THREE SPEED SAGINAW MANUAL TRANSMISSION

CONTENTS OF THIS SECTION

DESCRIPTION

The Saginaw three speed manual transmission is used as the standard equipment transmission on all Tempest and Firebird models except those equipped with the 400 cu. in. V-8 engine.

Gear ratios for the 6-cylinder engines are 2.85:1 in first, 1.68:1 in second, 1:00:1 in high and 2.95:1 in reverse. The 8-cylinder engine gear ratios are 2.54:1 in first, 1.50:1 in second, 1.00:1 in high and 2.63:1 in reverse.

PERIODIC SERVICE

TRANSMISSION

No periodic service of the transmission is required except checking for leaks and proper lubrication level every 6000 miles.

If there is evidence of leakage, leak should be corrected and lubrication added as needed. Refill capacity is 3-1/2 pints.

Use SAE 90 multi-purpose Gear Lubricant. No special additive to this lubrication is required or recommended.

SHIFT CONTROL

ON CAR ADJUSTMENTS

LINKAGE ADJUSTMENT—COLUMN SHIFT (Fig. 7B-1 and Fig. 7B-2)

1. Set transmission control levers in neutral position (see view A).

NOTE: Align shift levers in neutral position by inserting .185" dia. gauge pin through holes in levers as shown.

2. Loosen screw on each adjusting swivel clamp.

3. Set both shift levers on transmission in neutral position.

4. Tighten screws on each adjusting swivel clamp to 20 lb. ft.

5. Remove gauge pin and check complete shift pattern.

LINKAGE ADJUSTMENT—FLOOR SHIFT (Fig. 7B-3 and Fig. 7B-4)

1. Position selector lever in neutral position.

2. Loosen trunnion jam nuts on transmission gear

SHIFT CONTROL

No periodic service of the shift control is required. Certain parts are lubricated on assembly and require further lubrication only when parts become dry and sticky.

2. Loosen trunnion jam nuts on transmission gear shift control rods.

3. Place transmission lever and bracket assembly in neutral position and install gauge pin as illustrated in view A.

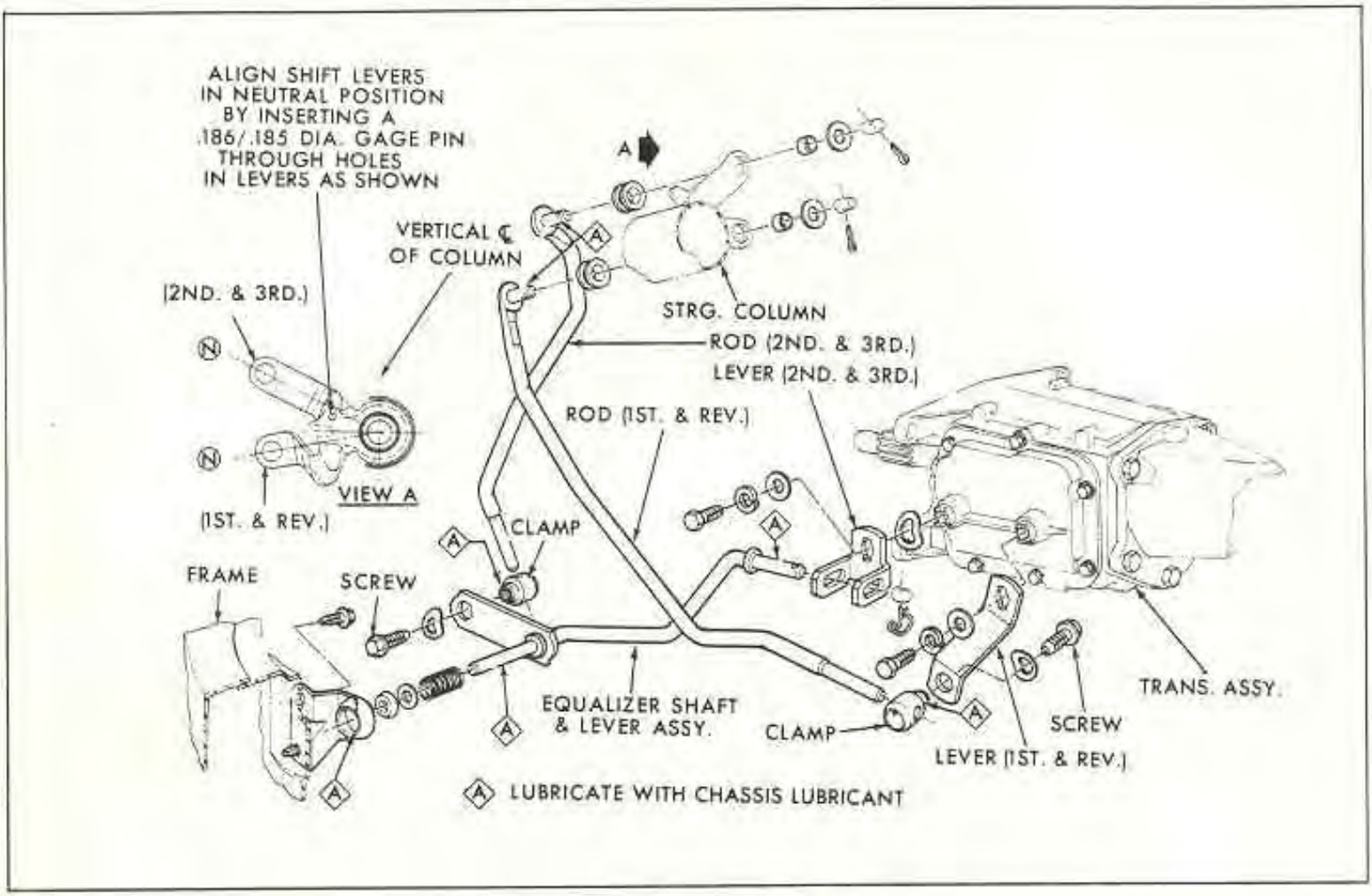


Fig. 7B-1 Tempest Column Shift Controls

4. Position levers on transmission in neutral.

5. Retorque jam nuts to 30 lb. ft.

6. Remove gauge pin and check complete shift pattern.

MINOR REPAIRS

EXTENSION HOUSING SEAL

REMOVE AND REPLACE

1. Remove drive shaft as outlined in Section 4C.

6. Place collar J 6403-2 onto tool J 6403-1 (Fig. 7B-5).

NOTE: Flat side of J 6403-2 must be toward rear of J 6403-1.

7. Place tool J 6403-1 over end of output shaft.

8. Tap end of tool with soft hammer to seat seal.

9. Reinstall drive shaft.

EXTENSION HOUSING SEAL AND BUSHING

1. Remove drive shaft as outlined in Section 4C.

2. Remove seal by prying out with screw driver.

3. Wash counterbore with cleaning solvent and inspect for damage.

4. Inspect propeller shaft yoke for nicks, burrs or scratches which would cut new seal or cause seal to leak or damage bushing.

