MAF Translator Gen II

User Manual

Manual Version 2.0
MAF Translator Gen-II version 1.20 and later

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Kit Contents:

The MAF Translator Gen-II kit is shipped with the following items.

- MAF Translator Gen-II unit
- Standard splice harness, 10 pin
- Standard splice harness, 4 pin (only 2 wires installed)
- Splice and tap connectors
- Manual

Available Accessories and Options:

- Various MAF wiring adapters.
- Laptop logging and tuning cable/kit.
- EGT/thermocouple interface
- Wideband AFR sensor and interface (LC-1)
- Accessory power pack (offline power supply, 120VAC)

Introduction:

The MAF Translator Gen-II is a powerful electronic module that allows the user to tune the engine performance of a modern fuel-injected vehicle. The unit is configurable for many different types of vehicles. Using its various operational modes, the user can adjust fuel delivery to extract more performance from their vehicles' engine.

Warning: The MAF Translator Gen-II is a powerful tool for adjusting the operation of the engine. It is possible to mis-adjust the settings and cause damage to the engine. The user must read and understand this entire User Guide before attempting to install and use the MAF Translator Gen-II. Adjustments should be made in small increments with continuous testing to ensure the engine is operating within its mechanical limits.

The primary function of the MAF Translator Gen-II is to allow the user to adjust the air-fuel ratio of their engine. This is accomplished by adjusting the amount of airflow the Engine Computer Module (ECM) or Engine

Control Unit (ECU) perceives is entering the engine. If the ECM/ECU senses less airflow is entering the engine, it will command less fuel be injected into the engine, thus making the Air/Fuel ratio "leaner". If the airflow signal is reduced by 1%, the resultant fuel delivery will be less by 1%. For example, an engine is consuming 100 grams of air per second, and the ECU is delivering fuel for 12:1 Air/Fuel Ratio (AFR). If the airflow signal to the ECU is reduced to 95 grams per second (-5%), the ECU will delivery fuel for this amount of air. The resulting AFR will be 12.6:1 (5% leaner).

Main Airflow Modes

The MAF Translator Gen-II sends airflow information in the form of an electrical signal (voltage or pulse frequency) to the ECU. Frequency signals are send out on the green, "frequency out" wire of the 10 pin harness. Voltage signals are sent out on the Brown (V Out 1) or the Gray (V out 2) wires of the 10 pin Main harness. The unit can be used to tune the vehicle using the original MAF sensor, or an upgraded, alternative sensor can be used. Examples include using a GM LS1 or LS6 MAF on a Toyota Supra, Mitsubishi Eclipse, or Ford SVO Mustang. The MAF Translator Gen-II is compatible with a great number of MAF sensors, both frequency style and voltage.

Installation Details

This section contains installation details that are not specific to any particular vehicle. Please refer to the appendix and other installation diagrams contained in the MAF Translator Gen-II kit. Harness connections are referred to by connector designation M or A (Main or Aux) and pin number, for example the +12V main power input is connected to the pink wire at M5, Ground at M10. In this manual, “TAP” means to connect to a harness wire without cutting it. “Splice” means to cut a harness wire and connect MAF Translator Gen-II wires to the cut ends. If a connection diagram specific to your vehicle is not contained in the kit, contact your distributor for a diagram.

Wire Splicing and Tapping information

The MAF Translator Gen-II is installed by connecting wires into the vehicle's wiring harness. Good connections are absolutely necessary for proper, reliable operation. A loose or intermittent connection could cause improper fuel delivery at full throttle resulting in engine damage. Squeeze style tap connectors are included in the kit due to their popularity, but are not the most reliable means of connection. To use the squeeze style properly they must be installed ***firmly***. Regular slip-joint pliers are best for this. If there is doubt about the users ability to install the squeeze taps properly, or the wiring area is subject to vibration, soldering the connections is recommended.

