

TurboTweak

AXiS **INTERFACE**



Mass Airflow Fuel & Spark Tuner for '86/87 Turbo Buick and '89 Turbo TA

The AXiS Interface device allows the replacement of the stock MAF sensor (mass airflow) with newer, more reliable, and higher flowing MAF sensors. It also adds the capability to tune fuel and spark advance when used with a compatible chip in the ECM.

MAF sensor compatibility:

3" LT1 alum or plastic	GM 25180303, AC 213-352
3.5" LS1 alum or plastic	GM 25179711, AC 213-353
85mm '07 Corvette/Truck (needs wiring adapter)	GM 25318411, AC 213-364, AC 2134160
4" Custom MAF Pipe (needs wiring adapter)	Not in production and not recommended

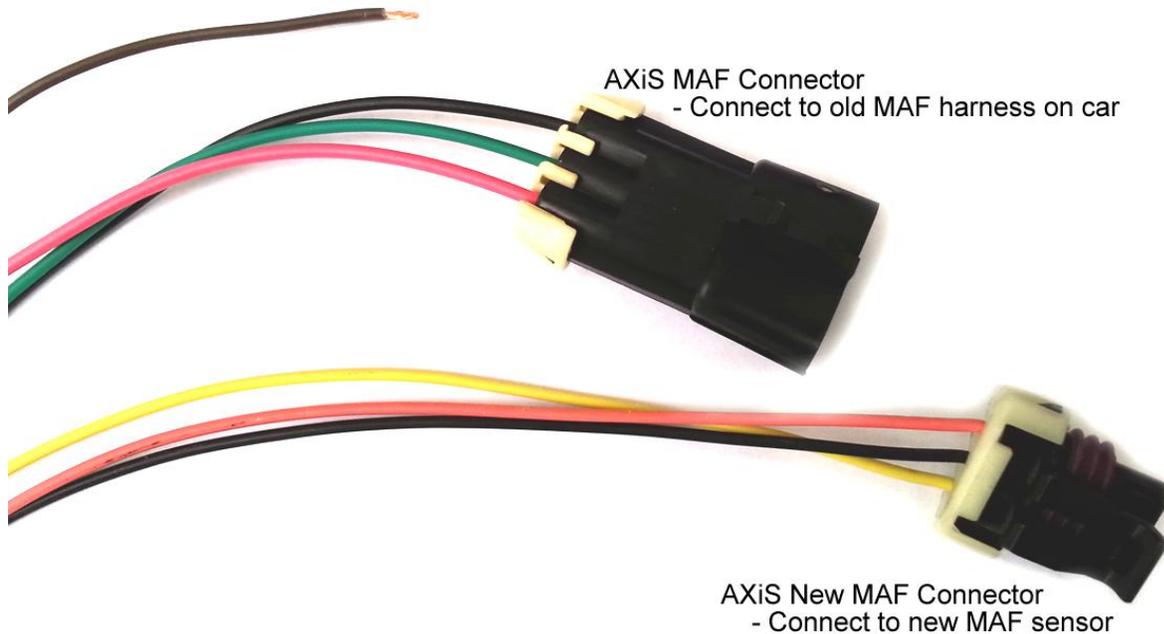
The manufacturers and sellers of the AXiS Interface cannot be held responsible for any damages resulting from the use or misuse of the product or information in this document. For off road use only.

Initial Setup Inside the Box:

1. Open the lid of the AXiS by removing the 4 phillips-head screws.
2. Set the Config switches for the type of chip you are using. (see Config settings page 5)
3. Set the MAF Base dial for the type of MAF sensor you are using. (see MAF Base settings page 6)
4. Leave all the other dials at zero for now.
5. Replace the lid and you are ready to install! (Sometimes it's helpful to leave the screws out and hold the lid on with a rubber band until you're done tuning.)

