

“Allison Lockup Controller”

Installation instructions (6-speed LBZ/LMM, v6.x.x)

By: BT DieselWorks, LLC.

First of all, thank-you for purchasing the BT DieselWorks 2nd generation Allison TCC lockup/unlock controller module! This switch was designed to override the TCM and allow full manual control of the Allison torque converter clutch. Full factory/automatic mode is still retained for normal driving, but in the event that you want to immediately lock or unlock the converter, you can do so at the push of a button, regardless of what the current state of the TCM and TCC solenoid is. The module is fully computerized with various safety lockouts, as well as using proper pulse-width-modulation to drive the TCC solenoid, identical to the factory TCM.

Depending on the converter and TCM programming, sometimes lockup is not actually achieved until 60 MPH and the top of 3rd gear. It is a well-known fact that the Allison TCM sometimes does not do what it is told or programmed to do...under high HP conditions during drag racing or sled pulling, TCC lockup can be extremely unpredictable. This is because whenever TCC “slip speed” is greater than 650rpm, lockup commands are inhibited within the TCM. Under high HP and loose converters, this threshold is easily exceeded, thus preventing TC lockup at the desired time.

Please check everything in the package to be sure nothing was damaged in shipping or otherwise not complete. All wires are color coded for easy installation. Installation should take ~45 minutes or so, depending on how you decide to route the wires, and if you have not previously drilled a hole in the firewall to pass wires through.

DISCLAIMER: Ben Tyler or BT DieselWorks, LLC will not be held responsible for any personal, property, truck, vehicle, engine/powertrain, property, 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.

I fully test **every** module for proper operation before I send it out. **This is why some of the wires on the harness might appear to have been ‘used’ before.** This module has been used on many trucks during testing/prototyping, with great success. If yours does not work for some reason, email/PM me and I 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 TCC module's abilities. IE, if you have a sticking converter flow valve or burnt up converter clutch, this module obviously will not be able to function properly.

The Allison TCC control modules are covered by a 1-year parts/labor warranty. If the module 'stops working' for some reason and you have diagnosed the problem and eliminated transmission mechanical failure as a problem source, send the module back to me. I will test the module and if it is indeed found to be defective/failed, I will replace or repair the module free of charge. I will not cover shipping charges.

If I 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 me know and I 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 me.

1. **Before beginning installation, be sure to check the module over for shipping damage or otherwise missing parts. The included parts are as follows:**
 - A) Lockup controller module. There will be a sticker on the bottom that will say "SOFTWARE REVISION: X.X.X". The first "x" will be either a "5" or a "6". A 5 denotes a 5-speed Allison module, a 6 denotes a 6-speed Allison module. For example, if you have a 6-speed transmission and the box you receive says 5.x.x on it, please contact me. The second number is the final software revision that is flashed into the module. This number just allows me to track each module and know at a glance what operating-system it is running. Periodically, I may come out with minor software updates to improve module operation, stability, etc.
 - B) Hand-held remote control. If you need an "extension cord" for the remote control, contact me.
 - C) Lockup controller main harness.
 - D) Zip-loc bag with extra heat-shrink tubing, zip-ties, and Scotch-Loc "T" tap connectors
2. **NOTE: BE SURE TO DOUBLE CHECK THAT MOUNTING OF MAIN CONTROL BOX AND ASSOCIATED WIRING DOES NOT INTERFERE WITH ACCELERATOR/BRAKE PEDAL MOVEMENT OR STEERING COLUMN MOVEMENT. ALSO USE EXTREME CAUTION AROUND ANY**

YELLOW/ORANGE COLORED CONNECTORS, AS THESE ARE AIRBAG SYSTEM RELATED CONNECTORS AND WIRING.

