

Cummins HD User Guide

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Cummins HD User Guide

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Contents



	4
Prerequisites	4
Intended Audience	4
Computer Knowledge	4
Tuning Knowledge	4

- VEFILice

	N		 	 .5
lr	ntroduction		 	 .5
	What is EFILive?		 	 .5
	EFILive Hardware		 	 .5
	Vehicle Communic	ations Ports	 	 .5
	Software Version (Overview	 	 .5
	V8 Software Sup	oport	 	 .6
	V7 Software Sup	oport	 	 .7
	Supported Engines	S	 	 .7
	Unsupported Appli	cations	 	 .8



\sim	9
Licensing Requirements	
Cummins HD Tuning Option Enabled	
VIN Licensing	9



V8 Scan and Tune Scan	11
Pass-Thru Data Logging	11
Pass-Thru Read a Controller	12
Edit a Tune File	13
Cummins Fuel Timing Calculator	15
Pass-Thru Licence and Flash a Controller	17
Pass-Thru OBD Functions	18
Retrieve Controller OBD Details	18
Lookup DTC	18
Move Tune and Log files from FlashScan/AutoCal to your PC	18
FlashScan/AutoCal V3	18
FlashScan/AutoCal HD	19



Configure FlashScan/AutoCal for BBX	21
Data Logging	21
Configure Tuning	21
Configure DTCs	22
Quick Setup	22



	24
FlashScan/AutoCal Menu Navigation	24
FlashScan/AutoCal V3	24
Data Logging	24
Read a Controller	24
License and Flash a Controller	25
FlashScan HD	25
Data Logging	25
Read a Controller	26
License and Flash a Controller	26
AutoCal HD	27
Data Logging	27

Read a Controller	
License and Flash a Controller	28



XCal File Con	version	 	29



S	Support	
	Trouble Shooting	
	Error Codes	
	Checksums	
	Cummins HD Vehicle Specific Information	31
	Failed Flash Recovery Methods	31
	Flash Base with without tune file security restrictions	31
	ROM Boot Recovery	31
	Trace Files	31
	V8 Scan and Tune *.htx files	31
	FlashScan/AutoCal V3 *.xalm files	
	FlashScan V2 Trace Files	
	AutoCal V2 Trace Files	
	Knowledgebase	
	EFILive Authorized Dealer	
	How to Tune?	
	EFILive Service Desk	33



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;
- On Board Diagnostics.

And enough common sense to understand the following:

- Make small incremental changes;
- Only make minimal changes 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.



Introduction

What is EFILive?

EFILive is tuning software and hardware - it is not a tune. Together the software and hardware give users the tools to write tunes. EFILive does not provide tune files, tuning advice or support, but do provide software support and hardware support.

EFILive Hardware

Cummins HD tuning support is available on the following EFILive hardware:

FlashScan V3 and AutoCal V3 will support Cummins HD vehicles where the Cummins HD Tuning Option is active.

FlashScan HD and AutoCal HD will only support Cummins HD vehicles.

FlashScan V2 and AutoCal will continue to support the GM Tuning option and/or Dodge Cummins Tuning option. FlashScan V2 and AutoCal V2 cannot be used to read/flash Cummins HD vehicles.

Vehicle Communications Ports

Cummins HD vehicles communicate using the J1939 communications protocol. The vehicle type and application will determine the style of communications port/diagnostic port fitted to the vehicle.

FlashScan HD and AutoCal HD are shipped with an OBD-II cable, and a J1939 9 pin Black Deutsch connector to 16 pin OBD-II adapter to suit most on-highway applications up to 2016.

On-Road applications for the 2017 model year and beyond communicate using a different CAN speed and vehicle connector. These vehicles require a J1939 9 pin Green Deutsch adapter. This adapter is not included with purchase, however upon public release of 2017+ support, this adapter will be an optional purchase via the EFILive store.

Some Off-Road applications use custom communications ports. Where the vehicle is not fitted with a standard OBD-II or 9 pin Deutsch communications port, customers will need to source an appropriate adapter and ensure its compatibility with the included OBD-II cable.

Some Light Duty On-Road applications contain multiple communications ports to support multiple CAN protocols. In some instances where an OBD-II port and another communication port is fitted, the OBD-II is non-standard and does not support J1939 communications protocols. Customers will need to source a specific adapter and ensure its compatibility with the included OBD-II cable.

Software Version Overview

This version of the Cummins HD Quick Start Guide migrates all processes to EFILive V8 Scan and Tune software. Functionality is still available in V7.5 software, however software support and bug fixes will cease in 2021.

FlashScan/AutoCal V3 and AutoCal HD are not compatible with V7 software. V7 functions are only supported by FlashScan V2/HD. The following is a brief view of the activities that are performed with the different software versions:

V8 Software Support

The following Cummins HD are supported in the following ways in the V8 Scan and Tune software:

Controllor	Voor	Voor V8 Software				
Controller	Tear	Scan	OBD	Read	Flash	Edit
CM2670	2020+	×	\checkmark	~	V	\checkmark
CM2450A	2020+	V	\$	\$	\$	V
CM2350A	2013+	V	V	V	V	V
CM2250	2010+	V	V	V	V	Ý
CM2220	2009+	V	V	V	V	V
CM2880	2009+	V	V	\$	\$	Ý
CM2150	2007-2011	V	V	V	V	\checkmark
CM2150E	2007-2014	V	V	\$	\$	Ý
CM850	2002+	×	V	V	V	≍
CM870 / CM875	2002-2006	×	V	\$	\$	×
CM871 / CM876	2007-2012	V	\checkmark	V	V	\checkmark

The following Dodge Cummins Light Duty controllers are supported in the following ways in the V8 Scan and Tune software:

Controllor	Year	V8 Software				
Controller		Scan	OBD	Read	Flash	Edit
CM846	2003-2005	≍	\checkmark	V	V	×
CM848	2003-2005	×	Ý	V	V	×

V7 Software Support

The following Dodge Cummins are supported in the following ways in the V7 Tune Tool and V7 Scan Tool software:

Controllor	Voor	V8 Software				
Controller	rear	Scan	OBD	Read	Flash	Edit
CM2670	2020+	×	≍	×	×	\checkmark
CM2450A	2020+	×	×	×	×	V
CM2350A	2013+	×	×	×	×	V
CM2250	2010+	×	×	×	×	V
CM2220	2009+	×	×	×	×	V
CM2880	2009+	×	×	×	×	Ý
CM2150	2007-2011	×	×	×	×	V
CM2150E	2007-2014	×	×	×	×	\checkmark
CM850	2002+	×	×	×	×	×
CM870 / CM875	2002-2006	×	×	×	×	×
CM871 / CM876	2007-2012	×	×	×	×	V

The following Dodge Cummins Light Duty controllers are supported in the following ways in the V7 Scan and Tune software:

Controller	Voor	V8 Software									
Controller	i cai	Scan	OBD	Read	Flash	Edit					
CM846	2003-2005	×	≍	×	×	≍					
CM848	2003-2005	×	×	×	×	×					

Supported Engines

EFILive will only support single ECM configurations, typically 4 cylinder and 6 cylinder applications. Two distinct categories of vehicles are supported;

On-Highway applications; covering Medium Duty, Heavy Duty, Light Commercial, Bus and Motorcoach applications.

Off-Highway applications; covering Agriculture, Construction, Fire & Emergency, Marine, Mining, Power Generation and Rail applications.

Supported engines by controller type is documented on the EFILive Cummins HD Supported Vehicles page. (Add link)

Most engines are available with between 5 and 10 different power ratings. EFILive recommends that ONLY the calibration read from the vehicle is used to program the vehicle.

Unsupported Applications

Vehicles using multiple ECMs will not be supported. For example; the QSK60 V16 engine uses a total of 4 ECMs.

Cummins HD Natural Gas engines will not be supported.