Wiring Connectors:

AXiS Timing Control Wire - Connect to old airtemp sensor input



Installation:

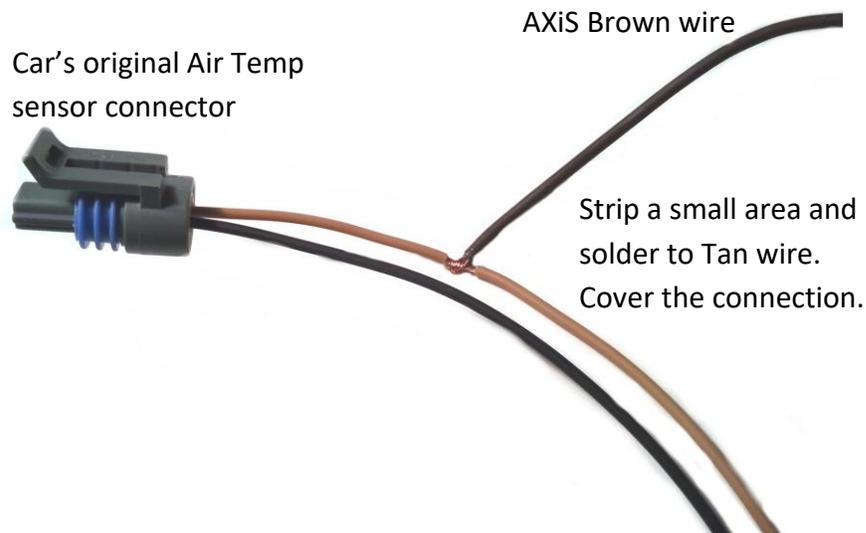
1. Find a suitable location for the AXiS box near the MAF sensor. Some people place it on the plastic inner fender. Others place it under the air filter, or other similar location. You can secure it with wire ties, when you're done with the connections.
2. Unplug and remove the stock MAF sensor. Mount the new MAF sensor, making sure it is facing the right direction. There is typically a small arrow on the MAF showing you the direction of airflow.
3. Plug the AXiS MAF sensor connector into the MAF sensor. With some MAF's, an adapter plug is necessary. Connect the vehicle MAF connector to the other pigtail. BE CERTAIN that you line up the connectors such that the PINK wires are aligned with each other!
4. If you are not using an AXiS chip compatible with the adjustable timing feature, then do not connect the brown wire from the AXiS. If you will be using the adjustable timing

feature, then you will need to connect the brown timing control wire from the AXiS to the old Air Temp sensor connector's tan wire (the Air Temp sensor will no longer be used). The car's original Air Temp connector was a 2-pin connector, a tan wire and a black wire (see pics). You will connect to the tan wire (the 84/85 cars don't have this wire, and it will need to be added at pin C11 at the ECM). It is preferred that this wire be soldered, or a good crimp. Cover the connection with some electrical tape or shrink tube. Do not plug the Air Temp sensor back in, leave it unplugged.

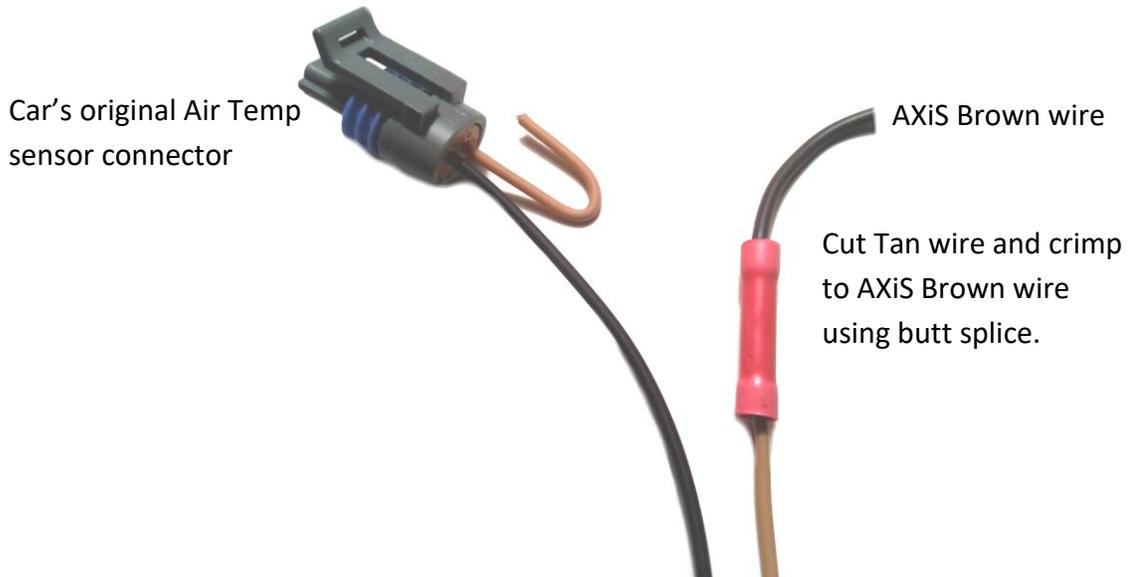
5. Inspect all connections to make sure they are clean and correct. Reset your ECM by disconnecting power for a couple seconds, and you're done!

