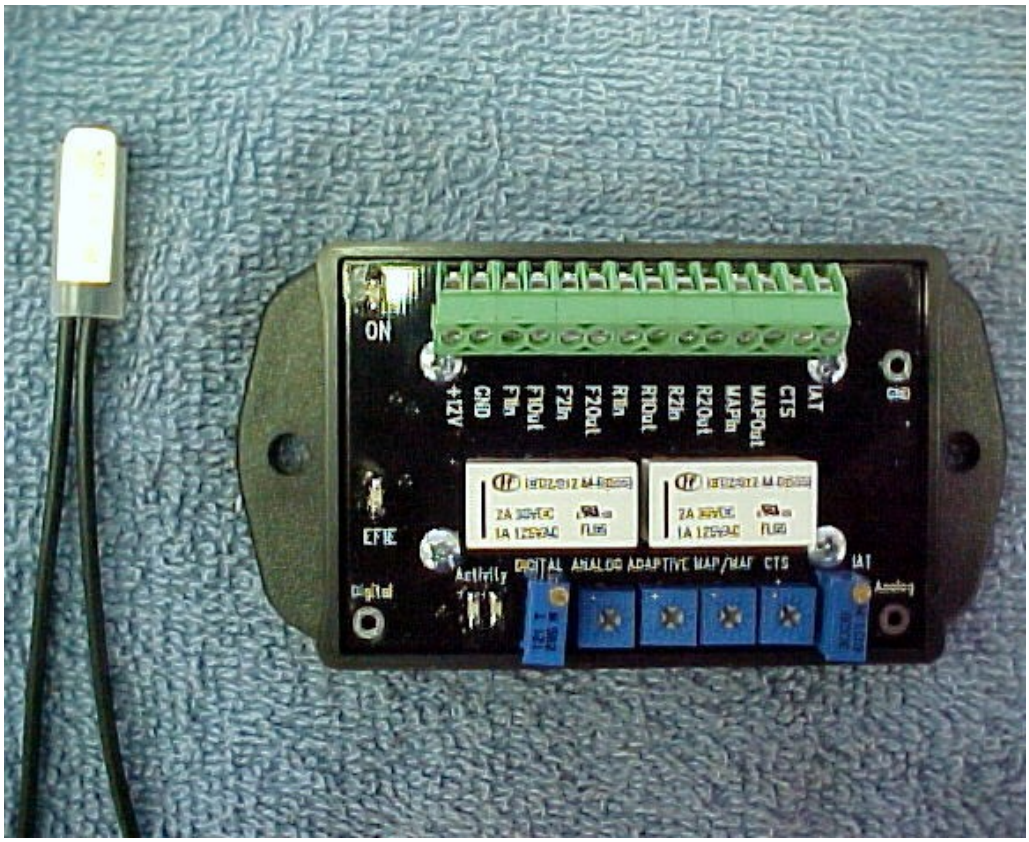


Install instructions for the New Tuning 101 AFR Control Center
Automated Tstat Control For Narrow Band Oxygen Sensors Only.

It is highly recommended that you purchase a Haynes or Chilton's repair manual for your specific vehicle with a schematic wiring diagrams and color coding identification. It will prove very valuable throughout your installation and tuning procedures. You will also need to purchase a Scan Tool for making adjustments. See Tuning 101

Mounting your Tstat Switch.

You must mount your Tstat switch on your Inlet Heater hose or your Upper Radiator hose. Please see update: We recommend using a universal hose clamp to hold it in place.

