MAPCAL3
Flex Fuel™
MAPECU3
Calibration Software

Performance Motor Research Limited

User Guide
Version 3.5

www.mapecu.com
Contact: Performance Motor Research Limited.
info@mapecu.com
Copyright 2015 Performance Motor Research Limited

Table of Contents

Introduction

This manual describes MAPCAL3 V3.5 Microsoft Windows™ based configuration application for the Performance Motor Research Limited MAPECU3. MAPCAL3 is designed to run on Industry Standard PC's using Microsoft™ Windows 2000™, XP, Vista™ and Windows7™ operating systems. The MAPCAL3 software provides an interface for tuning and data logging the MAPECU3 via a USB port or WiFi network. A driver needs to be installed in order to operate correctly. Refer to the separate MAPECU3 USB and WiFi Install Guides for installation instructions.

Features

MAPCAL3 software has the following features:

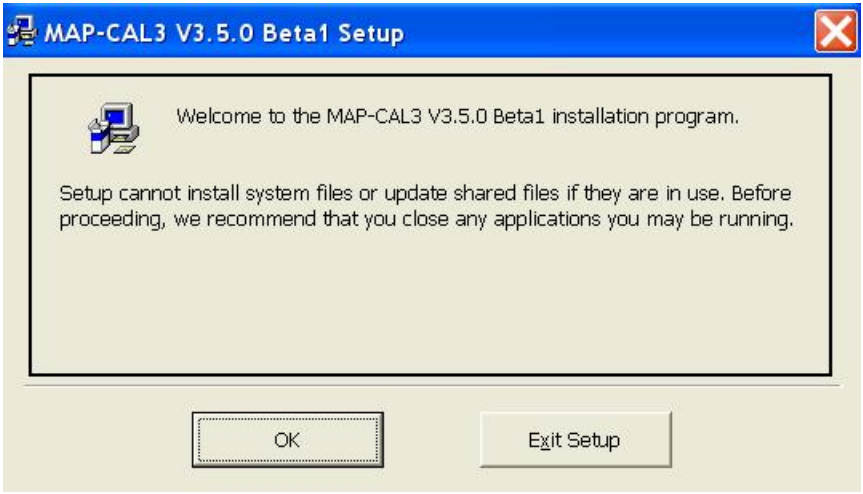
- Real-time monitoring of MAPECU3 inputs and outputs.
- Real-time programming of MAPECU3 tables and parameters.
- Real-time multi-zone tuning
- 2D and 3D data visualisation and manipulation.
- Offline data manipulation.
- Configurations can be saved and retrieved as files.
- Logging functions on all inputs and outputs, including the ability to save logs as files.

New Features

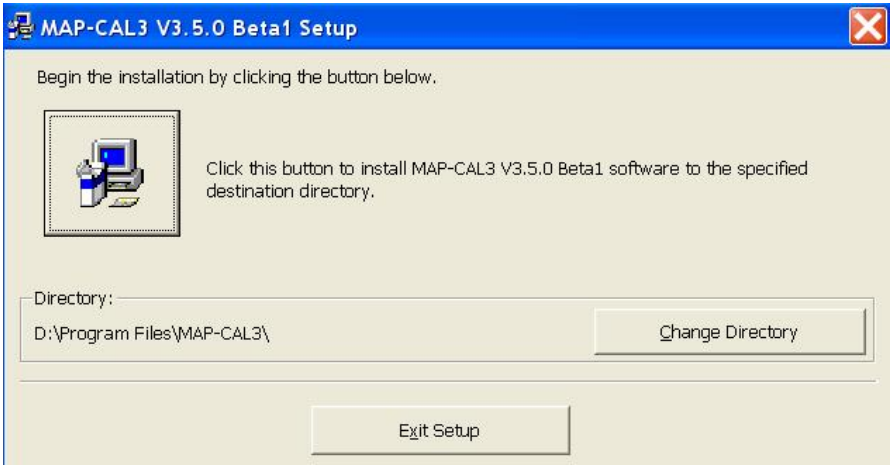
- Configure table read/write for connection speed.
- Enable/disable Fuel, Timing, O2, Auxiliary Injector tables
- Enable/disable Secondary Tables
- Support for Flex Fuel
- Support for advanced 2D IAT. Baro & CLT Compensations
- Support for Enrichment Clamp
- RPM Limiter Function
- Boost Ignition Cut Function
- EGT input for logging
- CLT input for logging and Compensation
- Launch Control Anti-lag output
- Vehicle Speed input displayed on dashboard if configured

Installation

MAPCAL3 is supplied on CDROM and requires approximately 10MB of disk space. The default installation directory is C:\Program Files\MAP-CAL3. Run the **setup.exe** program from the CDROM in order to complete installation. The first screen should be as follows:

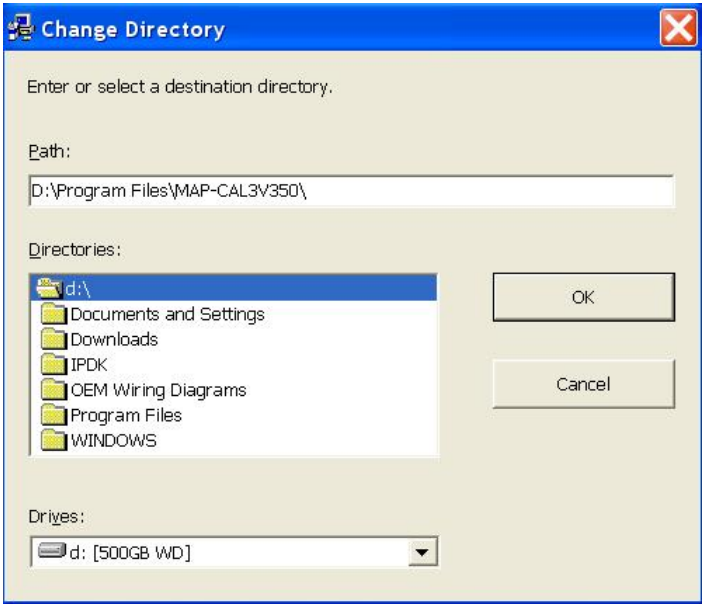


Ensure no other applications are running during installation in order to minimize the possibility of errors. Select the OK button and the following screen will appear:



If you wish to change the installation directory select the 'Change Directory' button or select the icon to accept the default directory.

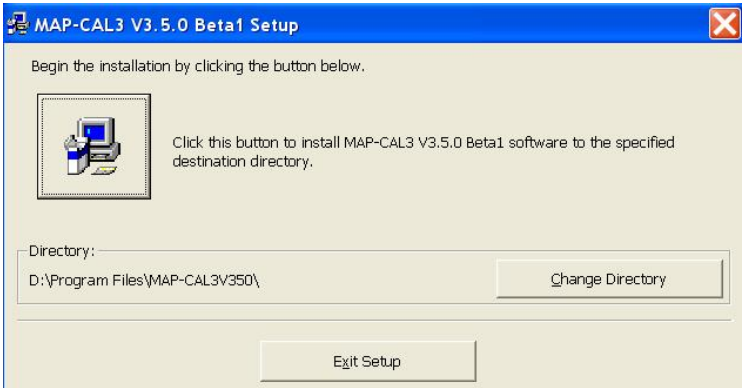
The following screen will appear if you chose to change the directory:



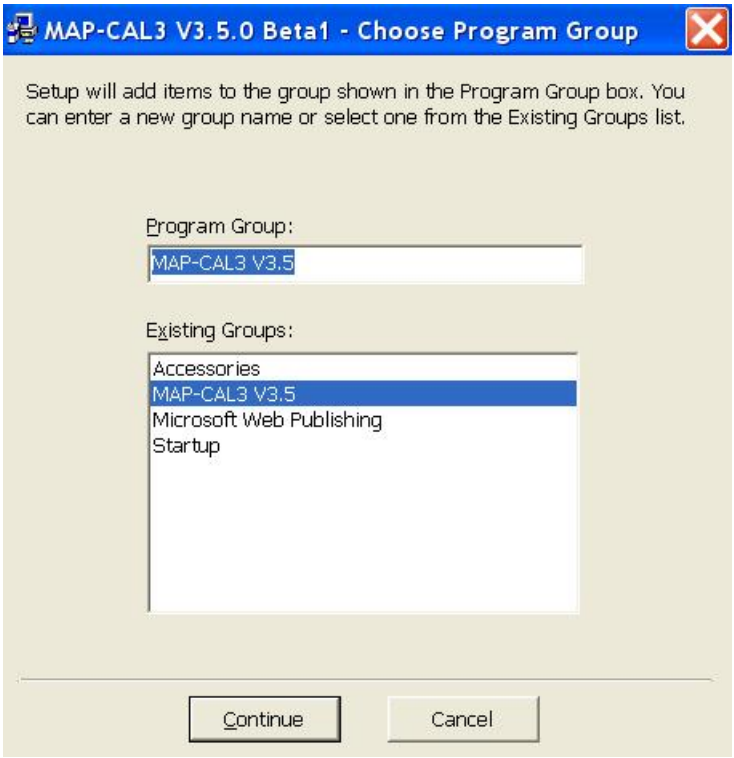
Use the 'Directories' and/or 'Drives' boxes to find an existing directory or alter the 'Path' as required.

If the new directory selected does not exist Setup.exe will ask if you wish to create a new directory, as follows:

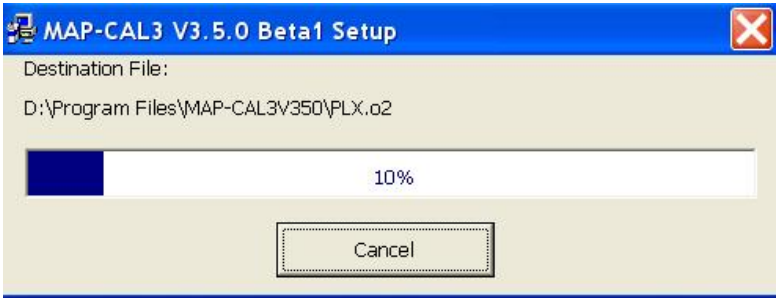
Select ‘Yes’ to create the new directory or ‘No’ to return to the directory selection screen. Click the icon labelled “Click this button to install MAP-CAL3 V3.5.X software to the specified destination directory.”



Once an install directory is selected, Setup.exe will ask which program group the MAPCAL3 should be located. The default being MAPCAL3 V3.5 as follows:



Should you wish to create a program group with another name simply type the name in the field below ‘Program Group’ or select an existing program group from the list. Once you select ‘Continue’ the files will be copied to disk as per the following screen:

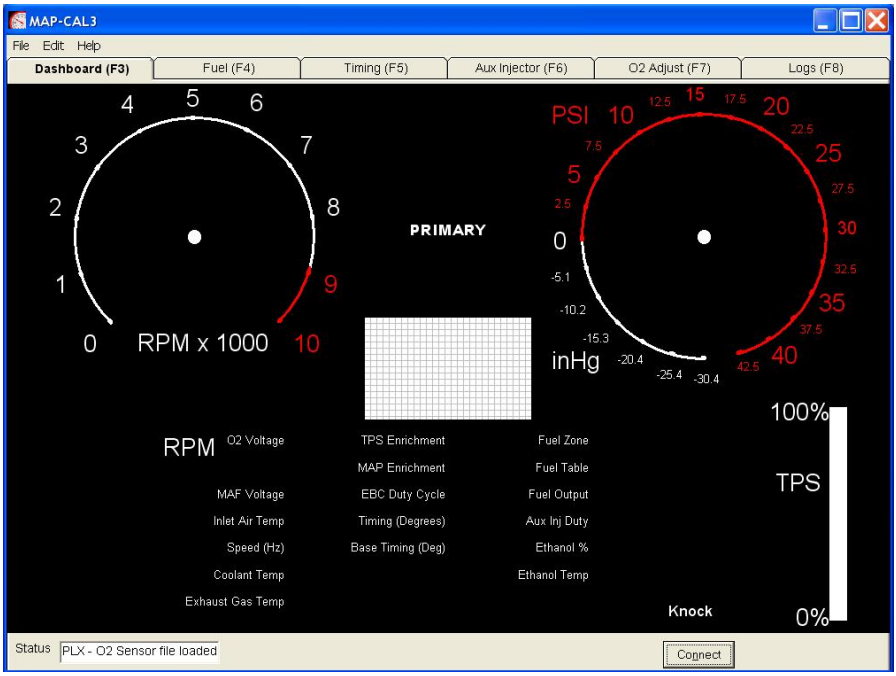


Once the files are copied successfully installation is complete and the following screen should appear:

You are now ready to run MAPCAL3 from the ‘Start’ menu.

Description

Below is the interface presented when the MAPCAL3 software is first started:



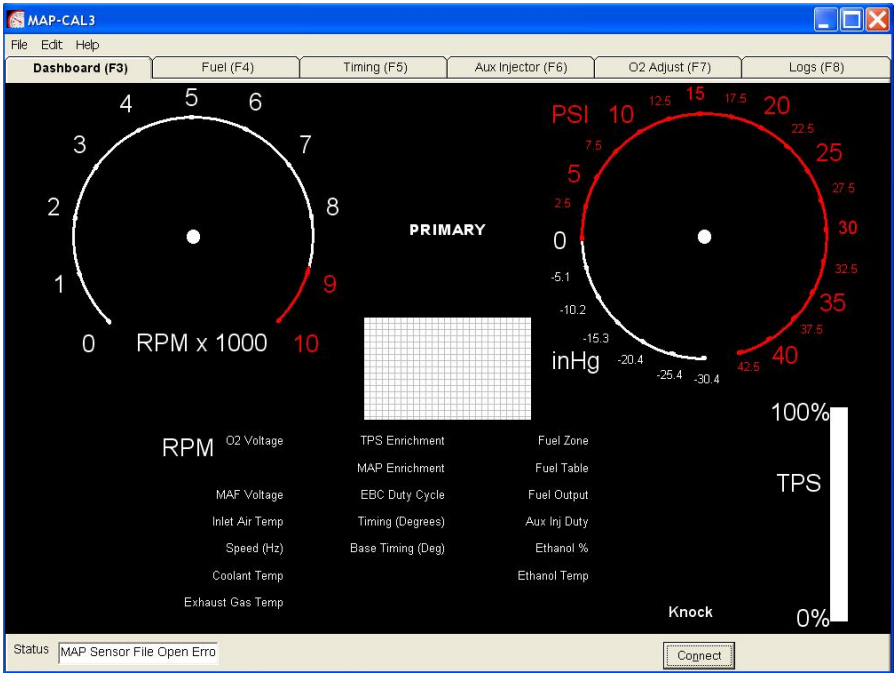
NEW

Note the new fields on the Dashboard:

- Vehicle Speed Input
- Coolant Temperature
- Exhaust Gas Temperature
- Ethanol Content %
- Ethanol Temperature (requires Flex Fuel Temperature Module)

Access to the various tabs are via shortcut function keys as described on the next pages.

The Status Box displays a message indicating a successful load of the MAP sensor lookup table ‘MAP_CONFIG.CFG’ located in the MAP-CAL directory. If this file does not exist, or is corrupt, an error message is displayed in the Status field as follows:



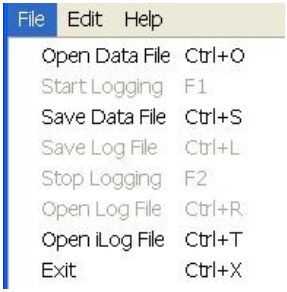
The following can be seen on this screen:

- File Menu
- Edit Menu
- Help Menu
- Dashboard Tab (F3)
- Fuel Tab (F4)
- Timing Tab (F5)
- Aux Injector Tab (F6)
- O2 Adjust/AFR Adjust Tab (F7)
- Logs Tab (F8)
- Tachometer (0-10,000 RPM)
- Vacuum/Boost Gauge
- Throttle Position Sensor (TPS) %
- NEW – Speed Input (Hz)
- NEW – Coolant Temperature
- NEW – Exhaust Gas Temperature

- NEW - Ethanol %
- NEW – Ethanol Temperature
- MAP Enrichment %
- TPS Enrichment %
- EBC Duty Cycle %
- Timing (Degrees)
- Base Timing (Degrees)
- Knock Intensity
- ‘Connect’ button
- Fuel Output reading
- Fuel ‘Mini’ Table
- Fuel Table reading
- Fuel Zone reading
- Auxiliary Injector Duty Cycle %
- An unlabelled field (MAF/KVF In)
- MAF Input Voltage (Only in MAF Voltage mode)
- Inlet Air Temperature (IAT)
- Air/Fuel Ratio reading
- Oxygen Sensor Voltage
- Primary/Secondary Label
- Status box

File Menu (Alt+F)

The following screen shot shows the options available under the File Menu at program startup, i.e. no data loaded and MAPECU3 offline:



Options active from the File Menu include:

- Open Data File (Ctrl+O)
- Save Data File (Ctrl+S) (Configuration is default on program start)
- Open iLog File (Ctrl+T) Opens a log from the iOS App.
- Exit (Ctrl+X)

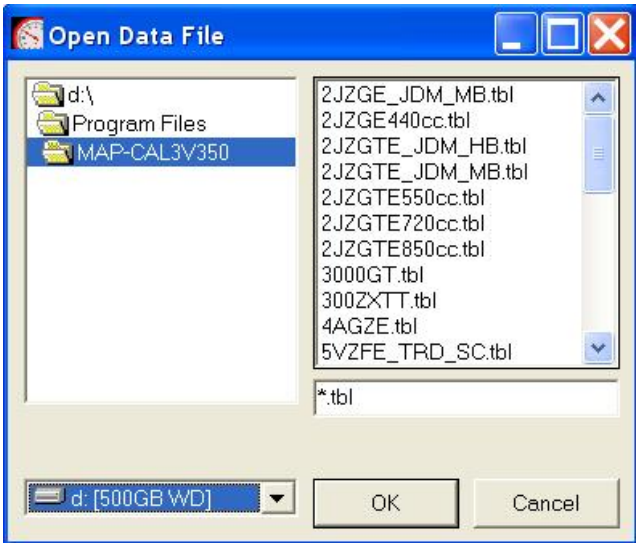
Other options not active on the File Menu include:

- Start Logging (F1)
- Save Log File (Ctrl+L)
- Stop Logging (F2)
- Open Log File (Ctrl+R)

These options are enabled and disabled depending on what state MAPCAL3 and MAPECU3 are in, as described below.

Open Data File (Ctrl+O)

Open an existing data file with previously saved MAPCAL3 data. The data can be read, manipulated and saved offline, or uploaded to a MAPECU3 connected to a serial port and then manipulated online (real-time). The filename extension for data files is '.tbl' for 'table'.

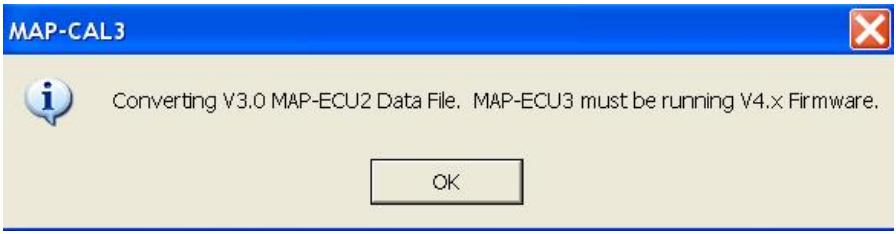


MAP-CAL File Conversion

MAPCAL3 will import and convert MAP-CAL V2.1, V2.2, MAP-CAL2 V3.0, V3.1, V3.2 and V3.3 table files directly into MAPCAL3 format. The V2.1 or V2.2 fuel table will be loaded into the primary fuel table and all other tables will be zeroed. When a V2.1 or V2.2 table file is opened, a message similar to the one below will be displayed.

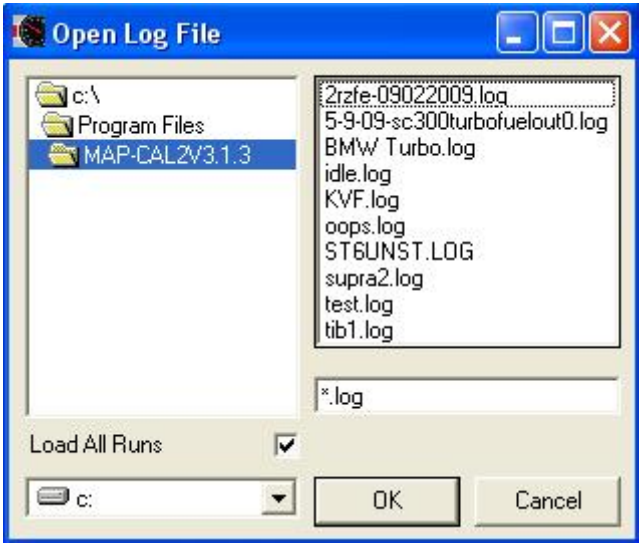
MAP-CAL2 V3.x.x Files

MAPCAL3 will import and convert MAPCAL3 V3.0.x, V3.1.x, V3.2.x, V3.3.x and V3.4.x files. When you save a file, it will be in the new format which is not backward compatible due to the additional features in MAPCAL3. When a V3.0, V3.1, V3.2 or V3.3 table file is opened, a message similar to the one below will be displayed:



Open Log File (Ctrl+R)

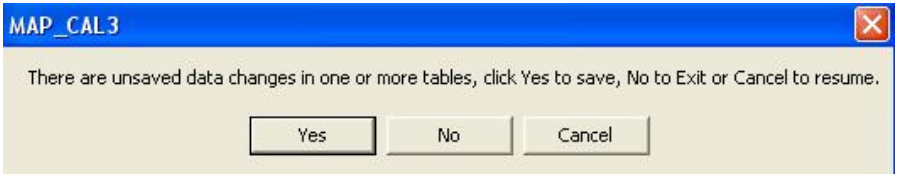
Open a previously saved log file as described later in this document. The extension for a log file is '.log'. A previously created log file is opened using the following screen:



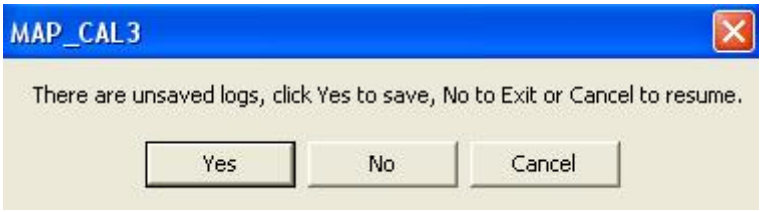
Note: Older log files cannot be opened with MAPCAL3 as they are not compatible.

Exit (Ctrl+X)

Exit the MAPCAL3 software. If you have modified your MAPECU3 configuration and not saved the .tbl file, the following prompt will appear:

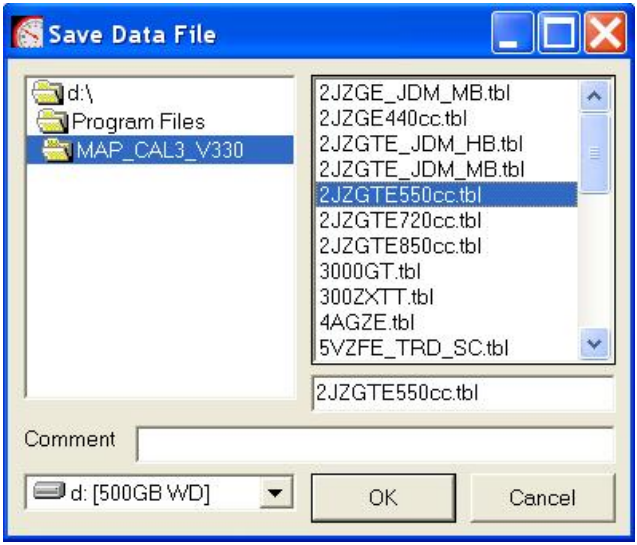


If you have a log in memory that has not been saved, the following prompt will appear when you exit MAPCAL3:



Save Data File (Ctrl+S)

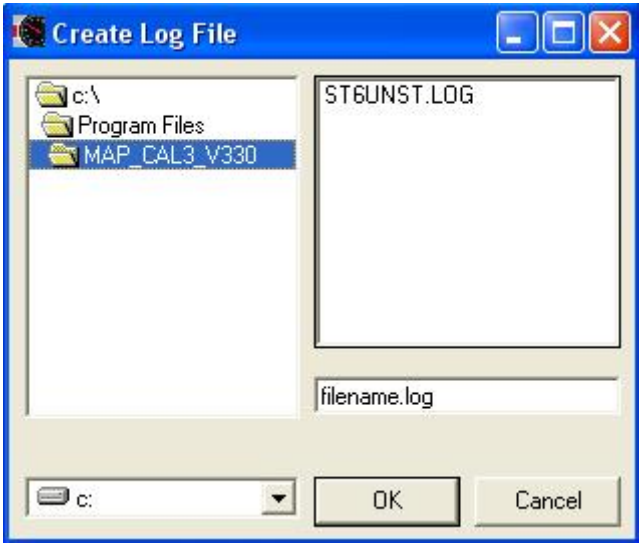
Save the current MAPECU3 tables and configuration. The filename extension for data files is '.tbl' for 'table'.



Note: There is a comment text box that allows the user to provide additional details about the file being saved. This information is retrieved and displayed in the Status box when the file is loaded. The field has a maximum length of 255 characters, although 20-30 are typically used.

Save Log File (Ctrl+L)

Save the current logged information in a file for later review. This option is enabled when some log data has been collected. The following dialog box appears when saving a log file:



Note: The filename extension is defaulted to '*.log'.

Start Logging (F1)

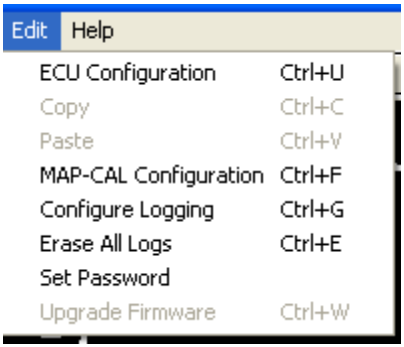
This option is only available when a MAPECU3 is Connected and active.

Stop Logging (F2)

This option is only available when logging is active. Current logging will stop immediately and can be displayed via the various graphs discussed later in this manual.

Edit Menu (Alt+E)

The following screen shot shows the options available under the Edit Menu:



Options active from the Edit menu are as follows:

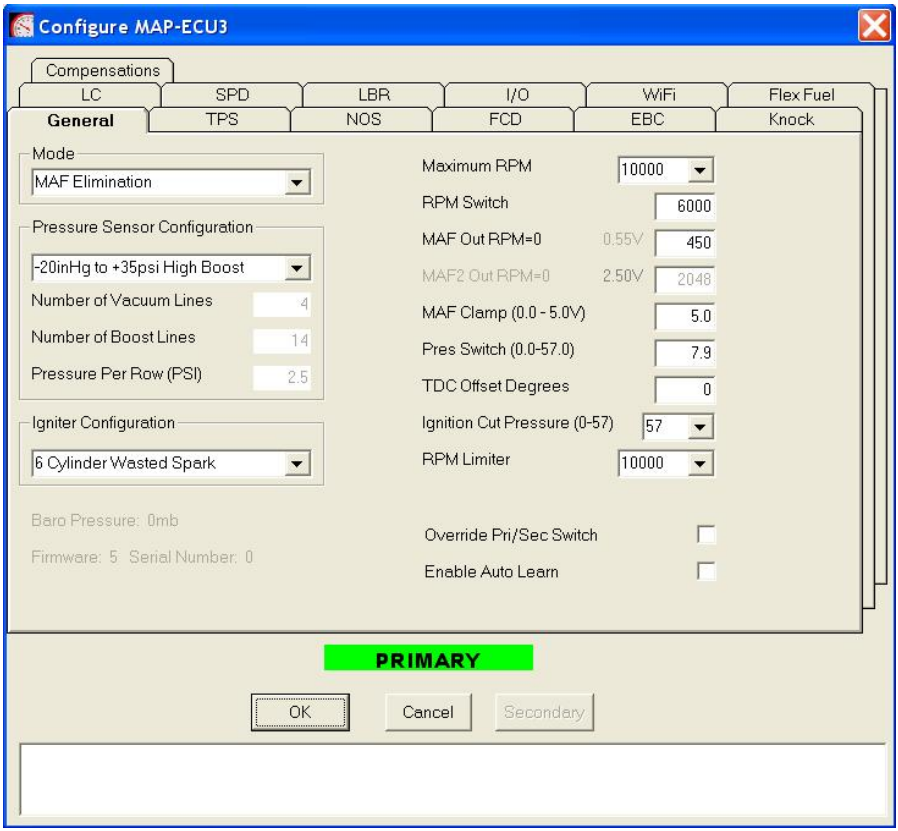
- ECU Configuration (Ctrl+U)
- MAP-CAL Configuration (Ctrl+F)
- Configure Logging (Ctrl+G)
- Erase All Logs (Ctrl+E)
- Set Password

On start-up, the following option is not active on the Edit Menu:

- Copy (Ctrl+C)
- Paste (Ctrl+V)
- Upgrade Firmware (Ctrl+W)

ECU Configuration – General (Ctrl+U)

The following screen configures the MAPECU3 parameters:



MAPCAL3 splits the ECU Configuration screen across a number of tabs due to the number of options.

NEW A number of new features are available with MAPCAL3 V3.5, e.g. Boost pressure based ignition cut, RPM Limiter, Advanced Compensations, Flex Fuel Support.

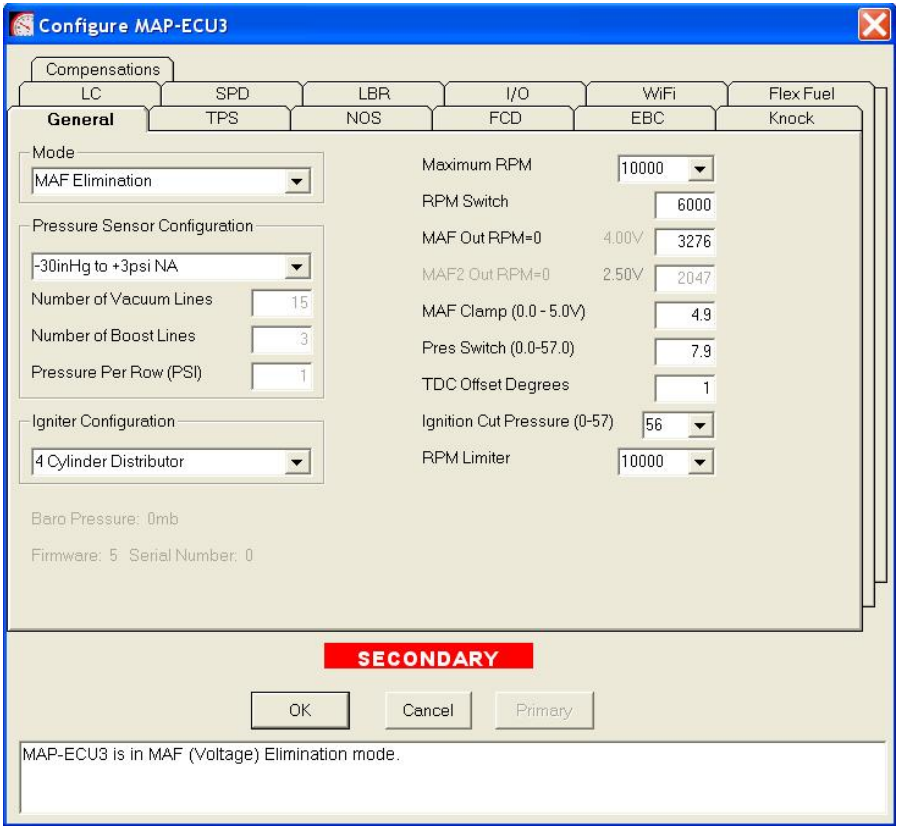
Note: The 'MAF 0 Out' field is labelled 'Baro', or Barometric Pressure output voltage in KVF mode and 'Hz RPM=0' in HF KVF mode.

Note: MAPCAL3 configuration changes are only written to the MAPECU3 after the 'OK' button is pressed.

Note: If the ‘Override Pri/Sec Switch” option is checked, you can press the Secondary button and a connected MAPECU3 will switch to the Secondary tables otherwise the MAPECU3 configured Primary/Secondary switch controls table selection.

Secondary Tables

If the “Secondary” button is pressed, the Secondary configuration parameters are displayed and the status message indicates the Secondary table is active as follows:



Warning: Ensure parameters are configured correctly in both Primary and Secondary configuration screens to ensure trouble free operation.

Mode

The Mode pull-down box configures the MAPECU3 in one of sixteen (16) available modes. Intercept modes retain the OEM air flow meter and simplify tuning if MAF elimination is not required.

The sixteen (16) modes are as follows:

1. MAF Elimination
2. MAP Replacement
3. MAF Intercept, MAP Y-axis
4. MAF Intercept, MAF Y-axis
5. KVF Elimination
6. HF KVF Elimination
7. KVF Intercept, MAP Y-axis
8. HF KVF Intercept, MAP Y-axis
9. KVF Intercept, KVF Y-axis
10. HF KVF Intercept, KVF Y-axis
11. MAF Elimination, TPS Y-axis
12. KVF Elimination, TPS Y-axis
13. HF KVF Elimination, TPS Y-axis
14. MAF Intercept, TPS Y-axis
15. KVF Intercept, TPS Y-axis
16. HF KVF Intercept, TPS Y-axis

MAF Elimination

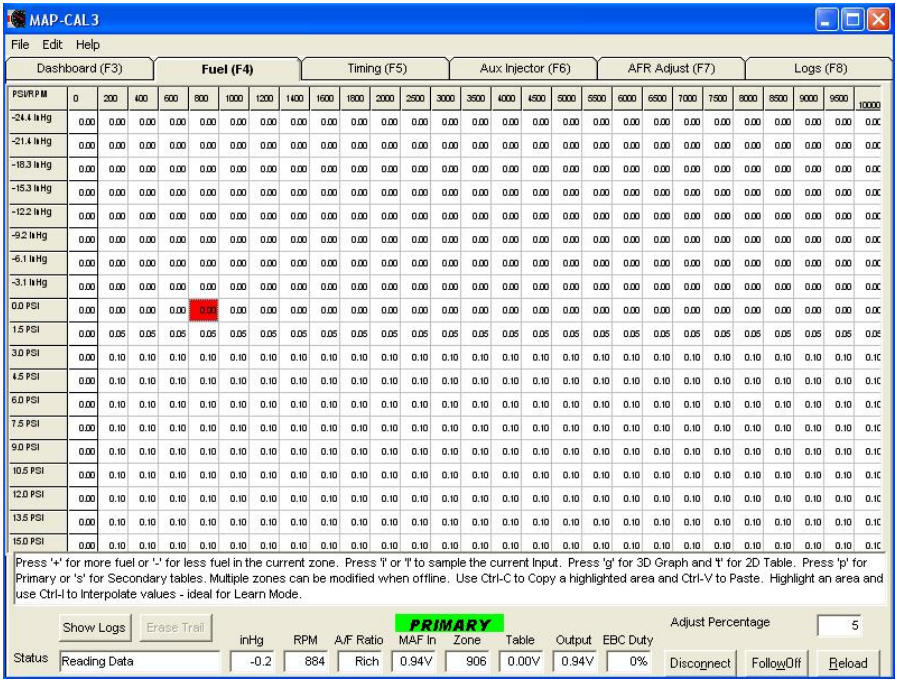
MAF Elimination is the legacy MAPECU3 mode where the MAF is removed and replaced with the MAPECU3.

MAP Replacement

MAP Replacement is very similar to MAF Elimination mode where a MAP sensor is replaced by the MAPECU3.

MAF Intercept, MAP Y-axis

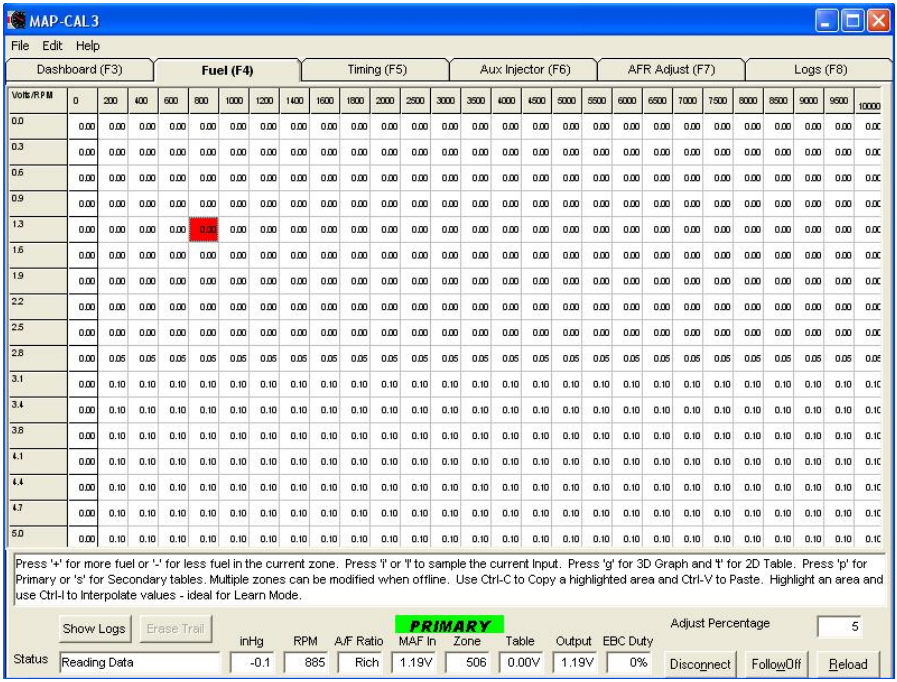
MAF Intercept retains the OEM MAF and uses the fuel table to adjust the voltage by up to +/- 2.50V in 0.01V steps. MAP Y-axis means the Y-axis (load) of the fuel table is the MAPECU3 MAP sensor as follows:



Note: A value of 0.00 in the fuel table means the MAF voltage is passed through without change. A positive value will add that amount to the MAF voltage, e.g. if the MAF voltage is 2.50V and the fuel table has the value 0.15V then the MAF output voltage will be 2.65V. Equally, a negative value will subtract that amount from the MAF voltage, e.g. if the MAF voltage is 2.50V and the fuel table has the value –0.15V then the MAF output voltage will be 2.35V, as per the example above.

