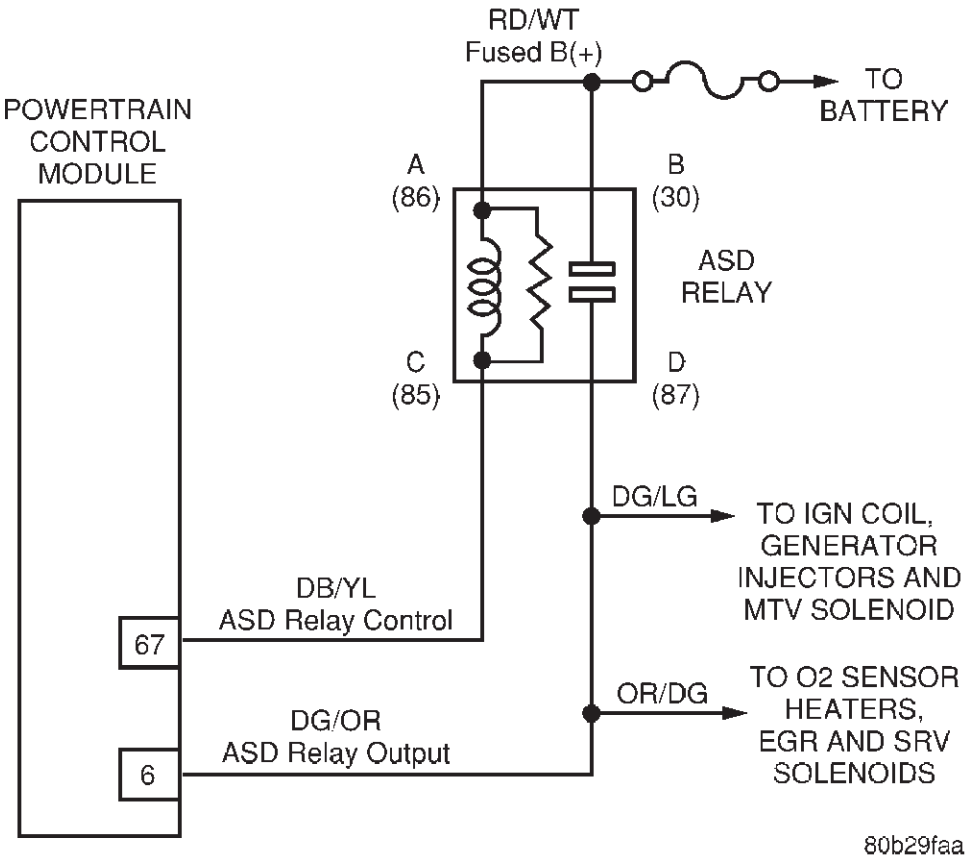
TEST TC-43B CONTINUED - REPAIRING - IGNITION COIL #1 PRIMARY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-44A REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM

Perform TEST DTC Before Proceeding



Name of code: No ASD Relay Output Voltage At PCM

When monitored: With the ignition key on and battery voltage greater than 10 volts.

Set condition: No voltage sensed at the powertrain control module when the auto shutdown relay is energized.

Theory of operation: When the ASD relay is energized, the relay's contacts connect the fused B(+) circuit to the relay output circuit. The powertrain control module is connected in parallel with the ASD relay output circuit. This connection provides the PCM with a circuit to monitor the ASD relay output state. Whenever the PCM energizes the ASD relay, it checks the feedback circuit to ensure voltage is present at the ASD relay output. If voltage is not present, a trouble code is set.

Possible causes:

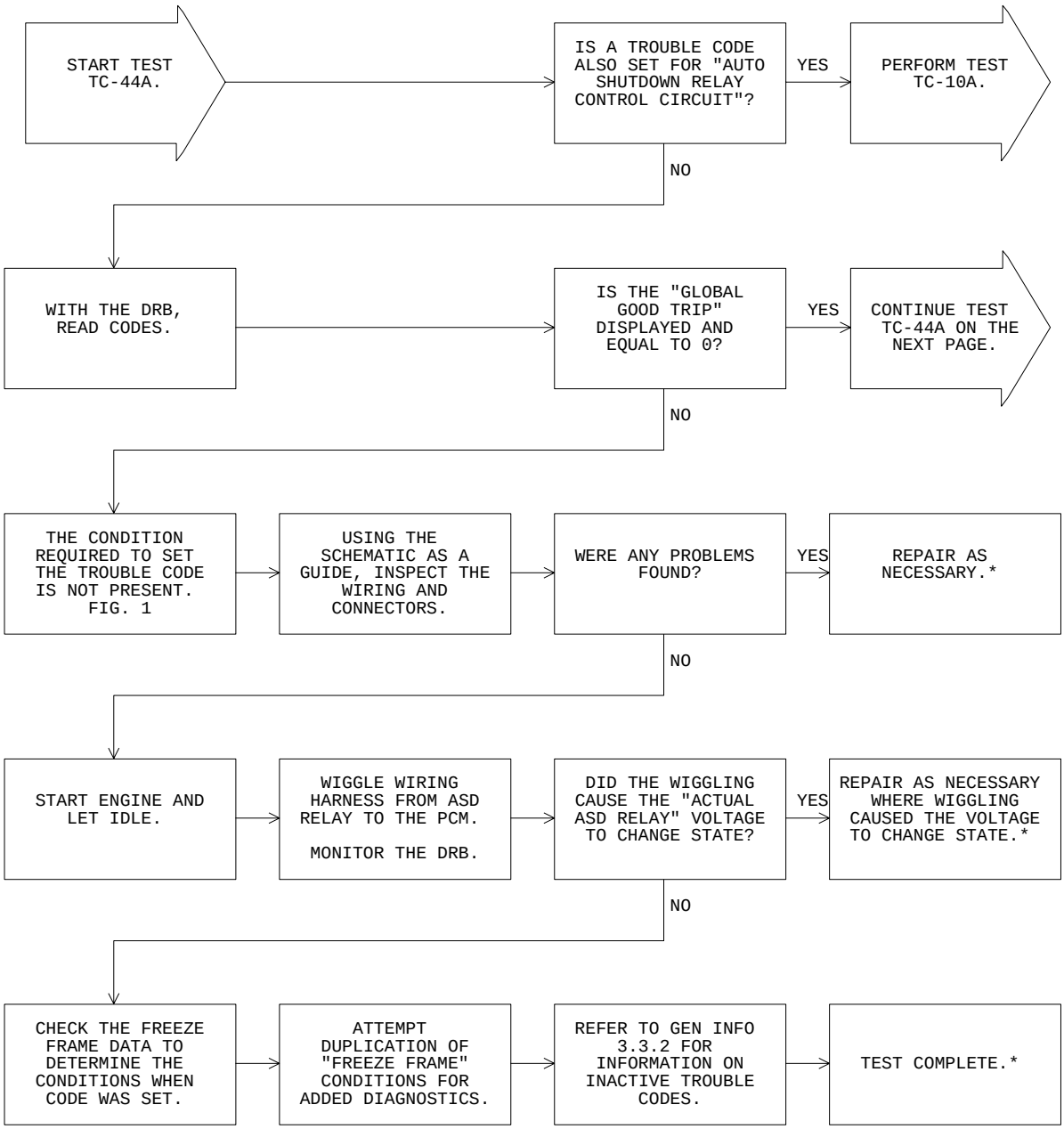
- ASD relay output circuit open
- Fused B(+) circuit open
- ASD relay
- Failed PCM
- Connector terminals
- Connector wires

1080606

FIG. 1

TEST TC-44A REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM

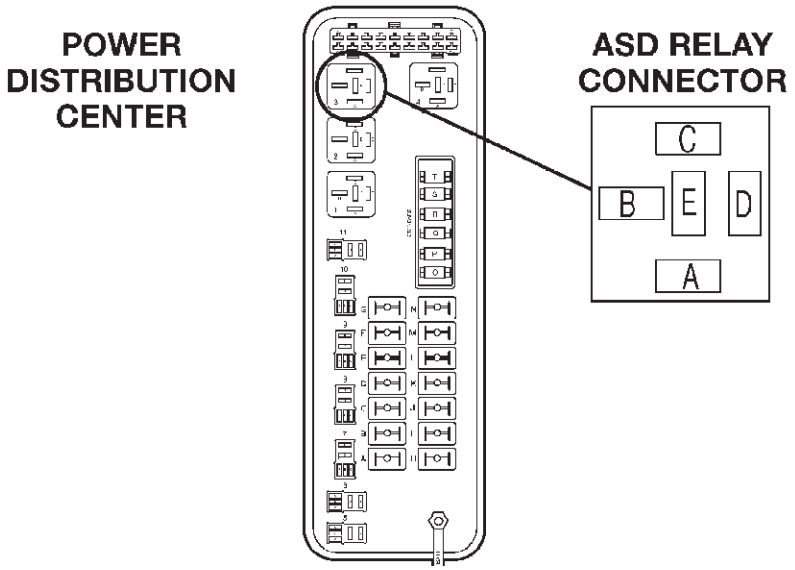
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

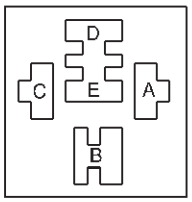
TEST TC-44A CONTINUED - REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM



CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

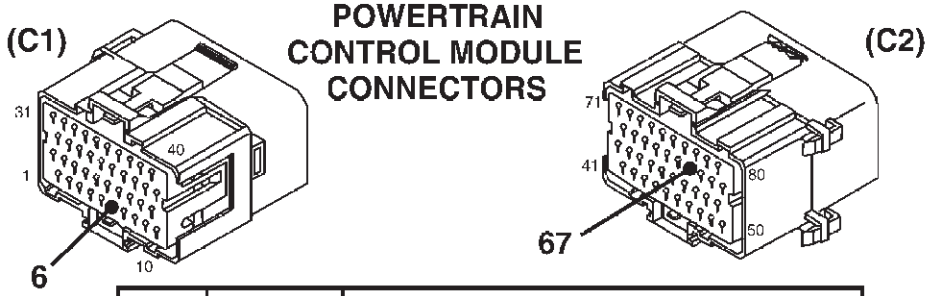
80b4fb4f

FIG. 1



AUTO SHUTDOWN RELAY (IN PDC)

CAV	COLOR	FUNCTION
A(86)	RD/WT	FUSED B(+)
B(30)	RD/WT	FUSED B(+)
C(85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D(87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

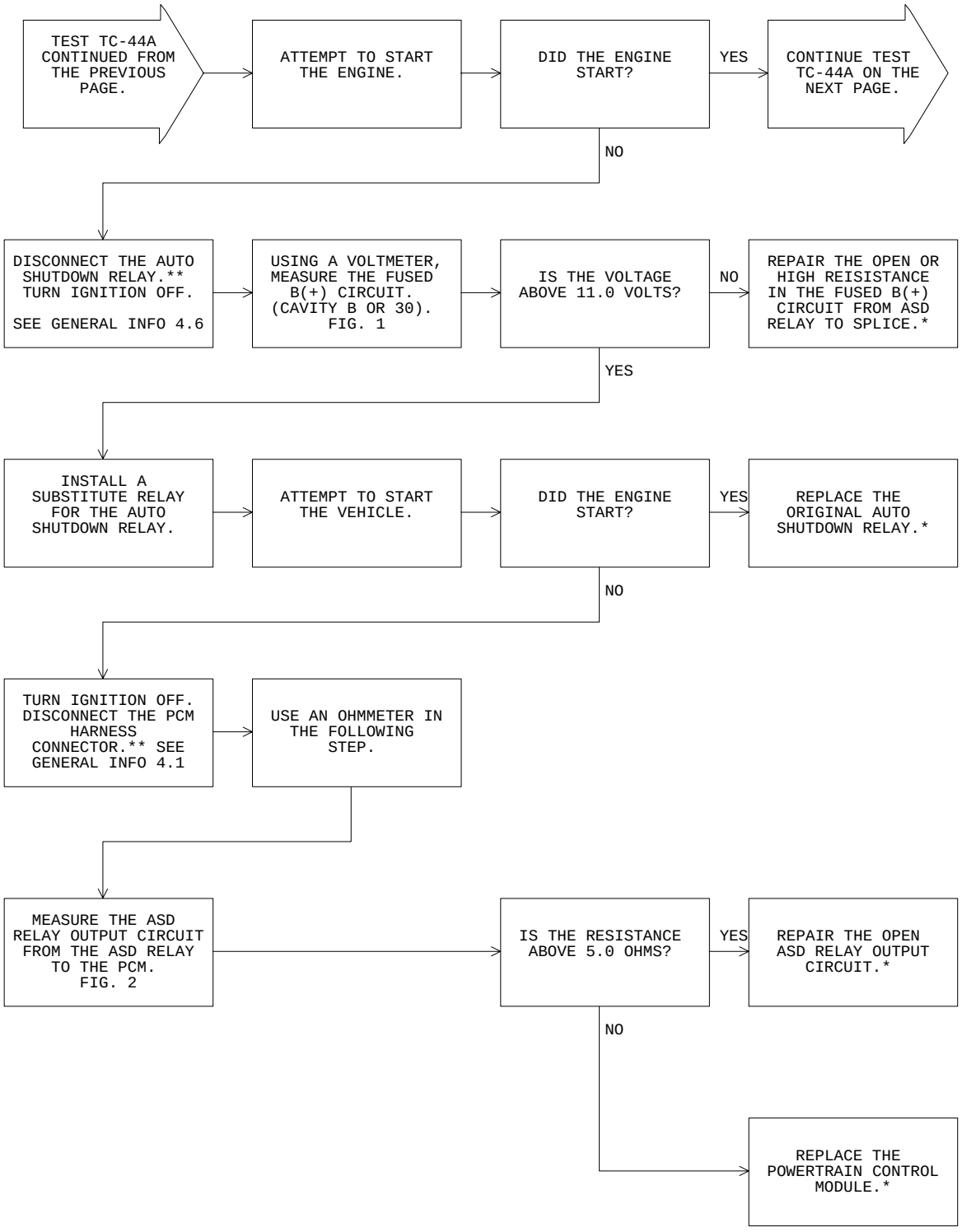


CAV	COLOR	FUNCTION
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT
67	DB/YL	AUTO SHUTDOWN RELAY CONTROL

80b29f38

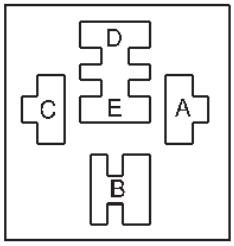
FIG. 2

TEST TC-44A CONTINUED - REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM



Perform Verification TEST VER-2A.

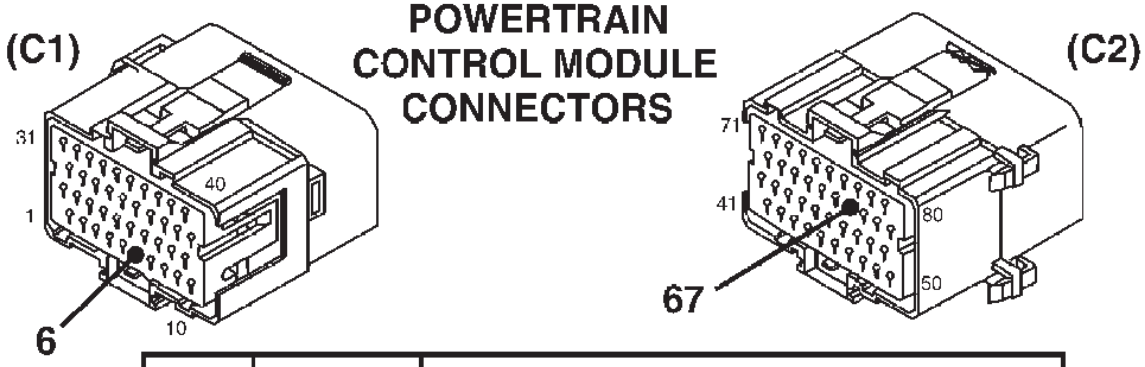
****Check connectors - Clean / repair as necessary.***



AUTO SHUTDOWN RELAY (IN PDC)

CAV	COLOR	FUNCTION
A(86)	RD/WT	FUSED B(+)
B(30)	RD/WT	FUSED B(+)
C(85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D(87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTORS

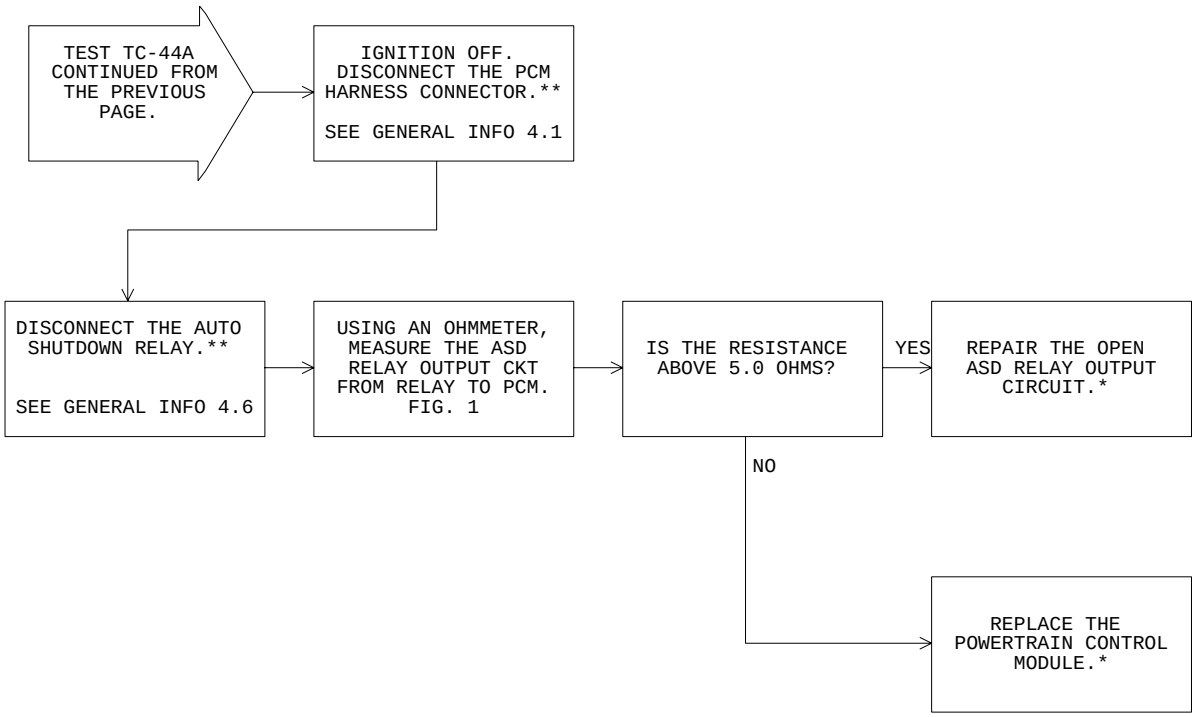


CAV	COLOR	FUNCTION
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT
67	DB/YL	AUTO SHUTDOWN RELAY CONTROL

80b29f38

FIG. 1

TEST TC-44A CONTINUED - REPAIRING - NO ASD RELAY OUTPUT VOLTAGE AT PCM

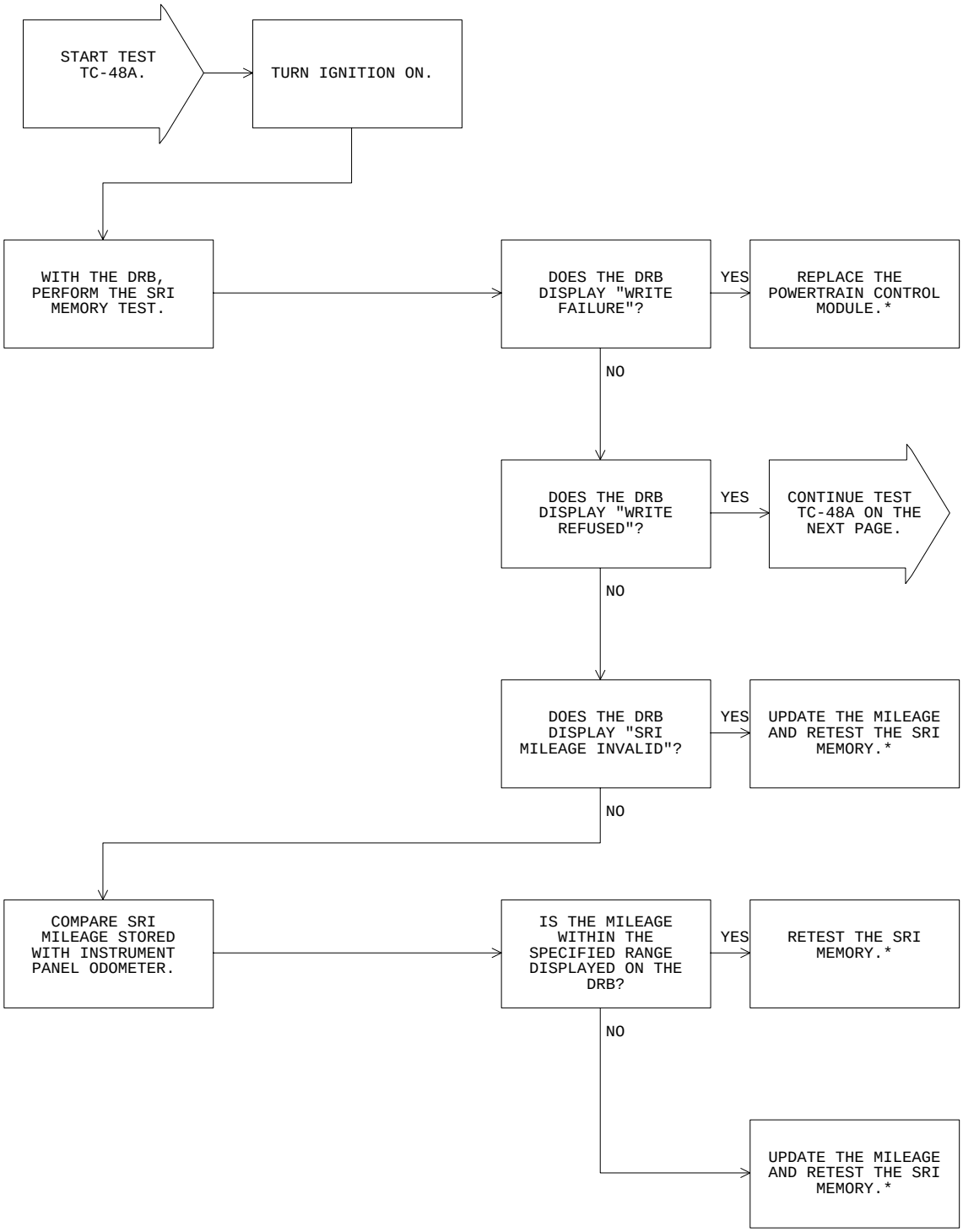


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-48A REPAIRING - PCM FAILURE EEPROM WRITE DENIED AND PCM FAILURE SRI MILE NOT STORED

Perform TEST DTC Before Proceeding

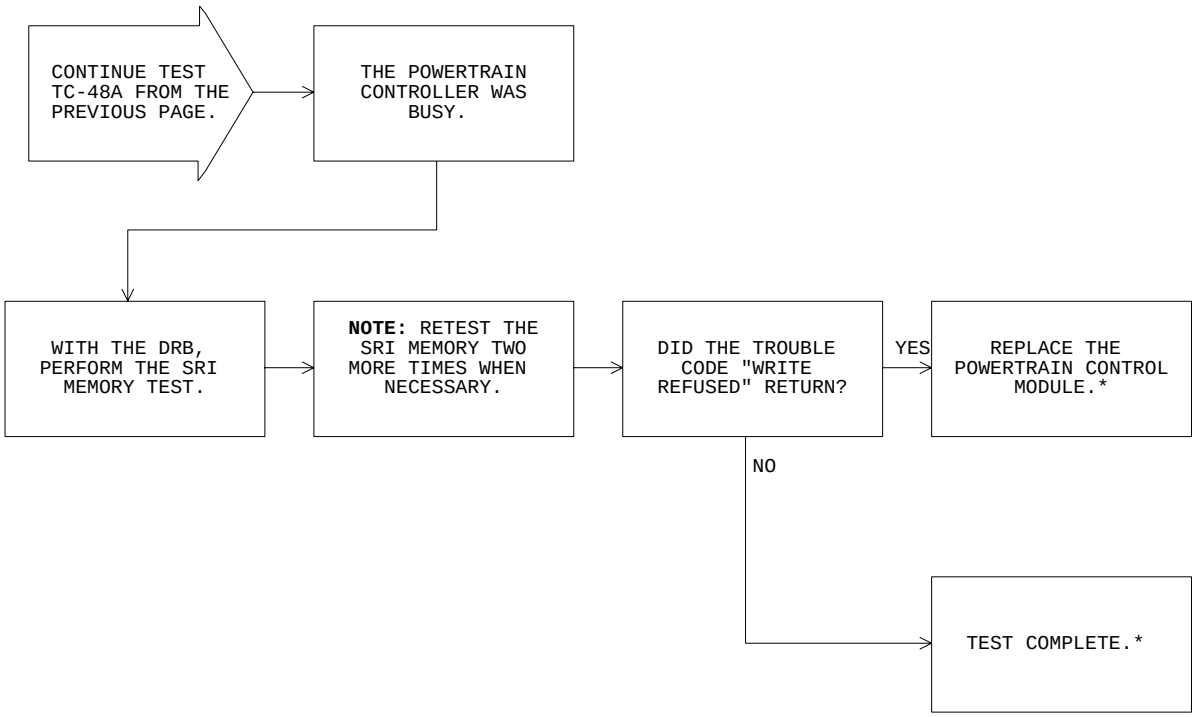


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-48A — CONTINUED - REPAIRING - PCM FAILURE EEPROM WRITE DENIED AND PCM FAILURE SRI MILE NOT STORED

Perform TEST DTC Before Proceeding



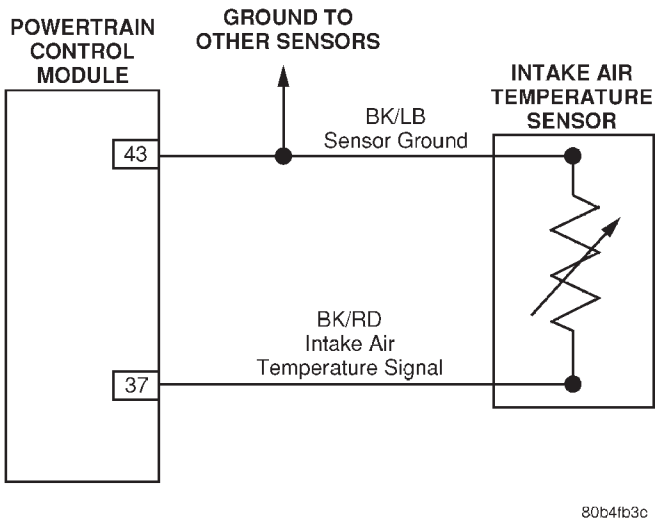
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

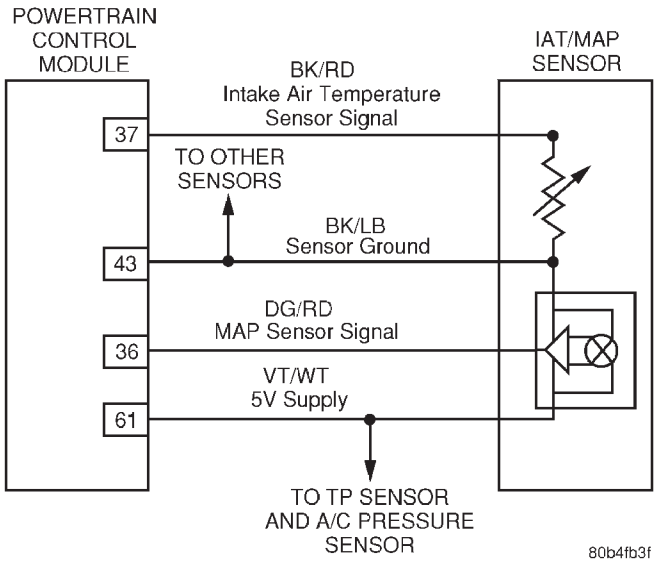
TEST TC-57A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE LOW

Perform TEST DTC Before Proceeding

2.7L



3.5L



Name of code: Intake Air Temp Sensor Voltage Low

When monitored: With the ignition on and the engine running.

Set condition: The intake air sensor circuit voltage at PCM cavity 37 goes below .50 volt.

Theory of operation: The intake air temperature sensor (IAT) is located in the intake manifold where it measures the temperature of the air that is about to enter the combustion chambers. The IAT is a negative temperature coefficient (NTC) thermistor-type sensor (resistance varies inversely with temperature). This means at cold temperatures its resistance is high so the voltage signal will be high. At high temperatures, resistance decreases and the voltage will decrease. This allows the sensor to provide an analog voltage signal to PCM cavity 37. The PCM uses this signal to compensate for changes in air density due to temperature.

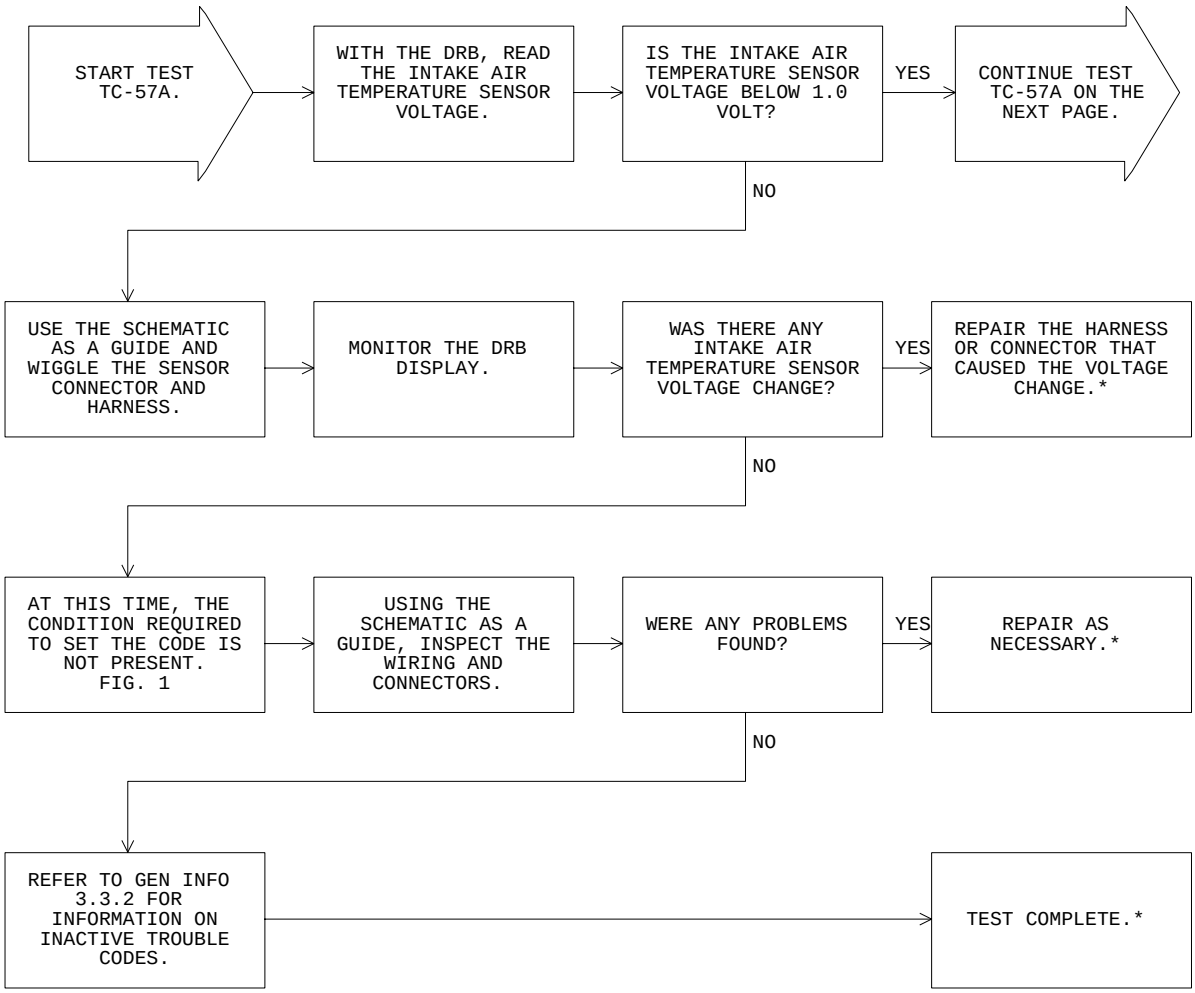
Possible causes:
- Sensor signal circuit shorted to ground
- Sensor internally shorted
- Powertrain control module failure
- Connector terminals
- Connector wires

80b27d27

FIG. 1

TEST TC-57A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE LOW

Perform TEST DTC Before Proceeding

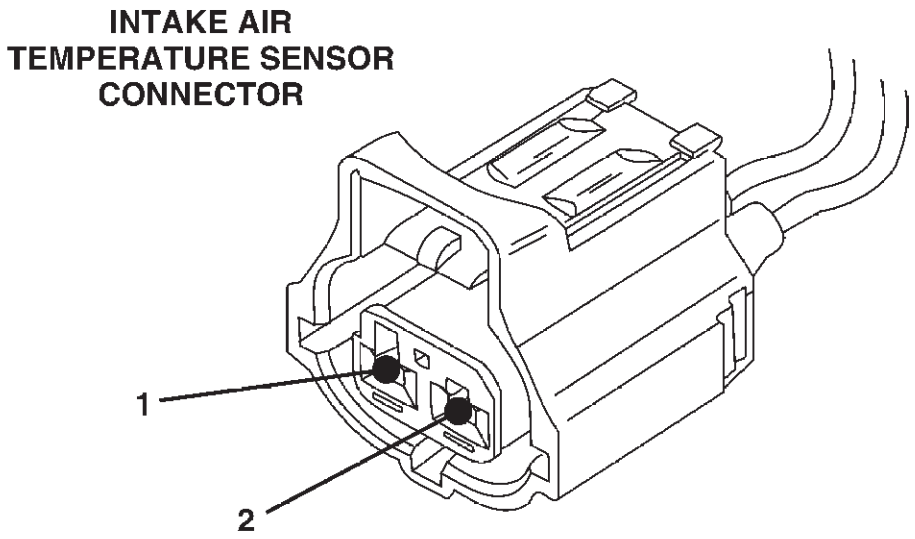


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-57A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE LOW

2.7L

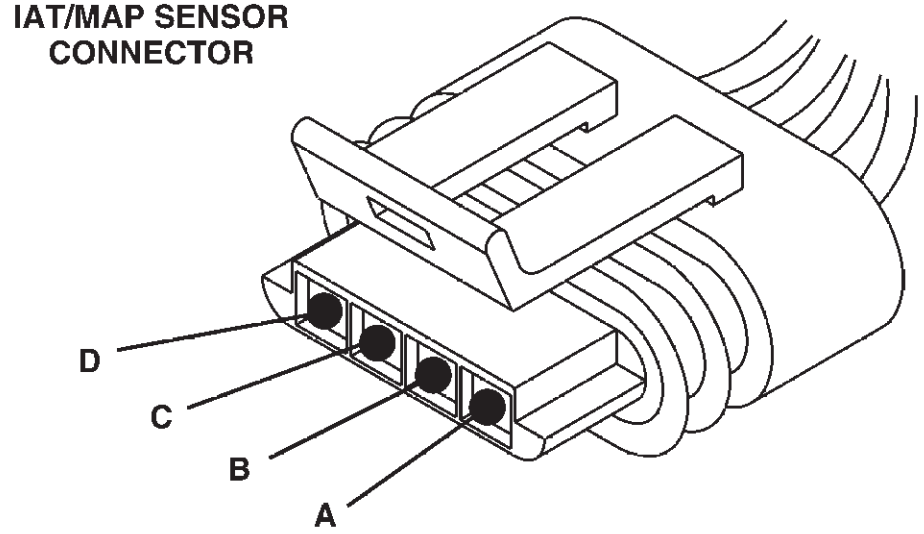


CAV	COLOR	FUNCTION
1	BK/RD	IAT SIGNAL
2	BK/LB	SENSOR GROUND

80a9b3c4

FIG. 1

3.5L

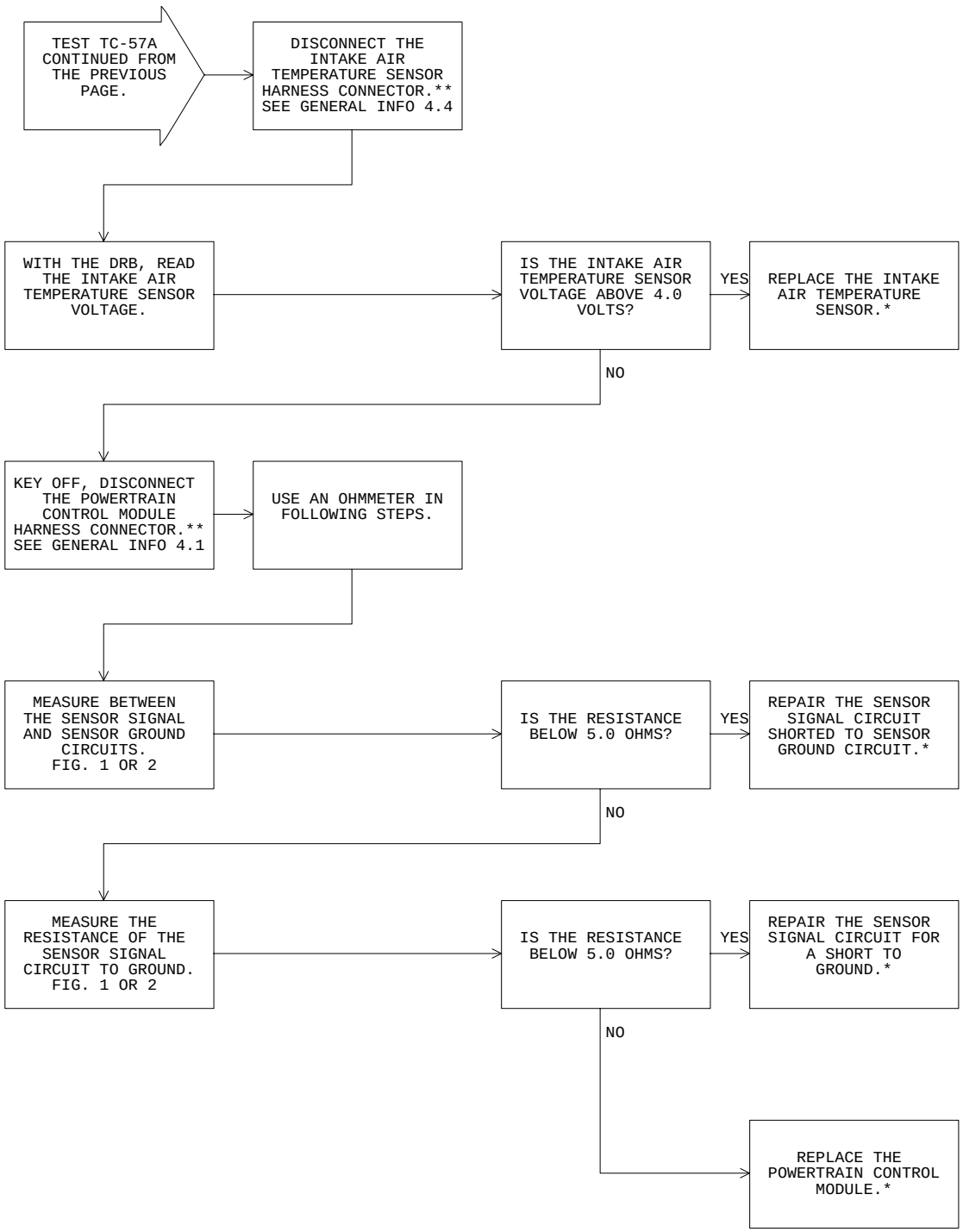


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

TEST TC-57A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE LOW



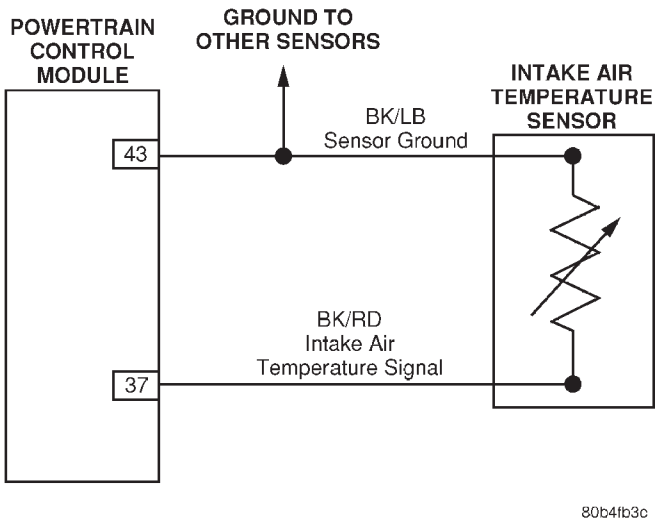
Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

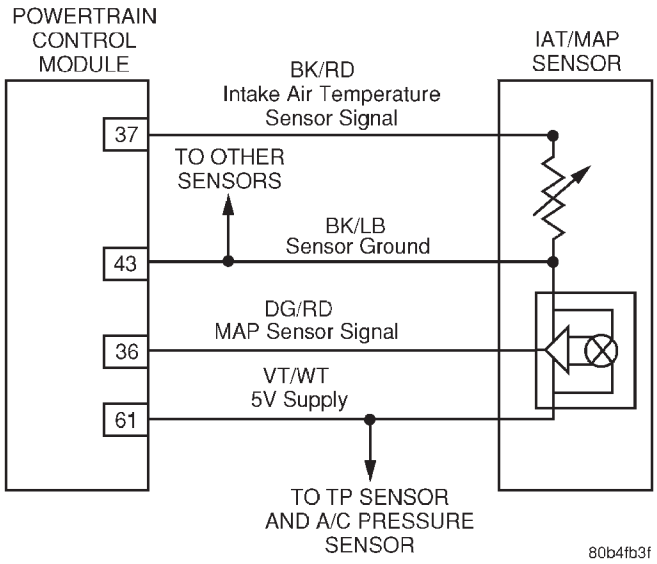
TEST TC-58A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH

Perform TEST DTC Before Proceeding

2.7L



3.5L



Name of code: Intake Air Temp Sensor Voltage High

When monitored: With the ignition on and the engine running.

Set condition: The intake air sensor circuit voltage at PCM cavity 37 goes above 4.9 volts.

Theory of operation: The intake air temperature sensor (IAT) is located in the intake manifold where it measures the temperature of the air that is about to enter the combustion chambers. The IAT is a negative temperature coefficient (NTC) thermistor-type sensor (resistance varies inversely with temperature). This means at cold temperatures its resistance is high so the voltage signal will be high. At high temperatures, resistance decreases and the voltage will decrease. This allows the sensor to provide an analog voltage signal to PCM cavity 37. The PCM uses this signal to compensate for changes in air density due to temperature.

Possible causes:

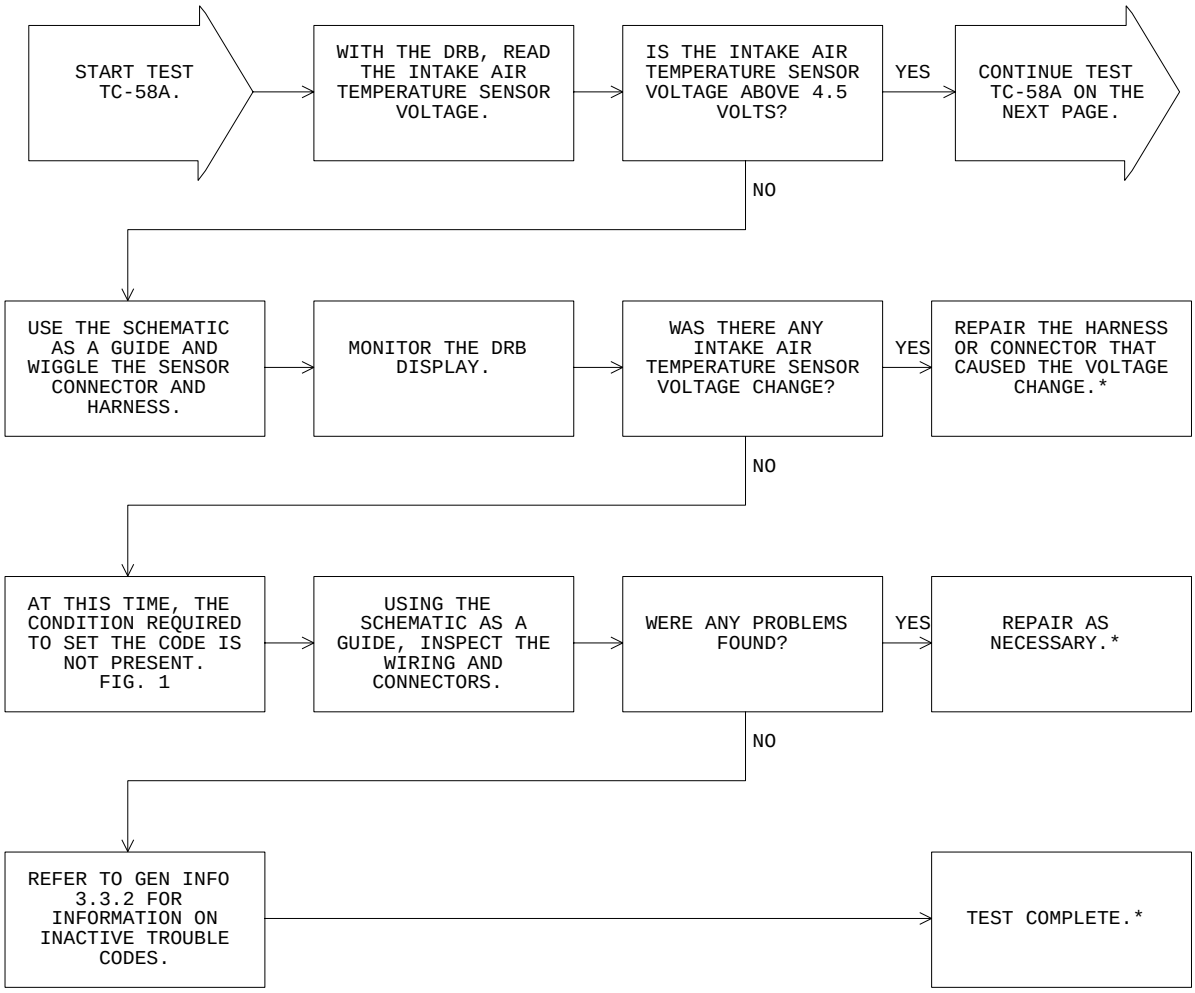
- Sensor signal circuit open
- Sensor internally open
- Sensor ground circuit open
- Powertrain control module failure
- Connector terminals
- Connector wires

2600205

FIG. 1

TEST TC-58A REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH

Perform TEST DTC Before Proceeding



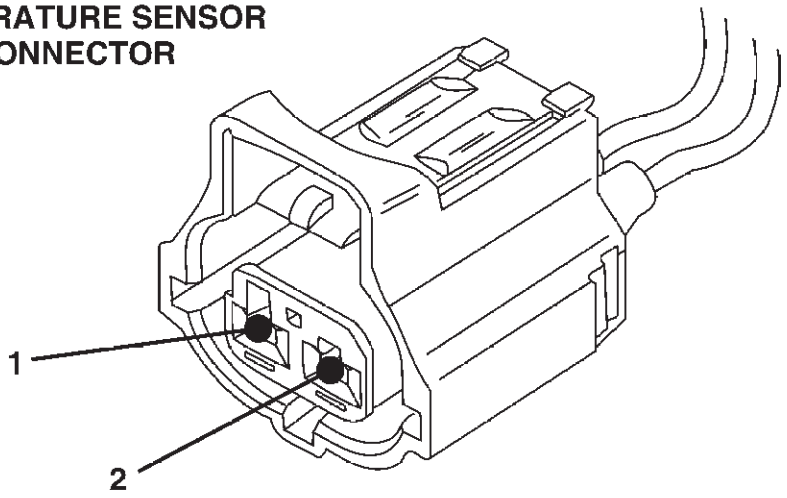
Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-58A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH

2.7L

INTAKE AIR TEMPERATURE SENSOR CONNECTOR



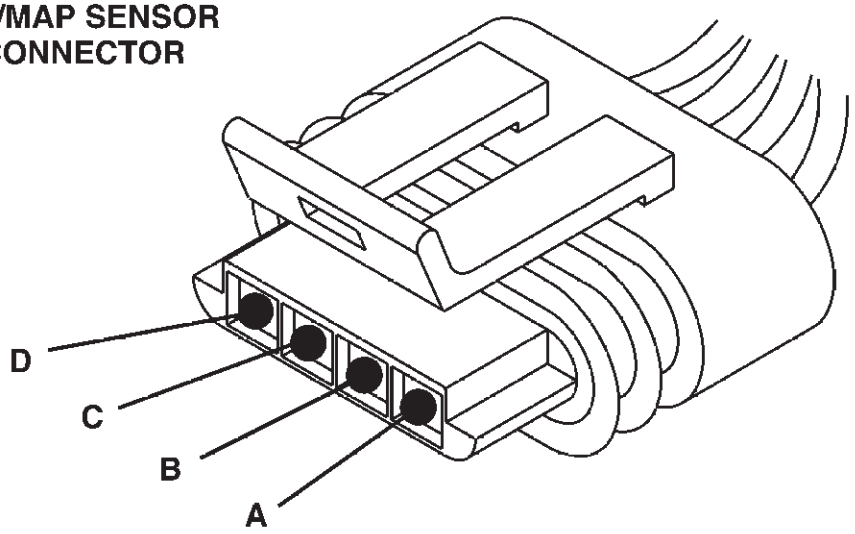
CAV	COLOR	FUNCTION
1	BK/RD	IAT SIGNAL
2	BK/LB	SENSOR GROUND

80a9b3c4

FIG. 1

3.5L

IAT/MAP SENSOR CONNECTOR

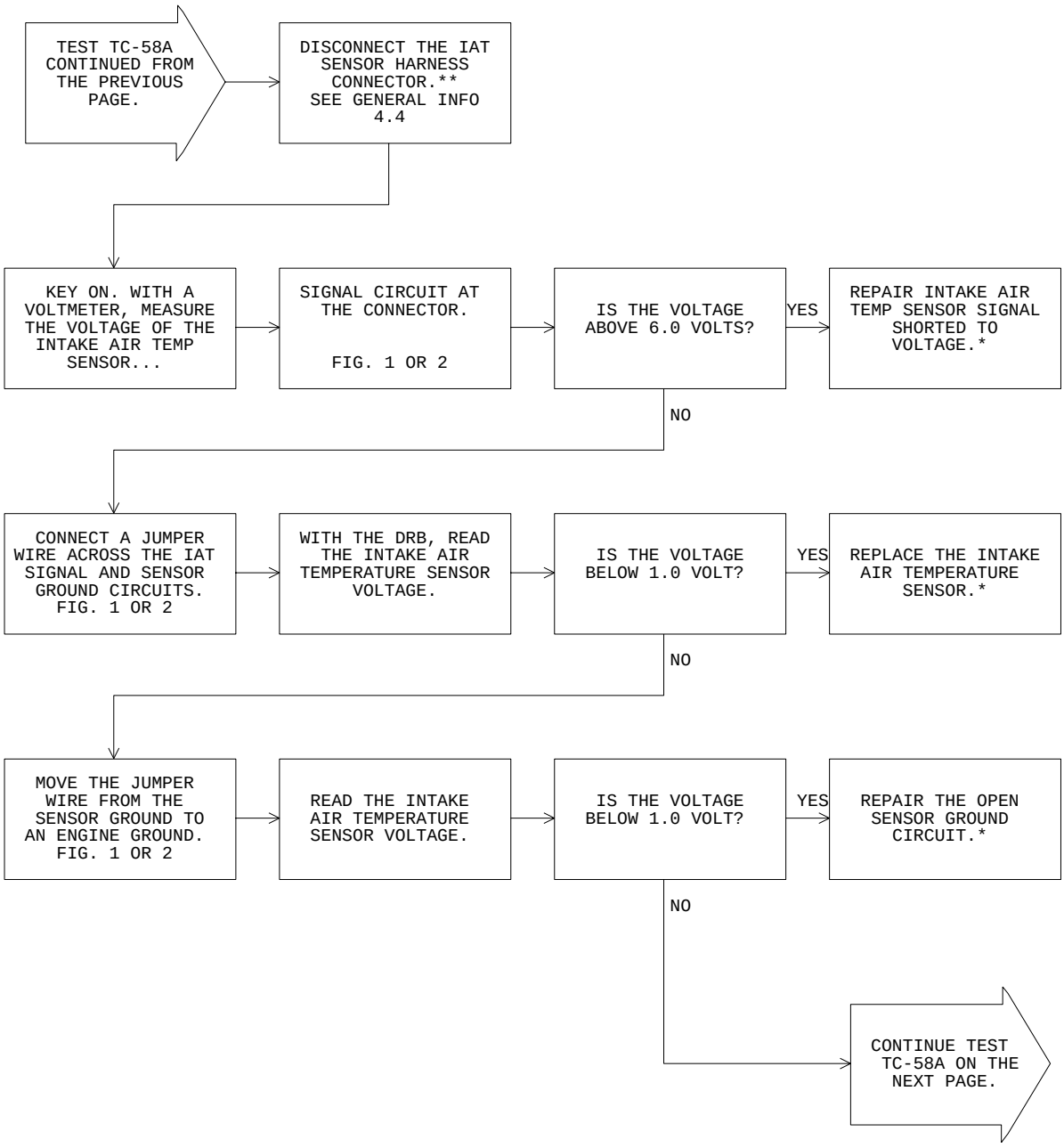


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

TEST TC-58A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH



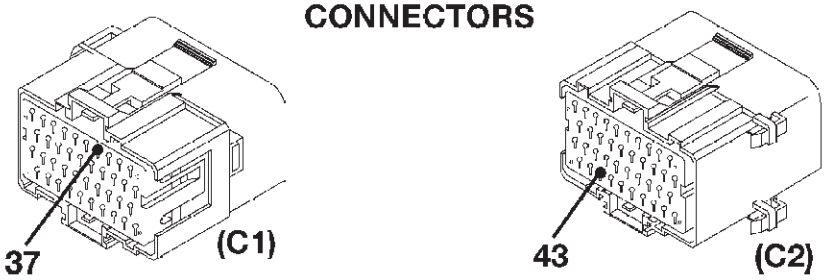
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-58A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH

2.7L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
37	BK/RD	IAT SIGNAL
43	BK/LB	SENSOR GROUND

INTAKE AIR TEMPERATURE SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK/RD	IAT SIGNAL
2	BK/LB	SENSOR GROUND

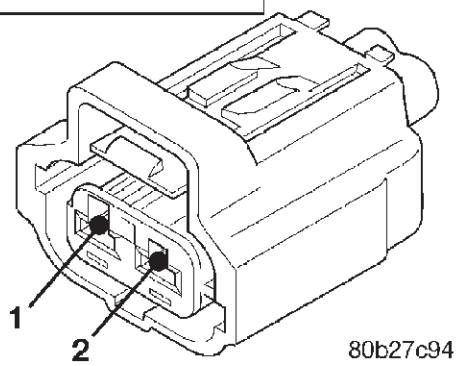
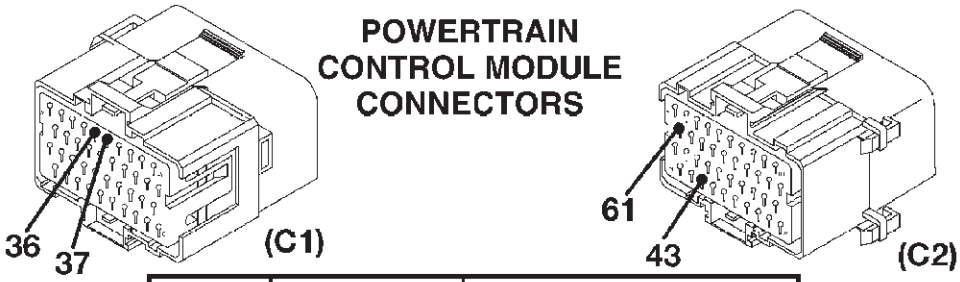


FIG. 1

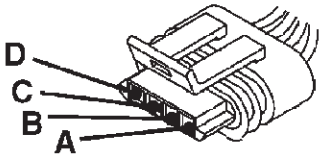
3.5L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
37	BK/RD	IAT SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP / INTAKE AIR TEMP SENSOR CONNECTOR

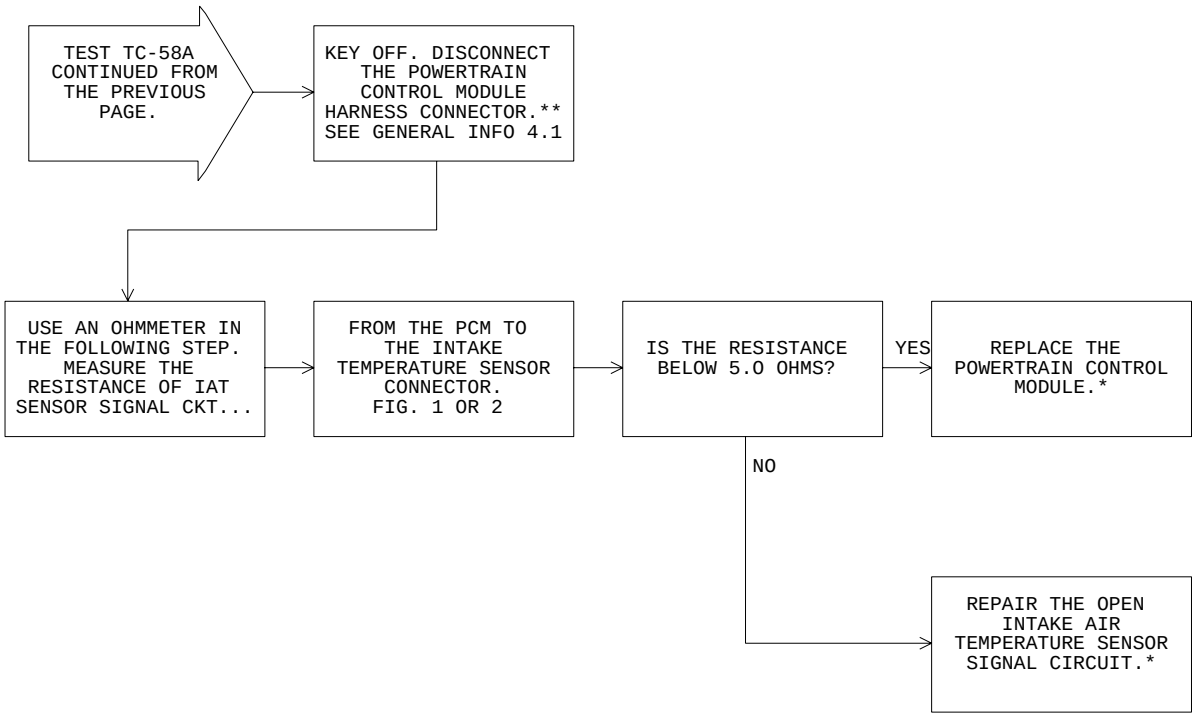


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SIGNAL
C	VT/WT	5-VOLT SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80b27d07

FIG. 2

TEST TC-58A CONTINUED - REPAIRING - INTAKE AIR TEMP SENSOR VOLTAGE HIGH



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-59A REPAIRING - KNOCK SENSOR CIRCUIT

Perform TEST DTC Before Proceeding

Name of code: Knock Sensor Circuit

When monitored: With the ignition on and the engine running.

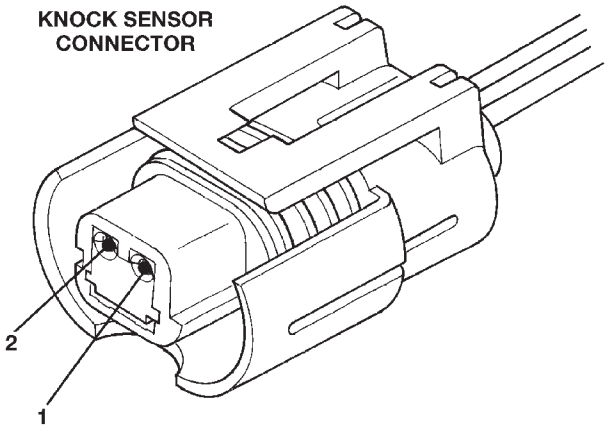
Set condition: The knock sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine rpm. The trouble code also sets if the sensor output is above 5.0 volts.

Theory of operation: The knock sensor is mounted on the cylinder block below the intake manifold. The knock sensor is comprised of thin piezo-electric ceramic discs bonded to a metal diaphragm. When engine knock occurs, the diaphragm vibrates along with the piezo-electric discs, producing an electrical signal. The signal is used by the PCM to adjust ignition timing to eliminate the knock condition.

Possible causes:
- Sensor signal open
- Sensor internally open
- PCM failure
- Sensor signal circuit shorted to ground
- Connector terminals
- Connector wires

2420105

2.7L

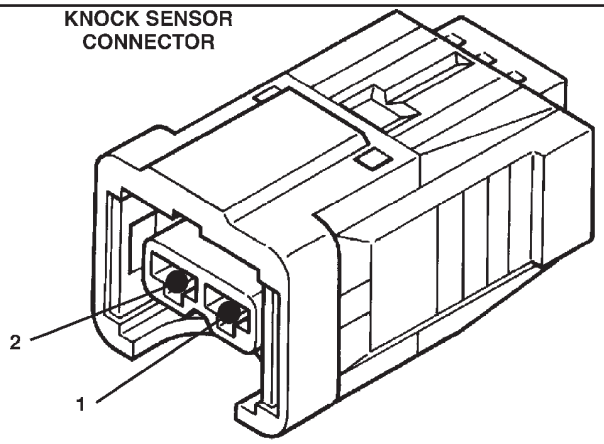


CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	BK/VT	KNOCK SENSOR SIGNAL

FIG. 1

80b09868

3.5L



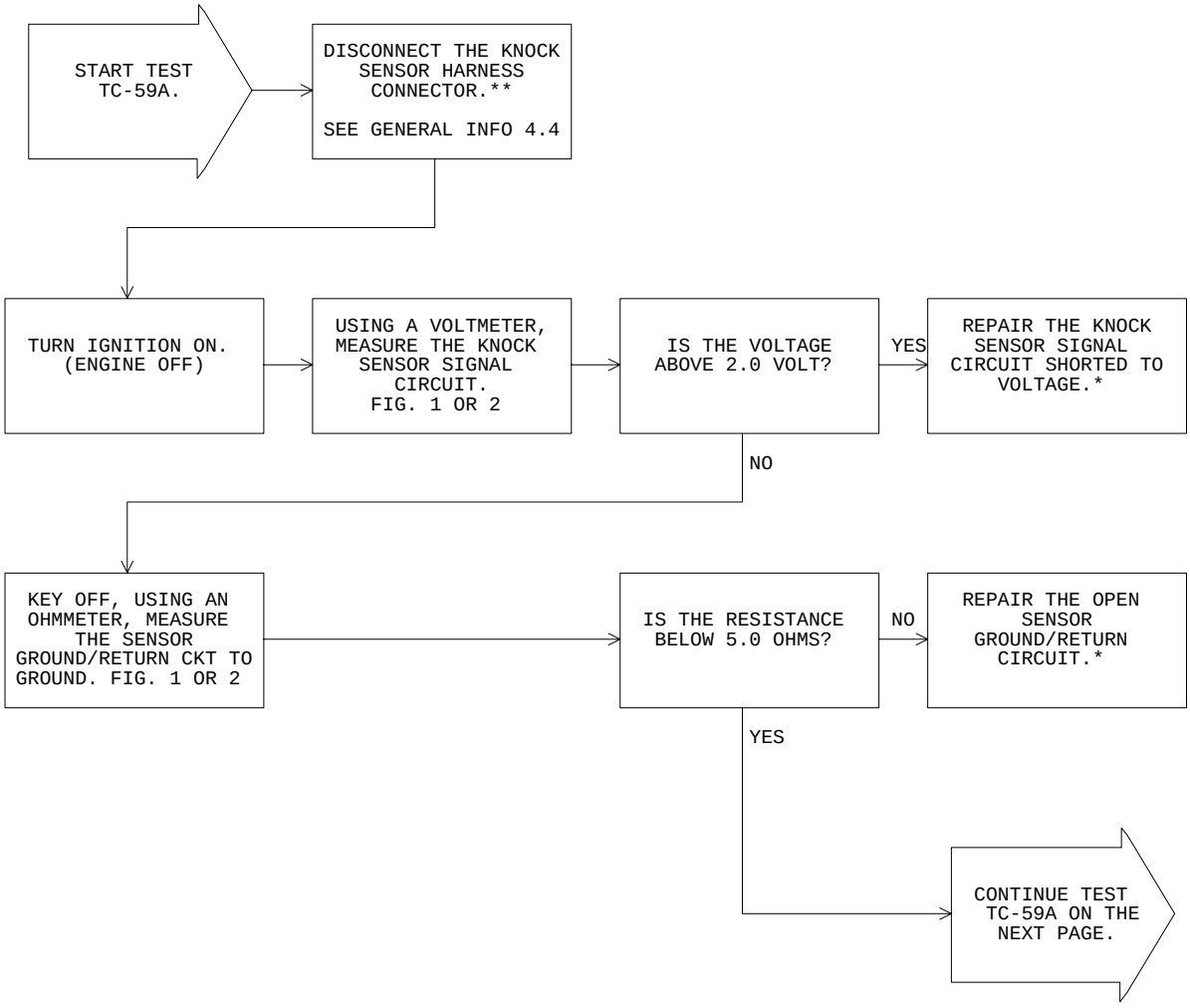
CAV	COLOR	FUNCTION
1	BK/VT	KNOCK SENSOR RETURN
2	DB/LG	KNOCK SENSOR SIGNAL

FIG. 2

80b09869

TEST TC-59A REPAIRING - KNOCK SENSOR CIRCUIT

Perform TEST DTC Before Proceeding

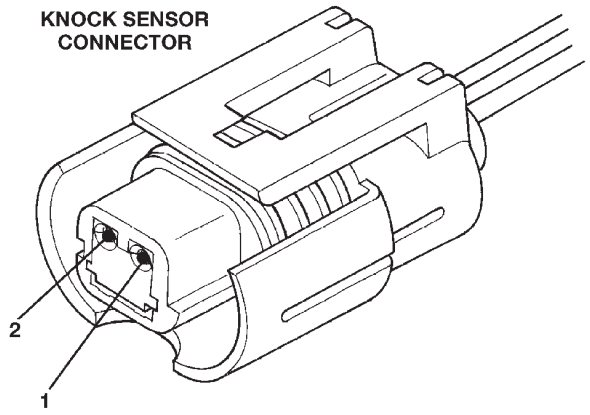


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-59A CONTINUED - REPAIRING - KNOCK SENSOR CIRCUIT

2.7L

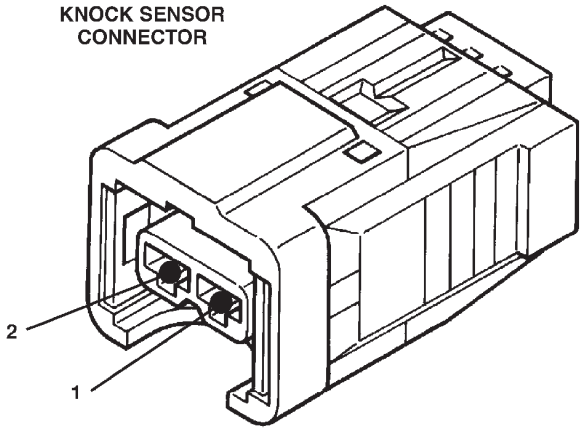


CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	BK/VT	KNOCK SENSOR SIGNAL

80b09868

FIG. 1

3.5L

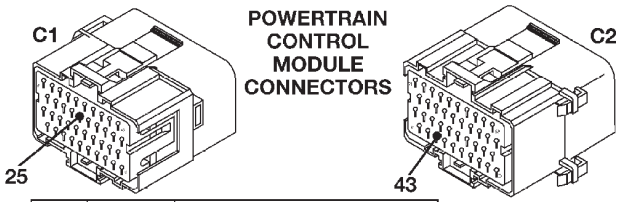


CAV	COLOR	FUNCTION
1	BK/VT	KNOCK SENSOR RETURN
2	DB/LG	KNOCK SENSOR SIGNAL

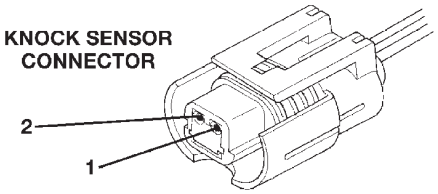
80b09869

FIG. 2

2.7L



CAV	COLOR	FUNCTION
25	BK/VT	KNOCK SENSOR SIGNAL
43	BK/LB	SENSOR GROUND

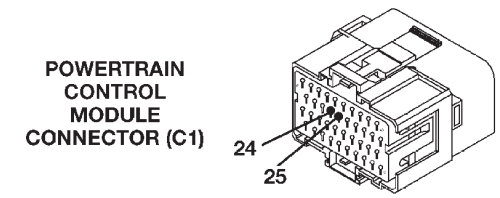


CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	BK/VT	KNOCK SENSOR SIGNAL

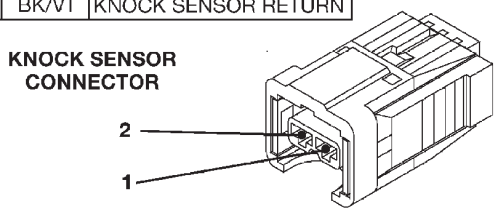
80b29f39

FIG. 3

3.5L



CAV	COLOR	FUNCTION
24	DB/LG	KNOCK SENSOR SIGNAL
25	BK/VT	KNOCK SENSOR RETURN

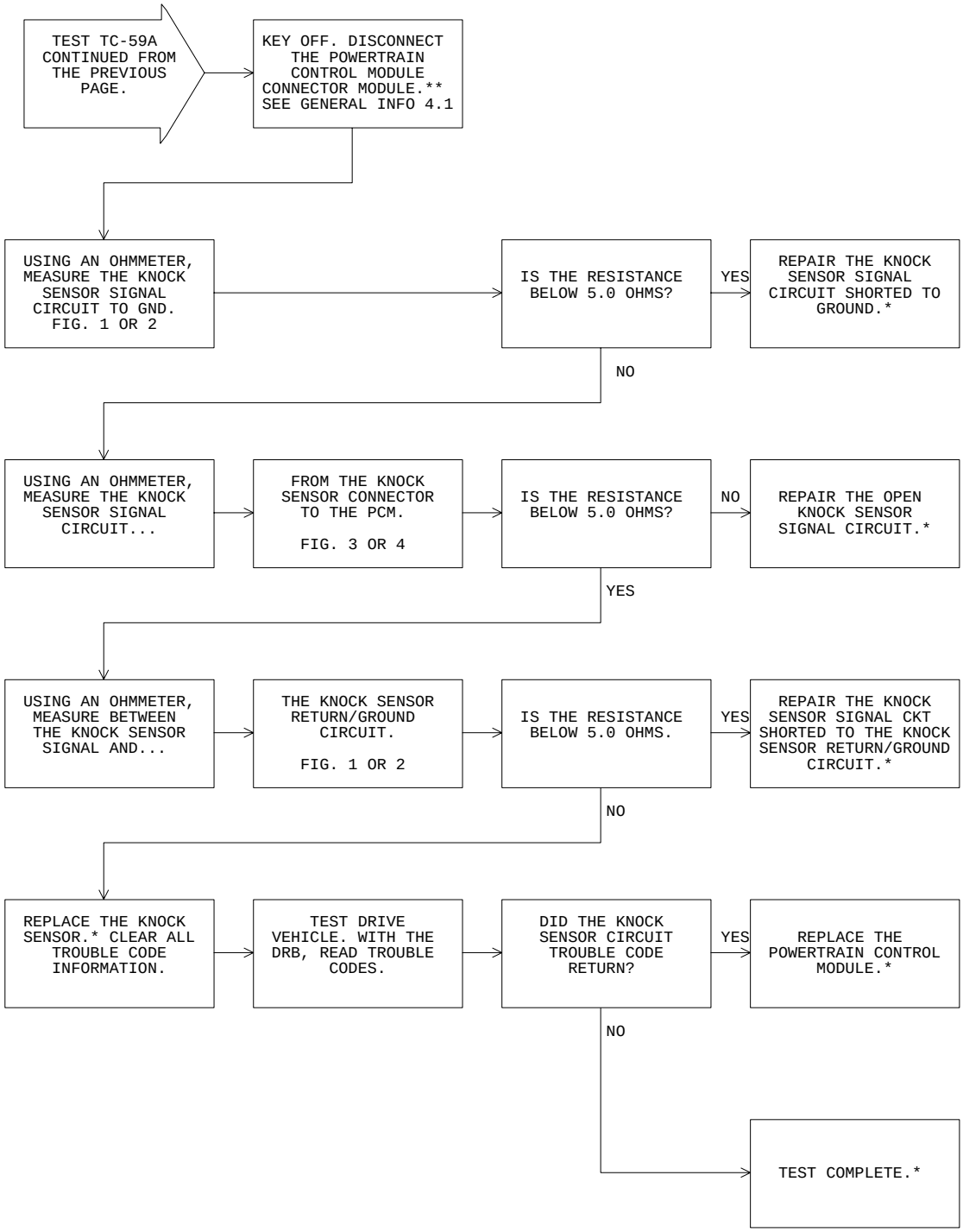


CAV	COLOR	FUNCTION
1	BK/VT	KNOCK SENSOR RETURN
2	DB/LG	KNOCK SENSOR SIGNAL

80b2b621

FIG. 4

TEST TC-59A CONTINUED - REPAIRING - KNOCK SENSOR CIRCUIT



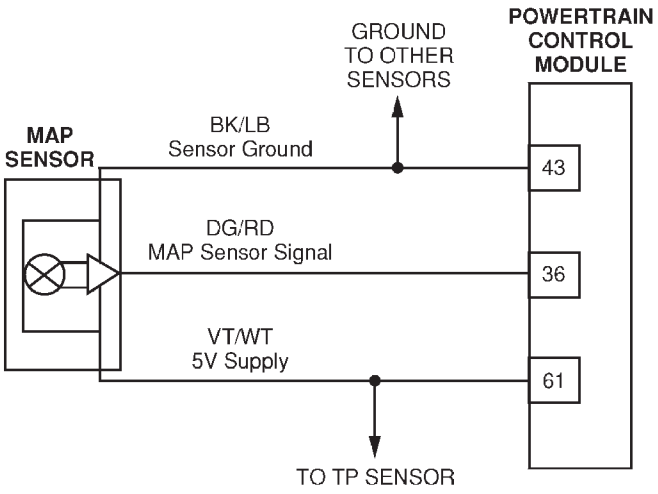
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

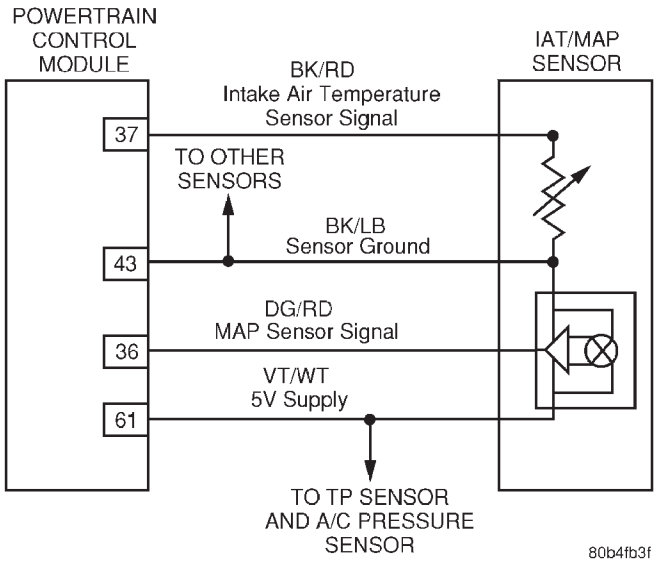
TEST TC-60A REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE

Perform TEST DTC Before Proceeding

2.7



3.5L



Name of code: Barometric Pressure Out Of Range

When monitored: With the ignition key on at less than 350 milliseconds and engine speed at less than 255 RPM.

Set condition: The PCM senses the voltage from the MAP sensor to be less than 2.196 volts but above 0.019 volt for 300 milliseconds.

Theory of operation: The MAP sensor voltage is used by the PCM to determine the barometric pressure within the manifold. The PCM uses that value as an altitude reference to determine the adjustments to the fuel control mixture.

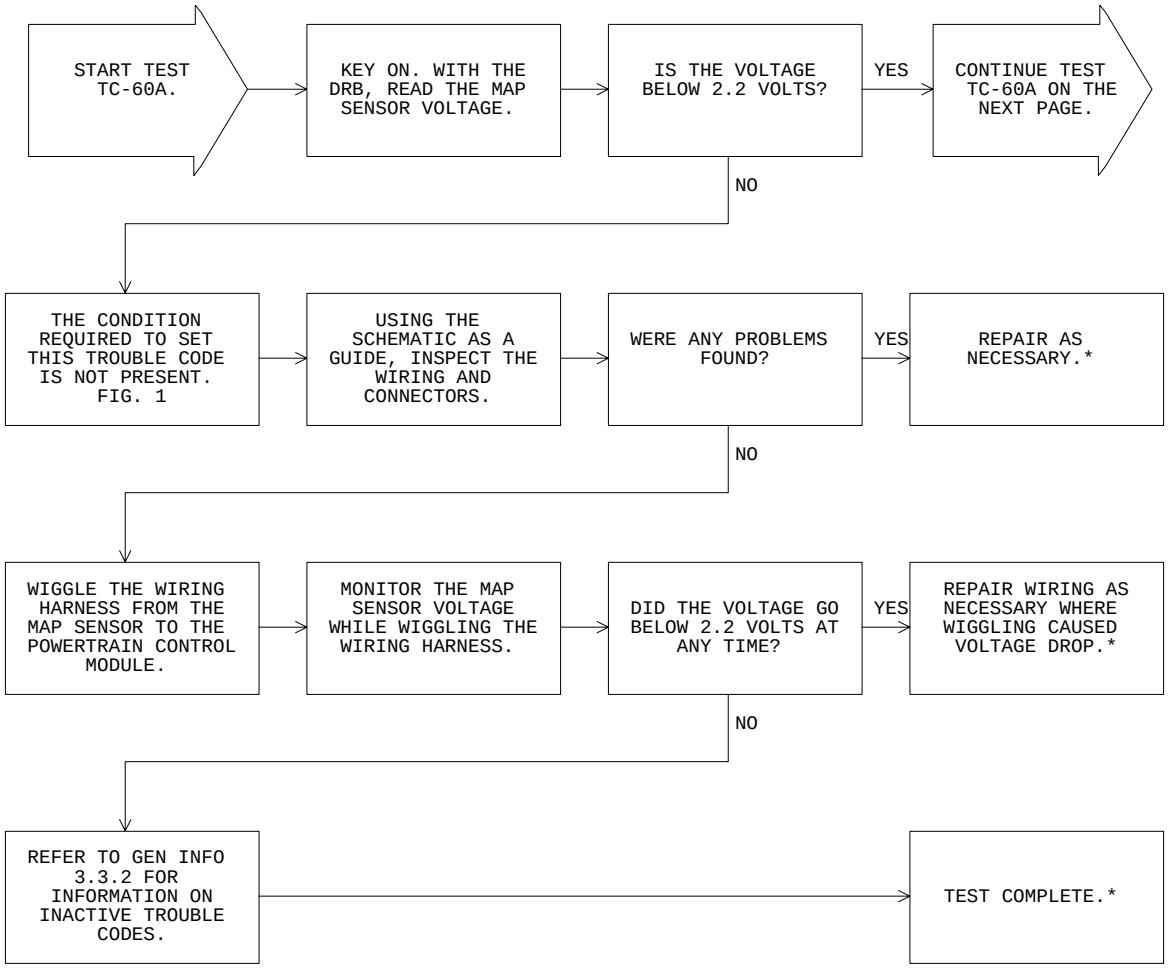
Possible causes:
- MAP sensor Failure
- PCM failure
- Connector terminals
- Connector wires

3400304

FIG. 1

TEST TC-60A REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE

Perform TEST DTC Before Proceeding



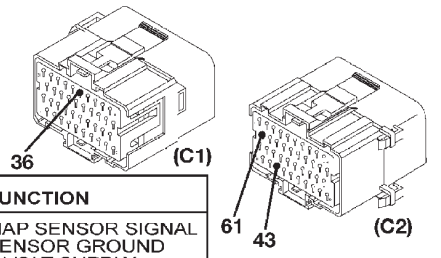
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-60A CONTINUED - REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE

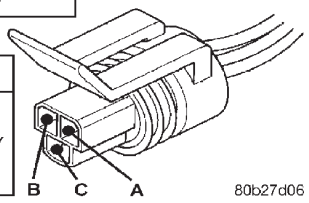
2.7L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP SENSOR CONNECTOR

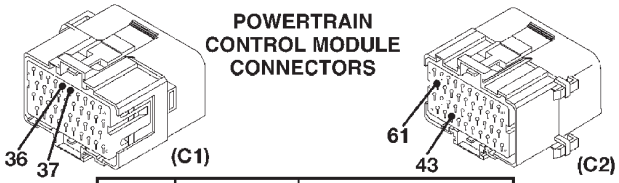


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 1

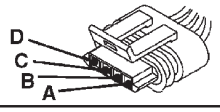
3.5L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
37	BK/RD	IAT SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP / INTAKE AIR TEMP SENSOR CONNECTOR



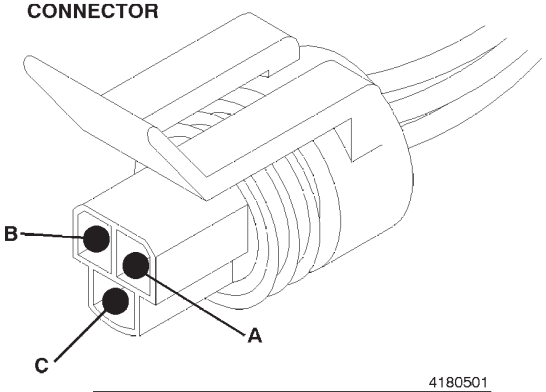
CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SIGNAL
C	VT/WT	5-VOLT SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80b27d07

FIG. 2

2.7L

MAP SENSOR CONNECTOR

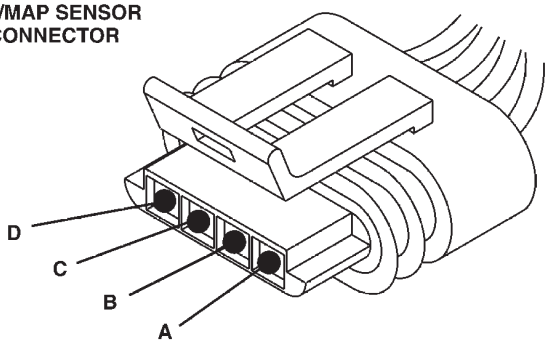


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 3

3.5L

IAT/MAP SENSOR CONNECTOR

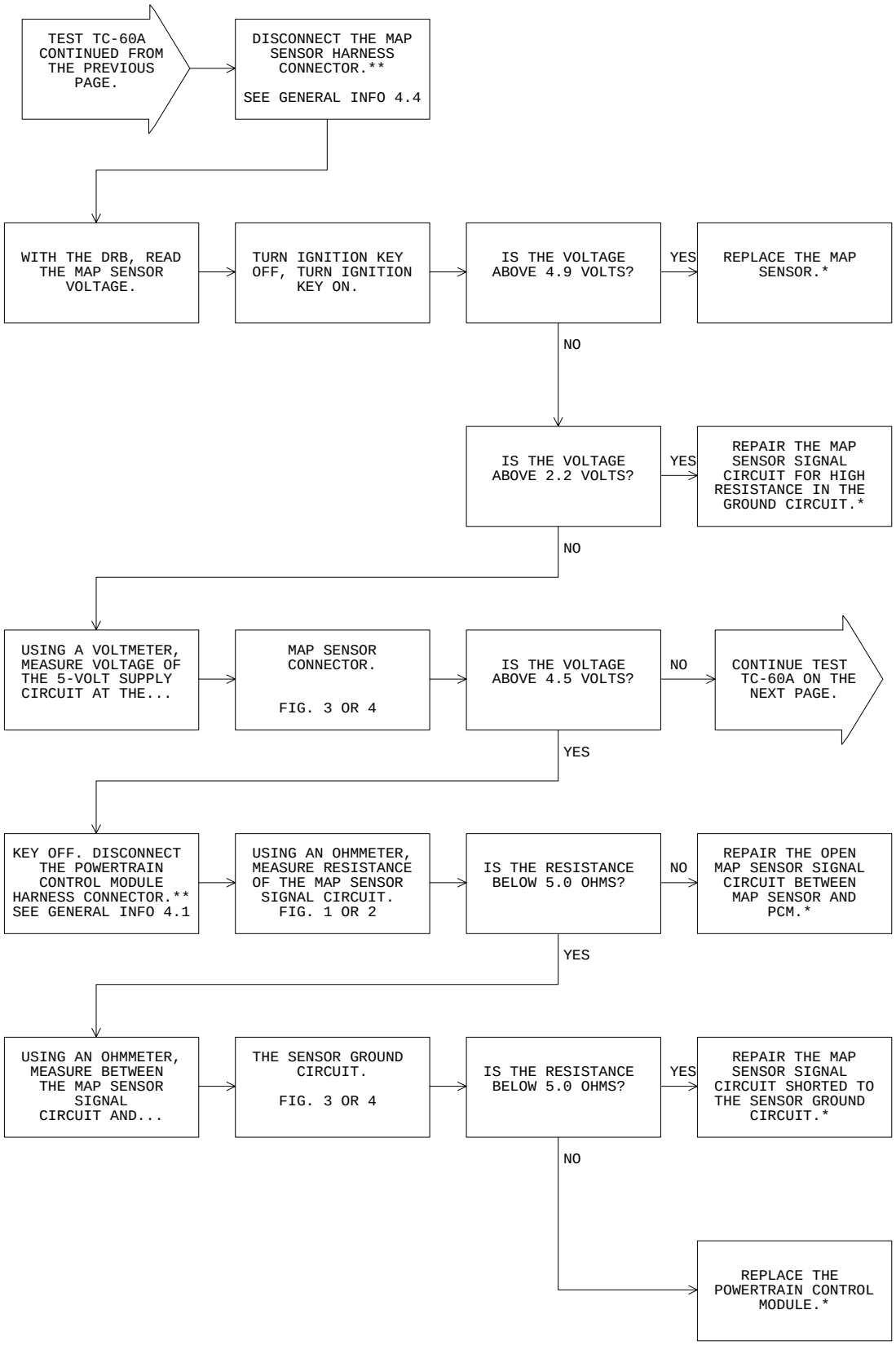


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 4

TEST TC-60A CONTINUED - REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE

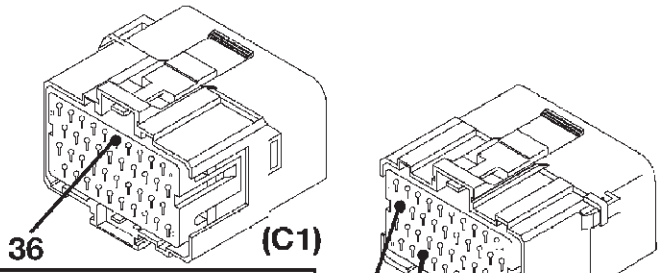


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

2.7L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP SENSOR CONNECTOR

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

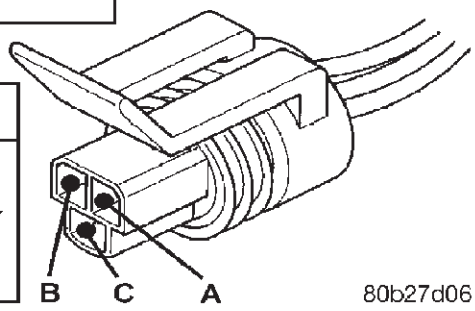
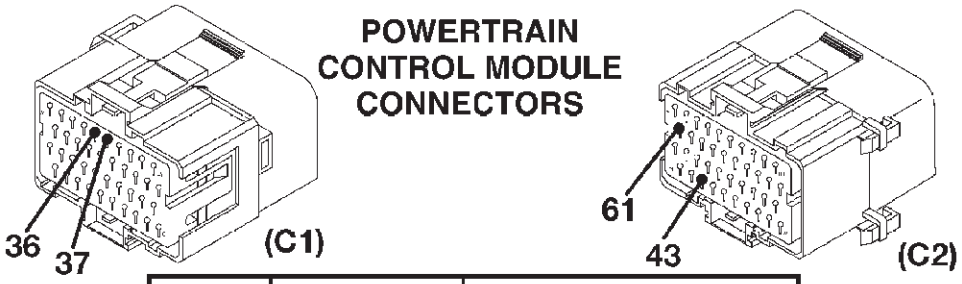


FIG. 1

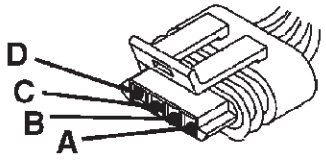
3.5L

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
36	DG/RD	MAP SENSOR SIGNAL
37	BK/RD	IAT SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

MAP / INTAKE AIR TEMP SENSOR CONNECTOR

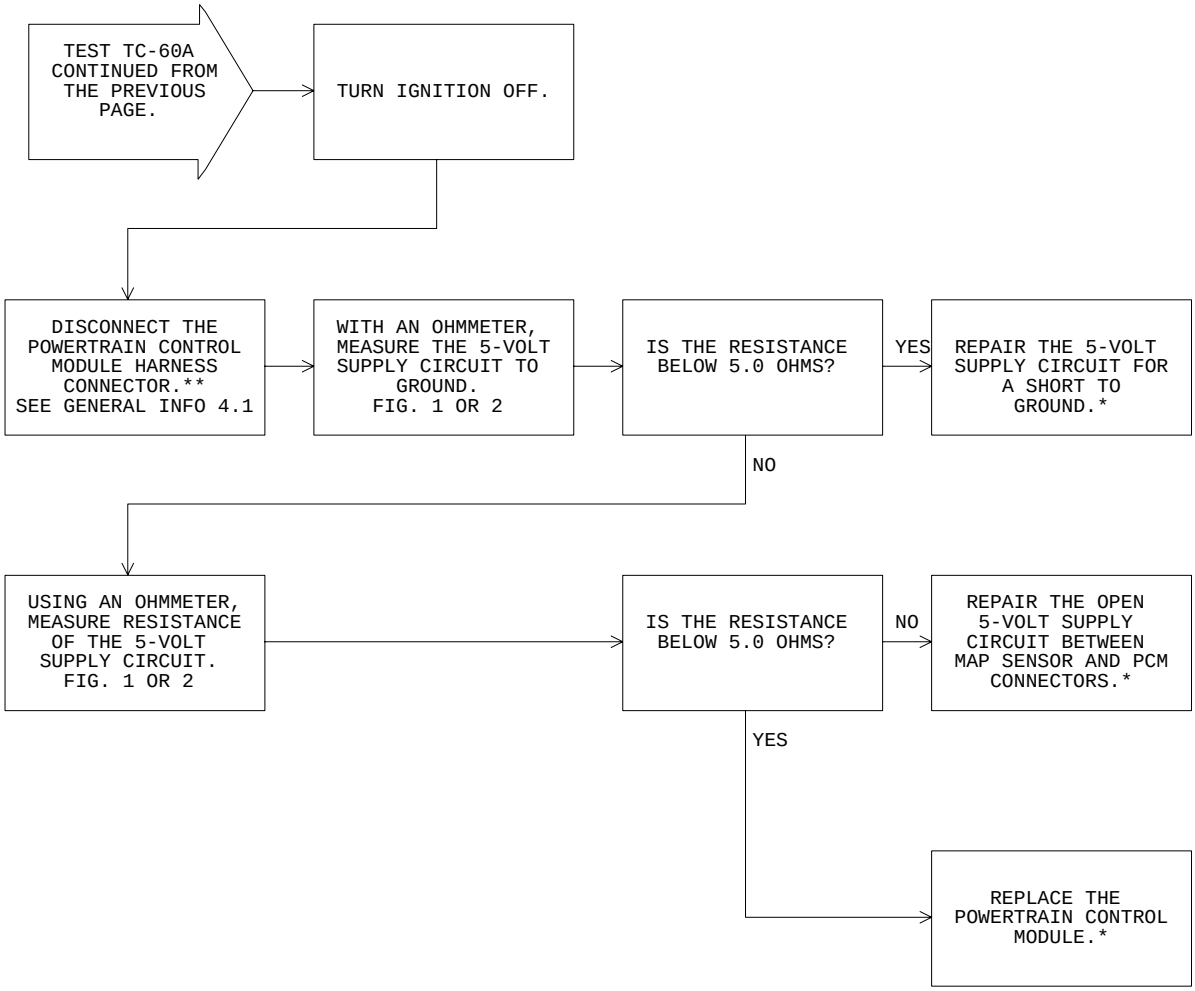


CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SIGNAL
C	VT/WT	5-VOLT SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80b27d07

FIG. 2

TEST TC-60A CONTINUED - REPAIRING - BAROMETRIC PRESSURE OUT OF RANGE

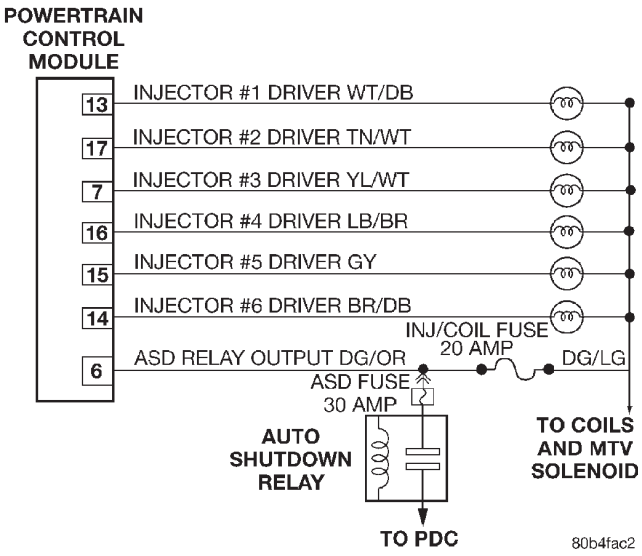


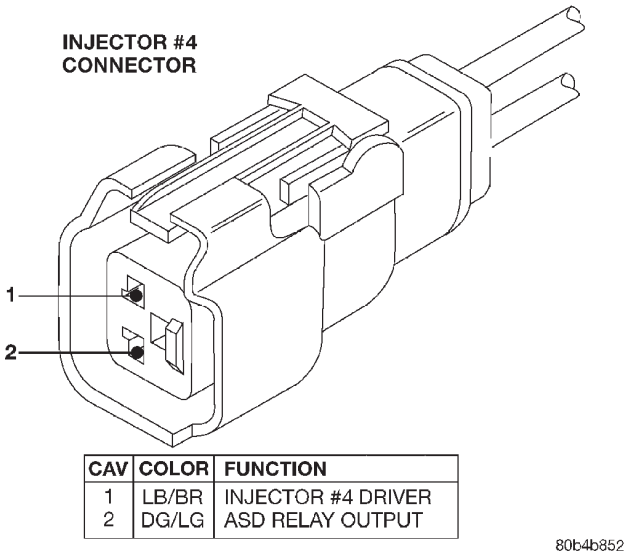
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-61A REPAIRING - INJECTOR #4 CONTROL CIRCUIT

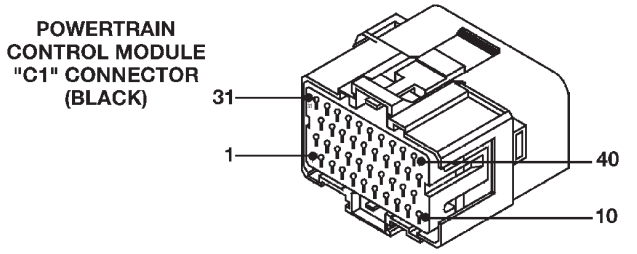
Perform TEST TC-21A Before Proceeding





CAV	COLOR	FUNCTION
1	LB/BR	INJECTOR #4 DRIVER
2	DG/LG	ASD RELAY OUTPUT

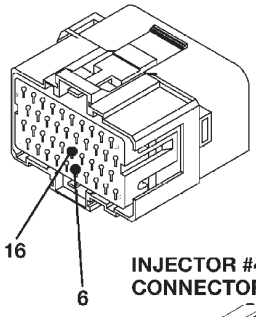
FIG. 1



CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/1 SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/1 SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSITION SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

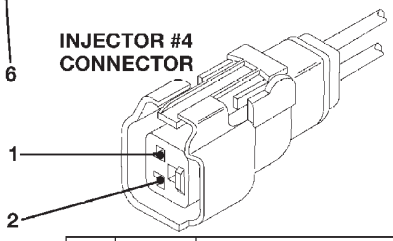
80b4b855

FIG. 2



POWERTRAIN CONTROL MODULE CONNECTOR (C1)

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
16	LB/BR	INJECTOR #4 DRIVER

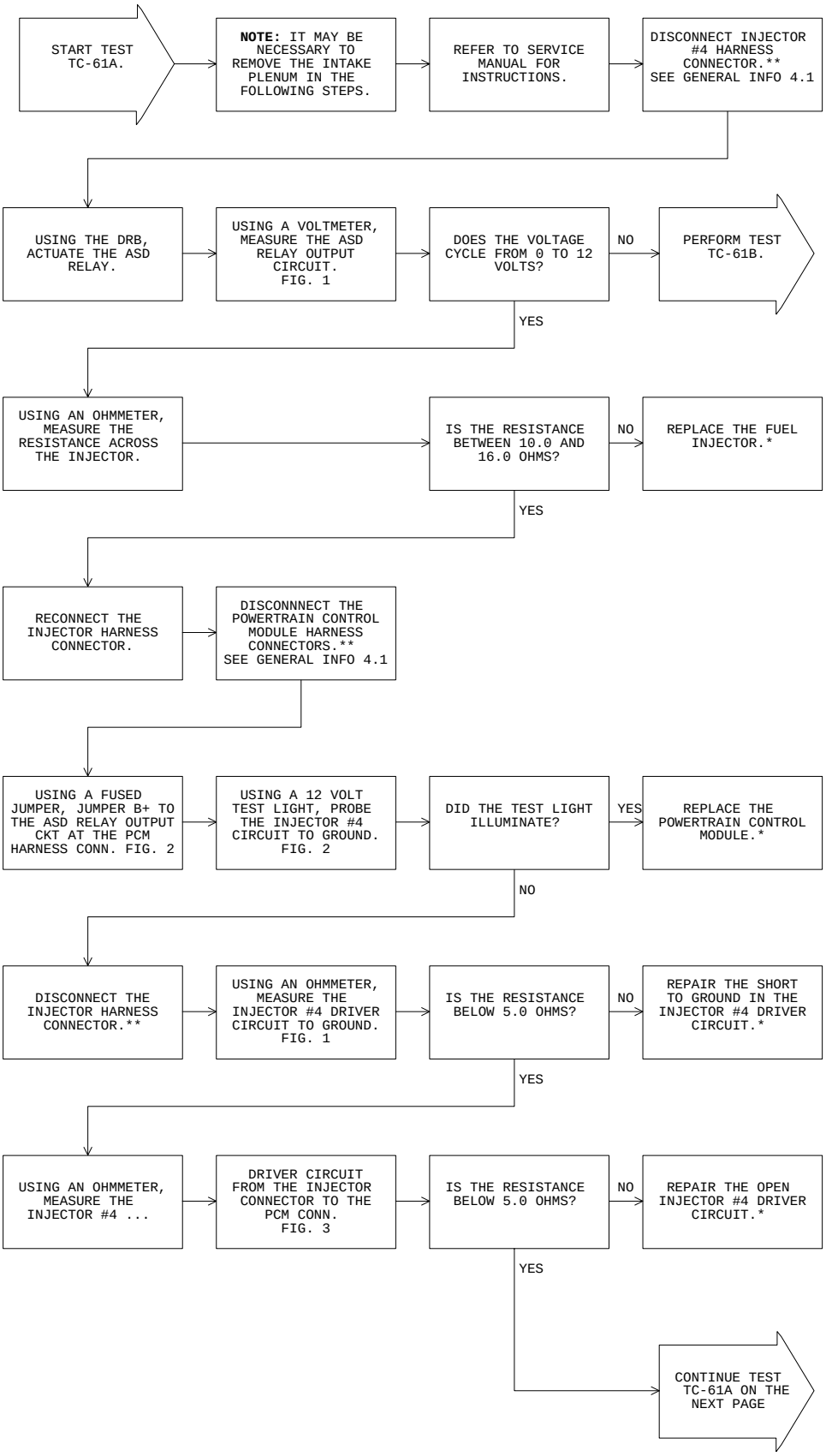


CAV	COLOR	FUNCTION
1	LB/BR	INJECTOR #4 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 3

TEST TC-61A REPAIRING - INJECTOR #4 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding

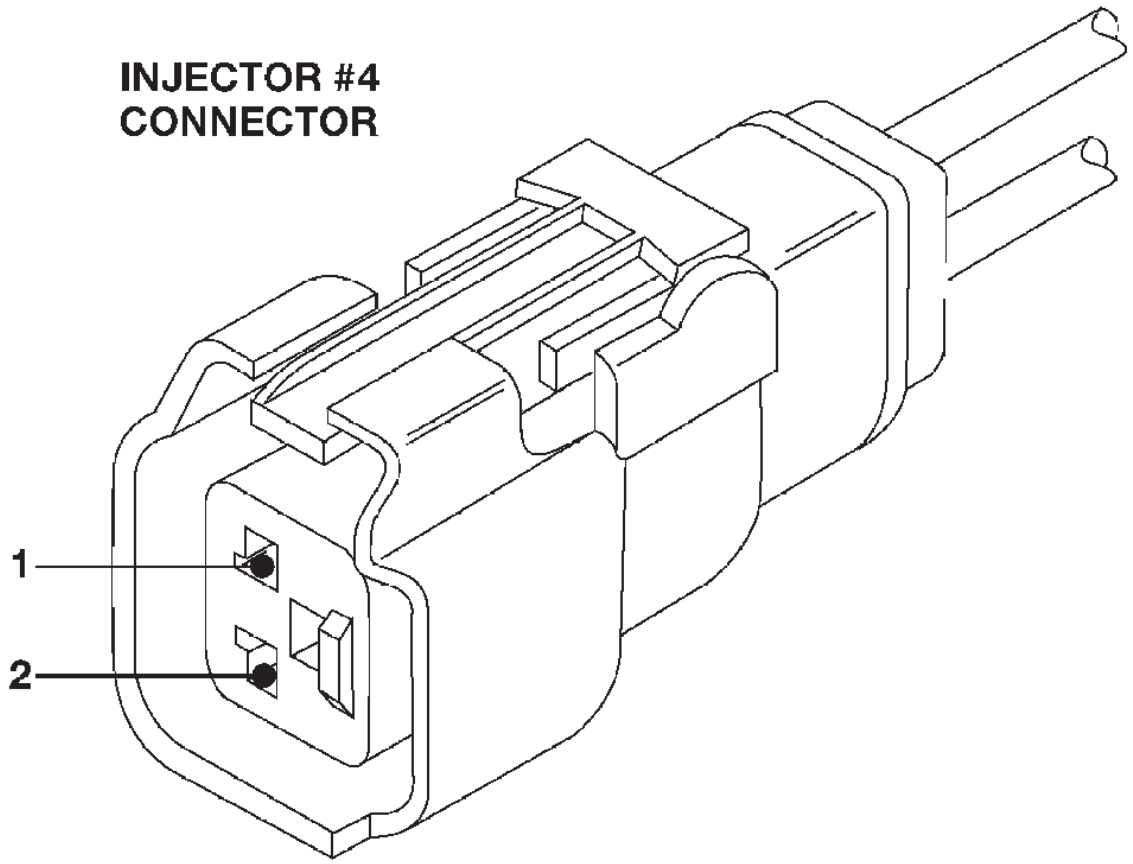


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-61A CONTINUED - REPAIRING - INJECTOR #4 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding



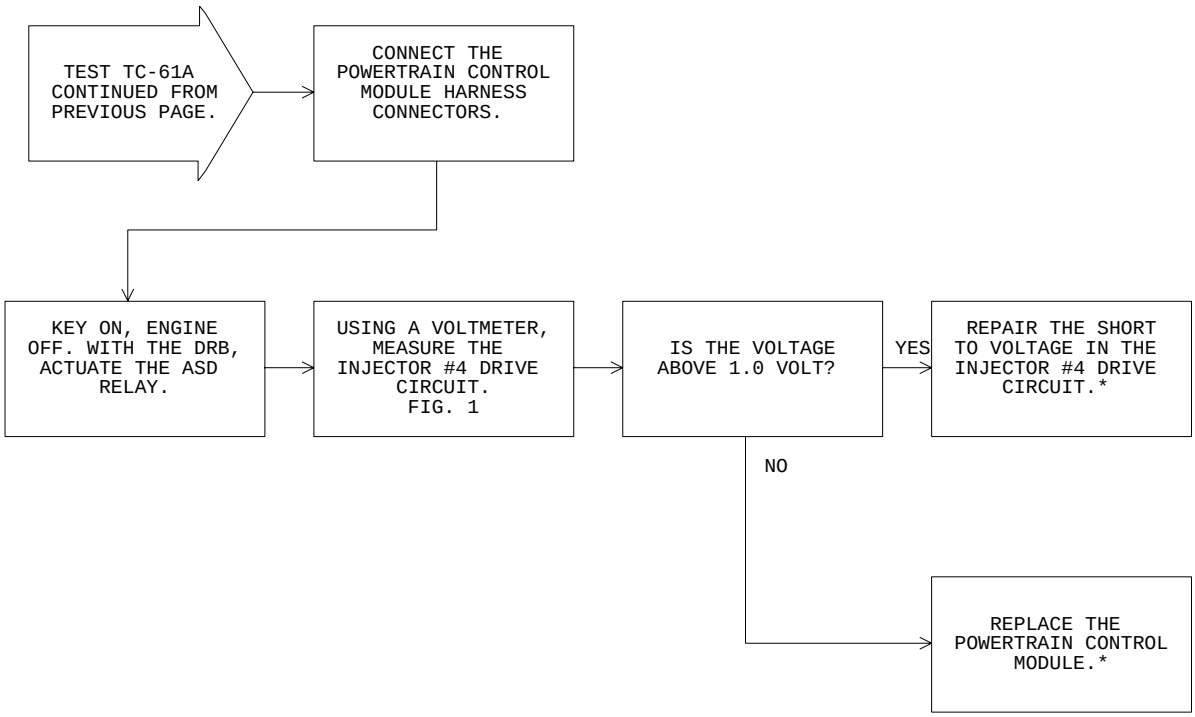
CAV	COLOR	FUNCTION
1	LB/BR	INJECTOR #4 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b4b852

FIG. 1

TEST TC-61A CONTINUED - REPAIRING - INJECTOR #4 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding

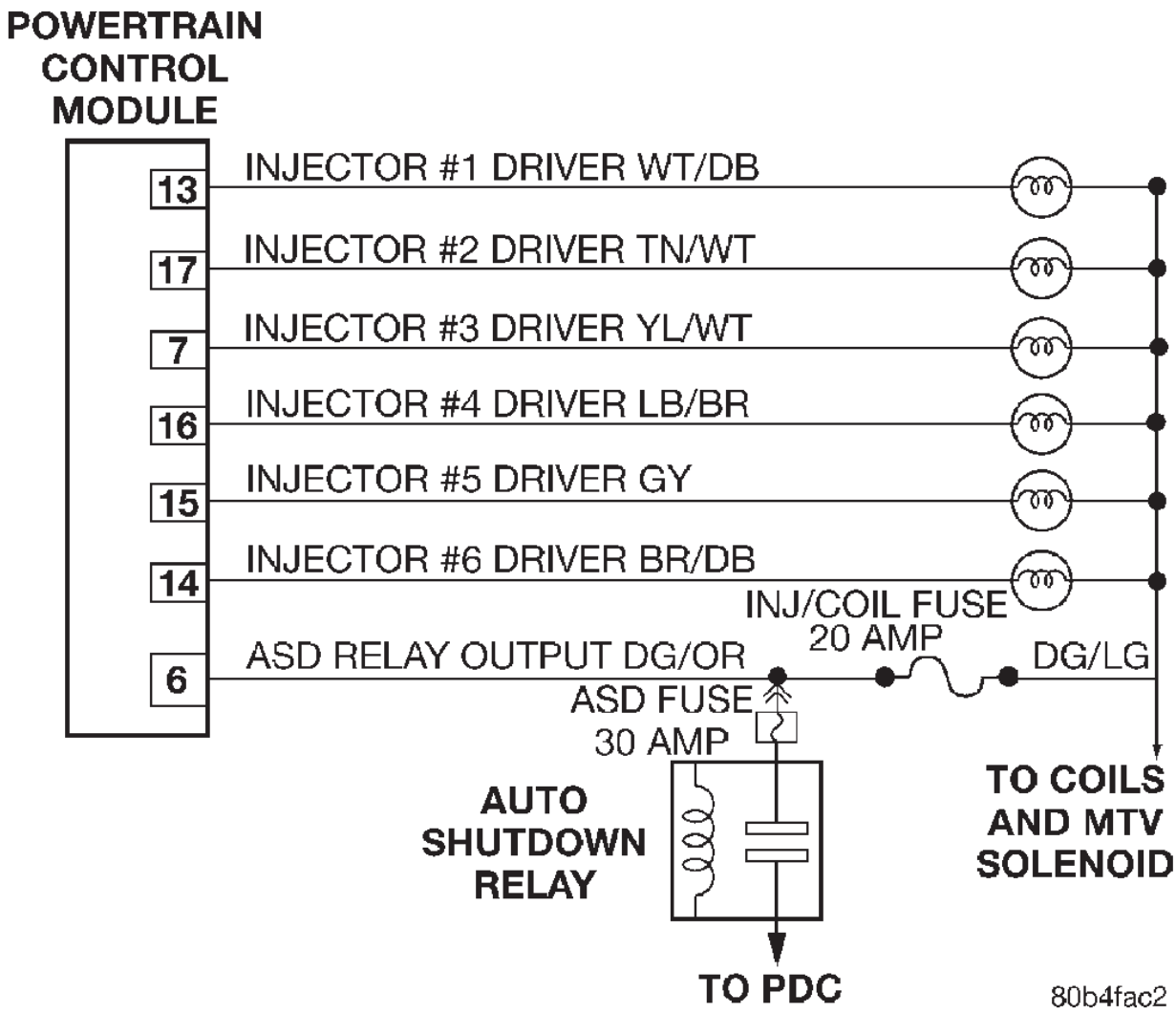


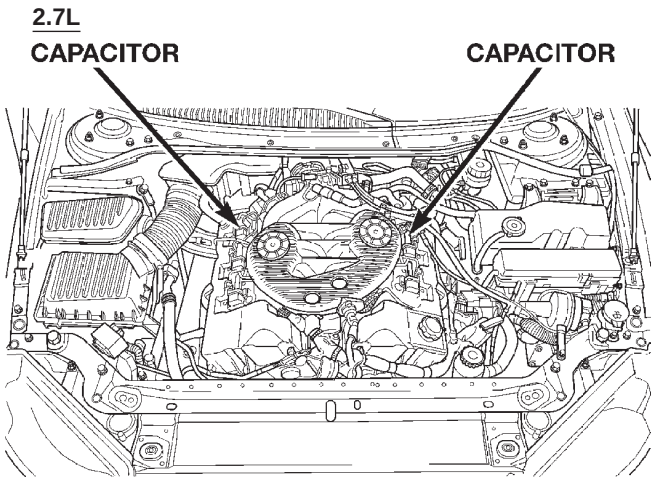
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-61B REPAIRING - INJECTOR #4 CONTROL CIRCUIT

Perform TEST TC-61A Before Proceeding

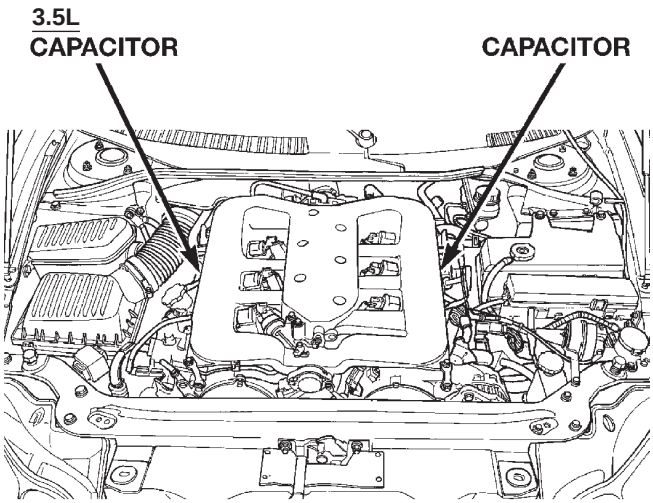




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1



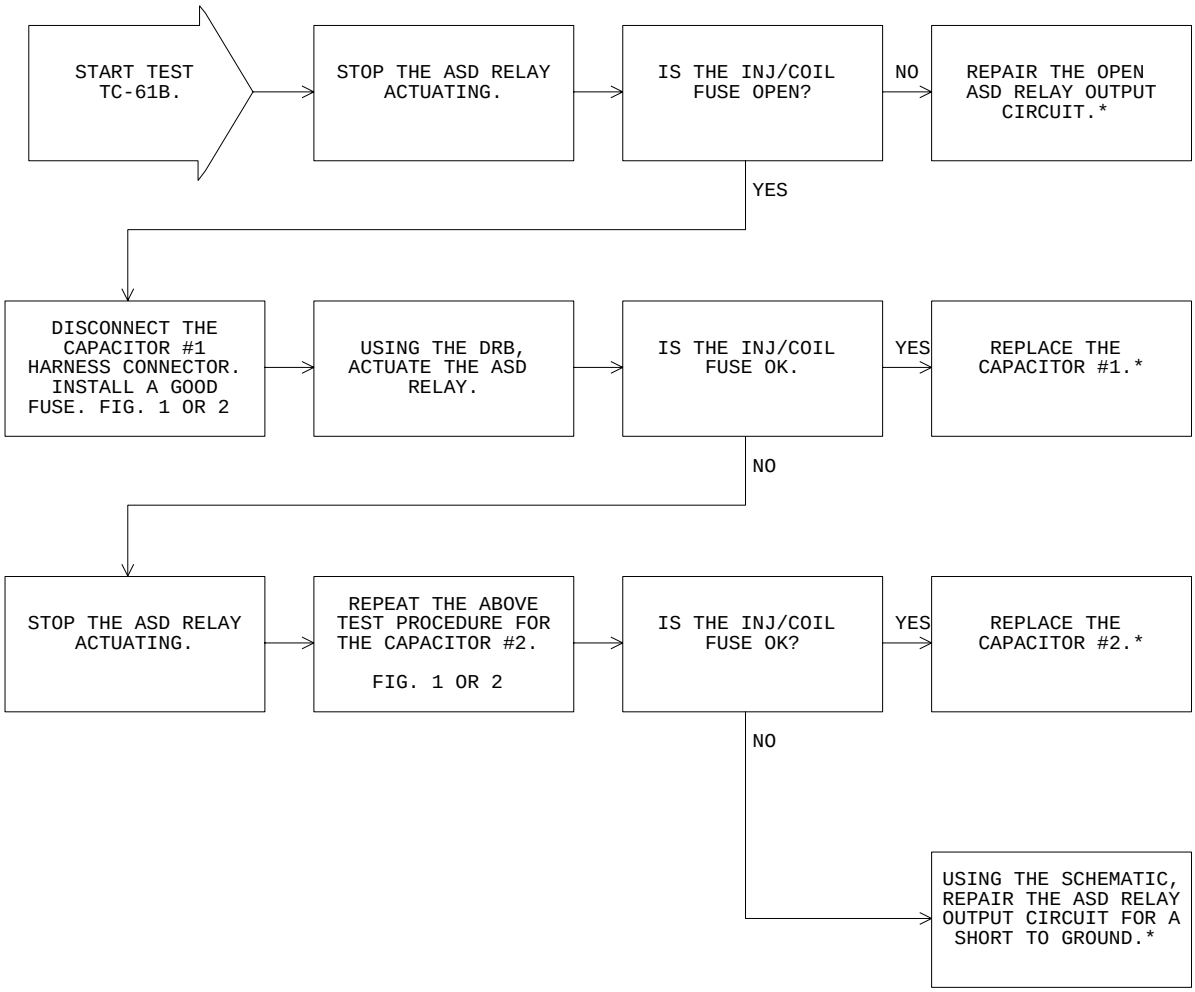
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-61B REPAIRING - INJECTOR #4 CONTROL CIRCUIT

Perform TEST TC-61A Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-62A REPAIRING - 1/1 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

1/1 RIGHT BANK UP

Name of code: O2 Sensor Shorted To Voltage

When monitored: With the engine running for more than 2 minutes and coolant temperature above 170°F.

Set condition: The oxygen sensor voltage is above 1.2 volts.

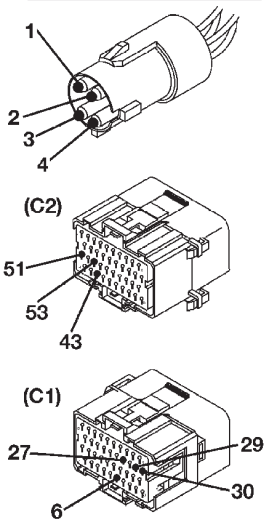
Theory of operation: Effective control of exhaust emissions is achieved by an oxygen feedback system. The oxygen sensor (O2S), which is located in the exhaust path, monitors the exhaust emissions. Once the sensor reaches its normal operating temperature of 300°-350°C (572°-662°F), it generates a voltage inversely proportional to the amount of oxygen in the exhaust.

Possible causes:

> Sensor output wire shorted to a power circuit
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires
> Open O2 sensor signal circuit

80b01cfe

1/1 RIGHT BANK UP



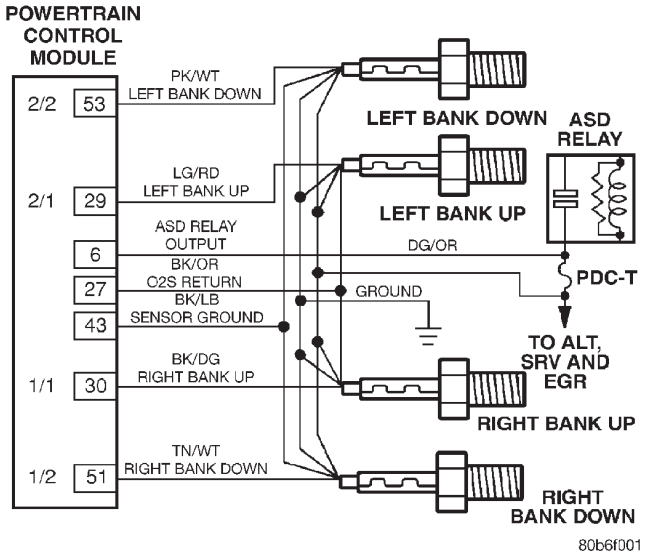
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

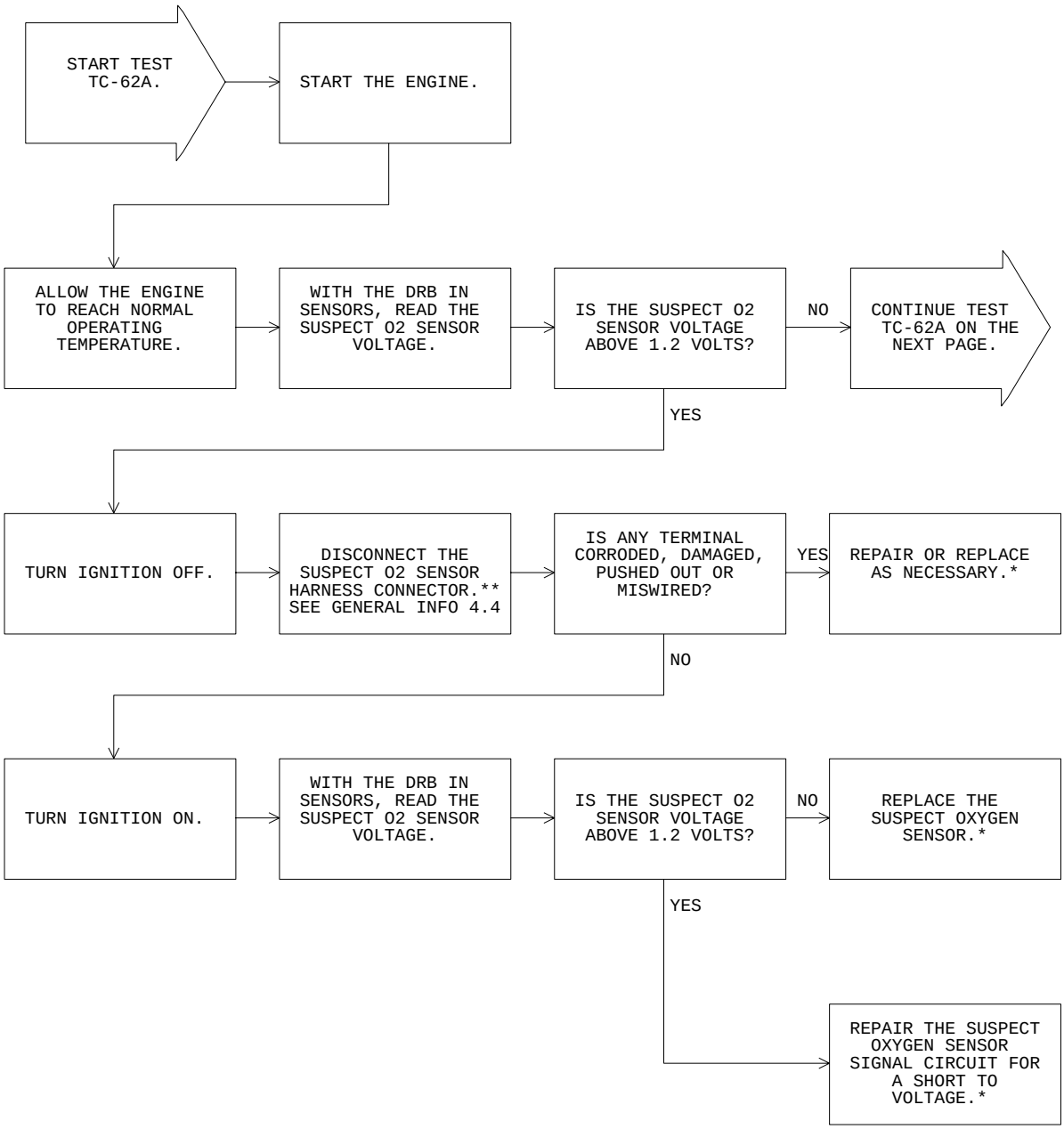
80b1b45c



80b6f001

TEST TC-62A REPAIRING - 1/1 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

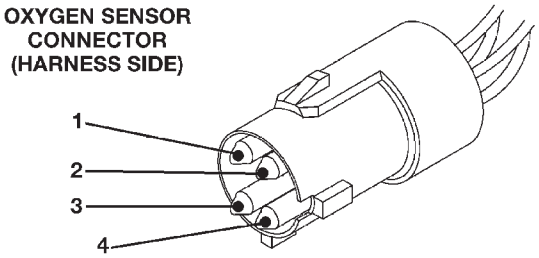


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-62A CONTINUED - REPAIRING - 1/1 O2S SHORTED TO VOLTAGE

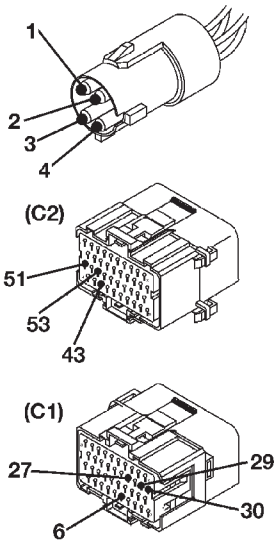
1/1 RIGHT BANK UP



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

1/1 RIGHT BANK UP



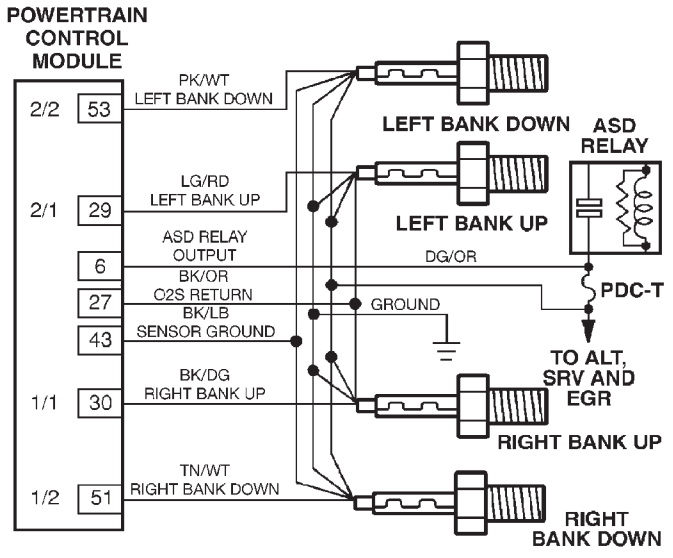
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

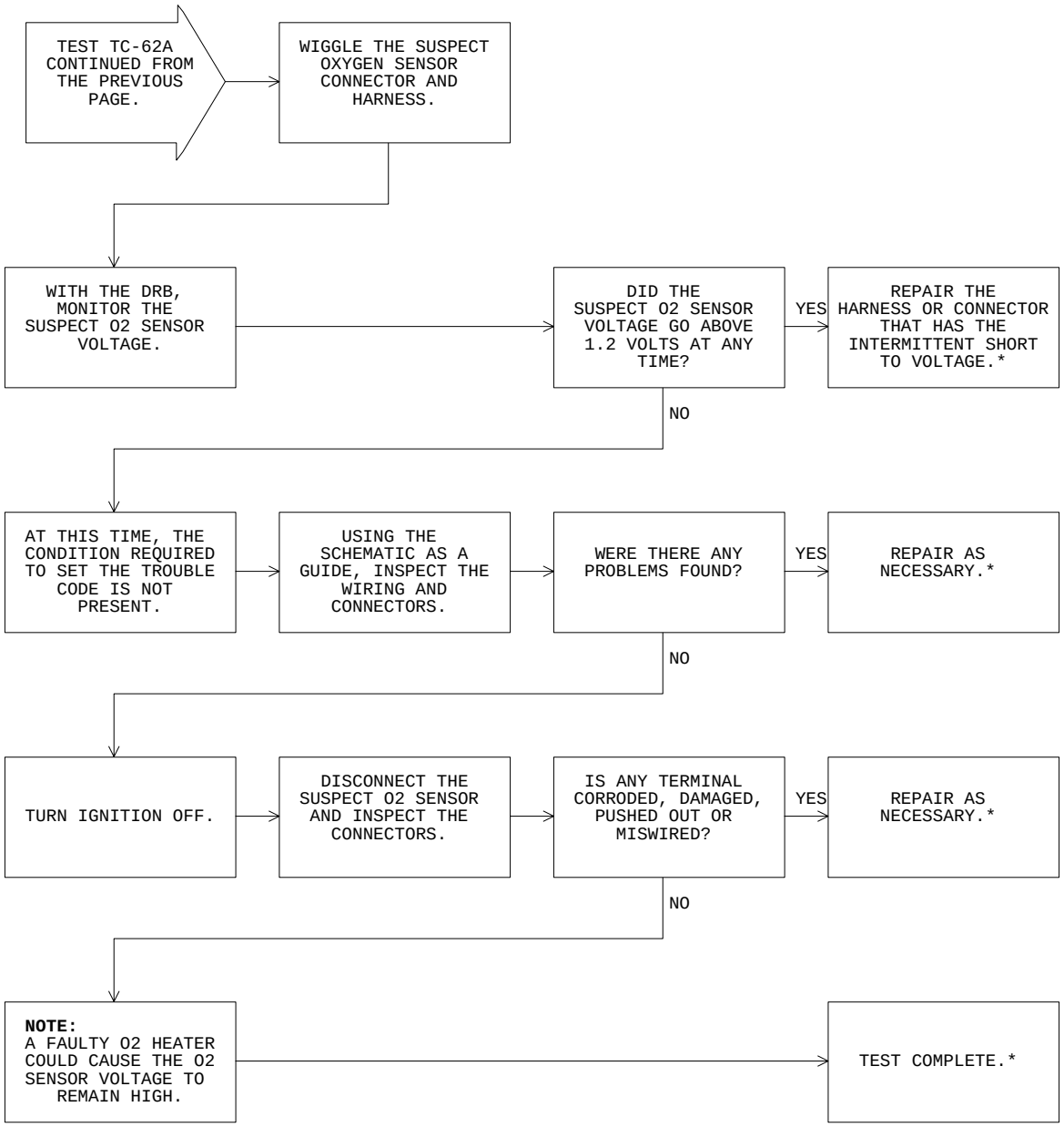
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c



80b6f001

TEST TC-62A CONTINUED - REPAIRING - 1/1 O2S SHORTED TO VOLTAGE



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-65A REPAIRING - 2/1 O2S STAYS AT CENTER

Perform TEST DTC Before Proceeding

2/1 LEFT BANK UP

Name of code: 02 Sensor Stays at Center

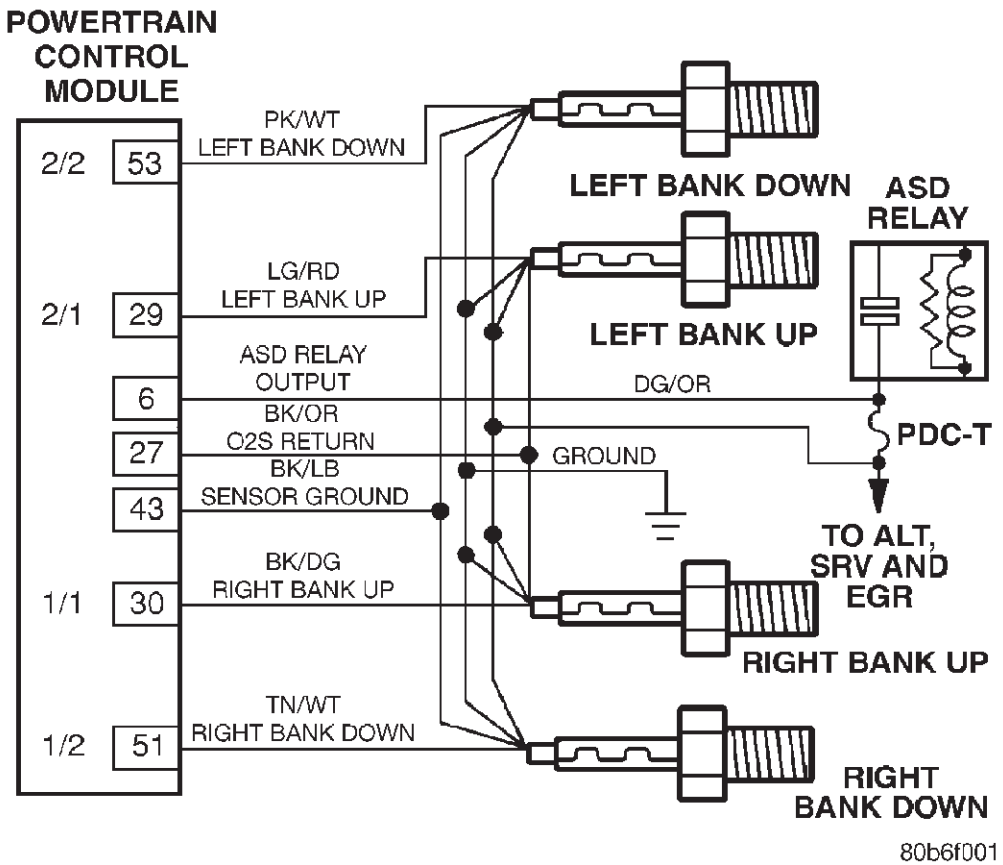
When monitored: With the engine running for more than 2 minutes and engine temperature greater than 170°.

Set condition: The oxygen sensor signal voltage is between 0.35 volt and 0.55 volt for 1.5 minutes.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this 02 sensor. The sensor detects exhaust gas content by a galvanic reation within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this 02 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be approximately 1 volt. When oxygen content is high (lean mixture), the voltage signal will be low, approximately 0.1 volt.

Possible causes:
- > Sensor output wire open
- > 02 sensor failure
- > Powertrain control module failure
- > Dirt/moisture/grease causing voltage tracking in connector
- > Connector wires

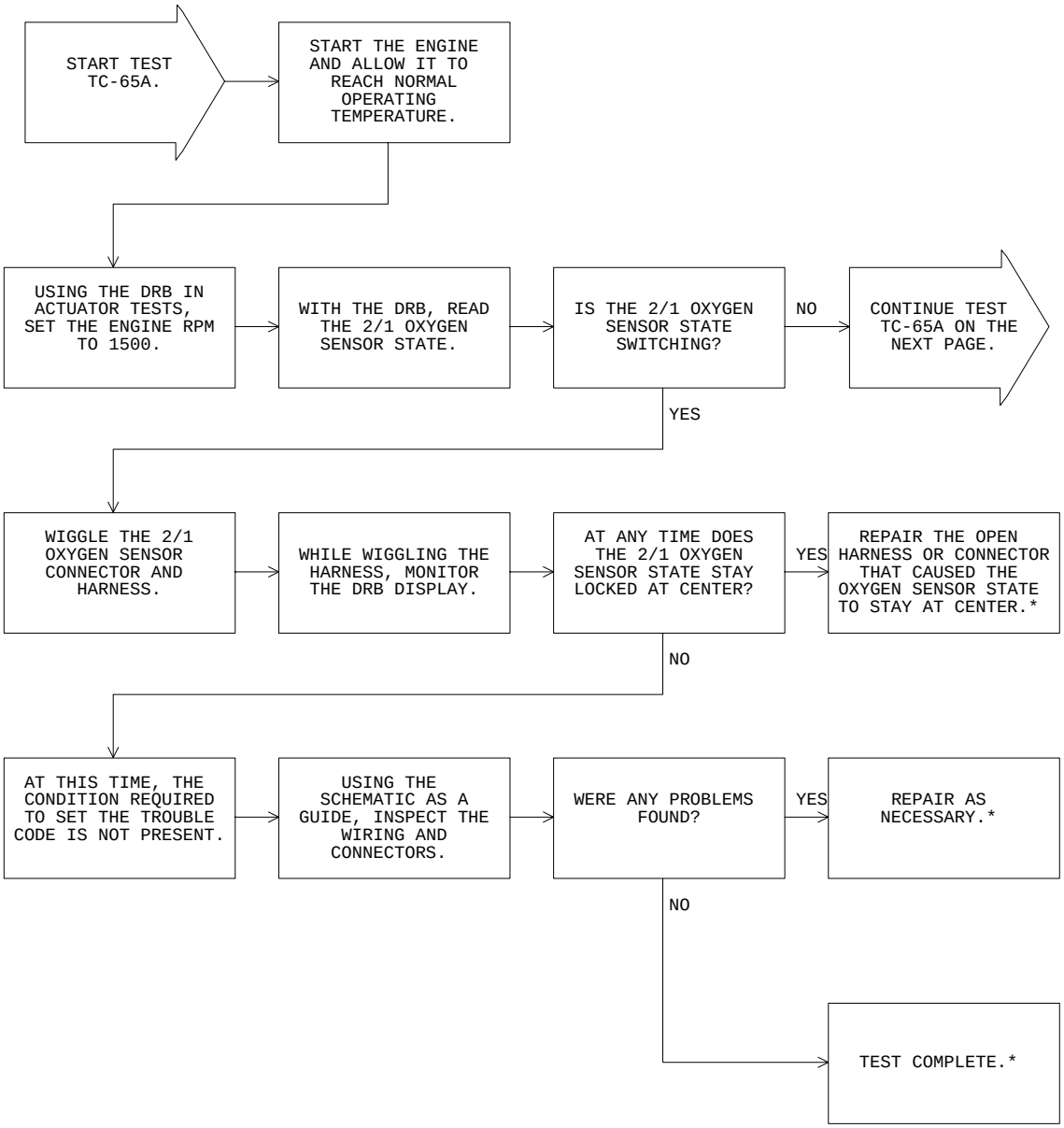
80b2439c



80b6f001

TEST TC-65A REPAIRING - 2/1 O2S STAYS AT CENTER

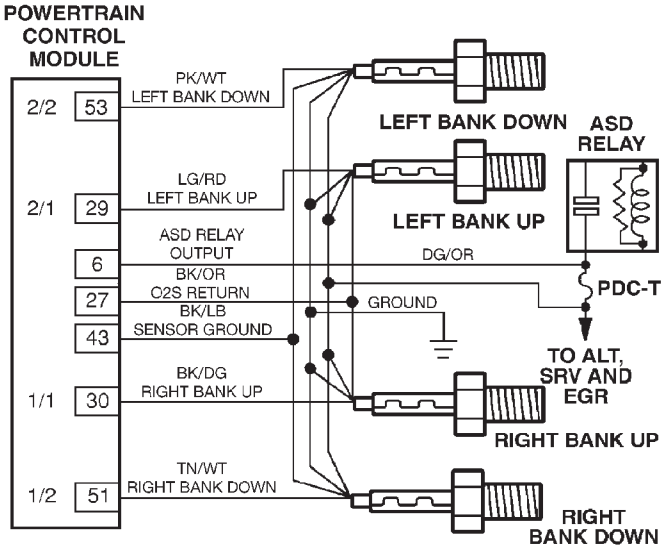
Perform TEST DTC Before Proceeding



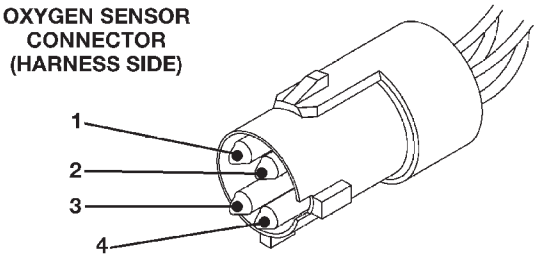
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-65A CONTINUED - REPAIRING - 2/1 O2S STAYS AT CENTER



2/1 LEFT BANK UP

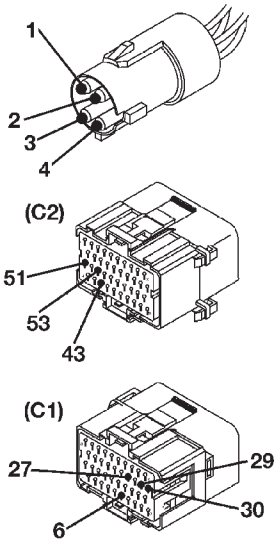


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

2/1 LEFT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

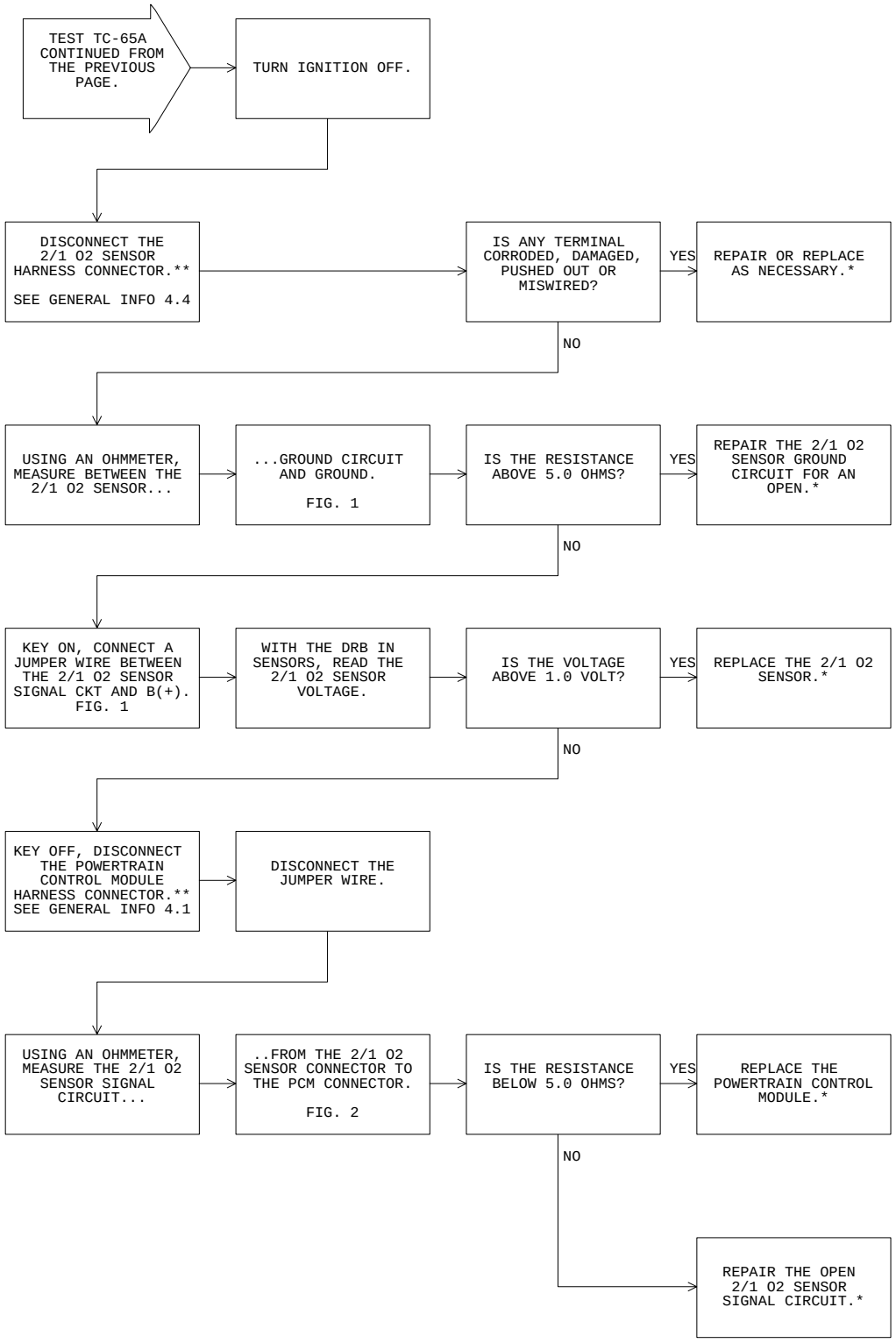
POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

FIG. 2

TEST TC-65A CONTINUED - REPAIRING - 2/1 O2S STAYS AT CENTER



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-66A REPAIRING - 2/1 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

2/1 LEFT BANK UP

Name of code: O2 Sensor Shorted To Voltage

When monitored: With the engine running for more than 2 minutes and coolant temperature above 170°F.

Set condition: The oxygen sensor voltage is above 1.2 volts.

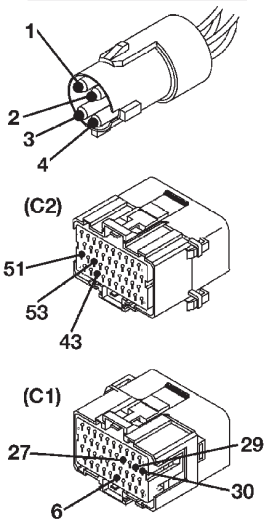
Theory of operation: Effective control of exhaust emissions is achieved by an oxygen feedback system. The oxygen sensor (O2S), which is located in the exhaust path, monitors the exhaust emissions. Once the sensor reaches its normal operating temperature of 300°-350°C (572°-662°F), it generates a voltage inversely proportional to the amount of oxygen in the exhaust.

Possible causes:

> Sensor output wire shorted to a power circuit
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires
> Open O2 sensor signal circuit

80b01cfe

2/1 LEFT BANK UP



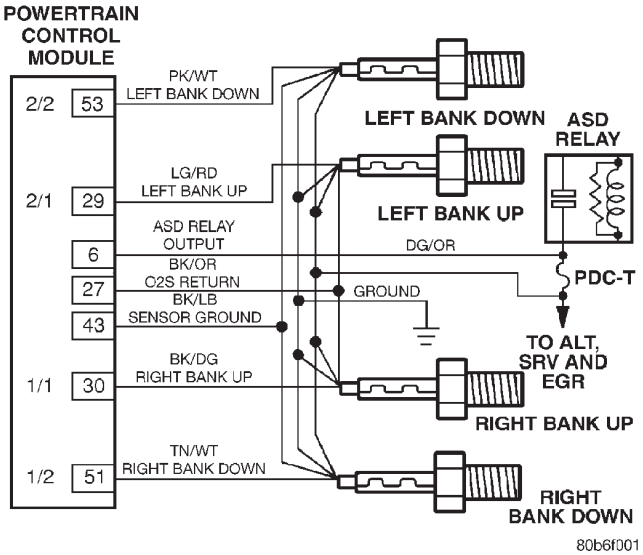
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

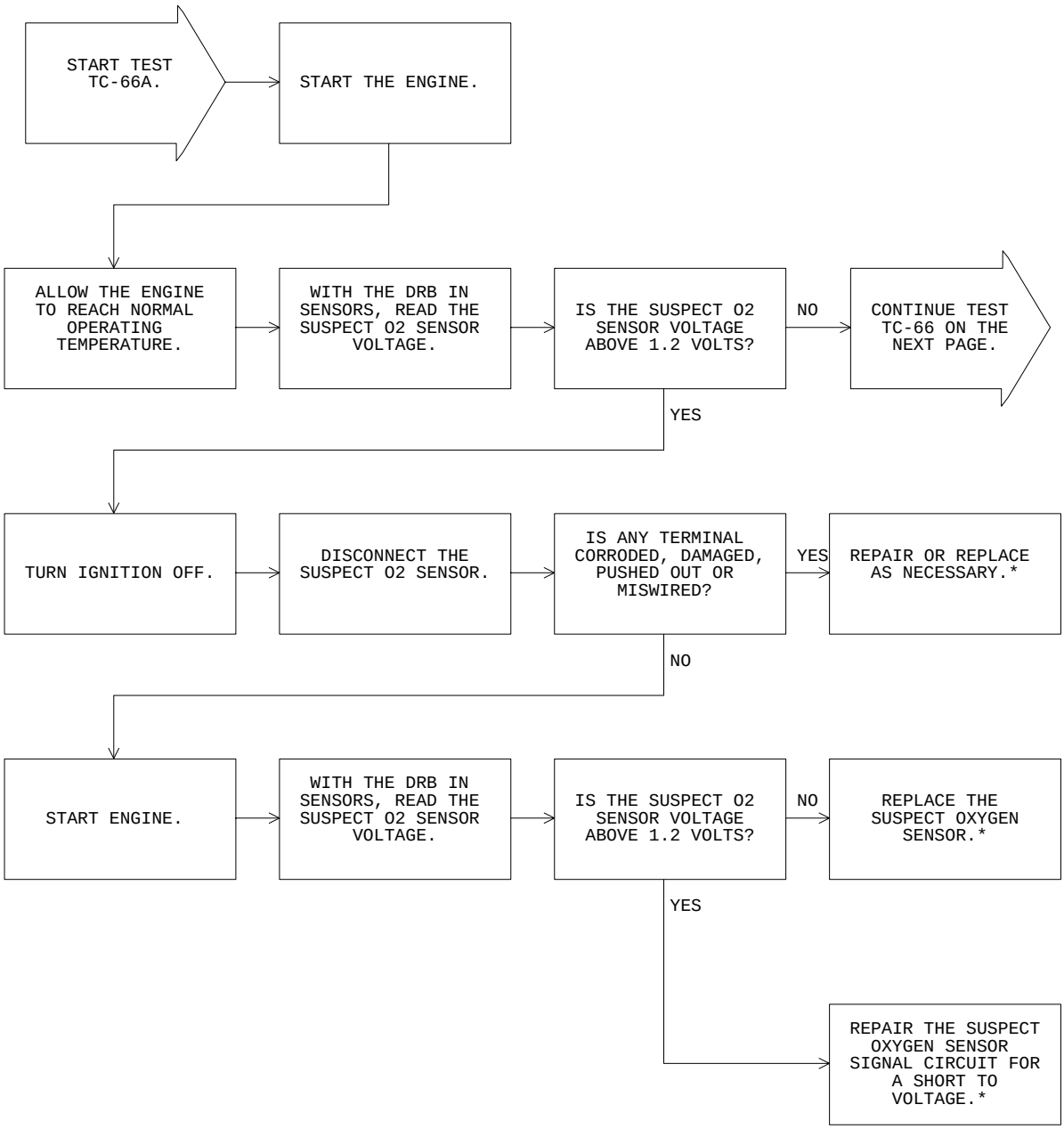
80b1b45c



80b6f001

TEST TC-66A REPAIRING - 2/1 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

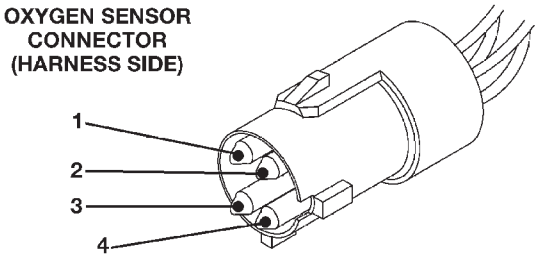


Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-66A CONTINUED - REPAIRING - 2/1 O2S SHORTED TO VOLTAGE

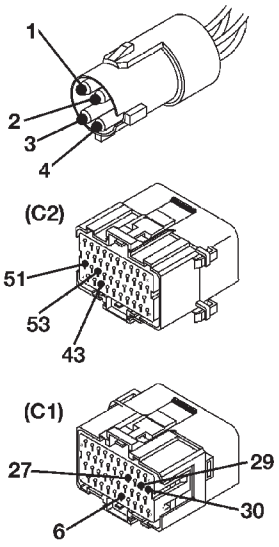
2/1 LEFT BANK UP



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

2/1 LEFT BANK UP



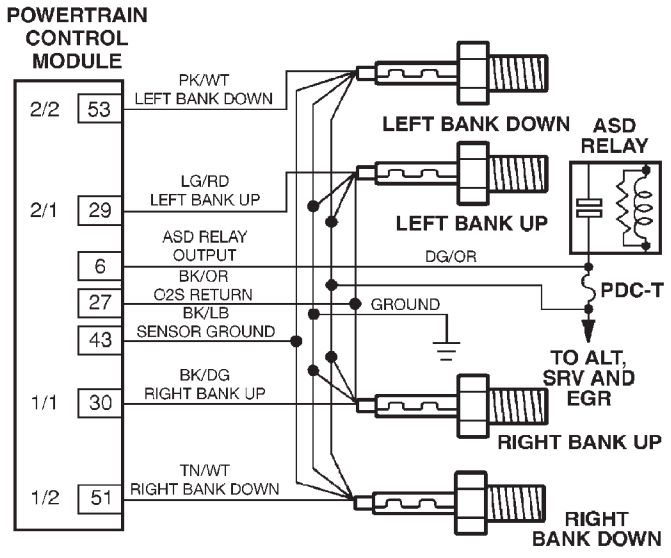
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

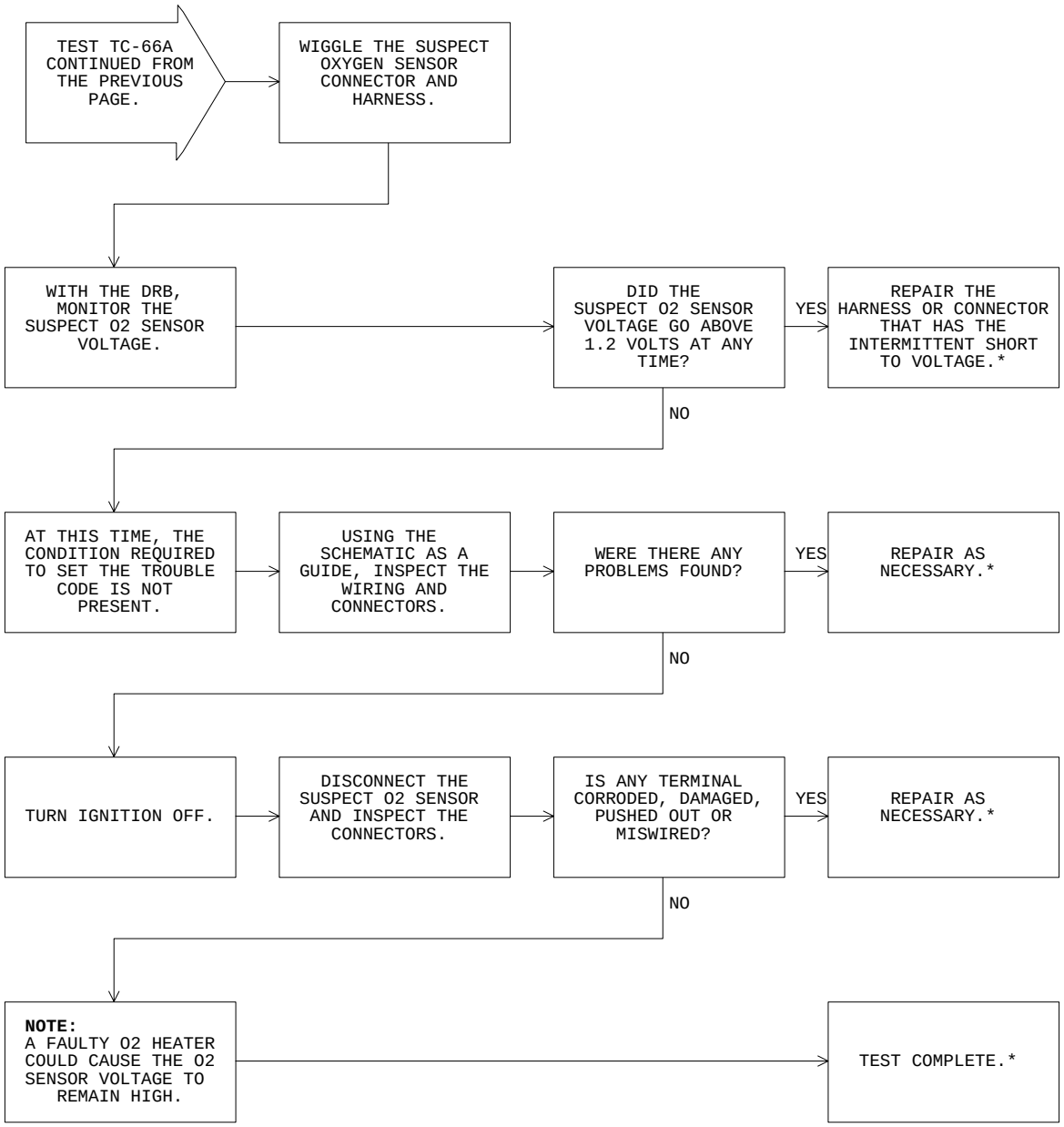
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c



80b6f001

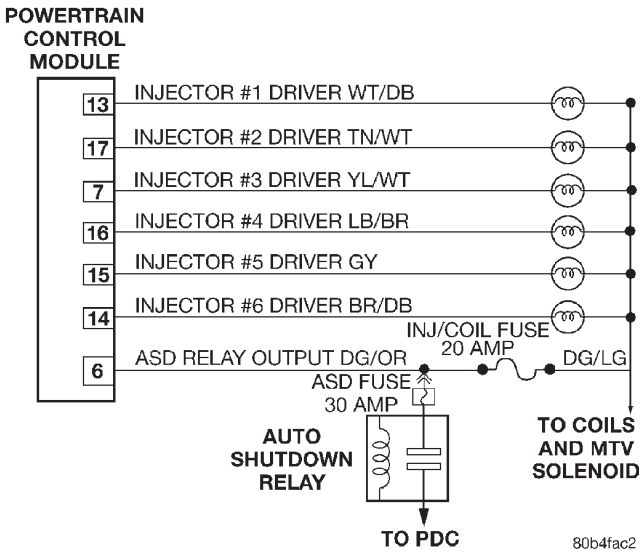
TEST TC-66A CONTINUED - REPAIRING - 2/1 O2S SHORTED TO VOLTAGE

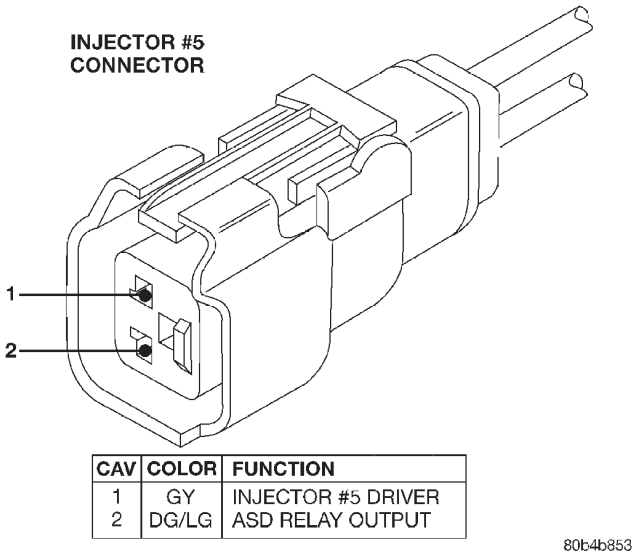


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

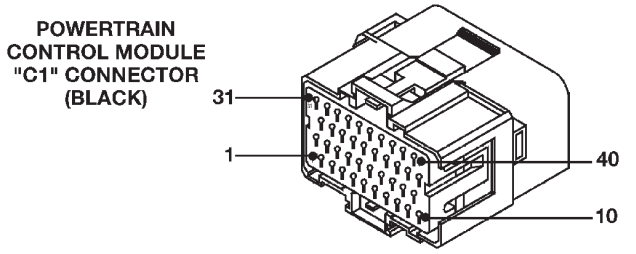
TEST TC-69A REPAIRING - INJECTOR #5 CONTROL CIRCUIT





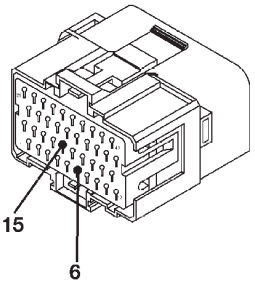
CAV	COLOR	FUNCTION
1	GY	INJECTOR #5 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 1

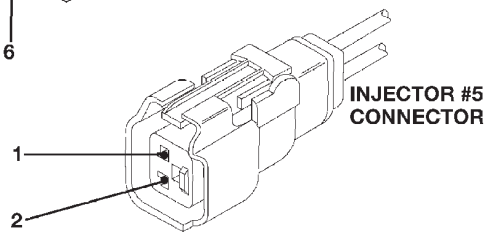


CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (2.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #5 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RC	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RC	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL
17	TN	INJECTOR #2 DRIVER (3.5L)			CNTRL (3.5L)
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

FIG. 2



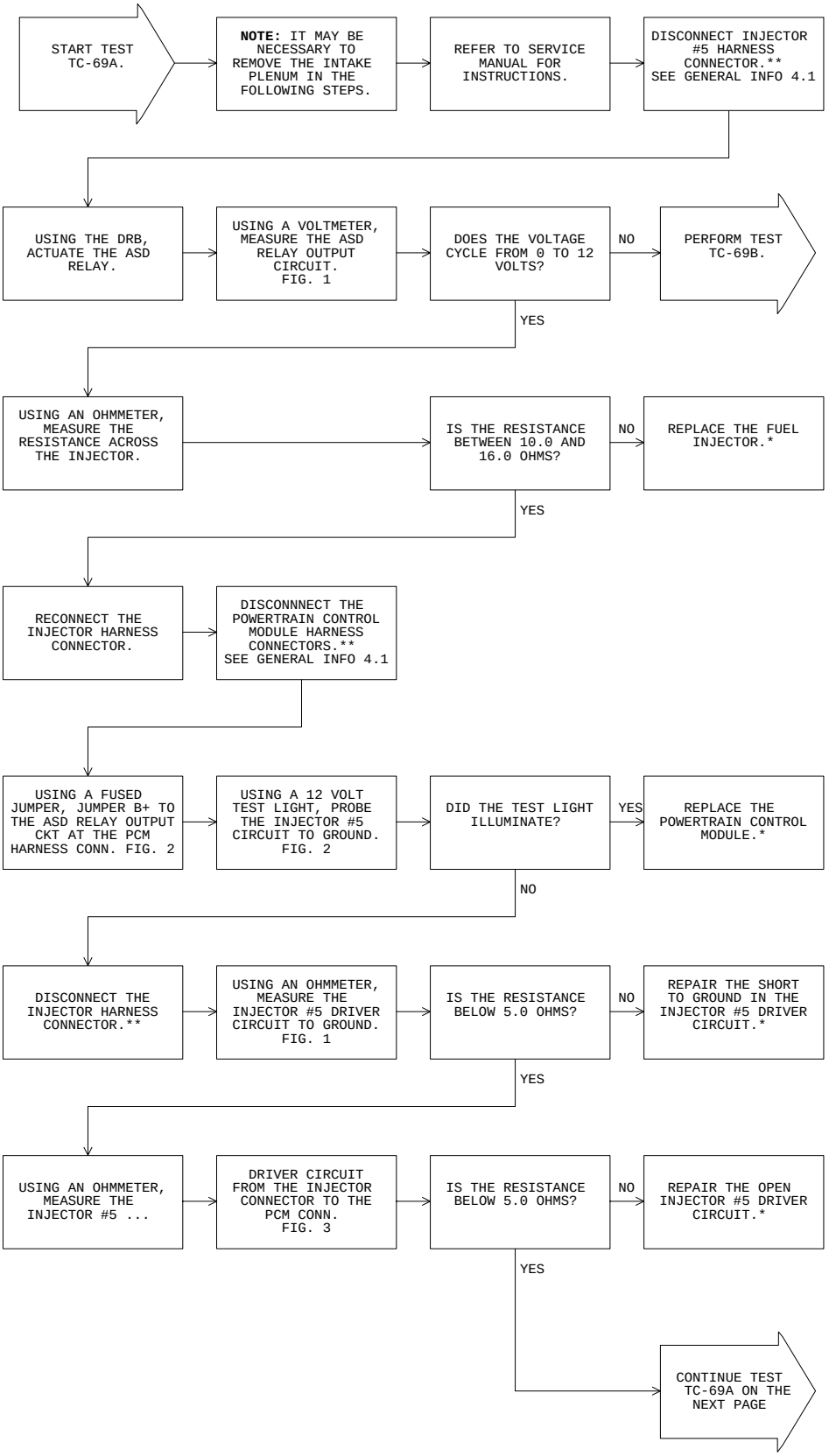
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
15	GY	INJECTOR #5 DRIVER



CAV	COLOR	FUNCTION
1	GY	INJECTOR #5 DRIVER
2	DG/LG	ASD RELAY OUTPUT

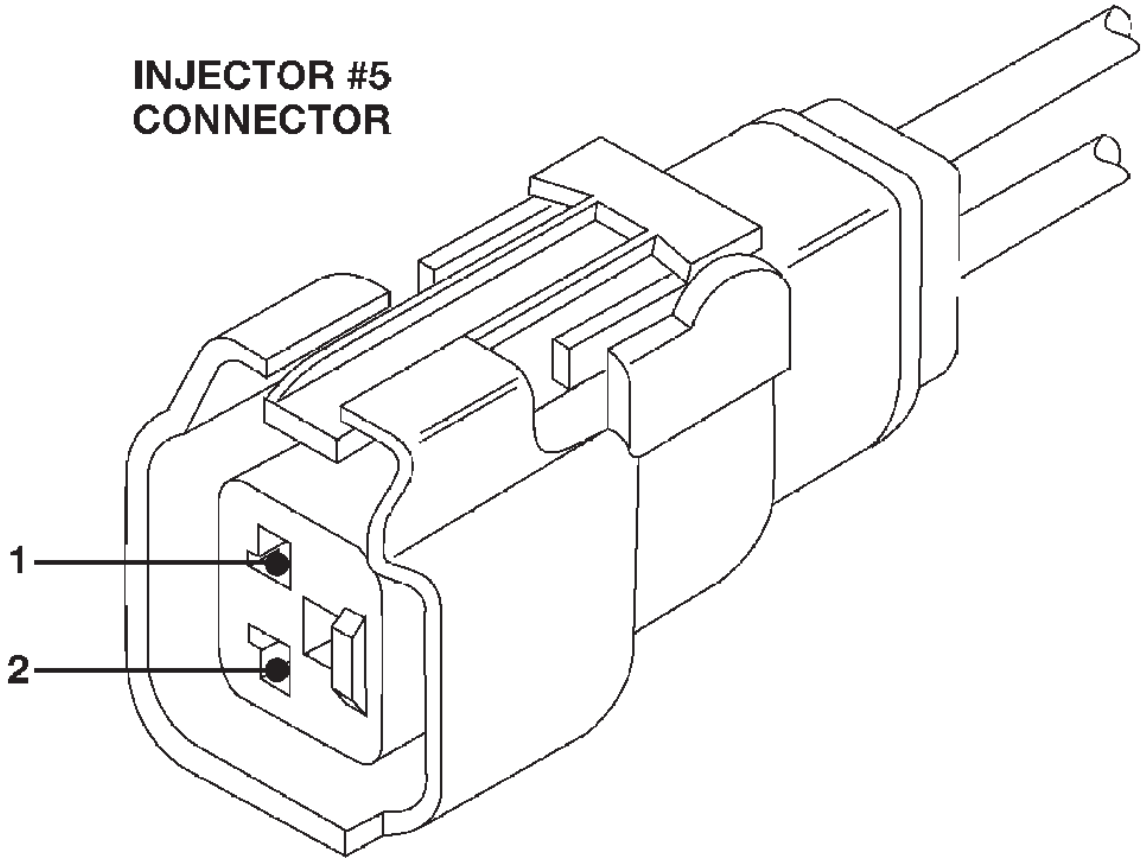
FIG. 3

TEST TC-69A REPAIRING - INJECTOR #5 CONTROL CIRCUIT



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

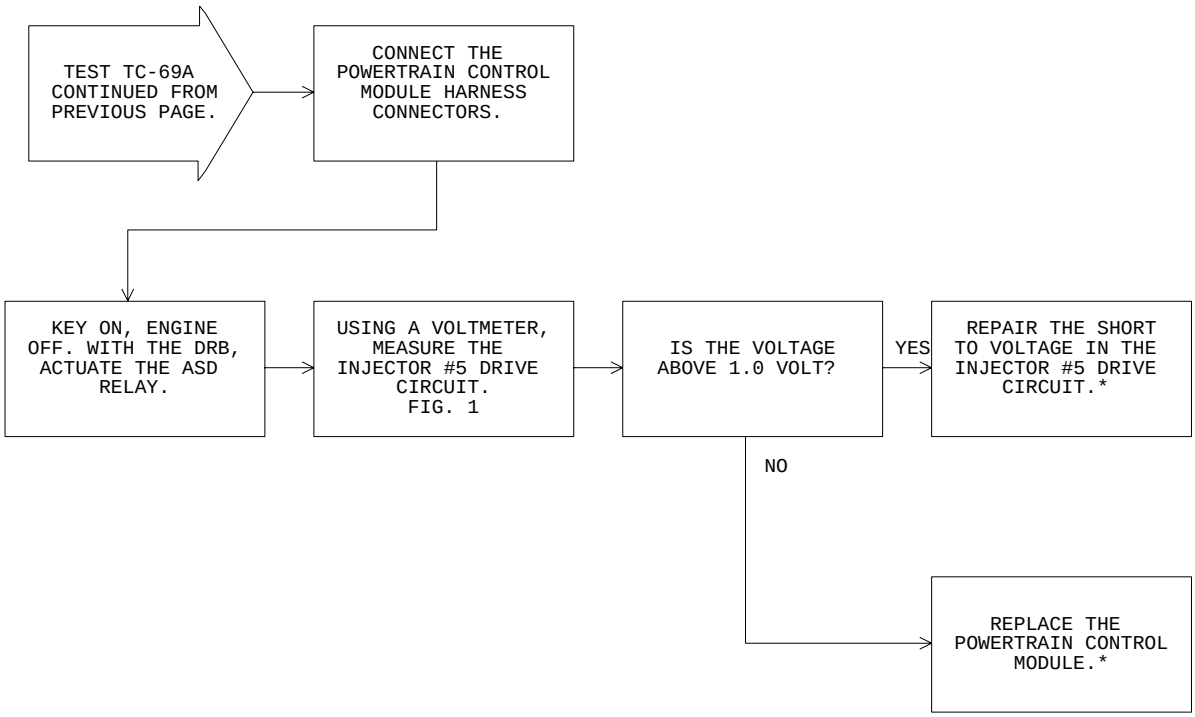


CAV	COLOR	FUNCTION
1	GY	INJECTOR #5 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b4b853