DO NOT over tighten. Locate it as close to the engine 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 portion of the sensor is carrying 12v+ of positive current. Grounding it will immediately destroy the Tstat switch. We do not want to have to SELL you another one.***

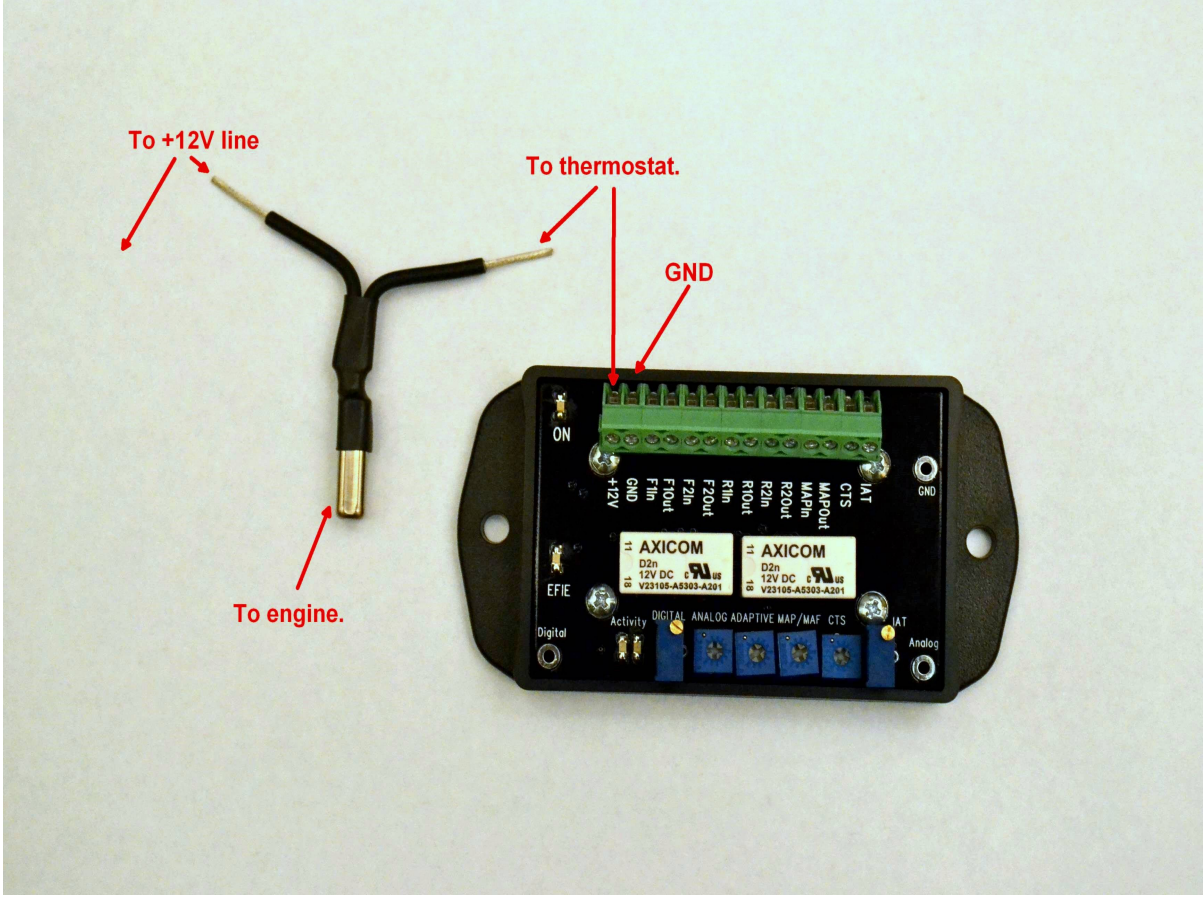
Important Update for Tstat Switch Mounting

We have discovered on certain vehicles, that mounting of the Tstat Switch on the Upper Radiator hose is not working satisfactorily. Many of these vehicles upper hoses do not warm sufficiently until the vehicle has reached 180-200 F. and the vehicle thermostat has already opened and allowed the coolant to flow through the upper hose.

We are now very strongly suggesting that you mount your Tstatswitch to the Inlet (hose going in) heater hose. This hose is pumping coolant directly from your vehicles water pump and is not affected by your vehicles thermostat. We still recommend attaching the Tstat Switch with a smaller universal hose clamp.

If you live in a cold winter climate, it is advise-able 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 below freezing temperatures.

