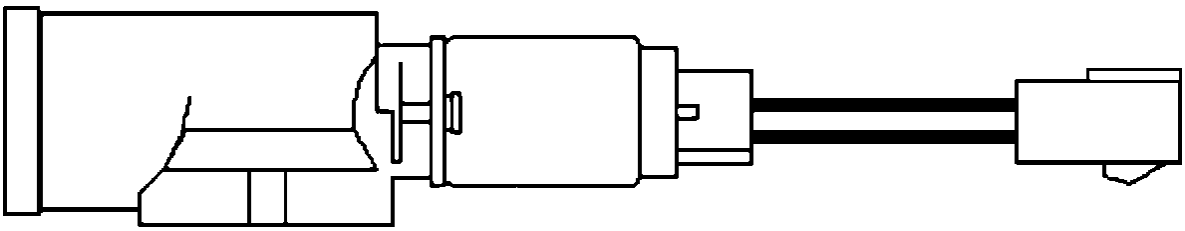
TomcoTechtips
TM
ISSUE 23

THROTTLE AIR BYPASS VALVE



Ford uses an idle air bypass valve, sometimes called a throttle air bypass valve (TABP), to control the idle on its multipoint injection systems. The TABP is located on the throttle body or on the air induction system before the throttle body.

The TABP is not a stepper motor like the Idle Air Control (IAC) valves, but it is a computer controlled solenoid. The TABP consists of a solenoid and a valve body assembly. The valve body contains a pintle style valve and a spring. (FIG.1)

Power is supplied to the solenoid through the Electronic Engine Control (EEC) power relay. (FIG. 2) The ground path for the solenoid is controlled by the Electronic Control Assembly (ECA). When the ground path is completed the solenoid is energized. The length of time the ECA completes the ground path (on time) depends on various conditions, such as engine temperature, engine load, AC engagement or other various loads. This varying length of time is known as a duty cycle.

When the solenoid is not energized, a spring keeps the pintle seated so that no air passes around the throttle blade.

When the solenoid is energized it causes the pintle to move forward. This results in the pintle being moved from its seat. This allows air from the atmospheric (inlet) side to pass behind the throttle blades to the intake manifold (outlet) side.

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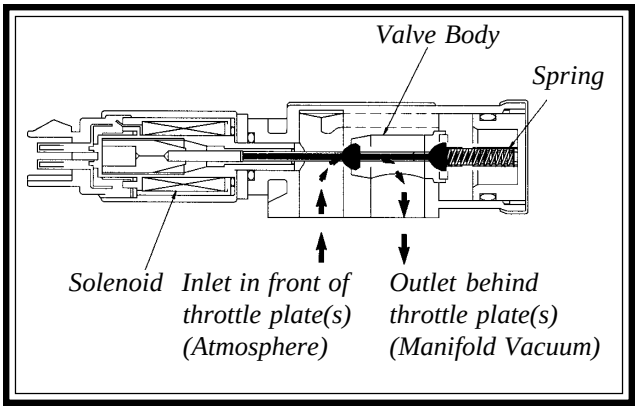

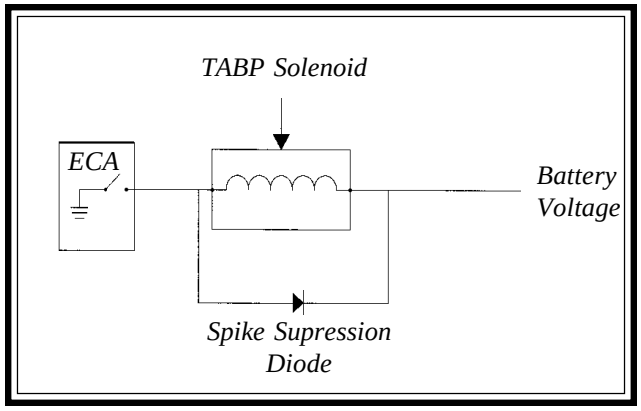

GM Fuel Pump Test

Today's automobiles need much higher fuel pressure to run their fuel injection systems than those of yesterday. In order to accomplish this, General Motors has moved the fuel pumps in their vehicles from the engine into (or next to) the fuel tank. These electric fuel pumps are called positive displacement, or centrifugal pumps.

Many of today's driveability complaints can stem from a problem within the fuel pump system. The following diagnostic test can be used on GM vehicles with electric fuel pumps.

A high impedance digital volt ohmmeter (DVOM) with the capability of controlling a 10 amp circuit and a wiring diagram or component locator are needed to perform the test. Find the "fuel pump test connector". This connector is a grey wire with a black pigtail on it, somewhat similar to a mixture control solenoid connector. It is usually located near the rear of the engine compartment in cars and under the "dog house" on vans. Turn the meter to the 10 amp scale, and place the meter leads in the correct plugs to read amps. Put the negative (-) lead in the fuel pump test connector and the positive (+) lead to the positive of the battery. This supplies voltage directly to the pump, while bypassing the relay. (FIG 4). The amperage reading on the meter can be used to determine the condition of the system.

