Installing the EFILive DSP² Custom Operating System & Using the DSP² features of EFILive V7

Ross Myers

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Introduction

This tutorial assumes you are running the latest release of version 7.3 of the EFILive Tuning Tool software, please ensure you are running the latest software, free updates can be downloaded from http://www.efilive.com/download.aspx

Your hardware must also be either licensed as Flashscan Commercial or Workshop. If you presently own a Flashscan Personal cable you will need to upgrade to use the DSP² programs.

The Custom Operating Systems supplied by EFILive are provided “as is” without warranty of any kind. Please take all reasonable caution when using the extended features of EFILive’s Custom Operating Systems.

You may return your ECM to its GM factory condition at any time, by reflashing a stock GM Operating System and calibration over the top of any EFILive Custom Operating System.

What is EFILive DSP² ?

DSP² is a customized ECM operating system developed by EFILive for the LB7 & LLY Duramax Diesels.

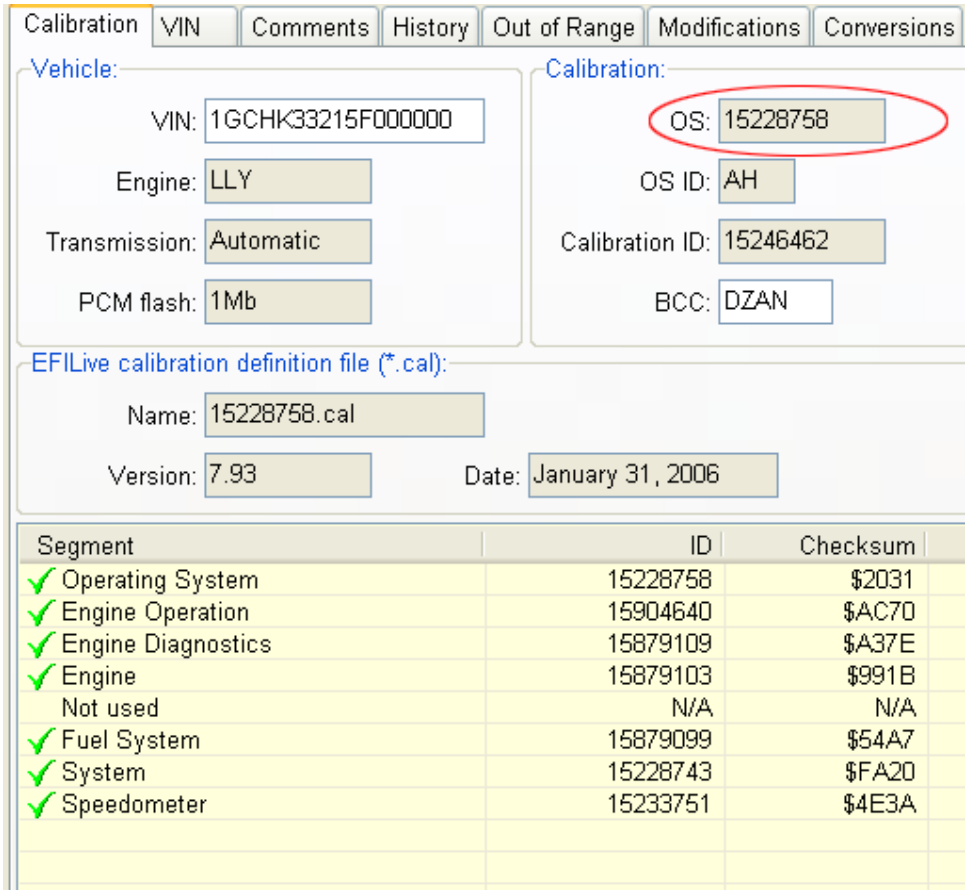
DSP² lets you to switch on the fly between two user programmable tunes; DSP² does this by allowing you create two versions of the main operating maps that control engine performance.

DSP² also offers you the feature of a switchable output using a spare pin on the ECM. This could be used for a variety of things, such as, switching a relay on/off, turning on a warning lamp under conditions that you can define (see hints on the last page of this document).

Please follow the steps on the following pages to successfully upgrade your Duramax ECM to DSP².

Step 1

Using the EFILive Tune Tool, read the ECM to be converted to DSP² and save the file, or, open an existing *.tun file copy of the ECM and note the Operating System number. You will need to select the correct DSP² Operating System *.tun file from the list shown on the next page based on this number. You may wish to write this down for reference.



You may wish to take note of the current Operating System in the ECM in the space below……..

Step 2

Using the table below, find the EFILive Custom Operating System that matches your ECM's current Operating System number.

The two numbers at the end of each DSP² filename may be 01, 02, 03, etc, this indicates the version number and feature-set of the EFILive Custom Operating System. At the time of writing only 01 is available.

The .tun file is what is programmed into the ECM's flash memory.

The .cal file contains the mapping information for the Tuning Tool.

Note: The listed year in the table refers to the year the ECM operating system was first released and then the various revisions of the first release, not the model-year of the vehicle.

