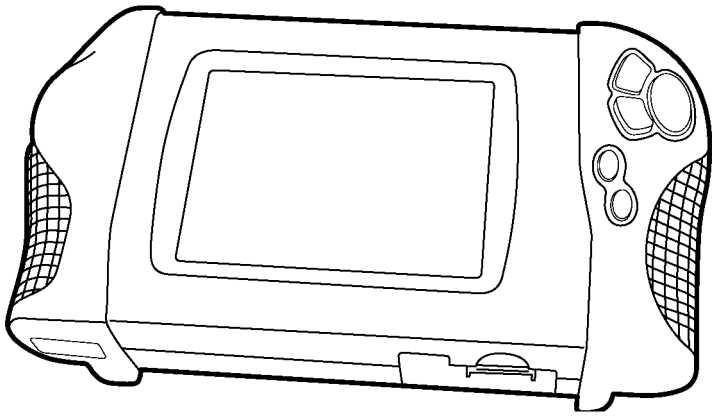
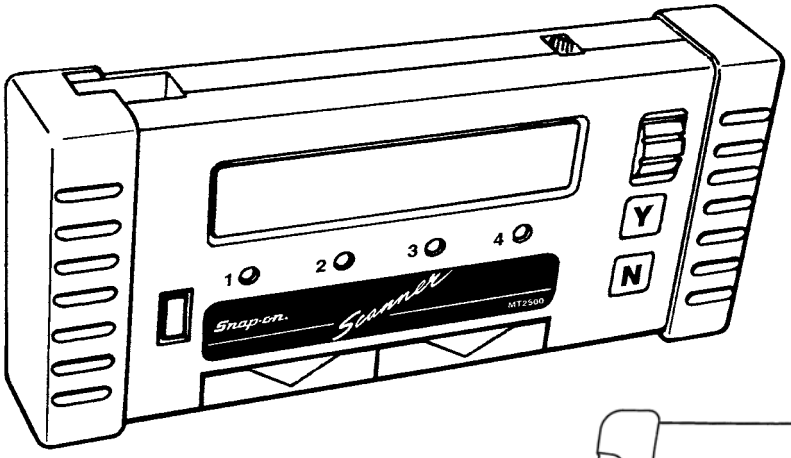
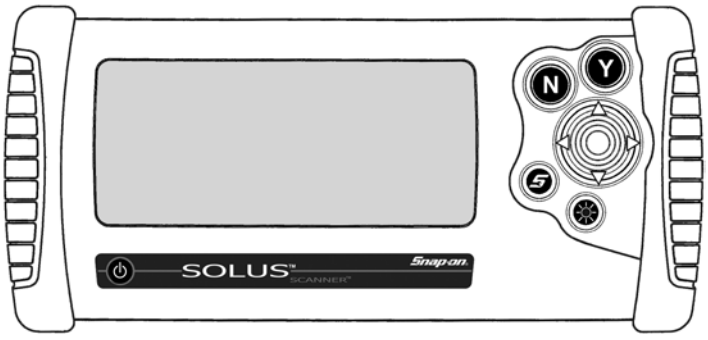
Fast-Track®

Ford Engine Troubleshooter Reference Manual

Version 9.2 Software **February 2009**







Snap-on®

Use in conjunction with the applicable Scanner User's Reference Manual and Diagnostic Safety Manual.

Safety Warnings and Cautions

Refer to Diagnostic Safety Manual.

Ford Engine
Troubleshooter Reference Manual

Version 9.2
February 2009

BEFORE OPERATING THIS UNIT,
PLEASE READ THIS MANUAL
AND ANY APPLICABLE SCANNER
AND SAFETY MANUALS.

Snap-on®

Ford

Introduction

CAUTION

1. Always read Scanner and Safety Manuals first.

2. Ensure correct ID on Scanner and connections correct for vehicle.

3. Always check for fault codes first – checking KOEO, KOER and memory codes in Self Tests.

About the Fast-Track Troubleshooter System

Snap-on's *Fast-Track Troubleshooter* is a unique time saving diagnosis tool which compliments the Snap-on Scanner. They are used in unison to diagnose and repair automatic transmission related problems. The *Troubleshooter* can incorporate known faults and repair tips, and rebuilding, and technical assistance to reduce the down time of diagnosis, therfore saving you time and money. This product is researched and made in Australia for Australian Vehicles. Information is researched from throughout Australia from a large network of technical sources with vast knowledge of product.

The Reference Manual supplied in this kit contains additional information to support many *Troubleshooter* tips when special instructions, specifications, pinouts and wiring diagrams are needed as indicated by the Scanner.

IMPORTANT: The *Fast-Track Troubleshooter* system contains information on the most common code problems and driveability complaints on the above vehicles. It does not, however, contain information for every possible code and every possible problem that could occur in all vehicles.

Using *Troubleshooter* Effectively

The checks in each *Troubleshooter* tip begin with the most likely cause of a problem or with the tests that should be made first. The checks then progress through other possible causes and tests. All checks in a tip are common causes of a problem or important basic tests, and the most important are listed first. For the most effective use of the *Troubleshooter* tips, follow the checks in the order in which they are given.

Many checks in the *Troubleshooter* tips with refer you to references in this *Troubleshooter* Manual. Consult the references as directed by the tips on the *Troubleshooter* cartridge. Trying to use the references by themselves may cause you to miss important information or to perform some test or adjustment out of sequence.

Begin with the basics

The *Fast-Track Troubleshooter* tips deal with automatic transmission electronics and controls. It assumes the basics have been checked. Eg: fluid level and condition, engine performance and other driveline components like brakes and differential assemblies. These should be checked before performing pinpoint tests on electronic components.

Always ensure that the following systems and components are in proper operating condition:

- Battery condition
- Electrical connectors and wiring harnesses
- Vacuum lines and connectors
- General engine mechanical condition
- Brakes and differential assemblies

Troubleshooting Trouble Codes

Ford refers to services codes as on-demand codes and memory codes, and the vehicle electronic control unit (ECU) transmits them in these groups during self-tests. On-demand codes are “hard” codes that indicate faults which are present at the time of testing. Memory codes are “soft” codes from the ECU memory of EEC systems. These indicate intermittent problems that have occurred in the past but which are not present at the time of testing.

For the key-on, engine-off self-test, the Ford Aust. EEC systems both transmit hard (on-demand) codes first, followed by soft memory codes.

Ford test procedures are very specific about the order in which self-tests should be performed and codes should be diagnosed and serviced.

The specified order for Ford tests and code diagnosis is as follows:

Key-on, engine-off (KOEO) test – This test displays on-demand hard codes present with the ignition on, but the engine not running. These are usually electrically open and short circuits and must be serviced first, before any other codes. For EEC systems, the key-on, engine-off test also displays memory codes of intermittent faults from ECU memory. These memory codes should be serviced first, after any other hard codes.

Note: On some models, a/trans codes are displayed only as memory codes.

Key-on, engine-running (KOER) test – This test displays on-demand hard codes present with the engine running. These should be serviced second, after any KOEO hard codes and before any memory codes. This test is applicable to vehicles with combined engine and trans ECU (power train control module).

Functional Tests – Vehicle-specific functional tests are available on some models to help you further diagnose and troubleshoot the nature of certain codes. These tests may include Output State Check, Computed Timing, and Wiggle Tests. The engine-off and engine-running wiggle tests place the Scanner and the ECU in a stand-by mode to indicate an intermittent problem caused by wiggling electrical harnesses. If a fault occurs during a wiggle test, it is recorded in ECU memory as a soft intermittent code. The KOEO test must be repeated to read the code.

Troubleshoot Ford codes in the order in which they are listed by the Scanner. After fixing a problem, repeat the self-tests to be sure the code does not reappear. Some codes may be present as both hard and soft codes. Fixing the hard codes first may also correct problems that caused soft codes.

Code Clearing

The CLEAR CODES selection appears on the SERVICE CODES menu. You must use the CLEAR CODES selection to clear codes from the ECU. The Scanner stores all codes in its own memory. You can review or print the code list by selecting REVIEW CODES or PRINT CODES from the SERVICE CODE MENU.

Ford service procedures state that you should clear all codes after making repairs and then repeat the self-test to verify the repair. Be sure, however, to note any memory codes displayed during the self-test or saved in Scanner memory. If codes are cleared and a problem does not recur as an on-demand code when a self-test is repeated, the ECU will not transmit the code. Repeating a self-test will erase the code list from a previous test in Scanner memory – including memory codes – and replace it with a new list.

Remember that only soft memory codes can be cleared. If a code reappears when you clear codes and repeat a test, it is a hard (on-demand) code that must be serviced.

General Reference

General circuit testing (voltage drop testing)

In most cases, measuring the voltage at various points in a circuit will tell you more about the circuit integrity than measuring the circuit resistance (ohms). A good circuit consists of the supply voltage, a load, and a ground. The load should be activated when current passes through it. A load is any electrical component, such as a lamp, a motor, a solenoid, or a relay. Most electrical circuits also include a fuse on the supply side to protect the load in the event of a short or power surge. Typically, mechanically-switched circuits, such as headlamps and wiper motors, have a switch on the supply side of the load. Electronically-switched circuits such as a TCC solenoid or an EGR solenoid, are usually ground-side switched. Remember, many switches actually energize a relay which, in turn, activates a circuit.

To determine if a circuit is good, check the supply voltage to the load, and check the ground. Figure 1 shows you how to test the supply voltage. Connect the positive (+) DVOM lead to pin A of the load, and the negative (-) DVOM lead to chassis ground. With the switch closed, the DVOM indicates a good supply voltage (13.00 volts) at pin A of the load. This typically indicates that the supply side of the circuit is good. It also indicates that the fuse is not blown. If the fuse was blown, the DVOM would indicate zero volts on the supply side of the circuit.

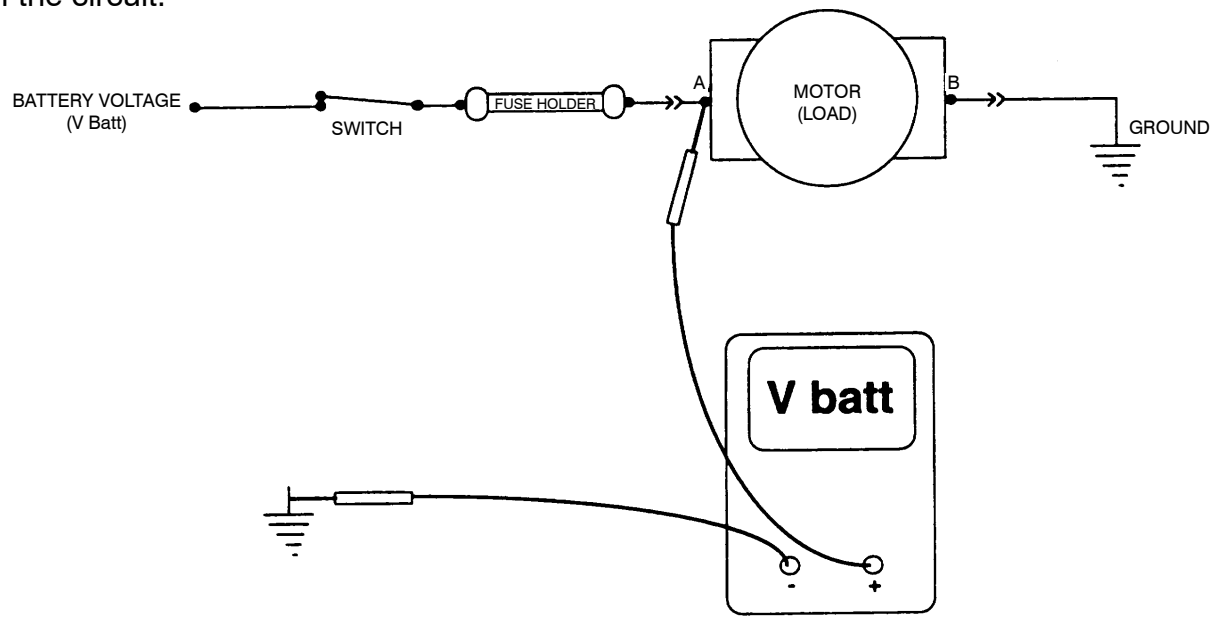
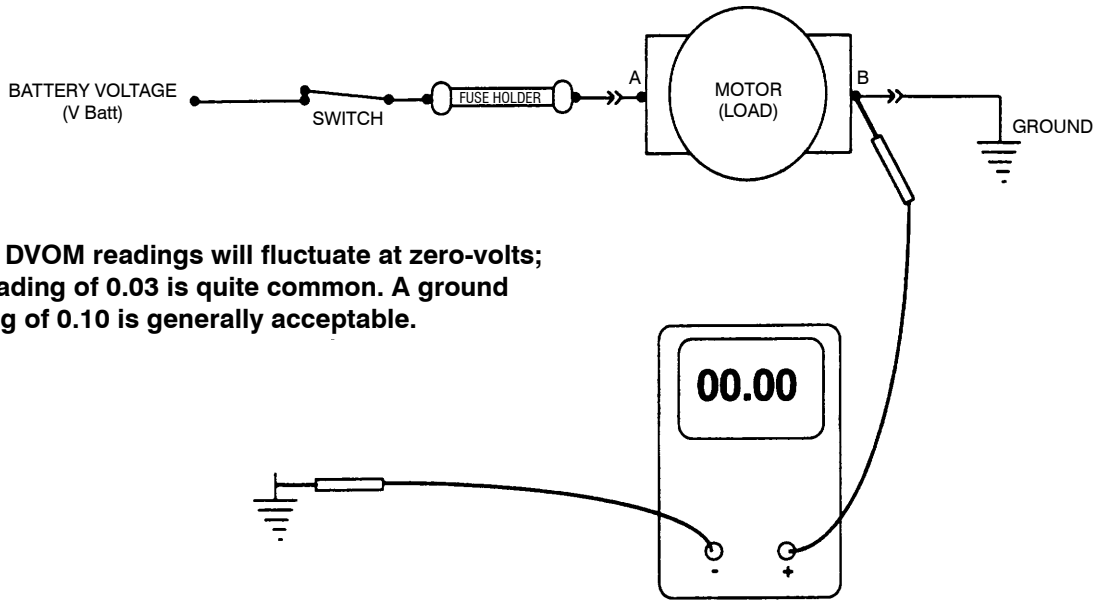


Figure 1. Good supply voltage.