5. Coat new seal with sealing compound and start new seal in opening.

EXTENSION HOUSING SEAL AND BUSHING

REMOVE AND REPLACE

1. Remove drive shaft.

2. Insert tool J 4830-02 over output shaft and tighten screw.

3. Attach slide hammer J-2619. Using hammer, pull bushing and seal from extension housing (Fig. 7B-6).

4. Start new bushing into extension housing.

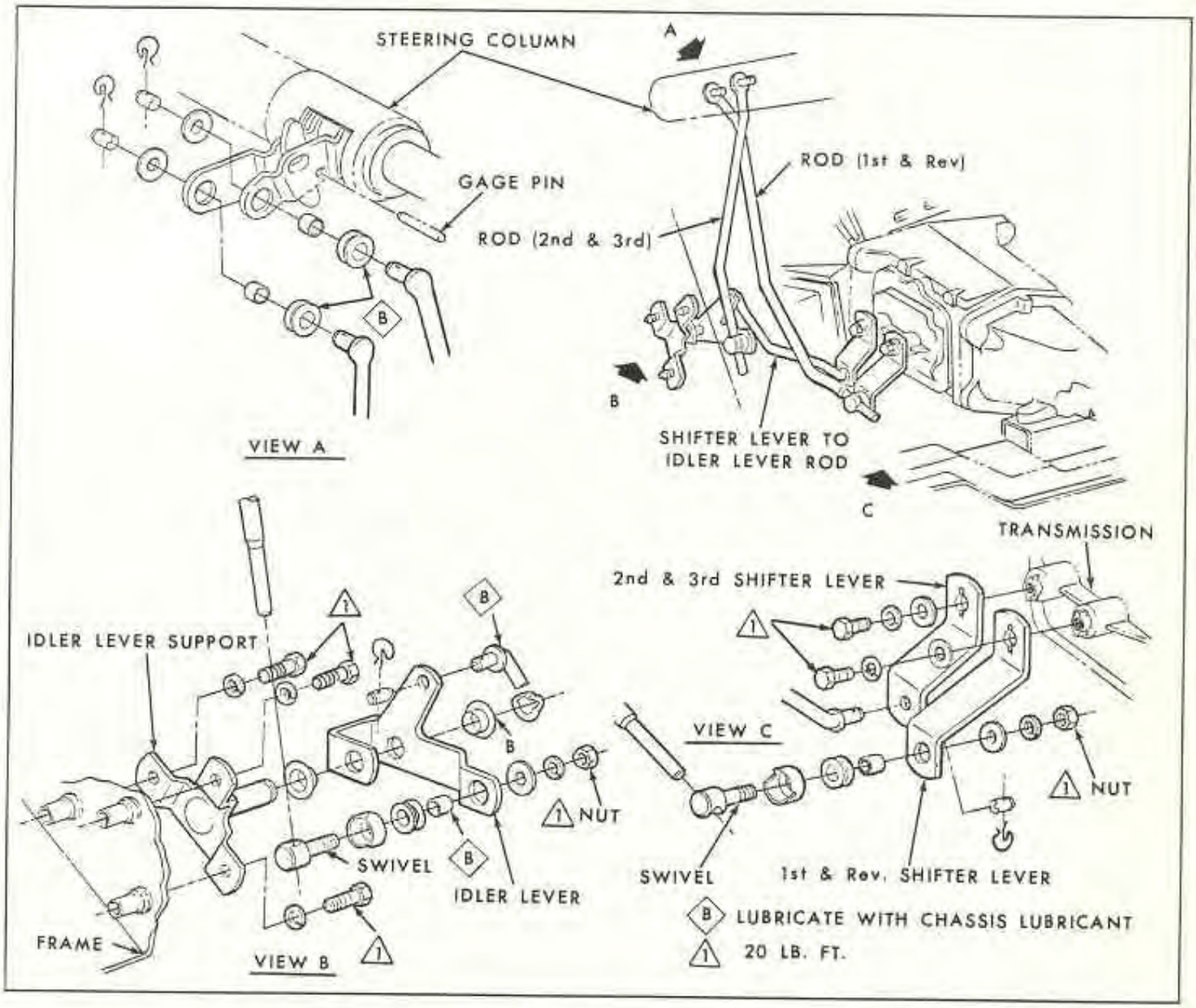


Fig. 7B-2 Firebird Column Shift Controls

5. Using tool J 6403-01 and soft hammer, tap bushing into place (Fig. 7B-7).

6. Install new seal, using tool J 6403-01 and collar J 6403-02 (Fig. 7B-5).

TRANSMISSION SIDE COVER— REMOVE AND DISASSEMBLE

It is not necessary to remove transmission from vehicle for inspection or replacement of parts in transmission side cover assembly, but cover itself must be removed from transmission case (Fig. 7B-8).

1. Loosen side cover bolts to allow transmission fluid to drain.

2. Disconnect control rods from levers.

3. Remove side cover from transmission case.

4. Disassemble side cover by removing detent cam spring, shifter forks and shafts, detent cam retainer and detent cams.

5. Inspect and replace necessary parts.

6. Inspect shifter shaft O-rings and replace if necessary.

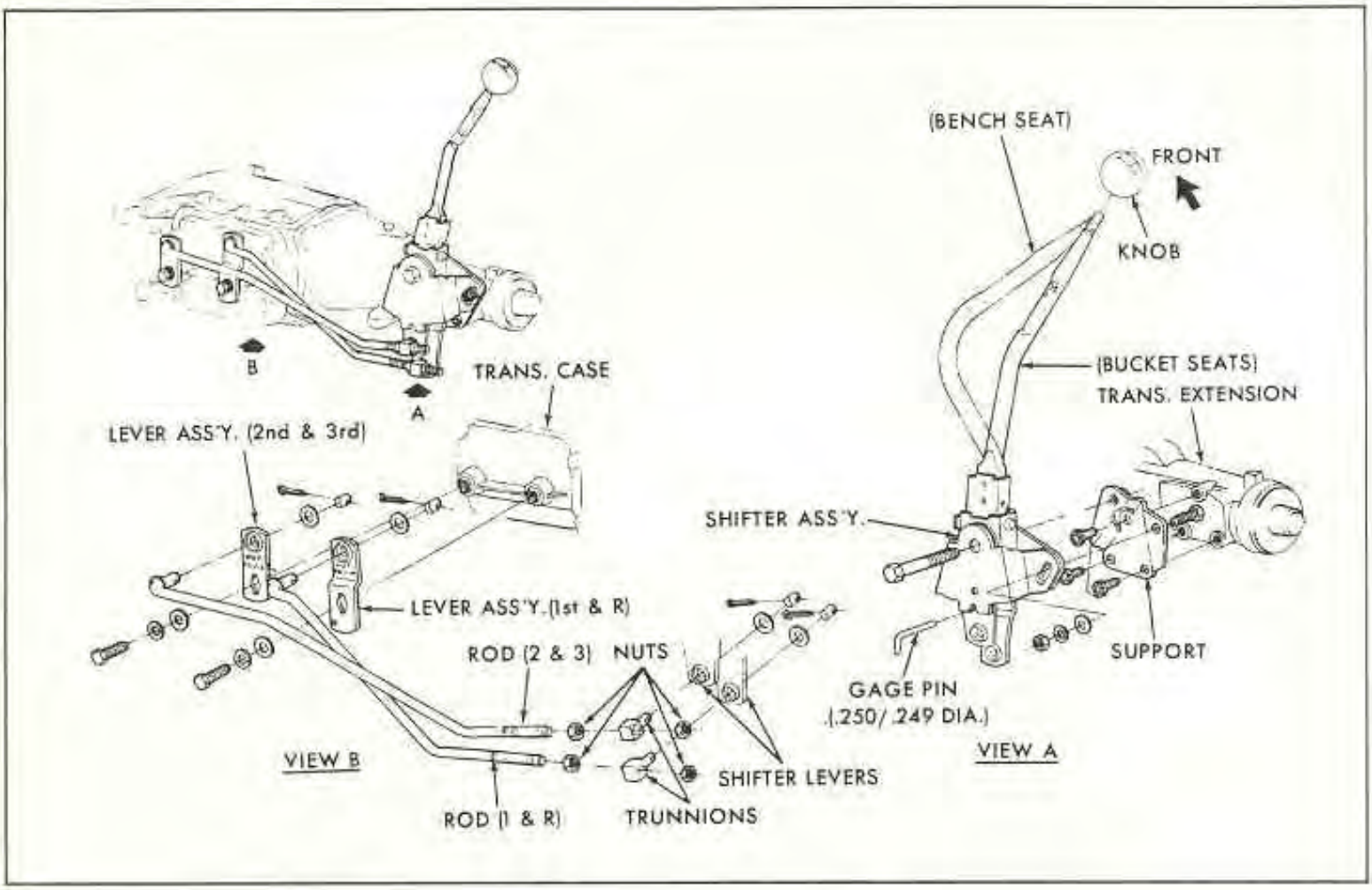


Fig. 7B-3 Tempest Floor Shift Controls

TRANSMISSION SIDE COVER—ASSEMBLE AND INSTALL

1. Install shifter shaft O-rings if removed.

2. Install detent cams, detent cam retainer, shifter shafts and forks and detent cam spring.

3. Attach side cover to transmission case.

4. Connect control rods to levers.

5. Refill transmission.

NOTE: Detent cams, shifter shafts and forks are interchangeable.

MAJOR REPAIRS

TRANSMISSION—REMOVE

1. Disconnect speedometer cable.

2. Disconnect shift control rods from transmission.

3. Scribe a mark on companion flange and shaft yoke to assure proper reassembly and remove propeller shaft.

4. Support rear of engine and remove transmission mount.

NOTE: On Firebird 6-cyl., remove driveline damper (Fig. 7B-26).

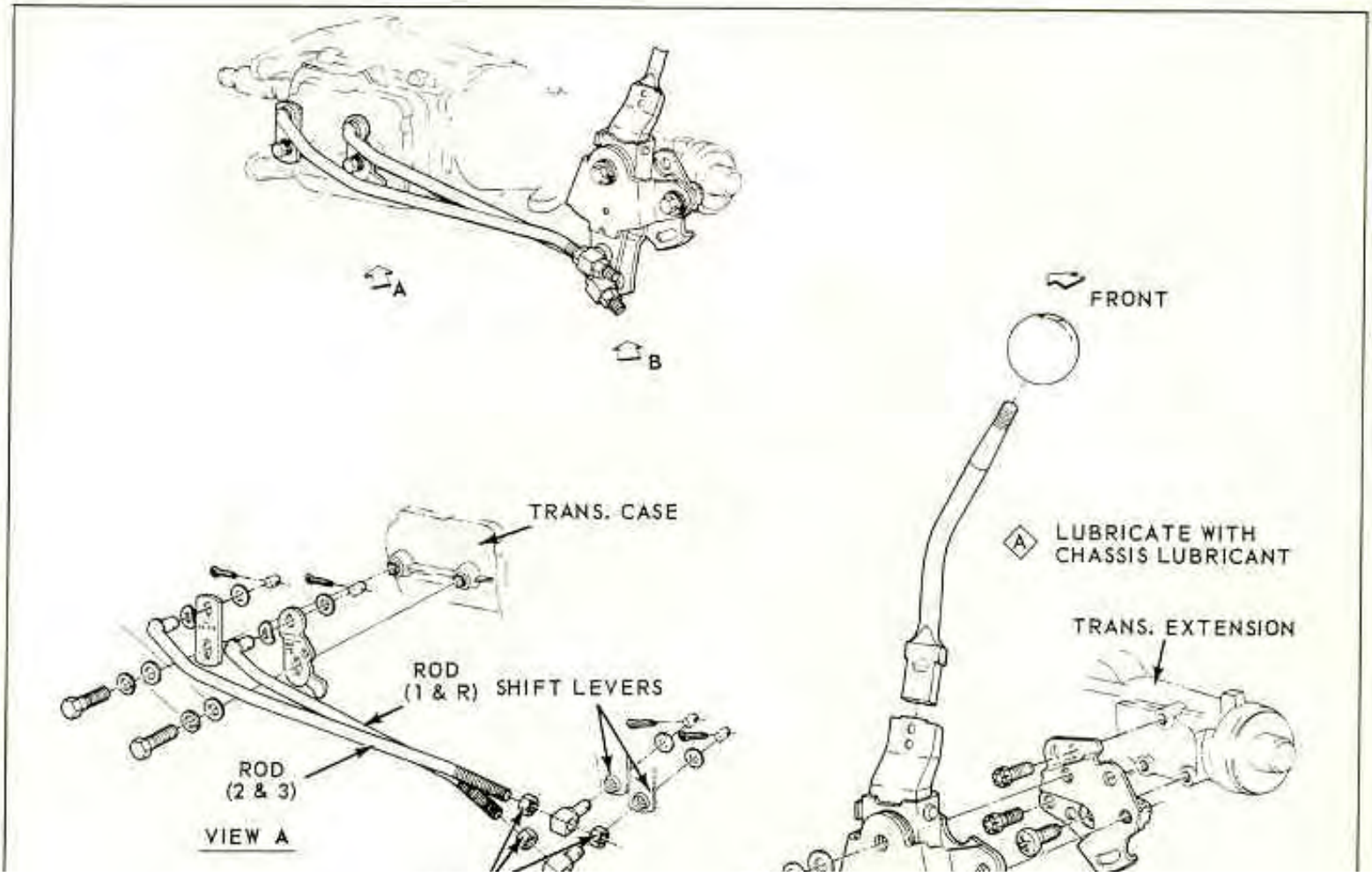
5. Remove four (4) crossmember bolts and slide member rearward.

