

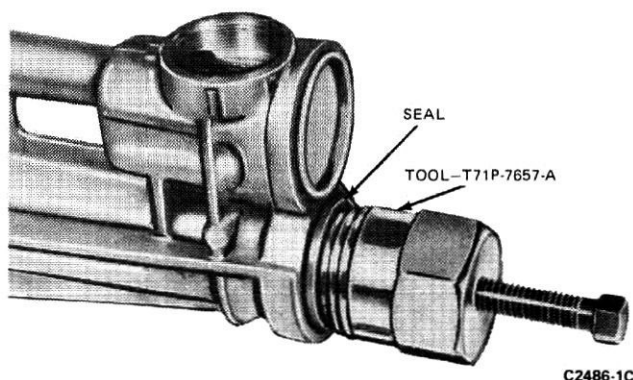


FIG. 17 Removing Extension Housing Seal

the same inserts. The springs should face in opposite directions (Fig. 15).

Rear Seal

Removal

1. Remove the driveshaft.
2. Remove the seal from the extension housing using Tool No. T71P-7657-A (Fig. 17).

Installation

1. Install the new seal in the extension housing using Tool No. T71P-7095-A (Fig. 19).
2. Install the driveshaft.

Rear Bushing and Seal

Removal

1. Remove the driveshaft from the vehicle.
2. Insert Tool No. T60K-7697-A into the extension housing until it grips on the front edge of the bushing.
3. Turn the screw clockwise until the bushing and seal are free of the housing (Fig. 18).

Installation

1. Drive a new bushing into the extension housing with Tool No. T71P-7095-A.
2. Install a new seal in the extension.
3. Inspect drive shaft yoke, and replace if worn, scored or damaged. Install the driveshaft.

TRANSMISSION

Assembly

1. Position the reverse idler gear and shaft in place.
2. Coat the countershaft thrust washers surfaces with a thin film of grease and position them on the countershaft gear and dummy shaft (plastic washer at front, bronze washer at rear). Optionally, position washers in case with tabs in case tab slots.
3. Place the transmission in the vertical position. **Do not allow the dummy shaft to fall through the front hole of the case.** Align the countershaft

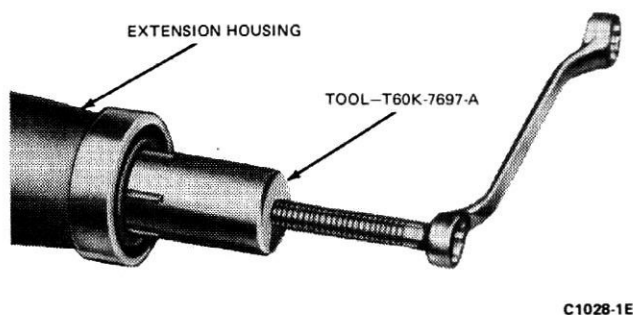


FIG. 18 Removing Extension Housing Bushing and Seal

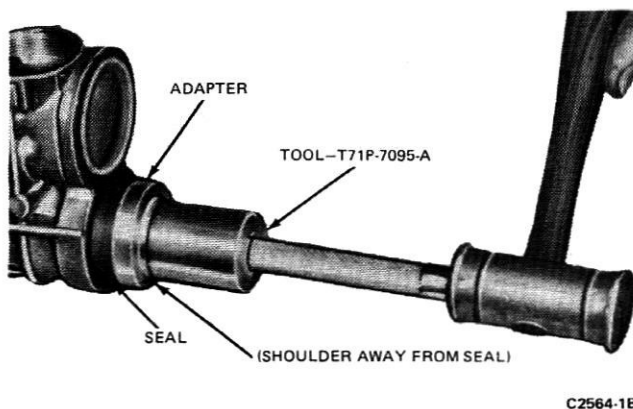


FIG. 19 Installing Typical Extension Housing Seal

gear bore and thrust washers with the bore in the case. Install the countershaft from the rear of the case.

4. Place the transmission in the horizontal position. Position the output shaft assembly into the case through the cover opening. Slide the dummy bearing onto the output shaft and into position to align and support the output shaft assembly.
5. Position the input shaft and fourth gear blocker ring through the front of the case, making sure that the notches in the blocker ring engage with the synchronizer insert.
6. Install a new snap ring on the input shaft bearing OD. Press the bearing into position using the input shaft bearing installation tool.
7. Install a new input shaft bearing retaining snap ring on the input shaft.
8. Install the front bearing retainer and new gasket. Apply a tape sealer or gasket sealer to the threads of the attaching bolts and torque to specifications.
9. Place the transmission in a vertical position. Remove the dummy output shaft bearing. Install a new snap ring on the output shaft bearing OD. With the snap ring positioned at the rear, install the bearing on the shaft, using the output shaft bearing installation tool.

NOTE: Make certain that the first gear thrust washer is in position on the roll pin and does not slip out of position during bearing installation. Install a new output shaft rear bearing retaining snap ring.

