



**Dealer Service
Information
Bulletin**

Attention: Service Manager

Subject: WARNER FOUR SPEED MANUAL TRANSMISSION

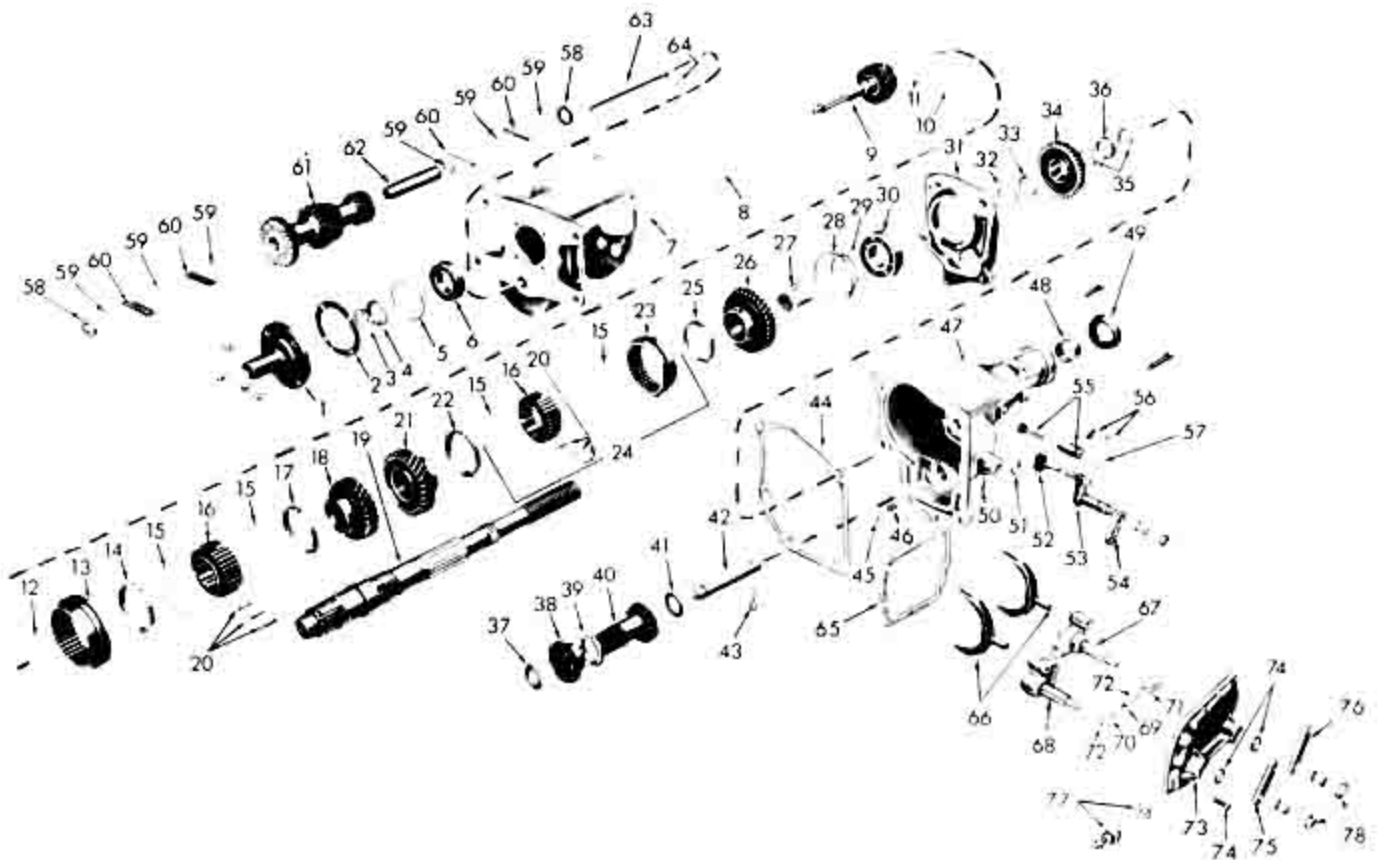
A new Warner four speed transmission has been introduced for use (in place of the Muncie four speed) on LeMans and Firebird models for the remainder of the 1974 production run.

This new transmission has a first gear ratio of 2.43 to 1 and is identified by the code letters "HW" (followed by a series of numbers) stamped on the transmission case face immediately rearward of the side cover.

● **DISASSEMBLY OF TRANSMISSION**

1. Thoroughly clean the exterior of the transmission assembly.

NOTE: Refer to exploded view of this transmission (Figure 1 on reverse side) for aid in disassembly and assembly of the transmission.



