

Cummins 5.9L CM849 CSP⁵ User Guide

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Introduction

This document is intended to assist EFILive customers with the basic operations and steps necessary to setup EFILive's CSP⁵ custom operating system for the Cummins CM849 ECM.

Additional Support Resources

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

If your question is in relation to the actual tuning of your vehicle (i.e. how to gain performance, economy etc.) then please ask these questions on the EFILive Forum (<u>http://forum.efilive.com/</u>). EFILive does not provide support or assistance for the actual tuning of any supported vehicles.

Software Version Overview

EFILive presently has two major software versions (V8 and V7) that service different parts of the tuning and scanning process. The V8 software is undergoing significant development and will eventually supersede V7 entirely for FlashScan V2 customers. For the moment, however, both versions are required.

The following is a brief view of the activities that are performed with the different software versions:

Software Version	Purpose
V8	 Reads and Flashes the Dodge Cummins ECM
	 Maintaining the bootblock and firmware versions on
	the EFILive FlashScan V2 and AutoCal devices.
	 Configuration of FlashScan V2 and AutoCal devices
	for CSP ⁵ tune switching and EDA data loggiing
	 Standalone logging to FlashScan / Autocal.
V7	 Modifications to the ECM calibration are made using
	the V7 Tune Tool application. The modified
	calibration is then flashed into the ECM (again using
	V8).
	 Logging of real time data from the vehicle is done
	using the V7 Scan Tool application.

What is EFILive CSP⁵?

EFILive's CSP⁵ custom operating system for the Cummins CM849 ECM allows customers to be able to switch 'on the fly' between 6 different tunes, all stored in the ECM's flash memory.

There are five tunes accessible through CAN bus switching, and a sixth tune that is switched using an input on one of the ECM's connectors.

Having multiple tunes instantly accessible means changing tunes to suit different driving conditions no longer requires the ECM to be reflashed each time you choose to run a different tune. (eg. racing, towing or power limiting). Simply build up all the tunes you need, flash the ECM once and then select your desired tune through your EFILive hardware (or other approved switching devices) at any time.

There is also the ability to have user defined control over an output pin on the ECM should you need to switch a relay or warning lamp under certain operating condition.

CSP⁵ delivers scanning enhancements to customers via Enhanced Data Acquisition (EDA). EDA, EFILive's custom scanning mode is the first of its kind and aims to simplify the task of information sharing between users as every individual data parameter has been selected with tuning feedback in mind. EDA allows customers to log 45 individual data parameters specifically chosen to complement tuning at up to 50 frames per second for V8 BBL & V7.5 pass through logging.

EDA scanning is only available on CSP⁵ upgraded ECM's.

CSP⁵ Upgrade Checklist

In order to upgrade your existing tune to CSP⁵, there are some things you need to check first.

 EFILive has made CSP⁵ conversions only for certain factory ECM Operating Systems (OS's), most (if not all trucks) will have been updated at the dealership to one of these later OS's at some point. If you come across a truck that has not, you will need to upgrade your base file first. EFILive will not be offering CSP⁵ on older or obsolete OS's.

Below is a list of the OS's available for CSP⁵ upgrading, essentially the last three factory updates per year model.

2006	2007
11352409	11450107
11352601	11450201
11352602	11450202

 If the truck has had a different tuner on it in the past (ie not EFILive) then the conversion process may fail. EFILive highly recommends customers source a good known base file for CSP⁵. This may involve either a dealer flash, or obtaining a suitable file from your chosen tuner.

EFILive cannot always detect the presence of other tuners in files, if a situation occurs where EFILive's modifications 'clash' with other tuners modification it might result in a bricked 'brain dead' ECM that cannot be recovered.

- 3. You have to be running the following (or higher) software versions.
 - 1. EFILive V8.2.2.236 or later
 - 2. FlashScan V2 / AutoCal Firmware 2.07.51
 - 3. EFILive V7.5.7.244 or later

The latest software versions are available for download from EFILive's website.

4. All previous beta versions of CSP5 will no longer work with the software & firmware versions listed above. Those software & firmware versions, plus this document are for CSP5 versions 1.01 and higher.

Upgrade Operating System to CSP⁵

Important: Ensure your FlashScan V2 / AutoCal is plugged in to the PC's USB port prior to starting V7.5.