6. Remove two (2) upper transmission to clutch housing bolts and insert guide pins J 1126.

7. Remove two (2) lower transmission to clutch housing bolts.

8. Slide transmission straight back on guide pins until main drive gear splines are free of splines in clutch friction plate.

9. Remove transmission.



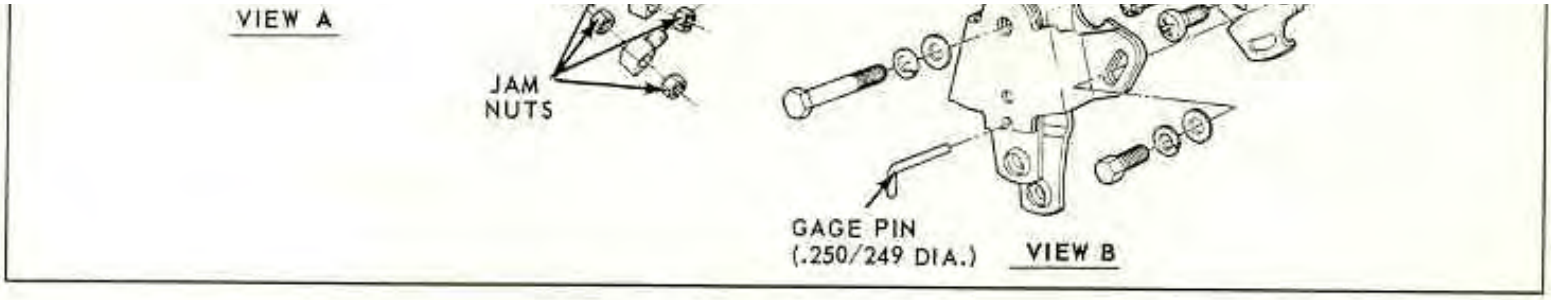


Fig. 7B-4 Firebird Floor Shift Controls

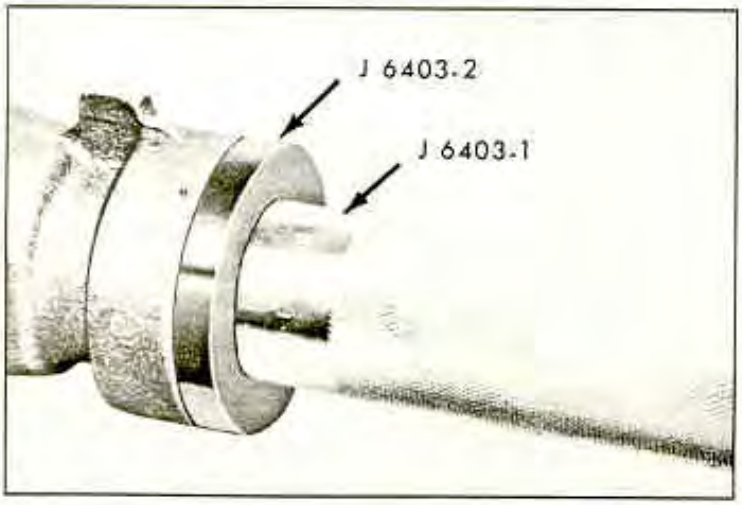


Fig. 7B-5 Installing Extension Housing Seal

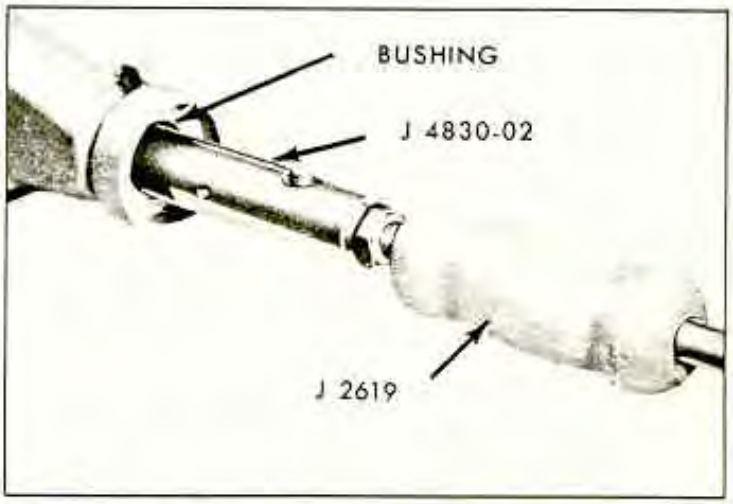


Fig. 7B-6 Removing Extension Housing Bushing

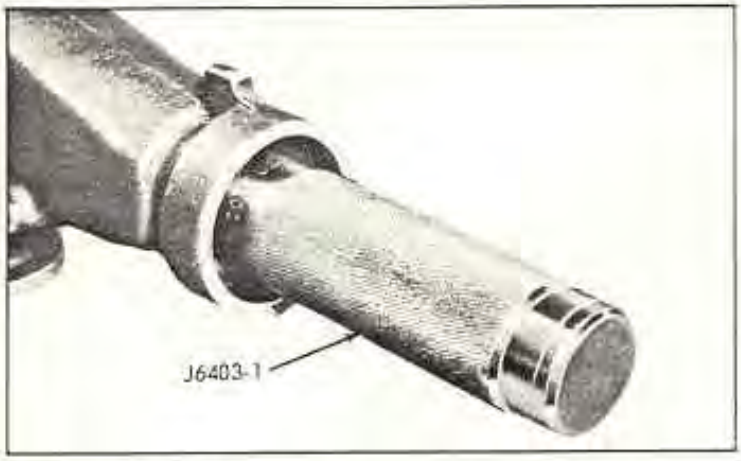
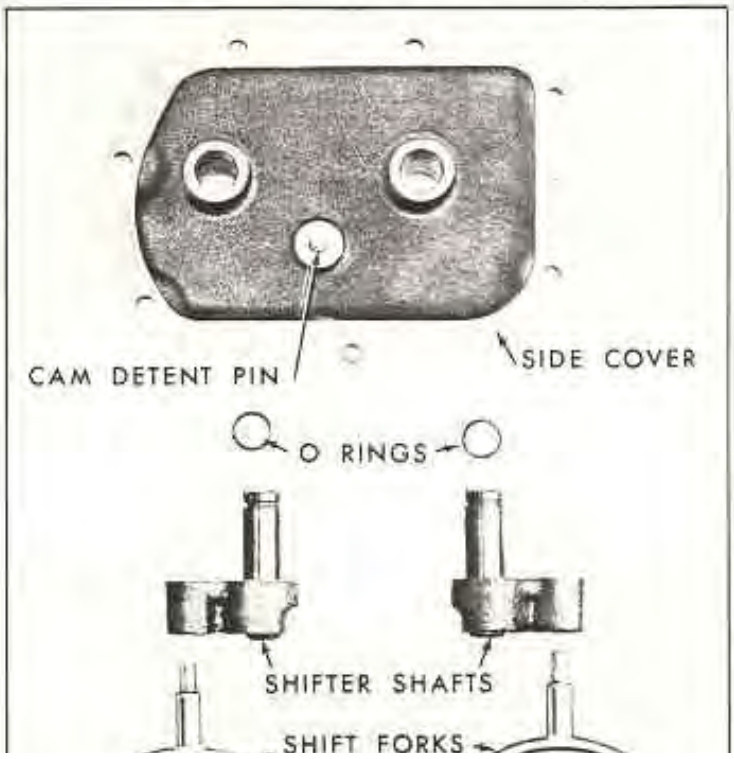


Fig. 7B-7 Installing Extension Housing Bushing



TRANSMISSION—DISASSEMBLE

1. Drain lubricant.

2. Remove side cover attaching bolts. Remove side cover and gasket.

side cover and gasket.

3. Remove front bearing retainer and gasket.

4. Remove front bearing to main drive gear snap ring.

5. Pull main drive gear out of case as far as possible and remove front bearing (Fig. 7B-9).

NOTE: Although front bearing is a slip fit on main drive gear, it may be necessary to aid removal with screwdriver.

6. Remove extension housing to case attaching bolts.

7. Remove reverse idler shaft to gear snap ring (Fig. 7B-10). Slide reverse idler gear forward on shaft.

8. From rear of case, remove extension housing and mainshaft assembly (Fig. 7B-11).

9. Remove main drive gear and third speed blocking ring from inside of case and remove 14 bearing rollers from mainshaft drive gear.