- | | | | |
|--|--|--|--|
| 1. Bearing Retainer | 23. First and Second Speed Clutch Sliding Sleeve | 44. Rear Bearing Retainer To Case Extension Gasket | 63. Countershaft |
| 2. Gasket | 24. First and Second Speed Clutch Assembly | 45. Reverse Shifter Shaft Detent Ball | 64. Countershaft Woodruff Key |
| 3. Selective Fit Snap Ring | 25. First Speed Gear Synchronizing Ring | 46. Reverse Shifter Shaft Ball Detent Spring | 65. Gasket |
| 4. Spacer Washer | 26. First Speed Gear | 47. Case Extension | 66. Forward Speed Shift Forks |
| 5. Bearing Snap Ring | 27. First Speed Gear Sleeve | 48. Extension Bushing | 67. First and Second Speed Gear Shifter Shaft and Detent Plate |
| 6. Main Drive Gear Bearing | 28. Rear Bearing Snap Ring | 49. Rear Oil Seal | 68. Third and Fourth Speed Gear Shifter Shaft and Detent Plate |
| 7. Transmission Case | 29. Thrust Washer | 50. Reverse Shifter Shaft Lock Pin | 69. Poppet Spring |
| 8. Rear Bearing Retainer Gasket | 30. Rear Bearing | 51. Reverse Shifter Shaft Lip Seal | 70. Interlock Pin |
| 9. Main Drive Gear | 31. Rear Bearing Retainer | 52. Reverse Shift Fork | 71. Interlock Sleeve |
| 10. Bearing Rollers (16) | 32. Washer | 53. Reverse Shifter Shaft and Detent Plate | 72. Detent Balls |
| 11. Washer | 33. Selective Fit Snap Ring | 54. Reverse Shifter Lever and Fitting | 73. Transmission Side Cover |
| 12. Snap Ring | 34. Reverse Gear | 55. Speedometer Driven Gear and Fitting | 74. Lip Seals |
| 13. Third and Fourth Speed Clutch Sliding Sleeve | 35. Snap Ring | 56. Retainer and Bolt | 75. Third and Fourth Speed Shifter Lever |
| 14. Fourth Speed Gear Synchronizing Ring | 36. Speedometer Drive Gear | 57. "O" Ring Seal | 76. First and Second Speed Shifter Lever |
| 15. Clutch Key Spring | 37. Reverse Idler Front Thrust Washer (Flat) | 58. Washer (Tanged) | 77. T.C.S. Switch and Gasket |
| 16. Clutch Hub | 38. Reverse Idler Gear (Front) | 59. Spacer (.050") | 78. Lever Attaching Nuts |
| 17. Third Speed Gear Synchronizing Ring | 39. Snap Ring | 60. Bearing Rollers (28) | |
| 18. Third Speed Gear | 40. Reverse Idler Gear (Rear) | 61. Countergear | |
| 19. Mainshaft | 41. Thrust Washer (Tanged) | 62. Countergear Roller Spacer | |
| 20. Clutch Keys (3) | 42. Reverse Idler Shaft | | |
| 21. Second Speed Gear Synchronizing Ring | 43. Reverse Idler Shaft Lock Pin and Welch Plug | | |

Fig. 1 Warner Four Speed Transmission — Exploded View

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2. Shift transmission into second gear, remove drain plug from lower right of case and drain lubricant from transmission.
3. Remove side cover attaching bolts (9) and slide side cover assembly (including both shift forks) away from transmission case. Remove and discard side cover gasket.
4. Remove speedometer driven gear from the case extension.
5. Remove reverse shifter shaft lock pin from its case extension boss and pull shifter shaft outward to disengage reverse shift fork from the reverse sliding gear (Figure 2).

6. Remove case extension attaching bolts (5), tap case extension rearward with a soft hammer and slide extension to rear until reverse idler shaft is clear of reverse idler gears. Then, rotate extension to the left to free reverse shift fork from collar of reverse sliding gear and remove the case extension. Remove and discard gasket.
7. Remove speedo gear outer snap ring (Figure 3), slide speedometer gear from mainshaft and remove the speedo gear inner snap ring.
8. Remove reverse sliding gear from mainshaft and slide rear portion of reverse idler gear from the rear bearing retainer (Figure 4).

