

Tomco Techtips

TM

ISSUE 2

How to get the car to tell you what's wrong.

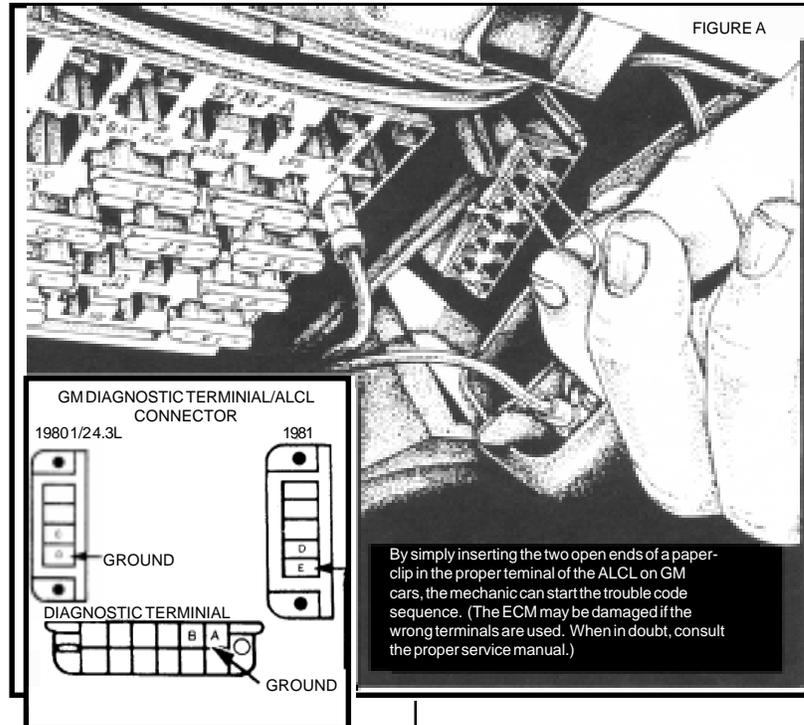
Changing technology doesn't always mean that your job will be more difficult—it does mean it will be different. For instance, if the car's performance is poor, it may not be due to plugs or points. It could be one of the new performance controls such as EGR valves, O₂ Sensors, coolant temperature sensors or ported vacuum switches.

Actually, today's newer cars with their on-board computers or electronic control modules (ECMs) make it easier to diagnose performance problems than ever before. And believe it or not, one of the most important tools you need is a paper clip. If you know where to put the paper clip, you can literally get new GM cars to tell you what's wrong with them.

What we will do here is give you a brief "by the numbers" way to read the on-board computers' self diagnostic system for Chrysler and GM. Each is a little different. We will also give you a listing of the service codes for these car makers. This listing will give you a leg up on solving performance problems on today's newer cars.

GENERAL MOTORS

1. Locate the Assembly Line Connecting Link (ALCL). You will probably find it under the dash. This is where the computer at the assembly plant hooks up to the car to check out the systems.
2. Turn the ignition key to the "ON" position, but do not start the engine.
3. Place the ends of a paper clip in the A and B terminals of the vehicle's ALCL (Fig A). This will



activate the system and the "Check Engine" light will begin to flash. Each flash is a digit in a code number. It will flash once, pause, then flash twice. This code is 12, and it will flash the code three times.

4. Read the flashing codes. After the three code 12's, the light will begin to flash service codes for components or systems which have malfunctioned in the last 50 starts. These codes will be repeated three times each. If no malfunction exists, the code 12 will flash until you remove the paper clip.

CHRYSLER

You don't even need a paper clip to get service codes from Chrysler cars.

1. Turn the ignition key ON-OFF, ON-OFF, on within 5 seconds. This activates the system and the POWER LOSS lamp will light up for two seconds, immediately after this, it will begin flashing the service codes always starting with code 88.

2. Count the flashes made by the POWER LOSS light. Each one is two digits (like GM). There is a short pause between digits and a 4-second pause between codes. The light will continue to flash until all codes in memory have been displayed.

ECM TROUBLE CODE CHART

FORD

Since mid year 1978 models, Ford has used several different versions of two basic engine control computer system; the electronic Engine Control (EEC) series and the Micro-processor Control Unit (MCU) system. Some early versions did not have self diagnosis capabilities. The latter systems can be checked using an analog (pointer) type voltmeter or scan tool. These systems will be covered in a future issue of TOMCO TECH TIPS.

The following chart lists the service codes and the components or circuits they indicate for Chrysler, and GM. We have condensed many pages of information in order to give you this basic troubleshooting tool. Specific service codes may be found in service manuals for each model and year. This chart is valuable to get you headed the right direction and it is much handier than searching through large service manuals.

