



Cummins ECM Reference Notes

Ross Myers

Cummins ECM Reference Notes

© 2012 [EFILive Limited](#)
All rights reserved

First published
02 January 2012

Revised
11 July 2012

Introduction

This document should be used as a reference for Cummins ECM specific operational functions that all tuners should be aware of.

Important: References made in this document refer to functions only found in EFILive software versions:

V7.5.7.211 or higher

V8.2.1.203 or higher

Any software versions older than this will not have functions discussed in this document. If your software is older than the versions listed above please download and install the latest versions from the EFILive website.

Table of Contents

Introduction	1
Table of Contents.....	1
Warnings in EFILive	2
Incomplete File after reading (B9999):.....	2
WARNING: Checksum is disabled!:.....	3
What is a Checksum (CVN)?	3
Restore Checksum Calculation Routine.....	4
Cummins 5.9L ECM VIN issues	5
EFILive Cummins Timing Calculator	6
2009 6.7L ECM 'Anti-Tuning' Update.....	8
Cummins ECM Tuning Myths.....	9

Warnings in EFILive

Incomplete File after reading (B9999):

If you see the warning below after reading your ECM then unfortunately the file is not usable as a base tune. Some 'box tuners' have developed custom programs that cannot be completely read from the ECM, in this situation the ECM has not allowed the entire contents of the Flash memory to be read and therefore the file is considered incomplete.

If you attempt to program a tune like this back in to the ECM the re-flash will fail mid way through resulting in a no start condition. To restore the ECM if this happens, a valid tune file (without this warning) will need to be flashed.

IMPORTANT NOTE FOR 6.7L ECM's:

Some 'box tuners' do not restore the ECM tune to a total stock tune when told to. In some cases once the ECM is restored to stock and then read back with EFILive as the base tune, flashing that tune in may render the ECM inoperable and not recoverable.

If you read a 6.7L ECM and see the warning below ** it is recommended you do not flash this tune in. Your options are to have the dealer reflash the ECM back to true stock for you, or, obtain a known good stock file to match your truck.

*** At the time of writing EFILive is able to detect most non stock OS modifications that may cause a reflash failure, however the 'box tuner' manufacturer may at any time release an update for their programmer which EFILive may not be able to detect as modified or incomplete.*

Segment	ID	Checksum	Notes
⚠ Calibration Verification	11352405	\$77AB9D92	WARNING: Checksum is disabled!
✓ Internal Flash	0	\$F74B	
✓ External Flash	0	\$6972	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	

Calibration ID	Description	Setting
B9999	Tune File Analysis	Incomplete, Do Not Flash
B9901	Block ECM Calibration Reading	Not Applied

Restore Checksum Calculation Routine

To restore the checksum calculation routine in the ECM and recalculate checksum values, the following steps must be followed.

Open the saved file with the V7 Tune Tool, navigate to the tab called "Upgrade OS".

Select "CVN Calculation Restore" and click "Apply Upgrade".

Calibration | Permissions | VIN | Comments | History | Out of Range* | Modifications | Upgrade OS | Conversions

Select custom operating system:

CVN Calculation Restore

This patch restores the ECM's checksum calculation routines to factory. This should be applied if your CVN = \$0 and EFiLive is warning you the checksums have been disabled. Once the patch is applied, also choose to 'Update Checksums', doing both these operations will eliminate any P0602 DTC's that may happen if a handheld tuner has ever been programmed in to the ECM.

Return to the main summary tab of the tune tool and click the "Update Checksums" button.

Transmission:

PCM flash:

Remote device:

Calibration Definition File (*.cal):

Name:

Version: Date:

Segment	ID	Checksum	Notes
Calibration Verification	11352409	\$7B53081B	WARNING: Checksum is disabled!
Internal Flash	0	\$BF33	
External Flash	0	\$6A62	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	
Not used	N/A	N/A	

Calibration ID	Description	Setting
B9999	Tune File Analysis	OK To Flash
B9901	Block ECM Calibration Reading	Not Applied

Read the Checksum Update Warning that pops up, if you agree to the changes, then save the file.