Using the EFILive V7.5 Tuning Tool, open your tune and click on the 'Upgrade OS' tab.

Calibration Permissi	ons VIN	Comments	History	Out of Range	Modifications	Upgrade OS	Conversions
Select custom op	erating sy	/stem:					
Apply Upgrade	CSP5 v1.	01 Custom	Operati	ing System			
, they obding	CVN Calc	ulation Res	store				

Select the 'CSP⁵ v1.01 Custom Operating System' option and click on the 'Apply Upgrade' button, you will then be asked to confirm the operation.

Save the file with a new name, *File > Save As*. Maybe something like... 'My Truck Base CSP5 Conversion'.ctz .

Once the file has been saved with its new name, close the file down, *File > Close Tuning File*.

Reopen the file so EFILive will recognise the file is a CSP^5 converted operating system. Please also take note of the new operating system (OS) number of the CSP^5 converted file. Eg, <u>11</u>352409 now becomes <u>55</u>352409

ients	Histor	y Out of	Range	Modific	ations	ions Upgrade OS		Conversions				
	Calibra	ation Ident	ifiers:									
]		OS:	5535260)1	0	s id:	N/A					
	Ca	alibration:			I	BCC:	N/A					
Calibration Definition File (*.cal):												
		Name:	5535260	1.calz			Disabl	e Checksums				
		Version:	7.30			Date	June 18	8th, 2013				
	ID	С	hecksum	Note:	S							
5535	2601	\$7F	A36C7B									

EFILive automatically populates the new CSP⁵ tables with factory values during the upgrade to get you started. On modified engines these may not be suitable settings, you may need to copy your own tables in to the new CSP⁵ section(s).

Any existing tables from your old converted tune are now located in the "CSP⁵ Program #5" folder.

Once you have made the necessary changes to your individual tunes you can reflash the ECM using V8 Scan and Tune as you normally would flash a Cummins ECM.

Please Note: CSP⁵ tunes cannot be read out of the ECM once flashed in.

Tune Features of CSP⁵

All tune features of CSP^5 are accessible via the V7 Tune Tool application.

Tune Switch Password

Users may restrict tune selection by adding a password to move between tune selections to prevent unauthorized switching between tunes 1 to 5.

Before switching between tune selections, users would need to enter in the password (1 to 9999). If the password is correct, the tune will switch, if it is incorrect the tune will not switch.

It should be noted that not all switching devices may support this function, however EFILive's own FlashScan V2 and AutoCal hardware does.

To enable the tune switch password, users need to input their chosen password in the calibration. As the calibration description states, if the password = 0 then there is no password prompt given to the user when switching tunes.



NOTE: Tune switch password will not restrict the activation of CSP⁵ Tune 6, Switch via ECM Input (labelled CSP⁵ Program Switched).

CSP⁵ Output Driver

The CSP⁵ custom OS allows you to reconfigure the 'Intake Air Heater" (IAH) Output for other purposes that may be useful for racing, such as turning on a shift light, or turning on or off a relay under certain conditions.

Each controlling parameter can be enabled or disabled. For example if you only wanted to have a warning lamp come on above 3,000 RPM and above 45 MPH you would enable both those parameters and set the values accordingly.

As this function shares the same output as the factory IAH circuits you should not use this function if the vehicle still has this fitted. To ensure you don't accidentally enable these functions with the IAH system still in place you must also let the ECM know the IAH system is not fitted. This is done by setting the calibration '*{F1185}* Intake Air Heater Option' to disabled.

Only use the CSP⁵ Output Driver if the IAH system had been removed.

The output is on (Connector #2, Pin6), when turned on the ECM applies 12V to this output, so if you are wiring in a relay or lamp the other wire needs to be connected to Negative (Ground).