The pink spade connectors included in the kit are of the best quality and will provide good reliability when properly crimped. Inexpensive crimpers may not crimp firmly enough. Tug on the crimped connection to ensure there is no looseness and the wire does not pull out. When in doubt, solder the connections.

For additional details on soldering the connections, refer to this guide: http://www.mmxpress.com/technical/connections.htm

Installation.

If upgrading the MAF sensor, remove the vehicle's original MAF and install the upgraded MAF. If a plug-and-play harness is available, follow the instructions included with it. Otherwise wire the new MAF such that the signals use the original vehicle wiring. Install the MAF Translator Gen-II wiring, splicing in to the MAF signal wire so the MAF Translator Gen-II can alter its signal. If the original MAF had extra signals, wire the analog outputs to those ECU wires so the MAF Translator Gen-II can generate those signals. Tap the TPS and RPM signals.

Using the Keypad

The MAF Translator Gen-II is equipped with a 4-key keypad and LCD to allow the user to make tuning adjustments to the unit without needing a laptop computer or other external device. Most tunable parameters are accessible from the keypad. There are 3 main sets of data that are manipulated with the keypad: page, range, and setting. The page is selected by holding the PAGE key, then pressing either Up(▲) or Down(▼) to select the desired page. The page description is displayed while PAGE is depressed. On any page, hold the RANGE key and use the Up(▲) and Down(▼) buttons to select the range to be adjusted Use the Up(▲) and Down(▼) by themselves change the setting of that range.

For example, to adjust the airflow (and consequentially the air/fuel ratio) at idle, select the AF Lo page by holding PAGE and using Up(▲) or Down(▼) to select the Airflow Low page. Then hold the RANGE key and use the Up(▲) and Down(▼) buttons to select the RPM range that's closest to idle speed. Then use the Up(▲) or Down(▼) buttons alone to adjust the setting.

The Config page is used to configure the unit for a specific kind of car and airflow mode.

MAF Translator Gen-II Pages:

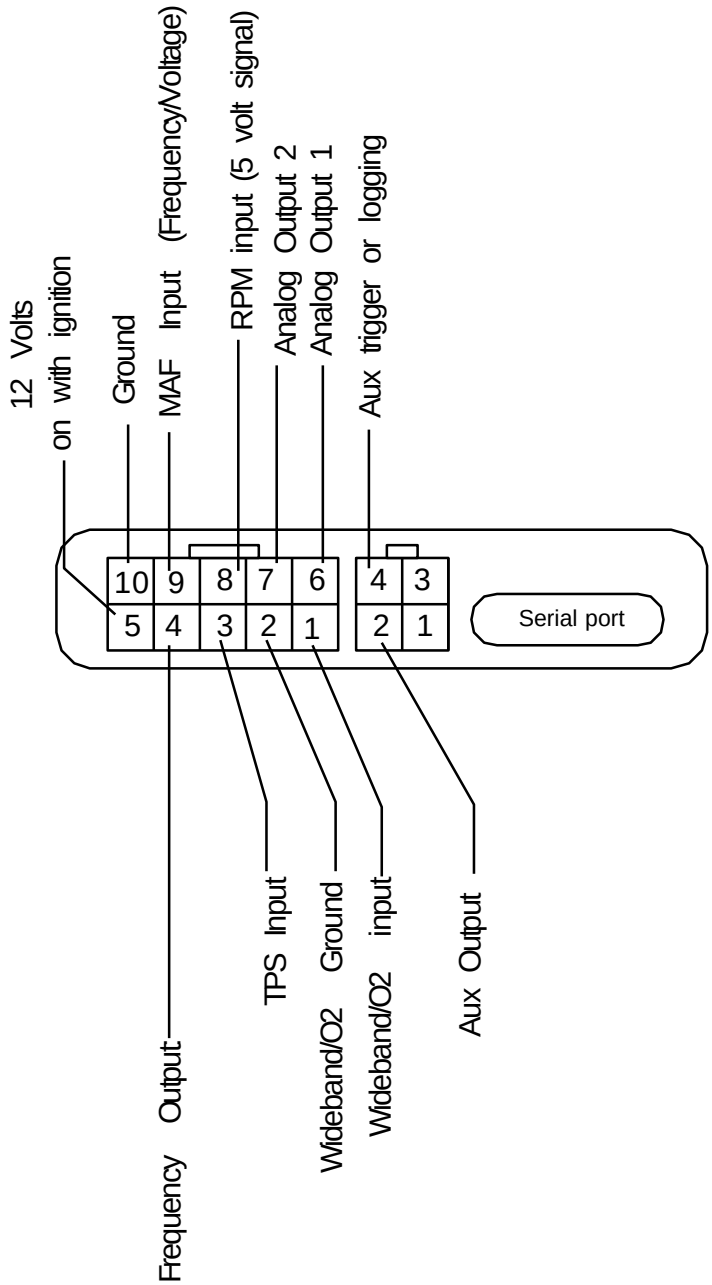
Use this page to set the operating mode for your specific vehicle
Config Select: Set the unit for the vehicle and sensors connected