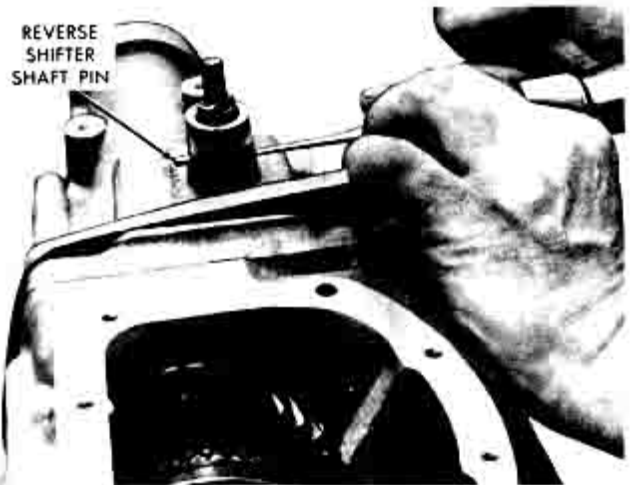


Fig. 2. Removing Reverse Shifter Shaft Lock Pin

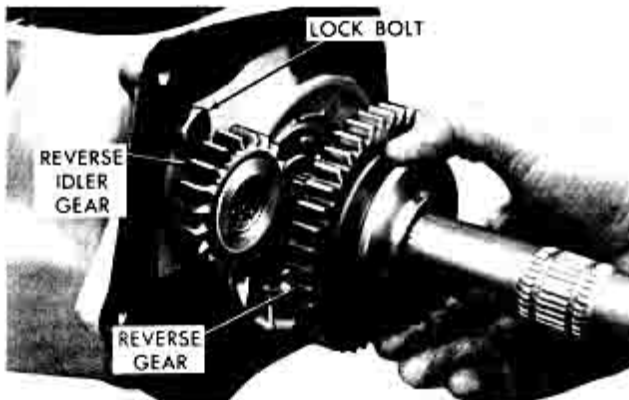


Fig. 4. Removing Reverse Gear

9. Remove lock bolt from rear bearing retainer (Figure 4), drive locating pin (adjacent to right upper bolt hole in bearing retainer) completely through bearing retainer and into transmission case and rotate rear bearing retainer counterclockwise about 45 degrees so as to provide access to rear end of the countershaft.
10. Using Loader J 24658 from front of case, tap countershaft and woodruff key out rear of transmission case and allow countergear assembly to rest in bottom of the transmission case (Figure 5).

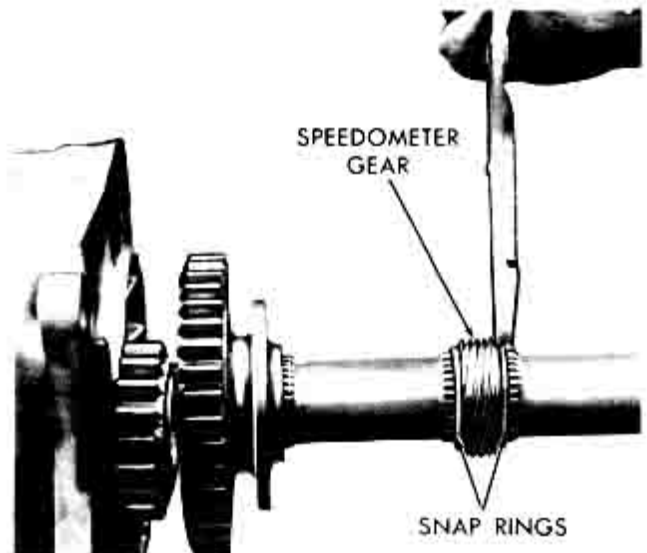


Fig. 3. Speedometer Gear and Snap Rings



Fig. 5. Removing Countershaft

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11. Tap rear bearing retainer rearward with a soft hammer and remove mainshaft assembly from rear of the transmission case. Remove bearing rollers (16) and flat washer from mainshaft, bore of main drive gear or inside of case.
12. Remove front portion of reverse idler gear and steel thrust washer from inside of the transmission case.
13. Remove fourth speed synchronizing ring from main drive gear (or mainshaft) and remove drive gear bearing retainer bolts (4), bearing retainer and gasket from the transmission case. Discard gasket.
14. Remove drive gear-to-bearing snap ring and flat washer from main drive gear and press drive gear from its bearing and into the transmission case (Figure 6).
15. From inside of case, tap out main drive gear bearing, remove countergear assembly and its two (2) tanged thrust washers and check inside of case for bearing rollers and/or other loose components. Drive locating pin into interior of case and remove.

● DISASSEMBLY OF MAINSHAFT

1. From rear end of mainshaft, spread bearing retainer snap ring with pliers (Figure 7) and tap or slide bearing retainer from rear bearing and the mainshaft.
2. Remove rear bearing-to-mainshaft snap ring and flat washer from the mainshaft (Figure 8).

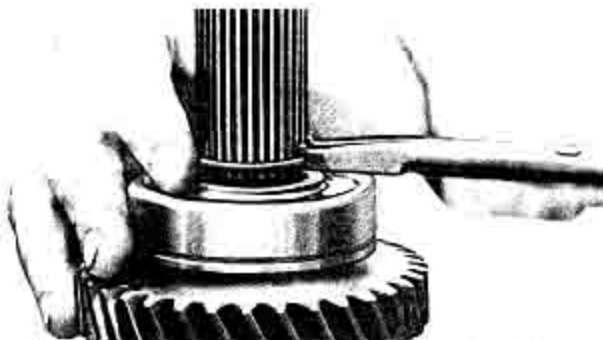


Fig. 8 Removing or Installing Rear Bearing Snap Ring

3. From other end of mainshaft, remove 3-4 synchronizer snap ring (Figure 9) and slide 3-4 synchronizer assembly and third speed gear from the mainshaft.