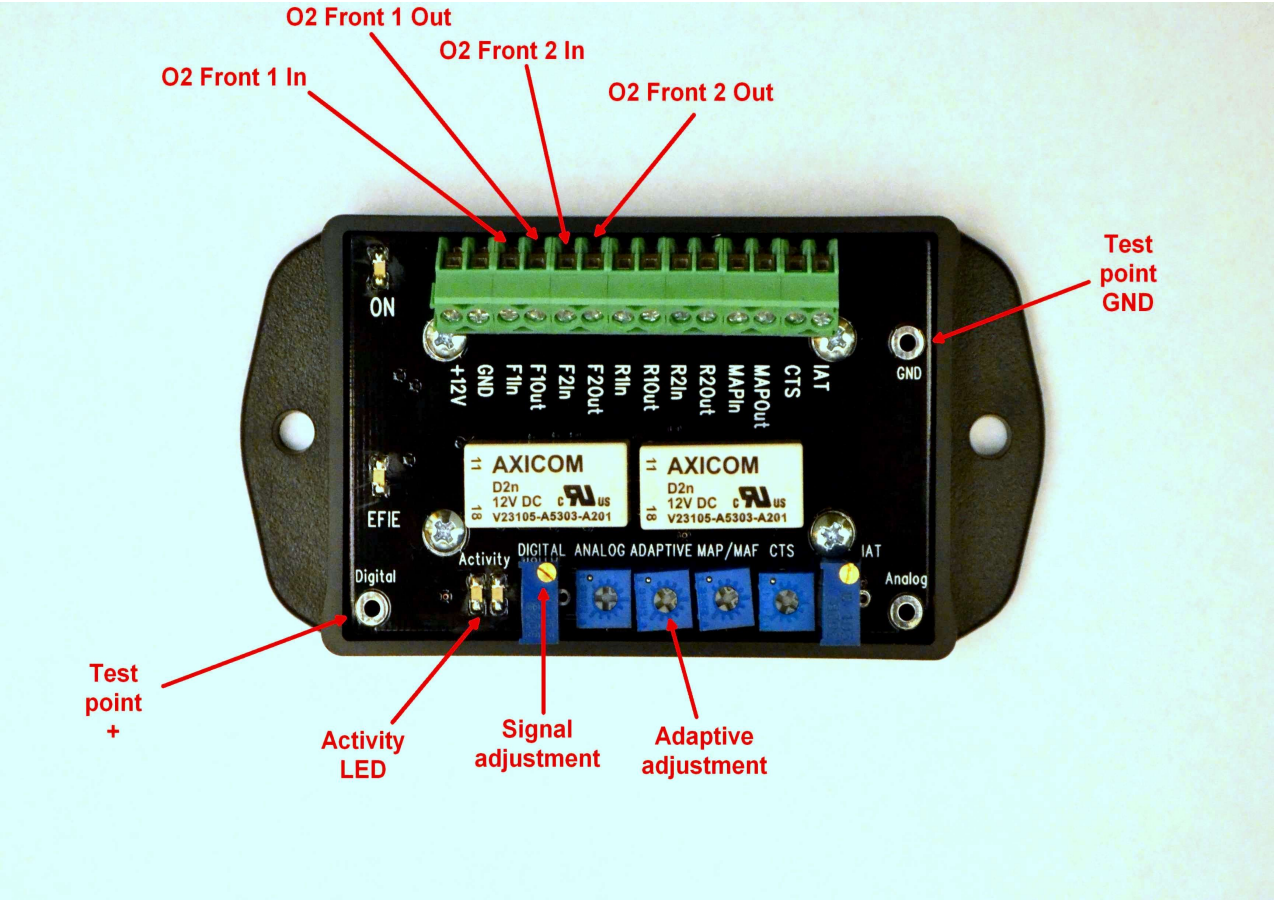
Connecting Your 12 V. Ignition Switched Source



With the new Tstat switching device, you will need to solder on lengths of wire to the Tstat stub wires in sufficient length to reach your 12 v ignition switched power source and to reach the 12v input of your Tuning 101 Automated AFR Control Center. Refer to above photo. Connect your terminal marked GND to either the negative terminal of the battery or a GOOD clean chassis ground.