10. Using snap ring pliers, expand snap ring at front of extension housing which retains extension housing to mainshaft (Fig. 7B-12) and remove extension housing.

11. Using countershaft alignment tool J 22246, tap out counter gear shaft and its woodruff key through rear of case (Fig. 7B-13). Remove counter gear and two (2) tanged thrust washers.

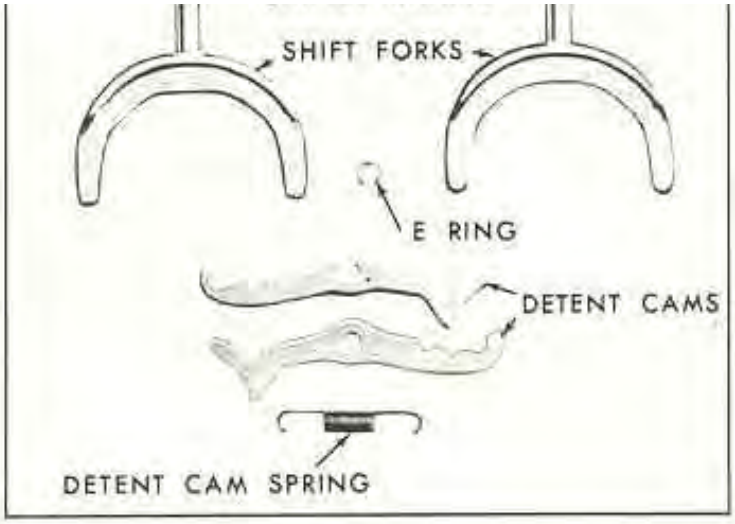


Fig. 7B-8 Exploded View of Transmission Side Cover

12. Remove countershaft alignment tool J 22246.

13. From each end of countershaft, remove spacer and 27 bearing rollers.

14. Using a long brass drift or punch, drive reverse idler shaft and woodruff key through rear of case (Fig. 7B-14).

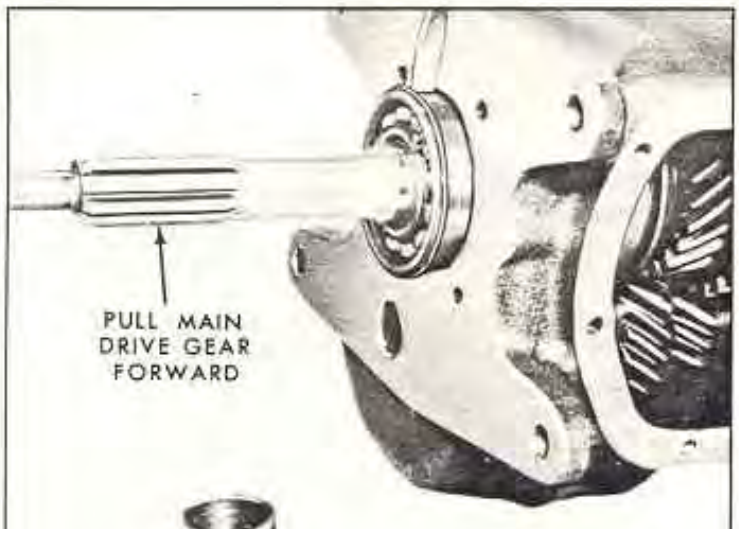
15. Remove reverse idler gear and tanged steel thrust washer.

16. Remove second-third synchronizer sleeve (Fig. 7B-15).

17. Remove rear bearing snap ring (Fig. 7B-15).

18. Remove speedometer drive gear by depressing retainer clip and sliding off output shaft.

19. Using hydraulic or arbor press, press off rear bearing, spring washer, thrust washer and reverse gear (Fig. 7B-16).



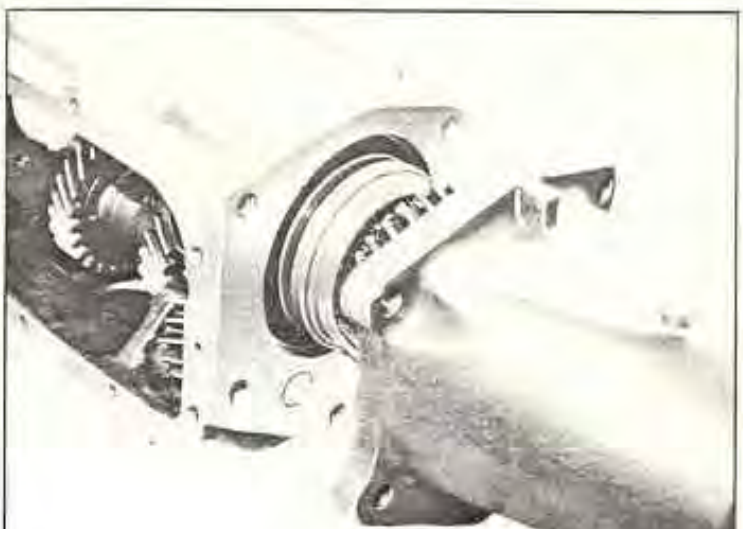


Fig. 7B-9 Removing Front Bearing

20. Remove first speed synchronizer snap ring (Fig. 7B-15).

21. Support first speed gear on press plate, using two (2) pieces of stock 6" x 1-7/8" x 1/4" (Fig. 7B-17). Remove first speed synchronizer assembly and first speed gear.

22. Remove second-third speed synchronizer snap ring (Fig. 7B-15).

23. Support second speed gear on press plate, using two (2) pieces of stock 6" x 1 7/8" x 1/4" (Fig. 7B-18). Remove second-third speed synchronizer assembly and second speed gear.

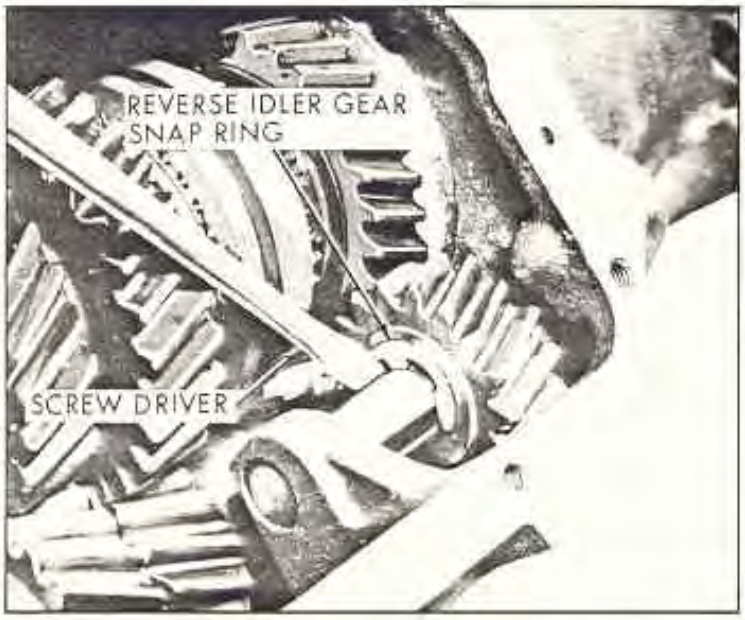


Fig. 7B-10 Removing Reverse Idler Gear Snap Ring

Fig. 7B-11 Removing Mainshaft

CLEANING AND INSPECTION

1. Check synchronizer hubs, sliding keys and springs and, if necessary, replace.

NOTE: The synchronizer hubs and sliding sleeves are a selected assembly and should be kept together as originally assembled.

a. Mark hub and sleeve so they can be reassembled in same position.

b. Remove sliding sleeve from synchronizer hub. Remove keys and springs from hub.

c. Replace the three (3) keys and two (2) springs in position (one on each side of hub) so

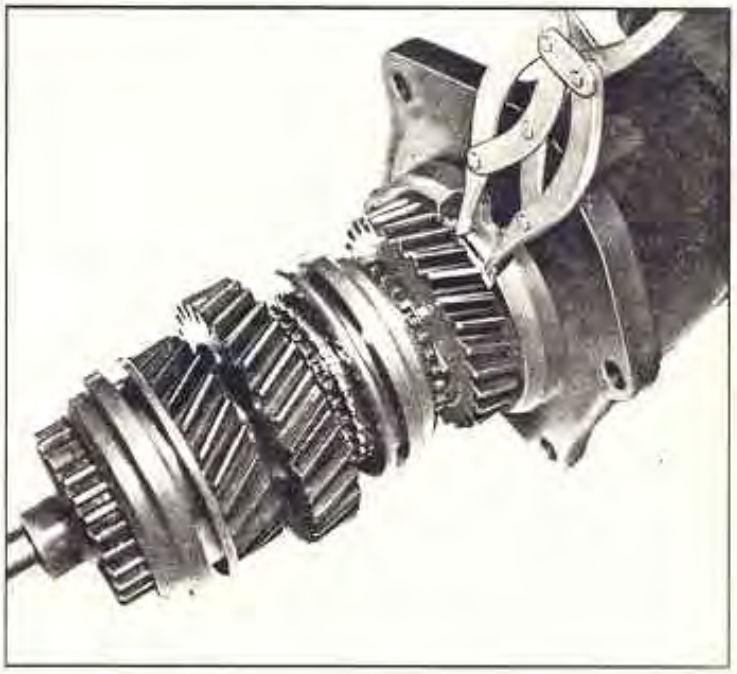


Fig. 7B-12 Expanding Extension Housing Snap Ring

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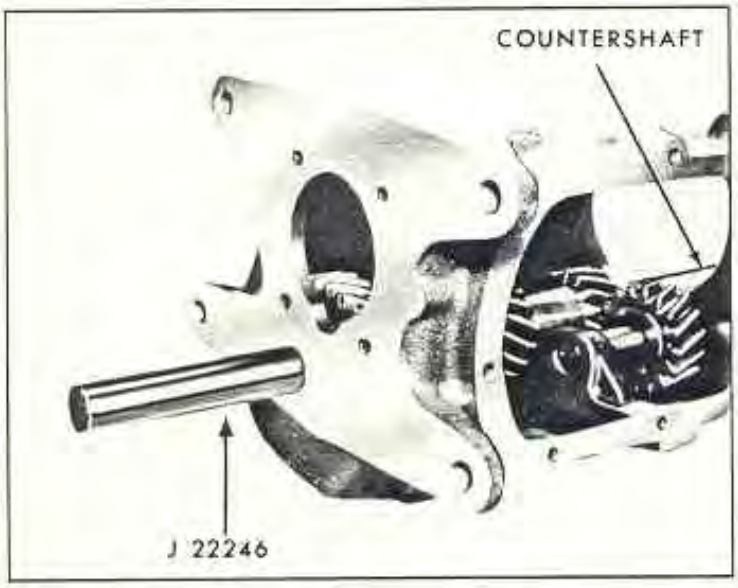


Fig. 7B-13 Removing or Installing Countergear

all three keys are engaged by both springs (Fig. 7B-19).

