



Water4Gas Dual Mode MAP/MAF Sensor Enhancer Ready to Install – www.hho-efie.com

This Map Sensor Enhancer was built directly from the **Water4-Gas** specifications manual. It has separate “City” & “Highway” adjustments along with an “On” & “Off” (Original Factory Setting) switch. This device was designed in accordance with **Water4-Gas** to work with an HHO generator (Hydrogen Fuel Cell).

Also included is a detailed installation, usage, tuning & maintenance guide based on information provided from Water4Gas manuals. Even if you have good mechanical skills, you should have the repair manual for your vehicle to help find the Map sensor and locate the wire that goes from the Map sensor to the computer. Improper installation of this Map Sensor Enhancer may cause problems with your vehicle’s electrical system.

Consult with a qualified mechanic before installing this device.

HOW DOES THE MAP SENSOR WORK?

The Manifold Absolute Pressure (MAP) sensor signal is electrically used in a similar way to the use of Mass Air Flow (MAF) sensor signal (although internally it is built differently). It takes a 5 volt power from the ECM or ECU (Engine Control Unit or Module) computer, and returns a lower signal in accordance with the vacuum in the engine. A higher output voltage means lower engine vacuum, which is then calculated as “more fuel is needed”. Lower output signal indicates higher engine vacuum, which requires less fuel.

It’s not just fuel control. The MAP sensor signal gives the computer a dynamic indication of engine load. The computer then uses this data to control not only fuel injection, but also gear shift and cylinder ignition timing.

THE ENHANCER

The invention we’re talking about here is a simple play with resistors. A resistor is a little piece of carbon that reduces current. Higher value means it resists more. The potentiometer (“pot” for short) is a variable resistor, which varies its value by turning the knob. There is another resistor, a fixed value resistor, in series to the pot to increase the dial range.

The MAP or Manifold Absolute Pressure Sensor is a little though expensive device installed in your intake manifold, or installed on the firewall and connected to the manifold with a thin hose. It has 5 Volts or 12 Volts coming in, and it simply senses the vacuum in the manifold and attenuates (reduces, weakens) this incoming voltage by a certain factor. In other words it reduces the supply voltage to a direct current voltage in the range of 15% to 60% of the supply voltage (depending on the car’s design these numbers will vary), and this varying (but non-pulsing) signal is then sent back to the computer.

The arrangement of resistors simply takes this already attenuated (reduced, weakened) signal – and **attenuates it further**. Too much attenuation stops the engine; it will simply shut off. Yet if you control it correctly, you can lean down the mixture from the balance of ingredients which is factory set at 14.7:1 (14.7 parts of air to 1 part gasoline) – down to 20:1 or so.

INSTALLING & TUNING

ATTENTION: The tuning procedure calls for clockwise and counter-clockwise rotation of the knob. The idea is that turning knob will “enhance” or “reduce” the voltage.

The Enhancer can be installed on the dashboard or sit on the console. To eliminate the work and possible damage to the dashboard, and to enable better control, place the box beside the driver’s seat. This makes tuning quite effortless.

Locate the 3 wires connected to the MAP sensor. There will be one for the positive supply voltage, usually 5 or 12 volts. The signal will be the wire with the WEAKER voltage and will change with RPM when the engine is started. There will also be a ground wire. You can solder or crimp these with electrical wire connectors.

If you cannot locate the sensor or the wires, or you're not sure,

you'd better get the car's manual. **DO NOT IMPROVISE OR GUESS** – you may damage your computer. Go to AutoZone and purchase the maintenance manual (Haynes) specific to the fuel injection system of your car.

Low Voltage
Circuit Tester



To find the MAP Sensor Signal Wire, use a Circuit Tester like the one above to find the correct wire. You can hook this tester in series with your multi-meter to find the actual voltage of the wires coming out of the MAP Sensor. The correct wire is the one with the lowest voltage or the one with a voltage that varies when the engine RPM is increased. **Note:** This procedure may damage the MAP Sensor so use the Tester to locate the ground with 0 volts and the supply voltage of 5 volts. The remaining wire is the MAP Signal wire.

