



EFILive V8 Reference

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EFILive V8 Reference

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First published
09 August 2012

Revised
9 May 2022

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Prerequisites

Intended Audience

EFILive Customers using the V8 Scan and Tune Tool software.

Computer Knowledge

It is expected that readers have a basic understanding of:

- The Windows operating system;
- Starting and using Windows applications;
- Navigating folders using Windows Explorer.

Tuning Knowledge

It is expected that readers have a basic understanding of:

- Electronic Fuel Injection;
- Electronic Spark Timing;
- On Board Diagnostics.

And enough common sense to understand the following:

- Make small incremental changes;
- Only make one change at a time;
- Evaluate and analyze the results of each change using the Scan Tool and/or other data logging devices before making the next change;
- Do not make changes that you do not understand;
- If you are unsure about making a particular change, ask a knowledgeable tuner first.

Systems Requirements

- PC or laptop running Win7 or higher.
- USB port.
- Color screen with 1280x960 or greater resolution.
- 1GB of available disk space.

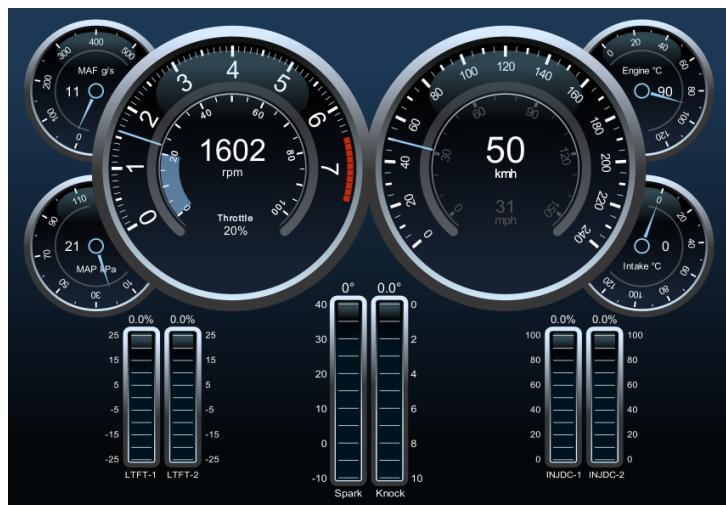


Introduction

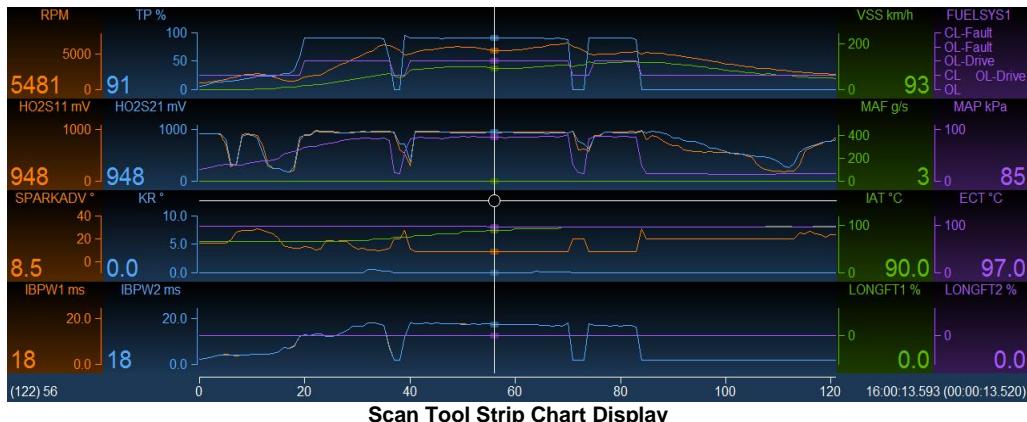
EFILive

Scan Tool

The EFILive Scan Tool records real-time data from engine and transmission controllers and can display that information in multiple formats. The logged data can be displayed using gauges similar to the instrument cluster in your vehicle or using strip charts that show data trends over time.



Scan Tool Gauge Display



Tuning Tool

The EFILive Tuning Tool reads and flashes calibration data and/or operating system code to and from vehicle controllers. The controllers may remain fitted to the vehicle while the read and/or flash processes are performed or the controllers may be removed and used with a bench harness.

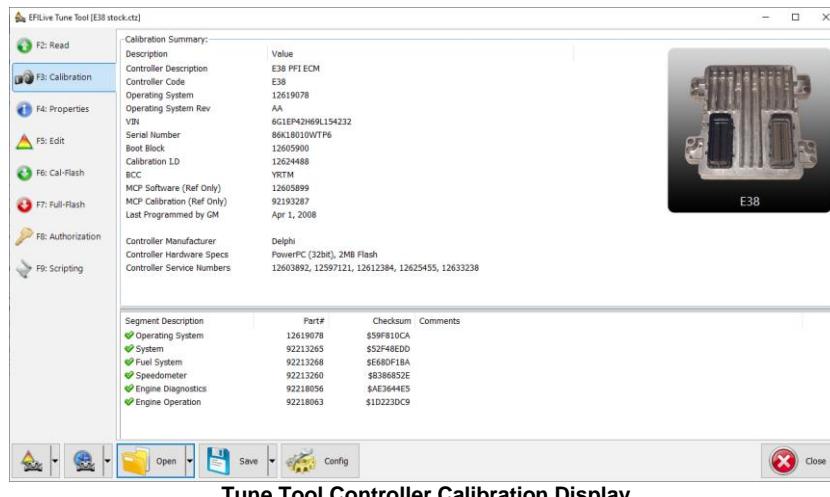


Sometimes reading or flashing a controller will fail due to badly behaved modules on the vehicle's network. Badly behaved modules usually fall into the following categories:

- Aftermarket radios.
- Navigation systems.
- Entertainment systems such as DVD players.
- Diagnostic and logging systems.

We recommend disconnecting such devices from the vehicle network or removing power from those devices prior to reading or flashing the engine or transmission controller.

The tuning tool also provides user friendly editing options for changing the calibrations in the controller.



Tune Tool Controller Calibration Display

FlashScan

FlashScan is really four devices in one:

1. A standalone tool that can display trouble codes, system readiness tests and data logger.
2. A pass-thru device allowing data logging to be displayed in real-time on your laptop computer.
3. A standalone read/flash tool that can read or flash a controller with no laptop or PC required.
4. A pass-thru device that can read or flash a controller from your PC or laptop.



AutoCal

AutoCal provides a convenient platform for professional tuners to distribute custom tunes to their customers. And for their customers to collect and submit logged data back to the tuner for analysis. It allows the tuner to update and optimize the original tune without shipping and/or removing controllers from customers' vehicles.



Differences between FlashScan and AutoCal

There are significant differences between FlashScan and AutoCal for end users. It is important that both the tuner and the tuner's customer (end user) understand these differences.

- With FlashScan, end users have the ability to create, view, and modify tunes. With AutoCal, only the tuner has that ability.
- Tunes from multiple sources can be flashed with FlashScan V2, however AutoCal is limited to flashing tunes provided by a single tuner.

A FlashScan Device is Required

FlashScan is required to create tunes for an AutoCal device. AutoCal devices cannot create tunes.

Comparison

Feature	FlashScan V3	AutoCal V3	FlashScan V2 (retired)	AutoCal V2 (retired)
Display/Clear Trouble Codes	✓	✓	✓	✓
Retrieve System Readiness Test Results	✓	✓	✓	✓
Pass-thru Logging	✓	✓	✓	✓
Pass-thru Reading/Flashing	✓	✓	✓	✓
Standalone Logging	✓	✓	✓	✓
Standalone Reading/Flashing	✓	✓	✓	✓
External Analog Inputs	✗	✗	✓	✗
Serial Interface	✓	✓	✓	✗ ¹
Master FlashScan Device Required		✓		✓
On Board Storage	512MB	512MB	6MB	6MB
Optional SD Card Storage	✗	✗	✓	✗
Audible Alarms	✓	✓	✓	✗
Visible Alarms	✗	✗	✓	✗
VIN License Capacity	600	600 ²	221	221 ²

- Internal serial interface is available via direct connection to circuit board but opening AutoCal's enclosure will void the warranty.
- Tuners control the number of license slots that are available for use.



F2: Scan

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Open

Open (Ctrl+O) will open a data log file.



When you open a version 7 (*.efi) data log file, you will be asked to confirm the controller type and transmission type. If you re-save the file using the version 8 software then you won't be asked for the controller type or transmission type when re-opening the version 8 file (*.pld)

Save

Save (Ctrl+S) will save the scan file with its current name.

Save As (Alt+S) will save the scan file with a new name.

Export (Ctrl+E) will export the scan file as a *.csv file suitable for use with Microsoft Excel. If a section is currently active then only the selected data will be exported.

Capture Screen to Clipboard (Shift+Alt+C) will copy the chart, gauge or map displayed directly to the clipboard.

Config

Config (Alt+Enter) opens the EFILive Property Settings window at the Scan Tool category.

Calculated PIDs (Ctrl+K) opens the Calculated PIDs editor window.

Display/Change Log File Information (Ctrl+I) allows you to view and modify log file specific information.

Manage Customers and Vehicles (Ctrl+D) opens the Customer/Vehicles Details window. These details are embedded into the log file meta data when it is first saved. Tuners can enter Customer details, Vehicle details and Comments.

The following fields link to folder/file template tags and can be used to construct folder/file templates using the VIN details from the scan or tune file:

```
<cn> "Customer Name"
<reg> the "Vehicle Registration"
<name> the "Vehicle Name"
```

Note: Folder/File templates are set up in the Edit->Properties->Files/Folders->[Tune Templates] or [Scan Templates].

To alter the information once it has been embedded in a log file, open the Manage Customers and Vehicles window, locate and edit the record.

Chart Properties (Shift+F4) displays the chart editing panel that can be used to customize the dashboard charts.

Dashboard Properties (Shift+F5) displays the dashboard editing panel that can be used to customize the dashboard gauges.

Map Properties (Shift+F6) displays the map editing panel that can be used to customize the dashboard maps (not available yet).

Open Dash

Open Dashboard (Shift+Ctrl+O) will open a dashboard file. The most recently used dashboard can also be selected from the drop down list at the bottom of the Scan Window.

Save Dash

Save Dashboard (Shift+Ctrl+S) will save the dashboard file with its current name.

Save Dashboard As (Shift+Alt+S) will save the dashboard file with a new name.



You may not save a dashboard with a file name that begins with “EFI_”, those file names are reserved for EFILive defined dashboard files.

Dashboard

Dashboard displays the last 10 used dashboards as a shortcut.

Search/Filter PID

Search/Filter PID displays Calculated PIDs defined with units of Boolean for searching or filtering logged data.

Close

Close (Ctrl+F4) closes the Window. If any changes have been made and not yet saved you will be asked to save the changes.



After you have modified which PIDs appear on the charts or gauges, the PID changes will be automatically saved in the current dashboard file.

You may customize that behavior using the: Properties->Scan Tool->Dashboard->PID Selection Options.

Parameter Identifiers (PIPs)

Types of PIDs

PIPs are the heart and soul of data logging. PID stands for Parameter IDentifier and as the name suggests a PID uniquely identifies a discreet data element that can be logged from the engine or transmission controller.

All PIDs are pre-defined by EFILive in metric units. All PID calculations are performed using metric units by the software.

EFILive can log many different types of PIDs:

Generic PIDs

Generic PIDs are available on all controllers that are fitted to vehicles registered in the US and subject to OBDII regulation. Effectively that means generic PIDs are available on all vehicles supported by the EFILive Scan Tool.

Enhanced PIDs

Enhanced PIDs are defined by the manufacturer to provide data above and beyond what is required to satisfy the US OBDII regulations.

Direct Memory Access (DMA) PIDs

DMA PIDS are defined explicitly by EFILive to provide specific information directly from the controller's memory. EFILive's DMA PIDs have been carefully designed to provide accurate and useful tuning information directly from the heart of the controller. Many DMA PIDs provide values used by the controller when indexing (looking up) data from calibration tables.

Calculated PIDs

Calculated PIDs may be defined by the user as mathematical expressions that use the values of other PIDs (including other calculated PIDs) to provide additional information. For example you could create a PID to compute the injector duty cycle from the RPM and injector pulse width as follows: duty cycle = pulse*rpm/1200.

External PIDs

External PIDs are provided to collect external information such as FlashScan's analog voltages, dynamometer integration and third party data logger integration.

Third party vendors wishing to integrate their external data logging with FlashScan are encouraged to contact EFILive to discuss integration options.

F2: PIDs

Selected Controller(s)

Allows the selection of the Engine and/or Transmission controller.

The Auto Detect option will connect to the controller and populate this selection.

Available PIDs

The list of available PIDs will be unique for individual controllers. Each time you select a different controller the PIDs shown in the Available PIDs section may change.



The list of available PIDs is divided into a number of groups displayed with blue headings. You can configure the display to automatically expand all the groups via: Properties->Scan->Dashboard->Expand PID Selection Groups Automatically.

To help locate a specific PID, you can enter all or any part of the PID's name, description or units into the "Search:" text box at the bottom of the window. When you stop typing into that text box EFILive will search for and display only those PIDs that match the search text. For example, if you were looking for a PID that had something to do with spark, then you should enter the text spark.

Click the button to clear the search options and display all PIDs again.

Selected PIDs

To include PIDs in the data log, you must "select" them. To select PIDs, highlight them and drag them from the Available PIDs section to the Selected PIDs section, or click the button or press the hotkey Ctrl+Ins.

To unselect PIDs, highlight them and click the button or press the hotkey Ctrl+Del.

If a custom dashboard is open, the button will copy all PIDs saved in the dashboard into the Selected PIDs window.

You can highlight multiple PIDs at once by left-clicking on them in combination with the Ctrl or Shift keys. Holding the Ctrl key down while left-clicking will allow you to select multiple individual PIDs. Holding the Shift key down while left-clicking will allow you to select a range of PIDs. Only PIDs that are in the same group can be selected at once.

Validating PIDs

PID validation only validates: generic, enhanced and custom PIDs. It does not validate: calculated, external or 3rd party PIDs.

To determine valid PIDs for a particular controller and operating system, connect FlashScan/AutoCal to your PC and vehicle, select the appropriate controller(s) in the scan tool and select the button. If not connected, select the target operating system to retrieve previously validated PIDs for that operating system.

All PIDs that are available for the selected controller(s) will be assessed irrespective of selected PIDs. PIDs that are invalid for a particular OS will be displayed with a icon to indicate that they should not be selected for the target operating system.

Channel Allocation per Module

Shows the channel usage by controller. Channel selected should not exceed the maximum capacity per controller.

Virtual Dashboards

A virtual dashboard provides a complete scan configuration profile. The virtual dashboard saves PID configurations, chart configuration, gauge layouts and custom maps for a particular controller. EFILive provides a range of sample dashboards for users, however users can create their own.

Common Functions

Each dashboard page contains a range of features that are consistent across virtual dashboard pages. In addition to frame counts and log time stamp information, a range of common buttons exist.

Task	Mouse	Hot Key
Clear Logged Data		Ctrl+N
Record		Ctrl+R, or <Numeric KeyPad 0>
Monitor		Ctrl+M
Pause/Resume		Ctrl+Space
Start Play Back		Ctrl+P
Stop		Ctrl+Q, or <Numeric KeyPad 0>
Repeat		Ctrl+L
Real-Time Speed		Ctrl+T
Data Logging Profiler Display		Ctrl+Y

F3: Data

The Scan Tool's Data tab page shows each selected PIDs' data and statistical information.

The precision displayed for each value is dependent on the value as follows:

- If the value is 0 then only 0 is displayed (with no precision)
- If the value is between -0.001 and 0.001 then the precision is 6 decimal places.
- If the value is between -1 and 1 then the precision is 3 decimal places.
- If the value is between -10 and 10 then the precision is 2 decimal places.
- If the value is between -100 and 100 then the precision is 1 decimal places.
- If the value is less than -100 or greater than 100 then the precision is 0 decimal places.
- If trailing zeros exist after the decimal point, then they are stripped.

F4: Charts

Strip charts show the recorded logged data. This view of the data is usually the most useful for analyzing trends over time and for comparing various PIDs' values at the same point in time.

To display the charts as a full screen, press F10. To exit from full screen mode press Escape.

Task	Mouse	Hot Key
Make a Selection	Click and drag left or right	Shift+Left Shift+Ctrl+Left Shift+ Right Shift+Ctrl+Right
Clear a Selection	Click outside selection	Left Ctrl+Left Right Ctrl+Right
Crop Selected	 Right-click on chart, select: Crop.	Ctrl+BackSpace
Delete Selected	 Right-click on chart, select: Delete	Ctrl+Delete
Zoom to Selection	Click inside selection Right-click on chart, select: Zoom->Zoom Selected.	Ctrl+Alt+S
Zoom None	Click time scale Right click on chart, select: Zoom->Zoom None.	Ctrl+Alt+N
Zoom Actual	Right click on chart, select: Zoom->Zoom Actual.	Ctrl+Alt+Z
Zoom In	Ctrl+Scroll Wheel Forward Mouse must be over the data area. Right click on chart, select: Zoom->Zoom In. Other: Use chart magnification slider below the scroll bar.	Ctrl+Alt+I

Zoom Out	<p>Ctrl+Scroll Wheel Back Mouse must be over the data area.</p> <p>Right click on chart, select: Zoom->Zoom Out.</p> <p>Other: Use chart magnification slider below the scroll bar.</p>	Ctrl+Alt+O
Pan Left	<p>Scroll Wheel Forward Mouse must be over the data area.</p> <p>Other: Use scroll bar under time scale.</p>	Left Ctrl+Left
Pan Right	<p>Scroll Wheel Back Mouse must be over the data area.</p> <p>Other: Use scroll bar under time scale.</p>	Right Ctrl+Right
Show/Hide Chart Notes		Ctrl+U
Filter data based on selected Filter PIDs value		Ctrl+F
Search backwards for previous change in Filter PIDs value		Ctrl+PgUp
Search forwards for previous change in Filter PIDs value		Ctrl+PgDn
Auto Scale PID Zero Biased	 <p>Right click on PID, select: Auto Scale this PID. Attempts to locate the scale's zero point at the top, center or bottom of scale.</p>	
Auto Scale PID Min/Max Biased	<p>Shift+Click </p> <p>Attempts to make the scale 10% larger than the displayed data.</p>	

Auto Scale PID Permanent	Ctrl+ Click  Attempts to locate the scale's zero point at the top, center or bottom of scale. <i>This option alters the PID's default min/max values.</i>	
Auto Scale PID Default	Click in the scale area. Sets the displayed min/max values to the PID's default min/max values.	
Auto Scale All PIDs	Right click on chart, select: Auto Scale All PIDs.	Ctrl+Alt+A
Default Scale All PIDs	Right click on chart, select: Default Scale All PIDs.	Ctrl+Alt+D
Pan PID Up	Scroll Wheel Forward Mouse must be over the appropriate scale.	
Pan PID Down	Scroll Wheel Back Mouse must be over the appropriate scale.	
Zoom PID In	Ctrl+Scroll Wheel Forward Mouse must be over the appropriate scale.	
Zoom PID Out	Ctrl+Scroll Wheel Back Mouse must be over the appropriate scale.	
Copy Scale	Ctrl+Click and drag from one scale to another.	
Hide PID	<input checked="" type="checkbox"/>	
Show PID	<input checked="" type="checkbox"/>	
Show Start/End Frames	Right click on chart, select: Show Start/End Frames.	Ctrl+Alt+L
Fetch Start/End Frames	Right click on chart: Fetch Start/End Frames.	Ctrl+Alt+F
Move Start/End Frames	Click and drag  tabs.	

Toggle Mouse Control	Right click on chart, select: Ignore Mouse. Click in chart area to resume mouse control.	Ctrl+F2
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F5: Gauges

The Gauges tab page shows a virtual instrument cluster that displays the logged data in real time.

To display the gauges as a full screen, press F11. To exit from full screen mode press Escape.

F6: Maps

Maps are used to display a single PID as a surface function of two other axis PIDs. Maps display the aggregate (count, minimum, average and maximum) values of one PID in a matrix based on the values of two other PIDs. These maps are also known as pivot tables or histograms.

For example you could choose to plot the spark advance surface function on a grid indexed by RPM and throttle position. Map data can be compared with calibration tables to evaluate tuning changes. Maps can also be configured to record percentage differences (via carefully crafted calculated PIDs) between commanded and actual calibration data which can then be used to update the calibrations.

There are ten maps. To change the display between each map, click on the tabs A through to J.

Task	Mouse	Hot Key
Map Properties	Right click on map: Map Properties.	Shift+F6
Chart Linking	Right click on map: Chart Linking.	Ctrl+Alt+K
Transpose	Right click on map: Transpose.	Ctrl+Alt+T
Copy Selected Cells	Right click on map: Copy	Ctrl+C
Copy with Labels	Right click on map: Copy with Labels	Shift+Ctrl+C
Copy/Paste Default Settings	Right click on map: Copy/Paste Default Settings	
Select Data PID	Right click on map: Select Data PID	
Select Column PID	Right click on map:	

	Select Column PID	
Select Row PID	Right click on map: Select Row PID	
Display Minimum Value		
Display Maximum Value		
Display Average Value		
Display Cell Count		

F7: DVT

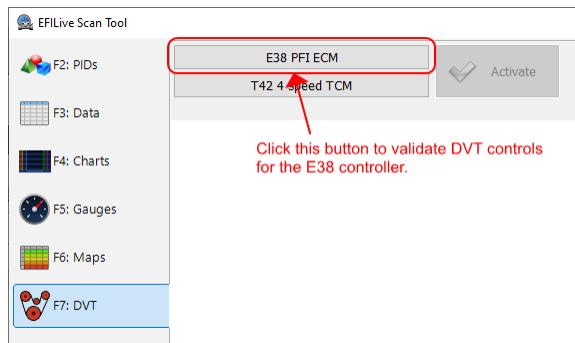


DVT is for use by experienced EFI technicians.

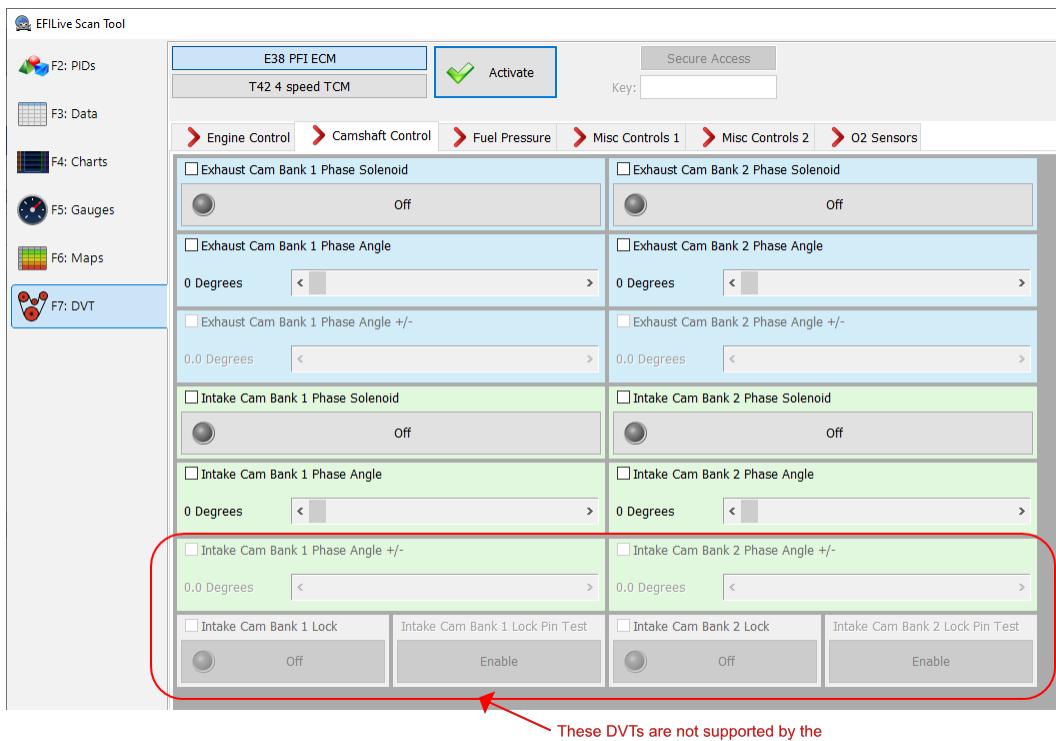
It temporarily overrides the normal operation of the controller and, if used incorrectly can damage the powertrain and/or the vehicle.

Open the [F2: Scan] tab page and select the target controller(s) on the [F2: PIDs] tab page. You can select both an engine and transmission controller. However, only one device may have DVT controls active.

Select the [F7: DVT] tab page and click on the controller for which you want to activate DVT controls.

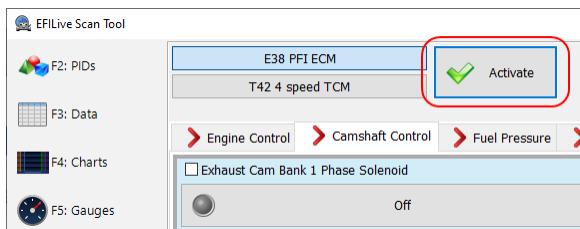


The controller will be queried to determine which DVT controls are available and those available DVTs will be displayed. Some DVTs will be disabled, those DVTs are not supported on the current controller.

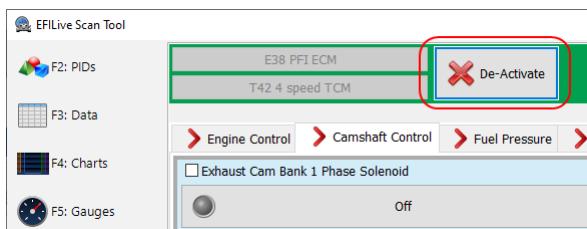


Not all overrides are available on all vehicles. Different model years support different combinations of override commands.

Before any controls can be used the DVT system must be activated. Click the [Activate] button to activate the DVT controls.



To de-activate the DVT system, click the [De-Activate] button.



Do not attempt to use any DVT controls while the vehicle is in motion. Always use a dynamometer if you need to use DVT controls while the vehicle is being driven.

It is possible to activate many DVT controls at the same time. EFILive recommends using only one or two controls at the same time.



Do not attempt to use any DVT controls to command settings that exceed the capabilities of the vehicle. It is possible to damage vehicle components and cause injury to yourself and/or others if misused.

Most controls have a checkbox at the top left. That checkbox activates/de-activates individual control. You should set the value or option within the control to the desired value before activating the control. For example, if you are using the “Desired Idle Speed Control”, you should set the rpm to the desired speed prior to checking the control’s activation checkbox – otherwise if the desired rpm was set to 0 then when you activate the control it will attempt to idle at 0 rpm – which will probably stall the engine.

Some controls are grouped by function and displayed using a common color. When a grouped control is active it is displayed in a bolder/darker color, when a grouped control is de-activated, it is displayed in a lighter color. You can see the top left control, once activated has a darker background color.

<input type="checkbox"/> Exhaust Cam Bank 1 Phase Solenoid <input checked="" type="radio"/> Off	<input type="checkbox"/> Exhaust Cam Bank 2 Phase Solenoid <input checked="" type="radio"/> Off
<input type="checkbox"/> Exhaust Cam Bank 1 Phase Angle 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Exhaust Cam Bank 2 Phase Angle 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>
<input checked="" type="checkbox"/> Exhaust Cam Bank 1 Phase Solenoid <input checked="" type="radio"/> Off	<input type="checkbox"/> Exhaust Cam Bank 2 Phase Solenoid <input checked="" type="radio"/> Off
<input type="checkbox"/> Exhaust Cam Bank 1 Phase Angle 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Exhaust Cam Bank 2 Phase Angle 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>

Single controls that are not part of a group, are displayed with a gray background when de-activated and with a green background when activated.

<input type="checkbox"/> Desired Idle Speed Control 600 rpm <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Spark Retard from Final Spark 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>
<input type="checkbox"/> Throttle Position 0.0 % <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Canister Purge Duty Cycle 50 % <input type="button" value="<"/> <input type="button" value=">"/>
<input checked="" type="checkbox"/> Desired Idle Speed Control 600 rpm <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Spark Retard from Final Spark 0 Degrees <input type="button" value="<"/> <input type="button" value=">"/>
<input type="checkbox"/> Throttle Position 0.0 % <input type="button" value="<"/> <input type="button" value=">"/>	<input type="checkbox"/> Canister Purge Duty Cycle 50 % <input type="button" value="<"/> <input type="button" value=">"/>

Controls that do not have a checkbox are always active and ready to be used.

Slip Detection Reset <input type="button" value="Reset"/>	Gear Position Sensor Reset <input type="button" value="Reset"/>	Brake Pedal Learn Reset <input type="button" value="Reset"/>	Clutch Pedal Learn Reset <input type="button" value="Reset"/>
<input type="checkbox"/> Starter Relay (USE CAUTION) <input checked="" type="radio"/> Off	<input type="checkbox"/> Neutral Gear Sensor Reset <input type="button" value="Reset"/>	<input type="checkbox"/> RVS Disable History Reset <input type="button" value="Reset"/>	<input type="checkbox"/> Reverse Inhibit <input checked="" type="radio"/> Off

Each time you change the state or value of an active control a message will be displayed showing the result of the change. If the change was successful then the controller will respond with “OK”, like this:

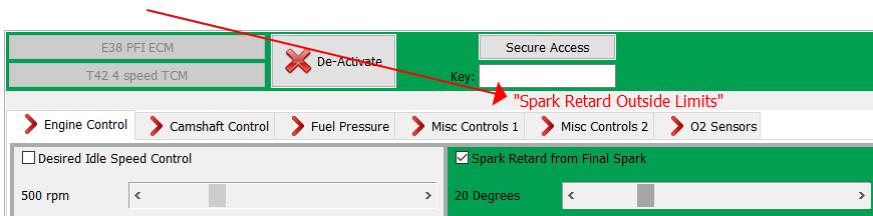
E38 PFI ECM T42 4 speed TCM De-Activate Secure Access
Key... OK

Engine Control Camshaft Control Fuel Pressure Misc Controls 1 Misc Controls 2 O2 Sensors

Desired Idle Speed Control
500 rpm

Spark Retard from Final Spark
10 Degrees

If the controller rejects the DVT control it will respond with an error message like this:



Some DVT controls require that the controller is not secured with a seed/key. For those controls you need to click the [Secure Access] button. That will send the stock key to the controller to un-secure it. If the controller is secured with a non-stock key and you know the key, you can supply the key in the "Key:" text box. If you don't know the key then you cannot use any controls that require the controller to be un-secured.

Some controls like the "Injector Flow Test" and "Crank Angle Sensor Error Learning" can only be performed once per ignition cycle.

Many controls will only work if/when certain conditions are met. For example, the "Crank Angle Sensor Error Learning" requires conditions such as the engine to be at operating temperature, the hood to be closed and the park brake applied.

Editing Gauges

See the separate document "EFILive V8 Gauge Editor".

Comparing Data Logs

(Not available yet)

Log File Information

To display and/or change the non-PID information in the log file, such as comments and various vehicle options, select the "Display/Change Log File Information" option from the [Config] button's drop down menu or press the Ctrl+I hotkey.

Calculated PIDs

There are two types of Calculated PIDs:

-  **EFILive Calculated PIDs** – Are predefined by EFILive and cannot be modified by the end user.
-  **User Calculated PIDs** – Are created by the user and can be modified by the user.

Calculated PIDs should be defined using metric units because all PIDs predefined by EFILive and all PID calculations are performed using metric units. Defining Calculated PIDs using units other than metric will prevent unit conversion routines from working correctly. PIDs defined using the correct metric units may be displayed using any of EFILive's pre-defined US customary units or if required, using custom units defined by the user.

Calculated PIDs Expression Editor

The EFILive Scan Tool contains an expression editor where users can create, view and modify their calculated PID expressions.

The Calculated PIDs expression editor can be accessed via the drop down menu on the [Config] button. Select “Calculated PIDs” or press the Ctrl+K hotkey.

Task	Mouse	Hot Key
Add PID Group		Shift+Ctrl+Ins
Delete PID Group		Shift+Ctrl+Del
Display Search Options		Ctrl+F
Add PID		Ctrl+Ins
Delete PID		Ctrl+Del

PID Group – add a PID Group by using the button. Enter a group name and description. Group names are limited to 4 uppercase letters and numbers.

User Defined PID – highlight one of the user defined PID groups in the Group list, then click the button in the PID list to add a user defined PID. Enter the PID (Parameter identifier code), Name, Units and Precision. Parameter identifier codes are limited to 11 uppercase letters and numbers.

Click the **[Edit]** button (or double click the calculated PID) to display the expression editor window where you can edit the calculated PID’s expression. Calculated PIDs use the Lua 5.x scripting language, documentation is available here: [Lua 5.3](#). Pre-defined EFILive functions, Lua code blocks and selected PIDs can be added by clicking on the required item in the list to the right.

Use the **[Test]** button to validate the programming expression.

EFILive PID Compiler

Some supported controllers are capable of data logging more PIDs than EFILive has pre-defined for the controller. Users can define many of those additional PIDs so that they can be data logged along with the pre-defined EFILive PIDs.