3. Drill hole in firewall using the plow-package blank/cutout as a reference. I find a step-bit works best for this.
4. Route the long gray wire through the firewall into the engine bay. Secure the gray wire along the firewall and along the fender so that the wire ends up at the TCM harness/connectors on the radiator shroud. **NOTE: BE SURE TO SECURE GRAY WIRE OUT OF THE WAY OF ANY HOT MANIFOLDS, MOVING PARTS, OR ANYTHING ELSE THAT COULD DAMAGE THE WIRE.**
5. Disconnect both batteries
6. Remove TCM and unplug the 80-pin connector
7. Unwrap electrical tape to expose a portion of the TCM wiring harness
8. Locate the brown wire that terminates at Pin #78 in the 80-pin TCM connector
9. **Cut wire**, leaving enough slack to splice in wires from the TCC-controller box
10. Strip ~1/2" of insulation off of each end of the brown wire.
11. Connect the TCM-side of the brown wire to the WHITE wire coming from the TCC-controller box. Connect the TRANSMISSION-side of the brown wire to the BLACK wire coming from the TCC-controller box. SEE DIAGRAM BELOW FOR DETAIL. Again, I recommend soldering and heat-shrink tubing.
12. Locate the DARK-BLUE wire that terminates at Pin #79 in the 80-pin TCM connector. DO NOT CUT the wire; you are only splicing/tapping into it ("T"). Using a provided T-tap connector in the "extra-parts" Ziploc bag, securely crimp the T-tap into the dark blue wire. Connect the spade terminal (RED wire coming from the TCC-controller) to the T-tap.
13. Locate the PURPLE wire that terminates at the stop lamp/TCC brake pedal switch. The switch is under the dash mounted on the brake pedal. Using a provided T-tap connector in the "extra-parts" Ziploc bag, securely crimp the T-tap into the PURPLE brake-pedal switch wire. Connect the TCC-controller PURPLE-wire spade terminal to the T-tap. SEE DIAGRAM BELOW FOR DETAIL.
14. Locate a **FUSED/PROTECTED** ignition hot +12v wire. Usually these wires are pink and can be found under the dash below the steering column going into the BCM connectors. **NOTE: The wire MUST be hot during run AND crank/start.** Be sure to check this with a multimeter or test light. **I highly recommend adding an additional in-line fuse with the pink wire going to the lockup controller.** These can be found at any auto parts store. A 2-amp fuse is sufficient. A known-good location to tap into an ignition-hot source that is hot in RUN and CRANK, is at the BCM. Locate the 27-pin LIGHT GREEN connector on the BCM. The PINK wire going to pin position 14 is a good ignition-hot source. Use a multimeter or test-light to confirm that you have the correct wire. Note: these power/ground sources apply to 2007.5+ GMT-900 trucks only!

15. Splice the PINK wire coming from the TCC-controller box into the fused ignition-hot wire. SEE DIAGRAM BELOW FOR DETAIL.
16. Locate a SOLID/CLEAN chassis-ground source in the truck. Connect the black/white wire coming from the TCC-controller to a solid/clean ground source. The ground MUST be solidly attached. A dirty ground can result in erratic module operation and/or "REDUCED ENGINE POWER" messages and accelerator-pedal-position-error DTC's. **NOTE: If you are experiencing random "REDUCED ENGINE POWER" messages, or an accelerator dead-pedal condition, that means that the ground is not clean. A known-good ground location is any of the ground wires going to the BCM connectors. The BCM LIGHT-BLUE 25-pin connector, pin position 5 (BLACK/WHITE-STRIPE) is a good ground. Note: these power/ground sources apply to 2007.5+ GMT-900 trucks only!**

17. Step 18-25, OPTIONAL STEERING WHEEL CONTROL INTERFACE (2003-2007 classic trucks only with factory steering wheel controls)

The TCC module also has the option to interface with the factory steering wheel controls, if your truck is equipped with them. **VOLUME-UP will FORCE-LOCK the torque converter** (effectively the same as pressing the GREEN button on the remote control). **VOLUME-DOWN will FORCE-UNLOCK the torque converter** (effectively the same as pressing the RED button on the remote control). **"PROG" will return TCC control to factory-operation and cancel any manual-TCC-control.** Pressing the brake pedal at any time will also return TCC control to factory-operation. The lower steering wheel controls for the Driver Info Center will still work normally regardless, as they are on a separate circuit. **There are three ways you can configure the steering wheel controls, depending on your preference. See following steps:**