Checksum calculation routines have now been restored to the file and the checksum values correctly calculated. Once flashed into the ECM, P0602 DTC will no longer set. Further, all checksums will be correctly calculated and updated any time changes are made to a tune.

Applying the "CVN Calculation Restore" patch to a factory OS will not harm the ECM, however it is completely unnecessary.

Cummins 5.9L ECM VIN issues

As part of the normal re-flash process for the 5.9L CM849B Cummins ECM, a section of the flash memory must be written that contains some vehicle specific values, such as the VIN and SKIM code. This part of the ECM must be re-flashed every time the ECM is programmed which can introduce issues.

When flashing the tune from another vehicle into the ECM the VIN from that file will also be flashed. As the VIN is used as part of the security system this will cause a no start condition until the VIN in the ECM is corrected to match the vehicle.

If an attempt is made to start the vehicle prior to changing the VIN with the EFILive Scan Tool, there are other modules on the truck that sense the non-matching VIN details, setting C2206 "Vehicle Configuration Mismatch" DTC in several modules. Once set, EFILive is UNABLE to correct this code and MIL, resulting in a dealer visit.

To resolve this issue, EFILive has now implemented a feature to allow customers to change the VIN in the .ctz tune file prior to flashing the ECM.

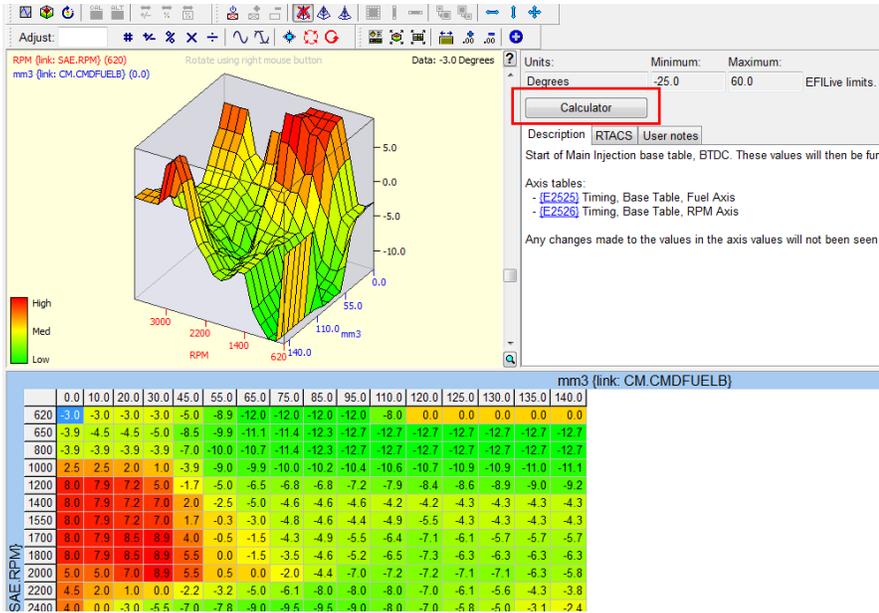
To change the VIN in the .ctz tune file, type the correct VIN into the VIN field in the tune tool and save the file prior to programming the ECM.

All VIN's must be 17 characters in length and must be capital letters where used.

