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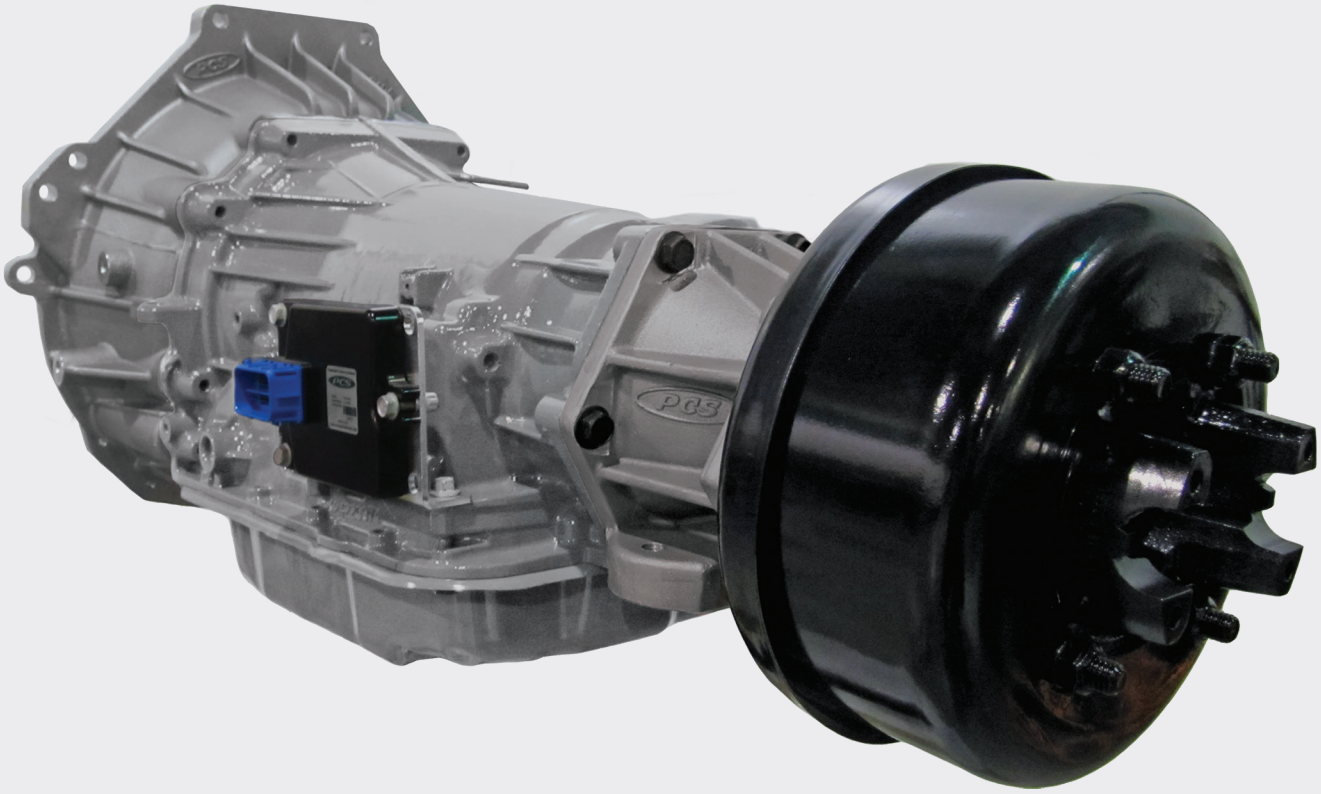
PCS C6 REPLACEMENT GUIDE v2.0



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FORWARD

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PREFACE

This installation guide is intended to inform the reader of the features and parts included in the PCS C6 Replacement Package, as well as general installation instructions. Every vehicle model eligible for this product is different, therefore while PCS is eager to assist it remains the responsibility of the vehicle owner/OEM to develop specific replacement/ installation procedures for each vehicle model.

All dimensions and values in this manual are for reference only. Refer to the appropriate manufacturing drawing(s) for more definitive information.

For information on the transmission characteristics, design criteria, and operation refer to the *PCS 4LHD/4LHDX Applications Guide*.