FIG. 1

TEST TC-69A CONTINUED - REPAIRING - INJECTOR #5 CONTROL CIRCUIT

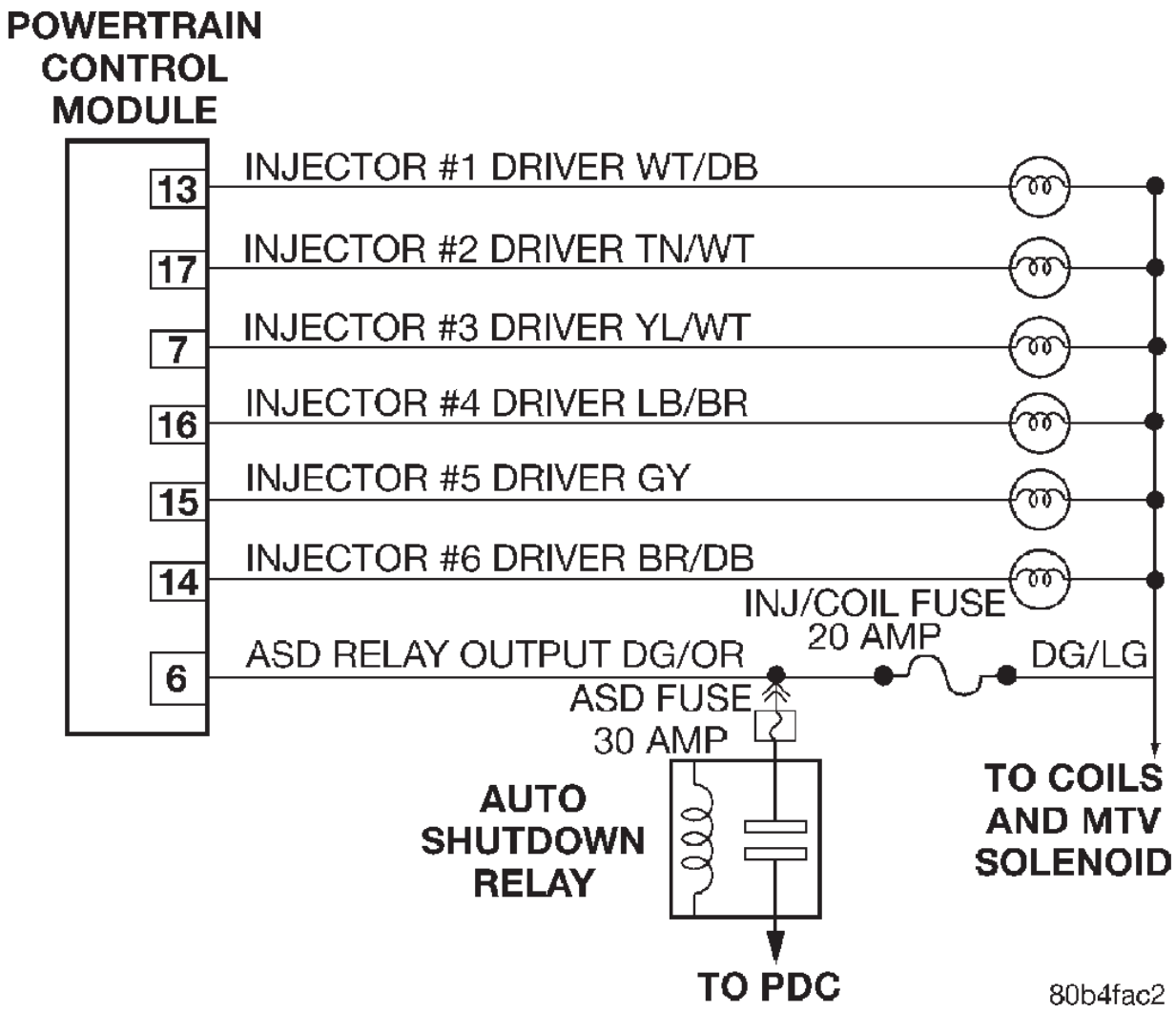


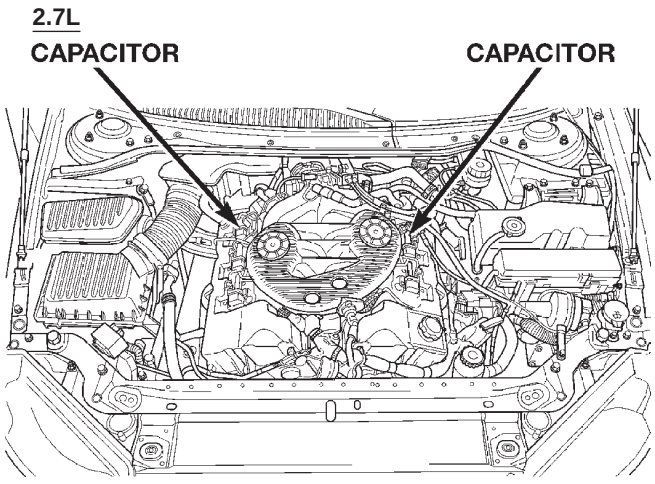
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-69B REPAIRING - INJECTOR #5 CONTROL CIRCUIT

Perform TEST TC-69A Before Proceeding

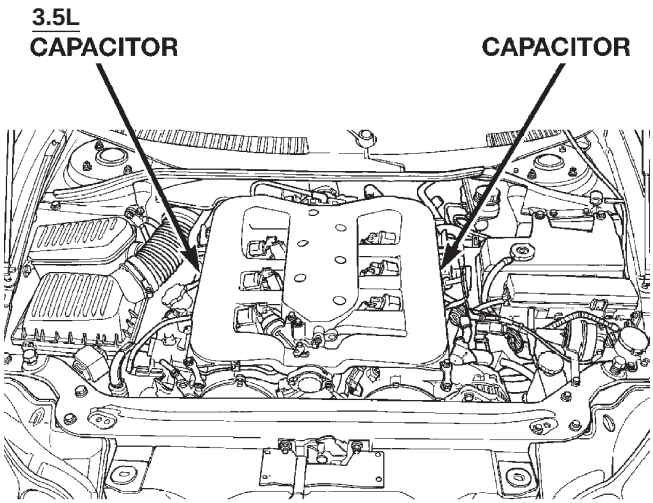




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1



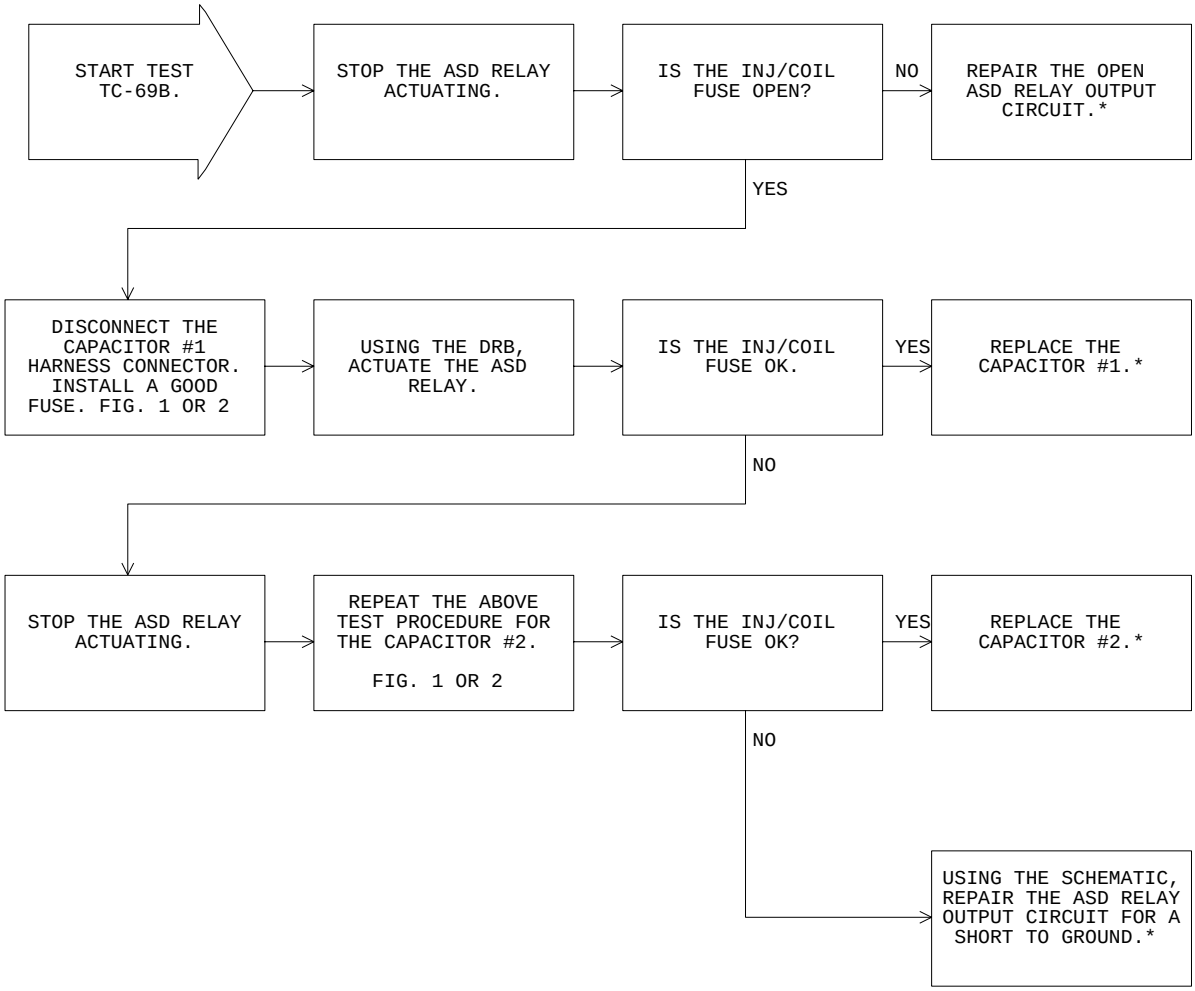
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-69B REPAIRING - INJECTOR #5 CONTROL CIRCUIT

Perform TEST TC-69A Before Proceeding

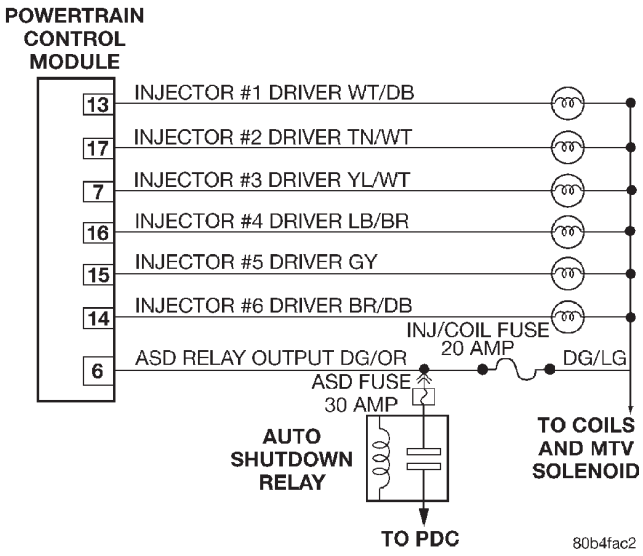


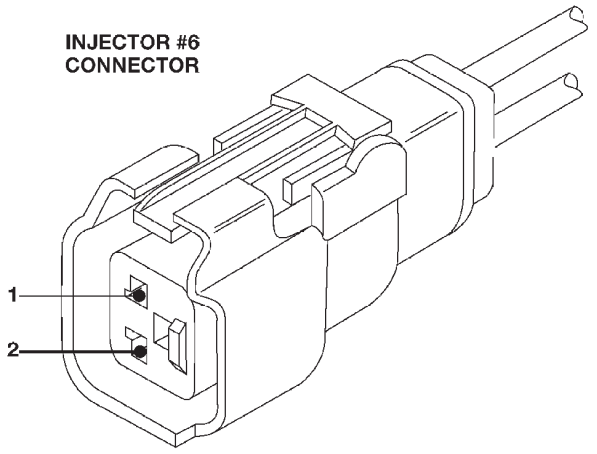
Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-70A REPAIRING - INJECTOR #6 CONTROL CIRCUIT

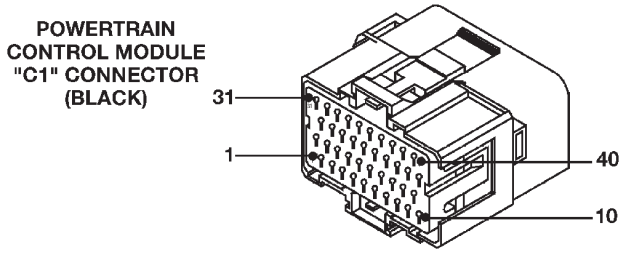
Perform TEST TC-21A Before Proceeding





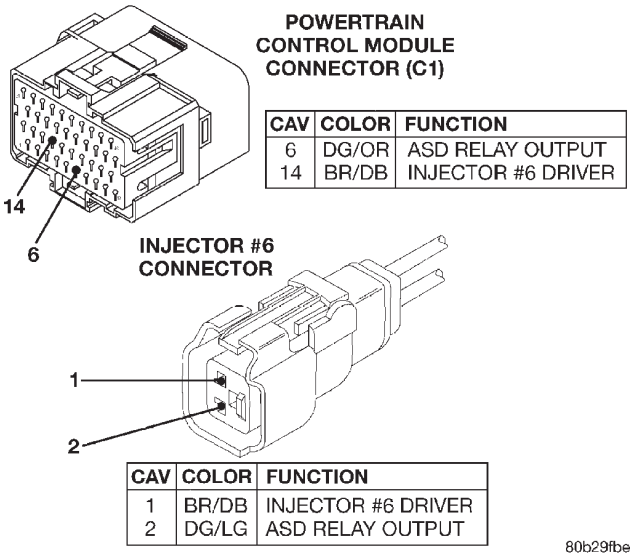
CAV	COLOR	FUNCTION
1	BR/DB	INJECTOR #6 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 1



CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/1 SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/1 SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSITION SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

FIG. 2



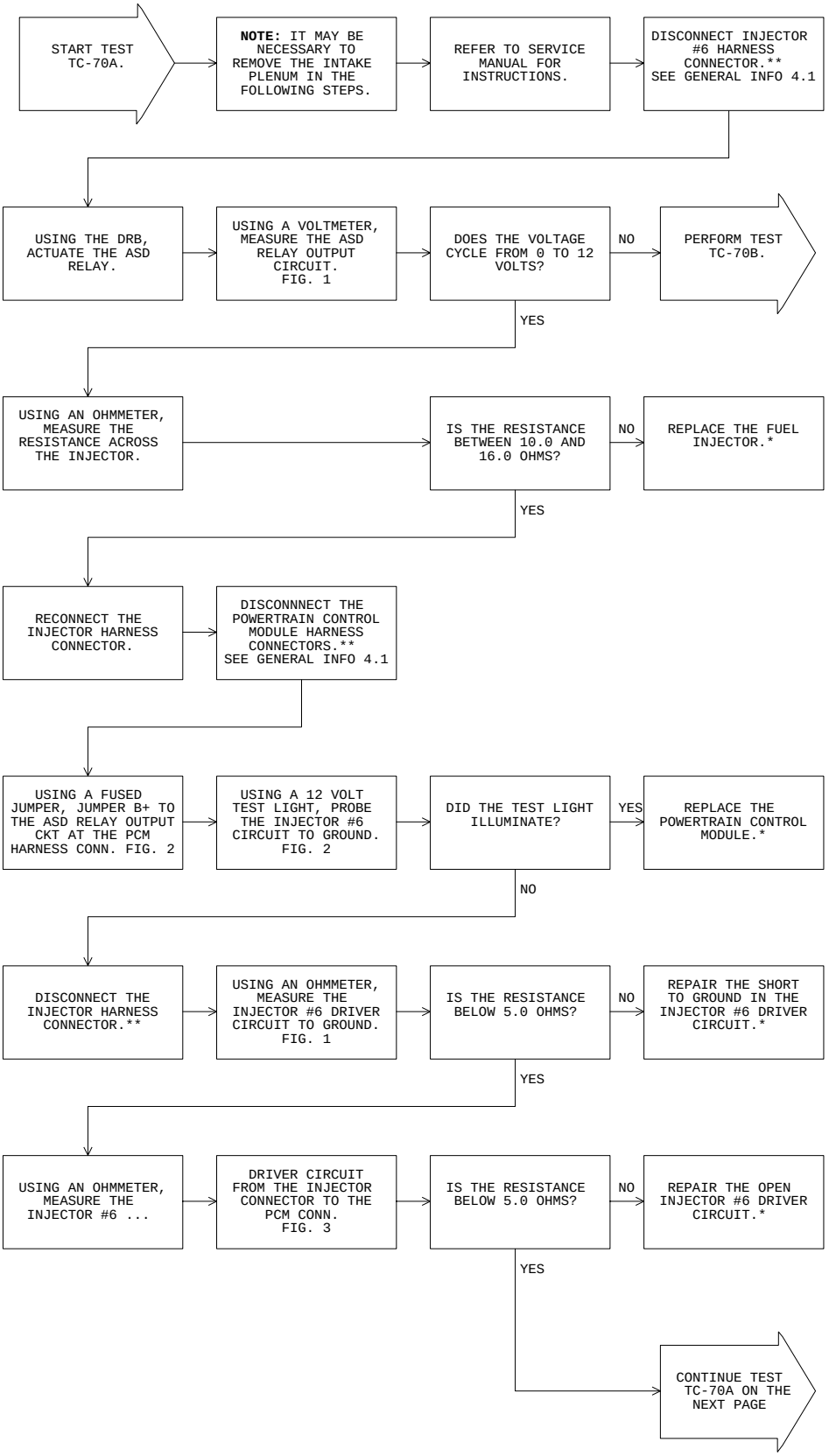
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
14	BR/DB	INJECTOR #6 DRIVER

CAV	COLOR	FUNCTION
1	BR/DB	INJECTOR #6 DRIVER
2	DG/LG	ASD RELAY OUTPUT

FIG. 3

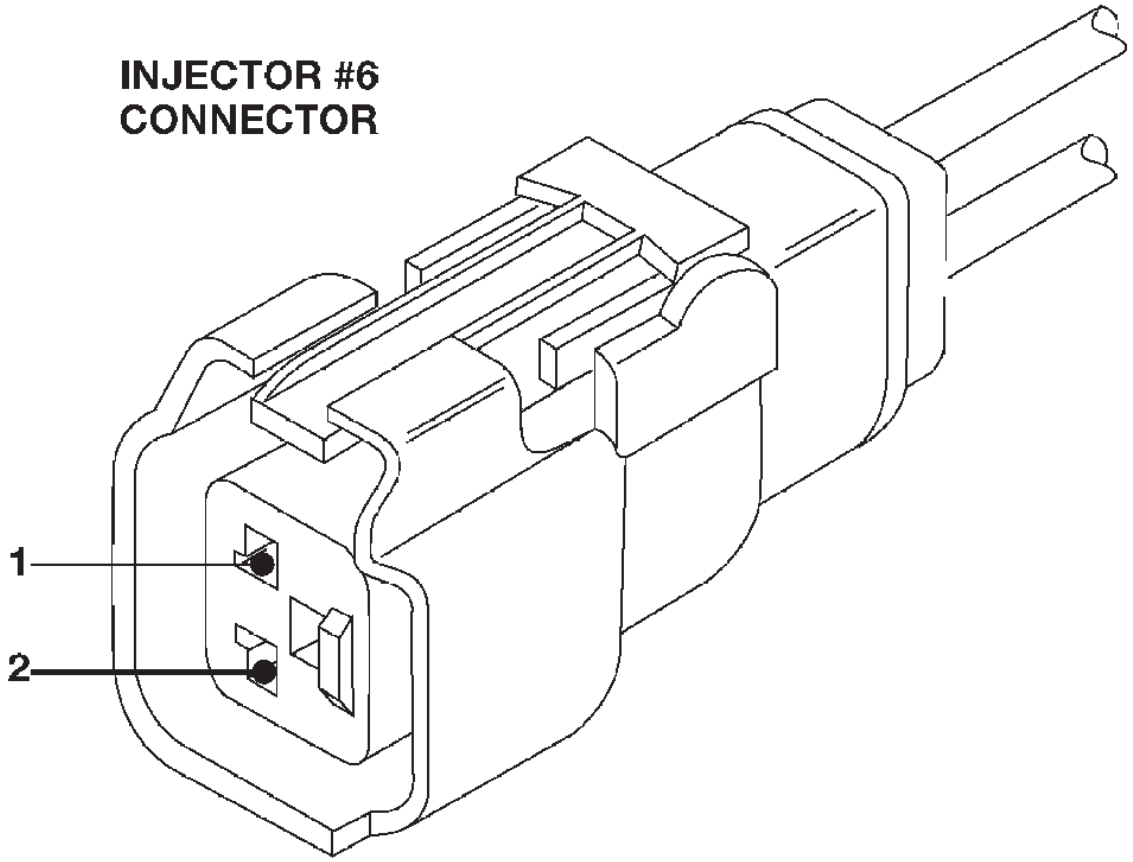
TEST TC-70A REPAIRING - INJECTOR #6 CONTROL CIRCUIT

Perform TEST TC-21A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

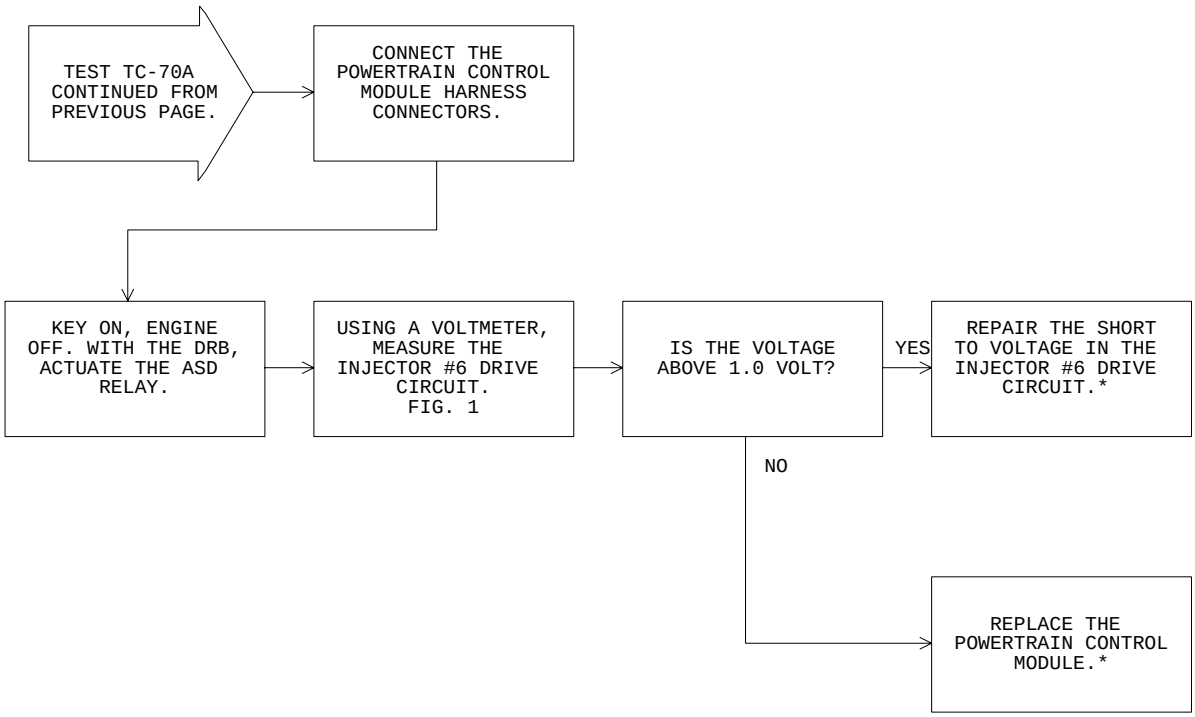


CAV	COLOR	FUNCTION
1	BR/DB	INJECTOR #6 DRIVER
2	DG/LG	ASD RELAY OUTPUT

80b4b854

FIG. 1

TEST TC-70A CONTINUED - REPAIRING - INJECTOR #6 CONTROL CIRCUIT

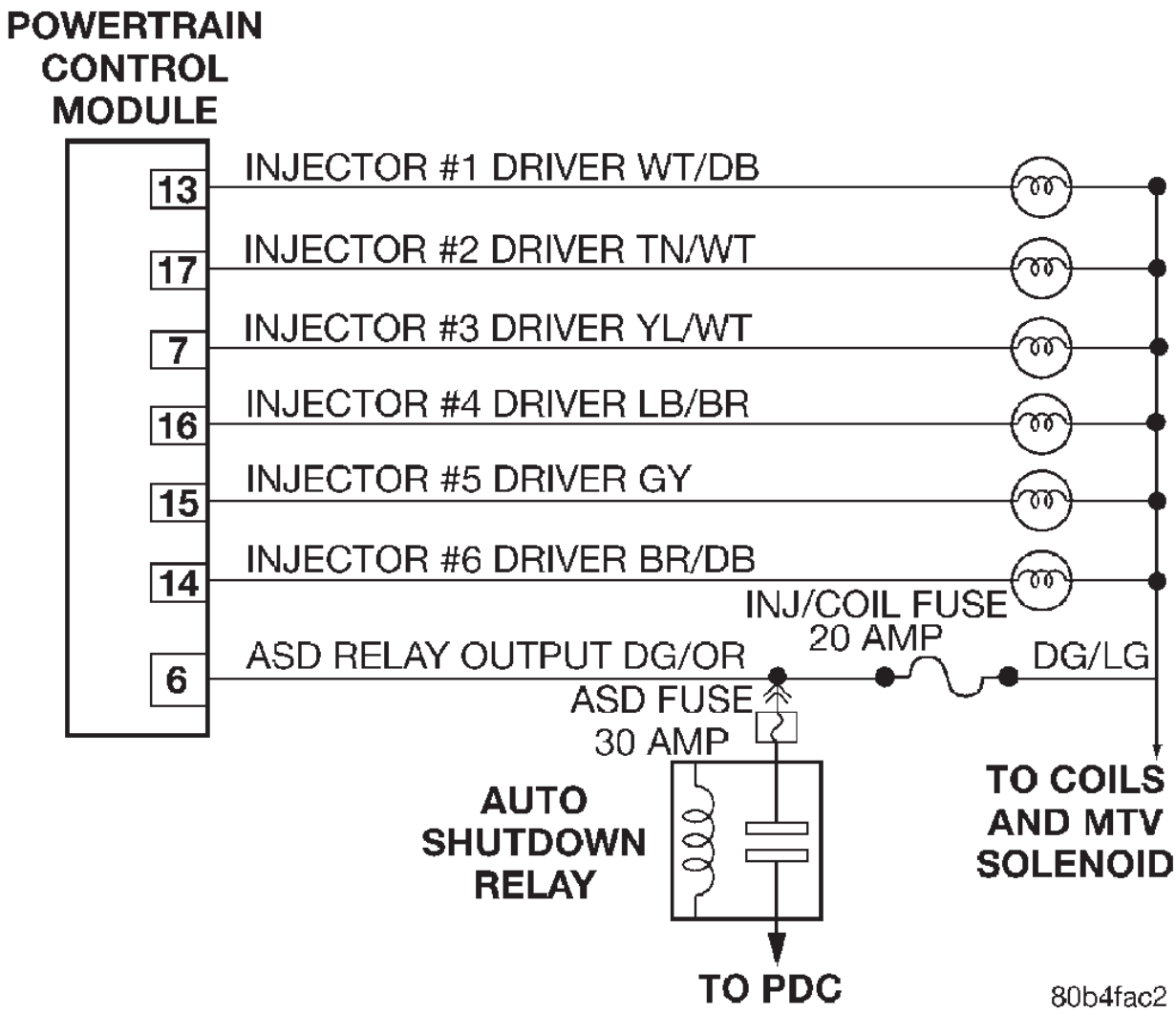


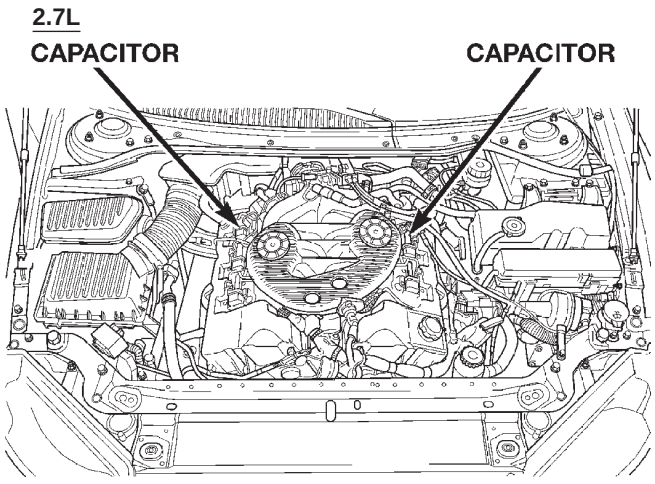
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-70B REPAIRING - INJECTOR #6 CONTROL CIRCUIT

Perform TEST TC-70A Before Proceeding

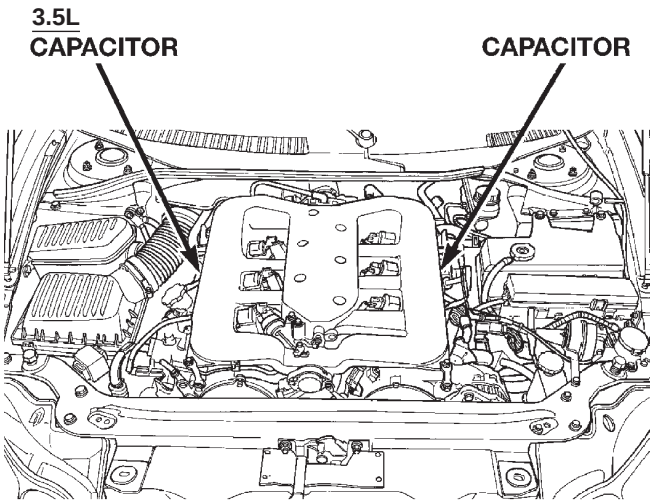




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1



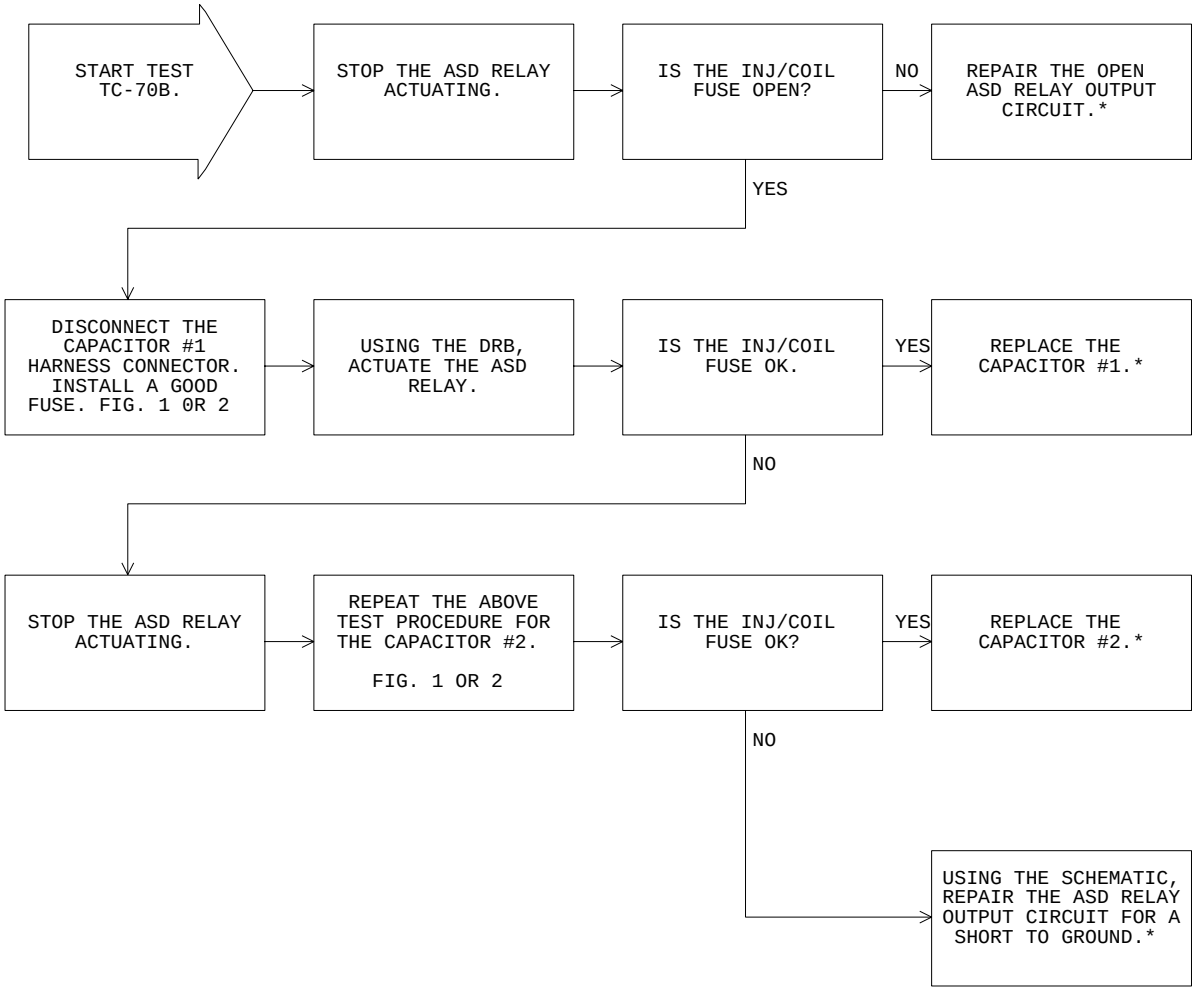
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-70B REPAIRING - INJECTOR #6 CONTROL CIRCUIT

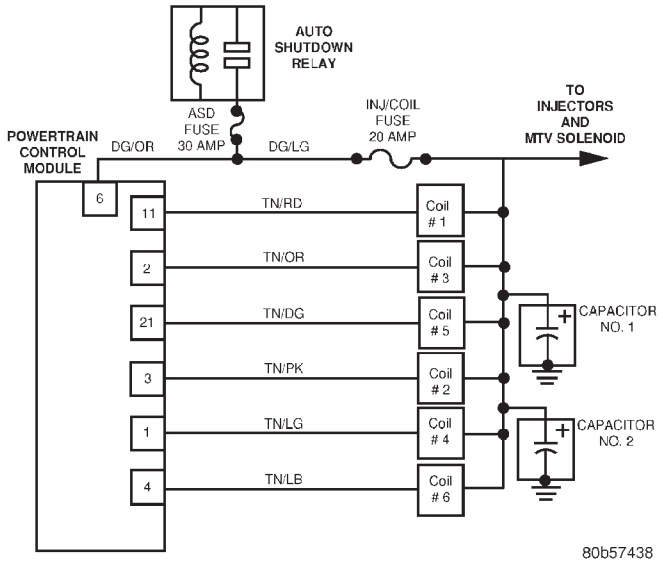
Perform TEST TC-70A Before Proceeding



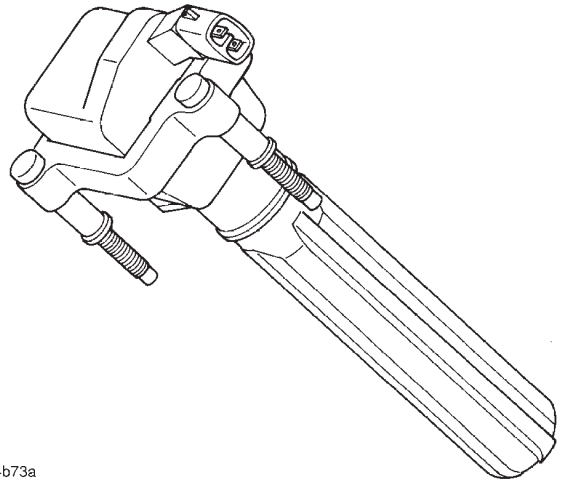
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-76A REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT



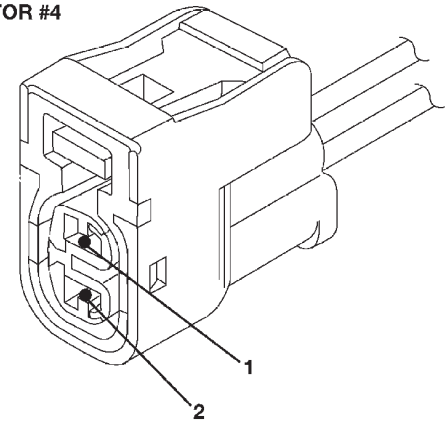
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #4

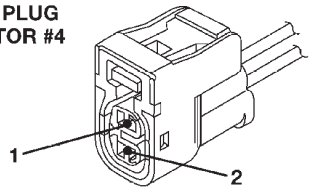


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LG	COIL ON PLUG DRIVER #4

80b27cd4

FIG. 2

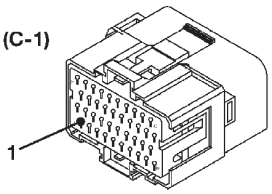
COIL ON PLUG CONNECTOR #4



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LG	COIL ON PLUG DRIVER #4

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

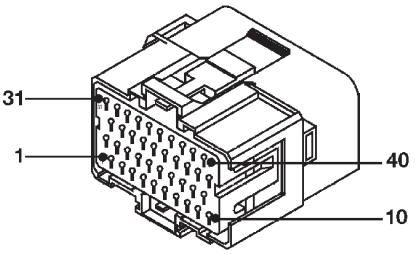


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cd5

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)

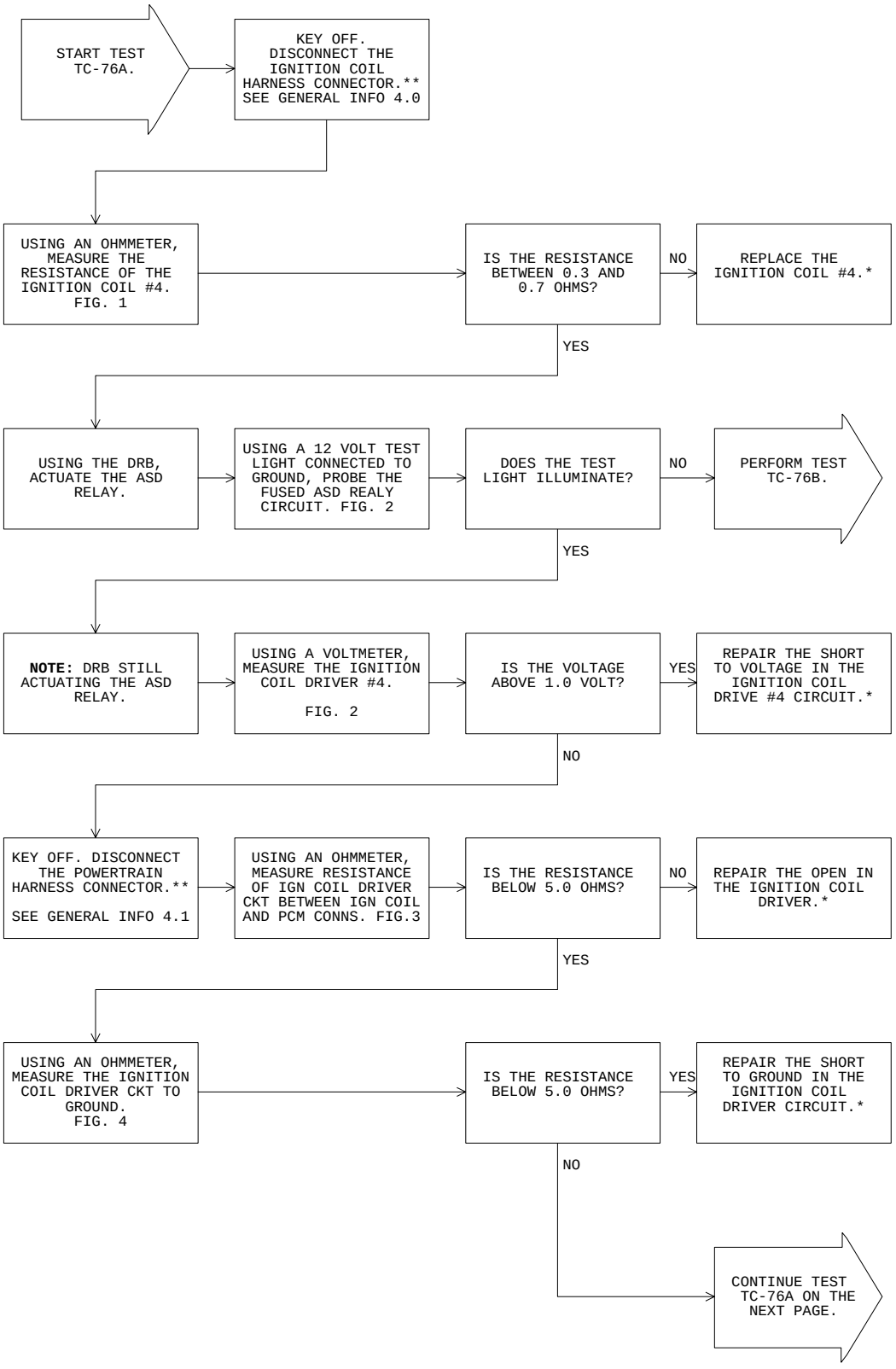


CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/- SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/- SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

TEST TC-76A REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT

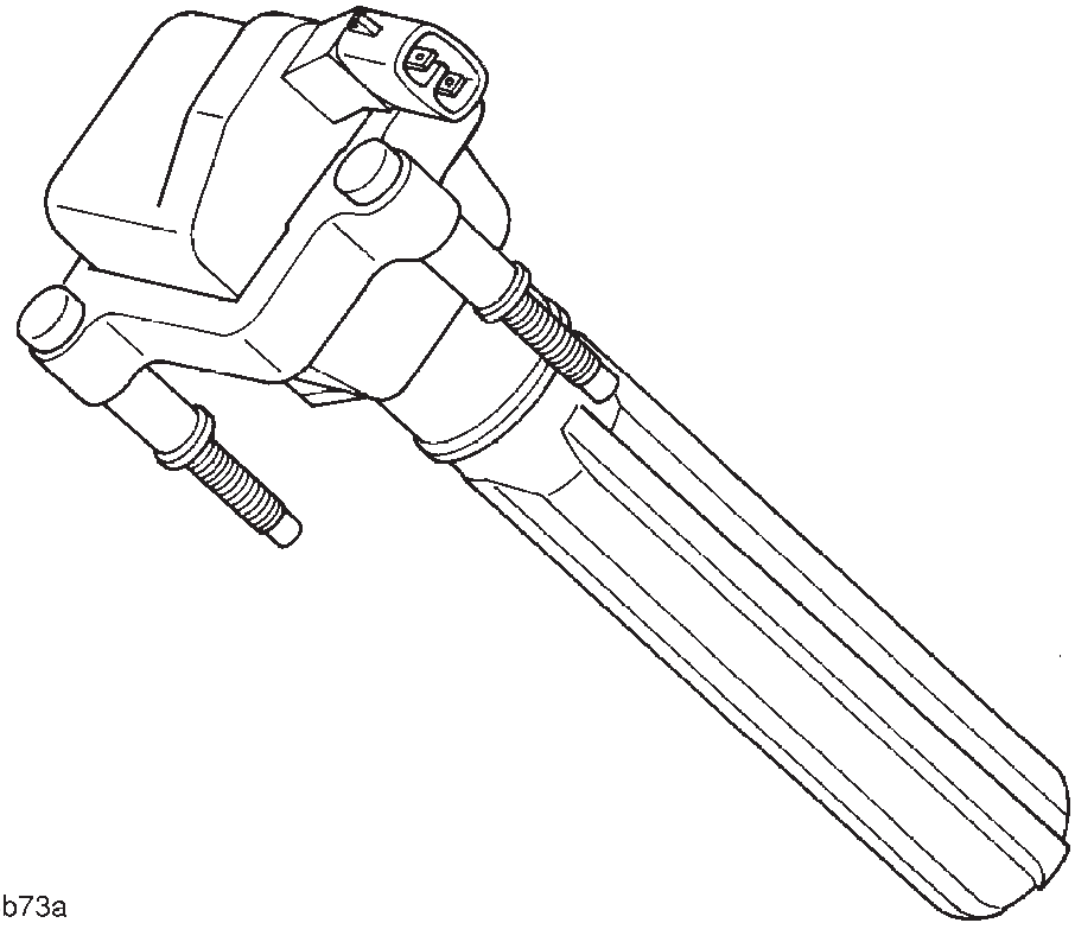


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-76A CONTINUED - REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT

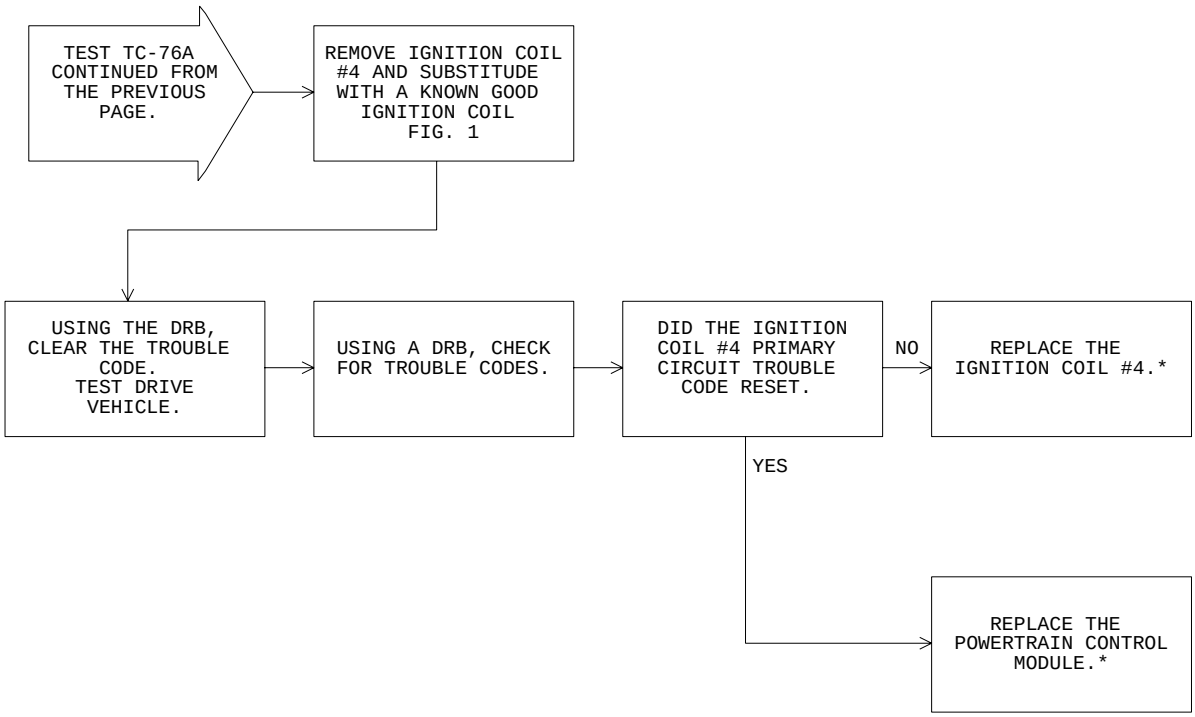
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

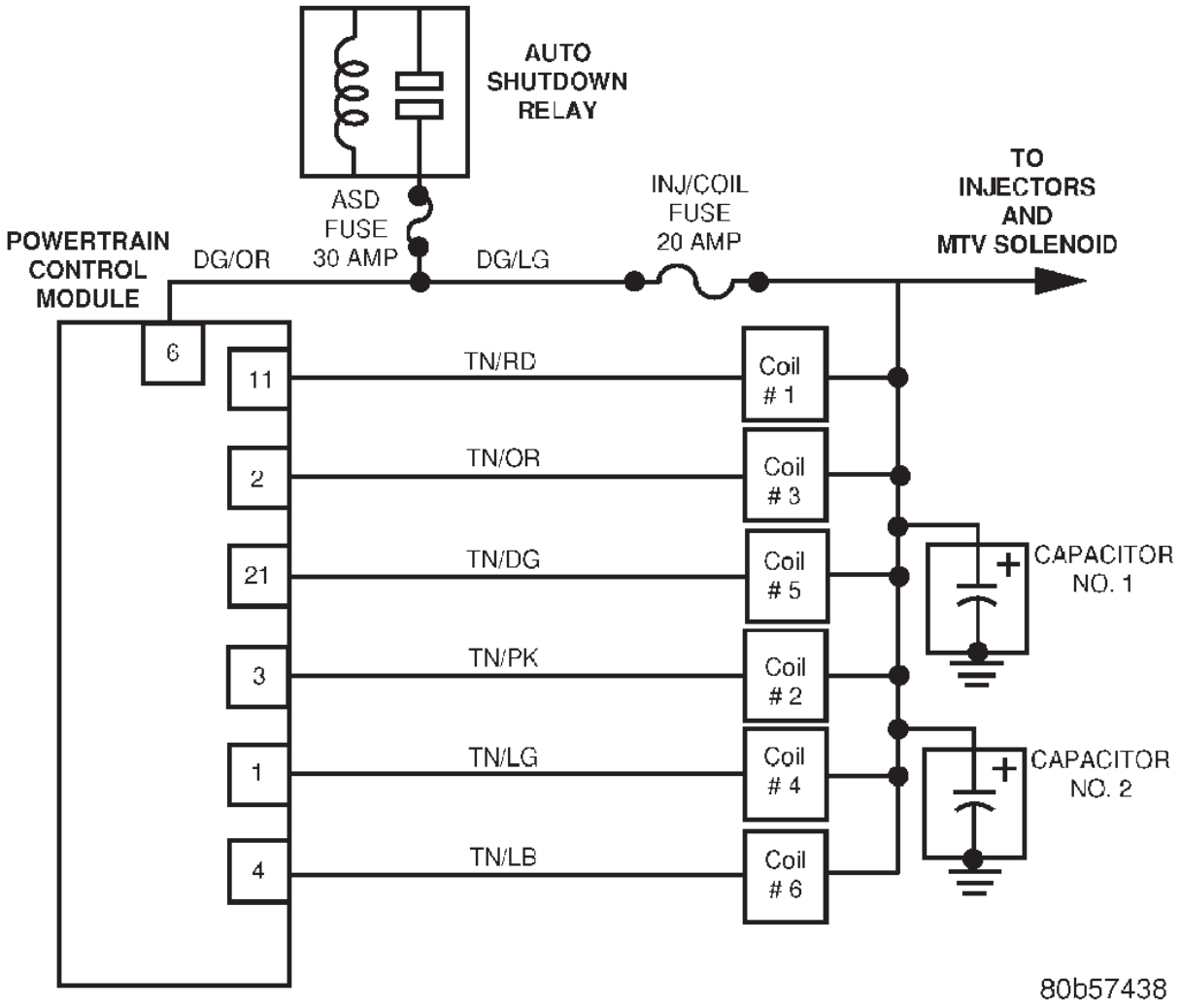
TEST TC-76A CONTINUED - REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT



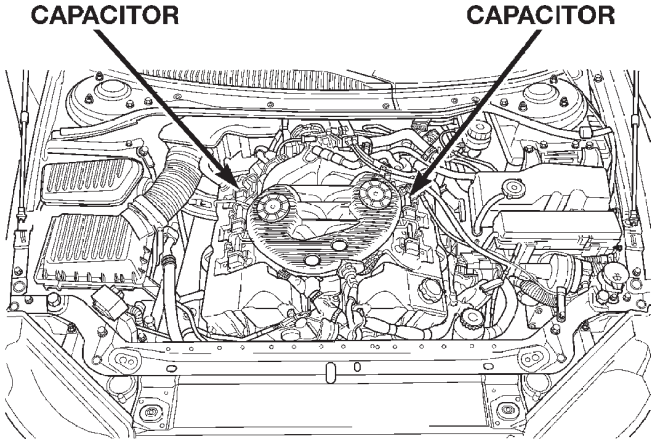
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-76B CONTINUED - REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT



2.7L

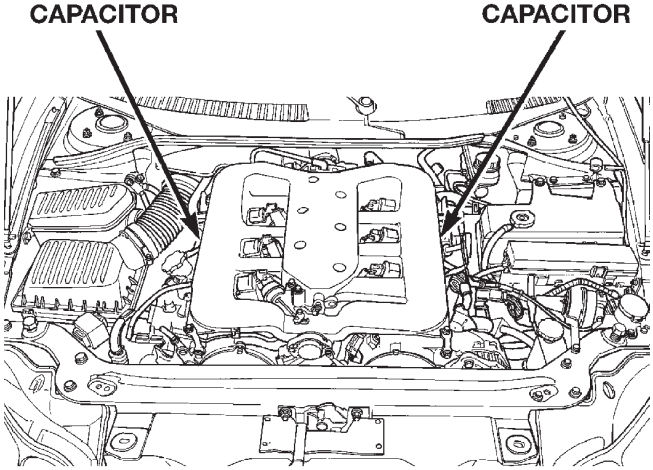


NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

3.5L

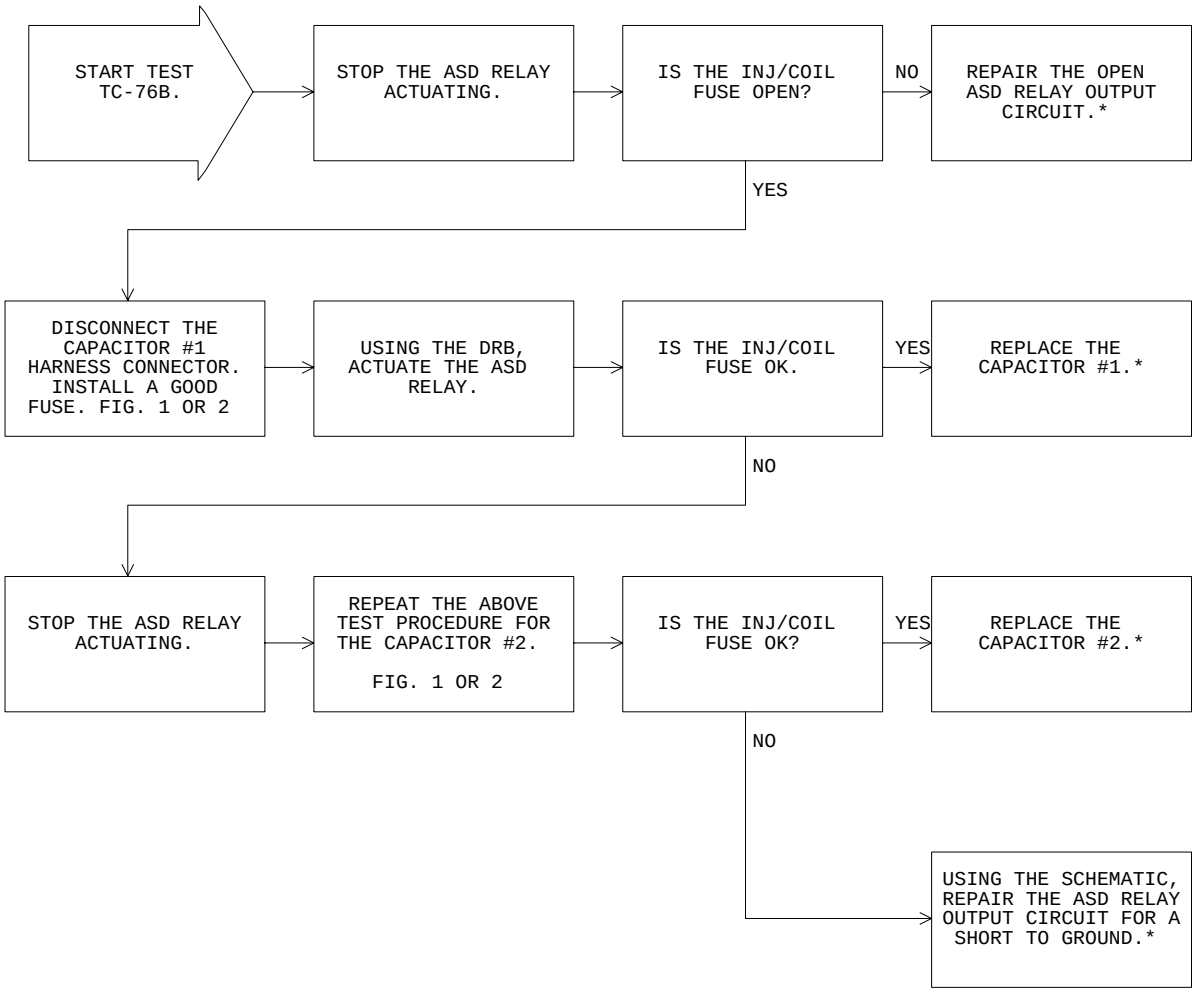


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

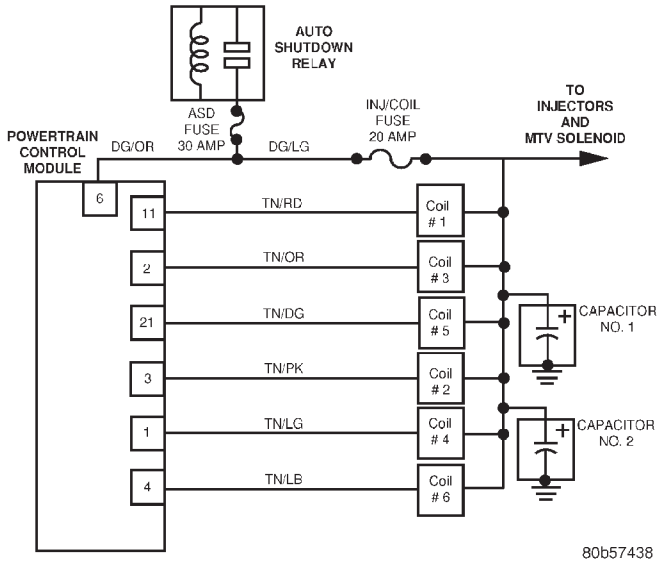
FIG. 2

TEST TC-76B CONTINUED - REPAIRING - IGNITION COIL #4 PRIMARY CIRCUIT

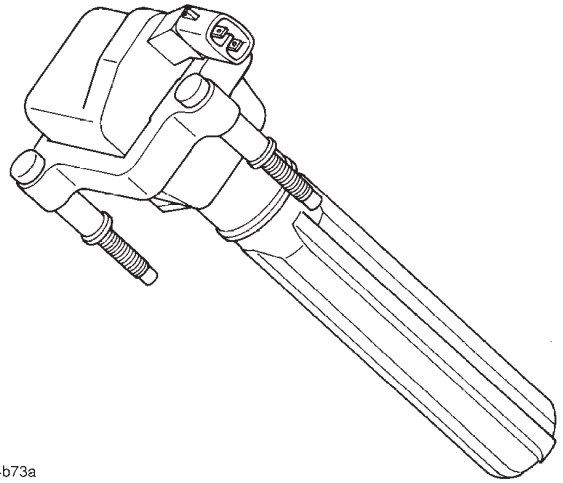


***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-77A REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT



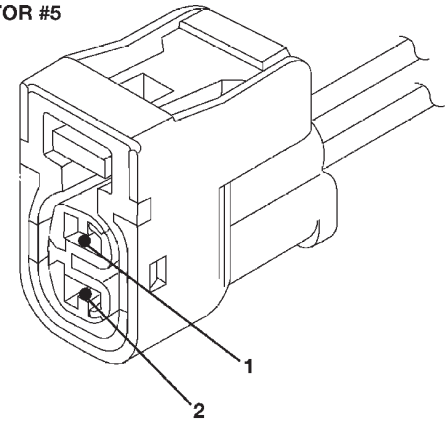
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #5

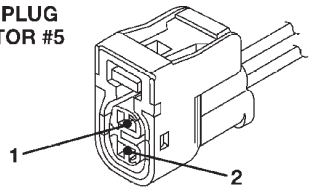


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/DG	COIL ON PLUG DRIVER #5

80b27cd7

FIG. 2

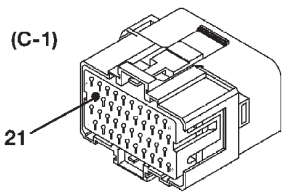
COIL ON PLUG CONNECTOR #5



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/DG	COIL ON PLUG DRIVER #5

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

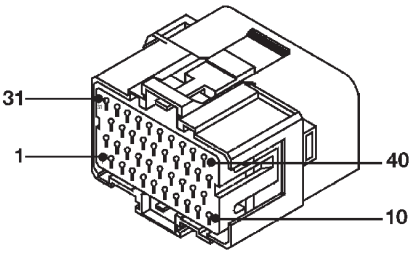


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cd8

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)

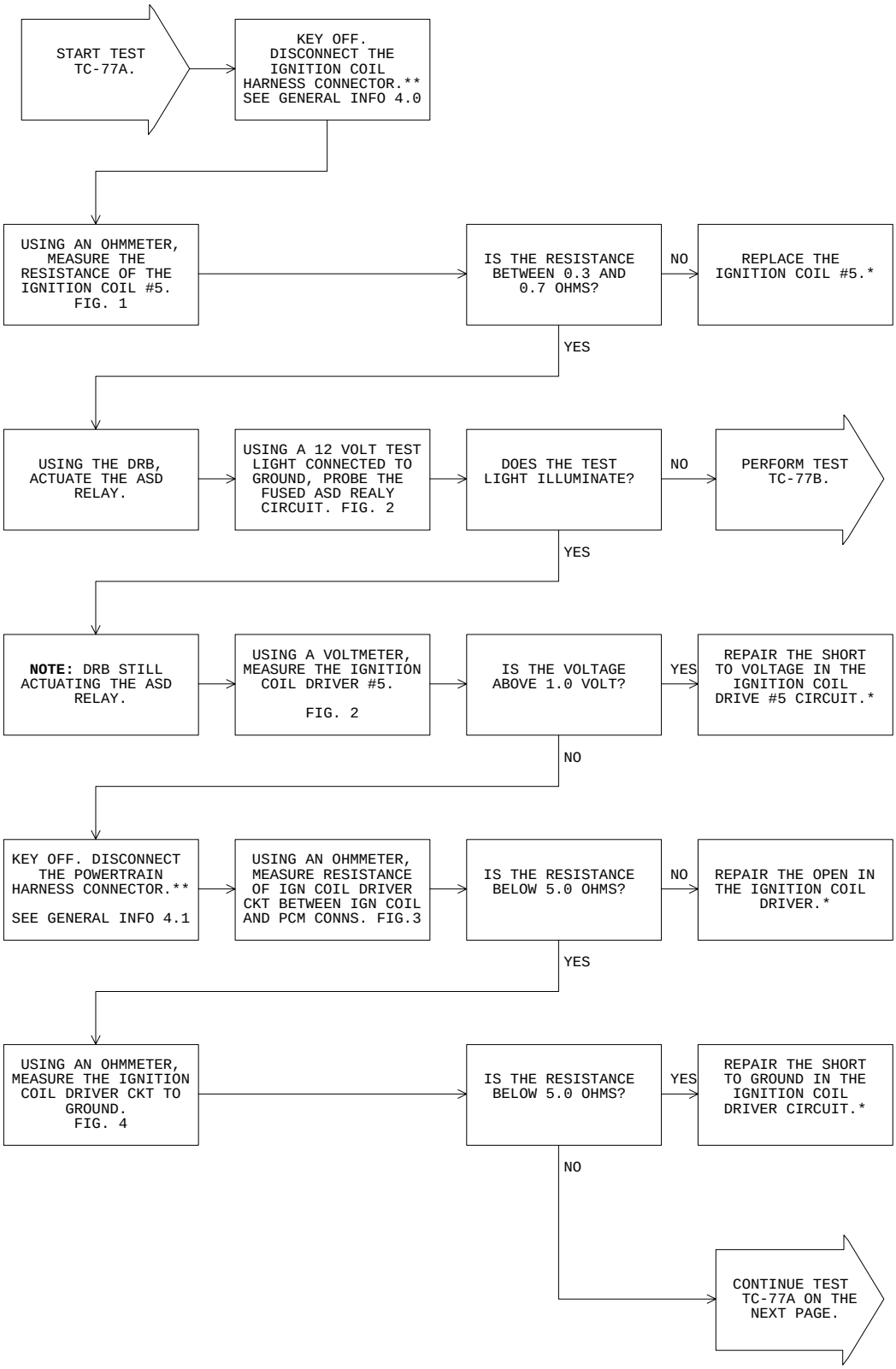


CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/ SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/ SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTR_
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL
17	TN	INJECTOR #2 DRIVER (3.5L)			CNTRL (3.5L)
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

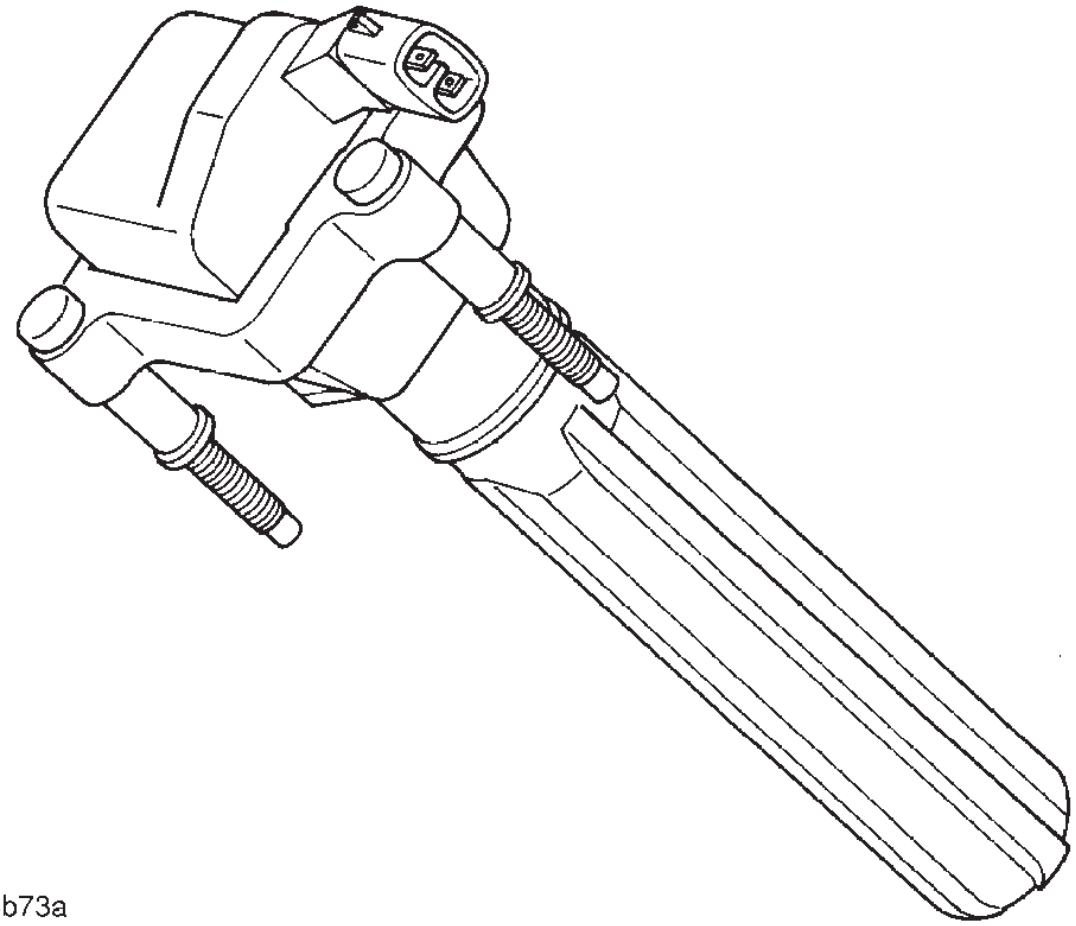
TEST TC-77A REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT



**Perform Verification TEST VER-2A.*

***Check connectors - Clean / repair as necessary.*

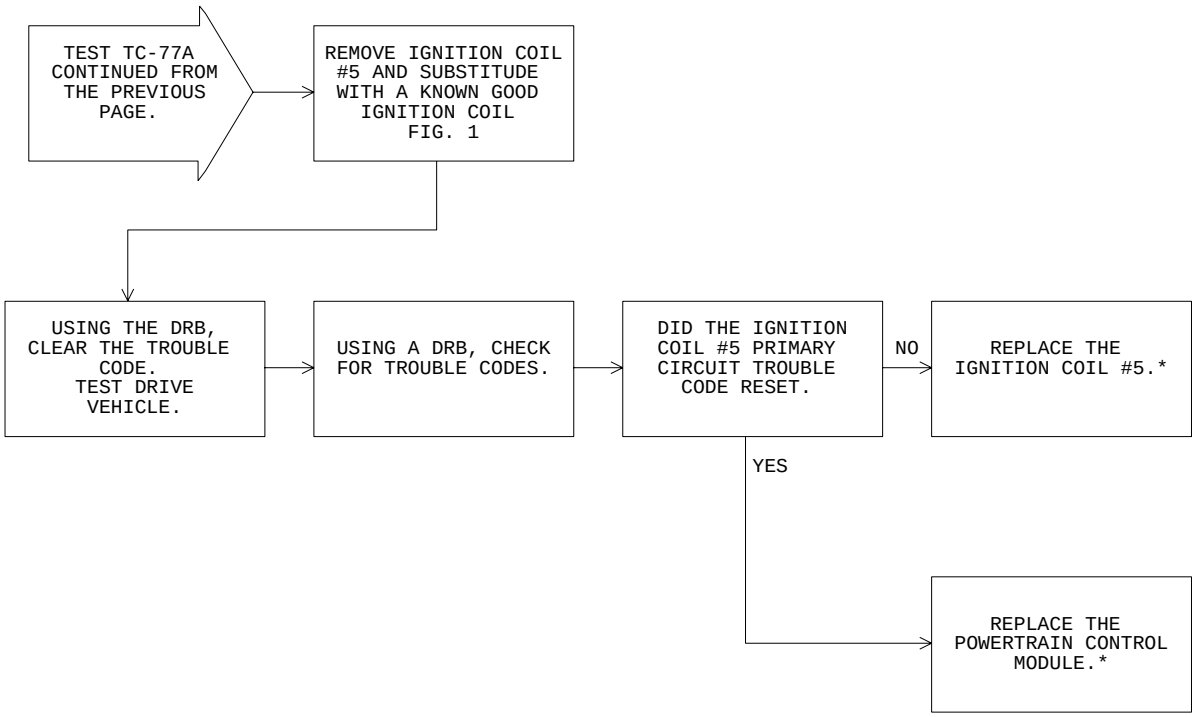
COIL ON PLUG
TYPICAL



80b4b73a

FIG. 1

TEST TC-77A CONTINUED - REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT

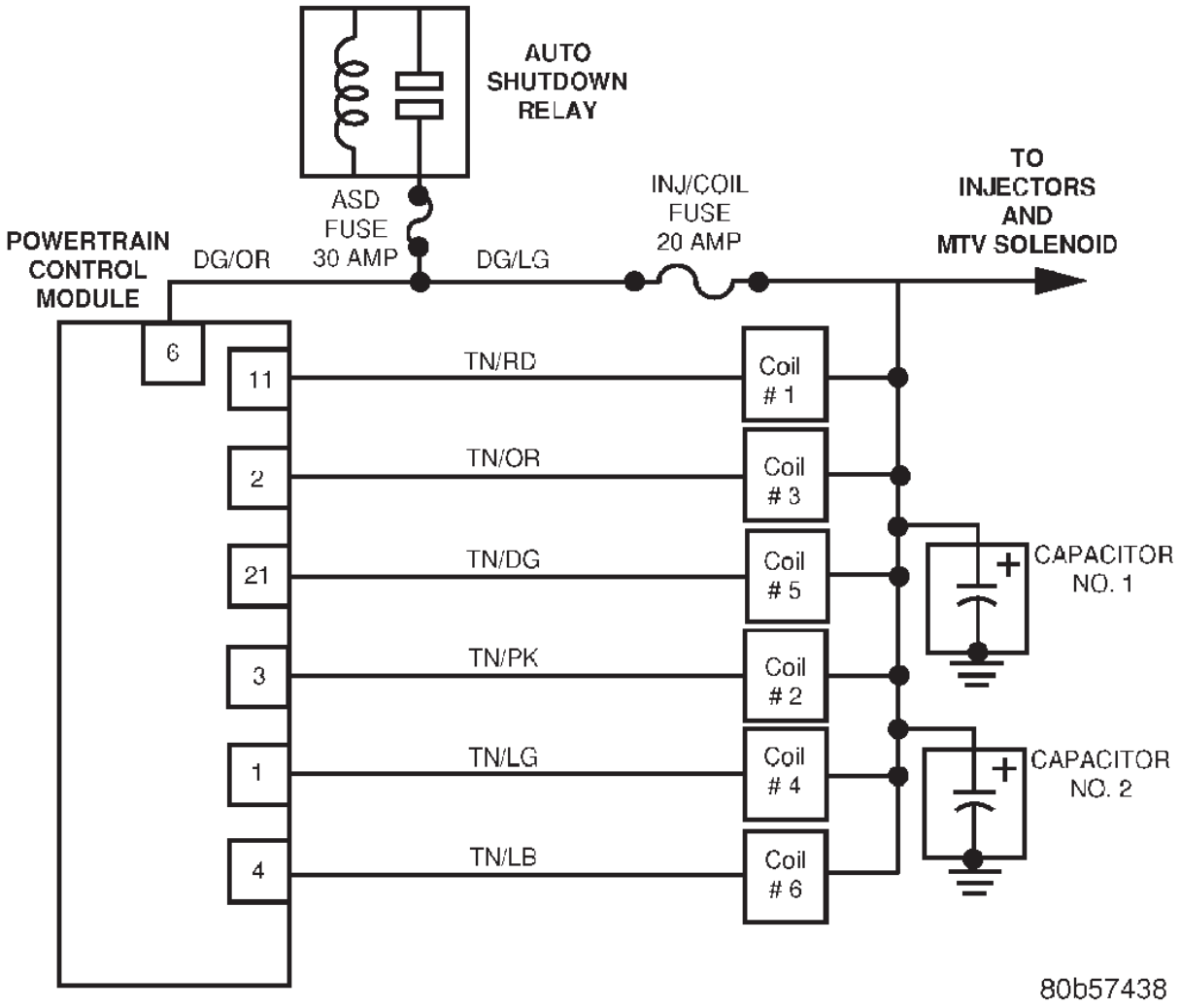


Perform Verification TEST VER-2A.

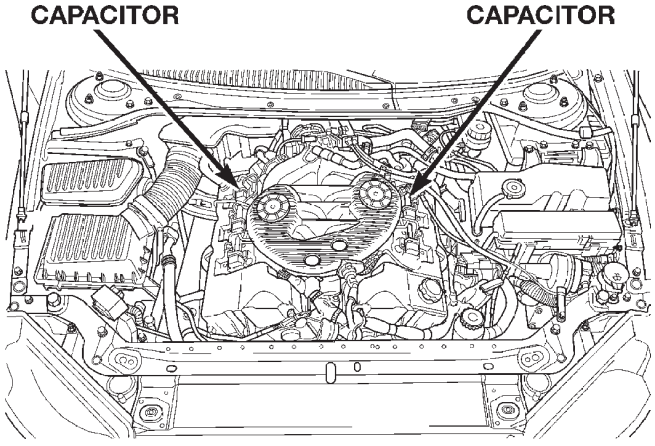
Check connectors - Clean / repair as necessary.

TEST TC-77B REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT

Perform TEST TC-77A Before Proceeding



2.7L

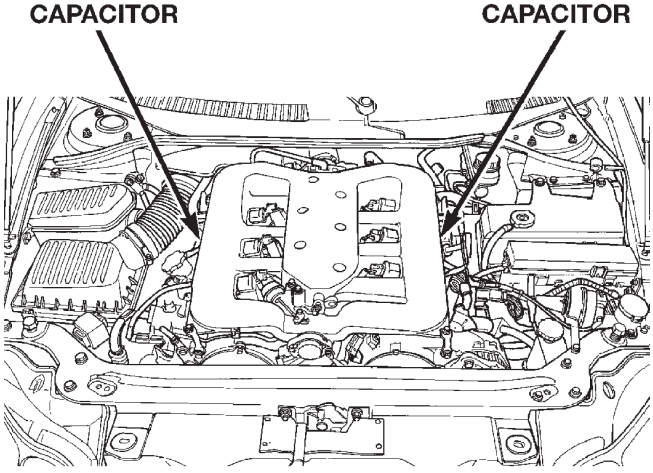


NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

3.5L



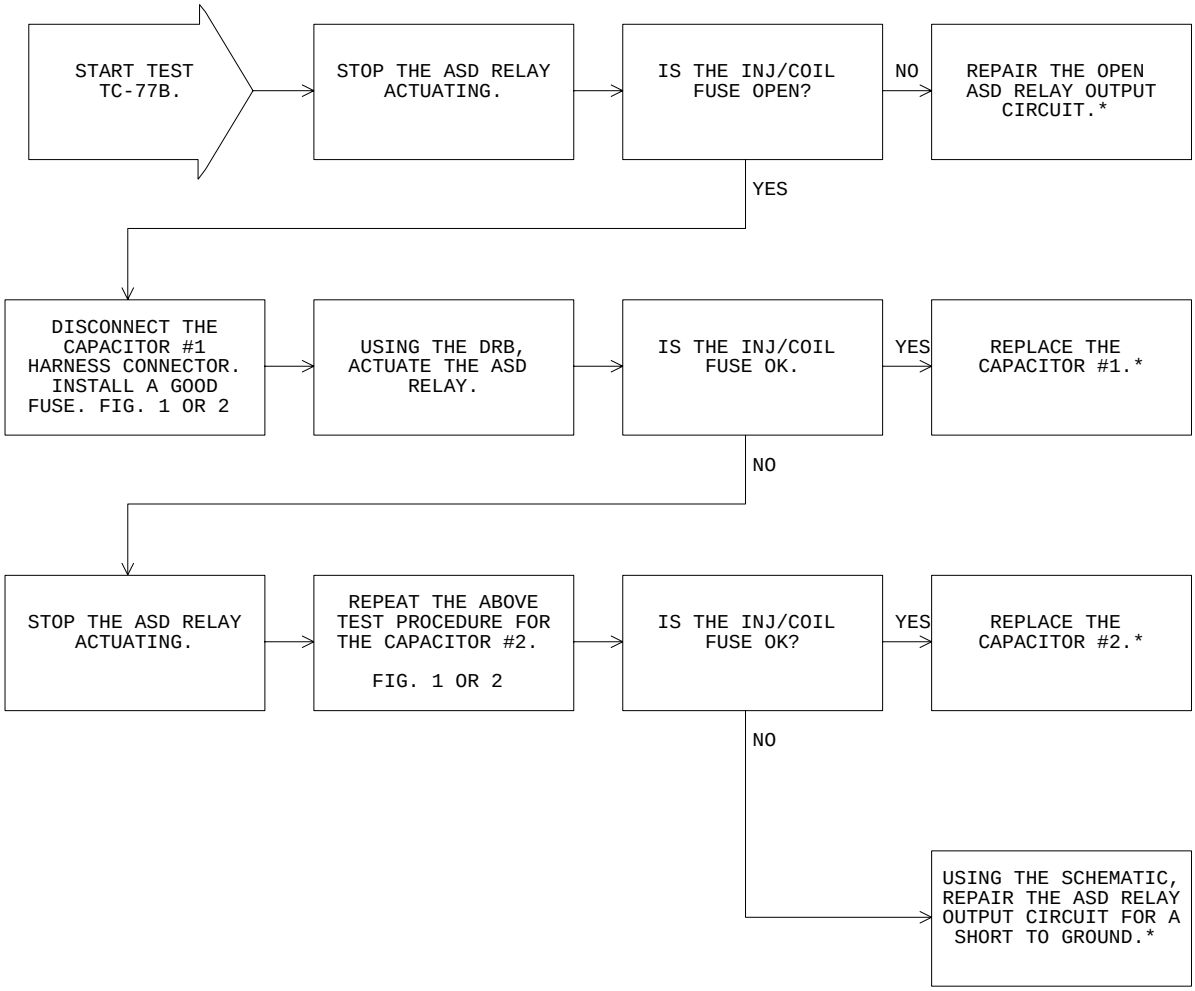
NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

TEST TC-77B REPAIRING - IGNITION COIL #5 PRIMARY CIRCUIT

Perform TEST TC-77A Before Proceeding

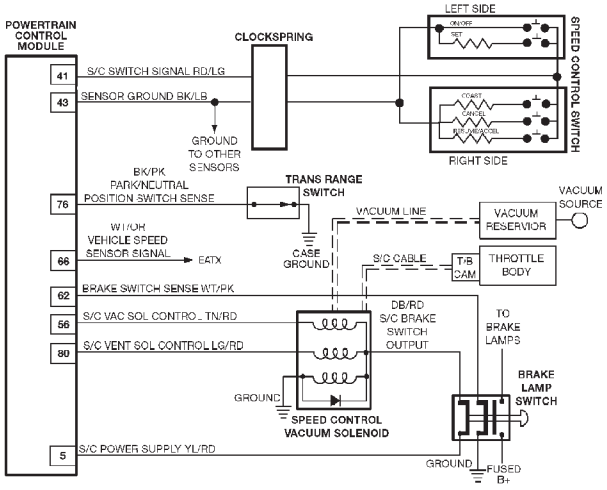


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST TC-82A REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT

Perform TEST DTC Before Proceeding



80b4fab1

Name of code: Speed Control Power Relay Circuit

When monitored: With the ignition key on, speed control switched on.

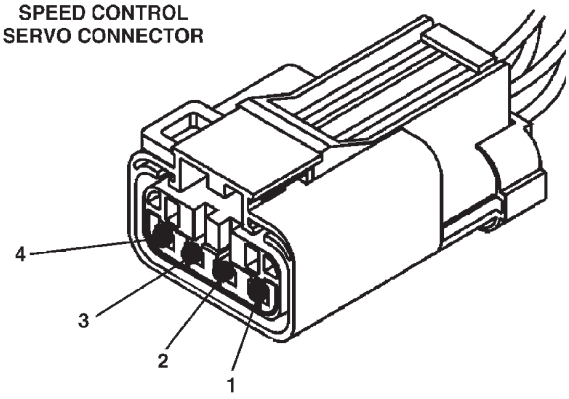
Set condition: The speed control power supply circuit is either open or shorted to ground.

Theory of operation: The PCM monitors the voltage drop across all speed control solenoids and the power supply circuit.

Possible causes:
> Open and shorted power supply circuit
> Failed dump solenoid (S/C servo)

80aa0f65

SPEED CONTROL SERVO CONNECTOR

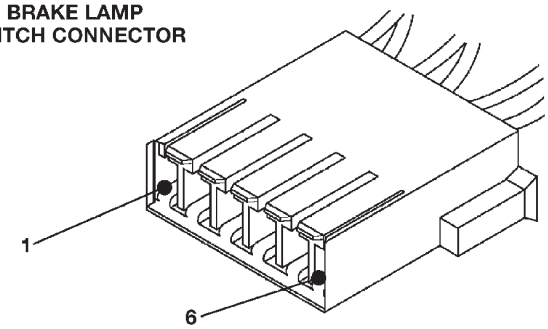


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1

BRAKE LAMP SWITCH CONNECTOR

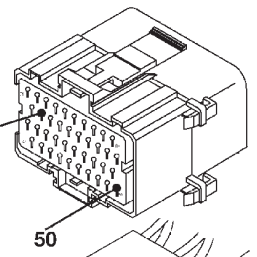


CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12

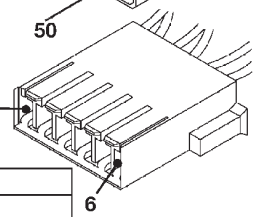
FIG. 2

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
5	YL/RD	S/C POWER SUPPLY
50	BK/TN	GROUND
62	WT/PK	BRAKE SWITCH SENSE

BRAKE LAMP SWITCH CONNECTOR



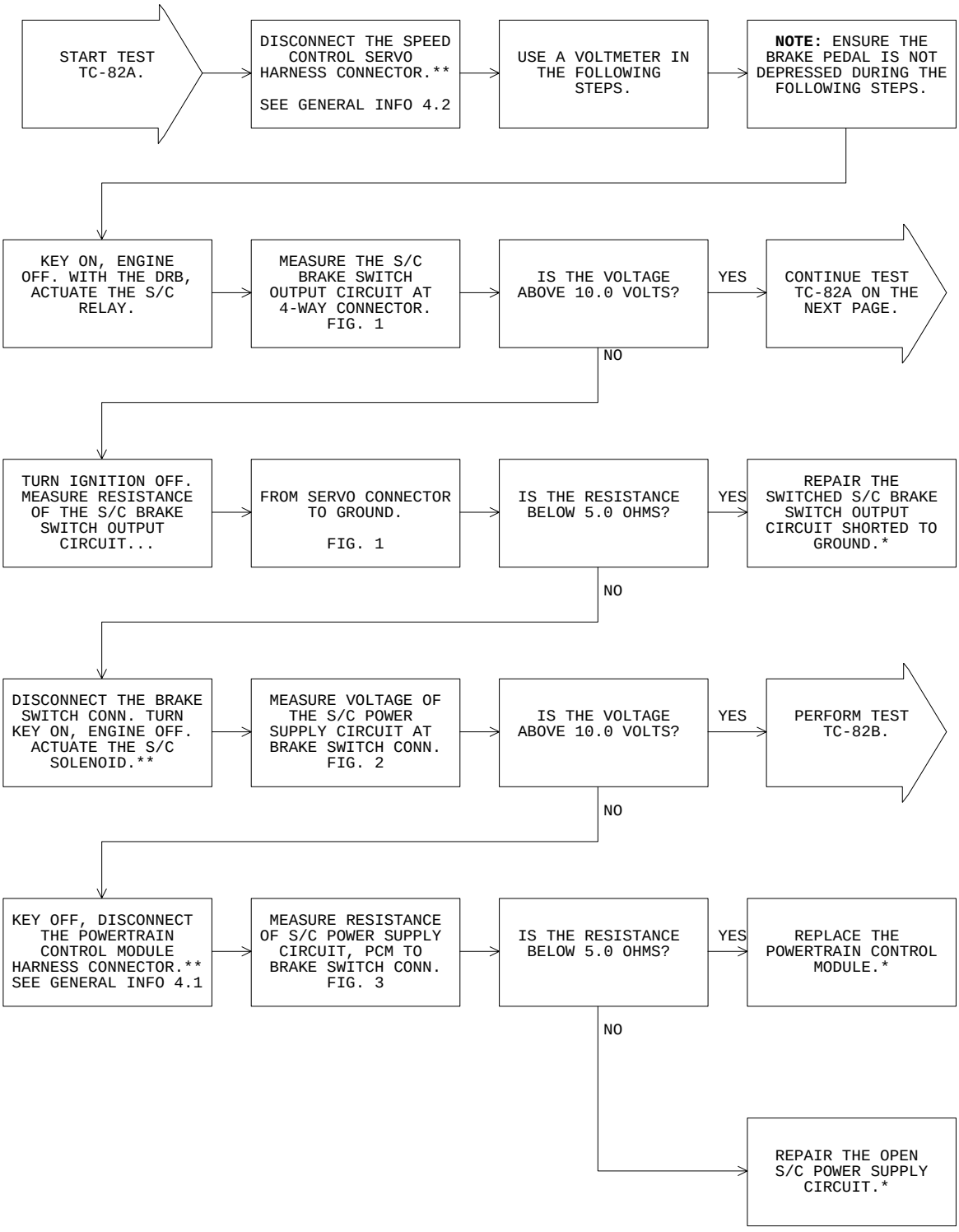
CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d28

FIG. 3

TEST TC-82A REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT

Perform TEST DTC Before Proceeding

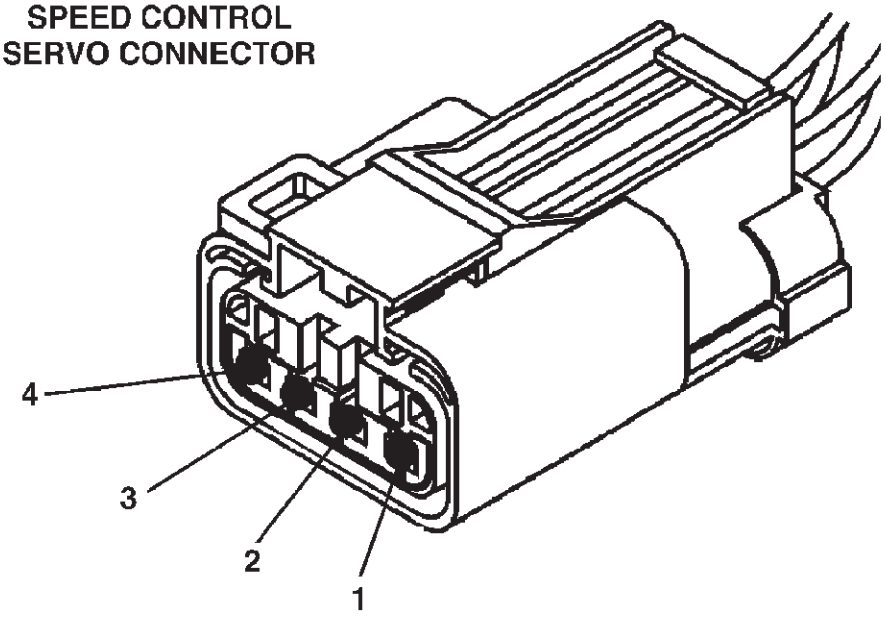


Perform Verification TEST VER-4A.

****Check connectors - Clean / repair as necessary.***

TEST TC-82A CONTINUED - REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT

SPEED CONTROL SERVO CONNECTOR

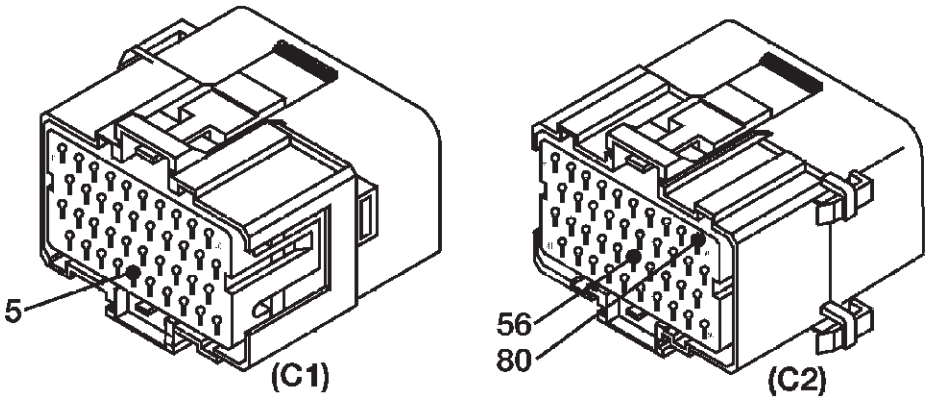


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1

POWERTRAIN CONTROL MODULE CONNECTORS

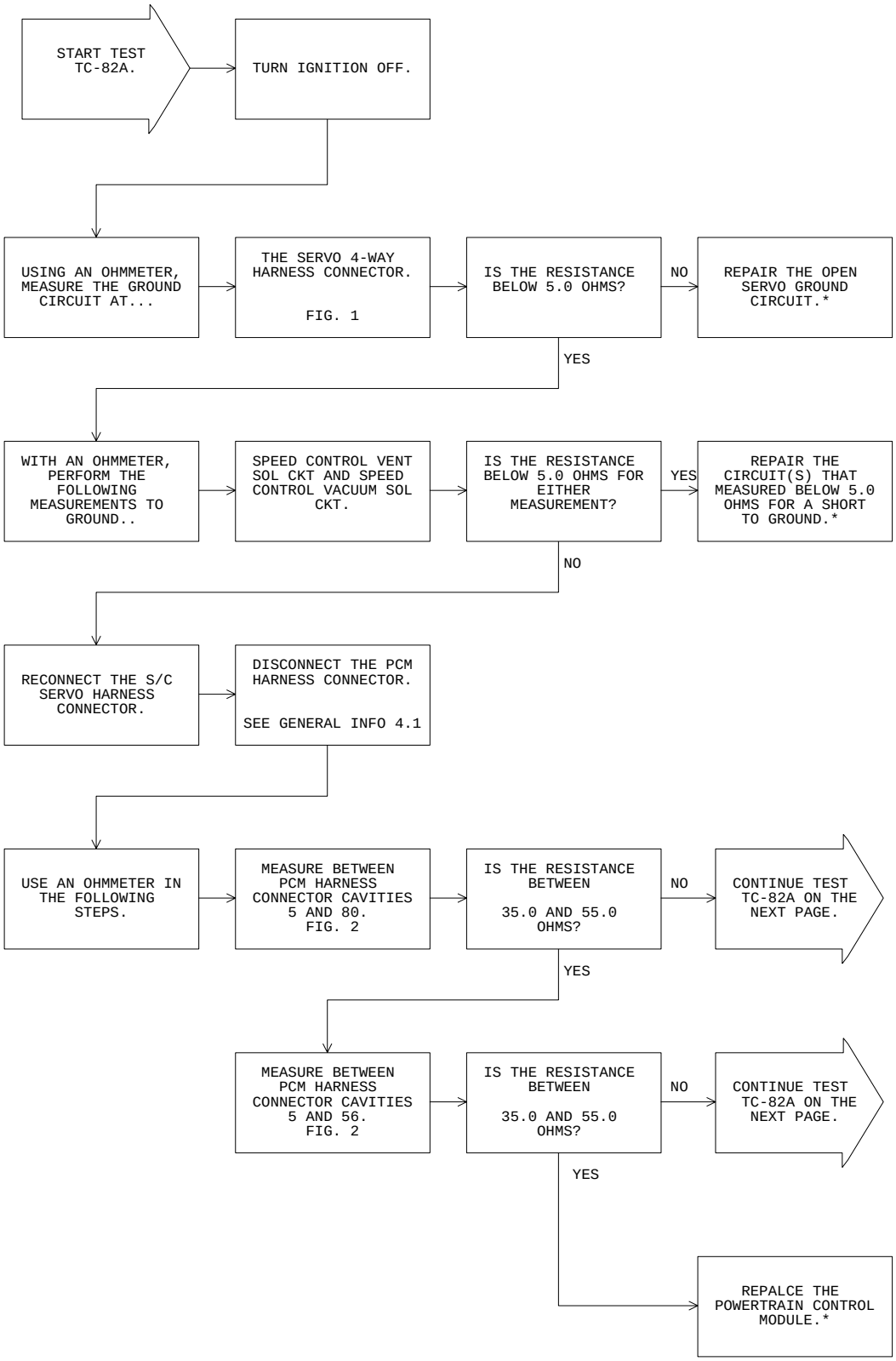


CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

80b4b84f

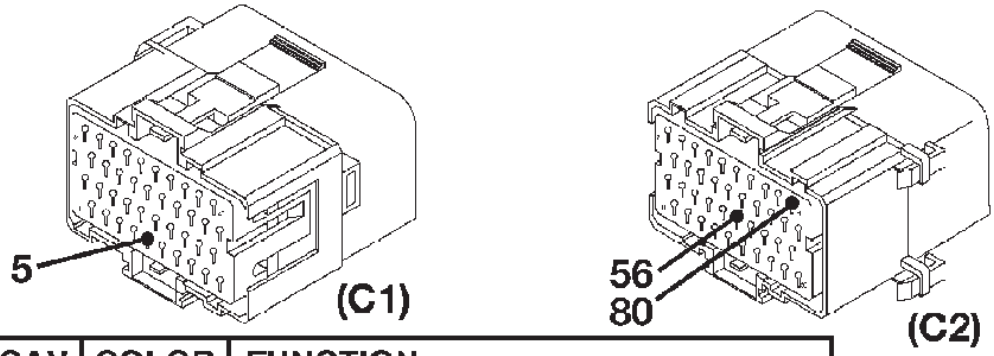
FIG. 2

TEST TC-82A CONTINUED - REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT



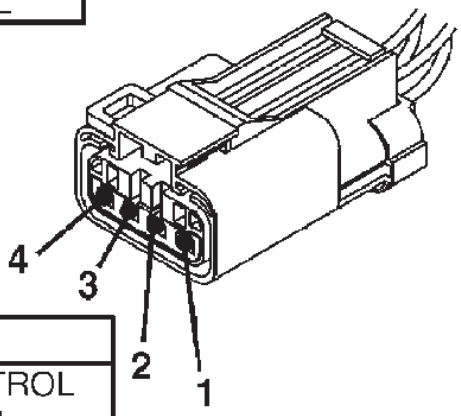
***Perform Verification TEST VER-4A.** | ***Check connectors - Clean / repair as necessary.**

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

SPEED CONTROL SERVO CONNECTOR

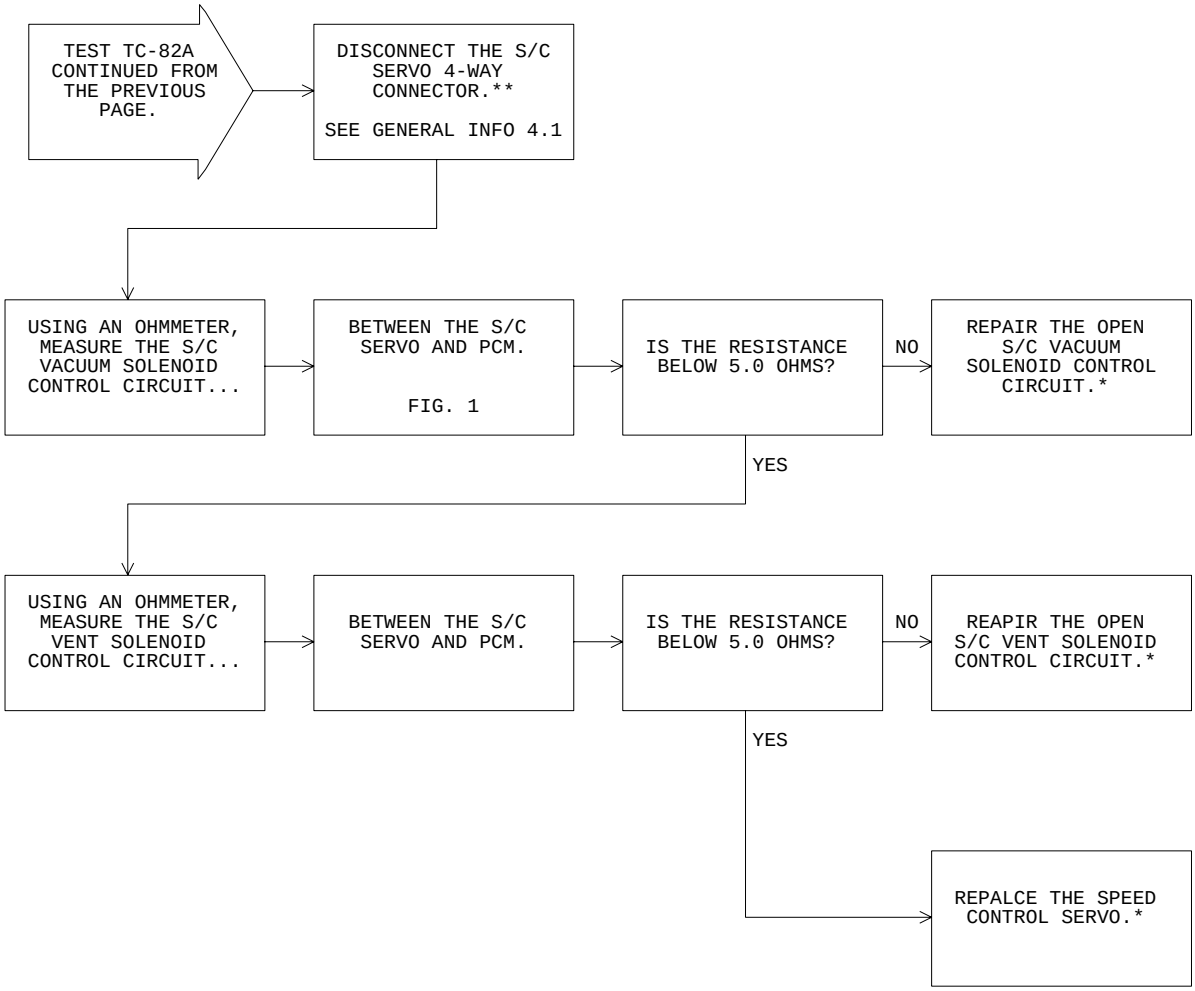


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84e

FIG. 1

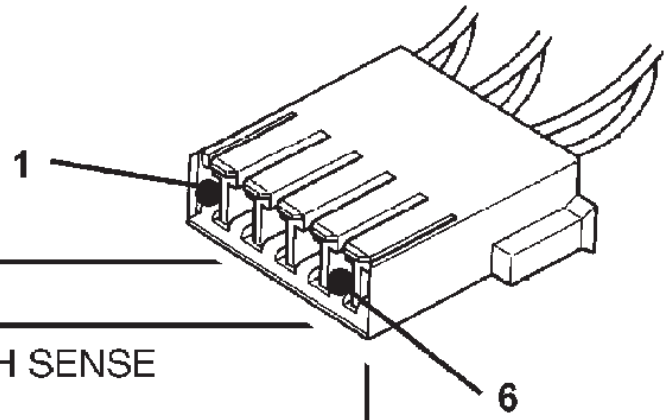
TEST TC-82A CONTINUED - REPAIRING - SPEED CONTROL POWER RELAY OR 12 V DRIVER CIRCUIT



Perform Verification TEST VER-4A.

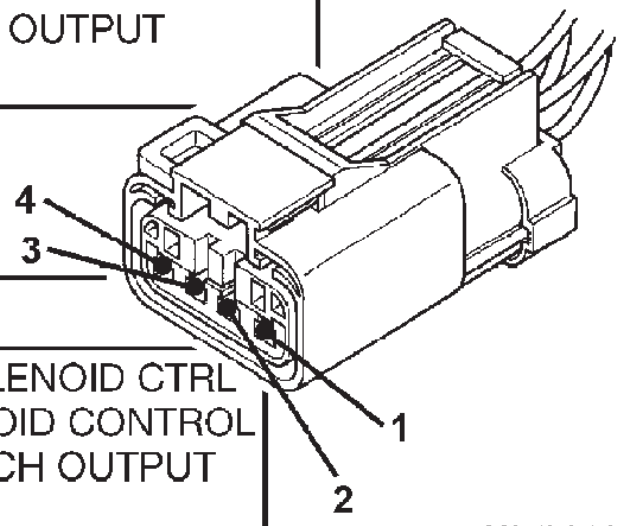
Check connectors - Clean / repair as necessary.

BRAKE LAMP SWITCH CONNECTOR



CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SW OUTPUT
6	PK/DB	FUSED B (+)

SPEED CONTROL SERVO CONNECTOR

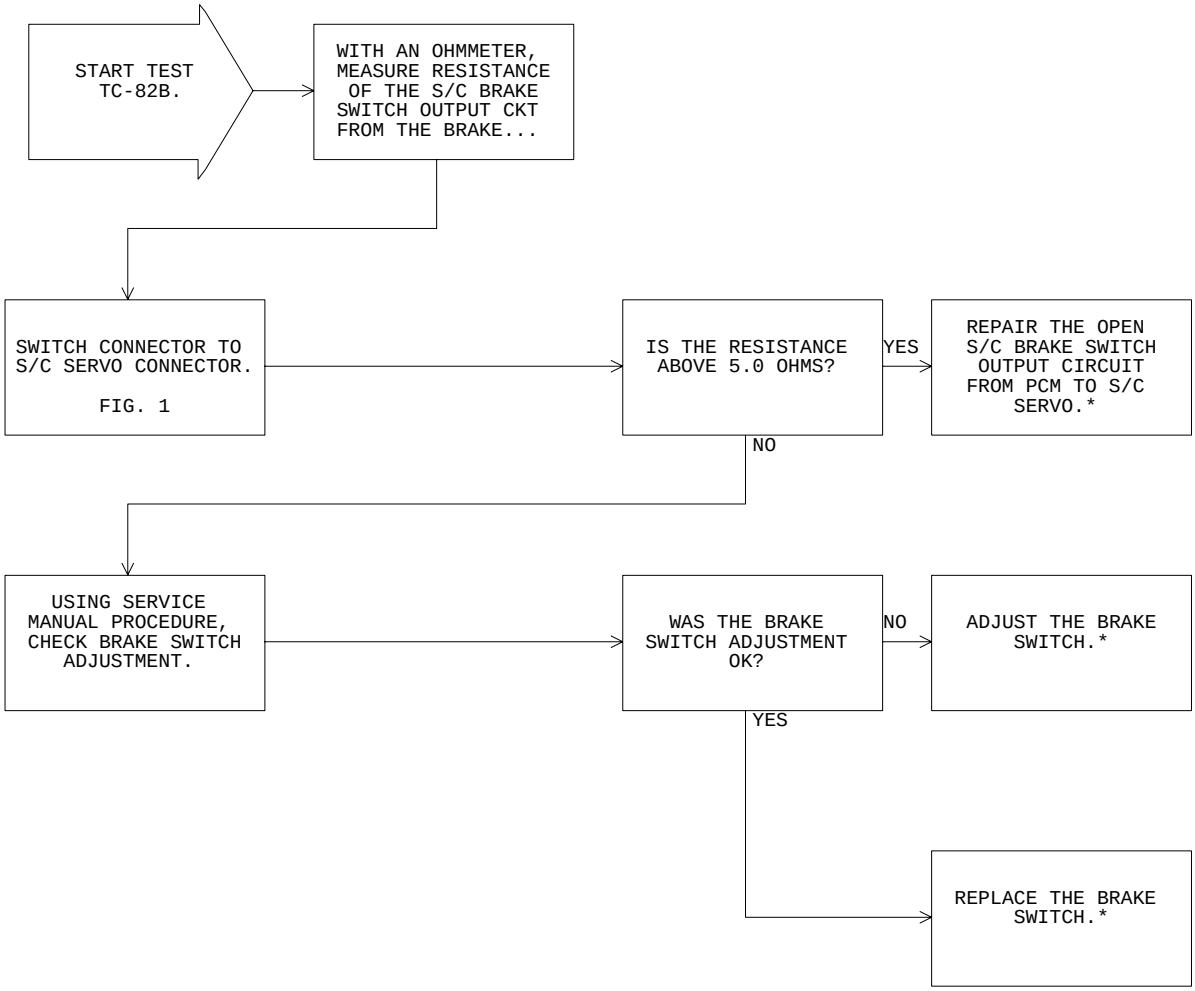


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CTRL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84d

FIG. 1

TEST TC-82B CONTINUED - REPAIRING - SPEED CONTROL POWER RELAY OR 12V DRIVER CIRCUIT



**Perform Verification TEST VER-4A.* | ***Check connectors - Clean / repair as necessary.*

TEST TC-87A REPAIRING - SPEED CONTROL SWITCH ALWAYS LOW

Perform TEST DTC Before Proceeding

Name of code: Speed Control Switches Always Low

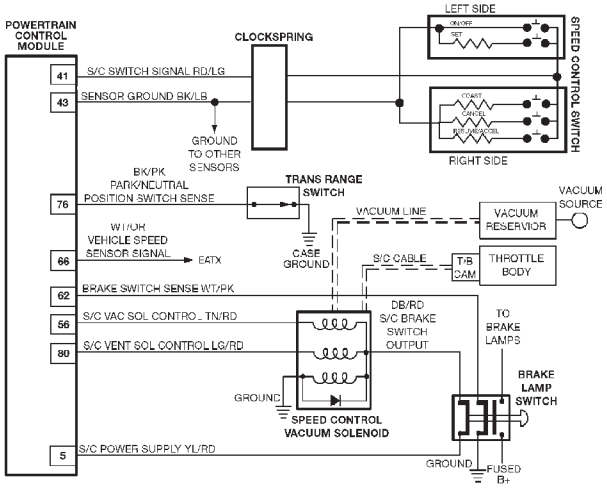
When monitored: With the ignition key on, and battery voltage greater than 10.4 volts.

Set condition: When switch voltage is less than 4.5 volts for 2 minutes.

Theory of operation: A single wire referenced to sensor return ground is used to sense steering wheel mounted switches. Each switch has an associated resistance valve. The switch resistance forms a voltage divider with the PCM's internal pull up resistor to 5 volts. The resistor divider creates a unique voltage at the PCM's input pin thereby allowing multiple switches to be "multiplexed" on a single input.

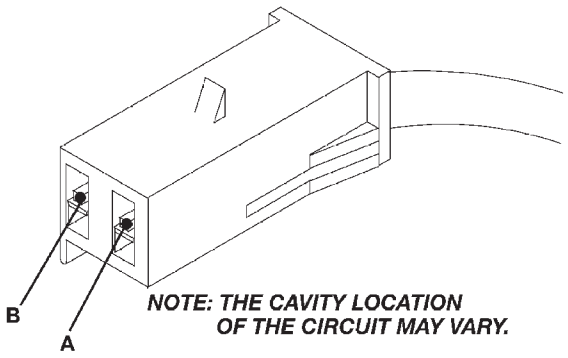
Possible causes:
> Switch circuit shorted
> PCM failure
> Shorted switch signal circuit
> Shorted switch

80b27d35



80b4fab1

SPEED CONTROL SWITCH CONNECTOR



NOTE: THE CAVITY LOCATION OF THE CIRCUIT MAY VARY.

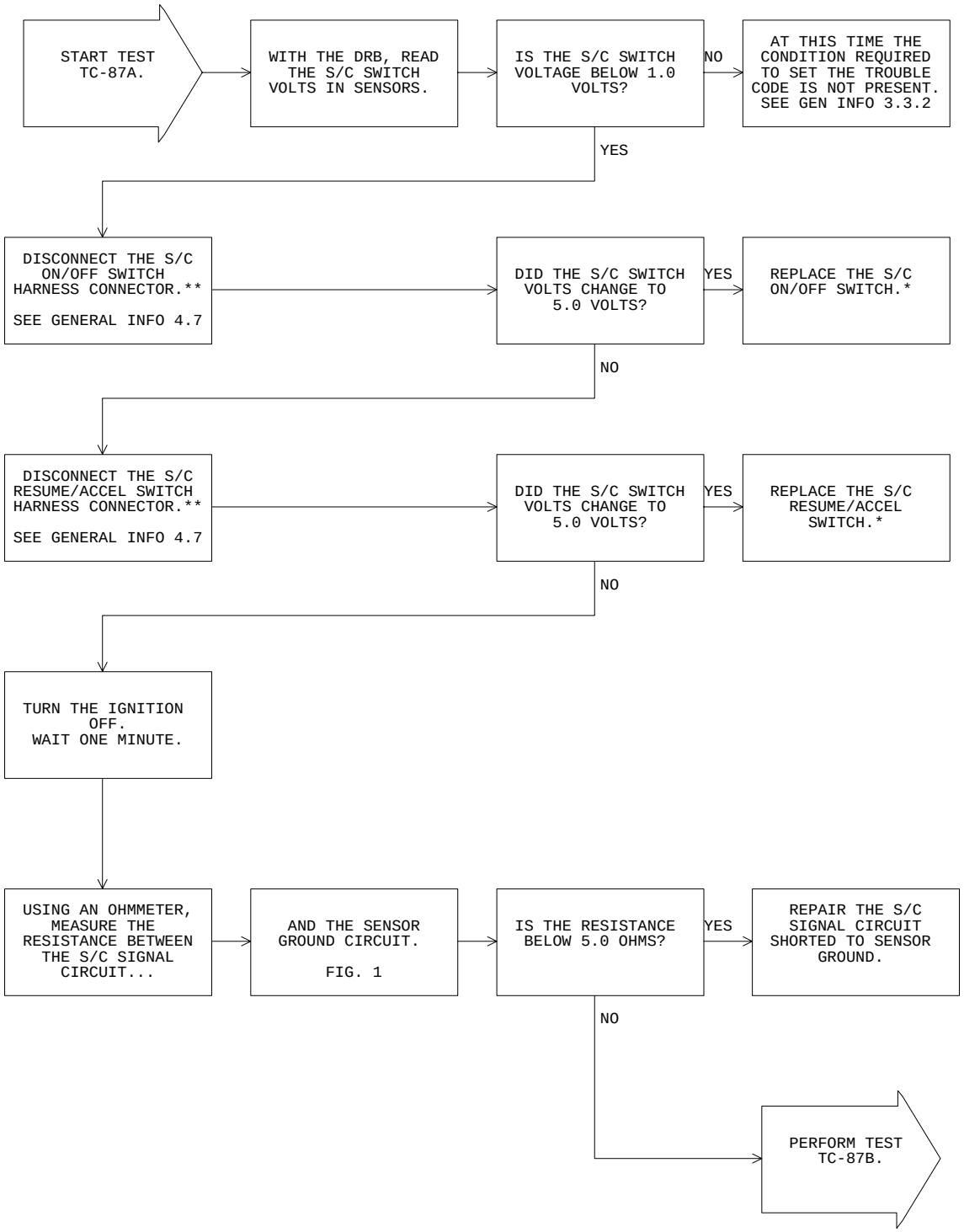
CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

FIG. 1

80b4fb57

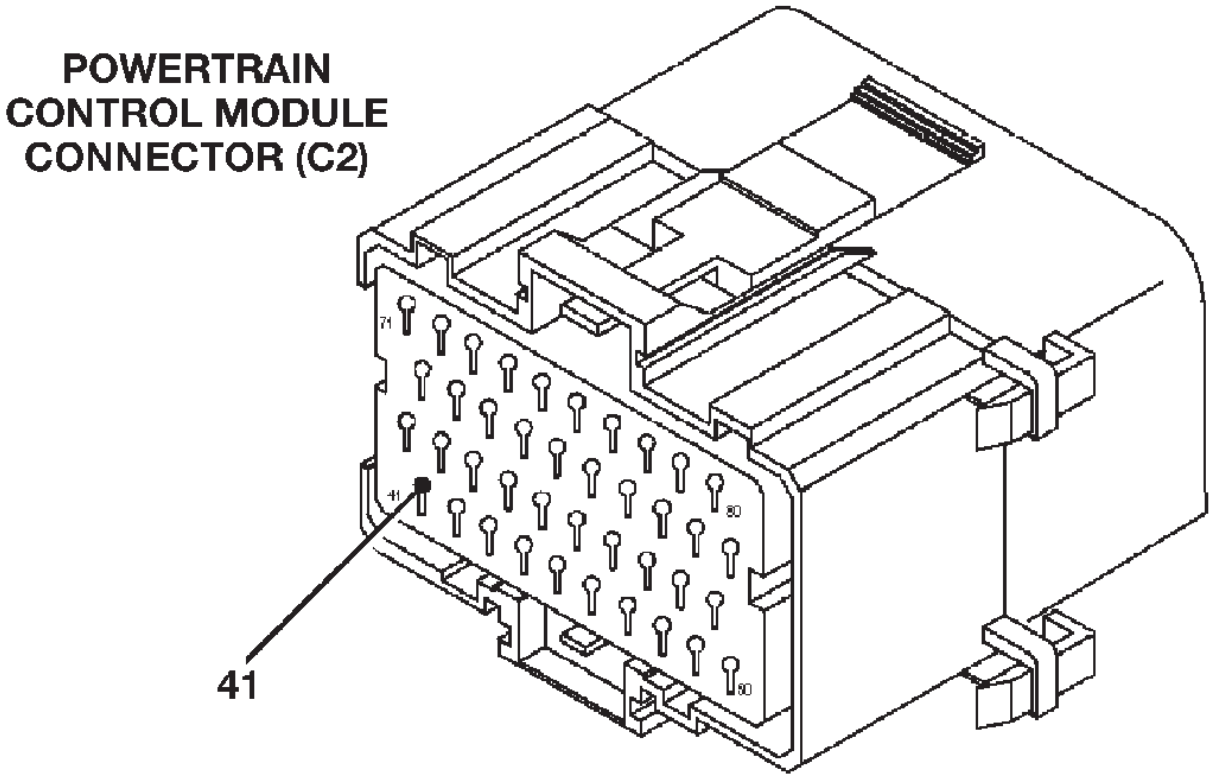
TEST TC-87A REPAIRING - SPEED CONTROL SWITCH ALWAYS LOW

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-4A.

****Check connectors - Clean / repair as necessary.***

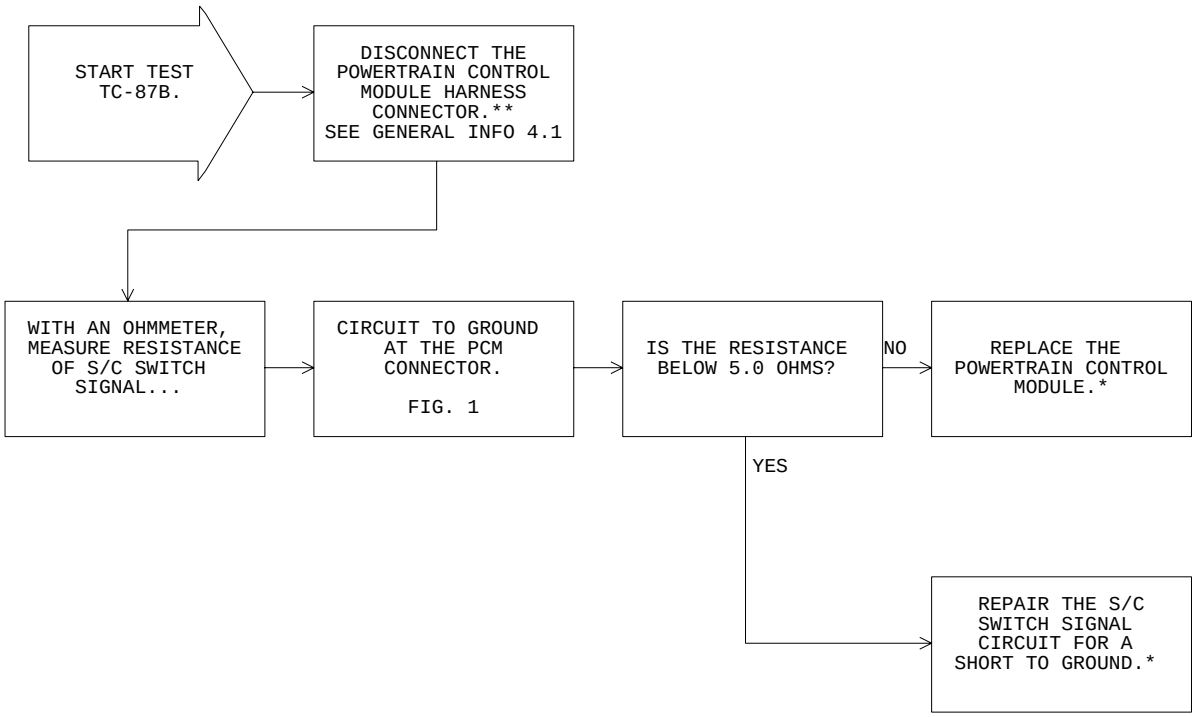


CAV	COLOR	FUNCTION
41	RD/LG	SPEED CONTROL SWITCH SIGNAL

80b27d30

FIG. 1

TEST TC-87B CONTINUED - REPAIRING - SPEED CONTROL SWITCH ALWAYS LOW

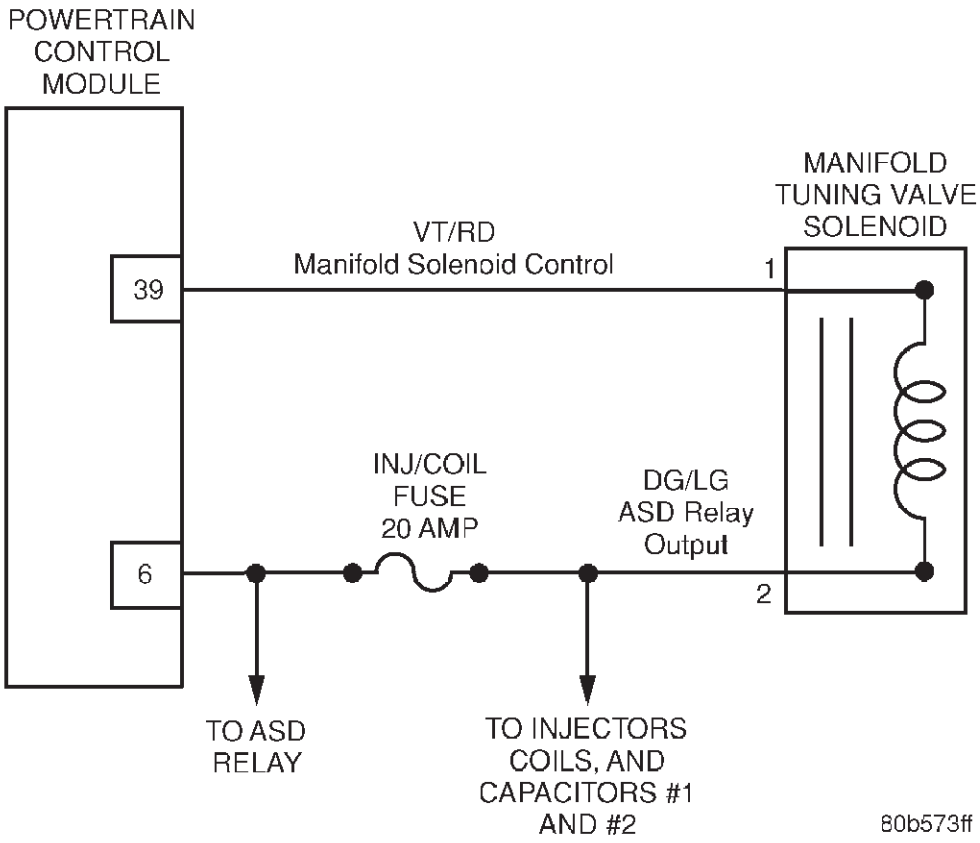


***Perform Verification TEST VER-4A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-88A REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: Manifold Tune Valve Solenoid Circuit

When Monitored: With the ignition key on and engine running.

Set condition: The MTV solenoid control circuit is not in the expected state when requested to operate by the PCM.

Theory of operation: The MTV solenoid is actuated by the PCM at wide open throttle and at various pre-set engine speeds. This solenoid controls a manifold mounted servo that power tunes the manifold. The PCM looks for a current spike when actuating the solenoid. If the spike is not present, the PCM sets a trouble code.

Possible causes:

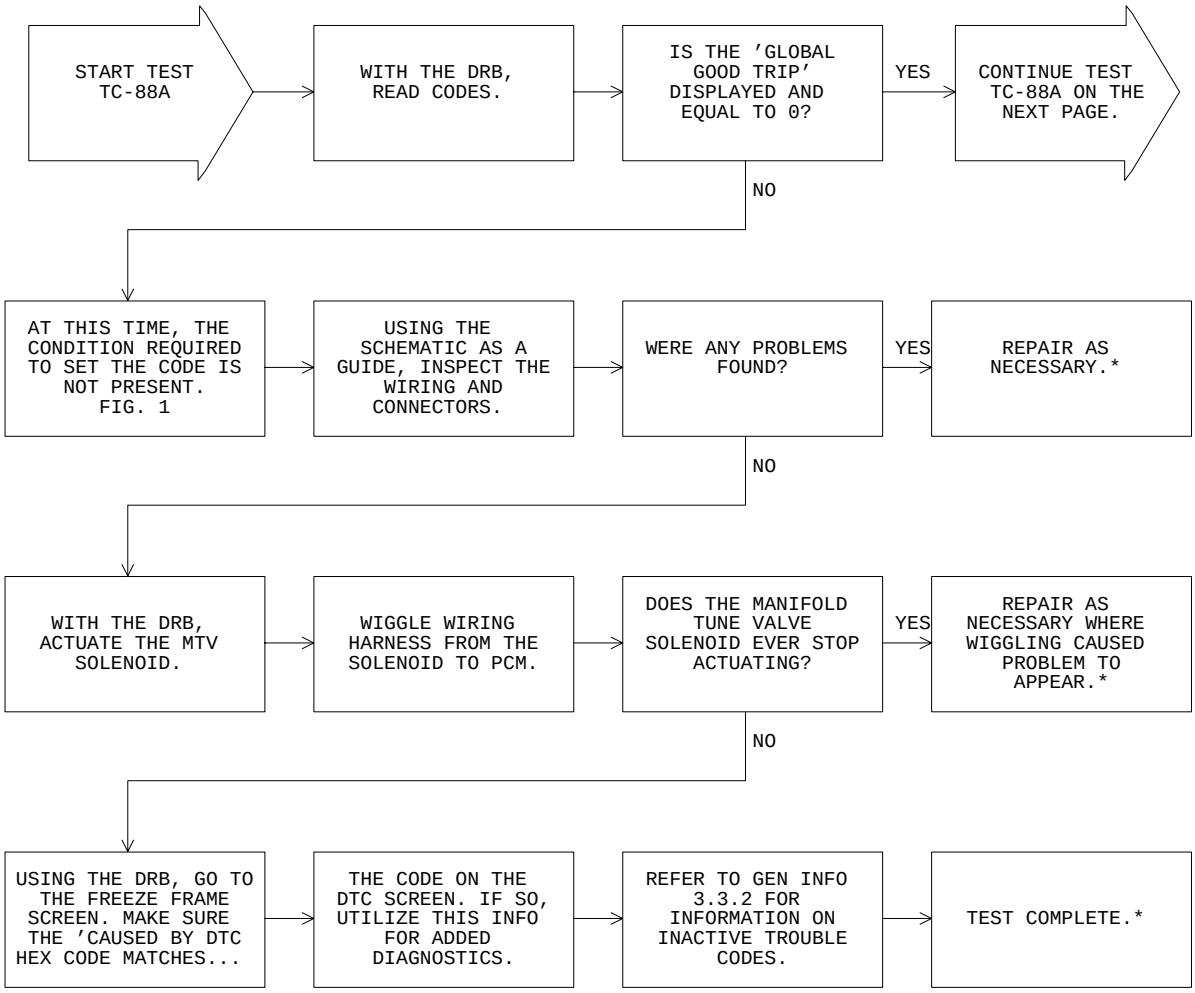
> Open or shorted control circuit
> Open ASD relay output circuit
> Open or shorted solenoid coil
> Powertrain control module failure

80b3c532

FIG. 1

TEST TC-88A REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT

Perform TEST DTC Before Proceeding

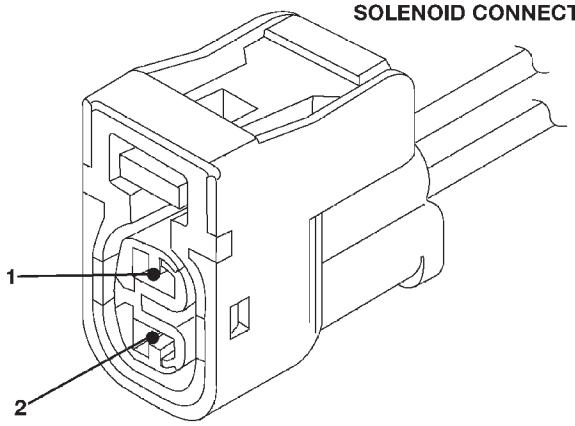


Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-88A CONTINUED - REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT

MANIFOLD TUNE VALVE SOLENOID CONNECTOR

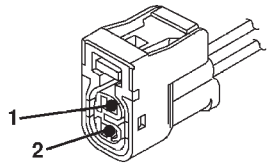


CAV	COLOR	FUNCTION
1	VT/RD	MTV SOLENOID CONTROL
2	DG/LG	ASD RELAY OUTPUT

80b09856

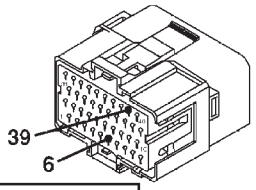
FIG. 1

MANIFOLD TUNING VALVE SOLENOID CONNECTOR



CAV	COLOR	FUNCTION
1	VT/RD	MTV SOLENOID CONTROL
2	DG/LG	ASD RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTOR (C1)

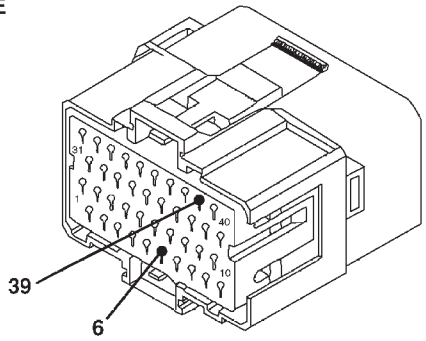


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
39	VT/RD	MTV SOLENOID CONTROL

80b09855

FIG. 2

POWERTRAIN CONTROL MODULE CONNECTOR (C1)

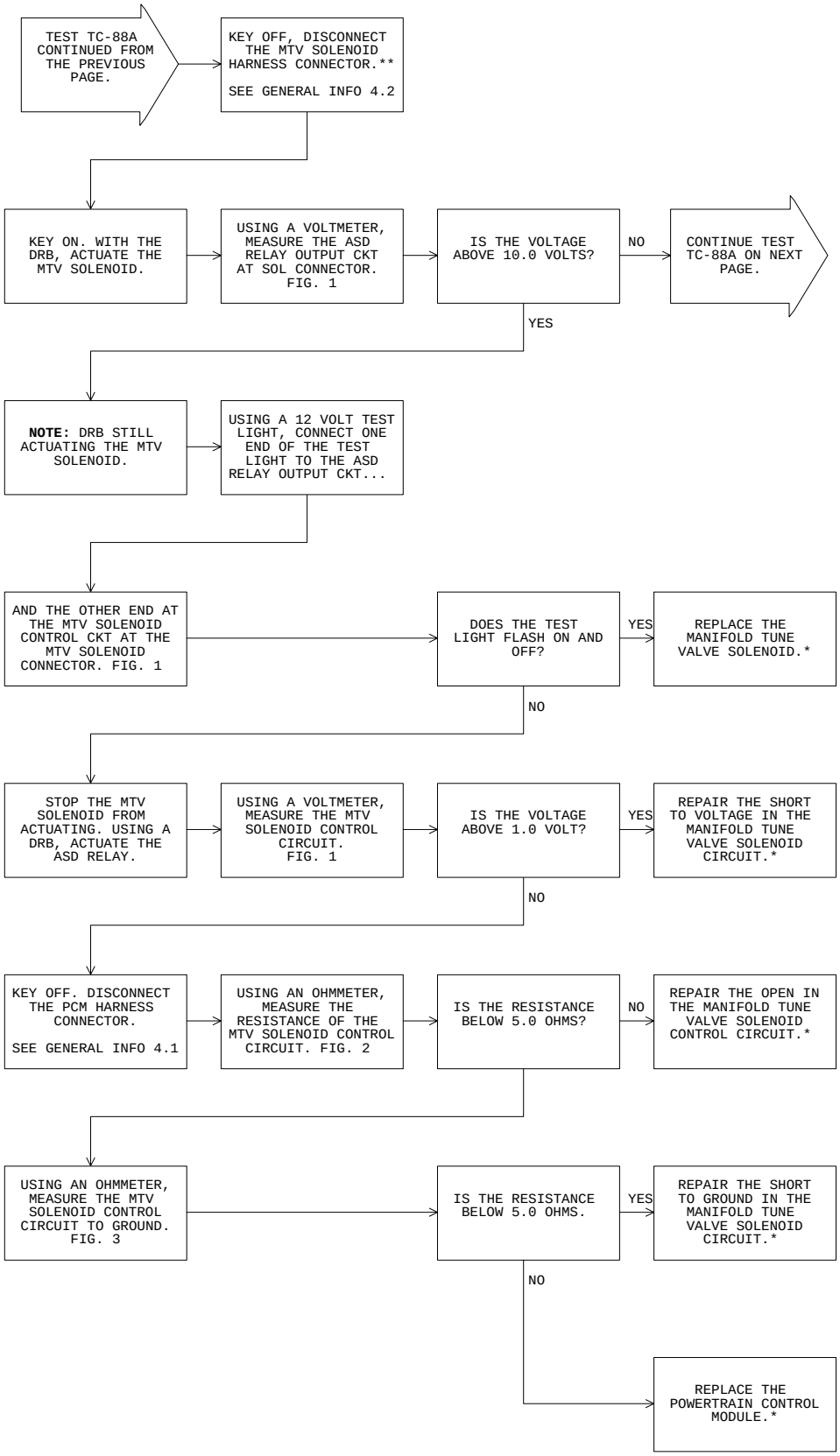


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
39	VT/RD	MANIFOLD TUNE VALVE SOLENOID CONTROL

80b09854

FIG. 3

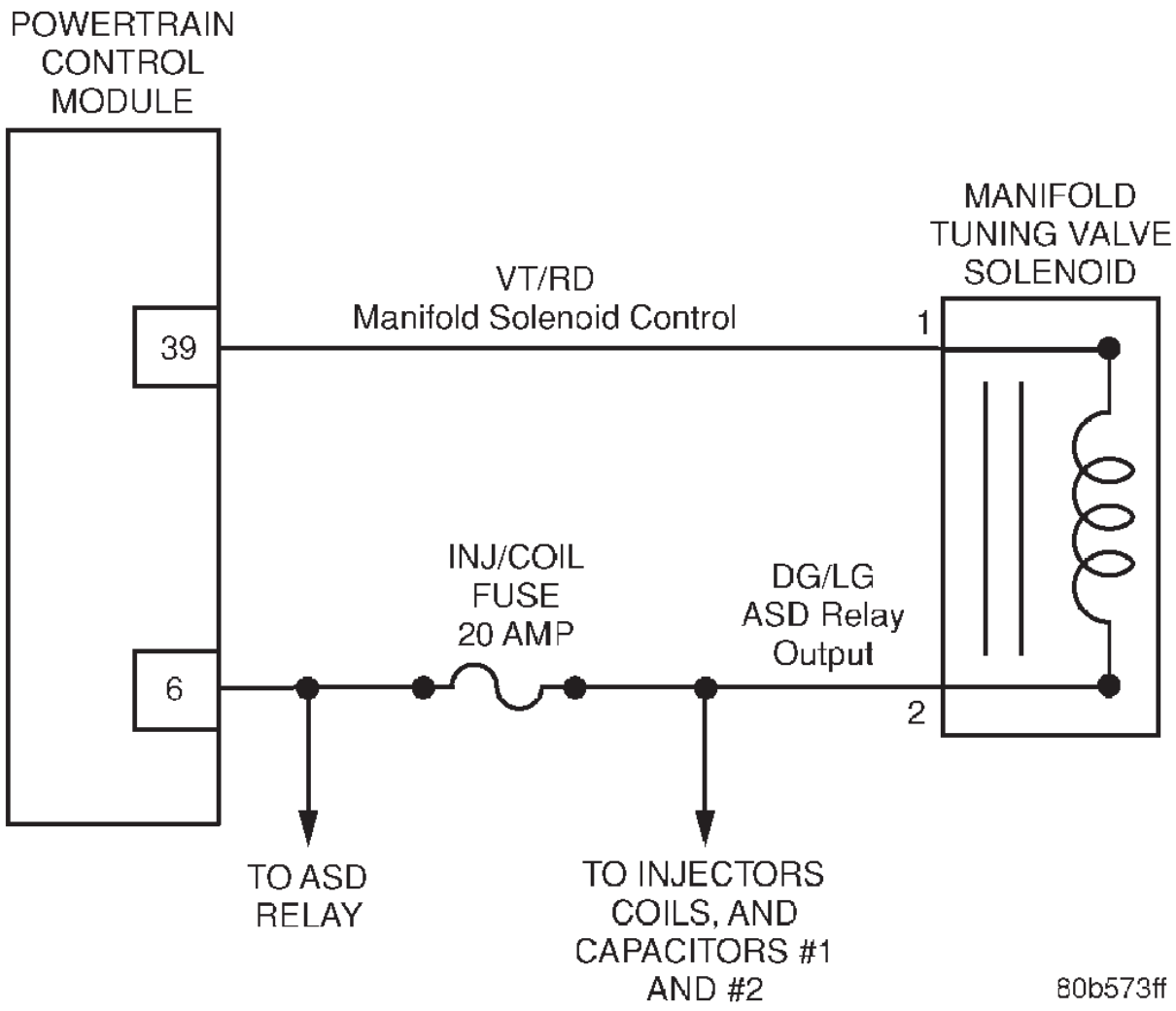
TEST TC-88A CONTINUED - REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT



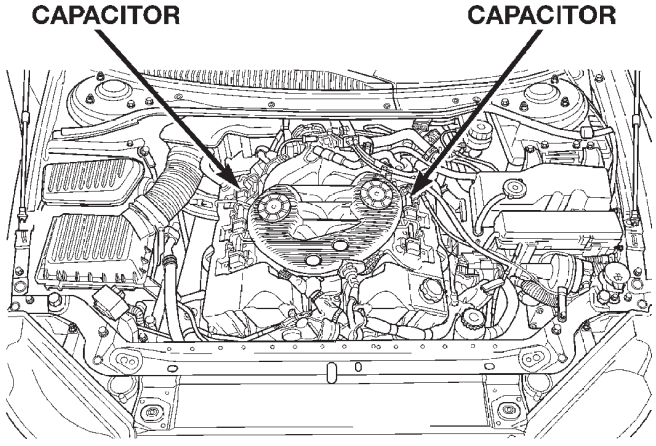
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-88A CONTINUED - REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT



2.7L

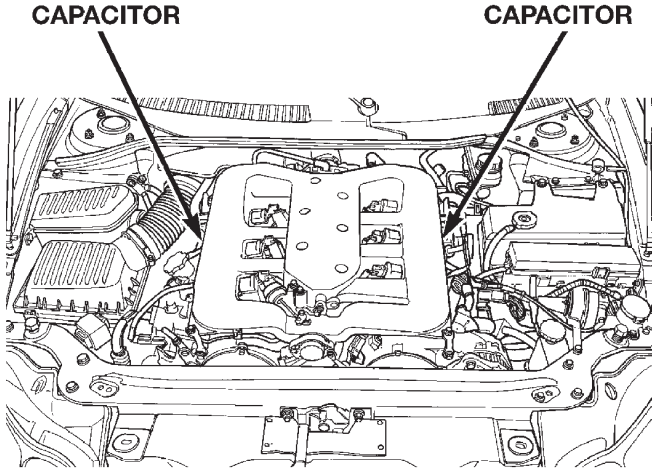


NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

3.5L

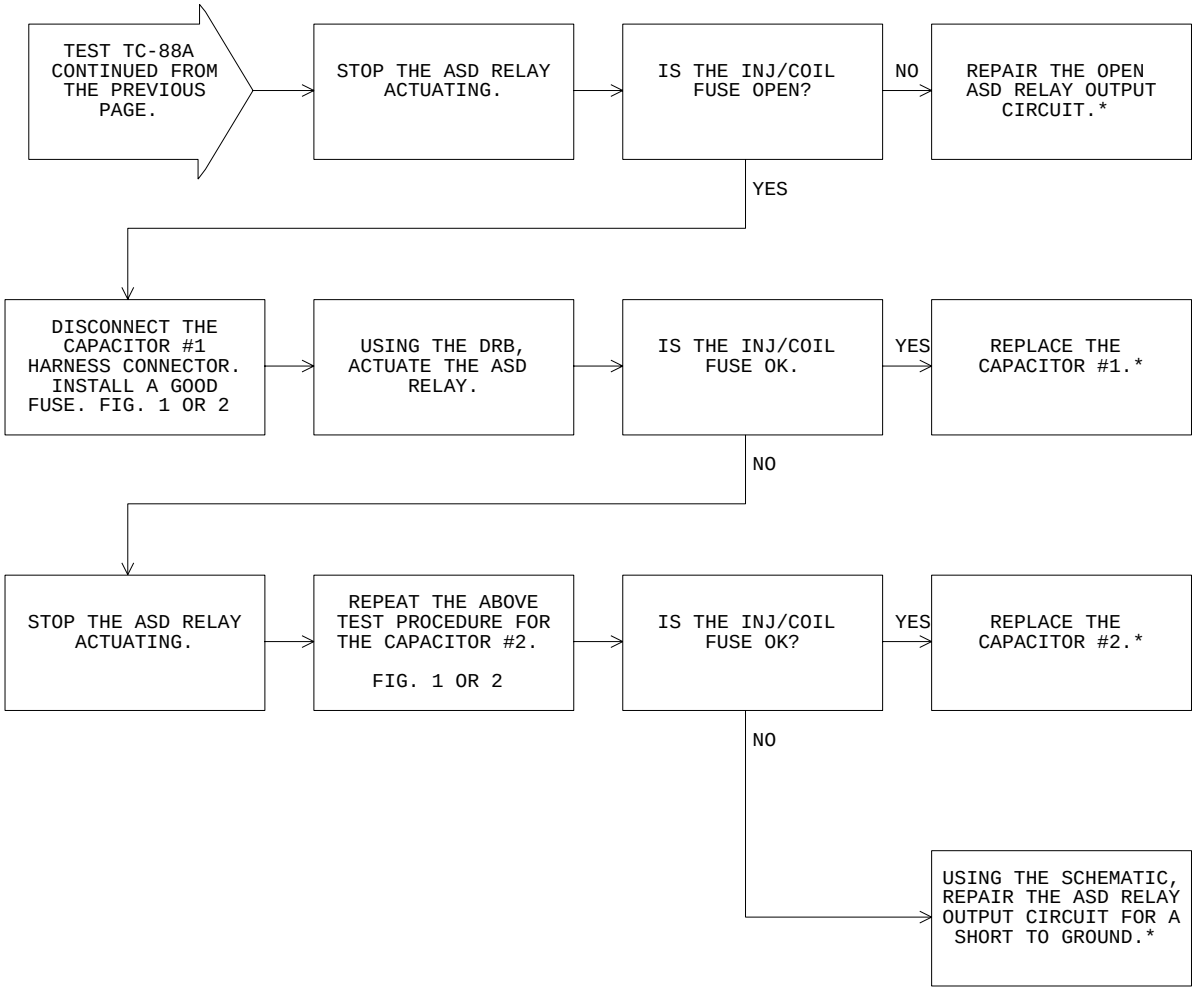


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

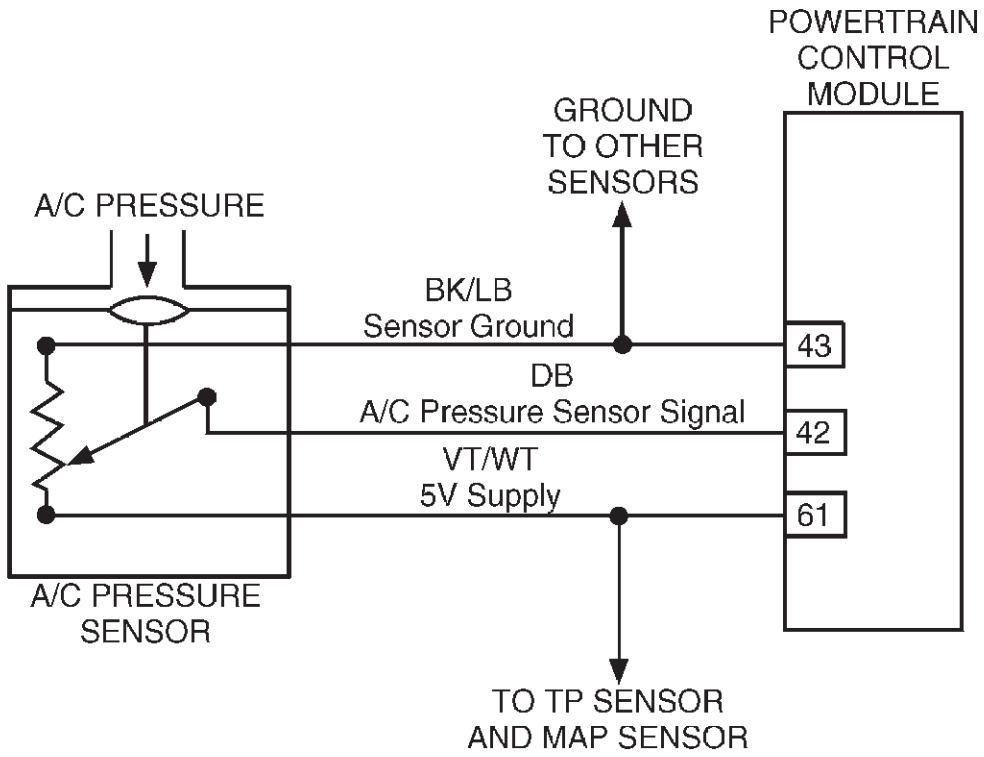
TEST TC-88A CONTINUED - REPAIRING - MANIFOLD TUNE VALVE SOLENOID CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-90A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO HIGH

Perform TEST DTC Before Proceeding



Name of code: A/C Pressure Sensor Volts Too High

When monitored: With the ignition on, the engine running, and the A/C relay energized.

Set condition: The A/C pressure sensor signal at PCM cavity 42 goes above 4.9 volts.

Theory of operation: The A/C pressure sensor informs the PCM if the A/C system pressure is too low or too high. This information allows the PCM to determine if it can engage the compressor clutch. If the A/C system pressure is too low, the PCM will not engage the compressor clutch. If the system pressure is too high, the PCM will disengage the compressor clutch and turn on the cooling fans to prevent the compressor head pressure from becoming too high. The sensor provides a signal to PCM cavity 42. The sensor receives a 5-volt supply from PCM cavity 61. The sensor ground is provided by PCM cavity 43.

Possible causes:

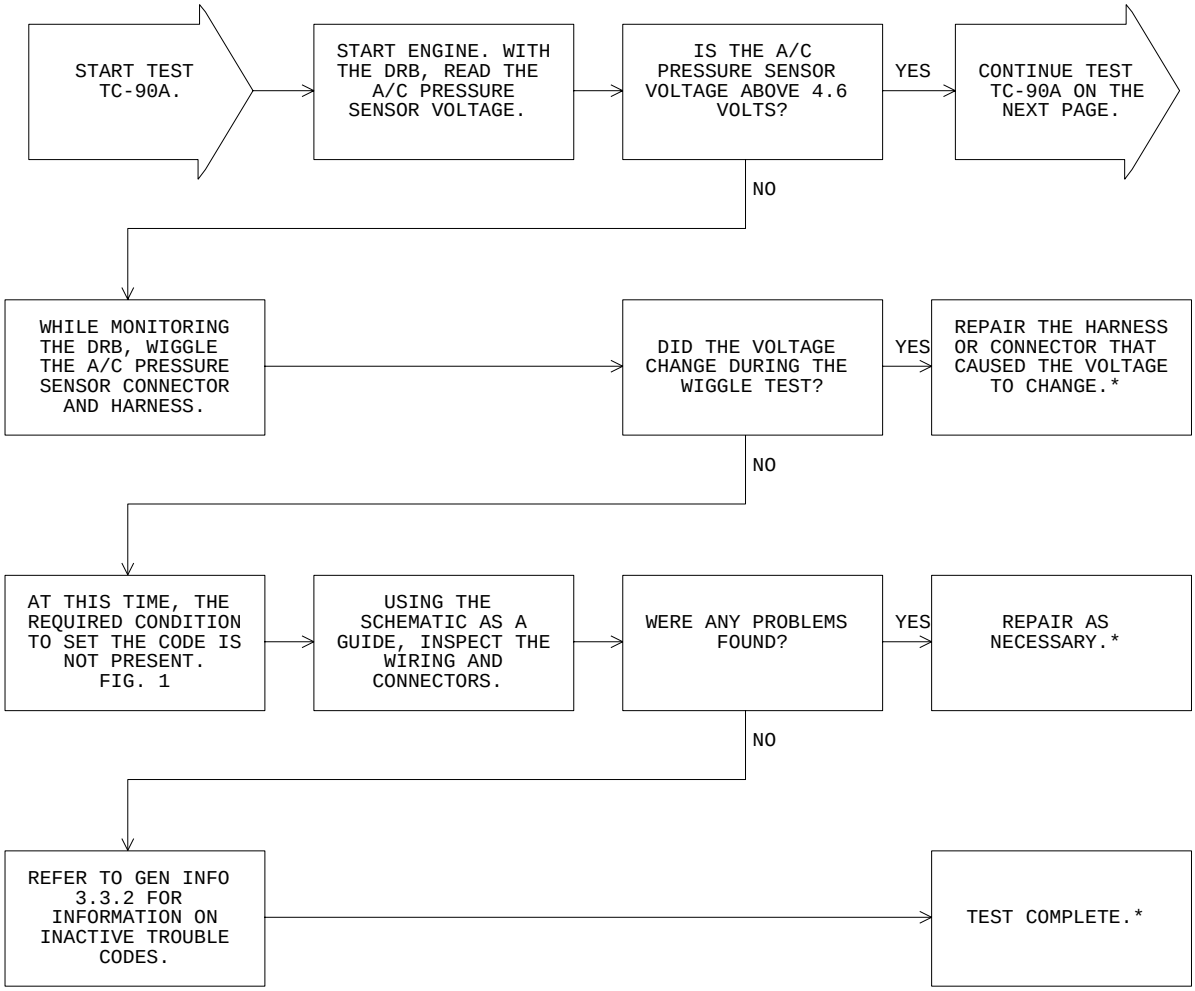
- Sensor signal open
- Sensor internally open
- PCM failure
- Open sensor ground

2600601

FIG. 1

TEST TC-90A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO HIGH

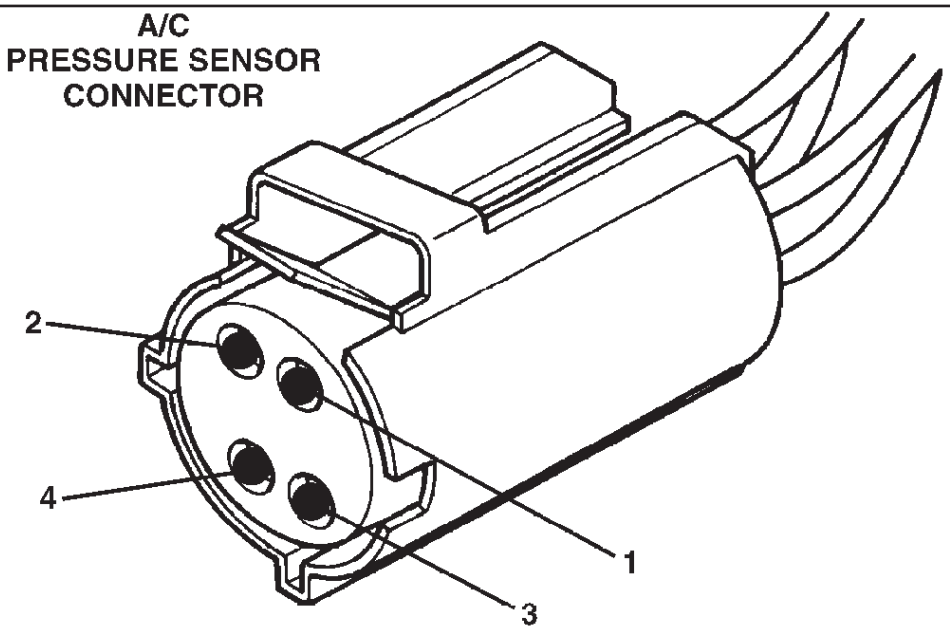
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

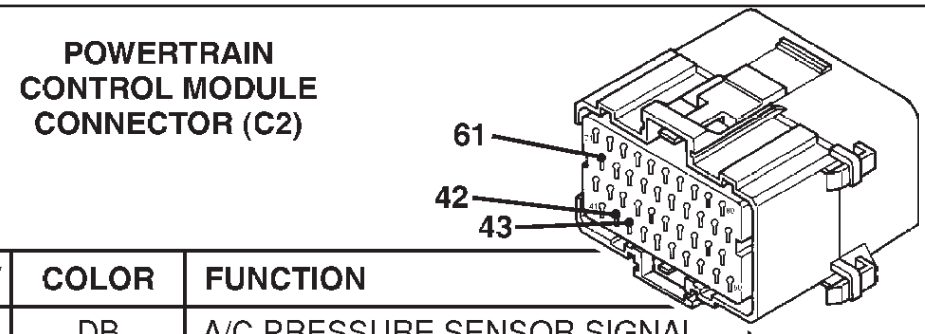
TEST TC-90A CONTINUED - REPAIRING - A/C PRESSURE SENSOR VOLTS TOO HIGH



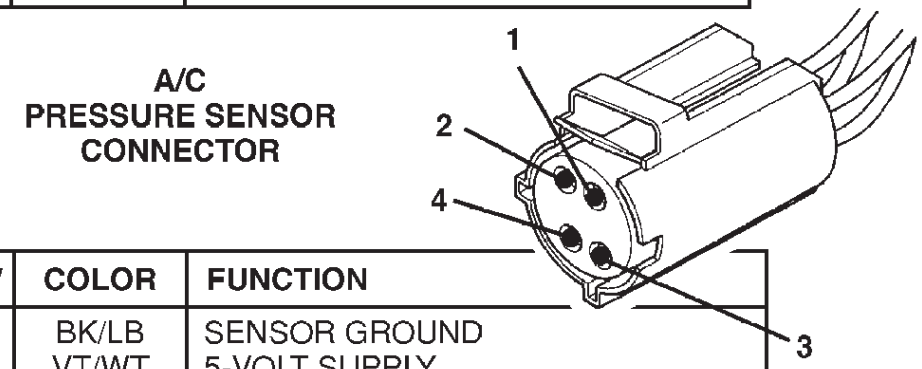
CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	VT/WT	5-VOLT SUPPLY
3	DB	A/C PRESSURE SIGNAL

80b09845

FIG. 1



CAV	COLOR	FUNCTION
42	DB	A/C PRESSURE SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

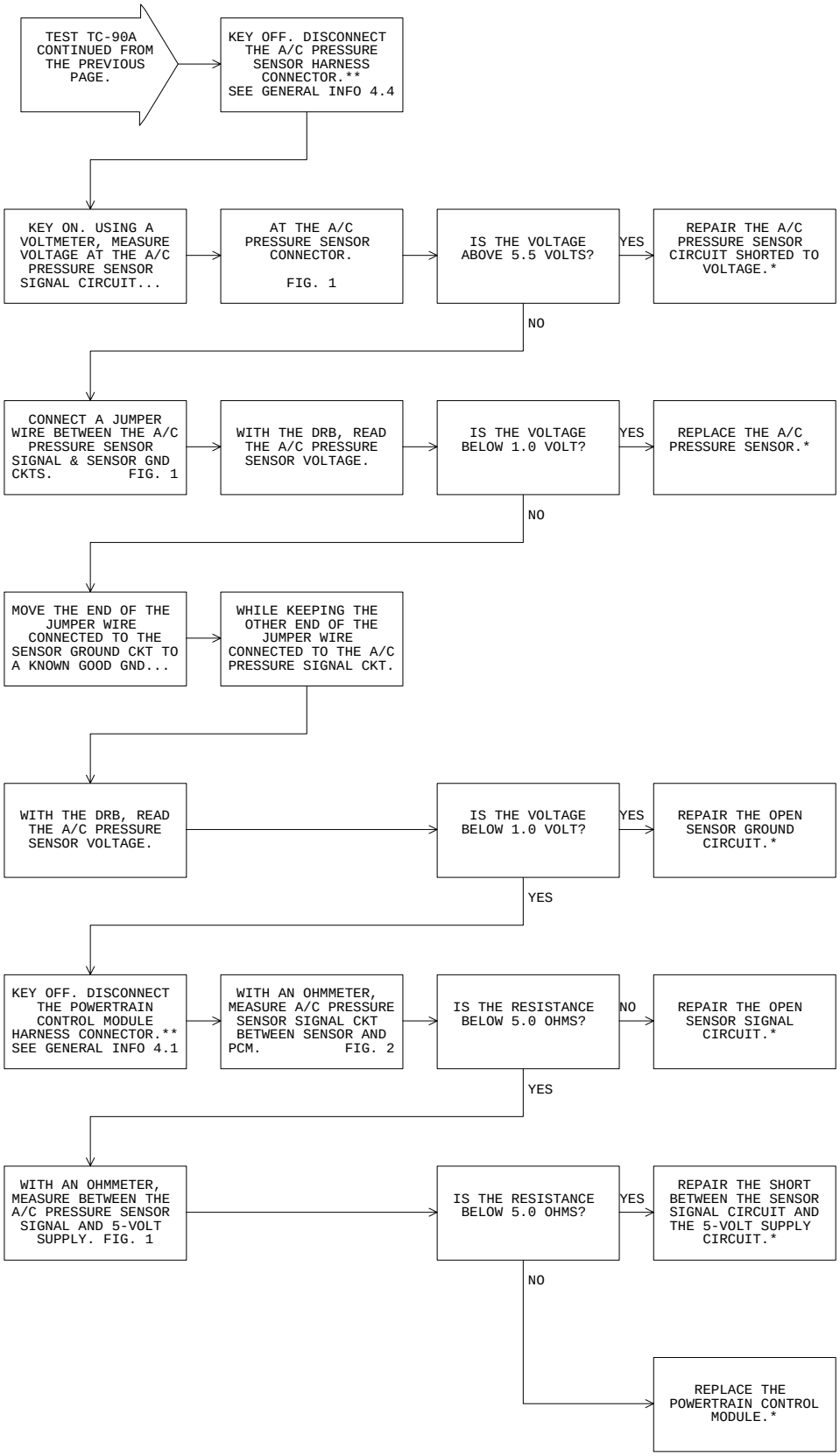


CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	VT/WT	5-VOLT SUPPLY
3	DB	A/C PRESSURE SENSOR SIGNAL

80b09862

FIG. 2

TEST TC-90A CONTINUED - REPAIRING - A/C PRESSURE SENSOR VOLTS TOO HIGH

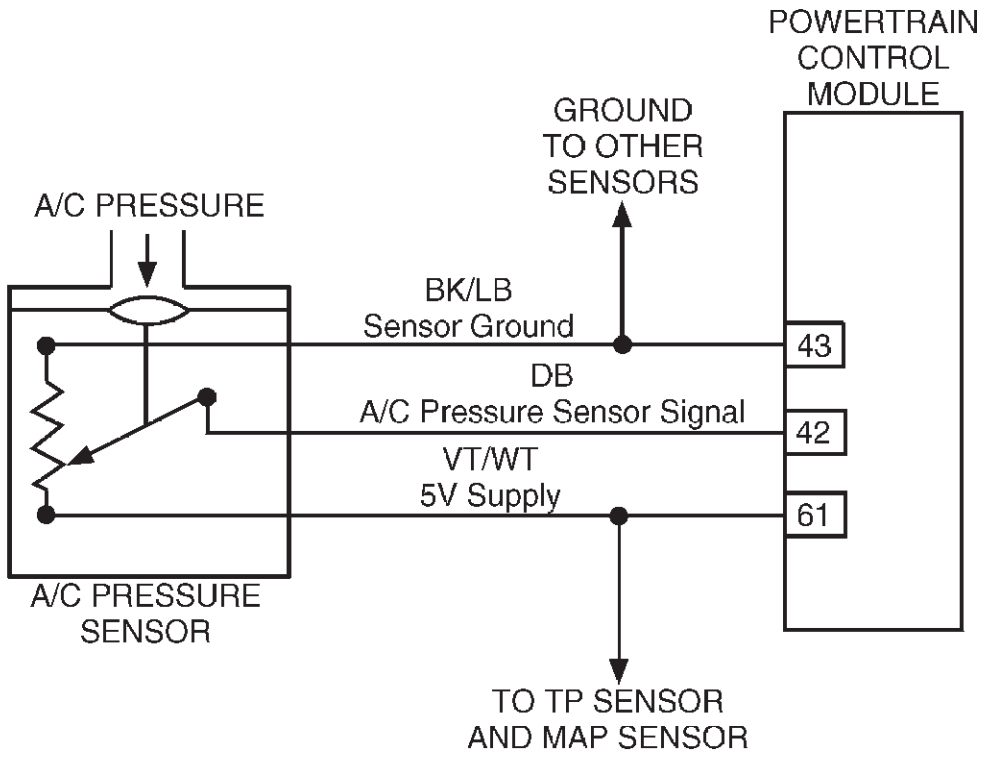


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-91A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO LOW

Perform TEST DTC Before Proceeding



Name of code: A/C Pressure Sensor Volts Too Low

When monitored: With the ignition on, the engine running, and the A/C relay energized.

Set condition: The A/C pressure sensor signal voltage at PCM cavity 42 goes below .5 volt, or the voltage is below .7 volt for 22 seconds when the A/C relay is energized.

Theory of operation: The A/C pressure sensor informs the PCM if the A/C system pressure is too low or too high. This information allows the PCM to determine if it can engage the compressor clutch. If the A/C system pressure is too low, the PCM will not engage the compressor clutch. If the system pressure is too high, the PCM will disengage the compressor clutch and turn on the cooling fans to prevent the compressor head pressure from becoming too high. The sensor provides a signal to PCM cavity 42. The sensor receives a 5-volt supply from PCM cavity 61. The sensor ground is provided by PCM cavity 43.

Possible causes:

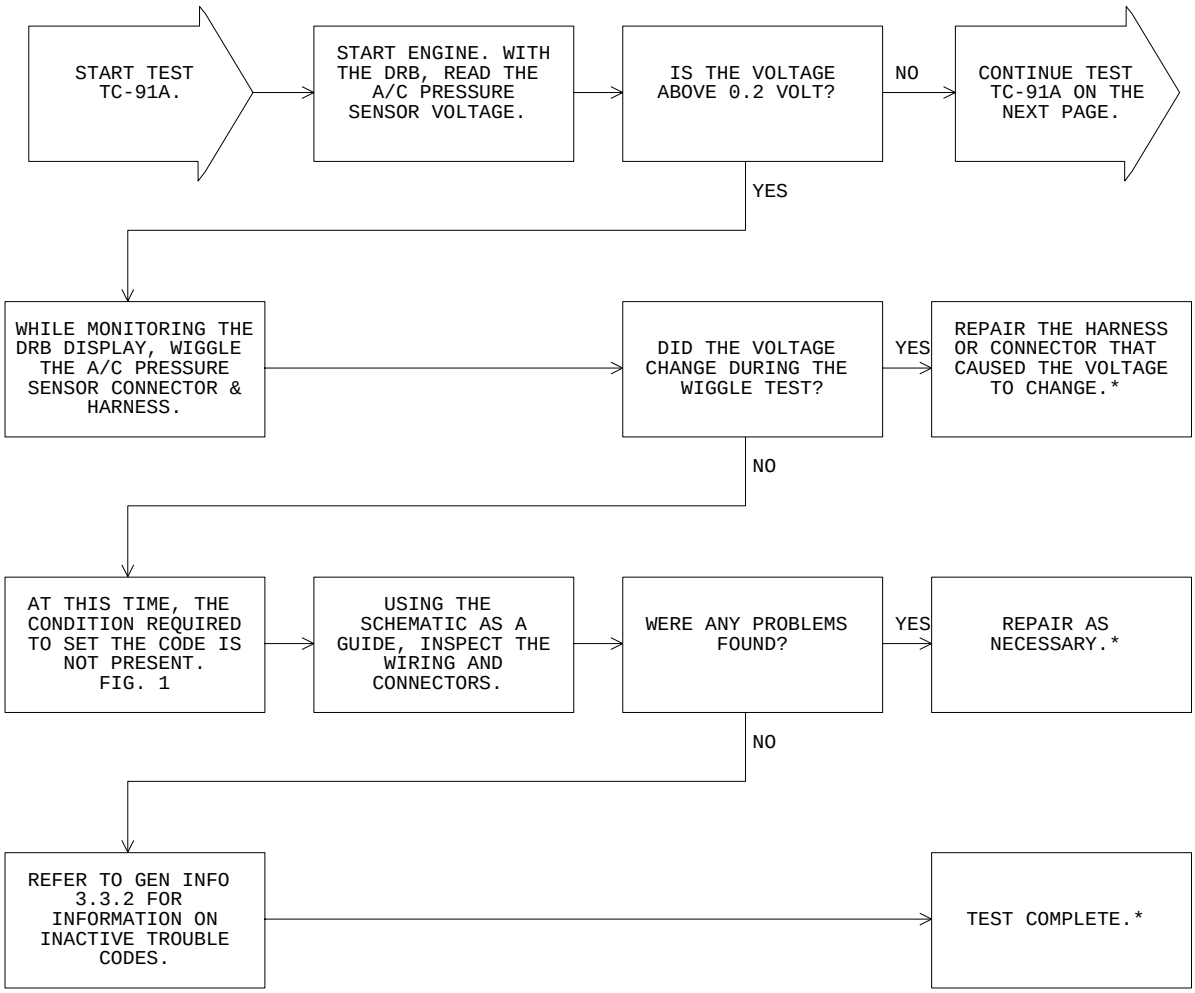
> Sensor signal shorted to ground
> Sensor internally shorted
> PCM failure

2600506

FIG. 1

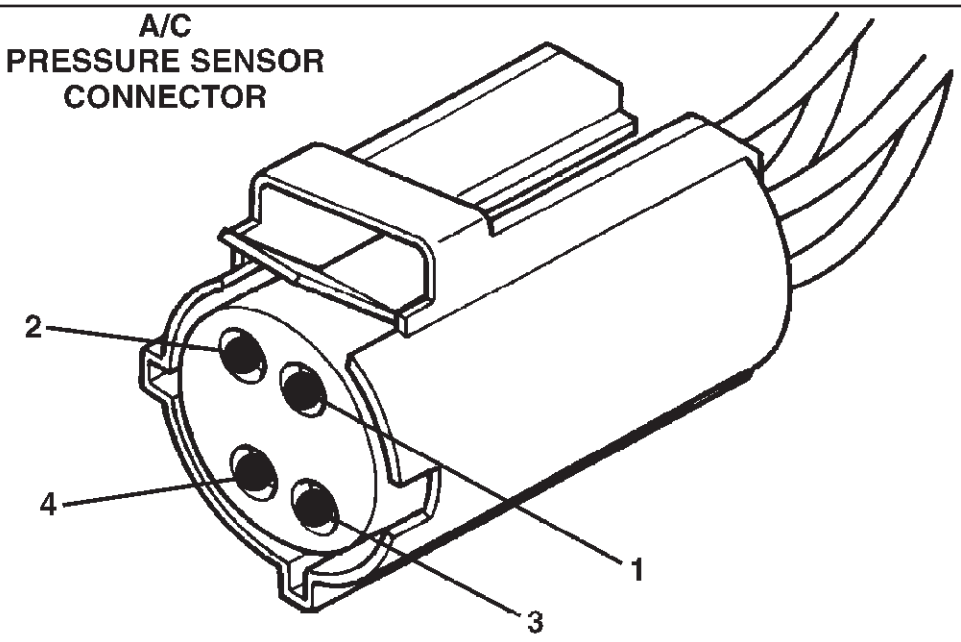
TEST TC-91A REPAIRING - A/C PRESSURE SENSOR VOLTS TOO LOW

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

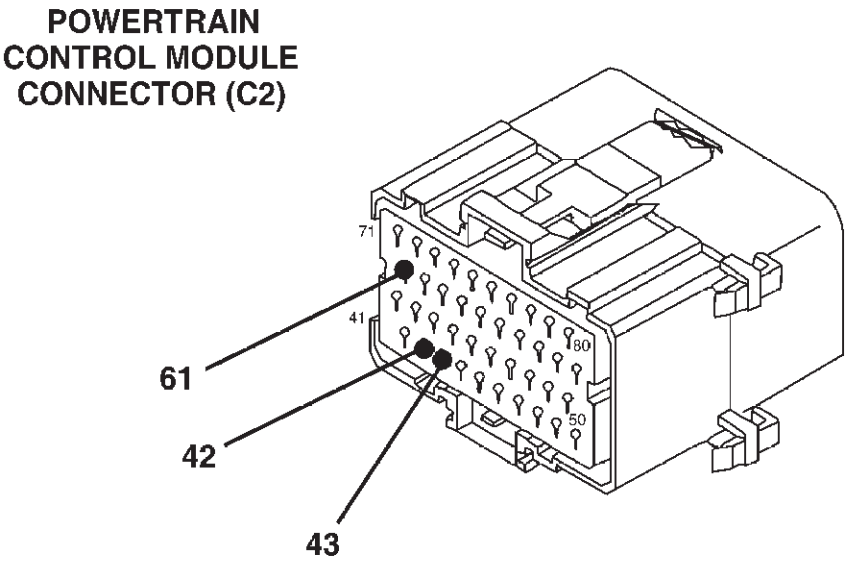
TEST TC-91A CONTINUED - REPAIRING - A/C PRESSURE SENSOR VOLTS TOO LOW



CAV	COLOR	FUNCTION
1	BK/LB	SENSOR GROUND
2	VT/WT	5-VOLT SUPPLY
3	DB	A/C PRESSURE SIGNAL

80b09845

FIG. 1

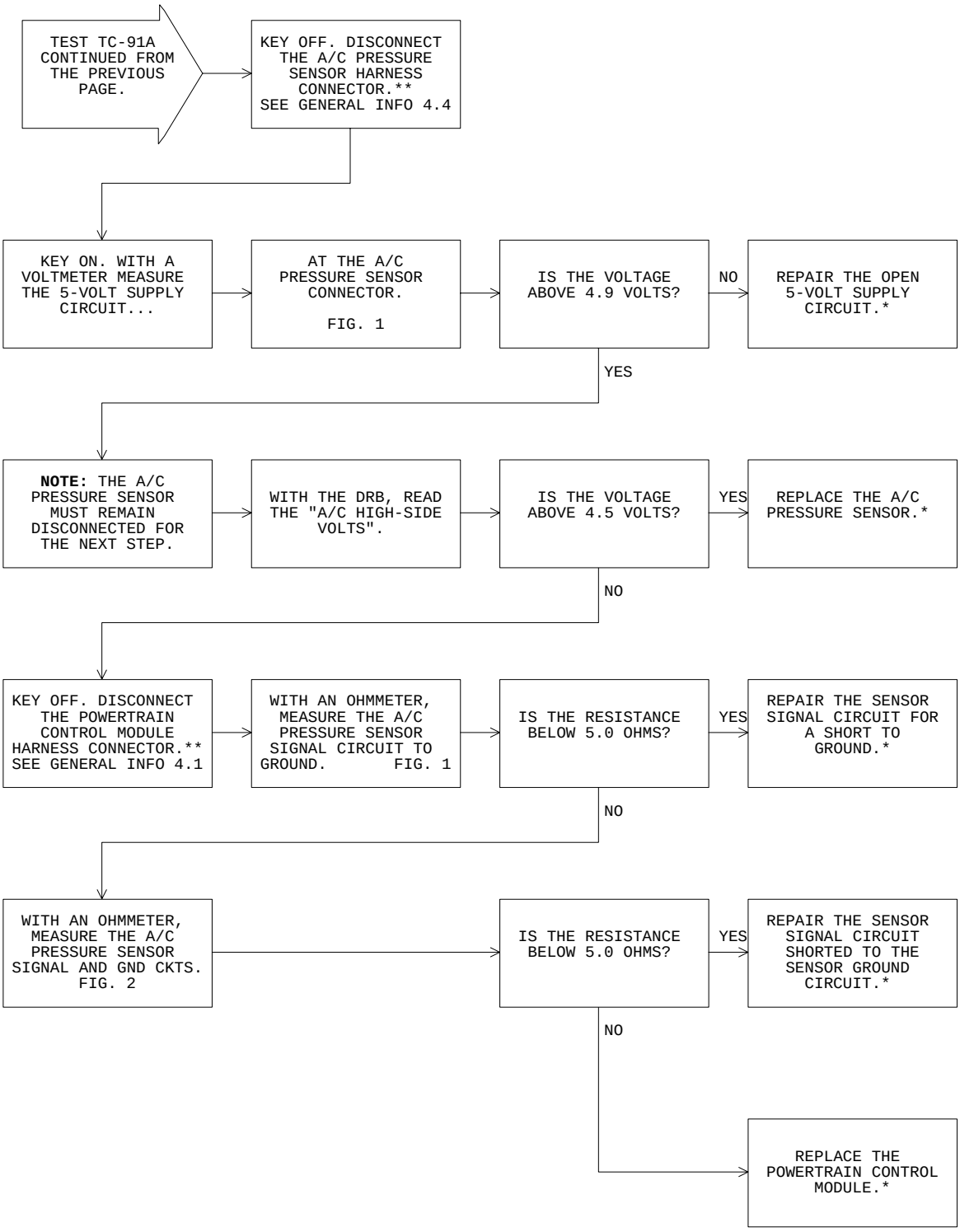


CAV	COLOR	FUNCTION
42	DB	A/C PRESSURE SWITCH SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

80b29f36

FIG. 2

TEST TC-91A CONTINUED - REPAIRING - A/C PRESSURE SENSOR VOLTS TOO LOW

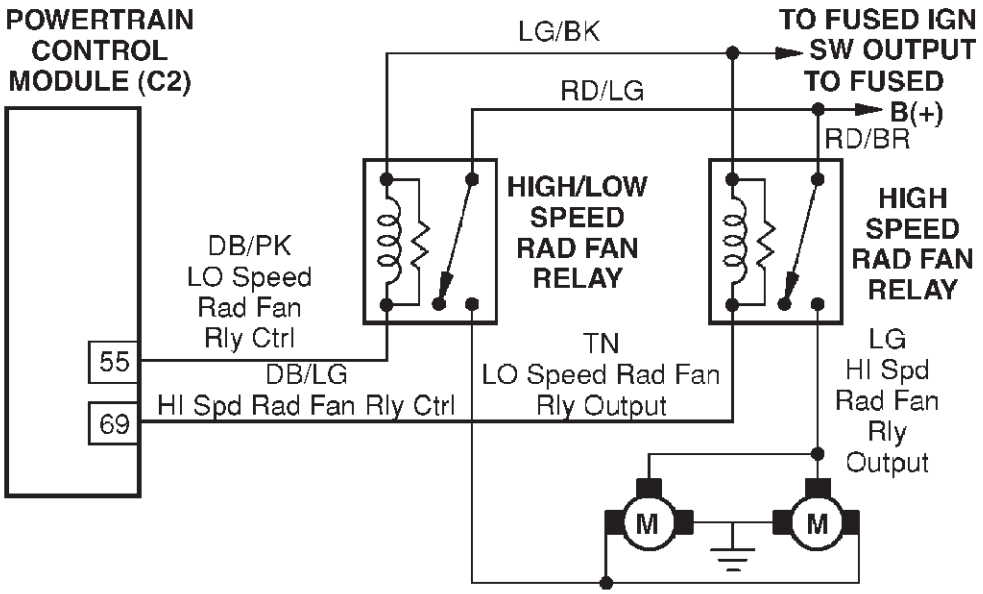


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-92A REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT

Perform TEST DTC Before Proceeding



80b57444

Name of code: Low Speed Fan Ctrl Relay Circuit

When monitored: With the ignition key on and battery voltage greater than 10 volts.

