DUAL-EDGE MAP SENSOR ENHANCER (DEMSE)

CAUTION: This device may be used ONLY in conjunction with an Electrolyzer (HHO device) or a Vaporizer (H2O device) installed and functional.

ALTERNATIVE ENHANCER

A recent addition, this enhancer worked much better (in OBD-II tests) than the O2 Sensor method. The O2 Sensor method, on the other hand, worked great on OBD-I. Too early to withdraw absolute conclusions, but this is what indicates at the time of writing.

A STUPID LITTLE RESISTOR???

Let me start with a limiter: THIS DEVICE IS EXPERIMENTAL AND HAS WORKED ON OBD-II. It has been reported to also work on OBD-I. I don't think it works well for MAF (Mass Air Flow) sensors or Oxygen sensors because those rely on **frequencies** while this is a direct current device.

Now let's define some words.

When we say the word "computer" in reference to the fuel and emulsions control system, we're generally referring to the ECU or Environmental Control Unit. It is also sometimes called the PCM or other names. So we may be using the word computer and ECU interchangeably, although some cars have more than one computer. The ECU is what we're interested in when it comes to saving energy.

OBD means On Board Diagnostics – basically the engine computer system and a dictated set of performance sensors that are **mandatory** on all cars since 1996. OBD-I is pre-1996. Now we have OBD-II. They say it is mandatory for emissions control. I have come to realize that it's for the purpose of wasting gas. This "modern" system uses gasoline to cool down the engine and "control" the emissions, when patents and technology have been in existence for a century now to do all that without wasting energy (deteriorating the planet) and without building up sludge (aging your car real fast). Thus from now on say OBD means On Board BS. "Potentiometer" (or "pot") simply means variable resistor. For a long while I've been hearing about the use of some "resistor" to lean out the mixture. I've heard it was being sold on eBay and thought it was too good to be true. Because if it is so simple, then why do we need EFIE or D17 (various electronic devices that change or "translate" the pulses of the O2 Sensors)?

Well, I'm not at all sure **why** we need the complicated stuff... I tried this simple device here in a vehicle running OBD-II and it worked better than expected.

While driving at 55 MPH I have dialed the MPG gauge up by as much as 77% just by turning the knob way down. The latest test results have averaged 59%.

BACKGROUND OF THE INVENTION - WHY IS THIS NEEDED

The simplicity of the background is this: we're using what some people refer to as "watergas technology". Electrolyzers, water vaporizers, water injectors, hydrogen generators of all sorts and colors. As far as I know everybody in the industry shares the same problem on modern computerized cars, and here's a typical story:

somebody installs a device and enjoys better fuel economy for a few days. Then after maybe half a tank or so, he calls or emails the developer and says: "Hey listen – your device stopped working – I'm losing mileage. I can see the bubbles coming out and all, but the performance has dropped!! I am losing the gains I had!" You know what it means when somebody is losing gains he's already got? It means there is some freaking suppression on the area! It needs to be detected and removed, either by handling or by disconnecting from the source of suppression. Same here. Now let's get purely technical and examine what happens.

You have enriched your car with something fantastic – water power of some sort. Hydrogen, water vapor, or both. As your computer senses a richer fuel it then reduces the amount of fuel being consumed, because you're already running rich. So far so good because you don't need as much fuel as before.

Now the problem shows its ugly face when we discover that the computer – your vehicle's computer – has been pre-designed to protect the vested interest of those who would like to see you waste fuel like crazy. While pretending to be your friends.

This is an unproven theory of course, but your computer figures out that we've been enforcing fuel economy for a while and it says: "Wait a minute - somebody is probably doing something fishy here" - and it switches your car into "Limp Home" mode which means, between other things, a constant-rich (wasteful) mixture.

What just happened? You've been enjoying good fuel economy for a while, but all of a sudden your gains are dropping and in some cases even going negative. That is, worse than before the installation. You computer has said: "Sorry buddy, we've just caught you cheating and we can't allow that."

Here comes the counter-measure. Several inventions exist to lean the usage of gasoline back to where it was before you've lost gains, and in most cases even much better. The invention we're presenting here is not the only one, but is among the simplest.

We're going to use this invention to change the set points so that the computer is still active in "closed circuit" or "closed loop" mode. That is, it still senses the car's performance and it still controls the consumption of fuel as needed every little moment of driving – **but the difference is that now we have totally changed the set points in your favor!**

Now you are going to enjoy the mileage gains and you'll get to KEEP THEM for a very long period of time.

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 signal from the computer, and returns a lower directcurrent 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 though. The MAP senor 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. In some cases it is even used to calculate changes in barometric pressure, to automatically adjust for different altitudes.

HOW DOES THE MAF SENSOR WORK?

The Mass Air Flow (MAF) sensor helps the computer to calculate the flow and mass of the air entering the engine. It does that by measuring the cooling effect of air flow over a heated wire element. The electronic circuit inside the sensor attempts to keep the sensor at a fixed temp. When it is cooled more by an increased air flow, more current is needed to maintain a constant temperature. The increase in current is converted into a signal and that signal goes to the computer. In most cars this signal would be a high frequency signal. Not as high as a radio wave, but much faster changing than the (relatively) slow frequency of the Oxygen sensor.