For information on the transmission maintenance, diagnostic, and troubleshooting procedures please refer to the latest version of the PCS 4LHD/HDX Technicians Guide.

For information on the Transmission Control Module (TCM), calibration process, and diagnostic procedures refer to your TCM Manual, as an example the *PCS TCM2600 Manual*.

Additional Information for PCS provided kits and their part numbers are available in the latest version of the *PCS OEM Parts Catalog*.

Powertrain Control Solutions
10511 Old Ridge Rd.
Ashland, VA 23005
+1 (804) 227-3023
support@ptcs.us

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Revision History

03-29-2016 - v1.0: Original Release
03-06-2019 - v2.0: Revisions in removal/installation instructions
08-17-2021 - v2.1: Revision to Step 31

Transmission Removal

STEP 1: Before replacing the transmission it is important to allow the vehicle systems to cool, an hour is typically adequate. In addition, you must disconnect the battery during the entirety of this process to prevent permanent electrical damage to the controller and sensor systems. Some vehicles getting this kit can have the transmission installed from the top of the vehicle, others will require the transmission to be installed from below. As many of the vehicles receiving this package are too heavy for traditional vehicle lifts, we wish to remind the reader that safely lifting the vehicle is paramount. Improperly securing a vehicle of this weight can result in permanent damage to the product and severe injury or death to the technician.

STEP 2: It is likely your vehicle has a dust cover over the Ford C6's converter / flexplate. Remove this cover and the four converter / flexplate nuts. Save these parts and hardware in an organized manner, you will re-use these during the 4LHD C6 Replacement Package installation.

STEP 3: Disconnect all of the transmission to vehicle interface systems. To prevent component damage during this process, full removal of specific components is up to the discretion of the mechanic / engineer. Interface components include the driveshaft, throttle kick-down-cable, speedometer, shifter linkage, MAP vacuum line, cooler lines, dipstick, starter motor, and any other vehicle specific systems in the path of the transmission removal procedure. It is recommended to save and organize all of these parts, as many of them are used again to interface with the new transmission. Note: The speedometer, kick-down-cables, shifter linkage, and MAP vacuum systems are not re-used, so complete removal is recommended.

STEP 4: Before removing the old transmission and transmission-mount, securely support the bottom of the transmission with a transmission-jack or with an engine-hoist. If straps are used to lift the transmission, route the straps just in front and just behind of the transmission-oil-pan. Removing the cross-member may be necessary to remove the transmission. Once the transmission mount is removed provide additional bracing to the rear of the engine to prevent damage to the set of engine mounts. PCS is not responsible for engine mount damage during this process.

STEP 5: Remove the transmission from the vehicle. As mentioned before, save and organize all of this hardware. Be sure to keep the torque converter engaged with the transmission during this process, it will fall out of the bellhousing, causing severe injury. Please dispose of the old transmission properly, either in its respective transmission crate "cocoon" for return to PCS or back to the original supplier for core charge.

Vehicle Preparation and Maintenance

STEP 6: Inspect all of the removed hardware and parts, replace if necessary. Nuts and bolts should be straight, clean, and with no damage to the threads / head. The flexplate should have no cracks or dents, be sure to inspect the mounting holes closely. Engine-transmission alignment dowels should be unmarred and still press-fit in the engine block, replace if loose or damaged.

STEP 7: The transmission radiator and cooler lines must be flushed (or replaced) before installing the new transmission. Now is a convenient time to do this step.

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Transmission Installation

STEP 8: When the new transmission and transmission accessories come to the shop be sure to store them in a dry location, the slightest exposure to water during storage can cause water damage to the transmission and cause the unit to prematurely fail. PCS does not cover transmissions or components that are improperly stored before installation. Remove the new transmission from the shipping cocoon, inspect for manufacturing defects or shipping / handling damages. PCS does not cover transmissions or accessories that are damaged or improperly installed during this process.

STEP 9: Before installing the transmission into the vehicle it is recommended to install the drum brake kit and transmission-mount first. Unless a new Drum Brake Kit (TRN8805) was ordered or requested install the drum housing, drum brake components, and yoke from the old Ford C6 transmission.TRN8805 is not included with this PCS C6 Replacement Package.