10. Install the reverse idler gear lever assembly, making sure the fork is positioned in the reverse idler gear groove.
11. Use a sealer on the reverse lever pivot bolt threads, and install the bolt into the case. Align the lever on the pivot bolt and torque bolt 15 to 25 ft-lb. Install reverse lever retaining spring clip to the reverse gear pivot bolt. Tilt the transmission forward and pour a light coat of lube over the gear train.
12. Use a new cover gasket and install the cover assembly. Install the bolts and wiring clips, and tighten to specification, 7 to 12 ft-lb after extension housing is tightened. **The two shouldered locating bolts must be installed first. Position the shift rail into first- or third-gear position.**
13. Insert the speedometer drive gear lock ball into the hole. Holding the ball, slide the speedometer drive gear into place and secure with a snap ring.
14. Using a new gasket, install the extension housing to the case. Use a sealer on the attaching bolts and torque 18 to 27 ft-lb. Caution should be taken so as not to damage the extension yoke seal.
15. Install the offset lever assembly onto the shift shaft, secure offset assembly with nut, using Loctite or equivalent on sealant on shift shaft threads, and torque, 8 to 12 ft-lb. Do not overtorque.
16. Insert the gearshift lever into place and check the gear positions.
17. Install the access plug into the rear of the extension housing, using a plastic-faced or copper mallet.

SPECIFICATIONS

MODEL RAD TRANSMISSIONS

Transmission Lubricant Models RAD -W, -S, -V		
Type	Level	Capacity
ESW-M2C83-C	To Bottom of Filler Hole	3.5 Pts. — U.S. (2.6 Pts. — IMP.) (1.7 Litres)

Transmission Component End Play

Component	In Inches
Cluster Gear To Case	.004-.018

Torque Specifications— Model RAD	
Description	Ft-Lb
Input Shaft Bearing Retainer to Case Bolt	11-15
Extension Housing to Case Bolts	18-27
Access Cover to Case Screw	7-10
Filler Plug to Case	15-25
Detent Set Screw (in cover)	8-12
Reverse Pivot Bolt	15-25
Offset Assembly Nut	14-20 ①
*Back-up Lamp Switch	8-12
Seat Belt Sensing Switch	8-12

① Assemble with Loctite Thread Adhesive Sealer M4G-157-A Or Equivalent

Gear Ratios — 1978

Engine	Transmission Model	1st	2nd	3rd	4th	Rev.
5.0L (302 CID) V-8	Model RAD-W	2.64	1.89	1.34	1.	2.56
2.3L	Model RAD-S	3.50	2.21	1.43	1.	3.38
2.8L	Model RAD-Y	4.07	2.57	1.66	1.	3.95

SPECIAL SERVICE TOOLS

Tool Number	Description	Tool Number	Description
T70P-7113	Countershaft Dummy Shaft	To Remove Input Shaft Bearing	
T60K-7697-A	Extension Housing Bushing Remover	T75L-7025-B	Basic Input Shaft Bearing Replacer
T71P-7095-A	Extension Housing Bushing Installer	T75L-7025-E	Split Collet (Use with T75L-7025-B)
T71P-7657-A	Extension Housing Seal Remover	T75L-7025-G	Collar (Use with T75L-7025-B)
T71P-7095-A	Extension Housing Seal Installer	T75L-7025-J	Forcing Screw (Use with T75L-7025-B)
T71P-7050-A	Input Shaft Seal Installer	To Install Input Shaft Bearing	
T69P-4621-A	Output Shaft Bearing Remover	T75L-7025-B	Basic Input Shaft Bearing Replacer
T71P-4621-B	Output Shaft Bearing Installer	T75L-7025-K	Shaft Sleeve Replacer (Use with T75L-7025-B)
T71P-7140-A	Reverse Idler Shaft Remover	T75L-7025-M, -N	Inner Shaft Collar* (Use with T75L-7025-B)
T69P-4621-A	Speedometer Gear Remover	T75L-7025-Q	Dummy Bearing Insert (Use with T75L-7025-B)
T71P-4621-A	Speedometer Gear Installer	*Select fit for appropriate shaft diameter.	
T71P-7A039-A	Speedometer Gear Opening Plug Installer		
T70P-7154	Snap Ring Thickness Gauge		
T59L-500-A	Transmission Holding Fixture		

Model 78ET Four-Speed Transmission

PART
16-29

Applies to Pinto/Bobcat, Fairmont/Zephyr

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CC3323-2B

DESCRIPTION AND OPERATION

TRANSMISSION

The Model 78ET four-speed transmission is manufactured in Germany. Externally, the transmission can be identified by the identification tag (Fig. 1). This tag is located under the lower left side extension to case retaining bolt.

The Model 78ET four-speed transmission (Fig. 2) is of the fully synchronized type with all gears except the reverse gear being in constant mesh. All forward-speed changes are accomplished through forged blocker ring synchronized units.

The constant mesh gears, that is, the input shaft gear, the three other forward gears on the output shaft, and the corresponding gears on the countershaft gear, are helically cut. The reverse gear on the countershaft gear has straight-cut spur teeth that mesh (through an idler gear) with spur teeth on the outside of the first-second gear synchronizer sleeve.

Gear selection is by means of a floor shift lever (Fig. 3). The shift lever is attached directly to a single selector rail, which has a selector lever assembled to it. Movement of the shift lever, and thereby the selector rail, causes the selector lever to locate in the appropriate selector fork and move it to the required position. Movement of the first-second or third-fourth selector fork causes the appropriate synchronizer sleeve to move as necessary to engage with the dog teeth on the required gear. When reverse gear is required, movement of the reverse selector relay lever draws the reverse idler gear into mesh with the reverse gear on both the countershaft gear and the output shaft.

