

SECTION 4-B 3-SPEED MANUAL TRANSMISSION

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4-4 DESCRIPTION

The 1965-1/2 Skylark Gran Sport will have as standard equipment a 3-speed manually operated transmission, with all forward gears synchronized. All forward-speed changes are accomplished with synchronizer sleeves (See Figure 4-3). The synchronizers permit quicker shifts, greatly reduce gear clash, and permit down-shifting from 3rd to 2nd between 40-20 MPH and from 2nd to 1st below 20 MPH. Power flow in all gears is shown in Figure 4-4.

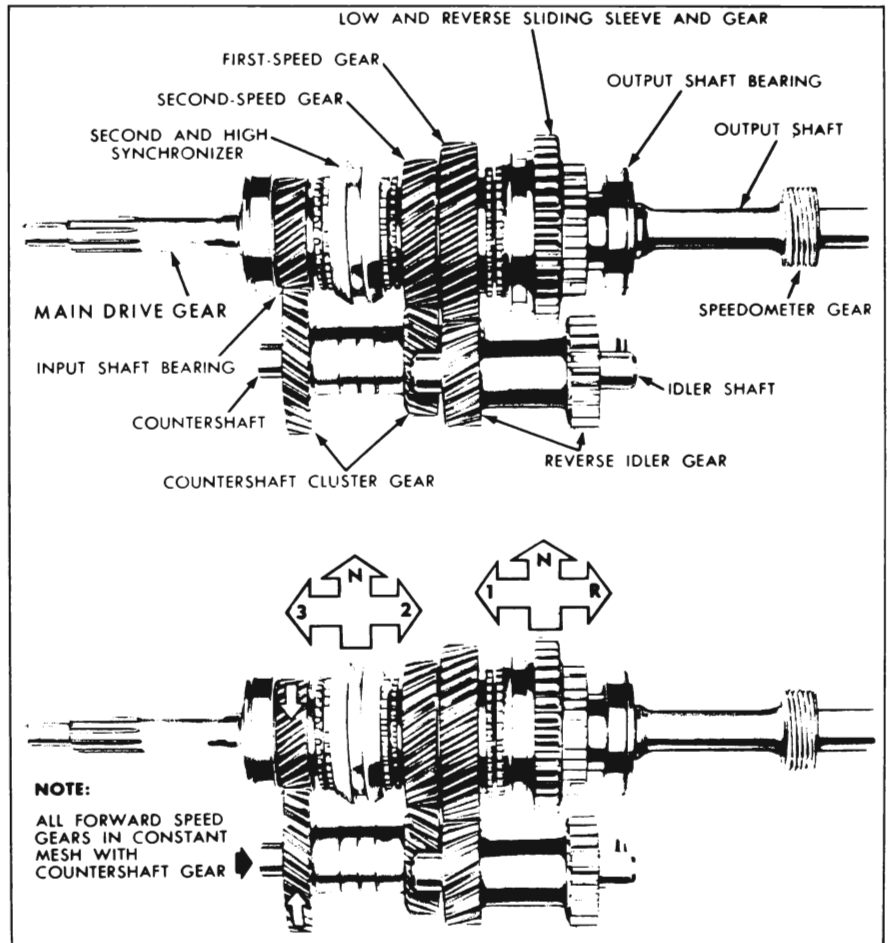


Figure 4-3—Gear Synchronizers

4-5 TRANSMISSION SPECIFICATIONS

a. Bolt Tightening Specifications

Location	Torque Lbs. Ft.
Rear Bearing Retainer to Case	42-50
Front Bearing Retainer to Case	19-25
Access Cover to Case	14-19
Filler Plug to Case	20-30
Drain Plug to Case	20-30
Shift Fork to Shift Rail Set Screw	10-18

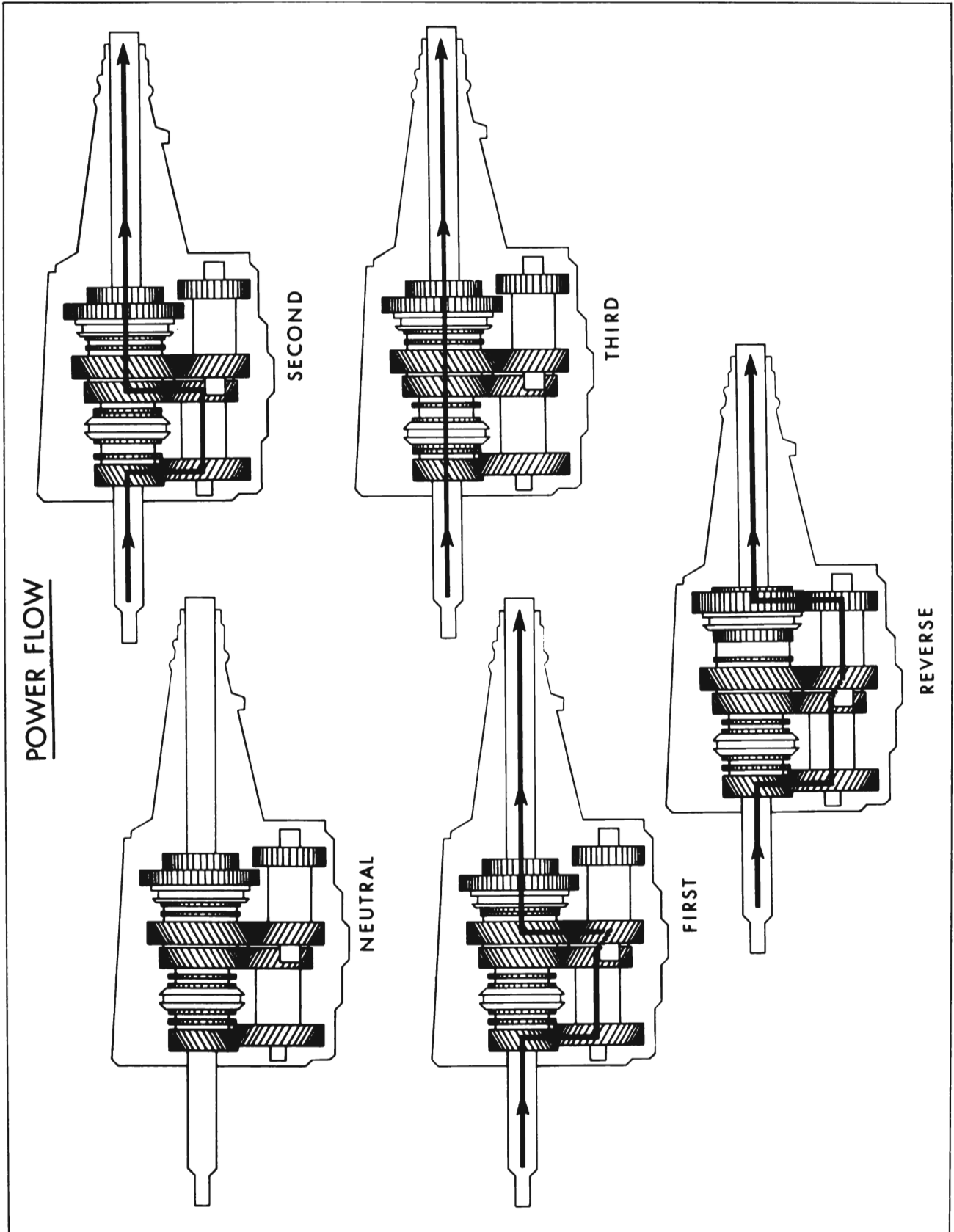


Figure 4-4—Power Flow

4-8 3-SPEED MANUAL TRANSMISSION

b. Transmission Specifications

Type	3-Speed Fully Synchronized in all 3 Forward Gears
Mounting	Unit with Engine
Lubricant	SAE 90 Transmission Multi-Purpose
Capacity	3 1/2 Pints
Synchronization	1st, 2nd, and 3rd Gears

4-6 DISASSEMBLY OF TRANSMISSION

1. Drain lubricant.
2. Remove front bearing retainer and gasket.
3. Remove access cover and gasket.
4. Remove rear bearing retainer housing and gasket.
5. Through filler plug hole drive out countershaft to case retaining pin. See Figure 4-5.
6. Remove set screw, spring, interlock plug, detent plugs, and spring. See Figure 4-6.
7. With transmission in neutral, remove shift fork to rail locking screws. See Figure 4-6.

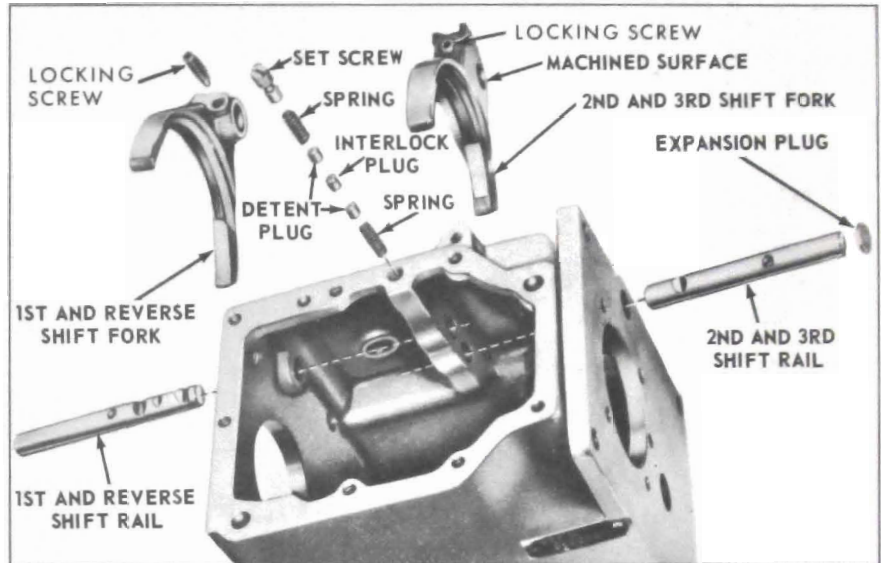


Figure 4-6—Shift Rails, Forks, and Detent Plugs

8. Remove 1st - reverse shift rail from rear of case.
9. Using battery pliers with jaws padded, rotate 2nd - 3rd shift rail 90°. See Figure 4-7.

