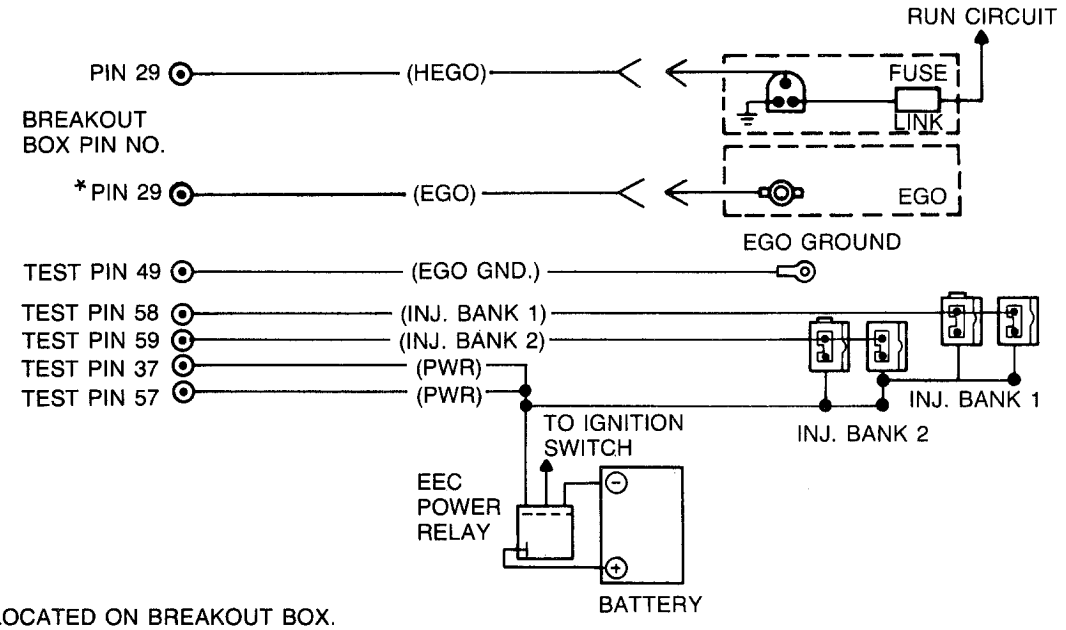
Fuel Control — EFI | Pinpoint Test | HA

HA



*TEST PINS LOCATED ON BREAKOUT BOX.
ALL HARNESS CONNECTORS VIEWED INTO MATING SURFACE.

STOP-WARNING

You should enter this Pinpoint Test Only when a Service Code 41 or 42 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test A or Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- EGO Sensor
- Harness Circuits EGO Grd., EGO, INJ BANK 1, INJ BANK 2, V PWR
- EGO Sensor Connection
  - — Code 42 start at HA8
  - — Code 41 start at HA11
- Vacuum Systems
- Fuel Injectors
- Processor Assembly

NOTE: Fuel contaminated engine oil may affect 41, 42 Service Codes. If this is suspected, remove the PCV from the valve cover and repeat the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — EFI | Pinpoint Test | HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA1 FUEL PRESSURE CHECK 1		
• Key Off, wait 10 seconds. • Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 241-310 kPa (35-45 psi). **For No Starts:** • If engine will not run, cycle the key from Off to On several times to increase fuel pressure.	Yes ▶ No ▶	GO to **HA2**. REFER to the Shop Manual Group 24 for electric fuel pump and Section 11 for fuel pressure regulator check.
HA2 FUEL PRESSURE CHECK 2		
• Fuel pressure must remain at 276 ± 34 kPa (40 ± 5 psi) for 60 seconds or longer after final Key Off.	Yes ▶ No ▶	GO to **HA3**. GO to **HA7**.
HA3 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HA1 • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5 second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	PRESSURE GAUGE READING: Pressure is approximately 10-20 psi at the end of 5 second crank cycle. Refer to note below. ▶ Pressure is greater or less than specified ▶	The EEC system is not the fault of the No Start. Fuel and spark are present. REFER to Section 2 for other No Start Routines. If complaint was runs rough/ misses or fuel code GO to **HA4**. GO to **HA4**.

NOTE: The colder the engine, the greater the pressure drop (i.e., an engine coolant temperature of 200°F equals approximately a 10 psi drop in 5 seconds. 60°F equals approximately a 20 psi drop in 5 seconds).

Fuel Control — EFI	Pinpoint Test	HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA4 HARNESS INJECTOR RESISTANCE CHECK • Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Connect Breakout box to harness. Leave processor disconnected. • DVOM on 200 ohm scale. • Measure the resistance of injector Bank 1 between test Pin 37 and test Pin 58 at the breakout box. Record reading. • Measure the resistance of injector Bank 2 between test Pin 37 and test Pin 59 at the Breakout box. Record reading. • Are both readings between 1.2 ohms and 1.8 ohms?	Yes ▶ No ▶	GO to **HA6**. GO to **HA5**.
HA5 ISOLATE FAULTY INJECTOR CIRCUIT • Key Off. • Breakout box installed. • Leave processor disconnected. • DVOM on 200 ohm scale. • Disconnect all injectors on suspect Bank. Measure resistance of each injector by connecting one injector at a time, and reading the resistance between test Pins 37 and 58 at the Breakout box for Bank 1 or test Pins 37 and 59 at the breakout box for Bank 2. • Are all readings between 2.0 and 2.7 ohms?	Yes ▶ No ▶	GO to **HA6**. SERVICE the harness/connectors on the suspect injector for opens or shorts. If OK, REPLACE injector. RERUN Quick Test.

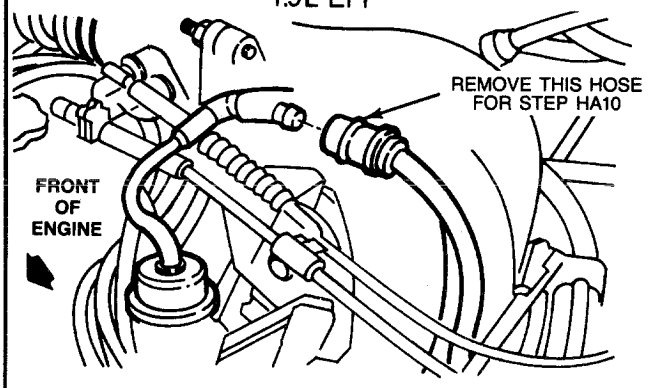
Fuel Control — EFI | Pinpoint Test | HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA6 INJECTOR DRIVE SIGNAL CHECK		
Requires standard non-powered 12 volt test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Connect test lamp between test Pin 37 and test Pin 58 at the Breakout box. • Crank or start engine. • Repeat above test between test Pin 37 and test Pin 59 at the Breakout box.	Dim glow at light on both tests ▶ No light on one or both tests ▶ Bright light on one or both tests ▶	GO to HA7. VERIFY 12-volt battery power at Pins 37 and 57. If OK, REPLACE processor. RERUN Quick Test. CHECK circuits Bank 1 and Bank 2 for shorts to ground. If OK, REPLACE processor. RERUN Quick Test.
HA7 INJECTOR BALANCE TEST		
• Connect tachometer to engine. Disconnect ISC. Run engine at 2000 rpm. Use throttle body stop screw to set engine speed. • Disconnect and reconnect the injectors one at a time; note rpm drop for each injector. • Does each injector produce at least a 150 rpm drop? • Reconnect ISC. Reset curb idle. Refer to VECI decal.	Yes ▶ No ▶	Fuel delivery OK. Problem is with area common to all cylinders, i.e.: Air/ vacuum leak, fuel contamination, EGR. REPLACE faulty injector. RERUN Quick Test.
HA8 FUEL CONTROL — ALWAYS RICH: CODE 42		
• Key Off, wait 10 seconds. • **NOTE: Non-EEC areas could cause a code 42.** **Check for:** **— Fuel contaminated engine oil** **— Ignition caused misfire** **— CANP problems** • Disconnect vehicle harness at the EGO sensor. Using a jumper wire, ground vehicle harness EGO circuit at the EGO sensor to the engine block. • Repeat Engine Running Self-Test. • Service code 41 results.	Yes ▶ No ▶	GO to HA10. GO to HA9.

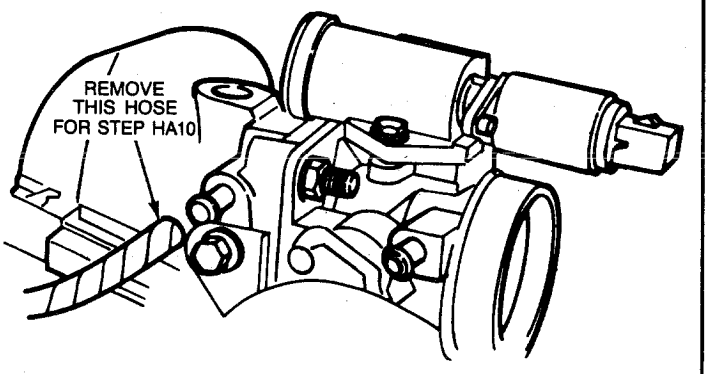
Fuel Control — EFI | Pinpoint Test | HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA9 HARNESS CHECK		
• Key Off, wait 10 seconds. • Install Breakout box. • Measure resistance of EGO ground circuit between test Pin 49 at the Breakout box and EGO ground at engine block. • Measure resistance of EGO circuit between test Pin 29 at the Breakout box and EGO harness connector. • Both circuits less than 5 ohms.	Yes ▶ No ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test. CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.
HA10 EGO CHECK		
• DVOM on 20V scale. • With EGO sensor disconnected from the vehicle harness, connect a DVOM from EGO sensor to engine ground. • Run the engine at 2000 rpm for 1 minute. While observing DVOM, disconnect the manifold vacuum hose indicated below. • Meter indicates less than 0.4V.	Yes ▶ No ▶	EGO sensor OK. GO to **HA1**. REPLACE EGO sensor. RERUN Quick Test.

1.9L EFI



2.3L TURBO



Fuel Control — EFI | Pinpoint Test | HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA11 FUEL CONTROL — ALWAYS LEAN: CODE 41 **NOTE: Vacuum/air leaks in non-EEC areas could cause a code 41. Check for:** **— Leaking vacuum actuator (eg: A/C control motor)** **— Engine sealing** **— EGR system** **— PCV system** **— Unmetered air leak between air meter and throttle body** **— Lead contaminated EGO sensor** • Key Off. DVOM on 20V scale. Disconnect EGO sensor from vehicle harness. Connect DVOM to EGO sensor and engine ground. Remove air cleaner to gain access to air meter inlet. Using a standard wood lead pencil, prop the air meter door part-way open. • Start the engine and run at approximately 2000 rpm for 2 minutes. • Does the DVOM read greater than 0.5V at the end of 1 minute?	Yes ▶ No ▶	GO to **HA12**. REPLACE EGO sensor. RERUN Quick Test.
HA12 HARNESS CHECK EGO CIRCUITS • Key Off. • Install Breakout box. Processor disconnected. • Measure resistance of EGO circuit between test Pin 49 at the Breakout box and engine block ground. Also EGO circuit between EGO connector and test Pin 29 at the Breakout box. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	GO to **HA13**. SERVICE/CORRECT as necessary any circuit greater than 5 ohms. RERUN Quick Test.
HA13 CHECK EGO CIRCUIT FOR SHORT TO GROUND • Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms scale. • Measure the resistance between test Pin 29 and test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶ Reading is less than 10,000 ohms ▶	GO to **HA14**. CORRECT cause of resistance to ground. RERUN Quick Test.