DMA (Direct Memory Access) PIDs are also supported, allowing users to data log specific data from specific RAM addresses in a target controller.

For instructions on defining PIDs and DMA PIDs, please review the comments and example PID definitions in the *.ini files in the folder \Documents\EFILive\V8\User Defined PIDs.



F3: Tune

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Open

Open (Ctrl+O) will open a tune file.

Save

Save (Ctrl+S) will save the tune file with its current name.

Save As (Alt+S) will save the tune file with a new name.

Save As (Read Only)... will save the tune file with a new name and set that new file to read-only. Use this option to designate the new file as a permanent archive that does not allow any further changes to be saved into it. To remove the read only flag, right click on the file using Windows Explorer and select Properties, then uncheck the Read-only check box.

Save (Calibration Only)... will save only the calibration portion of the tune file. Calibration only files are significantly smaller than a full tune file.



Use this option to save multiple calibrations for storage on AutoCal devices that have limited capacity. Calibration only files cannot be re-opened nor edited using the EFILive software.

Save, For AutoCal (Shift+Ctrl+S) same as “Save” but tags the saved file with the attached FlashScan’s License number which authorizes the saved file for use with any AutoCal linked to the FlashScan device.

Save As, For AutoCal (Shift+Alt+S) same as “Save As” but tags the saved file with the attached FlashScan’s License number which authorizes the saved file for use with any AutoCal linked to the FlashScan device.

Save (Calibration Only), For AutoCal - same as “Save (Calibration Only)...” but tags the saved file with the attached FlashScan’s License number which authorizes the saved file for use with any AutoCal linked to the FlashScan device.

Capture Screen to Clipboard (Shift+Alt+C) will capture screen contents to the clipboard.

Capture Graphic to Clipboard will capture only the graphic display to the clipboard.

Capture Table to Clipboard will capture only the table display to the clipboard.

Config

Config (Alt+Enter) Opens the EFILive Property Settings window at the Tuning Tool category.

Close

Close (Ctrl+F4) closes the Window. If any changes have been made and not yet saved you will be asked to save the changes.

Reading Calibrations

Click on the [Auto Detect] button to detect which controllers are available for reading via the attached FlashScan or AutoCal device.

If the controllers cannot be automatically detected, you can manually select the controller(s) by right clicking in the grey square and selecting the correct controller.

The green tick that appears on the controller's image indicates which controller (engine or transmission) will be read. Click on either controller to select it for reading.

Try Stock Key attempts to gain access to the controller using the stock key.

Try This Key allows you to specify the actual key that will be used to gain access to the controller. Use this option if you know the controller is locked and if you know the key that was used to lock it. Keys may be entered in decimal (1..65535) or in hexadecimal (\$0001..\$FFFF).

Try Common Alternative Keys attempts to gain access to the controller using additional keys. Use this option if EFILive reports that the controller is locked but you suspect it has not been locked with a custom key.

Assume Lock May Be Faulty ignores any security reported by the controller during reading or flashing and assumes the controller's security is non-functional and proceeds with the read operation regardless. Use this option if EFILive reports:

- the controller is locked (but you suspect it has not been locked with a custom key) or
- the controller has “returned to normal operations”.

Try Additional Unlock Strategies attempts to gain access to the controller by using a different seed/key strategy. If and when a controller cannot be unlocked using the above options, EFILive support may request that you use this option in conjunction with additional data supplied by EFILive support. Using this option without the additional data from EFILive support is not useful.

High Speed (VPW Only) will use the high speed VPW mode to transfer data from the controller. High speed VPW runs at 41.6kbps which is 4 times faster than standard VPW which runs at 10.4kbps.



For CAN controllers, EFILive has developed a proprietary “Fast CAN Mode” that can be selected in the FlashScan/AutoCal device settings. EFILive’s Fast CAN Mode provides a modest speed increase when reading and/or flashing controllers.

Exclude Boot Block When Reading Cummins HD Controllers will exclude the boot block resulting in reading the controller faster, but may result in a file that does not contain all the detailed information from the vehicle.

Show Summary When Finished will automatically display the [F3: Calibration] tab page when reading is complete.

Read will start the read process.

Quit will stop the read process. Stopping a read process midway through will not harm the controller. Usually an ignition off-countdown-on cycle will reset the controller successfully. In the worst case scenario, you may need to reset the controller by removing and restoring battery power.

Lock/Unlock the controller with your known key. Used for controllers that support Auto-Lock via a boot loader (E38, E40, E54, E60, E67, LS1B).

Problems Reading a Controller

There are a number of reasons why a controller may not be read, these include:

Check Software and Firmware Version: Ensure you are running the most up to date software and firmware.

Check Aftermarket devices: The read and flash operations command other modules on the vehicle communications bus to be silent. Some aftermarket devices do not respect the bus silence command and continue to transmit during a read or flash operation. That will usually cause the read or flash to fail. Aftermarket devices should be disabled (pull the fuse) or disconnected from the vehicle's communications bus prior to reading or flashing.

Do no operate vehicle: DO NOT operate any vehicle feature that may communicate on the data bus. This includes opening or closing of hood, doors, windows, as well as changing settings on radio, HVAC, connecting/removing charging devices etc.

Read Block: A previous tuner may have prevented access to the controller by applying the [Block ECM Calibration Reading] parameter in the tune tool.

Read Restriction: Some manufacturers have commenced implementing restrictive architecture preventing the contents of the controller from being read.

Custom Operating Systems: For some Custom Operating Systems EFILive writes tune files to non-readable memory. These tune files cannot be read out from the ECM.

NVRAM Status: Where the NVRAM area of the ECM is corrupted the vehicle may still run, however the tune file cannot be read or flashed. Typically where the VIN, Serial number, Hardware number and/or calibration ID do not contain valid data, the controller will need to be repaired to restore read and flash functionality.

Please refer to the [NVRAM Status](#) article for further information.

Controller Selection: Use the [Auto Detect] option to check the correct controller is selected.

Test for Rogue Modules: FlashScan/AutoCal V3 users can access a range of test modes to check the network for rogue modules that may cause read or flash operations to abort are available by navigating to the Tune Tool -> F1: Tuning -> F4: Test OBD Network menu.

If reading continues to fail, please see this knowledgebase article:
<https://service.efilive.com/kb/articles/problem-reading-a-controller>

Segments and Checksums

Controllers store their operating system code and calibration data in flash memory which is a type of computer memory that retains its contents even when power is removed. Usually flash memory is extremely robust and the data programmed into it remains unchanged for many, many years. However, faults can and do occur, so the controller must be able to reliably detect if and when the contents of the flash memory change unexpectedly.

Controllers employ various strategies to detect if and when the flash memory changes, one such strategy is to constantly sum up all the numbers in the controller's flash memory and to compare the total sum to a known sum that has previously been stored in the controller's flash memory. That sum is called a checksum. If the computed sum does not match the stored sum then the controller assumes that the flash memory has been corrupted and that the data is no longer reliable.

Once a change has been detected the controller will usually go into limp mode or it may even prevent the engine from starting.

When EFILive is used to edit a calibration file the controller must be told that the changes are ok and should not be detected as faults. To do that, EFILive computes the correct checksum and stores that checksum back into the flash memory. That way, when the controller performs its own sum it will match the sum stored by EFILive.

Each segment's checksum status can be one of five states; each state is displayed by EFILive using a different icon:

Icon	Description
	Checksum is correct.
	<p>Checksum is incorrect and disabled.</p> <p>This means the segment checksum has been set incorrectly but the controller has been instructed to not compute or verify the checksum during normal operating conditions.</p> <p>If a flash memory fault does occur the controller will not be able to detect it and the controller will continue to operate with faulty data.</p> <p>Usually this is caused when the data has been modified by a third party who has not updated or is not technically competent to update the checksum correctly.</p>
	<p>Checksum is correct but disabled.</p> <p>This means the segment checksum has been set correctly but the controller has been instructed to not compute or verify the checksum during normal operating conditions.</p> <p>If a flash memory fault does occur the controller will not be able to detect it and the controller will continue to operate with faulty data.</p>
	<p>Checksum is incorrect</p> <p>This indicates that the data in the tune file does not match the controller's checksum.</p> <p>EFILive will not allow a tune file with incorrect checksums to be flashed into a controller.</p>

	<p>EFILive is not configured to read or flash this segment – checksum is not managed by EFILive.</p> <p>This indicates that the EFILive software does not have enough information about the segment to compute the checksum and that the segment will never be flashed into a controller so it is not necessary for the EFILive software to manage the checksum.</p>
	<p>EFILive is not yet configured to manage checksums for this segment.</p> <p>This indicates that the EFILive software is not yet able to calculate, verify or update the checksum for the indicated segment. The checksum may still be correct, but the EFILive software cannot verify that the checksum is correct.</p> <p>Please send the file to EFILive so that we can add the configuration data required to calculate the checksums for this operating system.</p> <p>EFILive will still allow you to flash the file but <i>you must first be absolutely sure that the checksums are correct</i> or the vehicle will be left in a no start condition after the flash is complete.</p>

If you read a controller or open a tune file that shows one or more incorrect checksums we highly recommend not using that tune file to re-flash back into the same controller or into any other controller.

Sometimes the checksums are left disabled when a vehicle leaves the manufacturer (we don't know why), but EFILive can correct and re-enable the checksums. To do that right click on the segment you wish to correct and select "Force Checksum to be Correct".

All segments will be updated simultaneously.

Depending on the size of the segments it may take a few seconds to recompute and update the checksums.



NEVER, EVER force a checksum to be correct unless you are 100% certain that the file was obtained from a **working controller** and that the file has **not be tampered with or modified** outside of the EFILive software. Doing so will almost certainly render the controller inoperable and possibly unrecoverable.

Segment Import/Export

For GM controllers: Segments can be imported and exported from the [F3: Calibration] window by selecting one or more segments, right-clicking and selecting "Import" or "Export". You may export multiple segments at the same time but you may only import segments one at a time.

Main Operating System, Secondary Operating System and Boot Software segments cannot be imported or exported.

Not all controller types (for example E20, E47, E55, E69, E77, LS1A and some older VPW controllers) currently support segment import and export.

If a tune file has security settings of "Can Only be Viewed" then segments cannot be imported until that security setting is removed.

If a tune file has security settings of "Cannot be Viewed or Modified" then segments cannot be imported or exported until that security setting is removed.

When exporting multiple segments, you will be prompted to enter a unique suffix that will be appended to each segment's exported filename to prevent overwriting previously exported segments with the same part numbers.

You may only import a segment if that segment's operating system number matches the target tune file's operating system number. The segment number may be different.

Editing Calibration Data

Editing calibration data is performed on the [F5: Edit] tab page. An editable tune file must be open before any calibration data can be displayed and/or edited.

Segments are displayed in the navigation tree in the same order used by the manufacturer.



For some controllers the segment display order presented in the V8 software will be different to the segment display order presented in the V7 software.

There is no software registration required to activate the full features of the V8 tune editor. The V8 software may be used to edit, upgrade to custom operating systems and save tune files without any registration.

Some calibrations are displayed with red icons. The red icon indicates that the calibration should only be modified by tuners who fully understand the consequences of the modifications.

A FlashScan device is required to be connected to the PC when saving files where the author wants to apply tune file security, or for use with remote AutoCal devices that have been linked to that FlashScan device.

File Management

Task	Icon	Hot Key
Close alternate calibration.		
Open second file for comparison.		Shift+Ctrl+O
Display comparison results.		Ctrl+1
Show calibration data.		Ctrl+4
Show alternate calibration data.		Ctrl+5
Show difference between calibration and alternate.		Ctrl+6
Show relative percentage difference between calibrations calculated as		Ctrl+7

$((current-alternate) * 100)/alternate.$		
Show absolute percentage difference between calibrations calculated as $((current-alternate) * 100)/(max-min).$		Ctrl+8
Display calibrations that contain out of range values.		
Display list of calibrations modified since last saved. Custom Operating systems do not show as a modification because they cannot be undone/redone.		Ctrl+M
Convert data between units.		Ctrl+Alt+Enter
Speedo calculator		
Cummins injection timing calculator		
Hide/Show navigator tree.		Ctrl+F1
Hide/Show view toolbar		
Hide/Show adjust toolbar		
Open the EFILive V8 Reference Manual.		F1

Navigator Tree

Task	Icon	Hot Key
Add the currently highlighted calibration in the navigator tree to the favorites list.		
Expand currently selected node.		Shift+F9
Collapse currently selected node.		Shift+Ctrl+F9
Search all calibrations for text in search box.		Enter
Search backwards from previous calibration.		Shift+Ctrl+F3
Search forwards from next calibration.		Ctrl+F3
Update the corner flashes on the navigator tree icons that indicate modified calibrations. This option is useful when multiple calibrations are defined (usually via *.cax8 files) that overlap the same memory area in the tune file. After modifying one calibration the overlapping calibration may also contain modified data but it won't be indicated in the navigator as being modified until you click this refresh button.		
Display a brief explanation of navigator search options.		

Display Options

Task	Icon	Hot Key
Revert all changes to when file was opened.		Ctrl+R
Undo last change.		Ctrl+Z
Redo last undo.		Shift+Ctrl+Z
Set default view		
Show 2D chart.		Ctrl+2
Show 3D surface plot.		Ctrl+3
Rotate 3D surface plot.		Ctrl+0
Transpose (i.e. swap) row and column axis.		Ctrl+Alt+T
Set custom view.		
Set default view (hold Ctrl for larger graphic, hold Shift to set as user default).		
Show graph only.		
Show table only.		
Increase displayed precision.		Ctrl+Alt+I
Decrease displayed precision.		Ctrl+Alt+O
Increase displayed precision for column labels.		
Decrease displayed precision for column labels.		
Increase displayed precision for row labels.		
Decrease displayed precision for row labels.		
Add currently displayed/selected calibration to the favorites list.		

Calibration Editor

Task	Icon	Hot Key
Set value of selected cells.		
Add to selected cells.		
Subtract from selected cells.		
Increase selected cells by percentage.		
Decrease selected cells by percentage.		
Multiply selected cells.		
Divide selected cells.		
Clip selected cells to maximum.		
Clip selected cells to minimum.		
Reduce selected cells by 1.0.		F11

Increase selected cells by 1.0.		F12
Reduce selected cells by 0.1.		Ctrl+F11
Increase selected cells by 1.0.		Ctrl+F12
Fit curve to selected cells options.		Shift+F10
Fit curve horizontally – a minimum of 3 cells must be selected.		
Fit curve vertically – a minimum of 3 cells must be selected.		
Fit curve horizontally and vertically – a minimum of 3 cells must be selected.		
Smooth selected cells horizontally – a span of at least 3 columns must be selected.		Shift+F11
Smooth selected cells vertically – a span of at least 3 rows must be selected.		Shift+Ctrl+F11
Smooth selected cells horizontally and vertically – a span of at least 3 columns/rows must be selected.		Shift+Alt+F11
Make horizontal gradient – a minimum of 3 cells must be selected.		Shift+F12
Make vertical gradient – a minimum of 3 cells must be selected.		Shift+Ctrl+F12
Make rectangular gradient – a minimum of 3 cells must be selected.		Shift+Alt+F12
Make horizontal gradient, interpolate non-linear axis.		
Make vertical gradient, interpolate non-linear axis.		
Make rectangular gradient, interpolate non-linear axis.		

Navigator Tree icon descriptions

Icon	Modified	Description
		Calibration segment.
		Calibration folder.
		Parameters.
		2D Calibration.
		3D Calibration.
		Calibration folder that contains advanced calibrations.
		Advanced parameters.

		Advanced parameters should not be changed without a full and clear understanding of their purpose.
		Advanced 2D Calibration. Advanced parameters should not be changed without a full and clear understanding of their purpose.
		Advanced 3D Calibration. Advanced parameters should not be changed without a full and clear understanding of their purpose.
		DTC list.
		Custom Operating system. This icon does not have a modified format because once applied, a custom operating system cannot be undone.

When the navigator tree shows a modified icon, the corresponding font color is also changed to highlight that it has been modified.

The modified status of each calibration and all navigator items are reset to “not modified” when the file is saved.

Navigator Search

Searching for a calibration ID (also known as a calibration name) will only attempt to search for a calibration with that name. It will not search for references to that calibration in the description of other calibrations.

To search for a reference to a calibration name, enclose the calibration name in curly braces.

- Prefix a calibration name with the @ symbol to only search for that exact calibration.
- Searching for a calibration name without using the @ prefix may find references to that calibration.
- Enclose multiple words in quotes “.....” to search for that exact phrase.
- Enclose multiple words in parenthesis (...) to search for any word.
- Enter separate words to search for all words in any order.
- Prefix a search value with =, <, >, <= or >= to search for a calibration value, such as
 =150 to search for values that are equal to 150, or
 >=PWM to search for text values that contain the text "PWM".
 Add a :units suffix to search for a particular value:unit, such as
 >=4500:rpm to search for rpm values that are greater than or equal to 4500rpm.
 Note: Only parameter style calibrations (i.e. non-tables) are searched.
 Searches are performed using the calibration's metric value.

If a search is successful, the calibration will be opened and the navigator will be expanded to reveal the calibration entry.

Clicking on the search box drop down arrow will display the most recent search history.



The navigator search will search all Diagnostic Trouble Codes (DTC) and their descriptions even when the DTC calibration tables are closed, an improvement over V7 which required the DTC calibration table to be open before they could be searched.

Favorites

Calibrations can be saved in the [Favorites] tab page of the navigator. Use the “Add to Favorites” button in the navigator tree tool bar to add the calibration directly from the navigator. Use the “Add to Favorites” button in the display options tool bar to add the currently displayed/selected calibration or parameter to the favorites list.

The first ten favorites can be opened using the hotkeys Shift+Ctrl+1 through Shift+Ctrl+0. All other favorites can be opened by double-clicking on the item in the favorites list.

Re-order the list of favorites by selecting an item and using the up or down arrow buttons at the bottom of the favorites display.

Delete or Delete All to remove calibrations from the favorites list.

Tab Management

Tabs are opened by double clicking on a calibration in the navigator window, performing a search that returns a match, or clicking a calibration link in a calibration description.

Up to ten tabs can be opened at one time. When an eleventh tab is opened, the least recently used tab is closed, allowing the current selection to be opened.

Use the arrow buttons at the top right of the edit window to scroll the tabs left and right to view open tabs that are not visible on the current display, or use the page list button to list/select any of the currently open tabs.

Tabs can be moved and reordered by dragging the current tab to a different point in the tab list.

To close a tab, make it current and click the icon.

For faster tab management, right click in the tab area and select from the following options:

- Close Current Tab (Shift F4)
- Close All Tabs
- Close Tabs to the Left
- Close Tabs to the Right
- Close All Tabs

Modifications

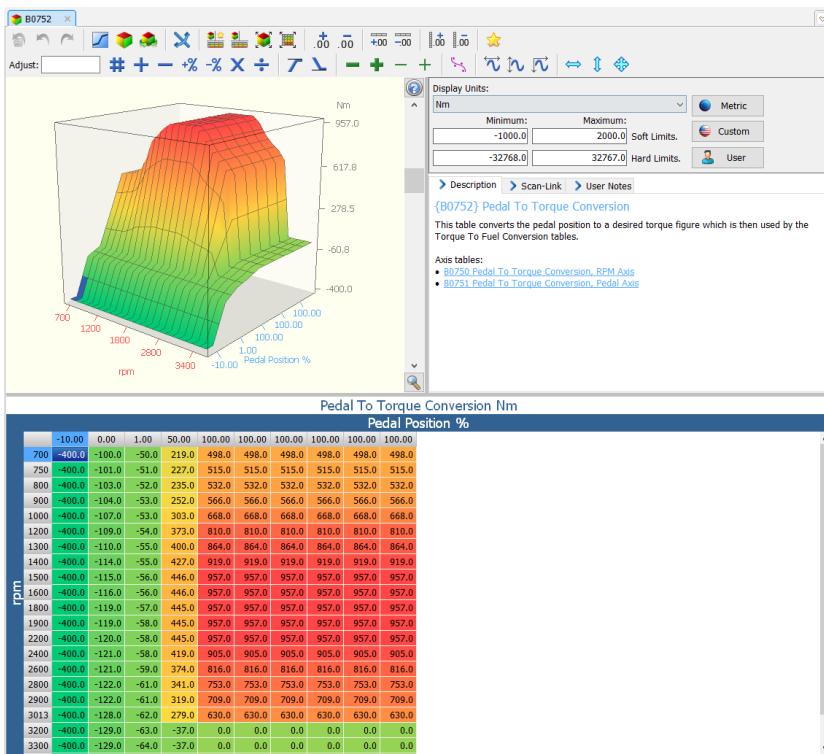
The icon and the Ctrl+M hot key will open the modifications tab. The modifications tab displays a list of calibrations modified since the tune file was last saved.

Custom Operating systems do not show as a modification because they cannot be undone/redone.

Where a calibration axis is modified, the modifications tab will list that the calibration axis has changed, but will not list each calibration that uses that axis as modified.

Click [Refresh] to re-scan the tune file for modifications.

2D and 3D Calibration Display



The calibration “map” display is split into three sections.

1. The top left section displays either a 2D or 3D representation of the tabular data.
2. The top right section displays unit information, descriptions, scan-linking and user notes related to the calibration.
3. The bottom section displays the tabular data.

The visual display can be changed using the two splitters to resize each section, or by using one of the tool bar icons.

Task	Icon	Hot Key
Set custom view.		
Set default view. <ul style="list-style-type: none"> • Hold Ctrl for larger graphic. • Hold Shift to make the new layout the custom view. 		
Show graph only.		
Show table only.		

To swap between 3D view and 2D view, the following options exist.

- or Ctrl+2 to display as 2D chart.
- or Ctrl+3 to display as 3D surface plot.

When a calibration is opened, it will always display using the default 2D or 3D graphic. The default graphic is indicated by the icon next to the calibration item in the navigator tree.

3D Surface Plot Control

Click (and drag) with the left mouse button to select cells. Combine with [Ctrl] and/or [Shift] to make multiple selections.

Click the  icon, use the Ctrl+0 hot key or click and drag the right mouse button to rotate the display.

Click and hold the mouse scroll wheel, then move the mouse to move the display.

Move the scroll bar (or the mouse scroll wheel) up to zoom in and down to zoom out.

Click both mouse buttons or the  icon to reset 3D plot size and position.

Use the  to access help options for controlling the 3D surface display.

2D Chart Control

2D charts display each column of data as a separate series of data points in the chart.

The active series is defined as the data column that contains the focus cell.

The active series is shown with the data points as circles or squares. Circular if the corresponding cell is not selected, square if the corresponding cell is selected.

If cells are selected from multiple columns in the table, then the column containing the focused cell will be displayed as the active series.

Where one or more entire columns are selected, only those columns' series will be displayed in the 2D chart. All other (non-selected columns) series will be hidden from view.

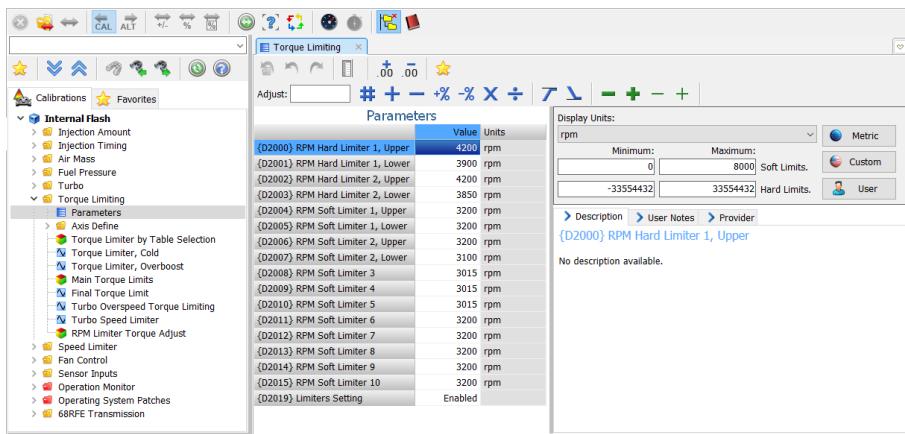
Click (and drag) with the left mouse button to modify data points. When a data point is dragged above the highest or below the lowest point the chart's vertical axis will be automatically adjusted when the mouse button is released.



An entire series can be remapped using the mouse. Place the mouse pointer within the chart boundaries, then hold down the left mouse button and drag the mouse across the chart from left to right (or right to left). The data points of the active series will follow the mouse.

The initial mouse movement determines the modification mode. If the initial mouse movement is up/down, then only the current point can be modified vertically – no matter how far left/right the mouse is moved. If the initial movement is left/right then all data points can be modified vertically by dragging the mouse left/right/up/down across the entire chart.

Parameters



Some calibrations are simple values rather than tables. The EFILive Tuning Tool groups these single value calibrations into sets called parameters.

Where multiple parameters all require the same change, multiple parameters can be selected and they will all be updated when one parameter in the group of selected parameters is edited.

Numeric parameters can be edited by clicking in the cell to be changed and entering a numeric value. The numeric value must lie within the hard limit range for the modification to be accepted.

Enumerated parameters can only be set to a discrete set of values. Enumerated parameters can be edited by:

1. Making a selection from the drop-down list in the cell,
2. Typing the first letter of one of the possible values (press the same letter multiple times to cycle through items that all begin with the same letter),
3. Pasting a case sensitive matching value.

Where an invalid letter is entered, or a case sensitive paste value does not match the acceptable values, no change will be made.

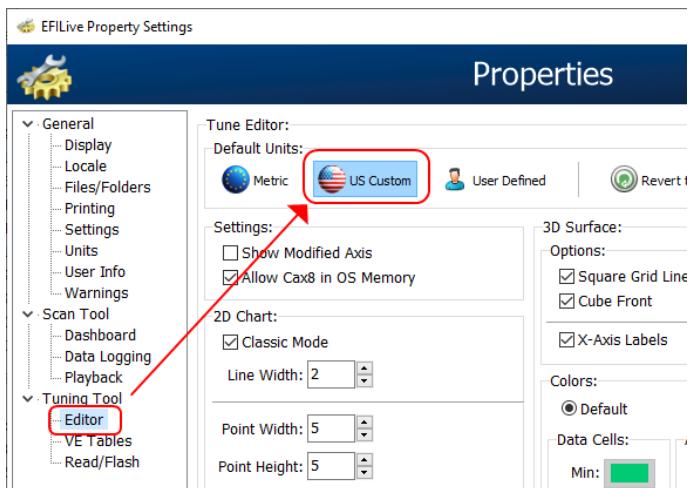
Use Alt+Down Arrow to drop down the list of the focused cell.

Display Units

All calibrations are initially created by EFILive using metric units. So, when a calibration is first opened its data will be displayed in metric. You can change the data units and the row and column label units to suit your preference.



You can choose to have calibrations display using US Customary units when first opened by setting the appropriate "Default Units" option in the Edit->Properties window, like this:



Some data values have multiple metric units and multiple US Customary units (sometimes incorrectly called imperial). To quickly select the default Metric, US Customary or User configured default units for the calibration's data, click on the [Metric], [Custom,] or [User] buttons respectively.

If the row and column labels have metric/custom options then you can change them as well by holding down the Ctrl key to change all three (data, row and col) units to the preferred unit system.

Row/column units can be selected independently by right-clicking on the table and selecting the row/column units option.

Where an alternative unit of measure for a table is not available, the display units options will be inaccessible. If row/column unit options are available, these can be modified by right-clicking on the row/column header and selecting the row/column units option.

Calibration Limits

EFILive enforces two sets of limits on each calibration's value(s), a hard limit set by the controller and a soft limit set by EFILive.

In some rare cases EFILive will set the hard limits to less than that allowed by the controller. For example, some speedometer calibrations should never be set below a certain threshold or the controller can fail permanently with divide by zero errors that prevent the controller from booting.

Hard limits cannot be exceeded.

If any calibration value exceeds the soft limits but not the hard limits, then that value is displayed with white corner flashes indicating that the value is outside of the soft limits range. Note: White is the default color for corner flashes indicating out of range calibrations, but may be customized to any other color.

The soft limits are usually the same as the hard limits, except in cases where it makes no sense to allow excessively large limits. For example, the spark maps in an LS1 controller allow up to 720 degree which is a nonsensical limit for spark advance.

If a calibration file is loaded containing values that exceed the hard limits, those values will be coerced so that they lie within the hard limits and reported in the "Out of Range" tab page. EFILive will not permanently alter the "Out of Range"

values, unless that calibration window is opened and at least one cell value is changed. In that case, all cells will be saved with their current "in range" values.

Calibration Description

The calibration name and description are displayed here along with links to related tables and links to related axis tables.

Click on links to open calibrations in a new tab.

Scan-Link

Scan-Link displays data from the scan tool into a tune tool calibration.

No Link do not link the scan tool to the tune tool.

Link to Scan Tool allow a link to be created between the scan tool and tune tool.

Link to Mouse set the mouse to display cross hairs based on the mouse position.

Scan Data select one of the currently open log files with which to link.

Column PID select the column PID to be linked from the log file. Use the check box to include all PIDs in the drop-down list.

Row PID select the row PID to be linked from the log file. Use the check box to include all PIDs in the drop-down list.

Select will select all of the linked cells in the calibration.

Column Value displays the value of the column PID from the selected scan tool chart inspector's instantaneous position.

Row Value displays the value of the row PID from the selected scan tool chart inspector's instantaneous position.

Data Lookup Value displays the intersecting value of the column/row from the tune calibration.

Linked cells show the selected frames from the scan tool. These are displayed in aqua when using default colors.

Runway display is visible whenever the "Link to Scan Tool" radio button is selected. It is a visual indicator to the user that scan linking is active. It shows the scan tool chart inspectors instantaneous position when scan tool data is selected. If playback is selected in the scan tool, the runway will track the chart inspector position.

If a log file has not been selected the runway sits in the top-most row and left-most column. These are displayed in dark blue when using default colors.



A caveat to runway display is that single column tables look the same as mouse-linking by displaying cross hairs rather than column highlights.

To use Scan-Link;

1. Open a log file and a tune file.
2. Open the calibration you wish to link to the scan data.
3. Select the [Link to Scan] Tool radio button.
4. Select the log file name in the Data field. Where multiple log files are open, use the drop down to make a log file selection.
5. Select Column PIDs and Row PIDs.

The Scan-Link is now active, you can now playback the data log to watch runway tracking.

Making a selection in the scan tool will link all corresponding cells in the tune tool table. Linked cells are shown with different background color.

Click the [Select] button to select all linked cells, once selected they can be edited or copied to the clipboard.

Virtual VE

The Virtual VE tab is only visible when Virtual VE style calibrations are open.

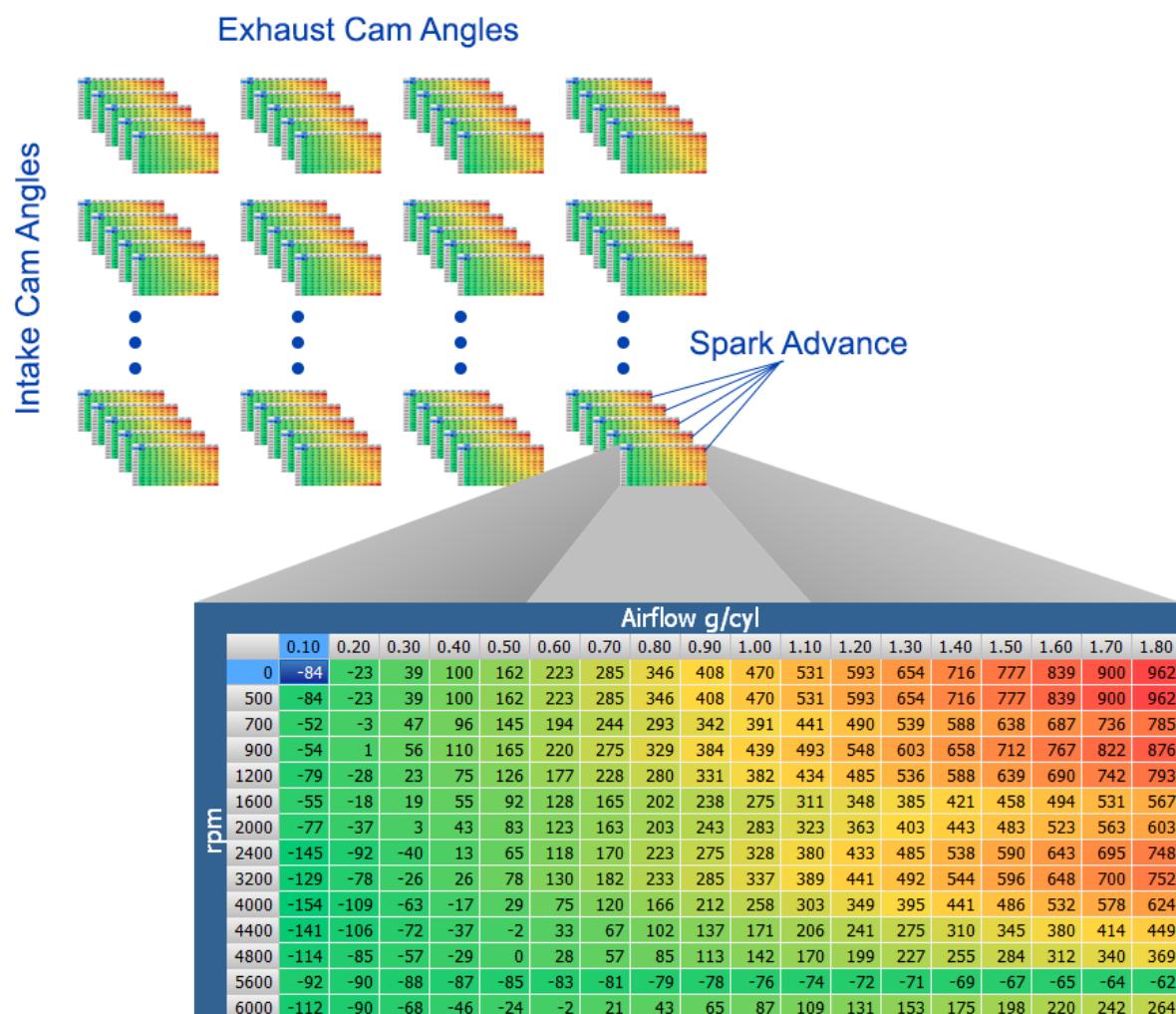
Refer to the Virtual VE documentation for further information.

