



1989

POWERTRAIN DIAGNOSTIC PROCEDURES



3.0L Raider (MMC)
Electronic Fuel Injection

Includes

- No-Start
- Driveability

SAFETY NOTICE

CAUTION

ALL SERVICE AND REBUILDING INSTRUCTIONS CONTAINED HEREIN ARE APPLICABLE TO, AND FOR THE CONVENIENCE OF, THE AUTOMOTIVE TRADE ONLY. All test and repair procedures on components or assemblies in non-automotive applications should be repaired in accordance with instructions supplied by the manufacturer of the total product.

Proper service and repair is important to the safe, reliable, operation of all motor vehicles. The service procedures recommended and described in this publication were developed for the professional service personnel and are effective methods for performing vehicle repair. Following these procedures will help assure efficient economical vehicle performance and service reliability. Some of these service procedures require the use of special tools designed for specific procedures. These special tools should be used when recommended throughout this publication.

Special attention should be exercised when working with spring or tension loaded fasteners and devices such as E-Clips, Circlips, Snap rings, etc., as careless removal may cause personal injury. Always wear safety goggles whenever working on vehicles or vehicle components.

It is important to note that this publication contains various **Cautions** and **Warnings**. These should be carefully read in order to minimize risk of personal injury, or the possibility that improper service methods may damage the vehicle or render it unsafe. It is important to note that these **Cautions** and **Warnings** cover only the situations and procedures Chrysler Motors has encountered and recommended. Chrysler Motors could not possibly know, evaluate, and advise the service trade of all conceivable ways that service may be performed, or of the possible hazards of each. Consequently, Chrysler Motors has not undertaken any such broad service review. Accordingly, anyone who uses a service procedure, or tool, that is not recommended in this publication, must assure oneself thoroughly that neither personal safety, nor vehicle safety, be jeopardized by the service methods they select.

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VOLUNTARY MECHANIC
CERTIFICATION
THROUGH**



FOREWORD

The diagnostic procedures included in this book are designed and intended to be used with Chrysler's DRB II and MMC Adapter. These procedures make use of On-Board Diagnostic Capabilities. It is recommended that the sequence and content of these procedures be followed to assure speed and accuracy of diagnosis and repair.

When a fault is found and repairs are required, refer to the appropriate 1989 Service Manual for the proper repair procedure.

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This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

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INTRODUCTION 3.0L RAIDER

All diagnosis should begin with the comprehensive visual inspection outlined in this publication. Further diagnostics are determined by the type of condition requiring diagnosis. Additional sections in this publication include test procedures for No Start conditions, Fault Codes in Memory, No Fault Codes in Memory, and Adjustments.

All electrical wiring, connectors, pins and cavities should be carefully inspected throughout the diagnostic procedure for damage, corrosion and poor contact. Vacuum hoses, connections and air passages should also be thoroughly inspected for leaks, restrictions and damage. Component part numbers should be verified to assure correctness for engine and emission certification applications. After repairs are made, the system should be retested to verify that no other repairs are required.

On-Board Diagnostics include fault codes which are retained in ECU memory until cleared. Fault codes are cleared from memory by turning the ignition key to the off position, and then disconnecting the negative battery cable for more than ten seconds. Fault codes should always be cleared using this procedure after repairs are made. It is important to remember that the length of time a fault code has been stored in memory cannot be determined.

USE OF DRB II AND MMC ADAPTER

The MMC (Mitsubishi Motors Corporation) DRB II (Diagnostic Readout Box II) Adapter was built so that the existing DRB II could work on all 1989 and later ECI Multi Systems. The Adapter has 3 cables coming out of it. One is for the battery positive (red alligator clip). The second cable is the round 8-Way DIN Cable. The third cable is the 12-Way Vehicle Diagnostic Cable (has Black cover and White 12-Way Connector). The Diagnostic Cable plugs into the vehicle's Diagnostic Connector.

Plug in the MMC Cartridge with the red label up or facing you. Another way of telling which way the Cartridge goes in is the two round "bumps" go up or facing you.

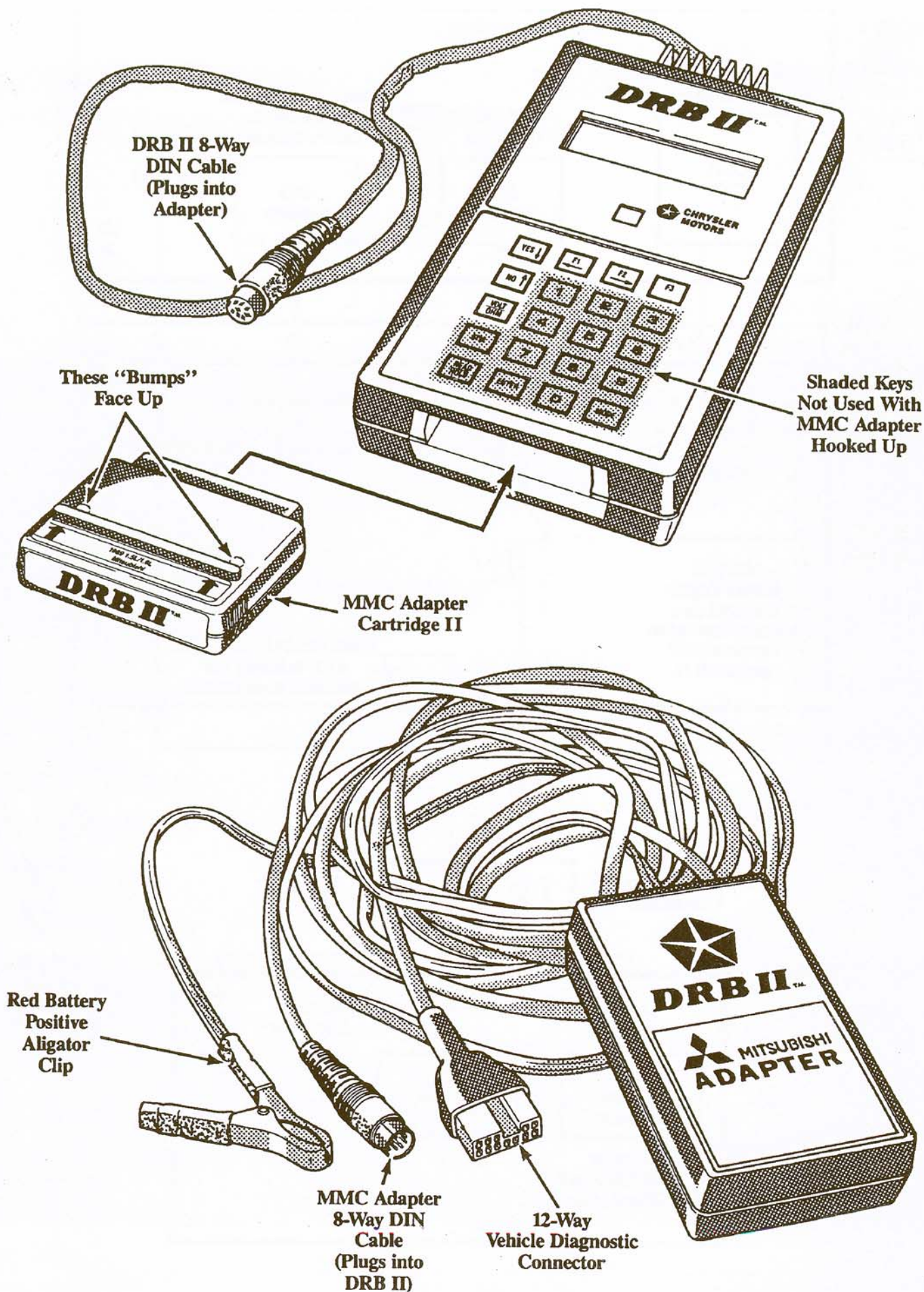
This is how the adapter works with the the DRB II and the ECU. When the DRB II and the Adapter are first powered up, both of them go through self checks (RAM and ROM). If there is a problem, an Error Screen is displayed on the DRB II will tell the Adapter (over the CCD BUS) to select Engine (channel 0). At this time the Adapter's hardware will make the connection between the DRB II and the ECU. Please note the Adapter is like someone plugging in an extension cord between 2 points. The Adapter cannot "hear" the DRB II "talking" to the ECU. The Adapter only makes the connection at power-up, after that the Adapter doesn't do anything until the DRB II and Adapter are powered down. Then the adapter will shut off all Channels (only Channel 0, Engine is used in 1989) so the DRB II is disconnected from the ECU.

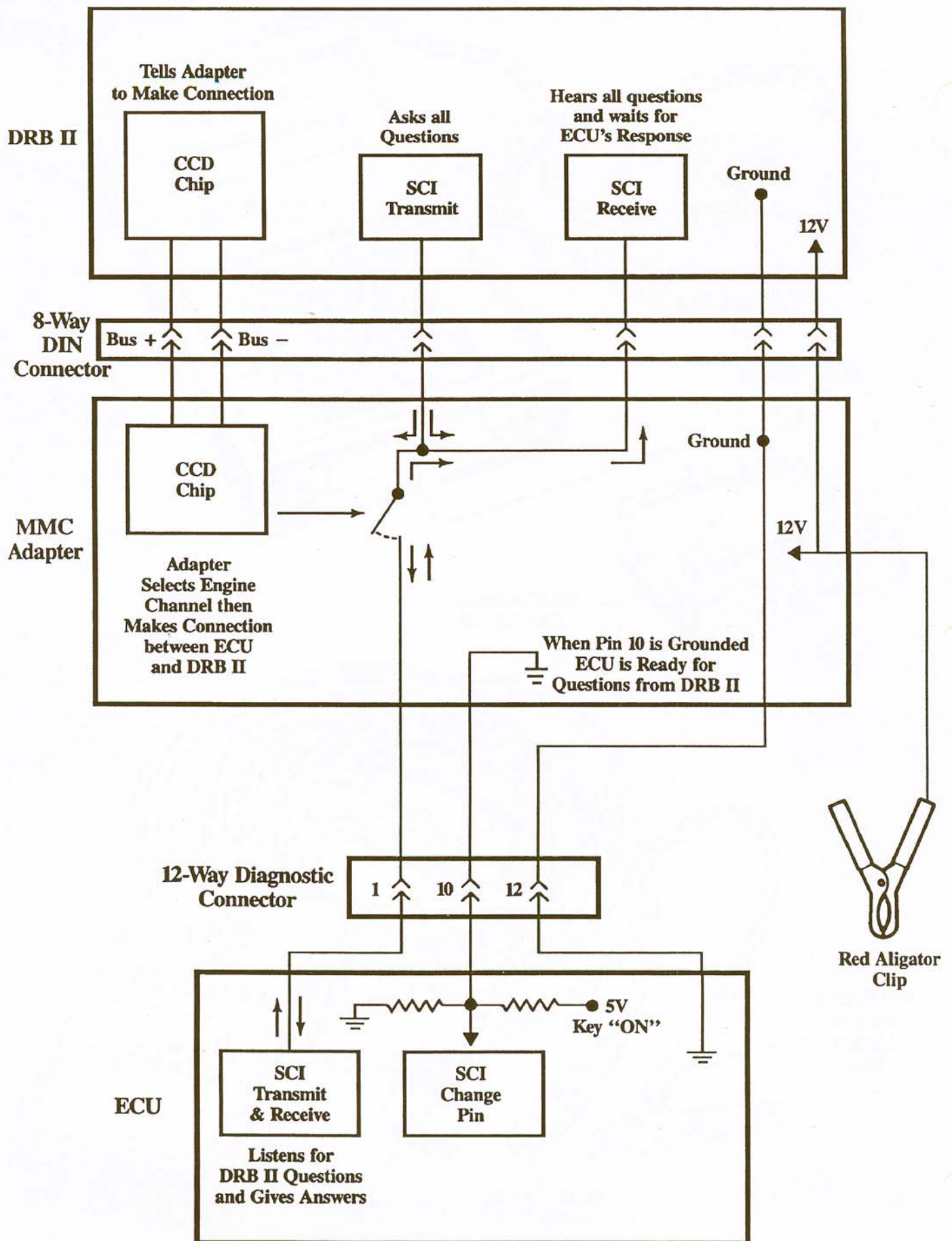
Until you select a SELECT TEST, the DRB II is not "talking" to the ECU and the key can be "OFF." From this point on, all tests are engine running or not running (key "ON" engine off). When you drop into a SELECT TEST, the DRB II will "talk" to the ECU over SCI (Serial Communication Interface). The DRB II will ask a question (What is the Air Flow Sensor Hertz?) and the DRB II will "hear" itself on the SCI Recieve port at the same time the ECU "hears" the question. When the DRB II "hears" itself ask a question, it waits for the ECU to "answer". If the DRB II did not "hear" itself or did not hear the ECU "answer" it will display an Error Screen. How fast the DRB II keeps "asking" the same question will determine how fast the DRB II Screen is updated.

So, all Data Line information is requested by the DRB II and supplied by the ECU on the SCI lines. Whenever the key is "OFF", this shuts down the ECU's SCI Transmit and Receive capabilities. This is why the error screen comes up when the key is "OFF".

Cartridge 2 is the first DRB II Diagnostic Cartridge for MMC Applications and covers the following engine packages:

- 1989 1.5L Colt Wagon and 1.5L Colt or Summit
- 1989 1.6L Colt or Summit
- 1989 1.6L Turbo Colt
- 1989 1.8L MPI Colt Wagon
- 1989 2.0L MPI SOHC USA, Colt Vista
- 1990 2.0L DOHC USA, Laser
- 1989 2.0L SOHC CAN., 2000GTX
- 1989 2.0L DOHC CAN., 2000GTX
- 1990 2.0L MPI Turbo, Laser
- 1989 3.0L MPI, Raider





NOTE: There is a display error on the DRB II on the 1.6L Non-Turbo, 1.6 Turbo, 1.8L SOHC, 2.0L SOHC, and 2.0L Diamond Star engine. If you are using the DRB II on either one of these engines and TOTAL ADVANCE is displayed, it should be used for checking electrical advance only. Basic timing or any timing adjustment should be performed by using the service manual procedures and an acceptable timing light.

It does not make any difference which cable is hooked up first or when the Cartridge is plugged in. To power up the DRB II, make the following hook-ups:

- 1 - Plug in the DRB II 8-Way DIN Cable to the Adapter 8-Way DIN Cable.
- 2 - Plug in the 12-Way Diagnostic Connector to the Vehicle's Diagnostic Connector.
- 3 - Plug the Mitsubishi Cartridge into the DRB II.
- 4 - Hook up the Red Alligator Clip to Battery Positive.
- 5 - TURN THE KEY TO "ON" OR START THE ENGINE.

No Data Stream information will be "given out" by the ECU if the key is not in the ON position.

At this time, the DRB II will go through the following power-up and screen sequence:

NOTE: All Boxed Areas Represent the DRB II Screen Display.

**FOR THIS PAGE ONLY,
ALL CORRECT
SCREENS SHOWN
ON THIS SIDE**

Test screen on power-up:

#####



**CHRYSLER MOTORS
DRB II
COPYRIGHT 1988
REVISION LEVEL 2.4**



All power-up error screens are displayed after this Copyright Screen.

If no Error Screens are displayed, the following screens are displayed:



**MITSUBISHI MOTORS
DIAGNOSTIC ADAPTER
CONNECTED
REVISION LEVEL 1.0**



**SELECT MODEL YEAR
1989**

At this point, all Keys on the DRB II will be ignored except for the **[YES]**. Pushing the **[YES]** will display the following screen:



**SELECT SYSTEM
ENGINE**



Pushing the **[NO]** will move you back to the previous screen.

Pushing the **[YES]** will move you to the next screen:



continued on next page...

**FOR THIS PAGE ONLY,
ALL ERROR SCREENS
SHOWN ON THIS SIDE**

**ERROR SCREENS
EXPLAINED**

RAM TEST FAILURE

= DRB II problem

KEY PAD TEST FAILURE

= DRB II problem. Key shorted (closed)

**LOW BATTERY
CORRECT PROBLEM, AND
POWER-UP DRB2 AGAIN**

= Vehicle problem

**HIGH BATTERY
CORRECT PROBLEM, AND
POWER-UP DRB2 AGAIN**

= Vehicle problem

**SCI TEST FAILURE
CHECK TEST CABLES
AND CONNECTORS
REVISION LEVEL 1.1**

= SCI "loop back" error. The DRB II does not hear itself talking to the Adapter. This message only appears on power up. Possible DRB II, Gray DIN Cable or Adapter problem

**WRONG OR NO
ADAPTER CONNECTED
CHECK ADAPTER/CABLE**

= CCD communications error between the DRB II and the Adapter. Possible DRB II, Gray DIN Cable or Adapter Problem

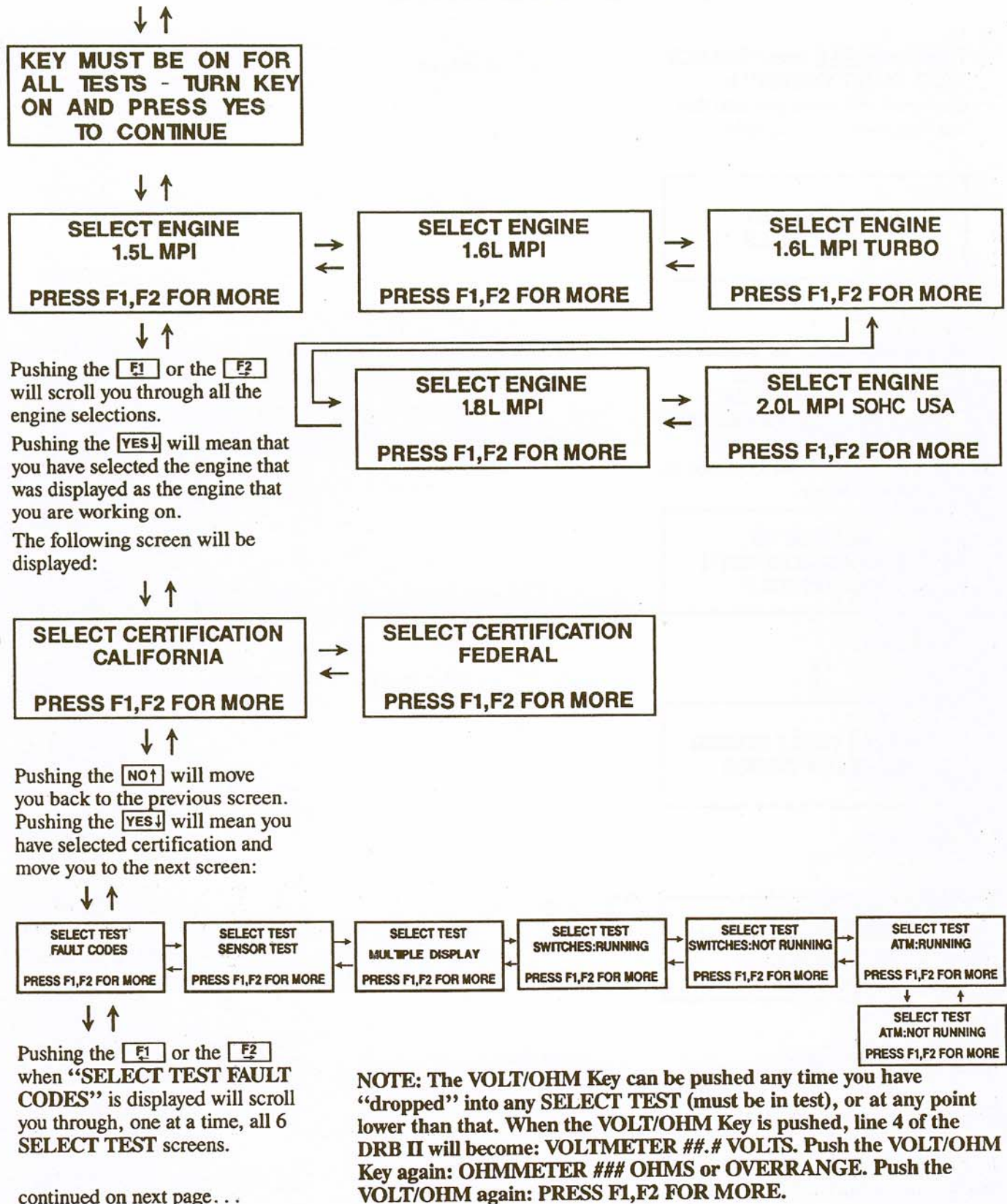
**CARTRIDGE ERROR
PAGE #
PAGING ERROR: #**

= DRB II ROM Paging error. Cartridge problem

**CARTRIDGE ERROR
PAGE #
CHECK SUM ####**

= DRB II ROM Check Sum error. Cartridge problem

NOTE: All Boxed Areas Represent the DRB II Screen Display.



NOTE: All Boxed Areas Represent the DRB II Screen Display.

Pushing the **YES↓** when **"SELECT TEST FAULT CODES"** is displayed will move you into that test displayed. For example:

**SELECT TEST
FAULT CODES**

push the **YES↓** .

If the key is "OFF" or there is an SCI communications error between the DRB II and the ECU, the following 4 screens are displayed one after the other. The last 2 screens are displayed in a continuous loop:

**UNABLE TO
COMMUNICATE WITH
THE VEHICLE**

then display:



**DISPLAY FAULT CODES
NO FAULT CODES**

then display:



**UNABLE TO
COMMUNICATE WITH
THE VEHICLE
IS KEY ON?**



then display:



**DISPLAY FAULT CODES
NO FAULT CODES
IS KEY ON?**



Then return to previous screen,
and continue loop of last 2 screens.
continued on next page . . .

NOTE: All Boxed Areas Represent the DRB II Screen Display.

If the key is turned "ON" now,
or everything is OK, one of the
following screens are displayed:

**DISPLAY FAULT CODES
NO FAULT CODES**

or

**## OF ## FAULT CODES
11: 02 SENSOR

PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
23: NUMBER 1
TDC SENSOR
PRESS F1,F2 FOR MORE**

(1.6L,1.6L Turbo,
2.0L, 2.0L Turbo only)

**## OF ## FAULT CODES
44: COIL NEGATIVE
PRIMARY CONTROL
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
12: AIR FLOW SENSOR

PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
24: VEHICLE SPEED
SENSOR
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
13: INTAKE AIR
TEMPERATURE
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
25: BAROMETRIC
PRESSURE
PRESS F1,F2 FOR MORE**

(1.6L & 2.0L Turbo only)

**## OF ## FAULT CODES
14: THROTTLE
POSITION
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
31: DETONATION
SENSOR
PRESS F1,F2 FOR MORE**

(1.5L, 1.8L & 2.0L Sohc only)

**## OF ## FAULT CODES
15: MOTOR POSITION

PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
41: INJECTOR

PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
21: COOLANT
TEMPERATURE
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
42: CONTROL RELAY
(FUEL PUMP)
PRESS F1,F2 FOR MORE**

(California certification only)

**## OF ## FAULT CODES
22: CRANK ANGLE
SENSOR
PRESS F1,F2 FOR MORE**

**## OF ## FAULT CODES
43: EGR SYSTEM

PRESS F1,F2 FOR MORE**

continued on next page...

NOTE: All Boxed Areas Represent the DRB II Screen Display.

Push the **[NO↑]** to exit Fault Code display. Pushing the **[F2]** when "SELECT TEST FAULT CODES" is displayed will scroll you to the following screen:

**SELECT TEST
SENSOR TESTS**

PRESS F1,F2 FOR MORE

Pushing the **[YES↓]** when "SELECT TEST SENSOR TESTS" is displayed will move you into that test displayed.

**O2 STATE
LEAN/RICH**

PRESS F1,F2 FOR MORE

Lean = less than .540 volts
Rich = more than .560 volts
(screen updated every 80 milliseconds)

Pushing the **[F2]** will display the following screen:

Keep pushing the **[F2]** to scroll through all the SENSOR TESTS.

**O2 SENSOR
#.### VOLTS**

PRESS F1,F2 FOR MORE

.001 to 4.973 volts in .020 volt steps
(screen updated every 160 milliseconds)

**AIR FLOW SENSOR
HZ**

PRESS F1,F2 FOR MORE

0 Hz to 1594 Hz in 6 Hertz steps
(screen updated every 160 milliseconds)

**INTAKE AIR TEMP
°F**

PRESS F1,F2 FOR MORE

-74 °F to 363 °F in 1° to 9° steps depending on temperature
-59 °C to 184 °C in 1° to 5° steps depending on temperature
[F3] changes °F to °C
(screen updated every 160 milliseconds)

**THROTTLE POSITION
#.### VOLTS**

PRESS F1,F2 FOR MORE

.001 to 4.973 volts in .020 volt steps
(screen updated every 160 milliseconds)

(1.5L, 1.8L & 2.0L Sohc only)

**ISC MOTOR POS SENSOR
#.### VOLTS**

PRESS F1,F2 FOR MORE

.001 to 4.973 volts in .020 volt steps
(screen updated every 160 milliseconds)

continued on next page...

NOTE: All Boxed Areas Represent the DRB II Screen Display.

**ECU POWER SUPPLY
VOLTS**

PRESS F1,F2 FOR MORE

.0 to 18.7 volts in .1 volt steps
(screen updated every 160 milliseconds)

**COOLANT TEMPERATURE
°F**

PRESS F1,F2 FOR MORE

−62°F to 313°F in 2° to 7° steps depending on temperature
−52°C to 156°C in 1° to 4° steps depending on temperature
F3 changes °F to °C
(screen updated every 160 milliseconds)

**CRANK ANGLE
RPM**

PRESS F1,F2 FOR MORE

0 to 7,969 RPM in 31 RPM steps
(screen updated every 160 milliseconds)

**BARO SENSOR
IN HG ABS**

PRESS F1,F2 FOR MORE

IN HG ABS = Inches of Mercury Absolute 0 to 37.3 in .1" steps
KPA ABS = Kilo Pascals Absolute 0 to 126 in 1 KPA steps
F3 changes Inches to Kilo Pascals
(screen updated every 160 milliseconds)

**INJECTOR PULSE
MS**

PRESS F1,F2 FOR MORE

.0 to 65.3 milliseconds in .2 or .3 millisecond steps
(screen updated every 160 milliseconds)

(California only)

**EGR TEMP
°F**

PRESS F1,F2 FOR MORE

−233°F to 606°F in 2° to 19° steps depending on temperature
−147°C to 319°F in 1° to 6° steps depending on temperature
F3 changes °F to °C
(screen updated every 160 milliseconds)

**TOTAL ADVANCE
BTDC**

PRESS F1,F2 FOR MORE

(1.6L, 1.6L Turbo, 2.0L Dohc,
2.0L Turbo & 3.0L Only)

**AIS MOTOR STEPS
STEPS**

PRESS F1,F2 FOR MORE

Will change name of screen to **Total Advance** in Cartridge 2
20° ATDC to 235° BTDC in 1° steps
(screen updated every 80 milliseconds)

0 to 255 Steps in 1 step increments
0 = fully closed, 255 = wide open,
9 = minimum position for air flow setting
(screen updated every 160 milliseconds)

NOTE: All Boxed Areas Represent the DRB II Screen Display.

Pushing the **[NO↑]** will exit
SENSOR TESTS and allow you
to select another test.

**SELECT TEST
SENSOR TESTS**

PRESS F1,F2 FOR MORE

Pushing the **[F2]** now will allow
you to select another test.

**SELECT TEST
SWITCHES:RUNNING**

PRESS F1,F2 FOR MORE

Push the **[YES↓]** now and the
following screen is displayed if
the engine is not running:

START ENGINE

Once the engine is started, or the
engine was running when the test
was selected, the following screen
is displayed:

**IDLE SWITCH
CIRCUIT OPEN/CLOSED**

PRESS F1, F2 FOR MORE

Closed = closed throttle or 0 volts into ECU
Open = off idle or 12 volts into ECU

Keep pushing the **[F2]** to scroll
through all the SWITCHES:
RUNNING tests.

**POWER STEERING
CIRCUIT OPEN/CLOSED**

PRESS F1, F2 FOR MORE

Closed = above 231-284 PSI or 0 volts into ECU
Open = below 100 PSI or 12 volts into ECU

**A/C SWITCH
CIRCUIT OPEN/CLOSED**

PRESS F1,F2 FOR MORE

Closed = A/C & Blower Switch on or 12 volts into ECU
Open = A/C Switch or Blower Switch off or 0 volts into ECU

**PARK/NEUTRAL
CIRCUIT OPEN/CLOSED**

PRESS F1,F2 FOR MORE

Closed = in gear, MAN TRANS always displayed as CLOSED or 0 volts
into ECU
Open = in Park or Neutral or 12 volts into ECU

NOTE: All Boxed Areas Represent the DRB II Screen Display.

**A/C RELAY
CIRCUIT OPEN/CLOSED
PRESS F1,F2 FOR MORE**

Push the **[NO↑]** to exit SWITCHES:
RUNNING test. The following
screen is displayed.

**SELECT TEST
SWITCHES:RUNNING
PRESS F1,F2 FOR MORE**

Push the **[F2]** and the following
screen is displayed:

**SELECT TEST
SWITCHES:NOT RUNNING
PRESS F1, F2 FOR MORE**

If engine is running, and the **[YES↓]**
is pushed, the following screen is
displayed:

**STOP ENGINE
AND TURN KEY BACK ON**

If you stop the engine and turn the
key back "ON" the following
screen is displayed:

**CRANK SIGNAL
CIRCUIT OPEN/CLOSED
PRESS F1,F2 FOR MORE**

Keep pushing the **[F2]** to scroll
through all the SWITCHES:
NOT RUNNING tests.

**IDLE SWITCH
CIRCUIT OPEN/CLOSED
PRESS F1,F2 FOR MORE**

**A/C SWITCH
CIRCUIT OPEN/CLOSED
PRESS F1,F2 FOR MORE**

Closed = when ECU provides a ground for the A/C Clutch Relay
Open = when ECU removes the ground for the A/C Clutch Relay

Closed = engine is being cranked or 12 volts into ECU
Open = engine is not being cranked or 0 volts into ECU

Closed = closed throttle or 0 volts into ECU
Open = off idle or 12 volts into ECU

Closed = A/C & Blower Switch on or 12 volts into ECU
Open = A/C Switch or Blower Switch off or 0 volts into ECU

continued on next page...

NOTE: All Boxed Areas Represent the DRB II Screen Display.

**PARK/NEUTRAL
CIRCUIT OPEN/CLOSED**

PRESS F1,F2 FOR MORE

Push the **[NO↑]** to exit SWITCHES:
NOT RUNNING test. The follow-
ing screen is displayed:

**SELECT TEST
SWITCHES:NOT RUNNING**

PRESS F1,F2 FOR MORE

Push the **[F2]** and the following
screen is displayed:

**SELECT TEST
ATM:RUNNING**

PRESS F1,F2 FOR MORE

If engine is not running, and
the **[YES↓]** is pushed, the following
screen is displayed:

START ENGINE

If the engine is started, the
following screen is displayed:

**SELECT TEST ITEM
INJECTOR 1**

PRESS F1,F2 FOR MORE

If you decide to shut off an
Injector, push the **[YES↓]**, and if
the engine is running, the DRB II
will display:

**INJECTOR 1
OFF**

then:

**INJECTOR 1
ON**

continued on next page. . .

Closed = in gear, MAN TRANS always displayed as CLOSED or 0 volts
into ECU

Open = in Park or Neutral or 12 volts into ECU

Pushing the **[F2]** or **[F1]** will allow you to change from Injector 1 to
Injector 2, 3, or 4.

NOTE: All Boxed Areas Represent the DRB II Screen Display.

This loop of 6 seconds Injector on and 6 seconds Injector off will continue for 5 minutes or until the **[NO↑]** is pushed (when the green LED is not lit) or the key is turned OFF.

If the key is turned OFF during this test, the DRB II will display the following:

**INJECTOR 1
UNABLE TO TEST**

then:

**SELECT TEST ITEM
INJECTOR 1**

PRESS F1,F2 FOR MORE

If the engine was off when

**“SELECT TEST ITEM
INJECTOR 1**

PRESS F1,F2 FOR MORE”

was displayed, and the **[YES↓]** is pushed, the following 3 screens are automatically displayed:

**INJECTOR 1
OFF**

then 6 seconds later:

**INJECTOR 1
UNABLE TO TEST**

then 2 seconds later:

**SELECT TEST ITEM
INJECTOR 1**

PRESS F1,F2 FOR MORE

To select Injector 2, 3, or 4, push the **[F2]** or the **[F1]**.

When “INJECTOR 1 OFF” is displayed, the green LED on the DRB II should light up. When the Injector is turned back on, the green LED should go out.

NOTE: All Boxed Areas Represent the DRB II Screen Display.

Any **ATM:RUNNING** or **ATM:NOT RUNNING** test can be entered from the wrong engine state. For example, the **ATM: RUNNING** test can be entered with the engine not running. If the **"SELECT TEST ATM:RUNNING"** is displayed and the engine is not running, and the **[YES↓]** is pushed, **"START ENGINE"** is displayed. If the **[YES↓]** is pushed a second time, the DRB II will allow you into the test.

This was done as a fail-safe measure so that if the ECU had a problem, you could not be "locked out" of any test.

NOTE: The ECU will not allow the Injector ATM to be performed if there is a speed signal (vehicle moving) or if auto. trans. is in gear.

Pushing the **[NO↑]** will allow you to exit **"SELECT TEST ITEM INJECTOR 1"** and the following screen is displayed:

**SELECT TEST
ATM:RUNNING**

PRESS F1,F2 FOR MORE

Pushing the **[F2]** will display the following screen:

**SELECT TEST
ATM:NOT RUNNING**

PRESS F1,F2 FOR MORE

If the **[YES↓]** is pushed and the engine is running, the following screen is displayed:

STOP ENGINE

AND TURN KEY BACK ON

continued on next page . . .

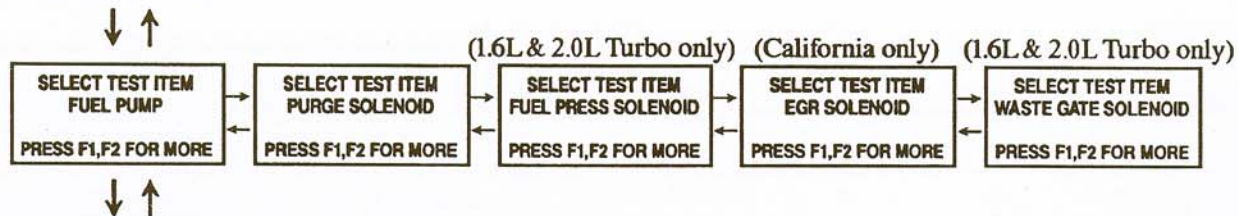
NOTE: All Boxed Areas Represent the DRB II Screen Display.

If the engine is shut off, but the key is not turned back "ON," the following screen is displayed:

**UNABLE TO
COMMUNICATE WITH
THE VEHICLE
IS KEY ON?**

Please note, this screen is an Error Screen. It means that the DRB II has lost SCI communication with the ECU. This could be a problem, or just the fact that the key is "OFF." If the key is "ON" and this message still appears, there is a possible problem with the DRB II, the Adapter, the ECU, or either cable (Diagnostic or DIN).

If the key is turned back "ON," the DRB II will display the following screen:



Pushing the **F2** or the **F1** when any one of these screens is displayed will scroll you through available tests for that engine and certification.

Pushing the **YES** when one of these screens is displayed will start the ATM test.

When the solenoid or Fuel Pump is on, the green LED on the DRB II will be lit. 6 seconds later when the solenoid or Fuel Pump is turned off, the green LED will go out.

There is only one of two ways to exit the ATMs. One is to turn the key "OFF." The other is to push the **NO** when the green LED is not lit. Once the DRB II "tells" the ECU to start the ATM cycle, it cannot be stopped before the 6 seconds of ON time is completed. The ECU will only listen to the DRB II when the green LED is not lit.

All ATMs will go 6 seconds on and 6 seconds off for 5 minutes or until the key is "OFF."

NOTES

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be from a notebook or a standard sheet of stationery. There is no handwriting or other markings on the page.

ELECTRICAL CONNECTIONS

Terminals in connectors must lock together. Look for connectors that are not fully plugged into each other or terminals that are not fully plugged into the insulator. Also, make sure the wiring between each connector, and where it goes into the convolute of the harness, is not pinched behind any screws, bolts or rubbing on metal, which would result in a short to ground.

Underhood Connectors

- Ground eyelet at driver's side of engine
- Ground eyelet at driver's side fender
- Remove cover of main fusible link housing
 1. blue 100 amp fuse
 2. green 40 amp fuse
 3. pink 30 amp fuse
- Remove cover of sub fusible link housing
 1. four fusible link wires
- Air flow sensor connector
- Power steering pressure switch connector (if so equipped)
- Distributor 4-way connector at bulkhead
- Injector control 8-way connector at bulkhead
- Automatic idle speed motor connector
- Throttle position sensor 4-way connector
- Ignition coil primary 2-way connector
- Ignition power transistor 3-way connector
- Purge control solenoid 2-way connector
- EGR solenoid 2-way connector (if so equipped)
- Spark plug wires
- Coil wire
- Coolant temperature sensor 2-way connector
- Air conditioning temperature sensor connector
- EGR temperature sensor 2-way connector (if so equipped)
- A/C compressor power relay 4-way connector

Underbody Connectors

- Oxygen sensor 2-way connector
- Fuel pump 2-way at fuel tank

Passenger Compartment Connectors

- Ground eyelet at ECU mounting bracket
- ECU 10-way connector
- ECU 18-way connector
- ECU 24-way connector
- Control relay 10-way connector

HOSE AND VACUUM LINE CONNECTIONS

All hoses and vacuum line connectors must be fully and firmly fitted at their connections. Also, they cannot be pinched anywhere along their routing. Look for hoses and vacuum lines that are not fully plugged in, are pinched, melted or cut. Also, make sure hoses are not egg-shaped at their connection points, causing a leak.

- Blue striped vacuum hose between intake manifold and fuel pressure regulator
- Red striped hose from throttle body to vacuum pipe
- Red striped hose from vacuum tube to purge solenoid
- Solid black hose from purge solenoid to canister
- Yellow striped hose from throttle body to vacuum pipe
- Green striped hose from throttle body to vacuum pipe (manual transmission only)
- Green striped hoses from throttle body to vacuum tees (automatic transmission only)
- Green striped hose from vacuum pipe to EGR valve
- Green striped hoses from throttle body to thermo valve (automatic transmission only)
- Yellow striped hose from vacuum pipe to EGR solenoid (manual transmission only)
- Yellow striped hose from vacuum pipe to thermo valve (automatic transmission only)
- Solid black PCV ventilation hose between driver side intake manifold and valve cover
- Solid black PCV breather hose from air inlet hose to passenger side valve cover
- All fuel lines and hoses
- All fuel vapor lines and hoses

The following are the recommended categories that should be used :

1. Engine Will Not Start -- Test numbers begin with NS for no start.
 - Visual Inspection
 - No Start Tests
2. Cold Driveability Problems -- Test numbers begin with DR for driveability.
 - Visual Inspection
 - Driveability Tests
3. Warm Driveability Problems -- Test numbers begin with DR for driveability.
 - Visual Inspection
 - Driveability Tests

Replacing Components

Before replacing any vehicle component inspect connector or connectors for pin or cavity damage that may result in a poor connection or an open circuit.

NOTES

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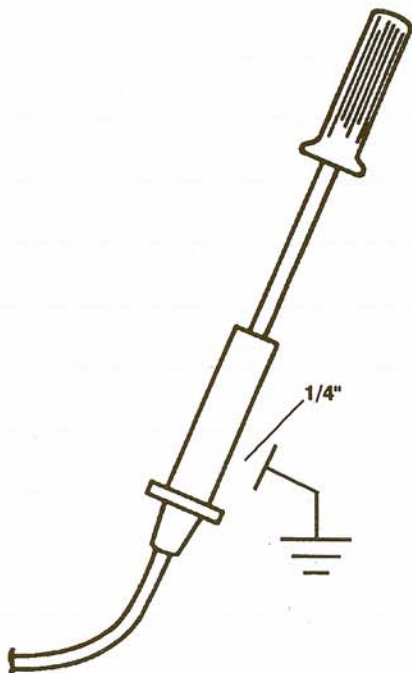


FIG. 1

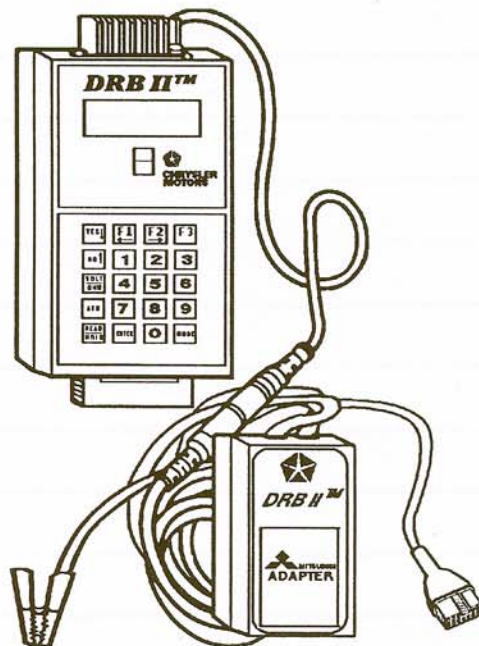
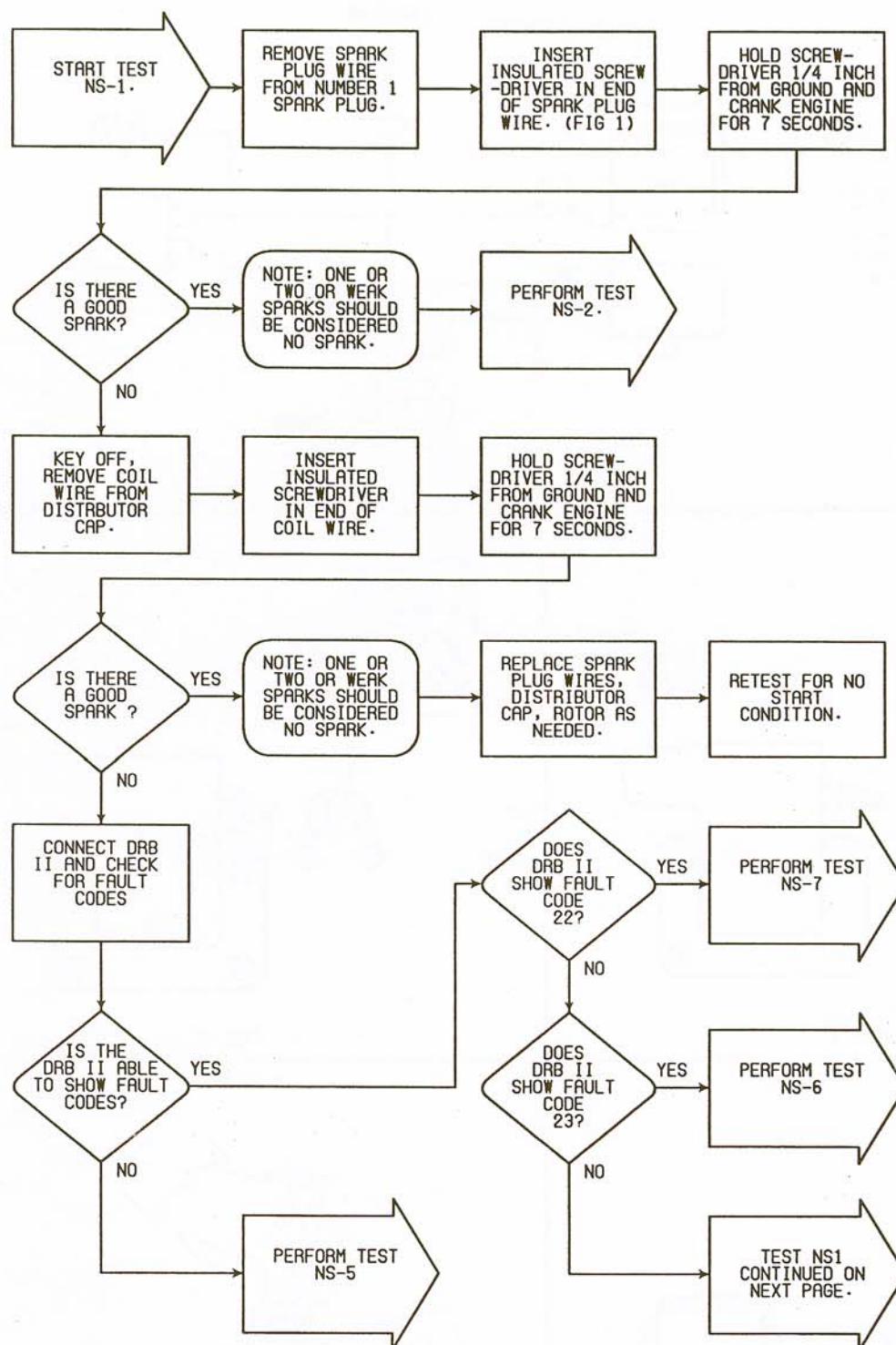


FIG. 2

TEST NS-1

BEGIN NO START TESTS

Perform VISUAL INSPECTION Before Proceeding



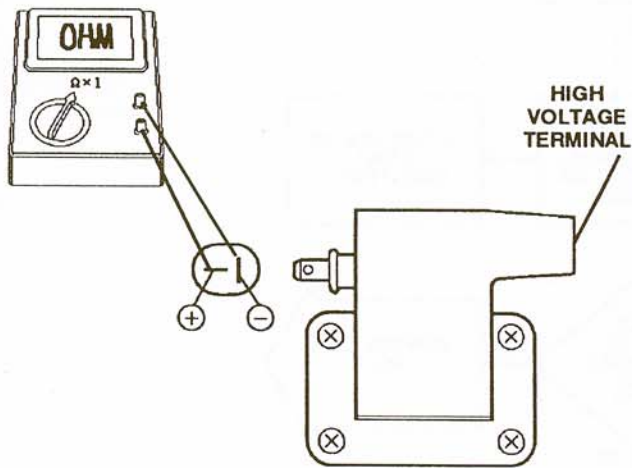
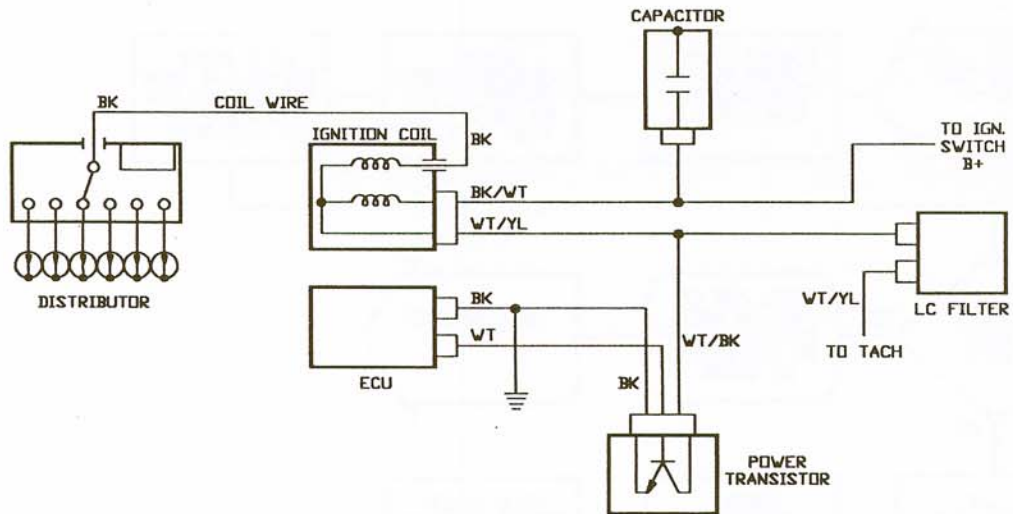


FIG. 1

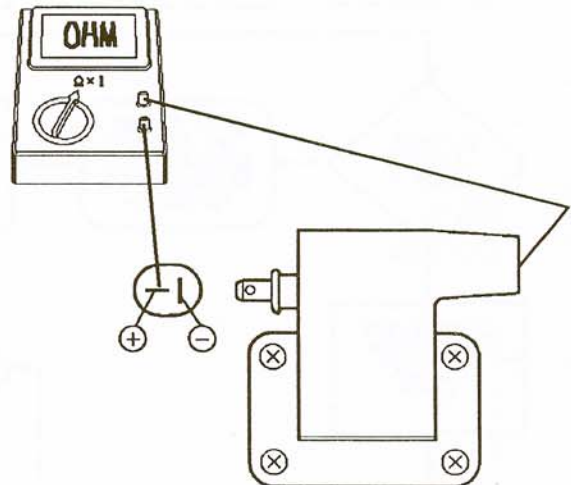


FIG. 2

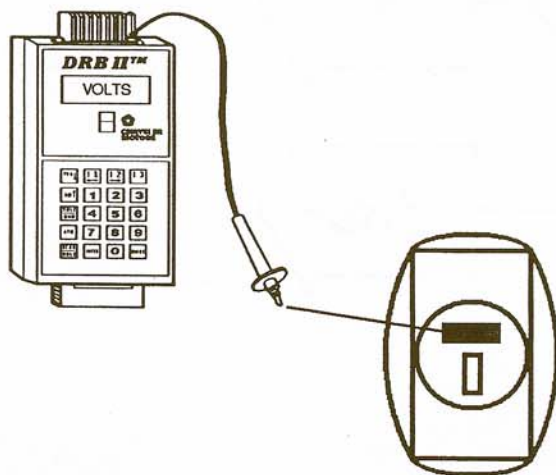


FIG. 3

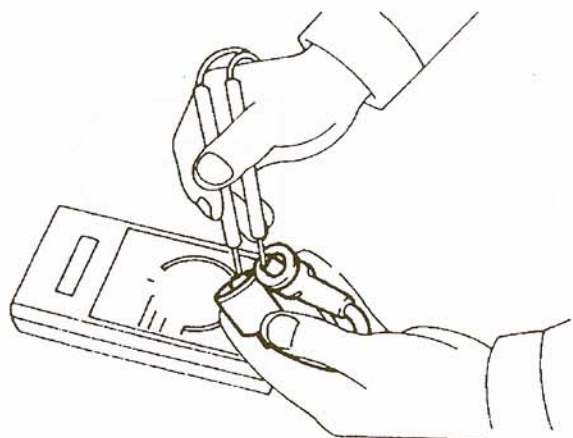
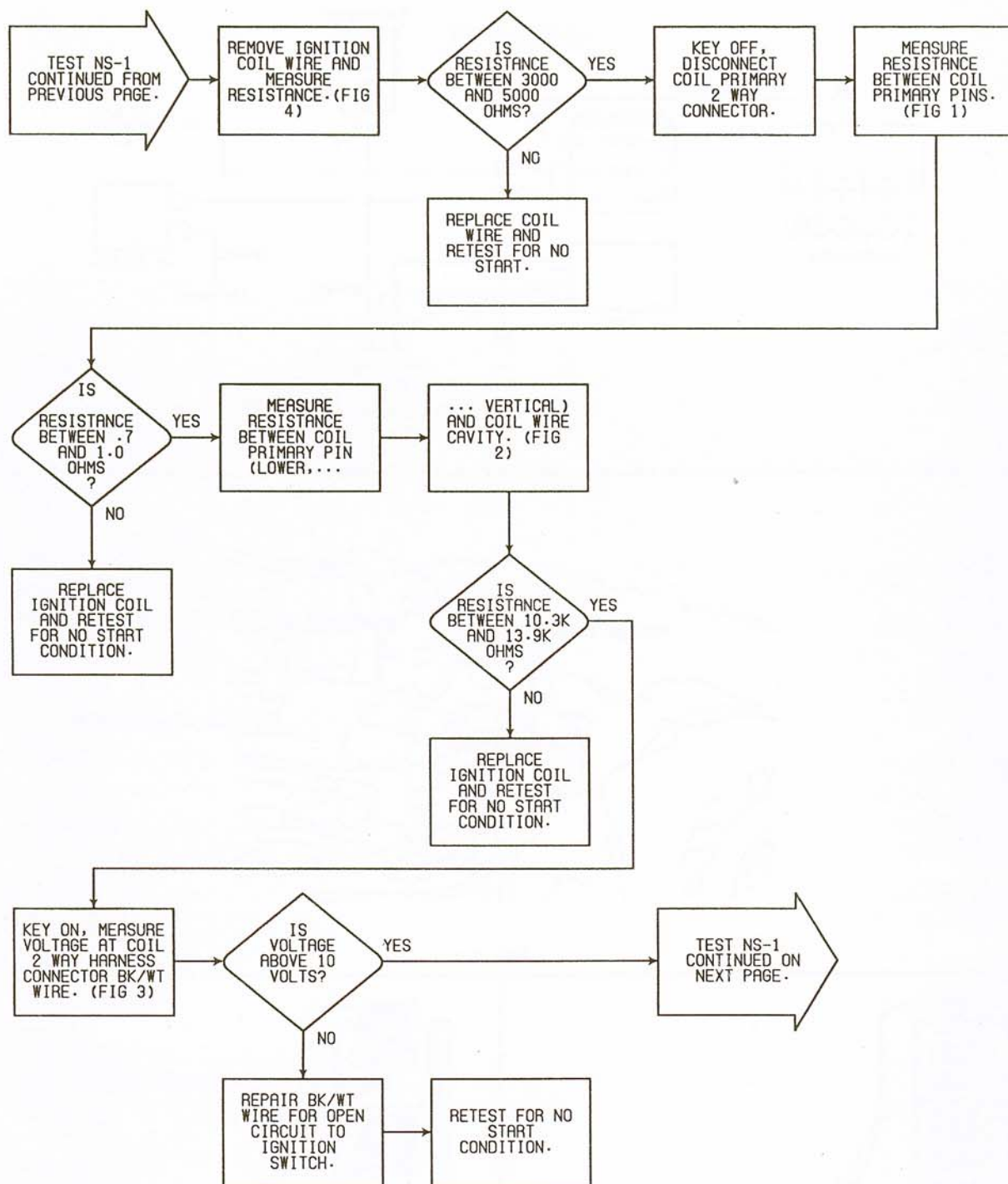


FIG. 4

TEST NS-1 CONTINUED - CHECKING IGNITION SYSTEM



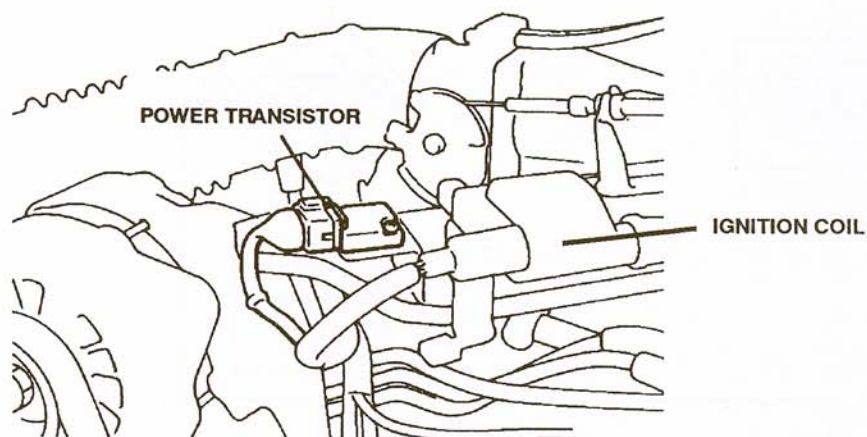


FIG. 1

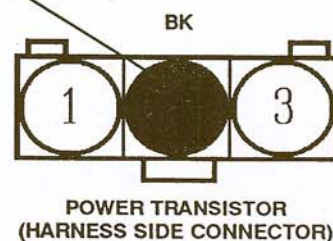
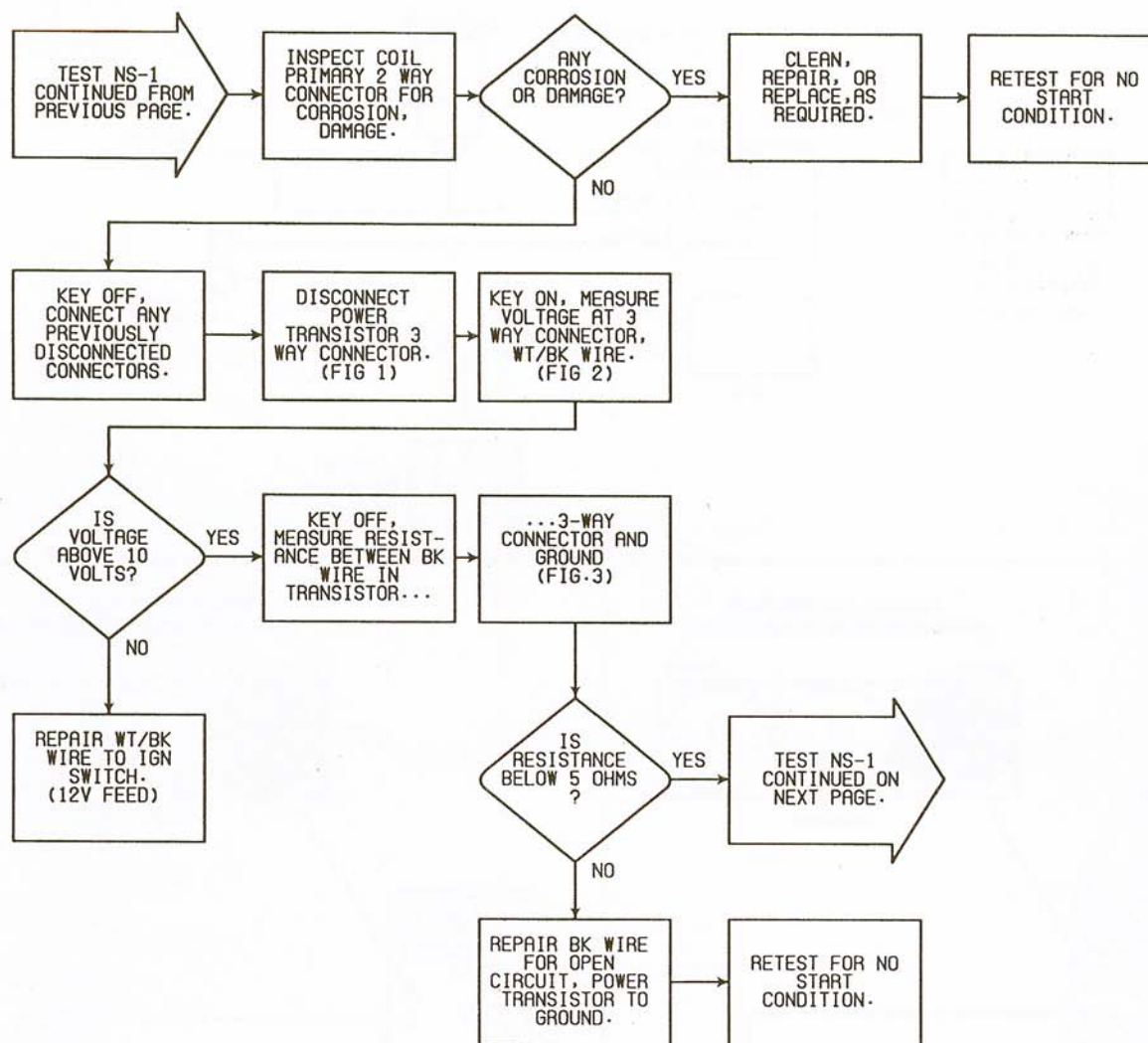


FIG. 2

FIG. 3

TEST NS-1 CONTINUED - CHECKING IGNITION SYSTEM

NO
START
TESTS
3
OL



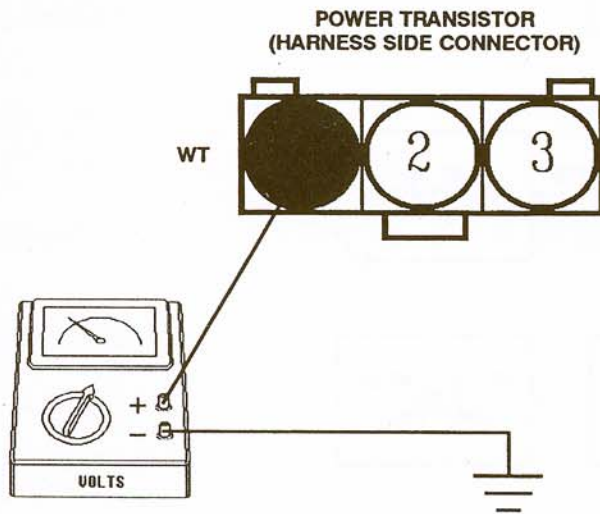
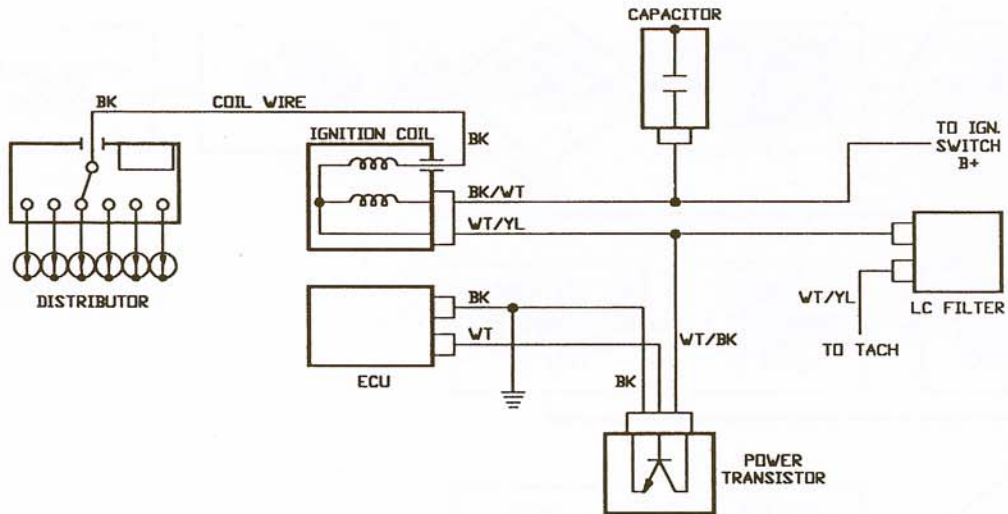