Figure 2 on the next page shows you how to test the ground side of the circuit. The DVOM indicates a good ground (0.00 volts) at pin B of the load, with the switch closed. This typically indicates that the ground side of the circuit is good. (Most DVOM readings will fluctuate at zero volts; a DVOM reading of 0.03 is quite common. A ground side reading of 0.10 is an accepted reading.)

Usually, the fastest and easiest way to check a circuit is to start at the load. In general, there are only six basic types of electrical problems that can affect automotive electrical circuits:

- No supply voltage
- A voltage drop on the supply voltage side
- A voltage drop on the ground side
- An open ground
- A shorted lead
- An open load



Note: Most DVOM readings will fluctuate at zero-volts; a DVOM reading of 0.03 is quite common. A ground side reading of 0.10 is generally acceptable.

Figure 2. Good ground.

Voltage Drop Across The Load

In some cases it may be preferable to actually measure the voltage directly across a load. This may be because you suspect a poor connection, corroded terminals, or a specific open or shorted component, or simply because a known good ground is not near the portion of the circuit you are testing. Resistance can be high in long thin wires, in poor connections, and in corroded terminals. Therefore, wires, poor connections, and corroded terminals can sometimes “load” a circuit.

To measure the voltage drop across a load, connect the positive (+) DVOM lead to the supply side of the load, and the negative (-) DVOM lead to the ground side of the load, figure 3. In a normally operating circuit, most of the supplied voltage is dropped across the load. If there are two or more loads in a circuit, the voltage drop is divided in proportion to the resistance of each load. That is, the voltage drop across each component should add up to the total supply voltage.

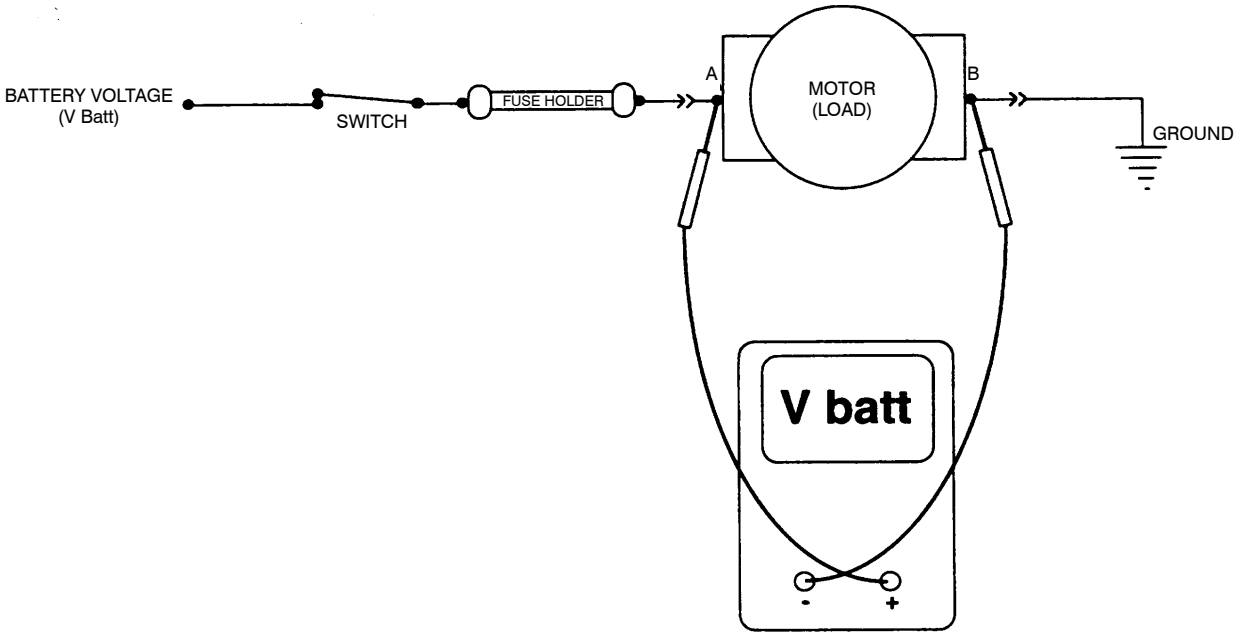


Figure 3. Voltage drop across the load.

Diagnosing Circuit Problems

Table 1 describes the symptoms, probable causes, and likely solutions for a circuit that is switched ON, but not operating properly. For a circuit that is switched OFF, but is still running, use a DVOM to probe between the load and the switch. Always start as close to the switch as possible. After isolating the problem to a specific segment of the circuit, unhook the circuit at that point to confirm that the circuit stops running. Always test the entire circuit (supply side and ground side) after fixing a problem.

Table 1. Circuit switched ON, but not operating properly. (All DVOM readings are referenced to battery ground, or a good chassis ground, separate from the circuit being tested.)

Supply Side	Ground Side	Probable Cause	Likely Solution
V batt	0.00-volts	Bad device or connections to device	Check for loose or corroded connector; if OK, replace component. Always test the entire circuit (supply side and ground side) after fixing a problem.
V batt	V batt	Open ground circuit	Use DVOM to probe circuit between ground side of component and ground source. Open circuit is located between adjacent test points having different readings. Always test the entire circuit (supply side and ground side) after fixing a problem.
0.00-volts	0.00-volts	Open supply circuit	Use DVOM to backprobe circuit between supply side of circuit and the supply source. Open circuit is located between adjacent test points having different readings. If fuse is open, check for a short to ground in section of circuit between load side of fuse and supply side of load. Always test the entire circuit (supply side and ground side) after fixing a problem.
V batt	Greater than 0.00-volts, less than V batt	High resistance ground connection	Use DVOM to probe circuit between ground side of component and ground source. High resistance circuit is located between adjacent test points having different readings. Always test the entire circuit (supply side and ground side) after fixing a problem.
Less than V batt, greater than 0.00-volts	0.00-volts	High resistance power connection	Use DVOM to backprobe circuit between supply side of circuit and supply source. High resistance circuit is located between adjacent test points having different readings. Always test the entire circuit (supply side and ground side) after fixing a problem.

Note: Most DVOM readings will fluctuate at zero-volts; a DVOM reading of 0.03 is quite common. A ground side circuit reading of 0.10 volts is acceptable.

ECU MODULE IDENTIFICATION CODE

This code is sometimes listed in front of self test codes. It is for ECU identification only and does not indicate a fault.

TWO DIGIT CODES EA TO ED

CODE ID No.	ENGINE	TRANS
20	3.9 MPEFI	MAN
	4.0 MPEFI	MAN
30	3.9 MPEFI	AUTO
	4.0 MPEFI	AUTO
40	3.9 TBI	MAN
	4.0 MPEFI	AUTO
50	3.9 TBI	AUTO
	4.0 MPEFI	AUTO
60	3.2 TBI	MAN
	5.0 SEFI	MAN
70	3.2 TBI	AUTO
	5.0 SEFI	AUTO
80	5.0 SEFI	AUTO
90	4.0 MPEFI	MAN

CODE ID No.	ENGINE	TRANS
A1	4.0 MPEFI	AUTO
A2	4.0 MPEFI	AUTO
A3	4.0 MPEFI	AUTO
B2	4.0 MPEFI	MAN
C1	5.0 SEFI	AUTO
C2	5.0 SEFI	AUTO
D1	5.0 SEFI XR8	MAN
20	4.0 MPEFI TICKFORD	MAN
AA	4.0 MPEFI XR6	MAN
A9	4.0 MPEFI XR6	AUTO
BA	4.0 MPEFI XR6	AUTO
B9	4.0 MPEFI XR6	MAN
C9	5.0 SEFI GT	AUTO
D9	5.0 SEFI GT	MAN

THREE DIGIT CODES

EF MODEL

CODE ID No.	ENGINE	TRANS
911	4.0 MPEFI	MAN
912	4.0 MPEFI	AUTO
913	4.0 MPEFI	AUTO
914	5.0 SEFI XR8	MAN
915	5.0 SEFI	AUTO
916	4.0 MPEFI XR6	MAN
917	4.0 MPEFI XR6	AUTO
918	4.0 MPEFI XR6	MAN
919	4.0 MPEFI XR6	AUTO
921	4.0 MPEFI Police	AUTO
922	4.0 MPEFI	AUTO
924	5.0 SEFI XR8 & Police	AUTO
926	4.0 MPEFI LPG	AUTO
932	4.0 MPEFI TICKFORD	AUTO
933	4.0 MPEFI LPG	AUTO
950	4.0 MPEFI XR6 Police	AUTO

EL MODEL

CODE ID No.	ENGINE	TRANS
923	4.0 MPEFI	AUTO
927	4.0 MPEFI	MAN
929	4.0 MPEFI	AUTO
939	4.0 MPEFI	AUTO
941	5.0 SEFI	AUTO
942	5.0 SEFI XR8 & Police	AUTO
944	4.0 MPEFI XR6	MAN
945	4.0 MPEFI XR6	AUTO
948	4.0 MPEFI LPG	AUTO
954	4.0 MPEFI XR6 Police	AUTO
958	4.0 MPEFI LPG	AUTO
959	5.0 SEFI XR8	MAN

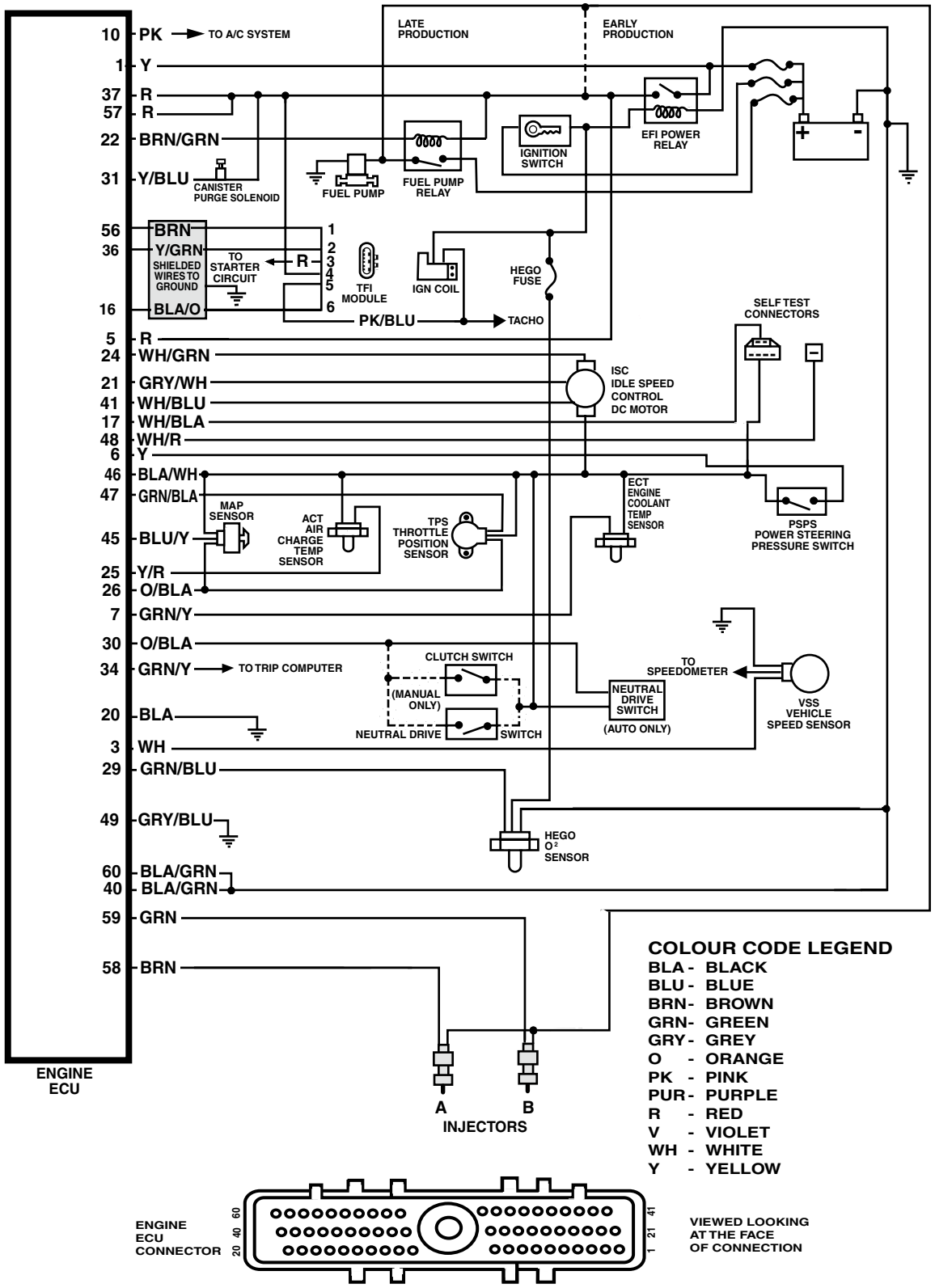
Ford Reference Bulletins

Ref. No.	Page	Subject
F001	11	EA Model 6 cyl throttle body injection wiring diagram and connectors
F002	13	EA Model 6 cyl multipoint injection wiring diagram and connectors
F003	15	EB Model 6 cyl throttle body injection wiring diagram and connectors
F004	17	EB Model 6 cyl multipoint injection wiring diagram and connectors
F005	19	EB Model V8 sequential injection wiring diagram and connectors
F006	21	EBII/ED Model 6 cyl multipoint injection wiring diagram and connectors
F007	23	EBII/ED Model V8 sequential injection wiring diagram and connectors
F008	25	EF Model 6 cyl multipoint injection wiring diagram and connectors
F009	27	EL Model 6 cyl multipoint injection wiring diagram and connectors
F010	29	EF/EL Model V8 sequential injection wiring diagram and connectors
F011	31	TFI module resistance test
F012	32	Expected oscilloscope waveforms
F013	33	Air charge temperature and engine coolant temperature sensor resistance chart and connector diagram
F014	33	EA/EB 6 cyl throttle body injection throttle body showing base idle screw
F015	34	EA to ED 6 cyl multipoint injection throttle body showing base idle screw
F016	35	EA to EL V8 throttle body showing base idle screw
F017	36	EF/EL 6 cyl multipoint injection throttle body showing base idle screw
F018	37	EA to ED 6 cyl fuel pressure and volume testing
F019	38	EA to ED V8 fuel pressure and volume testing
F020	38	EF to EL fuel pressure and volume testing

PLEASE NOTE WIRING DIAGRAM WIRE COLOURS ARE GIVEN AT THE ECU AND MAY NOT ALWAYS BE CORRECT DUE TO MANUFACTURING CHANGES IN PRODUCTION. ALSO WIRE COLOURS AT COMPONENTS AND SENSORS MAY NOT BE THE SAME AS AT THE ECU PARTICULARLY ON V8 MODELS DUE TO ENGINE BEING IMPORTED.