GM Operating Systems (O.S) vs EFILive DSP² Custom O.S

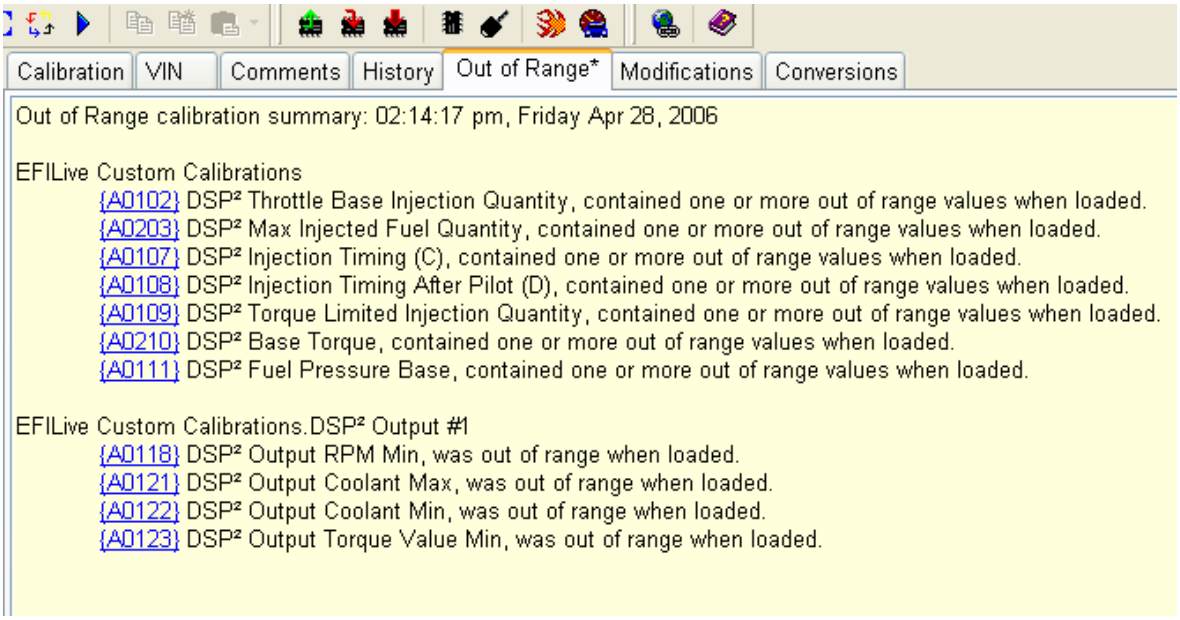
GM O.S	DSP² O.S	Calibration file (*.cal)	Tuning File (*.tun)
2001 LB7			
09393838	01383801	01383801.cal	01383801.tun
15063376	01337601	01337601.cal	01337601.tun
15097100	01710001	01710001.cal	01710001.tun
15188873	01887301	01887301.cal	01887301.tun
2002 LB7			
15166853	02685301	02685301.cal	02685301.tun
15186006	02600601	02600601.cal	02600601.tun
15194441	02444101	02444101.cal	02444101.tun
2003 LB7			
15189044	03904401	03904401.cal	03904401.tun
2004 LLY			
15141668	04166801	04166801.cal	04166801.tun
2005 LLY			
15193885	05388501	05388501.cal	05388501.tun
15231600	05160001	05160001.cal	05160001.tun
15228758	05875801	05875801.cal	05875801.tun

Step 3

Open the EFILive DSP² Custom Operating system *.tun file from the list on the previous page that matches the ECM's current GM Operating System.

You should NOT use this tune as the one to run your truck, the following steps will show you how to transfer your existing tune from your truck back into the DSP² Operating System.

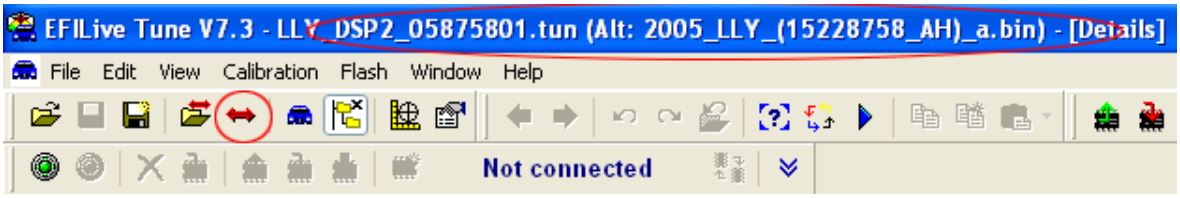
When the supplied DSP² file opens EFILive will warn you that there is some table values out of range, this is normal as the tables will contain no data at this stage, we will populate them later.



Step 4

Open as a *.tun file comparison, the file that contains the ECM's original calibrations (or an existing tun file you are using in that ECM).

Once this is done you should now see the DSP² file name as the main file and your ECM's current (non DSP²) file as the alternate calibration.