The tanged end of each synchronizer spring should be installed in different key cavities on either side of hub. Slide sleeve onto hub aligning marks made before disassembly.

NOTE: A groove around the outside of synchronizer hub identifies the end that must be opposite fork slot in sleeve when assembled. This groove indicates the end of the hub with a greater recess.

2. Wash front and rear bearings thoroughly in cleaning solvent. Blow out bearing with compressed air.

CAUTION: Do not allow bearings to spin; turn them slowly by hand. Spinning bearings will damage race and balls. Make certain bearings are clean, then lubricate with light engine oil and check them for roughness by slowly turning race by hand.

3. Check for cracks in blocking rings.

TRANSMISSION CASE

1. Wash transmission case thoroughly inside and outside with suitable cleaning solvent; then inspect case for cracks.

2. Check front and rear case faces for burrs and, if present, remove with a fine mill file.

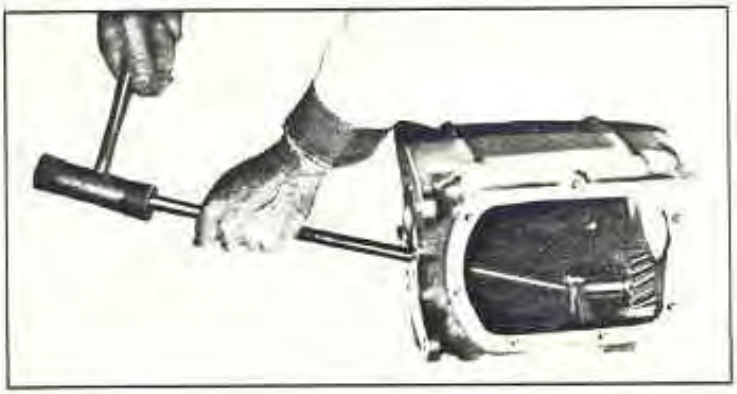


Fig. 7B-14 Removing Reverse Idler Gear Shaft

rollers should be inspected closely and replaced if they show wear.

GEARS

1. Inspect all gears for excessive wear, chips or cracks.

2. Inspect reverse gear bushing and, if worn or damaged, replace entire gear.

NOTE: Reverse gear bushing is not serviced separately.

3. Inspect reverse idler gear bushing and, if worn or damaged, replace entire gear.

COUNTERGEAR ASSEMBLY

1. Check for broken bearing rollers.

2. Inspect anti-rattle plate teeth for wear or other damage.

3. Check for broken anti-rattle springs.

NOTE: The anti-rattle plate is riveted to the countergear in three (3) places. Disassembly is not recommended (Fig. 7B-20).

FRONT BEARING RETAINER OIL SEAL

If lip seal in retainer needs replacement, pry out old seal with screwdriver. Replace with new seal, using flat plate, and tap until seal is seated in its bore (Fig. 7B-21).

NOTE: Lip of seal must face rear of bearing retainer.

TRANSMISSION—ASSEMBLE

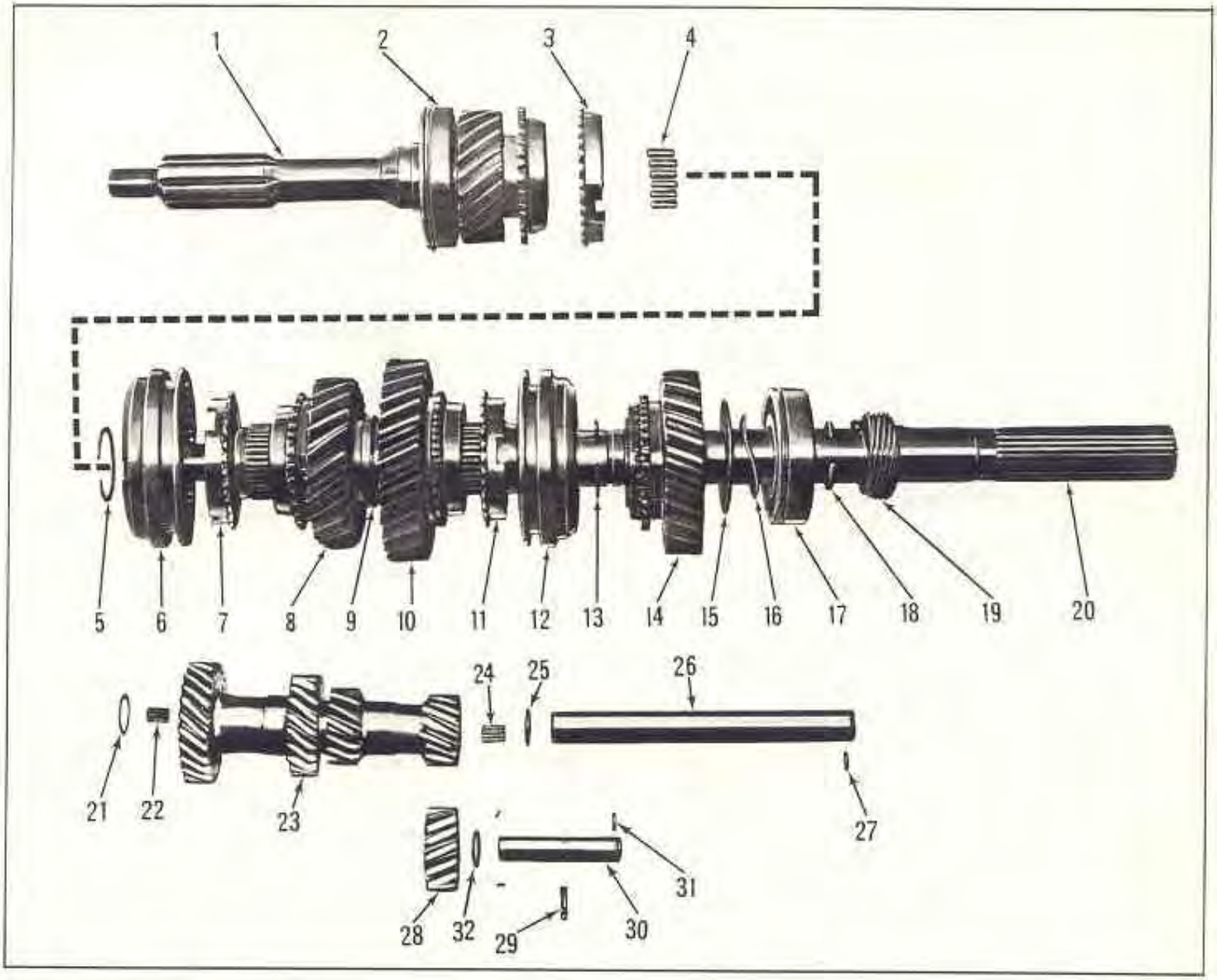
3. Check and clean magnet in bottom of transmission case.

BEARING ROLLERS

All main drive gear and countergear bearing

MAINSHAFT—ASSEMBLE

1. Turn the front of the mainshaft upward and install second speed gear and synchronizer on mainshaft. Using hydraulic or arbor press and press



1. Main Drive Gear
2. Front Bearing
3. Third Speed Blocking Ring
4. Main Drive Gear Bearing Rollers (14)
5. Second-Third Synchronizer Snap Ring
6. Second-Third Synchronizer Assembly
7. Second Speed Blocking Ring
8. Second Speed Gear
9. Shoulder (Part of Mainshaft)
10. First Speed Gear
11. First Speed Blocking Ring
12. First Speed Synchronizer Assembly
13. First Speed Synchronizer Snap Ring
14. Reverse Gear
15. Reverse Gear Thrust Washer
16. Spring Washer (Reverse Gear)
17. Rear Bearing
18. Rear Bearing Snap Ring
19. Speedometer Drive Gear
20. Mainshaft
21. Thrust Washer - Front
22. Countergear Bearing Rollers (27)
23. Countergear
24. Countergear Bearing Rollers (27)
25. Thrust Washer - Rear
26. Countershaft
27. Woodruff Key
28. Reverse Idler Gear
29. Reverse Idler Gear Snap Ring
30. Reverse Idler Shaft
31. Woodruff Key
32. Reverse Idler Gear Thrust Washer

Fig. 7B-15 Mainshaft, Countergear and Reverse Idler Gear Details

32. Reverse Idler Gear Thrust Washer

Fig. 7B-15 Mainshaft, Countergear and Reverse Idler Gear Details

plate J 21858, press second-third speed synchronizer assembly (with chamfer toward rear of transmission) onto mainshaft (Fig. 7B-22). Install retaining snap ring.