Virtual Torque

Starting with the E38 controller, GM calibrations include a torque model that is used by the ECM to compute the engine torque based on 5 inputs:

1. Exhaust Cam Angle
2. Intake cam Angle
3. Spark Advance
4. Airflow (either airflow in g/cyl or MAP in kPa)
5. RPM

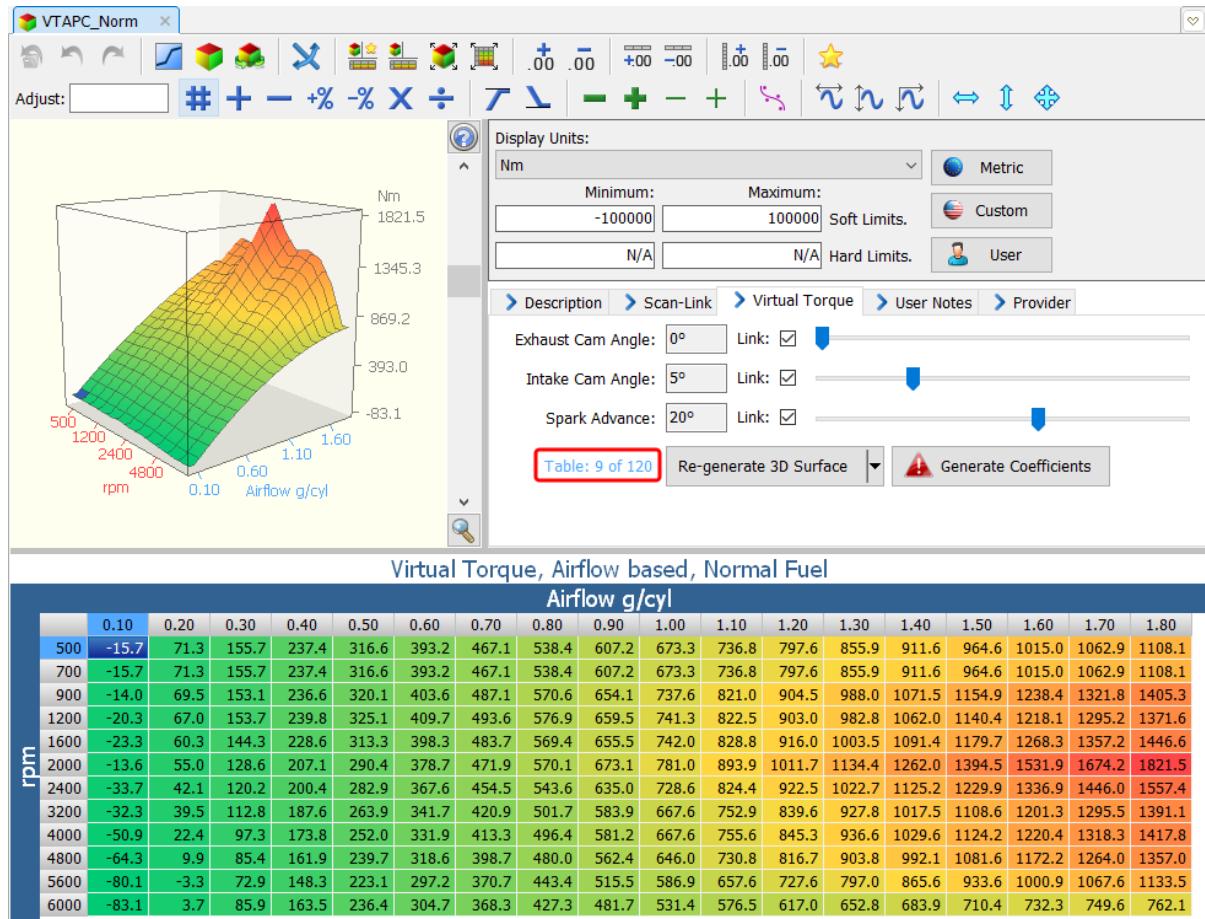
The torque model using those 5 inputs can be visualized as the 5-dimensional space shown below:



The number of virtual tables grows exponentially with each additional dimension and/or the size of each dimension. In the image above there are:

- 4 x Exhaust Cam Angles
- 5 x Intake Cam Angles
- 5 x Spark Advance Angles

The total number of virtual tables is defined by those values multiplied together; $4 \times 5 \times 5 = 120$ virtual tables.



The virtual table is selected by choosing the appropriate Exhaust Cam Angle, Intake Cam Angle and Spark Advance Angle. To help you keep track of which virtual table is being shown, the virtual table number is displayed (highlighted in red in the image above) to the left of the [Re-generate 3D Surface] button.

Use the three track bars to select the appropriate angles.

The Link checkboxes allow you to automatically apply the same changes that are made to the displayed virtual table, to all other virtual tables in that linked dimension. For example, if you checked only the Spark Advance Link checkbox, then any changes you made to the current virtual table would automatically be applied to all virtual tables that have the same exhaust and intake angles but that have different spark angles.

The [Generate Coefficients] button generates the coefficients tables from the current data in the virtual torque tables.

The [Re-generate 3D surface] button first generates the coefficients tables from the current virtual torque tables, then re-generates the virtual torque tables from those newly generated coefficients.

The drop-down option of the [Re-generate 3D surface] button, called “Generate 3D surface (from coefficients)” overwrites the existing virtual tables with newly generated data from the coefficients. Use this option after copy/pasting coefficient data from another calibration.

User Notes

Enter comments at a calibration level. Comments are saved in the calibration configuration settings. User notes are not saved to the tune file.

Where comments exist on a calibration, the tab heading [User Notes] changes to [User Notes *].

To add User Notes, type in the user notes tab.

To remove User Notes, delete the data that is present in the user notes tab.

Provider

Users may define their own calibrations (or obtain calibrations from other tuners) to compliment the calibrations provided by EFILive. In that case the user that created the calibration definitions (i.e. the provider of the *.cax8 file) should complete the “provider information” in that *.cax8 file.

If the calibration being displayed/edited is provided by EFILive then the EFILive provider information will be displayed.

If the calibration being displayed/edited is provided by a third party via a *.cax8 file then the provider information from the *.cax8 file will be displayed.

Table

All calibrations' data is displayed/edited using tables.

For 2D and 3D calibrations a 2D or 3D graphical representation of the data in the calibration may also be displayed as a 2D or 3D chart.

Focus Cell the cell highlighted in dark blue that indicates where data entry will occur. The focus cell is always a selected cell.

Selected Cells have a blue background by default – the background color of selected cells can be customized.

Linked Cells have a slightly different blue background by default – the background color of linked cells can be customized.

Modified Cells have blue corner flashes by default – the color of the corner flashes can be customized.

Out of Range Cells have white corner flashes by default – the color of the corner flashes can be customized.



Colors can be managed in the [Properties] -> Tuning Tool -> Editor in the Colors -> Miscellaneous section.

Click (and drag) with the left mouse button to select cells. Combine with [Ctrl] and/or [Shift] to make multiple selections.

Editing Data in the V8 Tune Tool Editor

Click in the Focus Cell to start editing the data in that cell or start typing an appropriate value in the cell.

Press Esc to undo any changes to the cell and terminate editing.

Press Enter or Up/Down or some of the other navigational keys (such as Tab, Page Up, Page Down, etc.) to terminate the edit and apply that new value to all Selected Cells.

Selecting Data in the V8 Tune Tool Editor

Select Cells by Dragging

Left click in any cell (other than the focus cell) and drag the mouse to select a rectangular range of cells.

Click in the top left blank cell to select the entire table, or use the hotkey Ctrl+A.

Click in any column heading to select the entire row, click+drag vertically to select multiple rows.

Click in any row heading to select the entire column, click+drag horizontally to select multiple columns.

Select Cells without Dragging

Select a cell or row or column by clicking in a column header or row header, then hold down the SHIFT key and click in different cell or a different column header or row header to select all cells between the first and second selections.

Make Multiple Selections

Make any selection as described above.

Hold down the CTRL key to start a new selection without clearing the previous selection. Any overlapping selection areas will be inverted.

Keyboard Selections

Use the arrow keys, Home, End, Page Up and Page Down keys to move the focus cell.

Moving the focus cell (without using either Shift or Ctrl) will unselect all previously selected cells. Hold down the Shift key to select a rectangular region of cells while moving the focus cell.

Hold down the Ctrl key to move the focus cell without unselecting any previous selected cells. Any overlapping selection areas will be inverted.

Press Ctrl+Space to toggle the selection status of the focus cell. Technically the focus cell always remains selected, this option is simply a construct to allow you to individually pick/choose which cells are focused and which are not by:

- Holding down the Ctrl key, and
- Moving the focus cell using the arrow keys, and
- Toggling the selected status using Ctrl+Space.

Column/Row Header Indications on Tables

The column and row labels will be highlighted to indicate the extent of the current selection. The extent of the selection is from the top, left most selected cell to the bottom, right most selected cell.

All column and row labels within that range will be highlighted in grey – not just the columns and rows that contain selected cells. The column and row labels of the focus cell will be highlighted in blue.

Editor Options

In addition to the various tool bars, a range of right-click mouse options are available when the mouse is positioned over the calibration table. Right-click options are:

Task	Icon	Hot Key
Undo last change.	↶	Ctrl+Z
Redo last undo.	↷	Shift+Ctrl+Z
Select All cells and column/row labels.		Ctrl+A
Copy/Paste Default Settings	☀	
Copy selected cell(s).	📋	Ctrl+C
Copy selected cell(s) and column/row labels.		Shift+Ctrl+C
Copy selected cell(s) as Lua Source.		Ctrl+Alt+C
Paste		

Copy/Paste Default Settings

The Copy/Paste Default Settings option is available via the right-click context menu. This option opens a window for user defined copy/paste settings.

Task	Description
Copy to Clipboard	
Copy Units to Clipboard	Include unit measurements for parameter style calibrations.
Fill Empty Cells	Will fill empty cells using the “weighted, nearest neighbor” method before pasting. If selected, the clipboard will not contain any empty cells, they will have been filled in as the data is copied onto the clipboard.
Precision	Specify the number of decimal places when copying numeric data.

Paste from Clipboard	
When Pasting with Labels	When pasting with labels, if an exact matching row and column cannot be found in the target calibration for any cell then that cell is not pasted, unless the Interpolate option is checked.
Interpolate	If the Interpolate option is checked and the row and/or column labels represent a numeric scale, then the data being pasted is adjusted using bilinear interpolation. The interpolation stops at the boundaries defined by the labels on the clipboard, unless the Fill to Edges option is checked.
Fill to Edges	Only available when Interpolate check box is active. If the Fill to Edges option is checked, the interpolation continues all the way to the four edges of the calibration's table.
Fill Empty Cells	Will fill empty cells using the "weighted, nearest neighbor" method before pasting. If the clipboard contains empty cells and you have "fill empty cells" selected, then the empty cells are filled in as they are pasted into the table.
Combine with Existing Data	
Overwrite Add Subtract	Manage the default paste method based on the option selected here.
Multiply Correction	Manage the default paste method based on the option selected and the weighting for the calculation here.

Pre-configured Paste Options

When the mouse is located over a calibration or parameter cell, pre-configured paste options are available by accessing the right-click menu.

Task	Description
Paste Paste and Add Paste and Subtract Paste and Multiply	Pastes the data cells from the clipboard into the calibration starting at the focused cell. The target cells are adjusted according to the option selected (overwrite, add, subtract, multiply or error correction).
Paste with Labels Paste and Add with Labels Paste and Subtract with Labels Paste and Multiply with Labels	Pastes the data cells from the clipboard into the calibration at the matching row and column labels. The target cells are adjusted according to the option selected (overwrite, add, subtract, multiply or error correction).

Paste as Error Correction Paste as Error Correction with Labels	<p>This option is usually used to paste error correction data recorded by the Scan Tool BEN factor MAPs. The data in the clipboard must be in the range 0.0 to 2.0 or it will be ignored.</p> <p>The data in the cell(s) is modified by a correction factor as follows:</p> $\text{new} = \text{old} * (1.0 + ((\text{cb} - 1.0) * w))$ <p>where:</p> <ul style="list-style-type: none"> • new is the cell's new value. • old is the cell's original cell value. • cb is the value in the clipboard (in the range 0.0 to 2.0) • w is the percentage weight expressed as a decimal value between 0.0 and 1.0, where 0.0=0%, 0.5=50% and 1.0=100%
Help for Paste Options	Opens detailed Paste help guide.

Copy/Paste with Labels Examples

When copy and pasting “with labels” EFILive attempts to copy cells from the clipboard to the calibration that have matching row and column labels.

g/cyl											
	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48
rpm	40.0	40.0	40.0	38.0	35.0	32.0	32.0	30.0	29.0	27.0	25.0
2000	40.0	40.0	40.0	39.0	36.0	33.0	32.5	30.5	29.5	28.0	26.5
2400	40.0	40.0	40.0	39.0	37.0	34.0	32.0	31.0	30.0	29.0	28.0
2800	40.0	40.0	40.0	39.0	37.0	35.0	34.0	32.0	30.0	30.0	28.0
3200	40.0	40.0	40.0	39.0	37.0	35.0	38.0	36.0	34.0	32.3	32.0
3600	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0
4000	40.0	40.0	40.0	38.0	36.0	35.0	33.0	32.0	31.0	31.0	30.0

Copying the above data using the “Copy with Labels” option will copy the following data to the clipboard (as shown when pasted into Microsoft Excel).

	A	B	C	D	E	F	G	H	I	J
1	LABELS	<g/cyl>	<>							
2	<rpm>	0.12	0.16	0.2	0.24	0.28	0.32	0.36	0.4	0.44
3	2200	40	40	39	36	33	32.5	30.5	29.5	28
4	2400	40	40	39	37	34	32	31	30	29
5	2800	40	40	39	37	35	34	32	30	30
6	3200	40	40	39	37	35	38	36	34	32.3
7	3600	40	40	38	36	35	34	34	34	32

When that same data is pasted back into a different calibration table using any of the “Paste with Labels” options, each data cell from the clipboard will be pasted into the calibration at the equivalent data cell that has the same row and column labels.

If the destination calibration has different row and/or column labels, then some cells (that have no matching row and column labels on the clipboard) are not pasted.

	Air Per Cyl g/cyl										
	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48
rpm	53.5	53.5	52.0	49.0	45.0	43.5	41.0	37.0	35.0	33.0	30.0
2000	53.5	53.5	52.0	49.0	45.0	43.5	41.0	37.0	35.0	33.0	30.0
2200	54.0	40.0	40.0	39.0	36.0	33.0	32.5	30.5	29.5	28.0	31.5
2400	54.0	40.0	40.0	39.0	37.0	34.0	32.0	31.0	30.0	29.0	33.5
2600	53.5	53.5	51.5	47.0	45.5	43.0	41.0	39.5	37.5	36.0	34.0
2800	52.5	40.0	40.0	39.0	37.0	35.0	34.0	32.0	30.0	30.0	35.0
3000	52.0	52.0	50.0	46.5	45.0	42.5	40.5	38.0	36.5	35.5	35.0
3200	52.0	40.0	40.0	39.0	37.0	35.0	38.0	36.0	34.0	32.5	34.5
3400	50.0	50.0	48.5	46.0	43.5	40.5	38.5	36.5	35.5	34.5	34.0
3600	49.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	33.0
3800	48.0	48.0	45.0	43.5	41.0	39.0	37.5	36.0	35.0	33.5	32.0
4000	46.5	46.5	43.5	42.5	40.0	38.5	37.0	36.0	34.5	33.5	31.5

After pasting the data from the clipboard, rows: 2600, 3000 and 3400 were not updated with data from the clipboard because there were no cells on the clipboard for those row labels.

If **Interpolation** is checked, then the data for the missing rows and/or columns will be inferred using bilinear interpolation. Bilinear simply means that the interpolation occurs in two directions: vertically and horizontally so that both missing rows and columns can be inferred.

	Air Per Cyl g/cyl										
	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48
rpm	53.5	53.5	52.0	49.0	45.0	43.5	41.0	37.0	35.0	33.0	30.0
2000	53.5	53.5	52.0	49.0	45.0	43.5	41.0	37.0	35.0	33.0	30.0
2200	54.0	40.0	40.0	39.0	36.0	33.0	32.5	30.5	29.5	28.0	31.5
2400	54.0	40.0	40.0	39.0	37.0	34.0	32.0	31.0	30.0	29.0	33.5
2600	53.5	40.0	40.0	39.0	37.0	34.5	33.0	31.5	30.0	29.5	34.0
2800	52.5	40.0	40.0	39.0	37.0	35.0	34.0	32.0	30.0	30.0	35.0
3000	52.0	40.0	40.0	39.0	37.0	35.0	36.0	34.0	32.0	31.0	35.0
3200	52.0	40.0	40.0	39.0	37.0	35.0	38.0	36.0	34.0	32.5	34.5
3400	50.0	40.0	40.0	38.5	36.5	35.0	36.0	35.0	34.0	32.0	34.0
3600	49.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	33.0
3800	48.0	48.0	45.0	43.5	41.0	39.0	37.5	36.0	35.0	33.5	32.0
4000	46.5	46.5	43.5	42.5	40.0	38.5	37.0	36.0	34.5	33.5	31.5

If **Fill to Edges** is checked, then the interpolation does not stop at the limits of the clipboard data, it continues pasting the edge values from the clipboard all the way to the edge of the calibration.

	Air Per Cyl g/cyl															
	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68
2000	40.0	40.0	40.0	39.0	36.0	33.0	32.5	30.5	29.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0
2200	40.0	40.0	40.0	39.0	36.0	33.0	32.5	30.5	29.5	28.0	28.0	28.0	28.0	28.0	28.0	28.0
2400	40.0	40.0	40.0	39.0	37.0	34.0	32.0	31.0	30.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
2600	40.0	40.0	40.0	39.0	37.0	34.5	33.0	31.5	30.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5
2800	40.0	40.0	40.0	39.0	37.0	35.0	34.0	32.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
3000	40.0	40.0	40.0	39.0	37.0	35.0	36.0	34.0	32.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0
3200	40.0	40.0	40.0	39.0	37.0	35.0	38.0	36.0	34.0	32.5	32.5	32.5	32.5	32.5	32.5	32.5
3400	40.0	40.0	40.0	38.5	36.5	35.0	36.0	35.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
3600	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
3800	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
4000	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
4200	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
4400	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
4800	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
5200	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0
5600	40.0	40.0	40.0	38.0	36.0	35.0	34.0	34.0	34.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0

Column/Row Label and Unit Options

When the mouse is located over a calibration or parameter cell, the edit column/row label and unit selections are available via the right-click menu.

Option	Description
Edit Column Axis Values	Opens the axis calibration in a new tab page to edit the column label values. When the axis is modified, all calibrations that use the axis are automatically updated.
Change Column Units	Displays a menu of compatible units in which to display the column labels. The currently selected units are identified by the  icon.
Edit Row Axis Values	Opens the axis calibration in a new tab page to edit the row label values. When the axis is modified, all calibrations that use the axis are automatically updated.
Change Row Units	Displays a menu of compatible units in which to display the row labels. The currently selected units are identified by the  icon.

Calibration Axis

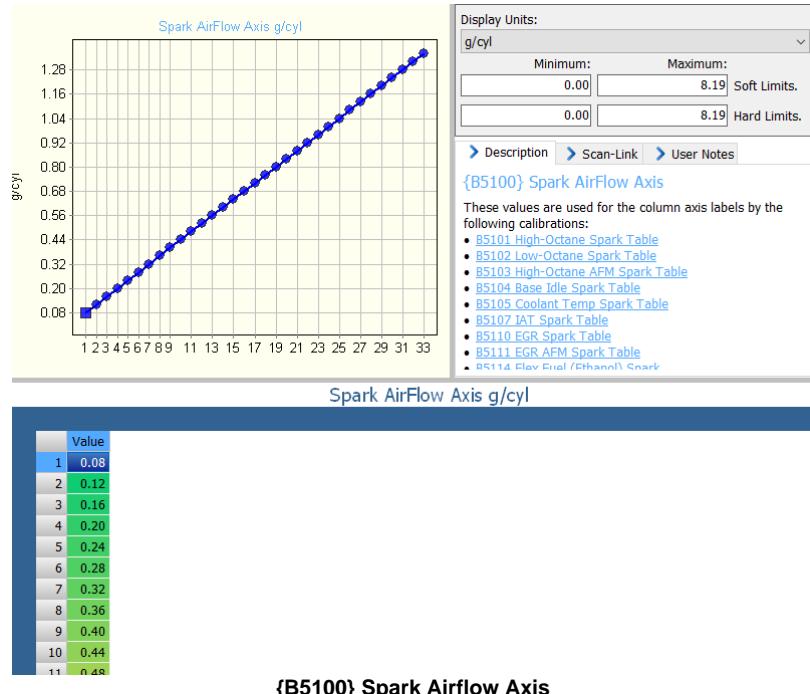
Some table-style calibrations have axis labels that may be modified by the EFILive software. The axis labels are effectively just another calibration that consists of a single column of values.

For example, the E38 {B5101} High Octane Spark Map shown below has both row and column axes that may be modified. To modify the row or column axes, right-click on the table and select either the “Edit Column Axis Values” or “Edit Row Axis Values” options.

High-Octane Spark Table °											
Air Per Cyl g/cyl											
rpm	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48
0.0	32.0	32.0	32.0	32.0	28.0	24.0	17.0	15.5	12.0	8.0	5.0
200.0	32.0								13.0	9.0	6.0
400.0	32.0								14.0	10.0	7.0
600.0	28.0								15.0	12.0	9.0
800.0	32.0								19.0	18.0	15.0
1000.0	39.0								22.5	19.0	16.5
1200.0	45.0								27.0	24.0	20.0
1400.0	50.0								29.0	25.5	23.0
1600.0	50.0								30.0	27.5	24.0
1800.0	50.0								30.5	29.0	27.5
2000.0	50.0								34.0	33.0	31.0
2200.0	50.0								34.5	34.0	31.5
2400.0	50.0								35.0	33.5	32.5
2600.0	50.0								36.0	34.5	33.5
2800.0	50.0								36.5	35.0	34.0
3000.0	50.0	50.0	50.0	46.5	43.5	41.0	39.5	38.0	37.0	36.0	35.0

{B5101} High Octane Spark Map

Selecting the “Edit Column Axis Values” option will open a new editor tab page that contains the calibration {B5100} Spark Airflow Axis.



{B5100} Spark Airflow Axis

The axis calibration displays the actual axis values as editable calibration data, and the [Description] tab page lists all calibrations that rely on this axis calibration for either their row or column labels.

Changing any axis calibration value will cause the axis labels of **all** those listed calibrations to be changed. All calibrations that use the axis will be updated in the row or column cell navigator tree to appear as modified as a result of the changes to the axis.

Some axis calibrations have been defined as visible calibrations in the EFILive software and they show up in the navigator tree as selectable calibrations. Those axes may be opened by selecting them from the navigator tree or by using the right-click options described above.

Other axis calibrations that have not been defined in the EFILive software do not show up in the navigator tree. Those calibrations may only be opened using the right-click options described above.

Both types of axes may be located using the navigator search.

Curve Tools

The curve fitting tool is most useful for single column calibrations (but can be used on 3D tables). It allows you to specify 3 or more data points and then fit a curve through those points. Curve fitting is most effective when non-selected cells exist between three or more selected cells.

The following Curve options are available:

Task	Icon	Hot Key
Fit curve to selected cells options.		Shift+F10
Fit curve horizontally – a minimum of 3 cells must be selected.		
Fit curve vertically – a minimum of 3 cells must be selected.		
Fit curve horizontally and vertically – a minimum of 3 cells must be selected.		

The curve fitting slider adjusts the weight of the curve. When the slider is all the way to the left the curve fits exactly through the selected points. When the slider is moved to the right the curve becomes more and more straight until at the right edge the best straight-line fit is made.

Moving the slider will display the proposed curve and proposed cells values based on the slider position. Select [OK] to apply the changes to the table. Select [Cancel] to discard the proposed curve values.

The values of all cells along the curve will be adjusted, not just the selected cells.

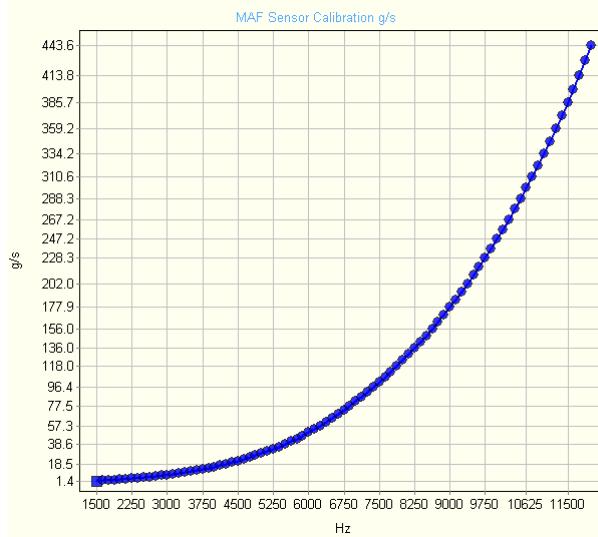
On 2D graphs, square points are selected points, and round points are non-selected points.



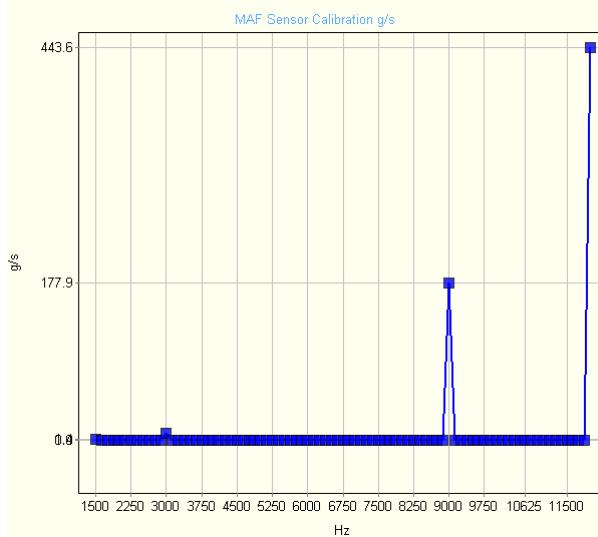
Curve Tools is a significant feature enhancement to the V8 Editor. It replaces the Blending options in the V7 Tune Tool.

For example, the LS1B {B5001} MAF Sensor Map images shown below curve options.

This image is a stock LS1B MAF curve.



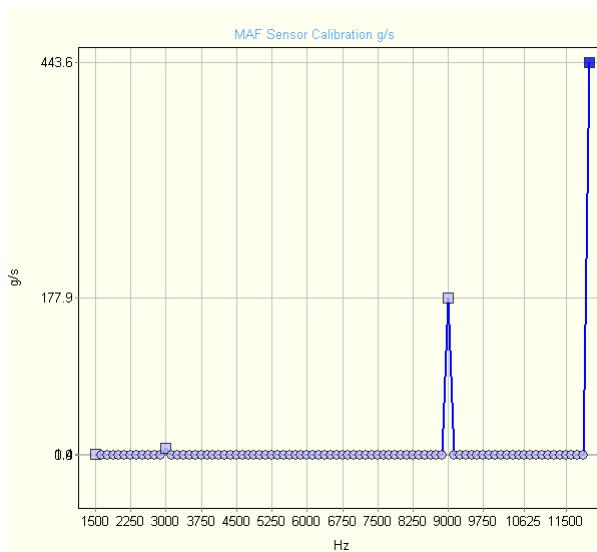
To generate a custom MAF curve to suit a unique/custom MAF design, users would typically log a few data points using an air-flow measuring system to generate a result like this.



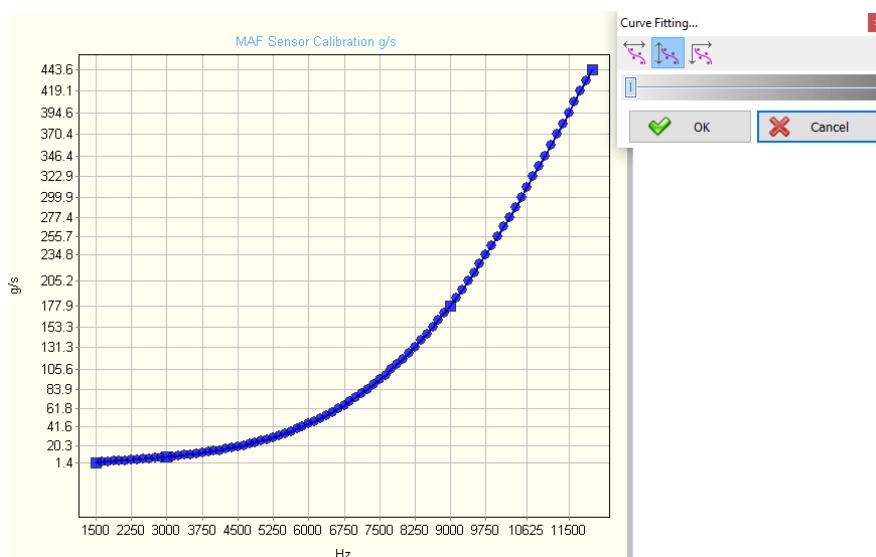
Previously the only option was to use the gradient tool on each "section, but it only generates straight lines.



Select the airflow points that were measured by holding Ctrl while selecting the cells with the mouse. (Note the data points change from round to square when selected).



Use the curve fitting tool to generate a curve through those points.



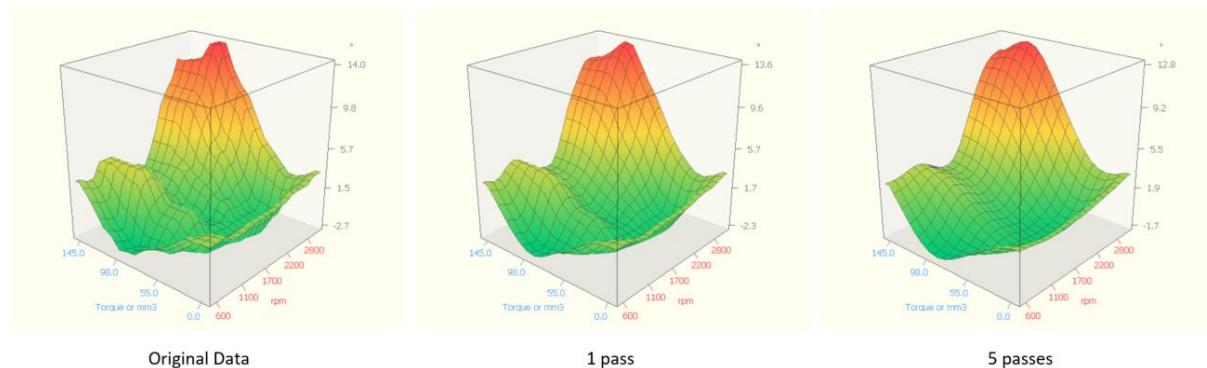
Smoothing

Smoothing is a process that removes the sharp peaks and troughs from a data series or surface map. Smoothing is designed to be applied after any modifications have been made.

Three smoothing options exist;

Task	Icon	Hot Key
Smooth selected cells horizontally – a span of at least 3 columns must be selected.	↷	Shift+F11
Smooth selected cells vertically – a span of at least 3 rows must be selected.	↶	Shift+Ctrl+F11
Smooth selected cells horizontally and vertically – a span of at least 3 columns/rows must be selected.	↷↶	Shift+Alt+F11

For example, the three CME {E2781} Main Timing Map images shown below contain varying degrees of smoothing. Smoothing was applied over the entire table (all cells) using the horizontal and vertical smoothing tool.



Gradient

Gradient is used to create straight lines between two points in row or column data, or both row and columns.

