



6201 Industrial Way * Marine City, MI 48039 * Phone 810-765-5100 * Fax 810-765-1503

INSTALLATION INSTRUCTIONS: THROTTLE BODY FUEL INJECTION HARNESS

You have acquired the latest in Electronic Fuel Injection harnesses. It will allow you to install and operate any 1986 or later Chevrolet V8 or 4.3 V6 throttle body injected engine in any NON-COMPUTER vehicle. It is designed to utilize the vehicle on-board computer and all the GM relays, sensors and other accessories to operate the fuel injection as originally designed. All systems that effect engine performance have been included except Cannister Purge. (EGR control and AIR have been retained in the harness)

Our harnesses are designed to operate with 1986 and later Electronic Control Modules (ECM's as used in passenger cars, vans and full sized pick-up trucks that were originally equipped with two-barrel throttle body fuel injection. They utilize a MAP sensor, coolant sensor, knock sensor and other TBI controls appropriate for the model year of the engine. They supply the complete wiring necessary to operate the engine, including the wiring necessary to operate the engine fuel system and spark control as originally designed. In 1991 GM changed the throttle position sensor connectors. In the event your harness does not have the connectors to match your engine, please let us know and we will supply the correct ones.

Throttle body injection units are sized by the manufacturer's specification for each different engine they are offered on. This is usually accomplished by installing injector nozzles of varying flow with the specific TBI unit. There is a matched ECM calibration for fuel and spark advance to go with each engine. Because of this you cannot mix and match parts that look alike to get a proper functioning system, therefore part numbers must be matched. All TBI systems we service are equipped with the correct matching ECM's and calibrations. Also, because of these unique calibrations you cannot significantly alter your engine to increase the airflow or power without running into drivability and fuel economy problems. In the event you have a non-stock engine combination, contact Howell Engine Developments, usually we can supply a custom calibration prom to match your engine.

The basic parts to run a complete TBI system are:

- ECM (computer) with Prom & Calpak installed
(Appropriate for your model and type of engine)
- Wiring Harness
- Distributor (Late model, remote coil with fixed rotor)
- Throttle Body Injector unit (To match engine size)
- Intake manifold for TBI (Better than adapting a 4BBL manifold)
- Coolant Sensor (Threads into manifold by thermostat)
- ESC Module (Control of spark timing during detonation)
- MAP sensor (Reads manifold vacuum continuously)
- EGR Solenoid and EGR Valve (To be emission legal)
- Oxygen sensor (Threads into exhaust pipe or manifold)



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- Knock sensor (Threads into block drain)
- Air Cleaner to fit

Any salvaged engine from a late model wreck should have all or most of the above parts. They can also be purchased separately and installed on any stock Chevy engine with good results. Any parts missing can be ordered from a GM dealer or one of our parts lists.

Howell Engine Developments harnesses are equipped with labels for all connectors, relays, sensors, etc. They are laid out to fit the most common engine arrangements. Engines should be installed with conventional exhaust manifolds and air cleaner, retaining the exhaust heat to the air cleaner from the exhaust manifold. This is important to prevent throttle icing at low ambient temperatures, just as it was in the original vehicle. This also applies to hot water routing through the intake manifold. In some original installations the heater water passes through the intake manifold to warm up the injector body and prevent icing.

INSTALLATION

A high-pressure (18-20 PSI) fuel pump is required to operate the TBI fuel system. The TBI unit has its own built in fuel pressure regulator that maintains a fuel pressure of approx. 11-12 PSI. GM production vehicles use an in-the-tank electric pump that is reasonably priced but difficult to install if your tank isn't made for it. Howell Engine Developments markets an externally mounted fuel pump for TBI units that can be located in the fuel line between the tank and engine.

Using your in-tank or in-line fuel pump, and an in-line fuel filter between the tank and pump, connect the incoming fuel pressure line to the left (driver's side) of the TBI unit. Since the system operates on only 12 PSI fuel pressure, a fuel tolerant flexible line or hose is suitable for incoming fuel. From the right side of the TBI unit, run a return fuel line back to the tank. If no other outlets are available on the fuel tank, you can make a hole in the fuel filler neck and return fuel there.

You will need a hole in the firewall large enough to pass the largest engine connector along with the harness, threading it through from the passenger side of the firewall. (Approx. 1.5-1.75 inches)

Mount the ECM, Fuse Block, ALDL Connector and Check Engine Light on the passenger side of the firewall or dashboard as you choose. Make or buy a protective grommet to protect and seal the harness where it passes through the firewall or seal it with body putty.

