TRANSMISSION & OVERDRIVE · SECTION 6

CONTENTS

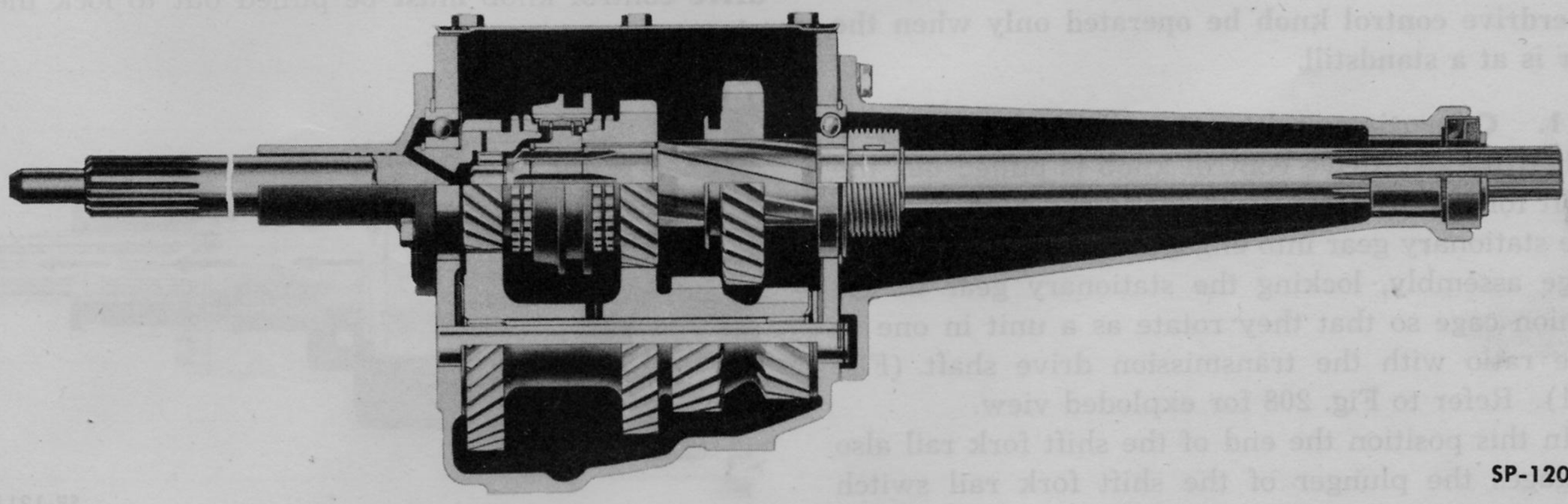
GENERAL

Standard, overdrive and Hydra-Matic transmissions are used in all models. The overdrive transmission and the Hydra-Matic transmission are available as special equipment. Servicing of standard and overdrive transmissions is covered in this manual. All information concerning the adjustments, removal, inspection and repair and assembly of the Hydra-Matic transmission is contained in the Hydra-Matic Shop Manual.

Exclusive of the overdrive unit, the standard and overdrive transmissions are basically and functionally the same. However, due to physical differences in the transmission case assemblies and the transmission mainshafts, the overdrive unit **cannot** be installed on the standard transmission.

The transmission bolts directly to the clutch housing and an insulator mounted on the number 2 crossmember under the transmission supports the rear end of the engine on both the Kaiser and Frazer models.

a. TRANSMISSION DESCRIPTION (Fig. 179). The gear train of the transmission is the synchromesh type which utilizes a synchronizing unit and constant mesh of the countershaft gears to assure smooth, silent shifting in second and high gear. An interlock mechanism is provided to assure positive gear engagement and prevent the selection of more



SP-1208

Fig. 179—Standard Transmission—Sectional View

than one pair of gears at a time. The transmission gears are helically cut and hardened to provide silent operation and long trouble free service life.

The gears are manually shifted in or out of the three forward and one reverse gear ratios by mechanical linkage to the manually operated gear shift lever on the steering jacket. Refer to Fig. 207.

b. OVERDRIVE DESCRIPTION AND OPERATION (Fig. 180). The overdrive unit, at the rear of the overdrive transmission, is essentially a fourth forward gear ratio. Operation in overdrive gives an approximate 30 per cent reduction in engine speed relative to the normal engine speed for any given car speed above 28 MPH.

The engagement and dis-engagement of the overdrive is automatic but is only effective at the dis-

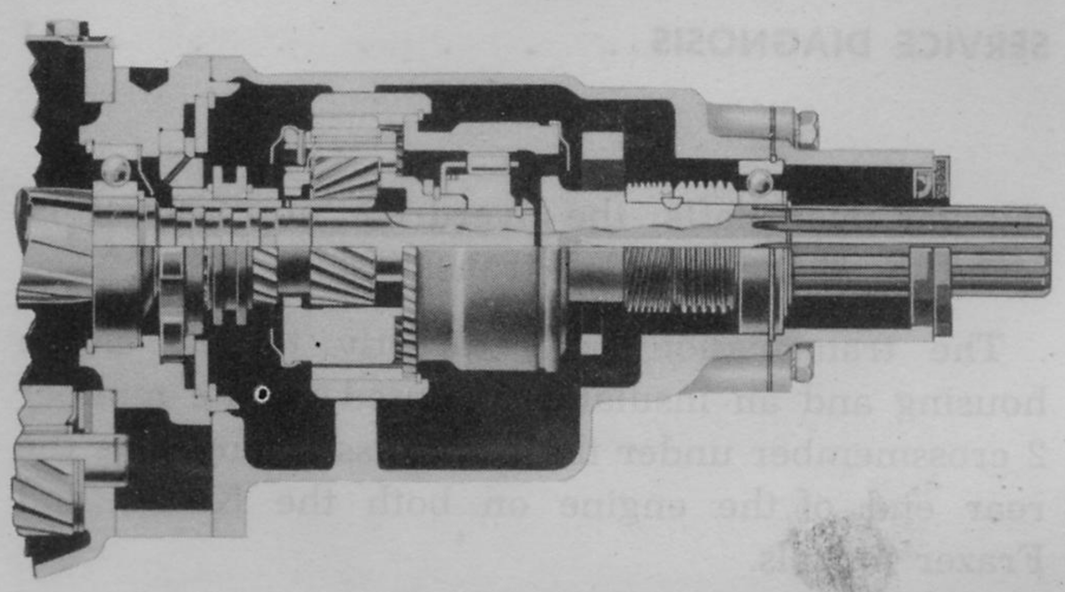


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Fig. 180—Overdrive Transmission—Sectional View

cretion of the operator. If it is desired to operate the car in conventional gear, pull the overdrive control knob all the way out. If it is desired to operate the car with overdrive, push the overdrive control knob all the way in. **It is recommended that the overdrive control knob be operated only when the car is at a standstill.**

1. Operation with Overdrive Disengaged. When the overdrive control knob is pulled **out** the shift fork rail in the overdrive is operated to move the stationary gear into engagement with the pinion cage assembly, locking the stationary gear in the pinion cage so that they rotate as a unit in one to one ratio with the transmission drive shaft (Fig. 181). Refer to Fig. 208 for exploded view.

In this position the end of the shift fork rail also engages the plunger of the shift fork rail switch to open the electrical circuit of the overdrive. These

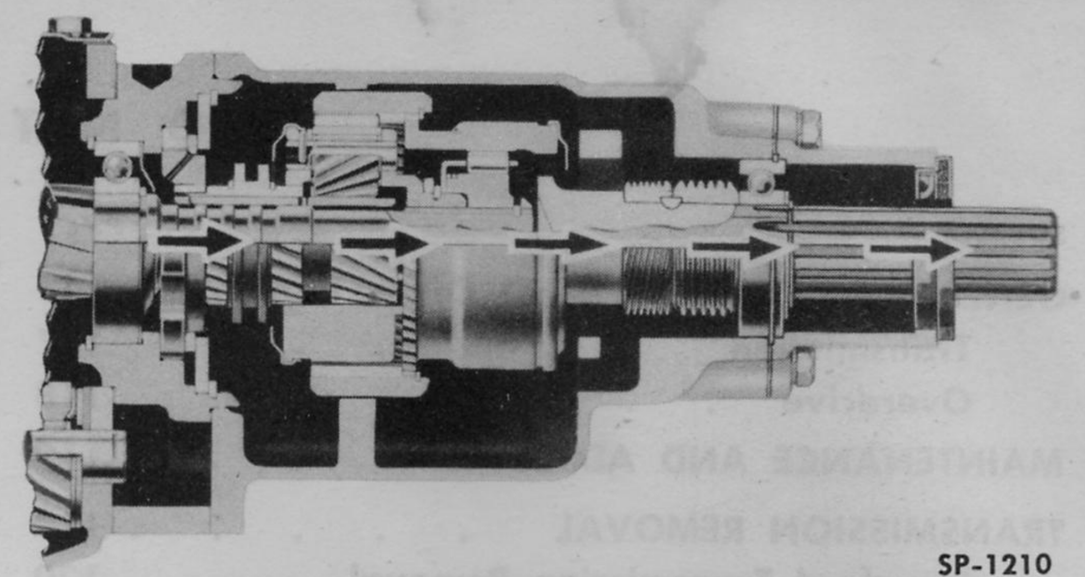

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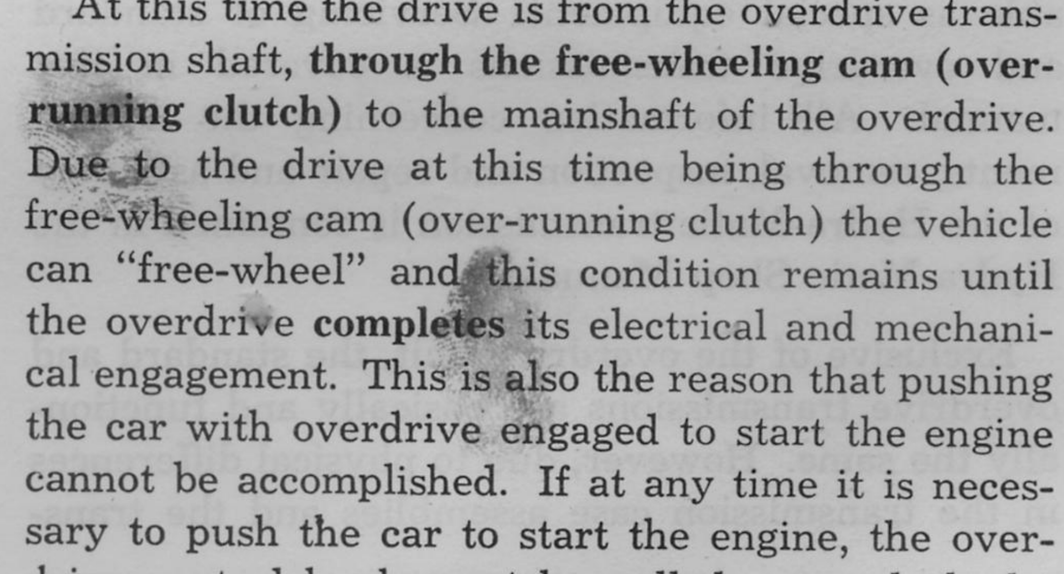
Fig. 181—Overdrive Unit Disengaged

same conditions are also in effect when the transmission is placed in reverse gear, preventing overdrive operation.

2. Operation with Overdrive Engaged. When the overdrive control knob is pushed **in** the shift fork rail is moved forward, taking the stationary gear out of engagement with the pinion cage assembly and also allowing the shift fork rail switch to close its contacts (Fig. 182). Refer to Fig. 208 for exploded view. The overdrive is now ready to function automatically, within the limits of the control exercised by the governor.

At this time the drive is from the overdrive transmission shaft, **through the free-wheeling cam (over-running clutch)** to the mainshaft of the overdrive. Due to the drive at this time being through the free-wheeling cam (over-running clutch) the vehicle can "free-wheel" and this condition remains until the overdrive **completes** its electrical and mechanical engagement. This is also the reason that pushing the car with overdrive engaged to start the engine cannot be accomplished. If at any time it is necessary to push the car to start the engine, the overdrive control knob **must** be pulled out to lock the planetary gear system.



SP-1211

Fig. 182—Overdrive Unit Engaged

When the car reaches a forward speed of approximately 28 MPH the overdrive governor closes its relay and it closes its contacts, energizing the overdrive solenoid. When this occurs the overdrive solenoid attempts to push the stationary gear pawl, on the end of the solenoid plunger, into engagement with the stationary gear and plate ("balk" ring) on the gear and plate assembly.

The final step in overdrive engagement is accomplished by the operator lifting his foot slightly from the accelerator. This momentary deceleration causes a slight torque reversal, moving the stationary gear plate ("balk" ring) out of the way of the stationary gear pawl, allowing the pawl to go into engagement with the gear and plate assembly.

With the stationary gear pawl in engagement with the gear and plate assembly the stationary gear is prevented from rotating and the pinion cage assembly (planetary) pinion gears begin to "walk" around the stationary gear and in so doing drive the overdrive mainshaft through the gear teeth on the inner diameter of the ring gear and mainshaft assembly.

The "walking" of the (planetary) pinion gears around the stationary gear drives the overdrive mainshaft at a speed of **one** revolution to **seven-tenths** of a revolution of the overdrive transmission shaft. This gives the 30 percent reduction in engine speed relative to normal engine speed for any given road speed.

The drive is now from the overdrive transmission shaft, to the stationary gear pinion cage assembly through the planetary gears to the overdrive ring gear and mainshaft assembly, over-running the free-wheeling cam (over-running clutch). Refer to Fig. 182.

Upon deceleration of the vehicle, when the car reaches a forward speed of approximately 21 MPH, the overdrive governor opens its contacts, de-energizing the overdrive relay which in turn opens its contacts de-energizing the overdrive solenoid. The overdrive solenoid plunger, which is spring loaded, withdraws the pawl from engagement with the stationary gear and plate assembly and the stationary gear turns with the pinion cage assembly gears which continue deceleration while the engine speed drops to idle. Free-wheeling is again in effect.

3. Over-ruling the Overdrive for Increased Acceleration. It has been noted, that when the overdrive is engaged, the engine turns only 0.7 as fast as when in direct drive; this reduces the power available (excepting at high car speeds). Although this reduced power is usually sufficient for all purposes, there are times when it is desirable to return to direct drive, for more power, without reducing the car speed to the overdrive cut-out speed (approximately 21 MPH).

Under such circumstances, the driver merely presses the accelerator pedal beyond the wide-open throttle position to depress the kick-down switch. Through suitable electrical controls, this releases the solenoid, urging the pawl from the control plate. However, due to the driving torque reaction, the pawl is held, and cannot move to release until the torque is momentarily relieved. An automatic interruption of the ignition accomplishes this with the ignition being restored at once as the pawl releases.

When the overdrive has been thus disengaged, the roller clutch carries the direct drive, and the driver may hold it in this condition at his pleasure, until he chooses to re-engage overdrive by momentarily lifting his foot from the accelerator. Thereupon the overdrive is resumed, unless the car speed has in the meantime fallen below the overdrive release point.

MAINTENANCE AND ADJUSTMENT

Maintenance and adjustment of the standard and overdrive transmissions is limited to maintaining the proper lubricant level in the case, checking the filler and drain plugs, checking the mountings and an inspection of the shift linkage.

Proper adjustment of the shift linkage is made at the factory and should require no periodic attention. However, if the transmisison is removed it may be necessary to adjust the linkage after the installation.

Refer to Section 15, "Electrical," for overdrive electrical circuit diagram.

TRANSMISSION REMOVAL

Internal repair or overhaul of the standard or overdrive transmissions will necessitate removal of the transmission from the vehicle. The overdrive transmission and the overdrive are removed from the vehicle as a unit.

A thorough diagnosis should precede transmission and overdrive removal to determine as far as possible the nature of the trouble and necessity for repair or overhaul. The removal, disassembly and

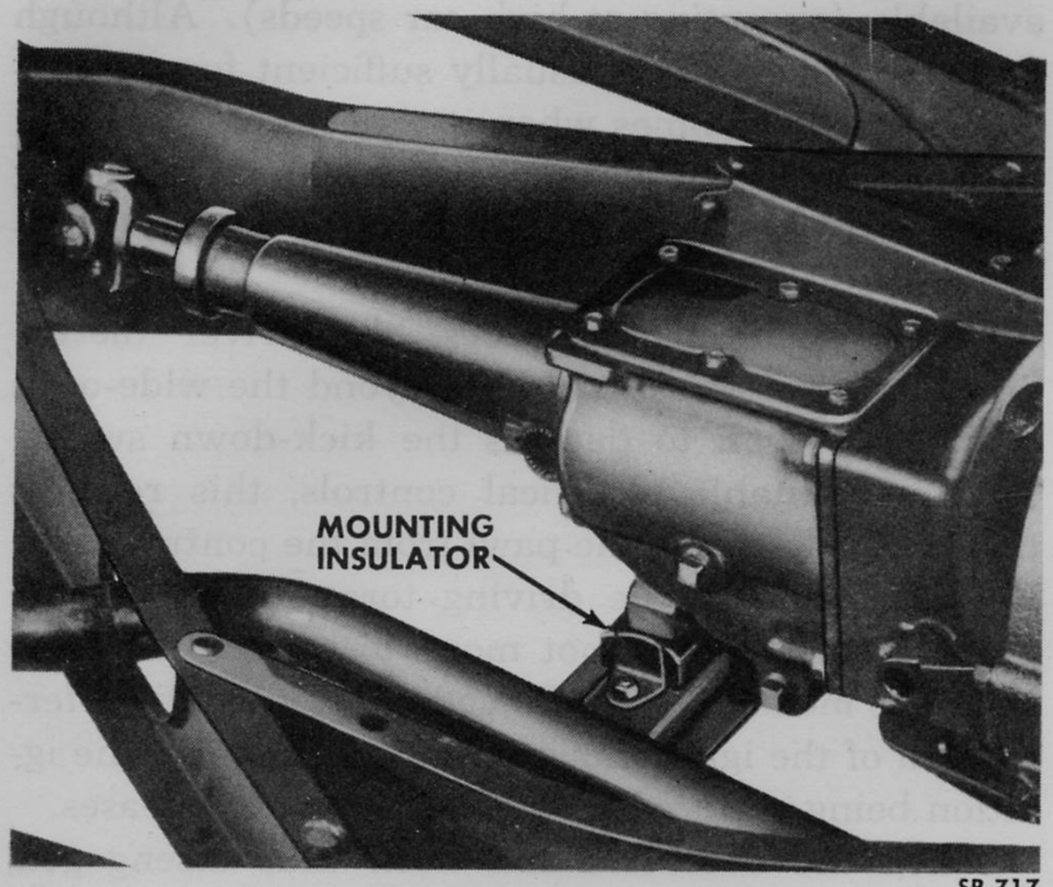


Fig. 183—Kaiser Standard Transmission Mounting

installation should be made in an orderly manner in a clean area.

a. STANDARD TRANSMISSION REMOVAL (Fig. 183). Proceed as follows:

1. Remove the drain plug in the transmission case and drain the lubricant.

2. Disconnect the gearshift rods at the outer shifting levers on the transmission case.

3. On Kaiser models remove the four nuts and lock washers and two U bolts which attach the propeller shaft to the rear axle flange. Tape the bearing retainers on the shaft to prevent losing the needle bearings. Carefully pull the propeller shaft out of the transmission.

On Frazer models remove the bolts that connect the front propeller shaft to the front companion flange and move the shaft away from the transmission.

4. Disconnect the speedometer cable at the transmission case. Disconnect the hand brake front cable so that it may be pulled through and removed from the engine rear support crossmember. Also disconnect the brake master cylinder operating rod at the bracket pedal clevis and remove the rod on Frazer models.

5. Support the rear of the engine using special Engine Support Tool KF-104 or a suitable jack. Refer to Fig. 184.

6. Remove the engine rear support crossmember to facilitate transmission removal. The two bolts, nuts and washers attaching the engine rear support

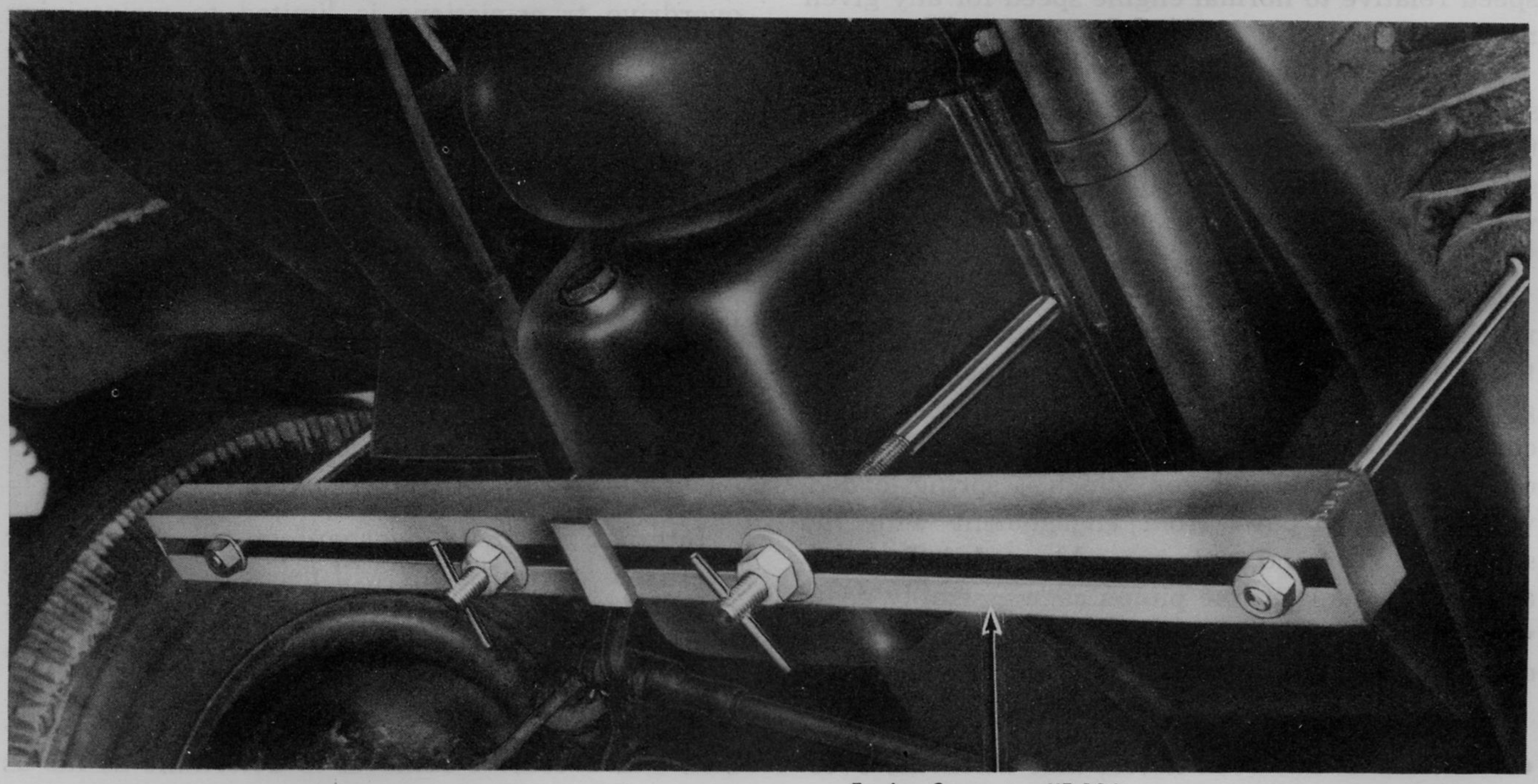


Fig. 184—Engine Support Tool Installed

insulator to the crossmember must be removed, followed by the eight bolts, nuts and washers attaching the crossmember to the frame. Then remove the crossmember.

