1975-79 COMPUTERIZED ENGINE CONTROLS
Ford Motor Co. Feedback Carb. System

1978-79 Ford Motor Co.

DESCRIPTION

The Feedback Carburetor System is used Pinto, Bobcat, and Mustang 2.3L (Turbo and non-Turbo) engines manufactured for sale in California. This system consist of 3 sub-systems: a dual catalytic converter, a Thermactor air control system, and an electronically controlled feedback carburetion system.

The Electronic Control Unit (ECU), monitors exhaust gases through the use of an exhaust gas oxygen sensor and sets carburetion main metering mixture for best exhaust emission control.

OPERATION

DUAL CATALYTIC CONVERTER

This converter assembly consists of two separate converters in one shell, with a mixing chamber in between. The forward converter is designed to control all 3 major emissions (NOx, HC, CO), and is therefore called a 3-way catalyst. The rear converter is a conventional oxidation catalyst and controls only HC and CO.

As gases flow out of the 3-way catalyst, they mix with air from the air pump system. This mixing is required to allow the rear converter to properly control HC and CO emissions.

THERMACTOR AIR CONTROL

This system is similar to the standard Thermactor air pump system, but it also adds a second air control valve (in addition to the by-pass valve), and a second exhaust check valve. Other system components include the air pump, Ported Vacuum Switch (PVS) and the Temperature Vacuum Switch (TVS).

Above 125°F coolant temperature, air pump air is routed to the mixing chamber of the dual catalytic converter. Below 125°F coolant temperature, the PVS applies vacuum to the air control valve which directs air pump air to the exhaust manifold to decrease HC and CO during warmup.

A catalyst protection feature is used when the TVS (on the air cleaner) senses inlet air temperatures below 49°F. This causes the by-pass valve to dump air pump air to the atmosphere (not to the exhaust manifold or converter mixing chamber).

ELECTRONICALLY CONTROLLED FEEDBACK CARBURETOR SYSTEM

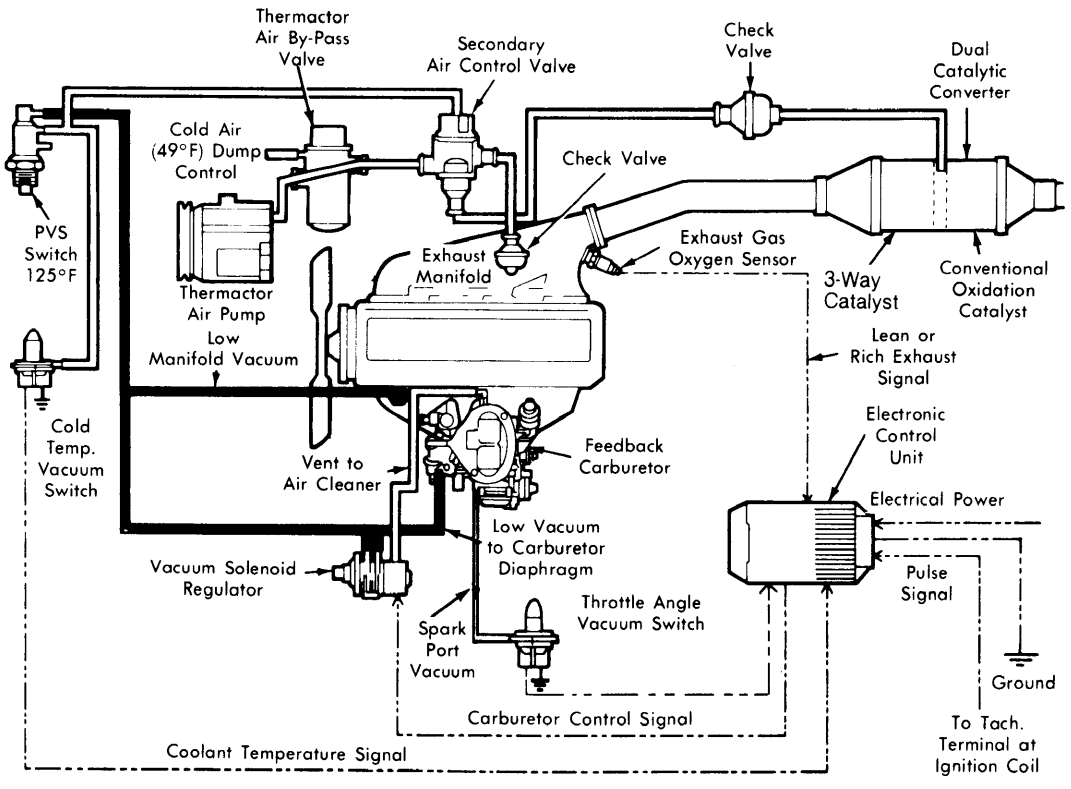
The use of a 3-way catalyst requires precise fuel metering. To provide precise fuel metering, the electronically controlled feedback carburetor system consists of the following components:

- Model 6500 Feedback Carburetor
- Vacuum Solenoid/Regulator
- Exhaust Gas Oxygen Sensor
- Throttle Angle Vacuum Switch (Non-Turbo)
- Cold Temperature Vacuum Switch (Non-Turbo)
- Idle/Deceleration Vacuum Switch (Turbo)

The electronically controlled feedback carburetor system has 2 modes of operation, as determined by the sensors. These are the "Closed Loop" and "Open Loop" modes.

Closed Loop Mode - In this mode, each component in the system is sensitive to the other components. This means that the carburetor is controlled by the vacuum solenoid regulator, which is controlled by ECU in response to a signal from the exhaust gas oxygen sensor in the exhaust manifold, which is reacting to the mixture in the carburetor. When all the components are functioning in this fashion, the system is termed to be in "Closed Loop" mode.

Open Loop Mode - In this mode the air/fuel mixture is set to a predetermined, non-varying setting by the ECU, and is not influenced by the oxygen sensor signals. This occurs during cold



Courtesy of Ford Motor Co.