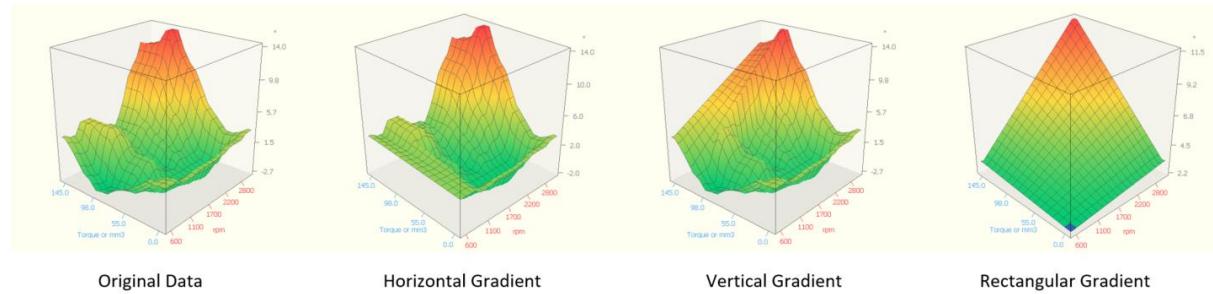


The V8 gradient feature was known as Linear Fill in V7 Tune Tool software.

Three gradient options exist.

Task	Icon	Hot Key
Make horizontal gradient – a minimum of 3 cells must be selected.	↔	Shift+F12
Make vertical gradient – a minimum of 3 cells must be selected.	↕	Shift+Ctrl+F12
Make rectangular gradient – a minimum of 3 cells must be selected.	❖	Shift+Alt+F12

For example, the four CME {E2781} Main Timing Map images shown below demonstrate the different gradient options.



Clip Selected Cells

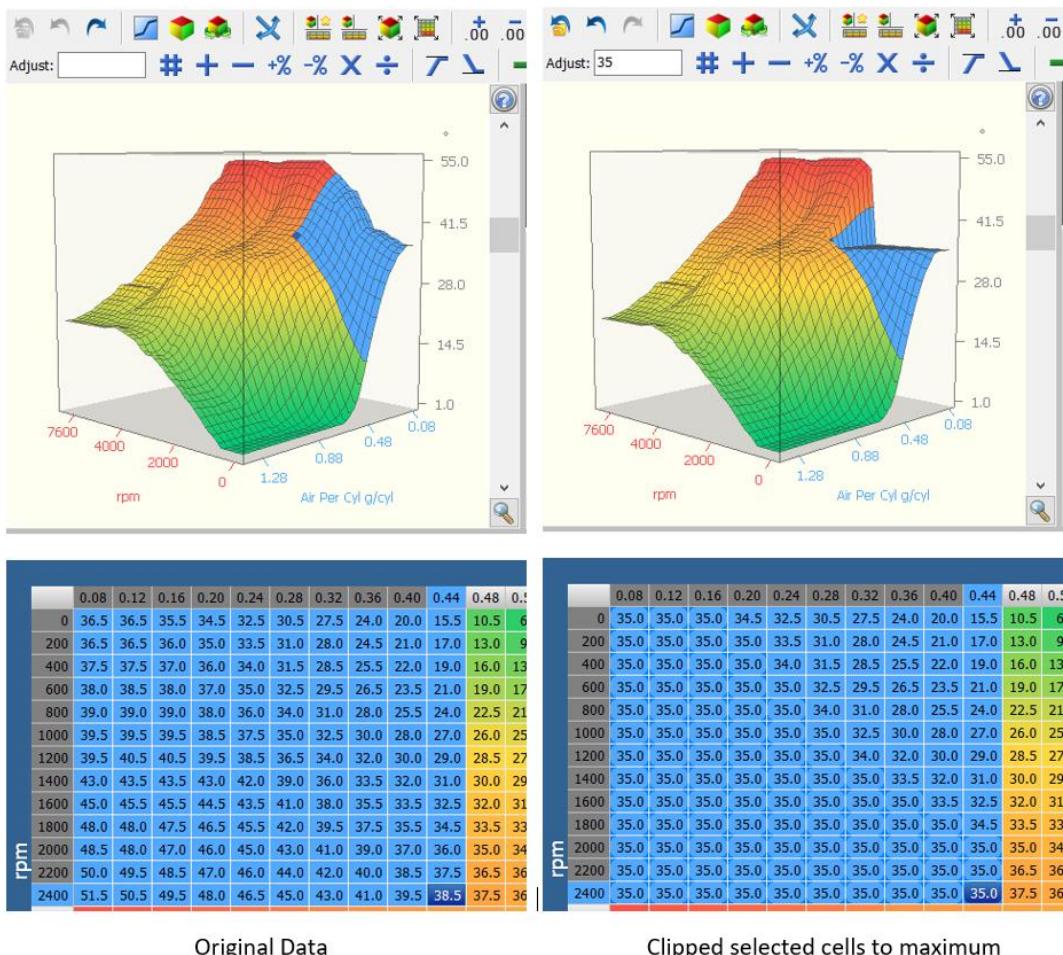
Clip is designed to crop selected cells to be less than or greater than a specified value.

Two clip options exist.

Task	Icon	Hot Key
Clip selected cells to maximum.		
Clip selected cells to minimum.		

To Clip cells, select a range of cells, enter the clip value into the Adjust box and apply the clipping tool.

For example, the E67 {B5101} High Octane Spark Map images shown below demonstrate clip options.



Comparing Two Calibrations

EFILive provides a rich set of calibration comparison tools. By loading in two calibrations from the same controller family, you can compare the differences (or similarities) of calibrations.

The tune files do not need to be from the same operating system nor from the same controller, but they must be from the same controller family.

The controllers on the same line in the table below are compatible and tune files from those controllers may be compared. If a controller is not listed, it is not compatible with any other controller.

E37, E38 and E67
E39 and E39A
E80, E81 and E82
E83A and E83B
E35A and E35B
E86A and E86B
E87A and E87B
T87 and T87A

When comparing two tunes using the compare  option, the original tune is defined as the  CAL calibration and the tune opened via the compare  option is defined as the  ALT calibration.

Only values in the CAL calibration can be modified and saved. ALT calibration data is used for reference and for copying data only and cannot be modified. Cell modification and tool bar buttons are disabled when the ALT calibration or any of the comparison displays are visible.

The compare icon  displays all calibration comparison results in a single tab. To ensure correct results, comparisons are computed and displayed using metric values only.

Custom Operating Systems are not compared nor displayed in the compare tab page.

Use the filter options at bottom of table to select display options.

Icon	Description
	Show calibrations that have identical checksums.
	Show calibrations that have different checksums.
	Show calibrations that contain identical data, identical axis and identical pairing.
	Show calibrations that have different data content.
	<p>Calibrations that have different axis sizes and/or axis label values.</p>  <p>Calibrations with different axes are detected and identified in the comparison tab page.</p> <p>However, when viewing the data, the CAL axes are used to display both the CAL data and the ALT data. The ALT data is interpolated (re-mapped) to fit accurately within the CAL axes. Refer to the Interpolation example later for a more detailed explanation.</p> <p>By using the same axis for both a more accurate and useful comparison is shown.</p>
	Calibrations that only exist in the CAL calibration.
	Calibrations that only exist in the ALT calibration.

The following range of right mouse click options exist:

Select All (Ctrl+A); selects all calibrations that are currently displayed.

Copy (Ctrl+C); copies the selected calibration(s) or folder(s).

Update (Ctrl+U); updates the selected calibration(s) or folder(s) to the value(s) in the alternate file. NOTE: The checksum and unpaired calibrations items cannot be updated.

Expand All; expands all folders in the compare tab.

Collapse All; collapses all folders in the compare tab.

Double click on a calibration to open that calibration in a new tab. Use the Compare toolbar buttons to move between the CAL and ALT files.

Show Calibration Differences the icon displays differences in cell values between the CAL and the ALT files. Where the value in the CAL and ALT files are identical the difference will display as an empty cell. The calibration difference cannot be modified.

Show Relative Percentage Differences the icon displays relative percentage differences in cell values between the CAL and the ALT files. The difference is calculated as $((CAL-ALT)*100)/ALT$. Where the value in the CAL and ALT files are identical the difference will display as an empty cell. The calibration difference cannot be modified.

Show Absolute Percentage Differences the  icon displays absolute percentage differences in cell values between the CAL and the ALT files. The difference is calculated as $((CAL-ALT)*100)/(max-min)$. Where the value in the CAL and ALT files are identical the difference will display as an empty cell. The calibration difference cannot be modified.



If a calibration is listed on the Compare tab with different data but a variance cannot be seen between the CAL and ALT values, try increasing the displayed precision to show the variance.

Update an entire calibration to alternate values by selecting the [Update] button in the Compare tab.

The re-compare icon  refreshes the status of all calibrations in the Compare tab.

Interpolation during calibration comparison

When two calibrations are being compared that differ in the number of rows or columns or differ in the values of the row or column labels the comparison is implemented using interpolation.

The Compare tab displays calibrations with different axis sizes or labels with the  icon.

For example, the E67 {B5101} High Octane Spark Map images shown below demonstrate how interpolation is used to compare tables with different axes.

This image is a stock High Octane Spark Map.

High-Octane Spark Table °									
Air Per Cyl g/cyl									
rpm	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
0	34.0	34.0	31.5	28.5	26.5	19.5	17.0	13.5	10.0
200	35.5	35.5	32.5	30.0	28.5	21.5	18.0	14.5	10.0
400	36.0	36.0	34.0	30.5	29.0	21.5	18.5	15.0	11.0

When an engine is running the ECM retrieves values from this table using an x-y lookup, i.e. it uses the current value for g/cyl (for example 0.20 g/cyl) and the current rpm (for example 200) to determine the row and column of the desired spark advance cell. The spark advance value for those two values is 30.0.

But what if the g/cyl value was in-between two existing labels? I.e. what if the g/cyl value was 0.26 g/cyl, half way between the existing labels of 0.24 and 0.28.

The spark value returned would then be halfway between the values that correspond to those labels, i.e. $(28.5+21.5)/2 = 25.0$

What if the rpm was 300? In that case bilinear interpolation must compute three linear interpolations as follows:

1. linear interpolation between the two air values for rpm 200 (i.e. between 28.5 and 21.5 = 25.0), and the
2. linear interpolation between the two air values for rpm 400 (i.e. between 29.0 and 21.5 = 25.25), and finally the
3. linear interpolation between those two values: 25.0 and 25.25 = 25.125

Using interpolation, we can translate the data from one table into the data of another table that has different row and column labels. Using the High-Octane Spark Map above,

The CAL tune contains the following data:

	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
0	34.0	34.0	31.5	28.5	26.5	19.5	17.0	13.5	10.0
200	35.5	35.5	32.5	30.0	28.5	21.5	18.0	14.5	10.0
400	36.0	36.0	34.0	30.5	29.0	21.5	18.5	15.0	11.0

The ALT tune contains the following data (with different column labels):

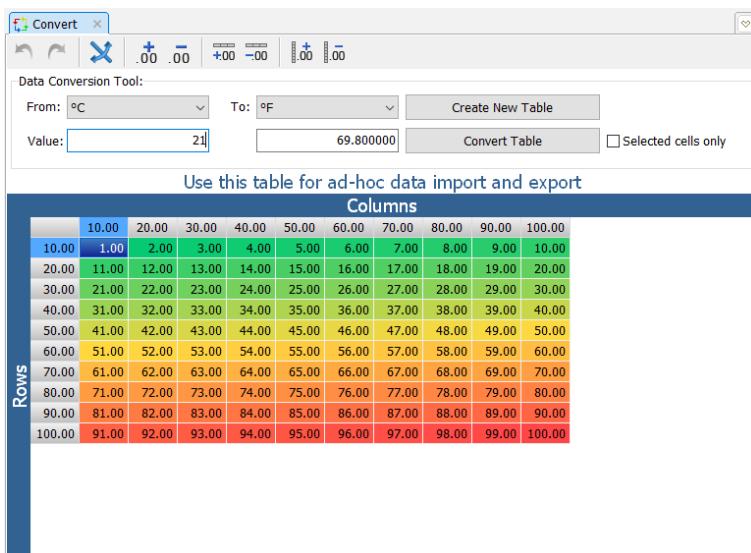
	0.08	0.14	0.20	0.26	0.32	0.38
0	30.0	27.5	25.0	22.5	20.0	17.5
200	31.0	26.0	21.0	16.0	11.0	6.0
400	32.0	25.5	19.0	12.5	6.0	-0.5

The compare function cannot compare the cells at the same col/row index between those two tables above because the data is for different axis labels.

So, a third table is constructed that uses the same axis labels as CAL and then the values from ALT are copied into the third table using bi-linear interpolation to compute the correct values for each of the labels. The computed ALT table is shown below. The orange cells exist in both CAL and ALT and the green cells are computed using bi-linear interpolation for the ALT display:

	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40
0	30.0	28.33	26.67	25.0	23.33	21.67	20.0	18.33	17.5
200	31.0	27.67	24.33	21.0	17.67	14.33	11.0	7.67	6
400	32.0	27.67	23.33	19.0	14.67	10.33	6.0	1.67	-0.5

Convert Data Between Units



The Convert tab page provides a data conversion tool that can be used to convert data between various units. It is most useful when importing/exporting data to other applications that may use slightly different data layouts and formats.

Access the Convert tab by selecting the  icon, or using the Ctrl+Alt+Enter hot key.

Select from and to units to be converted.

Enter sample conversion values in the Value fields to test the outcome of the units selection.

Create New Table requires that the data on the clipboard was created using the Copy with Labels option. A new table with the same dimensions and labels as the clipboard data will be created.

Convert Table will convert the data in the table from the **From** units to the **To** units.

Selected Cells only will convert only the selected cells not the entire table, unless the entire table is selected.

Speedometer Calculator

Manufacturers employ various methods to capture road speed and display it to the driver. Because of the wide variety of speedo implementations, the speedo

calculator is not designed to, and cannot “magically” correct or recalibrate the speed settings for every type of vehicle/controller. It is a tool that can calculate various, interdependent calibrations that you may need when calibrating your vehicle’s speed settings. The results from the speedo calculator may not be relevant for your particular application. Some manufacturers use more than one way to determine the vehicle’s speed and more than one way to calibrate various features that rely on the vehicle’s speed (such as transmission shift points, ABS, radio volume, steering sensitivity, etc.). For example, the speedometer display may be independently calibrated within the instrument cluster, the ABS system may use multiple speed sensors from multiple wheels, independently of the ECM’s vehicle speed sensor. It is up to the tuner to determine exactly how the vehicle’s speed is captured, calibrated, transmitted and displayed, as those things will usually be different for different platforms.

Most controllers supported by the EFILive Tuning Tool use a Vehicle Speed Sensor (VSS) that is located on either the drive shaft or the drive axle. Where the speed sensor is located determines whether the differential ratio affects the VSS signal or not.

The vehicle speed sensor sends a stream of pulses to the controller. The pulse frequency increases proportionally as the road speed increases. The controller needs to know how many pulses will be received in one mile (or one km if you are working in metric). This calibration term is called pulses per mile or pulses per km.

To display the Speedometer Calculator, select the  icon from the file management task bar.

Each of the five Speedometer Calculator tabs contains these options:

Metric and US Custom Select your preferred unit of measure. Updating the unit of measure selection in one tab will update the selection in all tabs.

[Reset] button re-loads the calibrated values from the tune file for the current tab page only.

[Apply] button applies changes on the current tab page to the tune file.

[Close] closes the Speedometer Calculator window.

Tire Size

Values in the Tire size calculator are color coded to assist users in determining the origin of those values:

User Supplied Values are yellow and display values that have been changed by the user.

Calculated Values are green and indicate values that have been calculated by EFILive software.

Calibrated Values are blue and indicate values that have been loaded from tune file.

Tire Size: Enter tire width, profile and rim diameter. Click the calculate button  to calculate the values in the Tire Calibration section using the values entered in the Tire Size section.

Tire Calibration: Enter either tire diameter, or tire circumference, or tire revolutions. Or, click the calculate button  to calculate the values in the Tire Calibration section using the values in the Speedometer Calibration section.

Transaxle: Uncheck this option for vehicles with a speed sensor fitted to the drive shaft between the transmission and the differential. Check this option for vehicles with a speed sensor fitted to the transaxle. Most vehicles with a transaxle (e.g. the Corvette) have a vehicle speed sensor fitted to the transaxle.

Diff Ratio: The differential ratio.

TOS Revs: The number of revolutions of the transmission output shaft (TOS) per the selected unit of measure. This value may not be used in vehicles with manual gearboxes and may be set incorrectly (in the 800 to 899 range) for some factory manual calibrations.

VSS Pickup Teeth: The number of teeth on the vehicle speed sensor. For GM vehicles, this value is usually 17 or 40. Generally, most manual cars use 17, most automatic cars use 40. Manual and automatic Corvettes use 40. Most trucks use 17.

Pulses /TOS Revolution: The number of pulses transmitted to the PCM per revolution of the transmission output shaft. This value may not be used in vehicles with manual gearboxes and may be set incorrectly in some factory manual calibrations.

Pulses/km or mile: The number of pulses transmitted to the PCM per mile or per km.

Sprocket Ratios

The 4T60-E and 4T65-E transmissions contain two chain driven sprockets. These sprockets may have varying number of teeth. The number of teeth is commonly 33, 35 and 37, however that may not always be the case.

Using EFILive's Sprocket Ratio calculator, you can determine the Sprocket Ratio and Calculated Diff Ratio.

Drive Sprocket: The number of teeth on the drive sprocket.

Driven Sprocket: The number of teeth on the driven sprocket.

Sprocket Ratio: The ratio of driven sprocket to drive sprocket.

Transmission Diff Ratio: The ratio of the differential gears fitted to the transmission.

Calculated Diff Ratio: The effective differential ratio that is used for speedo calculations.

[Copy to “Diff Ratio”] copies the Calculated Diff Ratio value to the “Diff Ratio” on the Tire Size tab.

Speedo Fine Tuning

If the speedometer is incorrect by only a few mph or km/h, use this calculator to calculate the required change.

Displayed Speed: The speed displayed on the speedometer.

Actual Speed: The speed measured independently (i.e. via GPS).

Correction Required: The percentage correction required.

New VSS Pulses is the new vehicle speed sensor pulses per mile/km.

Shift Point Correction

Changes made to tire and diff settings may cause the transmission shift points to change. To allow EFILive to automatically adjust the shift points, select the shift tables that EFILive should update and then click [Apply].

Original Calibration Values: Enter the original Tire Diameter and Diff ratio, or select [<-] to reset to original values.

New Calibration Values: Enter the new Tire Diameter and Diff ratio, or select [<-] to reset to user supplied values.

Adjust by is the percentage correction required.

Use the  icon to add calibrations to be adjusted.

Use the  icon to remove calibrations from the list to be adjusted.

Use the  icon to import the shift point correction calibration list for the current tune file's controller type from V7.

Setup

Controller displays the controller type from the open tune file.

[Set All to Default]: Sets all supported calibration names to their EFILive defaults.

Pulses/km or mile: Enter calibration name or use the [<-] to set to H0101.

Pulses/TOS Revolution: Enter calibration name or use the [<-] to set to H0102.

Final Drive Ratio: Enter calibration name or use the [<-] to set to H0103.

TOS Revolutions/km or mile: Enter calibration name or use the [<-] to set to H0104.

Sprocket Ratio: Enter calibration name or use the [<-] to set to H0116.

Tire Revolutions/km or mile: Enter calibration name or use the [<-] to set to H0136.

Tire Circumference: Enter calibration name or use the [<-] to set to H0139.

[Remove All Invalid Names] removes all calibration names that are not supported in the current tune file.

These setup values and the shift point correction table names are stored in the file: \\Documents\\EFILive\\V8\\Config\\speedo_adjust.ini

Custom Operating Systems

Custom Operating Systems provide support for additional functions not supported in OEM files. Custom Operating Systems exist on specific controllers and specific operating systems. Refer to the relevant Custom Operating System document for coverage details.

Where custom operating systems are available, they will be located in the Navigator as a calibration segment folder. The exact location is dependent on controller type and custom operating system type.

The complexity of the function determines the EFILive method of implementation. Two different methods exist to apply Custom Operating Systems.

Parameters are located under the Operating Systems Patches folder in the navigator and denoted by the  icon.

The function is enabled by changing the value of the parameter. These functions immediately apply the change to the tune file, update the navigator icons and the calibrations modified since last save list.

COS Upgrades are located under either the Operating Systems Patches folder or COS Upgrade folder in the navigator and are denoted by the  icon on non-upgraded tune files. EFILive hardware does not need to be detected for COS Upgrade options to be visible.



In the V7 Tune Tool, Custom Operating System Upgrades were located on the Calibration Window as an independent tab, not in the navigator.

In the V7 Tune Tool, EFILive hardware had to be connected to view and upgrade COS patches. This is not a requirement in the V8 Editor.

The function is applied by clicking the Apply Upgrade button, saving the tune file, closing the tune file and finally opening the file that was most recently saved.



 Custom Operating systems using the COS Upgrade method do not change icon format in the navigator window when applied because they cannot be undone/redone.

 Custom Operating systems using the COS Upgrade method do not show as modified calibrations in the modifications since last save window because they cannot be undone/redone.

Once the upgraded file is reopened, the vehicle operating system number will be upgraded to an EFILive Custom Operating System number and additional tuning parameters will be available for editing under the EFILive Custom Calibrations folder located at the top of the navigator. The folder path and the  icon(s) displayed in the OEM file will no longer be available because the operating system is upgraded.

Where multiple  COS Upgrade options are available, only one can be applied. To apply a different COS Upgrade option, the upgrade process must start with a standard operating system base file.

To remove a custom operating system, a tune file with an OEM operating system number must be full flashed into the controller.

Cax8

User defined calibrations are managed in the Editor using Cax8 files. Cax8 files are plain text files that can be incorporated into the tune tool to add additional tables and/or parameters for editing. This feature requires very detailed and specific knowledge regarding the location and definition of the controllers' data. Incorrect definition of parameters may render the controller unresponsive.



EFILive will support the integration between Cax8 and the Editor.

EFILive does not offer customer service support or assistance for parameter definition within Cax8 files.

If a controller becomes unresponsive after being flashed with a tune file created and/or edited while a cax8 file was active in the V8 software, EFILive will not provide a replacement VIN license under the VIN License Replacement Policy.

Cax8 files must adhere to the layout and design criteria documented in the template located in the \Documents\EFILive\V8\User Defined Cax8\Template.cax8 file.



To be correctly loaded, a *.cax8 file MUST start with the same name as the EFILive supplied *.cam file that is loaded for the target tune file. Usually the *.cam file name is the operating system number, however some controllers do not; specifically:

- Allison transmission calibrations use the calibration ID instead of the operating system number.
- Cummins calibrations use a modified operating system number.
So be careful to choose the correct file name for your *.cax8 file.

You can view the EFILive supplied *.cam file name in the [Provider] tab page of any EFILive defined calibration. You may have multiple *.cax8 files for a single operating system, so long as the *.cax8 filename starts with the same name as *.cam file loaded by the EFILive software. To be correctly loaded, a *.cax8 file MUST start with the same name as the EFILive supplied *.cam file that is loaded for the target tune file. Usually the *.cam file name is the operating system number, but for some controllers, such as AL5 and A40, the cam file name is different to the operating system number. You can view the EFILive supplied *.cam file name in the [Provider] tab page of any EFILive defined calibration. You may have multiple *.cax8 files for a single operating system, so long as the *.cax8 filename starts with the same name as *.cam file loaded by the EFILive software.

i.e. with names like:

- 12619078.cax8
- 12619078_Spark.cax8
- 12619078_AirFlow.cax8

If/when a tune file is opened with an operating system of 12619078, all of those *.cax8 files will be loaded.

To prevent naming conflicts, the cax8 author should define a Unique ID in the cax8 file. Failing to provide a Unique ID will result in the EFILive software providing a default Unique ID in the range U00..U99.

All values and units in this cax8 file MUST be specified using metric units and the metric units must valid units as defined in the V8 software under the Edit->Properties->General->Units tab page.

When the calibration is displayed, the user can select the actual display units. So, for example if a calibration is defined using km/h, then when the calibration is displayed, the user will be presented with all other speed related units such as mph, feet/sec, meters/second etc. The user can choose to display the calibration in any of those preferred units, and the V8 software will automatically convert the displayed values to the selected units.



When you are developing a *.cax8 file and you are cycling through the edit->save->edit->save process, you can force the V8 editor to reload the newly saved *.cax8 file by using the hot key combination Ctrl+Alt+X. That hotkey will close all open editor tab pages and reload all *.cax8 files for the current operating system.

Flashing

Try Stock Keys See Reading Calibrations for explanation of this item.

Try This Key See Reading Calibrations for explanation of this item.

Try Common Alternative Keys See Reading Calibrations for explanation of this item.

Try Key Range (Cal-Flash only) allows you to specify a range of keys to attempt to unlock E38, E40, E67, LS1B, E54 (LB7) and E60 (LLY) controllers.

Use this option if you know the controller is locked and if you do not know the key that was used to lock it. Large key ranges may take over 100 hours to find correct key. Keys may be entered in decimal (1..65535) or in hexadecimal (\$0001..\$FFFF).

Keys are tried in a random order in the range specified. If you need to pause or end the process, select the [Quit] button which saves the current status of the unlock process. To restart the unlock process, ensure the [Restart] option is checked prior to selecting [Cal Flash] to continue processing from the previously saved point.



Once the key is found, the controller is erased, then unlocked, then left in dead-poll mode. The key is not revealed. A Cal-flash with a compatible operating system is required to restore ECM functionality (or a full flash if changing operating systems).

Assume Lock May Be Faulty See Reading Calibrations for explanation of this item.

Try Additional Unlock Strategies See Reading Calibrations for explanation of this item.

High Speed (VPW Only) See Reading Calibrations for explanation of this item.

Dodge Cummins Fast CAN Mode (for CMD, CME, CMF controllers only)

Unlimited Fast CAN delivers the fastest possible flash time and is approx. 50% faster than standard flash routines.

Fast CAN is a little faster than standard, but more robust than Unlimited.

Standard use this option if you experience flash failures when using Unlimited Fast CAN or Fast CAN.

Perform Test Flash Only will simulate the flash process, complete with full data transfer to/from the controller. Use this option to test whether a flash will be successful or not without risking the integrity of the controller. Test flashing neither erases the flash memory nor programs any new data into the controller, therefore it is safe to interrupt a test flash, and even a test full-flash can be safely interrupted. For the same reason, test flashing is not able to test for correct battery voltage. If your battery voltage is too high or too low then the erase or flash may fail.

VAT Relink Ign. Cycles will set the ignition cycles required before VAT relink occurs. If 0 then the ignition cycle counter will not be modified. (LS1B, E54 and AL5 only)

Recover PCM (LS1B only) Recover PCM's NVRAM with data from the currently loaded tune file. (LS1B only)

Reset Allison TAPS (AL5 Only) Reset Allison Transmission Adaptive Pressures (TAPs) at completion of full-flash. (AL5 only)

Allison VIN Restore VIN to this value when full-flashing an Allison (AL5) controller.

Check License will communicate with the controller and check the controller's licensed status.

Activate License will license controller to FlashScan/AutoCal device.

Cal Flash will start the calibration only flash process. Calibration flashing only changes the calibrations in the controller and not the operating system. A calibration flash can be interrupted without rendering the controller inoperable.

Full Flash will start the full flash process. Full-flashing changes the operating system and the calibrations.



A full flash cannot be safely interrupted for older style controllers (e.g. LS1, L31, E54, E60, AL5 and all Pxx controllers). Interrupting a full-flash has a high probability of rendering those controllers inoperable and unrecoverable. If a full-flash is interrupted on the older style controllers, restart the full-flash process as soon as possible without removing power from the controller.

Quit will stop the cal-flash or full-flash process. Do not interrupt the full-flash process. If you absolutely must interrupt a full-flash process, please wait until it is more than 20% complete. See next section for more information on how to recover from a failed flash.

What causes a failed flash?

When a controller is re-flashed, EFILive performs the following steps:

1. Unlock the target controller.
2. Request other modules on the network be silent and respect the re-flash process.
3. Download a proprietary boot-loader program, designed and written by EFILive into the target controller (not all controllers require a bootloader).
4. Erase the target controller.
5. Reprogram the target controller.

Any of those 5 steps could fail for many different reasons. Below are some of the common reasons why each of those steps could fail.

Unlocking may fail because:

- The controller has been locked with a custom key by you or by some other tuner. In that case you must supply the key to the EFILive pass-thru software prior to reading or flashing the controller.
- The controller's security system has been damaged or is non-functional. In that case please check the "Try Alt Keys" and "Assume Lock May Be Faulty" check boxes and retry the flash process.
- The controller's security system has been modified by a non-EFILive tuner to use a different unlock strategy. In that case contact EFILive support and we will attempt to help you unlock the controller using the "Try Additional Unlock Strategies" option.
- The controller is not the correct controller. Trying to unlock one type of controller using another type of controller's key will fail and report that the controller is locked.
- Cummins controllers may contain an RSA digital signature and/or a Security Gateway module that needs to be addressed before flashing can commence.

Silencing modules on the network may fail because:

- Some aftermarket modules do not honor the request to be silent. In that case, please disconnect or disable all aftermarket electronic modules by removing their fuse or power supply. Typical culprits are radios, navigation systems, phone systems and other entertainment systems.
- FlashScan/AutoCal V3 users can access a range of test modes to check the network for rogue modules that may cause read or flash operations to abort are available by navigating to the Tune Tool -> F1: Tuning -> F4: Test OBD Network menu.

Downloading the boot-loader may fail because:

- One of the above failures occurred.

Erasing the controller may fail because:

- The boot-loader was not downloaded correctly.
- The vehicle's battery voltage is out of range. The battery voltage must be close to 12V.
- The erase command can take up to 60 seconds. During that time if any other module starts to transmit on the network the erase may not complete successfully.
- A cable has become disconnected.

Reprogramming the controller may fail because:

- The vehicle's battery voltage is out of range. The battery voltage must be close to 12V.
- The reprogramming command can take up to 10 minutes. During that time if any other module starts to transmit on the network the reprogramming may not complete successfully.
- A cable has become disconnected.

What should I do if the flash process fails?

Calibration only flash

A calibration-flash failure is not critical and will generally not result in an unrecoverable controller. To recover from a failed calibration only flash, turn the ignition off, wait 30 seconds, turn the ignition back on, wait a further 10 seconds, then retry the calibration only flash.

If the calibration only flash continues to fail:

1. Remove battery power from the controller, by either removing the controller's fuse or by disconnecting the battery from the vehicle.
2. Wait 30 seconds.
3. Reconnect power.
4. Retry the calibration only flash.

Full flash

A full flash failure is critical and may result in an unrecoverable controller. To attempt to recover from a full flash failure please follow the controller specific instructions:

For controllers that are any of the following:

GM Gas	GM Diesel
LS1A Gen III 97-98 PCM	E54 LB7 Duramax ECM
LS1B Gen III 99-08 PCM	E60 LLY Duramax ECM
L31 Vortec 98-00 PCM	AL5 Allison 5 Speed TCM
All Pxx controllers	

A full flash failure may cause these controllers to be rendered inoperable and unrecoverable. If a failure occurs while full flashing one of these controllers.



DO NOT REMOVE POWER FROM THE CONTROLLER.

As long as the controller remains powered up, EFILive's proprietary boot loader running in the controller will continue to wait for a successful full flash procedure. Simply retry the full flash procedure until it is successful.

If, for some reason power is removed from the controller the only other chance of recovery is that the original failed flash actually made it to about 15%-20% complete. In that case the operating system and communications code may have been restored enough to allow the controller to continue to operate in dead poll mode.



Retry the full flash procedure, if it fails with "no communications" error then the controller has probably been rendered inoperable and unrecoverable. The only way to recover the controller is to disassemble it and physically remove, reprogram and replace the flash chip on the main circuit board.

For all other controllers:

A full flash failure will generally not render these controller inoperable since the controller's built in boot block is not erased and will continue to allow the controller to be reprogrammed after the failure. To recover from a full flash failure, retry the full-flash process again.

If the full-flash continues to fail:

1. Remove battery power from the controller, by either removing the controller's fuse or by disconnecting the battery from the vehicle.
2. Wait 30 seconds.
3. Reconnect power.
4. Retry the full flash.

Where device and controller restrictions are implemented on the tune file, an unrestricted stock tune should be full flashed.

If calibration or full flashing continues to fail, please see this knowledgebase article: <https://service.efilive.com/kb/articles/problem-flashing-a-controller>

Controller Information

Displays Controller VIN, Operating System, Controller Code and Controller Serial details are displayed.

Controller VIN can be changed here.

Security Restrictions

Calibration security can be used to control how your calibration file(s) can be used by others. You can enable or disable a host of restrictions to suit most requirements.

Master FlashScan License

The security settings cannot be changed unless a FlashScan device is connected. The connected FlashScan's license number is copied into the "Master FlashScan License" field. Once the file has been saved, the security settings can only be changed/cleared when that same FlashScan (or a FlashScan with the same license number) is connected.

Clear All Security Restrictions removes tune file security when that same FlashScan that applied the security is connected.

Load All Security Restrictions From Another File (Ctrl+L) automatically applies security from another tune to this file where the controller type matches. Security changes can only be saved with FlashScan connected.

