



## INSTALLATION INSTRUCTIONS FOR B&M AUTOMATIC TRANSMISSIONS REPLACING FORD AOD

B&M part number: 114501

### INTRODUCTION

Your B&M automatic transmission is a precision component built to exacting standards. Handle it with care, and take the time to read and understand these instructions before starting.

Replacing a transmission requires better-than-average mechanical knowledge and skills. If this job is beyond your abilities, seek the services of a qualified technician.

### TRANSMISSION REMOVAL

#### 1. Disconnect the negative battery cable.

#### 2. Raise the vehicle.

**WARNING: AVOID SERIOUS INJURY OR DEATH BY CRUSHING!** Securely support the vehicle on a lift or jack stands. NEVER work under a vehicle that is supported only by jacks.

Use a lift, or jack and jack stands, to raise the vehicle to the height necessary to remove the transmission.

#### 3. Drain the transmission fluid.

**WARNING: AVOID BURNS FROM HOT COMPONENTS AND FLUIDS!** Automatic transmissions typically operate at 150–200°F. Allow the vehicle to cool sufficiently (1–2 hours) before starting transmission removal.

If the transmission pan does not have a drain plug, loosen a few bolts at one end of the pan, remove the rest of the pan bolts, and carefully lower one end of the pan so the fluid can drain. Then remove the remaining bolts, and lower the pan to drain the remaining fluid. When the fluid has finished draining, reinstall the drain plug or pan.

#### 4. Remove the driveshaft.

Handle it with care, and store it in a safe location.

**NOTE: Tie a quart freezer bag over the tailshaft housing with a cable tie, to catch any fluid that may leak as the transmission is removed.**

#### 5. Disconnect all of the following from the transmission:

- electrical connectors
- wire loom clamps
- vacuum hoses
- transmission cooler lines
- gear selector linkage
- throttle valve (TV) cable
- speedometer cable

... and any other similar items. (Label all connections for ease of reassembly.)

#### 6. Remove the transmission dipstick and fill tube.

#### 7. Remove the starter.

#### 8. Remove the flexplate-torque converter fasteners.

First remove the applicable dust or inspection cover. Then rotate the crankshaft slowly to access each fastener.

#### 9. Remove the crossmember.

Place a jack (and wide block of wood, if necessary) under the pan, and transfer some of the transmission's weight to the jack. Remove the transmission mount fasteners, and the crossmember-frame fasteners. Then remove the crossmember.

#### 10. Remove the exhaust crossover pipe,

and any other exhaust components that may interfere with the removal and lowering of the transmission.

#### 11. Remove the transmission bell housing bolts, except one at the bottom.

To gain access to the upper bell-housing bolts, slightly lower the transmission.

**CAUTION: To avoid damaging the engine mounts, do not lower the jack so much that it no longer supports the transmission.** Some of the transmission's weight must always be supported by the jack.

12. **Before removing the last bell housing bolt, perform a final check** to verify that:
  - all flexplate-torque converter fasteners have been removed;
  - all mechanical, electrical and fluid connections have been removed; and
  - the area surrounding the transmission is clear of anything that will interfere with its removal and lowering.
13. **If the engine is mounted only at the front end, support its rear end** with a separate jack or jack stand.
14. **Separate the transmission from the engine.**

**CAUTION: The torque converter is heavy! Once the transmission is separated from the engine, there is nothing holding the torque converter to the transmission. To avoid injury or parts damage, take care not to allow the torque converter to slide off the input shaft and fall out of the bell housing.** Keep the transmission level or tilted slightly rear-down, and hold the torque converter in place, while lowering the transmission to the ground.

Remove the last bell housing bolt. Carefully separate the transmission from the engine and lower it to the ground.

15. **Pull the torque converter off of the transmission input shaft** and out of the bell housing. Keep the pump drive hub tilted slightly upward, to prevent transmission fluid from sloshing out.

**CAUTION: If the input shaft comes out of the transmission with the torque converter, immediately reinstall it in the transmission, oriented correctly.** Some Ford input shafts have different length splines at each end, and installing them backwards will damage the torque converter.

B&M recommends that you replace the torque converter. But whether you are replacing or re-using the torque converter, drain the transmission fluid from it, then stuff a clean rag in the pump drive hub to keep debris out.

16. **Remove the TV control lever** (for use on the new transmission, if applicable).
- 

## PRE-INSTALL INSPECTION AND PREP

1. **In order to remove any debris left in the system from the previous transmission, B&M recommends that you a) hot flush and flow check the radiator and cooling system lines; b) replace the torque converter; and c) replace any auxiliary transmission cooler(s) (if applicable).**

Torque converters and transmission coolers can trap debris, which may then contaminate your new B&M transmission.

2. **Whether you replace the torque converter or not, inspect the sealing surface of its pump drive hub for excessive wear, scoring, or other damage.** A worn or damaged hub can result in a damaged transmission pump seal and lead to leaks.
3. **Inspect the mating surface on the engine block** for nicks, dirt, etc. Use a mill file to carefully remove any raised metal.