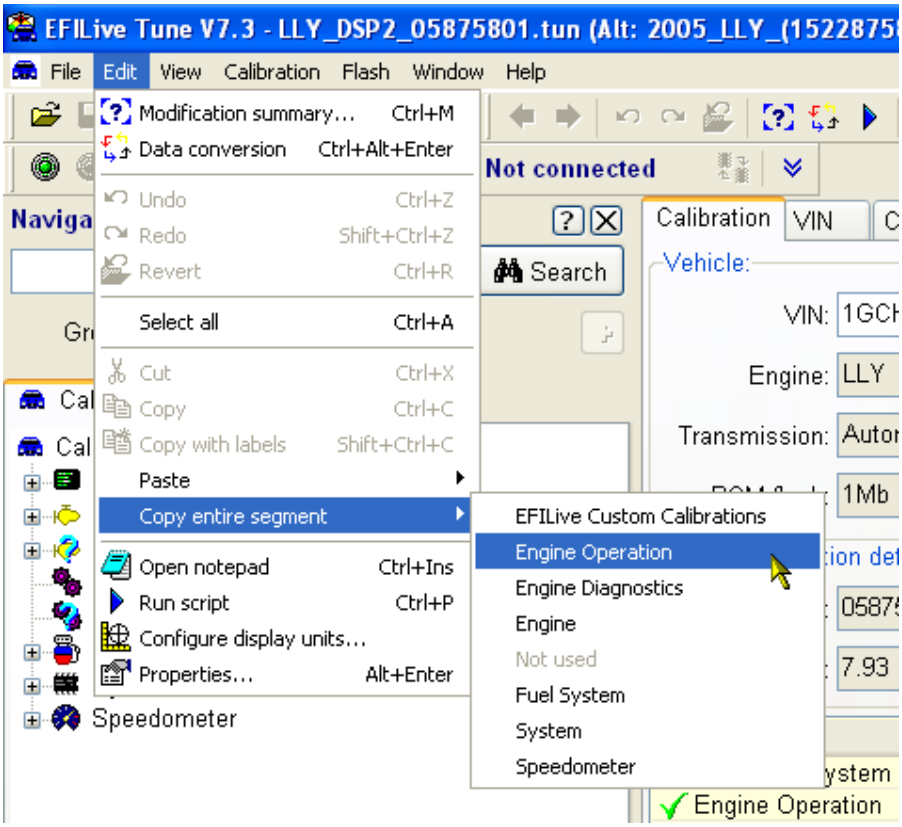


The compare calibrations button will also be active.

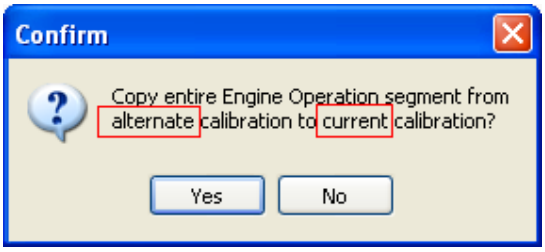
Step 5

You now need to transfer over your existing calibrations into the DSP² file. This is done using the segment copy feature.

From the menu choose – Edit **>** Copy entire segment.



When you perform that step please take note of the confirmation window that pops up telling you that you are about to copy from the alternate calibration to the current calibration, it must not say from the current calibration to the alternate calibration.

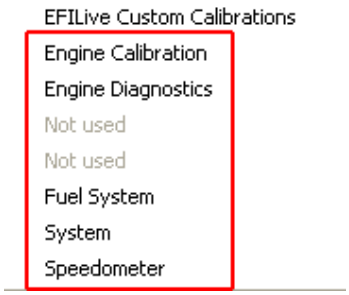
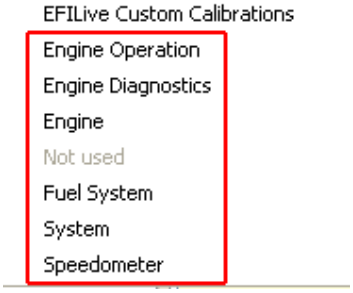


Then save the file.

You will need to repeat this process (copy then save) for all segments shown in the picture on the next page.

Step 5 continued

Do not copy the “EFILive Custom Calibrations” segment, just those in the red square.

For LB7	For LLY
	

Once all segments have been copied your saved file will now contain the DSP² program, but now with the calibrations from your truck installed. This is an important step as GM has many different calibrations for each model truck to cover different tire sizes, A/C configurations, emissions compliance etc. What you program back into your truck must match what was originally in the ECM.

