

“Digital DSP-5 switch”

Installation instructions, 2001-2004 LB7 Duramax

By: BT DieselWorks, LLC.

5/2015

Thank you for purchasing the BT DieselWorks digital DSP-5 switch! The original digital/electronic DSP-5 switch for 2001-2010 Duramax Diesel trucks with EFILive DSP-5 tunes installed. **This instruction manual covers installation of both the “gauge pod mount” and “surface mount” switches for 2001-2004 LB7 trucks only. See other documents for 2004.5-2005 LLY, or 2006-2010 LBZ/LMM.**

The digital DSP-5 switch is functionally identical to the old mechanical switches in that it offers the same instant switch-on-the-fly capability, however it also adds some unique new features that were previously not available with the old mechanical switches. The digital DSP-5 switch offers a unique “valet” mode that allows you to hide a secret toggle switch under the dash so that, when flipped, the truck is permanently locked into the “stock” tune. You can also use this input as a secret anti-theft/ignition kill switch (**ask your tuner for details**).

Additional programmable features include “tune reversal”, “adjustable display brightness”, and “tune recall”. The tune reversal feature is a program setting that will effectively reverse the order in which the DSP-5 switch cycles through the tunes. This is due to the fact that some tuners configure their tunes differently from other tuners. IE, some tuners put the “stock” tune into “DSP #4” tables in the EFILive tune file, and others use “DSP #4” tables for the “race” tune. (**contact your tuner for details**) Adjustable display brightness feature allows you to set the brightness of the LED display for both easy reading in direct sunlight, as well as not being distracting at nighttime. The final feature is “tune remember”, which simply allows you to program the switch to either default to “stock” tune every time the truck is started, or to “remember” which tune the truck was in when it was last shut off. The choice is yours!

DISCLAIMER: Ben Tyler or BT DieselWorks, LLC will not be held responsible for any personal, property, truck, vehicle, engine/powertrain, or transmission damage/injury that may result with the use of this module. This is an aftermarket part; just like any other aftermarket performance truck parts, install/use it at your own risk. Be sure to use caution when working around yellow connectors or wiring as these can be related to the SIR (airbag) system.

If yours does not work for some reason, email us and we will correct the situation. This is, of course, provided you do not have an existing mechanical/electrical problem with your truck/transmission that is outside of my control or the module’s abilities. IE, if you have a bad ground, bad wiring, incorrect ECM programming, ECM pin is not seated fully in the connector, etc, this module obviously will not be able to function properly.

The digital DSP-5 switch modules are covered by a 1-year warranty. If the module ‘stops working’ for some reason and you have diagnosed the problem and eliminated wiring problems/blown fuses/flasher module as a problem source, send the module back to us. We will test the module and if it is indeed found to be defective/failed, we will replace or repair the module free of charge (minus shipping costs). **If we receive the module back and see that it has been modified, tampered with, water-damaged, wired incorrectly, opened, or physically damaged, the warranty is VOID.** If the module does incur damage that would normally not be covered by warranty, let us know and we can most likely repair it for substantially less than the cost of a whole new module. If you have any questions regarding the warranty or module repair, feel free to contact us.