It is now time to ascertain 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 you could call your favorite auto parts house and most would be happy to supply you with this information.

Connecting Your Upstream 02 Sensors

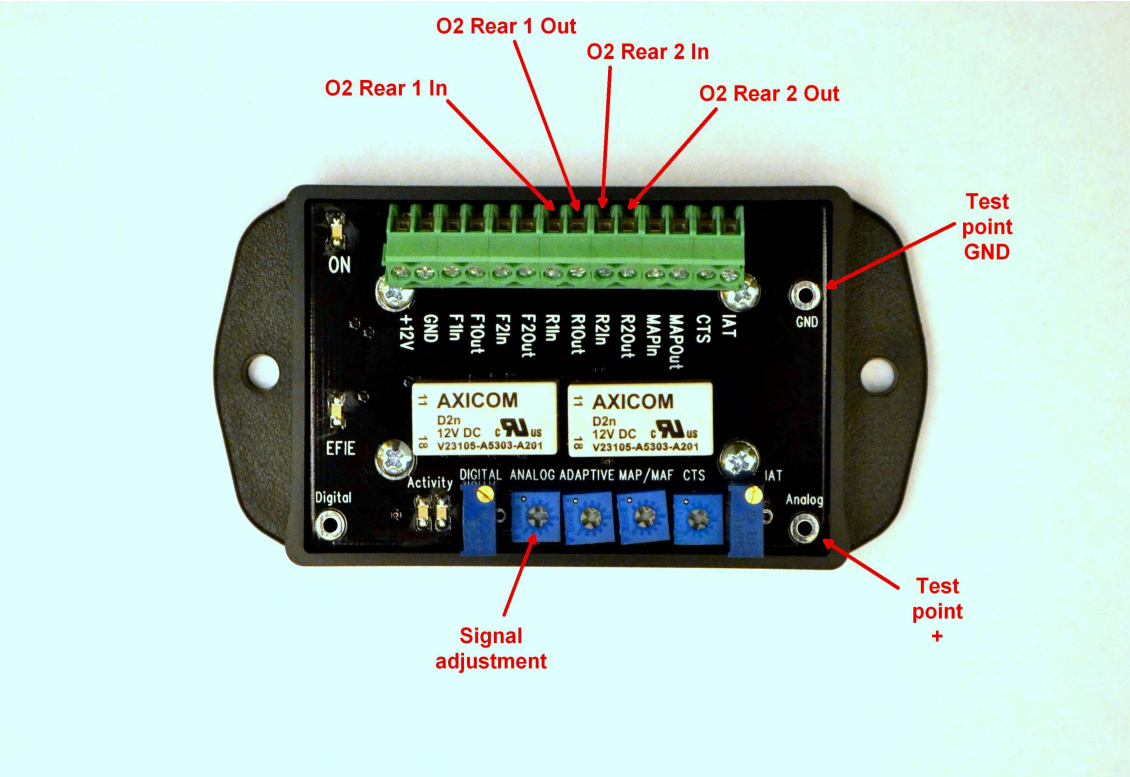


The next step is to determine your signal wire from each 02 sensor. This again will be identified in your repair manual wiring diagram. We have also included in a separate document of instructions for determining all of your signal wires with your volt meter as a second alternative to your Haynes or Chilton's Service Manual diagram.

You will now cut the signal wire of your upstream 02 sensor above the plug in block for the 02 sensor, anywhere between the plug in block and the computer. What ever location is most accessible. You will need to solder on a length of wire from the cut wire that goes directly to the 02 sensor and sufficient in length to reach your AFR Control mounting location. This wire is attached to the connector marked **F1 In** You will now solder on a length of wire to the remaining portion of the cut signal wire that goes to the computer and insert it into the connector marked **F1 Out.** ***We highly recommend that you heat shrink all of your wiring connections after you have completed your soldering.***

If your vehicle has Two 02 upstream (**before the catalytic converter**) sensors you will repeat the process that you have just completed. Locate the signal wire and cut it. This time the wire that goes directly to the 02 sensor inserts into the **F2 In** connector and the wire going to the computer inserts into **F2 Out** connector.

