



BEST PRACTICES



Automatic Transmission Installation



Automatic Transmission Installation BEST PRACTICES

INCLUDES:

- ✓ COMPUTER DAMAGE CAUTION
- ✓ COOLANT DETECTION
- ✓ FLUSHING TRANSMISSION COOLERS
- ✓ PROPER COOLER FLOW RATES and CHART
- ✓ PROPER TORQUE CONVERTER INSTALLATION
- ✓ TORQUE CONVERTER BOLTS
- ✓ BRACKETS, SENSORS AND MOUNT CONDITION
- ✓ DOWEL PINS AND BELL HOUSING MATING SURFACE CONDITION
- ✓ CRANK PILOT HOLE CONDITION
- ✓ ELECTRICAL WIRING AND CABLES
- ✓ TRANSMISSION JACK USAGE
- ✓ AXLE SHAFTS, SLIP YOKES, U-JOINTS:
- ✓ FLUID FILL PROCEDURES
- ✓ ENGINE PERFORMANCE
 - ✓ THROTTLE BODY AND MASS AIR FLOW SENSOR CLEANLINESS
 - ✓ TROUBLE CODES AND COMMUNICATION ISSUES
- ✓ ADAPTATIONS AND DRIVE CYCLES and TEST DRIVES

DO NOT ASSUME! CHECK, RE-CHECK AND HAVE A SECOND TEAM MEMBER VERIFY.



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COMPUTER DAMAGE

CAUTION: Do not touch the transmission electrical connector pins. Electrostatic charge may occur and will cause damage to the Transmission Control Module (TCM).

STEPS:

1. COOLANT IN TRANSMISSION FLUID DETECTION

A. TESTING TRANSMISSION FLUID: If coolant has entered the transmission (as a result of cross-contamination from the transmission cooler and radiator or other reason), indications of water/ethylene glycol in the ATF may include:

- ATF blowing out of the transmission vent tube
- ATF may appear cloudy, or in extreme contamination, have the appearance of a strawberry milkshake. (note: some synthetic fluids may not turn strawberry in color so do not assume!)
- Visible water/antifreeze in the transmission oil pan
- A milky white or pink substance inside the pan area
- A sweet smell to the transmission fluid
- Spacer plate gaskets that appear to have been glued to the valve body face or case
- Spacer plate gaskets that appear to be swollen or wrinkled in areas where they are not compressed
- Rust on internal transmission iron/steel components

If water/coolant has been found in the ATF and the source of the water entry has not been identified, or if a leaking in-radiator transmission oil cooler is suspected (with no evidence of cross-contamination in the coolant recovery reservoir), a simple and quick test kit is available through your supplier or the AAMCO Equipment Department that will detect the presence of ethylene glycol in ATF and a radiator replacement and cooler may be necessary.

NOTE: Glycol testers will not detect water/H₂O if present through an outside source. Carefully heating a small amount of transmission fluid in a metal container will produce steam if water is present. Pressure test the cooling system if you suspect leakage.


Check for contamination before replacing transmission or flushing the cooler and lines!

2. FLUSH OR REPLACE Transmission Cooler and Cooler lines

A. FLUSHING COOLERS AND LINES: Flushing the cooler and cooler lines before installing a remanufactured or rebuilt transmission are necessary and **EXTREMELY IMPORTANT**. A hot flush system is the preferred method. Improperly flushed transmission coolers and lines will leave behind debris which can cause sticky governors, and stuck valves which will severely affect electrically controlled transmissions performance, and cause premature failure in your newly installed remanufactured or rebuilt transmission.

B. Electrically energized solenoids in valve bodies act like electro-magnets and will attract any metal left behind in the transmission cooler and flowing with the fluid. This can cause malfunctioning in valve bodies and solenoids causing wrong gear starts, shift issues and low line pressure. A plugged or restricted transmission cooler can also cause the engine to stall out when put into reverse. This is caused from a torque converter lock-up engagement due to a lack of oil feed and restricted flow to the transmission.