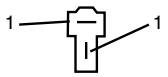
ALL CONNECTORS ARE VIEWED LOOKING INTO FACE OF CONNECTION.

F001 EA Model 6 cyl throttle body injection wiring diagram

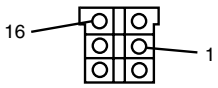


F001 EA Model 6 cyl throttle body injection wiring connectors

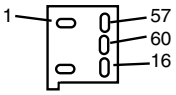
FUSIBLE LINK



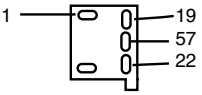
IGNITION SWITCH



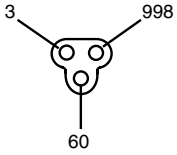
POWER RELAY



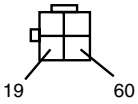
FUEL PUMP RELAY



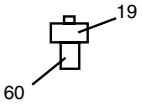
VSS VEHICLE SPEED SENSOR



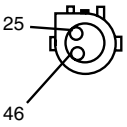
FUEL PUMP WAGON



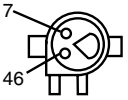
FUEL PUMP SEDAN



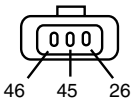
ACT AIR CHARGE TEMP SENSOR



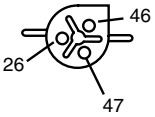
ECT ENGINE COOLANT TEMP SENSOR



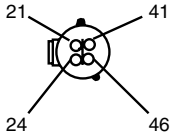
MAP MANIFOLD ABSOLUTE PRESSURE



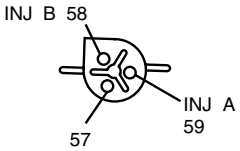
TPS THROTTLE POSITION SENSOR



ISC IDLE SPEED CONTROL DC MOTOR

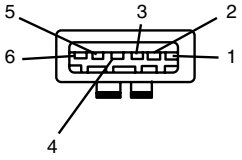


FUEL INJECTORS

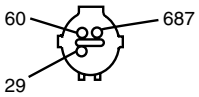


IGNITION COIL

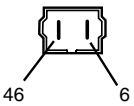
TFI THICK FILM IGNITION DISTRIBUTOR



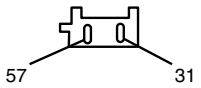
HEGO HEATED EXHAUST GAS OXYGEN SENSOR



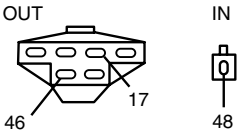
PSPS POWER STEERING PRESSURE SWITCH



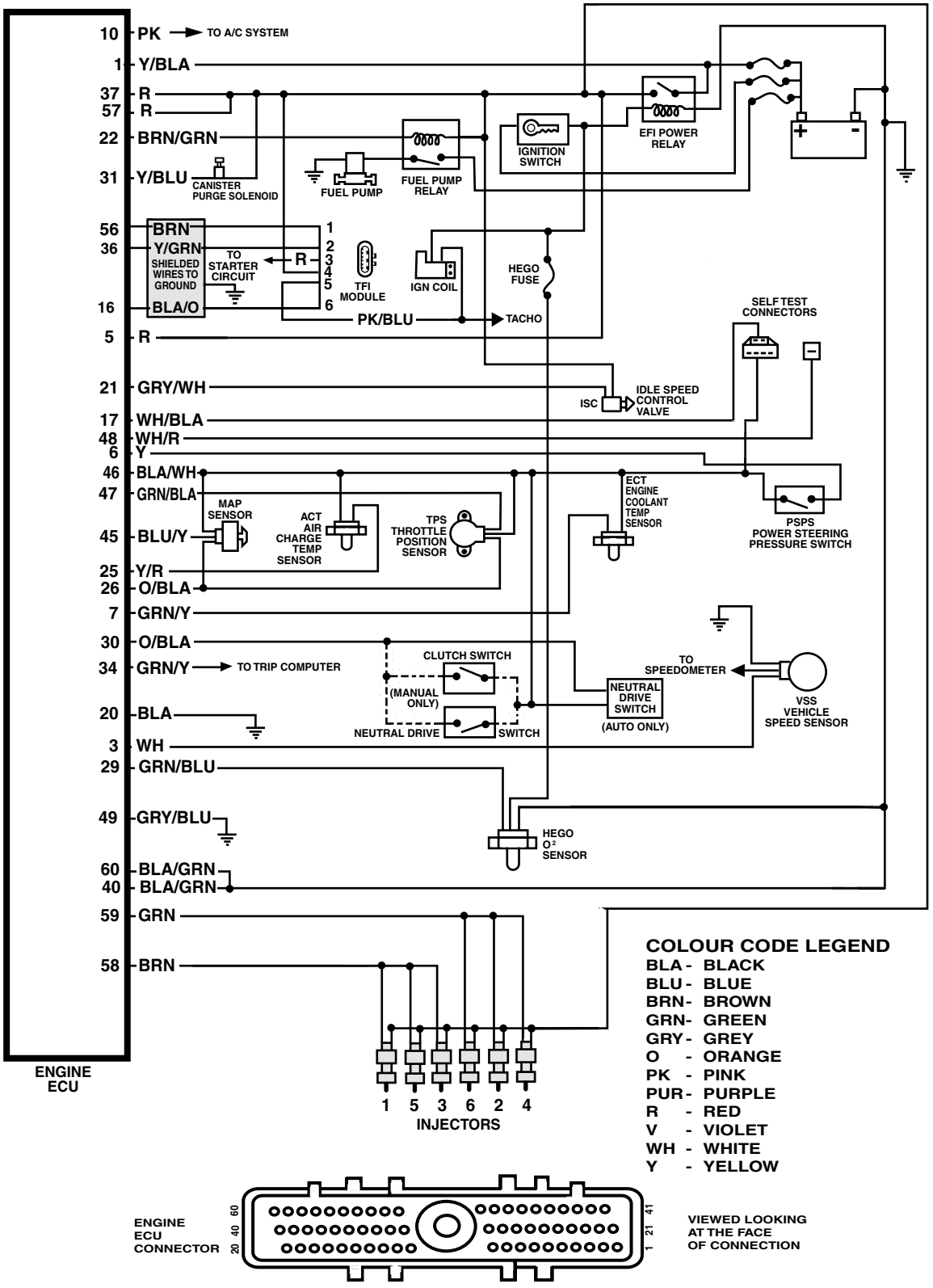
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTORS

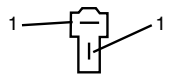


F002 EA Model 6 cyl multipoint injection wiring diagram

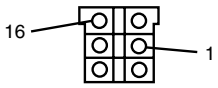


F002 EA Model 6 cyl multipoint injection wiring connectors

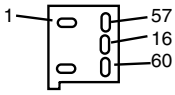
FUSIBLE LINK



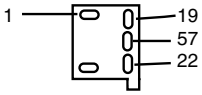
IGNITION SWITCH



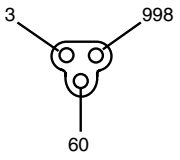
POWER RELAY



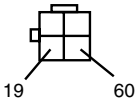
FUEL PUMP RELAY



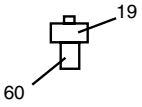
VSS VEHICLE SPEED SENSOR



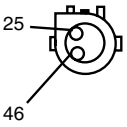
FUEL PUMP WAGON



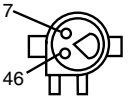
FUEL PUMP SEDAN



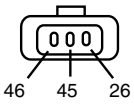
ACT AIR CHARGE TEMP SENSOR



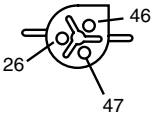
ECT ENGINE COOLANT TEMP SENSOR



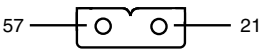
MAP MANIFOLD ABSOLUTE PRESSURE



TPS THROTTLE POSITION SENSOR

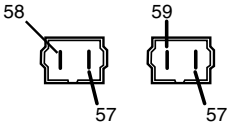


ISC IDLE SPEED CONTROL VALVE



FUEL INJECTORS

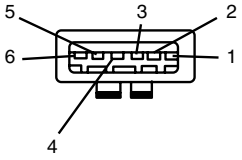
INJECTOR A INJECTOR B



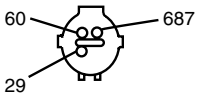
INJ 1, 3, 5 INJ 2, 4, 6

IGNITION COIL

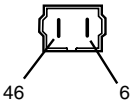
TFI THICK FILM IGNITION DISTRIBUTOR



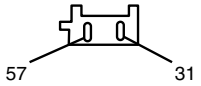
HEGO HEATED EXHAUST GAS OXYGEN SENSOR



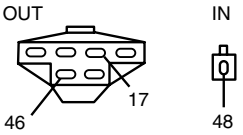
PSPS POWER STEERING PRESSURE SWITCH



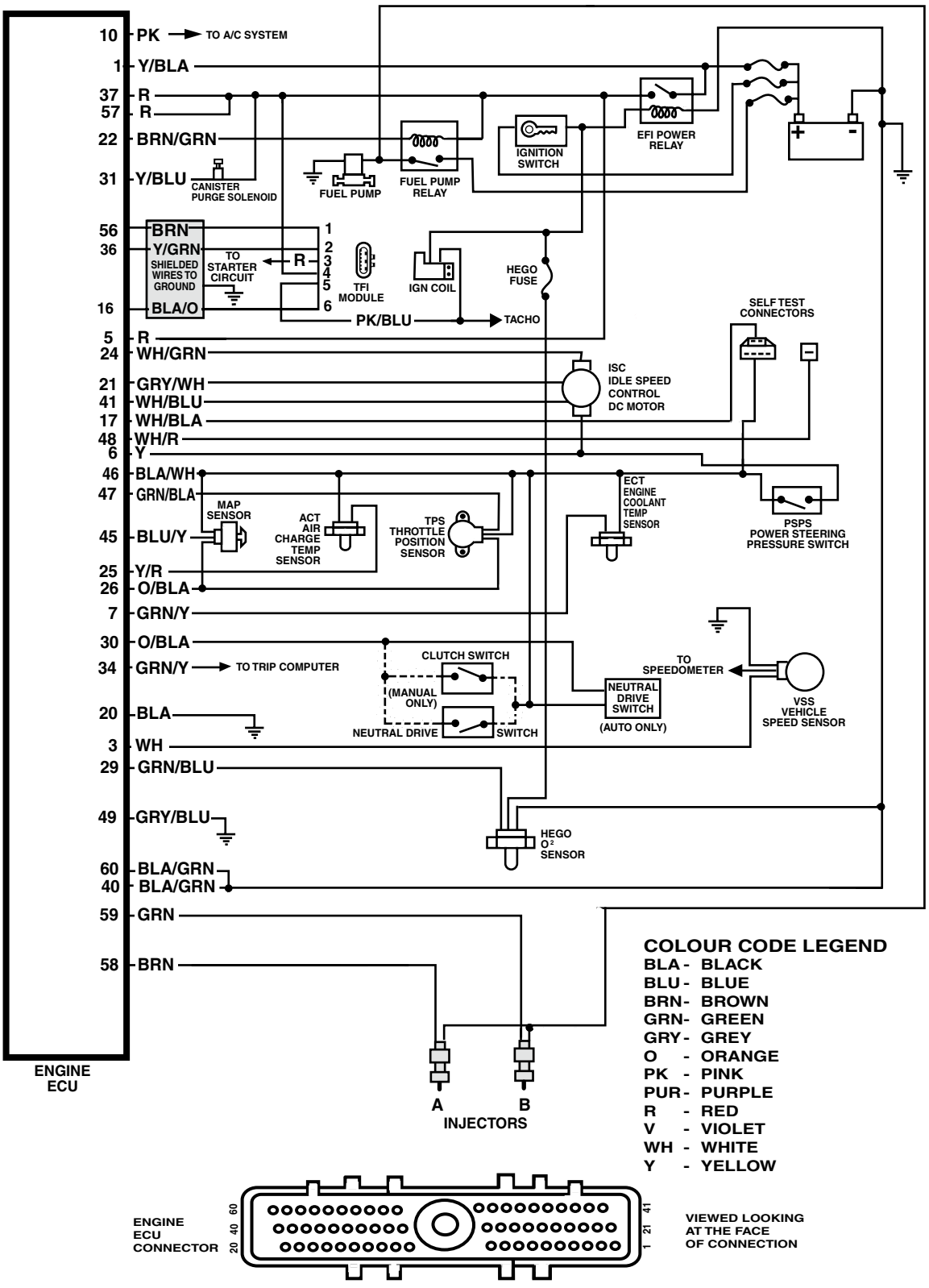
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTORS

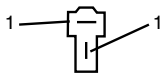


F003 EB Model 6 cyl throttle body injection wiring diagram

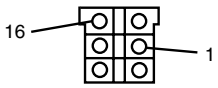


F003 EB Model 6 cyl throttle body injection wiring connectors

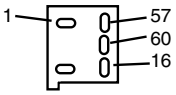
FUSIBLE LINK



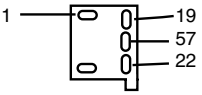
IGNITION SWITCH



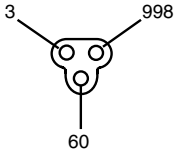
POWER RELAY



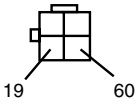
FUEL PUMP RELAY



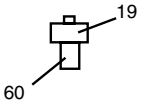
VSS VEHICLE SPEED SENSOR



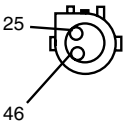
FUEL PUMP WAGON



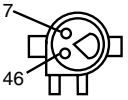
FUEL PUMP SEDAN



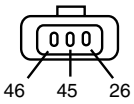
ACT AIR CHARGE TEMP SENSOR



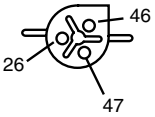
ECT ENGINE COOLANT TEMP SENSOR



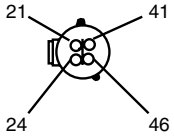
MAP MANIFOLD ABSOLUTE PRESSURE



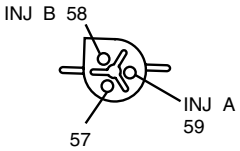
TPS THROTTLE POSITION SENSOR



ISC IDLE SPEED CONTROL DC MOTOR

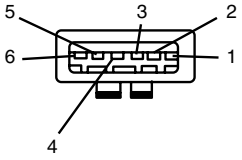


FUEL INJECTORS

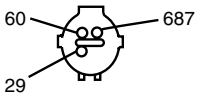


IGNITION COIL

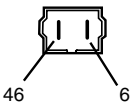
TFI THICK FILM IGNITION DISTRIBUTOR



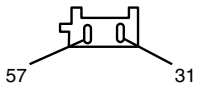
HEGO HEATED EXHAUST GAS OXYGEN SENSOR



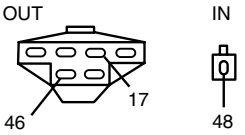
PSPS POWER STEERING PRESSURE SWITCH



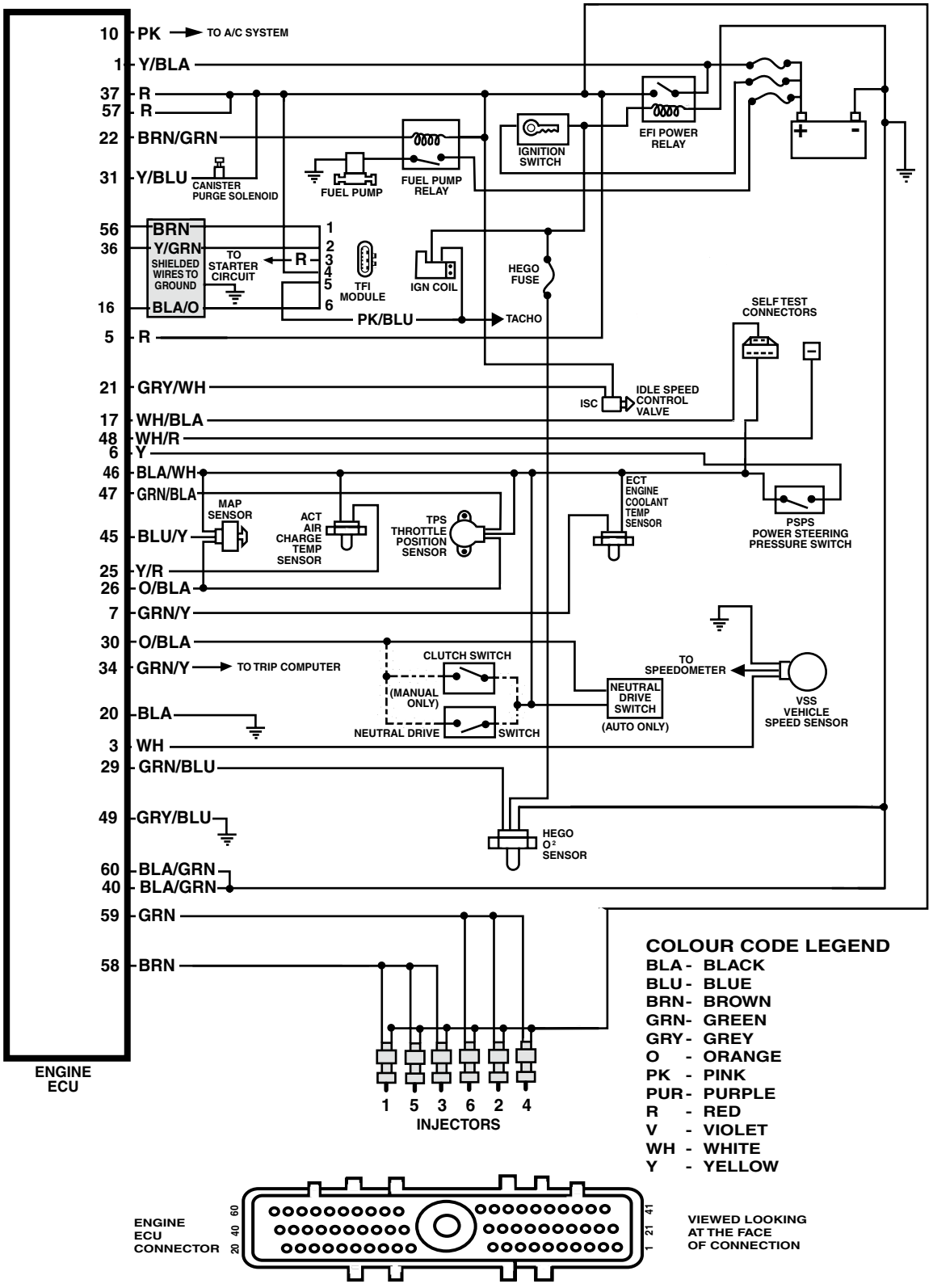
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTORS

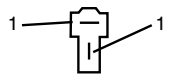


F004 EB Model 6 cyl multipoint injection wiring diagram

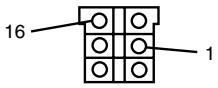


F004 EB Model 6 cyl multipoint injection wiring connectors

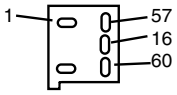
FUSIBLE LINK



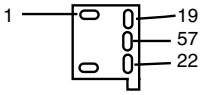
IGNITION SWITCH



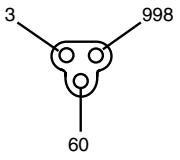
POWER RELAY



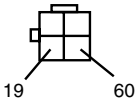
FUEL PUMP RELAY



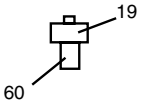
VSS VEHICLE SPEED SENSOR



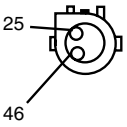
FUEL PUMP WAGON



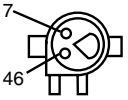
FUEL PUMP SEDAN



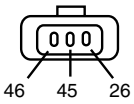
ACT AIR CHARGE TEMP SENSOR



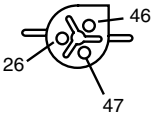
ECT ENGINE COOLANT TEMP SENSOR



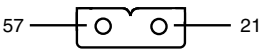
MAP MANIFOLD ABSOLUTE PRESSURE



TPS THROTTLE POSITION SENSOR

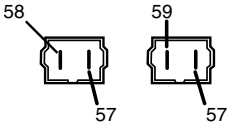


ISC IDLE SPEED CONTROL VALVE



FUEL INJECTORS

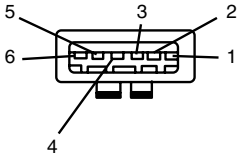
INJECTOR A **INJECTOR B**



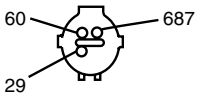
INJ 1, 3, 5 INJ 2, 4, 6

IGNITION COIL

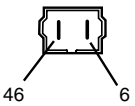
TFI THICK FILM IGNITION DISTRIBUTOR



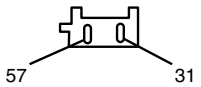
HEGO HEATED EXHAUST GAS OXYGEN SENSOR



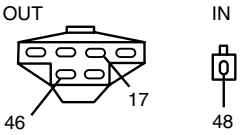
PSPS POWER STEERING PRESSURE SWITCH



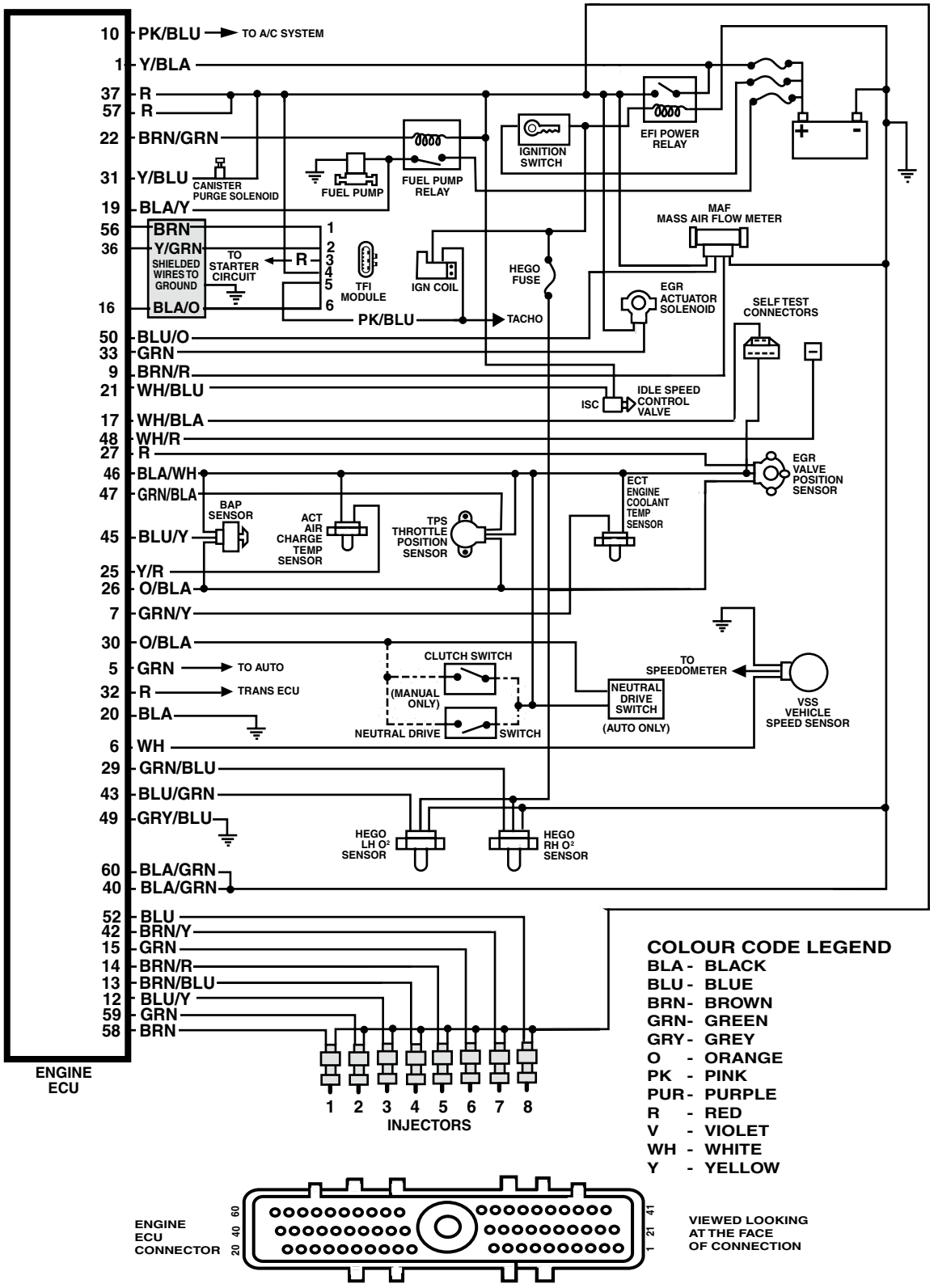
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTORS

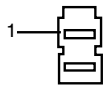


F005 EB Model V8 sequential injection wiring diagram

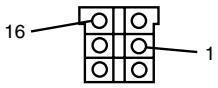


F005 EB Model V8 sequential injection wiring connectors

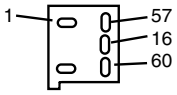
FUSIBLE LINK



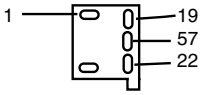
IGNITION SWITCH



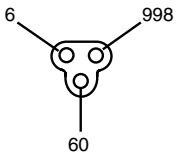
POWER RELAY



FUEL PUMP RELAY

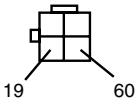


VSS VEHICLE SPEED SENSOR

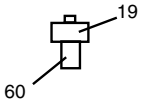


FUEL PUMPS

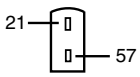
WAGON



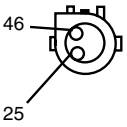
SEDAN



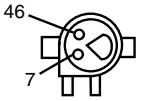
ISC IDLE SPEED CONTROL VALVE



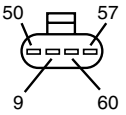
ACT AIR CHARGE TEMP SENSOR



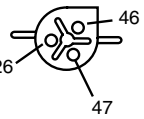
ECT ENGINE COOLANT TEMP SENSOR



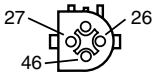
MAF MASS AIR FLOW SENSOR



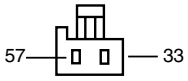
TPS THROTTLE POSITION SENSOR



EVP EGR VALVE POSITION SENSOR

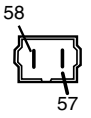


EVR EGR VALVE REGULATOR SOLENOID

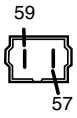


FUEL INJECTORS

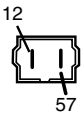
INJ 1



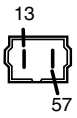
INJ 2



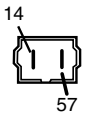
INJ 3



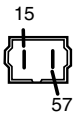
INJ 4



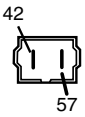
INJ 5



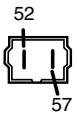
INJ 6



INJ 7

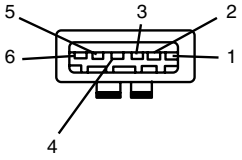


INJ 8



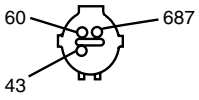
IGNITION COIL

TFI THICK FILM IGNITION DISTRIBUTOR

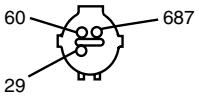


HEATED EXHAUST GAS OXYGEN SENSOR

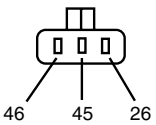
HEGO LH



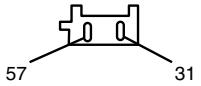
HEGO RH



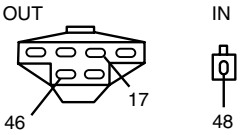
BAP BAROMETRIC ATMOSPHERIC PRESSURE SENSOR



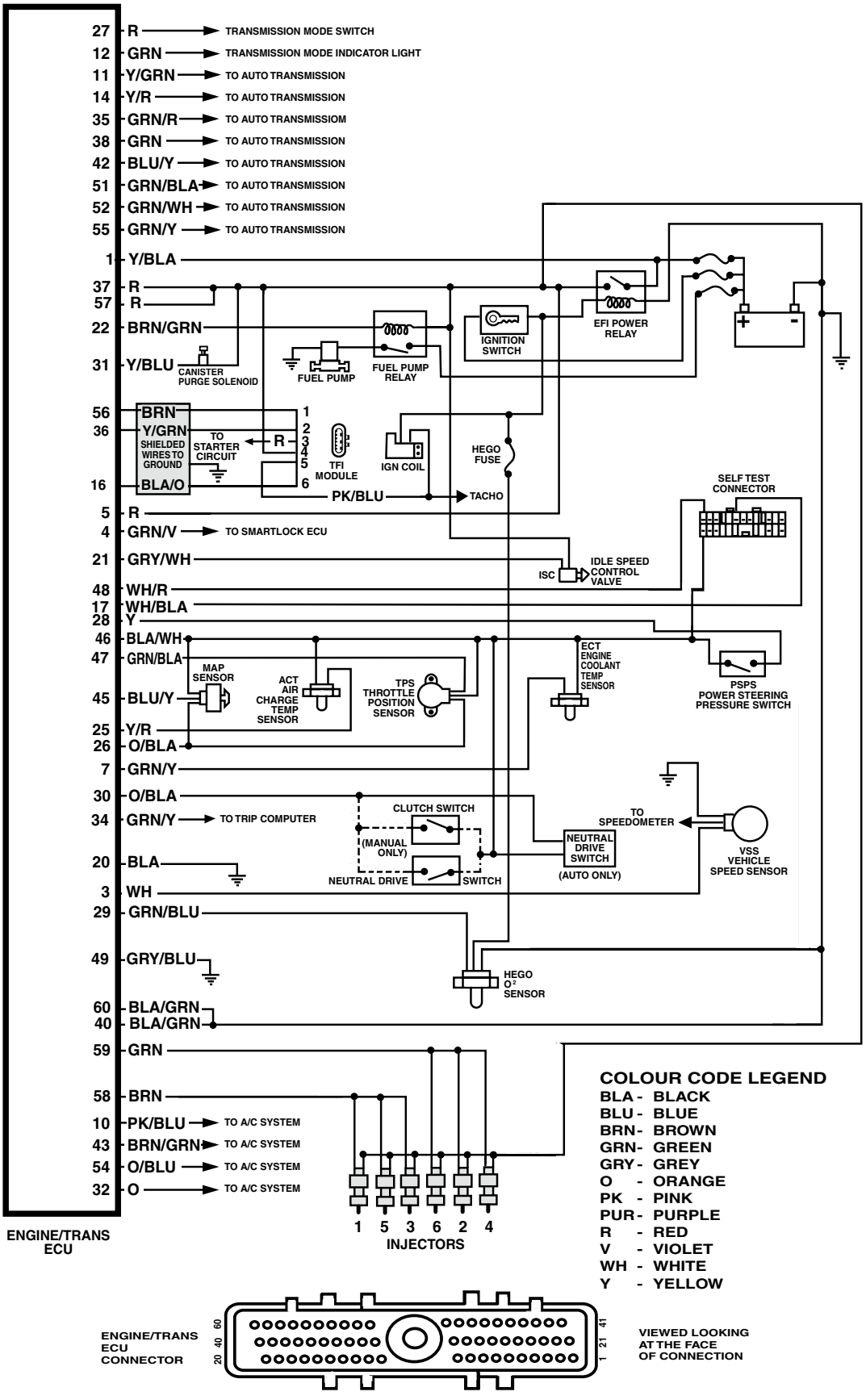
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTORS

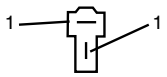


F006 EBII/ED Model 6 cyl multipoint injection wiring diagram

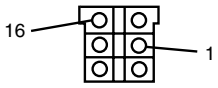


F006 EBII/ED Model 6 cyl multipoint injection wiring connectors

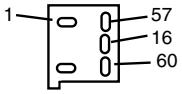
FUSIBLE LINK



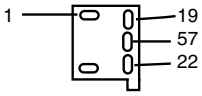
IGNITION SWITCH



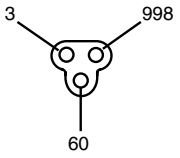
POWER RELAY



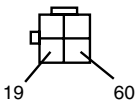
FUEL PUMP RELAY



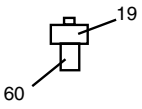
VSS VEHICLE SPEED SENSOR



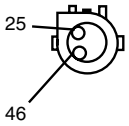
FUEL PUMP WAGON



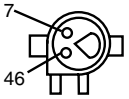
FUEL PUMP SEDAN



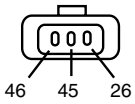
ACT AIR CHARGE TEMP SENSOR



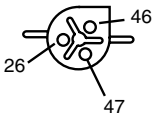
ECT ENGINE COOLANT TEMP SENSOR



MAP MANIFOLD ABSOLUTE PRESSURE



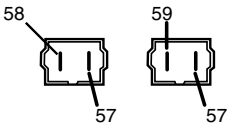
TPS THROTTLE POSITION SENSOR



ISC IDLE SPEED CONTROL VALVE

FUEL INJECTORS

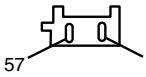
INJECTOR A INJECTOR B FOR MPFI



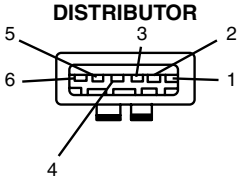
INJ 1, 3, 5 INJ 2, 4, 6

IGNITION COIL

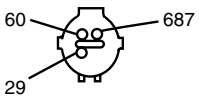
CANP CANNISTER PURGE SOLENOID



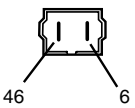
TFI THICK FILM IGNITION DISTRIBUTOR



HEGO HEATED EXHAUST GAS OXYGEN SENSOR

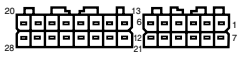


PSPS POWER STEERING PRESSURE SWITCH



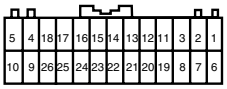
SMARTLOCK ECU

XG UTE

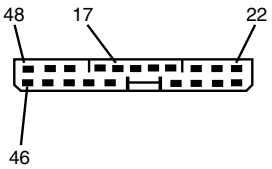


SMARTLOCK ECU

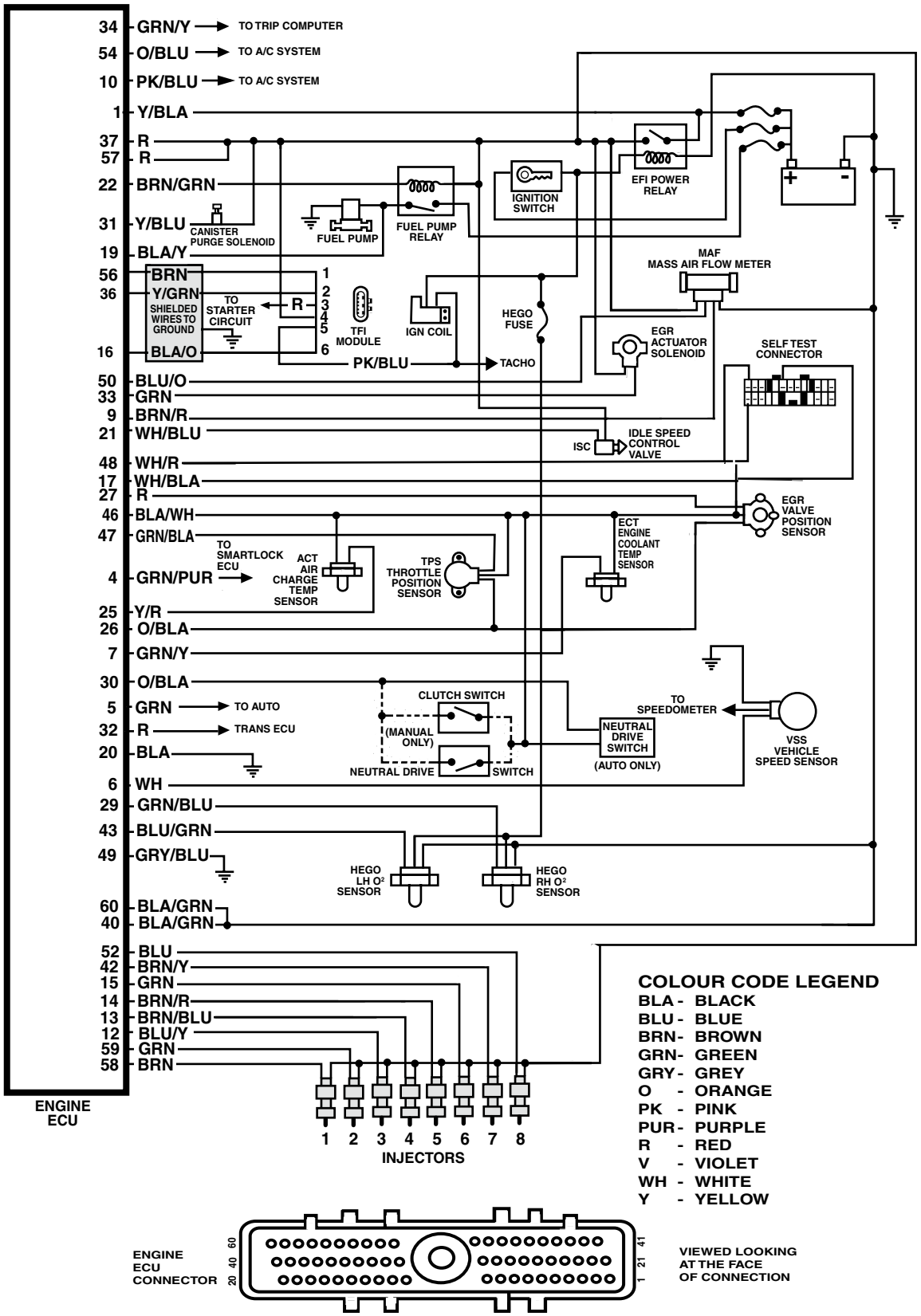
ALL OTHER MODELS



SELF TEST CONNECTOR

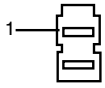


F007 EBII/ED Model V8 sequential injection wiring diagram

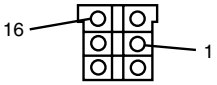


F007 EBII/ED Model V8 sequential injection wiring connectors

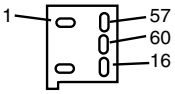
FUSIBLE LINK



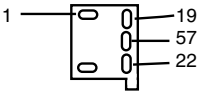
IGNITION SWITCH



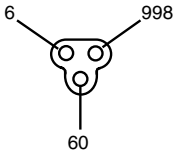
POWER RELAY



FUEL PUMP RELAY

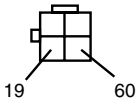


VSS VEHICLE SPEED SENSOR

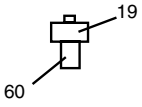


FUEL PUMPS

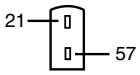
WAGON



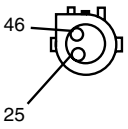
SEDAN



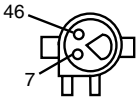
ISC IDLE SPEED CONTROL VALVE



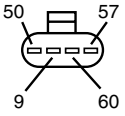
ACT AIR CHARGE TEMP SENSOR



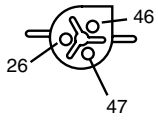
ECT ENGINE COOLANT TEMP SENSOR



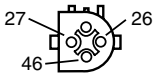
MAF MASS AIR FLOW SENSOR



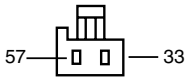
TPS THROTTLE POSITION SENSOR



EVP EGR VALVE POSITION SENSOR

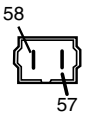


EVR EGR VALVE REGULATOR SOLENOID

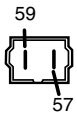


FUEL INJECTORS

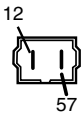
INJ 1



INJ 2

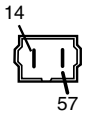


INJ 3

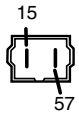


INJ 4

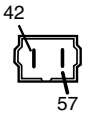
INJ 5



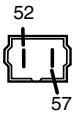
INJ 6



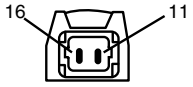
INJ 7



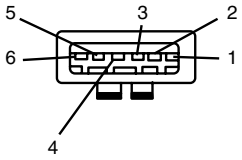
INJ 8



IGNITION COIL

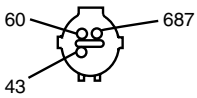


TFI THICK FILM IGNITION DISTRIBUTOR

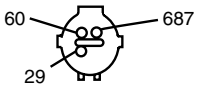


HEATED EXHAUST GAS OXYGEN SENSOR

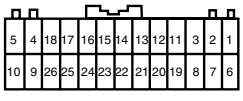
HEGO LH



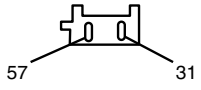
HEGO RH



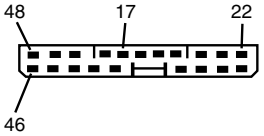
SMARTLOCK ECU



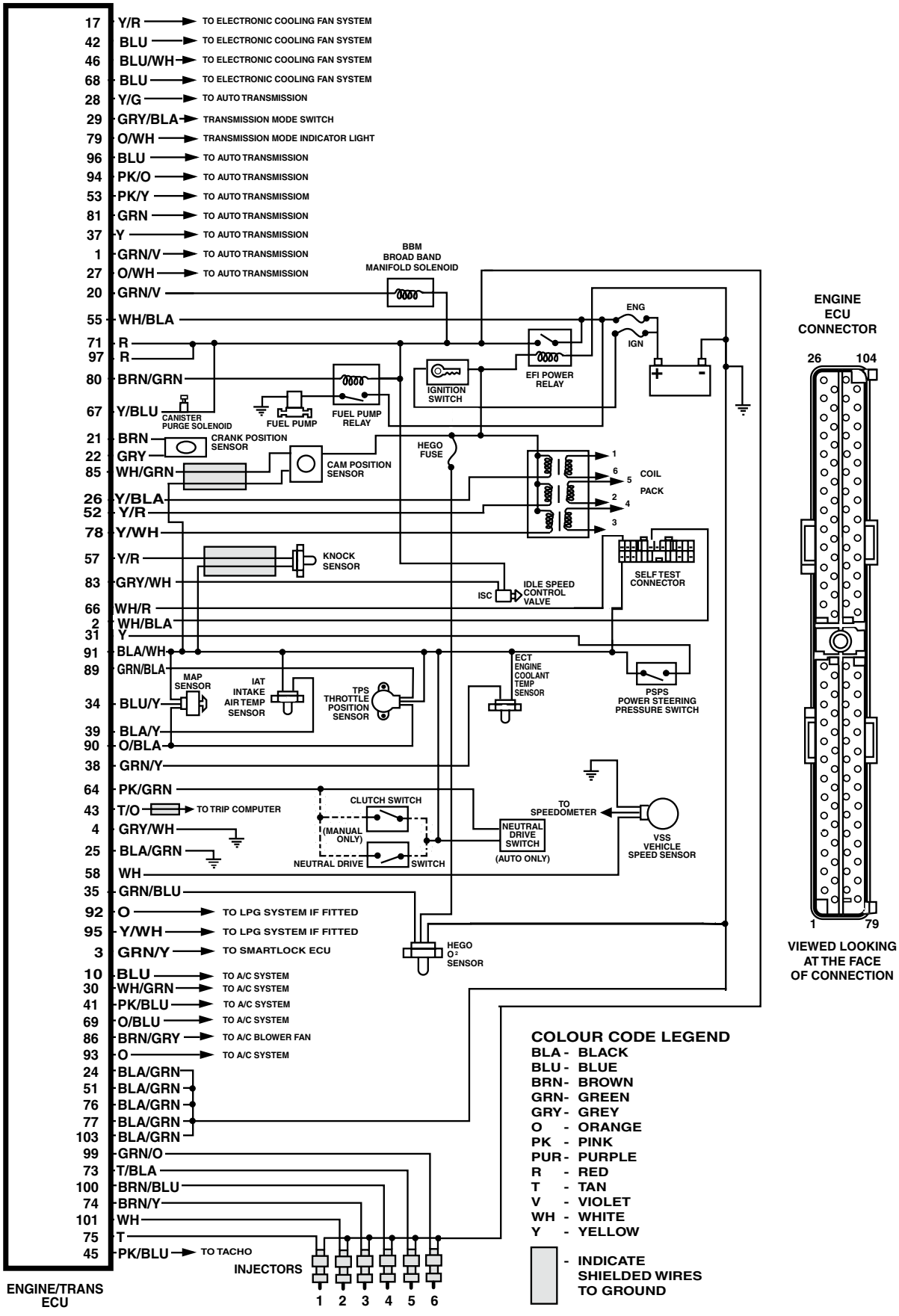
CANP CANNISTER PURGE SOLENOID



SELF TEST CONNECTOR

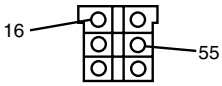


F008 EF Model 6 cyl multipoint injection wiring diagram

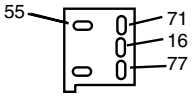


F008 EF Model 6 cyl multipoint injection wiring connectors

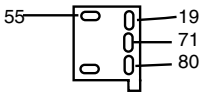
IGNITION SWITCH



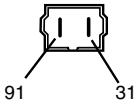
POWER RELAY



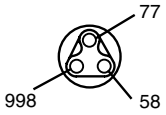
FUEL PUMP RELAY



PSPS POWER STEERING PRESSURE SWITCH

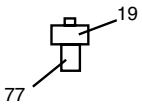


VSS VEHICLE SPEED SENSOR

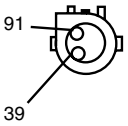


FUEL PUMP WAGON

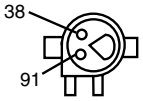
FUEL PUMP SEDAN



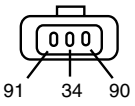
IAT INTAKE AIR TEMP SENSOR



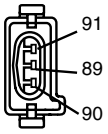
ECT ENGINE COOLANT TEMP SENSOR



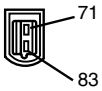
MAP MANIFOLD ABSOLUTE PRESSURE



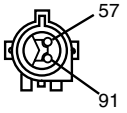
TPS THROTTLE POSITION SENSOR



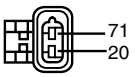
ISC IDLE SPEED CONTROL VALVE



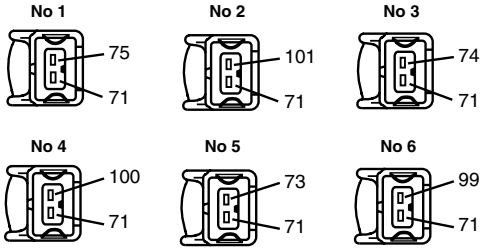
KNOCK SENSOR



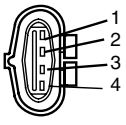
BBM BROAD BAND MANIFOLD SOLENOID



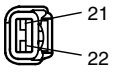
FUEL INJECTORS



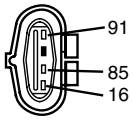
IGNITION COIL PACK



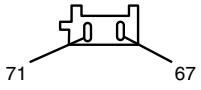
CRANKSHAFT POSITION SENSOR



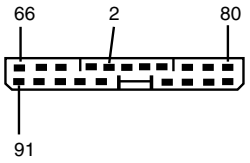
CAMSHAFT POSITION SENSOR



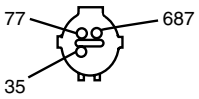
CANP CANNISTER PURGE SOLENOID



DIAGNOSTIC CONNECTOR

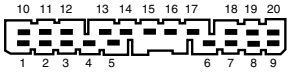


HEGO HEATED EXHAUST GAS OXYGEN SENSOR