Set condition: An open or shorted condition is detected in the low speed radiator fan relay control circuit.

Theory of operation: The low speed radiator fan relay controls the low speed operation of the radiator fan. When the vehicle is equipped with a power distribution center (PDC), the low speed radiator fan relay is inside the PDC. One side of the relay control coil is supplied with 12 volts when the ignition switch is in the "run" position. The circuit is completed when the other side of the relay coil is grounded by the powertrain control module (PCM). The PCM will actuate the relay whenever the A/C clutch is engaged regardless of coolant temperature and vehicle speed. If the A/C clutch is not engaged, the PCM will actuate the relay when the coolant temperature reaches approximately 207° F and turn off the relay when the coolant temperature drops to approximately 201° F. The relay is also turned off when the vehicle speed is above 62 MPH and A/C clutch is disengaged.

Possible causes:

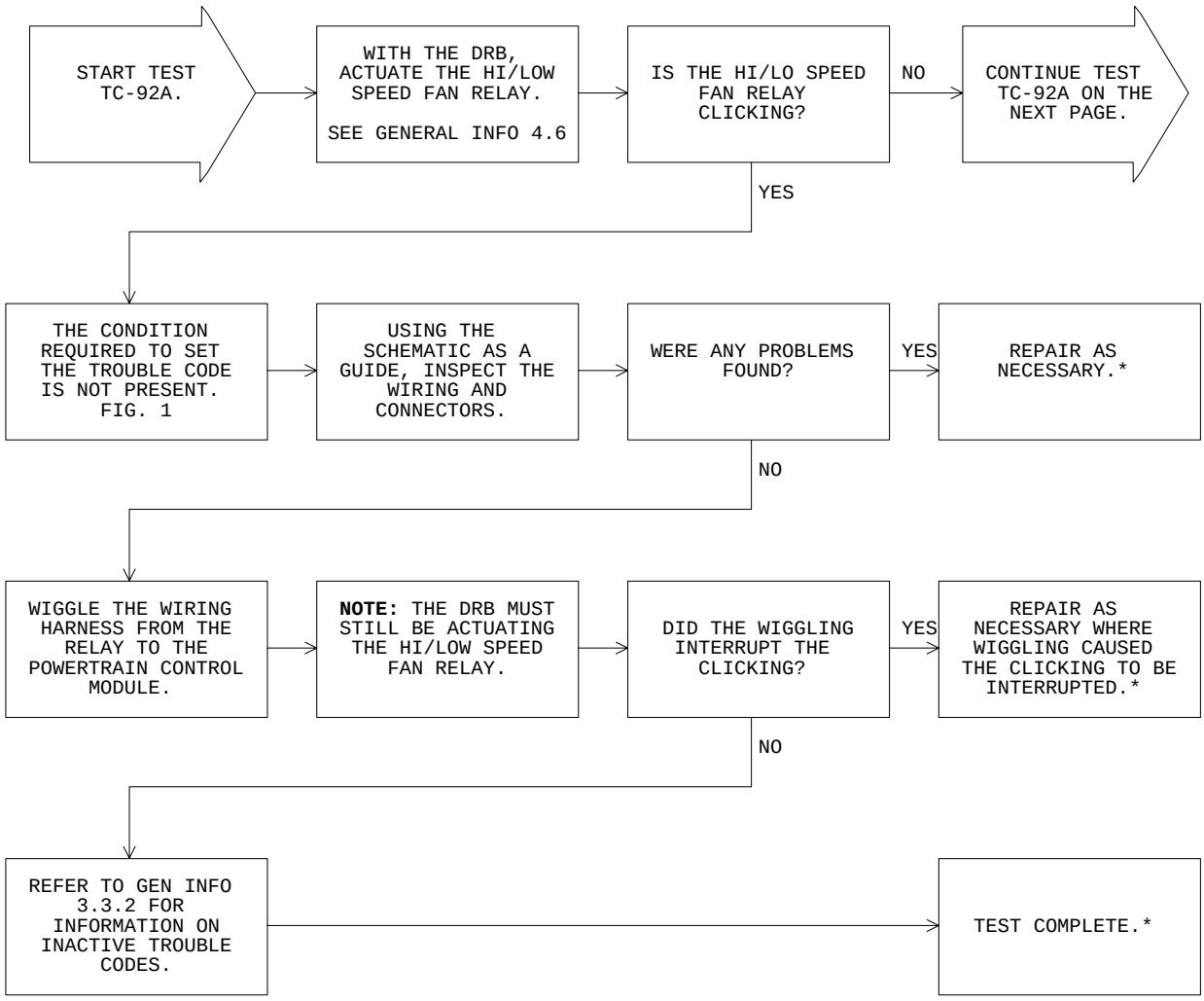
> Relay coil open or shorted
> Fused ignition switch output circuit open
> Low speed radiator fan relay control circuit open or shorted
> Inoperative circuit driver in powertrain control module

80a28c0f

FIG. 1

TEST TC-92A REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT

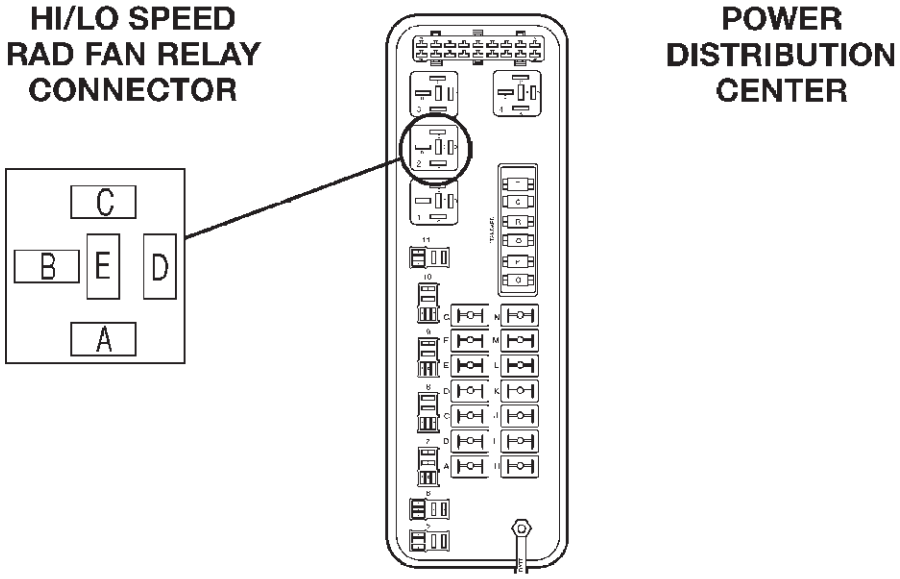
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

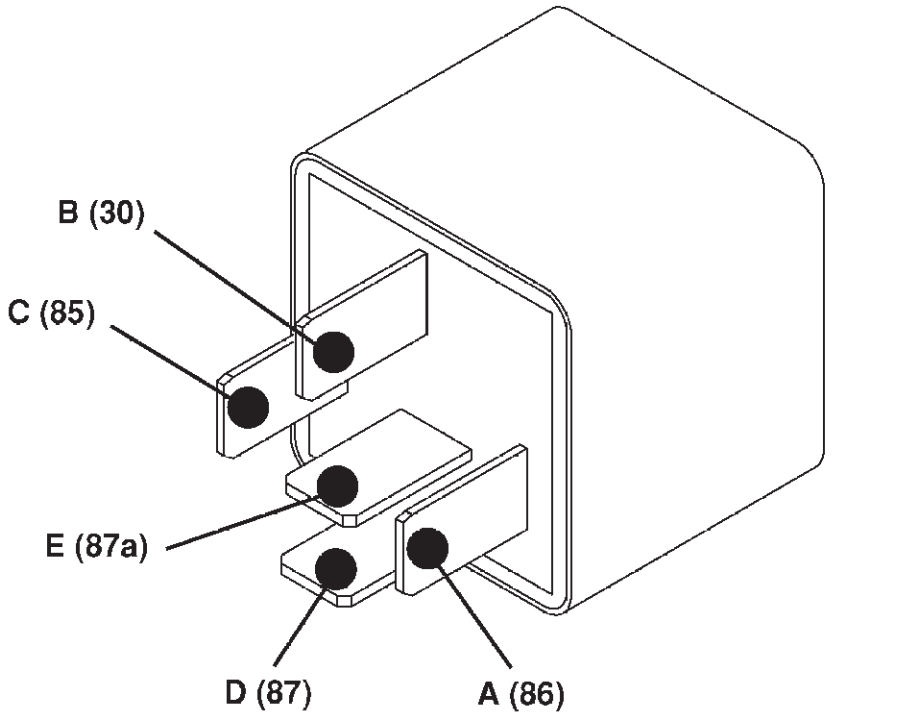
TEST TC-92A CONTINUED - REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT



CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/PK	LO SPEED RAD FAN RELAY CONTROL
D (87)	TN	LO SPEED RAD FAN RELAY OUTPUT

80b46bf8

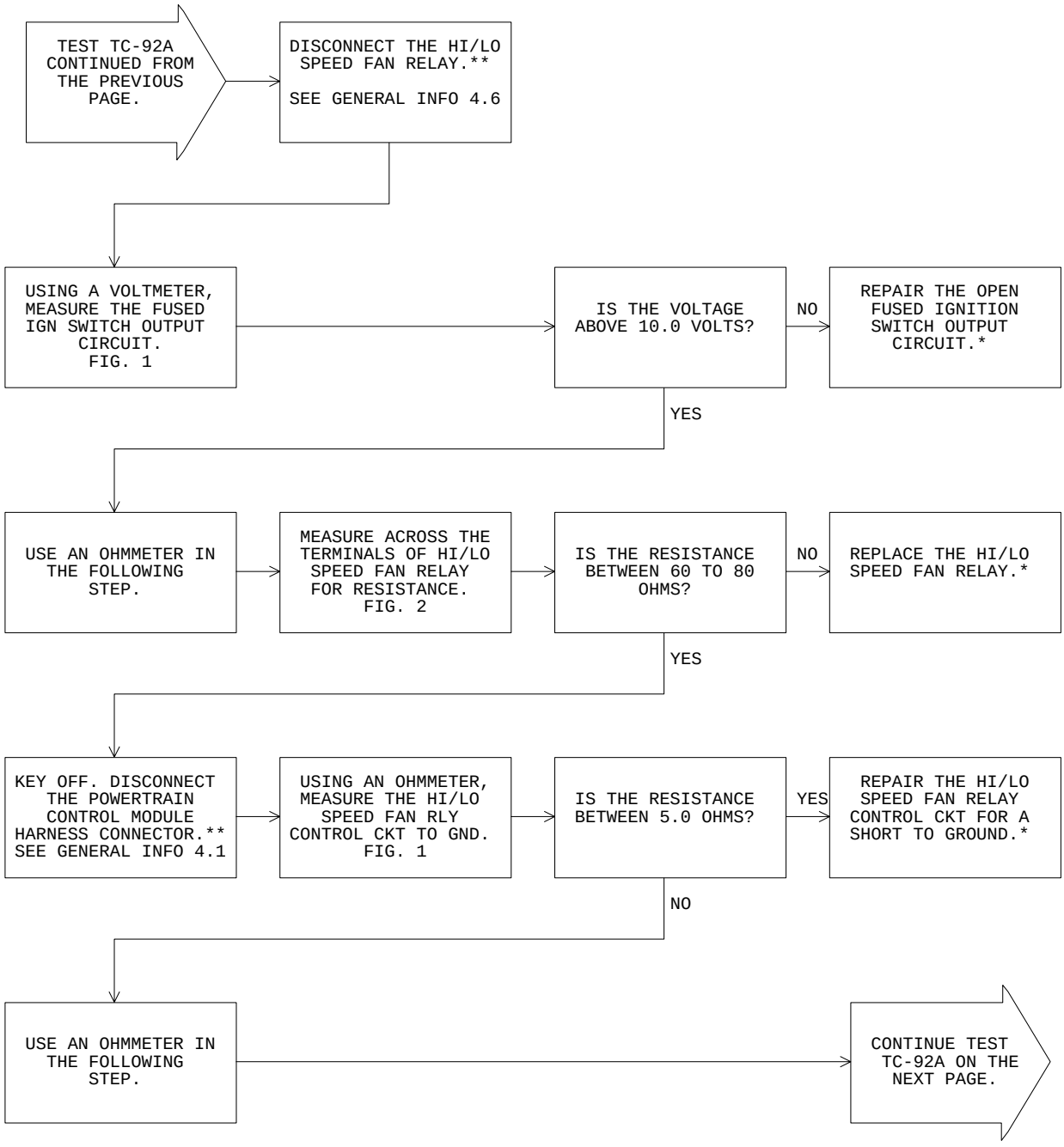
FIG. 1



80b4fa4e

FIG. 2

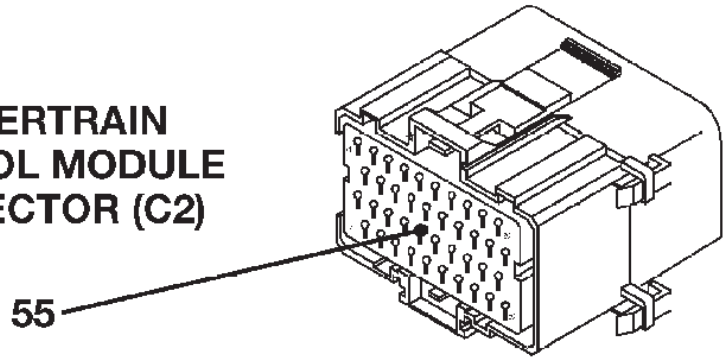
TEST TC-92A CONTINUED - REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT



Perform Verification TEST VER-2A.

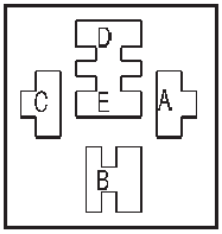
****Check connectors - Clean / repair as necessary.***

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
55	DB/PK	LOW SPEED FAN RELAY CONTROL

LOW SPEED FAN RELAY (IN PDC)

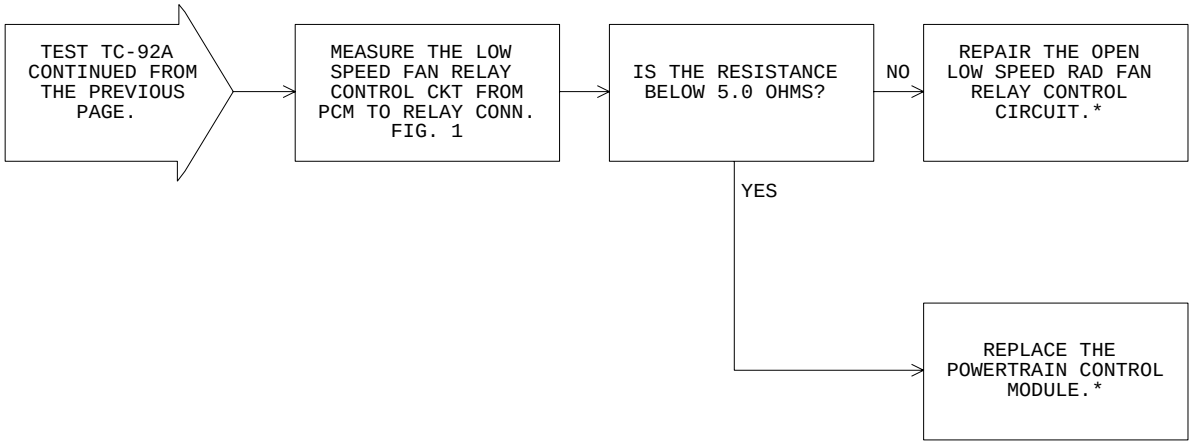


CAV	COLOR	FUNCTION
A	LG/BK	FUSED IGNITION SW OUTPUT
B	RD/LG	FUSED B(+)
C	DB/PK	LOW SPEED FAN RELAY CONTROL
D	TN	LOW SPEED FAN RELAY OUTPUT

80b09864

FIG. 1

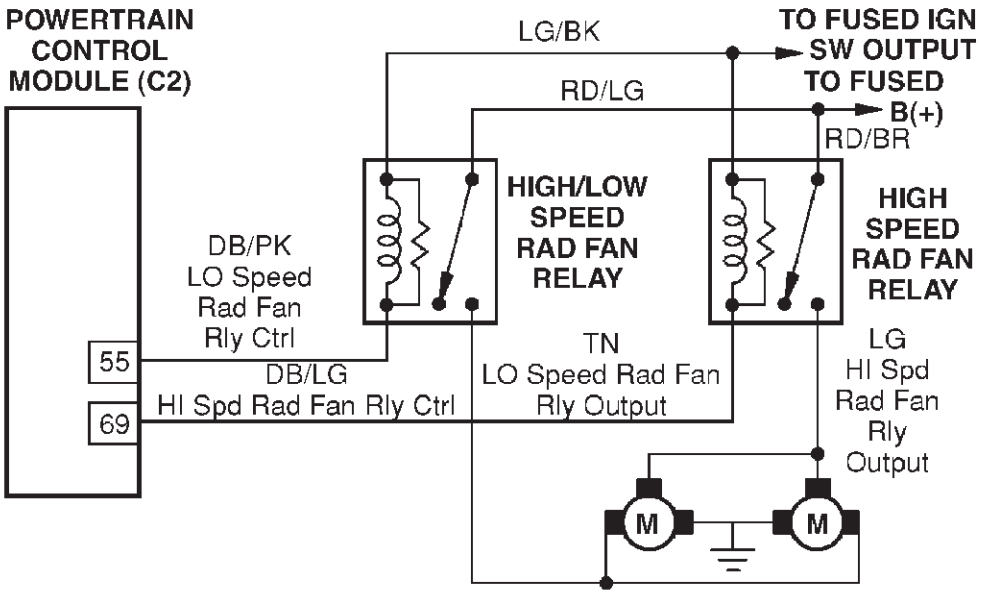
TEST TC-92A CONTINUED - REPAIRING - LOW SPEED FAN CTRL RELAY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-93A REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: High Speed Fan Control Relay Circuit

When monitored: With the ignition key in the run position and battery voltage above 10 volts.

Set condition: An open or shorted condition is detected in the high speed fan relay control circuit.

Theory of operation: The high speed fan relay controls the high speed operation of the radiator fans. The relay is located in the power distribution center. One side of the relay control coil is supplied with 12 volts when the ignition switch is turned to the run position. The circuit is completed when the other side of the relay coil is grounded by the powertrain control module (PCM). The PCM grounds the relay control circuit when the engine coolant temperature is too high and removes the ground when the temperature is acceptable.

Possible causes:

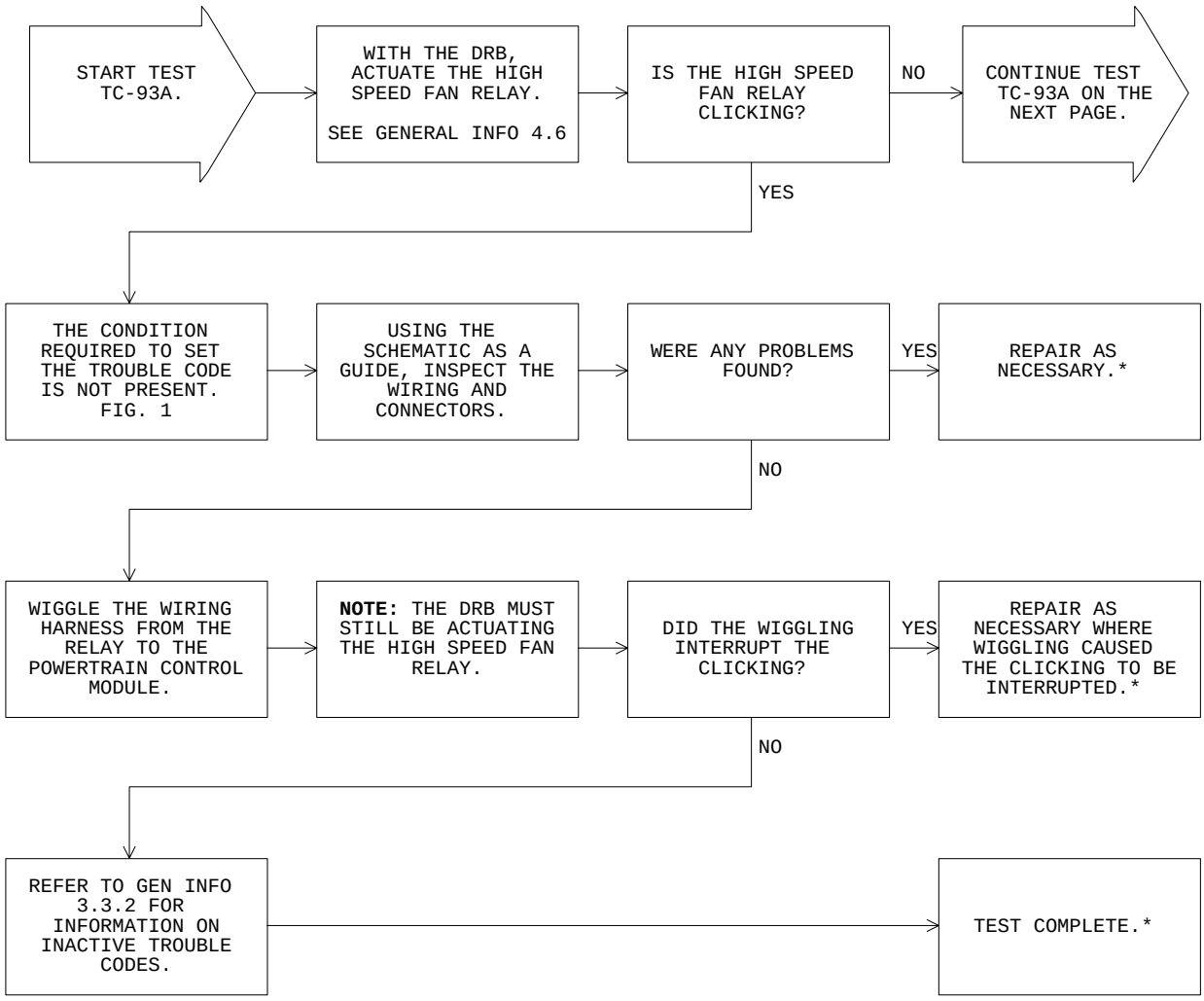
> Relay coil open or shorted
> Fused ignition switch output circuit open
> High speed fan relay control circuit is open or shorted
> Inoperative circuit driver in powertrain control module

2660506

FIG. 1

TEST TC-93A REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT

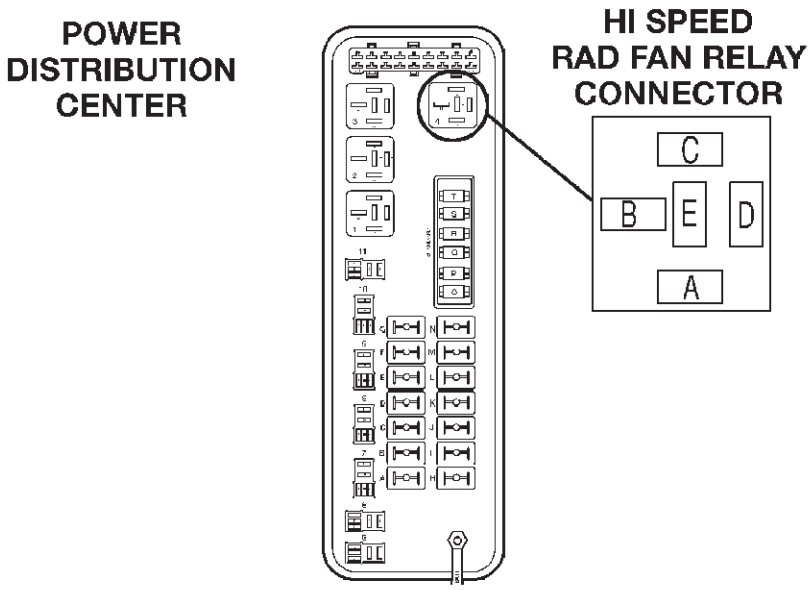
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

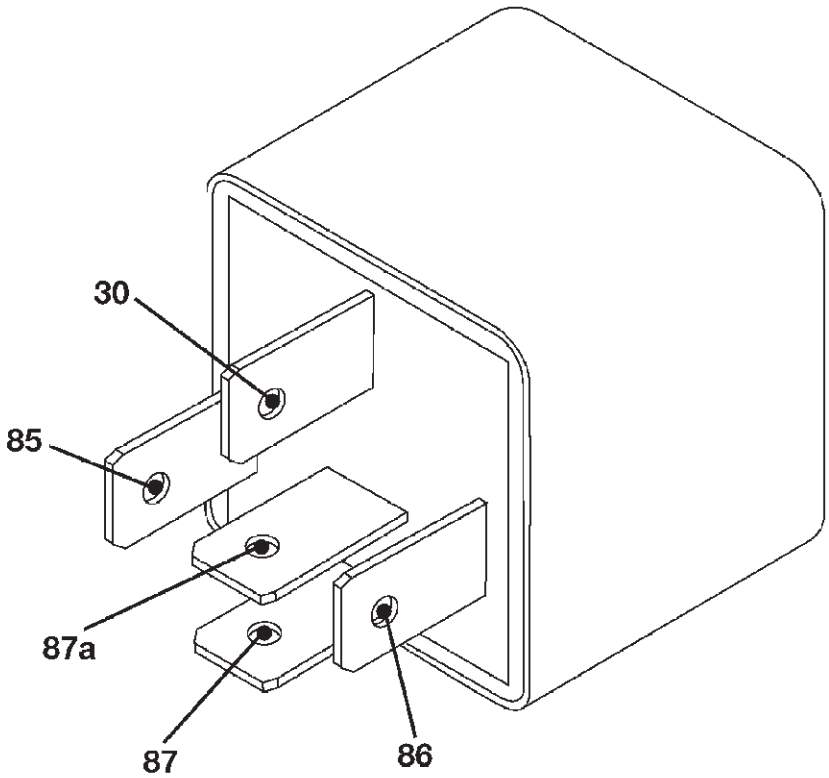
TEST TC-93A CONTINUED - REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT



CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/BR	FUSED B(+)
C (85)	DB/LG	HI SPEED RAD FAN RELAY CONTROL
D (87)	LG	HI SPEED RAD FAN RELAY OUTPUT

80b4fb2f

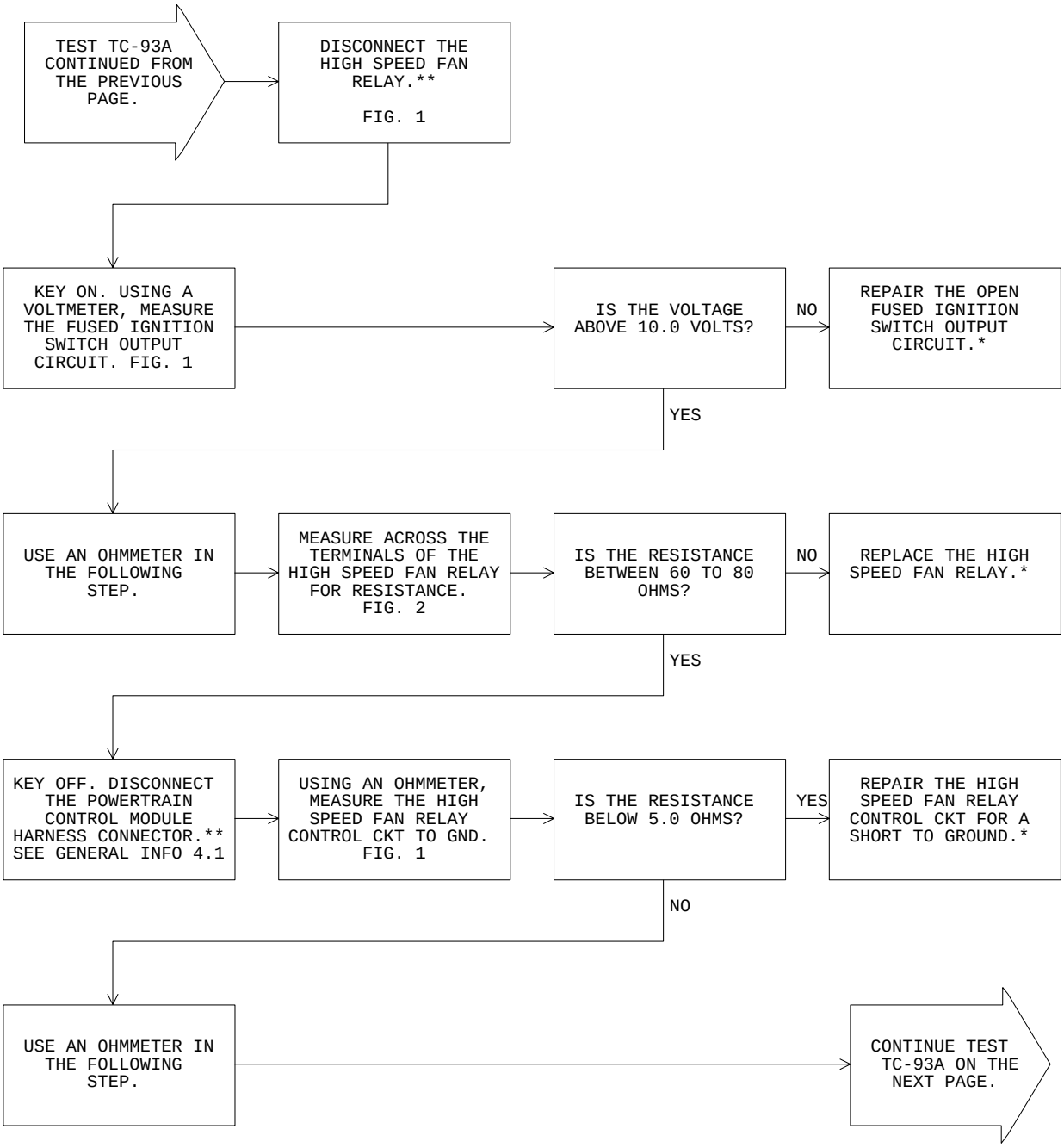
FIG. 1



80aac26a

FIG. 2

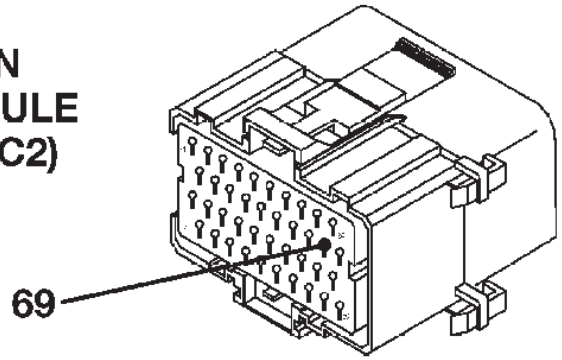
TEST TC-93A CONTINUED - REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT



Perform Verification TEST VER-2A.

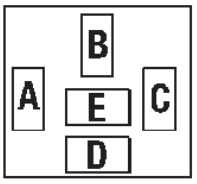
****Check connectors - Clean / repair as necessary.***

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
69	DB/LG	HIGH SPEED FAN RELAY CONTROL

HIGH SPEED FAN RELAY (IN PDC)

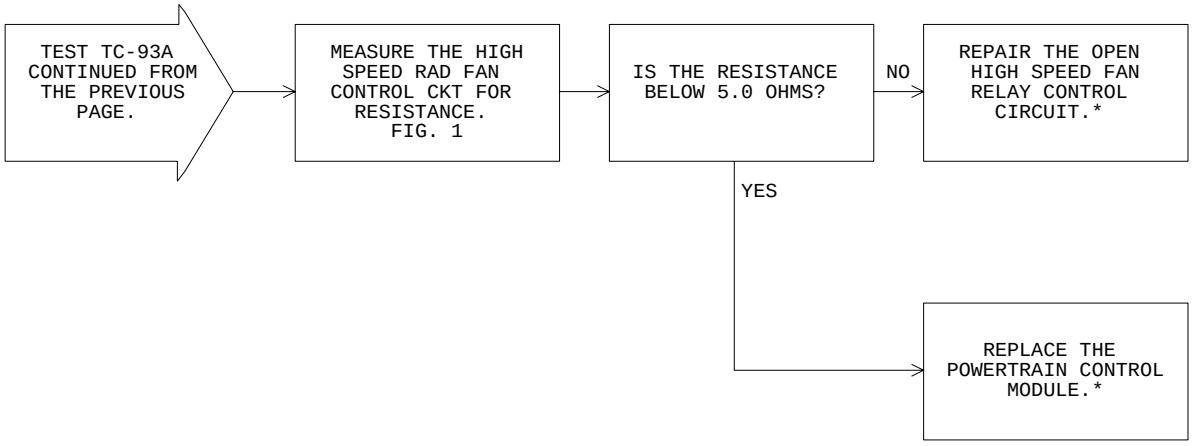


CAV	COLOR	FUNCTION
A	LG/BK	FUSED IGNITION SWITCH OUTPUT
B	RD/BR	FUSED B(+)
C	DB/LG	HIGH SPEED FAN RELAY CONTROL
D	LG	HIGH SPEED FAN RELAY OUTPUT

80b09865

FIG. 1

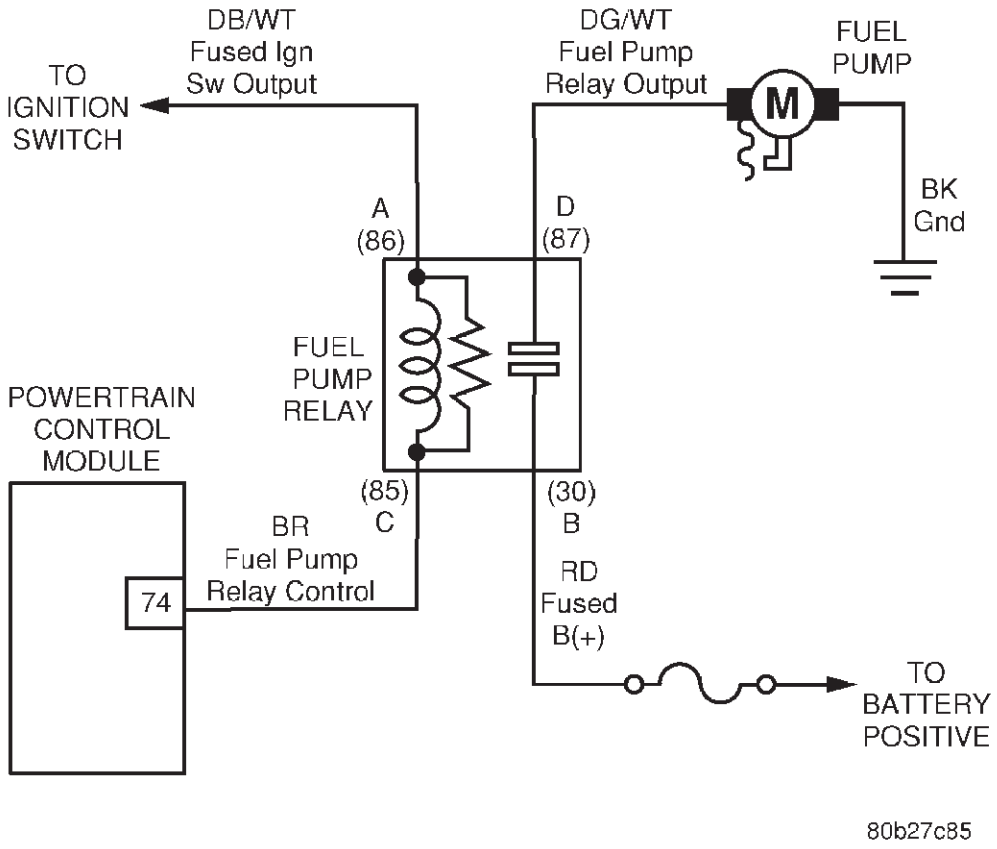
TEST TC-93A CONTINUED - REPAIRING - HIGH SPEED FAN CTRL RELAY CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-101A REPAIRING - FUEL PUMP RELAY CONTROL CIRCUIT

Perform TEST DTC Before Proceeding



Name of code: Fuel Pump Relay Control Circuit

When monitored: With the ignition key on and battery voltage greater than 10 volts.

Set condition: An open or shorted condition is detected in the fuel pump relay control circuit.

Theory of operation: The fuel pump relay controls the 12-volt source to the fuel pump. If the vehicle is equipped with a power distribution center, the relay is located in the PDC. One side of the relay control coil is supplied with 12 volts when the ignition switch is turned to the "run" position. The circuit is completed when the other side of the relay coil is grounded by the powertrain control module. The PCM grounds the relay when the ignition switch is in either the run or crank position and engine RPM is detected. If engine RPM is not detected, the PCM will remove the fuel pump relay control circuit ground.

Possible causes:

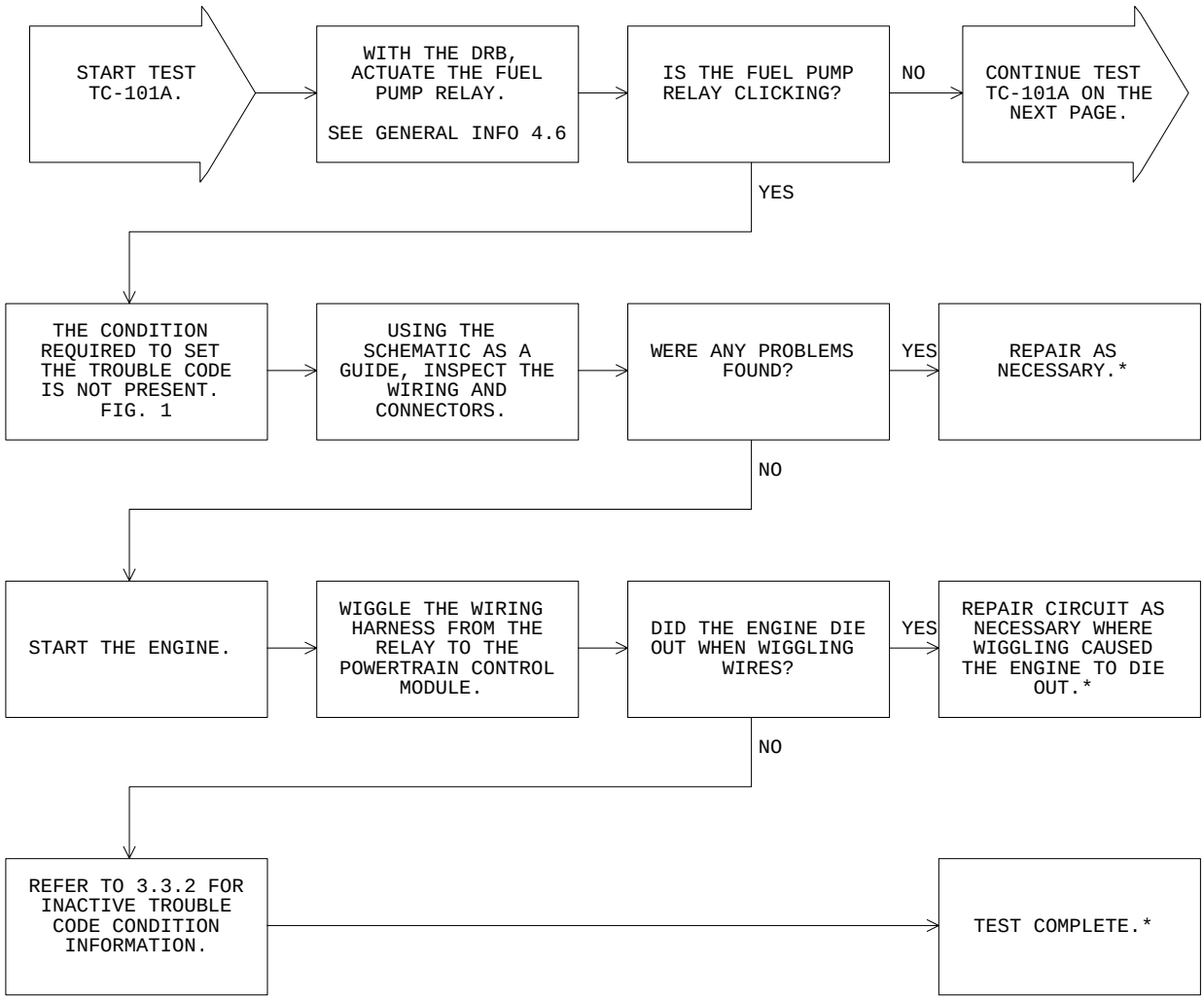
> Relay coil open or shorted
> Fused ignition switch output circuit open
> Fuel pump relay control circuit is open or shorted
> Inoperative circuit driver in powertrain control module
> Connector terminals
> Connector wires

2450505

FIG. 1

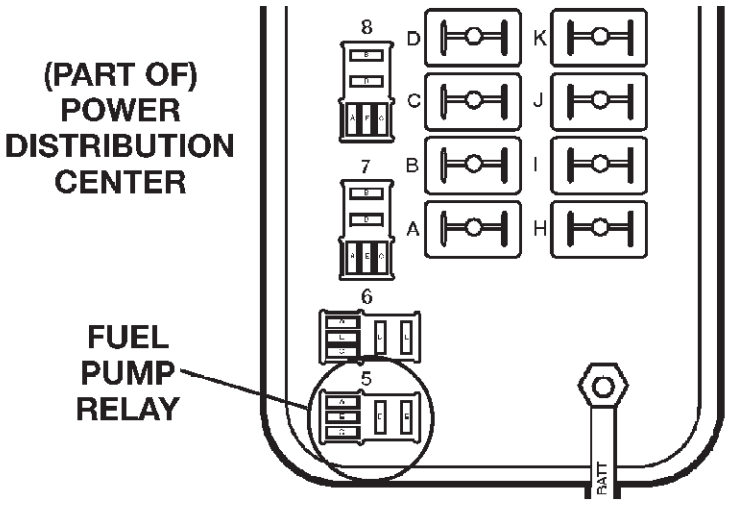
TEST TC-101A REPAIRING - FUEL PUMP RELAY CONTROL CIRCUIT

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

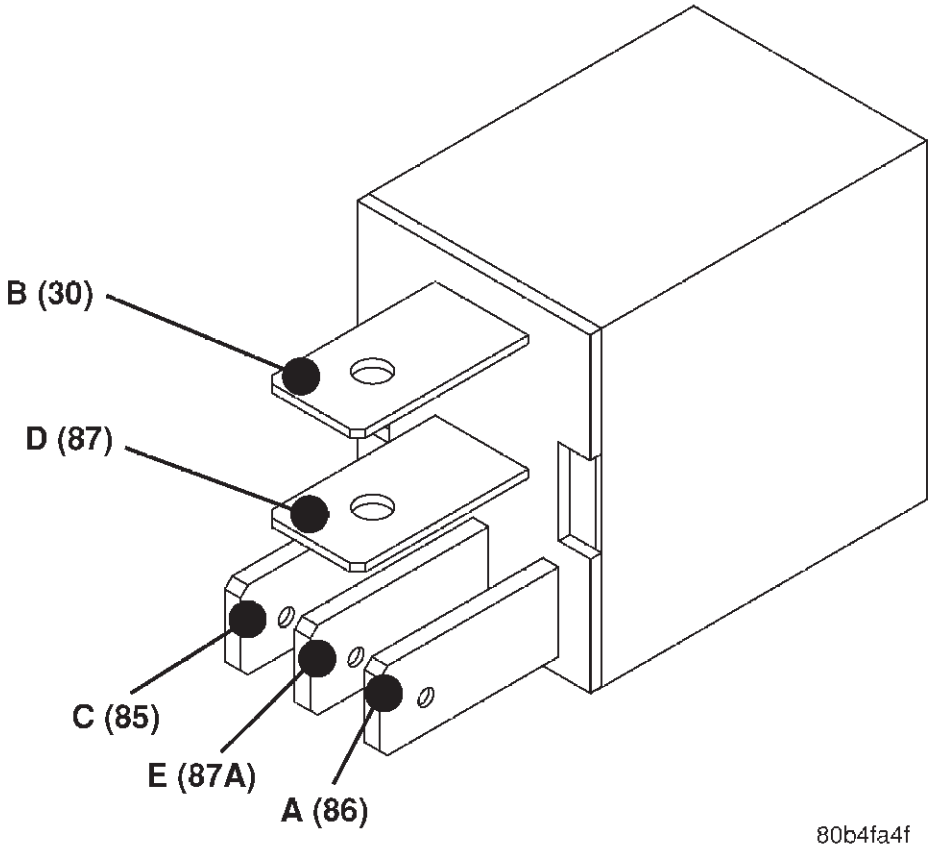
Check connectors - Clean / repair as necessary.



CAV	COLOR	FUNCTION
A(86)	DB/WT	FUSED IGNITION SWITCH OUTPUT
B(30)	RD	FUSED B(+)
C(85)	BR	FUEL PUMP RELAY CONTROL
D(87)	DG/WT	FUEL PUMP RELAY OUTPUT

80b4fb4e

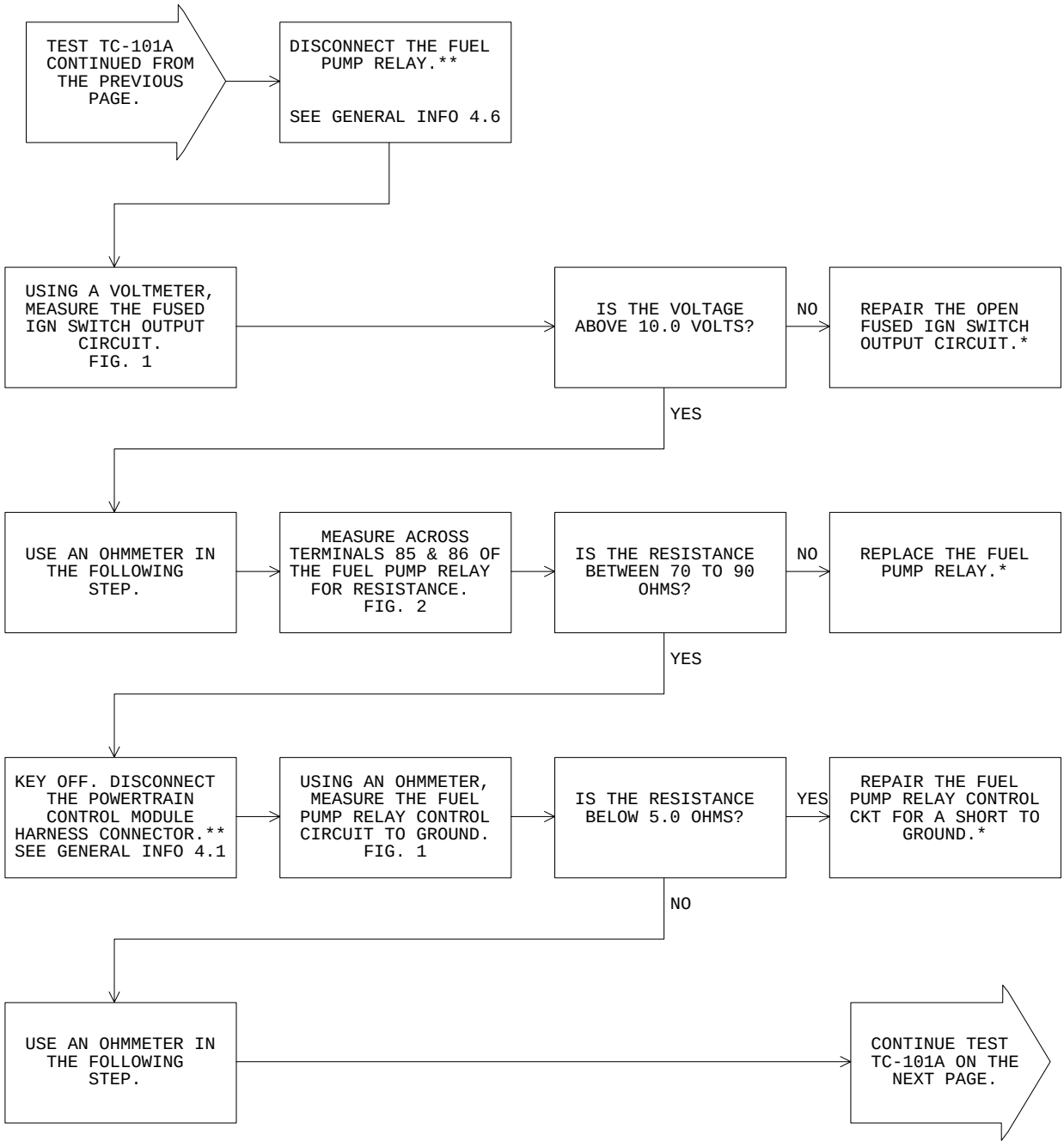
FIG. 1



80b4fa4f

FIG. 2

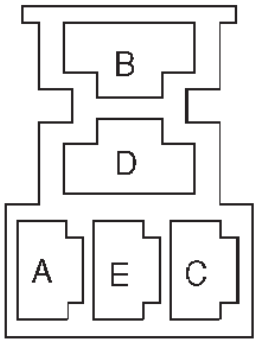
TEST TC-101A CONTINUED - REPAIRING - FUEL PUMP RELAY CONTROL CIRCUIT



Perform Verification TEST VER-2A.

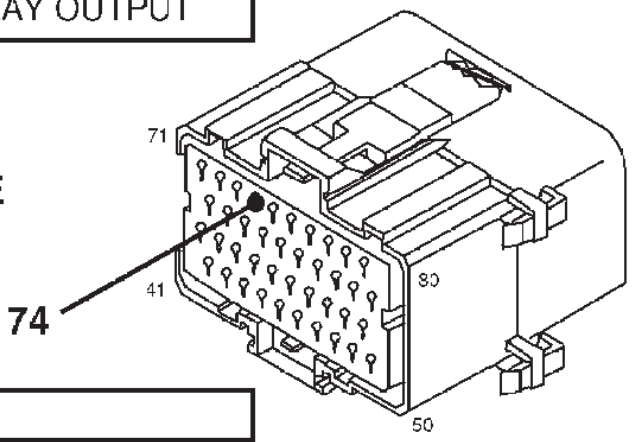
****Check connectors - Clean / repair as necessary.***

FUEL PUMP MOTOR RELAY CONNECTOR (IN PDC)



CAV	COLOR	FUNCTION
A(86)	DB/WT	FUSED IGN SW OUTPUT
B(30)	RD	FUSED B(+)
C(85)	BR	FUEL PUMP RELAY CONTROL
D(87)	DG/WT	FUEL PUMP RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTOR (C2)

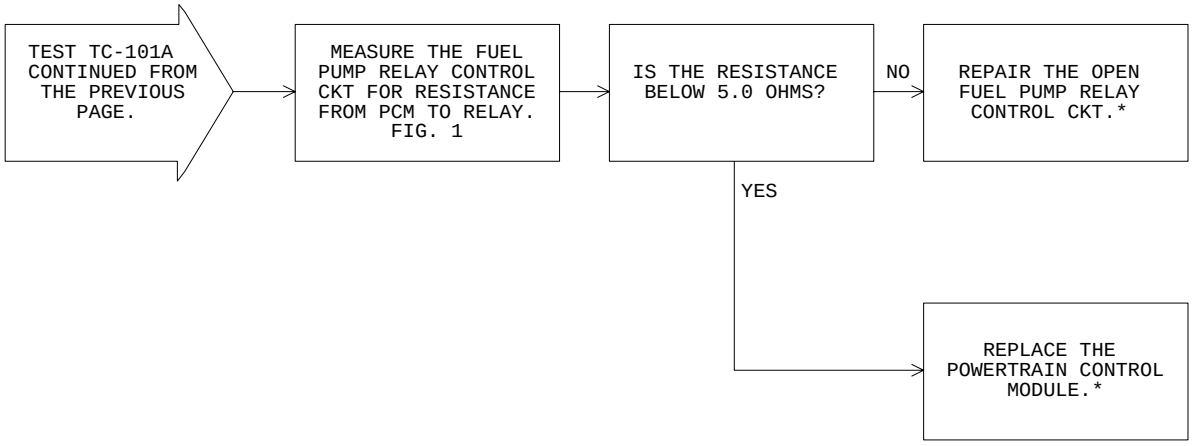


CAV	COLOR	FUNCTION
74	BR	FUEL PUMP RELAY CONTROL

80b27c86

FIG. 1

TEST TC-101A CONTINUED - REPAIRING - FUEL PUMP RELAY CONTROL CIRCUIT



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-103A REPAIRING - 1/1 O2S HEATER FAILURE

Perform TEST DTC Before Proceeding

1/1 RIGHT BANK UP

Name of code: O2 Sensor Heater Failure

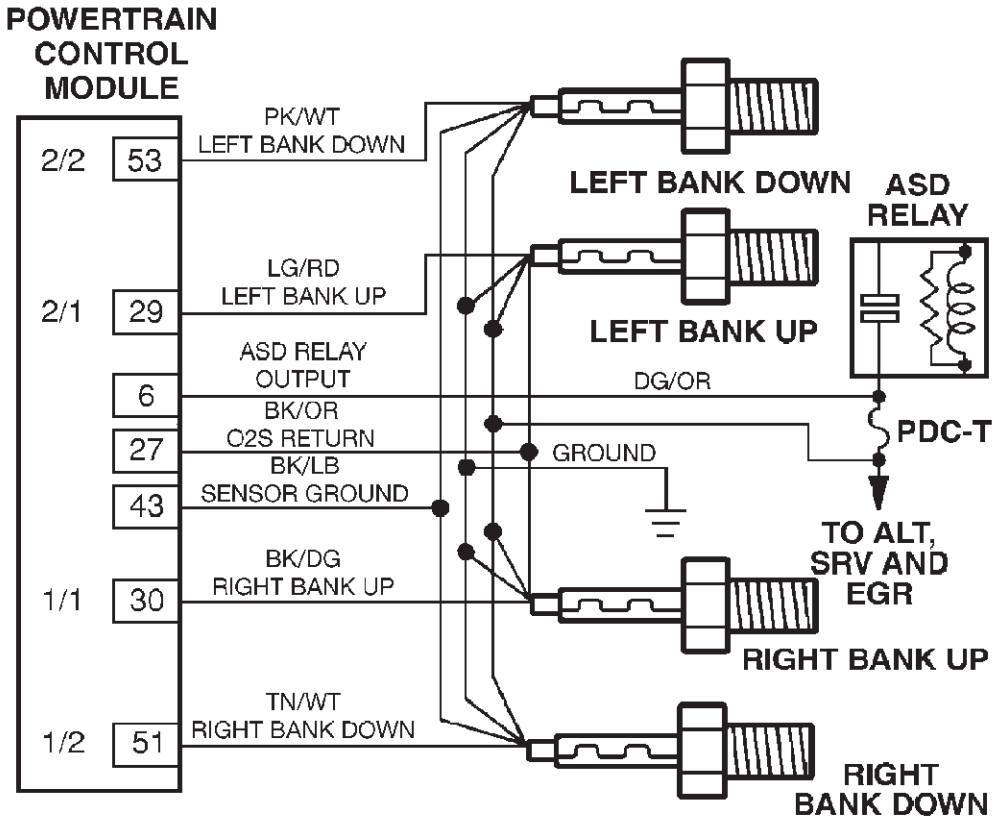
When monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut-down with the ignition key turned "OFF".

Set condition: Using O2 sensor signal voltage readings, during 02 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases. This O2 sensor serves as an indicator of oxygen content. The heater element helps the O2 sensor quickly reach a normal and steady operating temperature, which is required for proper emission control.

Possible causes:
> Open heater element circuit
> O2 sensor failure
> O2 heater wiring
> Powertrain control module failure
> Connector terminals
> Connector wires
> ASD Fuse(s)
> Open ASD Relay Circuit

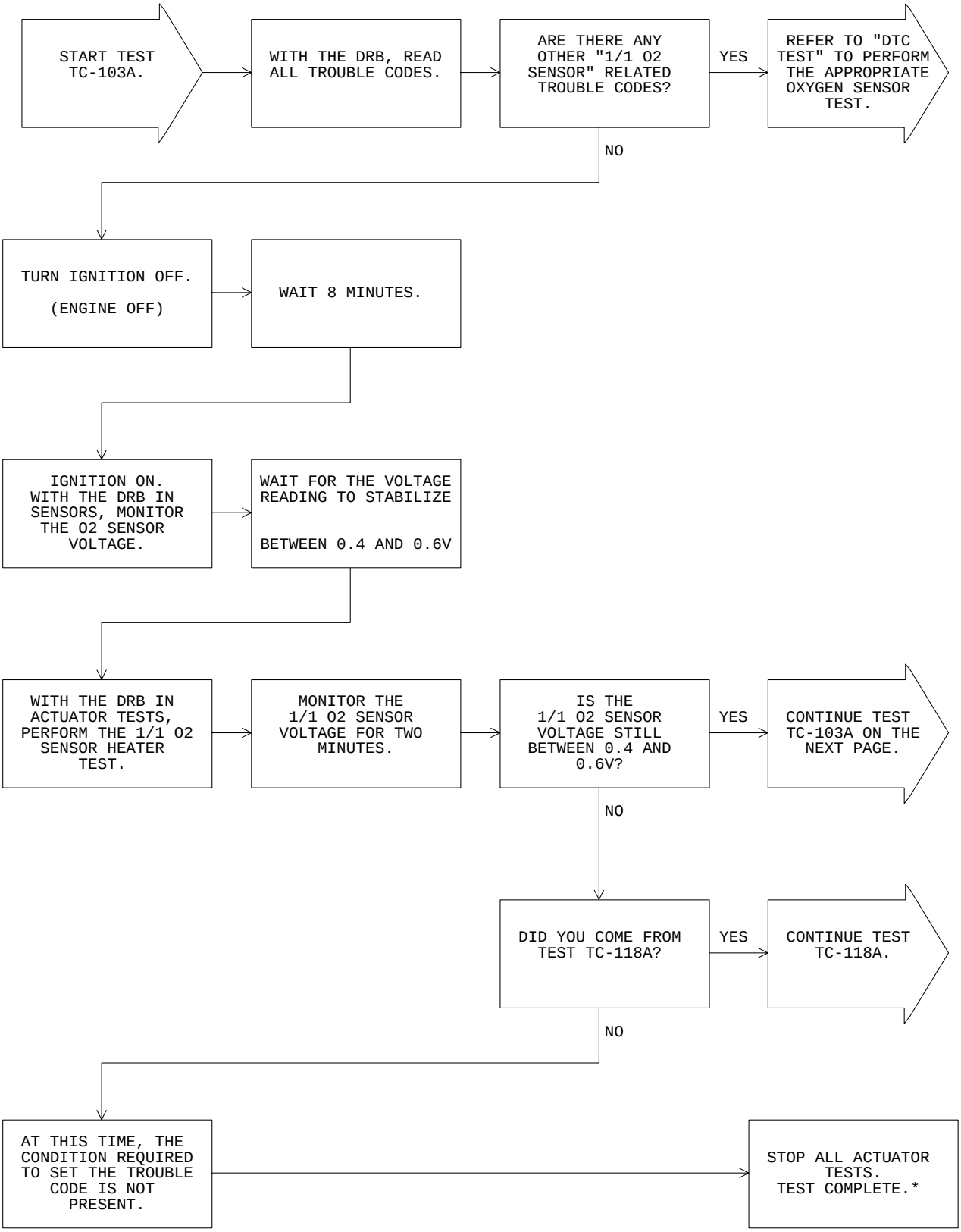
80b3afd6



80b6f001

TEST TC-103A REPAIRING - 1/1 O2S HEATER FAILURE

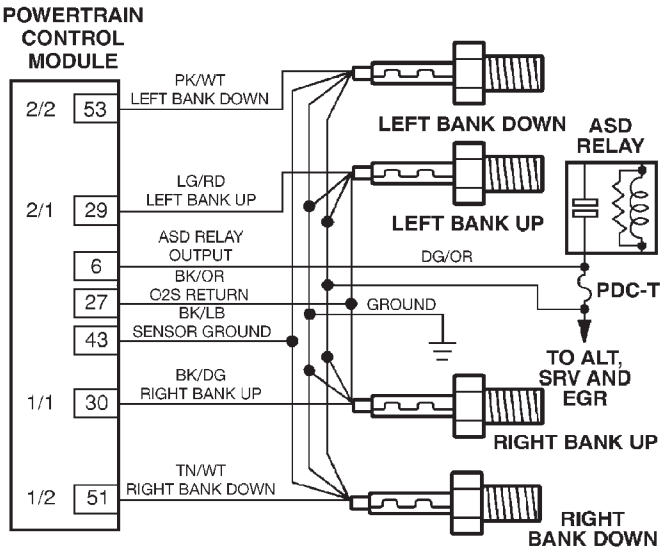
Perform TEST DTC Before Proceeding



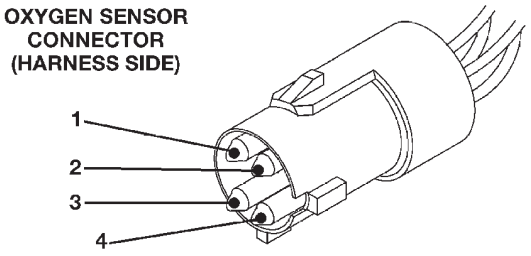
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-103A CONTINUED - REPAIRING - 1/1 O2S HEATER FAILURE



1/1 RIGHT BANK UP

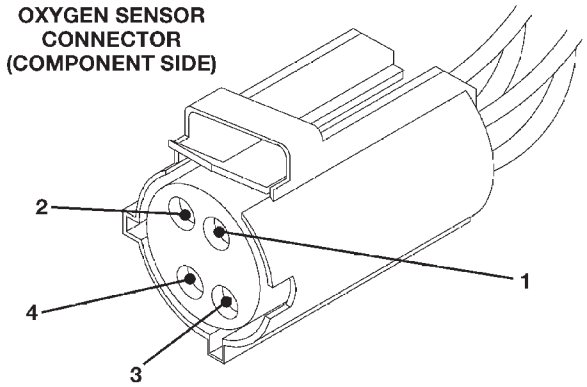


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

1/1 RIGHT BANK UP

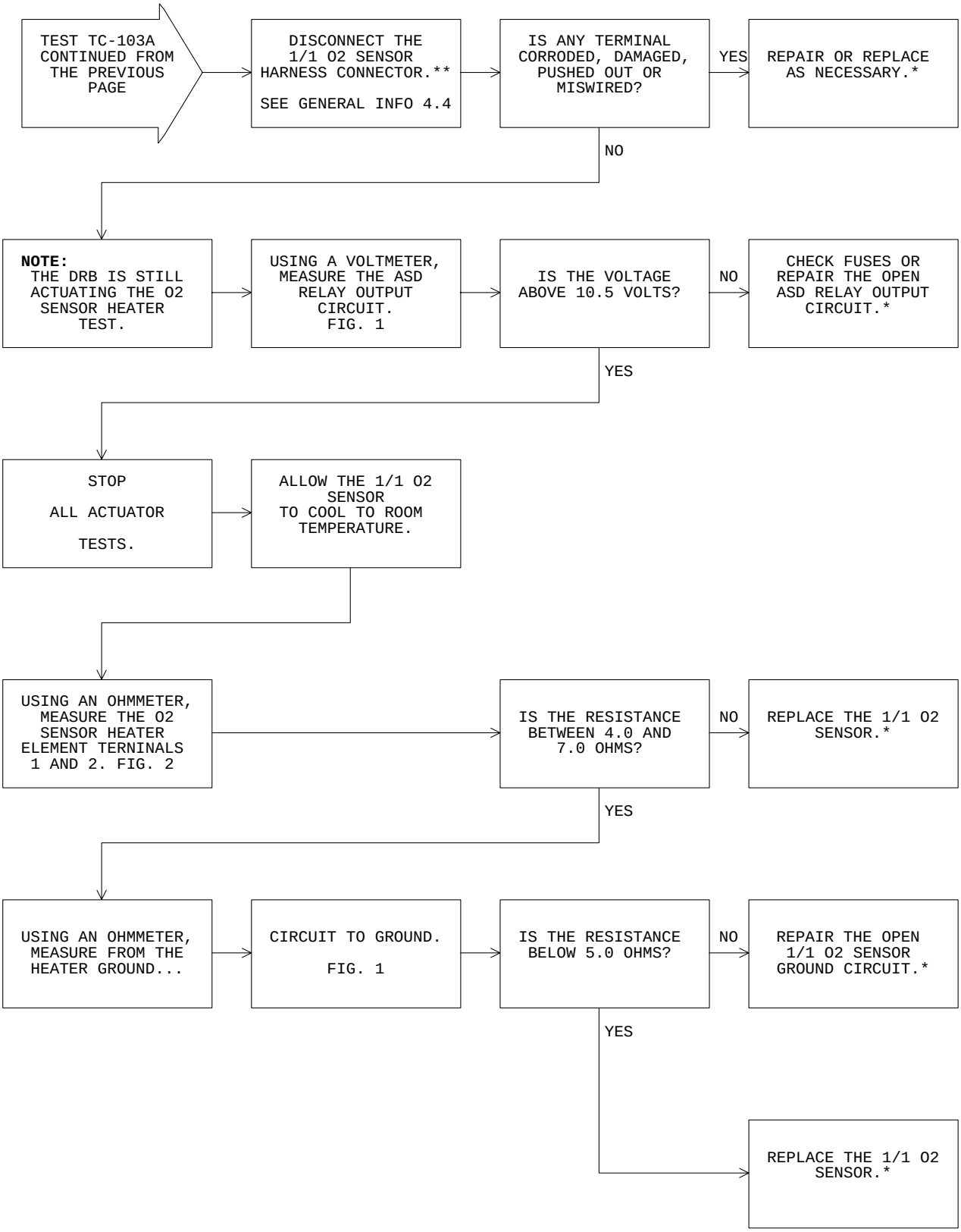


CAV	COLOR	FUNCTION
1	WT	GROUND (HEATER)
2	WT	ASD RELAY OUTPUT
3	GY	SENSOR GROUND
4	BK	OXYGEN SENSOR SIGNAL

80b27c81

FIG. 2

TEST TC-103A CONTINUED - REPAIRING - 1/1 O2S HEATER FAILURE



Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-105A REPAIRING - 1/2 O2S HEATER FAILURE

Perform TEST DTC Before Proceeding

1/2 RIGHT BANK DOWN

Name of code: O2 Sensor Heater Failure

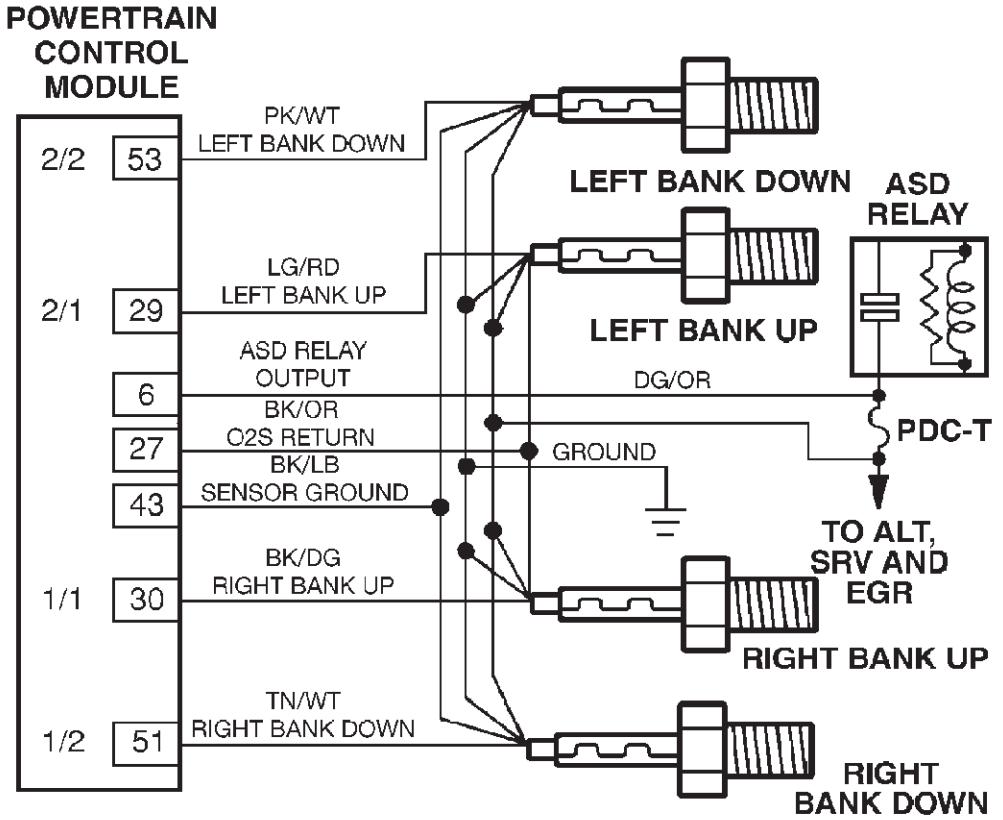
When monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut-down with the ignition key turned "OFF".

Set condition: Using O2 sensor signal voltage readings, during 02 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases. This O2 sensor serves as an indicator of oxygen content. The heater element helps the O2 sensor quickly reach a normal and steady operating temperature, which is required for proper emission control.

Possible causes:
> Open heater element circuit
> O2 sensor failure
> O2 heater wiring
> Powertrain control module failure
> Connector terminals
> Connector wires
> ASD Fuse(s)
> Open ASD Relay Circuit

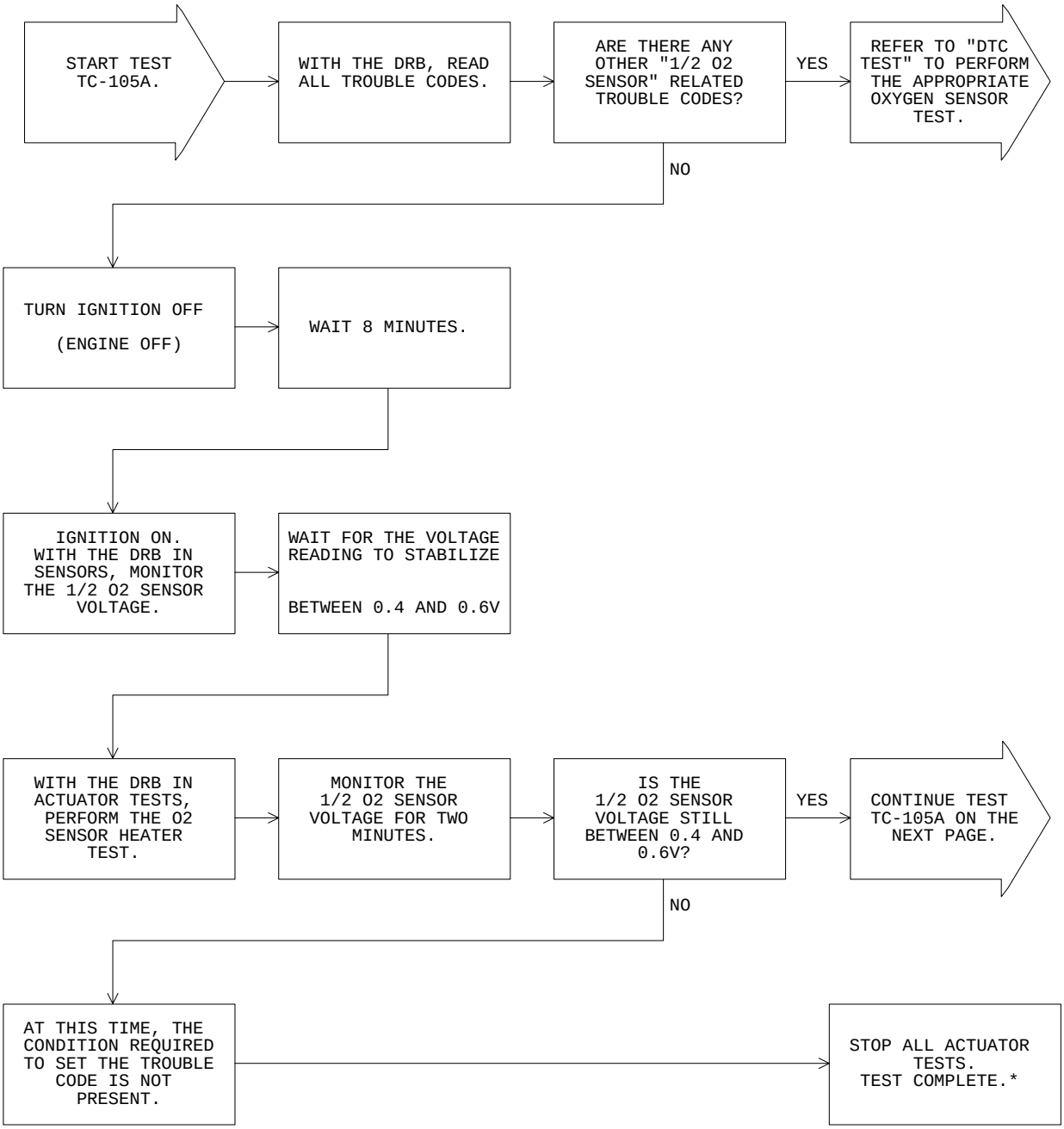
80b3afd6



80b6f001

TEST TC-105A REPAIRING - 1/2 O2S HEATER FAILURE

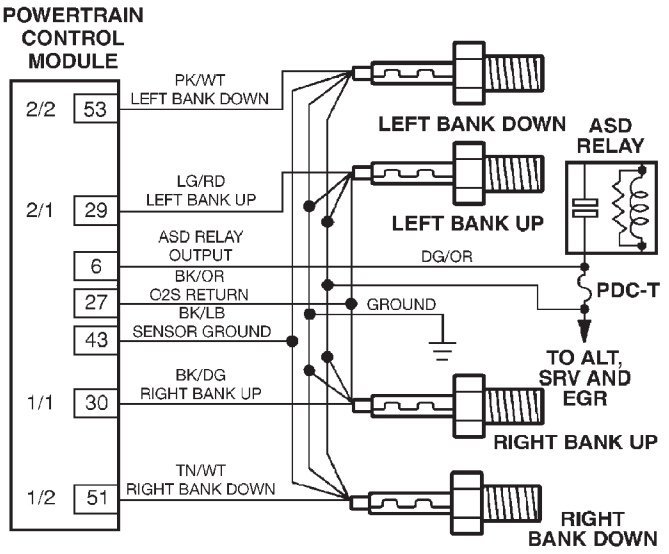
Perform TEST DTC Before Proceeding



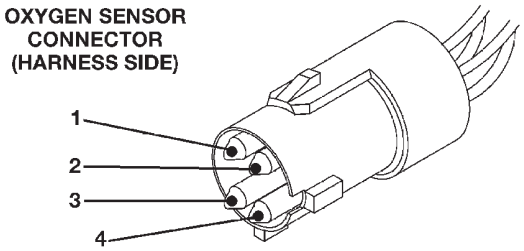
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-105A CONTINUED - REPAIRING - 1/2 O2S HEATER FAILURE



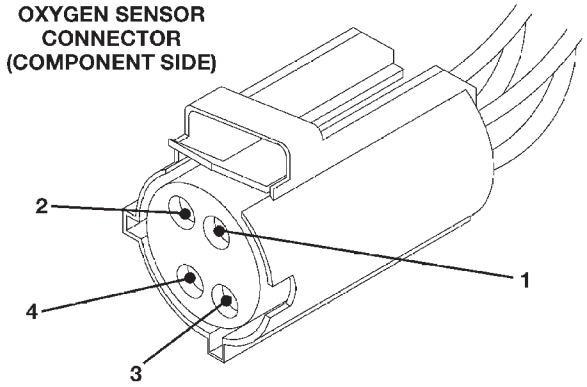
1/2 RIGHT BANK DOWN



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

FIG. 1

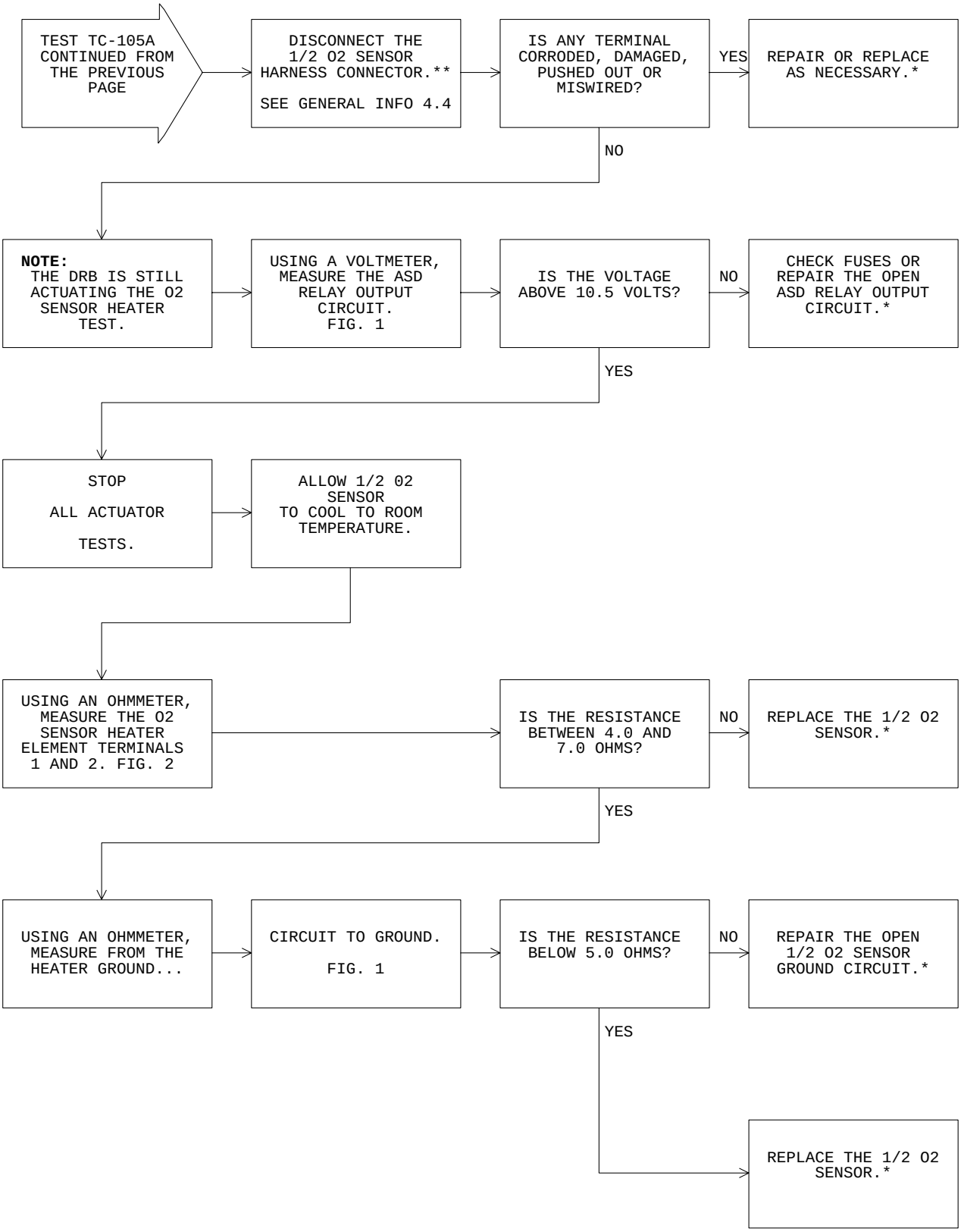
1/2 RIGHT BANK DOWN



CAV	COLOR	FUNCTION
1	WT	GROUND (HEATER)
2	WT	ASD RELAY OUTPUT
3	GY	SENSOR GROUND
4	BK	OXYGEN SENSOR SIGNAL

FIG. 2

TEST TC-105A CONTINUED - REPAIRING - 1/2 O2S HEATER FAILURE



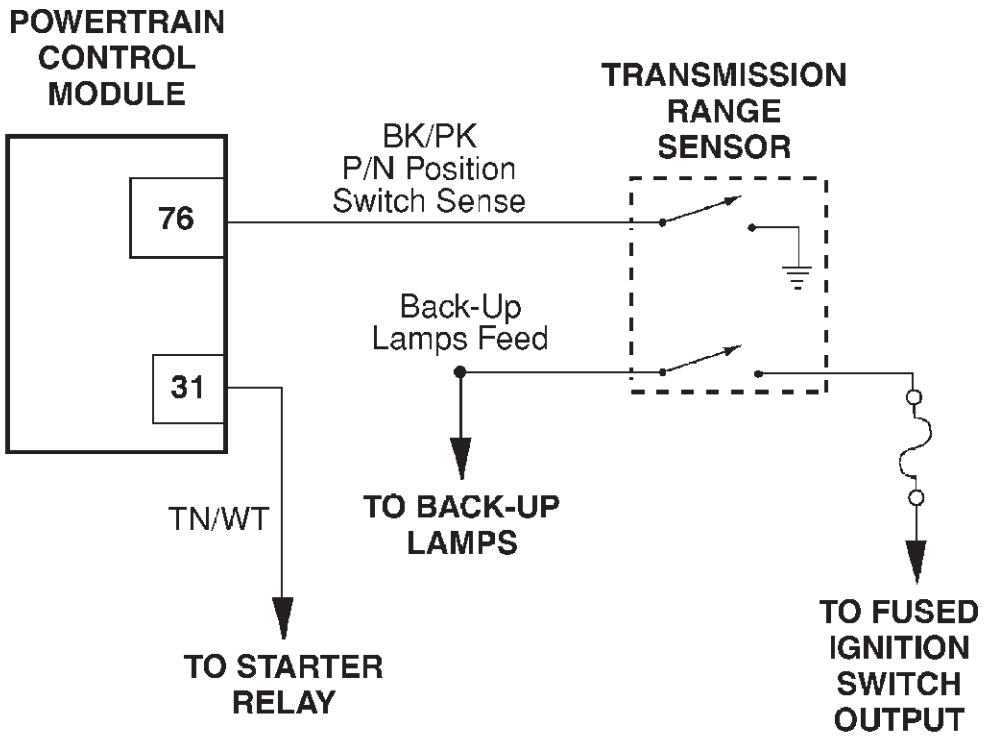
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-114A REPAIRING - PARK/NEUTRAL SWITCH STUCK IN PARK OR IN GEAR

Perform TEST DTC Before Proceeding

ALL 4 SPEED AUTO



Name of code: Park/Neutral Switch Failure (Sense Circuit)

When monitored: With the transmission in Park, Neutral, or Drive and not in limp-in mode.

Set condition: This code is set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation.

Theory of operation: The Transmission Range Sensor Park/Neutral position switch is used to communicate whether or not the transmission is in Park or Neutral to the PCM. When the transmission is in Park or Neutral the Park/Neutral position switch sense circuit is grounded.

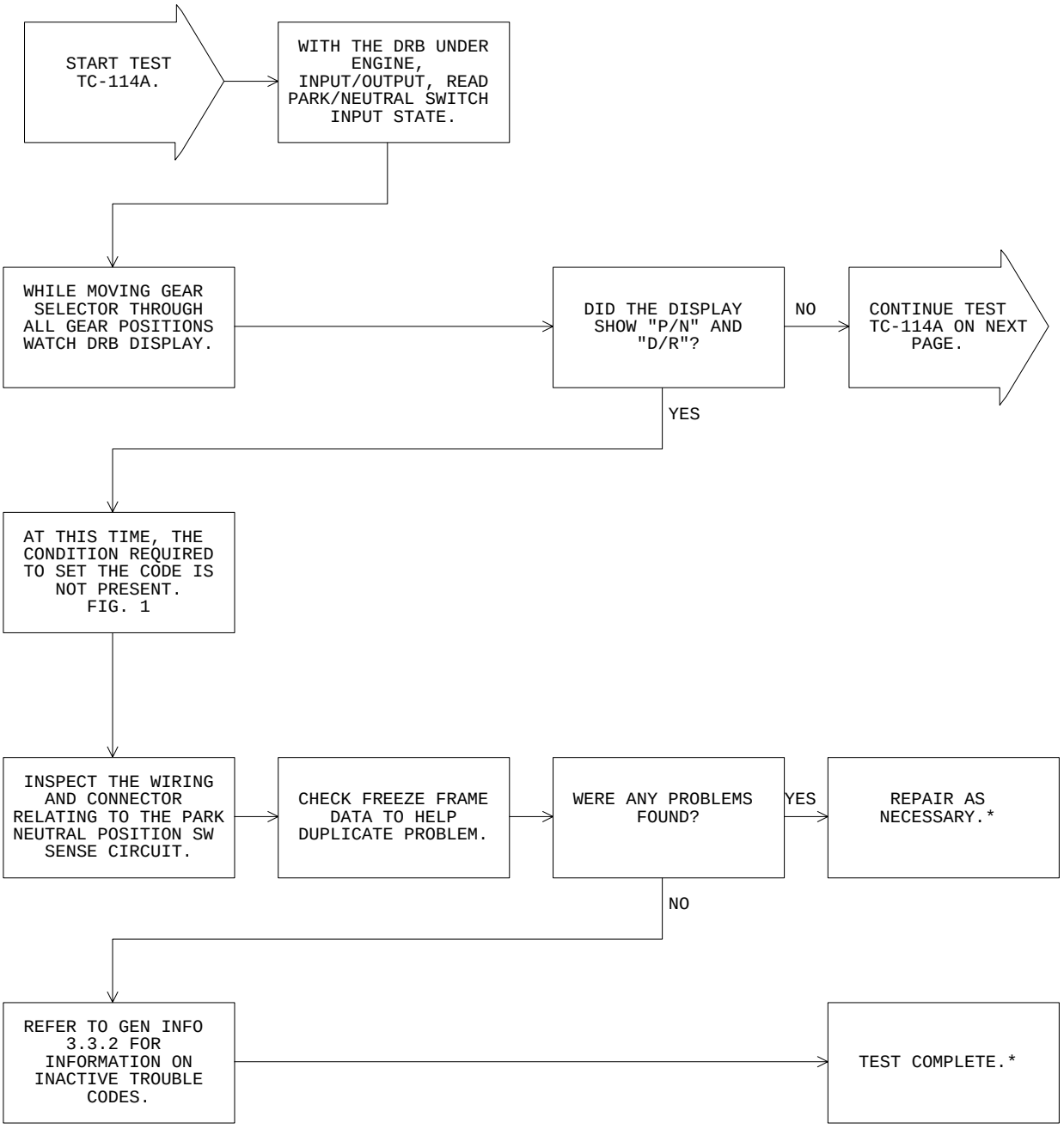
Possible causes:
- Connector terminals and/or wires
- Transmission Range Sensor (or Park/Neutral Position Switch)
- Mechanical transmission problem
- PCM failure

80b4fb49

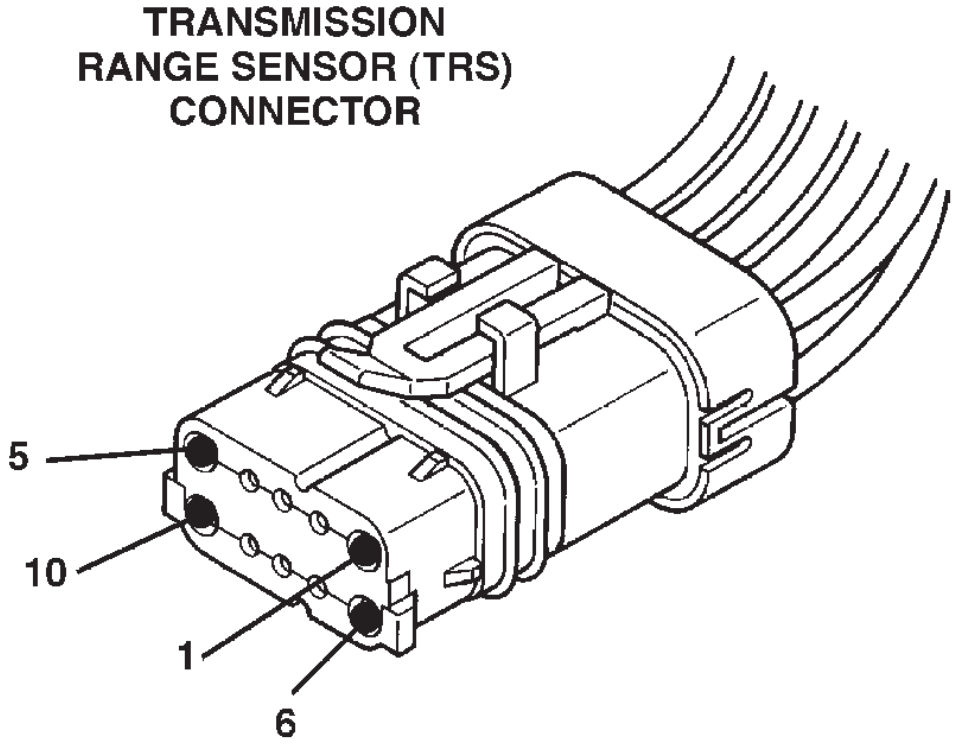
FIG. 1

TEST TC-114A REPAIRING - PARK/NEUTRAL SWITCH STUCK IN PARK OR IN GEAR

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

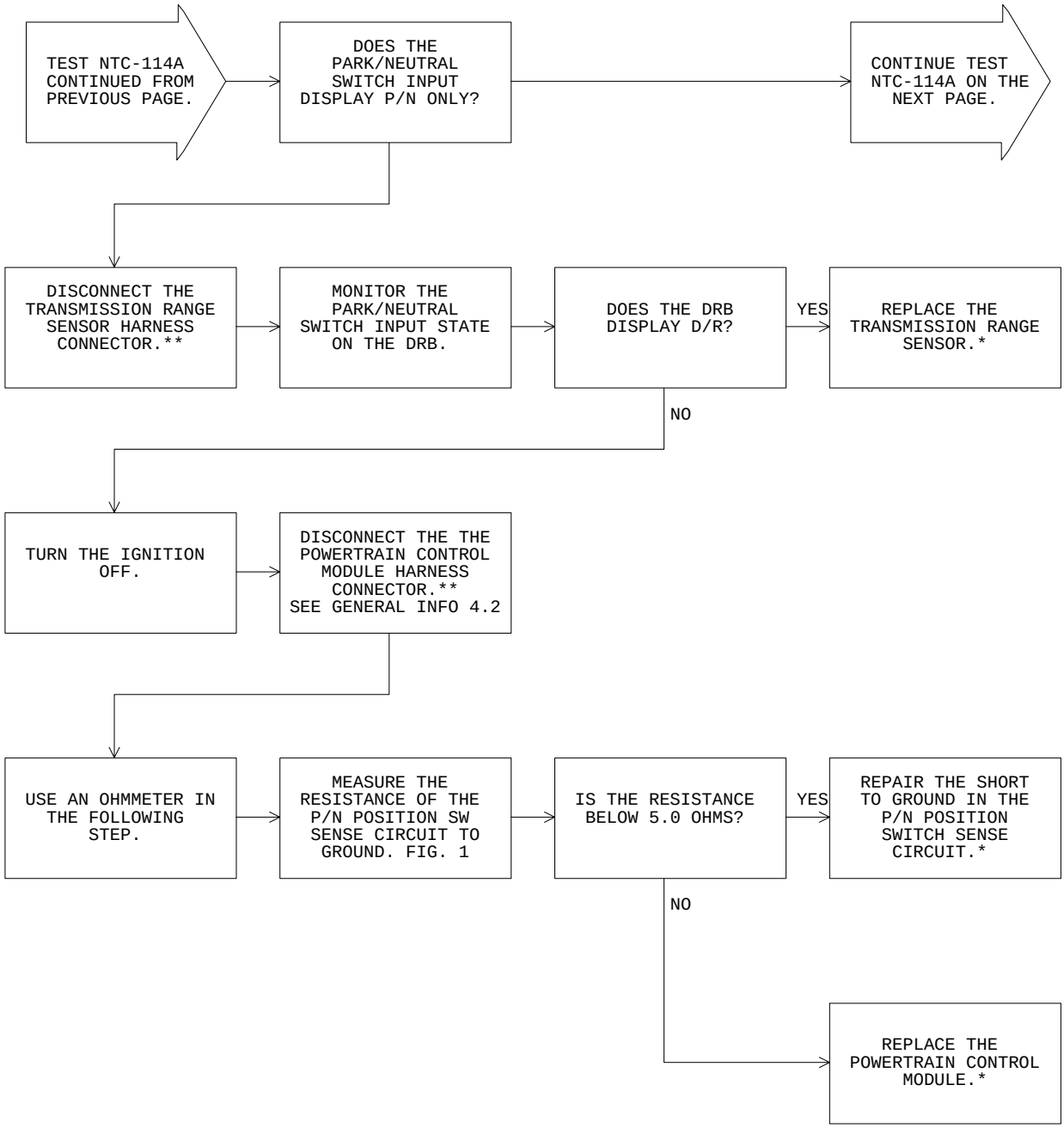


CAV	COLOR	FUNCTION
5	BK/WT	P/N POSITION SWITCH SENSE

80b57443

FIG. 1

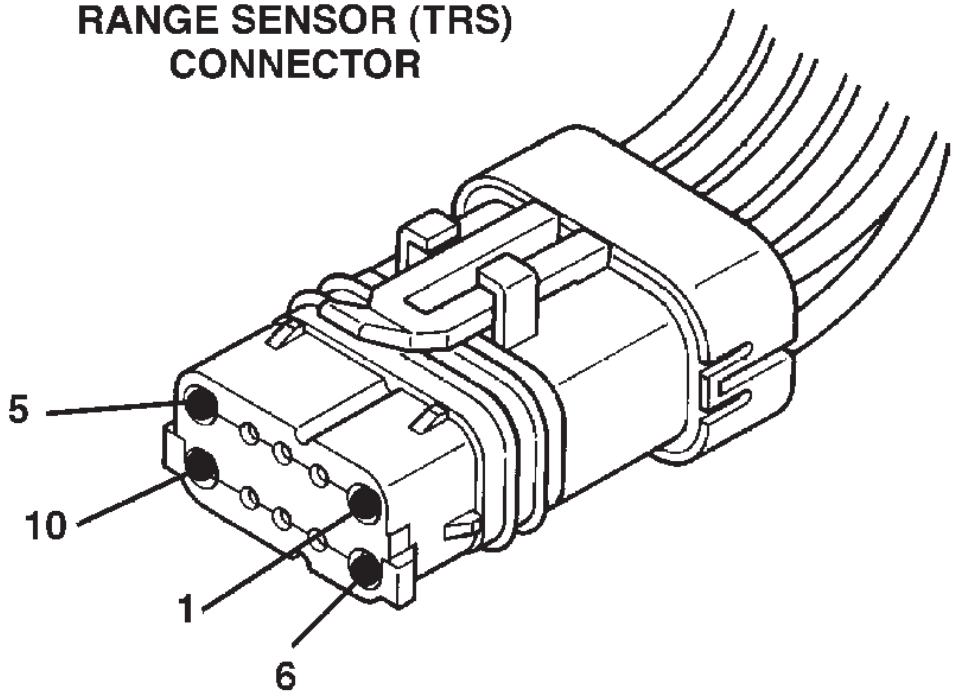
TEST TC-114A CONTINUED - REPAIRING - PARK/NEUTRAL SWITCH STUCK IN PARK OR IN GEAR



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TRANSMISSION RANGE SENSOR (TRS) CONNECTOR

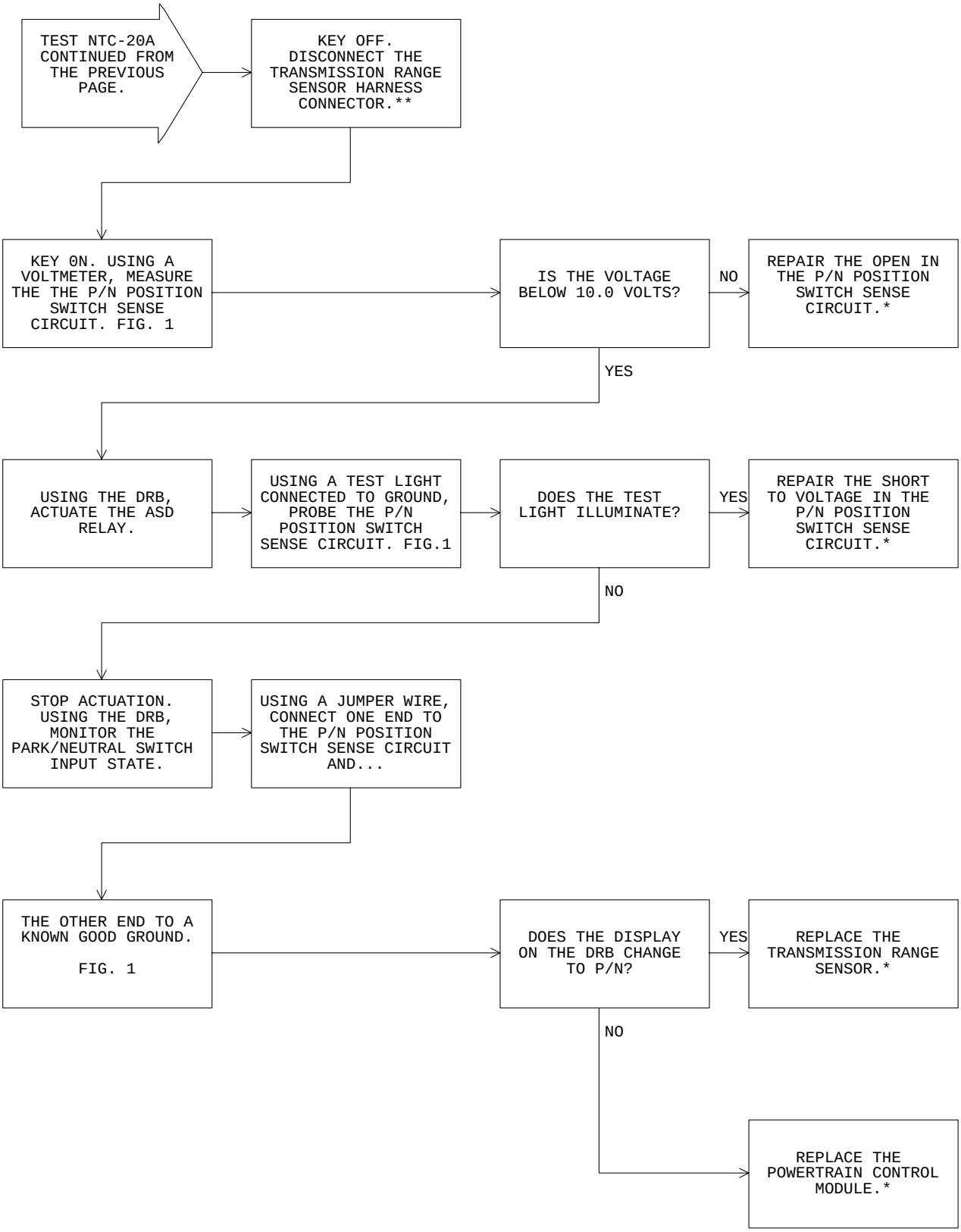


CAV	COLOR	FUNCTION
5	BK/WT	P/N POSITION SWITCH SENSE

80b57443

FIG. 1

TEST TC-114A CONTINUED - REPAIRING - PARK/NEUTRAL SWITCH STUCK IN PARK OR IN GEAR

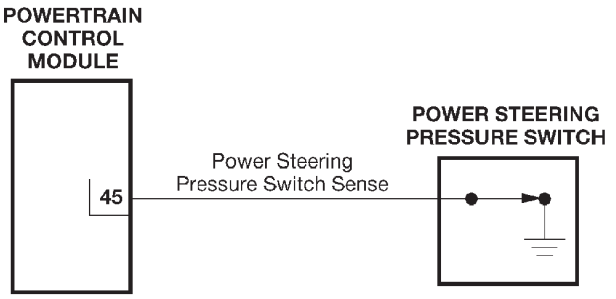


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-115A REPAIRING - POWER STEERING SWITCH FAILURE

Perform TEST DTC Before Proceeding



805e2a14

Name of code: Power Steering Switch Failure

When monitored: With the ignition key on and engine running.

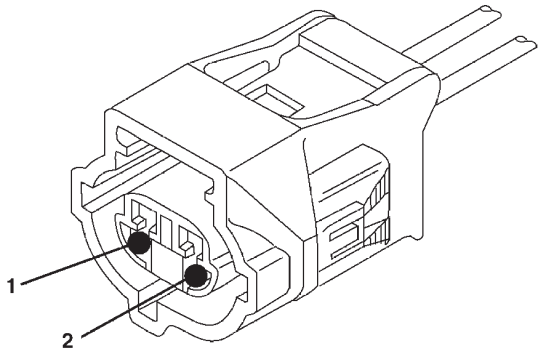
Set condition: With the vehicle above 40 mph for over 30 seconds, the power steering pressure switch remains open.

Theory of operation: The PCM monitors the power steering pressure switch for a high pressure condition. The power steering pressure switch signals the PCM whenever there is a power steering load (pressure exceeding 500 psi). During this condition, the PCM will adjust the RPM to prevent a possible stall. The power steering switch is a normally closed switch.

Possible causes:

- An open power steering switch
- Powertrain control module failure
- Connector terminals
- Connector wires

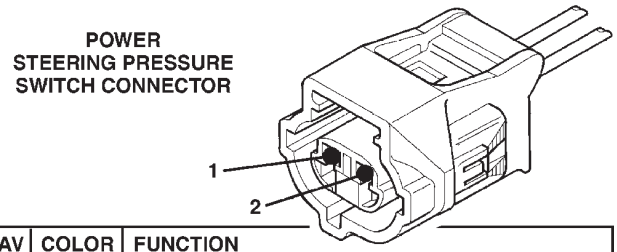
3220603



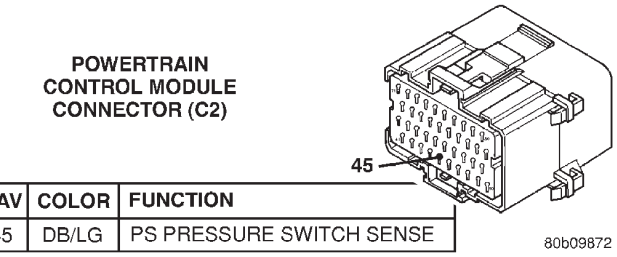
CAV	COLOR	FUNCTION
2	DB/LG	POWER STEERING PRESSURE SW SENSE

80b09846

FIG. 1



CAV	COLOR	FUNCTION
2	DB/LG	POWER STEERING PRESSURE SWITCH SENSE



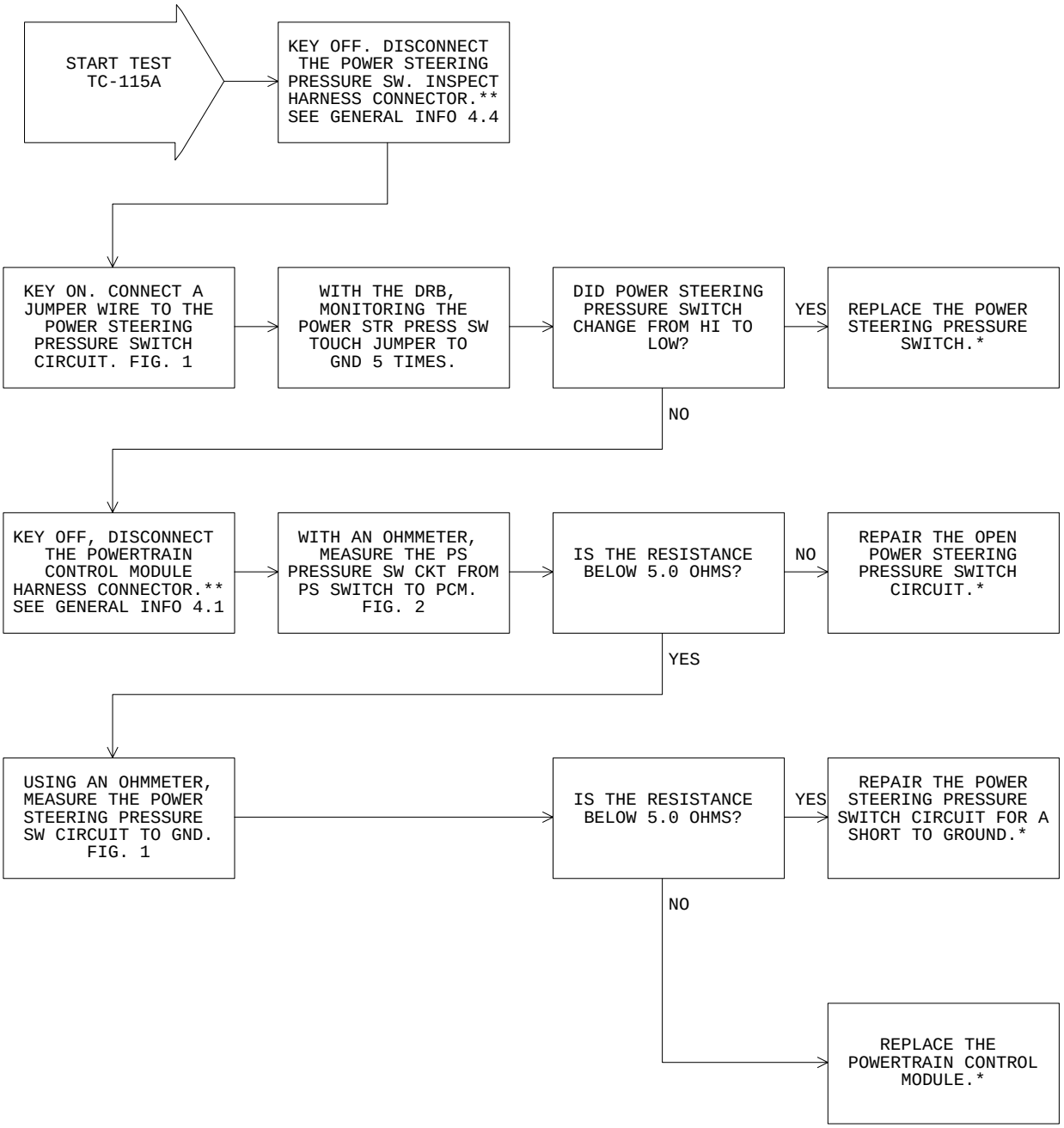
CAV	COLOR	FUNCTION
45	DB/LG	PS PRESSURE SWITCH SENSE

80b09872

FIG. 2

TEST TC-115A REPAIRING - POWER STEERING SWITCH FAILURE

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-118A REPAIRING - 1/1 FUEL SYSTEM RICH

Perform TEST DTC Before Proceeding

RIGHT BANK

Name of Code: Fuel System Rich

When monitored: With the engine running in closed loop mode and the ambient/ battery temperature above 20°F and altitude < 8000 ft.

Set condition: The PCM conducts a test to determine whether the fuel system is running too rich. If this happens for 2 trips, the MIL illuminates and a trouble code is stored. The MIL remains on for more than one trip but goes out if the conditions that set the code are not found on subsequent trips.

Theory of operation: The catalytic converter works best when the air/fuel (A/F) ratio is at or near the optimum of 14.7 to 1. The PCM maintains this optimum air/fuel ratio by making short-term corrections in the fuel injector pulse width based on the upstream O2 sensor output. The PCM uses the programmed memory as a self-calibration tool to compensate for variations in engine specifications, sensor tolerances, and engine fatigue over the life span of the engine. Monitoring the actual air/fuel ratio with the upstream O2 sensor (short term) and comparing it to the program (long-term or adaptive) memory determines whether the fuel system is operating within the limits needed to pass an emission test. If a malfunction prevents the PCM from maintaining the optimum A/F ratio, the MIL illuminates.

Possible causes:
> Catalyst plugged
> Powertrain control module
> Engine parts tolerance
> Injectors stuck open
> MAP sensor
> O2 sensor (upstream)
> Fuel pressure regu ator
> Wiring harness/connectors

80660077

FIG. 1

SBEC IIIA 02 SENSOR CONFIGURATION

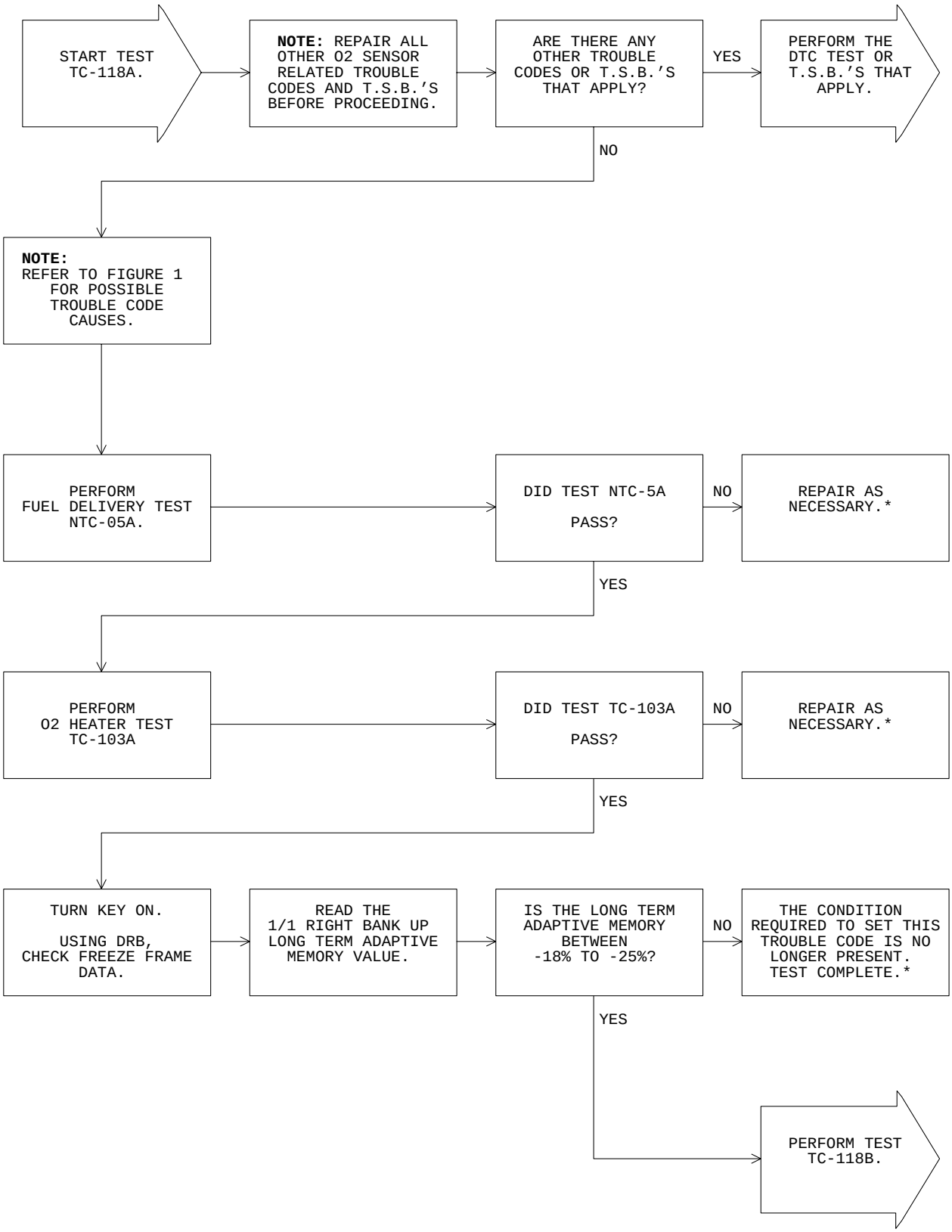
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST TC-118A REPAIRING - 1/1 FUEL SYSTEM RICH

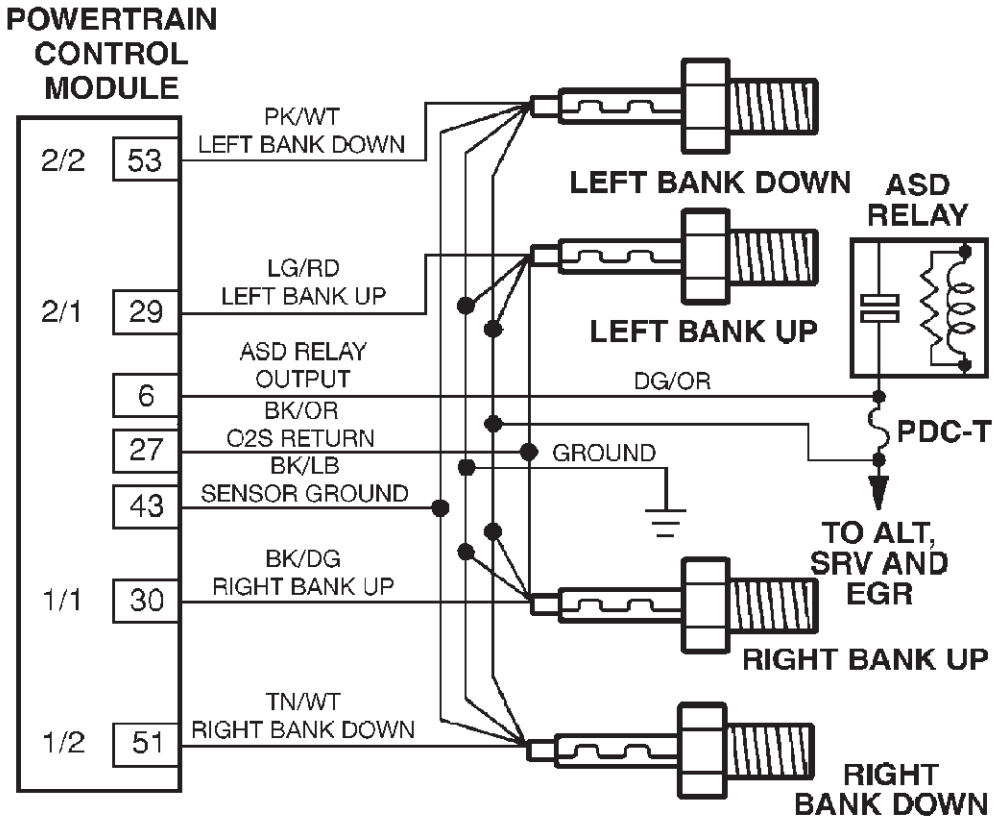
Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.** | ****Check connectors - Clean / repair as necessary.

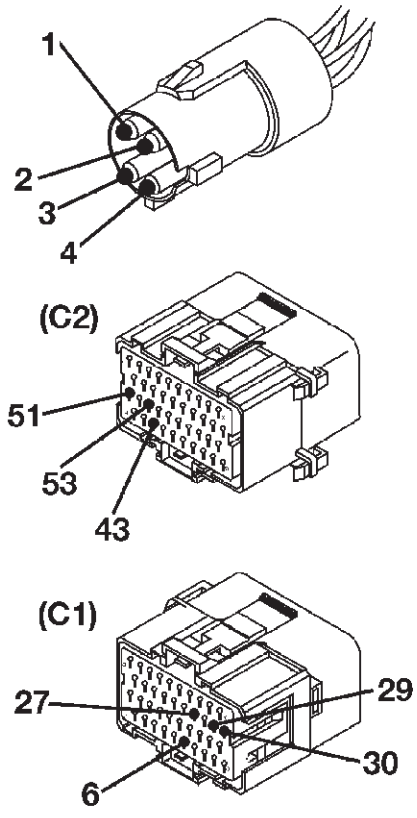
TEST TC-118B REPAIRING - 1/1 FUEL SYSTEM RICH

Perform TEST TC-118A Before Proceeding



80b6f001

1/1 RIGHT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST TC-118B REPAIRING - 1/1 FUEL SYSTEM RICH

Perform TEST TC-118A Before Proceeding

Using the test schematic as a guide, make sure all the wiring and connectors are okay.

Perform each of the following tests in the order listed below. If a test passes, continue to the next test until the problem is found:

Coolant Temperature Sensor. . . . . .TEST NTC-6A

Throttle Position Sensor . . . . . .TEST NTC-7A

MAP Sensor. . . . . .TEST NTC-8A

Engine Mechanical Systems . . . . . .TEST NTC-13A

Evaporative Emission System. . . . . .TEST NTC-17A

EGR System . . . . . .TEST NTC-18A

Intake Air Temperature Sensor . . . . . .TEST NTC-19A

TEST TC-119A REPAIRING - 1/1 FUEL SYSTEM LEAN

Perform TEST DTC Before Proceeding

RIGHT BANK

Name of Code: Fuel System Lean

When monitored: With the engine running in closed loop mode and the ambient/battery temperature above 20°F and altitude < 8000 ft.

Set condition: The PCM conducts a test to determine whether the fuel system is running too lean. If this happens for 2 trips, the MIL illuminates and a trouble code is storec. The MIL remains on for more than one trip but goes out if the conditions that set the code are not found on subsequent trips.

Theory of operation: The catalytic converter works best when the air/fuel (A/F) ratio is at or near the optimum of 14.7 to 1. The PCM maintains this optimum air/fuel ratio by makirg short-term corrections in the fuel injector pulse width based on the upstream O2 sensor output. The PCM uses the programmed memory as a self-calibration tool to compensate for variations in engine specifications, sensor tolerances, and engine fatigue over the life span of the engine. Monitoring the actual air/fuel ratio with the upstream O2 sensor (short term) and comparing it to the program (long-term or adaptive) memory determines whether the fuel system is operating within the limits needed to pass an emission test. If a malfunction prevents the PCM from maintaining the optimum A/F ratio, the MIL illuminates.

Possible causes:

- > Ignition coil
- > Powertrain control module
- > Engine parts tolerance
- > Exhaust pipe manifold
- > Fuel pump
- > Fuel pump inlet filter
- > Ignition secondary wires
- > Low fuel level
- > Injectors stuck closed
- > MAP sensor
- > O2 sensor (upstream)
- > Fuel pressure regulator
- > Fuel pump relay
- > Spark plugs
- > Wiring harness/connectors

80660063

FIG. 1

SBEC IIIA 02 SENSOR CONFIGURATION

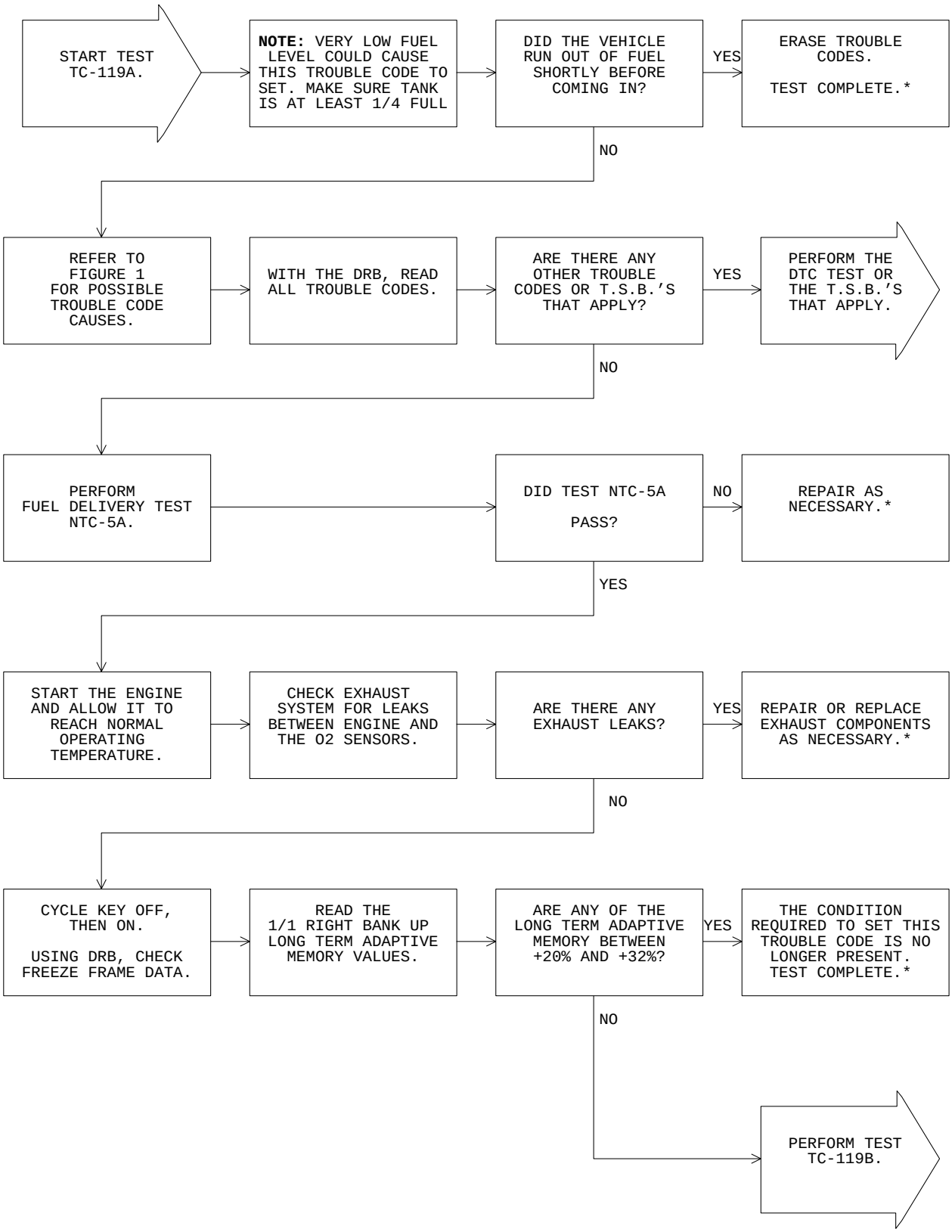
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST TC-119A REPAIRING - 1/1 FUEL SYSTEM LEAN

Perform TEST DTC Before Proceeding

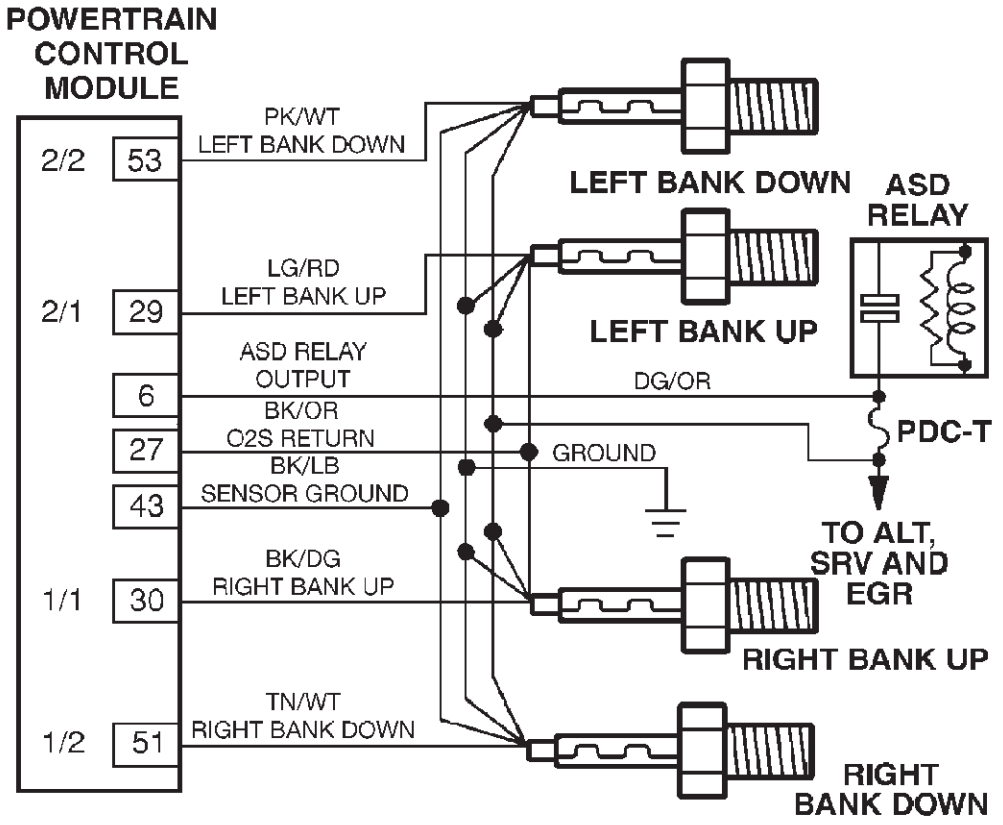


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

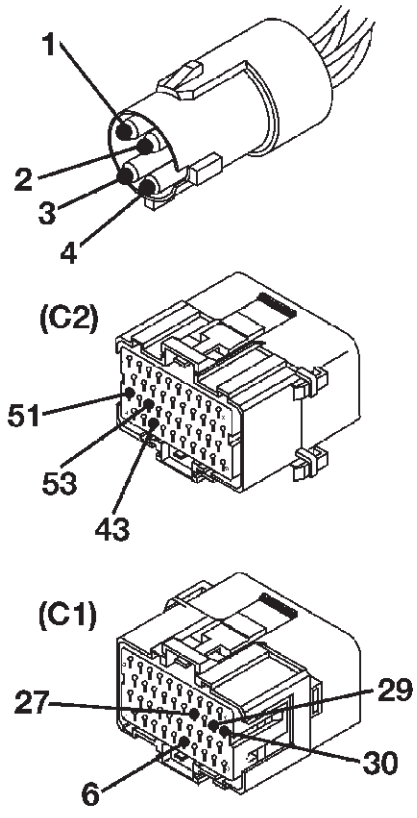
TEST TC-119B REPAIRING - 1/1 FUEL SYSTEM LEAN

Perform TEST TC-119A Before Proceeding



80b6f001

1/1 RIGHT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST TC-119B REPAIRING - 1/1 FUEL SYSTEM LEAN

Perform TEST TC-119A Before Proceeding

Using the test schematic as a guide, make sure all the wiring and connectors are okay.

Perform each of the following tests in the order listed below. If a test passes, continue to the next test until the problem is found:

Coolant Temperature Sensor. . . . . .TEST NTC-6A

MAP Sensor . . . . . .TEST NTC-8A

Engine Mechanical Systems . . . . . .TEST NTC-13A

Intake Air Temperature Sensor . . . . . .TEST NTC-19A

TEST TC-120A **REPAIRING - 2/1 FUEL SYSTEM RICH**

Perform TEST DTC Before Proceeding

LEFT BANK

Name of Code: Fuel System Rich

When monitored: With the engine running in closed loop mode and the ambient/ battery temperature above 20°F and altitude < 8000 ft.

Set condition: The PCM conducts a test to determine whether the fuel system is running too rich. If this happens for 2 trips, the MIL illuminates and a trouble code is stored. The MIL remains on for more than one trip but goes out if the conditions that set the code are not found on subsequent trips.

Theory of operation: The catalytic converter works best when the air/fuel (A/F) ratio is at or near the optimum of 14.7 to 1. The PCM maintains this optimum air/fuel ratio by making short-term corrections in the fuel injector pulse width based on the upstream O2 sensor output. The PCM uses the programmed memory as a self-calibration tool to compensate for variations in engine specifications, sensor tolerances, and engine fatigue over the life span of the engine. Monitoring the actual air/fuel ratio with the upstream O2 sensor (short term) and comparing it to the program (long-term or adaptive) memory determines whether the fuel system is operating within the limits needed to pass an emission test. If a malfunction prevents the PCM from maintaining the optimum A/F ratio, the MIL illuminates.

Possible causes:
> Catalyst plugged
> Powertrain control module
> Engine parts tolerance
> Injectors stuck open
> MAP sensor
> O2 sensor (upstream)
> Fuel pressure regu ator
> Wiring harness/connectors

80660077

FIG. 1

SBEC IIIA 02 SENSOR CONFIGURATION

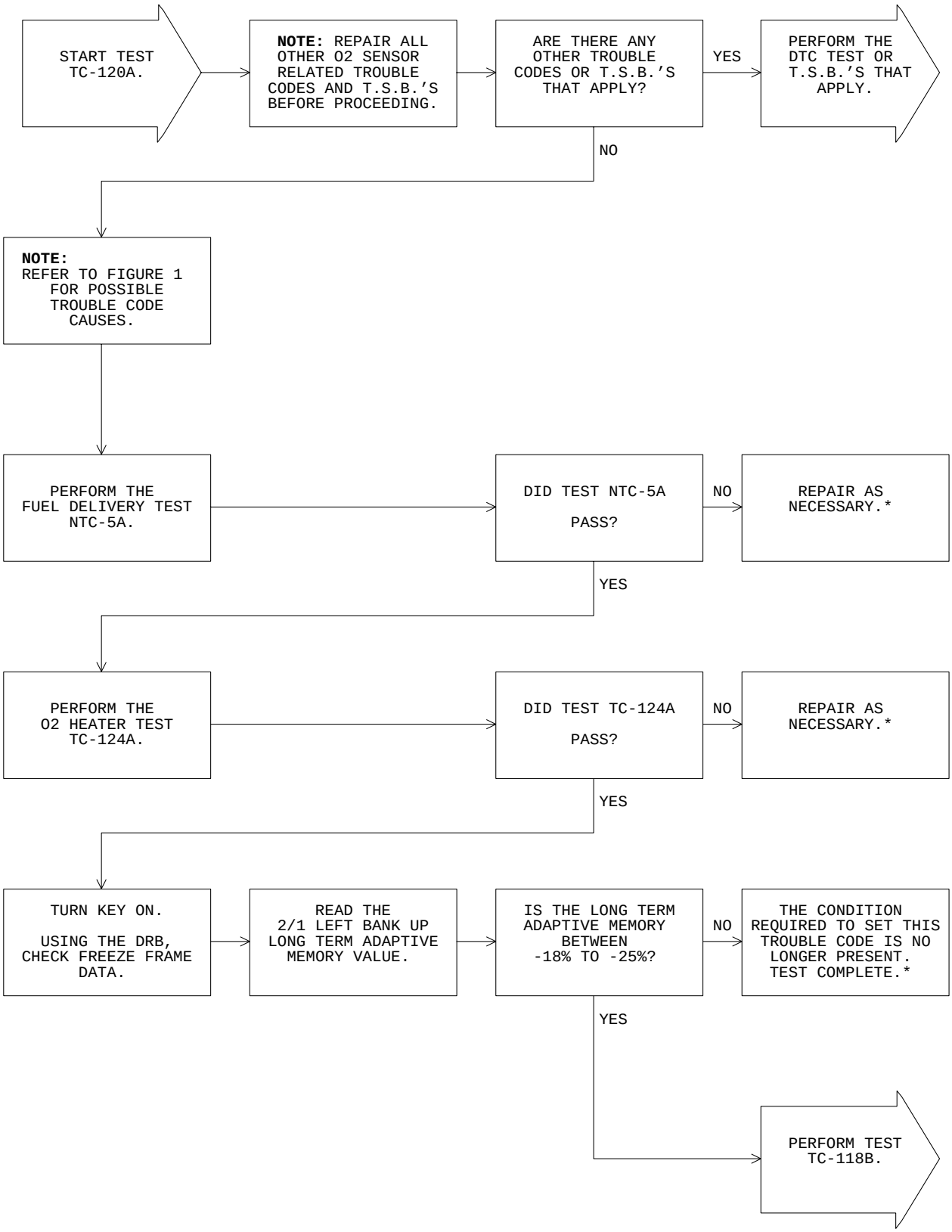
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST TC-120A REPAIRING - 2/1 FUEL SYSTEM RICH

Perform TEST DTC Before Proceeding

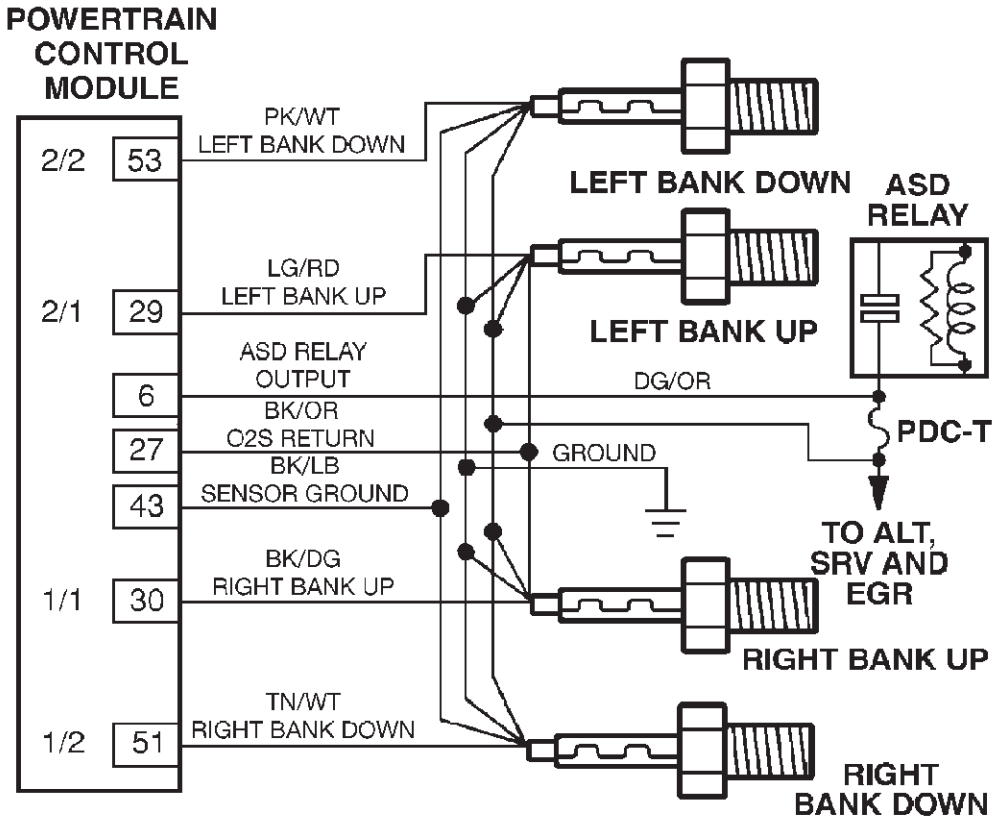


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

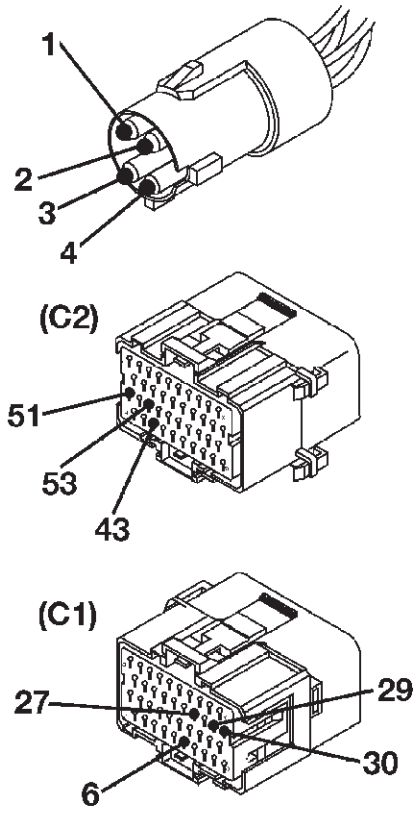
TEST TC-120B REPAIRING - 2/1 FUEL SYSTEM RICH

Perform TEST TC-120A Before Proceeding



80b6f001

2/1 LEFT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST TC-120B REPAIRING - 2/1 BANK FUEL SYSTEM RICH

Perform TEST TC-120A Before Proceeding

Using the test schematic as a guide, make sure all the wiring and connectors are okay.

Perform each of the following tests in the order listed below. If a test passes, continue to the next test until the problem is found:

Coolant Temperature Sensor. . . . . .TEST NTC-6A

Throttle Position Sensor . . . . . .TEST NTC-7A

MAP Sensor. . . . . .TEST NTC-8A

Engine Mechanical Systems . . . . . .TEST NTC-13A

Evaporative Emission System. . . . . .TEST NTC-17A

EGR System . . . . . .TEST NTC-18A

Intake Air Temperature Sensor . . . . . .TEST NTC-19A

TEST TC-121A **REPAIRING - 2/1 FUEL SYSTEM LEAN**

Perform TEST DTC Before Proceeding

LEFT BANK

Name of Code: Fuel System Lean

When monitored: With the engine running in closed loop mode and the ambient/battery temperature above 20°F and altitude < 8000 ft.

Set condition: The PCM conducts a test to determine whether the fuel system is running too lean. If this happens for 2 trips, the MIL illuminates and a trouble code is storec. The MIL remains on for more than one trip but goes out if the conditions that set the code are not found on subsequent trips.

Theory of operation: The catalytic converter works best when the air/fuel (A/F) ratio is at or near the optimum of 14.7 to 1. The PCM maintains this optimum air/fuel ratio by makirg short-term corrections in the fuel injector pulse width based on the upstream O2 sensor output. The PCM uses the programmed memory as a self-calibration tool to compensate for variations in engine specifications, sensor tolerances, and engine fatigue over the life span of the engine. Monitoring the actual air/fuel ratio with the upstream O2 sensor (short term) and comparing it to the program (long-term or adaptive) memory determines whether the fuel system is operating within the limits needed to pass an emission test. If a malfunction prevents the PCM from maintaining the optimum A/F ratio, the MIL illuminates.

Possible causes:

- > Ignition coil
- > Powertrain control module
- > Engine parts tolerance
- > Exhaust pipe manifold
- > Fuel pump
- > Fuel pump inlet filter
- > Ignition secondary wires
- > Low fuel level
- > Injectors stuck closed
- > MAP sensor
- > O2 sensor (upstream)
- > Fuel pressure regulator
- > Fuel pump relay
- > Spark plugs
- > Wiring harness/connectors

80660063

FIG. 1

SBEC IIIA 02 SENSOR CONFIGURATION

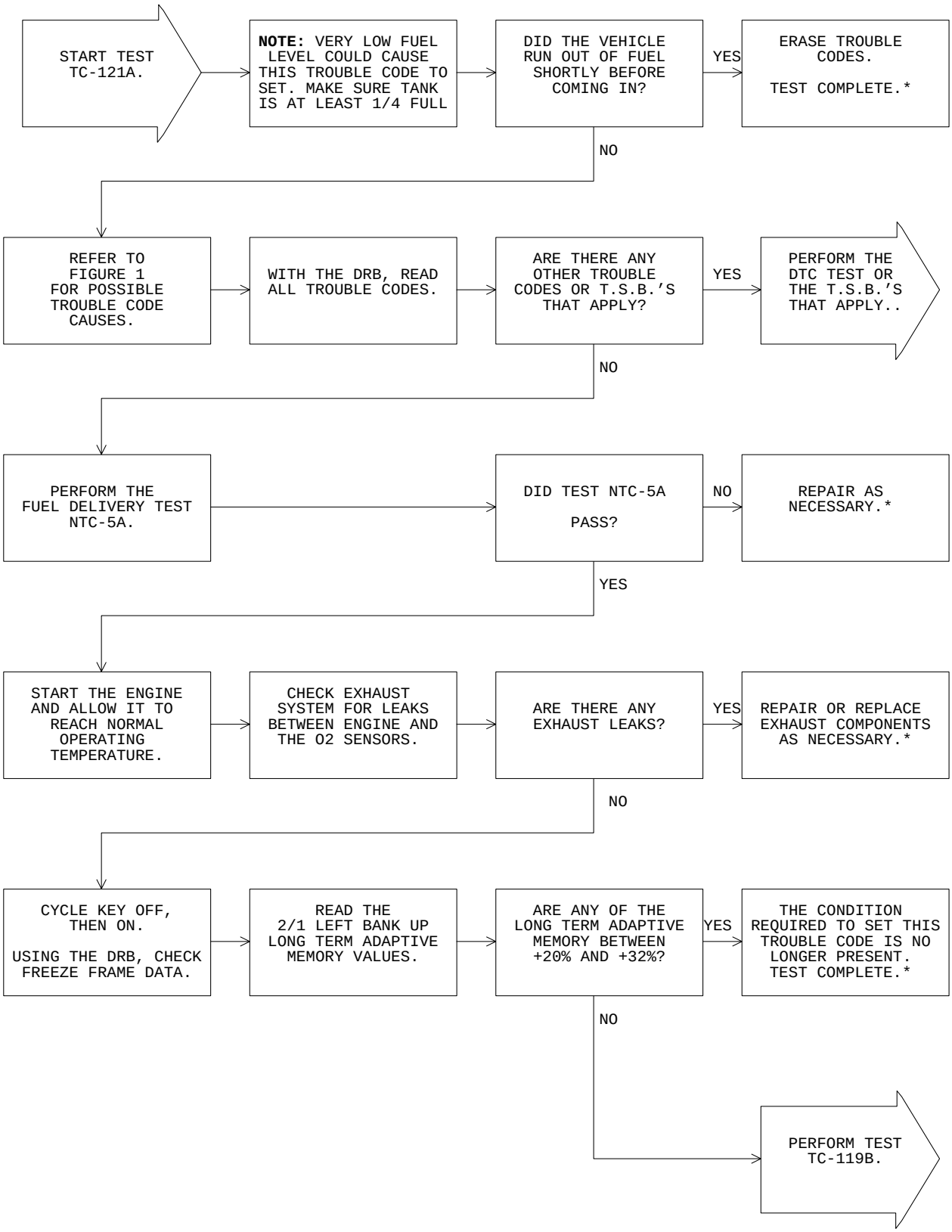
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST TC-121A REPAIRING - 2/1 FUEL SYSTEM LEAN

Perform TEST DTC Before Proceeding

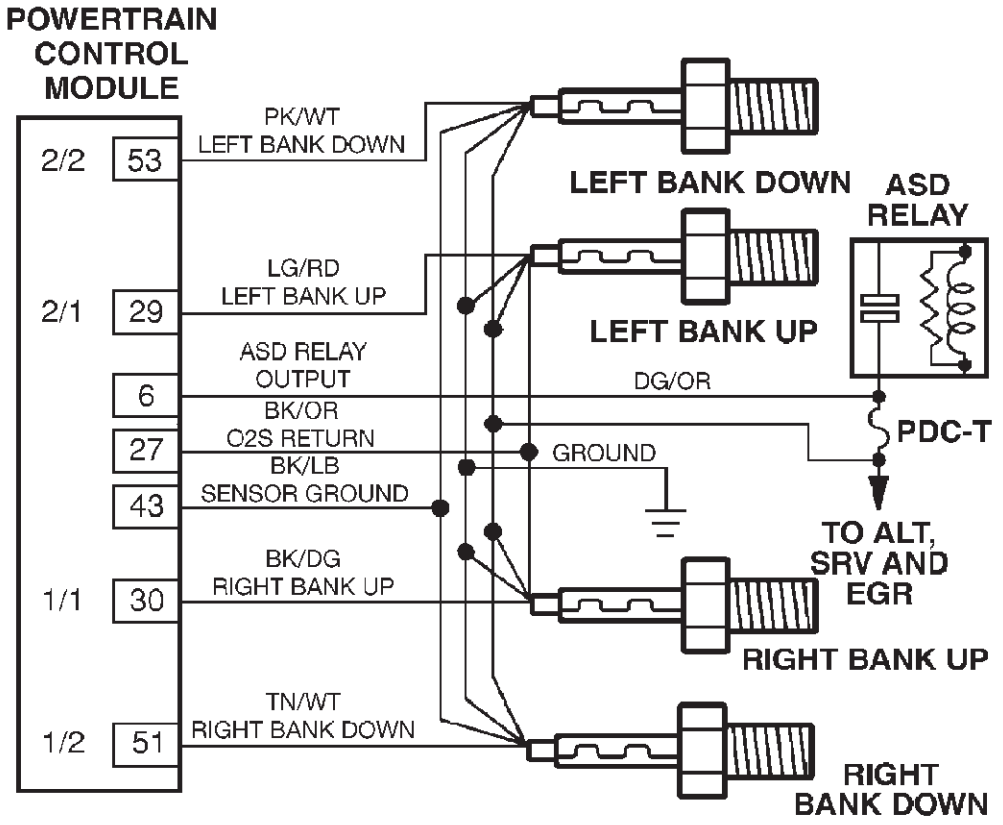


Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

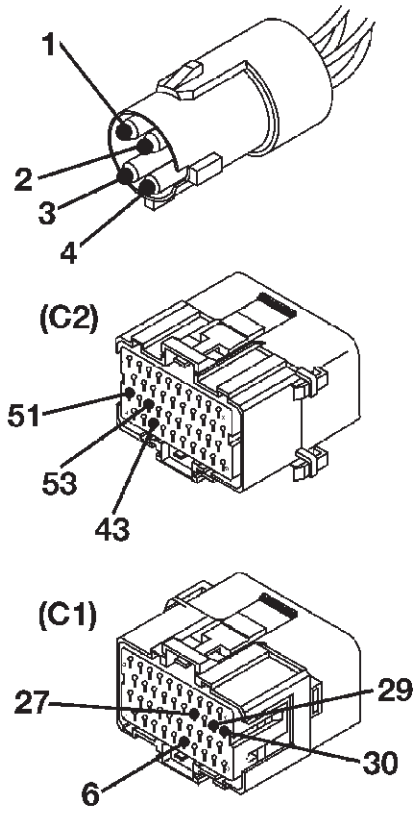
TEST TC-121B REPAIRING - 2/1 FUEL SYSTEM LEAN

Perform TEST TC-120A Before Proceeding



80b6f001

2/1 LEFT BANK UP



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST TC-121B REPAIRING - 2/1 BANK FUEL SYSTEM LEAN

Perform TEST TC-120A Before Proceeding

Using the test schematic as a guide, make sure all the wiring and connectors are okay.

Perform each of the following tests in the order listed below. If a test passes, continue to the next test until the problem is found:

Coolant Temperature Sensor. . . . . .TEST NTC-6A

MAP Sensor . . . . . .TEST NTC-8A

Engine Mechanical Systems . . . . . .TEST NTC-13A

Intake Air Temperature Sensor . . . . . .TEST NTC-19A

TEST TC-124A REPAIRING - 2/1 O2S HEATER FAILURE

Perform TEST DTC Before Proceeding

2/1 LEFT BANK UP

Name of code: O2 Sensor Heater Failure

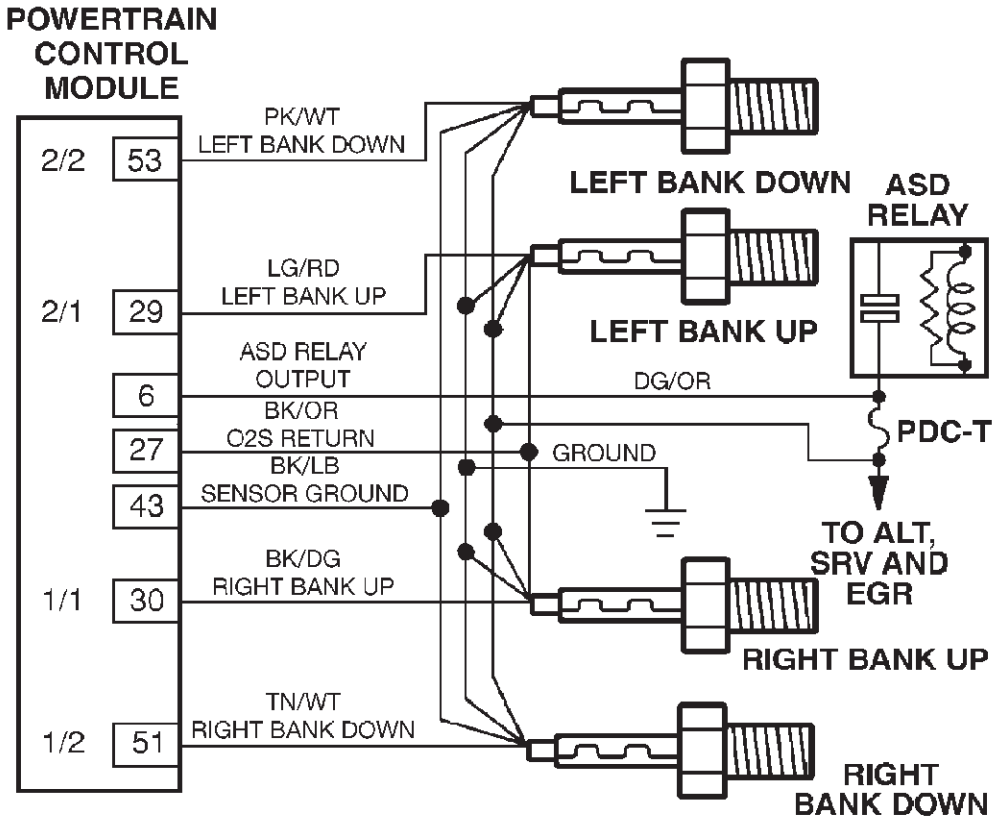
When monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut-down with the ignition key turned "OFF".

Set condition: Using O2 sensor signal voltage readings, during 02 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases. This O2 sensor serves as an indicator of oxygen content. The heater element helps the O2 sensor quickly reach a normal and steady operating temperature, which is required for proper emission control.

Possible causes:
> Open heater element circuit
> O2 sensor failure
> O2 heater wiring
> Powertrain control module failure
> Connector terminals
> Connector wires
> ASD Fuse(s)
> Open ASD Relay Circuit

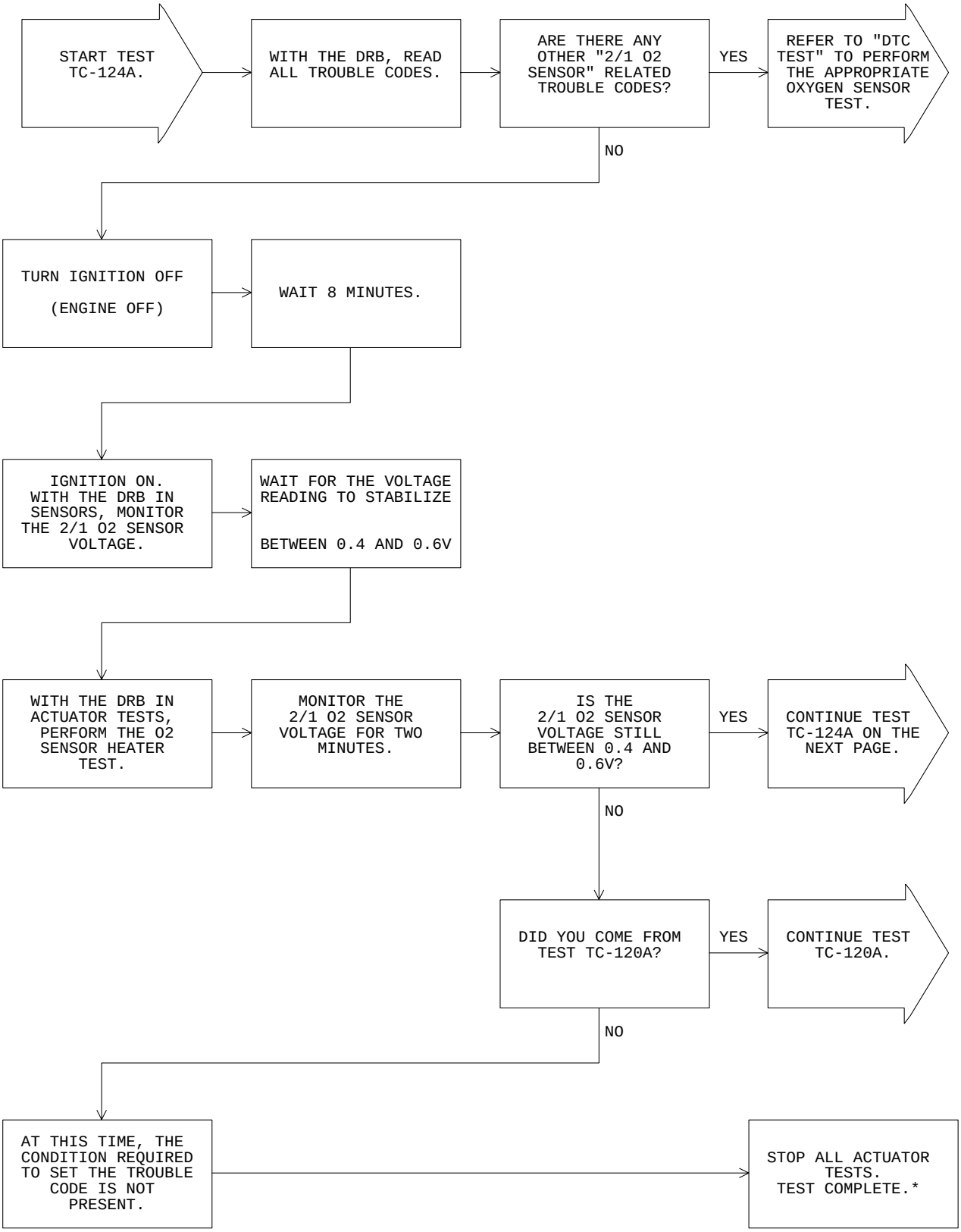
80b3afd6



80b6f001

TEST TC-124A REPAIRING - 2/1 O2S HEATER FAILURE

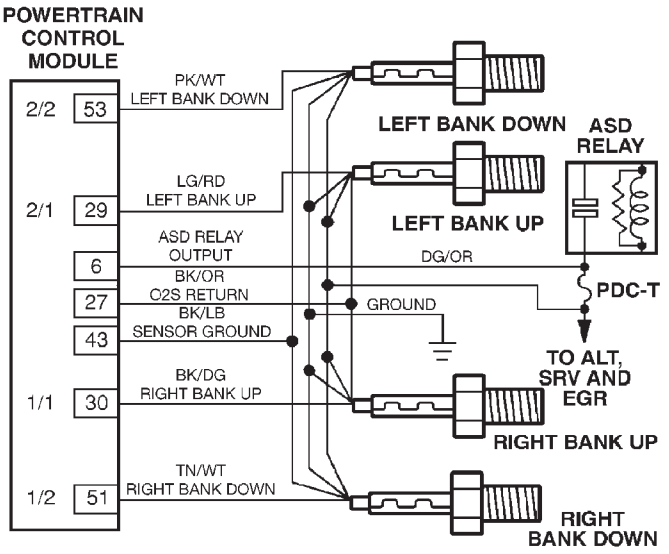
Perform TEST DTC Before Proceeding



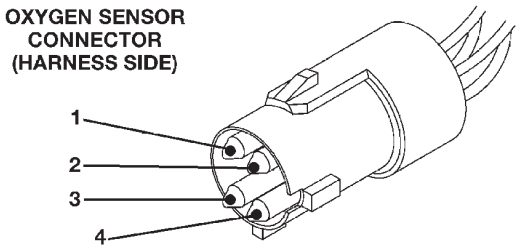
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-124A CONTINUED - REPAIRING - 2/1 O2S HEATER FAILURE



2/1 LEFT BANK UP

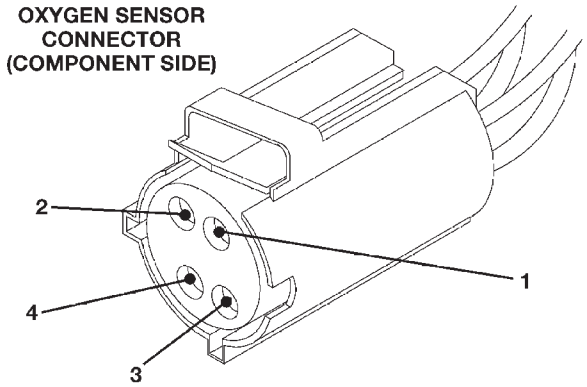


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

2/1 LEFT BANK UP

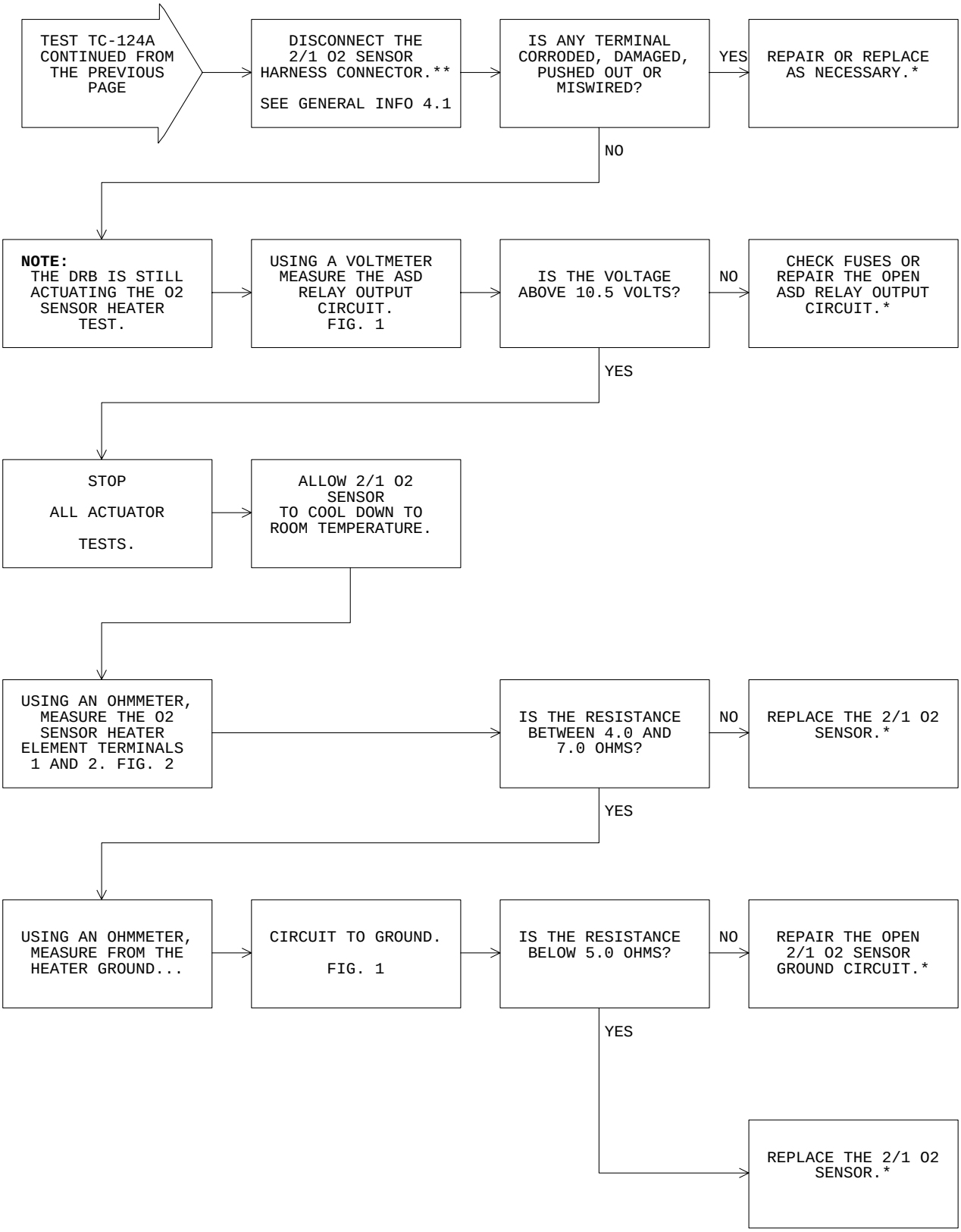


CAV	COLOR	FUNCTION
1	WT	GROUND (HEATER)
2	WT	ASD RELAY OUTPUT
3	GY	SENSOR GROUND
4	BK	OXYGEN SENSOR SIGNAL

80b27c81

FIG. 2

TEST TC-124A CONTINUED - REPAIRING - 2/1 O2S HEATER FAILURE



Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-125A REPAIRING - 2/2 O2S HEATER FAILURE

Perform TEST DTC Before Proceeding

2/2 LEFT BANK DOWN

Name of code: O2 Sensor Heater Failure

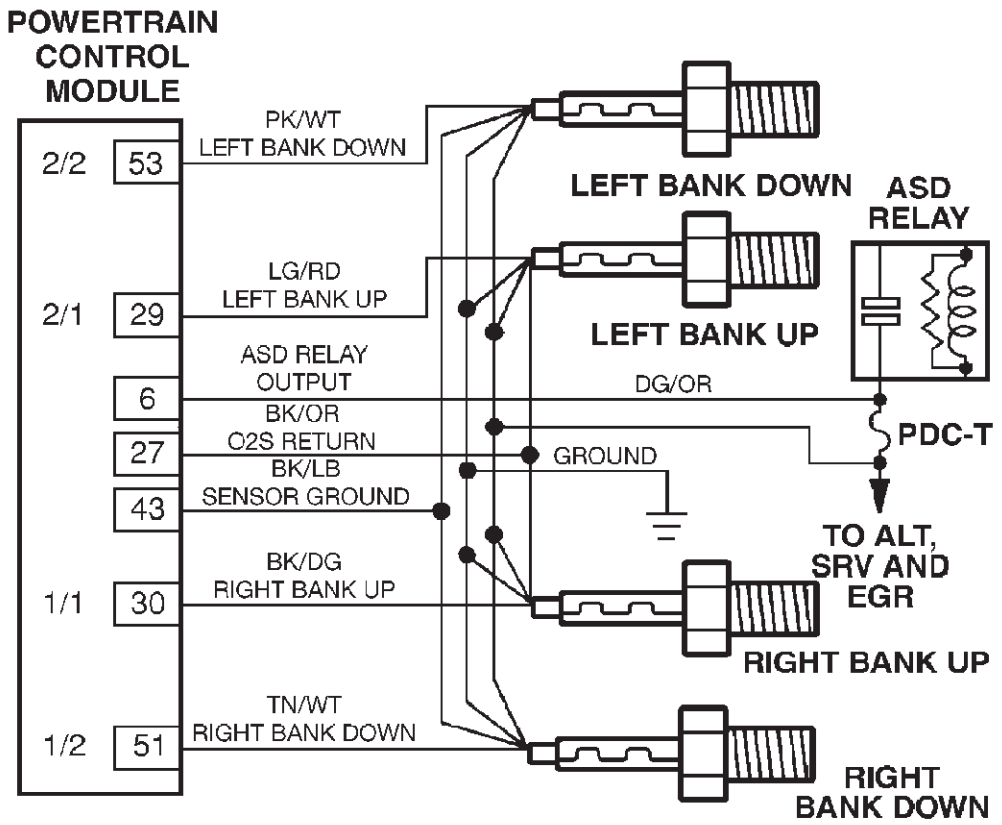
When monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut-down with the ignition key turned "OFF".

Set condition: Using O2 sensor signal voltage readings, during 02 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases. This O2 sensor serves as an indicator of oxygen content. The heater element helps the O2 sensor quickly reach a normal and steady operating temperature, which is required for proper emission control.