STEP 10: Before installation wipe clean the engine and transmission mating faces. Inspect these for nicks and other forms of damage. Also, inspect the crank pilot and mating face for damage and contaminates.

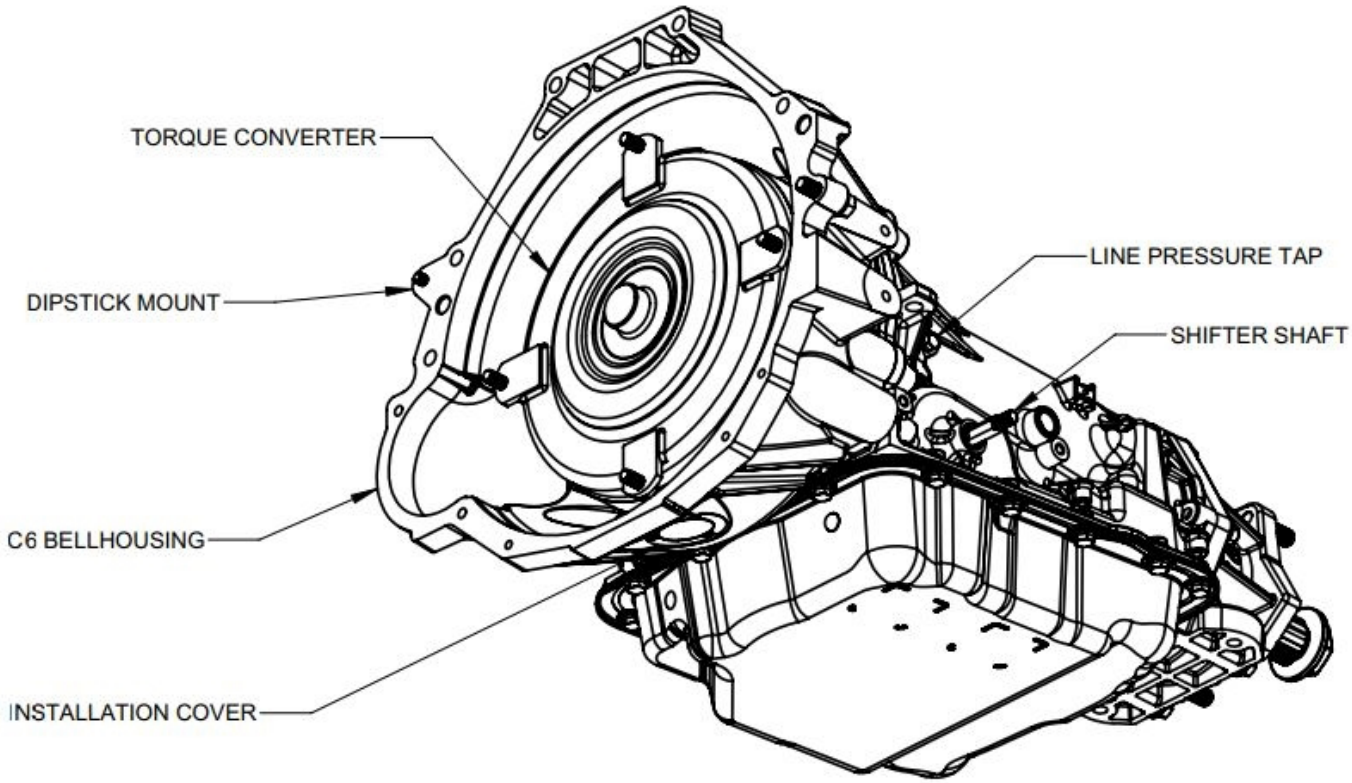

Figure 1

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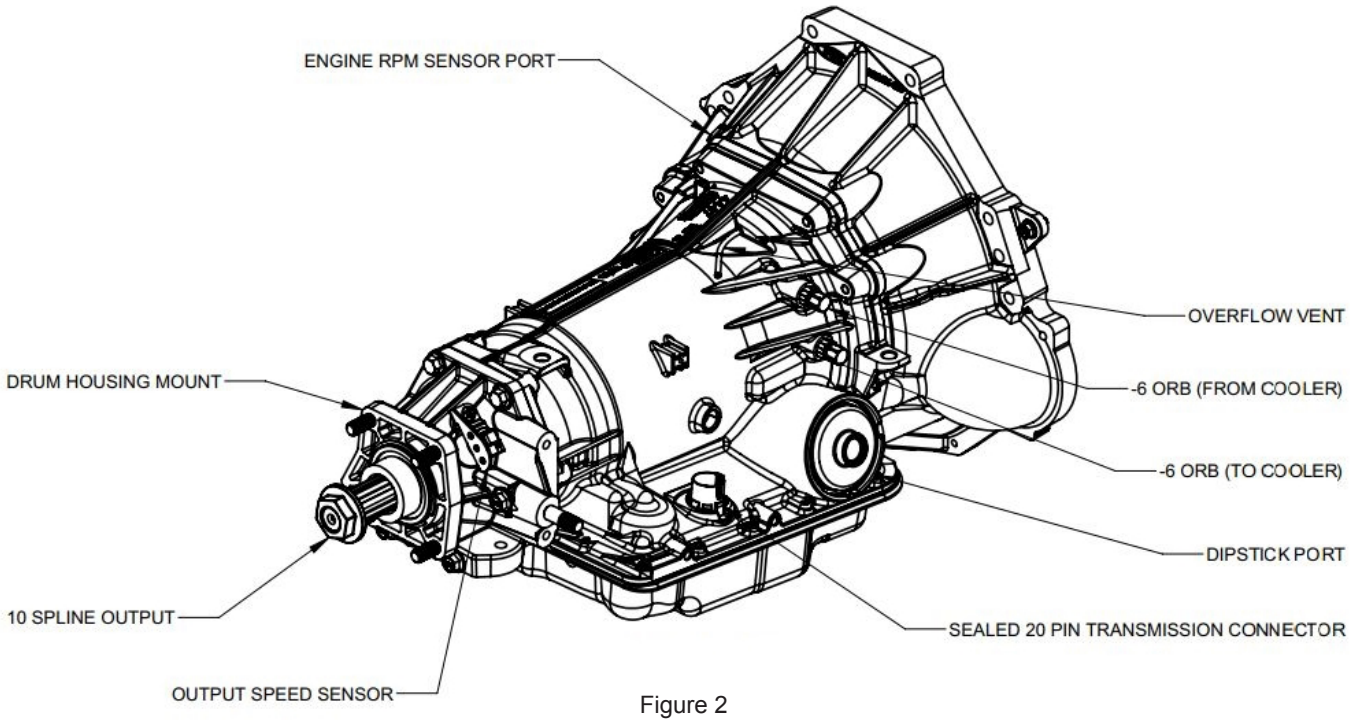

Figure 2

STEP 11: Remove the torque-converter-shipping-brackets. Place the two bellhousing-spacers provided in the cocoon onto the engine-block, or measure the difference between the converter-to-bellhousing compared to the engine-to-flexplate (estimating pullout and the number of spacers). Hoist the transmission using a transmission-jack or using an engine-hoist with straps just forward and behind the transmission-oil-pan. The transmission should be held parallel to the ground or slightly tilted back. This portion is a two man job, and one person should keep a hand on the torque converter to prevent it from slipping out and causing permanent damage to the transmission and risking serious injury to the installer. The torque converter will slide out if not paid attention to. In addition, ensure nothing falls behind the converter during this process. If the converter is taken out by accident or to retrieve a lost piece of hardware, it is critical to slide the unit back into the bellhousing fully so the two transmission-pump-tabs are properly engaged with the two slots on the back of the torque converter hub.