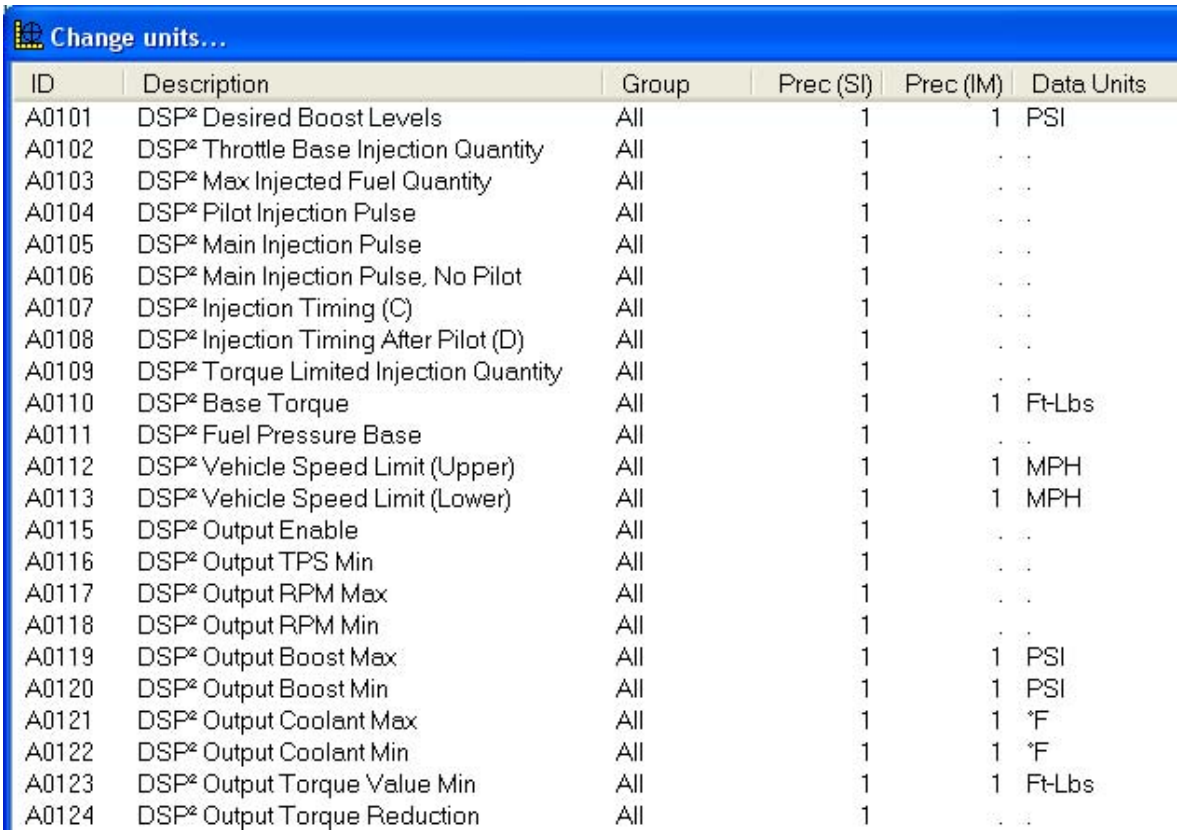
The next few steps involve populating the new DSP² tables as they will be blank.

Step 6

Ensure the display units (imperial or metric) for the DSP² tables are set the same as the tables you are about to copy the data from (the list of tables to copy can be found on page 13 of this document).

This is done via the menu option **Edit >> Configure Display Units**

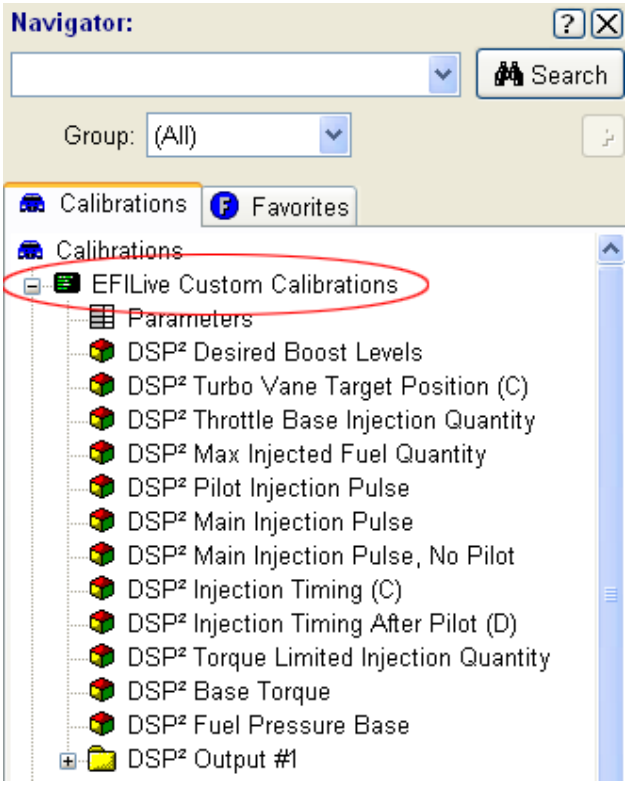
You only need to configure or confirm the Table / Parameter ID's that have something shown in the **Data Units** section (such as A0101 shown below).



ID	Description	Group	Prec (SI)	Prec (IM)	Data Units
A0101	DSP² Desired Boost Levels	All	1	1	PSI
A0102	DSP² Throttle Base Injection Quantity	All	1	.	.
A0103	DSP² Max Injected Fuel Quantity	All	1	.	.
A0104	DSP² Pilot Injection Pulse	All	1	.	.
A0105	DSP² Main Injection Pulse	All	1	.	.
A0106	DSP² Main Injection Pulse, No Pilot	All	1	.	.
A0107	DSP² Injection Timing (C)	All	1	.	.
A0108	DSP² Injection Timing After Pilot (D)	All	1	.	.
A0109	DSP² Torque Limited Injection Quantity	All	1	.	.
A0110	DSP² Base Torque	All	1	1	Ft-Lbs
A0111	DSP² Fuel Pressure Base	All	1	.	.
A0112	DSP² Vehicle Speed Limit (Upper)	All	1	1	MPH
A0113	DSP² Vehicle Speed Limit (Lower)	All	1	1	MPH
A0115	DSP² Output Enable	All	1	.	.
A0116	DSP² Output TPS Min	All	1	.	.
A0117	DSP² Output RPM Max	All	1	.	.
A0118	DSP² Output RPM Min	All	1	.	.
A0119	DSP² Output Boost Max	All	1	1	PSI
A0120	DSP² Output Boost Min	All	1	1	PSI
A0121	DSP² Output Coolant Max	All	1	1	°F
A0122	DSP² Output Coolant Min	All	1	1	°F
A0123	DSP² Output Torque Value Min	All	1	1	Ft-Lbs
A0124	DSP² Output Torque Reduction	All	1	.	.