**CAUTION: Do not remove metal below the mating surface.**

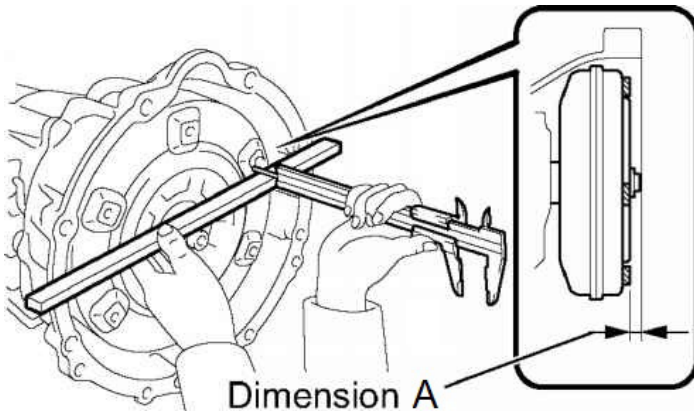
4. **Inspect the engine crank pilot hole and the torque converter pilot hub** for dirt, rust, paint, etc. Clean as required with emery cloth.
5. **Inspect the flexplate** for cracks around the crankshaft and torque converter mounting holes. Inspect the ring gear for damaged or broken teeth. If the flexplate was removed, check the crankshaft flange for nicks or burrs that may keep the flexplate from bolting up flush to the crankshaft. Torque the crankshaft-flexplate bolts per factory specification.

**NOTE: B&M recommends replacing the flexplate when replacing the transmission.**

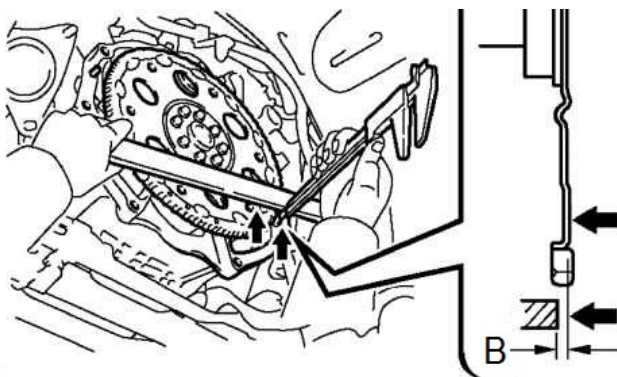
6. **Inspect the alignment pins in the engine block.** They must be secure and in good condition. Replace the pins if they are loose or damaged.
7. **Verify that the flexplate and torque converter fastener patterns and hole sizes match.** Replacing the original torque converter with an upgrade / performance unit may require enlargement of the fastener holes on the flexplate.
8. **Lubricate the sealing surface of the torque converter's pump drive hub** with a film of automatic transmission fluid.
9. **Mate the torque converter to the new transmission.** Pour 1 quart of automatic transmission fluid into the torque converter, then carefully slip it over the

transmission's two splined (input and stator) shafts, supporting its weight to avoid damaging the pump lip seal. **Rotate the torque converter as you push it toward the transmission, and listen and feel for three distinct "clicks" as the torque converter engages the input shaft, stator support, and pump lugs.**

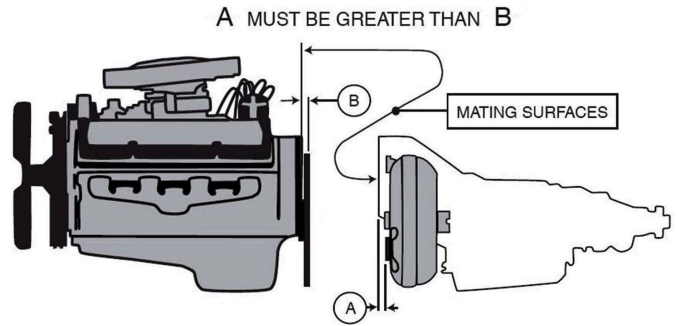
**10. Measure to verify the torque converter is fully seated on the transmission:**



**A. Measure Dimension A:** While holding the torque converter in place against the transmission, use a straightedge to measure the distance between the bell housing mating surface and the torque converter mounting pads. (Typical AOD torque converter depth = 1", ±0.050".)



**B. Measure Dimension B:** On the engine, measure the distance between the engine block mating surface and the torque converter mating pads (the raised surfaces on the flexplate at each torque converter fastener hole).



**C. Verify that Dimension A is greater than Dimension B.** If it is not, the torque converter is not fully seated. Pull it off slightly, then, while rotating it, push it back on. Continue to do this until you feel the torque converter move inward and make the proper engagement. Then repeat and compare Dimensions A and B. **Do not proceed further until the torque converter is fully seated.**

**INSTALLATION**

1. **Raise the transmission and mate it to the engine.** Keep the unit level or tilted slightly rear-down, and hold the torque converter in place, while raising the transmission.
  - A. **Install the bell housing over the engine's dowel pins.** Do not place the transmission's full weight on the dowel pins. The transmission must be supported by the jack until at least 2 bolts have been installed and tightened.
  - B. **Align the transmission and engine mating surfaces** so that they are flush all the way around.