SERVICE CODE	CHRYSLER	GM
0	Oxygen Feedback Sys. Lean	---
1	Oxygen Feedback Sys. Rich	---
8	Knock Circuit	---
11	Distributor Signal	---
12	Battery Feed to Logic Module Disconnected Recently	No Distributor Ref. Pulse or Engine Speed Active
13	MAP Sensor (vacuum)	O2 Sensor Circuit
14	MAP Sensor (electrical)	Coolant Sensor High
15	Vehicle Speed Sensor	Coolant Sensor Low
16	Battery Voltage Sensing	---
17	Detonation Sensor, Engine Cooling Sys.	---
19	---	---
21	O2 Sensor	TPS, Idle & WOT Switch Error
22	ECT Sensor	TPS, Fuel cut-off Solenoid
23	Charge Temp Sensor, Throttle Body Temp Sensor	M/C Circuit Solenoid, MAT Sensor, Air Fuel Solenoid
24	TPS	Vehicle Speed Sensor
25	Auto. Idle Speed Control	MAT Sensor, Air Switch Solenoid
26	Injector 1 & 2 Fuel Injector Driver	---
27	Injector 3 & 4 Fuel Control	---
28	---	---
31	Canister Purge Solenoid Circuit	Wastegate Elec. Sig-Open, Wastegate Hi MAP Overboost, MAP Low
32	Power Loss Lamp, Power Limit Lamp	EGR, Baro Sensor, EVRV/EGR
33	A/C Wide Open Throttle Cut Relay Circuit	Mass Air Flow Sensor, MAP Sensor
34	EGR Solenoid, Speed Control Solenoid Speed Control Servo	Mass Air Flow Sensor, MAP Sensor, Differential Pres. Vacuum
35	Radiator Fan Relay Circuit	ISC, Idle Air Control
36	Wastegate Control Solenoid	Burnoff Diagnostics
37	Trans. Lockup Solenoid, Baro Read Solenoid, Shift Indicator Lamp	---
41	Battery Charging Sys. Alternator Field Control	No Distrib Ref Signal, Cam Sensor Failed, Cylinder Select Error
42	Auto Shut Down Relay	EST Monitor Error, By Pass Line Error, Electronic Spark Control, Dist or C-3 Sys. Error, Fuel Cutoff Solenoid
43	Ignition & Fuel Control Interface Spark Control	Electronic Spark Control
44	Logic Module Battery Temp.	Lean Exhaust (44 & 45 = O2 Sensor
45	Overboost	Rich Exhaust (44 & 45 = O2 Sensor
46	Battery Voltage Sensing	---
47	Battery Voltage Sensing	---

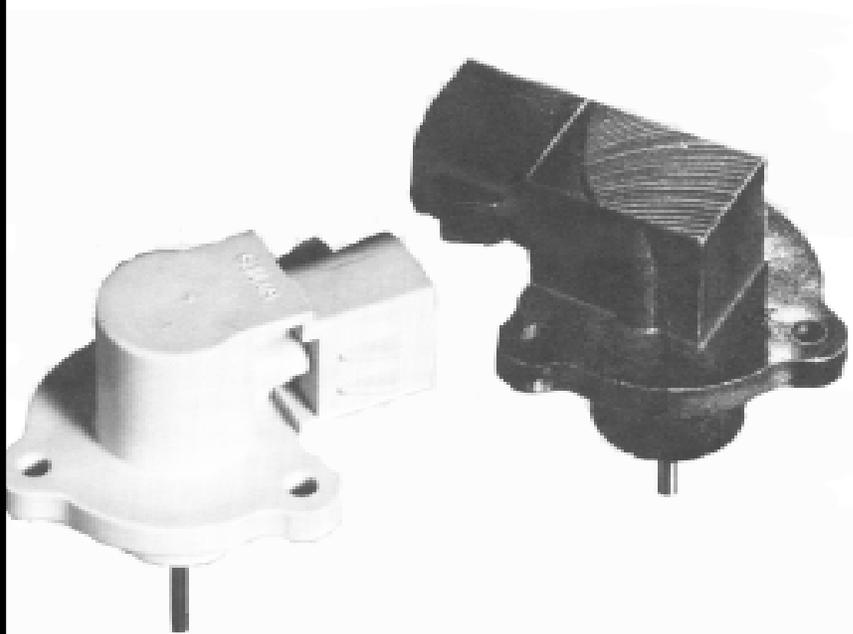
New EVP Sensor helps eliminate sudden acceleration problems.

Some 1983 through 1986, fuel injected Ford cars with 3.8 or 5.0 liter engines and automatic transmission are experiencing sudden acceleration.

The problem is believed to be caused by the failure of the EGR valve position. The sensor in question is an early design for which Ford now has a new specification.

Tomco, Inc. now offers an EGR valve position sensor with an improved design which conforms to Ford's latest specifications. Our design has greater durability and a longer service life. If you find one of the old models on a car you are servicing, it should be replaced with the new design.