Fig. 1: 2.3L Feedback Carburetor System Vacuum Schematic

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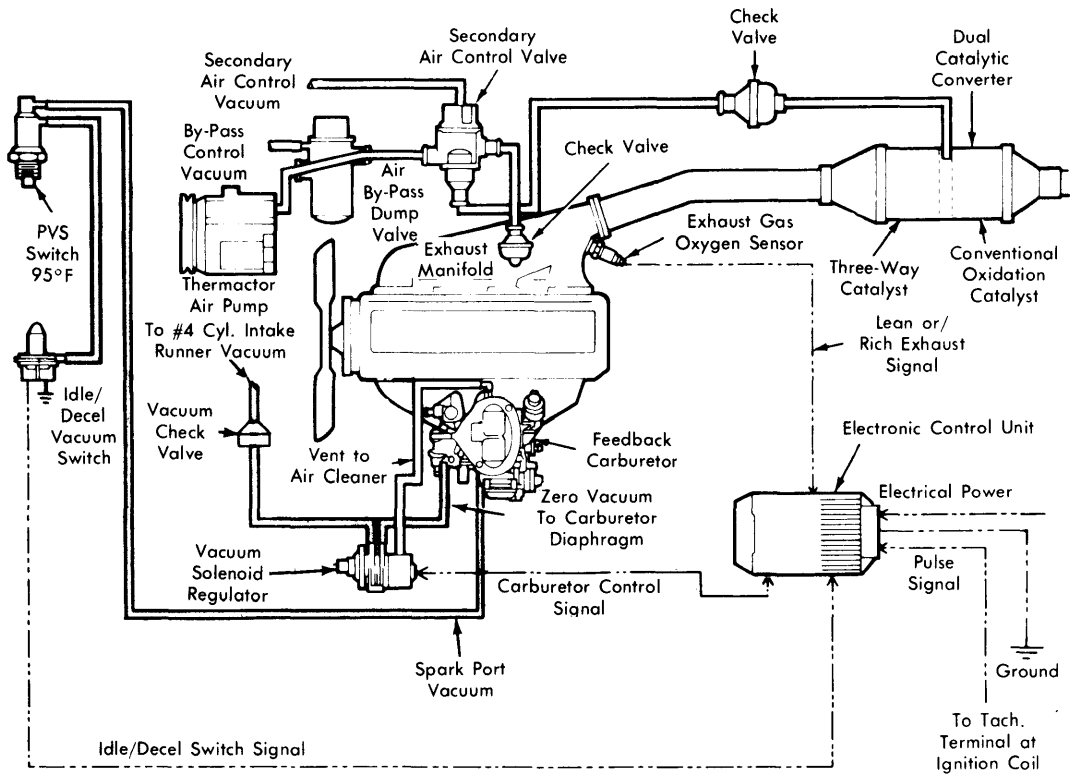
Ford Motor Co. Feedback Carb. System (Cont.)



Courtesy of Ford Motor Co.

Fig. 2: 2.3L Turbo Feedback Carburetor System Vacuum Schematic

operating temperatures or when throttle is closed (idle or deceleration). In "Open Loop" mode, the fuel mixture is set by the ECU.

Model 6500 Feedback Carburetor - This unit is basically the same as a Model 5200 carburetor except it has an externally-variable auxiliary fuel metering system in place of the enrichment valve used on the 5200. The auxiliary system is operated by vacuum from the vacuum solenoid regulator under control of the ECU.

Control vacuum from the vacuum solenoid regulator is channeled to the cavity above the metering rod diaphragm. With no vacuum present, the valve spring causes the valve to move to its lowest (richest) position, where maximum fuel can pass through the orifice.

As vacuum is applied to the diaphragm, spring pressure is overcome and the metering rod rises. This reduces the orifice area and permits less fuel to pass into main well tube passage of carburetor.

The metering valve is calibrated so that the maximum vacuum signal (5 in. Hg) supplied by the vacuum solenoid regulator raises the metering rod to its highest (leanest) position. *See Fig. 3.*

In "Open Loop" mode, a constant vacuum of 2-2 1/2 in. Hg is applied to the feedback valve diaphragm, holding the metering rod at its mid-position. In "Closed Loop" mode, the vacuum signal varies from 0 to 5 in. Hg, producing a richer or leaner mixture in response to commands from ECU.

During wide open throttle, manifold vacuum drops, resulting in little or no output vacuum signal. The feedback metering valve moves to its lowest (richest) position, providing a richer air/fuel mixture for good engine performance.

The 6500 carburetor has a switching bowl vent that allows venting fuel bowl vapors to the canister and a fresh air pickup for the vacuum solenoid regulator. This carburetor also has an internal choke pulldown diaphragm vacuum supply instead of the external vacuum connection on the 5200.

Vacuum Solenoid Regulator (VSR) - This component supplies the vacuum signal to the feedback carburetor. A solenoid and regulator are enclosed in one housing. *See Fig. 4.* In operation, the solenoid turns the assembly on and off according to electrical signal received from ECU, while vacuum regulator controls the amount of vacuum applied to the lower chamber at a constant 5 in. Hg.

When the solenoid portion is de-energized, the output port is blocked, and vacuum is dumped to the atmosphere. When the solenoid is energized, the lower output port is open (atmosphere vent blocked) and vacuum is applied to the carburetor auxiliary fuel metering system.

Exhaust Gas Oxygen Sensor - The exhaust gas oxygen sensor is threaded into the exhaust manifold and provides information to the ECU on the oxygen content of the exhaust gases. The sensor varies its output electrical signal to the ECU in response to the oxygen content.

The sensor monitors air/fuel ratio and generates 0.6-1.0 volt when surrounded by a rich exhaust gas mixture and less than 0.2 volt when surrounded by a lean mixture. This constantly changing voltage is sent to the ECU for analysis.