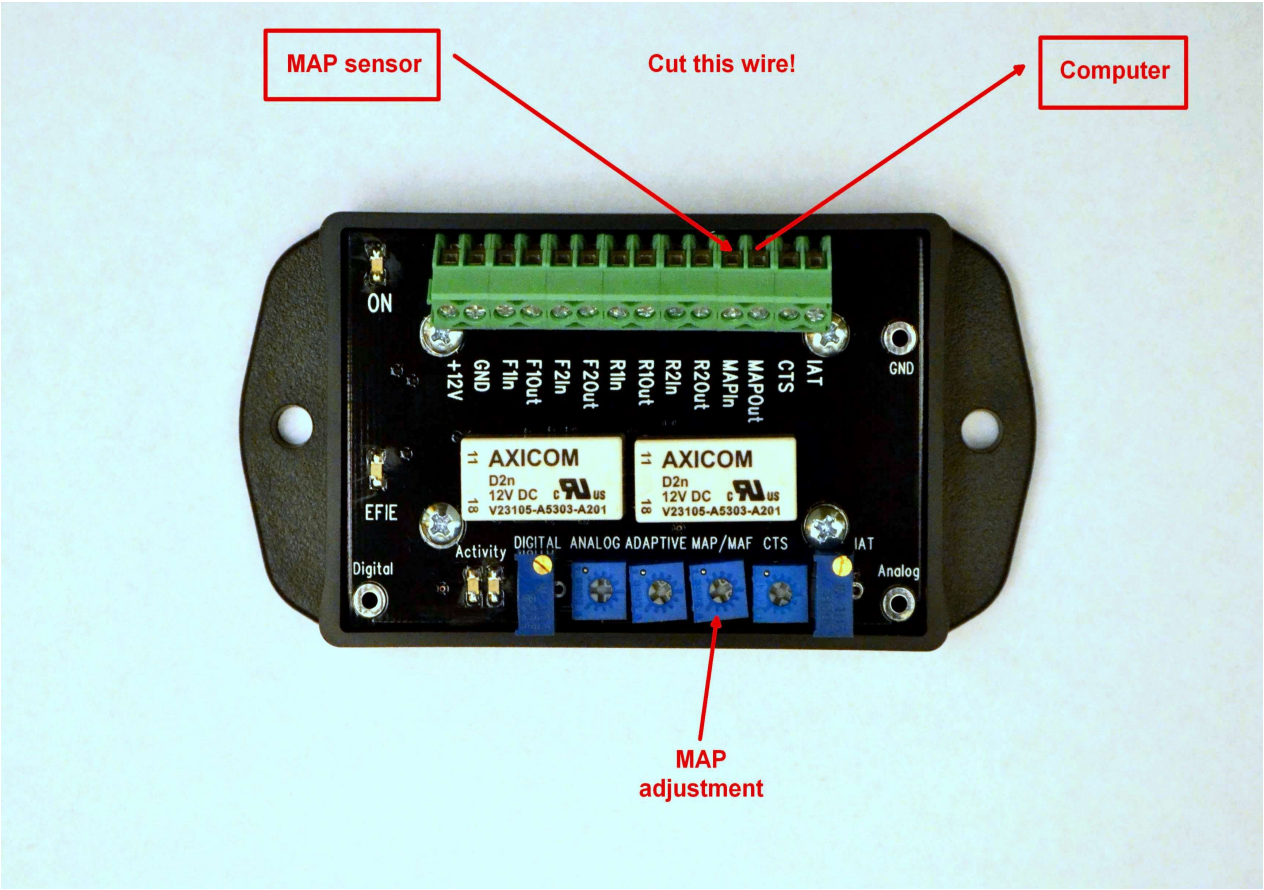
Connecting Your Downstream 02 Sensors



You will now be connecting your downstream (**after the catalytic converter**) 02 sensors if your vehicle has them. The procedure is the same as your upstream sensors. Locate the signal wire of your First downstream sensor and cut it. You will need to addlengths of wire to each side of your cut signal wire in order to reach your AFR Control mounting location. The wire that goes directly to the downstream 02 sensor is inserted into **R1 In** and the wire that goes to the computer is inserted into **R1 Out.**