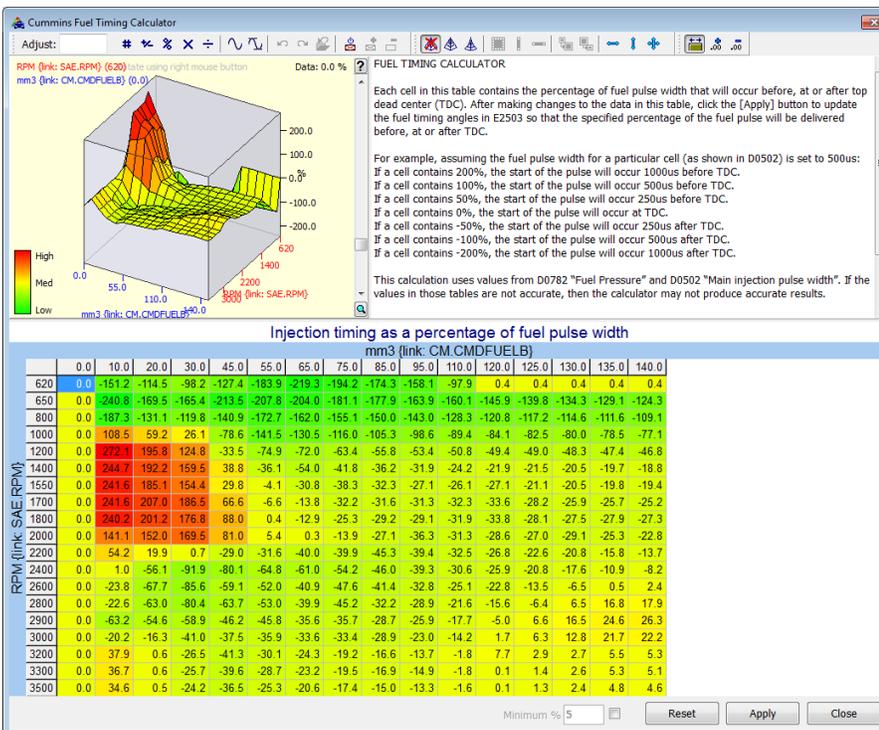
Calibration	Permissions	VIN	Comments	History	Out of Range	Modifications	Upgrade OS	Conversions	
Vehicle Identifiers:		Calibration Identifiers:							
VIN: 3D7KS28C96G		OS: 11352601		OS ID: N/A					
Engine: 5.9L Diesel Turbo		Calibration: 35325553AV		BCC: N/A					
Transmission: 48RE		Calibration Definition File (*.cal):							
PCM flash: N/A		Name: 11352601.calz		Disable Checksums					
Remote device: 0		Version: 7.11		Date: October 20th, 2011					
Segment	ID	Checksum	Notes						
✓ Calibration Verification	11352601	\$7FA3E2F7							
✓ Internal Flash	0	\$72CB							
✓ External Flash	0	\$E824							
Not used	N/A	N/A							
Not used	N/A	N/A							
Not used	N/A	N/A							
Not used	N/A	N/A							
Not used	N/A	N/A							

EFILive Cummins Timing Calculator

When looking at table {E2503}, if you click on the [Calculator] button a new window opens with a table containing the current timing percentages that were calculated based on the values in the tables: E2503 (Main Timing), D0782 (Fuel pressure) and D0502 (Main injection pulse width).



Timing calculator window:



The values in the timing calculator table are calculated as follows:

For each cell in E2503, the tuning software looks up (with interpolation) the matching MPa value from the table: D0782. Uses that MPa value to lookup (with interpolation) the injection pulse width in microseconds (i.e. "us") in table D0502. Sets the timing calculator table cell values to:

$\text{calculator_table} = \text{E2503}/(\text{us}*\text{rpm}*0.00000006)$.

That means the values in the timing calculator table are the percentage of the pulse width that you want to occur before top dead center.

If you wanted the injection pulse to start at top dead center, you'd put in 0%

If you wanted the middle of the injection pulse to be at top dead center you'd put in 50%.

If you wanted the injection pulse to finish at top dead center, you'd put in 100%

A negative value just means the injection pulse starts and finishes after top dead center. It should be noted that the ECM does have some limitations when it will start and end an injection event, the above is purely for example.

After entering your % change and you click on the [Apply] button the opposite calculation is done:

$\text{E2503} = \text{calculator_table}*\text{us}*\text{rpm}*0.00000006$;

So if your D0502 or D0782 tables are not accurate, then you won't get accurate fuel timings from the calculator.