Throttle Angle Vacuum Switch (Non-Turbo) - Switch is connected to the the carburetor spark port. Switch is mounted on left fender apron, along with the cold temperature vacuum switch. *See Fig. 5.*

When 3 in. Hg vacuum or more is applied to the switch, the electrical contacts open. A signal is sent to the ECU, telling it to operate system in the "Closed Loop" mode. When no vacuum is applied (idle and deceleration), the switch contacts are closed, the ECU operates system in "Open Loop" mode.

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Ford Motor Co. Feedback Carb. System (Cont.)

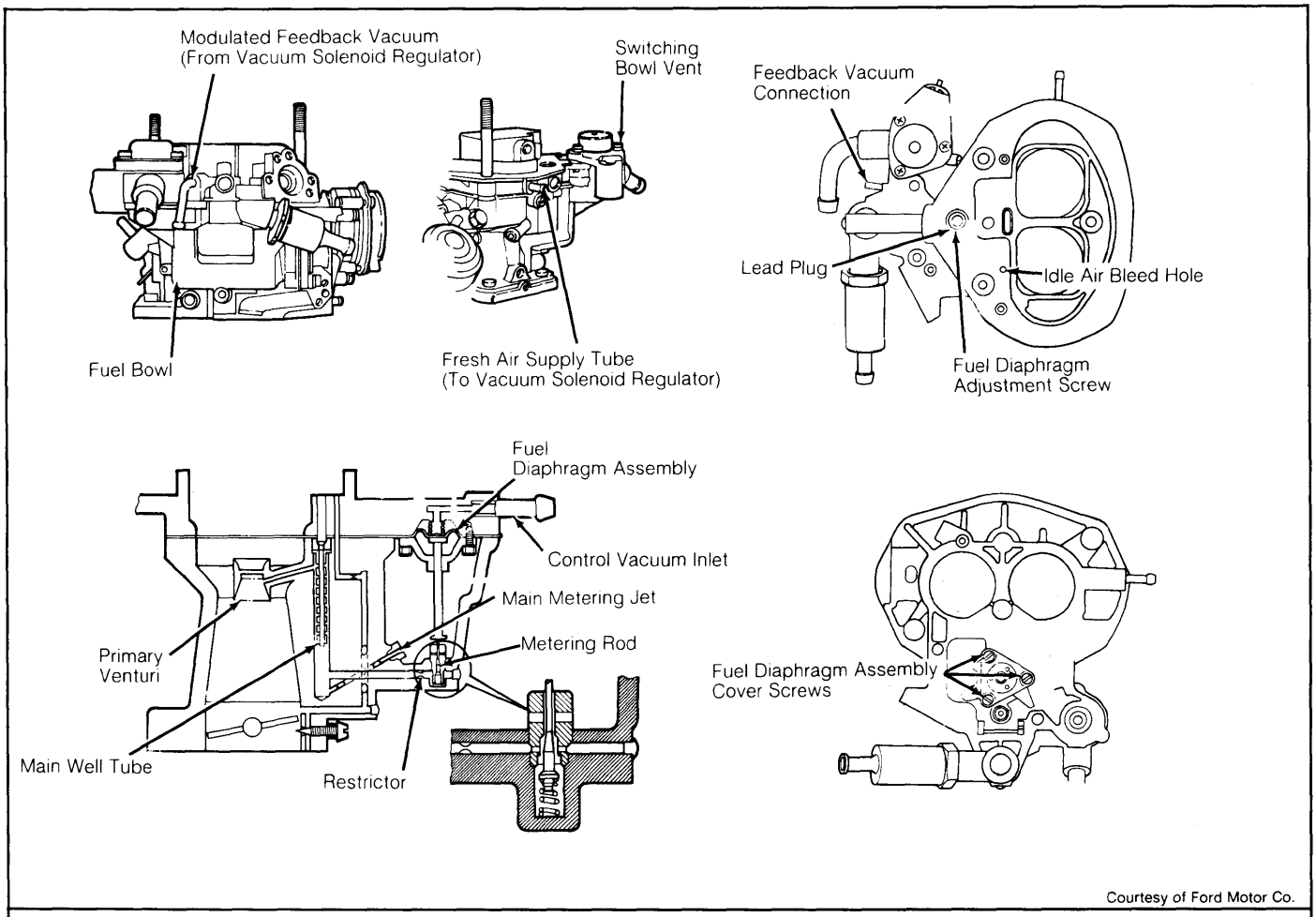

Fig. 3: Feedback Carburetor Metering System & Fuel Diaphragm Assembly

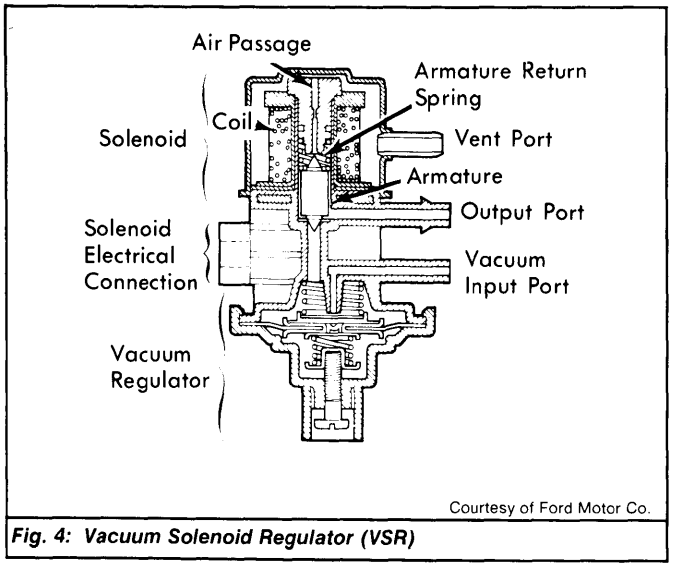

Fig. 4: Vacuum Solenoid Regulator (VSR)