MAF Intercept, MAF Y-axis

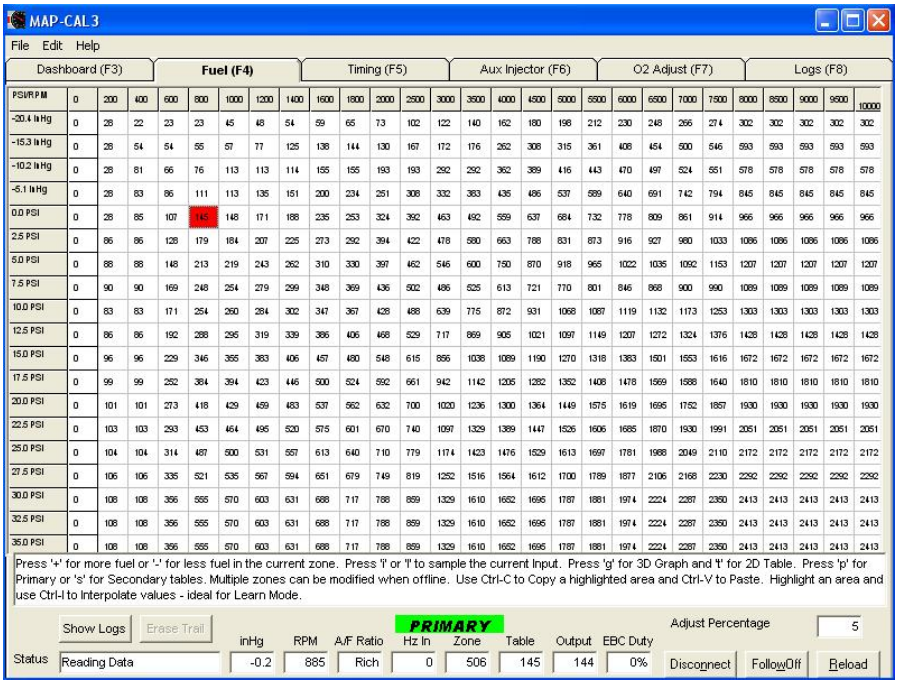
MAF Intercept retains the OEM MAF and uses the fuel table to adjust the voltage by up to +/- 2.50V in 0.01V steps. MAF Y-axis means the Y-axis (load) of the fuel table is the MAF sensor voltage as follows:



Note: The Y-axis is now the MAF voltage from 0.0 to 5.0V and the above screen shot shows the MAF voltage at 2.50V adjusted by 0.15V to 2.65V.

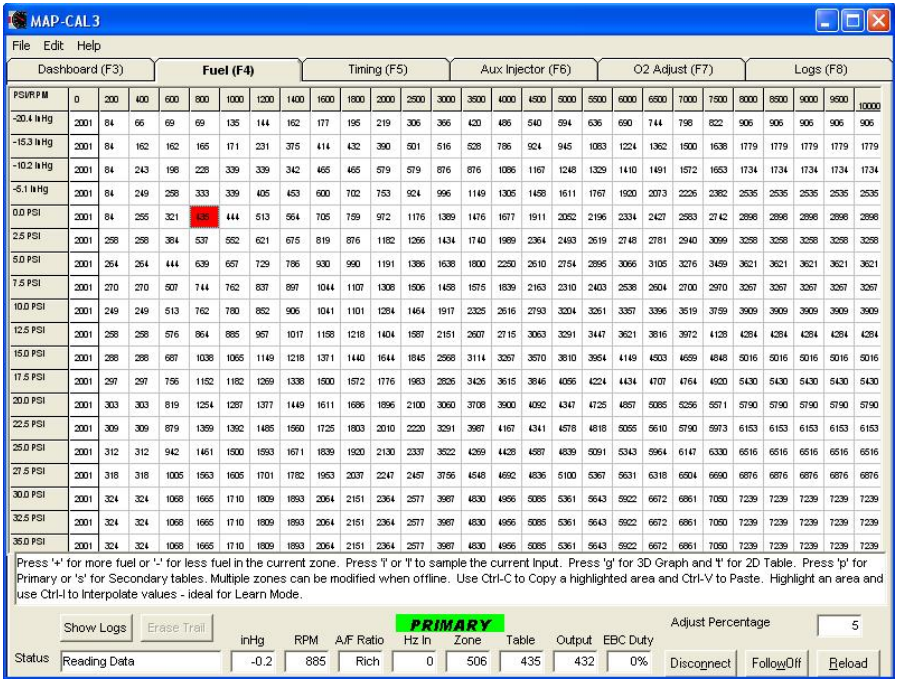
KVF Elimination

KVF Elimination is the legacy MAP-ECU mode where the Karman Vortex air flow meter is removed and replaced with the MAPECU3. The frequency range in this mode is 1Hz to 3400Hz in 1Hz steps. The following screen shot shows a KVF Elimination fuel table:



HF KVF Elimination

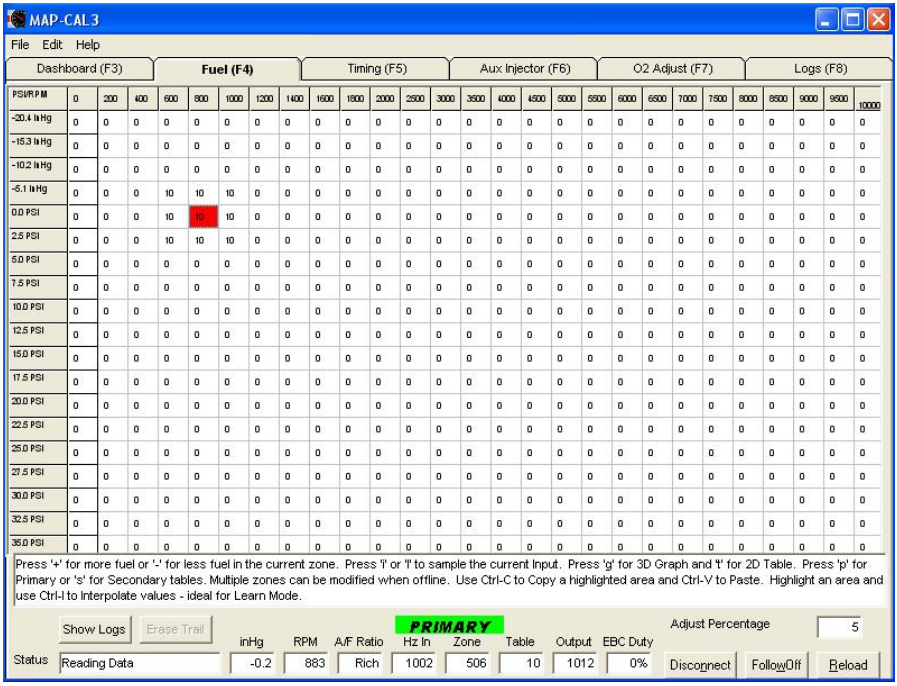
HF KVF Elimination similar to KVF Elimination MAPECU3 mode but where a High Frequency air flow meter is removed and replaced with the MAPECU3. This mode is provided for some modern vehicles which use a traditional Hotwire MAF but use a digital interface with the OEM ECU, e.g. US Specification R56 BMW™ Mini™. The frequency range in this mode is 48Hz to 9999Hz in 3Hz steps. The following screen shot shows a High Frequency KVF Elimination fuel table:



Note: In HF KVF mode the output frequency when RPM=0 can be set within ECU Configuration. In this example it has been set to 2001Hz.

KVF Intercept, MAP Y-axis

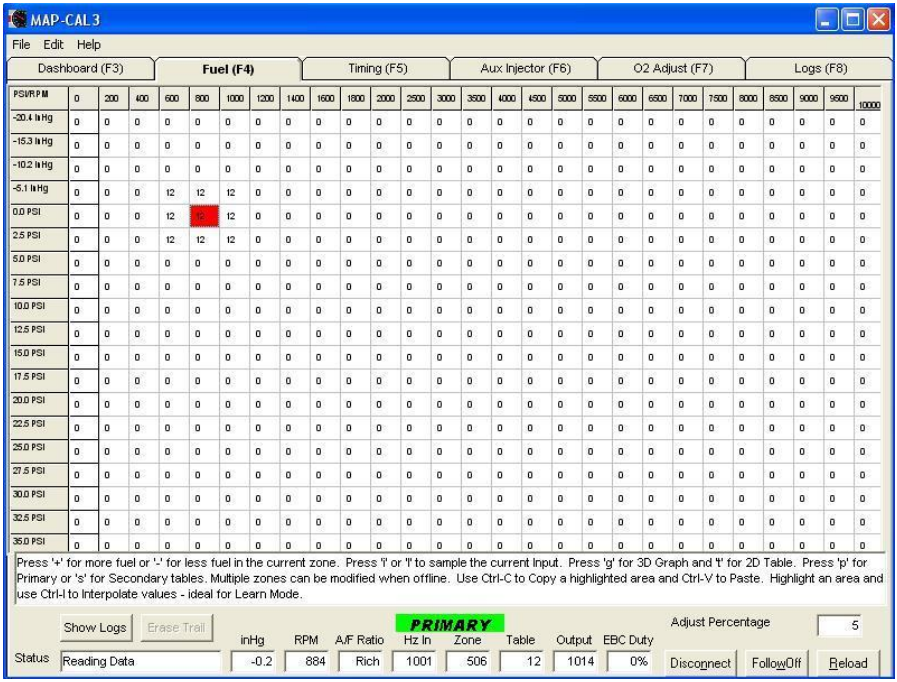
KVF Intercept retains the OEM Karman Vortex air flow meter and uses the fuel table to adjust the frequency by up to +/- 1700Hz in 1Hz steps. MAP Y-axis means the Y-axis (load) of the fuel table is the MAPECU3 MAP sensor as follows:



Note: The KVF input frequency is 1002Hz and 10Hz from the table is added producing an output of 1012Hz.

HF KVF Intercept, MAP Y-axis

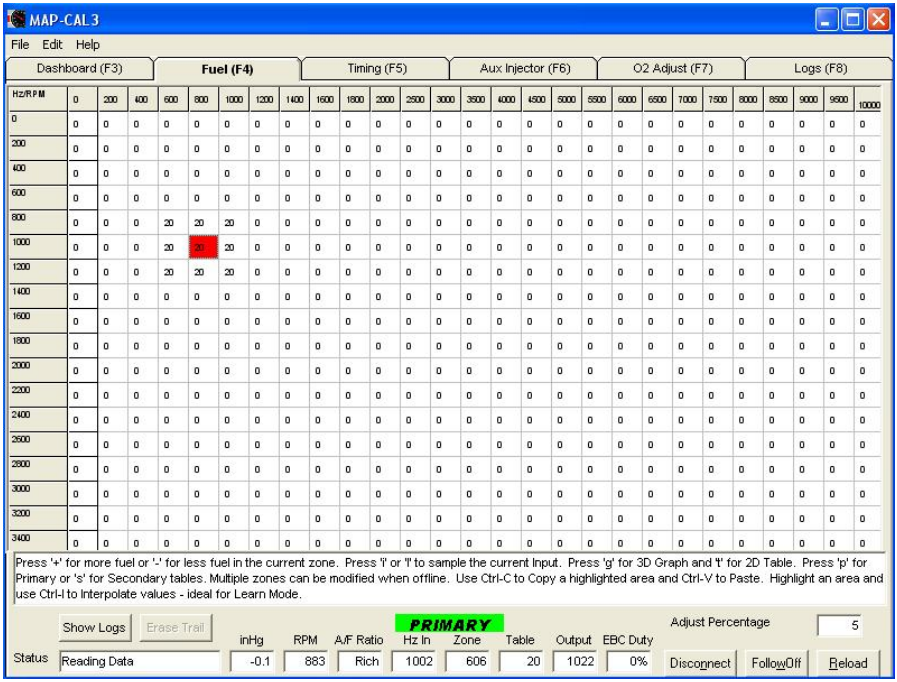
HF KVF Intercept retains the OEM High Frequency air flow meter and uses the fuel table to adjust the frequency by up to +/- 4998Hz in 3Hz steps. MAP Y-axis means the Y-axis (load) of the fuel table is the MAPECU3 MAP sensor as follows:



Note: The KVF output frequency is 1014Hz because 12Hz from the fuel table is added to the 1001Hz input frequency.

KVF Intercept, KVF Y-axis

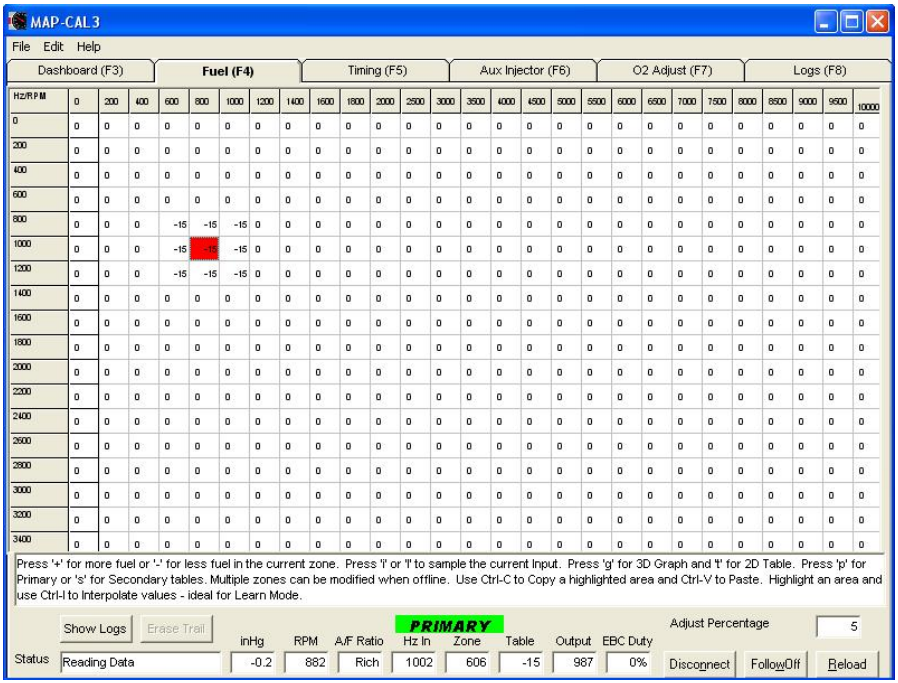
KVF Intercept retains the OEM Karman Vortex air flow meter and uses the fuel table to adjust the frequency by up to +/- 1700Hz in 1Hz steps. KVF Y-axis means the Y-axis (load) of the fuel table is the KVF sensor frequency as follows:



Note: The KVF input frequency is 1002Hz with a table value of 20Hz adding to produce a KVF output frequency of 1022Hz.

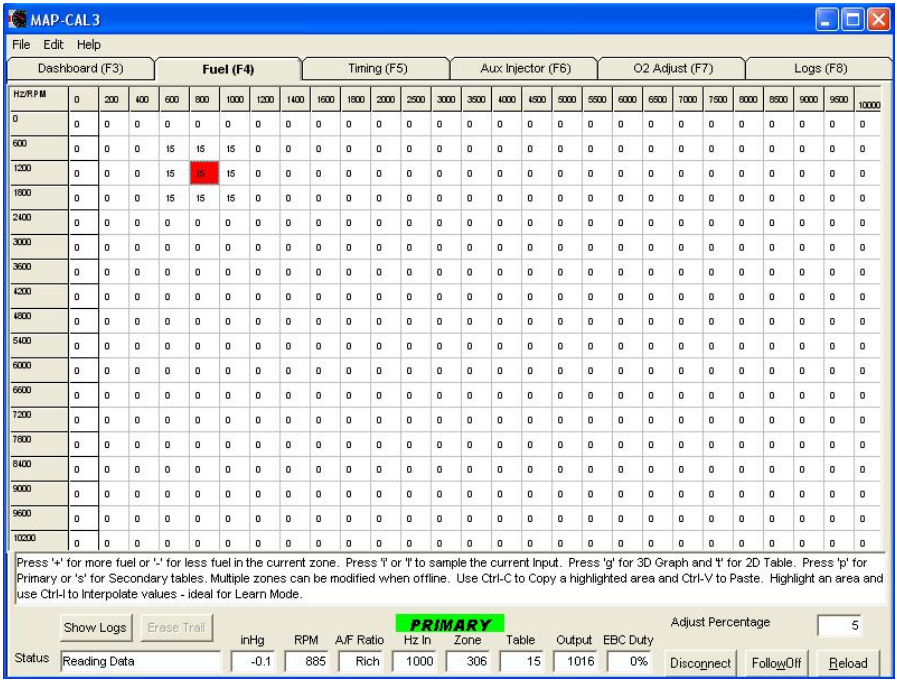
Note: The Y-axis is now scaled 0-3400Hz as it is based on the KVF input frequency.

The following screen shot shows a table value of –15Hz reducing the 1002Hz input frequency to 987Hz:



HF KVF Intercept, KVF Y-axis

HF KVF Intercept retains the OEM High Frequency air flow meter and uses the fuel table to adjust the frequency by up to +/- 4998Hz in 3Hz steps. KVF Y-axis means the Y-axis (load) of the fuel table is the KVF Input Frequency as follows:

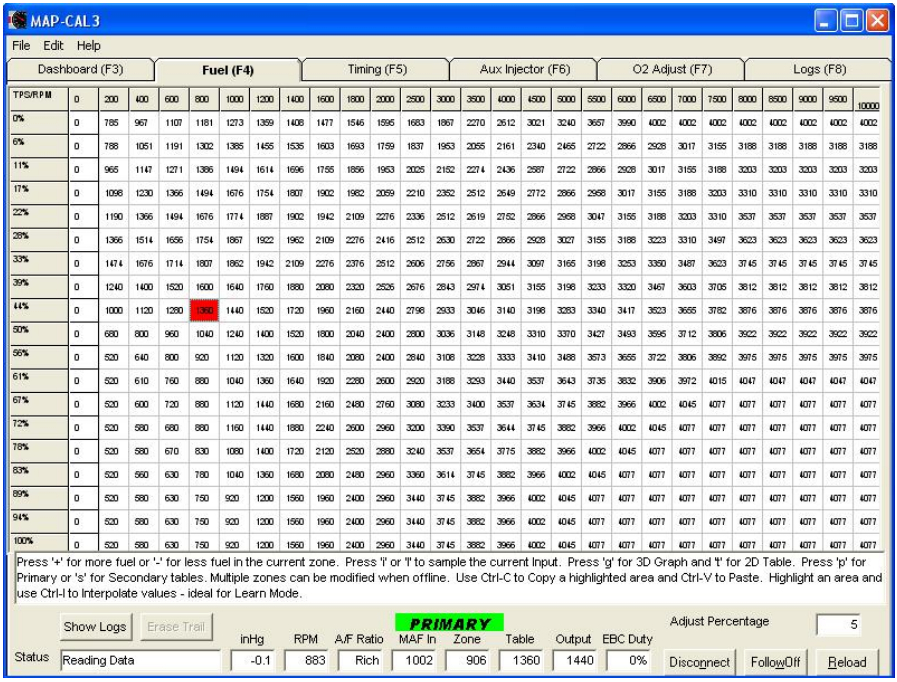


Note: The KVF input frequency is 1000Hz with a table value of 15Hz adding to produce a KVF output frequency of 1015Hz.

Note: The Y-axis is now scaled 0-10200Hz but the usable range is 0-9999Hz.

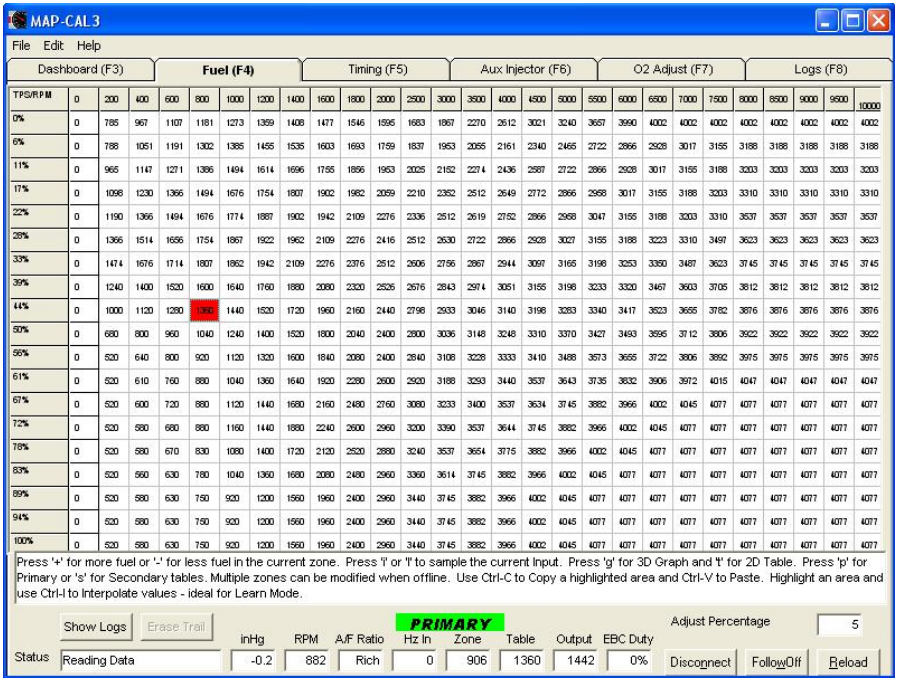
MAF Elimination, TPS Y-axis

MAF Elimination with TPS for the Y-axis (load) is used eliminate the OEM MAF in NA vehicles with low or unstable vacuum, e.g. large cams. TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



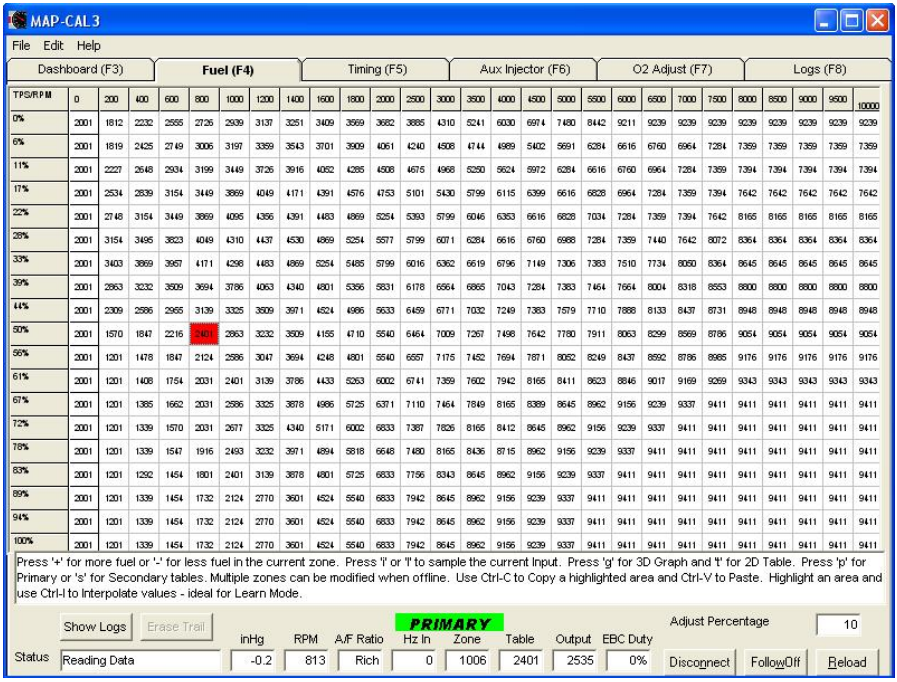
KVF Elimination, TPS Y-axis

KVF Elimination with TPS for the Y-axis (load) is used eliminate the OEM Karman Vortex air flow meter in NA vehicles with low or unstable vacuum, e.g. large cams. TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



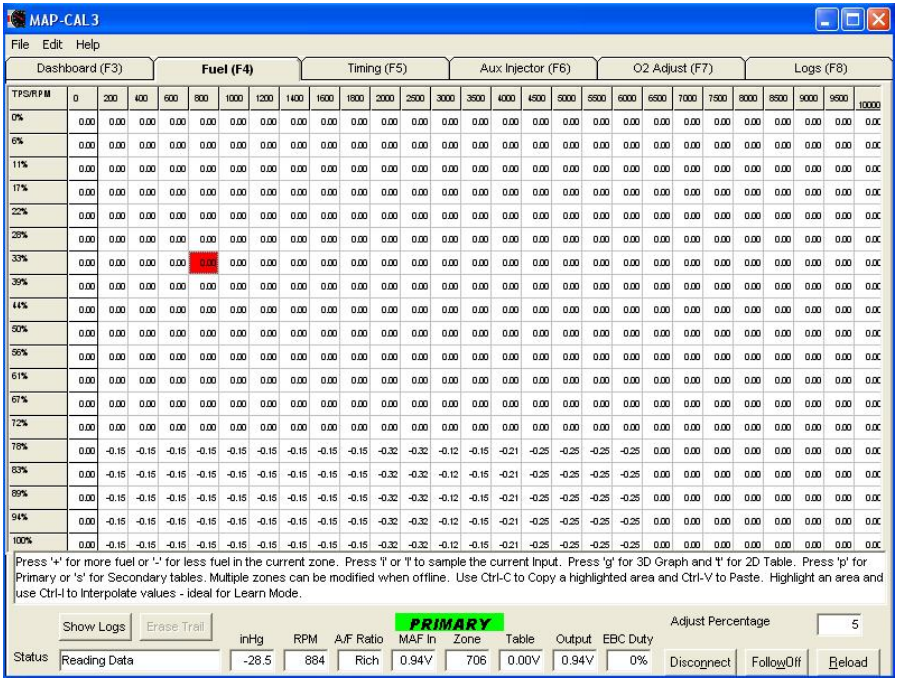
HF KVF Elimination, TPS Y-axis

HF KVF Elimination with TPS for the Y-axis (load) is used eliminate the High Frequency OEM air flow meter in NA vehicles with low vacuum, e.g. large cams. TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



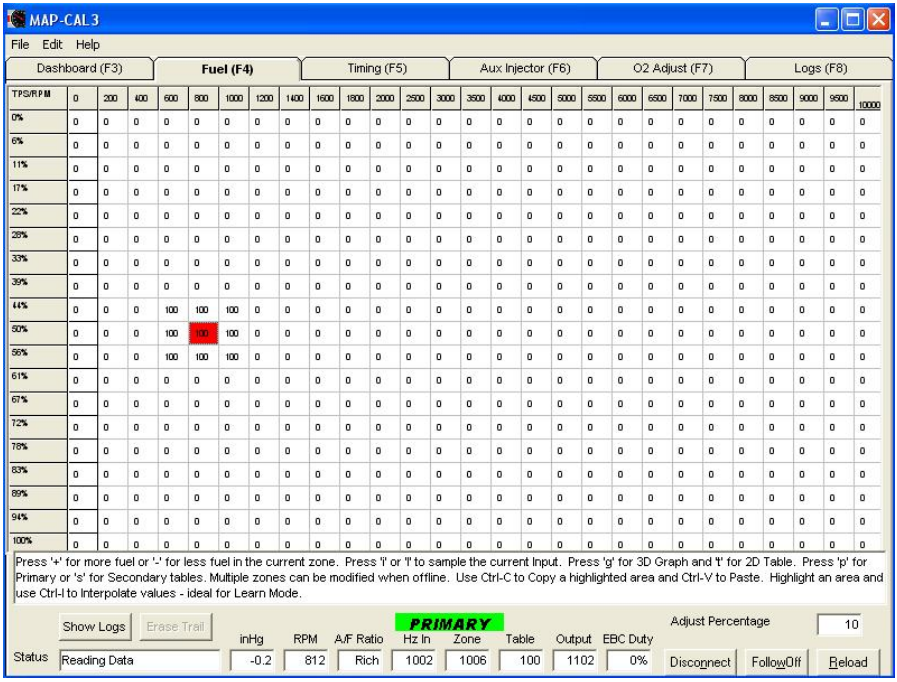
MAF Intercept, TPS Y-axis

MAF Intercept retains the OEM MAF and uses the fuel table to adjust the MAF voltage by up to +/- 2.50V in 0.01V steps. TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



KVF Intercept, TPS Y-axis

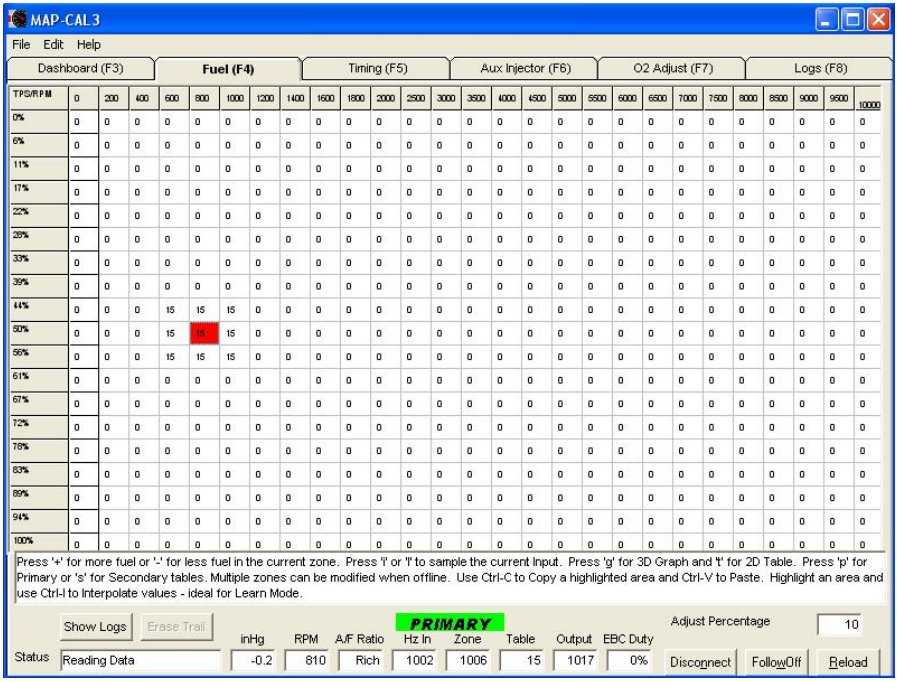
KVF Intercept retains the OEM Karman Vortex air flow meter and uses the fuel table to adjust the frequency by up to +/- 1700Hz in 1Hz steps. TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



Note: In this example the input KVF frequency is increased by 100Hz at 50% TPS and 800 RPM.

HF KVF Intercept, TPS Y-axis

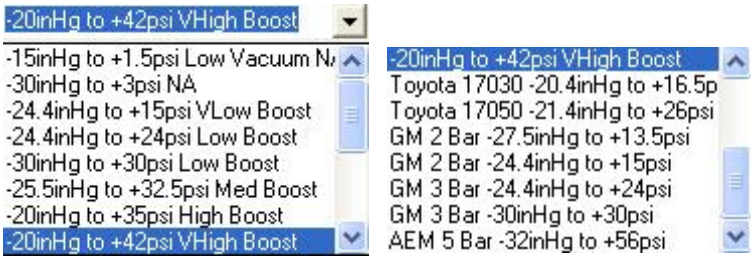
HF KVF Intercept retains the High Frequency OEM air flow meter and uses the fuel table to adjust the frequency by up to +/- 4998Hz in 3Hz steps. . TPS percent is used for the main load input (Y-axis) and it is therefore imperative that the TPS Idle and TPS Maximum values are configured correctly. The following screen shot illustrates an example of this configuration:



Note: The KVF output frequency is 1017Hz because 15Hz from the fuel table is added to the 1002Hz input frequency.

Pressure Sensor Configuration

The Pressure Sensor Configuration pull-down box configures the MAPECU3 internal MAP sensor pressure scale or allows selection of an external MAP sensor. The following screen shot shows the internal and external MAP sensor configurations:

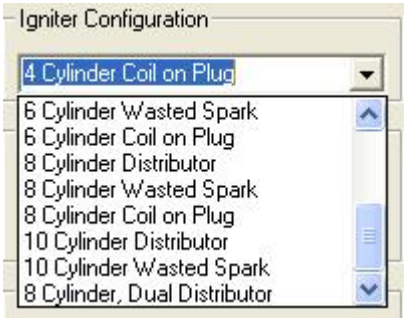


The number of vacuum lines, boost lines and pressure per line parameters are configured from the MAP sensor configuration selection. The selection of External MAP Sensors has been increased to include two (2) common Toyota™ MAP sensors, the GM™ 3-Bar Map Sensor and the AEM 5-Bar MAP sensor.

Note: The MAPECU3 has a new +42psi MAP sensor which has a smaller vacuum line fitting compared to the old +35psi MAP sensor used in MAP-ECU2.

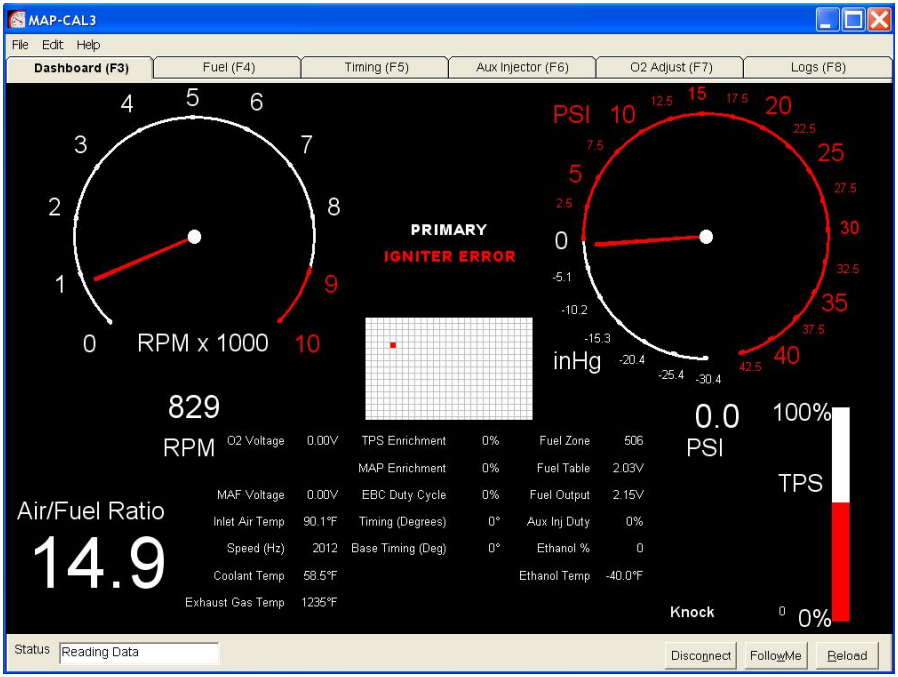
Igniter/Cylinder Configuration

The Igniter Configuration pull-down box configures the MAPECU3 igniter channels and cylinders. The following screen shot shows some of the igniter/cylinder combinations:



It is vital that the correct cylinder and igniter configuration is selected otherwise RPM will be incorrect and the correct number of igniter channels will not be active.

Note: If the MAPECU3 detects more ignition channels active than the configured number, the message **IGNITER ERROR** will be displayed on the MAPCAL3 Dashboard, Switched Output #2 LED will flash and all timing control functions will be disabled, including Launch Control. For example, if 6 Cylinder Wasted Spark is configured when six (6) channels are wired for 6 Cylinder Coil on Plug, then the Igniter Error condition will be triggered and displayed as follows:



Maximum RPM

MAPCAL3 allows the user to configure the maximum RPM of all the tables in 100 RPM steps. This is particularly useful for vehicles that have a redline less than 10,000 RPM. All the RPM columns are retained so the resolution of the tables in increased. For example, if the Maximum RPM is configured to 8,000, the RPM steps between 0 and 2000 RPM drop from 200 to 160 and the RPM steps between 2000 and 8000 RPM drop from 500 RPM to 400 RPM. The data in the tables is not modified.

RPM Switch

The RPM Switch value is a number between 0 and 10000 in 100 RPM steps, e.g. 5400. For correct operation one of the switched outputs must also be configured to the "RPM SW" function. When RPM reaches the RPM Switch value the nominated switched output will 'turn on' to enable the device connected to the switch output.