STEP 12: Apply grease to the torque converter pilot and slide the transmission assembly onto the alignment dowels found on the engine block, as well as the four torque-converter-studs into the proper slots in the flexplate. Start and tighten the upper six mounting bolts by hand, checking that the two faces mount flush. Before tightening the bolts to the engine manufacturer's torque specification, it is critical to verify that the torque converter spins freely and can be pushed back into the transmission to provide a gap between the converter-pads and the flexplate between 0.06" - 0.187". **Reference Figure 3.** This gap is critical to prevent a transmission-pump failure. If this torque-converter-pullout is too great, remove one (or two) of the bellhousing-spacers as necessary. If this torque-converter-pullout is too tight with the two bellhousing-spacers, do not proceed with the install and call PCS with the number found at the top of your 4LHD Quick Reference Guide. PCS will not be responsible for improperly installed torque converters. Once the proper gap has been established tighten the six bellhousing-bolts to the engine manufacturer's torque specification. Double check the torque converter pullout before tightening the four flexplate-nuts to the engine manufacturer's torque specification. Re-install the dust cover from the old transmission.

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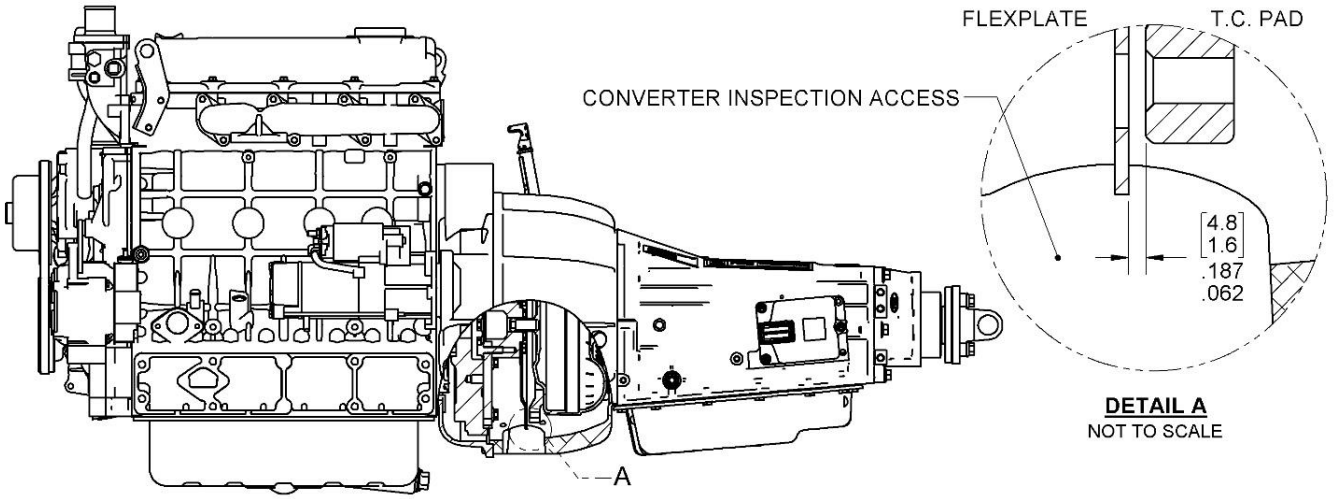

Figure 3

STEP 13: Re-install the cross-member if this had to be removed during the transmission installation procedure. Be sure to verify the newly assembled driveline is still properly supported by the hoist before removing the temporary supports on the engine and lowering the engine / transmission assembly onto the cross-member. The new transmission-mount-studs will fit into the same slots in the cross-member as the old transmission. Remove the transmission-jack or engine-hoist and torque the transmission-mount hardware.

STEP 14: Re-install the driveshaft, starter, and any other components (that are to be re-used) that were removed.

STEP 15: Install the Dipstick Kit onto the right side of the transmission. Ensure the top of the dipstick is not in close proximity to any exhaust system components.

STEP 16: Install the Heat Shield Kit onto the right side of the transmission.

