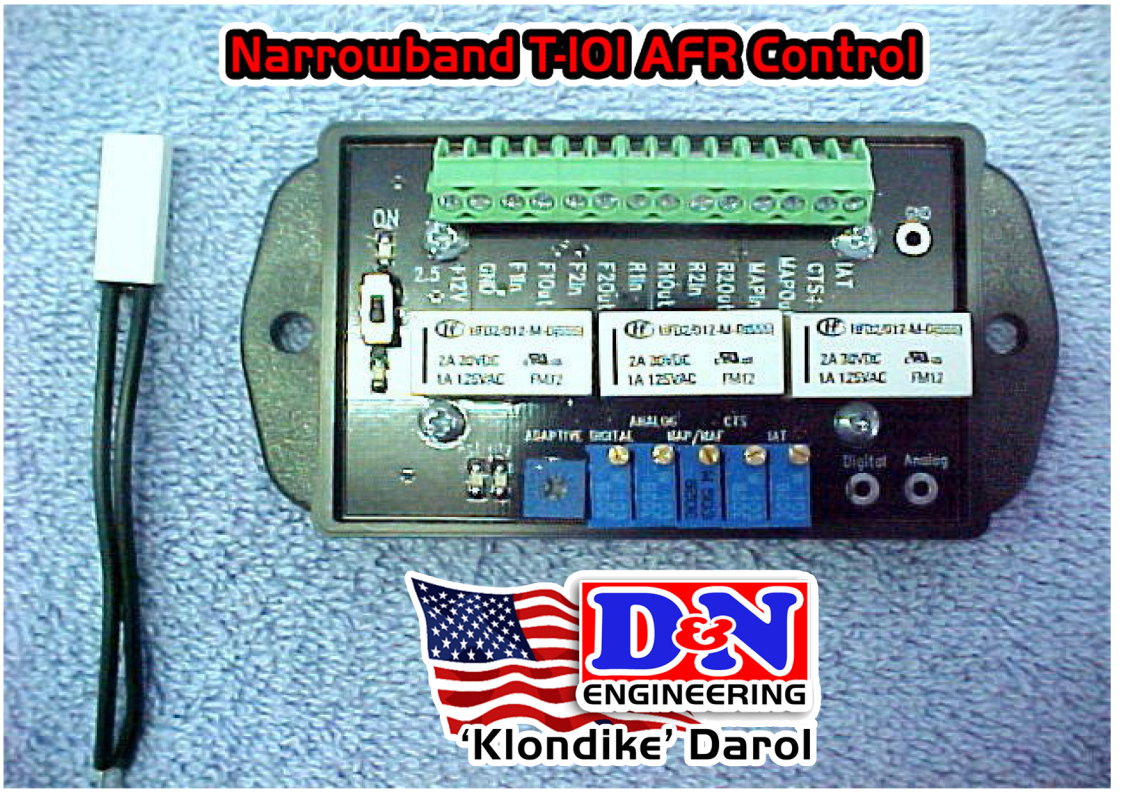


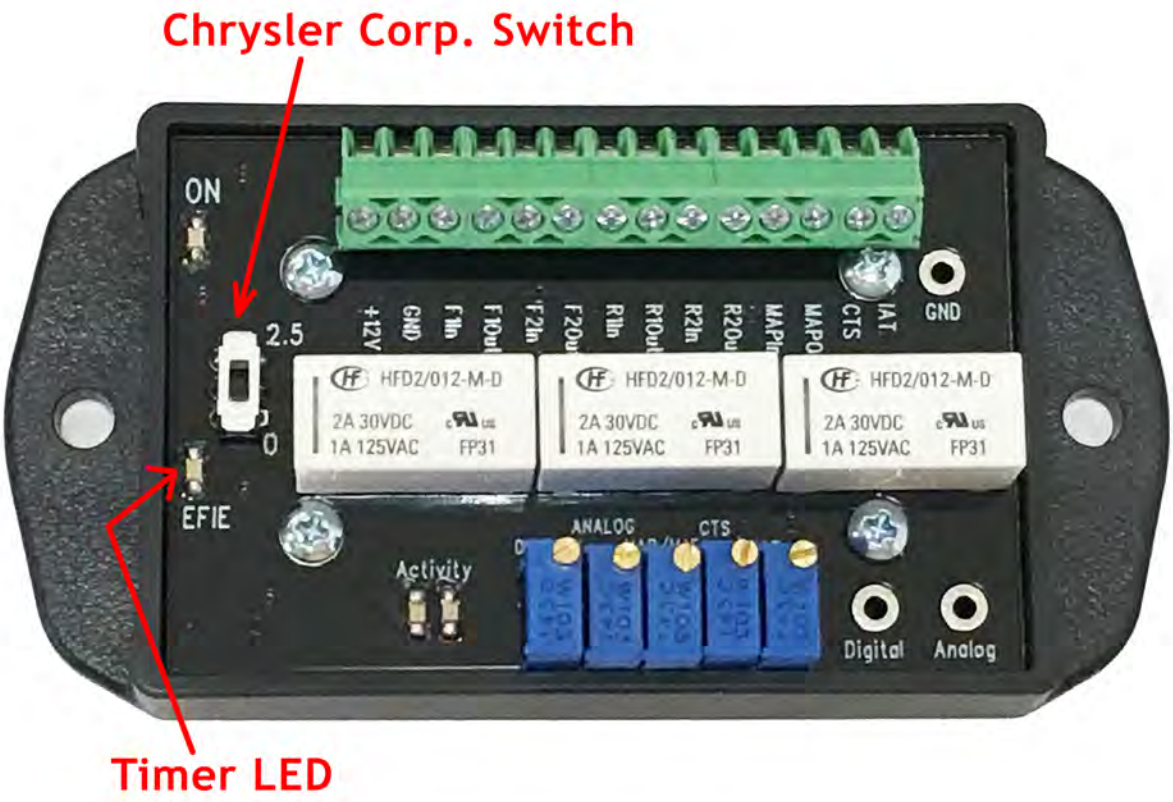
NEW SIMPLIFIED—EASY TO FOLLOW AND UNDERSTAND
Install instructions for the New Tuning 101 AFR Control Center
Automated Tstat Control For Narrow Band Oxygen Sensors Only.
If your can READ, you can easily install this device.