MAF Out RPM=0/Baro Out/Hz Out RPM=0 Setting

The setting labelled 'MAF 0' has three (3) possible functions:

1. When a MAPECU3 is configured for MAF Elimination, e.g. **Hotwire** or **Flap** Air Flow Meter or MAP sensor, this value controls the voltage sent to the OEM ECU when the MAF or MAP sensor senses no airflow, i.e. Ignition on but engine not running. This needs to be programmable as the zero setting is never exactly 0 Volts or 5 Volts and depends on the MAF or MAP sensor. Incorrectly setting this value may result in an engine 'Check' light. **Note**: This is especially critical with OBDII vehicles. **Note**: When replacing a MAP sensor, MAF 0 will be the voltage output of the MAP sensor at atmospheric pressure.
2. When a MAPECU3 is in Karman Vortex Frequency (KVF Elimination) mode, this controls the voltage output from one of the configurable Analog Outputs, e.g. MAF Out and applied to the Barometric Pressure input of the OEM ECU. **Note**: An Analog Output must be configured for BARO from the pull-down list. **Note**: Only some OEM ECU's have a Barometric Pressure Voltage input, otherwise this function is not used. This allows the user to have fine control of the fuel/air mixture over the entire range if required. If the Barometric Pressure input to the factory ECU is not connected, an engine 'Check' light may result. **Note**: The Baro Output setting can be set using the 's' sample key when the MAF Input signal is connected to the Barometric Pressure sensor output of the stock KVF air flow meter.
3. When the MAPECU3 is in High Frequency Karman Vortex Frequency (HF KVF Elimination) mode, this setting changes to the Hz output when RPM=0, i.e. Ignition on but engine not running. Some vehicles, e.g.

BMW™ Mini™ R56 models utilise a high frequency MAF that outputs approx 2000Hz at ignition on but engine not running.

The MAF Out RPM=0/Baro Out voltage is set with values from 0 to 4095, where 0=0 Volts and 4095=5 Volts. The user must first select the field using the mouse or 'tab' key, and then the keys function as follows: **Note**: the equivalent voltage is displayed immediately to the left of the box for reference.

Key	Function
's'	'Sample' the current MAF input. (Should only be used with the MAPECU3 fully connected and the ignition on, but the engine not running).
Backspace	Delete the current value ready to retype a value.
0-9	Numbers to enter a new value up to 4095.
Return	Enter the current value.

MAF2 Out RPM=0

MAPCAL3 V3.2 allows the user to configure the MAPECU3 in Dual Fuel table mode where the Secondary fuel table is utilised for the MAF2 output. Dual Fuel table mode is enabled by configuring one of the Analog Voltage Outputs, e.g. Analog Output #1 or #2 to MAF2. When this mode is enabled, this field allows the user to configure the voltage output on the MAF2 output when RPM=0 as per MAF Out RPM=0.

MAF Clamp/KVF Clamp

The user can configure an overall MAF or VKF output clamp that clamps the output from the fuel table. In any of the MAF and MAP modes, the MAF/MAP Clamp is a voltage in the range of 0.0 to 5.0Volts in 0.1V steps. In any of the KVF modes, the KVF Clamp is a frequency in the range 100 to 10000Hz in 100Hz steps. This is fully independent of the other two FCD functions and is therefore like a 3rd FCD channel.

Pressure Switch Setting

The Pressure Switch field contains the pressure at which the Pressure Switch function of the MAPECU3 will turn on if the function is allocated to a Switched Output. In the example above the setting is 9 PSI. This means the pressure switch output of the MAPECU3 will turn on at 9 PSI, regardless of RPM. This setting and control line can be used to drive an intercooler water mist pump relay or any other facility required based on Manifold Pressure. Note that this is a simple binary operation switch. This setting may be set from 0 to 35.0 PSI, in 0.1 PSI increments, i.e. 9.1 PSI is valid.

The following operators can be used to edit Pressure Switch setting:

Key	Function
Backspace	Delete the current value ready to retype a value.
0-9	Numbers to enter a new value up to 35.0.
Return	Enter the current value.

Boost Ignition Cut (NEW)

MAPCAL3 V3.5 introduces a general purpose Ignition Cut function based on Boost Pressure. When the MAP sensor registers boost above the configured maximum, ignition will be cut in a similar manner to Launch Control to reduce boost. This is a safely feature to prevent over boost and therefore save an engine from damage due to excessive boost. Ignition Cut pressure can be configured from 0 to 57psi in 1psi steps.

RPM Limiter (NEW)

MAPCAL3 V3.5 introduces a general purpose RPM Limiter function which is independent from Launch Control. When the MAPECU3 registers RPM greater than the configured maximum RPM, ignition will be cut in a similar manner to Launch Control to control RPM. This is a safety feature to provide a "valet mode" or to limit maximum RPM to save an engine from damage. RPM Limiter can be configured from 5,000 to 10,000 RPM in 100 RPM steps.

TDC Offset

This value corrects any offset between the crankshaft position sensor signal and Top Dead Centre (TDC) for Base Timing calculations. Values range from –100 to 100 degrees.

Override Pri/Sec Switch

When this option is unchecked, the MAPECU3 controls Primary/Secondary table selection through the configured Pri/Sec input. MAPCAL3 cannot alter which table is selected. When this option is checked, MAPCAL3 takes control over Primary/Secondary table selection when connected to a MAPECU3.

Enable Auto Learn

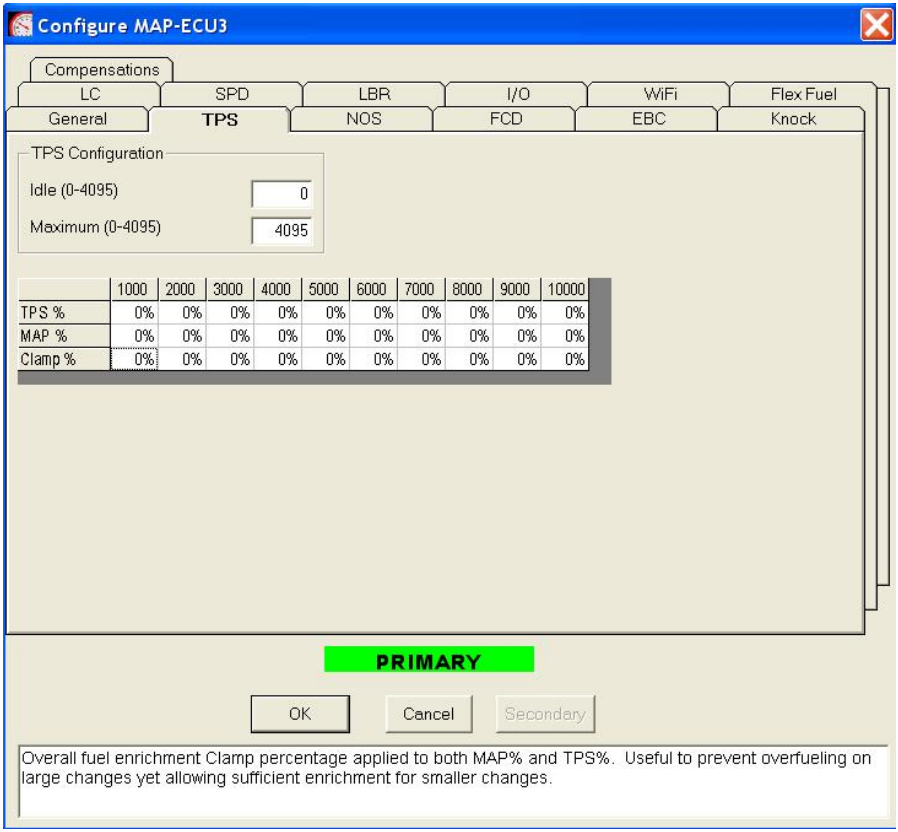
This switch instructs the MAPECU3 to enable Auto Learn mode internally. The MAPECU3 **must** be power cycled before it will enter or exit Auto Learn mode. A full description of Auto Learn mode can be found in the MAPECU3 manual.

Firmware Version

Displays the version number and serial number of the MAPECU3 attached.

Barometric pressure

Displays the barometric pressure in millibars sampled by the MAPECU3 when it was powered on.



TPS Idle

TPS input voltage at idle, i.e. minimum. Valid settings for TPS Idle are integers from 0 to 4095.

TPS Max

TPS input voltage at 'wide open throttle' (WOT), i.e. maximum. Valid settings for TPS Max are integers from 0 to 4095.

The following operators can be used to edit TPS Idle and TPS Max when each field is selected:

Key	Function
's'	'Sample' the current TPS input. (Should only be used with the MAPECU3 fully connected and the ignition on, but the engine not running).
Backspace	Delete the current value ready to retype a value.
0-9	Numbers to enter a new value up to 4095.
Return	Enter the current value.

Note: The MAPECU3 handles reverse voltage TPS input voltages automatically, i.e. TPS Idle Voltage > TPS Max Voltage. The MAPECU3 will assume the TPS operates in a reverse mode.

TPS Enrichment Table

This table determines the level of enrichment applied by the MAPECU3 to the output when fast transitions of the throttle are detected, similar to an accelerator pump. The faster the transition, the more enrichment is applied as a product of transition speed and TPS Percent. Transition speed is computed in the MAPECU3 using the integral of TPS input voltage. An integral value of 0-100 percent is generated by the MAPECU3 internally which is then multiplied by TPS Percent and the result used to enrich the MAPECU3 output. This means slow transitions of the throttle position result in little or no enrichment. Maximum enrichment can only be achieved by a throttle position change from Idle to WOT within approximately 200mS. Note that negative TPS transitions have no effect, i.e. additional leaning of the output signal is not provided. Valid settings for TPS Percent are integers from 0 to 100. It is vital that TPS Idle and TPS Max are set correctly otherwise TPS enrichment will not operate correctly. The TPS Enrichment table is configured as ten (10) Zones in 1000, RPM increments, e.g. 1000, 2000, 3000, etc.

MAP Enrichment Table

This table determines the level of enrichment applied by the MAPECU3 to the output when fast transitions of Manifold Pressure are detected, similar to the TPS Enrichment Table. This function is provided for vehicles where a TPS signal is not available. The faster the transition, the more enrichment is applied as a product of transition speed and MAP Percent. Transition speed is computed in the MAPECU3 using the integral of Manifold Pressure. An integral value of 0-100 percent is generated by the MAPECU3 internally which is then multiplied by MAP Percent and the result used to enrich the MAPECU3 output. This means slow transitions of the Manifold Pressure result in little or no enrichment. Maximum enrichment can only be achieved by a large change in Manifold Pressure, e.g. Idle to WOT within approximately 200mS. Note that negative Manifold Pressure transitions have no effect, i.e. additional leaning of the output signal is not provided. Valid settings for MAP Percent are integers from 0 to 100. The MAP

Enrichment table is configured as ten (10) Zones in 1000, RPM increments, e.g. 1000, 2000, 3000, etc.

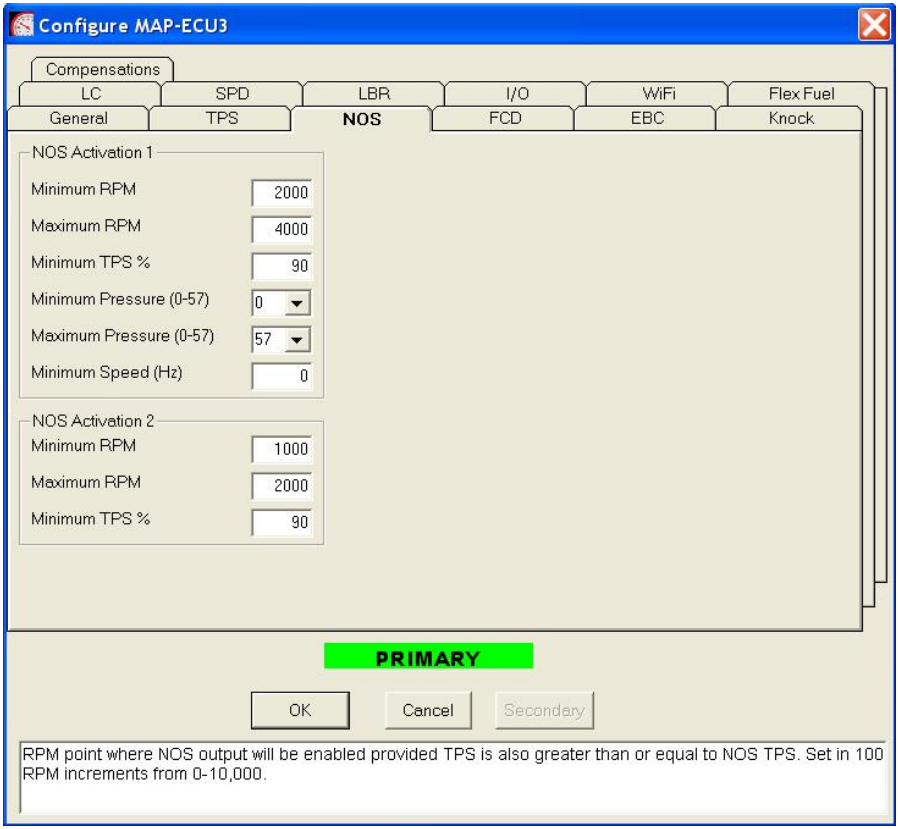
Enrichment Clamp Table (NEW)

This table allows the user to clamp the maximum amount of enrichment possible per 1000 RPM. This is useful when a very sensitive TPS enrichment is required with the clamp preventing over fuelling. Values of 0-100% are allowed and are applied to the combined TPS/MAP enrichment result.

Note: If both enrichment strategies are active only one enrichment is ever applied, i.e. whichever computed result is greater.

Note: MAPCAL3 enables TPS and MAP Enrichment in all **Intercept** modes. Earlier versions only allowed enrichment in Eliminate modes.

ECU Configuration – NOS



Note: MAPCAL3 V3.2 and above added a pressure window and minimum speed setting to NOS Activation 1. A minimum speed setting is also added to Launch Control.

NOS Activation 1

Min RPM

RPM must be greater than NOS Min RPM in order to activate the NOS output. Values of 0-10,000 are valid, provided the value is less than NOS Max RPM.

Max RPM

RPM must be less than NOS Max RPM in order to activate the NOS output. Values of 0-10,000 are valid, provided the value is greater than NOS Min RPM.

Min TPS %

TPS must be greater than NOS Min TPS % in order to activate the NOS output. Values of 0-100 are valid.

Minimum Pressure (0-57)
Pressure must be greater than Minimum Pressure in order to activate the NOS1 output. Values of 0-57 PSI can be selected using a new pull-down box.

Maximum Pressure (0-57)
Pressure must be less than Minimum Pressure in order to activate the NOS1 output. Values of 0-57 PSI can be selected using the new pull-down box.

Minimum Speed (Hz)
Speed must be greater than Minimum Speed in order to activate the NOS1 output. Values of 0-250 are valid. A valid of zero (0) disables the speed input.

Output
In addition to the above conditional parameters, a Switched Output must be nominated from the drop down list as "NOS1". This switched output will *ground* the nominated output when the conditions are met.

Note: The NOS1 Output will be activated when RPM>NOS Min RPM ***AND*** RPM<NOS Max RPM ***AND*** TPS>NOS Min TPS % ***AND*** Pressure>Minimum Pressure ***AND*** Pressure<Maximum Pressure ***AND*** Speed>Minimum Speed.

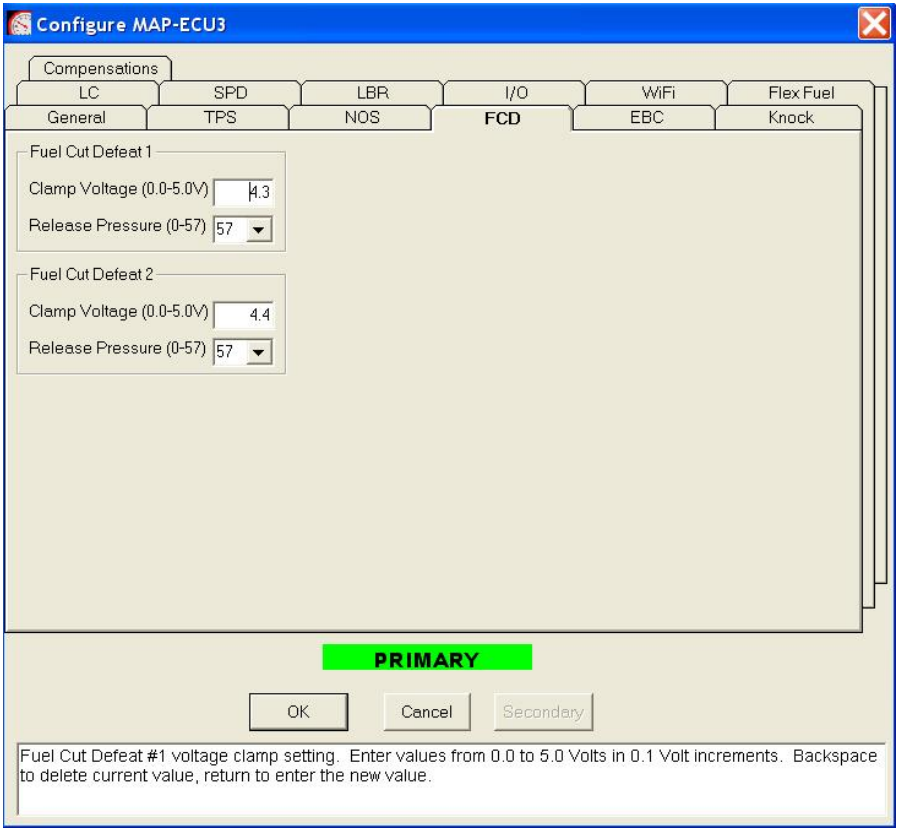
NOS Activation 2

Min RPM
RPM must be greater than NOS2 Min RPM in order to enable the NOS2 output. Values of 0-10,000 are valid, provided the value is less than NOS2 Max RPM.

Max RPM
RPM must be less than NOS2 Max RPM in order to enable the NOS2 output. Values of 0-10,000 are valid, provided the value is greater than NOS2 Min RPM.

Min TPS %
TPS must be greater than NOS2 Min TPS % in order to enable the NOS2 output. Values of 0-100 are valid. The NOS2 Output will be enabled when RPM>NOS2 Min RPM ***AND*** RPM<NOS2 Max RPM ***AND*** TPS>NOS2 Min TPS %.

Output
In addition to the above conditional parameters, a Switched Output must be nominated from the drop down list as "NOS2". This switched output will *ground* the nominated output when the conditions are met.



Fuel Cut Defeat (FCD) 1

Clamp Voltage

This is the voltage, e.g. 4.3V, the Fuel Cut Defeat #1 output is clamped to regardless of how high the input voltage rises. An analog input and output must be assigned to this function. An analog input is configured by selecting "FCD1" from the pull-down list and an analog output is configured by also selecting "FCD1" from the pull-down list.

Release Pressure

This is the pressure when the Fuel Cut Defeat voltage will be released causing a fuel cut. If the Release Pressure is set to 24psi, when manifold pressure reaches 24psi, the FCD input voltage, which was previously clamped, will be released

therefore invoking fuel cut. This provides a level of safety by allowing the user to raise the fuel cut rather than just eliminate it.

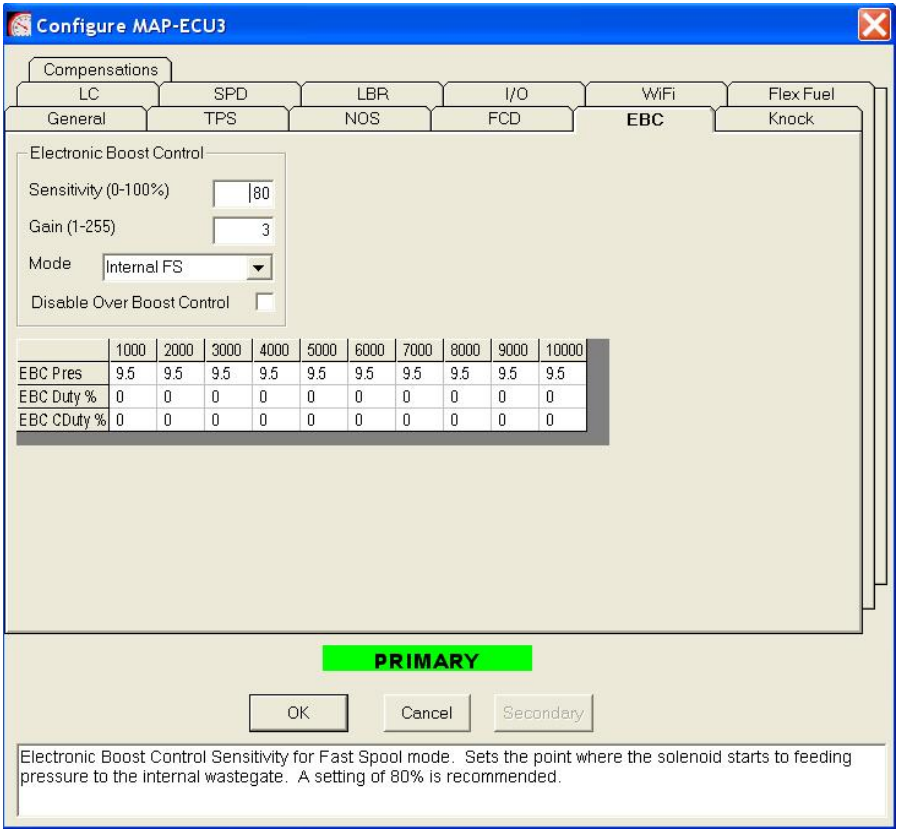
Fuel Cut Defeat (FCD) 2

FCD Clamp Voltage

This is the voltage, e.g. 4.4V, the Fuel Cut Defeat #2 output is clamped to regardless of how high the input voltage rises. An analog input and output must be assigned to this function. An analog input is configured by selecting “FCD2” from the pull-down list and an analog output is configured by also selecting “FCD2” from the pull-down list.

FCD Release Pressure

This is the pressure when the Fuel Cut Defeat voltage will be released causing a fuel cut. If the Release Pressure is set to 24psi, when manifold pressure reaches 24psi, the FCD input voltage, which was previously clamped, will be released therefore invoking fuel cut. This provides a level of safety by allowing the user to raise the fuel cut rather than just eliminate it.



Electronic Boost Control (EBC)

MAPECU3 has three EBC modes, including Fast Spool mode for internal wastegates. Fast Spool for Internal Wastegates is enabled by selecting "Internal FS" from the mode pull-down list. In Fast Spool mode, the EBC solenoid is opened when the MAPECU3 registers +1psi boost. This is effectively 100% Duty Cycle which vents the Wastegate canister to atmosphere until boost pressure reaches the EBC Sensitivity point. For example. if Target Boost is 20psi and Sensitivity is 80%, the EBC Solenoid will bleed pressure into the Wastegate canister at 16psi (20psi x 80% = 16psi). This holds the Wastegate closed until the Sensitivity point to prevent Wastegate creep.

EBC Sensitivity

EBC Sensitivity is a value from 0 to 100% and controls the percentage of target EBC boost pressure (set in the zoned table on the bottom right hand side of the

Configuration screen) where the EBC solenoid starts bleeding pressure from the wastegate. This function is discussed in more detail in the MAPECU3 manual. **Recommended** values for each mode are as follows:

- Internal: 0%
- Internal Fast Spool: 80%
- External: 80%

EBC Gain

EBC Gain is a value between 1 and 255 that controls how quickly the EBC control software reacts. This function is discussed in more detail in the MAPECU3 manual. The **recommended** setting is 20.

EBC Mode

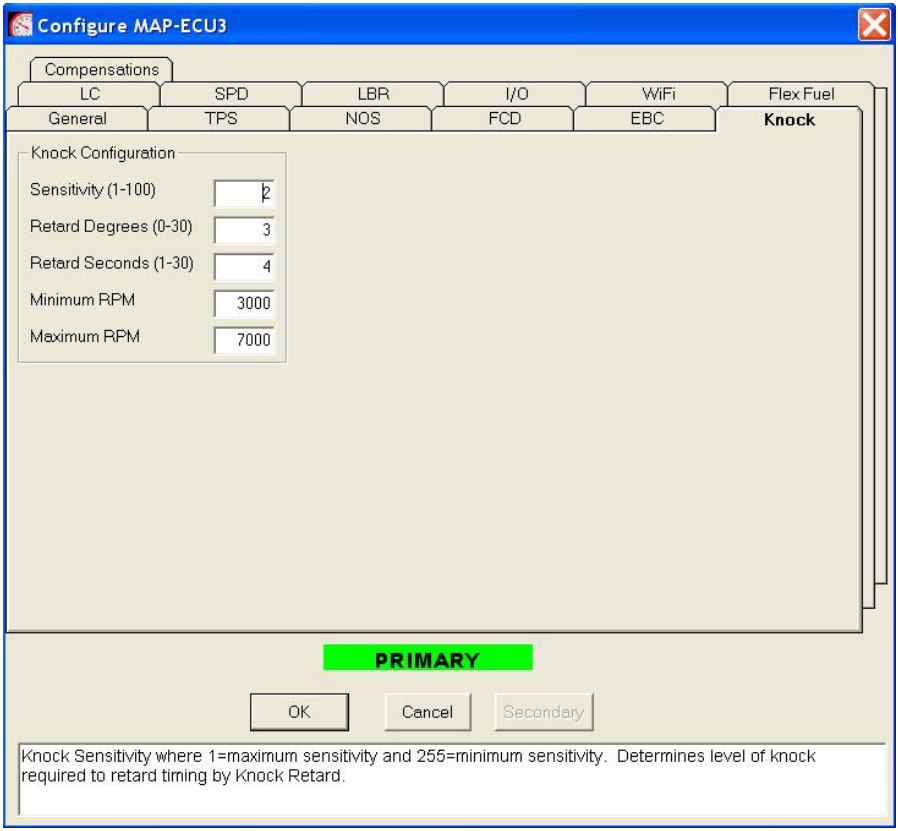
The EBC Mode pull-down list selects *Internal, ,Internal Fast Spool* or *External* Wastegate. This function is discussed in more detail in the MAPECU3 manual.

Disable Over Boost Control

Normally when the MAPECU3 sees boost exceeding the defined Target Boost, CDuty will be adjusted to prevent over boost. When checked, the EBC override functionality is **disabled**. This places the EBC in Duty Cycle only mode where the values in CDuty and Duty are the only values controlling maximum boost.

Warning: Overriding over boost control can cause excessive boost and therefore damage if not used cautiously.

ECU Configuration – Knock

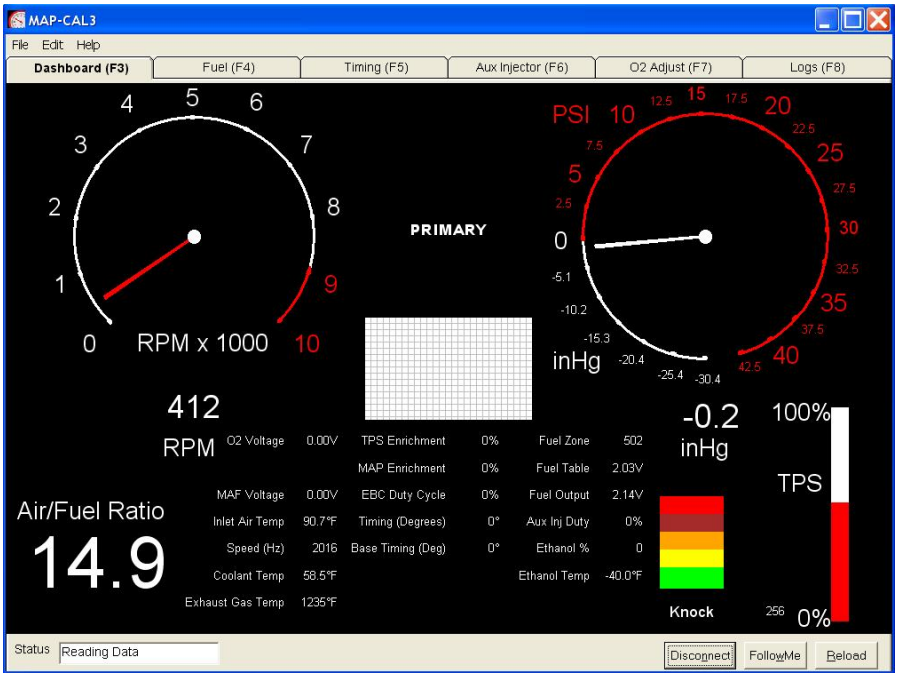


Knock control allows the MAPECU3 to retard timing when Knock (Detonation) is detected using an external Knock sensor and processor module. There are a number of configuration parameters for Knock Control as explained in this section. Knock Control is enabled by selecting "KNK" from the KVF Input pull-down list. More detail on wiring the required modules is covered in the MAPECU3 manual.

Note: Ignition Timing control must be wired and operational for Knock control to function.

Note: You cannot connect the KVF Input directly to the OEM Knock sensor. A dedicated Knock sensor and signal processor are required as defined in the MAPECU3 manual.

The following screen shot shows the MAPCAL3 Dashboard when Knock is detected and Ignition Timing has been retarded 3 degrees:



Sensitivity

Sensitivity is the number of Knock pulses required within the RPM range configured to invoke timing retard. Values can range from 1 to 100.

Retard Degrees

Retard Degrees is the number of degrees timing is retarded when the number of Knock pulses is greater than Sensitivity and RPM is within the range specified. Values can range from 1-30 degrees.

Retard Seconds

Retard Seconds is the number of seconds ignition timing is held retarded when all conditions are met. Values can be in the range 1-30 seconds.

Minimum RPM

Minimum RPM defines the low boundary for the Knock control window. Knock signals will be logged and displayed on the Dashboard but the MAPECU3 will not retard ignition timing if RPM is less than this value. You may select a RPM band to eliminate low RPM noise that may be incorrectly interpreted as detonation. Values can be in the range 0 to 10,000 RPM but must be less than Maximum RPM.

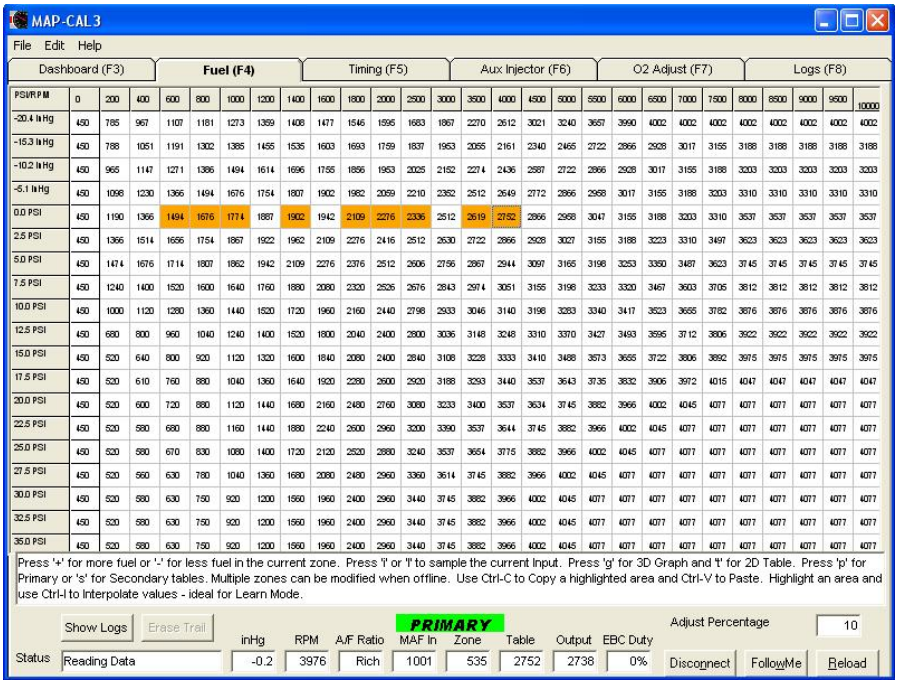
Maximum RPM

Maximum RPM defines the upper boundary for the Knock control window. Knock signals will be logged and displayed on the Dashboard but the MAPECU3

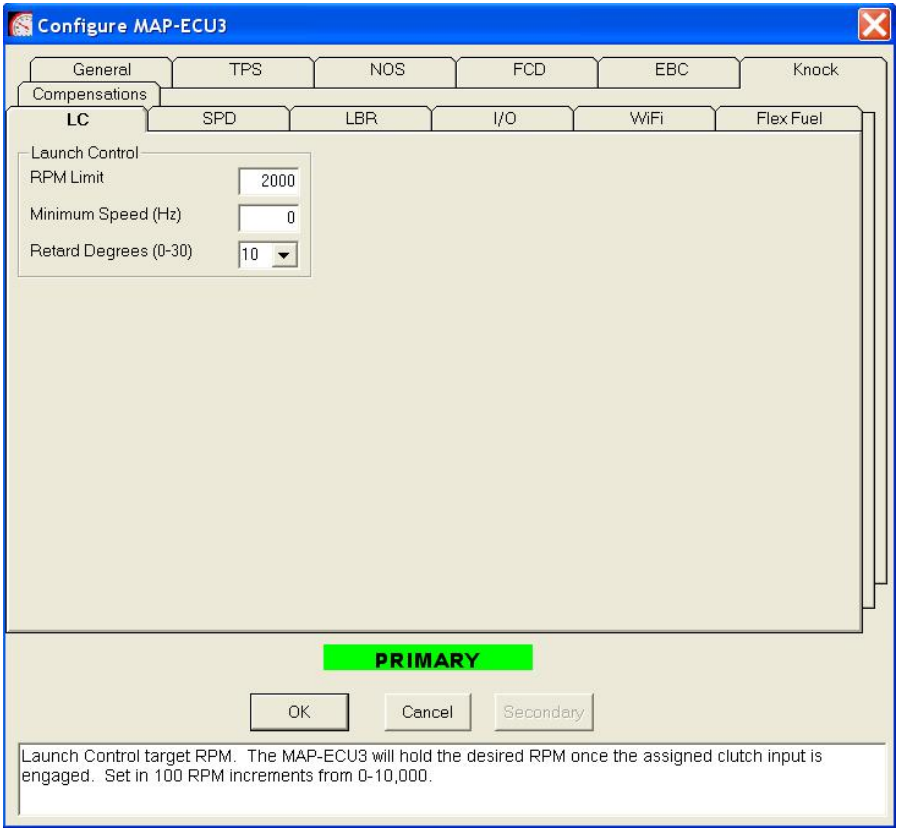
will not retard ignition timing if RPM is greater than this value. Values can range from 0 to 10,000 RPM but must be greater than Minimum RPM.

Knock by Zone Display

When MAPCAL3 is in any of the 2D Table modes (Fuel, Timing, Aux Injector or O2/AFR Adjust) and Knock is registered, MAPCAL3 will move to the active zone and highlight it Orange even if FollowMe mode is disabled. The following screen shot illustrates the Fuel Table when Knock has been registered in zones 502, 506, 518, 530 and 535:



ECU Configuration - LC



RPM Limit

Launch Control RPM is a value between 0 and 10,000 in 100 RPM steps, e.g. 3400. For correct operation a corresponding launch control clutch switch input must be configured to the KVF Input, MAF Input or External MAP Sensor input. The Launch Control RPM is the RPM the MAPECU3 will attempt to hold the engine by misfiring, or dropping ignition pulses. Launch control can only function when the MAPECU3 is configured to control engine timing. Complete details and wiring of Launch Control is described in the MAPECU3 manual.

Minimum Speed

Launch Control will remain in operation until the minimum speed input frequency is reached in order to reduce wheel spin on launch. Values of 0-250Hz are valid and a zero (0) value will disable the minimum speed function.

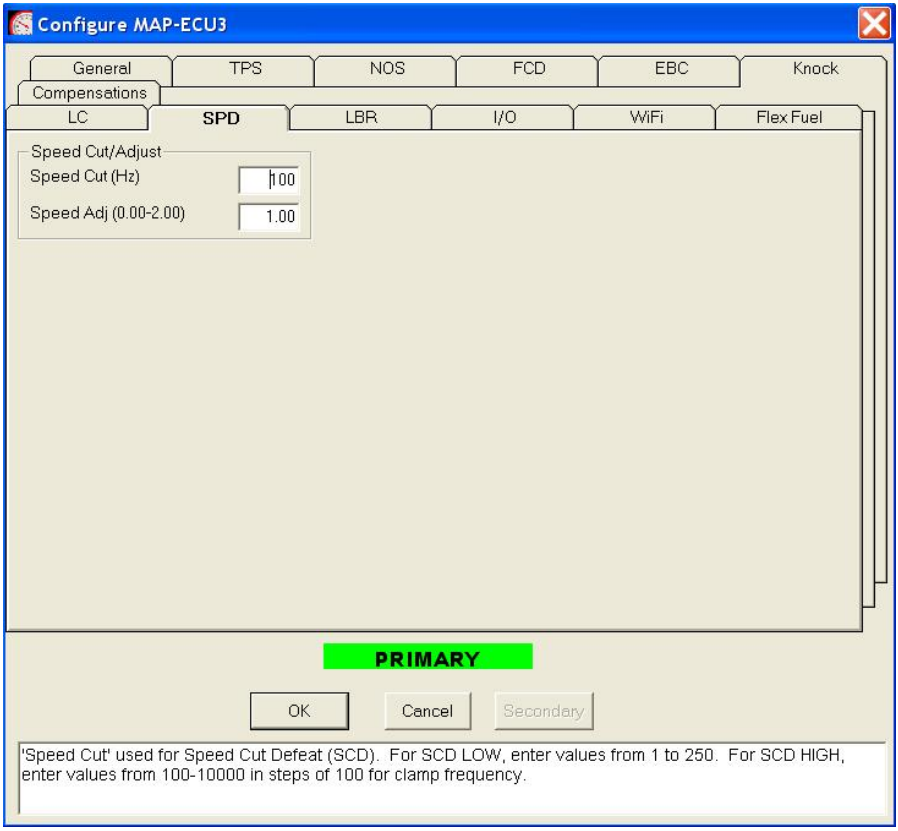
Retard Degrees

When Launch Control is active, the MAPECU3 can retard ignition timing by up to 30 degrees to help build boost. This option should be used very carefully to avoid excessive heat build up in the exhaust system and turbo, if fitted.
NEW: In MAPCAL3 V3.5 ignition retard is only activated when launch control is at the RPM limiter.