Attaching the Spark Control Wire (if using that feature)

Option 1



Option 2



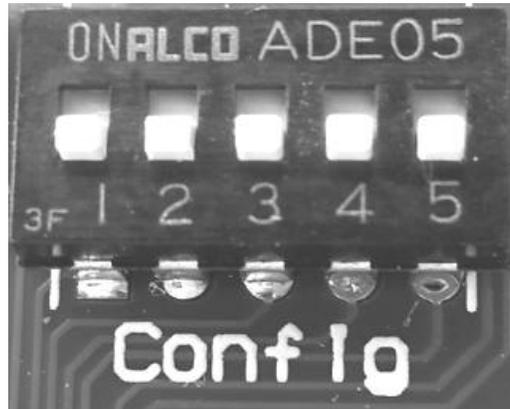
Inside the AXiS



The switches/dials inside the AXiS:

Config	Specifies the type of chip in use in the car's computer (ECM), and other options
Spark Low	Increase or decrease spark advance at low load levels
Spark High	Increase or decrease spark advance at high load levels
MAF Base	Specifies the type of MAF sensor in use
MAF Low	Increase or decrease fuel at low load levels
MAF High	Increase or decrease fuel at high load levels

Config Settings



↑ UP is
"ON"

Use Config to select what Chip you are using in your ECM.
If using an alcohol/methanol injection kit, turn on switch 3.

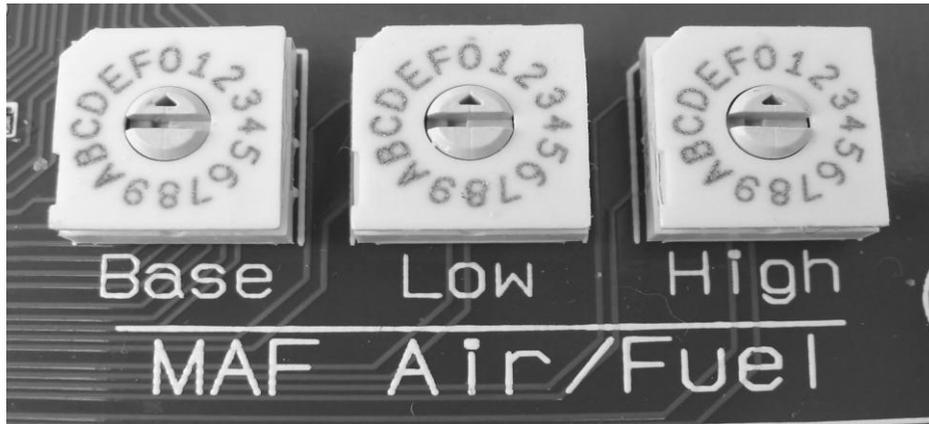
Config Switch 1 and 2 Settings (Chip Type)

Chip Type	Switch 1	Switch 2
Stock and other basic chips (TurboTweak 6.1 and lower)	OFF	OFF
Extender and AXIS chip	OFF	ON
Extender Extreme and Axis Extreme (768 gr/sec airflow)	ON	OFF
Check chip label for "Extreme" on it		

Option Switches

Switch	ON
3	Alcohol Injection in use (reduces WOT fuel)
4	Add throttle tip-in fuel (if you have a lean tip-in stumble)
5	Not currently used

MAF Dials



Use MAF Base to select what MAF you are using.

Use the “10% richer at idle” setting if your BLM reading at idle is substantially higher than 128 (138 or higher).