Fuel Control — EFI

Pinpoint Test HA

TEST STEP	RESULT ▶	ACTION TO TAKE
HA14 ATTEMPT TO ELIMINATE CODE 41		
• Key Off. • Reconnect EGO sensor. Remove air cleaner to gain access to air meter inlet. Using a standard wood lead pencil, prop the air meter door part-way open. • Start the engine and run at approximately 2000 rpm for 2 minutes. • Perform Engine Running Quick Test. • Is code 41 present?	Yes ▶	INSPECT for corrosion or damaged pins. If OK, REPLACE processor. RERUN Quick Test.
	No ▶	EGO input circuit OK. GO to **HA1**.

Fuel Control — EFI | Pinpoint Test | HA

HA20 CONTINUOUS TESTING: CODE 41/42

41 — EGO indicated the fuel system was lean for more than 15 seconds when the system should have been in closed loop fuel control.

42 — EGO indicated the fuel system was rich for more than 15 seconds when the system should have been in closed loop fuel control.

*CLOSED LOOP — Fuel control under the influence of the EGO sensor.

*OPEN LOOP — Fuel control NOT under the influence of the EGO sensor.

Before attempting to correct a fuel control code, 41/42, diagnose all other drive complaints first, eg., rough idle, misses, etc.

NOTE: The fuel control code may help in this diagnosis.

Using the fuel control service code, isolate the cause of the fuel control problem.

Some areas to check are:

- Unmetered Air: Vacuum leaks/intake air leaks.
  — Canister Purge System.
  — PCV System.
  — Engine sealing.
  — Air leaks between VAF meter and throttle body.

- EGO Fuel Fouled: Whenever an over-rich fuel condition has been experienced (fuel fouled spark plugs), make a thorough check of the ignition system. In the event the EGO sensor is suspected of being fuel fouled (low output, slow response), run the vehicle at sustained high speeds (within legal limits) followed by a few hard accelerations. This will burn off EGO contamination and restore proper EGO operation.

- Fuel Pressure: Perform Pinpoint Test Step **HA1**.

- Ignition System: Always in default spark (10 degrees). Refer to Quick Test Step **4.0**

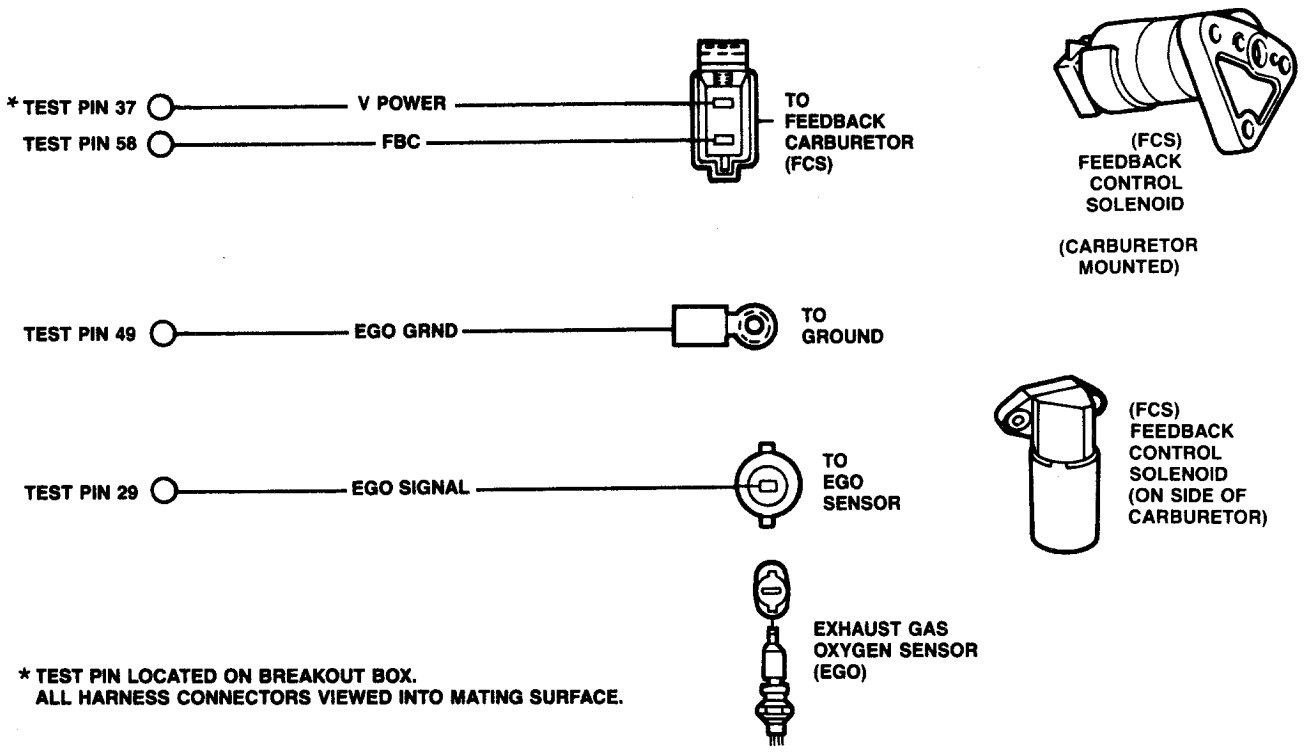
- Improper Fueling: Lead fouled EGO sensor.

- TP Sensor: Not moving (mechanical damage). Connect DVOM to test Pin 47 and to test Pin 46. Key to Run. Observe DVOM while moving the throttle. Reading must increase with increase in throttle opening. If not correct, REPLACE as necessary.

- If at this point, the drive concern is still present, perform Steps **HA3** through **HA6** only.

Fuel Control (FBC)	Pinpoint Test	HB

HB



STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 16, 41, 42, 43 or 47 in Quick Test Step 5.0 or 6.0 is received or when directed here from Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Fouled Spark Plugs
- Distributor Cap and Rotor
- Ignition Coil
- Spark Plug Wires
- CANP Problems
- PCV Valve
- Oil Contamination
- EGR Valve and Gasket
- Air Filter
- Fuel Filter
- Fuel Pump and Pressure
- Manifold Leak, Intake/Exhaust
- Engine Not at Normal Operating Temperature
- Carburetor
- Choke, Sticking Electrical

This Pinpoint Test is intended to diagnose only the following:

- EGO Sensor Connection
- EGO Sensor
- Harness Circuits: VPWR, FBC, EGO Control, EGO Signal
- Impact of Thermactor Air
- FBC Solenoid
- Vacuum System (EEC Only)
- Choke Circuit
- Processor Assembly

Fuel Control (FBC) | Pinpoint Test | HB

TEST STEP	RESULT ▶	ACTION TO TAKE
FAULT CODE 41		
HB1 VERIFY VEHICLE PREPARATION		
• Did vehicle run for more than 2 minutes before performing Quick Test?	Yes ▶	GO to **HB2**.
	No ▶	PREPARE vehicle, RERUN Quick Test.
HB2 TRY TO ELIMINATE CODE 41 BY REMOVING THERMACTOR AIR SUPPLY		
• Key Off. • Reconnect EGO sensor and processor to harness. • Disconnect Thermactor air supply hose at the air pump and cap the hose. • Run engine running Quick Test.	Code 41 is present ▶	GO to **HB3**. Leave Thermactor disconnected.
	Code 44 is present ▶	RETURN to Quick Test Step **5.0B**.
	Code 11 or 42 is present ▶	HANDLE as Code 44. RETURN to Quick Test Step **5.0B**.
HB3 CHECK FCS SOLENOID		
• Key Off, wait 10 seconds. • Thermactor disconnected. • Disconnect vehicle harness from FCS solenoid. • Perform Engine Running Quick Test. • Check for Code 41. **NOTE: Ignore all other codes at this time.**	Code 41 is not present ▶	GO to **HB5**.
	Code 41 is present ▶	GO to **HB4**.
HB4 FORCE SYSTEM RICH		
• Key Off, wait 10 seconds. • FCS and Thermactor disconnected. • Run for 2 minutes at part throttle. • Key Off, wait 10 seconds. • Perform Engine Running Quick Test while holding choke plate three-quarters closed **(Do not stall engine).** • Check for Code 41.	Code 41 is not present ▶	REPLACE FCS. RERUN Quick Test if Code 41 is still present. REFER to Shop Manual, Group 24 for carburetor diagnostics.
	Code 41 is present ▶	GO to **HB6**. HOOK UP all disconnected components.

Fuel Control (FBC) | Pinpoint Test | HB

TEST STEP	RESULT ▶	ACTION TO TAKE
HB5 CHECK FBC CIRCUIT FOR SHORT TO GROUND		
• Key Off, wait 10 seconds. • Connect Thermactor. • Leave FCS solenoid disconnected. • Disconnect processor 60 Pin connector, inspect for damaged pins, corrosion, loose wires, etc. • Install Breakout box, leave processor disconnected. • DVOM on 200,000 ohm scale. • Measure resistance between test Pin 58 and test Pins 20, 40 and 46 at the Breakout box.	Any reading is less than 10,000 ohms ▶ All readings are 10,000 ohms or greater ▶	SERVICE circuit shorts. RERUN Quick Test. REPLACE processor, RERUN Quick Test. HOOK UP all disconnected components.
HB6 FORCE EGO RICH		
• Key Off, EGO sensor disconnected. • Run engine for 2 minutes. • DVOM on 20V scale. • With engine running hold choke plate three-quarters closed **(Do not stall engine).** • Measure voltage between EGO sensor pig tail terminal and battery negative terminal.	Reading is less than .45V ▶ Reading is .45V or greater ▶	REPLACE EGO sensor. RERUN Quick Test. GO to **HB7**.
HB7 CHECK CONTINUITY OF EGO CIRCUIT AND EGO GROUND CIRCUIT		
• Key Off, wait 10 seconds. • EGO sensor disconnected. • Disconnect processor 60 Pin connector, inspect for damaged pins, corrosion, loose wires, etc. Service as necessary. • Install Breakout box, leave processor disconnected. • DVOM on 200 ohm scale. • Measure resistance between test Pin 29 at the Breakout box and EGO circuit at the EGO vehicle harness connector. • Measure resistance between test Pin 49 and test Pins 40 and 60 at the Breakout box.	All readings are less than 5 ohms ▶ Any reading is 5 ohms or greater ▶	GO to **HB8**. SERVICE open in circuit. REMOVE Breakout box. RECONNECT EGO and processor. RERUN Quick Test.

Fuel Control (FBC) | Pinpoint Test | HB

TEST STEP	RESULT ▶	ACTION TO TAKE
HB8 CHECK EGO CIRCUIT FOR SHORT		
• Key Off, wait 10 seconds. • Thermactor and FCS reconnected. • Disconnect vehicle harness from EGO sensor. • DVOM on 200,000 ohm scale. • Measure resistance between EGO circuit at EGO vehicle harness connector and battery negative terminal.	Reading is less than 10,000 ohms ▶	SERVICE circuit short. REMOVE Breakout box. RECONNECT processor and EGO sensor. RERUN Quick Test.
	Reading is 10,000 ohms or greater ▶	REPLACE processor. RECONNECT EGO sensor and processor. RERUN Quick Test.
FAULT CODES 42/47		
HB20 CHECK CHOKE		
• Does choke function properly without sticking or binding?	No ▶	SERVICE choke as required. REFER to Section 4. RERUN Quick Test.
	Yes ▶	GO to **HB21**.
HB21 GENERATE KNOWN FAULT		
• Run engine for 2 minutes at part throttle. • Key Off, wait 10 seconds. • Disconnect harness from EGO sensor. Jumper vehicle harness EGO circuit to ground. • Rerun Engine Running Quick Test. • Check for Code 41. Ignore all other codes at this time.	Code 41 is present ▶	GO to **HB22**.
	Code 41 is not present ▶	GO to **HB30**.
HB22 EGO CHECK		
• Key Off, wait 10 seconds. • Disconnect a 7/32 inch vacuum line (creates a manifold vacuum leak). • DVOM on 20V scale. • With EGO sensor disconnected from the vehicle harness, connect a DVOM from EGO sensor to engine ground. • Run the engine at 2000 rpm for 2 minutes while observing DVOM. • Does meter indicate less than 0.4V?	Yes ▶	EGO sensor OK. GO to **HB23**.
	No ▶	REPLACE EGO sensor. RECONNECT vacuum hose. RERUN Quick Test.