**CAUTION: Do not use bolts to draw the transmission up to engine.**

2. **Install the engine-transmission bolts** (including any applicable TV cable brackets), and torque per manufacturer's specification. The torque converter must be free to rotate, and have end-play (back-and-forth movement on the shaft), after the transmission is bolted to the engine.

**CAUTION: If there is no end-play, the torque converter is not properly engaged with the transmission; remove the transmission and correct the problem.**

3. **Fasten the torque converter to the flexplate.**

**NOTE: On Ford torque converters, align the drain plug(s) with the access hole(s) in the flexplate.**

After verifying torque-converter end-play, install the torque converter-flexplate fasteners (use of a medium-strength thread-locking fluid is recommended), and torque them per factory specification.

4. **Reinstall the crossmember.** Inspect the transmission mount for damage, and repair / replace as required. Then reinstall the crossmember on the vehicle frame, and secure the transmission to the mount and crossmember.
5. **Install the drive shaft.** Inspect the drive shaft yoke for excessive wear. If serviceable, apply a thin film of transmission fluid to the sealing surface of the yoke before installation.

Whether re-using your driveshaft or fabricating a new one, verify 3/4" of slip clearance for street use, or 1" of slip clearance for competition. The driveshaft must not be able to crash into the transmission when the suspension is compressed, or severe transmission damage will result. Likewise, the driveshaft must not be so short that it falls out of the transmission when the suspension extends fully.

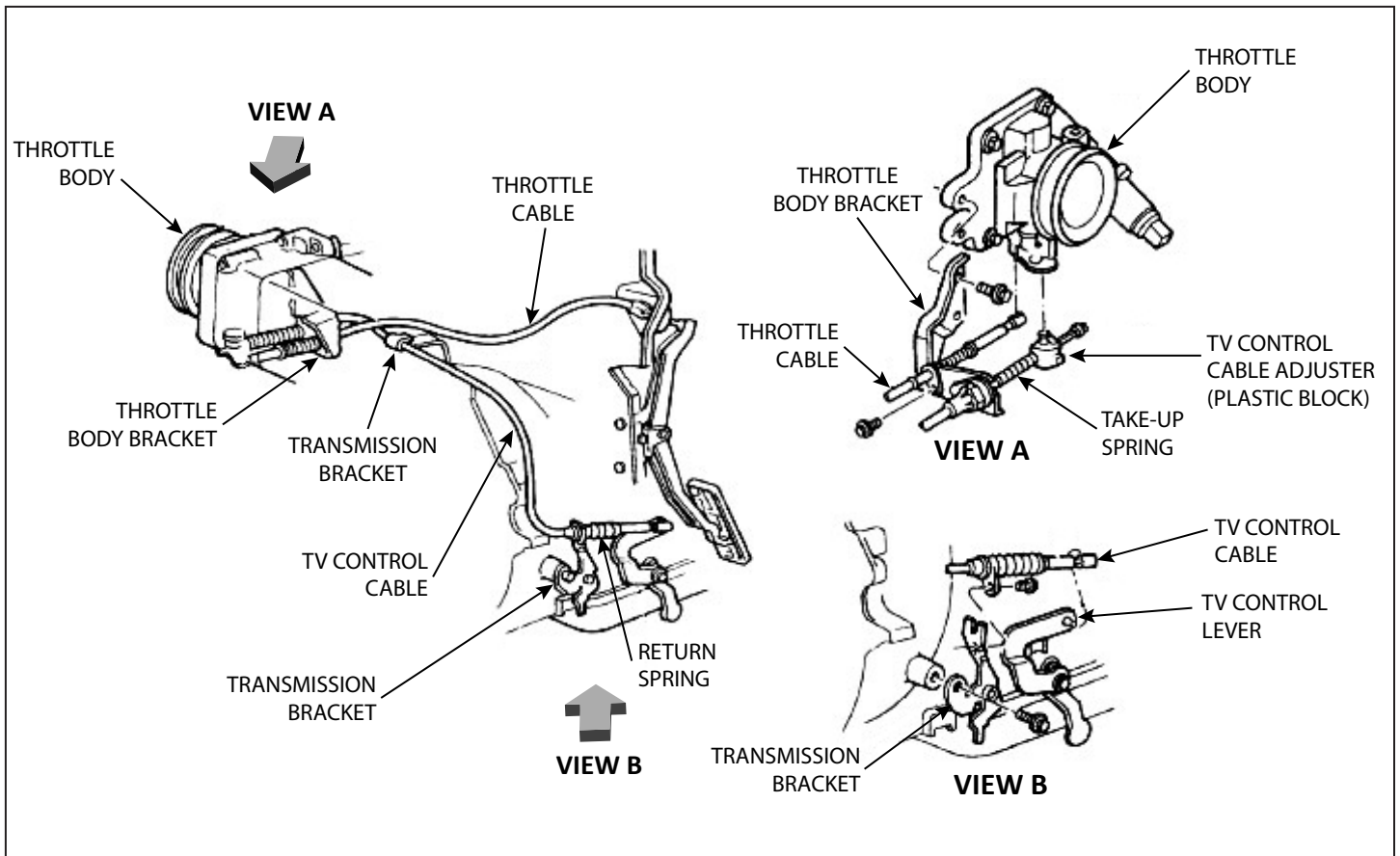
6. **Connect shifter linkage to shift arm on transmission.** If installing an aftermarket shifter, follow the manufacturer's instructions for shifter linkage connection

and adjustment. Otherwise, put the transmission and shifter in neutral, connect the linkage to transmission, and check for proper movement into each shifter position. There should be no tension on the shift lever when in any gear, and the cable end should slide in and out of the lever with no resistance.