18. **Option 1: Controlled automatically based on radio power.** Whenever the radio is OFF, the steering wheel controls will control the lockup controller. When the radio is turned ON, the steering wheel controls will automatically revert back to factory operation of controlling the radio. Remove the instrument panel bezel, and remove the radio. Locate the PINK wire going into pin position B3 of the large 24-pin radio connector. Splice the PINK/BLACK-STRIPE wire coming from the lockup controller into this PINK wire in the radio harness.
19. **Option 2: Controlled via separate toggle switch.** If you want to be able to manually select when the steering wheel controls are dedicated to the lockup controller and when they are dedicated to the radio, you can wire in a separate toggle switch. Use this method if you want to be able to use the steering wheel controls to control the lockup controller while the radio is still on. Use any standard on/off toggle switch. Attach the PINK/BLACK-STRIPE wire coming from the lockup controller to one side of the toggle switch. Attach the other side of the toggle switch to any fused ignition-hot source in the truck. Flip the toggle switch on and off to switch the steering wheel controls from radio to lockup-controller
20. **Option 3: steering wheel controls always set to control the lockup controller.** You can use this method if you have an aftermarket radio that does not support steering wheel controls, OR if you don't care about losing the ability to control the

- radio with the steering wheel controls.** Splice the PINK/BLACK-STRIFE wire coming from the lockup controller to any fused ignition-hot source.
21. Now locate the BROWN 24-pin connector going to the BCM. Find the LIGHT GREEN wire that goes to pin position A7.
 22. Cut the light green wire. Leave a bit of slack; do not cut the wire right up against the connector.
 23. Splice the LIGHT GREEN wire coming from the lockup controller into the BCM-side of the light green wire that you just cut in step 23.
 24. Splice the DARK GREEN wire coming from the lockup controller into the truck-harness-side of the light green wire that you just cut in step 23.
 25. Tape up connections securely and plug the brown 24-pin connector back into the BCM.
This ends the 2003-2007 classic steering wheel control interface instructions.
 26. **Step 27-33, OPTIONAL STEERING WHEEL CONTROL INTERFACE (2007.5+ GMT-900 with factory steering wheel controls, NOTE: feature not finalized on 2007.5+ trucks. Lockup controller will need a software update to enable steering wheel control function. COMING VERY SOON)** The TCC module also has the option to interface with the factory steering wheel controls, if your truck is equipped with them. **SEEK/ARROW-UP will FORCE-LOCK the torque converter** (effectively the same as pressing the GREEN button on the remote control). **SEEK/ARROW-DOWN will FORCE-UNLOCK the torque converter** (effectively the same as pressing the RED button on the remote control). **“RIGHT-POINTING-ARROW” will return TCC control to factory-operation and cancel any manual-TCC-control.** Pressing the brake pedal at any time will also return TCC control to factory-operation **There are two ways you can configure the steering wheel controls, depending on your preference. See following steps:**
 27. **Option 1: Controlled via separate toggle switch.** If you want to be able to manually select when the steering wheel controls are dedicated to the lockup controller and when they are dedicated to the radio, you can wire in a separate toggle switch. Use this method if you want to be able to use the steering wheel controls to control the lockup controller while the radio is still on. Use any standard on/off toggle switch. Attach the PINK/BLACK-STRIFE wire coming from the lockup controller to one side of the toggle switch. Attach the other side of the toggle switch to any fused ignition-hot source in the truck. Flip the toggle switch on and off to switch the steering wheel controls from radio to lockup-controller
 28. **Option 2: steering wheel controls always set to control the lockup controller.** You can use this method if you have an aftermarket radio that does not support steering wheel controls, OR if you don't care about losing the ability to control the radio with the steering wheel controls. Splice the PINK/BLACK-STRIFE wire coming from the lockup controller to any fused ignition-hot source.
 29. Now locate the LIGHT GREEN 27-pin connector going to the BCM. Find the LIGHT GREEN wire that goes to pin position 6.

