

CONTENTS

SUBJECT	PAGE	SUBJECT	PAGE
GENERAL	73	OVERDRIVE TRANSMISSION	82
MAINTENANCE AND ADJUSTMENT.	73	Overdrive Operation	83
TRANSMISSION GEARSHIFT LINKAGE	74	Removal	84
Adjustment	74	Repair.	84
STANDARD TRANSMISSION	75	Installation	88
Removal	76	SPEEDOMETER GEARS.	88
Repair.	76	SERVICE DIAGNOSIS.	89
Installation	81		

GENERAL

Henry J models are available with "Standard" or "Overdrive" transmission. The overdrive transmission is essentially a standard transmission with an overdrive unit attached to the rear. The main difference between the transmission used with the overdrive unit and the standard transmission is in the transmission case and the mainshaft. The overdrive unit, therefore, cannot be installed on a standard transmission.

The repair and adjustment procedures for the standard transmission are applicable to the transmission unit used with overdrive.

MAINTENANCE AND ADJUSTMENT

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

Proper adjustment of the shift linkage is made at the factory and should not require periodic attention. However, if the transmission is removed it may be necessary to adjust the linkage after the installation, as described under "Transmission Gearshift Linkage Adjustment" in this section.

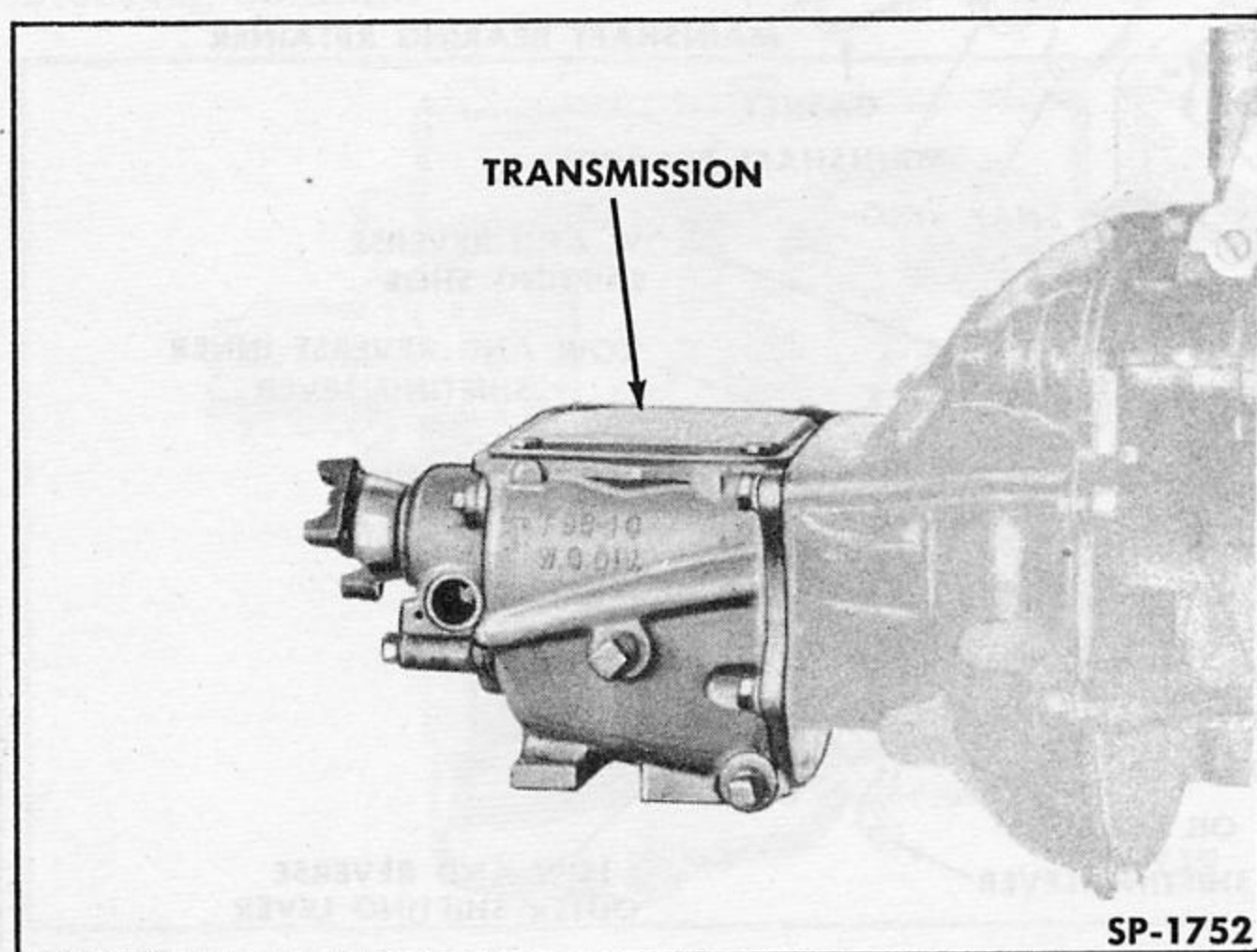


Fig. 116—Standard Transmission

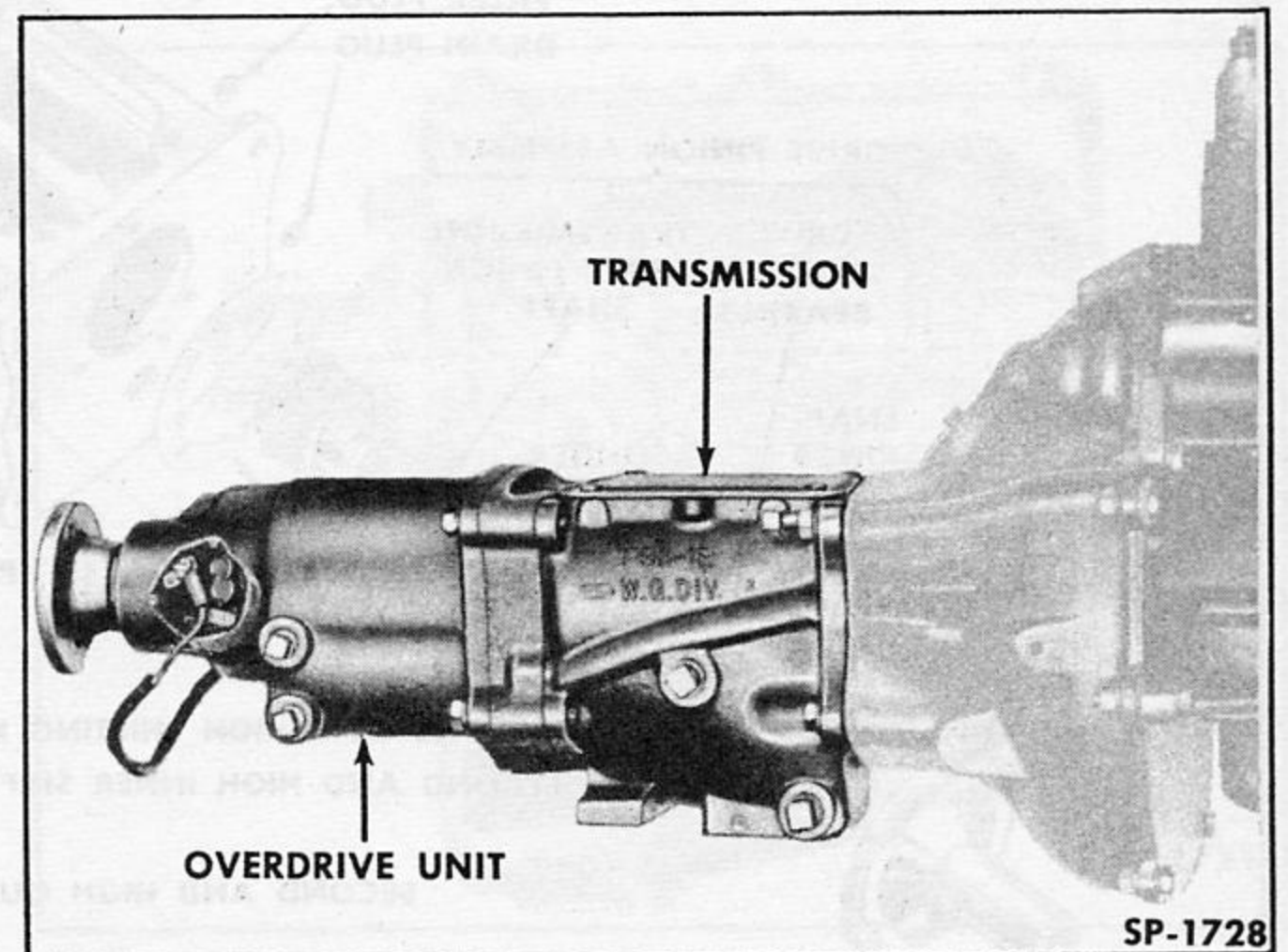


Fig. 117—Overdrive Transmission

HENRY J SHOP MANUAL

Refer to Section 15, "Electrical", for overdrive electrical circuit diagram and trouble-shooting procedures.

TRANSMISSION GEARSHIFT LINKAGE

The gearshift control levers are mounted on the steering column jacket (Fig. 119) with two rods connected directly between the lower control levers and the transmission outer shifting levers. The relatively few parts in the mechanism assure easy shifting effort and simplify maintenance and adjustment.

LINKAGE ADJUSTMENT

Adjustment of the gearshift linkage should be performed as follows:

1. Place upper control lever in neutral position.
2. Raise hood and loosen adjusting nuts on both lower levers.
3. Remove cap from lower lever housing and install Remote Control Gearshift Gauge KF-69 in the housing to center the cam on lower shaft.
4. Run adjusting nuts up against pivots and tighten, being careful not to spring the rods.
5. Remove gauge and install cap.