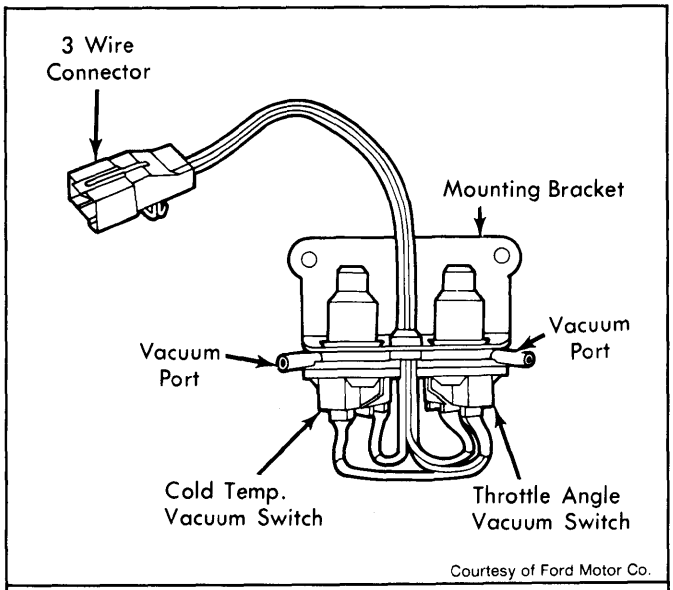

Fig. 5: Cold Temperature Vacuum Switch & Throttle Angle Vacuum Switch Assembly

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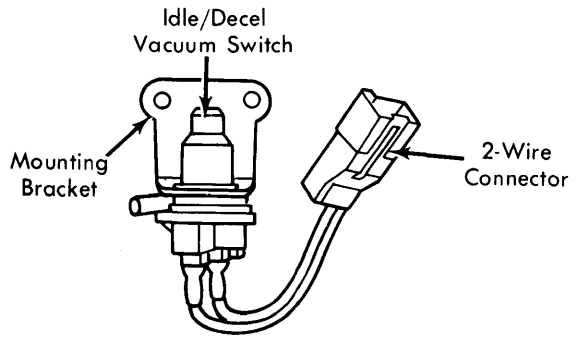
Ford Motor Co. Feedback Carb. System (Cont.)

Cold Temperature Vacuum Switch (Non-Turbo) - Switch is connected to the 3-way ported vacuum switch, which supplies vacuum when engine coolant temperature is below 125°F, closing the switch contacts. This tells the ECU to operate system in "Open Loop" mode. With coolant temperature above 125°F, the switch contacts open, the ECU operates system in "Closed Loop" mode.
Idle/Deceleration Vacuum Switch (Turbo) - The normally closed idle/deceleration vacuum switch is open whenever vacuum is applied from the carburetor spark port. *See Fig. 6.*

Vacuum to switch is controlled by a ported vacuum switch that opens at a coolant temperature of 95°F. The idle/deceleration vacuum switch signals the ECU to switch from "Open Loop" mode to "Closed Loop" mode.



Courtesy of Ford Motor Co.

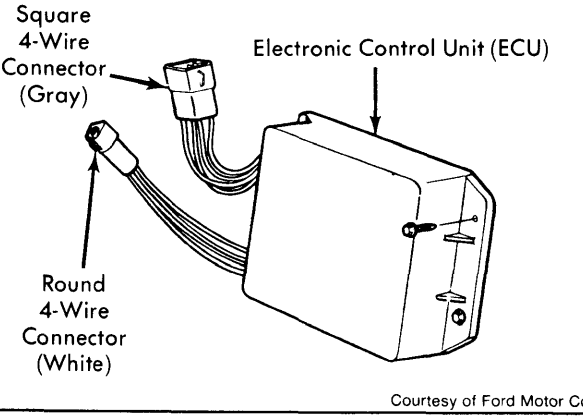
Fig. 6: Idle/Deceleration Vacuum Switch

ELECTRONIC CONTROL UNIT

The Electronic Control Unit (ECU) is the central component of the control loop. *See Fig. 7.* It constantly monitors exhaust gas oxygen sensor, throttle angle vacuum switch and coolant temperature vacuum switch.

The determined response is sent out to the vacuum solenoid/regulator, which supplies vacuum signal to the fuel metering rod in carburetor to obtain the proper air/fuel ratio required for optimum operation of the catalytic converter.

The ECU also contains circuitry that, based on engine RPM, varies the length of time required for a change in the air/fuel ratio. The ECU sends this constantly cycling voltage to the vacuum/solenoid regulator.



Courtesy of Ford Motor Co.

Fig. 7: Electronic Control Unit (ECU)

TESTING & DIAGNOSIS

TEST EQUIPMENT

The following equipment is recommended to properly diagnose and test the Feedback Carburetor System.

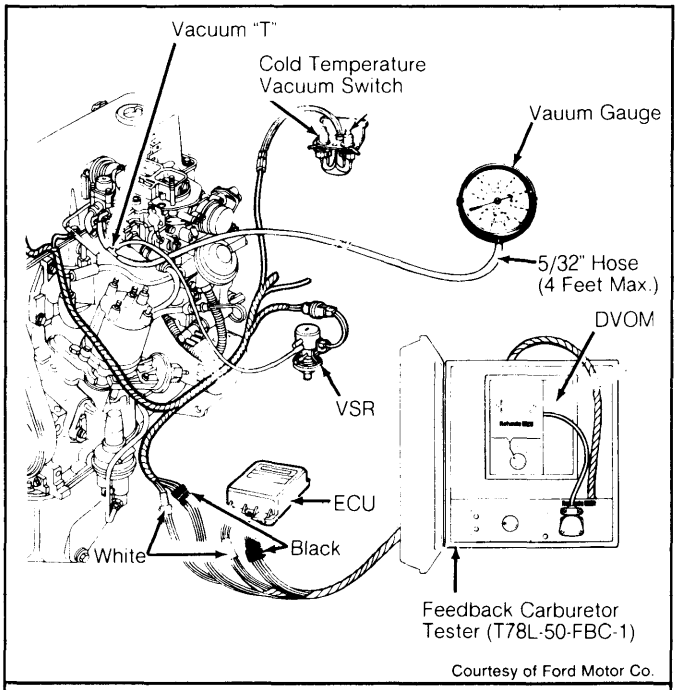
- Digital Volt/Ohmmeter (T78L-50-DVOM).
- Feedback Carburetor (FBC) Tester (T78L-50-FBC-1).
- Vacuum/Pressure Gauge (5 In. Hg/25 psi Range).
- Vacuum Tester (21-0014).
- Tachometer (0-3000 RPM Range).
- Speed Control Tester (Snap-On GA-437).