Licensing Requirements

To Flash a Cummins HD ECM, the following licensing conditions must be met:

- 1. The Cummins HD Tuning Option must be enabled.
- 2. A VIN License must be available (if not already licensed).

Cummins HD Tuning Option Enabled

To ensure that your device is licensed to tune Cummins HD vehicles:

- 1. Connect your FlashScan or AutoCal device to your PC.
- 2. Open the EFILive Scan and Tune application.
- 3. Select the [F7: License] option in the left-hand pane.
- 4. Select [F2: Hardware] to display Tuning License details.

FlashScan and AutoCal Li	icensing	×											
F2: Hardware	Serial Number: 006000000116 Copy												
👰 F3: VINs	License Number: 00600000116												
F4: Streams	ing Serial Number: 00600000116 License Number: 00600000116 Protected Number: 00600000116 EULA has been accepted. Firmware VIN Licenses Flash Counters Model: EFILive FlashScan V3 Boot Block: 3.00.005 20/10/2020 Eirmware: 3.00.062 25/03/2021 uning Licenses: G Scanning and Logging GM Tuning G Cummins Tuning Cummins HD Pro Tuning Activation Code: Activation Code(s)												
剩 F5: Convert	Firmware VIN Licenses Flash Counters Model: EFILive FlashScan V3												
	gg × Serial Number: 006000000116 Copy License Number: 006000000116 Image: Copy Firmware 006000000116 Image: Copy Firmware VIN Licenses Flash Counters Model: EFILive FlashScan V3 Image: Copy Boot Block: 3.00.062 25/03/2021 Firmware: 3.00.062 25/03/2021 Ing Licenses: Scanning and Logging GM Tuning Cummins Tuning Cummins HD Pro Tuning Activation Code: Activate Pro Tuning Purchase Tuning License Activation Code(s) Scanol												
		Al Number: 00600000116 Copy e Number: 00600000116 d Number: 00600000116 EULA has been accepted. are VIN Licenses Flash Counters del: EFILive FlashScan V3 cdc: 3.00.005 20/10/2020 are: 3.00.062 25/03/2021 anses: aning and Logging funing mins Tuning mins HD funing Activation Code: Activate Pro Tuning Purchase Tuning License Activation Code(s)											
	Tuning Licenses:	Ial Number: 006000000116 See Number: 006000000116 ied Number: 006000000116 EULA has been accepted. Image: Constraint of the second											
	GM Tuning	Al Number: 006000000116 Copy e Number: 006000000116 Image: Copy d Number: 00600000116 Image: Copy EULA has been accepted. Image: Copy Image: Copy are VIN Licenses Flash Counters del: EFILive FlashScan V3 Image: Copy ock: 3.00.005 20/10/2020 are: 3.00.062 25/03/2021 enses: Image: Copy Image: Copy ming and Logging Image: Copy Image: Copy Iming MC Image: Copy Image: Copy Iming HD Image: Copy Image: Copy Tuning Activation Code: Activation Code(s) Image: Copy arkun Refresh Copy Copy											
	✓ Cummins Tuning												
	Cummins HD												
	X Pro Tuning Activation Code: Activate Pro Tuning												
	Purchase Tuning License Activation Code(s)												
💩 🖣 🌚 🕇	Backup Refresh Copy Clo	se											

- To purchase Tuning Options FlashScan, click on the Purchase Tuning License Activation Code(s) link to order products. NOTE: The Cummins Tuning Option is included on AutoCal devices, if this is not active, please contact support.
- 2. Enter the activation code that was emailed to you and click the Activate button.

VIN Licensing

Each additional vehicle that you tune requires an available VIN license. The license is allocated during the flashing process. Reflashing the same controller multiple times using the same FlashScan/AutoCal uses the same license each time.

To check that you have an available VIN license to allocate to your vehicle, perform these steps.

- 1. Connect your FlashScan or AutoCal device to your PC.
- 2. Open the EFILive Scan and Tune application.
- 3. Select the [F7: License] option in the left-hand pane.
- 4. Select [F3: VINs] to display VIN License details.

FlashScan and AutoCal	Licensing				×
—			Serial Numb	er: 00600000558	
F2: Hardware	Lic # ECM	Engine Serial	Engine VIN		^
	80 CMB	000004933516	3D7LX380		
👰 F3: VINs	81 CMD	00000053465	KL8CB6SA	Used Engine VIN Licenses	
	82 CMC	00000019873	3D7KS28/	3	
F4: Streams	83 CME	000004010380	3C6UR5NI		
	84 E83	8626103921PG	MJBJA75B	Available Engine VIN Licenses	
- Es Convort	85	Available 🚽		Available Engine vin Licenses	5
Star convert	86	Available			
	87	Available			
	88	Available			
	89	Available	Device Sur	nmary	
	90	Available	94 uppd		
	91	Available	o4 used		
	92	Available	16 availab	le	
	93	Available	500 may b	e nurchased	
	94	Available	ooo may s		
	95	Available			
	96	Available			
	97	Available			
	98	Available			
	99	Available			
	100	Available			~
			Engine: 84 u	ised, 16 available.	
			500 additional VIN licenses i	may be purchased for this device.	
	Auth Code:		Generate Auth Code	Copy Copy Info	
	Activation Code:	License	e Number: 101 🔹 🛛 Ac	tivate VIN License	
			Purchase VIN Lice	ense Activation Code(s)	
🔬 🖣 🌚 🕇	Backup	Refresh	Сору	(3)	Close

- 5. To purchase additional VIN Licenses, click on the **Purchase Activation Code(s)** link to order products. NOTE: AutoCal Users should contact their Tuner before purchasing additional VIN licenses to manage the AutoCal's maximum VIN license capacity and tune file compatibility.
- 6. Paste the Activation Code and enter the License number from your email.





V8 Scan and Tune Scan

Pass-Thru Data Logging

To log data using FlashScan or AutoCal and V8 Scan and Tune software;

- 1. Open the EFILive V8 Scan and Tune.
- 2. Connect your FlashScan/AutoCal device to your PC and vehicle.
- 3. Turn the vehicle ignition to the *On* position.
- 4. Select an existing Dashboard configuration either by using the [Open Dash] button or using the Dashboard drop down, or configure your own customized dashboard after making controller and PID selections.
- 5. Navigate to the [F2: Scan] -> [F2: PIDs] menu option.
- 6. In the Engine field use the drop-down list to select the correct controller type or use Auto Detect option.
- 7. Drag the selected PID from Available PIDs window into the Selected PIDs window.