30. Cut the light green wire. Leave a bit of slack; do not cut the wire right up against the connector.
31. Splice the LIGHT GREEN wire coming from the lockup controller into the BCM-side of the light green wire that you just cut in step 21.
32. Splice the DARK GREEN wire coming from the lockup controller into the truck-harness-side of the light green wire that you just cut in step 21.
33. Tape up connections securely and plug the light green 27-pin connector back into the BCM. **This ends the 2007.5+ steering wheel control interface instructions.**
34. Disconnect the connector on the accelerator pedal position sensor. There is a CPA-clip on there that has to first be removed with a small screwdriver before the connector will be able to be unclipped.
35. Locate the DARK BLUE wire on the accelerator pedal connector harness. This dark blue wire terminates at Pin 5 on the accelerator pedal connector.
36. Using a provided T-tap connector in the “extra-parts” Ziploc bag, securely crimp the T-tap into the DARK BLUE wire on the accelerator pedal harness. Connect the TCC-controller DARK-BLUE wire spade terminal to the T-tap. SEE DIAGRAM BELOW FOR DETAIL. Reconnect the accelerator pedal position connector and replace the CPA-clip.
37. Decide where you want to route the remote control wiring, route the cable, and plug the remote control into the RJ11 plug on the lockup controller box.
38. Carefully route wiring and re-tape/secure wires so they do not interfere with proper accelerator pedal operation. **Press the accelerator pedal and brake pedal to the floor several times to verify that no wires are snagged or chaffing.**
39. Secure all wires and tape each connection/splice individually with good-quality electrical tape, or heat-shrink tubing.
40. **Triple check all connections and be sure no wires are exposed...**I will NOT be responsible for damaged TCM's, wiring, f-trim solenoids, or lockup-controllers due to mis-wiring or loose connections!!!
41. Re-wrap TCM wiring harness in electrical tape and/or wire loom and secure TCC-controller box wiring harness
42. Plug the TCM back in and replace the TCM mount, again checking for pinched wires.
43. Reconnect batteries
44. Turn the ignition on and verify that the LED on the remote control is dimly lit green (you might have to look closely at the LED if in bright sunlight). This means the module is powered up properly and in “stand-by” mode. If the LED does not light up dim-green, there is a power/ground connection issue.
45. **Read the following Operating Instructions first** and then take the truck for a test drive and double-check for proper TCC-unlock switch operation. **Remember** if the truck is cold,

it will take ~15 minutes of driving before the TCM will allow TCC lockup, so be sure the transmission temperature gauge has moved off the 100* mark before testing the switch.

-Whenever the brake pedal is pressed, the module will suspend all activity and return TCC control to factory default. This is a necessary safety feature. If the module appears to have “frozen”, the buttons do not do anything, and/or the LED will not light up, first check the purple brake pedal signal wire. The wire should have +12v when the brake pedal is released, and should drop to 0v when brake pedal is applied.

-Once the transmission temperature is above ~100*, TCC lockup is available and you will be able to lock or unlock it manually at anytime without limping the transmission or setting any DTC's.

-The remote control module has three momentary pushbuttons for TCC control, green, red, and blue, as well as a tri-color LED status indicator light.

-When the LED is 'BRIGHT GREEN', the TCC is in force-lockup mode

-When the LED is 'RED', the TCC is in force-unlock mode

-When the LED is 'BLUE', the TCC controller is in “automatic standby” mode

-MANUAL MODE OPERATION: When the LED is dim/soft green, the module is operating in stock manual/standby mode, and the TCC is operating normally/automatically just like it would from the factory.

-When the RED button is pushed, the module will force the TCC to unlock, regardless of its current state/status. IE, if you are driving around at lower speeds and the TCC is already unlocked, and you press the RED button, it will simply prevent the TCC from locking at all, even if you increase speed to where the TCM would normally lock it. If you are driving at higher speeds or higher throttle positions and the TCC is locked, pressing the RED button will immediately unlock it, regardless of what the TCM is telling it to do.