CAUTION: Make certain notches in blocking ring align with keys in synchronizer.

2. Install first speed gear and synchronizer on mainshaft (Fig. 7B-23). Using hydraulic or arbor press and press plate J 21858, press first speed synchronizer assembly onto mainshaft. Install retaining snap ring.

CAUTION: Make certain notches in blocking ring align with keys in first speed synchronizer.

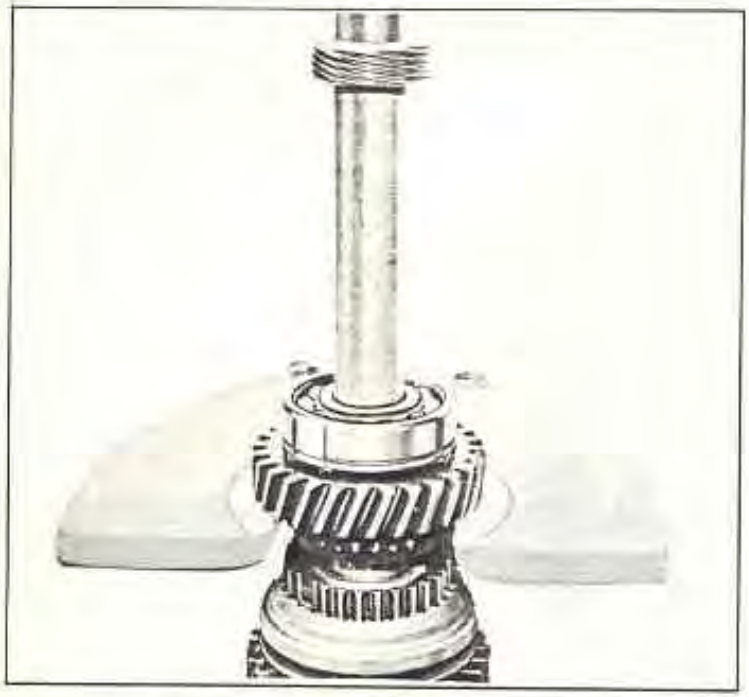


Fig. 7B-16 Removing Rear Bearing

3. Turn the rear of the mainshaft upward and install reverse gear, thrust washer, spring washer and rear bearing (Fig. 7B-15).

NOTE: Groove on bearing must be toward reverse gear. Using hydraulic or arbor press and press plate J 8904, press rear bearing into position (Fig. 7B-24). Install retaining snap ring.

4. Place speedometer gear retainer into hole in output shaft.

5. Align slot in speedometer drive gear with retainer clip and slide gear into place.

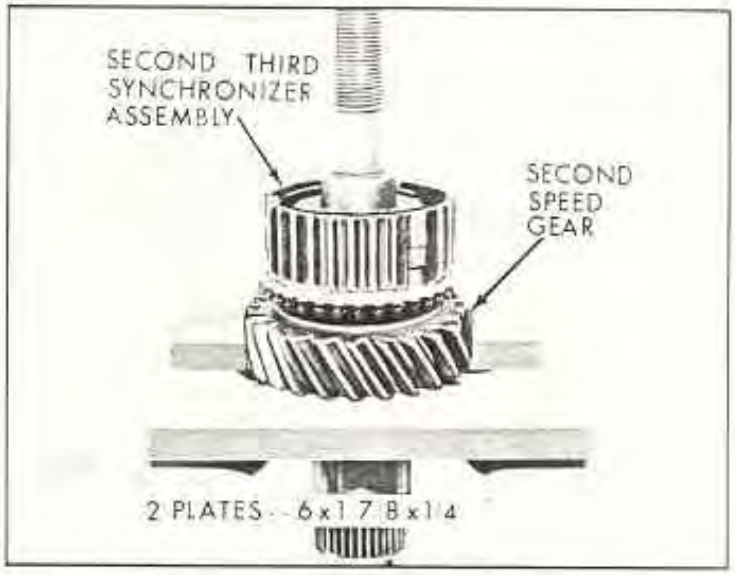


Fig. 7B-18 Removing Second - Third Synchronizer and Gear

6. Install second-third synchronizer sleeve (Fig. 7B-15).

COUNTERGEAR—ASSEMBLE

1. Install countershaft alignment tool J 22246.

2. From each end of countergear, install 27 bearing rollers and spacer (Fig. 7B-20).

NOTE: Coat needle bearings with heavy grease before installing.

TRANSMISSION—ASSEMBLE

1. Install countergear to case bronze thrust washers.

2. Install countergear assembly into case. Install countergear shaft from rear of case. Make certain woodruff key is in position.

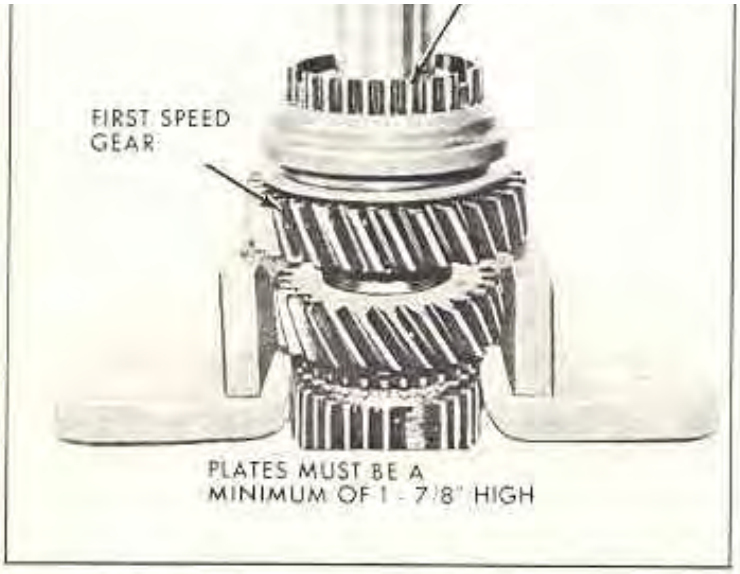


Fig. 7B-17 Removing First Speed Synchronizer and Gear

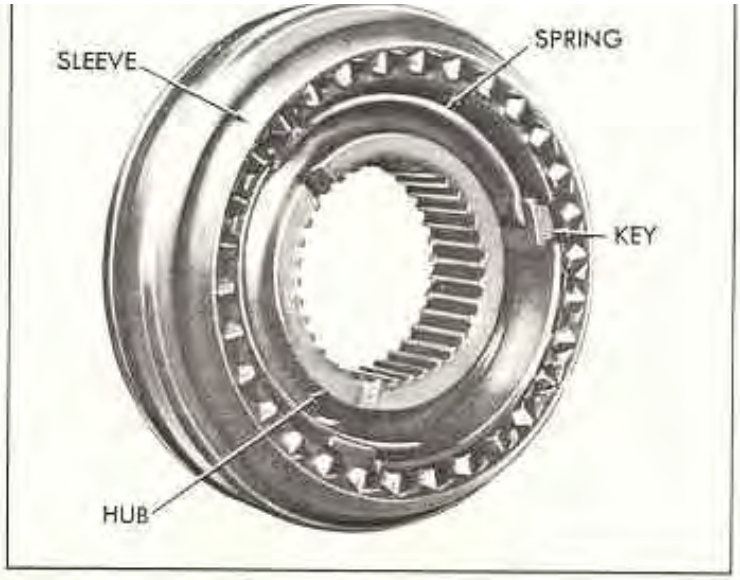


Fig. 7B-19 Synchronizer Assembly

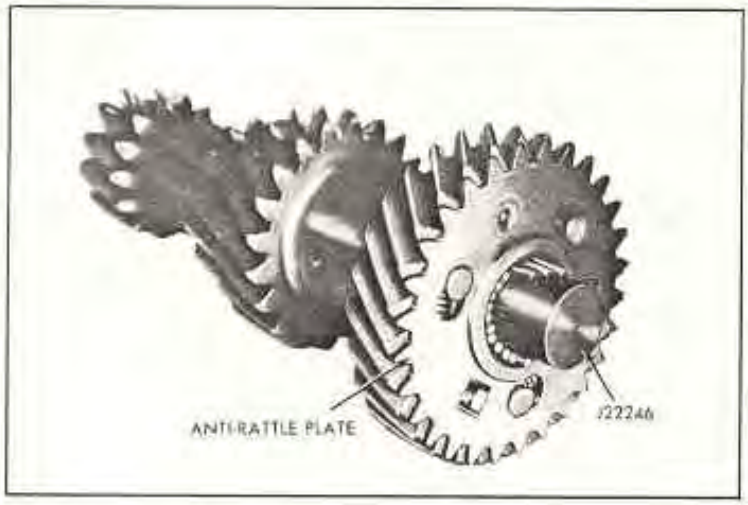


Fig. 7B-20 Loading Bearings into Countergear

3. Install reverse idler gear tanged steel thrust washer. Install reverse idler gear, shaft and woodruff key.

NOTE: Reverse idler gear snap ring will be installed after installation of mainshaft.

4. Install extension housing. Spread snap ring in housing to allow snap ring to drop around rear bearing (Fig. 7B-12). Press on end of mainshaft until snap ring engages groove in rear bearing.

5. Install fourteen (14) bearing rollers in the main drive gear, using heavy grease to hold bearings in place (Fig. 7B-25).