Anti-Lag (NEW)

MAPCAL3 V3.5 adds a new feature to Launch Control, an anti-lag solenoid output when launch control is active. This output can be used to drive a solenoid to control air bypass.

Note: Launch Control can also be used for "Flat-shifting" where the RPM is set to an ideal holding RPM during shifts. "Flat-shifting" means the throttle pedal is held flat down during gear shifts. The engine RPM is controlled by Launch Control when the clutch is depressed rather than lifting the throttle. Turbocharged vehicles benefit greatly by maintaining boost during gear shifts as boost is not dumped through the blow off valve.



Speed Cut

When the MAPECU3 is configured in MAF mode the digital frequency input (KVF Input) and output (KVF Output) can be used for Speed Cut Adjust (SCA) and Speed Cut Defeat (SCD).

Speed Adjust

In the earlier screen shot example, the KVF Input is assigned to the Speed function (SPD) and Switched Output #3 is configured for Speed Low (SPD LOW) or Speed High (SPD HIGH). The Speed Adjust value ranges from 0.00 to 2.00 in 0.01 steps. This value multiplies the input frequency to create an output frequency. A value of 1.00 means the output frequency equals the input frequency, e.g. Output = Input x 1.00, i.e. Output = Input. Any number less than 1.00 will decrease the output frequency and any value greater than 1.00 will increase the output frequency.

For example, if the input frequency is 100Hz and the Speed Adjust value is 0.90 then the output frequency is 100 x 0.90 or 90Hz. If the input frequency is 100Hz and the Speed Adjust value is 1.10 then the output frequency is 100 x 1.10 or 110Hz.

In practical terms, if you have a larger wheel/tyre size than stock you need to use Speed Adjust values greater than 1.00 to obtain the correct speed reading because the drive shaft turns slower for a given road speed. If the wheel/tyre size is smaller than stock then you set Speed Adjust less than 1.00 as the drive shaft turns faster for a given road speed.

Speed Cut Defeat

As per Speed Adjust, there are two (2) modes of Speed Cut Defeat, High and Low. When Switched Output #3 is configured for Speed High (SPD HIGH), the Speed Cut Frequency is valid from 100 to 10000 in 100Hz steps. When Switched Output #3 is configured for Speed Low (SPD LOW), the Speed Cut Frequency is valid from 1 to 250 in 1Hz steps.

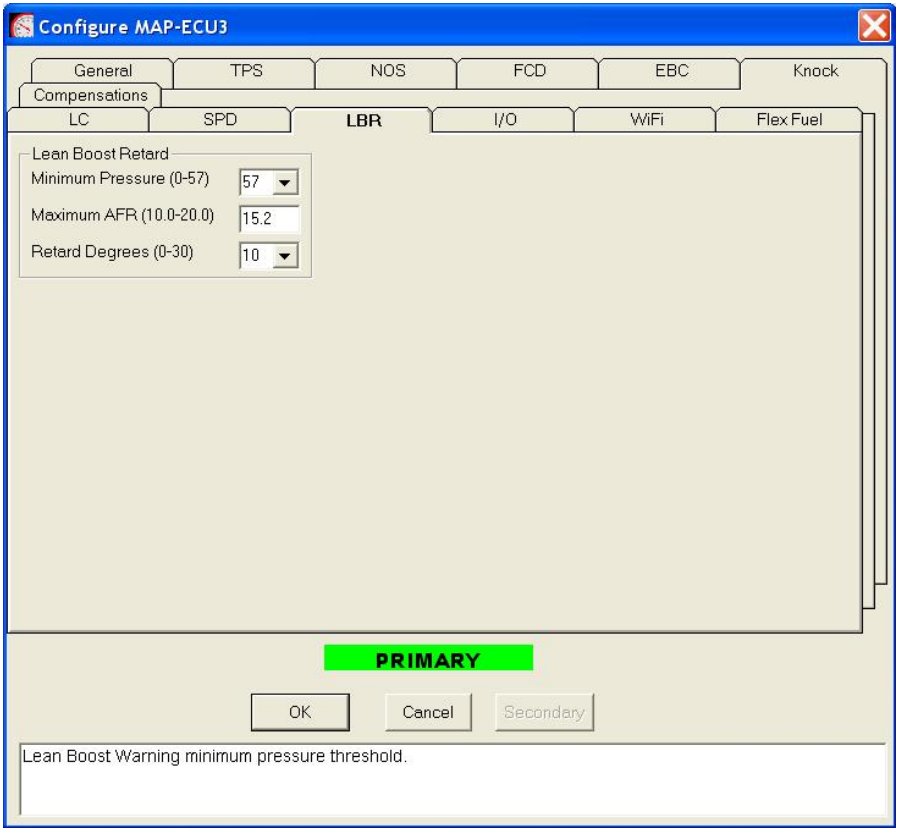
The Speed Cut value is the frequency the output will be clamped to regardless of the input frequency. For example, if the Speed Cut Frequency is set to 100, the output frequency will follow the input frequency until 100Hz is reached where the output frequency will be clamped to 100Hz regardless of the input frequency. Once the input frequency drops below 100Hz the output frequency will follow the input frequency again.

Speed Cut is typically used to remote the speed limiter on off-road or race vehicles.

Speed Display (NEW)

MAPCAL3 V3.5 adds a new field to the Dashboard, Speed (Hz). This displays the frequency received on KVF Input when configured to “SPD” to aid configuring speed related functions, e.g. Launch Control, NOS1 and SCD.

ECU Configuration - LBR



Lean Boost Retard is a safety function that requires an accurate Wideband AFR meter connected to theMAPECU3. It will retard ignition timing by a configured amount if the Air/Fuel Ratio becomes too lean under boost. It also has an indicator output function available on the Switched Outputs to alert the driver that lean boost retard has activated.

Minimum Pressure

The Lean Boost Retard minimum pressure is the minimum boost required before the function is activated. For example, if protect is only desired above 5psi, then set this value to 5. Pressures can range from 0 through 57psi.

Minimum AFR

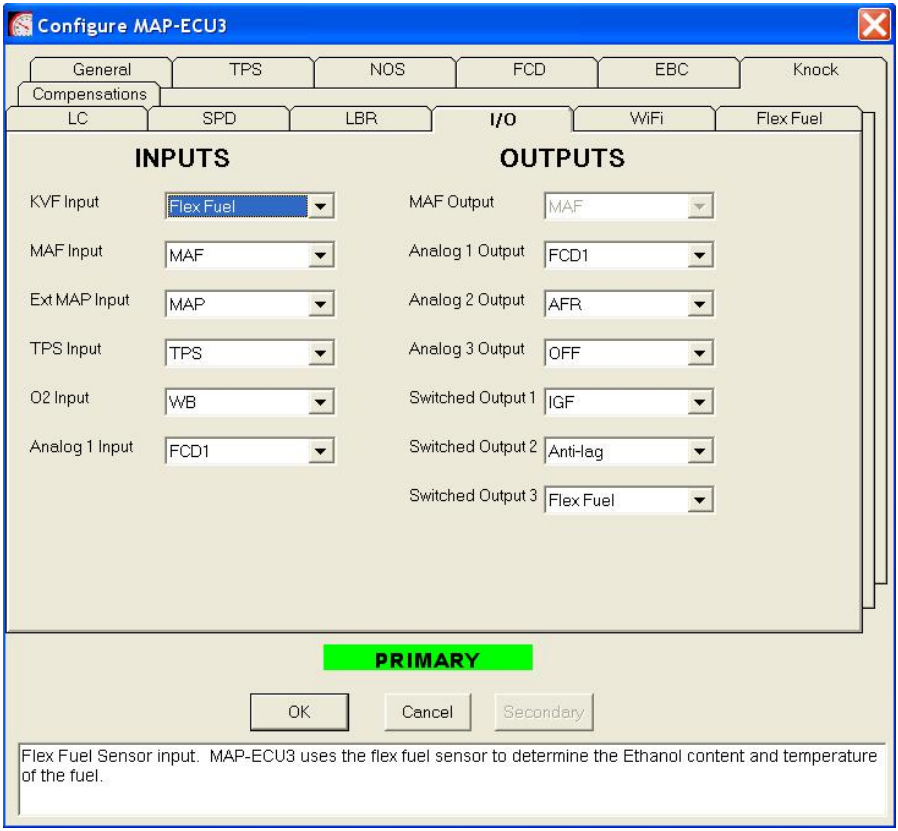
The Lean Boost Retard minimum AFR is the minimum Air/Fuel Ratio required before the function is activated. For example, if protection is only desired if the AFR is more lean that 11.5:1, then 11.5 should be entered into the field.

MAPCAL3 will configure the MAPECU3 based on the O2 lookup table configured in MAP-CAL Configuration.

Retard Degrees

Lean Boost Retard degree is the number of degrees ignition timing will be retarded if boost is above minimum boost and the Air/Fuel Ratio is leaner than minimum AFR.

ECU Configuration – Inputs/Outputs



KVF Input

The KVF Input can be used for a variety of digital input functions, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
KVF	Karman Vortex Frequency Input for learn mode.
SPD	Combined Speed Adjust/Cut/ Launch Control Input.
TDC	Crankshaft Top Dead Centre input to display Base Timing
RPM	Alternative RPM input (does not use Ignition Channels)
KNK	Knock signal input from Knock Processor
Flex Fuel (NEW)	Signal from the GM™ Fuel Composition Sensor and/or MAPECU3 Flex Fuel Temperature Module

MAF Input

The MAF Input can be used for a variety of analog input functions, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
MAF	MAF voltage input for learn mode.
FCD1	Fuel Cut Defeat #1 voltage input.
O2B	Secondary O2 Sensor voltage input
FCD2	Fuel Cut Defeat #2 voltage input
WB	Wideband meter input
MAF2	MAF #2 voltage input for dual fuel table mode
TPS	In MAPCAL3, the TPS (Throttle Position Sensor) function can be assign to any available analog input. Previously this function was hard coded to the 16-Way harness Brown wire.
O2	In MAPCAL3, the O2 (Oxygen Sensor) function can be assigned to any available analog input. Previously this function was hard coded to the 16-Way harness Yellow wire.
EGT (NEW)	Exhaust Gas Temperature input for display and logging.
CLT (NEW)	OEM Coolant Temperature sensor input for cold start compensation, display and logging.

External MAP Input

The External MAP Input can be used for a variety of analog input functions, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
MAF	MAF voltage input for learn mode.
FCD1	Fuel Cut Defeat #1voltage input.
MAP	External MAP Sensor Input.
O2B	Secondary O2 Sensor voltage input
FCD2	Fuel Cut Defeat #2 voltage input
WB	Wideband meter input
MAF2	MAF #2 voltage input for dual fuel table mode
TPS	In MAPCAL3, the TPS (Throttle Position Sensor) function can be assign to any available analog input. Previously this function was hard coded to the 16-Way harness Brown wire.
O2	In MAPCAL3, the O2 function can be assigned to any available analog input. Previously this function was hard coded to the 16-Way harness Yellow wire.
EGT (NEW)	Exhaust Gas Temperature input for display and logging.
CLT (NEW)	OEM Coolant Temperature sensor input for cold start compensation, display and logging.

TPS Input

In MAPCAL3 V3.4 and above, the TPS input can be reassigned to any other function when TPS is not required, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
MAF	MAF voltage input for learn mode.
FCD1	Fuel Cut Defeat #1voltage input.
MAP	External MAP Sensor Input.
O2B	Secondary O2 Sensor voltage input
FCD2	Fuel Cut Defeat #2 voltage input
WB	Wideband meter input
MAF2	MAF #2 voltage input for dual fuel table mode
TPS	Throttle Position Sensor input
O2	Oxygen Sensor input used for AFR display and O2 Adjust.

EGT (NEW)	Exhaust Gas Temperature input for display and logging.
CLT (NEW)	OEM Coolant Temperature sensor input for cold start compensation, display and logging.

O2 Input

In MAPCAL3 V3.4 and above, the O2 input can be reassigned to any other function when an O2 input is not required, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
MAF	MAF voltage input for learn mode.
FCD1	Fuel Cut Defeat #1voltage input.
MAP	External MAP Sensor Input.
O2B	Secondary O2 Sensor voltage input
FCD2	Fuel Cut Defeat #2 voltage input
WB	Wideband meter input
MAF2	MAF #2 voltage input for dual fuel table mode
TPS	Throttle Position Sensor input
O2	Oxygen Sensor input used for AFR display and O2 Adjust.
EGT (NEW)	Exhaust Gas Temperature input for display and logging.
CLT (NEW)	OEM Coolant Temperature sensor input for cold start compensation, display and logging.

Analog Input #1

In MAPCAL3 V3.4 and above, an additional general purpose analog input that can be configured to any function, as follows:

Pull-down Function	Description
PRI/SEC	Primary/Secondary Table select input.
LC CLUTCH	Launch Control Clutch Input.
MAF	MAF voltage input for learn mode.
FCD1	Fuel Cut Defeat #1voltage input.
MAP	External MAP Sensor Input.
O2B	Secondary O2 Sensor voltage input
FCD2	Fuel Cut Defeat #2 voltage input
WB	Wideband meter input
MAF2	MAF #2 voltage input for dual fuel table mode
TPS	Throttle Position Sensor input
O2	Oxygen Sensor input used for AFR display and O2 Adjust.
EGT (NEW)	Exhaust Gas Temperature input for display and logging.

CLT (NEW)	OEM Coolant Temperature sensor input for cold start compensation, display and logging.

MAF Output

When the MAPECU3 is in KVF (Frequency) Mode the MAF Output can be used for a variety of analog output functions, as follows:

Pull-down Function	Description
MAF	Primary MAF voltage output (default)
O2	O2 Adjust Output
FCD1	Fuel Cut Defeat #1 Output Voltage (clamped)
BARO	Barometric Pressure Output Voltage
O2B	Secondary O2 Sensor voltage output
AFR	Air/Fuel Ratio Sensor Calibrator output
FCD2	Fuel Cut Defeat #2 voltage output
MAF2	MAF #2 voltage output for dual fuel table mode

Analog Output #1

Analog Output #1 is a general purpose analog output that can be configured for a variety of analog output functions, as follows:

Pull-down Function	Description
O2	O2 Adjust Output
FCD1	Fuel Cut Defeat Output Voltage (clamped)
BARO	Barometric Pressure Output Voltage
O2B	Secondary O2 Adjust Output
AFR	Air/Fuel Ratio Sensor Calibrator output
FCD2	Fuel Cut Defeat #2 voltage output
MAF2	MAF #2 voltage output for dual fuel table mode

Analog Output #2

Analog Output #2 is a general purpose analog output that can be configured for a variety of analog output functions, as follows:

Pull-down Function	Description
O2	O2 Adjust Output
FCD1	Fuel Cut Defeat Output Voltage (clamped)
BARO	Barometric Pressure Output Voltage
O2B	Secondary O2 Adjust Output

AFR	Air/Fuel Ratio Sensor Calibrator output
FCD2	Fuel Cut Defeat #2 voltage output
MAF2	MAF #2 voltage output for dual fuel table mode

Analog Output #3

MAPECU3 has an additional general purpose analog output that can be configured for a variety of analog output functions, as follows:

Pull-down Function	Description
O2	O2 Adjust Output
FCD1	Fuel Cut Defeat Output Voltage (clamped)
BARO	Barometric Pressure Output Voltage
O2B	Secondary O2 Adjust Output
AFR	Air/Fuel Ratio Sensor Calibrator output
FCD2	Fuel Cut Defeat #2 voltage output
MAF2	MAF #2 voltage output for dual fuel table mode

Switched Output #1

Switch Output #1 is a general purpose high current digital output that can be configured for a variety of output functions, as follows:

Pull-down Function	Description
RPM0	Output is enabled when RPM>0 to mimic the fuel pump enable output of some air flow meters.
PSI	Pressure Switch function. Output is enabled when MAP pressure matches the Pressure Switch setting.
NOS1	Nitrous Oxide function. Output is enabled when RPM>NOS Min RPM & RPM <NOS Max RPM & TPS >NOS Min TPS %.
RPM SW	RPM Switch function. Output is enabled when RPM>RPM Switch value.
INJ	Auxiliary Injector function.
NOS2	Nitrous Oxide function #2. Output is enabled when RPM>NOS2 Min RPM & RPM <NOS2 Max RPM & TPS >NOS2 Min TPS %.
LBR	Lean Boost Retard activation indicator output.
IGF (NEW)	Igniter Feedback signal. This output simulates the IGF output from a OEM Toyota™ ignite. When launch control is used, the IGF output from the ignite is interrupted causing a CEL. This replaces the ignite IGF so the OEM ECU does not know the engine is mis-firing.
Flex Fuel (NEW)	Flex Fuel Output. This is required with the MAPECU3 Flex Fuel Temperature Module to enable the KVF Input t measure ethanol temperature. Not required if only ethanol content is required.
Anti-lag (NEW)	Anti-lag solenoid output. Used in conjunction with Launch Control to control an air bypass valve to build boost under launch control.

Switched Output #2

Switch Output #2 is a general purpose high current digital output that can be configured for a variety of output functions, as follows:

Pull-down Function	Description
RPM0	Output is enabled when RPM>0 to mimic the fuel pump enable output of some air flow meters.
PSI	Pressure Switch function. Output is enabled when MAP pressure matches the Pressure Switch setting.

NOS1	Nitrous Oxide function. Output is enabled when RPM>NOS Min RPM & RPM <NOS Max RPM & TPS >NOS Min TPS %.
RPM SW	RPM Switch function. Output is enabled when RPM>RPM Switch value.
EBC	Output is dedicated to Electronic Boost Control Solenoid function.
INJ	Auxiliary Injector function.
NOS2	Nitrous Oxide function #2. Output is enabled when RPM>NOS2 Min RPM & RPM <NOS2 Max RPM & TPS >NOS2 Min TPS %.
LBR	Lean Boost Retard activation indicator output.
Flex Fuel (NEW)	Flex Fuel Output. This is required with the MAPECU3 Flex Fuel Temperature Module to enable the KVF Input t measure ethanol temperature. Not required if only ethanol content is required.
Anti-lag (NEW)	Anti-lag solenoid output. Used in conjunction with Launch Control to control an air bypass valve to build boost under launch control.

Switched Output #3

Switch Output #3 is a general purpose high current digital output **shared with the KVF Output** that can be configured for a variety of output functions **only when the MAPECU3 is in MAF mode**, as follows:

Pull-down Function	Description
RPM0	Output is enabled when RPM>0 to mimic the fuel pump enable output of some air flow meters.
PSI	Pressure Switch function. Output is enabled when MAP pressure matches the Pressure Switch setting.
NOS1	Nitrous Oxide function. Output is enabled when RPM>NOS Min RPM & RPM <NOS Max RPM & TPS >NOS Min TPS %.
RPM SW	RPM Switch function. Output is enabled when RPM>RPM Switch value.
INJ	Auxiliary Injector function.
NOS2	Nitrous Oxide function #2. Output is enabled when RPM>NOS2 Min RPM & RPM <NOS2 Max RPM & TPS >NOS2 Min TPS %.
SPD LOW	Speed Low function. Output is the Speed Input adjusted and clamped as per the speed adjust and clamp functions. Low range is 1Hz to 250Hz.
SPD HIGH	Speed High function. Output is the Speed Input adjusted and clamped as per the speed adjust and clamp functions.

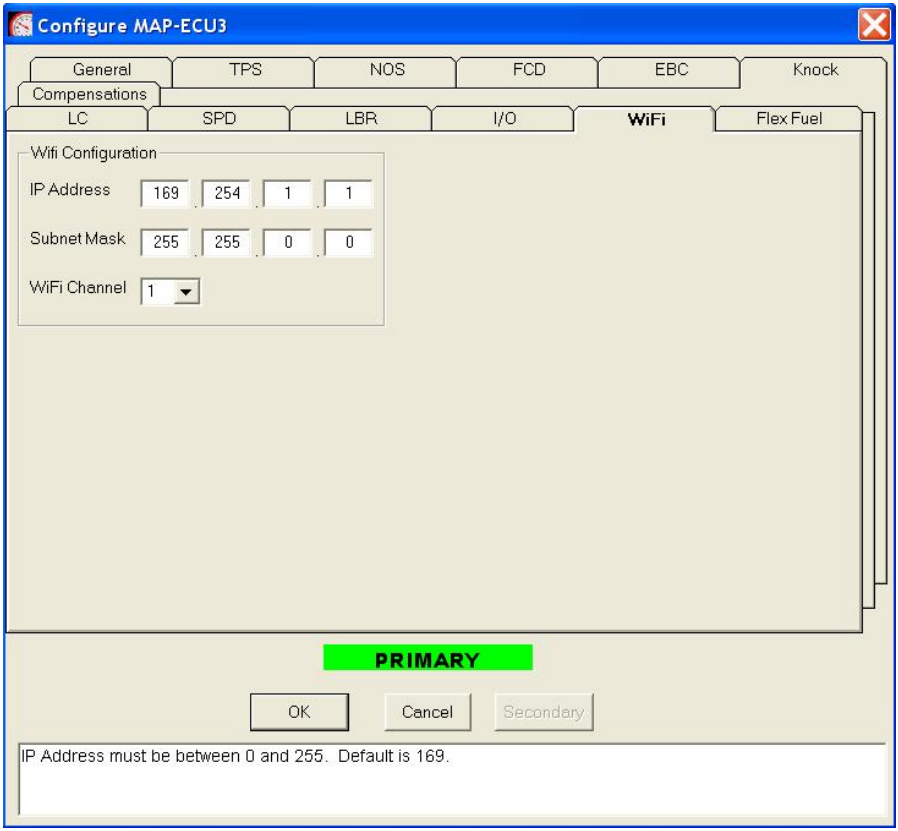
	High range is 100Hz to 10,000Hz.
LBR	Lean Boost Retard activation indicator output.
Flex Fuel (NEW)	Flex Fuel Output. This is required with the MAPECU3 Flex Fuel Temperature Module to enable the KVF Input t measure ethanol temperature. Not required if only ethanol content is required.
Anti-lag (NEW)	Anti-lag solenoid output. Used in conjunction with Launch Control to control an air bypass valve to build boost under launch control.

Note: Switched Output #3 shares the KVF Output wire (Blue) on the MAPECU3 16-Way harness as the output.

Note: **Any** Switched Output can drive Auxiliary Injectors.

Note: Switch Outputs *ground* the respective output wire to complete the electrical circuit. Do not connect the switched output directly to +12V otherwise damage will result.

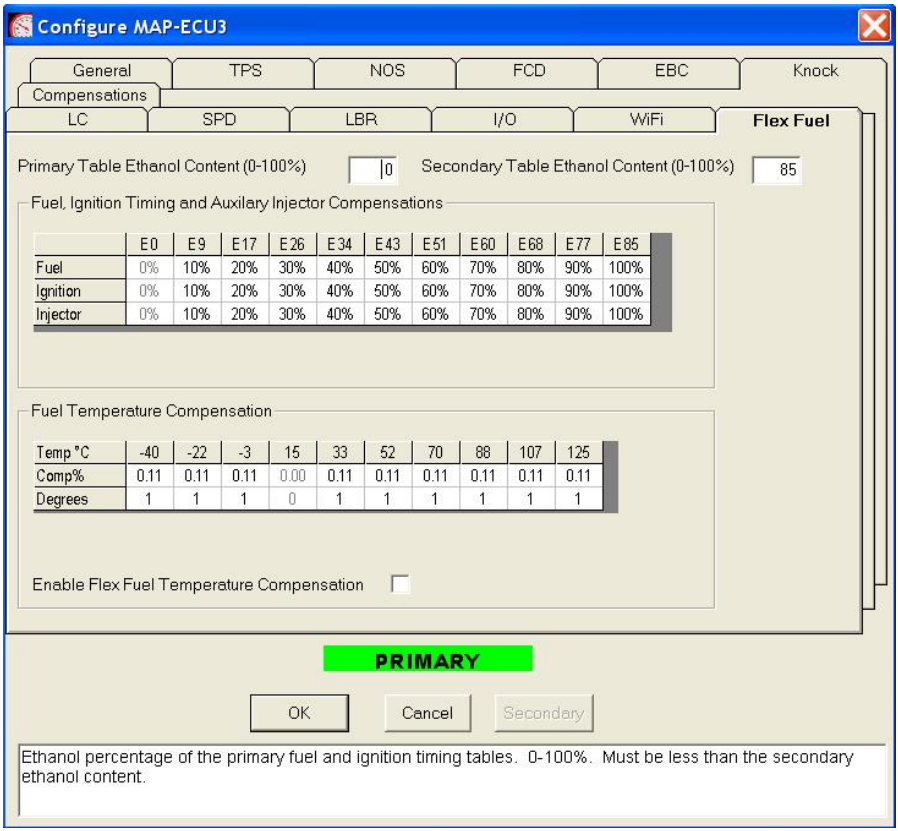
ECU Configuration – WiFi



MAPCAL3 V3.4 added support for the WiFi equipped MAPECU3. The above IP Address and Subnet Mask should not be modified. The Channel can be altered if you notice jerky response via WiFi connection. This could indicated a congested channel.

ECU Configuration – Flex Fuel (NEW)

MAPCAL3 V3.5 adds Flex Fuel support to the MAPECU3 with real-time adjustments based on a GM™ Fuel Composition sensor connected directly to the MAPECU3. Normally the Primary tables are tuned for normal pump gas, i.e. 0% ethanol, and the Secondary tables are tuned for maximum ethanol content, e.g. 85%. The maximum allowable ethanol content is 100%.



Primary Table Ethanol Content (0-100%)

The field tells the MAPECU3 the ethanol content of the fuel used to tune the Primary tables and therefore the minimum allowed ethanol content. This is normally 0%.

Secondary Table Ethanol Content (0-100%)

The field tells the MAPECU3 the ethanol content of the fuel used to tune the Secondary tables and therefore the maximum allowed ethanol content. This is normally 85%.

Fuel, Ignition Timing & Auxiliary Injector Compensations Table

This table controls the interpolation between the Primary and Secondary tables when ethanol content is somewhere between minimum and maximum. The example above shows the default linear curve which can be fine tuned as required. Interpolation is separated for Fuel, Ignition Timing and Auxiliary Injector tables.

Fuel Temperature Compensation

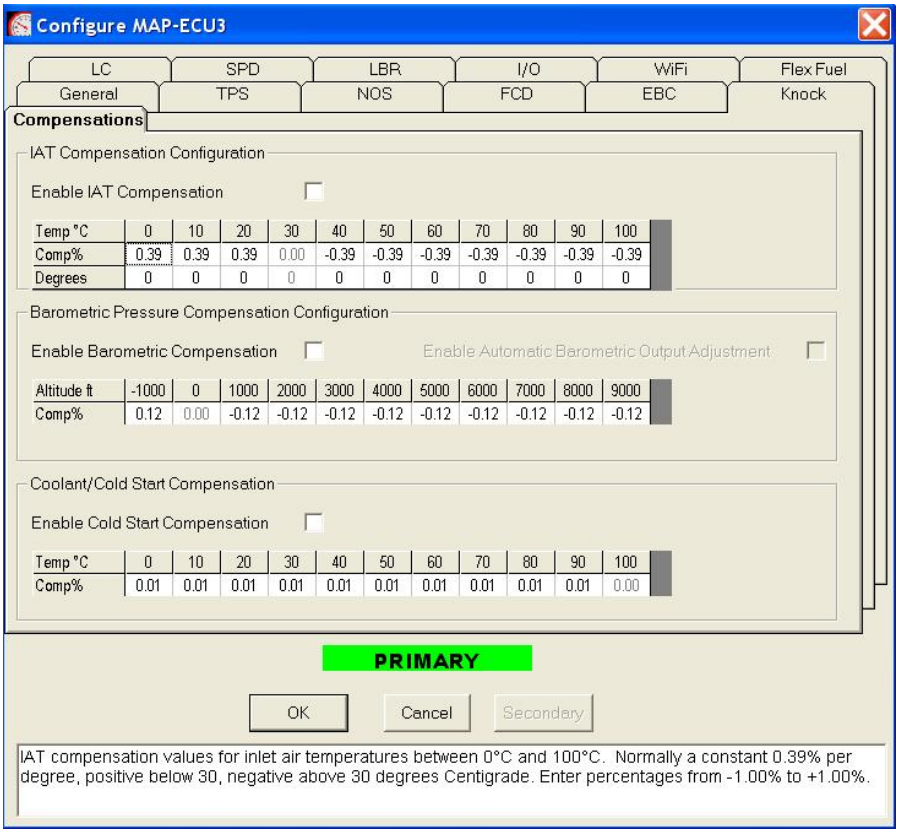
If a MAPECU3 Flex Fuel Temperature Module is installed along with the GM™ Fuel Composition sensor, then the MAPECU3 can adjust fuel and ignition timing based on fuel temperature.
Note: There is zero (0) compensation at 15°C (59°F) where the cells are greyed out and non-modifiable. Generally you would enter positive compensation for colder more dense fuel and negative compensation for warmer less dense fuel.

Please note that Comp % is a percentage from -0.99% to +0.99% and is ***PER DEGREE***. Normally you would enter the same percentage across all fields, e.g. -0.11 or +0.11 as per this example.

ECU Configuration – Compensations (NEW)

MAPCAL3 3.5 comprehensively enhances the Inlet Air Temperature (IAT) and Barometric pressure (Baro) compensation functionality and introduces Coolant Temperature (CLT) cold start compensation. In previous versions, a non-modifiable constant was used for IAT and Baro compensation. V3.5 introduces separate modifiable 2D tables for IAT, Baro and CLT compensations.

Note: Compensations are from -0.99% to +0.99% and are ***PER DEGREE***. Normally, you would enter a constant across all zones but can be fine tuned as required.



Enable IAT Compensation

The Enable IAT Compensation check box enables MAPECU3 inlet air temperature compensation of the fuel output. The IAT sensor must be connected to the MAPECU3 and installed in the air box of the vehicle. When the check box is unchecked, no IAT compensation is applied. IAT less than 30 degrees centigrade

means higher density air, usually requiring more fuel to maintain the correct AFR. IAT greater than 30 degrees centigrade means lower air density, usually requiring less fuel to maintain the correct AFR. The user can now has complete control over IAT compensation over the temperature range including positive or negative compensation.

Note: We recommend the IAT Sensor is placed in a physical location where 'heat soak' is minimised. Recommended positions include the air box and post intercooler but not high in the engine bay where 'heat soak' will heat the sensor excessively. Do not install the IAT in the plenum as heat soak can be a major issue in and around the plenum. Ideally, the brass body of the IAT should be insulated from any metal pipe work to further minimise heat soak.

Enable Baro Compensation

The Enable Baro Compensation check box enables MAPECU3 Barometric pressure compensation of the fuel output. The MAPECU3 samples barometric pressure on ignition on and the sample is displayed as the greyed out text, e.g. "Barometric Pressure 1013mb". When this check box is enabled the MAPECU3 will adjust the fuel output based on the barometric pressure. Higher barometric pressure means higher density air, usually requiring more fuel to maintain the correct AFR. Lower barometric air pressure means lower air density, usually requiring less fuel to maintain the correct AFR. The user can now has complete control over Baro compensation over the pressure range including positive or negative compensation.

Enable Auto Baro Output Adjust

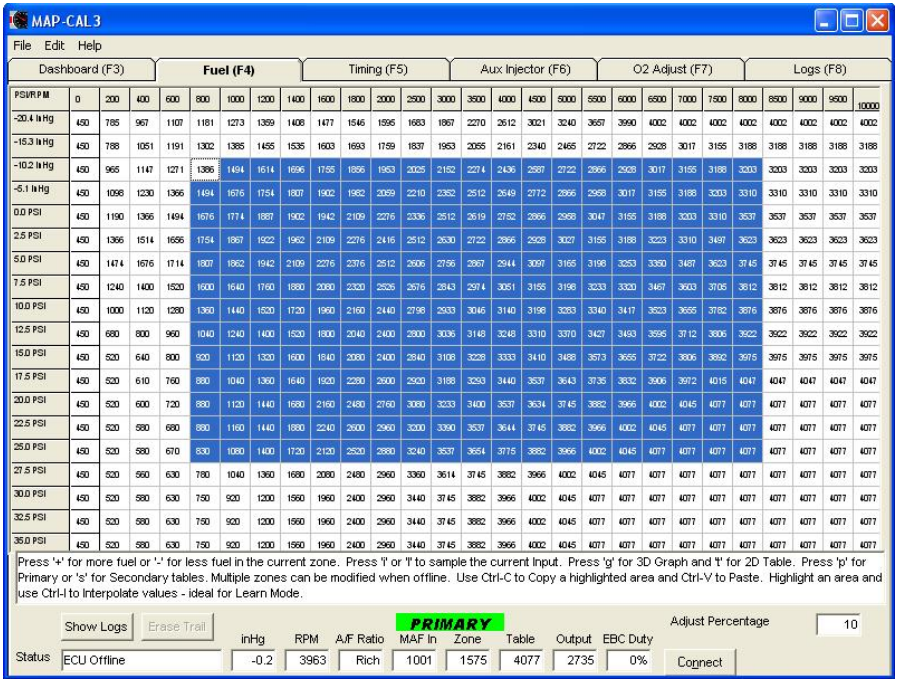
The Enable Auto Baro Output Adjust check box is only available in KVF Mode and automatically adjusts the Barometric Pressure output voltage according to the barometric pressure sampled at engine start. If the Barometric Pressure output voltage (MAF Output Green wire) is unused this function is redundant.

CLT Compensation

The MAPECU3 can now compensate fuel based on the OEM coolant temperature (CLT) sensor for cold start compensation. This is particularly useful when larger than stock fuel injectors are fitting and the user needs to lean the AFR's on cold start. A 2D table with 10 zones is provided with zero compensation at 100°C (212°F).

Table Copy (Ctrl+C)

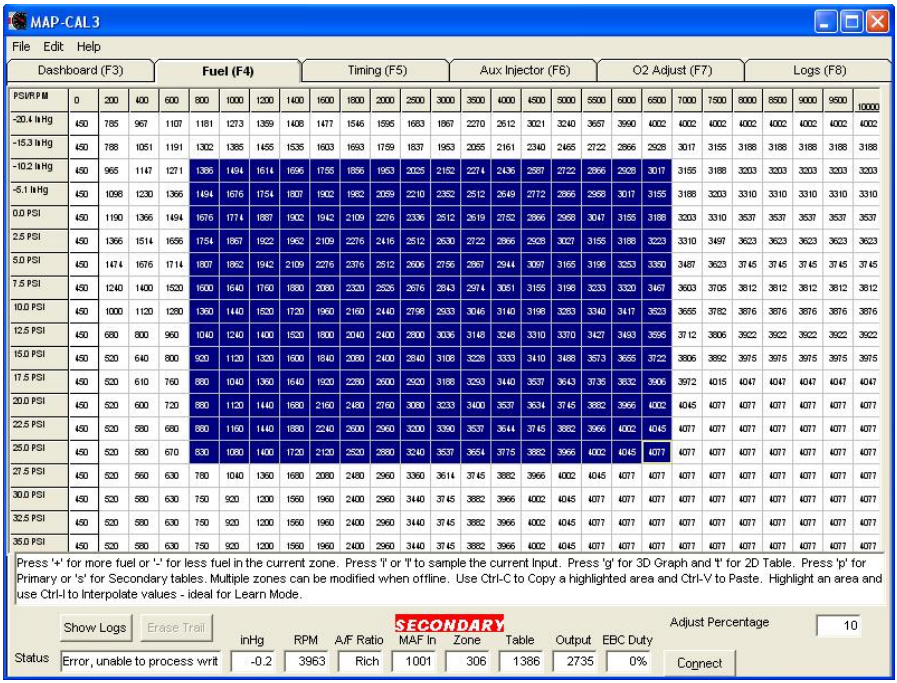
The copy function is only available when MAPCAL3 is Offline, i.e. not connected real-time to a MAPECU3. When active, blocks of data in table mode can be copied into an internal buffer to be 'pasted' into another area of the table or another table. In order to copy a block of data, highlight the block using the mouse, holding the left mouse button down. The highlighted block should look similar to this screen shot:



You can now select the menu option using the mouse or hold down the Ctrl key and press the letter "c".