STEP 17: Install the Cooler Line Kit onto the right side of the transmission. If the original cooler lines need to be replaced, now is a convenient time to eliminate the Cooler Line Kit and connect the new lines to the JIC-6 flared male fittings on the transmission case directly. The cooler lines should be as short, and with as few bends as possible. **Reference Figure 4.**

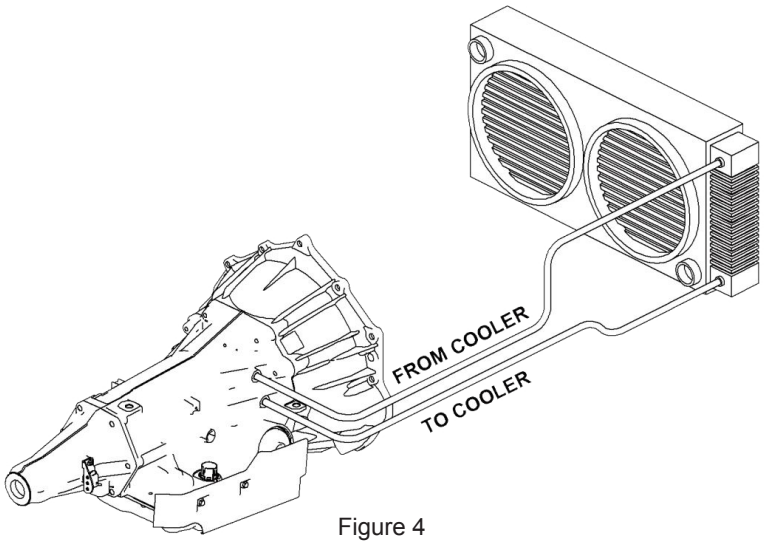

Figure 4

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STEP 18: Install the Overflow Vent Kit onto the top of the transmission and secure the two ends as shown below. The fluid vent shall be below / behind any components that would prevent proper drainage of the hot Automatic Transmission Fluid (ATF), such as below the cross-member. The atmosphere vent shall be mounted as high as possible within the vehicle with the cap pointed upward, such as against the firewall. After installation there shall be no low points within the hose for fluid to accumulate, or kinks in the hose to prevent flow. Route the entire hose to avoid fire hazards such as exhaust system components. Hot ATF is flammable. Improperly adhering to these instructions will risk a vehicle fire and/or water contamination to the transmission, voiding the warranty.