Possible causes:
> Open heater element circuit
> O2 sensor failure
> O2 heater wiring
> Powertrain control module failure
> Connector terminals
> Connector wires
> ASD Fuse(s)
> Open ASD Relay Circuit

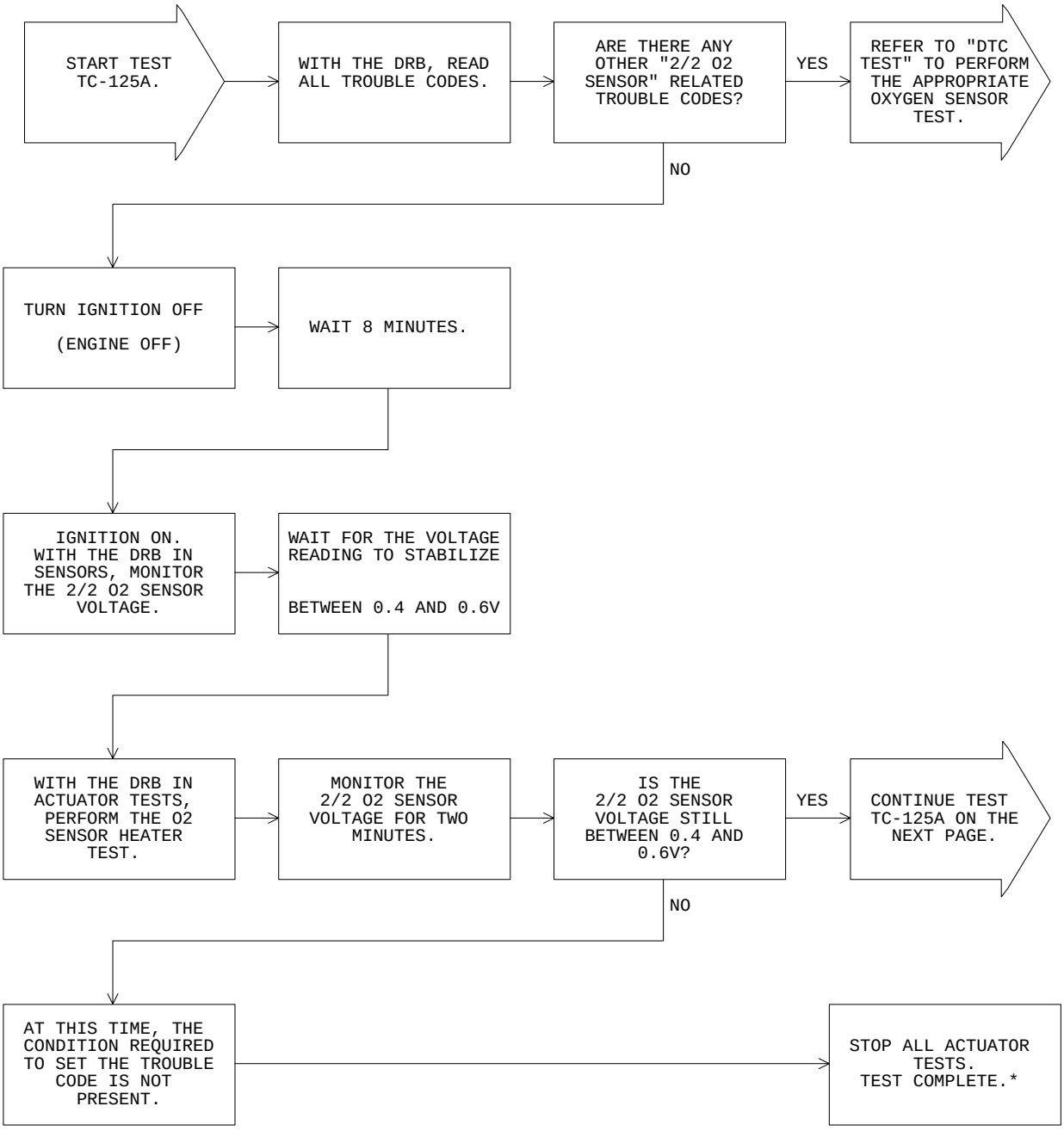
80b3afd6



80b6f001

TEST TC-125A REPAIRING - 2/2 O2S HEATER FAILURE

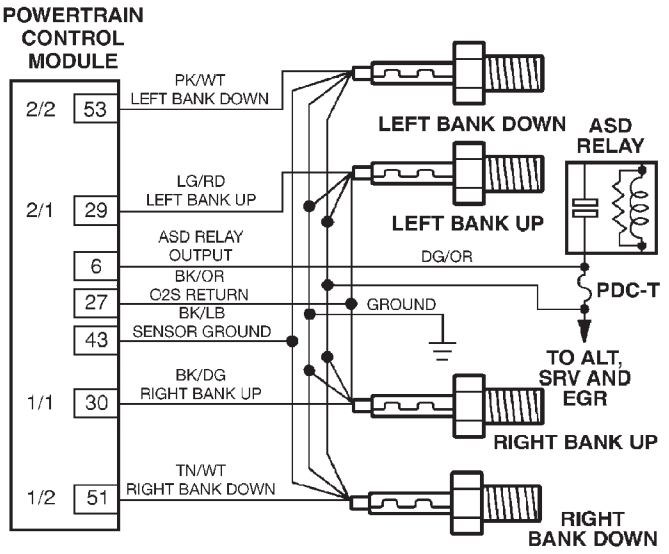
Perform TEST DTC Before Proceeding



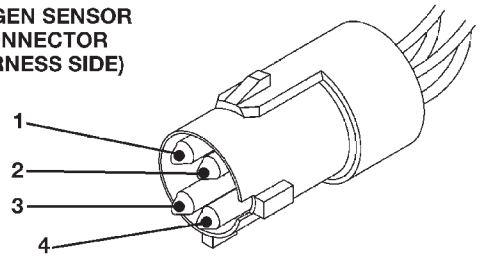
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-125A CONTINUED - REPAIRING - 2/2 O2S HEATER FAILURE



2/2 LEFT BANK DOWN

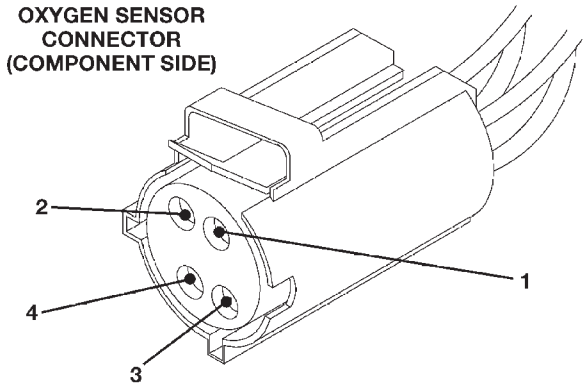


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

2/2 LEFT BANK DOWN

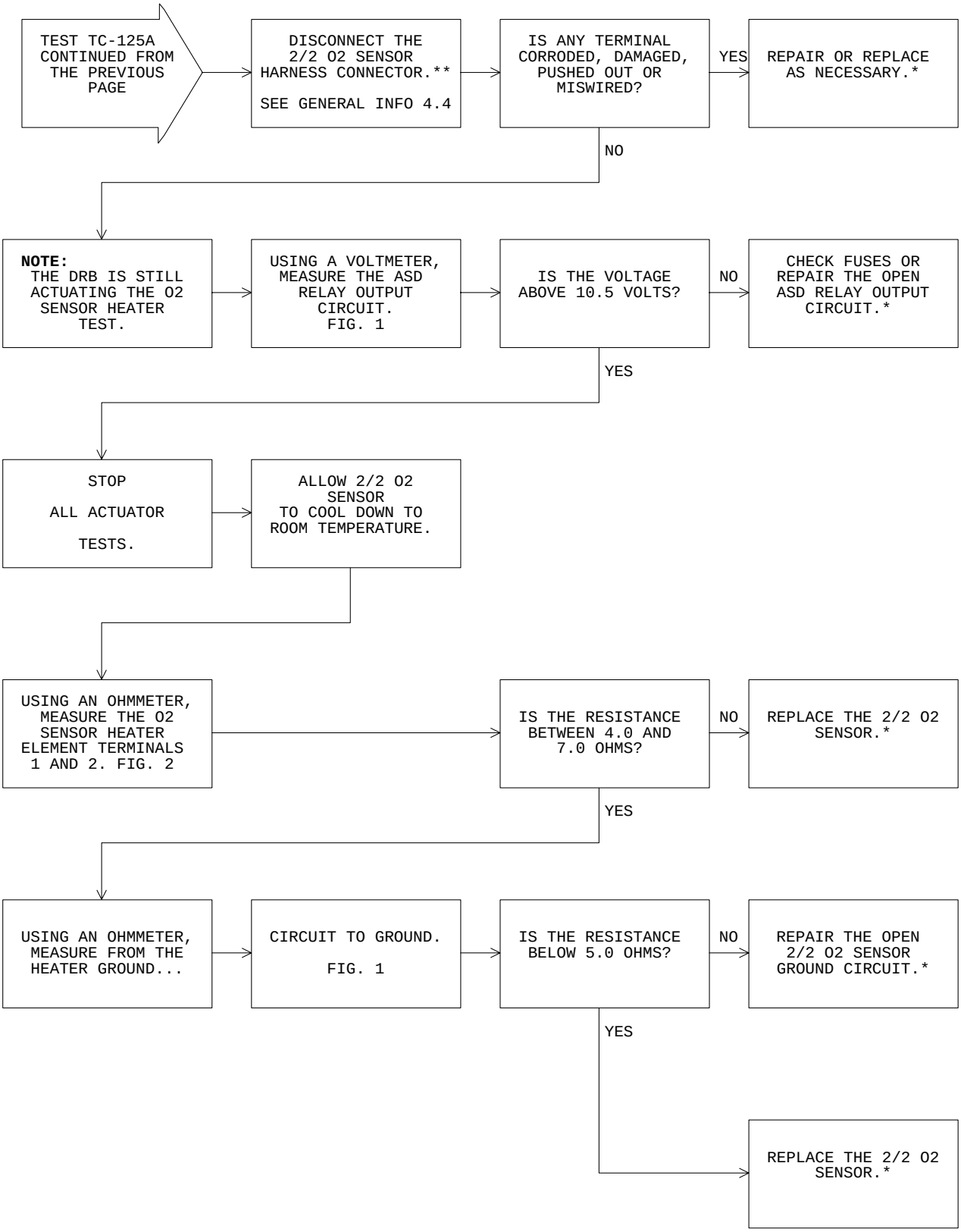


CAV	COLOR	FUNCTION
1	WT	GROUND (HEATER)
2	WT	ASD RELAY OUTPUT
3	GY	SENSOR GROUND
4	BK	OXYGEN SENSOR SIGNAL

80b27c81

FIG. 2

TEST TC-125A CONTINUED - REPAIRING - 2/2 O2S HEATER FAILURE



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-126A REPAIRING - 1/2 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

1/2 RIGHT BANK DOWN

Name of code: O2 Sensor Shorted To Voltage

When monitored: With the engine running for more than 2 minutes and coolant temperature above 170°F.

Set condition: The oxygen sensor voltage is above 1.2 volts.

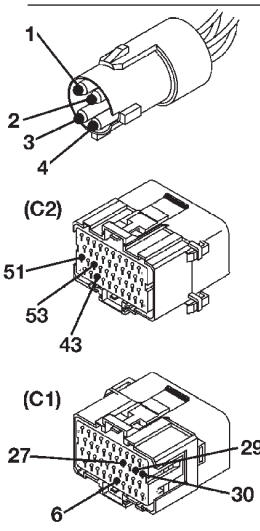
Theory of operation: Effective control of exhaust emissions is achieved by an oxygen feedback system. The oxygen sensor (O2S), which is located in the exhaust path, monitors the exhaust emissions. Once the sensor reaches its normal operating temperature of 300°-350°C (572°-662°F), it generates a voltage inversely proportional to the amount of oxygen in the exhaust.

Possible causes:

- Sensor output wire shorted to a power circuit
- O2 sensor failure
- Powertrain control module failure
- Connector terminals
- Connector wires
- Open O2 sensor signal circuit

80b01cfe

1/2 RIGHT BANK DOWN



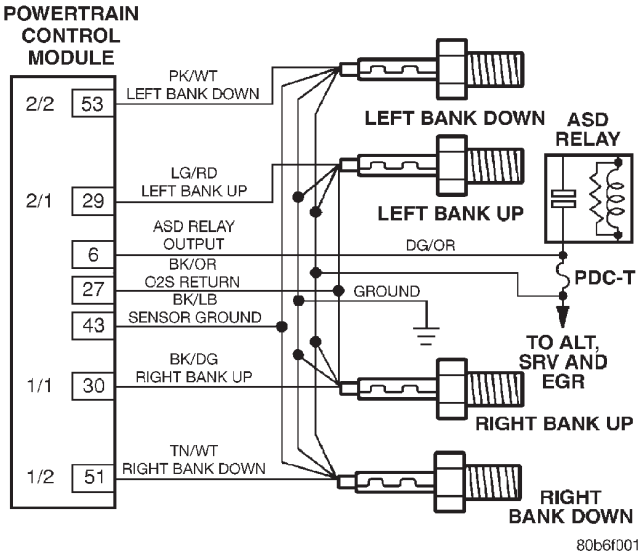
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

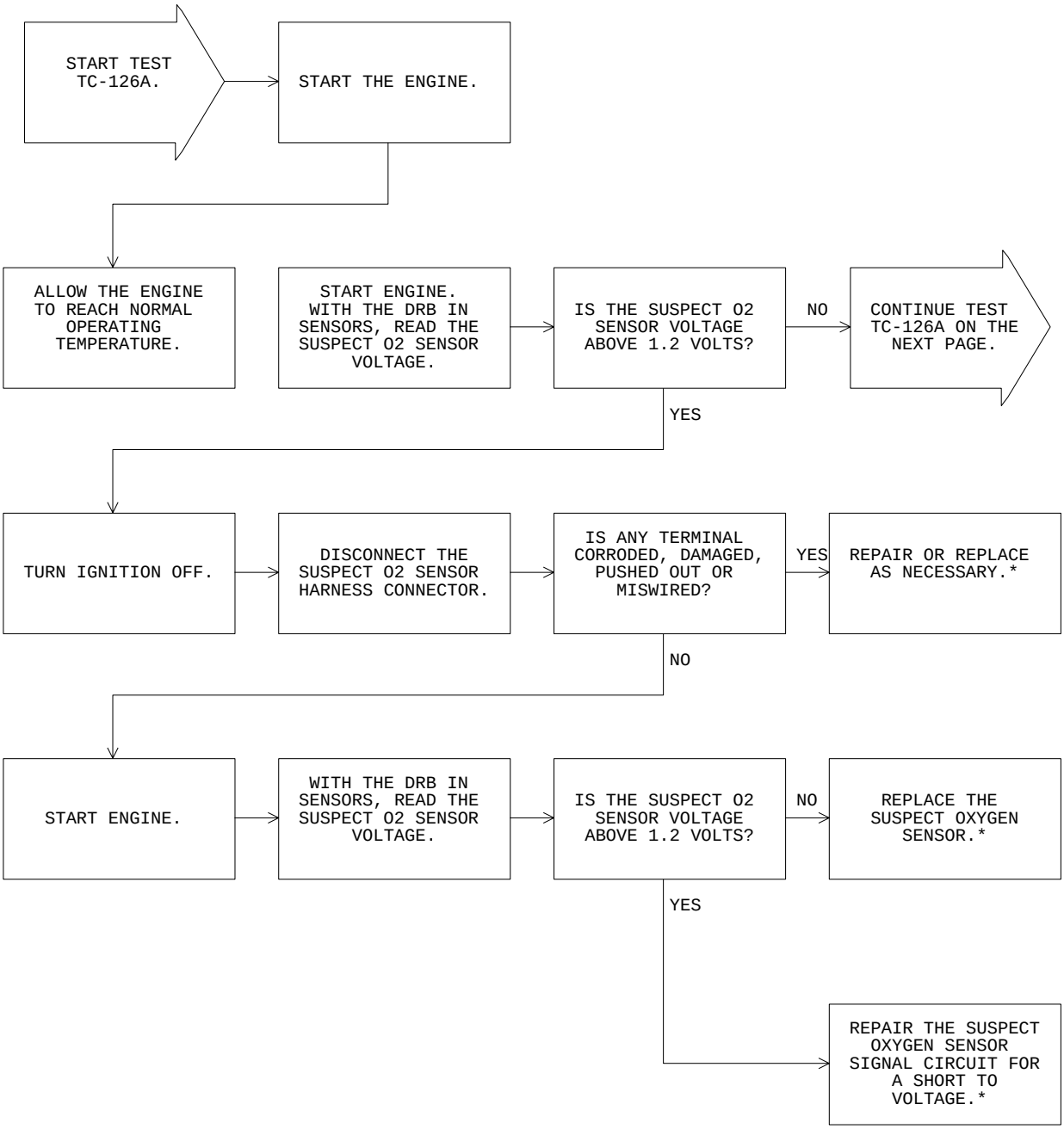
80b1b45c



80b6f001

TEST TC-126A REPAIRING - 1/2 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

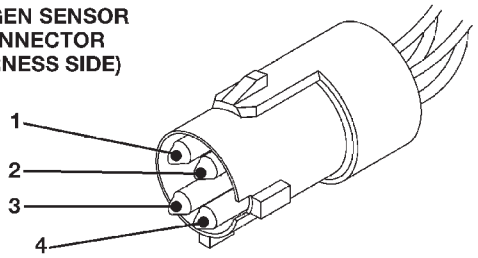


***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST TC-126A CONTINUED - REPAIRING - 1/2 O2S SHORTED TO VOLTAGE

1/2 RIGHT BANK DOWN

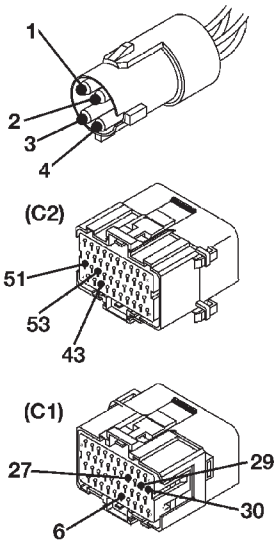
OXYGEN SENSOR CONNECTOR (HARNESS SIDE)



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

1/2 RIGHT BANK DOWN



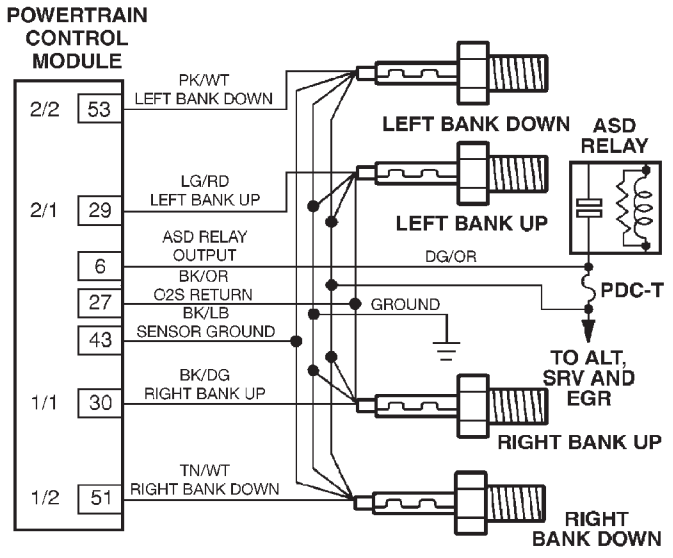
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

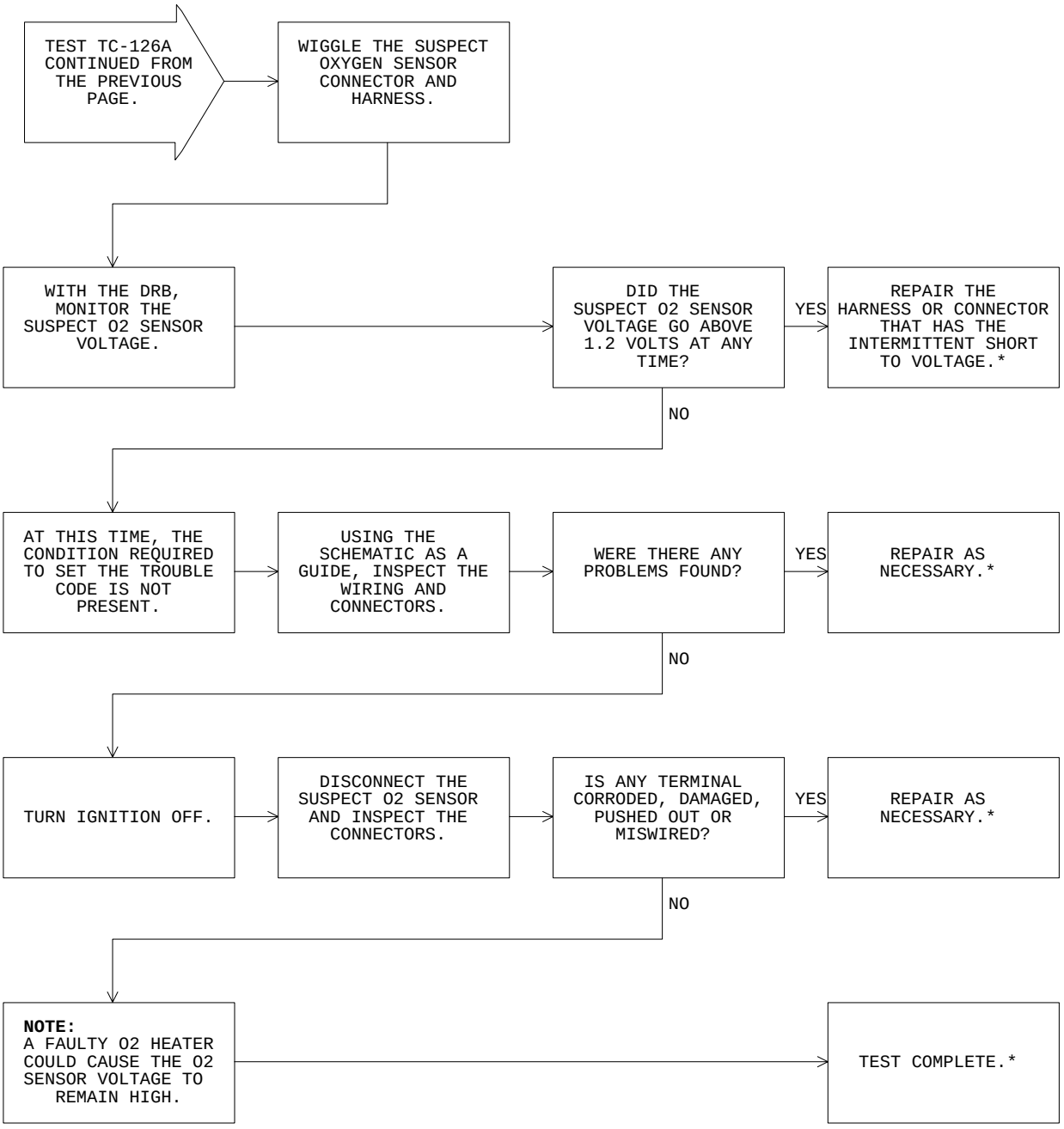
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c



80b6f001

TEST TC-126A CONTINUED - REPAIRING - 1/2 O2S SHORTED TO VOLTAGE



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-127A REPAIRING - 2/2 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

2/2 LEFT BANK DOWN

Name of code: O2 Sensor Shorted To Voltage

When monitored: With the engine running for more than 2 minutes and coolant temperature above 170°F.

Set condition: The oxygen sensor voltage is above 1.2 volts.

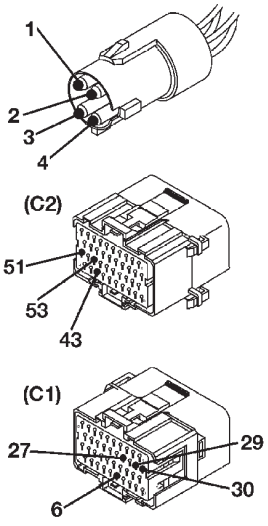
Theory of operation: Effective control of exhaust emissions is achieved by an oxygen feedback system. The oxygen sensor (O2S), which is located in the exhaust path, monitors the exhaust emissions. Once the sensor reaches its normal operating temperature of 300°-350°C (572°-662°F), it generates a voltage inversely proportional to the amount of oxygen in the exhaust.

Possible causes:

> Sensor output wire shorted to a power circuit
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires
> Open O2 sensor signal circuit

80b01cfe

2/2 LEFT BANK DOWN



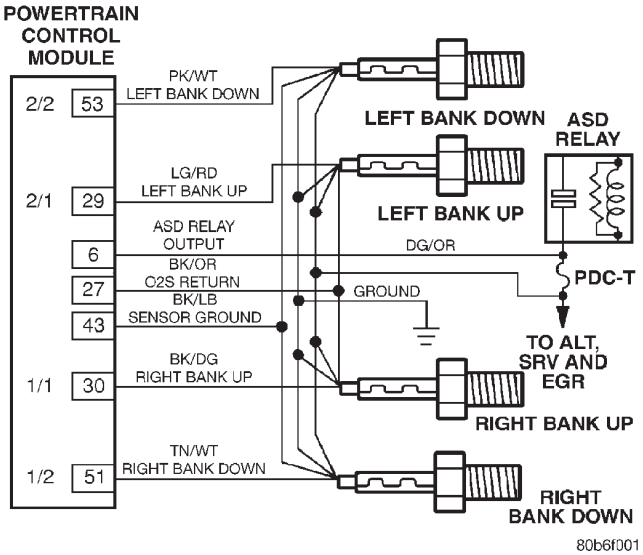
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

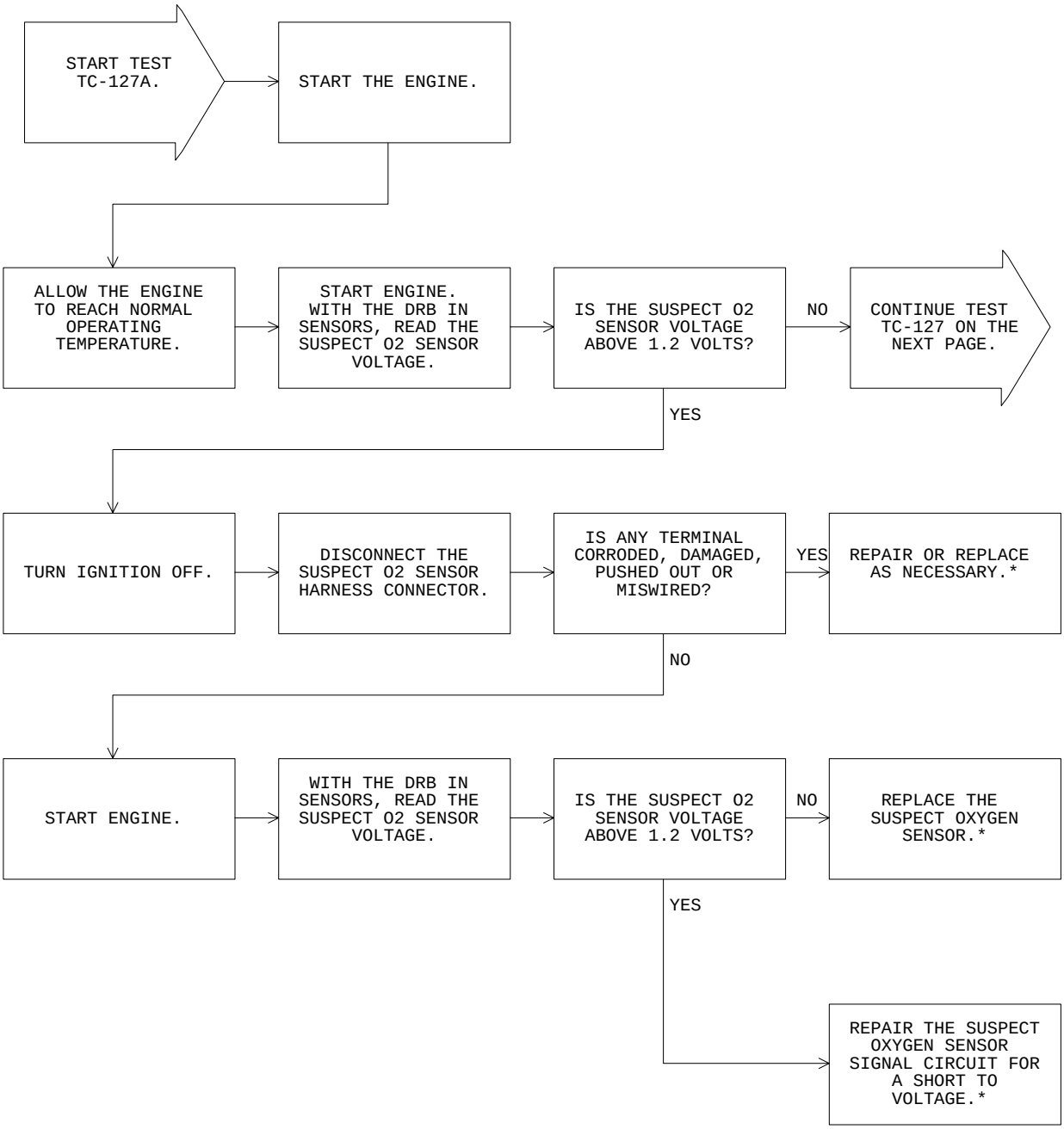
80b1b45c



80b6f001

TEST TC-127A REPAIRING - 2/2 O2S SHORTED TO VOLTAGE

Perform TEST DTC Before Proceeding

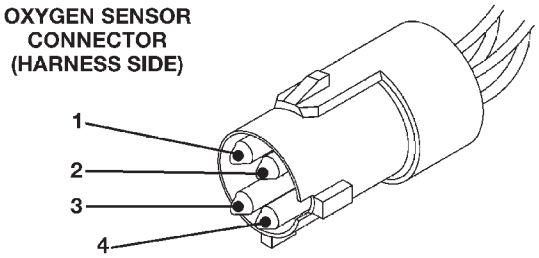


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-127A CONTINUED - REPAIRING - 2/2 O2S SHORTED TO VOLTAGE

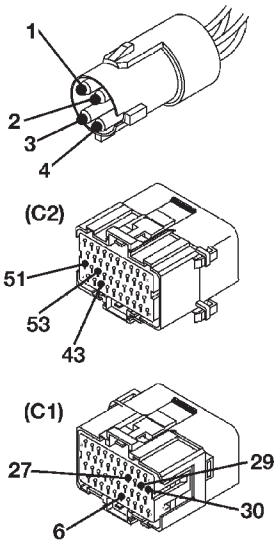
2/2 LEFT BANK DOWN



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

2/2 LEFT BANK DOWN



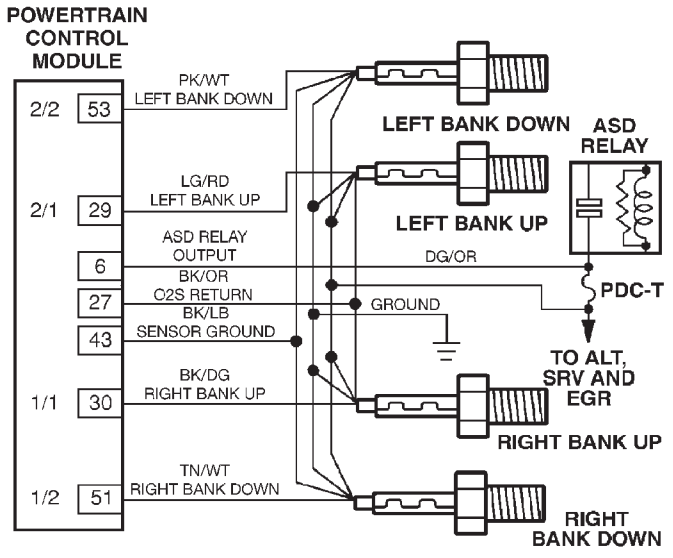
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

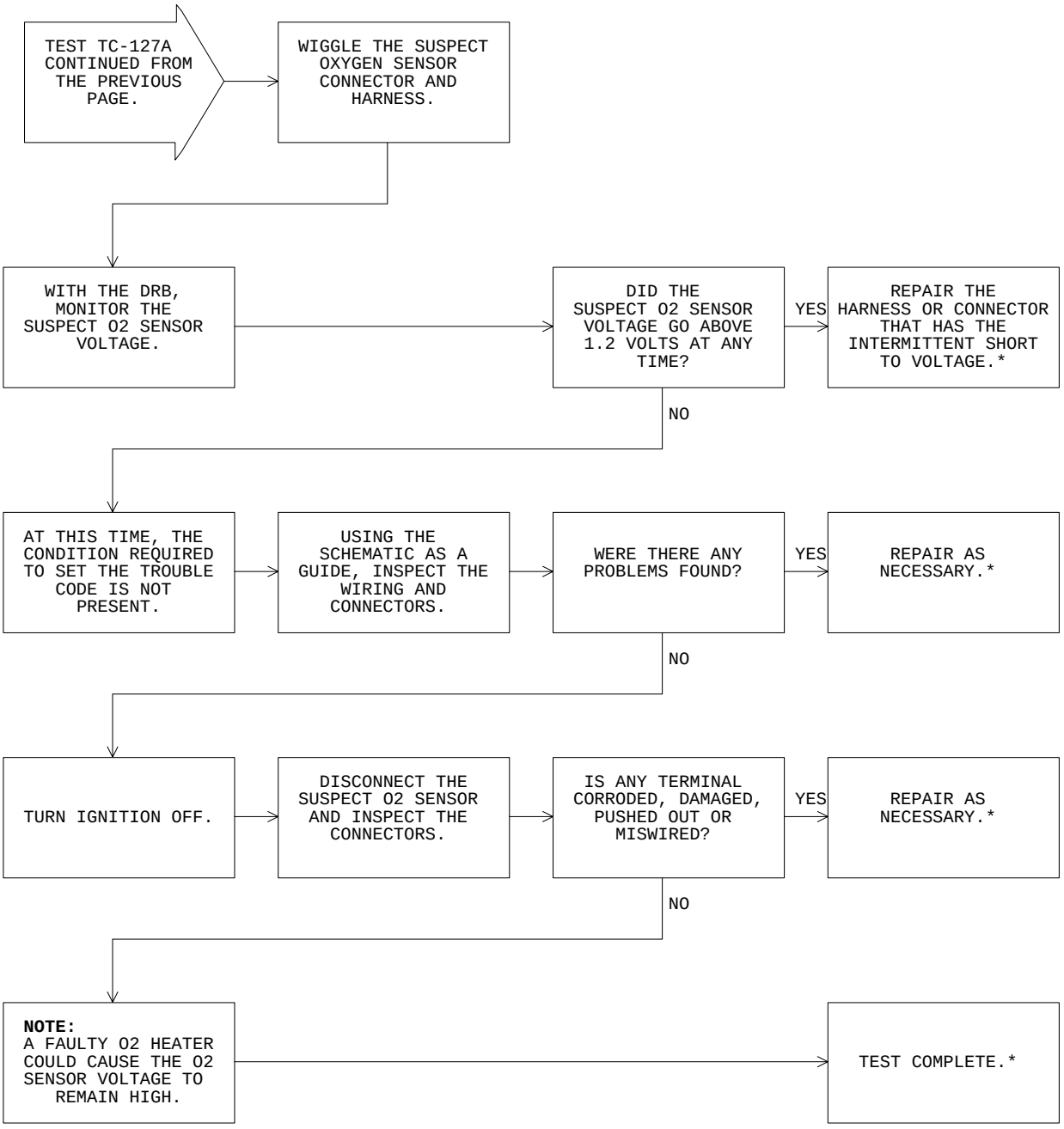
CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c



80b6f001

TEST TC-127A CONTINUED - REPAIRING - 2/2 O2S SHORTED TO VOLTAGE



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-129A REPAIRING - 1/2 O2S STAYS AT CENTER

Perform TEST DTC Before Proceeding

1/2 RIGHT BANK DOWN

Name of code: 02 Sensor Stays at Center

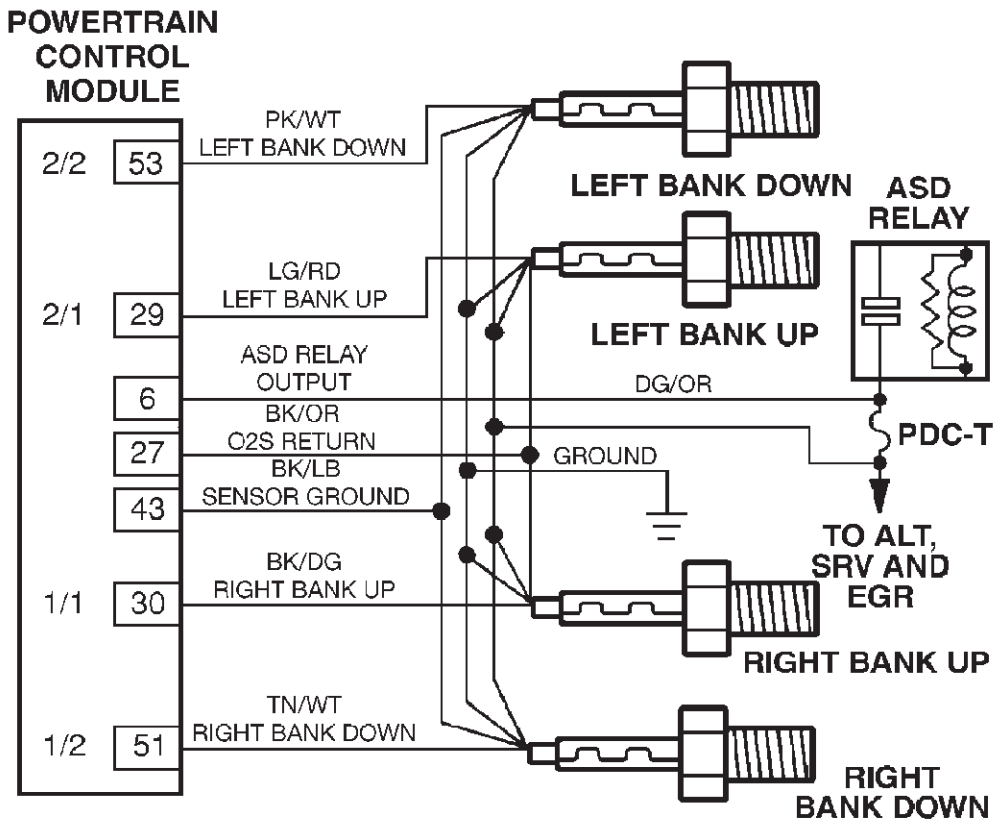
When monitored: With the engine running for more than 2 minutes and engine temperature greater than 170°.

Set condition: The oxygen sensor signal voltage is between 0.35 volt and 0.55 volt for 1.5 minutes.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this 02 sensor. The sensor detects exhaust gas content by a galvanic reation within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this 02 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be approximately 1 volt. When oxygen content is high (lean mixture), the voltage signal will be low, approximately 0.1 volt.

Possible causes:
- > Sensor output wire open
- > 02 sensor failure
- > Powertrain control module failure
- > Dirt/moisture/grease causing voltage tracking in connector
- > Connector wires

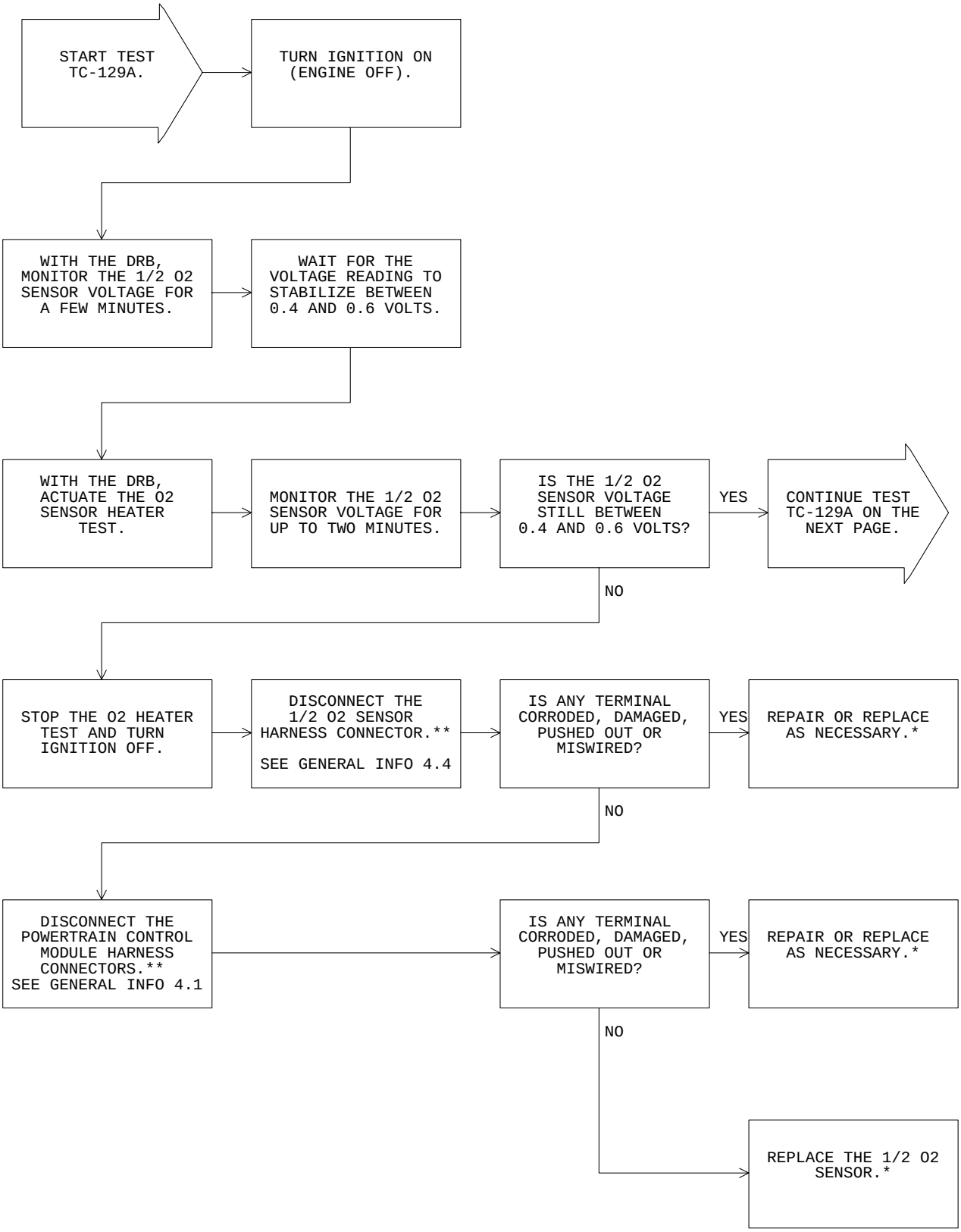
80b2439c



80b6f001

TEST TC-129A REPAIRING - 1/2 O2S STAYS AT CENTER

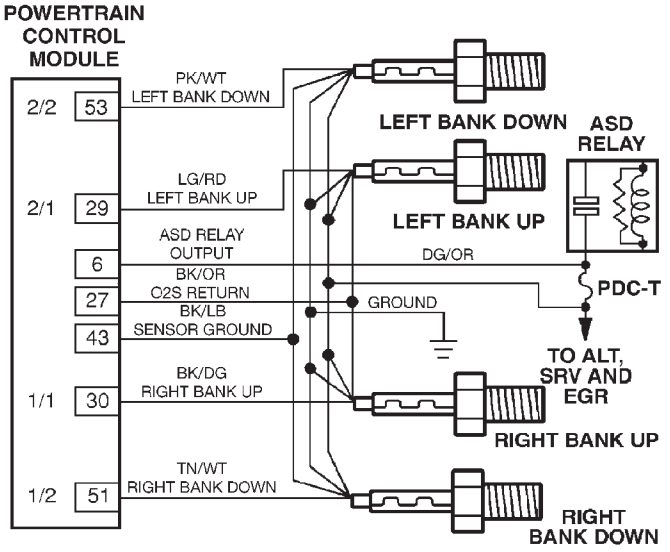
Perform TEST DTC Before Proceeding



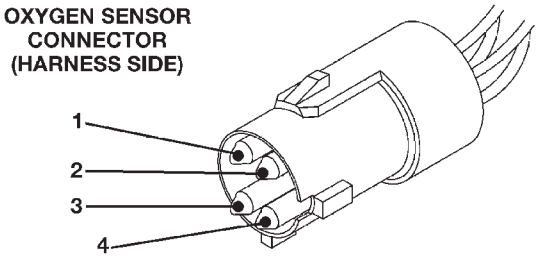
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-129A CONTINUED - REPAIRING - 1/2 O2S STAYS AT CENTER



1/2 RIGHT BANK DOWN

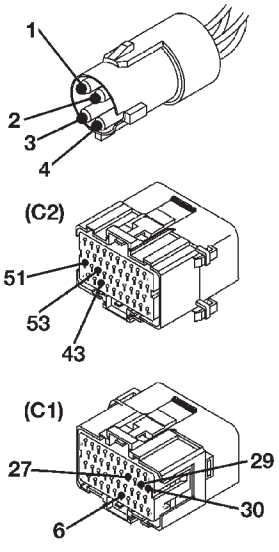


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

1/2 RIGHT BANK DOWN



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

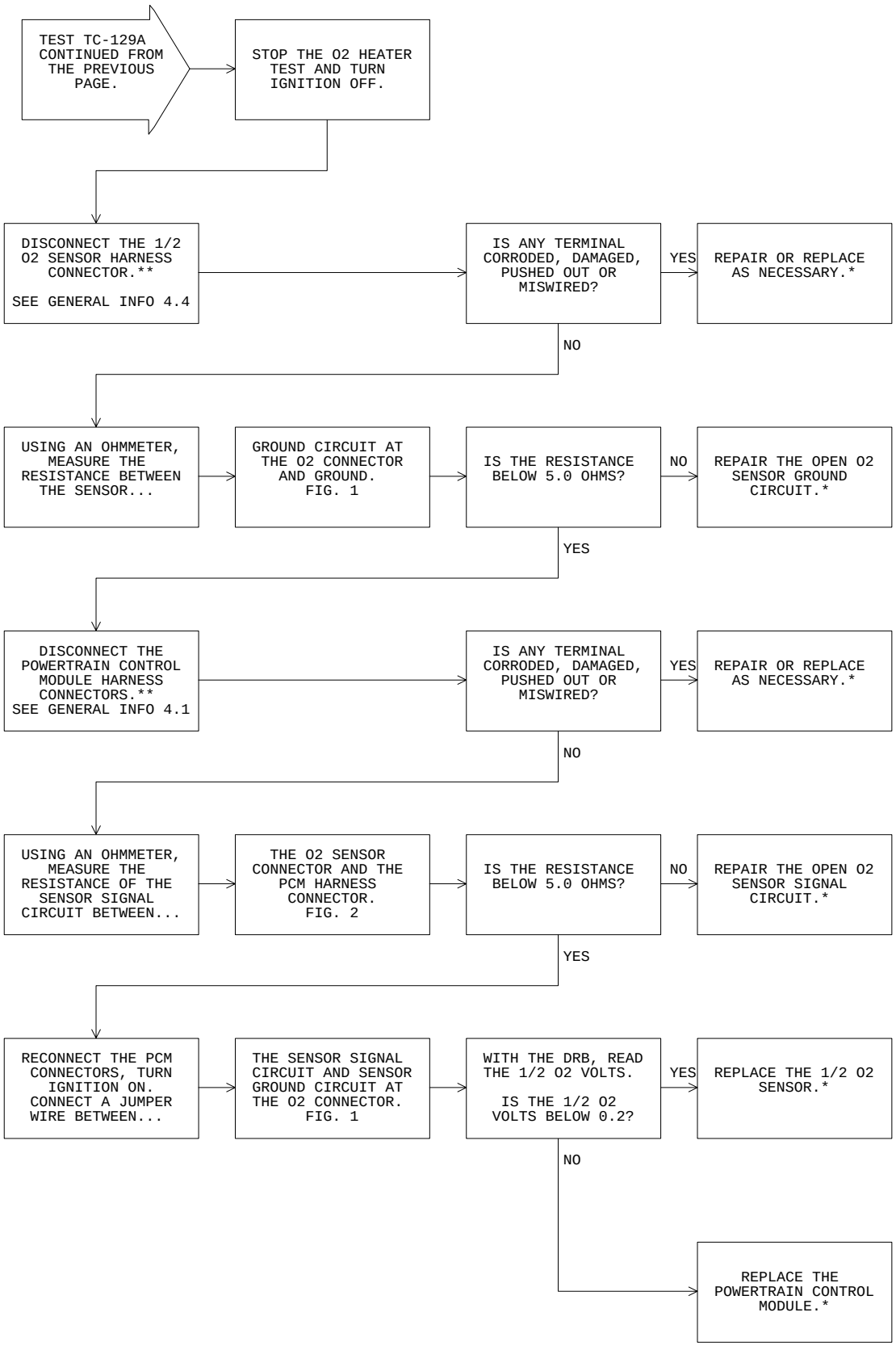
POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

FIG. 2

TEST TC-129A CONTINUED - REPAIRING - 1/2 O2S STAYS AT CENTER



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-130A REPAIRING - 2/2 O2S STAYS AT CENTER

Perform TEST DTC Before Proceeding

2/2 LEFT BANK DOWN

Name of code: 02 Sensor Stays at Center

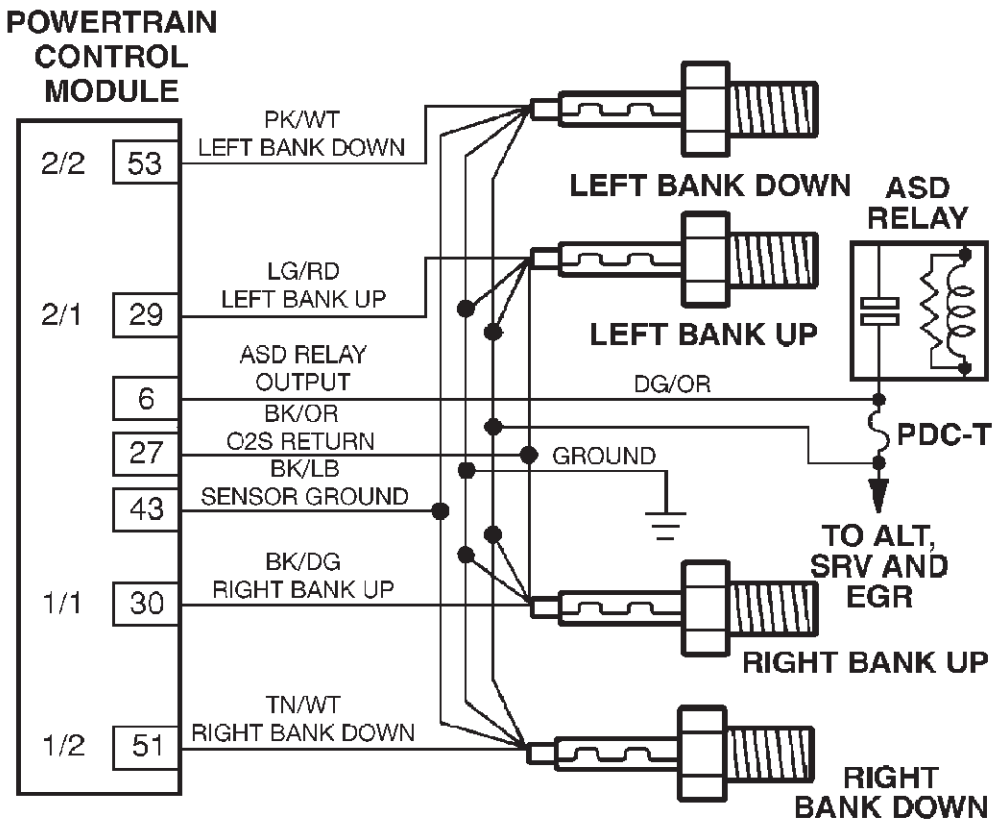
When monitored: With the engine running for more than 2 minutes and engine temperature greater than 170°.

Set condition: The oxygen sensor signal voltage is between 0.35 volt and 0.55 volt for 1.5 minutes.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this 02 sensor. The sensor detects exhaust gas content by a galvanic reation within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this 02 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be approximately 1 volt. When oxygen content is high (lean mixture), the voltage signal will be low, approximately 0.1 volt.

Possible causes:
- > Sensor output wire open
- > 02 sensor failure
- > Powertrain control module failure
- > Dirt/moisture/grease causing voltage tracking in connector
- > Connector wires

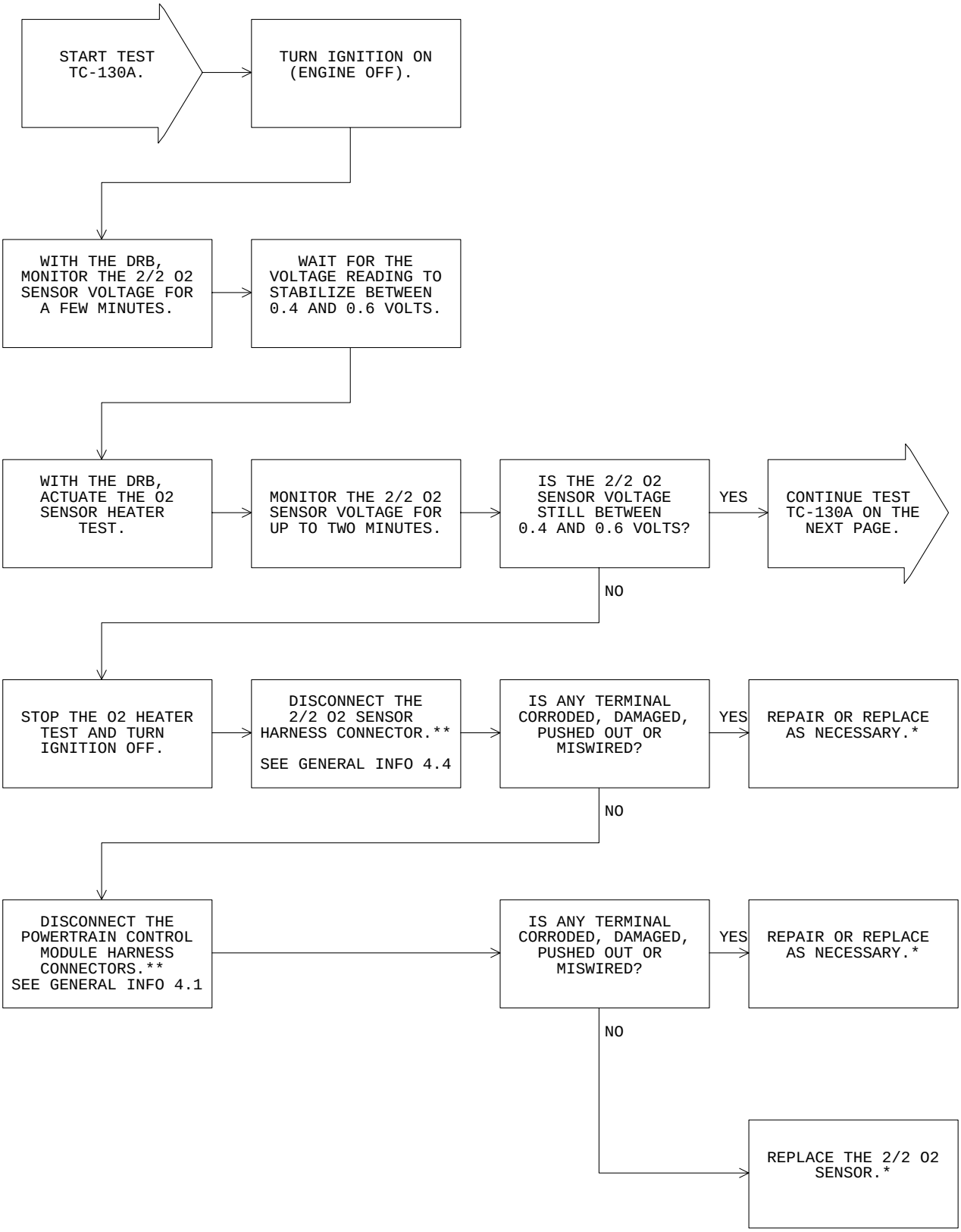
80b2439c



80b6f001

TEST TC-130A REPAIRING - 2/2 O2S STAYS AT CENTER

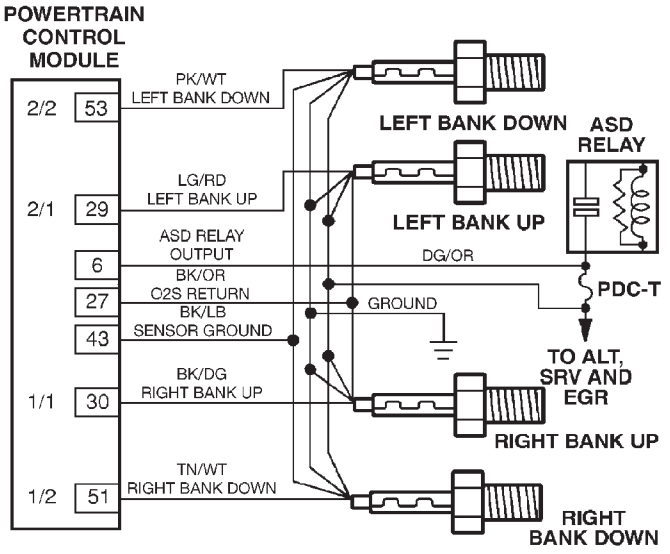
Perform TEST DTC Before Proceeding



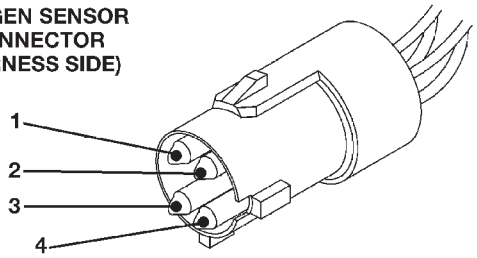
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-130A CONTINUED - REPAIRING - 2/2 O2S STAYS AT CENTER



2/2 LEFT BANK DOWN

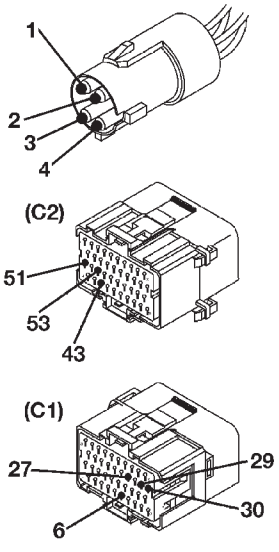


CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

2/2 LEFT BANK DOWN



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

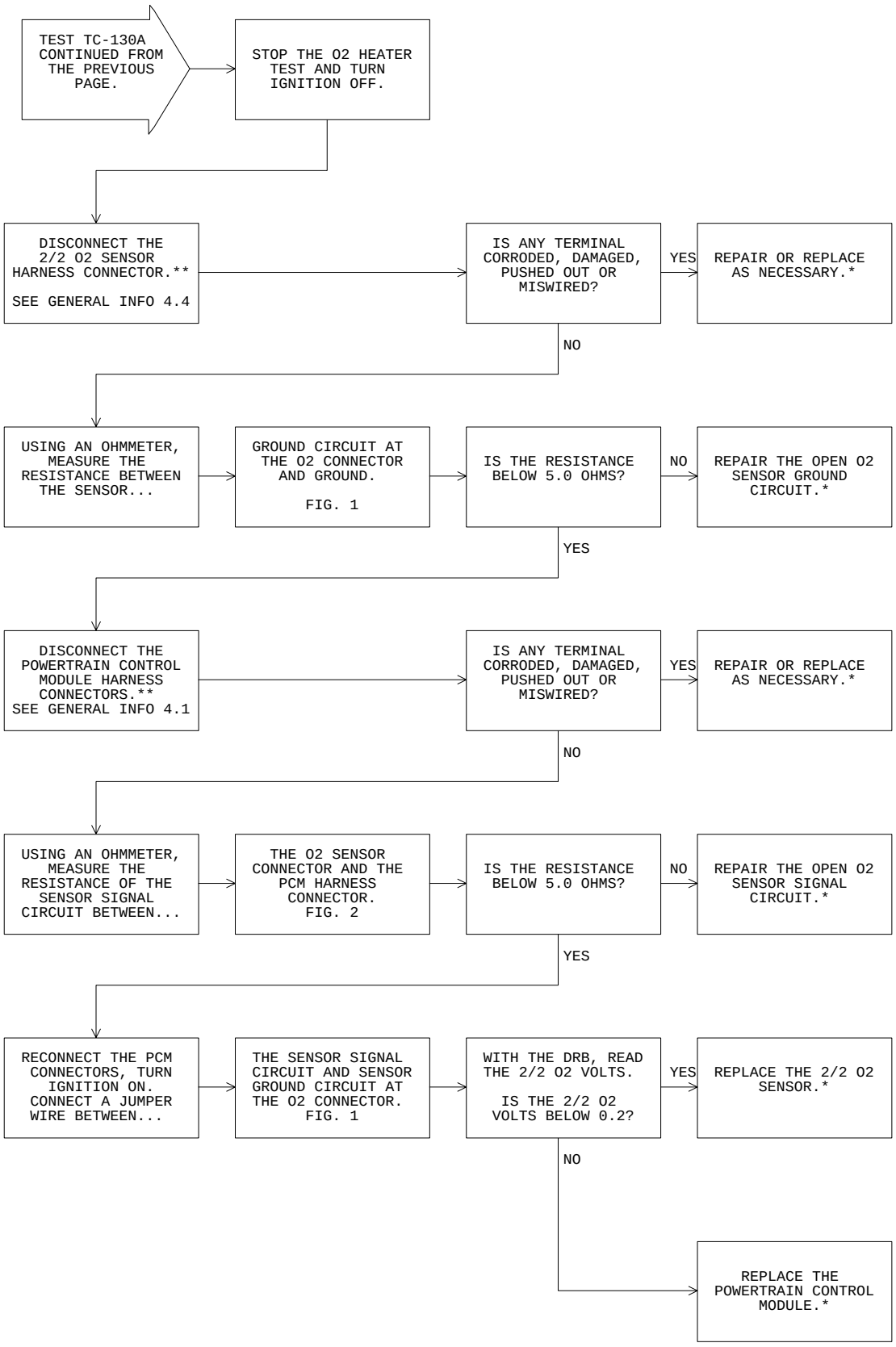
POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

FIG. 2

TEST TC-130A CONTINUED - REPAIRING - 2/2 O2S STAYS AT CENTER

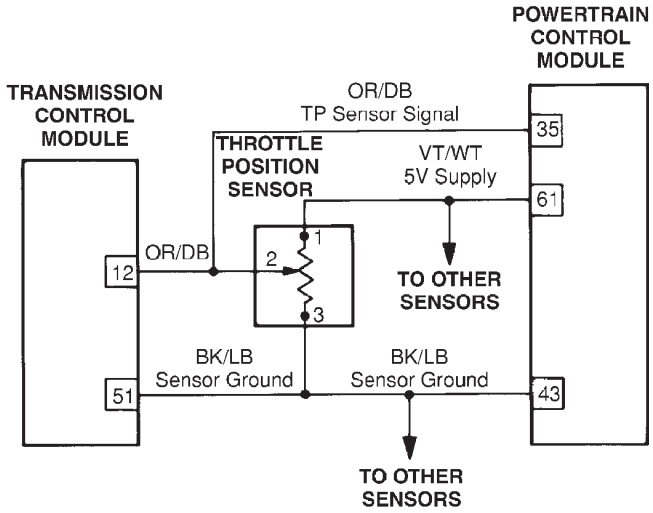


Perform Verification TEST VER-2A.

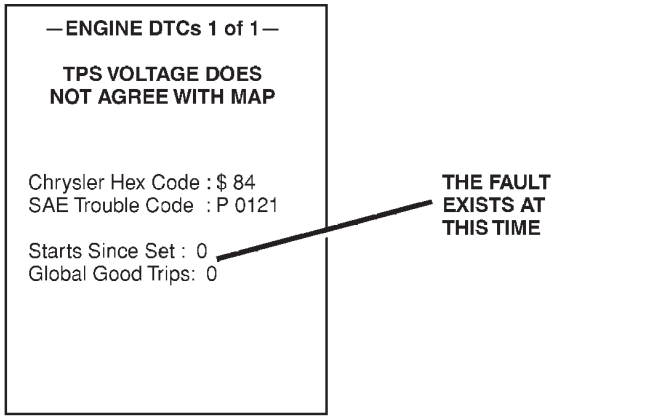
Check connectors - Clean / repair as necessary.

TEST TC-132A REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP

Perform TEST DTC Before Proceeding

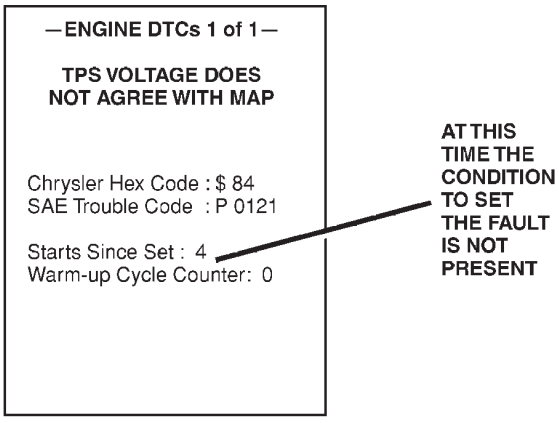


80b27c71



80b34dd7

FIG. 1



80b34dd8

FIG. 2

Name of Code: TPS Voltage Does Not Agree with MAP

When monitored: With the engine running and no MAP sensor or TP sensor trouble codes.

Set condition: The powertrain control module (PCM) performs two separate tests on the TP sensor: the high voltage test and the low voltage test. The high voltage test is performed when the engine speed is very low and manifold vacuum is very high; these conditions indicate that the throttle plate must be nearly closed, in which case the TP sensor signal voltage output must be low. The low voltage test is performed when the vechile speed is above 25 mph and manifold vacuum is low; these conditions indicate that the throttle plate is open, in which case the TP sensor signal must be high. If the proper TP sensor voltage is not present when the two conditions are met, the code will set after 4 continuous seconds.

Theory of operation: The TP sensor contains a potentiometer that is operated by the throttle blade shaft. As a throttle plate rotates, the TP sensor provides a variable 0 to 5-volt signal to PCM. The voltage is directly proportional to throttle angle. When the throttle plate is at rest the voltage is low. When the throttle is fully open, the voltage is high. With this signal, the PCM can determine precise throttle position under all operating conditions. The TP sensor receives a 5-volt supply from the PCM. The sensor ground is provided by the PCM.

Possible causes:

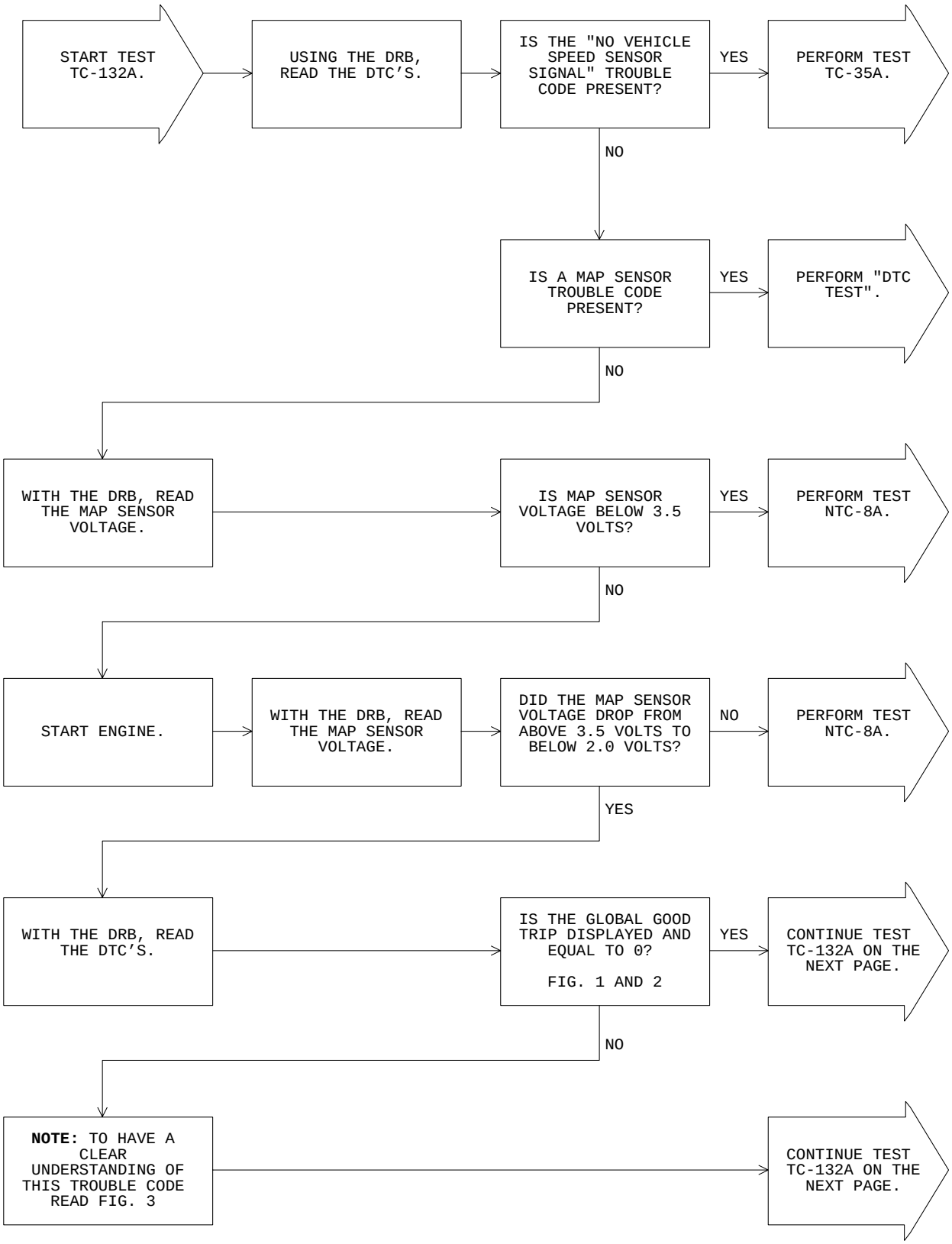
- Failed powertrain control module
- TP sensor failure
- Mechanical failure
- Connector terminals
- Connector wires
- Vechile speed
- MAP sensor

80b4fb4a

FIG.3

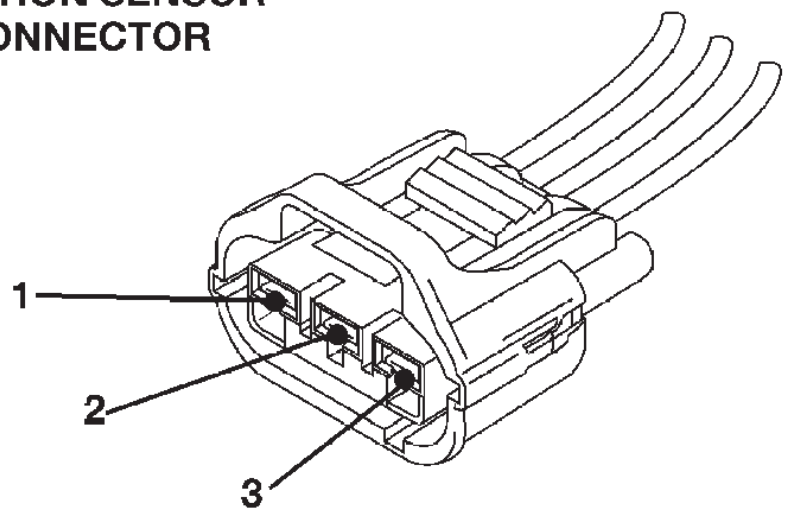
TEST TC-132A REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP

Perform TEST DTC Before Proceeding



*Perform Verification TEST VER-2A.	**Check connectors - Clean / repair as necessary.

THROTTLE POSITION SENSOR CONNECTOR

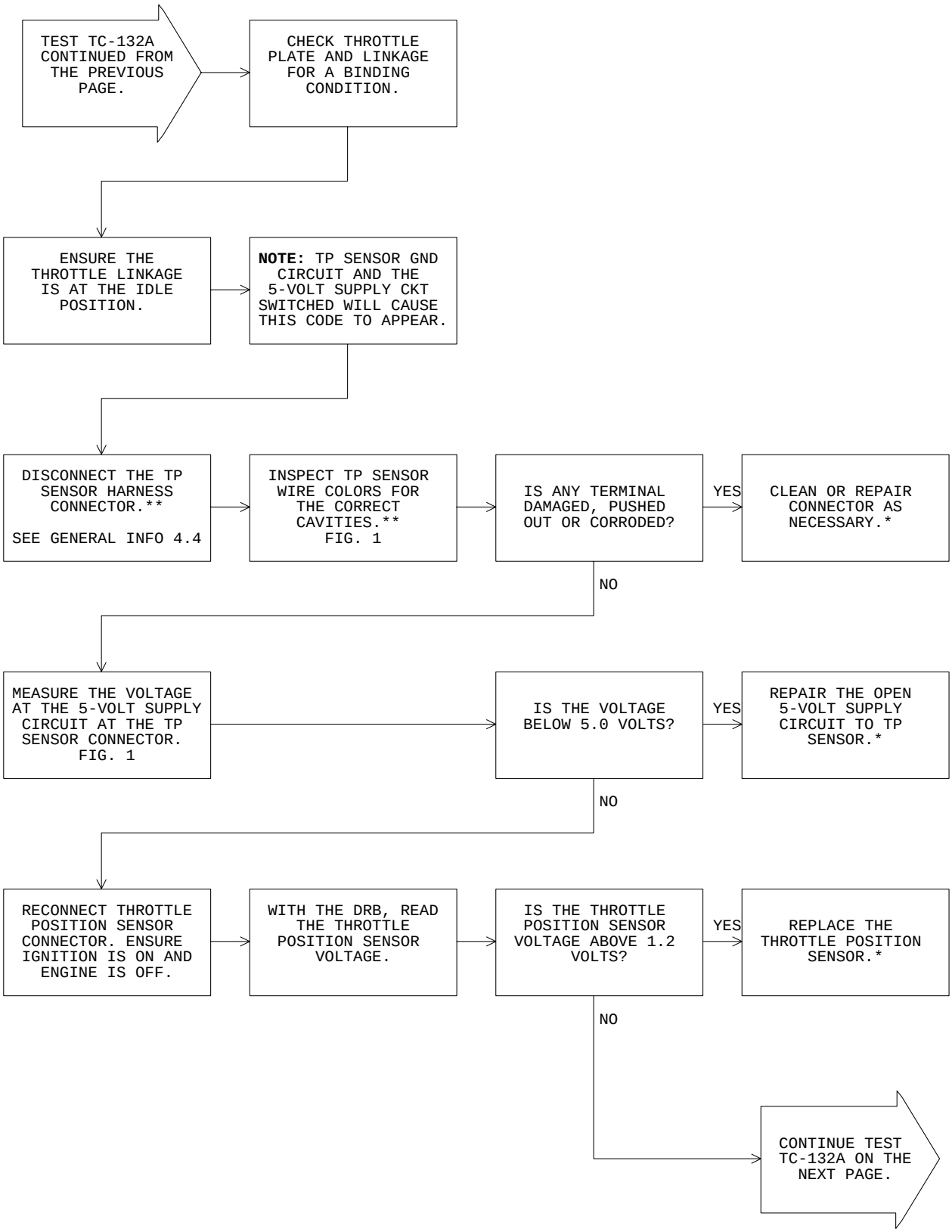


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b04fa9

FIG. 1

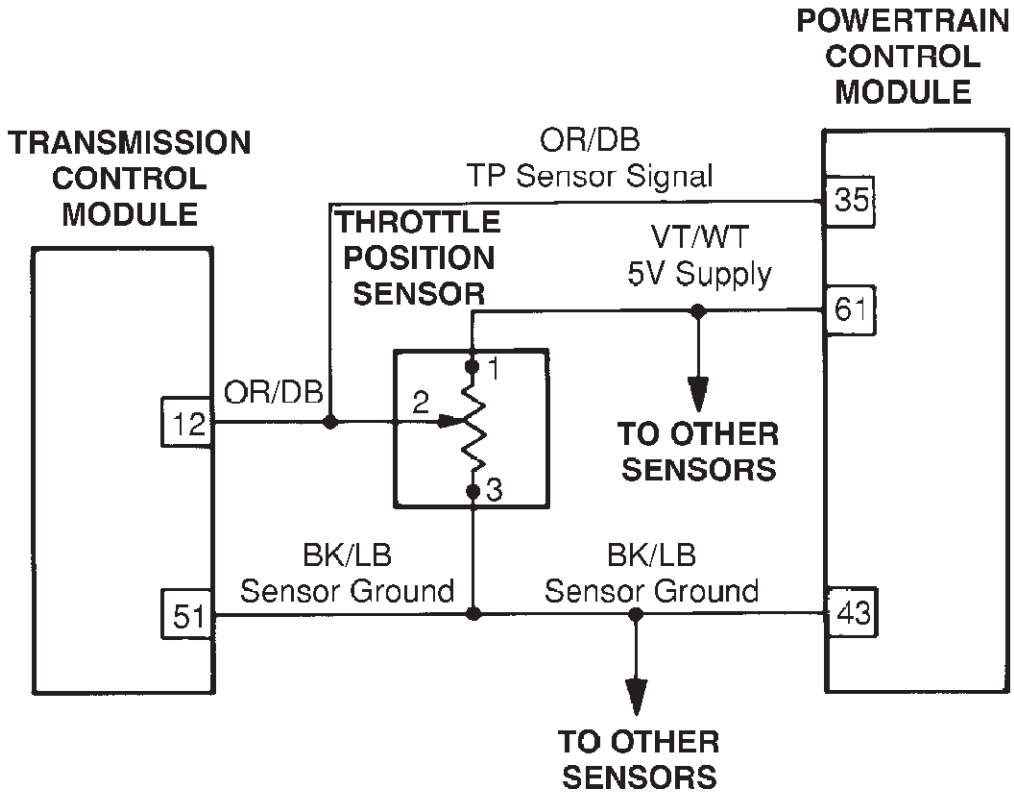
TEST TC-132A CONTINUED - REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-132A CONTINUED - REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP



TYPICAL

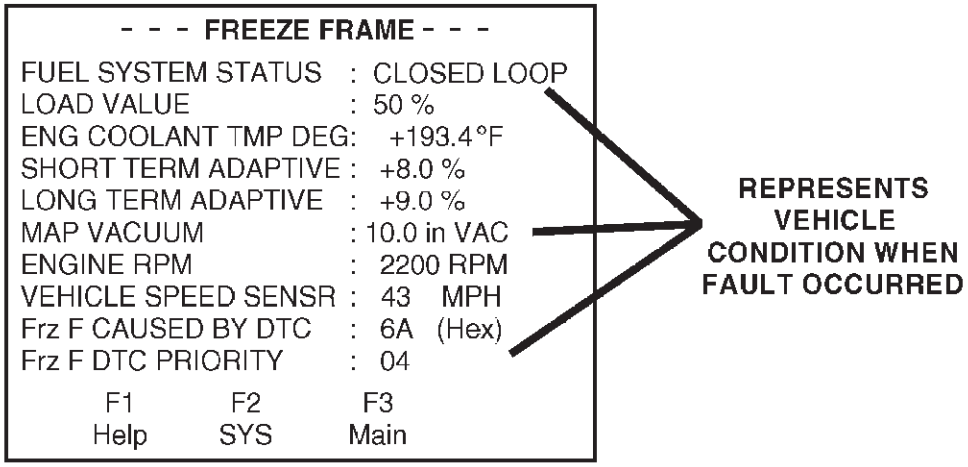
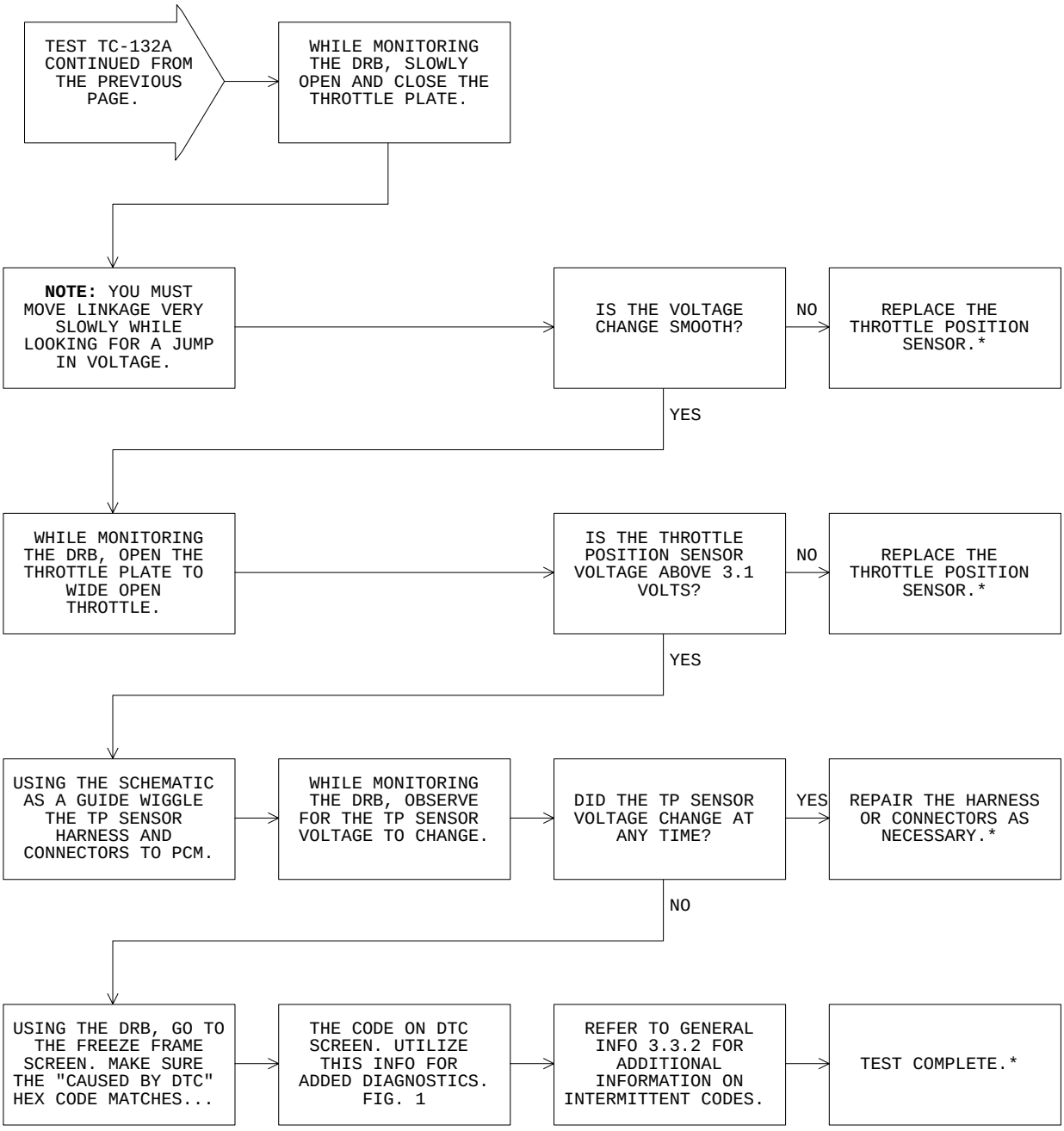


FIG. 1

TEST TC-132A CONTINUED - REPAIRING - TPS VOLTAGE DOES NOT AGREE WITH MAP



***Perform Verification TEST VER-2A.**	****Check connectors - Clean / repair as necessary.**

TEST TC-145A **REPAIRING - VACUUM LEAK FOUND (IAC FULLY SEATED)**

Perform TEST DTC Before Proceeding

Name of code: Vacuum Leak Found (IAC Fully Seated)

When monitored: With the engine running.

Set condition: The MAP sensor signal does not correlate to the TP sensor signal.

Theory of operation: The powertrain control module (PCM) monitors the MAP signal as well as the TP sensor signal. The vacuum reading decreases as throttle opening increases proportionally. The PCM compares the two values to verify the relation between the two signals.

Possible causes:

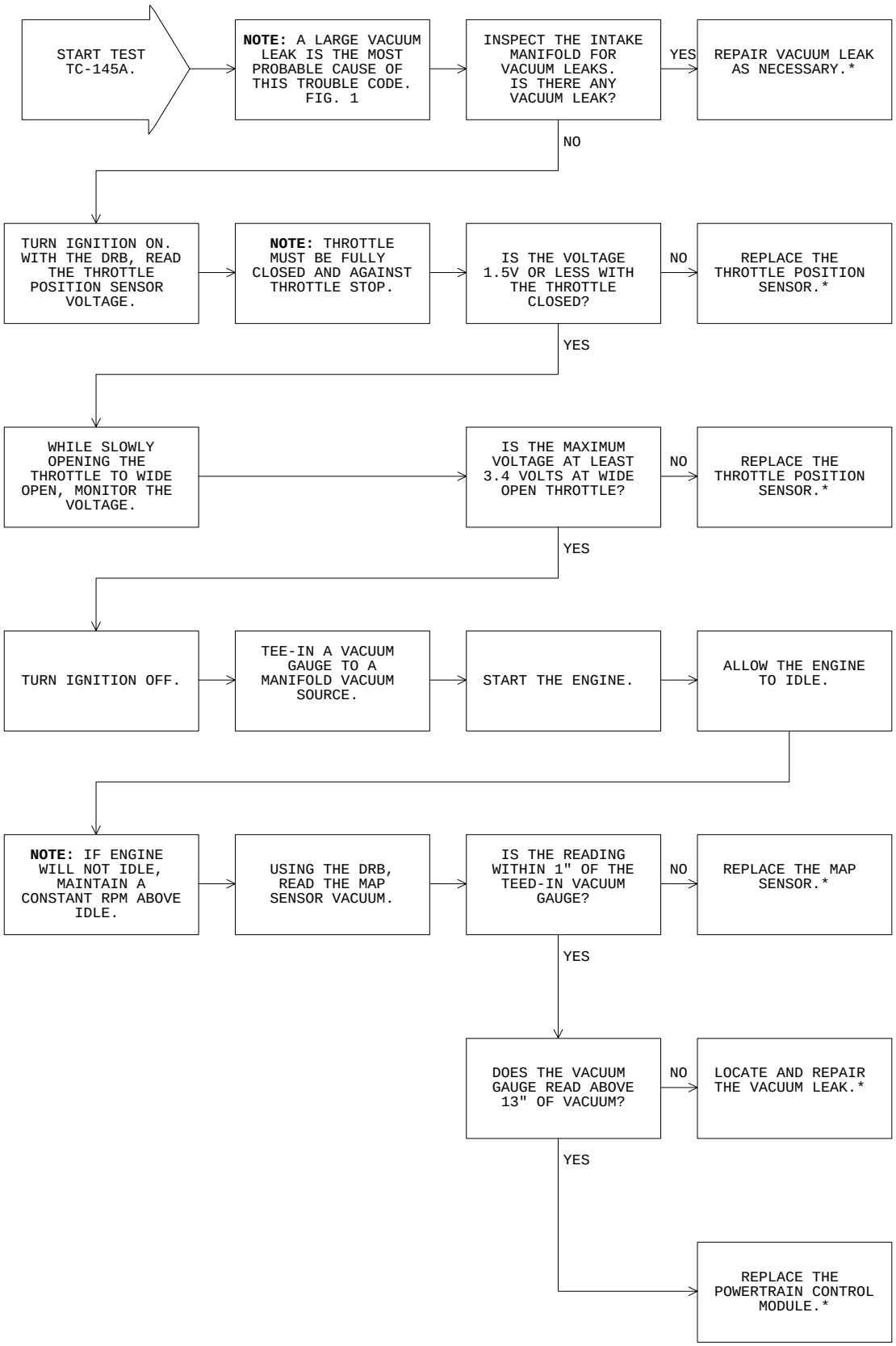
- Vacuum leak
- Faulty MAP sensor
- Faulty TP sensor
- Powertrain control module failure
- Connector terminals
- Connector wires

2440506

FIG. 1

TEST TC-145A REPAIRING - VACUUM LEAK FOUND (IAC FULLY SEATED)

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-146A REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW

Perform TEST DTC Before Proceeding

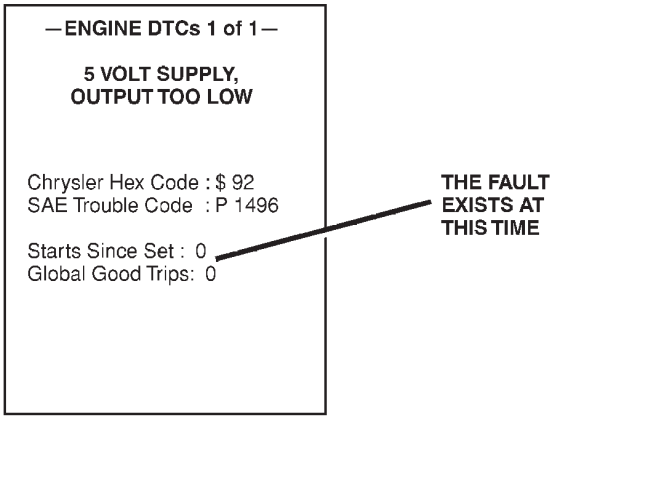


FIG. 1

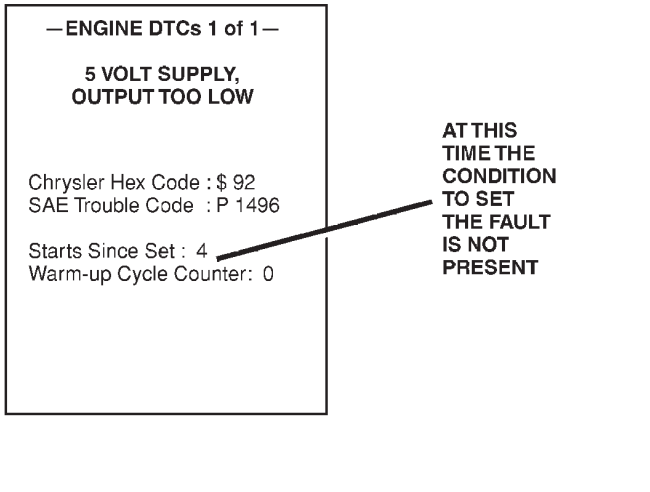
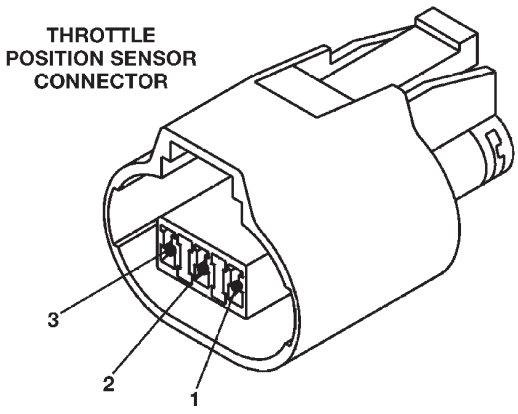


FIG. 2

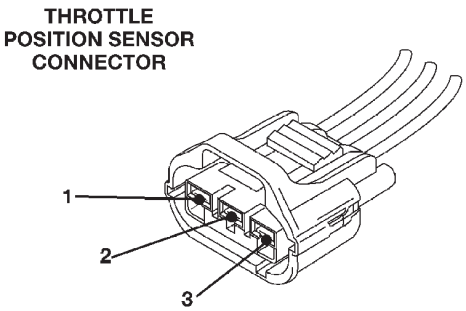
2.7L



CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

FIG. 3

3.5L

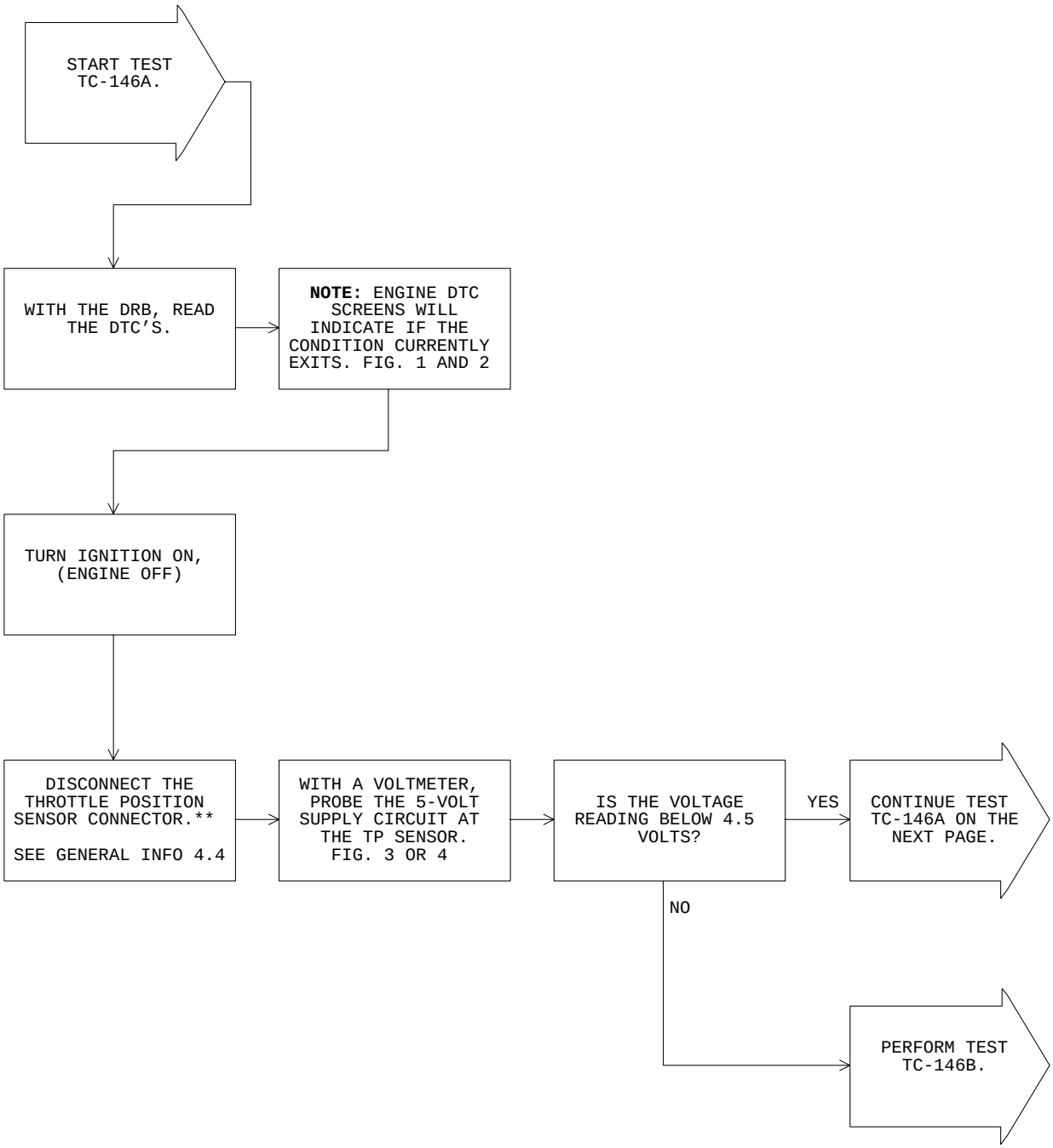


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

FIG. 4

TEST TC-146A REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW

Perform TEST DTC Before Proceeding

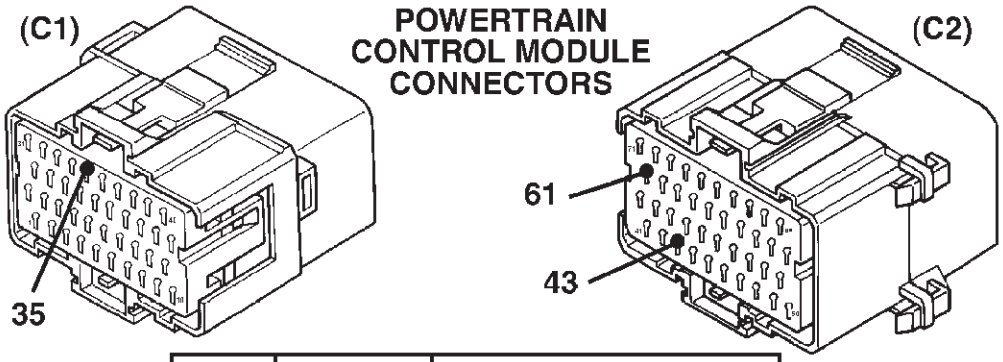


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST TC-146A CONTINUED - REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW

2.7L



CAV	COLOR	FUNCTION
35	OR/DB	TP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

THROTTLE POSITION SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

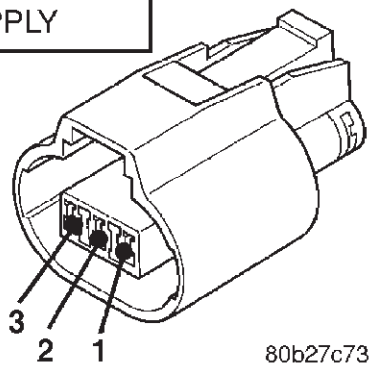
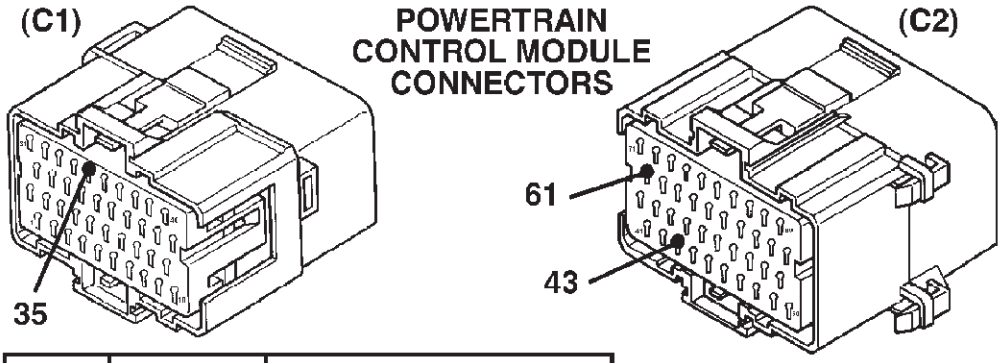


FIG. 1

3.5L



CAV	COLOR	FUNCTION
35	OR/DB	TP SENSOR SIGNAL
43	BK/LB	SENSOR GROUND
61	VT/WT	5-VOLT SUPPLY

THROTTLE POSITION SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

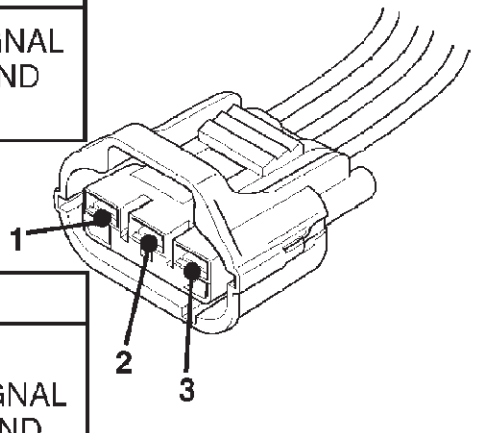
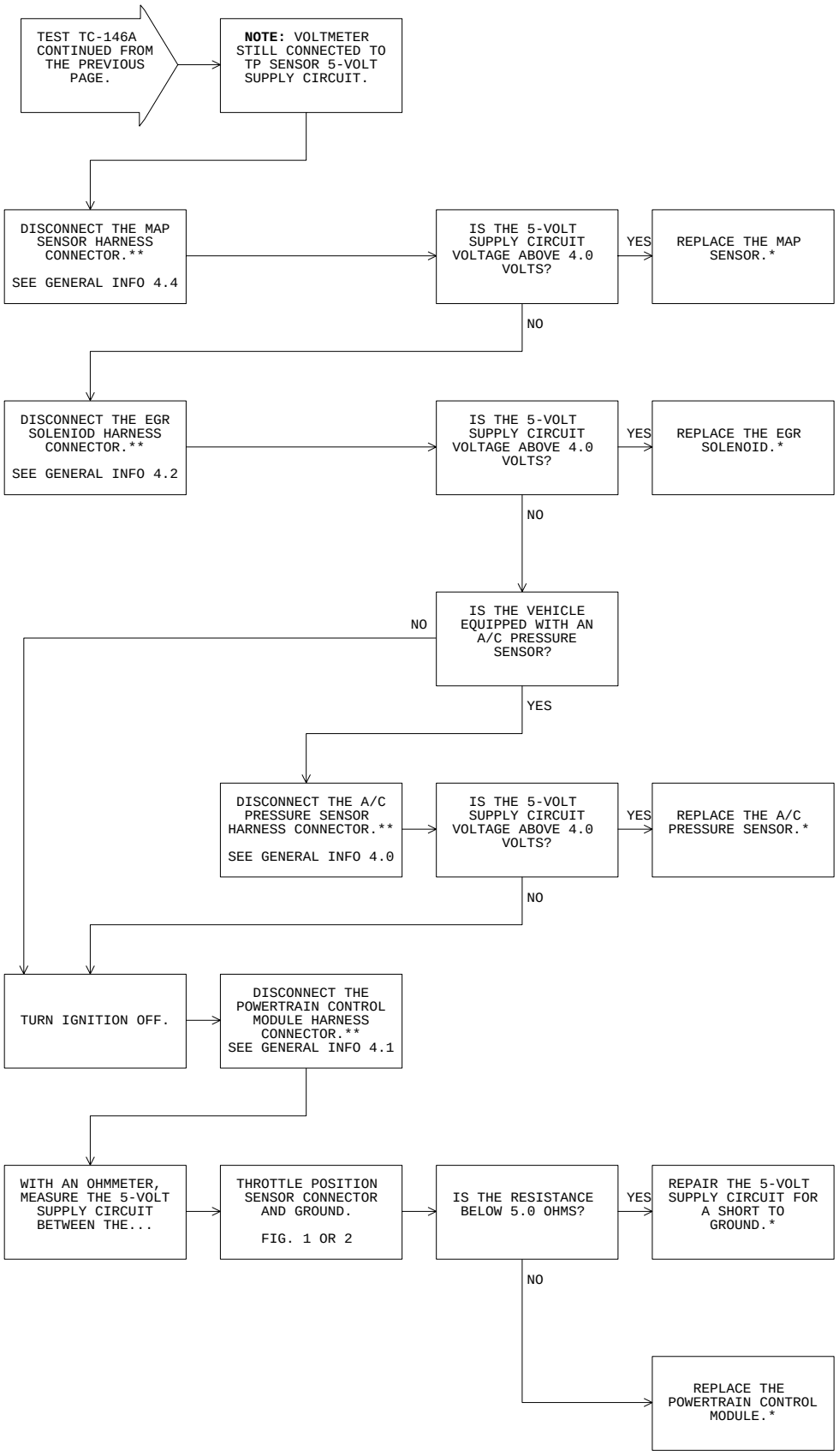


FIG. 2

TEST TC-146A CONTINUED - REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW



Perform Verification TEST VER-2A.

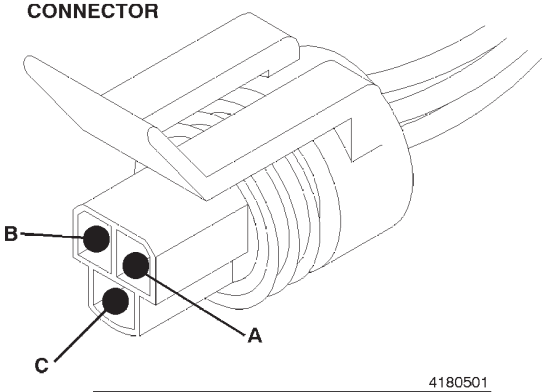
****Check connectors - Clean / repair as necessary.***

TEST TC-146B REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW

Perform TEST TC-146A Before Proceeding

2.7L

MAP SENSOR CONNECTOR



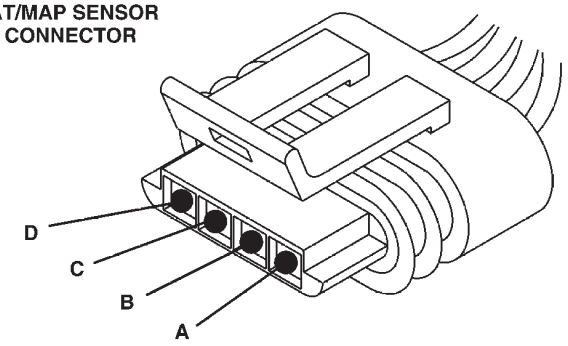
4180501

CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	VT/WT	5-VOLT SUPPLY
C	DG/RD	MAP SENSOR SIGNAL

FIG. 1

3.5L

IAT/MAP SENSOR CONNECTOR



CAV	COLOR	FUNCTION
A	BK/LB	SENSOR GROUND
B	BK/RD	INTAKE AIR TEMP SENSOR SIGNAL
C	VT/WT	5V SUPPLY
D	DG/RD	MAP SENSOR SIGNAL

80531038

FIG. 2

Name of code: 5-Volt Supply Output Too Low

When monitored: With the ignition on.

Set condition: The 5-volt supply to the sensors is below 3.5 volts for 4 seconds.

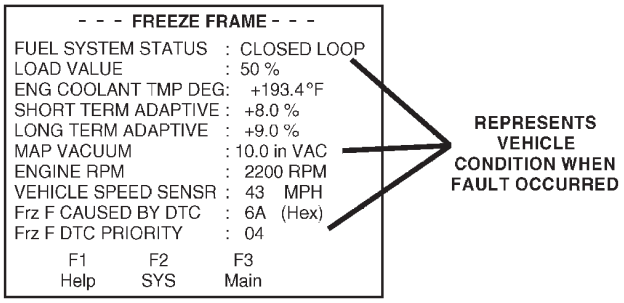
Theory of operation: The powertrain control module maintains a 5-volt supply to the MAP sensor, TP sensor, EGR valve, and A/C pressure sensor. It is critical that the 5-volt supply stays between 4.8 volts and 5.1 volts as this input has a direct effect on the sensors' output voltages.

Possible causes:

> Shorted 5-volt supply
> Shorted sensor
> PCM failure

80b34e17

FIG. 3

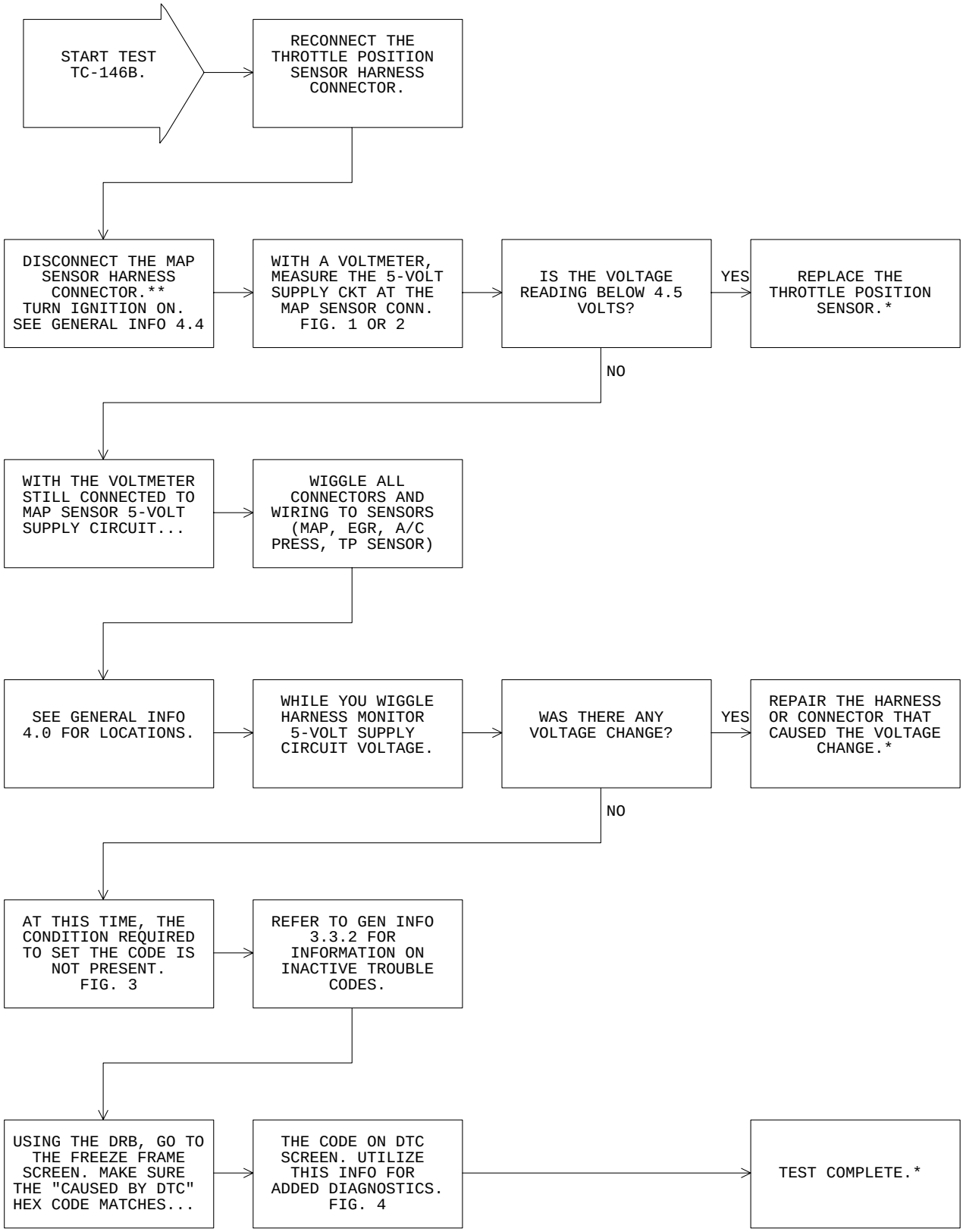


80b27cf5

FIG. 4

TEST TC-146B REPAIRING - 5 VOLT SUPPLY OUTPUT TOO LOW

Perform TEST TC-146A Before Proceeding

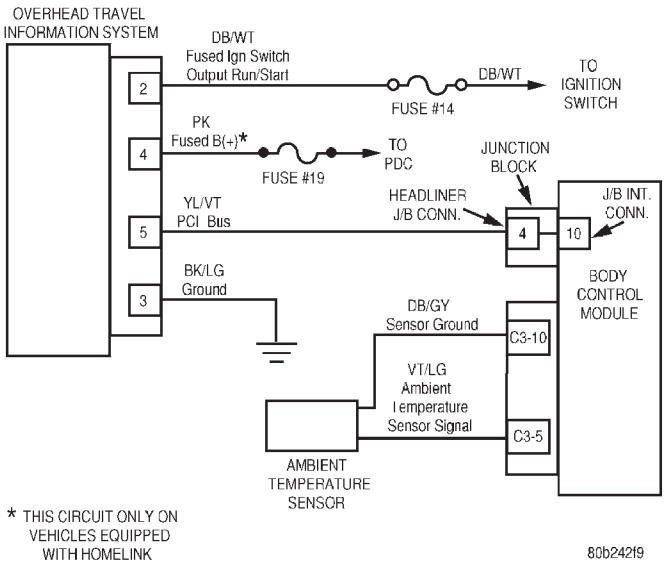


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-153A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding



Name of code: Ambient Temperature Sensor Failure

When monitored: With ignition on

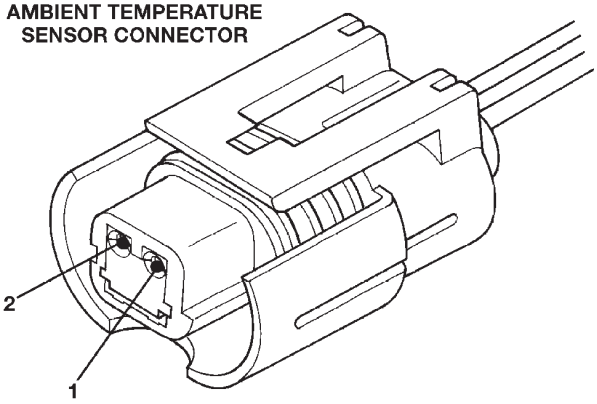
Set condition: BCM senses an abnormally high or low voltage on its input

Theory of operation: The ambient temperature sensor is a thermistor for which the BCM provides a 5V pull-up. Under normal operating conditions (-40 to 85° C) this voltage should be between 0.313 V and 4.88 V.

Probable causes:
- > Wiring open circuit
- > Wiring short to ground
- > Wiring short to battery
- > Failed ambient temp sensor
- > Failed BCM

80b242e8

AMBIENT TEMPERATURE SENSOR CONNECTOR

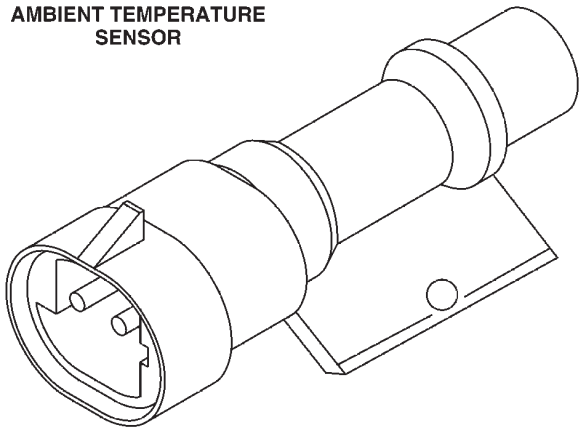


CAV	COLOR	FUNCTION
1	VT/LG	AMBIENT TEMP SENSOR SIGNAL
2	DB/GY	SENSOR GROUND

80b6eff6

FIG. 1

AMBIENT TEMPERATURE SENSOR



80a0754a

FIG. 2

AMBIENT TEMP SENSOR VALUES TEMPERATURE RESISTANCE (K-OHMS)

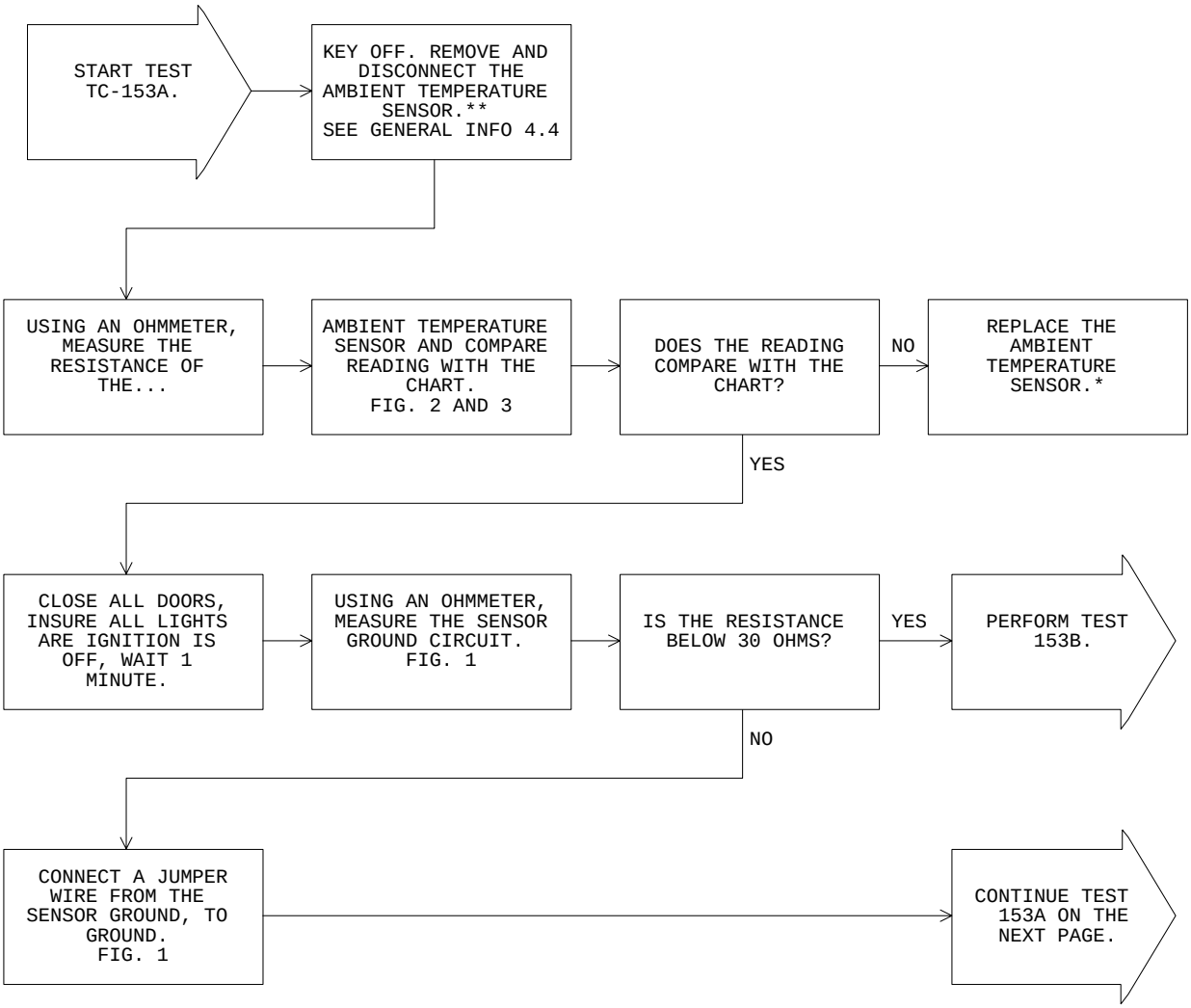
°C	°F	MIN	MAX
0	32	29.3	36
10	50	18	22
20	68	11.4	13.6
25	77	9.1	10.8
30	86	7.4	8.7
40	104	4.9	5.7
50	122	3.3	3.8

2880102

FIG. 3

TEST TC-153A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

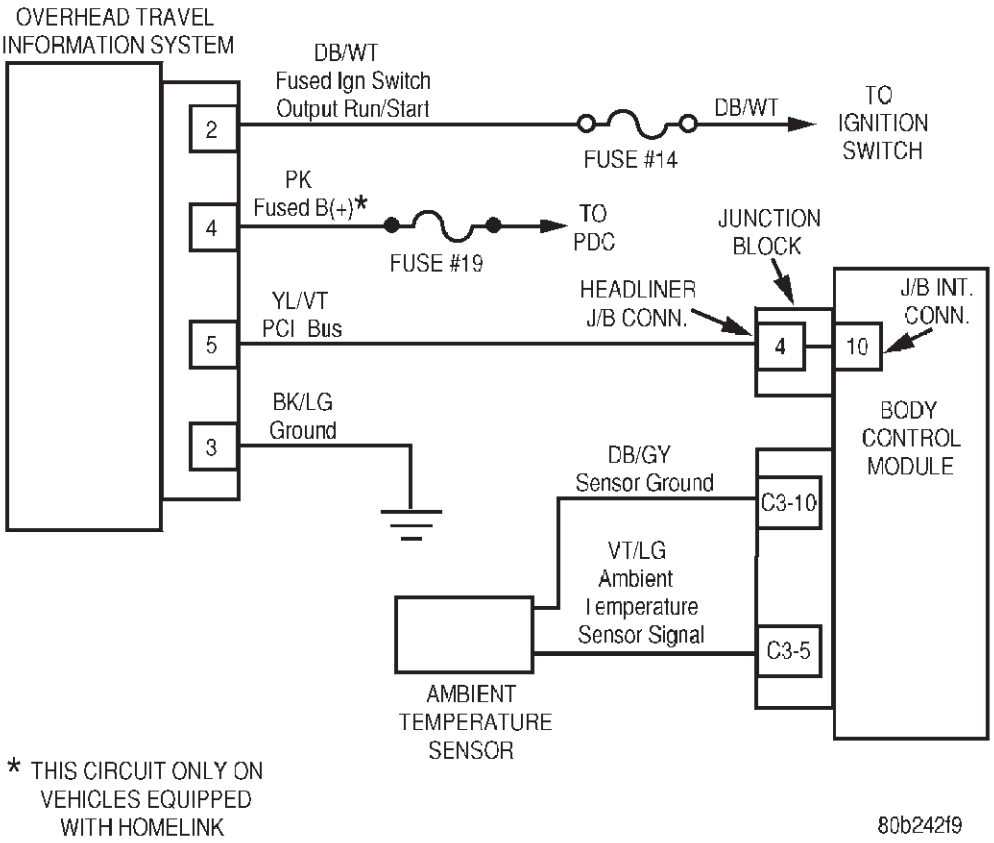


Perform Verification TEST VER-2A.

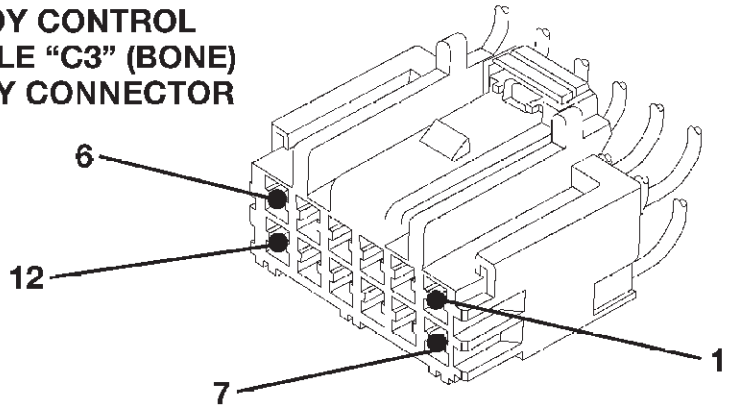
***Check connectors - Clean / repair as necessary.**

TEST TC-153A **CONTINUED - REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW**

Perform TEST DTC Before Proceeding



BODY CONTROL MODULE "C3" (BONE) 12-WAY CONNECTOR



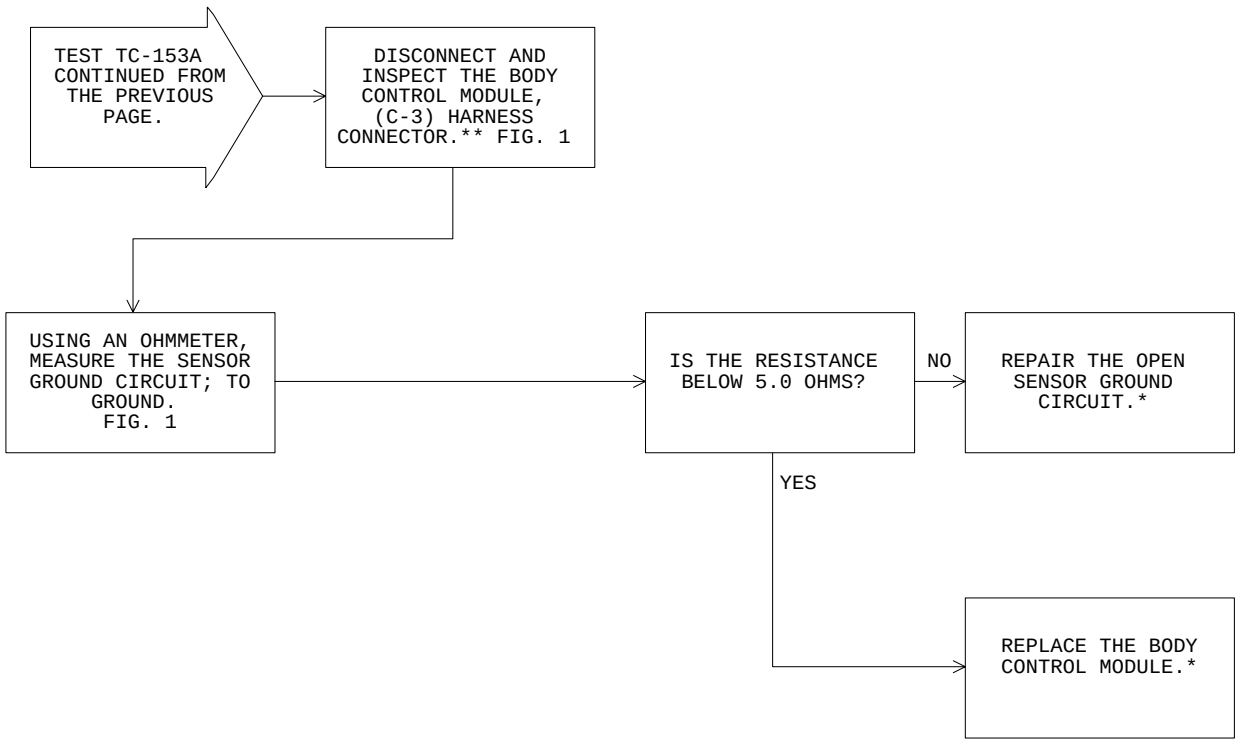
CAV	COLOR	FUNCTION
1	YL/VT	PCI BUS (PCM)
2	YL/VT	PCI BUS (ABS)
3	TN/RD	WIPER PARK SWITCH SENSE
4	RD/WT	WIPER ON OFF RELAY CONTROL
5	VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
7	YL/VT	PCI BUS (TCM)
9	BR/YL	HEADLAMP WASHER RELAY CONTROL
10	DB/GY	SENSOR GROUND
12	VT	WIPER HIGH LOW RELAY CONTROL

80b11938

FIG. 1

TEST TC-153A CONTINUED - REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

Perform TEST DTC Before Proceeding

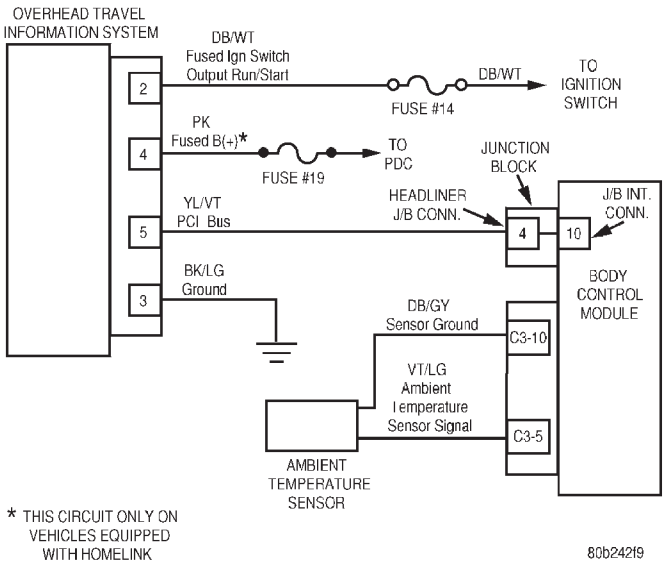


Perform Verification TEST VER-2A.

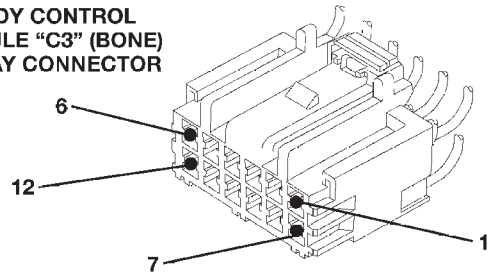
****Check connectors - Clean / repair as necessary.***

TEST TC-153B REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

Perform TEST TC-153A Before Proceeding



BODY CONTROL MODULE "C3" (BONE) 12-WAY CONNECTOR

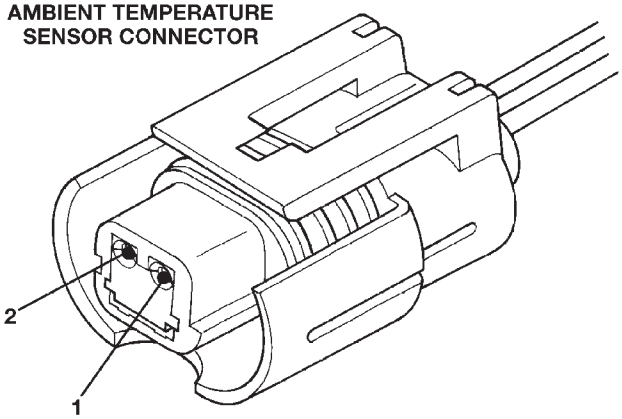


CAV	COLOR	FUNCTION
1	YL/VT	PCI BUS (PCM)
2	YL/VT	PCI BUS (ABS)
3	TN/RD	WIPER PARK SWITCH SENSE
4	RD/WT	WIPER ON OFF RELAY CONTROL
5	VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
7	YL/VT	PCI BUS (TCM)
9	BR/YL	HEADLAMP WASHER RELAY CONTROL
10	DB/GY	SENSOR GROUND
12	VT	WIPER HIGH LOW RELAY CONTROL

80b11938

FIG. 1

AMBIENT TEMPERATURE SENSOR CONNECTOR



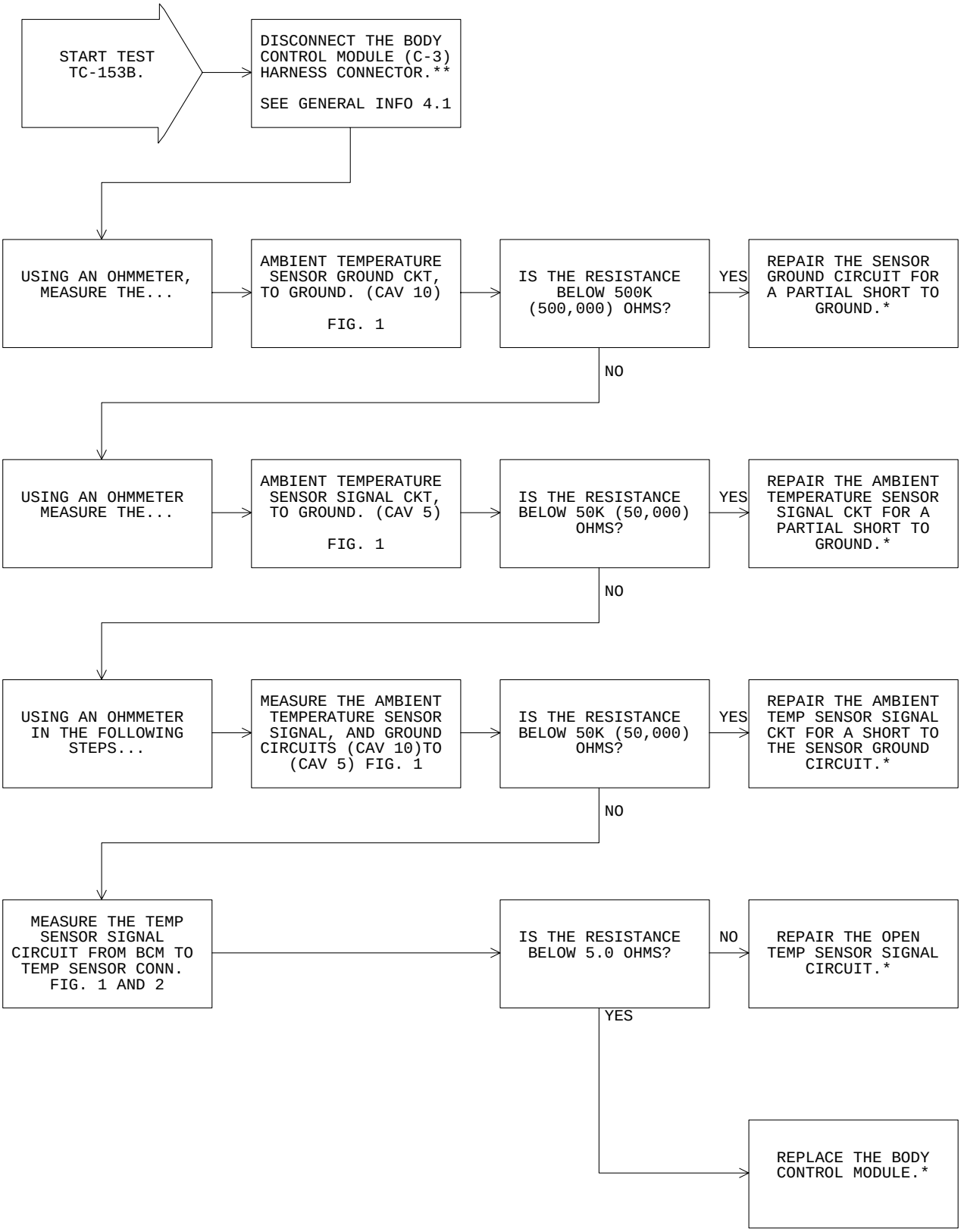
CAV	COLOR	FUNCTION
1	VT/LG	AMBIENT TEMP SENSOR SIGNAL
2	DB/GY	SENSOR GROUND

80b6eff6

FIG. 2

TEST TC-153B REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO LOW

Perform TEST TC-153A Before Proceeding

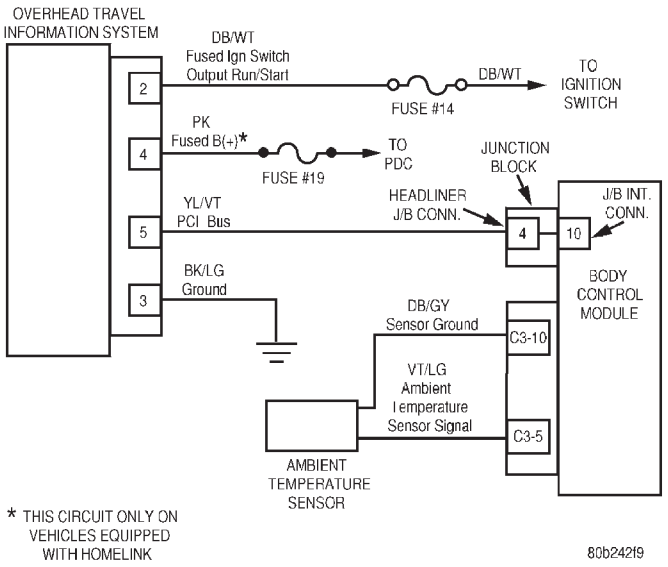


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-154A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding



Name of code: Ambient Temperature Sensor Failure

When monitored: With ignition on

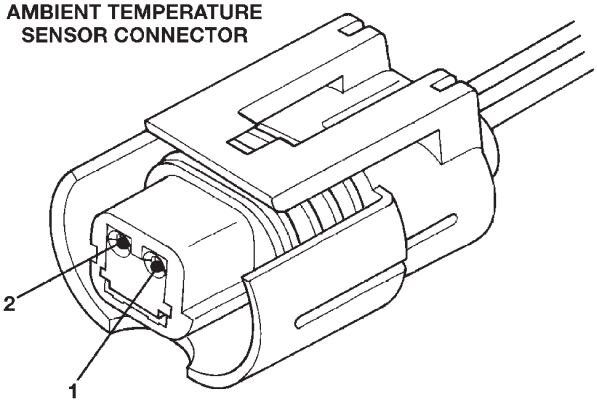
Set condition: BCM senses an abnormally high or low voltage on its input

Theory of operation: The ambient temperature sensor is a thermistor for which the BCM provides a 5V pull-up. Under normal operating conditions (-40 to 85° C) this voltage should be between 0.313 V and 4.88 V.

Probable causes:
- > Wiring open circuit
- > Wiring short to ground
- > Wiring short to battery
- > Failed ambient temp sensor
- > Failed BCM

80b242e8

AMBIENT TEMPERATURE SENSOR CONNECTOR

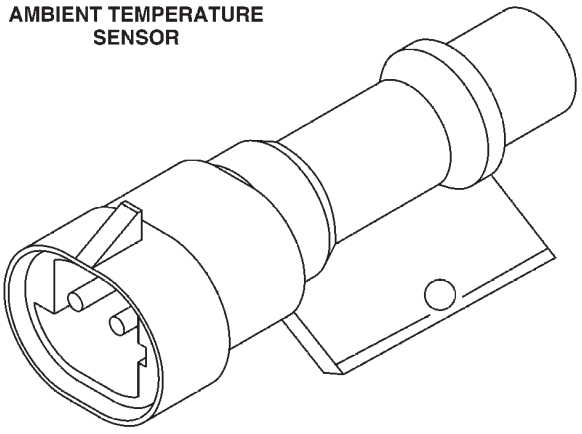


CAV	COLOR	FUNCTION
1	VT/LG	AMBIENT TEMP SENSOR SIGNAL
2	DB/GY	SENSOR GROUND

80b6eff6

FIG. 1

AMBIENT TEMPERATURE SENSOR



80a0754a

FIG. 2

AMBIENT TEMP SENSOR VALUES TEMPERATURE RESISTANCE (K-OHMS)

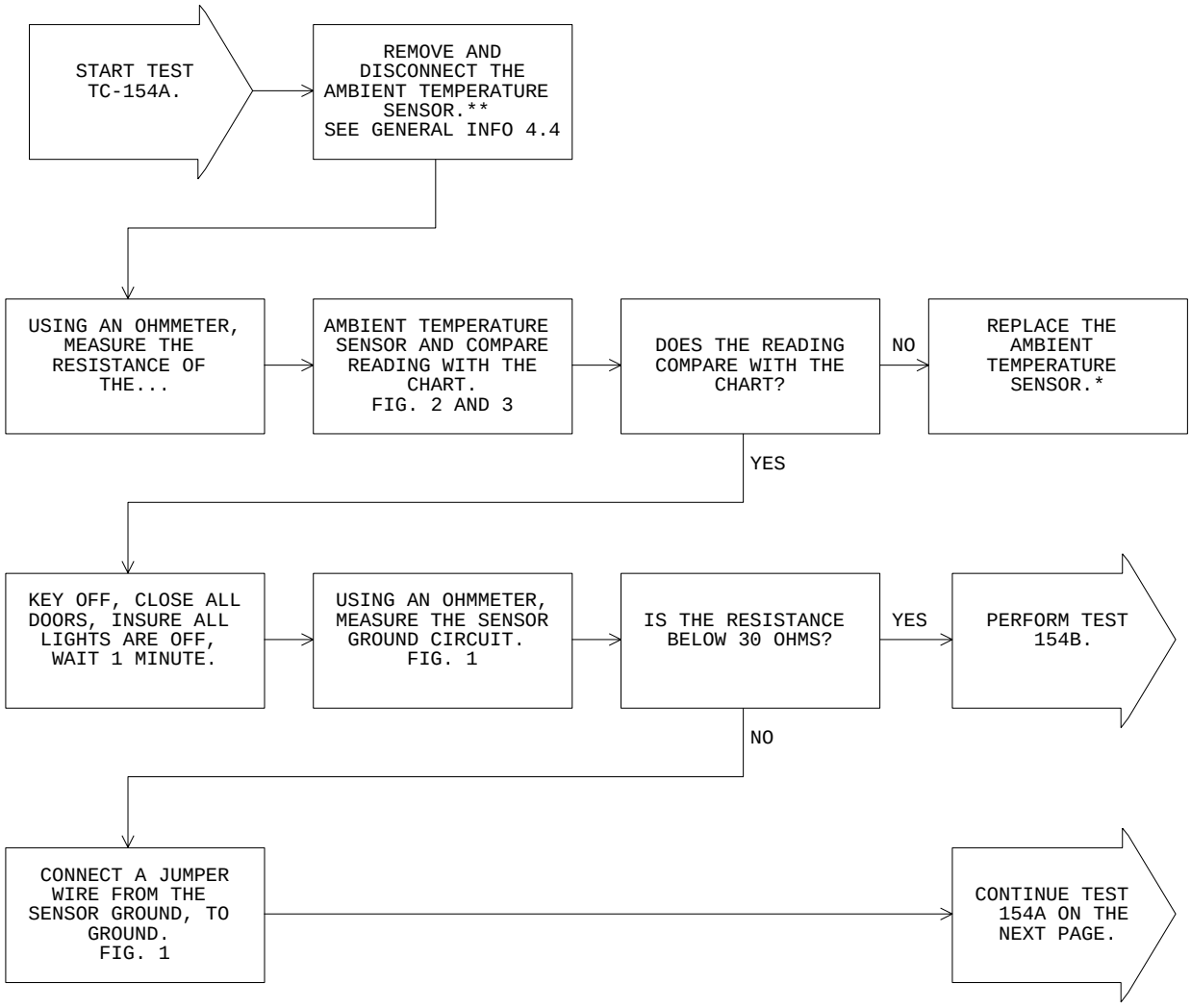
°C	°F	MIN	MAX
0	32	29.3	36
10	50	18	22
20	68	11.4	13.6
25	77	9.1	10.8
30	86	7.4	8.7
40	104	4.9	5.7
50	122	3.3	3.8

2880102

FIG. 3

TEST TC-154A REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding

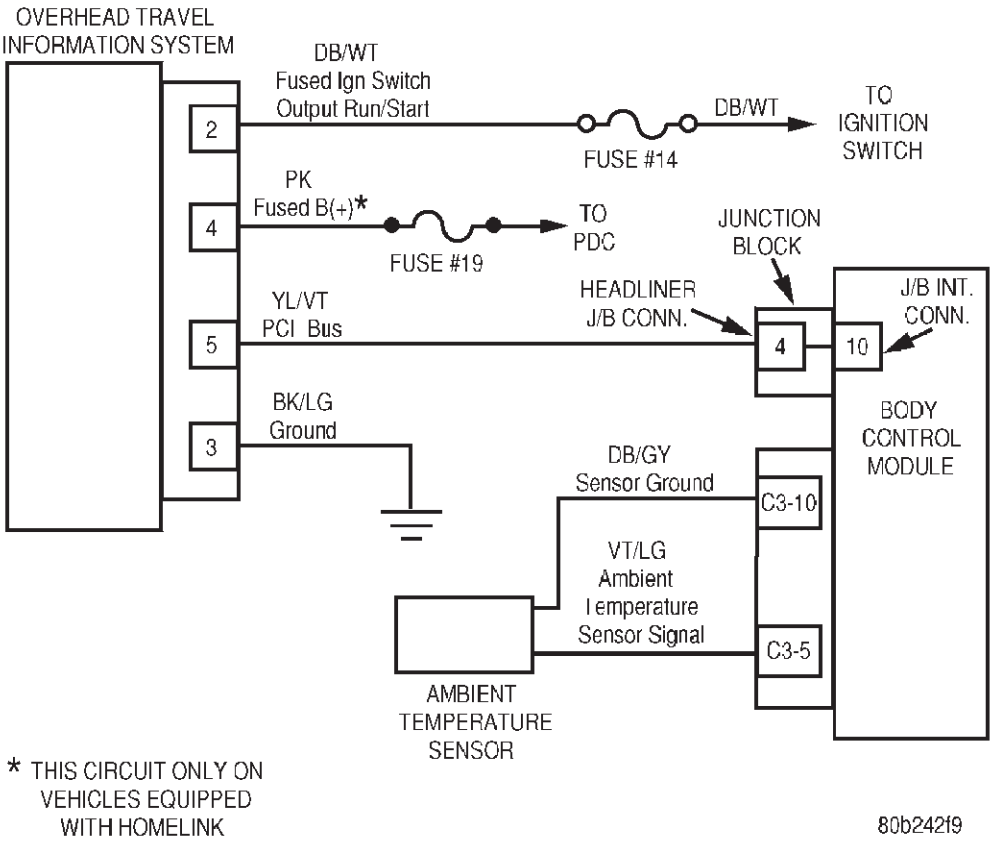


Perform Verification TEST VER-2A.

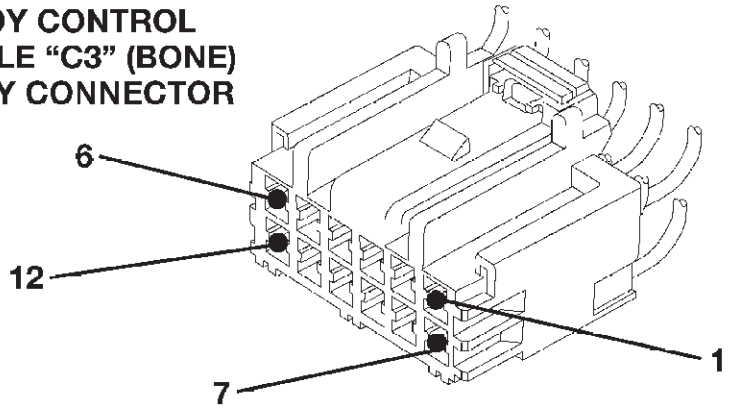
Check connectors - Clean / repair as necessary.

TEST TC-154A **CONTINUED - REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH**

Perform TEST DTC Before Proceeding



BODY CONTROL MODULE "C3" (BONE) 12-WAY CONNECTOR



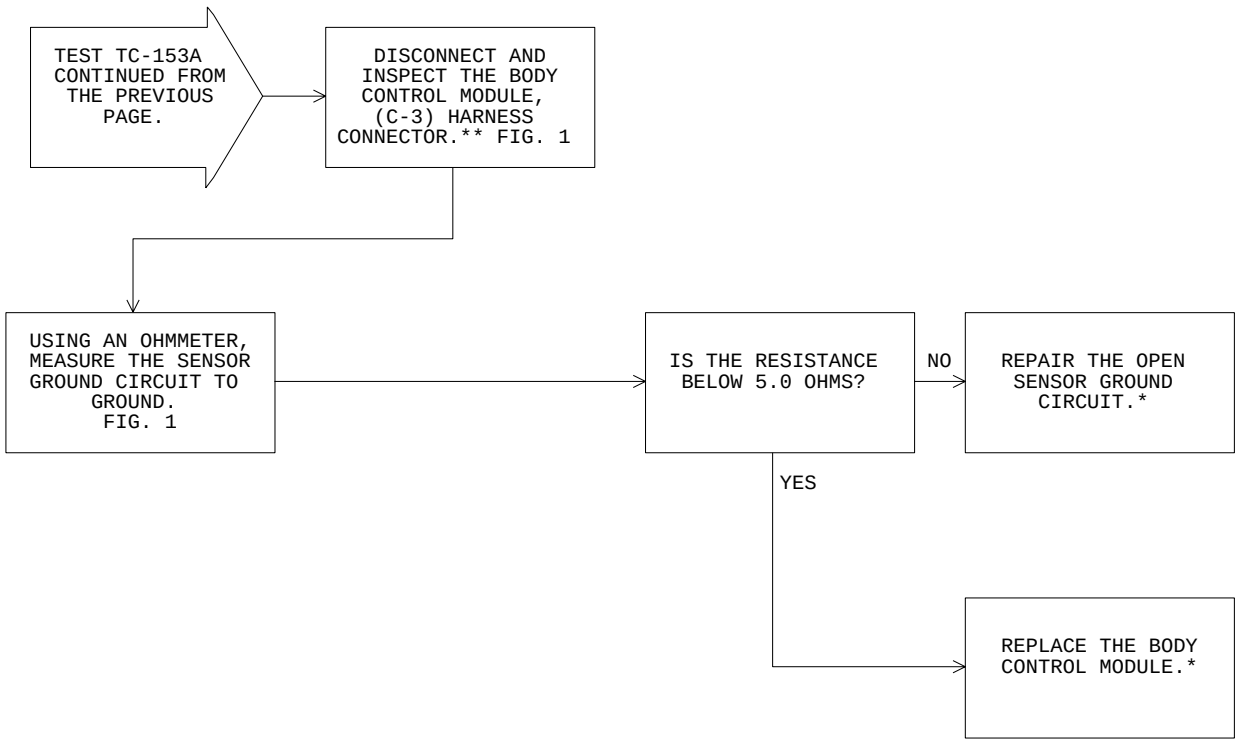
CAV	COLOR	FUNCTION
1	YL/VT	PCI BUS (PCM)
2	YL/VT	PCI BUS (ABS)
3	TN/RD	WIPER PARK SWITCH SENSE
4	RD/WT	WIPER ON OFF RELAY CONTROL
5	VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
7	YL/VT	PCI BUS (TCM)
9	BR/YL	HEADLAMP WASHER RELAY CONTROL
10	DB/GY	SENSOR GROUND
12	VT	WIPER HIGH LOW RELAY CONTROL

80b11938

FIG. 1

TEST TC-154A CONTINUED - REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

Perform TEST DTC Before Proceeding

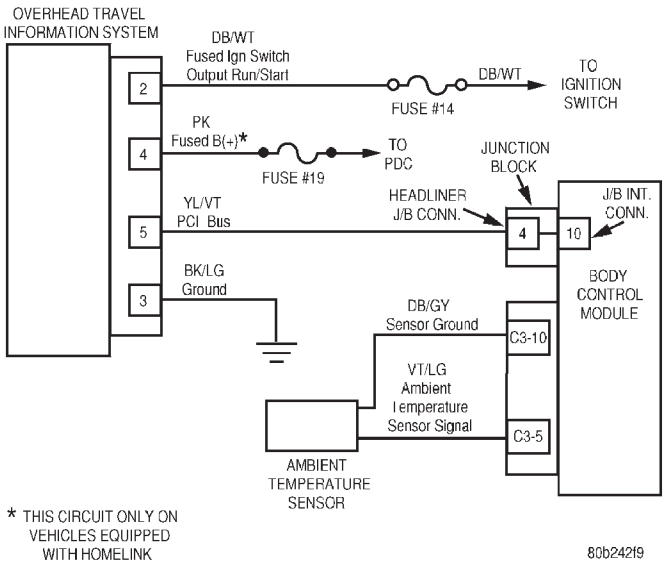


Perform Verification TEST VER-2A.

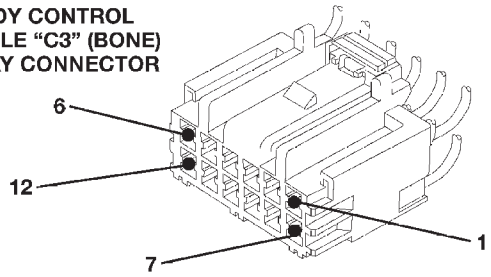
***Check connectors - Clean / repair as necessary.**

TEST TC-154B REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

Perform TEST TC-154A Before Proceeding



BODY CONTROL MODULE "C3" (BONE) 12-WAY CONNECTOR

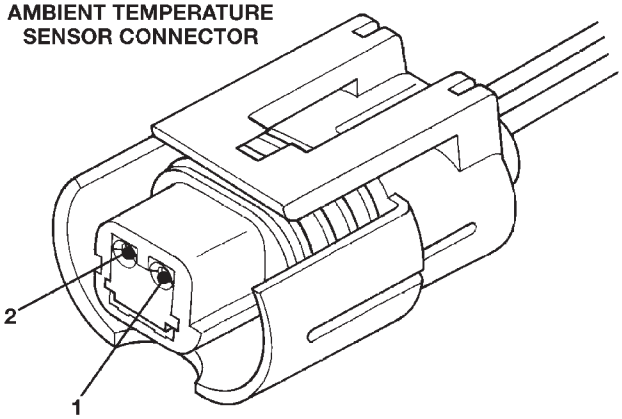


CAV	COLOR	FUNCTION
1	YL/VT	PCI BUS (PCM)
2	YL/VT	PCI BUS (ABS)
3	TN/RD	WIPER PARK SWITCH SENSE
4	RD/WT	WIPER ON OFF RELAY CONTROL
5	VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
7	YL/VT	PCI BUS (TCM)
9	BR/YL	HEADLAMP WASHER RELAY CONTROL
10	DB/GY	SENSOR GROUND
12	VT	WIPER HIGH LOW RELAY CONTROL

80b11938

FIG. 1

AMBIENT TEMPERATURE SENSOR CONNECTOR



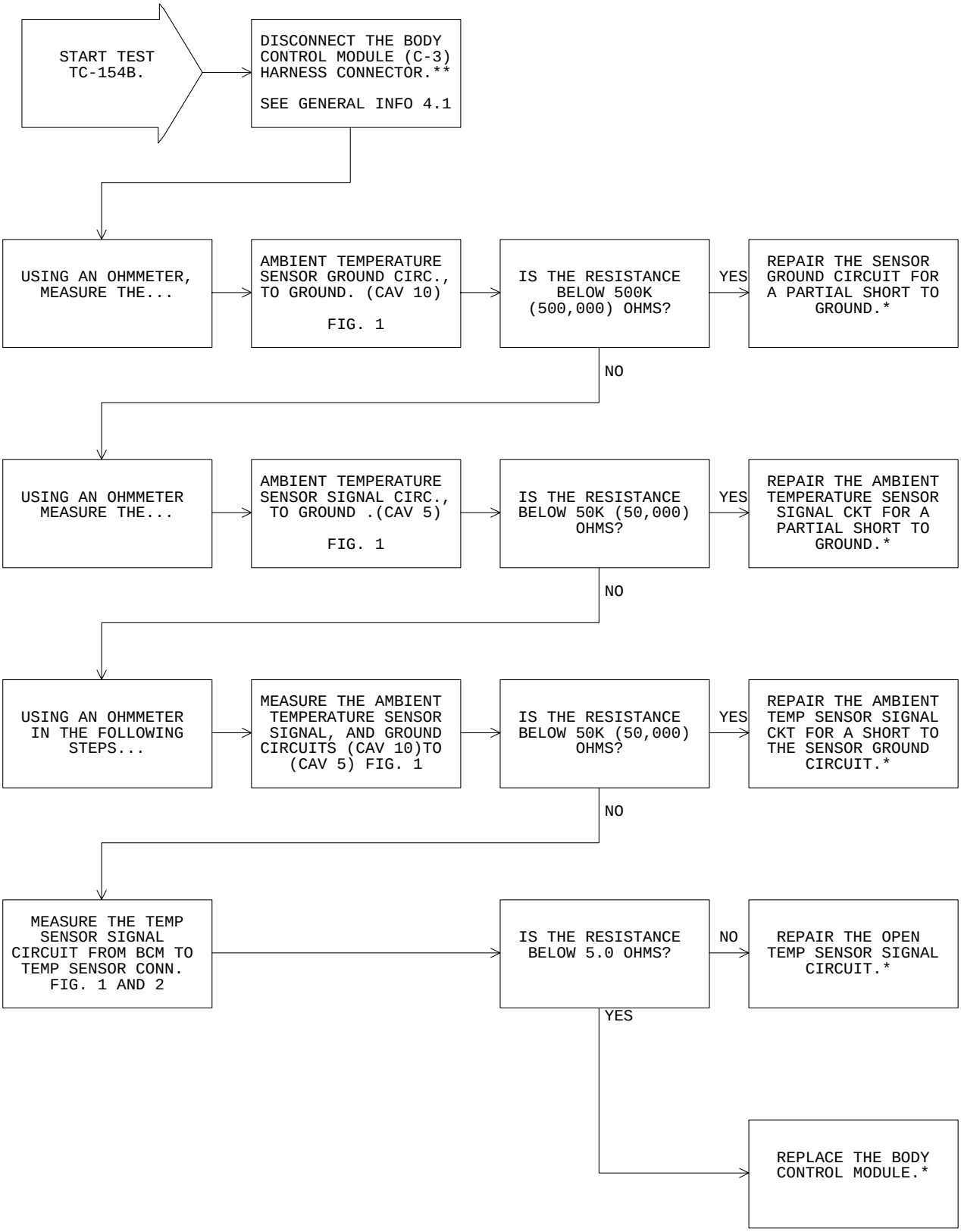
CAV	COLOR	FUNCTION
1	VT/LG	AMBIENT TEMP SENSOR SIGNAL
2	DB/GY	SENSOR GROUND

80b6eff6

FIG. 2

TEST TC-154B REPAIRING - AMBIENT/BATTERY TEMP SENSOR VOLTAGE TOO HIGH

Perform TEST TC-154A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-155A REPAIRING - 1/1 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding

1/1 RIGHT BANK UP

Name of Code: O2S Voltage Shorted To Ground

When monitored: With engine coolant temperature above 170°F on the previous key on, after a cold start, engine coolant below 98°F, and ambient/battery sensor reading within 27°F of engine coolant.

Set condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this O2 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be low, approximately 0.1 volt.

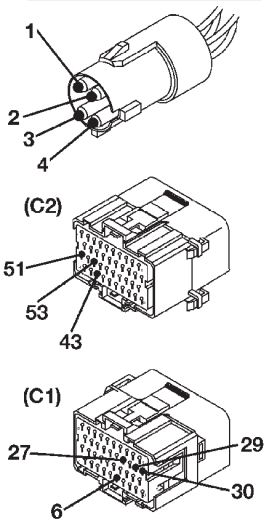
Possible causes:

> Sensor output wire shorted to ground
> Dirty/wet connection causing voltage tracking in connector
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires

80b01cfc

FIG. 1

1/1 RIGHT BANK UP



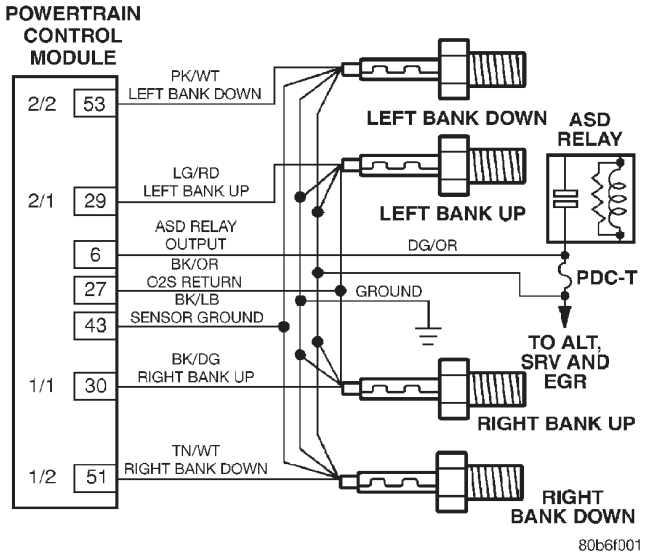
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

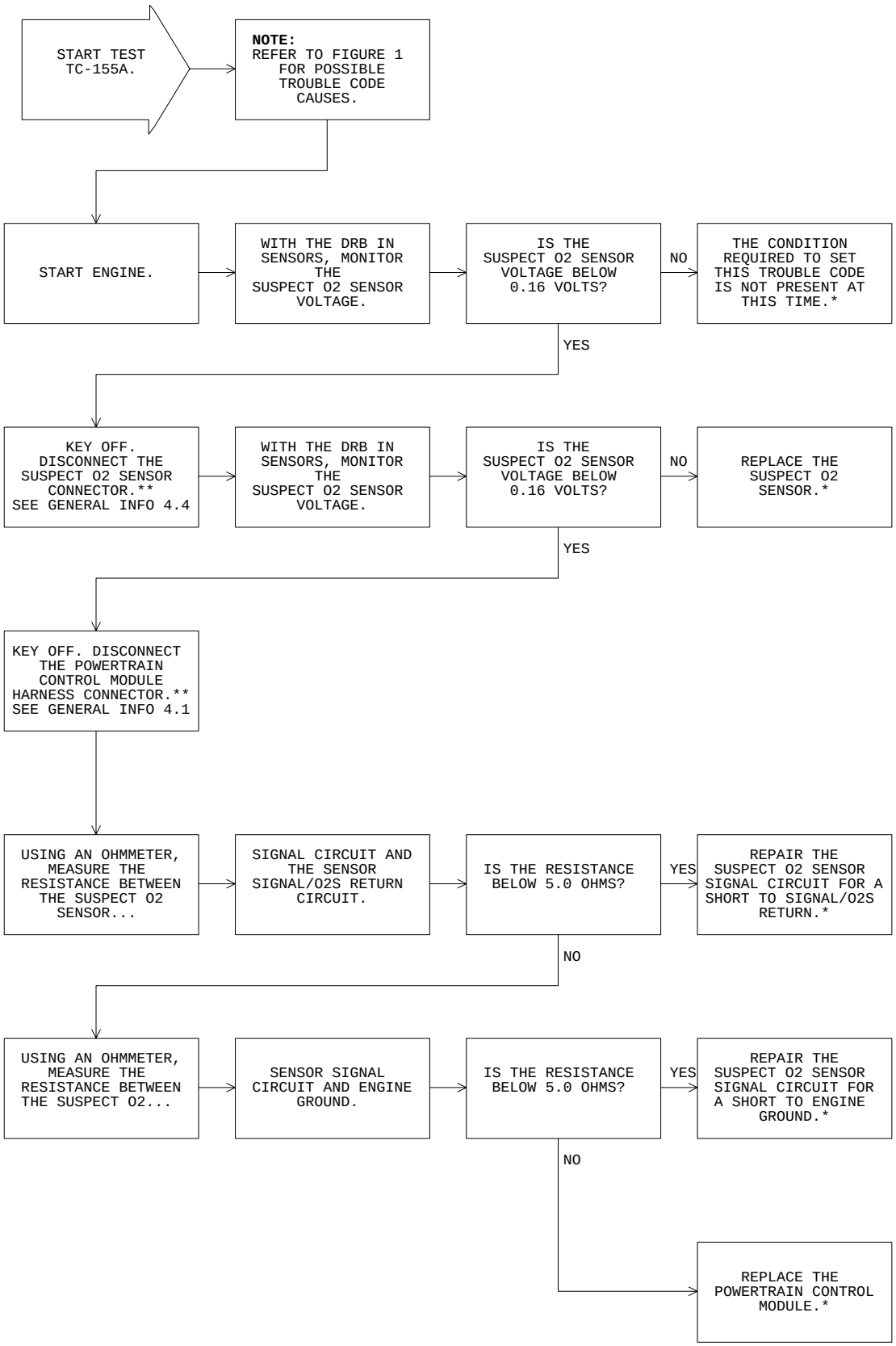
80b1b45c



80b6f001

TEST TC-155A REPAIRING - 1/1 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-156A **REPAIRING - 1/2 O2S VOLTAGE SHORTED TO GROUND**

Perform TEST DTC Before Proceeding

1/2 RIGHT BANK DOWN

Name of Code: O2S Voltage Shorted To Ground

When monitored: With engine coolant temperature above 170°F on the previous key on, after a cold start, engine coolant below 98°F, and ambient/battery sensor reading within 27°F of engine coolant.

Set condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this O2 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be low, approximately 0.1 volt.

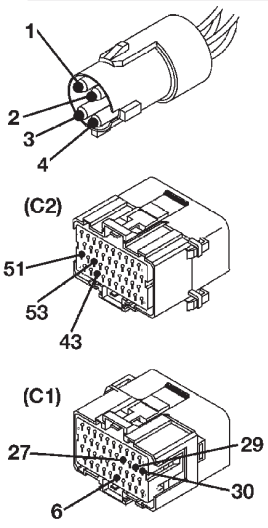
Possible causes:

> Sensor output wire shorted to ground
> Dirty/wet connection causing voltage tracking in connector
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires

80b01cfc

FIG. 1

1/2 RIGHT BANK DOWN



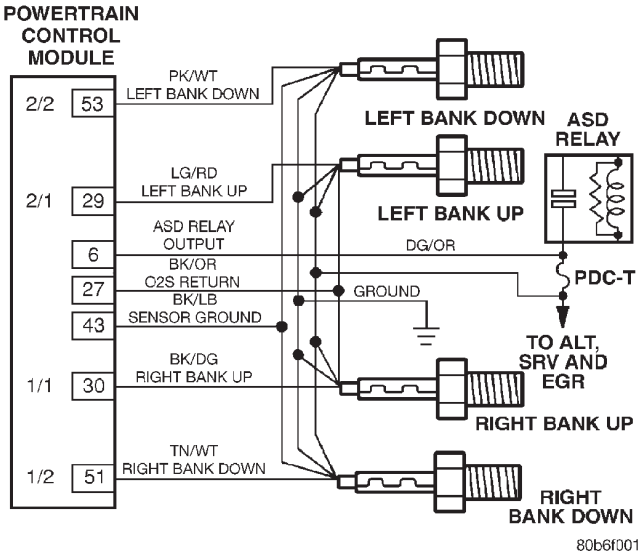
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

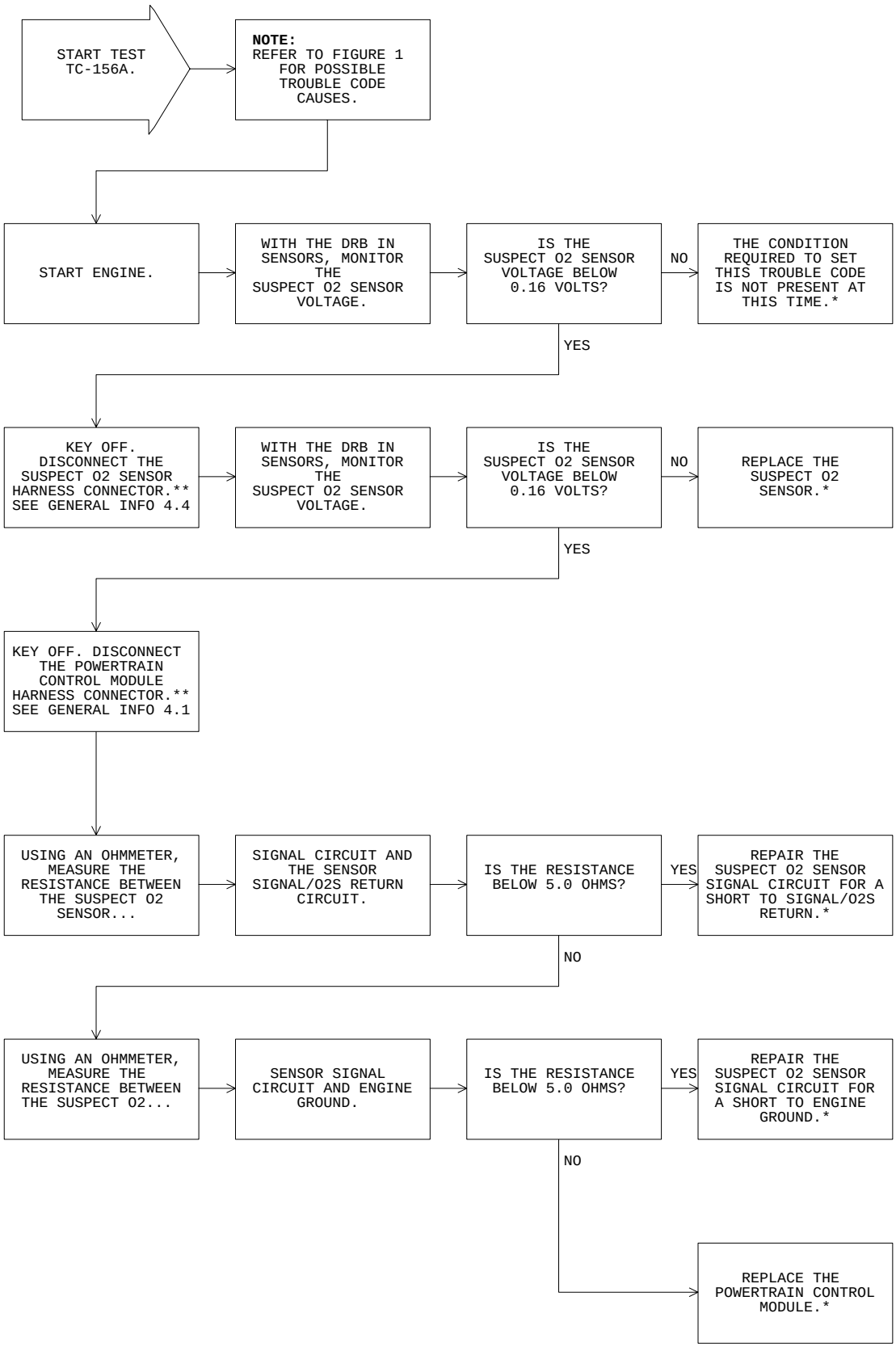
80b1b45c



80b6f001

TEST TC-156A REPAIRING - 1/2 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-157A REPAIRING - INTERMITTENT LOSS OF CMP OR CKP

Perform TEST DTC Before Proceeding

Name of code: Intermittent Loss of CMP or CKP

When monitored: During engine running.

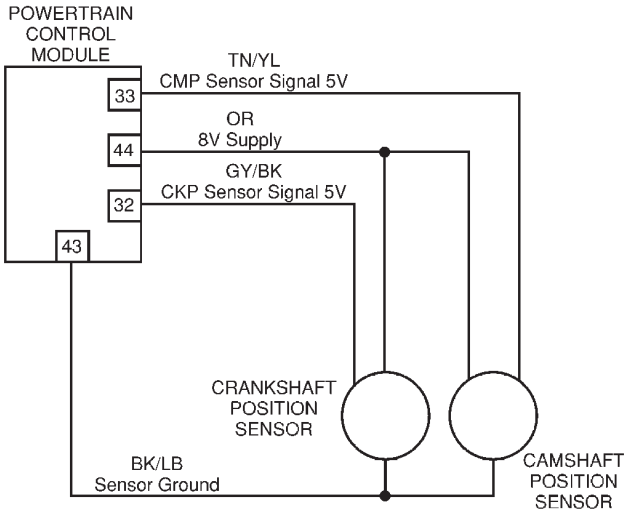
Set condition: When the expected cam signal level disagrees with the actual cam signal level.

Theory of operation: After the engine has been started, the powertrain control module maintains an expected camshaft port level value. At every 69 degree crank edge this value is toggled to reflect the expected change in the cam level. At every crank falling edge, this value is compared to the true camshaft port level. If there is a disagreement between the two values, then the trouble code is matured and set.

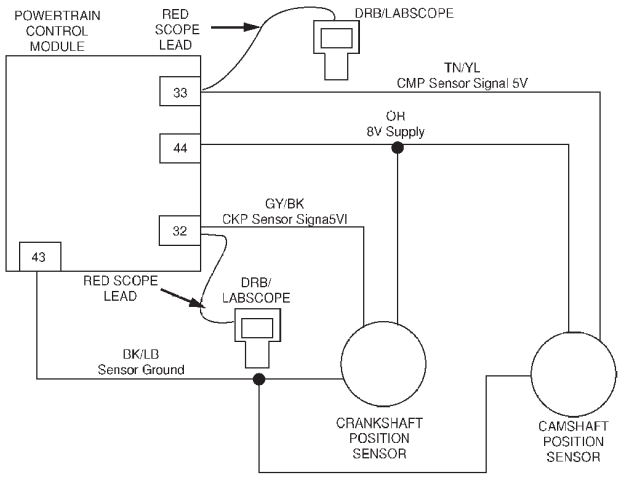
At this time, the powertrain control module is forced back into a spark start mode and it attempts to synchronize the cam and crank signals.