System Settings: Settings related to the selected configurations
AF Low: Low load AF tune vs. RPM
AF Mid: Mid load AF tune vs. RPM
AF Hi: High load AF tune vs. RPM.
MAF Sensor Tune: User AF tune vs. MAF flow.
AFR Tracking: Control how the unit uses wideband feedback at WOT
Aux Trig: User AF tune that is activated when the Window Switch output is activated. This adjustment is only applied to the high load AF tune.
Sensor Monitor: Display operating and tuning parameters.
Spark WOT: Adjust WOT (Wide Open Throttle) spark advance (not all vehicles)
Spark Aux: Adjust WOT (Wide Open Throttle) spark advance when the window switch is activated (not all vehicles)
Window Switch: The Aux output (+12volts, 100ma) is activated when the settings are all true and the delay time expires.

MAF Translator Gen-II Setup

The vehicle can be equipped with a larger high performance MAF than was originally installed. The new MAF is installed and wired to the MAF input wire (yellow). Configure the MAF Translator Gen-II "MAF Input" to match the sensor installed on the vehicle. The "MAF Output" mode is set to match the vehicle and ECU/ECM. Frequency MAF signals are sent on the Frequency Out wire (yellow), voltage MAF signals will be sent on either of volt out wires (brown or gray). Be sure to configure the volt out mode for "Volt MAF". Some vehicles have MAF sensors with other functions or signals. These other signals are typically Barometric pressure and Air Temperature. These MAF sensors are actually "Air Volume" sensors, and the ECU requires the temperature and pressure in order to calculate the airflow mass. When using a true MAF sensor, the air temp and baro signals must be kept constant to prevent double-compensation. These other sensors can be simulated by the MAF Translator Gen-II, using the V Out 1 and V Out 2 signals. Set the V out 1 and 2 mode to "Use Setpoint" in the Config page, and set the output voltages to normal levels in the Setup page.

Standard Connections



Parameter setting details for all pages:

Config:

MAF-In: Select function and scaling of MAF output
Select from list of available sensor types.
MAF-Out: Select function and scaling of MAF output
Select from list of available scalings.
RPM/Engine: Set to the number of cylinders of the engine
(exception: 96+ LT1, 4 cylinder)
Displacement: Displacement in Liters. Used to calculate Engine Load
Load Source: Determines the method used to determine engine load. Engine load is used to determine which of the High Mid or Low load tune settings are used. Selections are MAF/RPM (scaled in KPA), TPS (320 = 5 volts), or a MAP sensor connected to the Aux input.
Wideband O2: Select scaling of wideband input from the following list

- Innovate LC1
- Innovate LM1
- AEM Gauge, AFM-1, other (0 volts@10:1, 5 volt @ 20:1)
- Tech Edge (2B02) Wideband
- Zeitronix ZT2 Wideband
- Dynojet Wideband Commander (0-5 volts = 10:1 - 18:1)
- AEM interface (non gauge unit)
- DIY-WB

Aux Log Mode: Determines logging function of Aux input wire.