NOTE: Rail must be rotated 90° to disengage detent plunger.

10. Using brass drift, drive 2nd - 3rd shift rail and expansion plug out front of case.

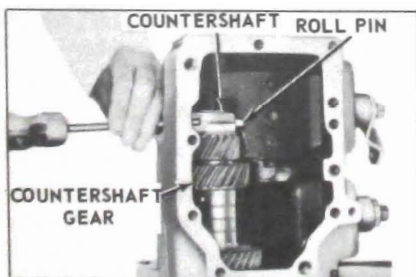


Figure 4-5—Removing Countershaft Retaining Pin

11. Using Tool J-21775 drive countershaft out rear of case. See Figure 4-8.

NOTE: Insert screwdriver through filler plug hole. Locate it between the case and countergear to prevent countergear from dropping to bottom of case. After removing countershaft, carefully lower countergear to bottom of case by removing screwdriver.

12. Remove speedometer drive gear snap ring, drive gear, and retaining ball.
13. Remove output shaft to bearing snap ring.
14. Remove large snap ring from rear bearing.
15. Remove rear bearing as follows:

- a. Slide Tool J-21774-1 over bearing and install snap ring in groove in bearing. See Figure 4-9.

- b. Install speedometer drive gear snap ring on output shaft.
- c. Slide Tool J-21774-2 onto output shaft and thread into J-21774-1.
- d. Thread J-21774-2 into J-21774-1 with J-8614-1 until bearing is free of output shaft.
- e. Remove tool and bearing.

16. Slide main drive gear forward until it rests against case.

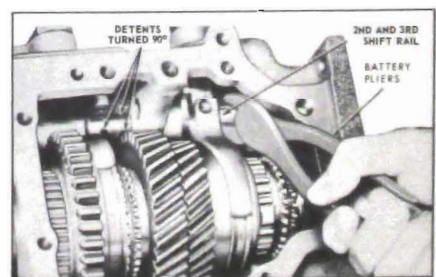


Figure 4-7—Rotating 2nd - 3rd Shift Rail

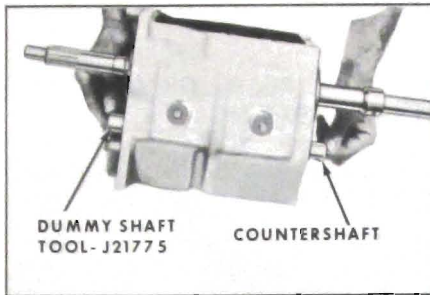


Figure 4-8—Removing Countershaft with J-21775

17. Remove shift forks.

18. Remove mainshaft assembly through top of case. See Figure 4-10

19. If it is necessary to remove main drive gear bearing use a soft hammer, tap gear down through bearing as shown in Figure 4-11.

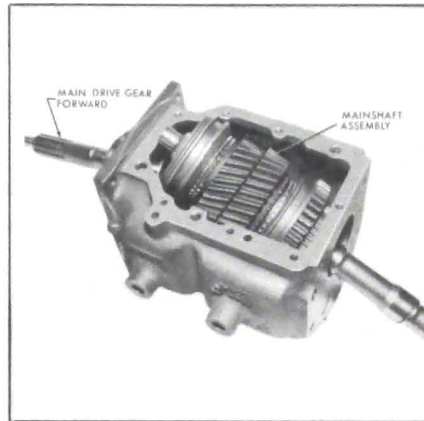


Figure 4-10—Removing Mainshaft Assembly

20. From inside case, tap out front bearing and snap ring.

21. Remove countergear and thrust washers.

22. Using a brass drift, drive re-

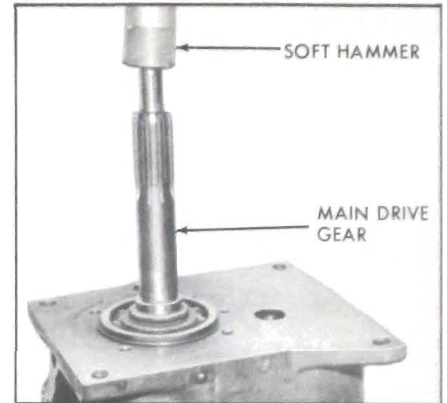


Figure 4-11—Removing Front Bearing

verse idle gear shaft out rear of case. See Figure 4-12. Remove gear from case.

4-7 SHIFT LEVER SHAFT AND SEAL REPLACEMENT

1. Remove nut, lock washer, flat washer and shift lever from the 1st - reverse and 2nd - 3rd shift lever shaft.

2. From inside case slide out shift lever shaft.

3. Remove and discard "O" ring seal.

4. Lubricate new seal and install.

5. Install shaft into case.

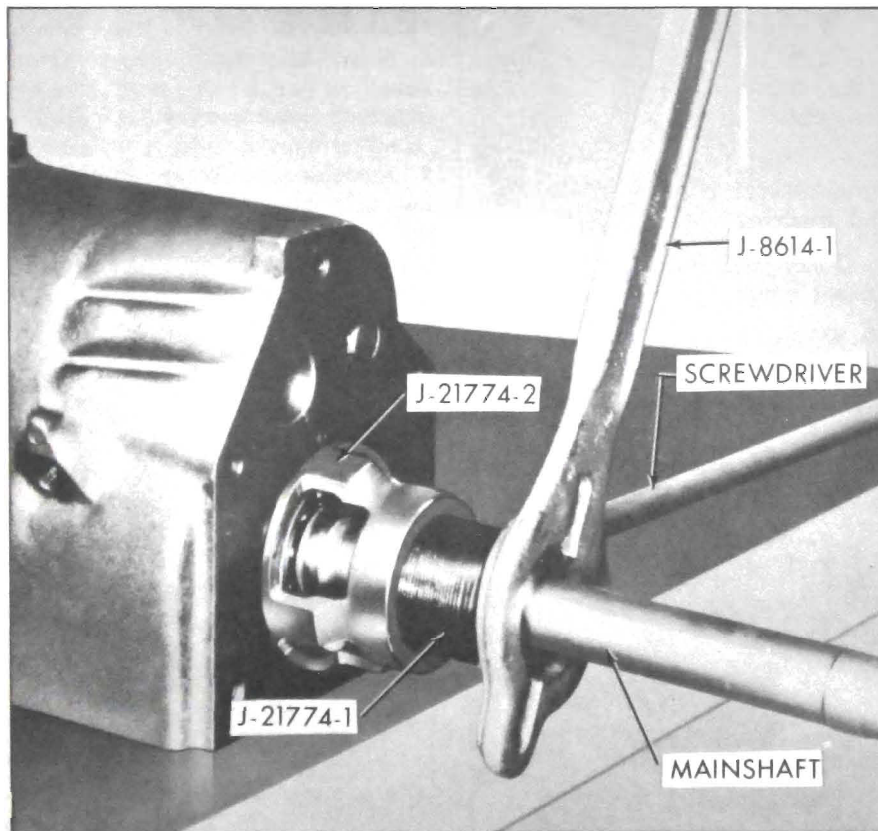


Figure 4-9—Removing Rear Bearing

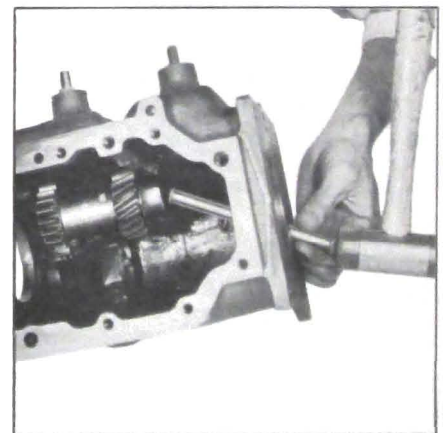


Figure 4-12—Removing Reverse Idle Gear

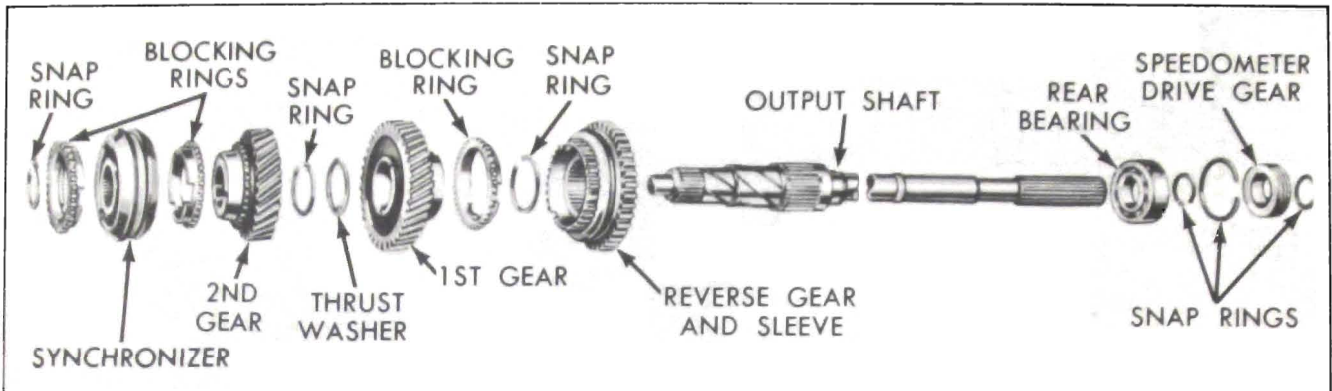
4-10 3-SPEED MANUAL TRANSMISSION

Figure 4-13—Exploded View of Mainshaft

6. Install shift lever and secure flat washer, lock washer, and torque to nut.

4-8 REAR BEARING RETAINER SEAL AND BUSHING REMOVAL AND INSTALLATION

a. Removal

- Using J-2619 slide hammer and J-4830-02 puller remove rear bearing retainer oil seal.
- Using J-2619 slide hammer and J-4830-02 remove rear bearing retainer bushing.