Engagement of two gears at once is prevented by means of a selector interlock plate pivoted in the

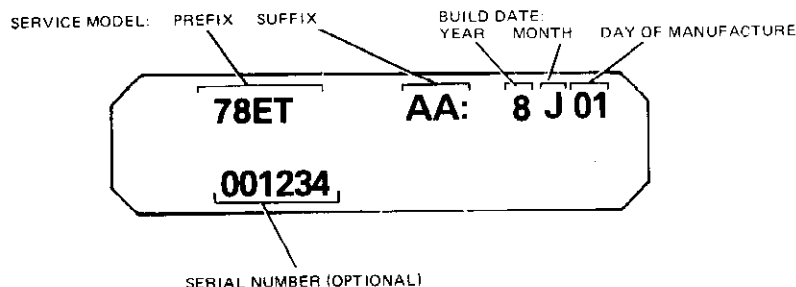


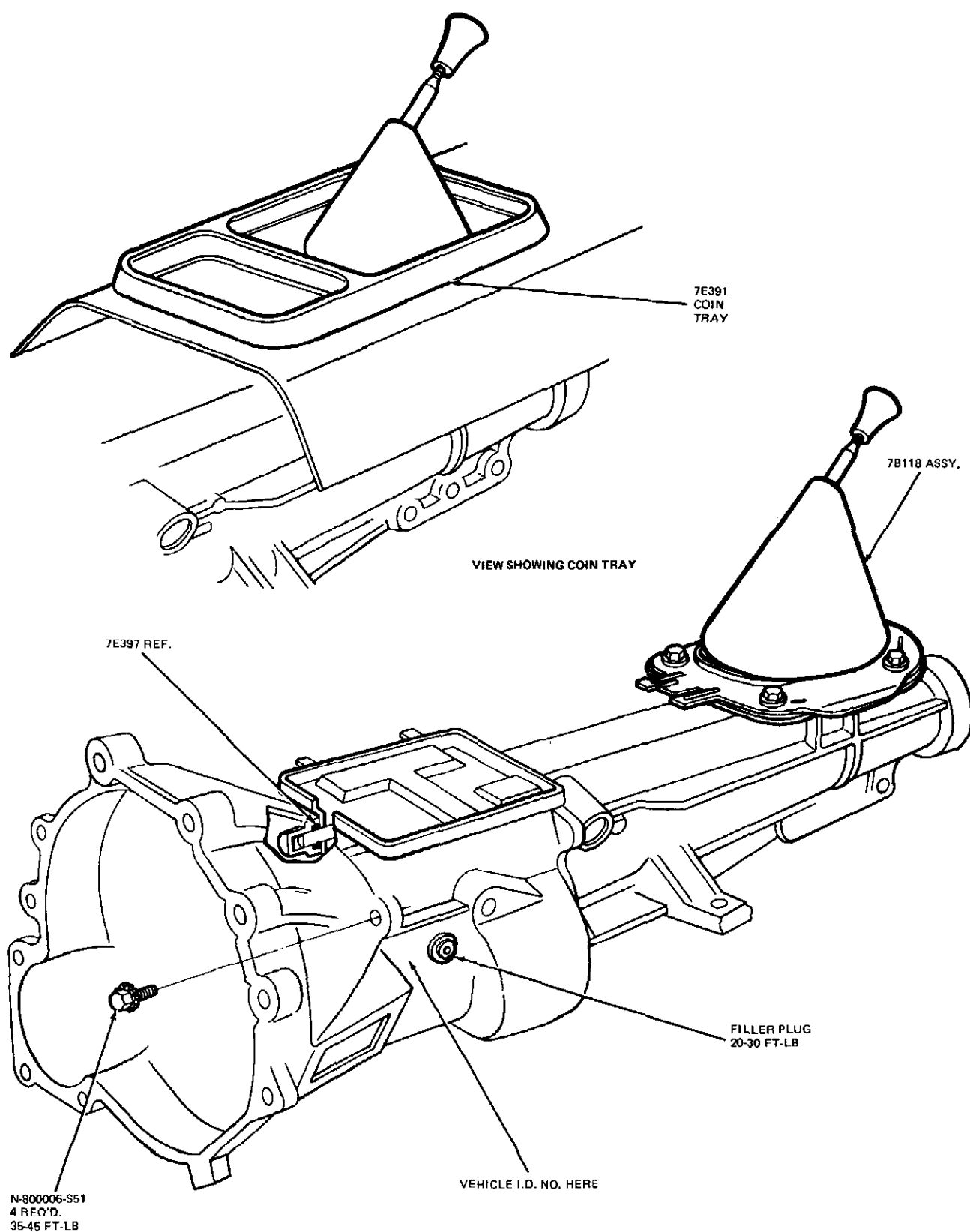
FIG. 1 Transmission Identification Tag

transmission case. This plate engages with the selector forks that are not in use and holds them positively in the disengaged position. The selector forks are not attached to the selector rail. The first-second and third-fourth forks, while they are mounted on the rail, are free to slide, when not retained by the interlock plate.

Gear engagement only takes place when the selector lever locates in the appropriate fork and moves it into the required position.