If you have a second downstream 02 sensor, once again locate the signal wire, cut it, and sufficient wire to each end of the cut signal wire to reach the mounting location of your AFR Control. The wire that goes directly to the 02 sensor is inserted into the connector marked **R2 In,** and the wire that goes to the computer is inserted into the connector marked **R2 Out.** You are now finished with the wiring for the EFIE portion of the AFR Control Center.

Connecting your MAF/MAP Enhancer



This AFR Control Center contains a voltage based MAF/MAP enhancer, which is prevalent 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 in some Ford & 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 suffice.
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 wire that goes directly to the MAF or MAP sensor is inserted into **MAP In** connector. The wire that goes to the computer is inserted into the **MAP Out** connector.

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.

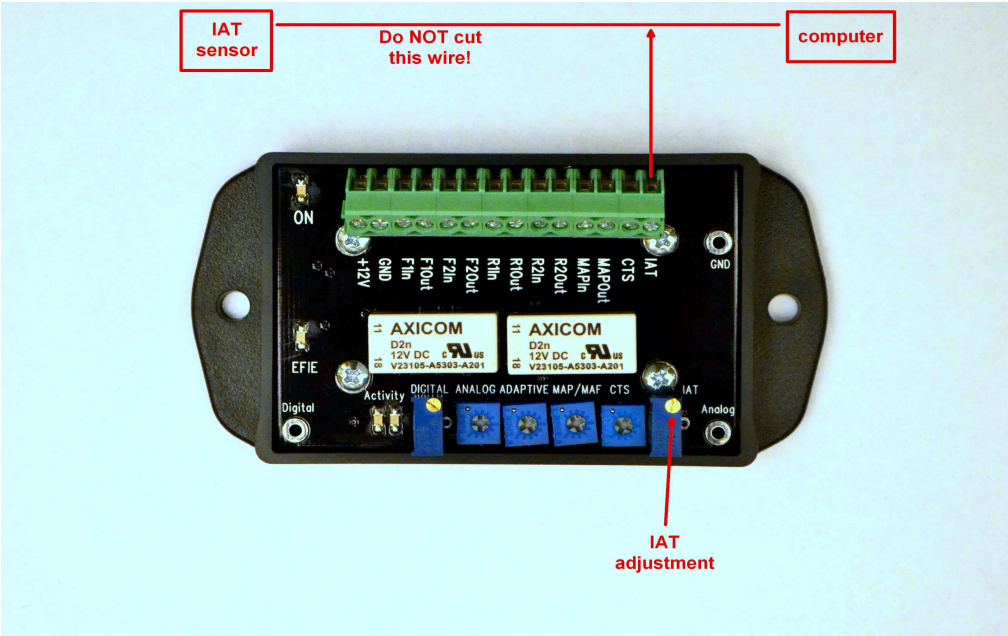
Tip: You can steal a straight pin from your wife's sewing box and push it through the insulation of the wire you want to test. Make sure you get into the conductor (wire) inside. This will be much easier than scraping away the insulation to test the wire

.

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.