b. Installation

- Install rear bearing retainer bushing using Tool J-6403-6.
- Install rear bearing retainer oil seal as follows:
 - Install J-6403-5 onto J-6403-6. **NOTE: Flat side of J-6403-5 must be toward rear of J-6403-6.**
 - Install oil seal.

4-9 DISASSEMBLY AND ASSEMBLY OF MAINSHAFT

a. Disassembly (See Figure 4-13)

- Remove front blocking ring.
- Remove mainshaft to 2nd - 3rd synchronizer snap ring.

3. Remove 2nd - 3rd synchronizer and blocking ring.

4. Remove 2nd speed gear.

5. Remove 1st gear snap ring, thrust washer, 1st gear, and blocking ring.

6. Remove reverse gear retaining snap ring, gear and sleeve assembly.

7. Mark 1st - reverse synchronizer hub and gear so it can be assembled in the same position.

8. Remove 1st - reverse gear synchronizer hub, insert springs, and inserts.

9. Clean and inspect all parts except countergear.

10. Disassemble, clean and inspect countergear and rollers.

b. Assembly

1. Install rear insert spring in groove in 1st - reverse synchronizer hub. See Figure 4-14.

NOTE: Make certain spring covers all insert grooves. If the tip of the rear insert spring is less than .120 inch in length, replace spring.

2. Start hub in sleeve making sure alignment marks are indexed. See Figure 4-15.

3. Position the three inserts in the hub with the small end over the spring and the shoulder on inside of hub. See Figure 4-16.

4. Slide sleeve onto hub until the detent is engaged. See Figure 4-17.

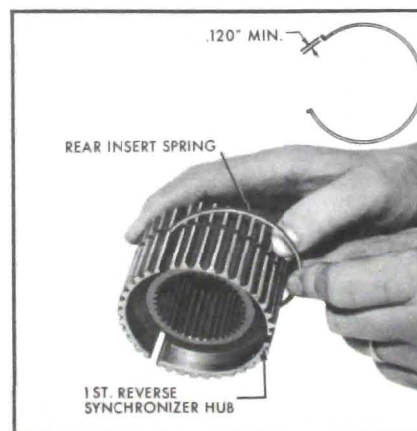


Figure 4-14—Installing Rear Insert Spring

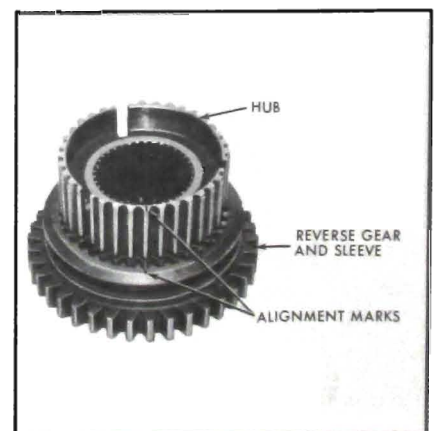


Figure 4-15—Starting Hub Into Gear

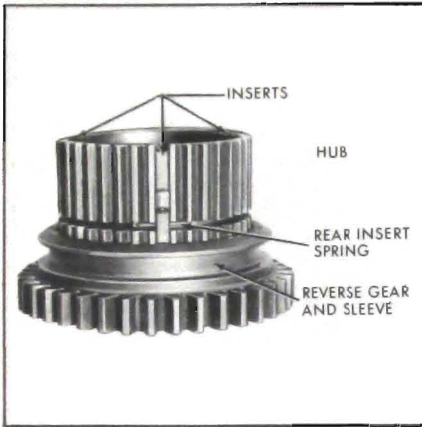


Figure 4-16—Positioning Inserts

5. Install front insert spring in hub as shown in Figure 4-18.

6. Lubricate mainshaft splines and machined surfaces with transmission lubricant.

7. Slide the 1st - reverse gear and sleeve assembly onto mainshaft with teeth of gear facing toward rear of shaft secure with snap ring. See Figure 4-19.

8. Coat tapered machine surface on 1st gear with grease. Place blocking ring on greased surface. See Figure 4-19.

9. Slide 1st gear onto mainshaft with blocking ring toward rear of shaft. Rotate gear as necessary to engage three notches in blocking ring with synchronizer inserts. See Figure 4-19.

10. Secure 1st gear with thrust washer and snap ring.

11. Coat tapered machine surface of 2nd gear with grease and slide blocking ring onto it.

12. Assemble 2nd - 3rd speed synchronizer as follows:

a. Install insert spring into groove of 2nd - 3rd speed synchronizer hub.

NOTE: Make certain that all three insert slots are fully covered. See Figure 4-20.

b. With alignment marks on hub and sleeve aligned, start hub onto sleeve. See Figure 4-20.

c. Place three inserts, in the slots, on top of retaining spring.

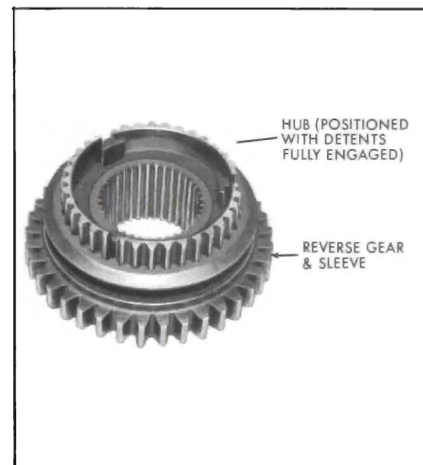


Figure 4-17—Sliding Sleeve Into Hub

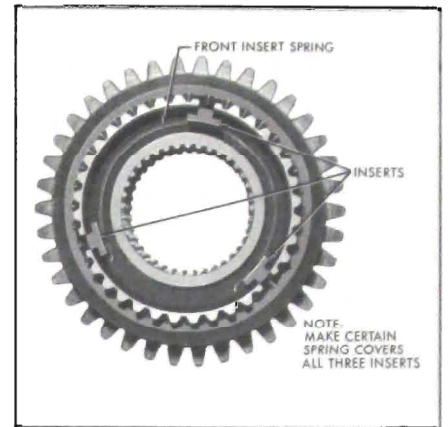


Figure 4-18—Installing Front Insert Spring

(See Figure 4-20). Push assembly together.

d. Install remaining insert spring so that spring ends cover same slots as does other spring. See Figure 4-20.

13. Slide 2nd speed gear with blocking ring and 2nd - 3rd gear synchronizer onto the mainshaft. Tapered machined surface of 2nd gear must be toward the front of shaft. See Figure 4-19.

NOTE: Make certain notches in blocking ring engage the synchronizer inserts.