Load All Security Restrictions and Remote Settings From Another File (Ctrl+Alt+L) automatically applies security and remote settings from another tune to this file where the controller type matches. Security changes can only be saved with FlashScan connected.

Calibration Privacy

Calibration privacy relates specifically to the calibration parameters of the tune file. This does not extend to non-calibration data such as checksums, VIN, or remote key options.

Can be Viewed and Modified allows anyone who has the tune file to display and modify the calibration contents of the file.

Can Only be Viewed allows anyone that has the file to view the calibration contents file but not to modify it.

Cannot be Viewed or Modified means that anyone who has the file cannot view the calibration contents of the file and therefore cannot modify it either*.

***Note:** Tunes with the restriction “cannot be viewed or modified” have their comments and modification history erased to prevent the recipient from viewing that information.

Encryption

To securely encrypt a tune file a FlashScan V3 must be connected. When saving a file with encryption the save process may take up to 60 seconds. Once encrypted, the file cannot be re-opened in the V7 or V8 software, it can only be Black-Box flashed.

Once the **Securely Encrypt File** checkbox is selected, the Calibration Privacy is automatically adjusted to cannot be viewed or modified. All other security options remain available for use.

For Use With V2 and/or V3 Devices allows the encrypted file to be flashed with V2 and V3 devices.

For Use With V3 Devices Only allows the encrypted file to be flashed only with V3 devices.

More Info displays encryption help.

Reflash Security

Can be Calibration-Flashed or Full-Flashed means the file can be either calibration-only flashed or full flashed into controllers that support either of those two options.

Can Only be Calibration-Flashed means the file can only be used as a calibration-only flash. It cannot be used to full flash a controller.

Can Only be Full-Flashed means the file can only be used as a full flash. It cannot be used to calibration-only flash a controller.

Auto-Lock controller during flashing means the target controller will be locked with a secret key that prevents the calibration from being read out of the controller. To unlock the controller it must be flashed with a tune file that does not have this option checked. Usually a stock file is used for unlocking duties.



Auto-Locking is available on selected controllers. The [Supported Controllers] button on the [Security Restrictions] tab lists controllers available for Auto-Locking.

Device and Controller Restrictions

Device License restricts the tune file to being flashed only by devices that have this license number.

Device Serial restricts the tune file to being flashed only by the single device that has this serial number.

Controller Serial restricts the tune file to being only flashed into the controller that has this serial number.

Controller VIN restricts the tune file to being only flashed into controllers that match the VIN pattern supplied. A VIN pattern may use a dot to indicate “don’t care” characters. All other characters must match the target VIN.

For example, the VIN pattern: “6G1.....6.....” will match ONLY VINs that start with the three letters “6G1” and that also have a “6” at position 10.

Clear All Security Restrictions

To clear all security settings and to remove the FlashScan License number, click the [Clear All Security Settings] button while the correct FlashScan device is connected.

Clear all security settings will not remove Auto-Lock restriction where Auto-Lock was set via the EFILocker COS Patch, or reset the AutoCal Remote License.

Remote Control

As the author of a tune you can choose to implement a variety of Remote Control options using the [F4: Properties] menu item and selecting the [Remote Control] tab.

Options for Remote Reading and Flashing

Various remote options can be embedded in a *.ctz or *.coz tune file to be used to control remote Black Box Flashing. These are ignored during pass-thru flashing.

Security Access

[Try this Key] allows a key to be entered to gain access the controller during BBF. The key is encrypted before being stored in the file.

[Try Key Range] See Reading Calibrations for explanation of this item.

[Clear Key] removes the key from the file.

Try Common Alternative Keys forces FlashScan/AutoCal to try additional known keys to gain access to the controller.

Assume Lock May Be Faulty See Reading Calibrations for explanation of this item.

Protocol Options

High Speed (VPW Only) attempts to flash the controller using high speed mode (the default value for this option is “checked”).

Dodge Cummins Fast CAN Mode (for CMD, CME, CMF controllers only) See Flashing Calibrations explanation of this item.



The options for remote flashing are only used when black box flashing (i.e. in standalone mode). When using pass-thru flashing these options are ignored and the equivalent pass-thru flashing options are used instead.

Full-Flash Options

VAT Relink Ign. Cycles will set the ignition cycles required before VAT relink occurs. If 0 then the ignition cycle counter will not be modified. (LS1B, E54 and AL5 only)

Recover PCM (LS1B only) Recover PCM’s NVRAM with data from the currently loaded tune file. (LS1B only)

Reset Allison TAPS (AL5 Only) Reset Allison Transmission Adaptive Pressures (TAPs) at completion of full-flash. (AL5 only)

Allison VIN Restore VIN to this value when full-flashing an Allison (AL5) controller.

AutoCal Remote License

Remote License shows that the tune file may be used by any remote AutoCal device that is linked to the remote license number shown. To set the remote license, use one of following drop down options on the [Save] button:

- Save, For AutoCal
- Save As, For AutoCal
- Save (Calibration Only), For AutoCal



Where device and/or controller restrictions are implemented, tuners should provide an unrestricted stock tune to assist in ECM recovery of a failed flash.

File Information

Comments

Allows users to store comments and notes about the tune file.



Tune files saved with the restriction "cannot be viewed or modified" have their comments erased to prevent the recipient from viewing this information.

History

EFILive automatically keeps a history of all changes made to the calibration. You may edit the history data; search for text or for particular dates.



Tune files saved with the restriction "cannot be viewed or modified" have their history erased to prevent the recipient from viewing this information.

Version/Author

File Version and Author created/modified details are found here, where Author details are setup in the Edit -> Properties -> General -> User Info menu.

Calibration Source

Records EFILive Software version, Device type and read method, Script version, Firmware and Boot Block versions.

GM Controller Locking/Unlocking

Locking refers to the security system built into most vehicle controllers. Most controllers' security systems employ a simple seed/key system to prevent unauthorized access to the controller's operating system and/or calibrations.

Many tuners like to protect their tunes by locking the controller.

Due to the very different controller architectures that have been released between 1998 and 2021, locking has been implemented differently for different controllers. In some instances only specific operating systems are supported for locking. Controller locking on 2017+ model year vehicles is not available due to GM security changes.

The GM Controller Locking Guide provides specific details on how to apply locking.

What GM Controllers can be Locked?

GM Gas

Controller	Locking method
E38 ¹	Auto Lock via BootLocker, or Manual locking.
E39/E39A ^{1 2}	Auto Lock via EFILocker Patch.
E40	Auto Lock via BootLocker, or Manual locking.
E67	Auto Lock via BootLocker, or Manual locking.
E78 ^{1 2}	Auto Lock via EFILocker Patch.
E80 ^{1 2}	Auto Lock via EFILocker Patch.
E92 ^{1 2}	Auto Lock via EFILocker Patch.
LS1B	Auto Lock via BootLocker, or Manual locking.

GM Diesel

Controller	Locking method
E54	Auto Lock via BootLocker, or Manual locking.
E60	Auto Lock via BootLocker, or Manual locking.
E98 ^{1 2}	Auto Lock via EFILocker Patch.

Transmission Controllers

Controller	Locking method
A50	Auto Lock via EFILocker Patch.
T43 ^{1 2}	Auto Lock via EFILocker Patch.
T87 ^{1 2}	Auto Lock via EFILocker Patch.

¹ Where the controller remains in use in 2017+ model year, or was released during or after 2017, locking is not available due to GM security changes.

² Select Operating Systems only; refer to GM Controller Locking Guide for further information.

Auto Locking

Auto Locking is an EFILive exclusive feature that allows tuners to automatically lock controllers when flashed with a protected tune file and to automatically unlock controllers when flashed with a non-protected tune file where the tune file was locked using V8.2.2 build 225 software (June 2013) or later.

When an ECM is Auto-Locked all non-EFILive reflash tools (such as GM's Tech II) will be prevented from reading and flashing the controller. However EFILive's Tuning Tool will always be able to reflash the ECM. Depending on the Auto-Lock status of the file being flashed, the ECM will either remain locked or be unlocked at the completion of the flash.

The Auto-Lock system generates and manages its own keys to ensure that any EFILive user can reflash an Auto-Locked controller. Because the keys are managed internally and are never exposed to the user, the controller cannot be unlocked manually by supplying the key.

Auto-Locking is implemented using two distinct methods, dependent on the controller type. The two methods are:

1. BootLocker.
2. EFILocker COS Patch.

Locking via BootLocker

BootLocker can be used to lock/unlock controllers during a calibration only-flash or a full-flash procedure by selecting the Auto-Lock security setting in the V8 Tune Tool.

Auto-Locking the controller via BootLocker can be applied to a tune file using:

- **V8 Scan and Tune** using the [F3: Tune] -> [F4: Properties] via the [Security Restrictions] tab.
- **V8 Scan and Tune** via the [F5: BBX] -> [F6: Quick Setup].

Locking via EFILocker COS Patch

EFILocker COS Patch must be applied to the tune file and requires a full-flash procedure to take effect in the controller. Where the controller remains in use in 2017+ model year, locking is not available due to GM security changes.

Auto-Unlock

Where the controller was locked using EFILive's Auto-Lock technology, the controller can be unlocked by any FlashScan or AutoCal in the following situations:

Auto-Lock using BootLocker Remove the Auto-Lock security setting in the tune file and calibration only-flash or a full-flash the controller.

Auto-Lock using EFILocker Remove the Auto-Lock security setting in the tune file and full-flash the controller.

Manual Unlock

Historically, locking involved the tuner setting a manual key, and the controller could not be read or flashed unless that key was known. For controllers locked using a manual key, or controllers locked using software other than EFILive software, the following options exist to unlock a controller during a calibration only-flash or full-flash procedure.

Try Stock Key See Reading Calibrations for explanation of this item.

Try This Key See Reading Calibrations for explanation of this item.

Try Common Alternative Keys See Reading Calibrations for explanation of this item.

Try Key Range (Full Flash only) See Reading Calibrations for explanation of this item.

Assume Lock May be Faulty See Reading Calibrations for explanation of this item.

Try Additional Unlock Strategies See Reading Calibrations for explanation of this item.

Controller Authorization

Process Retirement

In January 2021, EFILive implemented a method where the EFILive software now manages the Controller Authorization process from end to end for FlashScan/AutoCal V3 and FlashScan/AutoCal V2 devices.

Where FlashScan/AutoCal V3 and/or FlashScan/AutoCal V2 is updated, an Auth Code purchase is not required.

There are significant time savings for tuners and end users. Auth codes no longer need to be transferred between tuners and end users, and a secured controller that has not yet been unlocked will now read completely in a single step process.

This is a free enhancement for all customers who update their software and firmware to the January 2021 software release or later.

Historical Process

Please refer to the [Controller Authorization.pdf](#) document for the historical process first released in 2016.

Scripting

Making automated or repetitive changes to tune files can be accomplished by scripts. Scripting can be used to read tune file and controller information, as well as modify items including comments, history, tune file security settings and remote settings as well as reading/modifying calibration data.

The Lua scripting language and runtime interpreter is used by the EFILive V8 software to implement scripting. A range of example scripts are included in the \Documents\EFILive\V8\Scripts folder. Detailed documentation on how to script construction and application is located in the EFILive Command Line Reference.pdf.

The ten most recent used scripts are listed in the Script drop down.

To compile and test the script for syntax errors select [Compile].

Scripts can only be applied to open, unrestricted tune file. Any restrictions should be applied after the script is applied.

The [Run] function will apply the script to the tune file, or the script can be saved for later use and applied via the EFILive Command Line Interface.

To display success or error messages when compiling or running a script the Show Output option should be selected.

Where a script is applied, any changes made to the tune file cannot be undone. Changes that may have already been made to the security settings, comments or history will not be available until the tune file is saved.

For example, using E67 {B5102} Low Octane Spark Map a script can be created ensure that each cell in the low octane spark map is always less than the equivalent cell in the high octane spark map. If the lower cell is greater than or equal to the high cell then the low cell is set to one less than the high cell.

The script to compare and execute these changes is in the image below.

```

1 --[[[
2 |
3 |           Copyright © 1998
4 |           EFILive Limited
5 |           web: http://www.efilive.com
6 |           email: info@efilive.com
7 |
8
9 -- Sample script to ensure that each cell in the low octane spark map is
10 -- always less than the equivalent cell in the high octane spark map.
11 -- If the low cell is greater than or equal to the high cell then
12 -- the low cell is set to one less than the high cell.
13
14 high = _efiGetCalId(0,"B5101")
15 low = _efiGetCalId(0,"B5102")
16
17 colCount = _efiGetCalProp(low,cpidColCount)
18 rowCount = _efiGetCalProp(low,cpidRowCount)
19
20 for c=0,colCount-1 do
21   for r=0,rowCount-1 do
22     loVal = _efiGetCalValue(low,c,r)
23     hiVal = _efiGetCalValue(high,c,r)
24     if ( loVal>=hiVal ) then
25       n = _efiSetCalValue(low,c,r,hiVal-1)
26       if ( not n ) then
27         print("[...c...],[...r...] ..EFI_ErrMsg)
28       end
29     end
30   end
31 end

```

Script returned: \$0000 (0)

After running the script, Low Octane Spark Map is modified.

rpm	Low-Octane Spark Table										
	Air Per Cyl g/cyl										
	0.080	0.120	0.160	0.200	0.240	0.280	0.320	0.360	0.400	0.44	
0	33.0	33.0	30.5	27.5	24.5	18.0	11.5	4.5	0.0	-5.	
200	34.5	34.5	31.5	29.0	26.5	20.0	12.5	5.5	0.0	-4.	
400	35.0	35.0	33.0	29.5	27.5	20.0	13.5	6.5	2.0	-4.	
600	38.0	38.0	35.0	30.0	29.5	21.0	16.5	9.5	5.0	1.	
800	41.0	41.0	38.5	33.5	29.0	25.0	19.0	12.0	8.0	4.	
1000	44.0	44.0	42.0	36.5	30.5	25.0	19.0	13.5	9.5	6.	
1200	45.5	45.5	43.5	36.5	32.0	27.5	22.0	16.5	13.0	9.	
1400	46.0	46.0	43.5	37.0	33.0	29.0	24.0	19.0	15.5	12.	
1600	47.0	47.0	44.5	39.0	34.5	30.0	26.0	21.5	18.0	14.	
1800	50.0	50.0	46.0	42.0	38.0	34.0	30.0	26.0	22.5	19.	
2000	50.0	50.0	48.0	45.5	42.0	38.5	33.0	28.0	25.0	22.	



F4: OBD

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Config

Config (Alt+Enter) opens the EFILive Property Settings window at the Display category.

Close

Close (Ctrl+F4) closes the Window.

Controller Information

F2: OBD

[Read] (Ctrl+R) Displays various OBD (On Board Diagnostic) data that can be read from the controller, including:

- Controller information and segment part numbers.
- System Readiness Tests.

- Diagnostic Trouble Codes
- CVNs (Calibration Verification Numbers).

[Clear] (Ctrl+C) Clears diagnostic trouble codes and test results.

[Legend] (Ctrl+L) Displays explanation of diagnostic trouble code status.

Details Displays controller information including controller type, VIN, and operating system information.

Tests Displays Systems Rediness test results.

DTCs Displays the status of DTCs

VIN Change Retrieves and Reprograms the VIN.

VAT Relink Reset the VAT (Vehicle Anti-Theft) for auto linking with the BCM.

F3: Lookup DTC

This option can be used to lookup diagnostic trouble codes.



FlashScan and AutoCal provide an option to capture ALL diagnostic data from a connected vehicle into a single text file report in standalone mode.

Select FlashScan's menu option: F3 Diagnostics -> F4 Record All Diags.

Select AutoCal's simple menu option: Record Diags.

Select AutoCal's advanced menu option: Trouble Codes->Record Diags.

F4: Lookup OS

This option can be used to lookup GM Operating System compatibility.



F5: BBX

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Open

Open (Ctrl+O) will open a configuration file.

Save

Save (Ctrl+S) will save the configuration file with its current name.

Save As (Alt+S) will save the configuration file with a new name.

Save Quick Setup (Shift+Ctrl+S) will save the current quick setup configuration file.

Save Quick Setup As...(Shift+Alt+S) will save a quick setup configuration file with a new name.

Save Quick Setup As (Read Only)... will save a quick setup configuration file with a new name and make the file read-only. That means the file can't be accidentally modified unless the read-only flag is removed. To remove the read

only flag: Using Windows Explorer, right click on the quick setup file and select “Properties” then uncheck the “Read-only” check box.

Read

Read (Ctrl+R) reads the current configuration from the attached device.

Program

Program (Ctrl+P) Programs the attached device with the current configuration and any supporting files that have been updated since the device was last programmed.

Program Selections Only (Faster) programs the attached device with only the configuration file. This option should only be used if you have only changed PID selections. If you have changed the number and or type of controllers for either scanning or tuning then you should use the Program or Program All Required Data options.

Program Selections and Configuration Files (Slower) formats and then programs the attached device with all configuration files regardless of whether they are out of date or not.

Format CONFIG File System formats the CONFIG file system in which the configuration and supporting files are stored. When making significant changes to the BBX options, it is a good idea to format the CONFIG file system to discard any old/unused files prior to programming.



To save CONFIG file space you may also elect to exclude the DTC description files from FlashScan devices. In that case FlashScan will only be able to display DTCs but not their descriptions.

DTC description files are not copied to AutoCal V2 DTC devices.

Close

Close (Ctrl+F4) closes the Window. If any changes have been made and not yet saved you will be asked to save the changes.

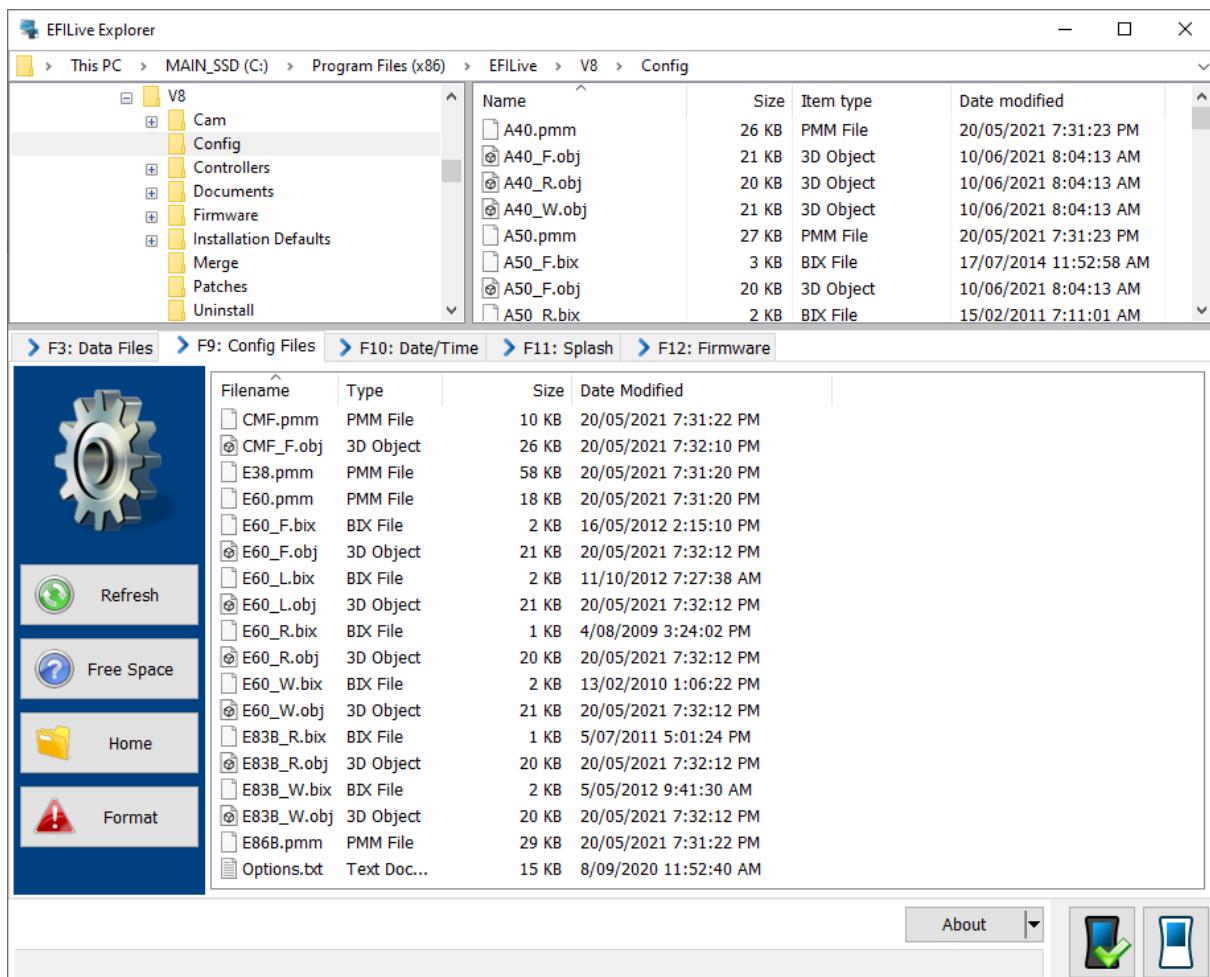
Standalone Operation (BBX)

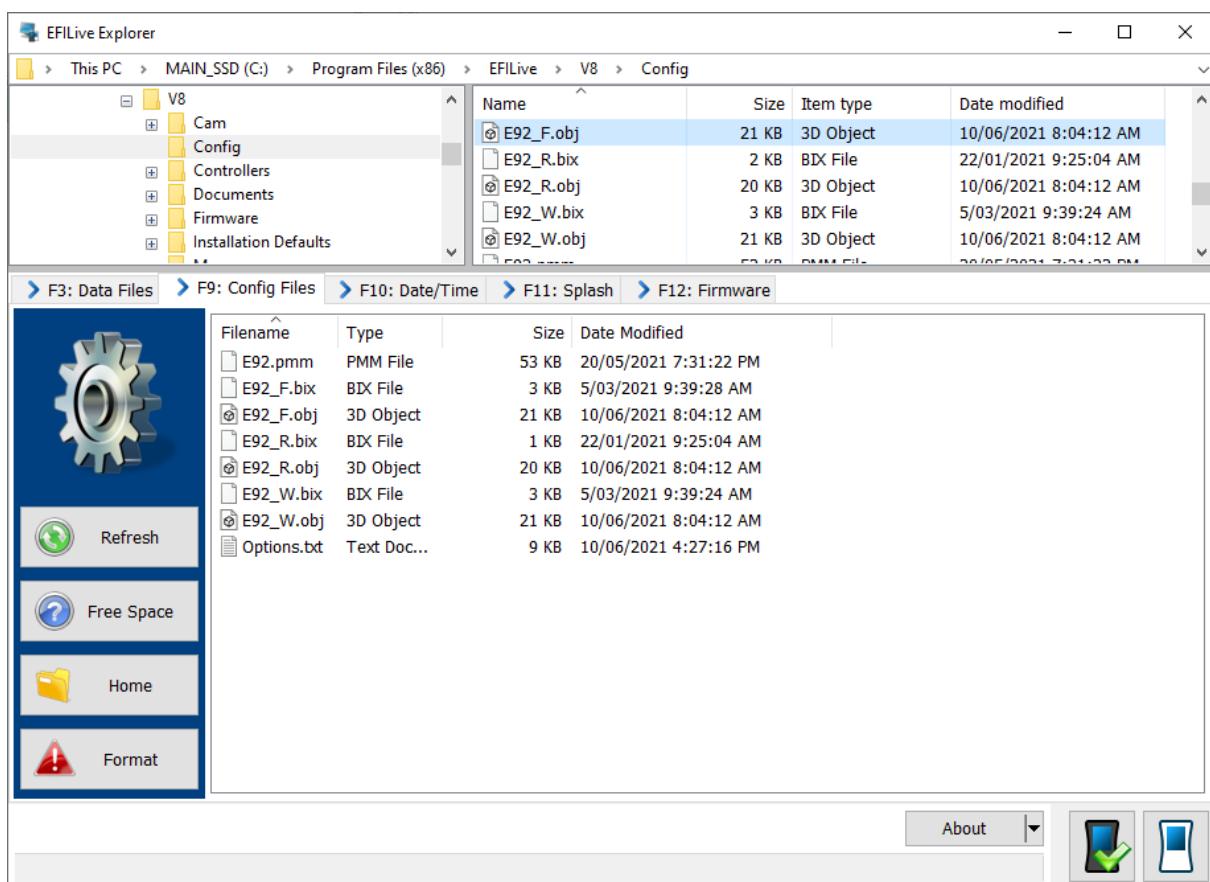
Standalone operation (aka BBX) is used to describe the operations that FlashScan and AutoCal devices can perform without being connected to a laptop or PC.

Before any BBX operations can be performed, the device must be configured with the appropriate data files. The data files that are copied to the device are:

- **Options.txt:** contains the options that you have selected to be available via BBX, such as which controllers to enable, which PIDs to log, which DTC descriptions will be available and the switchable tune names.
- ***.pmm files:** contain the PID definitions for each controller that you have selected for BBL.
- ***.obj files:** contain the read and flash configurations for each controller that you have selected for BBR and/or BBF.
- ***.bix files:** contain additional read and flash configurations for some controllers that you have selected for BBR and/or BBF. Not all controllers require the *.bix files.

For advanced users, it is possible to use EFILive Explorer to manually copy the necessary configuration and support files from \Program Files\EFILive\V8\Config\ to a FlashScan or AutoCal device, however it is much easier and more accurate to use the [F5: BBX] setup option in the EFILive Software.





EFILive Explorer showing BBX configuration files for the E92 controller



Many of the configuration files are intimately linked to FlashScan's and AutoCal's firmware version. Use the [Check Firmware] button in the main EFILive Scan and Tune Window to update the firmware and associated configuration files.

Quick Setup

V8 Scan and Tune [F5: BBX] -> [F6: Quick Setup] tab page provides a complete BBX configuration profile that can be used to configure a device in one easy step. Quick setups are most often used by tuners to create a single configuration file that they can email to their customers to allow their customers to quickly and easily configure an AutoCal device. Quick setups are not limited to AutoCal devices, they can also be used to configure FlashScan devices.

Create a new quick setup file using the **New Quick Setup** button.

Open an existing quick setup file using the **Open Quick Setup** button.

Program the quick setup into a device using the **Program Quick Setup** button.

Save a new quick setup file using one of the three drop down options on the [Save] button.

A black box quick setup file (*.bbx) contains copies of all the configuration data and tune files required to configure the AutoCal device. All necessary data and files are copied into the quick setup file when it is saved.

The data that is copied into the quick setup file is:

- The device settings that are currently configured in the [F6: Devices] window. You can modify the device settings by clicking on the [Edit AutoCal Settings]

button on the [F6: Quick Setup] tab page. FlashScan device settings can be modified by selecting the [Edit FlashScan Settings] item on the drop down box on the [Edit AutoCal Settings] item.

- The current file which contains the controllers and PID selections that are currently configured in the [F5: BBX] window.
- All required supporting configuration files (*.obj, *.pmm, *.bix and *.dtc).
- Various options that are to be performed when the user programs the quick setup configuration in to their device:
 - **Format the CONFIG file system before copying BBX configuration files to device** will as the description suggests format the CONFIG file system. It is recommended that you check this option to ensure all old configuration files are removed from the target device.
 - **Delete all existing tune files before copying new tune files to device** will delete all existing *.ctz and *.coz files from the /EFILive/Tune folder of the target device.
 - **Overwrite existing tune files when copying new tune files to device** will automatically and without any warning, overwrite existing files on the device. It is recommended that you check this option otherwise if a file already exists on the device then it will not be copied from the quick setup to the target device.
- Up to 10 *.ctz and/or *.coz tune files can be added to the quick setup configuration. To add one or more tune files to the quick setup configuration, click the  button. To remove selected tune files, click the  button.

Quick Setup.bbx files can be emailed to your end user to program or reprogram AutoCal.

Quick Setup.bbx files should be saved in the folder: \My Documents\EFILive\V8\BBX

Tuners and end users will need to manage file names and the appropriate back up of files, particularly for tune files should multiple Quick Setup configurations be required.

Tuners should provide instructions to end users on how to program Quick Setup.bbx files based on the configuration changes made.

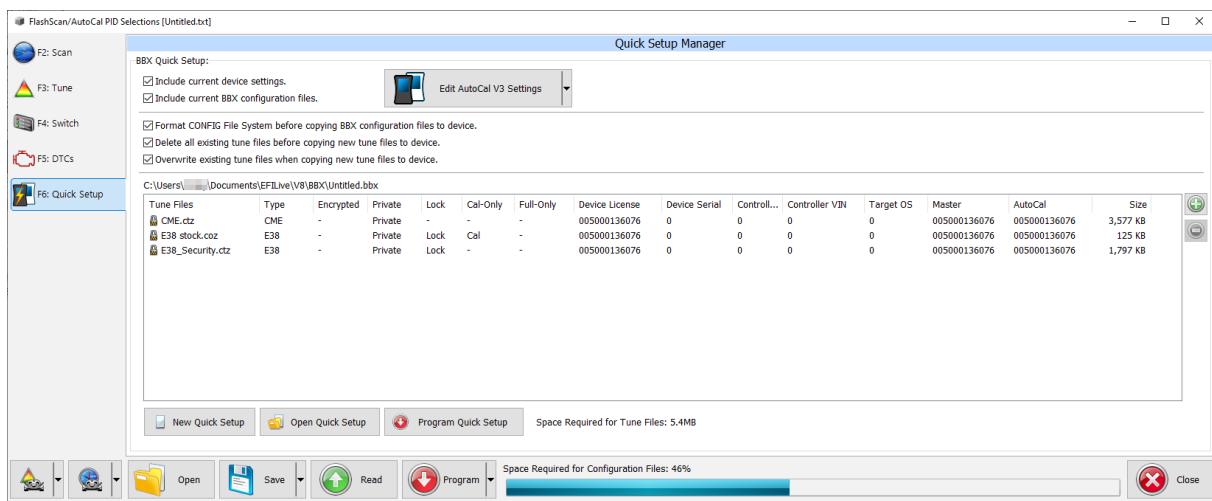
Quick Setup Security Restrictions:

You can select one or more tune files and right click to modify the various security attributes of the tune files as well as the file name. Modifying these attributes does not alter the original tune file, it only alters the copy of the file that is stored in the Quick Setup file.

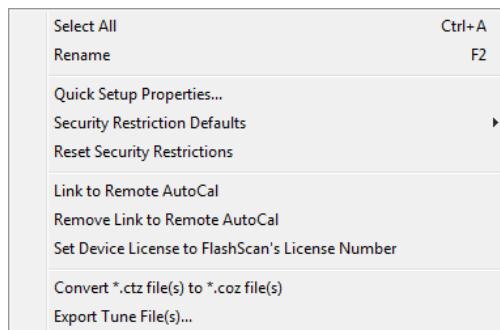
The padlock icon next to the tune file name displays the security restrictions status of that file.

If the padlock icon is locked for a tune file, then you cannot modify the security restrictions for that file. You must reset the security restrictions before you can set new restrictions. To reset security restrictions, the Master FlashScan device that was used to enable current security settings must be connected to your PC.

The security restrictions status padlock is only updated when a Quick Setup file is saved or when a file is converted from *.ctz to *.coz.



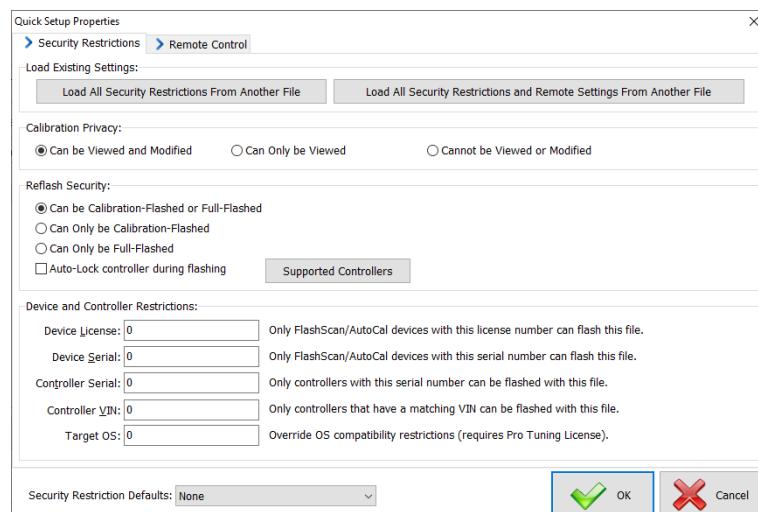
There are a variety of security settings available using the right click option on one or more tune files.



Select All – allows all files in the Quick Setup to be selected at once.

Rename – allows a single file to be renamed.

Quick Setup Properties – manages multiple file security settings via the “Quick Setup Properties” window, where both Security Restrictions and Remote Control options can be managed.