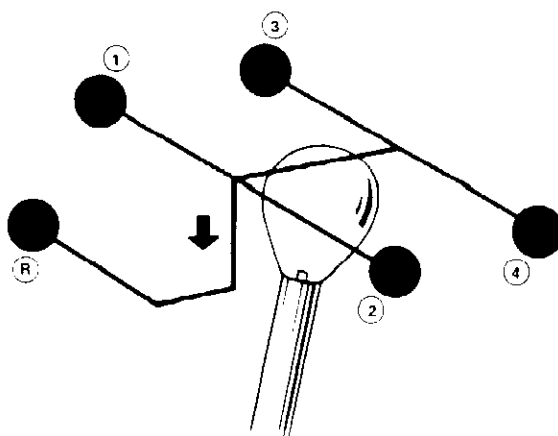
Selective snap rings compensate for tolerances which must be allowed in manufacture. Excessive end play or backlash can thus be eliminated without unnecessarily close, and expensive, tolerances and fits. Whenever overhauling the gear case, or a part of the case that involves removing a snap ring, be sure to properly install the correct size in brand-new (never used) snap rings (Fig. 4).

C2999-1C

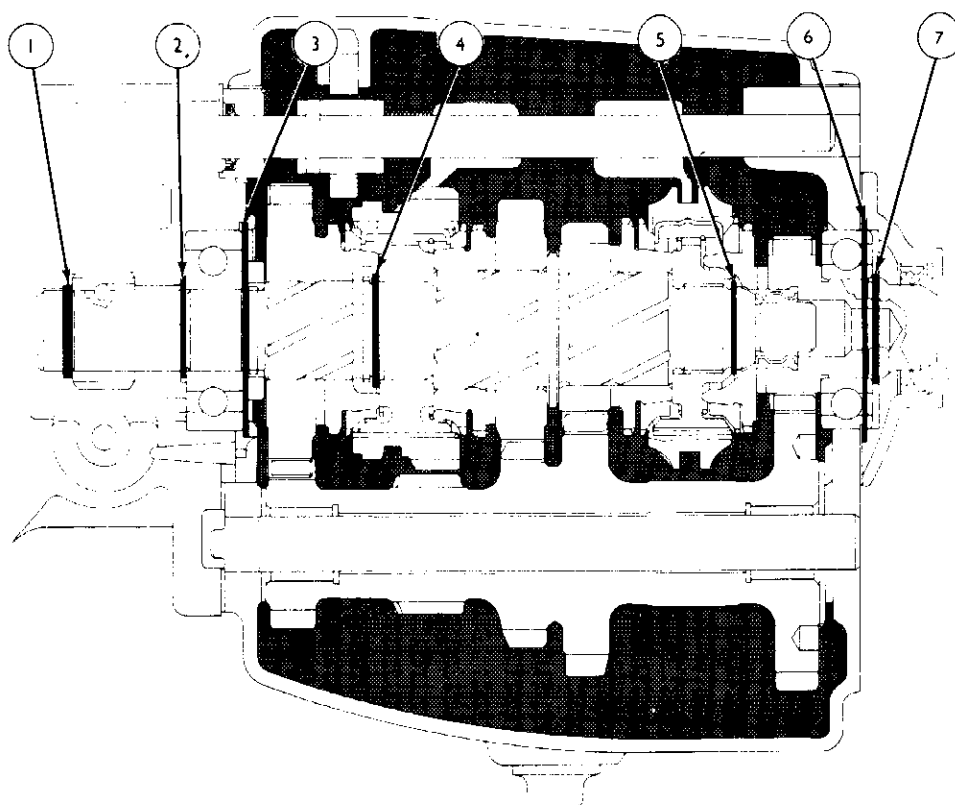


C3326-2A

FIG. 2 Model 78ET Transmission Installation—Fairmont/Zephyr



C2410-1A

FIG. 3 Gear Shift Lever Positions

C2206-2A

FIG. 4 Snap Ring Locations

REMOVAL AND INSTALLATION

SHIFT LEVER

PINTO/BOBCAT

Removal

1. Place the gearshift lever in the neutral position.
2. Raise the vehicle and remove the back-up lamp switch from the extension housing (Fig. 5).
3. Lower the vehicle.
4. Loosen the gearshift lever knob locknut and remove the knob and locknut.
5. Remove the two front attaching screws from each step plate.
6. Remove the attaching screws from each kick pad and remove the pads.

7. Working from the front, fold the carpet or floor mat up against the shift lever (Fig. 6). Remove the four shift lever boot retaining ring screws. Remove the boot through the opening in the floor mat.
8. Compress the corrugated rubber spring (Fig. 7) then remove the retaining snap ring and slide the spring upward on the lever.
9. Bend the shift lever lock tabs up, then carefully thread the plastic dome nut from the extension housing (Fig. 8).
10. Lift the gear shift lever from the extension housing.