One thing that is important to note is you might see the first column of E2503 got set to 0. That is because the data in the D0502 has its first column all set to zero. You may want to manually fix up the first column in the timing table when done so it does not end up as all zeros.

The idea behind this calculator is to ensure the injection event occurs 'exactly' when you want it in the cycle of the crank for any given injector pulse time, fuel pressure and RPM. Getting the timing correct is very important for a Diesel engine as it has a direct relationship to the the NOx and Soot emissions as well as cylinder pressure during the combustion event.

Keep in mind that the pilot injection pulse (if used) is referenced to the main injection timing, so changes to the main injection timing will have the effect of changing the pilot timing too.

The calculator should only be viewed as a tool, you should always review the final figures calculated prior to running the engine and decide if they are appropriate.

2009 6.7L ECM 'Anti-Tuning' Update

On March 13, 2009 Dodge issued a TSB informing dealers of an ECM update that stops aftermarket tunes being flashed in to an ECM.

If you search on the internet for 'Dodge TSB 18-007-09' you will probably find a copy of this document.

Essentially what happens when you attempt to program a modified tune in to one of these ECM's is the reflash will fail right at the end with an error code:

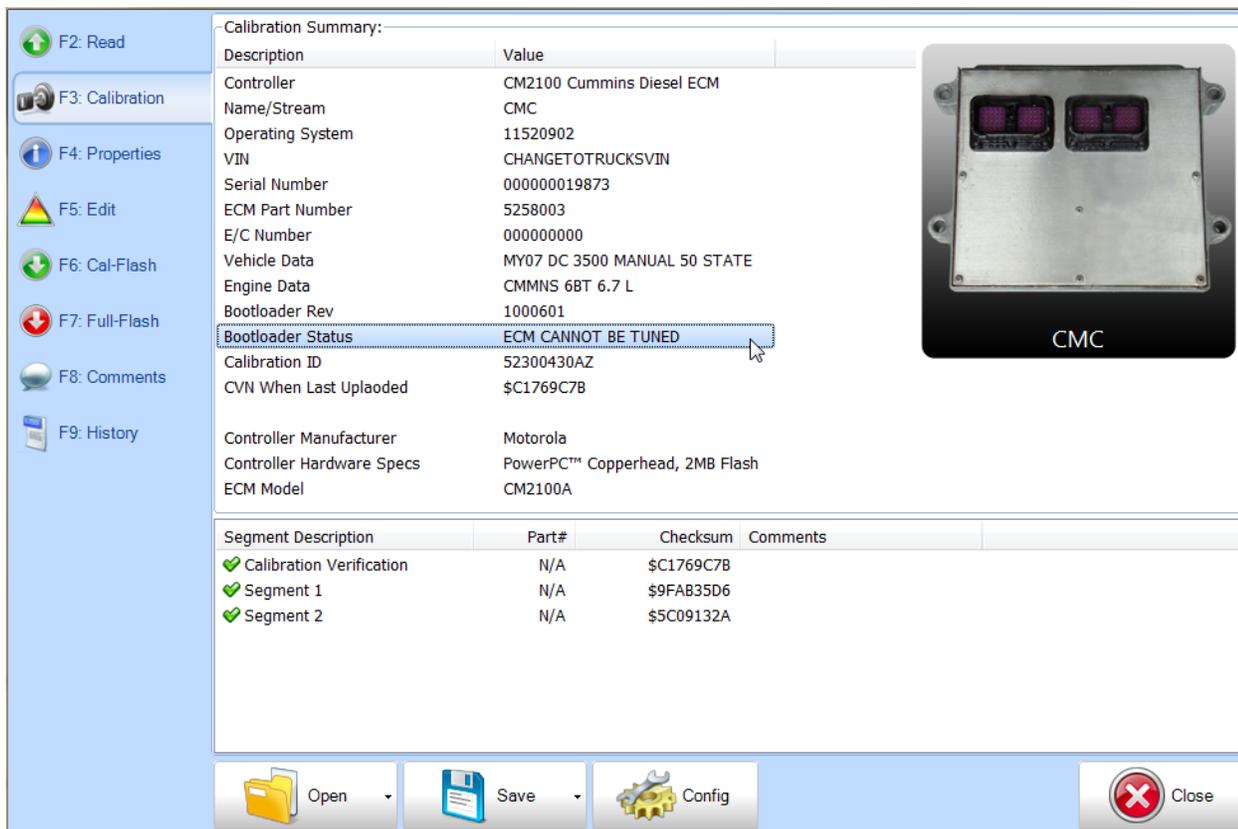
Code \$0340: Download Not Accepted

At this point the engine will not start and the only way to get the engine running again is to reflash back the stock tune.

It is possible to identify an ECM that has had this Anti-Tuning update installed once the tune is read. When you view the file details in EFILive V8, look at the 'Bootloader Rev' field.

If the number is 1000601 the ECM has the Anti-Tuning update and therefore cannot be reflashed with a modified tune. If the number is 1000500, 1000502 or 1000503 then it will accept a modified tune. Just below the Bootloader Rev field is also a status field indicating if the ECM can be tuned.

If the ECM on a truck built earlier than March 2009 has been replaced by the dealer chances are it may have been fitted with one of these Anti-Tuning ECM's.