Step 7

Open the first segment in the Navigator, called ***EFILive Custom Calibrations,*** you now need to fill these tables / parameters with values to be used for your switched tune. As a starting point, the best option is to copy your existing standard tables into the DSP² tables.



Continued next page:

Step 7 Continued

EFILive Custom Calibrations parameters, set them to the following values (suggested starter settings):

- **{A0112}** DSP² Vehicle Speed Limit (Upper): 250MPH / 410KMH
- **{A0113}** DSP² Vehicle Speed Limit (Lower): 250MPH / 410KMH

EFILive Custom Calibrations >> DSP² Output #1 parameters, set them to the following values (suggested starter settings):

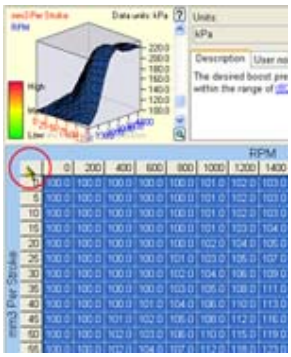
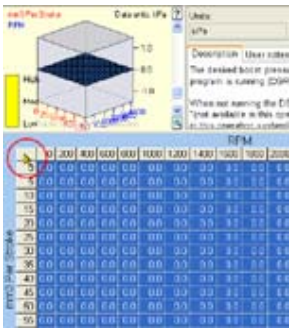
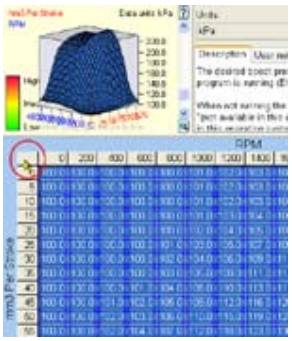
- **{A0115}** DSP² Output Enable: Disable
- **{A0116}** DSP² Output TPS Min: 50%
- **{A0117}** DSP² Output RPM Max: 5000
- **{A0118}** DSP² Output RPM Min: 1000
- **{A0119}** DSP² Output Boost Max: 40psi / 275kPa
- **{A0120}** DSP² Output Boost Min: 8psi / 55kPa
- **{A0121}** DSP² Output Coolant Max: 250F / 120C
- **{A0122}** DSP² Output Coolant Min: 32F / 0C
- **{A0123}** DSP² Output Torque Value Min: 0
- **{A0124}** DSP² Output Torque Reduction: Disable

Continued next page:

Step 7 Continued

Now copy **all** the tables needed as a starter into the DSP² 3D maps (See list below). To copy an entire table, click on the top left corner of the non DSP² table to highlight all the cells then press (Ctrl+C), then switch to the matching DSP² table and click the top left corner again to highlight the entire table and press (Ctrl+V).

LLY Desired Boost Levels shown as an example:

Highlight Table & Copy	Highlight blank DSP² table	Paste copied table
		
Click top corner to highlight all cells then press Ctrl+C. {B2206}	**Click top corner to highlight blank DSP² table.** {A0101}	**Press Ctrl+V.** {A0101} **Table is now populated**

LB7	LLY
{B0504} copy into {A0101}	{B2206} copy into {A0101}
{B0727} copy into {A0102}	{B0727} copy into {A0102}
{B0728} copy into {A0103}	{B0728} copy into {A0203}
{B0722} copy into {A0104}	{B0722} copy into {A0104}
{B0720} copy into {A0105}	{B0720} copy into {A0105}
{B0721} copy into {A0106}	{B0721} copy into {A0106}
{B0910} copy into {A0107}	{B0910} copy into {A0107}
{B0929} copy into {A0108}	{B0929} copy into {A0108}
{B0741} copy into {A0109}	{B0744} copy into {A0109}
{B1102} copy into {A0110}	{B1105} copy into {A0210}
{B1001} copy into {A0111}	{B1001} copy into {A0111}
	{B2206} copy into {A0114}

IMPORTANT

You have just about completed the EFILive DSP² upgrade.

Save the tune in a new *.tun file – use the menu option ***File->Save as…*** which will automatically increment a sequence number on the end of the file name. Each time you alter the calibration use ***File->Save as…*** That way you create a sequenced history of changes, allowing you to revert to a previous file should you need to.

This *.tun file will become your "base calibration" for the upgraded Operating System. Always keep a copy of this file in case you need to restore your ECM to its initial Custom Operating System state. Preferably, make a backup of it onto a CD and store it in a safe place or Email it to a friend.