🚉 EFILive Scan Tool											-		×
E2: PIDs		Selected C	Controlle	r(s)				Available PI	Ds				
	Engine:	CM2250 Cummins HD Die	sel ECM	 •		Auto	Name	Description	Units	Group	Source		
F3: Data	Transmission:			-	1	Detect	Y 🗐 ECM - Enhanced	Manufacturer Defined PIDs					
		Coloct	od DIDc				TRQENG	Torque Engine	Nm	ECM - Enhanced	ECM		
E4: Charts		Select	eu PIDS				TRQNOLOAD	Torque No Load	Nm	ECM - Enhanced	ECM		
	Name	Description	Units	Group	Source		TRQEB	l orque Exhaust Brake	Nm	ECM - Enhanced	ECM		
	RPM	Engine RPM	rpm	ECM - Enhanced	ECM		TRQFAN	Torque Cooling Fan	Nm	ECM - Enhanced	ECM		
F5: Gauges	VSS	Vehicle Speed	km/h	ECM - Enhanced	ECM	0	TRODEM	Lorque Demand	Nm	ECM - Enhanced	FCM	_	-
	S APP	Accelerator Pedal	%	ECM - Enhanced	ECM		D MAINQ	Main Injection Quantity	mg/	ECM - Enhanced	ECM		l
F6: Maps	TRQDRIV	ER Torque Desired	Nm	ECM - Enhanced	ECM	0	PILOTIQ	Pilot 1 Injection Quantity	mg/	SOM Schoold	ECM		ſ
-			-			0	PILOT 2Q	Pilot 2 Injection Quantity	mg/	ECM - Enhanced	ECM		
9 F7 DVT		-					POST1Q	Post 1 Injection Quantity	mg/	ECM - Enhanced	ECM		
Y F7. DV1							POST2Q	Post 2 Injection Quantity	mg/	ECM - Enhanced	ECM		
							POST3Q	Post 3 Injection Quantity	mg/	ECM - Enhanced	ECM		
						×	POST4Q	Post 4 Injection Quantity	mg/	ECM - Enhanced	ECM		
							S INJTIME1	Injector Time 1	us	ECM - Enhanced	ECM		
							INJTIME2	Injector Time 2	us	ECM - Enhanced	ECM		
							INJTIME3	Injector Time 3	us	ECM - Enhanced	ECM		
							MAINSOI	Main Injection Timing	•	ECM - Enhanced	ECM		
							PILOT1SOI	Pilot 1 Injection Timing	•	ECM - Enhanced	ECM		
							PILOT2SOI	Pilot 2 Injection Timing	۰	ECM - Enhanced	ECM		
							POST1SOI	Post 1 Injection Timing	•	ECM - Enhanced	ECM		
							POST2SOI	Post 2 Injection Timing	•	ECM - Enhanced	ECM		
							AIRDENL	Table Select Low	count	ECM - Enhanced	ECM		
							AIRDENH	Table Select High	count	ECM - Enhanced	ECM		
							AIRDENMIX	Table Base Blend		ECM - Enhanced	ECM		
							ECMTEMP	ECM Internal Temperature	°C	ECM - Enhanced	ECM		
							VGTTEMP	VGT Actuator Temperature	°C	ECM - Enhanced	ECM		
							TAI 📀	Intake Manifold Temperature	°C	ECM - Enhanced	ECM		
							🖸 AAT	Air Intake Temperature	°C	ECM - Enhanced	ECM		
	<				3		Search for PIDs:						
	Channel Allocatio	n per Module:					Channels: Any V Grou	p: All 🗸 😪 Clear					
	CM2250	14 of 1	28 channels	used.									
							Search:						
	Engine CM2250	00000	000	Transmission			00000000						
	-	🛄 . 🛛 🧩		Open	Sz. Sz	ave	Dashboard:	Search/Eilter PII	e				
🗠 🚾 1	Open	🔪 🔄 Save 🝸 🎆	Config	Dash	Dz	ash 🔻	CM2250_HD	~			- 🤇		ĺ

- 8. Navigate to the [F3: Data], [F4: Charts], [F5: Gauges] or [F6: Maps] tab and configure your dashboard to customize data display formats.
- 9. Users should [Save Dash] to save their custom configurations to reduce future configuration requirements.
- 10. Start the vehicle.
- 11. Select either Record or Monitor from the [F3: Data], [F4: Charts], [F5: Gauges] or [F6: Maps] screens.
- 12. Select Stop to stop the data logging session.
- 13. Save the log.

14. To replay the data log, navigate to the [F3: Data], [F4: Charts], [F5: Gauges] or [F6: Maps] tab and select the appropriate Playback buttons.



Pass-Thru Read a Controller

Follow these steps to read the selected controller.

- 1. Connect your FlashScan/AutoCal device to your PC and vehicle.
- 2. Turn the vehicle ignition to the *On* position (vehicle must not be cranked/running when reading).
- 3. Open the EFILive V8 Scan and Tune application.
- 4. Select the [F3: Tune] option in the left-hand pane.
- 5. On the [F2: Read] menu, select your controller(s) by using the [Auto Detect] button, or;
 - 1. Hover over the Engine Controller box, and right click on the "Right-click to select engine-controller" box and manually select the ECM.
 - 2. Navigate and select the correct controller.



6. Select the [Read] button to initiate the read operation.

EFILive Tune Tool		•	- 🗆 X
F2: Read	Controllers:	Read Controller's Operating System and Calibrations. Options: Seed/Key Security Access: Image: Image	
 F4: Properties F5: Edit F6: Cal-Flash 	CM2250 Unknown	Try Common Alternative Keys. Assume Lock May Be Faulty. Try Additional Strategies. High Speed (VPW Only). Cyclode Rest Risch When Reading Comparison UB Controllars	
F7: Full-Flash	 Read Lock/Unlock Read Quit Estimated Time Remaining: 00:00 Elapsed Time: 00:00 	Show Summary When Finished.	
	- Detailed information:		~
🔬 🖣 🤬 🖡	Open 🖌 📑 Save 🗸 🏹	Config	Close

- 7. While the ECM is reading an Elapsed time indicator, an Estimated Time Remaining indicator, and a Progress bar will display tracking the Read progress.
- 8. When the read process is complete a countdown timer will be shown. When prompted perform the following actions:
 - 1. Turn the vehicle ignition off.
 - 2. Click on the Start Countdown button to begin the countdown timer.
 - 3. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.



- 9. On the [F3: Calibration] tab, confirm Checksums are valid. Where the checksums are invalid, users should not use the file and should source a calibration file where checksums are valid.
- 10. If checksums are valid, save tune file. If this is your vehicle's stock calibration, you should ensure you make a backup of this file in case you ever need to return the vehicle to stock.

Edit a Tune File

Follow these steps to modify your ECM calibration.

- 1. Open the EFILive V8 Scan and Tune application.
- 2. Navigate to the [F3: Tune] -> [F5: Edit] menu in the left-hand pane.
- 3. Open your selected tune file.
- 4. On the [F3: Calibration] tab, confirm Checksums are valid. Where the checksums are invalid, users should not use the file and should source a calibration file where checksums are valid.
- 5. Navigate to the table(s) you wish to modify by using the Windows Explorer style navigation window.

6. Highlight a cell, multiple cells, columns, rows or the entire table and adjust the values using the calibrator editor icons.

🗛 EFILive Tune Tool (CM23	50A.ctz]		-	σ×
🚯 F2: Read	😔 🛶 😝 🐹 🚓 🐨 🐨 🗑 😰 🛟 🔮			
		<) S E2760 ×		
F3: Calibration		🖕 🔊 🗠 🖾 😹 📜 💭 📅 📅 👘 👘 👘		
F4: Properties	🔩 Calibrations 👷 Favorites	Adjust: # + + - + + + + + + + + +		
F5: Edit	V V Internal Flash	Dipolysy Units: mg/stocka: Menimum: Maximum:		
F6: Cal-Flash	Pedal To Torque Conversion Injection Pulse Conversion	197.2 N/A N/A Hard Limits. User		
👌 F7: Full-Flash	 Injection Pulses Limit Main Injection 	140.4 > Description > Scan-Link > User Notes > Provider		
F8: Authorization	 Torque To Fuel Conversion, Alternate Mode 1 Torque To Fuel Conversion, Alternate Mode 2 Torque To Fuel Conversion, Alternate Mode 3 	+ 93.6 (E2760) Torque To Fuel Conversion, Base This table converts the desired torque value vs RPM in to a commanded fuel rate (mg)st).		
PR: Scripting	Torgan To Faid Conversion, Alternath Model 4 Torgan To Faid Conversion, Alternath Model 5 Torgan To Faid Conversion, Alternath Model 9 Torgan To Faid Conversion, Alternath Model 91 Torgan To Faid Conversion, Alternath Model 13	These values will then be further adjusted by the air density adjustment tables (usually Atternate Modes 1 to 3). Anis tables: 2200 200 200 200 200 1000 200 1000 200 1000 200 100 200 100 200 100 1		
	AFR/EQRatio Limit Table	Torque To Fuel Conversion, Base mg/stroke		
	S Sile 1 Injection S Sile 2 Injection S Sile 2 Injection S Sile 1 Injection S Sile 2 Injection S Sile 7 Ext 2 Injection S Sile 1 Injection Timing S Sile 4 Mass	0 100 200 300 400 500 600 900 100 1100 1200 1500 400 CO 60 600 900 1000 1100 1200 1500 400 CO 600 902 1100 1200 1200 1200 600 600 702 802 902 1000 1100 1200 1200 600 600 702 802 1020 1400 1500 1500 600 600 702 802 1020 1400 1500 1500 600 600 702 802 1020 1800 1200 1800 1200 1800 1200 1800 1500 1500 600 600 702 800 1100 1200 1800 1500 1500 600 600 1000 1100 1200 1400 1500 1500 1500 600 </td <td></td> <td></td>		
	S = Fuel Pressure S = Turbo S = Torque Limiting S = Sensor Inputs	100 00 90 107 241 305 491 615 727 803 94 1104 1224 1344 1344 1344 1344 1344 1344 134		
	> 🥌 Operating System Patches	150 60 60 153 261 366 465 514 70.3 11.1 71.2 11.67 196.7 196.7 196.7 169 60 160 162 164 1		
	(E2760) Torque To Fuel Conversion, Base This table converts the desired torque value vs RPM in to a commanded fuel rate (mg/st).			
	These values will then be rurther adjusted by the air density adjustment tables (usually Alternate Modes 1 to 3).	2000 0.0 9.0 16.8 28.8 40.8 44.5 56.6 68.6 90.6 92.6 104.6 116.6 128.6 140.6 152.6 164.6		
	Axis tables: • E2200 Injection Core, RPM Axis, Base • E2200 Tarque To Evel Conversion, Torque Axis, Base			
<u>&</u> - <u>&</u> -	😜 Open 🖌 📑 Save 🖡 🐝 Config		C	Close