Possible INTERMITTENT causes:
- > Open or shorted 8-volt supply circuit
- > Open sensor ground
- > Open or shorted signal circuit
- > Excessive clearance between the crankshaft sensor and crankshaft pulse ring
- > Excessive clearance between the camshaft sensor and the target magnet
- > Damaged target magnet
- > Damaged crankshaft pulse ring
- > Failed sensor
- > Failed PCM
- > Loose/unlocked CMP/CKP connectors

80b09a93

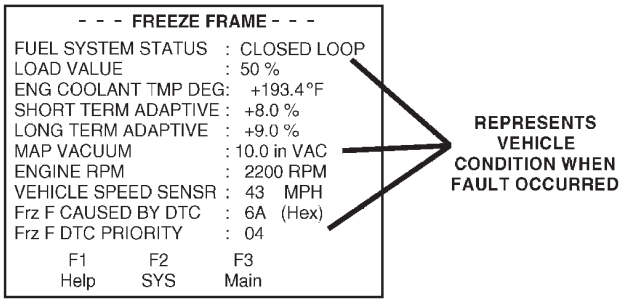


80b27c75



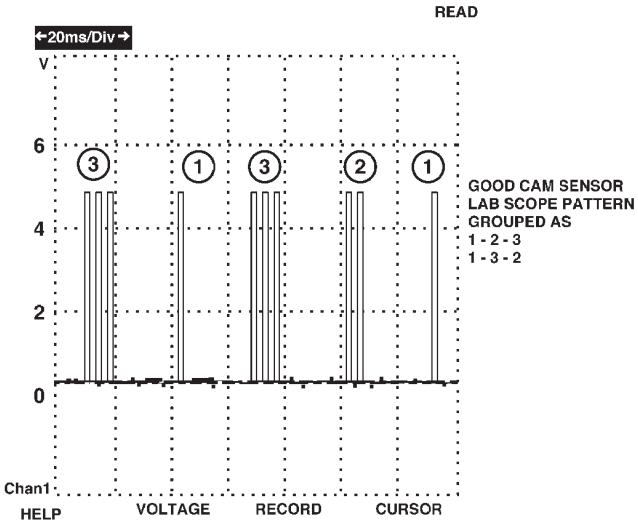
80b29fa9

FIG. 1



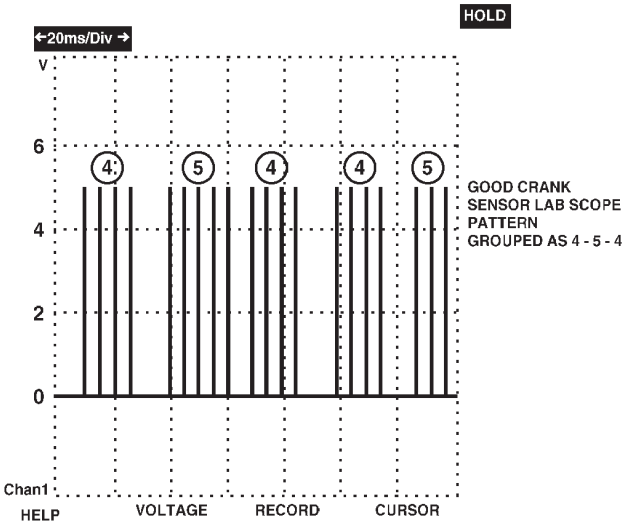
80b27cf5

FIG. 2



80b29fc1

FIG. 3

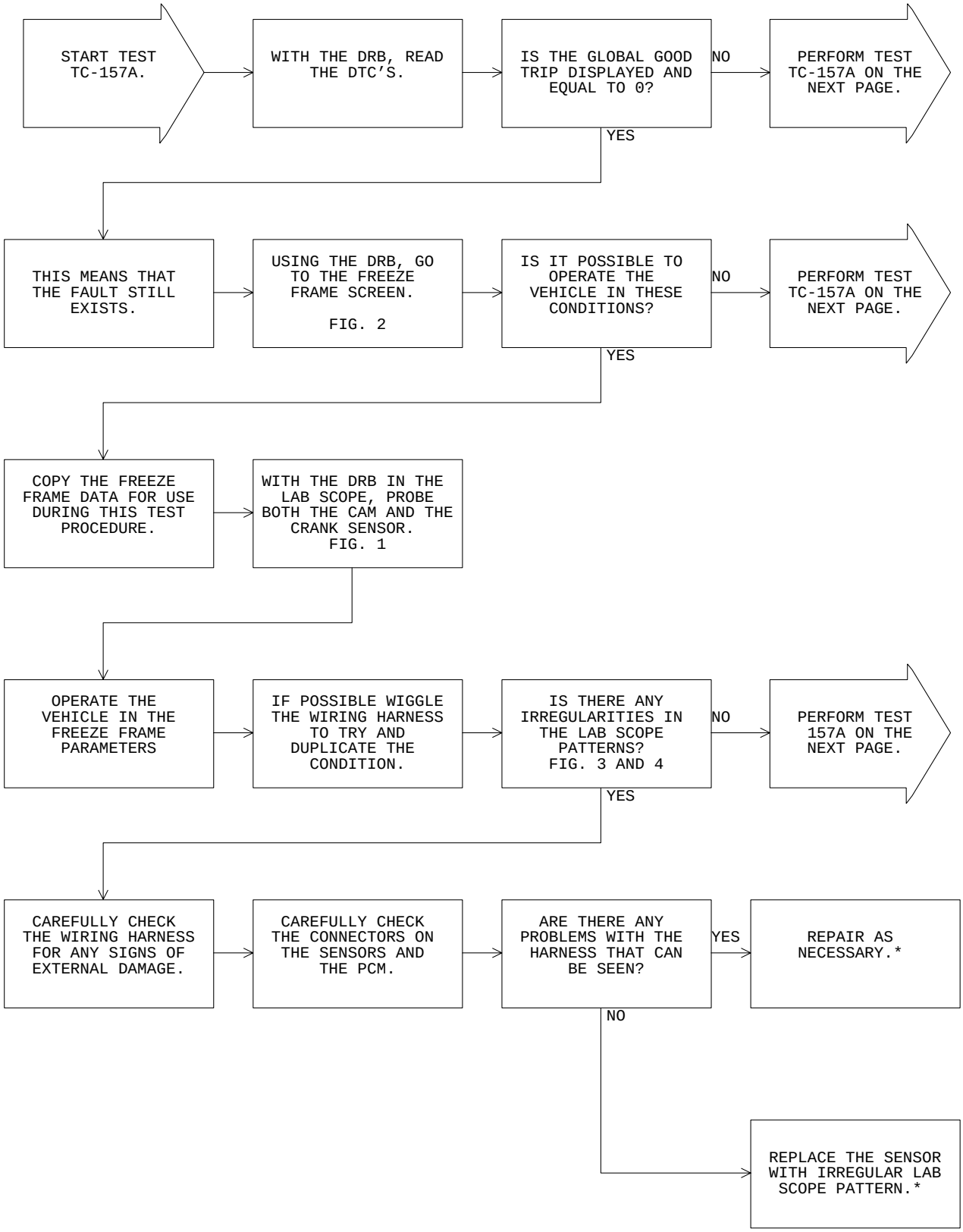


80b29fc0

FIG. 4

TEST TC-157A REPAIRING - INTERMITTENT LOSS OF CMP OR CKP

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

TEST TC-157A CONTINUED - REPAIRING - INTERMITTENT LOSS OF CMP OR CKP

Name of code: Intermittent Loss of CMP or CKP

When monitored: During engine running.

Set condition: When the expected cam signal level disagrees with the actual cam signal level.

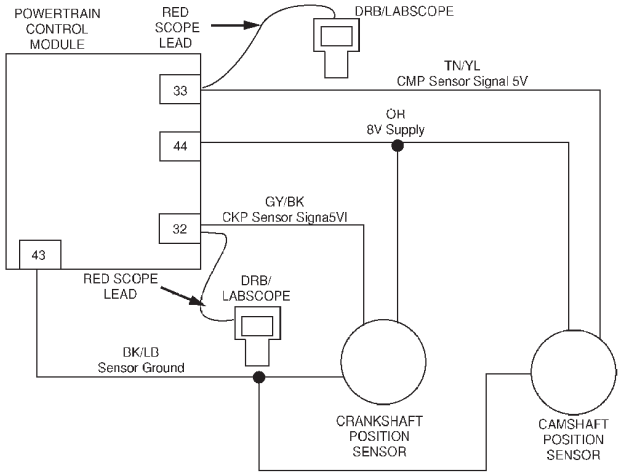
Theory of operation: After the engine has been started, the powertrain control module maintains an expected camshaft port level value. At every 69 degree crank edge this value is toggled to reflect the expected change in the cam level. At every crank falling edge, this value is compared to the true camshaft port level. If there is a disagreement between the two values, then the trouble code is matured and set.

At this time, the powertrain control module is forced back into a spark start mode and it attempts to synchronize the cam and crank signals.

Possible INTERMITTENT causes:
- Open or shorted 8-volt supply circuit
- Open sensor ground
- Open or shorted signal circuit
- Excessive clearance between the crankshaft sensor and crankshaft pulse ring
- Excessive clearance between the camshaft sensor and the target magnet
- Damaged target magnet
- Damaged crankshaft pulse ring
- Failed sensor
- Failed PCM
- Loose/unlocked CMP/CKP connectors

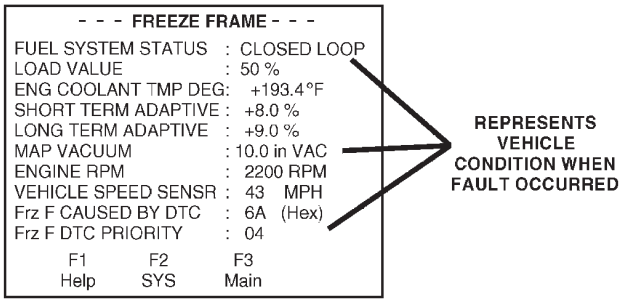
80b09a93

FIG. 1



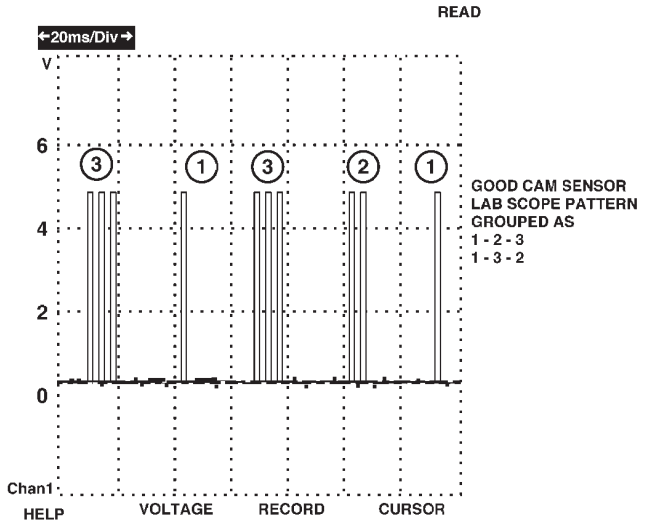
80b29fa9

FIG. 2



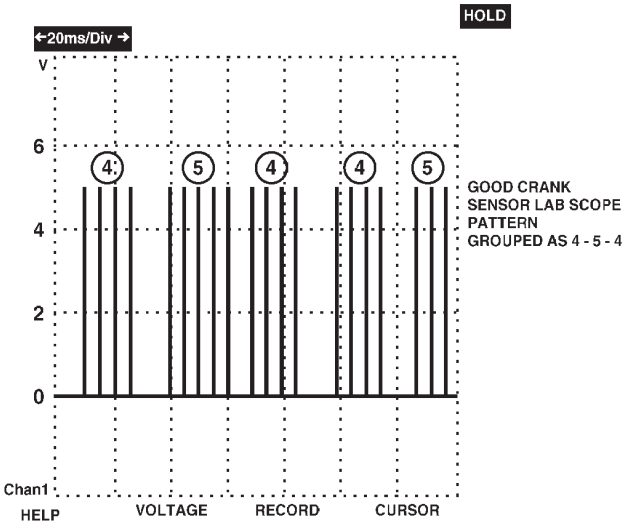
80b27cf5

FIG. 3



80b29fc1

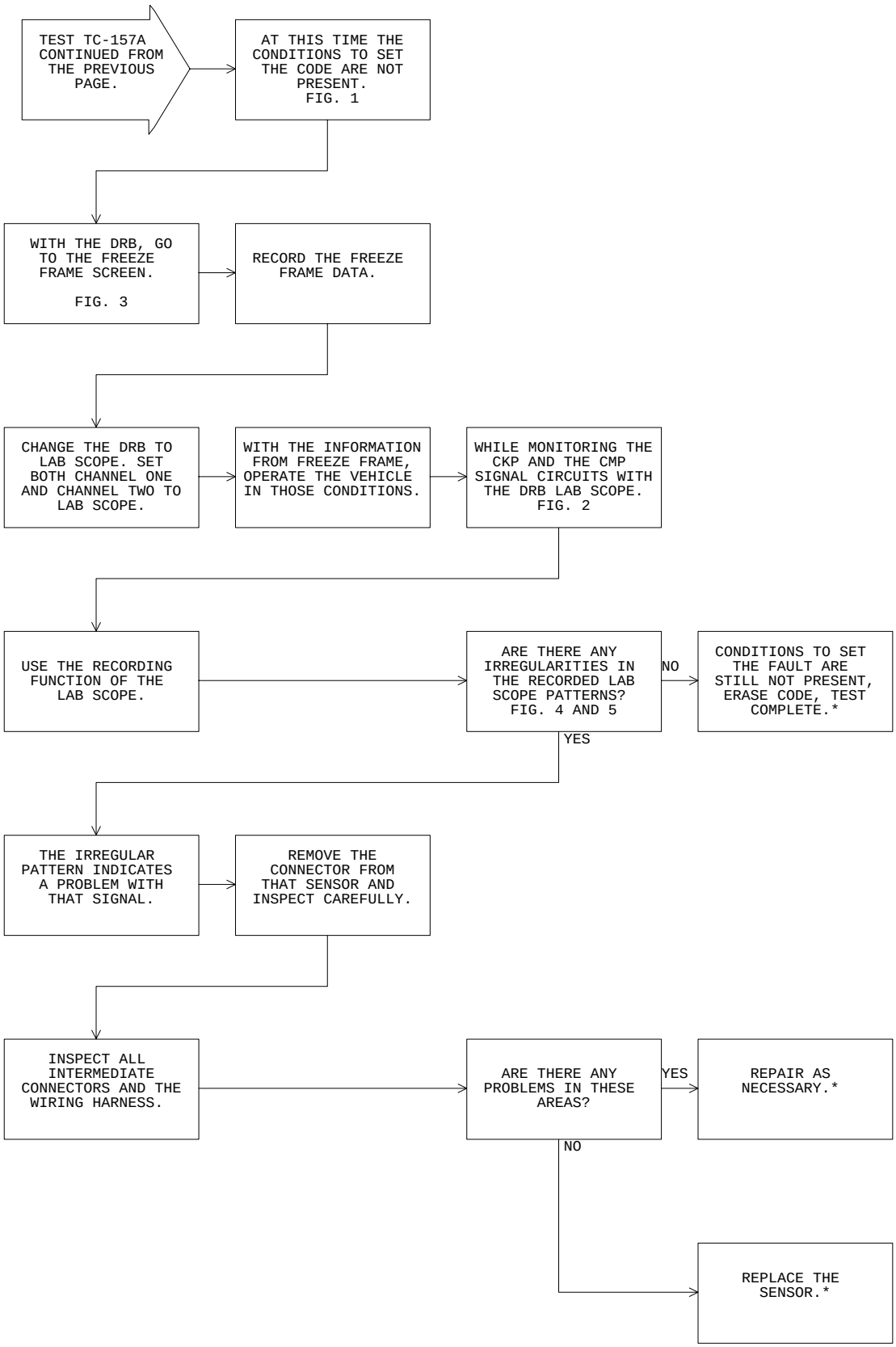
FIG. 4



80b29fc0

FIG. 5

TEST TC-157A CONTINUED - REPAIRING - INTERMITTENT LOSS OF CMP OR CKP



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-181A REPAIRING - 2/1 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding

2/1 LEFT BANK UP

Name of Code: O2S Voltage Shorted To Ground

When monitored: With engine coolant temperature above 170°F on the previous key on, after a cold start, engine coolant below 98°F, and ambient/battery sensor reading within 27°F of engine coolant.

Set condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this O2 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be low, approximately 0.1 volt.

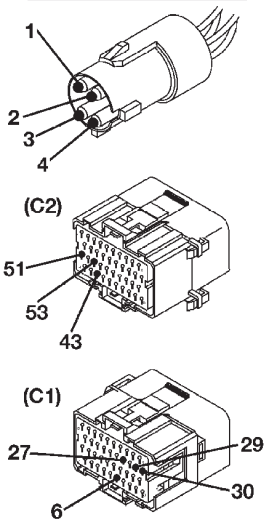
Possible causes:

> Sensor output wire shorted to ground
> Dirty/wet connection causing voltage tracking in connector
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires

80b01cfc

FIG. 1

2/1 LEFT BANK UP



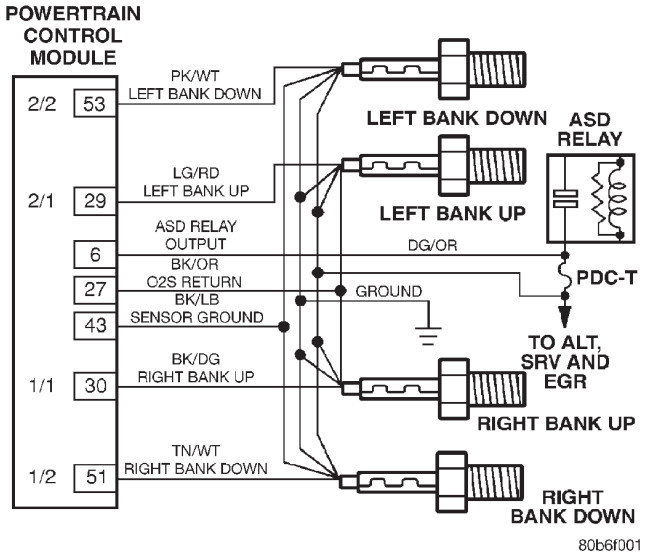
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

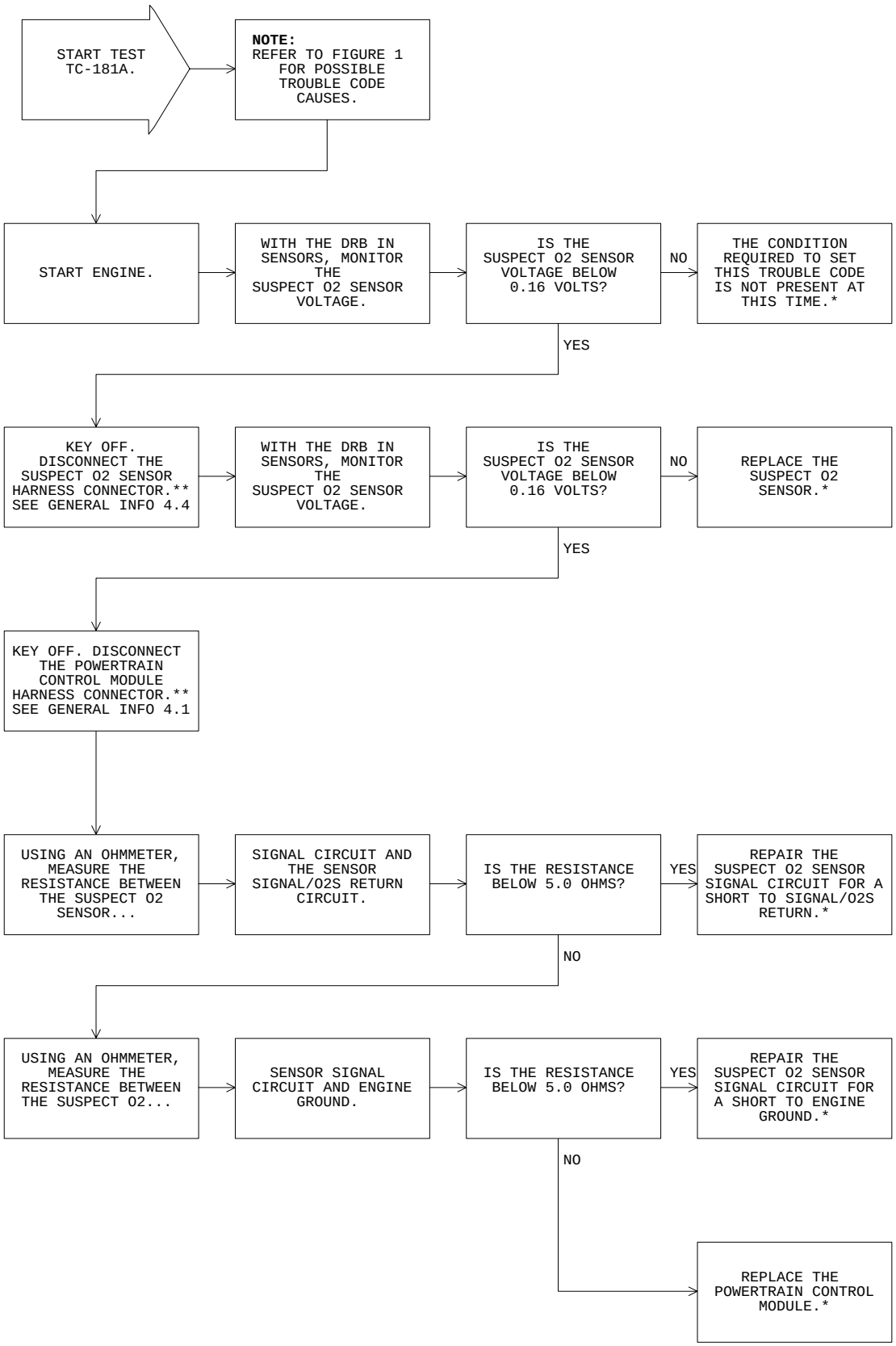
80b1b45c



80b6f001

TEST TC-181A REPAIRING - 2/1 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-182A **REPAIRING - 2/2 O2S VOLTAGE SHORTED TO GROUND**

Perform TEST DTC Before Proceeding

2/2 LEFT BANK DOWN

Name of Code: O2S Voltage Shorted To Ground

When monitored: With engine coolant temperature above 170°F on the previous key on, after a cold start, engine coolant below 98°F, and ambient/battery sensor reading within 27°F of engine coolant.

Set condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

Theory of operation: The oxygen sensor is a voltage generating device. The PCM receives exhaust gas information from this O2 sensor. The sensor detects exhaust gas content by a galvanic reaction within the sensor that produces a voltage. After measuring the amount of oxygen in the exhaust gases, the oxygen sensor tells the PCM how well its output signals are controlling the air/fuel ratio. Variations in the signal from this O2 sensor serve as air/fuel ratio indicators. Changes in the sensor signal occur because the air/fuel ratio is constantly changing. When oxygen content is low (rich mixture), the voltage signal will be low, approximately 0.1 volt.

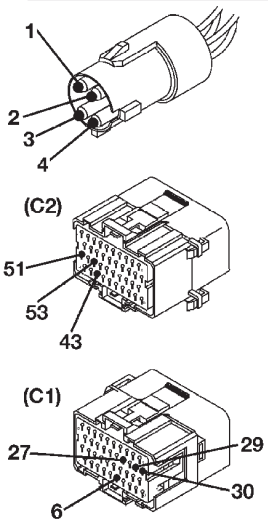
Possible causes:

> Sensor output wire shorted to ground
> Dirty/wet connection causing voltage tracking in connector
> O2 sensor failure
> Powertrain control module failure
> Connector terminals
> Connector wires

80b01cfc

FIG. 1

2/2 LEFT BANK DOWN



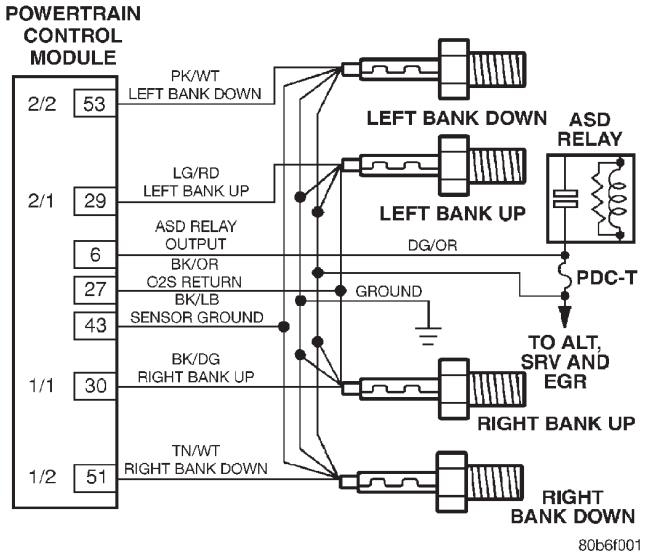
OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

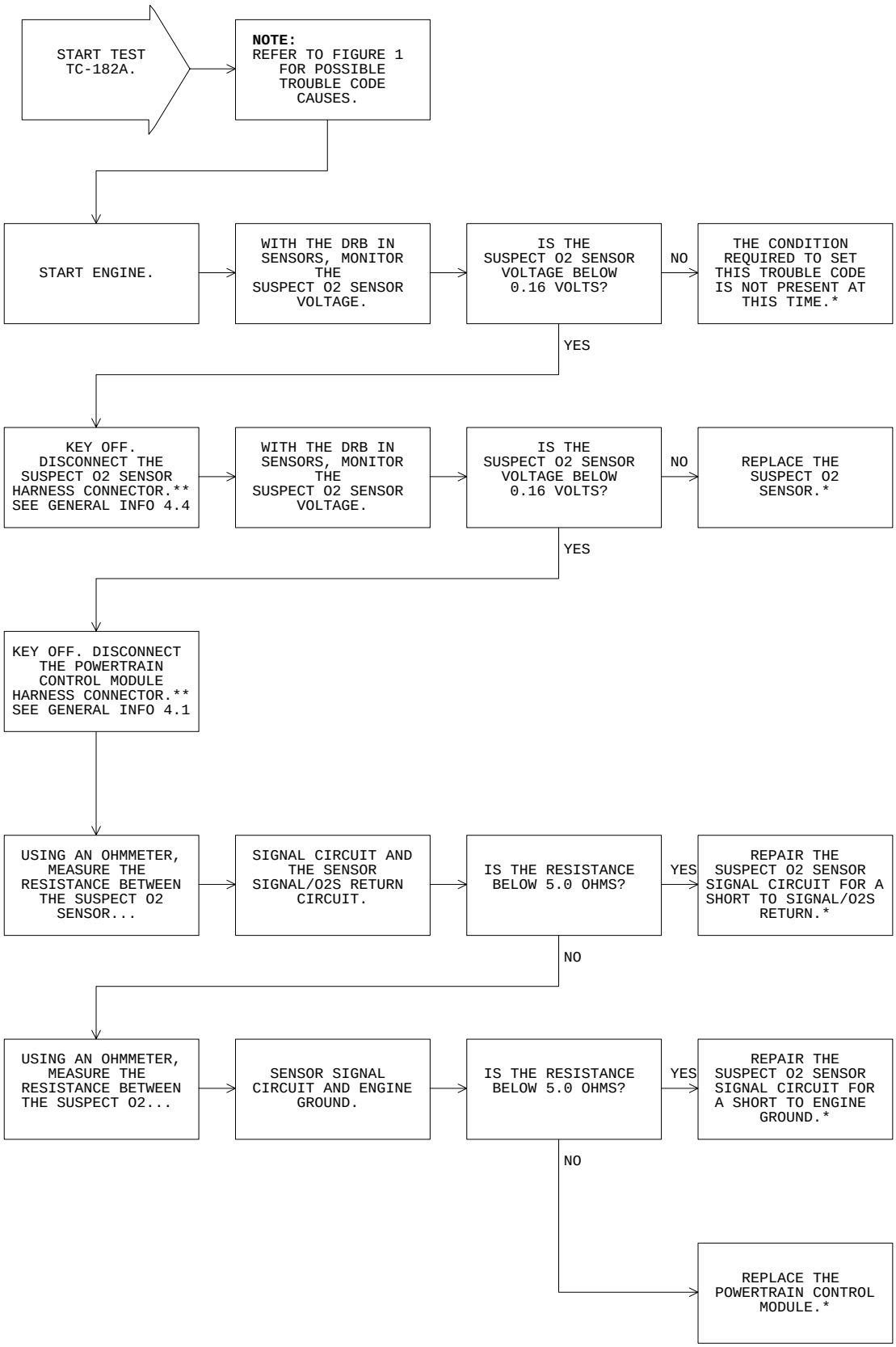
80b1b45c



80b6f001

TEST TC-182A REPAIRING - 2/2 O2S VOLTAGE SHORTED TO GROUND

Perform TEST DTC Before Proceeding

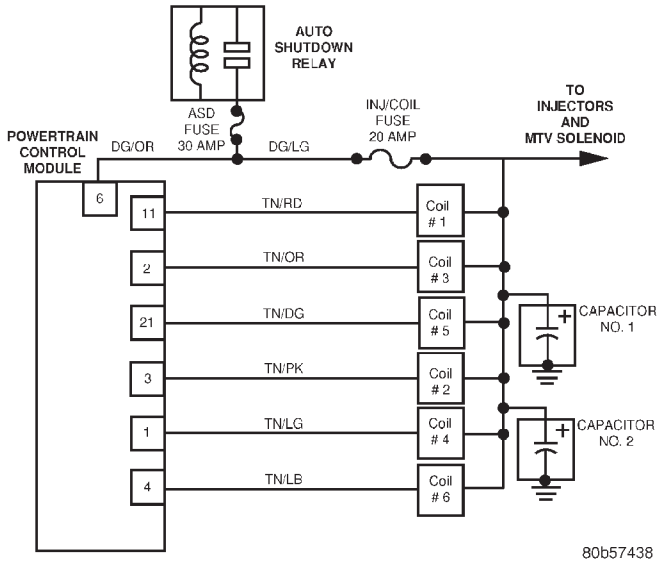


Perform Verification TEST VER-2A.

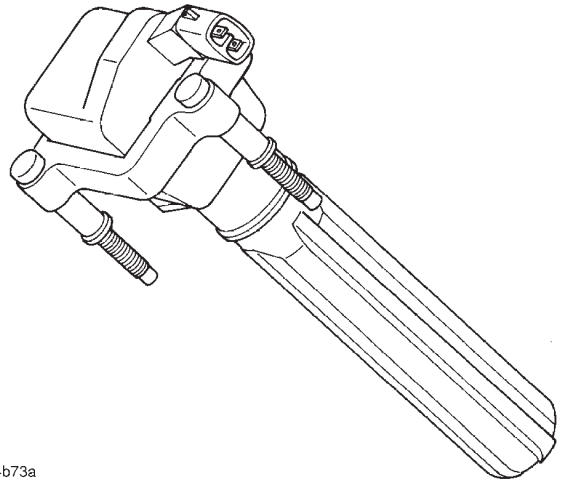
Check connectors - Clean / repair as necessary.

TEST TC-216A REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding



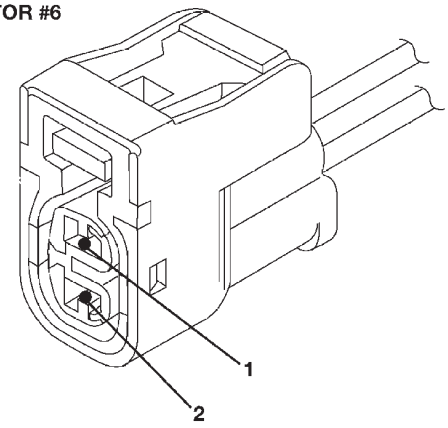
COIL ON PLUG TYPICAL



80b4b73a

FIG. 1

COIL ON PLUG CONNECTOR #6

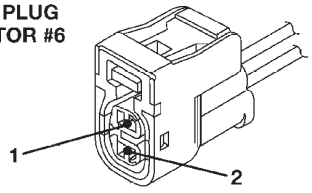


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LB	COIL ON PLUG DRIVER #6

80b27cd9

FIG. 2

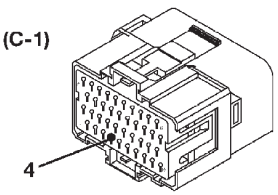
COIL ON PLUG CONNECTOR #6



CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD FEED
2	TN/LB	COIL ON PLUG DRIVER #6

POWERTRAIN CONTROL MODULE CONNECTOR

(C-1)

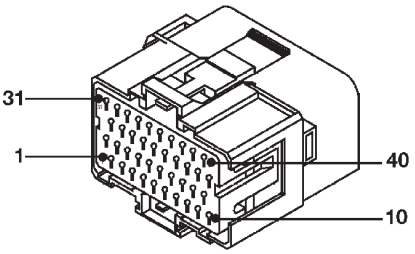


CAV	COLOR	FUNCTION
1	TN/LG	#4 DRIVER
2	TN/OR	#3 DRIVER
3	TN/PK	#2 DRIVER
4	TN/LB	#6 DRIVER
11	TN/RD	#1 DRIVER
21	TN/DG	#5 DRIVER

80b27cda

FIG. 3

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)



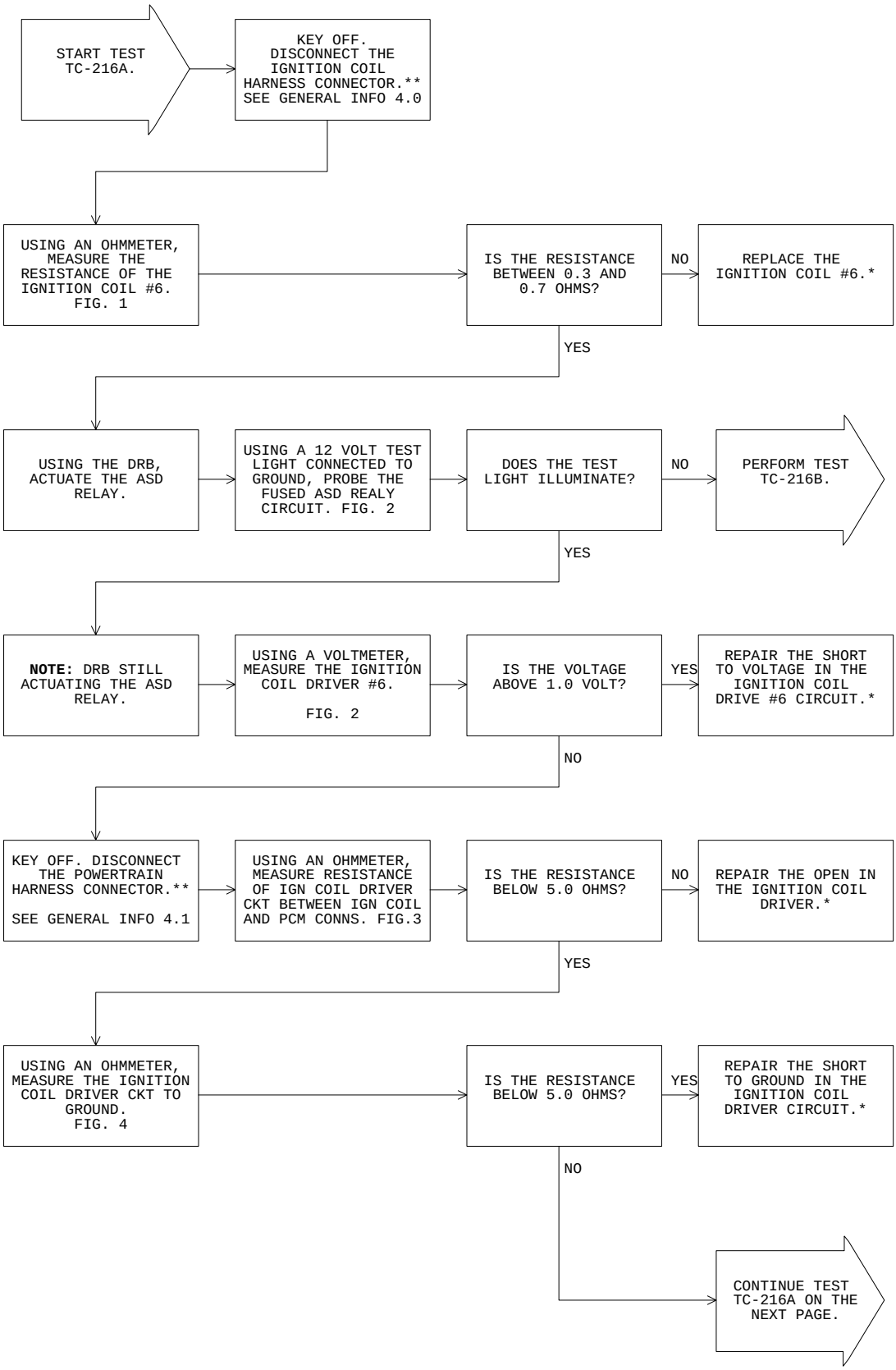
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/- SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/- SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSIT ON SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	38	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 4

TEST TC-216A REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT

Perform TEST DTC Before Proceeding

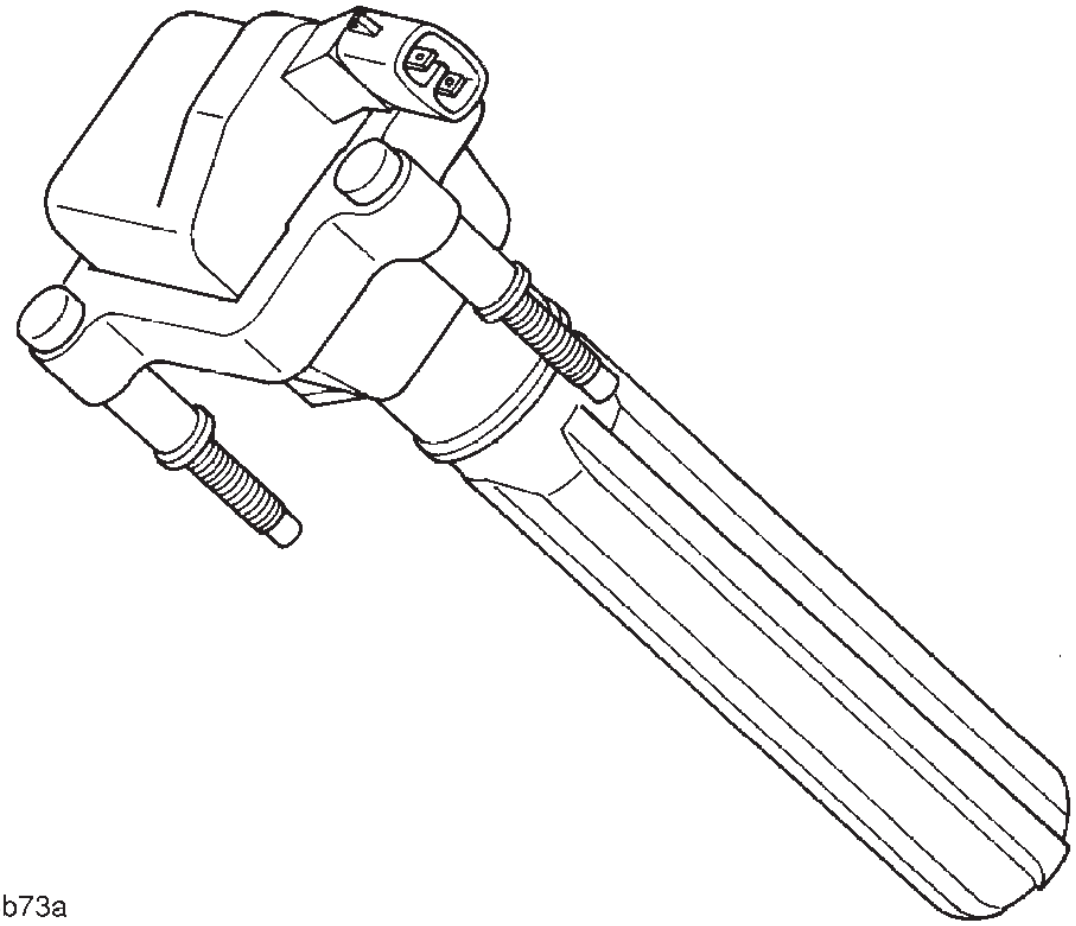


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST TC-216A CONTINUED - REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT

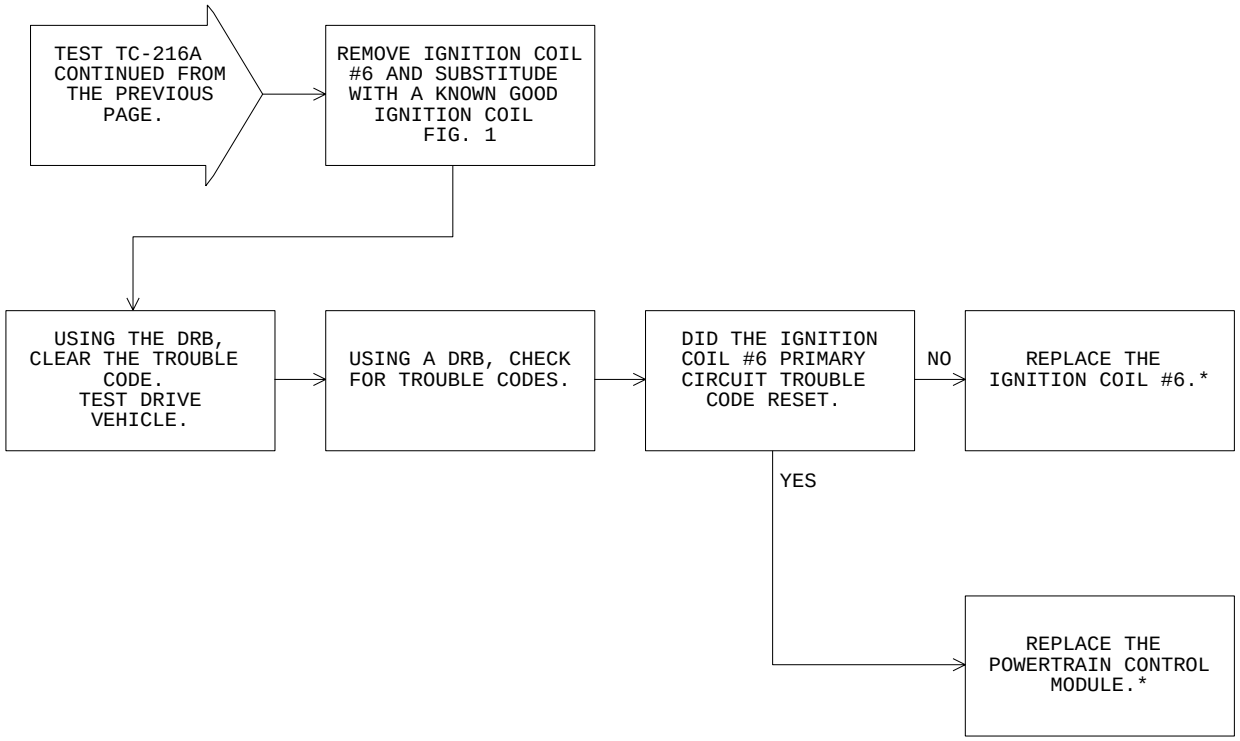
COIL ON PLUG
TYPICAL



80b4b73a

FIG. 1

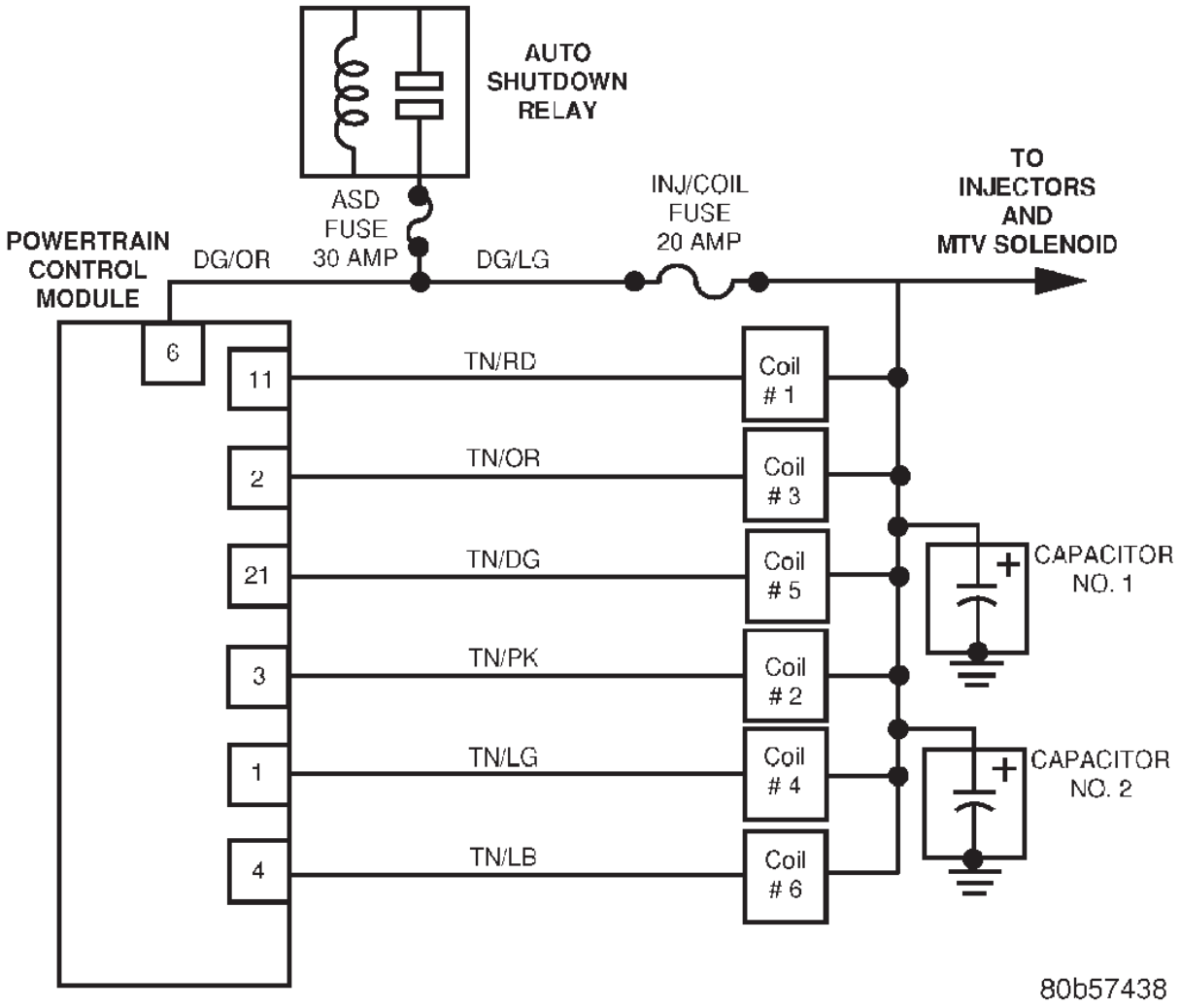
TEST TC-216A CONTINUED - REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT

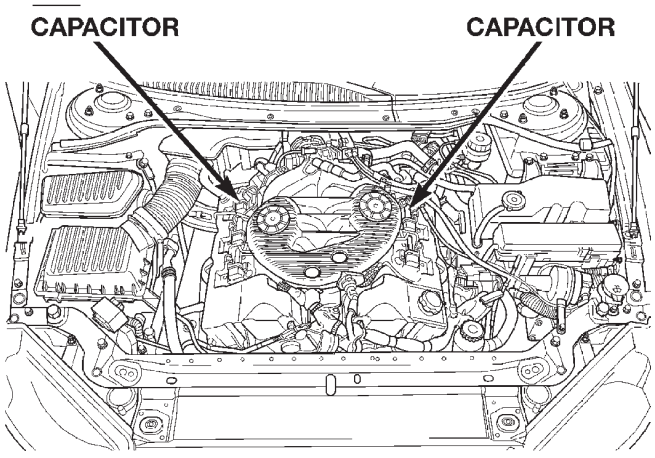


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-216B REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT

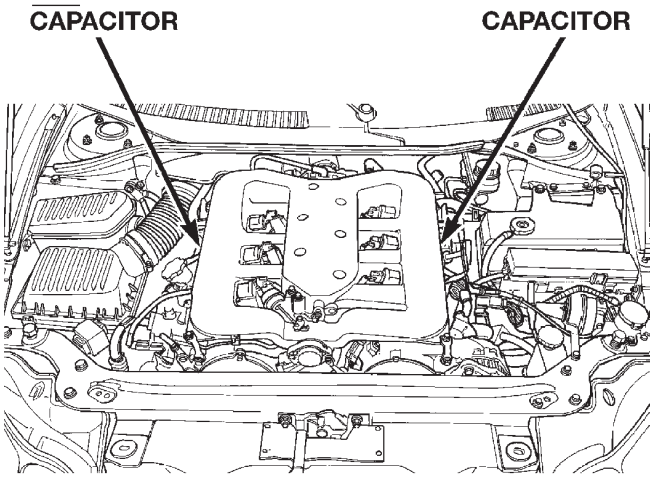




NOTE: CAPACITORS ARE ATTACHED TO THE REAR CENTER OF THE VALVE COVERS.

80b5cb59

FIG. 1

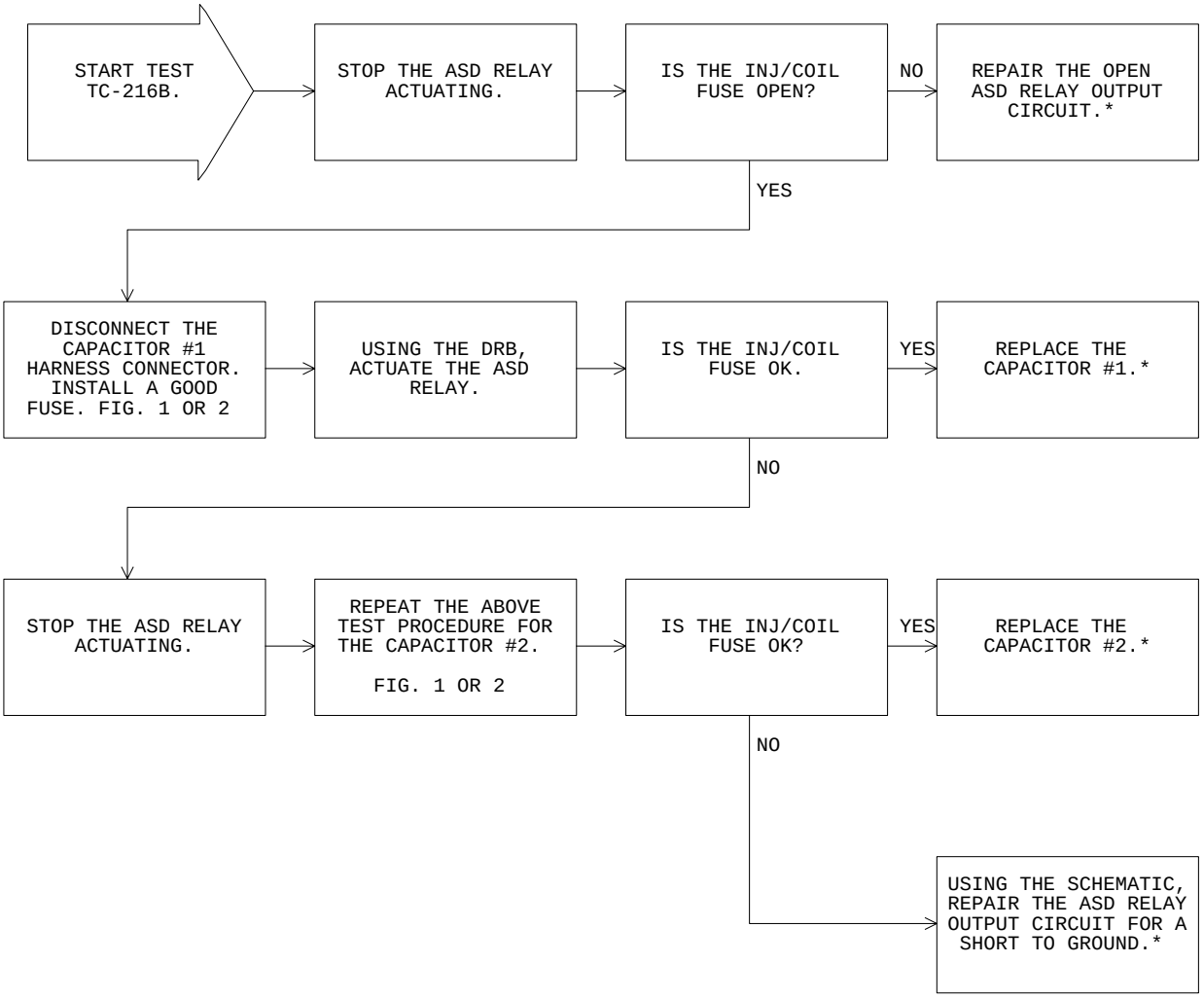


NOTE: CAPACITORS ARE ATTACHED TO THE SIDE OF THE VALVE COVERS.

80b5cb5a

FIG. 2

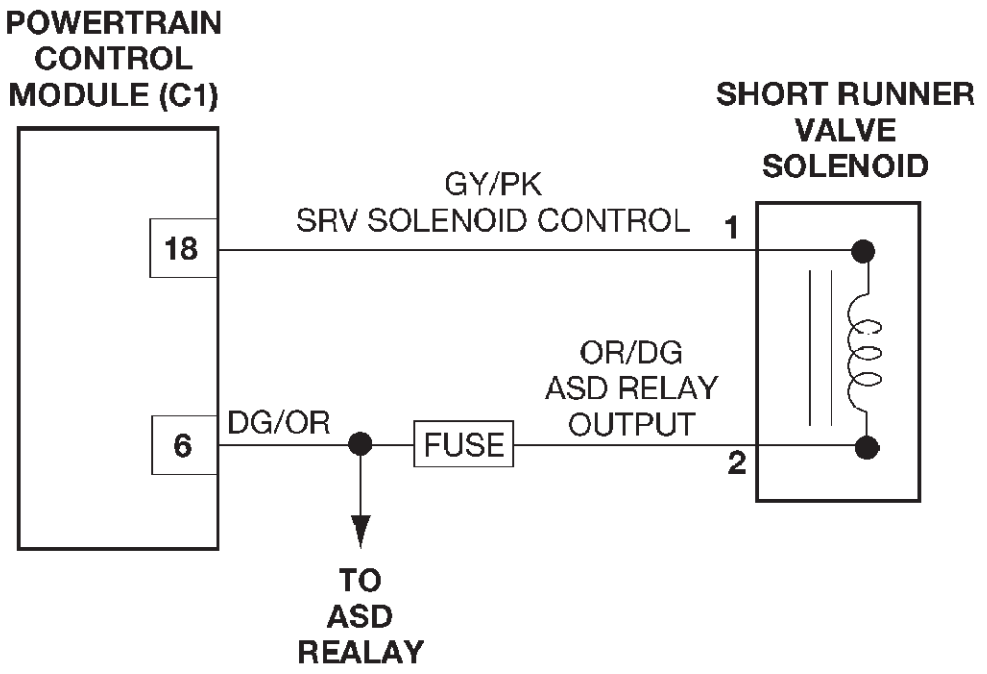
TEST TC-216B REPAIRING - IGNITION COIL #6 PRIMARY CIRCUIT



***Perform Verification TEST VER-2A.**	***Check connectors - Clean / repair as necessary.**

TEST TC-217A REPAIRING - SHORT RUNNER VALVE CIRCUIT

Perform TEST DTC Before Proceeding



80b29fab

Name of code: Short Runner Valve Solenoid Circuit

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set condition: The SRV solenoid control circuit is not in the expected state when request to operate by the PCM.

Theory of operation: The SRV system operates under WOT conditions above 5000 rpm to maximize engine performance. When actuated by the PCM, the SRV solenoid energizes, allowing mechanical linkage to redirect the intake air flow to six short runners. The PCM looks for a current spike when actuating the solenoid. If the spike is not present, the PCM sets the trouble code.

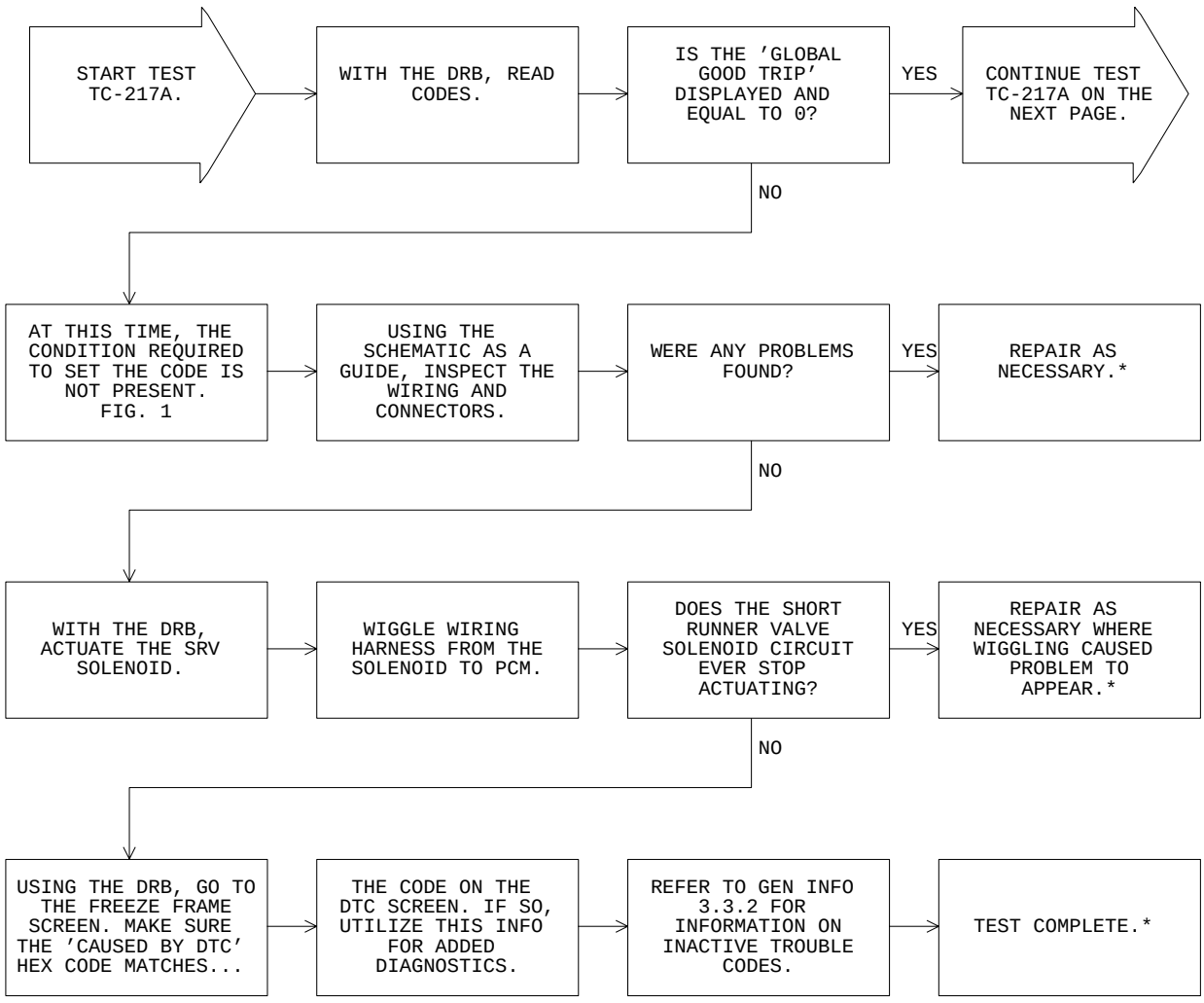
Possible causes:
> Open or shorted control circuit
> Open fused ASD relay output circuit
> Open or shorted solenoid control coil
> PCM failure
> Connector terminals
> Conector wires

80b2b620

FIG. 1

TEST TC-217A REPAIRING - SHORT RUNNER VALVE CIRCUIT

Perform TEST DTC Before Proceeding

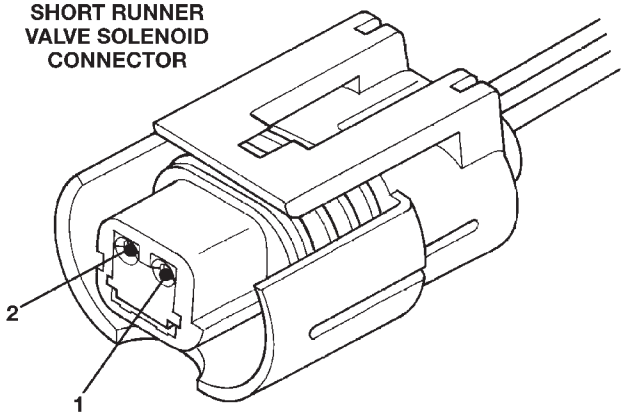


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-217A CONTINUED - REPAIRING - SHORT RUNNER VALVE SOLENOID CIRCUIT

SHORT RUNNER VALVE SOLENOID CONNECTOR

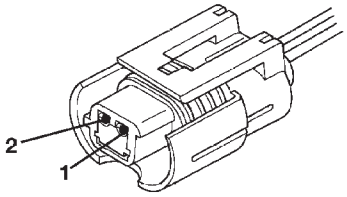


CAV	COLOR	FUNCTION
1	GY/PK	SRV SOLENOID CONTROL
2	OR/DG	ASD RELAY OUTPUT

FIG. 1

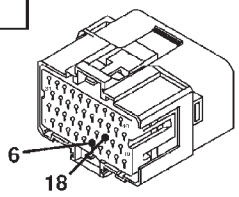
80b4fb55

SHORT RUNNER VALVE SOLENOID CONNECTOR



CAV	COLOR	FUNCTION
1	GY/PK	SRV SOLENOID CONTROL
2	OR/DG	ASD RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTOR (C1)

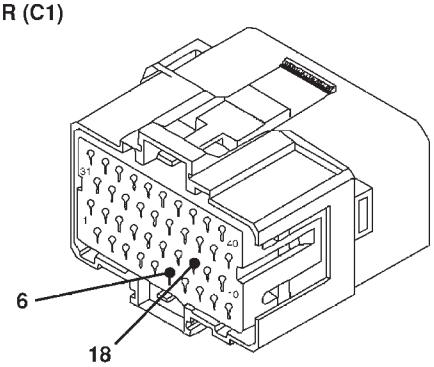


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
18	GY/PK	SRV SOLENOID CONTROL

FIG. 2

80b4fb56

POWERTRAIN CONTROL MODULE CONNECTOR (C1)

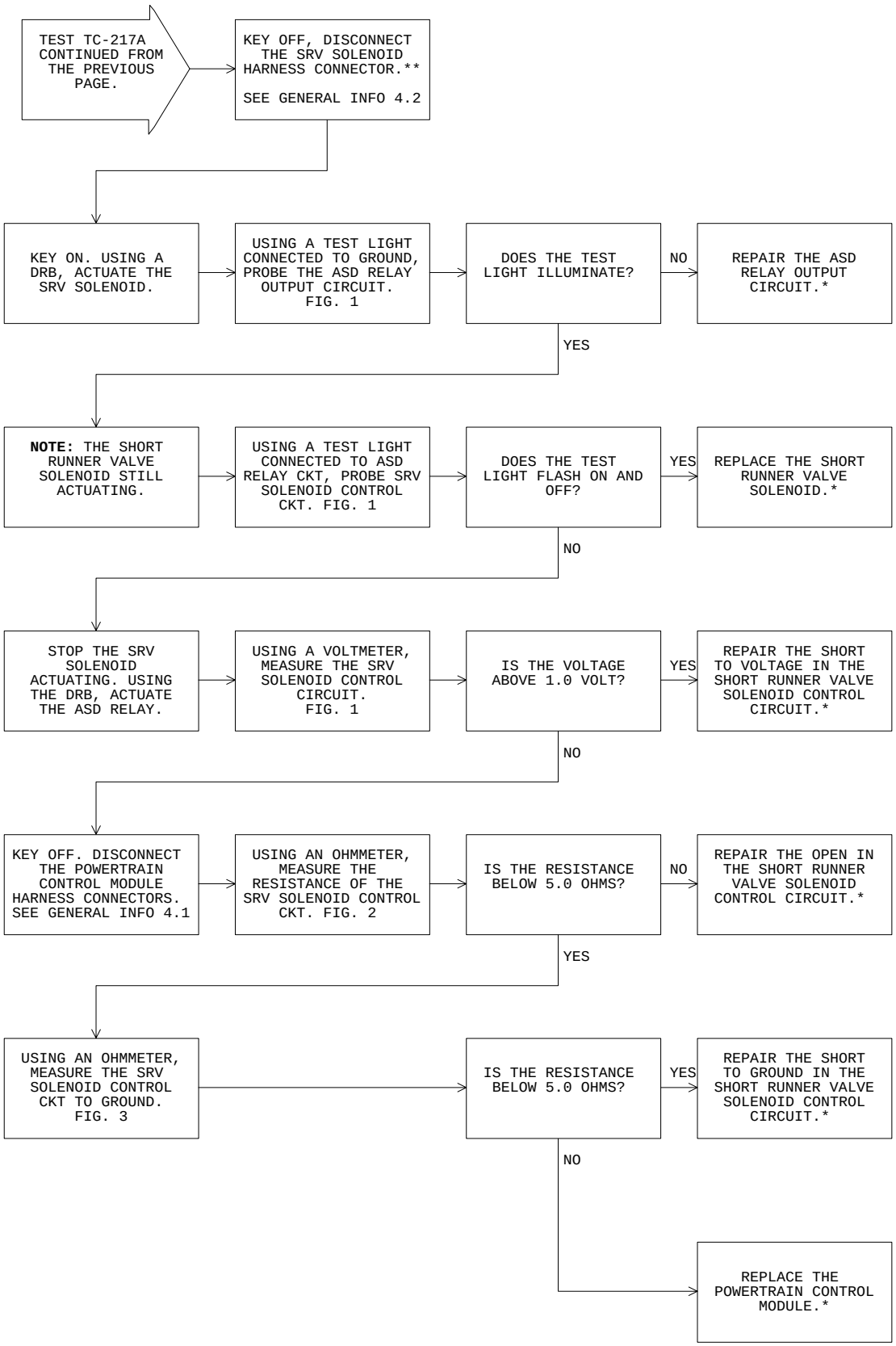


CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY OUTPUT
18	GY/PK	SHORT RUNNER VALVE SOLENOID CONTROL

80b09858

FIG. 3

TEST TC-217A CONTINUED - REPAIRING - SHORT RUNNER VALVE SOLENOID CIRCUIT

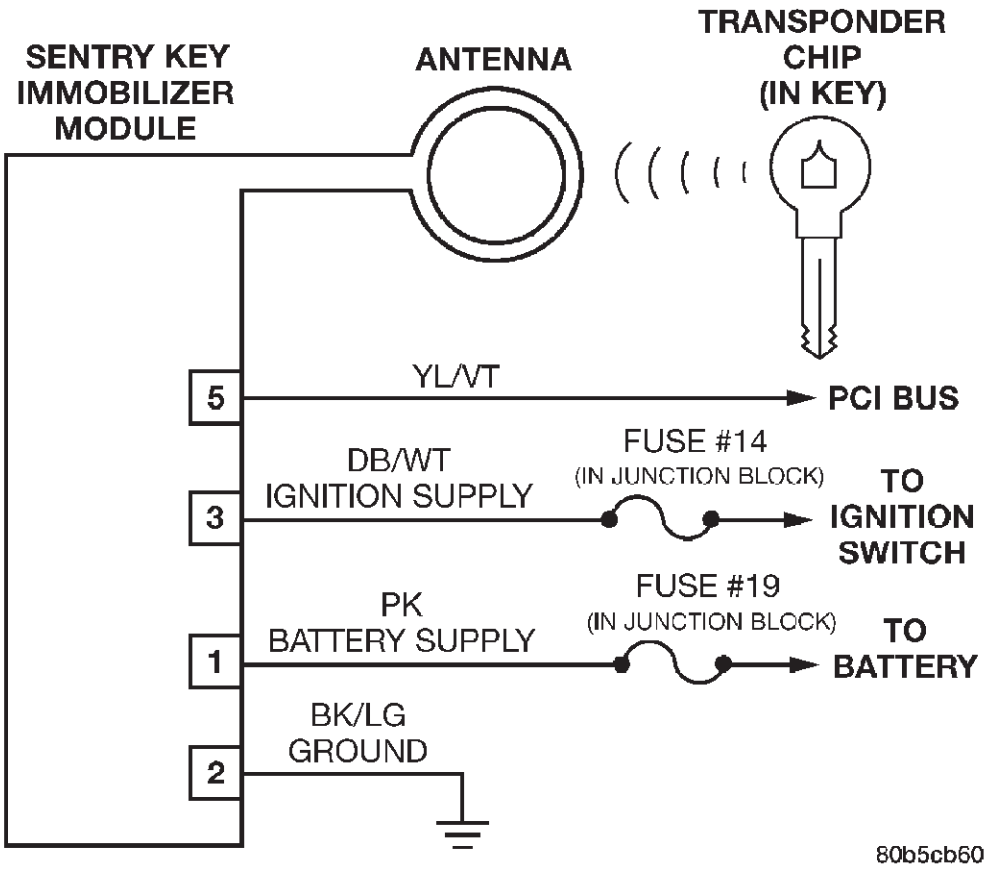


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST TC-226A **REPAIRING - NO PCI BUS MESSAGE RECEIVED FROM SKIM**

Perform TEST DTC Before Proceeding



Name of code: No PCI Message Received From SKIM

When Monitored: With ignition on.

Set Condition: The PCM does not receive a PCI Bus message from the SKIM module when expected.

Theory of operation: At ignition on, the SKIM sends a message to the PCM verifying the correct ignition key. If the PCM receives a correct message, it will allow the engine to start and continue to run. If the PCM does not receive a message or receives an incorrect key message the PCM will allow the engine to start and run for two seconds. If the PCM does not receive a valid key message in six start attempts the PCM will disable the starter relay until a valid key message is received.

Possible causes:

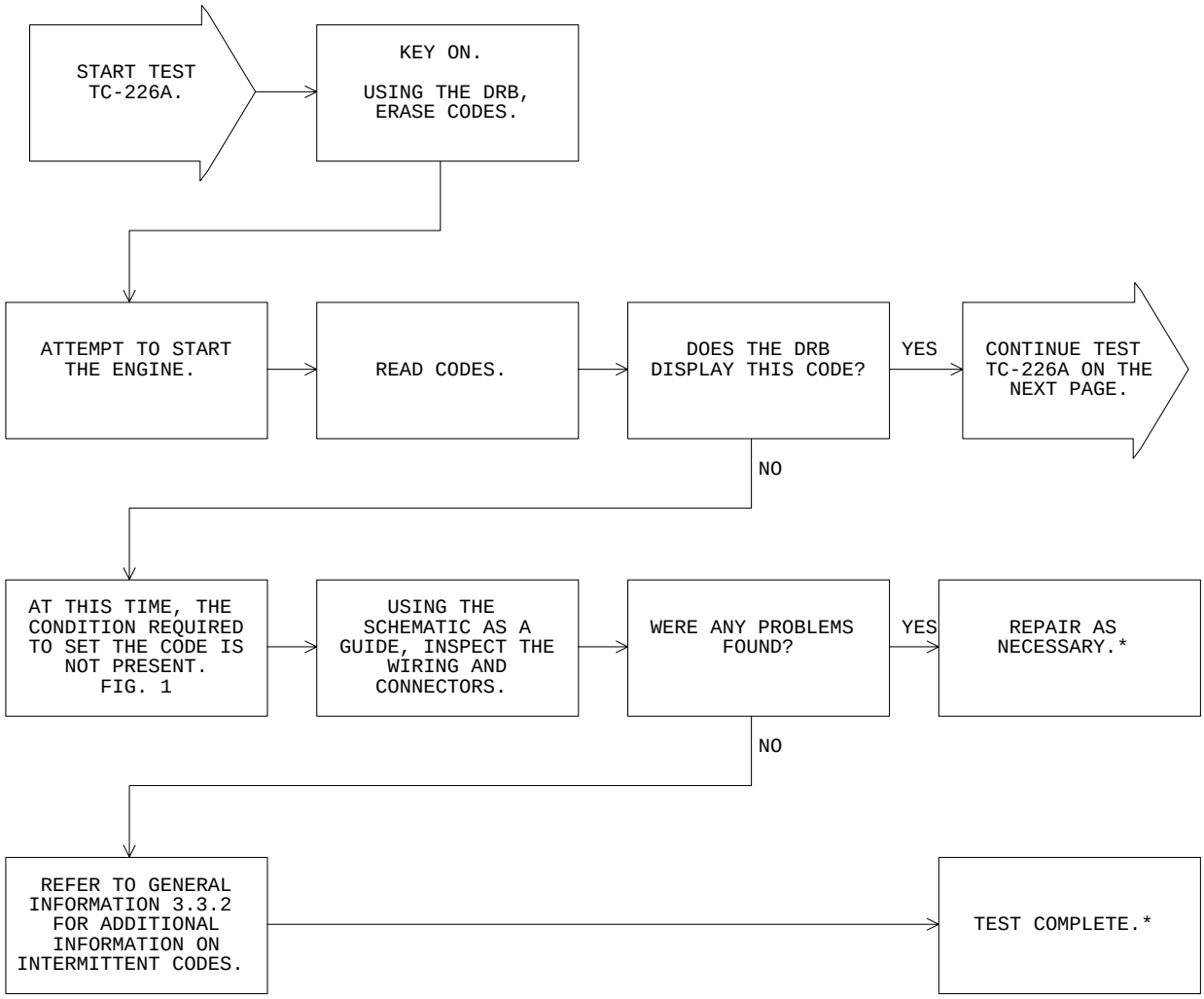
> Open or shorted PCI Bus circuit
> Failed SKIM
> Failed PCM
> Connector terminals
> Connector wires

80b89853

FIG. 1

TEST TC-226A REPAIRING - NO PCI BUS MESSAGE RECEIVED FROM SKIM

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

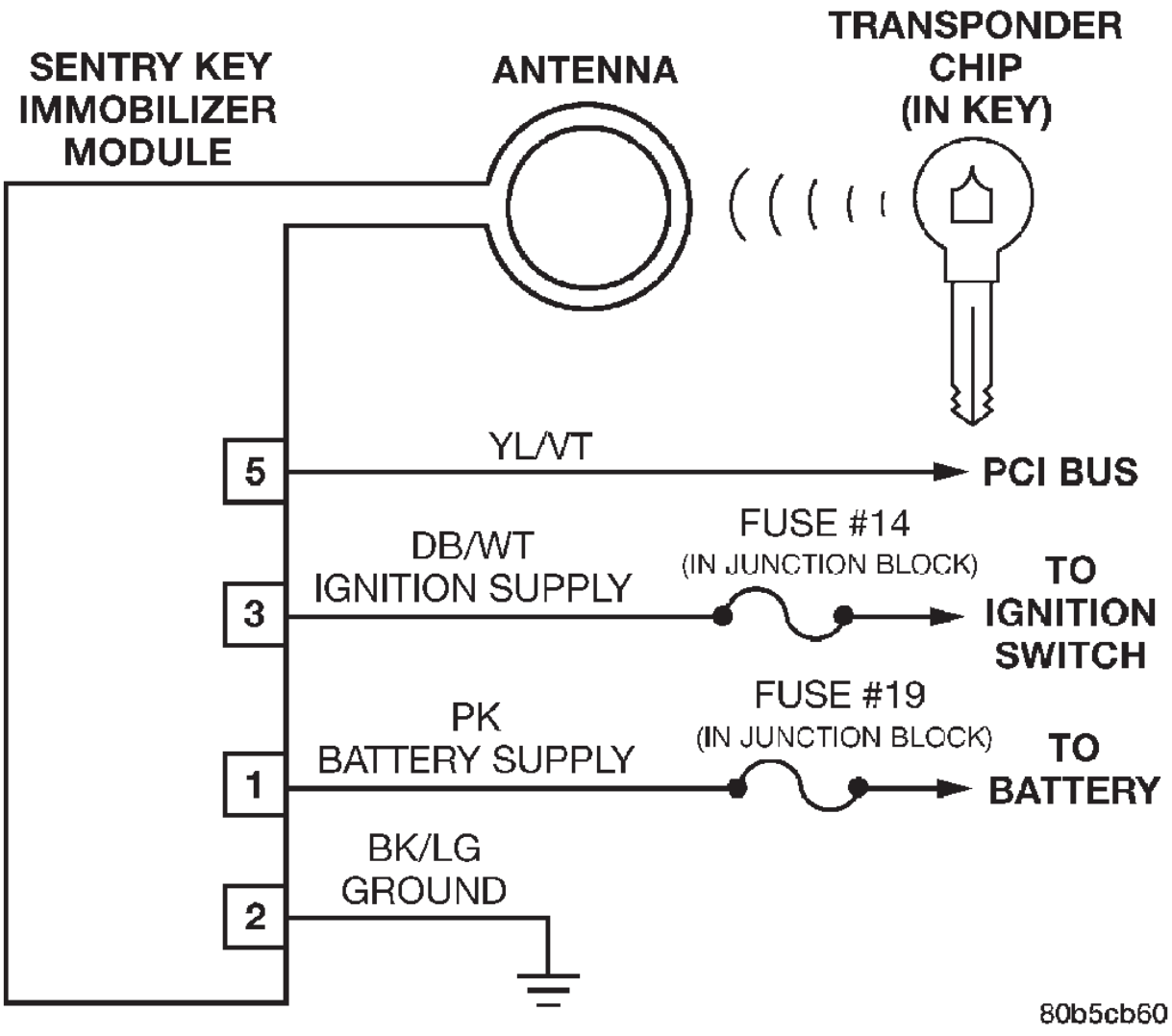
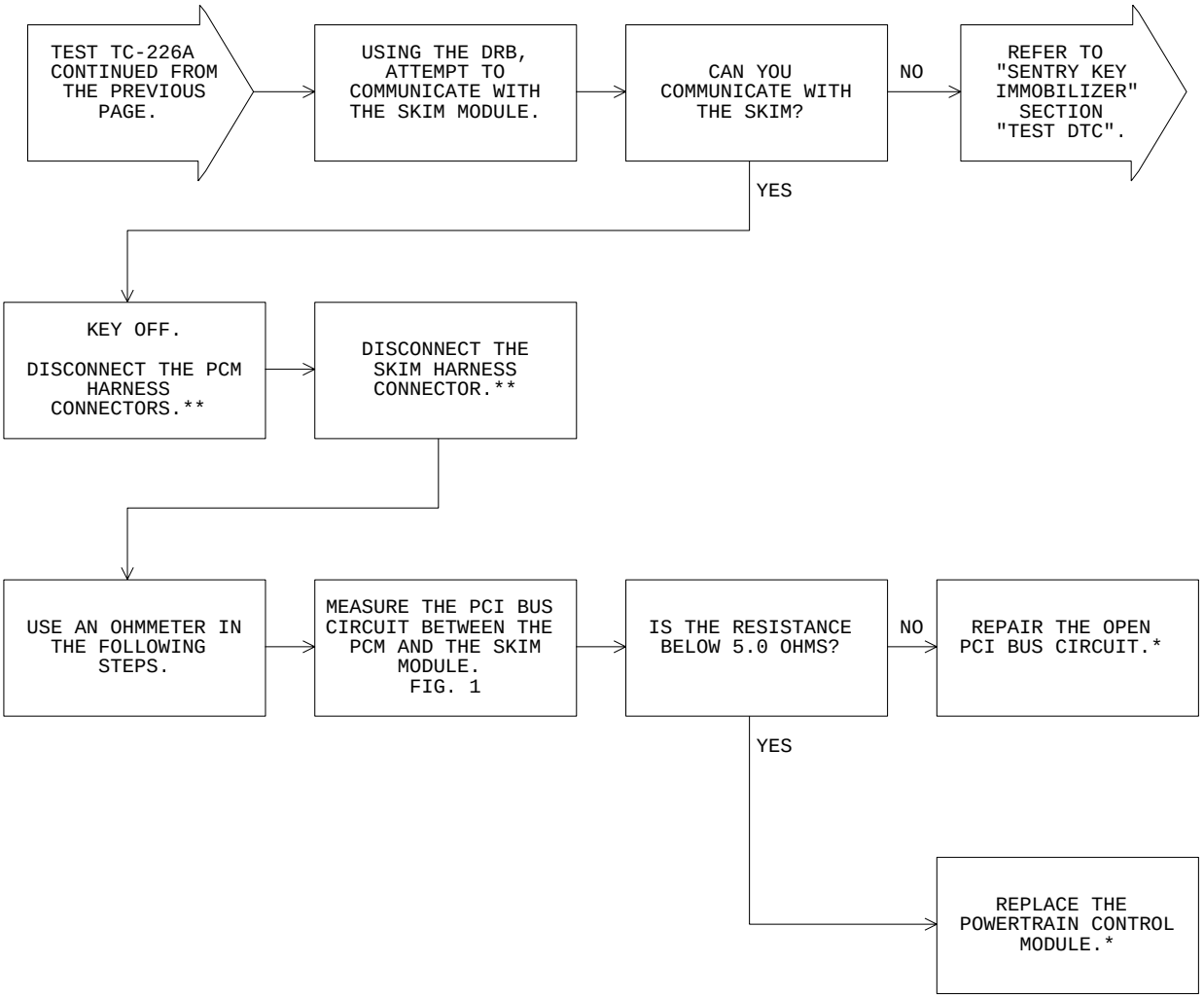

SENTRY KEY IMMOBILIZER MODULE
ANTENNA
TRANSPONDER CHIP (IN KEY)
5
YL/VT
PCI BUS
3
DB/WT IGNITION SUPPLY
FUSE #14
(IN JUNCTION BLOCK)
TO IGNITION SWITCH
1
PK BATTERY SUPPLY
FUSE #19
(IN JUNCTION BLOCK)
TO BATTERY
2
BK/LG GROUND
80b5cb60

FIG. 1

TEST TC-226A CONTINUED - REPAIRING - NO PCI BUS MESSAGE RECEIVED FROM SKIM

Perform TEST DTC Before Proceeding

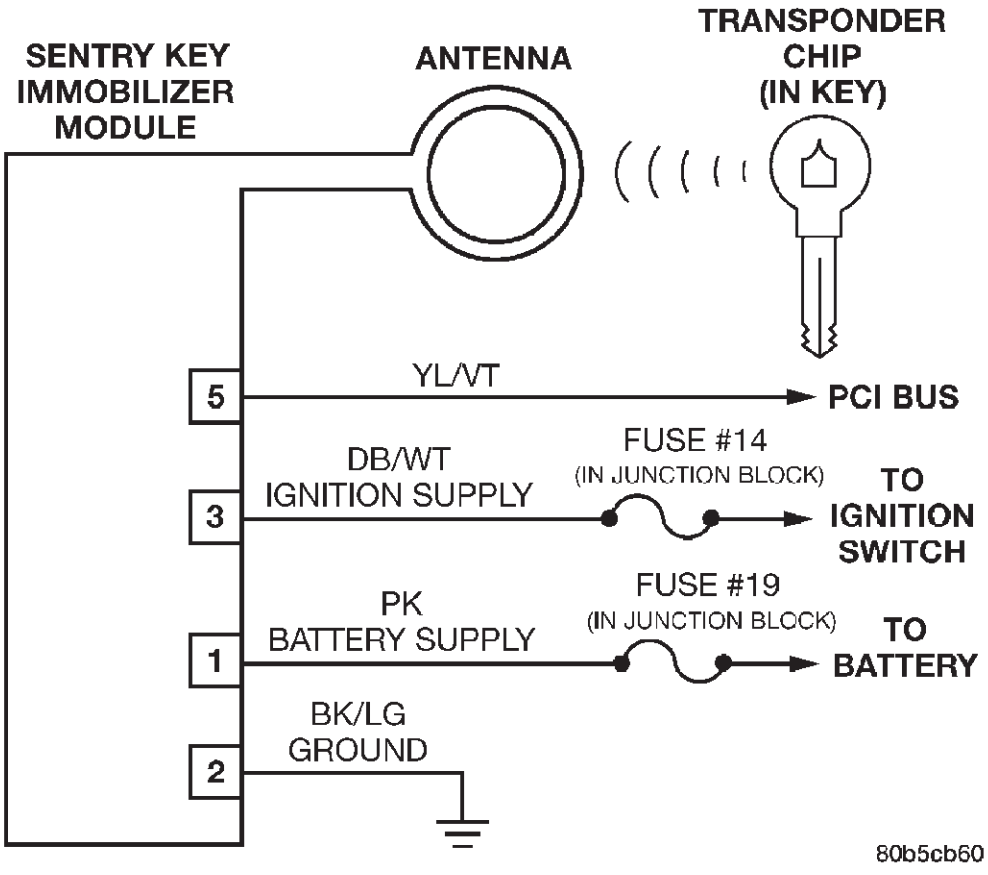


Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST TC-232A REPAIRING - INVALID OR WRONG KEY MESSAGE FROM SKIM

Perform TEST DTC Before Proceeding



Name of code: Invalid or Wrong Key Message From SKIM

When Monitored: With ignition on.

Set Condition: The PCM does not receive a valid key message from the SKIM module.

Theory of operation: At ignition on, the SKIM module sends a message to the PCM verifying the correct ignition key. If the PCM receives a correct message, it will allow the engine to start and continue to run. If the PCM does not receive a message or receives an incorrect message the PCM will allow the engine to start and run for two seconds. If the PCM does not receive a valid key message in six start attempts the PCM will disable the starter relay until a valid key message is received.

Possible causes:

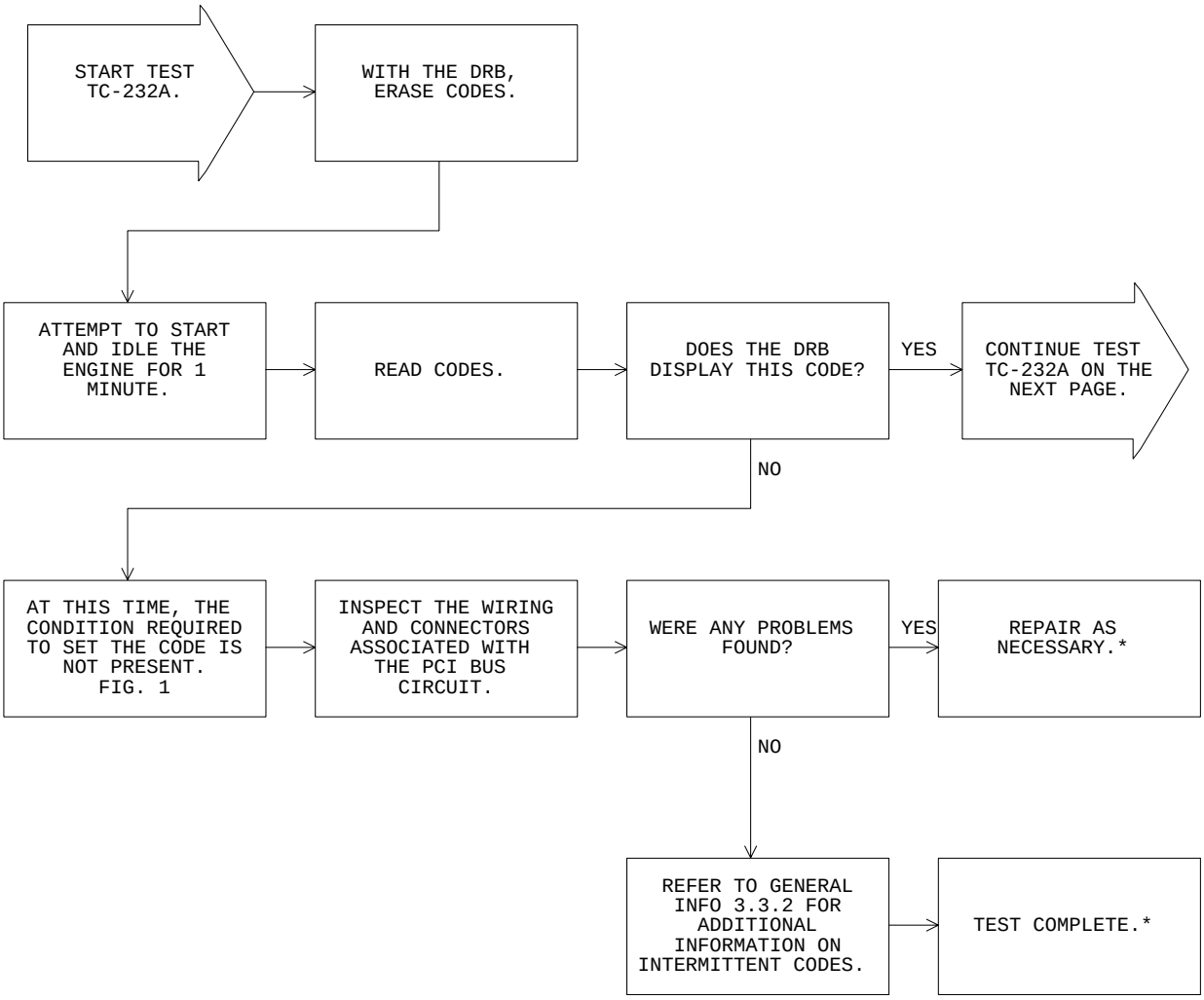
> Ignition key not programmed
> Wrong ignition key
> Incorrect VIN stored in PCM
> Failed SKIM module
> Failed PCM

80b118e7

FIG. 1

TEST TC-232A REPAIRING - INVALID OR WRONG KEY MESSAGE FROM SKIM

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-1A.**	****Check connectors - Clean / repair as necessary.**

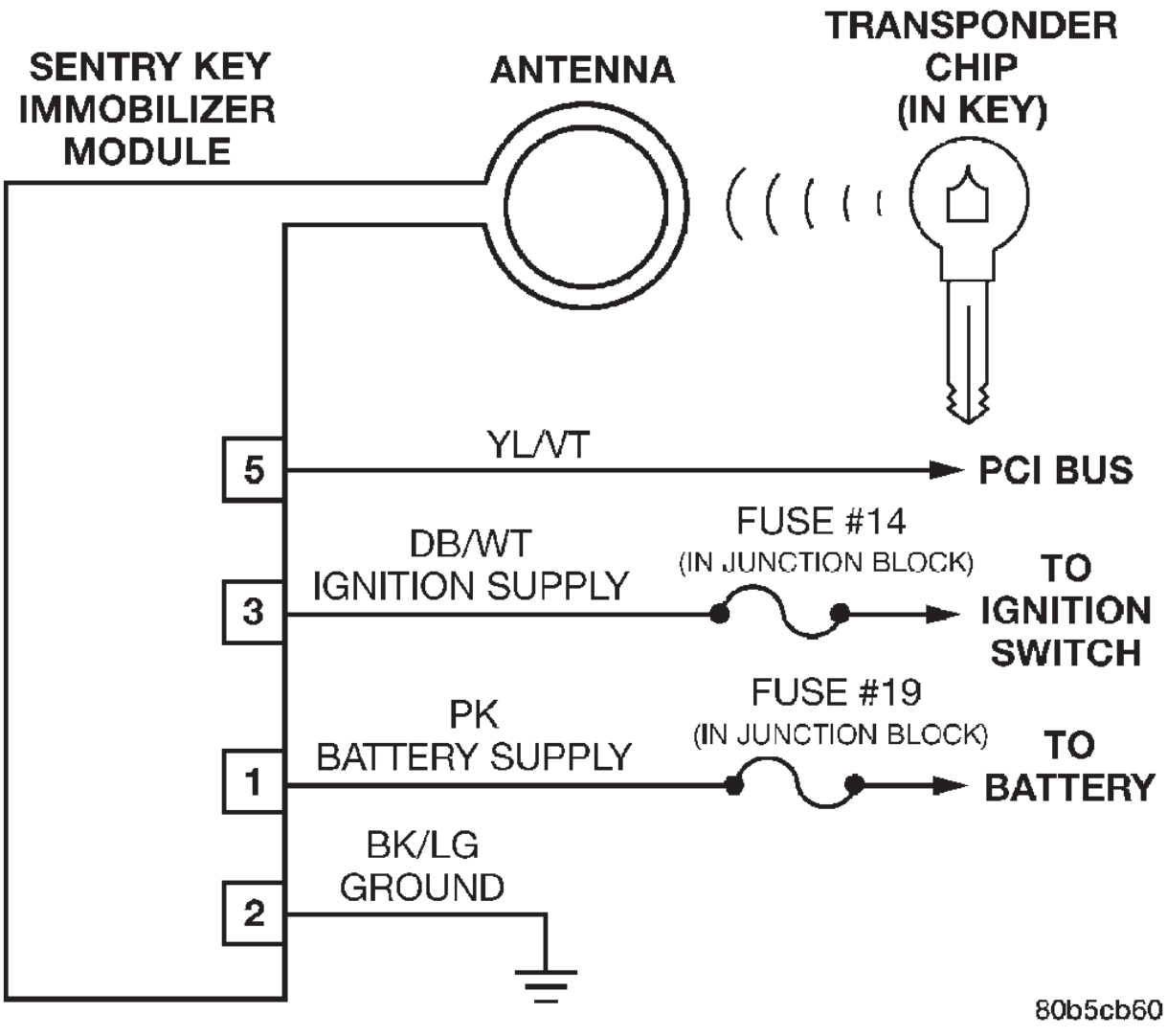
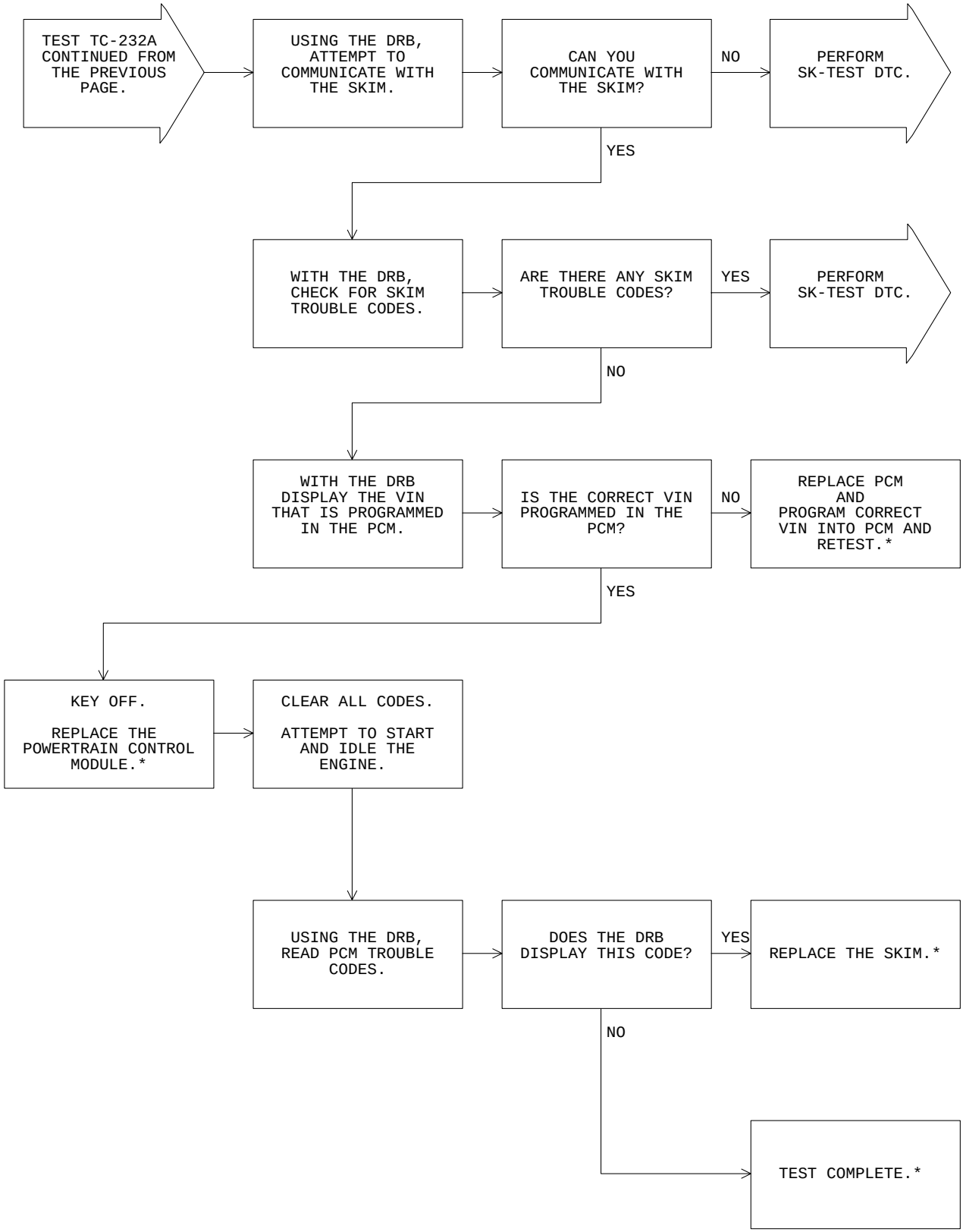

SENTRY KEY IMMOBILIZER MODULE
ANTENNA
TRANSPONDER CHIP (IN KEY)
5
YL/VT
PCI BUS
3
DB/WT IGNITION SUPPLY
FUSE #14
(IN JUNCTION BLOCK)
TO IGNITION SWITCH
1
PK BATTERY SUPPLY
FUSE #19
(IN JUNCTION BLOCK)
TO BATTERY
2
BK/LG GROUND
80b5cb60

FIG. 1

TEST TC-232A CONTINUED - REPAIRING - INVALID OR WRONG KEY MESSAGE FROM SKIM

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-1A.**	****Check connectors - Clean / repair as necessary.**

TEST SK | **IDENTIFYING SKIM PROBLEMS**

NOTES

TEST SK-1A IDENTIFYING SENTRY KEY IMMOBILIZER SYSTEM PROBLEMS

NOTE: The Sentry Key Immobilizer System (SKIS) diagnosis may require usage of the customer's additional keys to verify the cause of the system failure. In the event that the Sentry Key Immobilizer Module (SKIM) needs replacing, all of the keys previously programmed into the SKIM's memory must be programmed into the new SKIM. **THEREFORE IT IS IMPORTANT THAT ALL OF THE CUSTOMER'S KEYS PROGRAMMED FOR THE VEHICLE BE OBTAINED PRIOR TO BEGINNING VEHICLE DIAGNOSIS.**

NOTE: It is necessary to obtain the four-digit Personal Identification Number (PIN) from the customer or the vehicle invoice. The PIN is required to perform certain SKIM tasks using the DRB.

NOTE: It is very important that the PCM is programmed with the correct Vehicle Identification Number (VIN). Incorrect VIN programming may result in incorrect diagnosis and unnecessary component replacement. Use the DRB to verify the correct VIN and country code in the SKIM.

1. The battery must be fully charged for any test in this manual.
2. Attempt to start the engine. Crank for up to 10 seconds if necessary.
3. Connect the DRB to the diagnostic connector and select "Theft Alarm" then "SKIM". If the DRB displays "No Response".....perform test 1B.

NOTE: If the DRB screen is blank or has a DRB error message displayed, go to **General Information Section 3.5** in this manual.

4. With the DRB, read and record SKIM trouble codes.
5. If diagnostic trouble code(s) are displayed, refer to the diagnostic trouble code list on the next page for the appropriate test.

TEST SK-1A IDENTIFYING SENTRY KEY IMMOBILIZER SYSTEM PROBLEMS

DIAGNOSTIC TROUBLE CODE (DTC) DISPLAYED	DIAGNOSTIC TEST
ANTENNA FAILURE	**
COP FAILURE	**
EEPROM FAILURE	**
EMS STATUS FAILURE	SK-2A
INTERNAL FAULT	**
RAM FAILURE	**
ROLLING CODE FAILURE	SK-3A
SERIAL LINK EXTERNAL FAULT	SK-4A
SERIAL LINK INTERNAL	**
STACK OVERFLOW FAILURE	**
TRANSPONDER COMMUNICATION FAILURE	SK-5A
TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE	SK-6A
TRANSPONDER ID MISMATCH	SK-7A
TRANSPONDER RESPONSE MISMATCH	SK-8A
VIN MISMATCH	SK-9A

** These trouble codes indicate an internal SKIM fault. Using the DRB, clear SKIM trouble code(s). Perform several key cycles, leaving the key on for a minimum of 30 seconds per cycle. Using the DRB, read SKIM trouble codes. If the trouble code is present, replace the SKIM.

NOTE: An intermittent start and stall condition accompanied with a transponder DTC can be caused by the presence of a non-programmed key or key programmed to another vehicle, near the SKIM antenna (ignition halo). This can occur if the customer has a key holder (ring) that contains more than one key equipped with a transponder chip.

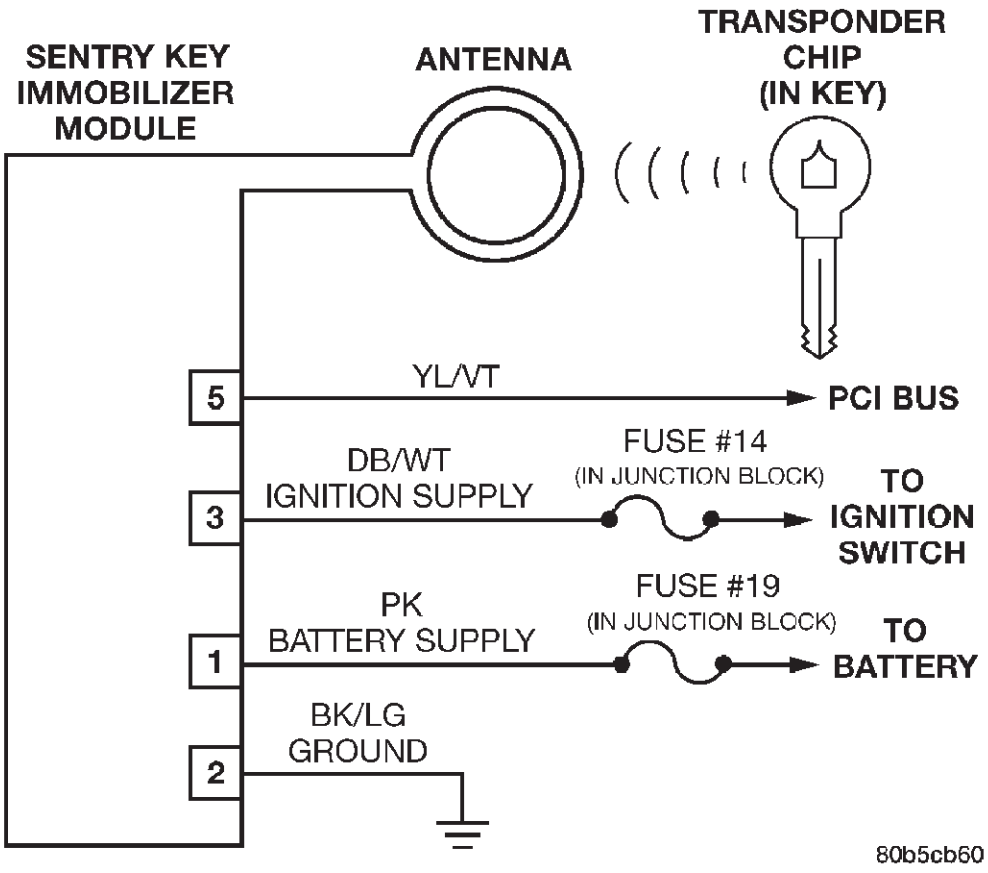
After replacement of the Sentry Key Immobilizer Module (SKIM) see **GENERAL INFORMATION SECTION 8.0 for SKIM initialization.**

TEST SK-1A IDENTIFYING SENTRY KEY IMMOBILIZER SYSTEM PROBLEMS

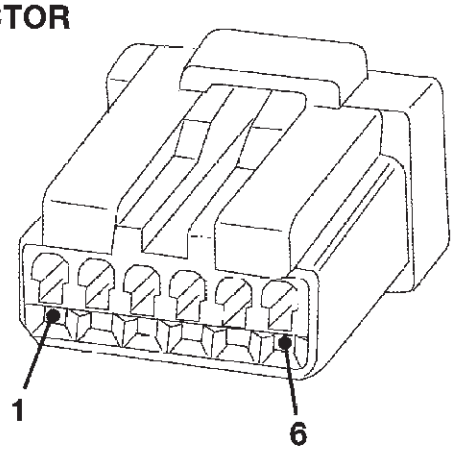
NOTES

TEST SK-1B SKIM COMMUNICATION

Perform TEST SK-1A Before Proceeding



SKIM MODULE HARNESS CONNECTOR



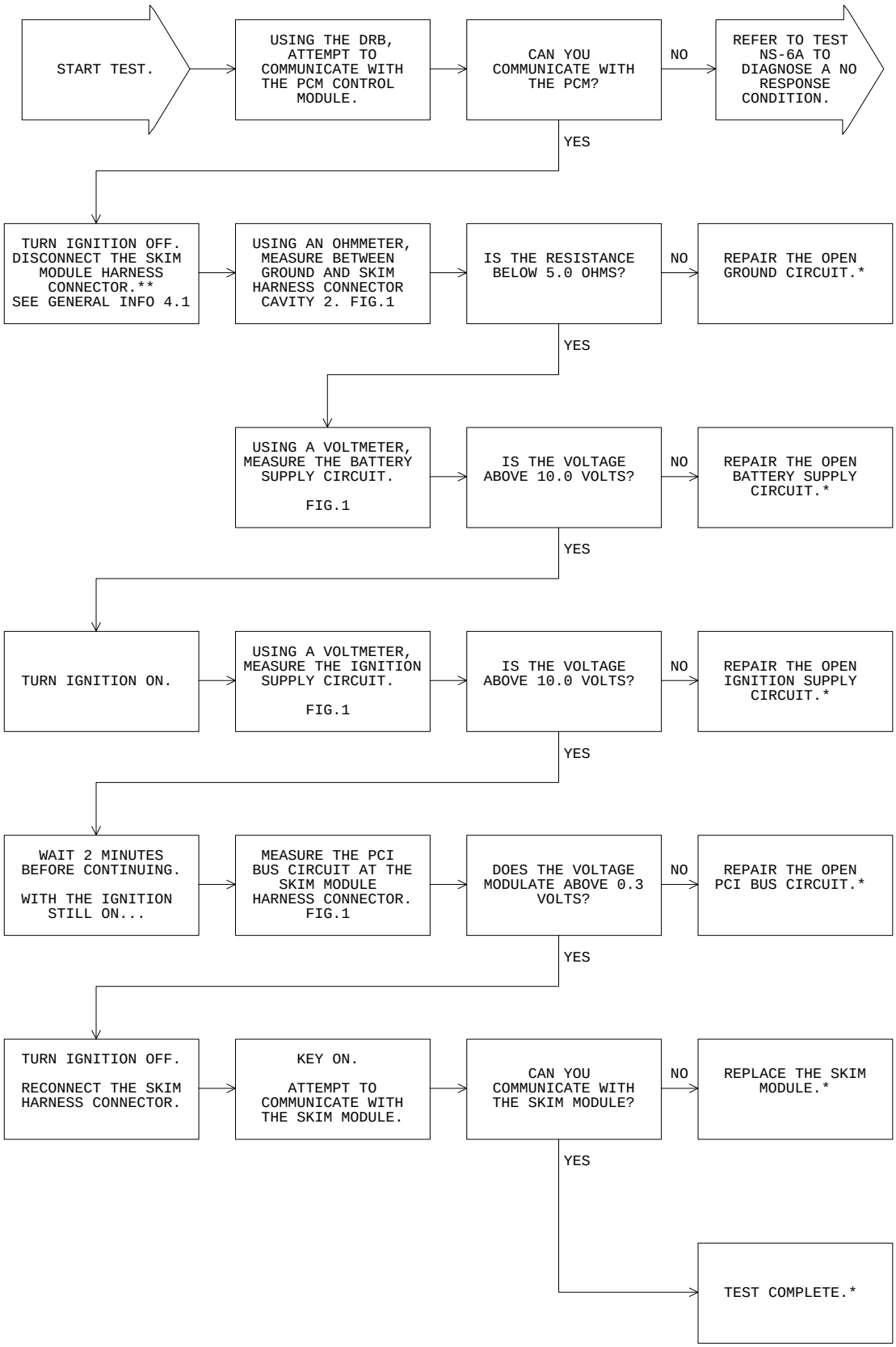
CAV	COLOR	FUNCTION
1	PK	FUSED B(+)
2	BK/LG	GROUND
3	DB/WT	FUSED IGNITION SWITCH OUTPUT
5	YL/VT	PCI BUS

80b5cb61

FIG. 1

TEST SK-1B SKIM COMMUNICATION

Perform TEST SK-1A Before Proceeding

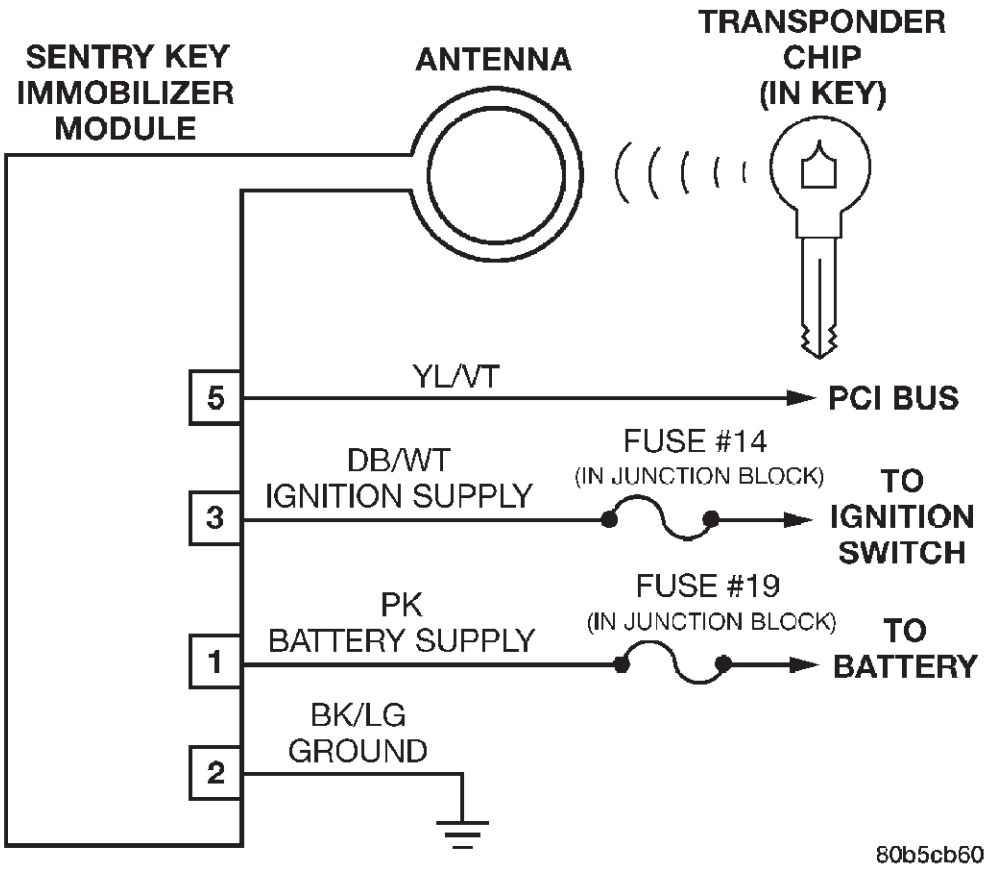


Perform Verification TEST VER-1A.

****Check connectors - Clean / repair as necessary.***

TEST SK-2A REPAIRING - EMS STATUS FAILURE

Perform TEST DTC Before Proceeding



Name of code: EMS Status Failure

When monitored: With the ignition on.

Set condition: The SKIM does not receive an expected EMS Status PCI BUS message from the PCM within the last 20 seconds.

Theory of operation: The EMS status message informs the SKIM whether the PCM has received a "valid key" or "invalid key" message from the SKIM. The PCM broadcasts the EMS status every 2.7 seconds on the PCI BUS.

Possible causes:

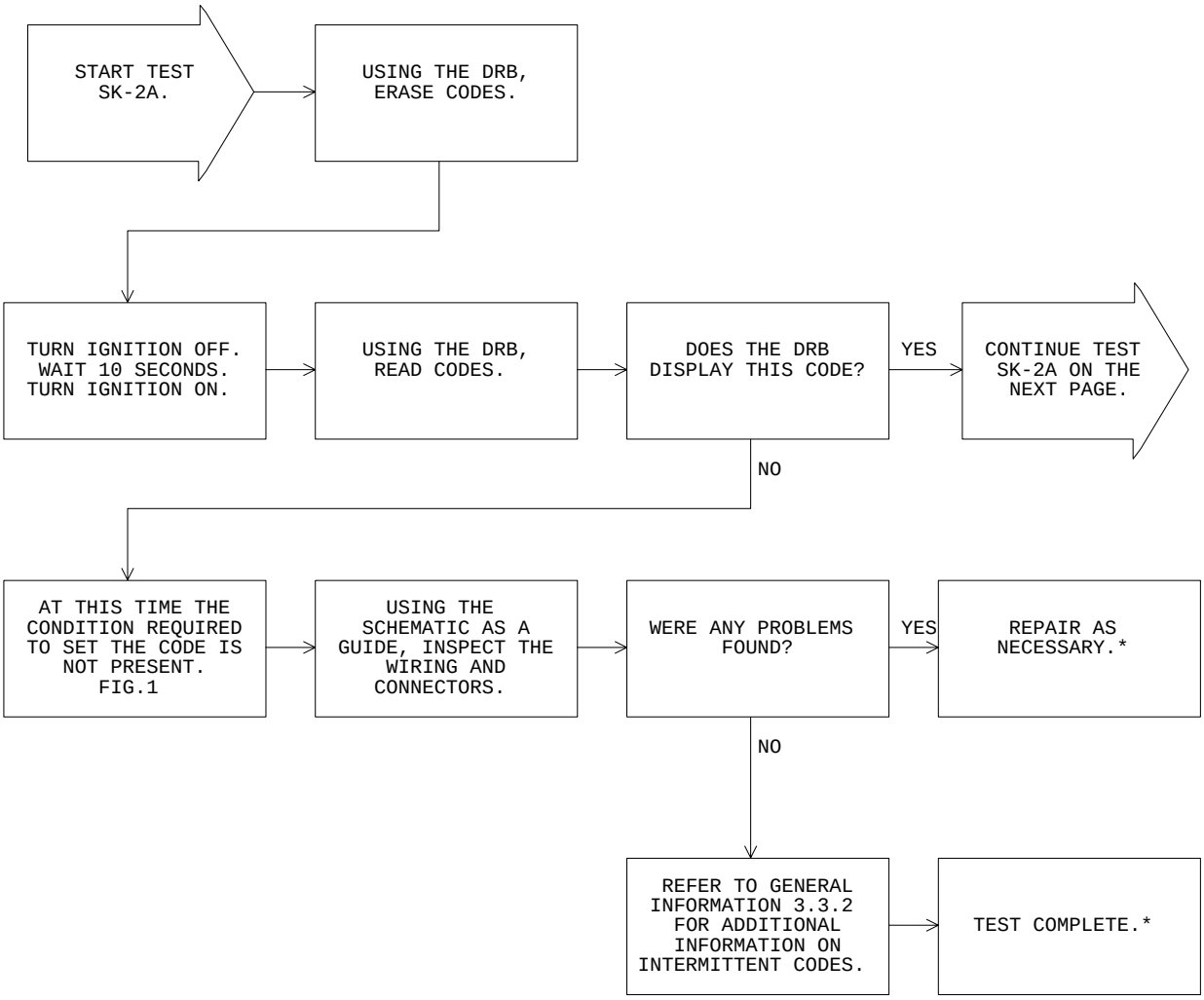
> PCI BUS circuit open, shorted to voltage or shorted to ground
> Failed SKIM
> Failed PCM

80b5cb5b

FIG. 1

TEST SK-2A REPAIRING - EMS STATUS FAILURE

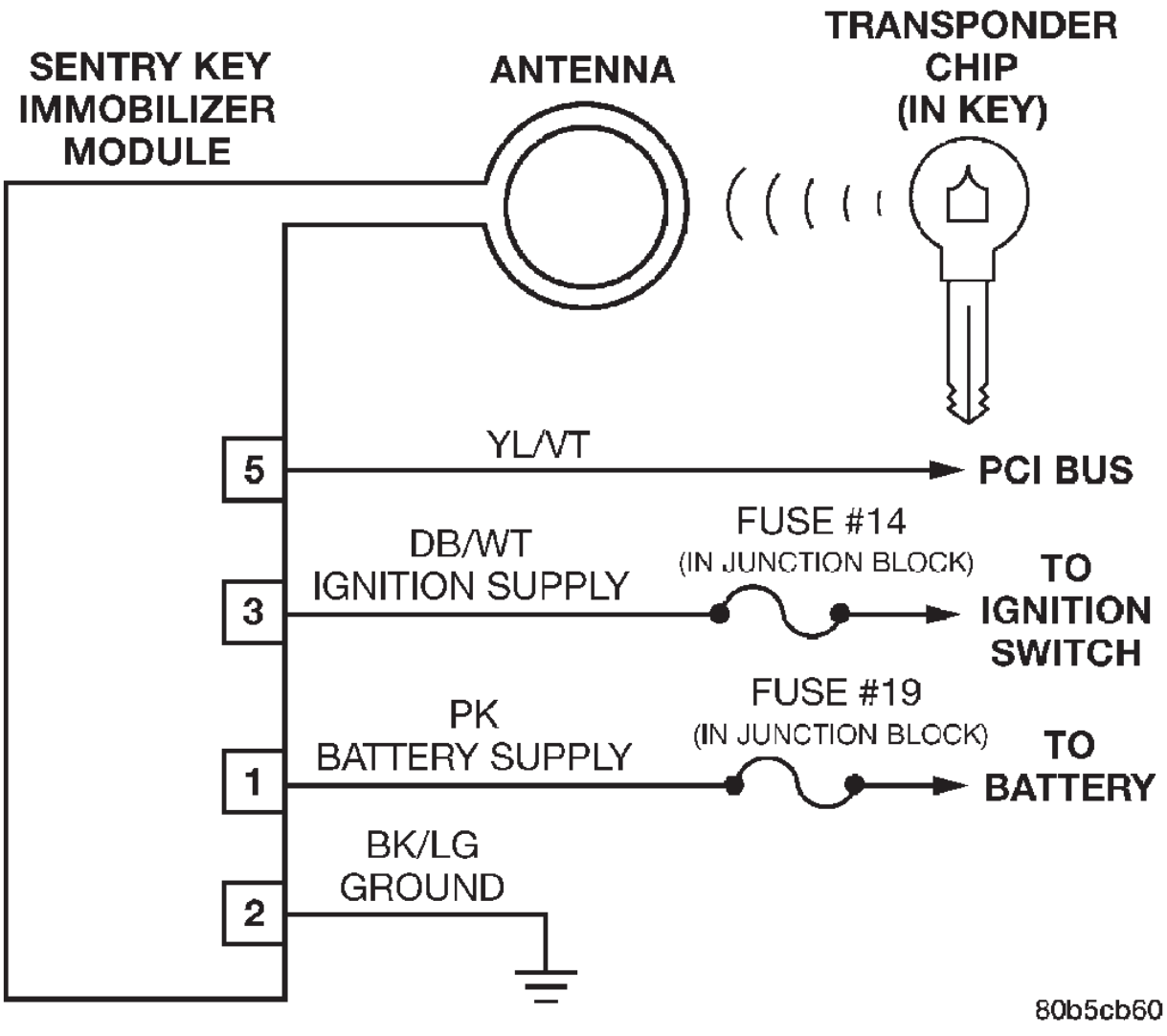
Perform TEST DTC Before Proceeding



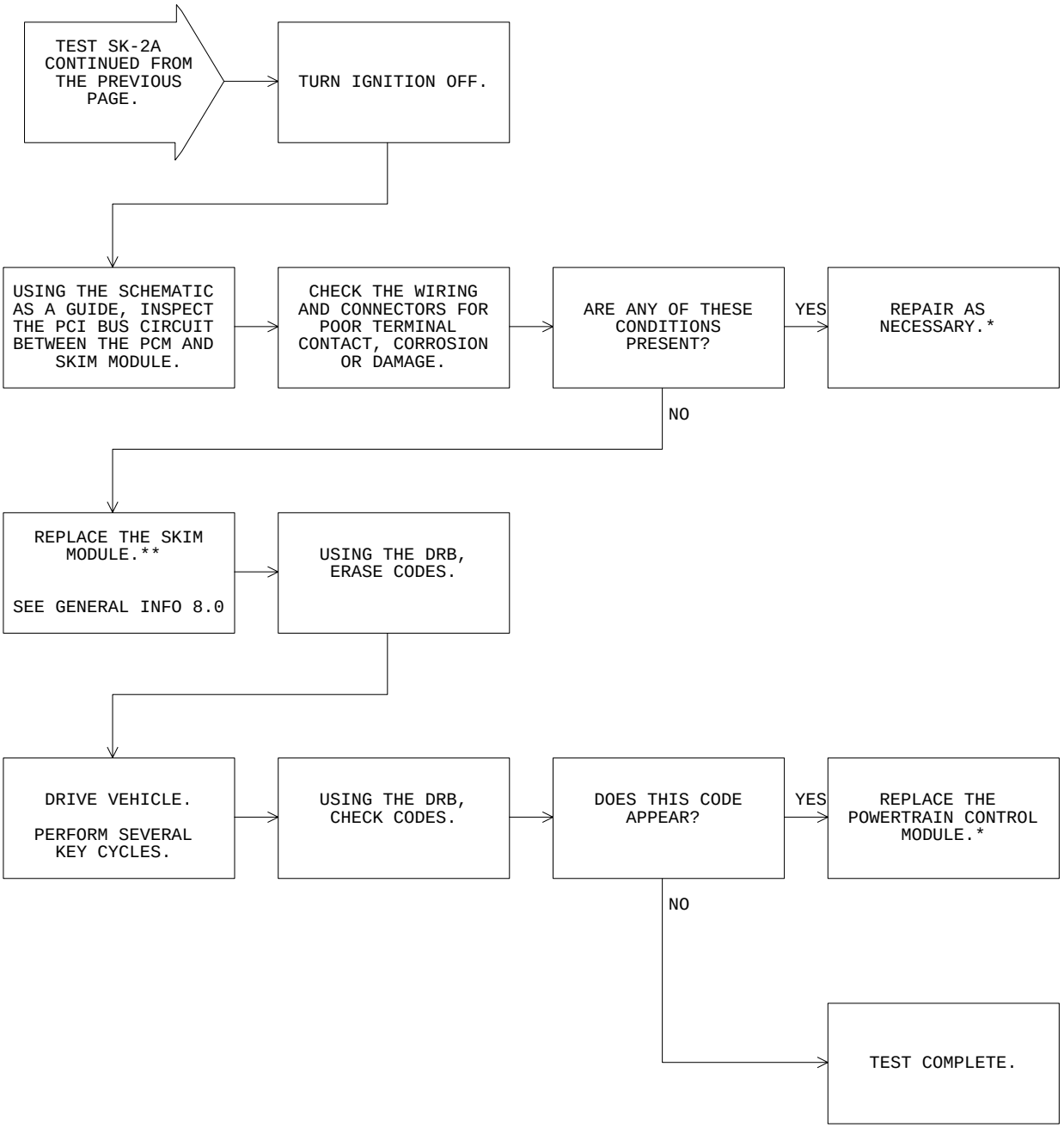
***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST SK-2A CONTINUED - REPAIRING - EMS STATUS FAILURE



TEST SK-2A CONTINUED - REPAIRING - EMS STATUS FAILURE

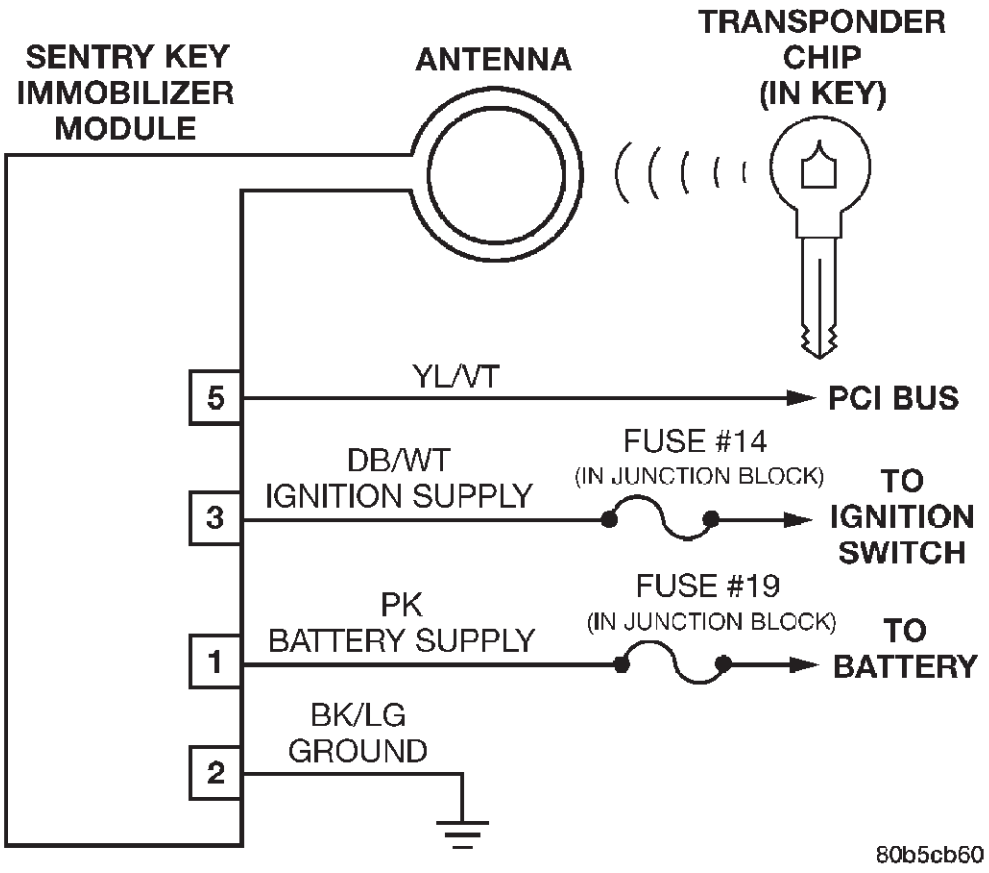


Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-3A | **REPAIRING - ROLLING CODE FAILURE**

Perform TEST DTC Before Proceeding



Name of code: Rolling Code Failure

When monitored: With the ignition on.

Set condition: The SKIM does not receive an expected EMS status PCI BUS message from the PCM within 3.5 seconds of transmitting a "valid key" message to the PCM.

Theory of operation: After determining the ignition key is a valid key, the SKIM sends a coded "valid key" PCI BUS message to the PCM. The SKIM expects a PCI BUS message acknowledgment from the PCM.

Possible causes:

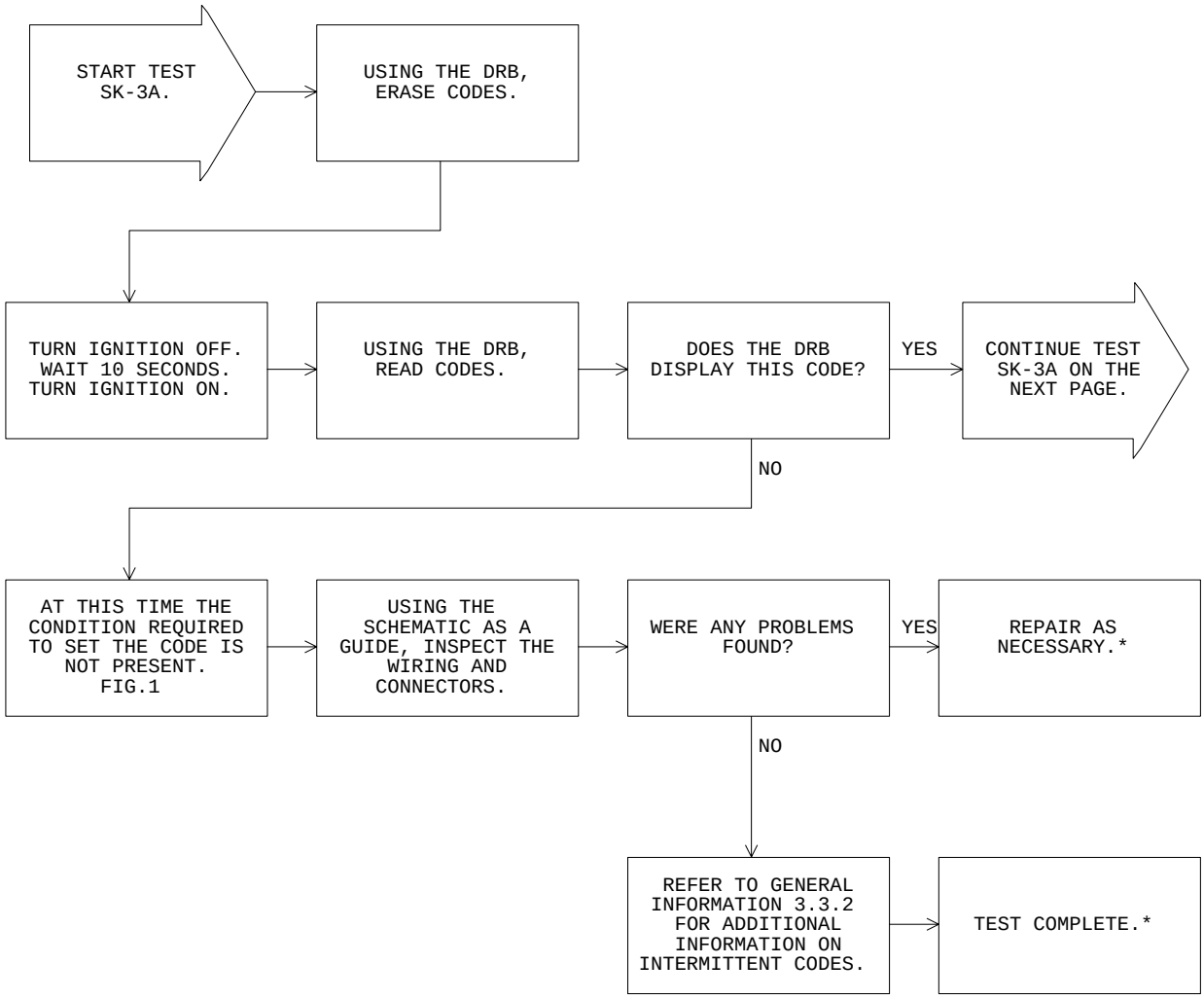
> PCI BUS circuit open, shorted to voltage or shorted to ground
> Failed SKIM
> Failed PCM

80b5cb5c

FIG. 1

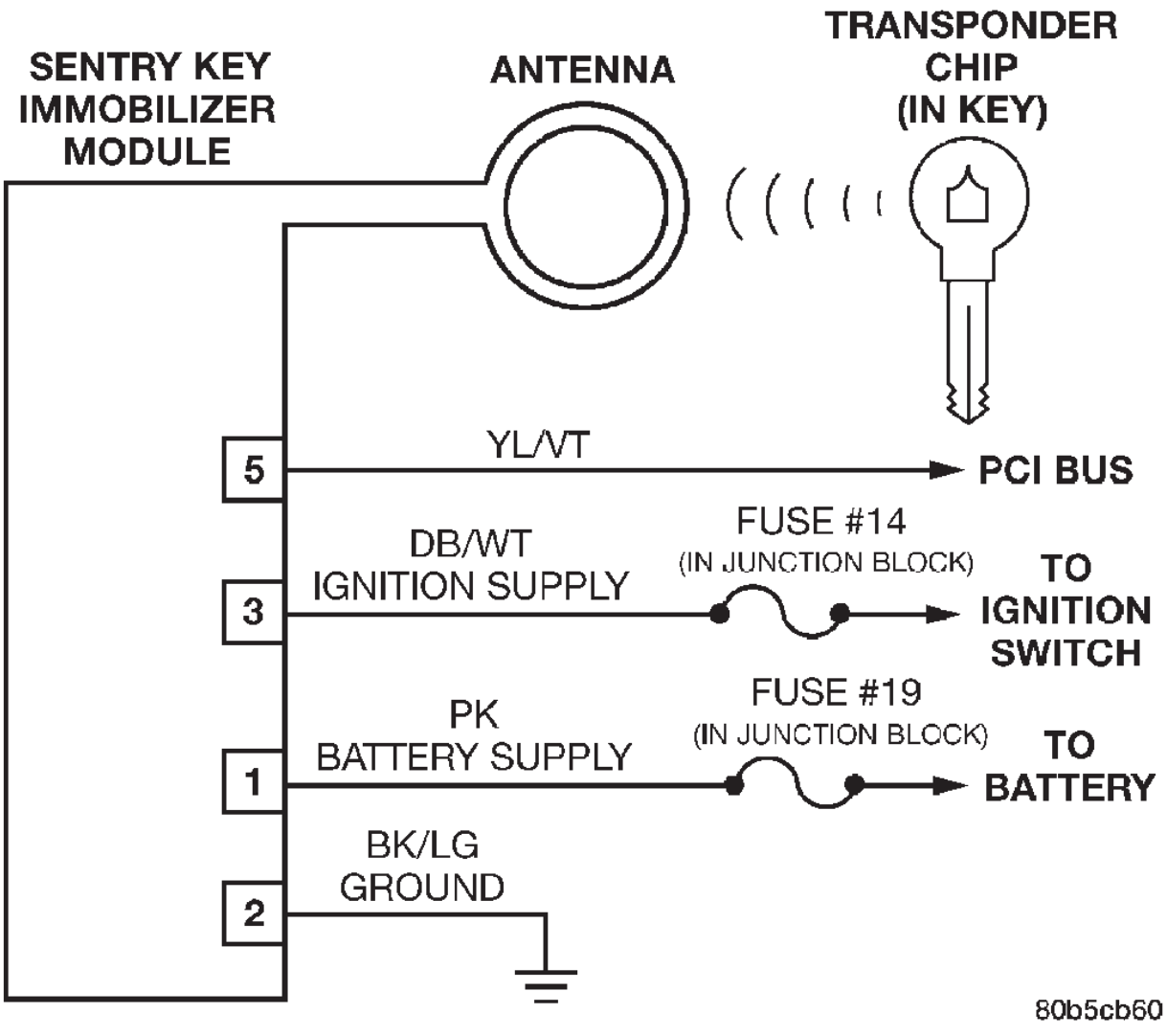
TEST SK-3A REPAIRING - ROLLING CODE FAILURE

Perform TEST DTC Before Proceeding

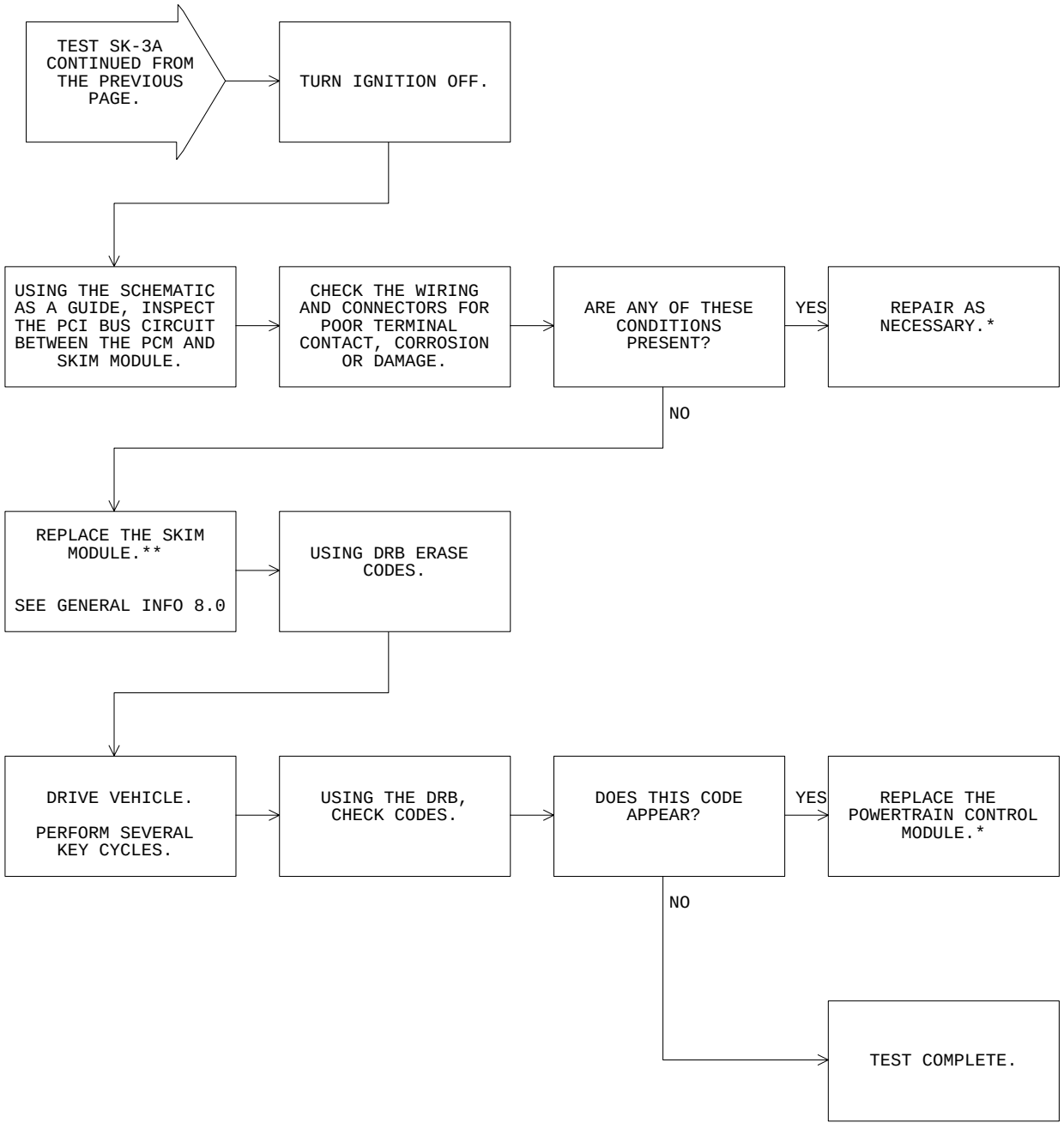


***Perform Verification TEST VER-1A.**	****Check connectors - Clean / repair as necessary.**

TEST SK-3A CONTINUED - REPAIRING - ROLLING CODE FAILURE



TEST SK-3A CONTINUED - REPAIRING - ROLLING CODE FAILURE

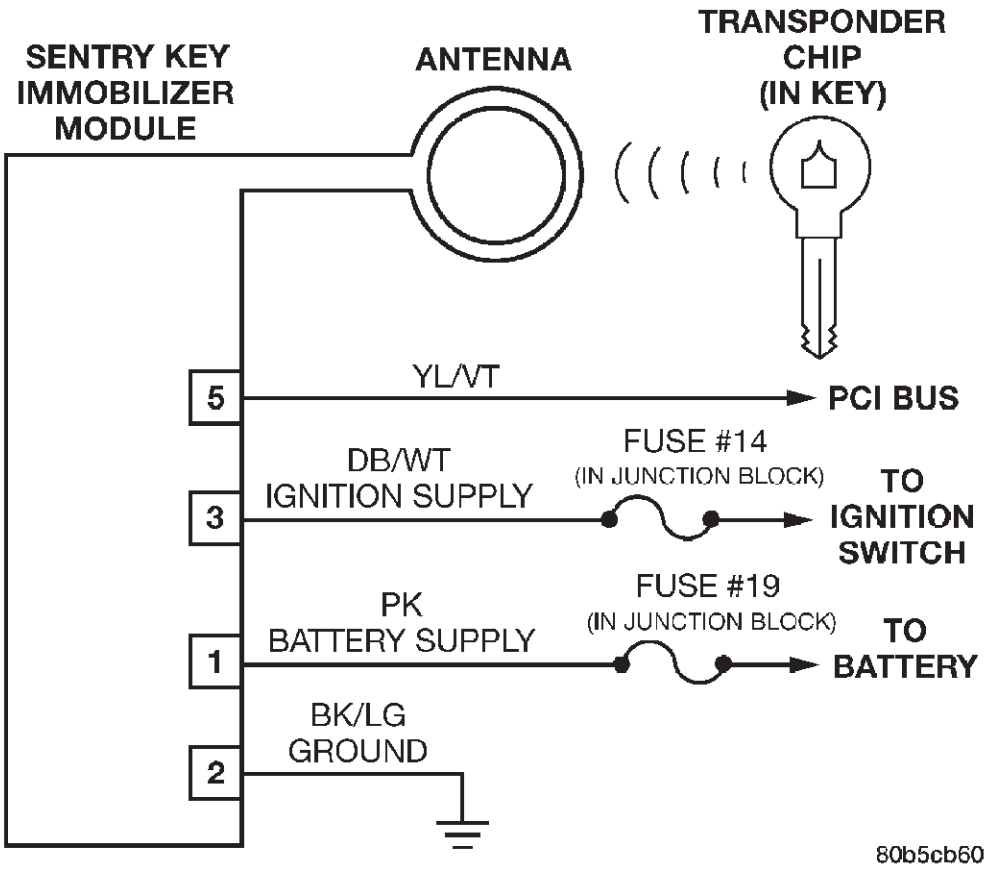


Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-4A REPAIRING - SERIAL LINK EXTERNAL FAULT

Perform TEST DTC Before Proceeding



Name of code: Serial Link External Fault

When monitored: With the ignition on.

Set condition: The SKIM does not receive an expected PCI BUS message transmission acknowledgment from the PCM after three transmit attempts.

Theory of operation: The SKIM expects a PCI BUS message acknowledgment from the PCM on the BUS during its communication process.

Possible causes:

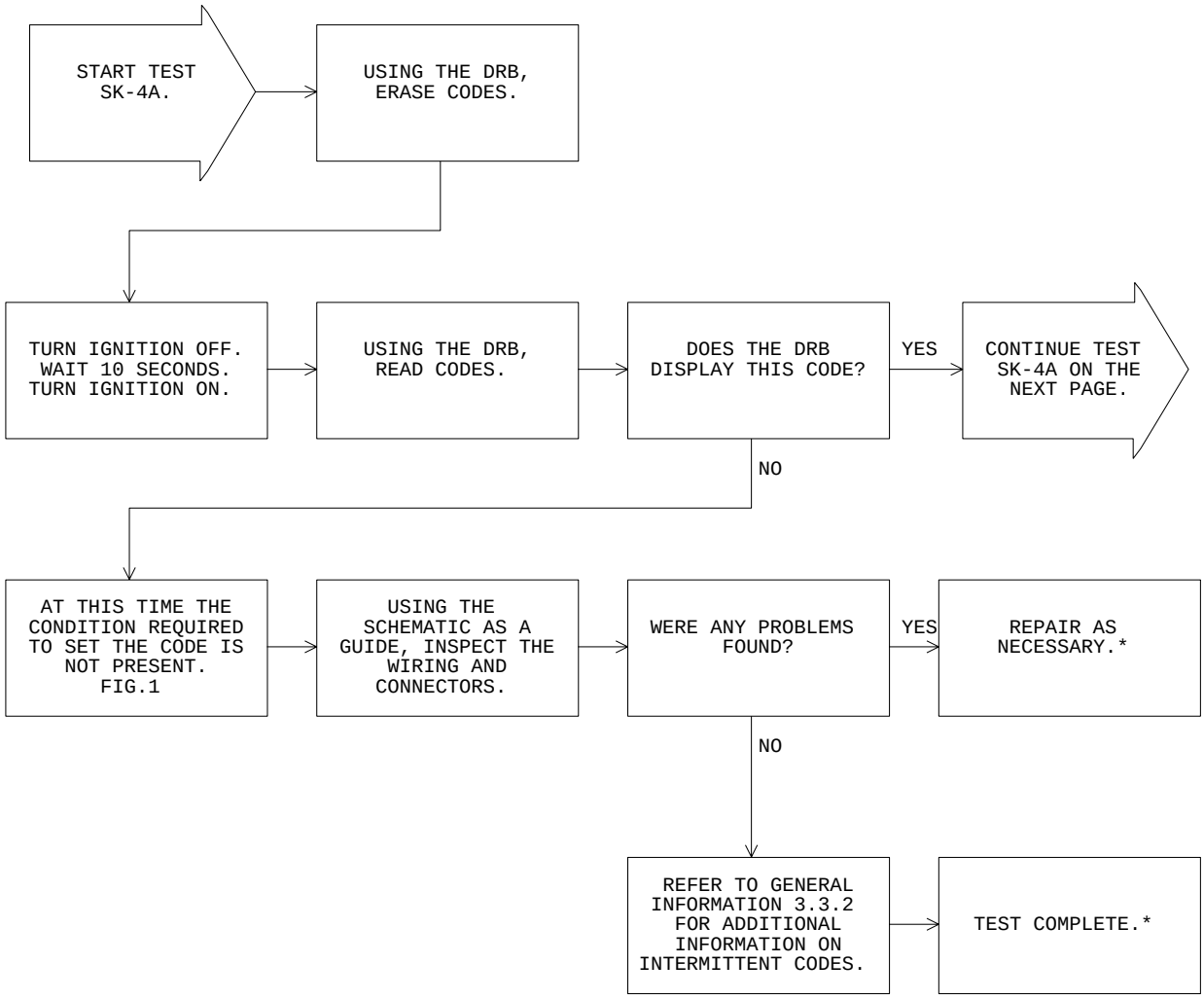
> PCI BUS circuit open, shorted to voltage or shorted to ground
> Failed SKIM
> Failed PCM

80b5cb5e

FIG. 1

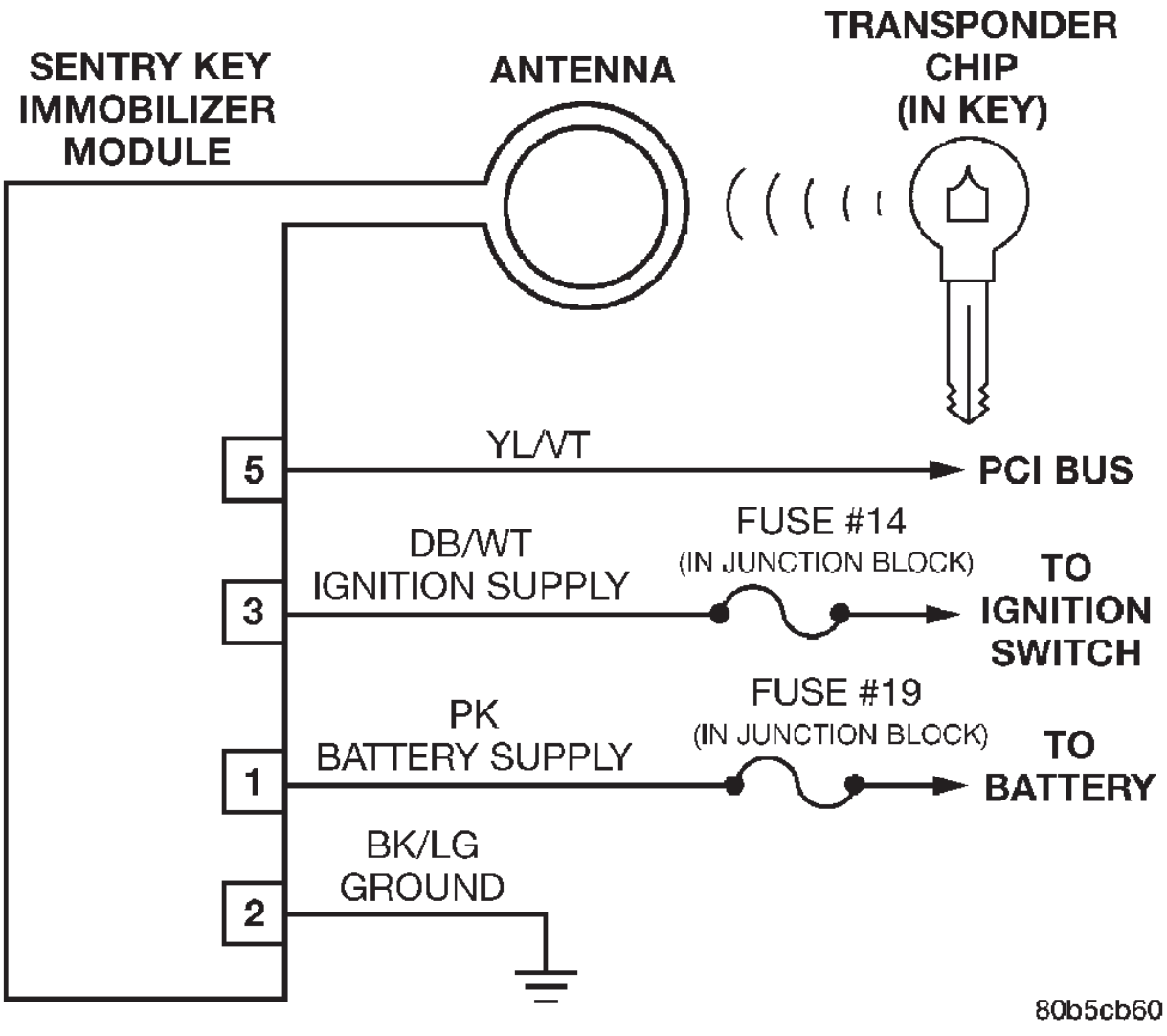
TEST SK-4A REPAIRING - SERIAL LINK EXTERNAL FAULT

Perform TEST DTC Before Proceeding

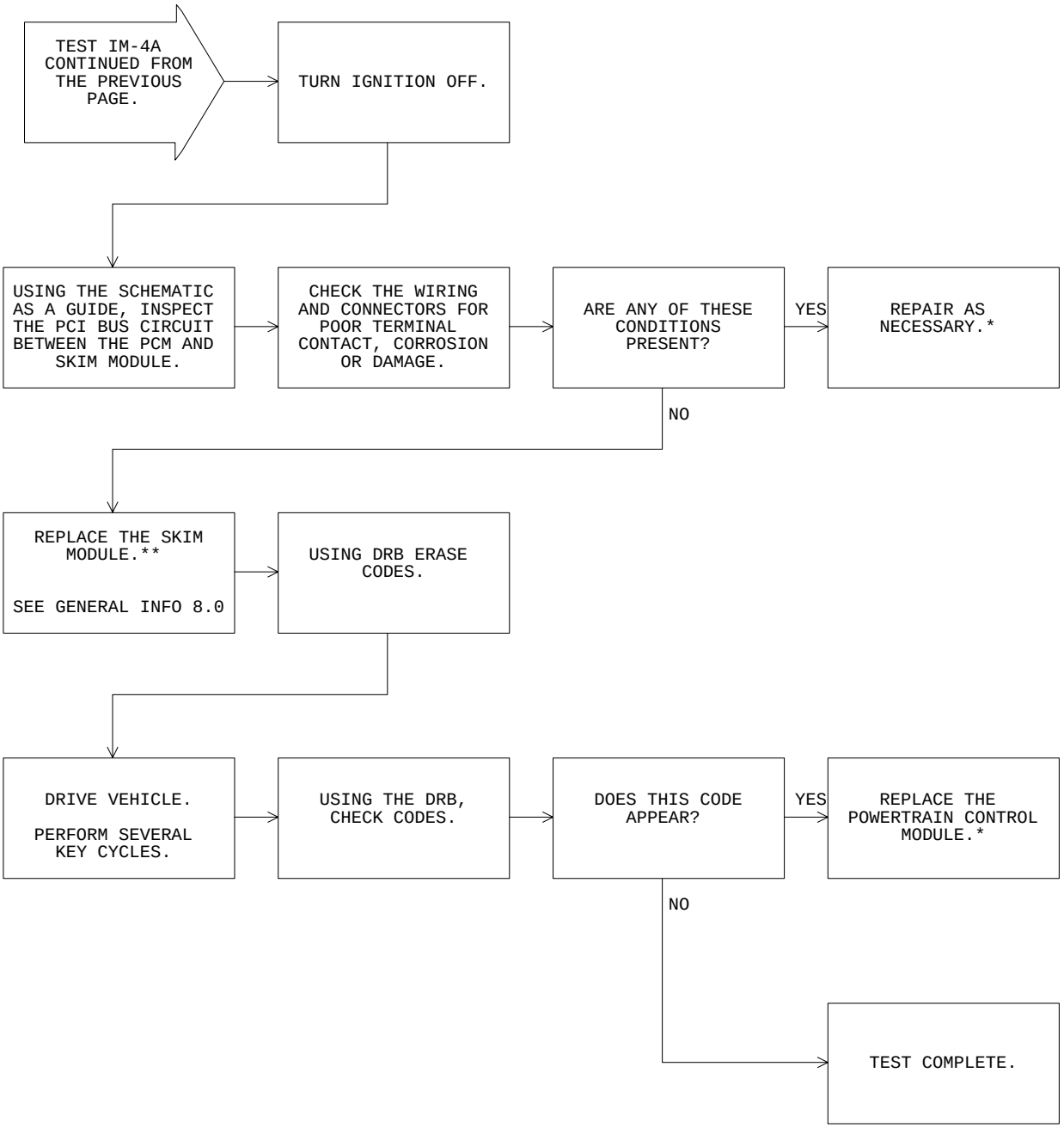


***Perform Verification TEST VER-1A.**	****Check connectors - Clean / repair as necessary.**

TEST SK-4A CONTINUED - REPAIRING - SERIAL LINK EXTERNAL FAULT



TEST SK-4A CONTINUED - REPAIRING - SERIAL LINK EXTERNAL FAULT

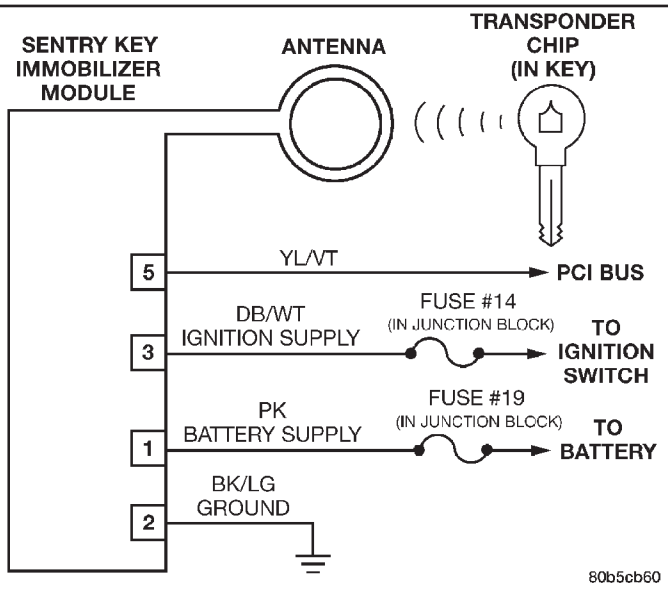


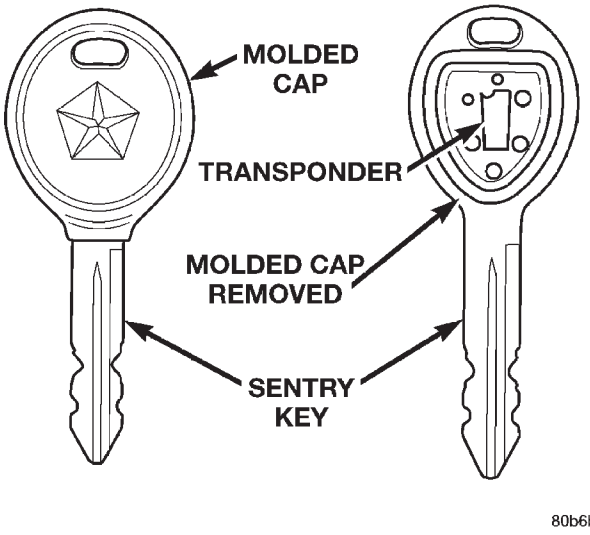
Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-5A REPAIRING - TRANSPONDER COMMUNICATION FAILURE

Perform TEST DTC Before Proceeding





Name of code: Transponder Communication Failure

When monitored: With the ignition on and during key programming operation.

Set condition: The SKIM fails to receive a valid message from the transponder after three consecutive read attempts.

Theory of operation: When the ignition is turned on or during key programming the SKIM attempts to power up the transponder. The SKIM module makes up to three attempts to communicate with the transponder. If the SKIM does not receive a response from the transponder, no further communication is attempted and a code is stored in memory.

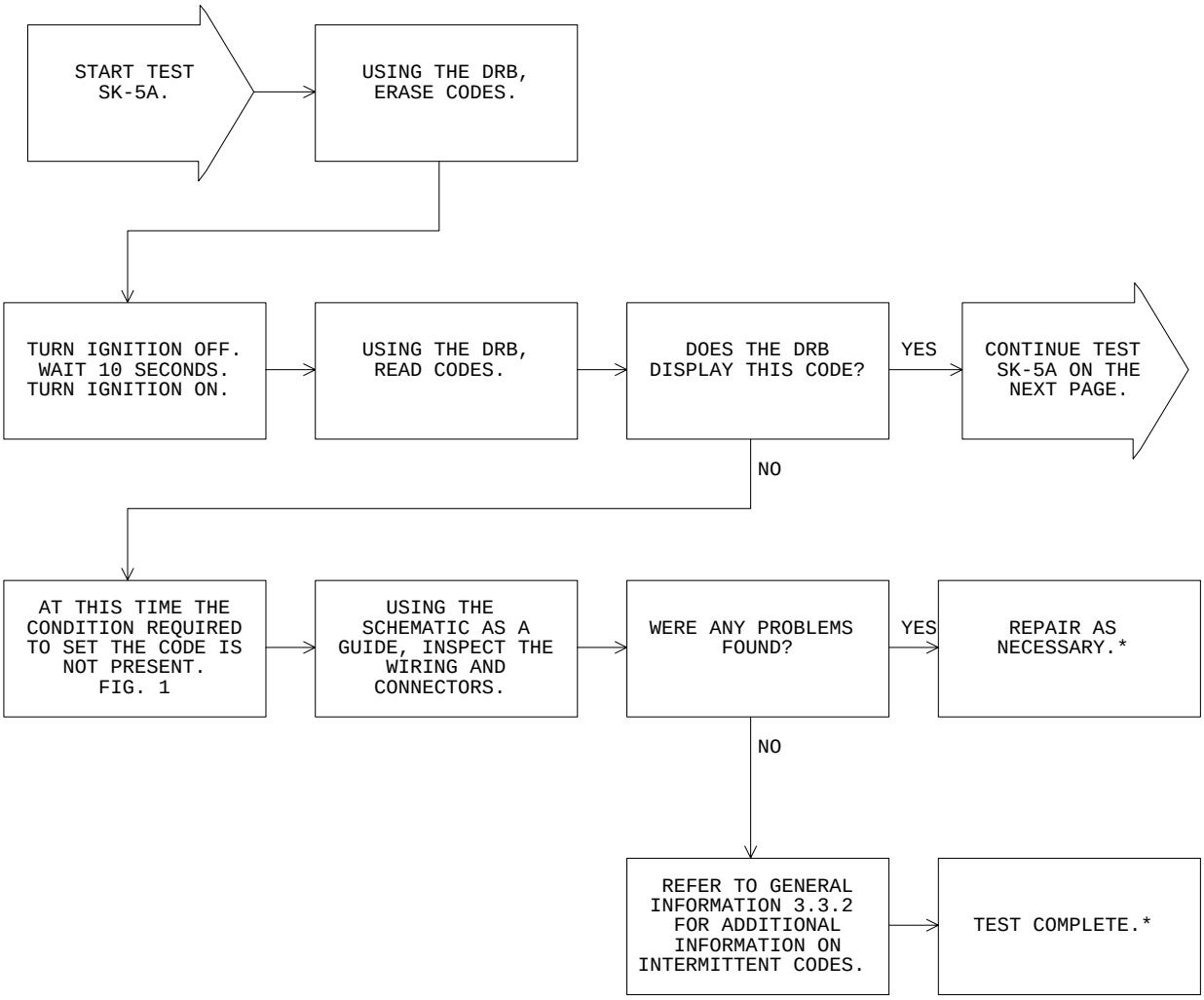
Possible cause:
> Failed transponder
> Invalid ignition key
> Electro magnetic interference
> Failed SKIM

80b6b151

FIG. 1

TEST SK-5A REPAIRING - TRANSPONDER COMMUNICATION FAILURE

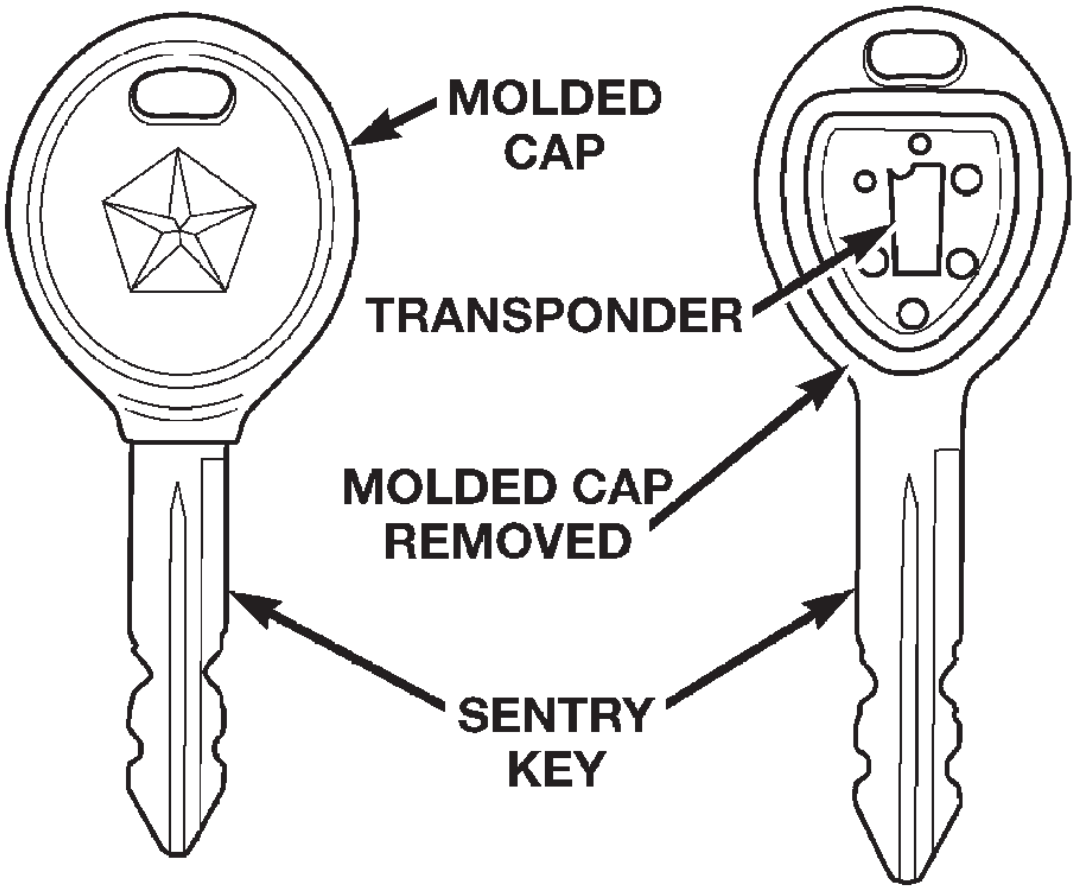
Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-1A.** | ***Check connectors - Clean / repair as necessary.**

TEST SK-5A CONTINUED - REPAIRING - TRANSPONDER COMMUNICATION FAILURE

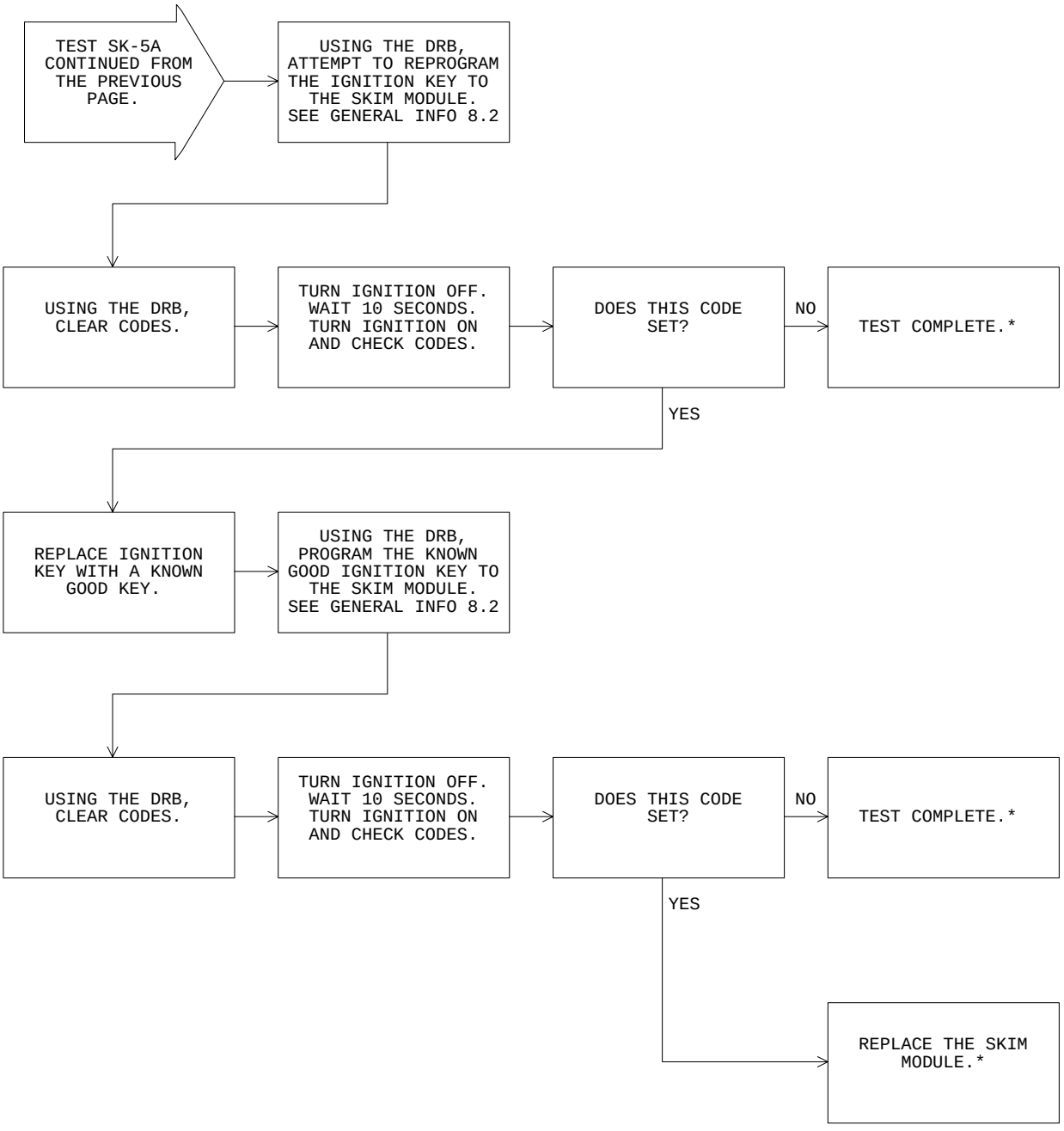
Perform TEST DTC Before Proceeding



80b6b145

TEST SK-5A CONTINUED - REPAIRING - TRANSPONDER COMMUNICATION FAILURE

Perform TEST DTC Before Proceeding

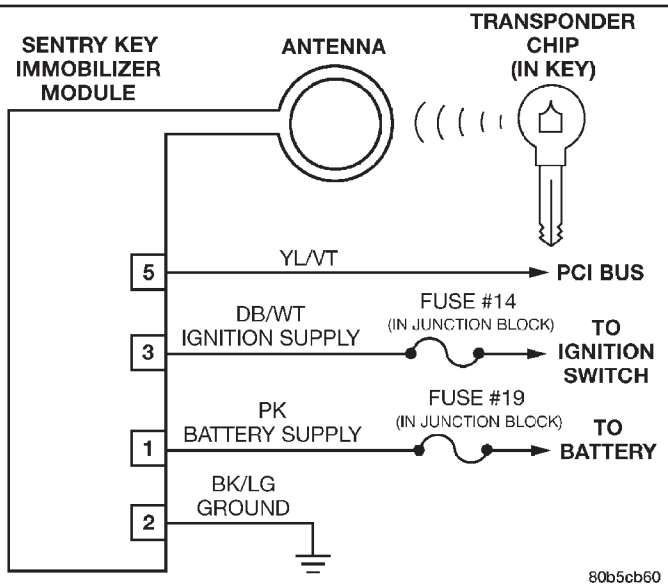


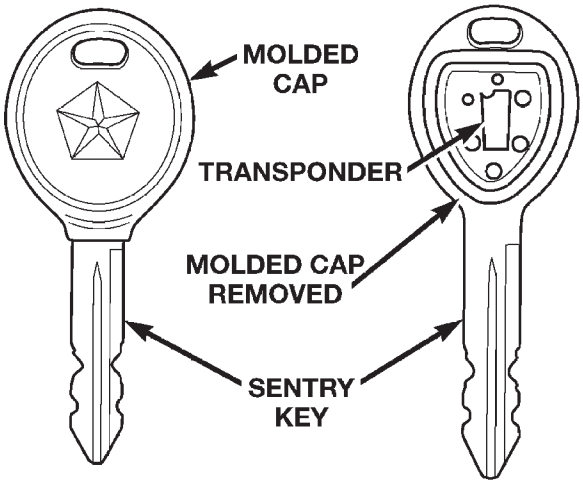
Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-6A REPAIRING - TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE

Perform TEST DTC Before Proceeding





Name of code: Transponder CRC (Cyclic Redundancy Check) Failure

When monitored: With the ignition on and during key programming operation.

Set condition: The SKIM receives five consecutive transponder messages that are correctly formatted but contain invalid data.

Theory of operation: When the ignition is turned on or during key programming, the SKIM attempts to power up the transponder. The SKIM makes up to five attempts to communicate with the transponder. If the SKIM checks for proper communication format and valid data from the transponder.