7. Loosen the four bolts attaching the transmission to the clutch housing. Support the transmission and remove the four case to clutch housing bolts. The transmission may then be worked loose and removed.

b. OVERDRIVE TRANSMISSION REMOVAL (Fig. 185). The overdrive transmission with overdrive is removed as a unit from the vehicle. The same procedure as detailed under STANDARD TRANSMISSION REMOVAL is applicable for removal of the overdrive transmission. However, in addition, the overdrive linkage and electrical wiring will have to be disconnected and the overdrive housing drained. Proceed as follows:

1. Remove the drain plug in the overdrive housing and drain the lubricant.

2. Disconnect the overdrive wiring at the shift fork rail switch terminal and the solenoid terminals.

3. Disconnect the speedometer cable at the overdrive housing.

4. Disconnect the overdrive control wire at the control shaft lever on the overdrive housing and tie-down clips.

5. For all other removal operations, refer to STANDARD TRANSMISSION REMOVAL.

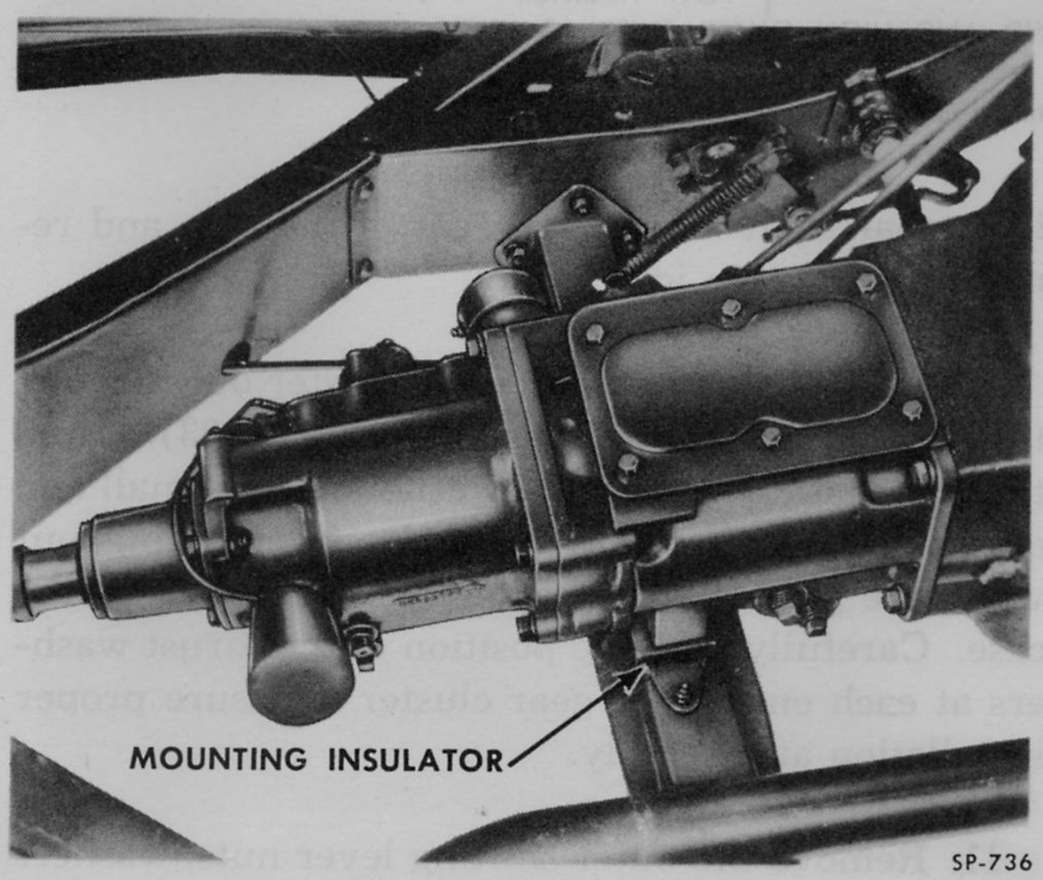


Fig. 185—Kaiser Overdrive Transmission Mounting

STANDARD TRANSMISSION OVERHAUL

Prior to disassembly, an inspection should be made to determine if the shifting interlock mechanism is operating properly. The drive pinion and mainshaft should be checked for looseness, end-play and free rotation in each gear engagement. These preliminary inspections will facilitate subsequent diagnosis.

a. STANDARD TRANSMISSION DISASSEMBLY (Fig. 186). The disassembly procedure detailed herein applies to standard transmissions.

1. Mount the transmission on a Transmission Stand KF-100, or other suitable holding fixture such as a bench vise (Fig. 187). Remove the case cover cap screws and washers, the cover and the gasket. Discard the gasket.

2. Install Puller W-165 by turning it into the mainshaft oil seal until the threads cut sharply into the seal. Remove the seal by turning the puller center screw against the mainshaft to pull the seal out of the mainshaft bearing retainer (Fig. 188). Regardless of its appearance and condition, it is recommended that the seal be replaced.

3. Remove the mainshaft bearing retainer attaching bolts and washers. Remove the retainer from the mainshaft.

4. Remove the three drive pinion bearing retainer bolts and washers and slide the retainer off the pinion shaft. Discard the gasket.

5. Drive out the reverse idler gear shaft lock plate using a suitable drift and hammer (Fig. 189).

6. Remove the countershaft from the case using Transmission Cluster Gear Arbor KF-1. Butt the arbor against the countershaft at the front of the case and drive it through, forcing out the countershaft. (Fig. 190). The arbor will replace the countershaft as it is driven out. Since the arbor is shorter than the countershaft, the gear cluster will drop to the bottom of the case, allowing clearance for removal of the drive pinion.

7. Remove the drive pinion assembly and mainshaft assembly from the transmission case. The drive pinion is removed from the front of the case. Since the pinion bearing is a light drive fit in the case it will be necessary to loosen it with a soft metal drift. Place the drift against the pinion gear

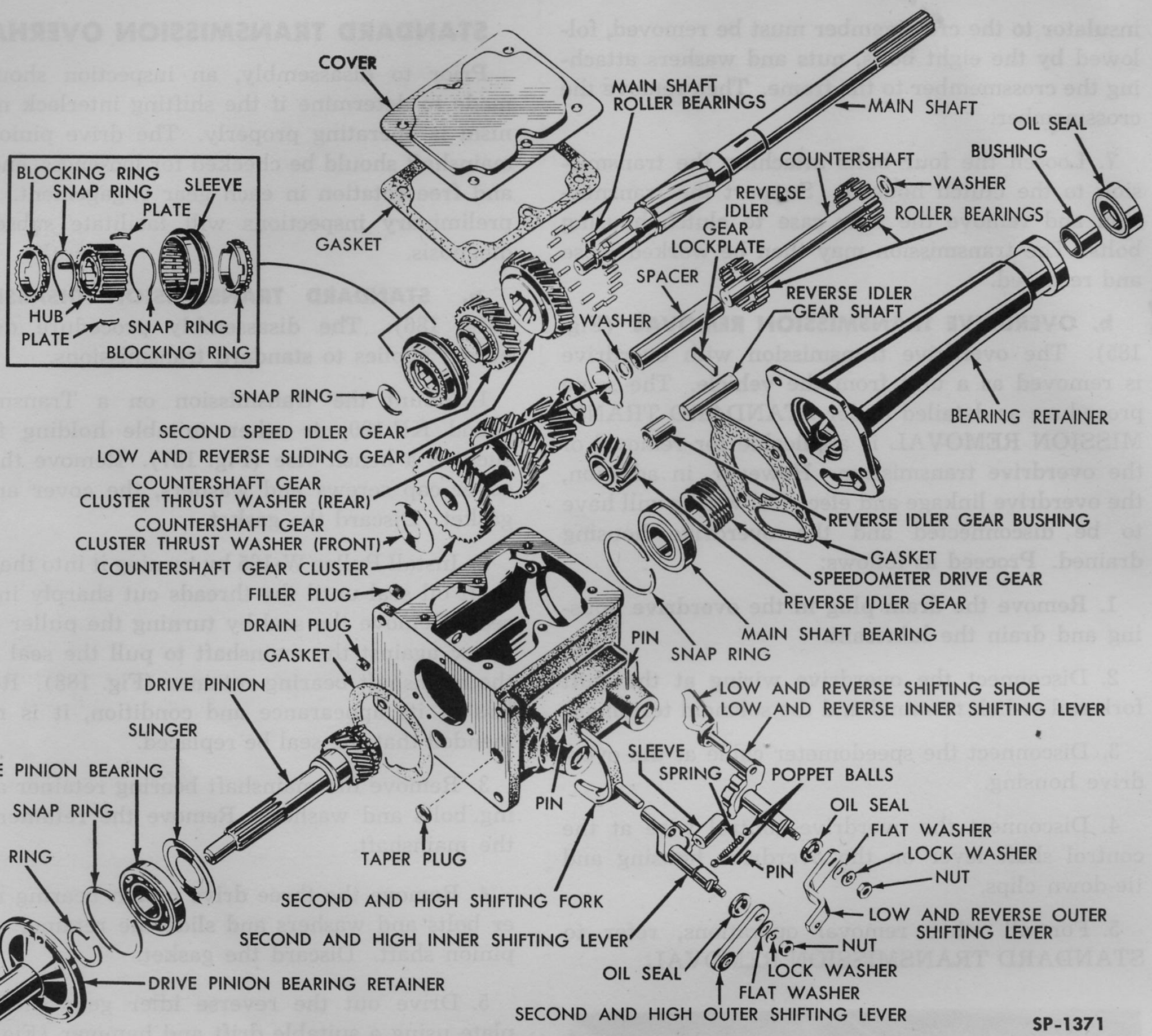


Fig. 186—Standard Transmission—Exploded View

and strike it lightly until the bearing and shaft are free for removal.

8. Remove the snap ring, speedomoter drive gear and woodruff key from the rear of the mainshaft. Tap the rear end of the mainshaft lightly with a soft hammer (Fig. 191) until it is free of the rear bearing. Remove the bearing from the case. Cock the mainshaft assembly away from the shifting fork and shifting shoe as far as possible and remove the shifting fork and the shoe. Lift out the shaft assembly through the top of the case (Fig. 192).

9. Using a soft metal drift, drive out the reverse idler gear shaft toward the rear of the case and remove the reverse idler gear.

10. Lift the countershaft gear cluster out through the top of the transmission case (Fig. 193). Hold the Arbor KF-1 and thrust washers at the small end of the gear to prevent the arbor from falling out when the gear is tilted when removing it from the case. Carefully note the position of the thrust washers at each end of the gear cluster to assure proper installation at assembly.

11. Remove the outer shifting lever nuts, washers and the levers.

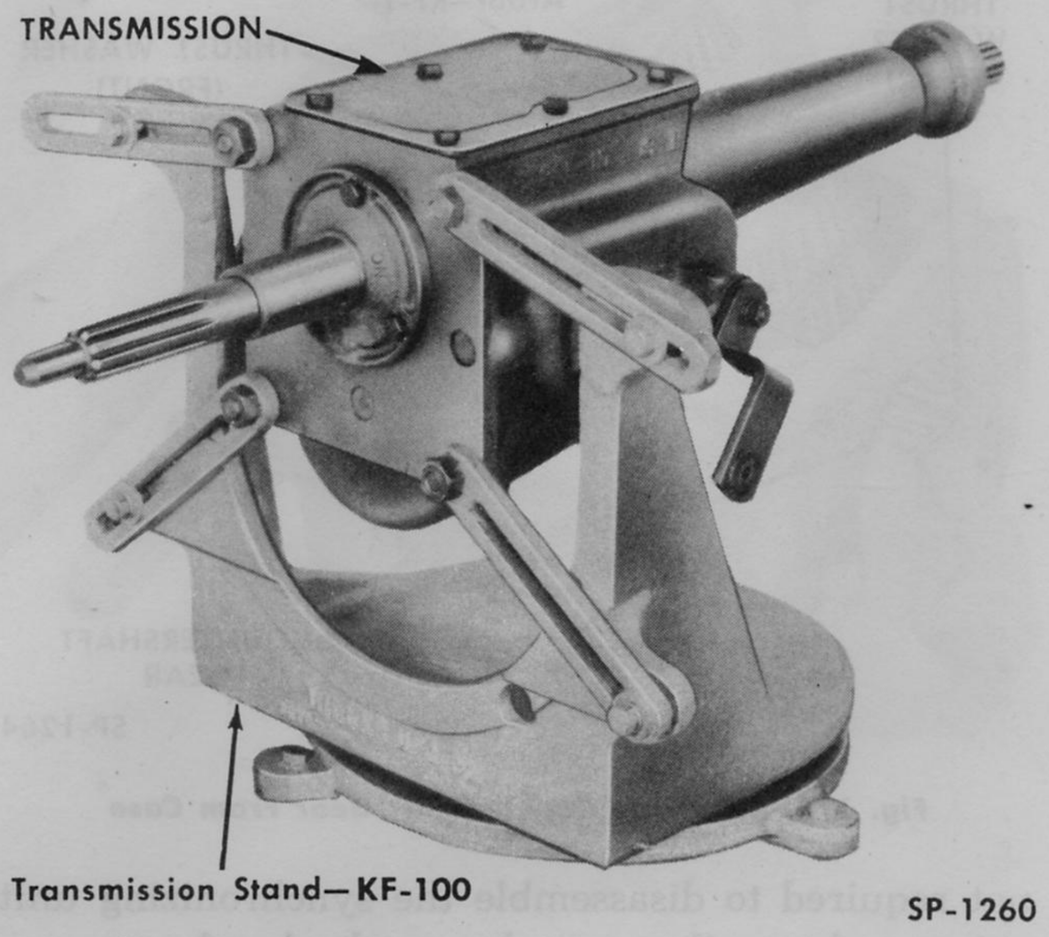


Fig. 187—Standard Transmission Mounted In Fixture

12. Using a punch or drift, drive out the two pins at the shift lever bosses on the transmission case. The pins must be driven from the bottom or underside of the boss (Fig. 194). The inner shifting lever and shaft assemblies are now free for removal.

13. Remove the second and high speed inner shifting lever and shaft from inside the case (Fig. 186). As it is being withdrawn from the case the shifting lever spring loaded poppet ball will disengage from the ramp of the lever and shaft and fall out. Remove the shift lever poppet ball spring, pin, sleeve and the balls from the transmission case. Remove the first speed and reverse inner shifting lever and shaft from the case.

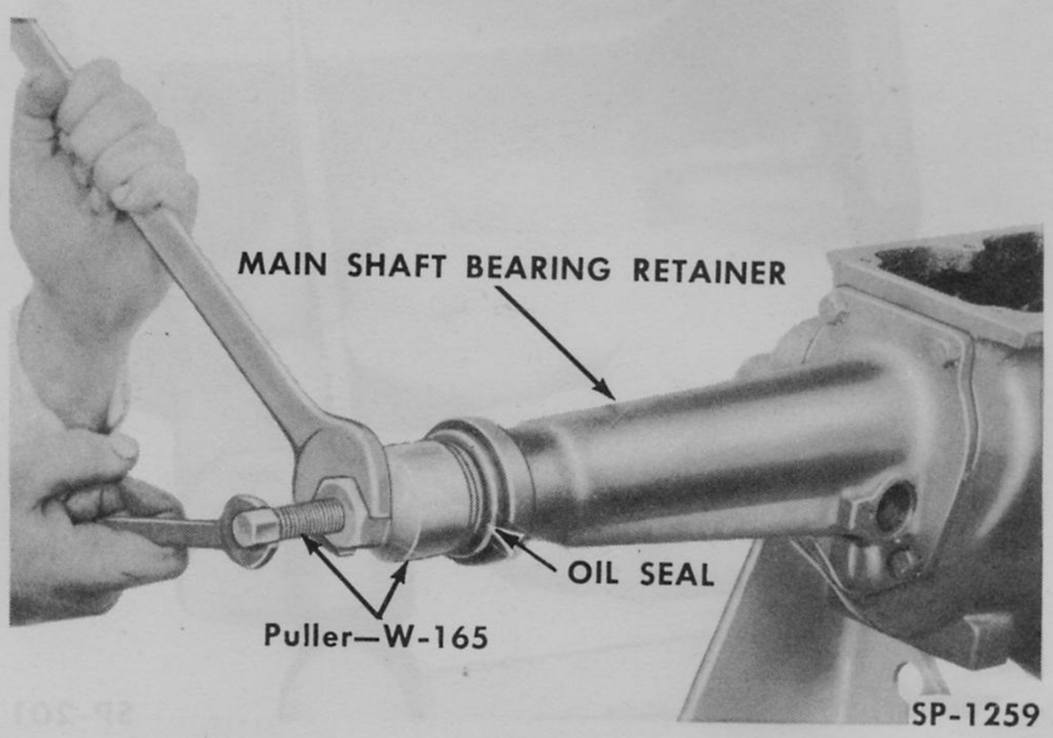


Fig. 188—Removing Mainshaft Oil Seal

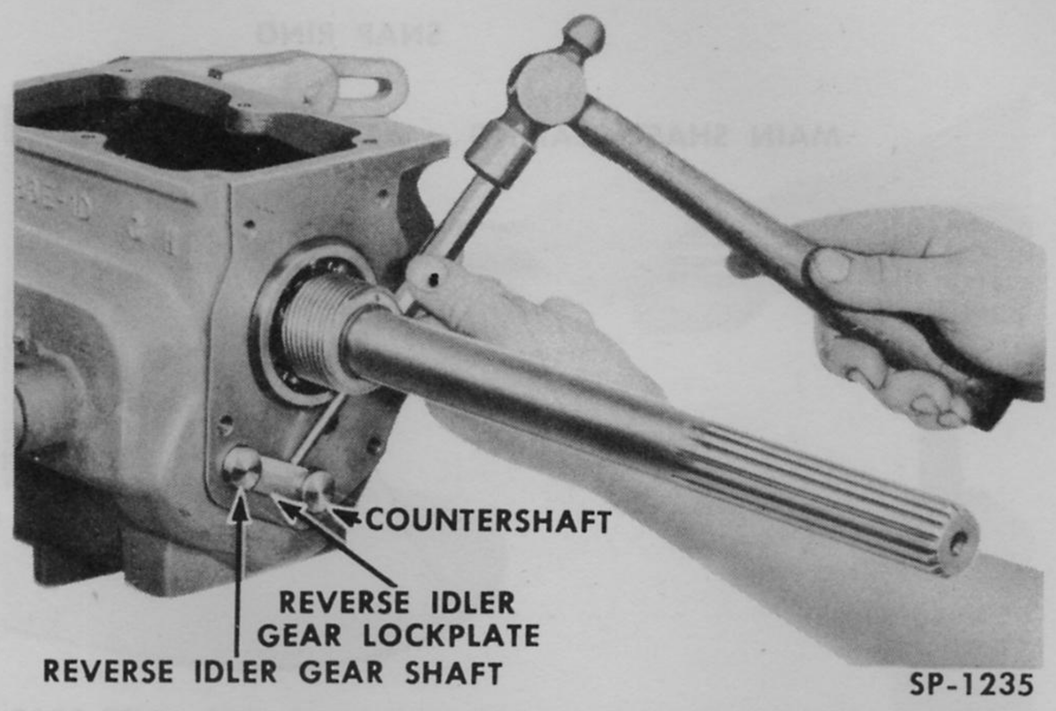


Fig. 189—Removing Idler Gear Shaft Lock Plate

14. Remove and discard the inner shifting lever oil seal from each of the transmission case bosses.

15. Disassemble the countershaft gear cluster assembly. The countershaft gear cluster was removed from the transmission case with the Arbor KF-1 installed in the hub, replacing the countershaft. As the arbor is removed the roller bearings and washers will fall out; therefore, be careful not to lose them during disassembly.

(a) Remove the countershaft gear bearing washers from the ends of the countershaft.

(b) Remove the Arbor KF-1, countershaft gear roller bearings, and the countershaft gear bearing spacer from the gear cluster hub.