7. **Temporarily disconnect the Throttle Valve (TV) control cable at the throttle body** to facilitate easier installation and adjustment of the cable.

The TV control system consists of the TV control cable, cable-mounting brackets on both the throttle body and the transmission, a cable-attaching grommet on the throttle body lever, and the external TV control lever on the transmission (see illustration below).

Note also the TV cable's two springs: the return spring (protected by a rubber boot, at the transmission end of the cable); and the take-up spring (at the throttle body end, behind the TV cable adjuster). The return spring is an operating component; it returns the TV control lever to idle when the throttle returns to idle. The take-up spring, however, simply tensions the cable and takes up the slack in the TV system when it is assembled. When the cable adjuster pin is inserted in the grommet, the

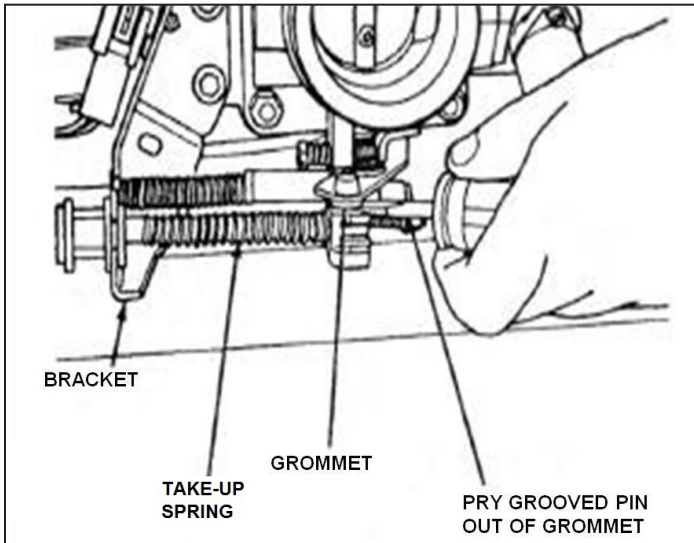


white locking tab is automatically pushed in, locking the cable to its correct length. After this, the take-up spring plays no part in the operation of the system.

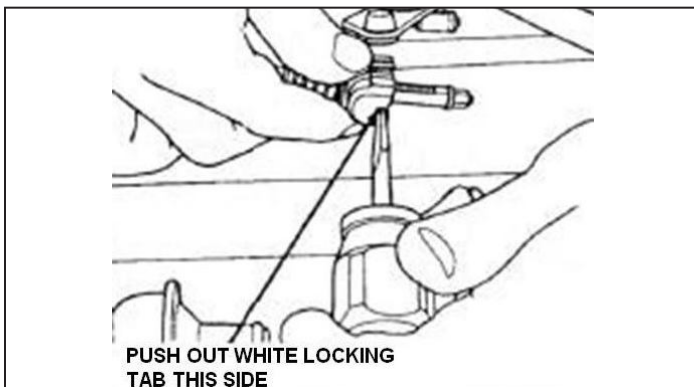
**CAUTION: Correct installation and adjustment of the TV cable is crucial to the proper operation of the AOD transmission. Failure to adjust the mechanism to factory specs may result in transmission damage. Such damage is not covered under warranty.**

Disconnect the TV cable at the throttle body as follows:

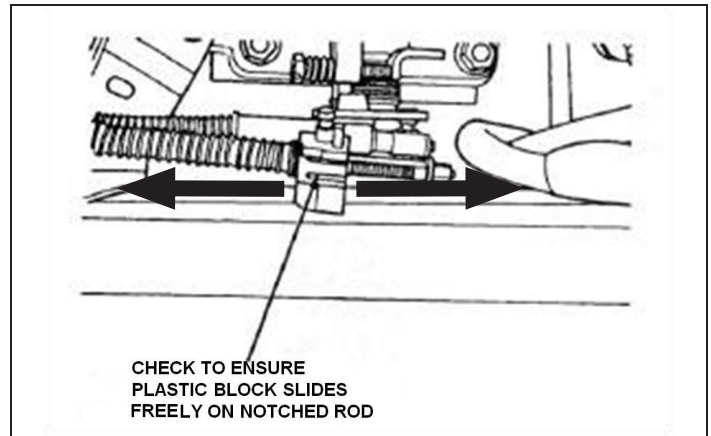
- A. Remove airbox and inlet tube to gain access to the throttle lever and control cables.



- B. Use a large flat screwdriver to pry the grooved pin on the adjuster block out of the grommet on the throttle body lever.