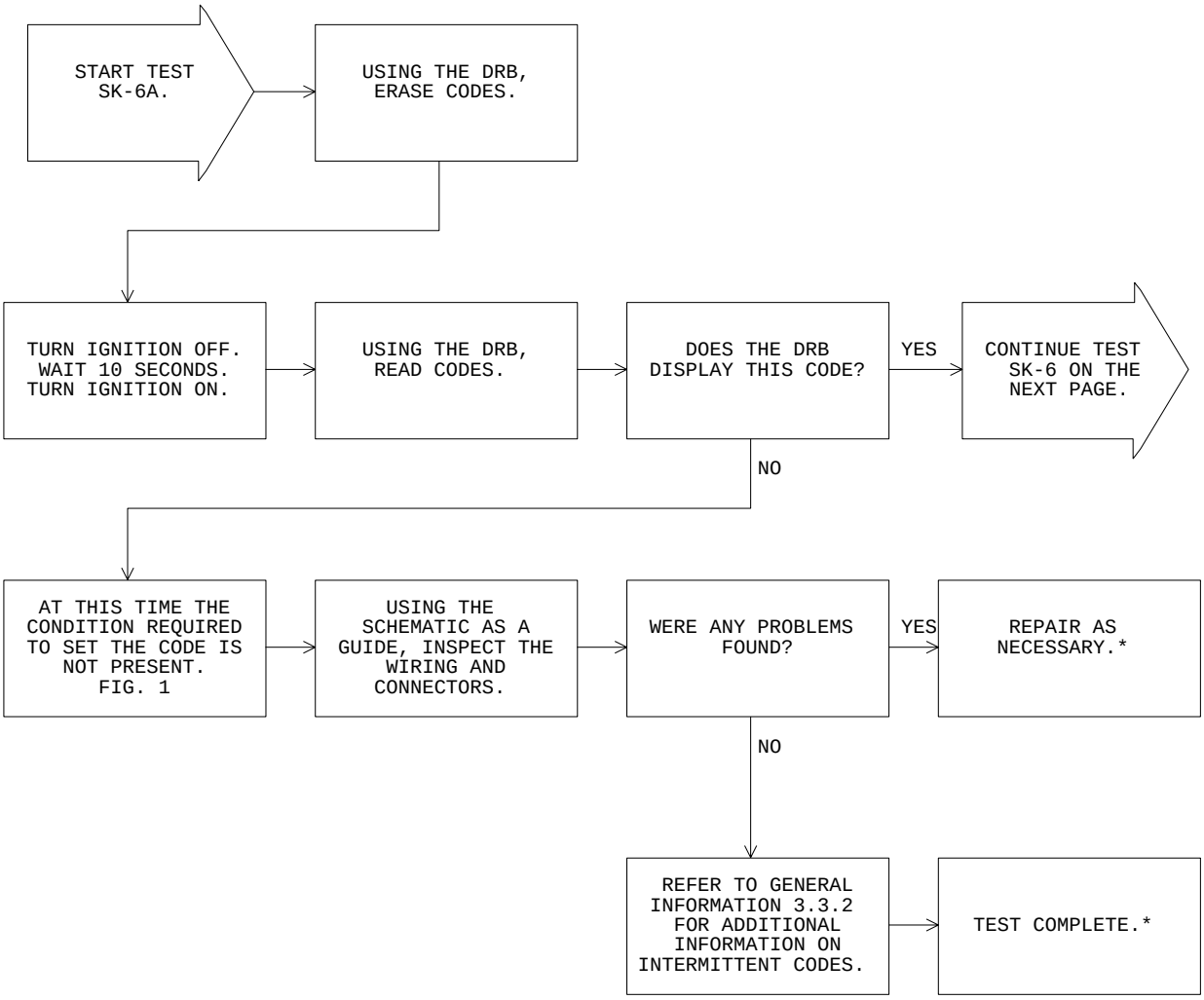
Possible cause:
> Failed transponder
> Failed SKIM
> Invalid key
> Electro magnetic interference

80b6b152

FIG. 1

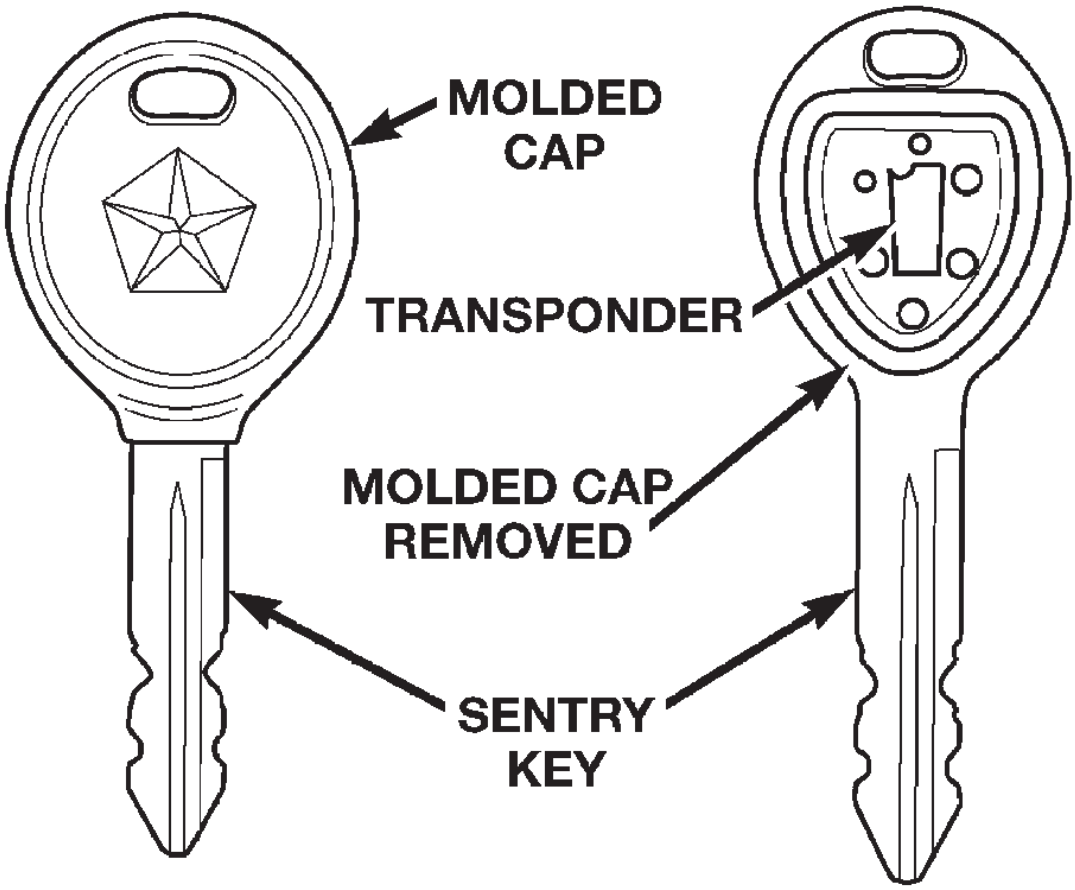
TEST SK-6A REPAIRING - TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE

Perform TEST DTC Before Proceeding

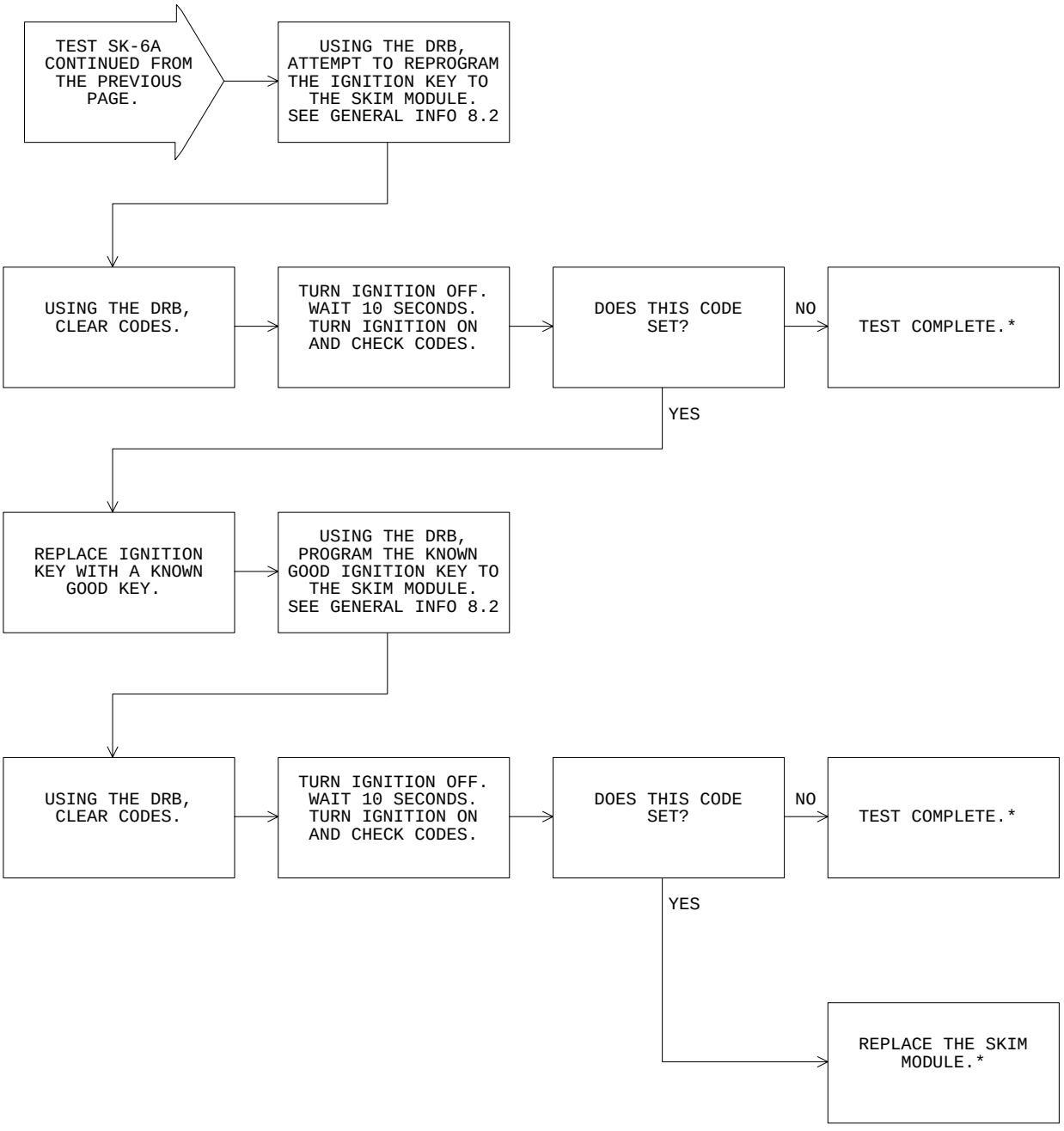


***Perform Verification TEST VER-1A.** | ***Check connectors - Clean / repair as necessary.**

TEST SK-6A CONTINUED - REPAIRING - TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE



TEST SK-6A CONTINUED - REPAIRING - TRANSPONDER CRC (CYCLIC REDUNDANCY CHECK) FAILURE

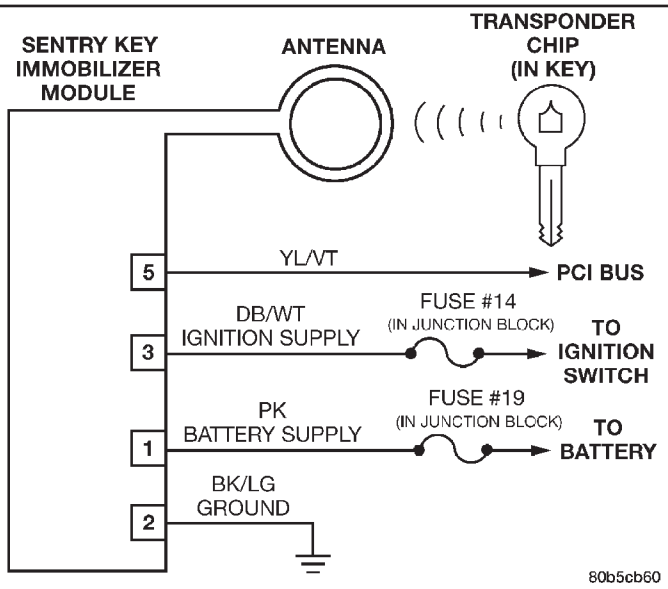


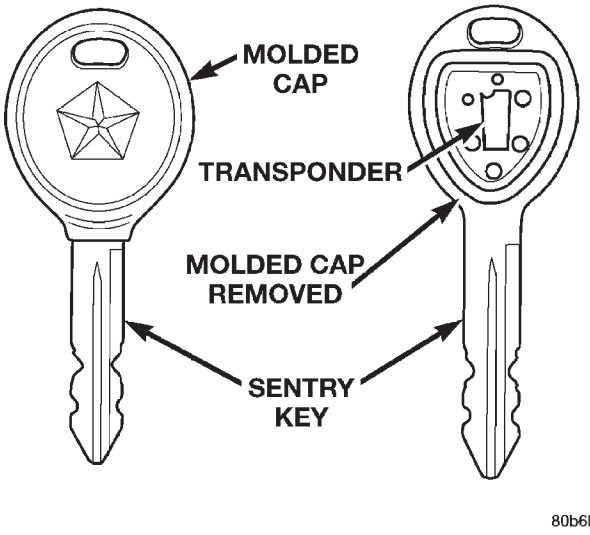
Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-7A REPAIRING - TRANSPONDER ID MISMATCH

Perform TEST DTC Before Proceeding





Name of code: Transponder ID Mismatch

When monitored: With the ignition on and during key programming operation.

Set condition: The SKIM receives a transponder ID that does not match any ID stored in SKIM memory.

Theory of operation: When the ignition is turned on or during key programming the SKIM attempts to power up the transponder. The SKIM makes up to three attempts to communicate with the transponder. The SKIM checks for proper communication format and valid data from the transponder.

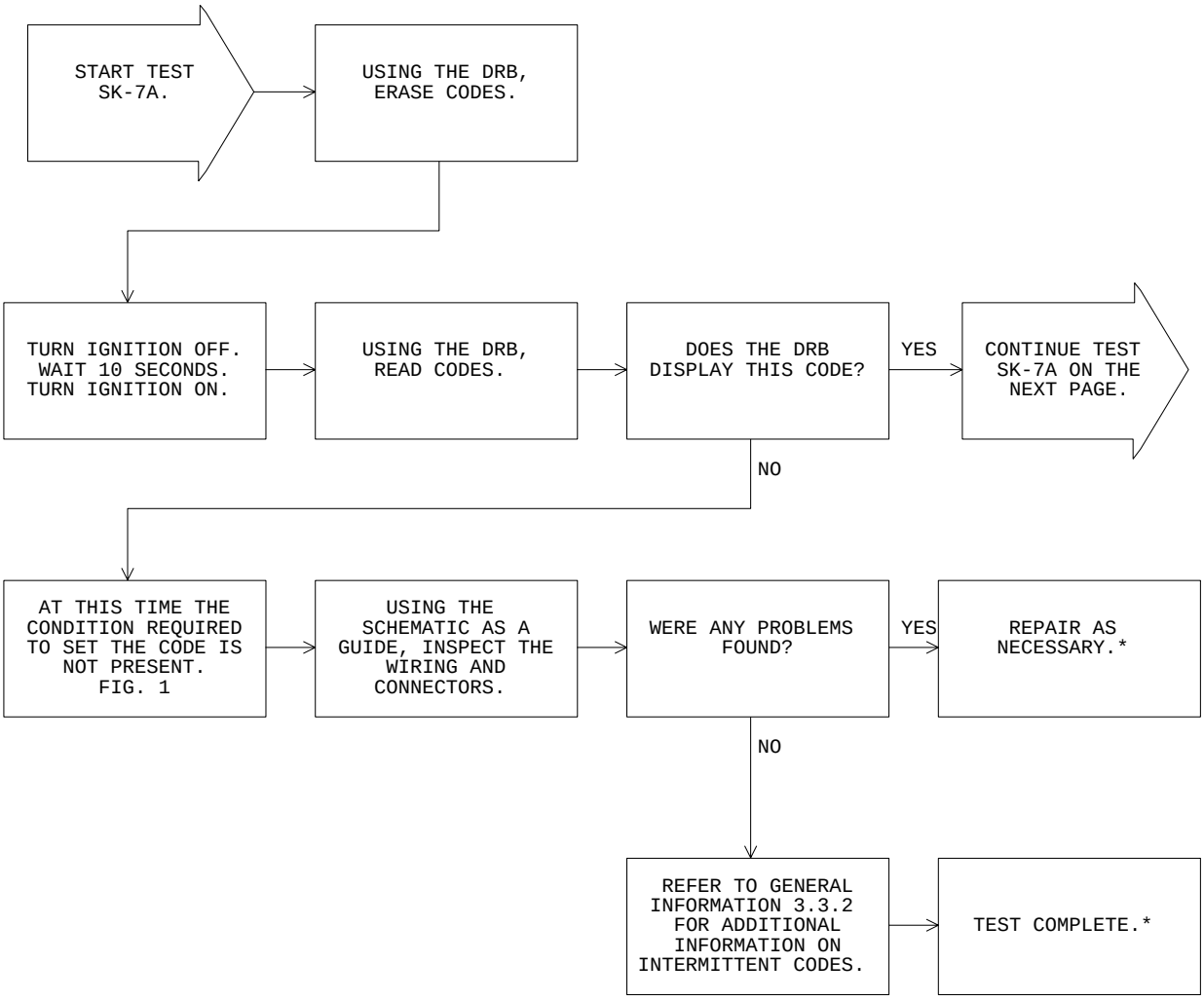
Possible cause:
> Invalid key
> Failed transponder
> Failed SKIM

80b6b153

FIG. 1

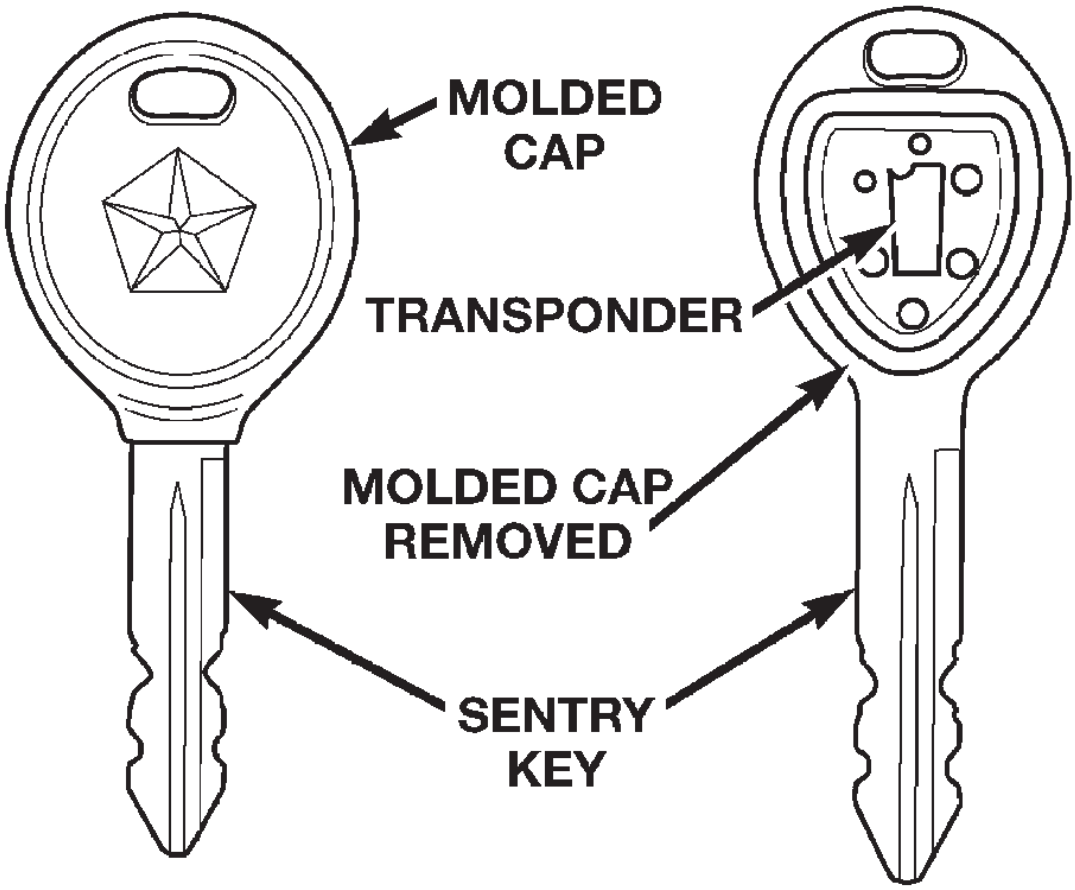
TEST SK-7A REPAIRING - TRANSPONDER ID MISMATCH

Perform TEST DTC Before Proceeding



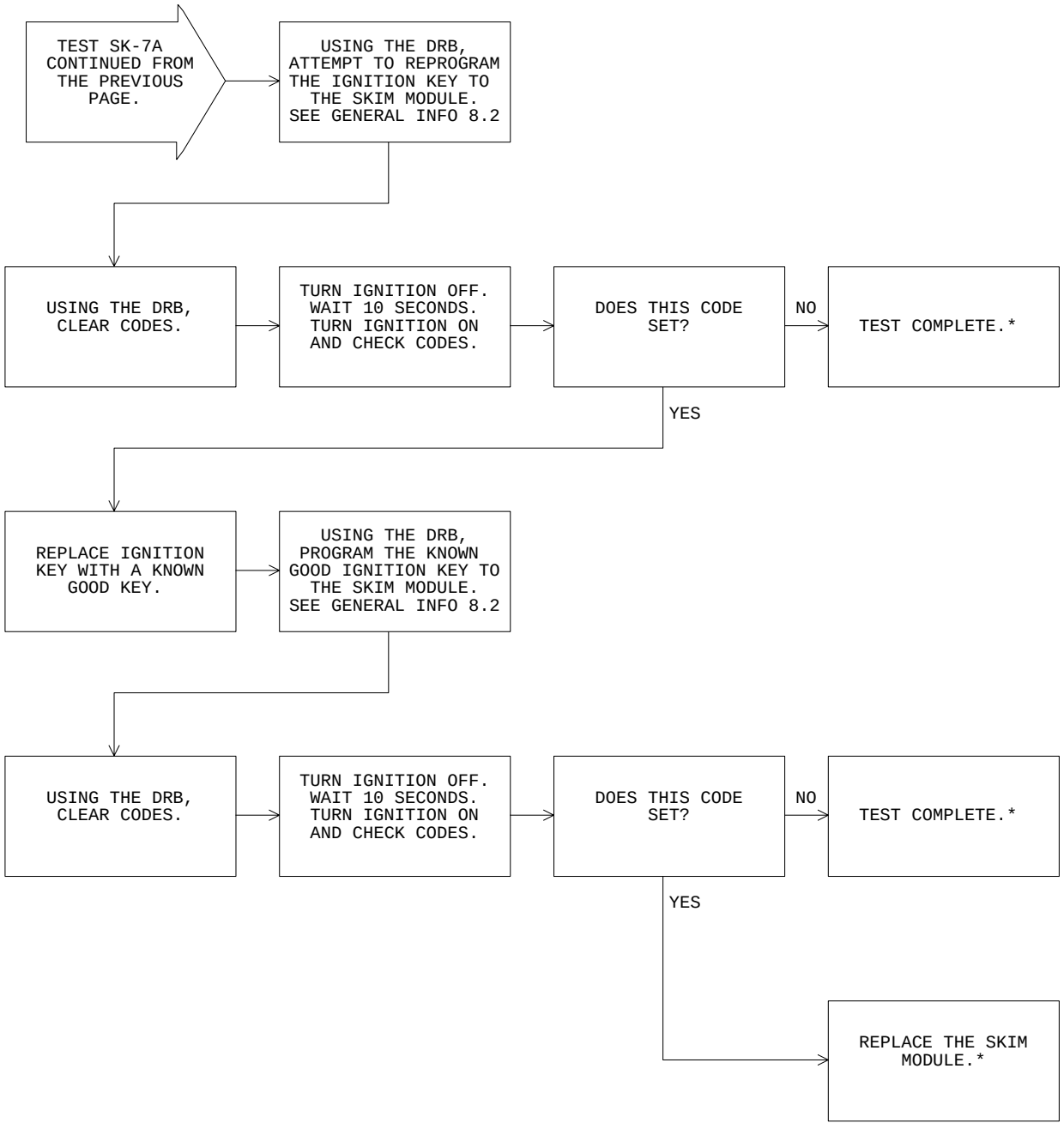
***Perform Verification TEST VER-1A.** | ***Check connectors - Clean / repair as necessary.**

TEST SK-7A CONTINUED - REPAIRING - TRANSPONDER ID MISMATCH



80b6b145

TEST SK-7A CONTINUED - REPAIRING - TRANSPONDER ID MISMATCH

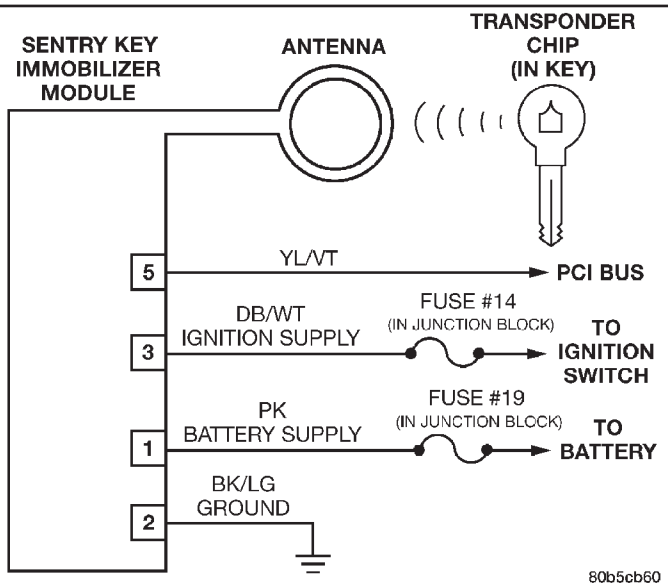


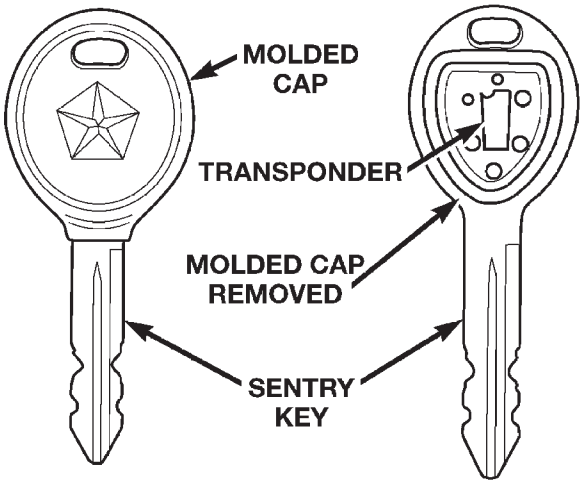
Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-8A REPAIRING - TRANSPONDER RESPONSE MISMATCH

Perform TEST DTC Before Proceeding





Name of code: Transponder Response Mismatch

When monitored: With the ignition on and during key programming operation.

Set condition: The transponder response from the "Crypto" algorithm fails to match the SKIM "Crypto" results.

Theory of operation: When the ignition is turned on or during key programming the SKIM attempts to power up the transponder. The SKIM makes up to three attempts to communicate with the transponder. The SKIM checks for proper communication format and valid data from the transponder.

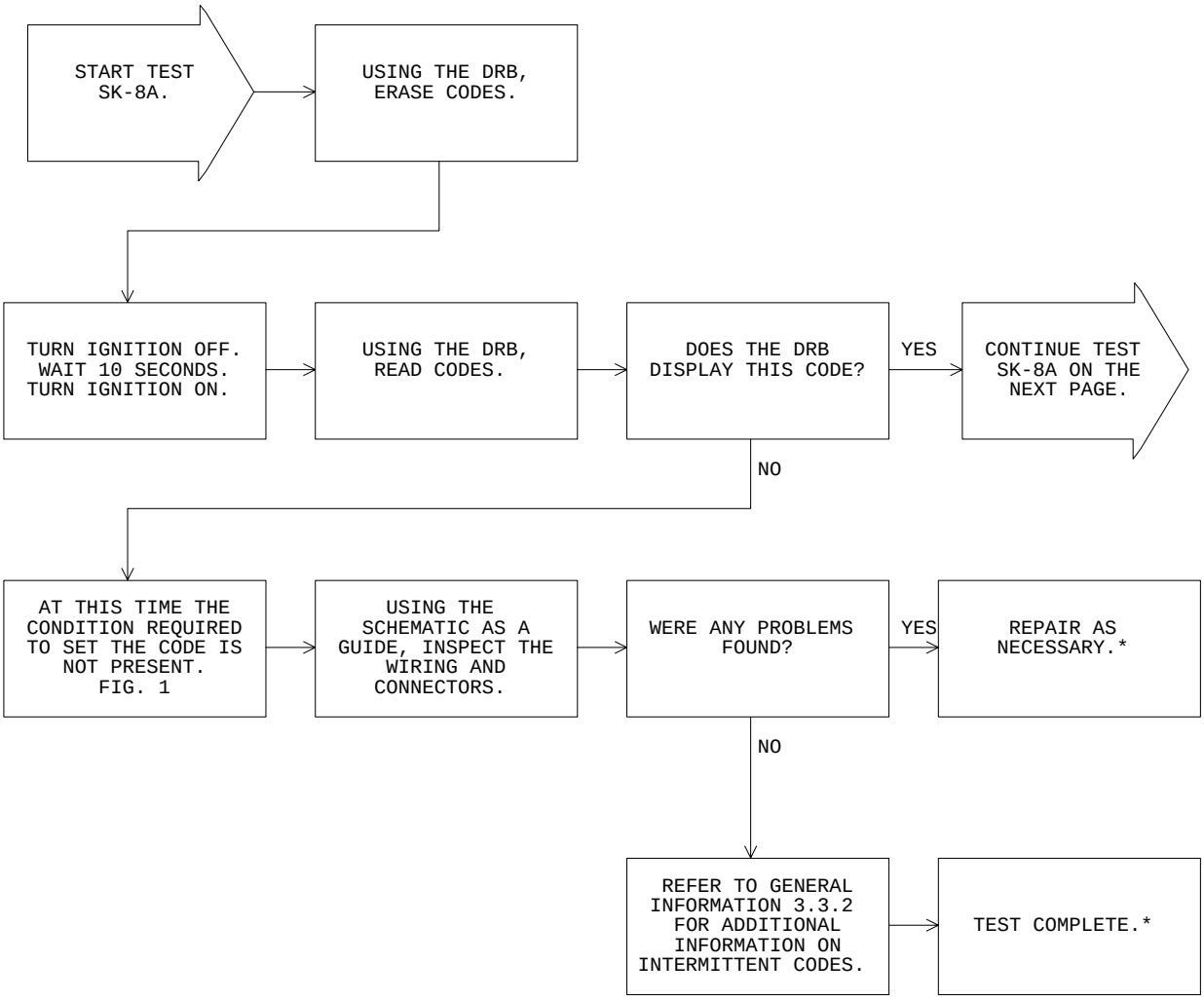
Possible cause:
> Invalid key
> Failed transponder
> Failed SKIM

80b6b154

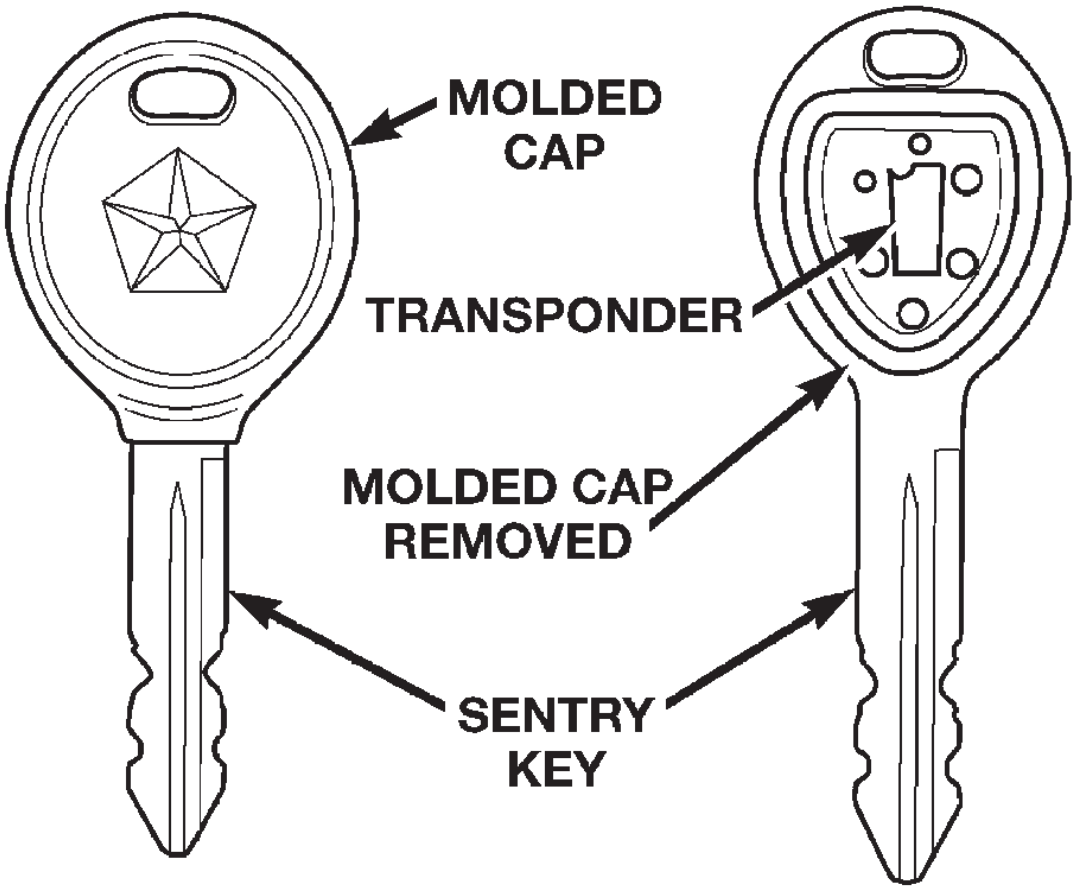
FIG. 1

TEST SK-8A REPAIRING - TRANSPONDER RESPONSE MISMATCH

Perform TEST DTC Before Proceeding

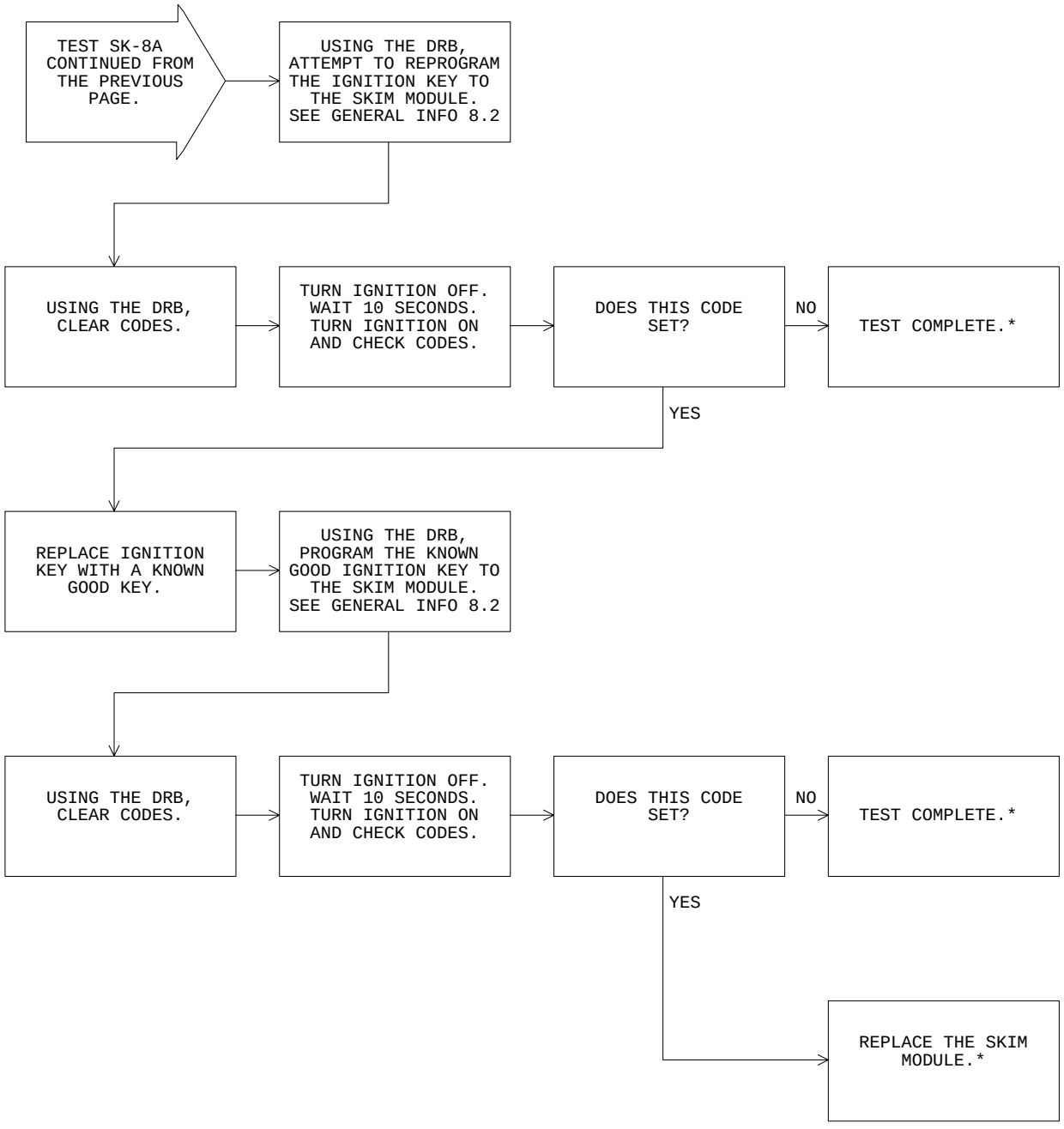


***Perform Verification TEST VER-1A.** | ***Check connectors - Clean / repair as necessary.**



80b6b145

TEST SK-8A CONTINUED - REPAIRING - TRANSPONDER RESPONSE MISMATCH

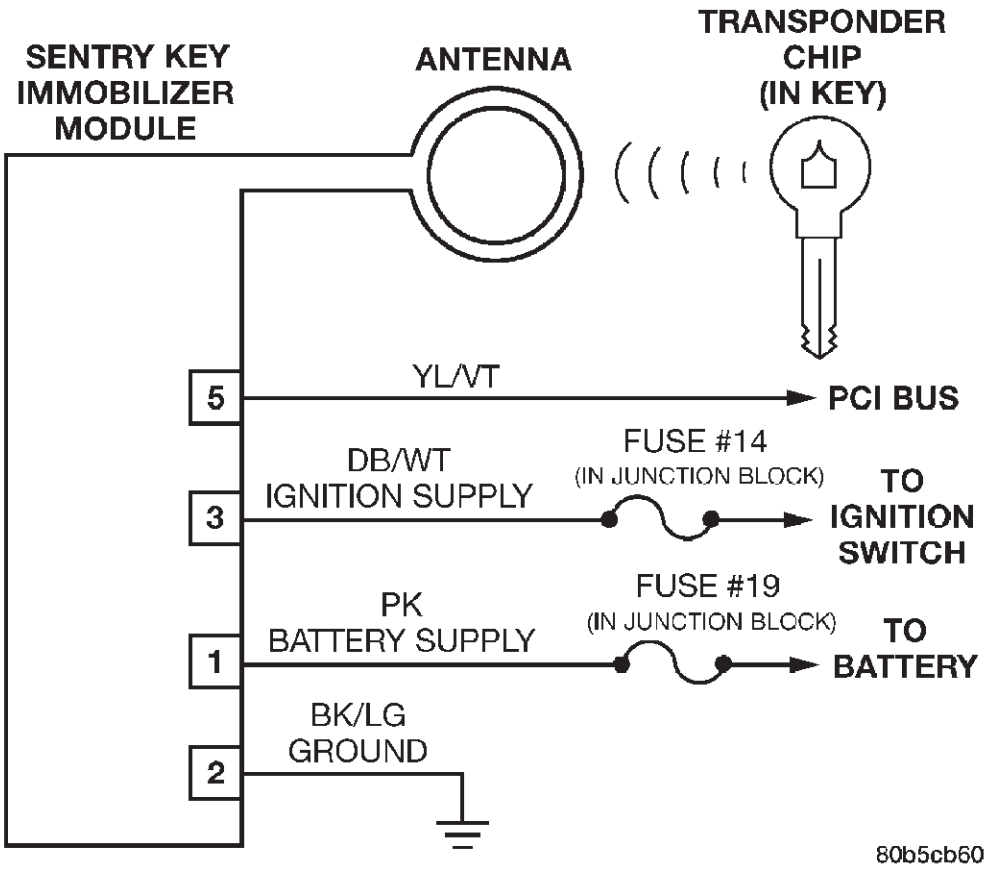


Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST SK-9A | **REPAIRING - VIN MISMATCH**

Perform TEST DTC Before Proceeding



Name of code: VIN Mismatch

When monitored: With the ignition on.

Set condition: The VIN received from the PCM does not match the VIN stored in the SKIM EEPROM.

Theory of operation: The PCM broadcasts the Vehicle Identification Number (VIN) on the PCI BUS. The SKIM receives and compares this number to the number stored in SKIM EEPROM.

Possible causes:

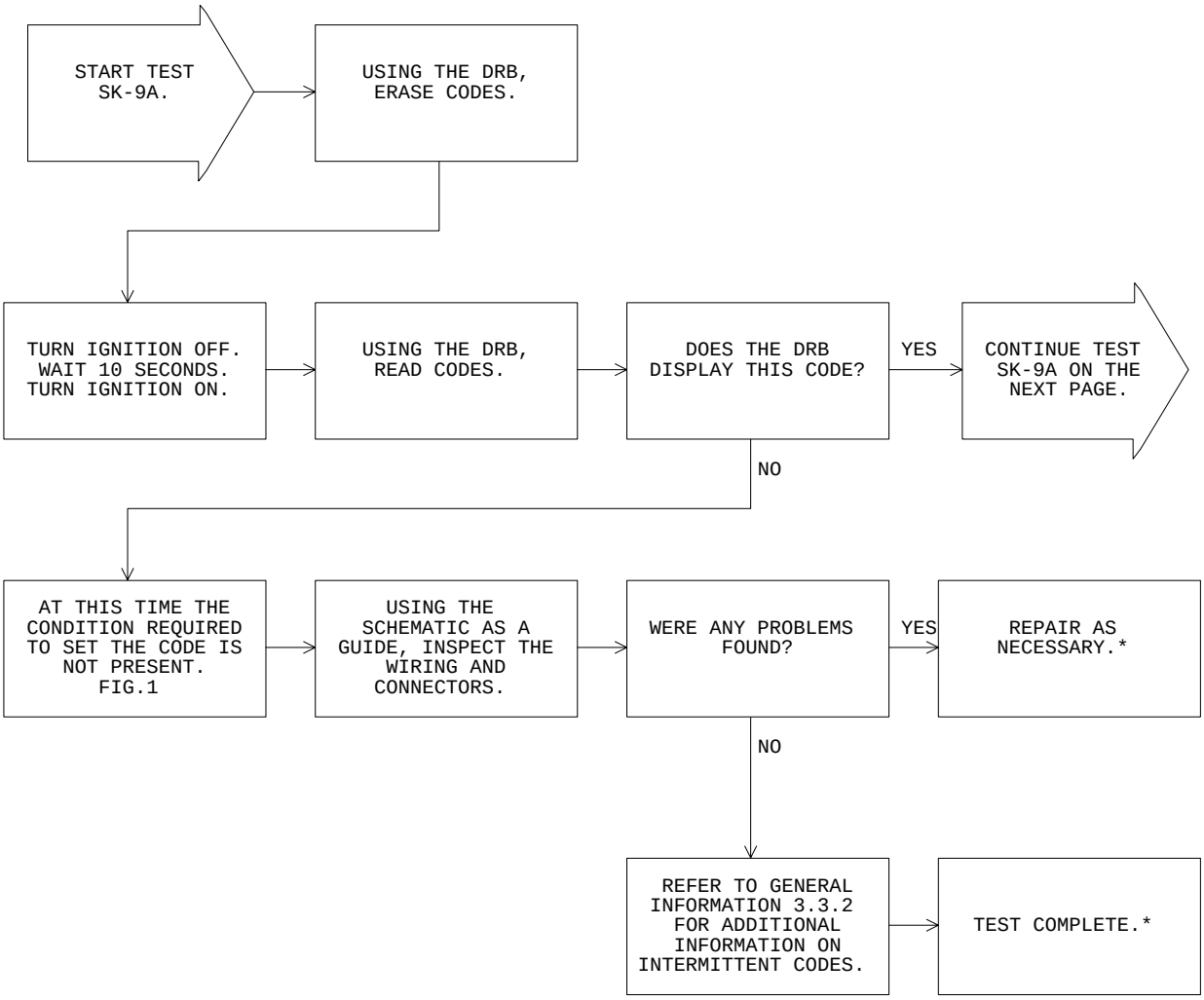
> Incorrect VIN stored in PCM memory
> Incorrect VIN stored in SKIM memory
> Failed SKIM

80b5cb5f

FIG. 1

TEST SK-9A REPAIRING - VIN MISMATCH

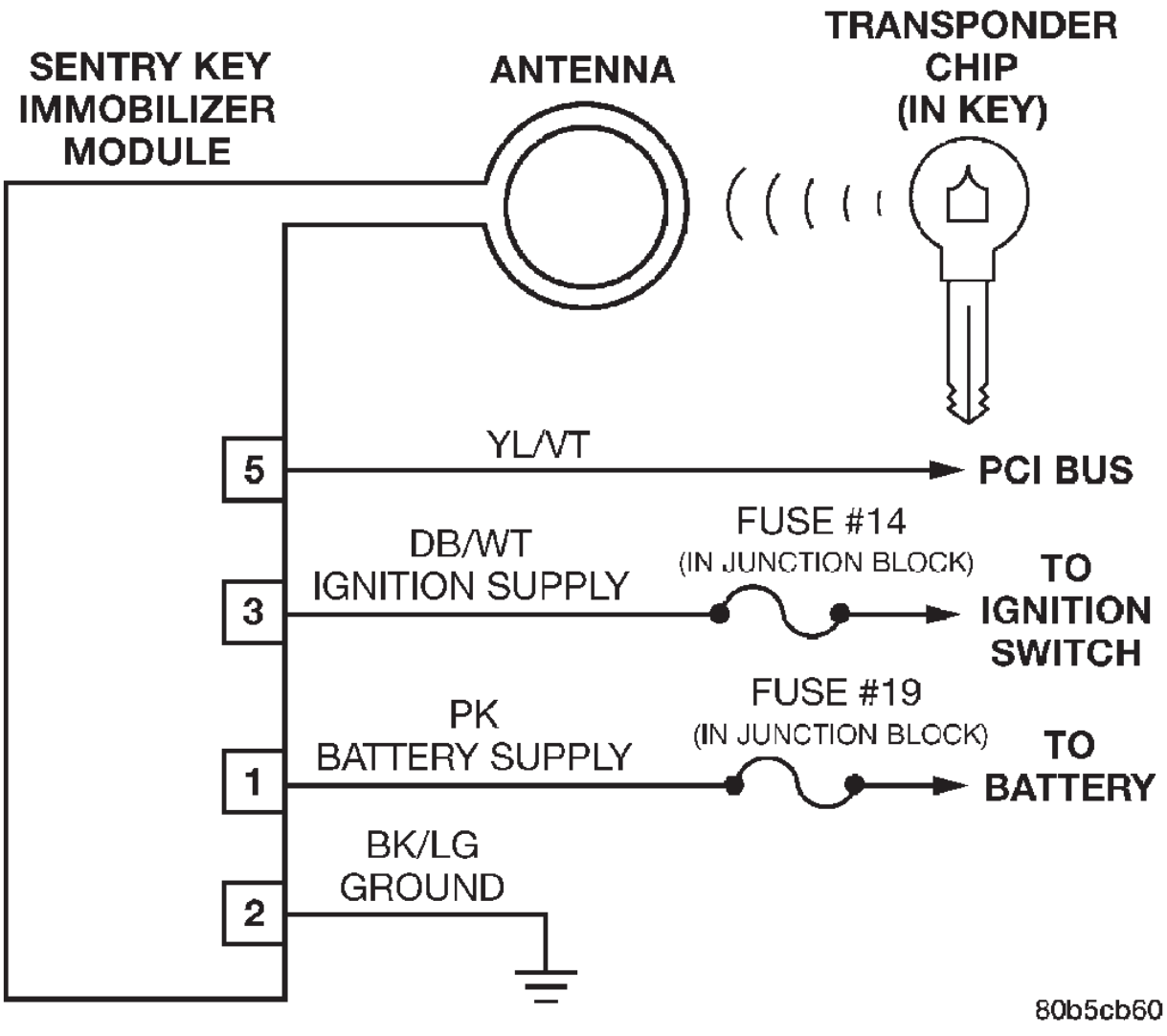
Perform TEST DTC Before Proceeding



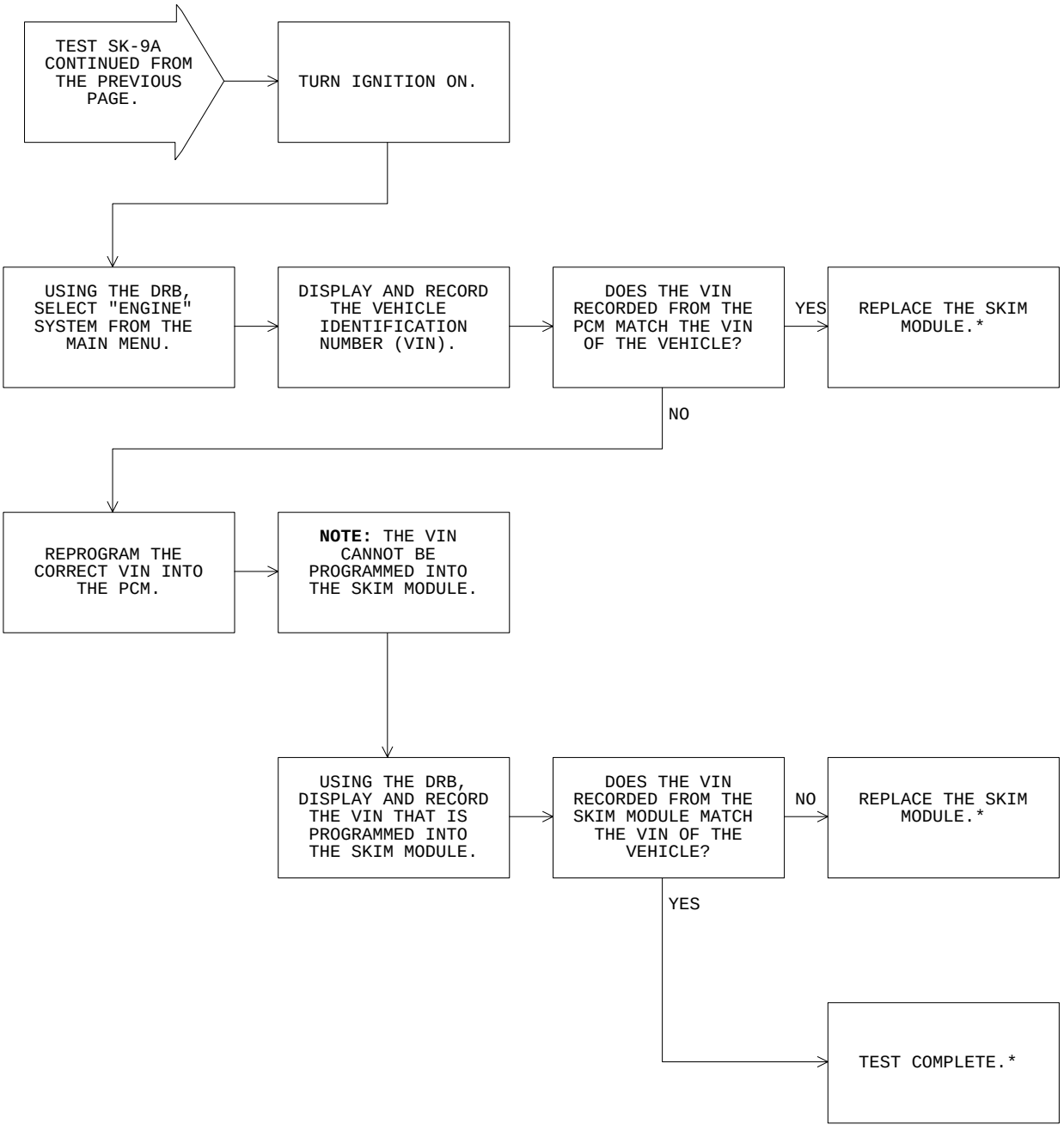
***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST SK-9A CONTINUED - REPAIRING - VIN MISMATCH



TEST SK-9A CONTINUED - REPAIRING - VIN MISMATCH



**Perform Verification TEST VER-1A.* | ***Check connectors - Clean / repair as necessary.*

TEST NTC-1A NO TROUBLE CODE TEST MENU

First, check all Technical Service Bulletins that relate to this driveability problem. Perform corrective actions if indicated, otherwise continue.

1. NO TROUBLE CODE COMPLETE TEST (non-monitored and monitored circuits)

Perform **TESTS NTC-3A** through **NTC-20A** in sequence until the driveability problem is found.

NO TROUBLE CODE MENU

CHECKING THE PCM POWER AND GROUND CIRCUITS NTC-3A
CHECKING THE ENGINE VACUUM NTC-4A
CHECKING THE FUEL DELIVERY. NTC-5A
CHECKING COOLANT SENSOR CALIBRATION NTC-6A
CHECKING THROTTLE POSITION SENSOR CALIBRATION NTC-7A
CHECKING MAP SENSOR CALIBRATION NTC-8A
CHECKING THE AUTO SHUTDOWN RELAY NTC-9A
CHECKING FOR OXYGEN SENSOR SWITCHING NTC-10A
CHECKING THE OXYGEN SENSOR HEATER NTC-11A
CHECKING THE IDLE AIR CONTROL MOTOR NTC-12A
CHECKING THE ENGINE MECHANICAL SYSTEMS NTC-13A
CHECKING THE EVAPORATIVE EMISSION SYSTEM NTC-17A
CHECKING THE EGR SYSTEM. NTC-18A
CHECKING THE INTAKE AIR TEMPERATURE SENSOR NTC-19A
CHECKING THE PARK/NEUTRAL POSITION SWITCH (TRS) NTC-20A
CHECKING THE OIL PRESSURE SWITCH. NTC-21
CHECKING THE A/C SYSTEM NTC-26
CHECKING THE RADIATOR FAN OPERATION NTC-27

2. NO TROUBLE CODE QUICK INDIVIDUAL TEST (individual test only)

If you suspect any of the above items to be the cause of the vehicle's driveability problem, perform the associated test(s) individually. **Return to No Trouble Code Menu if driveability problem still exists, or perform No Trouble Code Complete Test.**

3. NO TROUBLE CODE QUICK SYMPTOM TEST (symptom test only)

Symptom checks cannot be used properly unless the driveability problem characteristic actually happens while the vehicle is being tested. To reduce diagnostic time, ensure that the DTC-TEST and appropriate GENERAL INFORMATION sections have been reviewed before attempting to diagnose a symptom.

Select the symptom that most accurately describes the vehicle's driveability problem and then perform the test routine that pertains to this symptom. Perform each routine test in sequence until the problem is found. For definitions, see Section 12.0 in GENERAL INFORMATION section in this manual.

TEST NTC-1A NO TROUBLE CODE TEST MENU

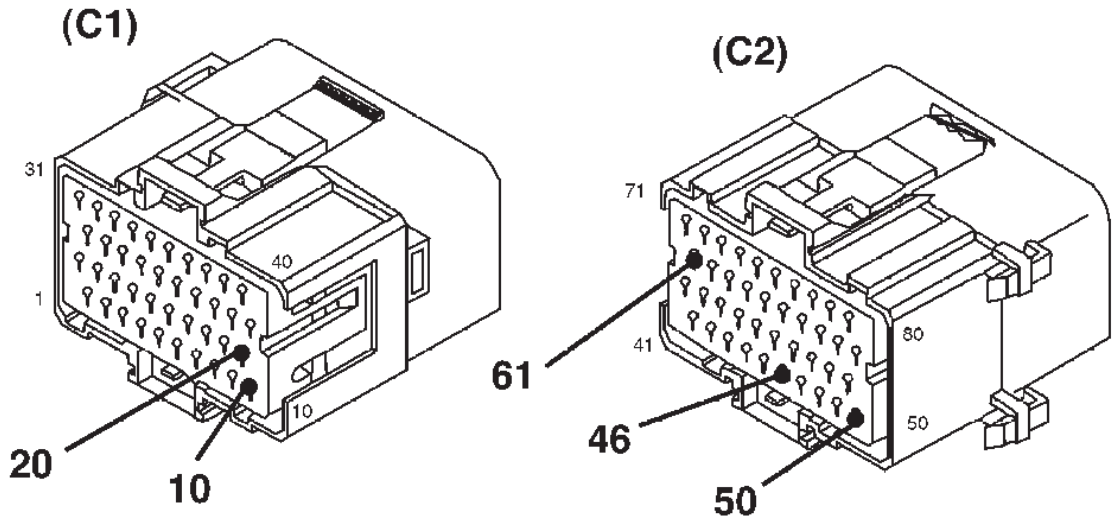
Perform TEST DTC Before Proceeding

SYMPTOM	DIAGNOSTIC TEST ROUTINE
HARD START	NTC-4A, 5A, 6A, 7A, 8A, 9A, 10A, 12A, 13A, 17A, 18A, 19A
START AND STALL	NTC-3A, 5A, 6A, 7A, 8A, 9A, 12A
HESITATION/SAG/STUMBLE	NO TROUBLE CODE COMPLETE TEST (STEP 1)
SURGE	NTC-3A, 5A, 6A, 7A, 8A, 9A, 10A, 12A, 17A
LACK OF POWER/SLUGGISH	NTC-3A, 5A, 6A, 7A, 8A, 9A, 10A, 12A, 18A
SPARK KNOCK/ DETONATION	NTC-3A, 5A, 6A, 7A, 8A, 9A, 10A, 12A, 17A
CUT OUTS/MISSES	NTC-3A, 5A, 9A, 10A, 18A
BACKFIRE/POPBACK	NTC-3A, 5A, 8A, 9A, 10A, 18A
RUNS ROUGH/UNSTABLE/ ERRATIC IDLE	NO TROUBLE CODE COMPLETE TEST (STEP 1)
POOR FUEL ECONOMY	NO TROUBLE CODE COMPLETE TEST (STEP 1)

TEST NTC-3A CHECKING THE PCM POWER AND GROUND CIRCUITS

Perform TEST NTC-1A Before Proceeding

POWERTRAIN CONTROL MODULE CONNECTORS



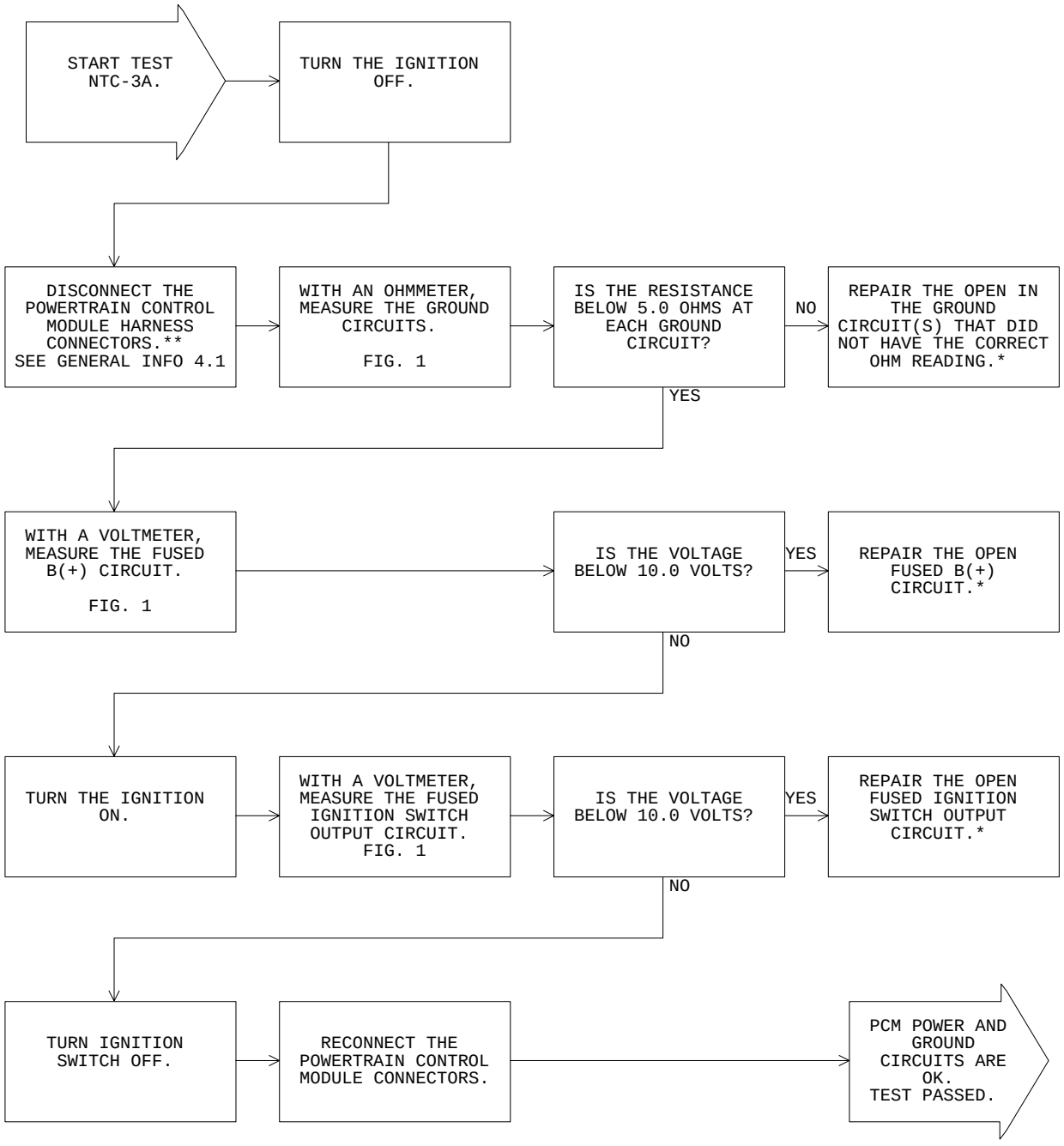
CAV	COLOR	FUNCTION
10	BK/TN	GROUND
20	DB/WT	FUSED IGNITION SWITCH OUTPUT
46	RD/WT	FUSED B(+)
47	BK/WT	GROUND
50	BK/TN	GROUND
61	VT/WT	5-VOLT SUPPLY

80b27c78

FIG. 1

TEST NTC-3A CHECKING THE PCM POWER AND GROUND CIRCUITS

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-1A.

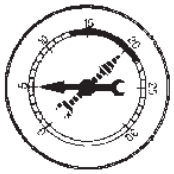
***Check connectors - Clean / repair as necessary.**

TEST NTC-4A CHECKING THE ENGINE VACUUM

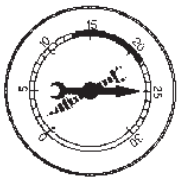
Perform TEST NTC-1A Before Proceeding



NORMAL READING RANGE AT IDLE



BLOWN HEAD GASKET AT IDLE



NORMAL READING RAPID ACCELERATION/ DECELERATION



WORN RINGS OR DILUTED OIL RAPID ACCELERATION/ DECELERATION



LATE VALVE TIMING, VACUUM LEAK AT IDLE



RESTRICTED EXHAUST (DROPS TOWARD ZERO AS ENGINE RPM INCREASES)



POOR VALVE SEATING AT IDLE



STICKING VALVE AT IDLE



WORN VALVE GUIDES (STEADIES AS ENGINE SPEED INCREASES)



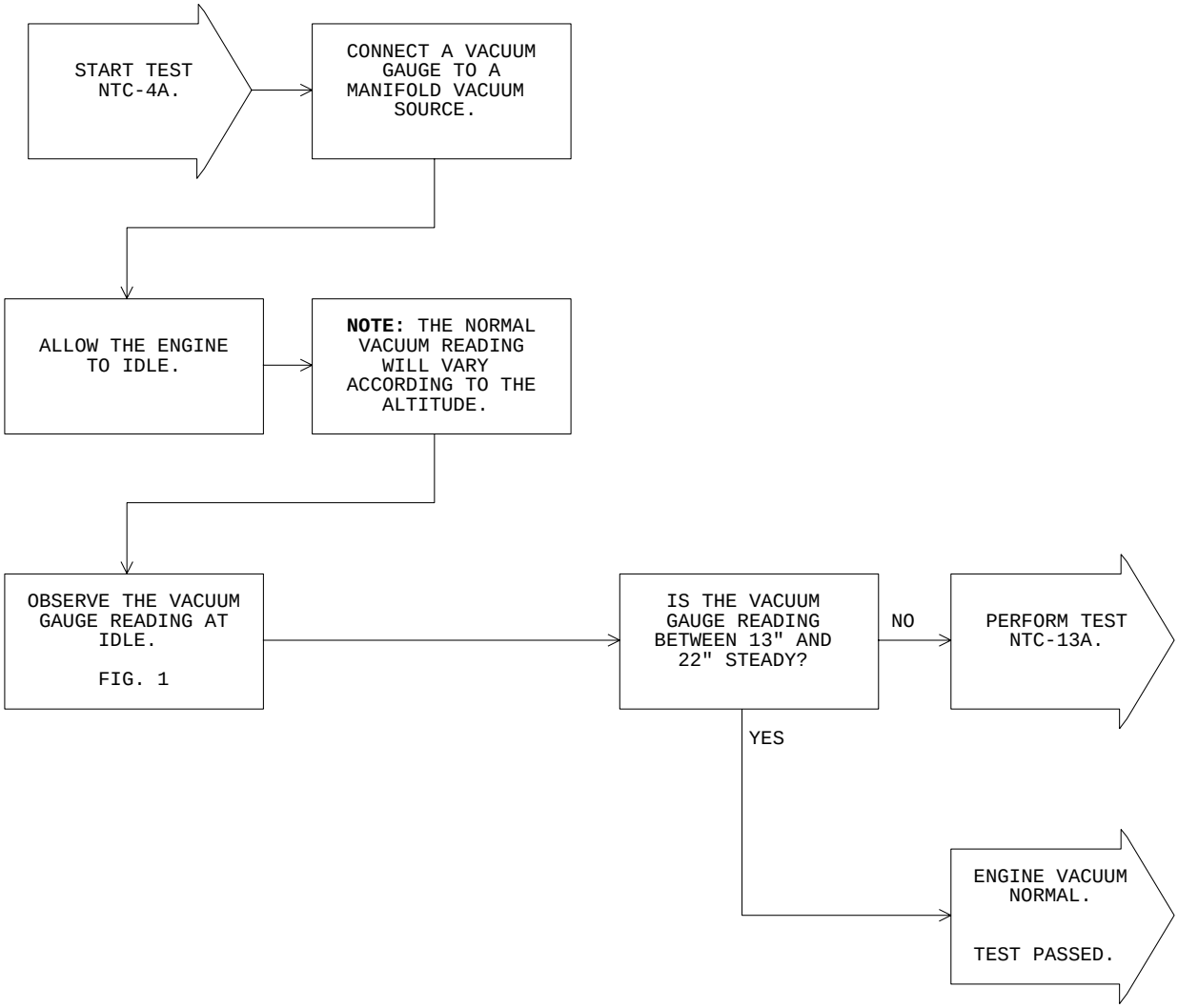
WORN VALVE SPRINGS (MORE PRONOUNCED AS ENGINE SPEED INCREASES)

0920606

FIG. 1

TEST NTC-4A CHECKING THE ENGINE VACUUM

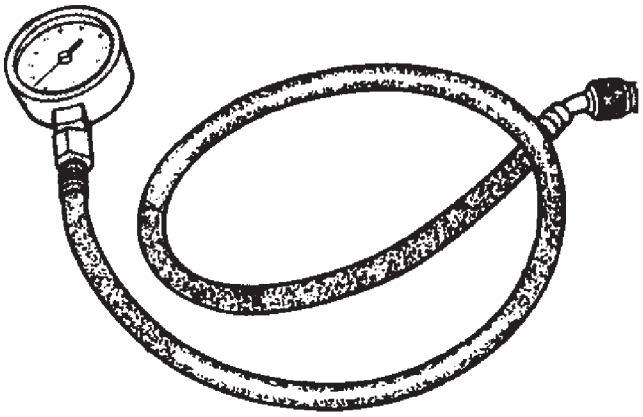
Perform TEST NTC-1A Before Proceeding



*Perform Verification TEST VER-2A.	**Check connectors - Clean / repair as necessary.

TEST NTC-5A CHECKING THE FUEL DELIVERY

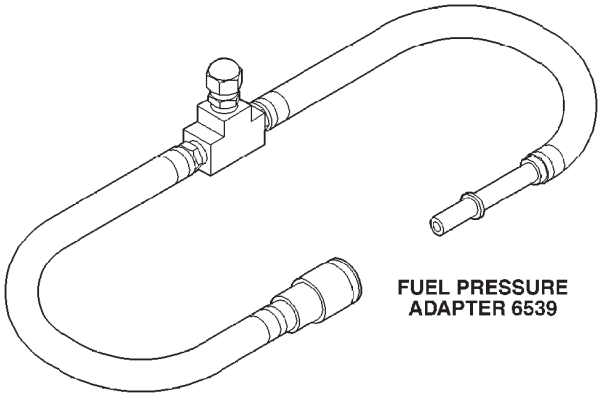
Perform TEST NTC-1A Before Proceeding



SPECIAL TOOL C-4799-B

0940403

FIG. 1



80b30880

FIG. 2

FUEL SYSTEM PRESSURE SPECIFICATIONS

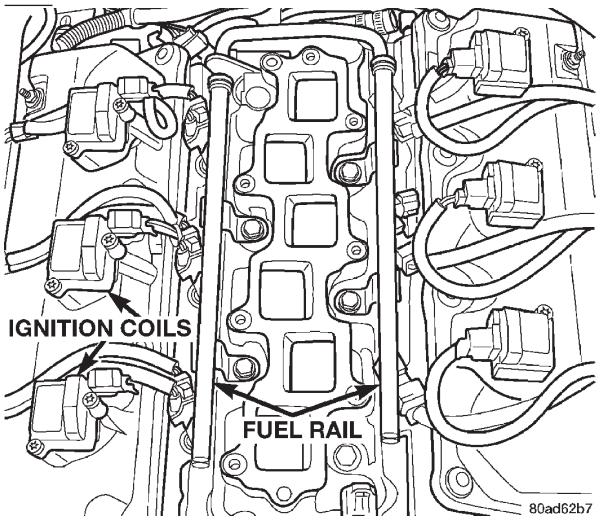
Note: Use the DRB tester to actuate the ASD Fuel System Test.

Body	Engine	Fuel Pressure
LH Body	ALL	48 PSI +/- 2 PSI

80b27c87

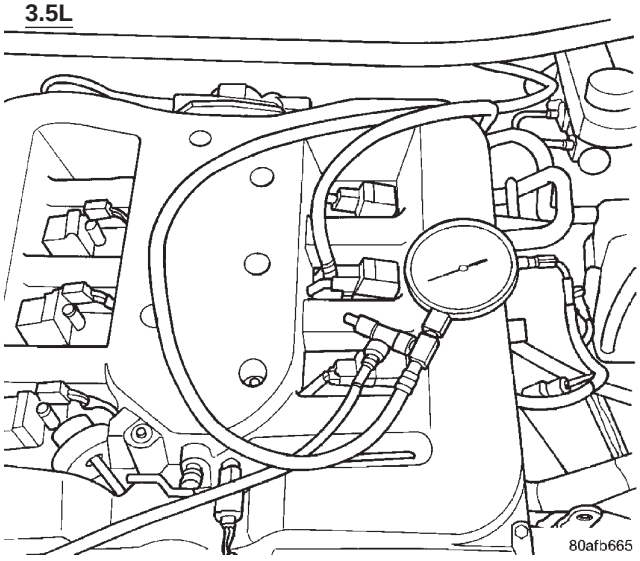
FIG. 3

2.7L



80ad62b7

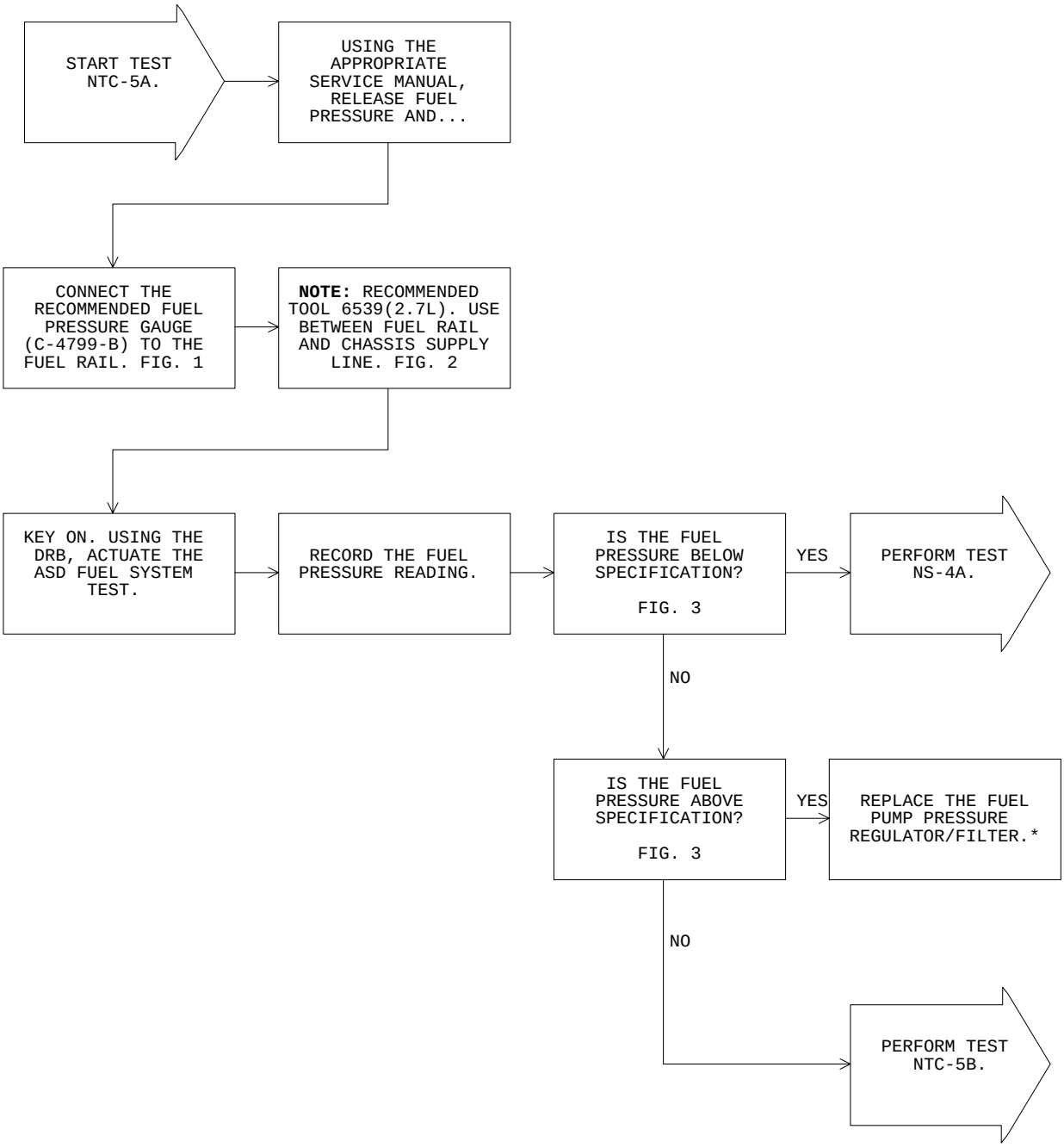
3.5L



80afb665

TEST NTC-5A CHECKING THE FUEL DELIVERY

Perform TEST NTC-1A Before Proceeding



***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

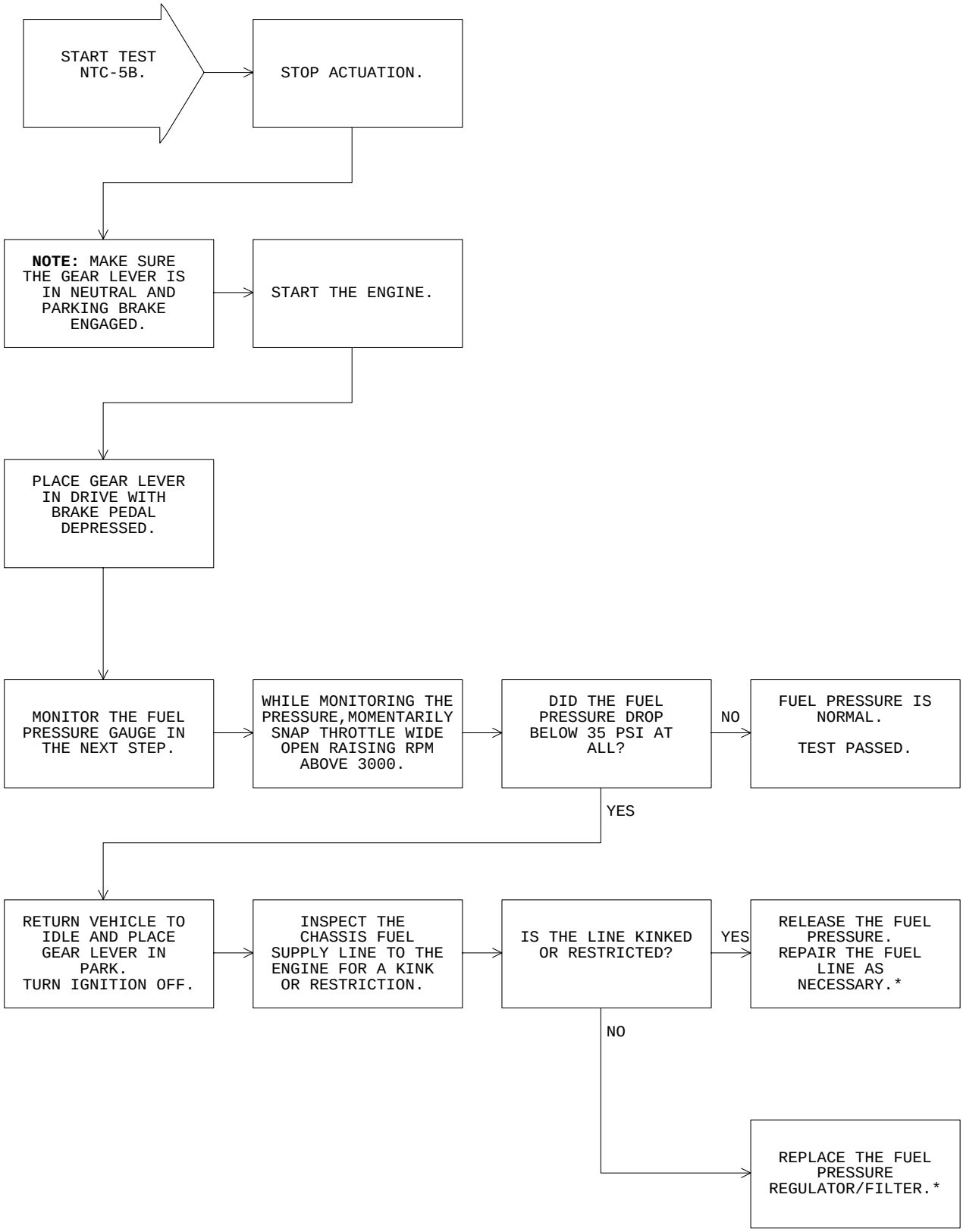
TEST NTC-5B CHECKING THE FUEL DELIVERY

Perform TEST NTC-5A Before Proceeding

NOTES

TEST NTC-5B CHECKING THE FUEL DELIVERY

Perform TEST NTC-5A Before Proceeding

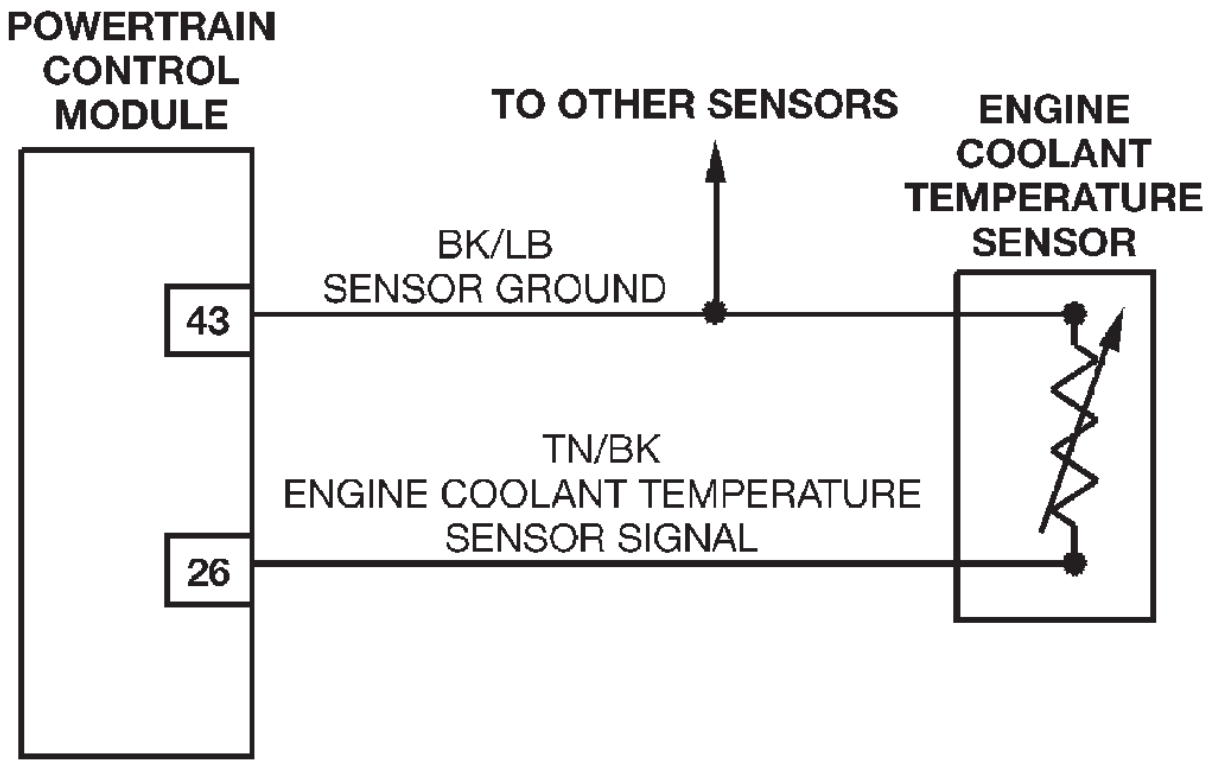


***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST NTC-6A CHECKING THE ENGINE COOLANT TEMP SENSOR

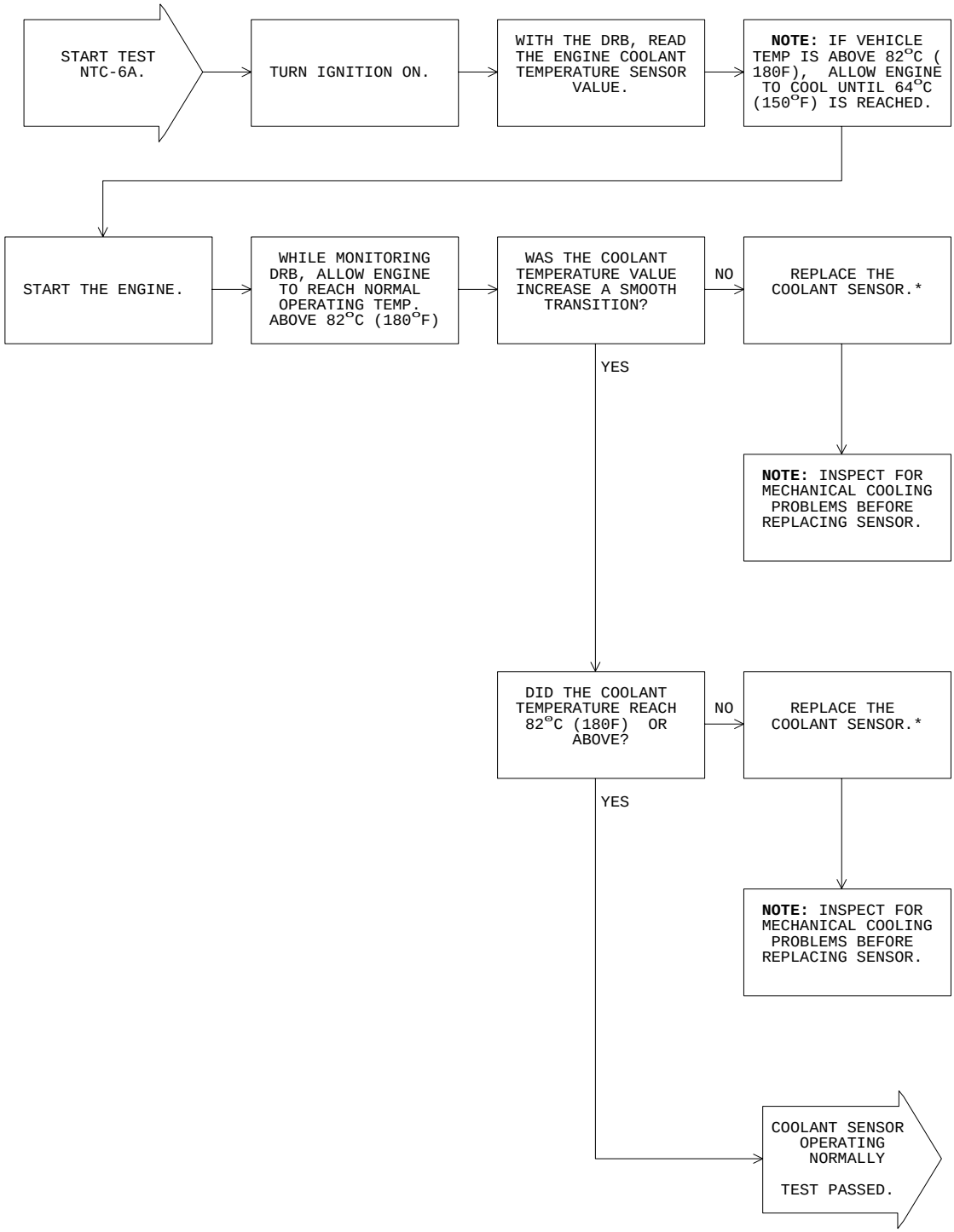
Perform TEST NTC-1A Before Proceeding



80b4fb2d

TEST NTC-6A CHECKING THE ENGINE COOLANT TEMP SENSOR

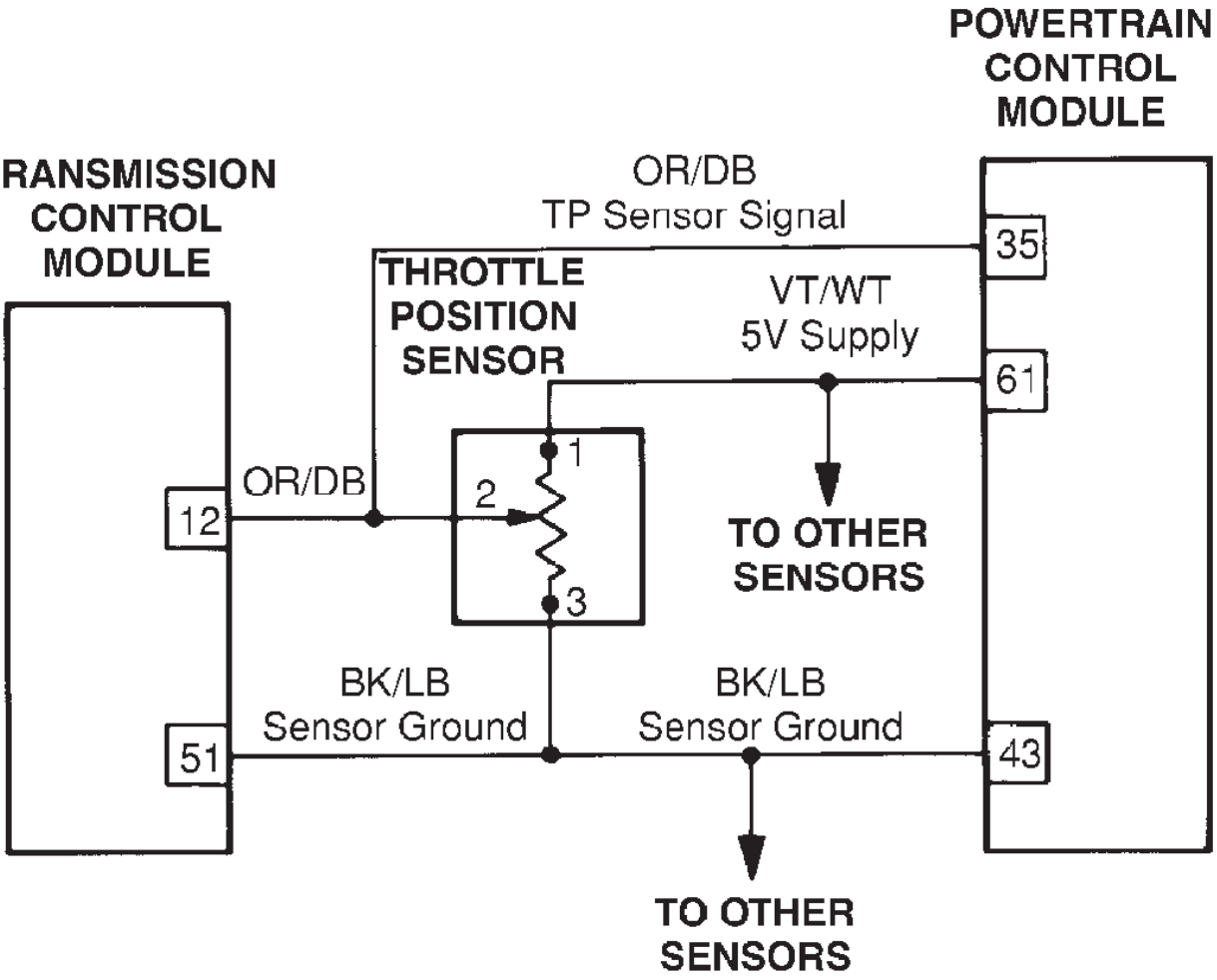
Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.	***Check connectors - Clean / repair as necessary.***

TEST NTC-7A CHECKING THE THROTTLE POSITION SENSOR

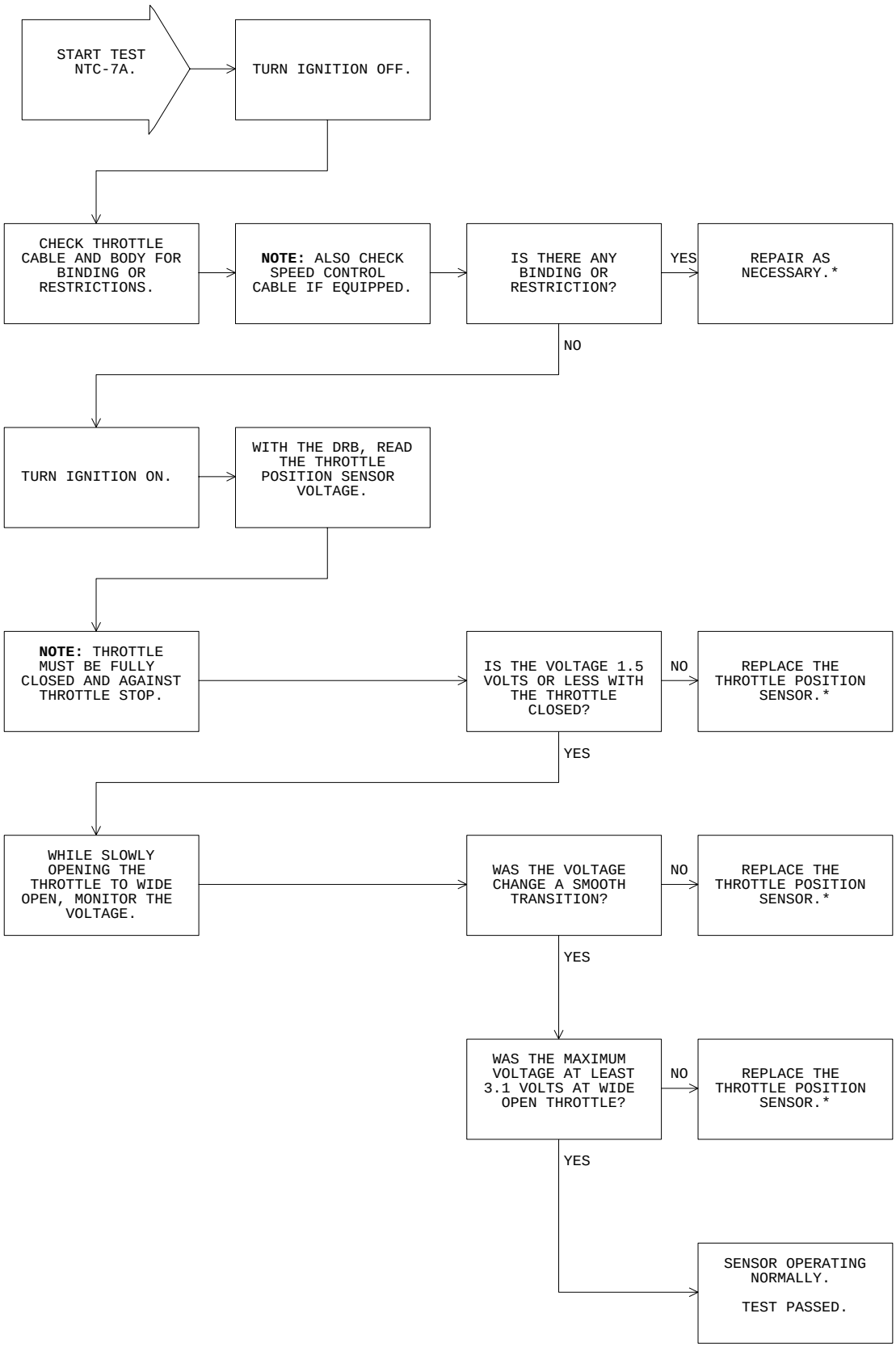
Perform TEST NTC-1A Before Proceeding



80b27c71

TEST NTC-7A CHECKING THE THROTTLE POSITION SENSOR

Perform TEST NTC-1A Before Proceeding



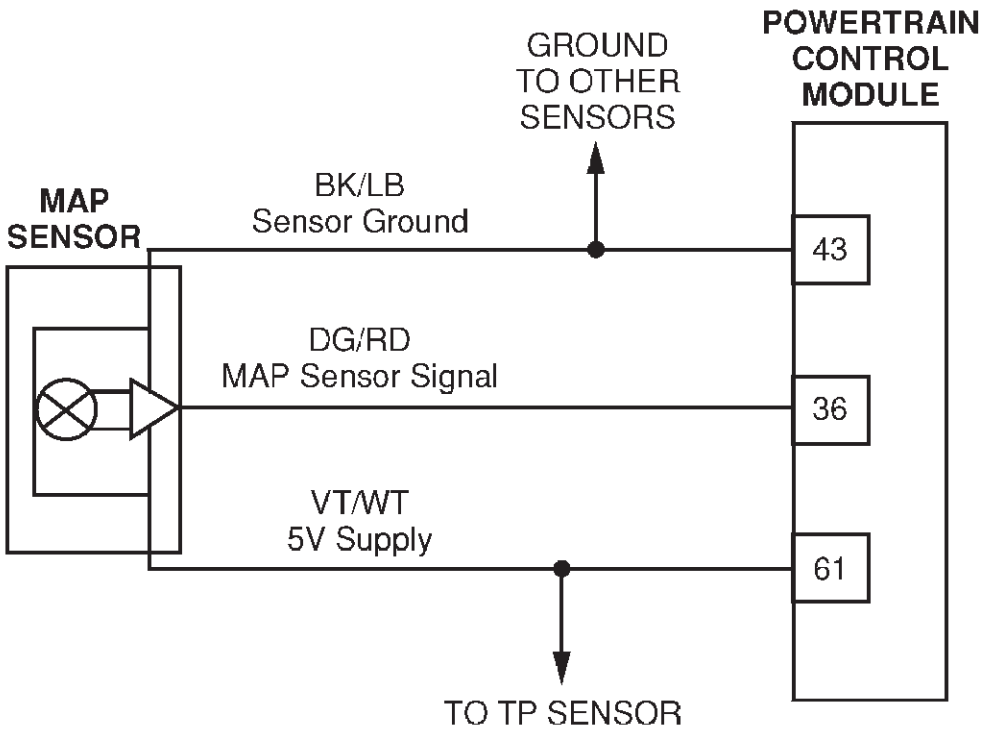
Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

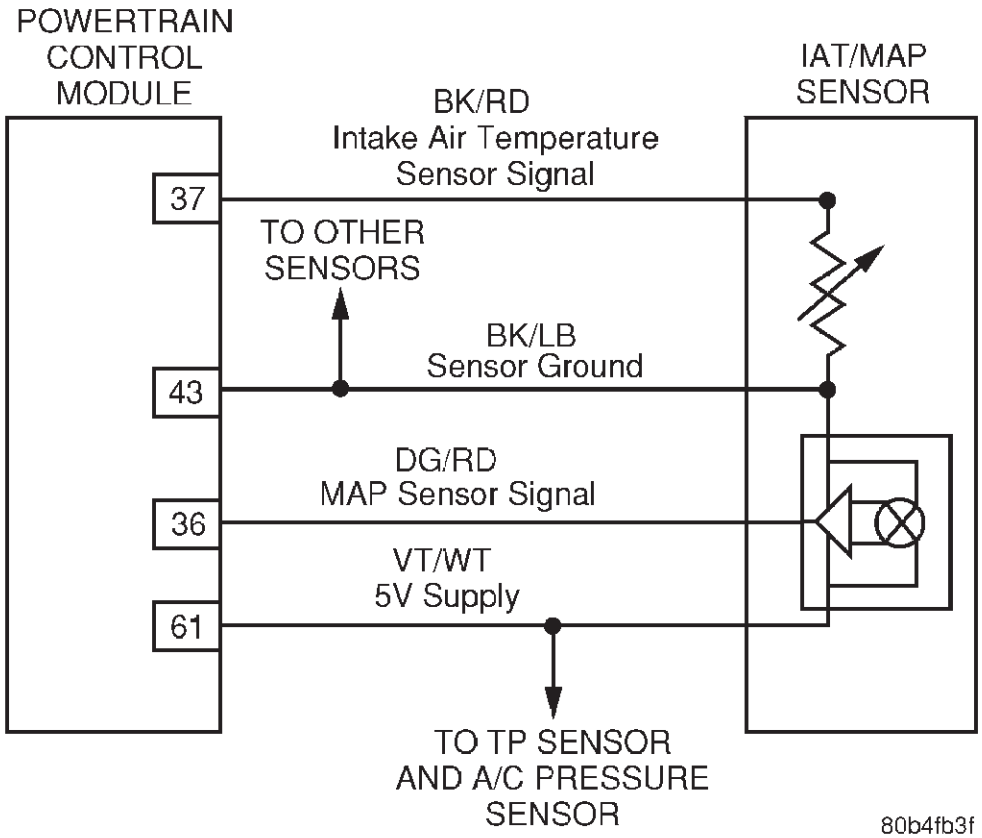
TEST NTC-8A CHECKING MAP SENSOR

Perform TEST NTC-1A Before Proceeding

2.7L

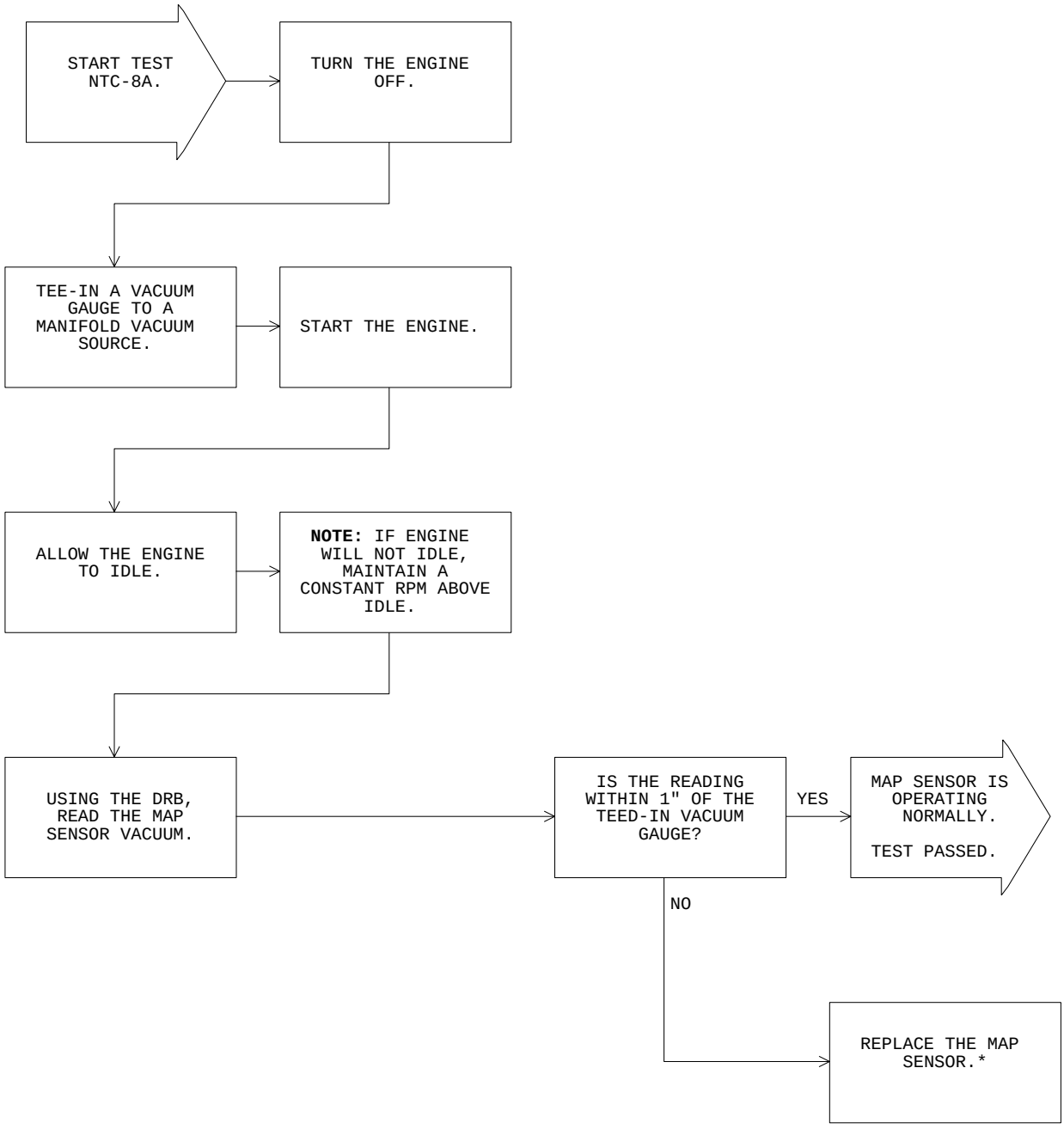


3.5L



TEST NTC-8A CHECKING MAP SENSOR

Perform TEST NTC-1A Before Proceeding

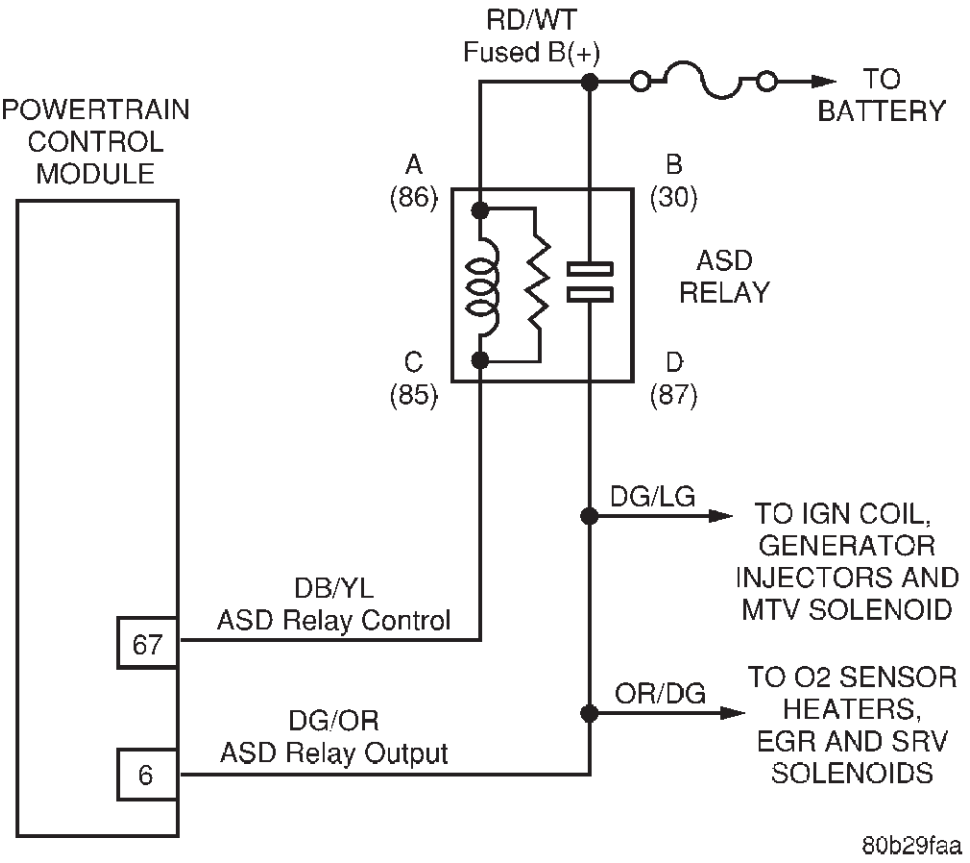


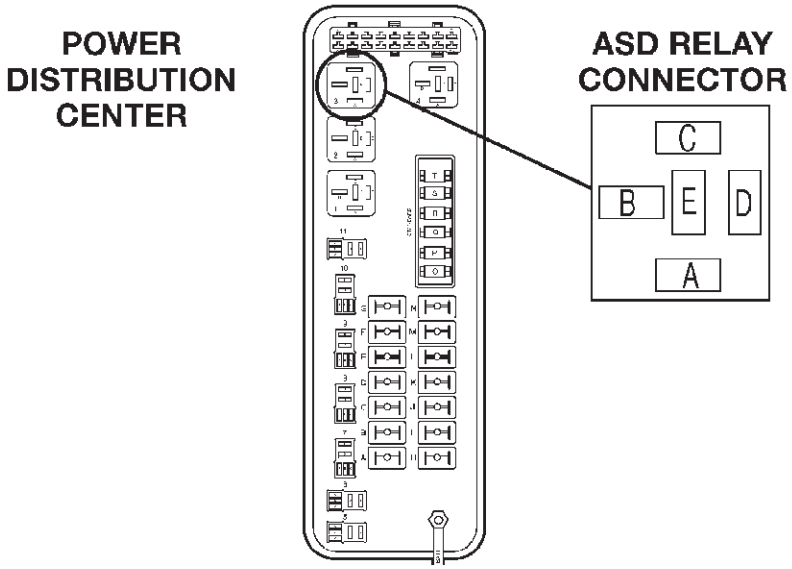
***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST NTC-9A CHECKING THE AUTO SHUTDOWN RELAY

Perform TEST NTC-1A Before Proceeding





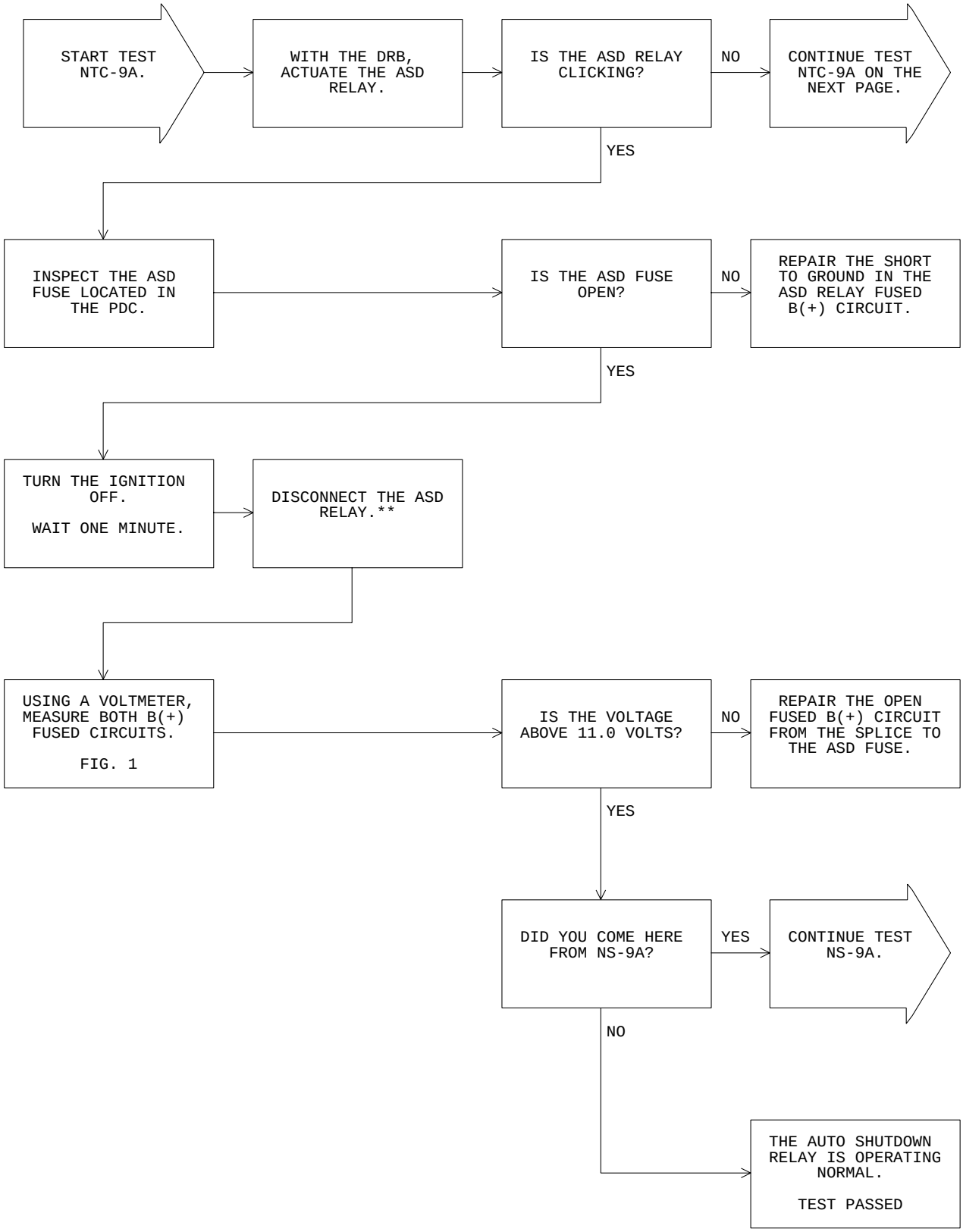
CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f

FIG. 1

TEST NTC-9A CHECKING THE AUTO SHUTDOWN RELAY

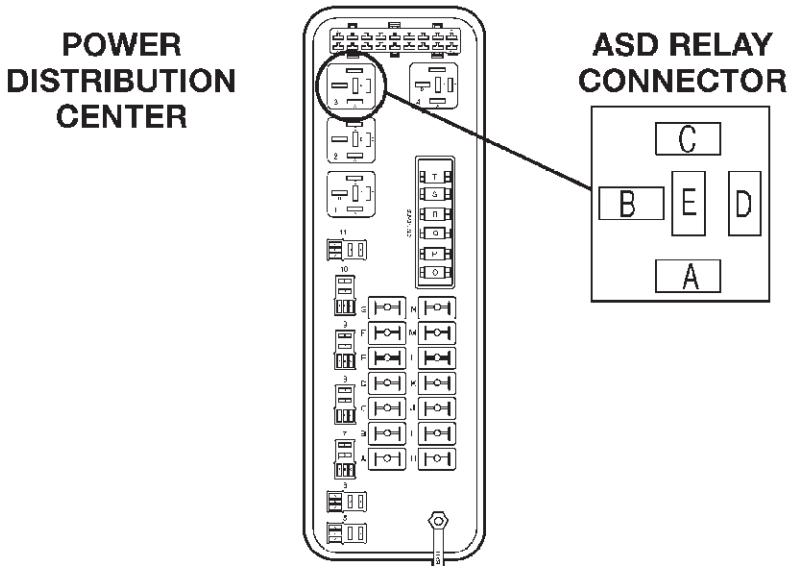
Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

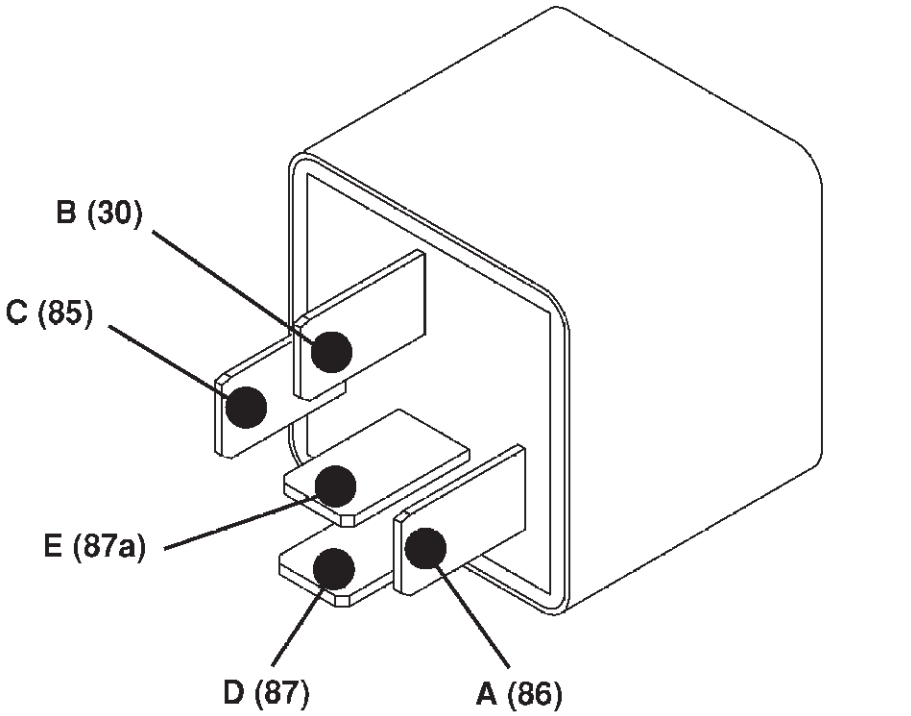
TEST NTC-9A CONTINUED - CHECKING THE AUTO SHUTDOWN RELAY



CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f

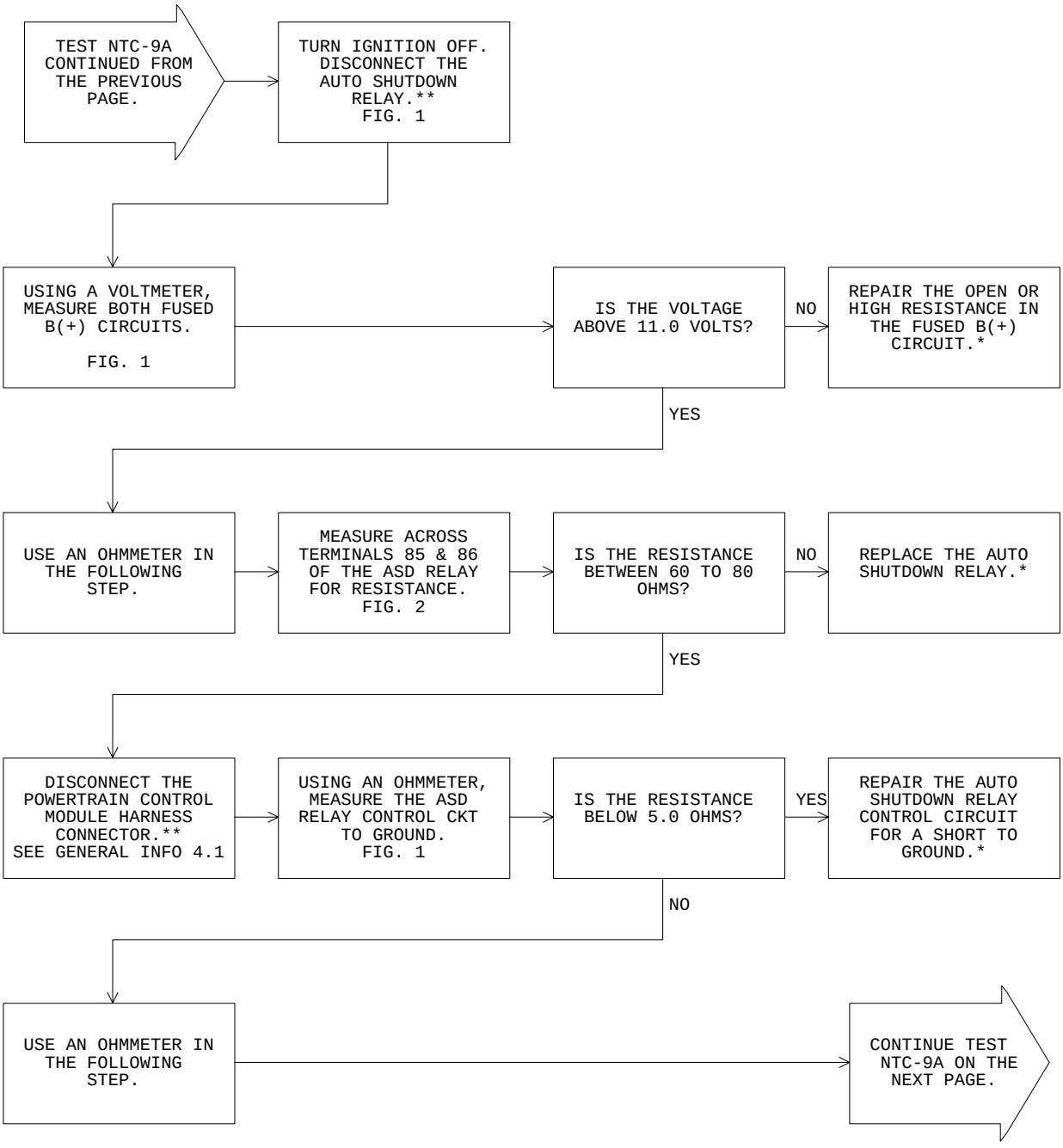
FIG. 1



80b4fa4e

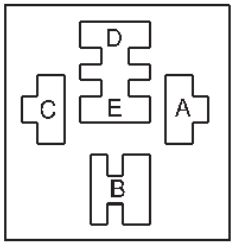
FIG. 2

TEST NTC-9A CONTINUED - CHECKING THE AUTO SHUTDOWN RELAY



Perform Verification TEST VER-2A.

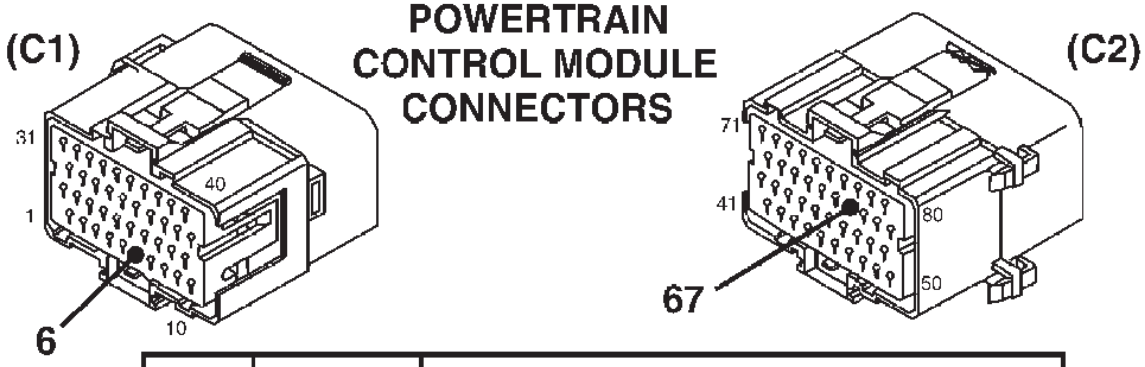
Check connectors - Clean / repair as necessary.



AUTO SHUTDOWN RELAY (IN PDC)

CAV	COLOR	FUNCTION
A(86)	RD/WT	FUSED B(+)
B(30)	RD/WT	FUSED B(+)
C(85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D(87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

POWERTRAIN CONTROL MODULE CONNECTORS

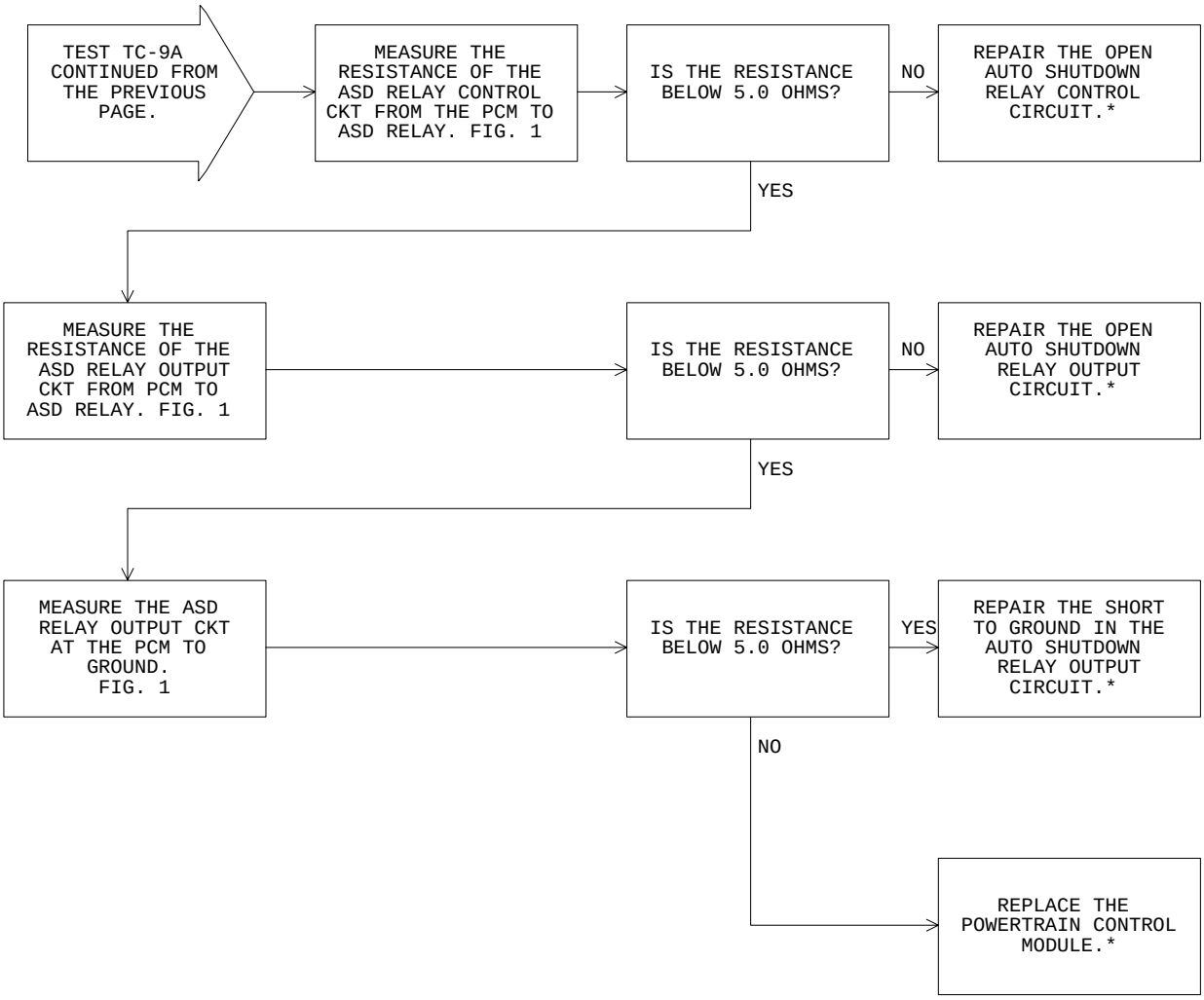


CAV	COLOR	FUNCTION
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT
67	DB/YL	AUTO SHUTDOWN RELAY CONTROL

80b29f38

FIG. 1

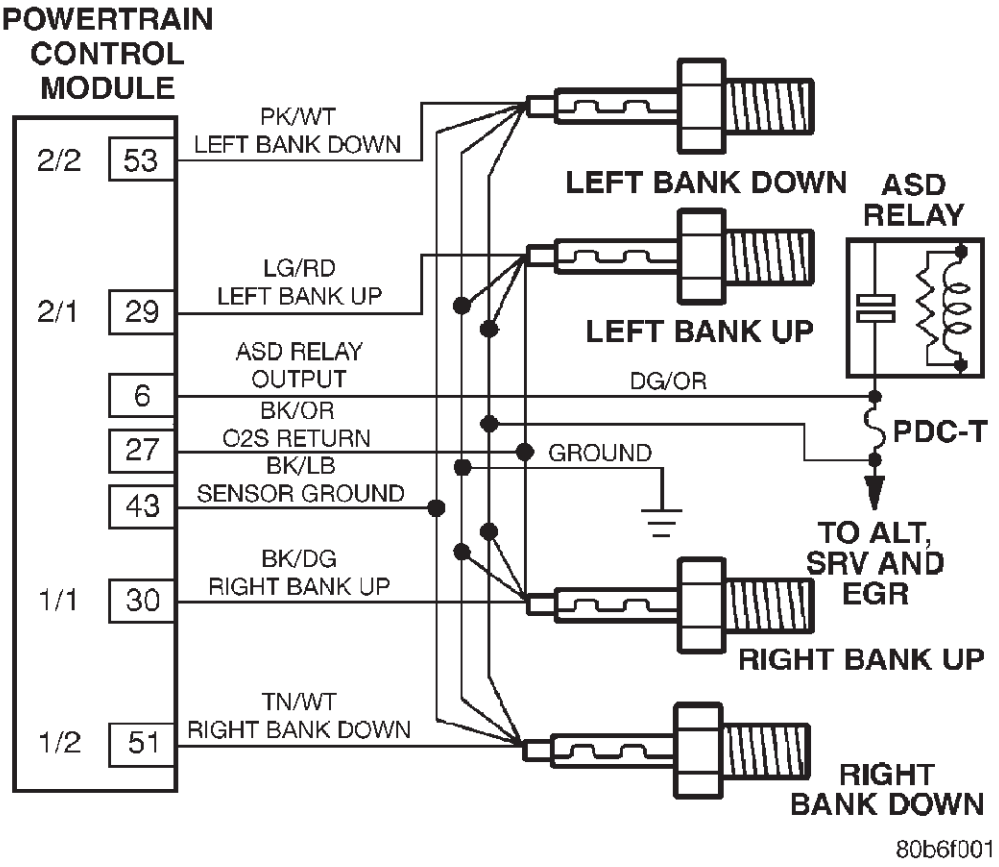
TEST NTC-9A CONTINUED - CHECKING THE AUTO SHUTDOWN RELAY



***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST NTC-10A CHECKING THE OXYGEN SENSOR SWITCHING

Perform TEST NTC-1A Before Proceeding



SBEC IIIA 02 SENSOR CONFIGURATION

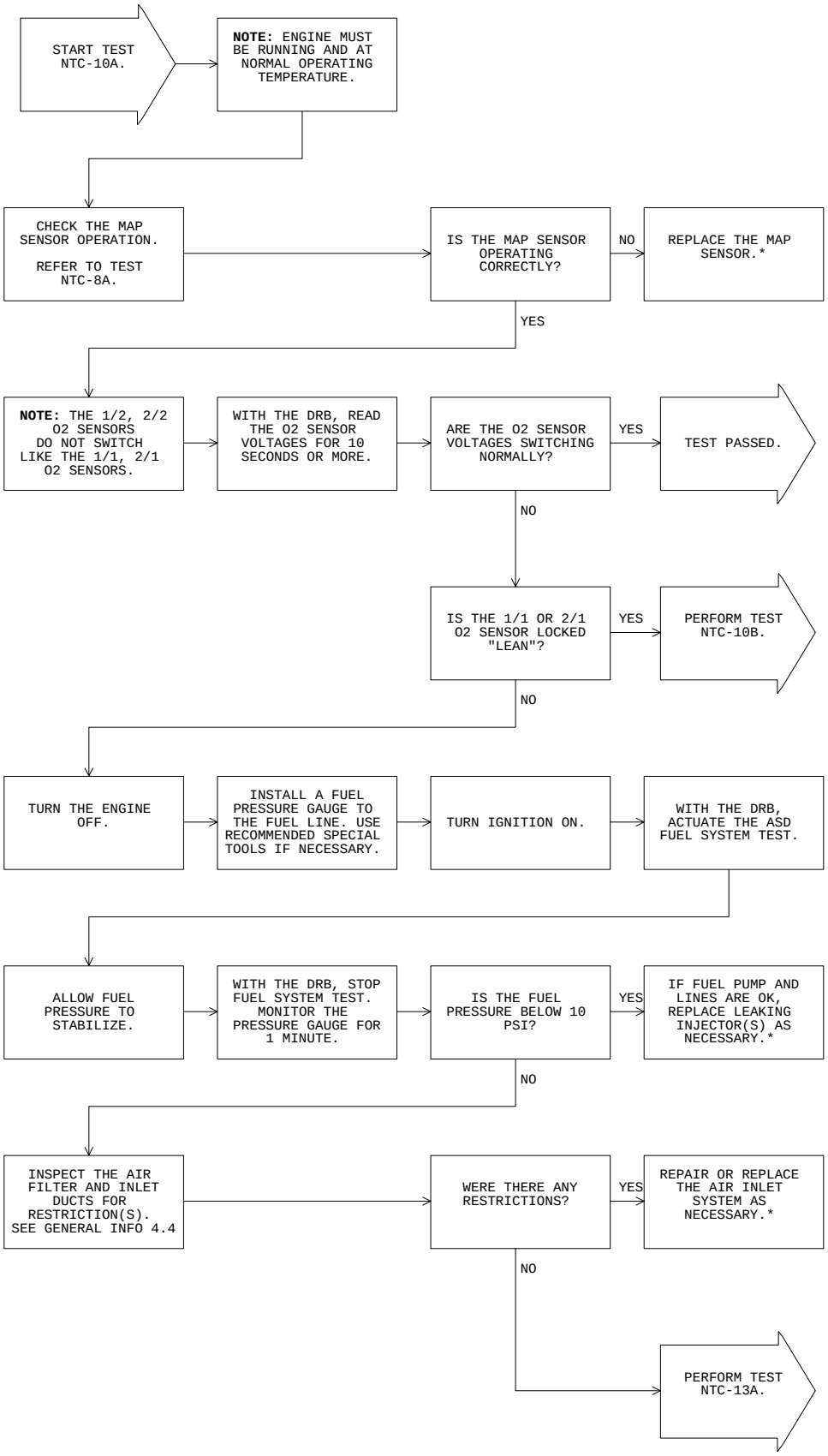
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST NTC-10A CHECKING THE OXYGEN SENSOR SWITCHING

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

*****Check connectors - Clean / repair as necessary.***

TEST NTC-10B CONTINUED - CHECKING THE OXYGEN SENSOR SWITCHING

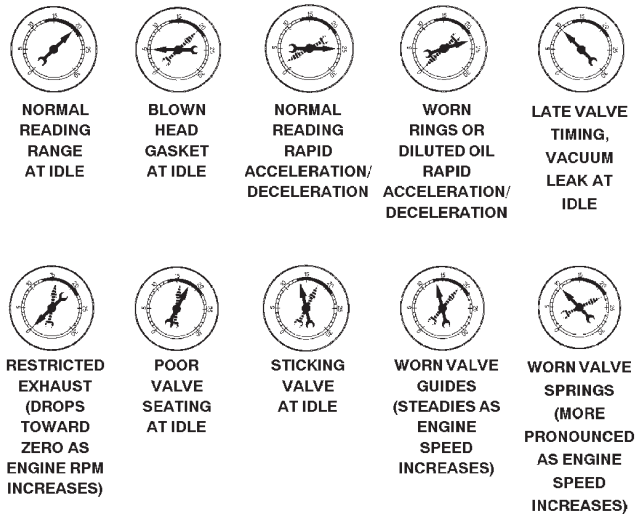


FIG. 1

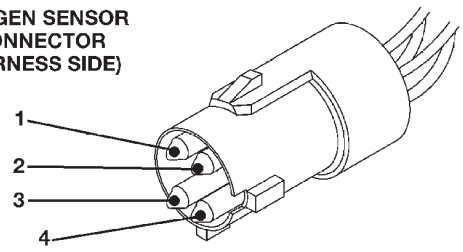
SBEC IIIA 02 SENSOR CONFIGURATION

300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

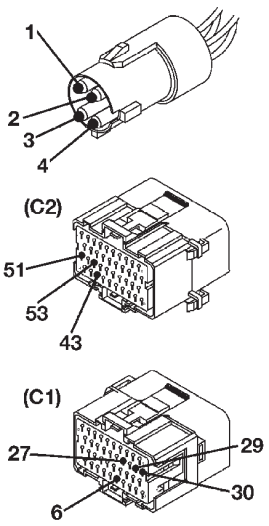
80b5cc93

OXYGEN SENSOR CONNECTOR (HARNESS SIDE)



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e



OXYGEN SENSOR CONNECTOR

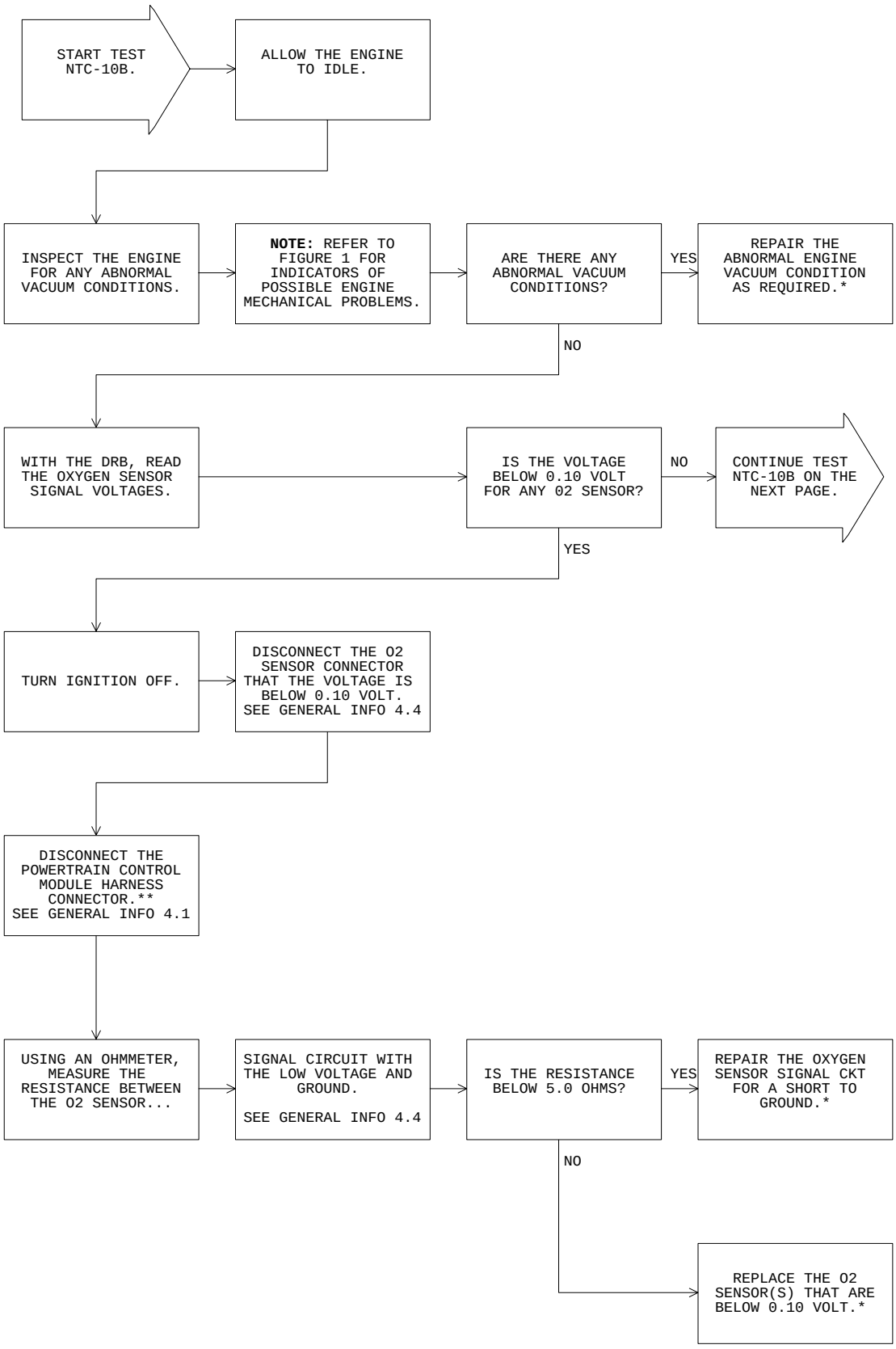
CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST NTC-10B CONTINUED - CHECKING THE OXYGEN SENSOR SWITCHING

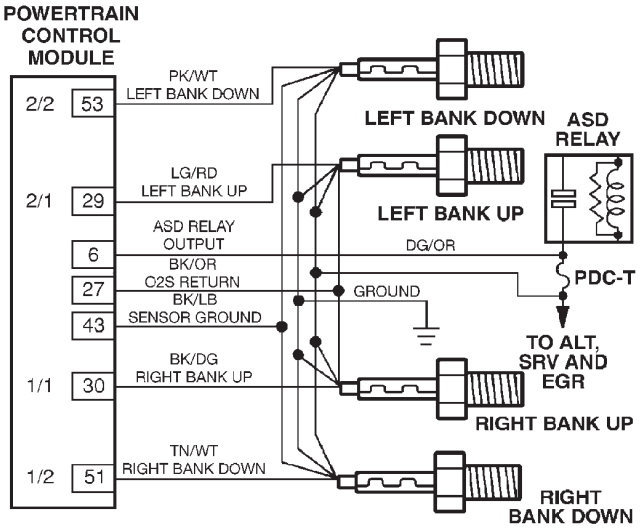


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST NTC-10B CHECKING THE OXYGEN SENSOR SWITCHING

Perform TEST NTC-1A Before Proceeding



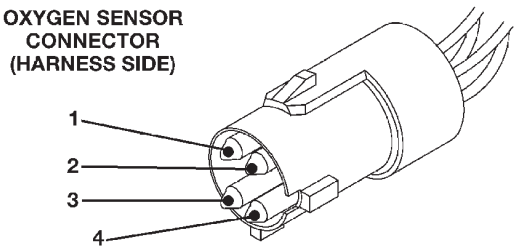
80b6f001

SBEC IIIA 02 SENSOR CONFIGURATION

300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

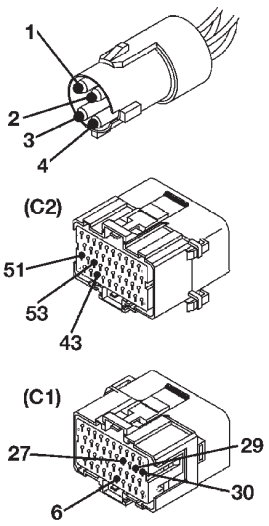
300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e



OXYGEN SENSOR CONNECTOR

CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

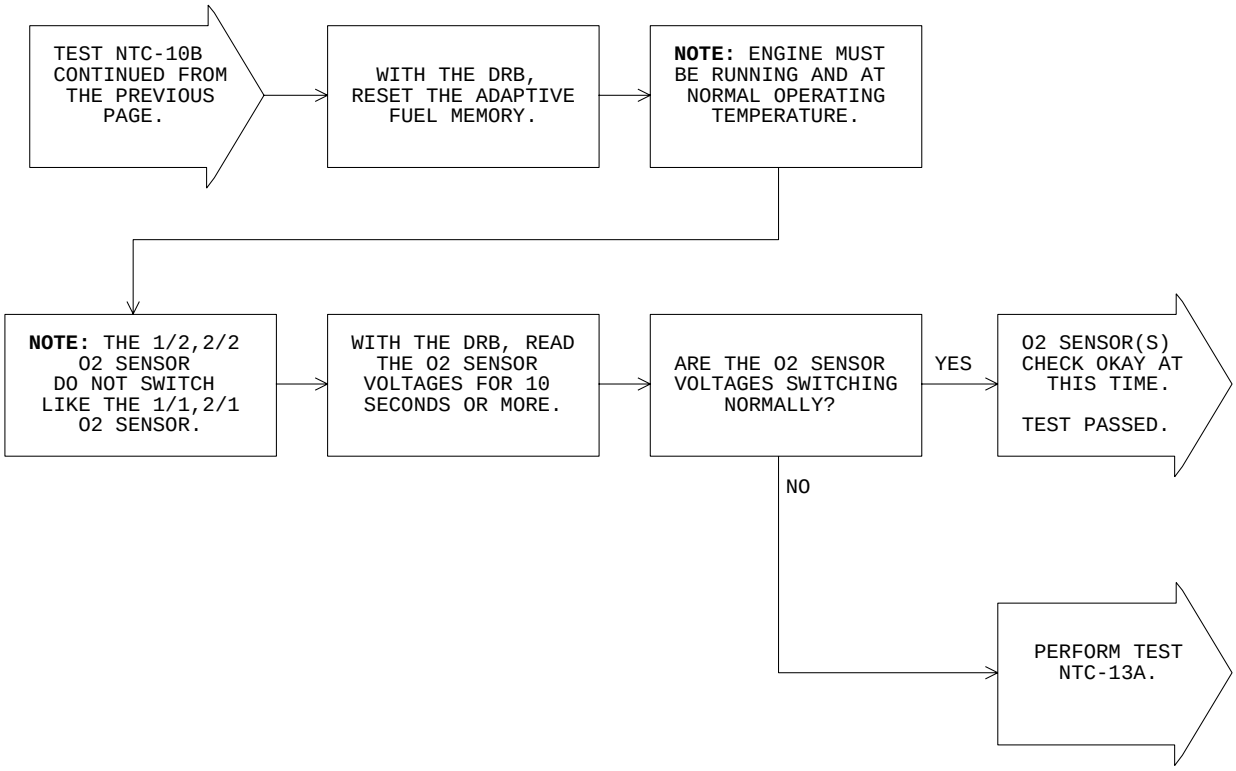
POWERTRAIN CONTROL MODULE CONNECTORS

CAV	COLOR	FUNCTION
6	DG/OR	ASD RELAY (SENSE)
27	BK/OR	1/1 02S RETURN
		2/1 02S RETURN
29	LG/RD	2/1 02S SIGNAL
30	BK/DG	1/1 02S SIGNAL
43	BK/LB	1/2 SIGNAL RETURN
		2/2 SIGNAL RETURN
51	TN/WT	1/2 02S SIGNAL
53	PK/WT	2/2 02S SIGNAL

80b1b45c

TEST NTC-10B CHECKING THE OXYGEN SENSOR SWITCHING

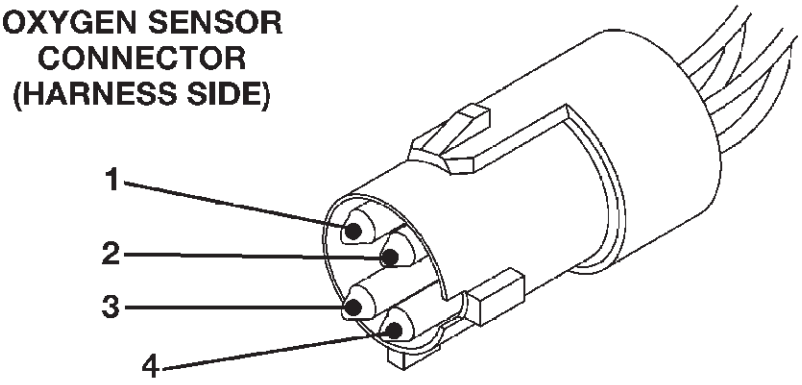
Perform TEST NTC-1A Before Proceeding



***Perform Verification TEST VER-2A.**	****Check connectors - Clean / repair as necessary.**

TEST NTC-11A CHECKING THE OXYGEN SENSOR HEATER

Perform TEST NTC-1A Before Proceeding



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

SBEC IIIA 02 SENSOR CONFIGURATION

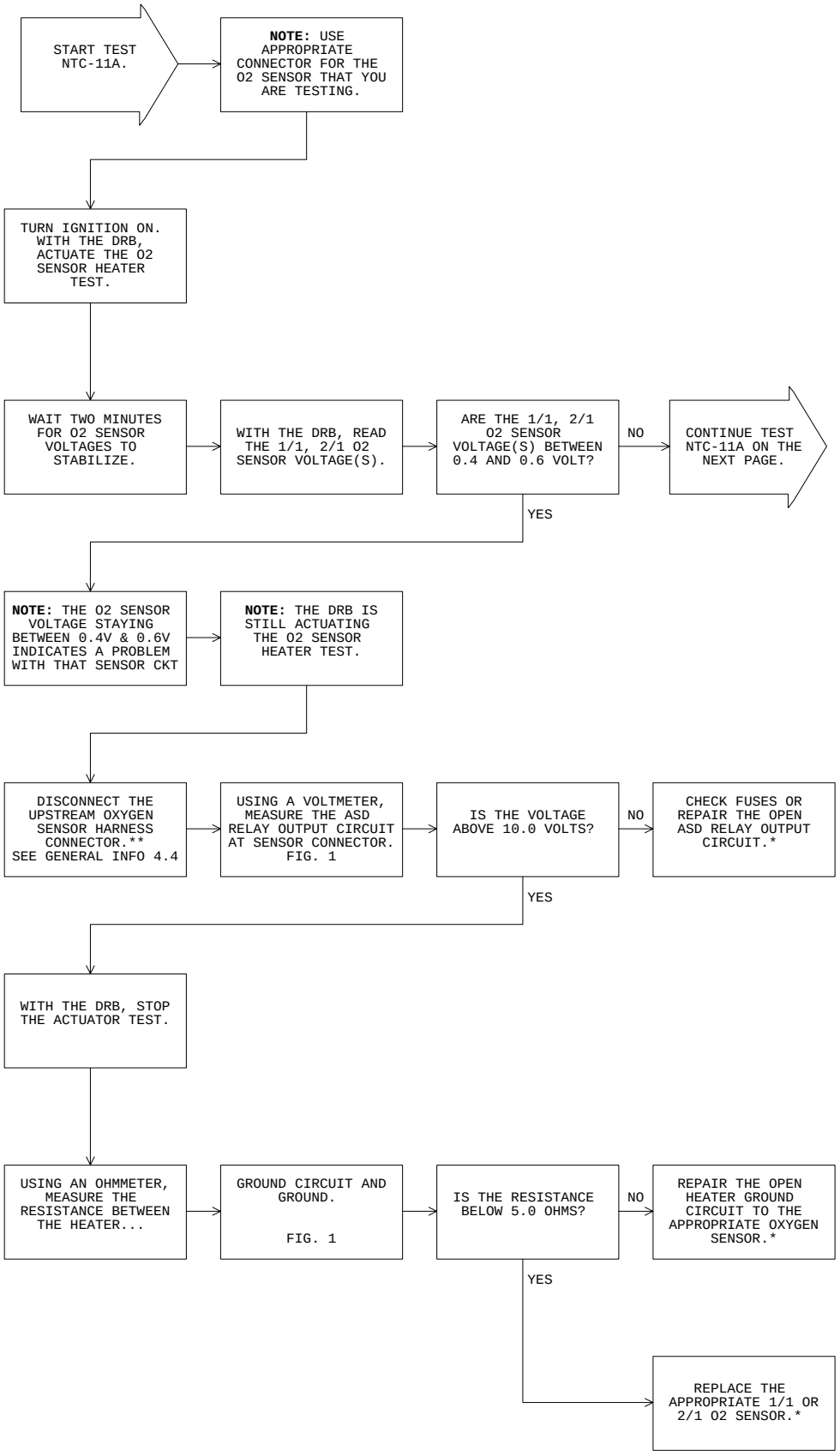
300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST NTC-11A CHECKING THE OXYGEN SENSOR HEATER

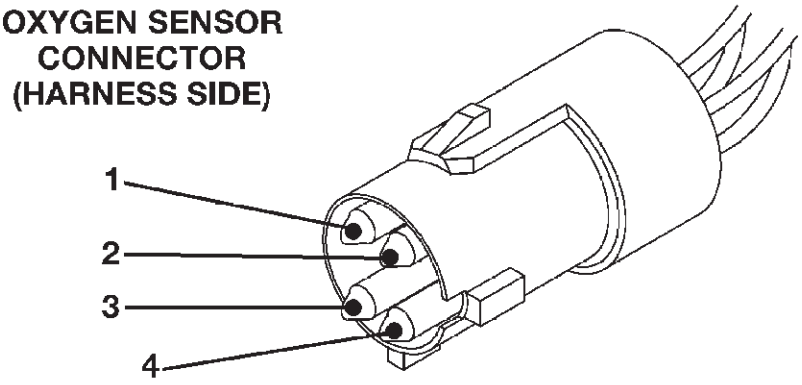
Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST NTC-11A CONTINUED - CHECKING THE OXYGEN SENSOR HEATER



CAV	COLOR	FUNCTION
1	BK	ENGINE GROUND
2	OR/DG	ASD RELAY
3	BK/OR	1/1 02S RETURN
	BK/OR	2/1 02S RETURN
	BK/LB	1/2 SIGNAL RETURN
	BK/LB	2/2 SIGNAL RETURN
4	BK/DG	1/1 02S SIGNAL
	TN/WT	1/2 02S SIGNAL
	LG/RD	2/1 02S SIGNAL
	PK/WT	2/2 02S SIGNAL

80b1b45e

FIG. 1

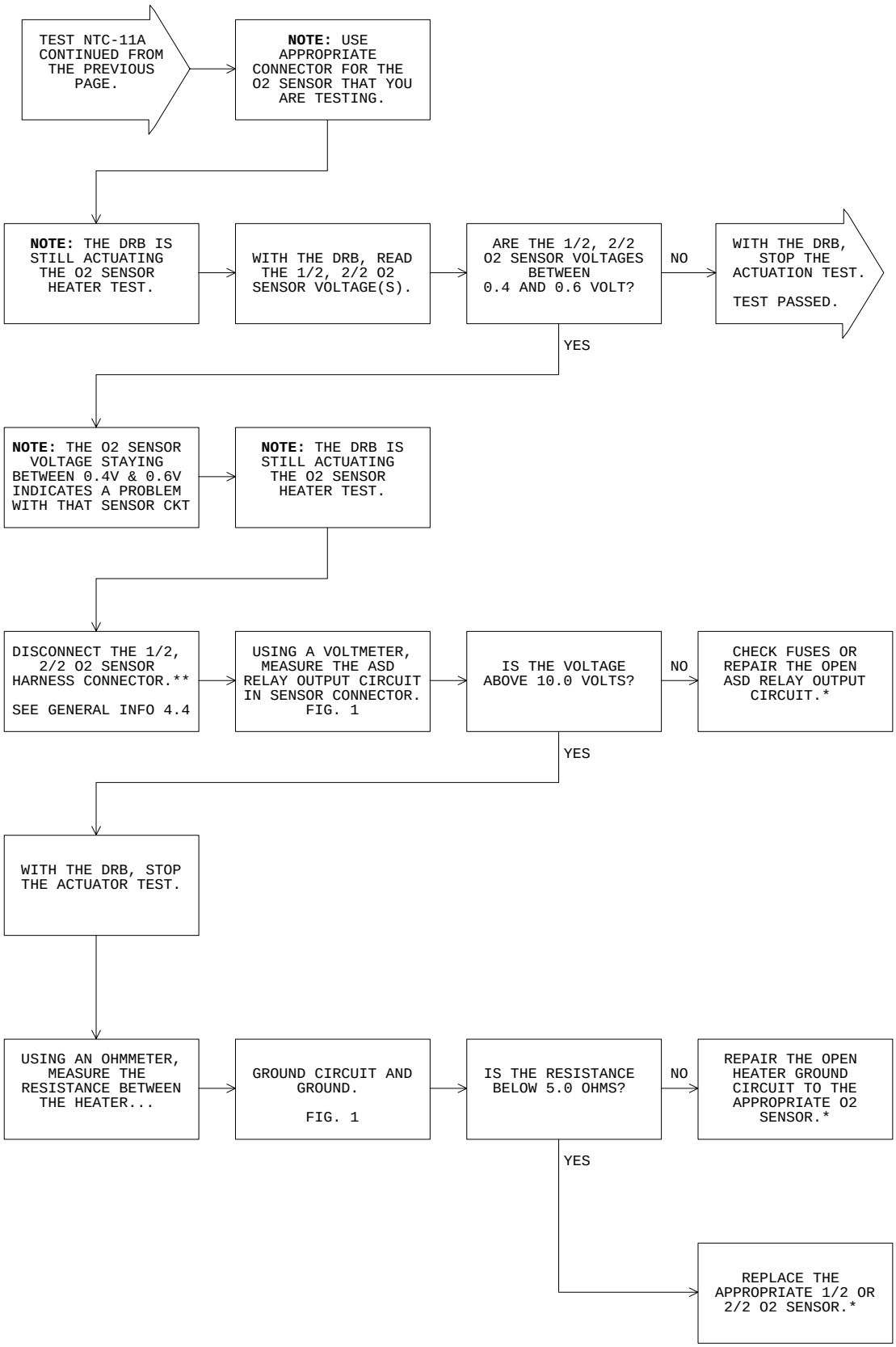
SBEC IIIA 02 SENSOR CONFIGURATION

300M 2.7L V-6 1/1 RIGHT BANK UP
300M 2.7L V-6 1/2 RIGHT BANK DOWN
300M 2.7L V-6 2/1 LEFT BANK UP
300M 2.7L V-6 2/2 LEFT BANK DOWN

300M 3.5L V-6 1/1 RIGHT BANK UP
300M 3.5L V-6 1/2 RIGHT BANK DOWN
300M 3.5L V-6 2/1 LEFT BANK UP
300M 3.5L V-6 2/2 LEFT BANK DOWN

80b5cc93

TEST NTC-11A CONTINUED - CHECKING THE OXYGEN SENSOR HEATER



Perform Verification TEST VER-2A.

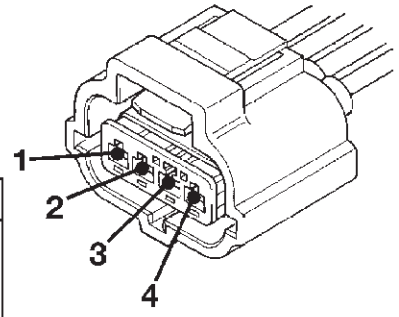
Check connectors - Clean / repair as necessary.

TEST NTC-12A CHECKING IDLE AIR CONTROL MOTOR

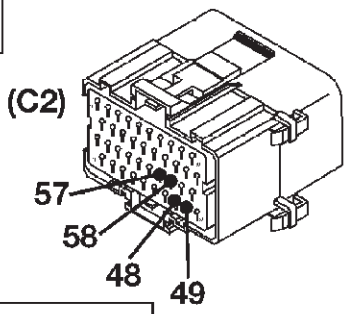
Perform TEST NTC-1A Before Proceeding

IDLE AIR CONTROL MOTOR CONNECTOR

CAV	COLOR	FUNCTION
1	GY/RD	IAC MOTOR #1 DRIVER
2	YL/BK	IAC MOTOR #2 DRIVER
3	YL/BK	IAC MOTOR #3 DRIVER
4	VT/BK	IAC MOTOR #4 DRIVER



POWERTRAIN CONTROL MODULE CONNECTOR



CAV	COLOR	FUNCTION
48	YL/BK	IDLE AIR CONTROL #3 DRIVER
49	YL/BK	IDLE AIR CONTROL #2 DRIVER
57	GY/RD	IDLE AIR CONTROL #1 DRIVER
58	VT/BK	IDLE AIR CONTROL #4 DRIVER

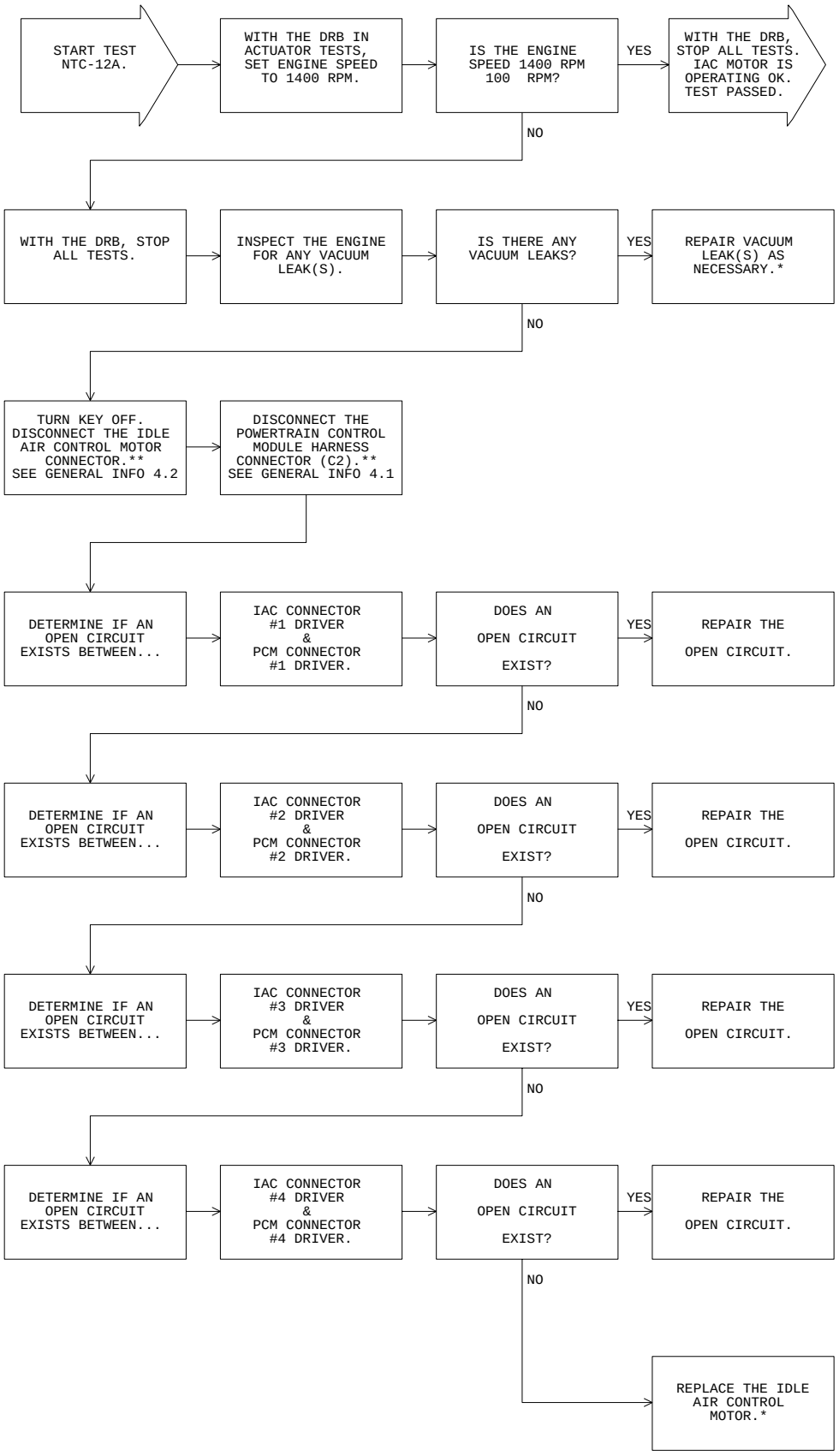
80b6f000

Theory of operation: The idle air control motor is used by the PCM to help regulate idle speed. The motor controls the amount of air allowed to bypass the throttle blade. The PCM controls the motor using four driver circuits to position the stepper motor.

2640605

TEST NTC-12A CHECKING IDLE AIR CONTROL MOTOR

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

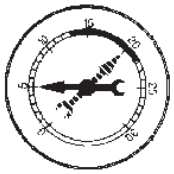
Check connectors - Clean / repair as necessary.

TEST NTC-13A CHECKING THE ENGINE MECHANICAL SYSTEMS

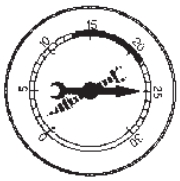
Perform TEST NTC-1A Before Proceeding



NORMAL READING RANGE AT IDLE



BLOWN HEAD GASKET AT IDLE



NORMAL READING RAPID ACCELERATION/ DECELERATION



WORN RINGS OR DILUTED OIL RAPID ACCELERATION/ DECELERATION



LATE VALVE TIMING, VACUUM LEAK AT IDLE



RESTRICTED EXHAUST (DROPS TOWARD ZERO AS ENGINE RPM INCREASES)



POOR VALVE SEATING AT IDLE



STICKING VALVE AT IDLE



WORN VALVE GUIDES (STEADIES AS ENGINE SPEED INCREASES)



WORN VALVE SPRINGS (MORE PRONOUNCED AS ENGINE SPEED INCREASES)

0920606

TEST NTC-13A CHECKING THE ENGINE MECHANICAL SYSTEMS

Perform TEST NTC-1A Before Proceeding

At this point in the diagnostic test procedure, you have determined that all of the **engine electrical systems** are operating as designed; therefore, they are **not the cause of the driveability problem.** The following additional items should be checked as possible mechanical causes of the problem:

1. **ENGINE VACUUM -** must be at least 13 inches in neutral *(see below)**
2. **ENGINE VALVE TIMING -** must be within specifications *(see below)***
3. **ENGINE COMPRESSION -** must be within specifications
4. **CAMSHAFT LOBES -** check for abnormal wear
5. **CRANK SENSOR PICK-UP -** check crankshaft slots for debris/deterioration
6. **ENGINE EXHAUST SYSTEM -** must be free of any restrictions
7. **ENGINE PCV SYSTEM -** must flow freely
8. **ENGINE DRIVE SPROCKETS -** must be properly positioned
9. **TORQUE CONVERTER STALL SPEED -** must be within specification
10. **POWER BRAKE BOOSTER -** no internal vacuum leaks
11. **FUEL -** must be free of contamination
12. **FUEL INJECTOR -** plugged or restricted injector; control wire not connected to correct injector

NOTE: If you came to this test from the oxygen sensor, and the rich or lean condition is not caused by one of the first items above, replace the powertrain control module and perform TEST VER-2A (Road Test Verification).

Always look for any Technical Bulletins that may relate to the problem.

*The readings shown on previous page are only indicators of possible mechanical engine problems.

**This is not a free-wheeling engine.

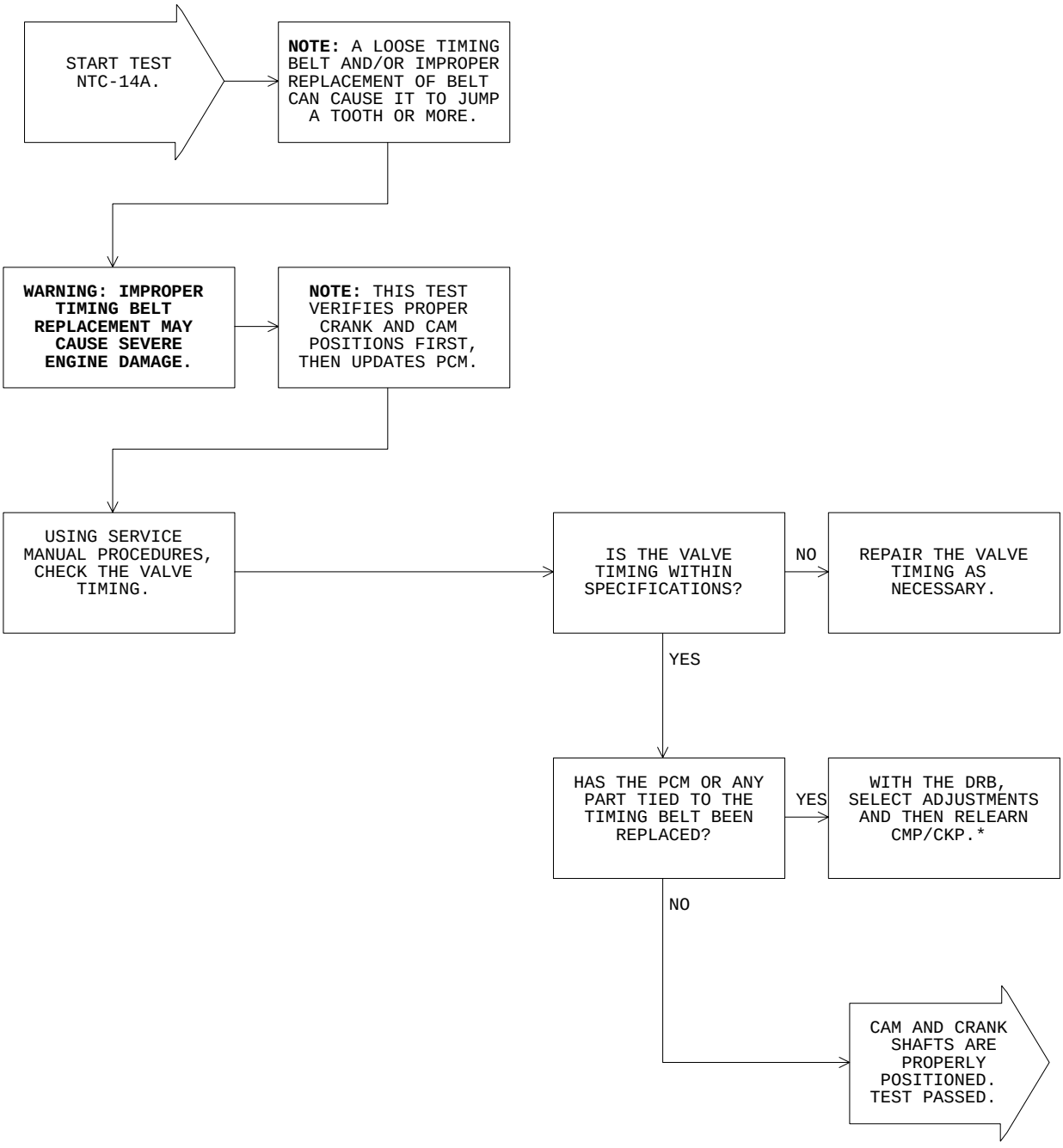
TEST NTC-14A **CHECKING THE TIMING BELT ALIGNMENT**

Perform TEST NTC-1A Before Proceeding

NOTES

TEST NTC-14A CHECKING THE TIMING BELT ALIGNMENT

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-1A.