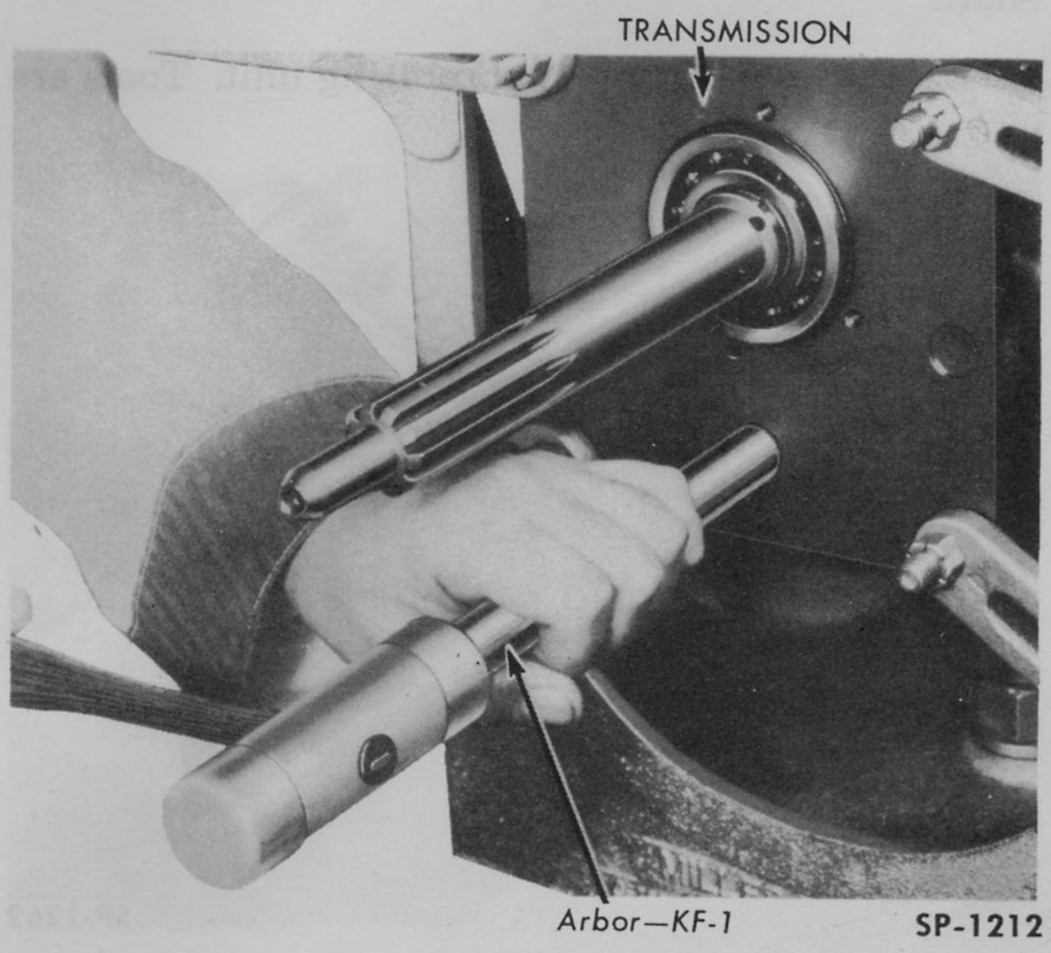


Fig. 190—Driving Out Transmission Countershaft

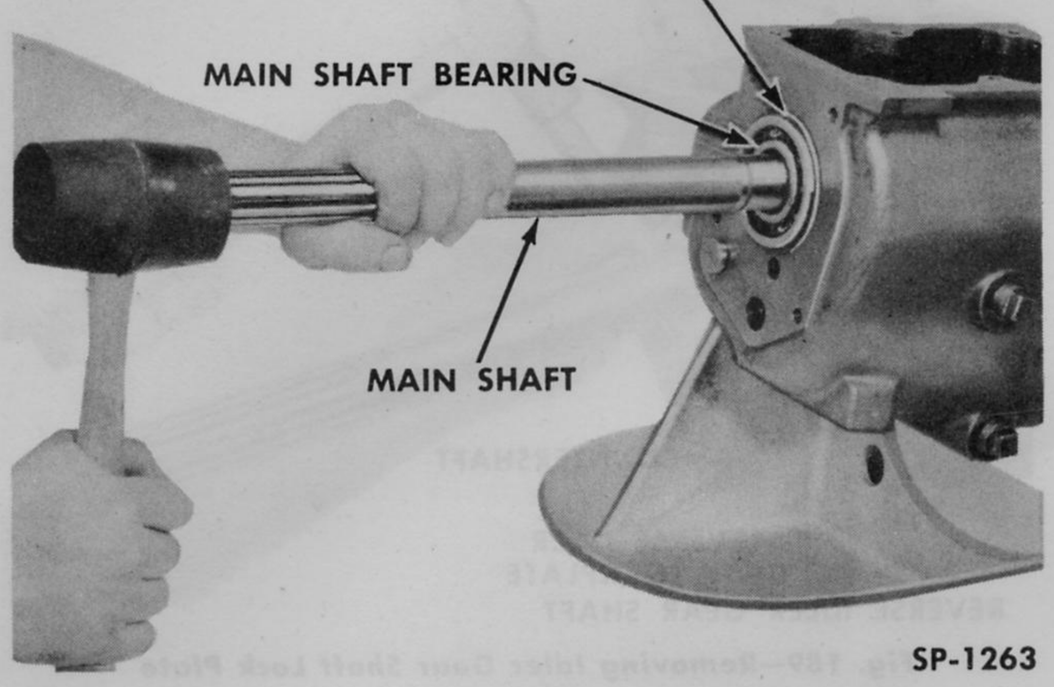


Fig. 191—Removing Mainshaft From Rear Bearing

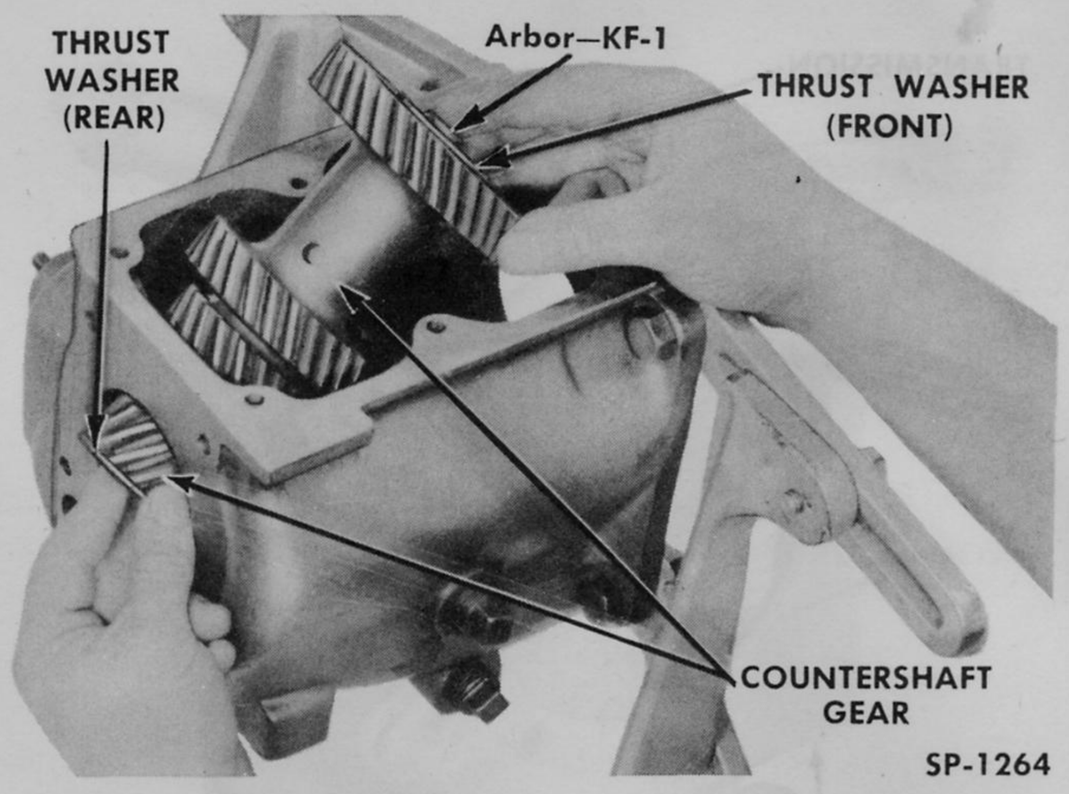


Fig. 193—Removing Countershaft Gear From Case

16. Disassemble the transmission mainshaft assembly. The mainshaft as removed from the transmission case includes the low and reverse sliding gear, the second and high synchronizer unit, and second speed idler gear (Fig. 195). Proceed with the disassembly as follows:

(a) Remove the low and reverse sliding gear from the mainshaft.

(b) Using Pliers C-484, remove the synchronizer snap ring and slide the second and high gear synchronizer unit off the mainshaft (Fig. 196).

(c) Slide the second speed idler gear off the mainshaft to complete the disassembly of the mainshaft.

17. Disassemble the synchronizing unit. Tools are not required to disassemble the synchronizing unit —it may be easily pressed apart by hand.

(a) Remove the synchronizer sleeve blocking rings. **NOTE: The front blocking ring may have been removed with the drive pinion assembly.**

(b) Remove the synchronizer sleeve and the three sleeve plates (detents) from the hub.

(c) Remove the two snap rings from the synchronizer hub.

18. Disassemble the drive pinion assembly. The

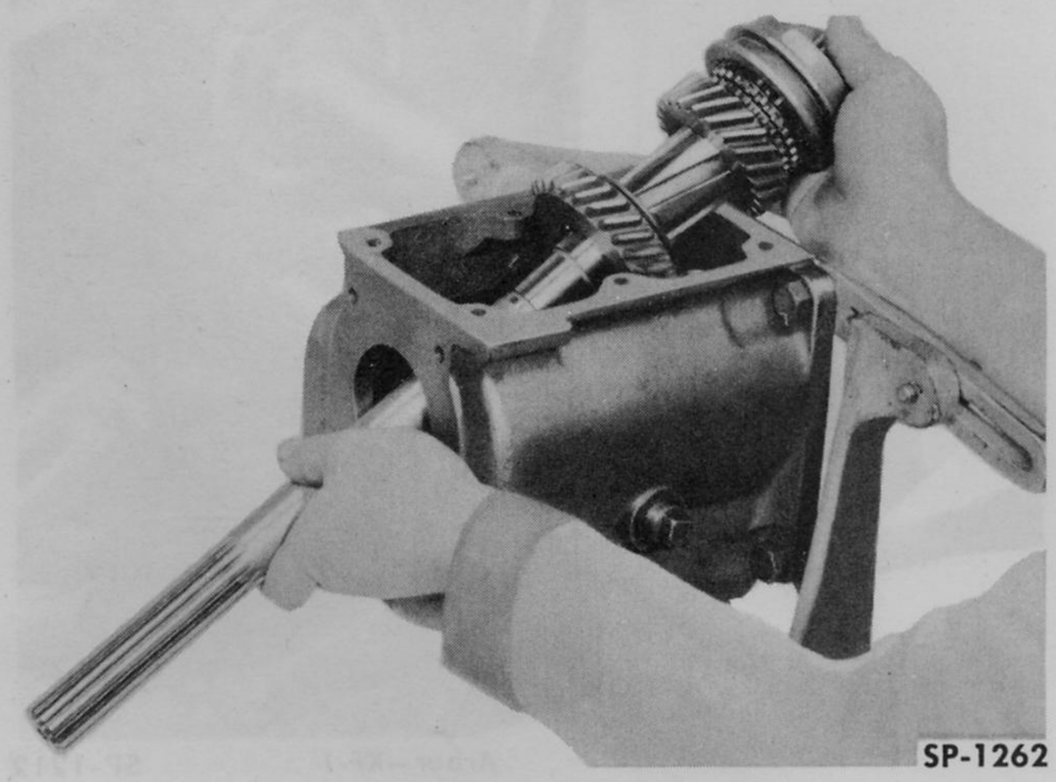


Fig. 192—Removing Mainshaft Assembly From Case

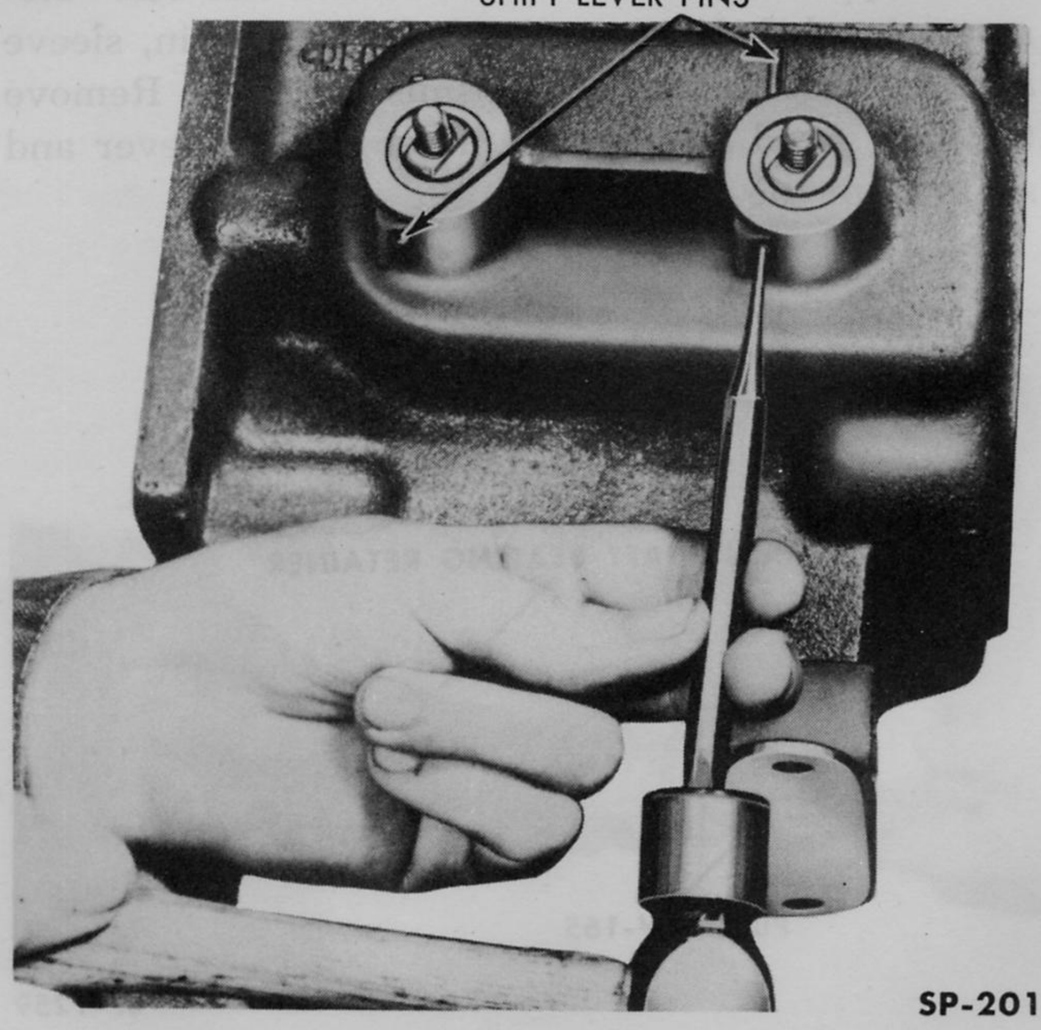


Fig. 194—Removing Shift Lever Shaft Pins

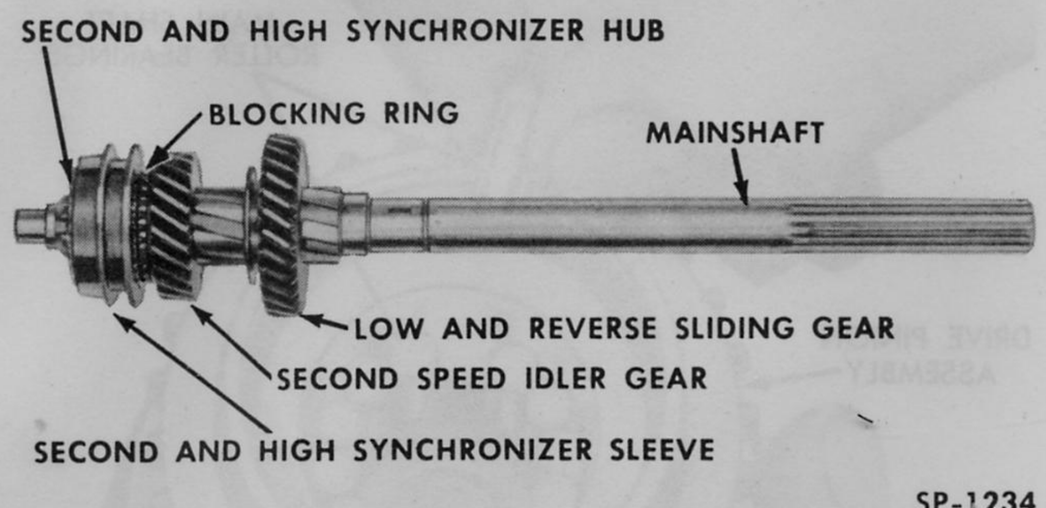


Fig. 195—Transmission Mainshaft Assembly

hub of the gear end of the pinion assembly contains the mainshaft roller bearings. When disassembled the roller bearings are free in the hub and should be removed to prevent their loss.

(a) Remove the fourteen roller bearings from the hub of the pinion.

(b) Remove the pinion bearing snap ring using Snap Ring Removing Pliers C-484.

(c) Remove the pinion bearing and slinger from the shaft using a universal puller (Fig. 197). Note the position of the slinger behind the bearing.

b. STANDARD TRANSMISSION INSPECTION AND REPAIR. Prior to the inspection and repair of the disassembled transmission, all components, except sealed bearings, oil seals and rubber parts, should be thoroughly cleaned in a suitable cleaning solvent. The transmission case should be cleaned inside and outside. Heavy deposits of tar or undercoating near or around working parts must be removed. The components, after cleaning, should be laid out in an orderly manner on a clean bench for inspection.

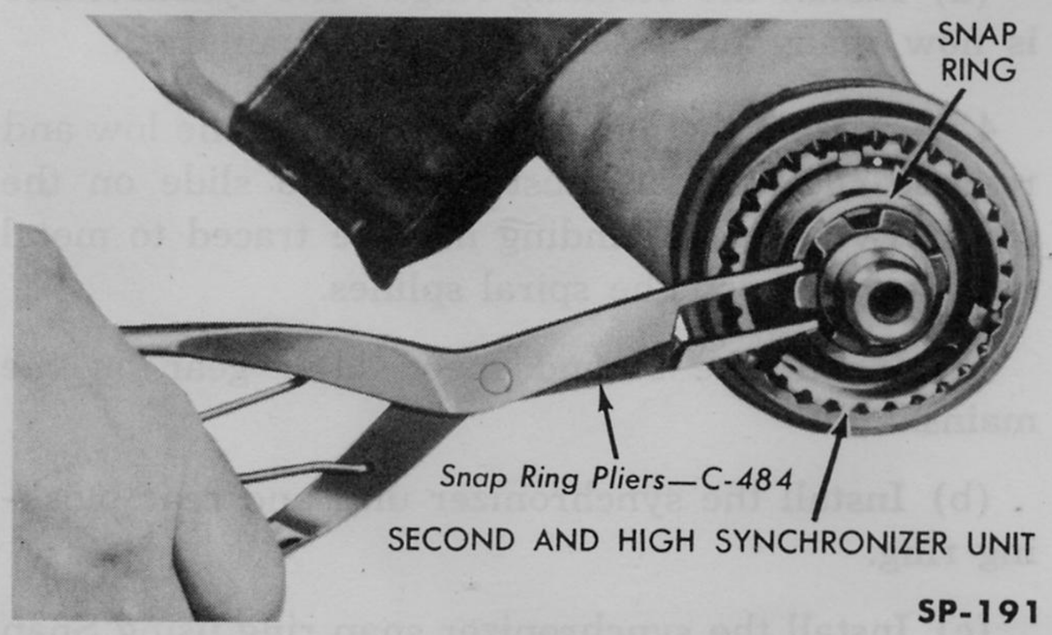


Fig. 196—Removing Synchronizer Unit

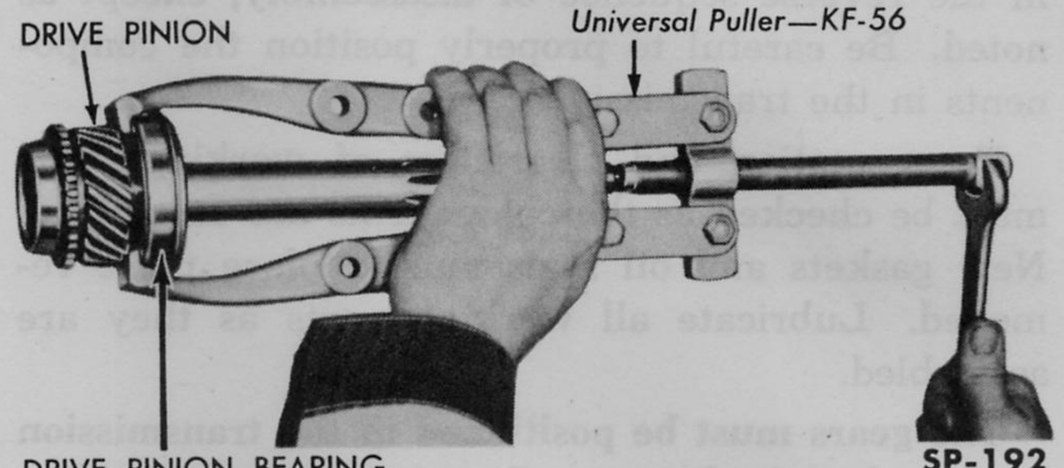


Fig. 197—Disassembling Drive Pinion Assembly

Inspect the case for cracks, misaligned holes, warpage, and damage caused by broken gears. Replace the case if any of these faults apply. All lubrication passages must be open and clean.

Replace bearings that appear to be loose in the races, discolored from overheating or if the balls have flat spots.

Replace the rear bearing retainer if cracked or damaged. Inspect the bushing at the rear of the retainer. If worn or scored, replace bushing using suitable driver. After the bushing is installed check the bushing using the propellor shaft front yoke as a gauge to make sure the bushing was not damaged when installing it.

Replace roller bearings that appear to be worn or damaged. **NOTE: Whenever wear is evident on a shaft the corresponding gear bearings and/or bushing are probably worn and should be replaced.** Replace gears that have chipped, worn or broken teeth.

Measure the inside diameter of the second speed idler gear and outside diameter of the surface where the second speed gear runs on the mainshaft. If the check discloses in excess of .0035 inch clearance, replace the gear and/or shaft, whichever is worn.

Position the first and reverse sliding gear on the mainshaft. Check the gear for looseness (rocking action) on the spline of the shaft within the distance the gear normally travels on the shaft when installed in the transmission. If excessive looseness is noted and the transmission is creeping out of first gear, replace the gear and/or shaft, whichever is worn.

Replace the mainshaft, drive pinion, countershaft or idler gear if the bearing surface is scored or damaged.

c. STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT. Assemble the standard transmission

in the reverse sequence of disassembly, except as noted. Be careful to properly position the components in the transmission case.

Free rotation and clearances of working parts must be checked as the components are assembled. New gaskets and oil seals must replace those removed. Lubricate all working parts as they are assembled.

The gears must be positioned in the transmission case so that the long or offset end of the gear faces toward the front of the case or in the forward position. Refer to Fig. 186.

1. Assemble the mainshaft bearing retainer assembly. End-play in the mainshaft is controlled by the proper assembly of the mainshaft bearing on the shaft. A selection of four thicknesses of snap rings is available to lock the bearings in place on the shaft. A loose bearing will allow end-play in the power train resulting in interlocking and partial engagement of gears.

Snap rings are provided in four thicknesses of .087, .090, .093 and .096 of an inch. Selective fitting of the snap ring to determine the proper thickness to be used will require the careful attention of the mechanic.

(a) Install the mainshaft bearing on the mainshaft.

(b) With the bearing fully seated, install the speedometer drive gear and selectively fit and install the speedometer drive gear snap ring. There will be no end-play in the bearing when the proper thickness snap ring is installed. Check between the snap ring and the drive gear with a feeler gauge to assure a tight fit.

(c) The speedometer drive gear and bearing must be removed from the mainshaft after the proper fit has been established and then the mainshaft must be built up, as detailed later in this procedure, and installed in the case as an assembly.

2. Assemble the drive pinion. Other than installing the roller bearings, the pinion is completely assembled during installation in the transmission case. Install the fourteen roller bearings in hub of the pinion shaft using lubricant to hold them in place (Fig. 198).