Security Restrictions

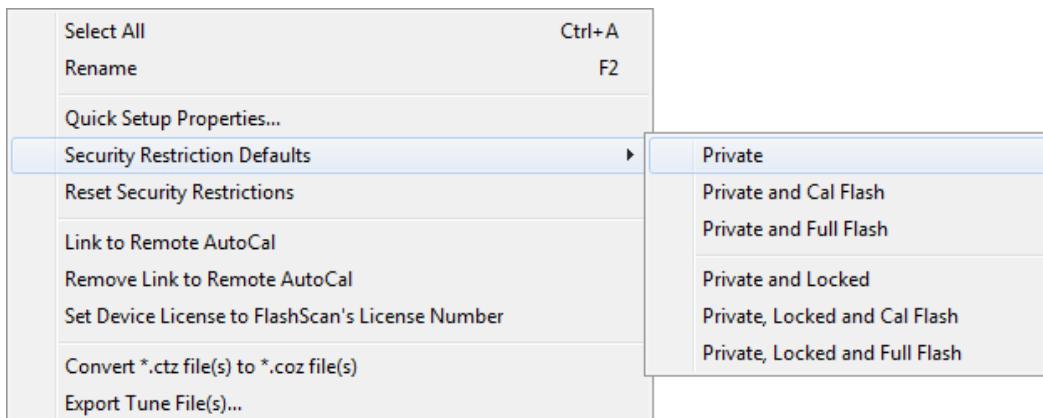
Security can either be set by selecting individual components under each section heading, or via selecting Security Restrictions Defaults which lists a range of pre-defined options that are available.

Detailed descriptions for each individual component are documented under Calibration Security.

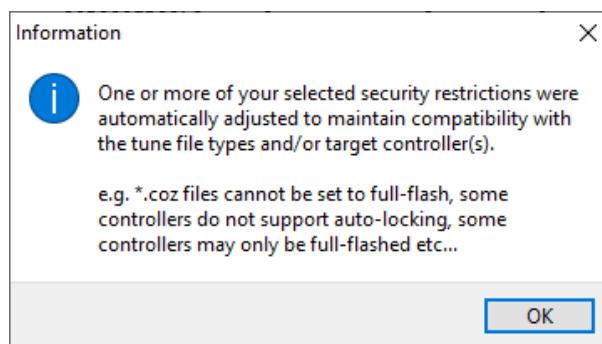
Remote Control

Detailed descriptions for each individual component are documented under Remote Control section listed earlier in this document.

Security Restrictions Defaults - manages single file or multiple file security settings via a range of pre-defined options that are available.



Where multiple files are selected, and security restrictions are not compatible across all files, the Quick Setup will automatically adjust security levels to the 'next applicable' security level. The following message will be displayed.



Reset Security Restrictions – removes security settings on single file or multiple file selections. The Master FlashScan device that was used to enable any current security settings must be connected to your PC.

Resetting security restrictions WILL NOT reset the Remote License field. Remote License is not a security restriction. A Remote License is an enabler that allows an AutoCal to flash tunes created by a particular FlashScan.

Resetting security restrictions WILL NOT remove Auto-Lock controller during flashing where the Auto-Lock was set via the EFILocker COS Patch.

Link to Remote AutoCal – enables an AutoCal to flash tunes created by a particular FlashScan. This is not a security restriction.

Remove Link to Remote AutoCal – removes the remote AutoCal license, disabling the file from being flashed by any AutoCal device.

Set Device License to FlashScan's License Number - restricts the tune to being flashed only by FlashScan devices that have the same License Number.

Convert *.ctz file(s) to *.coz file(s) – converts *.ctz file(s) to *.coz file(s) where *.coz file formats are supported for the controller type selected. If the controller type does not support *.coz file format, the file(s) will remain in *.ctz format. Files cannot be converted from *.coz format to *.ctz format.

Export Tune File(s) - If you accidentally lose or delete the original *.ctz tune files that were used to create a quick setup file, you can recover them using this option.

NOTE: When you change the security restrictions of files in the quick setup list, those restrictions are not applied immediately to the files. Instead, security restrictions are only applied to the files in the quick setup list when the quick setup file is saved.



EFILive recommends at least the following settings for AutoCal quick setup tune files:

- Private
- Lock (Auto-Locking is available on selected controllers. The [Supported Controllers] button on the [Security Restrictions] tab lists controllers available for Auto-Locking.)
- Device License (to prevent un-authorized FlashScan's from flashing tunes).
- Master License (to implement file security).
- Remote AutoCal License (to give AutoCal 'permission' to flash tunes created by a particular FlashScan).

Should Quick Setup files be saved without appropriate settings, the following warning messages will be displayed during the [Save] process:

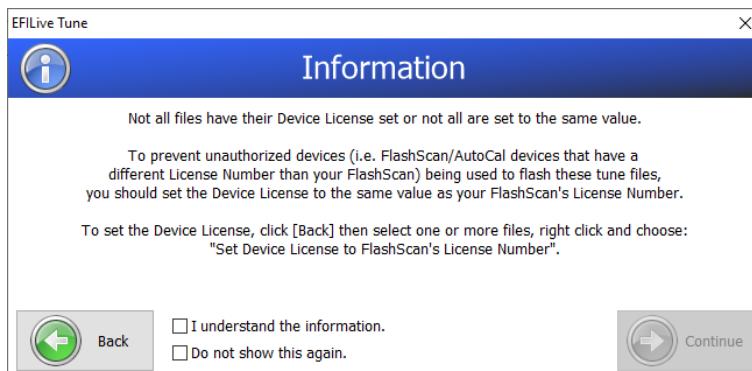
The image contains two screenshots of the EFILive Tune software interface, both titled "Information".

Screenshot 1 (Top):

- Message: "Not all files are linked for use with the same AutoCal device." and "To set the AutoCal field, click [Back] then select one or more files, right click and choose: "Link to Remote AutoCal"."
- Buttons: "Back" (left), "Continue" (right), and two checkboxes: "I understand the information." and "Do not show this again."

Screenshot 2 (Bottom):

- Message: "Not all files are set to Private." and "To prevent unauthorized viewing of, or modifications to your tune files, EFILive recommends setting the Private option on each tune file."
- Buttons: "Back" (left), "Continue" (right), and two checkboxes: "I understand the information." and "Do not show this again."



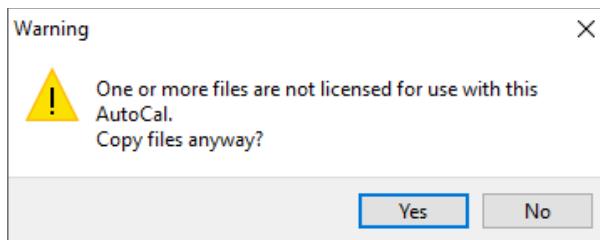
Tuners have the ability to select [Back] and modify the Quick Setup, or select [Continue] after selecting one of the available check boxes. Selecting [Continue] will allow the Quick Setup to be saved in its 'unsecured' format.

Should collective tune file sizes exceed 6MB, the following warning message will be displayed during the [Save] process:

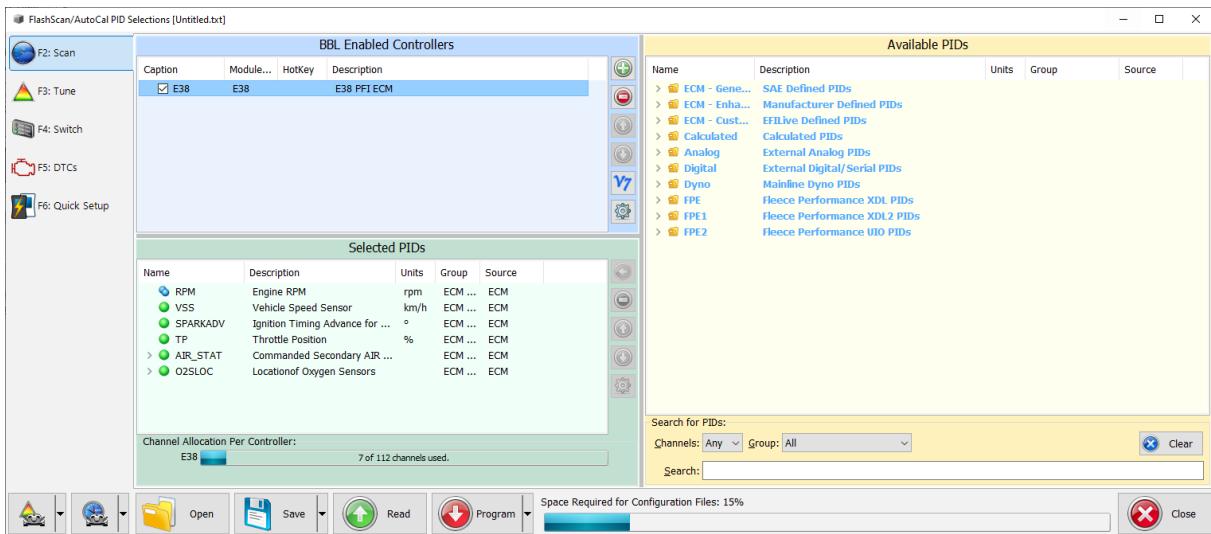


Tuners have the ability to select [Back] and modify the Quick Setup, or select [Continue] after selecting one of the available check boxes. Selecting [Continue] will allow the Quick Setup to be saved.

Should Quick Setup files be programmed into AutoCal where tune file(s) are not licensed for use with that device, the following warning message will be displayed:



Standalone Data Logging (BBL)



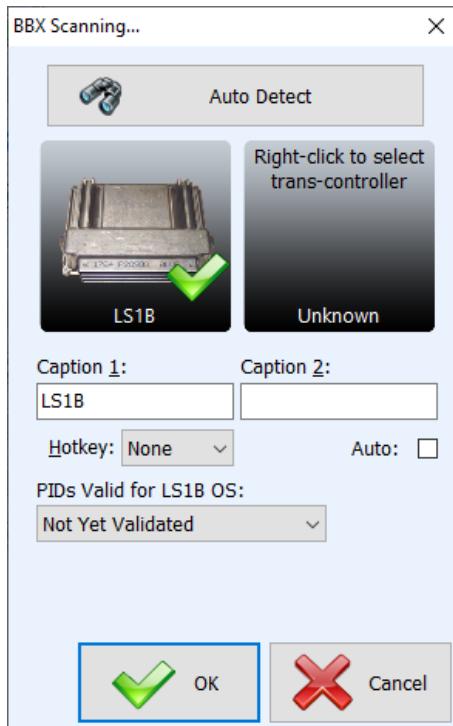
[F5: BBX] option showing E38 BBL PID selections

The [F2: Scan] page is divided into three regions:

1. **BBL Enabled Controllers** shows which controllers are selected for Black Box Logging.
2. **Available PIDs** for the currently highlighted controller.
3. **Selected PIDs** for the currently highlighted controller.

BBL Enabled Controllers

To add a new controller, click on the button or right-click and select "Add", or press the hotkey Shift+Ctrl+Ins.



Scan Controller Properties, LS1 controller selected

Caption 1 and Caption 2 contain the text that will be shown on FlashScan's or AutoCal's data logging selection menu. On FlashScan the two captions are

displayed on a single line with a space separating them, on AutoCal the two captions are displayed on two separate lines.

Some controllers (such as the LS1B) are capable of controlling both the engine and automatic transmission. In that case, use the Auto checkbox to indicate whether or not an automatic transmission is present. That will ensure the PIDs displayed in the **Available PIDs** area are for the correct transmission type.

If you allocate a hotkey (F1...F4) to this controller, then you may select this controller for data logging duties on FlashScan by pressing that hotkey on FlashScan's keypad. Hotkeys are not supported on AutoCal.

If you are currently connected to your vehicle, you may click [Auto Detect] to attempt to identify the controller(s) in your vehicle, otherwise right-click on the shaded squares to select the appropriate engine/transmission controllers.

Where PID validation has previously been performed for other operating systems, you can select one of those previously validated operating systems from the "PIDs Valid For Engine OS" or "PIDs Valid For Trans OS" drop down lists.

To remove a controller from the list, click the  button or right-click and select "Delete", or press the hotkey Shift+Ctrl+Del.



Deleting will delete all highlighted controllers and all their selected PIDs.

To retain the selected controllers and their selected PIDs while preventing the controllers from being visible in the FlashScan or AutoCal menus, uncheck the checkbox next to the controllers.

To move the highlighted controllers up or down in the list click on the  and  buttons respectively or press the hotkeys Shift+Ctrl+UpArrow or Shift+Ctrl+DownArrow respectively.

To select V7 compatibility options click on the  button. The V7 compatibility options allow you to specify the V7 dashboard that will be automatically loaded if/when you open the data file in the V7 software. You can also add V7 calculated PID names that will be automatically displayed if/when you open the data file in the V7 software. Calculated PIDs are not computed nor displayed by FlashScan or AutoCal in BBL mode.

To modify an existing controller selection, click on the  button or right-click and select "Properties" or press the hotkey Shift+Alt+Enter.

Available PIDs

The list of available PIDs is slightly different for most controllers. Each time you highlight a different controller in the BBL Enabled Controllers section the PIDs shown in the Available PIDs section may change.



The list of available PIDs is divided into a number of groups displayed with blue headings. You can configure the display to automatically expand all the groups via: Properties->Scan->Dashboard->Expand PID Selection Groups Automatically.

To help locate a specific PID, you can enter all or any part of the PID's name, description or units into the "Search:" text box at the bottom of the window. When you stop typing into that text box EFILive will search for and display only those PIDs that match the search text. For example, if you were looking for a PID that had something to do with spark, then you should enter the text spark.

Click the  button to clear the search options and display all PIDs again.

Selected PIDs

To include PIDs in the data log, you must “select” them. To select PIDs, highlight them and drag them from the Available PIDs section to the Selected PIDs section, or click the  button or press the hotkey Ctrl+Ins.

To unselect PIDs, highlight them and click the  button or press the hotkey Ctrl+Del.

You can highlight multiple PIDs at once by left-clicking on them in combination with the Ctrl or Shift keys. Holding the Ctrl key down while left-clicking will allow you to select multiple individual PIDs. Holding the Shift key down while left-clicking will allow you to select a range of PIDs. Only PIDs that are in the same group can be selected at once.



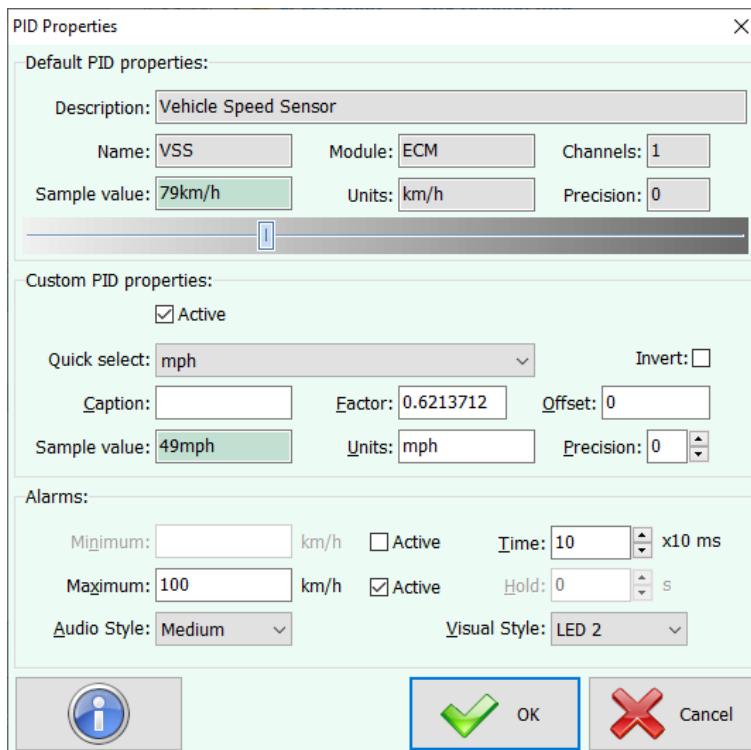
Known Issue:

FlashScan V2 and AutoCal V2 BBL use the *.efi logging file format. If you are logging PIDs from an ECM and TCM simultaneously and you have selected a PID from the transmission controller (TCM) that has an identically named PID in the engine controller (ECM), then when the log file is loaded back into the V8 software for viewing, that TCM PID will be displayed as if it originated from the ECM.

This restriction does not apply when logging in *.pld file format as used during V8 pass-thru logging or BBL with FlashScan/AutoCal V3.

Customizing PIDs

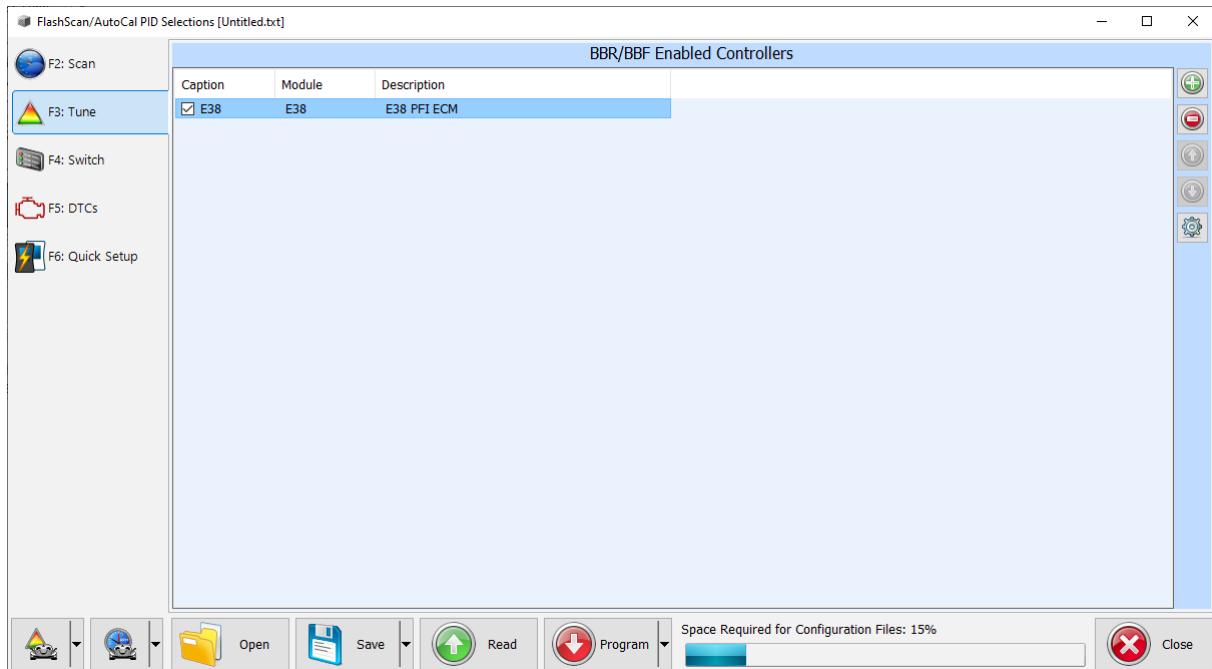
PIDs may be customized to display different units on FlashScan’s or AutoCal’s display and/or to activate alarms on FlashScan based on limits that you set. Alarms are not supported on AutoCal V2.



PID Properties showing custom units (mph) and alarm for vehicle speed PID

The “Hold” time option is not available yet. When implemented, that option will cause the FlashScan or AutoCal display to display the value that triggered the alarm for a pre-determined number of seconds, while continuing to log data in the background.

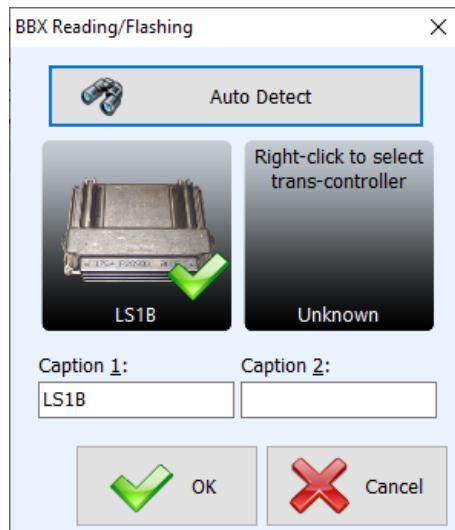
Standalone Reading and Flashing (BBR/BBF)



[F5: BBX] option showing BBX Read/Flash Controller selections

BBR/BBF Enabled Controllers

To add a new controller, click on the button or right-click and select “Add”, or press the hotkey Shift+Ctrl+Ins.



Tune Controller Properties, LS1B controller selected

Caption 1 and Caption 2 contain the text that will be shown on FlashScan’s or AutoCal’s data logging selection menu. On FlashScan the two captions are displayed on a single line with a space separating them, on AutoCal the two captions are displayed on two separate lines.

If you are currently connected to your vehicle, you may press [Auto Detect] to attempt to identify the controllers in your vehicle, otherwise right-click on the shaded squares to select the appropriate engine/transmission controller.

To remove a controller from the list, click the  button or right-click and select "Delete", or press the hotkey Shift+Ctrl+Del.



Deleting will delete all highlighted controllers.

To retain the selected controllers and their selected captions while preventing the controllers from being visible in the FlashScan or AutoCal menus, uncheck the checkbox next to the controllers.

To move the highlighted controllers up or down in the list click on the  and  buttons respectively or press the hotkeys Shift+Ctrl+UpArrow or Shift+Ctrl+DownArrow respectively.

To modify an existing controller selection, click on the  button or right-click and select "Properties" or press the hotkey Shift+Alt+Enter.

Switchable Tune Names

DSP5 (Duramax 5 option switch), DSP4 (E98 4 option switch) and CSP5 (Cummins 5 option switch) tunes can be switched on the fly from a FlashScan or AutoCal device. Enter the names of the switchable tunes that you want to appear on FlashScan/AutoCal switchable tunes menu.

DTC descriptions

FlashScan is capable of reading trouble codes. Trouble codes are displayed as codes with an option to display a description of the trouble code. This section allows you to select which trouble code description file(s) you want copied to your FlashScan device. The description files are relatively large and will take up space on FlashScan that could otherwise be used for configuring more controllers. If you find that all the controllers you need configured will not fit on FlashScan, you can uncheck one or more of these description files to prevent them from being copied to FlashScan.



AutoCal V2 cannot display DTC descriptions.



F6: Devices

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Open

Open (Ctrl+O) will open a device settings file.

Save

Save (Ctrl+S) will save the device settings file with its current name.

Save As (Alt+S) will save the device settings file with a new name.

Read

Read (Ctrl+R) reads the current device settings from the attached device.

Program

Program (Ctrl+P) Programs the attached device with the current device settings.

Close

Close (Ctrl+F4) closes the Window. If any changes have been made and not yet saved you will be asked to save the changes.

PC-Based Configuration

Device settings can be managed via [F6: Devices] tab page. For ease of use for tuners who manage remote customers, device settings can also be managed via the Quick Setup.

Both menu options perform the same functions, however the Quick Setup option allows for device settings, along with scan and tune configurations, and tune files to be collated as a *.bbx file and emailed for remote installation into FlashScan/AutoCal. The [F6: Devices] option only manages device settings, other BBX settings require independent configuration.

[F2: General]

Target Device Allows the configuration to be programmed into FlashScan and AutoCal or restricts the configuration to the selected device.

File System Configures FlashScan V2 to use either internal memory or SD card.

File Number Set the sequence number for the next FlashScan/AutoCal generated file name.

Date format Configures date to US Style or Australian Style.

Timing Set time frame to enable Low Power mode when the device remains connected but unused for a set period of time, and set Splash Screen display times.

LED Mode Set LED's to illuminate to indicate operational status, indicate PID range alarms, or none.

[F3: Display]

Units Sets Metric or Custom display units.

Inverse Display Choose screen color combination of White on Blue or Blue on White for FlashScan V2.

Data Logging Sets number of PID's per page display for FlashScan V2.

Contrast Adjusts the contrast for FlashScan V2 with a blue case.

[F4: Keypad]

Keypad Auto Repeat Sets the time delay before a key begins to auto-repeat, and the time delay between repeated key strokes in milliseconds.

Display Timeouts Sets the time that alerts and errors messages are displayed in milliseconds for FlashScan and AutoCal. (0 = User must respond to message).

[F5: Options]

AutoCal V2 Menu Set display as Simple Menu or Advanced Menu, set Splash Screen text for AutoCal V2 devices.

Custom Menu Install, Enable or Disable Custom Menu selections for FlashScan V3 and AutoCal V3 devices. Custom Menu instructions are located in the C:\Documents\EFILive\V8\User Defined Menus/SampleCustomMenu.txt file.

FlashScan Check SD card space and enable data protection for SD card. Use “S1” (12V switch) to remotely start/stop data logging, and set audible alert when starting and stopping data logging using the “S1” switch.

Common Settings Use EFILive's FAST CAN Mode to set flashing speed. This option can make flashing GM controllers twice as fast. For Dodge Cummins, 3 flash speed options are available.

[F6: Logging]

PID Selection Allows users to re-select the most recently used PID list, and/or automatically select all external analog/digital PIDs.

External Analog/Digital Inputs Configure the Filter level.

Data Set Logging speed rates for FlashScan V2 and AutoCal V2 only.

Notes Automatically add “Note 30” to log file when log file is paused/resumed.

[F7: BBX]

Black Box Logging Allows the choice to validate or skip validation prior to starting BBL for FlashScan V2 and AutoCal V2.

Black Box Reading and Flashing Provides options to enable/disable

Perform extended verification of uploaded file (can take up to 60 seconds). Checks that the uploaded file is complete and encoded correctly.

Display OBDII retry statistics after Read/Flash is complete. Displays the type and number of retries requested during a Read/Flash session.

Display folders when selecting tune files for flashing. Tunes placed in custom folders without this option selected will not display on FlashScan or AutoCal. For tuners who place tune files in custom folders, those files will only be accessible on AutoCal when this option is selected and AutoCal is using the Advanced menu. Tunes placed in custom folders will not display in the Simple menu.

Automatically save trace files if read or flash fails. Trace files are an essential tool in assisting remote customers who have read/flash failures. The trace file is automatically generated and saved onto AutoCal provided enough space exists on the devices [Data] file system. EFILive recommends this option be enabled on all devices used for remote tuning.

Black Box Options Display Switchable tune selections on AutoCal V2 simple menu. For tuners who do not provide switchable tune selections, this option can be disabled from the Simple menu.

[F8: Serial I/O]

Serial Com Port Setup Set the device connected to FlashScan's RS232 serial port. Supported devices are Wide Band and External Data Logger.

Wide Band Display Layout Set the Wide Band controller configuration and the Wide Band data display format for FlashScan V2.

Wide Band Type Select the type of Wide Band device connected to FlashScan's serial port, and configure the ID's for multiple ECM AFR wide band controllers.

FlashScan V3 and AutoCal V3 Configuration

There are various menus that allow configuration changes to be made on FlashScan/AutoCal V3 devices.

[Options] -> [F1 Setup] -> [F1 Configuration]

F1 Edit Settings

Option	Description
Display Theme	Set the color theme for the display
Font Size	Set the font size for the display. Font size does not control fonts in balloon boxes.
Locale	Locale USA or Locale Non-USA.
Time Format	Set time to 24 hour or am/pm.
Display Units	Metric or Custom.
Key Repeat Delay	Not yet available.
Key Repeat Speed	Not yet available.
Splash Time	Set value in milliseconds.
Low Power Time	Not yet available.
Next File Number	Set the sequence number for the next automatically generated file name.
Add Note on Pause	Automatically add a note to log file when log file is paused/resumed using [OK]. Set to Yes or No.
CAN Baudrate	Set CAN speed.
VPW Speed	Set VPW speed.
LED Mode	Set to Status or Off.
COM Port Type	Set the device connected to serial port. Supported devices are Wide Band O2, External, or None.
Set WO2 Type	Select the type of Wide Band device connected to serial port*.
Set WO2-1 ID	Configure the ID's for multiple ECM AFR wide band controllers.
Set WO2-2 ID	Configure the ID's for multiple ECM AFR wide band controllers.
Set Stoich	Set the stoichiometric value for the fuel that is being used. For Innovate's wide band controllers, the stoich value can't be set using this option, instead it must be set using Innovate's Logworks software.

Log Serial PIDs	Log external digital (i.e. Wide Band Serial) PIDs.
Load MRU PIDs	Not yet available.
12V Switch Log	Connect 12V to start logging. Disconnect 12V to stop logging. Set to Yes or No.
12V Switch Beep	Only active when 12V Switch Log is active. Two short beeps indicate start, one long beep indicates stop. Set to Yes or No.
Verify BBR	Perform extended verification of uploaded file. Set to Yes or No.
Check BBX Space	Check available BBX space before copying files. Set to Yes or No.
Save Trace Files	Automatically save trace file for read/flash errors. Set to Yes or No.
GM Fast	Use EFILive's Fast CAN mode which can make CAN flashing twice as fast. Set to Yes or No.
Cummins BBF	Set Cummins flash speed as Unlimited, Fast, or Standard.

Additional FlashScan Device Settings are available in the follow menus

F3 Date/Time

Adjust date and time settings.

F4 Update Boot Block

Update the boot block manually.

[Options] -> [F2 File System]

F1 Explore

Allows users to browse files and view free and used space available on FlashScan/AutoCal V3.

F2 Manage

Delete Files, Format Data File System and Format Entire SD card from these options.

F3 USB Thumb Drive

Turn FlashScan/AutoCal into a USB thumb drive so you can use Windows Explorer to manage the files on the device's SD Card.

FlashScan V2 Configuration

There are various menus that allow configuration changes to be made on FlashScan V2.

[F4 Options] -> [F1 Setup]

F1 Edit Settings

Option	Description
File sys	Configures FlashScan V2 to use either internal memory or SD card.
File #	Set the sequence number for the next AutoCal generated file name.
Locale	Locale USA or Locale Non-USA.
Units	Metric or Custom.
MRU PIDs	Load <u>Most Recently Used</u> PID's. Set to Yes or No.
ScanRate	Manage Logging Speed. Set to Fast, Medium or Slow.
CAN Baud	V2 light-duty (blue/black) units have a fixed baud rate and cannot be changed. V2 heavy duty (red) units can be changed between default, 250K and 500K.
Sw Log	Use "S1" (12V switch) to remotely start/stop data logging.
Sw Beep	Set audible alert when starting and stopping data logging using the "S1" switch.
ADFilter	Average this many samples of external analog PID data. Set value between 1-4.
A/D PIDs	Automatically select all external analog PIDs. Set to Yes or No.
Ser PIDs	Automatically select all external digital (serial) PIDs. Set to Yes or No.
PIDs/LCD	Set the number of PIDs to display on FlashScan V2 LCD screen.
Note 30	Automatically add "Note 30" to log file when log file is paused/resumed using [OK]. Set to Yes or No.
SD CRC	Enable CRC data protection for SD card.

GM Fast	Use EFILive's FAST CAN Mode for flashing. This option can make flash speeds twice as fast on CAN controllers.
CM BBF	Set Cummins flash speed as Unlimited, Fast, or Standard.
Skip Vfy	Skip PID validation prior to starting BBL. Set to Yes or No.
Vfy BBR	Perform extended verification of uploaded file. Set to Yes or No.
BBXStats	Display OBDII retry statistics after Read/Flash is complete. Set to Yes or No.
BBX Dir	Display folders when selecting tune files for flashing. Set to Yes or No.
Switches	Activates switchable tuning on simple menu. Set to Yes or No.
Trace	Automatically save trace file for read/flash errors. Set to Yes or No.
BBXSpace	Verify free space before logging data or reading a controller.
LED Mode	Set LED's to illuminate to indicate operational status, indicate PID range alarms, or none.
COM Port	Set the device connected to serial port. Supported devices are Wide Band O2, External, or Unknown.
WO2 Type	Select the type of Wide Band device connected to serial port*.
WO2 Fmt	Set the Wide Band controller configuration. Bank 1, Bank 2, Both.
WO2 Data	Set the Wide Band data display format.
WO2-1 ID	Configure the ID's for multiple ECM AFR wide band controllers.
WO2-2 ID	Configure the ID's for multiple ECM AFR wide band controllers.
Stoich	Set the stoichiometric value for the fuel that is being used.

	For Innovate's wide band controllers, the stoich value can't be set using this options, instead it must be set using Innovate's Logworks software.
Lo Power	Set time frame to enable Low Power mode to conserve power when the device remains connected but unused for a set period of time.
Splash	Set splash screen display times.
Alert	Set Display Timeout Alerts in milliseconds. (0 = User must respond to message).
Error	Set Display Timeout Errors in milliseconds. (0 = User must respond to message).
AR Delay	Set the time delay before a key begins to <u>A</u> uto- <u>R</u> epeat in milliseconds.
AR Speed	Sets the time delay between repeated key strokes in milliseconds.
Inverse	Choose screen color combination of White on Blue or Blue on White.
Contrast	Adjusts the contrast for FlashScan V2 with a blue case.

Additional FlashScan V2 Device Settings are available in the follow menus

F2 Set Date/Time

Adjust date and time settings.

F3 Change PIN

Set passcode to prevent unauthorized use of FlashScan V2 when first powered on. If there is no PIN set press [Enter] through the Enter Current PIN and press [Enter] message.

[F4 Options] -> [F2 File System]

F1 Delete Files

Allows users to delete tune and scan files stored on FlashScan V2.

F2 Free Space

Displays the amount of used, free and bad space available on FlashScan V2.

F3 Format File Sys

Formats the data file system, deleting all scan and tune files stored on FlashScan V2.

F4 File Sys Info

Provides tools to view information about and explore the contents of the FlashScan V2 file system.