-When the GREEN button is pushed, the module will for the TCC to immediately lock, regardless of its current state/status. IE, if you are driving around at lower speeds in non-tow/haul mode and the TCC is unlocked, pushing the GREEN button will immediately force lockup regardless of speed or current gear. If you are driving at higher speeds and the TCC is already locked, pressing the GREEN button will simply prevent the TCC from unlocking in the future, even if you reduce your speed to the point where in normal/factory conditions, the TCM would unlock the TCC.

- TO EXIT MANUAL TCC CONTROL MODE (either force-locked or force-unlocked), press the respective button once more and the TCC control will immediately return to factory mode, and it will relinquish TCC control back to the TCM. IE, if you are in force-unlock mode (LED is lit up red), simply press the force-unlock button (red button) one more time to return to factory-automatic-mode. If you are currently in force-lock mode (LED is lit up green), simply press the force-lock button (green button) one more time to return to factory-automatic-mode, **or just tap the brake pedal.**

-If you want to stay in manual mode, but change/swap between current TCC states (locked or unlocked), simply press the opposite respective button. IE, if you are in force-lock mode (LED is lit up green) and you want to transition right to force-unlock mode, simply press the force-unlock

button (red button), and the TCC will immediately unlock and the LED will turn red. To relock from the force-unlock mode, simply press the green button again and the LED will turn back to green.

-In summary, you do not have to return to 'factory-automatic' mode each time you want to switch between force-locked and force-unlocked. You have full authority at all times and can change between modes at will. As said before, to return to factory at any time, push the respective button of whatever "manual mode" you are in at the current time, or press the brake pedal.

-AUTOMATIC MODE OPERATION: The TCC controller has an automatic-lockup feature in addition to the standard manual TCC control. The parameters that must be met for the controller to automatically lock the torque converter (when armed in 'auto' mode) are [throttle position above 95%] and [transmission in 2nd, 3rd, 4th, 5th, or 6th gear]. So when you floor it from a stop, the TCC controller box will automatically lock the converter as soon as the transmission shifts into 2nd gear. If you are in 2nd gear or higher, the TCC controller box will automatically lock the converter when you go above 95% throttle.

-To "arm" the automatic lockup mode, press the BLUE button on the handheld remote control. The status indicator LED will light up BLUE indicating that the module is armed in automatic mode and is standing-by to automatically lock the converter as soon as the brake pedal is released, 95% throttle is detected, and 2nd gear is attained.

-When both parameters are met (in auto mode) and the converter is locked up automatically, the LED will change to GREEN, indicating that the converter has been force-locked automatically.

-When in auto mode and the converter has been force locked automatically, the TCC-controller box will "exit" and return the TCC control to factory configuration when throttle position drops below 50%, the transmission downshifts to 1st gear, or the brake pedal is pressed.

-When in auto-lock mode (at 100% throttle), you can still press the RED force-unlock button at any time to force the converter to unlock at any time, regardless of throttle position and current gear. When you are in AUTO mode, you do not lose the ability to force-unlock the converter after it has been locked automatically due to 95% throttle. When the TCC controller box is armed in "auto", the force-unlock and force-lock buttons are disabled.

-To return to normal manual TCC operation and re-enable the on-demand force lock/unlock buttons, press the blue "auto" mode button to exit auto mode. The status indicator LED will turn off, indicating auto mode has been canceled and it is returning to normal standby operation.