Group: (All)	0	F	ossible values:	Description	User notes		
R Calibrations 🕢 Favorites			Disabled	Enabler for (A	. <u>9633}</u> "Main Timin	g, Cranking	j"
 Calibrations EFILive Custom Calibrations Parameters CSP5 Program #1 CSP5 Program #2 CSP5 Program #3 CSP5 Program #4 CSP5 Program #5 			Enabled	- Disabled - Enabled	wing values may b	e enterea ir	ito this tadie:
CSP5 Program Switched			C	SP5 Output	Minimum RPM	Check	
Parameters Action of the second sec		ameters	Description [A9643] CSP5 Outpu [A9648] CSP5 Outpu [A9644] CSP5 Outpu [A9649] CSP5 Outpu [A9645] CSP5 Outpu [A9646] CSP5 Outpu [A9646] CSP5 Outpu [A9641] CSP5 Outpu	It, Minimum RP It, Minimum RP It, Minimum Sp It, Minimum Sp It, Minimum Thr It, Minimum Ra It, Minimum Ra	M Check M eed Check eed ottle Check ottle il Pressure Check il Pressure	Value Enabled 6000 Disabled 10 Disabled 20.0 Disabled 40.0	
Barramatarra	_	ä	{A9647} CSP5 Outpu	ıt, Minimum Bo	ost Check	Disabled	
Parameters			{A9642} CSP5 Outpu	it, Minimum Bo	ost	100.0	
{A9643} CSP5 Output, Minimum RPM Check	^		{A9648} CSP5 Outpu	it, Brake Switch	n Check	Disabled	

Connector #2 is the smaller connector of the two on the ECM.

CSP⁵ CAN Tunes

The CSP⁵ tunes labelled "Program #1 to Program #5" are all switched via a device on the CAN bus.

Each one of these programs has duplicate sets of tables for you to alter. Program #1 to Program #4 has some 'stock' values inserted in to the maps; Program #5 contains the values you already had in the standard OS maps prior to the CSP⁵ conversion.

It should be noted that whenever the ECM is reflashed it will default to using CSP^5 Program #1.

Group: (All)	0	mm3 Fuel	(0.0) Pressure	e . (9.0)						Rotate	using ri	ight mou	use butt	on			
 Calibrations Favorites Calibrations EFILive Custom Calibrations Pedal Position to Desired Fuel (Normal) Pedal Position to Desired Fuel (Normal) Pedal Position to Desired Fuel (Transient) Main Injection Pulse Pilot Quantity, Air Density Adjust 1 Post Quantity, Air Density Adjust 1 Fuel Limiter, Baos Fuel Limiter, Base Table Main Timing, Base Table, Air Density Adjust 1 Main Timing, Base Table, Air Density Adjust 2 Main Timing, Base Table, Air Density Adjust 3 Main Timing, Base Table, Air Density Adjust 4 Main Timing, Base Table, Air Density Adjust 4 Main Timing, Base Table, Air Density Adjust 4 Pilot Timing, Base Table, Air Density Adjust 4 Post Timing, Base Table, Air Density Adjust 1 	E		High Med Low				80.0	44.0	33.0 n3	12.0	0.0	10.0		0.0 Duel Pres	40.0 sure .		- 6000 - 4000 - 2000 - 0
Fuel Pressure, Air Density Adjust 1 Fuel Pressure Reg, Base Duty Cycle Auto Transmission Auto Transmission Auto Status Auto Transmission Auto Conversion Auto CSP5 Program #2		m3 	0.0 1.0 2.0 5.0 12.0 15.0 20.0 25.0 30.0 33.0 33.0 35.0	9.0 1 0 0 0 1 0 1 0 1 0 1 0 1 0 1 0 2 0 2 0 2 0 2	15.0 3 0 590 5 784 0 289 2 496 1 615 3 819 1 2038 1 244 1 385 1 479 1	20.0 0 407 513 732 883 1050 1159 1323 1477 1646 1766 1858	25.0 287 378 581 704 837 929 1063 1195 1359 1481 1555	30.0 259 333 482 595 712 790 911 1023 1165 1284 1359	40.0 160 264 373 457 560 621 720 817 935 1037 1102	50.0 160 213 312 383 460 526 604 690 775 870 933	60.0 160 200 284 351 398 455 539 602 686 742 817	70.0 160 186 263 313 369 398 490 544 608 657 694	80.0 160 160 243 289 351 374 426 501 552 580 599	100.0 0 160 227 261 315 348 381 424 486 517 534	110.0 160 160 226 257 301 342 381 415 451 486 507	120.0 160 160 222 248 288 321 366 396 432 456 480	140.0 160 160 215 235 265 290 345 377 407 425 437

CSP⁵ Tune 6 - Switch via ECM Input

The CSP⁵ OS also has the provision for one tune to be switched via a spare input pin on the ECM rather than the CAN bus.