6. Assemble third speed blocking ring on main drive gear.

7. Pilot main drive gear and third speed blocking ring over front of mainshaft.

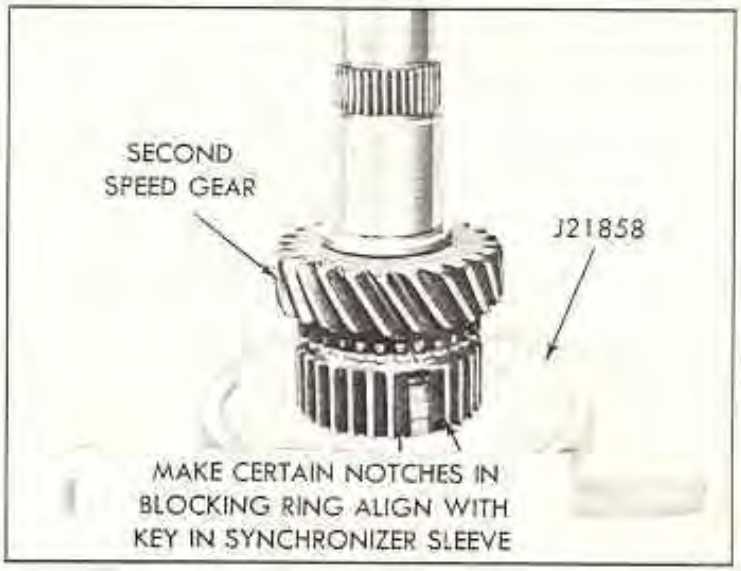


Fig. 7B-22 Installing Second - Third Speed Synchronizer and Gear

9. Install extension housing and mainshaft assembly into case. Install extension housing to case bolts. Torque 45 lb. ft.

CAUTION: Make certain notches in blocking ring align with keys in second-third synchronizer.

10. Install front bearing onto main drive gear. Outer snap ring groove must be toward front of gear.

11. Install retaining snap ring.

12. Install front bearing retainer, gasket and four attaching bolts, torquing bolts to 10 lb. ft.

NOTE: The retainer oil return hole must be at bottom of case.

7. Pilot main drive gear and third speed blocking ring over front of mainshaft.

8. Using heavy grease, install extension housing to case gasket.

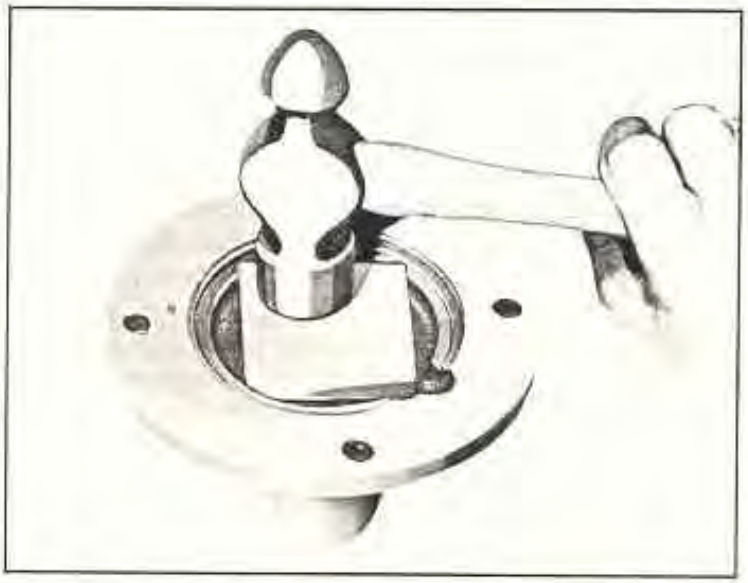


Fig. 7B-21 Installing Front Bearing Retainer Oil Seal

bottom of case.

13. Install reverse idler gear snap ring.

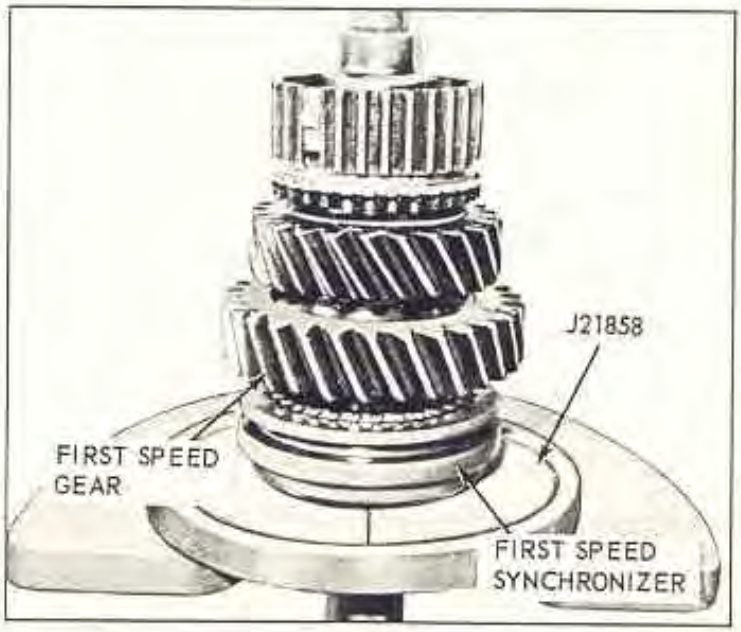


Fig. 7B-23 Installing First Speed Gear and Synchronizer

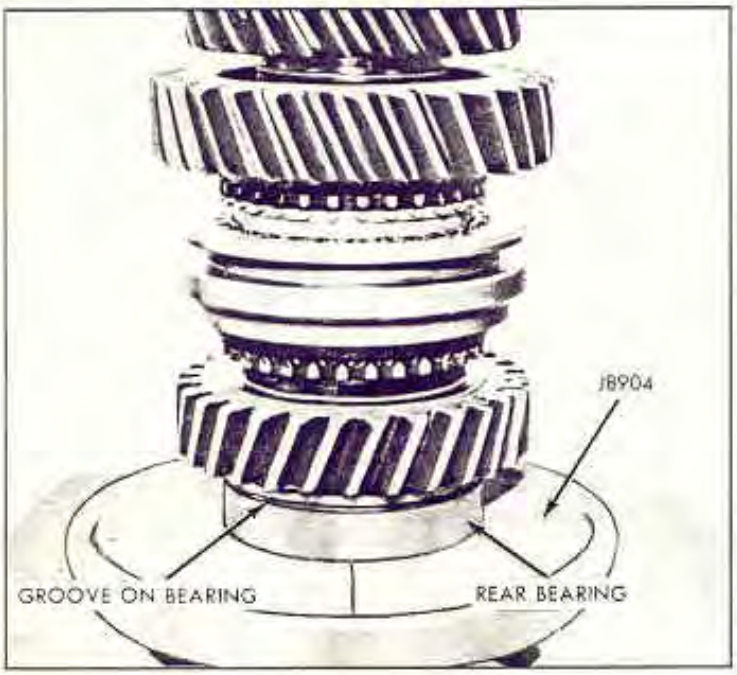


Fig. 7B-24 Installing Rear Bearing

14. Install new side cover gasket. Place transmission in neutral and install side cover. Secure with attaching bolts and torque evenly to 10 lb. ft. to avoid side cover distortion.

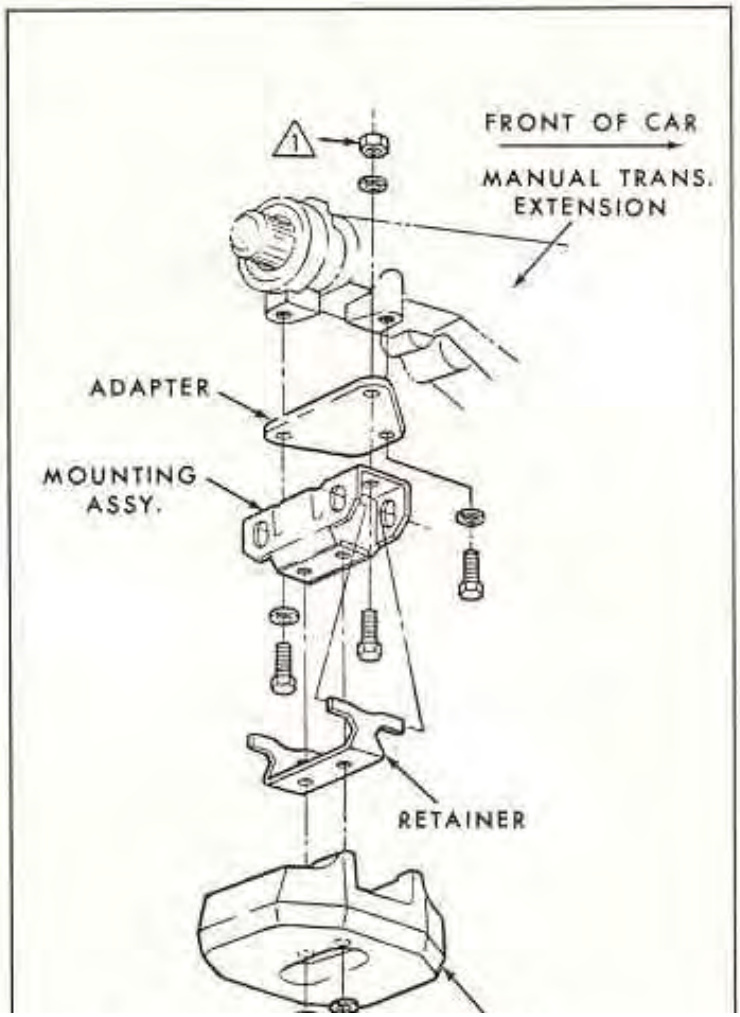


Fig. 7B-25 Loading Bearings Into Main Drive Gear

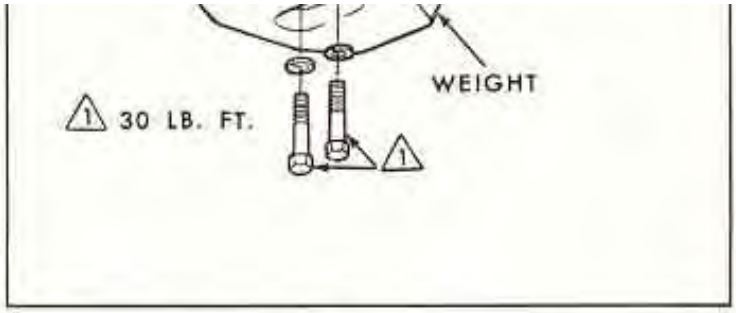


Fig. 7B-26 Drive Line Damper

TRANSMISSION—INSTALL IN VEHICLE

1. Install guide pin in upper right transmission to flywheel housing bolt hole for alignment and place transmission on guide pin. Rotate transmission as necessary to start main drive gear splines into clutch friction plate. Slide transmission forward.