C. To flush the lines, first blow compressed air through the lines. Use a gallon milk jug to catch the fluid and debris as it is blown out of the lines. After blowing compressed air through the lines, use a heated transmission flush machine to complete the cooler and line flush. Follow the instructions provided with equipment. Note: Using only solvent and air **is not** the proper procedure for flushing transmission coolers and lines.

D. Go to <http://www.g-tec.com/> for instructional videos and instructional manuals on how to operate and maintain your G-TECH hot flush machine. 

E. TRANSMISSION COOLER REPLACEMENT NOTE: Many vehicles require that the transmission cooler/radiator be replaced after transmission failure in order to reduce repeated failures. This is mandated by the manufacturer in many service bulletins. Many of these vehicles now operate with a “fin type” transmission cooler in the radiator and the debris from a major failure clogs these fins causing a restricted flow and severe transmission damage. These coolers cannot be flushed properly and will require replacement.

NOTE: If installing an external cooler, make sure the lines are routed correctly and away from any sharp objects.

- 3. PROPER COOLER FLOW RATES:** are important to the life and performance of the transmission! Some coolers cannot be flushed and must be replaced. Check cooler flow after HOT FLUSHING the lines and cooler and replace if the flow rate does not meet specifications.
- A. IMPORTANT FLOW RATE NOTE:** Flow rates will differ depending on temperature of the fluid. Also If equipped, make sure the cooler bypass has been disabled when flushing and checking for flow. See flow rate at bottom of this memo:
- NOTE:** 1994 and later Dodge, Jeep RWD (except Hemi) may have a check ball in the return cooler line that becomes clogged after a transmission failure. The cooler line must be replaced. Dodges and Jeeps after 1996 with external coolers may have a bypass valve that will bypass the cooler with fluid under 100 degrees. If this cooler is contaminated, it must be replaced as you will not remove all the debris with flushing.
- 4. TORQUE CONVERTER INSTALLATION:**
- A.** Start by installing one quart of the “CORRECT” transmission fluid specified for that vehicle into the torque converter and install the torque converter in the transmission.
- B. IMPORTANT TORQUE CONVERTER INSTALLATION NOTE:** You must be certain the torque converter is fully seated into the transmission before installation. Make sure the converter is all the way into pump gear and DO NOT ASSUME that the converter is in place fully when you receive the transmission. You should feel three distinctive clicks each time the converter drops into place. Continue wiggling the torque converter and rotating it back and forth while pushing in until it is fully engaged. Do not proceed with the transmission installation until the converter is fully engaged. After you are sure it is in place, always keep tail end of the transmission low to prevent the converter from slipping out during the install. This is the #1 cause of damage and failure at time of installation.
- 5. BRACKETS, SENSORS AND MOUNTS:** Install any external brackets, sensors and mounts to the transmission that are required during the install or exchange.
- 6. MOTOR AND TRANSMISSION MOUNT** condition can affect linkage adjustment, axle shaft and/or driveshaft alignment, and cause excessive wear to internal transmission parts if worn. Also, broken or oil-soaked mounts must be replaced.
- 7. DOWEL PINS AND MATING SURFACES:** Inspect the mating surfaces of both the transmission bell housing and engine for paint, dirt and grease and clean as needed. Also check the dowel pins on the engine and the dowel pin holes on the transmission as they also must be clean, not worn out of round/shape, and free of burrs. Lubricate the dowel pins and guide holes with a small amount of grease to aid the installation.
- A. IMPORTANT PREPARATION NOTE:** Paint, rust and dirt on the bell housing and/or block mating surfaces will create a bad ground connection and will affect transmission performance in today’s computerized vehicles. Clean carefully and completely tightened.
- 8. INSPECT THE CRANK PILOT HOLE:** closely to insure it is free of burrs, dirt and rust. Use a small round file or sandpaper to remove any burrs paint and rust.
- A. IMPORTANT PILOT NOTE:** Some crankshafts have a spacer that goes into the pilot hole on the crank shaft. This spacer may stick to the hub of the old converter. Double check that it is installed and not worn out.
- 9. ELECTRICAL WIRING AND CABLES** are moved aside so as not to interfere and get pinched during the transmission installation.
- 10. USE TRANSMISSION JACK** and with an Assistant, position the transmission carefully on to the transmission jack capturing the edges of the transmission pan correctly in order to avoid crushing or bending the pan and breaking the filter inside. With the transmission balanced correctly on the jack, secure transmission to jack with the hold down strap and position the jack so that the transmission bell housing will be slightly behind the engine.
- A.** Hold the transmission stable on the jack while raising it. When the transmission is in position, carefully slide the jack forward until the bell housing touches the back of the engine. You may need to raise or lower the jack slightly or move it slightly to one side or the other to line up the dowels with the dowel holes. Once lined up, gently push the transmission forward. When the dowel pins are in the dowel holes, loosely start the bell housing bolts by hand. **(DO NOT USE AN IMPACT WRENCH)!**
- B. BELL HOUSING BOLT INSTALLATION AND TIGHTENING NOTE:** Once you have the transmission bell housing bolt holes lined up on the dowel pins and threaded holes in the engine block, start two bolts and hand tighten just enough so the transmission does not slip back away from the engine block. Make sure everything is in the correct position and install the remaining bolts. **(CAUTION: DO NOT FULLY TIGHTEN ANY BOLTS UNTIL ALL OF THE BELL HOUSING BOLTS ARE HAND STARTED.)**
- C.** Check the torque converter at this time to make sure it is still fully engaged in the pump and moves freely. Continue to check this clearance as you draw down the bellhousing bolts until the bellhousing is fully seated. At any time during this step, the torque converter appears to be tight against the flywheel, stop, and make sure the converter has not slipped out of the pump. Converter to flywheel clearance should have 1/16” to 1/8” between pads on converter and flex plate. If you have more than 1/8”, Installation of equal thickness washers may be necessary to reduce clearance to 1/16” to 1/8”. If not enough clearance, remove transmission and check to see if converter is seated in front pump properly.