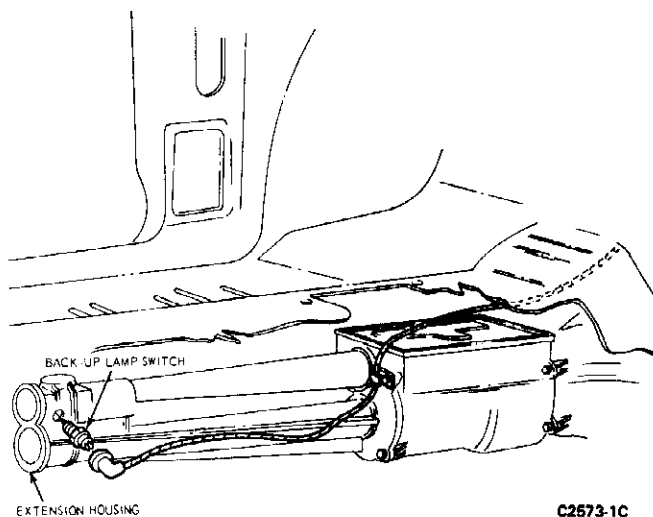


FIG. 5 Removing Back-Up Lamp Switch

Installation

1. Make sure that the shift lever insulator is in a straight downward position on the shift rail.
2. Position the shift lever in the extension housing so that the forked end engages the insulator properly.
3. Carefully thread the plastic dome nut into the extension until it seats, then bend a minimum of three tabs downward to lock it in place.
4. Compress the corrugated rubber spring, then install the retaining snap ring.
5. Install the boot and attaching screws.
6. Position the carpet or floor mat and install the step plates and screws.
7. Install the two kick pads.
8. Install the locknut and shift knob.
9. Check to make sure that the transmission lever operates in all shifts.
10. Raise the vehicle and install the back-up lamp switch.
11. Lower the vehicle.

FAIRMONT AND ZEPHYR

Removal

1. Place the gear shift lever in neutral position.
2. Remove attaching screws at rear of coin tray and lift to release from front hold-down notch on boot retainer. Lift it over the gear shift lever boot.
3. Remove the four capscrews attaching the boot to the floor pan (Fig. 9) and move the boot upward out of the way.

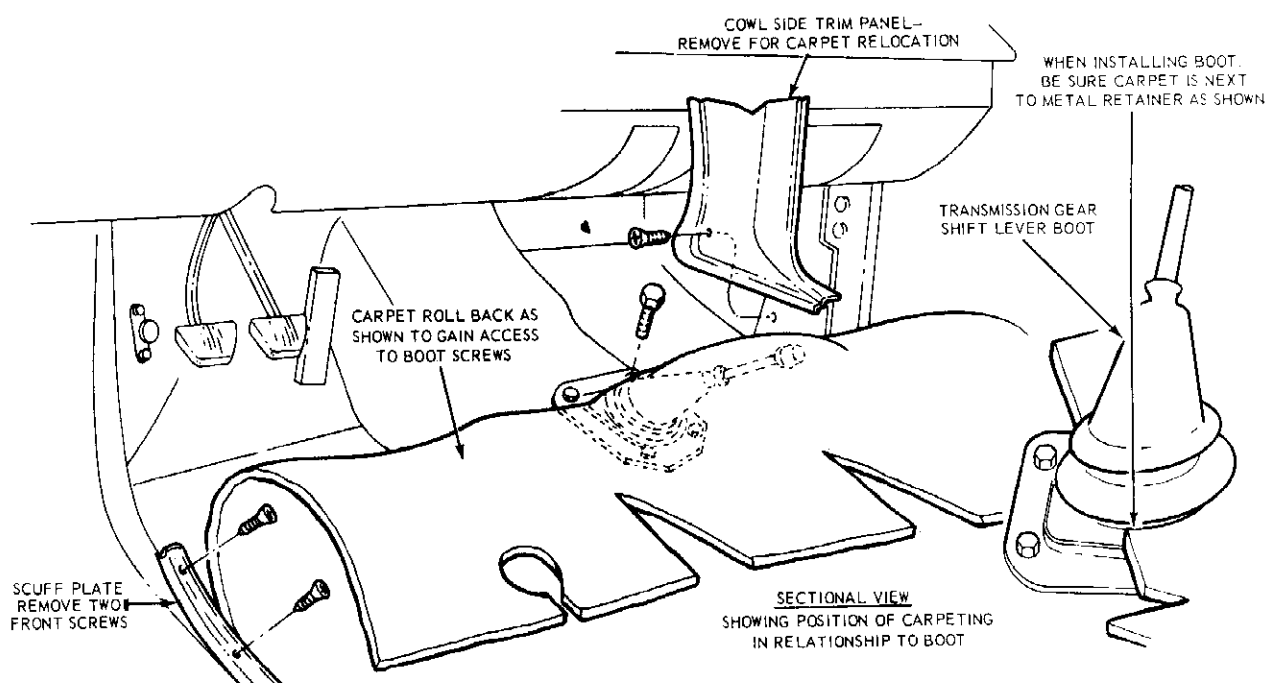
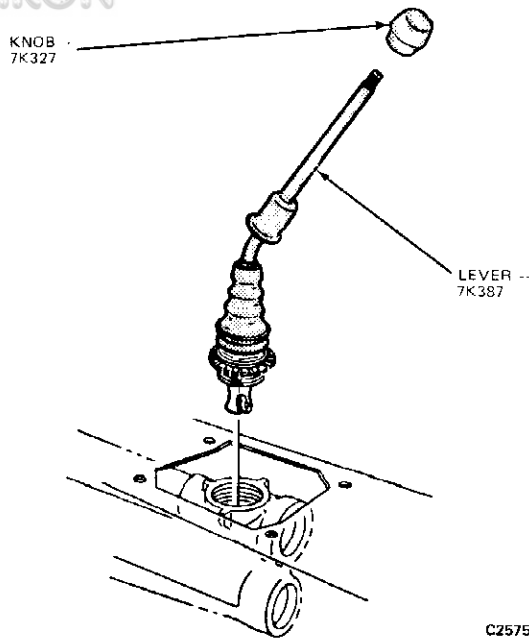


