Cummins 6.7L CM2100A CSP®
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 CSP\(^5\) custom operating system for the Cummins CM2100A 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 (e.g. how to gain performance, economy etc.) then please ask these questions on the EFILive Forum (http://forum.efilive.com/). 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:

<table>
<thead>
<tr>
<th>Software Version</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| V8               | - Reads CM849, and CM2100A Dodge Cummins ECM’s.  
                  - Flashes CM849, CM2100A, CM2200, CM2350 Dodge Cummins ECM’s  
                  - 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 logging  
                  - 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).  
                  - Pass-through logging of real time data from the vehicle is done using the V7 Scan Tool application. |
What is EFILive CSP\(^5\)?

EFILive's CSP\(^5\) custom operating systems for Cummins controllers allows customers to be able to switch 'on the fly' between multiple tunes, all stored in the ECM's flash memory. Historically, Cummins Switchable Programming had 5 tune positions; however as supported Cummins platforms have expanded this no longer holds true. ECM memory now defines the number of tunes that are available for switching for each ECM type as per the table below.

<table>
<thead>
<tr>
<th>CSP Controller Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM849</td>
</tr>
<tr>
<td>CM2100A</td>
</tr>
<tr>
<td>CM2200</td>
</tr>
<tr>
<td>CM2200</td>
</tr>
<tr>
<td>CM2350B</td>
</tr>
</tbody>
</table>

Whilst different controllers contain different numbers of tunes, collectively this feature is still referred to as CSP\(^5\).

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. (E.g. racing, towing, or power limiting.) Simply build multiple tunes to fill the CSP\(^5\) slots, flash the ECM once and then select your desired tune through your EFILive hardware (or other approved switching devices) at any time.

CSP\(^5\) 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 CSP\(^5\) upgraded ECM's.
CSP\textsuperscript{5} Upgrade Checklist

In order to upgrade an existing tune to CSP\textsuperscript{5}, there are some things to be checked first. CSP\textsuperscript{5} conversion files are only available for on selected factory ECM Operating Systems (OS's).

**EFILive will not be offering CSP\textsuperscript{5} on older or obsolete OS's.**

Below is a list of operating systems available for upgrading to CSP\textsuperscript{5}.

<table>
<thead>
<tr>
<th>Operating System #</th>
</tr>
</thead>
<tbody>
<tr>
<td>11520902</td>
</tr>
<tr>
<td>11551031</td>
</tr>
<tr>
<td>11551032</td>
</tr>
<tr>
<td>11551035</td>
</tr>
<tr>
<td>11610805</td>
</tr>
<tr>
<td>11620604</td>
</tr>
<tr>
<td>11620606</td>
</tr>
<tr>
<td>11620807</td>
</tr>
<tr>
<td>11710806</td>
</tr>
<tr>
<td>11720604</td>
</tr>
<tr>
<td>11720606</td>
</tr>
<tr>
<td>11720809</td>
</tr>
</tbody>
</table>

If the truck has had a different tuner on it in the past (not EFI Live) then the conversion process may fail. EFI Live highly recommends customers source a good known base file for CSP\textsuperscript{5}. This may involve either a dealer flash, or obtaining a suitable file from your chosen tuner.

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

**NEVER convert a base file that may contain traces of a previous tuner. ALWAYS start with a clean base file.**

To upgrade to CSP\textsuperscript{5}, the minimum software requirements are:

1. EFI Live V8.2.2.259 or later
2. FlashScan V2 / AutoCal Firmware - V2.07.65
3. EFI Live V7.5.7.263 or later

The latest software versions are available for download from EFI Live's website.
Upgrade Operating System to CSP\(^5\)

**Important:** FlashScan V2 / AutoCal MUST be plugged in to the PC’s USB port prior to starting V7.5 for the CSP\(^5\) operating system upgrade to be available.

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

Select the ‘CSP\(^5\) 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 CSP\(^5\) Conversion.ctz’.

Close the tune file by selecting, *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. E.g. 11720809 now becomes 55720809

EFILive automatically populates the new CSP\(^5\) tables with factory pickup truck 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 CSP\(^5\) section(s).

Any existing tables from your old converted tune are now located in the “CSP\(^5\) Program #5” folder.