D. Do not attempt to draw (or force) the transmission into the engine block by fully tightening one of the bell housing bolts as doing so can crack the bell housing and damage the pump and converter. You must be sure the transmission and engine block mating surfaces are lined up and seated correctly before tightening down the bolts.

11. TORQUE CONVERTER BOLTS: Line up the torque converter holes with the holes in the flywheel. Install one bolt but do not fully tighten. Then, use a flywheel wrench or an appropriate substitute tool that will not damage the flywheel teeth to rotate the crankshaft in the direction of normal engine rotation in order to gain access to the next bolt hole. Repeat this until all the torque converter bolts are installed. Slide the converter tight to the flywheel and torque each bolt to the proper torque specification. If vibration occurs after installation, mark converter to flex plate and rotate the converter one bolt hole at a time to check for possible balance issues.

A. IMPORTANT ENGINE ROTATION NOTE: if the engine is turned in the opposite direction of normal engine rotation it could cause the timing chain/belt to jump timing in engines regardless of mileage because of the tensioner design. This can result in severe engine damage!

IMPORTANT TORQUE CONVERTER BOLT NOTE: Be very careful to install the correct hardness and length bolts in the torque converter. Some torque converters may become damaged if the wrong length bolt is used. Some manufacturers use different sized bolts and mark the flywheel accordingly. If at any time a bolt becomes tight before seating, stop and inspect the threads and hole for correct depth to bolt size. DO NOT use an impact gun during this process.

NOTE: Make sure you remove the holding tool when complete

12. AXLE SHAFTS, SLIP YOKES, U-JOINTS: that have rough and worn joints may cause vibration in drive line and create failure of bushings and seal. U-Joints may need to be disassembled to properly inspect. (Note: Nylon fastened u-joints may not disassemble without replacement)

13. ELECTRICAL CONNECTIONS AND HOSES: Inspect for cleanliness and condition and hook up/plug in all electrical connectors and vacuum hoses. Make certain all ground straps are cleaned and re-installed in the correct attachment points. Install a new filler tube O-ring. Install the transmission oil filler dipstick tube.