In the engine compartment you will need to mount the Fuel Pump Relay, Battery Power and Fuel Pump Fuse in convenient locations on the firewall or fender wells. All other sensors are on the engine.

- Connect the large ground terminal to the back of the engine.
- Connect all other sensor and injector lines.
- Connect a 16-gauge wire directly from the battery positive terminal or other full-time 12 Volt connectors to the battery feed terminal on the harness. A Weather-Pack male terminal and female connector is supplied to connect this line to the harness. This battery power feed is color coded ORANGE and is protected by its own 20 Amp fuse and weather proof fuse block.

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- Connect a 16-gauge wire from the harness to your electric fuel pump. A Weather-Pack connector is supplied for this. This power feed from the harness is color coded RED and also has its own weatherproof fuse block and 15 Amp fuse.
- Connect a 16-gauge wire from your ignition switch or vehicle fuse block to the power lead at the 3-fuse block close to the ECM. **THIS 12-VOLT LEAD MUST HAVE POWER DURING THE TIME THE ENGINE IS CRANKING, SO BE SURE THAT IT DOES.** This power feed must turn off when the ignition switch is off. Power for the ECM and injectors comes from this connection and they are protected by three 5 Amp fuses. A Weather-Pack connector is also supplied for this power lead.

If you do not intend to use a light bulb already in your dashboard, you will need to purchase (at Radio Shack or an automotive parts store). A suitable 12V bulb and socket for a "Check Engine" light. This will be connected permanently to the wires marked as such near the ECM connectors. The "Check Engine" or "Service Engine Soon" light should be mounted where it is visible to the driver. It will come on whenever the ignition is turned on with the engine not running. **It should remain on while cranking and it should go off when the engine starts.** If it comes back on in a short time it means one of the sensors or systems is malfunctioning and the ECM has stored a trouble code to tell you where to look. The enclosed service pamphlet should be able to trouble-shoot it for you. Most of the Original GM wire color codes have been retained in this harness.

Under ECM control the fuel pump will operate for 2 seconds when the ignition is turned on. It will resume operating when you start to crank the engine and continue running when the engine starts.

You will need a 12 or 14 gauge ignition wire to the ignition terminal on the coil. This should be a full 12V with no resistor in series. The coil accepts a gray molded 2-pin connector that is a unique design to fit GM coils. This connector is not a part of our EFI harness. It can be purchased separately from GM or Howell Engine Developments if you cannot salvage one from the old vehicle TBI harness. It should be spliced to the ignition lead already in your vehicle. Usually you can use the engine wiring harness originally installed in your vehicle to power up the ignition and other standard sensors and gauges on your TBI engine.

It is necessary for you to retain the oxygen sensor in your system and run the engine on unleaded fuel. The GM ECM is a "smart" computer and as long as the battery feed is connected it will improve its driving calibration while operating "closed loop". Normally the engine will go closed loop after the oxygen sensor reaches 600° F. Whenever the battery power feed is disconnected the computer will lose its memory and your vehicle will not drive as well for a while until the learned calibration is restored by driving. The attached pamphlet tells you how to use the computer diagnostic system to find out if your engine is going into closed loop operation.

With all of the above connections made and 15 PSI of fuel pressure, your vehicle should start right up and smooth out as soon as the air is purged out of the injector nozzles. In case it doesn't, our service manual will help you trouble-shoot it.

In the event you are using a late model automatic transmission with lock-up torque converter, you will not be able to control the lockup with the ECM. To do that requires a vehicle speed sensor and brake light wiring. We market a lock-up kit of our own design to operate converter lockup in fourth



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gear under light load conditions. This kit can be used with any 3 or 4 speed auto trans with lockup converter.

EMISSION CONTROL FUNCTION

Our testing indicates that your emission controls should operate correctly on your late model engine. There are however a number of non-engine components that are required for emission compliance in different vehicles and in different states. These include catalytic converters, air pumps and air plumbing. In California you may have to present your EFI vehicle to a referee to determine its emission compliance and legality to license.

Our harnesses are designed to accept a Vehicle Speed sensor signal if your emission compliance requires it. A vehicle speed sensor also requires a functioning Park Neutral switch (for auto trans calibration proms) or use of a manual transmission calibration prom. If you are required to install a VSS and Park Neutral switch, please call us at **810-765-5100** and we can supply it.

A pamphlet explaining California's unique engine swapping emission rules is available upon request by calling Howell Engine Developments, Inc.