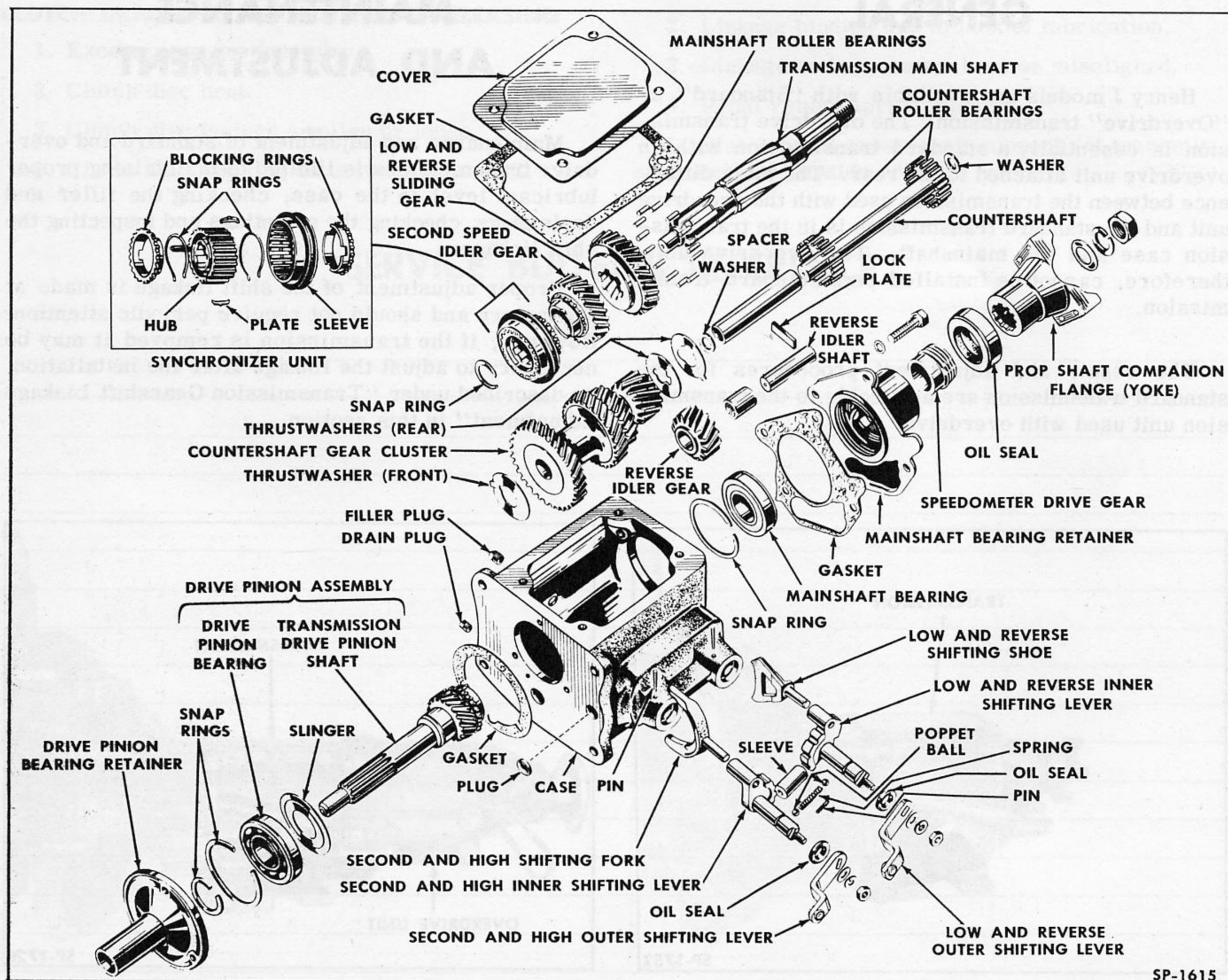


Fig. 118—Standard Transmission—Exploded View

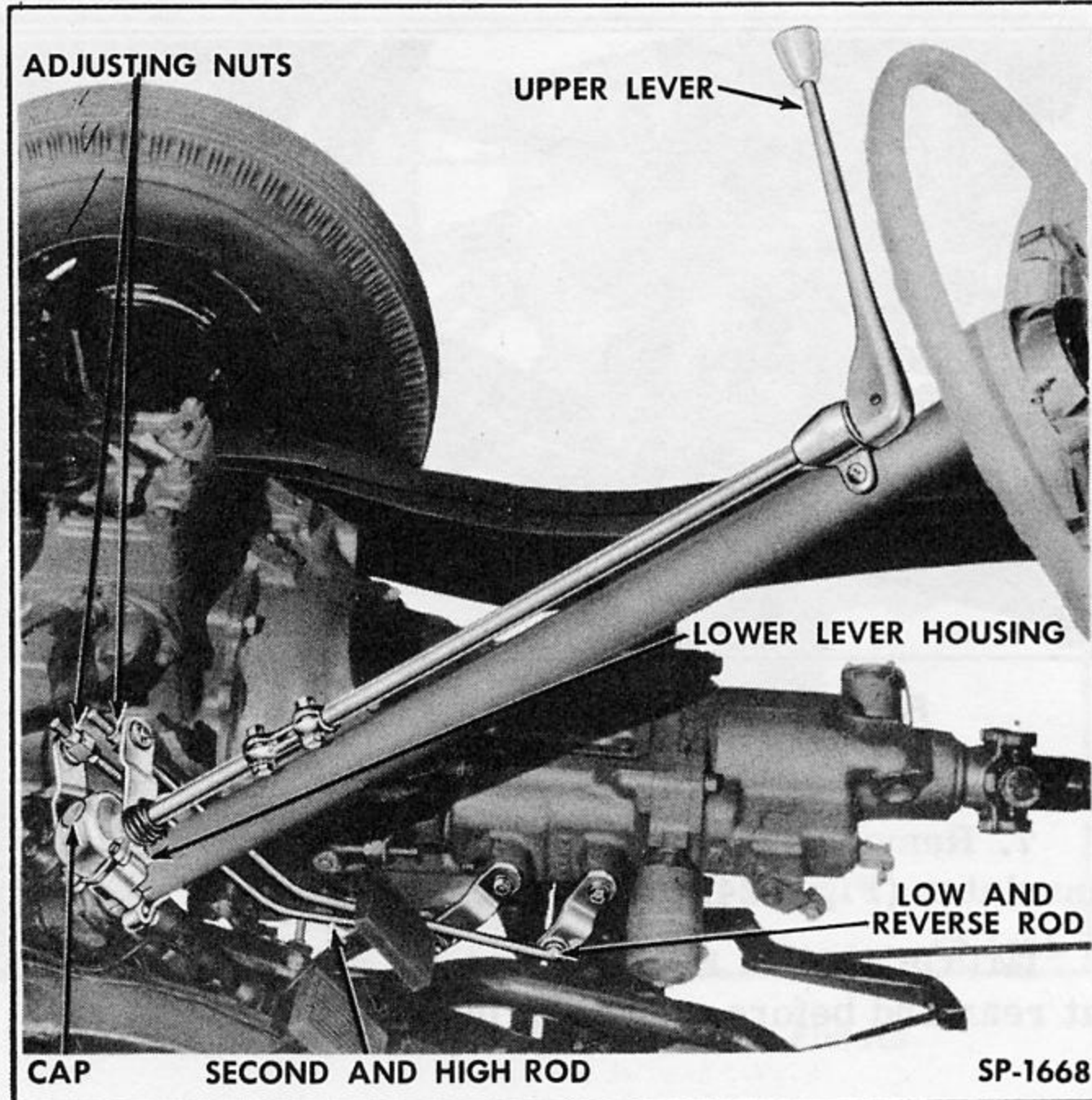


Fig. 119—Transmission Gearshift Linkage

STANDARD TRANSMISSION

The transmission gear train is of the synchromesh type which, by use of a synchronizing unit and constant mesh of the countershaft gears, assures smooth, silent shifting into second and high gear. An interlock mechanism is provided to assure positive gear engagement and prevent the selection of more than one "gear" at a time. The transmission gears are helically cut and hardened to provide silent operation and long trouble free service life. The gears are shifted in or out of the three forward and one reverse gear ratios by mechanical linkage to the gear shift lever on the steering column.