- No Aux Log (Reads only voltage)
- Log EGT (requires adapter)
- Log 2 Bar (calculates and logs MAP pressure from the aux signal)
- Log 3 Bar (calculates and logs MAP pressure from the aux signal)
- Log 3.5 Bar (calculates and logs MAP pressure from the aux signal)
- Log 5 Bar (calculates and logs MAP pressure from the aux signal)

V-Out1 mode and V-Out2 mode: Select function from the following list:

- Use setpoint: Use setpoint setting to output desired voltage
- Spark contrl: For 1G DSM and Buick Turbo cars with proper chips
- Volt MAF: outputs voltage signal of MAF Out.

- AFR Correctn: outputs voltage to indicate how much the AFR tracking feature is correcting. 2.5v = no correction.

Setup:

Main Scale: adjusts the entire range by the same %
V-Out1 Set: Setpoint for V-Out1
V-Out2 Set: Setpoint for V-Out2
Afterstart: Enrichment for the first few minutes of engine run time
Lo Load Pt: Load for the Lo Load User tunes (~KPA)
Mid Load Pt: Load for the Mid Load User tunes (~KPA)
Hi Load Pt: Load for the Hi Load User tunes (~KPA)
F Out Max: set for the maximum frequency that will be sent out the MAF output. Can be used to prevent fuel-cut, or intentionally lean out the top end. Set to 0 to disable frequency limiting.
MAFLim TPS: TPS value below which MAF Flow is limited to the below settings.
MAF Limit: When TPS is below the MAFLimTPS, MAF flow is limited to this. This helps reduce decel richness.
MAF /Krpm: Second limiting factor. This setting, multiplied by (RPM/1000), is added to the "MAF Limit" and the sum becomes the max allowable MAF Flow when TPS is less than "MAFLimTPS".
TPS Enrich: Throttle movement calculation for momentary enrichment, this calculated value is added to the MAF output signal. This calculation is only calculated at throttle openings below 30%. Typical setting is .20
TPS Decay: The rate at which the TPS Enrich fuel is reduced once throttle movement stops. Lower numbers decay more slowly. Typical setting is .30
Idle Flow: The airflow amount used to determine if OffIdle enrichment should be activated. Typical setting is 12 (Grams/Sec).
OffIdle fuel: Enrichment percentage added to the output airflow value for 1 second after the throttle is opened and airflow exceeds Idle Flow. This can compensate for larger than stock MAF sensors that are less responsive than the original. Typical setting 7-12 %

AFR Tracking

The AFR Tracking page is used to control how the MAF Translator Gen-II self-adjusts to maintain a desired AFR at WOT. The MAF Translator Gen-II does not self-tune, but will correct its output while at WOT. See the separate section on AFR Tracking.

MAF Sensor Tune

The MAF Sensor Tune setting is added to the regular system tune value. It is adjusted relative to MAF flow.

Aux Triggered

At each RPM point, the set tune percent is added to the ***High Load*** user tune when the Window Switch is activated.

Tune High
Tune Mid
Tune Low

User tune values, load points are determined in the Setup page. These settings are blended between RPM and load points and added to the System Scale, Air Temp, and Aux Trigger settings.

Sensor Monitor

Displays various sensor and system signal values. Up(▲) and Down(▼) buttons select the upper display. Holding the range button while pressing the Up(▲) and Down(▼) buttons select the bottom display.