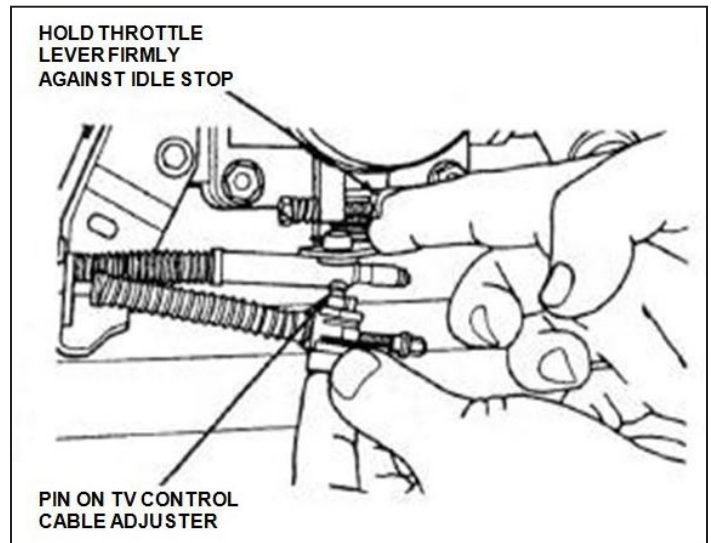
- C. Use a small flat screwdriver to push the white locking tab all the way out.



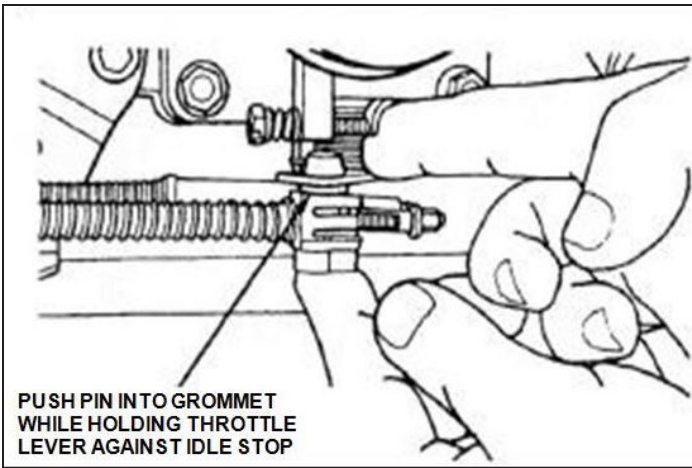
- D. Verify that the adjuster block slides freely along the notched rod. If it does not slide freely, the white tab is not pushed out all the way.

**8. Connect the TV control cable as follows:**

- A. Install the TV control lever on the transmission. (Use the lever from the previous transmission, or obtain the appropriate lever for your specific application.)
- B. Fasten the TV control cable to the cable bracket(s) on the bell housing.
- C. At the transmission end of the cable, connect it to the TV control lever.



- D. At the throttle body end, hold the throttle lever firmly against its idle stop.



- E. While continuing to hold the throttle lever against the idle stop, firmly push the pin on the cable adjuster all the way into the nylon grommet on the throttle lever.

**NOTE: Be sure not to allow the throttle lever to move away from idle stop while pushing the pin into the grommet.**

- F. Reinstall the air cleaner and inlet tube.

**9. Reconnect any remaining electrical and mechanical connections, such as:**

- electrical connectors / wire loom clamps
  - vacuum hoses
  - speedometer gear / cable
- ... and any other similar items.

**10. Reinstall:**

- any exhaust components that were removed;
- the starter; and
- the transmission fill tube and dipstick.

**11. Reconnect the cooling lines.** In addition to the typical radiator heat exchanger, the use of an auxiliary, oil-to-air transmission cooler is strongly recommended.

**NOTE: The transmission can be run briefly without a cooler, provided that its discharge (to cooler) port is plumbed back to its return (from cooler) port with 5/16" copper or steel tubing.**

**CAUTION: DO NOT attempt to run the unit with these ports blocked, as this will prohibit the vital flow of transmission fluid throughout the unit. B&M'S PRODUCT WARRANTY DOES NOT COVER TRANSMISSIONS THAT HAVE BEEN DAMAGED DUE TO OVERHEATING.**

**12. Lower the vehicle and fill the transmission with fluid.**

**CAUTION: Over-filling can cause fluid foaming, shifting problems, fluid leakage from the case vent, and transmission damage.**

Fill as follows to avoid over-filling:

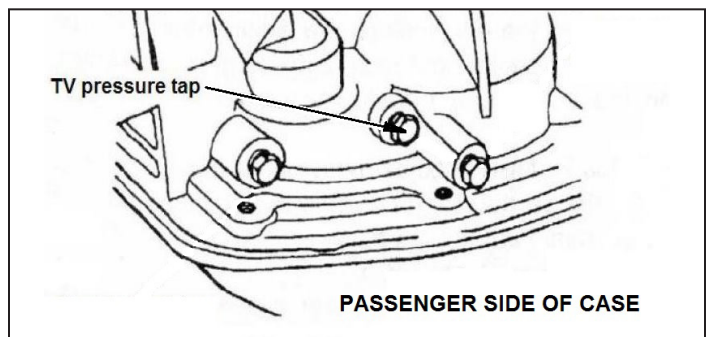
- A. Fill initially with 5 quarts of automatic transmission fluid. (Use either a Ford-specified ATF, or **B&M Trick Shift performance ATF**, a scientific blend of foam inhibitors, pressure agents and shift modifiers that will dramatically improve shift feel and extend the life of your transmission.)
- B. Start the engine, and run the shifter through the entire gear range and back, pausing briefly in each shifter position. With the engine still running, check the fluid level (in PARK or NEUTRAL).
- C. Each time you add fluid, run the shifter slowly through the entire gear range and back before re-checking the fluid level.
- D. Add fluid as necessary to bring the level up to the LOW mark on the dipstick.

**13. Check TV control pressure.**

When the throttle is moved from idle to wide-open throttle (WOT), the TV control cable also pulls the TV control lever on the transmission from idle to WOT. The TV lever actuates the internal TV control mechanism which regulates the TV control pressure. The travel of the TV lever is controlled by stops inside the transmission. Return of the TV control cable and lever to idle is accomplished by the return spring on the transmission-end of the TV cable.

It should not normally be necessary to re-adjust the initial setting of the TV control cable. When the cable is properly set, the TV control lever on the transmission will be at its internal idle stop (that is, fully to the rear) when the throttle lever is at its idle stop.

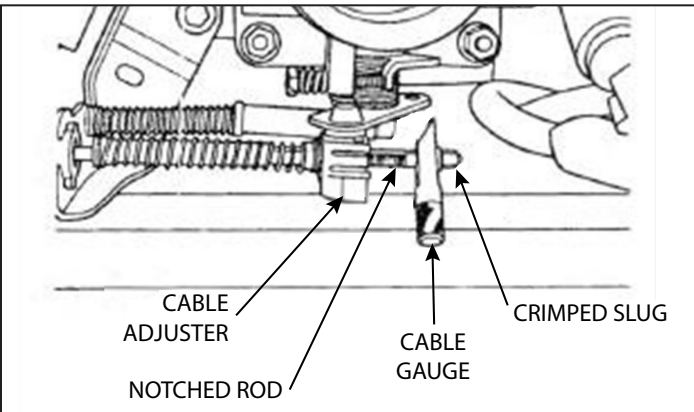
Check for correct TV control pressure as follows:



- A. Attach TV pressure gage (0-60 PSI; Ford tool T86L-70002-A, or fabricate an equivalent) to TV pressure tap on passenger-side of transmission case.



B. Obtain TV Cable Gauge (Ford tool T86L-70332-A or equivalent).



C. At the throttle-body end of the TV cable, insert tapered end of the cable gauge between the crimped slug and plastic notched adjustment rod, forcing the slug away from the rod end. Ensure the gauge is pushed fully onto the cable.

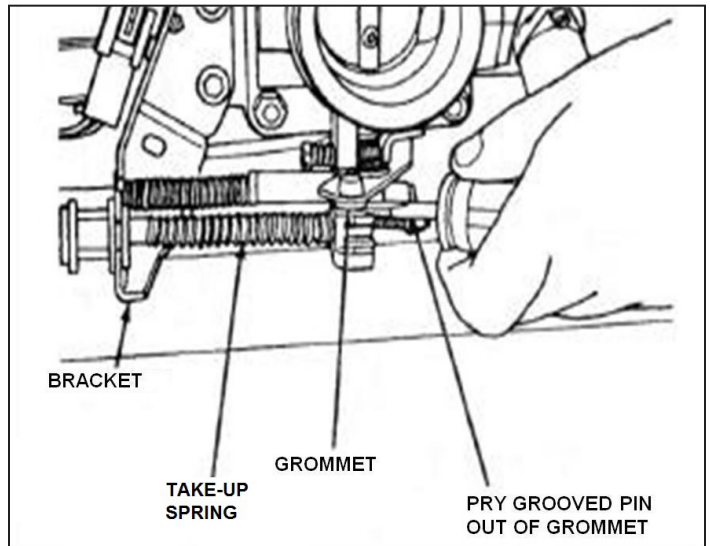
D. Operate engine until normal operating temperature is reached. The transmission fluid temperature should be approximately 100-150°F—neither cold, nor too hot to touch.

E. Set parking brake and shift transmission to NEUTRAL. With cable gauge in place and engine idling in NEUTRAL, TV pressure should be 30-40 PSI.