Fuel Control (FBC) | Pinpoint Test | HB

TEST STEP	RESULT ▶	ACTION TO TAKE
HB23 CHECK FCS SOLENOID		
• Key Off, wait 10 seconds. • Vacuum hose reconnected. • Disconnect FCS solenoid. • DVOM on 200 ohm scale. • Measure resistance between terminals on the FCS solenoid. • Is resistance within the following ranges: 15 to 30 ohms: 2150 carburetor 30 to 60 ohms: YFA carburetor	Yes ▶ No ▶	RECONNECT FCS. GO to **HB24**. REPLACE FCS. RERUN Quick Test.
HB24 CHECK V PWR CIRCUIT FOR POWER		
• Key Off, wait 10 seconds. • Deactivate Quick Test. • Disconnect harness from FCS. • DVOM on 20V scale. • Key On, Engine Off. • Measure voltage between VPWR circuit at FCS harness connector and battery negative terminal.	Reading is less than 10V ▶ Reading is 10V or greater ▶	RECONNECT FCS solenoid. SERVICE open circuit. RERUN Quick Test. GO to **HB25**.
HB25 CHECK FOR SHORT TO POWER		
• Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector, inspect connectors for damaged pins, corrosion, loose wires, etc. Service as necessary. • Install Breakout box, leave processor disconnected. • DVOM on 200,000 ohm scale. • Leave FCS solenoid disconnected, measure resistance between test Pin 58 and test Pin 37 at the Breakout box.	Resistance reading is 10,000 ohms or greater ▶ Resistance reading is less than 10,000 ohms ▶	GO to **HB26**. SERVICE short to power. RERUN Quick Test.
HB26 CHECK CONTINUITY OF FBC CIRCUIT		
• Key Off, wait 10 seconds. • Breakout box installed. • FCS disconnected. • DVOM on 200 ohm scale. • Measure resistance between FBC circuit at the FCS harness connector and test Pin 58 at the Breakout box.	Reading is less than 5 ohms ▶ Reading is 5 ohms or greater ▶	REMOVE Breakout box. RECONNECT FCS solenoid. REPLACE processor and RERUN Quick Test. SERVICE open circuit. REMOVE Breakout box. RECONNECT processor and FCS solenoid. RERUN Quick Test.

Fuel Control (FBC) | Pinpoint Test | HB

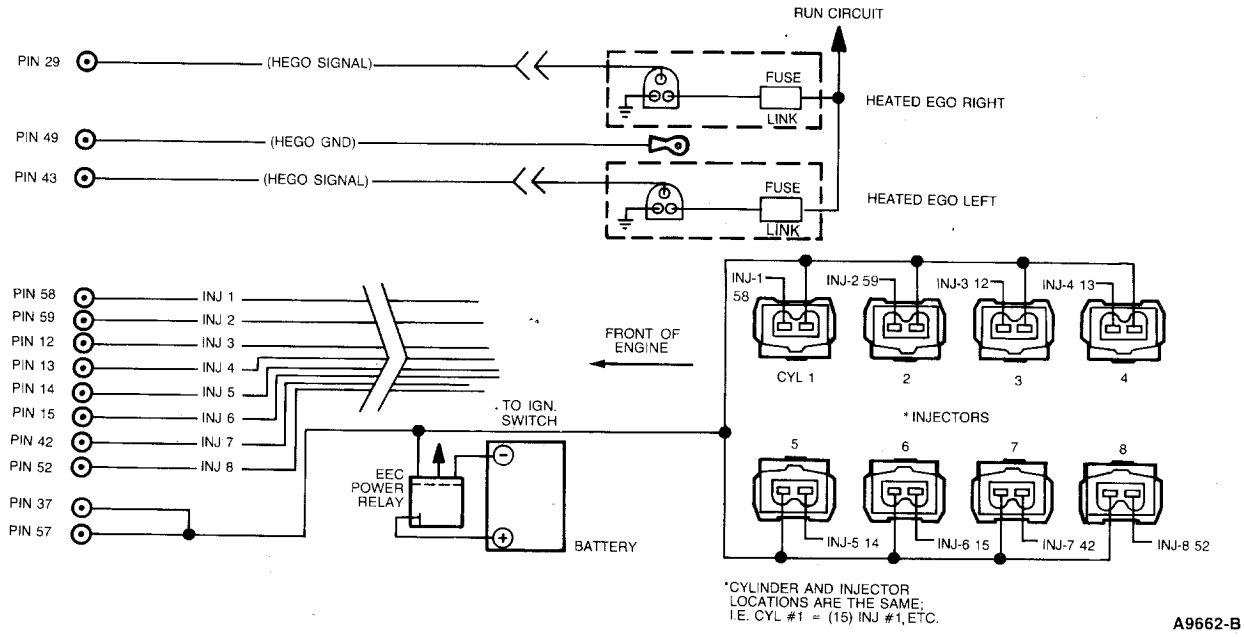
TEST STEP	RESULT ▶	ACTION TO TAKE
HB30 CHECK CANISTER PURGE		
• Key Off, wait 10 seconds. • Disconnect vacuum hose between canister purge solenoid and canister, plug both ends. • Rerun Engine Running Self-Test. • Is service code 42 still present?	Yes ▶ No ▶	GO to **HB31**. GO to **KD1**.
HB31 HARNESS CHECK		
• Key Off, wait 10 seconds. • Install Breakout box. • Measure resistance between test Pin 49 at the Breakout box and EGO ground at engine block. • Measure resistance between test Pin 29 at the Breakout box and EGO vehicle harness connector. • Both circuits less than 5 ohms.	Yes ▶ No ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test. CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.
FAULT CODE 43		
HB40 WARM ENGINE		
• Run vehicle at 2000 rpm for 2 minutes. • Key Off, wait 10 seconds. • Perform Engine Running Quick Test.	Code 43 is not present ▶ Code 43 is present ▶	SERVICE other codes as necessary. GO to **HB41**.
HB41 CHECK EXHAUST LEAKS		
• Are there any exhaust leaks at manifold or inlet pipe?	Yes ▶ No ▶	SERVICE as necessary. RERUN Quick Test. GO to **HB42**.
HB42 CHECK IDLE QUALITY		
• Start vehicle, let engine idle. • Does engine idle quality deteriorate and remain poor during and after the Quick Test?	Yes ▶ No ▶	REFER to Section 4, Carburetors. REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 5.0L SEFI

Pinpoint Test

HC

HC



STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 41, 91 or 42, 92 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test A or Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- HEGO Sensor
- HEGO Sensor Connection
- Vacuum Systems
- Fuel Injectors
- Processor Assembly
- Harness Circuits: HEGO GRD, HEGO, INJ 1-8 and VPWR

NOTE: Fuel-contaminated engine oil may affect 41, 91 and 42, 92 Service Codes, so if it is suspected, remove the PCV from the valve cover, and rerun the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — 5.0L SEFI | Pinpoint Test | HC

HC

DESCRIPTION

The cylinder balance test switches each injector "OFF" and "ON," one at a time. Service codes correspond to cylinder number. e.g., service code 30 indicates a problem with cylinder number 3. Causes could include processor, harness and injector, as well as **NON-EEC** items such as fuel, plugs, ignition plug wires, rotor, cap, etc.

SERVICE CODE	90	10	20	30	40	50	60	70	80	77*
Cylinder Number	Pass	1	2	3	4	5	6	7	8	Rerun Test
Breakout Box Pin Number		58	59	12	13	14	15	42	52	
Injector Number		1	2	3	4	5	6	7	8	

***If throttle is touched (moved) during cylinder balance test, service code 77 will appear, indicating test was not completed.**

TEST STEP	RESULT ▶	ACTION TO TAKE
HC1 CYLINDER BALANCE TEST		
• Perform Engine Running Quick Test — to enter cylinder balance test; goose throttle (brief wide-open throttle) immediately after last service code is sent from Quick Test. • Is service code 90 present from cylinder balance test?	Yes ▶	GO to HC10.
	No ▶	GO to HC5.
HC2 FUEL PRESSURE CHECK		
• Key Off, wait 10 seconds. • Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 241-310 kPa (35-45 psi). • Fuel pressure must remain at 276 ± 34 kPa (40 ± 5 psi) for 60 seconds after final key off. **For No Starts:** • If engine will not run, cycle the key from Off to On several times.	Fuel pressure is within specification ▶	GO to HC3.
	Fuel pressure is not 241-310 kPa (35-45 psi) ▶	REFER to Shop Manual Group 24 for electric fuel pump and Section 11 for fuel pressure regulator check.
	Fuel pressure remains at 276 ± 34 kPa (40 ± 5 psi) for 60 sec. or longer ▶	GO to HC1.

Fuel Control — 5.0L SEFI

Pinpoint Test

HC

TEST STEP	RESULT ▶	ACTION TO TAKE
HC3 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HC2. • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5 second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	PRESSURE GAUGE READING: Pressure is approximately 10-20 psi at the end of 5 second crank cycle; Refer to note below ▶ Pressure is greater or less than specified ▶	The EEC system is not the fault of the No Start; fuel and spark are present; REFER to Section 2 for other No Start Routines. If complaint was runs rough, misses or fuel code, GO to **HC4**. GO to **HC5**.
NOTE: The colder the engine, the greater the pressure drop (i.e., an engine coolant temperature of 200°F equals approximately a 10 psi drop in 5 seconds. 60°F equals approximately a 20 psi drop in 5 seconds).		
HC4 RUN CYLINDER BALANCE TEST		
• Key Off. • Perform Engine Running Quick Test. • To enter cylinder balance test; goose throttle (brief wide open throttle) immediately after last code is sent. • Is code 90 present?	Yes ▶ No ▶	GO to Diagnostic by symptom in appropriate engine supplement section. GO to **HC5**.

Fuel Control — 5.0L SEFI | Pinpoint Test | HC

TEST STEP	RESULT ▶	ACTION TO TAKE
HC5 HARNESS/INJECTOR RESISTANCE CHECK • Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector and inspect for damaged Pins, corrosion, loose wires. Service as necessary. • Connect Breakout box to harness. Leave processor disconnected. • DVOM on 200 ohm scale. • Measure the resistance of the suspect injector circuit between the injector circuit test Pin at the Breakout box and test Pins 37 and 57 at the Breakout box. • Is resistance reading between 15.0 ohms and 19.0 ohms? **NOTE: Refer to chart in test step HC3 for appropriate suspect injector circuit Pin number.**	Yes ▶ No ▶	GO to **HC6**. SERVICE the harness/connectors on the suspect injector for OPENS, if OK, replace injector. RERUN Quick Test.
HC6 INJECTOR HARNESS SHORT CHECK • Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohm scale. • Measure the resistance of the suspect injector circuit between the injector circuit test Pin at the Breakout box and test Pins 40 and 60 at the Breakout box. • Is resistance greater than 10,000 ohms?	Yes ▶ No ▶	GO to **HC7**. Service short to ground. RERUN Quick Test.
HC7 INJECTOR DRIVE SIGNAL CHECK Requires standard non-powered 12-volt test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Connect test lamp between test Pin 37 and the suspect injector(s) circuit test Pin at the Breakout box. • Crank or start engine. • Is glow on light dim?	Yes ▶ No (Bright light or no light) ▶	REPLACE injector. RERUN Quick Test and cylinder balance test. Replace processor. Rerun Quick Test and cylinder balance test.