Table Paste (Ctrl+V)

The Paste function is only available when MAPCAL3 is Offline, i.e. not connected real-time to a MAPECU3, and some data has been "copied" into the internal buffer. In order to Paste a block of data, select the zone where the data is to start and hold down the Ctrl key and press the letter "v". The Pasted block should look similar to this screen shot:

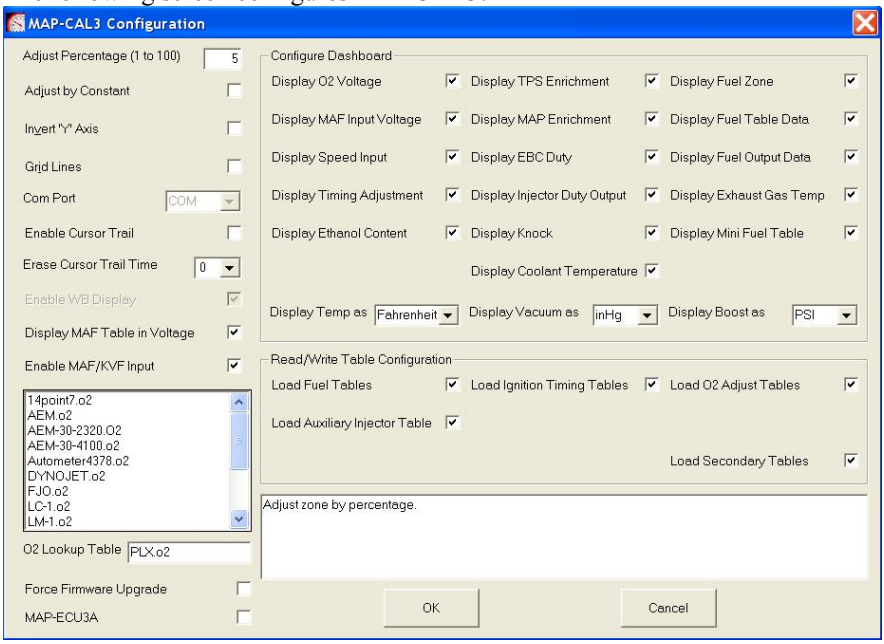


Note: In this example the date from the Primary table was Pasted into the Secondary table. Once the data was copied from the Primary table, the letter "s" was pressed to swap to the Secondary table for the Paste operation. The destination point at 0psi and 1000 RPM was selected using the mouse before Ctrl+V was pressed.

MAPCAL3 Configuration (Ctrl+F) (NEW)

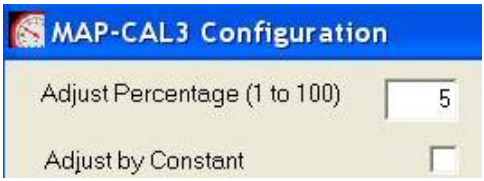
The MAPCAL configuration screen has been completely revamped in MAPCAL V3.5. A new feature has been added to the control the tables being read/written from/to the MAPECU3 to speed connection and tuning. You can select/deselect Fuel, Ignition Timing, O2 Adjust and Auxiliary Injector tables. If you deselect a table, it will not be read or written during tuning. If you alter one of these tables, an error message with appear. In addition, you can disable all the secondary tables if they are not being used.

The following screen configures MAPCAL3:



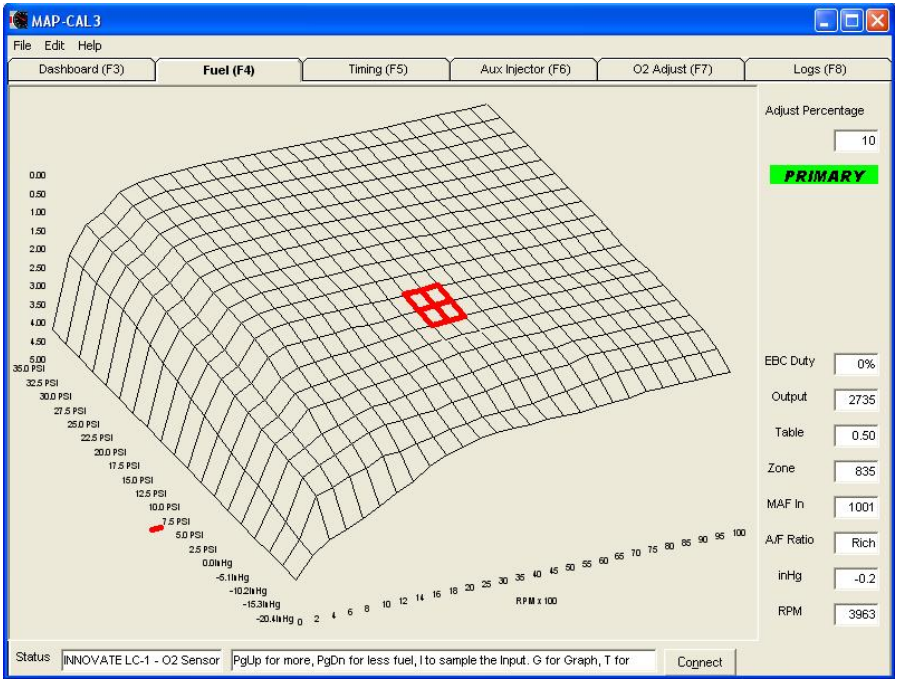
Adjust Percentage

The Adjust Percent field sets the adjustment percentage of the fuel tables when using the +/- functions. The default value is 5% as shown. **Note**: If the fuel zone has a value of zero (0) a percentage adjustment is not possible. It is possible to also adjust by a constant value, e.g. 10. This mode is enabled by checking the Adjust by Constant check box, as follows:



Invert 'Y' Axis Option

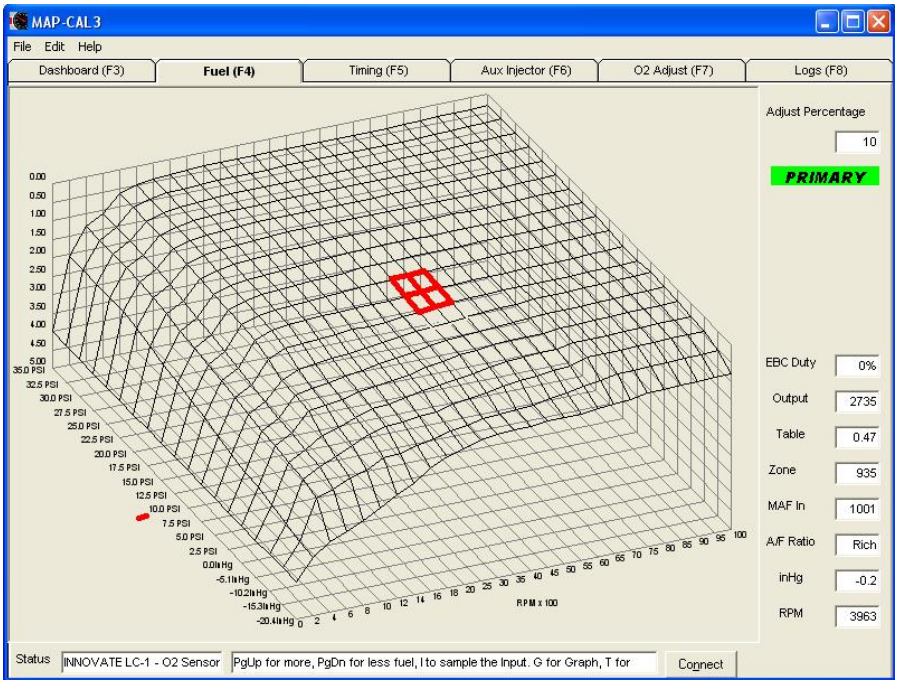
This particular Flap Type air flow meter equipped vehicle uses an inverted voltage MAF (where minimum air flow equals maximum voltage and vice versa). When the Invert 'Y' Axis option is enabled in MAPCAL Configuration the graph becomes more readable, as follows:



This display does not have grid lines showing.

Grid Lines Option

It is possible to enable or disable grid lines in 'Graph Mode' using the 'Grid Lines' option in MAPCAL Configuration. The graph changes as follows when Grid Lines are enabled:


MAP-CAL3
File Edit Help
Dashboard (F3)
Fuel (F4)
Timing (F5)
Aux Injector (F6)
O2 Adjust (F7)
Logs (F8)
Adjust Percentage
10
PRIMARY
EBC Duty 0%
Output 2735
Table 0.47
Zone 935
MAF In 1001
A/F Ratio Rich
inHg -0.2
RPM 3963
RPM x 100
Status
INNOVATE LC-1 - O2 Sensor
PgUp for more, PgDn for less fuel, I to sample the Input. G for Graph, T for
Connect

USB/COM

MAPECU3 has a built-in USB to serial converter that will be assigned a COM port number by Windows™. MAPCAL3 will automatically detect a MAPECU3 if it is plugged in and the driver configured correctly. In MAPCAL3 V3.5, three modes are supported, direct USB, virtual COM port and WiFi. If the Virtual COM Port (VCP) driver is not installed, use the "USB" setting. It is preferable to install the VCP as connection will be a little faster. Refer to the MAPECU3 USB Driver installation guide for full details on driver installation and configuration.

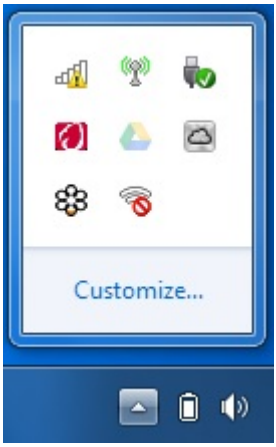
If a MAPECU3 cannot be found, the following error message will display when the "Connect" button is pressed:

WiFi

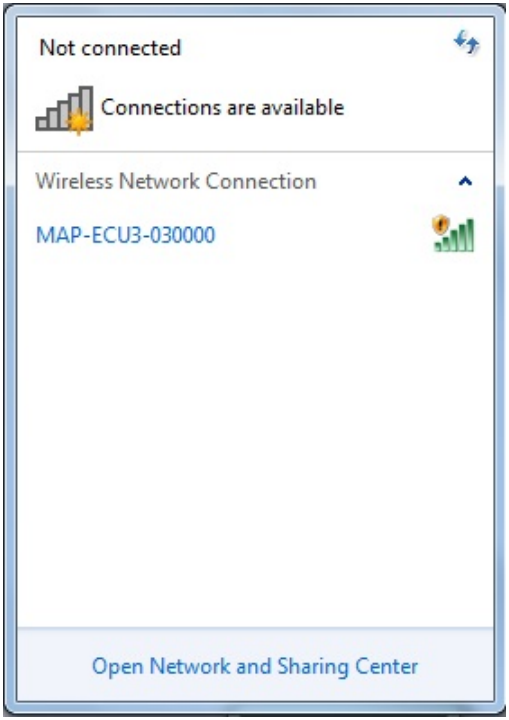
If the MAPECU3 is equipped with an optional WiFi module and connected to +12V, MAPCAL3 V3.5 can communicate with the MAPECU3 wirelessly. The MAPECU3 is configured as a WiFi Access Point (AP) therefore you must disconnect your laptop from your exiting WiFi network can "connect" to the MAPECU3. The MAPECU3 will appear as a WiFi AP with an SSID of MAPECU3-XXXXXX, where XXXXXX is the serial number of the MAPECU3.

Note: You must disconnect the USB cable from the MAPECU3 to enable the WiFi module.

In order to connect with your MAPECU3, select the Wireless networking icon from the Windows task bar, as follows:

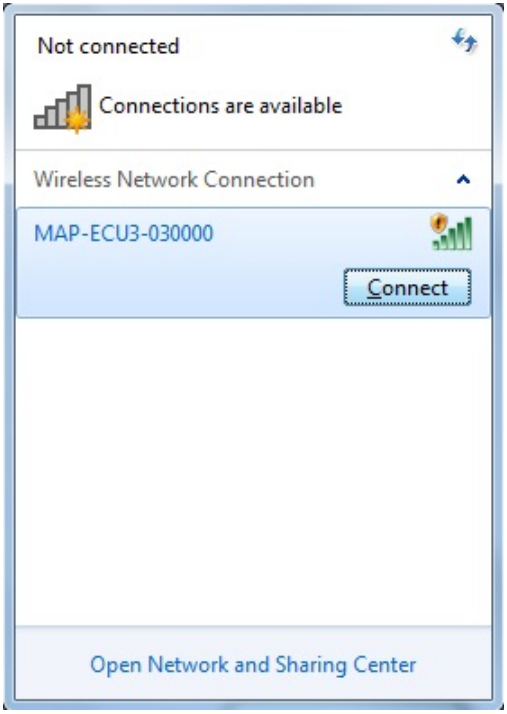


Click on the Wireless networking icon (5-bars with a yellow caution symbol), as follows:

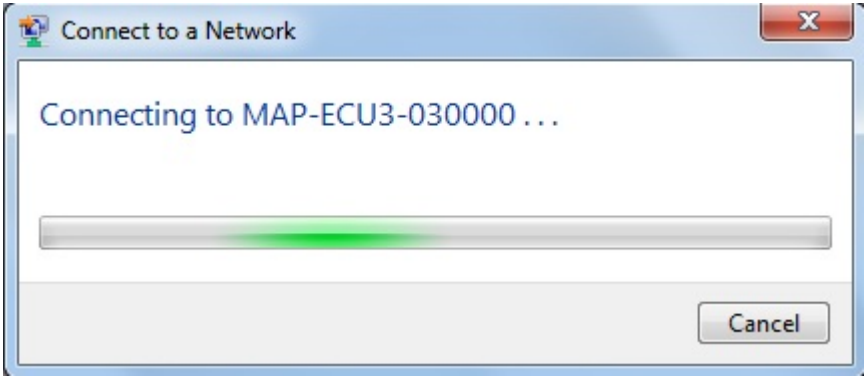


The MAPECU3 is a wireless Access Point with an SSID of “MAPECU3-XXXXXX”, where XXXXXX is the serial number of the unit.

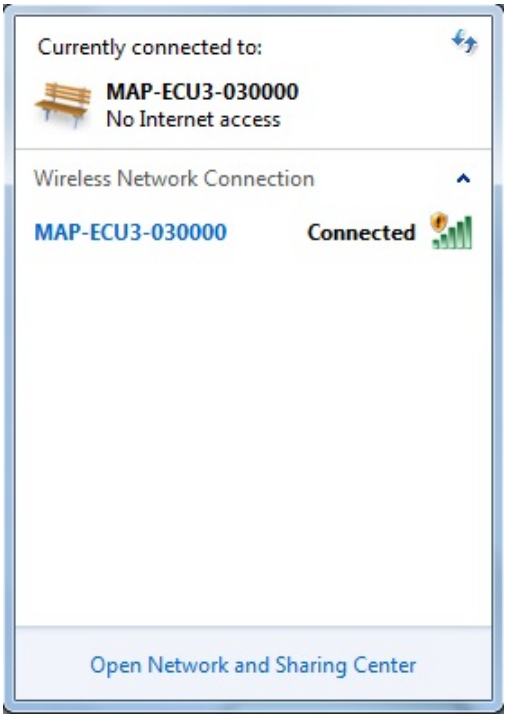
Click the SSID and a connect button will appear, as follows:



Click the Connect button to associate with the MAPECU3. The following screen may appear:

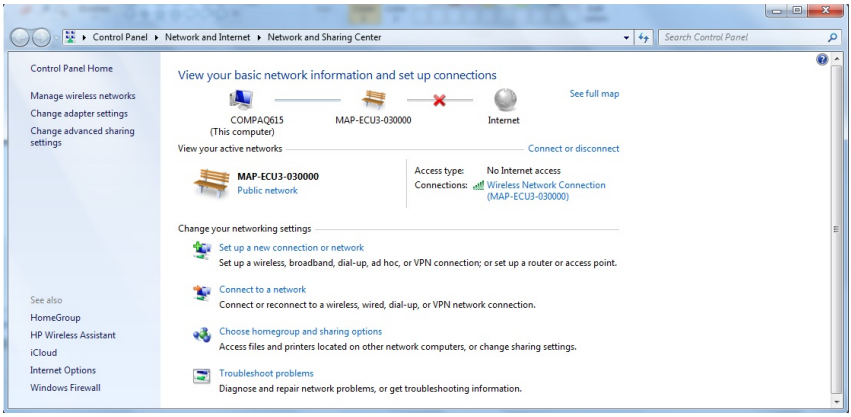


Once associated, you can check the status of the connection by clicking on the wireless networking icon on the Windows task bar:

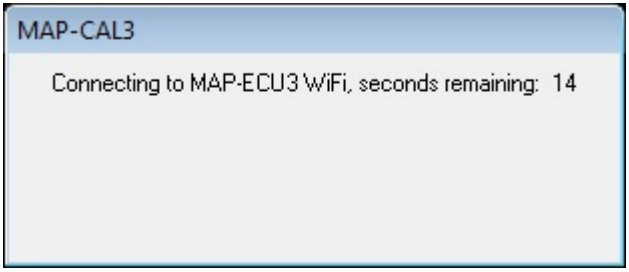


Note: It is normal to have the yellow caution icon as the MAPECU3 does not provide internet connectivity.

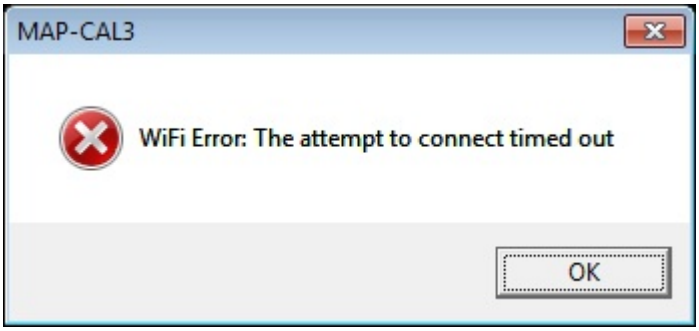
Open the Network and Sharing Centre and the following screen should be display:



When you click the Connect button on MAPCAL3, the following message will appear while MAPCAL3 is attempting to communicate with the MAPECU3 associated above:

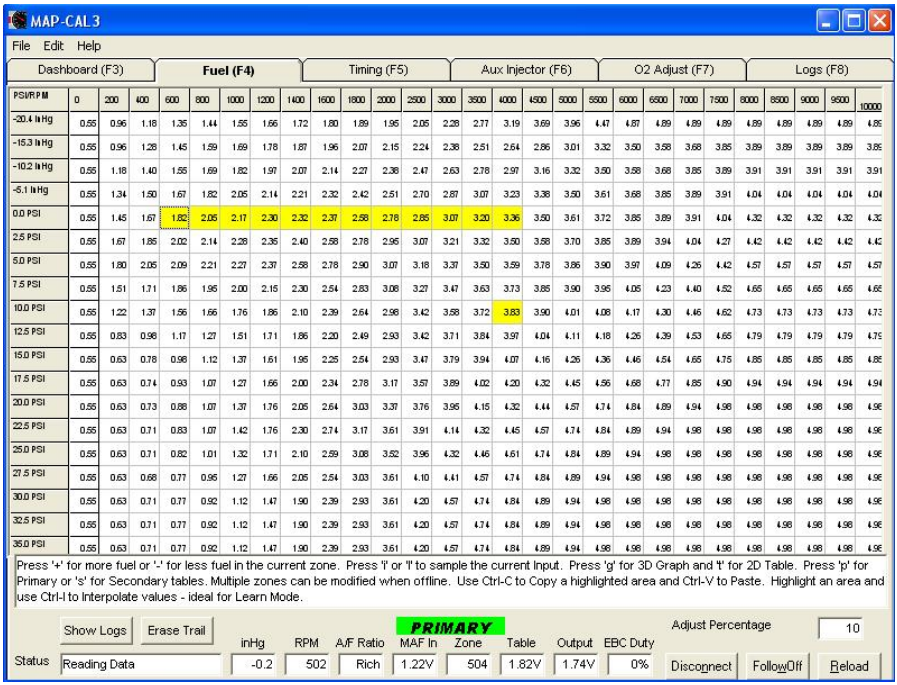


If MAPCAL3 cannot connect with the MAPECU3, the following error message will be displayed:



Cursor Trail

The Enable Cursor Trail checkbox instructs MAPCAL3 to highlight the zones (in Table mode only) that are accessed in real-time connected mode. The zones are highlighted in Yellow and remain highlighted for Enable Cursor Trail Time seconds. If Enable Cursor Trail Time is set to zero (0), the trail is never erased and must be manually erased by clicking the Erase Trail button. The following example illustrates a Cursor Trail on the fuel table:



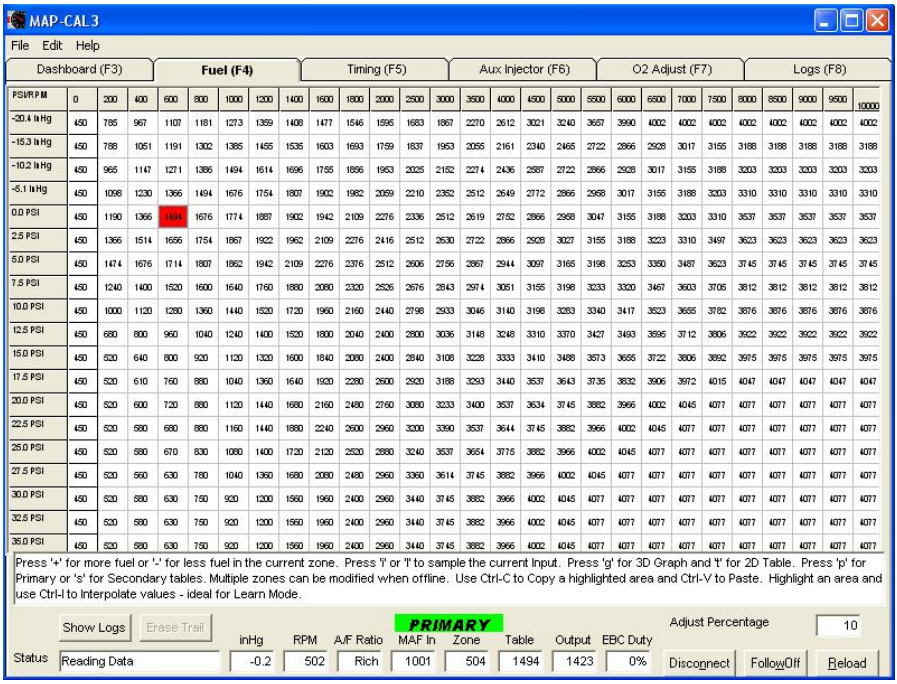
Note: Cursor Trail can be very resource intensive on some slower computers.

Enable O2 Input

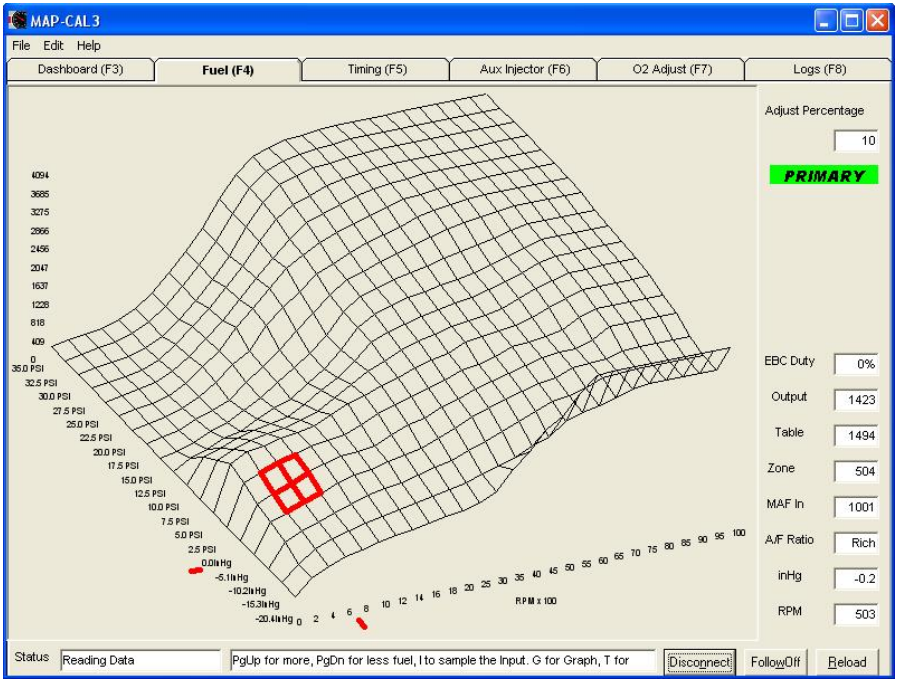
The Enable O2 Input checkbox enables/disables processing and display of the O2 sensor input voltage and A/F ratio on all screens. This should only be disabled if no O2 Sensor is to be monitored.

Display MAF Table in Voltage

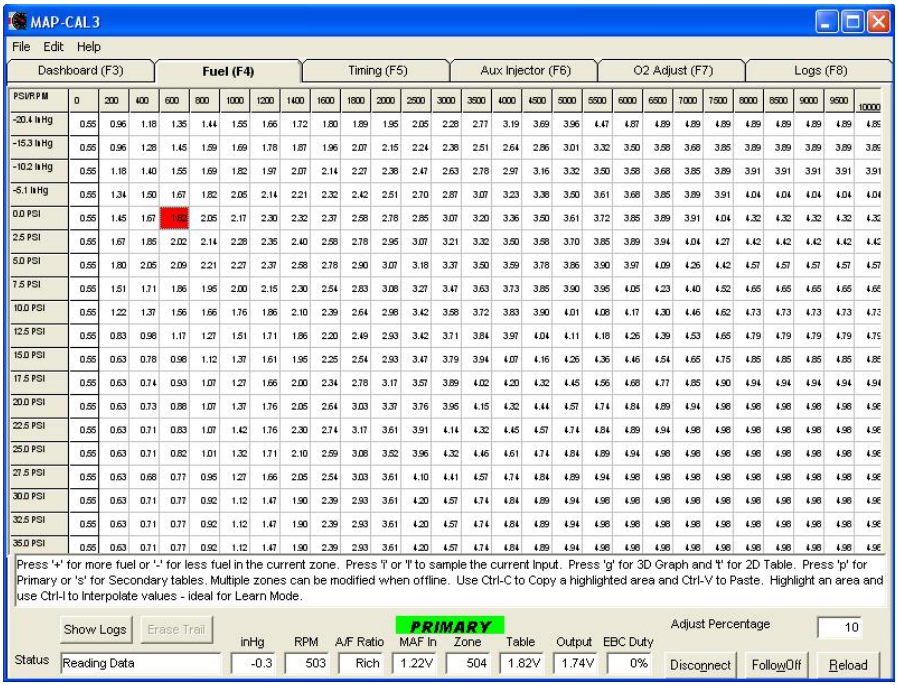
By default, the fuel table in MAF (Voltage) mode is displayed using raw values from 0-4095 (MAP-ECU mode). When this checkbox is enabled, MAF values are displayed as a voltage in the format 0.00-5.00 Volts. The following fuel table illustrates raw MAF values:



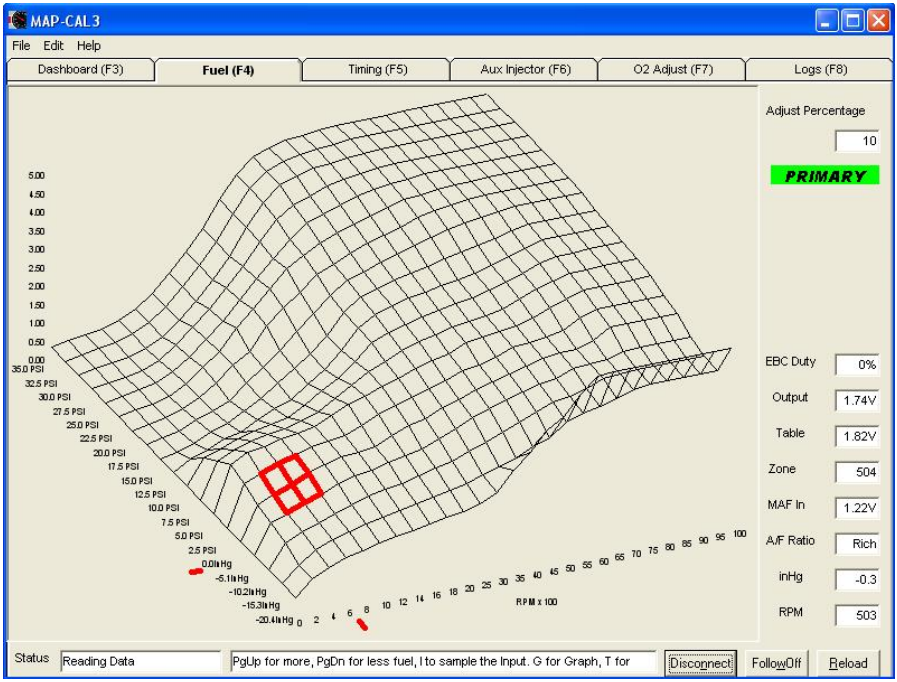
The following screen shot is the same raw data in Graph mode with Display MAF Table in Voltage disabled:



The following screen shot is the same table with Display MAF Table in Voltage enabled:

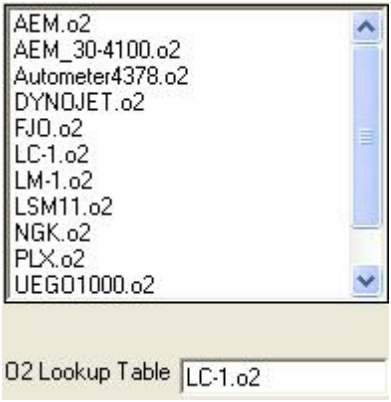


The following screen shot is the same data in Graph Mode with Display MAF Table in Voltage enabled:



O2 Lookup Table

The O2 Lookup Table field shows the O2 Lookup Table currently selected from the list shown below. In this case INNOVATE LC-1. The O2 Lookup Table is a table that configures MAPCAL3 to convert O2 Voltage to Air/Fuel ratios. Any of the lookup tables shown in the list can be selected as follows:



Note: This table is also used to configure the Lean Boost Retard Air/Fuel Ratio.

Force Firmware Upgrade

MAPCAL3 has an option to force a Firmware upgrade as soon as the Connect button is pressed. This is provided for major version upgrades where a Firmware upgrade needs to take place before MAPCAL3 can connect to the MAPECU3. The checkbox is disabled after the Firmware upgrade takes place.

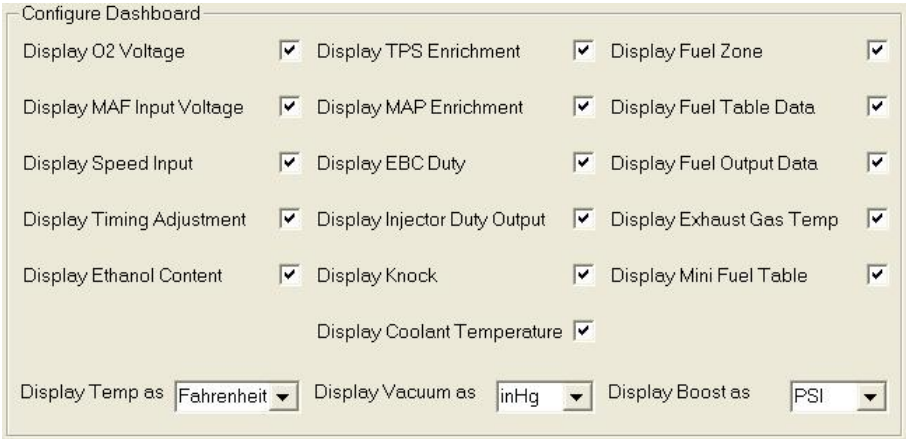
MAPECU3A (NEW)

From serial number 30504, MAPECU3's changed to a larger internal MAP sensor similar to MAPECU and MAPECU2. This different hardware is designated MAPECU3A and this check box is automatically set when a MAPECU3A is connected. You should not have to alter this setting.

Configure Dashboard

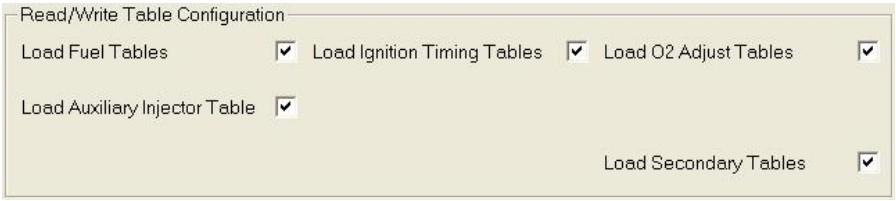
The options under Configure Dashboard allow the user to configure the information displayed on the dashboard. Display of all information can lead to an overly complex dashboard therefore users can tailor the amount of information displayed.

In addition, the user can choose whether vacuum is displayed as mmHg or inHg and boost is displayed as PSI, kPa or Bar. Inlet Air Temperature (IAT) can be displayed in Celsius, Fahrenheit or not at all.



Configure Tables (NEW)

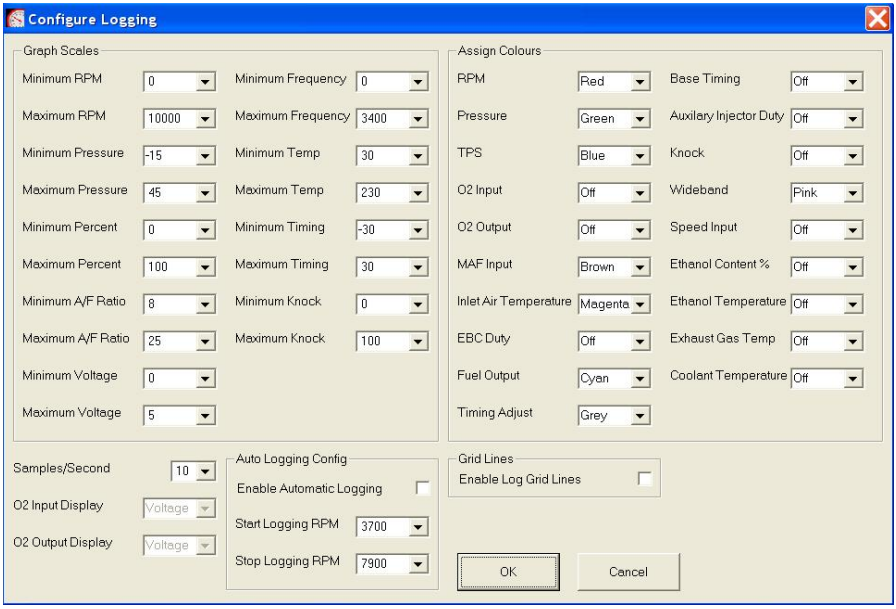
In MAPCAL3 V3.5, the tables read/written from/to the MAPECU3 can be configured as per the following screen.



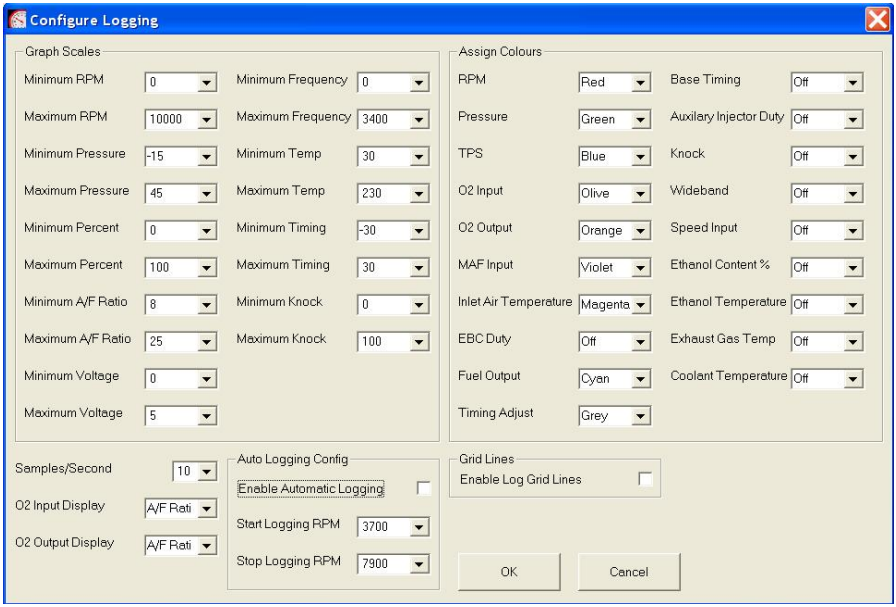
This new feature has been added to the control the tables being read/written from/to the MAPECU3 to speed connection and tuning. You can select/deselect Fuel, Ignition Timing, O2 Adjust and Auxiliary Injector tables. If you deselect a table, it will not be read or written during tuning. If you alter one of these tables, an error message with appear. In addition, you can disable all the secondary tables if they are not being used.

Configure Logging (Ctrl+G) (NEW)

The Configure Logging screen has been enhanced to support the new parameters: Speed, Ethanol Content %, Ethanol Temperature, EGT and CLT. Logging is configured using the Configure Logging menu option, as follows:



Note: O2 Input and O2 Output Display pull-down lists are greyed out because Wideband is enabled with the colour "Pink". If Wideband is disabled by selecting "OFF" then the options are enabled as per the screen shot on the next page.