Fig. 9 Removing or Installing 3-4 Synchronizer Snap Ring

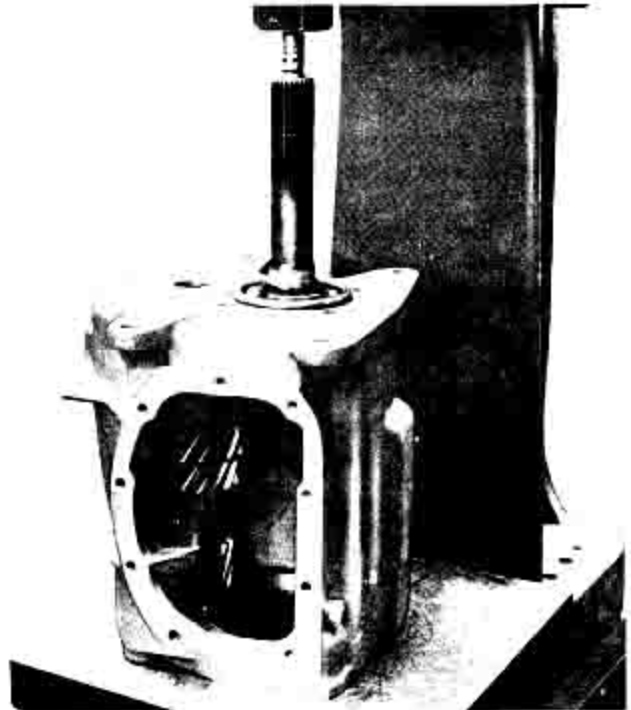


Fig. 6 Removing Main Drive Gear

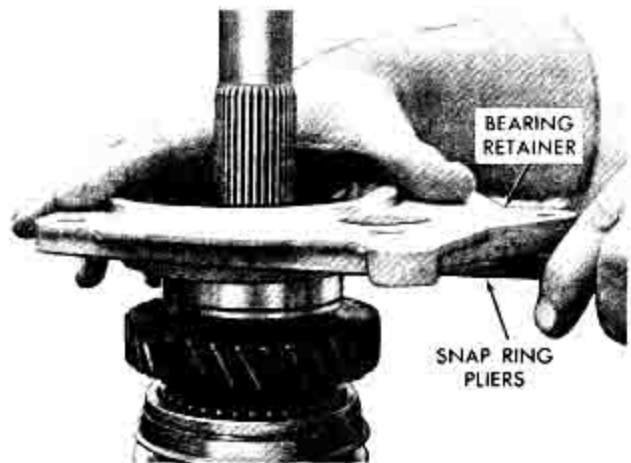


Fig. 7 Removing or Installing Rear Bearing Retainer

4. Supporting forward face of second speed gear, press on rear of mainshaft to remove rear bearing, large thrust washer, first speed gear and its bushing, 1-2 synchronizer assembly and the second speed gear.

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● DISASSEMBLY OF COUNTERGEAR

To maintain position of 112 bearing rollers in counter gear while it is lowered to bottom of case or when removed from transmission case, use Loader J 24658.

To disassemble counter gear, remove Loader J 24658 and 112 bearing rollers, six (6) spacers and a tubular spacer will drop out of the counter gear bore (Figure 10).

● DISASSEMBLY OF SIDE COVER

While disassembly of side cover assembly is covered here, transmission need not be removed from vehicle to perform this operation. To remove side cover assembly from vehicle, shift into second gear, drain transmission, disconnect shift linkage including shifter levers from transmission, thoroughly clean side cover and adjacent areas, remove side cover attaching bolts (9) and pull side cover assembly from the transmission.

1. Remove shift forks from shifter shafts. Forks are identical and, therefore, interchangeable.
2. Slowly push shifter shafts into cover, allowing detent balls (2) to fall free and then remove both shifter shafts (Figure 11). Note that 3-4 shifter shaft has a detent cavity on its shaft.
3. Remove interlock sleeve, poppet spring and lock pin.
4. If found to be leaking, pry out shifter shaft lip seals (2) from side cover and discard them.

● REPLACEMENT OF REVERSE IDLER SHAFT IN CASE EXTENSION

1. Remove tanged thrust washer from idler shaft in case extension.
2. Place small punch into hole in reverse idler shaft boss and drive welch plug and roll pin into idler shaft until shaft can be pulled from the case extension (Figure 12).
3. Insert new reverse idler shaft into case extension until hole in idler shaft lines up with hole in case extension boss.

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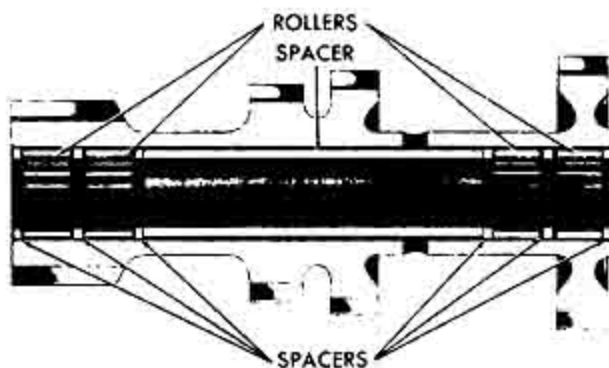