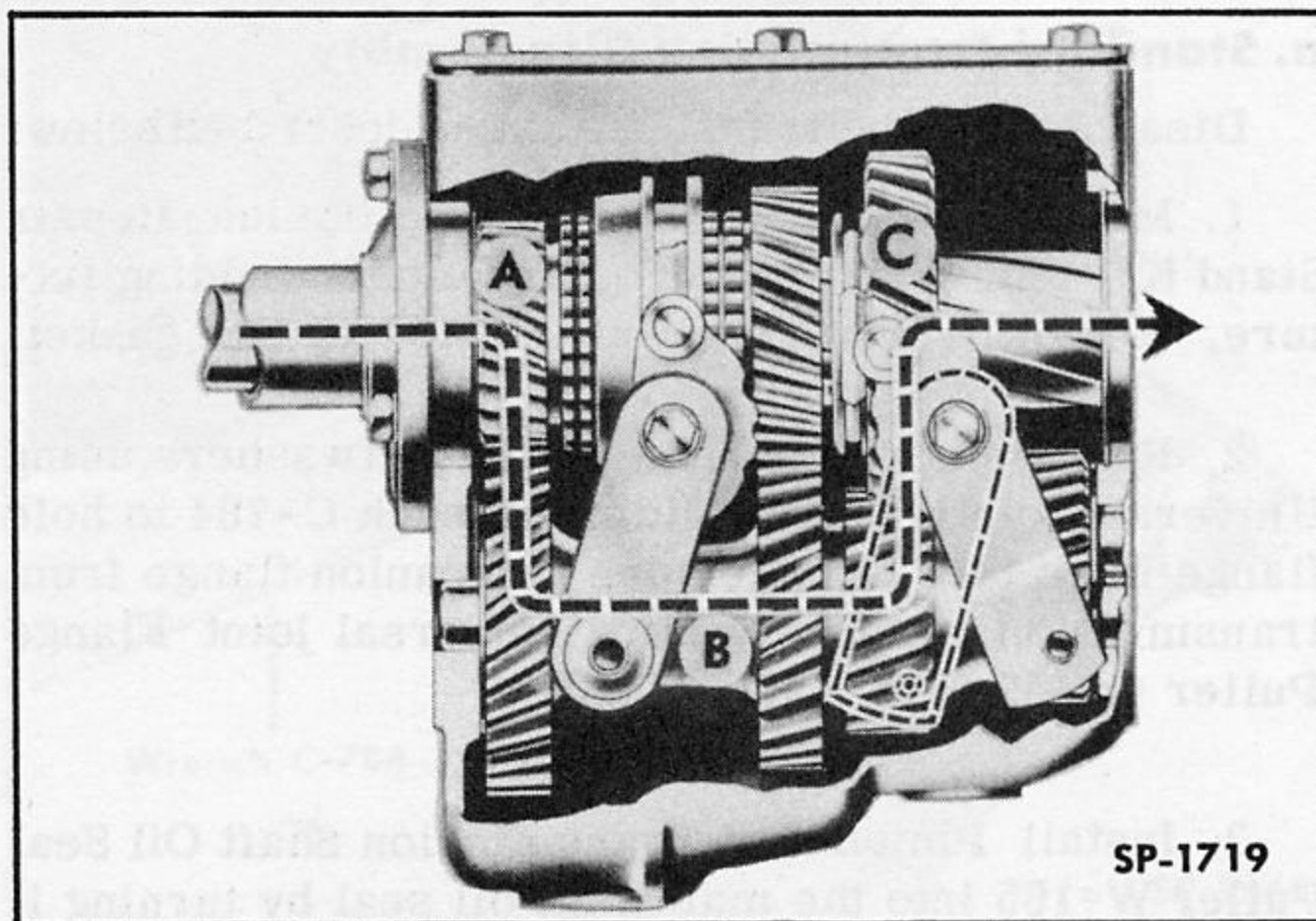


Fig. 120—First Gear Position

The transmission is attached to the rear of the clutch housing and rests on a rubber shock mount on the number 2 frame crossmember, providing a resilient support for the rear of the engine.

When the gearshift control lever is moved to first gear (low) position (Fig. 120) and the clutch is engaged, power from the engine is transferred through drive pinion gear A to gear cluster B. Sliding gear C is in mesh with gear cluster B, therefore power is transmitted through gear C to the transmission main shaft and out to the rear wheels.