7. EFILive has developed a method to prevent the calibration data from being read out via the J1939 CAN bus. Calibrations can still be flashed to the ECM by both EFILive and other tools.

Set {B9901} to Disable and Save the tune file. Once this tune file is flashed into the ECM, the read function will be blocked, preventing EFILive and any other tuning tools from reading out the contents of the ECM. Calibrations can still be flashed to the ECM by both EFILive and other tools.

To un-block the read function, flash a tune file with {B9901} set to Enabled.

8. A range of tune file security options can be applied using the options in the [F3: Tune] -> [F4: Properties] -> Security Restrictions tab.



9. Save changes to the tune file by using the Save tuning file, Save tuning file as, or Save tuning file for AutoCal options.

If using the Save option, ensure you have a copy of your stock tune saved elsewhere.

Save tuning file as, and Save tuning file for AutoCal options automatically appends a sequence number to the filename to make it unique giving users a history of sequentially numbered files with each saved change made. A FlashScan device must be connected to save security and/or AutoCal options.

Cummins Fuel Timing Calculator

To open the CFTC, click this icon in the tool bar:



The icon is only enabled when one of the fuel timing tables is displayed for editing.

When you open the CFTC window, the table is pre-populated with the correct percentages that are required to calculate the currently displayed timing table values. That allows you to evaluate the existing injection pulse timing. After you have made any changes to the CFTC table, click the [Apply] button. Applying the changes will update the underlying fuel timing table so that the injection pulses are delivered at the timing selected in the CFTC window.

Minimum %

It is sometimes required that the minimum timing does not fall below a certain percentage. In that case, check the Minimum % check box in the lower left corner of the calculator window. And set the minimum percentage value.

Setting that value will not change any values displayed in the timing calculator, instead it will simply force the calculator to compute timing values that are never less than the percentage value specified when the [Apply] button is clicked.

For example, setting the Minimum % to 5 will force the calculator to treat all cells' values that are less than 5% as if they were 5% when computing the fuel timing.



How does it work

When fuel is injected, the injection pulse width is some number of micro seconds. Some tuners would like to set the fuel timing so that the injection pulse will start at a given crankshaft position relative to top dead center (TDC) of the piston.

The CFTC allows you to specify the percentage of the injection pulse width that will occur before top dead center (positive values), exactly at top dead center (0) or after top dead center (negative values).

For example, assuming the injection pulse width for a particular cell is calibrated at 500us (500 micro seconds), then the following percentages in the fuel timing calculator will result in the injection pulse starting at various crank shaft degrees for 1000rpm and 2000 rpm:

Fuel Timing %	Injection Start us	Degrees @1000rpm	Degrees @2000rpm	Relative to TDC
200%	1000	6.0	12.0	Before TDC
100%	500	3.0	6.0	Before TDC
50%	250	1.5	3.0	Before TDC
0	0	0.0	0.0	At TDC
-50%	-250	-1.5	-3.0	After TDC
-100%	-500	-3.0	-6.0	After TDC
-200%	-1000	-6.0	-12.0	After TDC

Looking at the second row, a percentage of 100% means that the injection pulse starts 100% of the pulse width before TDC. Since the pulse width is 500us, the injection start time should be 500us (100% of 500us) before TDC. At 1000rpm that would be 6 degrees before TDC, at 2000rpm that would be at 12 degrees before TDC.

Looking at the fifth row, a percentage of -50% means that the injection pulse starts 50% of the pulse width after TDC. Since the pulse width is 500us, the injection start time should be 250us (50% of 500us) after TDC. At 1000rpm that would be 3 degrees after TDC, at 2000rpm that would be at 6 degrees after TDC.

Related Tables

The CFTC uses values from two other related tables. Those tables will usually be different for each timing table. The names of the related tables are shown in the CFTC window's description pane. If the values in those related tables are not accurate then the calculator may not produce accurate results. For example, if you were working with the timing table E2503, the related tables are: {D0508} "Injection Pulse Conversion" and {D0782} "Fuel Pressure, Base". The first column of data in {D0508} may be calibrated to be all zeros which will cause this calculator to set the corresponding first column of data in {E2503} to be all zeros.

You may prevent the calculator from adjusting any cells by selecting only those cells in this table that you want updated before clicking on the [Apply] button. If no cells (or all cells) are selected in this table, then the entire table will be updated.

Technical details

The CFTC computes the fuel timing percentages from the fuel timing degrees using the following equation:

% = t / (us * rpm * 0.0000006)

The CFTC computes the fuel timing degrees from the fuel timing percentages using the following equation:

t =% * (us * rpm * 0.0000006)

Where:

- t is the injection timing in degrees of crankshaft rotation.
- **us** is the injection pulse width in microseconds.
- **rpm** is the engine speed.

Pass-Thru Licence and Flash a Controller

Follow these steps to license and flash the selected controller.

- 1. Open the EFILive Scan and Tune application.
- 2. Connect your FlashScan/AutoCal to your PC and your vehicle.
- 3. Turn the vehicle ignition to the *On* position, (not the Accessory position. Vehicle must not be cranked/running when flashing).
- 4. Select the [F3: Tune] option in the left-hand pane.
- 5. Click on the Open button and select the calibration file for the controller you wish to flash or license.
- 6. If tune file security has been applied to the tune file, review and accept the Security Warning.
- 7. Click on the [F7: Full Flash] options in the left-hand pane.

💩 EFILive Tune Tool [CM22	50.ctz]	
A F2: Read		Program Controller's Operating System and Calibrations (Full-Flash).
U I I I I I I I I I I I I I I I I I I I	Controller:	Options:
F3: Calibration	• • • • • • •	Seed/Key Security:
F4: Properties		ITY Stock Key ITY This Key: OTry Common Alternative Keys.
A F5: Edit	СМ2250	Assume Lock May Be Faulty. Try Additional Strategies.
📀 F6: Cal-Flash	Check	
📀 F7: Full-Flash	Full Flash Quit	Perform Test Flash Only.
>> F8: Authorization	Elapsed Time: 00:00 Estimated Time Remaining: 00:00	
F9: Scripting	Detailed information:	

- 8. Click on the Check License button. This will indicate if the controller is already licensed or needs to be licensed.
- 9. Where the controller is NOT licensed, select Activate License to license the controller.
- 10. Select Yes to license the controller or No to close this window without licensing the controller.