FIG. 1

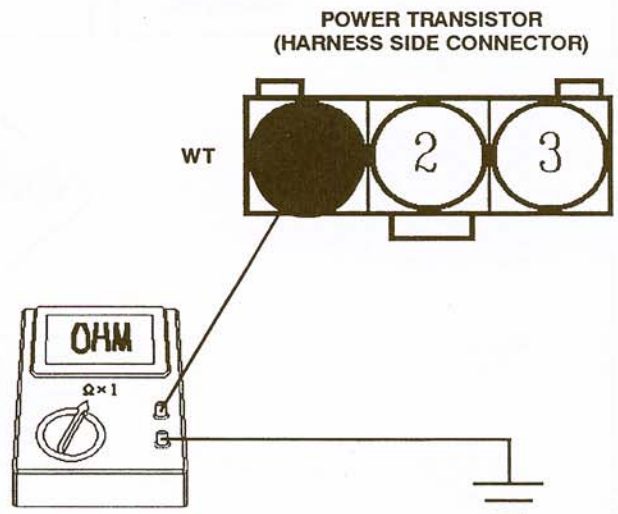


FIG. 2

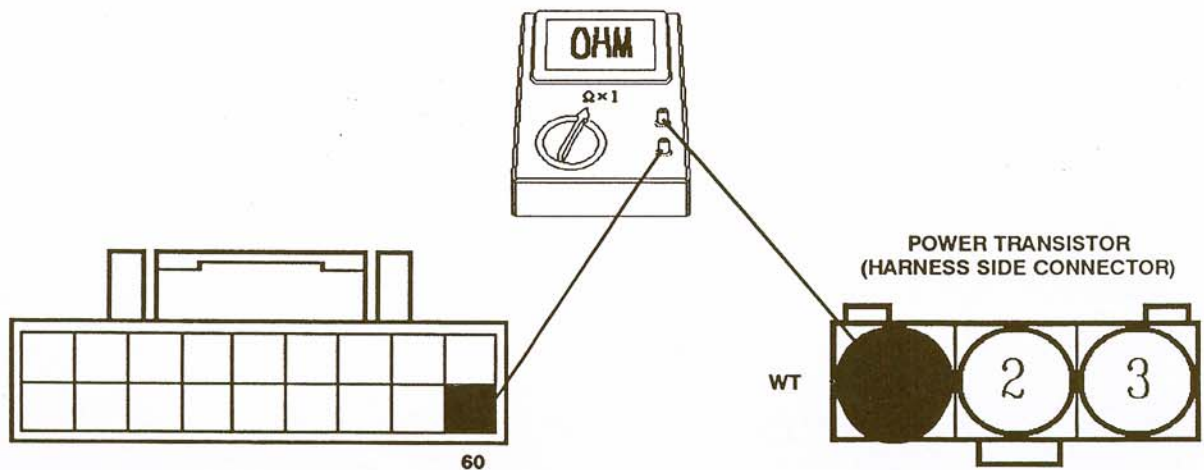
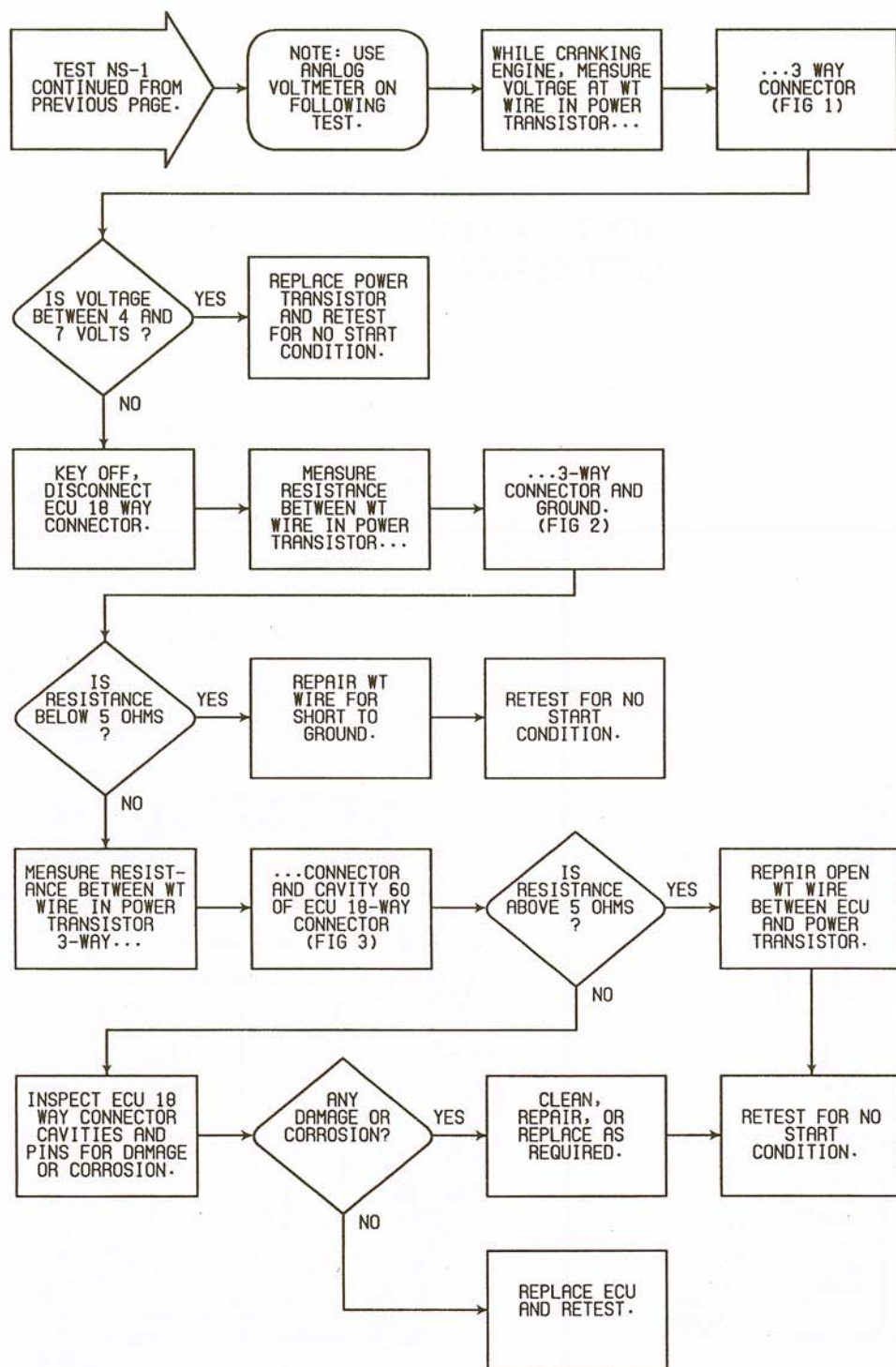


FIG. 3

TEST NS-1

CONTINUED - CHECKING IGNITION SYSTEM



TEST NS-2 NO START FUEL TEST

Perform TEST NS-1 Before Proceeding

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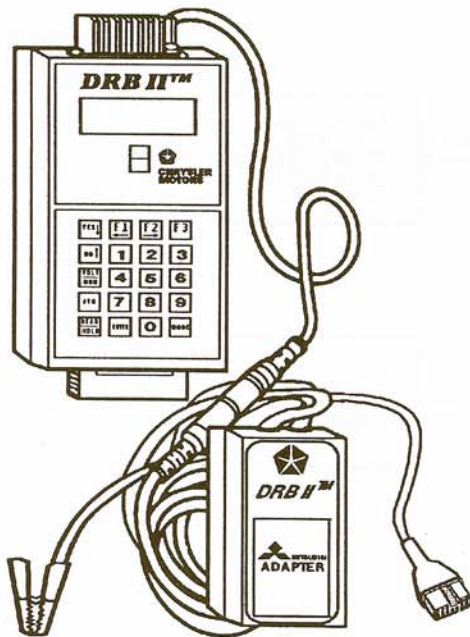


FIG. 1

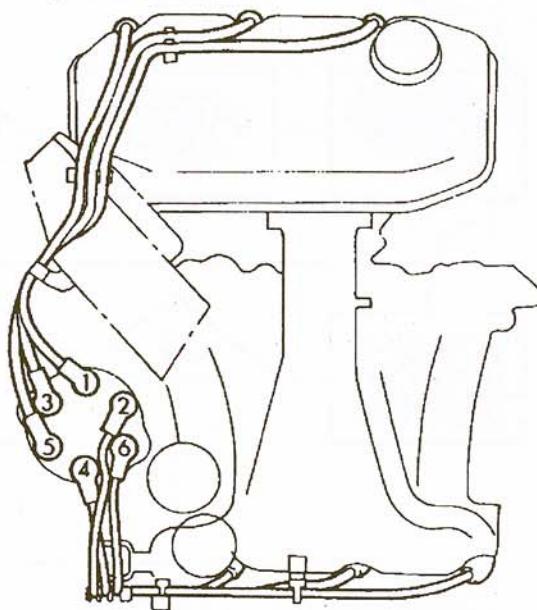
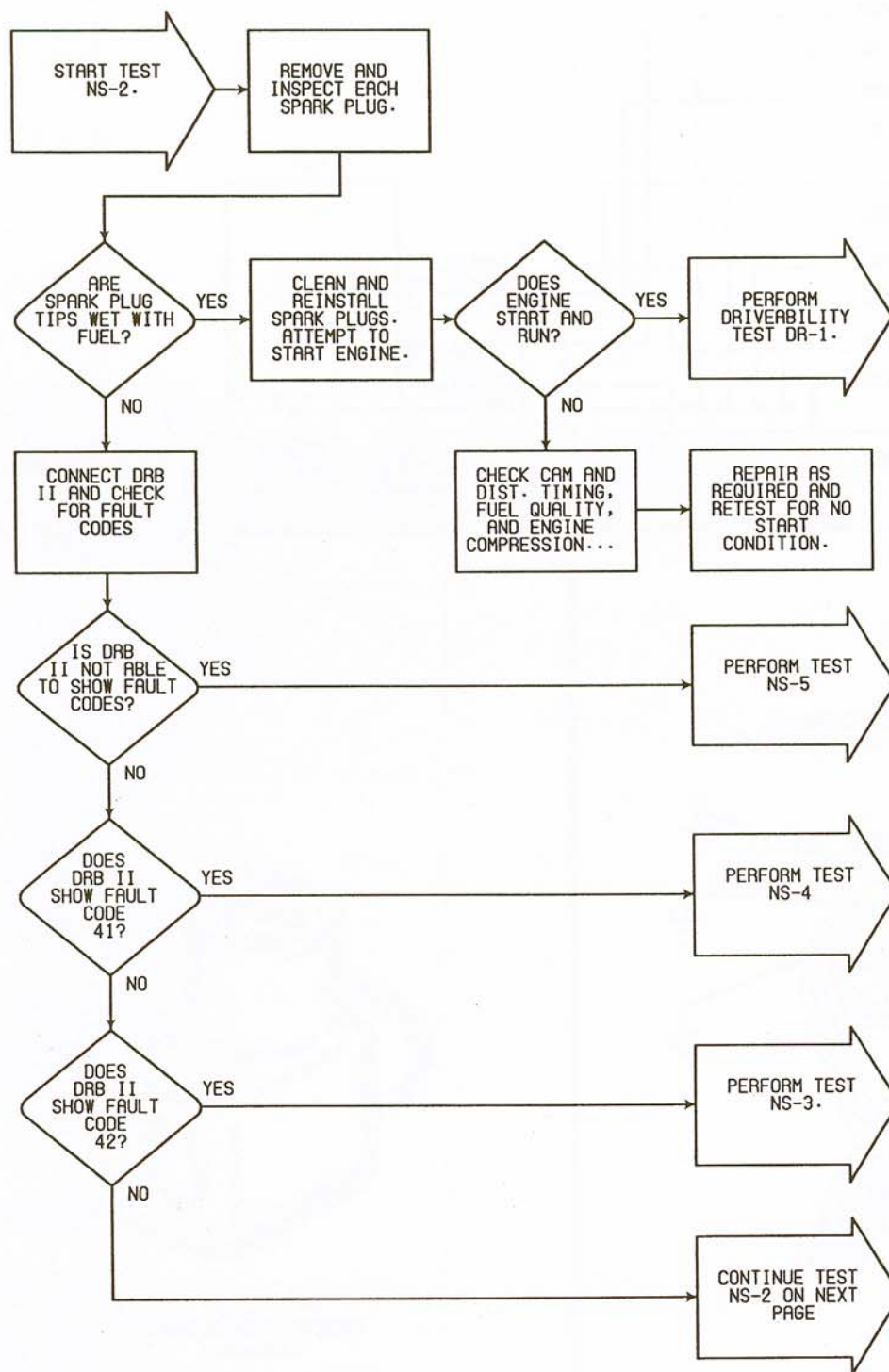


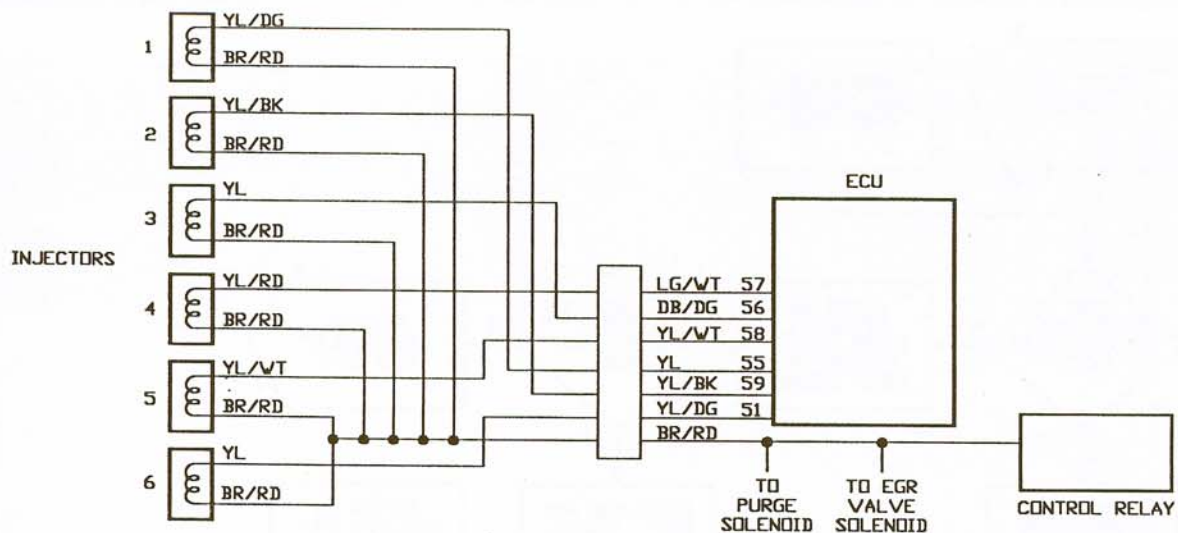
FIG. 2

TEST NS-2 NO START FUEL TEST

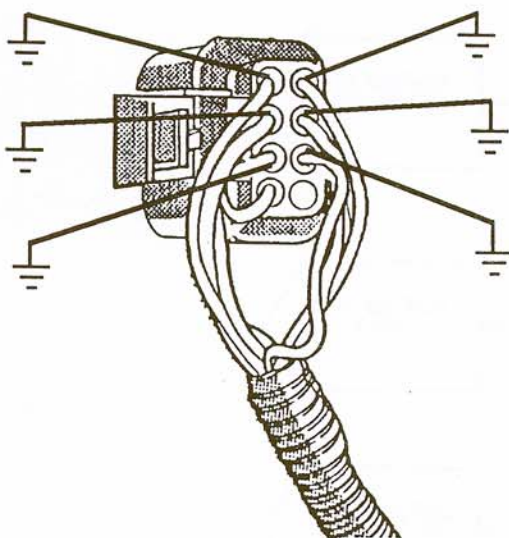
Perform TEST NS-1 Before Proceeding



TEST NS-2 CONTINUED - NO START FUEL TEST

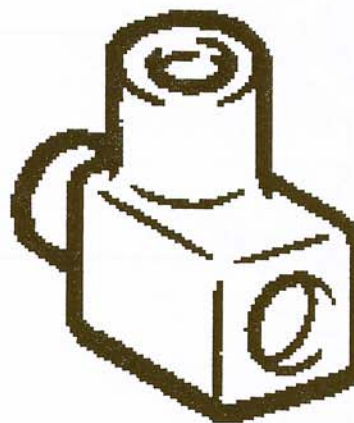


CONNECTOR ON BULKHEAD
AT REAR OF ENGINE COMPARTMENT



WIRE SIDE
(GROUND TIME 10 SEC. MAX.)

FIG. 1



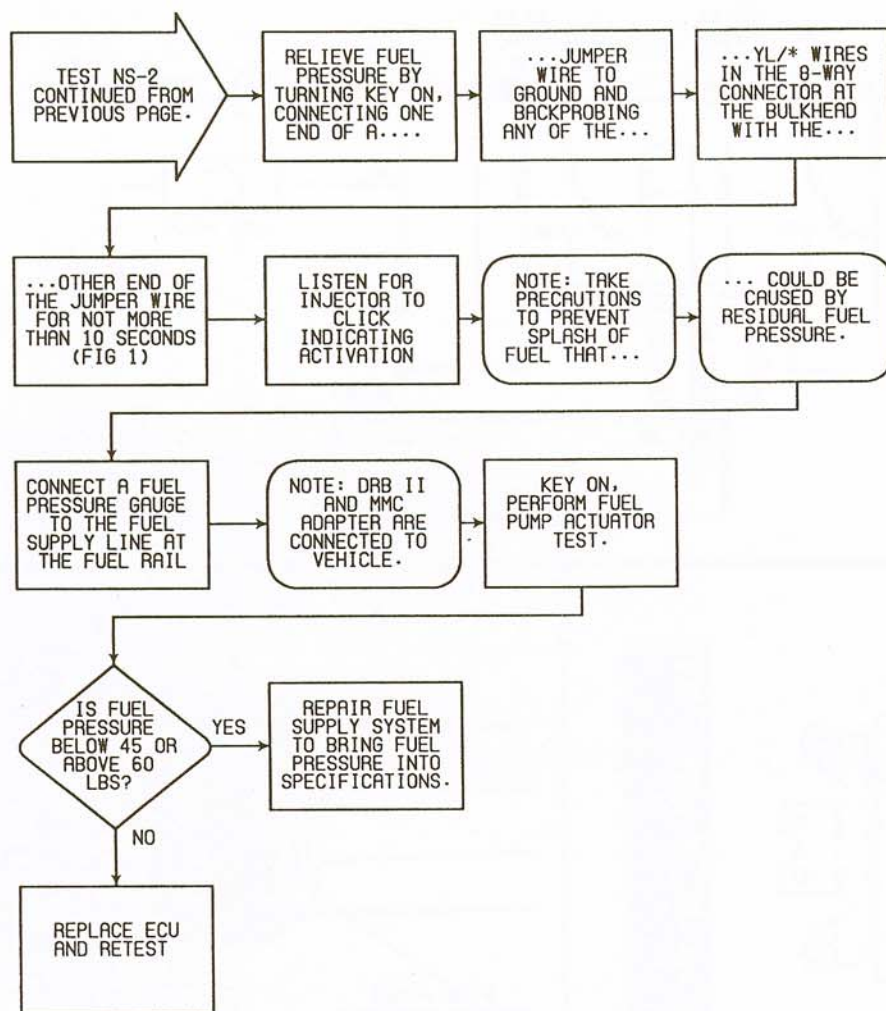
INSERT SPECIAL TOOL
MD998753

FIG. 2

TEST NS-2

CONTINUED - NO START FUEL TEST

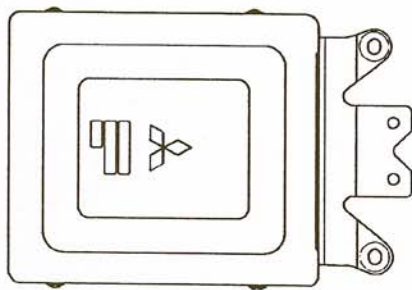
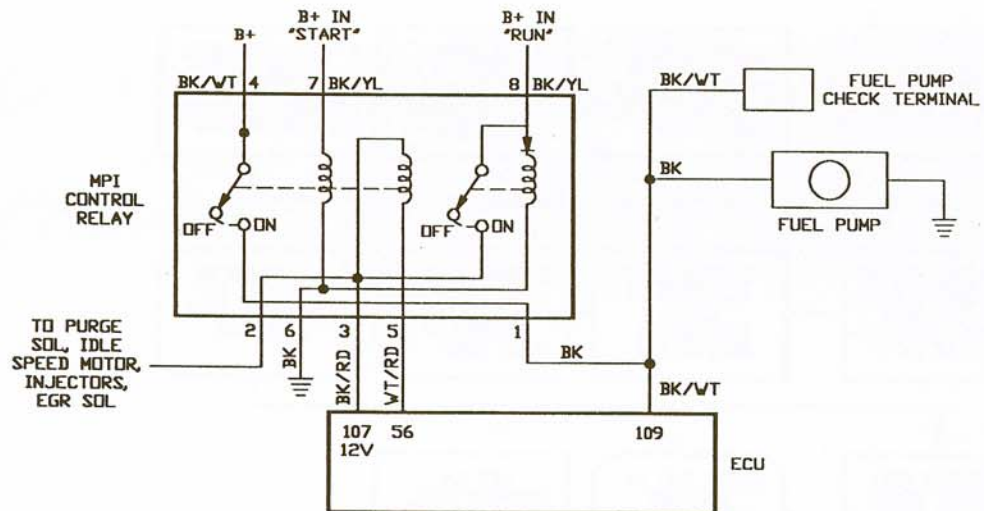
NO
START
TESTS
3:0L



TEST NS-3

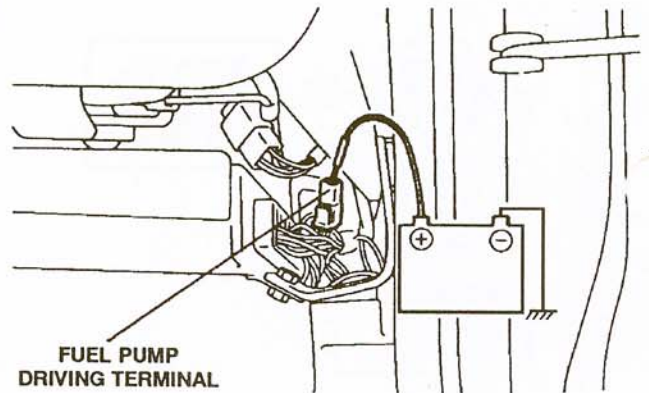
CHECKING FUEL PUMP OPERATION - FAULT CODE 42

Perform TEST NS-2 Before Proceeding



ECU

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106



FUEL PUMP
DRIVING TERMINAL

FIG. 1

FIG. 2

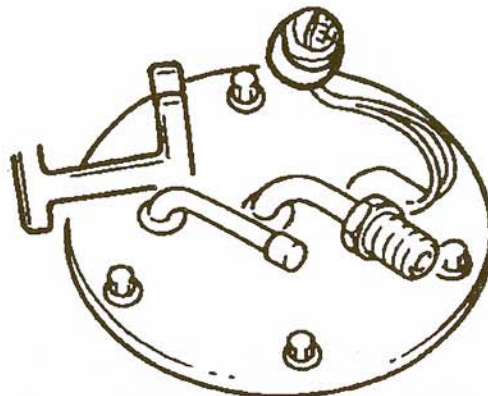
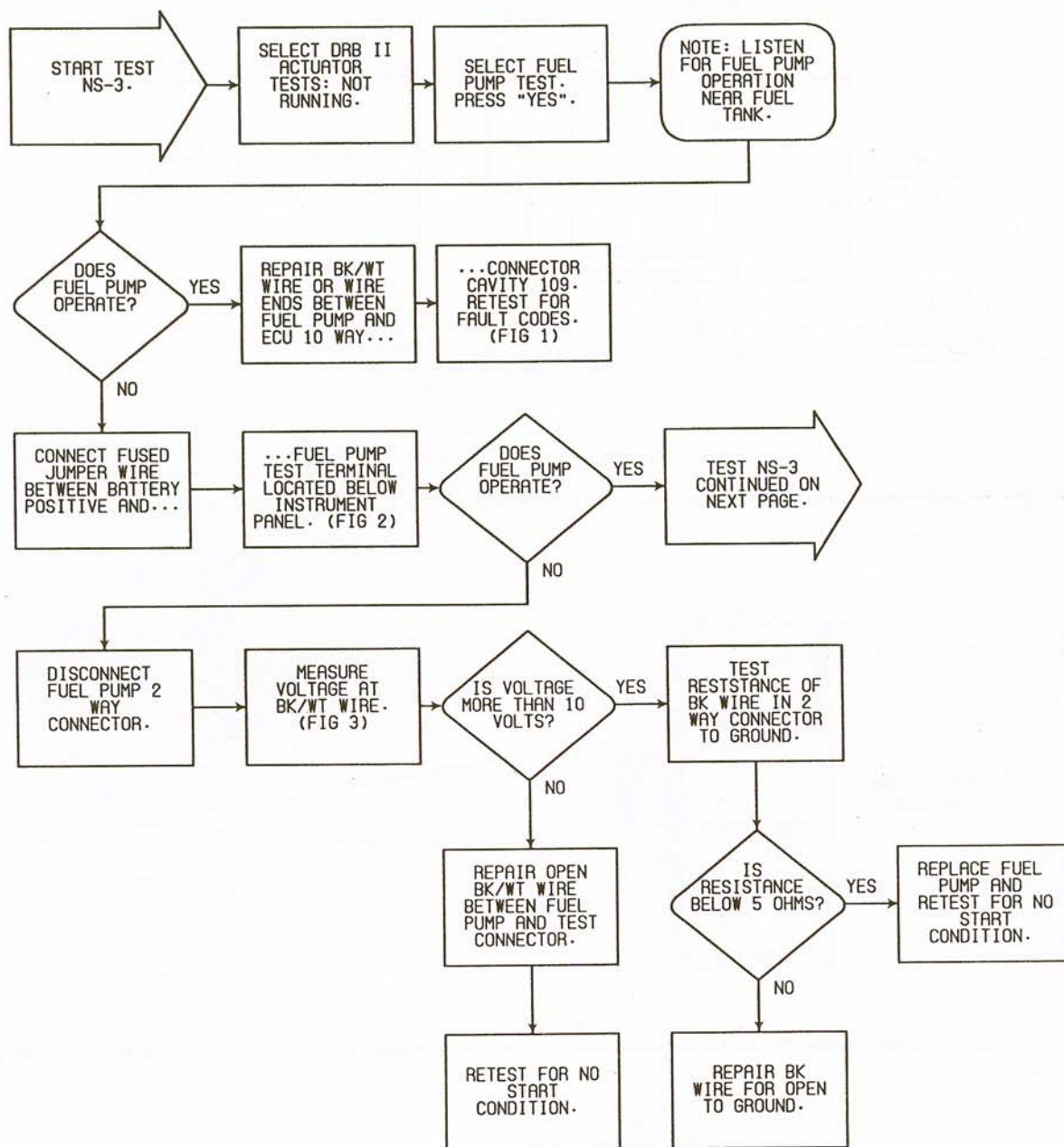


FIG. 3

TEST NS-3

CHECKING FUEL PUMP OPERATION - FAULT CODE 42

Perform TEST NS-2 Before Proceeding



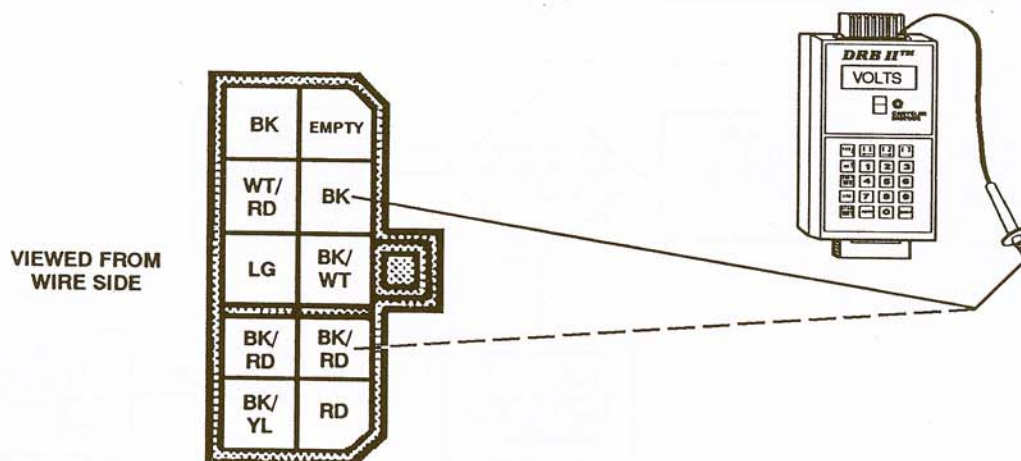
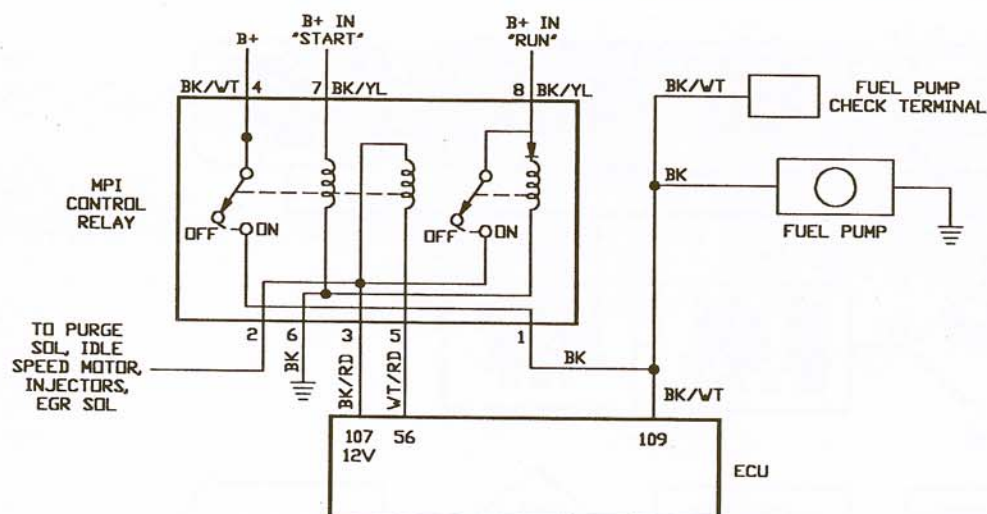
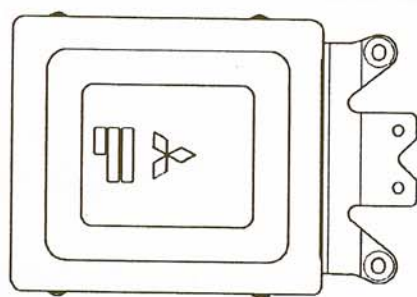


FIG. 1



ECU

FIG. 2

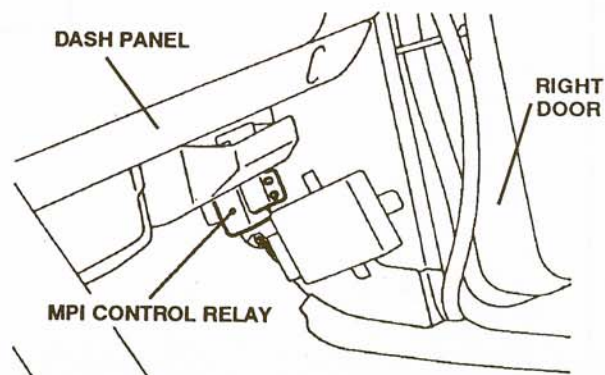
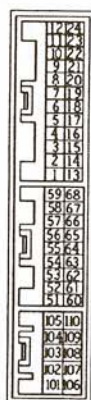
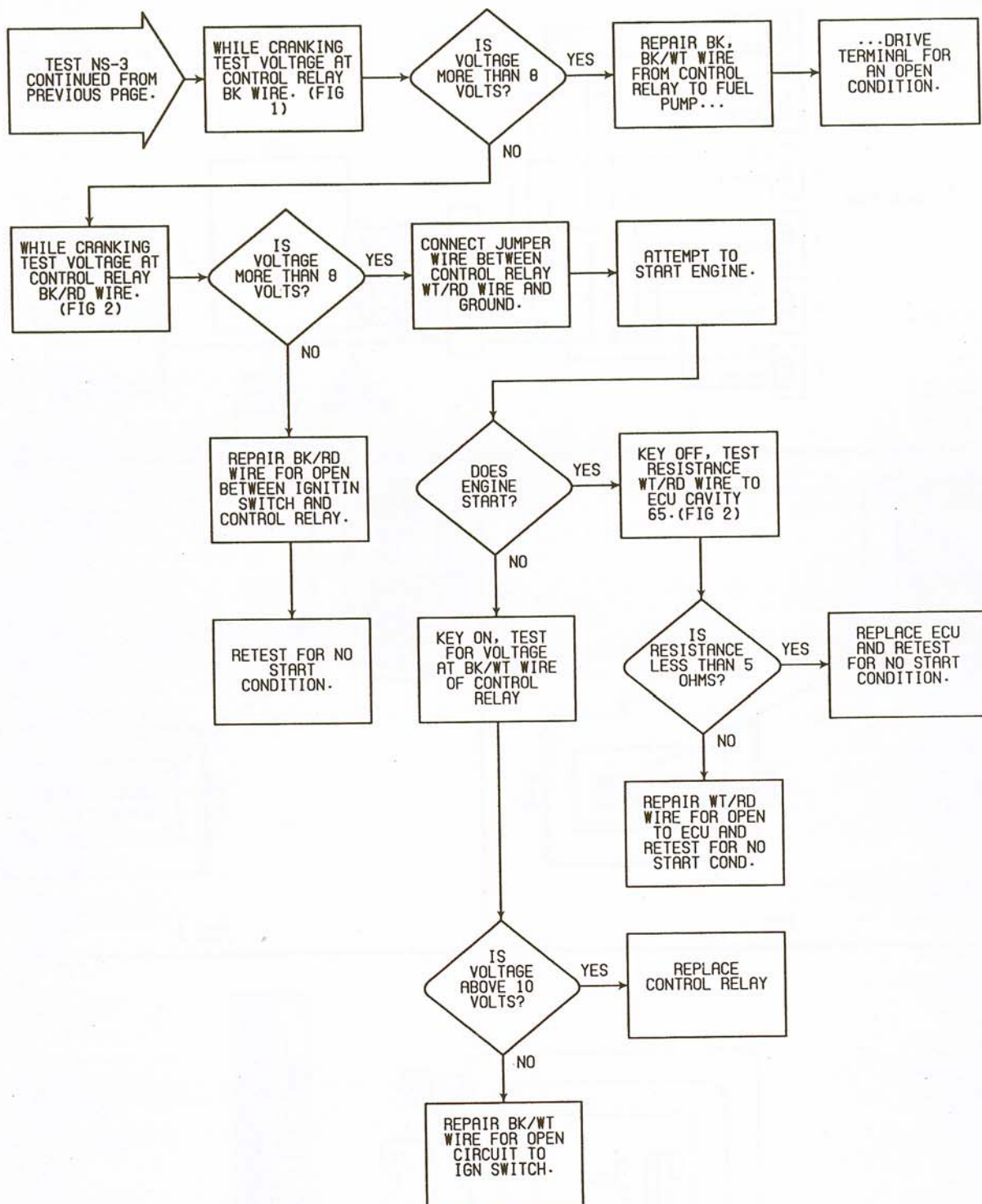


FIG. 3



TEST NS-4

TESTING INJECTOR CIRCUIT - FAULT CODE 41

Perform TEST NS-2 Before Proceeding

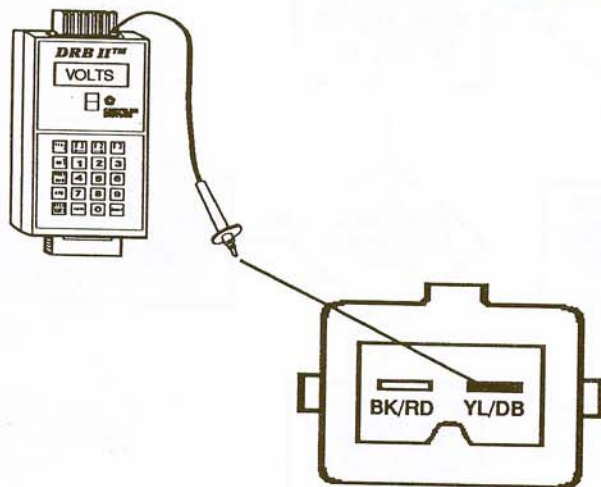
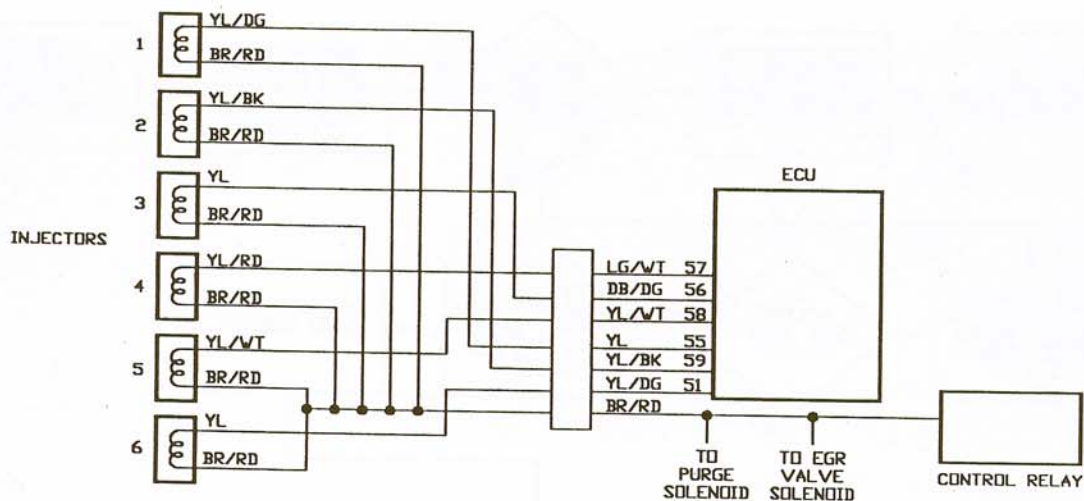


FIG. 1

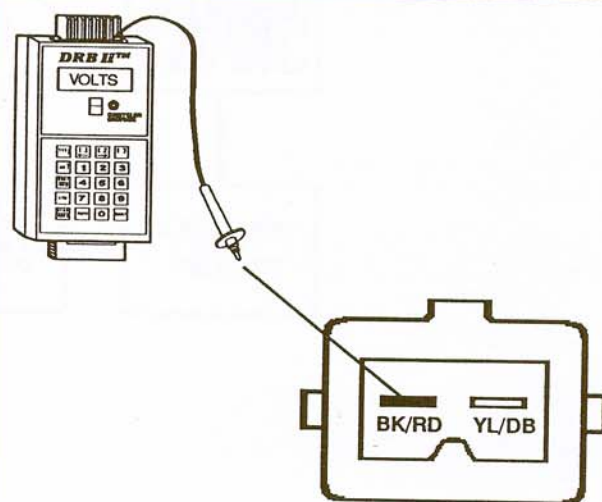


FIG. 2

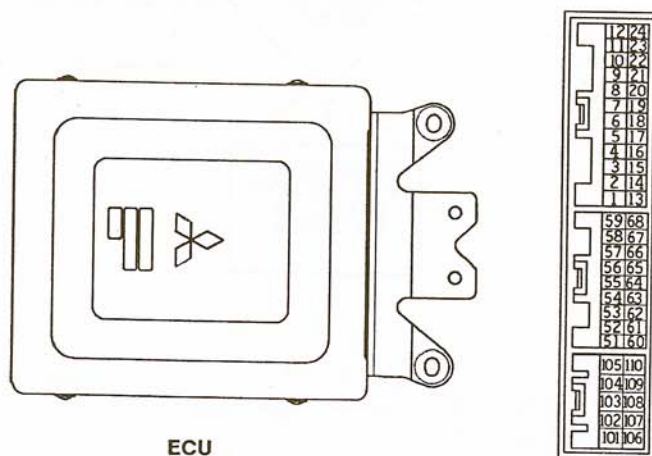
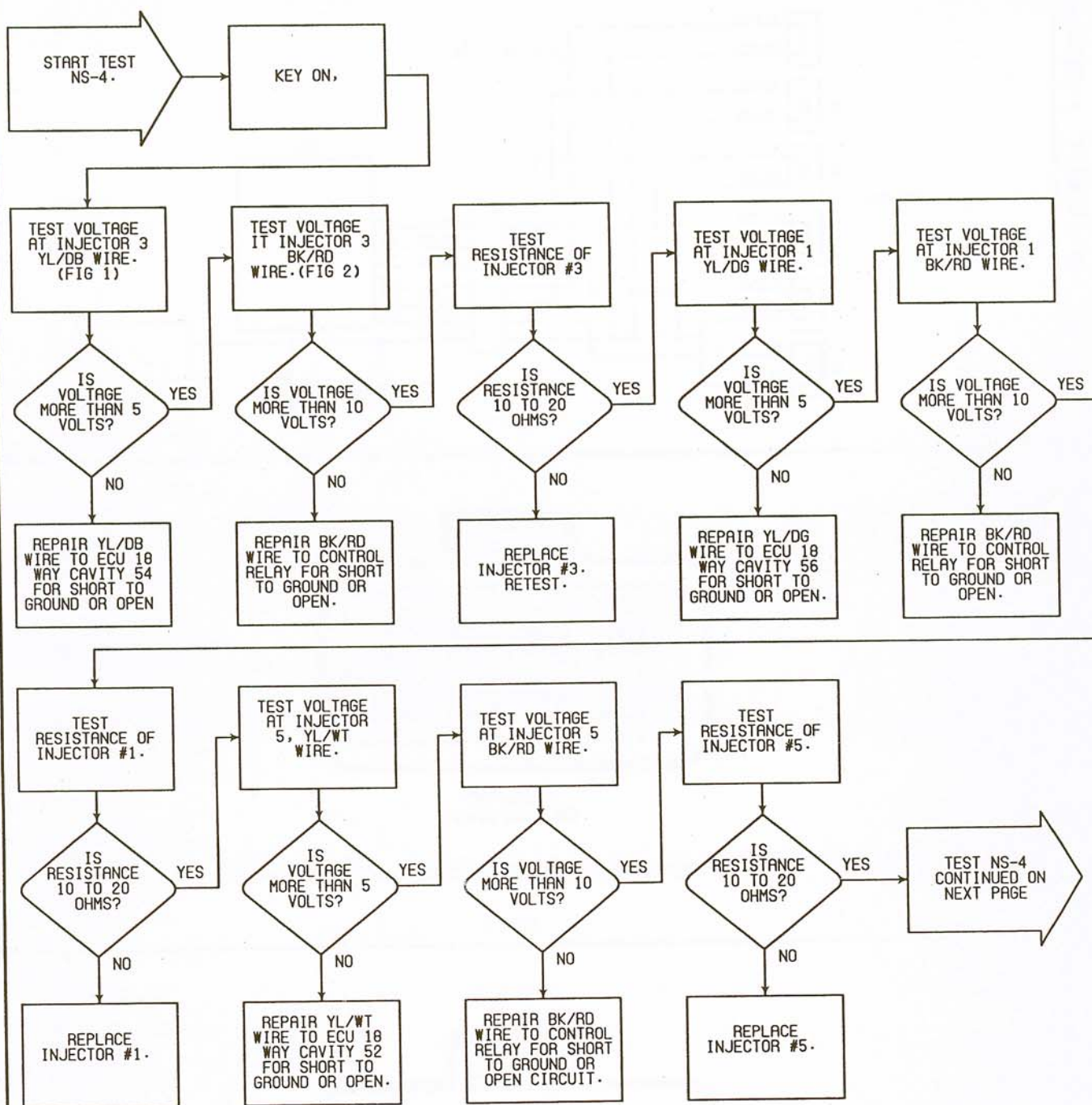


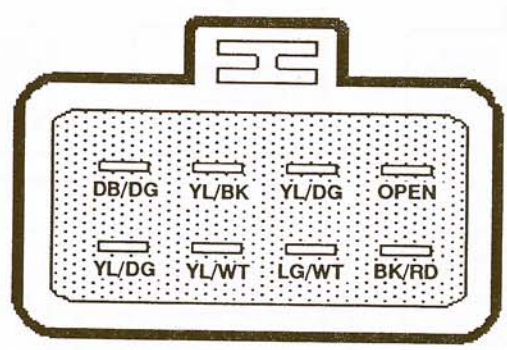
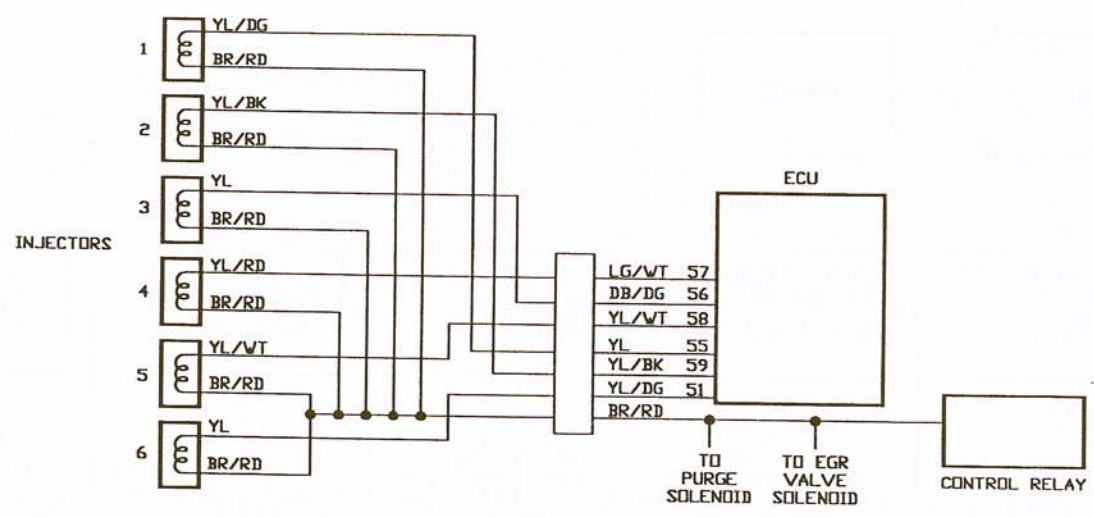
FIG. 3

TEST NS-4

TESTING INJECTOR CIRCUIT - FAULT CODE 41

Perform TEST NS-2 Before Proceeding

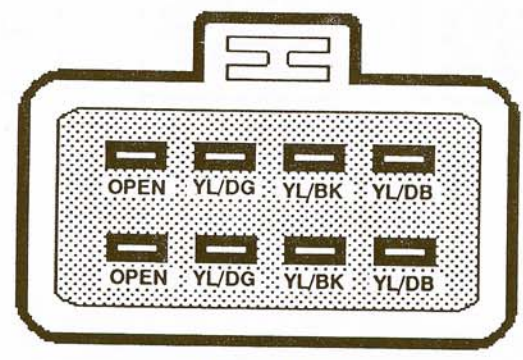




MALE PINS
(VEHICLE HALF)

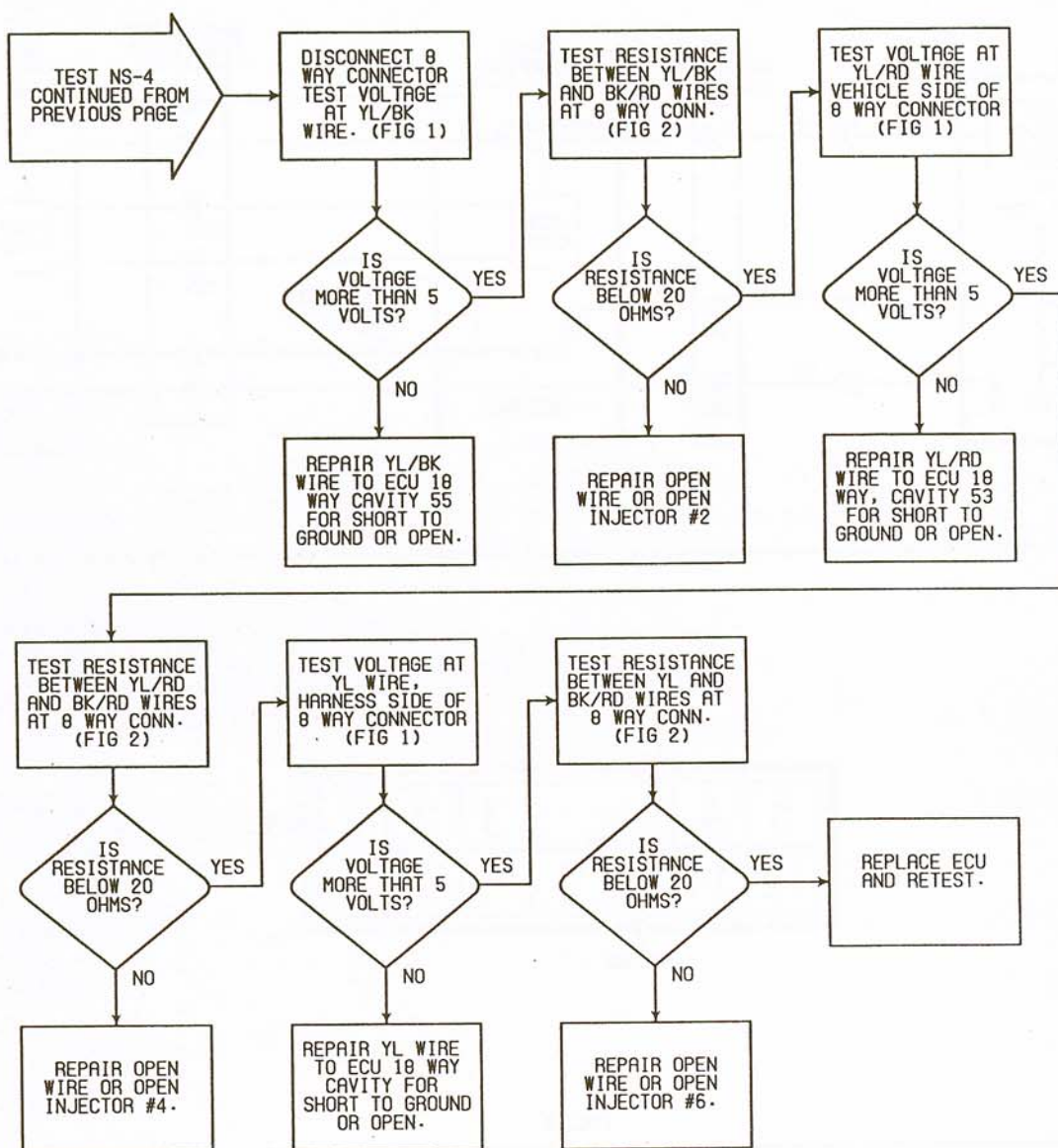
CONNECTOR LOCATED AT REAR OF ENGINE COMPARTMENT

FIG. 1



FEMALE PINS
(INJECTOR HALF)

FIG. 2



TEST NS-5 TESTING DIAGNOSTIC CONNECTOR

Perform TEST NS-1 Before Proceeding

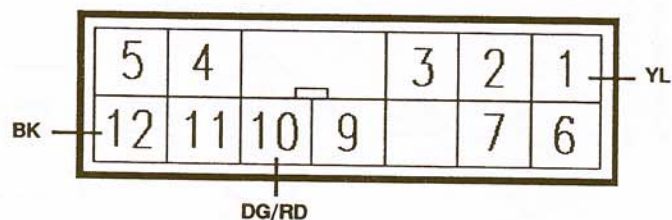
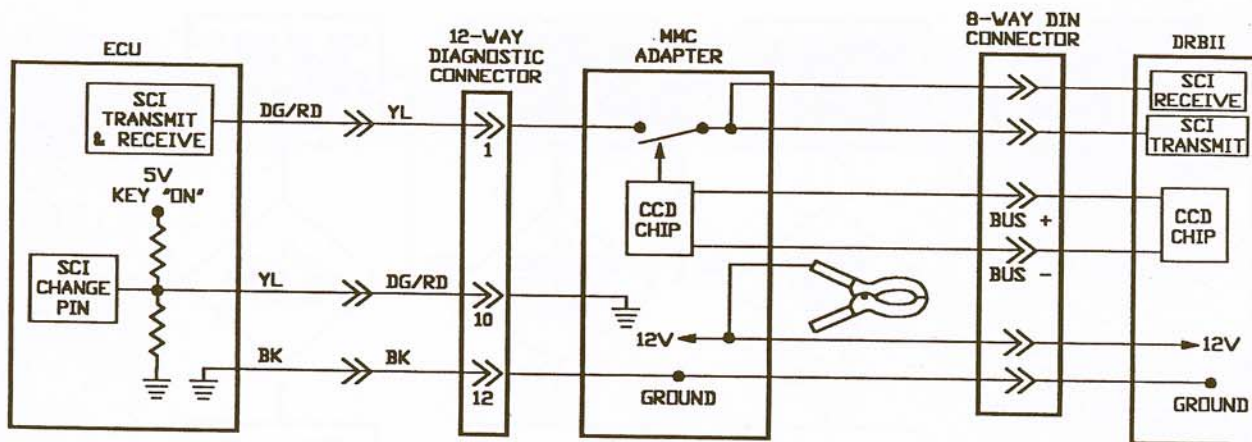
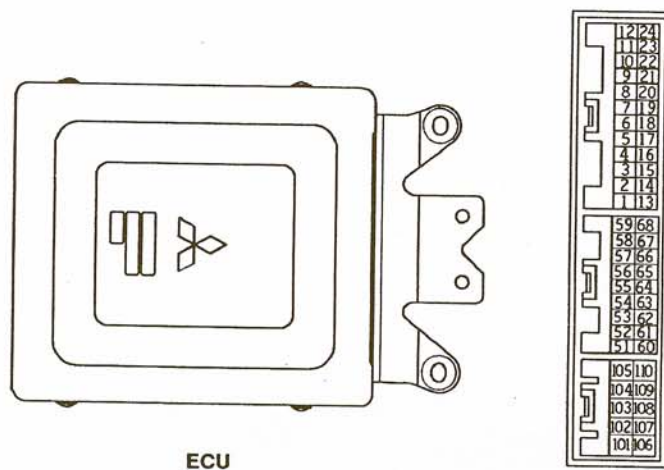


FIG. 1

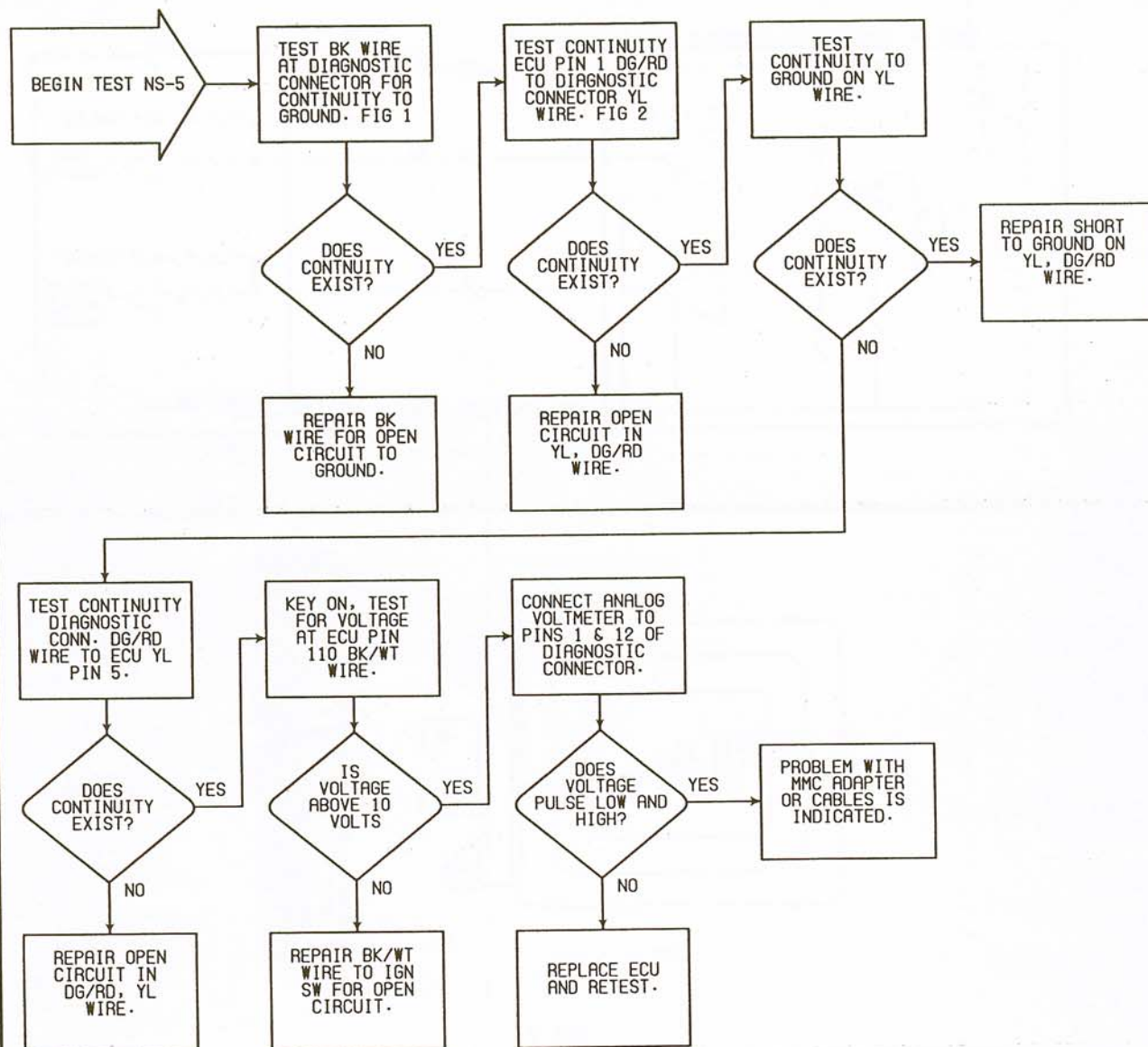


ECU

FIG. 2

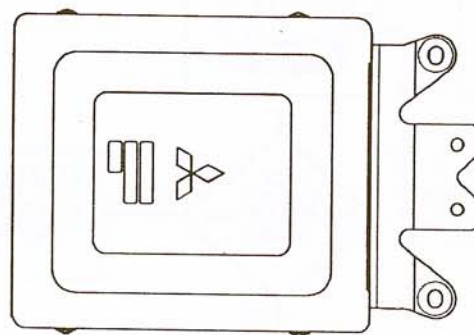
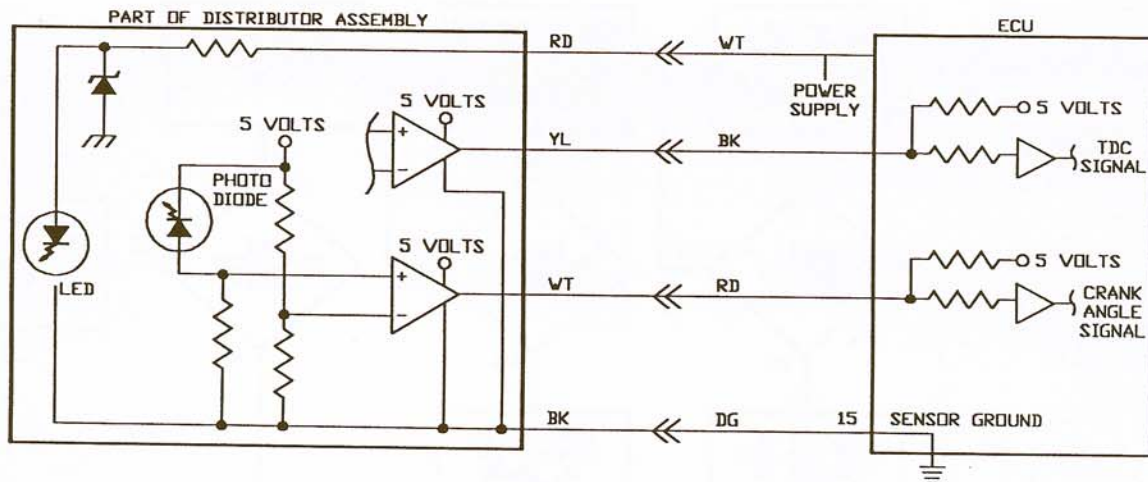
TEST NS-5 TESTING DIAGNOSTIC CONNECTOR

Perform TEST NS-1 Before Proceeding



TEST NS-6 TESTING CRANK ANGLE SENSOR - FAULT CODE 23

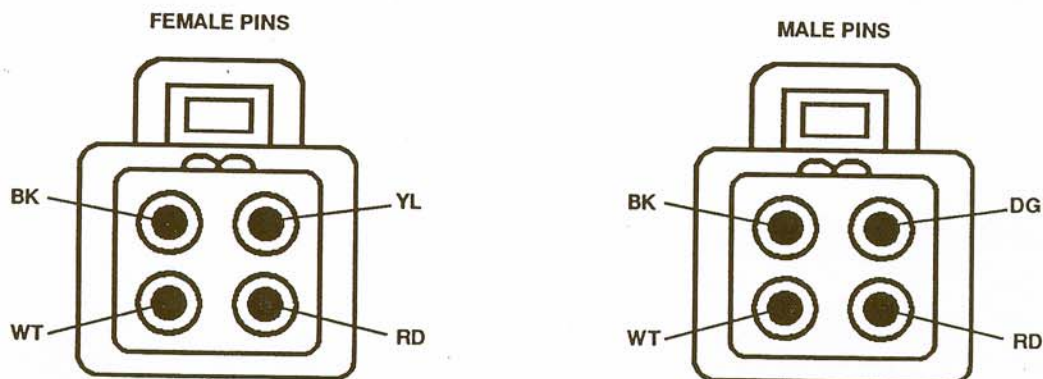
Perform TEST NS-1 Before Proceeding



ECU

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 1



VIEW FROM WIRE SIDE

(CONNECTOR LOCATED AT REAR OF ENGINE COMPARTMENT)