14. Secure synchronizer with snap ring.

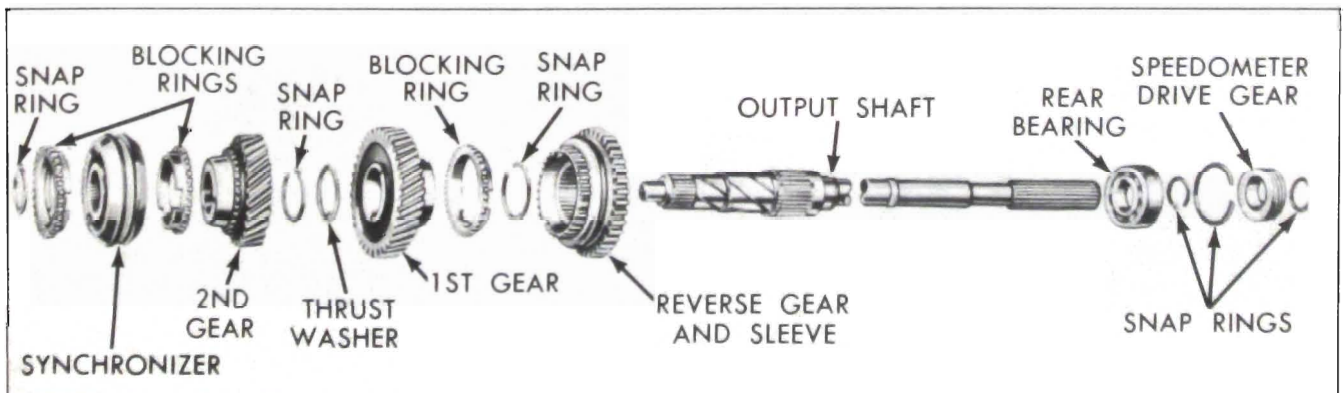


Figure 4-19—Mainshaft Exploded

4-12 3-SPEED MANUAL TRANSMISSION

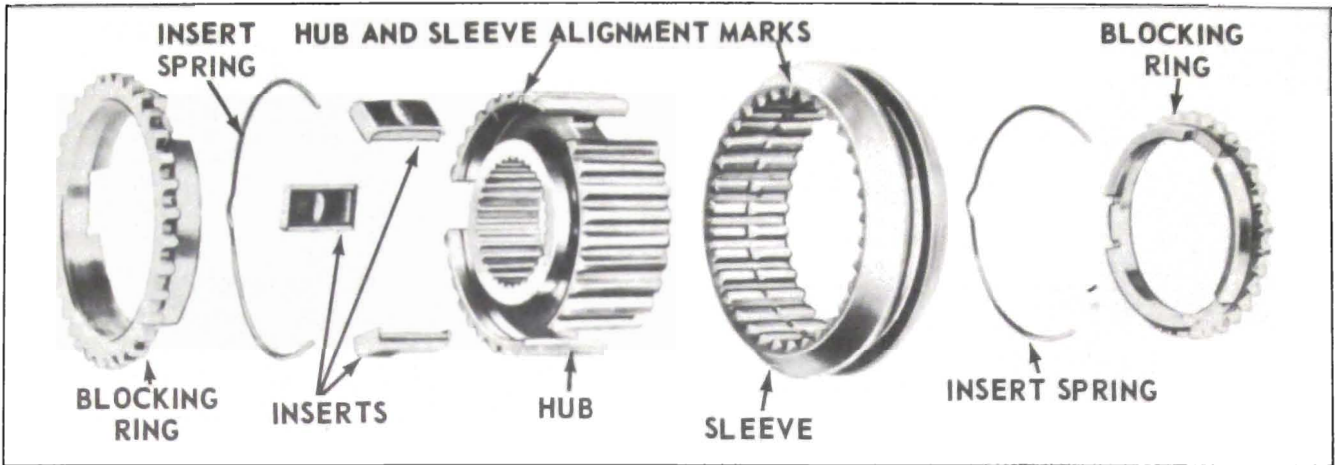


Figure 4-20—Exploded View of 2nd - 3rd Synchronizer

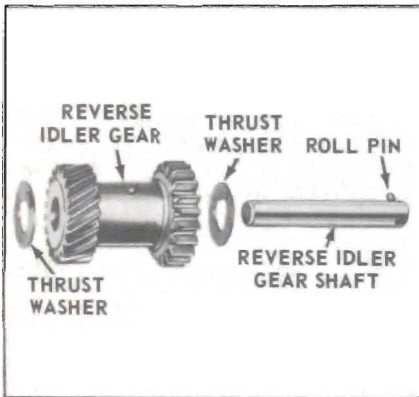


Figure 4-21—Exploded View of Reverse Idler Gear

4-10 ASSEMBLY OF TRANSMISSION

1. Install reverse idler gear, with a thrust washer on each end in case. See Figure 4-21. Make

sure that roll pin is seated in slot in back face of case.

2. Assemble the countergear, dummy shaft, bearings, thrust washers, and place in bottom of case. The countergear will remain in the bottom of the case until the main and input shafts have been installed. See Figure 4-22.

3. If main drive gear bearing was removed replace as follows:

a. Press bearing onto main drive gear (snap ring groove to front). See Figure 4-23. Be certain bearing fully seats against shoulder on gear.

4. Coat bore of main drive gear with a thin film of grease.

NOTE: A thick film of grease will plug lubricant holes and pre-

vent lubrication of bearings. Install the 15 needle bearings in bore.

5. Install main drive gear and bearing through top of case into bore in front of case. Install large snap ring on bearing.

6. Position mainshaft assembly in case. See Figure 4-24.

7. Install 2nd and 3rd speed shift fork on 2nd and 3rd speed synchronizer.

8. Place a detent plug spring and detent plug in case.

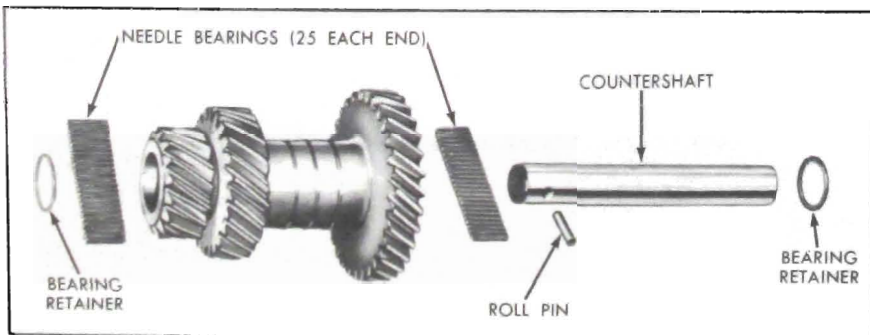


Figure 4-22—Exploded View of Countergear

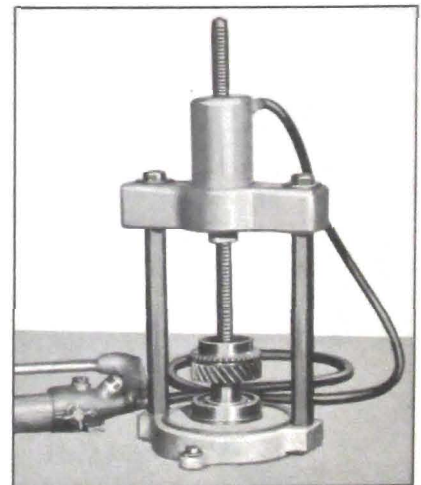


Figure 4-23—Installing Main Drive Gear Bearing

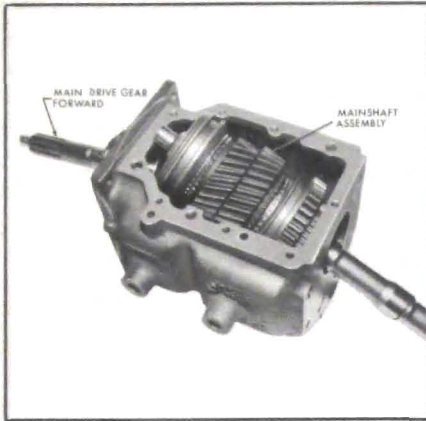


Figure 4-24—Positioning Mainshaft in Case

9. Place 2nd and 3rd speed synchronizer in 2nd speed position (toward rear of case).

10. Align shift fork and install 2nd and 3rd speed shift rail.

NOTE: It will be necessary to depress detent plug to install rail in the bore. Move rail in until detent plug engages forward notch.

11. Secure shift fork to shift rail with set screw.

12. Move synchronizer to neutral position.

13. Install interlock plug in case. If 2nd and 3rd speed shift rail is in neutral position, top of interlock will be slightly lower than surface of 1st and reverse shift rail bore.

14. Move 1st and reverse synchronizer forward and place 1st and reverse shift fork in groove of synchronizer.

15. Align fork and install 1st and reverse shift rail. Move rail in until center notch is aligned with detent bore.

16. Install remaining detent plug and spring. Secure spring with slotted head set screw. Turn

screw in until head is flush with case.

17. Secure shift fork to shift rail with set screw torque 10-18 lbs. ft.

18. Install a new shift rail expansion plug in front of case.

19. While holding main drive gear and blocking ring in position, move mainshaft forward to seat the mainshaft pilot in roller bearings of input shaft.

20. Tap input shaft bearing into place in case while holding mainshaft to prevent roller bearings from dropping out.

21. Install front bearing retainer, and new gasket, making sure the oil return slot is toward bottom of case. Torque attaching bolts to 19-25 lbs. ft.

NOTE: If front bearing retainer seal was removed proceed as follows:

a. Center new seal in opening.

b. Place a suitable size socket (approximately 1-1/4") on the seal and using a soft hammer tap seal into place. (With front bearing retainer removed.)

22. Install large snap ring on rear bearing.

23. Position bearing on output shaft with snap ring toward rear of shaft.

24. Thread Tool J-21774-2 all way into J-21774-1 and place tools on output shaft next to bearing.

25. Install speedometer driven gear snap ring on output shaft.

26. Back Tool J-21774-2, out of J-21774-1, using Handle J-8614-1 until bearing is positioned correctly on output shaft.

27. Remove speedometer driven gear snap ring and tools.

28. Place speedometer drive gear locking ball in detent on output shaft and slide speedometer drive gear into place. Secure gear with snap ring.

29. Using a hook or your hand, lift countergear from bottom of case, and align it and thrust washers with the bore in case.

30. Working from rear of case, push dummy shaft out of countergear with countershaft. Before countershaft is completely inserted, make sure that locking pin hole in shaft will line up with locking pin hole in case.

31. Drive shaft into place and insert locking pin.

32. Coat new extension housing gasket with sealer and install on case.

33. Dip threads of extension housing bolts in sealer.

34. Install extension housing. Torque bolts to 42-50 lbs. ft.

35. Install filler and drain plugs in case, making sure magnetic plug is installed in bottom of case. Torque bolts to 20-30 lbs. ft.