11. Select Yes to license the controller or No to close this window without licensing the controller.



12. Select the Full Flash button to commence the flash.

- 13. While the ECM is flashing an Elapsed time indicator, an Estimated Time Remaining indicator, and a Progress bar will display tracking the Flash progress.
- 14. When the flash process is complete a countdown timer will be shown. When prompted perform the following actions:
 - a. Turn the vehicle ignition Off.
 - b. Click on the Start button to begin the countdown timer.
 - c. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read/flash operation.

Pass-Thru OBD Functions

A variety of OBD (On Board Diagnostic) data can be obtained, cleared and/or changed from the ECM including:

- Controller information and segment part numbers.
- SAE-J1939 DTCs (Diagnostic Trouble Codes).
- Vehicle VIN.

Retrieve Controller OBD Details

Follow these steps to log the selected controller using EFILive Scan and Tune software in pass-thru mode.

- 1. Open the EFILive Scan and Tune application.
- 2. Connect your FlashScan/AutoCal to your PC and your vehicle.
- 3. Turn the vehicle ignition to the *On* position, (not the Accessory position. Vehicle must not be cranked/running when flashing).
- 4. Navigate to the [F4: OBD] -> [F2: OBD] menu option and select the [Details] tab.
- 5. Select your controller(s) by using the [Auto Detect] button, or;
 - a. Hover over the Engine Controller box, and right click on the "Right-click to select engine-controller" box and manually select the ECM.
 - b. Navigate and select the correct controller.
- 6. Click the [Read] button to populate controller data.
- 7. To reset DTCs and SRTs select Clear.

Lookup DTC

The EFILive Scan and Tune tool has an option to allow you to lookup DTC code descriptions. Navigate to the [F4: OBD] -> [F3: Lookup DTC] menu and enter your DTC code and FMI (Failure Mode Indicator) code.

Move Tune and Log files from FlashScan/AutoCal to your PC

FlashScan/AutoCal V3

Connect FlashScan/AutoCal V3 as a USB Thumb Drive to Windows Explorer

- 1. To move tune files and log files from FlashScan V3 onto your PC;
- 2. Connect FlashScan V3 to your PC.
- 3. On FlashScan V3 navigate to Options -> File System -> USB Thumb Drive.
- 4. Using Windows Explorer, locate the files you wish to copy in the correct folder of your FlashScan V3 and copy or drag the files into the desired folder on your PC.

↓ ♥ ↓ ♥ K:\EFILive\Tune					-	
Pinto Quick Copy Paste Ovew	Move Copy to v to v	New item •	Properties	Select all Select none		^ 🔮
Clipboard	Organise	New	Open	Select		
← → · · ↑	> Tune	ٽ ~	Search Tune			
EFILive (K:)	↑ Name	^	Date modifie	d Type	Size	
EFILive	Read		7/04/2020 7:4	9 AM File folde	er	
Config	📥 CM2	220.ctz	4/06/2021 3:2	9 PM EFILive T	une File 2,115 KB	
Menu	🔬 CM2	250.ctz	4/06/2021 3:2	9 PM EFILive T	une File 2,642 KB	
Scan						
Trace						
Tune						
3 items 1 item selected 2.06 MB	v					

EFILive Explorer

To move tune files and log files from FlashScan/AutoCal V3 to your PC;

- 1. Connect FlashScan/AutoCal V3 to your PC.
- 2. Open EFILive Explorer.
- 3. Navigate to the directory on your PC where you wish to save the file.
- 4. Navigate to: [F3: Data Files].
- 5. Select appropriate folder on your FlashScan device and drag the selected file to your PC.

🗣 EFILive Explorer							-		×
	ummins HD								~
E MAIN_SSD (C:)	ame	Size	Item type	Date modified					
Cummins	€CM2250.ctz	2,642 KB	EFILive Tune File	4/06/2021 3:29:18 PM					
Cummins HD									
GM Diesel									
Intel									
Program Files									
> F3: Data Files > F9: Config Files > F10: Da	ate/Time 📏 F11: Splash 👂 F12: Firm	ware							
FILive	Filename	Type	Size	Date Modified	os (Controller	Remote		
Config	<u>▲</u> CM2250.ctz	EFILive Tu	ne File 3 MB	4/06/2021 3:29:18 PM	07700062	CM2250			
Images	会 CM2220.ctz	EFILive Tu	ne File 2 MB	4/06/2021 3:29:10 PM 1	13240007 (CM2220			
Scan									
Read									
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Home Home									
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FlashScan/AutoCal HD

To move tune files and log files from FlashScan/AutoCal HD to your PC;

- 1. Connect FlashScan/AutoCal HD to your PC.
- 2. Open EFILive Explorer.
- 3. Navigate to the directory on your PC where you wish to save the file.
- 4. Navigate to: [F3: Data Files].
- 5. Select appropriate folder on your device and drag the selected file to your PC.

Note: Explorer Explorer							-	
	Cummins HD							````
MANUSD (C) ^ Image: Filtware Cummins Cummins HD GM Direst GM Direst GM Direst Image: Perflogs Perflogs Image: Perflogs V	kame ^ b _b CM2350A.dz	Size 3,366 KB	Item type EFILive Tune File	Date modified 15/12/2020 3:09:00 PM				
> F3: Data Files > F9: Config Files > F10: 0	Date/Time 💙 F11: Splash 💙 F12: Firm	ware						
Filive	Filename	Туре	Size	Date Modified	OS	Controller	Remote	
Scan	CM2350A.ctz	EFILive Tur	ne File 3 MB	4/06/2021 3:29:18 PM	07700062	CM2250		
Refresh Pree Space Home Format	ε							
						About	-	

Once tune and log files are copied from your FlashScan/AutoCal to your PC, they can be opened/viewed using EFILive Scan and Tune.



Configure FlashScan/AutoCal for BBX

There are a range of configuration files that must be installed on FlashScan and AutoCal devices before the device can be used in standalone mode (BBX).

Follow these instructions to configure your FlashScan or AutoCal for BBX.

- 1. Connect your FlashScan or AutoCal to your PC.
- 2. Open the EFILive V8 Scan and Tune application.
- 3. Select the [F5: BBX] option in the left-hand pane.

Data Logging

To configure data logging;

- 1. Select the [F2: Scan] option in the left-hand pane.
- 2. Remove any unnecessary controller configurations to ensure capacity restrictions are not exceeded.
- 3. Add your chosen controller(s) to your list;
 - a. Press the green '+' icon.
 - b. Right click on the Engine Controller box.
 - c. Navigate to Select the correct controller.
 - d. Select OK.
- 4. Click on the selected controller in the "BBL Enabled Controllers" window.
- 5. Navigate and drag the PIDs or PID folders from the Available PIDs window into the Selected PIDs window.