Fuel Control — 5.0L SEFI

Pinpoint Test

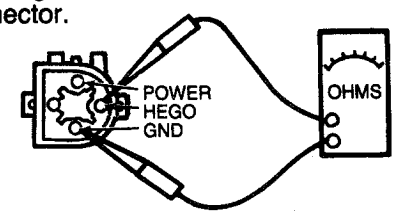
HC

TEST STEP	RESULT ▶	ACTION TO TAKE
HC10 FUEL CONTROL — ALWAYS LEAN: CODE 41 LEFT EGO, OR 91 RIGHT EGO		
NOTE: Vacuum/air leaks in non-EEC areas could also cause code 41, or 91. Check for: — Leaking vacuum actuator (e.g.: A/C control motor) — Engine sealing — EGR system — PCV system — Unmetered air leak between air meter and throttle body — Lead contaminated EGO sensor • Key Off. DVOM on 20V scale. Disconnect appropriate EGO sensor from vehicle harness. Connect DVOM to EGO sensor and engine ground. • Apply 14 in. Hg to MAP. • Start the engine. Does the DVOM read greater than 0.5V?	Yes ▶ No ▶	GO to HC11. REPLACE EGO sensor. RERUN Quick Test.
HC11 LEFT EGO, OR RIGHT EGO AND EGO GROUND CONTINUITY CHECK		
• Key Off. • Install Breakout box. Processor disconnected. • DVOM on 200 ohm scale. • Measure resistance between test Pin 49 at Breakout box and engine block ground. • Measure resistance between test Pin 29 at Breakout box and HEGO signal at vehicle harness connector and/or measure resistance between test Pin 43 at Breakout box and HEGO signal at vehicle harness connector. • Are all readings less than 5 ohms?	Yes ▶ No ▶	GO to HC12. SERVICE open in appropriate circuit. RERUN Quick Test.
HC12 CHECK LEFT AND/OR RIGHT HEGO CIRCUIT FOR SHORT TO GROUND		
• Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms scale. • Measure resistance between test Pin 29 (R-HEGO) and test Pin 40 or between test Pin 43 (L-HEGO) and test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶ Reading is less than 10,000 ohms ▶	GO to HC13. CORRECT cause of resistance to ground. RERUN Quick Test.

Fuel Control — 5.0L SEFI

Pinpoint Test

HC

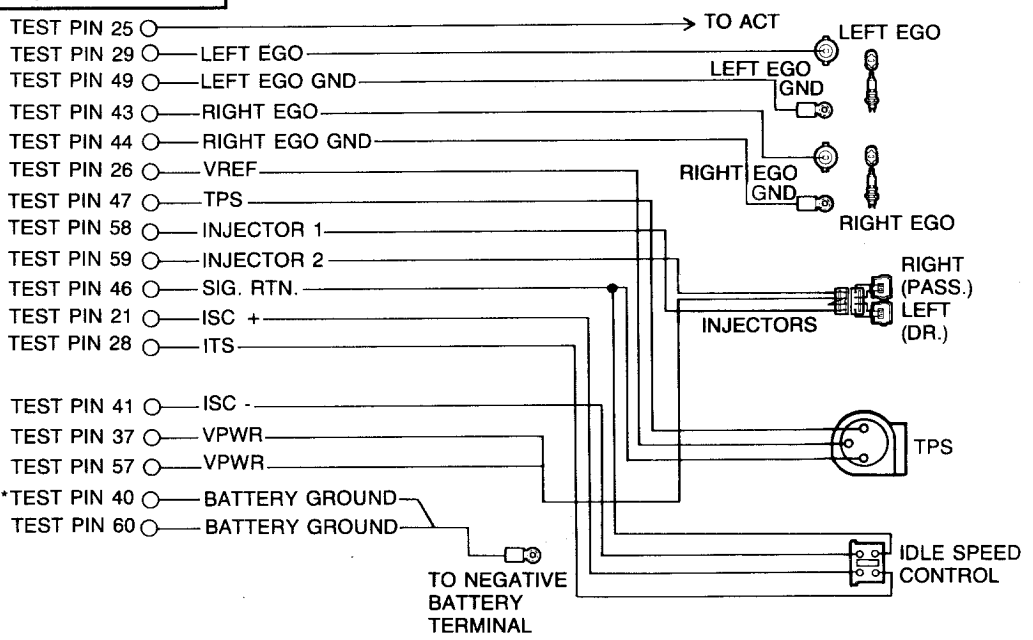
TEST STEP	RESULT ▶	ACTION TO TAKE
HC13 LEFT OR RIGHT HEGO CIRCUIT SHORT TO HEGO CIRCUIT GROUND		
• Key Off. • Breakout box installed. • DVOM to 200,000 ohm scale. • Disconnect appropriate HEGO. • Measure resistance between HEGO signal and HEGO ground circuit at the HEGO sensor connector.  • Is resistance greater than 10,000 ohms?	Yes ▶ No ▶	Start vehicle and run at 2000 rpm for 2 minutes, RERUN Quick Test if code 41 or 91 is present REPLACE processor. If code 41 or 91 is not present GO to **HC20**. REPLACE appropriate HEGO, RERUN Quick Test.
HC15 FUEL CONTROL — ALWAYS RICH: CODE 42 OR 92		
• Key Off, wait 10 seconds. • NOTE: Non-EEC areas could cause a code 42 or 92. Check for: — Fuel contaminated engine oil — Ignition caused misfire — CANP problems • Disconnect vehicle harness at the HEGO sensor. Using a jumper wire, ground vehicle harness HEGO circuit to the engine block. • Repeat Engine Running Self-Test. • Service code 41 or 91 results.	Yes ▶ No ▶	REPLACE HEGO. RERUN Quick Test if code 42 or 92 is present. GO to **HC2**. GO to **HC16**.

Fuel Control — 5.0L SEFI | Pinpoint Test | HC

TEST STEP	RESULT	ACTION TO TAKE
HC16 HEGO HARNESS CIRCUIT CHECK • Key Off, wait 10 seconds. • Install Breakout box. • Measure resistance between test Pin 49 (HEGO ground) and engine block. • Measure resistance between test Pin 29 at the Breakout box and HEGO vehicle harness connector for Code 92. • Measure resistance between test Pin 43 at the Breakout box and HEGO vehicle harness connector for Code 42. • Are all circuits less than 5 ohms?	Yes ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test.
	No ▶	CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.
HC20 CHECK HEATER ELEMENT RESISTANCE ON BOTH HEATED EGOS • Key Off, Engine Off. • DVOM on 200 ohm scale. • Measure resistance between Run circuit and ground at both HEGO sensor connectors at room temperature.	Both readings between 2.5 and 5.0 ohms ▶	GO to **HC21**.
	Either reading less than 2.5 or greater than 5.0 ohms ▶	REPLACE appropriate HEGO sensor. RERUN Quick Test.
HC21 CHECK FOR POWER AT BOTH HEGO HARNESS CONNECTORS • Key On, Engine Off. • DVOM on 20V scale. • Connect positive lead to run circuit and negative lead to ground at both HEGO vehicle harness connectors.	Both readings 10.5V or greater ▶	HEGO's sensor system OK, RETURN to Section 2.
	Either reading less than 10.5V ▶	GO to **HC22**.
HC22 CHECK CONTINUITY OF GROUND TO BOTH HEGO CONNECTORS • Key Off, wait 10 seconds. • DVOM on 200 ohm scale. • Measure resistance of both ground circuits from HEGO sensor connector to battery ground.	Any reading less than 5.0 ohms ▶	SERVICE open in run circuit. RERUN Quick Test.
	Any reading 5.0 ohms or greater ▶	SERVICE open in ground circuit. RERUN Quick Test.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

HD | **REFERENCE DRAWING**



*TEST PINS LOCATED ON BREAKOUT BOX.
ALL HARNESS CONNECTORS VIEWED INTO MATING SURFACE.

A9664-B

STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 41, 91, 42 or 92 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test A or by Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- EGO Sensors
- EGO Signals and Ground Circuits
- EGO Sensor Connections
- Fuel Injectors
- Processor Assembly

NOTE: Fuel-contaminated engine oil may affect 41, 91, 42 and 92 Service Codes, so if it is suspected, remove the PCV from the valve cover, and rerun the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD1 KEY POWER VOLTAGE CHECK		
• Key On. • Processor connected. • DVOM on 20V scale. • Measure voltage between test Pins 5 and 60 at the Breakout box.	Reading is less than 10.5V ▶	SERVICE open in key power circuit. RERUN Quick Test.
	Reading is 10.5V or greater ▶	GO to **HD2**.
HD2 FUEL PRESSURE CHECK		
• Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 241-310 kPa (35-45 psi). • Fuel pressure must remain at 276 ± 34 kPa (40 psi ± 5 psi) for 60 seconds after final Key Off. **For No Starts:** • If engine will not run cycle the key from OFF to ON several times to increase fuel pressure.	Fuel pressure is within specifications ▶	GO to **HD3**.
	Fuel pressure is not 241-310 kPa (35-45 psi) ▶	REFER to Shop Manual, Group 24 for electric fuel pump.
	Fuel pressure does not remain at 276 ± 34 kPa (40 psi ± 5 psi) for 60 seconds or longer ▶	GO to **HD6**.
HD3 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HD2. • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5-second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	Pressure Gauge Reading:	
	Pressure is approximately 10-20 psi at the end of 5-second crank cycle. Refer to Note below ▶	The EEC system is not the fault of the No Start. Fuel and spark are present. REFER to Section 2 for other No Start Routines. If complaint was runs rough, misses or fuel code, GO to **HD4**.
	Pressure is greater or less than specified ▶	GO to **HD4**.

NOTE: The colder the engine, the greater the pressure drop (i.e., an engine coolant temperature of 200°F equals approximately a 10 psi drop in 5 seconds. 60°F equals approximately a 20 psi drop in 5 seconds).