36. Place transmission in gear and put lubricant over entire gear train while rotating input shaft.

37. Coat new cover gasket with sealer and install on case.

38. Install cover. Torque bolts to 14-19 lbs. ft.

4-14 3-SPEED MANUAL TRANSMISSION**4-11 TROUBLE DIAGNOSIS**

COMPLAINT	PROBABLE CAUSE
NOISY IN FORWARD SPEEDS	<p>Low lubricant level.</p> <p>Incorrect lubricant.</p> <p>Transmission misaligned or loose.</p> <p>Gear relative to pertinent speed involved worn or damaged.</p> <p>Main drive gear bearing worn or damaged.</p> <p>Mainshaft bearing worn or damaged.</p> <p>Counter gear or bearings worn or damaged.</p> <p>Main drive gear worn or damaged.</p> <p>Synchronizers worn or damaged.</p>
NOISY IN REVERSE	<p>Reverse idler or shaft, worn or damaged.</p> <p>Reverse sliding gear worn or broken.</p>
HARD SHIFTING	<p>Clutch improperly adjusted.</p> <p>Shift linkage out of adjustment.</p> <p>Bent, damaged, or loose shift linkage.</p> <p>Shift levers, shafts, or forks worn.</p> <p>Incorrect lubricant.</p> <p>Synchronizers worn or broken.</p>
JUMPING OUT OF GEAR	<p>Shift linkage out of adjustment, worn or loose.</p> <p>Partial engagement of gear.</p> <p>Transmission misaligned or loose.</p> <p>Bent or worn shift fork, lever and/or shaft.</p> <p>Worn pilot bearing.</p> <p>End play in input shaft (bearing retainer loose or broken, loose or worn bearings on input and output shafts).</p> <p>Detent springs weak.</p> <p>Detent notches worn.</p> <p>Worn clutch teeth on main drive gear and/or worn clutch teeth on synchronizer sleeve.</p> <p>Worn or broken synchronizer.</p> <p>Bent output shaft.</p>

COMPLAINT	PROBABLE CAUSE
STICKING IN GEAR	<p>Clutch not releasing fully.</p> <p>Low lubricant level.</p> <p>Incorrect lubrication.</p> <p>Corroded transmission levers (shaft).</p> <p>Defective (tight) input shaft pilot bearing.</p> <p>Stuck detent plug.</p> <p>Frozen synchronizing blocking ring on input shaft gear cone.</p> <p>Burred or battered teeth on synchronizer sleeve and/or main drive gear.</p>
FORWARD GEARS CLASH	<p>Clutch not releasing fully.</p> <p>Weak or broken detent springs in the synchronizer assembly.</p> <p>Worn blocking rings and/or cone surfaces.</p> <p>Broken blocking rings.</p> <p>Excessive rock of synchronizer assembly on mainshaft.</p> <p>Excessive mainshaft end play.</p>
GEARS SPINNING WHEN SHIFTING INTO GEAR FROM NEUTRAL	<p>Clutch not fully releasing.</p> <p>Binding main drive gear pilot bearing.</p> <p>Synchronizers not functioning.</p>
REVERSE GEAR CLASH	<p>Allow approximately three - four seconds after the clutch pedal has been depressed before shifting into reverse gear.</p> <p>If gear clash continues after allowing proper time for the clutch plate to stop, check the clutch adjustments to make sure that they are within specifications.</p> <p>Make sure that the engine idle speed is set to specifications.</p> <p>Gear clash can also be caused by the following:</p> <ul style="list-style-type: none"> Dragging clutch plate. Distorted clutch plate. Tight or frozen main drive gear bearing.
SCORED OR BROKEN GEAR TEETH	<p>Insufficient lubricant.</p> <p>Failure of the car operator to fully engage the gears on every shift before engaging the clutch and applying engine power.</p>

GROUP 4A

TRANSMISSION SHIFT LINKAGE ADJUSTMENTS

GRAN SPORT

SECTIONS IN GROUP 4A

Section	Subject	Page	Section	Subject	Page
4A-A	Super Turbine 300 Transmission Shift Linkage Adjustment - Gran Sport Only	4A-1	4A-C	4-Speed Manual Transmission Shift Linkage Adjustment - Special-Skylark-Gran Sport	4A-7
4A-B	3-Speed Manual Transmission Shift Linkage Adjustment - Gran Sport Only	4A-4			

4A-A SUPER TURBINE 300 TRANSMISSION SHIFT LINKAGE ADJUSTMENT (CONSOLE LINKAGE)