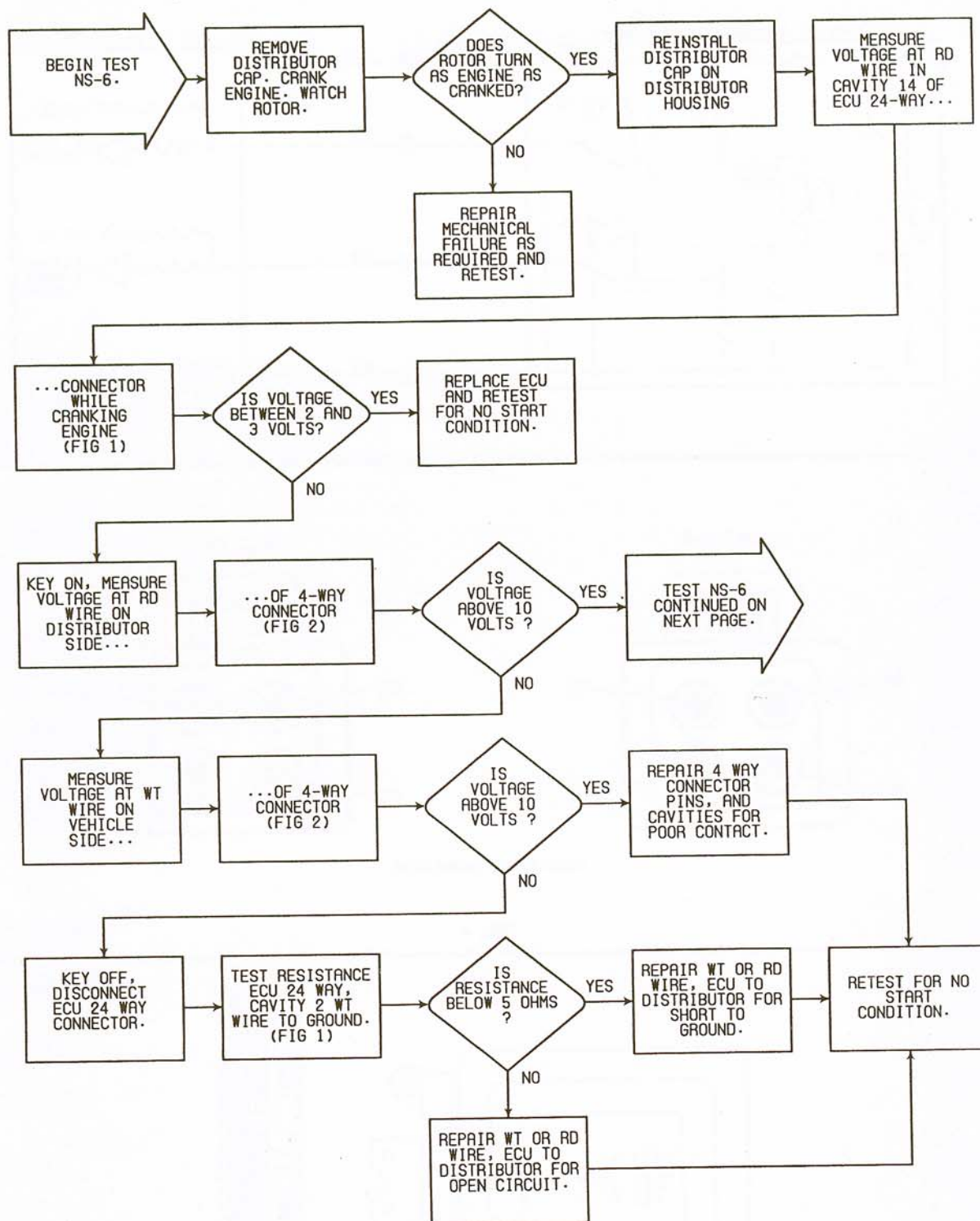
FIG. 2

TEST NS-6

TESTING CRANK ANGLE SENSOR - FAULT CODE 23

NO
START
TESTS
3
OL

Perform TEST NS-1 Before Proceeding



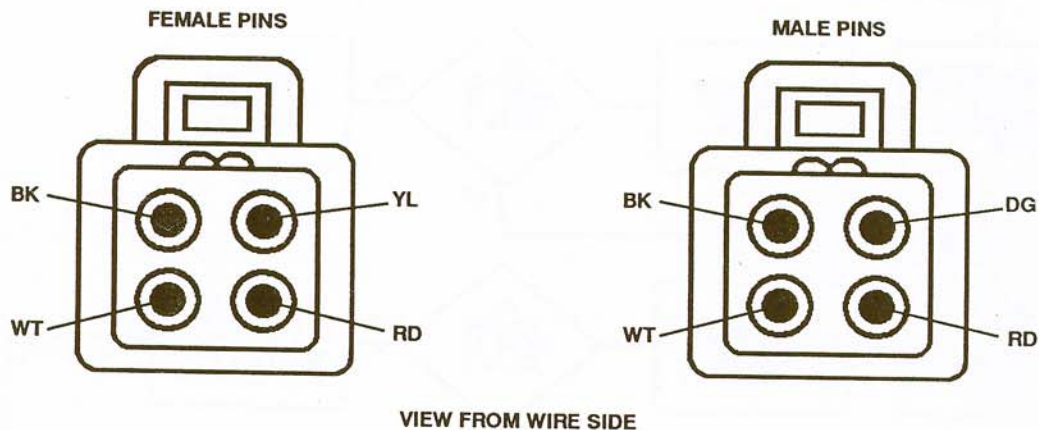
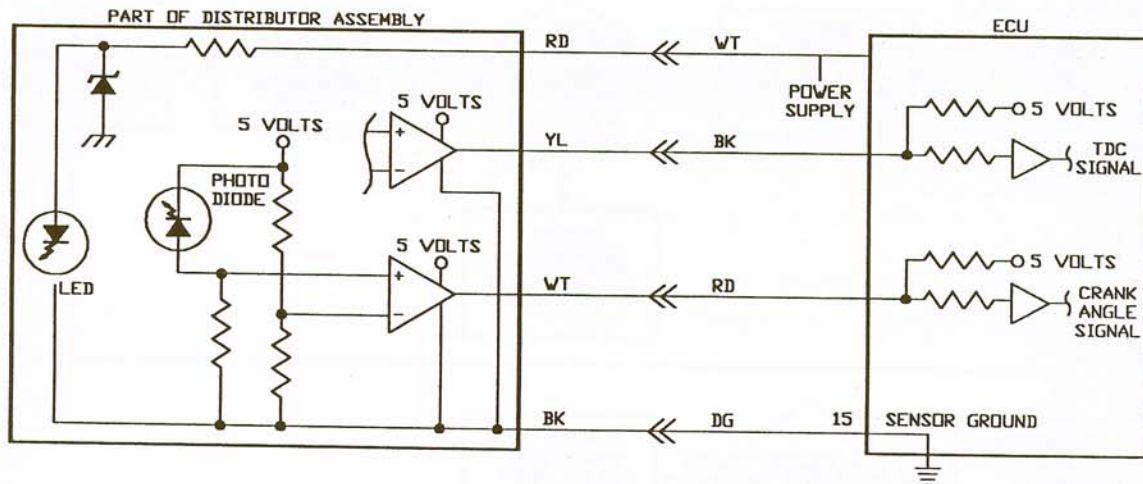


FIG. 1

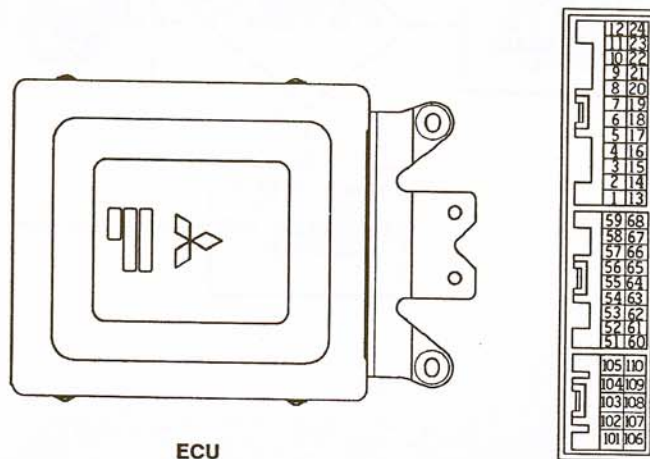
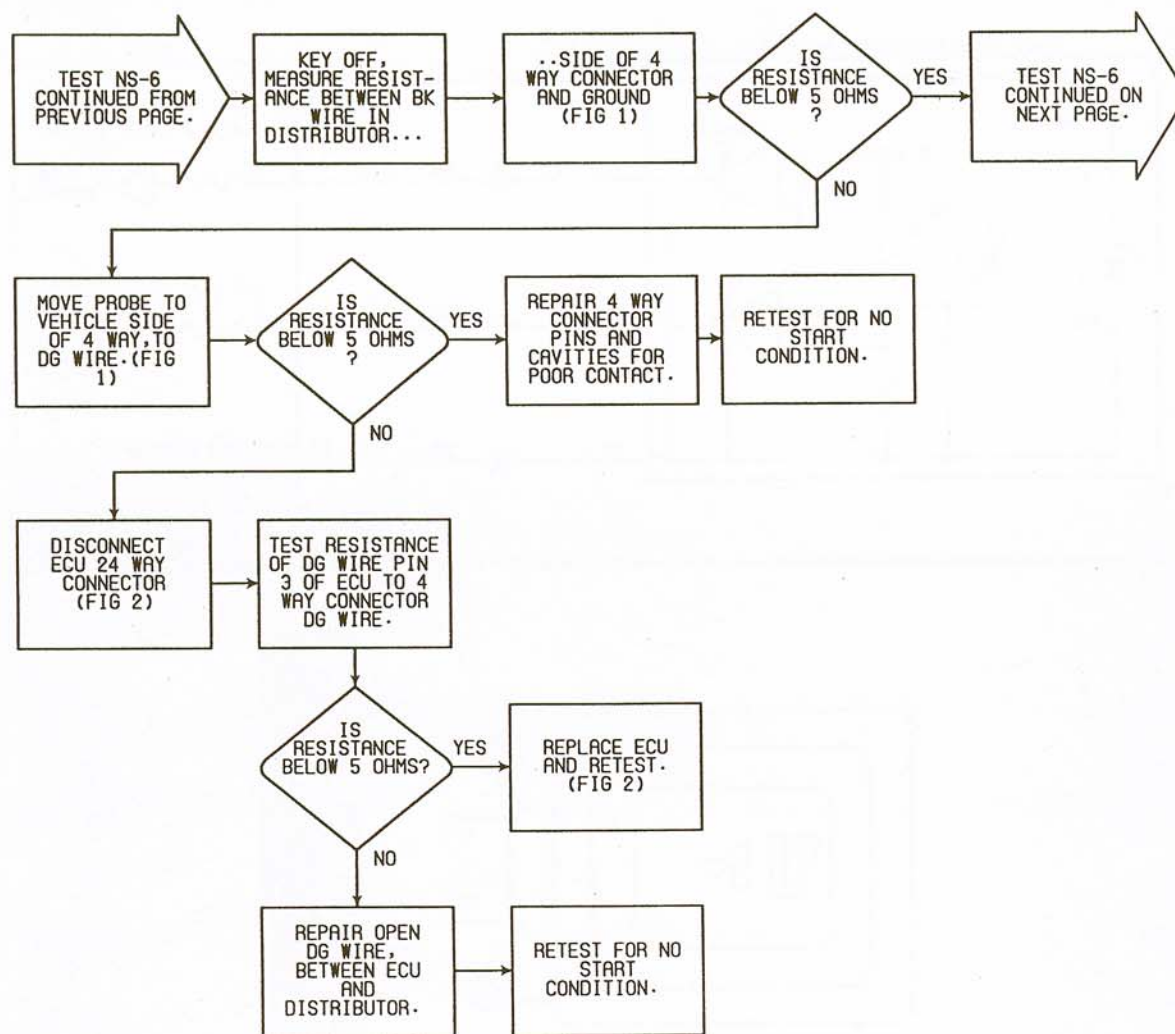
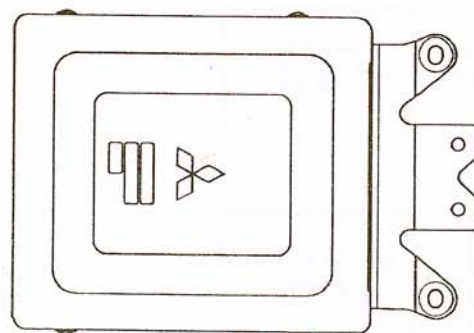
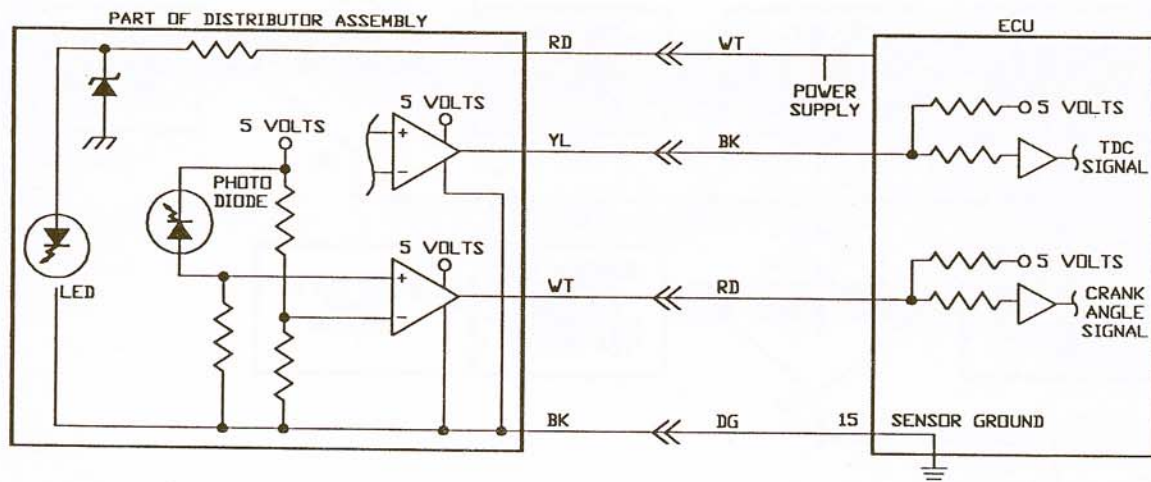


FIG. 2





ECU

1	21	24
11	12	23
10	12	22
9	11	21
8	10	20
7	11	19
6	18	18
5	17	17
4	16	16
3	15	15
2	14	14
1	13	13
59	68	
58	67	
57	66	
56	65	
55	64	
54	63	
53	62	
52	61	
51	60	
105	110	
104	109	
103	108	
102	107	
101	106	

FIG. 1

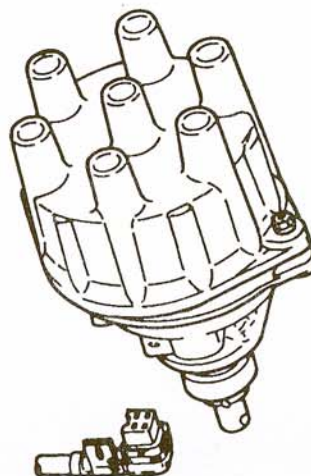
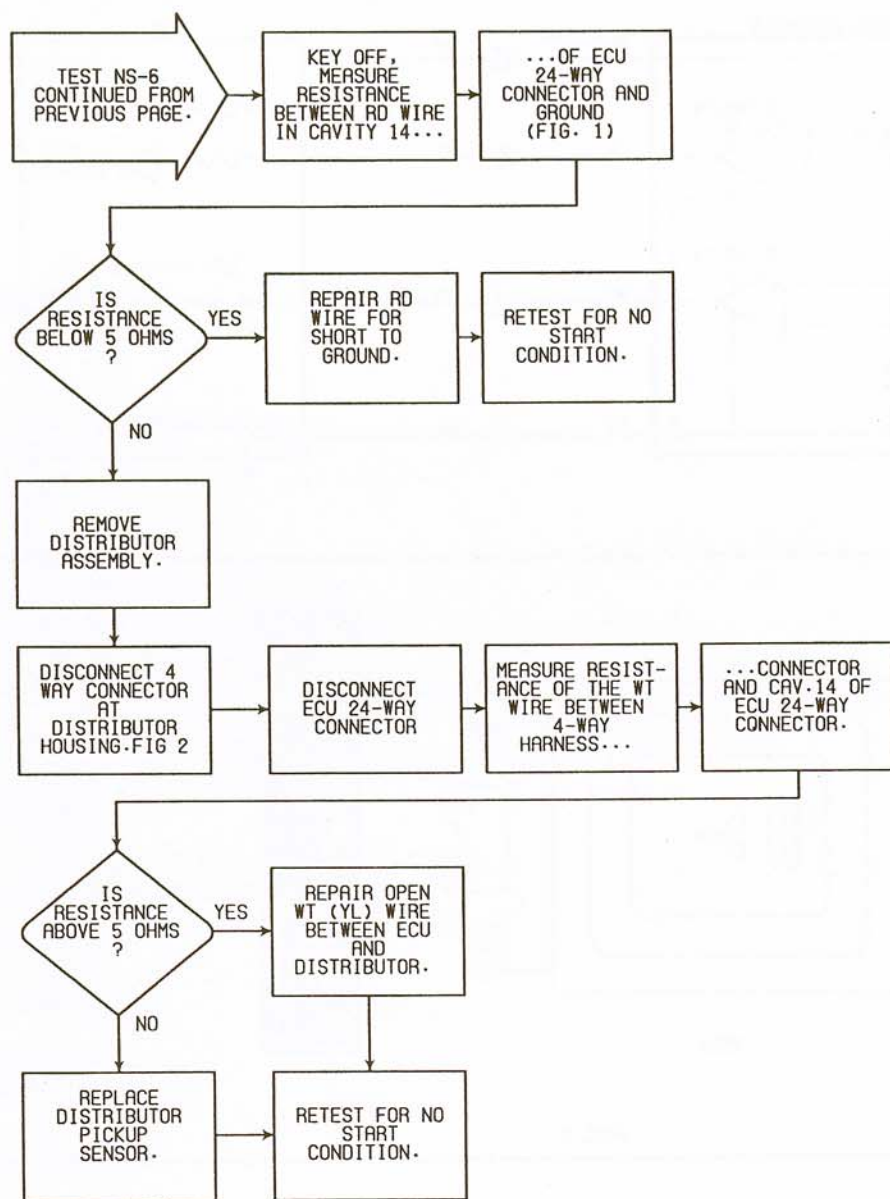
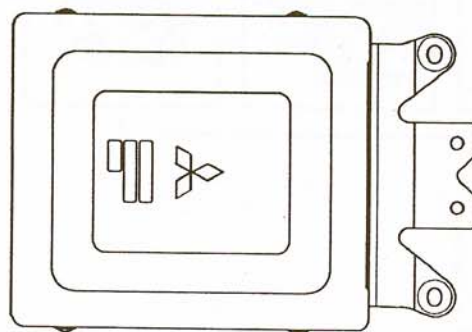
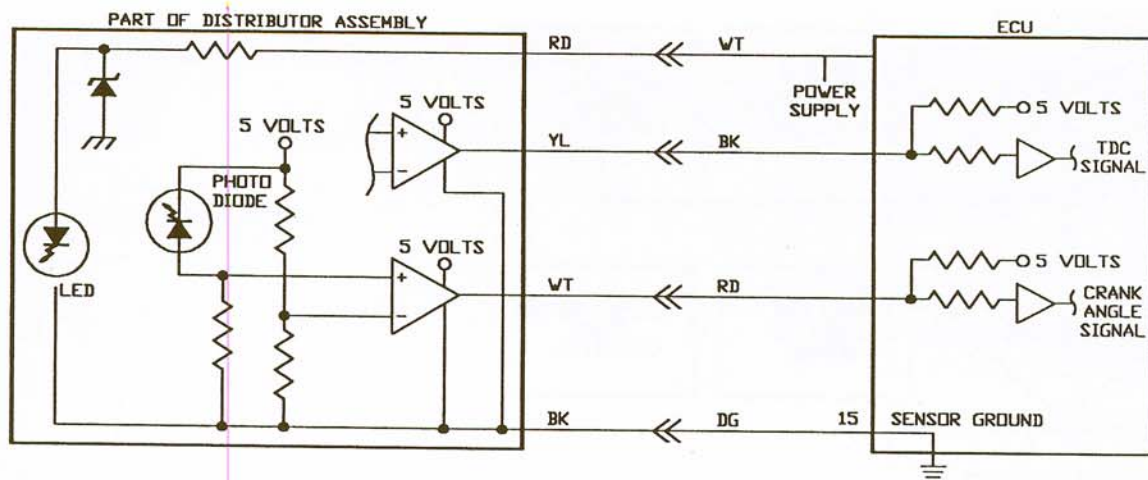


FIG. 2



TEST NS-7 TESTING TDC SENSOR - FAULT CODE 22

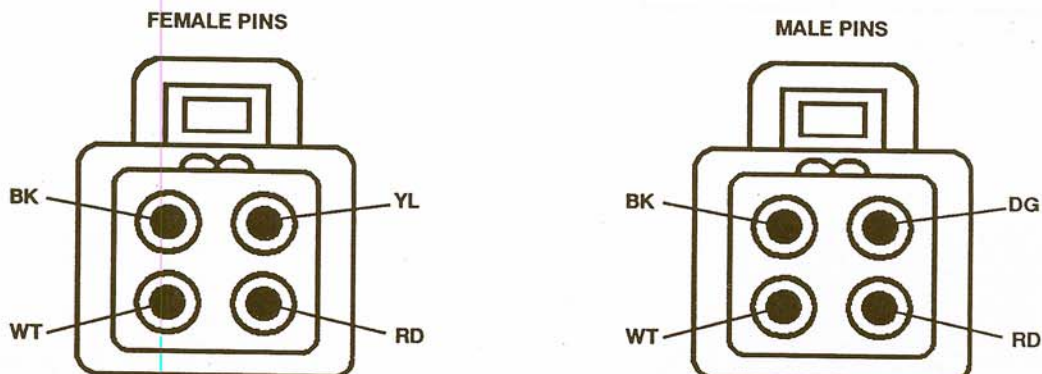
Perform TEST NS-1 Before Proceeding



ECU

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 1



VIEW FROM WIRE SIDE

(CONNECTOR LOCATED AT REAR OF ENGINE COMPARTMENT)

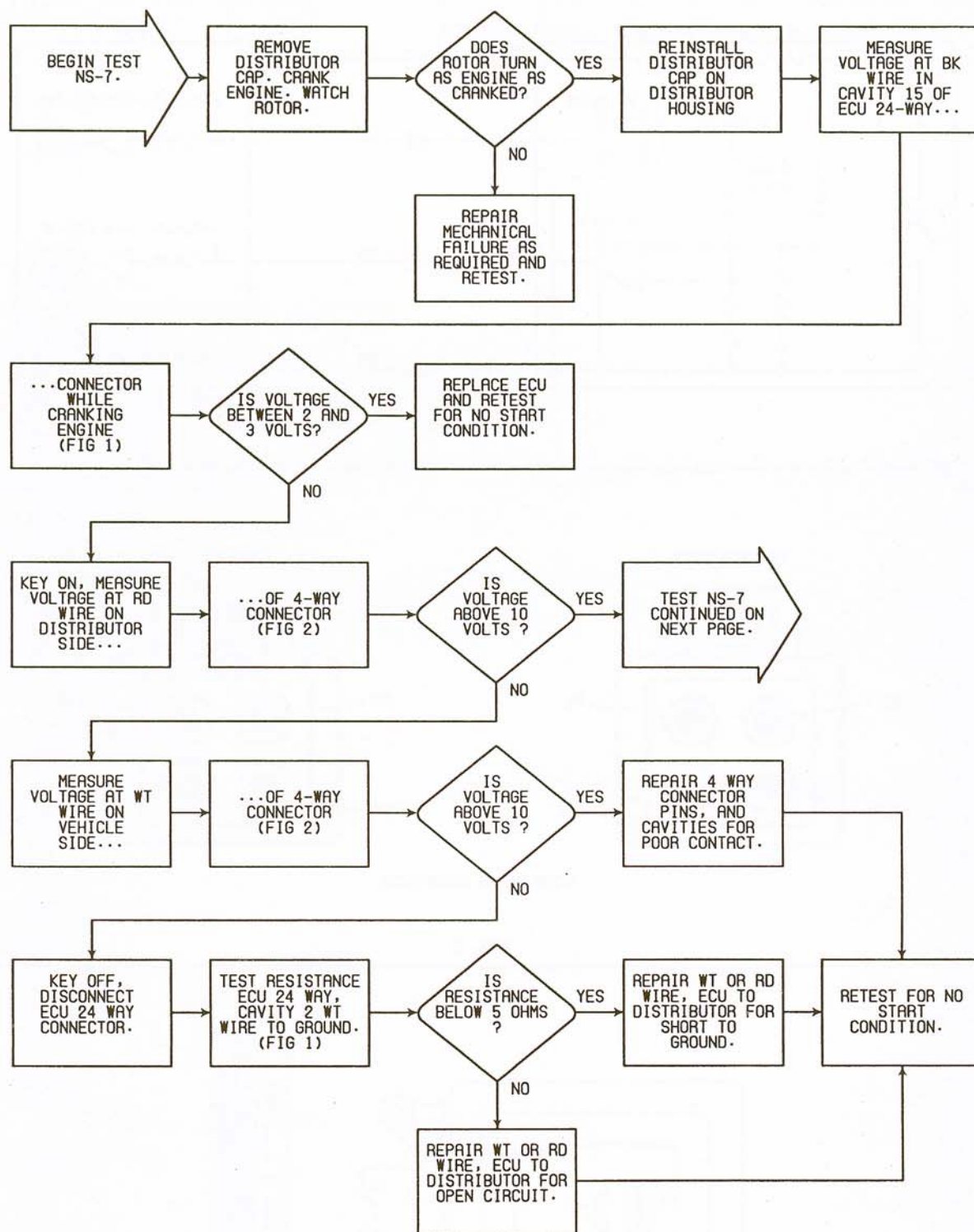
FIG. 2

TEST NS-7

TESTING TDC SENSOR - FAULT CODE 22

Perform TEST NS-1 Before Proceeding

NO
START
TESTS
3:0L



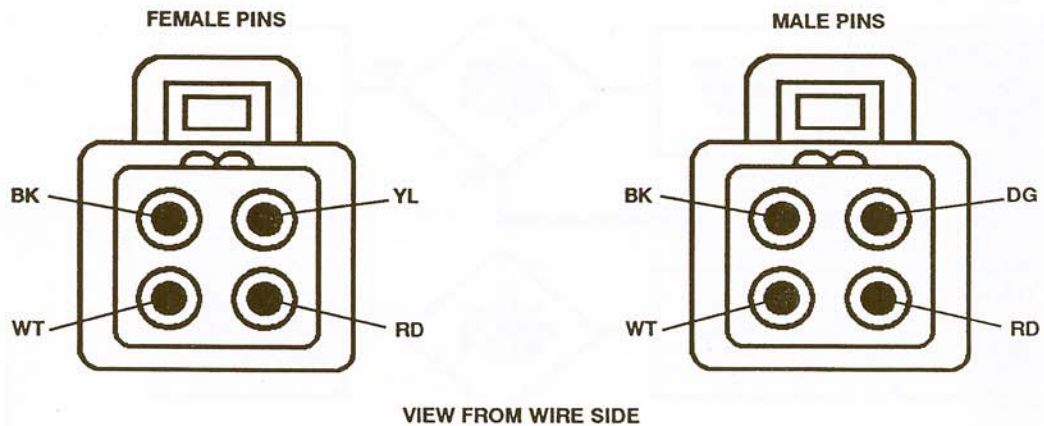
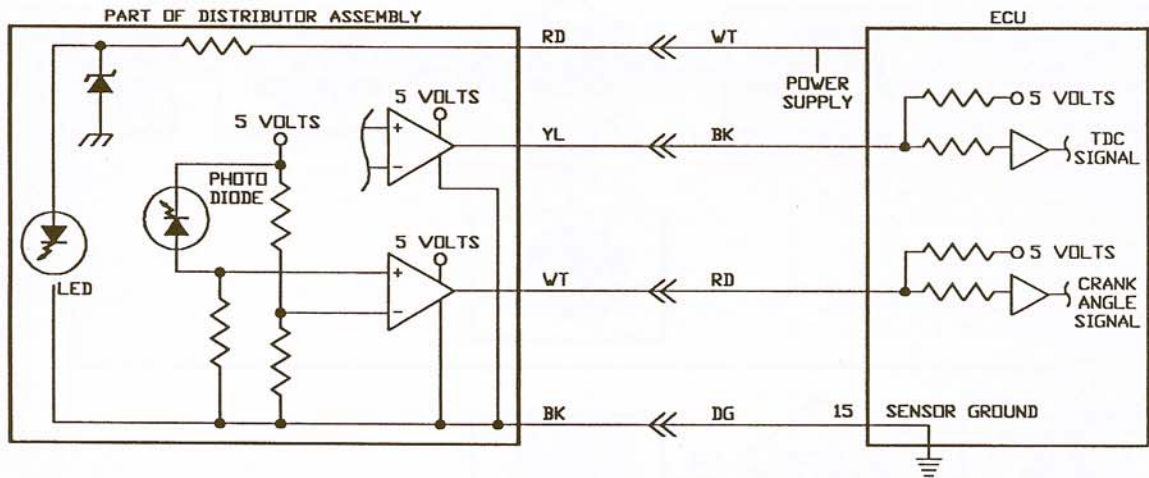


FIG. 1

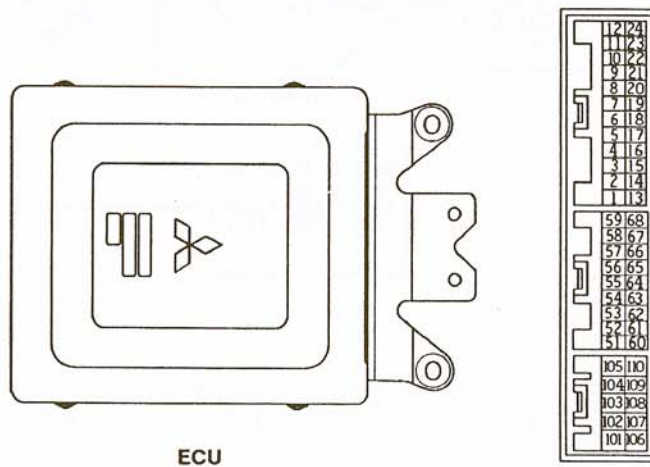
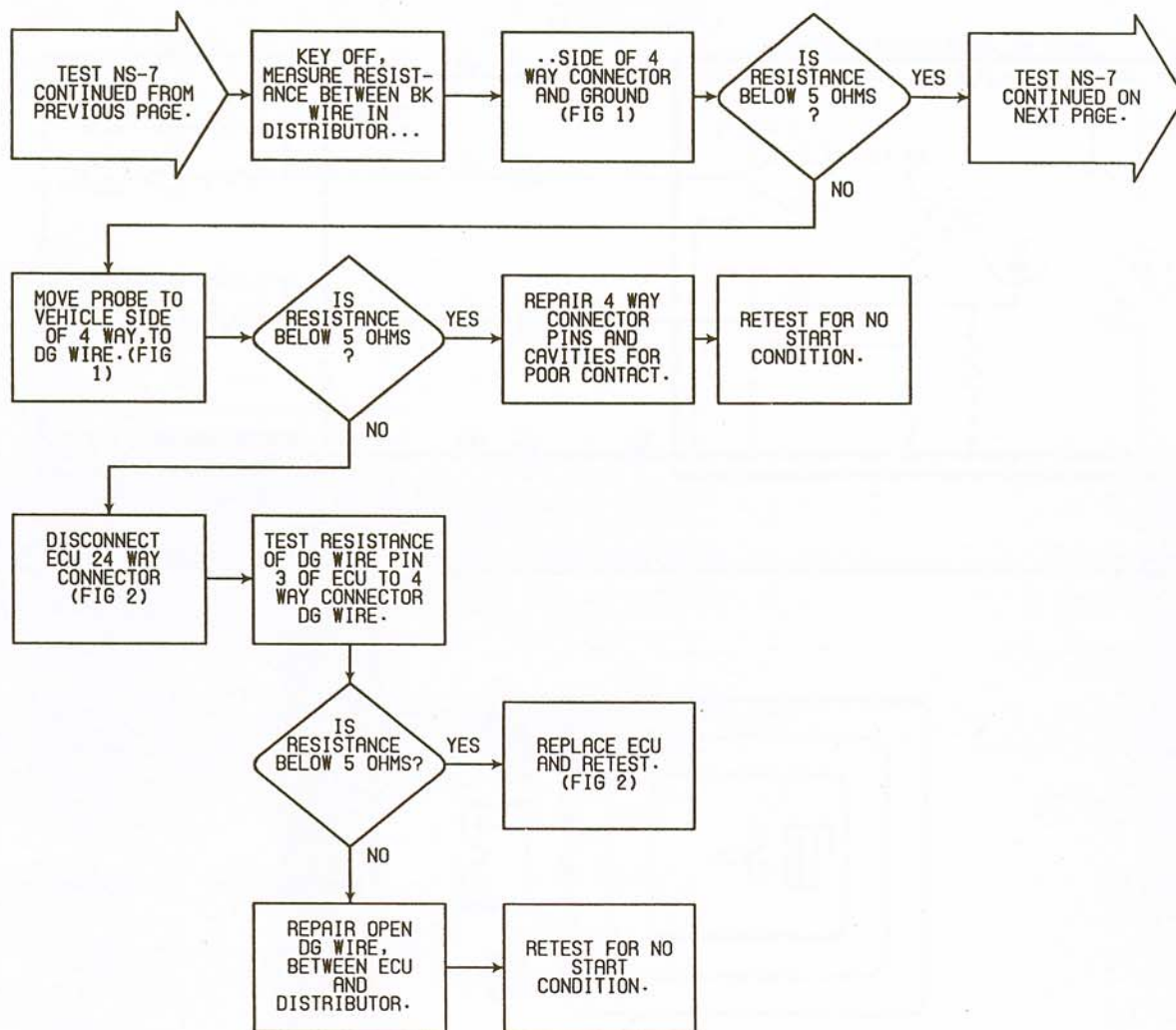


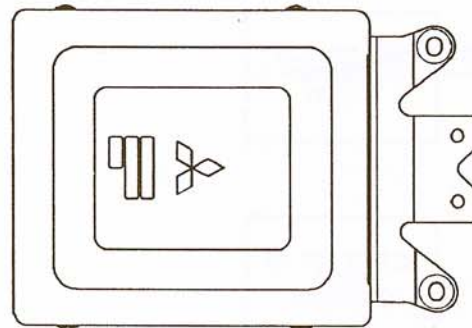
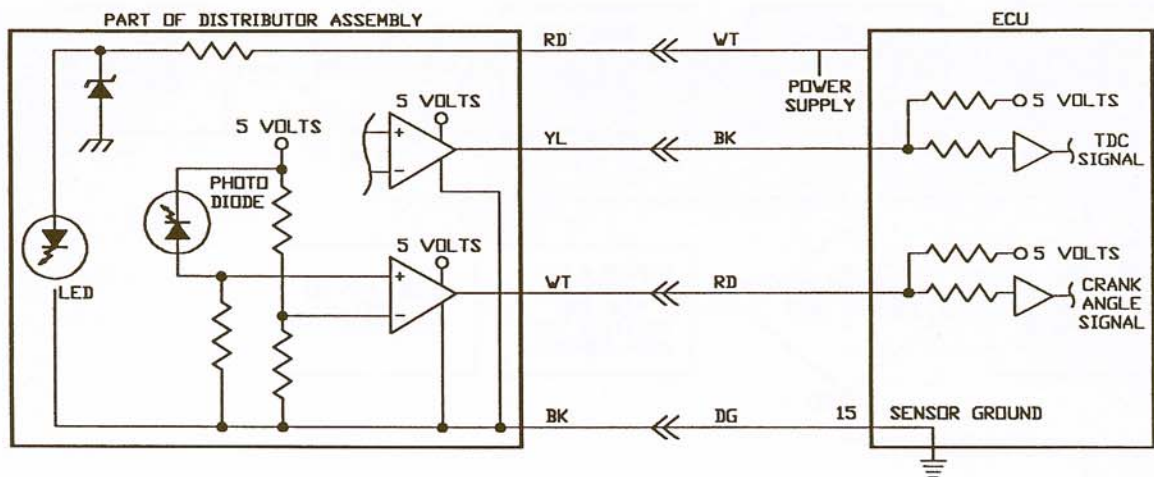
FIG. 2

TEST NS-7

CONTINUED - TESTING TDC SENSOR - FAULT CODE 22

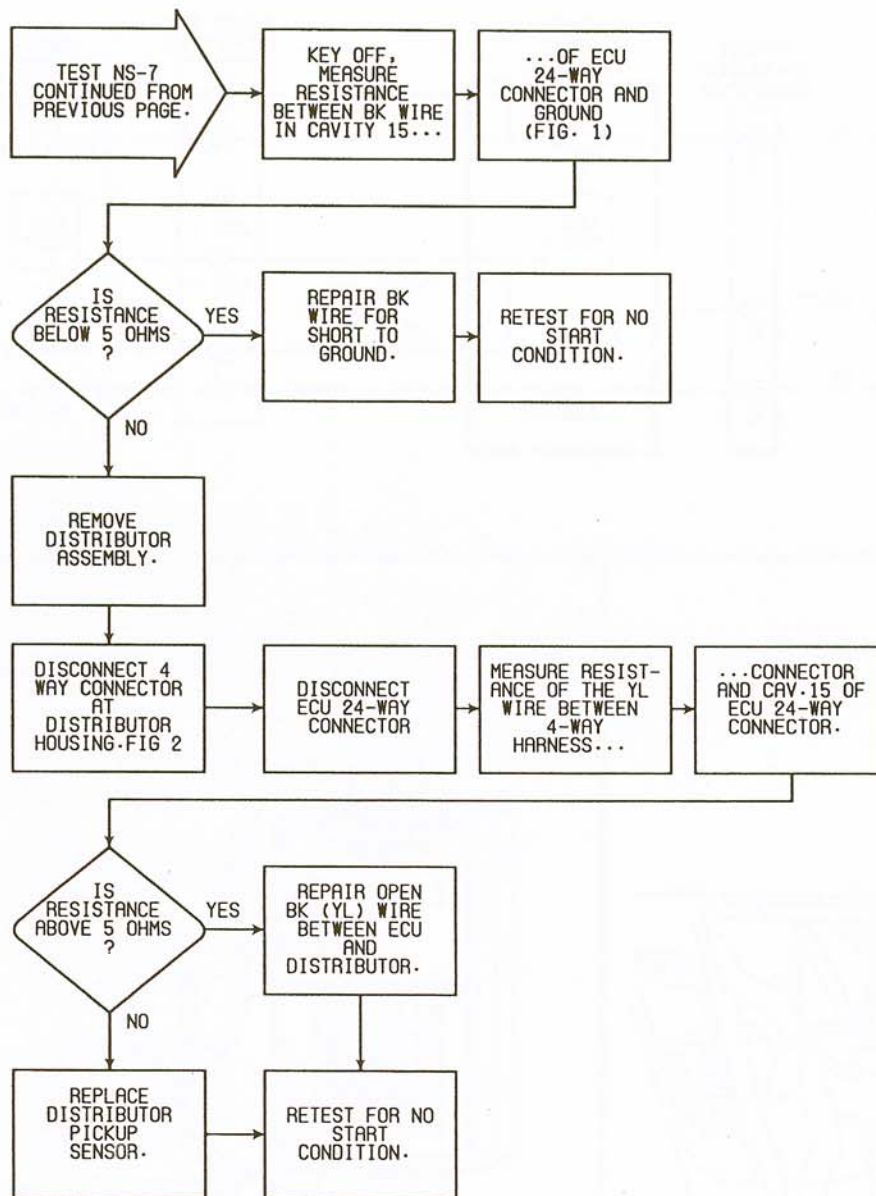
NO
START
TESTS
3:0L





ECU

11	21
12	23
13	24
14	25
15	26
16	27
17	28
18	29
19	30
20	31
21	32
22	33
23	34
24	35
25	36
26	37
27	38
28	39
29	40
30	41
31	42
32	43
33	44
34	45
35	46
36	47
37	48
38	49
39	50
40	51
41	52
42	53
43	54
44	55
45	56
46	57
47	58
48	59
49	60
50	61
51	62
52	63
53	64
54	65
55	66
56	67
57	68
58	69
59	70
60	71
61	72
62	73
63	74
64	75
65	76
66	77
67	78
68	79
69	80
70	81
71	82
72	83
73	84
74	85
75	86
76	87
77	88
78	89
79	90
80	91
81	92
82	93
83	94
84	95
85	96
86	97
87	98
88	99
89	100
90	101
91	102
92	103
93	104
94	105
95	106
96	107
97	108
98	109
99	110
100	111
101	112
102	113
103	114
104	115
105	116
106	117
107	118
108	119
109	120
110	121
111	122
112	123
113	124
114	125
115	126
116	127
117	128
118	129
119	130
120	131
121	132
122	133
123	134
124	135
125	136
126	137
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581	592
582	593



TEST DR-1 DRIVEABILITY FAULT CODE CHECK

Perform VISUAL INSPECTION Before Proceeding

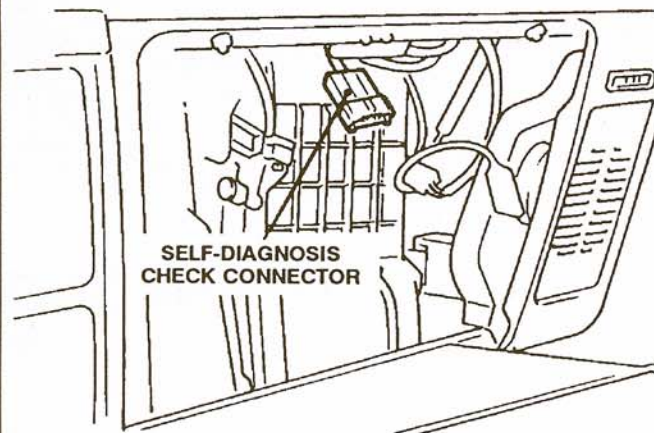
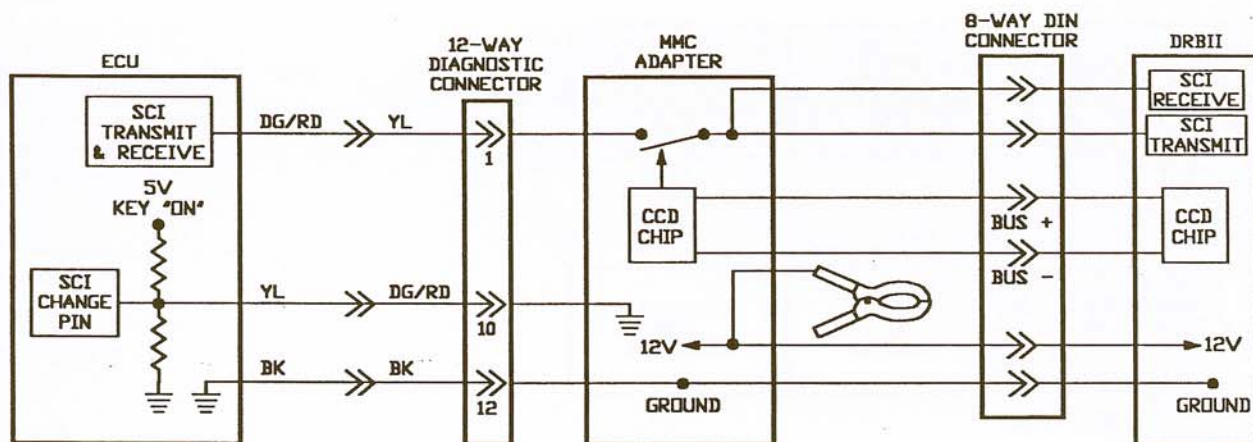


FIG. 1

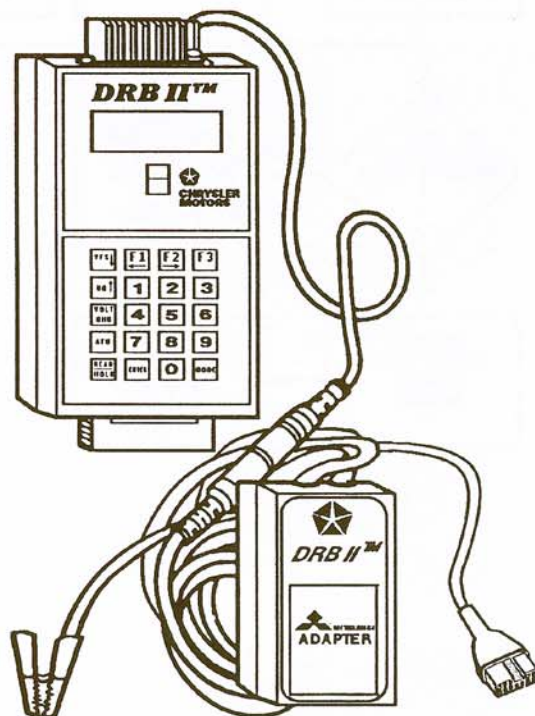
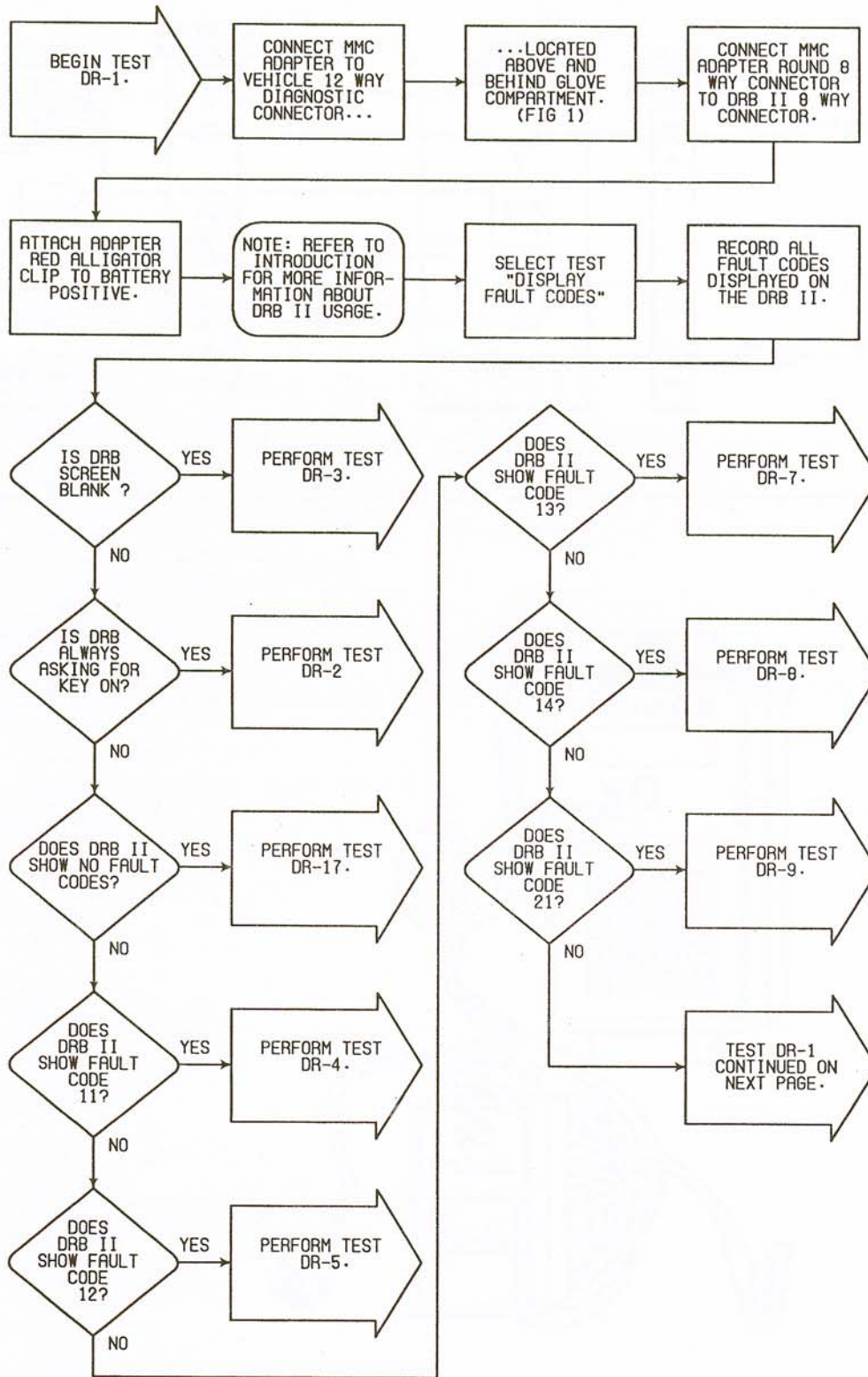


FIG. 2

TEST DR-1 DRIVEABILITY FAULT CODE CHECK

Perform VISUAL INSPECTION Before Proceeding



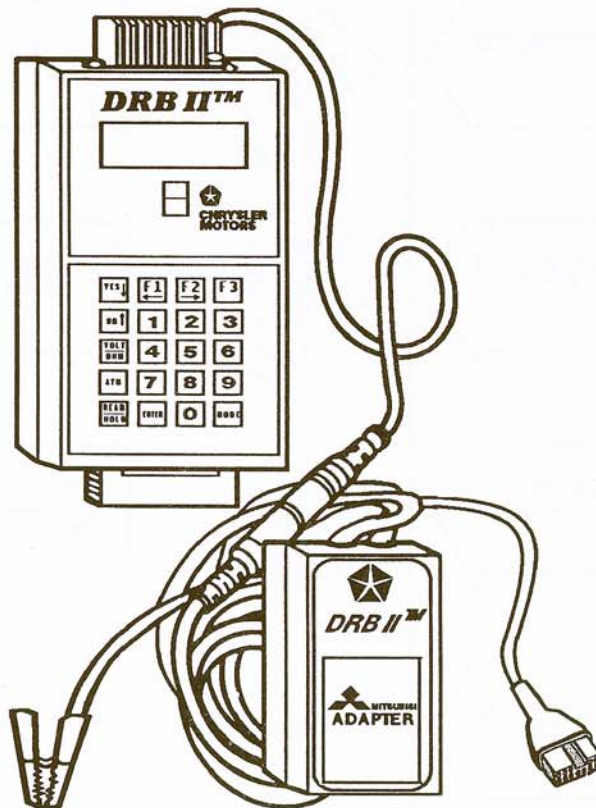
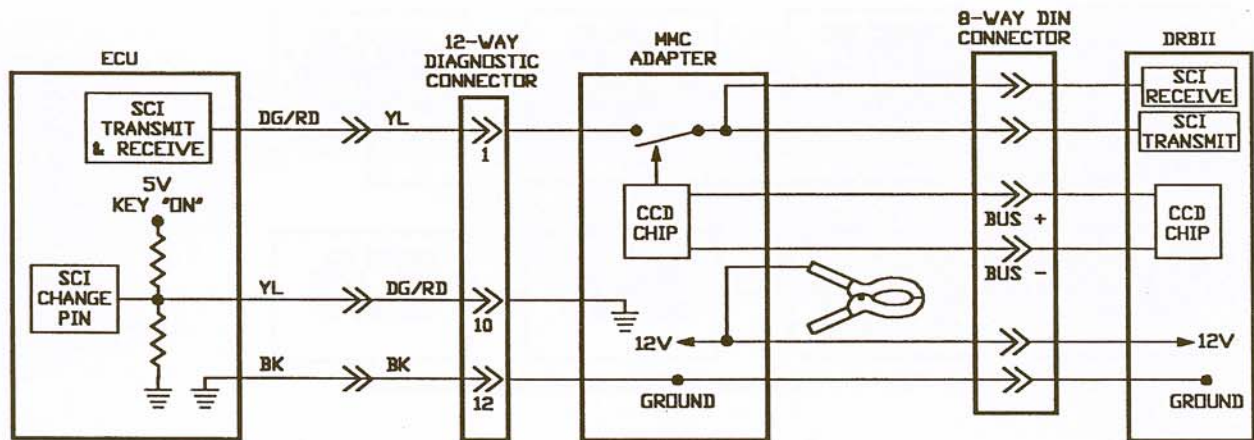
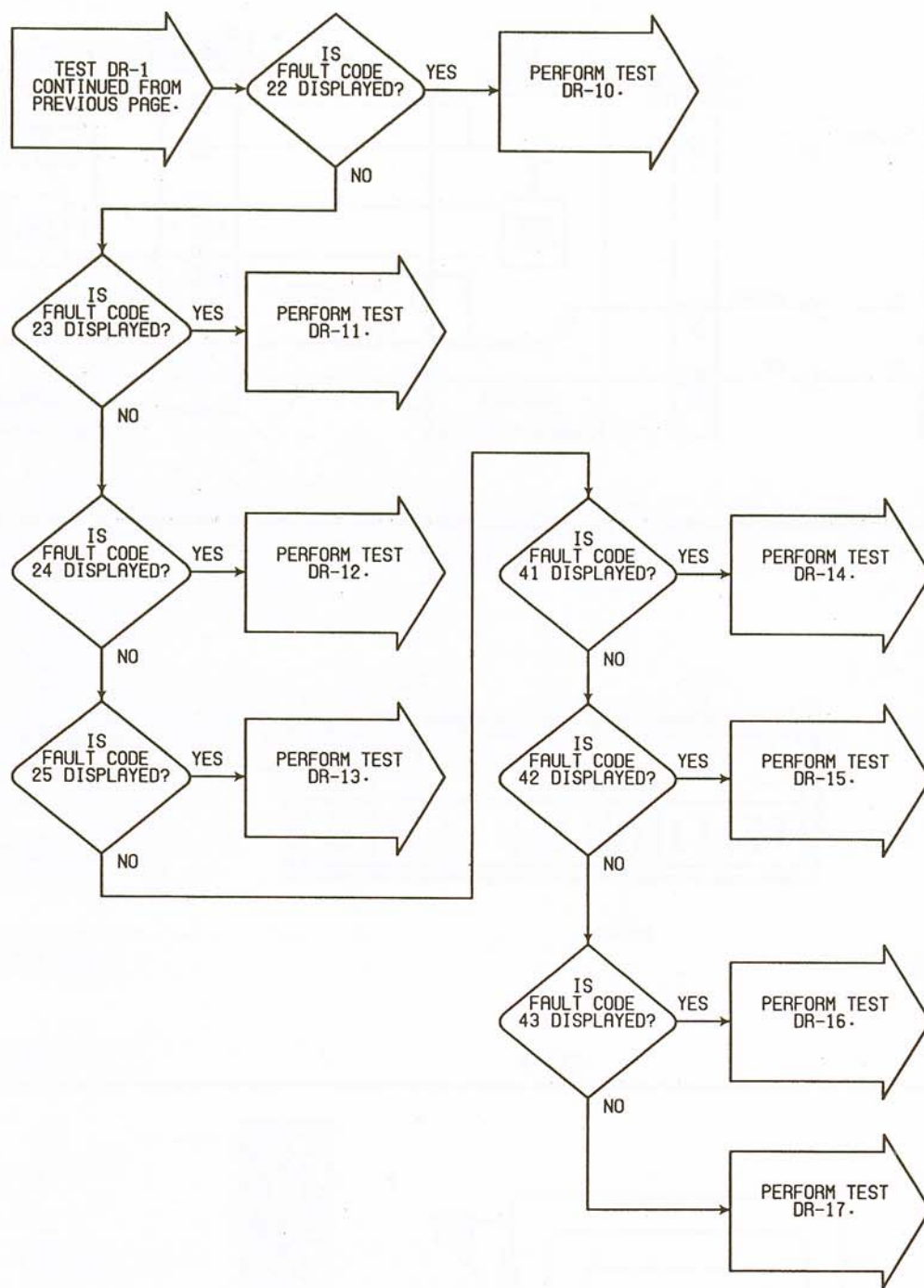


FIG. 1

TEST DR-1 CONTINUED - DRIVEABILITY FAULT CODE CHECK



TEST DR-2 TESTING DIAGNOSTIC CONNECTOR

Perform TEST DR-1 Before Proceeding

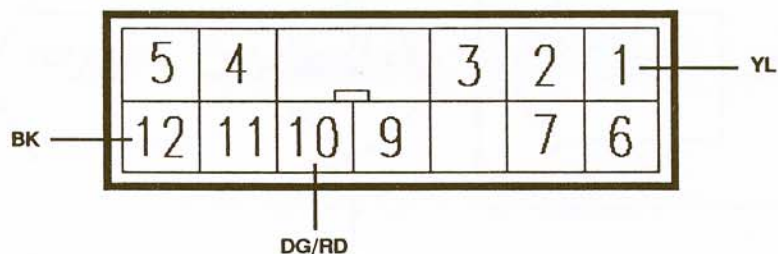
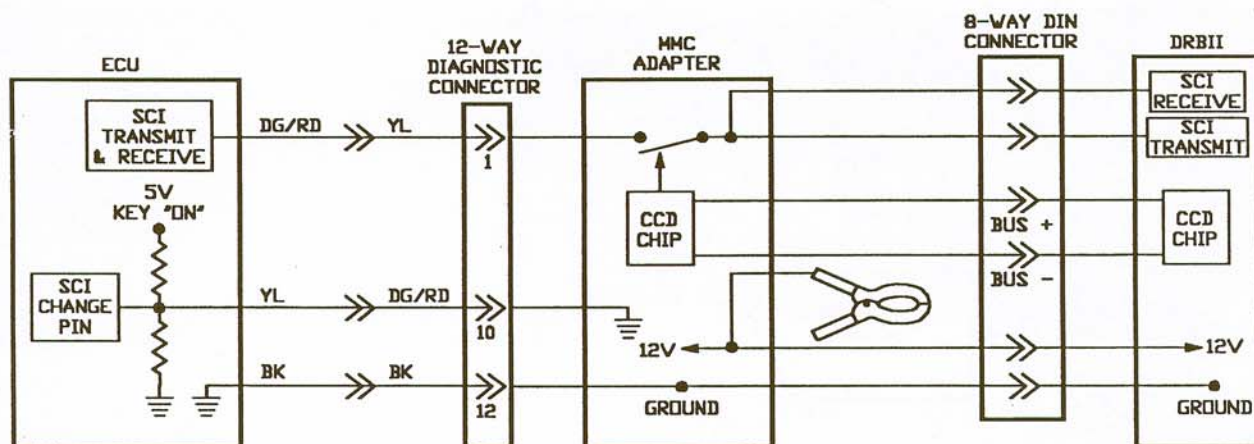


FIG. 1

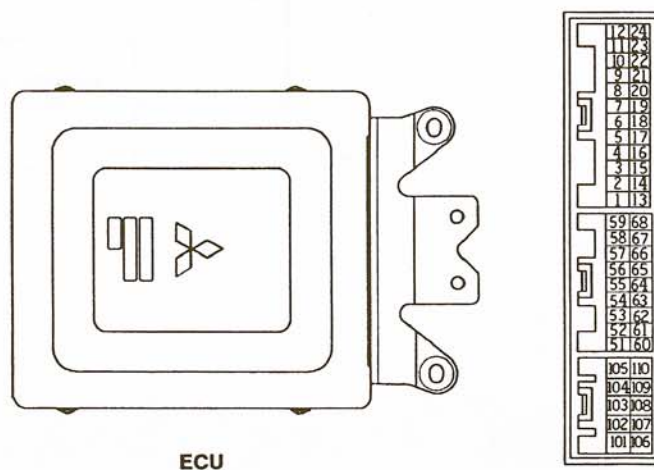
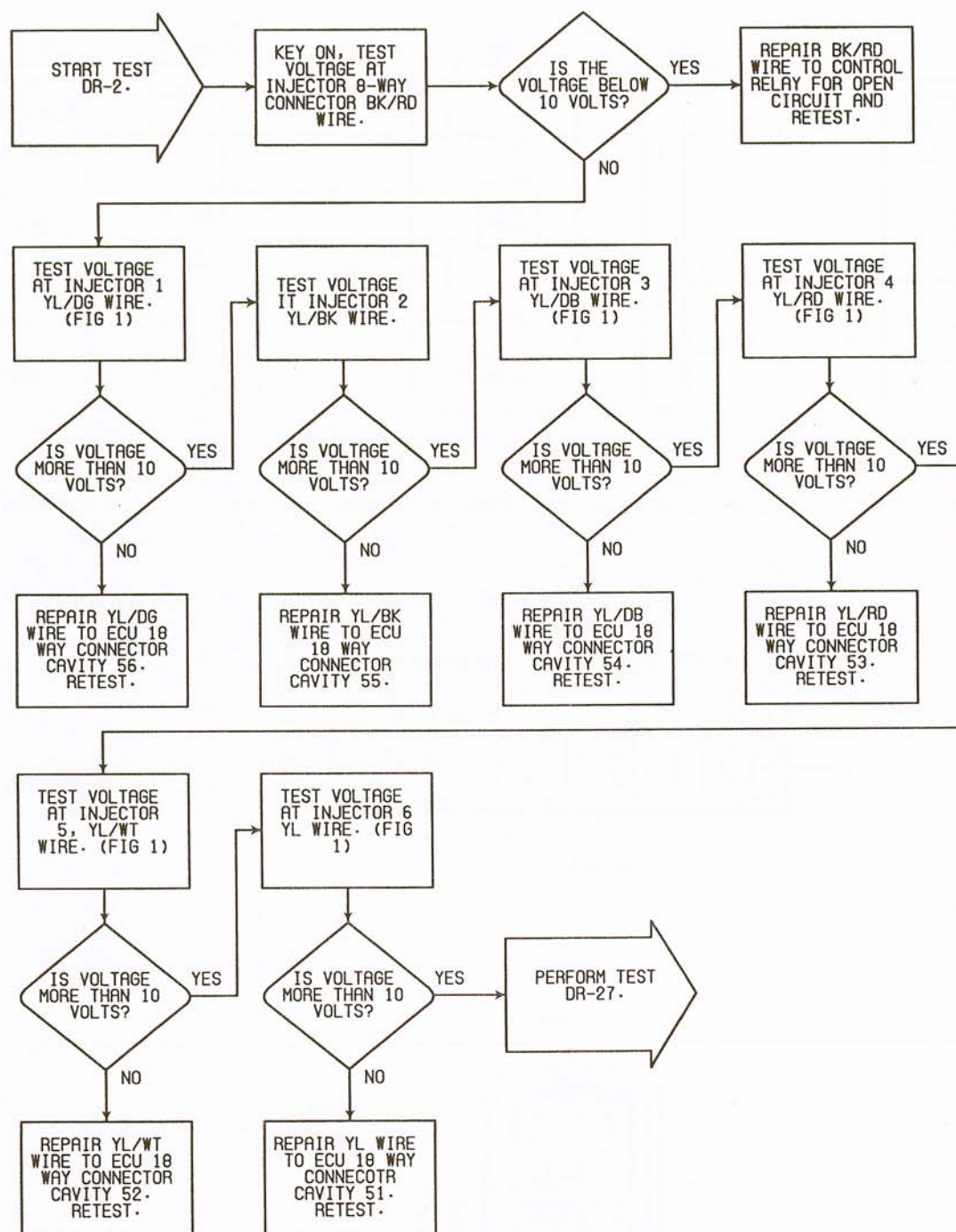