NOTE: Make certain splines of clutch friction plate are concentric with pilot bearing in crankshaft and release bearing properly installed.

2. Install two (2) lower transmission mounting bolts. Remove guide pins and install two (2) upper bolts. Torque bolts to 55 lb. ft.

3. Slide crossmember forward and install four (4) bolts. Torque to 25 lb. ft.

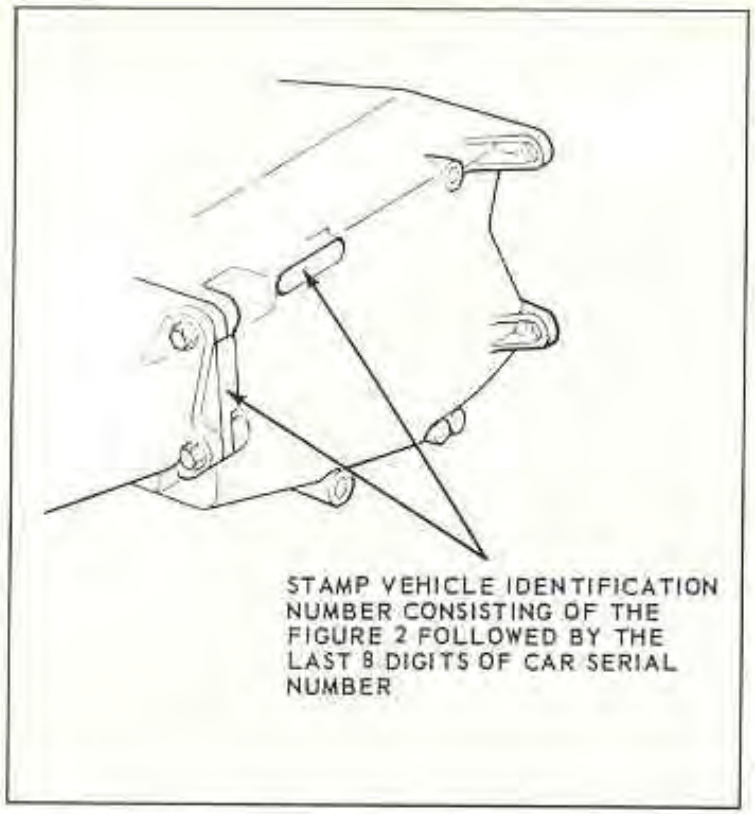


Fig. 7B-27 Vehicle Identification Number Location

4. Install transmission mount and lower engine. Torque mount bolts to 30 lb. ft.

5. Install propeller shaft.

NOTE: On 6-cyl. Firebirds, install driveline damper (Fig. 7B-26).

6. Connect linkage and adjust as described in ON CAR ADJUSTMENTS.

7. Connect speedometer cable.

8. Refill transmission with recommended lubricant.

FIREBIRD DRIVELINE DAMPER

A driveline damper is used to reduce power train vibration to an acceptable level. The damper is mounted under the rear of the transmission extension and consists of a weight retained by a mounting which, in turn, is attached to the underside of the transmission extension through an adapter (Fig. 7B-26).

SPECIFICATIONS

TRANSMISSION IDENTIFICATION

An identifying code is marked in yellow paint on all three speed manual transmissions. This code consists of two letters, 2 inches high, on the R.H. side of the transmission case.

Tempest	Code
6-cyl. (column shift)	FA
6-cyl. (floor shift)	FB
8-cyl. (350 cu. in.)	FC

Firebird	Code
6-cyl. (column shift)	FY
6-cyl. (floor shift)	FK
8-cyl. (350 cu. in.)	RJ

A number derived from the vehicle identification number is also stamped on the transmission case as shown in Fig. 7B-27.

GEAR RATIOS

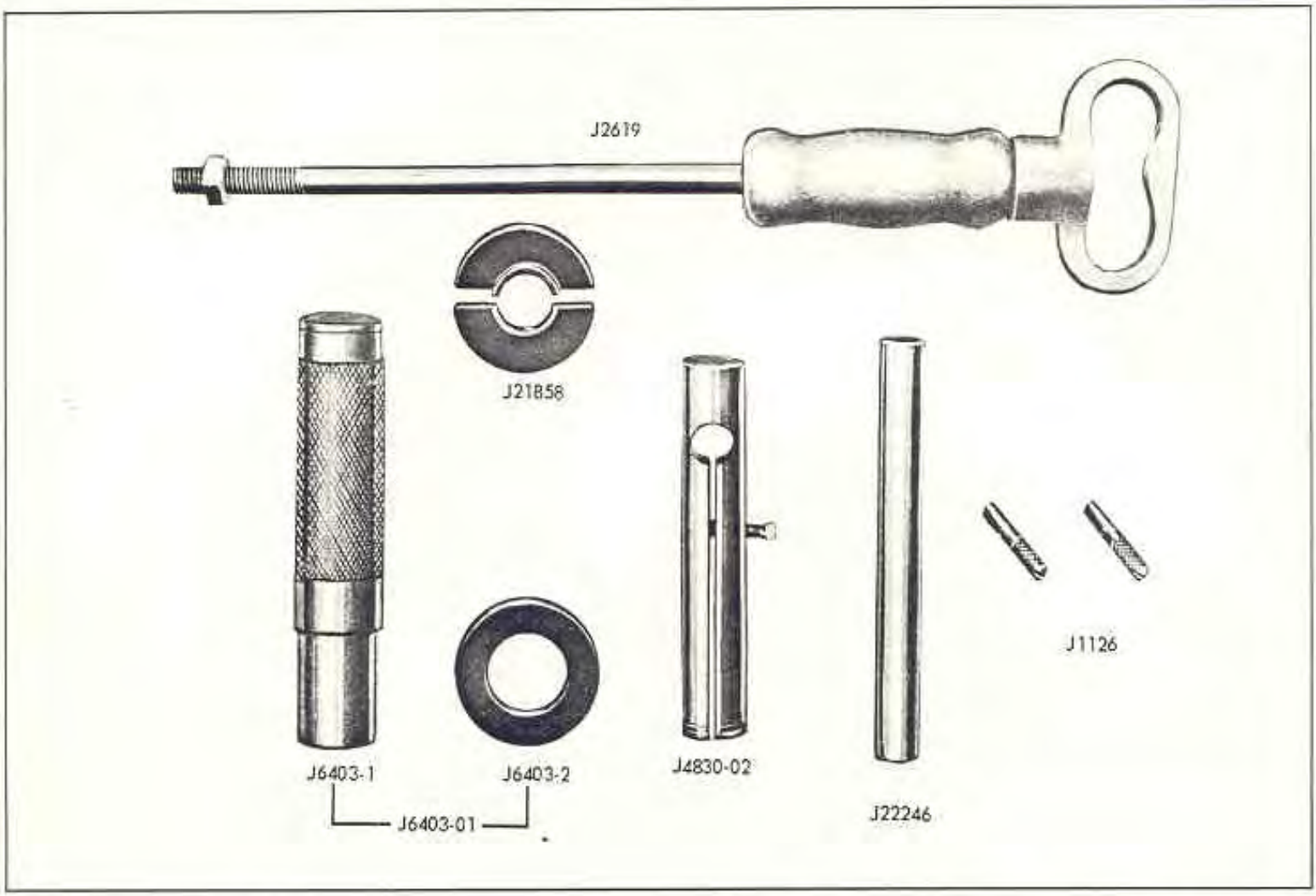
	6-Cylinder	8-Cylinder
First Speed	2.85:1	2.54:1
Second Speed	1.68:1	1.50:1
Third Speed	1.00:1	1.00:1
Reverse	2.95:1	2.63:1

LUBRICATION

Capacity	3 1/2 pints

TORQUE SPECIFICATIONS

Application	Lb. Ft.
Front Bearing Retainer to Case Bolts	20
Side Cover to Case Bolts	20
Extension Housing to Case Bolts	45
Shift Lever to Shifter Shaft Bolts	15
Lubrication Filler Plug	15
Transmission Case to Flywheel Housing Bolts	55
Linkage Swivel Clamp Screws	20
Trunnion Jam Nuts	30
Damper Weight to Mounting Assy. Bolts	30
Mounting Assy. and Adapter to Extension Housing Bolts and Nut	30



J 1126	Aligning Studs	J 6403-01	Extension Housing Bushing and Oil Seal Installer
J 2619	Slide Hammer	J 21858	Adapter (Axle Shaft Bearing Remover)
J 4830-02	Extension Housing Bushing and Oil Seal Remover	J 22246	Countershaft Alignment Tool

Fig. 7B-28 Special Tools

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