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD4 HARNESS INJECTOR RESISTANCE CHECK		
• Key Off. • DVOM on 200 ohm range. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box, processor disconnected. • Measure resistance between test Pins 57 and 58 at the Breakout box and between test Pins 57 and 59 at the Breakout box.	Either resistance is less than 1.5 ohms ▶	SERVICE the harness and/or connectors on the suspect injector for shorts. IF OK, REPLACE injector.
	Either resistance is greater than 3.5 ohms ▶	SERVICE the harness and/or connectors on the suspect injector for opens. If OK, REPLACE injector.
	Both resistances are 1.5-3.5 ohms ▶	GO to **HD5**.
HD5 INJECTOR DRIVE SIGNAL CHECK		
Requires standard non-powered 12V test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Refer to illustration HD. • Connect test lamp between test Pin 37 and Pin 58 at the Breakout box. • Crank or start engine. • Repeat above test between test Pin 37 and Pin 59 at the Breakout box.	Dim glow at light on both tests ▶	GO to **HD6**.
	No light on one or both tests ▶	VERIFY 12V battery power at Pins 37 and 57. If OK, REPLACE processor. RERUN Quick Test.
	Bright light on one or both tests ▶	CHECK injector circuits 1 and 2 for shorts to ground. If OK, REPLACE processor. RERUN Quick Test.
HD6 INJECTOR BALANCE TEST		
• Connect tachometer to engine. Run engine at idle. • Disconnect and reconnect the injectors one at a time; note rpm drop for each injector. • Does each injector produce at least a 100 rpm momentary drop?	Yes ▶	Fuel delivery OK. Problem in area common to all cylinders, i.e.: Air/ vacuum leak, fuel contamination, EGR.
	No ▶	REPLACE faulty injector. RERUN Quick Test.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD7 CODE 41 AND/OR 91 PRESENT		
• Verify codes received during Quick Test. • Are both code 41 and 91 present?	Yes ▶ No ▶	GO to **HD9**. GO to **HD8**.
HD8 SWAP INJECTOR CONNECTORS		
• Key Off. • Swap injector connections. • Start engine, run engine, run Quick Test. • Does the original code(s) repeat?	Yes ▶ No ▶	RECONNECT injector harness to original production state. GO to **HD9**. RECONNECT injector harness to original production state. GO to **HD4**.
HD9 FUEL CONTROL — ALWAYS LEAN CODES: 41 LEFT EGO, 91 RIGHT EGO		
NOTE: Vacuum/air leaks in non-EEC areas could cause a code. Check for: **— Leaking vacuum actuator (eg: A/C control motor)** **— Engine sealing** **— EGR system** **— PCV system** **— Lead contaminated EGO sensor** • Refer to illustration HD. • Key Off. DVOM on 20V scale. Disconnect appropriate EGO sensor from vehicle harness. Connect DVOM to EGO sensor and engine ground. Disconnect ACT sensor. • Start the engine and run at approximately 2000 rpm. Does the DVOM read greater than 0.5V within 1 minute?	Yes ▶ No ▶	GO to **HD10**. REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD10 HARNESS CHECK EGO CIRCUITS • Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box. Processor disconnected. • For left EGO code 41, measure resistance between test Pin 49 at the Breakout box and engine block ground and between left EGO connector and test Pin 29 at the Breakout box. • For right EGO code 91 measure resistance between test Pin 44 and engine block ground and also between right EGO harness connector and test Pin 43 at the Breakout box. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	GO to **HD11**. SERVICE/CORRECT open circuit as necessary. RERUN Quick Test.
HD11 CHECK EGO CIRCUIT FOR SHORT TO GROUND • Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms range. • Disconnect right EGO sensor at harness. • Measure resistance between test Pin 29 (left EGO) or test Pin 43 (right EGO) to test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶ Reading is less than 10,000 ohms ▶	GO to **HD12**. CORRECT cause of resistance to ground. RERUN Quick Test.
HD12 ATTEMPT TO ELIMINATE EGO LEAN CODE • Key Off. • Reconnect appropriate EGO sensor. • Make certain that the ACT sensor is still disconnected. • Start the engine and run at approximately 2000 rpm for 1 minute. Allow engine to return to idle. • Enter Engine Running Quick Test. • Is code 41 or 91 still present? **NOTE: Disregard any other code output at this time.**	Yes ▶ No ▶	INSPECT for corrosion or damaged pins. If OK, REPLACE processor. RERUN Quick Test. EGO input circuit OK. GO to **HD13**.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD13 CHECK FOR CODES WITH ACT RECONNECTED		
• Reconnect ACT sensor. • Repeat Quick Test. • Is code 41 or 91 present?	Yes ▶ No ▶	REPLACE processor. RERUN Quick Test. GO to **HD2**.
HD14 FUEL CONTROL — ALWAYS RICH CODES: 42 LEFT EGO, 92 RIGHT EGO		
• Key Off, wait 10 seconds. • **NOTE: Non-EEC areas could cause a rich code. Check for: — Fuel contaminated engine oil — Ignition caused misfire — CANP problems** • Refer to illustration HD. • Disconnect vehicle harness at the appropriate EGO sensor. Using a jumper wire, ground vehicle harness EGO circuit at the EGO sensor to the engine block. • Repeat Engine Running Self-Test. • Is service code 41 or 91 present?	Yes ▶ No ▶	GO to **HD16**. GO to **HD15**.
HD15 HARNESS CHECK		
• Key Off, wait 10 seconds. • Refer to illustration HD. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box. • Measure resistance between test Pin 49 at the Breakout box and left EGO ground at Breakout box or Pin 44 and right EGO ground at engine block. • Measure resistance between test Pin 29 and left EGO harness connector or test Pin 43 and right EGO harness connector. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test. CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

TEST STEP	RESULT ▶	ACTION TO TAKE
HD16 EGO CHECK		
• Refer to illustration HD. • DVOM on 20V scale. • With appropriate EGO sensor disconnected from the vehicle harness, connect a DVOM from EGO sensor to engine ground. • Disconnect PCV hose. • Start engine and run at approximately 2000 rpm. Does the DVOM read less than 0.4V within 1 minute?	Yes ▶	EGO sensor OK. GO to **HD2**.
	No ▶	REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 3.8L CFI | Pinpoint Test | HD

HD17 CONTINUOUS TESTING: CODE 41/42

41 — EGO indicated the fuel system was lean for more than 15 seconds when the system should have been in closed loop fuel control.

42 — EGO indicated the fuel system was rich for more than 15 seconds when the system should have been in closed loop fuel control.

*CLOSED LOOP — Fuel control under the influence of the EGO sensor.

*OPEN LOOP — Fuel control NOT under the influence of the EGO sensor.

Before attempting to correct a fuel control code, 41/42, diagnose all other drive complaints first, eg., rough idle, misses, etc.

NOTE: The fuel control code may help in this diagnosis.

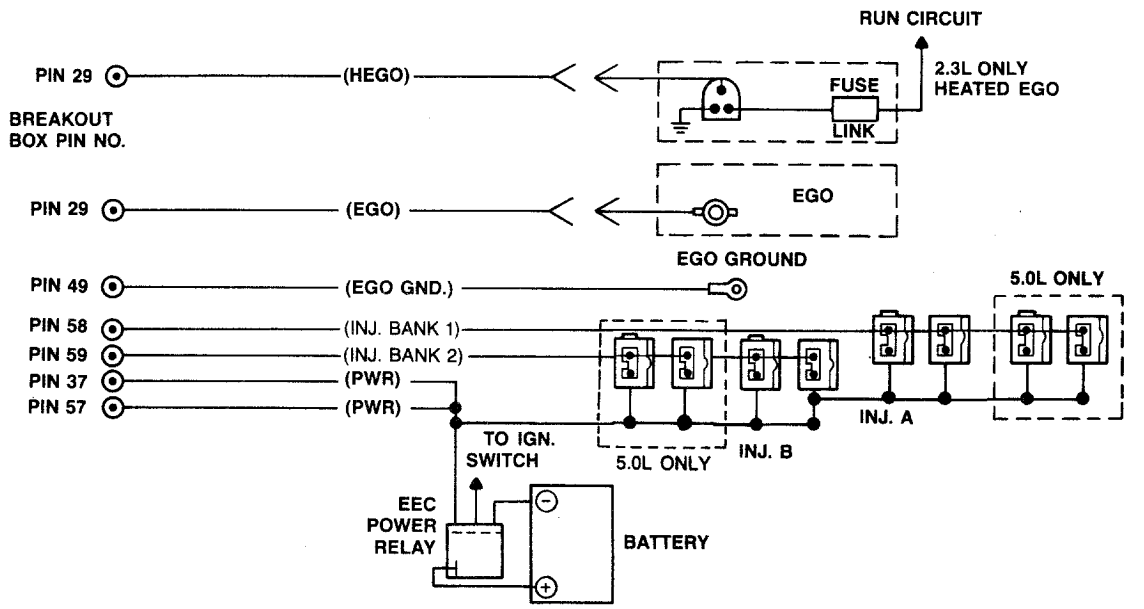
Using the fuel control service code, isolate the cause of the fuel control problem.

Some areas to check are:

- Vacuum Circuits: Vacuum leaks/intake air leaks.
  — Canister Purge System.
  — PCV System.
  — Engine sealing.
- EGO Fuel Fouled: Whenever an over-rich fuel condition has been experienced (fuel fouled spark plugs), make a thorough check of the ignition system. In the event the EGO sensor is suspected of being fuel fouled (low output, slow response), run the vehicle at sustained high speeds (within legal limits) followed by a few hard accelerations. This will burn off EGO contamination and restore proper EGO operation.
- Fuel Pressure: Perform Pinpoint Test Step **HD2**.
- Ignition System: Always in default spark (10 degrees). Refer to Quick Test Step **4.0**.
- Improper Fueling: Lead fouled EGO sensor.
- TP Sensor: Not moving (mechanical damage). Connect DVOM to test Pin 47 and to test Pin 46. Key to Run. Observe DVOM while moving the throttle. Reading must increase with increase in throttle opening. If not correct, SERVICE as necessary.
- If at this point, the drive concern is still present, perform Steps **HD3** through **HD6** only.

Fuel Control — EFI Truck | Pinpoint Test | HE

HE



STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 41 or 42 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test A or Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- EGO Sensor
- Harness Circuits EGO Grd., EGO, Inj. Bank 1, Inj. Bank 2, V PWR
- EGO Sensor Connection
  — Code 42 start at **HE8**
  — Code 41 start at **HE11**
- Vacuum Systems
- Fuel Injectors
- Processor Assembly

NOTE: Fuel contaminated engine oil may affect 41 and 42 Service Codes. If this is suspected, remove the PCV from the valve cover and repeat the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — EFI Truck

Pinpoint Test

HE

TEST STEP	RESULT ▶	ACTION TO TAKE
HE1 FUEL PRESSURE CHECK 1		
• Key Off, wait 10 seconds. • Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 241-310 kPa (35-45 psi). **For No Starts:** • If engine will not run, cycle the key from Off to On several times to increase fuel pressure.	Yes ▶ No ▶	GO to **HE2**. REFER to the Shop Manual, Group 24 for electric fuel pump and Section 11 for fuel pressure regulator check.
HE2 FUEL PRESSURE CHECK 2		
• Fuel pressure must remain at 276 ± 34 kPa (40 ± 5 psi) for 60 seconds or longer after final key Off.	Yes ▶ No ▶	GO to **HE3**. GO to **HE7**.
HE3 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HA1. • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5 second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	PRESSURE GAUGE READING: Pressure is approximately 10-20 psi at the end of 5 second crank cycle. Refer to note below ▶ Pressure is greater or less than specified ▶	The EEC system is not the fault of the No Start. Fuel and spark are present. REFER to Section 2 for other No Start Routines. If complaint was runs rough, misses or fuel code, GO to **HE4**. GO to **HE4**.

NOTE: The colder the engine, the greater the pressure drop (i.e., an engine coolant temperature of 200°F equals approximately a 10 psi drop in 5 seconds. 60°F equals approximately a 20 psi drop in 5 seconds).