When the ECM detects a ground signal on ECM plug C2, pin 38 it will switch to this tune. This tune will override all CAN based CSP⁵ programs, even when the tune switch password is active. When the switch is not grounded the ECM will revert to the previously selected CAN based CSP⁵ tune.

This function may be useful in racing situations where you only want a certain tune to become activated when something else switches, for example a Nitrous relay. When the Nitrous relay is grounded the ECM will automatically change to this tune for you.



Setting up FlashScan V2/AutoCal for CSP⁵ using V8 Scan and Tune

Tune Switching

With your FlashScan V2/AutoCal plugged in to a USB port, open up V8 Scan and Tune and click on the 'F5: BBX' option.

👰 EFILive Scan ar	nd Tune
File Edit View	Help
	EFILive Scan and Tune
F2: Scan	Display Updates Updates
۵	Quick Start:
F3: Tune	Tune Filename
i	
F4: OBD	
F5: BBX	

Click on the button that says "F4: Switch"

;
ins CSP5 Switchable Tune Names:
the switchable tune names (up to 16 characters) to be yed by FlashScan/AutoCal for Cummins switchable tunes.
1: Stock Tune
2: Tune 2
3: Tune 3
4: Tune 4
5: Tune 5

Enter in the Tune names as they will appear on the FlashScan V2/AutoCal LCD screens.

To switch tunes after powering off your FlashScan V2/AutoCal, the 'CMB' PID group needs to be selected. If you do not do this, switching will fail until the CMB PID group is selected. To automate this function each time FlashScan V2/AutoCal is powered on, in V8 click on F6: Devices, then F6: Logging and tick the box that gives the option to automatically re-select PID list, as shown below.



EDA Data Logging

Remove any existing PID groups for the 5.9L Cummins previously selected to ensure the scan rates remain as high as possible.

The EDA PID group aims to simplify the task of information sharing between users as every individual data parameter has been selected with tuning feedback in mind. If you choose to log additional data streams alongside the EDA stream it may slow the data logging rate down by as much as 70%.

Below is what a blank FlashScan V2/AutoCal would look like, it's ok to have PID groups already in there for other controllers, however for maximum scan rates existing 5.9L CMB PID groups should be removed.

	-	BBL Enal	_		Available PIDs			
F2: Scan	Caption	Module(s) HotKe	y Description			•	Name	Description
A F3: Tune						0		
F4: Switch								
F5: DTCs						V7		
						6.92		
		Cal	acted DIDs					
	Name	Description	Units	Group	Source			

To add the CMB controller to your list;

- Press the green '+' icon, which will open a second window where you can choose the controller types, or
- Right click on the first window and select 'CM849 Cummins Diesel ECM', then press OK.



Click on the CMB Enabled Controller, then the EDA 1 sub folder, as per the screen below.

Hold the left mouse button down on the EDA folder icon and drag it in to the 'Selected PIDs' window. This will copy over all the EDA PID's within that folder.

ridsnocdh/AutoCal P	TD Selections [Option:	s.txtj	DDI Ench	alad Contro	llore					Available DIDe	
F2: Scan			BBL ENdD	pied Contro	ners					AvdiidDie PIDS	
	Caption	Module(s)	HotKey De	escription				Name		Description	Unit
A E21 Tuno	CMB	CMB	C	M849 Cummi	ns Diesel EC	M		Þ 🗧	EDA 1	Enhanced Data Acquisition 1	
A rs. rune								▷ 🗧	Generic 1	General	
								⊳ ≦	Generic 2	Pressures and Temperatures	
F4: Switch								▷ 🕤	Generic 3	Instrumentation	
								▷ 🗧	Generic 4	Emissions Compliance	
ALC: DTO:							\bigcirc		Enhanced 1	Fuel Balanace Rates	
FS: DICS									Enhanced 2	Pedal, Water in Fuel, Baro	
							V7		Enhanced 3	Boost, RPM, Temperatures	
									Enhanced 4	Air Temp, Battery, Fuel Tank	
							top:		Enhanced 5	Fuel Pressure, Speed, A/C, Trans .	
									Enhanced 6	Trans, TTVA, Cruise	
									Enhanced 7	Fuel Injectors	
									Calculated	Calculated BIDs	
			Sele	ected PIDs						External Analog DIDs	
						-		6	Digital	External Digital/Serial PIDs	
	Name	Description		Units	Group	Source		Þ	Dvno	External Dyno PIDs	
								Þ	FPE	External Fleece Data Logger PIDs	
						▶ 🕏 FDA 1	$\mathbf{\Theta}$				
						+ Copy					
						, copy	C				
							523				
							Ş				

After copying...