FIG. 2

TEST DR-2 TESTING DIAGNOSTIC CONNECTOR**Perform TEST DR-1 Before Proceeding**

TEST DR-3 TESTING DIAGNOSIS CONNECTOR

Perform TEST DR-1 Before Proceeding

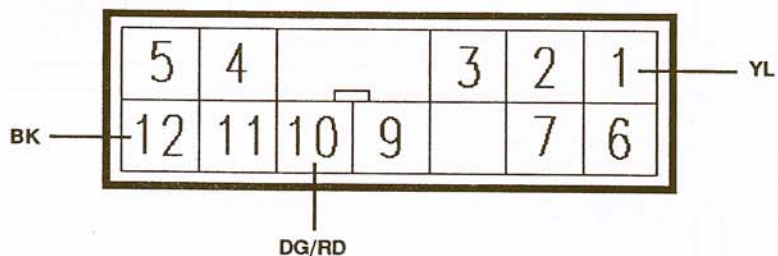
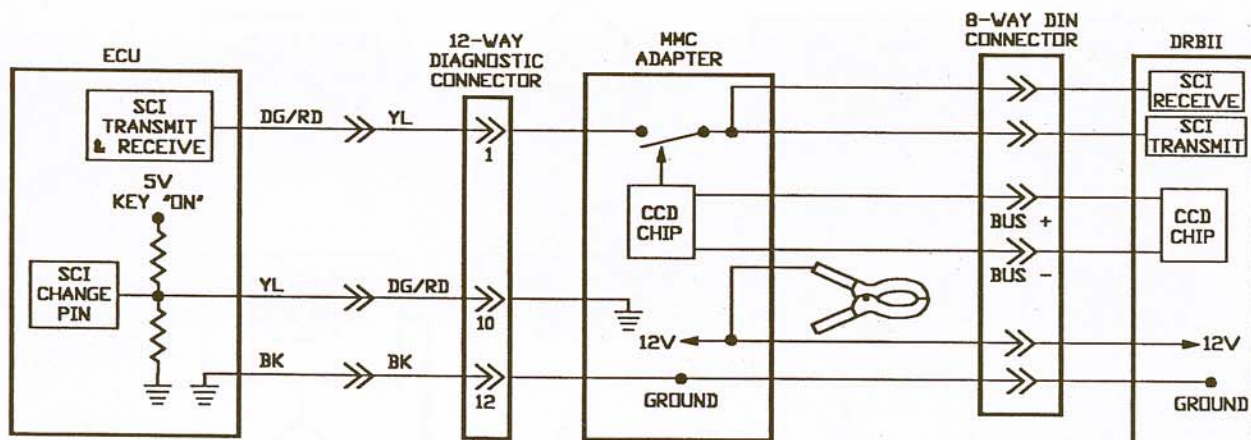


FIG. 1

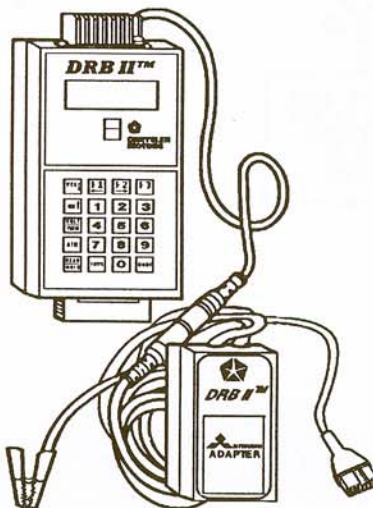
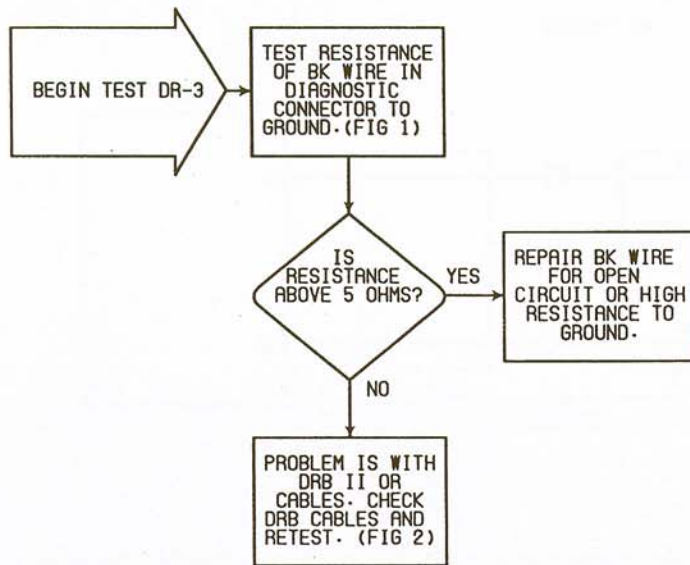


FIG. 2

TEST DR-3**TESTING DIAGNOSIS CONNECTOR****Perform TEST DR-1 Before Proceeding**

TEST DR-4 TESTING OXYGEN SENSOR CIRCUIT - FAULT CODE 11

Perform TEST DR-1 Before Proceeding

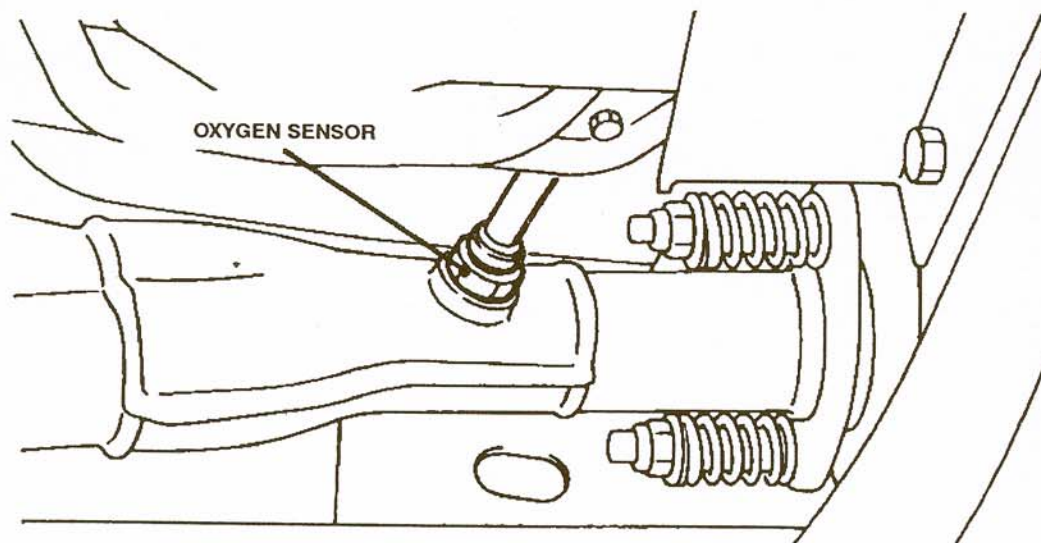
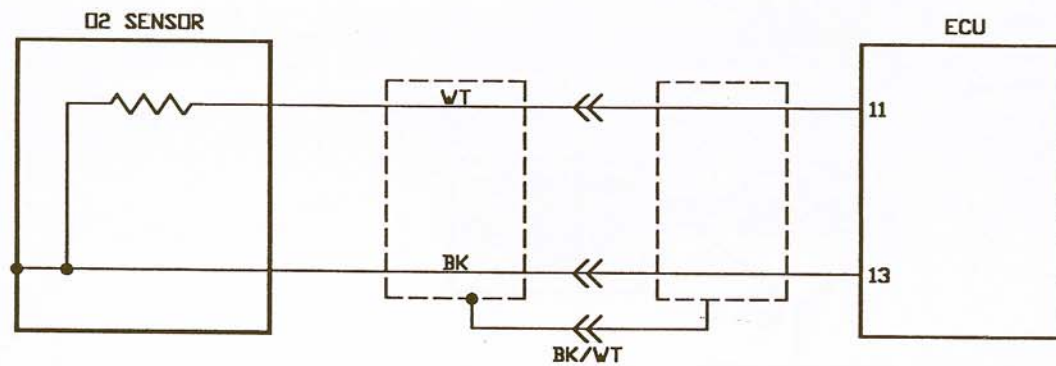
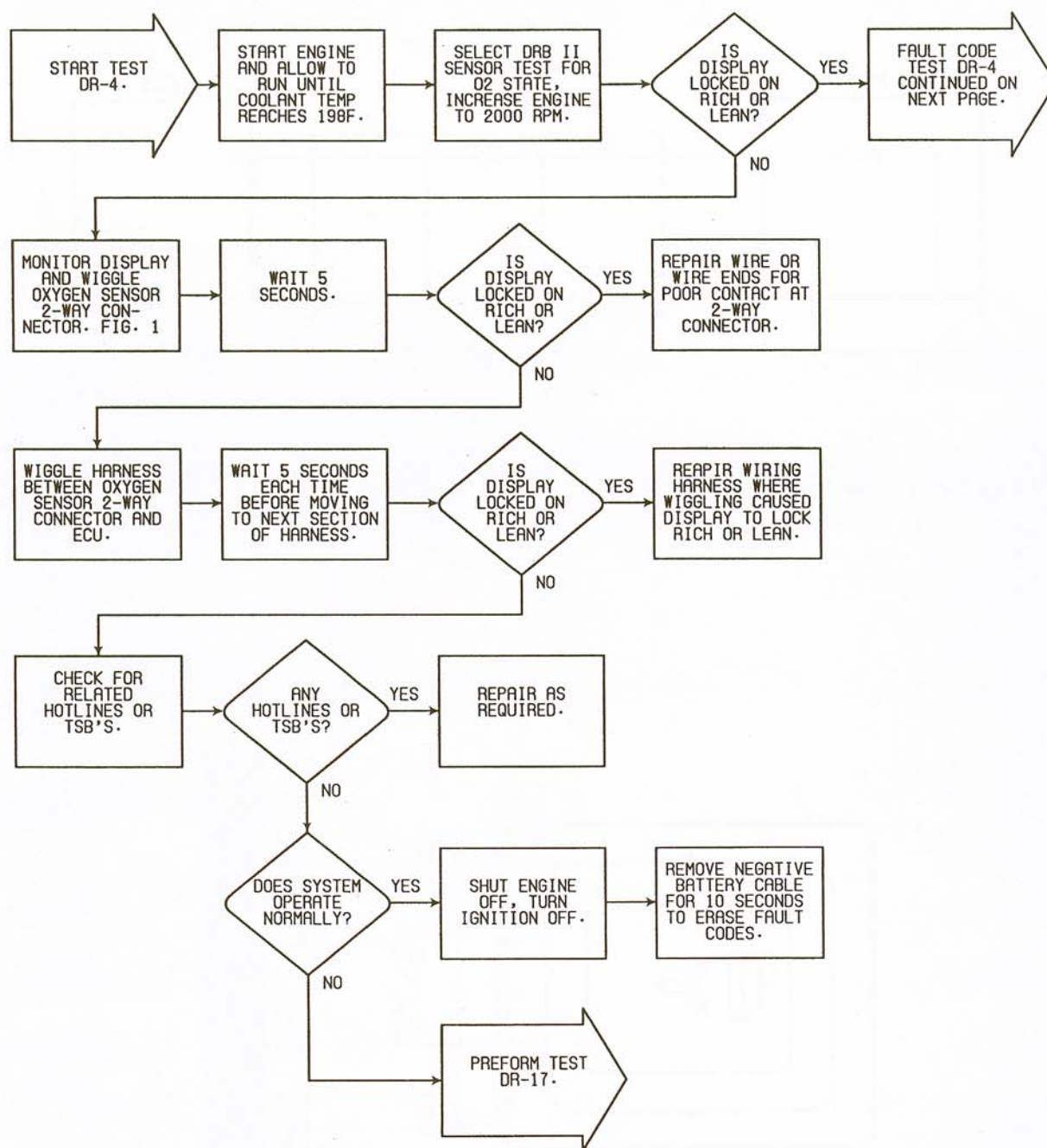
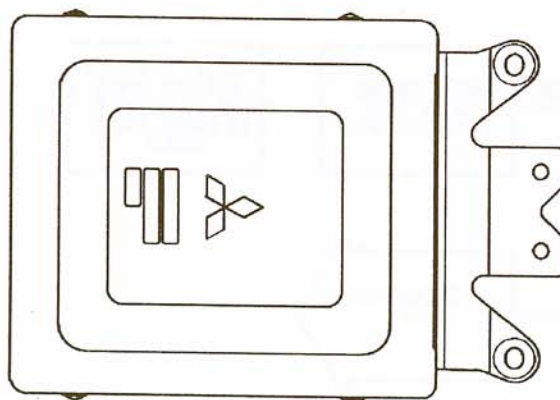
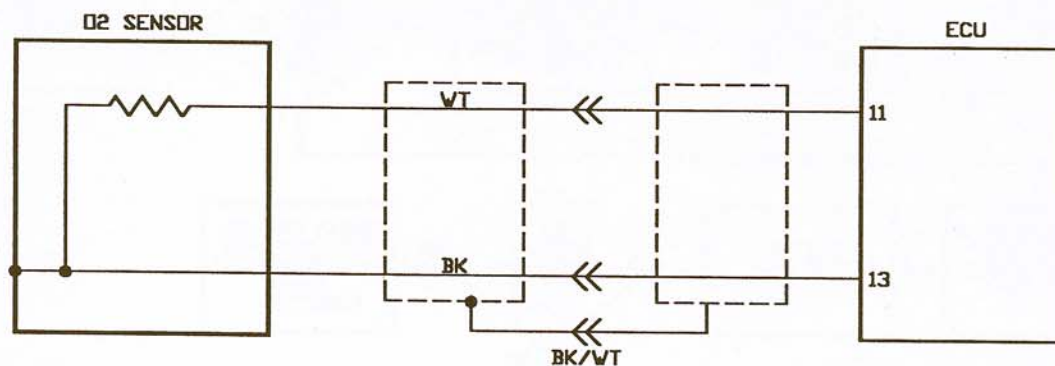


FIG. 1

TEST DR-4**TESTING OXYGEN SENSOR CIRCUIT - FAULT CODE 11****Perform TEST DR-1 Before Proceeding**

TEST DR-4

CONTINUED - TESTING OXYGEN SENSOR CIRCUIT - FAULT CODE 11

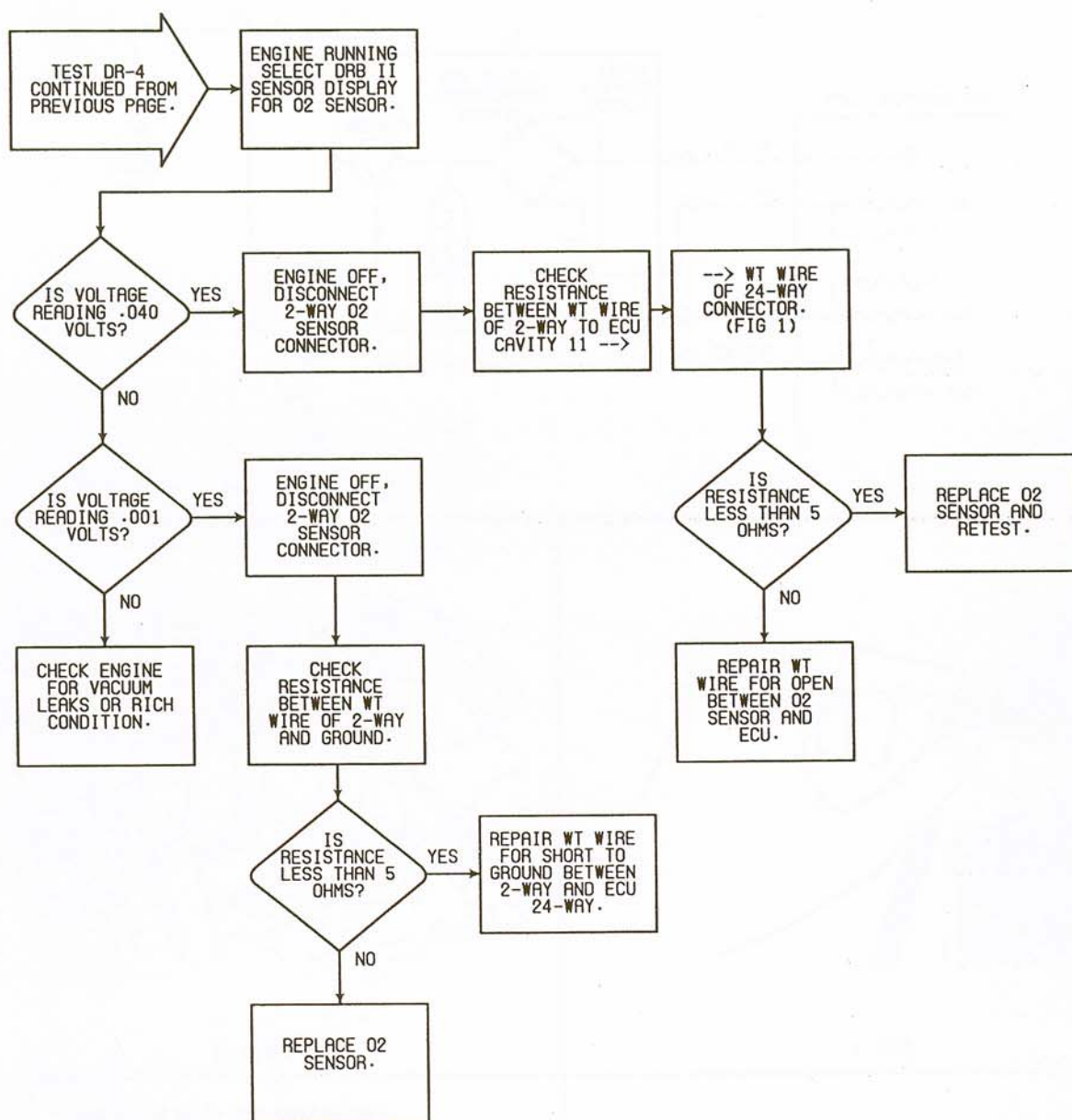


12	24
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3	15
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1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
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101	106

FIG. 1

TEST DR-4

CONTINUED - TESTING OXYGEN SENSOR CIRCUIT - FAULT CODE 11



TEST DR-5

TESTING AIR FLOW SENSOR CIRCUIT - FAULT CODE 12

Perform TEST DR-1 Before Proceeding

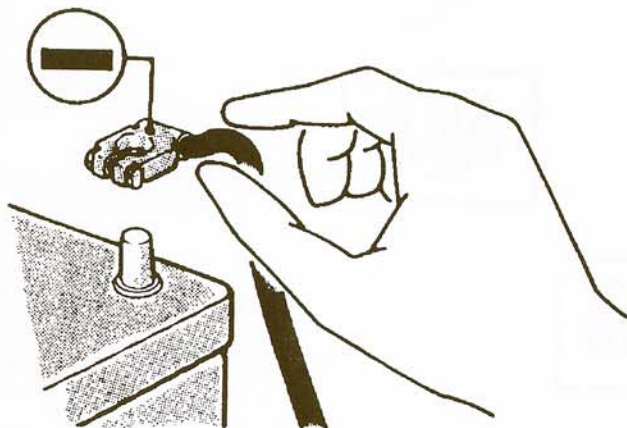
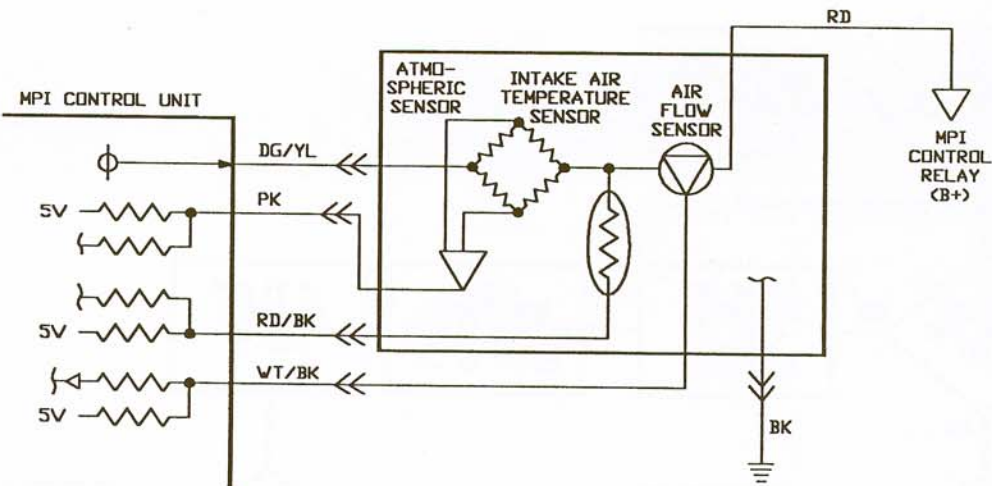


FIG. 1

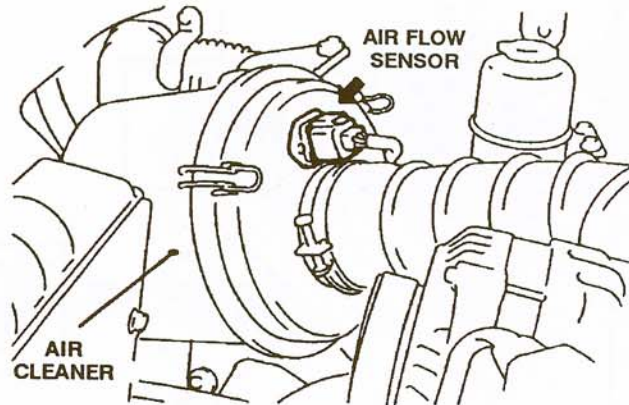
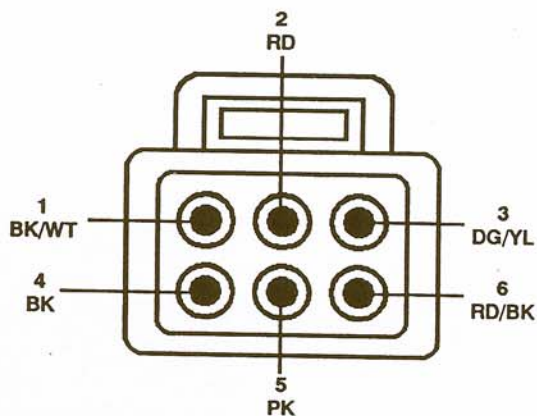


FIG. 2



VIEWED FROM WIRE SIDE

FIG. 3

Technical Service Bulletin

Technical Information +
Professional Service +
Customer Satisfaction

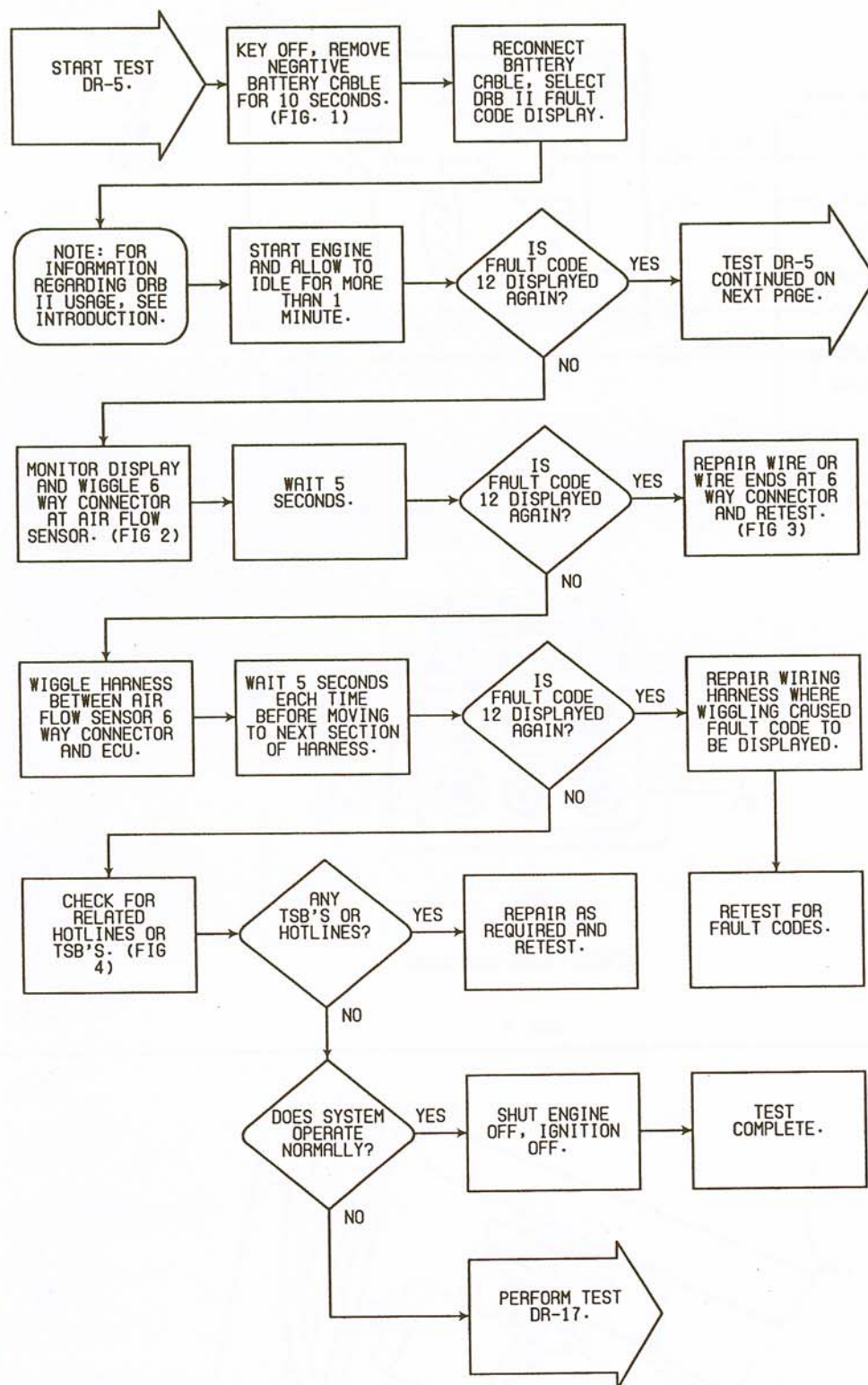
Model _____
Subject _____
Index _____
Date _____
By _____

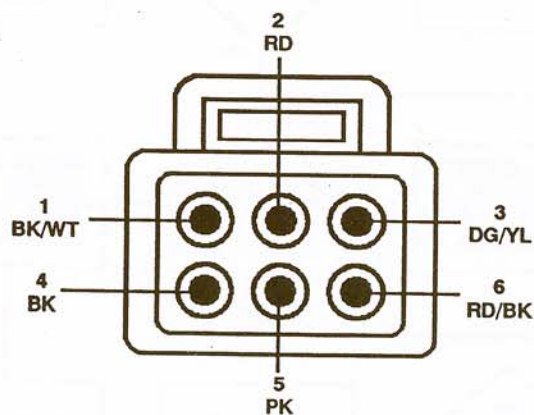
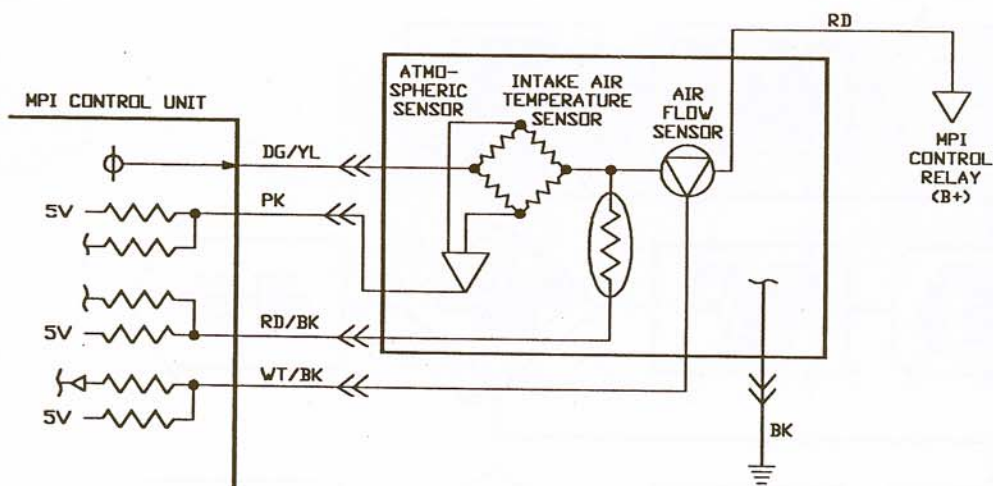
CHRYSLER
FORD
JEEP
RAM
DODGE
PONTIAC
BUICK
OLDSMOBILE
SAAB
VOLVO
BMW
MINI
AUDI
VW
MERCEDES-BENZ
Porsche
Ferrari
Lexus
Infiniti
Acura
Honda
Toyota
Nissan
Mazda
Subaru
Mitsubishi
Suzuki
Isuzu
Honda
Toyota
Nissan
Mazda
Subaru
Mitsubishi
Suzuki
Isuzu

FIG. 4

TEST DR-5 TESTING AIR FLOW SENSOR CIRCUIT - FAULT CODE 12

Perform TEST DR-1 Before Proceeding





VIEWED FROM WIRE SIDE

FIG. 1

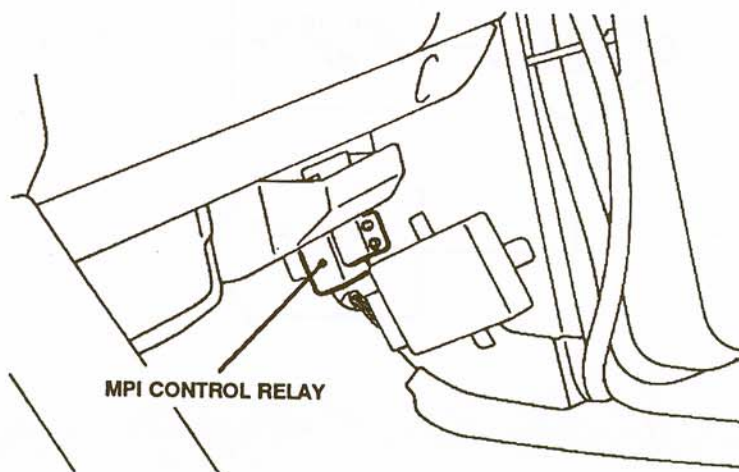
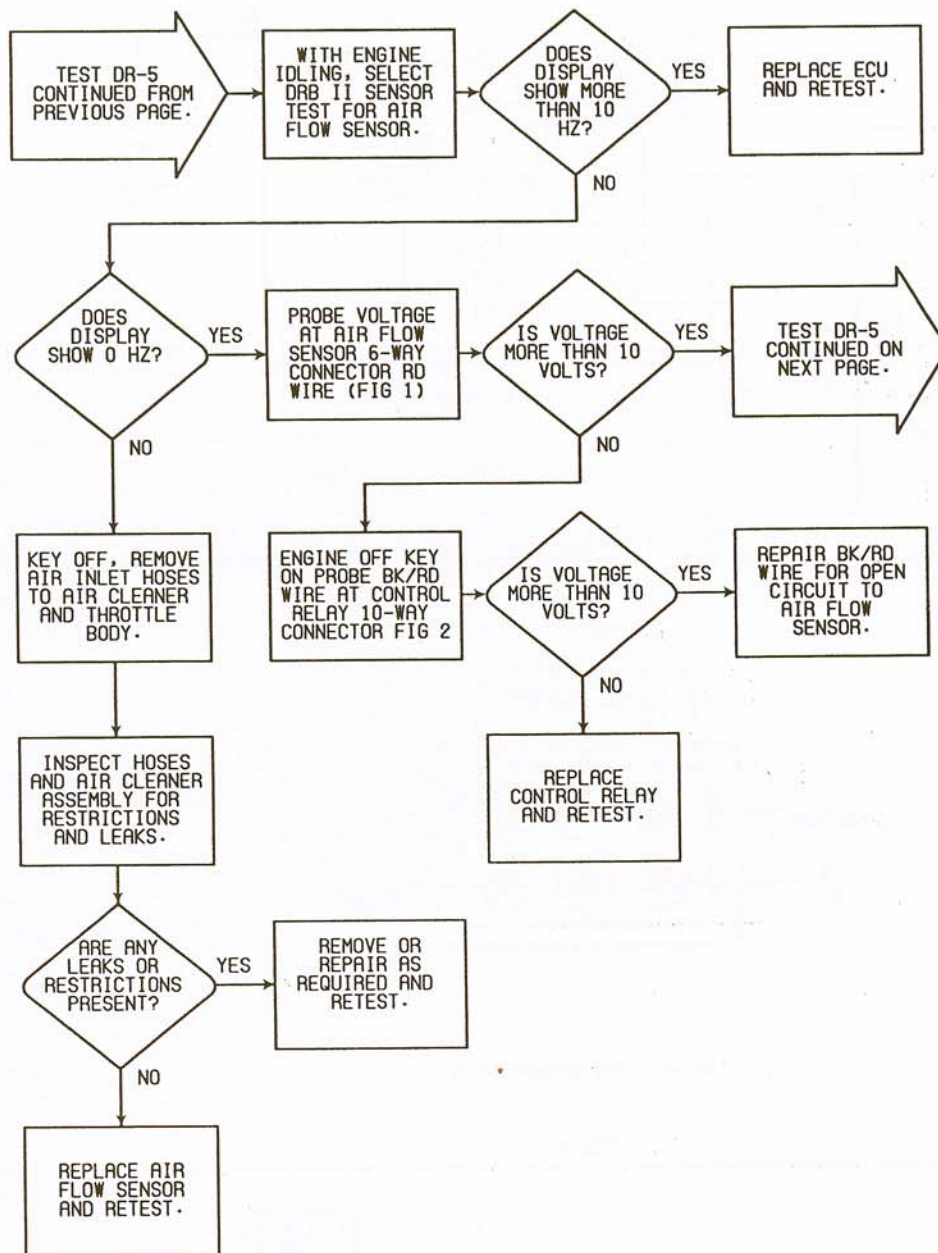
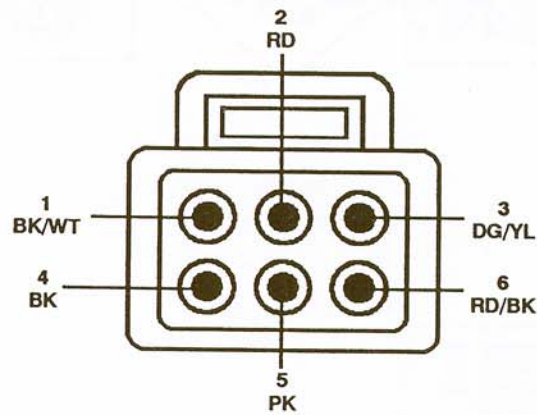
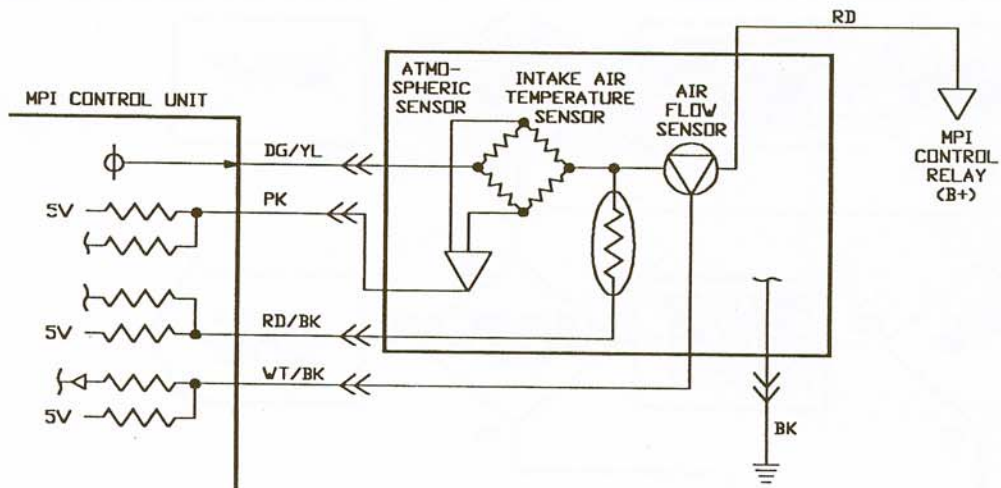


FIG. 2





VIEWED FROM WIRE SIDE

FIG. 1

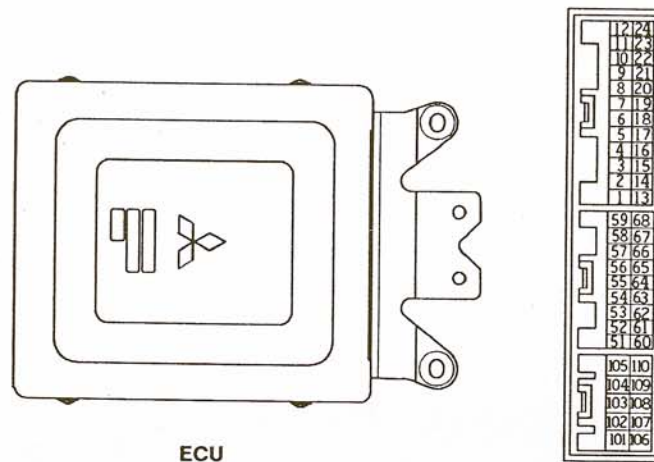
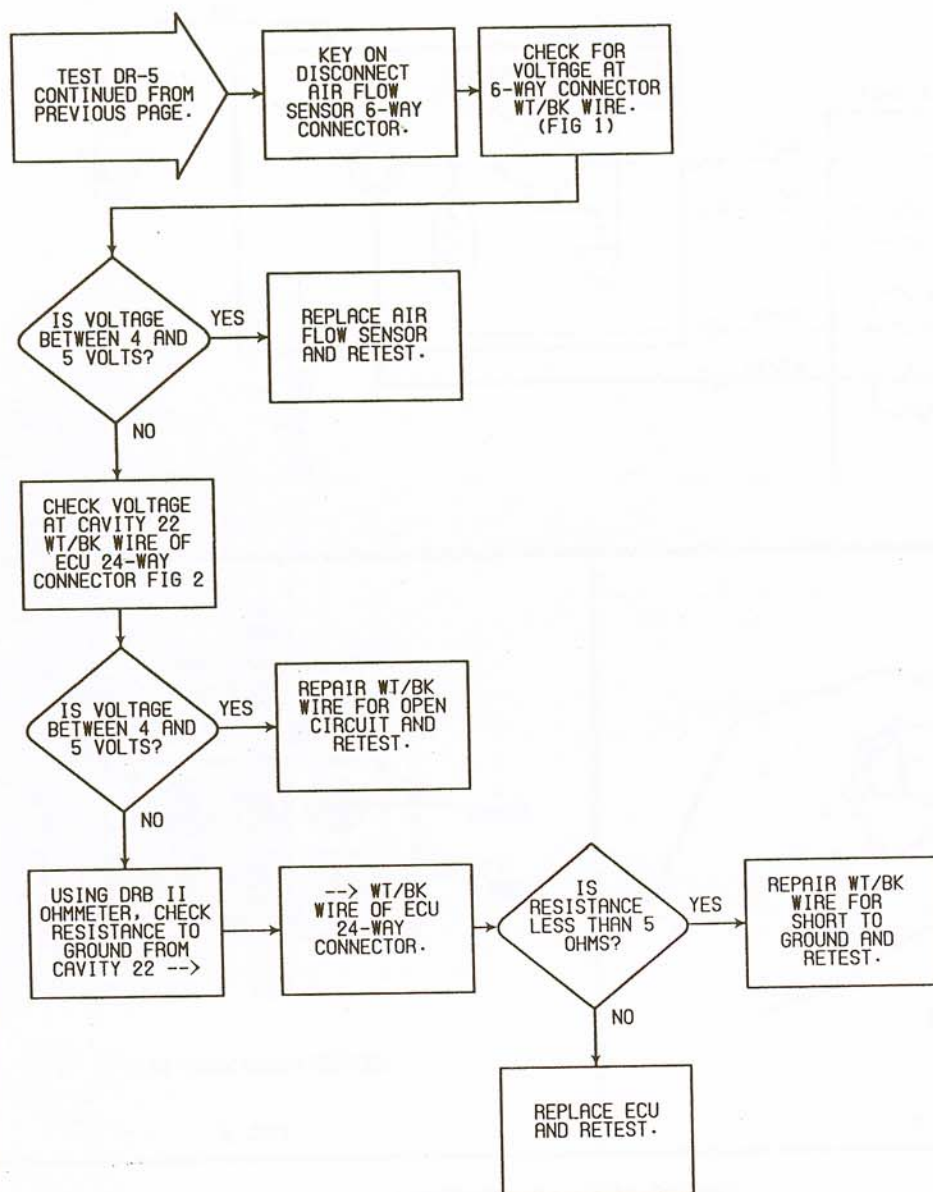


FIG. 2

TEST DR-5

CONTINUED - TESTING AIR FLOW SENSOR CIRCUIT - FAULT CODE 12



TEST DR-7

TESTING INTAKE AIR TEMP SENSOR CIRCUIT - FAULT CODE 13

Perform TEST DR-1 Before Proceeding

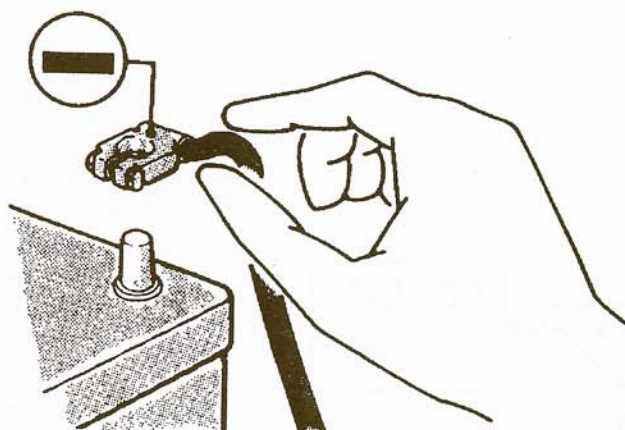
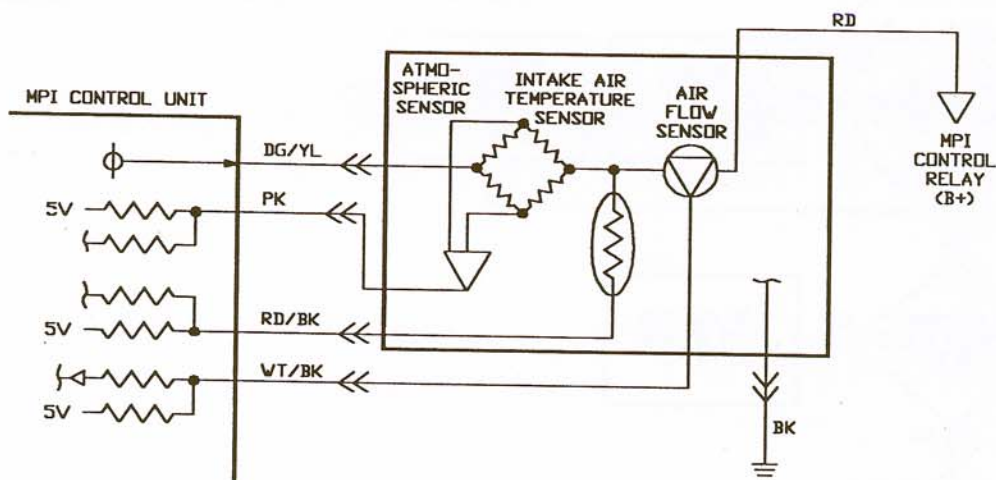
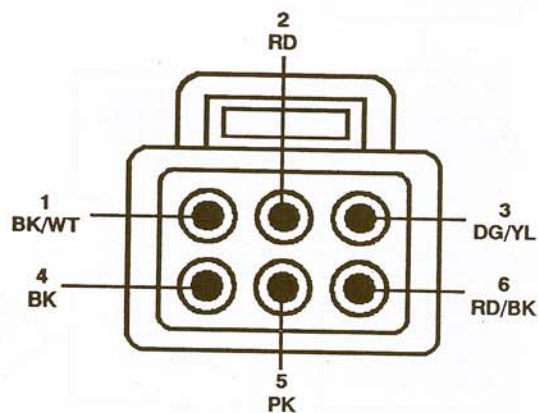


FIG. 1



VIEWED FROM WIRE SIDE

FIG. 2

Technical Service Bulletin

Technical Information +
Professional Service =
Customer Satisfaction

Model...
Sub...
Index...
Date...
No...

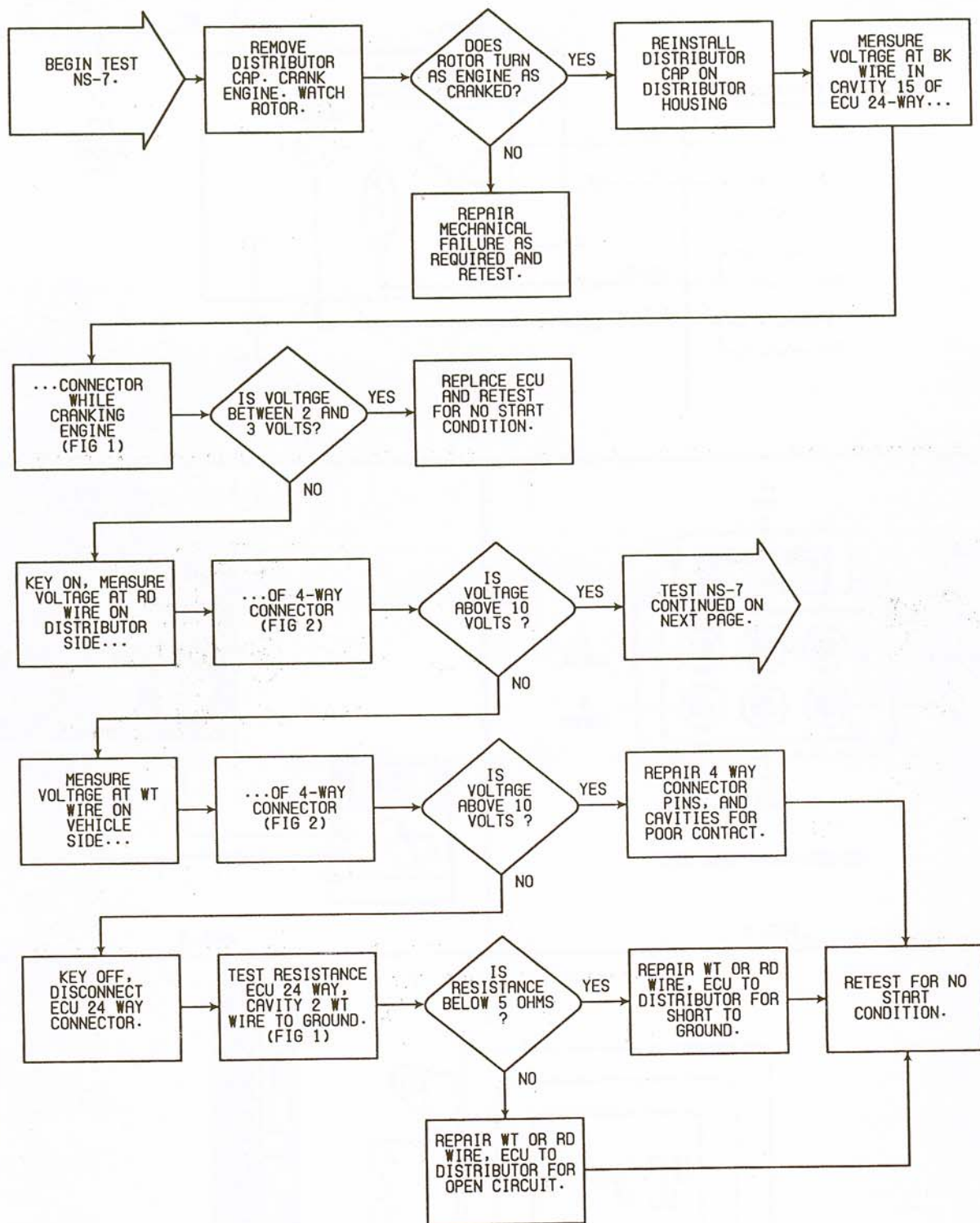


FIG. 3

TEST DR-7

TESTING INTAKE AIR TEMP SENSOR CIRCUIT - FAULT CODE 13

Perform TEST DR-1 Before Proceeding



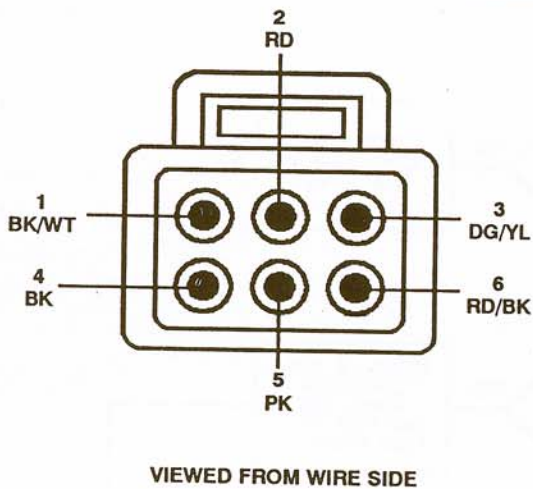
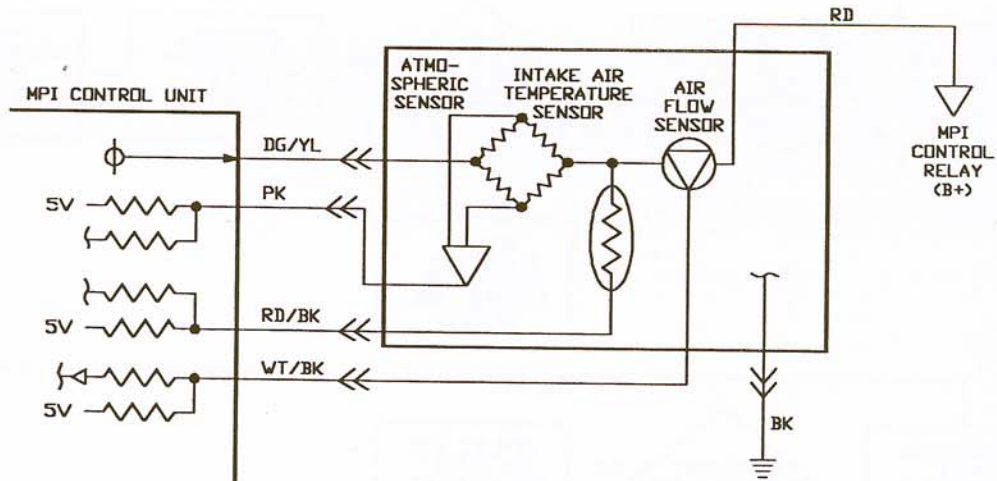


FIG. 1

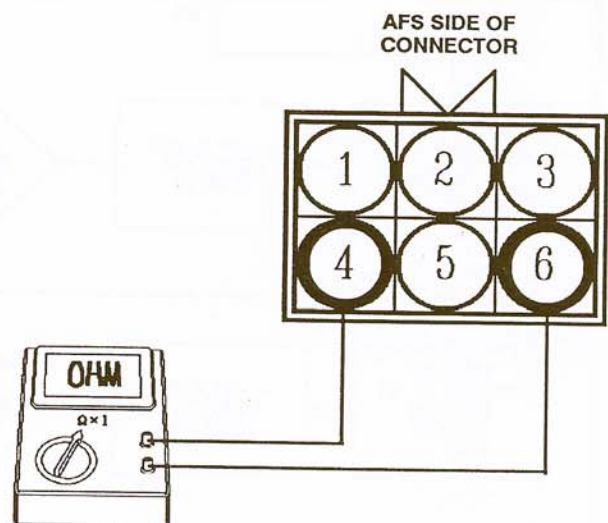
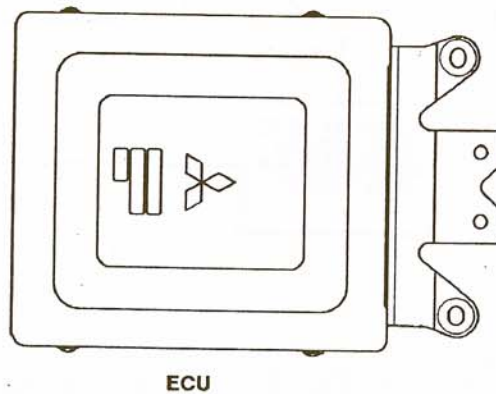
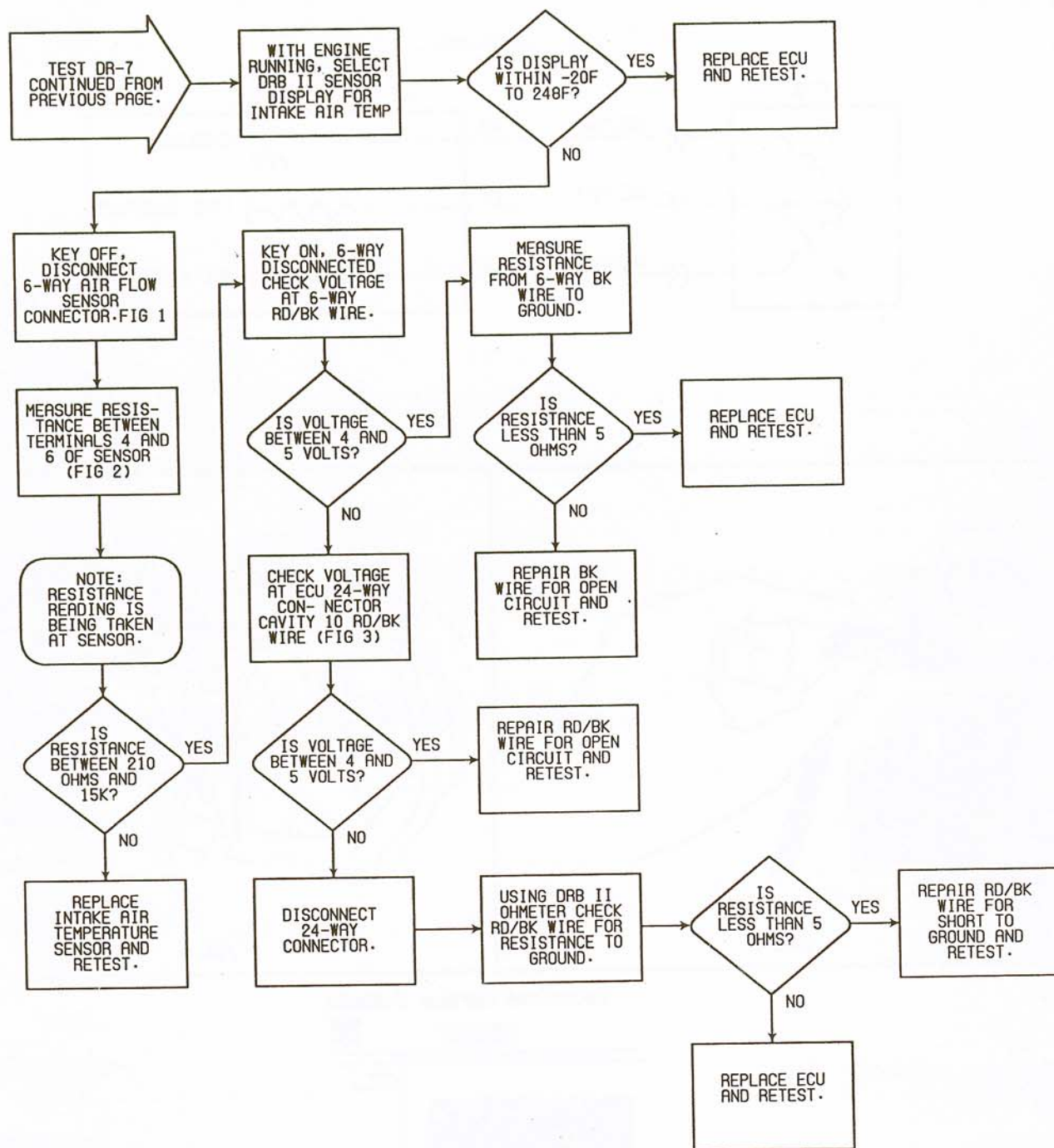


FIG. 2



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103	108
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101	106

FIG. 3



TEST DR-8

TESTING THROTTLE POSITION SENSOR - FAULT CODE 14

Perform TEST DR-1 Before Proceeding

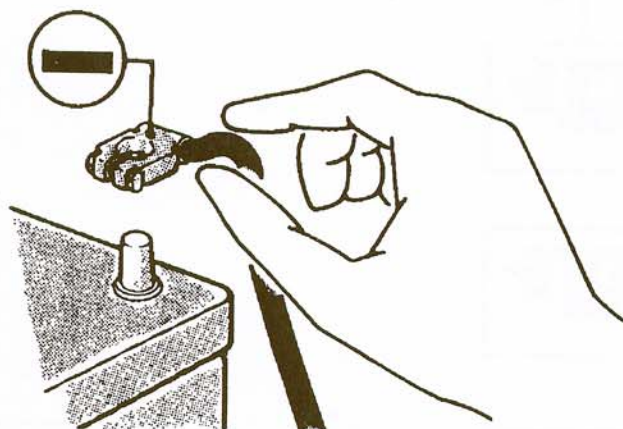
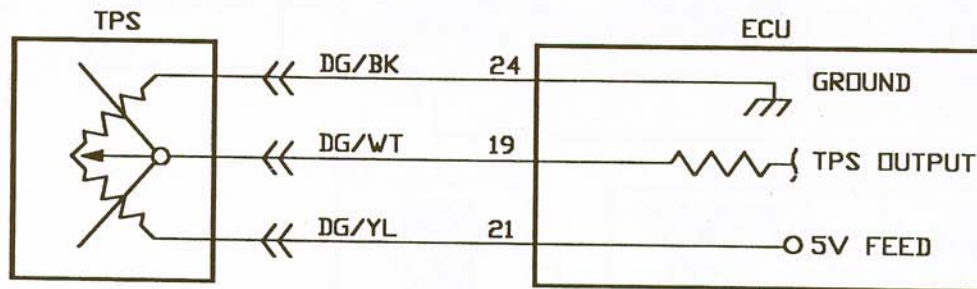


FIG. 1

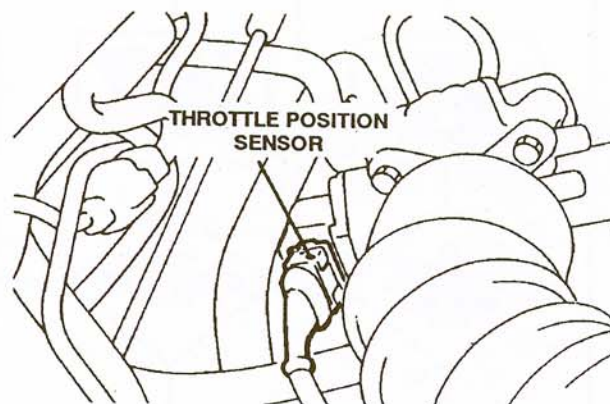


FIG. 2

Technical Service Bulletin

Technical Information +
Professional Service +
Customer Satisfaction



Model _____

Subject _____

Date _____



BMW of North America, Inc.
P.O. Box 655
Farmington, CT 06030-0655
1-800-551-4628



BMW of North America, Inc.
P.O. Box 655
Farmington, CT 06030-0655
1-800-551-4628



BMW of North America, Inc.
P.O. Box 655
Farmington, CT 06030-0655
1-800-551-4628



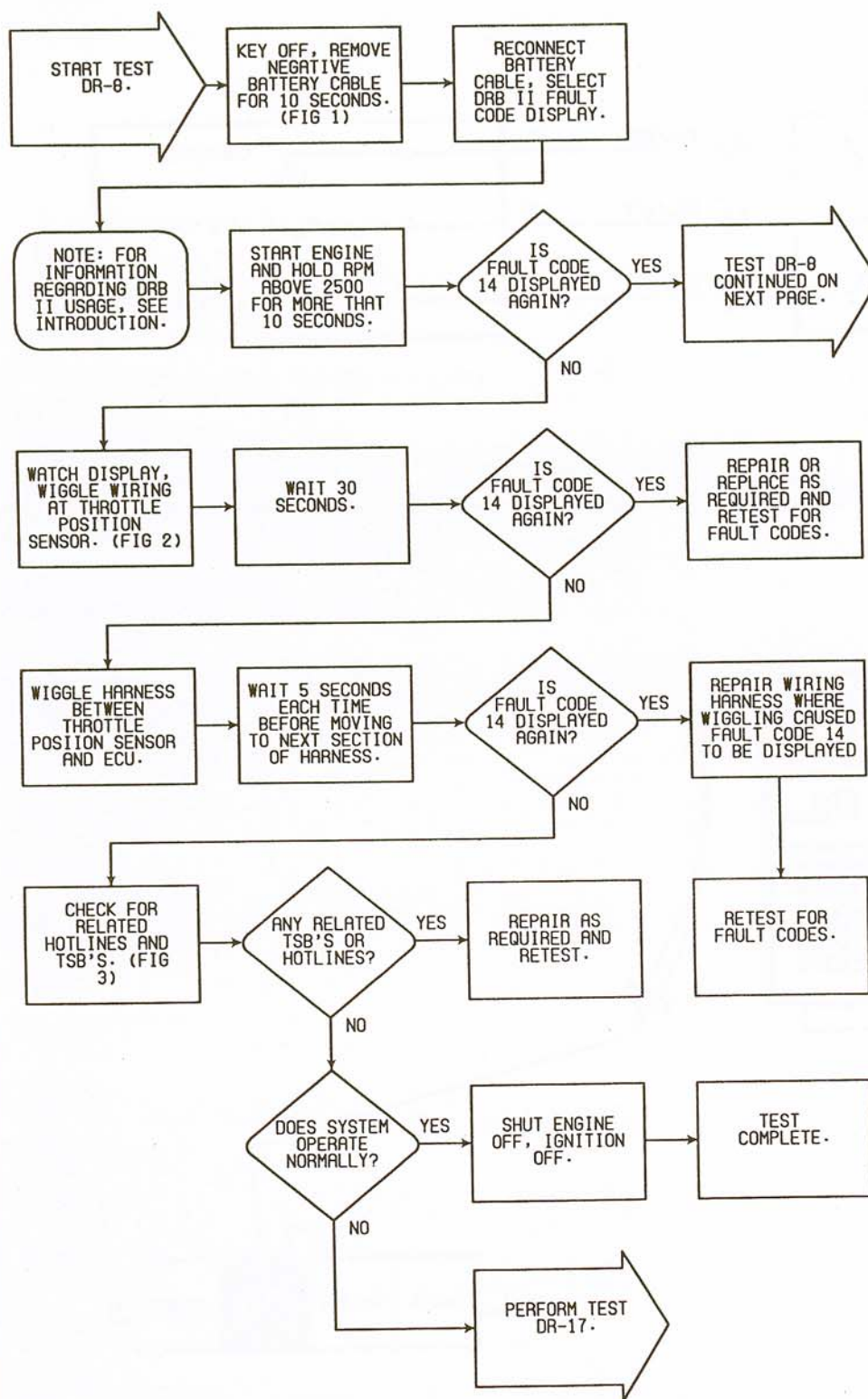
BMW of North America, Inc.
P.O. Box 655
Farmington, CT 06030-0655
1-800-551-4628