The final step is to now do an entire ECM reflash with the new DSP² operating system and calibrations.

Hints for in-vehicle ECM flashing:

- Ensure your vehicle is keyed to ON without the engine running.
- Turn off, or even better, disconnect any aftermarket entertainment devices, pull radio fuse if necessary. Some aftermarket entertainment devices will interrupt the reprogramming procedure possibly leaving the ECM in an unrecoverable state.
- Ensure the battery is in a good state of charge.
- If fitted with On-Star, turn it off.

You will need to perform a 'Full Reflash' of your ECM to use the newly created DSP² operating system and calibrations. Once this completes successfully you will only need to do 'Calibration' flashing for normal tuning procedures.

The EFILive Tuning Tool manual covers reflashing procedures, it is highly recommended you also refer to that document whilst performing this programming procedure as this covers the correct steps for performing the full ECM flash and how to go about ECM recovery should something go wrong.

With your DSP² file loaded press the button circled in the picture below.

Once the full flashing procedure finishes (approx 3 mins) then turn off the IGN for at least 30 seconds to allow all the vehicle modules to fully shutdown.

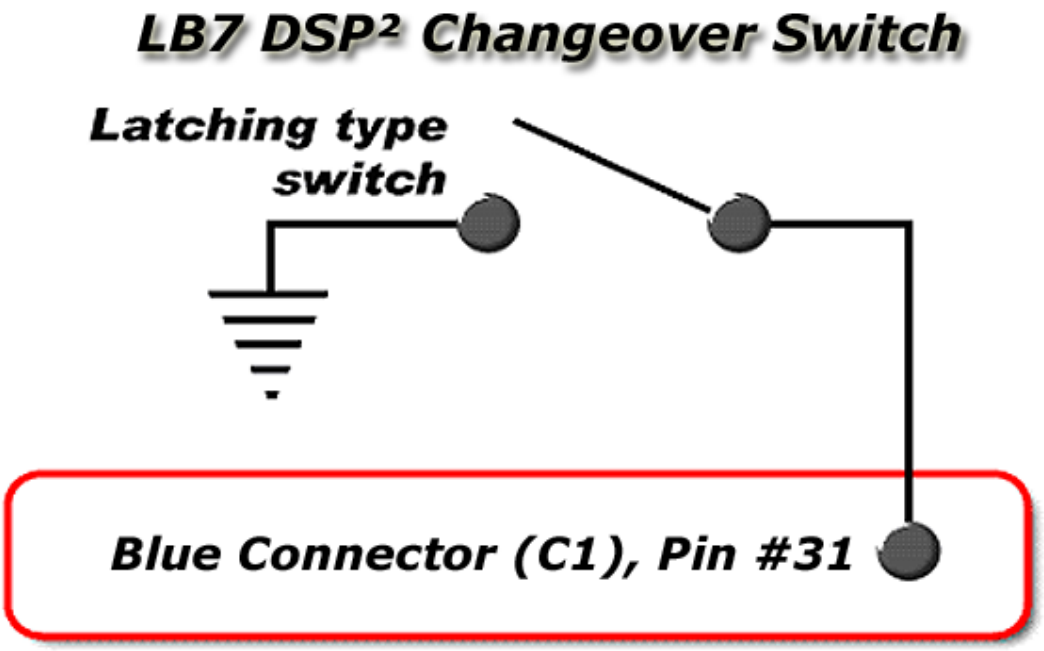
Next, start the truck and ensure everything is running and operating correctly (A/C, cruise control, etc).

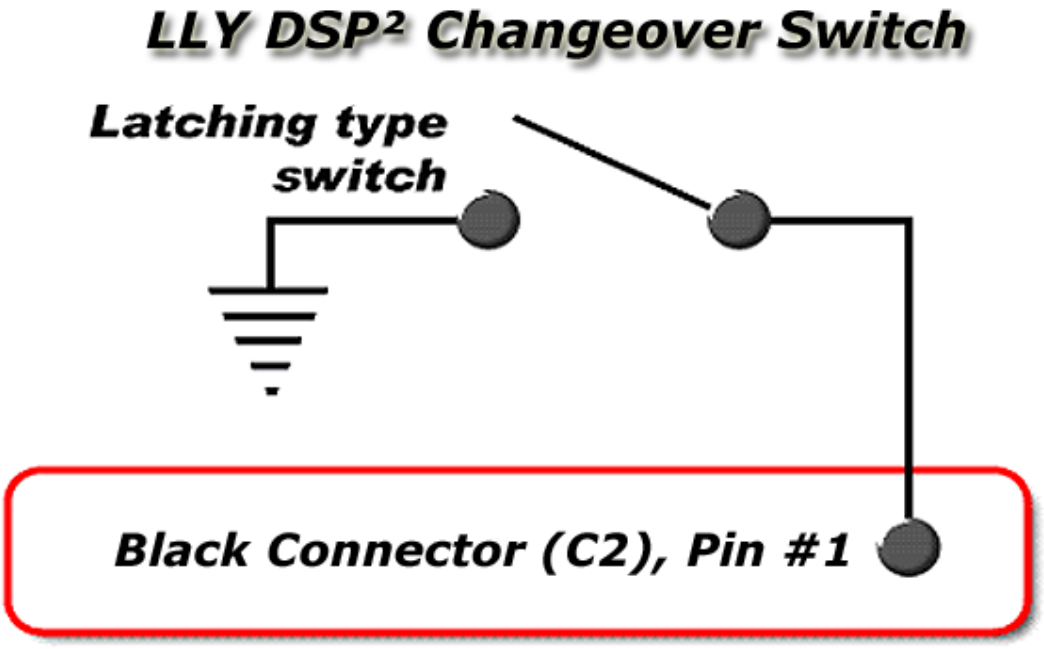
Once these tests are complete you can wire up your DSP² switch and DSP² programmable output (if not already done). Once that is complete you can start tuning your DSP² program.