VISUAL (PRE-CHECK) INSPECTION

1) Inspect all vacuum lines for proper connections and proper hose condition. Check electrical harness for loose or detached connectors, broken or frayed wires, loose terminals, shorting, or corrosion.
2) Check major components for physical damage. With engine running (if possible), check around exhaust manifold and exhaust gas oxygen sensor for leaks.

TEST EQUIPMENT HOOK-UP

1) Turn ignition off. Disconnect harness from Electronic Control Unit (ECU). Connect test equipment to vehicle. *See Fig. 8.* The hose length between the vacuum gauge and the test setup is critical. Hose length must be 3' minimum, 4' maximum, and 5/32" inside diameter.
2) Set DVOM to "BATTERY TEST". Verify that battery exceeds minimum voltage stated on tester label. When using DVOM in "TESTER" position, test leads must be removed from DVOM test jacks for proper operation.



Courtesy of Ford Motor Co.

Fig. 8: Feedback Carburetor System Test Equipment Hook-Up

ENGINE WILL NOT START OR RUN

Check starter, ignition, and emission systems as well as engine mechanical condition. To verify that ignition system is working properly, go to Motorcraft Dura-Spark I & II article in DISTRIBUTIOR & IGNITION SYSTEMS section.

VEHICLE PREPARATION

Block front wheels and set parking brake. Start and run engine until normal operating temperature is reached. Turn off all electrical accessories.

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Ford Motor Co. Feedback Carb. System (Cont.)

DATA COLLECTION

Test Sequence I - 1) See FEEDBACK CARBURETOR SYSTEM DIAGNOSTIC DATA CHART. *See Fig. 9.* Install Speed Control Tester (Snap-On GA-437) and set engine to 2200-2800 RPM.
2) Set test selector switch to position "1". Set DVOM to "TESTER" position. Perform test sequence as shown in data chart and record all data.
Test Sequence II - This is a timed procedure. Read full procedure instructions before starting test. *See Fig. 9.* At vacuum gauge "T" fitting, remove control vacuum hose going to carburetor. At the same time, cover "T" opening with finger. Note and record the time required for the vacuum gauge and vacuum regulator light to obtain a steady condition.
Test Sequence III - 1) Set engine to 2200-2800 RPM. Reconnect control vacuum hose to vacuum gauge "T" fitting. Disconnect vacuum hose from cold temperature vacuum switch (Pink hose). Apply 4.5-5.5 in. Hg vacuum to the switch and record data.
2) While covering carburetor idle air bleed hole, reduce vacuum to zero and record data as directed on test chart. *See Fig. 9.* Uncover idle air bleed hole and record data.
3) Return engine to idle and verify that reading is less than 0.3 volt. Turn engine off, connect vacuum hose to fittings, and reconnect all electrical leads.

NOTE: Complete all data gathering procedures for TEST SEQUENCE I, II and III before performing any diagnostic/repair procedures as listed under COMPONENT DIAGNOSIS, except as noted on data chart.

DATA ANALYSIS

1) Review test data obtained in test sequences. If all data is within limits, system is operating properly or complaint is no longer present. Proceed to step **4)**.
2) If one or more test points are out of limits, perform COMPONENT DIAGNOSIS subroutine(s) indicated at bottom of appropriate column of data chart. Subroutines should be used in sequence from left to right.
3) When a component is repaired or replaced, a retest is required. Retest should be started at DATA COLLECTION, TEST SEQUENCE I and run through TEST SEQUENCE III.
4) If initial system check or subroutine is completed and cause of complaint is not found, verify that the problem still exists. If it does, repeat initial system check and/or appropriate COMPONENT DIAGNOSIS subroutine(s).

Test Sequence	Vehicle Condition	No. 1 Vehicle Battery Voltage	No. 2 Cold Temp. Vac. Switch & Throttle Angle Switch	EGO Sensor Indicator	Vacuum Regulator Light	Feedback Vacuum Control
I	1. Front wheels blocked 2. Parking brake "ON" 3. Engine "Hot"; neutral 4. 2200-2800 RPM	Limits: 11.5-18.0	Limits: 11.5-18.0V	Limits: Alternating between Lean & Rich	Limits: Blinking	Limits: Oscillating with avg. about 1.5-3.5" Hg
II	1. Remove carb. feedback vac. control line from tee & cover opening with finger. 2. 2200-2800 RPM				Limits: From Blinking to on in 11 sec. or less.	Limits: From oscillating to steady at 4.5-5.5" Hg in 11 sec. or less
III	1. Replace carb. feedback vac. control line. 2. 2200-2800 RPM 3. Apply 5" Hg to cold temp. vac. switch.		Limits: 0.3V max.		Limits: Blinking	Limits: Oscillating with avg. about 1.75-3.25" Hg
	4. While covering carb. idle air bleed hole, remove vac. from cold temp. vac. switch.		11.5V min.		On	
	5. Uncover idle air bleed.		11.5V min.		Blinking	
	6. Return to curb idle.		0.3V max.			
		If out of limits, go to "Battery Voltage Not Within Limits" subroutine.	If out of limits, go to "CTVS or TAVS Not Within Limits" subroutine.	If out of limits, go to "EGO Sensor Not Within Limits" subroutine.	If out of limits, go to "VSR Indicator Light Not Within Limits" subroutine.	If out of limits, go to "Feedback Vacuum Control Not Within Limits" subroutine.

Courtesy of Ford Motor Co.

Fig. 9: Feedback Carburetor System Diagnostic Data Chart

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Ford Motor Co. Feedback Carb. System (Cont.)