FIG. 3

TEST DR-8

TESTING THROTTLE POSITION SENSOR - FAULT CODE 14

Perform TEST DR-1 Before Proceeding



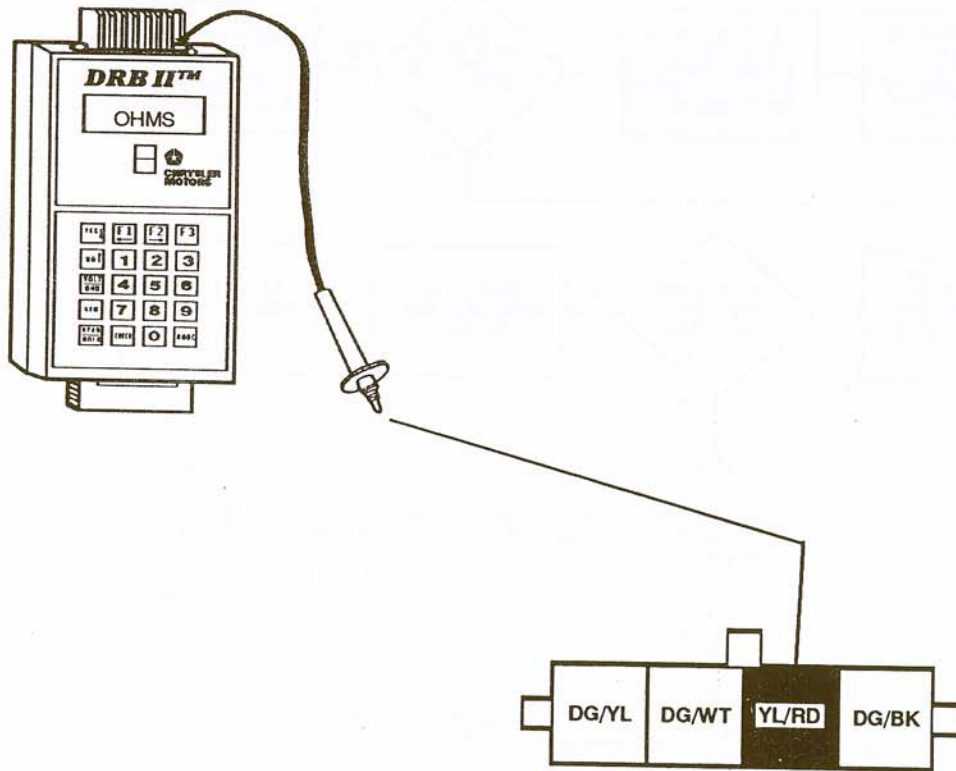
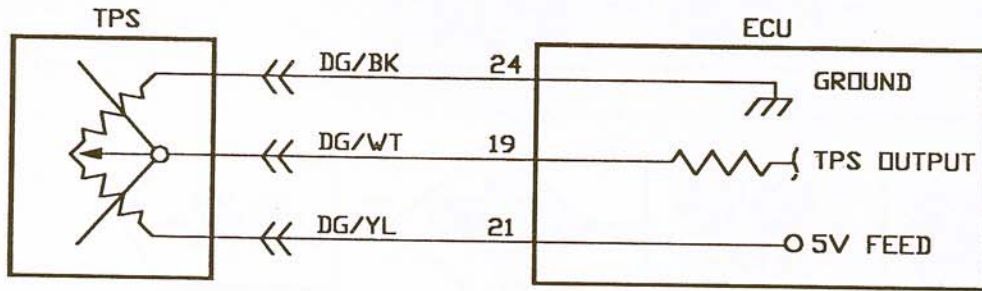
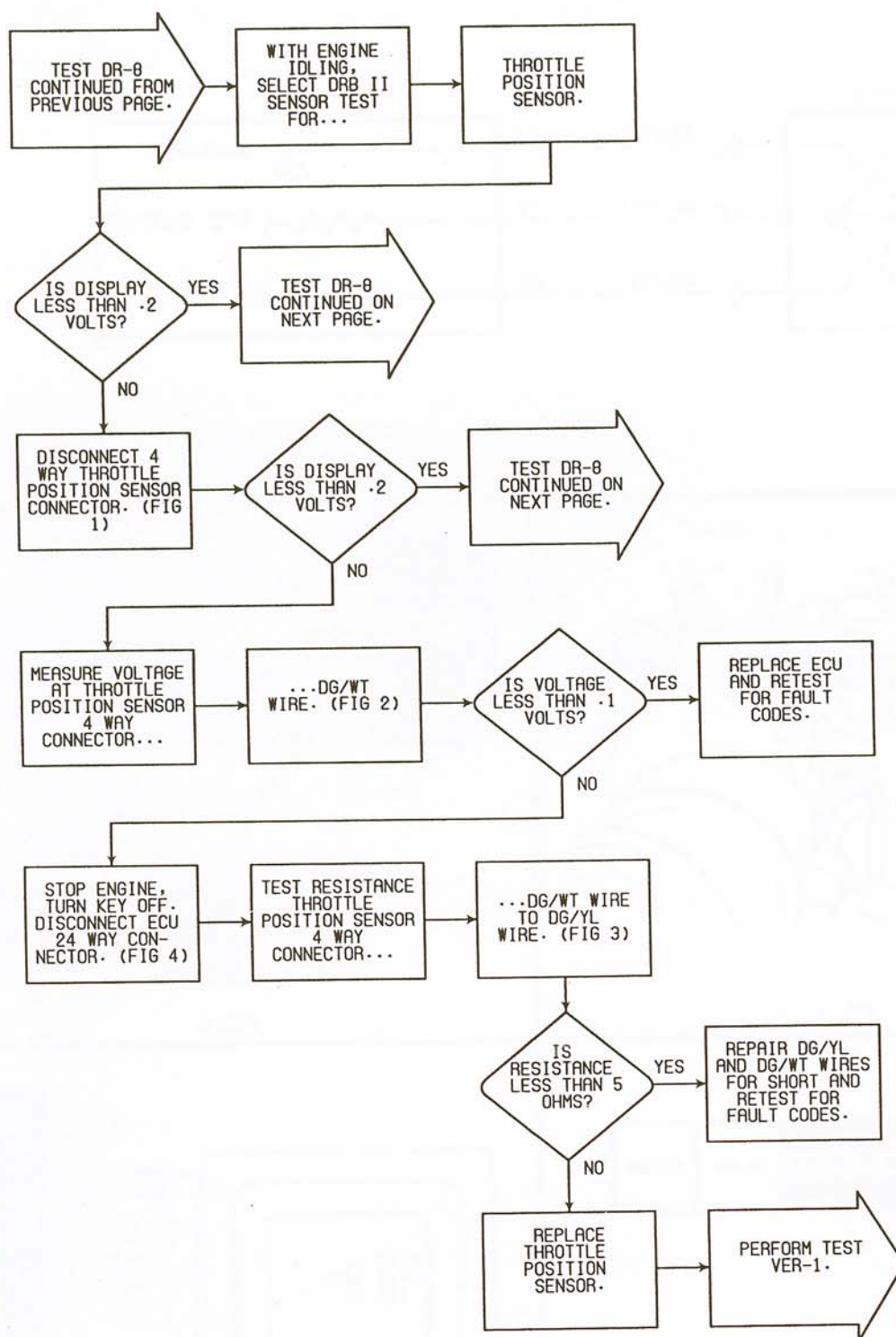


FIG. 1

TEST DR-8

CONTINUED - TESTING THROTTLE POSITION SENSOR - FAULT CODE 14



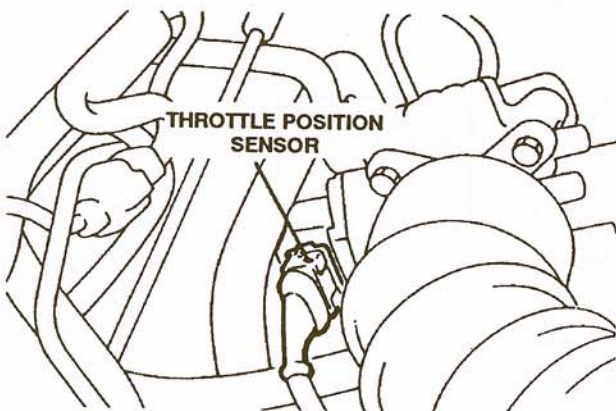
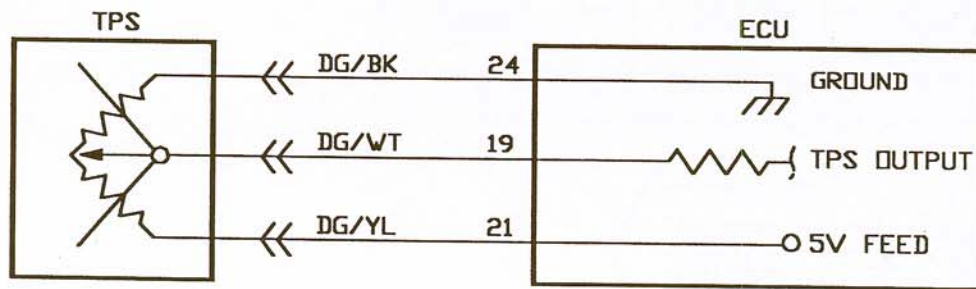


FIG. 1

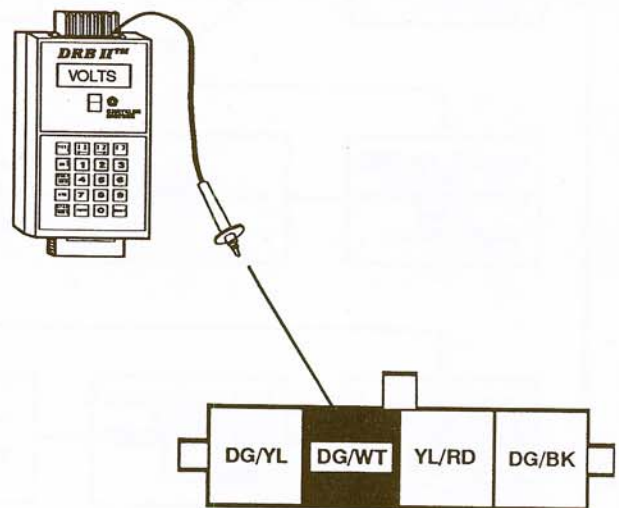


FIG. 2

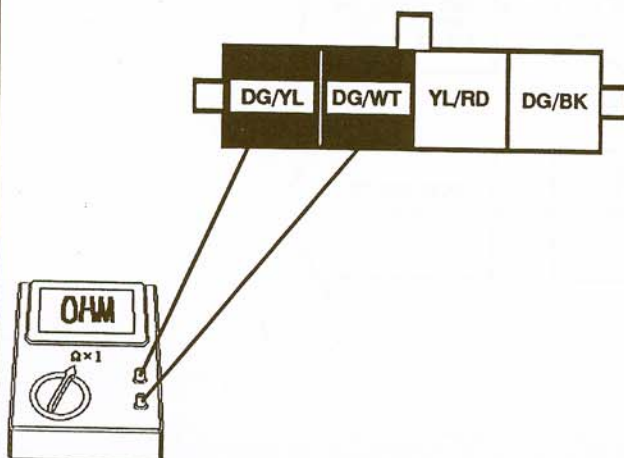


FIG. 3

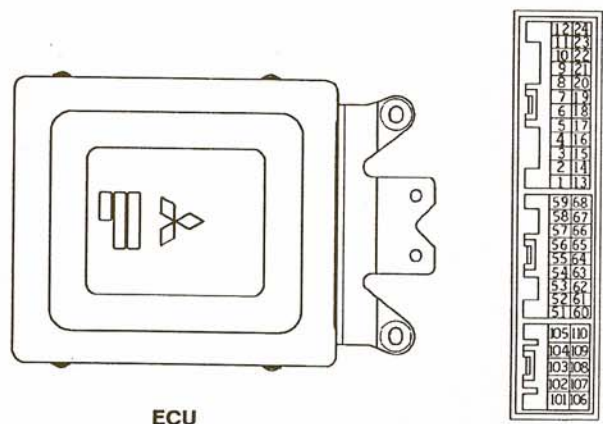
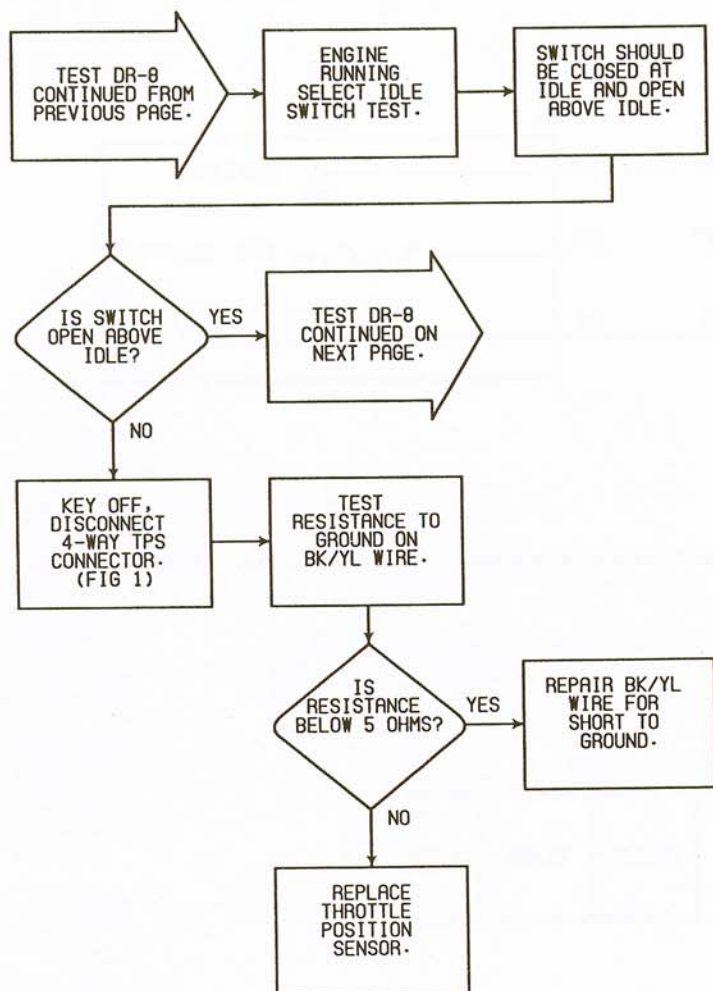


FIG. 4

TEST DR-8

CONTINUED - TESTING THROTTLE POSITION SENSOR - FAULT CODE 14



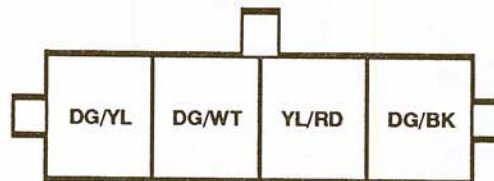
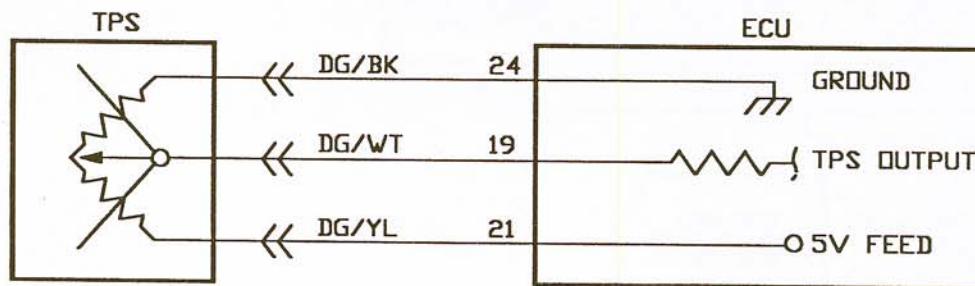
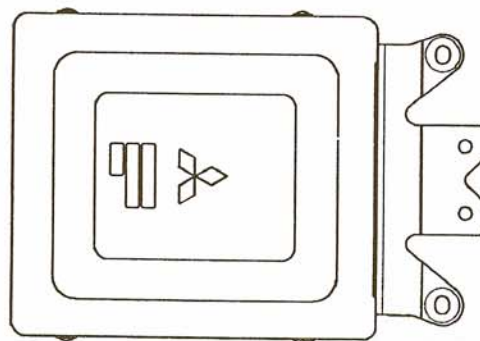


FIG. 1



ECU

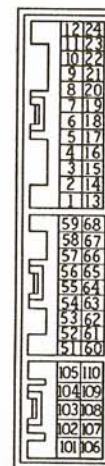
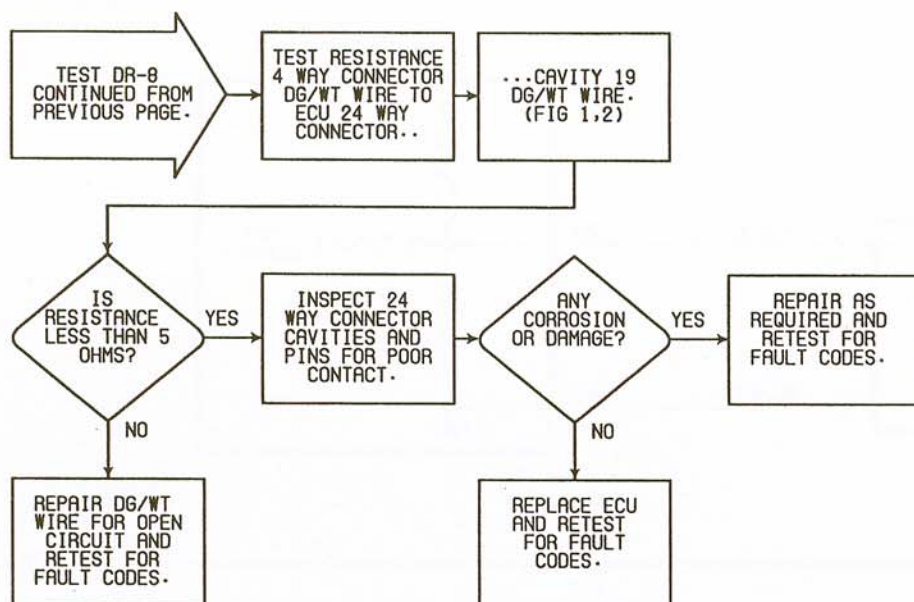


FIG. 2



TEST DR-9

TESTING COOLANT TEMP CIRCUIT - FAULT CODE 21

Perform TEST DR-1 Before Proceeding

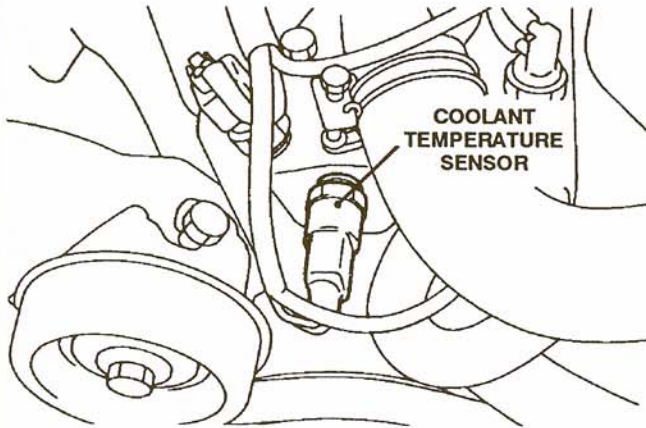
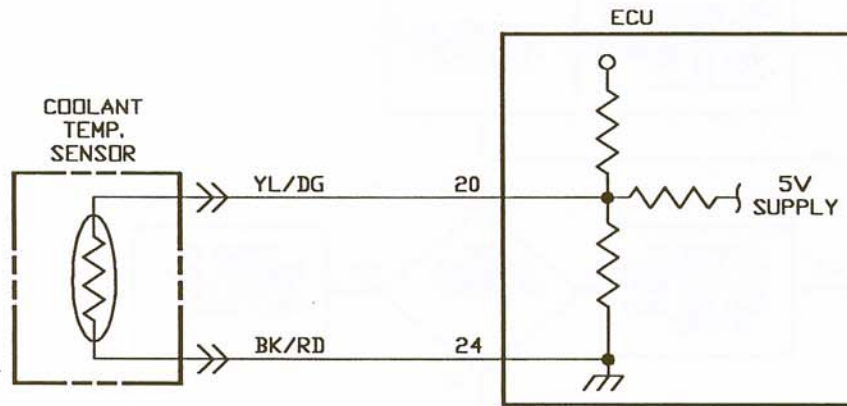


FIG. 1

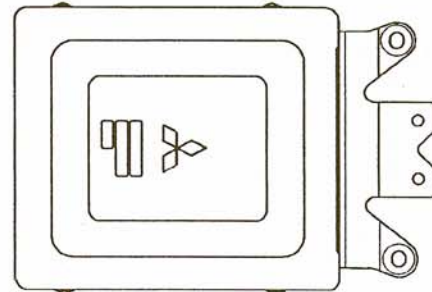


FIG. 2

12/24
11/24
10/22
9/21
8/20
7/19
6/18
5/17
4/16
3/15
2/14
1/13
59/68
58/67
57/66
56/65
55/64
54/63
53/62
52/61
51/60
105/10
104/09
103/08
102/07
101/06

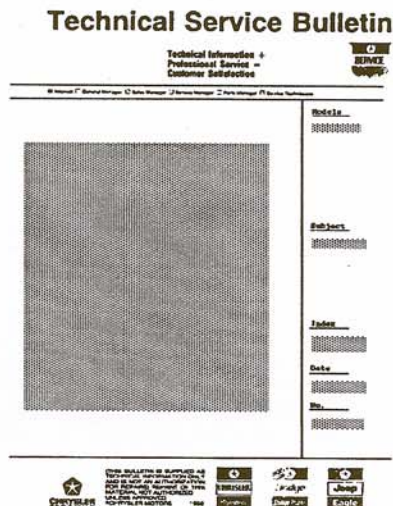


FIG. 3

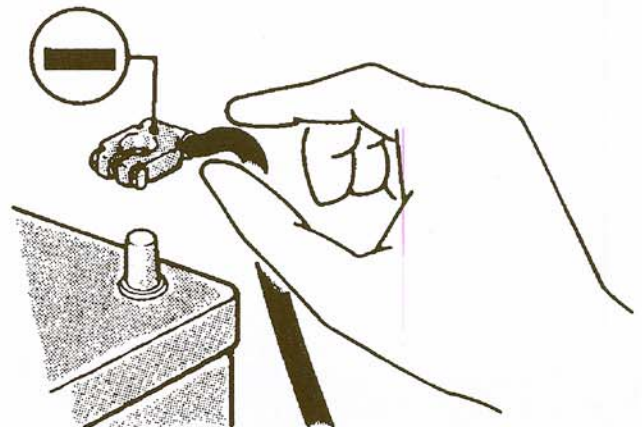
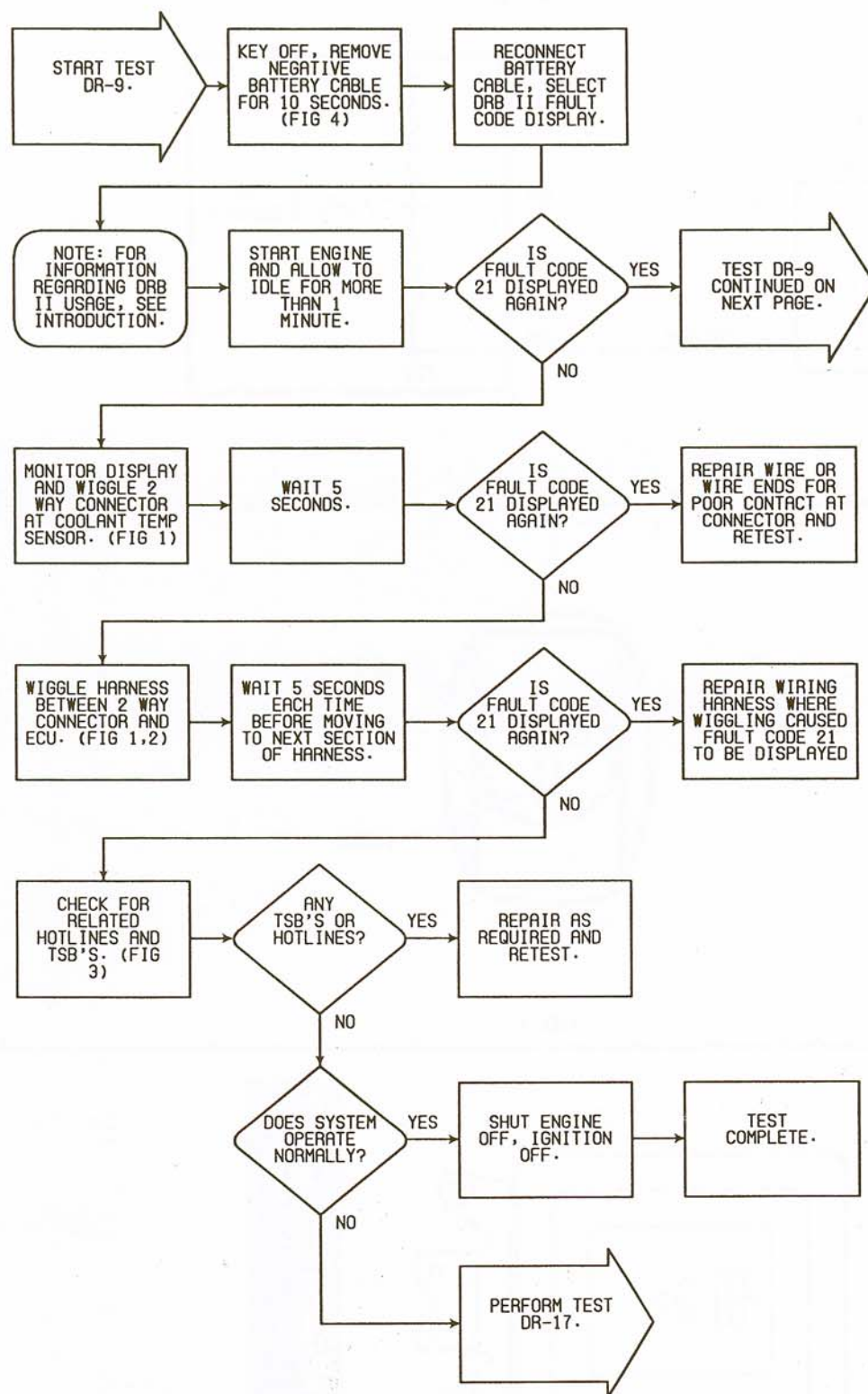


FIG. 4

TEST DR-9 TESTING COOLANT TEMP CIRCUIT - FAULT CODE 21

Perform TEST DR-1 Before Proceeding



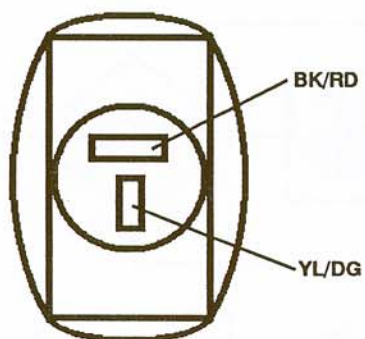
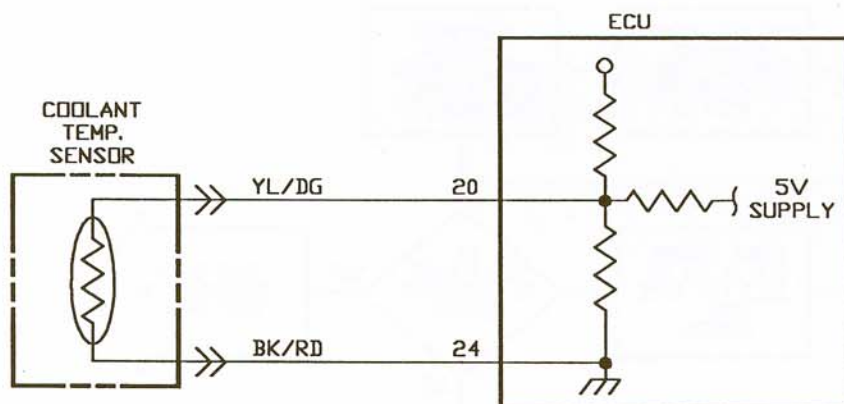
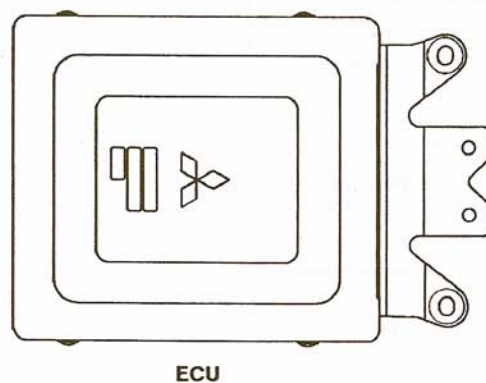


FIG. 1

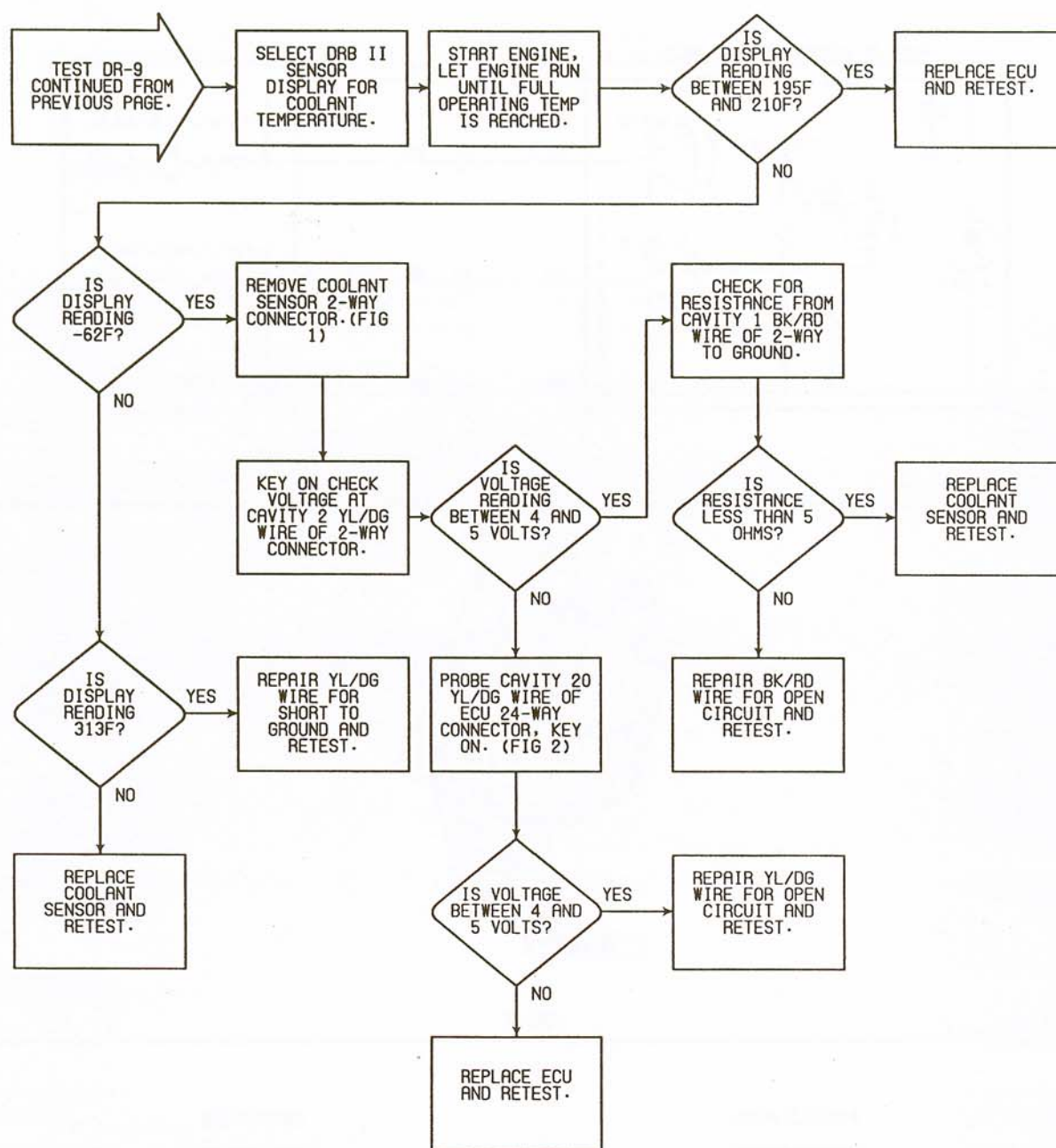


12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	100
104	099
103	098
102	097
101	096

FIG. 2

TEST DR-9

CONTINUED - TESTING COOLANT TEMP CIRCUIT - FAULT CODE 21



TEST DR-10 TESTING CRANK ANGLE CIRCUIT - FAULT 22

Perform TEST DR-1 Before Proceeding

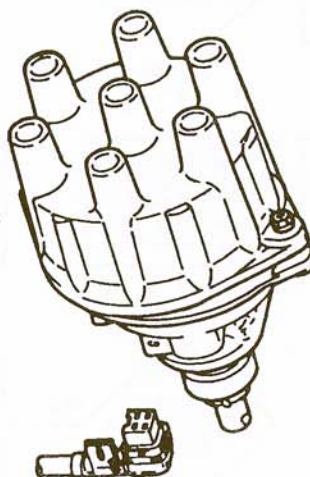
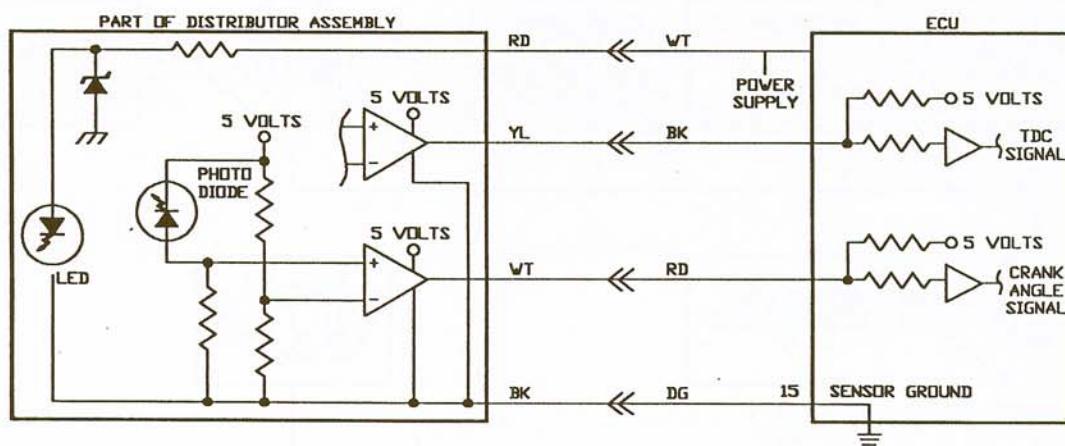


FIG. 1

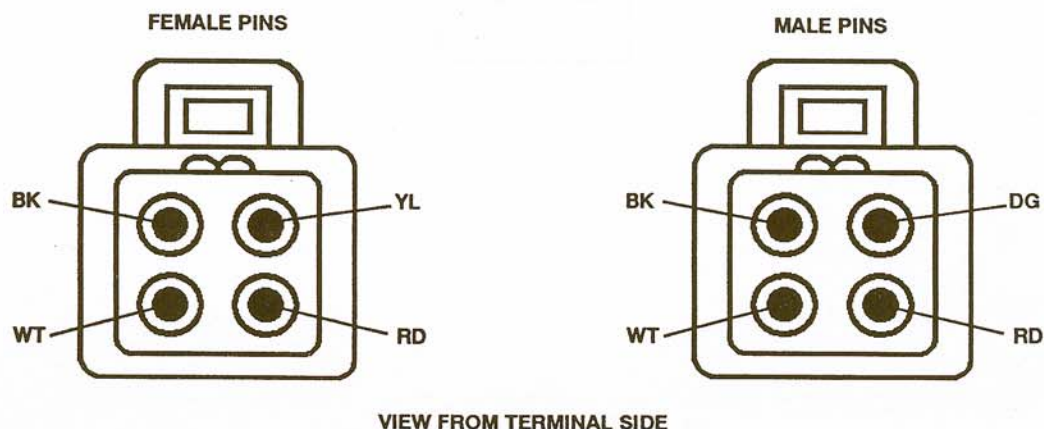
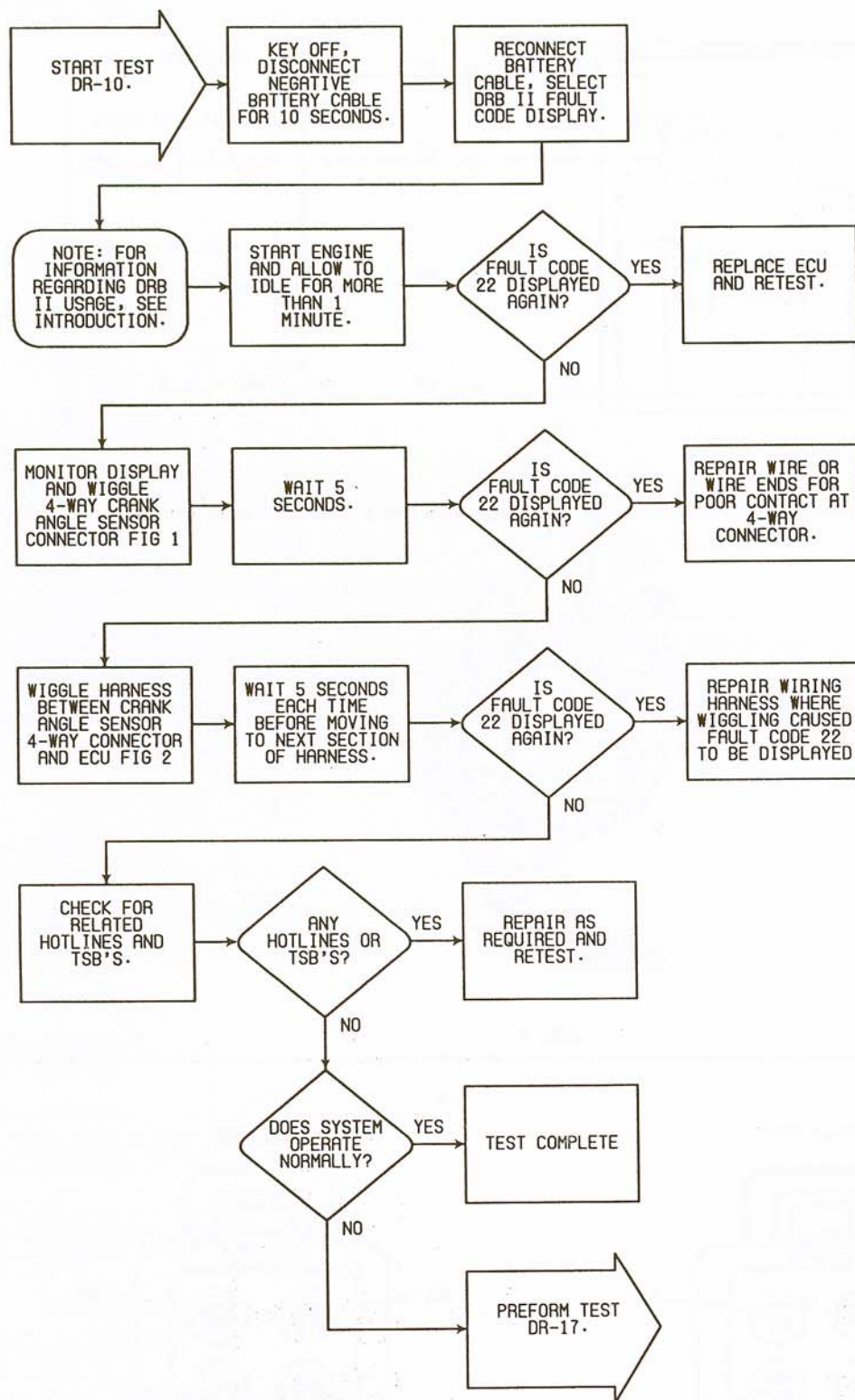


FIG. 2

TEST DR-10 TESTING CRANK ANGLE CIRCUIT - FAULT 22

Perform TEST DR-1 Before Proceeding



TEST DR-11 TESTING TDC SENSOR CIRCUIT - FAULT CODE 23

Perform TEST DR-1 Before Proceeding

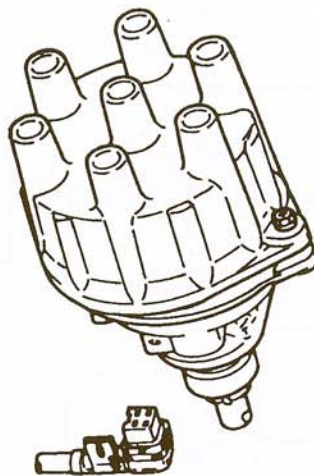
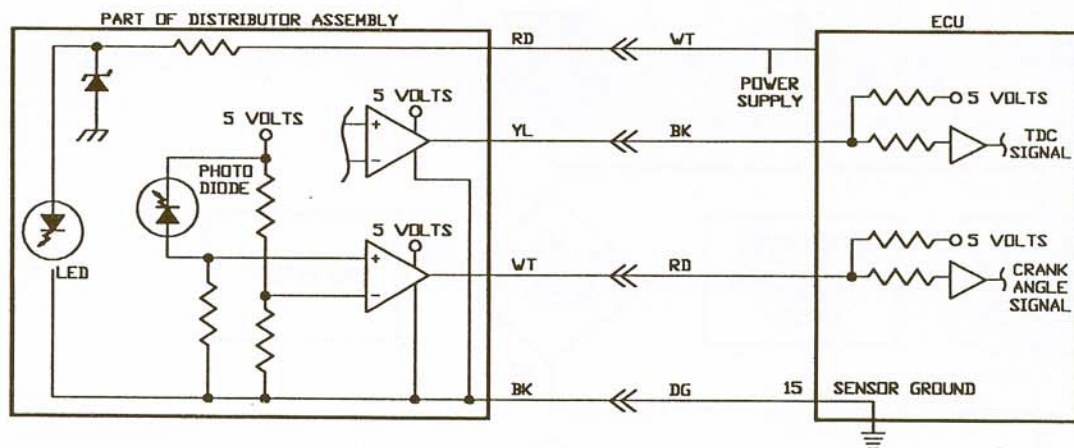


FIG. 1

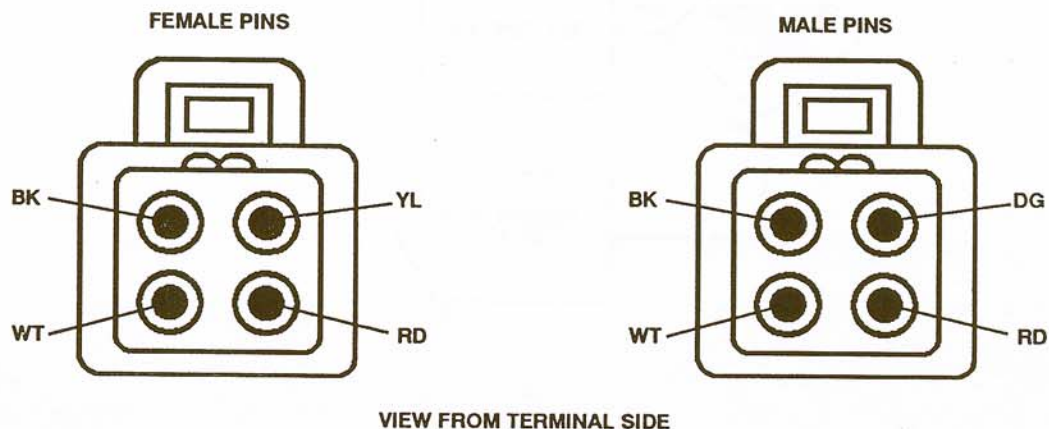
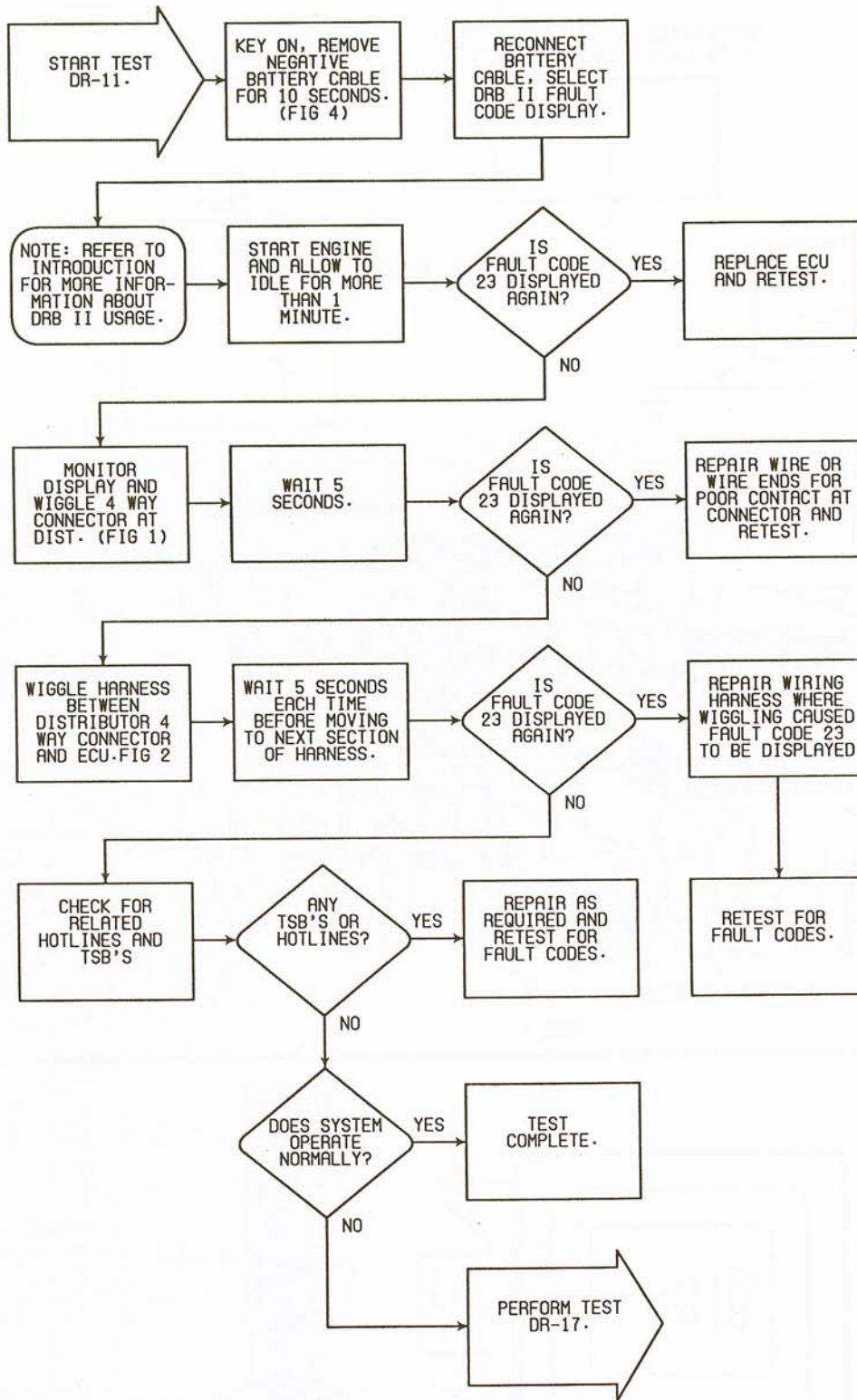


FIG. 2

TEST DR-11 TESTING TDC SENSOR CIRCUIT - FAULT CODE 23

Perform TEST DR-1 Before Proceeding



TEST DR-12 TESTING VEHICLE SPEED SENSOR - FAULT CODE 24

Perform TEST DR-1 Before Proceeding

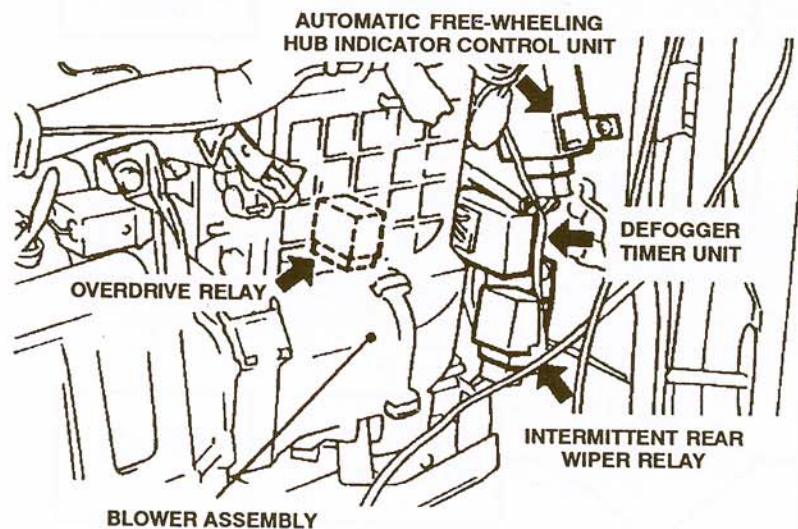
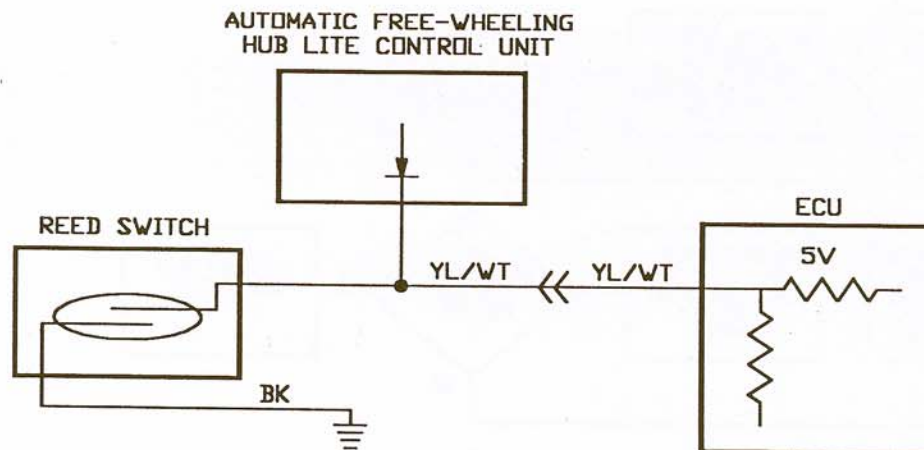


FIG. 1

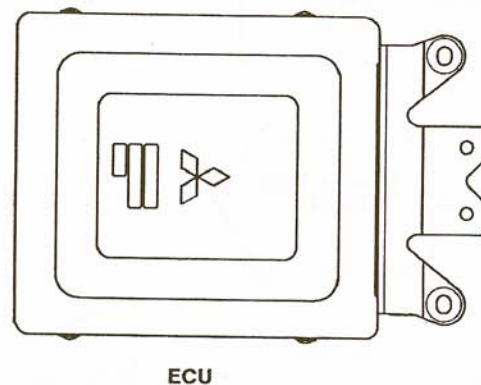
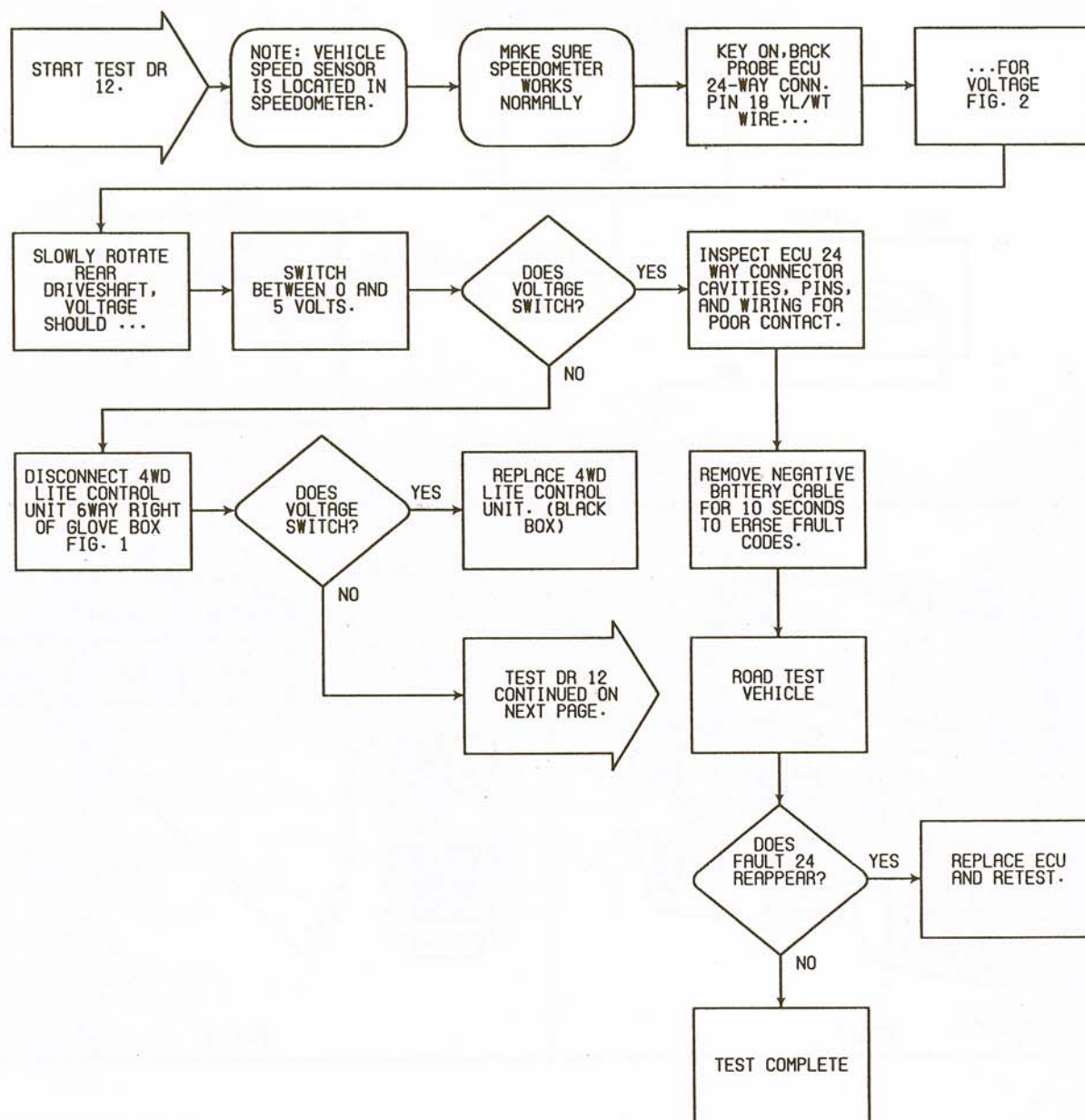


FIG. 2

TEST DR-12 TESTING VEHICLE SPEED SENSOR - FAULT CODE 24**Perform TEST DR-1 Before Proceeding**

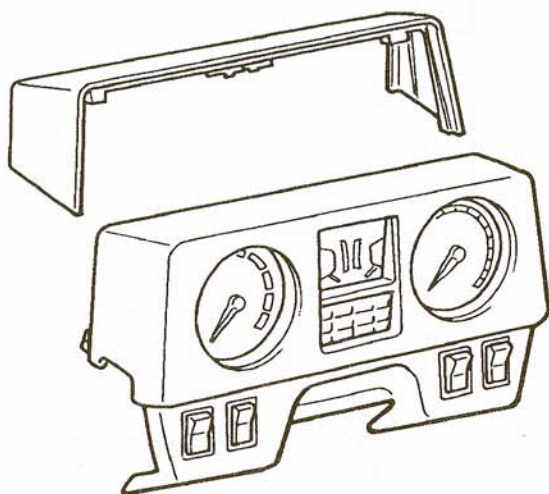
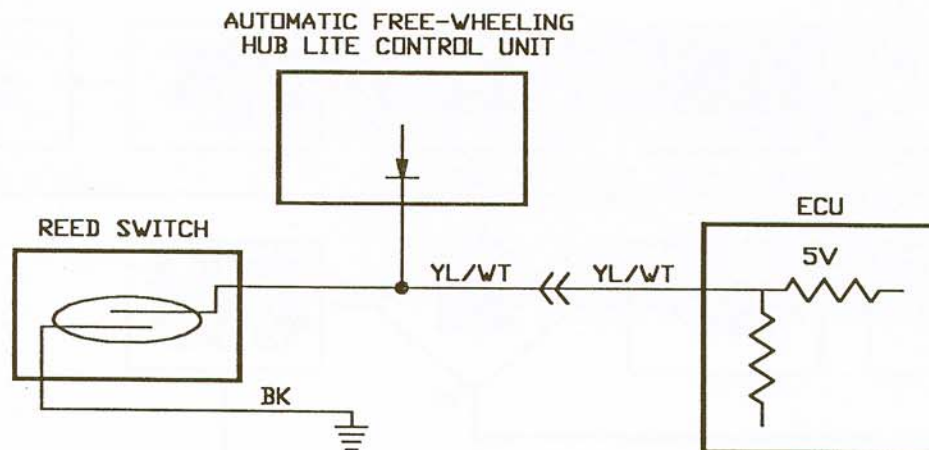


FIG. 1

TERMINAL SIDE

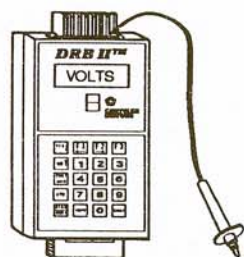
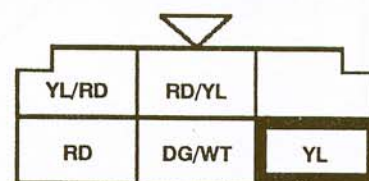
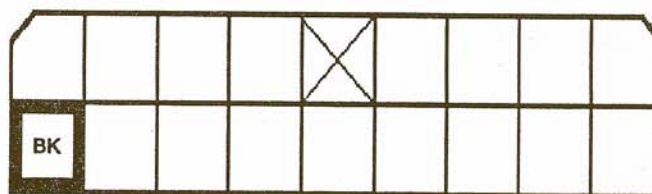
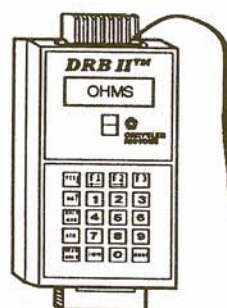
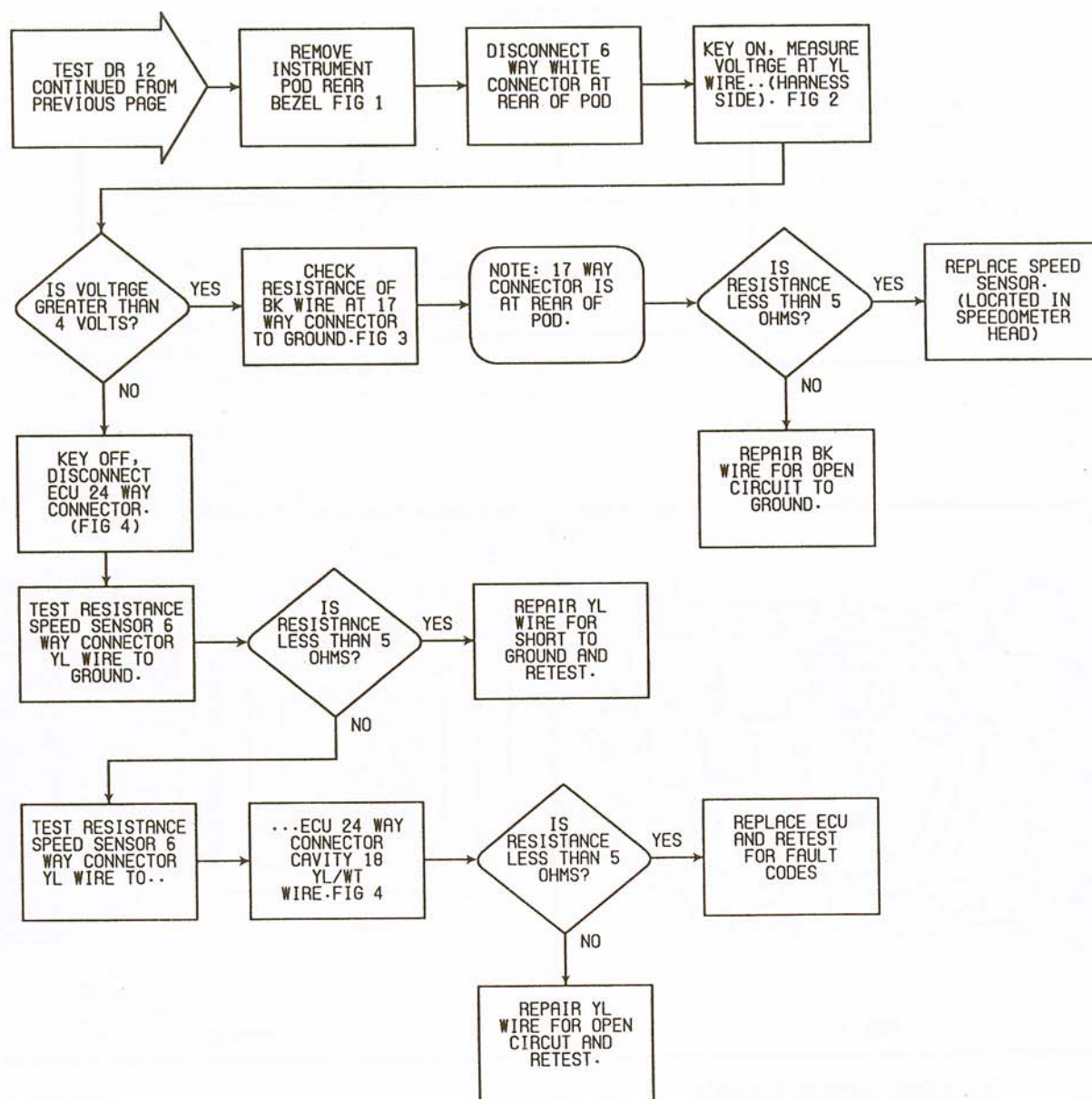