Wiring your ECM for DSP² Program switching operation

To switch between the normal ECM tables and the DSP² tables you must install a toggle switch and wire it to your ECM.

When the switch is switched to ground (negative) the ECM will use the DSP² tables. Choose the ECM type and wire the switch as follows.



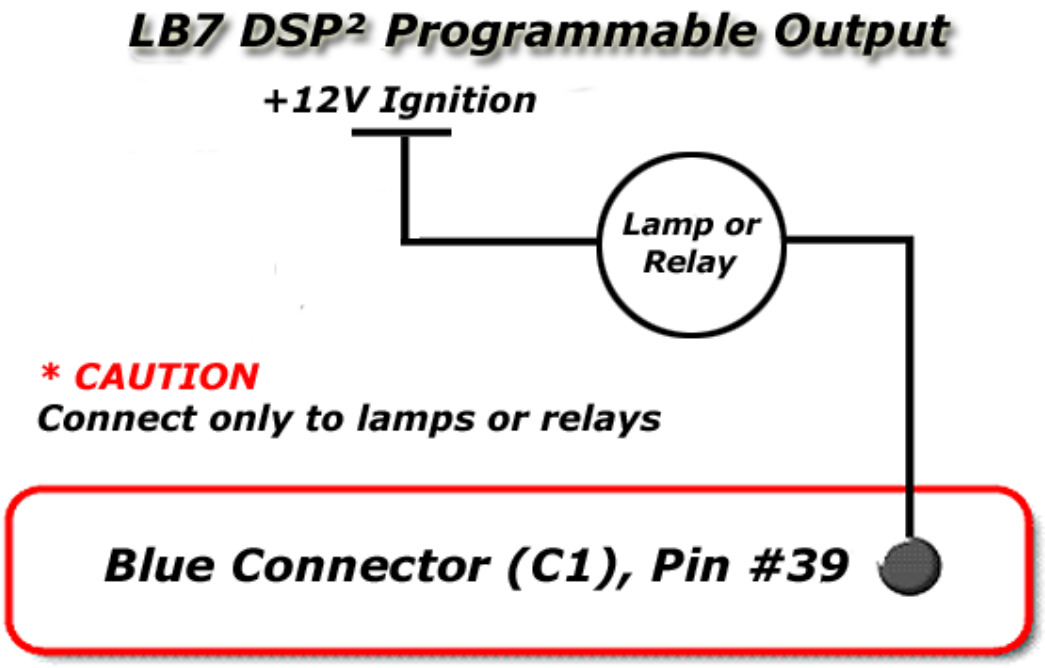


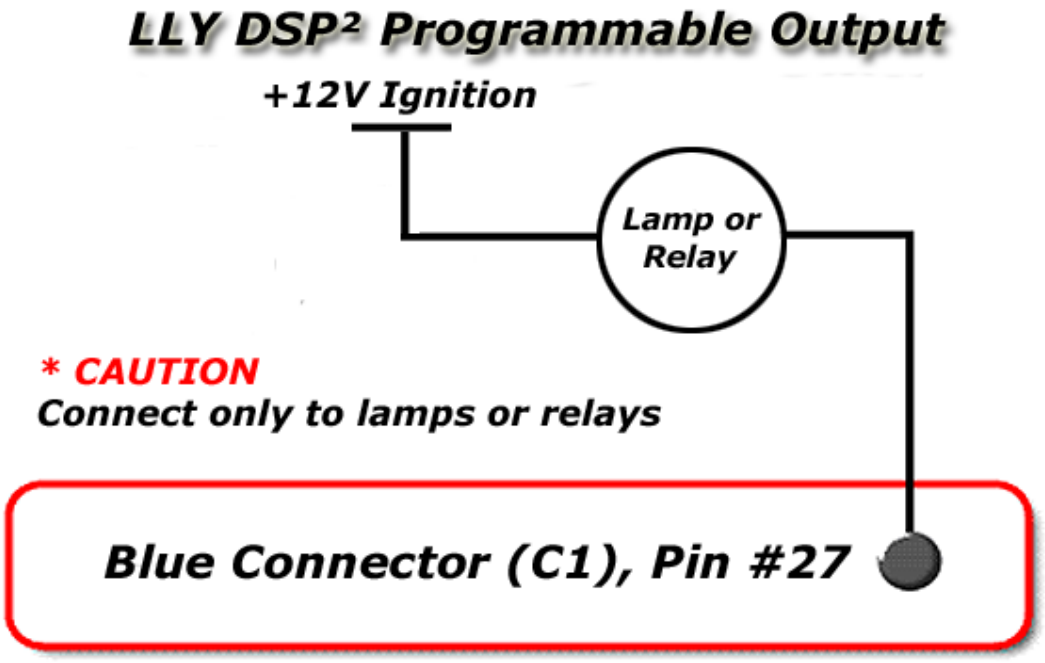
Wiring your ECM for DSP² Output operation

As well as wiring up the output, also please check the operational settings in the DSP² Output #1 section of the *.tun file.