During low air flow rates, such as at engine idle, the MAF sensor produces a lower frequency signal. During high air flow rates, such as at wide open throttle-road load, the MAF sensor increases the frequency. The control module then converts these frequencies into their corresponding Grams-Per-Second values.

Yet again, some MAF sensors may work on a straight DC signal 0-5Volts such as the typical MAP sensor. This is the case in some older MAP Sensor designs that have a trap door with a potentiometer connected to its shaft.

For better understanding of air flow sensors read this document: http://www.autoshop101.com/forms/h34.pdf

I'm giving you these descriptions so you can understand how to apply the correct circuit to each sensor. I don't think the pot

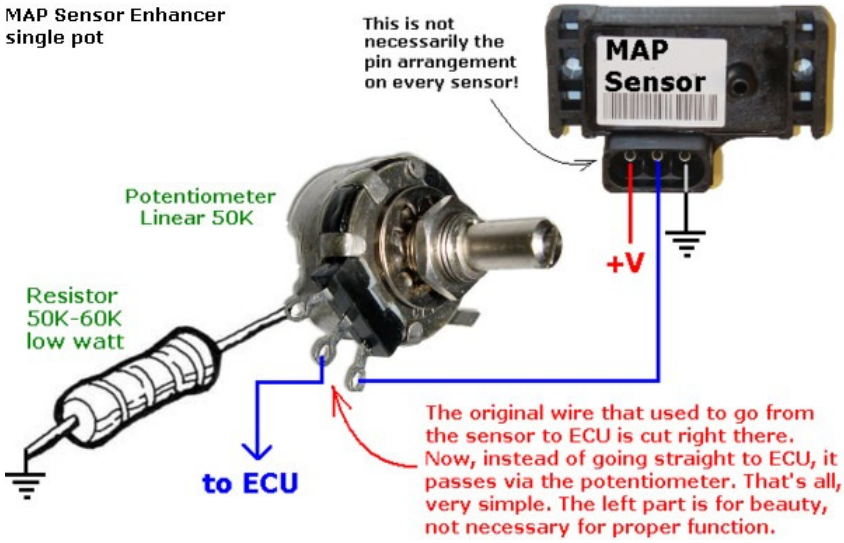
arrangement can do if all you have is a MAF sensor or if the MAP sensor works with frequencies (very rare). If this is the case, employ the Oxygen Sensor device called EFIE from www.Eagle-Research.com

THE ENHANCER

The invention we're talking about here is a simple play with resistors. A resistor is a little piece of carbon that somewhat blocks electrical current. Higher value means it resists more. The potentiometer ("pot" for short) is a resistor, a variable resistor, which varies its value by turning the knob. But it is still only a resistor. There is another resistor, a fixed value resistor, in series to the pot as shown in the diagram below.

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 kills the engine, it will simply shut off. Yet if you control it correctly you can lean down the mixture from the stoichiometric (a big word that simply means "balance of ingredients") which is factory set at 14.7:1 (14.7 parts of air to 1 part gasoline) – down to 20:1, maybe even 50:1 or 100:1.



This device is totally passive and will work just the same if the signal coming in is 12 volts, 5 volts, or whatever comes on the line. The diagram here is the SIMPLEST way of doing this. The line from the sensor to the ECU is cut, and you place a pot on the line as shown. Further below you will see the improved enhancer based on the same principle.

INSTALLATION AND TUNING

ATTENTION: The tuning procedure calls for clockwise and counter-clockwise rotation of the knob. In some of the drawings the shown connections will result in opposite rotation. The solution is to swap the connections of the SIDE wires going to the pot (not the wire in the middle). The last drawing in this chapter shows the "correct" connection on both pots. By "correct" I mean it will have full rich in the counter clockwise end and full lean in the clockwise. The idea is that turning clockwise will "enhance" the more you turn. But it's up to you.

The potentiometer can be installed on the dashboard. To eliminate the work and possible damage to the dashboard, and to enable me better control, you can build this into a small mobile box and place the box beside the driver seat. It makes tuning quite effortless.

(The markings “Highway” and “City” shown for example only)

Now locate the 3 wires connected to the MAP sensor. There will be one for the positive supply voltage, usually 5 or 12 volts but it does not matter. The signal will be the one with the WEAKER voltage, and will change with RPM if you start the engine. And there will be a ground wire. You can solder or crimp electrical wire connectors, so you can always hook it back to factory setup. But I doubt if you'll ever want to go back!

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. All I had to do at my (low) skill level was to walk into AutoZone and purchase the maintenance manual (Haynes) specific to the fuel injection system of my test car.

Two users of this method have advised me that one should also disconnect the plug of the upstream oxygen sensor (i.e., the one closer to the engine). The idea is that otherwise the computer will eventually lock in constant-rich mode again.

Now for actual tuning on the road.