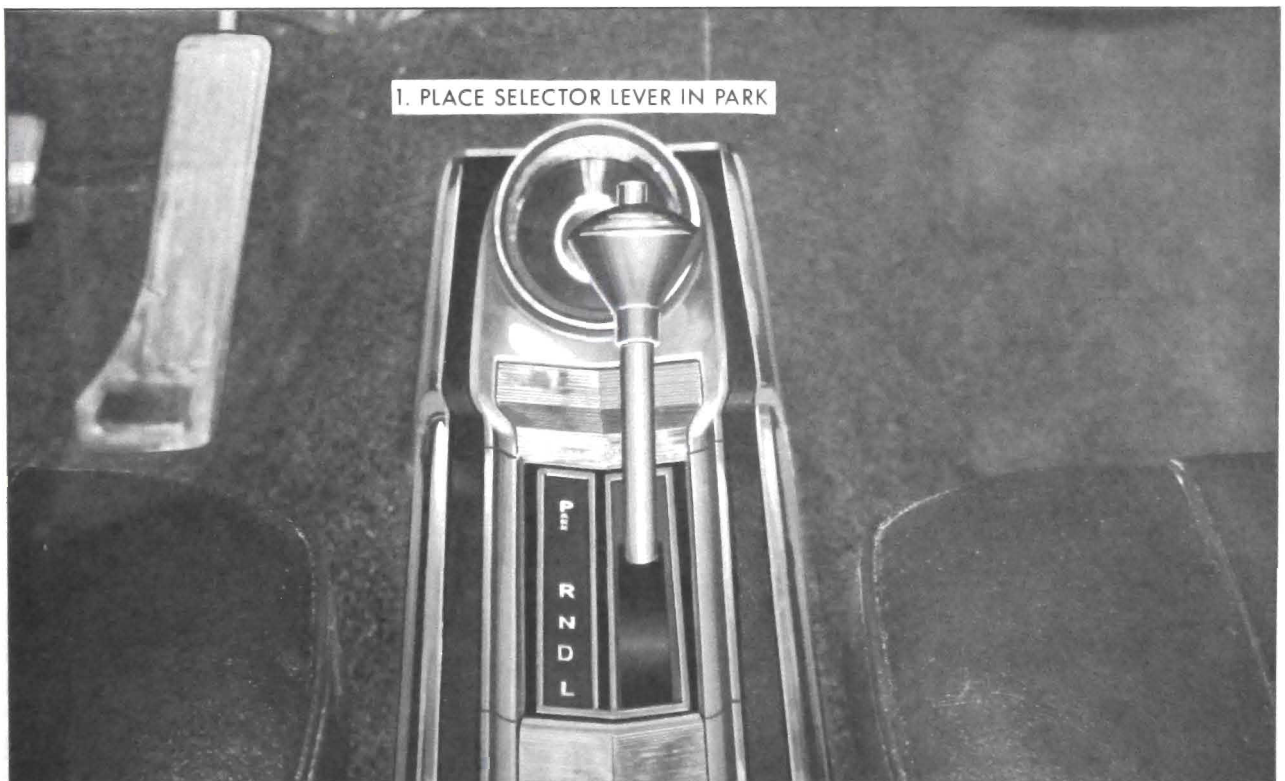


Figure 4A-1

4A-2

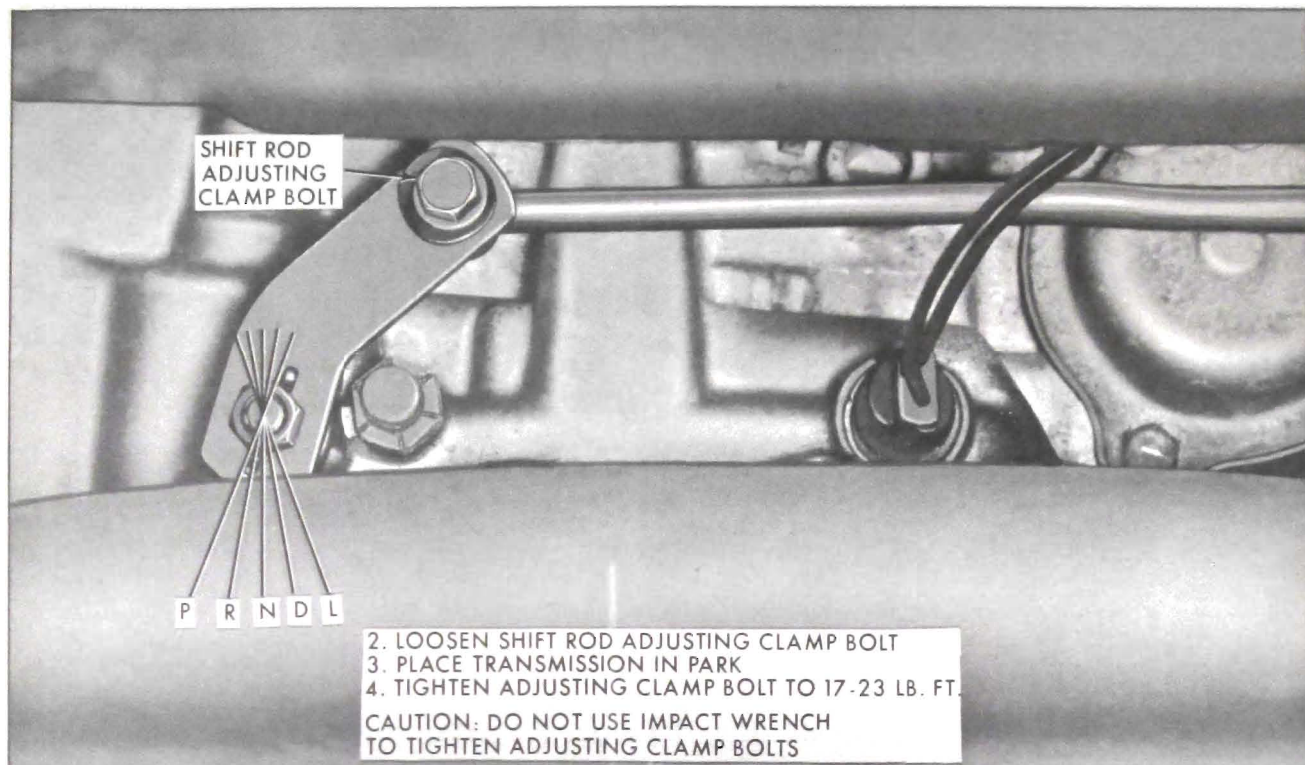


Figure 4A-2

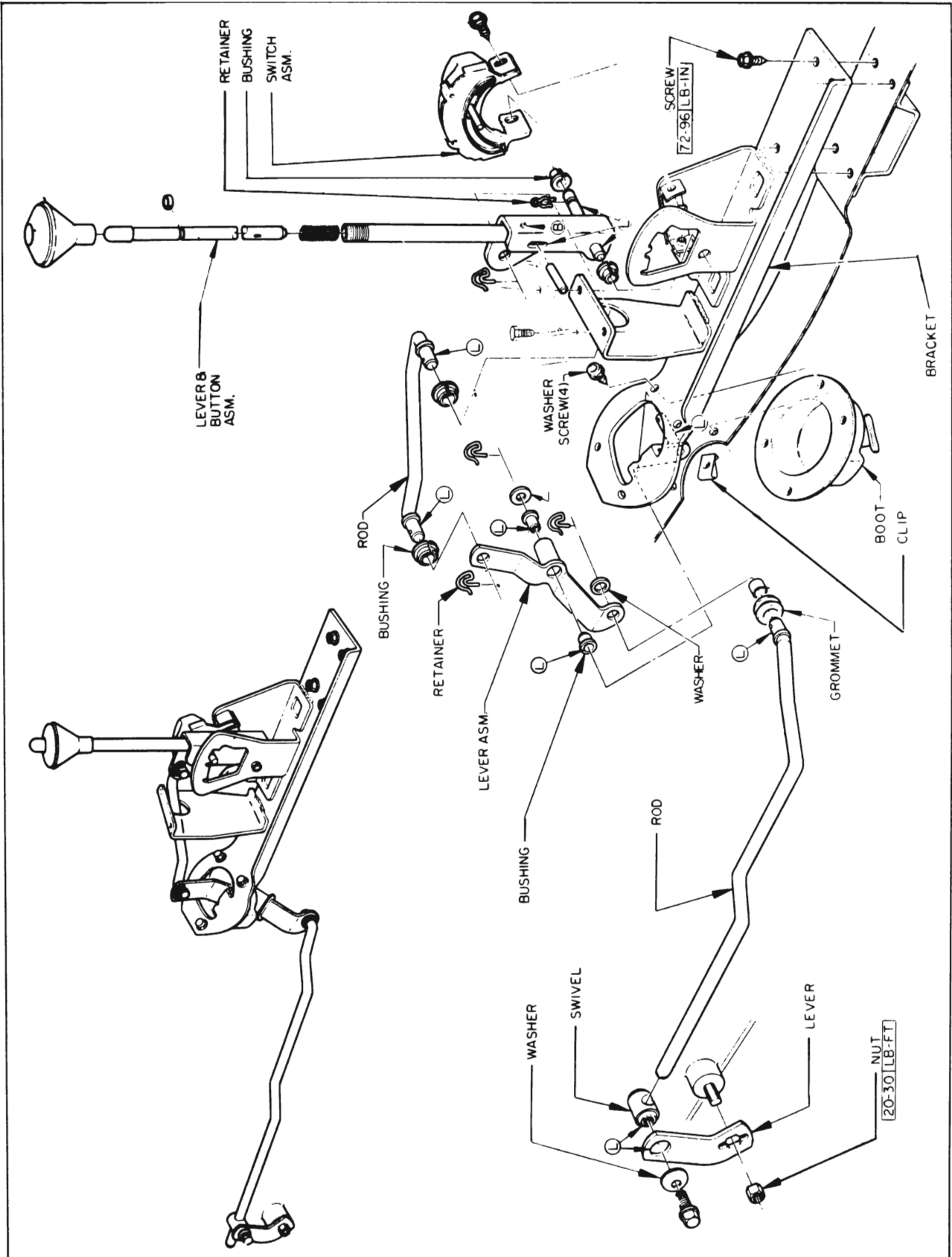


Figure 4A-3

4A-B 3-SPEED MANUAL TRANSMISSION SHIFT LINKAGE ADJUSTMENT

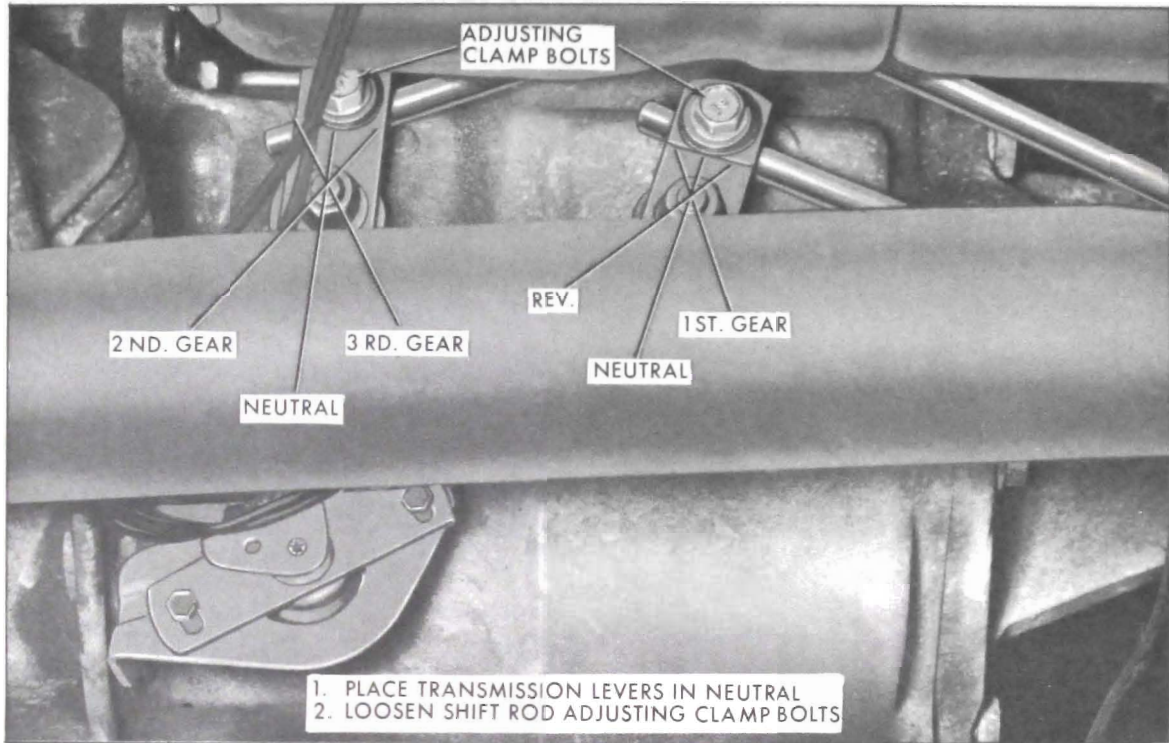


Figure 4A-4

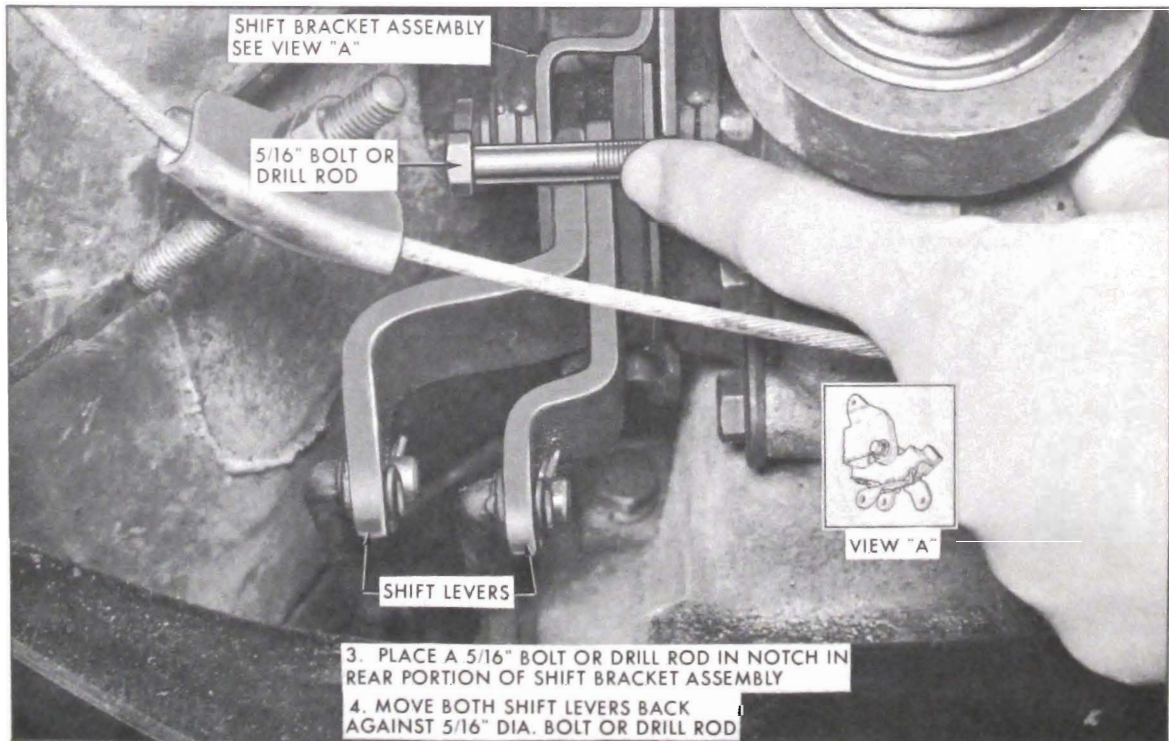