***Check connectors - Clean / repair as necessary.**

TEST NTC-17A CHECKING THE EVAPORATIVE EMISSION SYSTEMS

Perform TEST NTC-1A Before Proceeding

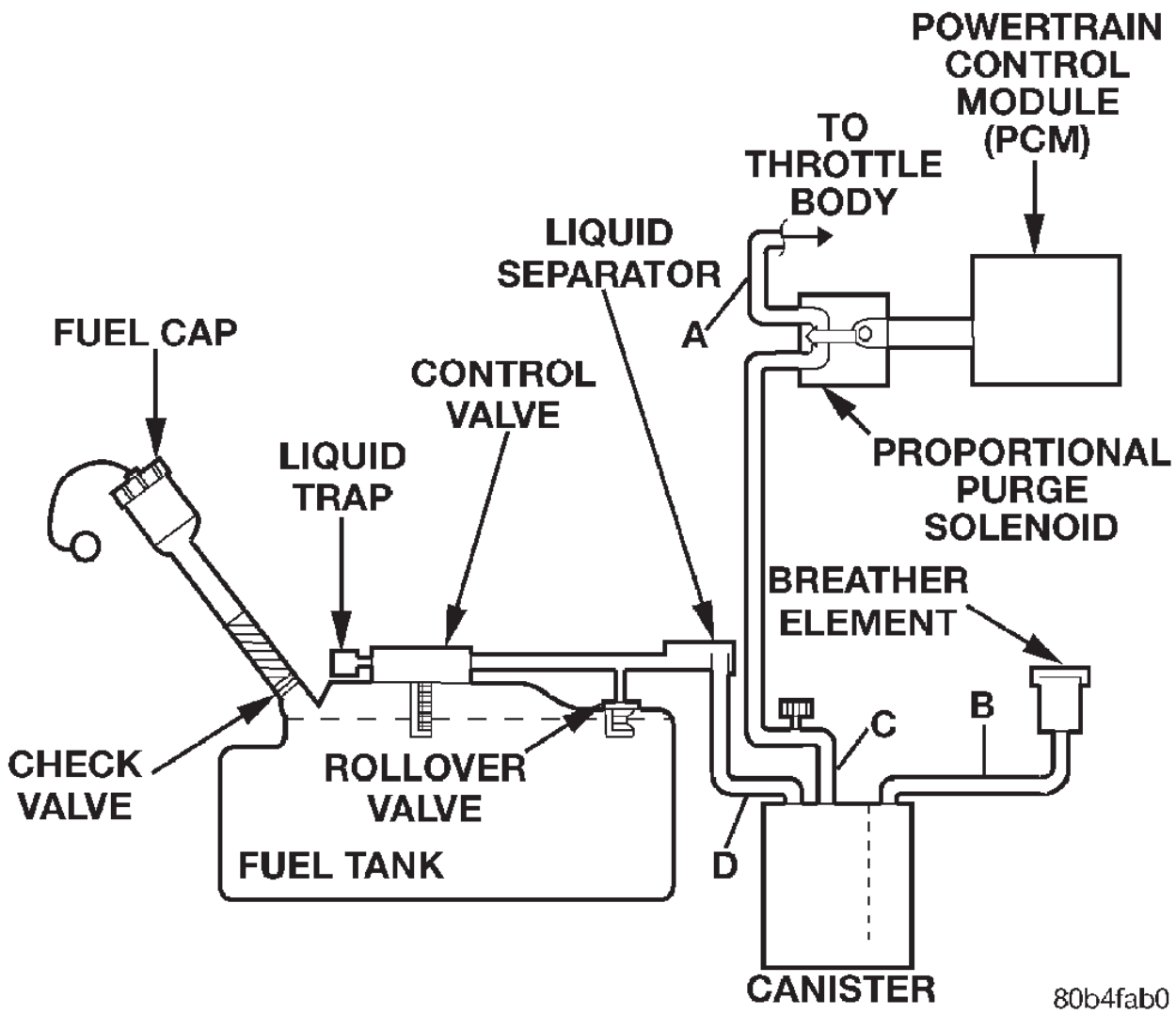


FIG. 1

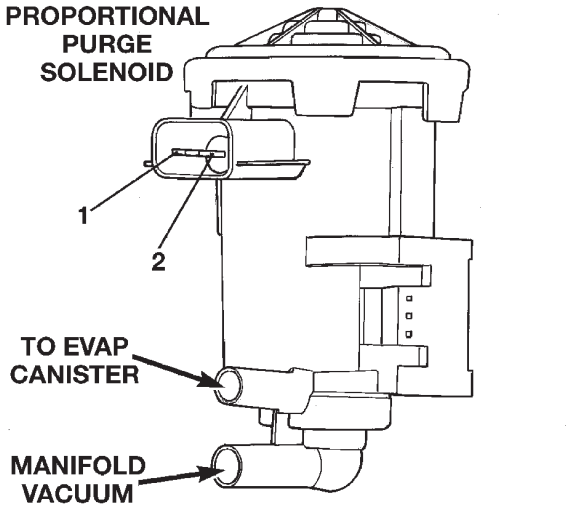


FIG. 2

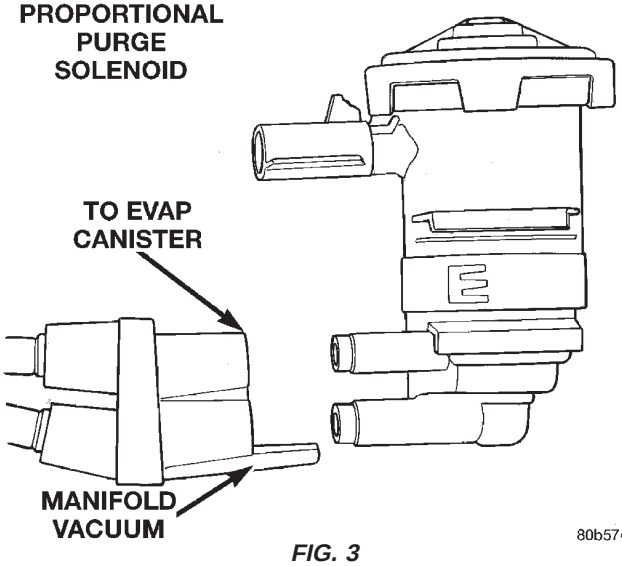
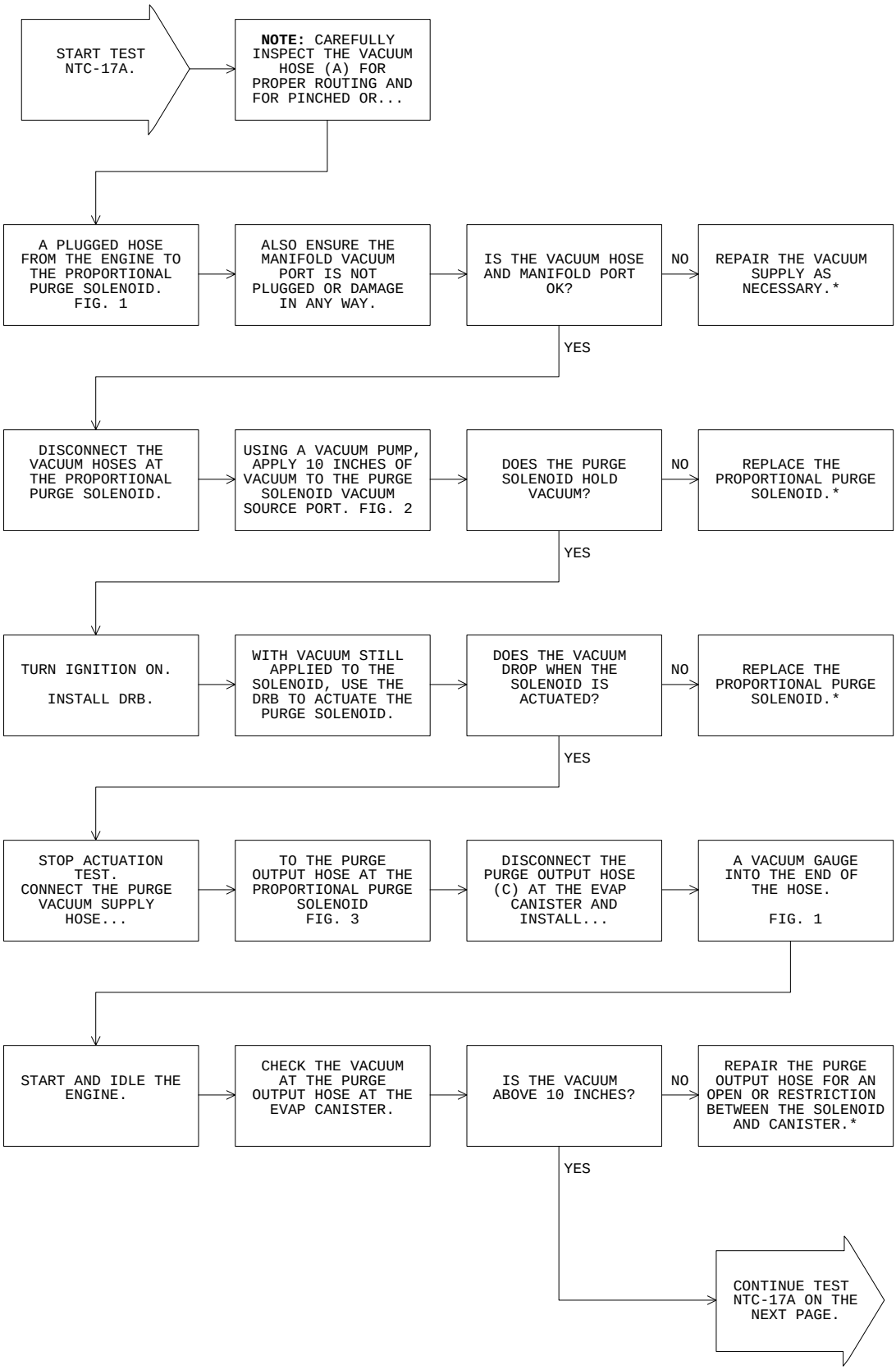


FIG. 3

TEST NTC-17A CHECKING THE EVAPORATIVE EMISSION SYSTEMS

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

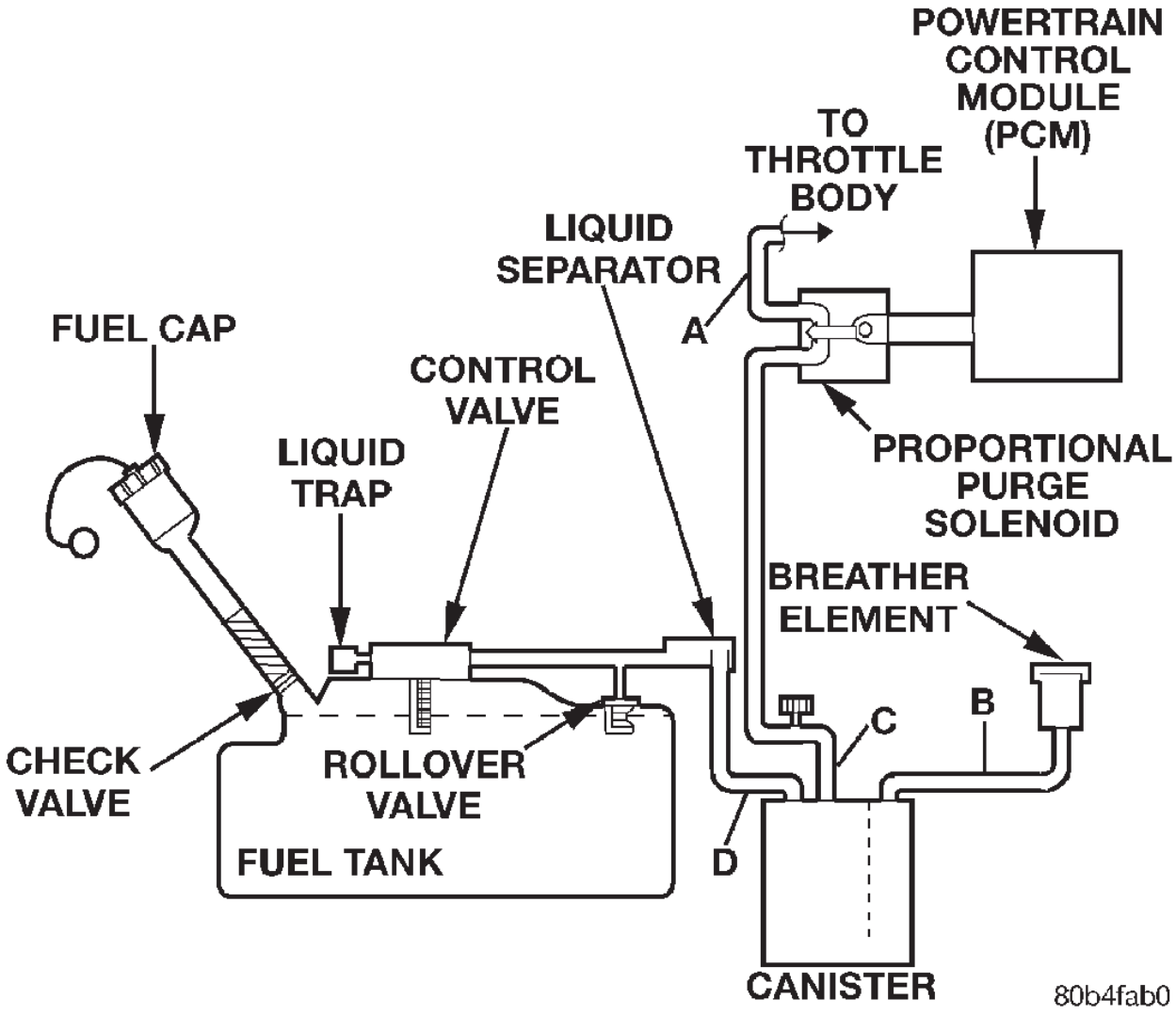
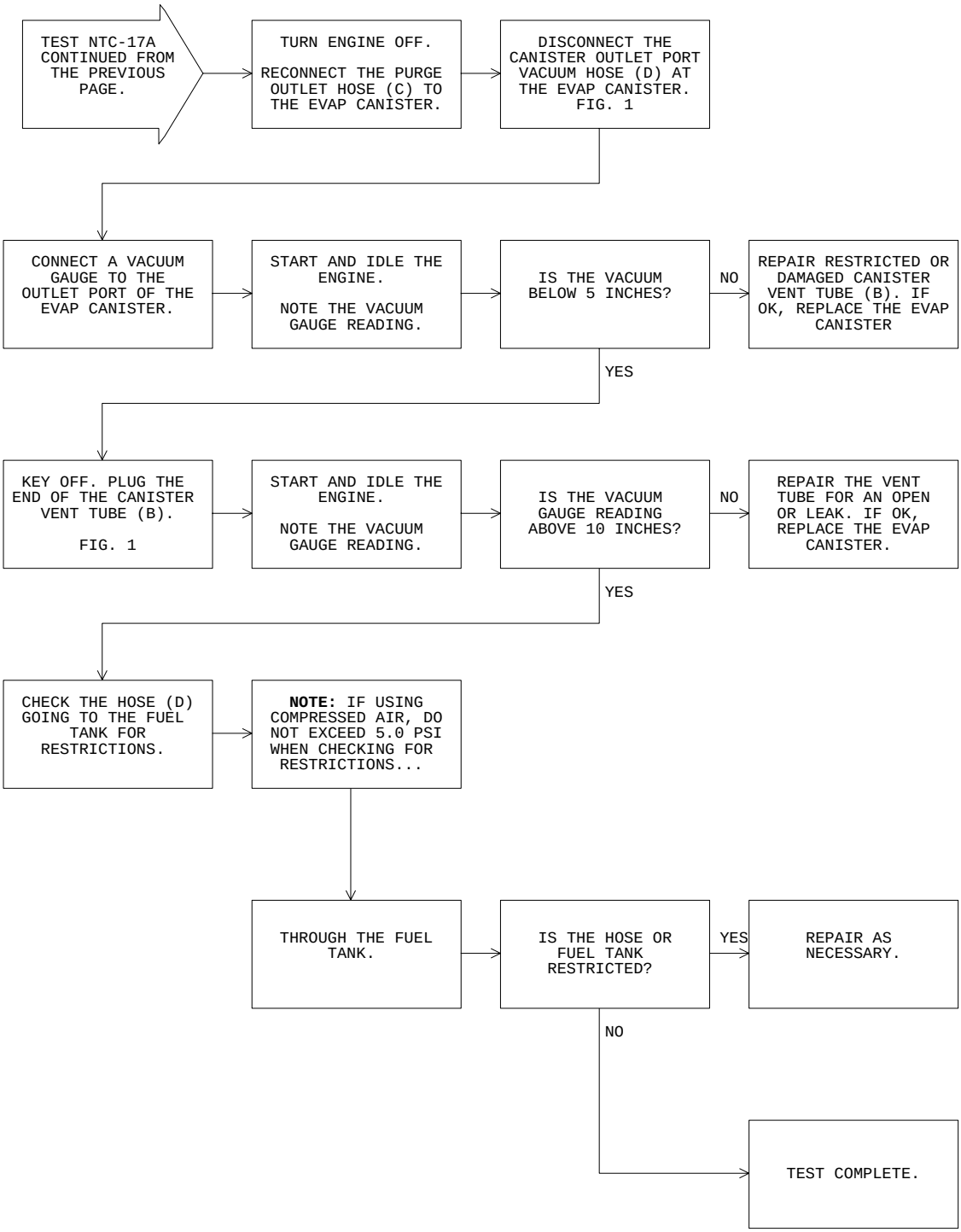

POWERTRAIN
CONTROL
MODULE
(PCM)
TO
THROTTLE
BODY
LIQUID
SEPARATOR
A
FUEL CAP
CONTROL
VALVE
LIQUID
TRAP
PROPORTIONAL
PURGE
SOLENOID
BREATHER
ELEMENT
B
C
CHECK
VALVE
ROLLOVER
VALVE
FUEL TANK
D
CANISTER
80b4fab0

FIG. 1

TEST NTC-17A CONTINUED - CHECKING THE EVAPORATIVE EMISSION SYSTEMS



**Perform Verification TEST VER-2A.*	***Check connectors - Clean / repair as necessary.*

TEST NTC-19A CHECKING THE INTAKE AIR TEMP SENSOR

Perform TEST TC-NTC-1A Before Proceeding

2.7L

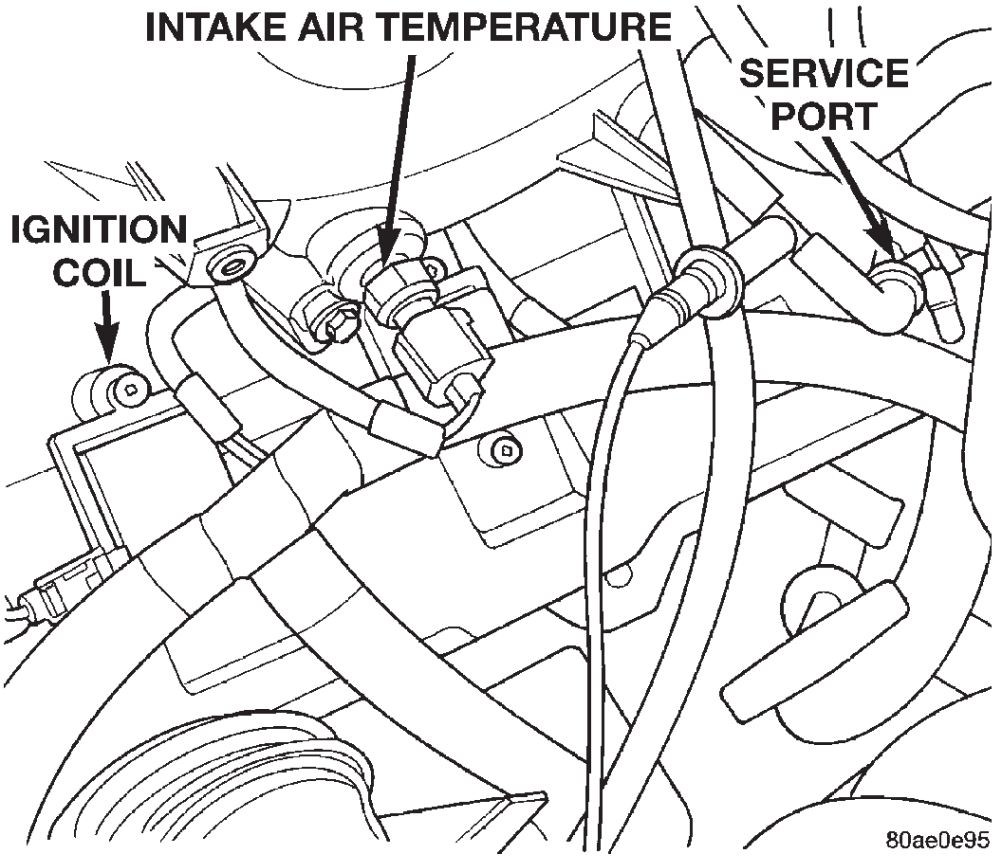


FIG. 1

3.5L

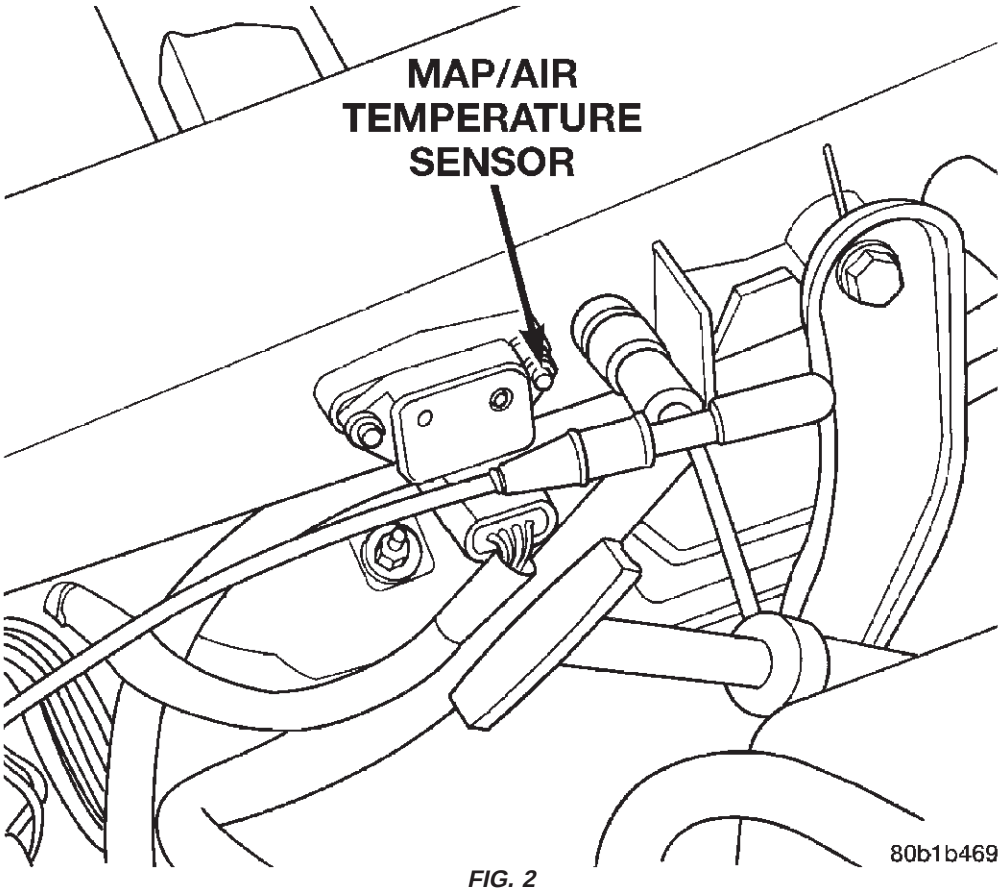
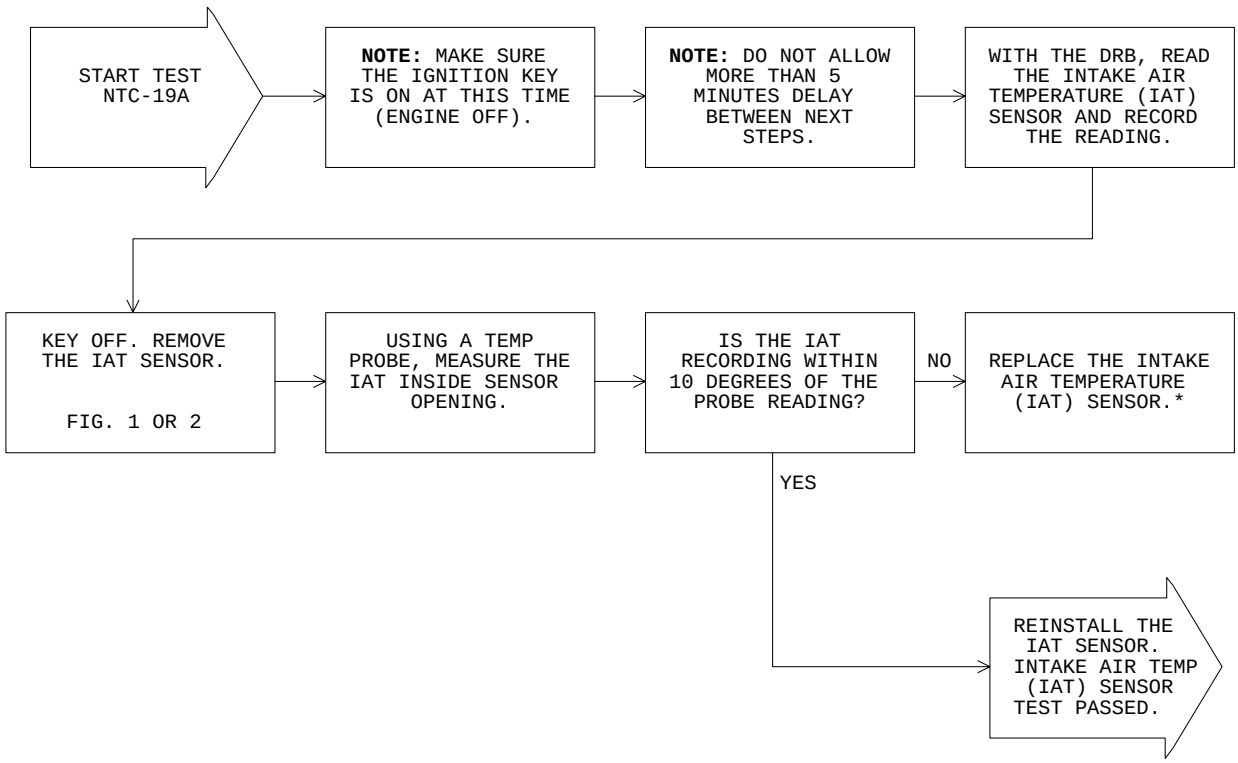


FIG. 2

TEST NTC-19A CHECKING THE INTAKE AIR TEMP SENSOR

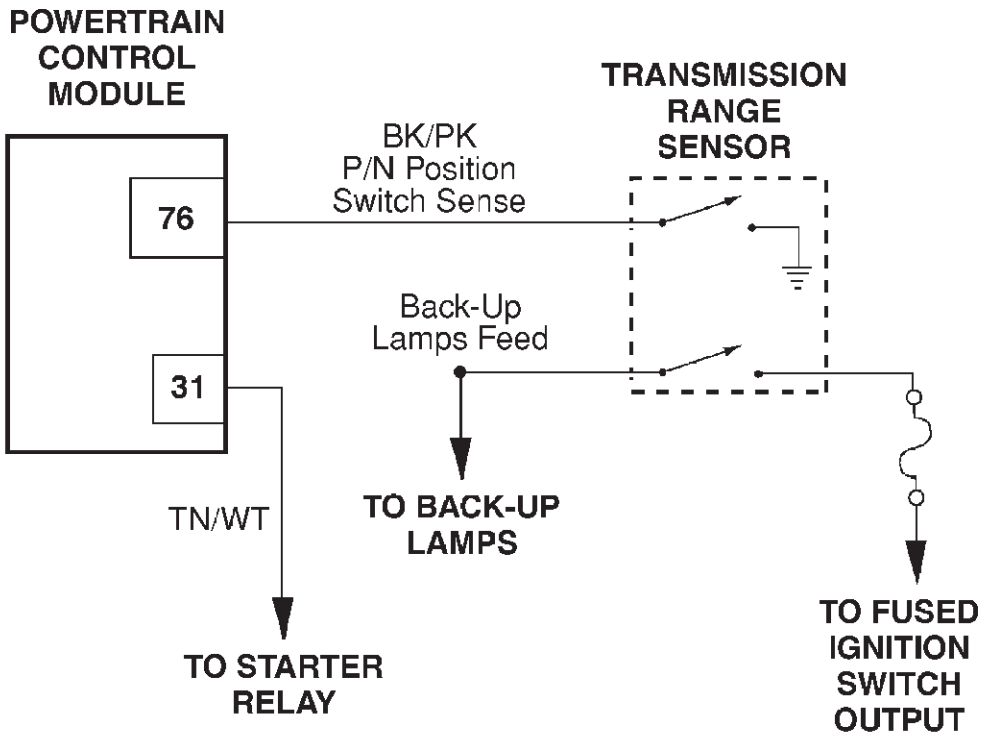
Perform TEST TC-NTC-1A Before Proceeding

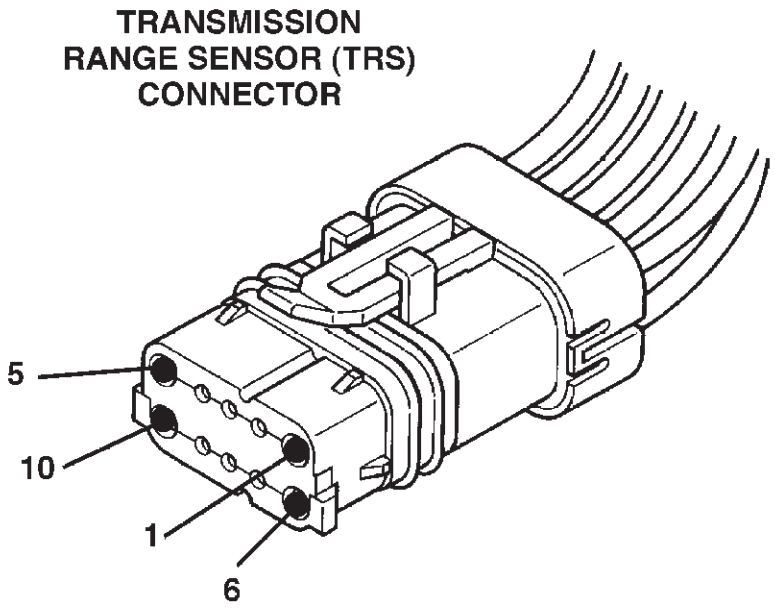


***Perform Verification TEST VER-2A.**	****Check connectors - Clean / repair as necessary.**

TEST NTC-20A **CHECKING - PARK/NEUTRAL SWITCH FAILURE**

Perform TEST NTC-1A Before Proceeding





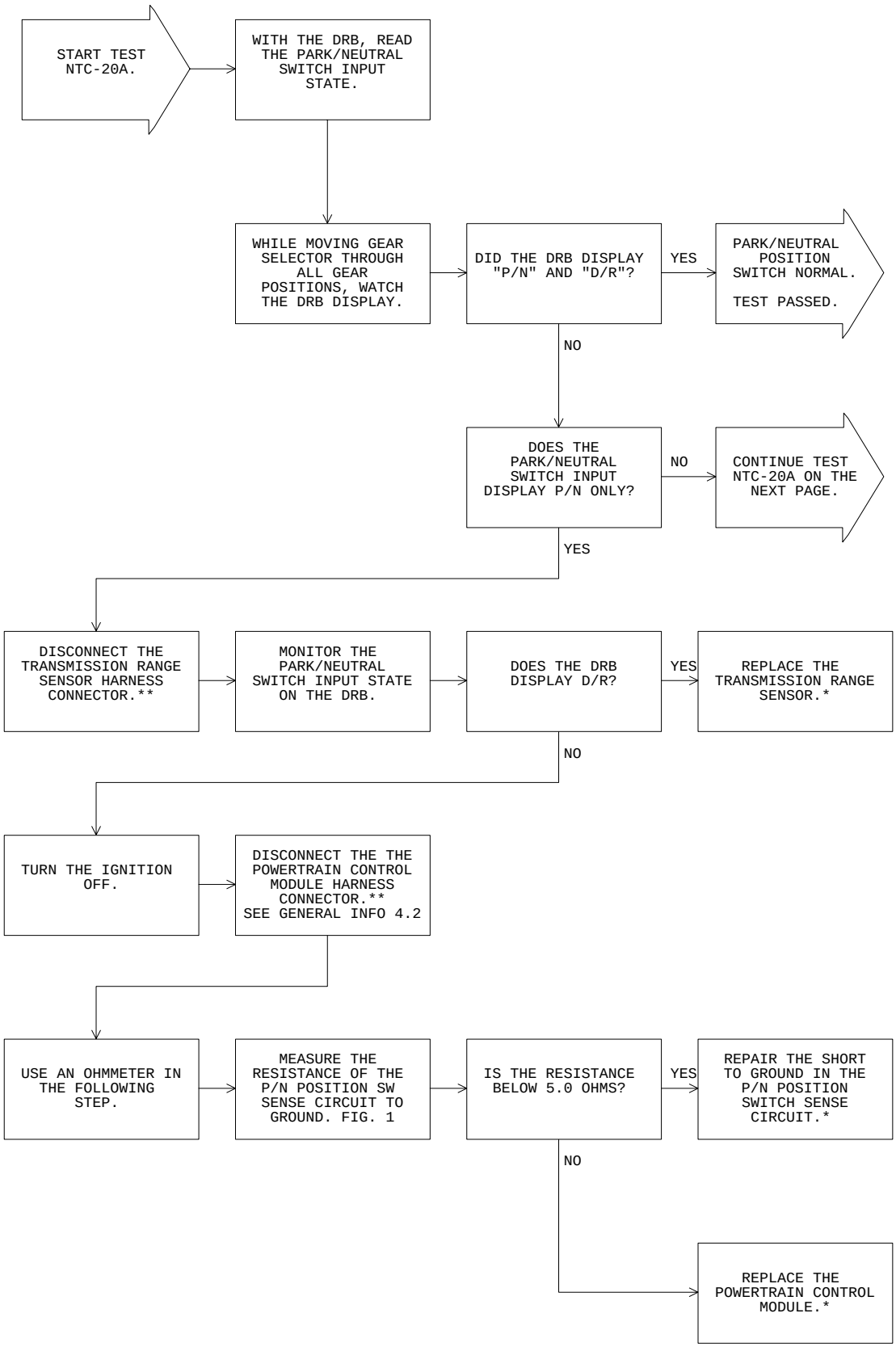
CAV	COLOR	FUNCTION
5	BK/WT	P/N POSITION SWITCH SENSE

80b57443

FIG. 1

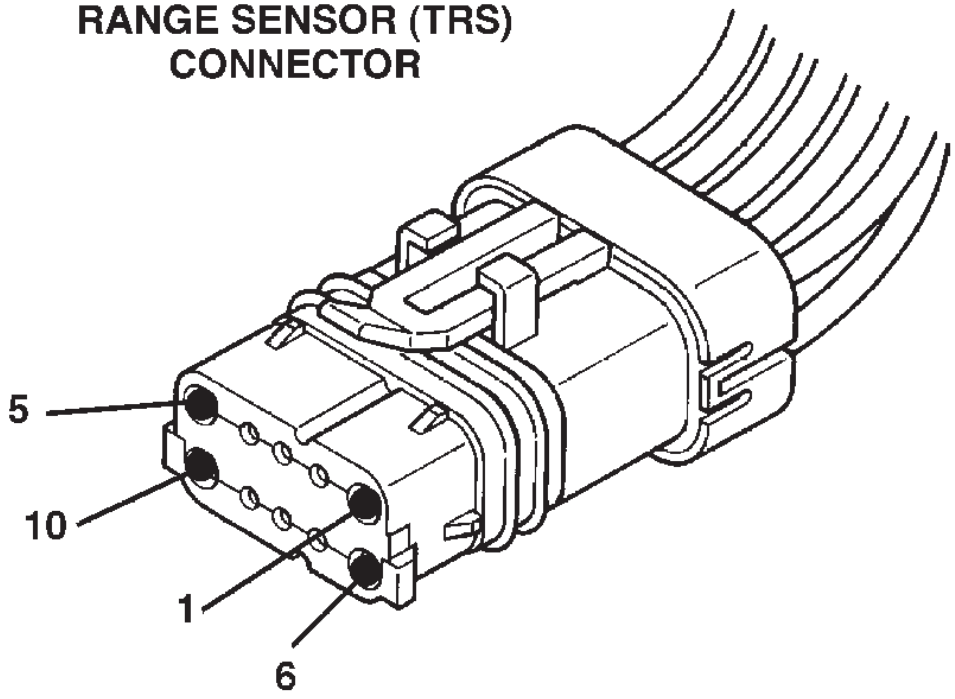
TEST NTC-20A CHECKING - PARK/NEUTRAL SWITCH FAILURE

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

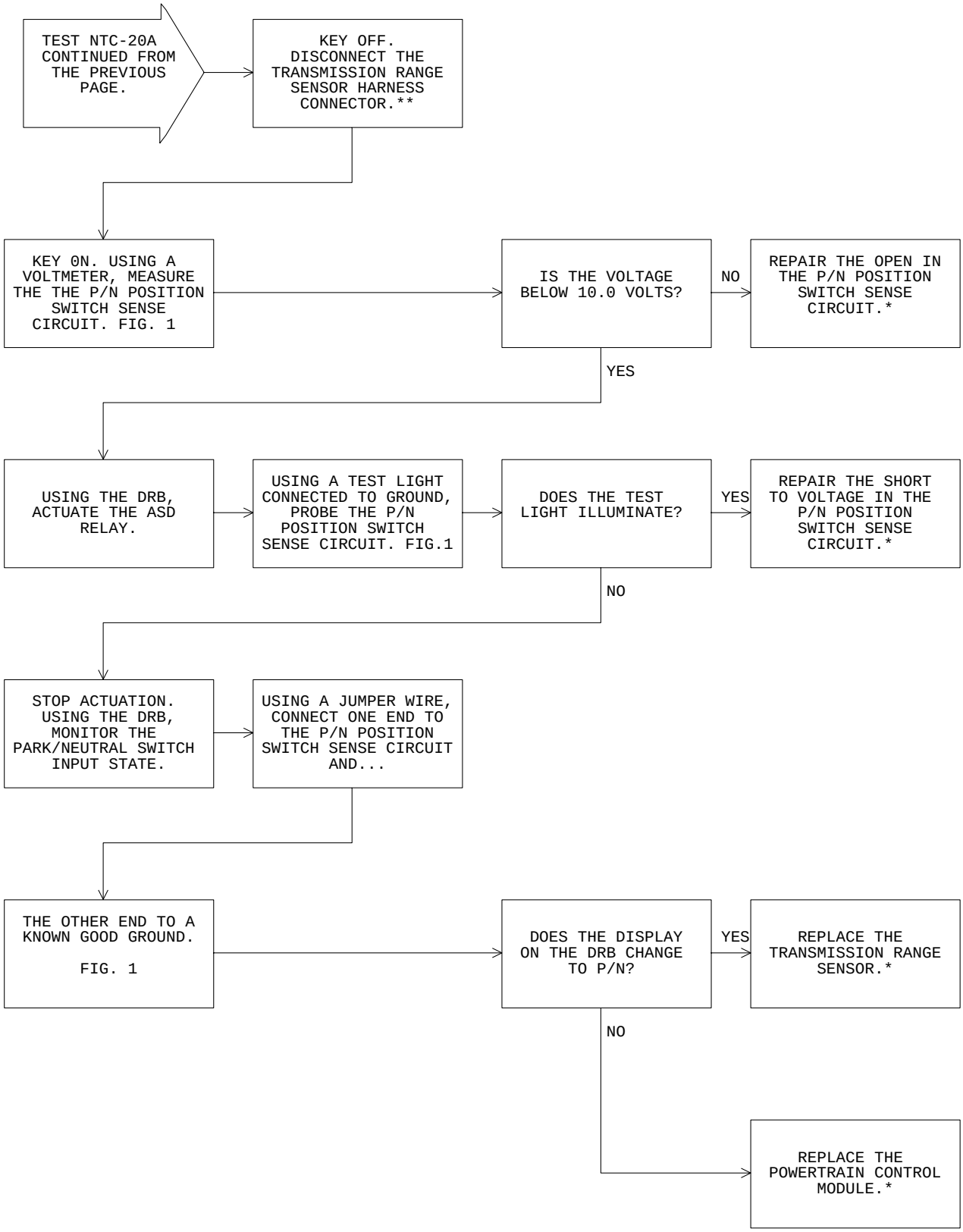


CAV	COLOR	FUNCTION
5	BK/WT	P/N POSITION SWITCH SENSE

80b57443

FIG. 1

TEST NTC-20A CONTINUED - CHECKING THE PARK/NEUTRAL POSITION SWITCH

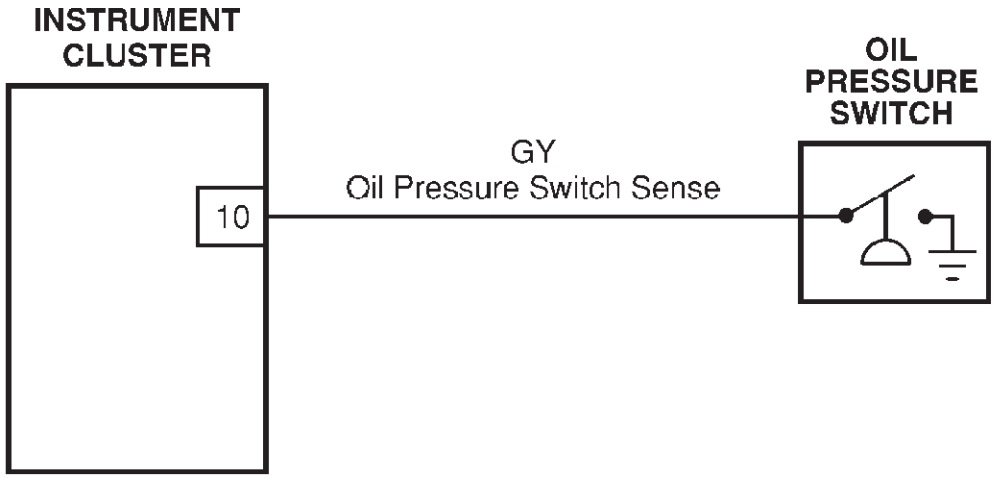


Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST NTC-21A CHECKING OIL PRESSURE SENDING UNIT

Perform TEST NTC-1A Before Proceeding



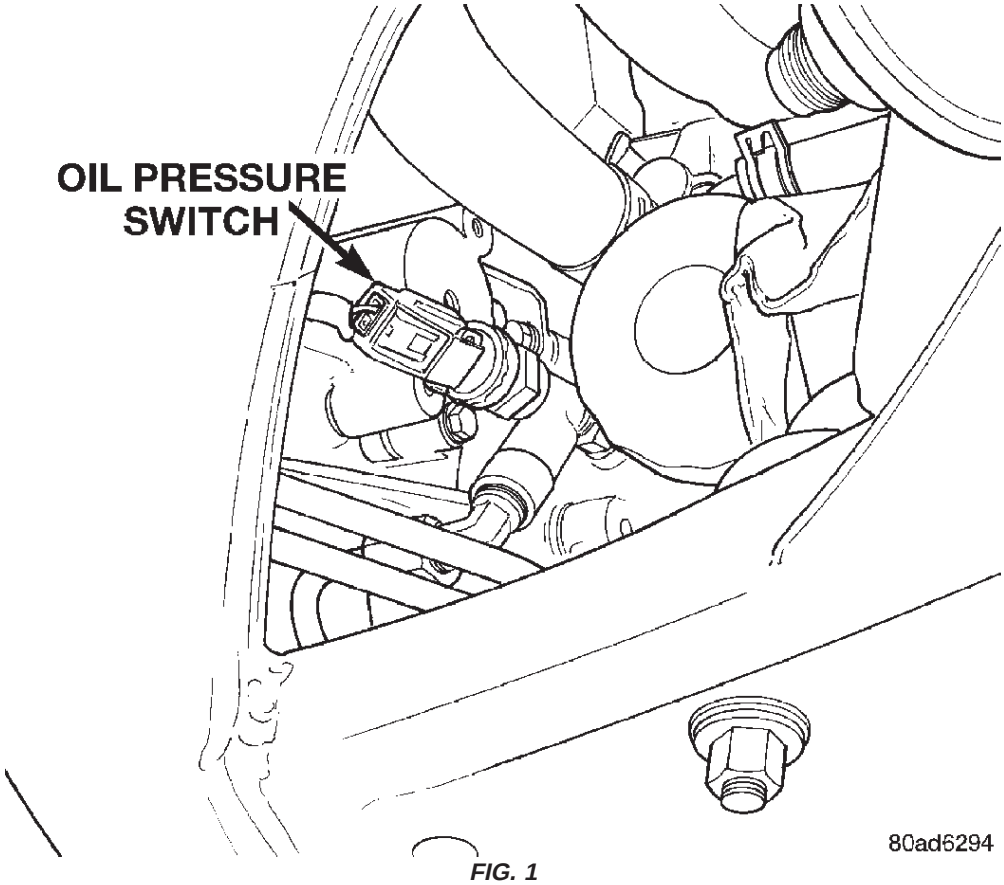
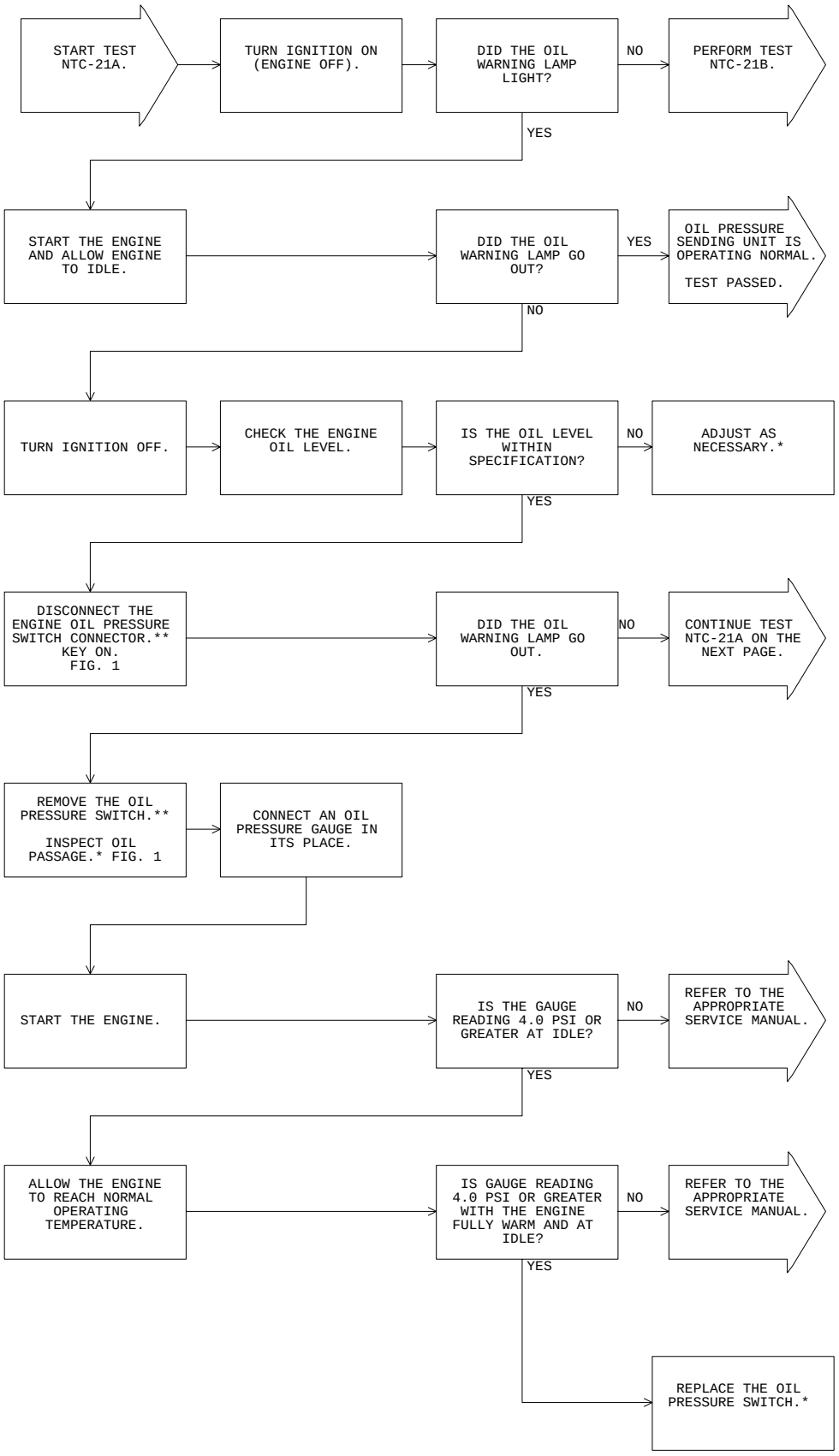


FIG. 1

TEST NTC-21A CHECKING OIL PRESSURE SENDING UNIT

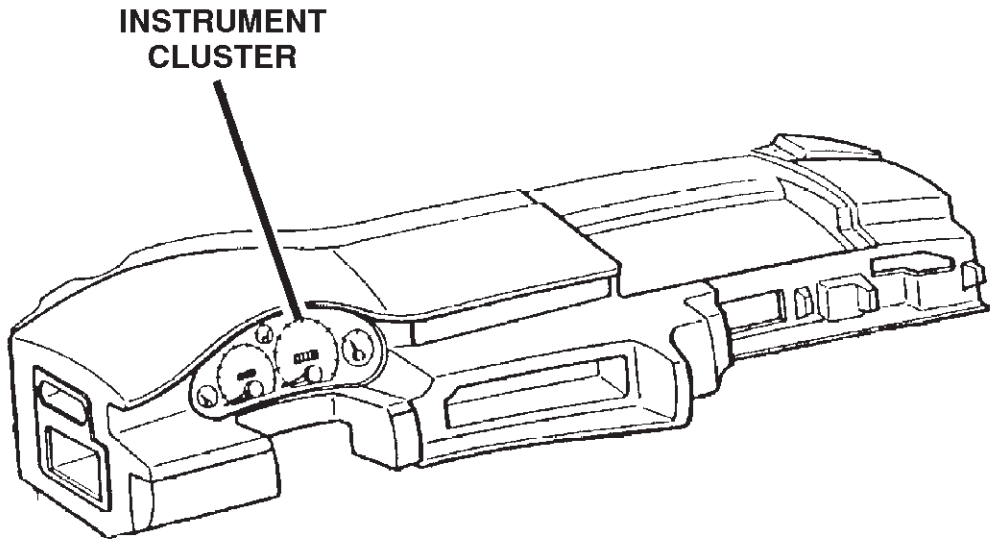
Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

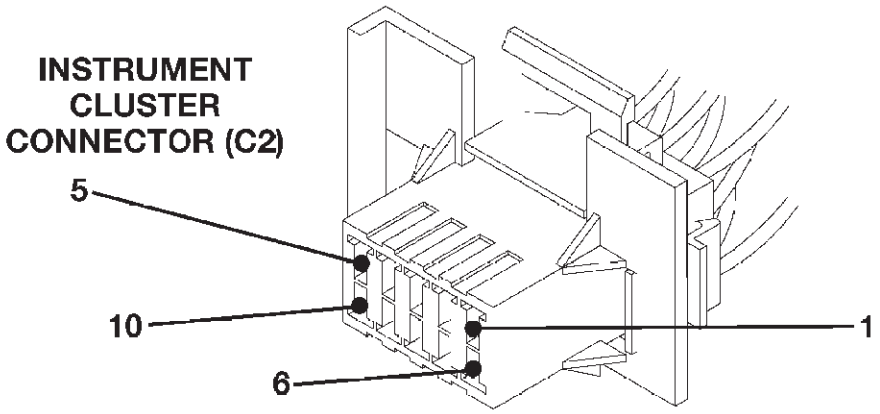
****Check connectors - Clean / repair as necessary.***

TEST NTC-21A CONTINUED - CHECKING OIL PRESSURE SENDING UNIT



0910402

FIG. 1

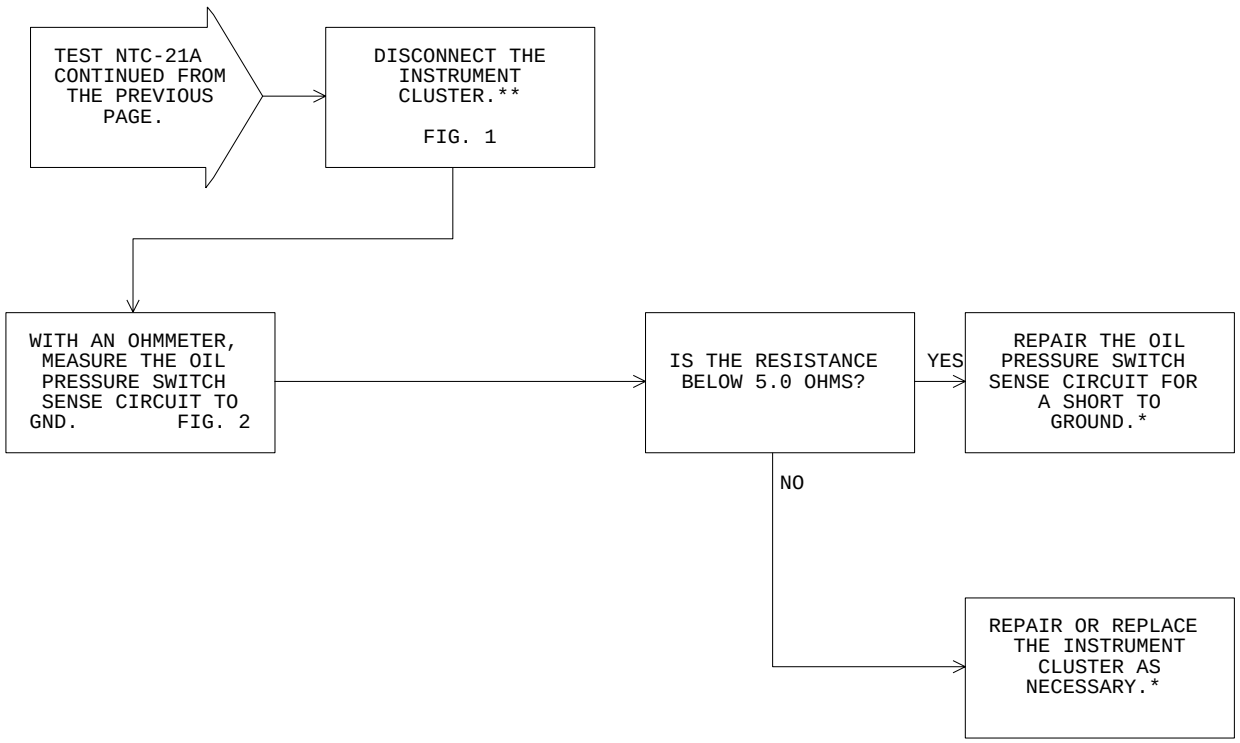


CAV	COLOR	FUNCTION
2	DB/WT	FUSED IGNITION SWITCH OUTPUT
3	GY/BK	RED BRAKE WARNING LAMP DRIVER
4	BK/TN	WASHER FLUID SWITCH SENSE
5	LG	LEFT TURN SIGNAL
6	BK	GROUND
8	RD/YL	TRACTION CONTROL SWITCH SENSE
9	TN/BK	TRUNK AJAR SWITCH SENSE
10	GY	OIL PRESSURE SWITCH SENSE

80b09879

FIG. 2

TEST NTC-21A CONTINUED - CHECKING OIL PRESSURE SENDING UNIT

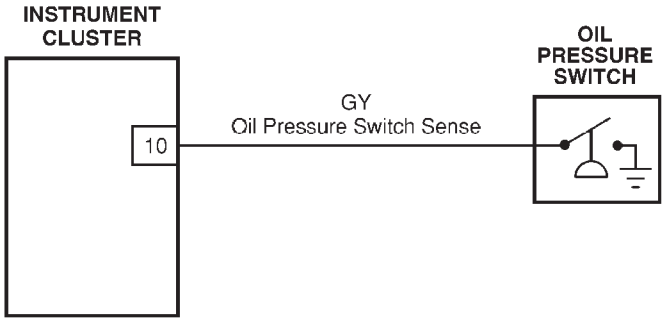


***Perform Verification TEST VER-2A.**

****Check connectors - Clean / repair as necessary.**

TEST NTC-21B CHECKING OIL PRESSURE SENDING UNIT

Perform TEST NTC-21A Before Proceeding



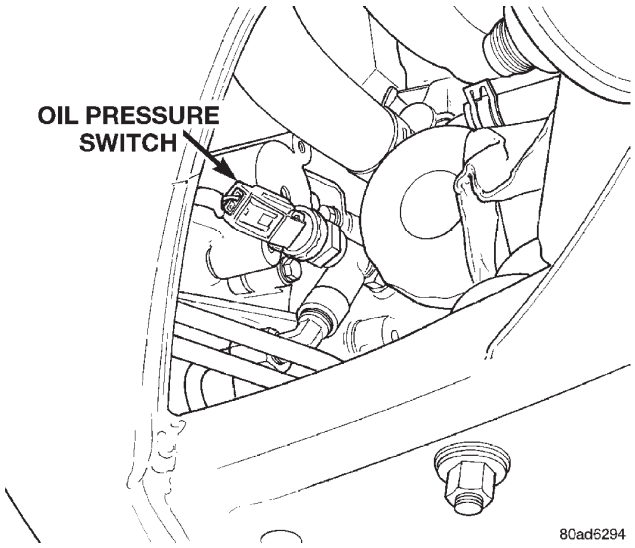
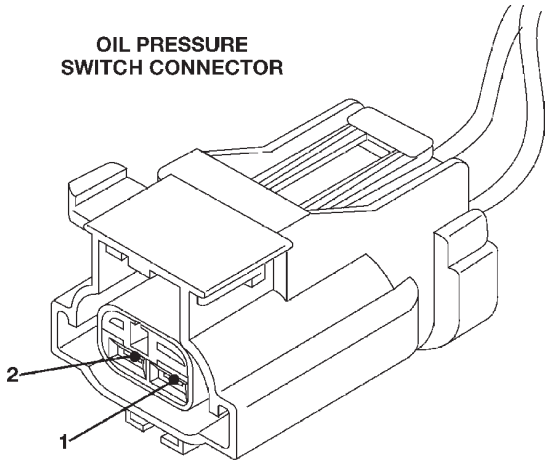


FIG. 1



CAV	COLOR	FUNCTION
1	GY	OIL PRESSURE SWITCH SIGNAL

80b09877

FIG. 2

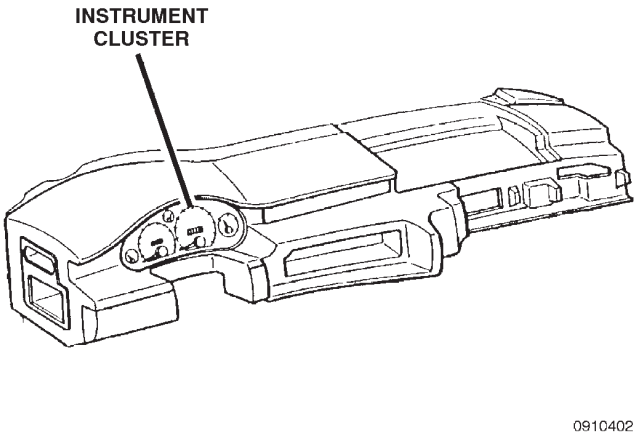
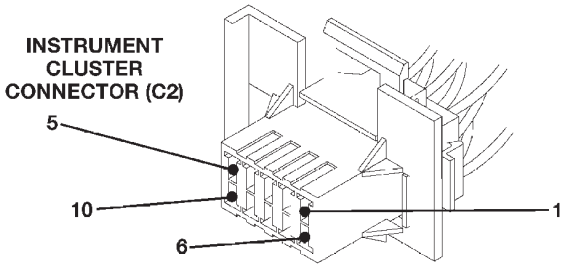


FIG. 3



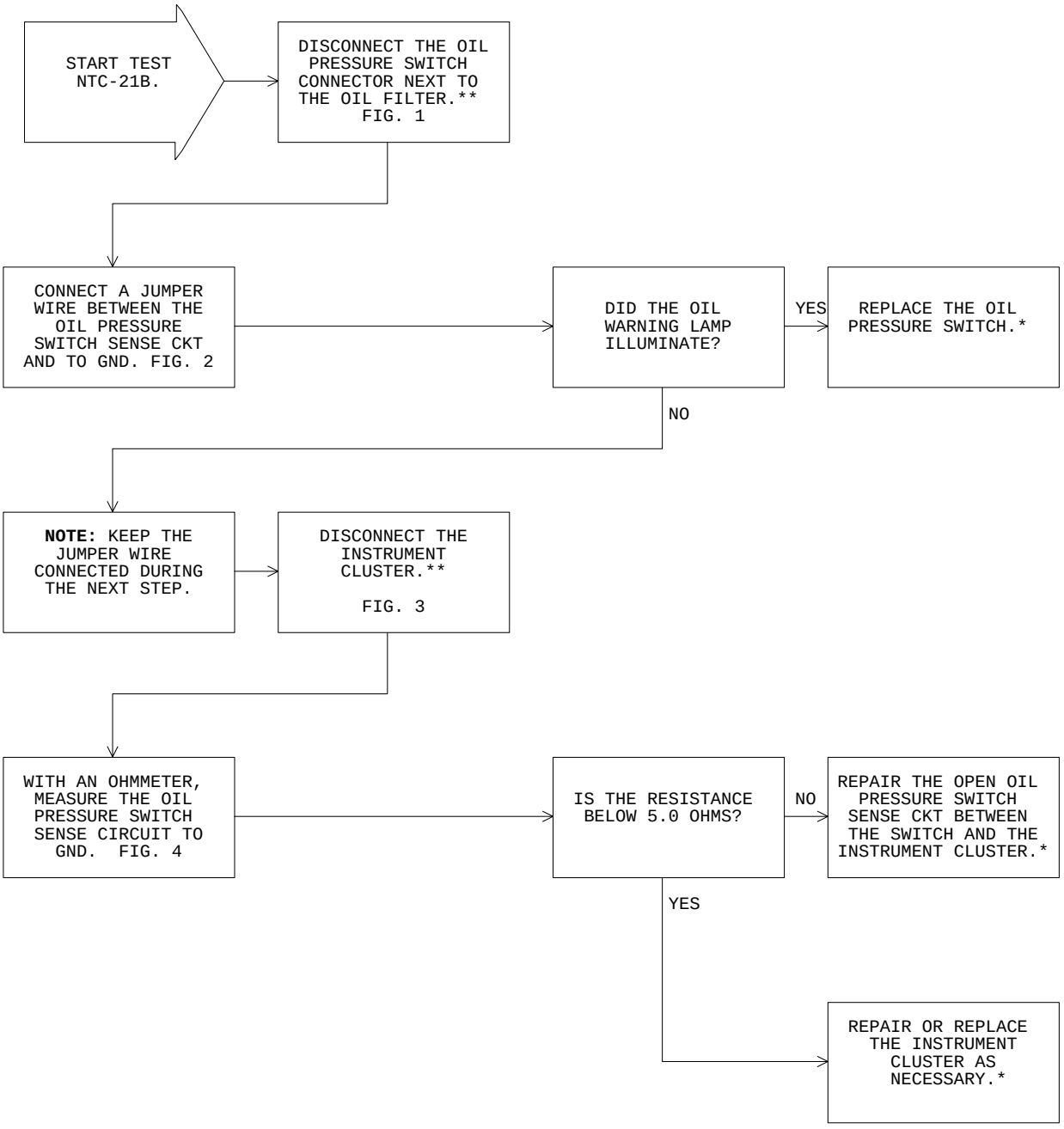
CAV	COLOR	FUNCTION
2	DB/WT	FUSED IGNITION SWITCH OUTPUT
3	GY/BK	RED BRAKE WARNING LAMP DRIVER
4	BK/TN	WASHER FLUID SWITCH SENSE
5	LG	LEFT TURN SIGNAL
6	BK	GROUND
8	RD/YL	TRACTION CONTROL SWITCH SENSE
9	TN/BK	TRUNK AJAR SWITCH SENSE
10	GY	OIL PRESSURE SWITCH SENSE

80b09879

FIG. 4

TEST NTC-21B CHECKING OIL PRESSURE SENDING UNIT

Perform TEST NTC-21A Before Proceeding

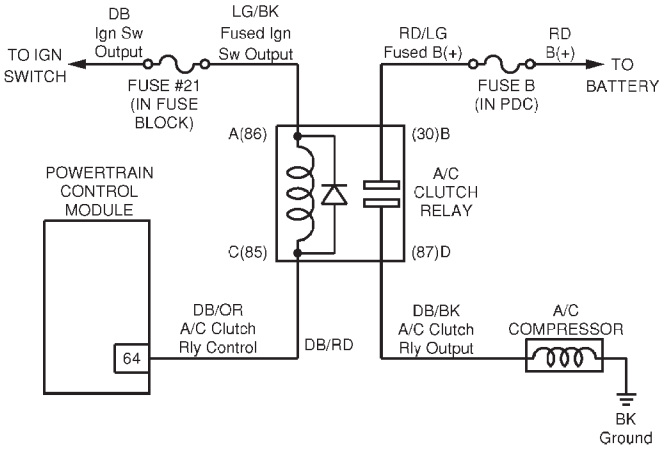


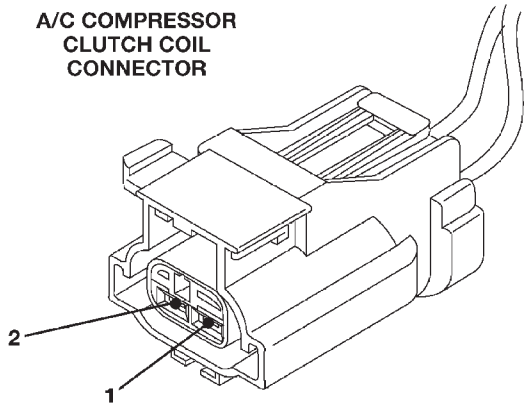
Perform Verification TEST VER-2A.

Check connectors - Clean / repair as necessary.

TEST NTC-26A CHECKING THE A/C SYSTEM

Perform TEST NTC-1A Before Proceeding

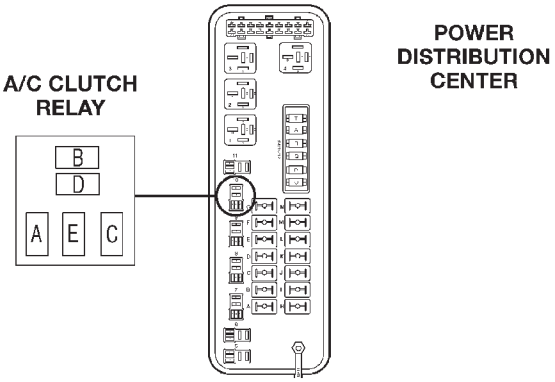




CAV	COLOR	FUNCTION
1	DB/BK	A/C CMP CLUTCH RELAY OUTPUT
2	BK	GROUND

FIG. 1

80b29f37



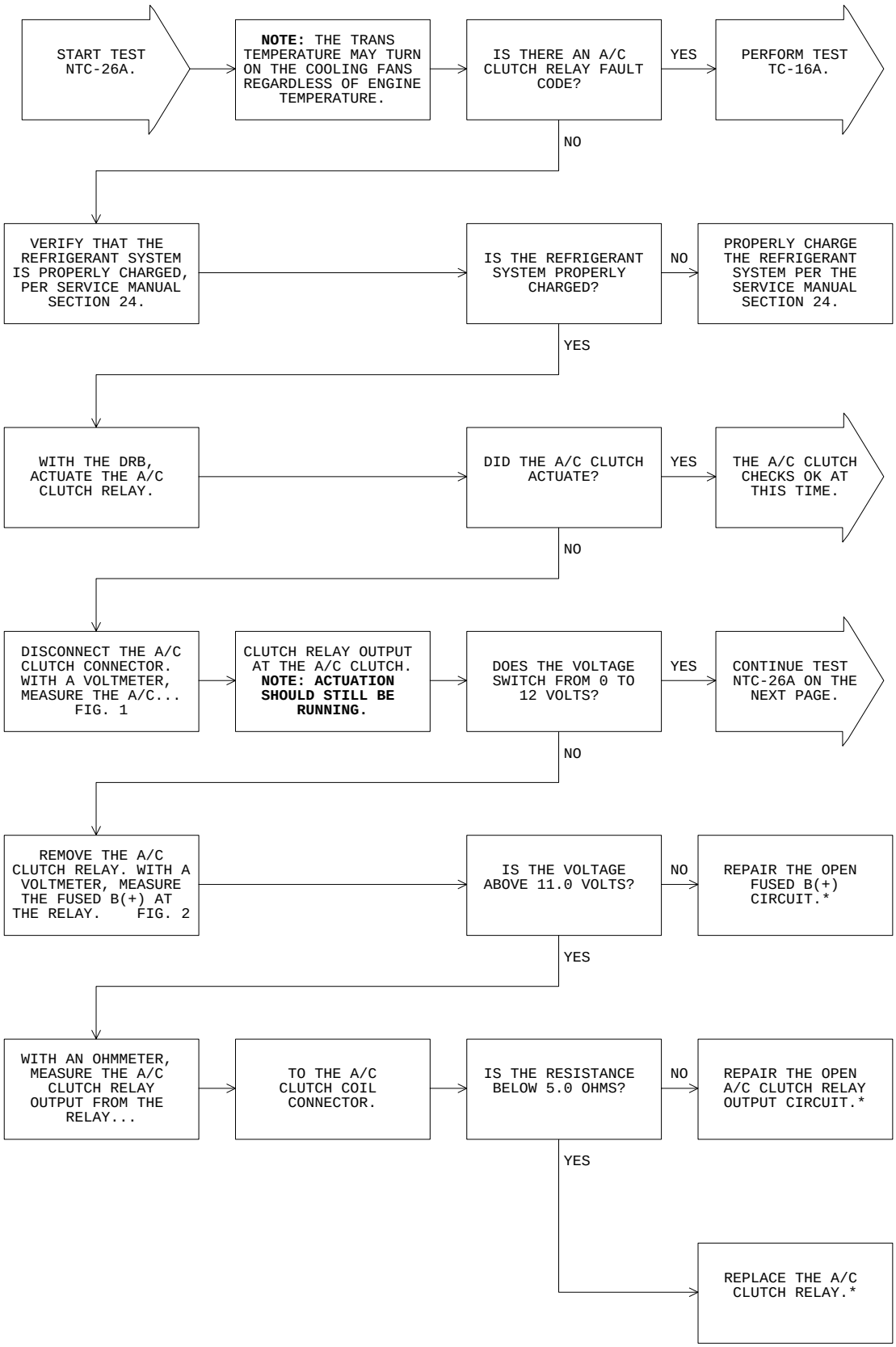
CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/OR	A/C COMP CLUTCH RELAY CONTROL
D (87)	DB/BK	A/C CLUTCH RELAY OUTPUT

FIG. 2

80b4fb2e

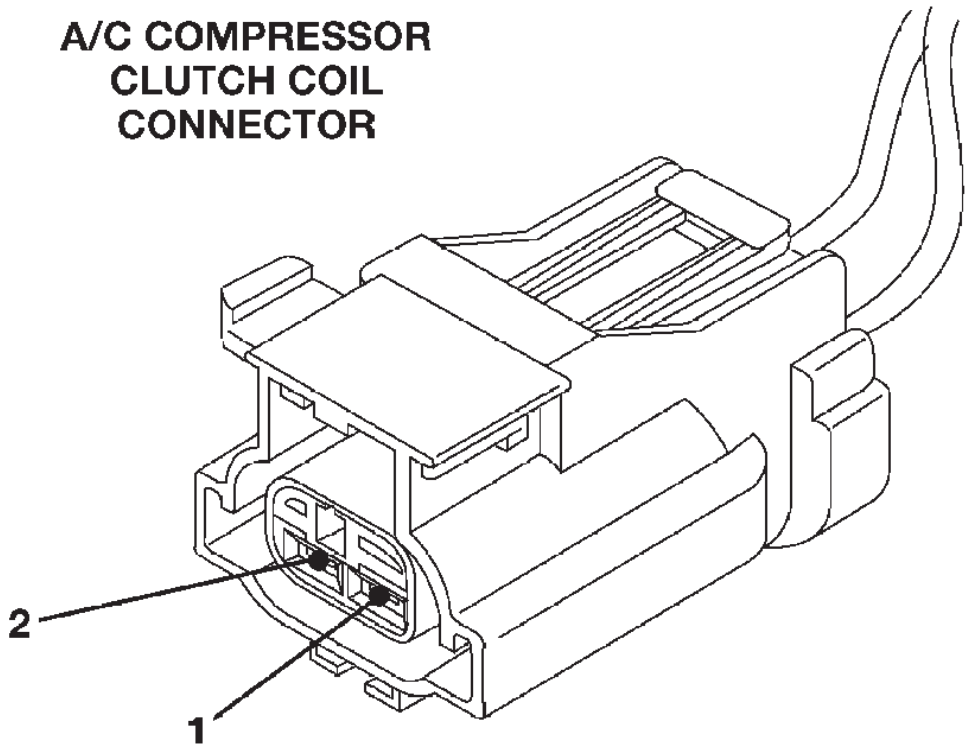
TEST NTC-26A CHECKING THE A/C SYSTEM

Perform TEST NTC-1A Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

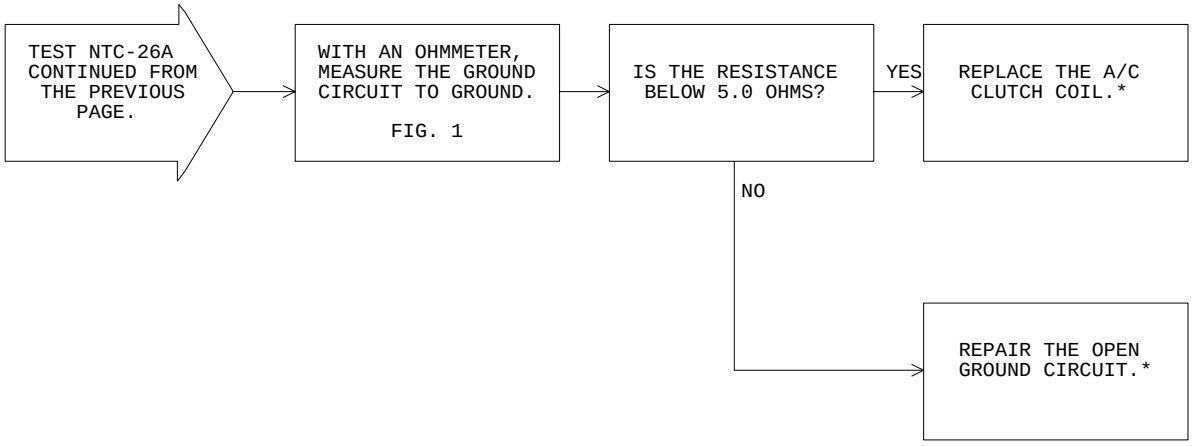


CAV	COLOR	FUNCTION
1	DB/BK	A/C CMP CLUTCH RELAY OUTPUT
2	BK	GROUND

80b29f37

FIG. 1

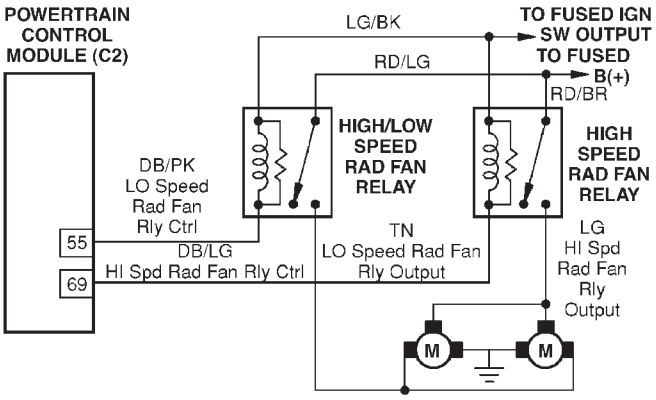
TEST NTC-26A CONTINUED - CHECKING THE A/C SYSTEM

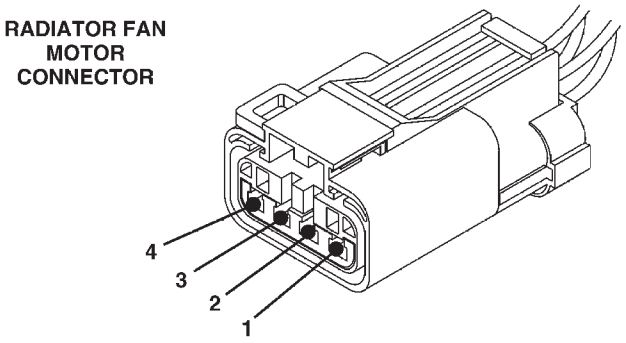


***Perform Verification TEST VER-2A.** | ***Check connectors - Clean / repair as necessary.**

TEST NTC-27A CHECKING RADIATOR FANS

Perform TEST NTC-1A Before Proceeding

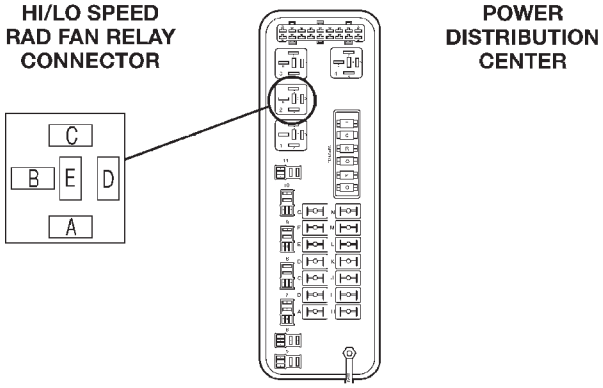




CAV	COLOR	FUNCTION
1	BK	GROUND
2	BK	GROUND
3	TN	LO SPEED RAD FAN RELAY OUTPUT
4	LG	HI SPEED RAD FAN RELAY OUTPUT

80b2b622

FIG. 1



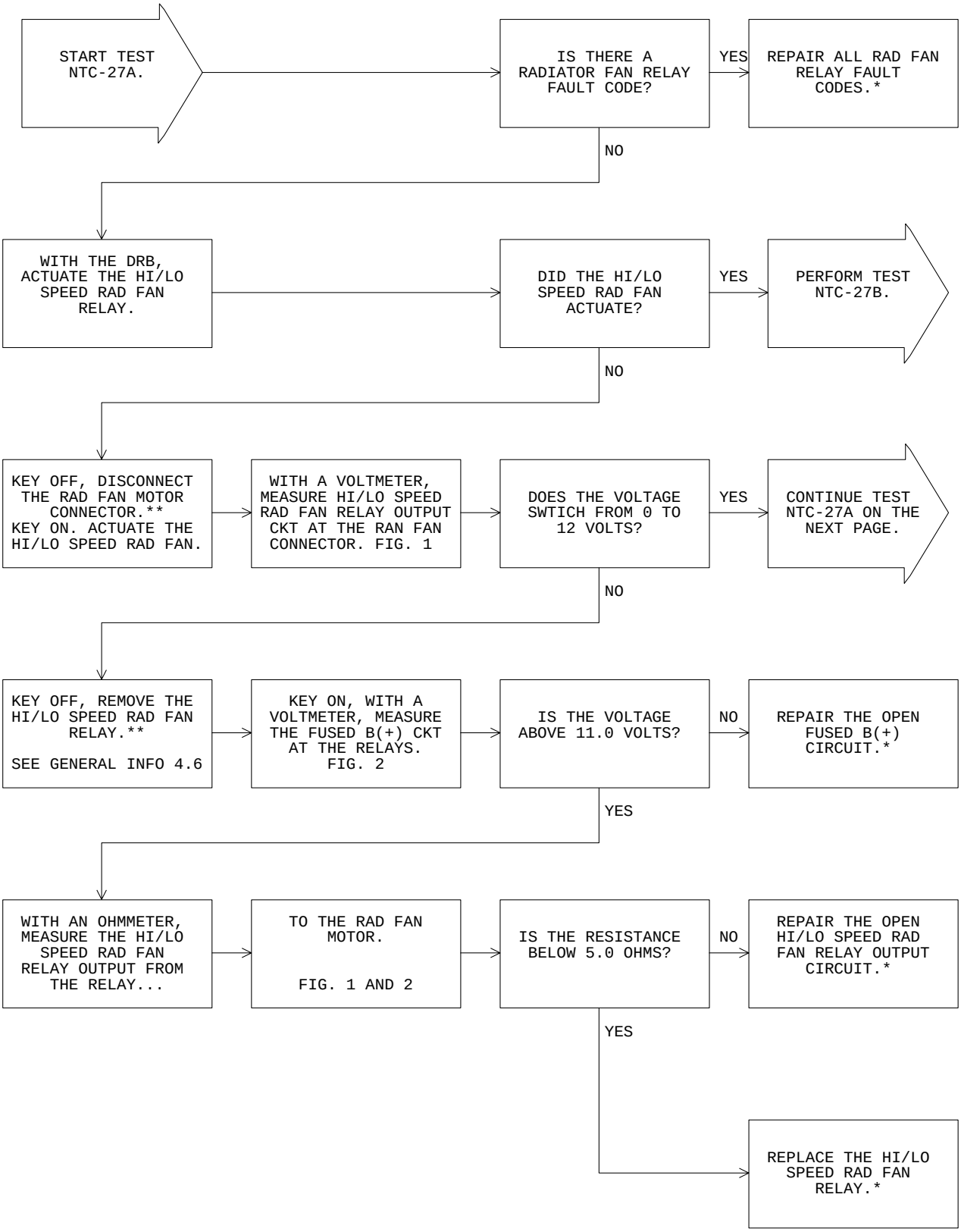
CAV	COLOR	FUNCTION
A (86)	LG/BK	FUSED IGNITION SWITCH OUTPUT
B (30)	RD/LG	FUSED B(+)
C (85)	DB/PK	LO SPEED RAD FAN RELAY CONTROL
D (87)	TN	LO SPEED RAD FAN RELAY OUTPUT

80b46bf8

FIG. 2

TEST NTC-27A CHECKING RADIATOR FANS

Perform TEST NTC-1A Before Proceeding

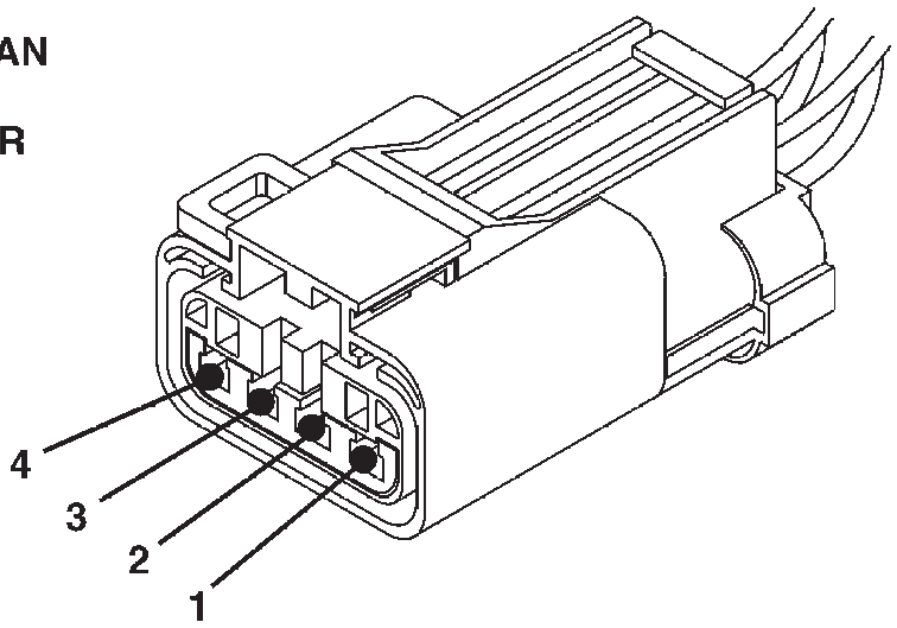


Perform Verification TEST VER-2A.

****Check connectors - Clean / repair as necessary.***

TEST NTC-27A CONTINUED - CHECKING RADIATOR FAN OPERATION

RADIATOR FAN MOTOR CONNECTOR

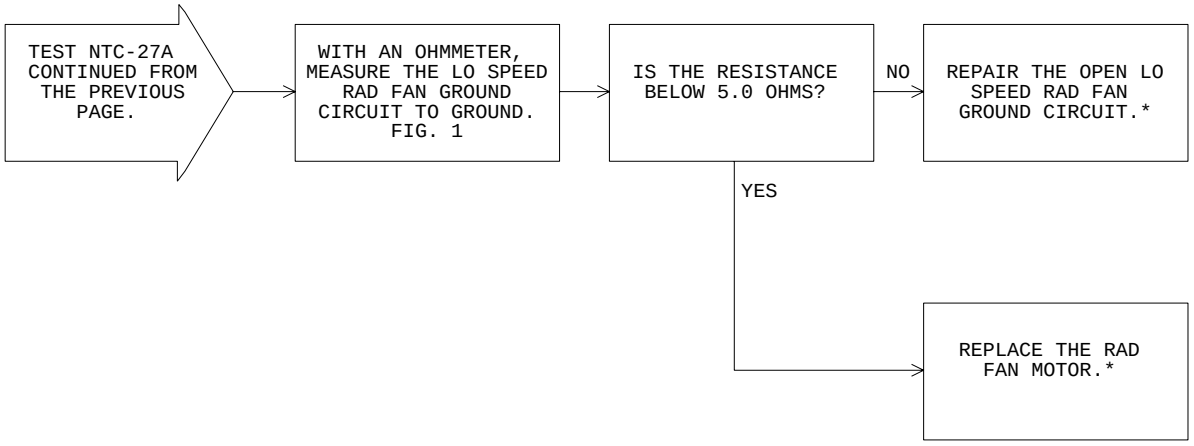


CAV	COLOR	FUNCTION
1	BK	GROUND
2	BK	GROUND
3	TN	LO SPEED RAD FAN RELAY OUTPUT
4	LG	HI SPEED RAD FAN RELAY OUTPUT

80b2b622

FIG. 1

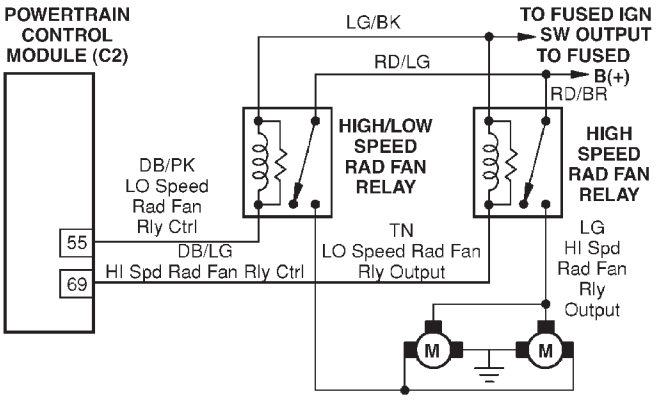
TEST NTC-27A CONTINUED - CHECKING RADIATOR FAN OPERATION

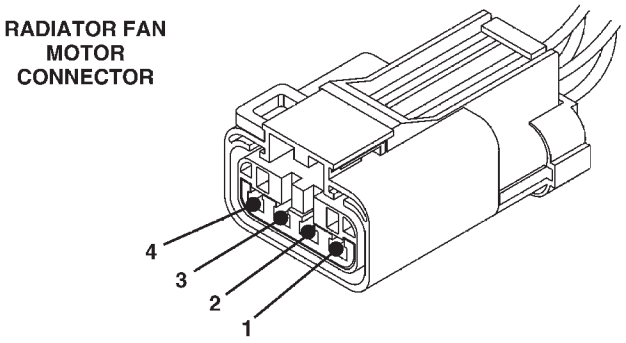


**Perform Verification TEST VER-2A.* | ***Check connectors - Clean / repair as necessary.*

TEST NTC-27B CHECKING RADIATOR FANS

Perform TEST NTC-27A Before Proceeding

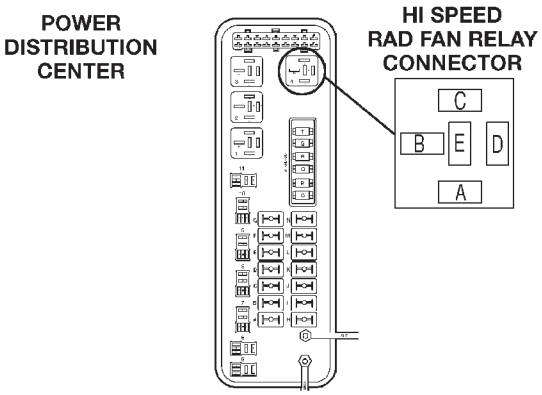




CAV	COLOR	FUNCTION
1	BK	GROUND
2	BK	GROUND
3	TN	LO SPEED RAD FAN RELAY OUTPUT
4	LG	HI SPEED RAD FAN RELAY OUTPUT

80b2b622

FIG. 1

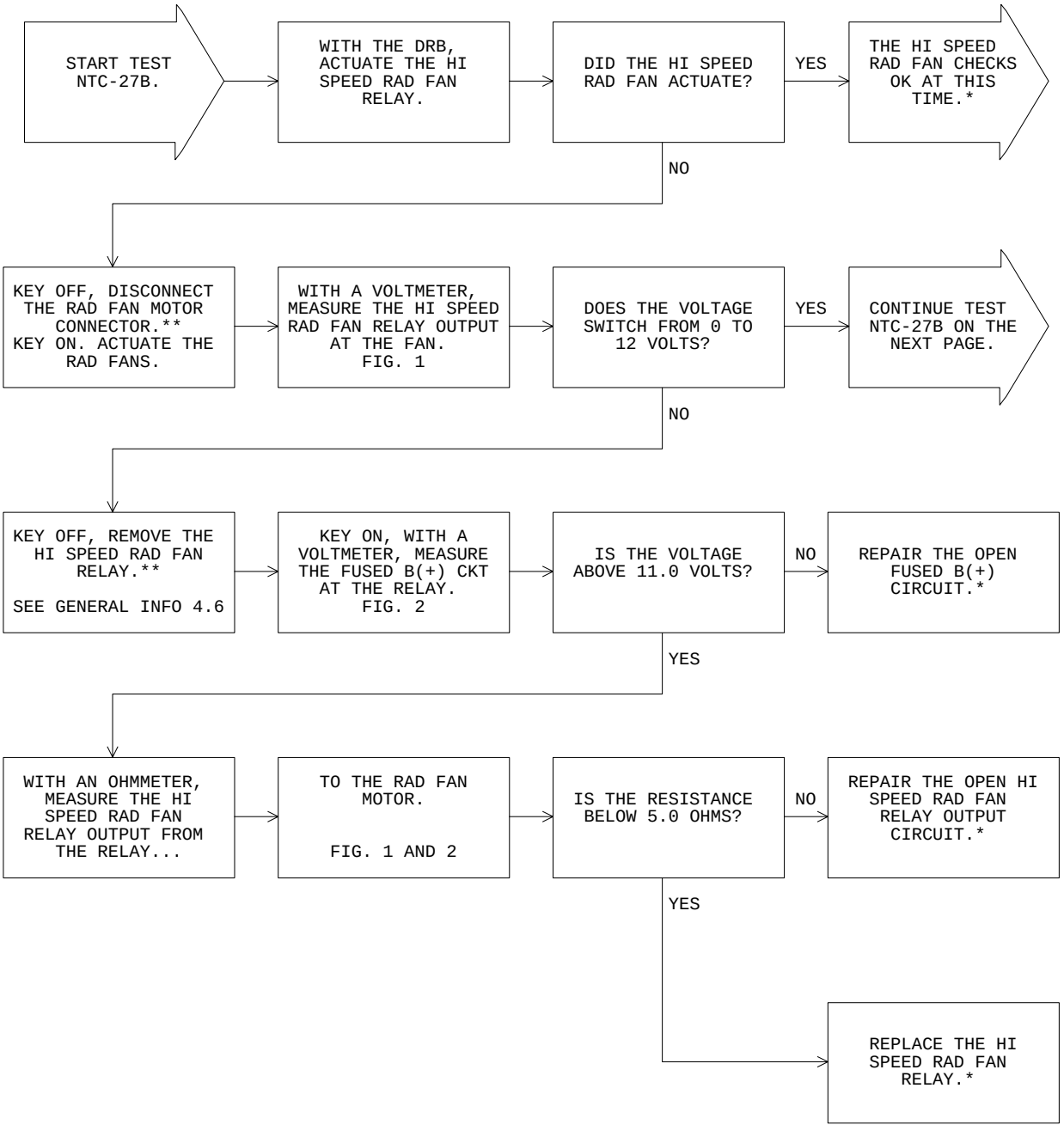


CAV	COLOR	FUNCTION
A	LG/BK	FUSED IGNITION SWITCH OUTPUT
B	RD/BR	FUSED B(+)
C	DB/LG	HI SPEED RAD FAN RELAY CONTROL
D	LG	HI SPEED RAD FAN RELAY OUTPUT

FIG. 2

TEST NTC-27B CHECKING RADIATOR FANS

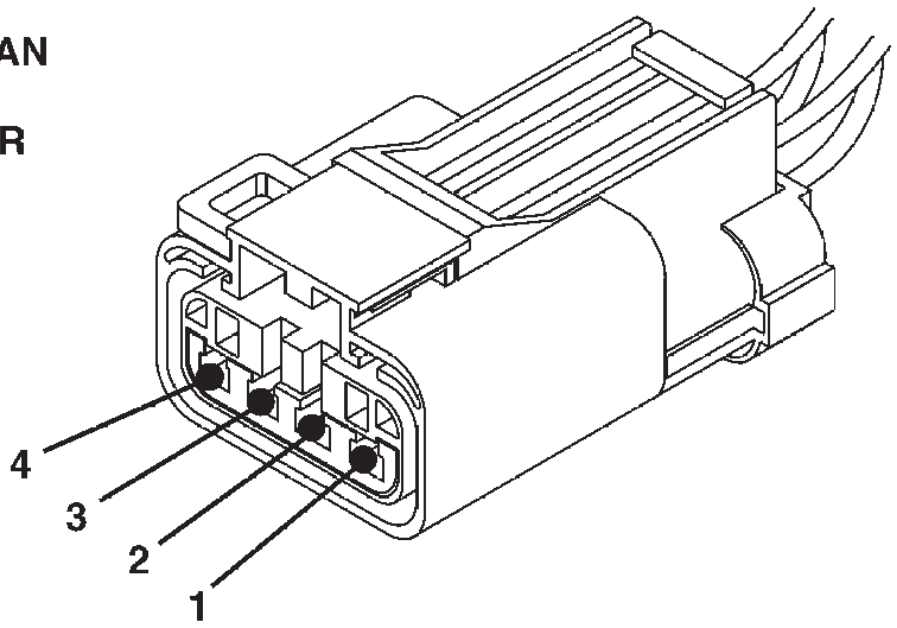
Perform TEST NTC-27A Before Proceeding



Perform Verification TEST VER-2A.

***Check connectors - Clean / repair as necessary.**

RADIATOR FAN MOTOR CONNECTOR

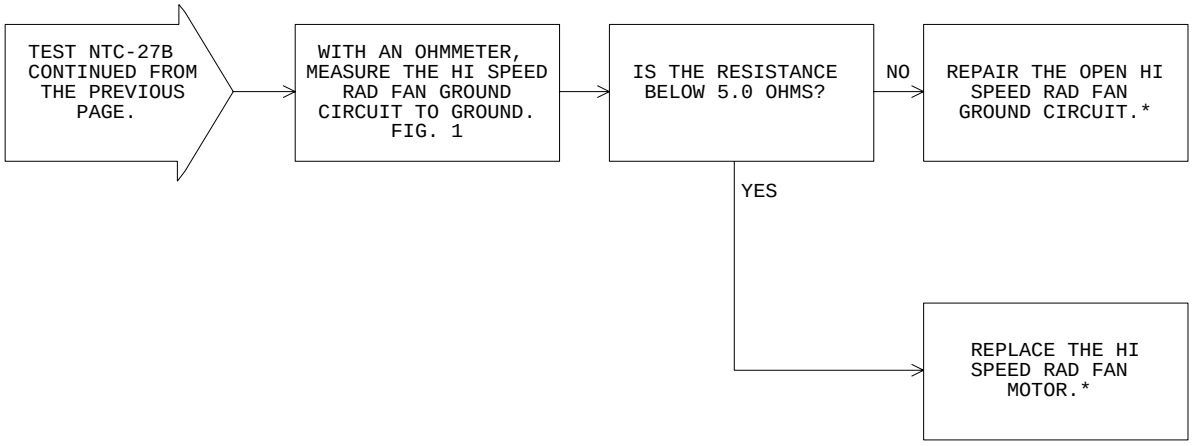


CAV	COLOR	FUNCTION
1	BK	GROUND
2	BK	GROUND
3	TN	LO SPEED RAD FAN RELAY OUTPUT
4	LG	HI SPEED RAD FAN RELAY OUTPUT

80b2b622

FIG. 1

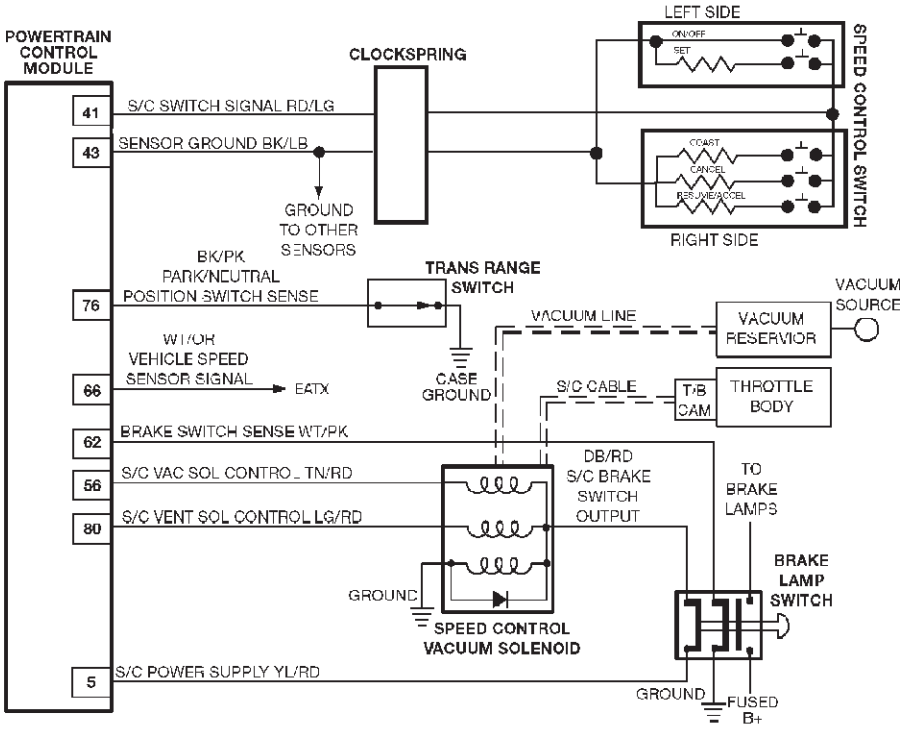
TEST NTC-27B CONTINUED - CHECKING RADIATOR FANS



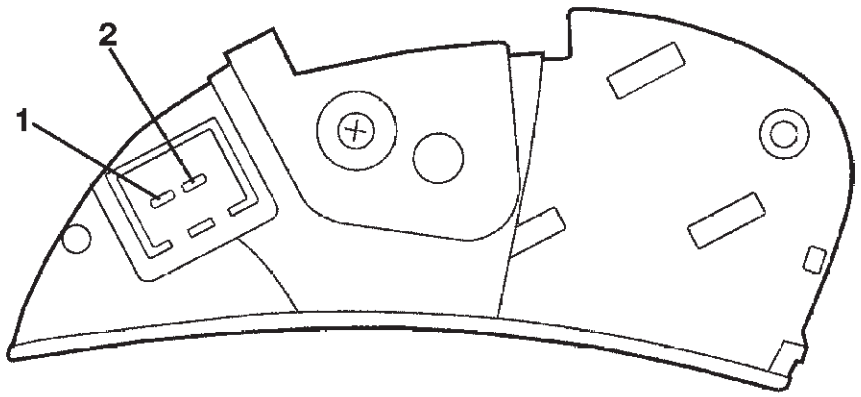
**Perform Verification TEST VER-2A.* | ***Check connectors - Clean / repair as necessary.*

TEST SC-1A CHECKING SPEED CONTROL OPERATION

Perform TEST DTC Before Proceeding



80b4fab1

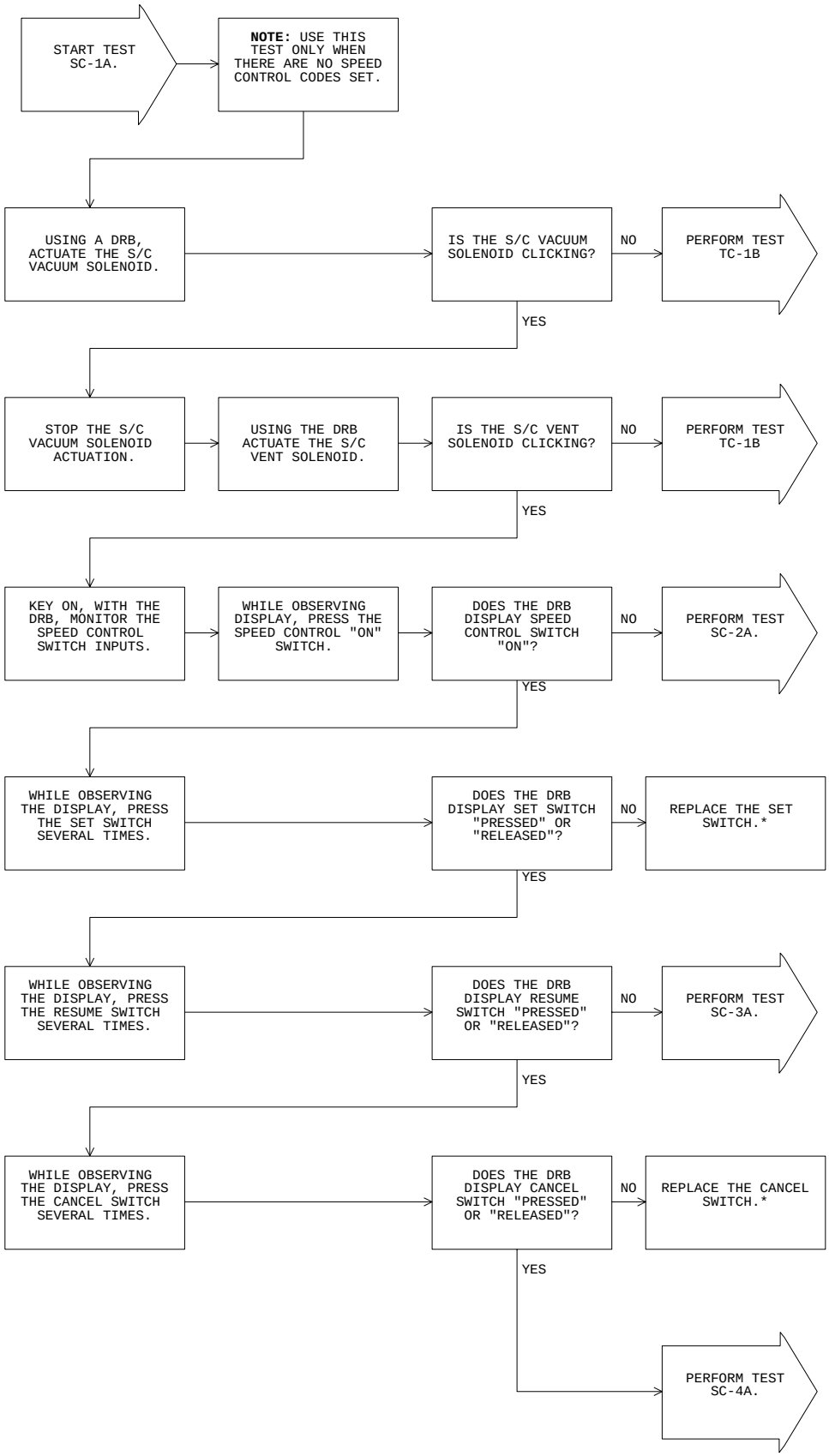


SWITCH POSITION	RESISTANCE BETWEEN PINS 1 AND 2
CANCEL	909 ohms +/- 9 ohms
SET	6650 ohms +/- 66 ohms
ACCEL/RESUME	15,400 ohms +/- 154 ohms
ON/OFF	0 ohms (close circuit)
COAST	2940 ohms +/- 29 ohms

80b0d783

TEST SC-1A CHECKING SPEED CONTROL OPERATION

Perform TEST DTC Before Proceeding



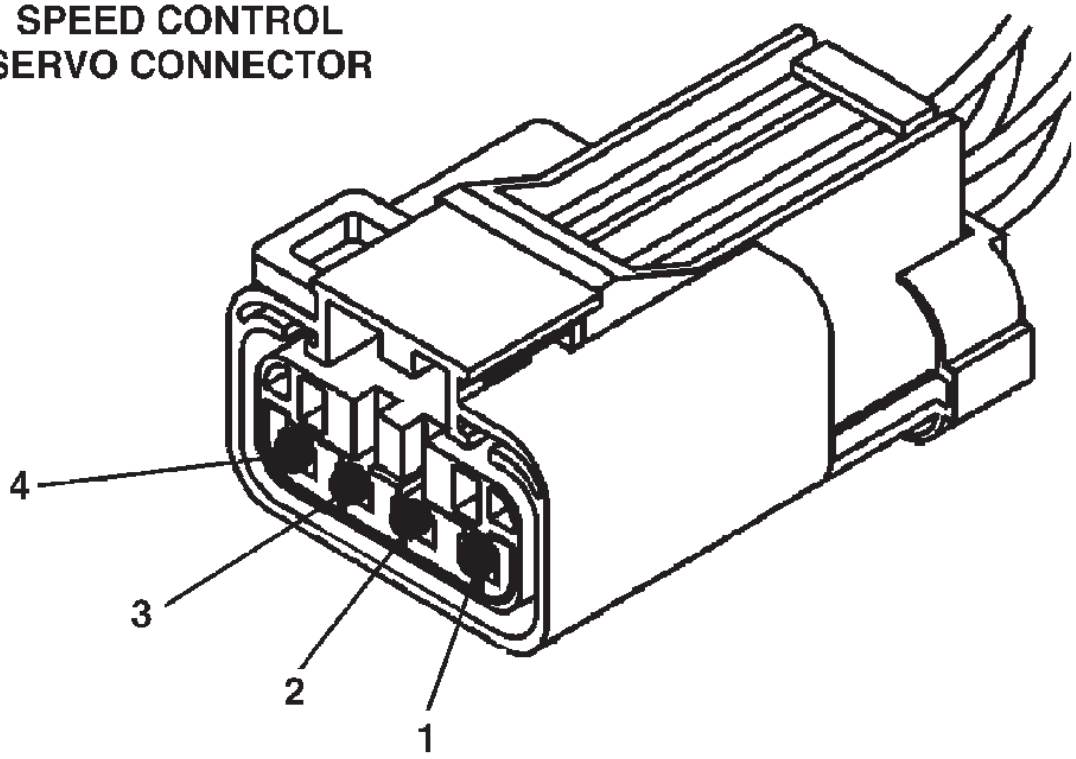
***Perform Verification TEST VER-4A.**

****Check connectors - Clean / repair as necessary.**

TEST SC-1B CHECKING SPEED CONTROL OPERATION

Perform TEST SC-1A Before Proceeding

SPEED CONTROL SERVO CONNECTOR



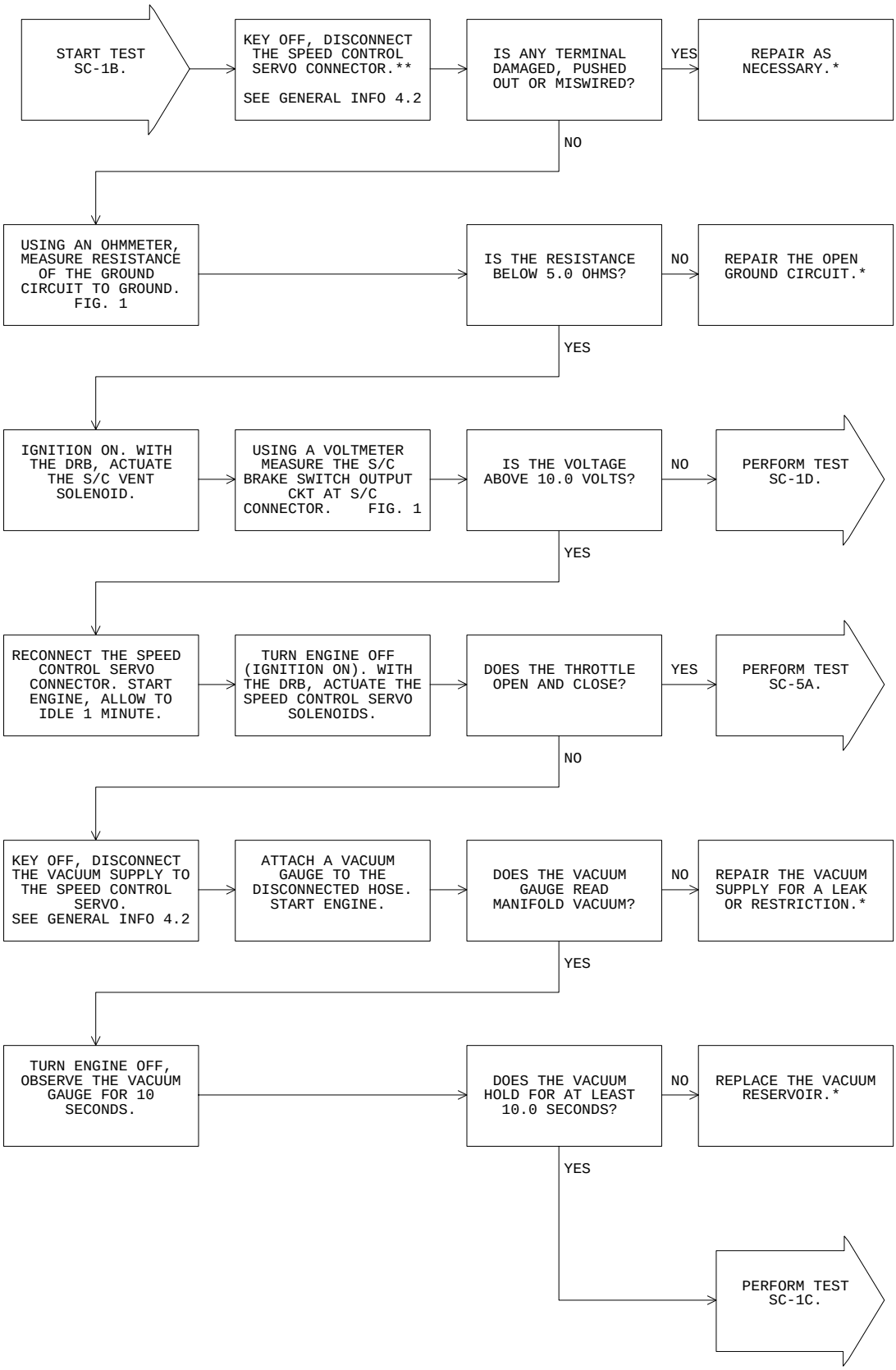
CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1

TEST SC-1B CHECKING SPEED CONTROL OPERATION

Perform TEST SC-1A Before Proceeding



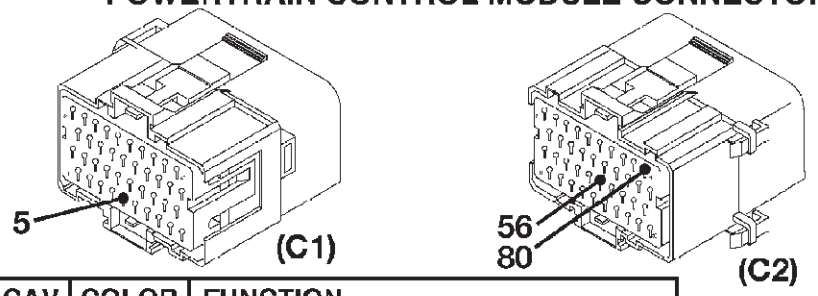
Perform Verification TEST VER-4A.

***Check connectors - Clean / repair as necessary.**

TEST SC-1C CHECKING SPEED CONTROL OPERATION

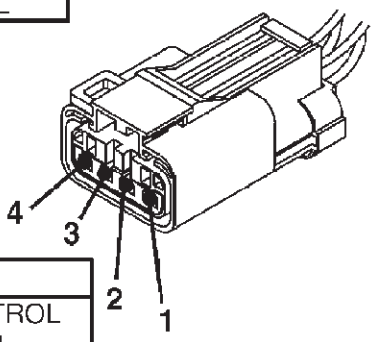
Perform TEST SC-1A Before Proceeding

POWERTRAIN CONTROL MODULE CONNECTORS



CAV	COLOR	FUNCTION
5	YL/RD	SPEED CONTROL POWER SUPPLY
56	TN/RD	S/C VACUUM SOLENOID CONTROL
80	LG/RD	S/C VENT SOLENOID CONTROL

SPEED CONTROL SERVO CONNECTOR

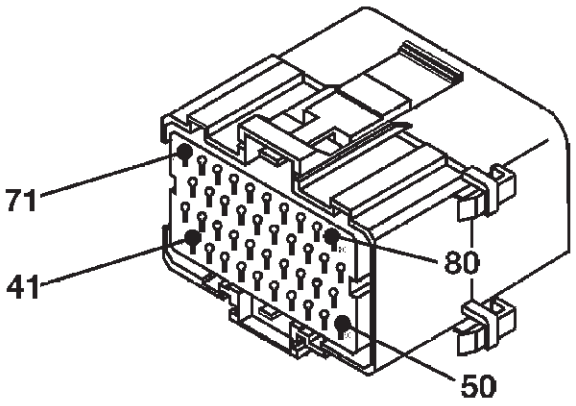


CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84e

FIG. 1

POWERTRAIN CONTROL MODULE "C2" CONNECTOR (GREY)



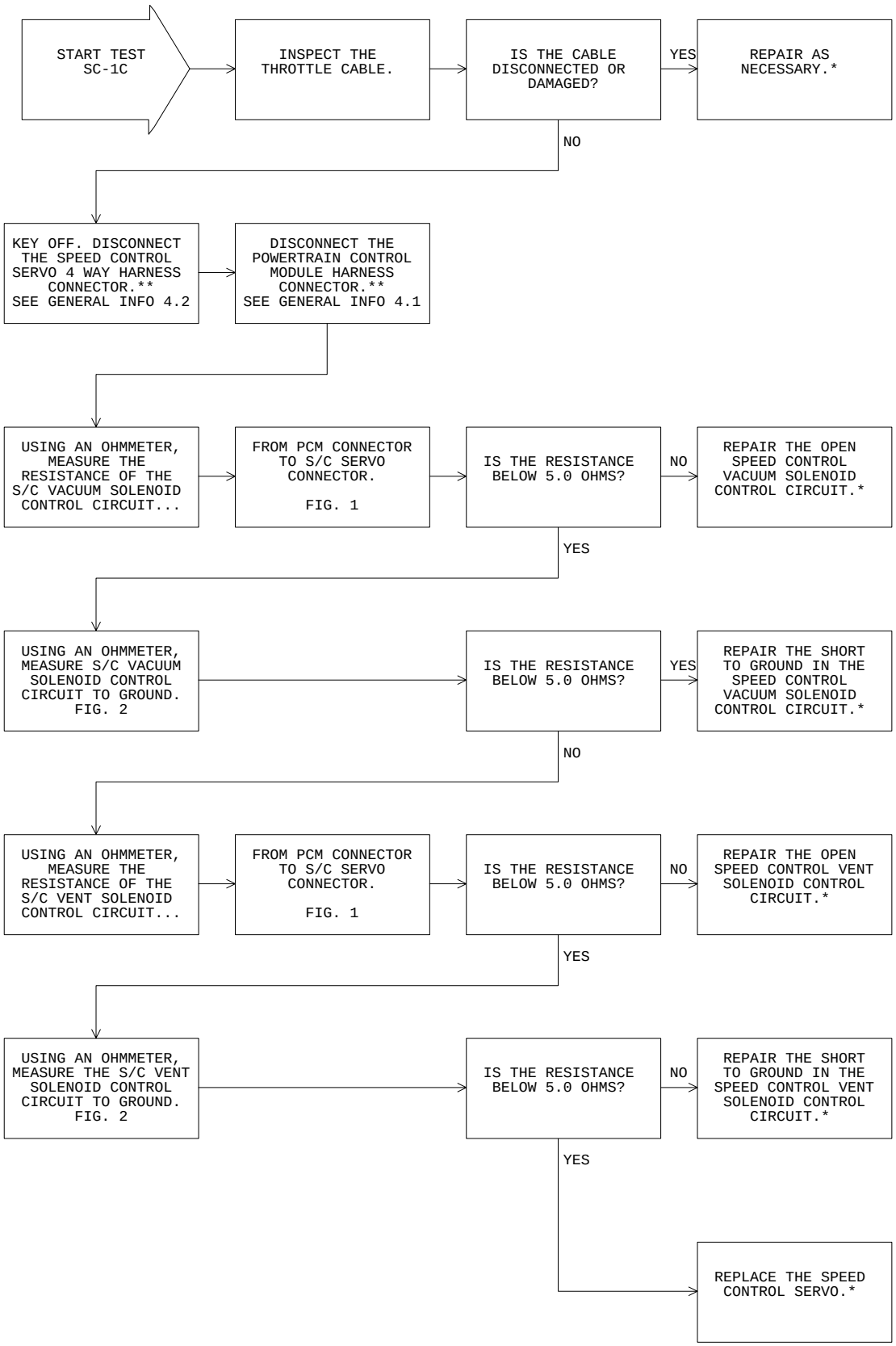
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
41	RD/LG	SPEED CNTRL SWITCH SIGNAL	62	WT/PK	BRAKE SWITCH SENSE
42	DB	A/C PRESSURE SIGNAL	63	YL/DG	TORQUE MNGMNT REQUEST SENSE
43	BK/LB	SENSOR GROUND	64	DB/OR	A/C COMP CLUTCH RLY CNTRL
44	OR	8-VOLT SUPPLY	65	PK	SCI TRANSMIT
45	DB/LG	PWR STEERING PRESS SW SENSE	66	WT/OR	VEHICLE SPEED SENSOR SIGNAL
46	RD/WT	FUSED B(+)	67	DB/YL	AUTO SHUTDOWN RLY CNTRL
47	BK/WT	SIGNAL GROUND	68	PK/BK	PROPORTIONAL PURGE SOL CNTRL
48	YL/BK	IDLE AIR CNTRL #3 DRIVER	69	DB/LG	HI SPEED RAD FAN RELAY CNTRL
49	YL/BK	IDLE AIR CNTRL #2 DRIVER	70	DG/LG	PWM PURGE SENSE
50	BK/TN	POWER GROUND	71	WT/RD	EATX RPM SIGNAL
51	TN/WT	HEATED C2 SENSOR 1/2 SIG	74	BR	FUEL PUMP RELAY CONTROL
53	PK/WT	HEATED C2 SENSOR 2/2 SIG	75	LG	SCI RECEIVE
55	DB/PK	LOW SPEED RAD FAN RLY CNTRL	76	BK/PK	PARK NEUTRAL POSITION SWTCH SENSE
56	TN/RD	SPEED CNTRL VACUUM SOL CNTRL	80	LG/RD	SPEED CNTRL VENT SOL CNTRL
57	GY/RD	IDLE AIR CNTRL #1 DRIVER			
58	VT/BK	IDLE AIR CNTRL #4 DRIVER			
59	YL/VT	(J1850) PCI BUS			
61	VT/WT	5-VOLT SUPPLY			

80b4b8a4

FIG. 2

TEST SC-1C CHECKING SPEED CONTROL OPERATION

Perform TEST SC-1A Before Proceeding

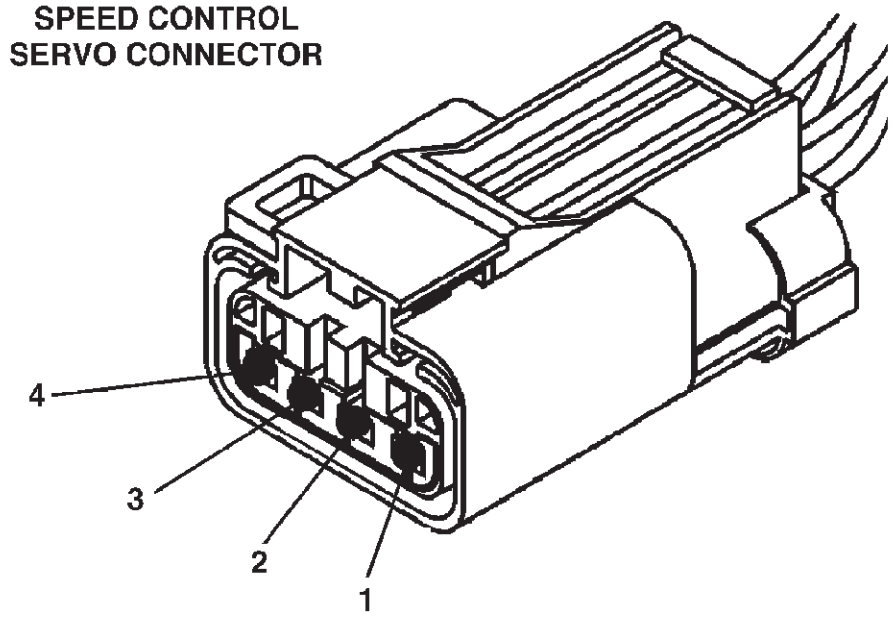


Perform Verification TEST VER-4A.

Check connectors - Clean / repair as necessary.

TEST SC-1D CHECKING SPEED CONTROL OPERATION

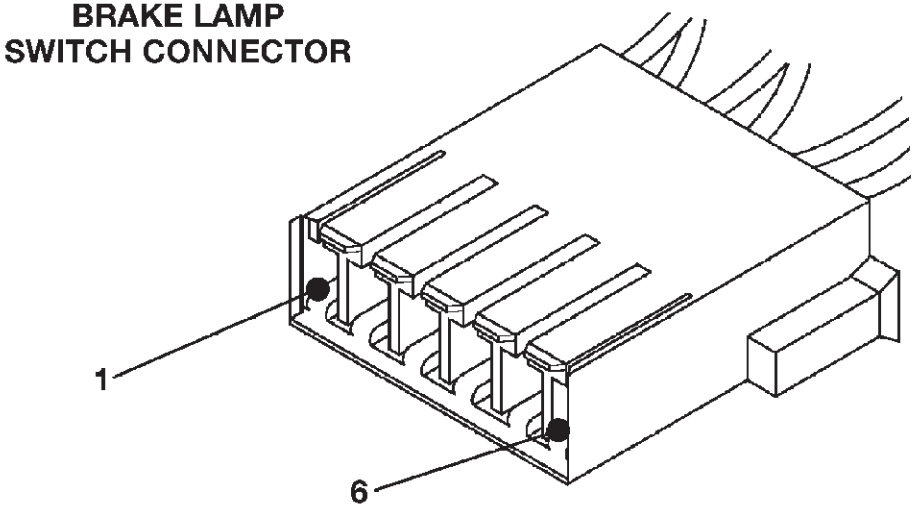
Perform TEST SC-1A Before Proceeding



CAV	COLOR	FUNCTION
1	TN/RD	S/C VACUUM SOLENOID CONTROL
2	LG/RD	S/C VENT SOLENOID CONTROL
3	DB/RD	S/C BRAKE SWITCH OUTPUT
4	BK	GROUND

80b4b84c

FIG. 1



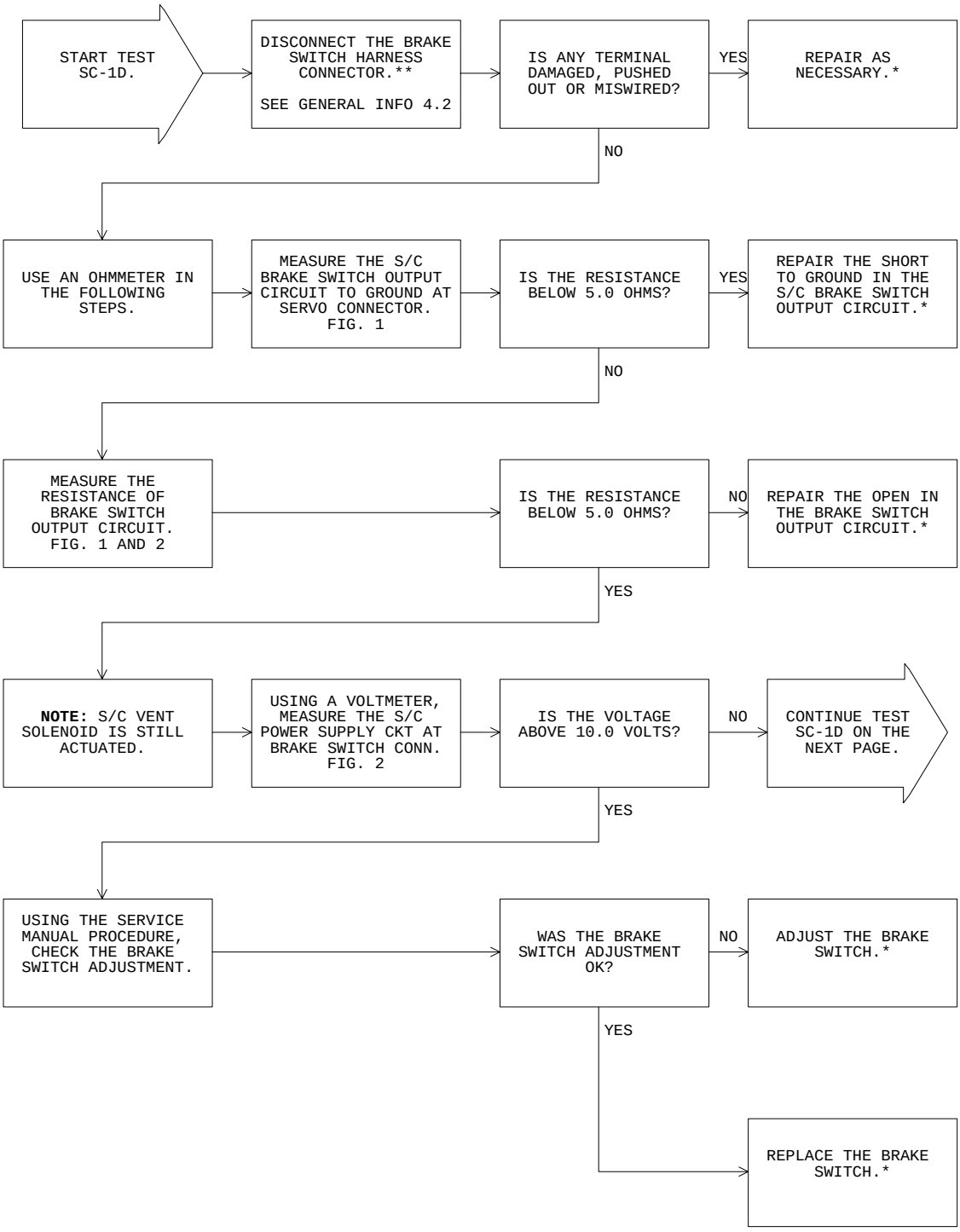
CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12

FIG. 2

TEST SC-1D CHECKING SPEED CONTROL OPERATION

Perform TEST SC-1A Before Proceeding

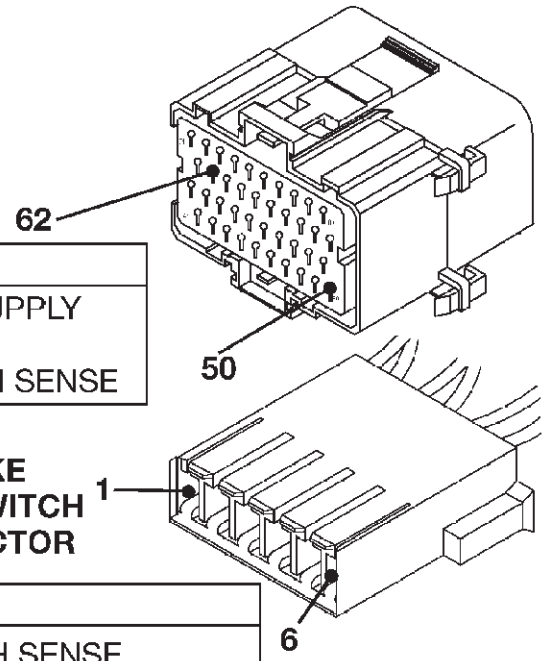


***Perform Verification TEST VER-4A.**

****Check connectors - Clean / repair as necessary.**

TEST SC-1D CONTINUED - CHECKING SPEED CONTROL OPERATION

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
5	YL/RD	S/C POWER SUPPLY
50	BK/TN	GROUND
62	WT/PK	BRAKE SWITCH SENSE

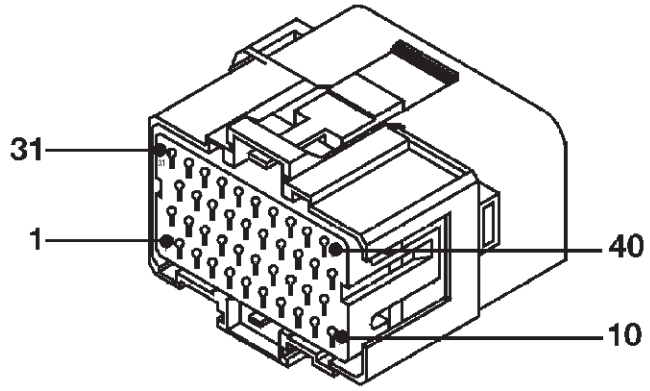
BRAKE LAMP SWITCH CONNECTOR

CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d28

FIG. 1

POWERTRAIN CONTROL MODULE "C1" CONNECTOR (BLACK)

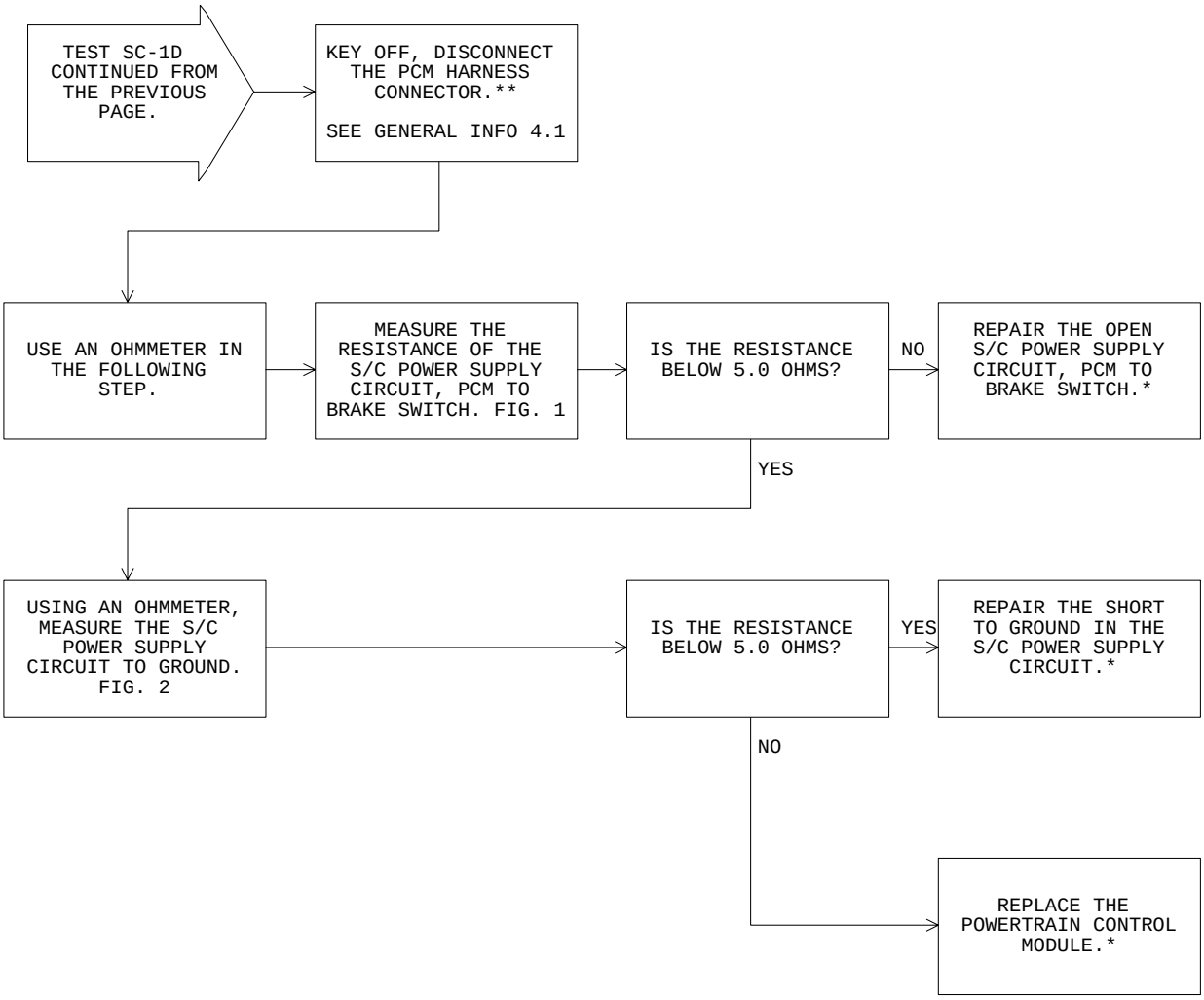


CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
1	TN/LG	IGNITION COIL #4 DRIVER	21	TN/DG	IGNITION COIL #5 DRIVER
2	TN/OR	IGNITION COIL #3 DRIVER	24	DB/LG	KNOCK SENSOR RETURN (3.5L)
3	TN/PK	IGNITION COIL #2 DRIVER	25	BK/VT	KNOCK SENSOR SIGNAL
4	TN/LB	IGNITION COIL #6 DRIVER	26	TN/BK	ENG COOLANT TEMP SENS SIG
5	YL/RD	SPEED CNTRL POWER SUPPLY	27	BK/OR	OXYGEN SENS GND
6	DG/OR	AUTO SHUTDOWN RELAY OUTPUT	29	LG/RD	HEATED 02 SENS 2/1 SIGNAL
7	YL/WT	INJECTOR #3 DRIVER	30	BK/DG	HEATED 02 SENS 1/1 SIGNAL
8	DG	GEN FIELD DRIVER	31	TN/WT	START RELAY CNTRL
10	BK/TN	POWER GROUND	32	GY/BK	CRANK POSITION SENSOR SIG
11	TN/RD	IGNITION COIL #1 DRIVER	33	TN/YL	CAMSHAFT POSITION SENS SIG
13	WT/DB	INJECTOR #1 DRIVER	34	LG/PK	EGR POSITION SENSOR SIGNAL
14	BR/DB	INJECTOR #6 DRIVER	35	OR/DB	THROTTLE POSITION SENS SIG
15	GY	INJECTOR #5 DRIVER	36	DG/RD	MAP SENSOR SIGNAL
16	LB/BR	INJECTOR #4 DRIVER	37	BK/RD	INTAKE AIR TEMP SIGNAL
17	TN/WT	INJECTOR #2 DRIVER (2.7L)	39	VT/RD	MANFLD TUNING VALVE SOL CNTRL (3.5L)
17	TN	INJECTOR #2 DRIVER (3.5L)			
18	GY/PK	SHORT RUNNER VALV SOL CNTRL	40	GY/YL	EGR SOLENOID CONTROL
20	DB/WT	FUSED IGN SWITCH OUTPUT			

80b4b855

FIG. 2

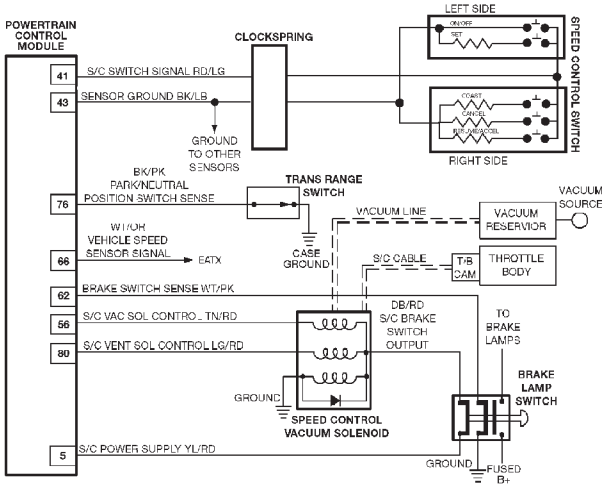
TEST SC-1D CONTINUED - CHECKING SPEED CONTROL OPERATION



***Perform Verification TEST VER-4A.** | ***Check connectors - Clean / repair as necessary.**

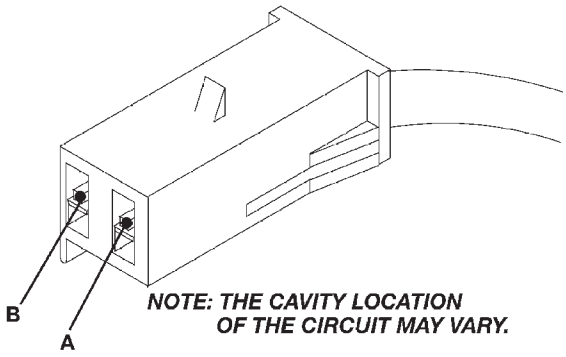
TEST SC-2A CHECKING SPEED CONTROL ON/OFF SWITCH

Perform TEST SC-1A Before Proceeding



80b4fab1

SPEED CONTROL SWITCH CONNECTOR



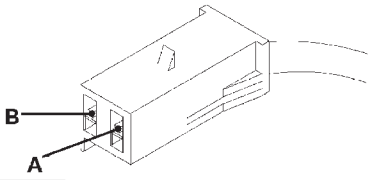
NOTE: THE CAVITY LOCATION OF THE CIRCUIT MAY VARY.

CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

FIG. 1

80b4fb57

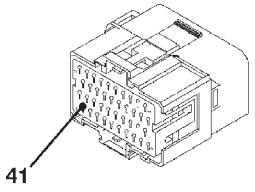
SPEED CONTROL SWITCH CONNECTOR



NOTE: The cavity location of the circuit may vary.

CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



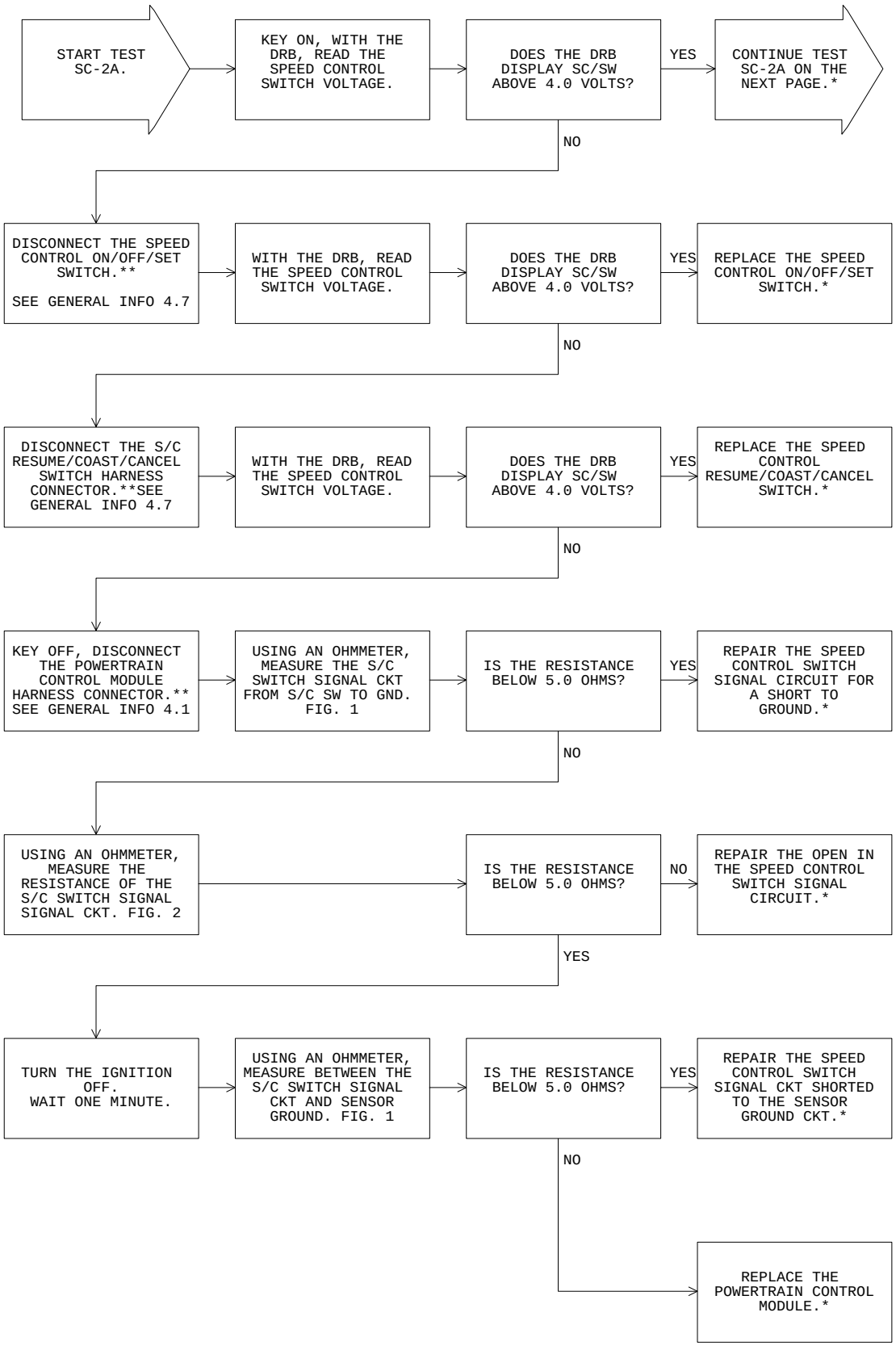
CAV	COLOR	FUNCTION
41	RD/LG	S/C SWITCH SIGNAL

FIG. 2

80b4fb58

TEST SC-2A CHECKING SPEED CONTROL ON/OFF SWITCH

Perform TEST SC-1A Before Proceeding

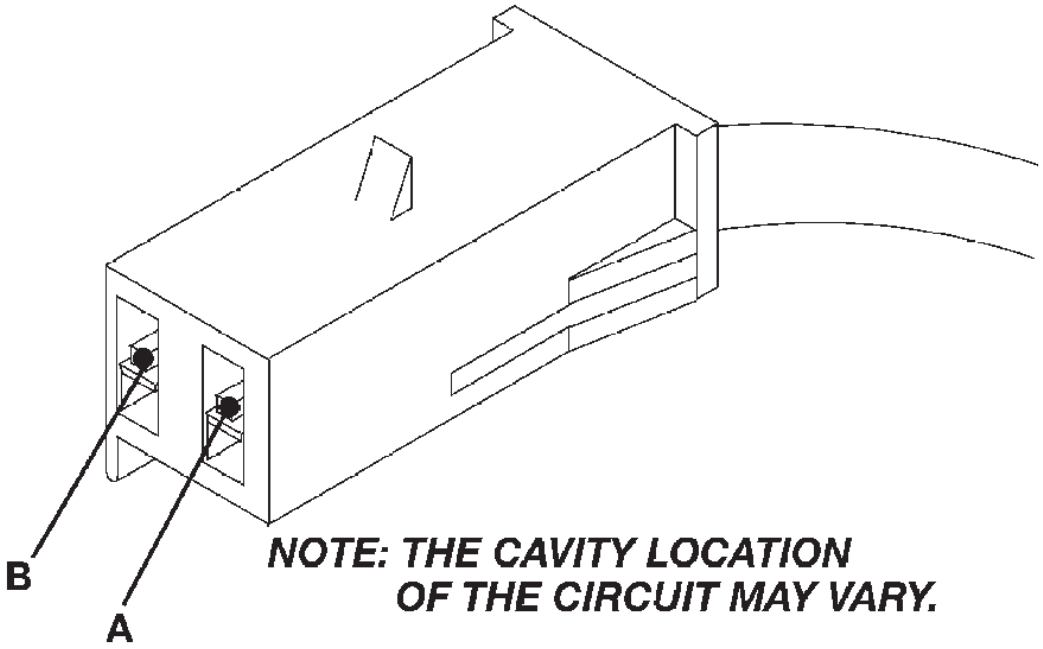


Perform Verification TEST VER-4A.

***Check connectors - Clean / repair as necessary.**

TEST SC-2A CONTINUED - CHECKING SPEED CONTROL ON/OFF SWITCH

SPEED CONTROL SWITCH CONNECTOR



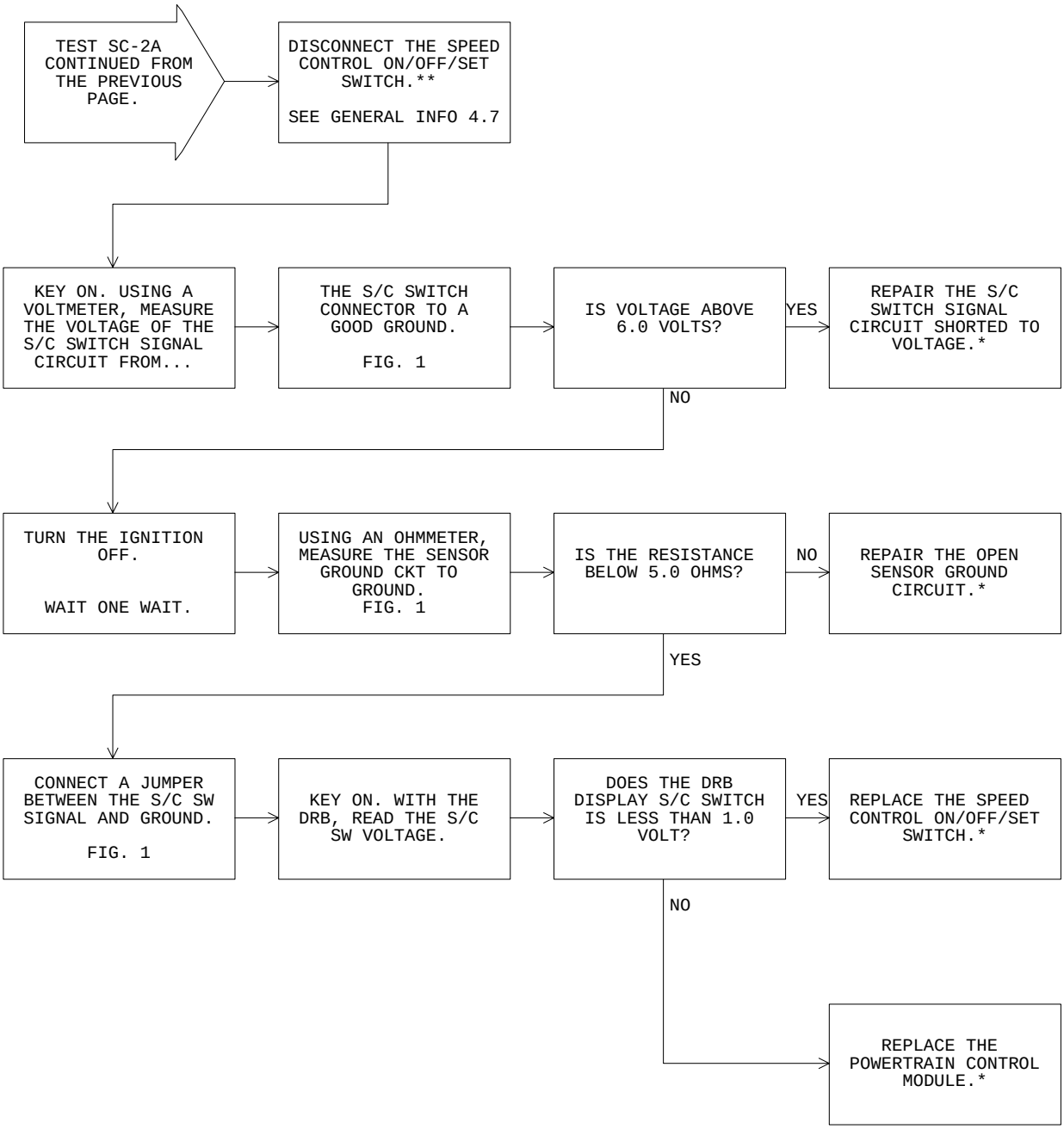
NOTE: THE CAVITY LOCATION OF THE CIRCUIT MAY VARY.

CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

80b4fb57

FIG. 1

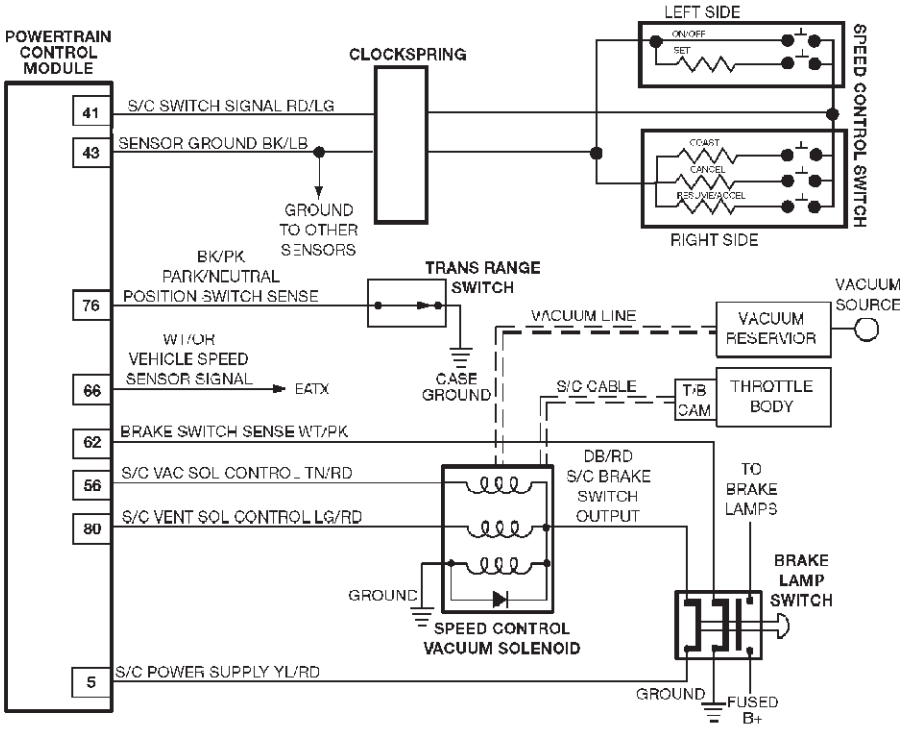
TEST SC-2A CONTINUED - CHECKING SPEED CONTROL ON/OFF SWITCH



**Perform Verification TEST VER-4A.* | ***Check connectors - Clean / repair as necessary.*

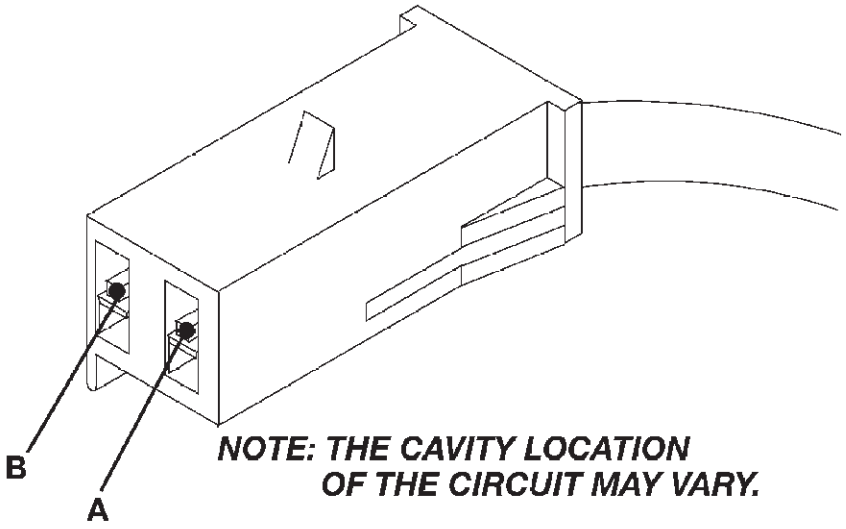
TEST SC-3A CHECKING SPEED CONTROL RESUME SWITCH

Perform TEST SC-1A Before Proceeding



80b4fab1

SPEED CONTROL SWITCH CONNECTOR



NOTE: THE CAVITY LOCATION OF THE CIRCUIT MAY VARY.

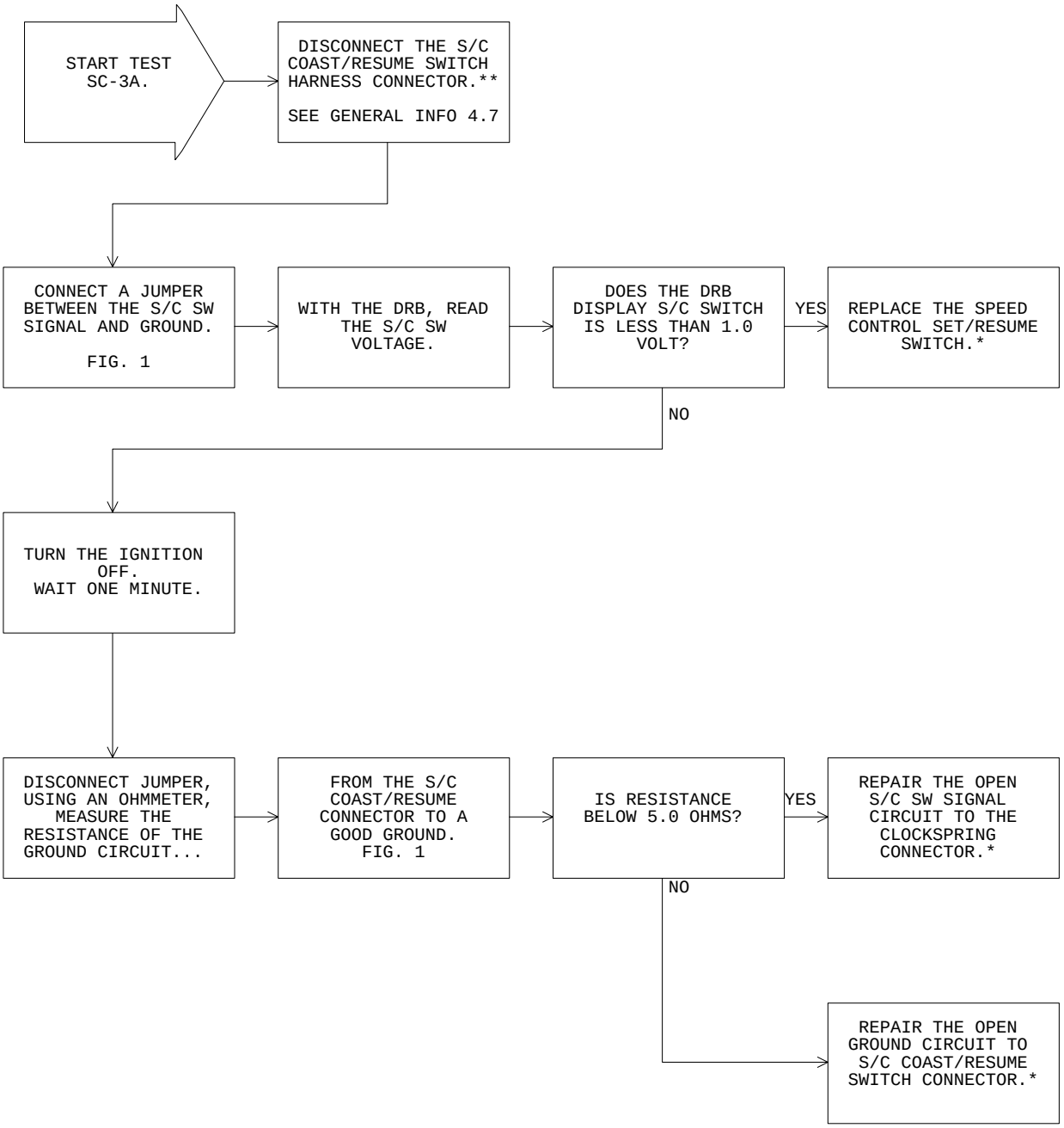
CAV	COLOR	FUNCTION
A	DG	GROUND
B	WT	S/C SWITCH SIGNAL

80b4fb57

FIG. 1

TEST SC-3A CHECKING SPEED CONTROL RESUME SWITCH

Perform TEST SC-1A Before Proceeding

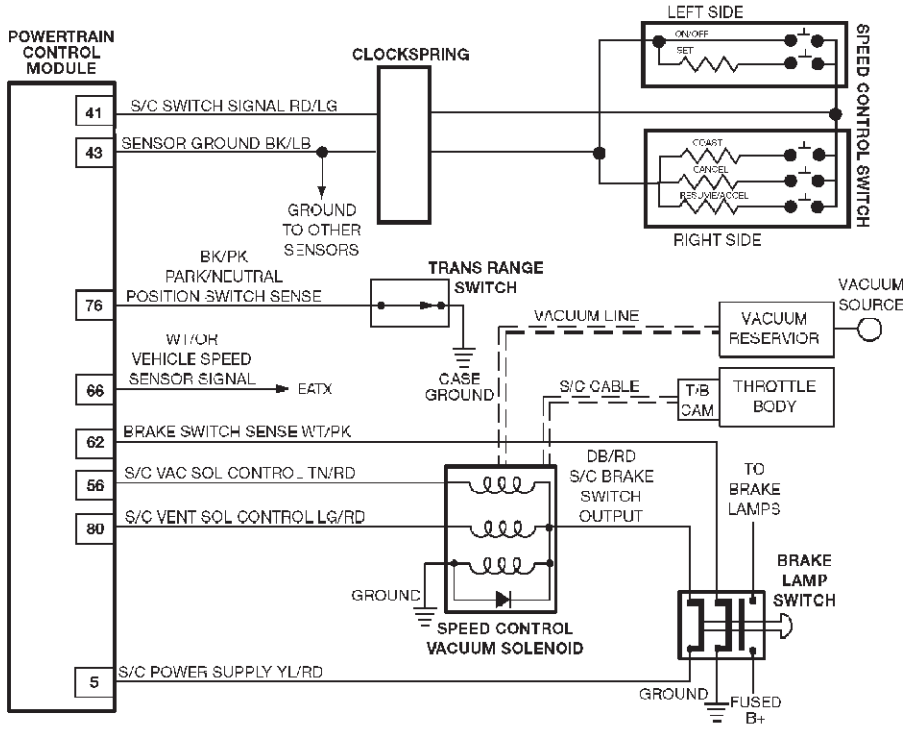


Perform Verification TEST VER-4A.

Check connectors - Clean / repair as necessary.

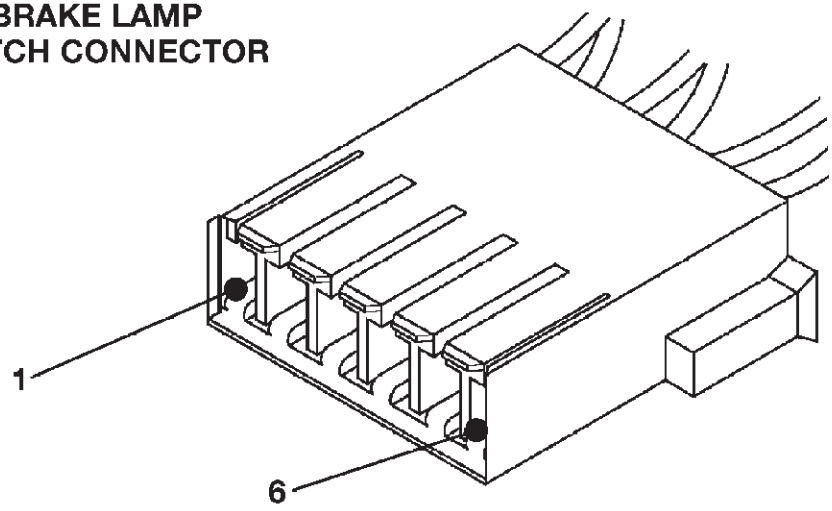
TEST SC-4A CHECKING THE BRAKE SWITCH SENSE

Perform TEST SC-1A Before Proceeding



80b4fab1

BRAKE LAMP SWITCH CONNECTOR



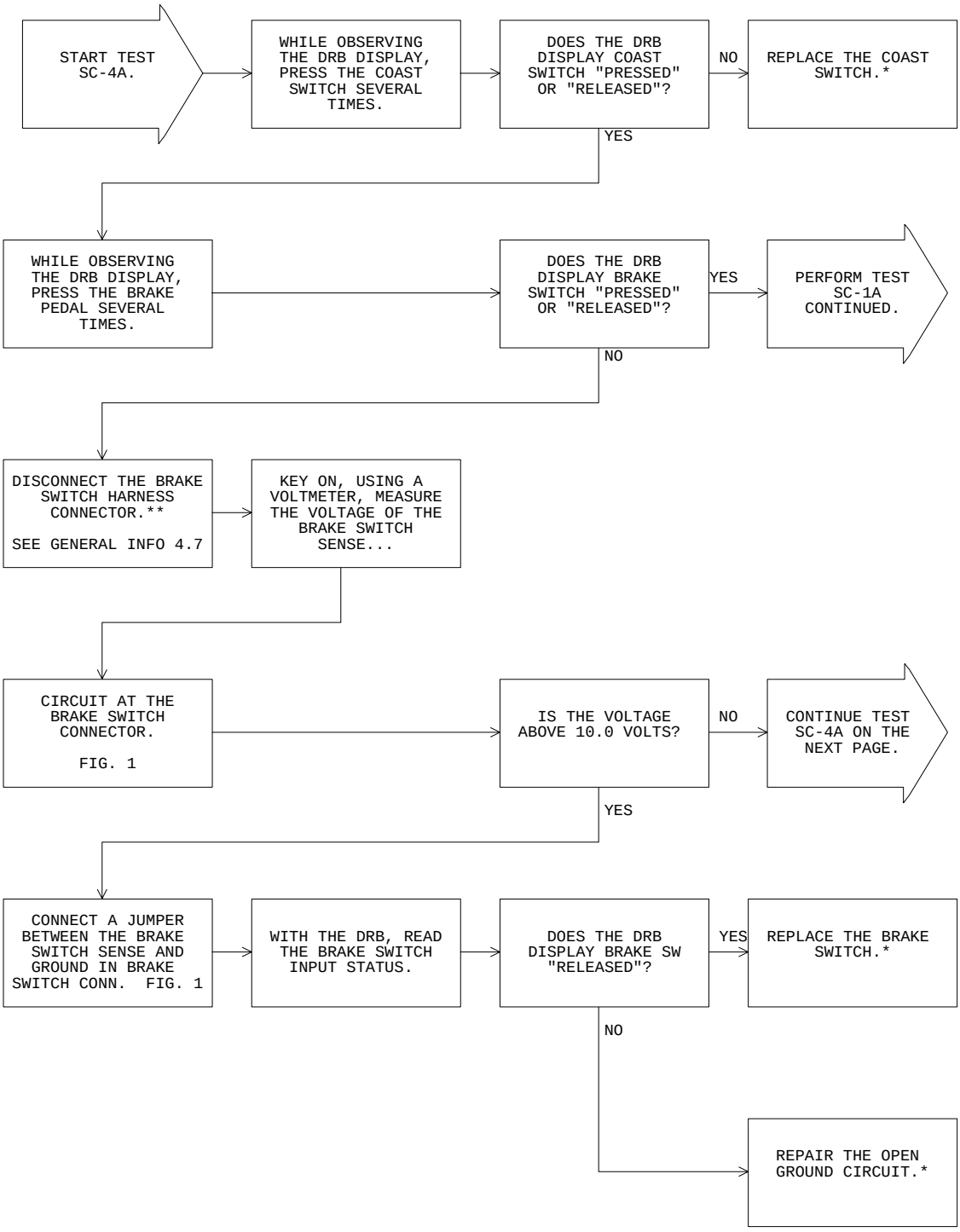
CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d12

FIG. 1

TEST SC-4A CHECKING THE BRAKE SWITCH SENSE

Perform TEST SC-1A Before Proceeding

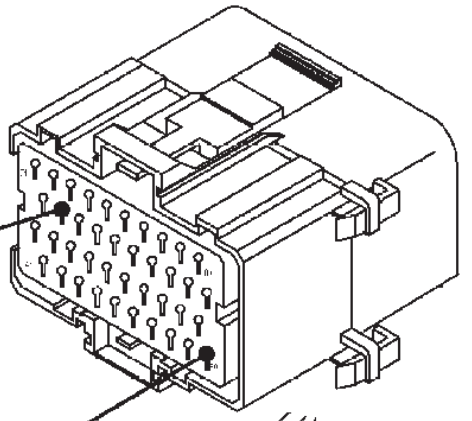


Perform Verification TEST VER-4A.

*****Check connectors - Clean / repair as necessary.***

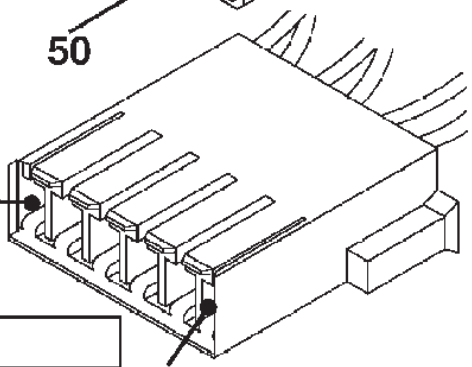
TEST SC-4A CONTINUED - CHECKING THE BRAKE SWITCH SENSE

POWERTRAIN CONTROL MODULE CONNECTOR (C2)



CAV	COLOR	FUNCTION
5	YL/RD	S/C POWER SUPPLY
50	BK/TN	GROUND
62	WT/PK	BRAKE SWITCH SENSE

BRAKE LAMP SWITCH CONNECTOR

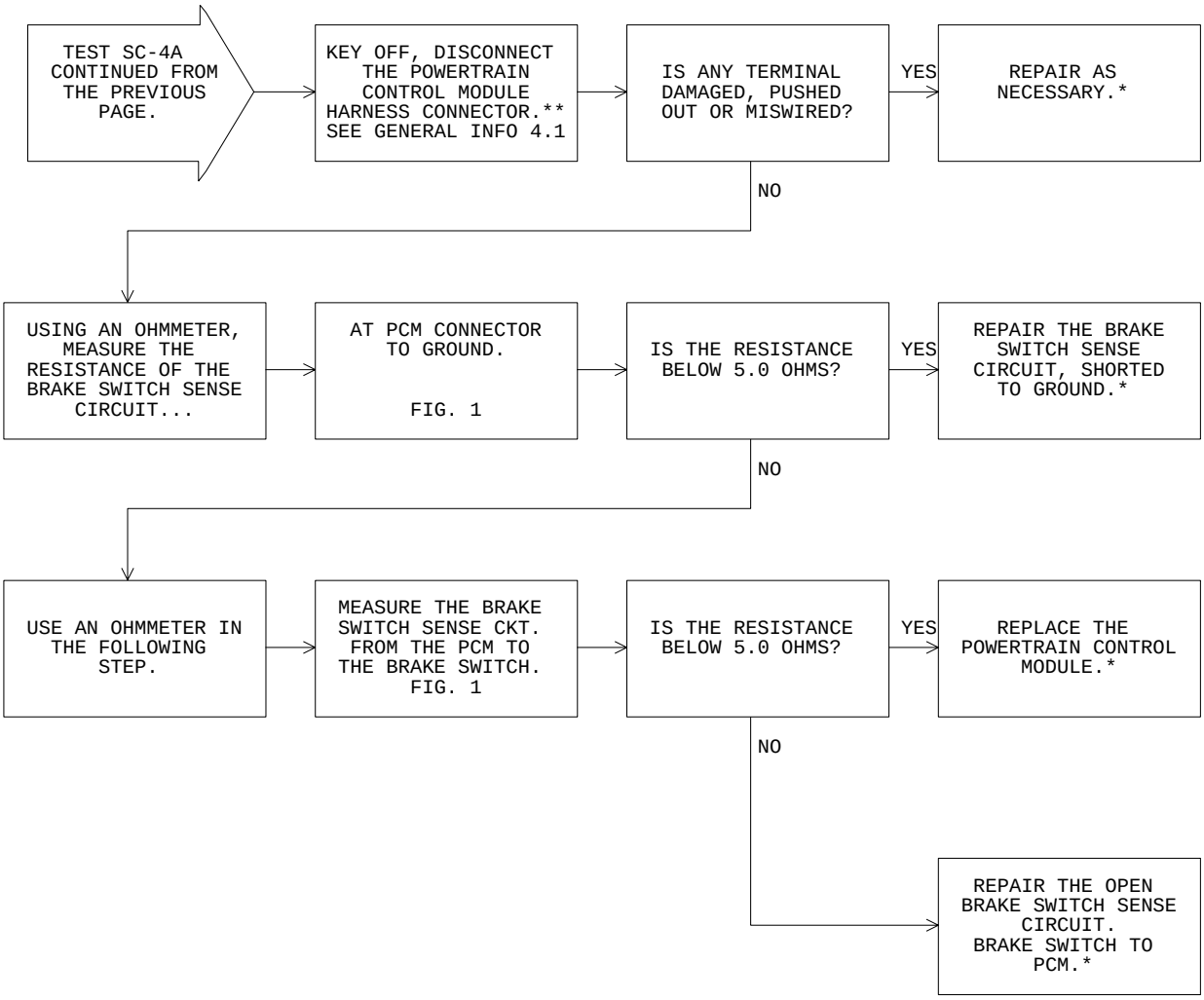


CAV	COLOR	FUNCTION
1	WT/PK	BRAKE SWITCH SENSE
2	BK/LG	GROUND
3	YL/RD	S/C POWER SUPPLY
4	DB/RD	S/C BRAKE SWITCH OUTPUT
5	WT/TN	BRAKE LAMP SWITCH OUTPUT
6	PK/DB	FUSED B(+)

80b27d28

FIG. 1

TEST SC-4A CONTINUED - CHECKING THE BRAKE SWITCH SENSE



Perform Verification TEST VER-4A.

Check connectors - Clean / repair as necessary.

TEST SC-5A CHECKING FOR A SPEED CONTROL DENIED MESSAGE

Perform TEST SC-1A Before Proceeding

NOTES

TEST SC-5A CHECKING FOR A SPEED CONTROL DENIED MESSAGE

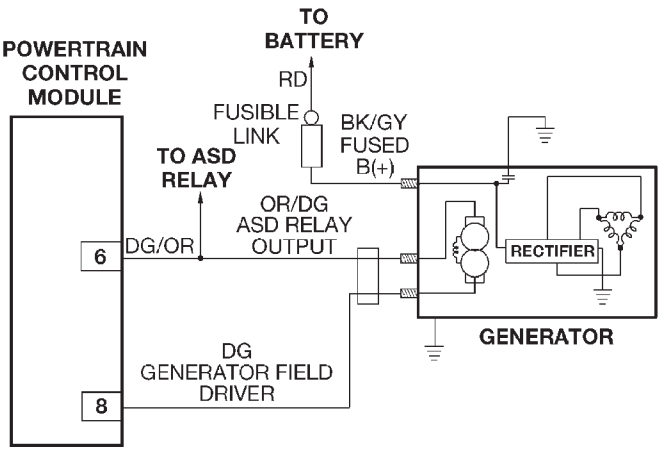
Perform TEST SC-1A Before Proceeding

At this time the speed control switch and servo functions appear to operate properly. Using the DRB, monitor the speed control ‘‘output’’ status. Road test the vehicle at speeds over 55 kmh (35 mph) and attempt to set the speed control. The following items will not allow the speed control to set. The last or most recent cause for speed control not to set is indicated by the ‘‘Denied’’ status.

Denied Message	
ON/OFF	The powertrain control module does not see an ‘‘ON’’ signal from the switch at cavity 41.
SPEED	The vehicle speed as seen by the powertrain control module at cavity 66 is not greater than 50 kmh (30 mph).
RPM	The engine rpm is excessive high.
BRAKE	The brake switch sense circuit is open indicating to the powertrain control module that the brakes are applied. The sense circuit, cavity 62 of the PCM, is grounded through the brake pedal switch when the brakes are released.
P/N	The park/neutral switch sense circuit is grounded indicating to the powertrain control module that the transmission is not in gear. The sense circuit, cavity 76 of the PCM, is grounded through the Transmission Range Sensor when the transmission is in park or neutral.
RPM/SPD	The PCM senses excessive engine rpm for a given vehicle speed.
SOL FLT	The powertrain control module senses a servo solenoid circuit trouble code that is maturing or set in memory.