AutoCal V2 Configuration

To edit the Device Settings directly on the AutoCal V2 Hold Next key to activate advanced menu while connecting AutoCal to your vehicle.

Edit Settings

Using the [Prev] and [Next] buttons, navigate to the [AutoCal Options] -> [Edit Settings] menu to manage the following options:

Option	Description
Set Pro Menu	Yes for Advanced Menu, No for Simple Menu.
Set File #	Set the sequence number for the next AutoCal generated file name.
Set Locale	Locale USA or Locale Non-USA.
Set Units	Metric or Custom.
Set MRU PIDs	Load <u>Most Recently Used</u> PID's. Set to Yes or No.
Set Scan Rate	Manage Logging Speed. Set to Fast, Medium or Slow.
Set CAN Baud	V2 light-duty (blue/black) units have a fixed baud rate and cannot be changed. V2 heavy duty (red) units can be changed between default, 250K and 500K.
Set Note 30	Automatically add "Note 30" to log file when log file is paused/resumed using [OK]. Set to Yes or No.
Set GM Fast	Use EFILive's FAST CAN Mode for flashing. This option can make flash speeds twice as fast on CAN controllers.
Set CM BBF	Set Cummins flash speed as Unlimited, Fast, or Standard.
Set Skip Vfy	Skip PID validation prior to starting BBL. Set to Yes or No.
Set Vfy BBR	Perform extended verification of uploaded file. Set to Yes or No.
Set BBX Stats	Display OBDII retry statistics after Read/Flash is complete. Set to Yes or No.
Set BBX Dir	Display folders when selecting tune files for flashing. Set to Yes or No.
Set Switches	Activates switchable tuning on simple menu. Set to Yes or No.

Set Trace	Automatically save trace file for read/flash errors. Set to Yes or No.
Set COM Port	Set the device connected to serial port. Supported devices are Wide Band O2, External, or Unknown.
Set WO2 Type	Select the type of Wide Band device connected to serial port*.
Set WO2 Fmt	Set the Wide Band controller configuration. Bank 1, Bank 2, Both.
Set WO2 Data	Set the Wide Band data display format.
Set WO2-1 ID	Configure the ID's for multiple ECM AFR wide band controllers.
Set WO2-2 ID	Configure the ID's for multiple ECM AFR wide band controllers.
Set Stoich	Set the stoichiometric value for the fuel that is being used. For Innovate's wide band controllers, the stoich value can't be set using this options, instead it must be set using Innovate's Logworks software.
Set Lo Power	Set time frame to enable Low Power mode to conserve power when the device remains connected but unused for a set period of time.
Set Splash	Set splash screen display times.
Set Alert	Set Display Timeout Alerts in milliseconds. (0 = User must respond to message).
Set Error	Set Display Timeout Errors in milliseconds. (0 = User must respond to message).
Set AR Delay	Set the time delay before a key begins to <u>Auto-Repeat</u> in milliseconds.
Set AR Speed	Sets the time delay between repeated key strokes in milliseconds.

Use the [Prev] button to return to the top of the list and select [Exit] to return to [AutoCal Options Menu].



AutoCal V2 Device Settings contain serial wide band configuration options. AutoCal V2 does not ship with a serial port. A serial port can be fitted to the circuit board, but doing so will void Warranty.

Additional AutoCal V2 Device Settings and information displays are available in the [AutoCal Options] menu:

Restore Settings

Returns any modification made in the Edit Settings menu options back to factory defaults.

Set Date and Time

Adjust date and time settings.

Browse Files

View tune and log files stored on the AutoCal.

Delete File

Allows users to delete tune and scan files stored on the AutoCal V2.

Free Space

Displays used and available space on the AutoCal V2.

Format File Sys

Formats the data file system, deleting all scan and tune files stored on the AutoCal V2.



F7: Licenses

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Backup

Backup will create a license backup file and save it to the My Documents\EFILive\V8\Backup folder, named XXXXXXXXXXXXXXXX.ibu.

The XXXXXXXXXXXXXXX portion of the backup filename will be replaced with the Serial Number of your FlashScan or AutoCal device.

Refresh

Refresh reloads license details from the attached device.

Copy

Copy will copy all details displayed to the clipboard.

Close

Close (Ctrl+F4) closes the Window.

Device Summary

A summary for the connected device is displayed for FlashScan/AutoCal on the [F2: Hardware] tab. The device summary details:

1. Serial Number, License Number and Protected Number details.
2. Model, Boot block and Firmware version details.
3. Installed, Used and Available VIN Licenses.
4. Flash Counters detailing the number of Cal Flashes and Full Flashes.

Hardware Matrix

Up to three serial number fields are displayed to identify the functionality of the connected device.

Serial number displays the unique serial number of the connected device.

License number links multiple FlashScan and/or AutoCal devices under one license. This can be the same as the serial number for the attached device or the serial number of the Master FlashScan.

Protected number is used for linking AutoCal and “Save For AutoCal” operations. This can be the same as the serial number of the attached device or the serial number of the Master FlashScan.

The combination of each serial number field determines the hardware capability for the connected device. The following table displays the Hardware Matrix.

Hardware	Serial #	License #	Protected #	Hardware Capability
Master FlashScan	Connected Device	Connected Device	Connected Device	Has identical license and protected numbers to its serial number that are shared with zero, one or more Proxy / Protected FlashScans.
Proxy FlashScan	Connected Device	Master FlashScan	Master FlashScan	Has identical license and protected numbers that are shared with its Master FlashScan.
Protected FlashScan	Connected Device	Connected Device	Master FlashScan	Has identical license and serial numbers that are not shared with any other device. Has a protected number that is shared with its Master's (and its Master's Proxys') license/protected number.
Linked AutoCal	Connected Device	Master FlashScan	n/a	Serial and license do not match. License is set to the Master FlashScan.
Unlinked AutoCal	Connected Device	Connected Device	n/a	Has identical license and serial numbers. To be functional, the AutoCal must be linked.

Tuning Licenses

Each FlashScan device can be configured with a combination of different licenses:

1. Scanning and Logging which means the device operation is limited to scan tool duties and reading any EFILive supported controllers. It cannot be used to flash (i.e. re-program) any controllers.
2. GM Tuning which means the device can flash any EFILive supported GM controller.
3. Dodge Cummins Tuning which means the device can flash any EFILive supported Dodge Cummins controller.
4. Cummins HD Tuning which means the device can flash any EFILive supported Cummins HD controller.
5. Pro Tuning which activates advanced tuning options.

The following table displays the Tuning Option matrix.

Tuning Option	FlashScan V3	FlashScan V2	FlashScan HD	AutoCal V3	AutoCal V2	AutoCal HD
Scanning and Logging	✓	✓	✓	✓	✓	✓
GM Tuning	✓	✓	✗	✓	✓	✗
Cummins Tuning	✓	✓	✗	✓	✓	✗
Cummins HD Tuning	✓	✗	✓	✓	✗	✓
Pro Tuning	✓	✓	✓	✗	✗	✗

You can purchase Tuning Licenses from EFILive's web site, just click the [Purchase Activation Code\(s\)](#) link in the software. You must provide your hardware serial number to purchase tuning options.

Automated processing of your Tuning Option Activation code and included VIN licenses occur within approximately 10 minutes of order placement. Validation of your serial ensures correct order placement. The activation code must be entered into the correct field.

VIN Licenses

VIN Licenses for the attached device are displayed on the [F3: VINs] tab page. Each VIN license can be used to flash one engine controller. Supported transmission controllers do not require a license.

Lic # shows the license number for the connected hardware device.

ECM (Only applicable for FlashScan/AutoCal V3 devices) shows the controller type to which the license has been.

Engine Serial shows the last 9 letters/digits of the engine controller serial number to which the license has been allocated.

Engine VIN (Only applicable for FlashScan/AutoCal V3 devices) shows the VIN of the engine controller to which the license has been allocated.

You can purchase additional VIN licenses from EFILive's web site, just click the [Purchase Activation Code\(s\)](#) link in the software. To order, you must provide;

1. Hardware serial number. Click the [Copy] button on the [F2: Hardware] tab page to copy the serial number to the Windows Clipboard.
2. Auth code. Click the [Copy] button on the [F3: VINs] tab page to copy the Auth code to the Windows Clipboard.

Automated license processing occurs within approximately 10 minutes. Validation of your serial and auth code ensures correct order placement.

The activation code must be entered into the Activation Code field and the License Number must be set to the number of licenses the device will contain after the new VIN license are added. For example if the device currently contained 10 VIN licenses and you purchase 3 more, then select 13 as the License Number.

If you do not receive an email response from the automated VIN license web page, please log into the EFILive store and view the notes attached to your order. Refer to the [Order Status, Order History & Historical Activation Codes](#) for assistance in locating order history.

Stream Licenses

Stream licenses are available on FlashScan V2 for some controller types. Stream licenses allow for unlimited tuning of various controller types.

Stream Licenses for the attached device are displayed on the [F4: Streams] tab page. Each Stream license can be used to flash unlimited numbers of controllers of that type.

Code shows the stream code as shown on the EFILive web store and the status of the stream license. A grey cross indicates that the steam is not active on the device. A green tick indicates that the stream is active on the device.

Description is a description of the stream.

Installed shows stream licenses that have been activated for the connected device.

Available for Purchase shows stream licenses that can be purchased.

You can purchase additional Stream licenses from EFILive's web site, just click the [Purchase Activation Code\(s\)](#) link in the software. You must provide your hardware serial number to purchase Stream licenses.

Stream licenses are delivered via email during regular New Zealand business hours. The activation code must be entered into the Activation Code field and the correct Stream must be selected from the drop down list box.

If you wish to claim your VIN license rebates when purchasing Streams, please contact sales@efilive.com prior to placing an order.

Convert

The conversion option allows end users to enter a code generated by the tuner remotely to perform the following actions:

1. Link an AutoCal device to a FlashScan device.
2. Unlink an AutoCal device from a FlashScan device.
3. Change the maximum number of VIN slots available for a linked AutoCal device.

To perform any of those actions, the tuner who owns/controls the FlashScan device to which your AutoCal device is linked (or is to be linked) must provide you with the appropriate Conversion Code.

Copy/paste the Conversion Code and click the [Convert] button.



F8: Tools

Buttons

Tune

Next Tune Window (Alt+3) will make the Next Tune Window the focus window.

New Tune Window (Ctrl+Alt+3) will open a New Tune Window.

Tune Window will list the open Tune Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Scan

Next Scan Window (Alt+2) will make the Next Scan Window the focus window.

New Scan Window (Ctrl+Alt+2) will open a New Scan Window.

Scan Window will list the open Scan Windows.

OBD Window (Alt+4) will open the OBD Window.

BBX Window (Alt+5) will open the BBX Window.

Devices Window (Alt+6) will open the Devices Window.

Licenses Window (Alt+7) will open the Licenses Window.

Tools Window (Alt+8) will open the Tools Window.

Close

Close (Ctrl+F4) closes the Window.

Search

Search

Historically to find a particular scan or tune file, the user would have to open a range of files to view controller information. This feature allows users to search EFILive files for specific controller information without the need to open each file.

Users can define the following:

Search Folder Set the folders on your PC to be included in the search.

Controller Info Set one or more of the following search criteria:

1. VIN

2. Controller Serial
3. Remote AutoCal License
4. Operating System (or Any Segment Part #)
5. Checksum (must select Search Entire File for this field to be active)
6. User Comments
7. Controller ID

File Types Set one or more file types to be searched.

1. V8 Tune Files
2. V8 Quick Setup Files
3. V7 Tune Files
4. Binary Files
5. Scan Files

Search Options Set the search type to search Meta Data Only or Search Entire File.

Search Now commences the search. Once Search Now is selected, the search can be stopped by pressing **Stop**. Stop will retain all EFILive files returned in the search up until that point.

Clear removes controller info selections. Search Folder does not clear/revert to previous selection.

Data returned from a search can be used in a variety of ways;

1. Left click on the chosen column heading to sort by alpha/numeric values contained in that column.
2. Double click on a file will open that file within V8 Scan and Tune software.
3. Right click over a file will give options to:
 1. Open File.
 2. Open File Location.
4. Single click on a file will highlight that file, activating the arrow keys to move up/down the list, and displays the file location path in the display footer.

Browse

The browse function allows users to navigate through folders on the PC and display specific controller information for EFILive files without the need to open each file. Short cuts to common EFILive file storage locations, and windows explorer style navigation system are provided.

Users can specify to Show Part Numbers from Meta Data or Extract Part Numbers from File.

Extracting Part Numbers from File option can be slow, and displays segment details (Part Numbers) contained in the tune file that may not be contained in Meta Data.

Browse files displayed can be used in a variety of ways;

1. Right click on the column heading provides column display selection options.
2. Left click on the chosen column heading to sort by alpha/numeric values in that column.
3. Double click on a file will open that file in the application the file is associated with.
4. Right click over a file will display standard windows explorer right click options.

5. Single click on a file will highlight that file, activating the arrow keys to move up/down the list.

Importing Data

This section is not written yet.

Exporting Data

This option is not yet available.

Controller Lock/Key Management

Whenever you choose to lock a controller, a copy of the seed and key that you used to lock the controller is saved in a file called PCMLocks.ini (V7), or in FlashScan's or AutoCal's onboard flash memory (V8). Locks that are created automatically when flashing Auto-Lock files using the V8 software are not available via this utility.

The key recovery utility will search for a key that matches either the controller's serial number or controller's seed value that you enter. It will search in the following locations:

1. In the file called PCMLocks.ini on your computer, as saved by the V7 software.
2. In the flash memory of the connected FlashScan or AutoCal device, as saved by the V8 software.

To begin searching, enter the controller's Serial Number (12 letters/digits) or the controller's Seed value (a decimal number between 0 and 65,535 or a hexadecimal number between \$0000 and \$FFFF) then click the [Find Key] button.

Note: Multiple matching keys may be displayed. You should try all matching keys when attempting to unlock a controller. To lock or unlock a controller, use the [F3: Tune]->[F2: Read]->[Lock/Unlock] option.

Bulk Files

Update Files

From time to time EFILive's proprietary encryption routines are updated. To check for updated encryption and/or apply encryption changes to tune files, users can check and/or automatically update folders of *.ctz and *.coz tune files without the need to open and re-save individual tunes. Tune files can be checked/updated via a batch process.



EFILive recommends user's backup all tune files to a second location before Updating Tune Files. The Update Tune Files option edits existing tune files. This option does not duplicate or backup tune files.

Folder navigation is used to locate files to be checked/updated.

Include subfolders option allows subfolders of the chosen folder to be checked/updated.

Test Only option will check each tune file located in the chosen folder(s) and display files to be updated. This option does not update tune files, but will display a list of tune files that needs updating.

Update button will process files in the selected folder(s) that need updating.

Where Test only is selected, a TEST MODE ONLY list will display files that require processing.

Where Test only is not selected, Update Now will update outdated *.coz and *.tune files to the latest version.

An error list is also provided should files fail to be updated.

Convert Files

EFILive can generate *.coz copies of *.ctz files via a batch process without the need to open and select save-as to convert individual tunes. The original *.ctz tune file remains untouched.

Folder navigation is used to locate files to be copied.

Include subfolders option allows subfolders of the chosen folder to be copied.

Test Only option will check each tune file located in the chosen folder(s) and display files that can be converted. This option does not convert tune files, but will display a list of tune files that can be converted.

Overwrite existing *.coz files will overwrite and replace the contents of an existing *.coz file if a *.ctz file with the same name exists during the copy process.

Convert button will process files in the selected folder(s) that can be copied from *.ctz to *.coz.

Where Test only is selected, a TEST MODE ONLY list will display files that can be converted.

Where Test only is not selected, Convert will convert *.ctz to *.coz and *.tune files, leaving the original *.ctz tune file untouched.

An error list is also provided should files fail to be updated. (i.e. some controllers, including Cummins do not support *.coz files)

Collate Files

EFILive can collate scan and tune files based on file templates. Users can copy or move files based on various data such as VIN, OS and ECM type. A full list of available criteria is available by accessing the destination folder/file name option and right clicking in the Folder or File template field.

Convert User Calibration Files

EFILive can copy and convert V7 *.cax files stored in the C:\Program Files (x86)\EFILive\V7.5\Calibrations directory to V8 *.cax8 file format and place them in the C:\Users\Documents\EFILive\V8\User Defined Cax8 directory.

Specify a Provider Name which will be displayed on the Provider tab on each calibration defined within the *.cax8 file.

Use the Unique ID to identify your custom calibration name in the navigation tree and parameter heading to prevent calibration name conflicts between multiple third parties.

It is highly recommended to backup any existing *.cax8 files before attempting to convert. Existing *.cax8 files may be overwritten without asking.

Convert Script Files

EFILive can copy and convert V7 metric script files stored in the C:\Users\Documents\EFILive\V7.5\User Configuration\Scripts directory to V8 LUA script files in the C:\Users\Documents\EFILive\V8\Scripts directory.

It is highly recommended to backup any existing V8 LUA script files before attempting to convert. Existing *.lua files may be overwritten without asking.



Script conversion assumes that all numeric values in the V7 script are in metric units. If any units are non-metric they will be incorrectly processed as if they were metric by the V8 software when the script is run.

If non-metric units are used in your V7 script files, then after you have converted the V7 script file to a V8 script file you must edit the script file and change all non-metric values in the V8 script file to their metric equivalent, including data tables.

The EFILive V8 conversion tab page may be used to help with the conversion process.

For example to convert single values like 12.34psi to kPa, you can use the top part of the [Conversion] tab page, like this:

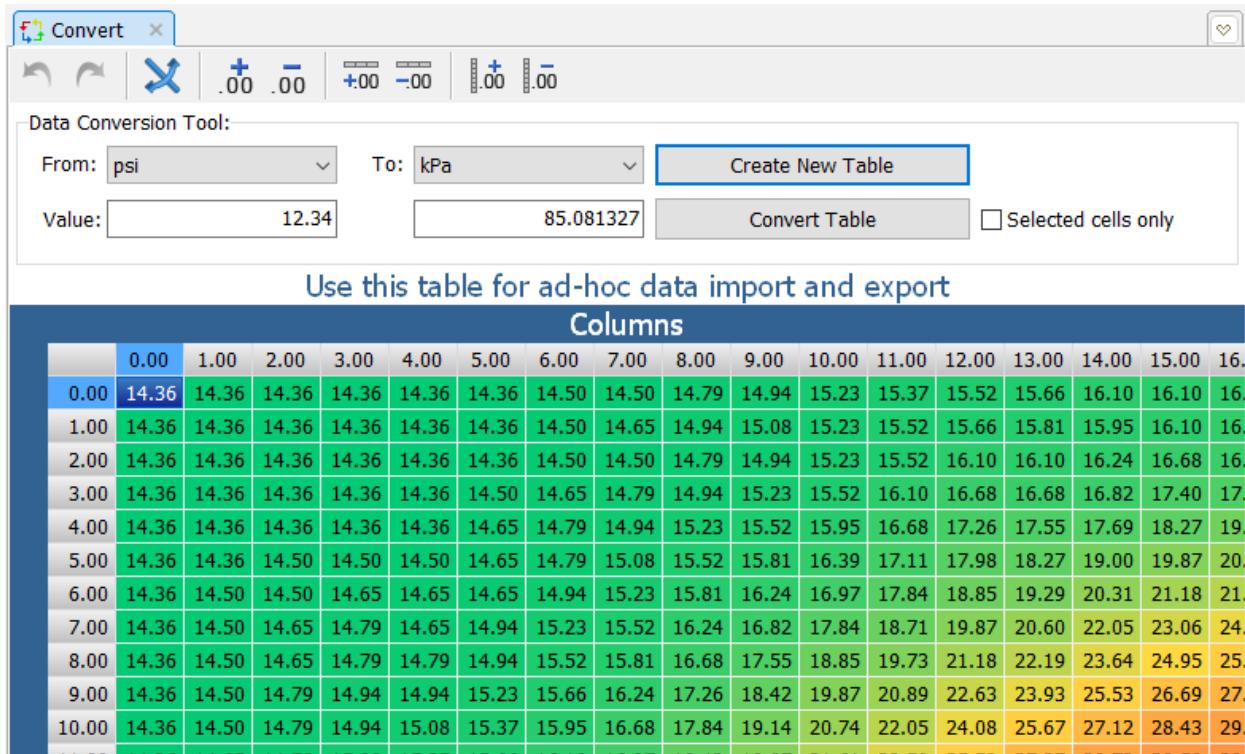
Columns										
	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00
10.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
20.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
30.00	21.00	22.00	23.00	24.00	25.00	26.00	27.00	28.00	29.00	30.00
40.00	31.00	32.00	33.00	34.00	35.00	36.00	37.00	38.00	39.00	40.00
50.00	41.00	42.00	43.00	44.00	45.00	46.00	47.00	48.00	49.00	50.00
60.00	51.00	52.00	53.00	54.00	55.00	56.00	57.00	58.00	59.00	60.00
70.00	61.00	62.00	63.00	64.00	65.00	66.00	67.00	68.00	69.00	70.00
80.00	71.00	72.00	73.00	74.00	75.00	76.00	77.00	78.00	79.00	80.00
90.00	81.00	82.00	83.00	84.00	85.00	86.00	87.00	88.00	89.00	90.00
100.00	91.00	92.00	93.00	94.00	95.00	96.00	97.00	98.00	99.00	100.00

To convert an entire data table in a V8 script from psi to kPa:

1. Copy the entire table from the script to the clipboard.

Select the entire data table from the V8 script file.
This table has values specified in psi.

2. Click the [Create New Table].



3. Select From: psi and To: kPa, then click the [Convert Table] to convert the entire table from psi to kPa.

The screenshot shows the EFILive Data Conversion Tool interface. At the top, there are conversion buttons for 'Convert' (with icons for file, clipboard, and cross), and numerical input fields for 'From' (.00) and 'To' (.00). Below this is a 'Data Conversion Tool' section with dropdowns for 'From' (psi) and 'To' (kPa), a 'Create New Table' button, and a 'Value' input field containing '12.34'. To the right is a 'Convert Table' button and a checkbox for 'Selected cells only'. A large table below is titled 'Use this table for ad-hoc data import and export' and has a header row labeled 'Columns'. The table body contains 10 rows of data, each with 14 columns labeled from 0.00 to 13.00.

	0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00
0.00	99.00	99.00	99.00	99.00	99.00	99.00	100.00	100.00	102.00	103.00	105.00	106.00	107.00	108.00
1.00	99.00	99.00	99.00	99.00	99.00	99.00	100.00	101.00	103.00	104.00	105.00	107.00	108.00	109.00
2.00	99.00	99.00	99.00	99.00	99.00	99.00	100.00	100.00	102.00	103.00	105.00	107.00	111.00	111.00
3.00	99.00	99.00	99.00	99.00	99.00	100.00	101.00	102.00	103.00	105.00	107.00	111.00	115.00	115.00
4.00	99.00	99.00	99.00	99.00	99.00	101.00	102.00	103.00	105.00	107.00	110.00	115.00	119.00	121.00
5.00	99.00	99.00	100.00	100.00	100.00	101.00	102.00	104.00	107.00	109.00	113.00	118.00	124.00	126.00
6.00	99.00	100.00	100.00	101.00	101.00	101.00	103.00	105.00	109.00	112.00	117.00	123.00	130.00	133.00
7.00	99.00	100.00	101.00	102.00	101.00	103.00	105.00	107.00	112.00	116.00	123.00	129.00	137.00	142.00
8.00	99.00	100.00	101.00	102.00	102.00	103.00	107.00	109.00	115.00	121.00	130.00	136.00	146.00	153.00
9.00	99.00	100.00	102.00	103.00	103.00	105.00	108.00	112.00	119.00	127.00	137.00	144.00	156.00	165.00
10.00	99.00	100.00	102.00	103.00	104.00	106.00	110.00	115.00	123.00	132.00	143.00	152.00	166.00	177.00

- Highlight the entire table (by clicking in the top left gray cell) and right-click and select "Copy as Lua Source".
- Paste it back into the script, overwriting the previous data. The table will be pasted with the generic name TableName, you must change TableName to the original table's name.
- Note: after pasting the new metric data table and renaming it to the correct name, remember to delete the original non-metric data table with that same name from the script table.

Bin Mapping

EFILive tune files are usually stored in encrypted *.ctz files. However, *.bin (binary format) and/or *.hex (Motorola hex record format) files may also be opened by the EFILive software.

The *.hex file format will always contain a 1-to-1 mapping of the controller's memory and the data in the *.hex file.

To save file space, the *.bin file format as implemented by EFILive, will not always contain a 1-to-1 mapping of the controller's memory and the data in the *.bin file – depending on the controller type.

When creating *.cax8 files for controllers with address mapping, ALWAYS use the controller's address as shown by this tool, not the *.bin file address (unless the addresses are the same).

Use this tool to display the address mapping for each controller type and to accurately convert between the *.bin file addresses and the controller's memory addresses.

Lookup Error Codes

A large range of EFILive error codes are documented to assist with troubleshooting. Enter the 4 digit error code displayed in V8 Scan and Tune software, or displayed on FlashScan/AutoCal LCD screen with or without the \$ prefix and

select enter. The error code description, the cause and possible actions will be displayed.

The EFILive Error Messages.PDF document can be displayed by selecting the message at the bottom of the screen, or by navigating to Start->All Programs->EFILive->V8->Documents->EFILive Error Codes.



Properties

General

Display

The main EFILive window displays the most recently used tuning files and the most recently used scan files. You can select which columns of data you would prefer to be visible by checking the appropriate recent start check boxes. The columns can also be selected by right clicking on the list of files in the main EFILive window and selecting “Select Columns”.

Many sub-windows display a set of tab options down the left hand side of the window and a set of buttons across the bottom of the window. Those controls take up some screen real-estate. To allow the window more screen real-estate, you may choose to make the tabs and buttons smaller. The tab and button sizes can also be controlled using the menu option View->Hide Tab Descriptions and View->Small Buttons.

Controllers displayed in EFILive software are grouped by controller type and by default are displayed in an EFILive defined sort order. You can choose to display controllers by each group in alphabetical order.

A range of useful software tips are displayed at software startup. These can be disabled or reactivated in the Display menu. Tip of the day can also be displayed using the menu option View->Tip of the Day, and disabled using the check box on the Tip of the Day screen.

Three color themes are available; Windows (Light), Slate (Medium) and Onyx (Dark). To apply theme changes, make a selection and restart the application.

Locale

Because the EFILive software is used in many countries around the world it must be able to handle data transfers using different numeric and date formats. The Quick Select options selects the chosen measurements default settings. The three options for formatting numbers and dates can also be manually selected:

1. **Display:** these settings control the format of numbers and dates that are displayed on this computer’s screen.
2. **Clipboard:** these settings control the format of numbers and dates that are copied to and pasted from the clipboard.
3. **Import/Export:** these settings control the format of numbers and dates that are exported from and imported to the software. If for example you are based in the US and you attempt to send an exported file to a colleague in Europe then you could select the Euro number and date formats to allow your exported data to be imported seamlessly by your European colleague.

Files/Folders

When saving tune files you can choose which file types you want to be displayed in the save file dialog box.

Auto-Generate and Auto-Increment filenames will (by default) append a unique, incrementing number to the end of scan and tune file names each time you select “Save As”. Users can setup Auto-Generate and Auto-Increment when using both “Save” and “Save As” options, as well as increment *.coz files.

The Tune Templates... and Scan Templates... options allows you to specify the layout and content of the auto-generated filename and the size and position of the auto-incrementing number within the filename, see next section.

When saving tune files for use with a remote AutoCal device, you can choose which other security settings you want to be automatically applied to the saved file.



When saving files for use with AutoCal devices, the unique ID may not be visible on AutoCal's display because only the first 8 characters of the filename are shown.

Files/Folders – Tune Templates... and Scan Templates...

Templates can be created that determine the folder and file names which will be used when newly created scan and/or tune files are being saved. Templates contain tags which are identified by angle brackets such as: <**ctrl**> and <**type**>. Each tag in the template is replaced with its appropriate value when creating the folder and file names.

File/Folder template selections are accessible by **right mouse click** in the Folder Template and the File Template text boxes. Templates can be restored to default settings by selecting Restore [<->] option.

Tag	Replaced with
<mydoc>	C:\Users\username\Documents\ The <mydoc> tag should only be applied to the folder template.
<filename>	The file's original name. Can only be applied in the File Template.
<type>	Scan if saving a *.pld log file or Tune if saving a *.ctz tune file. The <type> tag may be applied to the folder and file templates.
<ctrl>	The controller name of the file being saved, such as E38, T43 or LS1B. The <ctrl> tag may be applied to the folder and file templates.
<os>	The operating system number identified in the file.
<sn>	The serial number of the controller identified in the file.

<vin>	The VIN of the vehicle identified in the file.
<cn>	Customer Name if defined in the Scan Tool -> Config -> Manage Customers and Vehicles register. If customer name is not defined, then <cn> will default to "Customer Name".
<reg>	Vehicle Registration if defined in the Scan Tool -> Config -> Manage Customers and Vehicles register. If vehicle registration is not defined, then <reg> will default to "ABC-123".
<name>	Vehicle Name if defined in the Scan Tool -> Config -> Manage Customers and Vehicles register. If vehicle name is not defined, then <name> will default to "Vehicle Name".
<date>	<p>The current date in the form CCYYMMDD. Nov 16, 2015 would be 20151116.</p> <p>The <date> tag should only be applied to the file template.</p>
<cc>	<p>The current century i.e. 19, 20, 21 etc.</p> <p>While it is technically true that the 20th century covers the years ranging from 1901 to 2000, for ease of use this tag always returns the first two digits of the current 4 digit year, regardless of the definition of a "century".</p> <p>The <cc> tag should only be applied to the file template.</p>
<yy>	<p>The current year in the range 00..99.</p> <p>The <yy> tag should only be applied to the file template.</p>
<mm>	<p>The current month in the range 01..12.</p> <p>The <mm> tag should only be applied to the file template.</p>
<dd>	<p>The current day in the range 01..31.</p> <p>The <dd> tag should only be applied to the file template.</p>
<jd>	<p>The current Julian day in the range 01..366 Nov 16, 2015 would be 319.</p> <p>The <jd> tag should only be applied to the file template.</p>
<time>	<p>The current time in the form HHNNSS. 6:15:30p.m. would be 181530.</p> <p>The <time> tag should only be applied to the file template.</p>
<hh>	<p>The current hour in the range 00..23.</p> <p>The <hh> tag should only be applied to the file template.</p>

<code><nn></code>	The current minute in the range 00..59. The <code><nn></code> tag should only be applied to the file template.
<code><ss></code>	The current second in the range 00..59. The <code><ss></code> tag should only be applied to the file template.

The `<vin>` and `<filename>` tags can be subdivided into sub-sections by adding start and length modifiers to the tag: `<tag:start:length>`. A negative start number will count backwards from the end of the text.

Examples:

1. `<vin:1:3>` will return the first 3 characters of the VIN.
2. `<vin:-6:6>` will return the last 6 characters of the VIN.
3. `<filename:5:4>` will return character 5..8 of the filename.

Auto-Generate and Auto-Increment file names can use a variety of sequence setups to best suit your needs.

1. **Digits** determines how many digits will be inserted into the file name to represent the sequence number. Set digits to 0 to use the smallest number of digits required to represent the sequence number. I.e. instead of `_0015`, `_15` would be used instead.
2. **Delimiter Character** determines how the software identifies the sequence number in the file name. I.e. whether the sequence number is surrounded by spaces or by underscores.
3. **Position In File Name** determines where the sequence number is placed in the filename.

Prefix means a 1 to 4 digit number will be prepended to the file name followed by the chosen delimiter character. Or if an existing 1 to 4 digit number already exists at the start of the file name then that number will be used as the sequence number.

“Prefix” Examples (delimiter is underscore)

1234_E38 Z06 16 Race Tune.ctz

55_LS1B.ctz

Suffix means a 1 to 4 digit number will be appended to the file name preceded by the chosen delimiter character. Or if an existing 1 to 4 digit number already exists at the end of the file name then that number will be used as the sequence number.

“Suffix” Examples (delimiter is underscore)

E38 Z06 16 Race Tune_1234.ctz

LS1B_55.ctz

First means the first 1 to 4 digit number that has the chosen delimiter characters immediately before and after, will be used as the sequence number.

“First” Examples (delimiter is space)

E38 12 Z06 16 Race Tune.ctz

Notice how the 12 (not the 16) is identified as the *first* sequence number.

LS1B 55 Track.ctz

Last means the last 1 to 4 digit number that has the chosen delimiter characters immediately before and after, will be used as the sequence number.

“Last” Examples (delimiter is space)

E38 12 Z06 16 Race Tune.ctz

Notice how the 16 (not the 12) is identified as the *last* sequence number.

LS1B 55 Track.ctz

4. Restore [**<-**] will restore Auto-Increment settings to defaults.

If the **Update sequence number dynamically** option is checked, then when the “Save File” dialog box is displayed, each time the user selects a new folder, that folder is scanned for matching filenames and the sequence number is updated to reflect the next available sequence in that folder.

If the **Include the letters A..Z in sequence numbers** option is checked, then the sequence numbers will use the digits 0..9 and the letters A..Z before wrapping around to 0 again.