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

NOTE: CSP\(^5\) tunes cannot be read out of the ECM once flashed in.
Tune Features of CSP\textsuperscript{5}

All tune features of CSP\textsuperscript{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 CSP\textsuperscript{5} Tune 6, Switch via ECM Input (labelled CSP\textsuperscript{5} Program Switched).
**CSP\textsuperscript{5} Output Driver**

The CSP\textsuperscript{5} 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 CSP\textsuperscript{5} Output Driver if the IAH system had been removed.**

The output is on (Connector #2, Pin 55), 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).

Connector #2 is usually the one above the part number stickers on the ECM with a Brown and Yellow wire already connected (the IAH control).
**CSP**\(^5\) **CAN Tunes**

The **CSP**\(^5\) 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 **CSP**\(^5\) conversion.

When the **CSP**\(^5\) OS conversion is performed the new tables are populated with maps from a standard pickup truck, these may not be suitable for your vehicle, especially if it is a Cab and Chassis (C & C) vehicle, please review and change as necessary the default maps in all the **CSP**\(^5\) tunes before starting and driving the vehicle.

It should be noted that whenever the ECM is reflashed it will default to using **CSP**\(^5\) Program #1.
**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 16 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.

**Important:** This input is shared with the 'Stationary Remote Power Takeoff (PTO)'' in-cab switch, if the truck is fitted with the PTO option this tune will become active with the in-cab PTO activation. (E.g. 3500/4500/5500 Chassis Cab with option PTO Prep Package “LBN”). The PTO will still function as normal but these CSP tables will be used.
CSP\textsuperscript{5} Min/Max Turbo Position Control

The CSP\textsuperscript{5} OS control of the Turbo Vane Positions is slightly different to the normal factory method.

Instead of 4 altitude based min/max position tables there is just a single minimum and maximum position table per CSP tune. You must select to use either the four factory min/max tables or the single min/max table in each CSP tune position.

This parameter can be found at the top of the navigation tree for each CSP tune.

If set to 'disabled' then the ECM will continue to use the tables below for that CSP tune.

If 'enabled' for a particular CSP tune then it will use the single tables below (Tune #1 example) and ignore the four factory min/max tables.
Setting up FlashScan V2/AutoCal for CSP\textsuperscript{5} using V8 Scan and Tune

There are a range of configuration files that need to be programmed onto FlashScan and AutoCal to enable hardware to work in standalone mode for your controller. Each step can be programmed into the device individually, or collectively.

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

**BBL (Black Box Logging) Configuration - EDA Data Logging**

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%.

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 the CMC controller to your list;
   a. Press the green '+' icon.
   b. Right click on the Engine Controller box.
   c. Select “CMC CM2100 Cummins Diesel ECM”
   d. Read and accept the BBL Information display.
   e. Select OK.
4. Navigate and select Available PIDs to facilitate logging.
5. Drag EDA1 PID selections from the Available PIDs window into the Selected PIDs window.
**BBR & BBF (Black Box Reading and Flashing) Configuration**

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 or Transmission Controller box.
   c. Click on a selected controller.
   d. Select OK

![BBR & BBF Configuration Screen](image)

**Switchable Tune Configuration**

1. Select the [F4: Switch] option in the left-hand pane.
2. Enter switchable tune names you wish to display on FlashScan V2/AutoCal as appropriate.

![Switchable Tune Screen](image)
Quick Setup

1. Select the [F6: Quick Setup] option in the left-hand pane.

2. Edit FlashScan V2 or AutoCal Settings as required. Ensure that tunes can be switched after powering off FlashScan V2/AutoCal by selecting
   1. [F6: Logging] → At start-up, automatically re-select the most recently used PID list.

3. Select appropriate BBX Quick Setup options.
4. Add tune files to the Quick Setup using the green '+' icon.

Write this configuration to FlashScan V2 or AutoCal using the [Program Quick Setup] function. The [Program Quick Setup] programs all selected Scan, Tune, Switch options, as well as selected device settings, BBX Quick Setup selections and tune files. Once the device is programmed, FlashScan V2 or AutoCal is configured for BBX functions and tune switching via FlashScan V2 or AutoCal.

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

1. Select **F2 Tune Tool**.

![F2 Tune Tool Menu](image)

2. Select **F3 Switchable Tunes**.

![F3 Switchable Tunes Menu](image)

3. Use the **Up** and **Down** arrow to navigate between tunes.

![Select Custom Tune](image)

4. Press the ‘**Ok**’ button to select that tune. If it was successful you should see confirmation of that on the screen.