RPM	Engine RPM
Load	Calculated engine load, MAP, or scaled TPS (0-320 KPA)
AFL In	Airflow from the MAF sensor (Grams/sec)
Vlt In	Voltage of the MAF input (Volt MAFs only)
Hz In	Frequency of the MAF input (Hz) (Frequency MAFs only)
Hz Out	Frequency of the MAF output (Hz)
UserTn	User Tune, the total of the tune and mainscale (+/- %)
TPS V	Throttle Position Sensor. (volts)
O2 V	Voltage of the O2 input (volts)
AftrSt	Afterstart enrichment (%)
AFR	Air/Fuel Ratio
WB Corr	Correction used by AFR Tracking (+/- %)
AFR Des	Desired AFR used by AFR tracking
Sprk	Commanded WOT spark advance
Aux V	Voltage of the Aux input (volts)
EGT	Exhaust Gas Temp, use adapter to connect to Aux in. (°F)
Batt V	Voltage at power input to the unit (volts)
V Out1	Voltage output on pin x (brown wire) (volts)
V Out2	Voltage output on pin x (gray wire) (volts)
Enrich	Airflow enrichment from throttle movement (Grams/sec)
Offidle	Airflow enrichment from throttle opening from idle (%)

Spark Adv @ WOT

At each RPM point, the Spark advance that is programmed is what the vehicle ECU will run once boost is over approximately 6 psi. This feature only works on vehicles specifically set up for Remote Spark Advance Control. Currently this is only DSMChips equipped cars with this feature activated, and Buick GN's running the Extender Pro chips.

Spark Adv @ WOT (trig)

The Spark advance programmed into this page will be used instead of the WOT Spark if the Window Switch is activated. (DSMChips equipped cars with this feature activated, and Buick GN's running the Extender Pro chips only)

Window Switch

The unit can be configured to energize the aux output (+12 volts, 100 ma max) when the input conditions are satisfied. When activated, the other AUX triggered modes for AFR control and spark advance are also triggered.

- Min TPS - TPS must be above this to enable the output
- Max TPS - TPS must be below this to enable the output
- Min Aux – Aux input must be above this to enable the output
- Max Aux – Aux input must be below this to enable the output
- Min RPM - RPM must be above this to enable the output
- Max RPM - RPM must be below this to enable the output
- Delay Time - once all the above settings are true, this time must elapse before the output and aux functions will activate. (0-2.50 sec)

Tuning with the MAF Translator Gen-II

Generally, once the MAF Translator Gen-II is properly configured, the engine should start and run. Then the next step is tuning. "Tuning" is the term used to describe adjusting the fuel delivery and spark advance (as well as other items) for best operation of the engine and vehicle.

Tuning is accomplished using the MAF Translator Gen-II keypad. Air/Fuel ratio (AFR) is adjusted in the low/mid/high load tuning pages. "Load" refers to how hard the engine is working at a certain RPM. Low load means light throttle operation, idle, and steady speed driving. Mid load refers to easy acceleration at moderate throttle. High load refers to heavy throttle acceleration.

The AFR tuning is the sum of the Mainscale, low/mid/hi/aux User Tune, and MAF Sensor tune settings. This total can be viewed on the Sensor Monitor page as UT (User Tune). Adjust the Mainscale initially for the best compromise between idle and part throttle driving. This sets the tune "close". Then use the low load page to adjust the tune at idle and light throttle driving. The mid load adjustments should be set for proper AFR for moderate acceleration. The mid load settings at 800 to 1200 RPM also affect "tip-in" smoothness. Hi load adjustments are used to adjust the AFR for WOT operation.

Open Loop vs. Closed Loop

Modern engine control systems operate in "closed loop" during part throttle operation. The ECU measures the signal from the Oxygen Sensor, mounted in the exhaust system, and makes internal fuel delivery corrections to maintain 14.7:1 AFR. Adjusting the MAF Translator Gen-II when the ECU is operating closed loop will not affect the AFR, since the ECU will re-correct back to 14.7:1. This effect can be seen by monitoring the ECU controlled variables using a "Scan Tool "or "Datalogger". Tuning part throttle, closed loop operation is predominantly adjusting for consistent "trim" or "BLM" values. During warm-up and WOT operation the ECU operates in "open loop" mode, and tuning changes directly affect the AFR. Refer to the technical documentation specific to your vehicle for more details.