Figure 4A-5

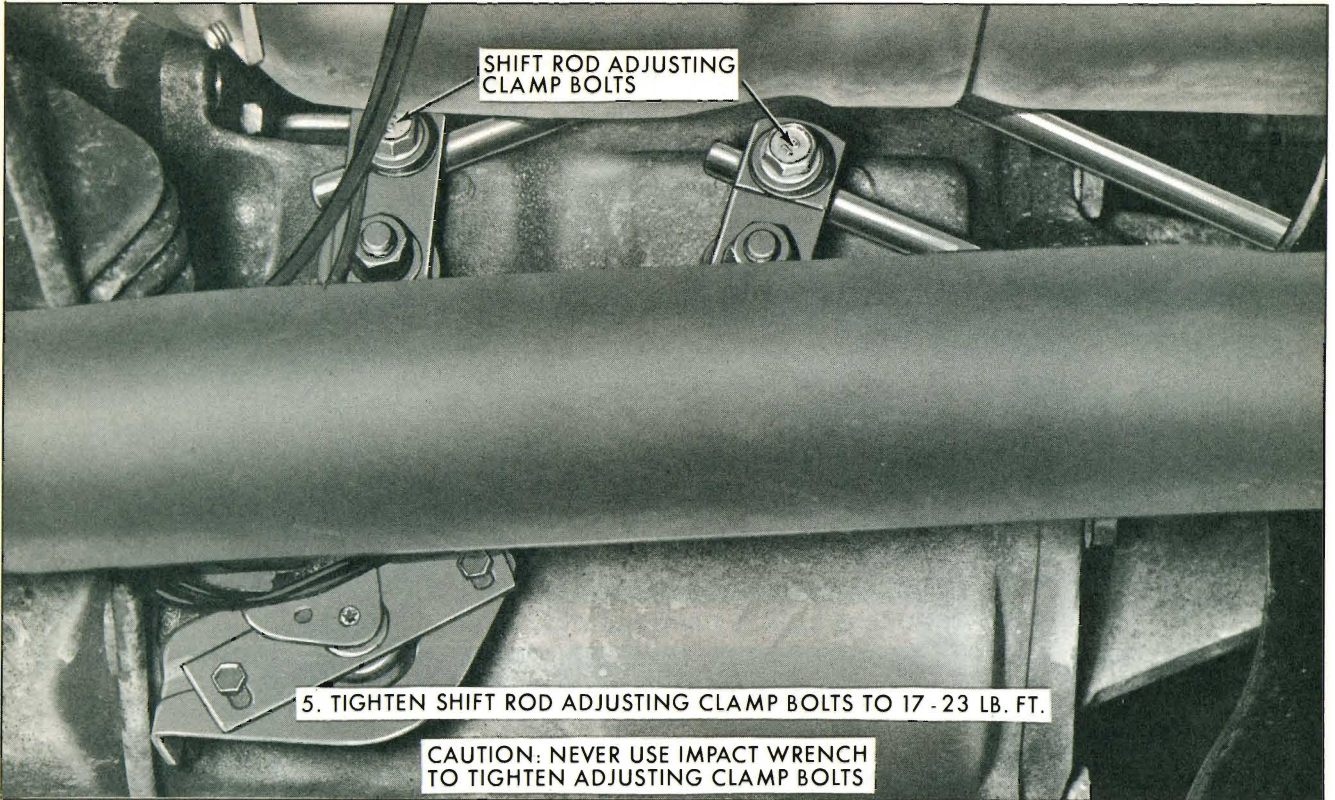


Figure 4A-6

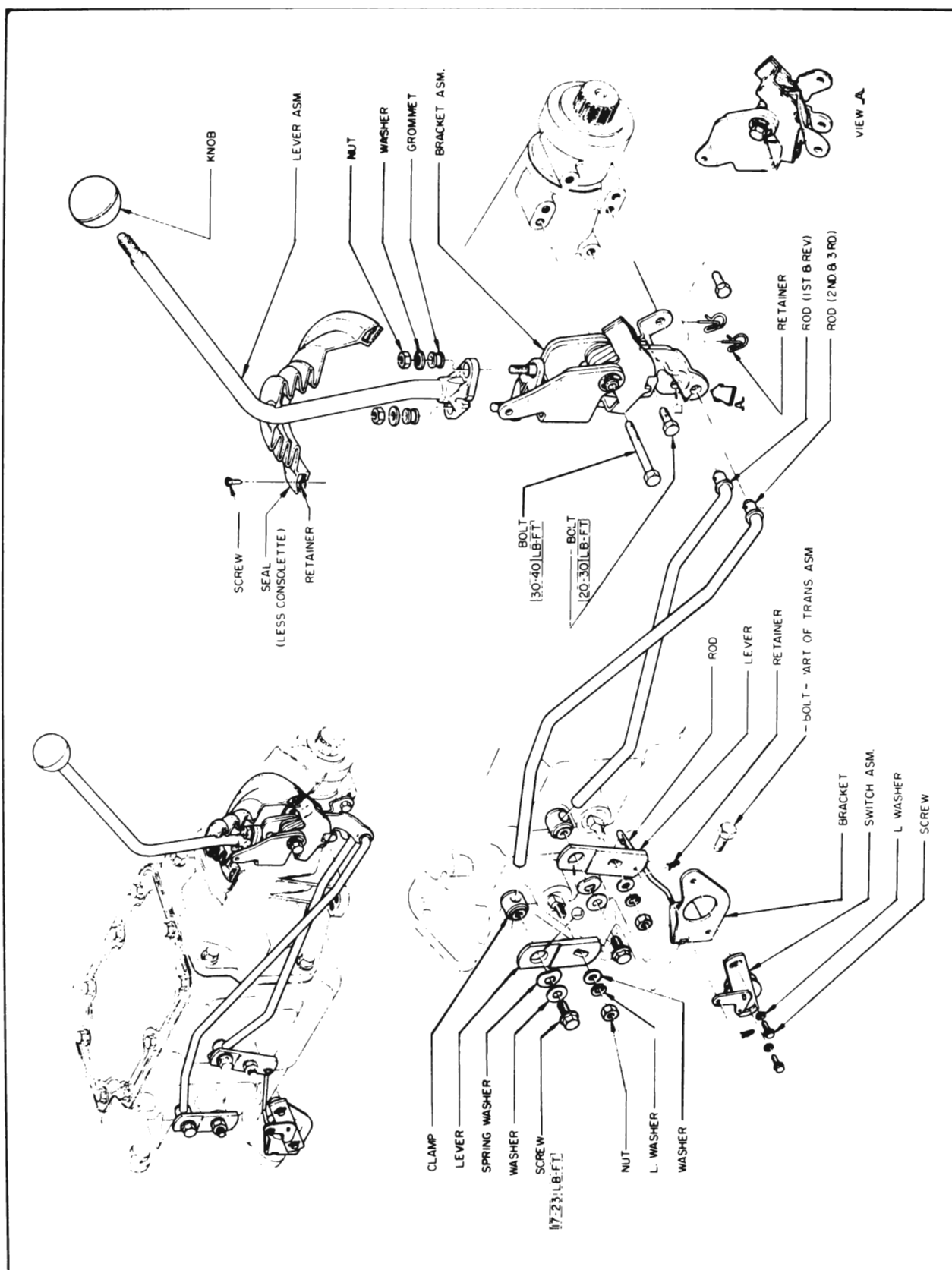


Figure 4A-7

4A-C 4-SPEED MANUAL TRANSMISSION SHIFT LINKAGE ADJUSTMENT SPECIAL-SKYLARK-GRAN SPORT

NOTE: This adjustment will also apply to all 1965-1/2 Special and Skylarks equipped with 4-speed transmission.

