Augment Automotive Technical Manual Title: Augment Automotive 3D Tuner Manual Document Number: AUG/MAN/007 Version: 003 Author: Tom Barker Date: 04 June 2015	

Purpose

This manual provides a quick reference for user of the Augment Automotive 3D Tuner application.

Scope

It is broadly relevant to all versions of 3D Tuner. Not all features are available in all versions of 3D Tuner. For advice on a specific version of 3D Tuner contact Augment Automotive.

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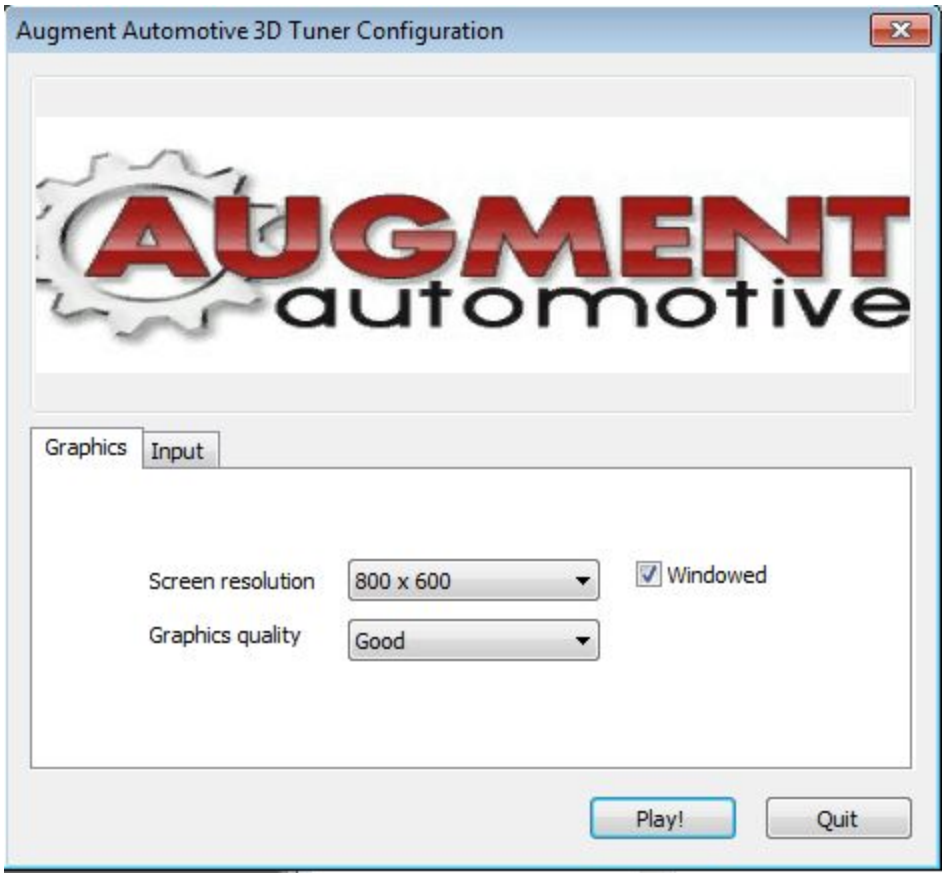
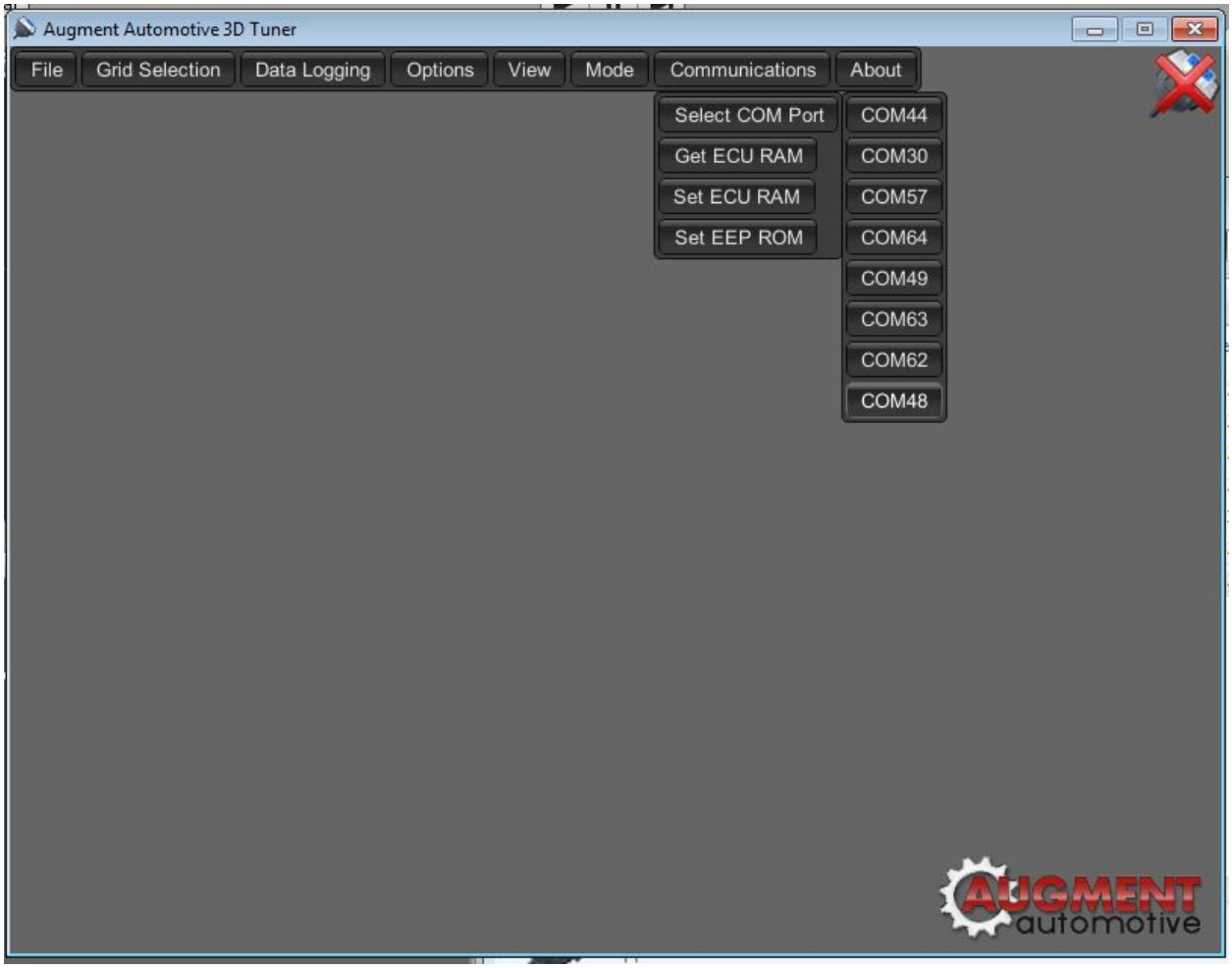
Starting the Augment Automotive 3D Tuner