Fig. 10 Cross Section of Counter gear

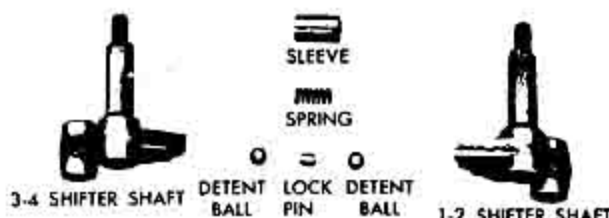


Fig. 11 Side Cover Assembly - Exploded View

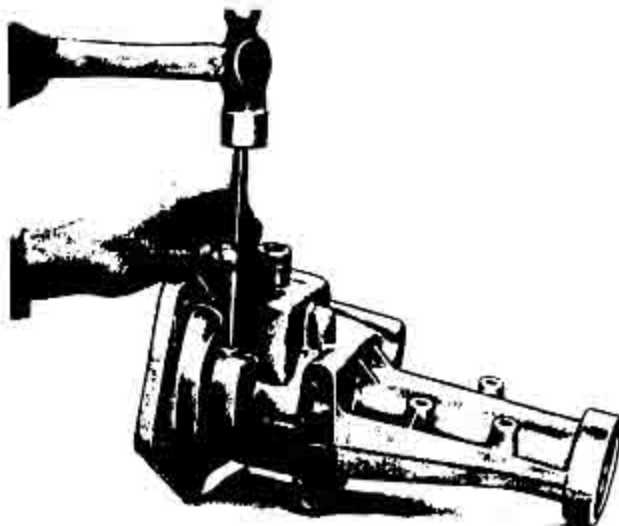


Fig. 12 Removing Reverse Idler Shaft Roll Pin

4. Insert new roll pin in extension boss opening, drive roll pin in until reverse idler shaft is securely locked in place and then install new welch plug (with sealer) into boss opening.

● REPLACEMENT OF REVERSE SHIFTER SHAFT AND SEAL

1. With case extension removed from transmission, reverse shifter shaft lock pin has been disengaged from its shifter shaft (see ● DISASSEMBLY OF TRANSMISSION).
2. Remove reverse shift fork, tap reverse shifter shaft slowly into case extension, allowing ball detent to drop into extension and remove shifter shaft, ball detent and ball detent spring from the extension. Remove O-ring seal from shifter shaft and discard.
3. Insert ball detent spring into spring hole in extension and, with new O-ring seal on shifter shaft, start reverse shifter shaft into its opening in the case extension.
4. Place ball detent on spring and, while holding ball down, push shifter shaft into place and rotate until ball detent snaps into place in detent on shaft detent plate. Then, push shaft into extension as far as possible.
5. Install reverse shift fork into its shifter shaft opening.

CAUTION: Do not drive shifter shaft lock pin into place until case extension is re-installed to transmission case.

● REPLACEMENT OF CASE EXTENSION OIL SEAL AND BUSHING

1. Pry oil seal from case extension and drive bushing into extension by using Tool J 21465-17 with Handle J 8092 (Figure 13). Discard oil seal and bushing.

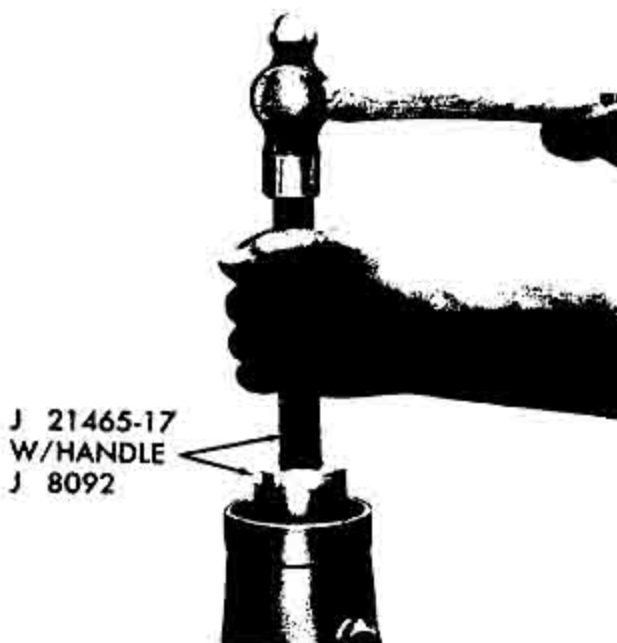


Fig. 13 Removing or Installing Case Extension Bushing



Fig. 14 Installing Case Extension Oil Seal

2. Using same tools, press new bushing into rear of extension, coat I.D. of bushing and new oil seal with transmission lubricant and install oil seal into extension, using Installer J 21359 (Figure 14).

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● REPLACEMENT OF DRIVE GEAR BEARING RETAINER OIL SEAL

If oil seal in main drive gear bearing retainer needs replacement, pry out oil seal with a screwdriver and replace with new oil seal by using a flat plate and tap until seal is seated in its bore (Figure 15).

CAUTION: Lip of oil seal must face rear of bearing retainer.

● OVERHAUL OF SYNCHRONIZER ASSEMBLY

The synchronizing rings (2), clutch keys (3) and clutch key springs (2) are serviced separately and may be replaced if they are broken or excessively worn. However, the synchronizer clutch hub and sliding sleeve of a synchronizer assembly are selected parts and are serviced only as an assembly (Figure 16).