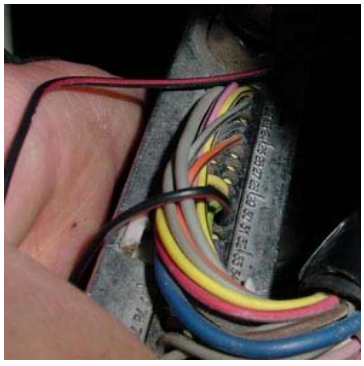
WARNING: Do not wire this output directly to heavy duty solenoids such as N2O controls, such solenoids must be switched via a relay, permanent damage to the ECM will occur if this is not done. Also do not use high wattage lamps.

Choose the ECM type and wire the output as follows.



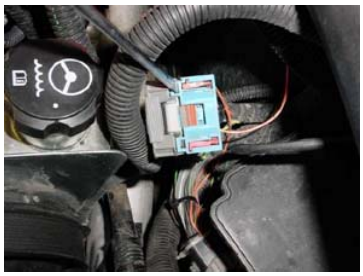
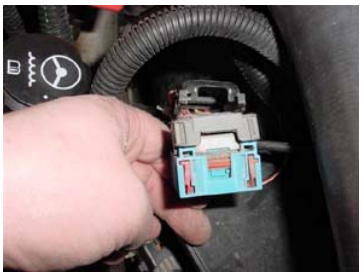
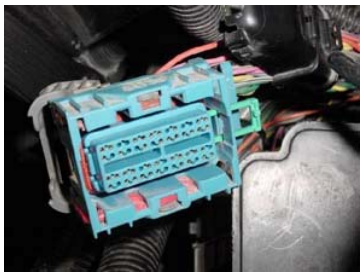


LB7 ECM Connector wiring installation

#1 – Remove TCM cover	#2 – Lift out TCM	#3 – Disconnect TCM
		
#4 – Remove ECM cover	**#5 – Unbolt blue plug**	**#6 – Remove blue cover**
		
#7 – Pins now exposed	**#8 – Insert new pin/wire**	**#9 – Re-assemble**
		

Installation photos courtesy of Tony Nostedt

LLY ECM Blue Connector (Repeat for Black connector)

#1 - Lift Grey lever	#2 - Detatch plug	#3 - Lift grey cover
		
#4 - Grey cover lifted	**#5 - Now removed**	**#6 - Remove pin lock**
		
#7 - Remove pin filler	**#8 - Keep pin lock safe**	**#9 – Insert new pin & wire**
		
#10 – Push in pin to latch	**#11 – Reassemble 6 & 4**	**#12 - Finished**
		

The LLY ECM also has the connector pin numbers stamped on it's case for confirmation, though these can be difficult to see when the ECM is fitted to the vehicle.

Installation photos courtesy of Tony Nostedt

Some DSP² Program usage ideas

Valet Mode:

With DSP² setup as follows you could limit the maximum truck speed and limit engine power using your hidden switch.

You can set the DSP² speed limit parameters to a lower setting than standard depending on what you want the maximum speed limit to be, to stop thieves you could set this to 10MPH, to stop young drivers going too fast you could set this to 60 – 70MPH.

Reducing engine power may be another option, you could reduce table {A0103} LB7 or {A0203} LLY, this table will limit the amount of fuel that can be injected, therefore limiting engine power.

Using either one of these methods (or both) you can rest easy knowing your truck will not 'perform' above the limits you apply.

N2O / Propane Mode:

With DSP² setup as follows you could provide different fuel and timing when N20 or Propane is being used. Then used in conjunction with the DSP² programmable output you can have a built in safety shutoff feature.

As an idea, you could wire up the DSP² input to a relay that is switched to ground when your N20 is switched on, therefore whenever the N2O is on your ECM automatically uses the DSP² fuel and timing maps. As a safety factor, you could use a relay to provide a master shut off (kill switch) to the N2O system in the event of an over-rev or if you lift off the throttle. Look through all the parameters in the DSP² Output #1 section.

For example, you might setup the DSP² Output #1 to shutoff if the throttle falls below 80% or the RPM's go above 4000 (missed gear on a manual trans).

Over boost / Over Temp warning:

Still using the parameters in the DSP² Output #1 section you could set {A0120} Minimum boost setting to the value you wish your warning lamp to illuminate at then set {A0119} Maximum boost setting to the maximum allowed value. You will also need to set all other parameters to a value they will always allow the output to function. This way, when the boost level hits the minimum value you set, the output will be switched on.

Similar to an over boost warning this could also be used for racing situations where the driver want to build consistent boost levels when staging, in which case the lamp will switch on once a preset boost level is reached.

END OF DOCUMENT