A note of caution. There are replacement EGR valve position sensors in the aftermarket which are the very same units in question. That is, they have the old design which is no longer specified by Ford. You will know when you come across one of these, because the serial number has been ground off the top of the housing.



New Tomco, Inc. EVP Sensor, on left is white and has a rounded housing. Old model on right has square housing. Also notice that the old model on the right has had the serial number machined off. Do not install an EVP Sensor that looks like this!

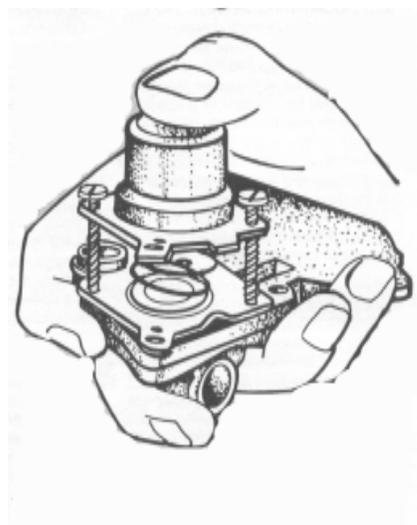
How to service the GM TBI pressure regulator.

There is no need to replace the pressure regulator on GM TBI units. Tomco, Inc. offers a kit that allows you to safely service this component. The kit also reduces your parts cost while allowing you to bill more labor.

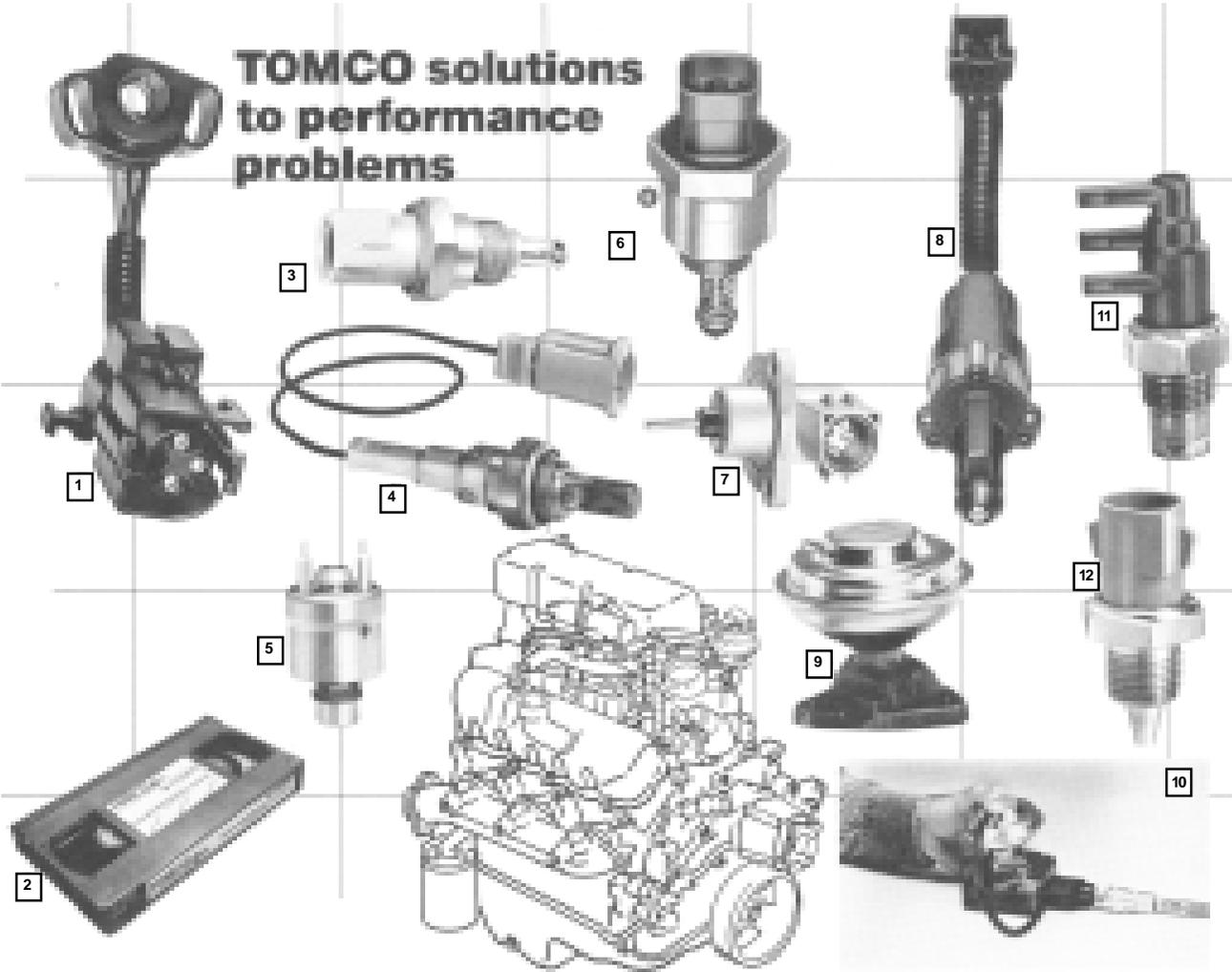
Kit 3-272 contains two long screws. When dismantling a pressure regulator, first remove only two short screws. Now remove the long screws which control the extension of the regulator spring. This allows the housing to be opened safely. These screws also position the stamped