This test can have three results. (CHART A) First: The pump is in good working order. This would give a reading of about 3.0 to 4.0 Amps.

Second: Low amp draw (below 3.0 Amps). This would indicate high resistance in the electrical circuit of the fuel pump. High resistance in the circuit is normally caused by a clogged filter sock or pump. A clogged filter sock decreases the amount of fuel to the pump. By restricting the fuel flow, cooling is inhibited. The buildup of heat increases the amount of resistance. Worn or corroded armature brushes may also increase resistance. *Note: The fuel filter should be checked first to avoid a misdiagnosis*.

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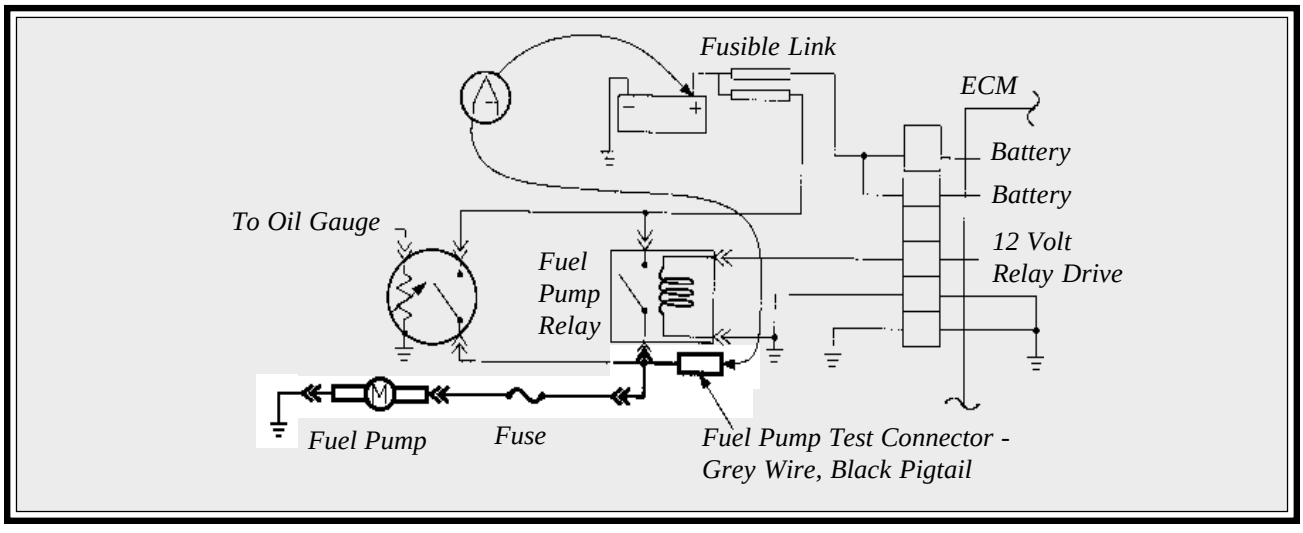
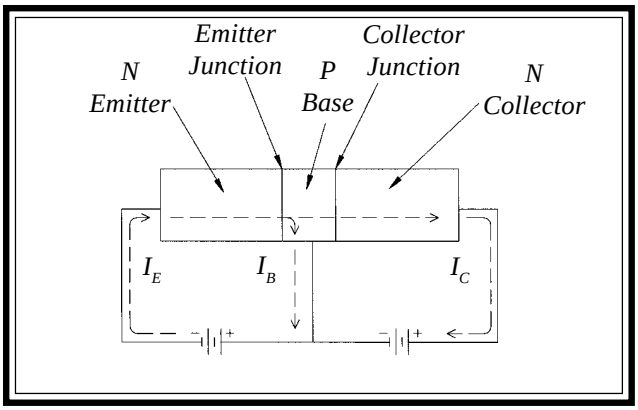
Fuel Pump Amperage Specifications

3.0 to 4.0 Amps	Pump is good
Less than 3 Amps	High resistance, restriction
Greater than 4 Amps	Low resistance, internal pump problem





Electronics 101 Transistors

Theory

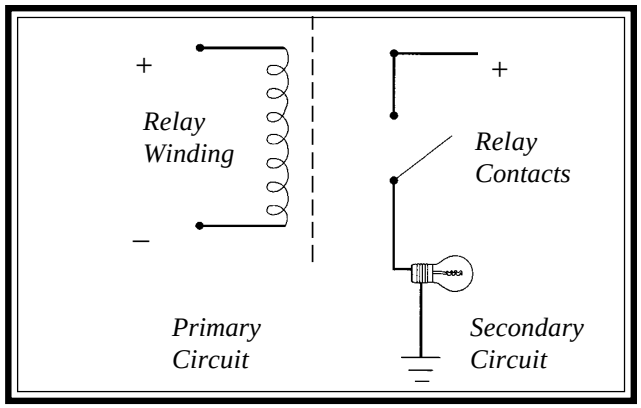
Last issue we looked at forward biasing a NPN transistor. When we forward bias the emitter junction of a transistor we find that only a small amount of current flows out of the base region. (FIG 5) This small amount of current is called base current (I_B).