MAF Base Settings

Setting	Type of MAF
0	3" Aluminum/Plastic LT1
1	3" Aluminum/Plastic LT1 (10% richer at idle)
2	3.5" Aluminum LS1
3	3.5" Aluminum LS1 (10% richer at idle)
4	4" MAF tube with integral sensor (not recommended)
5	4" MAF tube with integral sensor (10% richer at idle)
6	3.5" LS1 Plastic
7	3.5" LS1 Plastic (10% richer at idle)
8	85mm
9	85mm (10% richer at idle)
A	3" MAF tube with integral sensor - LSJ
B	3" MAF tube with integral sensor (10% richer at idle)
C	Not used
D	Not used
E	Not used
F	Not used

MAF Low/High Settings

Setting	Effect on Fuel
0	No change
1	2% Richer
2	4% Richer
3	6% Richer
4	8% Richer
5	10% Richer
6	12% Richer
7	14% Richer
8	Not used
9	14% Leaner
A	12% Leaner
B	10% Leaner
C	8% Leaner
D	6% Leaner
E	4% Leaner
F	2% Leaner

With the MAF Low and High adjustment, you can help fine tune your fuel curve.

The MAF Low adjustment has the most effect around 0psi and lower (into vacuum). It adjusts fueling during idle and cruising (low load).

The MAF High adjustment has the most effect around 10psi boost and higher (considered WOT, or high load). If the car is too lean or rich at full throttle, this is the setting you would change.

Spark Dials



Be careful with these settings! Make sure you are monitoring for knock. These settings add or subtract from you chip's base timing if you have a compatible chip. "Low" is 0psi boost and lower, "High" is 10psi boost and higher (full throttle).

Spark Low/High Settings

Setting	Effect on Spark Advance
0	No change
1	+1.4° (all settings are approximate
2	+2.4° and could vary up to .4°)
3	+3.5°
4	+4.9°
5	+6.0°
6	+7.4°
7	+8.4°
8	+9.5°
9	-8.5°
A	-7.1°
B	-6.0°
C	-4.6°
D	-3.6°
E	-2.5°
F	-1.4°

Fuel Tuning

For low speed tuning, like idle and cruising, it is easiest to watch the BLM (fuel trim, bL on a Scanmaster) on a scantool to see if it is within an acceptable range, which is 128 +/-10. A number higher than 128 means the computer is adding fuel to correct for a lean condition. If it's lower than 128, the computer is subtracting fuel to correct for a rich condition.

The MAF BASE knob has a "richer at idle" selection. You can use this setting if your idle BLM is too high. For example, if your idle BLM is, say 142, but the BLM looks ok while driving, you can use the "richer at idle" setting to help bring the idle BLM down closer to 128. You might have to drive around a bit for the BLM to change.

If the BLM is always on the high or low side, you can use the MAF LOW knob to help correct it. If the BLM is high (above 138), make the MAF LOW richer. If the BLM is low (below 118), make the MAF LOW leaner.

For full throttle tuning, it's helpful to have a wideband air/fuel ratio gauge. As a starting point, an air/fuel ratio of around 10.8-11.0 at full throttle usually works well. If using the stock O2 sensor and reading millivolts, then around 780-800mv when at full boost is a good starting point. You can use the MAF HIGH knob to make it richer or leaner, as long as you have a compatible chip, such as an Extender series chip or AXiS chip. If you have a stock chip or basic chip (such as a TurboTweak 6.1 or lower chip), these can only read airflow up to 255 gr/sec, so the MAF HIGH knob won't have much of an effect. The MAF HIGH knob will still change how fast the airflow reading gets to 255gr/sec, and will affect the airflow readings just under 255.

Typically, leaning out the air/fuel mixture will make more power (to a point), but you have to watch for knock. If it's knocking, then you may need to go richer. If that doesn't help the knock, then you can try decreasing spark advance or decreasing boost, or increasing octane.

If using alcohol injection, turning on Option Switch 3 will reduce WOT fuel about 10% so it doesn't get too rich at WOT. You still may need to adjust the MAF HIGH dial to fine tune the A/F.

Spark Advance Tuning

If you have a chip designed to use the AXiS spark adjustment feature, the spark adjustment dials will add or subtract from that chip's base timing. Base full throttle timing is about 17° with the AXiS chip (varies with RPM). For example, if you set the Spark High knob to "5", it will add 6°, for a total of 23° at full throttle. The Spark Low knob affects timing when in vacuum, like cruising around (but not idle). If you are using an Extender Extreme chip made for the Axis, your base timing could be different (check with your chip maker).