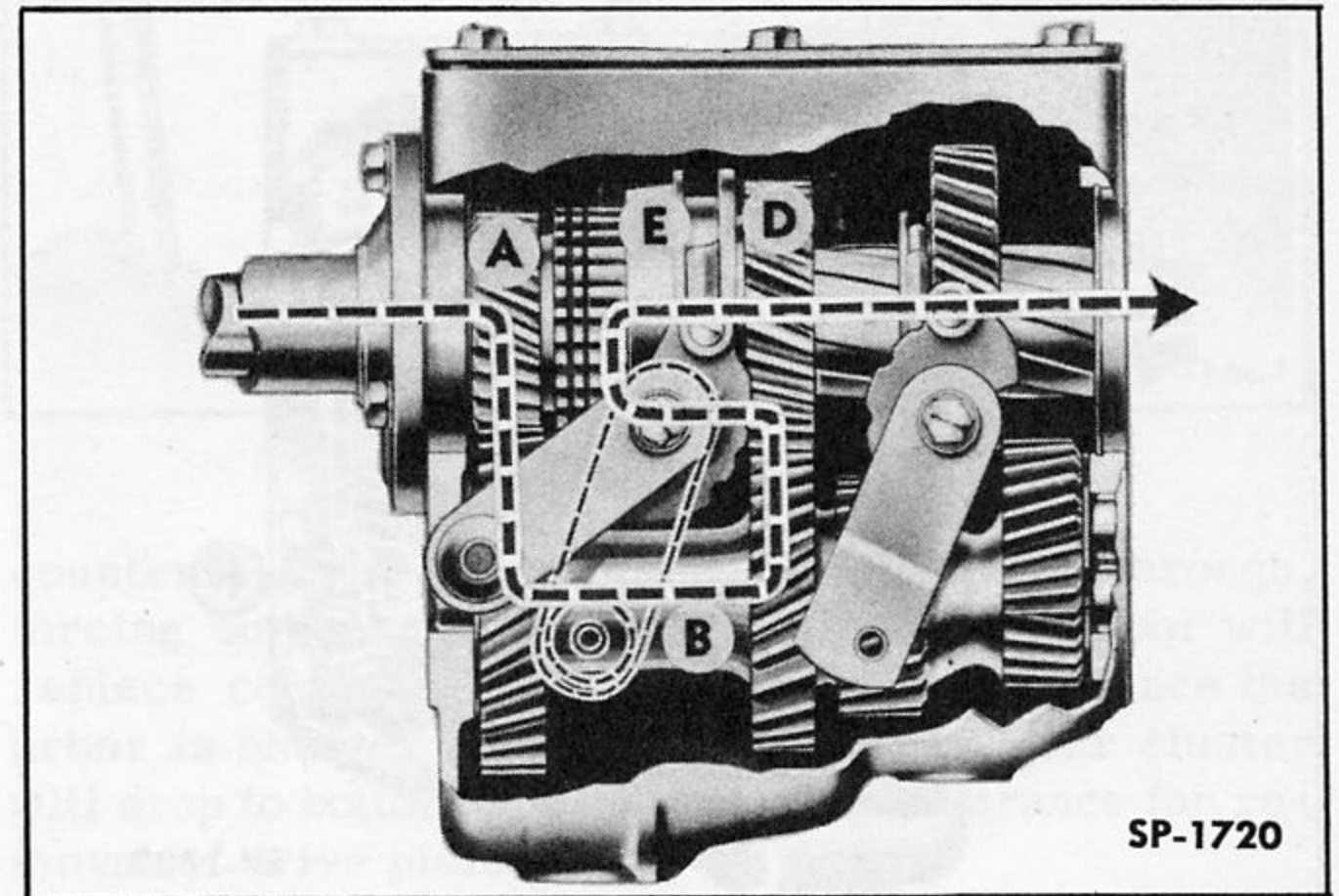


Fig. 121—Second Gear Position

In second gear position, the drive pinion gear A (Fig. 121) turns gear cluster B and second speed idler gear D. (NOTE: Second speed idler gear D is always engaged and turning with gear cluster B. It is not splined to the transmission main shaft.) The synchronizer sleeve E transfers power from idler gear D to the synchronizer hub which is splined to the main shaft.

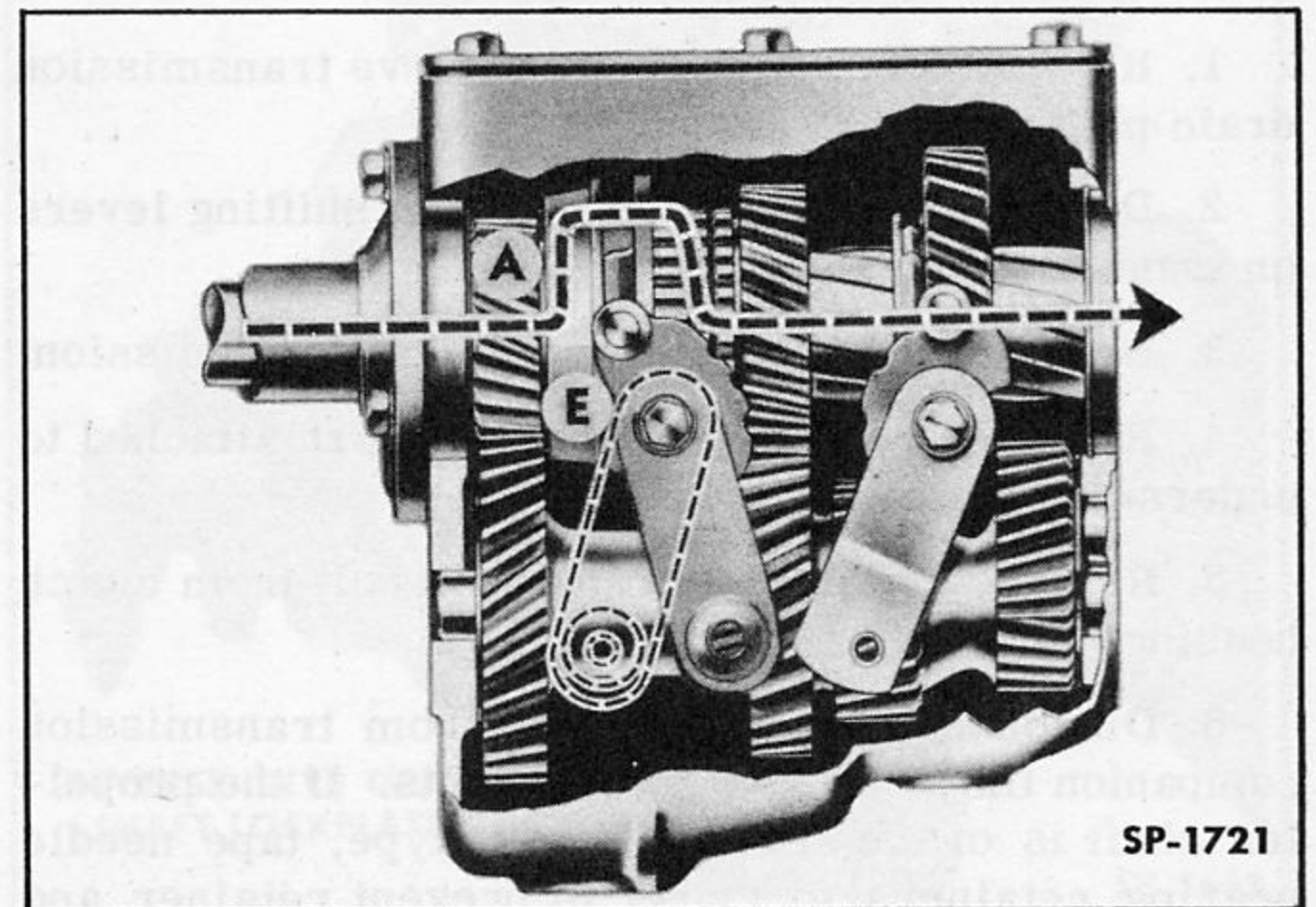


Fig. 122—Third Gear Position

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In third gear position (high), the synchronizer sleeve is moved forward to connect drive pinion gear A and the synchronizer hub, thus turning the main shaft at a one to one ratio (Fig. 122).