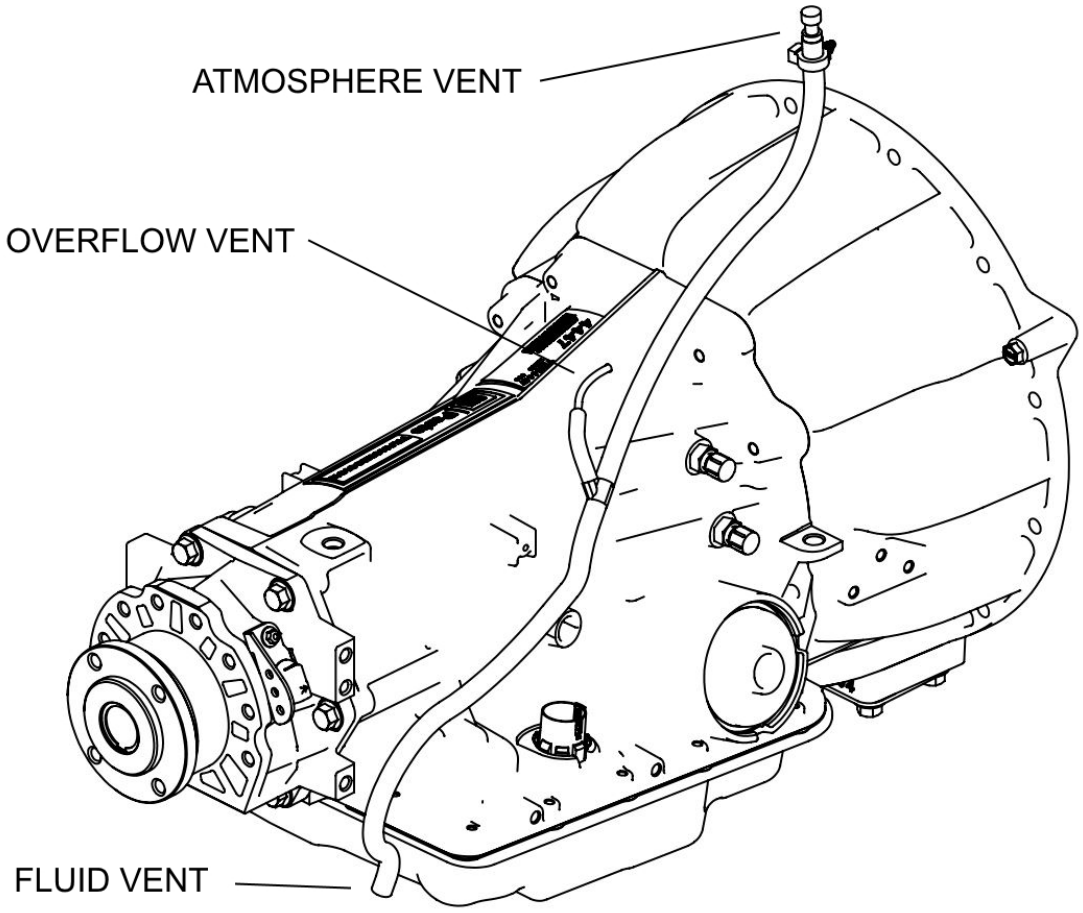

Figure 5

STEP 19: Install the C6 Brake Cable Bracket Kit onto the right side of the transmission's extension housing. This kit and the drum brake kit will adjust and function the same as the original system.

STEP 20: Install the TCM Bracket Kit and the Transmission Controller to the left side of the transmission.

STEP 21: Install the Electronic-Shifter in the cab in its proper location.

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STEP 22: Install the Throttle Position Sensor in the cab, attached to the throttle pedal. Getting the maximum possible range as shown on the TPS Installation Instructions (found on GSEhelp.com) is critical to get an accurate reading from the sensor. Modifications may have to be done to the throttle pedal to attach this sensor properly. Do not mount the sensor in a location where it is exposed to the elements or can be damaged by the operator's foot. When verifying the installation with the laptop (after all the electrical steps are complete) the sensor should read as close to 0.5V at Idle and 4.5V at full throttle as possible. **Reference Figure 6.**

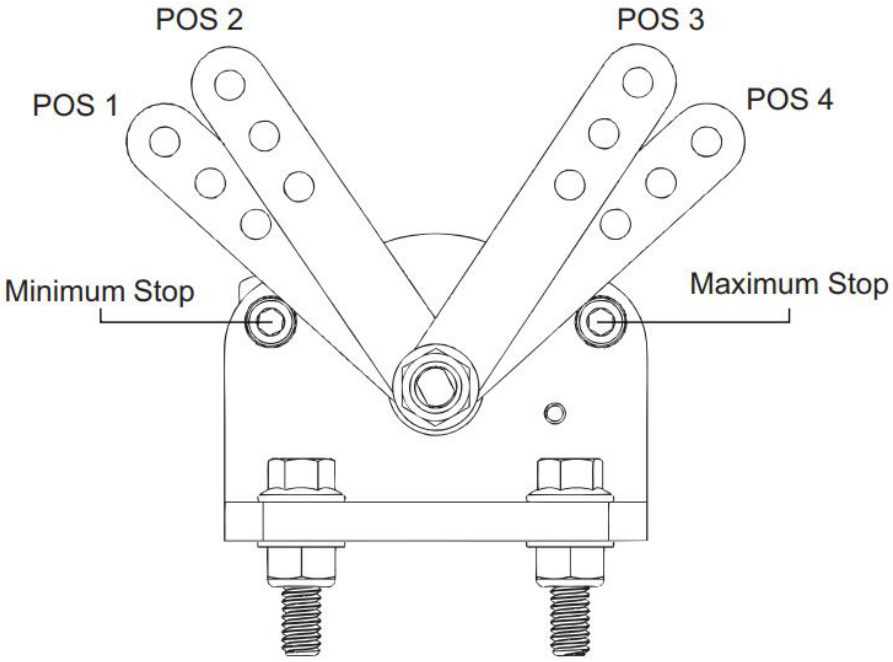

Figure 6

STEP 23: Install the Engine RPM Connector into the bore provided on the left side of the bellhousing. Be sure to fully bottom out the sensor on the back of the torque converter, the sensor will auto adjust its gap when the engine starts.