Configure Logging
Graph Scales
Minimum RPM 0
Maximum RPM 10000
Minimum Pressure -15
Maximum Pressure 45
Minimum Percent 0
Maximum Percent 100
Minimum A/F Ratio 8
Maximum A/F Ratio 25
Minimum Voltage 0
Maximum Voltage 5
Minimum Frequency 0
Maximum Frequency 3400
Minimum Temp 30
Maximum Temp 230
Minimum Timing -30
Maximum Timing 30
Minimum Knock 0
Maximum Knock 100
Assign Colours
RPM Red
Pressure Green
TPS Blue
O2 Input Olive
O2 Output Orange
MAF Input Violet
Inlet Air Temperature Magenta
EBC Duty Off
Fuel Output Cyan
Timing Adjust Grey
Base Timing Off
Auxilary Injector Duty Off
Knock Off
Wideband Off
Speed Input Off
Ethanol Content % Off
Ethanol Temperature Off
Exhaust Gas Temp Off
Coolant Temperature Off
Samples/Second 10
O2 Input Display A/F Rati
O2 Output Display A/F Rati
Auto Logging Config
Enable Automatic Logging
Start Logging RPM 3700
Stop Logging RPM 7900
Grid Lines
Enable Log Grid Lines
OK
Cancel

The fields available include:

- Start RPM
- Stop RPM
- Automatic Logging select
- Enable Grid Lines on the Log Display
- Display Input/Output O2 Voltage or A/F Ratio select
- Log Entries per second
- Colour Assignments
- Graph Scale Minimum/Maximum

Samples/Second

The Samples/Second pull-down box allows the user to configure the number of samples per second stored from 1 to 10. MAPCAL3 is configured to store up to 6000 samples per log which equals 10 minutes at 10 samples per second.

O2 Input/Output Display

The O2 Input and Output Display pull-down boxes allow the user to independently configure if O2 data is displayed as voltage or Air/Fuel ratios on the log graph.

Start RPM

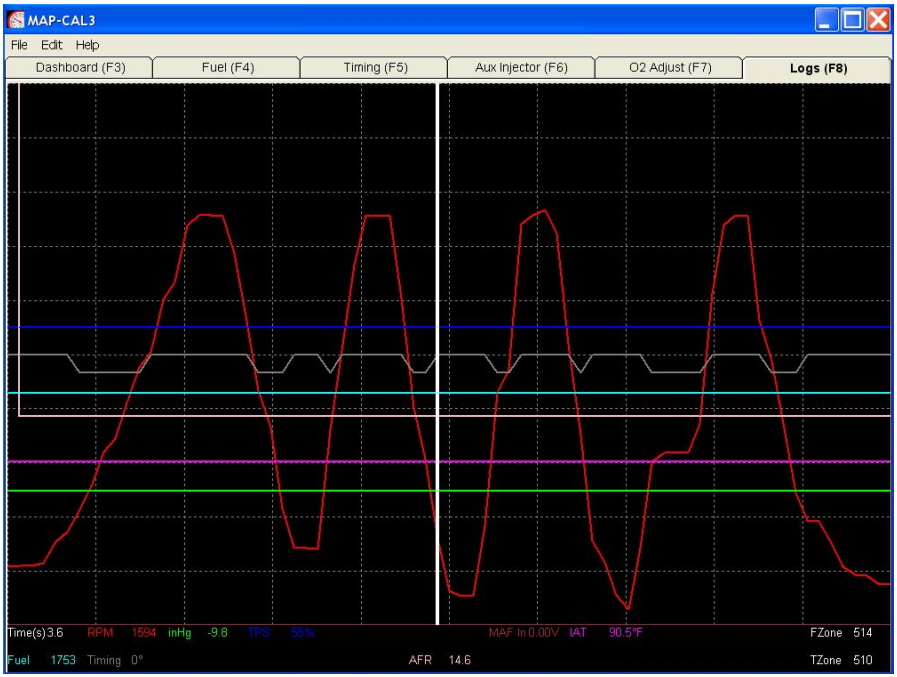
This value sets the RPM at which logging will automatically start. Valid entries are 1-8000. **Note**: Start RPM must be less than Stop RPM otherwise an error will be reported.

Stop RPM

This value sets the RPM at which logging will automatically stop. Valid entries are 1-8000. **Note**: Stop RPM must be greater than Start RPM otherwise an error will be reported.

Enable Log Grid Lines

Checking this option displays grid lines on the log as per the following screen shot:



Data Elements (NEW)

With MAPCAL3 V3.5, all the data elements are now displayed regardless of screen size when configured and are in the assigned colour.

Assign Colours

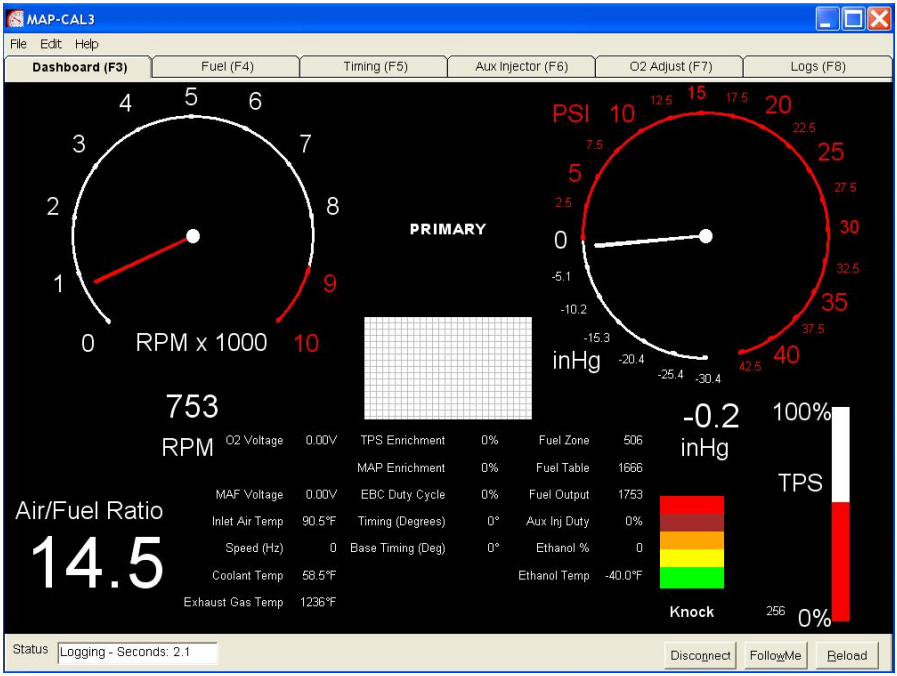
The colour used to display each of the data elements logged can be configured using the pull-down boxes. To reduce log display clutter, individual log elements can be disabled by selecting the OFF option.

Graph Scales

The y-axis (vertical scale) maximum and minimum values can be configured for each log data element type. This option is provided to improve display usage where a data element only has a limited range, e.g. Maximum RPM may only be 8000 instead of 10,000 maximum of the MAPECU3. Additionally, the user may wish to examine a range of data in detail and therefore expand the display resolution. These options do not alter the log data in any way.

Automatic Logging

When correct values are entered in the Start and Stop RPM fields selecting this switch enables the auto log function. The MAPCAL3 software will automatically jump to Dashboard mode while waiting for the Start RPM. MAPCAL3 will 'Beep' when logging starts and stops. The Status field also indicates logging is in progress, as follows:



Note: MAPCAL3 displays the length of time logging has been active in seconds in the Status Box.

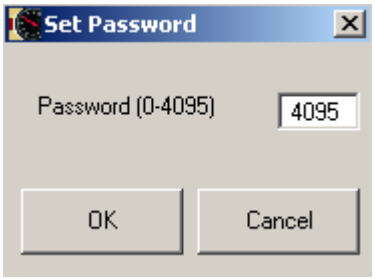
Erase All Logs (Ctrl+E)

Selecting this menu option, or using the shortcut key (Ctrl+E) will erase all logs held in MAPCAL3's memory.

Set Password

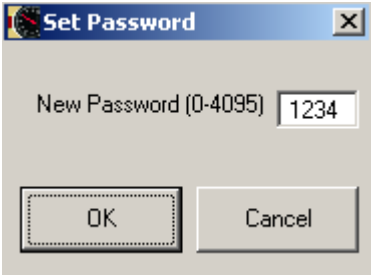
The MAPECU3 has a password protection facility that protects **all** data in the MAPECU3. With a password of '4095' (the default), the MAPECU3 behaves as if no password is applied. Setting the password to anything other than 4095 will lock access to the MAPECU3. Valid passwords are in the range 0-4095.

If the Set Password menu item is selected when the MAPECU3 is 'Disconnected', the following screen is presented:



The Password entered is verified against the MAPECU3 when the 'Connected' button is pressed. If a password protected MAPECU3 is connected, this password **must** be set before pressing the 'Connect' button.
If the password is not set, or it is set incorrectly, the following screen will be displayed once the 'Connect' button is pressed:

Once a MAPECU3 is successfully 'Connected' with the correct Password, the Set Password screen will alter slightly as follows:

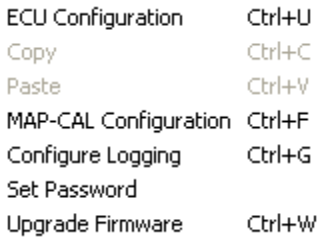


This version of the screen indicates the Current Password is '1234' and allows the user to enter a New Password (0-4095). When the 'OK' button is pressed, the new password is written to the MAPECU3.

Note: It is strongly recommended that a password is set only when MAPECU3 tuning is completed. Once a MAPECU3 has been password protected, it is **IMPOSSIBLE** to break the password. It must be returned to your local distributor for complete erasure.

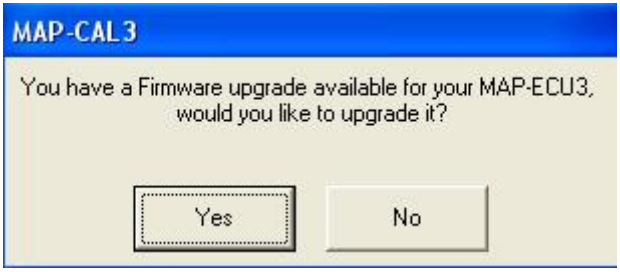
Upgrade Firmware

MAPCAL3 can upgrade the firmware in a MAPECU3 at anytime using this menu option. Firmware is the software programming contained in the MAPECU3 controlling all features and functions. From time to time new versions of MAPCAL3 may be released that include a firmware upgrade for the MAPECU3. Firmware upgrades are provided to add features or fix bugs. If MAPCAL3 contains a later firmware version to that installed in the currently attached MAPECU3, this option will be available, as follows:

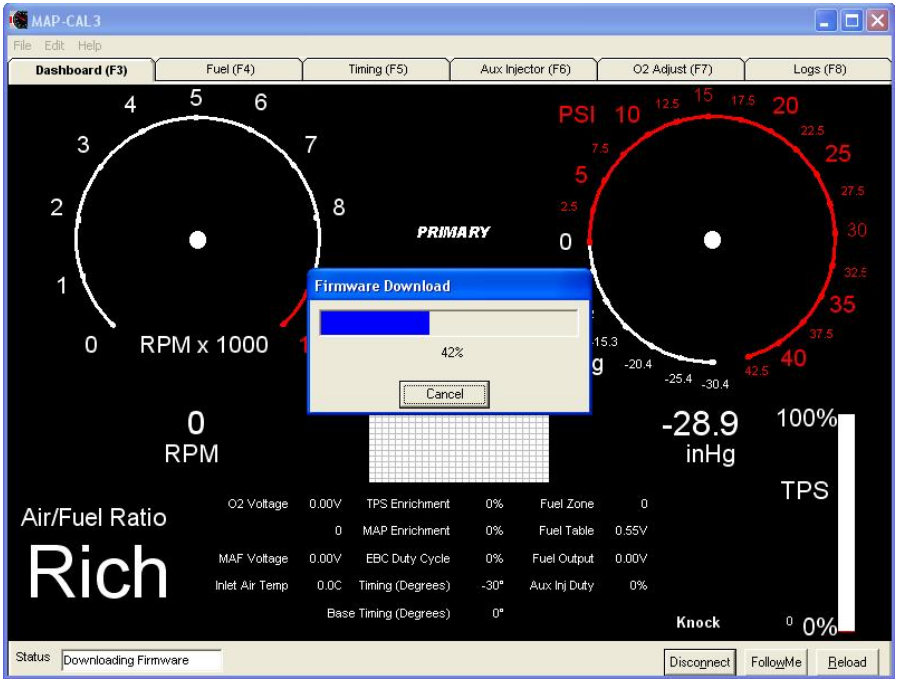


It is recommended that the data in the MAPECU3 is saved to a ".tbl" file before a firmware upgrade is attempted.
You cannot upgrade Firmware in a MAPECU3 where RPM>0, i.e. engine in running. If you select Upgrade Firmware when RPM>0 the following error message with appear:

Selecting the Upgrade Firmware option when RPM=0 will cause the following screen to appear:



Pressing the Yes button will result in the following screen appearing:



Once a firmware upgrade is complete, MAPCAL3 will rewrite the MAPECU3 Configuration parameters, reload all data and remain Connected.

Warning: Do not interrupt the firmware upgrade process once started otherwise the MAPECU3 may not operate correctly and will need to be returned to your dealer for repair.

Note: MAPCAL3 will automatically prompt the user when you connect to a MAPECU3 and a Firmware upgrade is available. Pressing Yes will queue the upgrade after the configuration data is loaded.

Note: If a MAPECU3 detects a error with it's Firmware, LED's 3 and 4 with flash back and forth to indicate there is a problem. If this occurs, instigate a Firmware reflash process.

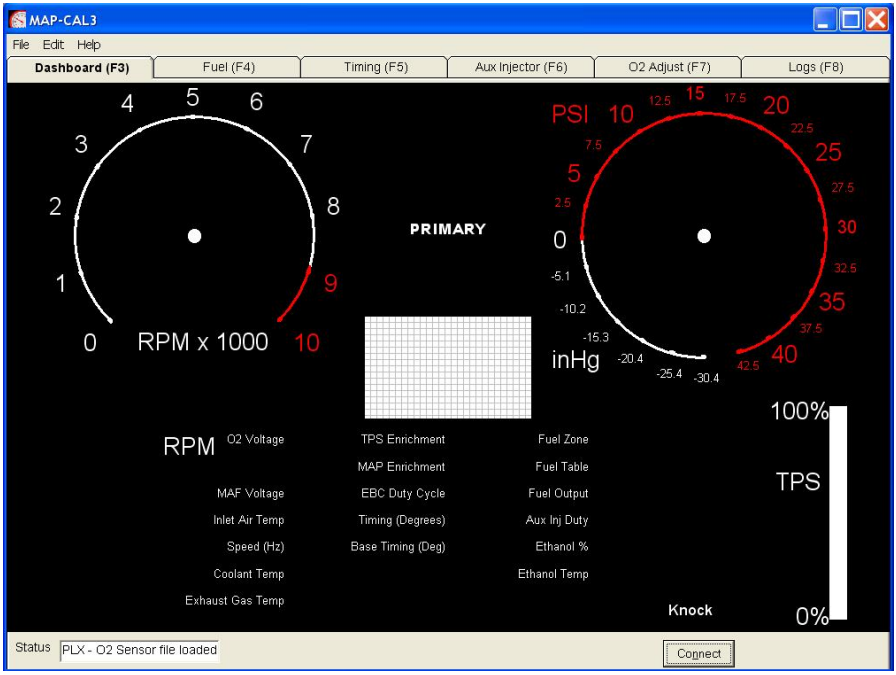
Help

When the Help menu entry is selected a message box displaying the software version number similar to the following is displayed:

MAPECU3 Data Loaded

Dashboard Tab (F3)

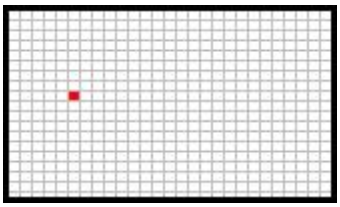
If the F3 key is pressed the Dashboard Tab similar to this will appear:



Note: The button labelled ‘Connect’ changes it’s label depending on state. Since the MAPECU3 is disconnected the button is labelled ‘Connect’ indicating that pressing it will cause the MAPCAL3 software to communicate with the MAPECU3. When the MAPECU3 is Connected, the button will change label to ‘Disconnect’, indicating that if the button is pressed MAPCAL3 will Disconnect.

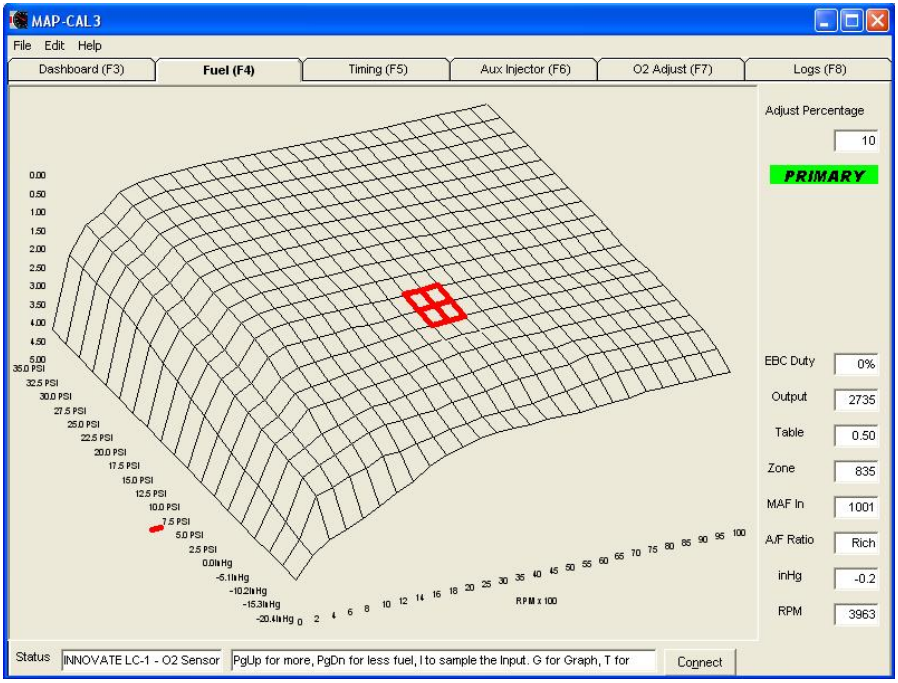
Mini-Table

A fuel mini-table view is represented on the Dashboard to provide a visual reference of the active zone (red square) when connected:



Fuel Tab (F4)

If the F4 key is pressed the fuel table similar to this will appear:

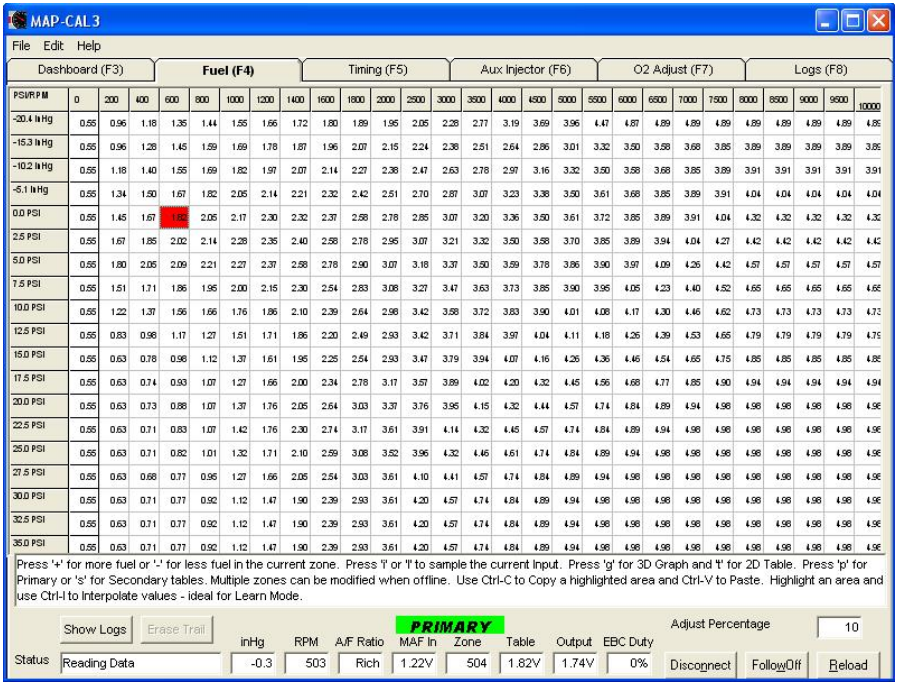


Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Increment zone by the adjust percentage/constant.
PgDn or '-'	Decrement zone by the adjust percentage/constant.
'I'	Sample the current air flow meter input and store to the zone.
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

In order to change the fuel display to 2D Table mode, press the 'T' key and a table similar to this will appear:



Note: Data in the RPM 0 column cannot be modified.
Note: In this example, the MAPECU3 is in MAF (Voltage Mode) and MAPCAL3 has been to configured to display data as Voltage (0.00-5.00V) versus raw data (0-4095).

Editing Table Mode

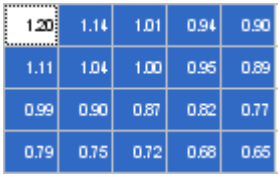
MAPCAL3 now allows real-time multi-zone update. A number of functions are available to edit and modify data when Online **and** Offline in Table mode, as follows:

Function	Description
'+'	Increment zone(s) by the adjust percentage/constant. If multiple zones are selected all the zones are incremented.
'-'	Decrement zone(s) by the adjust percentage/constant. If multiple zones are selected all the zones are decremented.
0-9	Enter data directly. In voltage mode the decimal point is automatically entered, e.g. if 1.23 volts is required, '123' is entered and the decimal point is automatically inserted.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.
Backspace	Zero the value(s) in the selected zone(s) and allow keyboard input. Backspace is required to enter a negative number in intercept modes.
Offline Functions	
Ctrl+C	Copy. Copy the selected zones to an internal clipboard.
Ctrl+V	Paste. Paste the already copied zones to the zones starting with the selected zone.
Ctrl+I	Interpolate zones. This function can be used to fill in zones that have no data after using auto-learn. The data in zones between the 1st and last zones selected are filled with values based on the evenly spread difference between the 1st and last zone. Interpolation will operated across rows and columns.

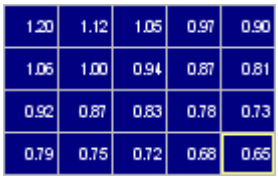
Interpolation Explained

The following example illustrates how Interpolation works. **Note**: Any data in between the 1st and last zones is overwritten.

The following screen shot illustrated a portion of the raw table highlighted prior to interpolation:



The following screen shot illustrated the same portion of the table after Interpolation (Ctrl+I):



Note that in the first row, the values 1.14, 1.01 and 0.94 have been overwritten with 1.12, 1.05 and 0.97 respectively. These values are calculated by evenly distributing the difference between the 1st zone (1.20) and the last zone (0.90). The same principle has been used for interpolation down the column.

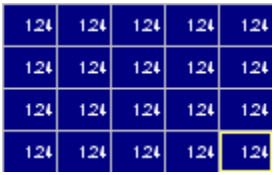
Interpolation can be used across any number of rows (1-19) or columns (1-26).

Edit Bulk Data

Data can be entered into any number of zones simultaneously. When a number of zones are selected the same value can be entered into all the selected zones. In the following example, '123' was entered once will all the zones selected:

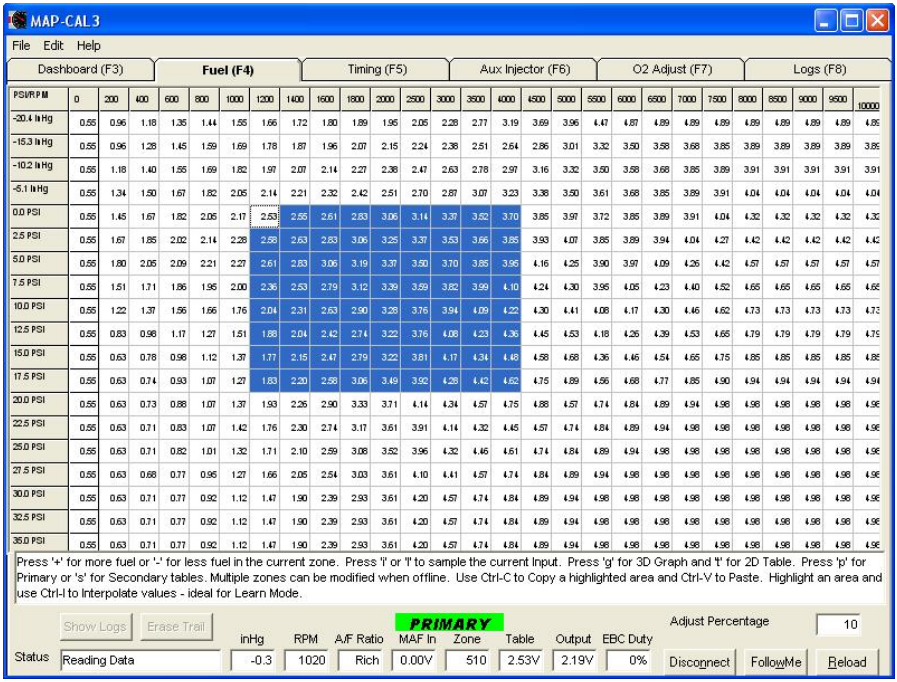
In the same way, a group of zones can be incremented or decremented using the ‘+/-‘ keys respectively. In the following example, all the previous selected zones were decremented by one by pressing the ‘-‘ key once:

In the following example, all the previous selected zones were incremented by one by pressing the ‘+’ key once:

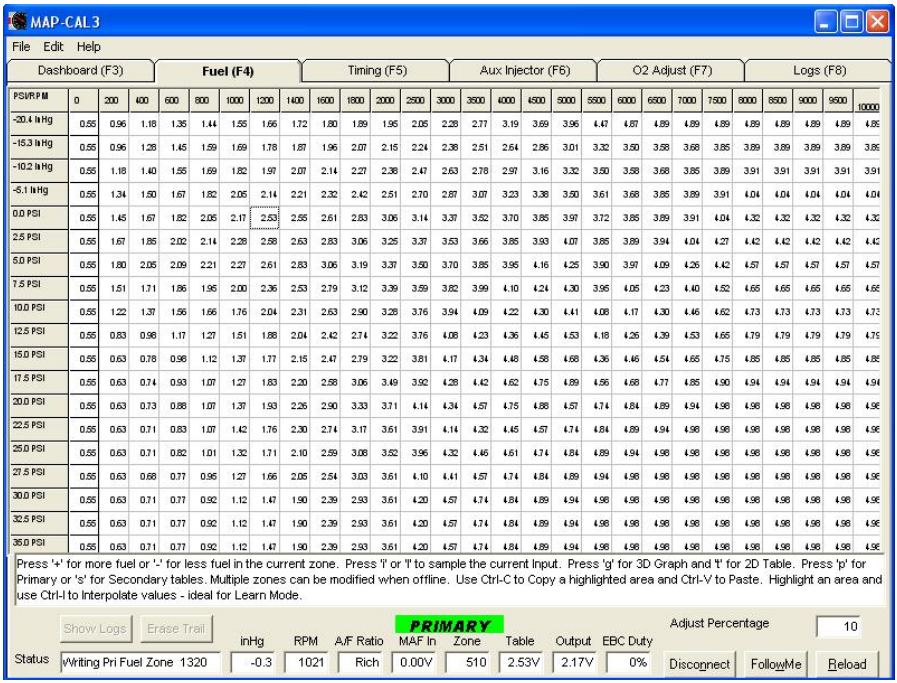


Real-time Multi-Zone Update

When multiple zones are selected for update in real-time, i.e. connected to a MAPECU3, the Status box will display the zones being updated. If a very large number of zones are selected for update, it can take some time. The screen shot below shows the zones selected which are to be modified real-time. The selection below takes approximately two seconds to update:



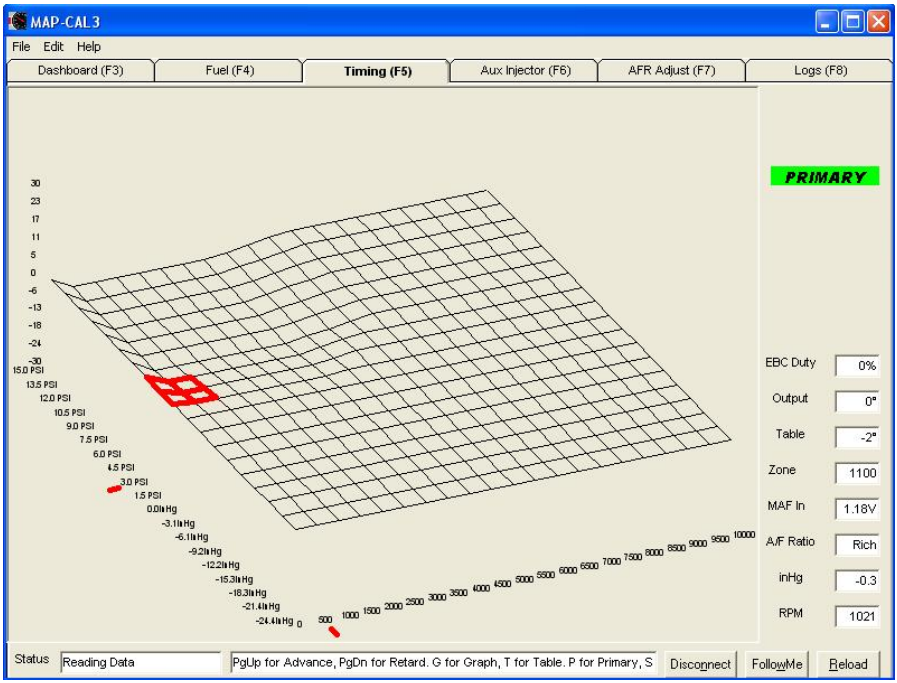
The following screen shows MAPCAL3 updating the MAPECU3 after pressing "+" with multiple zones selected. Note the Status box progress:



Note: Real-time multi-zone update works on all MAPECU3 tables.

Timing Tab (F5)

If the F5 key is pressed the timing table similar to this will appear:

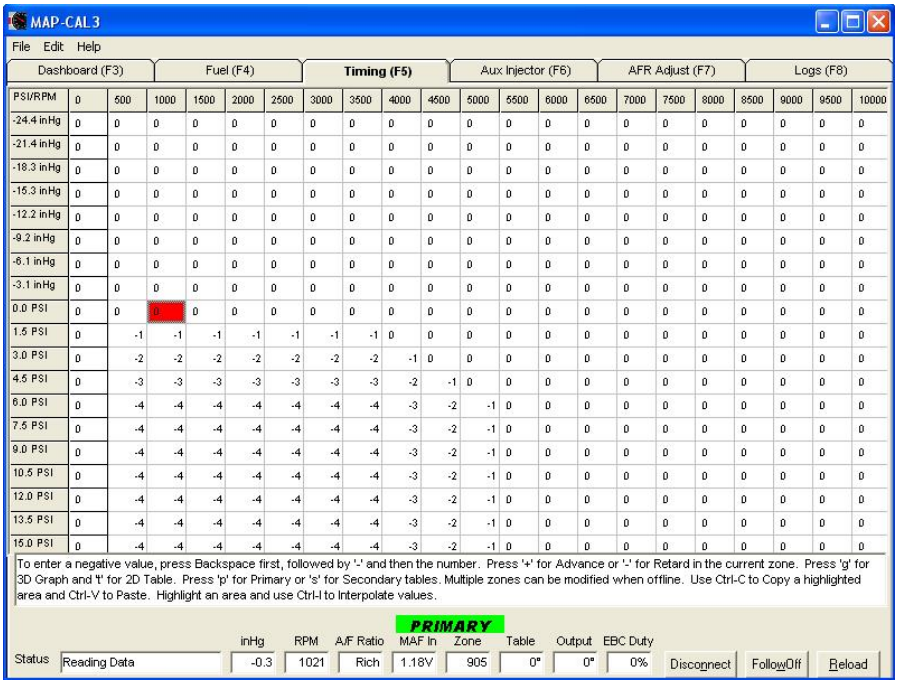


Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Advance timing in zone by 1 degree.
PgDn or '-'	Retard timing in zone by 1 degree.
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

In order to change the timing display to 2D Table mode, press the 'T' key and a table similar to this will appear:



Note: Data in the RPM 0 column cannot be modified.

Editing Table Mode

A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
'+'	Increment zone(s) by 1 degree. If multiple zones are selected all the zones are incremented.
'-'	Decrement zone(s) by 1 degree. If multiple zones are selected all the zones are decremented.
0-9	Enter data directly. T enter a negative number, press "Backspace" followed by '-' and then the number between 0 and 30.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

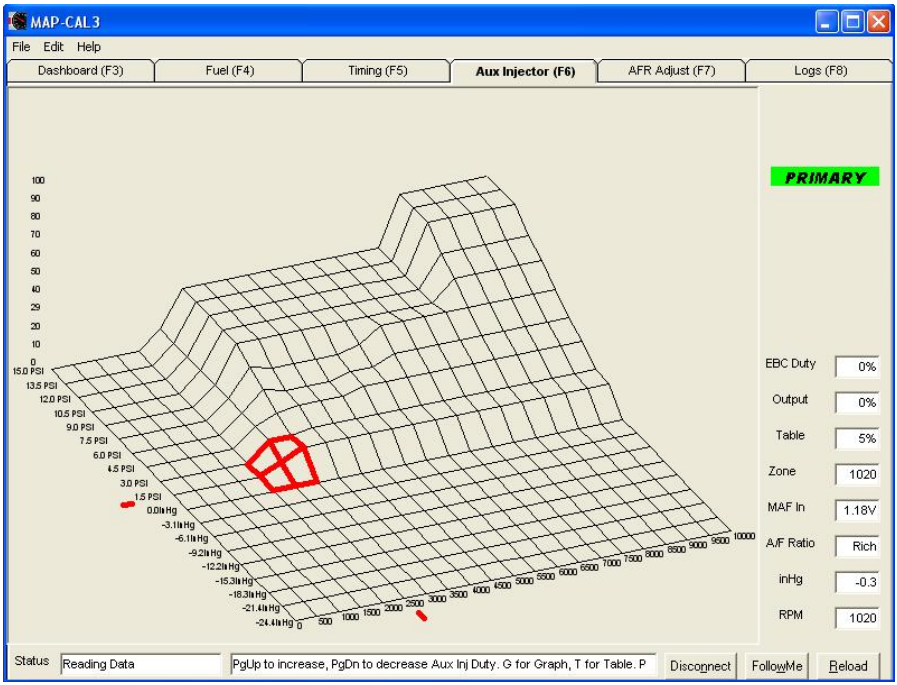
Backspace	Zero the value(s) in the selected zone(s) and allow keyboard input. Backspace is required to enter a negative number in intercept modes.
Offline Functions	
Ctrl+C	Copy. Copy the selected zones to an internal clipboard.
Ctrl+V	Paste. Paste the already copied zones to the zones starting with the selected zone.
Ctrl+I	Interpolate zones. This function can be used to fill in zones that have no data after using auto-learn. The data in zones between the 1st and last zones selected are filled with values based on the evenly spread difference between the 1st and last zone. Interpolation will operated across rows and columns.

How Timing Control Works

The timing adjustment value is calculated from the 380 zone timing table in the same way as the fuel value is calculated using interpolation. The result is a number in the range –30 (retard) to +30 (advance) degrees. The timing values in the MAPECU3 are **not** base timing values, they are **adjustments** on top of the OEM ECU timing. A value of zero (0) means no change to standard base timing, i.e. the MAPECU3 is not adjusting timing from the OEM ECU base configuration and the MAPECU3 is passing the timing signal "straight-through". If the OEM ECU has a setting of +6 degrees at 0psi and 1500 RPM (zone 510) and the MAPECU3 has –2 degrees in zone 510, the overall timing will be adjusted to +4 degrees, i.e. 4 degrees advance which is retarded 2 degrees from stock. The default values in the timing table is zero (0), i.e. no adjustment.