3. Assemble the synchronizer unit. When assembling synchronizer assembly, care should be exercised that the etched line at the rear of the synchronizer hub and sleeve are opposite each other to assure a close fit. The components of the synchronizer unit are easily assembled without the use of tools. Proceed as follows:

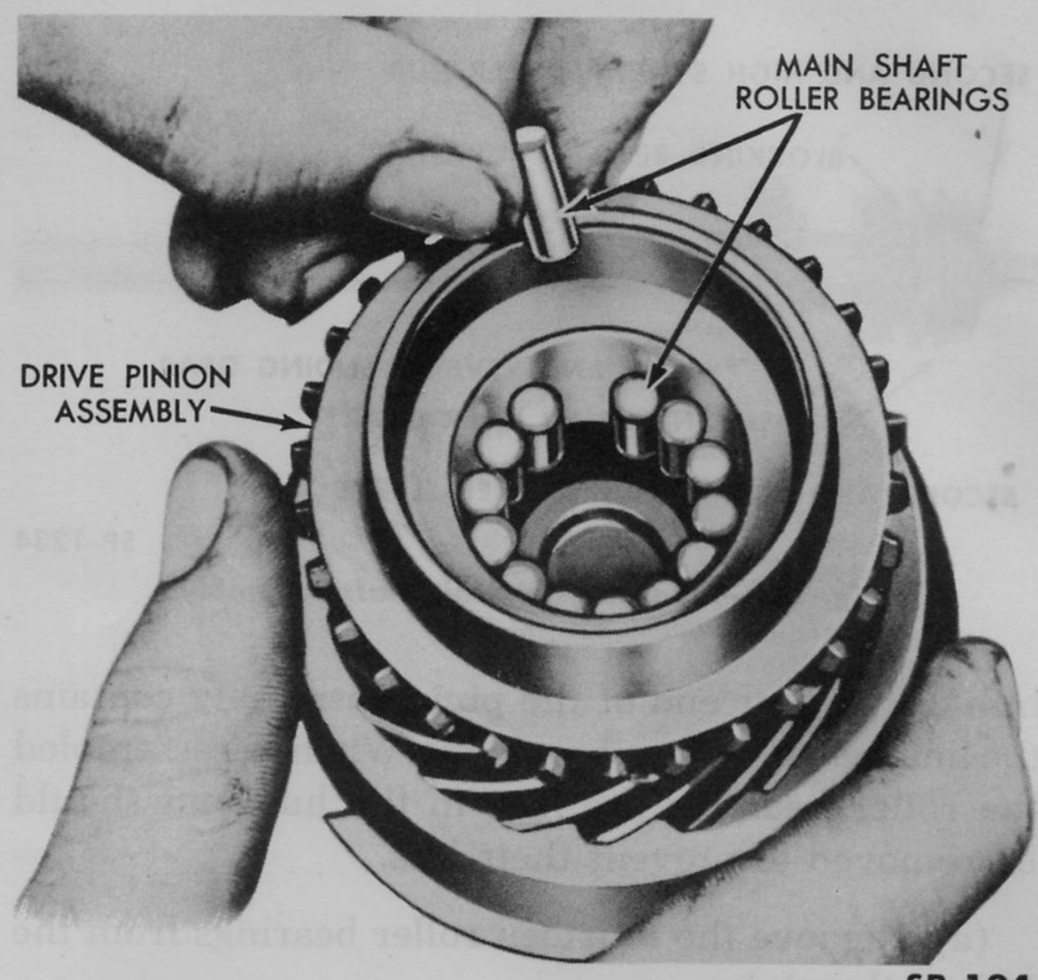


Fig. 198—Installing Roller Bearings In Pinion

(a) Install the two synchronizer hub snap rings in the hub.

(b) Install the three synchronizer sleeve plates (detents) on the hub. Apply a lubricant to hold the plates (detents) in place.

(c) Install the synchronizer sleeve on the hub. The sleeve must be free to slide on the hub splines.

(d) Install the blocking rings. The synchronizer is now ready for assembly on the mainshaft.

4. Assemble the mainshaft assembly. The low and reverse sliding gear must be free to slide on the shaft. Evidence of binding may be traced to metal chips or nicks on the spiral splines.

(a) Install the second speed idler gear on the mainshaft.

(b) Install the synchronizer unit and rear blocking ring.

(c) Install the synchronizer snap ring using Snap Ring Pliers C-484.

(d) Install the low and reverse sliding gear on the mainshaft.

(e) Check the end-play of the synchronizer and second speed idler gear on the mainshaft as shown in Fig. 199. The clearance between the second speed idler gear and the shoulder on the mainshaft should be .003 to .010 of an inch, the lower clearance being preferred. A variety of oversize snap rings are available for service to establish the correct clearance between the gear and shaft.

5. Assemble the countershaft gear cluster. Until installed in the transmission case the Arbor KF-1 must be used to hold the countershaft gear roller bearings and the bearing spacer in position in the gear cluster hub.

(a) Install the countershaft gear bearing spacer on the Arbor KF-1 and insert in the hub of the gear cluster.

(b) Install the twenty-two countershaft gear roller bearings in each end of the hub around the arbor (Fig. 200).

(c) Install the countershaft bearing washer at each end of the hub. The countershaft gear cluster is now ready for assembly in the transmission case.

6. Install the interlock and outer shift levers. Initial assembly of the transmission case includes the installation of the interlock (Fig. 201) and the outer shift levers. Proceed with the assembly as follows:

(a) Install new inner shifting lever and shaft oil seals in the transmission case; seal lip toward the inside of the case. Be sure the seals are not cocked and that they bottom in the case counterbores.

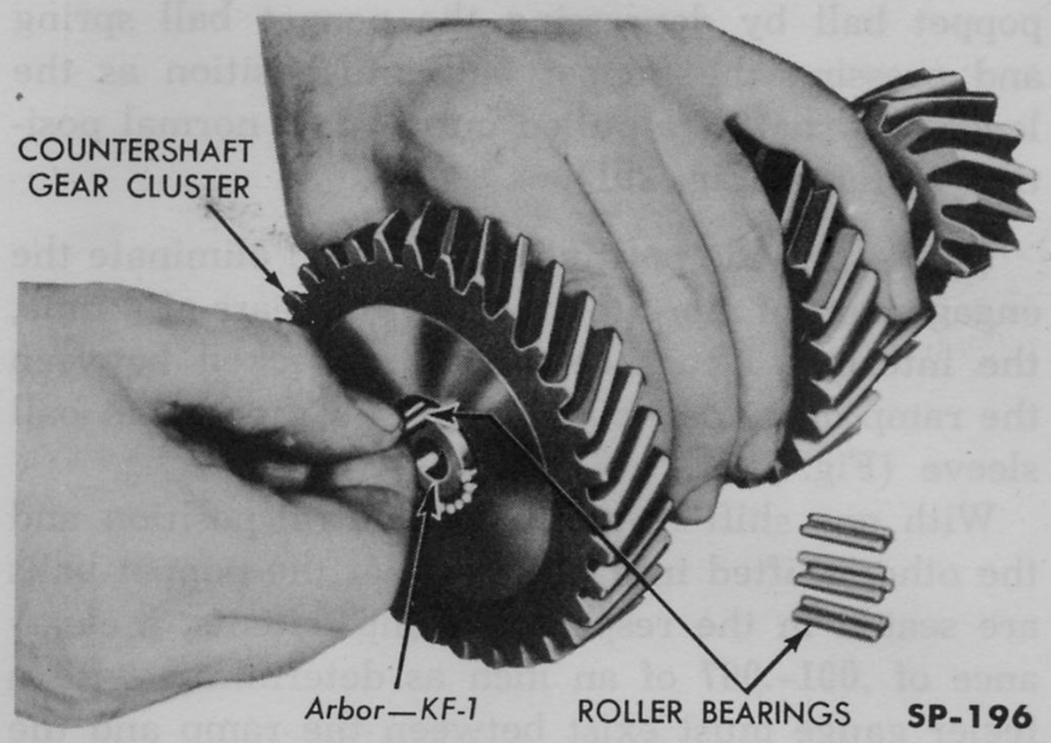


Fig. 200—Installing Countershaft Gear Roller Bearings

(b) Install the low and reverse shifting lever and shaft, pin, outer shifting lever, flat washer, lock washer and nut. Be careful not to damage the seal when inserting the low and reverse shifting lever shaft through the seal.

(c) Install one of the shifting lever poppet balls, the spring and sleeve in the case. The ball must seat in the notch (detent) in the ramp of the shift lever and shaft.

(d) Install the second and high shifting lever and shaft in the transmission case. Be careful not to damage the seal when installing the lever and shaft. The outer shifting lever may be installed loosely until the ramp clearance has been checked.

(e) Move the lever and shaft inward toward the side of the transmission case. Install the second

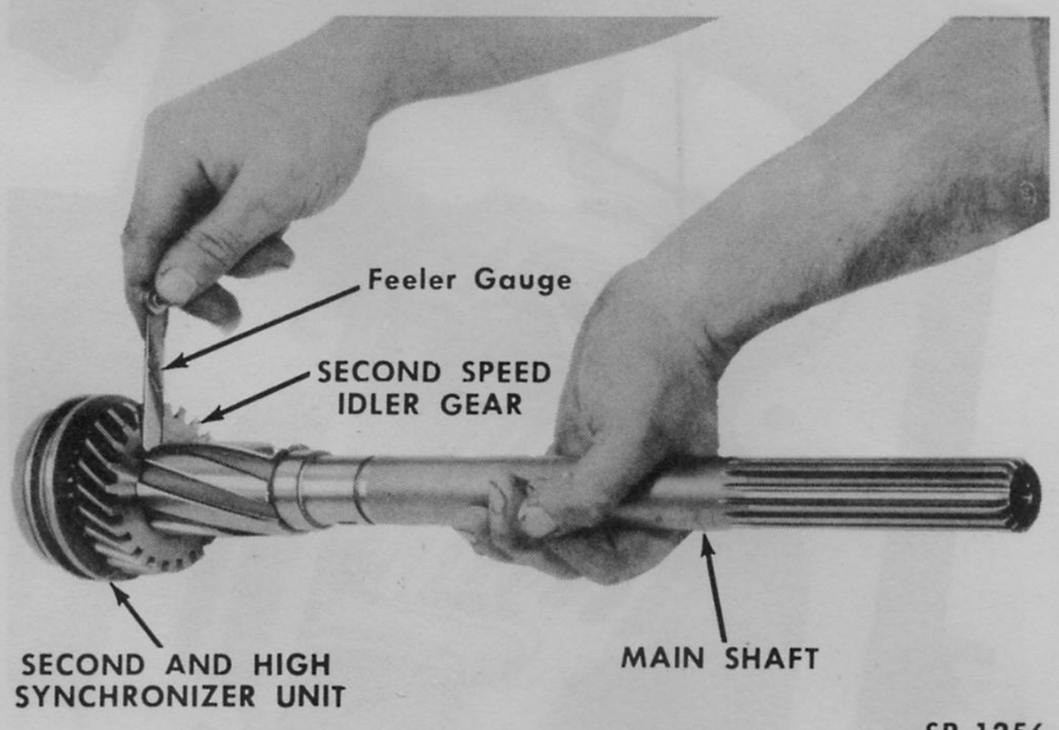


Fig. 199—Checking Synchronizer And Second Speed Idler Gear End-Play

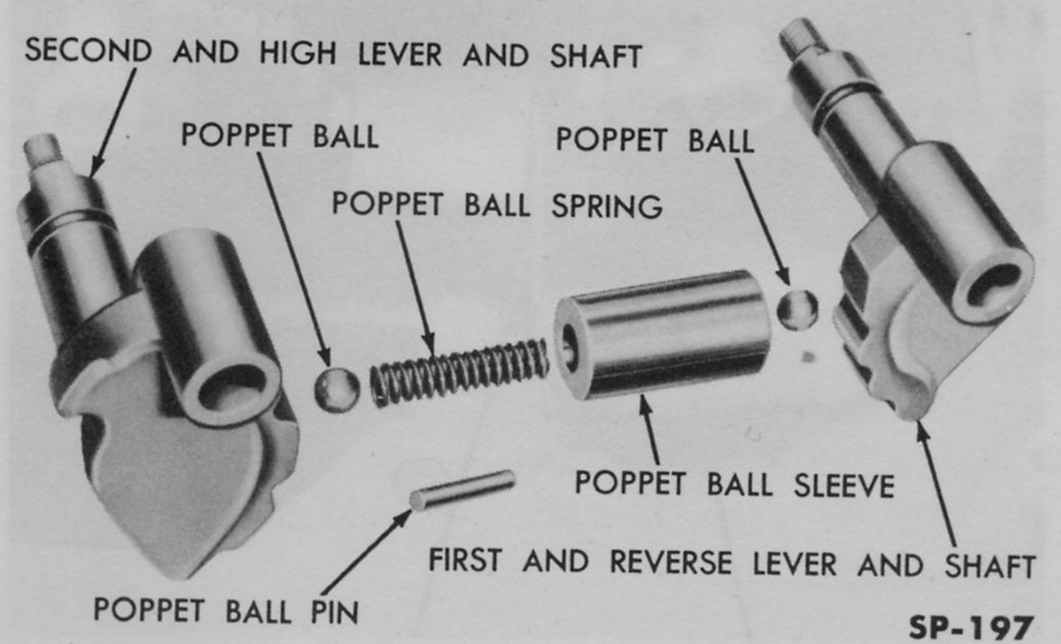


Fig. 201—Interlock Components—Exploded View

poppet ball by depressing the poppet ball spring and pressing the poppet ball into position as the lever and shaft are pulled outward to normal position (refer to Fig. 201).

(f) To provide positive shifting and eliminate the engagement of more than one set of gears at a time, the interlock clearance must be checked between the ramp of the lever and shaft and the poppet ball sleeve (Fig. 202).

With one shift lever in the neutral position and the other shifted into gear, so that the poppet balls are seated in the respective ramp detents, a clearance of .001–.007 of an inch as determined with a feeler gauge must exist between the ramp and the end of the poppet sleeve.

If improper clearance is evident, then the sleeve must be removed and replaced with one of the correct length. Poppet ball sleeves are available in five different lengths to provide selective fitting for proper clearance. The available sleeves are 1.295, 1.291, 1.287 and 1.303 inches long, marked "A," "B," "C" and "D" respectively, and one sleeve 1.299 inches long which is unmarked.

(g) When the proper sleeve has been selected and assembled, completely install the second and high shift lever and shaft and the outer shift lever, including the pin, flat washer, lock washer and nut.

7. Install the countershaft gear cluster in the transmission case. Thrust washers are placed at the front and rear of the gear as it is installed. The tab of the front thrust washer must face up and align with the slot in the case. Two thrust washers must be installed at the rear. The outer rear thrust washer is installed with the gear cluster in the case. The arbor will have to be moved forward slightly to provide clearance to slip the thrust washer into position. New thrust washers should replace those removed to provide specified clearance.

The countershaft may now be installed from the top of the case (Fig. 193). The slotted end of the countershaft must be to the rear with the slot facing toward the reverse idler gear shaft slot. Drive out the Arbor KF-1 using the countershaft as the driver. Check the countershaft gear cluster end-play between the two rear thrust washers (Fig. 203). Specified clearance is .002–.006 of an inch.

8. Install the reverse idler gear and shaft in the transmission case. With the gear in position the shaft is installed (with the slotted end toward the rear) from the rear of the case until it is flush with the front end of the boss in the case. The slot in the shaft must align with the countershaft slot so that the lock plate may be installed.

9. Install the reverse idler gear lock plate. Refer to Fig. 189.

10. Install the transmission mainshaft assembly and the drive pinion assembly in the case. The mainshaft is installed through the opening in the top of the case. Install the second and high shifting fork and the low and reverse shifting shoe in their

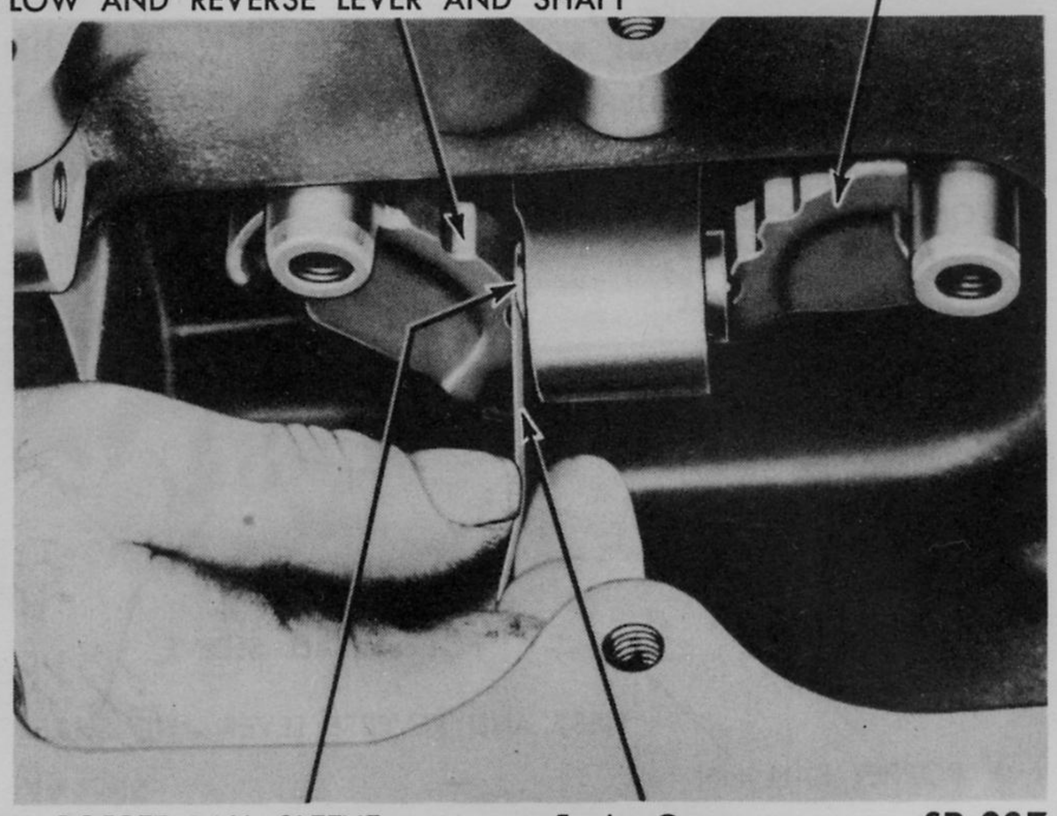


Fig. 202—Checking Interlock Sleeve Clearance

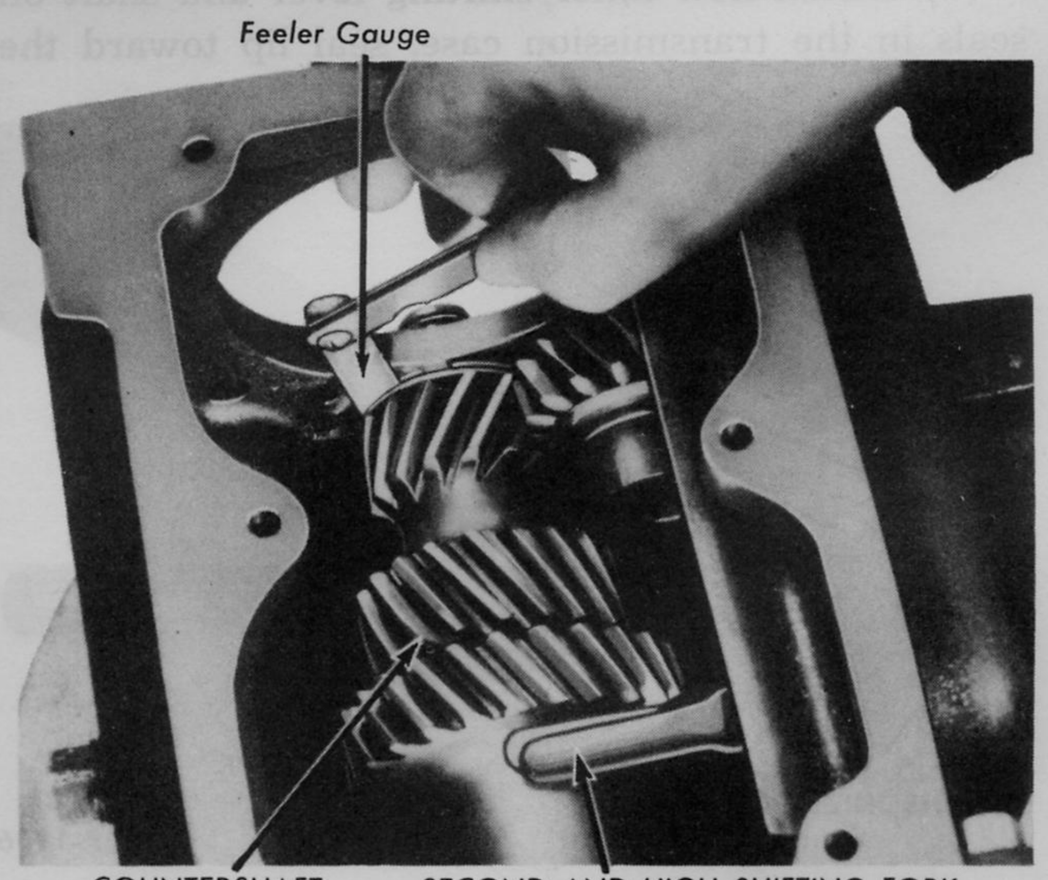


Fig. 203—Checking Countershaft Gear End-Play

respective positions inside the case engaging the shifting fork and shoe in their respective positions on the synchronizer sleeve and low and reverse gear.

11. The drive pinion is installed through the front of the transmission case and positioned so that the pilot of the mainshaft extends into the hub of the pinion, supported in the roller bearings.

End-play in the drive pinion assembly is controlled by the proper assembly of the bearing on the pinion shaft. Four thicknesses of snap rings (.086, .089, .092 and .095 of an inch) are available to permit selective fitting to lock the bearing in place and seat it securely on the pinion shaft. A loose bearing on the pinion shaft will allow end-play through the power train resulting in interlocking and partial engagement of gears.

Fig. 204—Installing Bearing On Pinion Shaft

Assemble the slinger, bearing and snap ring on the drive pinion, with the pinion in the transmission, as follows:

(a) Install the drive pinion bearing slinger on the pinion shaft, with the offset to the gear side to prevent interference with the outer bearing race.

(b) Install the bearing on the pinion shaft using Driver KF-128 (Fig. 204) being careful not to damage the synchronizer unit.

(c) With the bearing fully seated on the pinion shaft, selectively fit and install the snap ring using Snap Ring Pliers C-484. Using a feeler gauge check between the snap ring and bearing to assure a tight fit (Fig. 205). The drive pinion bearing is a slight drive fit in the transmission case and must also be fully seated against the snap ring in the bearing outer race with Driver KF-128.