1. Before disassembly of synchronizer assembly, mark clutch hub and sliding sleeve so as to ensure that they are reinstalled in their original position.
2. With synchronizing rings removed, press clutch hub from sliding sleeve, clutch keys should fall free and clutch key springs are easily removed from the clutch hub.
3. To reassemble, place clutch key springs in position (one on each side of clutch hub) so that all three clutch keys are engaged by both springs. Holding keys in position and aligning marks made previously (Step 1), slide the sliding sleeve onto the clutch hub.
4. Repeat this same procedure for other synchronizer assembly.

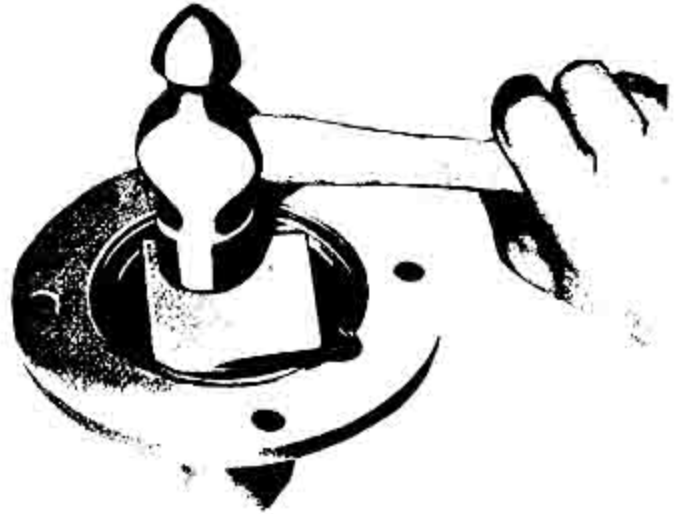


Fig. 15 Installing Bearing Retainer Oil Seal

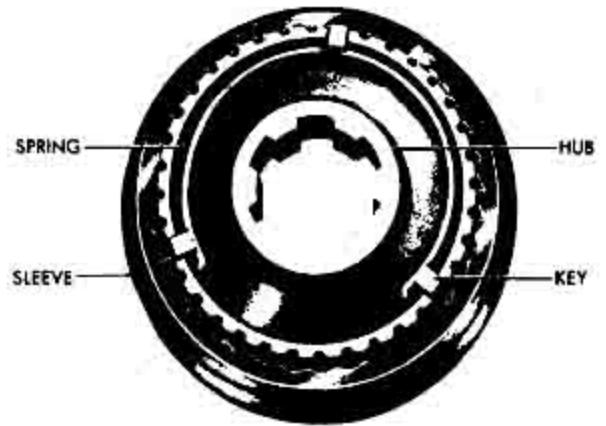


Fig. 16 Synchronizer Assembly (Less Synchronizing Rings)

● INSPECTION OF TRANSMISSION CASE

1. Remove filler plug from right side of transmission case.
2. Wash transmission case thoroughly inside and out with suitable cleaning solvent, then inspect bearing bores in case for wear or scoring and examine case for cracks.
3. Check front, side and rear faces of transmission case for burrs and, if present, dress them off with a fine mill file.

● INSPECTION OF BEARING ROLLERS AND SPACERS

Closely inspect front drive gear and countergear bearing rollers and replace if they show excessive wear. At same time, inspect countershaft and reverse idler shaft for scoring or excessive wear and replace if necessary. Also, replace all worn spacers.

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● INSPECTION OF GEARS

1. Inspect all gears for excessive wear, cracked or clipped teeth and check their bores for scoring. Replace as needed.
2. Inspect reverse idler gear bushing and, if excessively worn or damaged, replace reverse idler gear assembly as this bushing is not serviced.
3. Check both synchronizer sliding sleeves to see that they slide freely on their respective clutch hubs.

● INSPECTION OF FRONT AND REAR BEARINGS

1. Wash both bearings in suitable cleaning solvent.
2. Blow out bearings with compressed air while turning them slowly by hand.
CAUTION: Do not spin bearings with compressed air. Spinning can damage race and balls.
3. When bearings are clean and dry, lightly lubricate them with clean engine oil and check them for roughness. Roughness may be determined by slowly turning outer races by hand.

CAUTION: Do not check for roughness if bearings are not lubricated.

● ASSEMBLY OF SIDE COVER

NOTE: Always use new gaskets, oil seals and snap rings when reassembling transmission.

1. If removed, install new lip seals into shifter shaft openings in the side cover.
2. Insert 3-4 shifter shaft (contains a detent cavity on its shaft) into forward bore of side cover, place it in neutral and then install detent ball, interlock sleeve and poppet spring with its lock pin in position (Figure 11).
3. Insert other detent ball into other end of interlock sleeve and, while depressing ball, insert 1-2 shifter shaft into side cover and place it in second gear position.
4. Install shift forks.

● ASSEMBLY AND INSTALLATION OF COUNTERGEAR

1. Place Loader J 24658 into countergear and slide tubular spacer onto loader and into countergear.
2. Slide spacer on loader and, using heavy grease to retain rollers, insert twenty eight (28) bearing rollers around loader, install second spacer and insert twenty eight (28) more bearing rollers around the loader. Install third spacer (with grease) to hold bearing rollers in position (Figure 10).
3. Repeat this operation at other end of countergear.