Installation Procedure

1. Disconnect both batteries.
2. Decide where you are going to mount the digital DSP-5 switch. Only the PINK, BLACK, and PURPLE wires from the DSP-5 switch will have to be run out to the ECM in the engine compartment. The GRAY and WHITE wires will remain on the interior of the truck and be connected under the dash.
3. Depending where you mount the digital DSP-5 switch, you might have to extend some of the wires. **If you do extend the wires, be sure not to mix up wires/colors, and be sure to make the connections clean/solid. If any wires get mixed up, the DSP-5 switch could be permanently damaged and repair will not be covered under warranty.**
4. Disconnect both ECM connectors. (7mm or 9/32" nut driver or socket wrench) Carefully remove the gray plastic wire dressing covers on both ECM connectors. It may be easier to work with the connectors and wiring if the ECM itself is removed from its plastic mounting bracket. **As a visual guide, you can follow the "DSP-5 switch install tutorial" guide in EFILive for a description of how to disassemble the ECM connectors and install the pins for your specific truck. LB7, LLY, and LBZ/LMM all have different styles of connectors and pin locations, so be sure that you install the pin in the proper location for your generation of Duramax.** If you accidentally lose or damage the ECM pin retainer, I sell replacements.
5. **NOTE: It is recommended that you only work on one ECM connector at a time**, to avoid accidentally mixing up the clear and blue pin retainers...if these pin retainer covers are mixed up, it could allow the connectors to be accidentally reversed, and potentially cause serious ECM damaged if plugged in backwards.
6. Start with the BLUE (C1) ECM connector. Remove both blue plastic shields on the connector by pressing in the retaining tabs with a small screwdriver. **Carefully insert the PURPLE wire/pin from the DSP-5 switch into pin position 69, next to a brown wire. (this is the "DSP-5 signal" pin)** Be sure not to bend the pin or wire. It will make inserting the pin easier if you first use a small screwdriver or pick to poke through the hole first, piercing the insulation on the ECM connector. **NOTE:** If you already have an existing DSP-5 switch, there will already be a pin/wire in this position. You will have to remove that existing pin from your old DSP-5 switch, and insert the new pin/wire from your new digital DSP-5 switch.
7. On the same BLUE (C1) ECM connector, **carefully insert the BLACK wire/pin from the DSP-5 switch into pin position 49, next to a tan wire. (this is the "DSP-5 ground" pin)** Be sure not to bend the pin or wire. It will make inserting the pin easier if you first use a small screwdriver or pick to poke through the hole first, piercing the insulation on the ECM connector. **NOTE:** If you already have an existing DSP-5 switch, there will already be a pin/wire in this position. You will have to remove that existing pin from your old DSP-5 switch, and insert the new pin/wire from your new digital DSP-5 switch.
8. Reassemble the BLUE (C1) ECM connector. Use extreme care in reinstalling the blue pin retainer shields, paying extra attention to make sure no pins are bent, misaligned, or otherwise not installed correctly. These plastic shields should easily slide right on with little/no effort. If they do not easily slide on, something is misaligned or not inserted correctly.
9. Move onto the CLEAR (C2) ECM connector. Remove the clear plastic shields on the connector by pressing in the retaining tabs with a small screwdriver. **Carefully insert the PINK wire/pin from the DSP-5 switch into pin position 28, next to a gray wire. (this is the "DSP-5 power"**

pin) Be sure not to bend the pin or wire. It will make inserting the pin easier if you first use a small screwdriver or pick to poke through the hole first, piercing the insulation on the ECM connector.

NOTE: SOME 2003-2004 LB7's MAY ALREADY HAVE A WIRE IN THIS POSITION. IF YOUR TRUCK IS A 2003-2004 AND ALREADY HAS A WIRE IN THIS POSITION, SPLICE THE PINK WIRE FROM THE DSP SWITCH INTO ANY SWITCHED +12v IGNITION HOT CIRCUIT IN THE UNDERHOOD FUSE BOX OR UNDER THE DASH.

10. Reassemble the CLEAR (C2) ECM connector. Use extreme care in reinstalling the blue pin retainer shields, paying extra attention to make sure no pins are bent, misaligned, or otherwise not installed correctly. These plastic shields should easily slide right on with little/no effort. If they do not easily slide on, something is misaligned or not inserted correctly.
11. Reinstall the ECM, reconnect both ECM connectors and carefully **hand-tighten** the bolt on both connectors. **DO NOT OVERTIGHTEN.**
12. **Carefully route the three PINK, PURPLE, BLACK wires so they are secured (zip ties are recommended) far away from any moving parts, belts, pulleys, exhaust manifolds, hot surfaces, or anything else that may potentially damage the wires. It is highly recommended to run the wiring through protective plastic wire loom as well. Take extra care of where the wires run through the firewall as well, making sure they will not rub/chaff on sharp metal surfaces.**
13. **On the interior, carefully secure the wires under the dash away from any brake pedal linkage, accelerator pedal parts, and steering column moving parts. Also be sure to protect the wires from any sharp metal surfaces, such as dash brackets/braces.**
14. If you choose to install the **OPTIONAL** valet/anti-theft toggle switch, run the GRAY wire coming from the DSP-5 switch to a secret location under your dash, or wherever you want to hide the switch. If you do **NOT** want to install the valet switch, simply tape up the end of the GRAY wire, secure it out of the way, and continue to step #20
15. **Whenever the GRAY wire is GROUNDED, the DSP-5 switch will be locked in "valet" mode. When the GRAY wire is left "floating" (IE, not connected to anything, open circuit), the DSP-5 switch will operate normally.**
16. You can use any standard basic on/off toggle switch, available at Radio Shack, auto parts stores, etc.
17. Attach the GRAY wire from the DSP-5 switch to one terminal of the toggle switch.
18. Attach the other terminal of the toggle switch to any **GROUND** source.
19. **NOTE: DO NOT CONNECT THE GRAY VALET TRIGGER WIRE TO +12v POWER, AS THIS WILL PERMANENTLY DAMAGE THE DSP-5 SWITCH AND VOID THE WARRANTY.**
20. The **OPTIONAL** "auto dimming" feature is so the display will dim automatically to a preset level when the headlights are turned on at night. You do not have to use this feature, if you choose not to hook up the auto-dim feature, the display can still be dimmed manually through several different levels (as described in STEP #25), just the display will not automatically dim at night when the headlights are on. If you do not wish to install this "auto dim" feature, tape off the end of the white wire, tuck it under the dash, and skip to STEP #22.