Hi Guys

Although you can get by without a repair maunual if your a really good experienced mechanic, I highly recommended that you purchase a Haynes, Clymer or Chilton's repair manual for your specific vehicle with a schematic wiring diagram and wire color codes for easier wire identification. It will help you a lot throughout your installation and tuning procedures. I have noticed that these companies are not including the wiring diagrams on a lot of the newer model vehicles, and you have to order the wiring diagrams separately. You may want to check this before you buy, and order them while you are there if you need to. I guess this is their way of taking a little more money out of our pockets.

Note* *All of your "Pots" are Pre-Set to their "0" position, Full Counter Clockwise.*

Note** ***Use 18 AWG stranded copper wire for all your connections. We recommend using as many different colors as you can find. This will help you, now and later in identification of where the wire is going to, or coming from.***



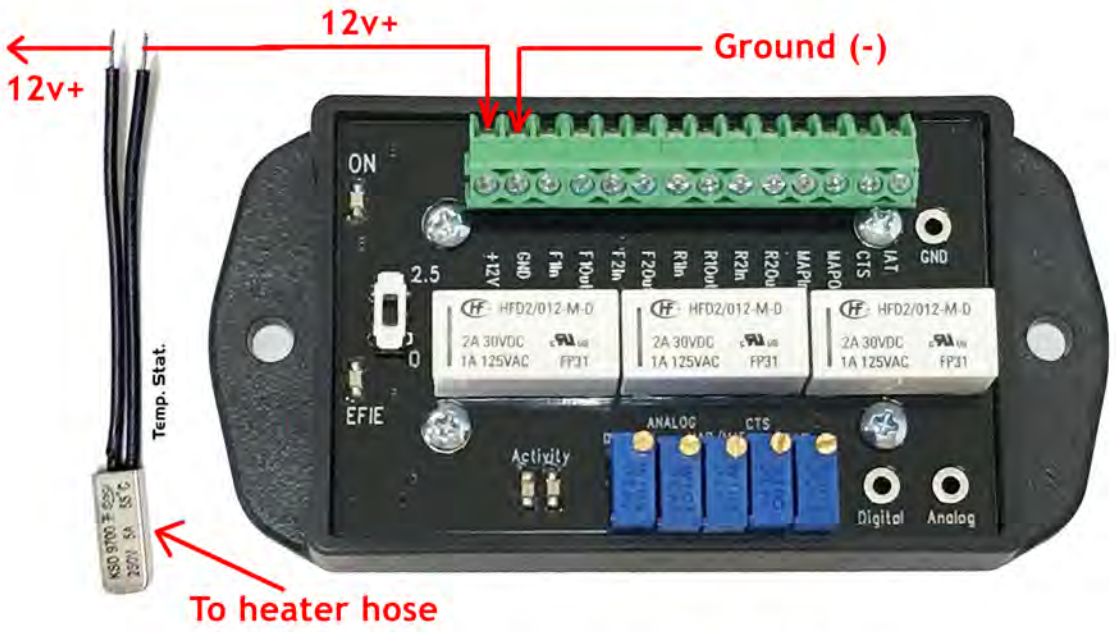
The Chrysler Bias Switch

If you are installing on a Chrysler Product, (Chrysler, Dodge, Jeep, Plymouth) with a V6 or V8 engine you may have a 2.5 volt bias voltage on your Signal Wire. Measure the voltage from the signal wire to ground **with the engine running. If the voltage is jumping between 2.6 volts and 3.5 volts, you have the bias voltage, and you will have to slide the chrysler switch upward to the 2.5 position. Make certain that you slide it all the way up. See above photo. If your voltage is the normal .100 volts to .900 volts, place the switch in the "0" downward position for all normal vehicles.**

Mounting your Tstat Switch.