In reverse gear position, power is transmitted from pinion gear A to gear cluster B. The direction of rotation is then changed by reverse idler gear F. Sliding gear C then picks up the power from idler gear F and turns the main shaft in a reversed direction (Fig. 123).

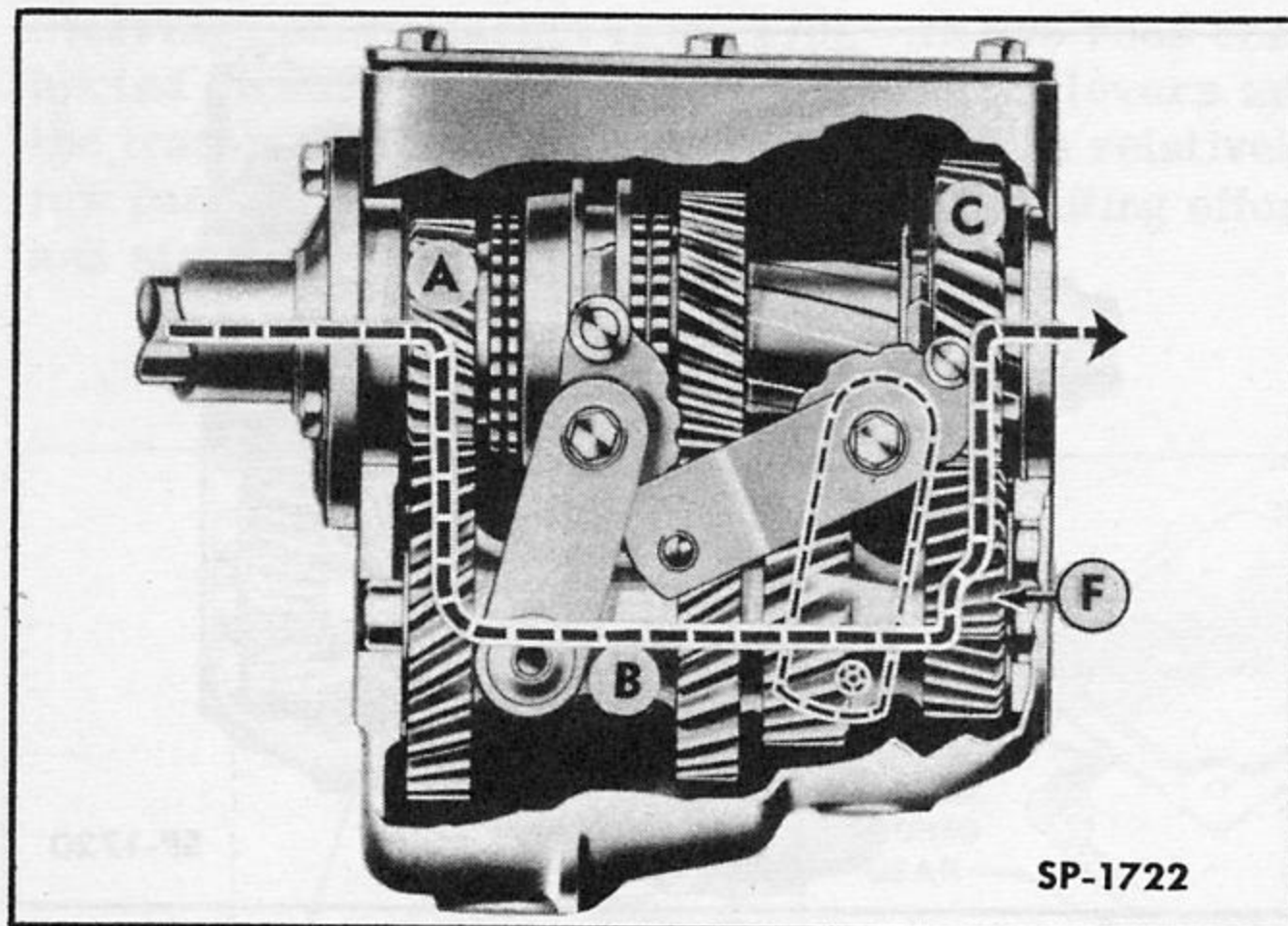


Fig. 123—Reverse Gear Position

STANDARD TRANSMISSION REMOVAL

Internal repair or overhaul of the standard transmission will necessitate removal of the transmission from the vehicle. A thorough diagnosis should precede transmission removal to determine as far as possible the nature of the trouble and the necessity for repair. Remove the transmission from the vehicle as follows:

1. Raise vehicle on a hoist, remove transmission drain plug and drain lubricant.
2. Disconnect gearshift rods from shifting levers on transmission case.
3. Disconnect speedometer cable at transmission.
4. Remove clutch cross shaft support attached to underside of transmission.
5. Remove clutch bell crank pivot bolt from clutch housing.
6. Disconnect propeller shaft from transmission companion flange by removing V-bolts. If the propeller shaft is of the cross and yoke type, tape needle bearing retainers to cross to prevent retainer and bearings from falling off. The propeller shaft to one side, out of the way.

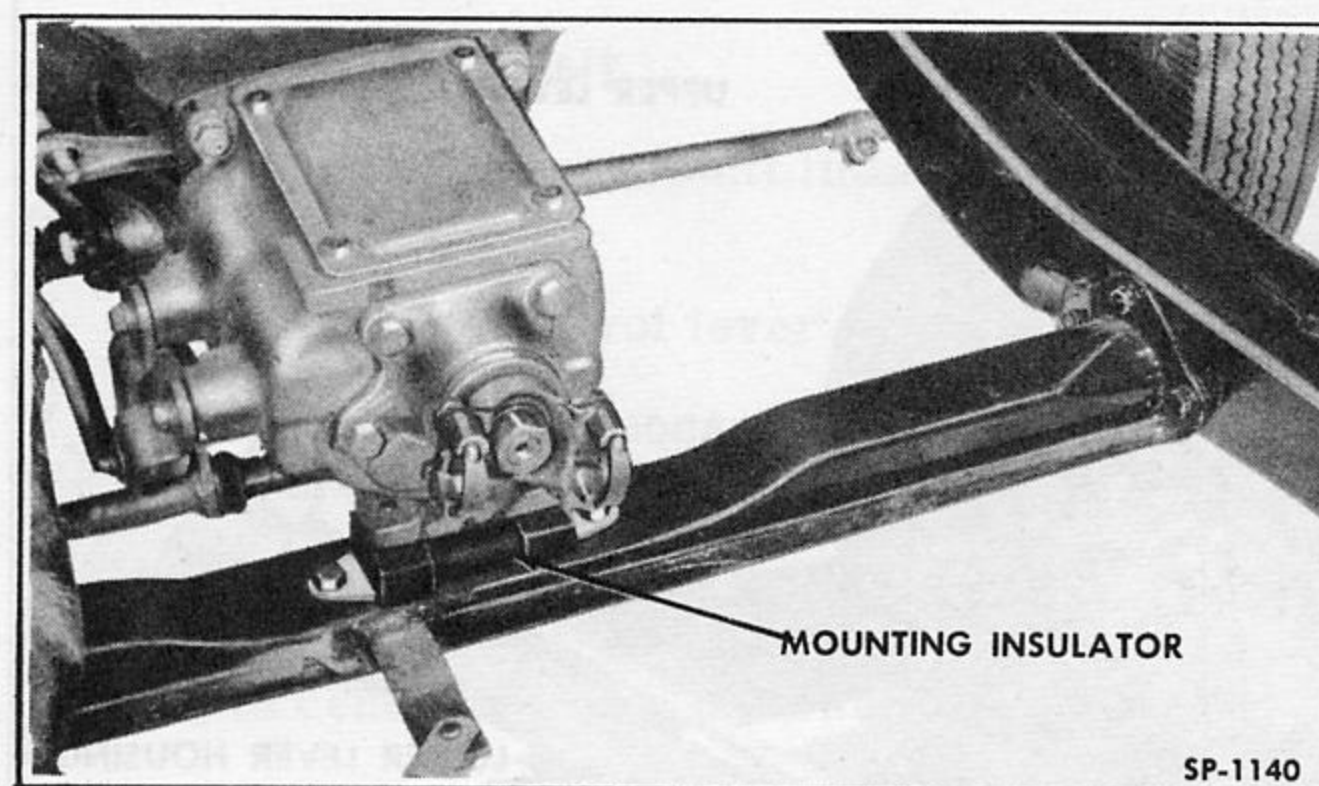


Fig. 124—Standard Transmission Mounting

7. Remove bolts attaching rear engine mounting insulator (Fig. 124) to frame crossmember.

IMPORTANT: Engine must be solidly supported at rear end before removing these bolts.