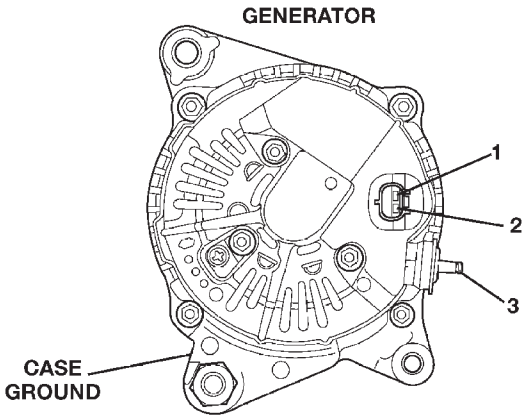
TEST CH-1A CHARGING SYSTEM NO CODE TEST

Perform TEST DTC Before Proceeding



80b4b84b

2.7L

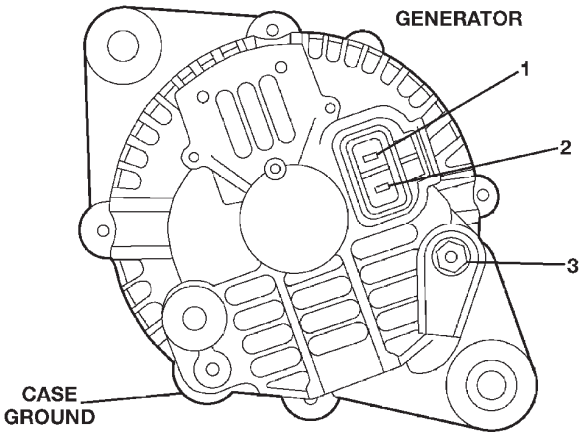


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

FIG. 1

80b6eff9

3.5L



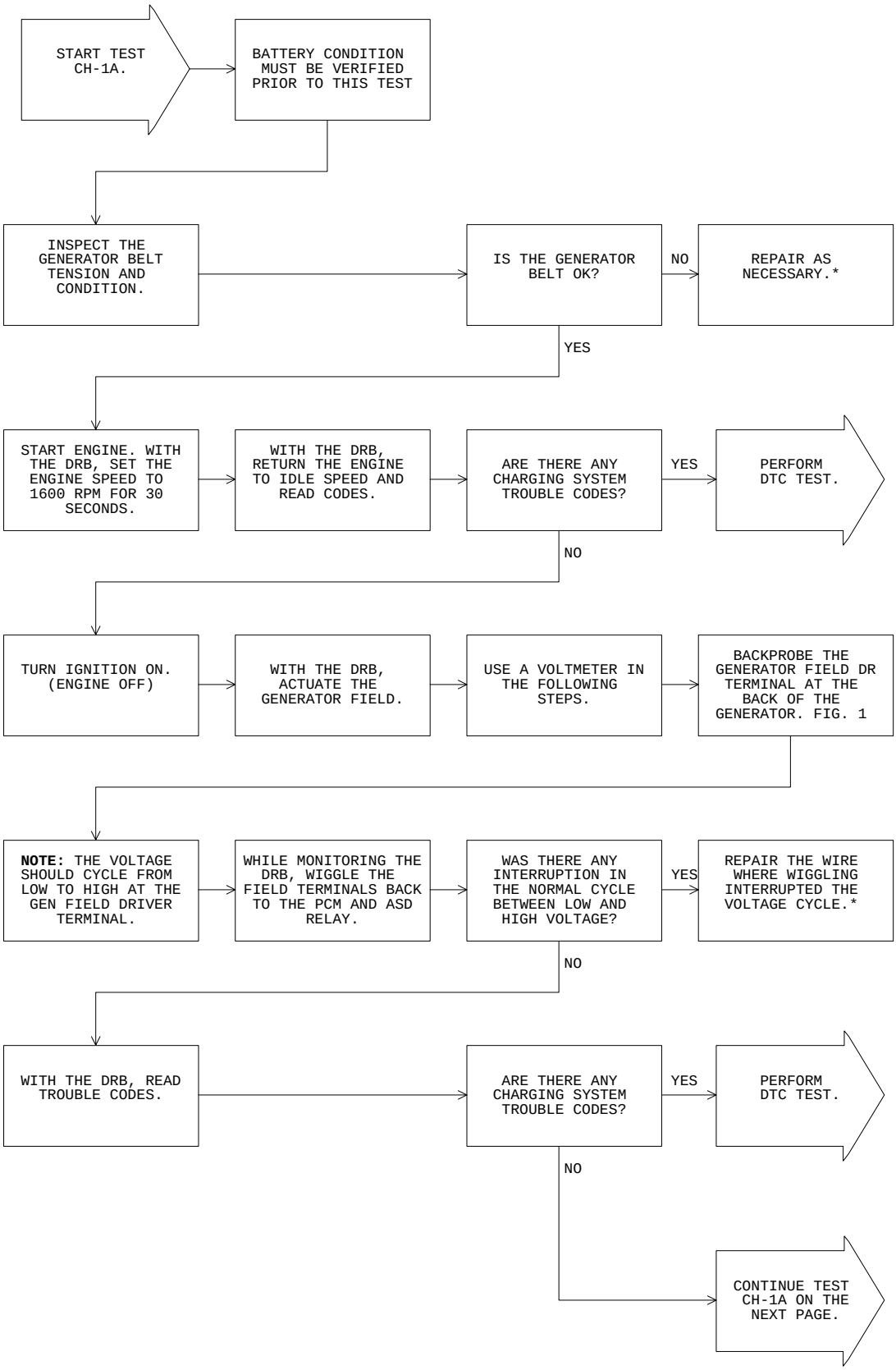
CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

FIG. 2

80b6effa

TEST CH-1A CHARGING SYSTEM NO CODE TEST

Perform TEST DTC Before Proceeding

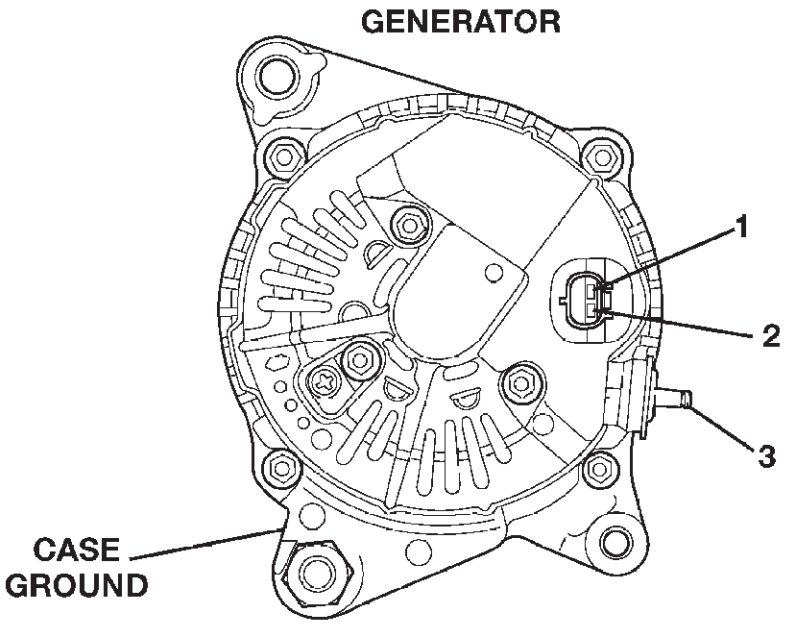


Perform Verification TEST VER-3A.

*****Check connectors - Clean / repair as necessary.***

TEST CH-1A CONTINUED - CHARGING SYSTEM NO CODE TEST

2.7L

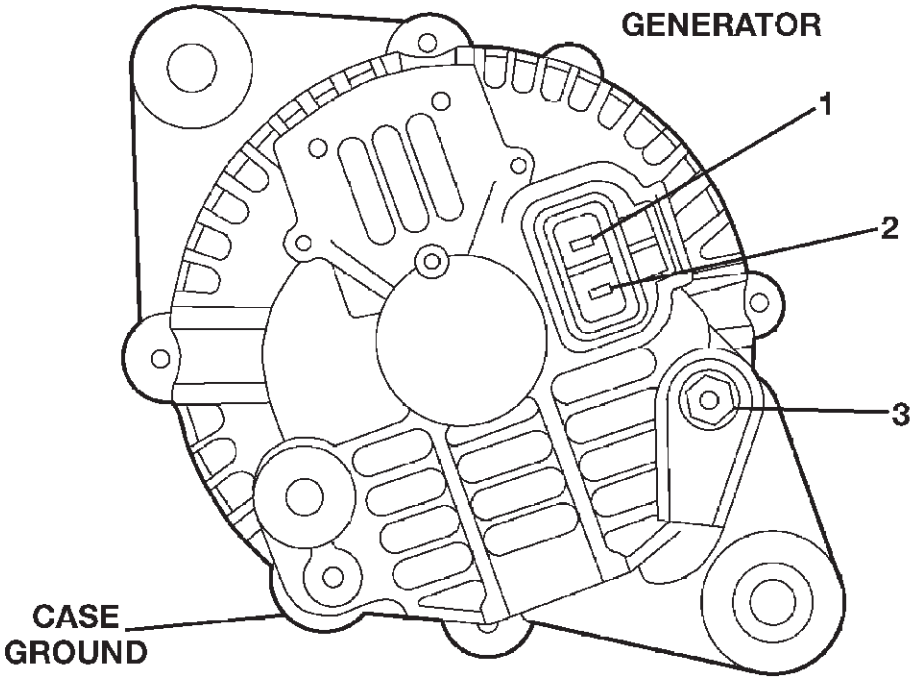


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B(+)

80b6eff9

FIG. 1

3.5L

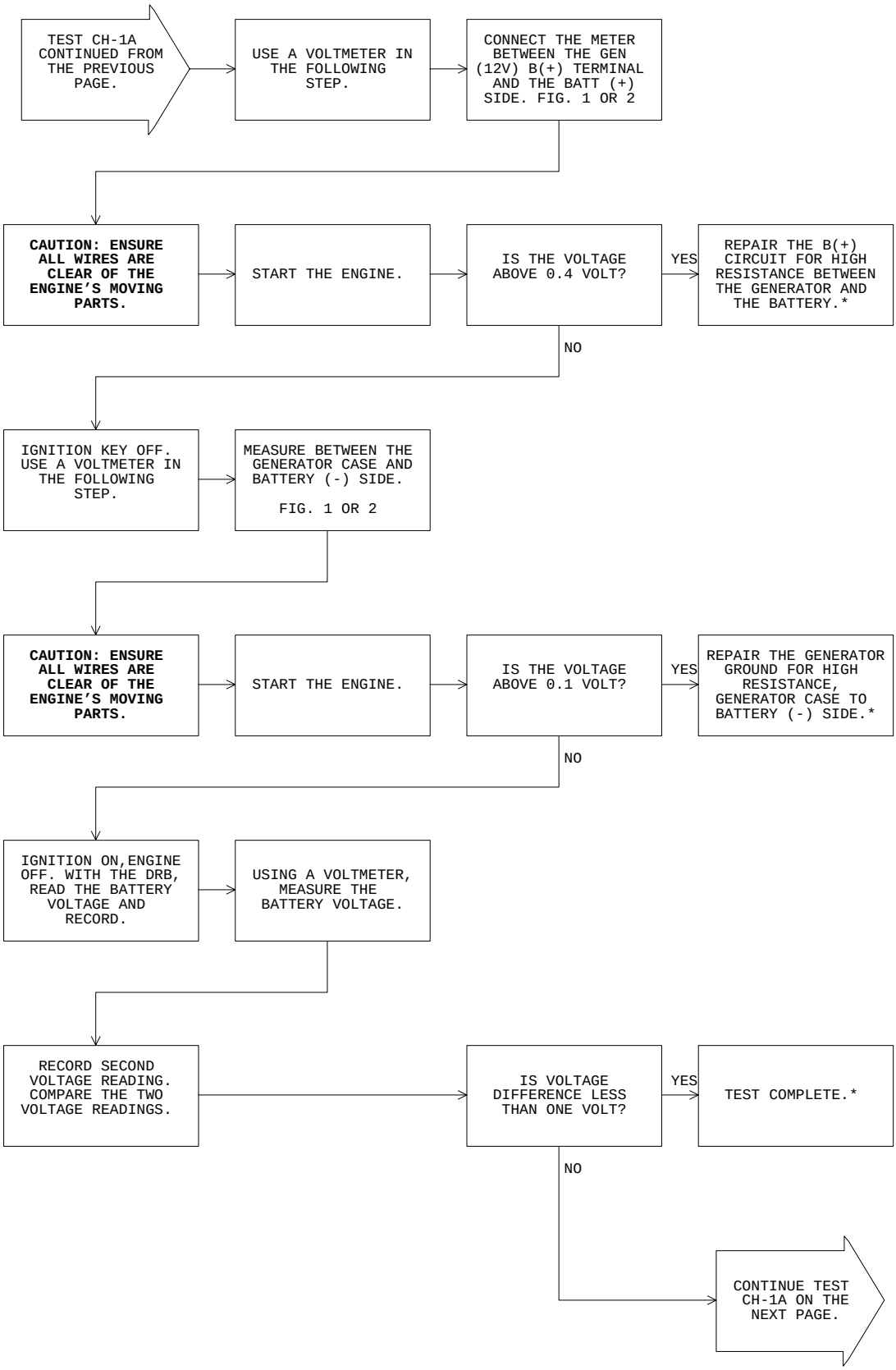


CAV	COLOR	FUNCTION
1	DG	GENERATOR FIELD DRIVER
2	OR/DG	ASD RELAY OUTPUT
3	BK/GY	B (+)

80b6effa

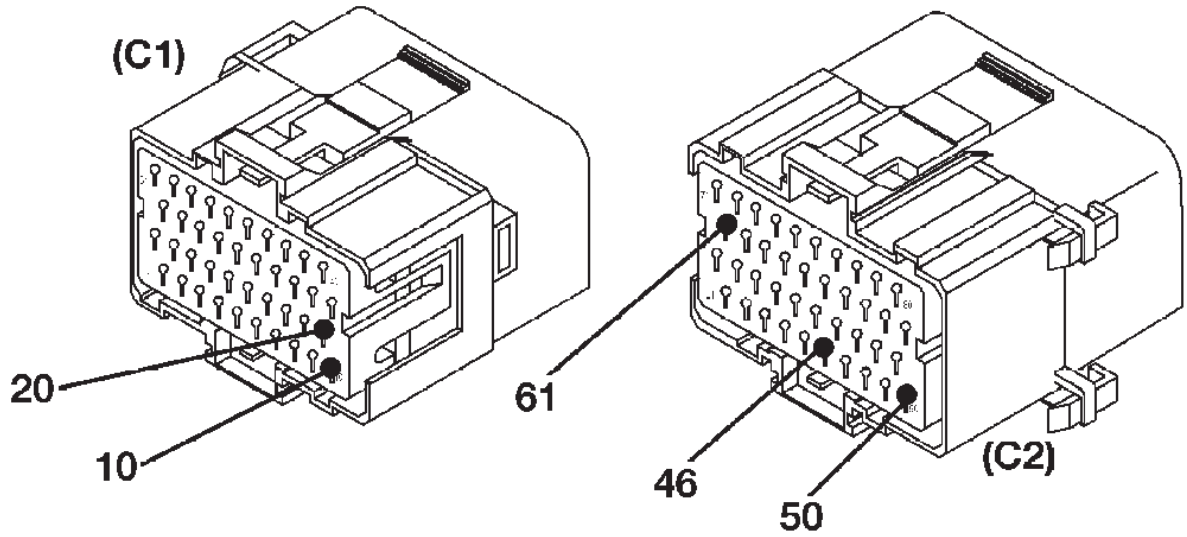
FIG. 2

TEST CH-1A CONTINUED - CHARGING SYSTEM NO CODE TEST



**Perform Verification TEST VER-3A.* | ***Check connectors - Clean / repair as necessary.*

POWERTRAIN CONTROL MODULE CONNECTORS

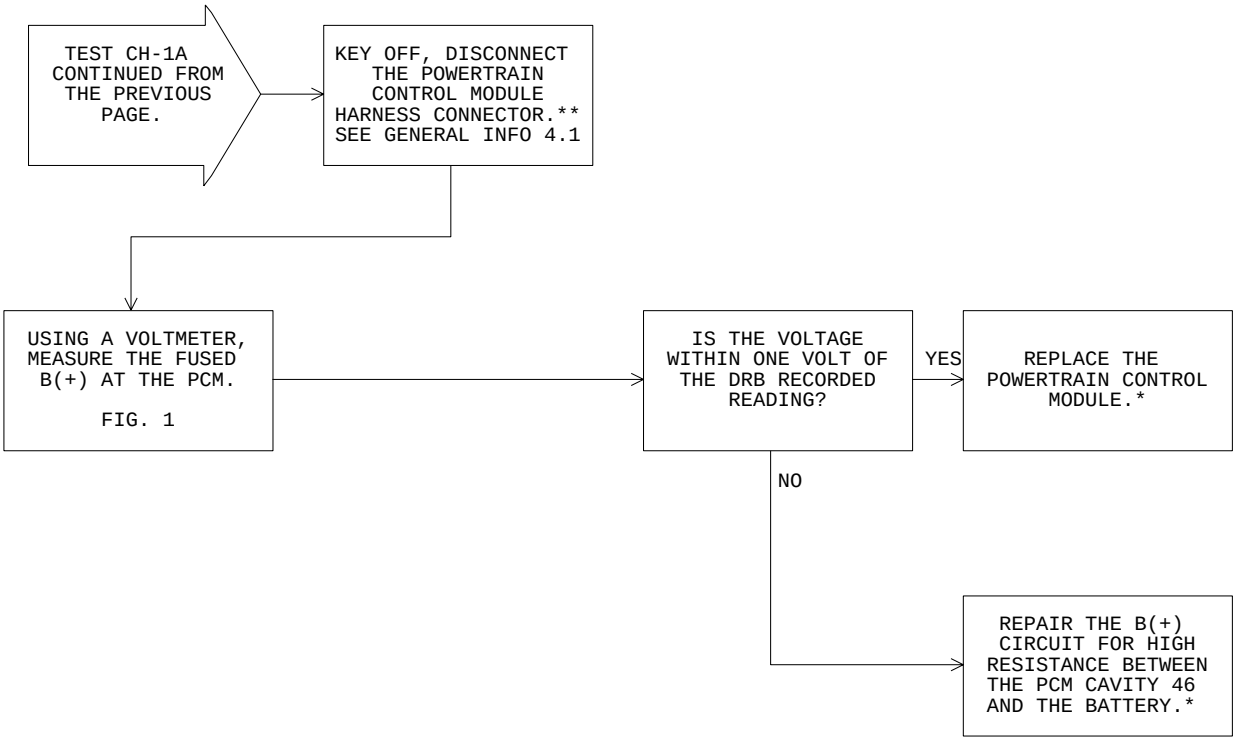


CAV	COLOR	FUNCTION
10	BK/TN	GROUND
20	DB/WT	FUSED IGNITION SWITCH OUTPUT
46	RD/WT	FUSED B(+)
47	BK/WT	GROUND
50	BK/TN	GROUND
61	VT/WT	5-VOLT SUPPLY

80b1b344

FIG. 1

TEST CH-1A CONTINUED - CHARGING SYSTEM NO CODE TEST



***Perform Verification TEST VER-3A.**

****Check connectors - Clean / repair as necessary.**

TEST NS-SEL NO START SELECTION MENU

Perform TEST DTC Before Proceeding

NOTES

TEST NS-SEL NO START SELECTION MENU

Perform DTC TEST Before Proceeding

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to GENERAL INFORMATION SECTION 8.0 for programming the Powertrain Control Module and the SKIM.

NOTE: If the engine will not crank or cranks but will not run, be sure to check the SKIM for proper communication and trouble codes.

NOTE: If there are any trouble codes present they must be repaired before continuing with the No Start Symptom diagnostics.

NOTE: The battery must be fully charged before performing any test in this manual. If the battery is low, charge the battery and then attempt to start vehicle by cranking the engine for 15 seconds 3 consecutive times. This will allow any Trouble Codes to set that may have been erased due to a dead battery. Read trouble codes with the DRB. If any trouble codes are present, they must be repaired before continuing with the No Start diagnostics.

Below you will find a list of recommended procedures to correct a no start problem. Start with **Test NS-1A** and it will guide you through the No Start Procedures. If you have a symptom and would like to perform only the test that correlates to that symptom, refer to the list below for the appropriate test procedures.

Qualifying a “No Start Condition” NS-1A

Checking Fuel System NS-2A

Checking Engine Mechanical Systems NS-3A

Repairing Low Fuel Pressure. NS-4A

Repairing Fuel Pump NS-5A

Repairing a ‘‘No Response’’ Condition NS-6A

Checking Idle Air Control Motor Operation NS-7A

Repairing a Start and Stall Condition NS-8A

Repairing a No Crank Condition NS-9A

Always look for any Technical Service Bulletins that may relate to a No Start condition.

TEST NS-1A QUALIFYING A NO START CONDITION

Perform TEST NS SEL Before Proceeding

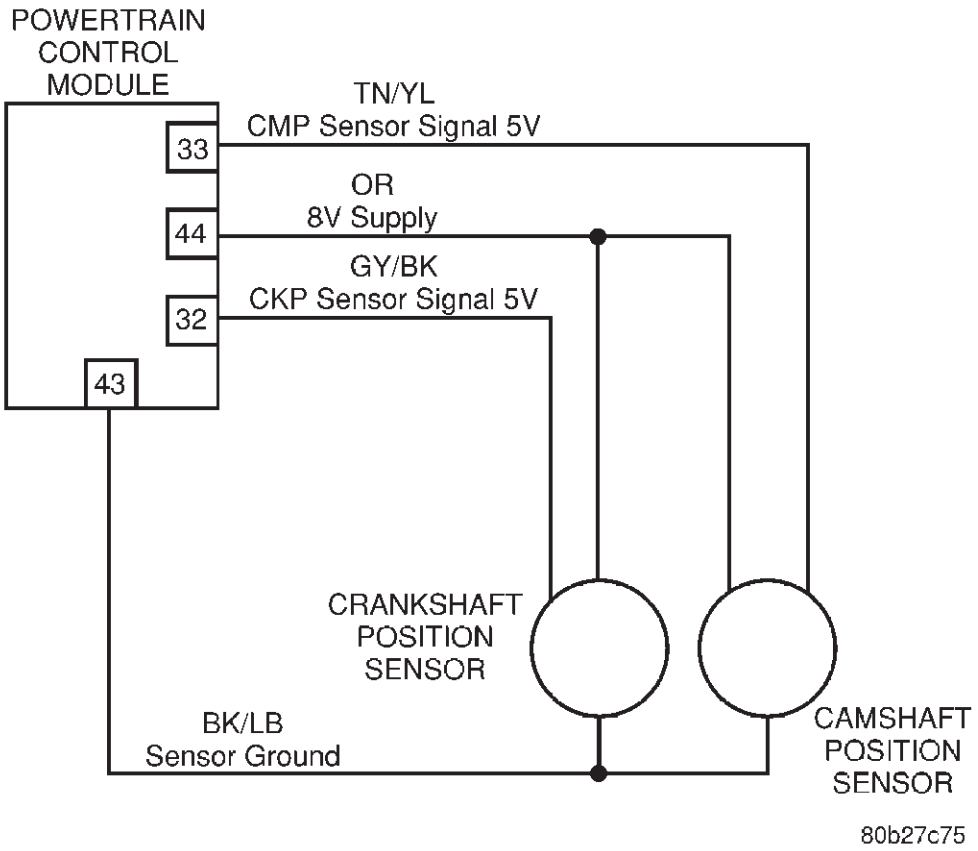


FIG. 1

TYPICAL DRB SCREEN

```
– – – INPUT / OUTPUT – – –

CURRENT FUEL SHUTOF :  NONE
HISTORY FUEL SHUTOF  :  NONE
VEH THEFT SECURITY   :  FUEL ON
VEH THEFT STATE      : NOT SEEN
CURRENT CKP STATE    : PRESENT
CURRENT CMP STATE    :  PRESENT
CURRENT SYNC STATE   :  IN SYNC
HISTORY OF SYNC      :  NOT LOST
FUEL SYSTEM STATUS   :  OPEN LOOP
 1 of 31 Items                ENGINE

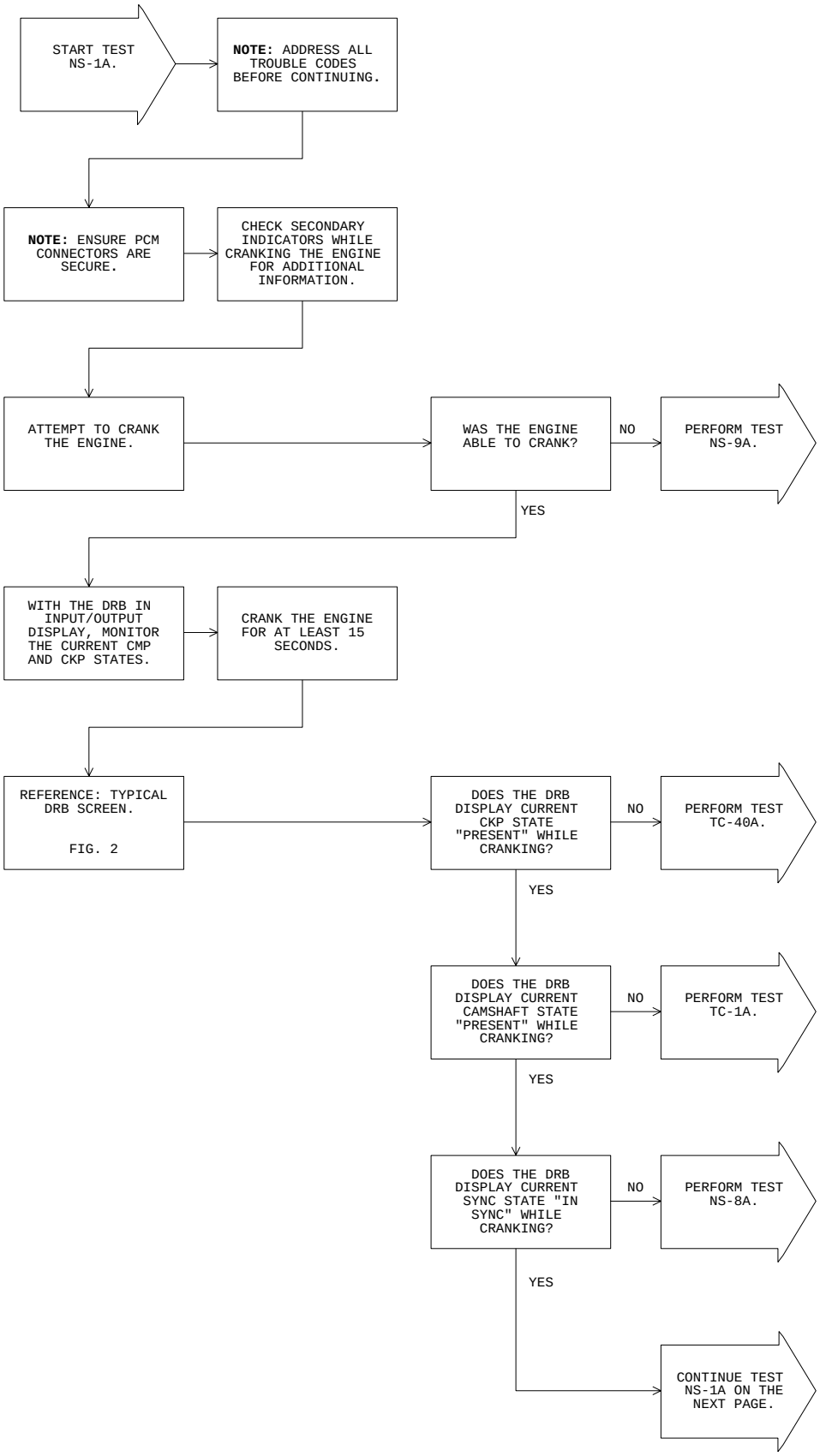
   #1          #2          #3
```

80b29fd6

FIG. 2

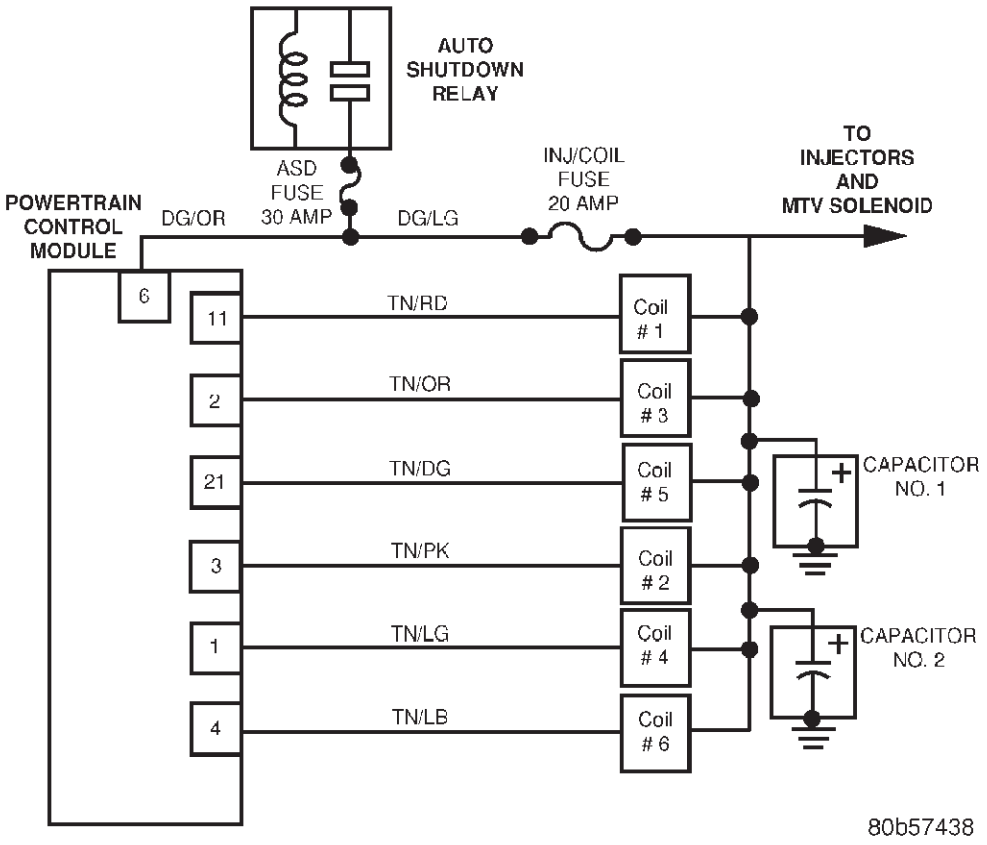
TEST NS-1A | QUALIFYING A NO START CONDITION

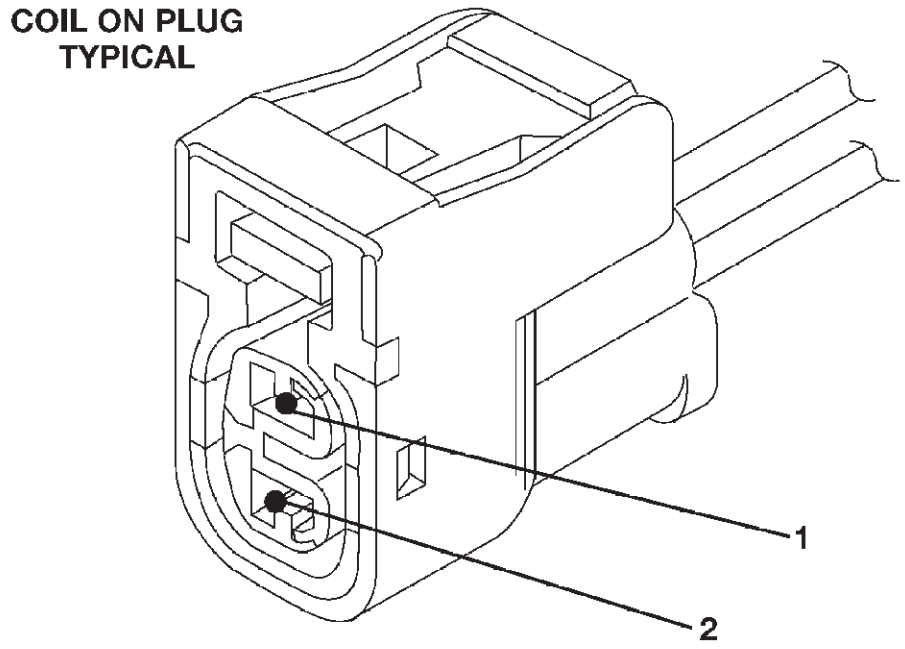
Perform TEST NS SEL Before Proceeding



**Perform Verification TEST VER-1A.*	***Check connectors - Clean / repair as necessary.*

TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION



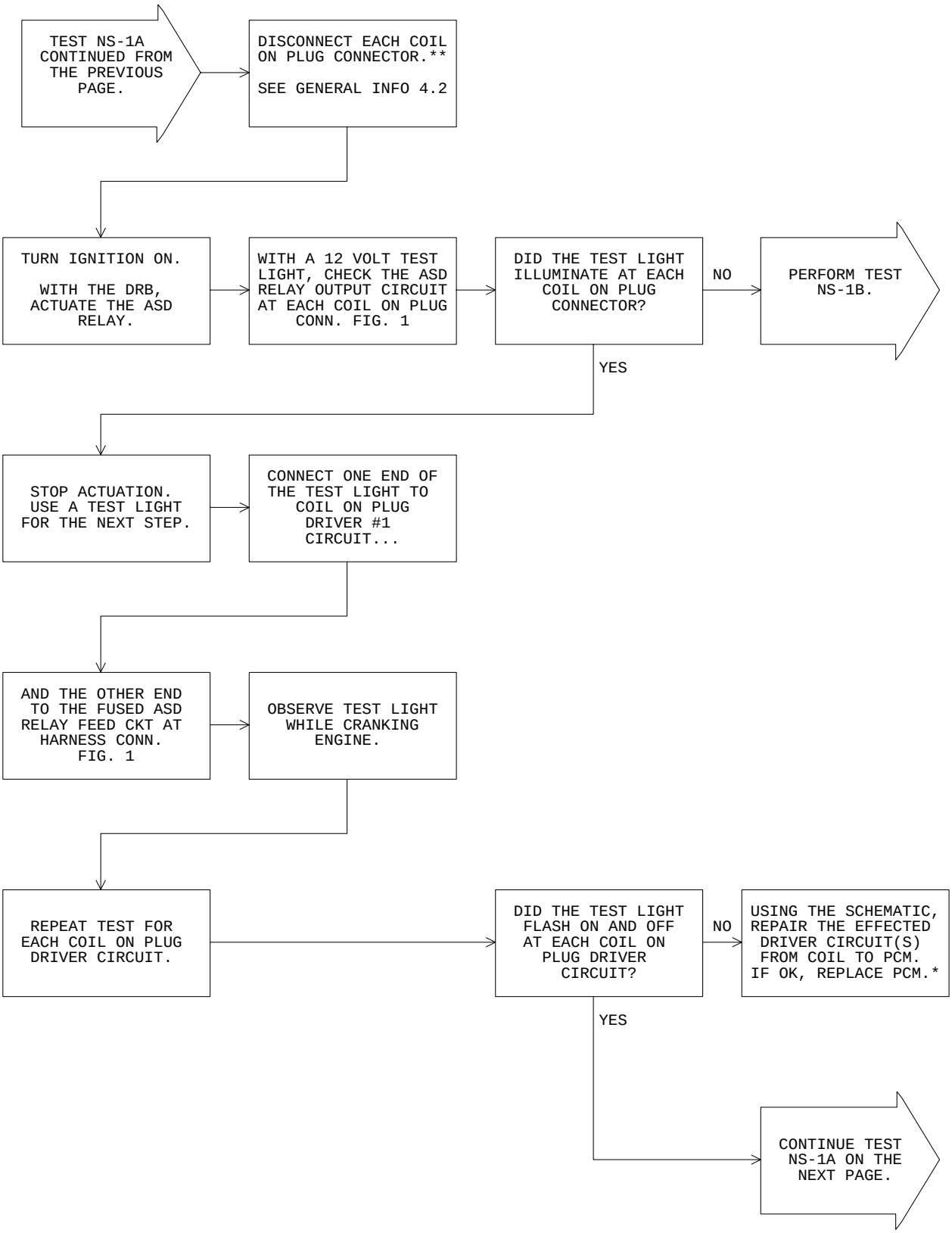


CAV	COLOR	FUNCTION
1	DG/LG	FUSED ASD RELAY FEED
2	TN/RD	COIL ON PLUG DRIVER #1

80b27c76

FIG. 1

TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION



Perform Verification TEST VER-1A.

****Check connectors - Clean / repair as necessary.***

TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION

2.7L

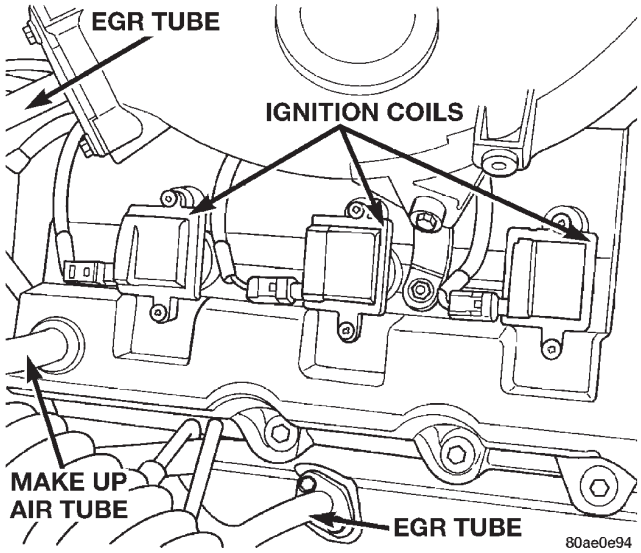


FIG. 1

3.5L

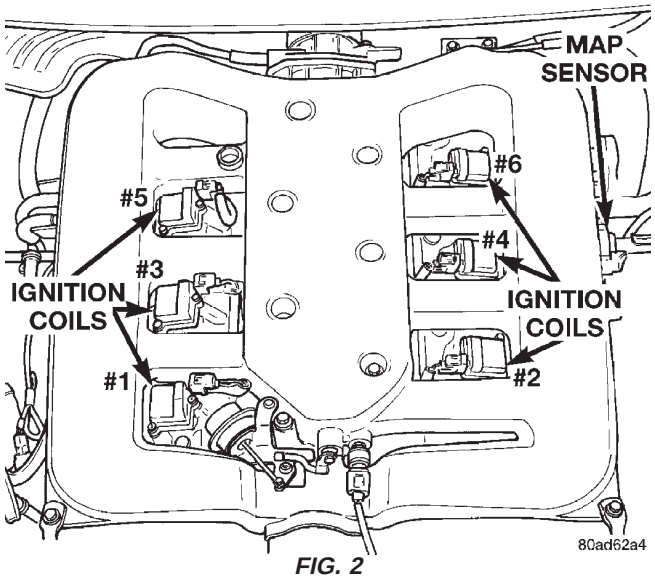


FIG. 2

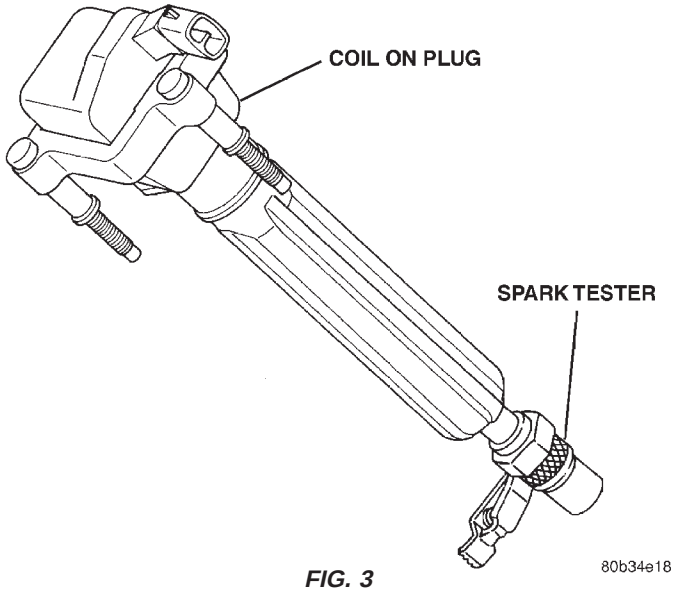
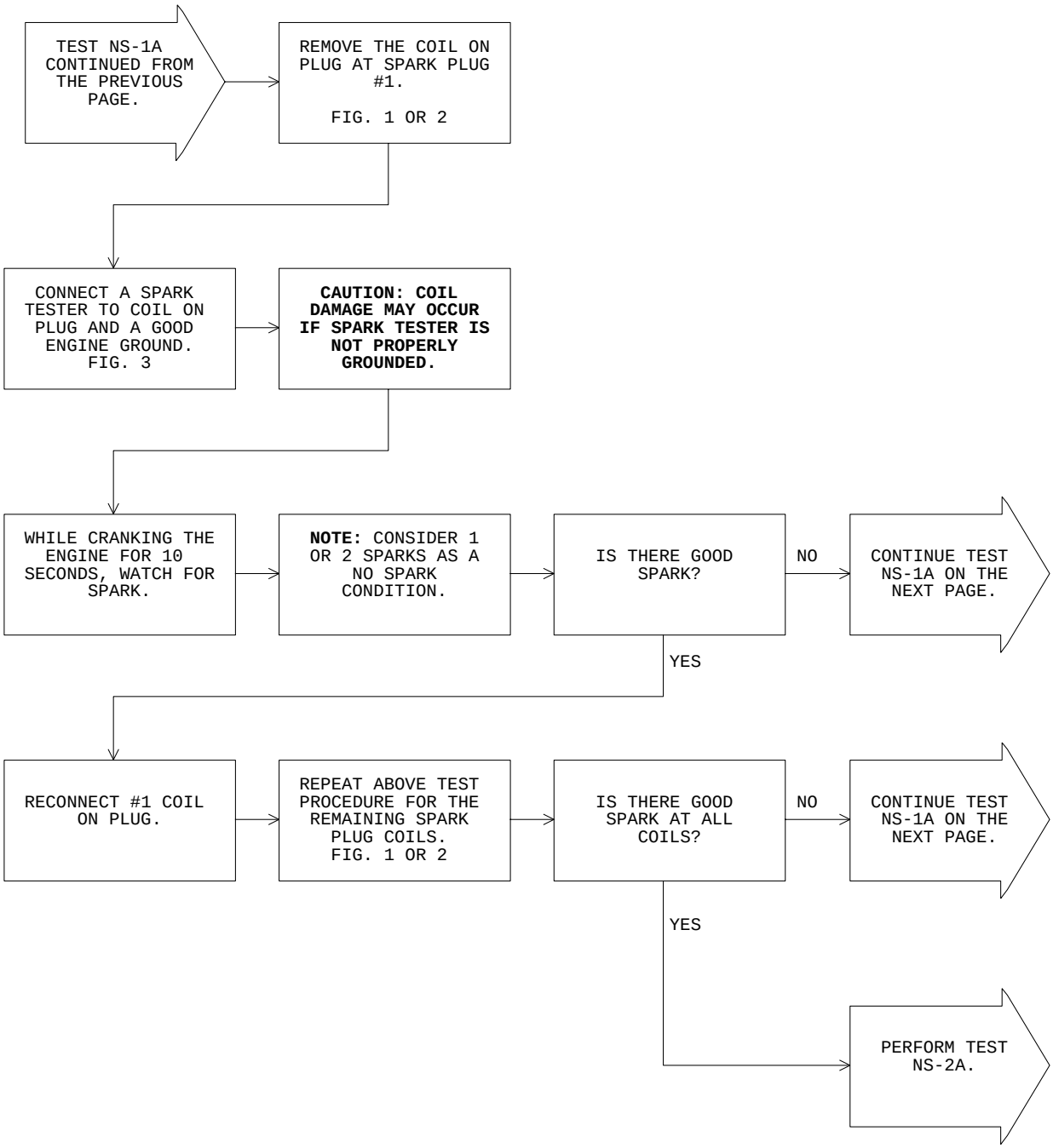


FIG. 3

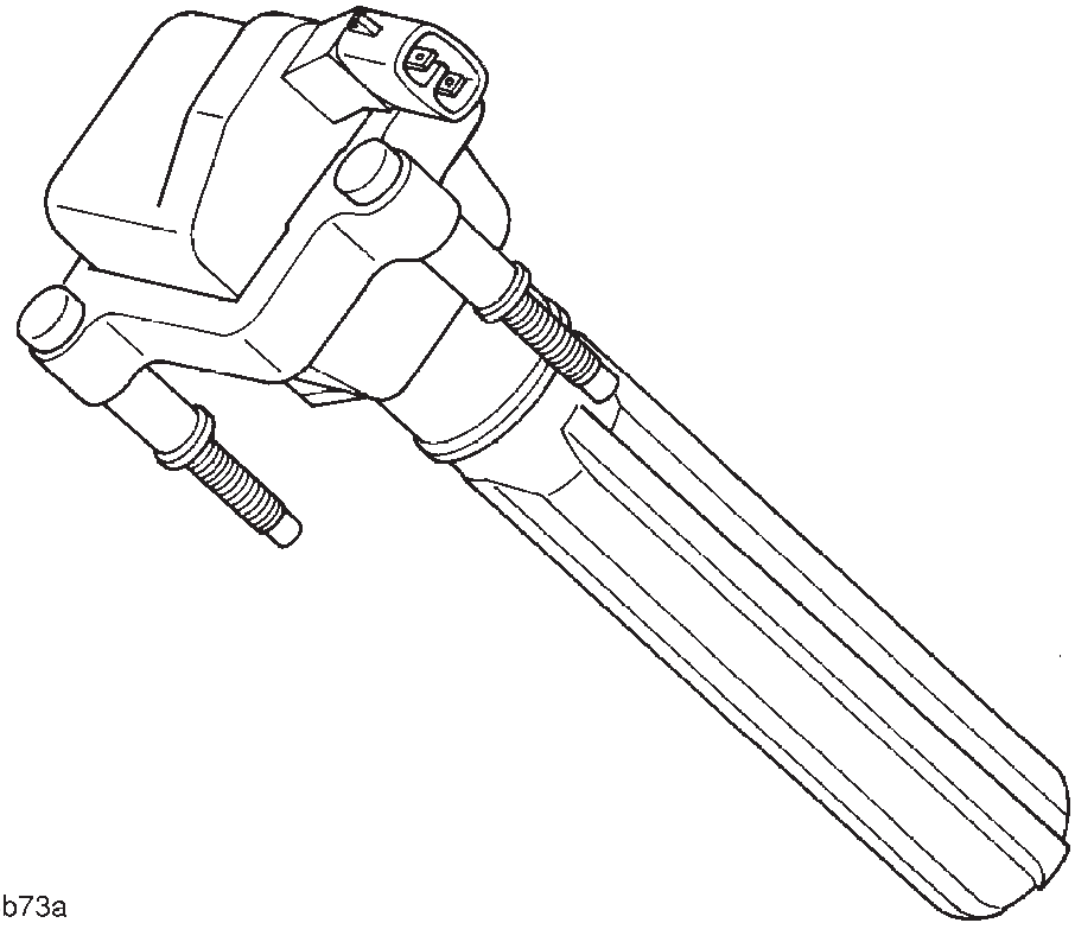
TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION



**Perform Verification TEST VER-1A.* | ***Check connectors - Clean / repair as necessary.*

TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION

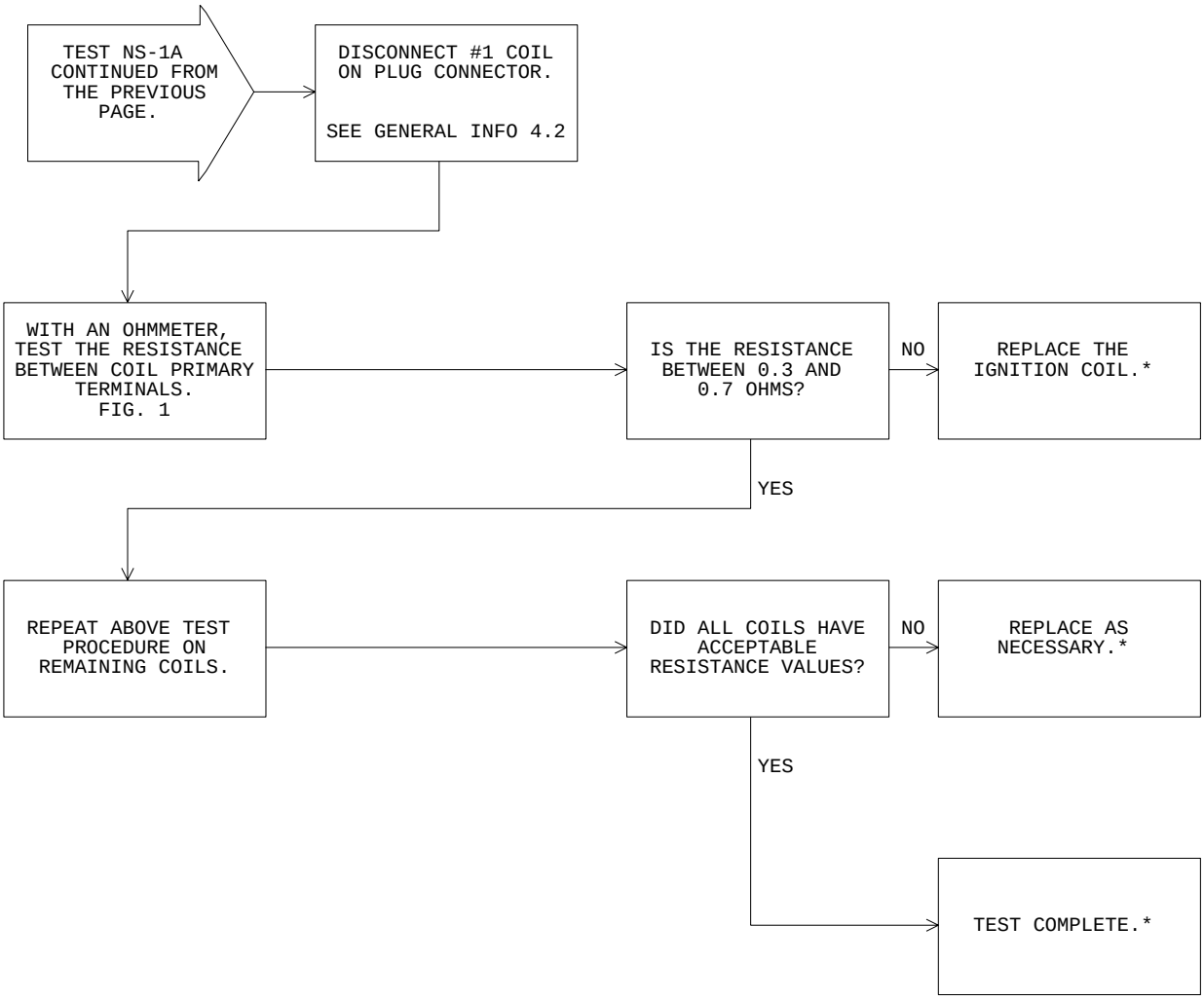
COIL ON PLUG
TYPICAL



80b4b73a

FIG. 1

TEST NS-1A CONTINUED - QUALIFYING A NO START CONDITION

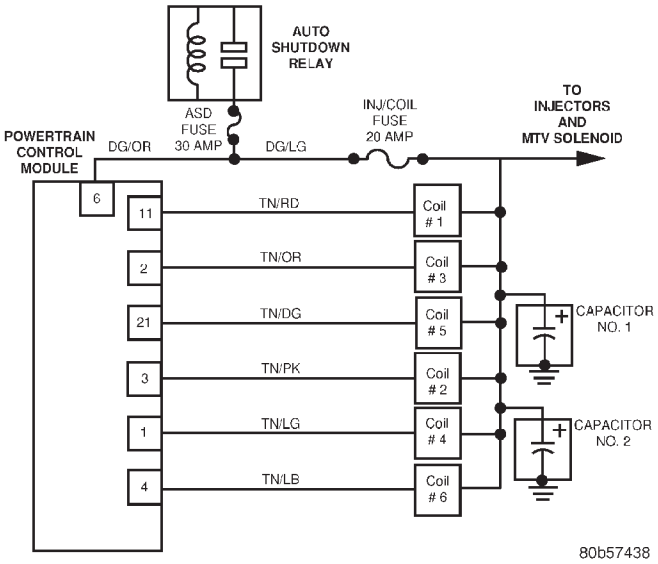


***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST NS-1B QUALIFYING A NO START CONDITION

Perform TEST NS-1A Before Proceeding



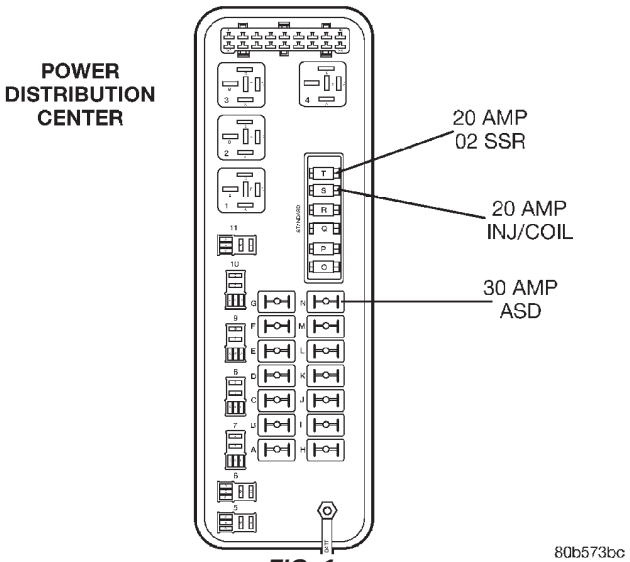
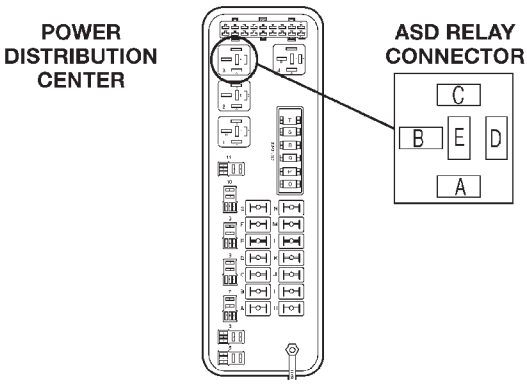


FIG. 1



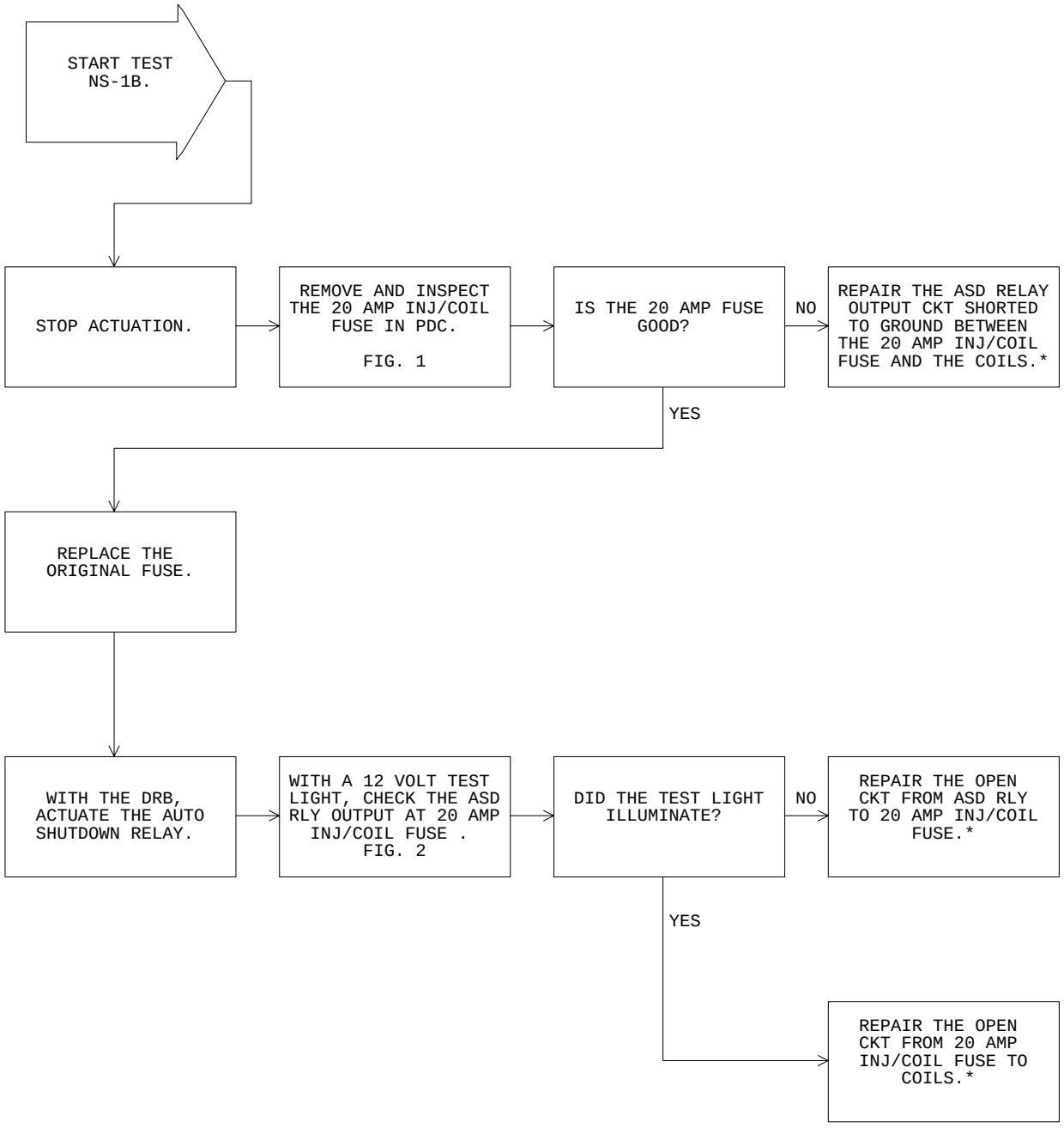
CAV	COLOR	FUNCTION
A (86)	RD/WT	FUSED B(+)
B (30)	RD/WT	FUSED B(+)
C (85)	DB/YL	AUTO SHUTDOWN RELAY CONTROL
D (87)	DG/OR	AUTO SHUTDOWN RELAY OUTPUT

80b4fb4f

FIG. 2

TEST NS-1B QUALIFYING A NO START CONDITION

Perform TEST NS-1A Before Proceeding



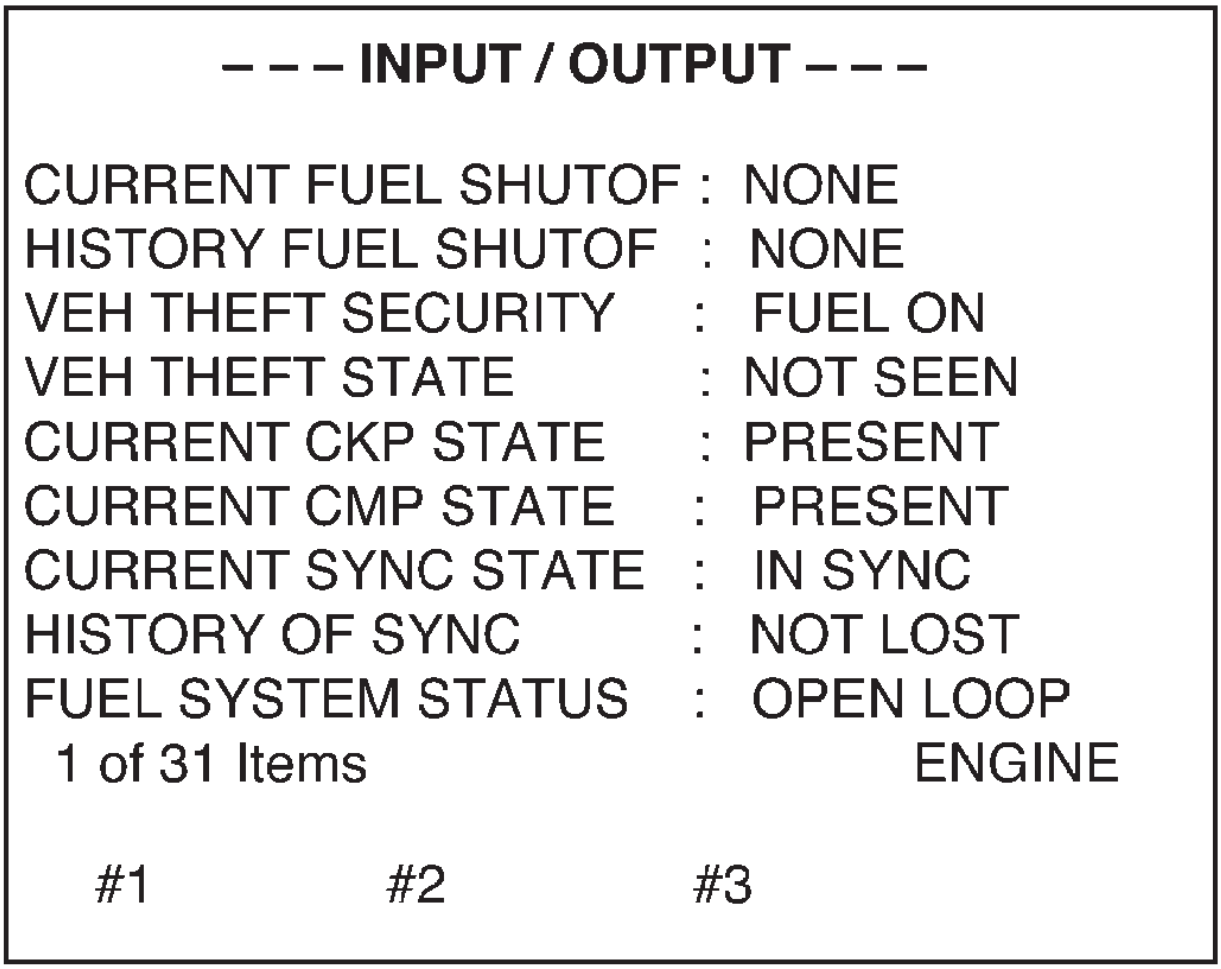
Perform Verification TEST VER-1A.

***Check connectors - Clean / repair as necessary.**

TEST NS-2A | **CHECKING FUEL SYSTEM**

Perform TEST DTC Before Proceeding

TYPCIAL DRB SCREEN

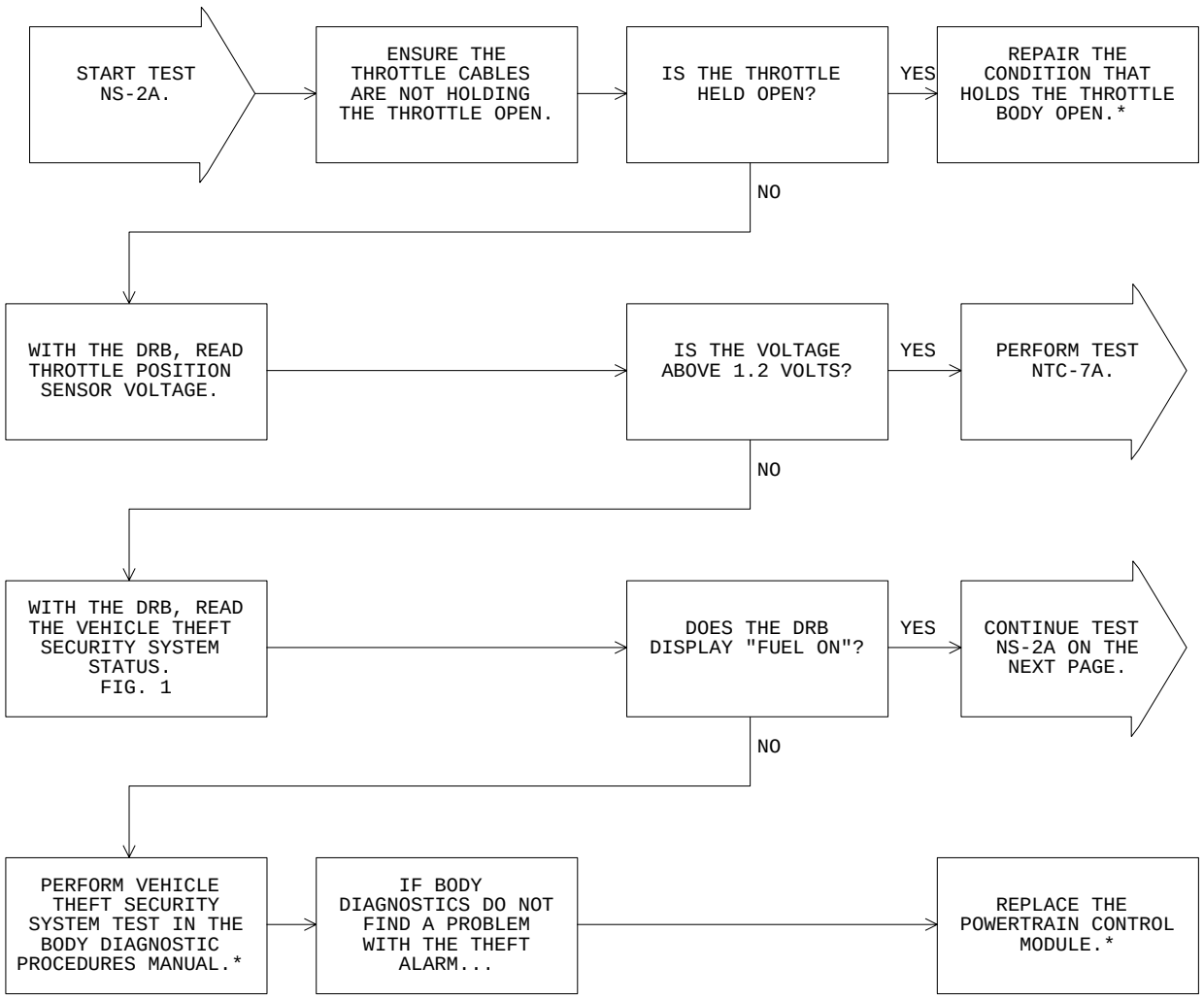


80b29fd6

FIG. 1

TEST NS-2A CHECKING FUEL SYSTEM

Perform TEST DTC Before Proceeding



***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST NS-2A CONTINUED - CHECKING FUEL SYSTEM

Perform TEST NS-2A Before Proceeding

2.7L

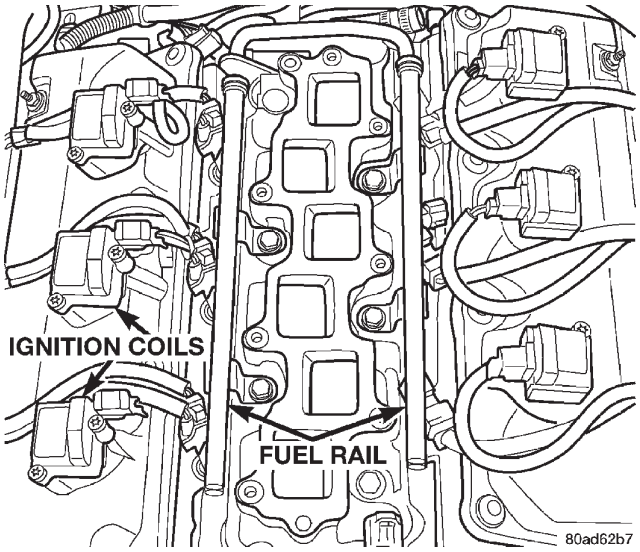


FIG. 1

3.5L

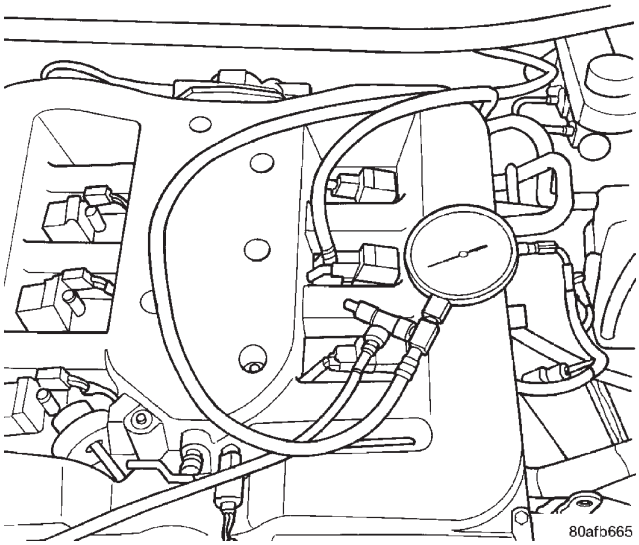


FIG. 2

FUEL SYSTEM PRESSURE SPECIFICATIONS

Note: Use the DRB tester to actuate the ASD Fuel System Test.

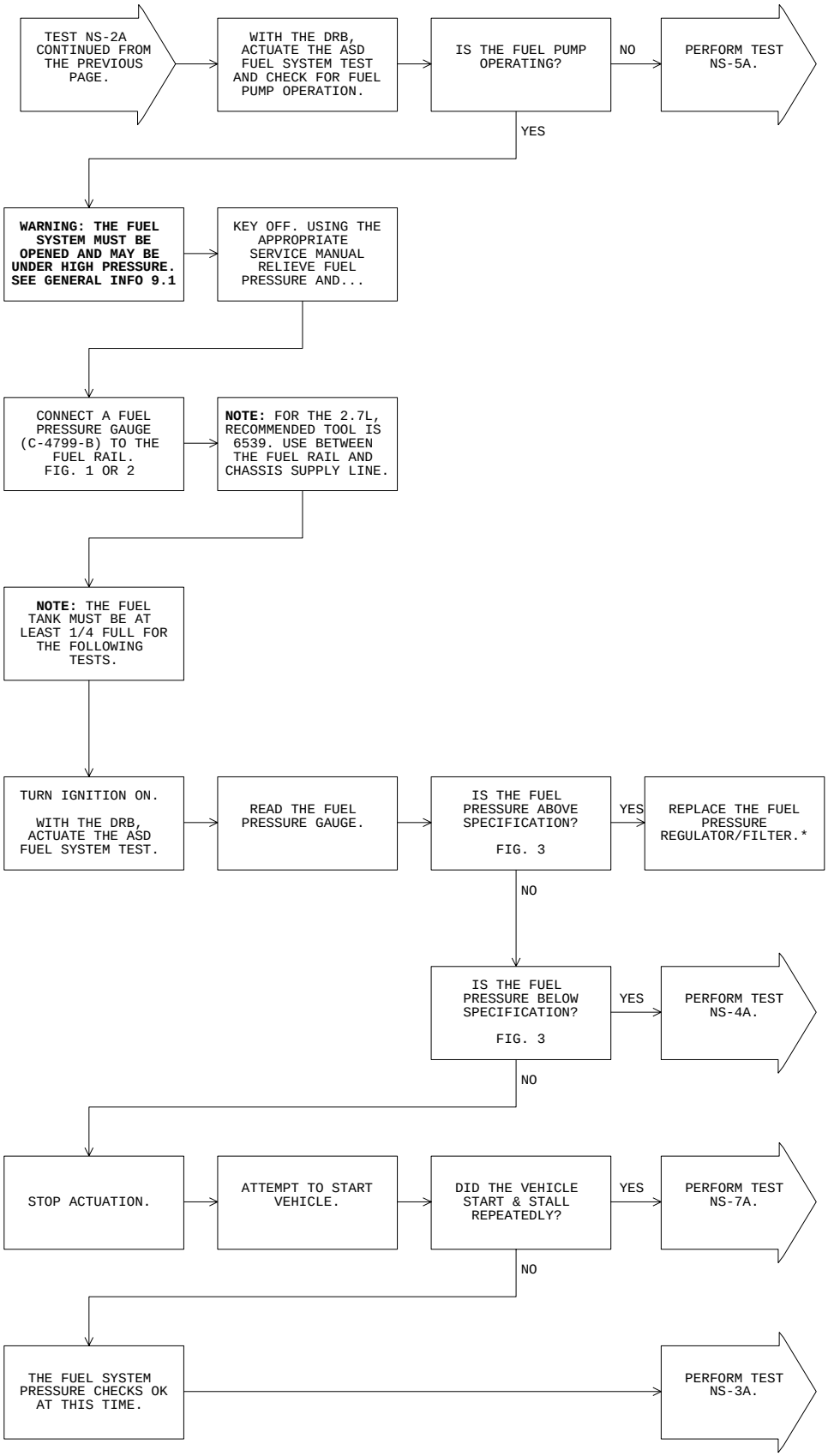
Body	Engine	Fuel Pressure
LH Body	ALL	48 PSI +/- 2 PSI

80b27c87

FIG. 3

TEST NS-2A CONTINUED - CHECKING FUEL SYSTEM

Perform TEST NS-2A Before Proceeding



Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST NS-3A CHECKING THE ENGINE MECHANICAL SYSTEMS

Perform TEST NS-2A Before Proceeding

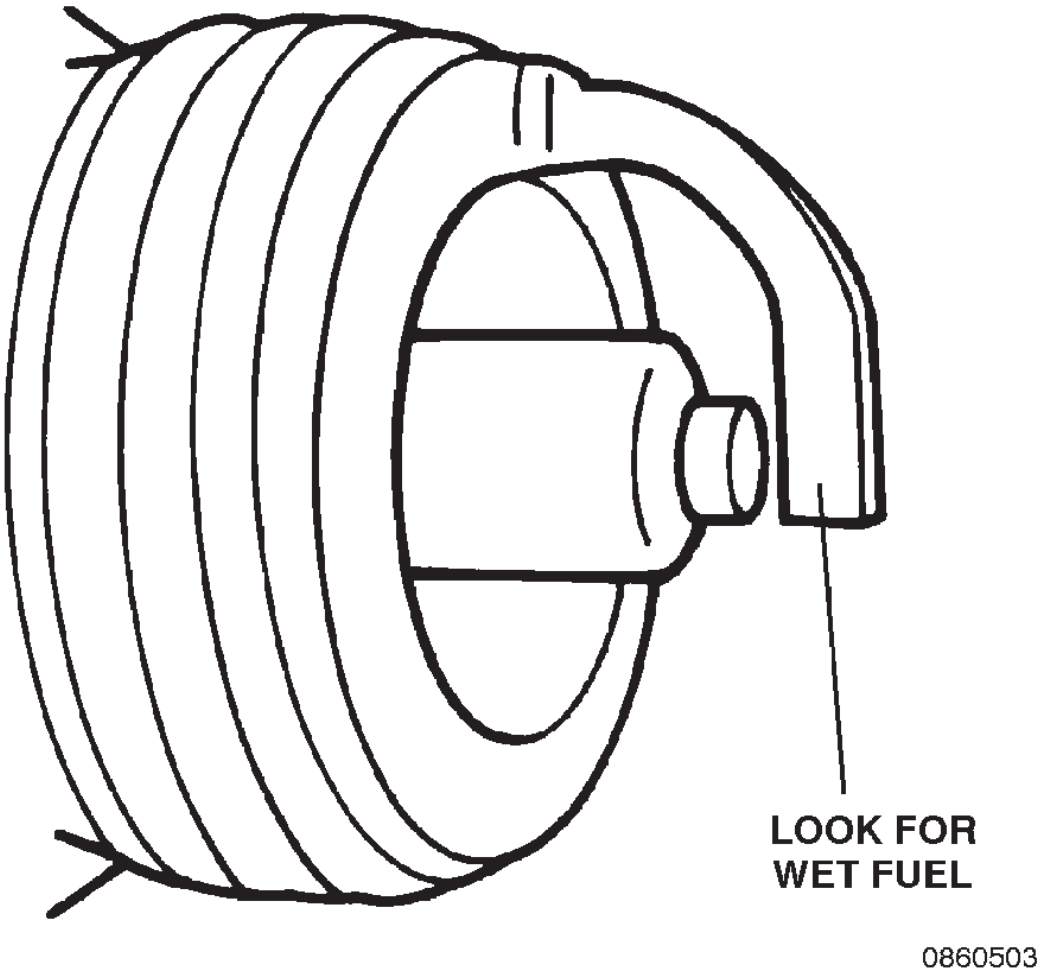
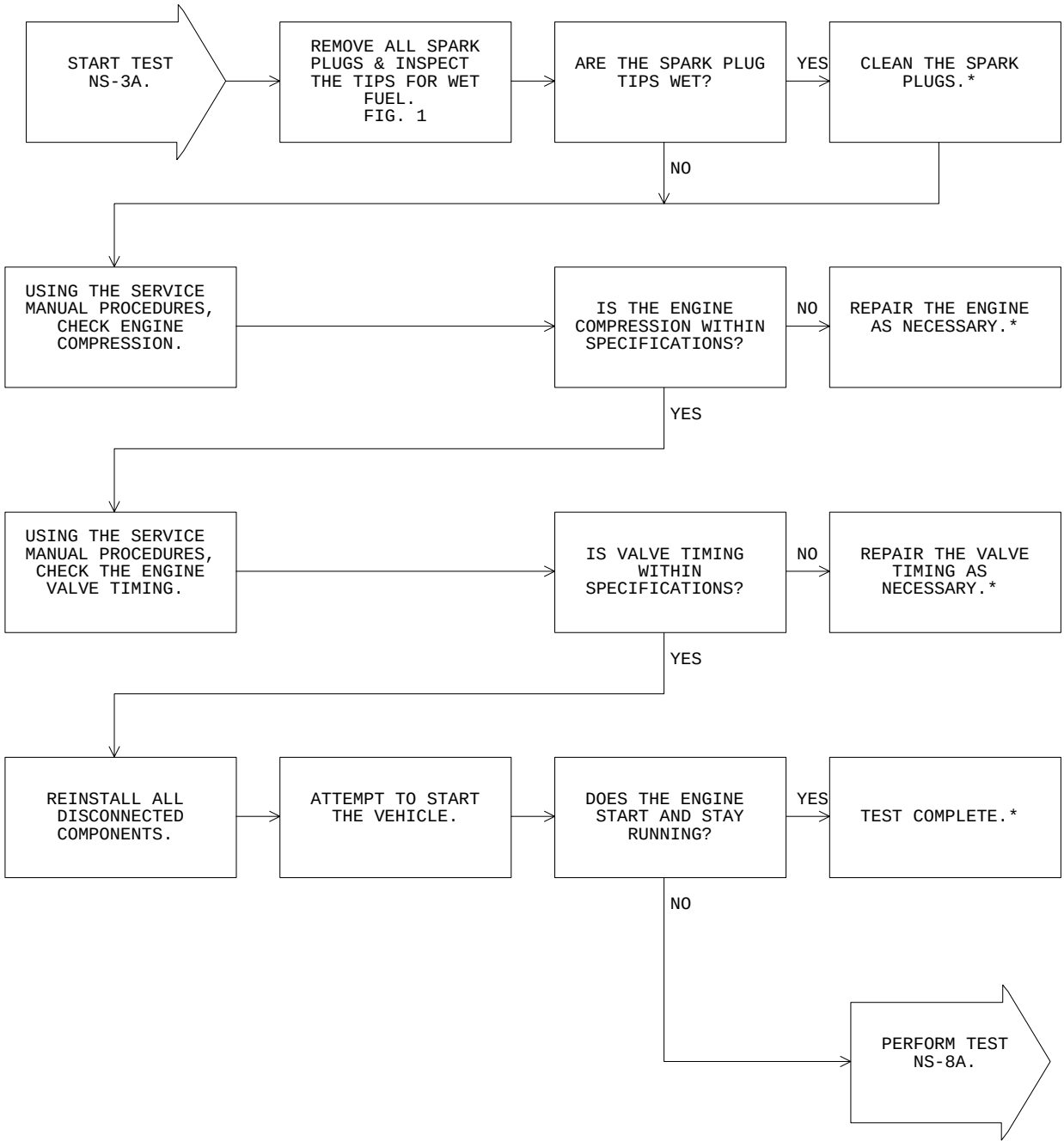


FIG. 1

TEST NS-3A CHECKING THE ENGINE MECHANICAL SYSTEMS

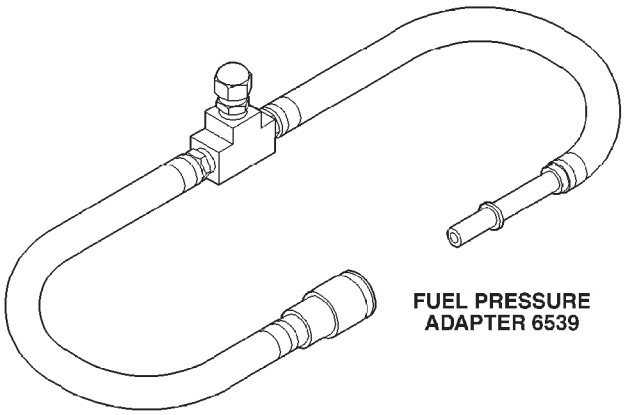
Perform TEST NS-2A Before Proceeding



Perform Verification TEST VER-1A.

*****Check connectors - Clean / repair as necessary.***

TEST NS-4A REPAIRING LOW FUEL PRESSURE



80b30880

FIG. 1

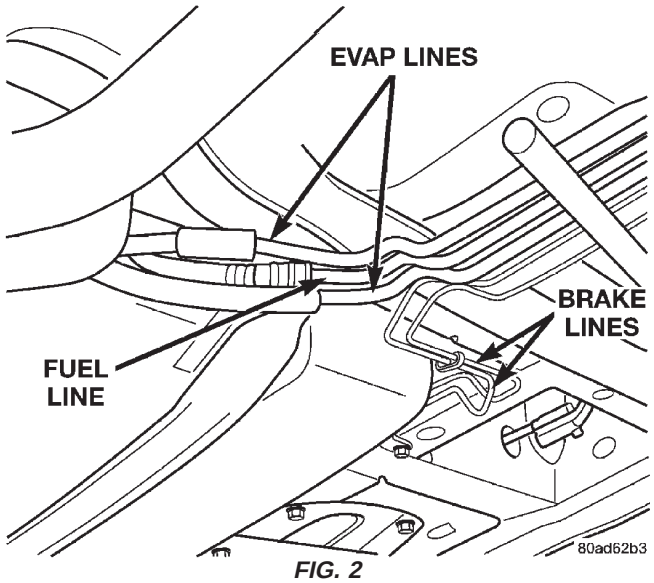
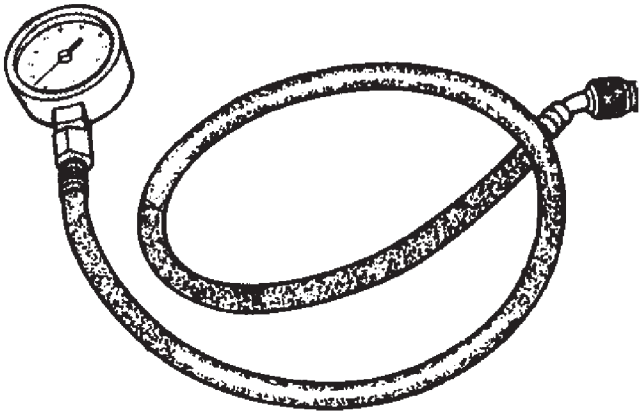


FIG. 2

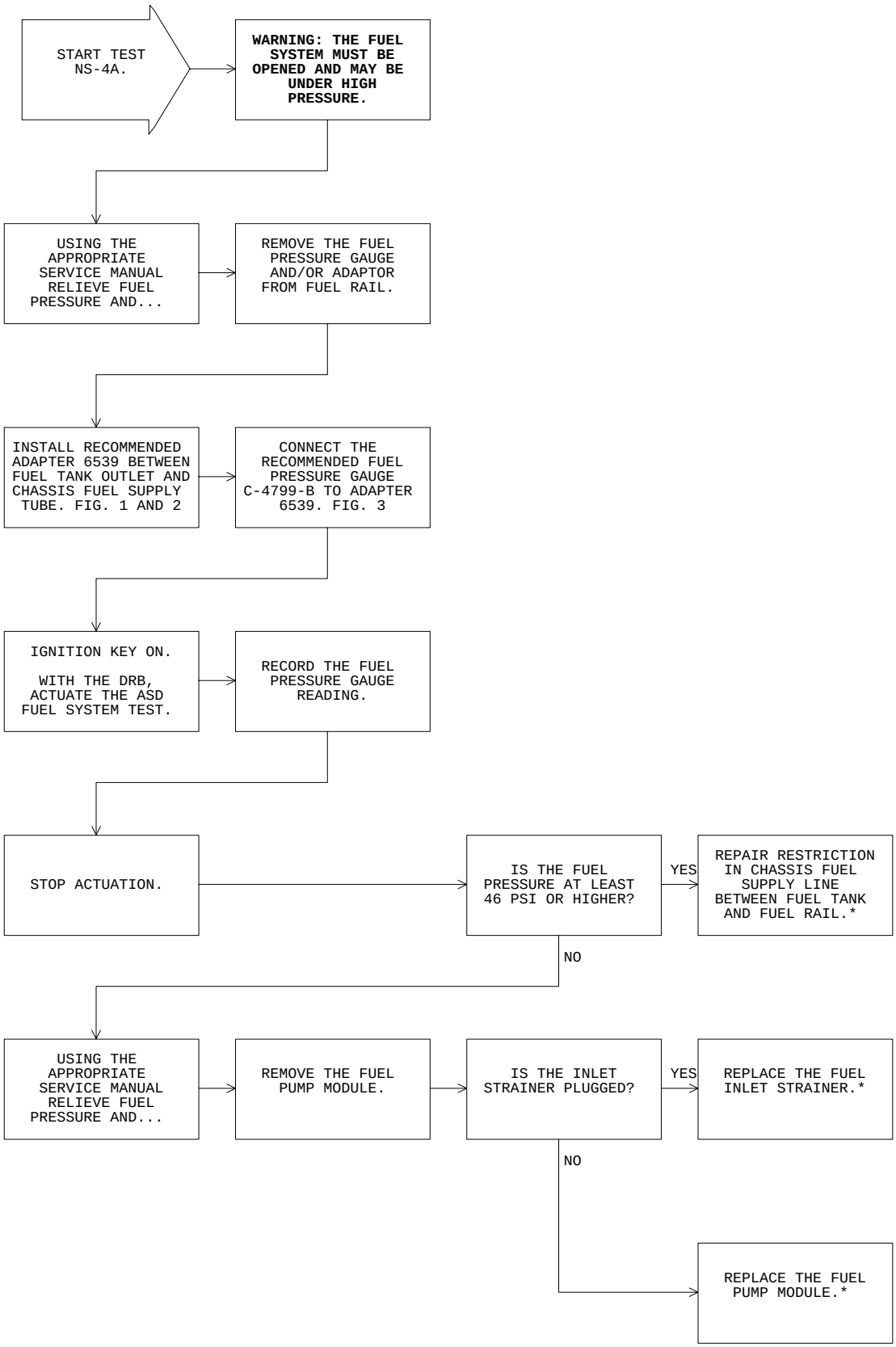


SPECIAL TOOL C-4799-B

0940403

FIG. 3

TEST NS-4A REPAIRING LOW FUEL PRESSURE

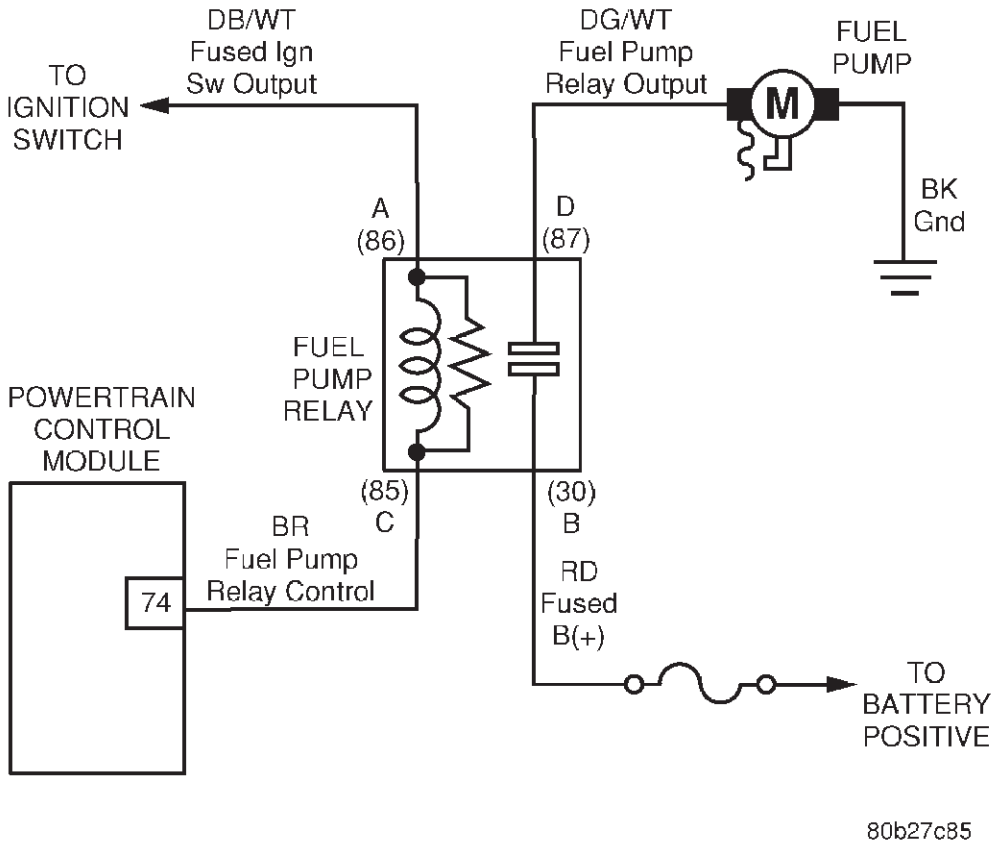


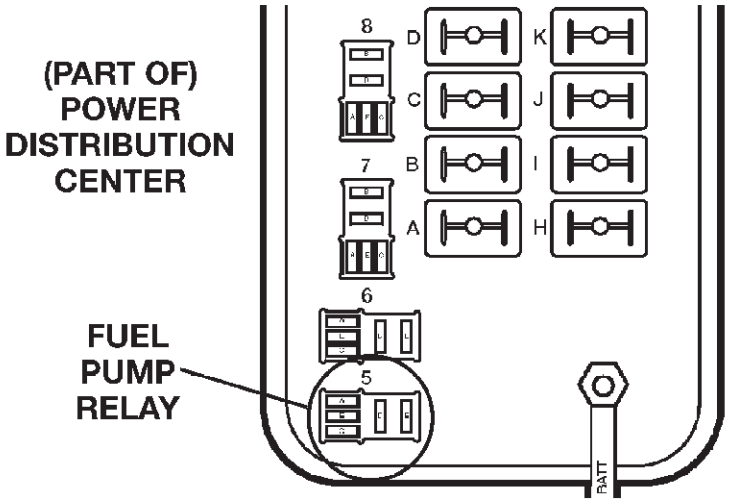
***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST NS-5A CHECKING THE FUEL PUMP

Perform TEST NS-2A Before Proceeding





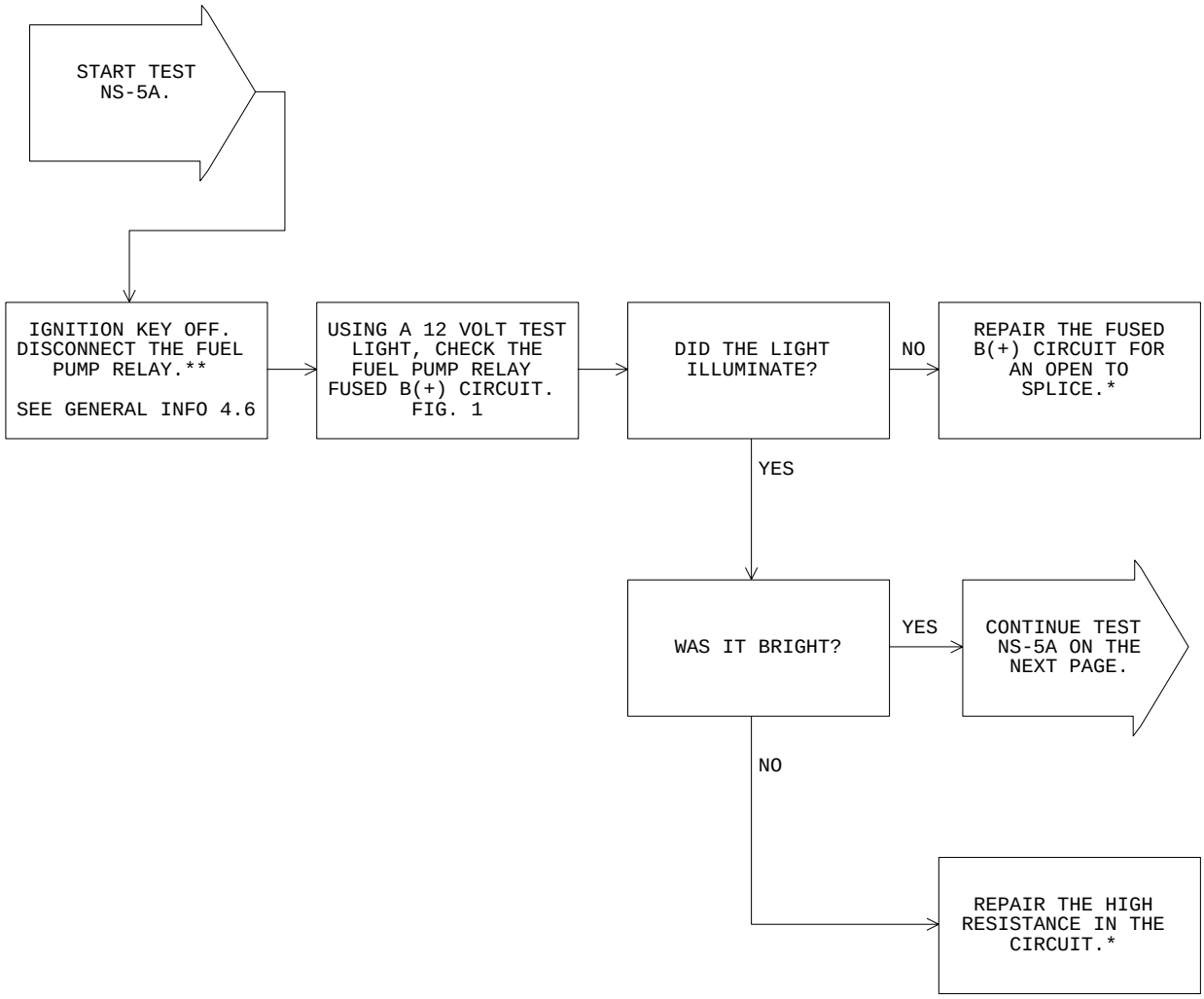
CAV	COLOR	FUNCTION
A(86)	DB/WT	FUSED IGNITION SWITCH OUTPUT
B(30)	RD	FUSED B(+)
C(85)	BR	FUEL PUMP RELAY CONTROL
D(87)	DG/WT	FUEL PUMP RELAY OUTPUT

80b4fb4e

FIG. 1

TEST NS-5A CHECKING THE FUEL PUMP

Perform TEST NS-2A Before Proceeding



***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

TEST NS-5A CONTINUED - CHECKING THE FUEL PUMP

LOCATED UNDER REAR SEAT

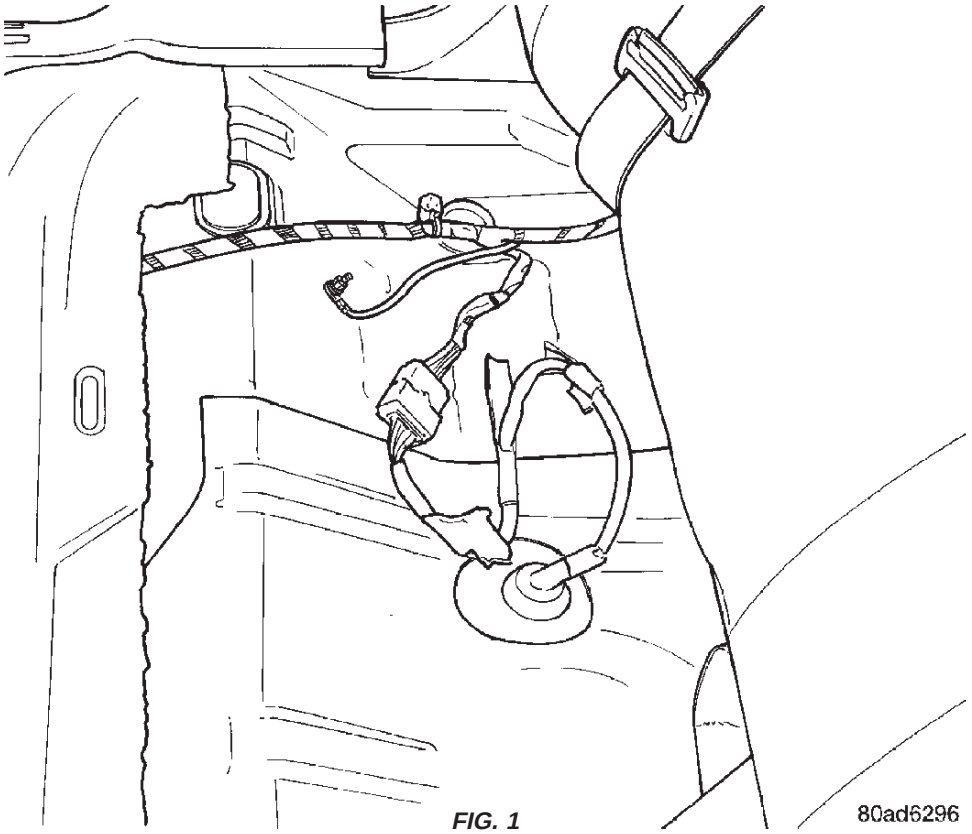
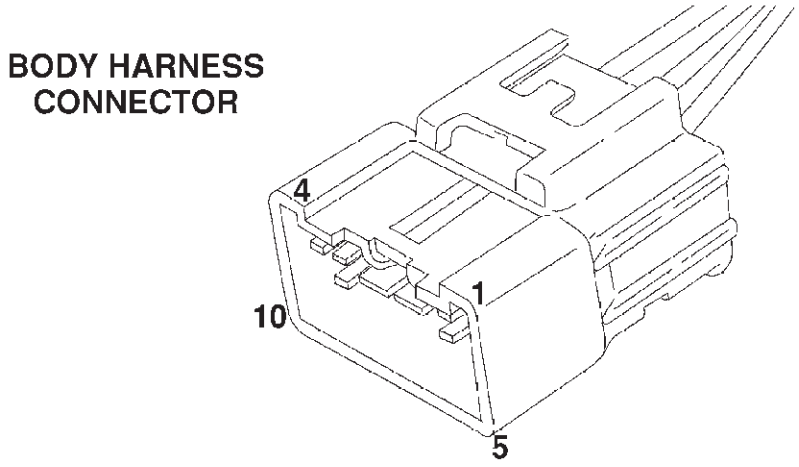


FIG. 1

80ad6296

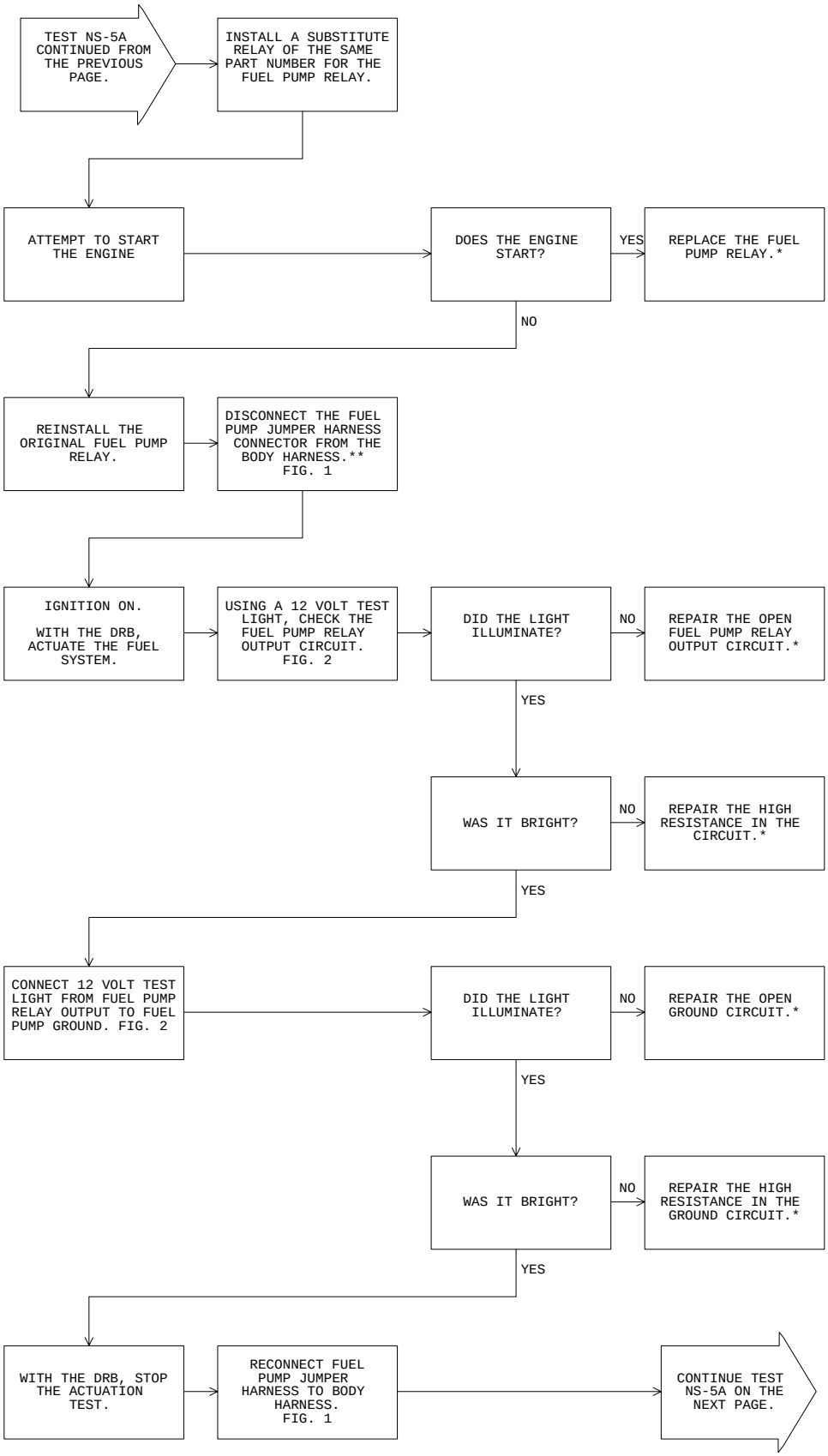


CAV	COLOR	FUNCTION
2	DB	FUEL LEVEL SENSOR SIGNAL
7	DG/WT	FUEL PUMP RELAY OUTPUT
8	BK	GROUND (FUEL PUMP)

80b4fb27

FIG. 2

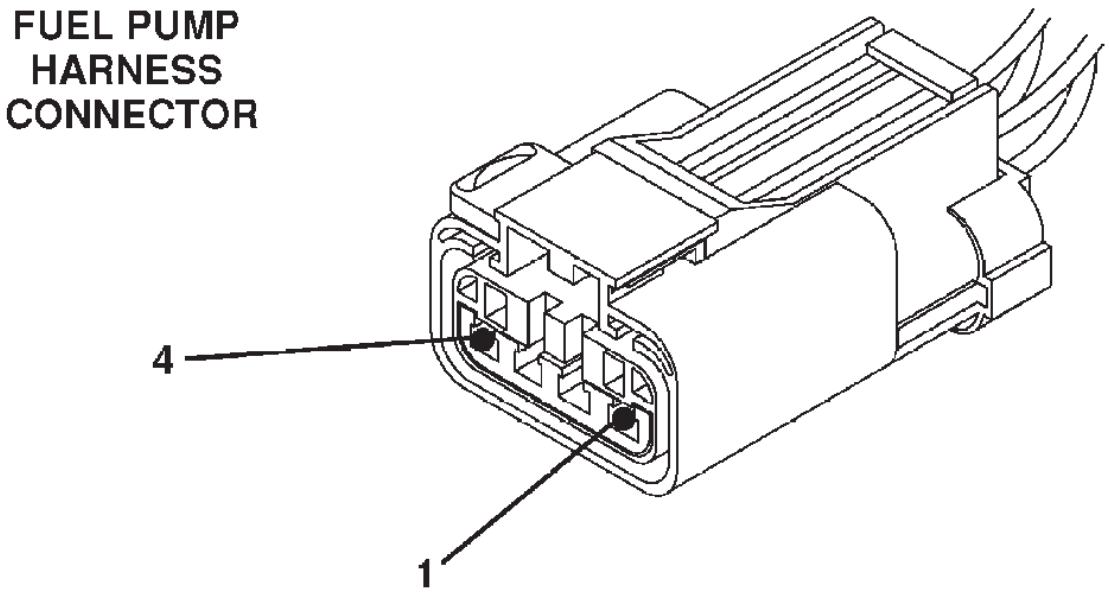
TEST NS-5A CONTINUED - CHECKING THE FUEL PUMP



Perform Verification TEST VER-1A.

****Check connectors - Clean / repair as necessary.***

TEST NS-5A CONTINUED - CHECKING THE FUEL PUMP

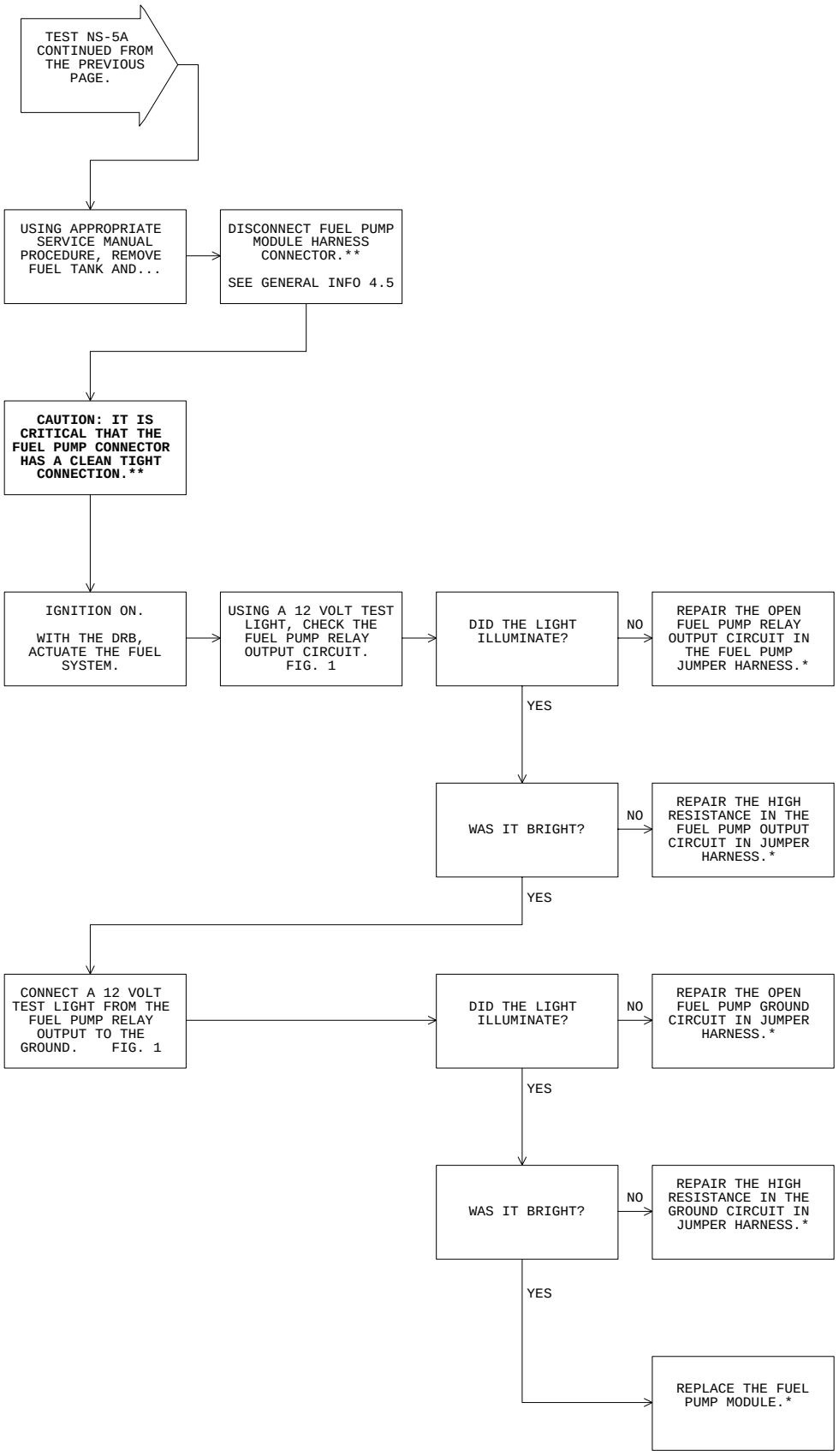


CAV	COLOR	FUNCTION
1	BK	GROUND (FUEL PUMP)
2	BK/LG	GROUND (SENSOR)
3	DB	FUEL LEVEL SENSOR SIGNAL
4	DG/WT	FUEL PUMP RELAY OUTPUT

80b6eff7

FIG. 1

TEST NS-5A CONTINUED - CHECKING THE FUEL PUMP



Perform Verification TEST VER-1A.

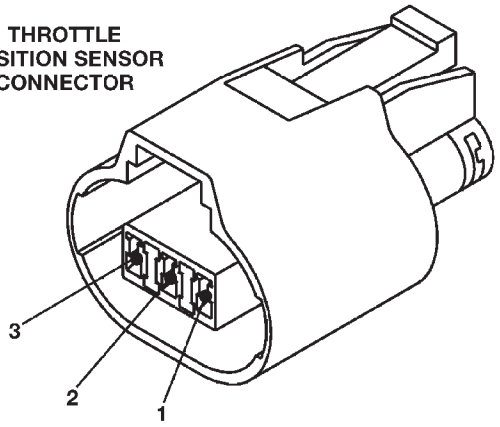
Check connectors - Clean / repair as necessary.

TEST NS-6A REPAIRING A "NO RESPONSE" CONDITION

Perform TEST DTC Before Proceeding

2.7L

THROTTLE POSITION SENSOR CONNECTOR



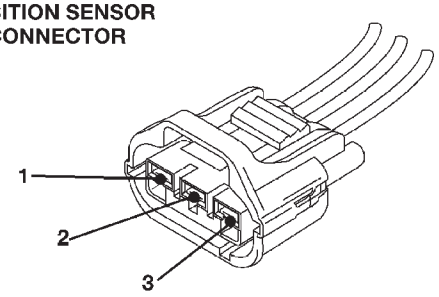
CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b27c72

FIG. 1

3.5L

THROTTLE POSITION SENSOR CONNECTOR

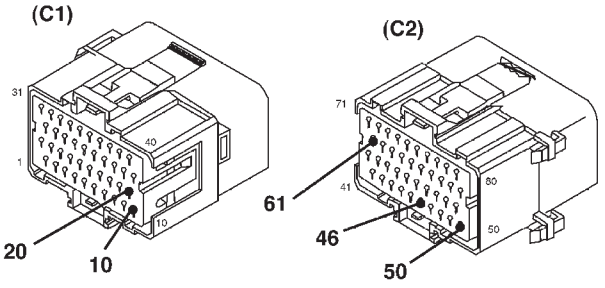


CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	OR/DB	TP SENSOR SIGNAL
3	BK/LB	SENSOR GROUND

80b04fa9

FIG. 2

POWERTRAIN CONTROL MODULE CONNECTORS



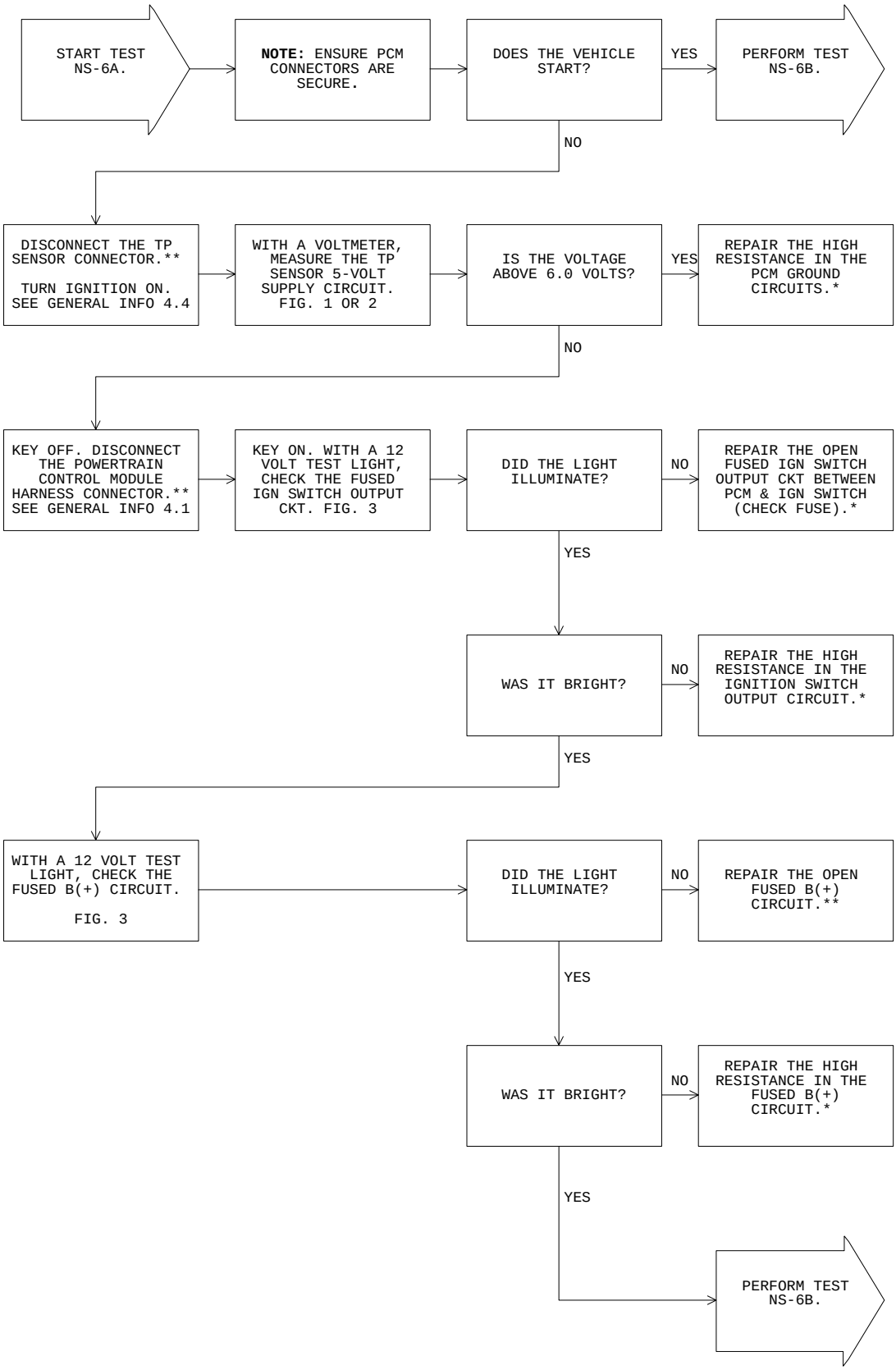
CAV	COLOR	FUNCTION
10	BK/TN	GROUND
20	DB/WT	FUSED IGNITION SWITCH OUTPUT
46	RD/WT	FUSED B(+)
47	BK/WT	GROUND
50	BK/TN	GROUND
61	VT/WT	5-VOLT SUPPLY

80b27c78

FIG. 3

TEST NS-6A | REPAIRING A ″NO RESPONSE″ CONDITION

Perform TEST DTC Before Proceeding

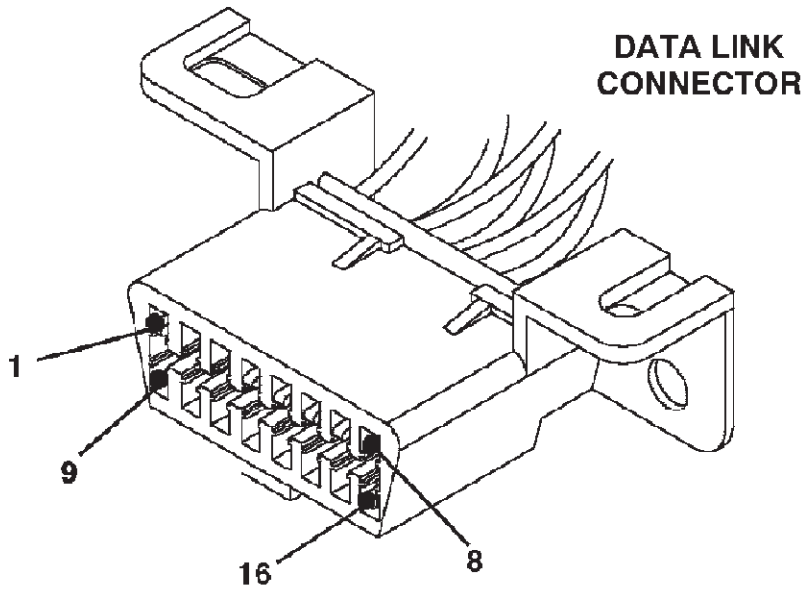


Perform Verification TEST VER-1A.

****Check connectors - Clean / repair as necessary.***

TEST NS-6B REPAIRING A ″NO RESPONSE″ CONDITION

Perform TEST NS-6A Before Proceeding



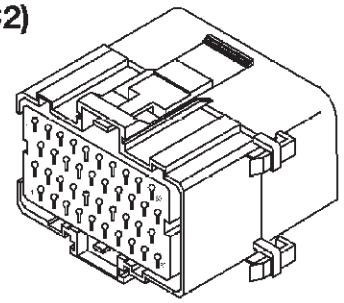
CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
2	YL/VT	PCI BUS	8	RD/WT	FUSED IGN SW OUTPUT
4	BK	GROUND	14	PK/BK	SCI RECEIVE (TCM)
5	BK/LG	GROUND	16	PK	FUSED B(+)
6	LG	SCI RECEIVE (PCM)			
7	DB	SCI TRANSM T (TCM)			

80b6eff8

FIG. 1

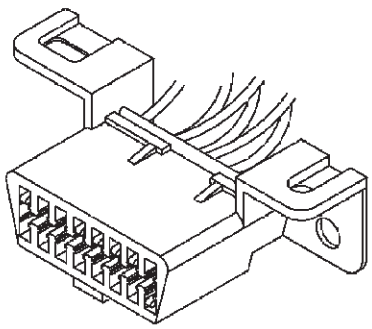
POWERTRAIN CONTROL MODULE CONNECTOR (C2)

CAV	COLOR	FUNCTION
59	YL/VT	PCI BUS
65	DB	SCI TRANSMIT
75	LG	SCI RECEIVE



DATA LINK CONNECTOR

CAV	COLOR	FUNCTION
2	YL/VT	PCI BUS
6	LG	SCI RECEIVE
7	DB	SCI TRANSMIT

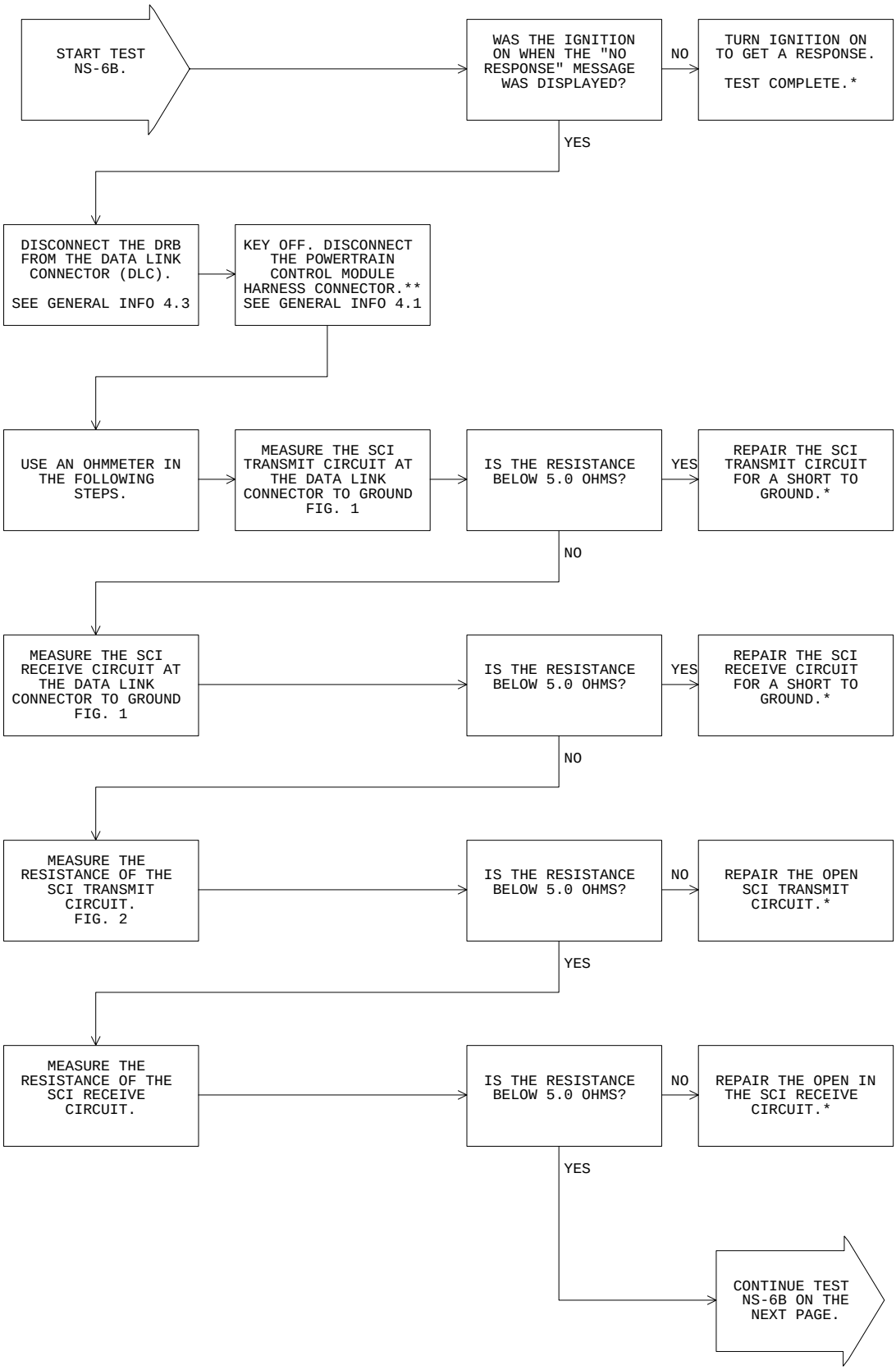


80b27c80

FIG. 2

TEST NS-6B REPAIRING A ″NO RESPONSE″ CONDITION

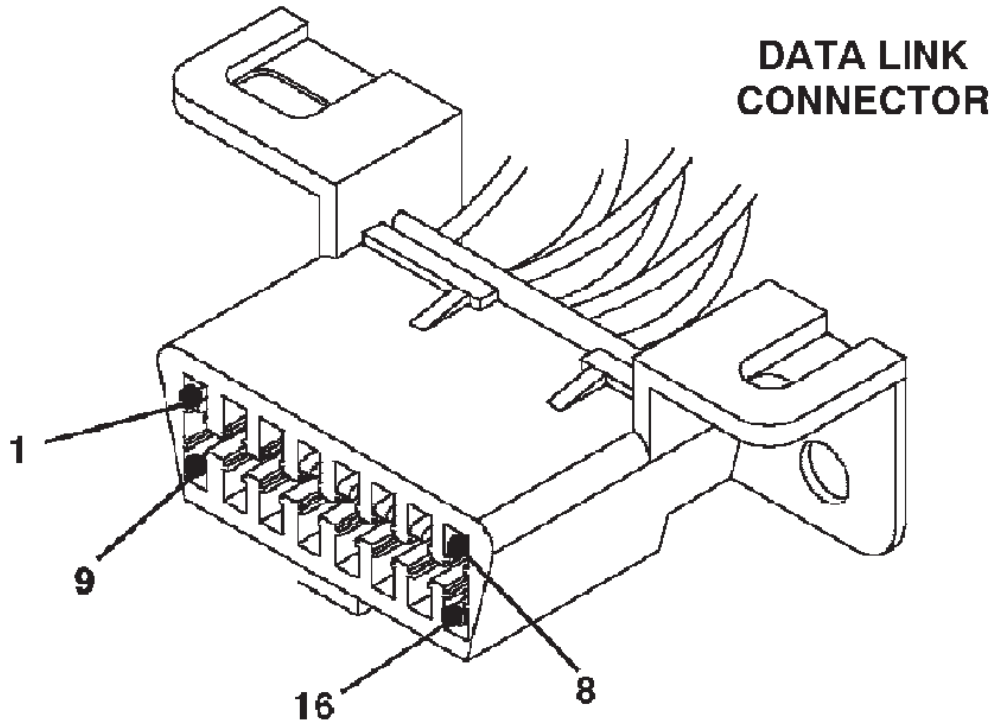
Perform TEST NS-6A Before Proceeding



Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.

TEST NS-6B CONTINUED - REPAIRING A "NO RESPONSE" CONDITION

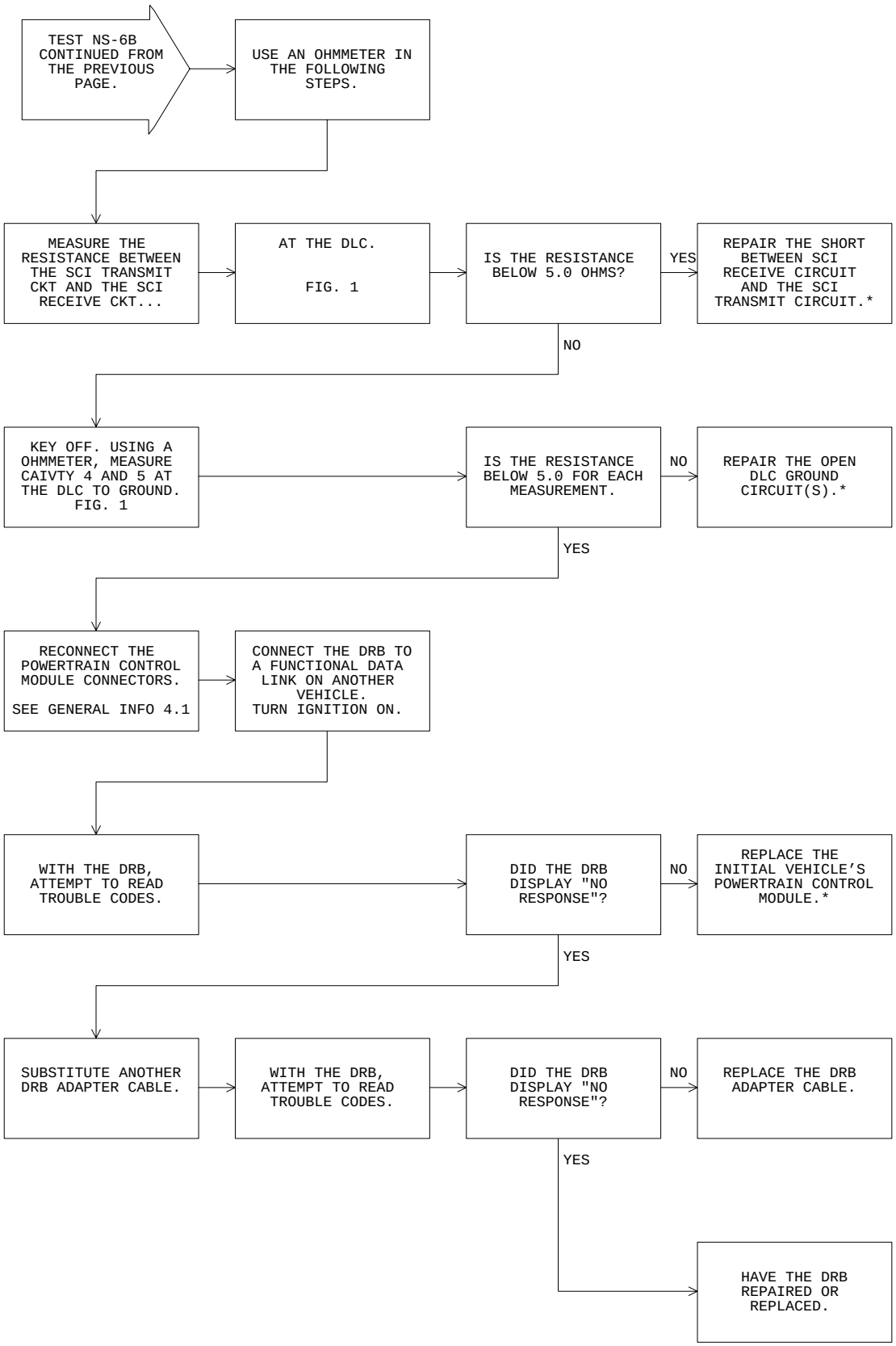


CAV	COLOR	FUNCTION	CAV	COLOR	FUNCTION
2	YL/VT	PCI BUS	8	RD/WT	FUSED IGN SW OUTPUT
4	BK	GROUND	14	PK/BK	SCI RECEIVE (TCM)
5	BK/LG	GROUND	16	PK	FUSED B(+)
6	LG	SCI RECEIVE (PCM)			
7	DB	SCI TRANSM T (TCM)			

80b6eff8

FIG. 1

TEST NS-6B CONTINUED - REPAIRING A ″NO RESPONSE″ CONDITION



***Perform Verification TEST VER-1A.**

****Check connectors - Clean / repair as necessary.**

NO START TESTS

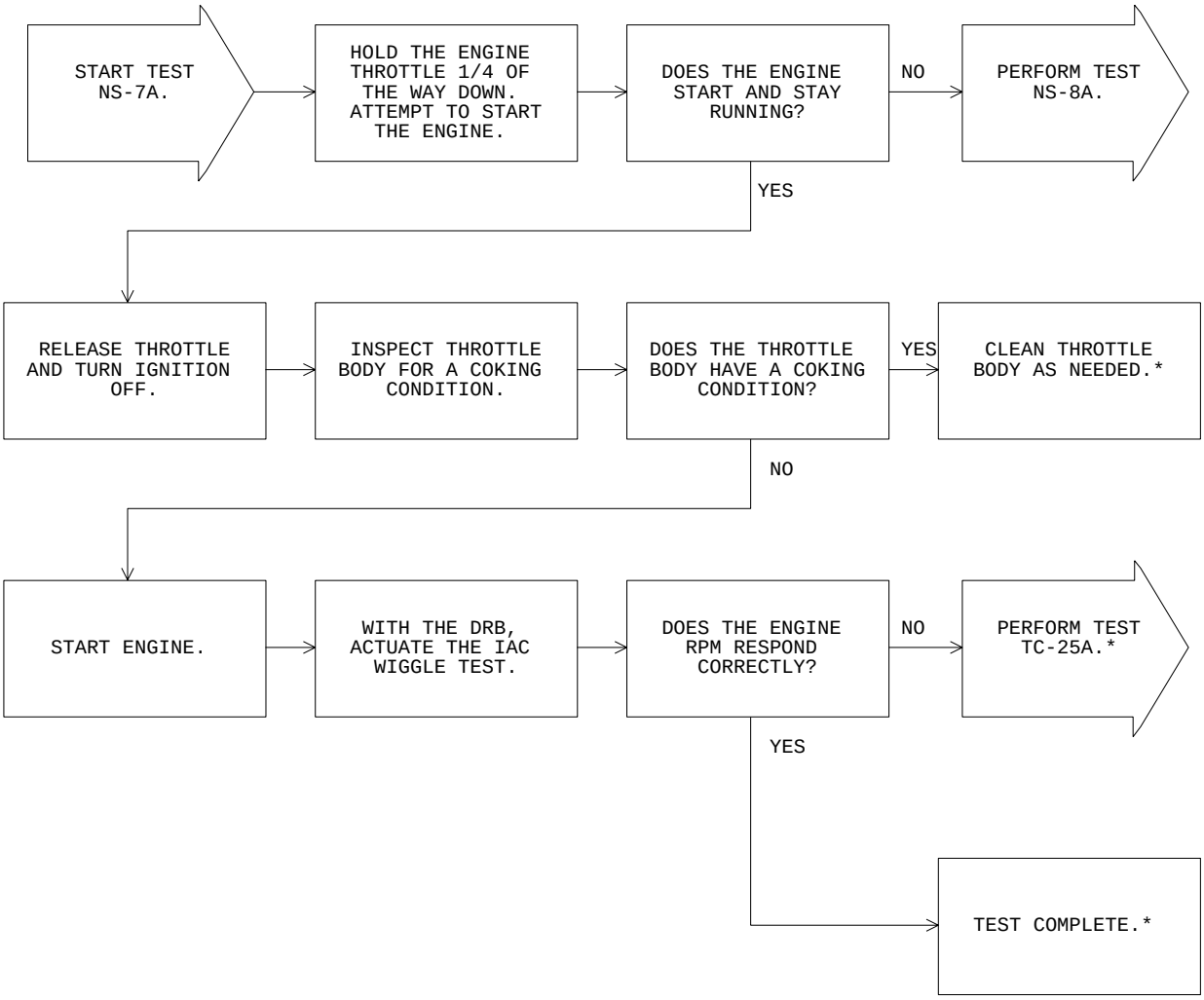
TEST NS-7A **CHECKING THE IDLE AIR CONTROL MOTOR OPERATION**

Perform TEST NS-2A Before Proceeding

NOTES

TEST NS-7A CHECKING THE IDLE AIR CONTROL MOTOR OPERATION

Perform TEST NS-2A Before Proceeding



Perform Verification TEST VER-1A.

*****Check connectors - Clean / repair as necessary.***

TEST NS-8A REPAIRING A START AND STALL CONDITION

Perform TEST NS-7A Before Proceeding

NOTES

TEST NS-8A REPAIRING A START AND STALL CONDITION

Perform TEST NS-7A Before Proceeding

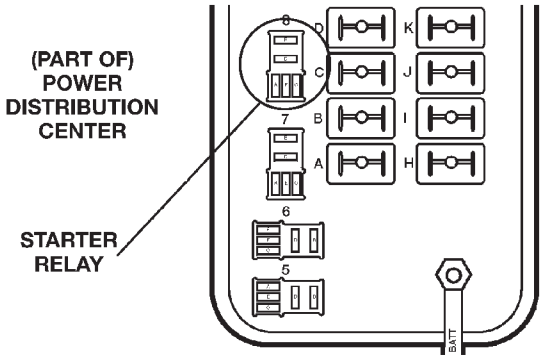
At this point in the diagnostic test procedure, you have determined that all of the **engine electrical systems** are operating as designed; therefore, they are **not the cause of the start and stall problem.** The following additional items should be checked as possible mechanical causes of the no start condition. Any one or more of these items can produce a no start condition; none can be overlooked as a possible cause.

1. **ENGINE VALVE TIMING -** must be within specifications
2. **ENGINE COMPRESSION -** must be within specifications
3. **ENGINE EXHAUST SYSTEM -** must be free of any restrictions
4. **ENGINE PCV SYSTEM -** must flow freely
5. **ENGINE DRIVE SPROCKETS OR TIMING BELTS -** must be properly positioned
6. **FUEL -** must be free of contamination
7. **ENGINE SECONDARY IGNITION CHECK -** must exhibit a normal scope pattern

Always look for any Technical Service Bulletins that may relate to this condition.

TEST NS-9A REPAIRING A NO CRANK CONDITION

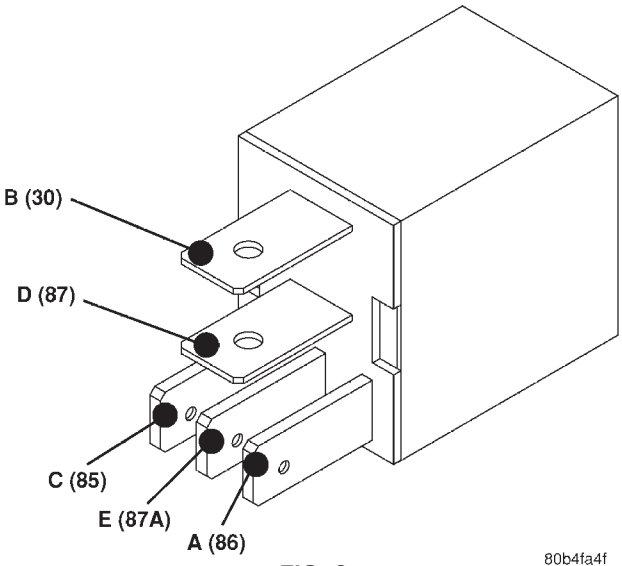
Perform TEST NS-1A Before Proceeding



CAV	COLOR	FUNCTION
A(86)	YL	IGNITION SWITCH OUTPUT (SWITCH)
B(30)	RD	FUSED B(+)
C(85)	TN/WT	STARTER RELAY CONTROL
D(87)	LG	STARTER RELAY OUTPUT

80b573bb

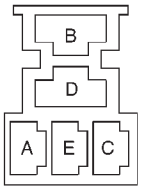
FIG. 1



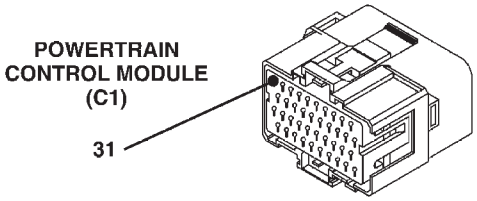
80b4fa4f

FIG. 2

STARTER RELAY
(IN PDC)



CAV	COLOR	FUNCTION
A (86)	YL	IGNITION SW OUTPUT (START)
B (30)	RD	FUSED B (+)
C (85)	TN/WT	STARTER RELAY CONTROL
D (87)	LG	STARTER RELAY OUTPUT



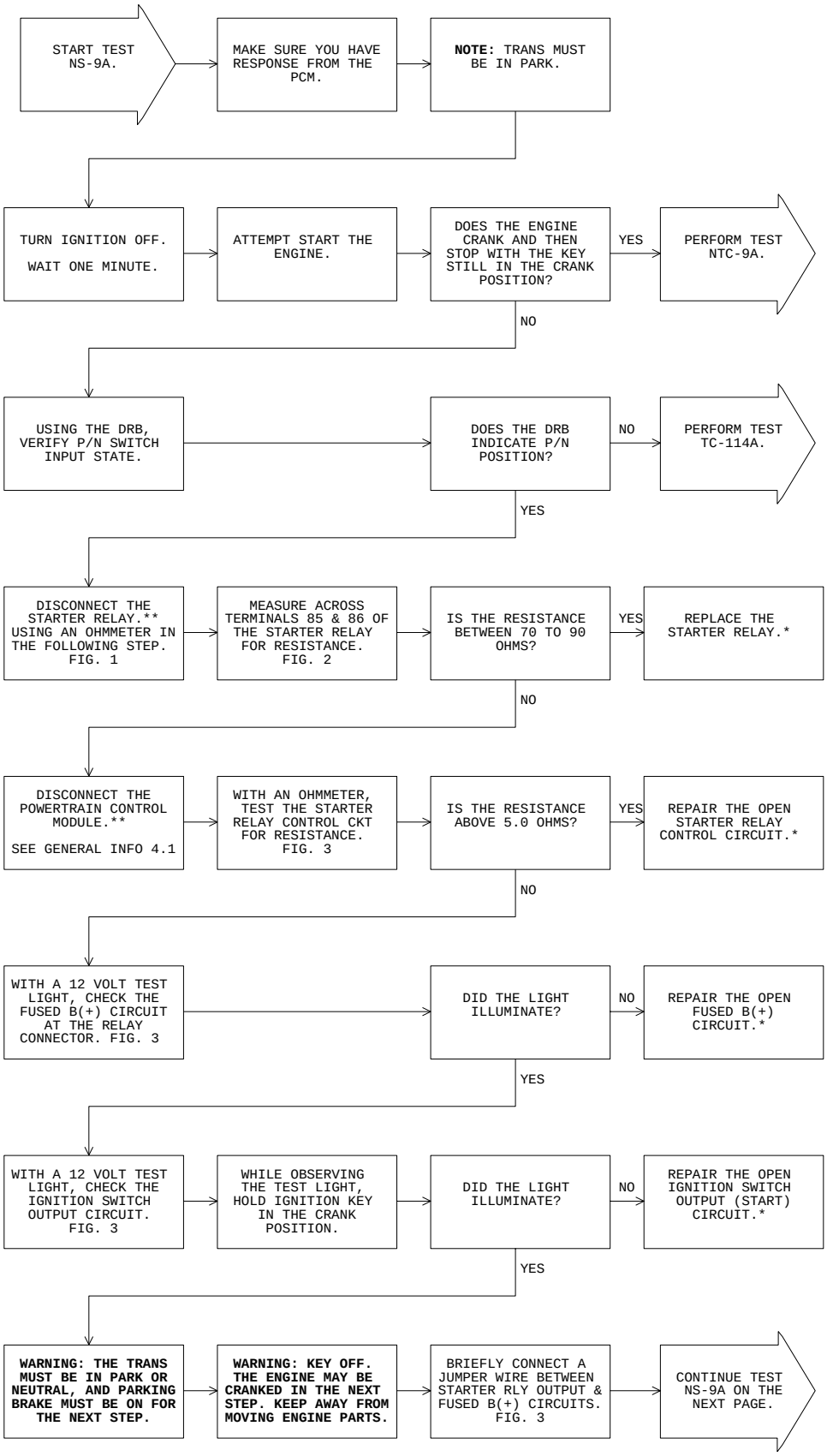
CAV	COLOR	FUNCTION
31	TN/WT	STARTER RELAY CONTROL

80b4fac5

FIG. 3

TEST NS-9A REPAIRING A NO CRANK CONDITION

Perform TEST NS-1A Before Proceeding



Perform Verification TEST VER-1A.

*****Check connectors - Clean / repair as necessary.***

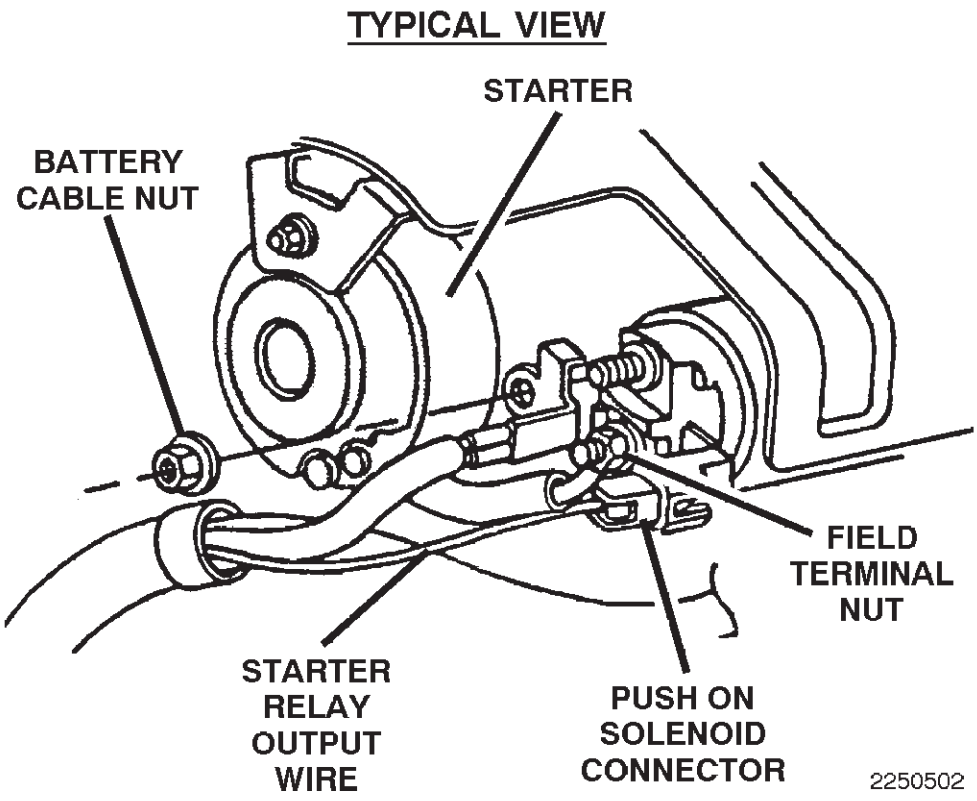
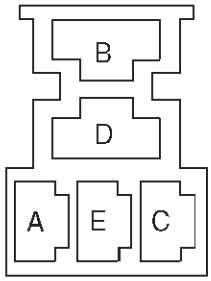
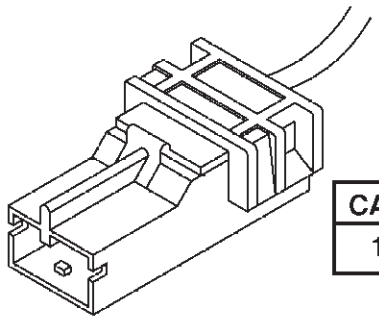


FIG. 1

STARTER RELAY (IN PDC)



CAV	COLOR	FUNCTION
A(86)	YL	IGNITION SW OUTPUT (START)
B(30)	RD	FUSED B(+)
C(85)	TN/WT	STARTER RELAY CONTROL
D(87)	LG	STARTER RELAY OUTPUT

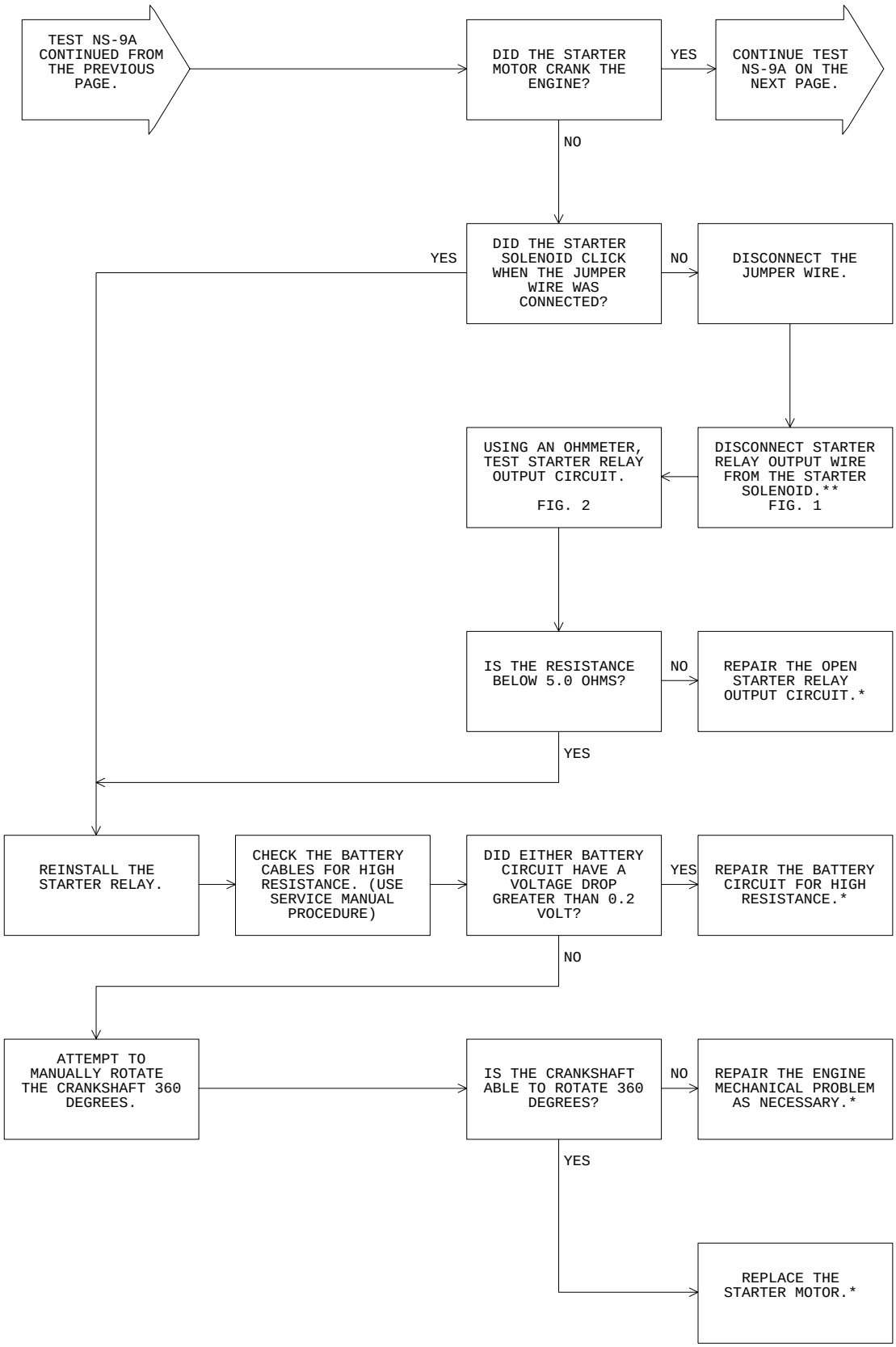


CAV	COLOR	FUNCTION
1	LG	STARTER RELAY OUTPUT

80b4fadb

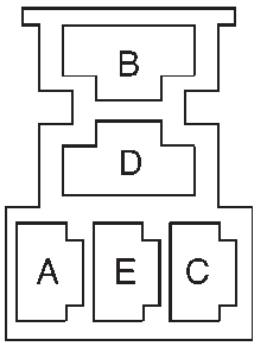
FIG. 2

TEST NS-9A CONTINUED - REPAIRING A NO CRANK CONDITION



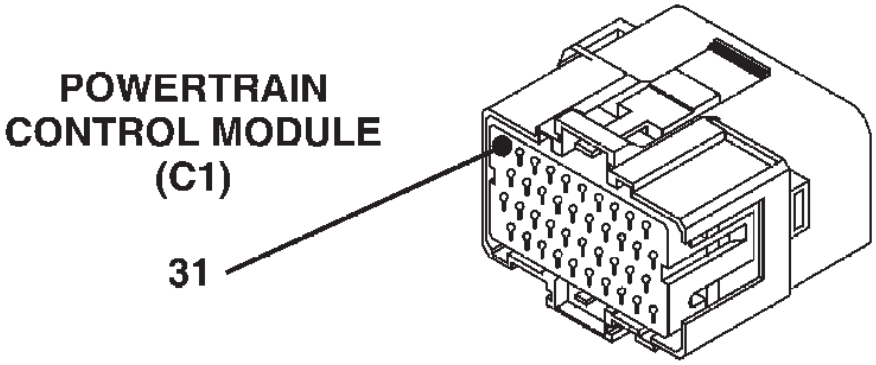
Perform Verification TEST VER-1A.

Check connectors - Clean / repair as necessary.



STARTER RELAY (IN PDC)

CAV	COLOR	FUNCTION
A (86)	YL	IGNITION SW OUTPUT (START)
B (30)	RD	FUSED B (+)
C (85)	TN/WT	STARTER RELAY CONTROL
D (87)	LG	STARTER RELAY OUTPUT

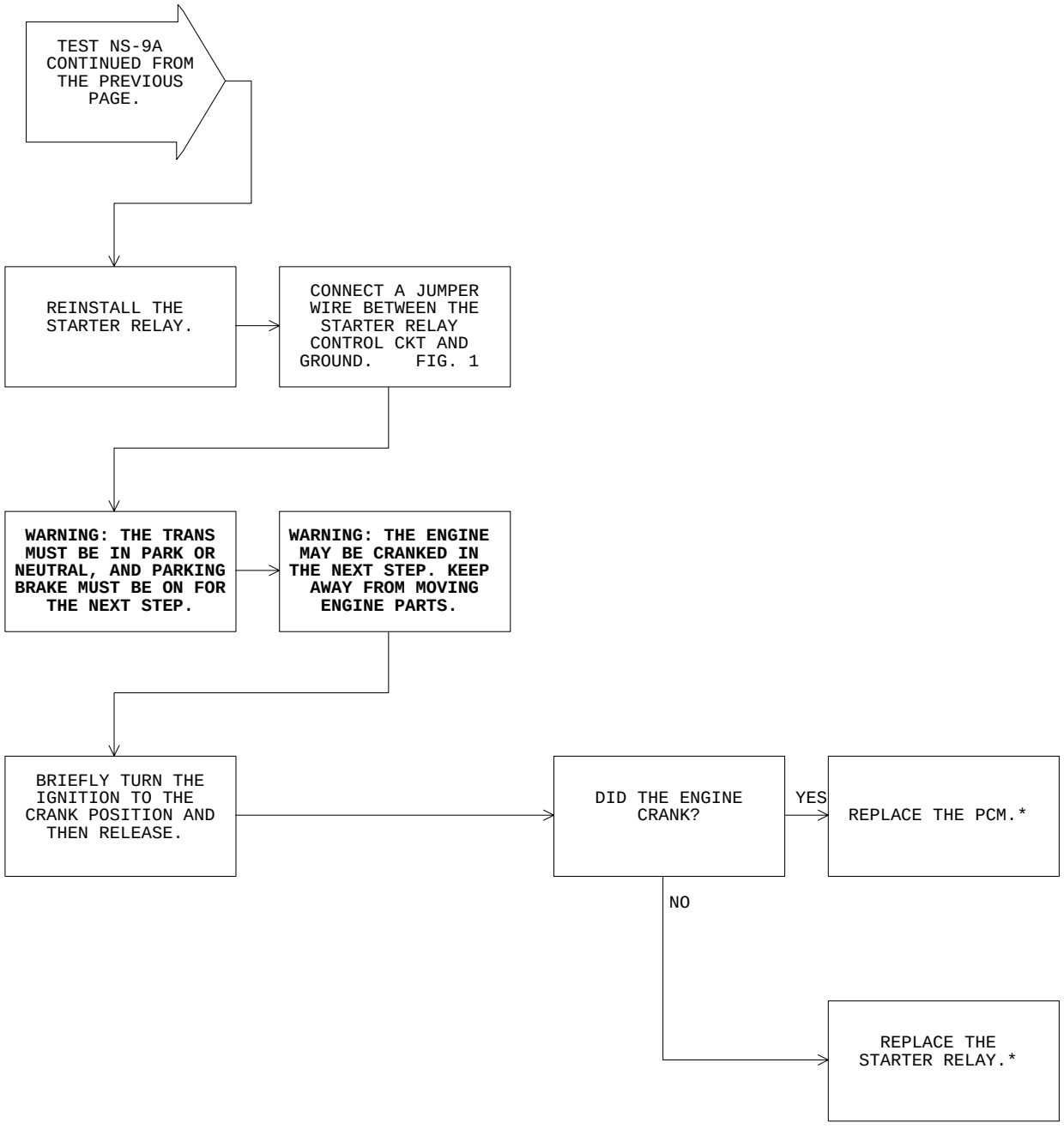


CAV	COLOR	FUNCTION
31	TN/WT	STARTER RELAY CONTROL

80b4fac5

FIG. 1

TEST NS-9A CONTINUED - REPAIRING A NO CRANK CONDITION



*Perform Verification TEST VER-1A.

**Check connectors - Clean / repair as necessary.

TEST VER-1A NO START VERIFICATION

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to GENERAL INFORMATION SECTION 8.0 for programming the Powertrain Control Module and the SKIM.

For ABS and Airbag Systems:

ACTION:

1. Enter correct VIN and Mileage in PCM.
2. Erase codes in ABS and Airbag modules.

For SKIM Theft Alarm:

ACTION:

1. Connect the DRB to the data link connector.
2. Go to Engine, Misc. and place the SKIM in *secured access* mode, by using the appropriate PIN code for this vehicle.
3. Select Update the Secret Key data, data will be transferred from the SKIM to the PCM.

Inspect the vehicle to ensure that all engine components are connected. Reassemble and reconnect components as necessary.

Inspect the engine oil for contamination. If it is contaminated, change the oil and filter.

Attempt to start the engine.

If the engine is **unable** to start, look for any Technical Service Bulletins that may relate to this condition. Return to **DTC TEST** if necessary.

The repair is now complete.

TEST VER-2A **ROAD TEST VERIFICATION**

Important Note:

Inspect the vehicle to ensure that all engine components are connected. Reassemble and reconnect all components as necessary.

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to GENERAL INFORMATION SECTION 8.0 for programming the Powertrain Control Module and SKIM.

For ABS and Airbag Systems:

ACTION:

1. Enter correct VIN and Mileage in PCM.
2. Erase ABS and Airbag module codes.

For SKIM Theft Alarm:

ACTION:

1. Connect the DRB to the data link connector.
2. Go to Engine, Misc., and place the SKIM in *secured access* mode, by using the appropriate PIN code for this vehicle.
3. Select Update the Secret Key data to be transferred from the SKIM to the PCM *(this is required to allow the vehicle to start with the new PCM).*

All trouble codes should be repaired before continuing, if not, return **DTC-TECT** and follow suggested test.

Use the following methods depending on the type of test you came from, **No Trouble Code,** or **Trouble Code.**

- Connect the DRBIII to the data link connector.

No Trouble Code Repair

1. Check to see if the initial symptom still exists (use DRB freeze frame when available to assist).
2. If the initial or another symptom exists, or a Trouble Code Set, repairs are not complete. Check all pertinent Technical Service Bulletins and return to **TEST NTC-1A,** or for codes return to **DTC-TEST.**

TEST VER-2A CONTINUED - ROAD TEST VERIFICATION

Trouble Code Repair

1. If the verification is for an A/C fault, ensure it is operating during the following road test.
2. Place the DRB in read trouble codes, reading the repaired DTC.
3. Turn the ignition off for at least 10 seconds, and the restart vehicle, and run 2 minutes.
4. Did Starts since set and a Good Trip (when applicable), change to one or more? Look at bottom of repaired DTC screen. If yes, STOP, repair is complete, otherwise continue.
5. Road test the vehicle, drive for at least 10 minutes, shift through all gears, and attain at least 40 mph. Stop once during the trip, turn the ignition off for 10 seconds, then restart and continue.
6. Did Starts since set and a Good Trip (when applicable), change to one or more? Look at bottom of repaired DTC screen for this. If yes, STOP, that repair is complete. Look for any new Trouble codes set during the trip, if there are, return to **DTC-TEST** and follow suggested test path.
7. If there are no new codes, the repair was successful. Erase Trouble Codes and testing is finished.

TEST VER-3A CHARGING VERIFICATION

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to GENERAL INFORMATION SECTION 8.0 for programming the Powertrain Control Module and SKIM.

For ABS and Airbag Systems:

ACTION:

1. Enter correct VIN and Mileage in PCM.
2. Erase ABS and Airbag module codes.

For SKIM Theft Alarm:

ACTION:

1. Connect the DRB to the data link connector.
2. Go to Engine, Misc., and place the SKIM in *secured access* mode, by using the appropriate PIN code for this vehicle.
3. Select Update the Secret Key data, data will be transferred from the SKIM to the PCM.

Inspect the vehicle to ensure that all engine components are connected. Reassemble and reconnect components as necessary.

Ensure no other charging system problems remain by doing the following:

1. Start the engine.
2. Perform generator output test per service manual
3. Raise the engine speed to 2000 rpm for at least 30 seconds.
4. Allow the engine to idle.
5. Turn the engine off.
6. Turn the ignition key on.
7. With the DRB, read trouble code messages.

If the repaired code has reset, or any other one has set, check all pertinent Technical Service Bulletins and return to **DTC TEST** if necessary.

If there are no codes, the repair is now complete.

TEST VER-4A SPEED CONTROL VERIFICATION

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM modules. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to GENERAL INFORMATION SECTION 8.0 for programming the Powertrain Control Module and SKIM.

For ABS and Airbag Systems:

ACTION:

1. Enter correct VIN and Mileage in PCM.
2. Erase codes in ABS and Airbag modules.

For SKIM Theft Alarm:

ACTION:

1. Connect the DRB to the data link connector.
2. Go to Engine, Misc. and place the SKIM in *secured access* mode, by using the appropriate PIN code for this vehicle.
3. Select Update the Secret Key data, data will be transferred from the SKIM to the PCM.

Inspect the vehicle to ensure that all engine components are connected. Reassemble and reconnect components as necessary.

Connect the DRB to the PCM data link connector and erase the codes.

Ensure no other speed control problems remain by doing the following:

1. Road test the vehicle at a speed above 30 mph.
2. Turn the speed control ON/OFF switch to the ON position.
3. Depress and release the SET switch. If the speed control did not engage, the repair is not complete.*
4. Quickly depress and release the RESUME/ACCEL switch. If the vehicle speed did not increase by 2 mph, the repair is not complete.*
5. Press and HOLD coast switch, vehicle speed should decrease, if no decrease, the repair is not complete.*
6. Using caution, depress and release the brake pedal. If the speed control did not disengage, the repair is not complete.*
7. Bring the vehicle speed back up to 25 mph.
8. Depress the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete.*
9. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete.*
10. Ensure the vehicle speed is greater than 30 mph and release the SET switch. If the vehicle did not adjust and set a new vehicle speed, the repair is not complete.*

11. Depress and release the cancel switch. If the speed control did not disengage, the repair is not complete.*
12. Bring the vehicle back up to 35 mph and engage speed control.
13. Turn the ON/OFF switch to the OFF position. If the speed control did not disengage, the repair is not complete.*

If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete.

*Check for Technical Service Bulletins that pertain to speed control problem and then, if necessary, return to **DTC TEST**.

TEST VER-4A CONTINUED - SPEED CONTROL VERIFICATION

NOTES

8.0 MAINTENANCE AND SERVICE INFORMATION

8.1 Programming the Powertrain Control Module

The SKIS "Secret Key" is an I.D. code that is unique to each SKIM. This code is programmed and stored in the SKIM, engine controller and transponder chip (ignition keys). When replacing the PCM it is necessary to program the secret key into the new PCM using the DRB. Perform the following steps to program the secret key into the engine controller.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRB and select "MISCELLANEOUS" from the main menu.
3. Select "PCM REPLACED" (GAS ENGINE).
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: If three attempts are made to enter secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the RUN position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

5. Press "ENTER" to transfer the secret key (the SKIM will send the secret key to the PCM).

8.2 Programming the Sentry Key Immobilizer Module

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRB and select "MISCELLANEOUS" from the main menu.
3. Select "SKIM MODULE REPLACEMENT (GAS)".
4. Program the vehicle four-digit PIN into SKIM.
5. Select "COUNTRY CODE" and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced.

6. Select "UPDATE VIN" (the skim will learn the VIN from the BCM).
7. Press "ENTER" to transfer the secret key (the BCM will send the secret key to the SKIM).
8. Program ignition keys to SKIM (for programming procedure, refer to **GENERAL INFORMATION SECTION 8.3)**.

8.3 Programming Ignition Keys to the Sentry Key Immobilizer Module

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRB and select "MISCELLANEOUS" from the main menu.
3. Select "PROGRAM IGNITION KEY'S" (Indicator lamp will begin flashing to indicate that learn mode is in progress.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: The PIN must be re-entered each time an additional key is learned.

5. Insert key into ignition switch and observe ALARM SET lamp. Once the key has been learned, the ALARM SET lamp will turn off.

NOTE: A maximum of eight keys can be learned to each SKIM. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRB will display one of the following messages:

Programming Not Attempted - The DRB attempts to read the programmed key status and there are no keys programmed into SKIM memory.

Programming Key Failed (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder

- ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

1. Obtain ignition keys to be programmed from customer (8 keys maximum).
2. Using the DRB, erase all ignition keys by selecting “MISCELLANEOUS” and “ERASE ALL CURRENT IGN. KEYS”
3. Program all ignition keys.

Learned Key in Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

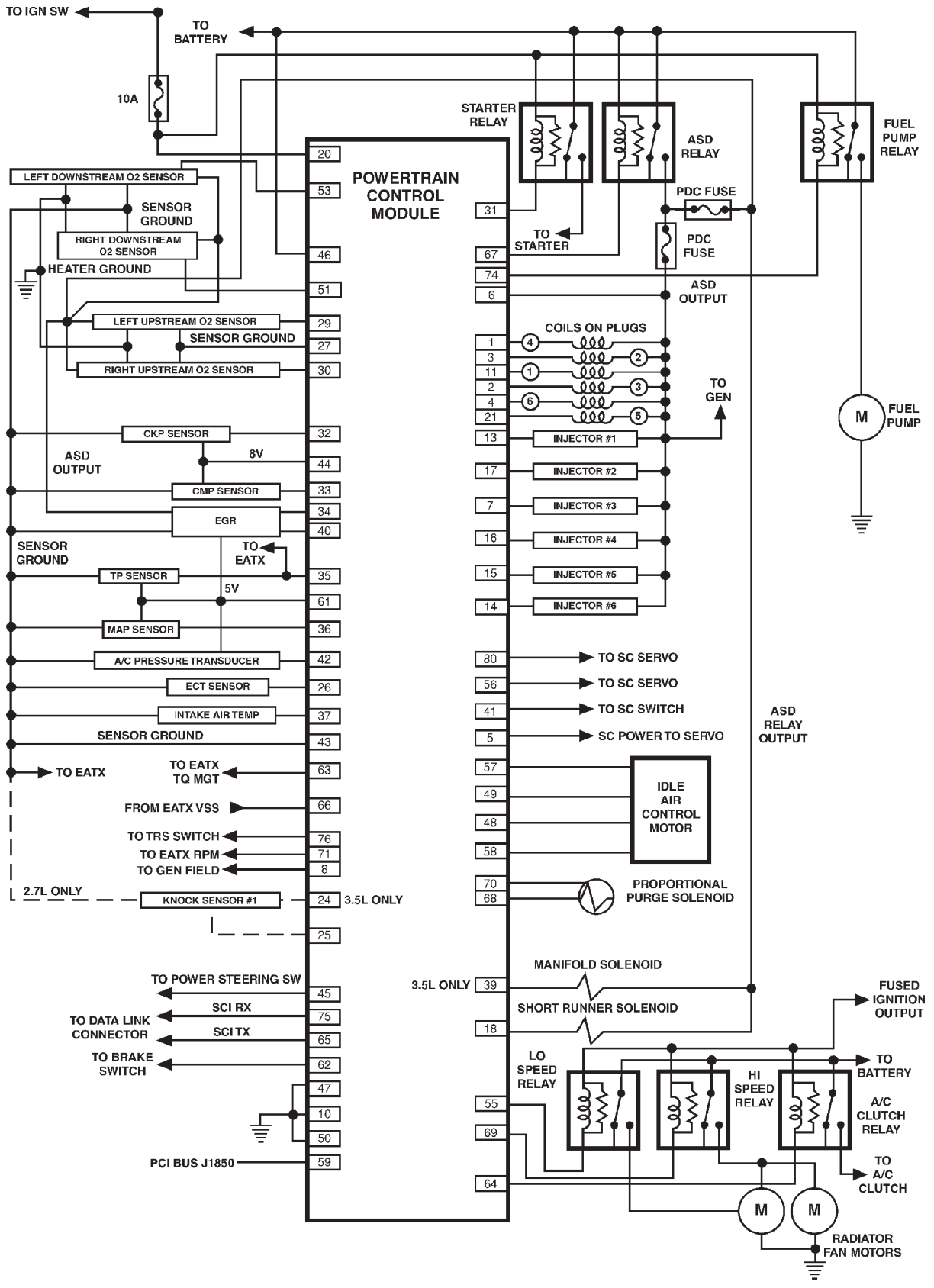
9.0 SPECIFICATIONS

9.1 Fuel System Release Procedure (Gasoline)

1. Remove the fuel pump relay.
2. Start and run engine until it stalls.
3. Attempt to restart the engine until it will no longer run.
4. Ensure the ignition key is off.
5. With fuel pressure relieved the fuel system can now be opened for required work. Continue to use caution, fuel leakage is still possible.

10.0 SCHEMATIC DIAGRAMS

10.1 Engine Controls (1999)



80b4fadc

11.0 RECOMMENDED TOOLS AND EQUIPMENT

DRBIII®
DB (diagnostic read-out box) scan tool
fuel filler adapter #6922
fuel line adapter (C-6631)
fuel pressure gauge (C-4799-B)
fuel release hose (C-4799-1)
flow indicator #6890
jumper wires
ohmmeter
oscilloscope
vacuum gauge
voltmeter
12 volt test light minimum 25 ohms resistance with probe #6801

Caution:
A 12 volt test light should not be used for the following circuits, damage to the Powertrain Controller will occur.

- 5 Volt Supply
- 8 Volt Supply
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

12.0 GLOSSARY OF TERMS

backfire, popback	fuel ignites in either the intake or the exhaust system
CKP	crankshaft position sensor
CMP	camshaft position sensor
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector (previously called ‘‘engine diagnostic connector’’)
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECT	engine coolant temperature sensor
EGR	exhaust gas recirculation valve and system
generator	previously called ‘‘alternator’’
hard start	The engine takes longer than usual to start, even though it is able to crank normally.

hesitation, sag, stumble	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
IAT	intake air temperature sensor
IAC	idle air control valve
lack of power, sluggish	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
O2S	oxygen sensor (left oxygen sensor when there are two sensors)
O2SR	right oxygen sensor
PCM	powertrain control module
PCV	positive crankcase ventilation
poor fuel economy	There is significantly less fuel mileage than other vehicles of the same design and configuration
rough, unstable, or erratic idle stalling	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called ‘‘hunting’’). This condition may cause stalling if it is severe enough.
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
start & stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

NOTES