You must mount your Tstat switch on your Inlet Heater hose. If you do not know which hose this is, then just do the following. It is very easy to tell. Start your engine and let it warm up a little. While it is warming up, I want you to find the 2 hoses that run from your water pump to your heater, Your heater is normally mounted inside the passenger compartment behind the firewall. When your vehicle is warmed up a little, I want you to turn your heater on. I don't care if it is 98 degrees outside, go ahead and turn it on. Now go back under the hood and feel the 2 heater hoses that you found before. One of them is going to be warmer than the other one. This will be your inlet heater hose. This is the hose you will mount your Tstat switch to. We recommend using a universal hose clamp to hold it in place. DO NOT over tighten. Locate the Tstat as close to the water pump as possible. ***DO NOT let any part of the metal sensor come in contact with the vehicles Ground or ANY metal part of the vehicle. The metal part of the sensor is "HOT" carrying 12+ volts of positive current. Grounding it will immediately destroy the Tstat switch. We do not want to have to SELL you another one. If you live in a cool climate, it is a good idea to wrap some fiberglass pipe insulation around your hose and Tstat Switch, and then wrap your insulation, and Tstat Switch with black electricians tape. This will insulate your Tstat Switch from cold air flow when you are driving in very cold or below freezing Freezing temperatures.***

Before you mount your Tstat, you are going to have to solder some wire on each of the 2 wires on your Tstat. One of them has to be long enough to reach your 12 volt (ignition switched) power source, and the other one has to be long enough to comfortably and safely reach your EFIE& MAP/MAF Tuner and attach to the 12+ connector on the Tuner. See Photo below.



Connecting Your 12 V. Ignition Switched Source

With the new Tstat switching device, you will need to solder on lengths of wire to the Tstat stub wires long enough in length to reach your chosen 12 volt ignition switched power source on one side of the Tstat, and long enough to reach the 12v input of your EFIE & MAP/MAF 2 in 1 Combo to the other wire of the Tstat. Refer to above photo. Connect your terminal marked GND to either the negative terminal of the battery or a GOOD clean chassis ground. No dirty or rusty bolts. You will need a very good ground connection. So take your time and make sure it is. When you make your solder connections to the Tstat stubs, please uses heat shrink tubing to insulate and weather proof your connections. Please do not use electricians tape unless you absolutely have to.

It is now time to figure out how many 02 (oxygen) sensors your vehicle has. You can use your repair manual to determine this. If you are uncertain and can not determine this on you own, you should call your favorite auto parts house, and most would be glad to supply you with this information. If you happened to have purchased a “Haynes Repair Manual” it will have photos showing you where your sensors are and how many.

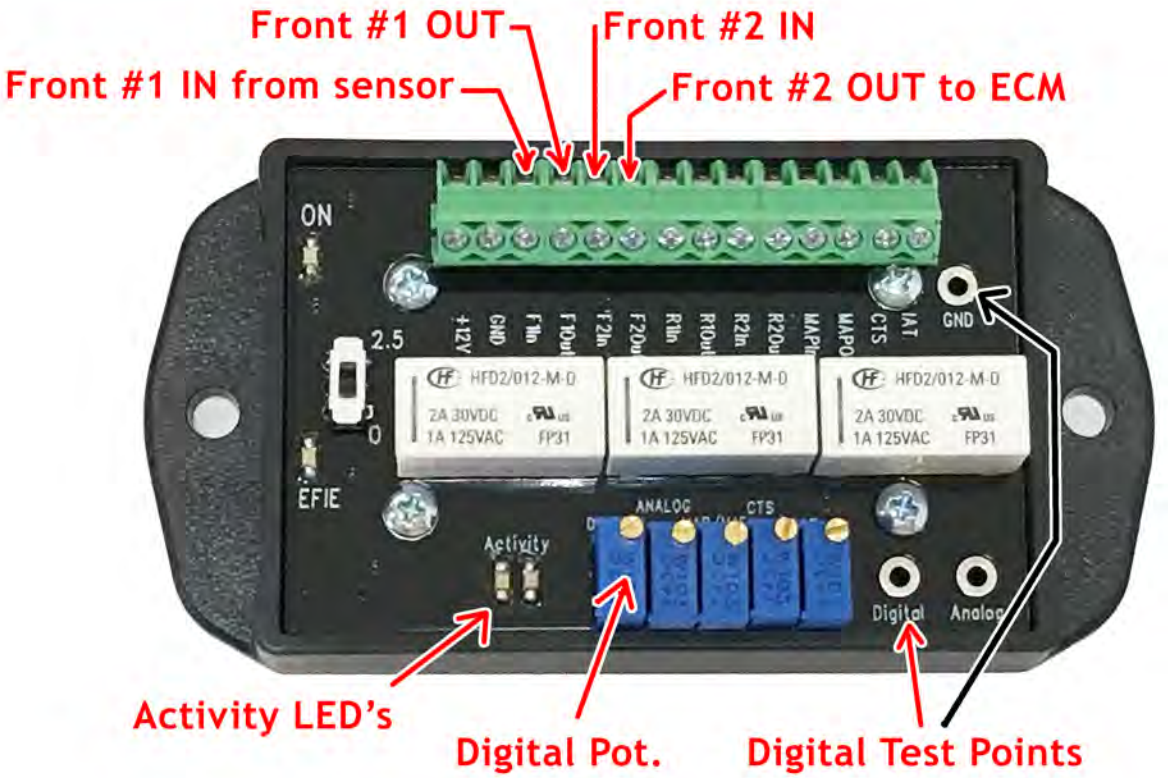
I hope you took the time to read the article that we sent called Locate your 02 signal wire. It is very helpful. Specially if you did not buy a repair manual. If you follow the manual check method, all you will need are some straight pins and a voltmeter to locate your signal wire on each 02 (oxygen) sensor.

An upstream oxygen sensor is an oxygen sensor that is located between the catalytic converter, and the exhaust manifold(s). Depending on the Year, Make, Model, and Engine Size of your particular vehicle, you will either have 1 or 2 upstream 02 (oxygen) sensors.