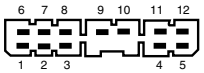
BEM BODY ELECTRONIC MODULE INC SMARTLOCK

CONNECTOR A



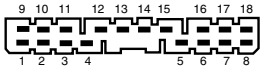
LOW/MID SERIES VEHICLES

CONNECTOR A



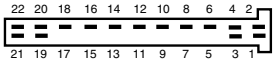
HIGH SERIES VEHICLES

CONNECTOR B



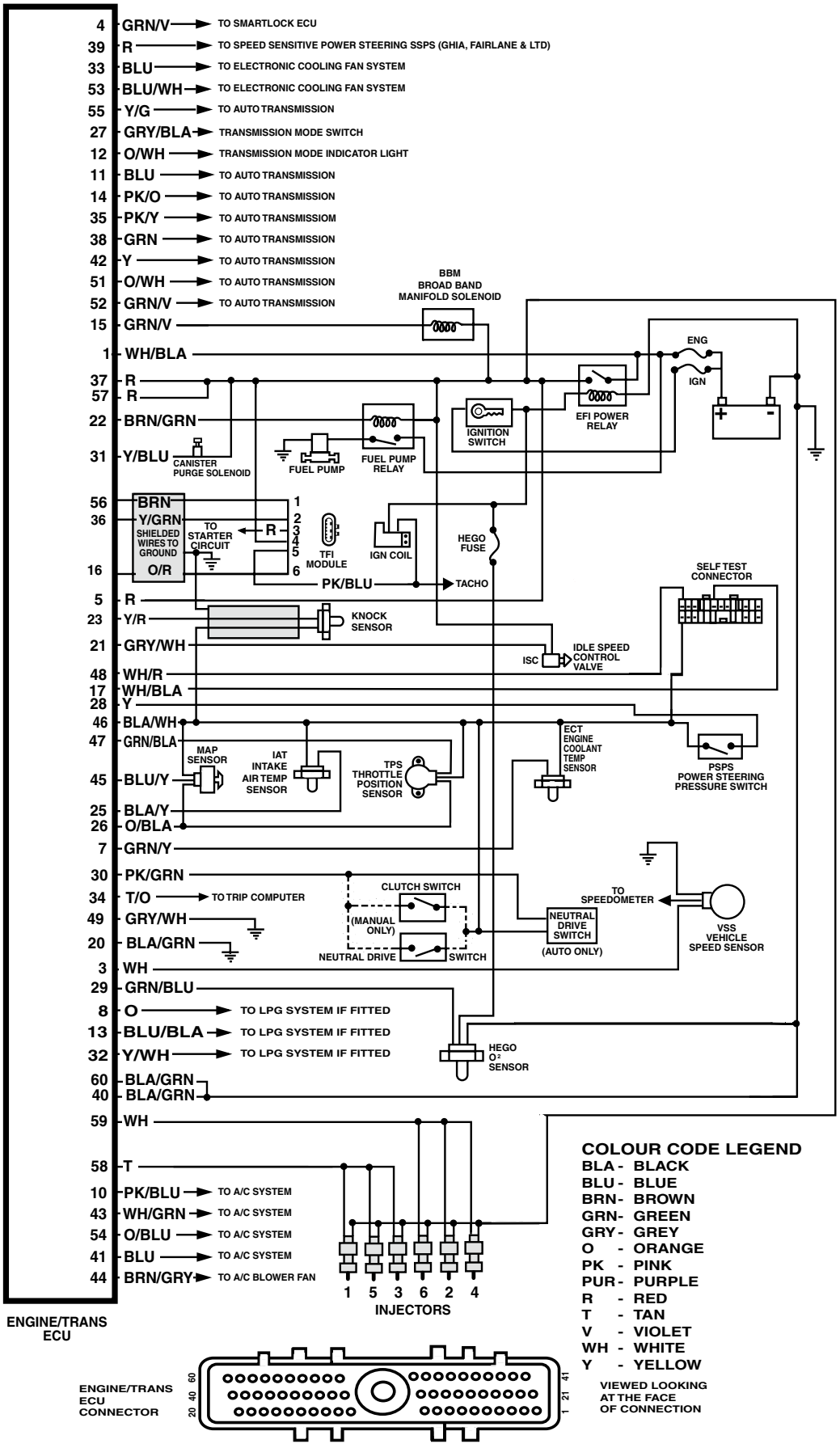
HIGH SERIES VEHICLES

CONNECTOR C



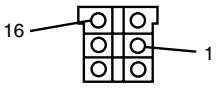
COMMON ALL VEHICLES

F009 EL Model 6 cyl multipoint injection wiring diagram

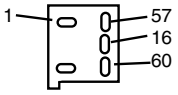


F009 EL Model 6 cyl multipoint injection wiring connectors

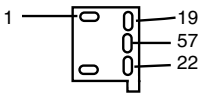
IGNITION SWITCH



POWER RELAY

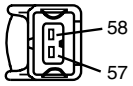


FUEL PUMP RELAY

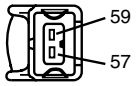


FUEL INJECTORS

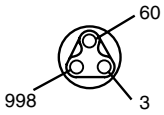
CYLINDER 1, 3, 5



CYLINDERS 2, 4 , 6

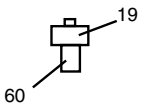


VSS VEHICLE SPEED SENSOR

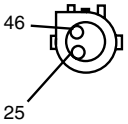


FUEL PUMP WAGON

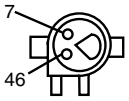
FUEL PUMP SEDAN



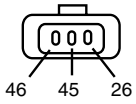
ACT AIR CHARGE TEMP SENSOR



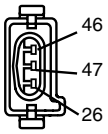
ECT ENGINE COOLANT TEMP SENSOR



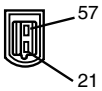
MAP MANIFOLD ABSOLUTE PRESSURE



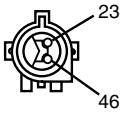
TPS THROTTLE POSITION SENSOR



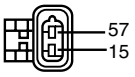
ISC IDLE SPEED CONTROL VALVE



KNOCK SENSOR

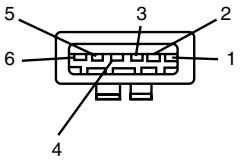


BBM BROAD BAND MANIFOLD SOLENOID

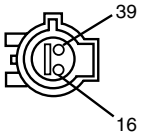


IGNITION COIL

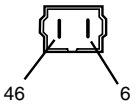
TFI THICK FILM IGNITION DISTRIBUTOR



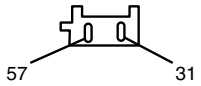
SSPS SPEED SENSITIVE POWER STEERING



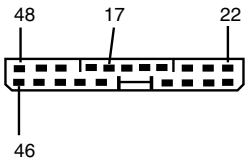
PSPS POWER STEERING PRESSURE SWITCH



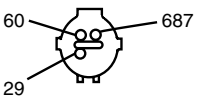
CANP CANNISTER PURGE SOLENOID



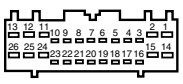
DIAGNOSTIC CONNECTOR



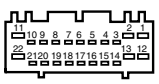
HEGO HEATED EXHAUST GAS OXYGEN SENSOR



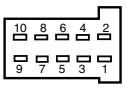
BEM BODY ELECTRONIC MODULE INC SMARTLOCK



CONNECTOR A

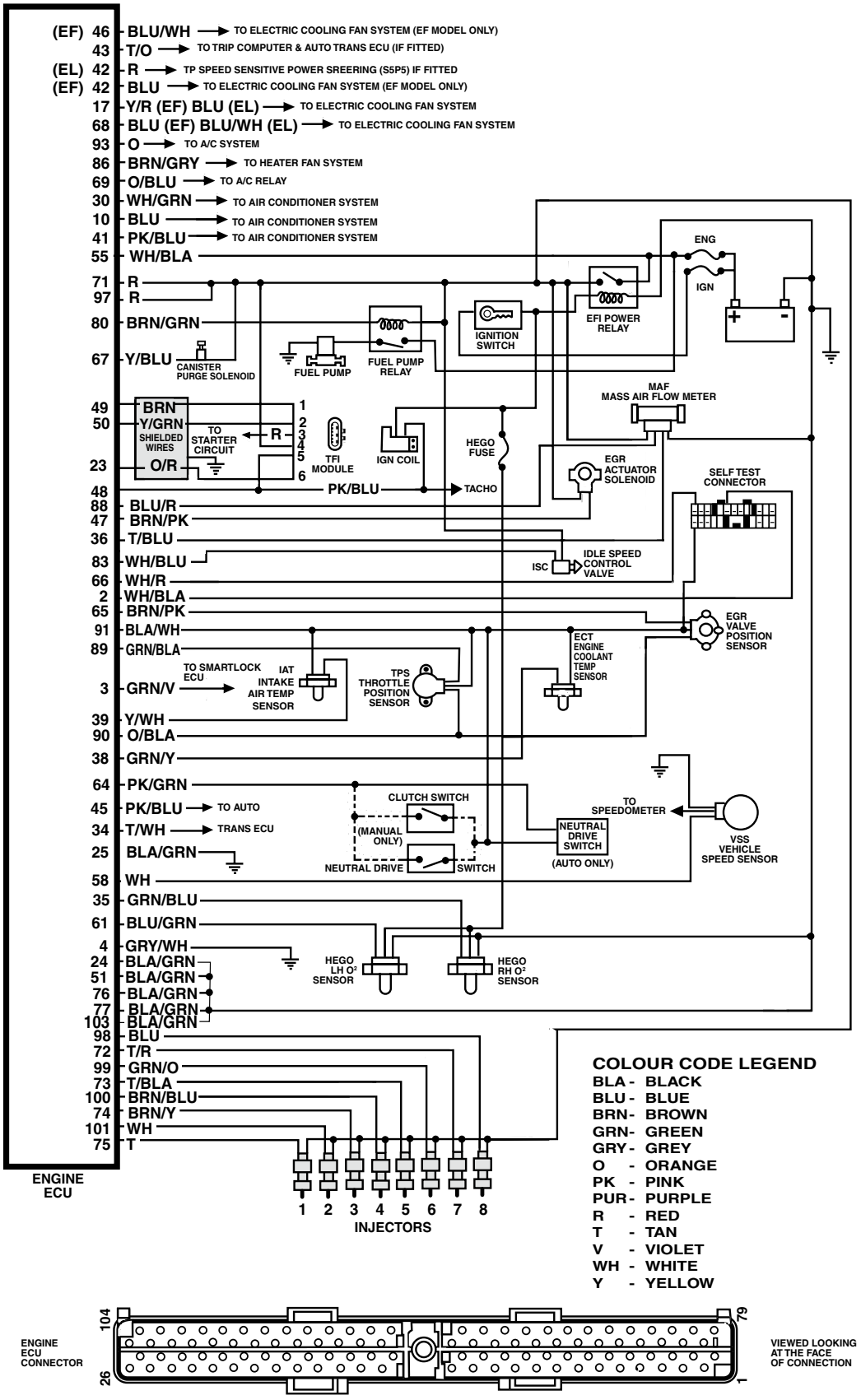


CONNECTOR B



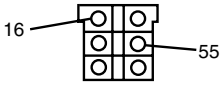
CONNECTOR C

F010 EF/EL Model V8 sequential injection wiring diagram

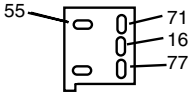


F010 EF/EL Model V8 sequential injection wiring connectors

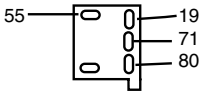
IGNITION SWITCH



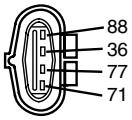
POWER RELAY



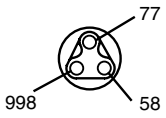
FUEL PUMP RELAY



MAF MASS AIR FLOW SENSOR

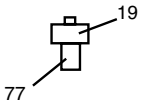


VSS VEHICLE SPEED SENSOR

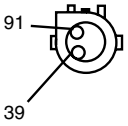


FUEL PUMP WAGON

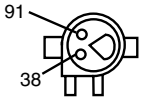
FUEL PUMP SEDAN



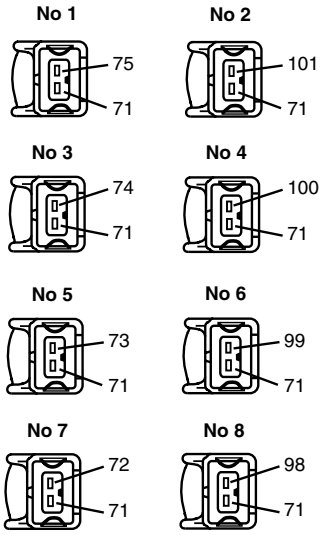
IAT INTAKE AIR TEMP SENSOR



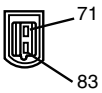
ECT ENGINE COOLANT TEMP SENSOR



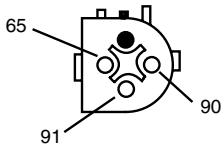
FUEL INJECTORS



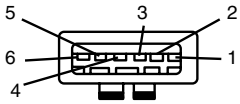
ISC IDLE SPEED CONTROL VALVE



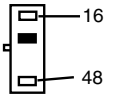
EVP EGR VALVE POSITION SENSOR



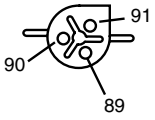
TFI THICK FILM IGNITION DISTRIBUTOR



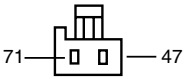
IGNITION COIL



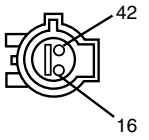
TPS THROTTLE POSITION SENSOR



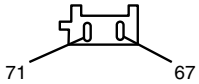
EVR EGR VALVE REGULATOR SOLENOID



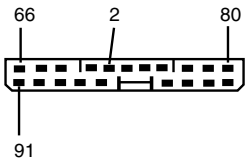
SSPS SPEED SENSITIVE POWER STEERING



CANP CANNISTER PURGE SOLENOID

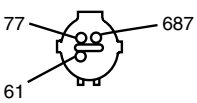


DIAGNOSTIC CONNECTOR

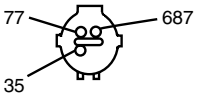


HEATED EXHAUST GAS OXYGEN SENSOR

HEGO LH

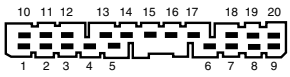


HEGO RH



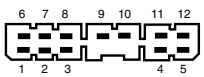
BEM
BODY ELECTRONIC MODULE INC SMARTLOCK

EF CONNECTOR A



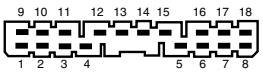
EF LOW/MID SERIES VEHICLES

EF CONNECTOR A



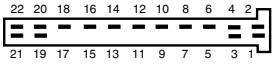
EF HIGH SERIES VEHICLES

EF CONNECTOR B



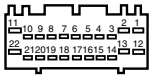
EF HIGH SERIES VEHICLES

EF CONNECTOR C



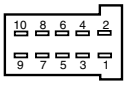
EF COMMON ALL VEHICLES

EL CONNECTOR A



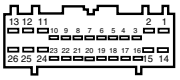
EL MODELS

EL CONNECTOR B



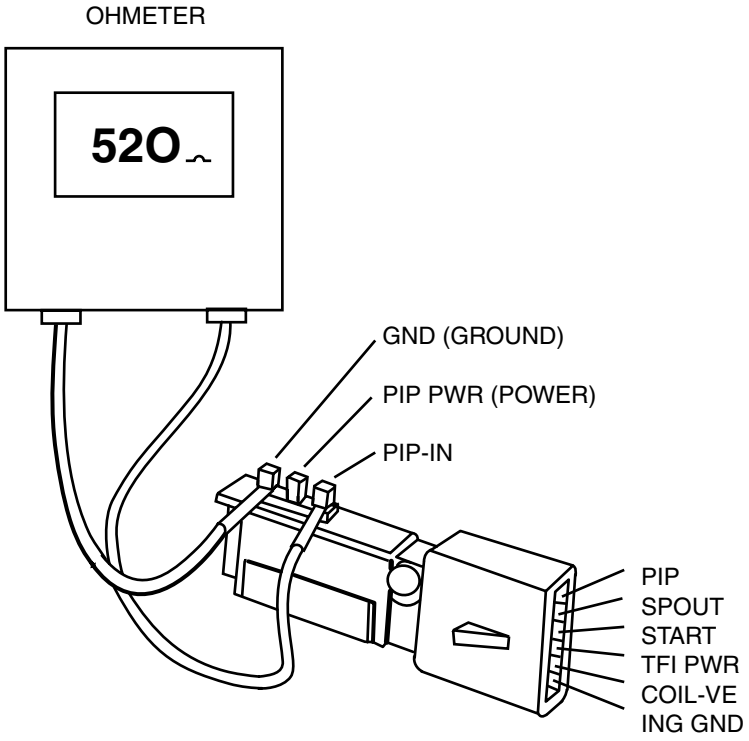
EL MODELS

EL CONNECTOR C



EL MODELS

F011 TFI module resistance test



MEASURE BETWEEN TERMINALS	RESISTANCE
GND — PIP IN	Greater than 500 Ohms
PIP PWR — PIP IN	Less than 2K Ohms
PIP PWR — TFI PWR	Less than 200 Ohms
GND — IGN GND	Less than 2 Ohms
PIP IN — PIP	Less than 200 Ohms

F012 Expected oscilloscope waveforms

Fig 1. SPark OUTput signal

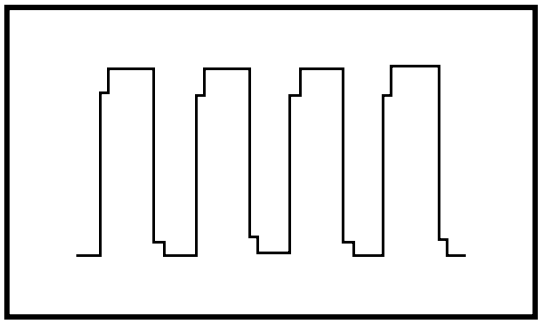


Fig 2. Profile Ignition Pickup signal

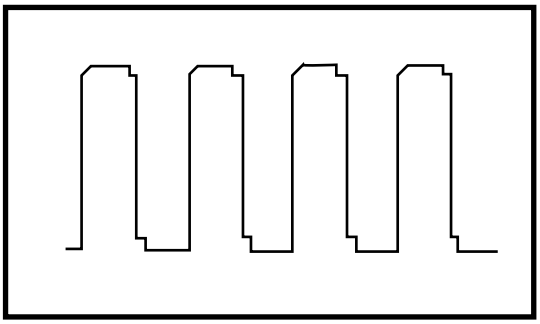


Fig3. INJector pulse signal

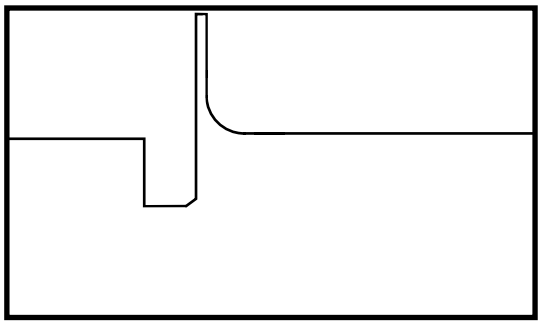
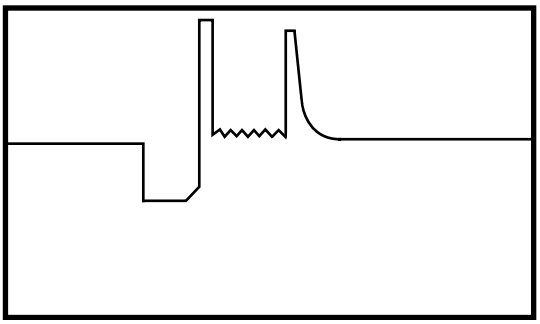
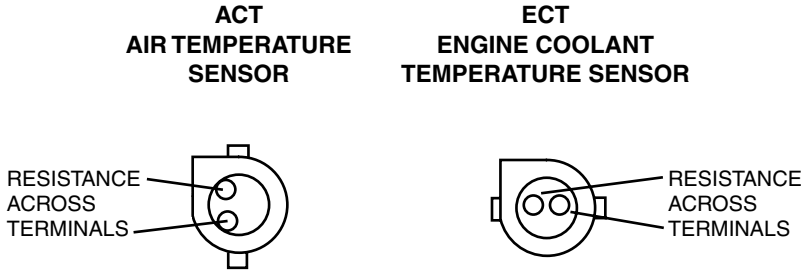


Fig 4. INJector pulse signal

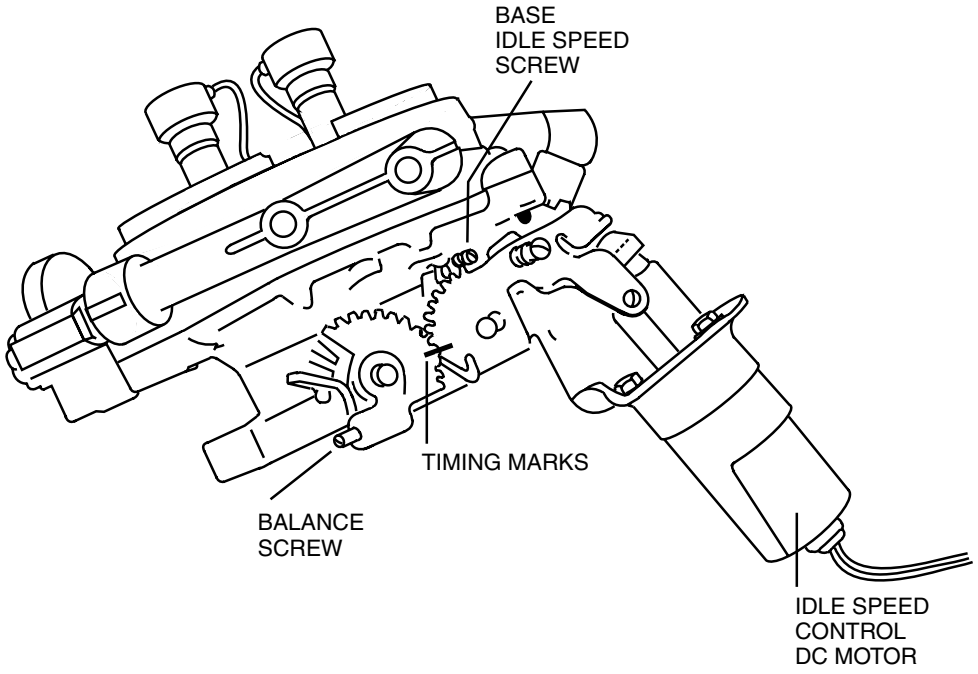


F013 Air charge temperature and engine coolant temperature sensor resistance chart and connector diagram