AFR Tracking

The MAF Translator Gen-II can control WOT AFR to a desired setting using feedback from a wideband AFR sensing device. Install the wideband sensor in the exhaust following the manufacturer’s instructions. Connect the MAF

Translator Gen-II wideband/O2 input to the analog output of the wideband unit. Connect the wideband/O2 sensing ground to the wideband ground. (use the "analog ground" if the wideband has one, or connect to the wideband main ground, close to the unit) The wideband/O2 sensing ground must be connected or the wideband signal will not be measured correctly. The wideband input on the MAF Translator Gen-II is a "differential input" and measures the difference between the input and the sensing ground. Set the Wideband O2 in the Config page to match the wideband unit installed. Setup or program the wideband unit if required.

When the wideband unit is installed and operating the analog voltage can be monitored on the O2 parameter of the Sensor Monitor page, and the AFR is also viewable. Ensure the AFR displayed matches the wideband unit.

The AFR tracking page is adjusted for WOT AFR control as follows.
Min TPS: - TPS above which the AFR tracking is enabled. Set this high enough to ensure the ECU will be operating Open Loop whenever AFR tracking is enabled.
Min RPM: - RPM above which the AFR tracking is enabled. Set this high enough to ensure the ECU will be operating Open Loop whenever AFR tracking is enabled.
Min Load: - Engine load above which AFR tracking is enabled. Set this high enough to ensure the ECU will be operating Open Loop whenever AFR tracking is enabled.
Lean Lim%: - The maximum % that the system will lean out to maintain the desired A/F. It is advisable to set this around 5%, so the AFR will not go incredibly lean if there is a problem with the wideband unit.
Rich Lim%: - The maximum % that the system will richen up to maintain the desired A/F. This can be fairly high (25%) to help protect the engine in case of a fuel system partial failure.
Gain: - The speed that the system will try to maintain the desired A/F ratio. Start with 5, and test the operation of the tracking. Setting this too high will result in unstable AFR and a system that "oscillated
AFR 2000R ... AFR 8000R Desired A/F Ratio at each RPM from 2000 RPM to 8000

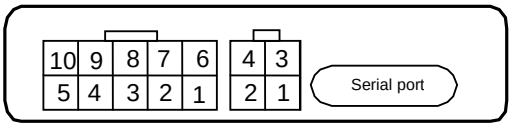
Aux% - Change to target AFR when The Window Switch is activated (there is a "AF Trk Dly" parameter on the Settings page which controls a delay from when the enabling conditions are true to when AFR tracking begins.
AF TrDelay: Adjustable delay of 0-25.5 seconds that AFR tracking waits after enabled, before it begins to correct.

Note: The tune values can be reset to the factory defaults by holding the upper right keypad button for 15 seconds while powering up the unit. When the default settings have been restored, the unit will display "All data Reset!"

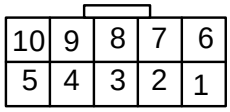
Glossary:

AFR	.....	Air Fuel Ratio.
WOT	.....	Wide Open Throttle
ECU	.....	Engine Control Unit
ECM	.....	Engine Control Module
TPS	.....	Throttle Position Sensor
MAF	.....	Mass Airflow Sensor
RPM	.....	Revolutions Per Minute
UT	.....	User Tune
OEM	.....	Original Equipment Manufacturer

MAF Translator Gen-II Harness Connector Details

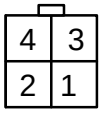


Main (10 pin) Harness



1 — Orange – O2/wideband input.
2 — Purple – O2/wideband sensing ground
3 — Blue – TPS input
4 — Green – MAF/Frequency signal output
5 — Pink – +12 volts ignition power
6 — Brown – Voltage signal output #1
7 — Gray – Voltage signal output #2
8 — White – RPM signal input
9 — Yellow – MAF / Frequency signal input
10 — Black – Ground

Aux (4 pin) Harness



1 — Not used
2 — Brown – Window switch, trigger output
3 — Not used
4 — Purple – Aux input