8. Remove bolts attaching transmission to clutch housing. Carefully pull transmission away from clutch, at the same time, disengage clutch release fork from release bearing. Clutch release bearing will be removed with transmission and can be taken off drive pinion shaft by unhooking the return spring from transmission case.

STANDARD TRANSMISSION REPAIR

Prior to overhauling the transmission, 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 diagnosis and repairs.

a. Standard Transmission Disassembly

Disassemble the transmission as described below:

1. Mount transmission on Transmission Repair Stand KF-100, (Fig. 125) or other suitable holding fixture. Remove screws and washers, cover and gasket.
2. Remove companion flange nut and washers using Universal Joint Flange Holding Wrench C-784 to hold flange from turning. Remove companion flange from transmission mainshaft using Universal Joint Flange Puller C-452 (Fig. 126).
3. Install Pinion and Transmission Shaft Oil Seal Puller W-165 into the mainshaft oil seal by turning it until the threads cut sharply into the seal. Remove seal by turning puller center screw against mainshaft

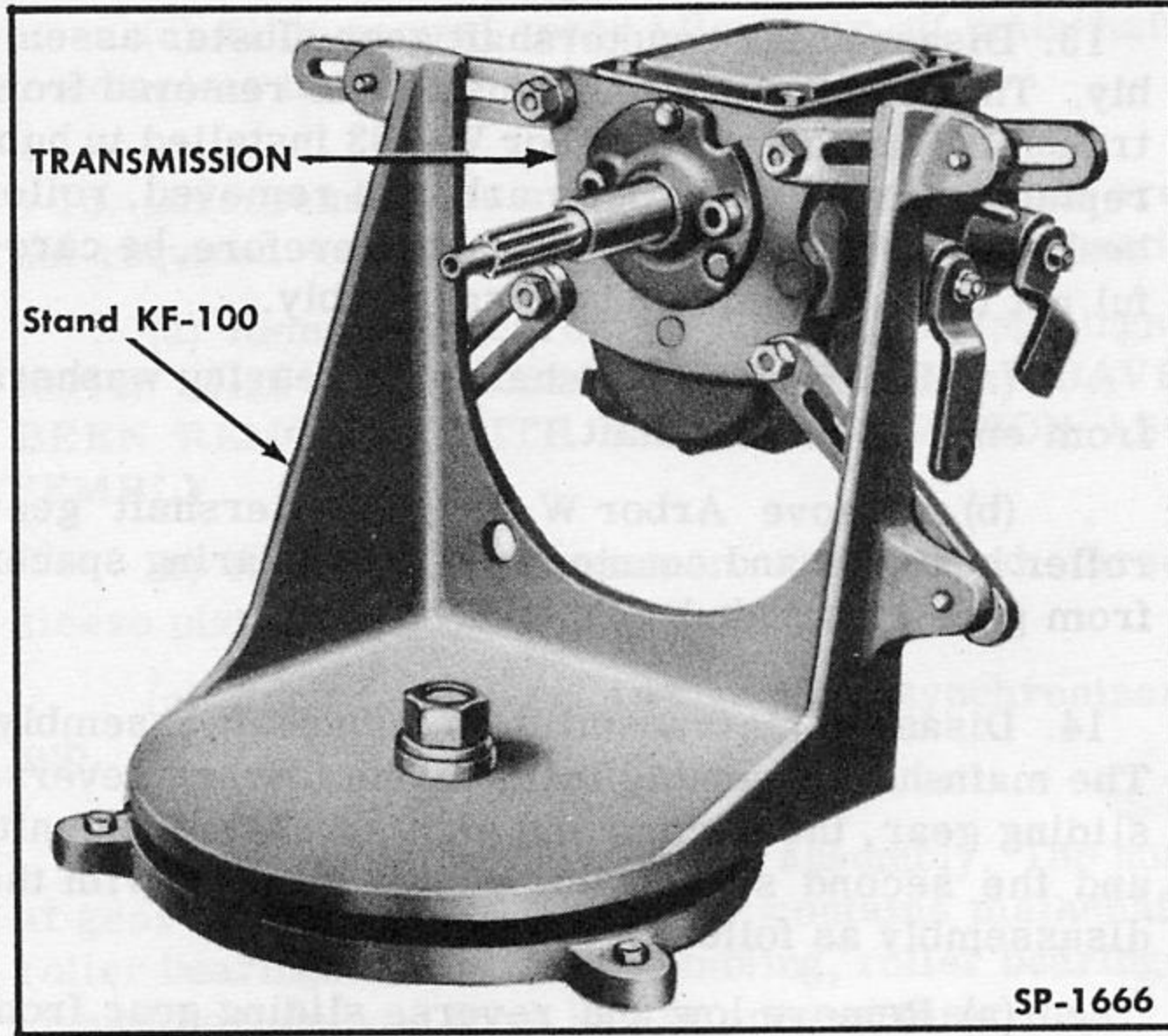


Fig. 125—Transmission Mounted in Fixture

(Fig. 127). Regardless of its appearance and condition, it is recommended that a new seal be installed.