FIG. 2



17-WAY
TERMINAL SIDE

FIG. 3



Perform TEST DR-1 Before Proceeding

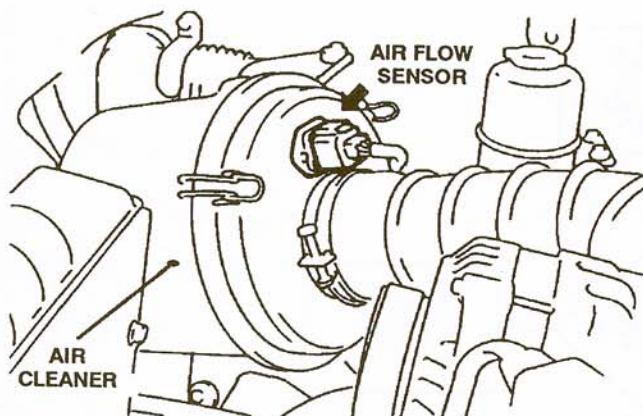
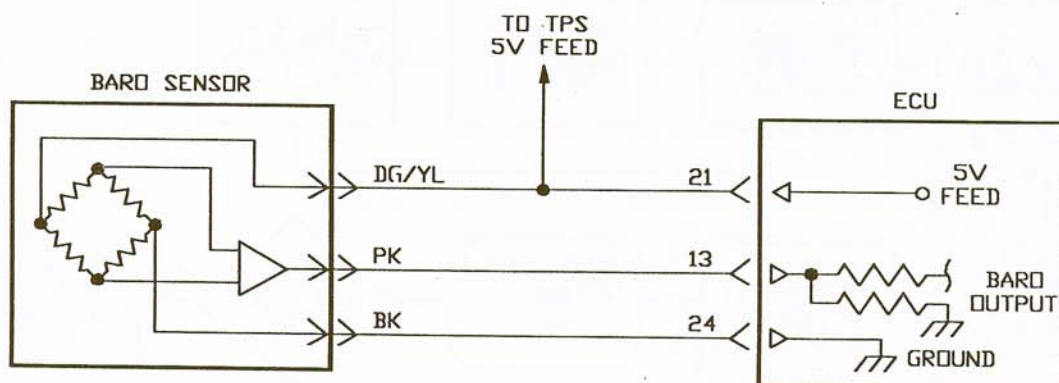


FIG. 1

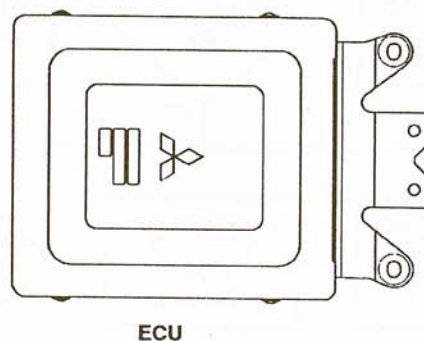


FIG. 2

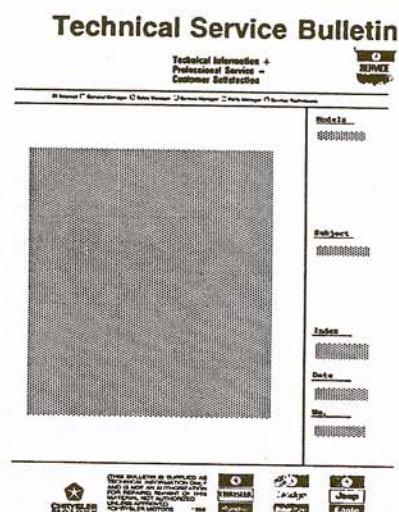


FIG. 3

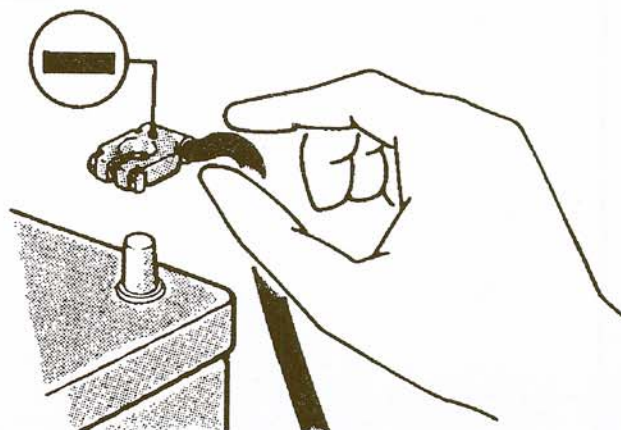
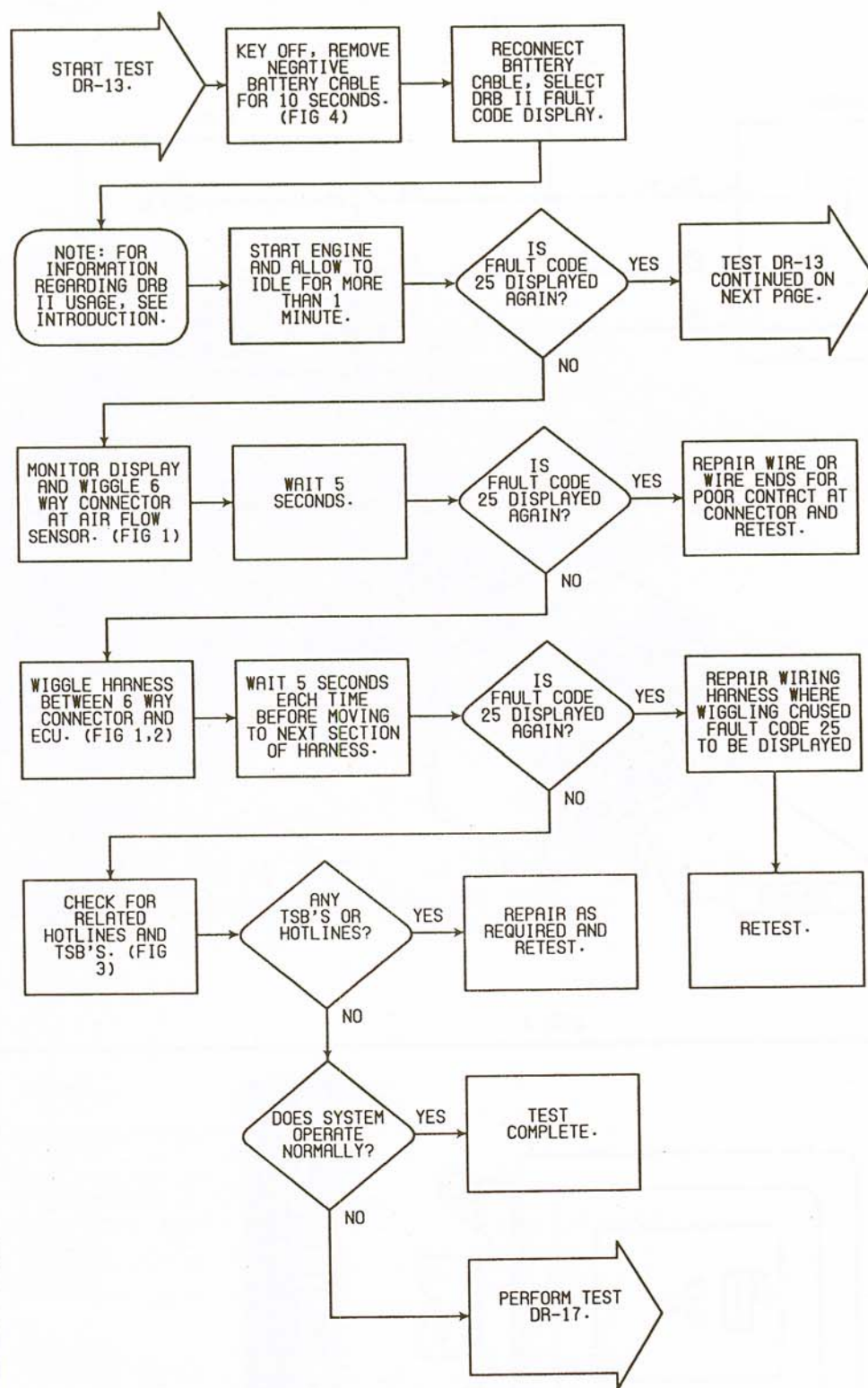


FIG. 4

TEST DR-13

TESTING BAROMETRIC PRESSURE SENSOR - FAULT CODE 25

Perform TEST DR-1 Before Proceeding



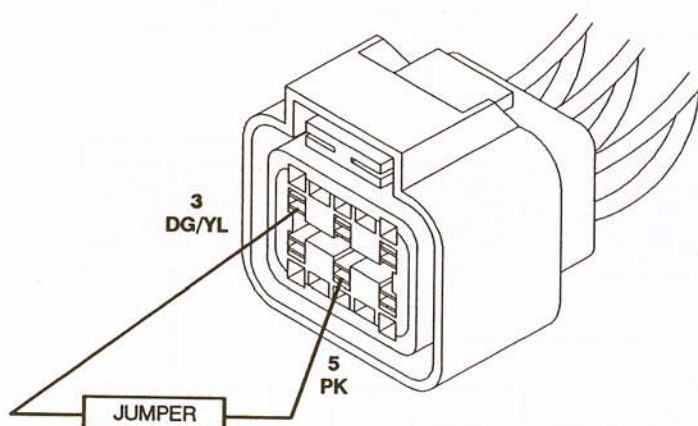
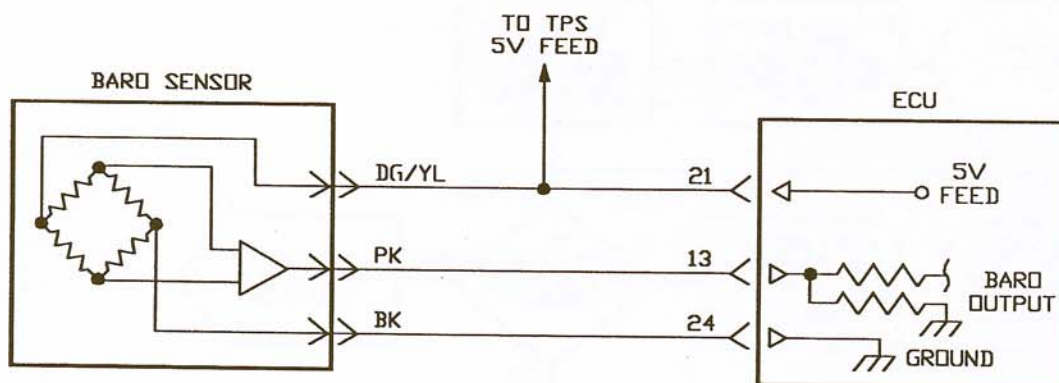
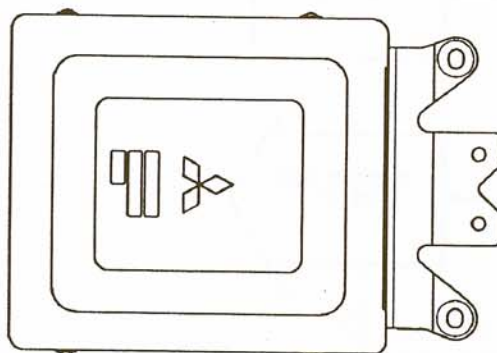


FIG. 1



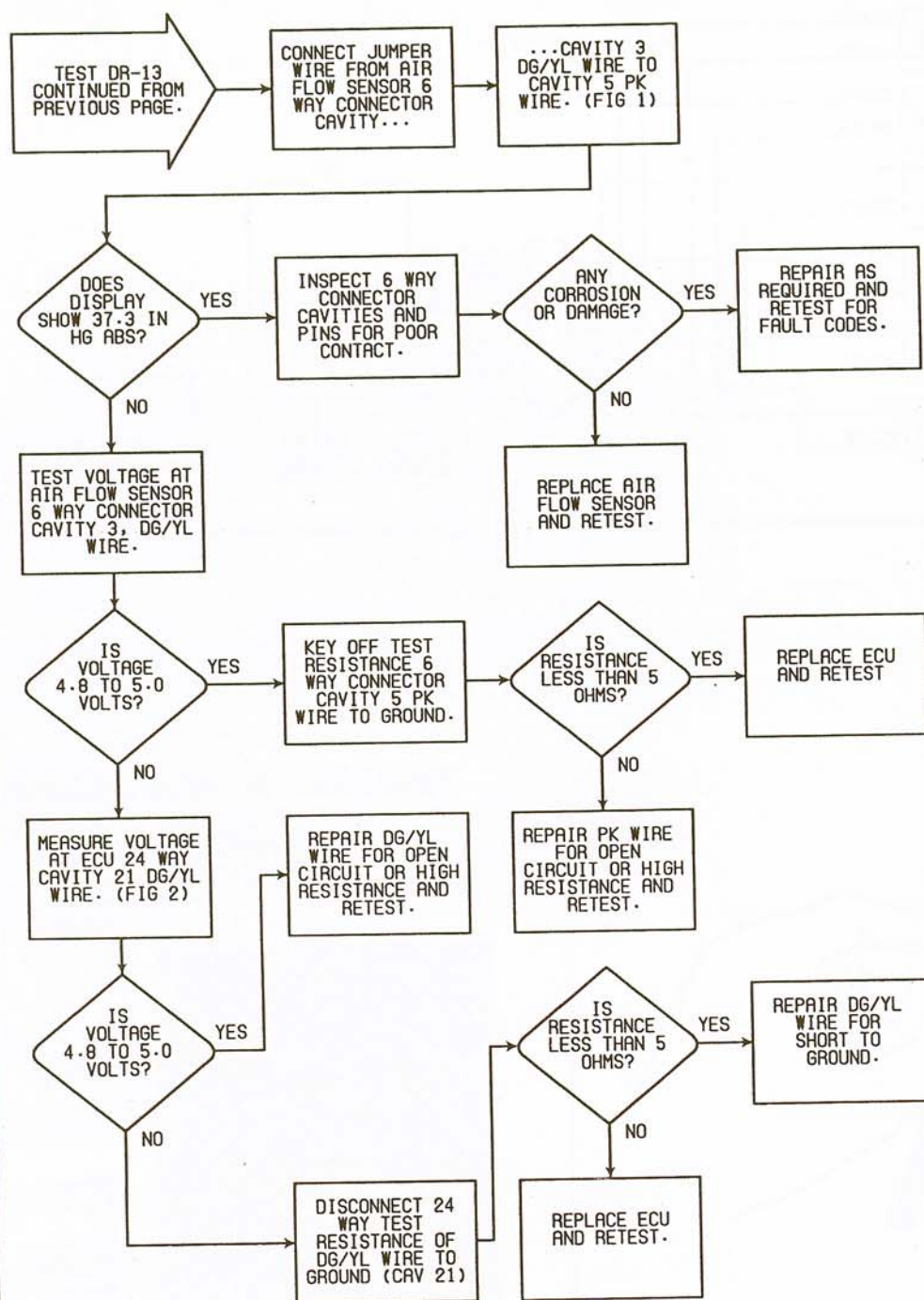
ECU

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 2

TEST DR-13

CONTINUED - TESTING BAROMETRIC PRESSURE SENSOR - FAULT CODE 25



TEST DR-14 CHECKING INJECTOR CIRCUIT

Perform TEST DR-1 Before Proceeding

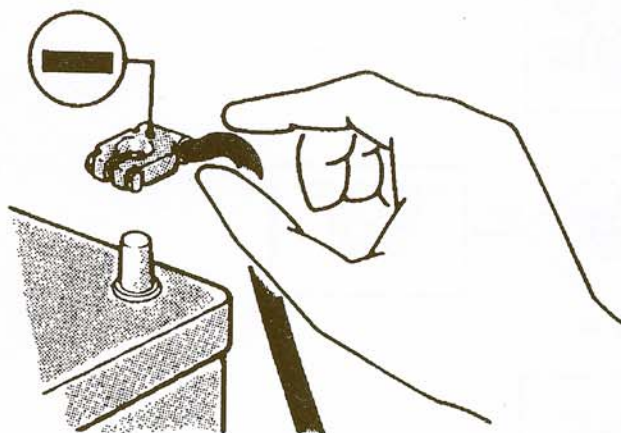
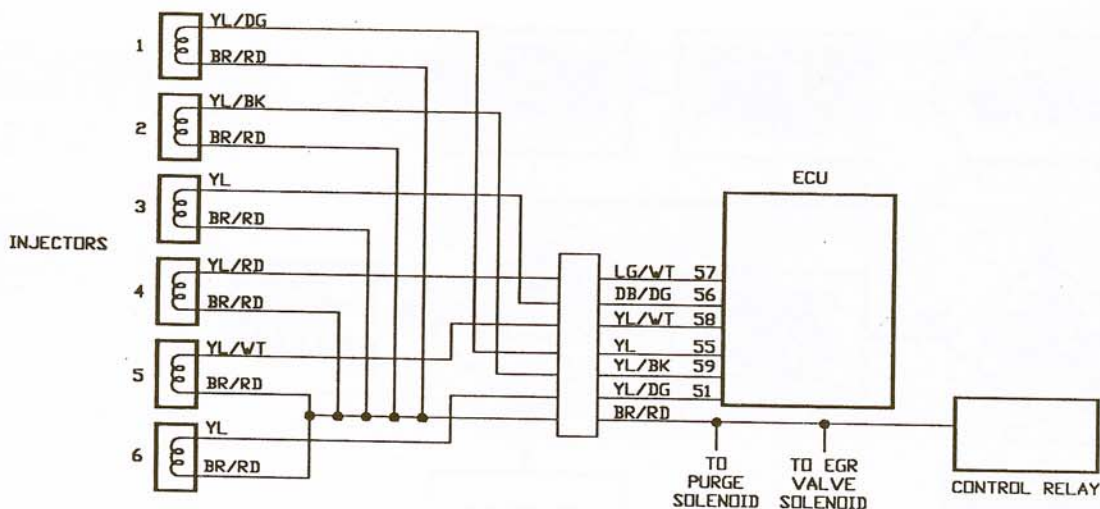


FIG. 1

Technical Service Bulletin

Technical Information +
Professional Service =
Customer Satisfaction



General Manager Sales Manager Service Manager Parts Manager Service Technicians



Models

Subject

Index

Date

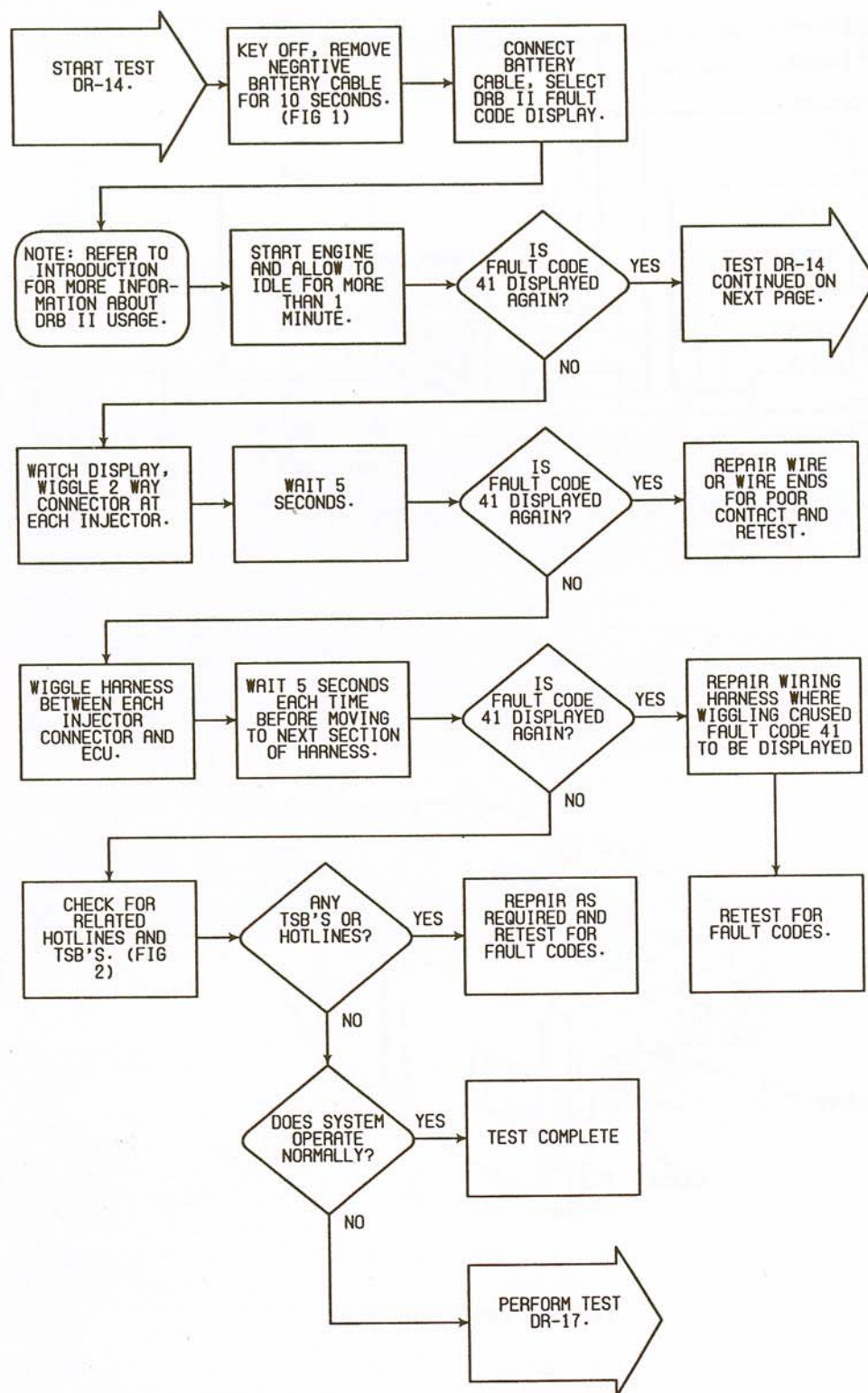
No.

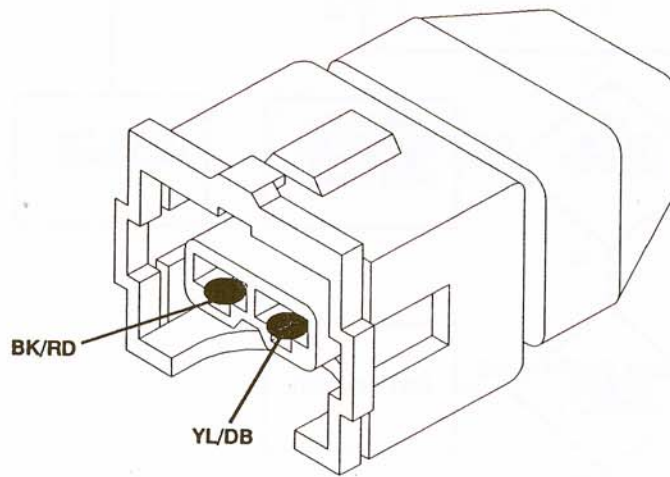
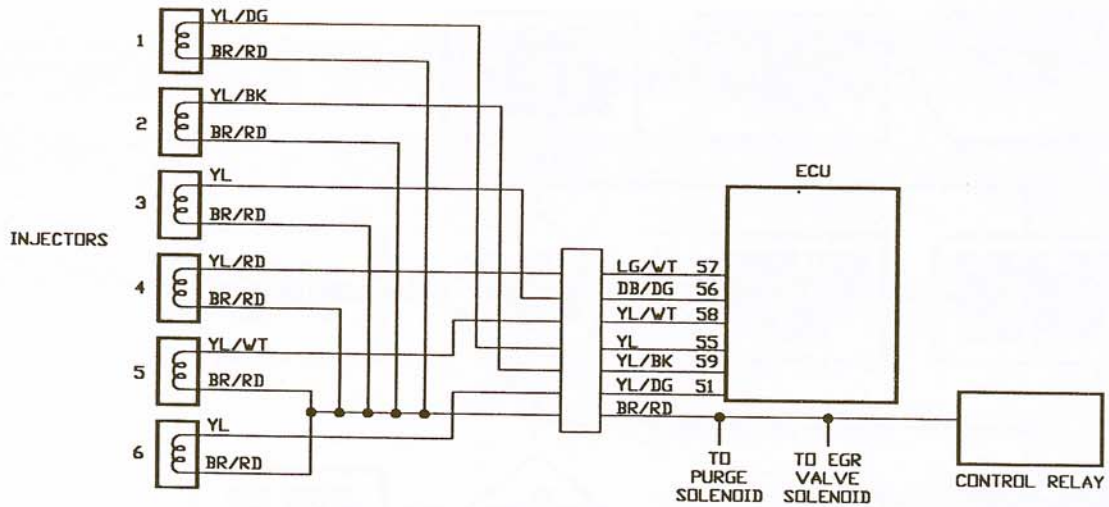


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TECHNICAL INFORMATION ONLY.
AND IS NOT AN AUTHORIZED REPAIR
FOR REPAIRS REPAIRS OF THIS
MATERIAL, NOT AUTHORIZED
UNLESS APPROVED
CHRYSLER MOTORS



FIG. 2

TEST DR-14 CHECKING INJECTOR CIRCUIT**Perform TEST DR-1 Before Proceeding**

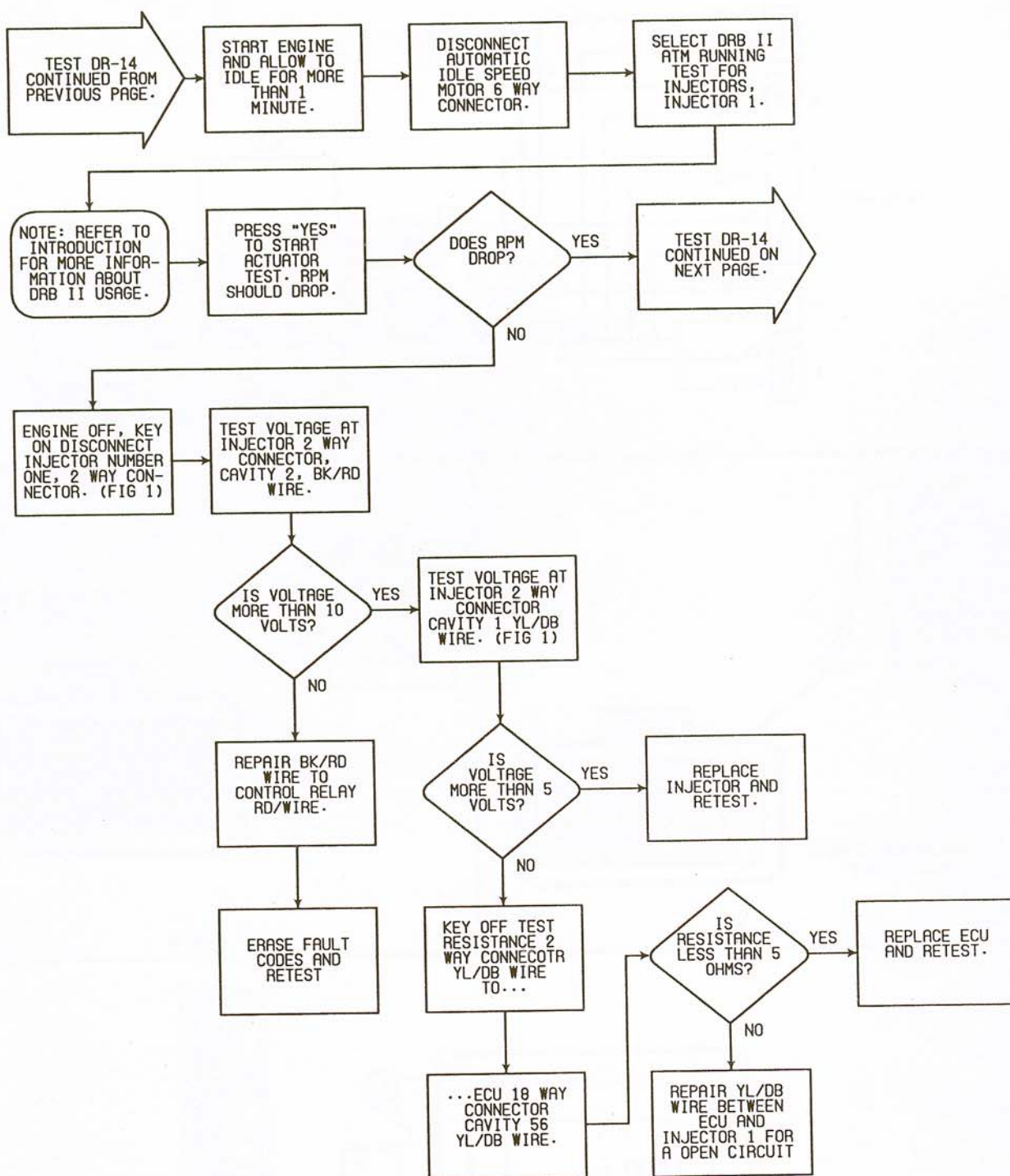


TERMINAL SIDE

FIG. 1

TEST DR-14

CONTINUED - CHECKING INJECTOR CIRCUIT



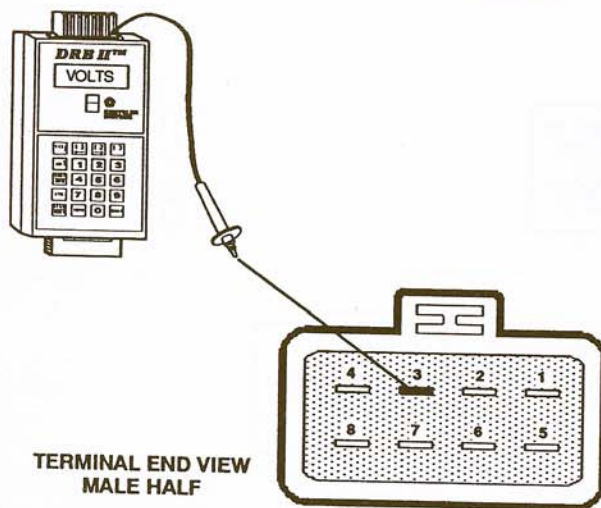
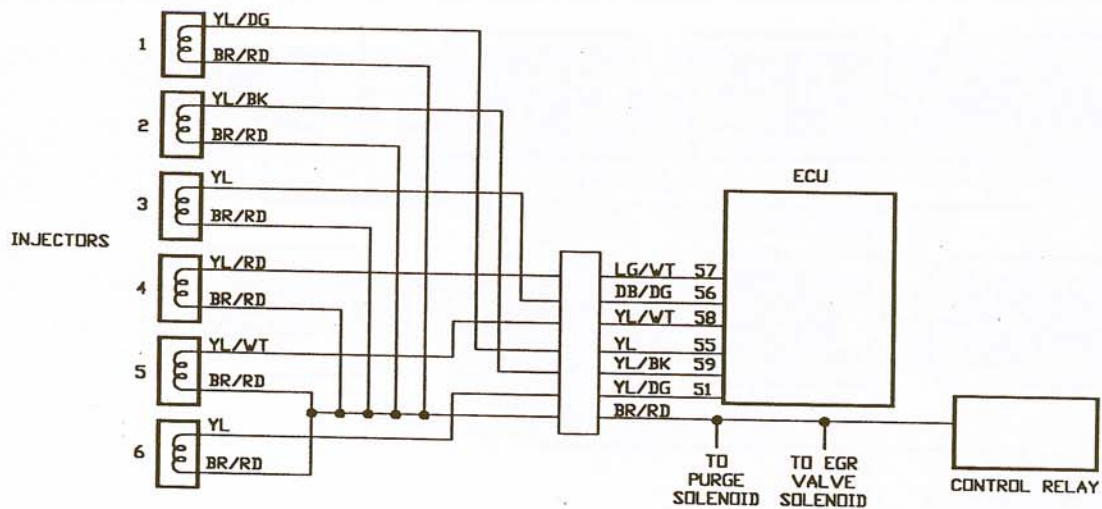


FIG. 1

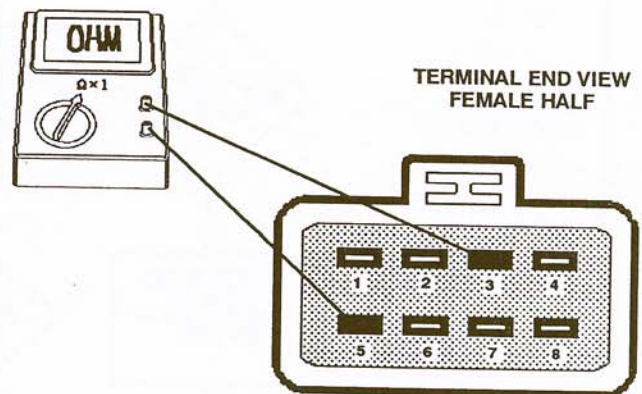
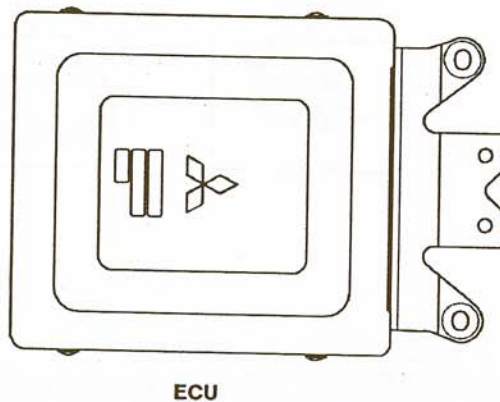
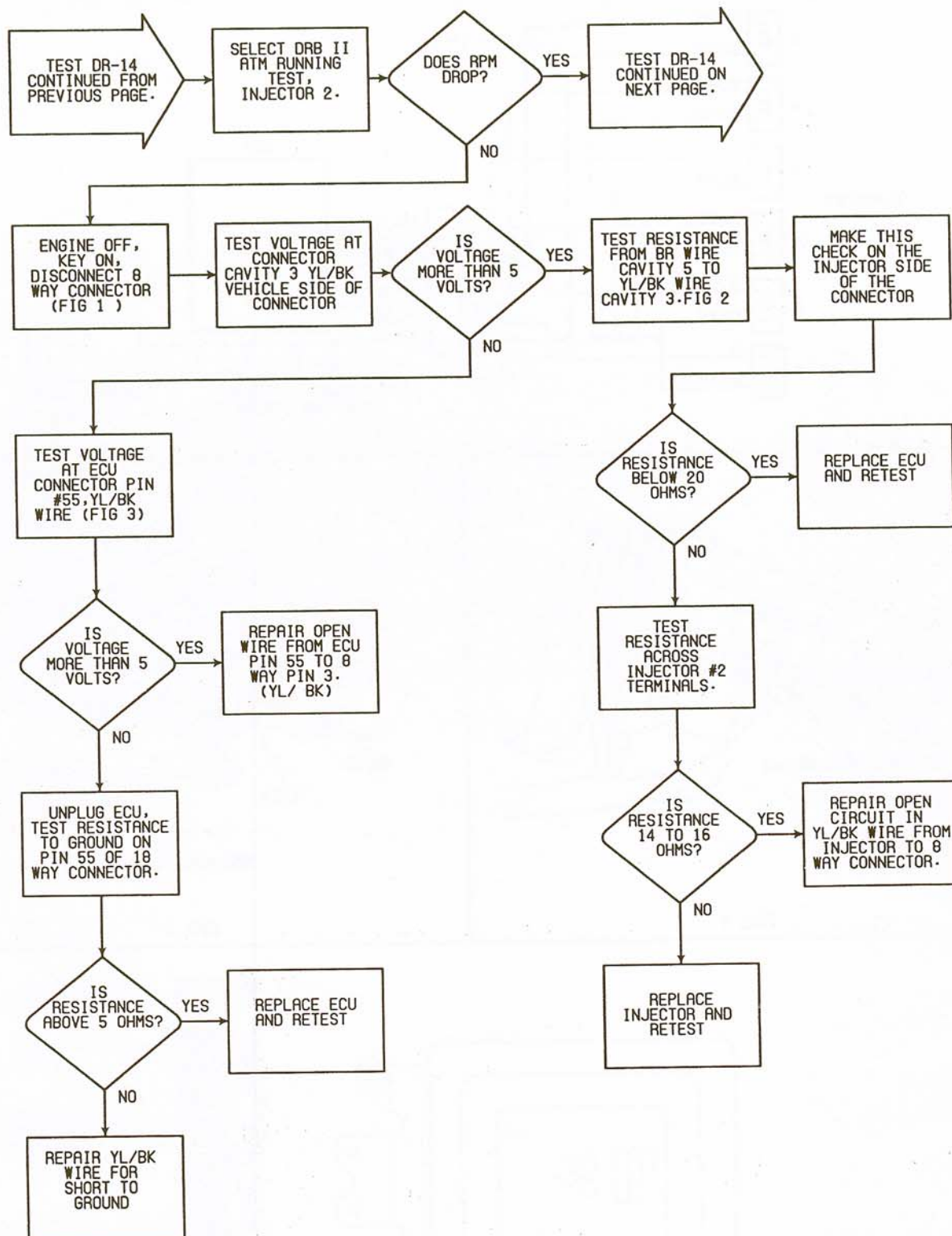


FIG. 2



12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 3



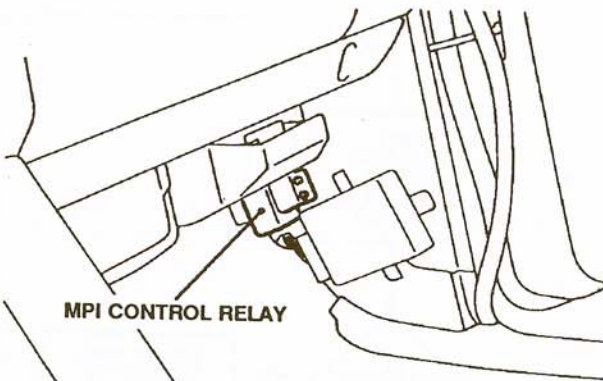
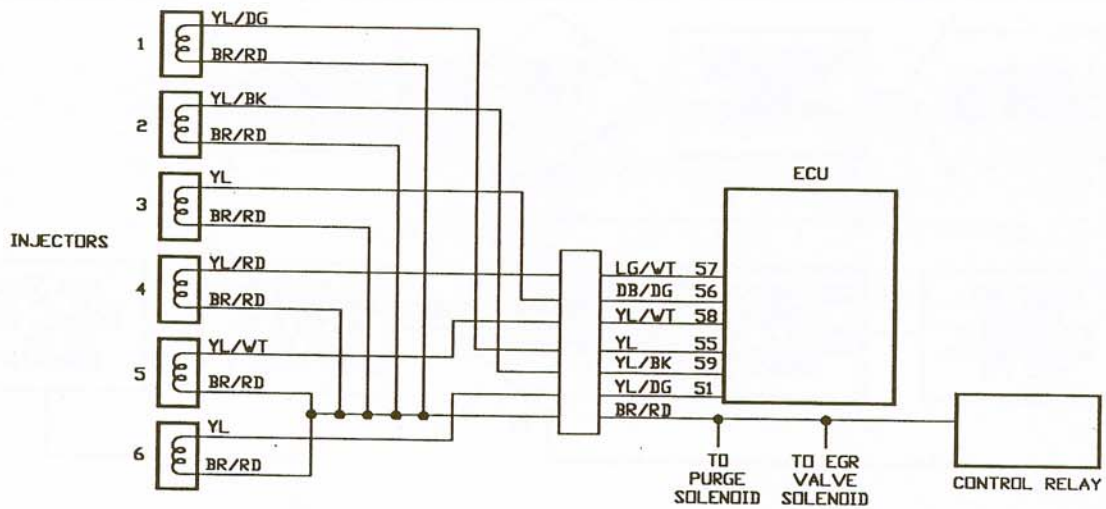
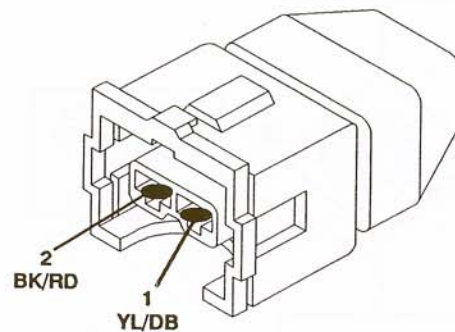


FIG. 1



TERMINAL SIDE

FIG. 2

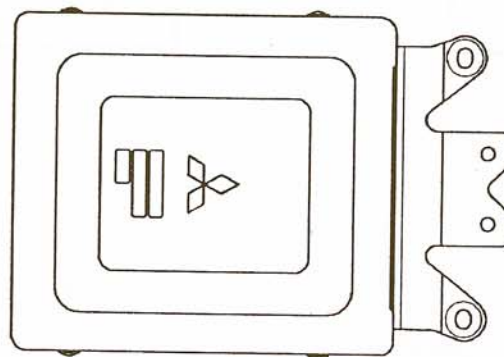
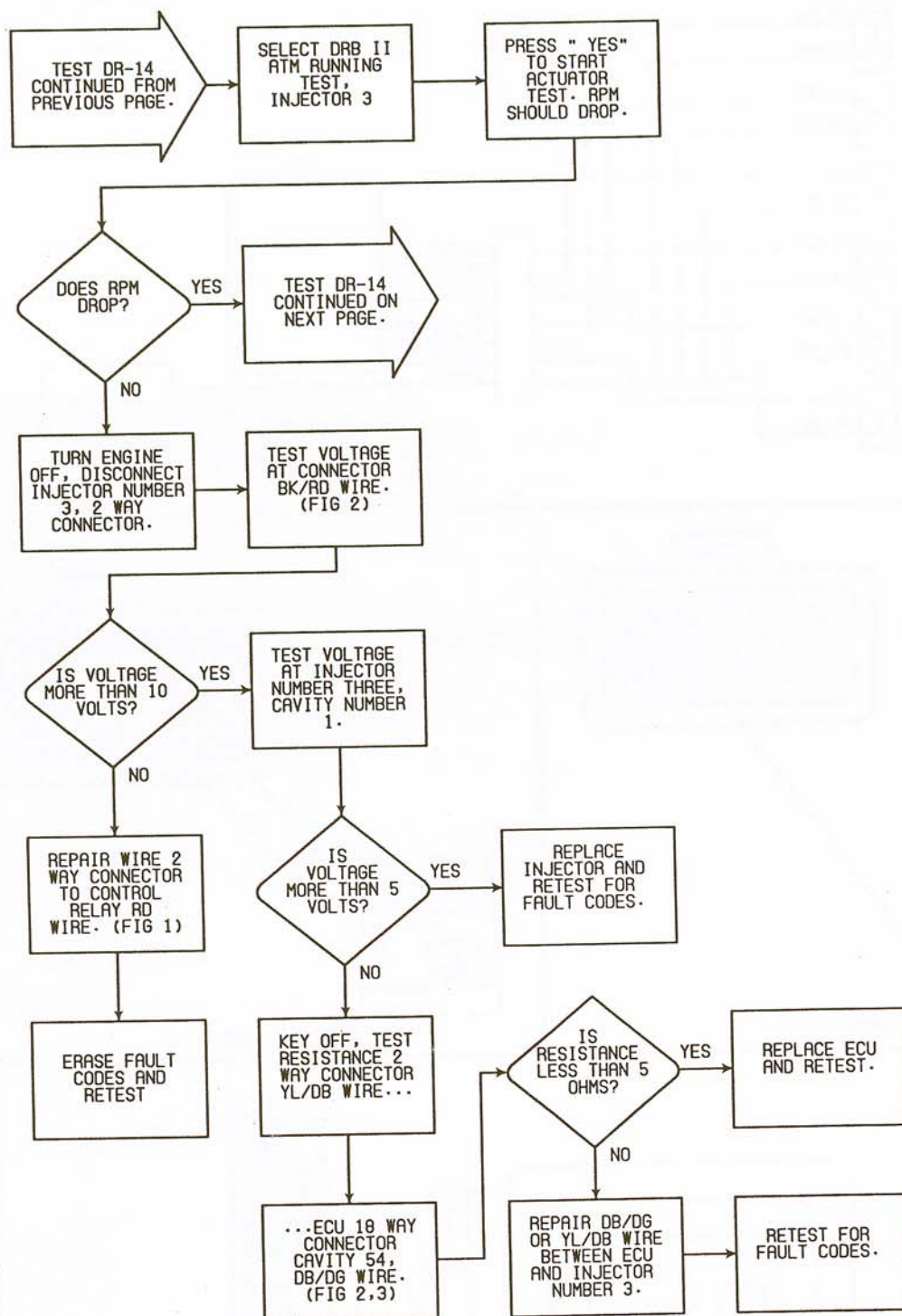
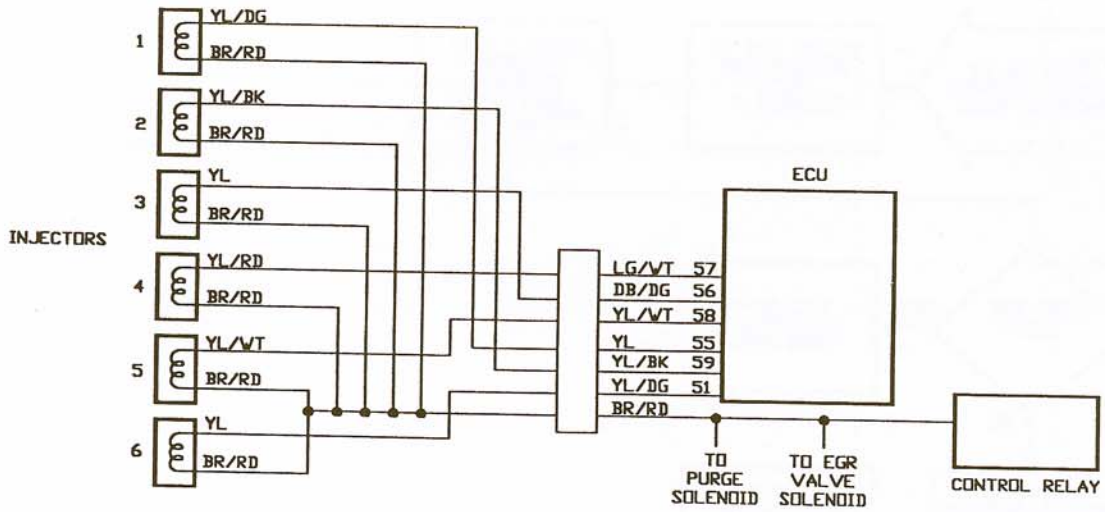


FIG. 3

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

TEST DR-14 CONTINUED - CHECKING INJECTOR CIRCUIT





TERMINAL END VIEW

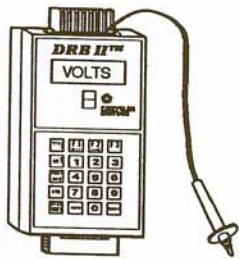
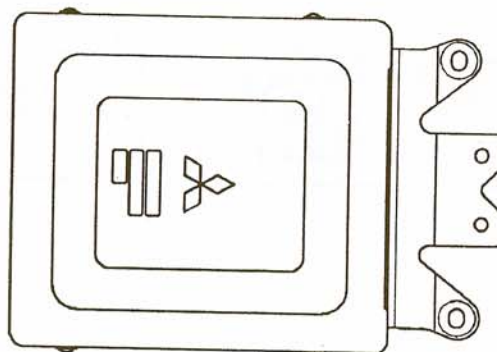


FIG. 1

TERMINAL END VIEW



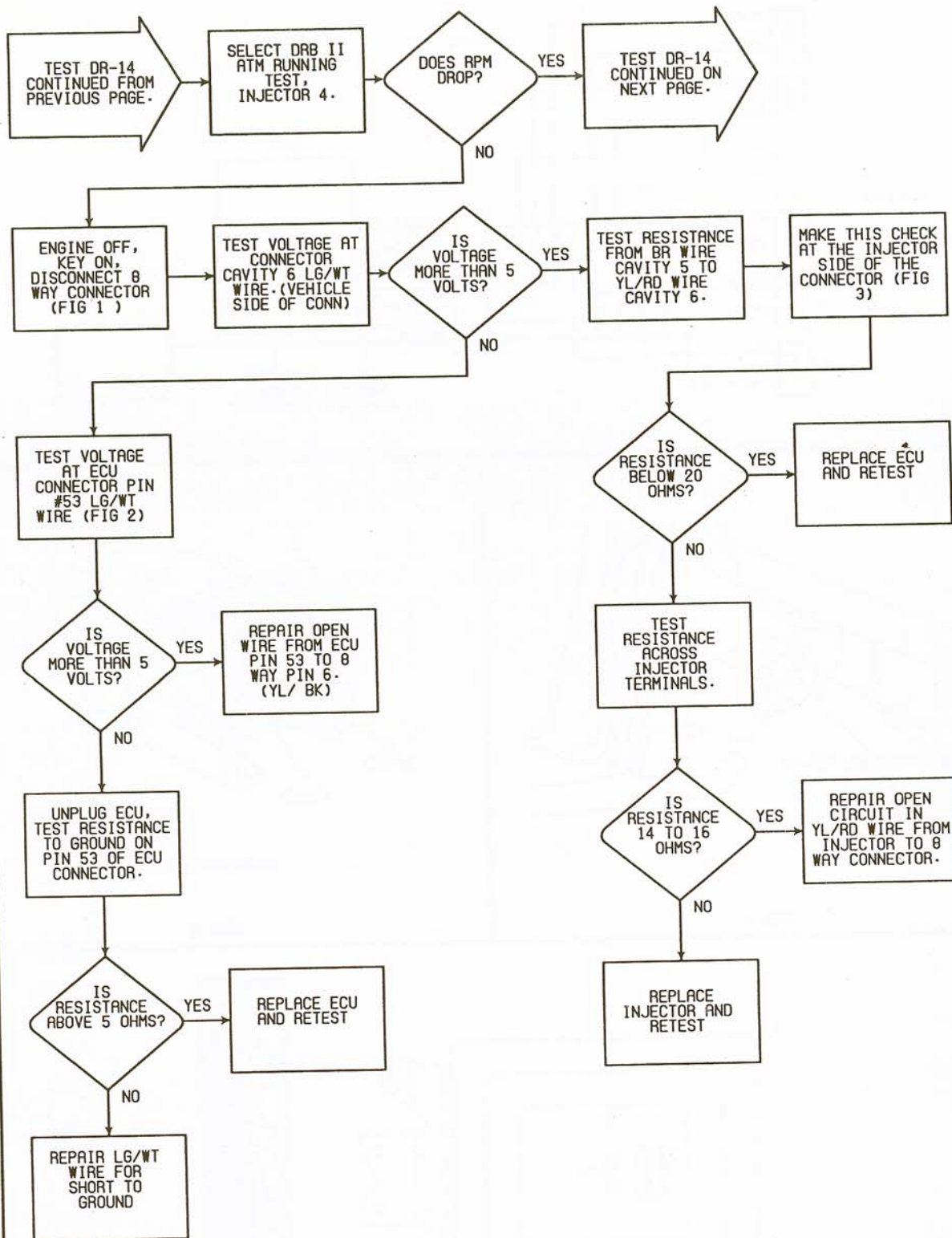
FIG. 2



12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 3

TEST DR-14 CONTINUED - CHECKING INJECTOR CIRCUIT



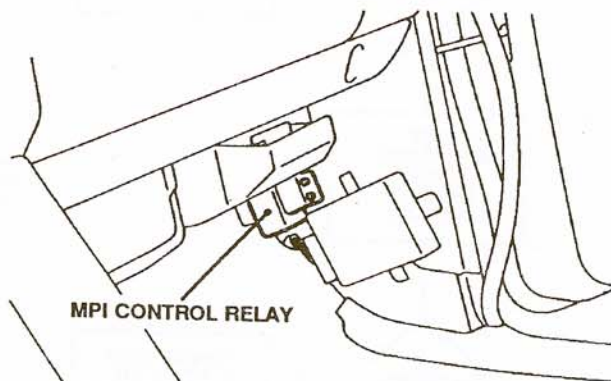
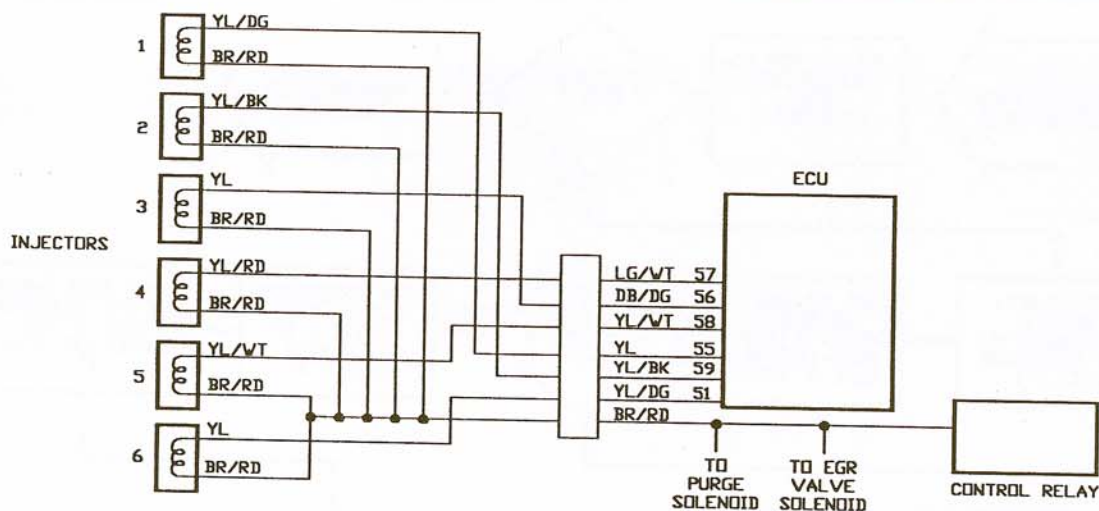
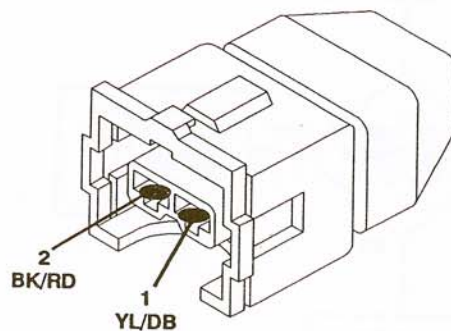
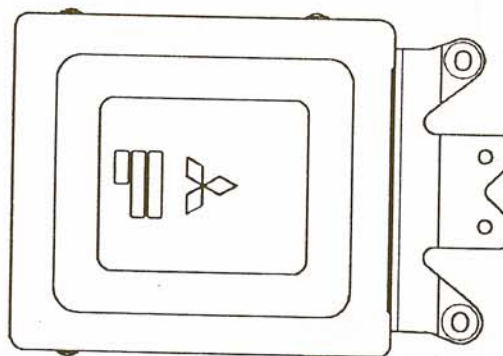


FIG. 1



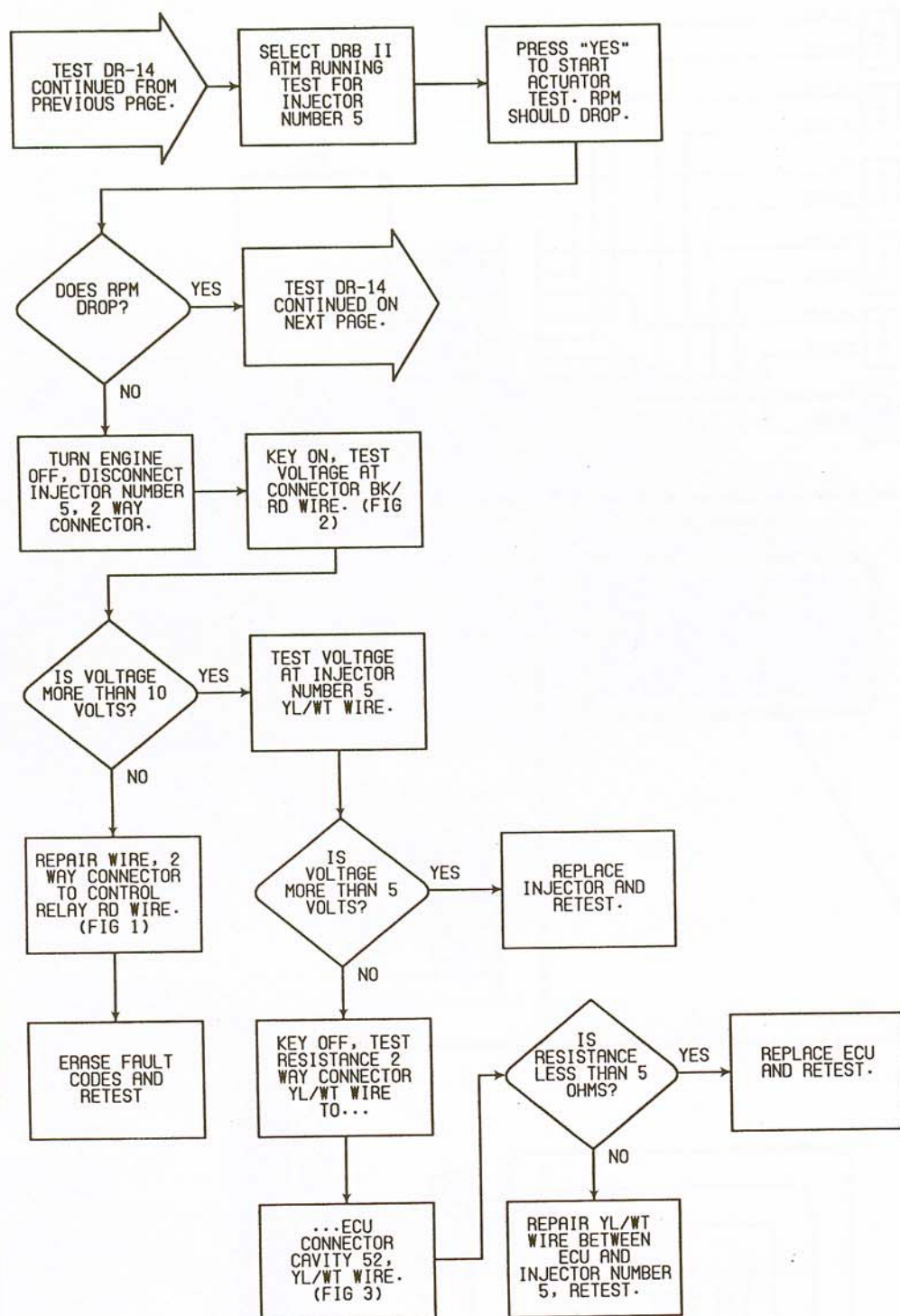
TERMINAL SIDE

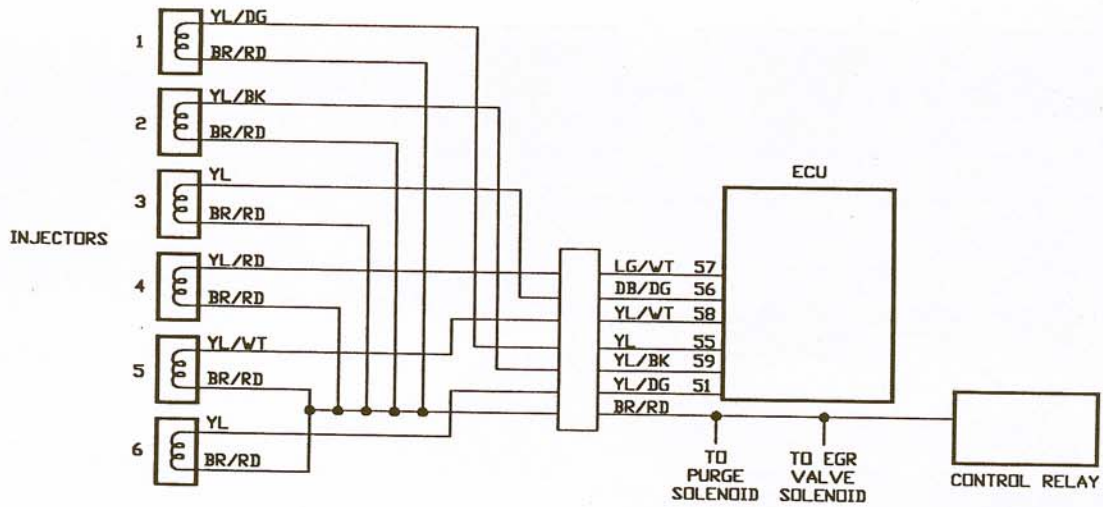
FIG. 2



12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 3





TERMINAL END VIEW

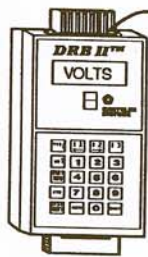


FIG. 1

TERMINAL END VIEW

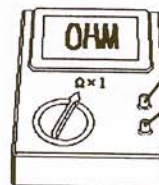
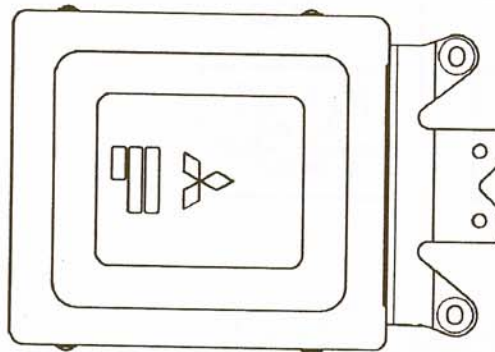