14. BATTERY CABLE CONNECTIONS: Clean and reconnect the Battery Cable(s). If both battery cables have been disconnected, install the positive battery cable first and then the negative cable. This important step will insure you have good battery ground from the battery.

15. FLUID FILL: Before starting the engine, pour 5 quarts of the “Correct” transmission fluid for that vehicle into the transmission. Start the engine and continue adding fluid until it reaches the correct full level. With the brake pedal depressed, move the shifter through each of the gears - then place back in the Park position. With the engine still running, check the fluid level. Add fluid as needed until the dipstick shows “full” or in the “full range”.

NOTE: (Follow manufacturers’ guidelines for adding and checking fluid, not all transmissions have dipsticks and **not all** vehicle fluid levels are checked in Park. **CAUTION!** universal dipsticks may not be accurate and will cause an under-fill or overfill condition.)

16. ENGINE PERFORMANCE: Transmissions depend on engine performance for proper shift patterns. Good engine performance is a must to insure proper pressures. Be sure there are no unrepaired codes and all sensors are attached and functioning properly. Check long & short term fuel trims.

17. THROTTLE BODY AND MASS AIR FLOW sensor cleanliness can affect transmission performance and shift quality greatly. It is a good practice to clean the throttle body and mass air flow sensor with manufacture approved cleaner and procedure before you do any adapts and relearns. Example: 4L60E and 4L80E vehicles.

18. TROUBLE CODES: All systems with set trouble codes must be repaired. (Note: not all codes will set a Check Engine Light, Scan all modules with a capable scanner for trouble codes and repair as necessary.

19. ABS SYSTEM: Make sure there are no unresolved codes

20. COMMUNICATION ISSUES: All U codes must be resolved.

21. LEAKS: Check the vehicle completely for leaks.

22. ADAPTATIONS AND DRIVE CYCLES: Using the manufactures’ guidelines, perform all adaptation, drive cycle functions, and test drive mileage required for proper performance and repair verification. Many relearn procedures can be performed with a capable scanner.

A. IMPORTANT RE-PROGRAMMING NOTE: Some vehicles may require a re-programming process to match the TCM with the PCM and other modules. Check manufacturer’s guidelines.

23. TEST DRIVE: Vehicle to insure that all concerns have been taken care of.

A. TEST DRIVE NOTE: After the original technician tests drives the vehicle to ensure the original concern has been corrected, have a another member of your team test drive the vehicle a second time to agree that the vehicle is ready for delivery and enough mileage and time has been put on the vehicle to establish a proper drive cycle and adaptations.

DO NOT ASSUME! CHECK, RE-CHECK AND HAVE A SECOND TEAM MEMBER VERIFY.

Minimum Flow Rate in Gallons per Minute (gpm)

TEMPERATURE RANGE	STEEL	ALUMINUM
65 - 66°F	0.6 gpm	0.5 gpm
67 - 70°F	0.7 gpm	0.6 gpm
71 - 75°F	0.8 gpm	0.7 gpm
76 - 80°F	0.9 gpm	0.8 gpm
81 - 84°F	1.0 gpm	0.9 gpm
85 - 89°F	1.1 gpm	1.0 gpm
90 - 94°F	1.2 gpm	1.1 gpm
95 - 98°F	1.3 gpm	1.2 gpm
99 - 103°F	1.4 gpm	1.3 gpm
104 - 108°F	1.5 gpm	1.4 gpm
109 - 112°F	1.6 gpm	1.5 gpm
113 - 117°F	1.7 gpm	1.6 gpm
118 - 120°F	1.8 gpm	1.7 gpm



ALWAYS THE RIGHT FIX.

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