Double click the executable file “Augment Automotive 3D Tuner.exe” to start the application. Select the screen resolution, graphics quality and whether the application should run in a window. If the application runs slowly reduce the resolution and or graphics quality to suit your computer. Press “Play” to start the tuning application.



Connecting to the AugTronic ECU

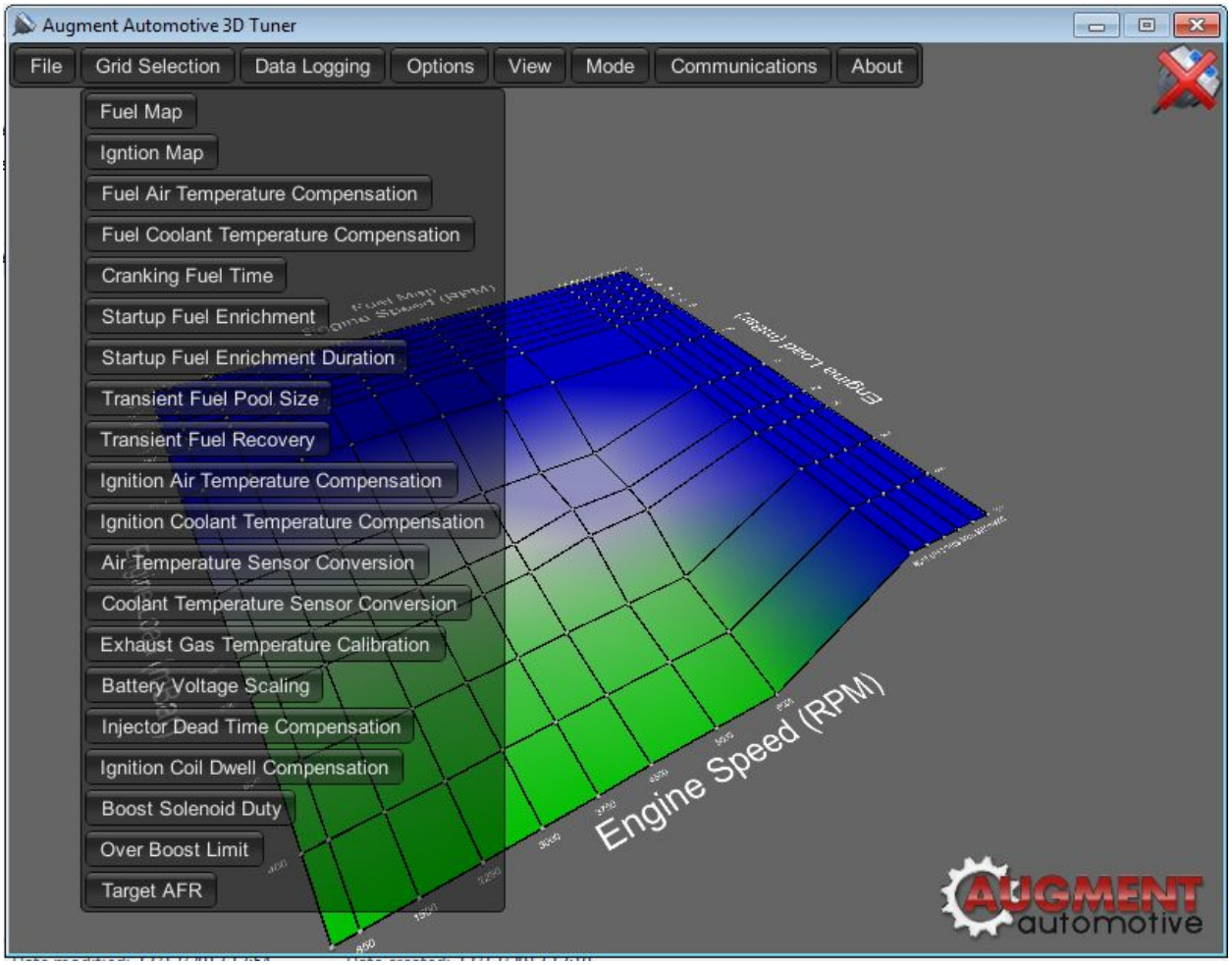
Obtain a COM port as per the “Augment Automotive Serial Connection Manual”. Once your COM port has been obtained you can connect to the AugTronic system. Click on the “Communications” menu button then the “Select COM Port” menu button and then select the correct COM port from the list.