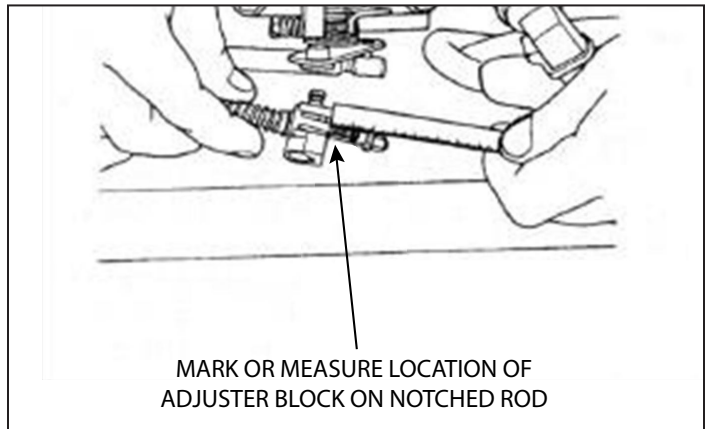
**NOTE: Do not attempt to check or set TV pressure with the transmission in PARK or in gear.**

F. Remove cable gauge, allowing cable to return to its normal idle position. With engine still idling in NEUTRAL, TV pressure should be at or near zero (less than 5 PSI).

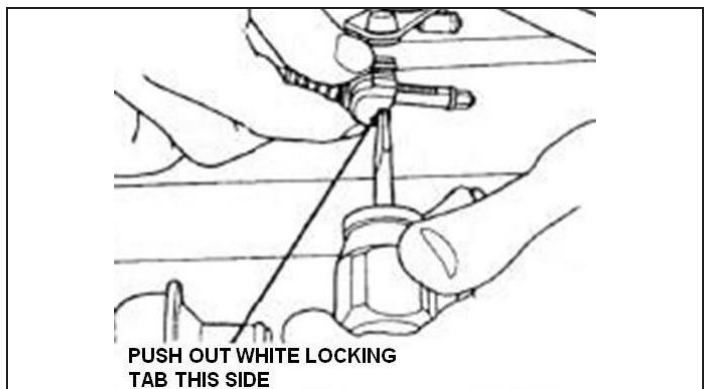
G. If TV pressure does not meet specification in either or both of the previous steps, re-adjust cable as outlined under Installation Steps 7 and 8, then repeat steps 13.C through 13.F. If TV pressure still does not meet specification, it adjust the CV control cable as follows.



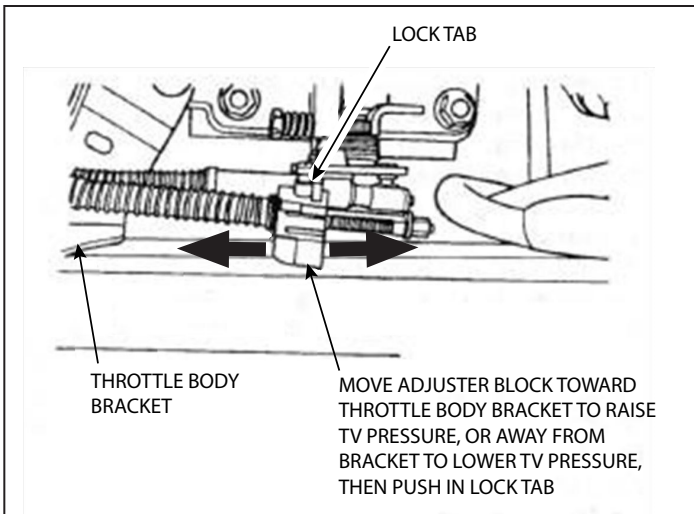
H. Remove gauge tool and pry grooved pin out of grommet on throttle lever.



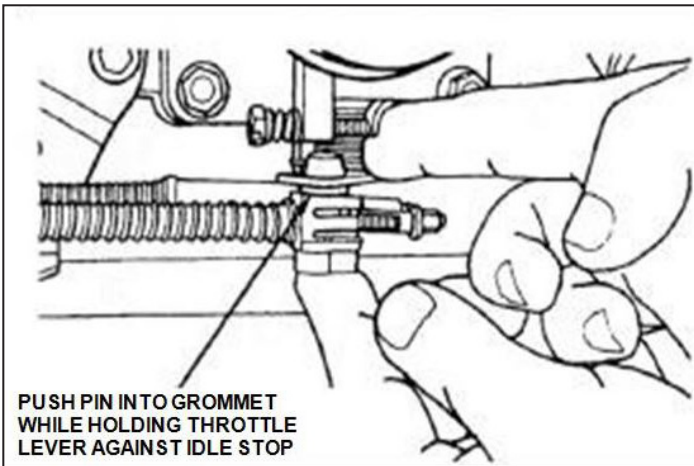
I. Mark or measure location of adjuster block on notched rod.



J. Push out locking tab.



- K. Using mark or measurement on the adjuster block as a reference, move block towards throttle body bracket to raise TV pressure, or move it away from bracket to lower TV pressure. Push in white locking tab to lock adjusting block in position.



- L. Insert grooved pin back into grommet.  
 M. Recheck TV pressure per Steps 13.A - F.

**NOTE: For best transmission function, the TV pressure should be set as close as possible to 33 PSI in NEUTRAL with the cable gauge installed.**

Since the TV pressure increases approximately 2 PSI when the shift lever is moved from NEUTRAL to a forward gear, this will result in a TV pressure setting near the desired 35 PSI in any forward gear.