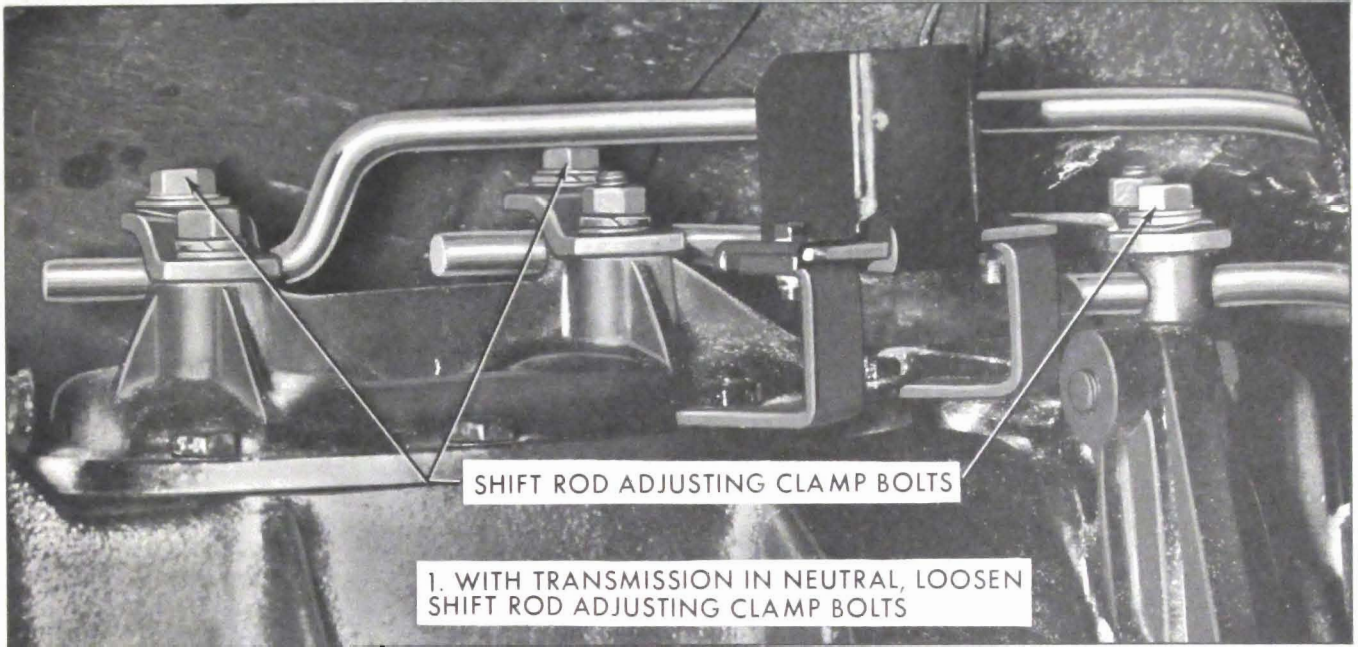


Figure 4A-8

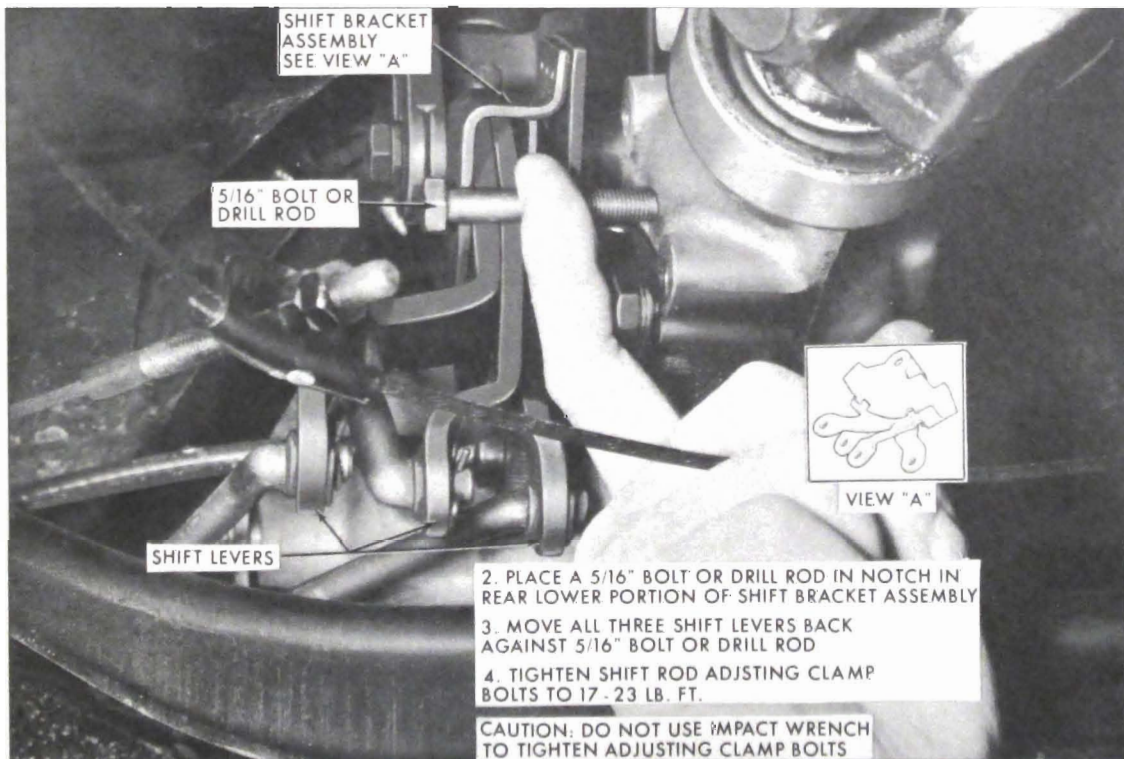


Figure 4A-9

This "T" handle must travel a minimum of 7/16"

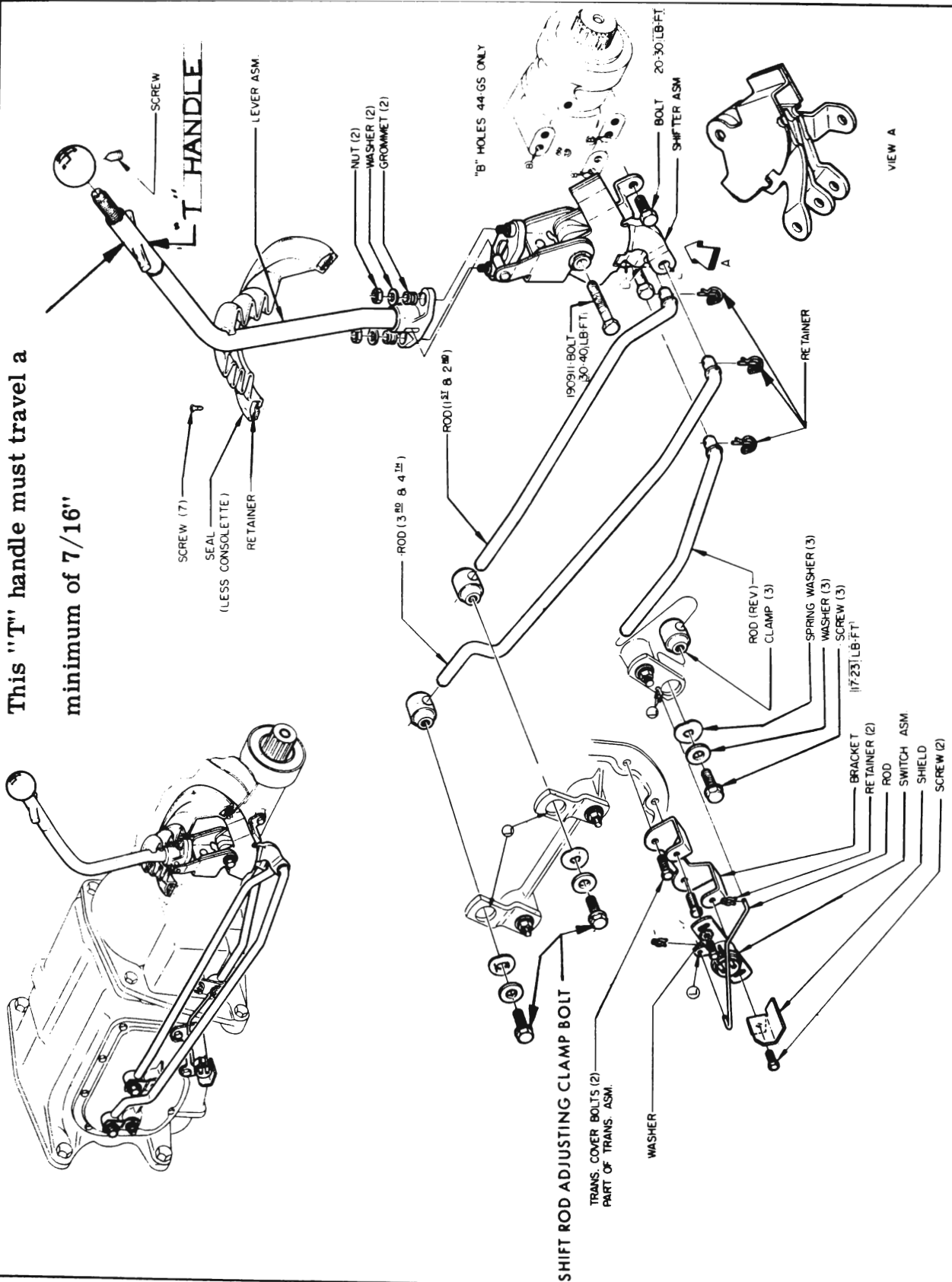


Figure 4A-10