Most of the current flows across the base region into the collector region towards the positive external voltage source. This current is called collector current (I_C).

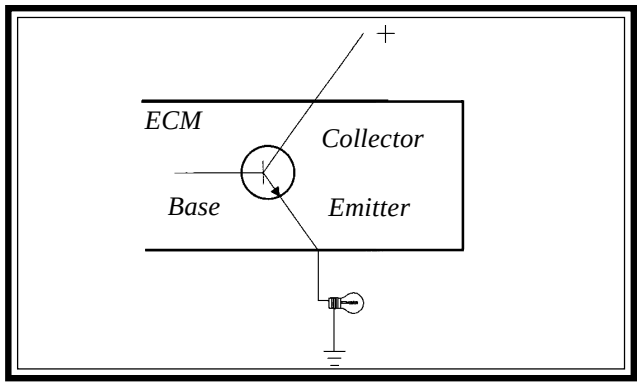
The total amount of current that flows will flow through the emitter region and is known as emitter current (I_E).

It will be helpful to remind you at this point that we are talking about Electron Flow theory and not Conventional Current Flow theory. Electron Flow theory looks at electron movement from the negative to the positive. Conventional Current Flow theory looks at the movement of positive to negative.

There is a mathematical relationship between these three current flows. It states that $I_E = I_B + I_C$. This means that the emitter current is equal to the base current plus the collector current. As you can see from this relationship, changing one of these currents will change the others. This makes the transistor more useful than a conventional relay, but first let's look at a transistor as it functions as a relay.



When voltage is applied to the relay winding the light turns on.



When voltage is supplied to the base the light turns on.

Practical Use

In a relay we have a primary circuit and a secondary circuit. (FIG 6) The primary circuit is the control for the secondary circuit. When the primary circuit, which is a coil, is energized a magnetic field is formed. This magnetic field attracts the relay contacts and causes them to close making contact. This energizes the secondary circuit. This allows a small current to control a large amount of current.

In a transistor we use the base current as the primary circuit and the collector current as the secondary circuit. When a voltage is applied to the base the emitter junction becomes forward biased, then current can flow through the collector junction. (FIG 7) This means that the base current (primary circuit) turns on the collector current (secondary circuit). By turning on and off the base current we can turn on and off the collector current.

Discussion of Transistors continues in the next issue.

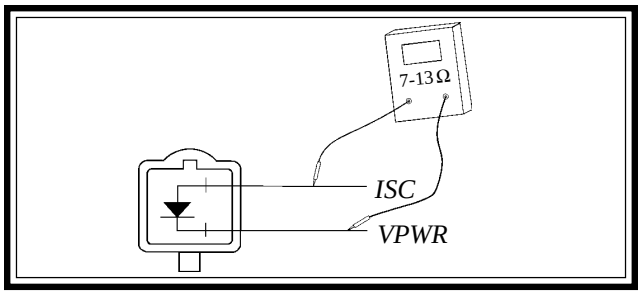
Throttle Air Bypass Valve

(continued from page 1)

As the ECA increases the duty cycle (on time) more air is allowed to flow past the throttle blade. This results in an increase of idle speed.

During a cold start the duty cycle (on time) will be 100%. This means that the pintle will be held wide open. As the engine warms the duty cycle lowers and less air is passed around the throttle blade.

The TABP is used to control idle speed under various operating conditions and changes in engine load, fast idle, and a high temperature idle boost. The TABP functions as a dashpot on deceleration. It also allows air to bypass the throttle blades so no touch of the accelerator pedal is required when starting the vehicle.



The TABP's solenoid can be checked by measuring the resistance of the solenoid. The resistance should be 7 to 13 ohms. If the readings are out of spec, the TABP is bad. (FIG 3)

GM Fuel Pump Test

(continued from page 2)

Third: High amperage draw (above 4.0 Amps). This indicates low resistance with the possibility of a pump being shorted.

This amperage test can be used as a quick way to see if the fuel system is playing a part in the driveability complaint. If something does look questionable, pressure and volume tests should always be done to avoid an incorrect diagnosis.

The following two incidents at Tomco made use of this test.

The driver of a 1987 GMC Safari with a 4.3L engine complained of a hesitation or stumble under a load. Fuel pressure was normal at 10.5 psi, and the amperage draw was 1.2 amps. The low amperage indicated there was high resistance in the circuit. We performed a volume test, which showed low volume. This confirmed the amp test diagnosis. We replaced the pump and filter sock, which were contaminated, to cure the problem.

A 1994 Blazer with a 4.3L Vortec had a hard or no-start condition. When the amperage draw was tested it was 9 amps. Pressure and volume tests were done on this vehicle, and both were out of spec. Replacing the pump solved the problem.