FIG. 6 Shift Lever Boot Removal



C2575-1F

FIG. 7 Shift Lever—Pinto/Bobcat

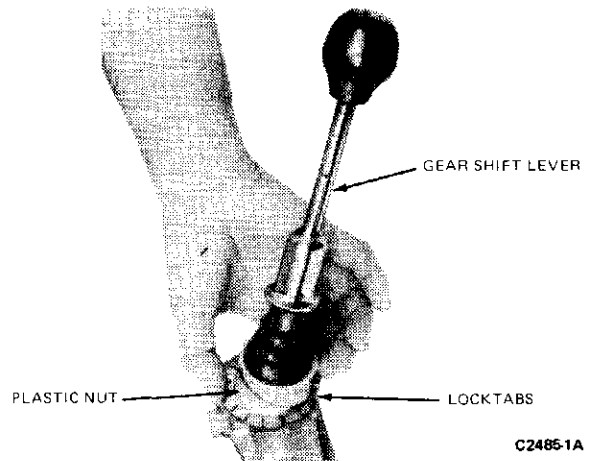
4. Remove the three lever-attaching bolts (Fig. 9). **Caution: The attaching bolts are Metric (M8).** Remove the lever and boot assembly from the extension housing.
5. Remove the gear shift knob and lock nut and slide the boot off the lever.

Installation

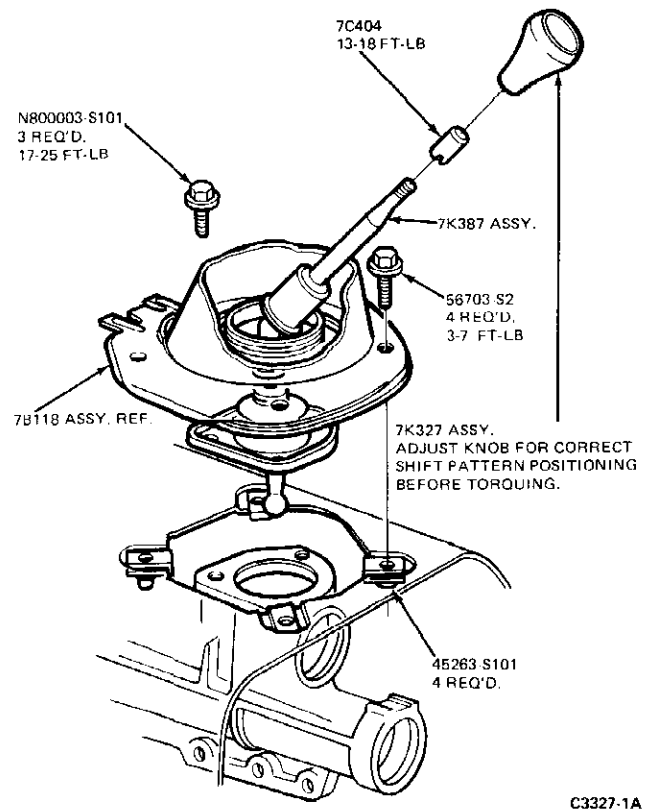
1. Make sure the shift lever insulator is in a straight downward position on the shift rail.
2. Position the shift lever in the extension housing so that the forked ends engage in the insulator properly as in Fig. 7.
3. Install the three metric attaching bolts (M8) and torque to specifications (Fig. 9).
4. Slide the boot over the lever and install the attaching bolts. Torque the bolts to specifications (Fig. 9).
5. Install the gear shift knob and adjust as shown in Fig. 10.
6. Position the coin tray (Fig. 2) over the shift lever boot.
7. Secure the tray to front notch on boot retaining ring and attach at rear with screws.

TRANSMISSION**Removal**

1. Remove the shift lever following directions above.
2. Working from under the hood, remove upper bolts (or stud nuts) that attach flywheel housing to engine.
3. Raise the vehicle on a hoist.
4. Mark the position of the driveshaft relative to the axle companion flange. Remove the driveshaft and install Tool T71P-7095-A in the extension housing to prevent lubricant leakage.
5. Remove the clutch release lever dust cover.



C2485-1A

FIG. 8 Removing or Installing Shift Lever—Pinto/Bobcat

C3327-1A

FIG. 9 - Removing and Installing Gear Shift Lever—Fairmont and Zephyr

6. Disconnect the clutch release cable from the release lever.
7. Remove the starter motor attaching bolts and place the starter to one side.
8. Remove the speedometer cable attaching screw and lift the cable from the extension housing.
9. Support the rear of the engine with a jack and remove the bolts that attach the crossmember to the body (Figs. 11 and 12).
10. Remove the bolt (or bolts) that attaches crossmember to extension housing, and remove the crossmember.

11. Lower the engine as required to permit removal of bolts that attach the flywheel housing to the engine. Slide the transmission away from the engine and from under the vehicle.

NOTE: On Fairmont/Zephyr vehicles, it may be necessary to slide the mounting bracket forward from the catalytic converter heat shield in order to move the transmission rearward far enough to remove it.