You can use this adjustment to help tune out knock, or add advance when using race fuel or alcohol injection, for example. Typical 93 octane spark advance would be in the 17-18° area. Alcohol injection and 100-104 octane would be around 21-23°. Race fuel of 110-114 octane and higher is around 25-26°. These numbers are not set in stone, so experiment to see what works best. Be careful, as damage can be done from knock by running excessive spark advance.

For support on the web, see www.turbotweaksupport.com

You can also email, eric@turbotweak.com

AXiS Chip

Chip for '86/87 Turbo Buick, '89 Turbo TA

Please read before installing!

1. This chip is designed to work with the TurboTweak AXiS Interface only. It is designed to read up to 512 gr/sec of airflow (or 768 in some cases). Do not use it without the AXiS Interface, or with any other Translator device.
2. Before installing the chip, disconnect the power to the ECM by unplugging the orange wire with the black connector by the battery. This resets the ECM's memory so it can re-learn with the new chip.
3. After gaining access to the ECM and removing the cover, remove the old chip, and carefully insert the new chip. Sometimes you may have to squeeze the sides of the chip slightly for it to fit into the socket. The chip will only go in one way. The notch on one end of the chip should be the same direction as the notch in the ECM socket.
4. Reconnect the ECM power wire. (**Important!** Always reset the ECM power when changing chips.)
5. Turn the key on. The "Service Engine Soon" light should come on, blink once and stay on. If, after installing the new chip and turning the key on, the "Service Engine Soon" light flashes on and off rapidly, do not start the car. Try to re-insert the chip, checking for bent pins. Also, check the ECM chip socket for any pins that are bent in too far, possibly making poor contact with the chip. The ECM socket pins can be carefully bent back out with a pin or needle. If the SES light still flashes, then the chip may be defective, or damaged during shipment, and will need to be replaced. Some post offices are using X-ray equipment that has damaged chips in the past.
6. Set the fuel pressure to 43psi (vacuum line off), for injectors 120 lb/hr and larger start at 38psi. Some cars may need to have the fuel pressure higher or lower to run their best.
7. The very first time you start the car with a new chip, the idle may flare up to around 2000rpm. This is common, as the ECM has lost track of the idle air control motor's position. Simply turn the car off and wait about 5 seconds, then restart. The idle should return to normal.
8. This chip utilizes an open loop idle mode for smoothness. The first time the car is run, open loop idle mode will not be enabled. This is to allow the BLM

fuel trim to learn quicker. Once the car is warmed up and driven around, the next time the car is started, open loop idle will be enabled for a smoother idle.

9. The car may need to be warmed up and driven around for the ECM to re-learn, in order for it to run its best. This learning process only applies to idling and cruising, not full throttle operation. Once the car is warmed up (160°F), most of the learning can be done in about 15 minutes of city driving. Open loop idle will not be enabled until the ECM has “learned” and the car is restarted the 2nd time.

Recommended Sensor Readings and Adjustments

Fuel pressure: Start at 43psi (vacuum line off) at idle. It should drop about 5-8psi with vacuum line on when idling. For injectors 120 lb/hr and larger, start at 38psi.

TPS: Set the closed throttle TPS to .40-.46 volts. Set the WOT position to 4.20-4.60 volts, try not to not exceed 4.8 volts as sometimes it will set a malfunction code.

IAC: With the car fully warmed up in Park, around 10-30 is a good reading for IAC. You can adjust the IAC reading by turning the throttle stop screw (min air screw). If the IAC reading is too high, turn the screw clockwise which will open the throttle blade slightly. If the IAC is too low, turn the screw counter clockwise to close up the throttle blade a little. You can make these adjustments while the car is running, and watch the IAC reading on your scan tool.

Oxygen sensor: Car warmed up at idle, .750-.850 is typical once open loop idle is enabled.

At WOT on pump gas, .780-.830 is typical.

At WOT on race fuel or alcohol injection, .750-.800 is typical.

Take WOT O2 readings in 3rd gear for consistency. The reading will generally be higher in the lower gears and drop some by the time you get to 3rd gear due to the O2 sensor heating up. These readings are typical for Scanmaster, Directscan, and Turbolink. Other scantools may read differently.

Wideband O2

If you have a wideband O2 sensor installed, the idle AFR in open loop will typically be 12.5-13.5. At full throttle we normally target around 10.8 as a good starting point. Cruising around should be in the 14.0-15.0 range.