Be aware that when using letters as part of the sequence number, the software can be easily confused by filenames such as **MY_TUNE.ctz**. In that case the **_TUNE** part of the filename is effectively the sequence number, the next few values in the sequence would be **_TUNF, _TUNG, _TUNH** etc.

If the **Auto-Generate and Auto-Increment filenames** option is active then...

When saving a file that has been created by EFILive, i.e. a tune file that has been read from a controller or a log file that has been recorded from a controller, the file being saved is considered a **new** file.

When a new file is being saved, the folder template is used to determine where it should be created and the file template is used to determine the filename. The sequence number will be incremented and inserted into the filename (if possible) to ensure that the filename is unique in the folder in which it is being saved.



The value of the sequence number is determined by scanning the entire folder for all conflicting filenames, finding the highest numbered conflicting filename, then adding one to that file's sequence number.

For example:

if a file being saved is E38.ctz and
its new sequence number filename is E38_nnnn.ctz and
if the target folder contained the file E38_1234.ctz then
the new filename would be E38_1235.ctz.



If a file name with the highest possible sequence number already exists in the target folder, then the new file name will use that same sequence number.

If the **Default to template folder (create folder if it does not exist)** option is checked, and the folder path does not exist it will be created.

When the **Default to most recently used folder** is checked, the most recently used path will be used.

An existing file is always saved back into the folder from which it was opened using the same file name but with the incrementing sequence counter embedded in the name.

If the **Auto-Generate and Auto-Increment filenames** option is disabled then...

When saving a new file the default Scan or Tune folder will be used.

When saving an existing file the file is saved back to the folder from which it was opened, using the same file name.

Printing

Not available yet.

Settings

When Opening the “F6: Devices” window:

Use these options to determine how the software will initialize the information displayed in the “F6: Devices” window.

Load settings from:

Check the **most recently used file** option to cause the most recently opened or saved device (*.dat) file to be re-opened. This option is useful for EFILive dealers when setting up multiple AutoCal devices.

Check the **connected device** option to cause the software to attempt to read the device settings from the currently connected device. This option is useful for tuners who are using the same device most of the time.

If no device is connected then the software needs to know which device specific options to enable. Select the option that best suits your needs.

Units

The EFILive software is extremely flexible when it comes to displaying data in your preferred units. By default the EFILive software uses metric units to store and display data values. However, many customers are more familiar with and prefer to work with US customary units. The Units settings allow you to define any units in which to display your data.

There are three tab pages in the Units section:

1. **Units:** This is where you define the units of your choice.
2. **Conversions:** This is where you tell the EFILive software how to convert from the underlying metric value to the units of your choice.
3. **Default Units:** This is where you define the default units that you want to use for various types of measurements.

To define a unit, for example “Knots” which measures speed:

- Select the **Units** tab page and click on the green plus button (Ctrl+Ins).
- Type the name of the units: Knots, then press Tab.
- Select the group: Speed, then press Tab.
Note: The group name is important because it determines which units are offered by the software, when displaying values that deal with speed.
- Enter the description for multiple units, i.e. Knots, then press Tab.
- Enter the description for single units i.e. Knot, then press Tab.
- Enter the most likely minimum value for this unit, i.e. 0, then press Tab.
- Enter the most likely maximum value for this unit, i.e. 50, then press Tab.
- Enter the precision (the number of decimal places to display), i.e. 0.

To define the conversion from km/h to Knots:

- Select the **Conversions** tab page and click on the green plus button (Ctrl+Ins).
- From the drop down list in the first column, select km/h->Knots, then press Tab.
- Enter the multiplication factor that you should multiply 1 km/h by to get 1 Knot, i.e. 0.54, then press Tab.
- Enter the value to add to the above multiplication if required. In this case no additional offset is required, so enter 0, then press Tab.
- If the conversion requires that the metric value should be inverted prior to multiplying by the factor, then check the “Invert” check box. In this case inversion is not required, so leave the check box unchecked.

You can test the conversion by sliding the “Test” slider left/right. The values of the metric and converted units are displayed.

You may have noticed that when you create or modify units the icon to the left of the unit name shows differently. To see a description for each icon, right click on any unit and select “Show Legend”.

A user modified entry can be restored to its system default by right clicking on it and selecting “Restore” (Ctrl+R).

The **Default Units** tab page is where you decide which units you want to use for various measurement. You can set up three different sets of default units: Metric

(used mostly in Europe and Asia), US Customary (used mostly in the USA) and User Defined.

- The Metric column should contain only metric units.
- The Custom column should contain only US customary units.
- The User Defined column may contain a combination of metric and US customary units.



You can use the default units to quickly select the units for multiple PIDs. For example in the [F2: Scan Tool]->[F3: Data] tab page, highlight one or more PIDs that have the same unit group, then right click and select the desired default units.

User Info

Record your user information here. The text that you enter into the Author field can be optionally copied into tune files that you create. Select one or both of the check boxes to cause the text to be copied into tune files when they are being saved.

If you check the “Created By” check box, then when you first save a tune file after reading it from a controller, the text will be copied into the file’s “Created By” field. Once the “Created By” field is populated in the tune file it cannot be changed.

If you check the “Modified By” check box, then each time the file is saved, the text will be copied into the file’s “Modified By” field. The modified field will be overwritten each time the file is saved.

The other fields; Name, Company and Email are used as default settings for sending receiving data log files, tune files and support files between a customer and their tuner or EFILive. (The email subsystem is not operational in the EFILive software yet).

Warnings

Disable/Enable various warning messages that are displayed by the EFILive software.

Scan Tool

Dashboard

Show PIDs’ Controller Names causes PIDs to be listed in drop down selection lists prefixed with their controller names. This option is useful to help distinguish between PIDs with identical names from different controllers. For example ECM.RPM and TCM.RPM, without the controller prefix both PIDs would display RPM only.

Show PIDs’ Descriptions causes PIDs to be listed in drop down selection lists along with their description. This option is useful to help you identify PIDs as sometimes it is difficult to identify them by their name only.

Sort PIDs Alphabetically causes PIDs to be listed in drop down selection lists sorted alphabetically. Otherwise the PIDs are listed in the order that they are displayed in the PID selection list.

Expand PID Selection Groups Automatically causes all groups in the list of available PIDs to be automatically expanded.

Ask to Save PID Changes will prompt you to save any changes that you make to the PID selection.

Automatically Save PID Changes will automatically save any changes that you make to the PID selection without asking.

Automatically Discard PID Changes will automatically discard any changes that you make to the PID selection without asking.

Maximum PID Selection Menu Items will split PID selection menus if more than this many items are selected.

Hardware Acceleration will force the EFILive software to use OpenGL hardware acceleration if it is available on your system. You can check the OpenGL hardware capabilities by clicking on the [About] button in the main EFILive window.



If your system does not have hardware acceleration, it may attempt to support OpenGL using software emulation. In that case, using OpenGL with the EFILive software will be slower than not using OpenGL.

Use Simple Data Plot will plot data in the charts using a less accurate but faster drawing algorithm to display compressed chart data. Use this option if you have a slow PC.

The drawing is only less accurate when the zoom level displays more data frames on the screen than there are horizontal pixels in the charts. Once the zoom level can display each frame of data in one or more pixels then this option has no effect.

Show Descriptions As Caption Hints will display PID descriptions as pop-up hints when you hold the mouse over a PID caption in the charts.

Show Button Hints determines if the hints on the “Hide/show PID” and “Auto Scale” buttons in the charts’ y-axis are displayed or not.

Dynamic Resize Limit will prevent charts being redrawn while the scan window is being resized if the number of frames in the log file is greater than this value. Log files with 50,000 frames or more may take a non-trivial amount of time to redraw. Performing that redrawing while trying to resize the window is counterproductive.

Progress Bar Delay will cause a progress bar to display if the chart redrawing will take longer than this many milliseconds.

Allow Secure DVT Controls send security password to controller when activating DVT controls.

Data Logging

Maximum Log File Size determines how many frames of data can be logged before the log automatically stops.

Use the Estimated Time and Size Limits options to determine the optimum number of frames to reserve for data logging.

Automatically Save Log File check this option to have log file saved automatically when logging stops.

Prompt for Filename ask user to provide filename otherwise use templates.

Clear Data After Auto-Saving check this option to clear logged data after auto-saving, ready for next data log.

Save DTCs when checked, DTCs will be scanned at the end of the data log and if any DTCs are detected they will be stored in the log file. DTCs that are stored in

the log file in this way can be viewed using the [Config]->Display/Change Log File Information (Ctrl+I) option in the Scan Tool window.

Export Options when checked exports PID descriptions when exporting logged data and export text values for state encoded data.

Playback

Arrow Key Scrolls sets the number of frames that the Left and Right arrow keys will move the chart inspector.

Ctrl+Arrow Key Scrolls sets the number of frames that the Ctrl+Left and Ctrl+Right arrow keys will move the chart inspector.

If the charts are scaled such that each display pixel represents more than one frame, then these values will be interpreted as the number of pixels (not frames) to move the chart inspector.

Tuning Tool

Editor

Default Units selected here are displayed when a calibration is opened for the first time. If the calibration's units and/or precision are changed while it is displayed in the editor those changes are saved and used next time the calibration is opened overriding the default setting.

Revert to Default units will reset any custom calibration units and/or precision adjustments back to default. Calibration that are currently open in the editor will not be reset.

Show Modified Axis will show modification to calibrations displayed in the navigational tree when a related axis is modified.

Allow Cax8 in OS Memory allow definitions that are defined in the OS area of a tune file. This option is only available for LS1A, LS1B, P10, P11, P12, L31, P08, T42, T43, T76, AL5, A40 and A50 controllers only.

Table set the view of tables' main title bar, adjust entire window to display cells and cell font sizes.

Sync With Window Size displays all cells in the

2D Chart set options when dragging points using the mouse. Also set line width, point width, point height, point visibility and show label points of Y-Axis.

3D Surface set options for grid lines, cube display and axis labels. Set default, classic or custom colors.

Colors use Default V8 color selection, Classic colors modelled on V7 colors, or set Custom colors.

Scripting

Set scripting defaults for tables and cells for numeric tables and enumerated tables.

VE Tables

Set display units for Non Virtual VE Tables. Changes are displayed in real-time, no need to close/re-open the tune file when changing units.

Charge pressure is used when converting VE calibrations that do not contain a pressure axis.



Undo/redo information is discarded for all open VE tables if/when the VE display units are changed, which means changes to VE tables cannot be undone/redone after changing the VE display units.

Virtual Torque

Use the Air Per Cylinder section to create the axis labels for the horizontal axis of the APC virtual torque tables.

Use the Manifold Absolute Pressure section to create the axis labels for the horizontal axis of the MAP virtual torque tables.

Use the Spark Advance section to create the list of spark advance degrees for the virtual tables.

Note: all axis label values are subject to range limitations, a warning will be displayed if any labels are out of range. Hover the mouse over the warning message to display the range limits. Any label ranges that contain "out of range" values will not be used, instead the virtual torque tables will be displayed using default axis labels.



Changing these axis definitions for the virtual torque tables will only affect newly displayed virtual torque tables. Torque tables that are currently displayed in the editor will not be adjusted until they are closed and reopened.

Read/Flash

Seed/Key Security will select default settings for reading and flashing options in the Tune tool. These options are not used for BBX.

High Speed (VPW Only) will enable the use the high speed VPW mode to transfer data from the controller. High speed VPW is 4 times faster than standard VPW.

Cummins Fast CAN Mode (for CMD, CME, CMF controllers only)

Unlimited Fast CAN delivers the fastest possible flash time and is approx. 50% faster than standard flash routines.

Fast CAN is a little faster than standard, but more robust than Unlimited.

If you experience flash failures when using **Unlimited Fast Can** or **Fast CAN**, try unchecking that option and retry the flash.

Show Summary When Finished will automatically display the [F3: Calibration] tab page when reading is complete.

Perform Test Flash Only will simulate the flash process, complete with full data transfer to/from the controller. This option is not supported on all controllers.

Display lock/unlock key entry fields with a password mask will hide passwords when entered, which is useful for entering a private key during a remote tuning session. Passwords can be displayed by unchecking this box.



EFILive V8 Control Panel



The EFILive V8 Control Panel is a utility that manages FlashScan and AutoCal hardware and associated connections.

The EFILive V8 Control Panel is started automatically whenever an EFILive V8 application attempts to communicate with either a FlashScan or an AutoCal device. It is terminated automatically when all EFILive applications are closed.

The Control Panel can be opened via the [EFILive Control Panel] button at the top right of the EFILive V8 Scan and Tune main window, or by clicking on the FlashScan icon in the Windows System Tray (on the Windows Task Bar near the clock) while EFILive V8 Scan and Tune software is running.

The Control Panel may also be started independently of any other EFILive application by selecting the “EFILive V8 Control Panel” option from the Windows Start Menu. If you manually start the Control Panel from the Windows Start Menu, then you will need to manually close it by right clicking on the FlashScan icon in the System Tray and selecting “Exit”.

USB Connections

Displays the license details of FlashScan and/or AutoCal, and displays the connection status of:

- USB.
- FlashScan and/or AutoCal.
- Vehicle/Controller.

The “Sent:” and “Recv:” counters display the number of messages sent and received via the USB connection to all devices.

[Reset] resets counters to zero.

[Devices] checks the connection status.

USB Testing

To test the USB connection, select FlashScan or AutoCal and click [Test] for the connected device.

The USB connection is tested 10 times, unless the extended option is enabled. When the extended option is enabled, the USB connection test is performed 100 times.

The test results are displayed in the “Result:” field. If the test passed then “OK” is displayed, otherwise an error message is displayed to indicate why the test failed.

You should expect to see approximately 1.0 to 1.2Mbps (million bits per second) transfer speed.

Options

Allows users to configure the EFILive V8 Control Panel for a range of options including;

Popup Balloons

Show information balloon at startup. Enable/disable the information balloon that is displayed when the EFILive Control Panel is first started.

Prompt for firmware upgrade when available. Automatically displays a balloon with the prompt: "The FlashScan or AutoCal firmware requires updating" when a firmware update is detected and available.

Automatic Refresh

Automatically refresh the USB connection status when the [F2: USB] window is opened.

Automatically refresh firmware details when the [F6: Firmware] window is opened.

Automatically refresh FlashScan's/AutoCal's internal clock with the time from the PC's clock when the Control Panel first connects to the device. The internal clock is not updated until 5 seconds has elapsed and there is no other communication between the device and the Control Panel. To manually update the internal clock use the [F10: Date/Time] tab page in the EFILive Explorer application.

[**Restore**] restores changes to the installation defaults.

[**Cancel**] cancels any changes made to the configuration.

[**Apply**] saves changes made to configuration settings.

Calibrate A/D

The Analog to Digital (A/D) inputs on FlashScan are opto-isolated from the main circuit board. The opto-isolators can introduce unwanted offsets into the A/D conversion process. To compensate for any unwanted offsets, FlashScan's A/D inputs may be re-calibrated if and when required.

Pre-requisites

A voltage source capable of providing two different, stable voltages in the range 0-5V. The low voltage should be in the range 1-2V, the high voltage should be in the range 3-5V.

Procedure

1. Enter the low millivolts that will be supplied from the external power source in the "Low (mV)" field.
2. Enter the high millivolts that will be supplied from the external power source in the "High (mV)" field.
3. Check the checkbox of each A/D input that is to be recalibrated.
4. Apply the low voltage to all A/D inputs that have been checked.
5. Click the [**Initialize**] button to record the low voltage.
6. Apply the high voltage to all A/D inputs that have been checked.
7. Click the [**Calibrate**] button to calibrate the A/D inputs based on the low and high voltages supplied.

You can verify the calibration by checking the "Display Data" checkbox, applying different voltages and observing the received voltages in the [mV] column.

Existing Factor/Offset values can be displayed by selecting the [Get Factor/Offset] button.

Explanation of Calibration Values

The raw AD value is a count in the range 0..1023 where 0=0mV and 1023=5000mV. To convert from AD counts to millivolts, including the calibration factor and offset, the following formula is applied:

$$\text{mV} = (\text{AD} * \text{factor} + \text{offset}) * 5000 / 1023, \text{ which is the same as}$$

$$\text{mV} = (\text{AD} * \text{factor} + \text{offset}) * 4.8875855$$

[Info] displays the Calibrate A/D procedural information.

[Restore] restores changes to the installation defaults.

Firmware

Displays the FlashScan/AutoCal Boot block and Firmware for the connected device.

If multiple devices are connected (i.e. a FlashScan and an AutoCal), you must manually select one or the other device in the list to see/update that device's boot block or firmware version.

Where outdated boot block or firmware is detected, an option to update boot block and/or firmware to the latest version will be displayed.

[Devices] refreshes device connection status and boot block/firmware version numbers.

Licensing

FlashScan/AutoCal

The FlashScan/AutoCal tab allows tuners to manage AutoCal Linking/Unlinking and AutoCal VIN slot limits either by connecting both FlashScan and AutoCal to the PC, or by connecting FlashScan to the PC and generating remote codes for the AutoCal customer to apply to their device.

Link/Unlink FlashScan to AutoCal

To be able to create tunes for your customers' AutoCal devices, you must link the AutoCal to your FlashScan.

There are two ways to link an AutoCal device to your FlashScan.

1. Physically Link/Unlink AutoCal.

With both FlashScan and AutoCal connected, select the [Link] option. Once FlashScan and AutoCal are linked, they can be unlinked by using the [Unlink] option.

The "Can self-sign" option is available when physically linking AutoCal. It allows the AutoCal device to save any file that it reads from any controller as if it had been saved by you using the "Save for AutoCal" option.

2. Remotely Link/Unlink AutoCal.

With FlashScan connected, select the [Generate Remote-Link Code] or [Generate Remote-Unlink Code] option from the drop down on the Link button.

Enter Remote AutoCal's Serial number and select OK.

Copy Activation instructions and code and send to your AutoCal customer.

Maximum VIN Slots

Tuners can manage the number of available VIN slots they wish their AutoCal devices to hold. AutoCals will ship with a default maximum VIN slot count set to 1. AutoCal V3 is configurable to a capacity of 600, AutoCal V2 is configurable to a capacity of 221.

VIN slot limits can be changed to any value between 1 and maximum capacity. If the VIN slot limit is already greater than 1, the VIN slot limit can only be decreased to a value greater than or equal to the number of VIN slots already installed on the AutoCal device.

To change VIN slot limits AutoCal must first be linked to FlashScan. Only the FlashScan that provided the link can be used to change the maximum VIN slots.

There are 2 ways to change the maximum VIN slots for AutoCal.

1. Physically change Max VIN Slots

With both FlashScan and AutoCal connected, select the [Max VIN Slots] option. Enter Maximum VIN slots.

2. Remotely change Maximum VIN slots

With FlashScan connected, select the [Generate Remote-Link Code] or [Generate Remote-Unlink Code] option from the drop down on the Link button.

Enter Remote AutoCal's Serial number, Max VIN slots and select OK.

Copy Activation instructions and code and send to your AutoCal customer.

V1->V2 Upgrade

This option is used where users have purchased the FlashScan V1 to FlashScan V2 Upgrade option and have received their FlashScan V2 product and upgrade codes.

Trace Files

Allows users to configure trace file settings for EFILive V8 applications. Trace files are saved in the folder: \My Documents\EFILive\V8\Trace

Diagnostic tracing is enabled by default but can be activated/deactivated by selecting the Enable Diagnostic Tracing checkbox. Users can set the maximum trace size and automatic deletion of trace files after a specific number of days.

Read/Flash trace files are saved using the following naming convention:

YYYYMMDD_HHNNSS_T_CCC.htx

Where:

- YYYYMMDD: is the year, month and day that the trace was recorded.
- HHNNSS: is the hour, minute and second that the trace was recorded.
- T: is the mode and is one of R=Read F=Full-Flash W=Cal-Flash.

- CCC: Is the controller type
- htx: is the file extension.

[Clear Trace] clears current trace file information from PC memory.

[Save Trace] saves current trace file information from PC memory.

[Delete All] moves all trace files in the trace folder to the recycle bin.

[Show Files] opens the specified folder to view the list of saved trace files.

[Restore] restores changes to the installation defaults.

[Cancel] cancels changes made, but not yet saved to diagnostic trace file settings.

[Apply] saves changes made to diagnostic trace file settings.



See Diagnostic Trace Files in Appendix D for information about other types of logging/tracing options.

LCD Capture

LCD capture takes an image of the connected FlashScan's screen display. This option is not available for AutoCal.

[Restore] restores changes to the installation defaults.

[Copy] copies the imaged displayed to the clipboard. **[Save]** saves the captured LCD image in *.png file format.

[Capture] captures LCD image from the connected FlashScan.

About

Displays the EFILive Scan and Tune version number, USB driver version and USB library version.



Appendix A

Command Line Parameters

Command Line Options

The EFILive Scan and Tune software can be started using various command line options. The command line options allow shortcuts to be created that can be used to start the software and automatically select one of the main menu options.

/Scan <filename>

Automatically opens the Scan window and displays the named log file.

/Tune <filename>

Automatically opens the Tune window and displays the named tune file.

/DTC

Automatically opens the OBD window.

/BBX <filename>

Automatically opens the Black Box Configuration window.

/Dev <filename>

Automatically opens the Device Settings window and displays the named settings file.

/Lic

Automatically opens the Licenses window.

/Tool

Automatically opens the Tools window.

Command Line Interface (CLI)

The EFILive Command Line Interface application (CLI) provides tuners with a way to automate the following tasks using the Windows command line or Windows batch files:

- Program FlashScan/AutoCal device settings;
- Program black box scan and tune options;
- Format the FlashScan/AutoCal file systems;
- Copy tune files to FlashScan/AutoCal;

As well as automation, the CLI also supports gang-programming. Gang-programming allows up to five devices to be programmed simultaneously.

The EFILive_CmdLine.exe file is included within the EFILive V8 software download. Refer to the [EFILive Command Line Reference.pdf](#) for documentation.



Appendix B

Files and Folders

Files and Folders

Documents Folder

The EFILive software stores data files in the **\My Documents\EFILive\V8** folder of the user who installed the software.

Installation Folder

By default the EFILive software installs the application files into the folder:

For Windows 32 bit systems: **C:\Program Files\EFILive\V8**

For Windows 64 bit systems: **C:\Program Files (x86)\EFILive\V8**

However, you may choose any folder in which to install the EFILive software during the installation process.



Appendix C

International Settings

Units

Metric

All numeric data managed by EFILive applications is stored and computed in metric units.

Custom

Numeric data may be displayed in either the default metric units or in user defined custom units. Custom units are usually define as US Customary units, such as psi, mph and lbs.

Custom units can be created and managed using: Properties->General->Units.

See the [Units](#) section of this document for more info.

Display Formats

Dates

Two date formats are supported, European style dates that display the day first like this: **15 Jan 2012**, and US style dates that display the month first like this **Jan 15, 2012**.

Numbers

Two number formats are supported, European style numbers that display like this: **12.345,67**, and US style numbers that display like this **12,345.67**.

Numeric and date formats may be configured independently for Display, Clipboard and Import/Export duties using: Properties->General->Locale.

See the [Locale](#) section of this document for more info.

Language

Translations

The EFILive applications have been released in English; they have not been translated into any other language.



Appendix D

Troubleshooting

Error Messages

Error Message Document

Error numbers are listed in the EFILive Error Codes.pdf document that can be accessed via: Start->All Programs->EFILive->V8->Documents->EFILive Error Codes.

Error codes and messages can be “looked up” in the EFILive V8 software using the option [F8: Tools]->[F8: Error Codes].

Reporting Problems

Obtaining Support Information

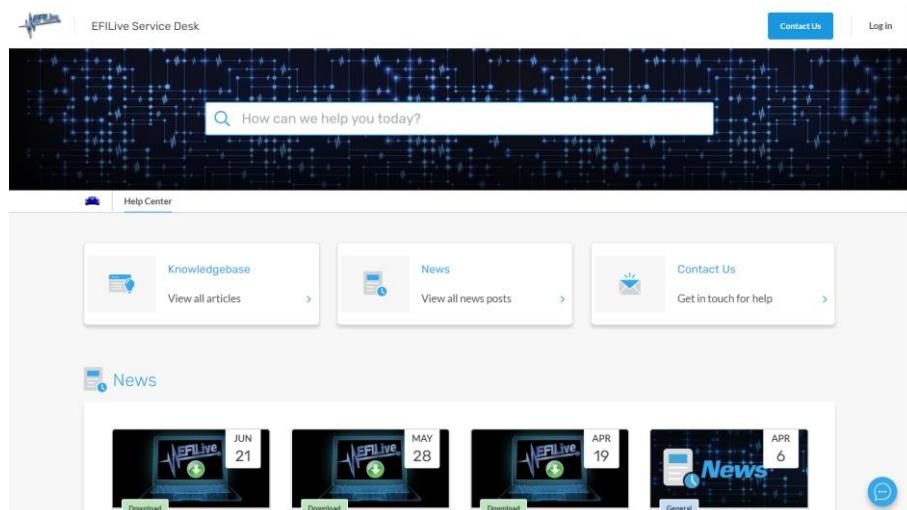
If you purchased your FlashScan or AutoCal device from an EFILive dealer, your first contact for obtaining support should be that dealer. The dealer can direct you to the appropriate resources to help resolve problems using the EFILive software and/or FlashScan/AutoCal devices.

If you purchased your FlashScan or AutoCal device directly from EFILive you may visit our web site and select one or more of the appropriate Support menu options.

Creating a Support Ticket

The EFILive Helpdesk is a web based application. The EFILive Helpdesk can be accessed here: <http://service.efilive.com/>

When you first visit the EFILive Helpdesk you will be presented with a screen similar to the image below.



The EFILive Service Desk Username and Password are shared with the EFILive store. If you already have an account on the EFILive store, enter the same **Username and Password** in the **Login to Your Account** section.

If you do not currently have an EFILive store account you can sign up as a new user or create a ticket as a guest.

Asking a Question

Use the Contact Us links to create a support ticket. Please provide as much information as possible for our support team to assist with your request.

Diagnostic Trace Files

Read/Flash Trace Files

When the EFILive application reads or flashes a controller the details of the read/flash process may be saved in trace files for diagnostic purposes.

If you experience difficulty reading or flashing a controller, EFILive Support may request that you send the appropriate trace file to EFILive.

Trace files are created on your PC or laptop in the folder: \My Documents\EFILive\V8\Trace and are named using the following naming convention:

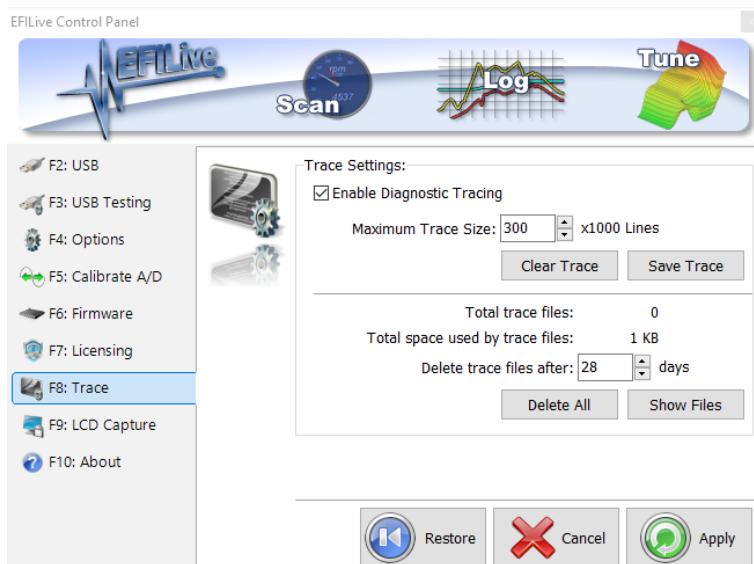
YYYYMMDD_HHNNSS_T_CCC.htx

Where:

- YYYYMMDD: is the year, month and day that the trace was recorded.
- hhnnss: is the hour, minute and second that the trace was recorded.
- T: is the mode and is one of
 - R=Read
 - F=Full-Flash
 - W=Cal-Flash.
- CCC: is the controller type
- htx: is the file extension.

An example trace file name might be: 20110604_214334_F E38.htx which contains a trace of a Flash attempt on an E38 controller on June 04, 2011 at 09:43:34pm.

Trace files can be managed using the EFILive Control Panel application on the [F8: Trace] tab page.



Application Log Files

Each EFILive application can be forced to create a log file in which important information about the state and progress of the application is saved. To force an application to create and maintain a log file, hold down the **Ctrl** key while starting the application.

Log files are created in the folder: \My Documents\EFILive\V8\Trace with a filename that matches the application being logged. The files contain plain text that can be read using any text editor including the Windows Notepad program.

Each diagnostic message is stored on a separate line and consists of three pipe “|” delimited fields.

1. Timestamp
2. Process ID
3. Message

A typical application log file will contain information like this:

```
10:21:37.083|5008|Version: 8.2.2 Build 208
10:21:37.083|5008|Create Form: fMain_ScanAndTune
10:21:37.084|5008|Opened INI file: D:\EFILive_Production\V8\EFILiveSystem.ini
10:21:37.085|5008|Opened INI file: D:\Blacksys_Documents\EFILive\V8\Config\EFILiveScanAndTuneLayout.ini
10:21:37.086|5008|Opened INI file: D:\Blacksys_Documents\EFILive\V8\Config\EFILiveScanAndTune.ini
10:21:37.087|5008|Opened INI file: D:\EFILive_Production\V8\EFILiveCalculatedPids.ini
10:21:37.087|5008|Opened INI file: D:\Blacksys_Documents\EFILive\V8\Config\UserCalculatedPids.ini
10:21:37.149|5008|Opened internal INI file
10:21:37.149|5008|Opened internal INI file
10:21:37.152|5008|Closed internal INI file
10:21:37.152|5008|Closed internal INI file
10:21:39.395|5008|Closed INI file: D:\EFILive_Production\V8\EFILiveSystem.ini
10:21:39.397|5008|Closed INI file: D:\Blacksys_Documents\EFILive\V8\Config\EFILiveScanAndTuneLayout.ini
10:21:39.398|5008|Closed INI file: D:\Blacksys_Documents\EFILive\V8\Config\EFILiveScanAndTune.ini
10:21:39.399|5008|Closed INI file: D:\EFILive_Production\V8\EFILiveCalculatedPids.ini
10:21:39.400|5008|Closed INI file: D:\Blacksys_Documents\EFILive\V8\Config\UserCalculatedPids.ini
10:21:39.401|5008|Destroy Form: fMain_ScanAndTune
```

FlashScan/AutoCal Trace Files

The option to automatically save a trace file onto FlashScan or AutoCal if the read or flash fails using BBX is enabled by default. This option is managed in the [F6: Devices] -> [F7: BBX] window.

Trace files can be manually saved at the end of a failed process using:

FlashScan/AutoCal V3: Navigate to Scan Tool -> F3 Scan Options -> F1 Save Trace File.

FlashScan V2: Navigate to F1 Scan Tool -> F3 Scan Options -> F1 Save Trace File.

AutoCal V2 (Simple Menu): Save Trace File.

AutoCal V2 (Advanced Menu): Scan Tool -> Save Trace File.

The FlashScan and AutoCal devices maintain an internal buffer of the most recent messages sent to and received from the vehicle. That buffer is stored in RAM memory and is wiped clean each time the device is powered off or rebooted. Therefore you **MUST** save the trace file **before** powering off or rebooting the device.

The support file will be saved in the "Scan" folder on the device;

FlashScan/AutoCal V3 trace files are named using the following naming convention:

yyyymmdd_hhnss_<desc>.xalm, where:

- yyyymmdd: is the year, month and day that the trace was recorded.
- hhnss: is the hour, minute and second that the trace was recorded.

- <desc>: is the description where:
 - “User” means user generated trace files
 - “xxx._x_\$xxxx” identifies the 3 character controller ID, the communication process upload/download, and the 4 digit error code.
- xalm: is the file extension.

The trace file can be retrieved by connecting FlashScan/AutoCal V3 to your PC and navigating to Options-> F2: File System -> F3: USB Thumb Drive on the device to open FlashScan/AutoCal V3 in Windows Explorer.

FlashScan/AutoCal V2 trace files will be named USR_xxxx.efx, where xxxx is the unique file counter number and can be retrieved using the V8 EFILive Explorer program.



Appendix E

Cummins HD File Conversion Tool

XCal File Conversion

To assist tuners who have existing Cummins HD tune file libraries in the *.xcal file format, EFILive has developed a conversion tool called “EFILive XCal” to convert these tune files for use in EFILive software.

.xcal files are essentially .hex files but use the extension of “.xcal”.

*Sometimes the xcal file extension might be *.00, *.01, *.02, *.03, etc, in these cases we refer to them as .0? files.

This document is intended to provide EFILive tuners with an overview of the file conversion process.

EFILive XCal is a standalone program that is included with the EFILive V8 software installation. The EFILive V8 software installation is governed by the EFILive Terms and Conditions and the EFILive End User License Agreement.

The EFILive XCal application file (EFILive_xcal.exe) may be copied to and used on any other device, including but not limited to external thumb drives.

Refer to the [Cummins HD File Conversion Guide.pdf](#) for documentation.