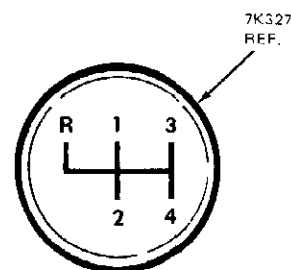
12. Remove the cover attaching bolts and drain the lubricant into a container.
13. Remove the bolts that attach flywheel housing to transmission case and remove the housing.

Installation

1. Install a new shift rod seal in the flywheel housing (if the old seal is damaged).
2. Position flywheel housing on transmission case, and install and torque the attaching bolts to specification.
3. Install the clutch release lever and bearing.
4. Make certain that machined surfaces of flywheel housing and engine are free of dirt and foreign material.
5. Apply a film of C4AZ-19584-A lubricant or equivalent to the input shaft bearing retainer. Position the flywheel housing and transmission assembly on the engine block. **It may be necessary to place the transmission in gear and rotate the output shaft to align the input shaft and clutch splines.**
6. Slide the flywheel housing firmly and squarely onto the locating dowels, to be sure of a positive engagement. Then, holding the flywheel housing firmly in position on the dowels, thread the attaching bolts through the hollow portion of the dowels and into the housing. Torque the bolts to specification.
7. Install and torque the center attaching bolts.
8. Lower the vehicle and install the two upper attaching bolts or stud nuts. Torque to specification. Install the shift lever (and carpet on Pinto/Bobcat) following directions under Shift Lever Installation.
9. Raise the vehicle. Raise the engine until the transmission is in its normal position. Secure the crossmember to the body with the attaching bolts, and torque to specification. Install the bolt that attaches crossmember to extension housing, and torque to specification.

On Fairmont/Zephyr vehicles, position the catalytic converter heat shield mounting bracket to the transmission mount.

10. Remove Tool T71P-7095-A, install the speedometer cable and torque the attaching screw to specification.
11. Position the starter, install the attaching bolts, and torque to specification.
12. Apply grease to the ball end of the clutch release cable and connect it to the release lever. Install the clutch release fork dust cover.



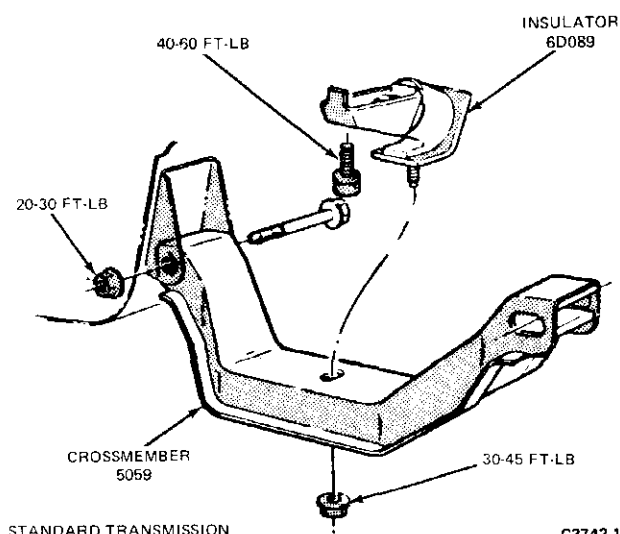
INSTALLATION OF SHIFT KNOB

WITH LEVER IN NEUTRAL POSITION, INSTALL LOCKING NUT 7C404 UNTIL HAND TIGHT. THEN INSTALL KNOB 7K327 UNTIL HAND TIGHT. BACK KNOB OFF UNTIL SHIFT PATTERN ALIGNS WITH THE OF DRIVE LINE. TIGHTEN LOCKING NUT 13-18 FT.-LB. NO THREADS SHALL BE VISIBLE AFTER NUT HAS BEEN TIGHTENED. SHIFT PATTERN ALIGNMENT MUST BE WITHIN $\pm 15^\circ$ OF Q.O.F. OF DRIVE LINE.

STD. KNOB

C3328-1A

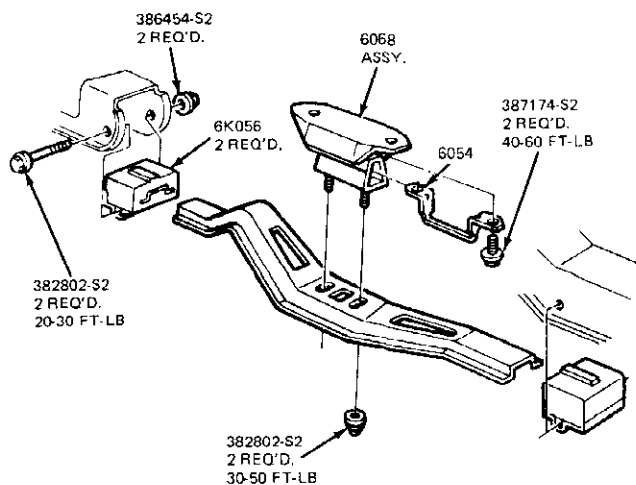
FIG. 10 - Installing Gear Shift Knob



STANDARD TRANSMISSION

C2742-1A

FIG. 11 Engine Rear Mount—Pinto/Bobcat



C3329-1A

FIG. 12 Engine Rear Mount—Fairmont/Zephyr

13. Install the driveshaft, making sure that it is connected to the pinion flange in its original position.
14. Fill the transmission with the specified lubricant until it appears at the bottom of the filler plug hole. Install the filler plug and torque to specification.