AUTO MODE TIME DELAY PROGRAMMING INSTRUCTIONS

Lockup controller modules with software version 6.4.0 and later have the ability to custom program a time delay before force-lockup will occur when in automatic mode. Normally, when in AUTO mode, as soon as the throttle is at 100% and the truck shifts into 2nd gear, the module will immediately force-lock the converter automatically. However, sometimes with custom converters or bigger turbochargers, the module can force lockup to happen too soon, not allowing the turbo to become fully spooled. When this happens, the truck can bog down and lose acceleration. If you find that lockup is happening too soon when the controller is in AUTO

mode, you can set a 0-6 second time-delay that the controller will wait before going into force-lockup mode. For example, if you set the time delay for 3 seconds, the controller will look for 100% throttle and 2nd gear, and as soon as those two conditions are met, the controller will wait an additional 2 seconds before force-locking the converter.

1. Begin with key OFF
2. Press and hold down both the red and green buttons on the remote control
3. While still holding the red and green buttons, turn the key ON (do not start the truck)
4. The remote light will blink red/blue quickly, indicating programming mode is active
5. Once the light is blinking red/blue, release the red and green buttons
6. Press the blue button once (just momentarily, no need to hold it)
7. The light will turn a solid green, indicating the delay is "zero seconds"
8. Press the blue button again (just momentarily)
9. The light will blink green once, and then go back to solid green. That one blink indicates the delay is set for "one second"
10. To set the delay for two seconds, press the blue button again. Then the light will blink green twice and go back to solid green. The two blinks indicates the delay has been set for "two seconds"
11. Press the blue button again for 3 seconds, then 4 seconds, then 5 seconds, then 6 seconds, etc... The delay can be set anywhere from 0 to 6 seconds. 6 seconds is the max delay.

Once the desired delay has been set (IE, the light blinks the desired amount of times, and then goes back to solid green), just turn the key off, wait 10 seconds, and turn the key on again. The setting is now saved permanently (IE, even if the module is disconnected from the truck or battery power is disconnected, the time-delay setting is still saved), or until you re-enter programming mode to change it again.

You can reprogram it as many times as you want, to set the delay differently, just follow the steps all over again.

If you accidentally go "past" the desired setting (IE, you want to set it for 4 seconds, but accidentally hit the blue button a 5th time and the light blinks 5 times), just turn the key off, wait 10 seconds, and start the programming process over again.

REGARDLESS OF CURRENT MODE/STATUS, PRESSING THE BRAKE PEDAL WILL ALWAYS OVERRIDE THE MODULE AND RETURN THE TCC CONTROL/OPERATION TO "FACTORY". Anytime your foot is on the brake pedal, all force lock/unlock commands are ignored. This is a safety feature for obvious reasons.

-IMPORTANT SAFETY NOTE: TRUCKS WITH THE ALLISON 6-SPEED HAVE THE ABILITY TO ALLOW MANUAL LOCKUP IN FIRST GEAR. So if you are idling along in a parking lot in first gear with your foot off

the brake, and you press the green "force lock" button, **the converter will lock and the truck will surge forward.** As always though, a tap on the brake pedal will return everything to normal.

-NOTE: The TCC control module does have a limited duty cycle; try not to run with the converter "forced unlocked" or "force locked" for an excessive amount of time. The force lock/unlock feature is only recommended to be used during racing/pulling. This is generally never a problem because sled pulls and drag races are far shorter than this time. There is an automatic thermal-overload protection built into the controller for safety that will prevent you from accidentally leaving the converter force-locked/force-unlocked. **If the module is left in force-lock or force-unlock for longer than 30-seconds, the module will go into "thermal-overload protection" mode. TCC operation will be immediately returned to factory-stock and the LED will rapidly flash BLUE/RED for ~15 seconds, indicating that the duty-cycle has been exceeded. During this 30-second cool-down period, all force-lock and force-unlock commands will be ignored. After 15 seconds, the LED will stop flashing, and the module will automatically reboot/reset and return to normal operation. Also, under rare circumstances, repeated locking and unlocking with the module, or force-locking the converter at very low speeds and engine RPM's has the slight potential to set a TCC stuck-on DTC.**

Any further questions or if you ever have problems with the Allison TCC lockup/unlock switch module, feel free to PM me, email me at BTDieselWorks@gmail.com,

Thanks again, Ben Tyler, BT DieselWorks, LLC.