Aux Injector Tab (F6)

If the F6 key is pressed the Auxiliary Injector table similar to this will appear:

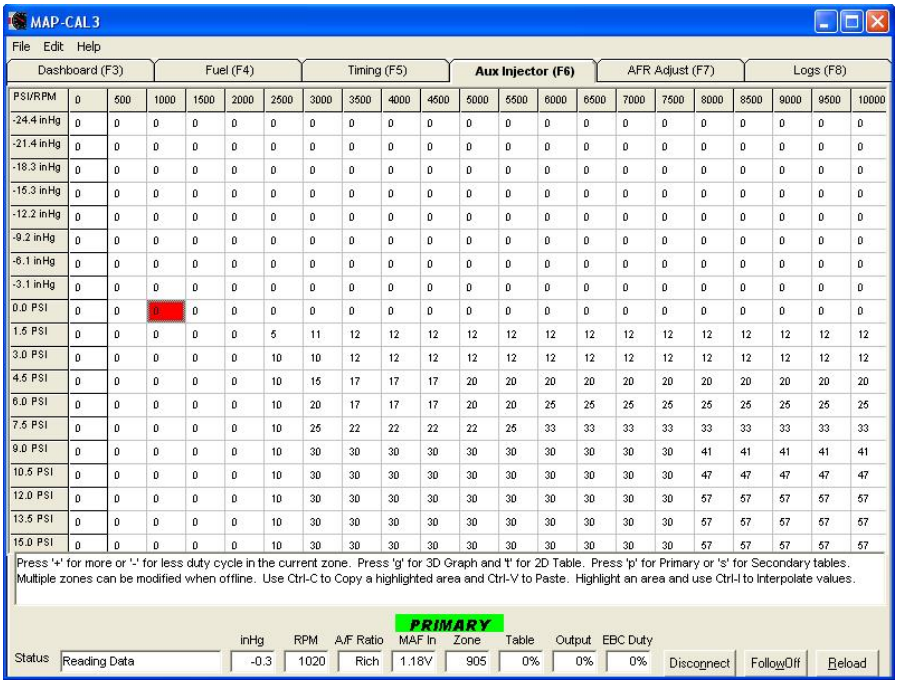


Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Increase Injector duty cycle by 1%, maximum 90%.
PgDn or '-'	Decrease Injector duty cycle by 1%
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

In order to change the Auxiliary Injector display to 2D Table mode, press the 'T' key and a table similar to this will appear:



Note: Data in the RPM 0 column cannot be modified.

Editing Table Mode

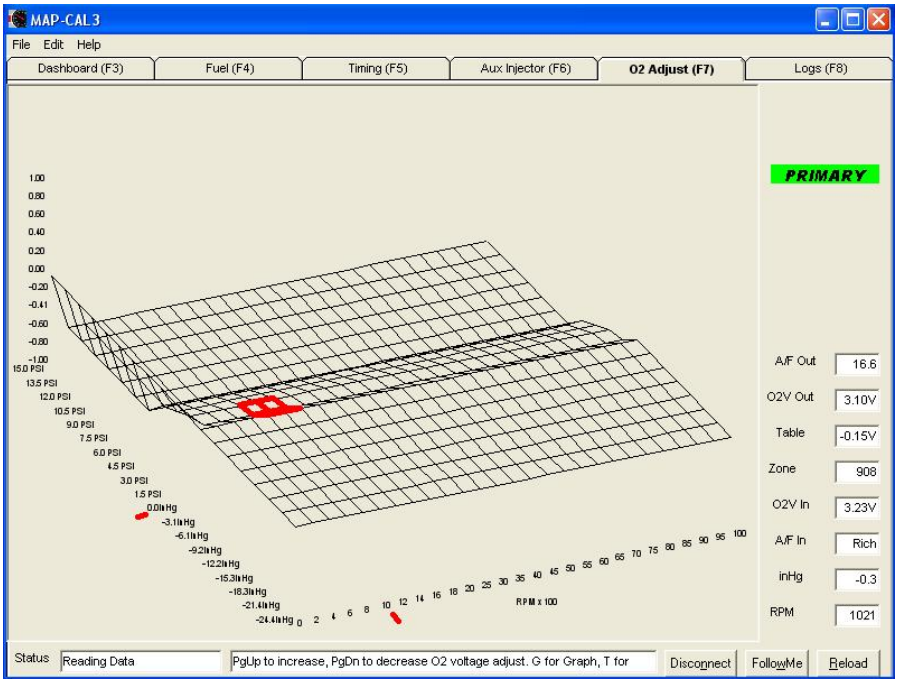
A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
'+'	Advance timing in zone(s) by 1 degree. If multiple zones are selected all the zones are incremented.
'-'	Retard timing in zone(s) by 1 degree. If multiple zones are selected all the zones are decremented.
0-9	Enter data directly. To enter a negative value, press 'BackSpace' to clear the zone.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Offline Functions	
Ctrl+C	Copy. Copy the selected zones to an internal clipboard.
Ctrl+V	Paste. Paste the already copied zones to the zones starting with the selected zone.
Ctrl+I	Interpolate zones. See “Interpolation Explained”.

O2 Adjust/AFR Adjust Tab (F7)

MAPCAL3 has AFR Sensor Adjust mode for the wideband AFR sensors used in some modern Toyota™ and Nissan ™ vehicles. These sensors are current based and require an external AFR Sensor Calibration module available from our website. AFR Adjust mode is enabled by configuring one of the Analog Voltage Outputs to "AFR". If the F7 key is pressed the O2 Adjust table similar to this will appear:

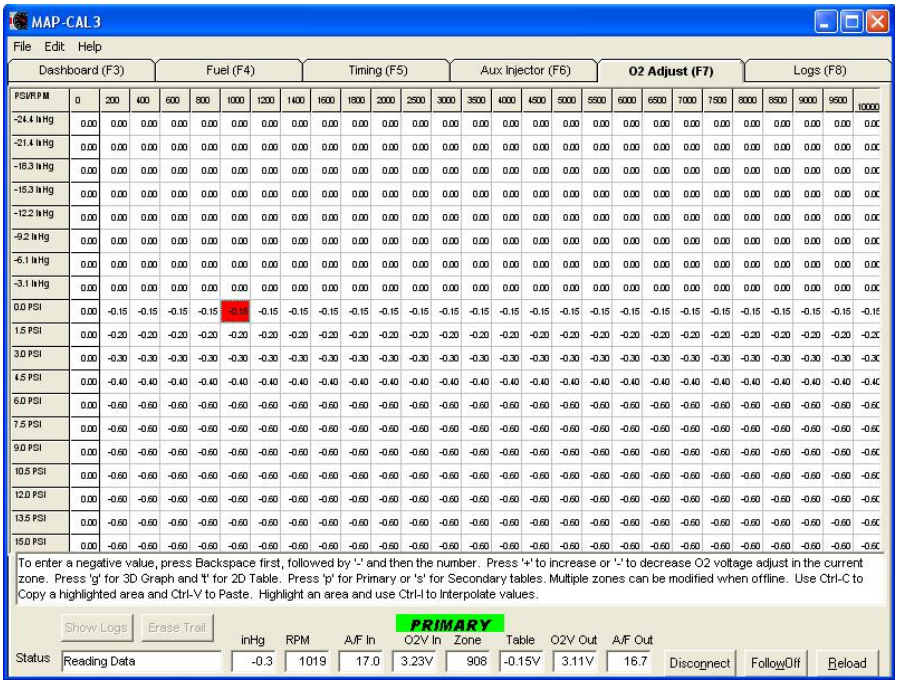


Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Increase current O2 Adjust zone(s) by 0.01 Volts.
PgDn or '-'	Decrease current O2 Adjust zone(s) by 0.01 Volts.
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

In order to change the O2 Adjust display to 2D Table mode, press the ‘T’ key and a table similar to this will appear:



Note: Data in the RPM 0 column cannot be modified.

Editing Table Mode

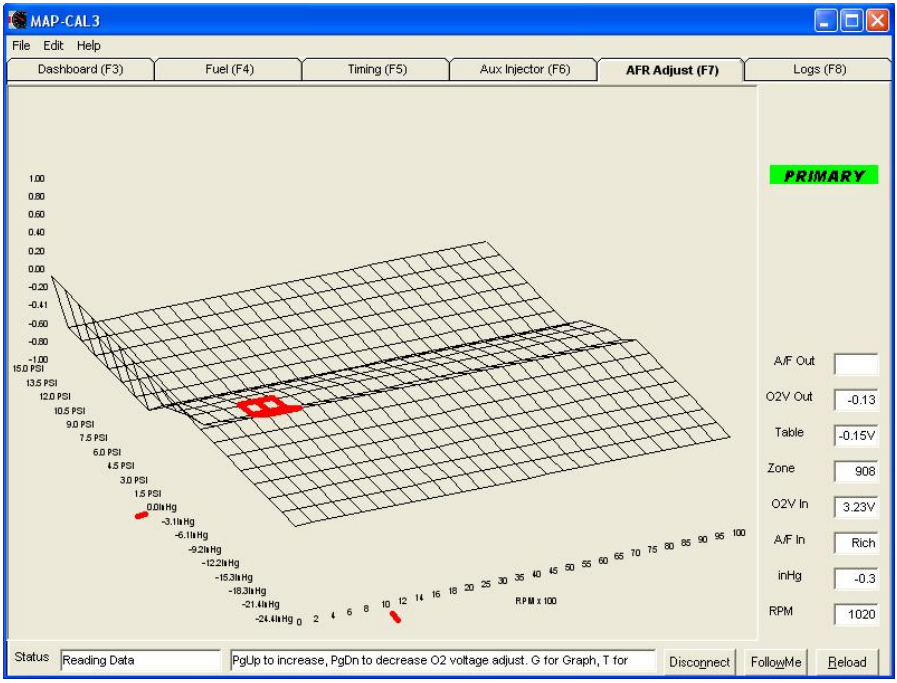
A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
‘+’	Increase current O2 Adjust zone(s) by 0.01 Volts.
‘-‘	Decrease current O2 Adjust zone(s) by 0.01 Volts.
0-9	Enter data directly. To enter a negative value, press ‘BackSpace’ to clear the zone and press ‘-‘ as the first character.
‘G’	Change to ‘Graph Mode’.
‘S’	Change to Secondary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
‘P’	Change to Primary fuel table. Note: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Offline Functions	
Ctrl+C	Copy. Copy the selected zones to an internal clipboard.
Ctrl+V	Paste. Paste the already copied zones to the zones starting with the selected zone.
Ctrl+I	Interpolate zones. See “Interpolation Explained”.

AFR Adjust Mode

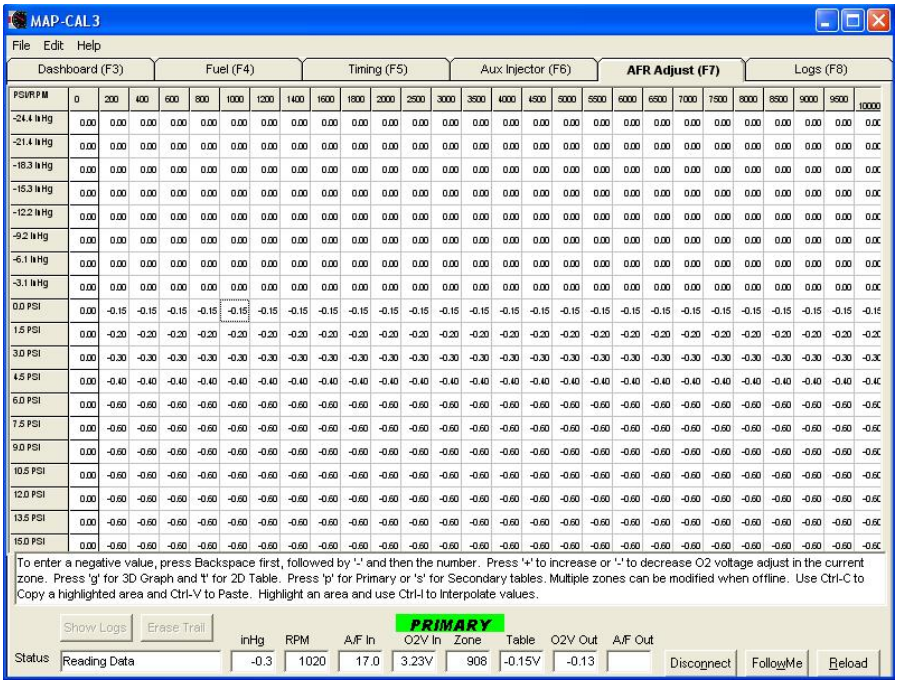
AFR Adjust has a range of +/- 1.00 which equates to +/- 10mA of in steps of 0.1mA. A value of 0.00 means there no AFR Sensor Adjust. If one of the outputs is configured for AFR mode, the screen will look like this example:



Note: This example is not adjusting the AFR Sensor as the table is all zero's.

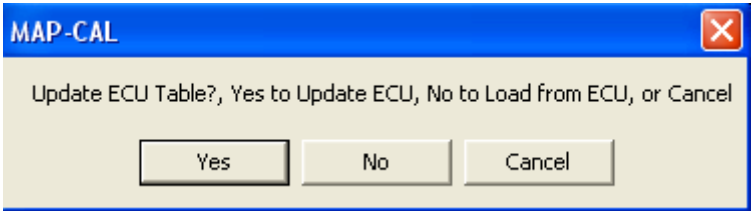
Note: The name of the tab has changed to AFR Adjust.

The following AFR mode table has a value of –0.15 which equates to –1.5mA adjust to the AFR sensor:



Connect/Disconnect Button (Alt+N)

Online mode is entered by pressing the button labelled ‘Connect’. The ‘Connect’ button can be pressed before data is loaded from a data file, or after. If the ‘Connect’ button is pressed before a file is opened, a simple ‘Yes’ or ‘Cancel’ option is presented before the MAPECU3 data is loaded. If the ‘Connect’ button is pressed after data is loaded from a file, a prompt will appear asking the user for a decision. A screen similar to this will appear if a data file has already been opened:



If the user selects ‘Yes’, MAPCAL3 will overwrite the MAPECU3 with the current data in the MAPCAL3 software, i.e. the contents of the data file.

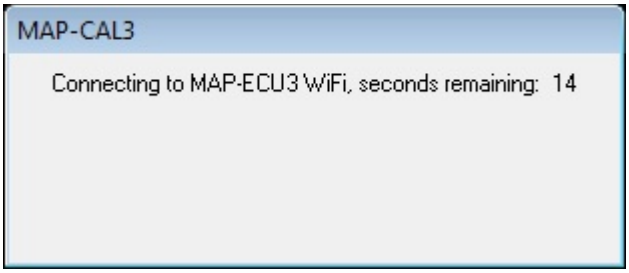
MAPCAL3 has a new feature called fast reconnect. If modifications have been made “offline” only the changes will be written to the MAPECU3. For example, if only the Primary Fuel table has been modified offline, then only the Primary Fuel Table will be written back to the MAPECU3 greatly speeding up reconnection. In previous versions of MAPCAL3, all tables would have been rewritten.

Warning: This will overwrite any data in the MAPECU3 and it will not be recoverable. If the user selects ‘No’, MAPCAL3 will discard the data currently loaded and read all data from the MAPECU3. Again, the data in the MAPCAL3 software will be deleted and cannot be recovered, unless a copy was saved to disk prior to pressing the ‘Connect’ button. Pressing the ‘Cancel’ button will terminate this prompt and no action will take place as if the ‘Connect’ button was never pressed.

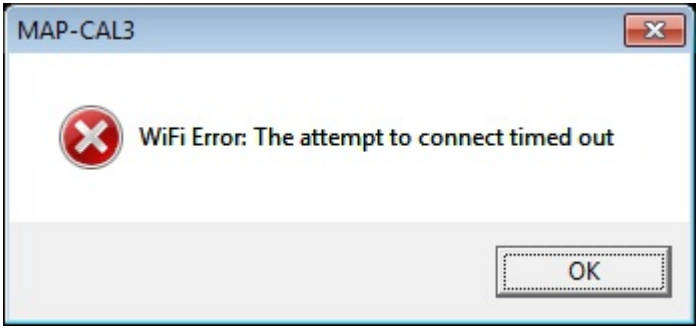
If the user selects the 'No' option, MAPCAL3 will attempt to find a MAPECU3 connected via USB or WiFi. If MAPCAL3 cannot find a MAPECU3 or the device driver is not correctly configured, a message similar to this will be displayed:

WiFi Connection

If WiFi has been configured, MAPCAL3 will attempt to connect with the MAPECU3 for up to 20 seconds over the wireless network. While connecting, MAPCAL3 may display the following message:

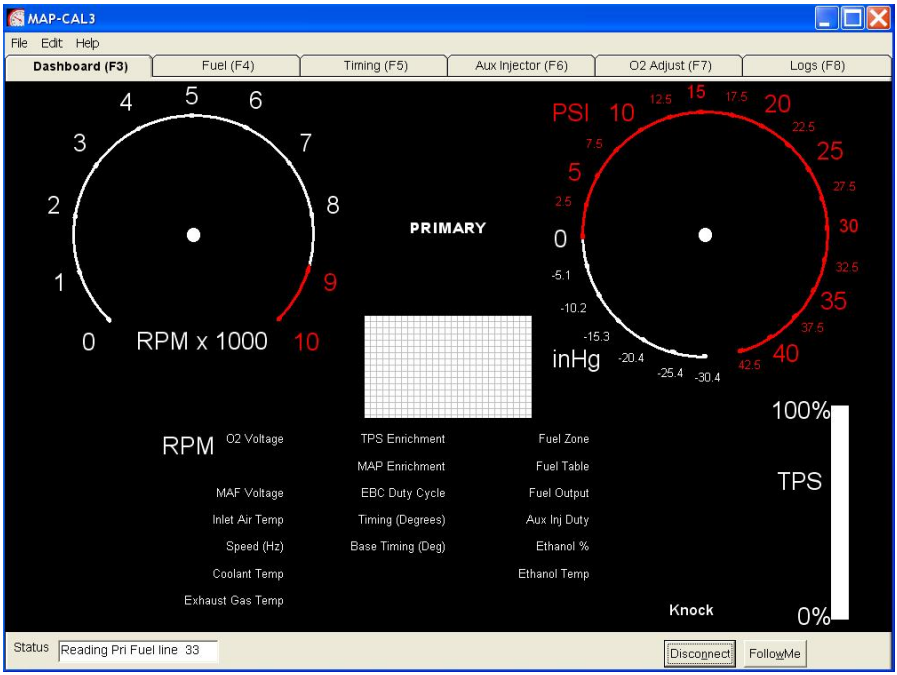


If MAP-CAL cannot connect to the selected MAPECU3, the following screen will be displayed:



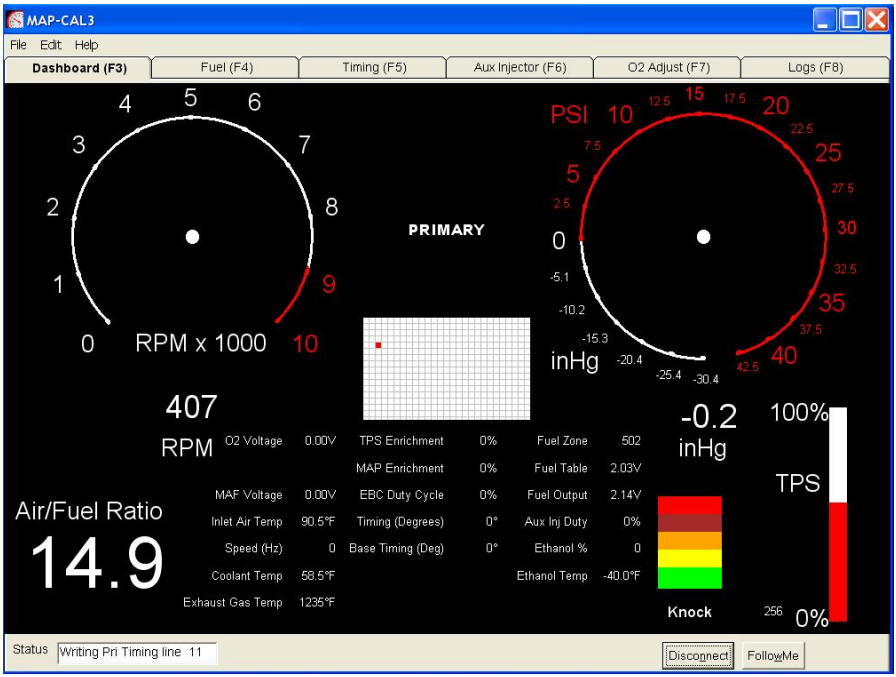
Note: Refer to page 79 for instructions on connecting with a MAPECU3 via WiFi.

When MAPCAL3 is successfully communicating with a MAPECU3, the status box will be as follows:



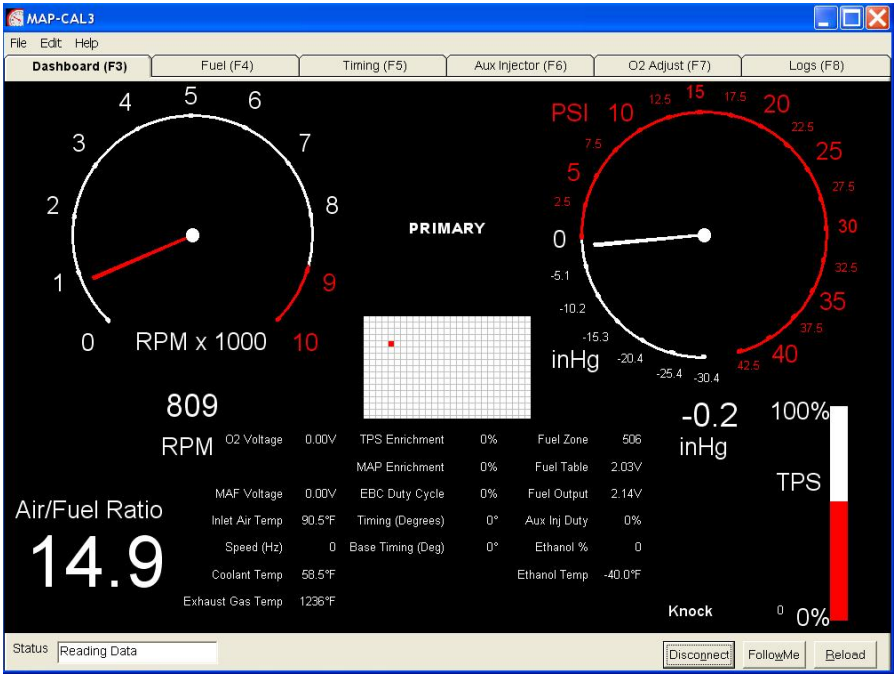
The Status line is showing that MAPCAL3 is reading the data tables from the MAPECU3 but the MAPECU3 is not yet fully online, i.e. Real-time mode. Note also that another button has now appeared, labelled ‘FollowMe’. ‘FollowMe’ is part of the real-time edit mode which will be explained later in this manual. ‘FollowMe’ is only available when the MAPECU3 is online, therefore it was not active before the button was pressed.

If the user selects the ‘Yes’ option to the previous question, a screen similar to this would appear:



Note: The Status box indicates that MAPCAL3 is writing (downloading) the current data to the MAPECU3 before going into real-time online mode.

Once data transfer has concluded, a screen similar to this will appear:

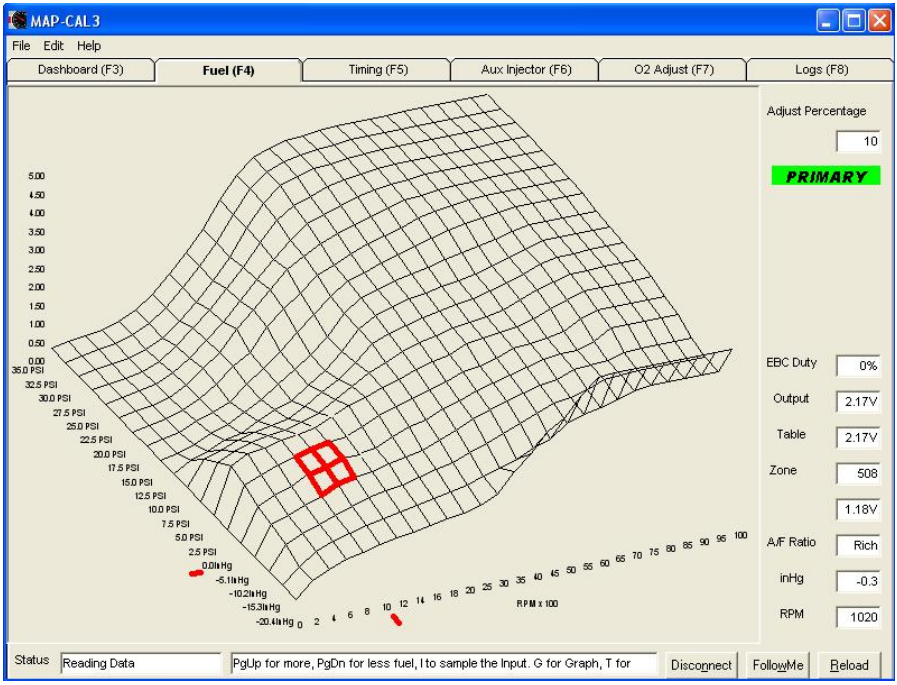


The MAPECU3 is fully online, showing current readings from the MAPECU3, such as current Pressure, RPM and calculated Output. Note that another new button has appeared, labelled ‘Reload’. This allows the user to request a data transfer from the MAPECU3, overwriting all data in MAPCAL3.

Note: The example above is showing all dashboard data. This can be configured using MAP-CAL Configuration (Ctrl+F).

Connected Fuel Graph Mode

If the Fuel Graph is selected, when the MAPECU3 is connected, a screen similar to the following will appear:

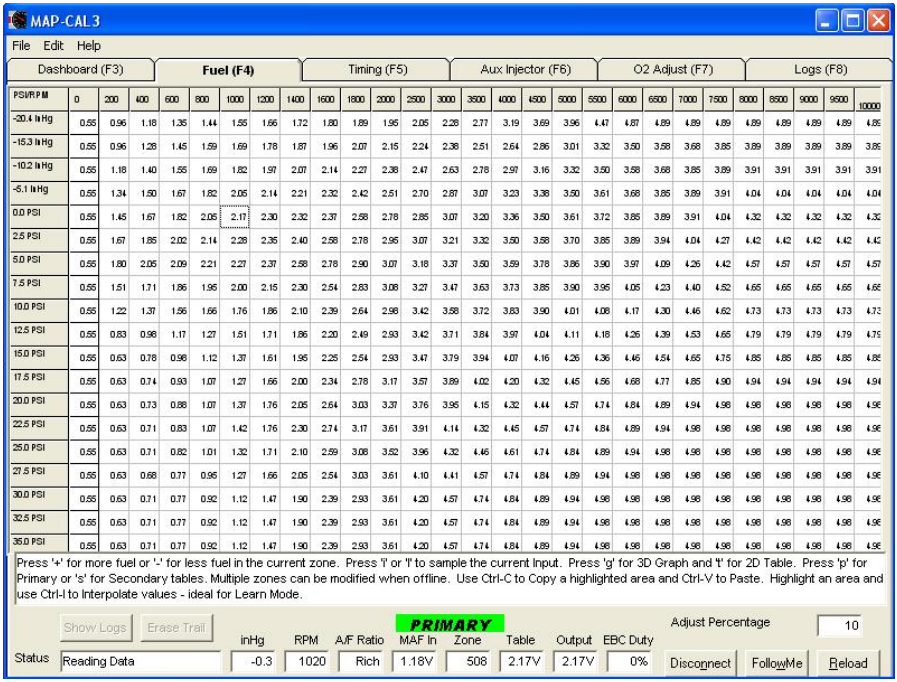


In FollowMe mode, the centre of the red square indicates the active zone with small red lines on the Pressure and RPM axes indicating their actual positions.

Note: The 'Invert Y Axis' option has **not** been activated to invert the table in this example.

Connected Fuel Table Mode

If the Fuel Table is selected, when the MAPECU3 is connected, a screen similar to the following will appear:



The ‘Zone’ highlighted with a dotted box indicates the currently active Zone. Note that ‘FollowMe’ is deactivated therefore the active zone does not necessarily match current pressure and RPM. As with the previous Graph Mode example, context sensitive help is provided below the Table with a summary of key strokes available for the selected function.

Zone Reading

The value in the ‘Zone’ field always shows the current zone being accessed whether’ Connected’ or ‘Disconnected’. This ‘Zone’ number reflects each of the zones in the MAPECU3 data table. The first one or two digits refer to the row number, i.e. 1-17 and the last two digits, the column number. A more in depth discussion on zone numbering can be found in the MAPECU3 manual. In this example, the current zone is 512, which corresponds with 0 PSI and 1400 RPM.

Table Reading

The 'Table' field is the current value in the data table at the zone currently shown. Therefore, in the example above, the table has the value 2.17 Volts at zone 508.

Output Reading

The 'Output' field (2.17 Volts) is the current *computed* output from the MAPECU3 based on zones surrounding actual RPM and pressure. A discussion of how this value is computed can be found in the MAPECU3 manual. It should be noted that this value is only valid when the ECU is Connected, as it is read from the MAPECU3, not computed by MAPCAL3.

Pressure (PSI) Field

There are two pressure indicators. One is the digital field that displays current manifold pressure, in PSI, kPa or Bar depending in the configuration selected under MAP-CAL Configuration. Vacuum is display in inHg. This value is read from the MAPECU3 in Connected mode and is real-time.

Status Field

The Status field is used by MAPCAL3 to inform the user of events in progress, or error messages. Error messages are usually related to errors communicating with the MAPECU3 due to incorrect COM Port configuration or poor cabling. Note that the normal status message during real-time 'Connected' mode is 'Reading Data' which indicates that MAPCAL3 is reading information from the MAPECU3. Status messages will appear when MAPCAL3 attempts to write configuration, zone or line changes during editing, e.g. Writing Zone 512.

MAF In Field

The field labelled 'MAF In' reports the current Hotwire or Flap MAF input voltage where 0=0 Volts and 4095=5 Volts as used by the MAPECU3 table. This field is renamed 'KVF In' or Karman Vortex Frequency input when the MAPECU3 is configured in KVF mode.

Air/Fuel Ratio Display

The box labelled A/F Ratio displays the current Air/Fuel ratio based on O2 sensor voltage and the lookup table selected under MAP-CAL Config. **Note**: This Air/Fuel ratio must **not** be used for final tuning purposes. A professional Air/Fuel ratio meter should be used for actual tuning.

EBC Duty

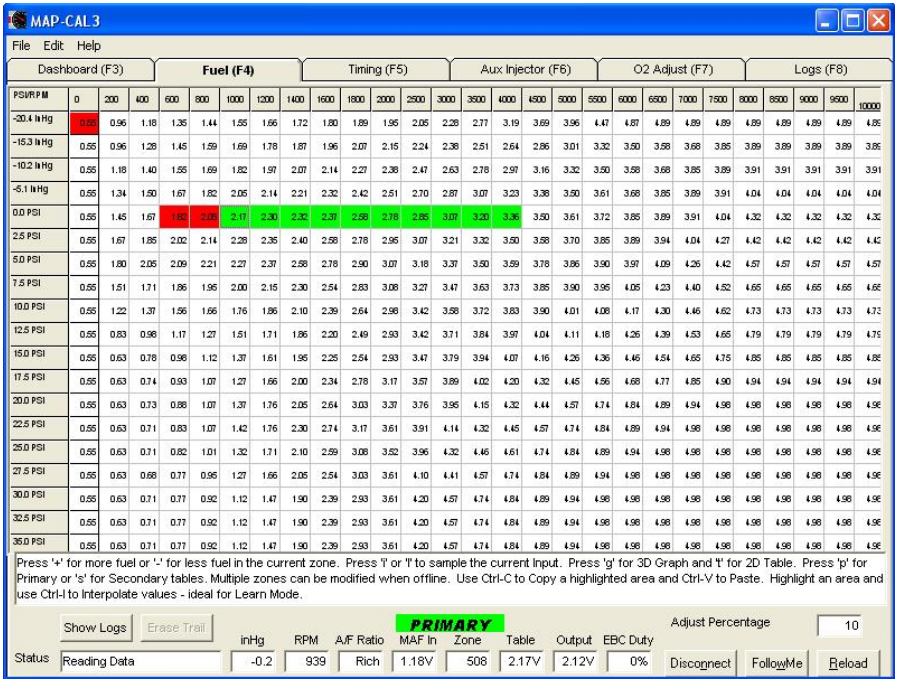
The EBC Duty field displays the current Electronic Boost Controller duty cycle as a percentage if active.

Adjust Percentage/Constant

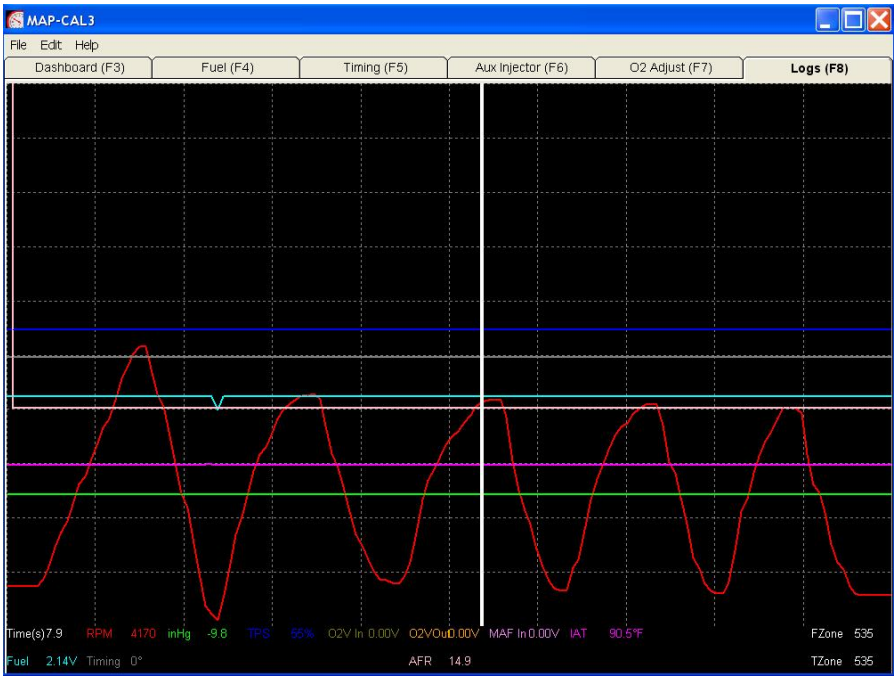
The adjustment method is configured under MAP-CAL Configuration to Percentage or Constant. The mode and value is displayed on the fuel graph and table screens. Adjust Percentage is a data field the user can leave blank, or enter an integer between 1 and 100. This value is used when modifying data using the + or - keys. Instead of incrementing or decrementing the value by 1, the value is modified by 'Adjust Percentage' of the current value.

Show Logs

The Show Logs button will highlight any logged information on the table in the same colour as the log graphs, e.g. Red for the first log, Green for the second, etc., as follows:



This example is a simple log showing a change in RPM from approximately 800 to 4000 as per the following log:



Erase All

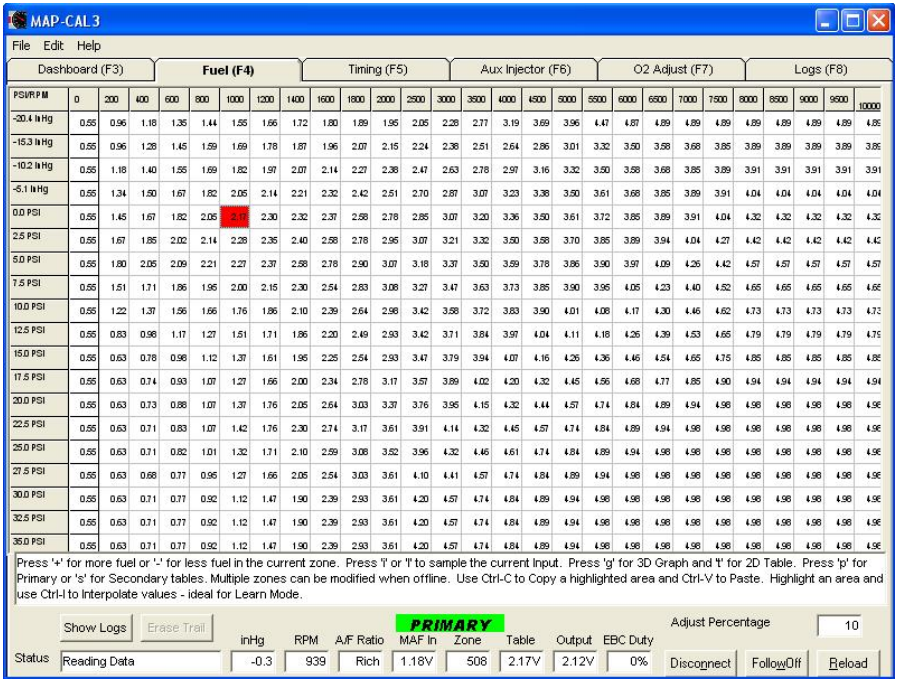
The Erase All function (Edit, Erase All Logs or Ctrl+E) will remove any log information currently held by MAPCAL3.

FollowMe Mode (Alt+W)

FollowMe ***disabled*** is the default setting when a MAPECU3 is online. FollowMe is not available when a MAPECU3 is disconnected. FollowMe only works in Graph and Table modes and forces MAPCAL3 to track which Zone is being accessed based on real-time information from the MAPECU3. This allows the user to track and edit the active Zone being used by the MAPECU3 in real-time.

The FollowMe button works in a similar way to the Connect/Disconnect button in that the label changes to reflect what action will take place when it is pressed. When the button is labelled 'FollowOff', pressing the button will turn off FollowMe mode as the button suggests. When the button is labelled 'FollowMe', pressing the button will enable FollowMe.