5) If problem does not exist, road test vehicle to try to create problem. Repeat initial system check and/or appropriate COMPONENT DIAGNOSIS subroutine(s).
6) Once problem is corrected, reconnect all vacuum and electrical leads. Remove test equipment. If problem has not been corrected, go to COMPONENT DIAGNOSIS or repeat initial checks and/or check the starter, ignition, fuel, and emission systems. Also check engine mechanical condition.

COMPONENT DIAGNOSIS

NOTE: Although Ford Motor Co. has not recommended testing the Feedback Carburetor System without the use of the FBC tester, the following test steps may be performed without the tester.
Read entire test procedure and study the wiring diagram to determine what (how) each switch/sensor and circuit is being tested. After you're familiar with the circuits and test values given in the test steps, test and correct affected circuit. Retest circuit after each repair.

Battery Voltage Not Within Limits - 1) Start and run engine until normal operating temperature is reached. Set test selector switch to position "1". If reading is over 18 volts, check battery electrolyte level and voltage regulator. Replace voltage regulator, if required and retest.
2) If reading is less than 11.5 volts, check for a discharged battery and for a damaged ignition switch. Check Gray/Yellow wire between ECU and ignition switch for short or open. Charge battery, repair wire or replace ignition switch as necessary and retest.
3) Also check Black ground wire between ECU and engine block. Connect test lead from tester continuity lead jack to engine block. Set test selector switch to position "6". If reading is greater than 3.0 ohms, repair Black wire and retest.
Cold Temperature Vacuum Switch (CTVS) or Throttle Angle Vacuum Switch (TAVS) Not Within Limits - 1) With engine idling at normal operating temperature, remove Pink vacuum hose from CTVS and check for vacuum. If vacuum is present, replace feedback system ported vacuum switch and retest. If no vacuum is present, go to next step.
2) Run engine at 1500 RPM. Remove vacuum hose from TAVS and check for vacuum. If vacuum is present, go to next step. If no vacuum is present, check for blocked vacuum hose or carburetor vacuum spark port. Repair or replace as necessary and retest.
3) Turn ignition off. Disconnect flat 3-pin connector between CTVS/TAVS and wiring harness. Set test selector switch to position "7". If reading is more than 1000 ohms, go to step **5)**.
4) If reading is less than 1000 ohms, disconnect the square 4-pin connector between tester and ECU. Set test selector switch to position "8". If reading is more than 4 ohms, replace ECU and retest. If less than 4 ohms, replace Dark Green/Light Green wire from CTVS to ECU and retest.
5) Turn ignition on (engine not running). Set test selector switch to position "2". If reading is 10.5-18.0 volts, go to next step. If reading is less than 10.5 volts, replace ECU and retest.
6) Turn ignition off. Reconnect CTVS/TAVS to wiring harness (flat 3-pin connector). Set test selector switch to position "7". If reading is less than 0.5 (500) ohms, go to step **8)**. If reading is more than 0.5 (500) ohms, go to next step.
7) Apply 5 in. Hg vacuum to CTVS. If reading is 0.5 (500) ohms or more, repair Dark Green/Light Green wire between CTVS and ECU and retest. If less than 0.5 (500) ohms, replace CTVS/TAVS assembly and retest.
8) Remove Yellow vacuum hose from CTVS and apply 5 in. Hg vacuum to switch. Set test selector switch to position "8". If reading is more than 4 ohms, go to next step. If reading is less than 4 ohms, replace CTVS/TAVS assembly and retest.
9) Disconnect and plug vacuum hose from CTVS. Set test selector switch to position "2". Run engine at 2200-2800 RPM. Apply zero and 5 in. Hg vacuum to CTVS. If reading is 11.5-18.0 volts at zero vacuum and less than 11.5 volts at 5 in. Hg, go to next step. If reading is less than 11.5 volts at zero vacuum and/or 11.5-18.0 volts at 5 in. Hg, replace CTVS/TAVS assembly and retest.
10) Reconnect all vacuum and electrical leads. Turn test selector switch to position "2". Turn ignition key to "RUN" (engine off). Apply 5 in. Hg vacuum to TAVS. If reading is less than 10.5 volts, replace ECU and retest. If reading is 10.5-18.0 volts, repeat TEST SEQUENCE I and TEST SEQUENCE III. If data chart is within limits, system is operating properly. Problem no longer exists.
Exhaust Gas Oxygen (EGO) Sensor Not Within Limits - A series of conditions may exist which make different diagnostic procedures necessary. Note the different system symptoms listed in the following EGO sensor indication headings to determine which subroutine to use.
EGO Sensor Indication Rich; Control Vacuum High (4.5-5.5 In. Hg); Vacuum Solenoid Light On - Check for proper choke system operation. Repair and retest. Check complete carburetor system for proper operation. Repair and retest.
EGO Sensor Indication Rich; Control Vacuum Low (0-0.5 In. Hg); Vacuum Solenoid Light On - 1) With engine at 2200-2800 RPM, remove control vacuum hose from carburetor. Check vacuum at Vacuum Solenoid Regulator (VSR) input. Vacuum should be greater than 10 in. Hg. If not, check for leak or blockage in feedback vacuum system. Repair and retest.
2) If vacuum is more than 10 in. Hg, reconnect hose to regulator input and check vacuum at outlet port. If less than 4.5 in. Hg, replace VSR and retest. If more than 4.5 in. Hg, check hose between VSR and carburetor for leaks or blockage. Replace and retest. If hose is okay, check carburetor for vacuum leaks. Repair and retest.
EGO Sensor Indication Rich; Control Vacuum Low (0-0.5 In. Hg); Vacuum Solenoid Light Off - 1) Disconnect square 4-pin connector between tester and ECU. Set test selector switch to position "11". If reading is less than 10.5 volts, go to next step. If reading is more than 10.5 volts, replace ECU and retest.
2) Turn ignition off. Set test selector switch to position "5". Detach 2-pin connector to Vacuum Solenoid Regulator (VSR). Attach tester continuity lead probe to Black wire in harness connector which mates to VSR. If reading is more than 3 ohms, repair Black wire and retest. If reading is less than 3 ohms, go to next step.
3) Set test selector switch to position "12". Attach tester continuity lead probe to Dark Blue/Yellow wire in harness connector which mates to VSR. If reading is less than 3 ohms, go to step. If reading is more than 3 ohms, repair Dark Blue/Yellow wire and retest.
4) Use DVOM on "200 OHMS" range and measure VSR coil resistance. If reading 30-55 ohms, system is operating properly or specific problem is no longer present. If reading is incorrect, replace VSR and retest.
EGO Sensor Indication Lean; Control Vacuum High (4.5-5.5 Hg); Vacuum Solenoid Light On - Replace ECU and retest.
EGO Sensor Indication Lean; Control Vacuum High (4.5-5.5 Hg); Vacuum Solenoid Light Off - 1) Ensure ignition is off. Apply 12-14 in. Hg vacuum to Vacuum Solenoid Regulator (VSR) input port and connect vacuum gauge to VSR output port. If gauge reading at output port is 2 in. Hg vacuum or more, replace VSR and retest.
2) Disconnect harness from VSR to check Dark Blue/Yellow wire for an open. Set test selector switch to position "12". Attach tester continuity lead probe to Dark Blue/Yellow wire in harness connector which mates to VSR. If reading is more than 3 ohms, repair wire and retest. If reading is less than 3 ohms, go to next step.
3) Set DVOM to "2000 OHMS" range and check for short to ground at VSR connector. Resistance from both pins should be greater than 300 ohms. If less than 300 ohms, replace VSR and retest.
EGO Sensor Indication Lean; Control Vacuum Low (0-0.5 In. Hg); Vacuum Solenoid Light Off - 1) Ensure ignition is off. Disconnect exhaust gas oxygen sensor from harness. Set test selector switch to position "13".
2) Take a resistance reading between tester/continuity lead jack on tester and EGO connector on harness. If reading is more than 3 ohms, repair Dark Green/Yellow wire and retest. If reading is less than 3 ohms, go to next step.
3) Connect DVOM between exhaust gas oxygen sensor lead and engine block. Disconnect air output hose from air by-pass valve. Start and run engine at idle until normal operating temperature is reached.