Any oxygen sensors located between the catalytic converter and the end of your tail pipe are called Downstream 02 (oxygen) sensors. You will normally have either 1 or 2 of these, depending once again on your particular vehicle.

We will now proceed and connect your upstream 02 sensors.

Connecting Your Upstream 02 Sensors



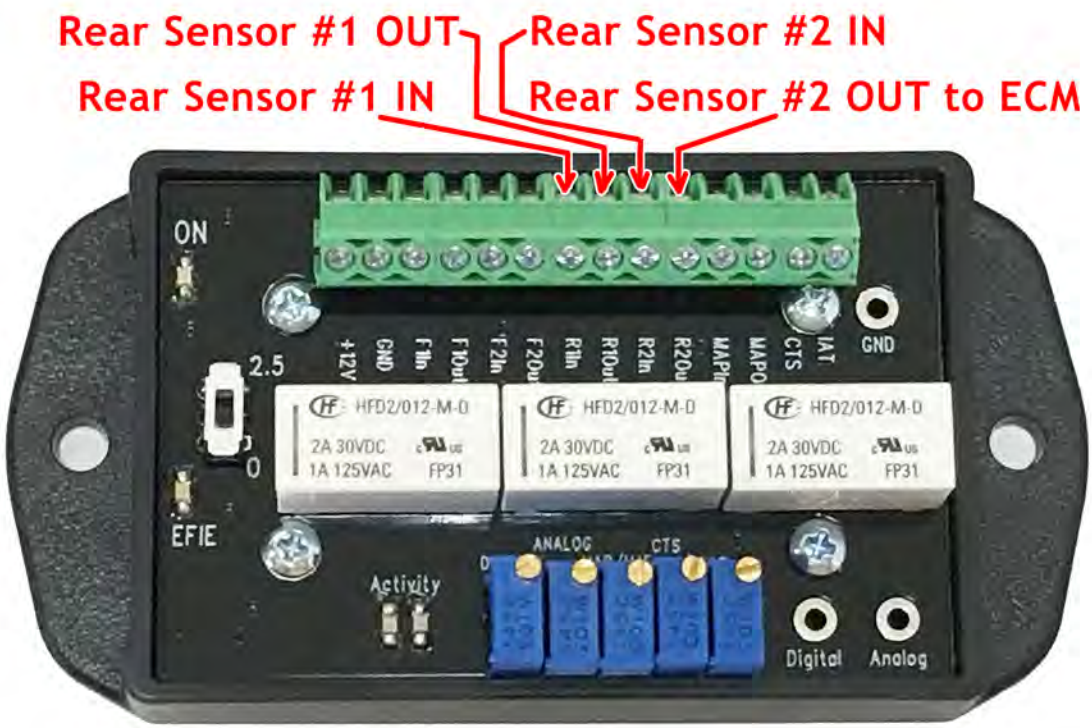
We have included in a separate document, instructions for determining all of your signal wires with your volt meter and as a double check to your Haynes or Chilton's Service Manual diagram.

Now that you have located your upstream oxygen sensor(s) You will now cut the signal wire of your upstream 02 sensor above the plug in block on the 02 sensor wiring harness anywhere between the plug in block and the computer. What ever location is easiest for you to get to. Now that you have cut the wire, we will call the part of the wire that goes to the sensor, " The sensor wire" and the other part of the cut wire will be called " The computer wire " You will need to solder on a length of wire to the "Sensor wire" long enough to reach the **F1in** connector on your tuner. You will now solder on a length of wire to the "Computer Wire" long enough to reach the **F1out** connector on your EFIE tuner. Connect both of these wires to their proper connector on the EFIE tuner.

If your vehicle has Two 02 upstream (**before the catalytic converter**) sensors you will repeat the same process that you have just completed. Locate the signal wire and cut it. This time The "Sensor Wire" connects to the **F2in** connector and the "Computer Wire connects to the **F2out** connector. **If your vehicle only has 1 upstream sensor, leave the F2 connectors empty and do not use them.**

We highly recommend that you heat shrink or silicone seal, all of your wiring connections after you have completed your soldering.