On successful connection an ECU connected message will pop up asking if you want to load the settings from the AugTronic ECU or to keep current settings. If current settings are kept the computer will not sync with the ECU unless you click “Communications” then “Set ECU Ram”. If the settings on the ECU are adopted the configuration will be automatically loaded and the ECU synced with the computer. Changes can only be made if tuning mode is enabled. To check click the mode button and ensure that tuning mode is enabled. If the 3D tuner application is not correct for the AugTronic firmware version an error will raise. Contact Augment Automotive for advice if this is the case.

Grid Selection

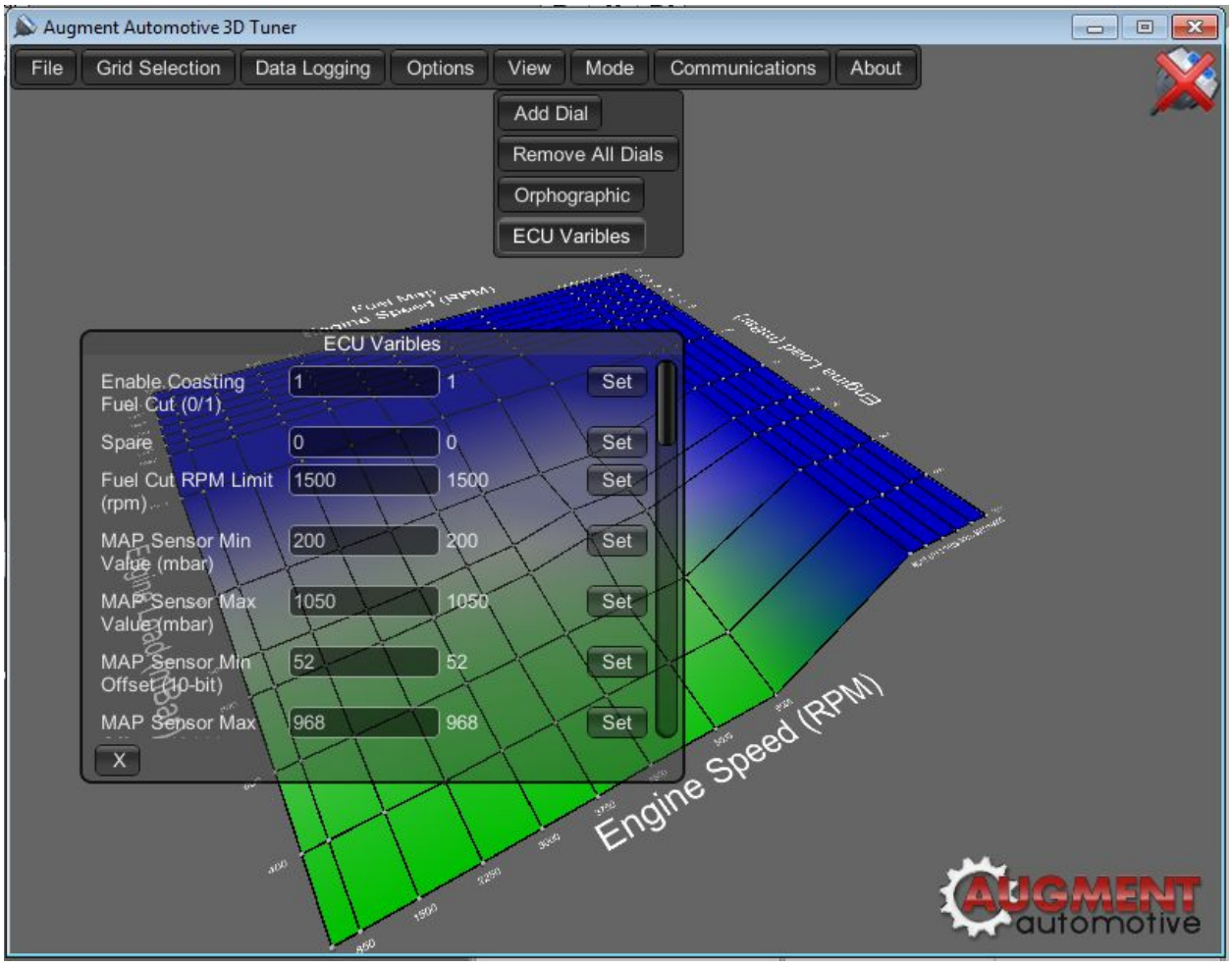
In the Augment Automotive 3D tuner the maps on the AugTronic ECU are represented as grids aka maps that can be selected by left clicking on the “Grid Selection” or on some versions “Map Selection” menu button:



See the Hotkey section for controls used in manipulation of the grids as part of the tuning process. In general the grid points are manipulated by selecting a single point by left clicking or by holding the left mouse button and dragging over a group of points and releasing the left mouse button. The point values can then be altered by pressing or holding the up or down arrows. Grid point labels can be displayed only on the selected points or on all points by toggling the “Label all points” option in the “Options” menu. The position of the grid sites can be adjusted in “Grid Manipulation Mode” which can be selected under the “Mode” menu

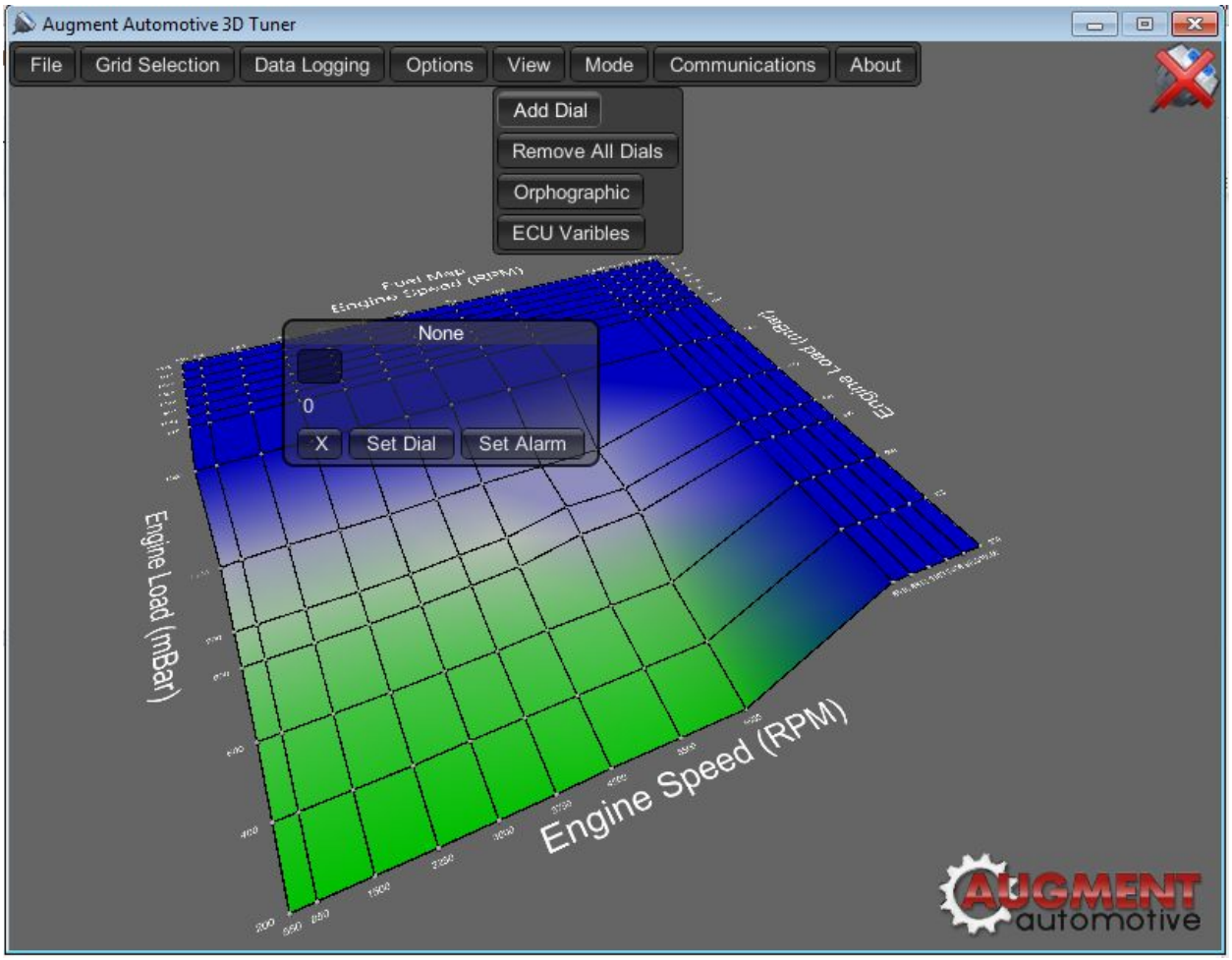
ECU Variables

Various ECU configuration parameters are available through left clicking on “View” then “ECU Variables”. To edit a value enter it in the corresponding text box and hit the set button. The variables available is specific to the version of firmware. Contact Augment Automotive Limited for the ECU Variable description for your firmware version.



Viewing ECU Parameters and Setting Alarms

Augment Automotive 3D tuner uses configurable dials to display ECU parameters such as Engine Speed and Temperature. Left click on the “View” menu button and left click the add dial to add a draggable dial to the view. The dial can be dragged via the top bar.