NOTE: After completing DVOM readings, reconnect hose to air by-pass valve.

4) Increase engine speed to 2200-2800 RPM for 3 minutes (minimum). Reduce speed to curb idle and immediately place finger over carburetor idle air bleed hole. *See Fig. 3.*
5) Observe DVOM reading. If reading is less than 0.55 volt, replace exhaust gas oxygen sensor and retest. If reading is 0.55 volt or more, remove finger from idle air bleed hole and reconnect sensor to harness.
6) Increase engine speed to 2200-2800 RPM. If EGO sensor indication is still lean, check feedback carburetor. If reading varies between lean and rich, check Thermactor air injection system. See Thermactor I System article in EXHAUST EMISSION SYSTEMS section.
EGO Sensor Indicator Blinking Lean & Vacuum Solenoid Light Blinking - 1) Start and run engine at idle until normal operating temperature is reached. Set DVOM to "TESTER" and test selector switch to position "22".
2) Increase engine speed to 2200-2800 RPM for 3 minutes (minimum). Reduce speed to curb idle and immediately place finger over carburetor idle air bleed hole. *See Fig. 3.*
3) Observe DVOM reading. If reading is less than 0.55 volt, replace exhaust gas oxygen sensor and retest. If reading is 0.55 volt or more, system is okay. Check feedback carburetor tester to verify it is working properly.
EGO Sensor Indicator Blinking Rich & Vacuum Solenoid Light Blinking - 1) Start and run engine at idle until normal operating temperature is reached. Set DVOM to "TESTER" and test selector switch to position "22".
2) With engine at 2200-2800 RPM, remove vacuum hose from fuel evaporation canister at fitting located between PCV valve and carburetor. Observe DVOM reading.
3) If reading is more than 0.25 volt, replace exhaust gas oxygen sensor and retest. If reading is 0.55 volt or more, system is okay. Check feedback carburetor tester to verify it is working properly. Reconnect vacuum hose to fitting.
Vacuum Solenoid Regulator (VSR) Indicator Light Not Within Limits - 1) If VSR indicator light in TEST SEQUENCE II changed from blinking to always on in more than the specified time, go to next step. If indicator light malfunctions in any other manner, go to step **3)**.
2) Set test selector switch to posiiton "4". If reading is less than 0.5 (500) ohms, replace ECU and retest. If reading is 0.5 (500) ohms or more, repair open in VRS circuit and retest.
3) If EGO sensor, CTVS and TAVS functions are okay, check feedback carburetor tester for a malfunction in the VRS indicator light circuit. If tester is okay, go to next step.
4) Turn ignition switch to "RUN" position (engine off). Set test selector switch to position "11". If average reading is 0.5-4.5 volts or 7.0-14.0 volts, replace ECU and retest.
5) If average reading is 4.5-7.0 volts, recheck feedback carburetor tester for a malfunction in VRS indicator light circuit or repeat this test starting at step **1)**.
6) If average reading is 0.0-0.5 volts, set test selector switch to position "5". Detach 2-pin connector to Vacuum Solenoid Regulator (VSR). Attach tester continuity lead probe to Black wire in harness connector which mates to VSR. If reading is more than 3 ohms, repair Black wire and retest. If reading is less than 3 ohms, go to next step.
7) Set test selector switch to position "12". Attach tester continuity lead probe to Dark Blue/Yellow wire in harness connector which mates to VSR. If reading is less than 3 ohms, go to step. If reading is more than 3 ohms, repair Dark Blue/Yellow wire and retest.
8) Use DVOM on "200 OHMS" range and measure VSR coil resistance. If reading 30-55 ohms, system is operating properly or specific problem is no longer present. Reconnect VSR connector. If reading is incorrect, replace VSR and retest.
Feedback Vacuum Control Not Within Limits - 1) Disconnect manifold vacuum input hose from Vacuum Solenoid Regulator (VSR) and connect vacuum gauge to hose.
2) Start and run engine at idle. Ensure that throttle is fast idle cam and note vacuum gauge reading. If reading is less than 12 in. Hg, check for leak in vacuum hose. Repair and retest. If reading is greater than 12 in. Hg, go to next step.
3) Reconnect manifold vacuum input hose to VSR. Disconnect vacuum control hose from carburetor and connect vacuum gauge to it. If average vacuum reading is less than 1.75" or more than 3.25 in. Hg, replace VSR and retest. If average vacuum is between 1.75-3.25 in. Hg, check CARBURETOR FEEDBACK DIAPHRAGM ASSEMBLY and retest.