4. Remove mainshaft bearing retainer and drive pinion retainer from case after removing their attaching bolts.

5. Drive out reverse idler gear shaft lockplate using a suitable drift and hammer (Fig. 128).

6. Remove countershaft from case using Transmission Cluster Gear Arbor W-193. Butt arbor against

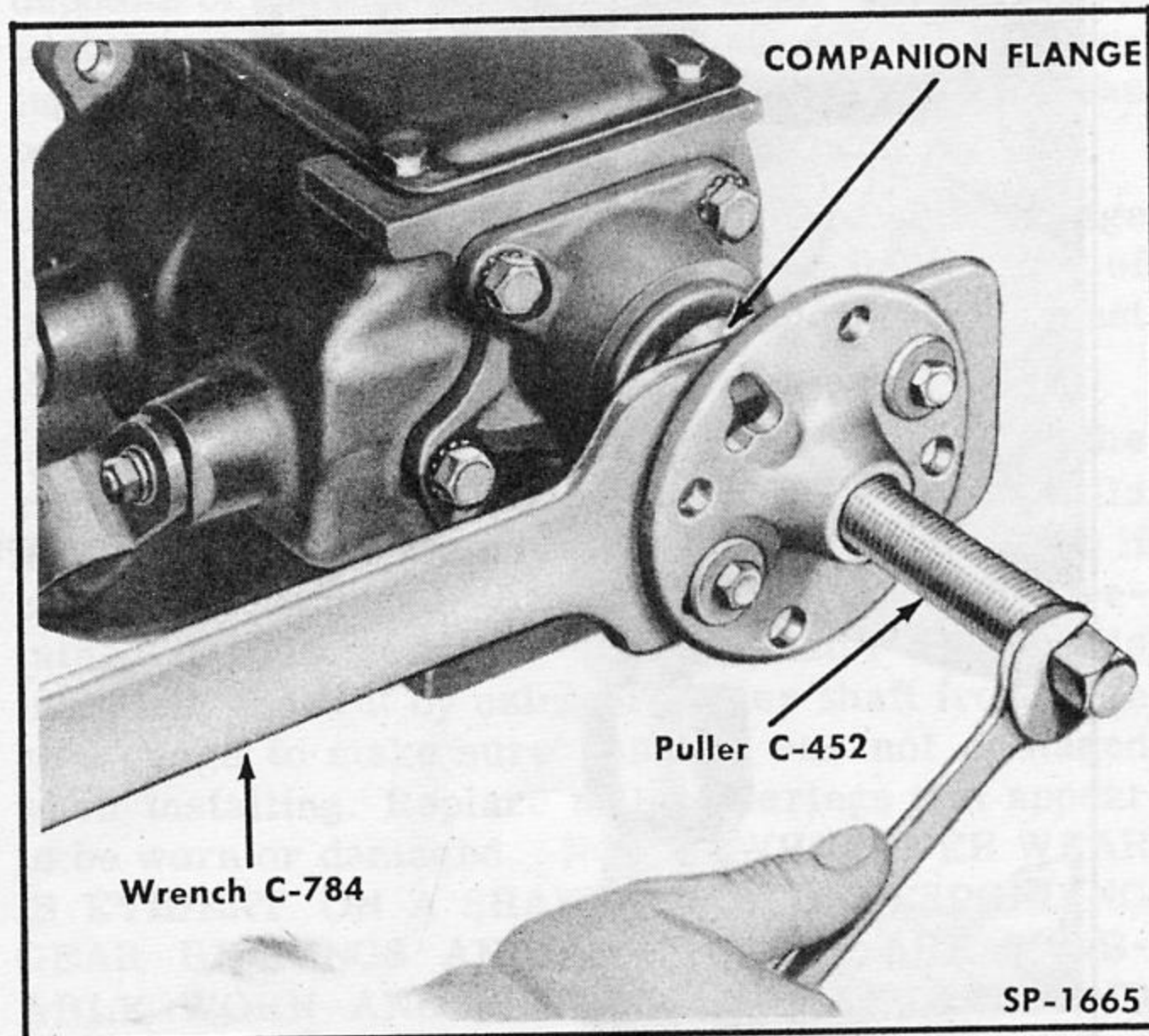


Fig. 126—Removing Companion Flange

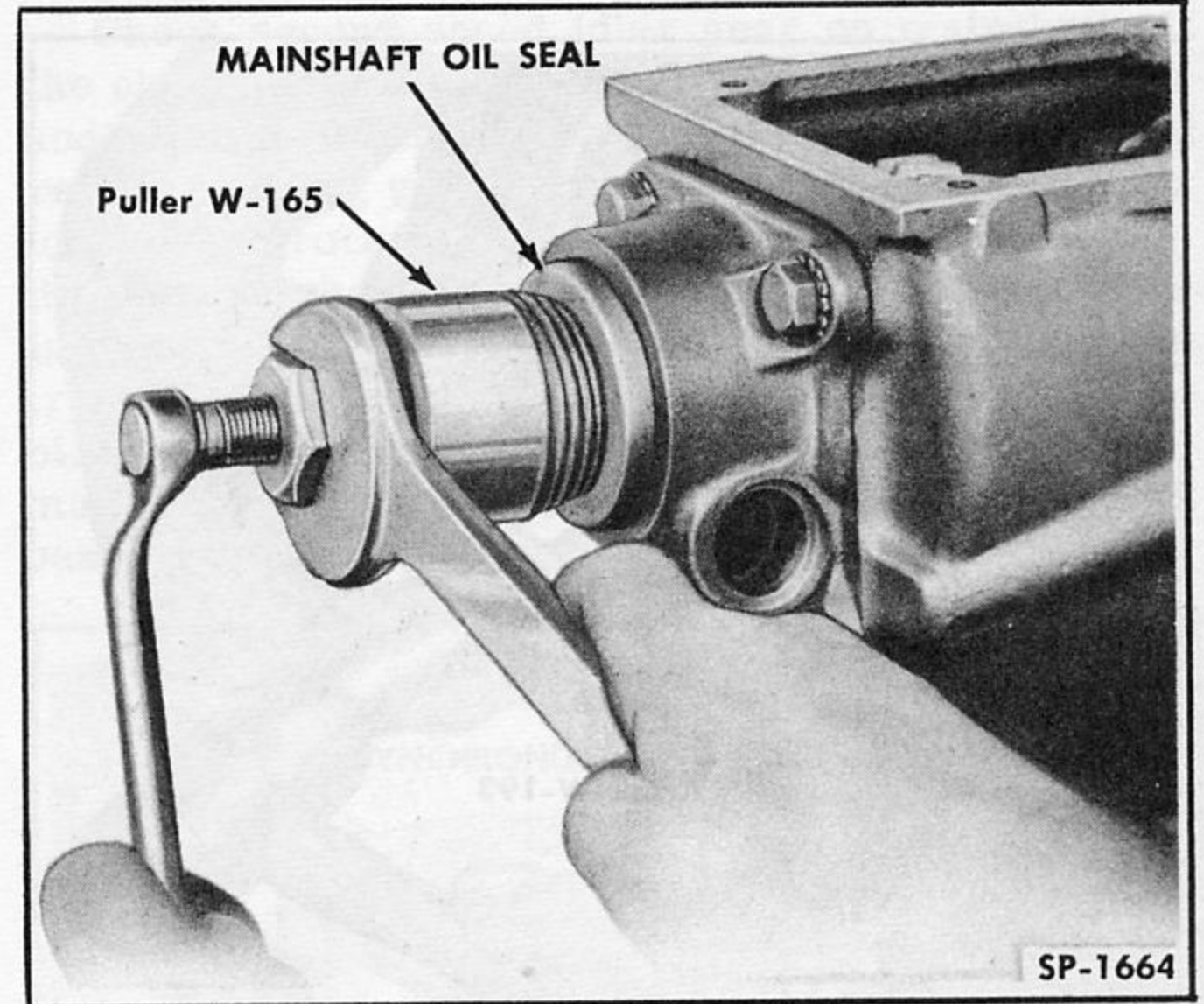


Fig. 127—Removing Mainshaft Oil Seal

countershaft at front of case and drive it through, forcing out countershaft (Fig. 129). The arbor will replace countershaft as it is driven out. Since the arbor is shorter than the countershaft, gear cluster will drop to bottom of case, allowing clearance for removal of drive pinion.