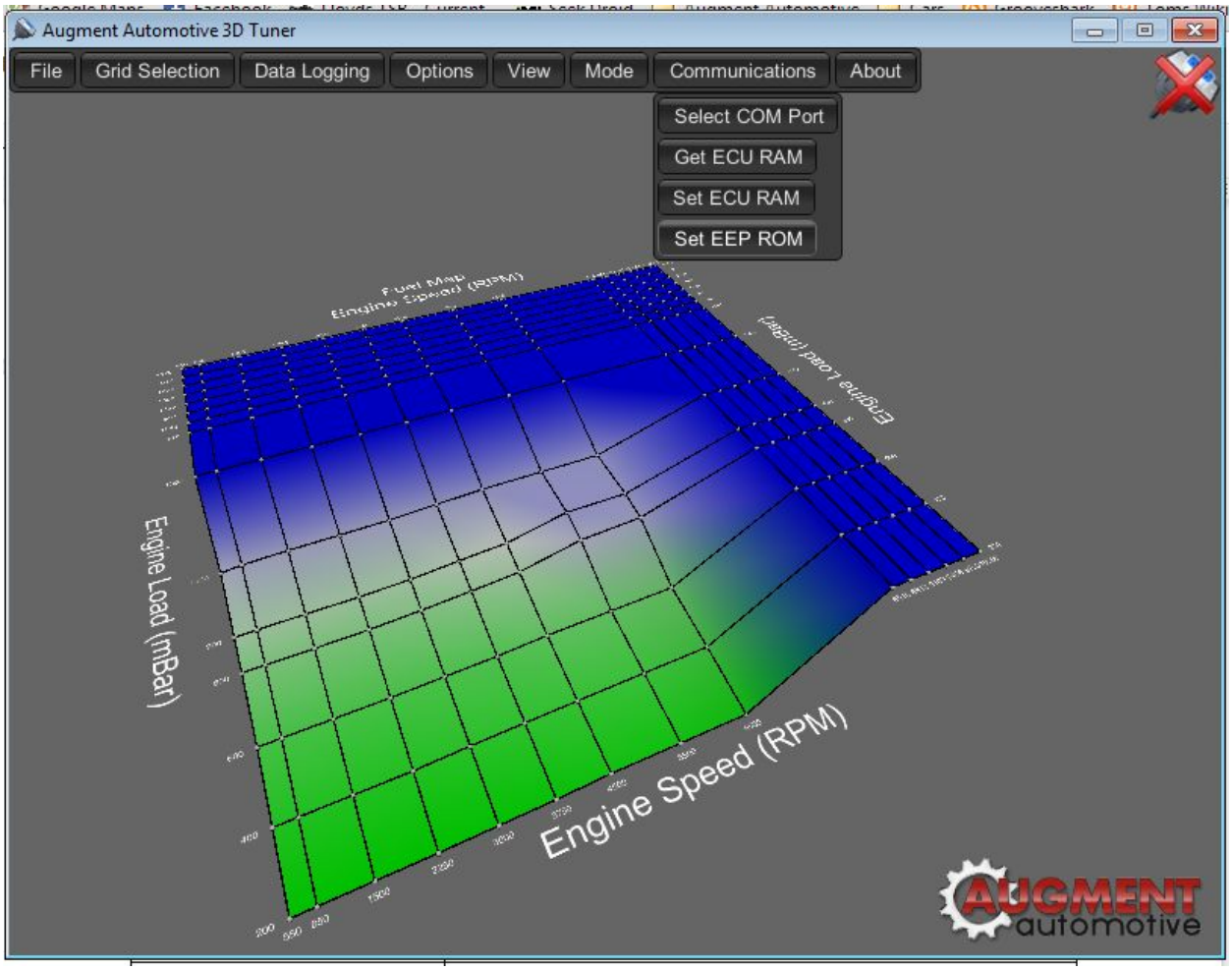


Left click the “Set Dial” button to get a scrollable list of parameters, then left the desired parameter to set the dial. This dial will now display the current live value of that parameter. All parameters can be alarmed on low and or high level. Click the “Set Alarm” button to open the alarm menu. To change the alarm levels edit the text value and then hit the set button, the default values are the maximum and minimum possible alarm values. Alarms can be enabled or disabled, if the disabled button is showing the alarm is not active. Click the disabled button and the alarm will be enabled and the button will display enabled in green text. The set alarm text will also turn green to indicate the alarm is active. Should the alarm levels be breached an alarm will sound and the screen flash red.

From version 1.27 of 3D tuner a summary windows is made available. This can be activated through the view menu and clicking the “ECU Summary” button.