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4. Install bronze countergear thrust washers at each end of transmission case, indexing tabs of washers in recessed areas in the case. A film of grease will help hold washers in position.
5. Set countergear assembly into position in transmission case, with thrust washers in place, and start countershaft in through rear of case to align with and to push loading tool out through front of the case. Before completely inserting countershaft, install woodruff key and tap countershaft into case until it is flush with rear face of the case.

● CHECKING COUNTERGEAR END PLAY

Attach dial indicator as shown in Figure 17 and check fore and aft movement of the countergear assembly. End play must not exceed .025". If end play exceeds this amount, new thrust washers must be installed.

● ASSEMBLY OF MAINSHAFT

1. From rear end of mainshaft, install second speed gear with its tapered cone surface facing rearward.
2. With synchronizing rings mated to both sides, install 1-2 synchronizer assembly on mainshaft with tapered area of sliding sleeve facing rearward.
3. Position first speed gear bushing on mainshaft and press onto mainshaft until second speed gear, 1-2 synchronizer assembly and first speed gear bushing bottom against shoulder of the mainshaft (Figure 18).

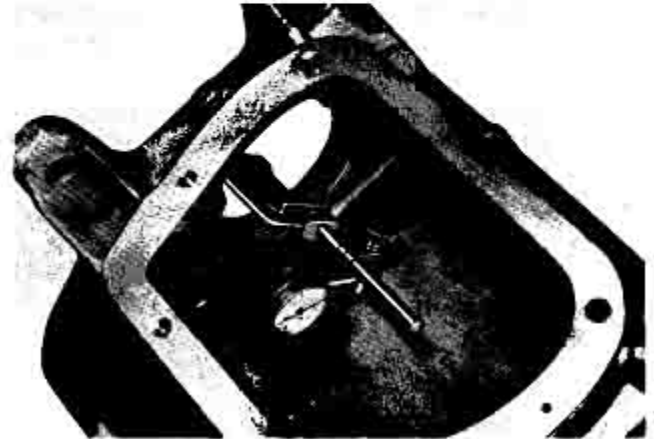


Fig. 17 Checking Countergear End Play

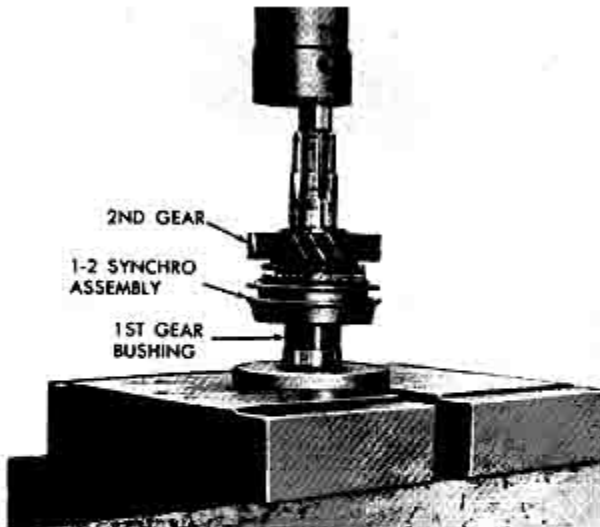


Fig. 18 Installing 2nd Speed Gear, 1-2 Synchronizer Assembly and 1st Speed Gear Bushing

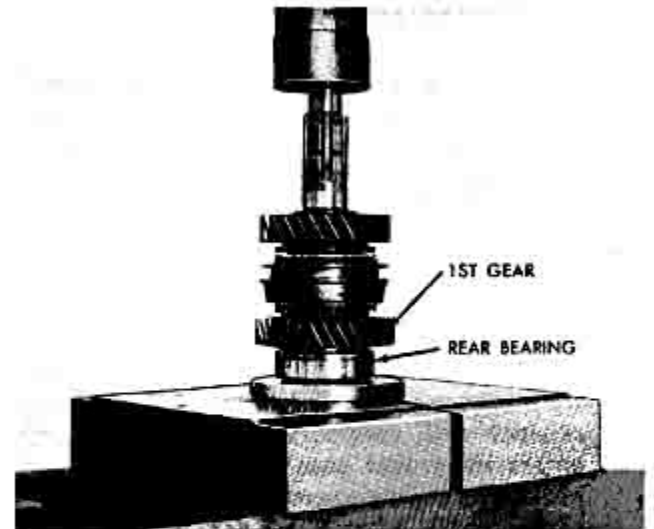


Fig. 19 Installing 1st Speed Gear and Rear Bearing

4. Install first speed gear on mainshaft with tapered cone surface facing front, install large flat washer and press on rear bearing, with its snap ring groove facing front, onto the mainshaft (Figure 19).
5. Install flat washer and new snap ring on mainshaft behind rear bearing (Figure 8).

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NOTE: Snap ring is serviced in selective thicknesses; install thickest snap ring that still fits groove of mainshaft.

6. On front end of mainshaft, install third speed gear with tapered cone surface facing front.
7. With third speed gear synchronizing ring mated to back side, install 3-4 synchronizer assembly on mainshaft with tapered area of sliding sleeve facing front.
8. Install new snap ring in groove of mainshaft to retain 3-4 synchronizer assembly (Figure 9).