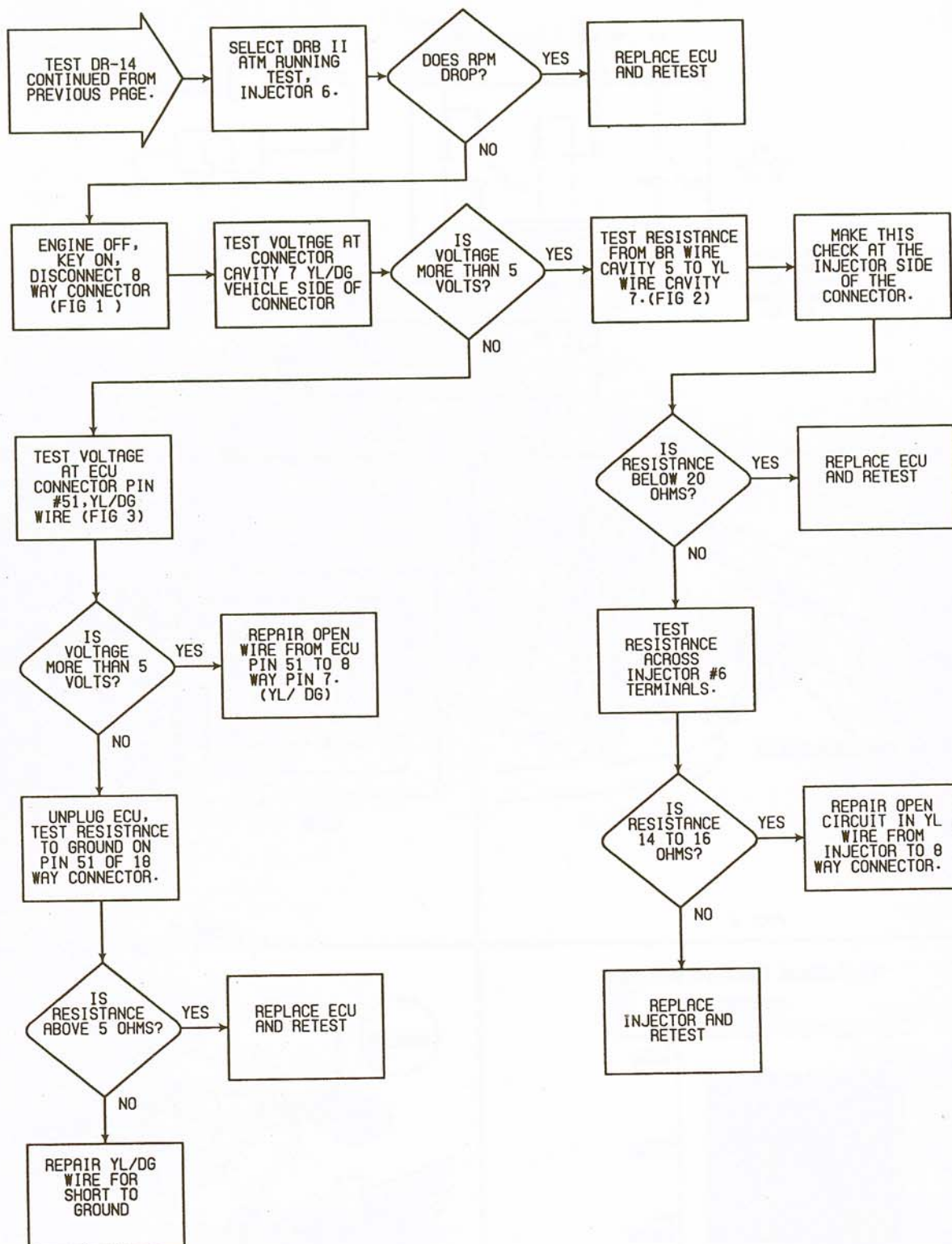
FIG. 2



ECU

12	24
11	23
10	22
9	21
8	20
7	19
6	18
5	17
4	16
3	15
2	14
1	13
59	68
58	67
57	66
56	65
55	64
54	63
53	62
52	61
51	60
105	110
104	109
103	108
102	107
101	106

FIG. 3



TEST DR-15 TESTING FUEL PUMP CIRCUIT - FAULT CODE 42

Perform TEST DR-1 Before Proceeding

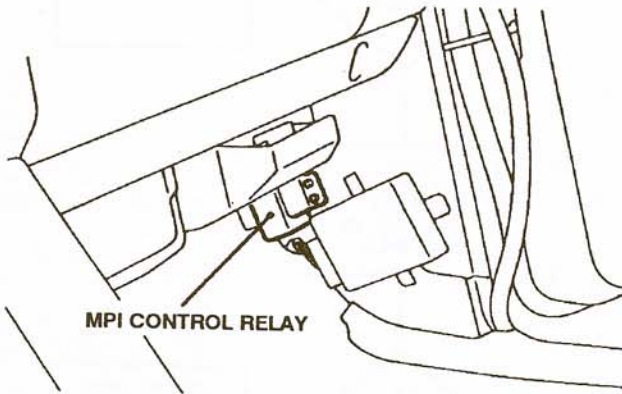
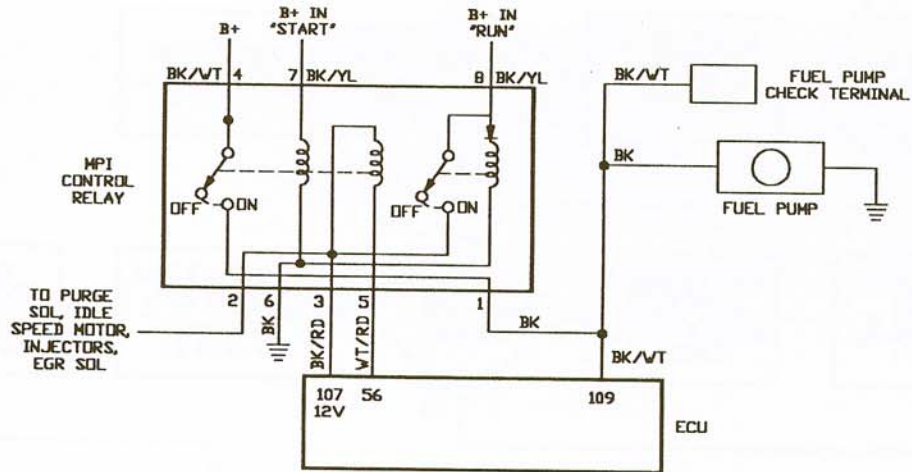


FIG. 1

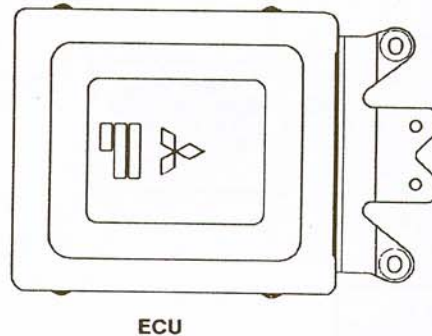


FIG. 2

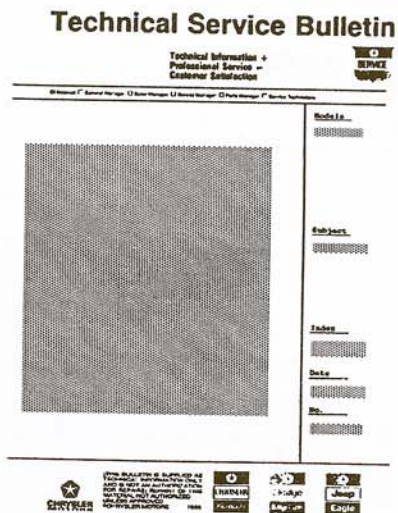


FIG. 3

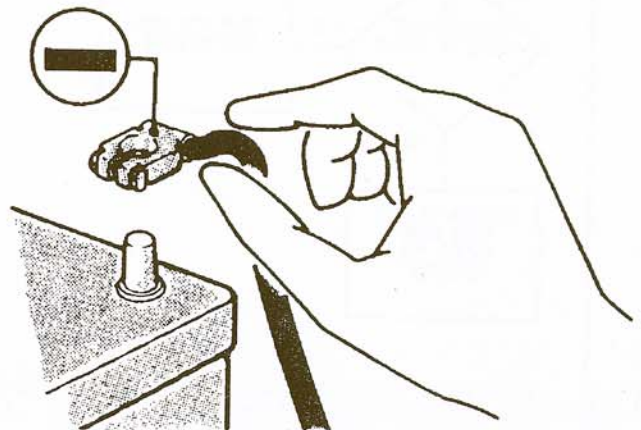
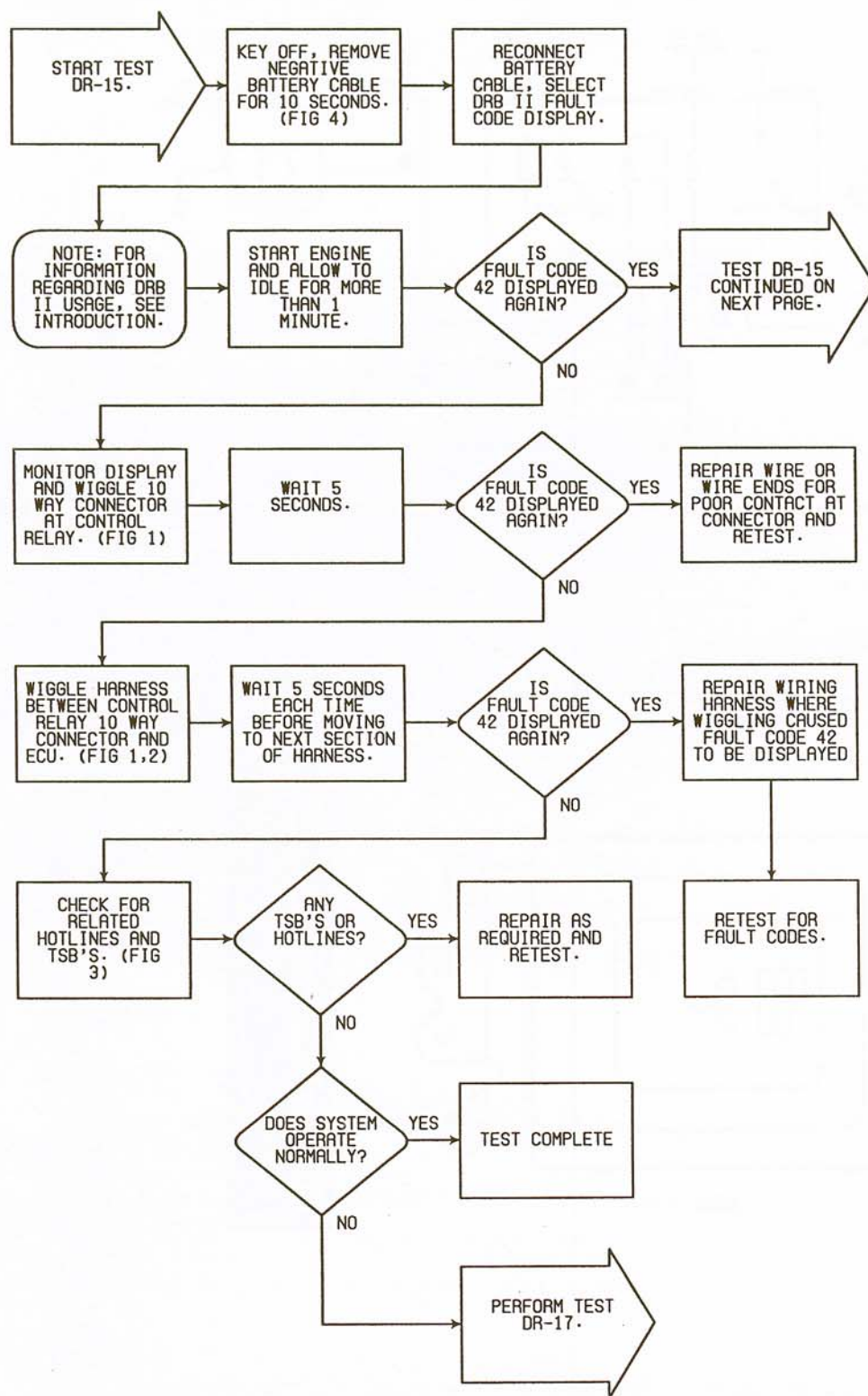
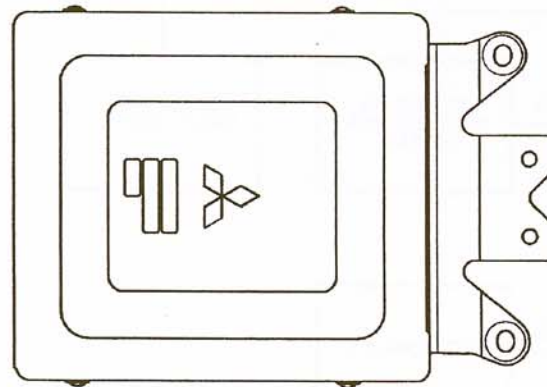
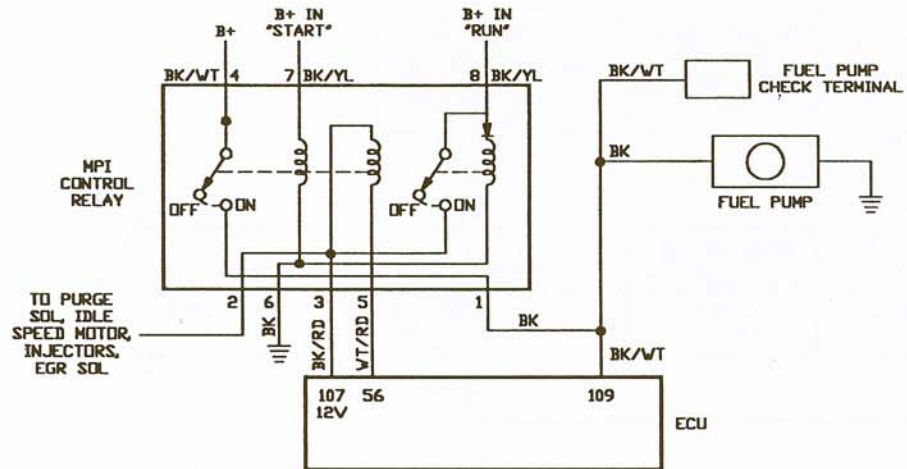


FIG. 4

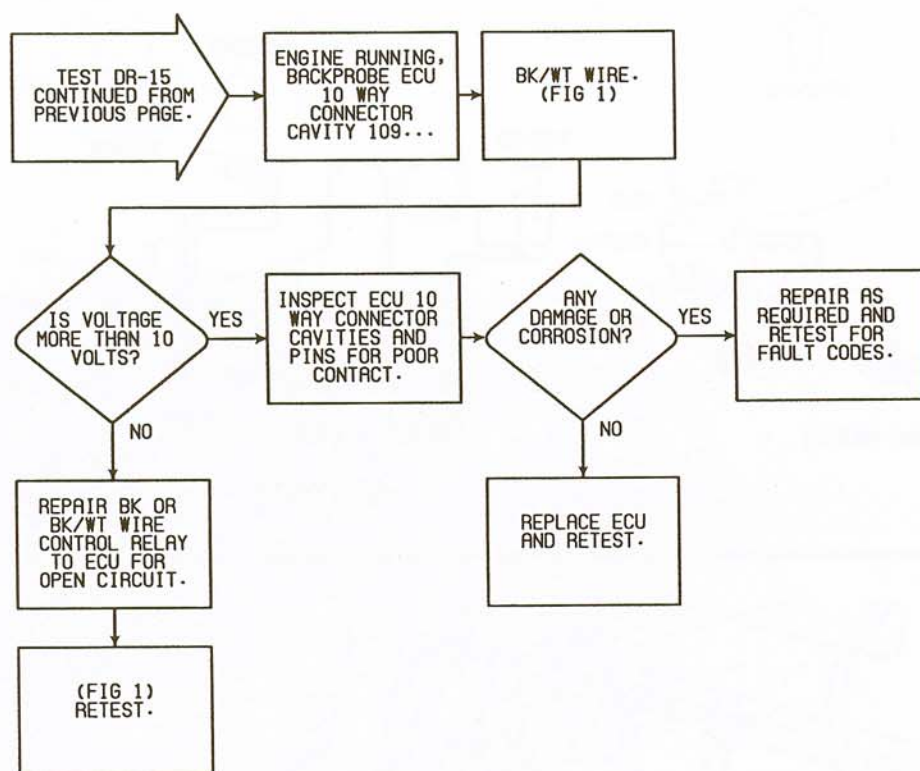
TEST DR-15 TESTING FUEL PUMP CIRCUIT - FAULT CODE 42**Perform TEST DR-1 Before Proceeding**



ECU

12	24
11	23
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103	108
102	107
101	106

FIG. 1



TEST DR-16

TESTING EGR TEMPERATURE CIRCUIT - FAULT CODE 43

Perform TEST DR-1 Before Proceeding

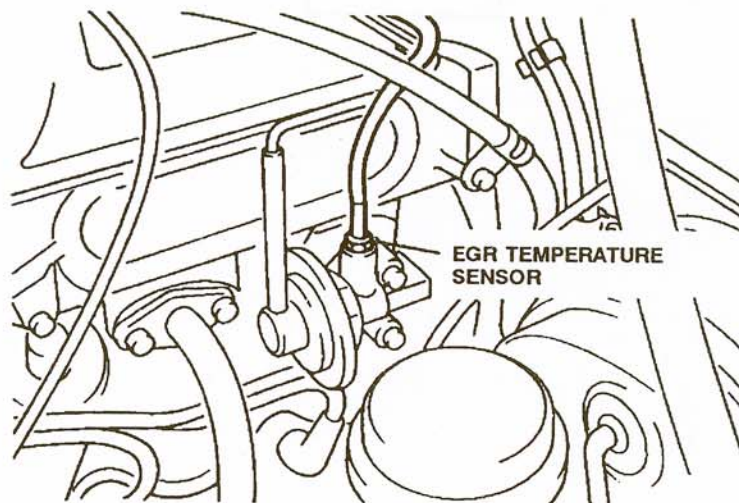
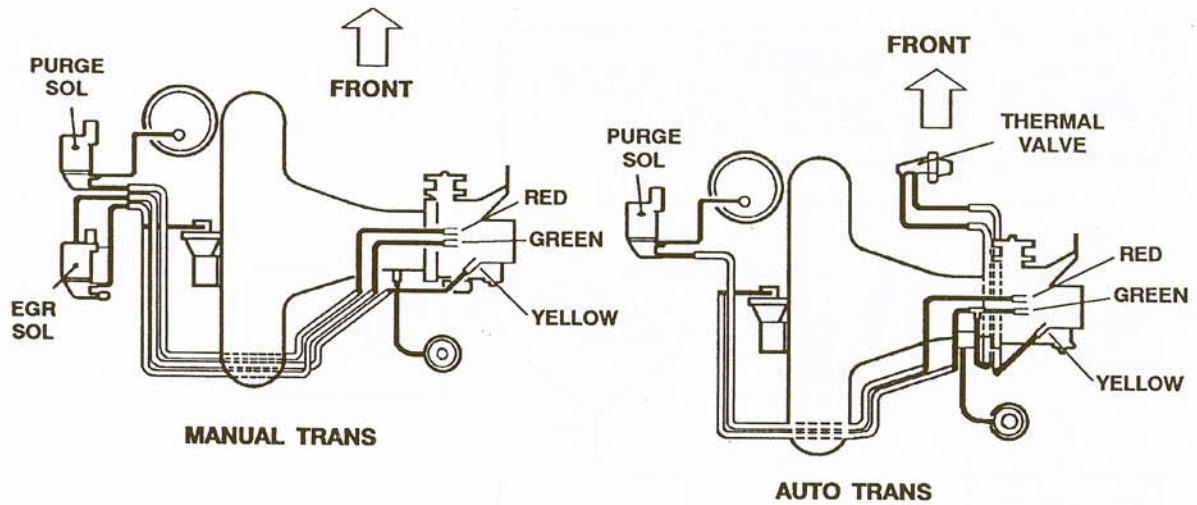


FIG. 1

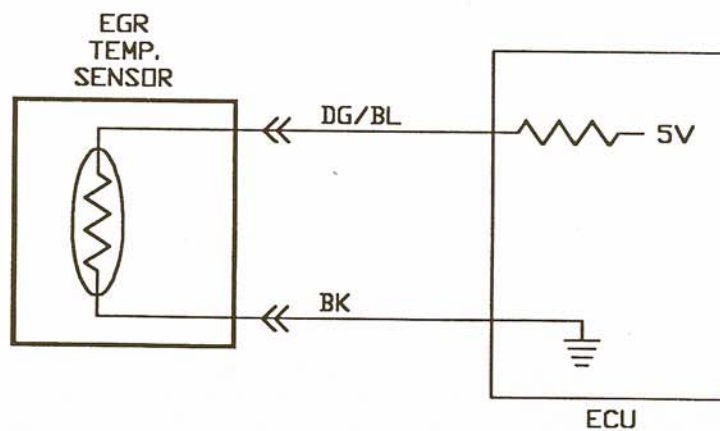
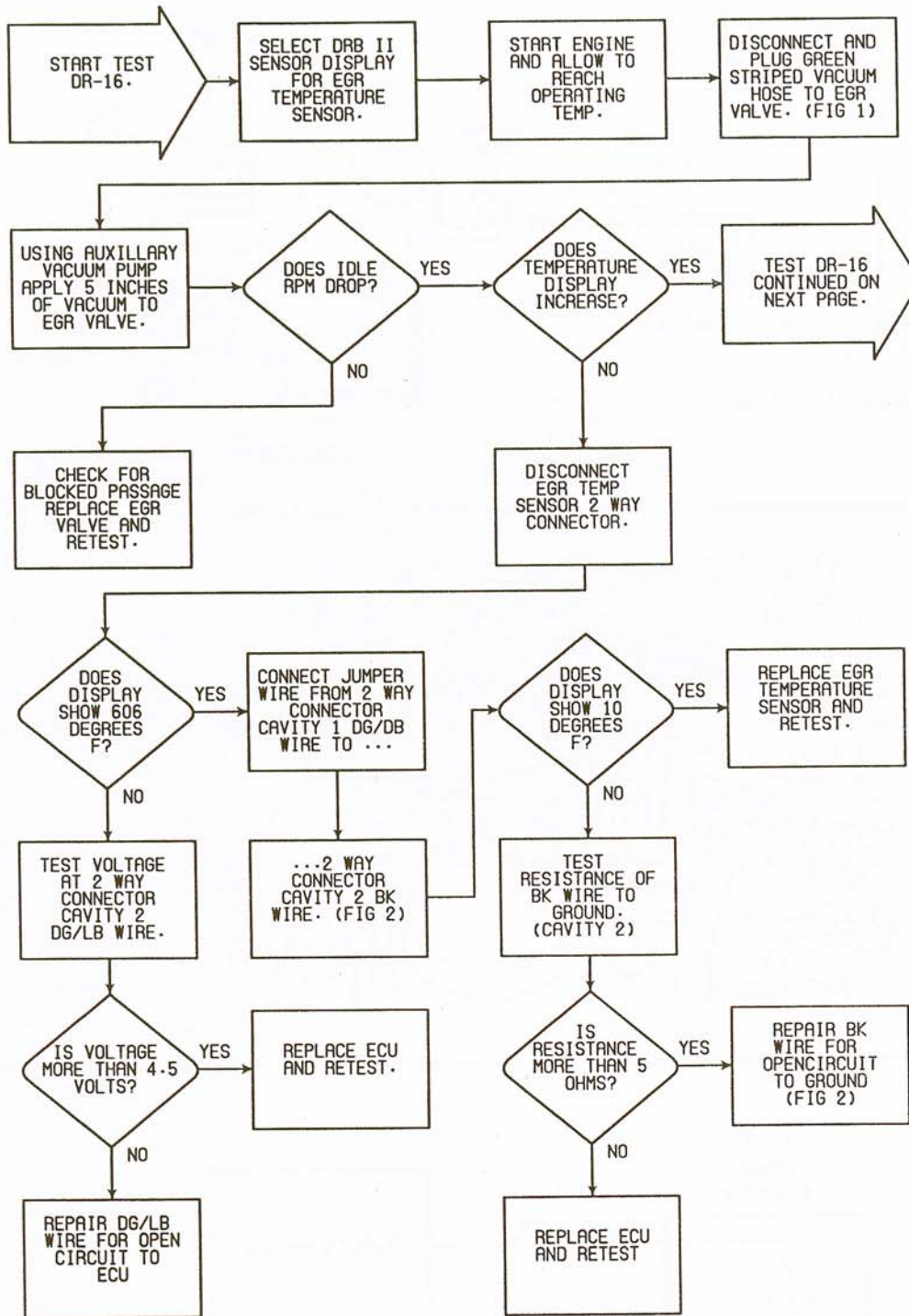


FIG. 2

TEST DR-16 TESTING EGR TEMPERATURE CIRCUIT - FAULT CODE 43

Perform TEST DR-1 Before Proceeding



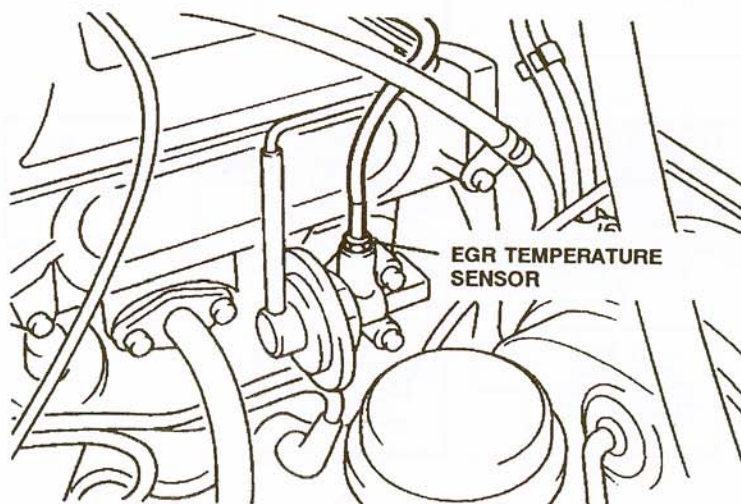
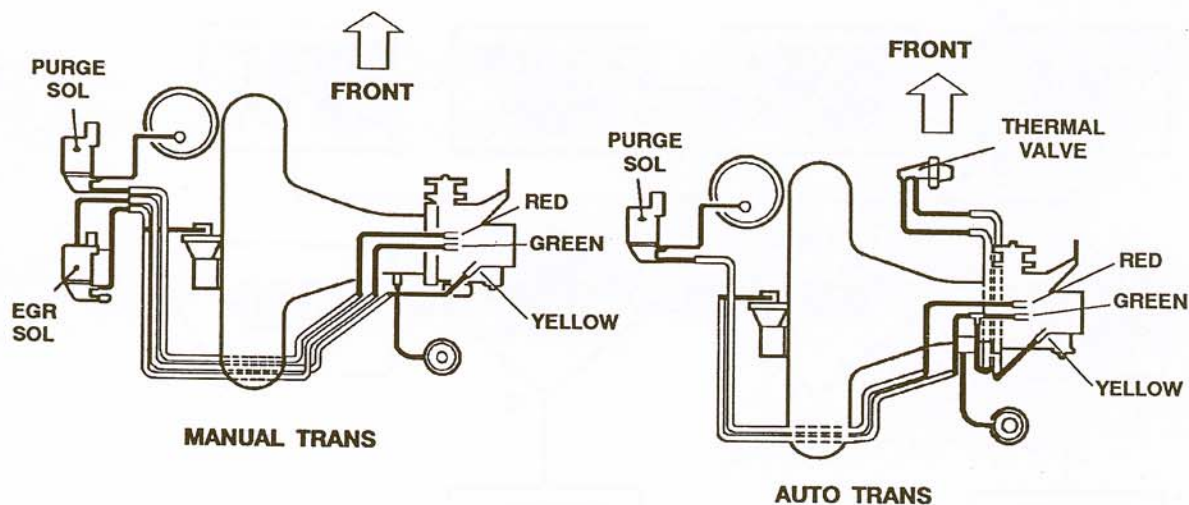


FIG. 1

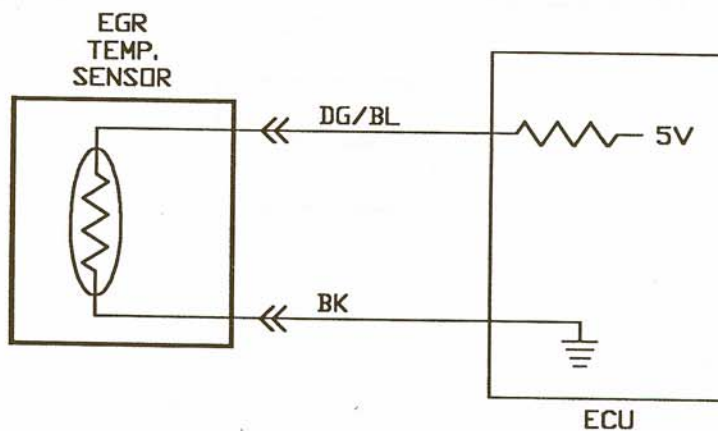
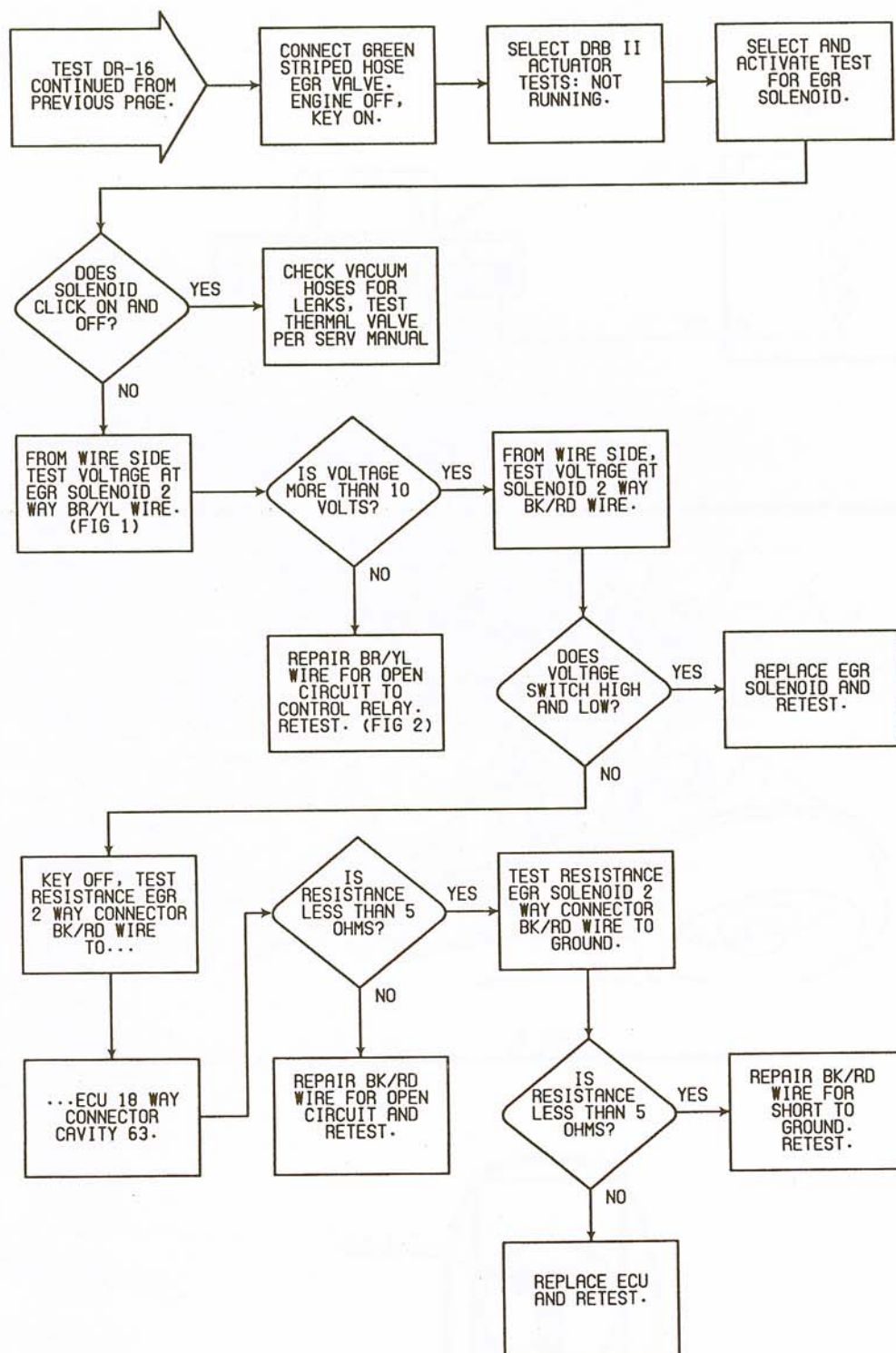


FIG. 2



TEST DR-17 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-1 Before Proceeding

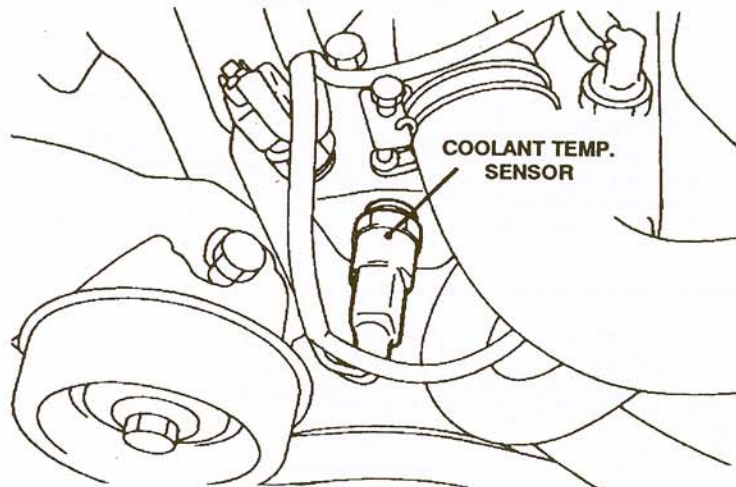
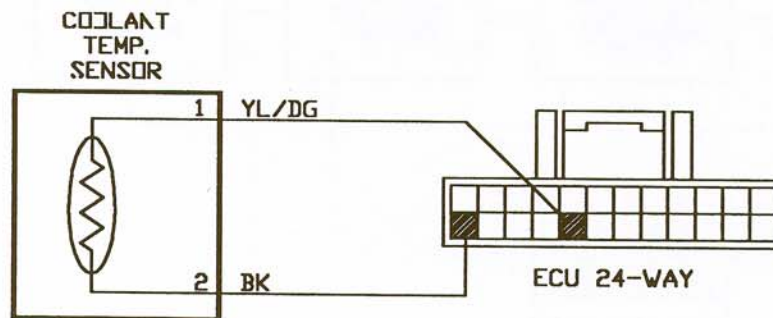


FIG. 1

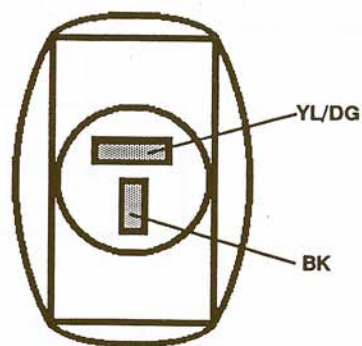
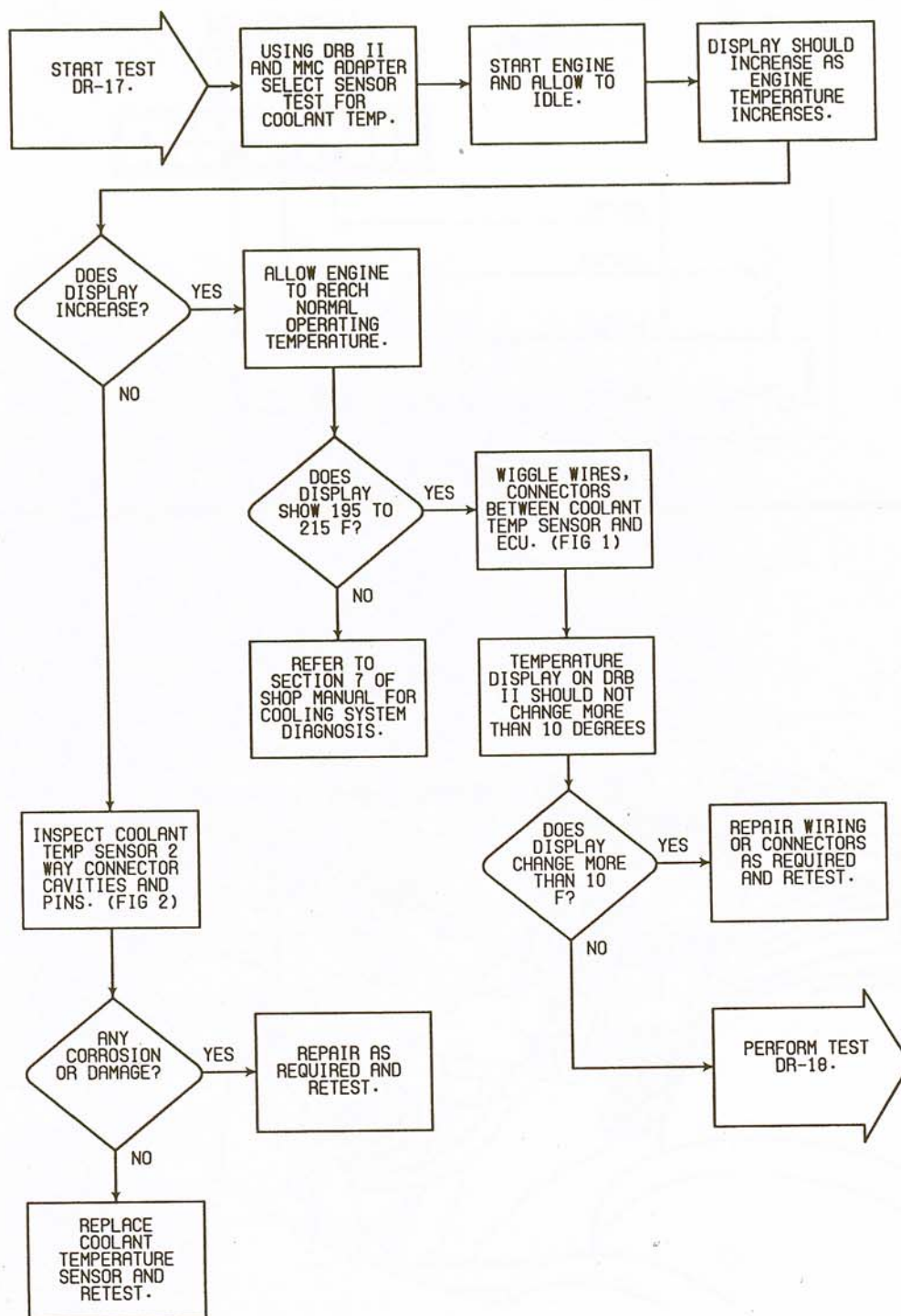


FIG. 2

TEST DR-17 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-1 Before Proceeding



TEST DR-18 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-1 Before Proceeding

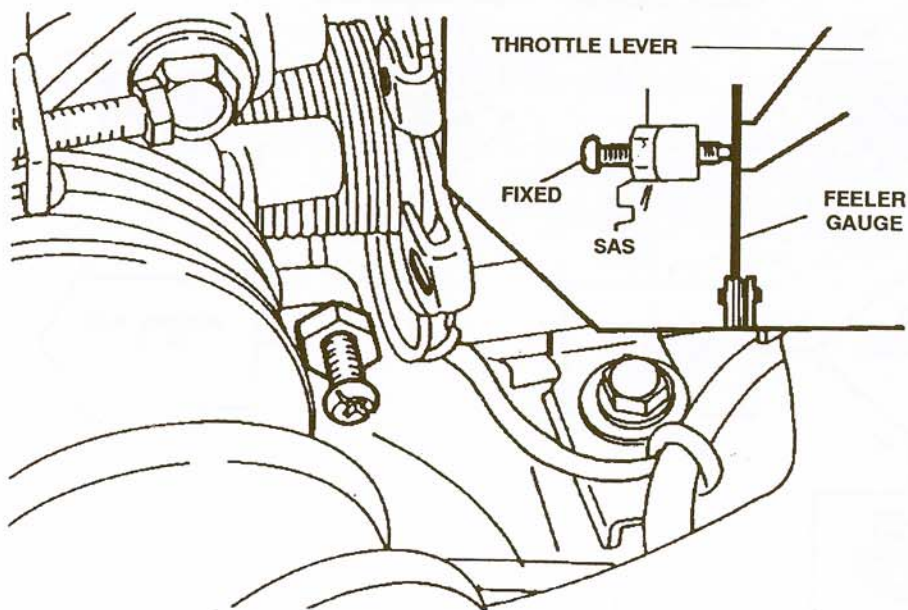
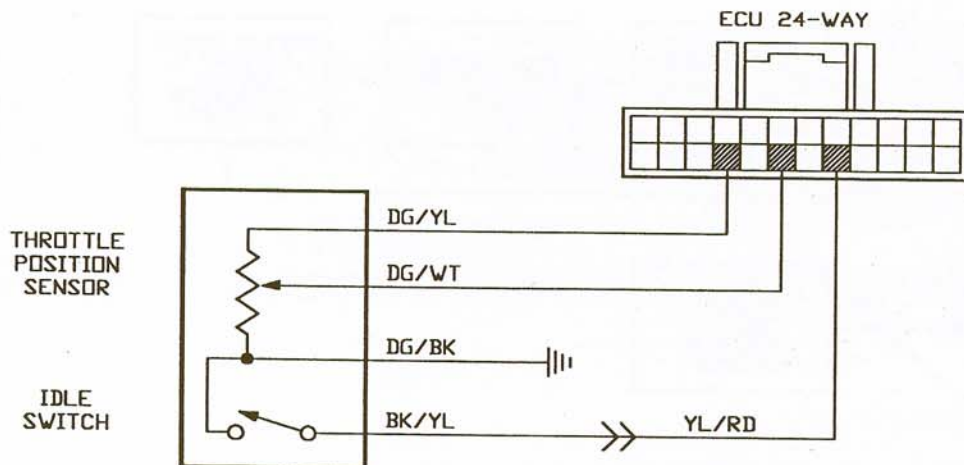
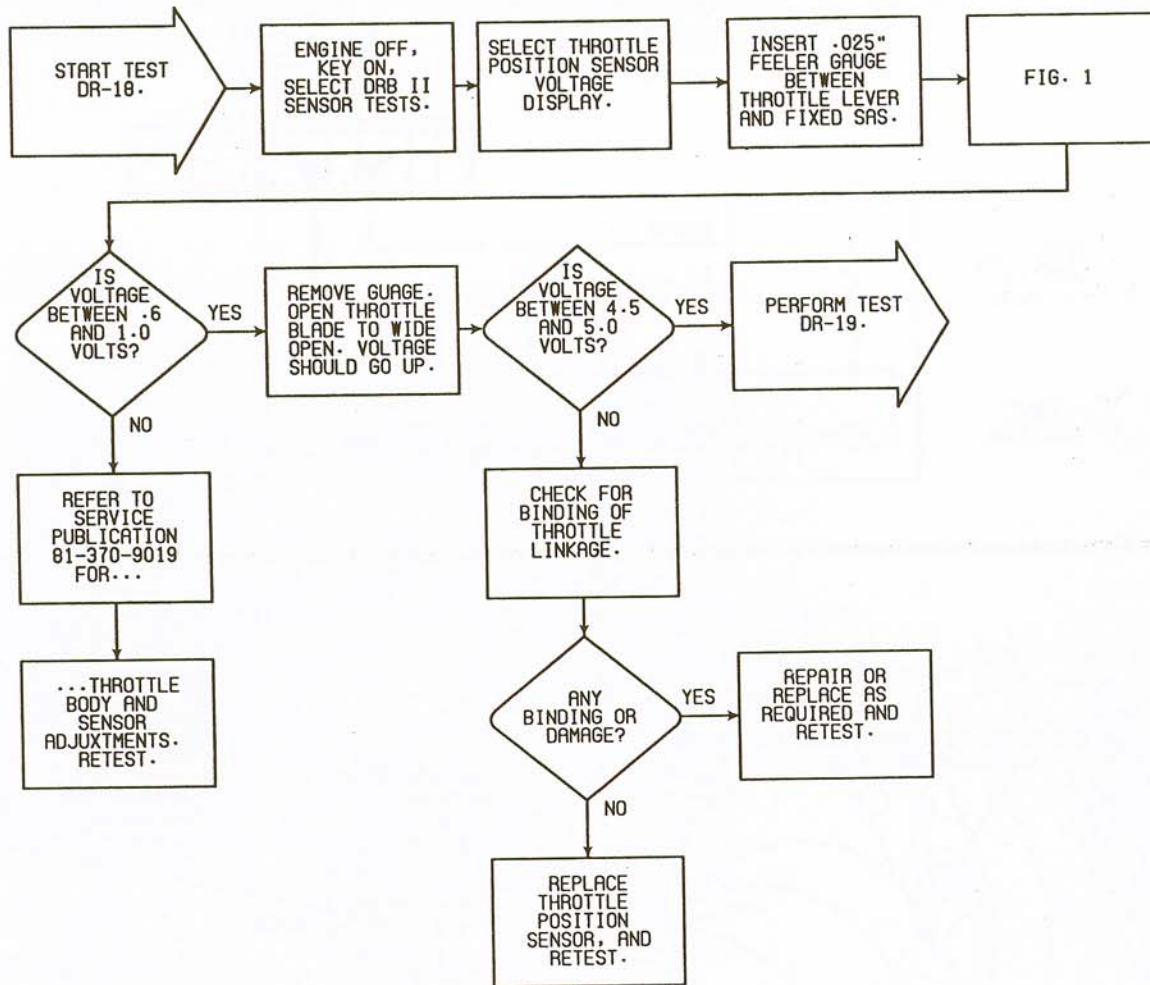


FIG. 1

TEST DR-18

PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-1 Before Proceeding



TEST DR-19 PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding

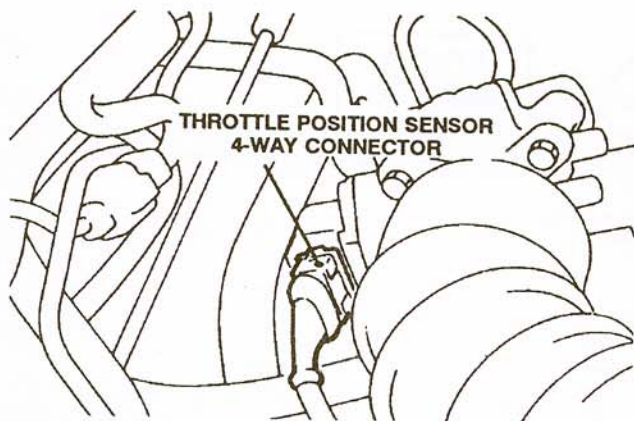
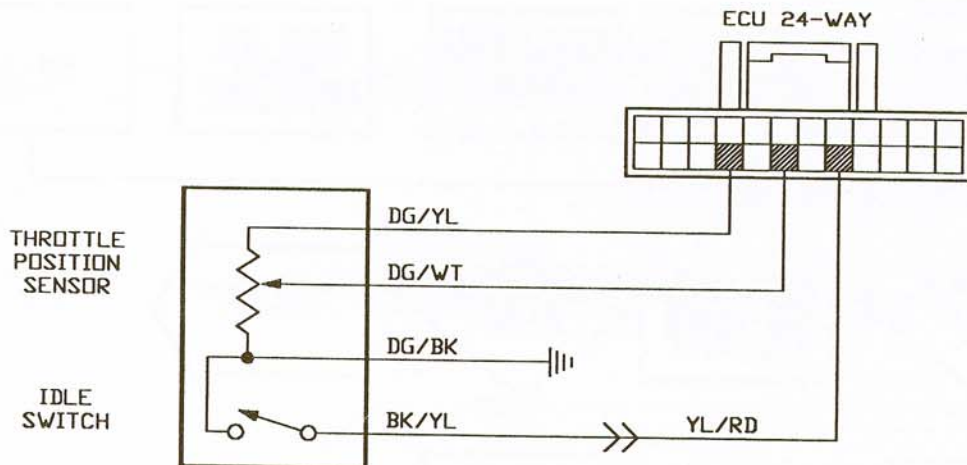


FIG. 1

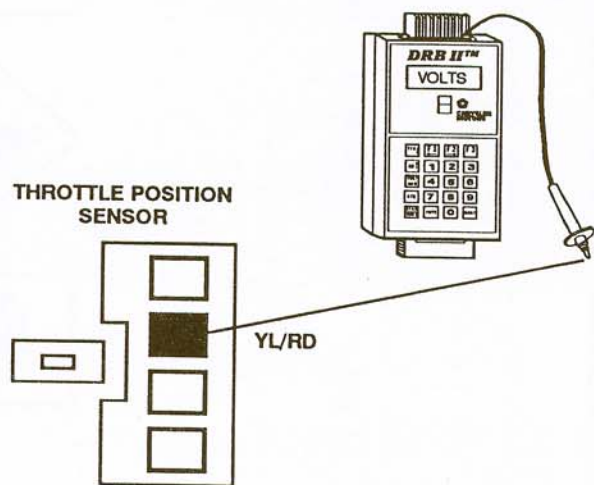


FIG. 2

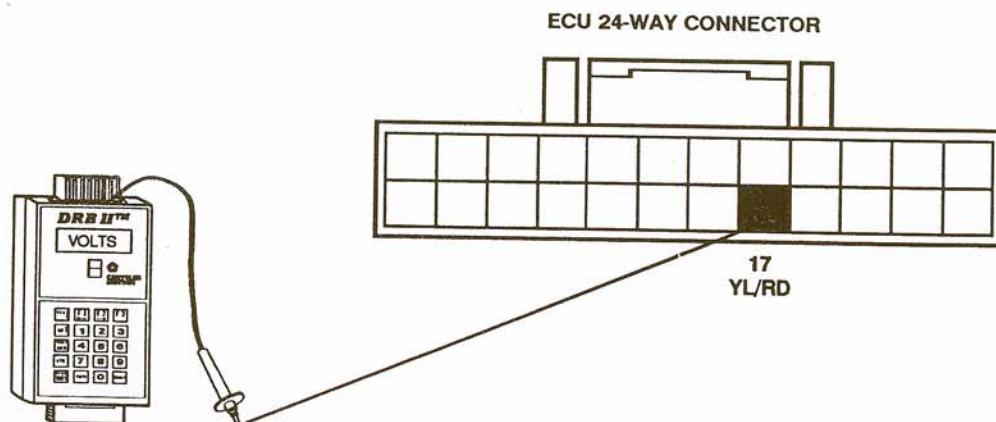
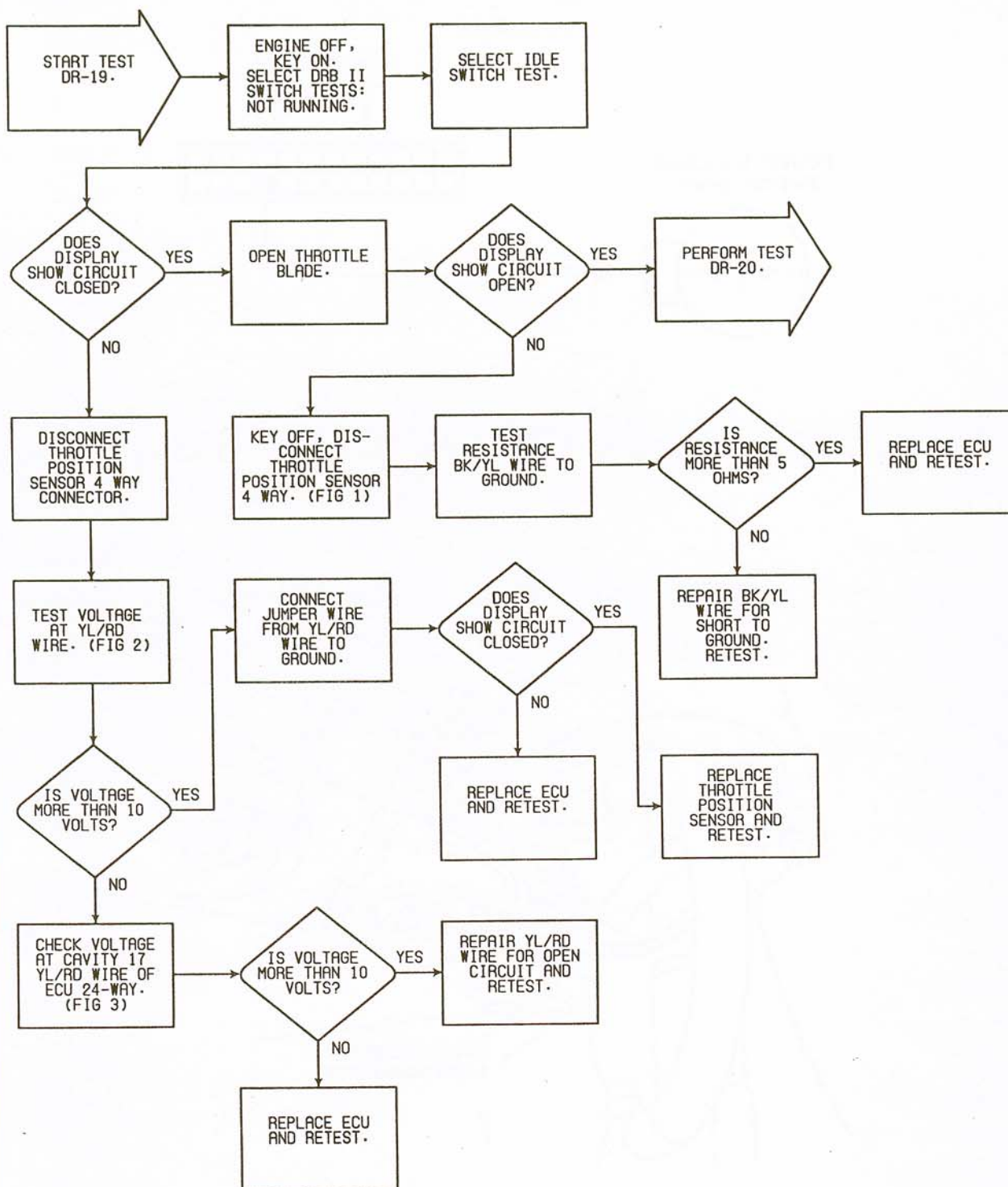


FIG. 3

TEST DR-19 PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding



TEST DR-20

PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST/
SWITCHES RUNNING TEST

Perform TEST DR-17 Before Proceeding

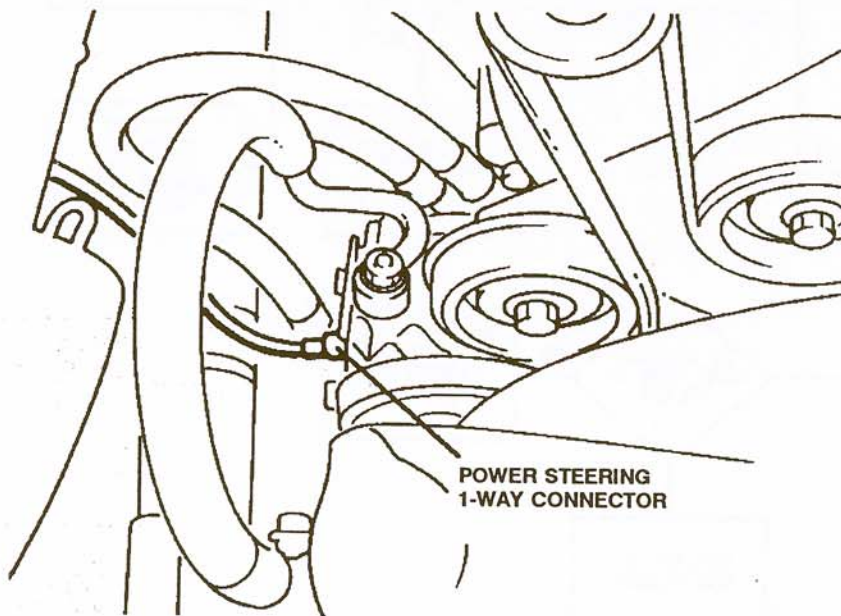
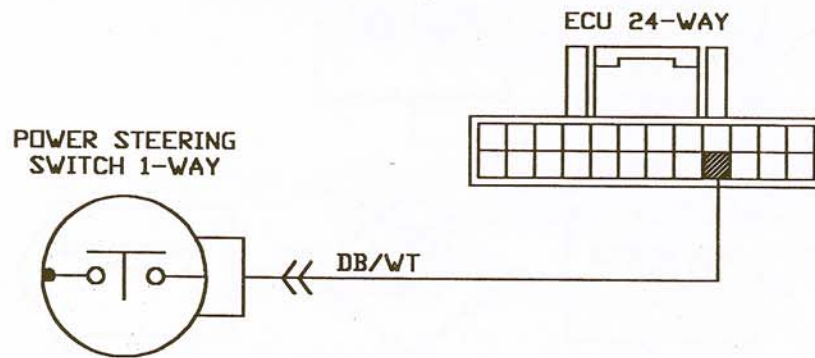
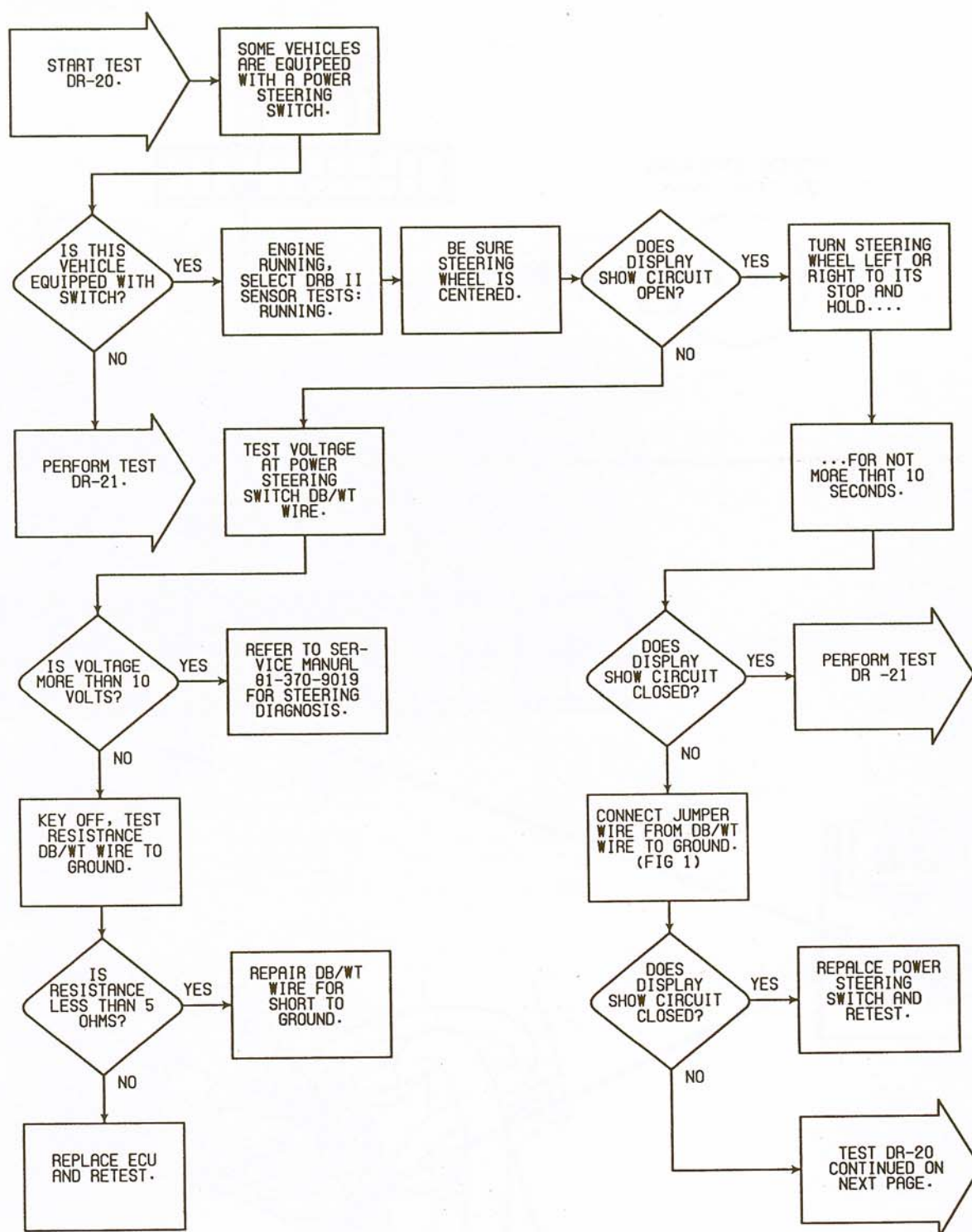


FIG. 1

TEST DR-20**PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST/
SWITCHES RUNNING TEST****Perform TEST DR-17 Before Proceeding**