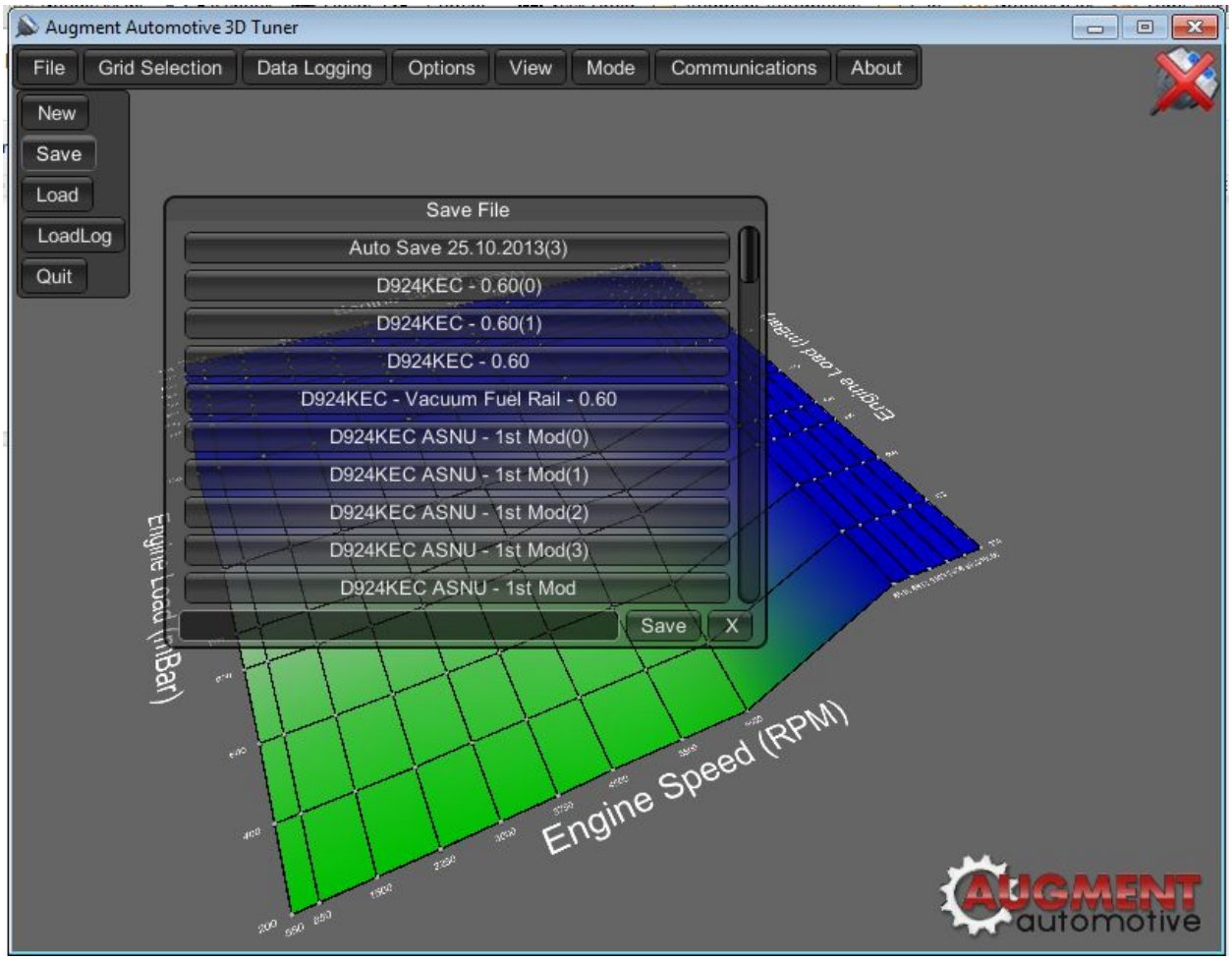
Saving ECU Memory

Changes made to the ECU configuration in live mode are not permanent. In order to save changes in the ECU the “Communications” menu button must be left clicked followed by left click on the “Set EEPROM” button. If modifications are made to the configuration and the ECU is reset the changes will be reverted on the ECU. On reconnection the software may attempt to load the previous configuration from the ECU and if accepted by the user the changes may be lost. If this happens save the configuration to laptop and load it on reconnection to the ECU. Once EEPROM saving is complete the activity indication in the top right will flash (usually immediately unless lots of changes have been made).