FlashScan/AutoCal PID Se	lections [Untitled.txt	1								
F2: Scan		BBL Enabled	Control	lers					Available PIDs	
	Caption	Module(s) HotKey Descripti	ion				Name		Description	
F3: Tune F4: Switch	CMB	CMB CMB49	Cummir	IS Diesel EC	1	0 0 7 7 8		EDA 1 Generic 1 Generic 2 Generic 3 Generic 4 Enhanced 1 Enhanced 3 Enhanced 4 Enhanced 4 Enhanced 6 Enhanced 6	Enhanced Data Acquisition 1 General Pressures and Temperature Instrumentation Emissions Compliance Fuel Balanace Rates Pedal, Water in Fuel, Baro Boost, RPM, Temperatures Air Temp, Battery, Fuel Tani Fuel Pressure, Speed, A/C, Trans, TIVA, Cruise Timing, Engine Status, Jide	1 25 C Trans
		Selected	PIDs					Enhanced 8 Calculated Analog	Fuel, Injectors Calculated PIDs External Analog PIDs	
	Name	Description	Units	Group	Source		▷ 🧧	Digital	External Digital/Serial PIDs	
	 VSS_F CMDF INTIM AIRDE AIRDE TP_F FDRAT TPC_F BOOS TOS_F TTVAD TTVAP 	Vehick Speed Main Injection Quantity Uncom. Main Injection Timing Air Density Table Select Ling Driver Throttle Position Fuel Delivery Rate Transmission Pressure Gauge Transmission Output Shaft Sp Transmission Pressure Gauge Transmission Pressure Actual TTVA Position commanded	km/h mm3 count count % g/s kPa kPa kPa kPa kPa % o	EDA 1 EDA 1	ECM ECM ECM ECM ECM ECM ECM ECM ECM ECM		≥	FPE	External Reece Data Logger	PIDs

Please note: Individual PID's cannot be added / removed from the EDA scan group, trying to do so will not improve logging speeds.

Write this configuration over to the FlashScan V2/AutoCal using the Program function as shown below. To ensure everything is correct, EFILive recommends you should choose the "Program ALL Required Data (Slower)" Option for initial setups.



Once the device is programmed, FlashScan V2/AutoCal is configured to log data from the ECM using EDA, as well as switch tunes.

Data Logging with V7.5 Scan Tool

To perform the tasks below you should have your FlashScan V2/AutoCal device connected to your vehicle. Note: Data logging with V7.5 is not supported with AutoCal hardware.

The first thing you need to do is select the correct ECM type to log, in this case the 'CMB CM849' ECM is what you need. Select this option and press OK.



Just like when setting up the V8 PID's you need to make sure that the EDA PID group is the only thing selected before logging. If you have other selections (or warnings like the screenshot below) the logging will either fail to start or be a lot slower than expected.

🔒 🚄 📱 📲	PID file: Default N	Metric.pid		
🔽 Supported	System: (All)	•		
Pre-defined PID Groups		Comments		
🖌 General				
🚦 Pressures and Temperatures		WARNING: Only some PIDs in this group		
 Instrumentation 				
Emissions Compliance				
Fuel Balanace Rates				
Pedal, Water in Fuel, Baro				
Boost, RPM, Temperatures				
Air Temp, Battery, Fuel Tank				
Fuel Pressure, Speed, A/C, Tr	ans Temp			
🔵 Trans, TTVA, Cruise				
🔵 Timing, Engine Status, Idle				
 Fuel, Injectors 				
EFILive EDA Scan				

In the situation like above you should create a new PID selection group, further details on how to do that can be found in the V7.5 user manual, however we will give a quick overview on the following pages. First create a new blank PID selection file by clicking the 'Clear Existing PID's' button.



The Pre-Defined PID Groups should now look like this



Double click just the 'EFILive EDA Scan' PID group.