FlashScan/AutoCal PID Set	elections [Cummins.txt]														-		×
F2: Scan		В	BL Enabled (Control	lers						A	vailable PIDs					
	Caption Mo	odule HotKey	Description						Name		Description	Units	Group	Source	•		
A F3: Tune	CM2250 C	M2250	CM2250 Cum	mins HD	Diesel ECM	4			V 60 F	M - Enha	Manufacturer Defined DIDc			_			^
	CM2350A C	M235	CM2350A Cur	nmins Hl	D Diesel EO	CM		9		MAINQ	Main Injection Quantity	mg/	ECM - Enhar	iced ECM			
The Switch										PILOTIQ	Pliot 1 Injection Quantity	mg/	ECM - Ennar	ICEO ECM	_		
F4. SWICH										PILOT2Q	Pilot 2 Injection Quantity	mg/	ECM - Enhar	iced ECM			
_										POST1Q	Post 1 Injection Quantity	mg/	ECM - Enhar	iced ECM			
F5: DTCs										POST2Q	Post 2 Injection Quantity	mg/	ECM - Enhar	iced ECM			
								ν_7		POST3Q	Post 3 Injection Quantity	mg/	ECM - Enhar	iced ECM			
F6: Quick Setup								cebra		POST4Q	Post 4 Injection Quantity	mg/	ECM - Enhar	iced ECM			
								<u></u>	S 2	INJTIME1	Injector Time 1	us	ECM - Enhar	iced ECM			
						/			S 2	INJTIME2	Injector Time 2	us	ECM - Enhar	iced ECM			
			Selected	PIDs					S	INJTIME3	Injector Time 3	us	ECM - Enhar	iced ECM			
	Alexand .	Description		(In the	C	/				MAINSOI	Main Injection Timing	۰	ECM - Enhar	iced ECM			
	Name	Description		Units	Group	Source				PILOT1SOI	Pilot 1 Injection Timing	٥	ECM - Enhar	iced ECM			
	C RPM	Engine RPM		rpm	ECN	ECM		0		PILOT2SOI	Pilot 2 Injection Timing	•	ECM - Enhar	iced ECM			
	VSS	Vehicle Speed		km/h	PCM	ECM				POST1SOI	Post 1 Injection Timing	0	ECM - Enhar	iced ECM			
	APP	Accelerator Peda	al de la companya de	%	ECM	ECM				POST2SOI	Post 2 Injection Timing	0	ECM - Enhar	iced ECM			
	TRQDRIVER	Torque Desired		Npr	ECM	ECM			S	AIRDENL	Table Select Low	count	ECM - Enhar	iced ECM			
	TRQENG	Torque Engine		Nm	ECM	ECM		\odot	S	AIRDENH	Table Select High	count	ECM - Enhar	iced ECM			
	TRQDEM	Torque Demand		Nm	ECM	ECM		0.000		AIRDENMIX	Table Base Blend		ECM - Enhar	iced ECM			
	TRQNOLOAD	Torque No Load		Nm	ECM	ECM		<u>19</u>	S	ECMTEMP	ECM Internal Temperature	°C	ECM - Enhar	iced ECM			
	TRQEB	Torque Exhaust	Brake	Nm	ECM	ECM			S	VGTTEMP	VGT Actuator Temperature	°C	ECM - Enhar	iced ECM			
	TRQFAN	Torque Cooling		Nm	ECM	ECM			0	IAT	Intake Manifold Temperature	°C	ECM - Enhar	iced ECM			
		K								AAT	Air Intake Temperature	°C	ECM - Enhar	iced ECM			
										AMBAT	Ambient Air Temperature	°C	ECM - Enhar	iced ECM			~
									Search fo	r PIDs:							
	Channel Allocation Pe	er Controller:							Channel	a: Any 🗸 🤉	Group: All ~					🙆 ci	lear
	CM2250		32 of 128 of	hannels u	ised.											-	
									Seard								
🔬 - 🤬 -	Open	Save 🗸		ad	P	rogram 🖛	Space Require	ed for Co	onfiguration	Files: 11%						8 0	llose

Configure Tuning

To configure flashing for your chosen controller on your FlashScan/AutoCal;

- 1. Select the [F3: Tune] option in the left-hand pane.
- 2. Remove any unnecessary controller configurations to ensure capacity restrictions are not exceeded.

- 3. Add your chosen controller(s) to your list;
 - a. Press the green '+' icon.
 - b. Right click on the Engine Controller box.
 - c. Navigate to select the correct controller.
 - d. Select OK.

Configure DTCs

To configure the display of trouble codes and descriptions onto FlashScan;

- 1. Select the [F5: DTC's] option in the left-hand pane.
- 2. Select appropriate DTC options.

Quick Setup

To configure BBX settings, device settings, and configure tune files for BBX;

- 1. Select the [F6: Quick Setup] option in the left-hand pane.
- 2. Select appropriate BBX configuration options.
- 3. Edit device settings as necessary. To automatically select the most recently used controller and PID selection when FlashScan/AutoCal powers up:
 - a. Selecting the correct hardware on the [F6: Quick Setup] -> [Edit AutoCal V3 Settings] button.
 - b. In the Device Settings window, navigate to [F6: Logging] and tick the "At start-up, automatically re-select the most recently used PID list."

	Display Updates	0	Check for Updates	Check	k are							
F2: Scan	FlashScan/AutoC	al PID Se	elections [Cum	imins.txt]								
	C2 500				Quick Setup Manager							
E3: Tune	P2: Scan		BBX Quick	Setup:								
	A F3: Tune		☐ Include	e current device s e current BBX con	settings. Edit AutoCal V3 Settings							
F4: OBD	F4: Switch		RutoCal V3 Device Settings [Untitled.dat]									
	F5: DTCs		F2: G	eneral	PID Selection: ☑ At start-up, automatically re-select the most recently used PID list.							
F5: BBX	F6: Quick Setup		F3: D	isplay	Automatically select ALL external analog PIDs. (FS V2 Only)							
F6: Devices			[₽] ₽ F4: K	eypad	Automatically select ALL external digital (i.e. serial) PIDs. External Analog/Digital Inputs:							
			5: O	ptions	Filter Level 4							
F7: Licenses			F6: Lo	ogging	Data (FS/AC V2 Only):							
X			F7: BI	вх	Logging Speed: Fast (10-40 frames/second)							
F8: Tools			5 F8: S	erial I/O	Notes: Automatically add "Note 30" to log file when logging is paused/resumed. Press [OK] on FlashScan/AutoCal V2 keypad to pause/resume logging. Press [Tick] on FlashScan/AutoCal V3 keypad to pause/resume logging.							

4. Add tune files to the **Quick Setup** using the green '+' icon.

FlashScan/AutoCal PID	Selections [Untitled.txt]														-		×
								Quick S	etup Manager								
F2: Scan	BBX Quick Setup:			_													
F3: Tune	□ Include current device settings. ☑ Include current BBX configuration files.																
F4: Switch	Format CONFIG Delete all existin	File System be g tune files bel	fore copying fore copying	BBX configur	ation files t s to device.	to device.											
FS: DICS	Overwrite existin	ig tune files wi	ten copying r	lew tune file:	s to device.												
F6: Quick Setup	Tune Files 네 CM2220.ctz 네 CM2250.ctz	Туре СМ2220 СМ2250	Encrypted - -	Private - -	Lock - -	Cal-Only - -	Full-Only - -	Device License 0 0	Device Serial 0 0	Controll 0 0	Controller VIN 0 0	Target OS 0 0	Master 0 0	AutoCal 0 0	Si; 2,116 K 2,642 K	Ze (B (B	
	New Quick S	ietup 🧃	Open Quick	Setup	Progr	ram Quick Se	etup Sp	ace Required for Tun	e Files: 4.6MB								

5. Write this configuration to FlashScan or AutoCal using the [Program Quick Setup] function. The [Program Quick Setup] programs all selected Scan, Tune, Switch, and DTC options, as well as selected device settings, BBX Quick Setup selections and tune files. Once the device is programmed, FlashScan or AutoCal is configured for BBX functions.

Each option can be programmed individually using the [Program] button on each tab, or collectively using the [Program Quick Setup] option.



FlashScan/AutoCal Menu Navigation

FlashScan/AutoCal V3

FlashScan/AutoCal V3 supports two menu structures; the EFILive standard menu and the user defined menu. Where a used defined menu is not installed, the EFILive standard menu will be displayed.

Data Logging

- 1. Configure FlashScan/AutoCal V3 for BBX features if not already setup.
- 2. Connect your FlashScan/AutoCal V3 device to your vehicle.
- 3. Turn the vehicle ignition to the On position.
- 4. Navigate to the Scan Tool -> F1 Select PIDs menu option.
- 5. Select correct controller type from BBX configured controllers.
- 6. Navigate to the F1 Scan Tool -> F2 Data Logging menu option.
- 7. Select F1: Record Data to commence the logging session.
- 8. The LCD will display recording status, elapsed time, frame count and the selected PIDs.
- 9. A range of options are available while the Log is recording:
 - 1. Select \checkmark to pause/resume the log.
 - 2. Select the up and down arrows to navigate through selected PIDs.
 - 3. Select X, to stop data logging and save the logged data.
- 10. Start the vehicle and drive to record actual performance. Do not attempt to operate a FlashScan/AutoCal device while your vehicle is in motion.
- 11. Select X on FlashScan/AutoCal V3 to stop data logging and save the log file.