STEP 24: Having the appropriate harness drawings printed for reference is important for the following steps, this example uses TCM4663 (Transmission Harness) and TCM4659 (Vehicle-side harness) as examples. Plug in the following connectors of the TCM4663 and TCM4659 harnesses once the transmission accessories in the steps above have been installed: Transmission-Controller-Connector, Transmission-Connector, Output-Shaft-Speed-Sensor-Connector, Engine-RPM-Connector, E-Shifter-Connector, Bulkhead-Connector, Throttle-Position-Connector. All connectors should be installed using the Push-Click-Verify method. Ensure the Transmission-Connector has the arrow facing outwards.

STEP 25: Connect the BLACK wire from TCM4659 to a clean and secure chassis ground location.

STEP 26: Connect the RED wire from TCM4659 to a circuit on the vehicle (as close to the battery as circuit on the vehicle (as close to the battery as possible) that gets +12V CONSTANT from the battery.

STEP 27: Connect the YELLOW wire from TCM4659 and the YELLOW wire from TCM4663 to a +12V SWITCHED source on the vehicle, such as the Vehicle-On-Post on the Ignition Switch.

STEP 28: Install the Check-Trans-Light into the dash. A +12V SWITCHED source from the vehicle should be connected to the RED wire on the Check-Trans-Light. The PINK/LIGHT-GREEN wire from TCM4659 should be connected to the BLACK wire on the Check-Trans-Light. Add a label "CHECK TRANS on the dash to properly notify the operator of the light's function.

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STEP 29. Connect the BLUE-RED wire from the reverse-light-relay of TCM4663 to the high-side of the reverse-light circuit. Chassis-ground should be wired to the opposite side of the reverse-lights. There is an additional BROWN/LIGHT-GREEN wire in TCM4659 for a reverse-horn (or other reverse accessory) option, this circuit is an output going to the relay. A relay is required for this optional circuit. Available separately.

STEP 30. Connect the ORANGE horn wire from TCM4663 to the horn circuit. **Reference Figure 7.**

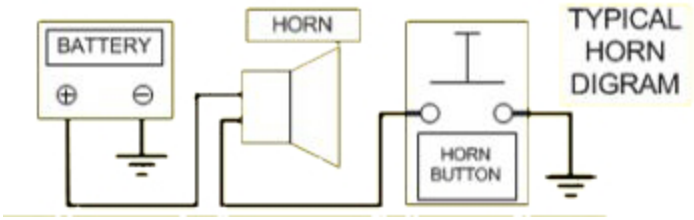

Figure 7

STEP 31. Connect the BROWN/RED wire from TCM4659 to Pin-86 of the neutral-safety-circuit (starter-circuit) as shown on the TCM4659 wiring diagram. Connect Pin-85 to the +12V IGNITION post on the ignition switch. Connect Pin-30 to the +12V START post on the ignition switch. Connect Pin-87 to the starter-solenoid. Relay is provided with TCM4659.

STEP 32. If you are not using a shift-inhibit feature, connect the GREY/WHITE wire from TCM4659 to +12V SWITCHED. If your vehicle is utilizing a brake-switch, seat-switch, shift-button, parking-brake-proximity-switch, or any other form of a shift-inhibit-circuit that must be satisfied before the transmission will shift into gear: connect the GREY-WHITE wire to the ground side of the circuit. The vehicle side of the circuit should be designed so our input does not see +12V SWITCHED until all of the safety requirements are satisfied.

STEP 33. Reconnect the battery and test all the circuits listed above for proper functionality. Once complete, go back to the TCM4663 / TCM4659 harnesses and secure all the wiring to prevent excessive vibration / strain on the connection points, contact any sharp corners, and avoid proximity with thermal / electrical sources (such as the exhaust and any moving parts). The laptop-comm-connector should be routed and secured to an easily accessible location. Ensure the laptop-comm-connector-cap is installed whenever the connector is not in use.

STEP 34. Using the list provided on page 2 of your 4LHD Quick Reference Guide, go through the pre-ramp checklist and verify full functionality of the install. If any problems are found, use the Five-Step-Process on page 3 of the 4LHD Quick Reference Guide to diagnose the issue. If the five steps do not reveal the problem contact PCS via email at **gsetechs@powertraincontrol.com** with a data-log and full description of the issue.

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