housing as the heavy regulator spring is compressed and the short screws are installed during reassembly. Also included are instructions and a special thread compound to prevent the screws from loosening.

This kit complements our TBI repair kit 5525 which contains gaskets, seals, pressure regulator diaphragm and filter. Complete instructions are included.



TOMCO solutions to performance problems



① THROTTLE POSITION SENSOR.

Outside of most carburetors and TBI units (inside some GM carbs). Signals computer how much air is being consumed. Check operation, adjust voltage and inspect for corrosion on connectors every 25,000-30,000 miles. **Failure symptoms:** Hesitations, tip in surge, engine pinging, no torque converter lock-up, "Check Engine" light is on.

② SEND FOR NEW ENGINE PERFORMANCE CONTROL TAPE.

Get an overview of engine performance controls in this 40 minute tape. Use it as an update for yourself or your mechanics. The tape covers location, function and troubleshooting tips for the 10 engine performance controls pictured on this page. It also demonstrates the new EGR valve tester.

③ AIR CHARGE & MANIFOLD AIR TEMPERATURE SENSOR.

Located in the intake manifold or air filter housing. Measures air/fuel mixture temperature. Signals computer to adjust injector for damage and corrosion when trouble codes indicate problem in this circuit. **Failure symptoms:** "Check Engine" light is on continuously, hesitation, poor mileage or strong exhaust odor.

④ OXYGEN SENSOR.

Located on exhaust manifold. Measures amount of oxygen in exhaust. Signals on-board computer to adjust fuel mixture. Check and replace according to manufacturer's specifications. Bad oxygen sensor may cause "Check Engine" light to light up, poor performance, reduced fuel economy, and will damage catalytic converter.

⑤ FUEL INJECTOR.

Located in the TBI assembly. Meters and atomizes fuel delivered to engine. Inspect every 25,000-30,000 miles for proper spray pattern and leakage. **Failure symptoms:** No start, flooding, hesitations, exhaust odor

⑥ IDLE AIR CONTROL.

Located on TBI unit or throttle body (PFI engines). Minimizes the variation in engine speed under various idle load conditions. Check for proper idle control, free pintle movement and corrosion on connectors every 25,000-30,000 miles. **Failure systems:** Stalling, high idle speeds. "Check Engine" light on continuously.

⑦ EGR VALVE POSITION SENSOR.

Located on back of EGR valve. Signals computer to adjust EGR valve opening. Inspect when driveability problems occur. Check for corrosion on terminals every 25,000-30,000 miles. **Failure symptoms:** Poor fuel economy, sudden acceleration, hesitation.

⑧ IDLE SPEED CONTROL.

Attached to carburetor or TBI unit. Adjusts throttle opening to maintain proper idle speed. Inspect and adjust during tune-up 25,000-30,000 miles. Check for corrosion on terminals. **Failure symptoms:** Engine stalling and/or dieseling.

⑨ EGR VALVES.

Located on exhaust manifold. EGR valves recirculate exhaust gas to intake manifold to cool peak combustion temperature. Reduce NOX emissions. Inspect ever 12,000 to 15,000 miles. Bad EGR valve may cause rough idle, overheating, loss of power and poor fuel economy.

⑩ PORTED VACUUM SWITCH.

Located in vehicle cooling system. Controls various vacuum-actuated components, including EGR valve. Inspect for damage every 6,000 to 8,000 miles. Test if engine overheats. Damaged or broken switches cause poor performance, reduced fuel economy, surging, and engine knock.

⑪ COOLANT TEMPERATURE SENSOR.

Located in vehicle coolant system. Major component of computer-controlled engines. Measures engine temperature. Signals computer to adjust fuel mixture. Inspect every 12,000 to 15,000 miles. Bad sensors may cause poor performance, reduced fuel economy and hard starting.

⑫ NEW EGR VALVE TESTER AVAILABLE FROM TOMCO.

This hand-held tester allows positive testing of all types of EGR valves. It is easy to use, inexpensive and operates on shop air. It comes with complete instructions and storage case.

TOMCO[®] INC.