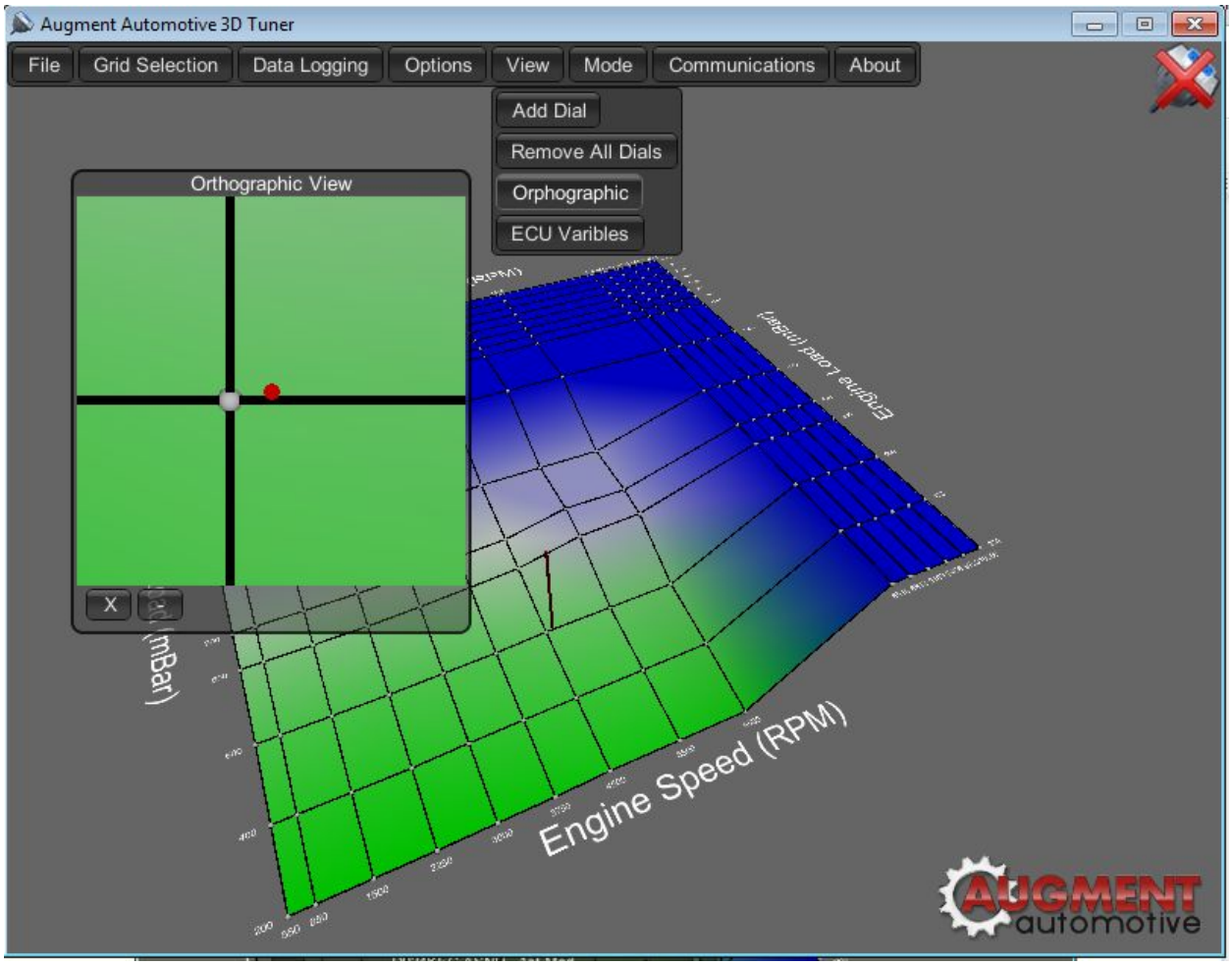
Saving and Loading ECU Configurations

ECU configurations can be loaded from and saved to the tuning device i.e. laptop. This is done through the “File” menu. Left click on the “File” menu button and select “Save” or “Load to gain access to the “Save” and “Load” functions. When saving enter the file name in the text box or click on an existing file then hit the save button. If the file exists it will not be overwritten but the name appended with a number that generates a unique name. When loading left click a file from the scrollable list of files and clock load. Close the load or save window by clicking on the X in the bottom right. The window can be dragged via the top bar to an appropriate position on screen.



Orthographic View

To help located the engine on a particular site during tuning an orthographic view is provided. It can be enabled through the “View” menu. The window can be dragged via the top bar to an appropriate position on screen.



Hotkeys

Key	Function
I	Zoom in
O	Zoom out
L	Lock selected grid site for editing
U	Unlock selected grid site for editing
Left Mouse	Select point
Right Mouse	Rotate grid
Middle Mouse/Tab	Pan grid
M	Increase size of grid site labels
N	Decrease size of grid site labels
Press Up Arrow	Increase value of grid site by one increment
Press Down Arrow	Decrease value of selected grid site by one increment
Hold Up Arrow	Increase value of selected grid by 3% per second
Hold Down Arrow	Decrease value of selected grid 3% per second
Left Shift	Hold to force change in value of point of 40% of range per second while up or down error is held
C	Bring up command terminal. 3D grids only.

Command terminal

As of 3D Tuner version 1.27 a command terminal can be brought up by pressing ‘c’. This feature is only active on 3D maps. This can be used to set and manipulate the values of single or multiple data points on the maps. The command terminal accepts a number of command value inputs e.g. =100 would set all selected points to a value 100. The following commands are available:

Command	**Value**	**Description**
+	decimal e.g. 10.1	add the value to the selected data point(s) existing value(s)
-	decimal e.g. 10.1	subtract the value from the selected data point(s) existing value(s)
*	decimal e.g. 10.1	multiply the selected data point(s) existing value(s) by the value
=	decimal e.g. 10.1	set the existing data point(s) value(s) to the value
/	decimal e.g. 10.1	divide the selected data point(s) existing value(s) by the value
l (lower case L)	none	set the value(s) of the data point(s) selected to the value left of it
d (lower case D)	none	set the value(s) of the data point(s) selected to the value below it
i (lower case I)	none	interpolate the value(s) of the data point(s) selected