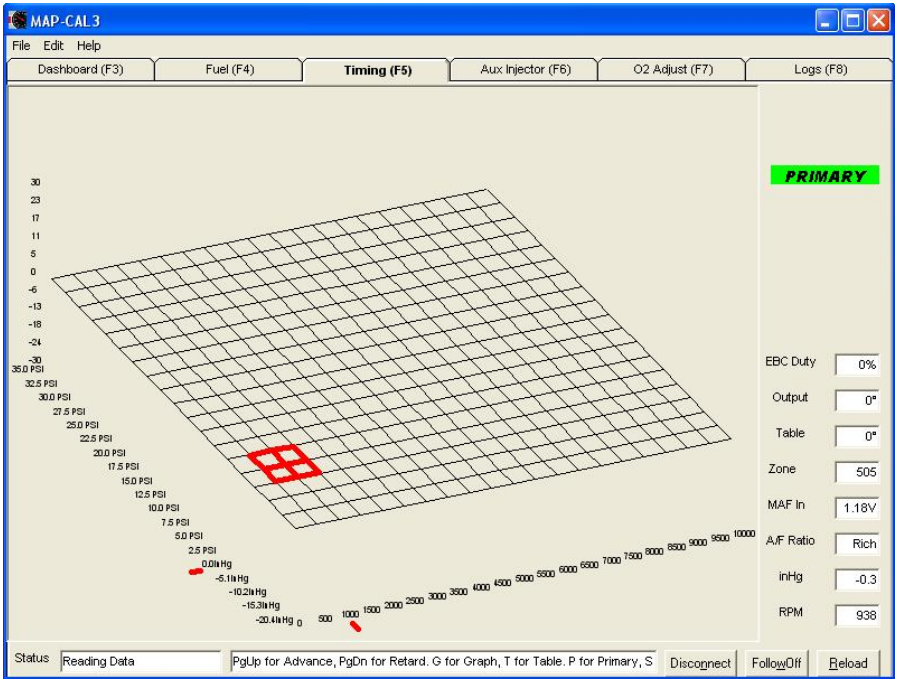
When Table Mode is accessed in FollowMe mode, the active zone is highlighted in red, as follows:



Note: In order to move the cursor in Table or Graph modes, 'FollowMe' must be disabled.

Timing Graph Mode

When the Timing Tab is selected with Graph mode, a screen similar to this will appear:



Note: Timing is displayed as a +/-30 Degree value on the graph where any positive number advances ignition and any negative number retards ignition. A value of zero means the MAPECU3 will make no timing adjustments what so ever.

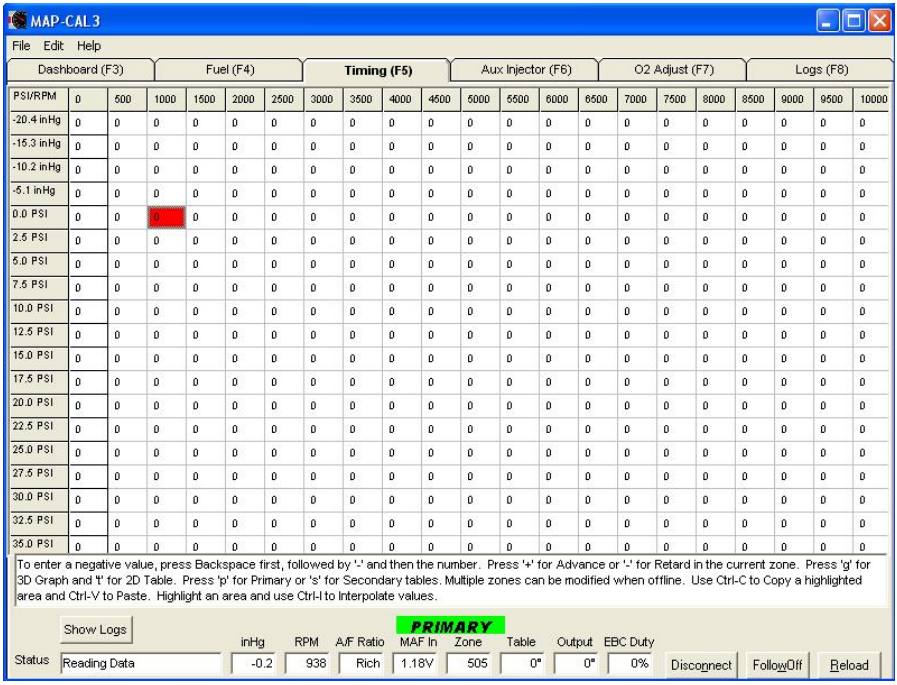
Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Advance timing in zone(s) by 1 degree.
PgDn or '-'	Retard timing in zone(s) by 1 degree.
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Timing Table Mode

When the Timing Tab is selected with Table mode, a screen similar to this will be appear:



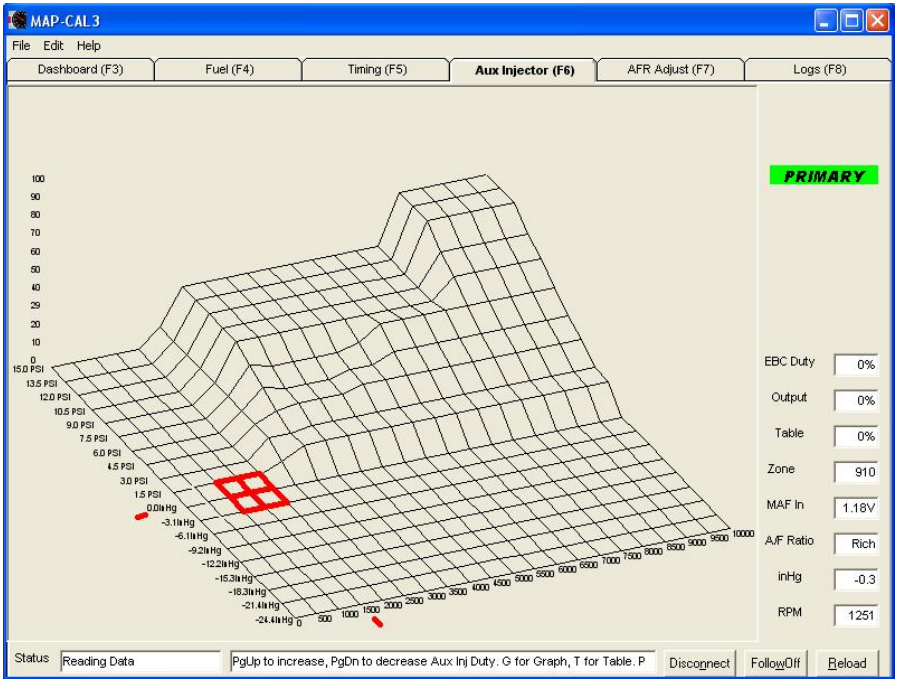
Editing Table Mode

A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
'+'	Advance timing in zone(s) by 1 degree.
'-'	Retard timing in zone(s) by 1 degree.
0-9	Enter data directly. To enter a negative value, press 'BackSpace' to clear the zone(s) and press '-' as the first character.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Auxiliary Injector Graph Mode

When the Auxiliary Injector Tab is selected with Graph mode, a screen similar to this will appear:



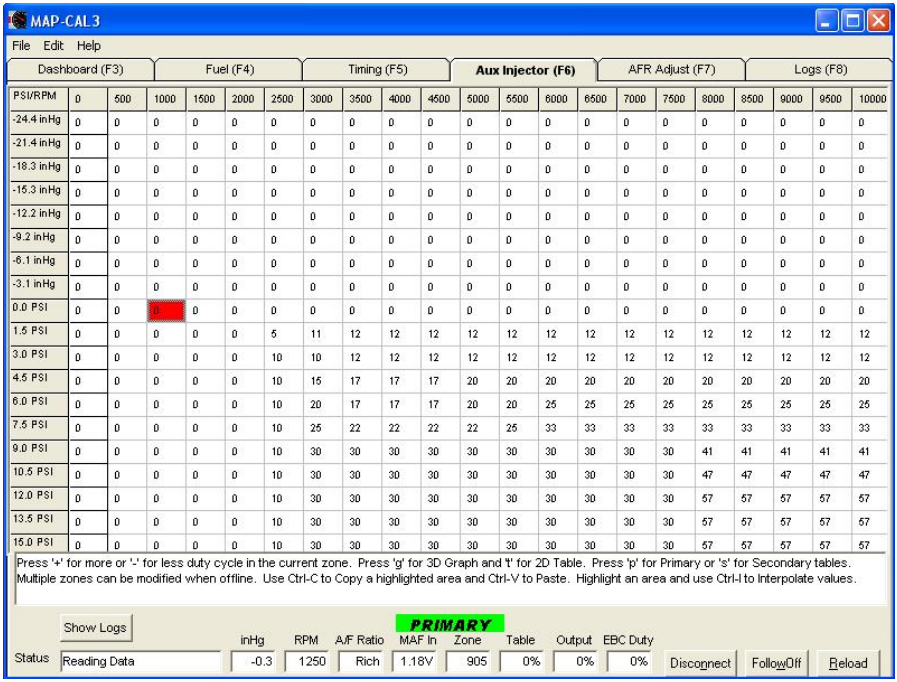
Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or '+'	Increase Injector duty cycle zone by 1%, maximum 90%.
PgDn or '-'	Decrease Injector duty cycle zone by 1%
'T'	Change to 'Table Mode'.
'S'	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Auxiliary Injector Table Mode

When the Auxiliary Injector Tab is selected with Table mode, a screen similar to this will appear:



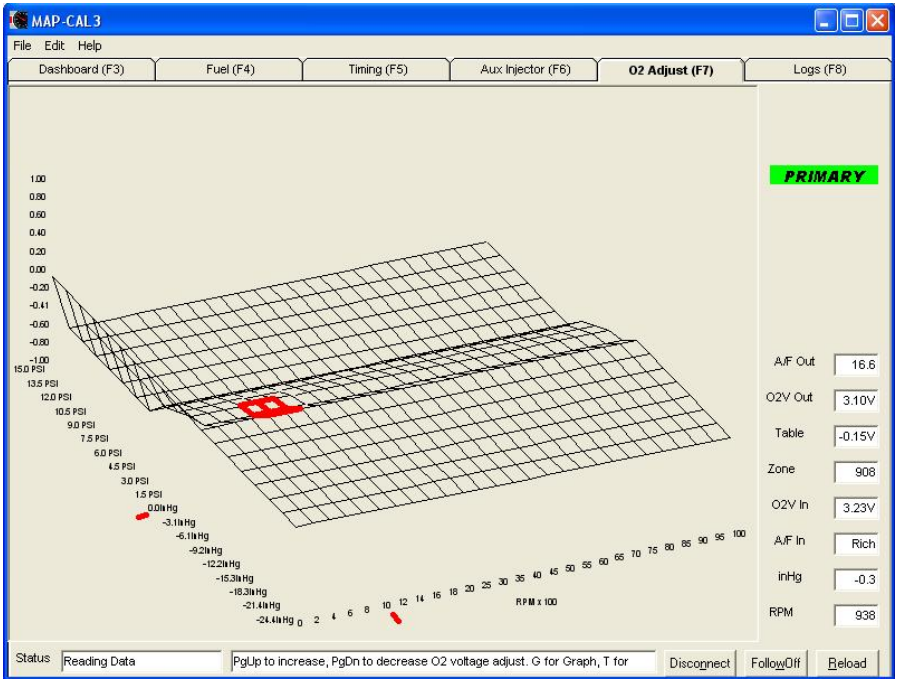
Editing Table Mode

A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
'+'	Advance timing in zone(s) by 1 degree.
'-'	Retard timing in zone(s) by 1 degree.
0-9	Enter data directly. To enter a negative value, press 'BackSpace' to clear the zone(s) and press '-' as the first character.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

O2 Adjust Graph Mode

When the O2 Adjust Tab is selected with Graph mode, a screen similar to this will appear:



O2V In

The" O2V In" field shows the current O2 input voltage before any O2 Adjust is applied.

A/F In

The "A/F In" field is the Air/Fuel ratio of the O2 Input voltage based on the conversion table selected under MAP-CAL Configuration.

O2V Out

The" O2V Out" field shows the current O2 output voltage after any O2 Adjust is applied.

A/F Out

The “A/F Out” field is the Air/Fuel ratio of the O2 Output voltage based on the conversion table selected under MAP-CAL Configuration.

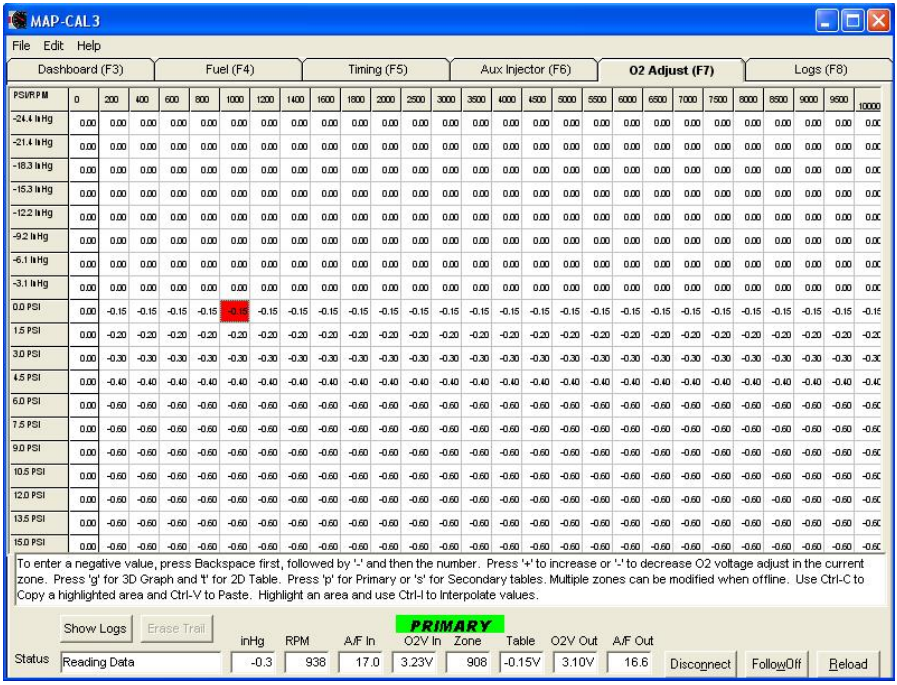
Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or ‘+’	Increase current O2 Adjust zone by 0.01 Volts.
PgDn or ‘-‘	Decrease current O2 Adjust zone by 0.01 Volts.
‘T’	Change to ‘Table Mode’.
‘S’	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
‘P’	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

O2 Adjust Table Mode

When the O2 Adjust Tab is selected with Table mode, a screen similar to this will appear:



O2V In

The" O2V In" field shows the current O2 input voltage before any O2 Adjust is applied.

A/F In

The "A/F In" field is the Air/Fuel ratio of the O2 Input voltage based on the conversion table selected under MAP-CAL Configuration

O2V Out

The" O2V Out" field shows the current O2 output voltage after any O2 Adjust is applied.

A/F Out

The "A/F Out" field is the Air/Fuel ratio of the O2 Output voltage based on the conversion table selected under MAP-CAL Configuration.

O2B Secondary O2 Adjust Output

Some vehicles, especially OBD-II, have more than one O2 sensor for reduced emissions. One sensor is usually placed before the catalytic converter and one after. This configuration allows the OEM ECU to verify catalytic converter operation as the oxygen content of the exhaust gases will be different pre and post catalytic converter. This means you cannot drive both O2 sensor inputs of the OEM ECU from a single O2 sensor, or single Adjusted O2 sensor voltage as an error will be reported. The MAPECU3 has the ability to apply the O2 Adjust voltage to two (2) independent O2 Sensor voltages to cater for this situation. The O2 Adjust voltage is applied to both O2 and O2B input voltages and output on the O2 and O2B configured outputs. For example, the O2 Adjust value from the table is –0.01V, O2 Input is 0.61V and O2B is 0.64V. O2 Output will be 0.60V and O2B will be 0.62V.

Editing Table Mode

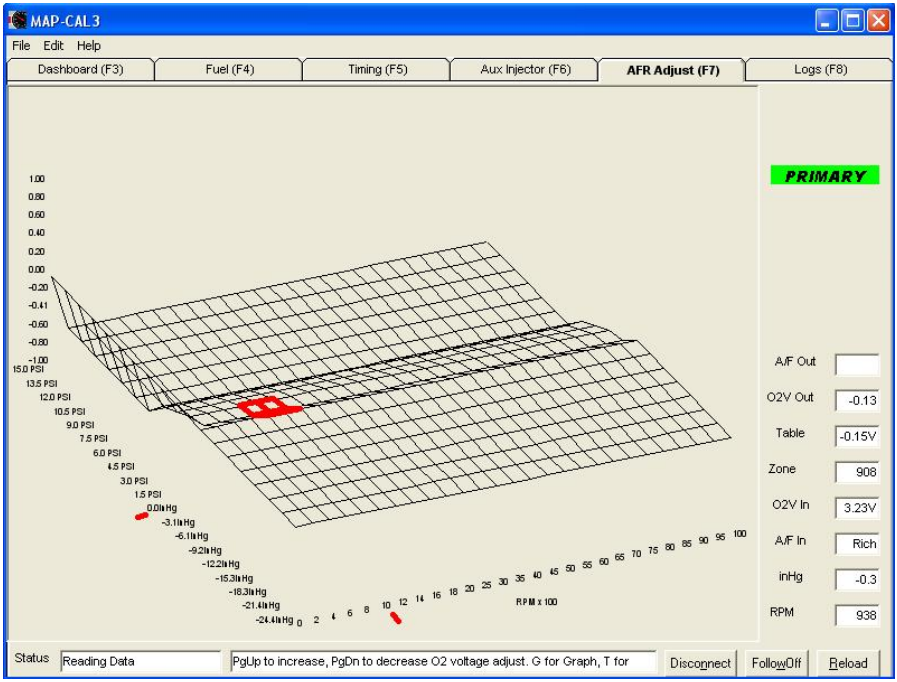
A number of functions are available to edit and modify data in Table mode, as follows:

Function	Description
'+'	Increase current O2 Adjust zone(s) by 0.01 Volts.
'-'	Decrease current O2 Adjust zone(s) by 0.01 Volts.
0-9	Enter data directly. To enter a negative value, press 'BackSpace' to clear the zone and press '-' as the first character.
'G'	Change to 'Graph Mode'.
'S'	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
'P'	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

Note: The O2 Voltage and Air Fuel Ratio fields above only display the primary O2 sensor voltages. If O2B is configured it is not displayed.

AFR Adjust Graph Mode

When the AFR Adjust Tab is selected with Graph mode, a screen similar to this will appear:



O2V In

The" O2V In" field shows the current O2 input voltage but is not used in AFR mode.

A/F In

The "A/F In" field is the Air/Fuel ratio of the O2 Input voltage based on the conversion table selected under MAP-CAL Configuration.

O2V Out

The" O2V Out" field shows the current AFR output voltage. In this case the output is –0.12V which makes the AFR Sensor Calibrator unit adjust the AFR Sensor by -1.2mA.

A/F Out

The “A/F Out” field is not used in AFR mode.

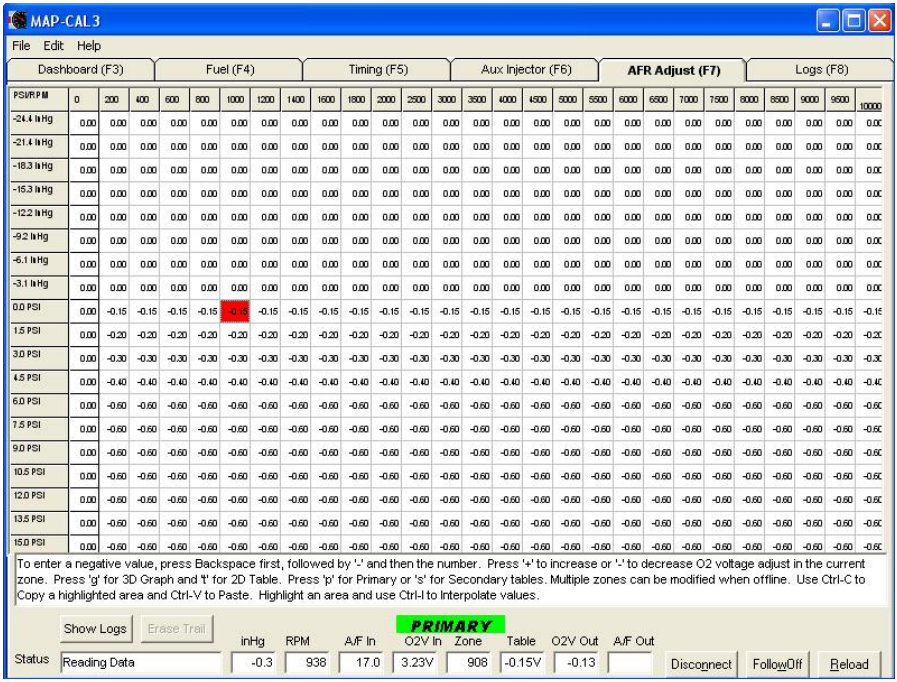
Editing 3D-Graph Mode

A number of functions are available to edit and modify data 3D-Graph mode, as follows:

Function	Description
PgUp or ‘+’	Increase current O2 Adjust zone by 0.01 Volts.
PgDn or ‘-‘	Decrease current O2 Adjust zone by 0.01 Volts.
‘T’	Change to ‘Table Mode’.
‘S’	Change to Secondary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Secondary fuel table real-time.
‘P’	Change to Primary fuel table. **Note**: If MAPECU3 is online, the MAPECU3 will also switch to the Primary fuel table real-time.

AFR Adjust Table Mode

When the AFR Adjust Tab is selected with Table mode, a screen similar to this will appear:



O2V In

The" O2V In" field shows the current O2 input voltage but is not used in AFR mode.

A/F In

The "A/F In" field is the Air/Fuel ratio of the O2 Input voltage based on the conversion table selected under MAP-CAL Config.

O2V Out

The" O2V Out" field shows the current AFR output voltage. In this case the output is –0.12V which makes the AFR Sensor Calibrator unit adjust the AFR Sensor by -1.2mA.

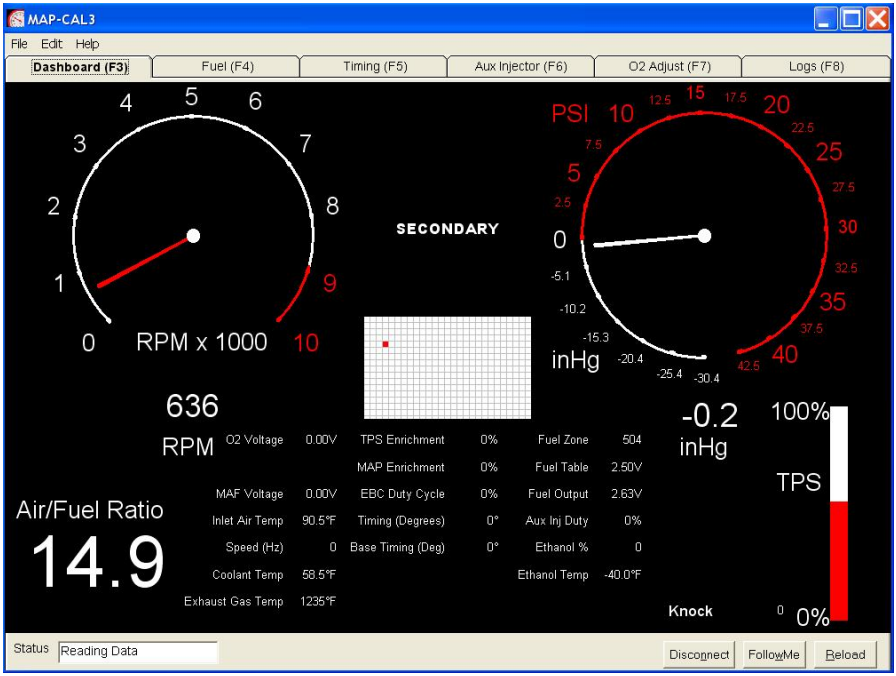
A/F Out

The “A/F Out” field is not used in AFR mode.

Primary/Secondary Selection

While the MAPECU3 is “Connected” MAPCAL3 can override any manual Primary/Secondary switches depending on the state of the “Override Pri/Sec Switch” option in ECU Configuration. When this option is unchecked, the MAPECU3 controls Primary/Secondary table selection through the configured Pri/Sec input. MAPCAL3 cannot alter which table is selected. When this option is checked, MAPCAL3 takes control over Primary/Secondary table selection when connected to a MAPECU3.

Primary/Secondary selection can take place from the Dashboard and any Graph or Table using the “p” and “s” keys for Primary and Secondary respectively. The Dashboard shows Secondary selection as follows:



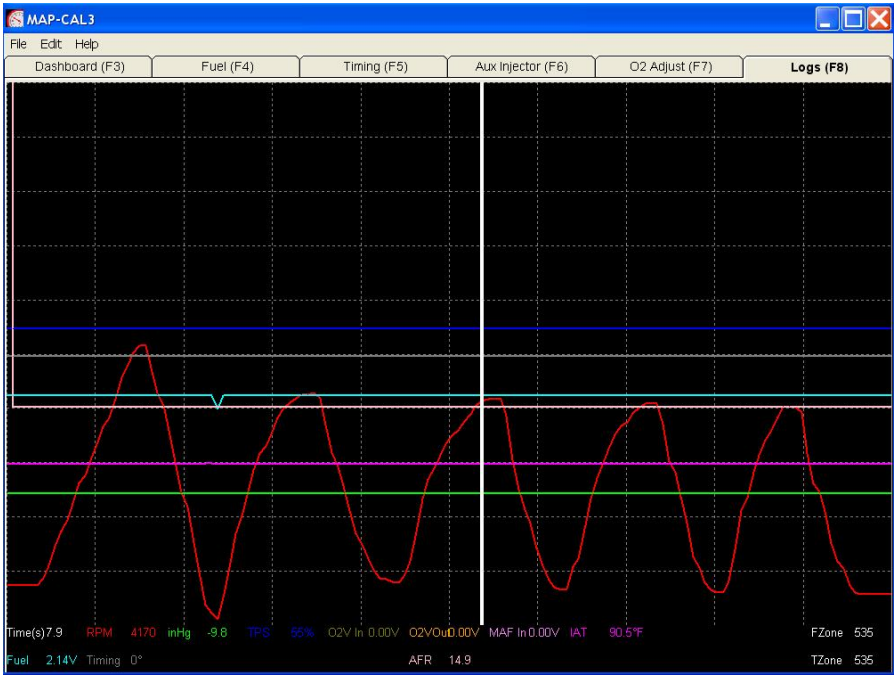
Logging (F8)

A log display mode is provided in conjunction with the ability to save logs to disk. When a MAPECU3 is Connected, the user can start and stop logging using the F1 and F2 keys respectively. An automatic mode is provided where logging can be started and stopped based on RPM. Logging records the following information:

- Time Stamp
- Auxiliary Injector Duty Cycle
- Inlet Air Temperature (IAT)
- Timing Adjust
- EBC Duty Cycle
- Pressure Input
- RPM
- O2 Sensor Input Voltage/AFR
- MAF/KVF Input
- TPS Input
- O2 Sensor Output Voltage/AFR
- Fuel Output
- Base Timing
- Fuel Zone
- Timing Zone
- Wideband Input
- Knock Input
- Speed Input (NEW)
- Coolant Temperature (NEW)
- Exhaust Gas Temperature (NEW)
- Ethanol Content % (NEW)
- Ethanol Temperature (NEW)

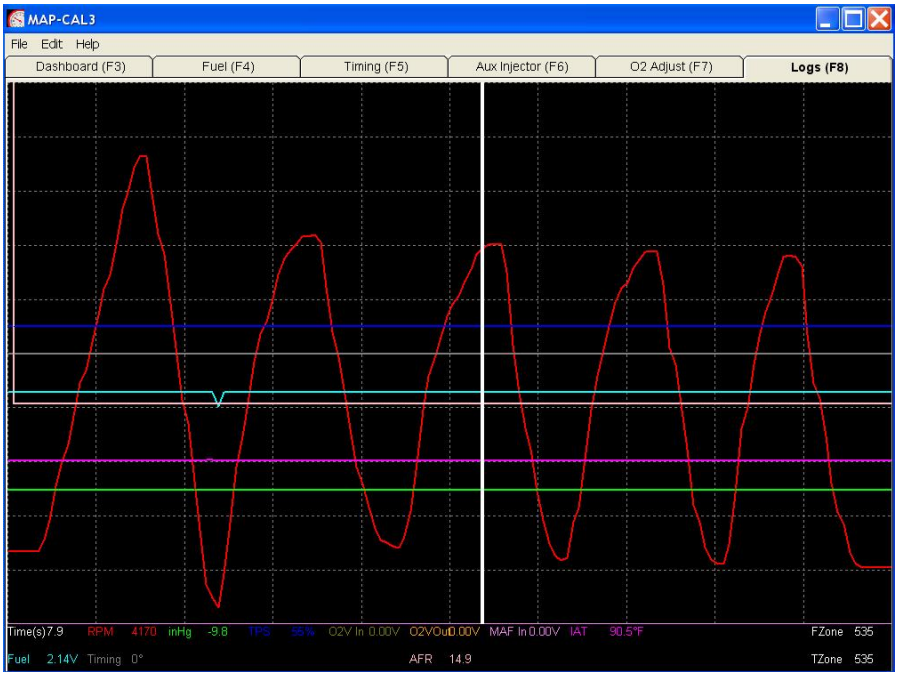
Note: Each of the six (6) logs can be up to 10 minutes in length. We recommend that log length be keep at a minimum as log display and navigation performance is affected by log length. Performance can be improved by disabling log traces that are not required through the Configure Logging screen.

Up to six (6) independent logs can be recorded and displayed. Each log is selected using the PgUp and PgDn keys. The following screen shot is an example of a simple log where RPM rises from approx 800 to 4000 and then back to 800:



In this example, all the data elements are enabled. If some of the data elements are disabled using the options under Configure Logging, the same log looks like this:

Note: Knock Input is only visible when the screen size is increased.



Note: Values of data elements not graphed are still displayed in the fields in white.

Log Cursor

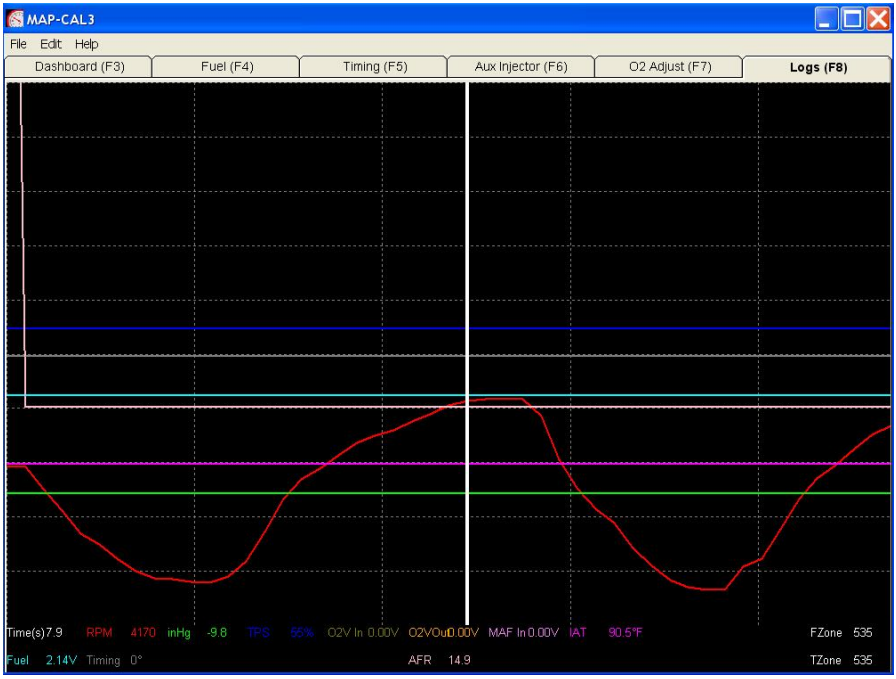
The white vertical line is the log cursor which is moved left and right using the left and right cursor keys. As the cursor is moved, the data elements at the point highlighted by the cursor is displayed in the respective fields at the bottom of the screen in matching colours. In addition, the Time field displays the time in seconds the cursor is positioned relative to the start of this particular log entry.

Function	Description
←	Move cursor left, towards the start of the log.
→	Move cursor right, towards the end of the log.
↑	Zoom in at current cursor position.
↓	Zoom out at current cursor position.
PgUp	Next log entry (if more than one recorded).
PgDn	Previous log entry (if more than one recorded).

Note: You can position the cursor quickly by using the mouse button and "clicking" on a point on the screen.

Zoom

The user can zoom in and out of the current log using the cursor up and down keys respectively. The following screen shot illustrates the above log entry once the zoon in (cursor up) key is pressed once:



Previous/Next Log

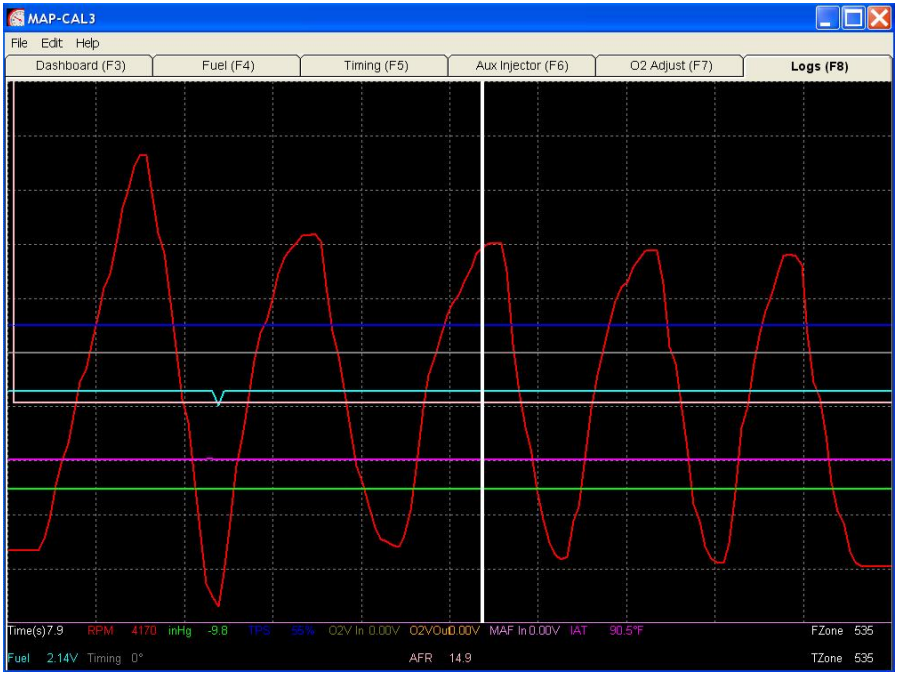
Up to six (6) logs can be stored simultaneously. Each log can be accessed using the PgUp and PgDn keys where PgDn will sequence from first to last log and PgDn the reverse.

Start/Stop

Logging is started using the F1 key and stopped using the F2 key. Logs are saved sequentially to each of the six (6) independent log areas. Once six logs are saved, the seventh will overwrite the 1st.

Custom Log Vertical Scales

As described previously, the vertical log scale can be customised to zoom in on the vertical scale. The following screen shot is an example where the maximum RPM scale is set to 8000 RPM where the sample range is 800 to 8000 RPM:

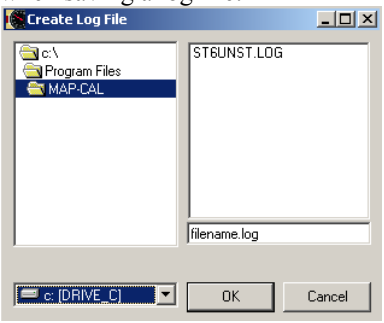


Saving a Log

By default, enabling Log mode does not record data to disk, this is an independent operation enabled through the File menu as described previously.

Save Log File (Ctrl+L)

Save the current logged information in a file for later review. This option is enabled when some log data has been collected. The following dialog box appears when saving a log file:



Note: The filename extension is defaulted to '*.log'.

Note: If MAPCAL3 has a log in memory and you exit MAPCAL3 before saving it, you will be prompted to save the log.

Appendix 1 - Shortcut Keys

The follow list of shortcut keys are available for the various menu items.

Shortcut	Function
Alt+E	Edit Menu
Alt+F	File Menu
Ctrl+F	MAP-CAL Configuration
Ctrl+O	Open Data File
Ctrl+S	Save Data File
Ctrl+R	Open Log File
Ctrl+L	Save Log File
Ctrl+U	ECU Configuration
Ctrl+X	Exit
Ctrl+C	Copy
Ctrl+V	Paste
Ctrl+G	Configure Logging
Ctrl+E	Erase All Logs
F1	Start Logging
F2	Stop Logging
F3	Dashboard
F4	Fuel
F5	Timing
F6	Auxiliary Injector
F7	O2 Adjust
F8	Logs

The follow list of shortcut keys are available for the various buttons.

Shortcut	Function
Alt+N	Connect/Disconnect Button
Alt+R	Reload Button
Space Bar / Alt+W	Toggle FollowMe/FollowOff