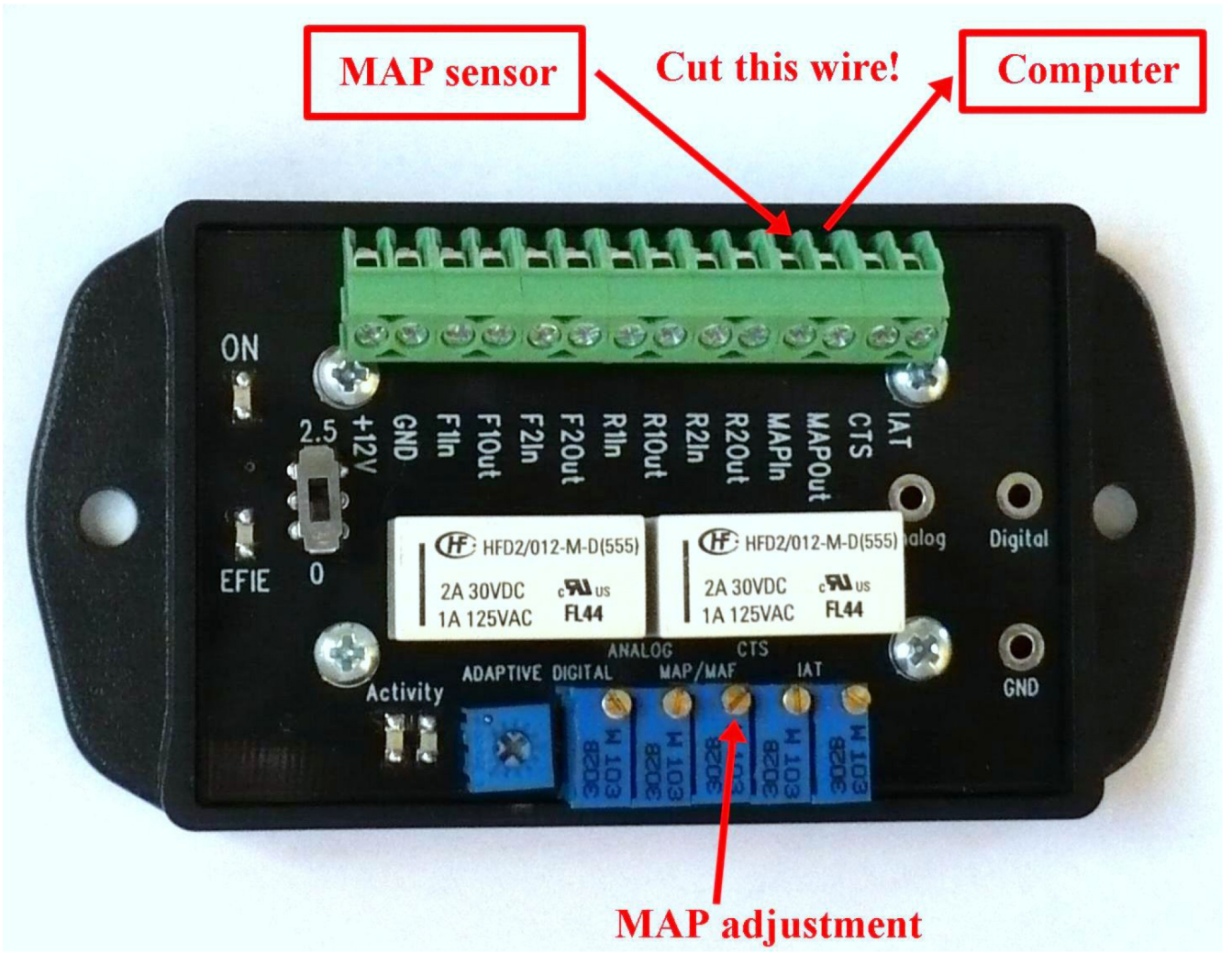
Connecting Your Downstream 02 Sensors



We will now be connecting your downstream (**after the catalytic converter**) 02 sensors if your vehicle has them. This is done exactly the same as your upstream sensors. Locate the signal wire of your First downstream sensor and cut it. You will need to add lengths of wire to each side of your cut signal wire in order to reach your EFIE Control mounting location. The “Sensor Wire” is inserted into **R1In** and the “Computer wire” is inserted into **R1Out.**

If you have a second downstream 02 sensor, once again locate the signal wire, cut it, and add enough wire to each end of the cut signal wire to reach the mounting location of your EFIE Control. The “Sensor Wire” is inserted into the connector marked **R2In,** and the “Computer” wire is inserted into the connector marked **R2Out.** You are now finished with the wiring of the EFIE portion of the Control Center.

Connecting your MAF/MAP Enhancer



This AFR Control device contains a voltage based MAF/MAP enhancer, which is the most common in most vehicles today. There are some vehicles that use a frequency based MAF sensor and a voltage based MAP sensor. These are rare, and are usually found on very few Fords & larger V8 GM products. **If your vehicle has this combination, use which ever of the two sensors is voltage based. You do not need to adjust the signals of both.** Either the MAF or the MAP will work just fine.

If your vehicle has a voltage based MAF sensor we recommend using the MAF.

Locate your MAF or MAP sensor. They will normally have three wires.

+ 5volt
- Ground
Signal Wire

Once again, cut the signal wire. Add additional wire if necessary to reach your EFIE mounting location. The "Sensor Wire of the MAF or MAP sensor is inserted into MAP In connector. The "Computer Wire" is inserted into the MAP Out connector. If you have any doubts about your signal wire, here is the easiest way to find it.

Finding the Signal Wire

Of course the easiest way to find the signal wire is to use your manual's wiring diagram for your vehicle. This can tell you the exact wire, and it's color code, and save you some time. But if you didn't take our advice and don't have a wiring diagram, you can still find your signal wire by measuring it
A MAP or a MAF will have 3 wires. One will by 5 volts, which powers the device and is supplied by the ECU. One will be ground, or 0 volts. So if you measure the 3 wires, just eliminate the 5 volt wire and the 0 volt wire, and the remaining wire is the signal wire. This is slightly complicated by the fact that many MAF sensors today also include an Intake Air Temperature sensor in the same housing. In this case you'll have 5 wires going to the sensor. But it's OK, it's easy to find the correct wires you need. The temp sensor will have a ground wire and a signal wire. The signal wire will be up near 5 volts when the sensor is cold, but as it heats up that voltage gets lower. But a temp sensor's voltage
will not change when you goose the engine, and that's how you can tell the difference. Also, if you unplug the sensor, and measure the signal wire on the computer side, it will read 5 volts.