21. The WHITE wire going to the DSP-5 switch is the “auto dim” signal wire. Using the provided spade terminal and T-tap connector, splice (“T”) the white wire into the following wires at the following BCM connectors: **2001-2002 trucks splice into the WHITE wire at pin position A5 of the light blue BCM connector.....2003-2007 trucks splice into the WHITE wire at pin position B2 of the gray BCM connector. NOTE: be sure to follow the PROGRAMMING instructions on page 5-6 to enable the auto-dimming feature.**
22. After securing all wiring, double-check all connections, plug the DSP-5 harness connector into the back of the DSP-5 switch, and mount the DSP-5 switch in its final mounting location. **NOTE: you might have to carefully file opening of the hole in your gauge pod mount. The body of the digital DSP-5 switch is slightly oversized and tapered, for a tight “interference fit”. Use care when fitting/sizing the hole for the switch.**
23. Reconnect batteries.
24. Start the truck and verify proper operation of the DSP-5 switch. When the truck is started, the DSP-5 switch will go through a startup routine and then show which tune number you are in. “1” being “stock” tune, and “5” being “race” tune. Use the “up” and “down” buttons on the DSP-5 switch and verify that the number cycles properly 1 through 5. When the highest/lowest tune level is reached, an additional press of the “up” or “down” buttons will simply be ignored. IE, when you are in tune 5, if you press the “up” button again, nothing will happen and the switch will remain in tune 5.
25. To test the “valet” mode (if installed, as described in steps 14-19), flip your hidden toggle switch. The display should immediately switch to “L” (for “Locked”). Whenever “L” is displayed, the DSP-5 tune is locked into the “stock” tune level. Any attempt at pressing the “tune up” or “tune down” buttons will result in a “tamper protection” routine in which the DSP-5 switch display will display “LOC” (“locked”) for roughly a minute, during which time all switch operation is disabled. To exit “valet” mode, flip the hidden toggle switch back, and the display should immediately return to your previously selected tune. The valet mode is “saved” when the truck is turned off. (IE, if you leave the toggle switch in “valet” mode, and turn the truck off, “valet” mode will automatically be re-enabled next time the truck is started, until the switch is flipped back to “normal” mode.)
26. To control display brightness, momentarily press both “up” and “down” buttons simultaneously. The display will dim down one step. To dim the display further, press the “up” and “down” buttons simultaneously again. There are 5 levels of brightness, plus a “display off” mode. The final brightness level that can be cycled to shuts the display off completely for a less distracting/stealth look at night. **Once the display has been cycled to this “display off” mode, the switch is still “on” and working as a DSP-5 switch in the background, just the number display is off.** The buttons will remain dimly illuminated so they are easy to locate in the dark. If you press an up or down button to change tunes, the display will immediately turn back on to full brightness so you can see which tune you are changing to, and then after 2 seconds of button inactivity, it will automatically dim “off” again. To return to full brightness (daytime) mode, simply press both buttons simultaneously one more time, and the display brightness level will loop back “to the top”.
27. If you have the “automatic dimming” feature/wire hooked up (as described in steps 20-21), cycle the headlights on and off to verify that the display transitions between “daytime mode” and “nighttime mode”.
28. Turn the truck off and re-check all connections/wires/fitment. **NOTE: the DSP-5 switch will remain “on” for a couple extra seconds after the ignition is switched off due to the fact that the ECM does not power itself down immediately at key-off. Within 10 seconds of shutting the truck off, the ECM should power down automatically, and the DSP-5 switch will then turn off. THIS IS NORMAL OPERATION.**

Tune reversal/tune recall programming procedure:

1. If your tuner has your DSP-5 tunes configured in “reverse” order (IE, your “race” tune is in the “non-DSP/stock” tables, and your “stock” tune is in the “DSP #4” tables, follow the steps below to program the switch for “reverse tune order”. Also follow these steps if, after using the DSP-5 switch, you find that “5” puts your truck in a stock tune, and “1” puts your truck in a race tune. (that would signify that your tuner has your tables reversed)
2. The “tune recall/remember” programming setting is if you want the switch to remember what tune the truck was last in when it was shut off. If the tune-recall feature is programmed to “off”, the switch will automatically start on tune #1 each time the truck is started, regardless of what tune the truck was last left in when it was shut off. If the “tune recall” is “on”, the switch will remember the last tune that the switch was in when the truck was shut off.
3. Start with the ignition OFF and be sure the DSP-5 switch is powered down.
4. Press and hold both “up” arrow and “down” arrow buttons.
5. While still holding the “up” and “down” buttons, turn the ignition ON, but don’t start the engine.
6. After a second or so, the display will show “P” (Program) to indicate programming mode has been entered.
7. Once the display shows “P”, release both buttons.
8. **After several seconds, the display will show a number, indicating which program setting is selected. “1” denotes “remember tune at key-off/normal tune order”. “2” denotes “remember tune at key-off/reverse tune order”. “3” denotes “don’t remember tune at key-off/normal tune order”. “4” denotes “don’t remember tune at key-off/reverse tune order”.**
9. Once the display shows “1”, to change to configuration “2”, “3” or “4”, simply press the “up” button. Each press of the “up” button will cycle through the different programming configurations.
10. Once the desired program setting has been reached (1, 2, 3, 4), simply turn the ignition OFF, wait 5 seconds, and the setting will be permanently saved until you re-enter programming mode again. Disconnecting the batteries, etc will not erase the programming setting. NOTE: when in programming mode, you can only go “up” in programming settings. If you accidentally pass your desired programming setting (IE, you wanted configuration 2, but you accidentally pressed the “up” button an extra time and the DSP-5 switch went to configuration 3), simply turn the ignition OFF, wait 5 seconds, and repeat steps #4-8, and the module will reset/default back to configuration 1. The program setting can be changed/reset as many times as you want.
11. To reset the switch back to factory default settings, just repeat steps #3-8, and then once the display shows “1”, turn the ignition off and wait 5 seconds, and the switch will be returned to factory settings.

Auto-dimming programming procedure:

1. Start with the ignition OFF and be sure the DSP-5 switch is powered down.
2. Press and hold the “UP” arrow button.
3. While still holding the “UP” arrow button, turn the ignition ON, but don’t start the engine.
4. The display will show “P-L-P-L-P-L” (for Program Lights). Once the display starts showing “P-L”, release the up arrow button.
5. The display will then show “O” indicating the auto-dim feature is OFF (default).
6. Each (momentary) press of the “DOWN” arrow button will cycle the switch through the various auto-dim levels/modes.
7. There are 5 levels of brightness. Each press of the down arrow will make the switch cycle up through 1, 2, 3, 4, 5. When the indicated level/number goes up with each button press, the display will also dim accordingly, giving you a “preview” of what the brightness levels look like when you turn the headlights on.
8. Once you get to level 5 (the dimmest setting), the switch will not loop around back to the top. If you accidentally go past your desired setting (IE, you wanted setting 3 but accidentally pressed the button an extra time and the switch went to 4), turn the ignition off for 5-10 seconds, wait for the switch to power down, and repeat steps #1-7.
9. Once the switch is showing your desired level of brightness (1, 2, 3, 4, 5) and you are satisfied, turn the ignition OFF and wait 5-10 couple seconds for the DSP-5 switch to power down and turn off. Once the display turns off, the setting is saved until next time you manually re-enter programming mode (as described in step #1). The setting will NOT be lost if you disconnect the batteries etc.
10. Once the switch is off and powered down, start the truck normally and test out the auto-dimming feature by turning the headlights on and off. When the headlights are on, the display will automatically dim to the preset level. The factory automatic headlights feature is unaffected, and the DSP-5 switch is fully compatible with the factory auto headlights.

Troubleshooting Guide

1. If the switch does not light up or do anything with the key turned on, then the switch is not getting power or ground. Double check that the ECM connectors are fully seated/latched, and the pins are fully seated in the ECM connectors. The #1 cause of DSP-5 switch problems is with incorrectly inserted/not fully-seated pins in the ECM connectors.
2. If the switch turns on and appears to work properly, but does not actually change tunes, the problem is most likely due to the pin in the ECM connector not being fully seated, or the pin was installed in the wrong position altogether. If the pin is verified in the proper position, and the pin is verified to be fully seated, you can use the EFILive scan tool to check what voltages the switch is sending to the ECM. Start and idle the engine. Open up the EFILive scan tool, connect to the truck, and look for the “DSP5 TUNE” and “DSP5 SWITCH VOLTAGE” PIDs. Log those PIDs and verify that the voltage and tune level changes with when you press the “up” and “down” arrow buttons on the DSP-5 switch. **The APPROXIMATE voltage reading should cycle from 4.6**

volts, 3.5 volts, 2.4 volts, 1.5 volts, 0.5 volts, as the switch is cycled up and down from tune 1 through tune 5. If the voltage does not change, is erratic/jumps around, or stays at "0.00v", check the wiring and make sure the pin is not damaged.