Read a Controller

- 1. Configure FlashScan/AutoCal V3 for BBX features if not already setup.
- 2. Connect your FlashScan/AutoCal V3 device to your vehicle.
- 3. Turn the vehicle ignition to the *On* position. (Vehicle must not be cranked/running when reading).
- 4. Navigate to the Tune Tool -> F1 Tuning -> F1 Read Tune menu option.
- 5. Select correct controller type from BBX configured controllers.
- 6. Click the \checkmark button to initiate the read operation.
- 7. While the ECM is reading a Progress bar will display for the user to visually track the read.
- 8. When the read process is complete, the saved file name will display. Select **X** to close this message.
- 9. The **Reset Controller** notification will be shown, and the controller reset process will begin.
 - 1. Turn the vehicle ignition off.
 - 2. Click on the Start button to begin the countdown timer.
 - 3. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.

License and Flash a Controller

- 1. Configure FlashScan/AutoCal V3 for BBX features if not already setup.
- 2. Copy selected tune file(s) from your PC to FlashScan/AutoCal V3 if not already copied via Quick Setup during step 1.
- 3. Connect your FlashScan/AutoCal V3 device to your vehicle.
- 4. Turn the vehicle ignition to the *On* position, (not the *Accessory* position. Vehicle must not be cranked/running when flashing).
- 5. Navigate to the Tune Tool menu and select F1: Tuning -> F3 Program Full menu option.
- 6. Navigate to the folder your tune file is located in and select \checkmark to commence the flash.
- If the controller has not been licensed by this device previously, you will be presented with an "Unlicensed Controller" message. Select ✓ to proceed with licensing the controller, or X to exit without licensing the controller.
- 8. Select \checkmark to confirm licensing the controller and commence the flash, or **X** to exit without licensing the controller.
- 9. When the flash process is complete, select **X** to close the flash completed message.
- 10. The Reset Controller notification will be shown, and the controller reset process will begin.
 - 1. Turn the vehicle ignition Off.
 - 2. Click on the Start button to begin the countdown timer.
 - 3. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.



FlashScan HD

Data Logging

- 1. Configure FlashScan HD for BBX features if not already setup.
- 2. Connect your FlashScan HD device to your vehicle.

- 3. Turn the vehicle ignition to the *On* position.
- 4. Navigate to the F1 Scan Tool F1 Select PIDs menu option.
- 5. Select correct controller type from BBX configured controllers.
- 6. Navigate to the F1 Scan Tool F2 Data Logging menu option.
- 7. Select F1: Record Data to commence the logging session.
- 8. The LCD will display the elapsed time, frame count and the selected PIDs.
- 9. A range of options are available while the Log is recording:
 - 1. Select OK to pause/resume the log.
 - 2. Select F1..F4 or Ctrl+F1..Ctrl+F4 to add "user notes" 1 thru 8 to the log.
 - 3. Select Enter to toggle between Metric and US Customary units.
 - 4. Select the up and down arrows to navigate through selected PIDs.
 - 5. Select Cancel, to stop data logging and save the logged data.
- 10. Start the vehicle and drive to record actual performance. Do not attempt to operate a FlashScan/AutoCal device while your vehicle is in motion.
- 11. Select Cancel on FlashScan V2 to stop data logging and save the log file.

NOTE: When data logging is activated you cannot return to the menu until logging is stopped.

Read a Controller

- 1. Configure FlashScan V2 for BBX features if not already setup.
- 2. Connect your FlashScan V2 device to your vehicle.
- 3. Turn the vehicle ignition to the *On* position. (Vehicle must not be cranked/running when reading).
- 4. Navigate to the F2 Tune Tool -> F1 Tuning -> F1 Read Tune menu option.
- 5. Select correct controller type from BBX configured controllers.
- 6. Click the OK button to initiate the read operation.
- 7. While the ECM is reading a Progress bar will display for the user to visually track the read.
- 8. When the read process is complete, the saved file name will display. Select OK to close this message.
- 9. The Reset Controller notification will be shown, and the controller reset process will begin.
 - a. Turn the vehicle ignition Off.
 - b. Click on the Start button to begin the countdown timer.
 - c. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.

License and Flash a Controller

- 1. Configure FlashScan V2 for BBX features if not already setup.
- 2. Copy selected tune file(s) from your PC to FlashScan V2 if not already copied via Quick Setup in step 1.
- 3. Connect your FlashScan V2 device to your vehicle.
- 4. Turn the vehicle ignition to the *On* position (not the Accessory position. Vehicle must not be cranked/running when flashing).
- 5. Navigate to the F2 Tune Tool -> F1 Tuning and select F3 Program Full menu option.
- 6. Using the arrow keys, navigate to the correct tune file and select OK.
- 7. If the controller has not been licensed by this device previously, you will be presented with the License this controller now? message. Select Yes to license the controller or No to exit without licensing the controller.

- 8. Select Yes to confirm licensing the controller and commence the flash, or No to exit without licensing the controller.
- 9. When the flash process is complete the Reset Controller notification will be shown. When prompted perform the following actions:
 - a. Turn the vehicle ignition Off.
 - b. Click on the Start button to begin the countdown timer.
 - c. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal functions after a read/flash operation.



AutoCal HD

Data Logging

- 1. Configure AutoCal for BBX features if not already setup.
- 2. Connect your AutoCal device to your vehicle.
- 3. Turn the vehicle ignition to the *On* position.
- 4. Navigate to the Select PIDs menu option and select OK.
- Select the correct controller type from BBX configured controllers and make a selection using the OK button. Where only one controller is in the BBX, executing the Select PIDs option will make that selection and return to the menu.
- 6. Navigate to the Record Data option and select OK to commence the logging session. AutoCal will display the following to commence the logging session;
 - a. Creating Log File.
 - b. Starting Scanner.
- 7. The Time indicator will increment to indicate recording has commenced.
- 8. Start the vehicle and drive to record actual performance.
- 9. Stop the vehicle and turn the ignition off prior to saving the log on AutoCal.
- 10. A range of options are available while the log is recording.
 - a. Select OK to pause/resume the log.
 - b. Select Next to scroll forward through the list of PIDs.
 - c. Select Prev to scroll backwards through the list of PIDs. Scrolling back to the very first entry displays "Exit", when "Exit" is displayed, click OK to stop data logging and save the log.

Read a Controller

- 1. Configure AutoCal for BBX features if not already setup.
- 2. Copy selected tune file(s) from your PC to AutoCal if not already copied via Quick Setup in step 1.
- 3. Connect your AutoCal device to your vehicle.
- 4. Turn the vehicle ignition to the *On* position (not the Accessory position. Vehicle must not be cranked/running when flashing).
- 5. Navigate using the arrow keys to the Read menu option.
- Select the correct controller type from the previously configured BBX controllers in the Read 1-5 options. (NOTE: Unused Read options are hidden on the AutoCal Simple Menu).
- 7. Click the OK button to initiate the read operation.
- 8. When the read process is complete the following messages will be displayed.
 - a. Saving Wait
 - b. Checking
 - c. Saved as with file name displayed on the screen.
- 9. The Ignition Off NOW! notification will be shown, and the controller reset process will begin.
 - a. Turn the vehicle ignition Off.
 - b. Click on the Start button to begin the countdown timer.
 - c. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.