It would be worth saving this configuration with a new name for easy reference later on. Click on the 'Save PID selection' icon, and rename (eg ' CMB EDA').



You are now ready to monitor or log data from the ECM in real time. Both of these operations can be performed using the Yellow and Red buttons at the bottom of the screen.

1	TPC_F	Transmission Press	sure Commanded	0.0	kPa	0.0	0.0	0.0	CM.TPC_F	CMBEDAScan	
1	1 TPSPMW_F Transmission Pressure Solenoid PWM		0.0	%	0.0	0.0	0.0	CM.TPSPMW_	F CMBEDAScan		
1	VSS_F	Vehicle Speed		0.0	КМН	0.0	0.0	0.0	CM.VSS_F	CMBEDAScan	
Scan	mode: Unknown	n	PIDs:	C	hannels:						
Scan	mode: Unknowr	n	PIDs:	C	hannels:						
Scan <	mode: Unknowr	1	PIDs:	C	hannels:					€: * M ₪	« II 🧿 🔴

Whilst the laptop is connected to the FlashScan V2/AutoCal device and data logging tune switching will not work from the keypad, you have to stop logging first.

Switching Tunes with FlashScan V2/AutoCal

To switch tunes via the FlashScan V2/AutoCal, the device must first be configured for switching, and a CSP⁵ tune file flashed into the ECM, as detailed above. Once configured, navigate the menu like so (FlashScan V2 samples shown)...



Then F3 Switchable Tunes



Now you will see your Tune Selections.



Simply press the 'Ok' button to select that tune. If it was successful you should see confirmation of that on the screen.



You do not need to reselect the tune once the engine is shut down; the ECM 'remembers' which tune you previously selected.

Occasionally the ECM and FlashScan V2/AutoCal may get out of sync when switching tunes if the trucks ignition was turned off but the FlashScan V2/AutoCal remained powered up. When this occurs the following message will be displayed on the LCD screen.



If you do see that error simply try to switch the tune again.

Data Logging with FlashScan V2/AutoCal

From the Main Menu, choose F1 Scan Tool...



If you haven't previously select the 'CMB' PID's you need to do so...



Then 'CMB' and press Ok Select PID List CMB

Now you can choose to Record Data or Display Data (display data shown below).

FCADCALF	70×
FCADCC_F	<u>0</u> ×
FPRC_F	34.2 ^{MB}
FPA_F	189.8MPa

Please note: When data logging is activated you cannot return to the tune selection menu unless logging is stopped.

Integrating CSP⁵ with Approved 3rd Party Products

Integration of EFILive's proprietary CSP⁵ custom operating system with 3rd party products is restricted to approved providers, many of which are listed on the <u>www.efilive.com</u> website. EFILive recommends that customers confirm that their chosen integration product is approved for use.

To setup an approved integration product, users should:

- 1. Convert their base file to a CSP⁵ operating system, as described in this document.
- 2. Edit tune parameters as necessary and save the file using the V7 Tune Tool application, as described in this document.
- 3. Flash their modified file into their ECM using the V8 Scan and Tune application as described in this document. (Specific selection of 3rd party product is NOT required in tune file).
- 4. Setup the 3rd party device as per the manufacturer's instructions.

Troubleshooting

Should users encounter problems with upgrading to CSP⁵ they should:

- Confirm V7, V8 firmware and bootblock versions match the CSP⁵ minimum requirements (listed above) using these instructions <u>Finding FlashScan &</u> <u>AutoCal Bootblock and Firmware versions</u>
- 2. Confirm CSP⁵ file was upgraded to new operating system number, as sequenced above.
- If you require assistance in reading, flashing or editing tuning parameters on your controller it is recommended you read the <u>Cummins 2006-2009 Quick</u> <u>Start</u> guide which can be found in your V8 installation under documents, or the Documentation section of the EFILive website.
- 4. If you require assistance in setting up FlashScan V2 or AutoCal standalone features (BBX), it is recommended you refer to the <u>EFILive V8 Reference</u>.
- 5. If you are concerned your device is not switching between tunes, edit your tunes to see a notable difference (ie Pedal to Desired Fuel table), reflash and then test. Also note the EDA data stream has a parameter that indicates which tune the ECM is running.