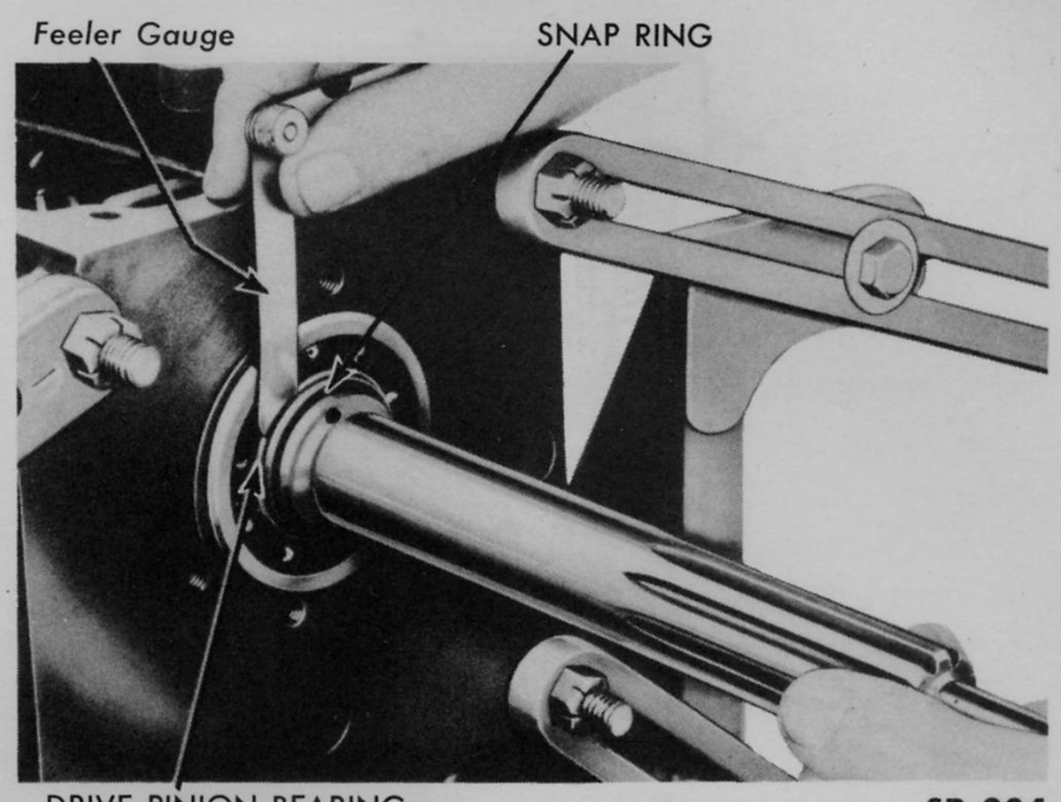


Fig. 205—Checking Fit Of Drive Pinion Bearing Snap Ring

12. Install the drive pinion bearing retainer gasket and the retainer. Gaskets should be selected from the four different thicknesses available to assure tight fit of the retainer against the pinion bearing. Check to see that no end-play of the pinion exists at this point.

13. Install the mainshaft bearing with Driver KF-128, being careful not to damage the synchronizer unit. Install the woodruff key, speedometer drive gear and the snap ring that was previously selected.

14. Install the bearing retainer with a new gasket of the proper thickness to prevent end-play of the mainshaft assembly. Gaskets are available in four different thicknesses. Install a new mainshaft oil seal in the mainshaft bearing retainer using Driver KF-127 (Fig. 206).

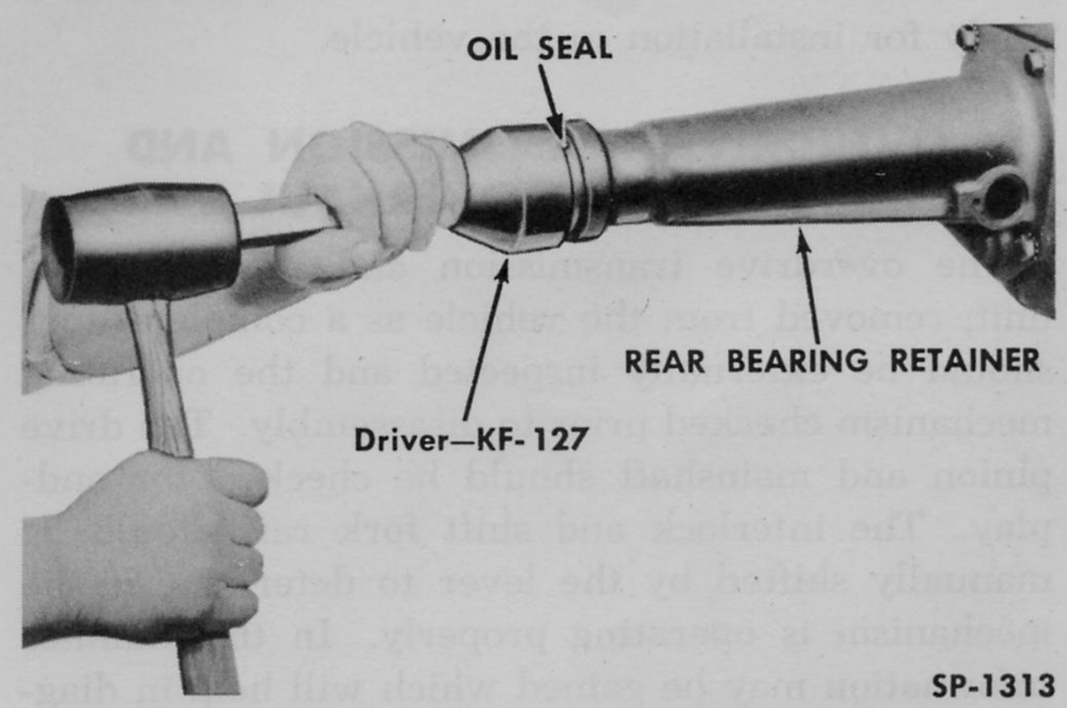
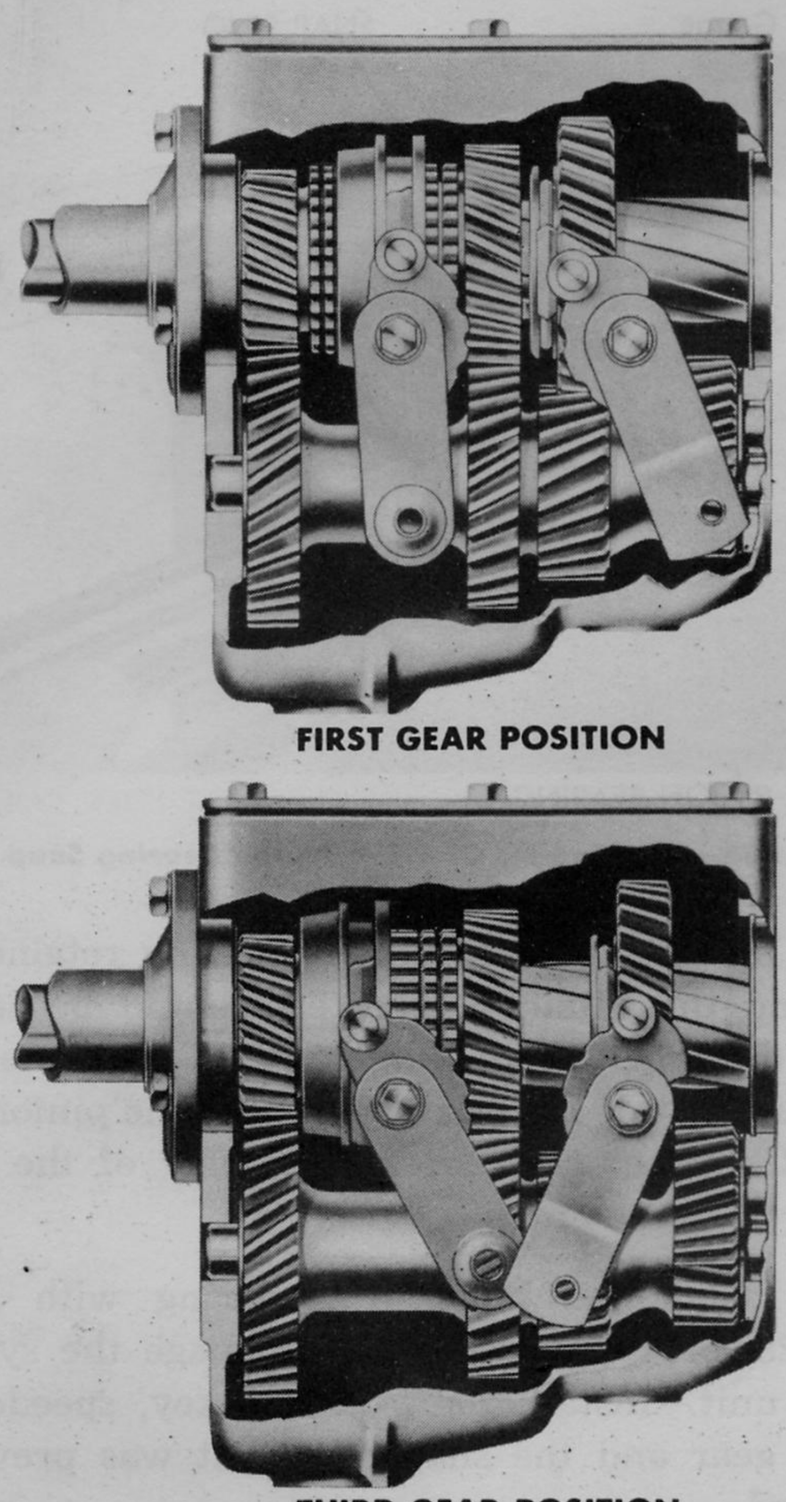
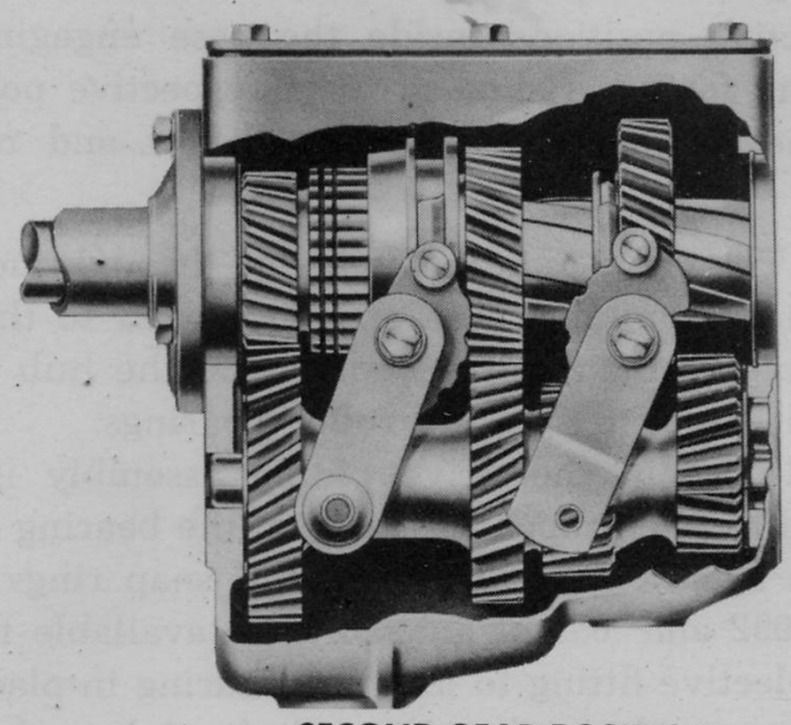


Fig. 206—Installing Mainshaft Oil Seal

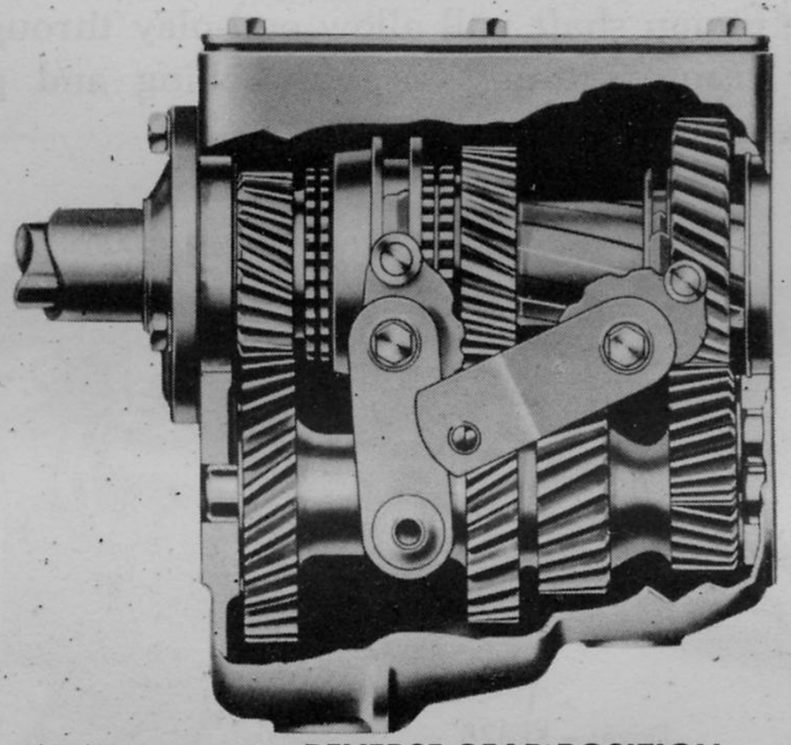


FIRST GEAR POSITION



SECOND GEAR POSITION

THIRD GEAR POSITION



REVERSE GEAR POSITION SP-1213

Fig. 207—Transmission Gearshift Positions

15. Manually check the transmission assembly for free operation in each gear engagement (Fig. 207).

16. Install a new case cover gasket and the cover on the transmission case. The transmission is now ready for installation in the vehicle.

OVERDRIVE TRANSMISSION AND OVERDRIVE OVERHAUL

The overdrive transmission and the overdrive unit, removed from the vehicle as a complete unit, should be externally inspected and the operating mechanism checked prior to disassembly. The drive pinion and mainshaft should be checked for end-play. The interlock and shift fork rail should be manually shifted by the lever to determine if the mechanism is operating properly. In this manner information may be gained which will help in diagnosing either transmission or overdrive trouble.

The procedure which follows covers overhaul of both the transmission and the overdrive, starting with the overdrive and concluding with the transmission. To correct transmission difficulty where disassembly is required, it is recommended that the overdrive be disassembled rather than removed as a unit from the transmission. Then overdrive parts can be inspected to determine if transmission trouble has affected the overdrive mechanism.

a. OVERDRIVE UNIT DISASSEMBLY (Fig. 208). The following disassembly procedure is applicable to all overdrive units, except as noted. With the overdrive unit assembled to the transmission, proceed as follows:

1. Mount the transmission and overdrive on Transmisison Stand KF-100 or suitable holding fixture (Fig. 209).

2. Remove the overdrive solenoid attaching bolts

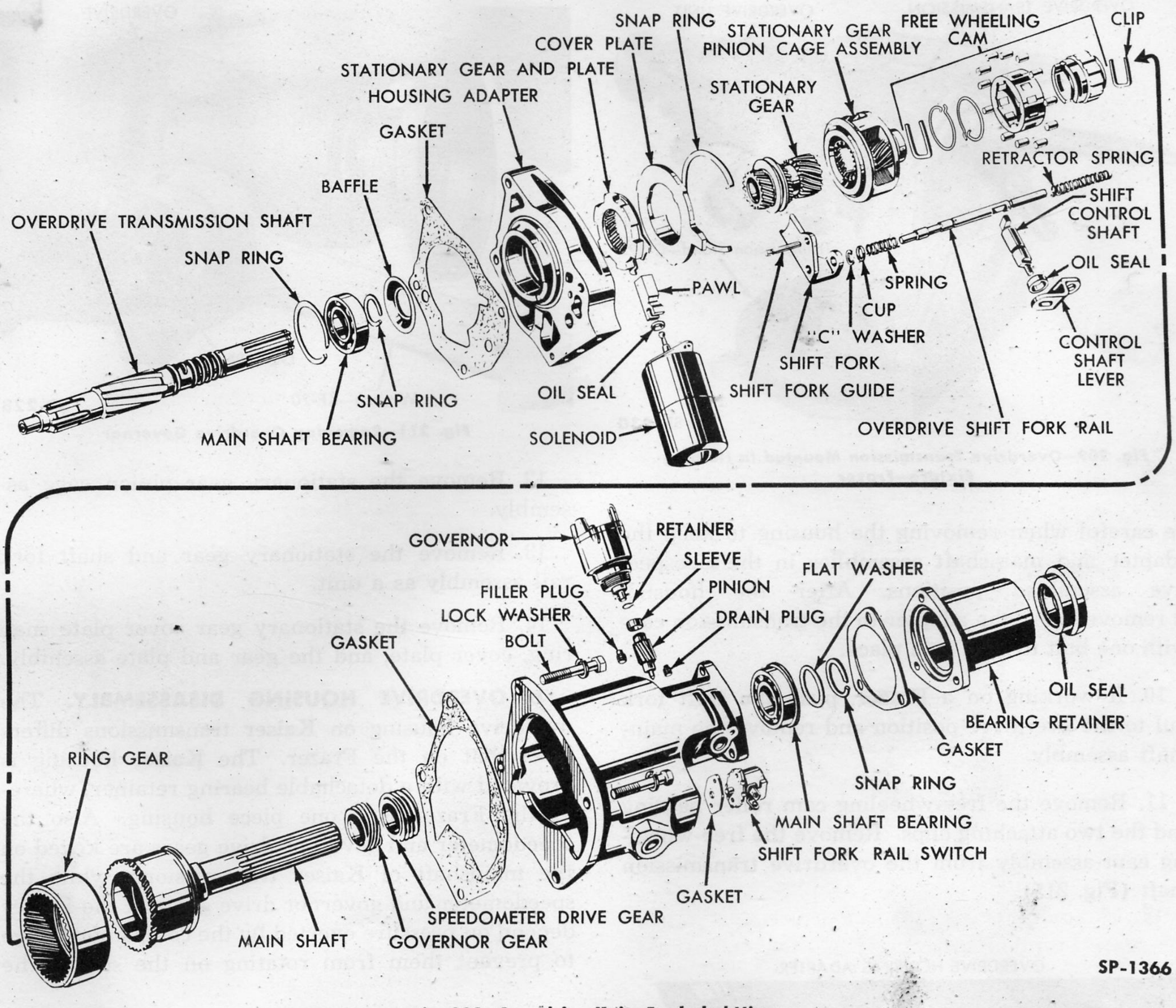


Fig. 208—Overdrive Unit—Exploded View

and washers. Rotate the solenoid clockwise 45 degrees to disengage the plunger from the stationary gear pawl and remove the solenoid (Fig. 210).

3. Remove the governor, using Overdrive Governor Wrench KF-20 (Fig. 211).

4. Remove the shift fork rail switch attaching screws and washers. Lift out the switch and gasket. Discard the gasket.

5. If working on a Frazer, remove the companion flange nut, lock washer and flat washer using Spanner Wrench C-784 to hold the companion flange from turning. Refer to Fig. 212.

6. Remove the companion flange using Flange Puller C-452 (Fig. 212).

7. Install Puller W-165 by turning it into the mainshaft oil seal and turn the puller center screw against the mainshaft to remove the oil seal (Fig. 213).

8. Remove the shift control shaft pin. Pull the shaft outward to disengage the shift fork rail.

9. Remove the bolts and washers attaching the overdrive housing and adapter to the transmission case. The overdrive housing may now be removed. If working on a Kaiser, the mainshaft is removed with the housing (Fig. 214). If working on a Frazer,

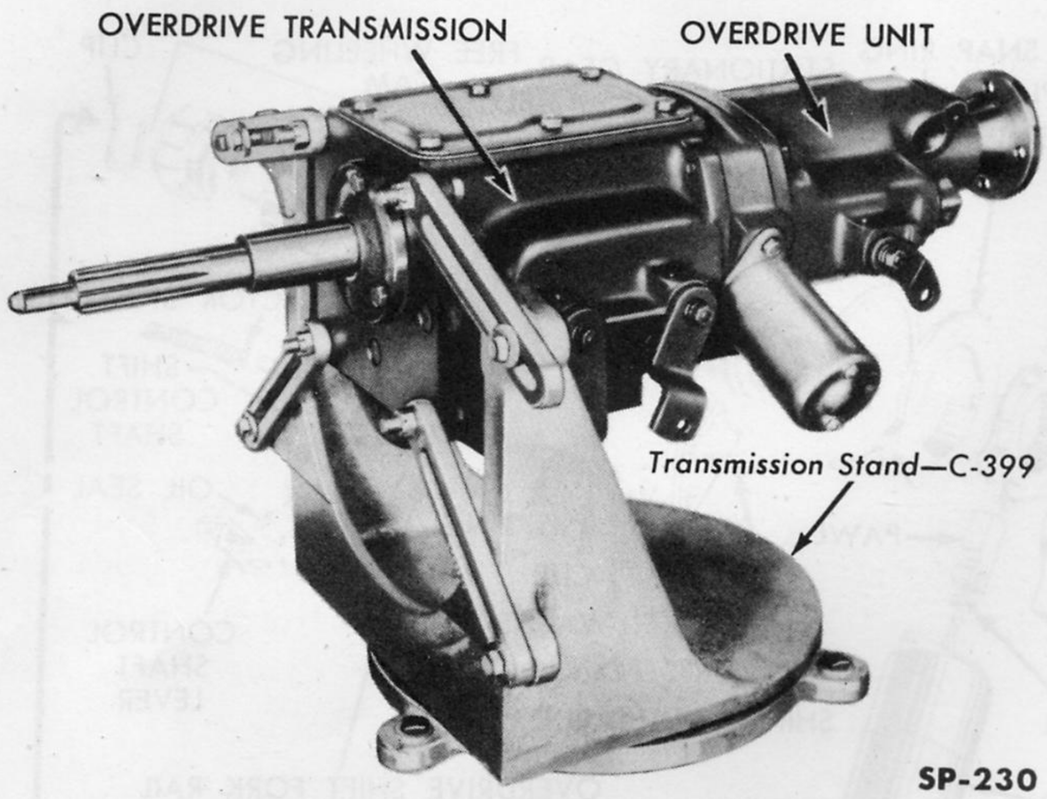


Fig. 209—Overdrive Transmission Mounted In Holding Fixture—Frazer

be careful when removing the housing to keep the adapter and mainshaft assemblies in their respective assembled positions. After the housing is removed, bolt the adapter to the transmission case with one bolt to hold it in place.

10. If working on a Frazer, push the shift fork rail to the overdrive position and remove the mainshaft assembly.

11. Remove the free-wheeling cam roller bearing and the two attaching clips. Remove the free-wheeling cam assembly from the overdrive transmission shaft (Fig. 215).