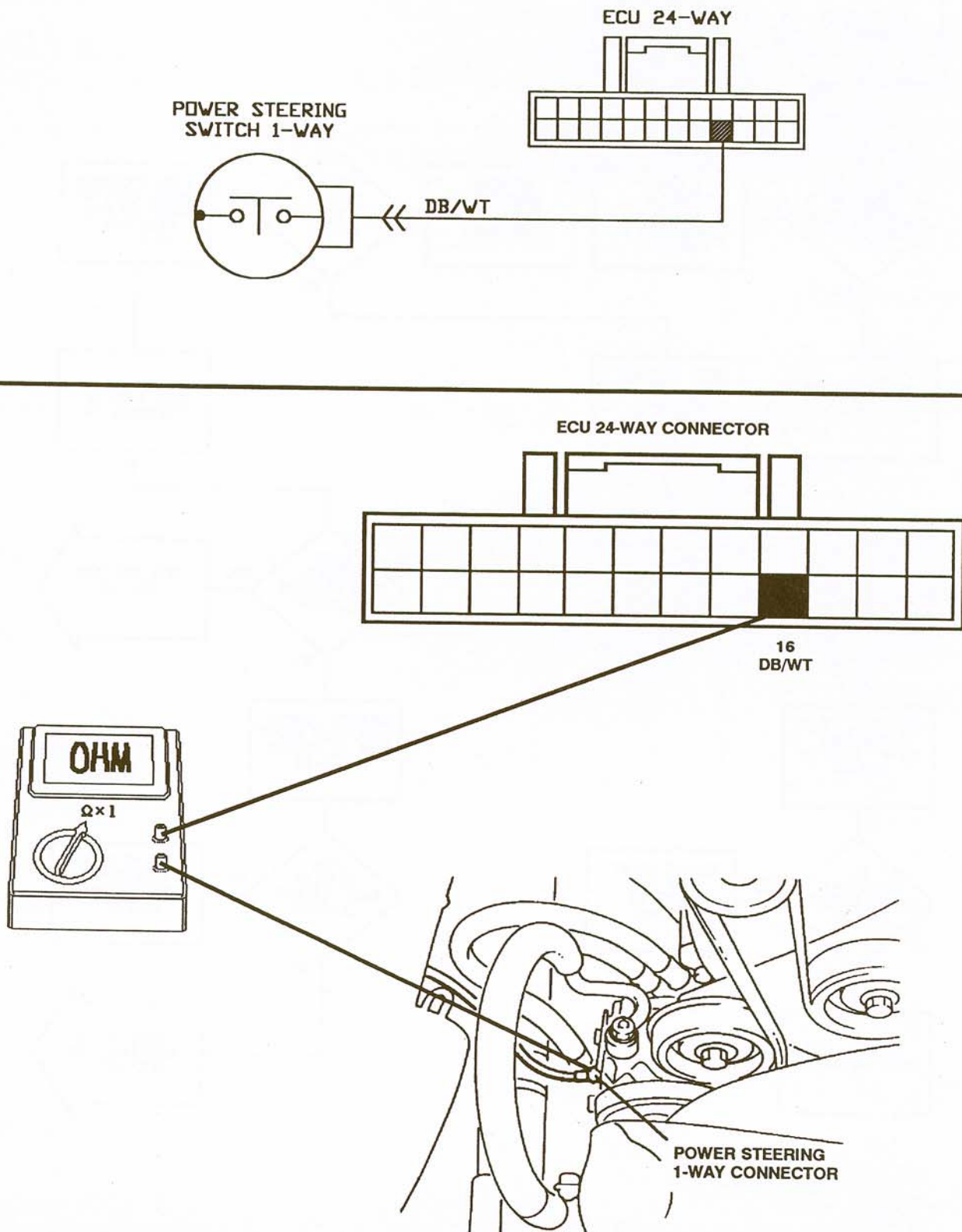
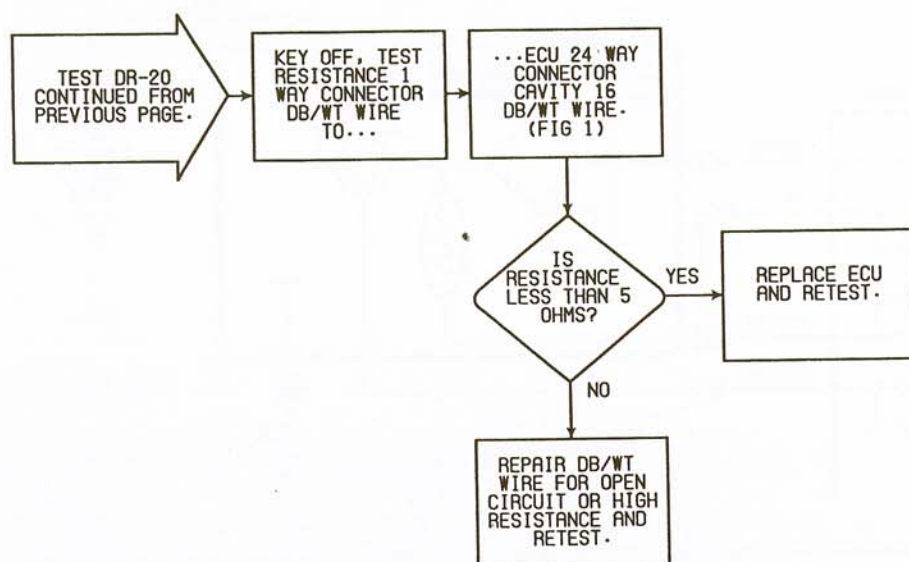


FIG. 1

TEST DR-20

CONTINUED - PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST/SWITCHES RUNNING TEST



TEST DR-21

PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding

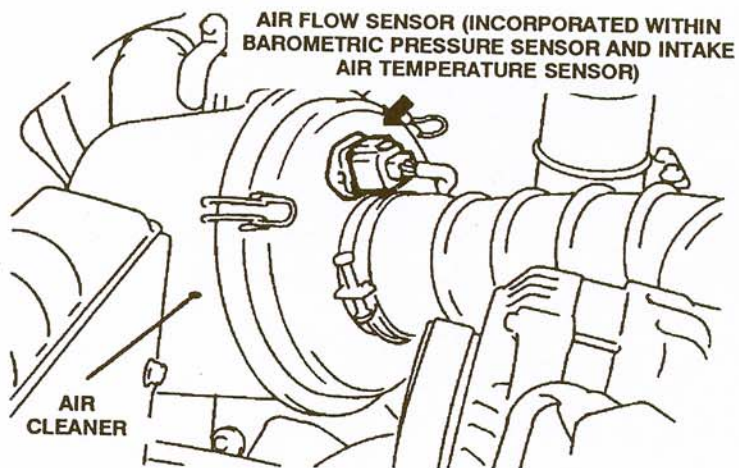
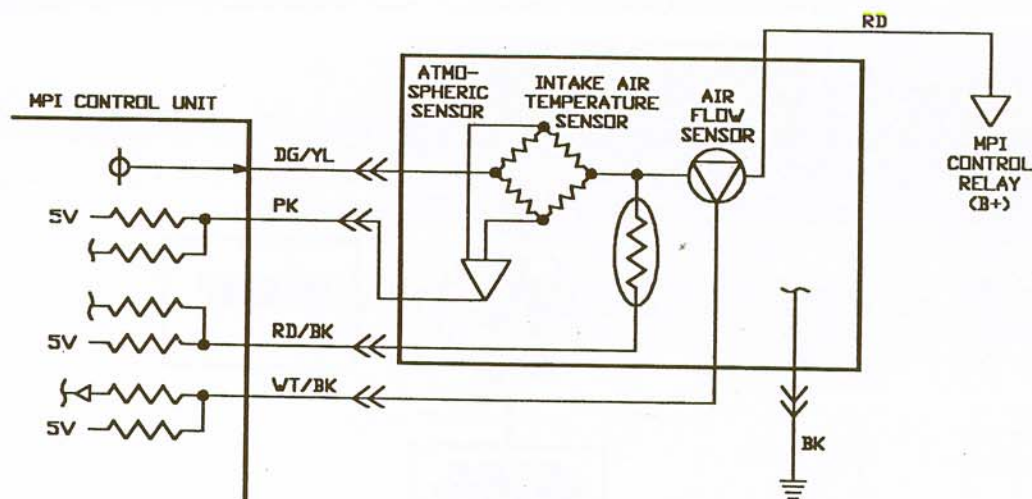
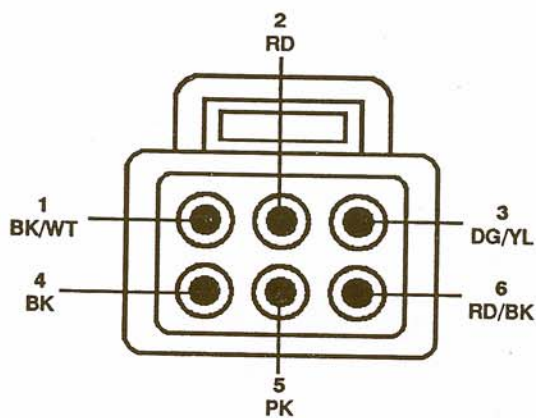


FIG. 1

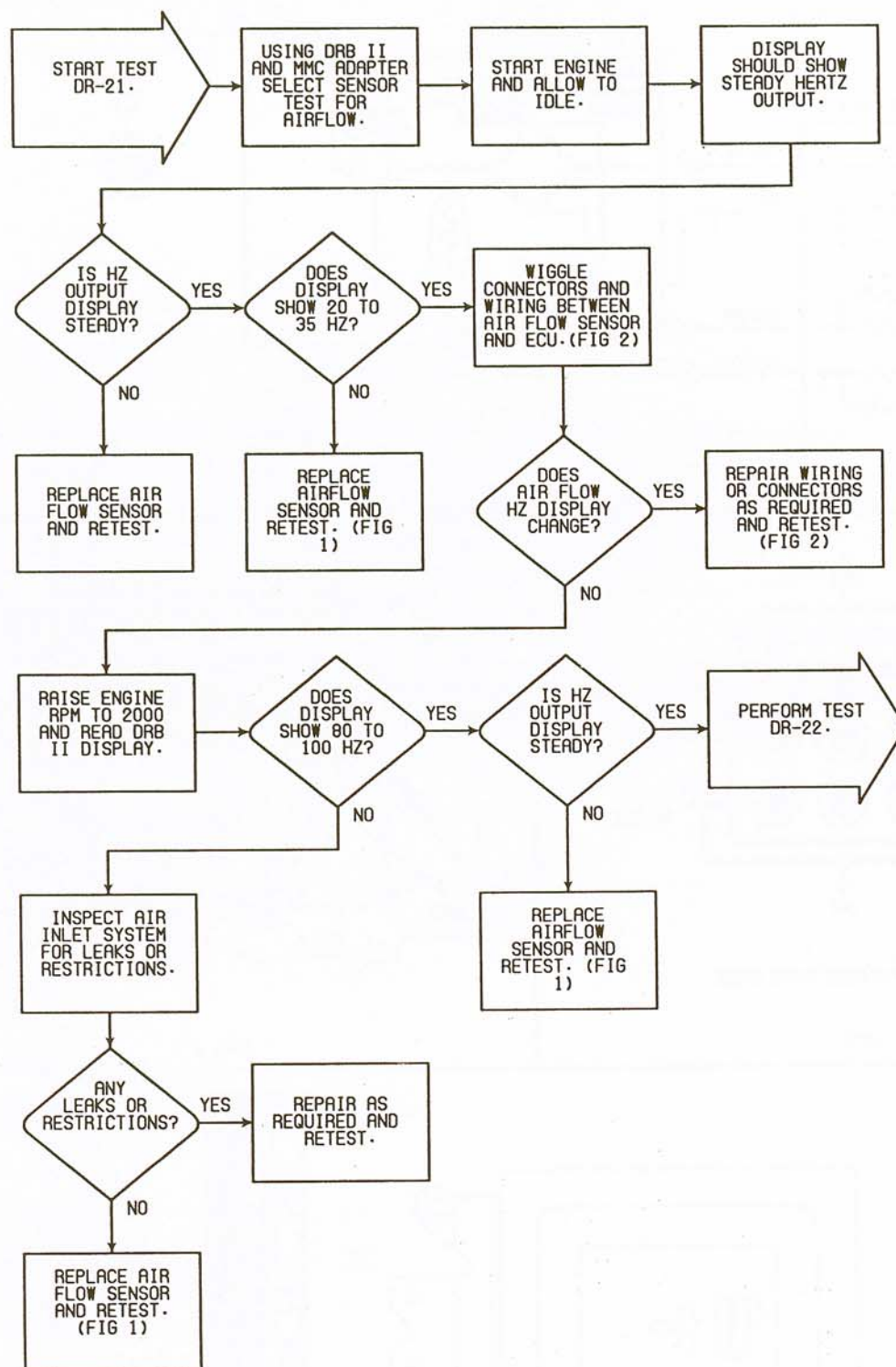


VIEWED FROM WIRE SIDE

FIG. 2

TEST DR-21 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding



TEST DR-22 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding

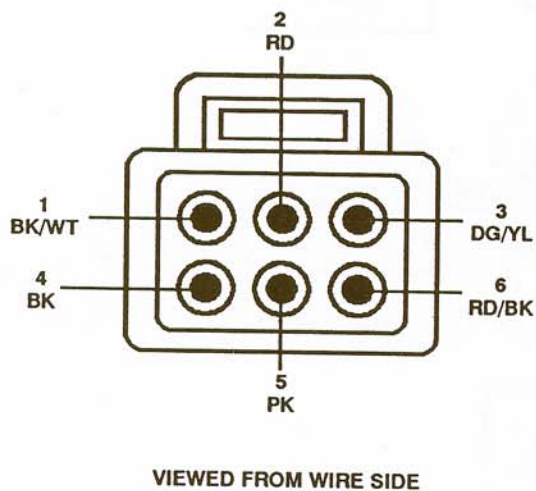
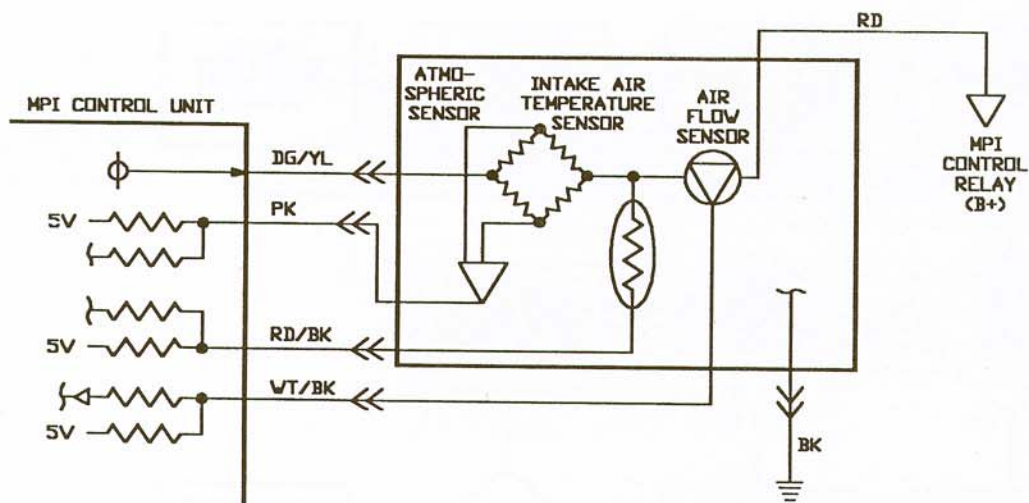


FIG. 1

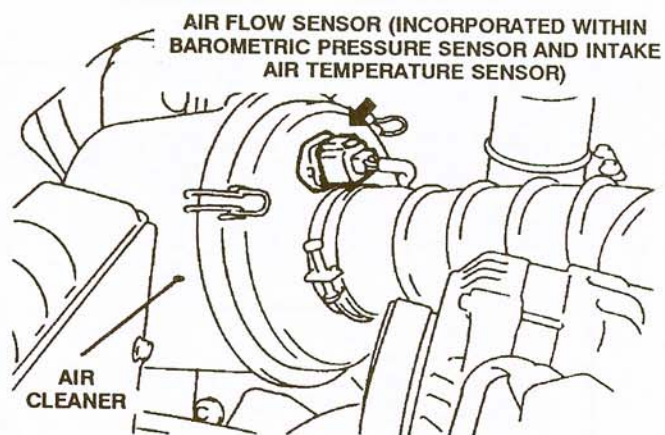
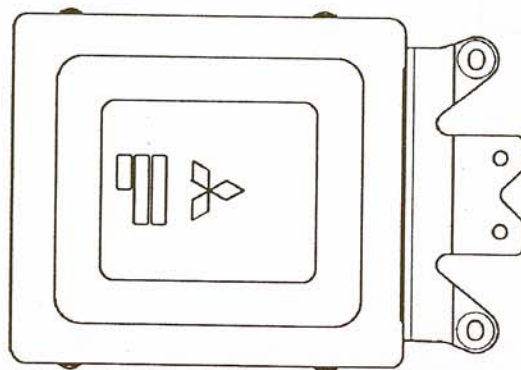


FIG. 2

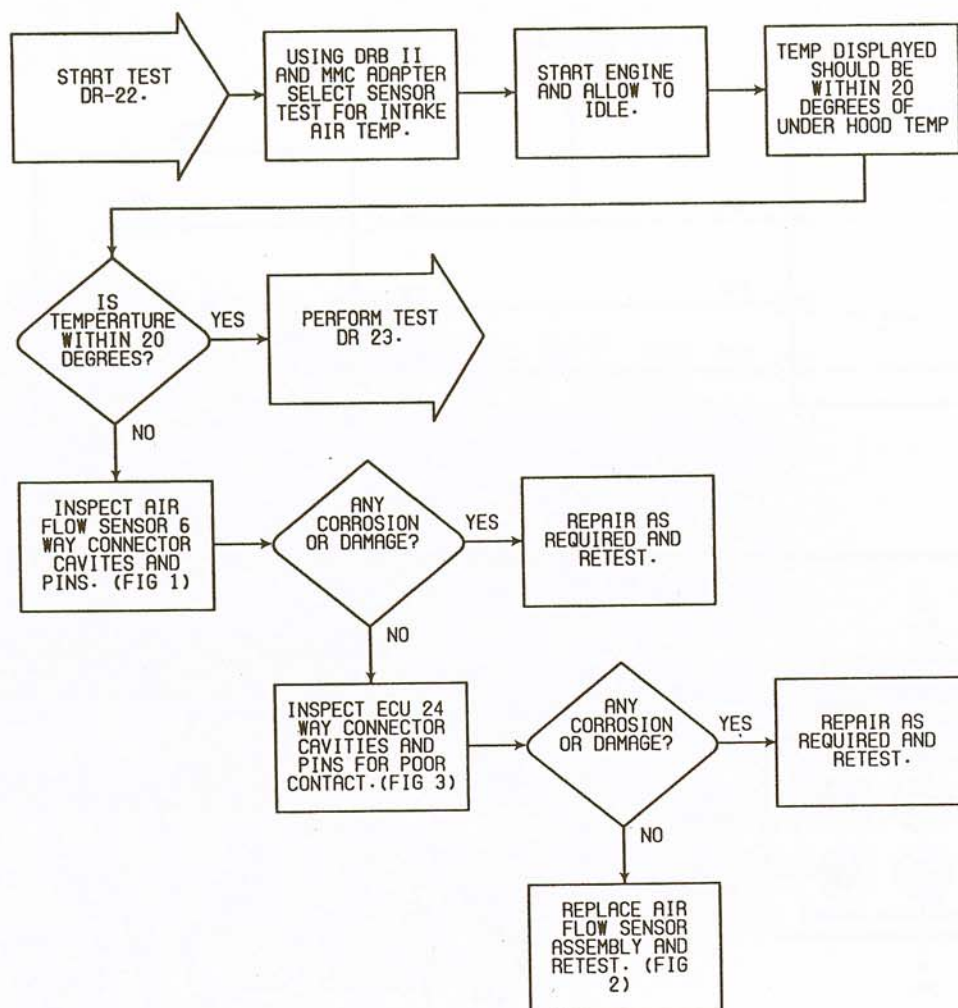


	12	24
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	53	62
	52	61
	51	60
	105	110
	104	109
	103	108
	102	107
	101	106

FIG. 3

TEST DR-22 PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding



TEST DR-23

PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding

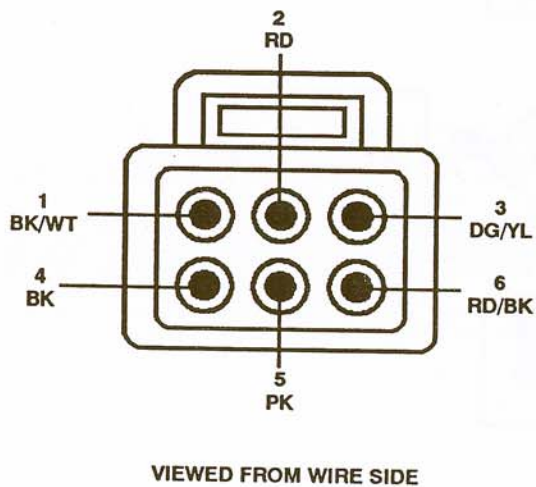
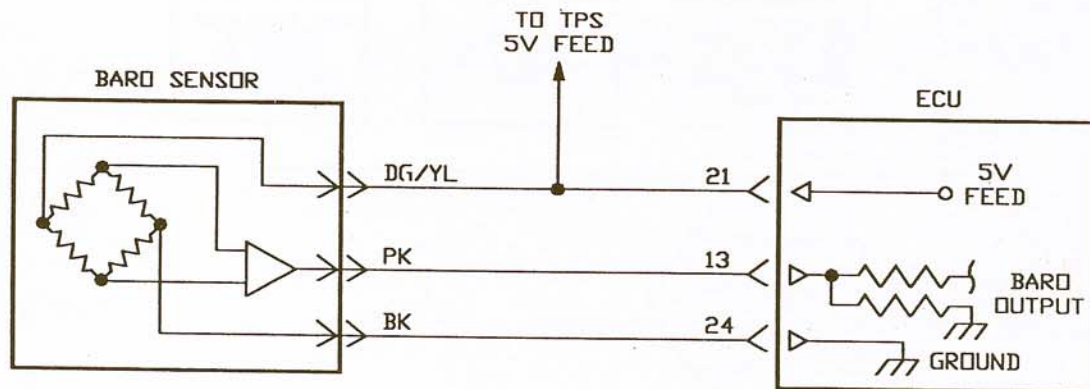


FIG. 1

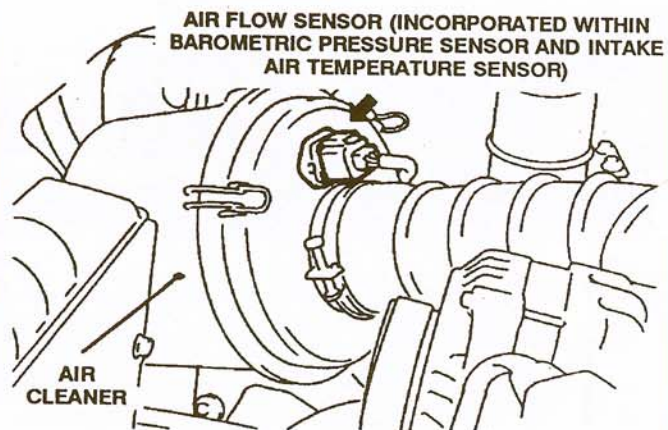
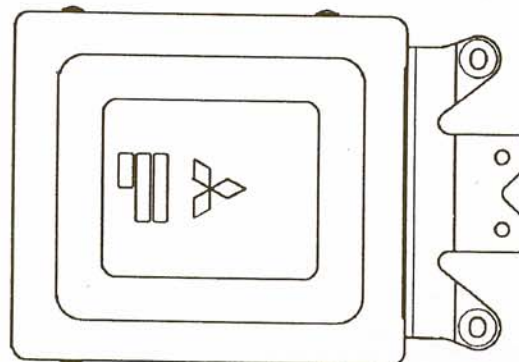


FIG. 2



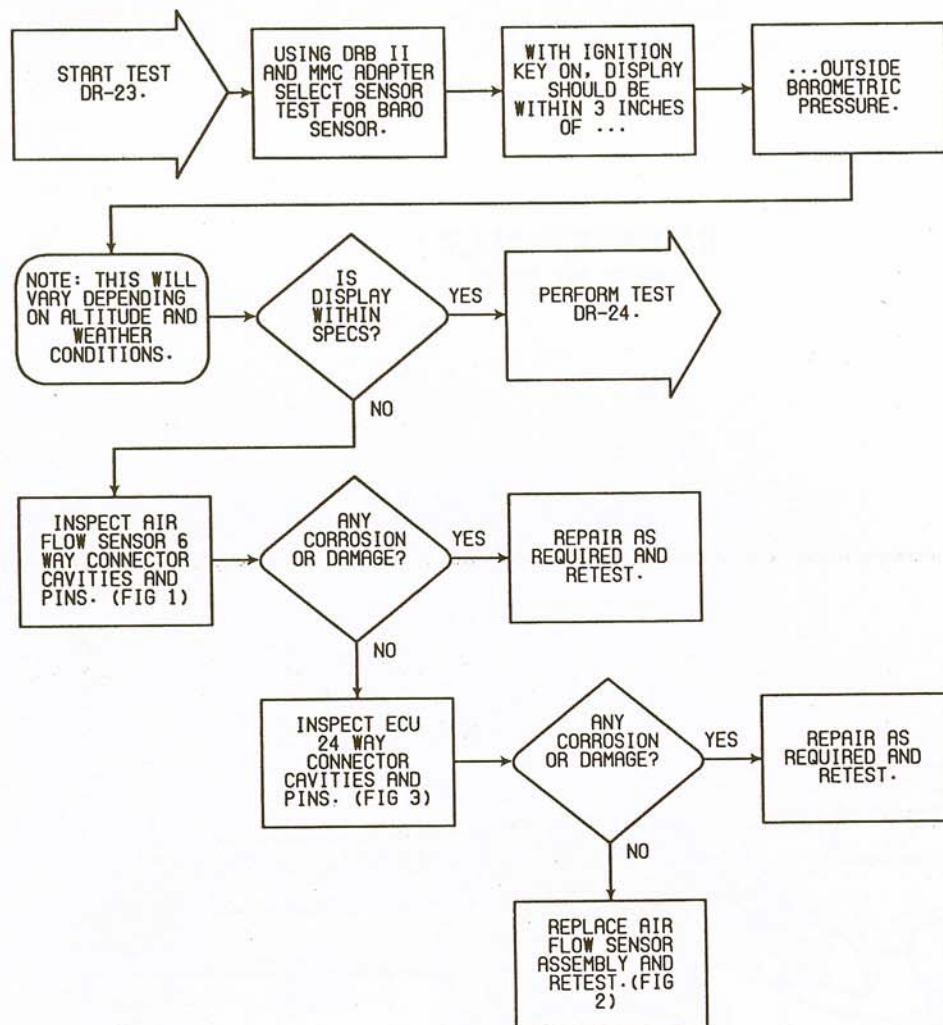
12	24
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2	14
1	13
59	68
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53	62
52	61
51	60
105	110
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103	108
102	107
101	106

FIG. 3

TEST DR-23

PERFORMING NO FAULT CODE TEST - DRBII SENSOR TEST

Perform TEST DR-17 Before Proceeding



TEST DR-24

PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding

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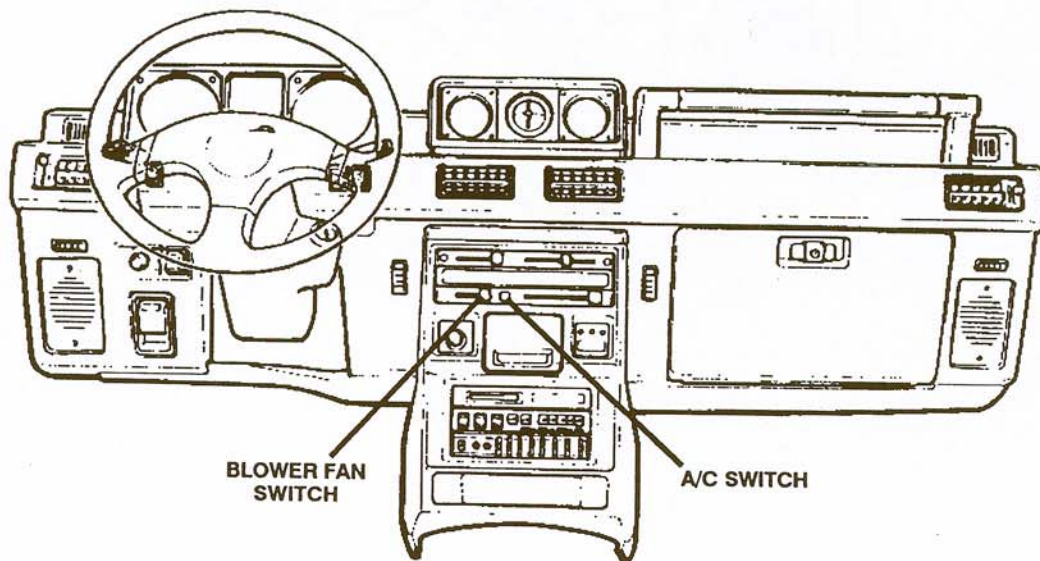
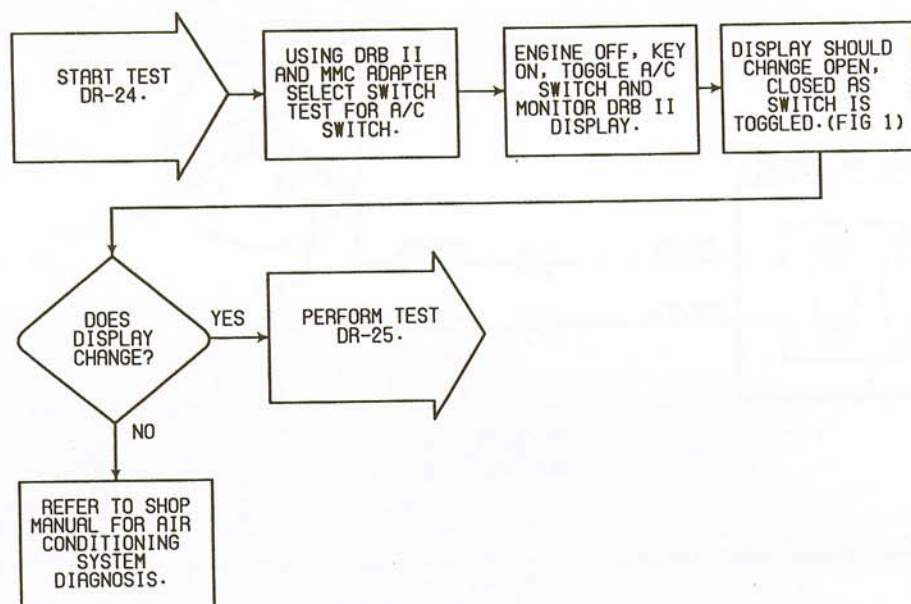


FIG. 1

TEST DR-24 **PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST****Perform TEST DR-17 Before Proceeding**

TEST DR-25

PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding

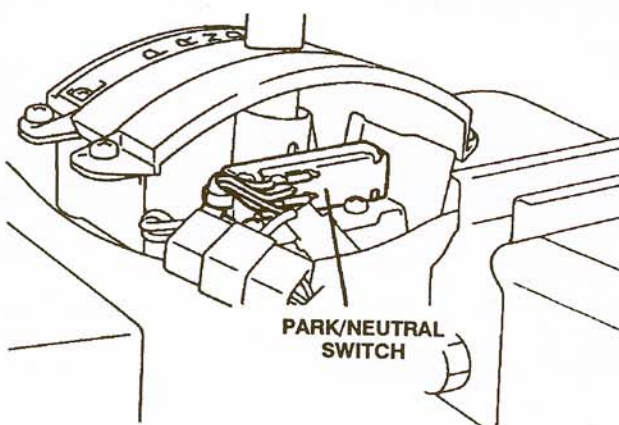
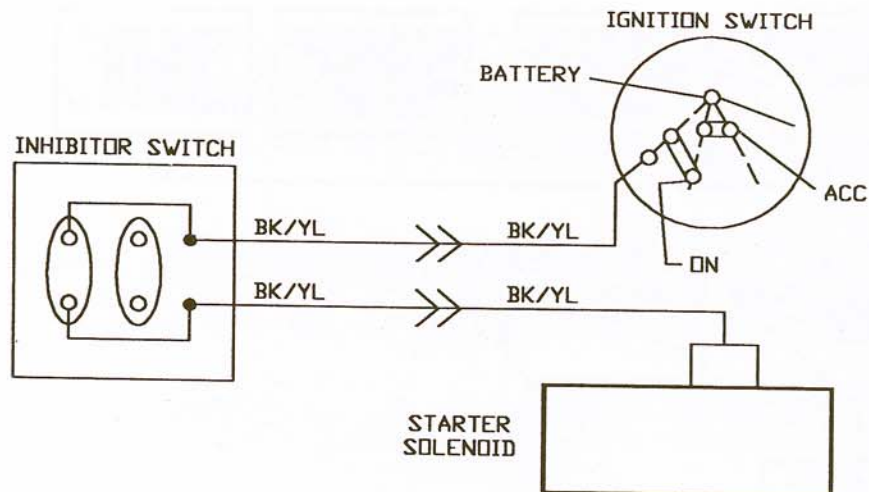


FIG. 1

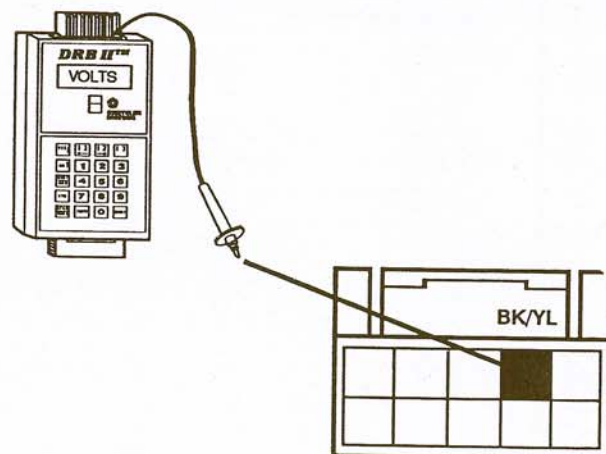


FIG. 2

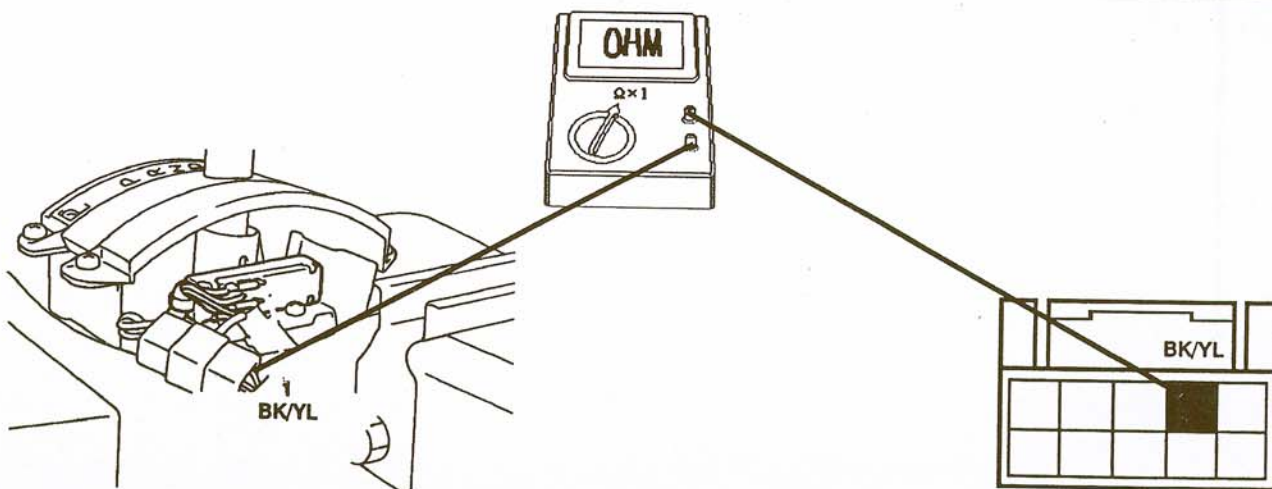
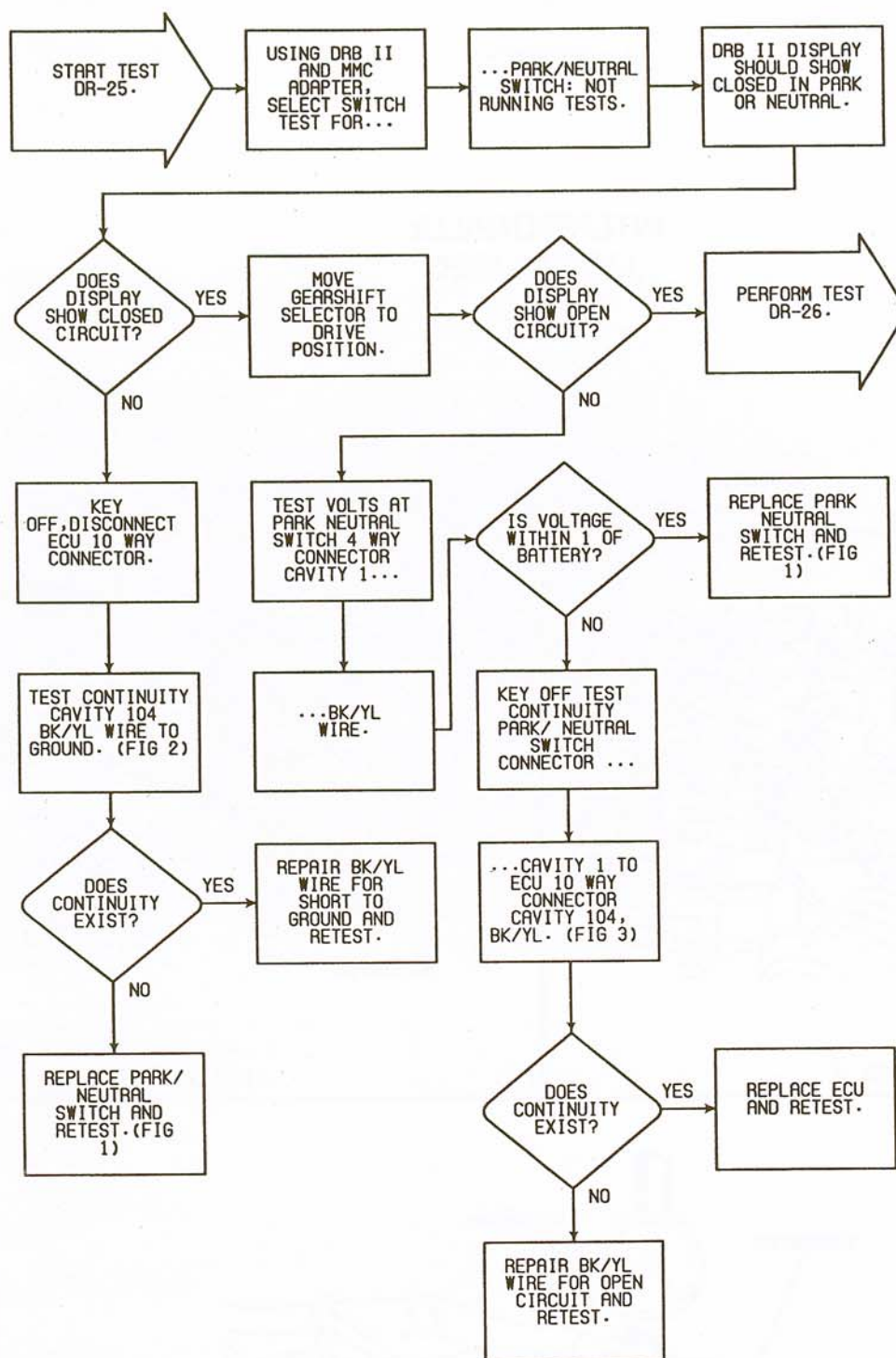


FIG. 3

ECU 10-WAY CONNECTOR

TEST DR-25 PERFORMING NO FAULT CODE TEST - DRBII SWITCHES NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding



TEST DR-26 CHECKING FUEL PUMP OPERATION

Perform TEST DR-17 Before Proceeding

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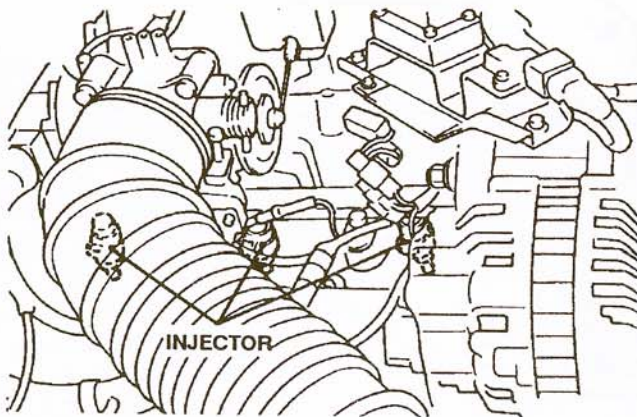


FIG. 1

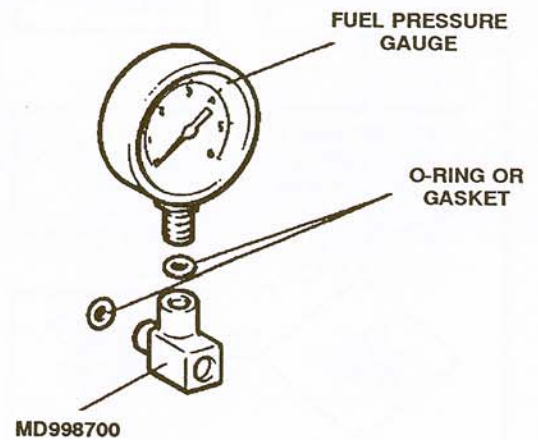


FIG. 2

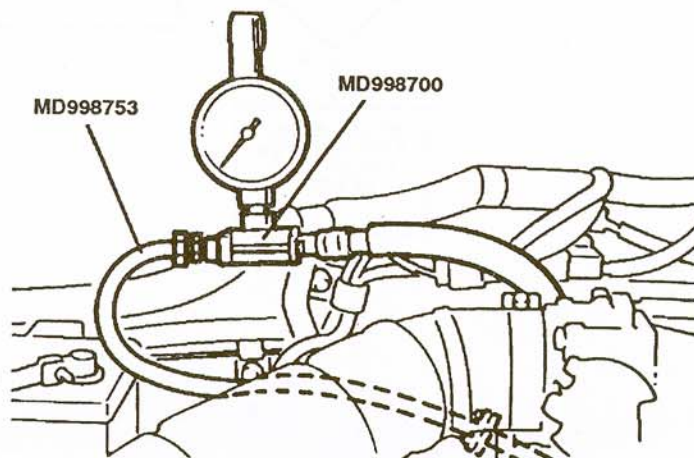
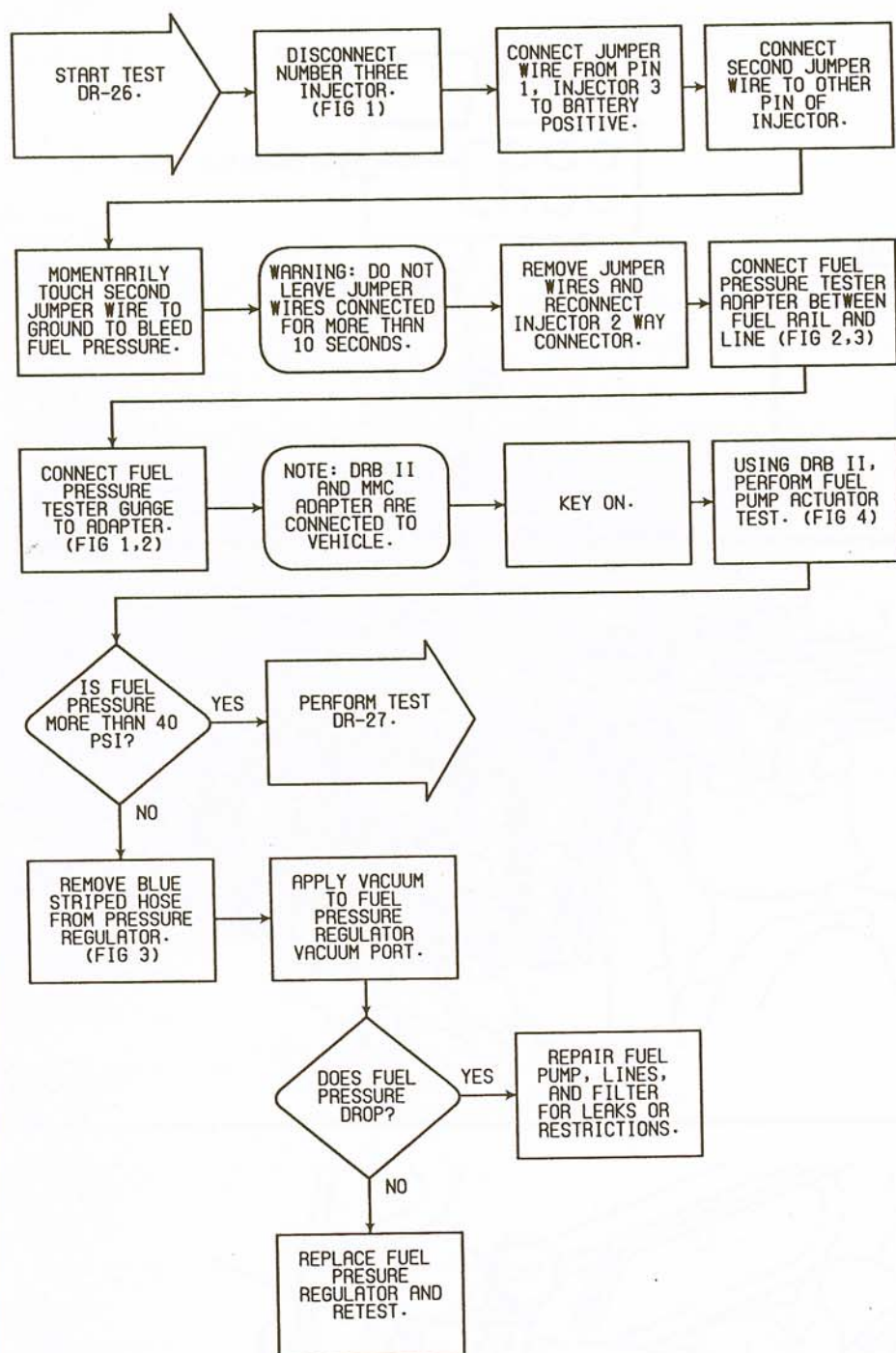


FIG. 3

TEST DR-26 CHECKING FUEL PUMP OPERATION

Perform TEST DR-17 Before Proceeding



TEST DR-27 CHECKING EGR VALVE CIRCUIT (MANUAL TRANS. ONLY)

Perform TEST DR-17 Before Proceeding

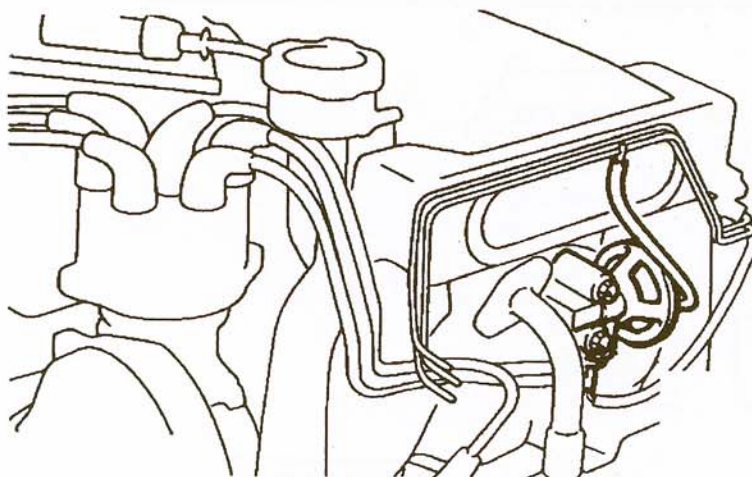
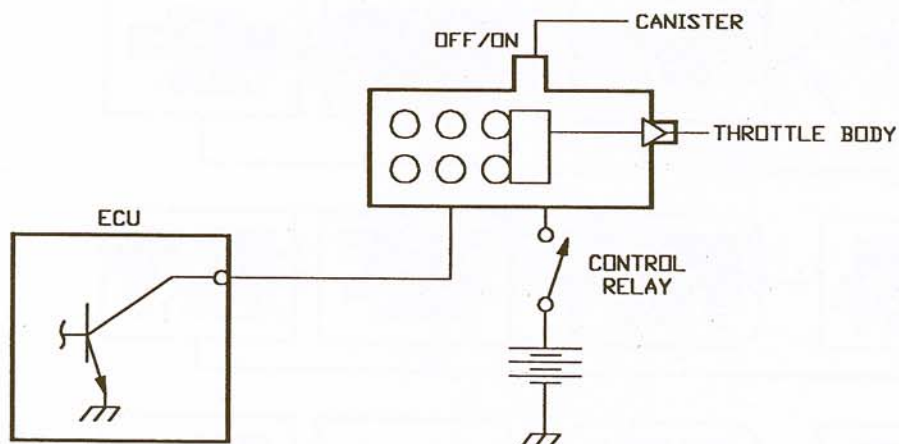


FIG. 1

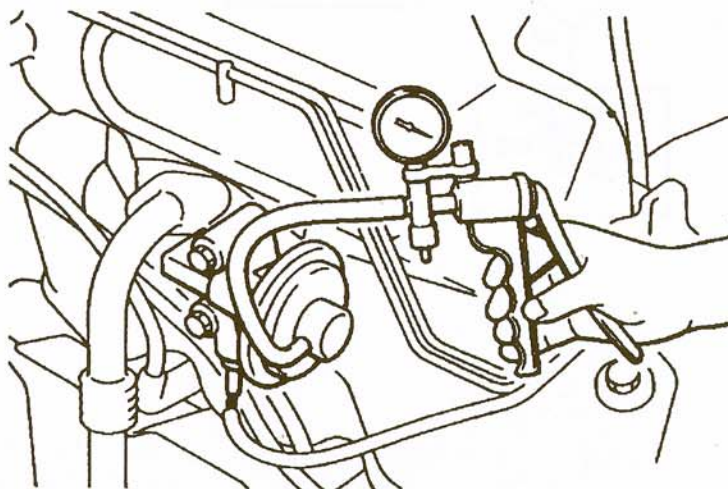
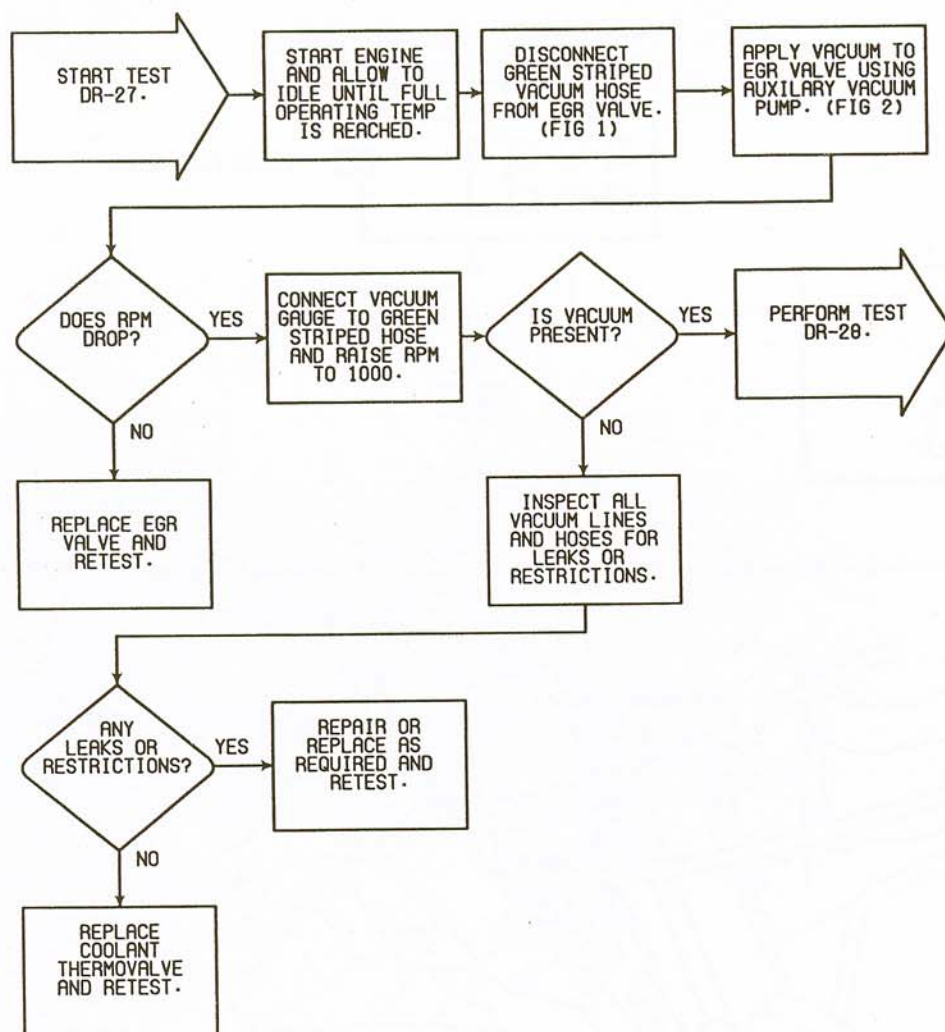


FIG. 2

TEST DR-27 CHECKING EGR VALVE CIRCUIT (MANUAL TRANS. ONLY)

Perform TEST DR-17 Before Proceeding



TEST DR-28 PERFORMING NO FAULT CODE TEST - DRBII ATM NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding

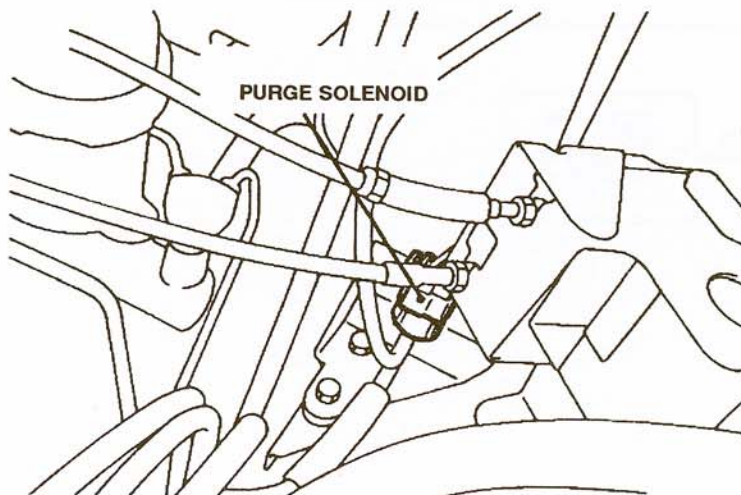
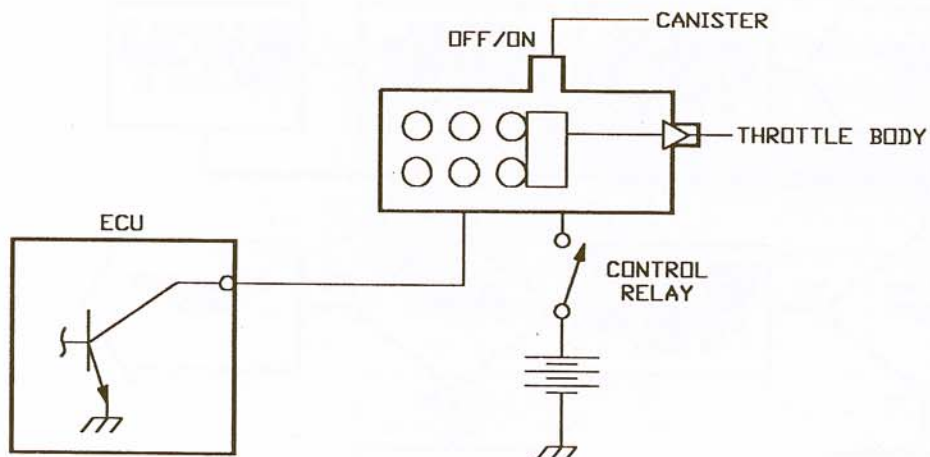


FIG. 1

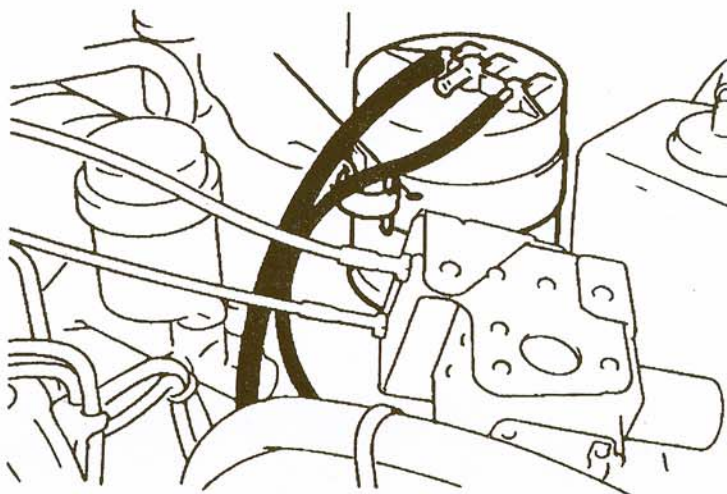
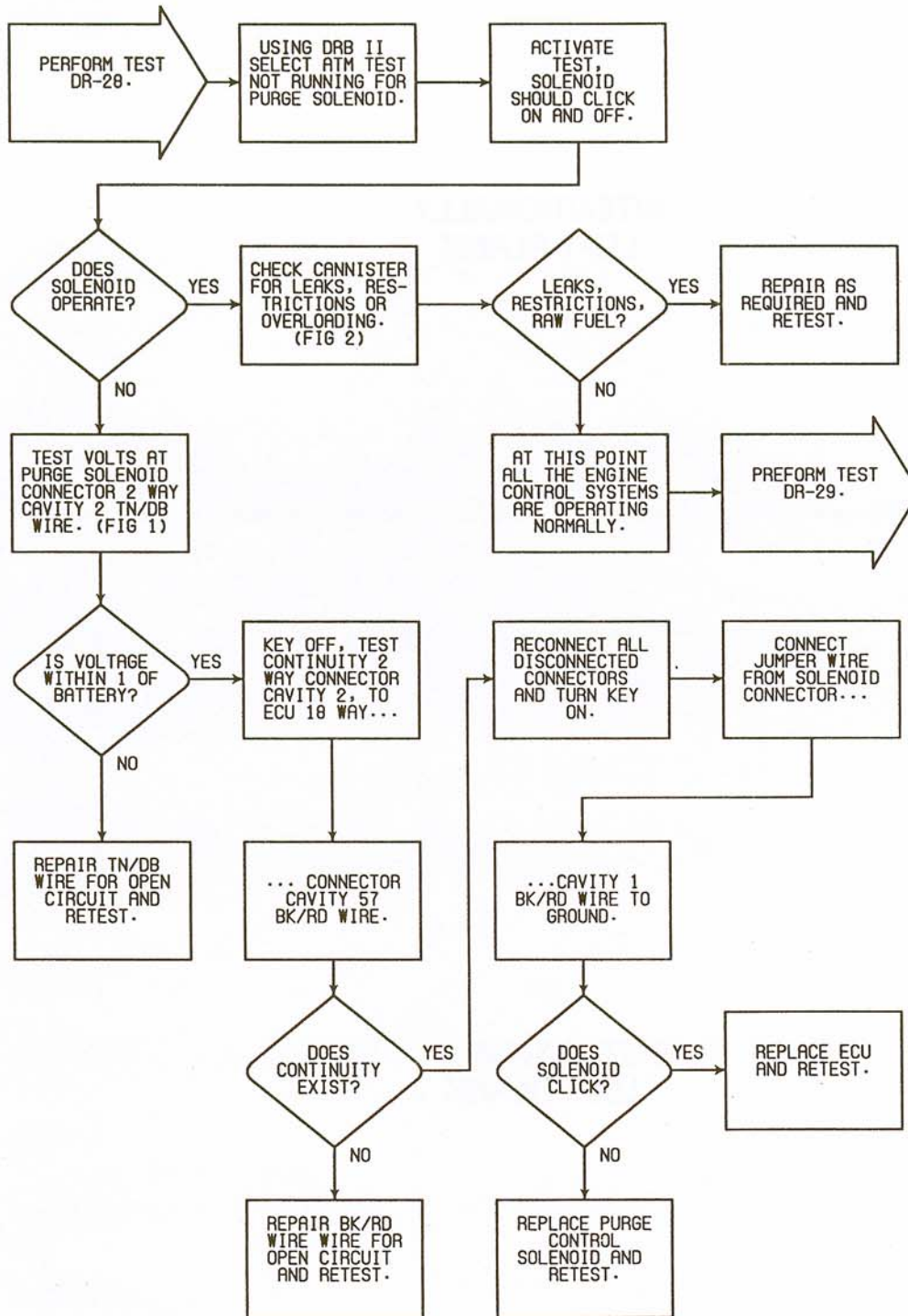


FIG. 2

TEST DR-28

PERFORMING NO FAULT CODE TEST - DRBII ATM NOT RUNNING TEST

Perform TEST DR-17 Before Proceeding



TEST DR-29

PERFORMING NO FAULT CODE MECHANICAL TEST

Perform TEST DR-17 Before Proceeding

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TEST DR-29 **PERFORMING NO FAULT CODE MECHANICAL TEST**

Perform TEST DR-17 Before Proceeding

AT THIS POINT IN THE DRIVEABILITY TEST PROCEDURE YOU HAVE DETERMINED THAT ALL OF THE ENGINE CONTROL SYSTEM ARE OPERATING AS THEY WERE DESIGNED TO. THEREFORE, THEY ARE **NOT THE CAUSE OF THE DRIVEABILITY PROBLEM.**

THE FOLLOWING ADDITIONAL ITEMS SHOULD BE CHECKED AS POSSIBLE CAUSES:

1. **ENGINE VACUUM** - MUST BE AT LEAST 13 INCHES IN NEUTRAL.
2. **ENGINE VALVE TIMING** - TO SPECIFICATIONS.
3. **ENGINE COMPRESSION** - TO SPECIFICATIONS.
4. **ENGINE EXHAUST SYSTEM** - MUST BE FREE OF ANY RESTRICTIONS.
5. **ENGINE PCV SYSTEM** - MUST FLOW FREELY.
6. **ENGINE DRIVE SPROCKETS** - CAM AND CRANK SHAFT.
7. **TORQUE CONVERTER STALL SPEED** - TO SPECIFICATIONS.
8. **POWER BRAKE BOOSTER** - NO INTERNAL VACUUM LEAKS.
9. **FUEL CONTAMINATION** - HIGH ALCOHOL AND WATER CONTENT.
10. **FUEL INJECTORS** - ROUGH IDLE MAY BE CAUSED BY INJECTOR CONTROL WIRE NOT CONNECTED TO CORRECT INJECTOR.
11. **TECHNICAL SERVICE BULLETINS** - ANY THAT MAY APPLY TO VEHICLE.
12. **ENGINE SECONDARY IGNITION CHECK** - ANY ABNORMAL SCOPE PATTERN.

ANY ONE OR MORE OF THESE ITEMS CAN GIVE A DRIVEABILITY RELATED PROBLEM. THEY CANNOT BE OVERLOOKED AS POSSIBLE CAUSES.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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