CARBURETOR FEEDBACK DIAPHRAGM ASSEMBLY

1) With engine off, disconnect vacuum hose between Vacuum Solenoid Regulator (VSR) and carburetor. Using an external vacuum source, apply 10 in. Hg vacuum to hose and check for leakage.
2) If vacuum falls from 10 in. Hg to 7 in. Hg within 15 seconds, disconnect hose and apply vacuum directly to carburetor. If leakage rate exceeds specification, go to next step. Otherwise, replace vacuum hose, recheck leakage rate and go to step **7)**.
3) Seal feedback system diapraghm adjustment screw with finger and recheck leak rate. *See Fig. 3.* If leak rate now falls wihtin specified limits, pry open lead plug on adjustment screw.
4) Apply locking compound to housing threads at leaking screw, let dry and recheck leak rate. If leak rate now falls within specified limits, install new lead plug and go to step **7)** If not, go to next step.
5) Disassemble air horn and remove float assembly. Check for proper torque on feedback system diaphragm assembly cover screw. If torque is 4-5 INCH lbs., go to next step. If not, tighten screw to specified limits and recheck leak rate. If leak rate now falls within specified limits, go to step **7)** Otherwise, go to next step.
6) Remove diapraghm assembly cover screws. Examine sealing surface for burrs, nicks or other damage. Repair or clean as necessary. If sealing surface is questionable, reinstall original diaphragm assembly and recheck leak rate. If leak rate is now correct, go to next step. If excessive leakage still exists, replace carburetor assembly.
7) While applying 5 in. Hg vacuum to feedback diaphragm vacuum source, observe diaphragm assembly stem for movement. Total stroke must be .09" in as vacuum is applied. If not, replace diaphragm assembly as necessary.
8) Also check feedback system metering needle located at bottom of fuel bowl for free movement. Total stroke from the free to the fully depressed position must be .20". If not, repair or replace metering needle as necessary.
9) After repairs, reassemble float assembly and install air horn on carburetor. If a new diaphragm assembly has been installed, reset idle fuel mixture.

1975-79 COMPUTERIZED ENGINE CONTROLS
Ford Motor Co. Feedback Carb. System (Cont.)

WIRING DIAGRAMS

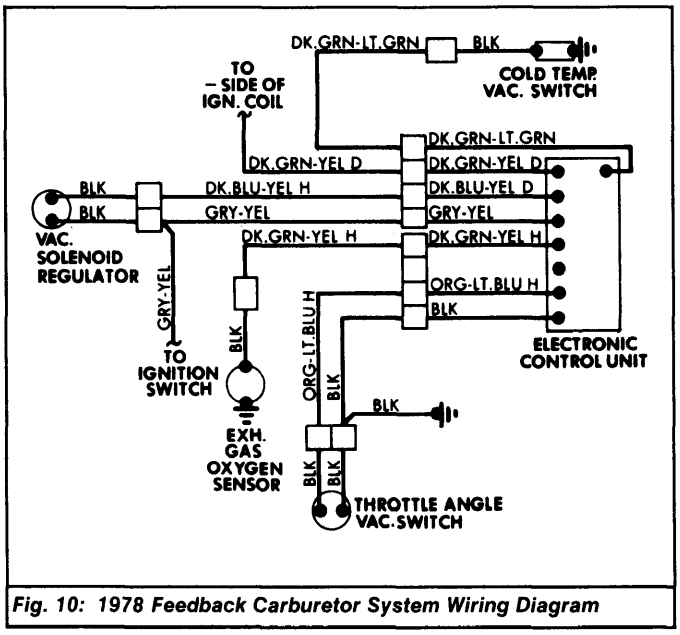

Fig. 10: 1978 Feedback Carburetor System Wiring Diagram

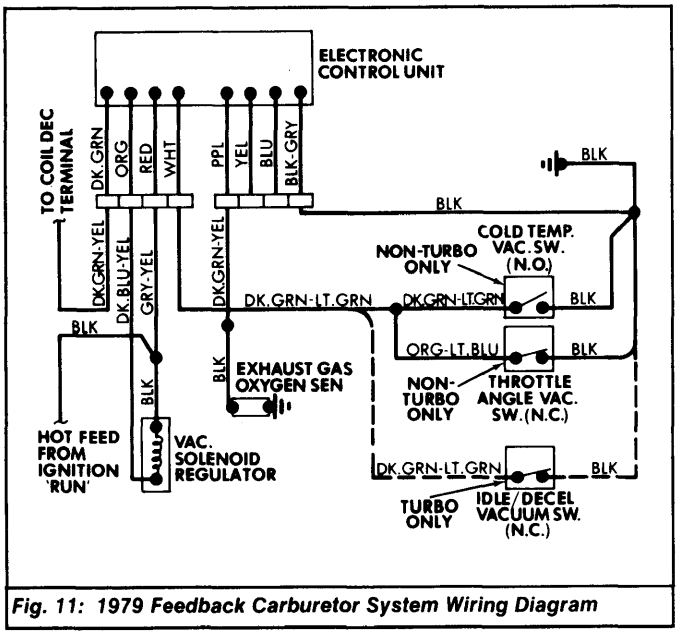

Fig. 11: 1979 Feedback Carburetor System Wiring Diagram