Fig. 210—Removing Overdrive Solenoid

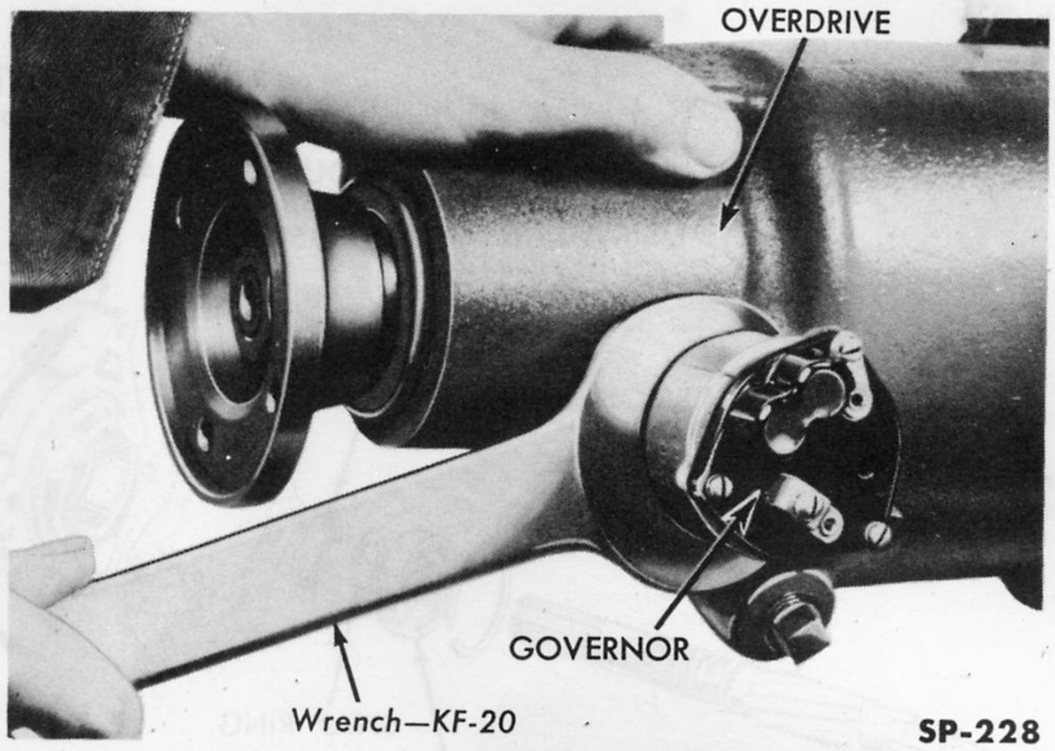


Fig. 211—Removing Overdrive Governor

12. Remove the stationary gear pinion cage assembly.

13. Remove the stationary gear and shaft fork rail assembly as a unit.

14. Remove the stationary gear cover plate snap ring, cover plate, and the gear and plate assembly.

b. OVERDRIVE HOUSING DISASSEMBLY. The overdrive housing on Kaiser transmissions differs from that on the Frazer. The Kaiser housing is provided with a detachable bearing retainer, whereas the Frazer is a one piece housing. Also the speedometer and governor drive gears are keyed on the mainshaft of Kaiser transmissions, while the speedometer and governor drive gears of the Frazer depend on pressure exerted by the companion flange to prevent them from rotating on the shaft. The

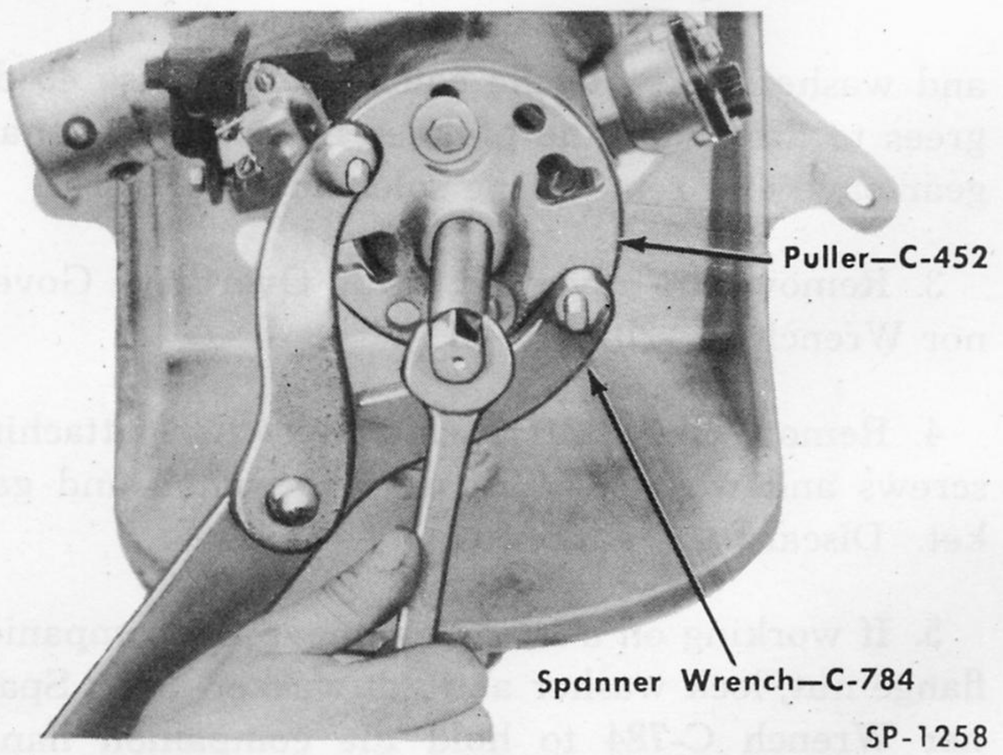


Fig. 212—Removing Companion Flange—Frazer

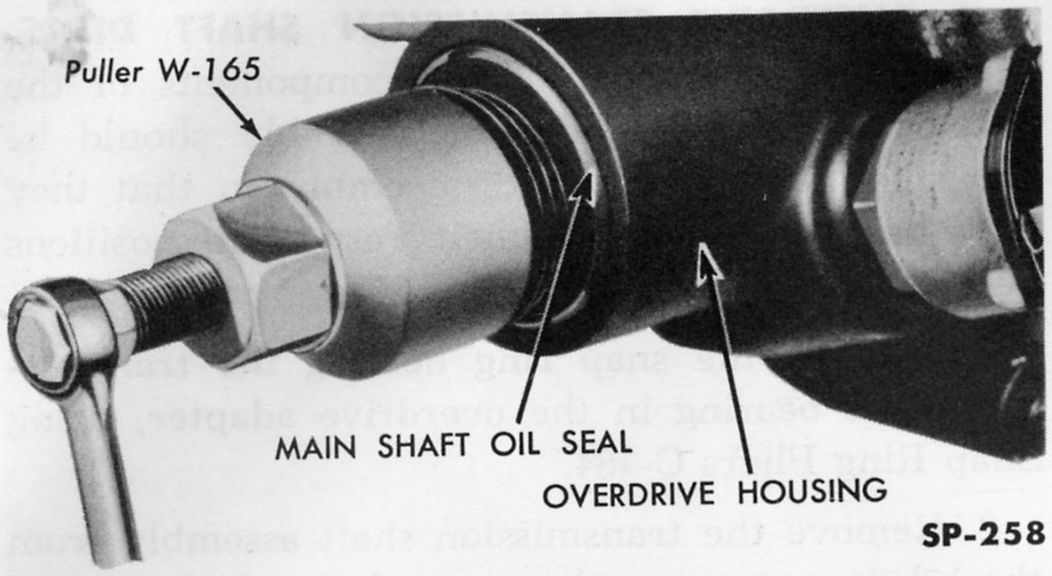


Fig. 213—Removing Mainshaft Oil Seal

Frazer overdrive governor and speedometer drive gears are contained in the rear of the overdrive housing, the governor drive gear positioned ahead of the speedometer drive gear.

1. Frazer Overdrive Housing. To disassemble, proceed as follows:

(a) Remove the rear snap ring and, with a soft metal drift held inside the housing, drive out the rear bearing. Remove the governor and speedometer drive gears.

(b) After removing the snap ring, use a soft metal drift and drive out the inner bearing toward the transmission end of the housing.

(c) Remove the shift control shaft retractor spring.

(d) Remove the control shaft lever nut, lock washer, flat washer and the lever.

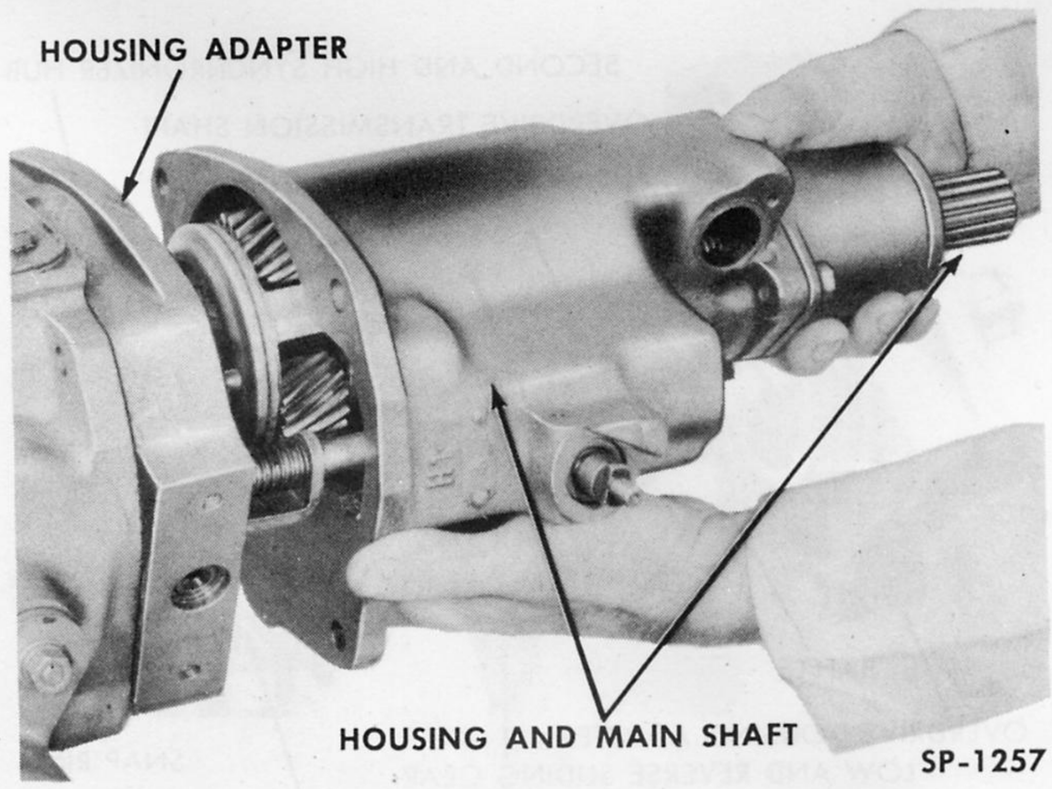


Fig. 214—Removing Overdrive Mainshaft Assembly And Housing—Kaiser

(e) Remove the shift control shaft from inside the housing.

(f) Remove the shift control shaft oil seal from the housing, discarding the seal. This completes the disassembly of the overdrive housing and the overdrive unit.

2. Kaiser Overdrive Housing. To disassemble, proceed as follows:

(a) Remove rear bearing retainer from housing.

(b) Remove the snap ring and washer from the mainshaft and remove the shaft assembly from the housing. Remove the bearing from the housing. Remove speedometer and governor drive gears and woodruff key from mainshaft.

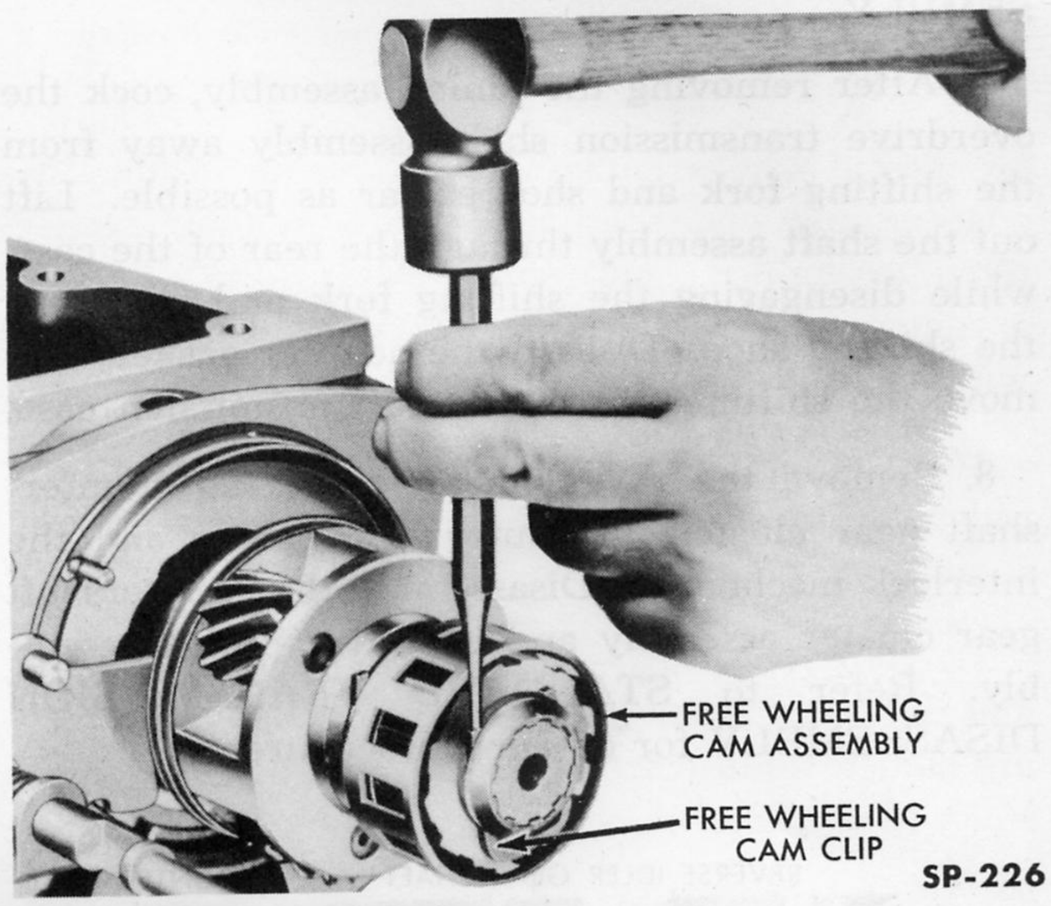


Fig. 215—Removing Free-Wheeling Cam Assembly

(c) Remove the remaining parts from the housing as detailed for the Frazer overdrive housing.

c. OVERDRIVE TRANSMISSION DISASSEMBLY. The disassembly procedure for the overdrive and standard transmissions is the same, except for the mainshaft removal and disassembly. Those procedures which are different, plus minor operations, are detailed below. For the remainder of the operations, references are made to the standard transmission disassembly procedure. Proceed as follows:

1. Remove the transmission case cover bolts, washers, cover, and gasket. Discard the gasket.

2. Remove the three drive pinion bearing retainer bolts and washers and slide the retainer off the pinion shaft. Discard the gasket.

3. Loosen the bolt holding the overdrive housing adapter and gasket to the transmission case so that the adapter may be moved about ¼ of an inch away from the transmission case, allowing access to the reverse idler gear shaft lock plate. Drive out the lock plate using a suitable drift (Fig. 216).

4. Remove the countershaft as outlined in STANDARD TRANSMISSION DISASSEMBLY. However, the countershaft must be removed through the rear opening in the case.

5. Remove the bolt attaching the overdrive adapter to the transmission case.

6. Remove the drive pinion assembly as detailed in STANDARD TRANSMISSION DISASSEMBLY.

7. After removing the pinion assembly, cock the overdrive transmission shaft assembly away from the shifting fork and shoe as far as possible. Lift out the shaft assembly through the rear of the case, while disengaging the shifting fork and removing the shifting shoe. Discard the adapter gasket. Remove the shifting fork from the transmission case.

8. Remove the reverse idler gear, the countershaft gear cluster, the outer shift levers and the interlock mechanism. Disassemble the countershaft gear cluster assembly and the drive pinion assembly. Refer to STANDARD TRANSMISSION DISASSEMBLY for detailed procedures.

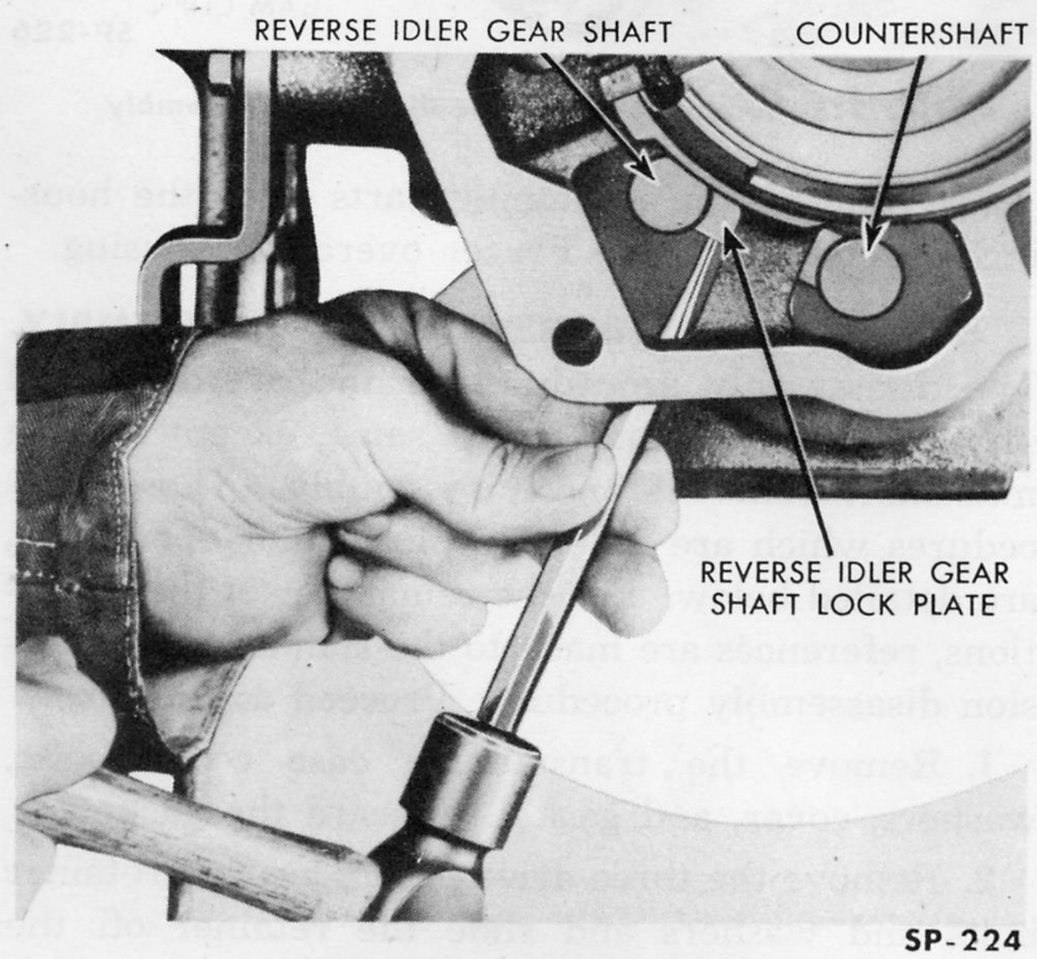


Fig. 216—Removing Reverse Idler Gear Shaft Lock Plate

d. OVERDRIVE TRANSMISSION SHAFT DISASSEMBLY. The position of the components of the overdrive transmission shaft assembly should be carefully noted prior to disassembly so that they may be reassembled in their respective positions (Fig. 217). Proceed as follows:

1. Remove the snap ring holding the transmission shaft bearing in the overdrive adapter, using Snap Ring Pliers C-484.

2. Remove the transmission shaft assembly from the adapter, tapping the rear of the shaft with a rawhide mallet until the bearing is free of the adapter.

3. Remove the transmission shaft bearing snap ring using Snap Ring Pliers C-484.

4. Using a universal puller, remove the transmission shaft bearing.

5. Complete the disassembly of the mainshaft assembly and disassemble the synchronizer unit as described in STANDARD TRANSMISSION DISASSEMBLY. The overdrive transmission is now completely disassembled.

e. OVERDRIVE AND TRANSMISSION INSPECTION AND REPAIR. Prior to the inspection and repair of the disassembled overdrive and transmission, all components should be thoroughly cleaned in a suitable cleaning solvent, except sealed bearings, oil seals, rubber parts and electrical components.

The transmission case and overdrive housing must be cleaned inside and outside, removing any heavy

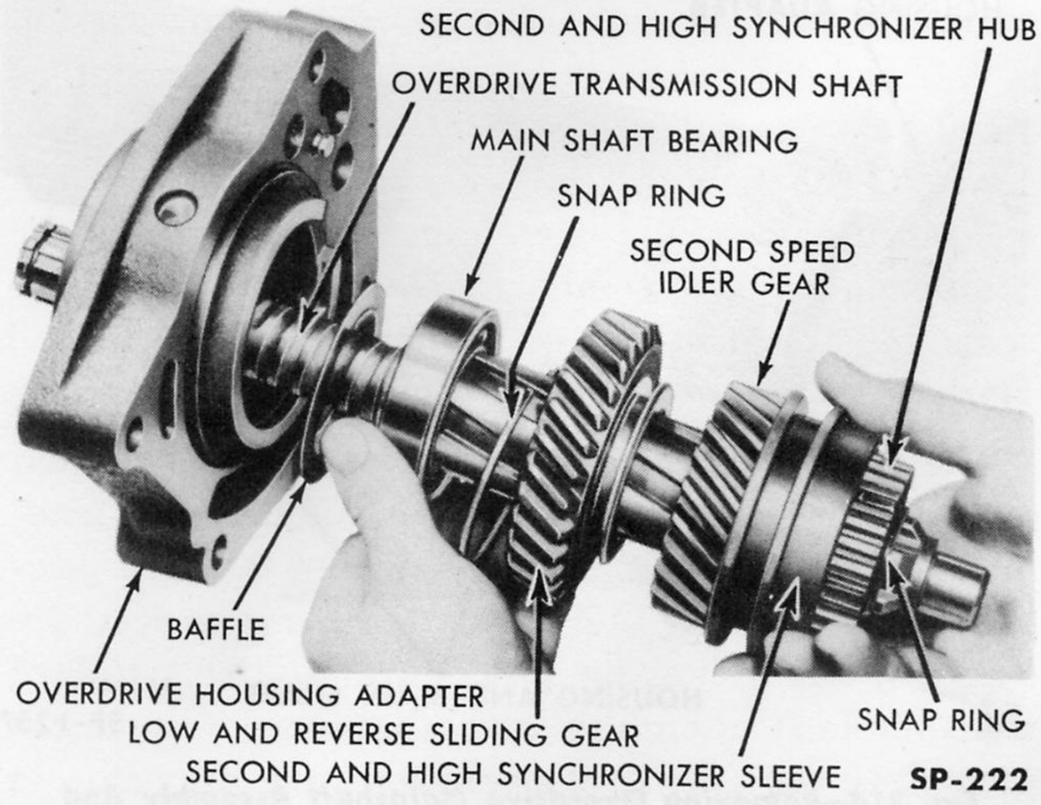


Fig. 217—Overdrive Transmission Shaft Assembly Components

deposits of tar or undercoating from or near parts which move. The components, after cleaning, should be laid out in an orderly manner on a clean bench for inspection.