License and Flash a Controller

- 1. Configure AutoCal for BBX features if not already setup.
- 2. Copy selected tune file(s) from your PC to AutoCal if not already copied via Quick Setup in step 1.
- 3. Connect your AutoCal device to your vehicle.
- 4. Turn the vehicle ignition to the *On* position (not the Accessory position. Vehicle must not be cranked/running when flashing).
- 5. Navigate using the arrow keys to the Full 1-5 option. (NOTE: Unused Prog/Full options are hidden on the AutoCal Simple Menu).
- 6. Select the correct tune file from those listed and select OK.
- 7. If the controller has not been licensed by this device previously, you will be presented with the License controller message.
- 8. Select OK or Prev to exit without licensing the controller.
- 9. Select OK to license the controller and initiate the flash operation or Prev to exit without licensing the controller.
- 10. When the flash process is complete the Ignition Off NOW! notification will be shown. When prompted perform the following actions:
 - a. Turn the vehicle ignition off.
 - b. Click on the OK button to begin the countdown timer.
 - c. DO NOT turn the vehicle ignition on until the countdown timer expires. This time is critical to allow the ECM to perform internal, initialization functions after a read or flash operation.



XCal File Conversion

To assist tuners who have existing Cummins HD tune file libraries in *.xcal or *.0? file formats EFILive has developed a conversion tool called "EFILive XCal" to convert these tune files for use in EFILive software.

*.xcal files are files with an extension of "xcal".

*.0? files are files with extensions similar to: *.00, *.01, *.02, *.03, etc.

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.

Please refer to the <u>Cummins HD File Conversion Guide.pdf</u> for more information.



Support

Trouble Shooting

Should users encounter problems with the EFILive software, FlashScan or AutoCal hardware they should:

- 1. Confirm software, firmware and boot block versions are up to date.
- 2. Check the stock file was read from your vehicle. Where the stock file is not read from the vehicle, vehicle specific information will be missing which may cause running issues or vehicle functions to stop working.
- 3. Check that checksums are valid.
- 4. Remove/isolate all after-market devices including mobile phone adapters, aftermarket equipment (audio systems, security, remote start etc.) and any devices wired into the OBD port that may interfere with vehicle communications.
- 5. 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.

Error Codes

If an error occurs while using AutoCal, users can look up the error code description in the EFILive V8 Scan and Tune software.

The [F8: Tools] -> [F8: Error Codes] menu item provides an error code lookup function, and the "EFILive Error Codes.pdf" document accessed by selecting the Windows Start Icon and navigating to Program Files->EFILive->V8->Documents->EFILive Error Codes.pdf is also available. Both options provide error code descriptions, causes and actions.

Should the issue not be resolved after reviewing the Error code list, end users should contact their Tuner for support.

Checksums

Checksums perform a vital role in ensuring the integrity of the data in the tune file. There are two main reasons that checksums display as invalid:

- 1. The data in the file is corrupt and MUST NOT be flashed into a controller.
- 2. The data in the file has been modified with a software package that did not update the checksums such as a hex editor.

Do not correct the checksums unless you know the tune file was modified outside of the EFILive software and that the modifications are correct and accurate.

If you correct the checksums of a file with corrupt data you are merely masking corruption. If you flash a corrupt file into a controller, you risk damaging the controller and/or causing the vehicle to operate incorrectly.

Cummins HD Vehicle Specific Information

The ECM contains information specific to each vehicle which is usually programmed at the point of manufacture. This includes VIN, tire sizes, PTO and/or other operating options.

Where a tune file from a different vehicle is flashed into the ECM, the vehicle specific information will be reprogrammed with the information contained in the tune file.

This may cause running issues or vehicle functions to stop working. This can be corrected by flashing the correct base file back into the ECM which will restore vehicle functionality.

Failed Flash Recovery Methods

In the event that an ECM fails during the flashing process, recovery methods exist to restore the ECM.

Flash Base with without tune file security restrictions.

In most instances, simply retrying the flash process will return the ECM to working order.

In the instance where tuners apply security restrictions to a tune file, including locking to the controller serial number, and the flash fails, you must try to recover the ECM with a file that has no security restrictions in place (e.g. stock tune) before attempting to reflash a file with security restrictions.

ROM Boot Recovery

In some flash failure instances the ECM may stop responding and cannot be recovered to normal operation by simply retrying the flash.

Such situations may occur if the ECM was flashed with a non-compatible operating system, or where the failed flash occurred right at the end of the process but the ECM thinks it completed.

In these situations the ECM is usually only recoverable by forcing the ECM into ROM Boot Recovery mode. Specialized bench programming equipment, such as the BenchForce PowerBlock IV with ROM Boot Switch is required to perform this task.

Tips to recover the ECM using this equipment includes:

- 1. The ECM must be powered down. (IGN switch off but battery power connected.)
- 2. Hold the ROM Boot switch on.
- 3. Power the ECM and bench equipment.
- 4. Attempt to flash the ECM with your recovery file.
- 5. Once the flash is under way you can turn off the ROM Boot switch.

Trace Files

V8 Scan and Tune *.htx files

When V8 Scan and Tune software reads or flashes a controller the details of the read/flash process may be saved in trace files for diagnostic purposes.

In addition, users can manually save trace files where options do not perform the desired outcome.

To manually generate a trace file, generate the error in V8 software, then open the EFILive Control Panel and navigate to [F8: Trace] and select [Save Trace]. Users can set the trace file and save location during this process.

Automatically generated trace files are created on your PC or laptop in the folder: \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.

FlashScan/AutoCal V3 *.xalm files

Trace files are automatically saved where an error message is presented using the device in BBX mode. Users can manually save trace files where options do not perform the desired outcome, including for pass-thru functions.

To manually generate a trace file on FlashScan/AutoCal V3 navigate to Scan Tool -> F3: Scan Options -> F1: Save Trace.

FlashScan/AutoCal V3 maintains 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.

Trace files are located in the EFILive -> Trace folder on FlashScan/AutoCal V3. Trace files are named using the following naming convention:

yyyymmdd_hhnnss_<desc>.xalm, 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.
- <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.

FlashScan V2 Trace Files

Trace files are automatically saved where an error message is presented using the device in BBX mode. Users can manually save trace files where options do not perform the desired outcome.

To manually generate a trace file on FlashScan V2 navigate to F1 Scan Tool -> F3 Scan Options -> F1 Save Trace File.

FlashScan V2 maintains 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.

Trace files are located in the Scan folder on FlashScan V2. It will be named USR_xxxx.efx, where xxxx is the unique file counter number.

AutoCal V2 Trace Files

Provided enough space exists in the [Data] file system of AutoCal V2 trace files are automatically saved where an error message is presented using the device in BBX mode. Users can manually save trace files where options do not perform the desired outcome.

To manually generate a trace file on AutoCal V2 navigate to:

- 1. AutoCal (standard menu): Save Trace File
- 2. AutoCal (advanced menu): Scan Tool -> Save Trace File

AutoCal V2 maintains 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 trace file will be saved in the Scan folder on the device. It will be named USR_xxxx.efx, where xxxx is the unique file counter number.

Knowledgebase

The <u>EFILive Knowledgebase</u> provides a detailed resource on how to configure and use your EFILive software and hardware.

EFILive Authorized Dealer

If after reviewing this guide further assistance is required please contact the EFILive Authorised Dealer from whom you purchased your product. They are your first point of contact for EFILive support related inquiries.

How to Tune?

EFILive is tuning software and hardware - it is not a tune. Together the software and hardware give users the tools to write tunes. EFILive does not provide tune files, tuning advice or support, but do provide software support and hardware support.

If your question is in relation to the actual tuning of your vehicle (e.g. how to gain performance, economy etc.) then please ask these questions on the EFILive Forum (<u>http://forum.efilive.com/</u>).

EFILive Service Desk

Should you require additional assistance after using this support guide, please start a ticket on the <u>EFILive Service Desk</u>. Please include the following information:

- 1. Dealer Name.
- 2. Device type.
- 3. Serial Number and Auth Code.
- 4. Your computer operating system.
- 5. Software and firmware versions.
- 6. Trace files.
- 7. Detailed information about your issue.