ECU Variable Descriptions

AugTronic Firmware 1.08

Name	Description
Teeth per revolution	The number of teeth counted in one revolution of the flywheel
Stroke tooth set on reference pulse	The internal stroke counter value set when the reference pulse is seen
Rotation tooth set on reference pulse	The internal rotation tooth set when the reference pulse is seen
Cylinder banks	The number of cylinder banks (pairs) e.g. for a 4 cylinder there are 2
Cylinder bank offsets (1-3)	The offset of each cylinder bank in teeth/16 this allows for correction of errors due to alignment of the top dead position for the bank with a tooth edge
Cylinder TDC tooth (1-3)	The TDC (TD really) tooth for each cylinder bank specifies at what point in the rotation of the engine the cylinder bank reaches its top dead position
MAP Sample Tooth	The stroke tooth on which the MAP is measured
Wasted spark enabled	Enables/disables wasted spark
Engine coasting fuel cut enabled	Enables/disables fuel cut on the overrun
Engine coasting RPM limit	Determines the RPM below which fuel cut is disabled
EGT Source	The ADC channel which EGT is being measured on
MAP sensor min value	The minimum value of the MAP sensor e.g. 200 mBar
MAP sensor max value	The maximum value of the MAP sensors e.g. 4000 mBar
MAP sensor min offset	The ADC offset of the minimum MAP sensor value e.g. for 0.4V the value is 0.4 / (5/1023) = 82
MAP sensor max offset	The ADC offset of the maximum MAP sensor value e.g. for 4.8V the value is 4.8 / (5/1023) = 982
MAP variability averaging limit	The minimum value in mBar above which the change in MAP between two successive samples will disable MAP averaging
MAP averaging samples	The number of averaging samples for the MAP signal
MAP sample weight gain	When averaging the error between successive MAP samples is divided by the weight gain and the result is used to weight the latest MAP sample
Engine speed averaging threshold	The RPM threshold above which the engine speed is averaged for stability

Engine speed weight gain	When averaging the error between successive RPM samples is divided by the weight gain and the result is used to weight the latest RPM sample
Cranking RPM threshold	The RPM value above which the ECU switches from cranking to normal running parameters
Cranking dwell teeth	The number of flywheel teeth that the ignition is in dwell during cranking
Cranking fuel cut rotations	During cranking the fuel is cut after the specified number of rotations to prevent flooding
Cranking idle valve duty	The idle valve duty when cranking, this is not a % duty but a raw value from 0-180. 180 would be 100% pulse width
Injector pulses per cycle	The number of times the injectors are batch fired per engine cycle (2 rotations)
Rev limit	The RPM above which the fuel cut is activated
Rev limit hysteresis	The RPM below the rev limit at which fuel is re-enabled following a cut
Rev limit limp mode RPM	The rev limit if the ECU is in limp mode due to position sensor faults
Idle target RPM	The target idle speed
Idle ignition advance	Used to set the base ignition advance in certain idle ignition control modes
Idle ignition advance mode	0 - Use the Ignition Map, 1 - Ignition set to Idle Ignition Advance, 2 - Closed loop control of ignition advance
Ignition damping enabled	Used to enable/disable smoothing of the ignition to try and reduce engine oscillations
Ignition damping clamp	The maximum value that the damped ignition can differ from the compensated ignition advance
PWM integral gain	The integral gain setting for the PWM idle valve control system. The speed error is divided by this value and the result is added to the integral summator.
PWM max integral gain	The maximum value of the integral gain
PWM integral frequency	The frequency at which the PWM closed loop algorithm executes. This is a value for an 87hz counter so a value of 9 would cause the loop to run approx every 0.1 seconds
Wideband min value	The minimum value output by the wideband sensor multiplied by 100 e.g. 850 for (8.5:1 AFR)
Wideband max value	The maximum value output by the wideband sensor multiplied by 100 e.g. 1800 for (18:1 AFR)
Wideband min offset	The minimum voltage offset in bits (255 is 5V) e.g. for 0.5V value = 0.5 / (5 / 255) = 25

Wideband max offset	The maximum voltage offset in bits (255 is 5V) e.g. for 4.5V value = 4.5 / (5 / 255) = 230
Closed loop fueling enabled	Enables/disables closed loop fueling
Closed loop fueling coarse adjustment	The value in percent that the closed loop fuel is adjusted for larger errors
AFR sample frequency	The frequency at which the AFR is sample and the closed loop fueling algorithm executes. This is a value for an 87hz counter so a value of 9 would cause the loop to run approx every 0.1 seconds
Closed loop max correction	The maximum correction that can be applied in closed loop
Closed loop MAP ROC Limit	The limit above/below which closed loop is disabled for MAP rate of change
Closed loop accel limit	The limit above/below which closed loop is disabled for engine speed rate of change
TPS closed ADC	The TPS raw value for the throttle closed position e.g. for 0.4V the value is 0.4 / (5/1023) = 82
TPS open ADC	The TPS raw value for the throttle open position e.g. for 4.8V the value is 4.8 / (5/1023) = 982
Transient fuel pooling percentage	The amount of fuel in percent of base fuel time that is assumed to be pooled e.g. on the internal surfaces of the manifold etc
Transient fuel recover percentage	The rate at which the fuel pool size corrects itself during transient periods in percentage of the difference between the current pool value and the new one
Transient fuel dead band	The dead band around the transient fuel in injector ticks
Boost solenoid MAP trigger	The MAP value above which the boost solenoid is enabled
Boost solenoid TPS control enabled	Enables/disables scaling of the boost solenoid pulse width by TPS value
Boost solenoid TPS trigger	The TPS value which is used to scale the boost solenoid pulse width from e.g. 600 would scale the boost solenoid duty from 0 to Max linearly from 600 to the TPS open ADC value
Debug	Not for end user use
testValue	1 = Test Fuel Pump, 2 = Test boost solenoid