15. Install the back-up lamp switch and connect the wire to the switch.
16. Lower the vehicle to the ground.
17. Check the transmission for proper operation.

DISASSEMBLY AND ASSEMBLY

TRANSMISSION

Disassembly

1. Remove the clutch release bearing and lever. Remove the clutch housing attaching bolts and remove the housing.
2. Remove the cover attaching bolts with a 10mm wrench. Remove the cover and the gasket from the case and remove the lubricant.
3. Remove the threaded plug, spring, and the shift rail detent plunger from the front of the transmission case (Fig. 13).
4. Drive the access plug from the rear of the case (Fig. 14). Drive the interlock plate retaining pin from the case as shown in Fig. 15. Lift the interlock plate from the case.
5. Remove the roll pin (Fig. 14) from the selector lever arm.
6. Tap the front end of the shift rail to displace the plug at the rear of the extension housing.
7. Withdraw the shift rail from the extension housing and case as shown in Fig. 16.
8. Lift the selector arm and the shift forks from the case.

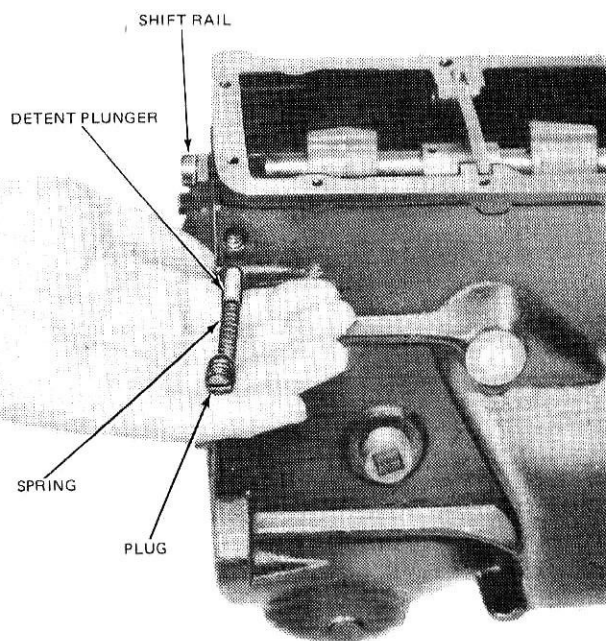


FIG. 13 Removing or Installing Shift Rail Detent Plunger

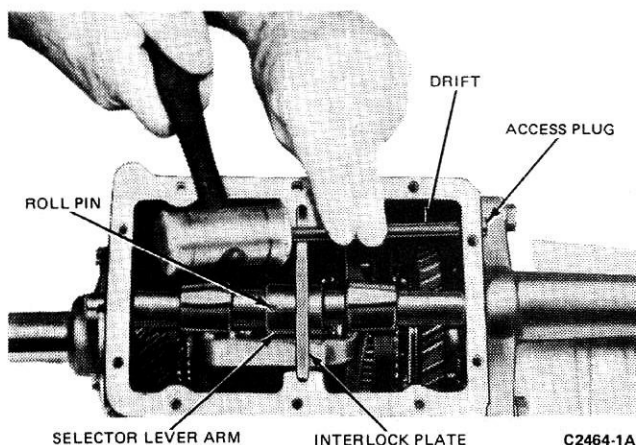


FIG. 14 Removing Interlock Plate Access Plug

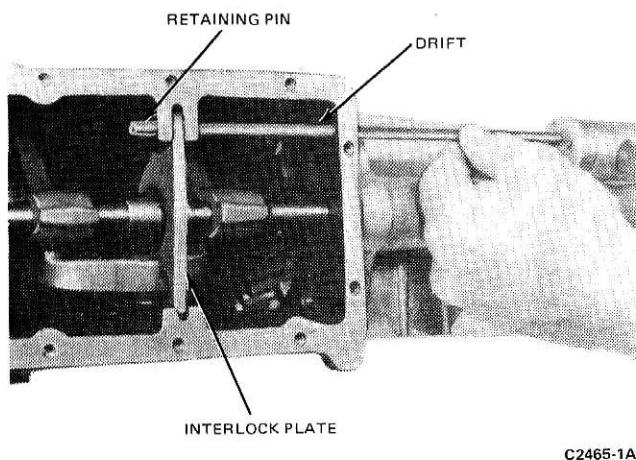


FIG. 15 Removing Interlock Plate Retaining Pin

9. Remove the four extension housing attaching bolts. Tap the extension housing with a plastic hammer to loosen it from the case so that it may be rotated.
10. Rotate the housing to align the countershaft with the cutaway in the extension housing flange. Using a brass drift, drive the countershaft rearward until it just clears the front of the case. Install the dummy shaft T71P-7111-B in the case and gear until the countershaft gear can be lowered to the bottom of the case, then remove the countershaft.
11. Lift the extension housing and mainshaft from the case as an assembly (Fig. 17).
12. Remove the four 10mm input shaft bearing retainer attaching bolts. Remove the input shaft bearing and bearing retainer from the case as an assembly.