Fuel Control — EFI Truck

Pinpoint Test

HE

TEST STEP	RESULT ▶	ACTION TO TAKE
HE4 HARNESS INJECTOR RESISTANCE CHECK		
• Key Off, wait 10 seconds. • Disconnect processor 60 pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Connect Breakout box to harness. Leave processor disconnected. • DVOM on 200 ohm scale. • Measure the resistance of injector Bank 1 between test Pin 37 and test Pin 58 at the Breakout box. Record reading. • Measure the resistance of injector Bank 2 between test Pin 37 and test Pin 59 at the Breakout box. Record reading. • Are both readings between 1.2 ohms and 1.8 ohms?	Yes ▶ No ▶	GO to **HE6**. GO to **HE5**.
HE5 ISOLATE FAULTY INJECTOR CIRCUIT		
• Key Off. • Breakout box installed. • Leave processor disconnected. • DVOM on 200 ohm scale. • Disconnect all injectors on suspect Bank. Measure the resistance of each injector by connecting one injector at a time, and reading resistance between test Pin 37 and 58 at the Breakout box for Bank 1 or test Pin 37 and 59 at the Breakout box for Bank 2. • Are all readings between 15.0 and 19.0 ohms?	Yes ▶ No ▶	GO to **HE6**. SERVICE the harness/connectors on the suspect injector for opens or shorts. If OK, REPLACE injector. RERUN Quick Test.
HE6 INJECTOR DRIVE SIGNAL CHECK		
Requires standard non-powered 12-volt test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Connect test lamp between test Pin 37 and test Pin 58 at the Breakout box. • Crank or start engine. • Repeat above test between test Pin 37 and test Pin 59 at the Breakout box.	Dim glow at light on both tests ▶ No light on one or both tests ▶ Bright light on one or both tests ▶	GO to **HE7**. VERIFY 12-volt battery power at Pins 37 and 57. If OK, REPLACE processor. RERUN Quick Test. CHECK circuits Bank 1 and Bank 2 for shorts to ground. If OK, REPLACE processor. RERUN Quick Test.

Fuel Control — EFI Truck | Pinpoint Test | HE

TEST STEP	RESULT ▶	ACTION TO TAKE
HE7 INJECTOR BALANCE TEST		
• Connect tachometer to engine. Run engine at idle. • Disconnect and reconnect the injectors one at a time; note rpm drop for each injector. • Does each injector produce at least a 100 rpm momentary drop, as ISC will attempt re-establish rpm.	Yes ▶	Fuel delivery OK. Problem is with area common to all cylinders, i.e.: Air/ vacuum leak, fuel contamination, EGR.
	No ▶	REPLACE faulty injector. RERUN Quick Test.
HE8 FUEL CONTROL — ALWAYS RICH: CODE 42		
• Key Off, wait 10 seconds. • **NOTE: Non-EEC areas could cause a code 42.** **Check for:** **— Fuel contaminated engine oil** **— Ignition caused misfire** **— CANP problems** • Disconnect vehicle harness at the EGO sensor. Using a jumper wire, ground vehicle harness EGO circuit at the EGO sensor to the engine block. • Repeat Engine Running Self-Test. • Service code 41 results.	Yes ▶	GO to **HE10**.
	No ▶	GO to **HE9**.
HE9 EGO HARNESS CHECK		
• Key Off, wait 10 seconds. • Install Breakout box. • Measure resistance between test Pin 49 at the Breakout box and EGO ground at engine block. • Measure resistance between test Pin 29 at the Breakout box and EGO harness connector. • Are both circuits less than 5 ohms?	Yes ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test.
	No ▶	CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.

Fuel Control — EFI Truck

Pinpoint Test

HE

TEST STEP	RESULT ▶	ACTION TO TAKE
HE10 EGO CHECK		
• DVOM on 20V scale. • With EGO sensor disconnected from the vehicle harness, connect a DVOM from EGO sensor to engine ground. • Disconnect PCV hose. • Start engine and run at approximately 2000 rpm. Does the DVOM read less than 0.4V within 1 minute?	Yes ▶ No ▶	EGO sensor OK. GO to **HE1**. REPLACE EGO sensor. RERUN Quick Test.
HE11 FUEL CONTROL — ALWAYS LEAN: CODE 41		
NOTE: Vacuum/air leaks in non-EEC areas could cause a code 41. Check for: **— Leaking vacuum actuator (eg: A/C control motor)** **— Engine sealing** **— EGR system** **— PCV system** **— Unmetered air leak between air meter and throttle body** **— Lead contaminated EGO sensor** • Key Off. DVOM on 20V scale. Disconnect EGO sensor from vehicle harness. Connect DVOM to EGO sensor and engine ground. • Disconnect ACT sensor. • Start the engine and run at approximately 2000 rpm. Does the DVOM read greater than 0.5V within 1 minute?	Yes ▶ No ▶	GO to **HE12**. REPLACE EGO sensor. RERUN Quick Test.
HE12 HARNESS CHECK EGO CIRCUITS		
• Key Off. • Install Breakout box. Processor disconnected. • Measure resistance between test Pin 49 at the Breakout box and engine block ground and between EGO connector and test Pin 29 at the breakout box. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	GO to **HE13**. SERVICE/CORRECT poor connection or open circuit as appropriate. RERUN Quick Test.

Fuel Control — EFI Truck | Pinpoint Test | HE

TEST STEP	RESULT ▶	ACTION TO TAKE
HE13 CHECK EGO CIRCUIT FOR SHORT TO GROUND		
• Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms range. • Measure resistance between test Pin 29 and test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶ Reading is less than 10,000 ohms ▶	GO to **HE14**. CORRECT cause of resistance to ground. RERUN Quick Test.
HE14 ATTEMPT TO ELIMINATE CODE 41		
• Key Off. • Reconnect EGO sensor. • Make certain that ACT sensor is still disconnected. • Start the engine and run at approximately 2000 rpm for 1 minute. Allow engine to return to idle. • Perform Engine Running Self-Test. • Is code 41 still present? **NOTE: Disregard any other code output at this time.**	Yes ▶ No ▶	INSPECT for corrosion or damaged pins. If OK, REPLACE processor. RERUN Quick Test. RECONNECT ACT sensor. EGO input circuit OK. GO to **HE1**.

Fuel Control — EFI Truck | Pinpoint Test | HE

HE20 CONTINUOUS TESTING: CODE 41/42

41 — EGO indicated the fuel system was lean for more than 15 seconds when the system should have been in closed loop fuel control.

42 — EGO indicated the fuel system was rich for more than 15 seconds when the system should have been in closed loop fuel control.

*CLOSED LOOP — Fuel control under the influence of the EGO sensor.

*OPEN LOOP — Fuel control NOT under the influence of the EGO sensor.

Before attempting to correct a fuel control code, 41/42, diagnose all other drive complaints first, eg., rough idle, misses, etc.

NOTE: The fuel control code may help in this diagnosis.

Using the fuel control service code, isolate the cause of the fuel control problem.

Some areas to check are:

- Vacuum Circuits: Vacuum leaks/intake air leaks.
  — Canister Purge System.
  — PCV System.
  — Engine sealing.
- EGO Fuel Fouled: Whenever an over-rich fuel condition has been experienced (fuel fouled spark plugs), make a thorough check of the ignition system. In the event the EGO sensor is suspected of being fuel fouled (low output, slow response), run the vehicle at sustained high speeds (within legal limits) followed by a few hard accelerations. This will burn off EGO contamination and restore proper EGO operation.
- Fuel Pressure: Perform Pinpoint Test Step **HE1**.
- Ignition System: Always in default spark (10 degrees). Refer to Quick Test Step **4.0**.
- Improper Fueling: Lead fouled EGO sensor.
- TP Sensor: Not moving (mechanical damage). Connect DVOM to test Pin 47 and to test Pin 46. Key to Run. Observe DVOM while moving the throttle. Reading must increase with increase in throttle opening. If not correct, SERVICE as necessary.
- If at this point, the drive concern is still present, perform Steps **HE3** through **HE6** only.

Fuel Control — EFI Truck | Pinpoint Test | HE

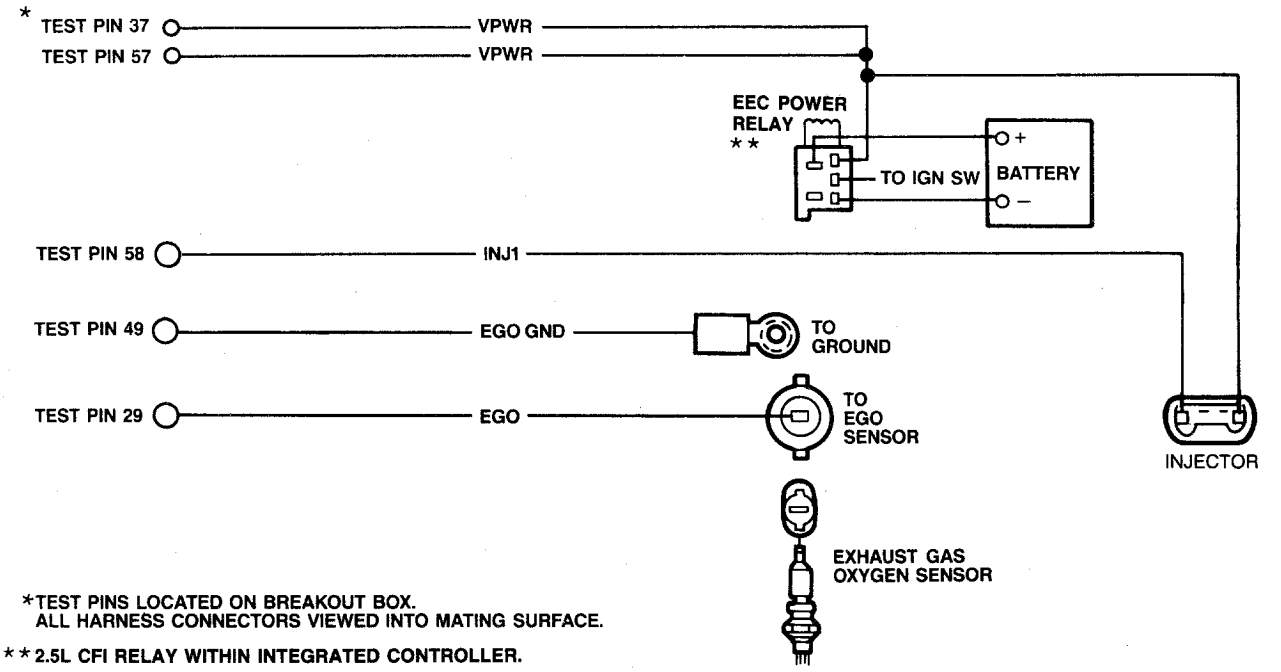
TEST STEP	RESULT ▶	ACTION TO TAKE
HE21 CHECK HEATER ELEMENT RESISTANCE ON HEATED EGO		
• Key Off, Engine Off. • DVOM on 200 ohm scale. • Measure resistance between Run circuit and ground at heated EGO sensor connector at room temperature.	Reading between 2.5 and 5.0 ohms ▶	GO to **HE22**.
	Reading less than 2.5 or greater than 5.0 ohms ▶	REPLACE HEGO sensor. RERUN Quick Test.
HE22 CHECK FOR POWER AT HEGO HARNESS CONNECTOR		
• Key On, Engine Off. • DVOM on 20V scale. • Connect positive lead to run circuit and negative lead to ground at HEGO vehicle harness connector.	Reading 10.5V or greater ▶	HEGO sensor system OK, RETURN to Section 2.
	Reading less than 10.5V ▶	GO to **HE23**.
HE23 CHECK CONTINUITY OF GROUND TO HEGO CONNECTOR		
• Key Off, wait 10 seconds. • DVOM on 200 ohm scale. • Measure resistance of ground circuit between HEGO sensor connector and battery ground.	Reading less than 5.0 ohms ▶	SERVICE open in run circuit. RERUN Quick Test.
	Reading 5.0 ohms or greater ▶	SERVICE open in ground circuit. RERUN Quick Test.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