The screenshot displays the EFILive V8 software interface. On the left is a navigation pane with icons for F2: Read, F3: Calibration, F4: Properties, F5: Edit, F6: Cal-Flash, F7: Full-Flash, F8: Comments, and F9: History. The main window shows a 'Calibration Summary' table with the following data:

Description	Value
Controller	CM2100 Cummins Diesel ECM
Name/Stream	CMC
Operating System	11520902
VIN	CHANGETOTRUCKSVIN
Serial Number	000000019873
ECM Part Number	5258003
E/C Number	000000000
Vehicle Data	MY07 DC 3500 MANUAL 50 STATE
Engine Data	CMMNS 6BT 6.7 L
Bootloader Rev	1000601
Bootloader Status	ECM CANNOT BE TUNED
Calibration ID	52300430AZ
CVN When Last Uploaded	\$C1769C7B
Controller Manufacturer	Motorola
Controller Hardware Specs	PowerPC™ Copperhead, 2MB Flash
ECM Model	CM2100A

Below the summary table is a 'Segment' table:

Segment Description	Part#	Checksum	Comments
✔ Calibration Verification	N/A	\$C1769C7B	
✔ Segment 1	N/A	\$9FAB35D6	
✔ Segment 2	N/A	\$5C09132A	

At the bottom right of the main window is a photograph of the physical ECM, labeled 'CMC'. The bottom of the interface features a toolbar with 'Open', 'Save', 'Config', and 'Close' buttons.

Cummins ECM Tuning Myths

[The factory ECM will not rev past 4,000RPM.](#)

Not true, numerous EFILive customers are now running RPM's as high as 5,500 with the factory ECM. They have full commanded fuel rates at these RPM's with no limiting whatsoever, no other tuner can do this. Of course no ECM failures have occurred as a result of running high RPM's.

[You will lose the cluster PRND display on an Auto if you turn off Torque Reduction.](#)

If you aren't using EFILive this is true, however in EFILive you can eliminate torque reduction on an auto without disabling the PRND indicator, without disabling the OD/TH indicator, without disabling reverse lights and most importantly the truck cannot be started in gear.

[The factory ECM can't be tuned for wild engines.](#)

When EFILive is in the hands of a good tuner, we are seeing many trucks transformed from smoky, ill-mannered injector rattlers to something so drivable you might mistake it for stock (except for the extra 400Hp). Most of the time they also make considerably more horsepower than any previous box tuner/fooler box combo.