![Select Custom Tune](image)

5. 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.

![Select Custom Tune](image)

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

6. You do not need to reselect the tune once the engine is shut down; the ECM ‘remembers’ which tune you previously selected.
Data Logging with FlashScan V2/AutoCal

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

2. Select F1 Select PIDs (If you haven't previously selected 'CMC' PID's).


4. Select Record Data to record a log, or Display Data to display to LCD (display data shown below).

<table>
<thead>
<tr>
<th>PID</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCADCA_F</td>
<td>70%</td>
</tr>
<tr>
<td>FCADCC_F</td>
<td>0%</td>
</tr>
<tr>
<td>FPBC_F</td>
<td>34.2 mA</td>
</tr>
<tr>
<td>FPA_F</td>
<td>189.8 MPa</td>
</tr>
</tbody>
</table>

NOTE: When data logging is activated you cannot return to the tune selection menu unless logging is stopped.
Data Logging with V7.5 Scan Tool

To perform the tasks below you should have your FlashScan V2/AutoCal device connected to your vehicle.

The first thing you need to do is select the correct ECM type to log, in this case the 'CMC CM2100A' 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.

<table>
<thead>
<tr>
<th>Pre-defined PID Groups</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
</tr>
<tr>
<td>! Pressures and Temperatures</td>
<td>WARNING: Only some PID's in this group are selected, highlight this group and...</td>
</tr>
<tr>
<td>! Instrumentation</td>
<td></td>
</tr>
<tr>
<td>! Emissions Compliance</td>
<td></td>
</tr>
<tr>
<td>! Fuel Deliverance Rates</td>
<td></td>
</tr>
<tr>
<td>! Pedal, Water in Fuel, Baro</td>
<td></td>
</tr>
<tr>
<td>! Boost, RPM, Temperatures</td>
<td></td>
</tr>
<tr>
<td>! Air Temp, Battery</td>
<td></td>
</tr>
<tr>
<td>! Fuel Pressure, Speed, A/C, Trans Temp</td>
<td></td>
</tr>
<tr>
<td>! Timing, Engine Status, Idle</td>
<td></td>
</tr>
<tr>
<td>! Fuel, Injectors</td>
<td></td>
</tr>
<tr>
<td>! Variable Geometry Turbo</td>
<td></td>
</tr>
<tr>
<td>! EFILive EDA Scan 1</td>
<td></td>
</tr>
<tr>
<td>! EFILive EDA Scan 2</td>
<td></td>
</tr>
</tbody>
</table>

In the situation like above you should create a new PID selection group. To create a new PID selection group;
1. Navigate to the PIDs [F8] tab
2. Create a new blank PID selection file by clicking the 'Clear Existing PID's' button and unselect all PIDs.

The Pre-Defined PID Groups should now look like this

3. Double click just the 'EFILive EDA Scan 1' PID group.
4. Click on the 'Save PID selection' icon, and rename (E.g. 'CMC EDA') for easy reference later on.

5. Select the Yellow button to monitor data, or the Red button to log data.

NOTE: When a laptop is connected to FlashScan V2 and data logging is active, tune switching will not work from the keypad. Logging must be stopped for tune switching to activate.
Integrating CSP<sup>5</sup> with Approved 3<sup>rd</sup> Party Products

Integration of EFILive’s proprietary CSP<sup>5</sup> custom operating system with 3<sup>rd</sup> party products is restricted to approved providers, many of which are listed on the www.efilive.com 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 CSP<sup>5</sup> 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 3<sup>rd</sup> party product is NOT required in tune file).
4. Setup the 3<sup>rd</sup> party device as per the manufacturer’s instructions.

Troubleshooting

Should users encounter problems with upgrading to CSP<sup>5</sup> they should:
1. Confirm V7, V8 firmware and bootblock versions match the CSP<sup>5</sup> minimum requirements (listed above) using these instructions Finding FlashScan & AutoCal Bootblock and Firmware versions
2. Confirm CSP<sup>5</sup> file was upgraded to new operating system number, as sequenced above.
3. If you require assistance in reading, flashing or editing tuning parameters on your controller it is recommended you read the Cummins 2006-2009 Quick Start 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 EFILive V8 Reference.
5. If you are concerned your device is not switching between tunes, edit your tunes to see a notable difference (i.e. 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.