HF



STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 41 or 42 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test A or Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- EGO Sensor
- EGO Signal and Ground Circuit
- EGO Sensor Connection
- Fuel Injector
- Processor Assembly

NOTE: Fuel contaminated engine oil may affect 41 and 42 Service Codes, so if it is suspected, remove the PCV from the valve cover, and rerun the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

TEST STEP	RESULT ▶	ACTION TO TAKE
HF1 FUEL PRESSURE CHECK		
• Key Off, wait 10 seconds. • Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 14.5 ± 1.5 psi. • Fuel pressure must remain at 14.5 ± 1.5 psi for 60 seconds after final Key Off. **For No Starts:** • If engine will not run cycle the key from off to on several times.	Fuel pressure is within specification ▶	GO to **HF2**.
	Fuel pressure is not 14.5 ± 1.5 psi ▶	REFER to Shop Manual, Group 24 for electric fuel pump.
	Fuel pressure does not remain at 14.5 ± 1.5 psi for 60 seconds or longer ▶	GO to **HF20**.
HF2 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HF1. • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5-second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	Pressure Gauge Reading:	
	Pressure drops approximately 5-8 psi at the end of 5-second crank cycle. Refer to Note below ▶	The EEC system is not the fault of the No Start. Fuel and spark are present. REFER to Section 2 for other No Start Routines. If complaint was runs rough or misses, CONTINUE to **HF3**.
	Pressure is greater or less than specified ▶	GO to **HF3**.
NOTE: The colder the engine, the greater the pressure drop (i.e., an engine coolant temperature of 200°F equals approximately a 5 psi drop in 5 seconds. 60°F equals approximately a 8 psi drop in 5 seconds).		
HF3 HARNESS INJECTOR RESISTANCE CHECK		
• Key Off. • DVOM on 200 ohm range. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box, processor disconnected. • Measure resistance between test Pins 57 and 58 at the Breakout box.	Resistance is less than 1.0 ohms or greater than 2.0 ohms ▶	SERVICE the harness and/or connectors on the injector for opens or shorts. If OK, REPLACE injector.
	Resistance is between 1.0 and 2.0 ohms ▶	GO to **HF4**.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

TEST STEP	RESULT ▶	ACTION TO TAKE
HF4 INJECTOR DRIVE SIGNAL CHECK		
Requires standard non-powered 12-volt test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Refer to illustration HF. • Connect test lamp between test Pin 37 and test Pin 58 at the Breakout box. • Crank or start engine.	Very dim glow at light ▶	Fuel delivery OK. Problem is with area common to all cylinders, i.e., air/ vacuum leak, fuel contamination, EGR.
	No light ▶	VERIFY 12-volt battery power at Pins 37 and 57. If OK, REPLACE processor. RERUN Quick Test.
	Bright light ▶	CHECK injector circuit for shorts to ground. If OK, REPLACE processor. RERUN Quick Test.
HF5 FUEL CONTROL — ALWAYS LEAN: CODE 41		
NOTE: Vacuum/air leaks in non-EEC areas could cause a code 41. Check for: **— Leaking vacuum actuator (eg: A/C control motor)** **— Engine sealing** **— EGR system** **— PCV system** **— Lead contaminated EGO sensor** • Refer to illustration HF. • Key Off. DVOM on 20V scale. Disconnect EGO sensor from vehicle harness. Connect DVOM to EGO sensor and engine ground. Disconnect ACT sensor. • Start the engine and run at approximately 1000 rpm. Does the DVOM read greater than 0.5V within 30 seconds? * CK MAP/BP SENSOR	Yes ▶	GO to **HF6**.
	No ▶	REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

TEST STEP	RESULT ▶	ACTION TO TAKE
HF6 HARNESS CHECK EGO CIRCUITS		
• Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box. Processor disconnected. • Measure resistance between test Pin 49 at the Breakout box and engine block ground and between EGO connector and test Pin 29 at the Breakout box. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	GO to **HF7**. SERVICE/CORRECT circuit with resistance greater than 5 ohms, as necessary. RERUN Quick Test.
HF7 CHECK EGO CIRCUIT FOR SHORT TO GROUND		
• Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms range. • Disconnect EGO sensor at harness. • Measure resistance between test Pin 29 and test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶ Reading is less than 10,000 ohms ▶	GO to **HF8**. CORRECT cause of resistance to ground. RERUN Quick Test.
HF8 ATTEMPT TO ELIMINATE CODE 41		
• Key Off. • Reconnect EGO sensor. • Make certain that the ACT sensor is still disconnected. • Start the engine and run at approximately 1000 rpm for 1 minute, allow engine to return to idle. • Enter Self-Test. • Is code 41 still present? **NOTE: Disregard any other code output at this time.**	Yes ▶ No ▶	INSPECT for corrosion or damaged pins. If OK, REPLACE processor. RERUN Quick Test. EGO input circuit OK. RECONNECT ACT sensor. GO to **HF1**.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

TEST STEP	RESULT ▶	ACTION TO TAKE
HF9 FUEL CONTROL — ALWAYS RICH: CODE 42		
• Key Off, wait 10 seconds. • **NOTE: Non-EEC areas could cause a code 42.** **Check for:** **— Fuel contaminated engine oil** **— Ignition caused misfire (fouled spark plug)** **— CANP problems** • Refer to illustration HF. • Disconnect vehicle harness at the EGO sensor. Jumper (ground) the EGO circuit at the EGO sensor vehicle harness connector to the engine block. • Repeat Engine Running Self-Test. • Service code 41 results.	Yes ▶ No ▶	GO to **HF11**. GO to **HF10**.
HF10 HARNESS CHECK		
• Key Off, wait 10 seconds. • Refer to illustration HF. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Install Breakout box. • Measure resistance between test Pin 49 at the Breakout box and EGO ground at engine block. • Measure resistance between test Pin 29 at the Breakout box and EGO circuit at the EGO vehicle harness connector. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test. CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.
HF11 EGO CHECK		
• Refer to illustration HF. • DVOM on 20V scale. • With EGO sensor disconnected from the harness, connect a DVOM from EGO sensor to engine ground. • Disconnect PCV hose. • Start engine and run at approximately 2000 rpm. Does the DVOM read less than 0.4V within 30 seconds?	Yes ▶ No ▶	EGO sensor OK. GO to **HF1**. REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 2.3L & 2.5L (HSC) CFI | Pinpoint Test | HF

HF12 CONTINUOUS TESTING: CODE 41/42

41 — EGO indicated the fuel system was lean for more than 15 seconds when the system should have been in closed loop fuel control.

42 — EGO indicated the fuel system was rich for more than 15 seconds when the system should have been in closed loop fuel control.

*CLOSED LOOP — Fuel control under the influence of the EGO sensor.

*OPEN LOOP — Fuel control NOT under the influence of the EGO sensor.

Before attempting to correct a fuel control code, 41/42, diagnose all other drive complaints first, eg., rough idle, misses, etc.

NOTE: The fuel control code may help in this diagnosis.

Using the fuel control service code, isolate the cause of the fuel control problem.

Some areas to check are:

- Vacuum Circuits: Vacuum leaks/intake air leaks.
  — Canister Purge System.
  — PCV System.
  — Engine sealing.
- EGO Fuel Fouled: Whenever an over-rich fuel condition has been experienced (fuel fouled spark plugs), make a thorough check of the ignition system. In the event the EGO sensor is suspected of being fuel fouled (low output, slow response), run the vehicle at sustained high speeds (within legal limits) followed by a few hard accelerations. This will burn off EGO contamination and restore proper EGO operation.
- Fuel Pressure: Perform Pinpoint Test Step **HF1**.
- Ignition System: Always in default spark (10 degrees). Refer to Quick Test Step **4.0**.
- Improper Fueling: Lead fouled EGO sensor.
- TP Sensor: Not moving (mechanical damage). Connect DVOM to test Pin 47 and to test Pin 46. Key to Run. Observe DVOM while moving the throttle. Reading must increase with increase in throttle opening. If not correct, SERVICE as necessary.
- If at this point, the drive concern is still present, perform Steps **HF2** through **HF3** only.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

TEST STEP	RESULT ▶	ACTION TO TAKE
HF13 WARM ENGINE, CODE 43		
• Run vehicle at 2000 rpm for 2 minutes. • Key Off, wait 10 seconds. • Perform Engine Running Quick Test.	Code 43 is not present ▶	SERVICE other codes as necessary.
	Code 43 is present ▶	GO to **HF14**.
HF14 CHECK EXHAUST LEAKS, CODE 43		
• Are there any exhaust leaks at manifold or inlet pipe?	Yes ▶	SERVICE as necessary. RERUN Quick Test.
	No ▶	GO to **HF15**.
HF15 CHECK IDLE QUALITY, CODE 43		
• Start vehicle, let engine idle. • Does engine idle quality deteriorate and remain poor during and after the Quick Test?	Yes ▶	REFER to EFI/CFI, Section 4.
	No ▶	REPLACE EGO sensor. RERUN Quick Test.

Fuel Control — 2.3L & 2.5L (HSC) CFI

Pinpoint Test

HF

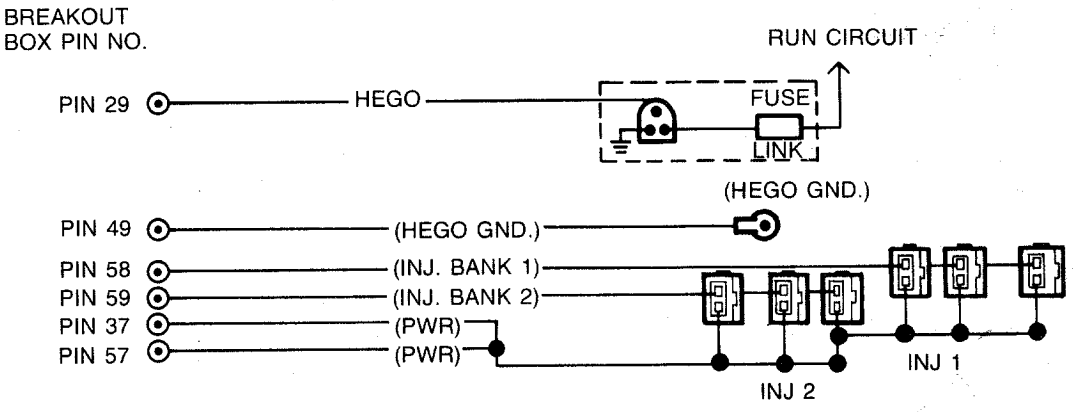
TEST STEP	RESULT ▶	ACTION TO TAKE
HF20 LEAKING INJECTOR		
• Remove air inlet tube at fuel charging assembly. • Pressurize fuel system as per Test Step HF1. • Key Off. • Observe throughout the air horn inlet for fuel leaking and/or weeping at the fuel injector discharge area.	No sign of fuel leak ▶	GO to **HF21**.
	Fuel leak ▶	SERVICE injector and/or O-rings as necessary. REFER to Shop Manual, Section 24-03 for service procedure. **NOTE: After having completed service, RERUN Quick Test.**
HF21 EXTERNAL FUEL LEAKS		
• Pressurize fuel system as per Test Step HF1. • Key Off. • Look for fuel leak external to fuel charging assembly fuel line, fitting, etc.	No sign of fuel leaks ▶	SERVICE fuel pressure regulator as necessary. REFER to Shop Manual, Section 24-03 for service procedure. **NOTE: After having completed service, RERUN Quick Test.**
	Fuel leaks ▶	SERVICE as necessary. RERUN Quick Test.