Now, how do you make sure your MAP is a voltage type, and not a frequency type? You will need to watch the voltage as you make changes to the engine's RPMs. The best way is to goose the engine. The voltage will change dramatically on either a MAP or a MAF if it is voltage type. You will see a small change in DC voltage for a frequency type device too, but the changes will be slight, like tenths of a volt. Whereas the changes on a voltage type will be much more dramatic. Changes of over a volt indicate a voltage type MAP or MAF.

Tip: You can steal a straight pin from your wife's sewing box and push it through the insulation of the wire you want to test. Make sure you get into the conductor (wire) inside. This will be much easier than scraping away the insulation to test the wire

.

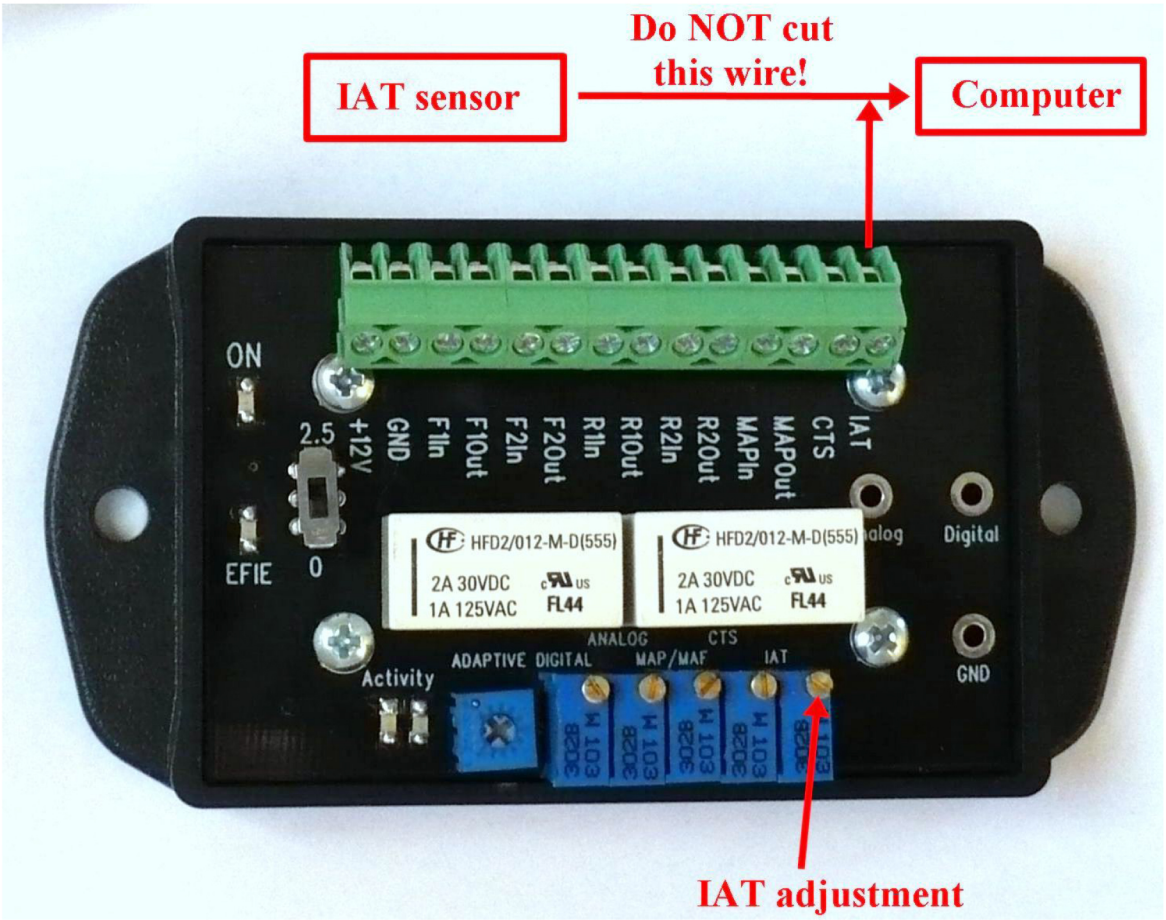
Even if you find your signal wire using a diagram, you should still test it before proceeding. You must make sure that you see a voltage change when you rev the engine, and that the voltage drops back down when the engine slows back down again. If you see this phenomena, you can proceed to install the circuit. If you don't see this phenomena, then you have the wrong wire, or an incompatible sensor type. Do not try to use this circuit unless you find a signal wire that matches this phenomena.

The biggest single cause of failure for any sensor modification project is to mis-identify the signal wire. So it's best to be absolutely sure.

*Note If your vehicle is one of the very rare models that uses frequency based circuitry for both the MAF & MAP sensor this MAF/MAP enhancer will not work with your vehicle. Contact us and we will advise you where you can purchase a frequency based MAF/MAP enhancer.