ACTUAL TUNING ON THE ROAD

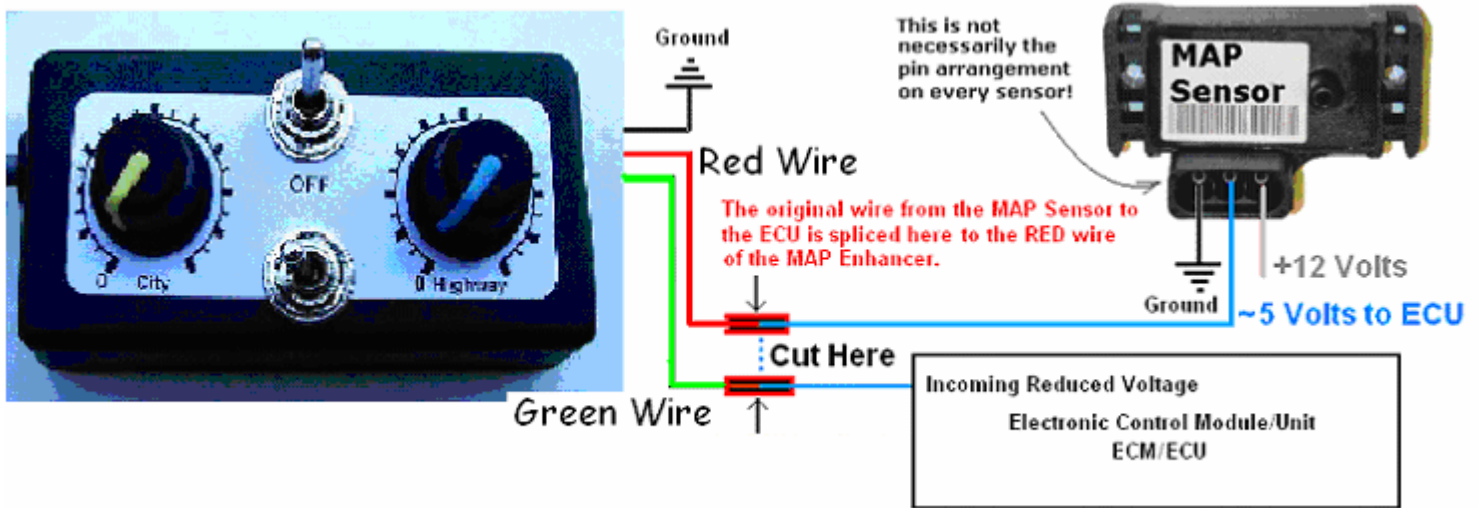
Turn the knob all the way to zero (The Dial should point to "0"). Make sure your HHO Generator is operational. Warm up the engine and drive a while before experimenting with the knob. For speeds above 40 mph, adjust the "Highway" dial.

1. **DO THE NEXT STEP WITH CARE – ON A SIDE ROAD - JUST IN CASE YOUR ENGINE STOPS UNEXPECTEDLY.**
2. Now, start turning the knob clockwise; the mixture will turn leaner and leaner until the car stalls or bucks as you drive. Back the knob off slightly after the bucking and chugging.
3. Keep the danger of overheating in mind. If your **Water4Gas** device is non-operational, temporarily set the enhancer at or near original factory setting (0).
4. Set points can change from one gas station fuel to another, weather conditions, cold engine, etc. The differences are not large, but if you're on the edge, then the car will buck or vibrate, and you'll need to change the set point a bit. Remember that this is a simple device.
5. NOTE: When this device turns on, the "check engine light", and it WILL do that, you can turn off the light using a ScanGauge-II or an OBD-2 Connector (1996 cars or newer).

MAXIMIZE BENEFITS

One recent set of road tests (6-16-07) averaged 52.4% better mileage. But, tests from a week earlier on the same car averaged only 24.5%. Actually, 22% if you discount idling. WHY such great difference?

The secret of the BIG DIFFERENCE between the two test groups: The later and more successful one got MORE THAN DOUBLE the average gain because the MPG was not dialed to near choke point. It was about ¼ turn closer to factory setting! Don't overwork the engine by leaning it too much – play around until you find the PERFECT BALANCE point.



Frequently Asked Questions

1. When should I use the “Highway” and “Enhanced” setting?

Answer: This unit can be switched to the original factory settings by putting the switch in the OFF position and is used in this position for cold starts and where conditions such as passing, steep grades or any situation that requires performance is needed. The Enhanced Switch position is used in conjunction with the Highway - City Switch, and the Highway - City Potentiometers which are leaned in to achieve the best mileage in respect to city or highway speeds. Use the “Highway” setting for speeds above 40 mph.