Fuel Control — 2.9L & 3.0L EFI V-6

Pinpoint Test

HG

HG



STOP-WARNING

You should enter this Pinpoint Test only when a Service Code 41 or 42 is received in Quick Test Step 5.0 or 6.0 or when directed here from Pinpoint Test S or Diagnostics by Symptom in the Engine Supplement Section.

To prevent the replacement of good components, be aware that the following non-EEC areas may be at fault:

- Ignition Coil
- Distributor Cap
- Distributor Rotor
- Fouled Spark Plugs
- Spark Plug Wires
- CANP Problems
- PCV Valves (see note below)
- EGR Valve and Gasket
- Air Filter
- Fuel Contamination, Engine Oil
- Poor Power Ground
- Fuel Pressure
- Manifold Leaks, Intake/Exhaust
- Engine Not at Normal Operating Temperatures

This Pinpoint Test is intended to diagnose only the following:

- HEGO Sensor
- Harness Circuits EGO Grd., HEGO, Inj. Bank 1, Inj. Bank 2, VPWR
- HEGO Sensor Connection
- Vacuum Systems
- Fuel Injectors
- Processor Assembly

NOTE: Fuel contaminated engine oil may affect 41 and 42 Service Codes. If this is suspected, remove the PCV from the valve cover and repeat the Quick Test. If the problem is corrected, then change the engine oil and filter.

Fuel Control — 2.9L & 3.0L EFI V-6 | Pinpoint Test | HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG1 FUEL PRESSURE CHECK		
• Key Off, wait 10 seconds. • Install fuel pressure gauge. • Start and run engine. Fuel pressure must be 241-310 kPa (35-45 psi). • Fuel pressure must remain at 276 ± 34 kPa (40 ± 5 psi) for 60 seconds after final Key Off. **For No Starts:** • If engine will not run, cycle the key from off to on several times.	Fuel pressure is within all specifications ▶	GO to **HG2**.
	Fuel pressure is not 241-310 kPa (35-45 psi) ▶	REFER to the Shop Manual, Group 24 for electric fuel pump and Section 11 for fuel pressure regulator check.
	Fuel pressure does not remain at 276 ± 34 kPa (40 ± 5 psi) for 60 seconds or longer ▶	GO to **HG6**.
HG2 FUEL DELIVERY TEST		
• Key Off. • Fuel pressure gauge installed. • Pressurize fuel system as per Step HG1. • Locate and disconnect the fuel pump relay. • Crank engine for 5 seconds. • Take pressure reading at the end of 5 second crank. **NOTE: Verify fuel quality; air and/or water will also pressurize and look like acceptable fuel delivery.**	Pressure Gauge Reading: Pressure is approximately 69-138 kPa (10-20 psi) at the end of 5 second crank cycle. Refer to Note below ▶	The EEC system is not the fault of the No Start. Fuel and spark are present. REFER to Section 2 for other No Start Routines. If complaint was runs rough, misses or fuel code, GO to **HG3**.
	Pressure is greater or less than specified ▶	GO to **HG3**.

NOTE: The colder the engine, the greater the pressure drop (for example, an engine coolant temperature of 200°F equals approximately a 69 kPa [10 psi] drop in 5 seconds. 60°F equals approximately a 138 kPa [20 psi] drop in 5 seconds).

Fuel Control — 2.9L & 3.0L EFI V-6

Pinpoint Test

HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG3 HARNESS INJECTOR RESISTANCE CHECK • Key Off, wait 10 seconds. • Disconnect processor 60 Pin connector and inspect for damaged pins, corrosion, loose wires. Service as necessary. • Connect Breakout box to harness. Leave processor disconnected. • DVOM on 200 ohm scale. • Measure the resistance of injector Bank 1 between test Pin 37 and test Pin 58 at the Breakout box. • Measure the resistance of injector Bank 2 between test Pin 37 and test Pin 59 at the Breakout box. • Are both readings between 5.0 and 6.5 ohms?	Yes ▶ No ▶	GO to **HG5**. GO to **HG4**.
HG4 ISOLATE FAULTY INJECTOR CIRCUIT • Key Off. • Breakout box installed. • Leave processor disconnected. • DVOM on 200 ohm scale. • Disconnect all injectors on suspect Bank. Measure the resistance of each injector by connecting one injector at a time, and reading resistance between test Pin 37 and 58, for Bank 1, or test Pin 37 and 59, for Bank 2, at the Breakout box. • Are all readings between 16.0 and 18.0 ohms?	Yes ▶ No ▶	GO to **HG5**. SERVICE the harness and/or connectors on the suspect injector for opens or shorts. If OK, REPLACE injector. RERUN Quick Test.
HG5 INJECTOR DRIVE SIGNAL CHECK Requires standard non-powered 12-volt test lamp. • Key Off. • Breakout box installed. • Connect processor to Breakout box. • Connect test lamp between test Pin 37 and test Pin 58 at the Breakout box. • Crank or start engine. • Repeal above test between test Pin 37 and test Pin 59 at the Breakout box.	Dim glow at light on both tests ▶ No light on one or both tests ▶ Bright light on one or both tests ▶	GO to **HG6**. VERIFY 12V battery power at Pins 37 and 57. If OK, REPLACE processor. RERUN Quick Test. CHECK circuits Bank 1 and Bank 2 for shorts to ground. If OK, REPLACE processor. RERUN Quick Test.

Fuel Control — 2.9L & 3.0L EFI V-6 | Pinpoint Test | HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG6 INJECTOR BALANCE TEST		
• Connect tachometer to engine. Run engine at idle. • Disconnect and reconnect the injectors one at a time; note rpm drop for each injector. • Does each injector produce at least a 100 rpm momentary drop, as ISC will attempt re-establish rpm?	Yes ▶	Fuel delivery OK. Problem is with area common to all cylinders, i.e.: Air/ vacuum leak, fuel contamination, EGR.
	No ▶	REPLACE faulty injector. RERUN Quick Test
HG7 FUEL CONTROL — ALWAYS RICH: CODE 42		
• Key Off, wait 10 seconds. **NOTE: Non-EEC areas could cause a code 42.** **Check for:** **— Fuel contaminated engine oil** **— Ignition caused misfire** **— CANP problems** • Disconnect vehicle harness at the HEGO sensor. • Jumper (ground) the HEGO circuit at the HEGO sensor vehicle harness connector to the engine block. • Repeat Engine Running Self-Test. • Service code 41 results.	Yes ▶	GO to **HG9**.
	No ▶	GO to **HG8**.
HG8 EGO HARNESS CHECK		
• Key Off, wait 10 seconds. • Install Breakout box. • Measure resistance between test Pin 49 at the Breakout box and HEGO ground at engine block. • Measure resistance between test Pin 29 at the Breakout box and HEGO circuit HEGO vehicle harness connector. • Are both circuits less than 5 ohms?	Yes ▶	DISCONNECT processor connector. INSPECT for damage or corrosion. If OK, REPLACE processor. RERUN Quick Test.
	No ▶	CORRECT harness circuit with resistance greater than 5 ohms. RERUN Quick Test.

Fuel Control — 2.9L & 3.0L EFI V-6 | Pinpoint Test | HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG9 HEGO CHECK • DVOM on 20V scale. • With HEGO sensor disconnected from the harness, connect a DVOM from HEGO sensor to engine ground. • Disconnect PCV hose. • Start engine and run at approximately 2000 rpm. Does the DVOM read less than 0.4V within 1 minute?	Yes ▶ No ▶	HEGO sensor OK. GO to **HG1**. REPLACE HEGO sensor. RERUN Quick Test.
HG10 FUEL CONTROL — ALWAYS LEAN: CODE 41 VERIFICATION • Run vehicle at 2000 rpm for 2 minutes. • Key Off, wait 10 seconds. • Perform Engine Running Quick Test.	Code 41 is not present ▶ Code 41 is present ▶	GO to **HG21**. GO to **HG11**.
HG11 FUEL CONTROL — ALWAYS LEAN **NOTE: Vacuum/air leaks in non-EEC areas could cause a code 41.** **Check for:** **— Leaking vacuum actuator (e.g.: A/C control motor)** **— Engine sealing** **— EGR system** **— PCV system** **— Lead contaminated HEGO sensor** • Key Off. DVOM on 20V scale. Disconnect HEGO sensor from vehicle harness. Connect DVOM to HEGO sensor and engine ground. • Disconnect ACT sensor. • Start the engine and run at approximately 2000 rpm. Does the DVOM read greater than 0.5V within 1 minute?	Yes ▶ No ▶	GO to **HG12**. REPLACE HEGO sensor. RERUN Quick Test.
HG12 HARNESS CHECK HEGO CIRCUITS • Key Off. • Install Breakout box. Processor disconnected. • Measure resistance between test Pin 49 at the Breakout box and engine block ground and between HEGO circuit at the HEGO vehicle harness connector and test Pin 29 at the Breakout box. • Are both circuits less than 5 ohms?	Yes ▶ No ▶	GO to **HG13**. SERVICE/CORRECT as necessary circuit with greater than 5 ohms resistance. RERUN Quick Test.

Fuel Control — 2.9L & 3.0L EFI V-6 | Pinpoint Test | HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG13 CHECK HEGO CIRCUIT FOR SHORT TO GROUND		
• Key Off. • Breakout box installed. Processor disconnected. • DVOM to 200,000 ohms range. • Measure resistance between test Pin 29 and test Pin 40 at the Breakout box.	Reading is 10,000 ohms or greater ▶	GO to **HG14**.
	Reading is less than 10,000 ohms ▶	CORRECT cause of resistance to ground. RERUN Quick Test.
HG14 ATTEMPT TO ELIMINATE CODE 41		
• Key Off. • Reconnect HEGO sensor. • Make certain that ACT sensor is still disconnected. • Start the engine and run at approximately 2000 rpm for 1 minute. Allow engine to return to idle. • Perform Engine Running Self-Test. • Is code 41 still present? **NOTE: Disregard any other code input at this time.**	Yes ▶	INSPECT for corrosion or damaged pins. If OK, REPLACE processor. RERUN Quick Test.
	No ▶	RECONNECT ACT sensor. HEGO input circuit OK. GO to **HG1**.

Fuel Control — 2.9L & 3.0L EFI V-6

Pinpoint Test HG

TEST STEP	RESULT ▶	ACTION TO TAKE
HG21 CHECK HEATER ELEMENT RESISTANCE ON HEATED EGO		
• Key Off, Engine Off. • DVOM on 200 ohm scale. • Measure resistance between Run circuit and ground at heated EGO connector at room temperature.	Reading between 2.5 and 5.0 ohms ▶	GO to **HG22**.
	Reading less than 2.5 or greater than 5.0 ohms ▶	REPLACE HEGO sensor.
HG22 CHECK FOR POWER AT HEGO HARNESS CONNECTOR		
• Key On, Engine Off. • DVOM on 20V scale. • Connect positive lead to run circuit and negative lead to ground at HEGO vehicle harness connector.	Reading 10.5V or greater ▶	HEGO sensor system OK, RETURN to Section 2.
	Reading less than 10.5V ▶	GO to **HG23**.
HG23 CHECK CONTINUITY OF GROUND TO HEGO CONNECTOR		
• Key Off, wait 10 seconds. • DVOM on 200 ohm scale. • Measure resistance of ground circuit from HEGO vehicle harness connector to battery ground.	Reading less than 5.0 ohms ▶	SERVICE open in run circuit.
	Reading 5.0 ohms or greater ▶	SERVICE open in ground circuit.