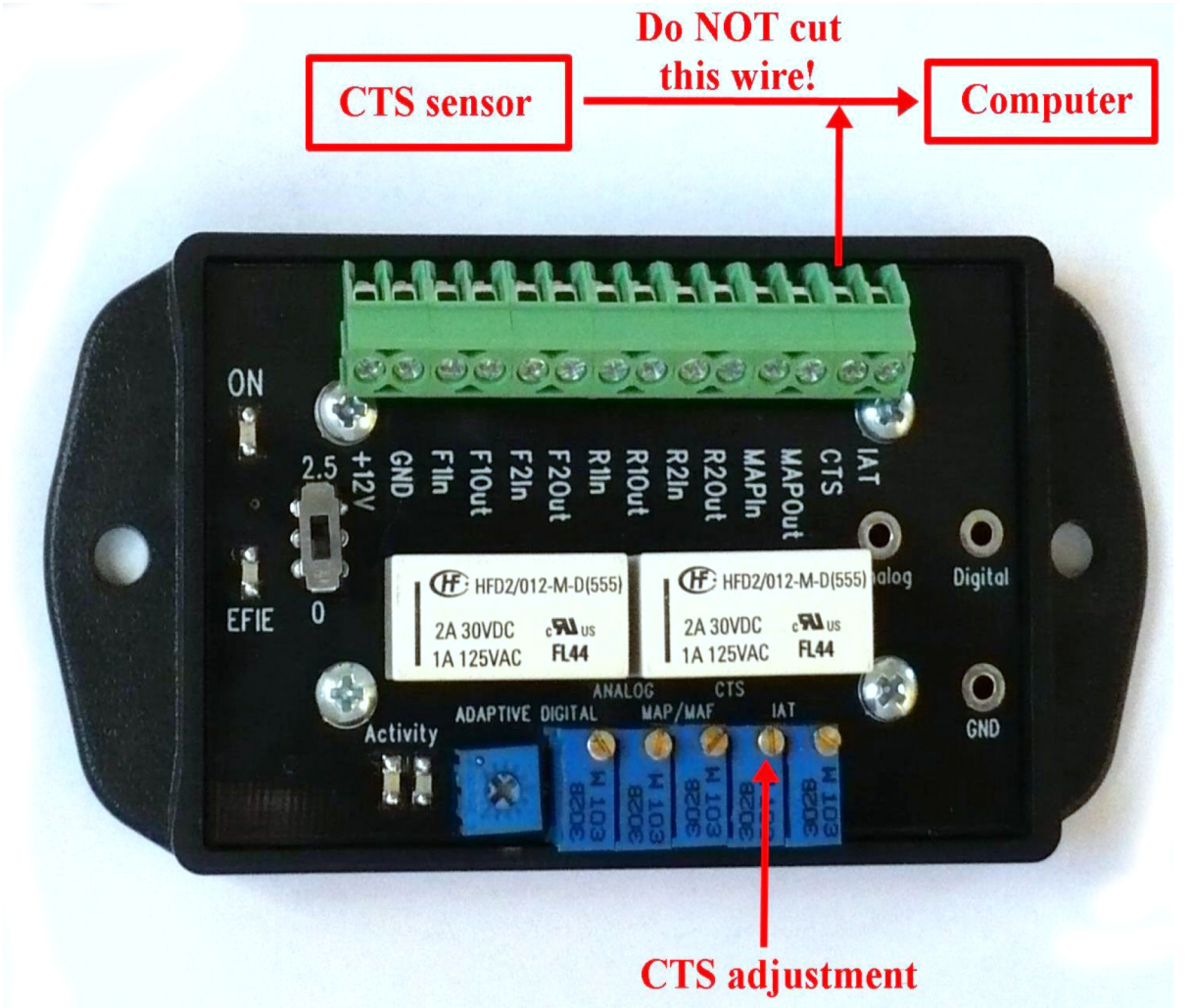
All of Your Control Potentiometers Have been pre-set to their " 0 " positions

Connecting your IAT enhancer.



Locate your IAT (intake air temperature) sensor. There will be 2 wires going to the sensor. You will **NOT** be cutting any wires. You will skin off some of the insulation from the signal wire. Sometimes referred to as a 5v ref. Wire. Refer to your manuals diagram. Or you can refer to the document Identifying your signal wires. Solder on a length of wire sufficient in length to reach your AFR Control Center and attach it in the terminal marked IAT as pictured above. To help you easily identify the proper wire. Turn on the ignition key without starting the engine. Measure the voltage on each wire. The wire that is the closest to 5 volts With the key turned on, and the engine NOT running, is the one you will be making your connection to.

Connecting your CTS.



Locate your **CTS. A word of caution:** Some vehicles have 2 almost identical **CTS**. (coolant temperature sensor's) One is for operation of a temperature gauge or indicator, and one that supplies information to the ECU. Make certain that you locate and connect to the one that is supplying information to the ECU. The one you are looking for will have 2 wires. To help you easily identify the proper wire. Turn on the ignition key without starting the engine. Measure the voltage on each wire. The wire that is the closest to 5 volts is the one you will be making your connection to.

Your connections will be exactly the same as you performed on your **IAT** sensor. This time you of course run your connecting wire to the connector marked **CTS.** If you are having trouble locating your CTS, refer to your repair manual for it's location. If you are still unable to locate it, it would probably be a good idea to contact your favorite mechanic or repair facility.

Special AFR Control Warning
CTS WIRING HOOKUP

There are a number of vehicles that use dual (2) CTS sensors. One of them is used to furnish the signal to the ECU, and the other is used to run a temperature gauge or a warning indicator light. It is EXTREMELY IMPORTANT that you attach to the correct CTS sensor. The sensor you will be attaching to will have a 5 volt input to the sensor. SOME, but not all of the manufacturers use a 12 volt input to the other sensor that powers your temperature gauge or indicator (idiot) light. If you accidentally attach the 12 volt sensor to your AFR Control Center, you will destroy the unit.