Inspect the transmission case and overdrive housing for cracks, misaligned holes, warpage and damage caused by broken gears. Replace ball bearings that appear to be loose in the races, discolored from overheating or if the balls have flat spots. Replace roller bearings that appear to be worn or damaged. **NOTE: Whenever wear is evident on a shaft the corresponding gear bearings and/or bushing are probably worn and should be replaced.**

Replace gears that have chipped, worn or broken teeth. Measure the inside diameter of the second speed idler gear and outside diameter of the surface where the second speed gear runs on the mainshaft. If the check discloses in excess of .0035 inch clearance, replace the gear and/or shaft whichever is worn.

Position the first and reverse sliding gear on the mainshaft. Check the gear for looseness (rocking action) on the spline of the shaft within the distance the gear normally travels on the shaft when installed in the transmission. If excessive looseness is noted and the transmission is creeping out of first gear replace the gear and/or shaft, whichever is worn.

Replace the mainshaft or drive pinion if the roller bearing surface is scored or damaged. Defective or worn parts must be replaced.

f. OVERDRIVE TRANSMISSION ASSEMBLY AND ADJUSTMENT. Assemble the overdrive transmission in the reverse sequence of disassembly, except as noted. Be careful to properly position the components in the transmission case. Free rotation and clearance of working parts must be checked as the components are assembled. New gaskets and oil seals must replace those removed. Lubricate all working parts and bearings during assembly.

The gears must be positioned in the transmission case so that the long or offset end of the gear faces toward the front of the case or in the forward position. Refer to Fig. 186. Note that references are made in the following procedure to the standard transmission assembly, and that the adjustment procedure for details of operations are the same in both the overdrive and the standard transmissions.

1. Assemble the drive pinion as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT.

2. Assemble the synchronizer unit as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT.

3. Assemble the overdrive transmission shaft. Other than instructions for assembling the rear bearing and overdrive adapter, the assembly operations for the overdrive transmission shaft and for the standard transmission mainshaft are the same. Proceed as follows:

(a) Assemble the gears and the synchronizer unit on the overdrive transmission shaft as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT. Refer to Fig. 186.

(b) Install the bearing to overdrive adapter snap ring on the overdrive transmission shaft.

(c) Install the transmission shaft bearing on the shaft using Driver KF-128. The bearing must be fully seated against the shoulder of the shaft (Fig. 218).

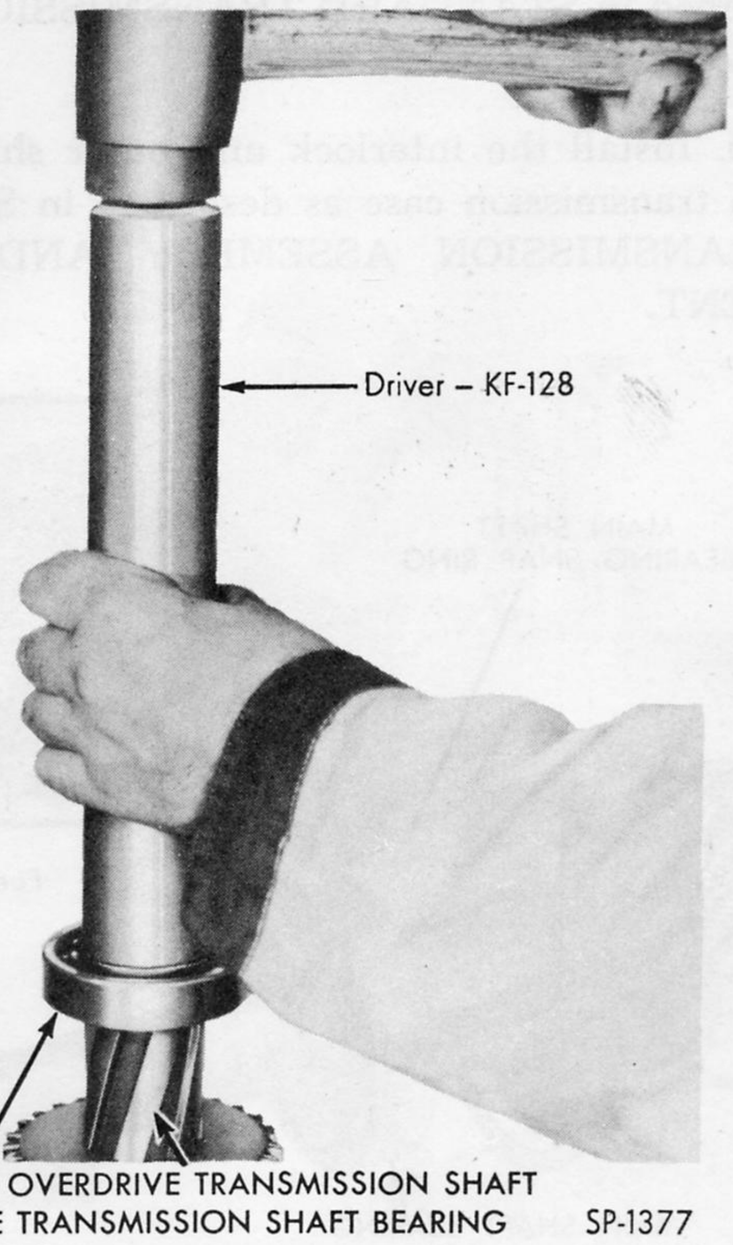


Fig. 218—Installing Overdrive Transmission Shaft Bearing

(d) Selectively fit and install the proper thickness snap ring to hold the bearing securely in position. There must be no end-play or clearance between the inner bearing race, snap ring, and the shoulder of the shaft. (Fig. 219).

(e) Install the baffle and overdrive adapter on the transmission shaft using a rawhide mallet to firmly seat the bearing in the adapter. With the bearing fully seated in the adapter, install the snap ring in the groove. There must be no end-play in the bearing when the proper thickness snap ring is installed.

Check the fit of the snap ring with a feeler gauge (Fig. 220). If the snap ring does not fit tight replace it with a thicker snap ring. Four thicknesses of snap rings (.086, .089, .092 and .095 of an inch) are available to permit selective fitting to lock the bearing in place and seat it securely in the adapter housing. A loose bearing will allow end-play in the power train resulting in interlocking and partial engagement of gears.

The overdrive transmission shaft is now ready for assembly in the transmission case.

4. Assemble the countershaft gear cluster as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT.

5. Install the interlock and outer shift levers in the transmission case as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT.

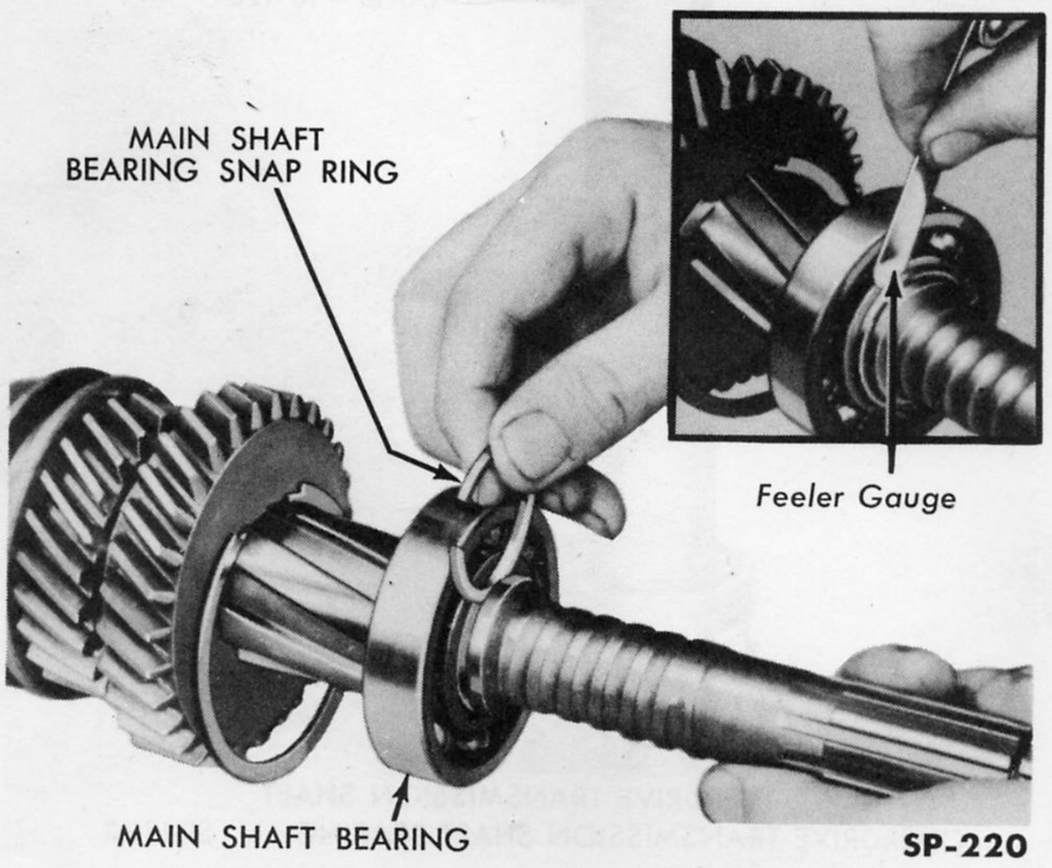


Fig. 219—Checking Fit Of Bearing Snap Ring

6. Install the countershaft gear cluster, the reverse idler gear and shaft, the shifting forks, the overdrive transmission shaft and drive pinion and the drive pinion bearing retainer, as described in STANDARD TRANSMISSION ASSEMBLY AND ADJUSTMENT.

7. With a new gasket in place between the transmission case and the overdrive housing adapter, bolt the adapter in place on the transmission case before assembling the overdrive components.

g. OVERDRIVE HOUSING ASSEMBLY. The assembly of the mainshaft bearing in the overdrive housing requires extreme care to assure its proper position. The rear bearing may be selectively positioned by the thickness of snap ring used during assembly.

1. Frazer Overdrive Housing. To assemble, proceed as follows:

(a) Install a new shift control shaft oil seal in the housing with a suitable driver being careful not to damage the seal.

(b) Position the shift control shaft in the housing and install the lever, flat washer, lock washer and nut. Install the shift control shaft retractor spring in the housing.

(c) Install the inner snap ring in the housing. Install the bearing in the housing with Driver KF-128 making sure the bearing is seated against the inner snap ring. Select an outer snap ring that will allow no end-play between the bearing and snap ring. Snap rings are available in four different thicknesses ranging from .062 to .071 inch thick.

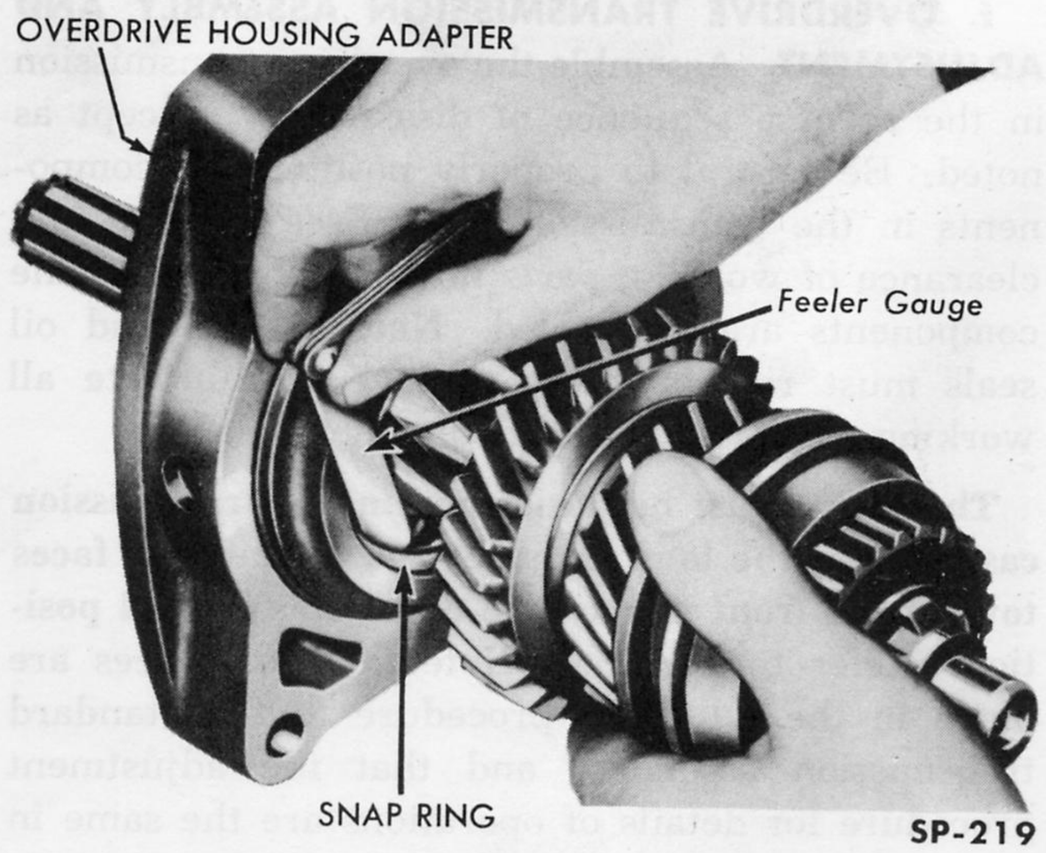


Fig. 220—Checking Fit of Bearing Snap Ring In Adapter

The housing is now ready for installation.

2. Kaiser Overdrive Housing. To assemble, proceed as follows:

(a) Install the oil seal, shift control shaft and retractor spring in the housing as detailed under FRAZER OVERDRIVE HOUSING above.

(b) Install the woodruff key in the mainshaft. Install the governor (narrow) gear and speedometer drive gear on the shaft. Hold the shaft assembly in position in the housing and install the bearing, plain washer and snap ring on the shaft.

Check the clearance between the flat washer and bearing and washer. If any clearance exists select a thicker snap ring. Snap rings are available in four different thicknesses ranging from .086 to .095 inch thick.

The housing is now ready for installation.

h. OVERDRIVE UNIT ASSEMBLY AND ADJUSTMENT. The overdrive components are assembled in the following manner:

1. Install the gear and plate assembly on the overdrive transmission shaft and seat it in the adapter housing (Fig. 221). Note the position of the plate.

2. Install the stationary gear pawl in the adapter housing.

3. Install the cover plate on the overdrive transmission shaft and seat it in the adapter housing. Refer to Fig. 221.

4. Install the stationary gear cover plate snap ring.

5. Install the stationary gear and the shift fork rail assembly together (Fig. 222).

6. Install the stationary gear pinion cage assembly.

7. Install the free-wheeling cam assembly and the cam roller bearings. The bearings may be held in place on the cam with grease until the mainshaft and ring gear assembly, or housing and mainshaft assembly, if working on a Kaiser, is installed.

8. Remove the one bolt from the overdrive housing adapter. Move the shift fork rail to the unlocked position so that the gears in the pinion cage assembly are free to rotate. Place a new gasket on the overdrive housing adapter, using grease to hold it in place. On a Frazer, install the mainshaft and ring gear assembly, or housing and mainshaft if working on a Kaiser, slowly rotating the mainshaft counterclockwise until the pinion cage gears are fully engaged (Fig. 223). On a Frazer, install the overdrive housing.

9. Install the four bolts and lock washers, with the control cable bracket on the lower left hand bolt, to

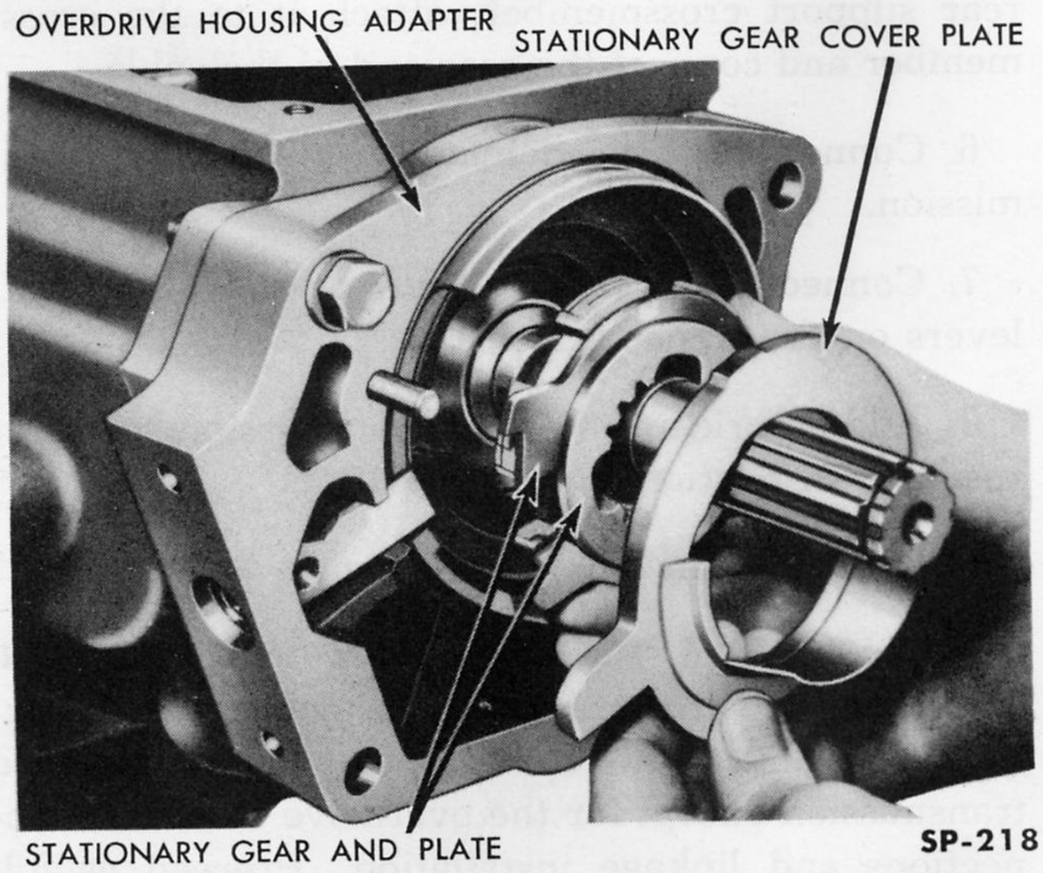


Fig. 221—Installing Gear And Plate Assembly In Adapter

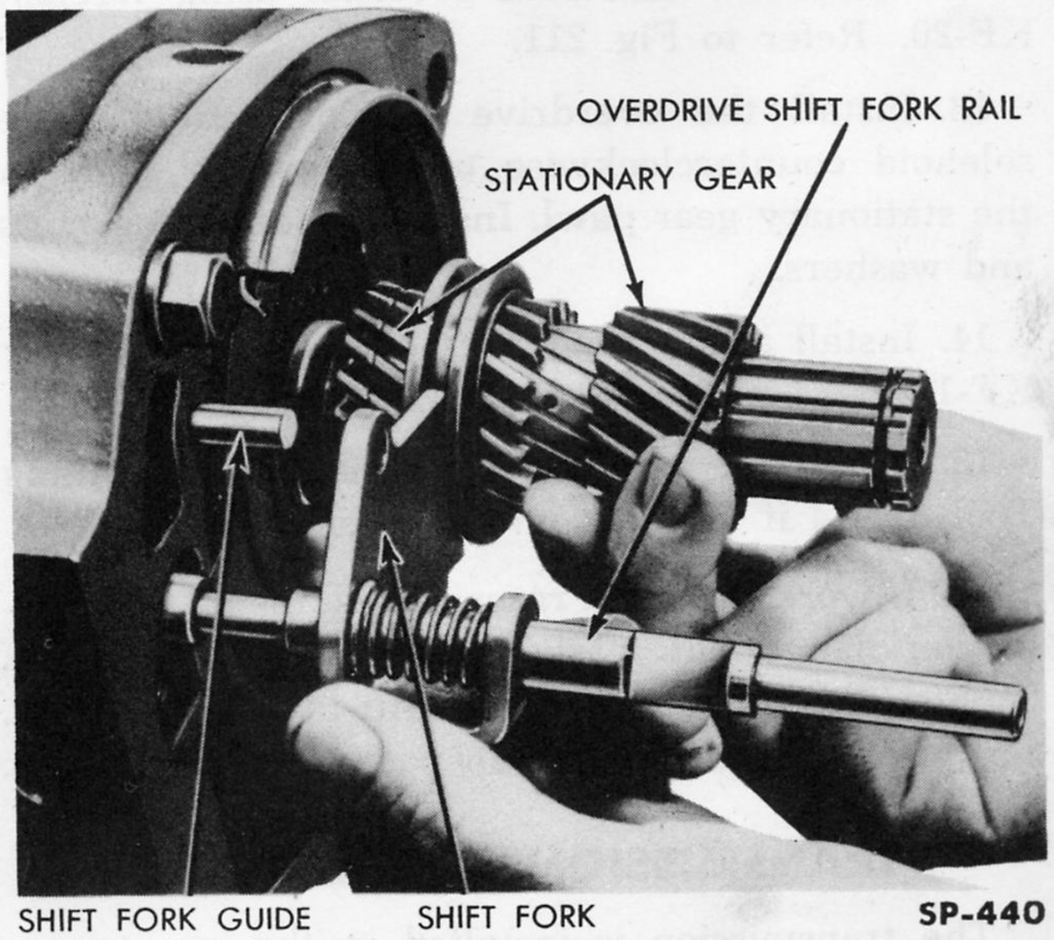


Fig. 222—Installing Stationary Gear and Shift Fork Rail Assembly

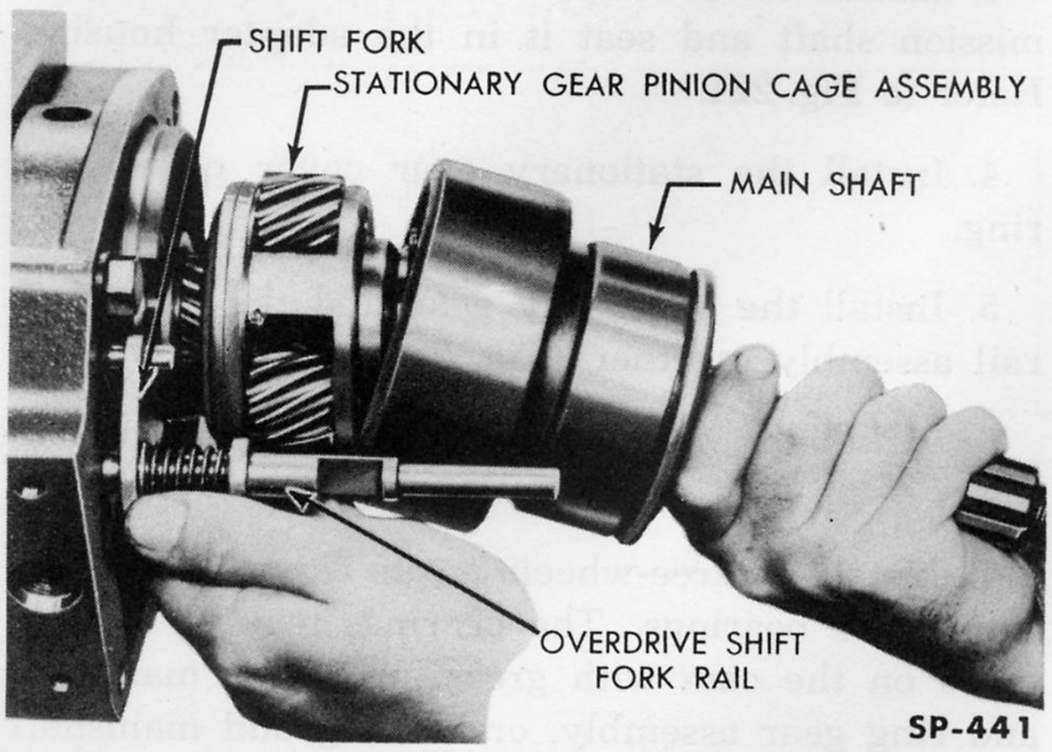


Fig. 223—Installing Mainshaft And Ring Gear—Frazer

attach the overdrive housing and adapter to the transmission case and tighten securely.