NOTE: Snap ring is serviced in selective thicknesses; install thickest snap ring that still fits groove of mainshaft.

9. Install new locating pin in rear bearing retainer (adjacent to right upper bolt hole) and install bearing retainer over rear end of mainshaft, spreading its snap ring so that bearing retainer will drop around the rear bearing (Figure 7).
10. Using heavy grease, install bearing rollers (16) into bore of main drive gear and install flat steel washer in bore to hold rollers in position (Figure 20).
11. Place fourth speed gear synchronizing ring on 3-4 synchronizer assembly (align notches in ring with keys in clutch hub) and install front drive gear onto front of mainshaft.

● ASSEMBLY OF TRANSMISSION

1. Install drain plug in bottom of case and torque to 20 lb. ft.
2. Install steel thrust washer (retain with grease) and front portion of reverse idler gear in transmission case with hub section of gear facing rear.
3. Position new gasket on rear face of transmission case.
4. With synchronizer assemblies in neutral, install mainshaft assembly into transmission case, aligning rear bearing retainer with case so that its locating pin enters its proper case bore. Then, install bearing retainer-to-case lock bolt and torque to 25 lb. ft.
5. Position main drive gear bearing over front end of mainshaft and tap into position in case by using Bearing Installer J 5590 or a hollow shaft. When bearing is seated in front case face, pull drive gear shaft forward, tap on installer again and repeat until bearing bottoms on main drive gear so that flat washer and new snap ring can be installed on main drive gear shaft.
6. Position drive gear bearing retainer and new gasket over main drive gear and bearing, apply sealer to bolts and torque bearing retainer-to-case bolts (4) to 18 lb. ft.



Fig. 20 Installing Bearing Rollers

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7. Insert rear portion of reverse idler gear through opening in bearing retainer and index its splines into front portion of gear in case.
8. Install reverse sliding gear with shift collar rearward on mainshaft and install new speedo gear inner snap ring, slide or tap speedometer gear onto mainshaft and retain with new speedo gear outer snap ring (Figure 3).
9. Position new gasket on rear face of rear bearing retainer and install tanged thrust washer on reverse idler shaft in the case extension.
10. Rotate reverse shifter shaft to bring reverse shift fork as far forward in case extension as possible and, with both synchronizer sleeves in neutral, start case extension forward over mainshaft.
11. Guiding reverse idler gear shaft into reverse idler gears, align reverse shift fork into collar of reverse sliding gear. When shift fork is engaged on collar, push reverse shifter shaft back into position.
12. Rotate reverse shifter shaft forward (clockwise—moving reverse sliding gear rearward) and move case extension forward, using care to align locating pin of bearing retainer to the case extension.
13. Using sealer on bolts, install and torque long case extension-to-case bolts (3) to 40 lb. ft. and short case extension-to-bearing retainer bolts (2) to 25 lb. ft.
14. Install new reverse shifter shaft tapered lock pin.
15. Shift transmission into second gear (front synchro sleeve in neutral position and move rear synchro sleeve fully forward to engage second speed gear synchronizer teeth) and position side cover assembly and new gasket on transmission case while indexing shaft forks into shift collars of both synchronizer sliding sleeves. Install and torque side cover-to-case bolts (9) to 18 lb. ft.
16. Check operation of transmission.
17. Install transmission in vehicle and install two (2) pints of SAE 80 multi-purpose lubricant into filler plug opening on right side of case and one-half (1/2) pint into speedometer driven gear opening in case extension. Install and torque filler plug to 30 lb. ft.
18. Install speedometer driven gear and cable to transmission and install and adjust shift linkage.
19. After vehicle is road tested, recheck lubricant level and add as required.

NOTE: Transmission should be filled to filler plug level on right side of case.

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SPECIFICATIONS

TRANSMISSION IDENTIFICATION

An identifying code "HW" is stamped on rear side of side cover case face. This code identifies the Warner four speed manual transmission used on "A" and "F" Series vehicles equipped with 400/455 cu. in., 4 barrel engines.

GEAR RATIOS

1st Speed2.43 to 1
2nd Speed1.75 to 1
3rd Speed1.47 to 1
4th Speed1.00 to 1
Reverse2.35 to 1

LUBRICATION

Capacity 39 fl. oz. (approximately 2 1/2 pints)

TORQUE

	lb. ft.
Transmission Case-to-Flywheel Housing Bolts	55
Drive Gear Bearing Retainer-to-Case Bolts	18
Side Cover-to-Case Bolts	18
Case Extension-to-Case Bolts (Long)	40
Case Extension-to-Bearing Retainer Bolts (Short)	25
Rear Bearing Retainer-to-Case Lock Bolt	25
Lubrication Filler Plug	30
Drain Plug	20

SPECIAL TOOLS

J 5590	Bearing Installer
J 8092	Handle
J 21359	Oil Seal Installer
J 21465-17	Bushing Remover and Installer
J 24658	Countershaft Bearing Loader (New)

**SERVICE DEPARTMENT
PONTIAC MOTOR DIVISION
GENERAL MOTORS CORPORATION**