2. Will the Enhancer work on any make and model vehicle with a MAP Sensor?

Answer: It will work on MAP Sensors that operate by varying a voltage to the ECU. It will not work if the MAP Sensor is frequency varied.

3. Will the Enhancer work with a MAF – Mass Air Flow Sensor?

Answer: If the sensor operates by varying a voltage to the ECM, it should work unless the MAF Sensor is frequency varied. See Next Page...

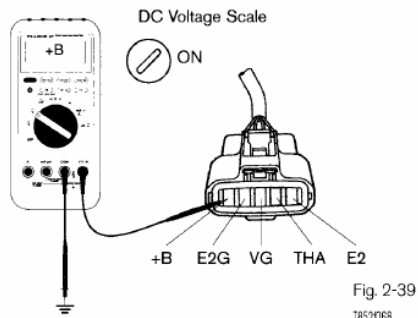
Mass Air Flow Sensor Detail

The Air Flow Sensor or Mass Airflow Sensor (MAF) is one of the components of an electronic fuel injection system and is found in many of modern vehicles. The Mass Air Flow sensor is usually installed inside the intake air duct between the air filter and the engine. The Mass Air Flow sensor is used to measure the amount of air entering the engine. This measurement is used by the engine computer or ECM to calculate proper amount of fuel injected into the cylinders in order to provide optimum combustion and low emissions. If your MAF Sensor is voltage varied, incorporate the MAF Enhancer to reduce voltage to the ECM. (See Below.)

Note: The information contained in these instructions is for educational purposes only and cannot substitute for the advice of professional mechanic or authorized dealer. Don't attempt to repair your car if you don't have proper knowledge and tools, you can be injured and your vehicle could be damaged. Take your car to a dealer or a repair shop for proper installation.

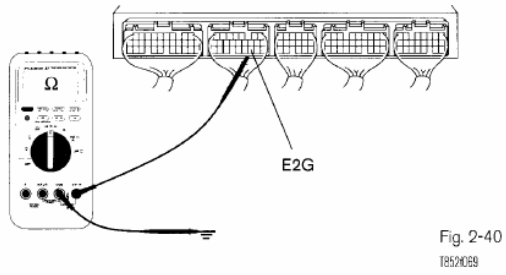
MAF Supply Voltage

The +B terminal supplies voltage for the MAF Sensor. VG is the MAF signal line and E2G is the ground. THA terminal supplies 5 Volts for the IAT sensor and E2 is the ground.



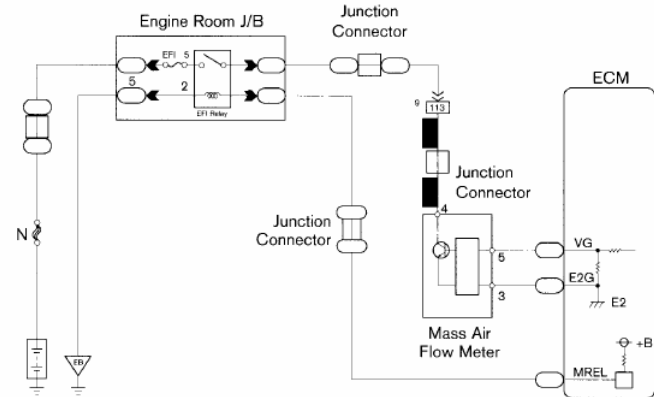
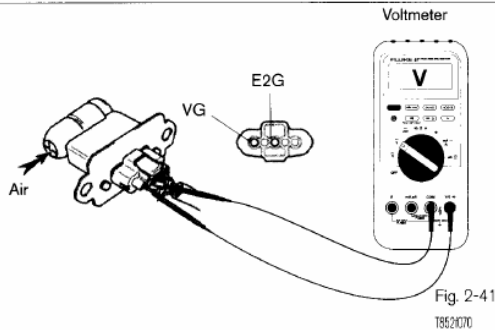
MAF Ground Circuit

MAF ground circuit check is performed with an ohmmeter.



Checking MAF Operation

Most MAF sensors can be checked by supplying power and a ground to the right terminals, connecting a voltmeter to the signal (VG) wire, and blowing air through the sensor.



Mercedes-Benz Air Flow Sensor



Ford airflow sensor



Volkswagen airflow sensor