Always check the voltage going to the sensor before connecting your wires to the CTS terminals on you AFR Control center. You can skin off a little insulation from one of the wires. Using your volt meter, attach your positive probe to the wire and your negative probe to ground. If your meter shows 5 volts or less you are safe and probably have the correct sensor. Although there are some model vehicles that use a 5 volt feed to both of the CTS sensors. If this is the case you will need to refer to your repair manual to identify which sensor is which. We have already had one person that made this mistake and hooked to the wrong sensor and blew up his AFR Control Center. PLEASE DO NOT BE THE SECOND. We will repair it for you at areasonable cost, but it will not be covered under warranty.

Sequential Timing: What to expect.

When you start your vehicle your ECU will take a barometric reading from you MAF/MAP sensor.
1. When the temperature of your engine coolant in your radiator hose reaches 160 F. the power ON LED and the ACTIVITY LED's will light and your IAT & CTS circuits will be activated.
2. 30 Seconds later your EFIE LED will light and activate the EFIE controls.

I am going to attempt to give you your basic beginning set up, and the numbers you should be starting with. After your basic setup that I am going to give you, you will then most likely need to do some tweaking and fine tuning adjustments. **REMEMBER, ALL OF THE SENSORS SIGNALS YOU ARE MODIFYING MUST BE IN AGREEMENT FOR THE COMPUTER TO BELIEVE ALL THE SIGNALS YOU HAVE MODIFIED.** This is why it is important to make your adjustments exactly in this order.

All of Your Control Potentiometers Have been pre-set to their " 0 " positions

We Have added the following instructions to Greatly Simplify your installation. These are Short Cuts that we have learned over the past 4 years, since the introduction of our very first AFR Control Center. All Tuning should be done with your engine at operating temperature, and following the Tuning Tips file that was sent to you with all the rest of your instructions.

Your first adjustment should be to your CTS, (ECT, CHT) your setting should be a maximum of 10 degrees Fahrenheit higher than the engines coolant thermostat. Example: Your vehicle has a thermostat that controls the flow of coolant from the radiator to the engine block. It could be anywhere from 180 F. to 205 F. depending on your vehicle. At it's rated temperature, it will open up and let the cooler coolant from the radiator flow into the block. If you already know what temperature your thermostat is great. If not, use your scan tool to monitor your coolant temperature sensor. As your engine is getting warmed to maximum temperature, you will note the temperature reach a certain point and then begin to fall. The maximum temperature that it reached before it began to fall is the number we are looking for. Adjust your CTS control so that your scan tool shows a temperature 10 degrees F. higher than that number.

Note: If this setting causes your electric radiator fans to run continuously, you will need to lower the setting until they turn off.

Your second adjustment should be your IAT. I recommend setting your IAT so that your scan tool sees a temperature of 195 F. as your starting basic setting.

Your next setting will be the Digital setting of your EFIE. When setting this portion of the device, use the TEST POINTS ON THE BOARD ONLY. Do not measure incoming or outgoing voltage. Set your volt meter to it's lowest DC voltage setting (normally 2 volts) and place your positive probe into the DIGITAL test point, and then place your negative probe into the GND test point.

Now adjust your digital potentiometer until you have a reading on your voltmeter of .300 (2.80 on Chrysler products with 2.5 volt bias voltage). Now you are going to adjust your ANALOG setting for your down stream 02 sensors. With your negative probe still in the GND test point on the board, insert your Positive probe in the Analog test point on the board. Now adjust your Analog potentiometer so that you see a reading of .250 on all vehicles.

Your next and most difficult setting will be your MAF or MAP adjustment. I have run into way too many instances where the installer is not testing either or both of these sensors to make certain that they are VOLTAGE BASED sensors. The MAF or MAP enhancer in this device is for VOLTAGE based sensors ONLY. Get out your original instructions and perform the test as described. You will only be able to use which ever of these sensors is VOLTAGE BASED. If neither of these sensors are VOLTAGE BASED (which is extremely rare) you will need to contact us for further instructions. Using your Scan Tool, observe the engine LOAD %. Now using your MAP potentiometer on the board of the AFR device, adjust this number to read 15% lower. Example: If your engine load % reads 15% you would want to reduce this number by 2.2% =12.8% new setting.

I am not even going to begin to attempt to explain the Why's or How's to you. I am 83 years old, and I am not certain that I would have enough time left here on earth, to complete it.

Further fine tuning of this device will greatly improve your results. **This can only be accomplished with a Scan Tool**. PLEASE REFER TO ATTACHED "TUNING 101 REVISED" FOR USE WITH THE TUNING 101 AFR CONTROL CENTER FOR FURTHER TUNING DIRECTIONS.

We have recently discovered that there are an abundance of OBD II scan programs available on the market. Many of these programs come with a wireless transmitter that plugs into your OBD II port, and transmits the signal and display to your laptop, tablet, or Smart Phone. Most all of these programs are superior to the lower priced Scan Tools that have been used in the recent past. We urge you to consider purchasing one of these wireless OBD II programs for more accurate tuning of your T-101 AFR Control Center.

God Bless
and Good Luck with your project
D&N Automotive Engineering.