10. Push the shift control shaft inward to engage the shift fork rail and install the taper pin. Install the control shaft lever, flat washer, lock washer, and nut.

11. If working on a Kaiser select a gasket that will allow no end-play of the mainshaft and still will seal the slip joint housing to the overdrive housing. Gaskets are available in four different thicknesses ranging from .003 to .012 inch. Install the gasket and slip joint housing, bolting it to the overdrive housing.

12. Install the overdrive governor using Wrench KF-20. Refer to Fig. 211.

13. Install the overdrive solenoid. Rotate the solenoid counterclockwise to engage the shaft in the stationary gear pawl. Install the attaching bolts and washers.

14. Install a new mainshaft oil seal using Driver KF-127.

15. Install the companion flange using Installing Tool KF-14 if working on a Frazer model.

16. If working on a Frazer model, install the companion flange flat washer, lock washer and nut. Tighten the companion flange nut to 100-140 ft. lbs. torque. The overdrive is now completely assembled.

TRANSMISSION INSTALLATION

The transmission is installed in the reverse sequence of the removal procedure. The overdrive transmission and the overdrive are installed as a unit.

a. STANDARD TRANSMISSION INSTALLATION. Proceed as follows:

1. Lift the transmission into place in the vehicle, inserting the transmission pinion shaft through the clutch release bearing sleeve and through the splined hub of the clutch disc so that the pilot on the end of the shaft is seated in the crankshaft pilot bushing.

2. Install and tighten the four transmission case bolts. Secure the engine rear support insulator to the transmission case with two cap screws and lock washers.

3. Install the engine rear support crossmember and attach it to the frame with bolts, washers and nuts, tightening the nuts securely. Install the two bolts, washers and nuts to attach the engine rear support insulator to the crossmember.

4. On Kaiser models slip the propeller shaft front yoke into the transmission. Connect the propeller shaft securely to the flange on the rear axle with the two U bolts, lock washers and nuts.

On Frazer models move the front end of the front propeller shaft into place on the transmission companion flange and connect the two by installing the four bolts. Refer to Section 7, "Propeller Shafts and Universal Joints" for additional information.

5. Install the hand brake cable through the engine rear support crossmember, attach it to the crossmember and connect the rear end of the cable.

6. Connect the speedometer cable at the transmission.

7. Connect the gearshift rods at the outer shift levers on the transmission.

8. Add lubricant to the transmission case as specified in Section 17, "Lubrication."

9. Road test the vehicle for proper operation.

b. OVERDRIVE TRANSMISSION INSTALLATION. The overdrive transmission and overdrive installation, as a unit, is the same as that of the standard transmission except for the overdrive electrical connections and linkage installation. Proceed as follows:

1. Install the overdrive transmission and overdrive as outlined under STANDARD TRANSMISSION INSTALLATION.

2. Connect the speedometer cable at the overdrive housing.

3. Connect the electrical wiring at the shift fork rail switch terminal and the solenoid terminals at the overdrive unit.

4. Connect the overdrive control wire in the control shaft lever swivel and at the tie-down clips. Set the overdrive control adjustment by pushing the control knob in and rotating the control shaft lever on the housing to the rear or engaged position. The control assembly must then be aligned with the lever and the wire secured in the swivel.

5. Add lubricant to the overdrive housing as specified in Section 17, "Lubrication."

6. Road test the vehicle for proper operation.

SPEEDOMETER GEARS

The speedometer drive gear is located toward the front of the transmission housing on the standard transmission and in the rear of the overdrive housing in the overdrive transmission. The spiral tooth drive gear is designed to mesh with the teeth of the speedometer pinion gear on the speedometer cable. The ratio of the speedometer drive and pinion gears is coordinated with the rear axle gear ratio to provide accurate speedometer readings for that rear axle ratio.

Whenever the rear axle gear ratio is changed it may also be necessary to change the ratio of the speedometer drive and pinion gears to obtain correct speedometer readings. The following chart indicates the application of speedometer gears in relation to rear axle gear ratios.

SPEEDOMETER GEARS

Model	Axle Ratio	Trans. Type	Drive Gear No. of Teeth	Pinion No. of Teeth
1951 K-511, 512	3.54:1	HYD	7	18
	3.91:1	STD	6	17
	4.09:1	STD	6	18
	4.27:1	STD	6	19
	4.55:1	STD	6	20
	4.27:1	OD	6	19
	4.55:1	OD	6	20
1951 F-515, 516	3.54:1	HYD	7	18
	4.27:1	OD	6	19
	4.55:1	OD	6	20

STD — Standard Transmission
OD — Overdrive Transmission
HYD — Hydra-Matic Drive

GEARSHIFT MECHANISM

The engagement of the transmission gears is selectively controlled by the gearshift mechanism. The gearshift is manually operated at the upper shift lever on the steering column to actuate the linkage to the outer shift levers of the transmission. The gearshift mechanism for the Kaiser and Frazer models is covered separately.

a. GEARSHIFT MAINTENANCE AND ADJUSTMENT —FRAZER (Fig. 224). Maintenance of the gearshift mechanism consists mainly of periodic lubrication as outlined in Section 17, "Lubrication."

The gearshift mechanism is properly adjusted at the factory and should require no periodic adjustment. In the event of damage, or replacement of parts of the gearshift mechanism, adjustment should be made as follows:

1. Check the engine mounting bolts to assure their proper tightness.

2. Disconnect the gearshift rods at the lower levers on the steering jacket and at the outer shift levers of the transmission.

3. Check the operation of the upper gearshift lever shaft and brackets. If operation is stiff, or if binding is evident, loosen the upper and lower brackets and align them properly on the steering column jacket.

4. The lower levers and cross shaft bellcranks must be free to rotate on the shaft. Proper lubrication at these points should relieve any binding condition.

5. Align the lower shift levers using a length of ¼ inch drill rod through the lever aligning holes and extending into the hole provided in the lower bracket. Operate the gearshift upper lever to assure no bind occurs between the lower lever slots and the shaft pin.

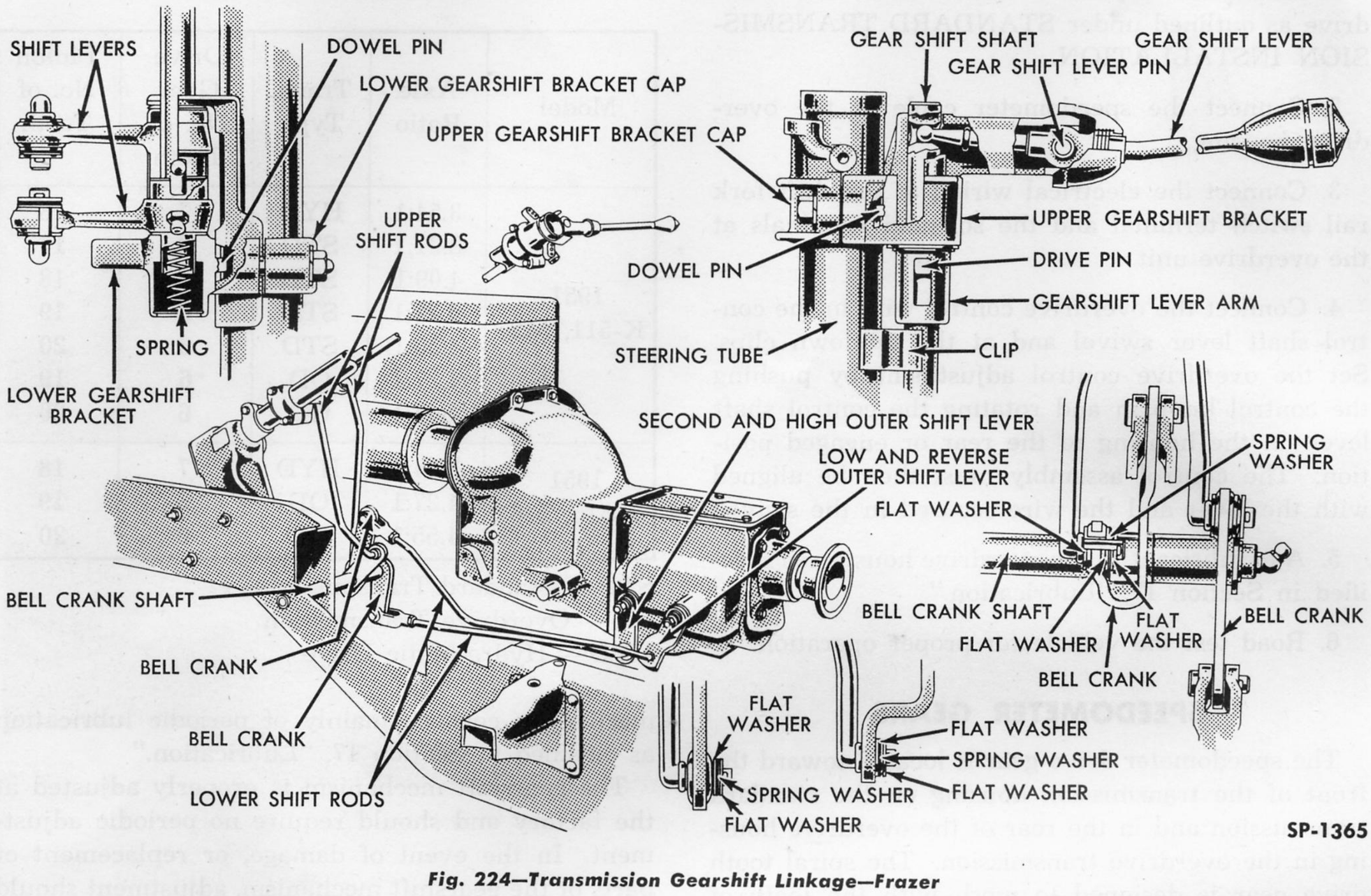


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Fig. 224—Transmission Gearshift Linkage—Frazer

6. With the transmission outer levers in the neutral position adjust and install the shift rods. Adjust the rod end to align with the lever and bellcrank attaching holes while in the neutral position. **Do not move the levers or bellcranks to fit the rod length.**

7. Remove the drill rod from the lower levers.

8. To provide proper travel of the upper shift lever and to assure full gear engagement, position the shift lever as follows:

(a) Disconnect the second and high shift rod at the transmission outer lever and shift the transmission into second gear (move the front lever on the transmission to the forward position). Move the upper shift lever on the steering jacket into second gear position and check the position of the rod end in relation to the attaching hole in the lever on the transmission. For proper position the rod should be slightly short of the lever hole, requiring the upper shift lever to be moved back to make the connection.

(b) Repeat this procedure in each gear engagement. In the first and high position the rod must be slightly longer in relation to the attaching hole in the lever. Adjustment at the rod clevis will provide the proper relationship between the two components.

9. After proper positioning of the upper shift lever throw, return to the neutral position and install the shift rod washer, and cotter pins complete.

b. GEARSHIFT MAINTENANCE AND ADJUSTMENT —KAISER (Fig. 225).

Maintenance of the gearshift mechanism consists mainly of periodic lubrication as outlined in Section 17, "Lubrication."

The gearshift mechanism is properly adjusted at the factory and should require no periodic adjustment. In the event of damage, or replacement of parts of the gearshift mechanism, adjustment should be made as follows:

1. With the shift lever below the steering wheel in neutral position, loosen the trunnion lock nuts at each lever on the steering jacket.

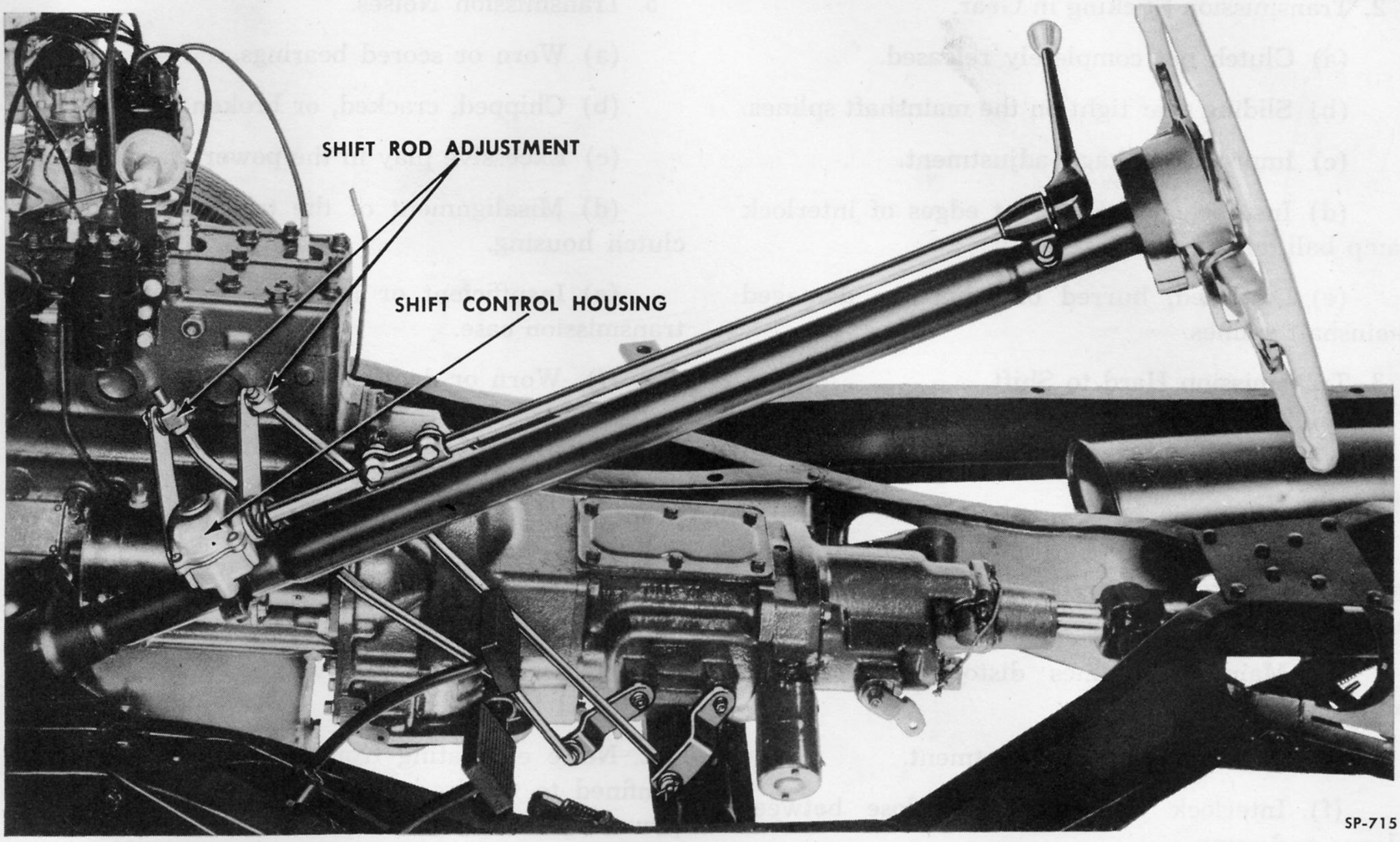

Fig. 225—Transmission Gearshift Linkage—Kaiser

2. Remove the cap from the shift lever housing and install Gauge KF-69 in the housing (Fig. 226).

3. Run the lock nuts up against the pivots and tighten, being careful not to spring the levers.

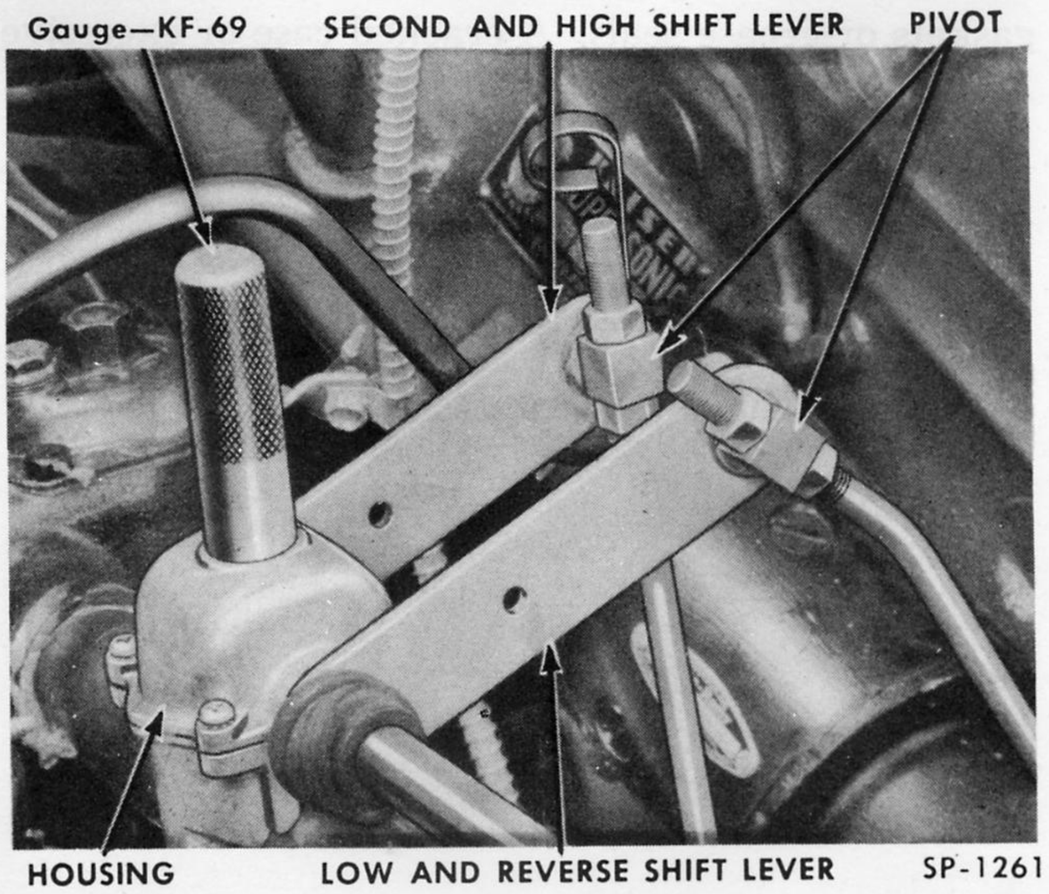

Fig. 226—Gearshift Linkage Adjustment—Kaiser

4. Remove the gauge and install the cap.

SERVICE DIAGNOSIS

Proper and thorough diagnosis should precede any disassembly of either the standard or overdrive transmission, overdrive unit or gearshift mechanism. Usually by careful checking and elimination the difficulty may be correctly diagnosed, saving time and labor.

a. STANDARD AND OVERDRIVE TRANSMISSION. Transmission troubles are usually confined to the following:

1. Transmission Slipping Out of Gear.

(a) Improper linkage adjustment.

(b) Insufficient throw or travel of upper clearance.

(c) Interlock ramp worn or too much ramp clearance.

(d) Excessive end-play in the power train through the transmission preventing full gear engagement.

2. Transmission Sticking in Gear.

(a) Clutch not completely released.

(b) Sliding gear tight on the mainshaft splines.

(c) Improper linkage adjustment.

(d) Insufficient chamfer at edges of interlock ramp ball detent.

(e) Distorted, burred or otherwise damaged mainshaft splines.

3. Transmission Hard to Shift.

(a) Clutch not released.

(b) Synchronizing unit sleeve is too tight on the hub.

(c) Synchronizer blocking ring too tight, caused by improper end-play between synchronizer and idler gear.

(d) Mainshaft splines distorted, burred or otherwise damaged.

(e) Improper linkage adjustment.

(f) Interlock clearances too close between sleeve and ramp.

(g) Misalignment of components within the transmission case.

4. Transmission Oil Leaks.

(a) Loose drain or filler plugs.

(b) Leaky or missing gaskets and oil seals.

(c) Cracked case.

(d) Lubricant level too high.

(e) Damaged or improperly installed oil slinger.

5. Transmission Noises.

(a) Worn or scored bearings.

(b) Chipped, cracked, or broken gear teeth.

(c) Excessive play in the power train.

(d) Misalignment of the transmission on the clutch housing.

(e) Insufficient or improper lubricant in the transmission case.

(f) Worn or damaged speedometer gears.

b. OVERDRIVE UNIT. Overdrive trouble is usually confined to the failure of the unit to disengage properly.

1. Overdrive will not disengage to permit shifting into reverse. This is caused by the failure of the stationary gear pawl to disengage from the blocker ring. Corrective measures will be found in Section 15, "Electrical."

2. Noise emanating from the overdrive may be confined to the free-wheeling unit or gears of the power train through the overdrive.

(a) Worn, chipped, or broken teeth on the stationary gear, gear pinion cage assembly, or ring gear.

(b) Worn or scored mainshaft bearing.

(c) Worn or scored free-wheeling unit.

3. Oil leaks may be traced to leaky, worn or torn gaskets or grease seals. A cracked case or excessive lubricant will also cause grease leaks.

4. Improper end-play in the mainshaft will cause malfunctioning of the overdrive.