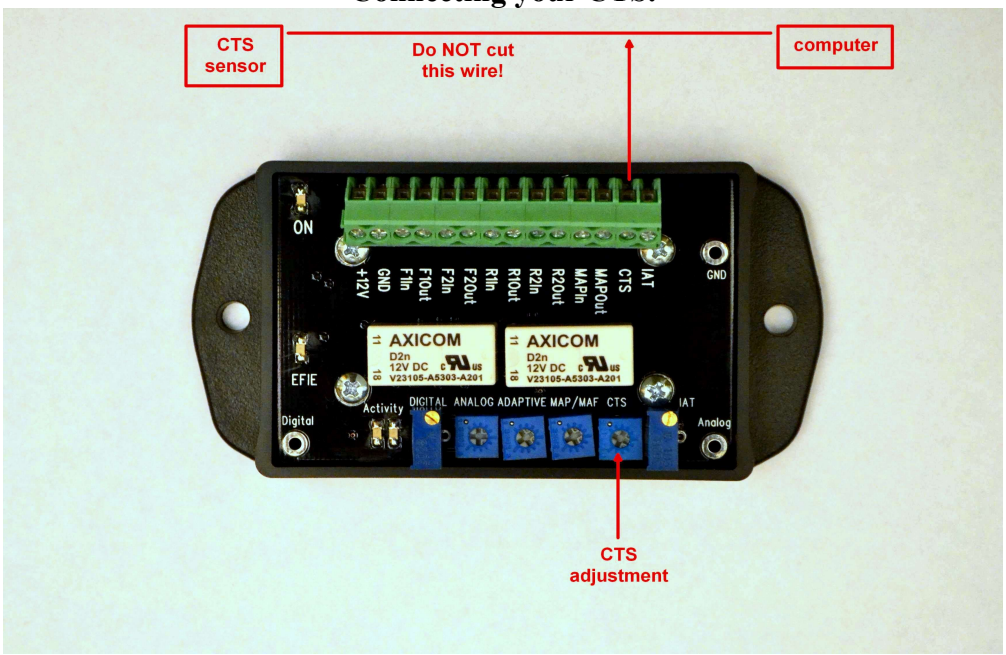
*Note If your vehicle is one of the very rare models that uses frequency based circuitry for both the MAF & MAP sensor this MAF/MAP enhancer will not work with your vehicle. Contact us and we will advise you where you can purchase a frequency based MAF/MAP enhancer.

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. 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.

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, one will be a 5 volt input to the sensor, and the other is your signal wire. 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.

Pre-Setting your Control Potentiometers to their basic start positions.

After you have all of your connections made and all of your wiring is neatly and cleanly arranged, you will need to pre-set certain of your potentiometers. Turn your ADAPTIVE, ANALOG, MAF/MAP, IAT, & CTS potentiometers **full counter clockwise. DO NOT ADJUST YOUR DIGITAL POTENTIOMETER AT THIS TIME.**

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.

After the EFIE LED is lit, and the ACTIVITY LED's begin to blink, Insert the probes from your Volt meter as follows. Insert your positive probe in the Digital test point, located in the lower left hand corner of the board. Next insert your negative probe into the GND test point located in the upper right. Set your volt meter on the lowest (2 v DC) voltage scale. You will now adjust your Digital potentiometer. Turning it clockwise lowers the voltage, (leaning the fuel supply) and counter clockwise raises the voltage (richening the fuel supply). You want to start with an initial setting of 350

mV.
Note: If you have a Chrysler Corporation vehicle with a 2.5 volt bias feed to the upstream 02 sensors please contact us for special instructions. You will also need to exchange your Control center for a custom built Chrysler/Dodge AFR.

Step Two:
Notice the ACTIVITY LED's blinking. When the LED's are ON it is telling the ECU that too much fuel is being supplied or a rich condition exist. When the LED's are Off, it is telling the ECU that not enough fuel is being supplied or a lean condition exists. What we want to accomplish is to have the LED's ON for longer periods than they are OFF. This will tell the ECU that it is supplying too much fuel most of the time. Start by adjusting your Digital Potentiometer clockwise, lowering the voltage. The further you adjust the longer the LED's should stay ON. If you adjust too far the LED's will go into a constant ON. When this happens you have over-adjusted and the ECU has gone into OPEN LOOP. You will now need to back off your adjustment on the Digital Potentiometer until the LED'S are blinking again. If there is a significant difference (LED's ON noticeably much longer than they are OFF), you can stop here. You have older style or worn 02 sensors and adjustment of the ADAPTIVE control in not necessary. If there is not a significant difference in the ON and OFF times, proceed to step Three. You have newer style, higher speed 02 sensors.