1. Turn the knob all the way to “rich” (it should be fully counter clockwise if you hooked it as shown in the last photos of this chapter). This will be factory original.
2. Make sure your water device is operational. Warm up the engine and drive a while before messing with the knob.
3. DO THE NEXT STEP WITH CARE – ON A SIDE ROAD - JUST IN CASE YOUR ENGINE STOPS UNEXPECTEDLY.
4. 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.
5. Keep the danger of overheating in mind. If your **Water4Gas** device is non operational temporarily, set the enhancer at or near original factory setting (rich).
6. Another thing I've noticed is that set points 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. There is no point in computerizing it, it will require a whole new programmable ECU which is a very costly thing for most drivers and countries.
7. 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 (1996 cars or newer).

HOW TO MAXIMIZE YOUR 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 count out 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 average gain, was because the MPG was not dialed to near choke point. It was about ¼ turn closer to factory setting! On the earlier tests I was choking the engine half to death. It reminds me of the greedy guy slaying the gold laying hen to get all the gold right now...

Each and every MPH readout was obtained by ScanGauge-II after (and only if) the readout has STABILIZED. My rules were strict: I wrote down a DEFINITE result only if there was a steady road condition where I could dial in a certain MPG on the enhancer (in enhanced mode), then switch back to original, back to SAME enhanced point (by an electric switch so I know it duplicates exactly), back to original. I let the readout stabilize in EACH mode. If the road was flat enough or steady uphill enough AND I could do it back and forth and still got the same numbers, I'd write down one line of results, and the speed I was in. Cruise control, never touched the pedal. Windows up, no air conditioner, no radio, nothing else changed.

MY CONCLUSIONS

Don't overwork the engine by leaning it too much – play around until you find the PERFECT BALANCE point. Leave it where at its best position.

Now there's a bit of a problem because the "best position" will vary by driving area and environmental conditions. I have found that there could be two or even three points that you want to be set at:

1. Absolute maximum gas savings for highways.
2. A bit less than that for city driving, because you'll need extra power to start off after each stop.
3. Possibly you may want to switch back and forth between full rich and full lean (maximum lean that doesn't kill the engine and doesn't cause bucking or vibration) mixture, so you can compare the effect of the enhancer. That's what I used to get easy readouts in my tests.

THIS IS MY OWN CONCLUSION. I am willing to be proven wrong, but so far the results indicate that this principle can work in your favor. One last note, I studied other solutions and methods. I believe they are of some benefit, but they are mostly VERY complicated, far beyond the scope of our philosophy of keep-it-simple (and affordable) .

MARKINGS

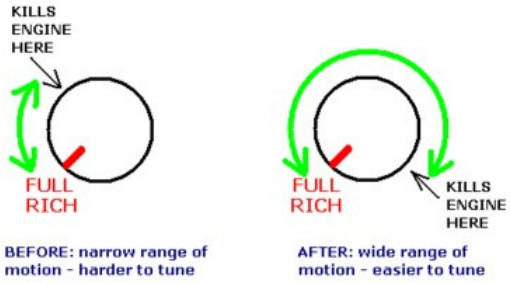
The "city" side is identical to 'highway". There are several ways to use the device. For instance you can mark one side as "enhanced" and the other side would be marked "original" (in which case you leave that side at full-rich position) so now you can switch between enhanced mode and original factory setting. Or mark them "hot engine" vs. "cold engine", or "bypass/uphill" vs. "flat road" - or whatever suits your use and driving conditions.

TROUBLESHOOTING

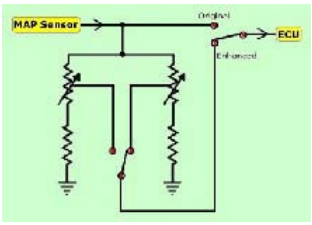
Watch out for mixed-up wires. It is not a complicated device, but its structure must be duplicated exactly. Especially note these points:

1. The potentiometers are wired in such a way that turning it counter-clockwise will ENRICH the mixture and clockwise will LEAN the mixture. If you get anything else, check the wires per the diagram above. Also refer to the photos below.
2. The nature of this type of lever switch is that the right-hand pot is actually the "highway" adjustment, and the left-hand pot is the "city" adjustment. Observe the photo below - see how the wires are crossed to the switch? (Otherwise the knob/switch arrangement would be confusing).
3. Fixed resistors of 33K worked fine in my experiment. Your engine may be different. Any similar value will work, but the idea is that this resistor is calculated to enable a larger active range of the pot's movement. Call or email me if this is not clear.

This diagram below demonstrates the reason and usage of the fixed resistor. You may want to trim the value of your (fixed) resistor to a different value if the control range you're getting is not optimal. NO FIXED RESISTOR FIXED RESISTOR ADDED



FANCY DESIGN



This may be going too far. Maybe not. But it is definitely a convenience to have TWO settings enhanced, and be able to switch back to original stock (factory settings) with a flip of a button.

In the device shown below which is a variation of DEMSE, the lower switch moves up-down rather than left-right, and toggles between "Original" and "Enhanced" modes. In Enhanced mode the upper witch toggles between the two knobs. For instructions on how to replicate this design, see the User Manual (Book #1).