**CAUTION: Do not attempt to check TV pressure with the transmission in gear!**

When the cable gauge is removed, TV pressure should drop to less than 5 PSI. If TV pressure does not drop to less than 5 PSI, reset the TV pressure to 30-33 PSI with cable gauge installed. Verify that the TV pressure is less than 5 PSI with cable gauge removed.

#### 14. Final Test Drive and Fluid Level Check

- A. Take the vehicle for a short drive (3-5 minutes) to bring the transmission up to operating temperature.
- B. Park the vehicle, and run the shifter slowly through the entire gear range and back.
- C. Fluid level should be at the FULL mark with the transmission at operating temperature, the shifter in PARK or NEUTRAL, and the vehicle on a level surface.
- D. If not, gradually add fluid, then run the shifter slowly through its range and back, until the fluid level reaches the FULL mark.





## TROUBLESHOOTING GUIDE FOR THE FORD AOD TRANSMISSION

This troubleshooting guide is provided to help you identify possible causes of **malfunctions that could be related to incorrect assembly or adjustment of the transmission hydraulic system (valve body and accumulator) and / or mechanical controls**. Refer to a detailed AOD transmission service manual for problems related to the torque converter or transmission hard parts.

<b>Slow initial engagement</b>	Low line pressure Fluid level low	<p style="text-align: center;"><b>Line Pressure Check</b></p> <p>Pressure test should be performed with engine and transmission at normal operating temperature, and under two operating conditions: Idle (closed throttle / zero TV pressure); and wide open throttle (WOT (stall) / full TV pressure).</p> <p>When testing at WOT (stall), the wheels must be locked to prevent any vehicle motion.</p> <p>Operate at WOT (stall) for no more than 10 seconds at a time, followed by at least 2 minutes in NEUTRAL, at about 1,000 RPM, to cool the transmission fluid.</p> <p>Connect a 0-300 PSI pressure gage to the line pressure tap on the driver side of the transmission. Connect a 0-100 PSI pressure gage to the TV pressure tap on the passenger side of the transmission. Gage hoses must be long enough to read the gages while operating the engine.</p> <p>Idle pressure must be read with throttle off the fast idle stop.</p> <p>Specified pressures apply to stationary vehicle only. In 3rd and 4th gears, line pressure is reduced (lower than shown) for "all other ranges."</p>	
<b>Harsh initial engagement</b>	Engine idle too high Loose U-joint or engine mount High line pressure Sticking valves in valve body 2-3 accumulator valve stuck		
<b>No drive in any selector position</b>	Valve body leaking internally Valve body bolts loose Sticking valves in valve body Manual valve pin not engaged Fluid level low		
<b>No drive forward, but has reverse</b>	Worn or stuck governor Valve body bolts loose Sticking valves in valve body Damaged 2-3 accumulator seal		
<b>Slips or chatters in 1st gear (Selector in "OD")</b>	TV linkage out of adjustment Low line pressure Valve body bolts loose		
<b>Slips or chatters in 2nd gear (Selector in "OD", OK in 1st)</b> <b>Slips or chatters in Reverse</b>	Defective intermediate clutch Sticking valves in valve body Low line pressure Valve body bolts loose		
<b>Starts in 2nd or 3rd</b>	Sticking governor Sticking valves in valve body Cross channel leaks between case or separator plate and valve body		
<b>Incorrect shift points</b>	TV linkage out of adjustment Worn governor Sticking valves in valve body		
<b>No 1-2 upshift</b>	TV linkage out of adjustment Governor valve sticking Sticking valve in valve body		
<b>Mushy 1-2 shift</b>	Out of tune engine Defective intermediate clutch TV linkage out of adjustment Low line pressure		
<b>No 2-3 upshift</b>	Defective direct clutch Converter damper hub broken Sticking valve in valve body		
<b>Mushy 2-3 upshift</b>	Defective 2-3 accumulator piston or seals Low line pressure		
<b>Mushy or rough 3-4 upshift</b>	Out of tune engine Defective OD band or reverse drum TV linkage out of adjustment		
<b>No forced down shifts</b>	Defective clutch or band TV linkage damaged or out of adjustment Sticking valve in valve body		
<b>Transmission overheats</b>	Overheated engine Restriction in cooler or lines Converter overrun clutch seized Sticking valves in valve body		
<b>Transmission noise</b>	Relief valve buzzing Oil pump cavitation		
		<b>Oil Pressure Specifications</b>	
		Line Pressure (PSI)	TV Limit Pressure (PSI)
		Selector Position	
		<b>At idle</b>	
		In Reverse	0
		All Other Ranges	0
		<b>At WOT (stall)</b>	
		5.0L Engine	74-86
		All Other Engines	79-91
		<b>All Other Ranges</b>	
		5.0L Engine	74-86
		All Other Engines	79-91
		<b>Line Pressure Test Results</b>	
		<p><b>Low at idle in all ranges:</b> Check for low fluid level, clogged or damaged filter, loose valve body bolts, stuck pressure regulator valve, missing pressure regulator spring or oil temperature too hot from excessive WOT test.</p> <p><b>Low at WOT but OK at idle:</b> Check for low oil level, clogged filter, damaged or out of adjustment TV linkage, sticking TV or TV limit valve in valve body.</p>	