Note* Some vehicles will have a very slow blink rate at idle. If necessary increase the engine RPM to make the final adjustments.

Step Three:
Adjustment of the ADAPTIVE Control is very simple and easy to adjust. Keep an eye on the LED's and begin turning the ADAPTIVE potentiometer clockwise slowly. Immediately you will see the changes. The LED's will stay ON for longer periods of time and OFF for shorter periods of time. The amount of adjustment will vary from vehicle to vehicle. If you notice a loss of power or performance, turn the ADAPTIVE control counter clockwise, back to the point where power is restored.

Special Note***
If you have only one of the upstream digital EFIEs hooked up, then only that one LED will show activity. We recommend connecting a jumper wire from the ground terminal to the input port of the unused digital EFIE. Otherwise the LED for the unused EFIE will randomly turn on or off, and can be confusing. There is no other harm to leaving the unused port ungrounded. But jumpering it as mentioned above will cause the LED for the unused EFIE to be off all the time, making the other LED much easier to use.

Step Four:
Downstream sensors should be treated with analog EFIE's. Analog EFIE's work better on downstream sensors than digital EFIE's due to the nature of the signal they generate. But analog EFIE's also work differently than the digital EFIE's and therefore are adjusted differently. For Digital EFIE's, you lower the voltage to make the mix leaner. For analog EFIE's you raise the voltage to make the mix leaner. Once again, to keep things simple, our EFIE's make the mix leaner when you turn the adjustment screw clockwise, and richer when you turn the adjustment counter clockwise. When you turn the Digital EFIE clockwise, the voltage gets lower, and the mix gets leaner. When you turn the analog EFIE clockwise the voltage goes higher, but the mix gets leaner.

We're sorry that this can be a bit confusing, but the 2 types of EFIE work on a different technology. Once again, using your Volt Meter, place the Negative probe in the Gnd.Test Point, and the Positive

probe in the White Analog test point. Now adjust your ANALOG potentiometer. We recommend starting out your rear sensors at about 200mV. Once again, you will need to experiment with the settings on these sensors, and make adjustments based on your fuel mileage gains. In general, you shouldn't ever need to go above 350 mV on any analog EFIE. We also recommend fine tuning the front EFIE's first, with the rear EFIE's set at about 200 mV. Then, you can try experimenting with raising the rear EFIE's to see if you get better results. But realize that the bulk of your results will come from the front sensors.

Step Five:
Adjustment of your MAF/MAP Enhancer. With the engine running, and using your Scan Tool, turn the MAF/MAP potentiometer clockwise until you see a 10 to 15% reduction in air flow (or Load) on your Scan Tool. Further adjustments are covered in Tuning 101 for The AFR Control Center.. Adjustments to the **IAT & CTS** Controls **require the use of a Scan Tool** after the
warm up period. Refer to Tuning 101 for adjustment of these controls.

Further fine tuning of this device will greatly improve your results. **This can only be accomplished with a Scan Tool**. PLEASE REFER TO TUNING 101 REVISED FOR USE WITH THE TUNING 101 AFR CONTROL CENTER FOR FURTHER TUNING DIRECTIONS.
We have recently discovered a new Scan Tool that appears to have all of the necessary functions that are necessary to properly tune your Tuning 101 AFR Control Center. We are not endorsing this product or any other, however this Scan Tool sells for about one half the price of a ScanGuageII. It is well worth looking at (ultra-gauge.com) Thisof course is for OBD II systems only. 1996 and newer vehicles. We have not been ableto find an inexpensive Scan Tool for the older OBD I systems. There are ways to accomplish extremely high mileage gains on OBD I systems, but it is a lot more work and a lot of trial and error. There are some Scan tools for the OBD I systems but they are expensive and will only work on that specific vehicle. Most require the purchase of a downloadable program for your specific vehicle.