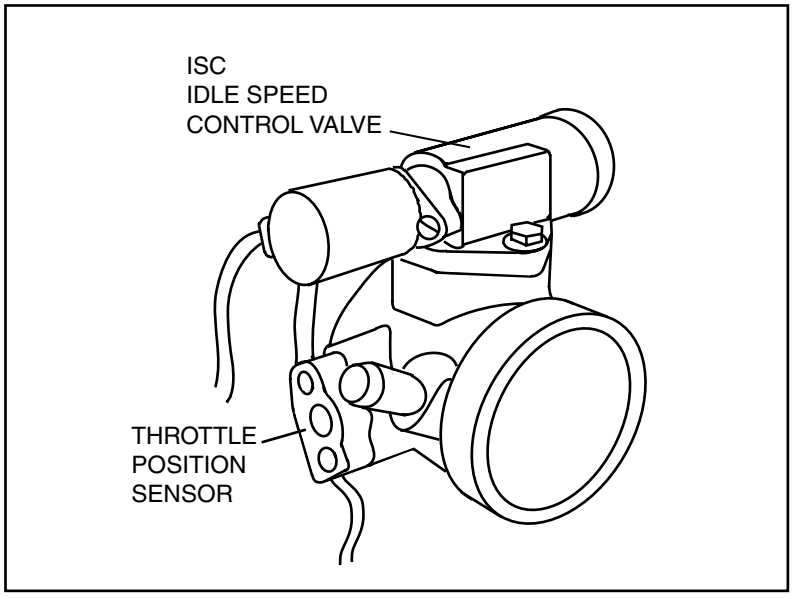


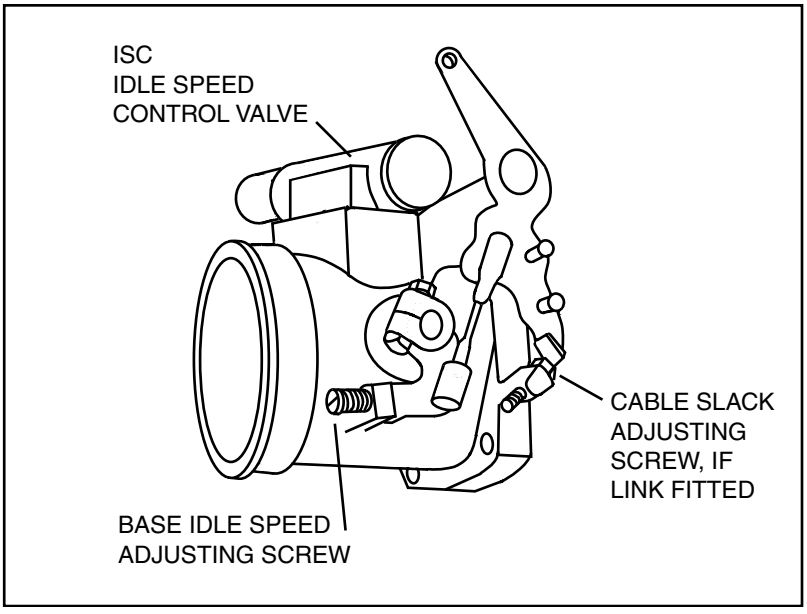
RESISTANCE AT TEMPERATURE °C	
58750	10
37300	20
24270	30
16150	40
7599	60
3843	80
2069	100

F014 EA/EB 6 cyl throttle body injection throttle body showing base idle screw

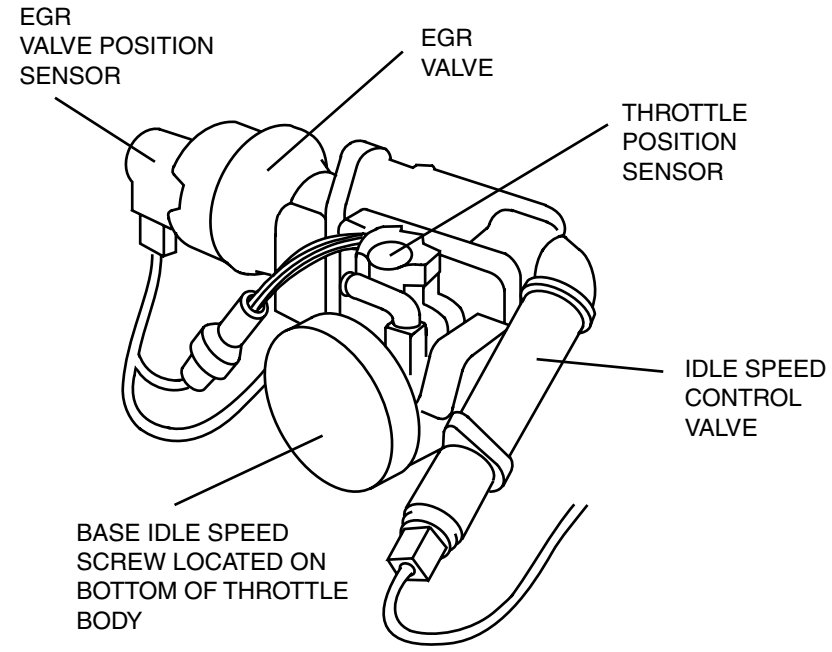


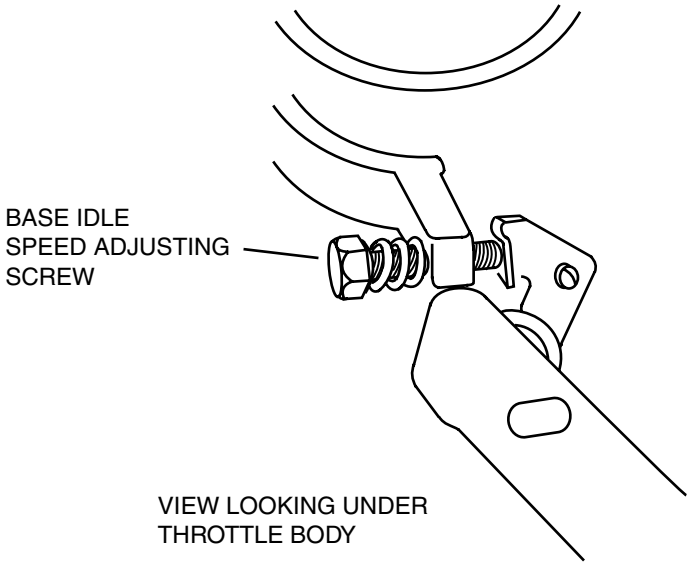
F015 EA to ED 6 cyl multipoint injection throttle body showing base idle screw



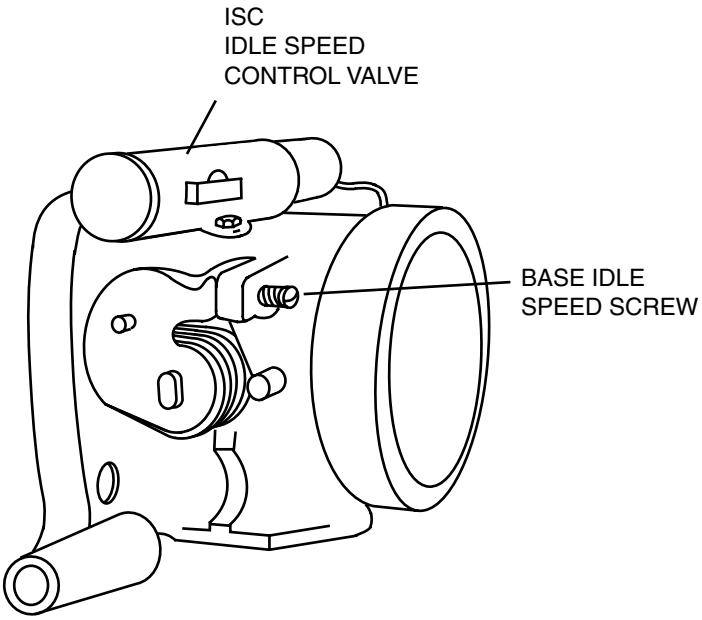


F016 EA to EL V8 throttle body showing base idle screw



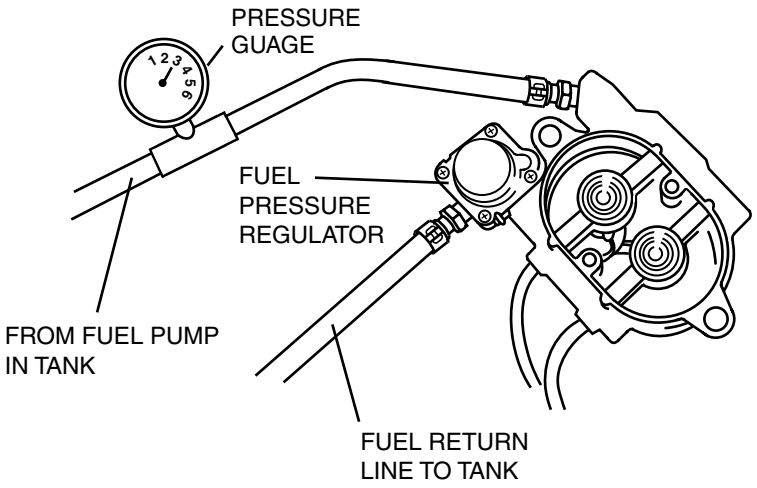


F017 EF/EL 6 cyl multipoint injection throttle body showing base idle screw

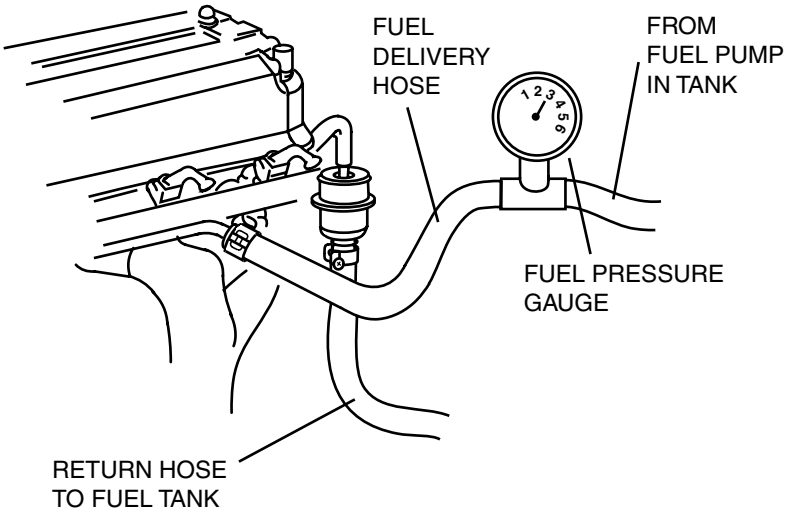


F018 EA to ED 6 cyl fuel pressure and volume testing

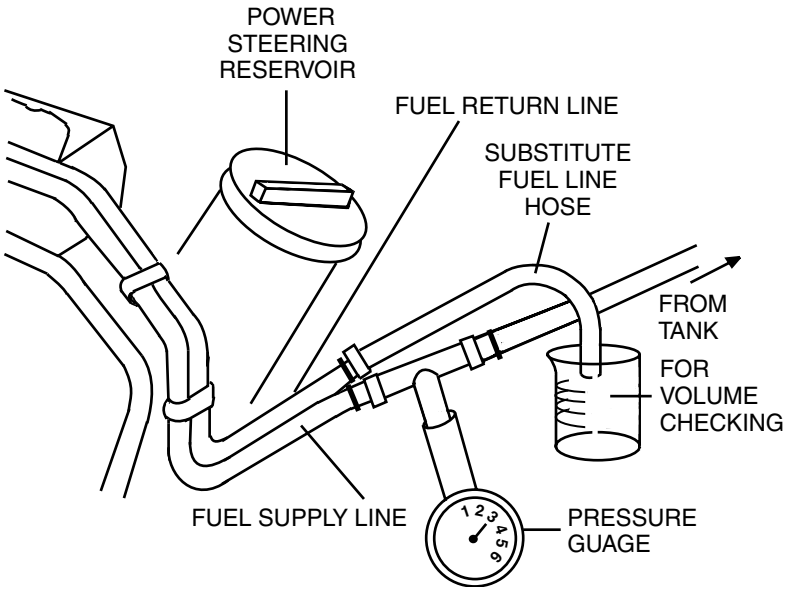
Throttle body injection



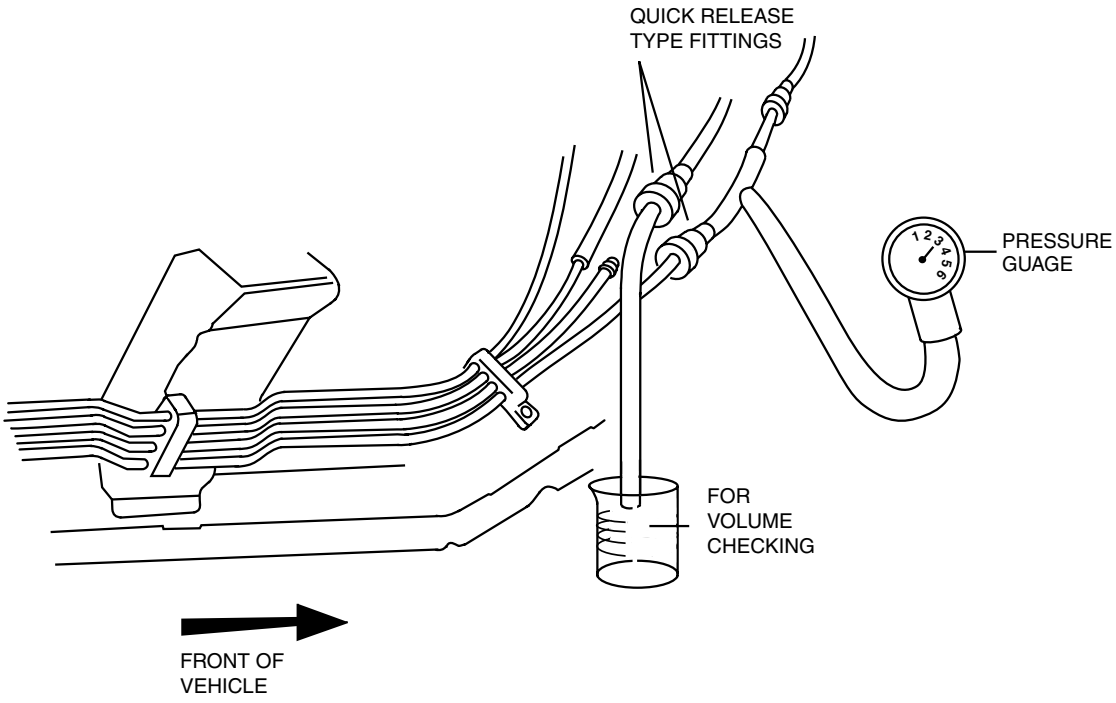
Multipoint injection



F019 EA to ED V8 fuel pressure and volume testing



F020 EF to EL fuel pressure and volume testing



E&OE

SNAP-ON TOOLS (AUSTRALIA) PTY LTD

ABN 55 010 793 683