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

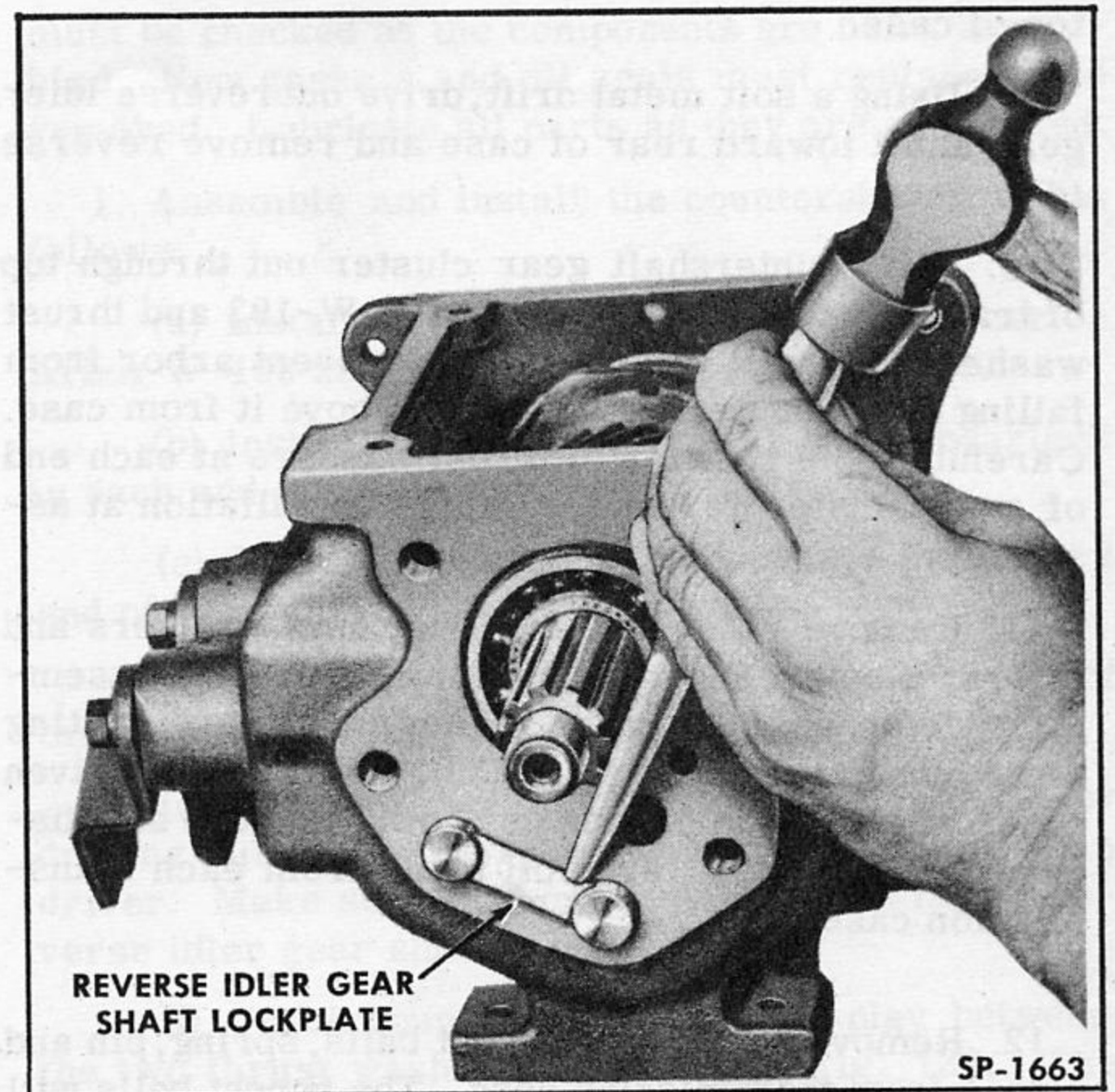


Fig. 128—Removing Reverse Idler Lockplate

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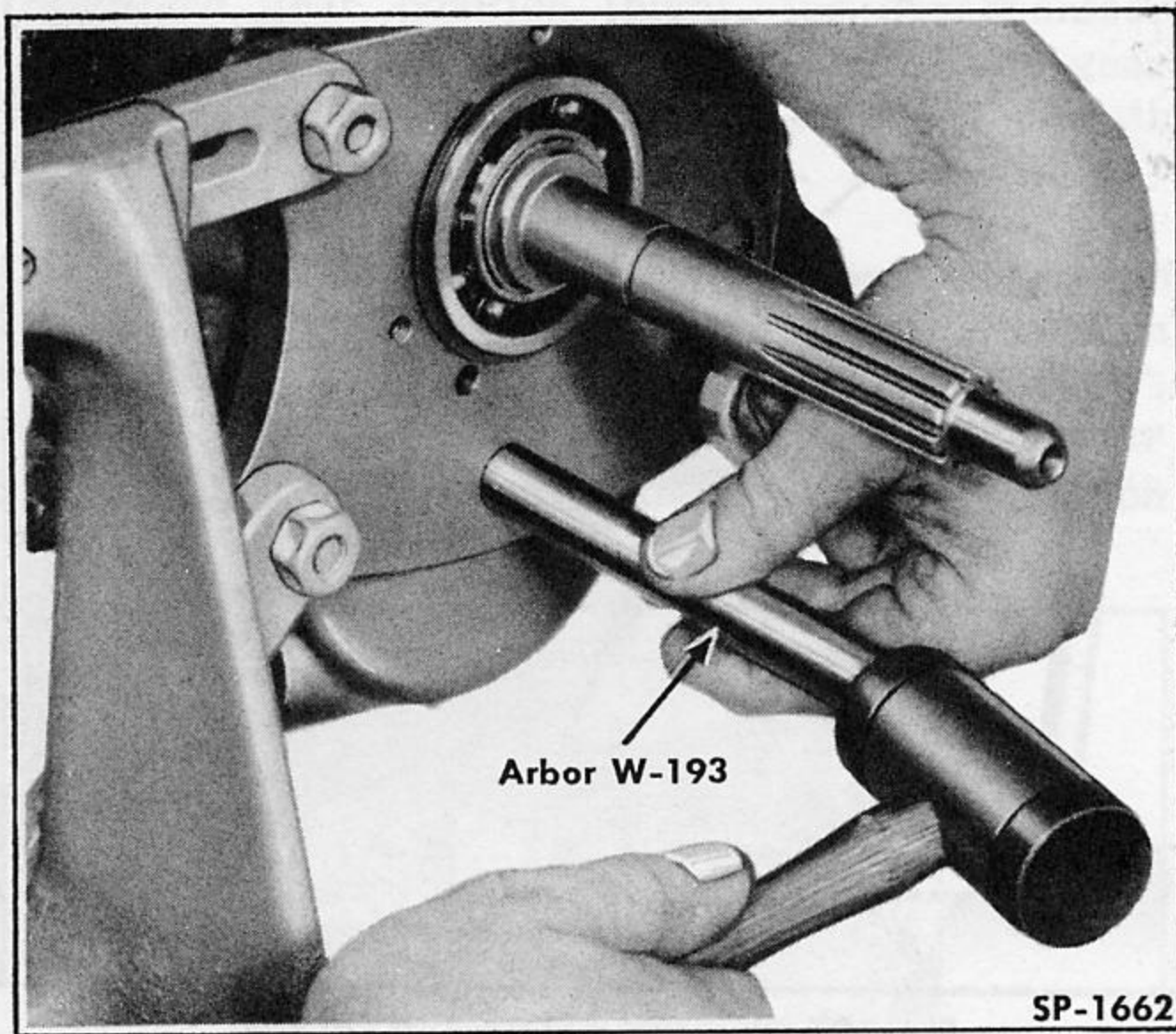


Fig. 129—Removing Countershaft

Place drift against pinion gear and strike it lightly until bearing and shaft assembly are free.

8. Remove bearing snap ring and speedometer drive gear from rear of mainshaft. Tap rear end of the mainshaft lightly with a soft hammer until it is free of rear bearing. Remove bearing from case. Tilt mainshaft assembly away from shifting fork and shifting shoe as far as possible and remove shifting fork and shoe. Lift out main shaft assembly through top of case.

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

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

11. Remove outer shifting lever nuts, washers and levers. Remove inner shifting lever and shaft assemblies from inside transmission case after shifting lever pins are removed (Fig. 130). Pins must be driven out from underside of boss as shown. Remove and discard inner shifting lever oil seals from each transmission case boss.

12. Remove shift lever poppet balls, spring, pin and sleeve from transmission case. The poppet balls will probably have dropped into case when inner shifting levers were removed.

13. Disassemble countershaft gear cluster assembly. The countershaft gear cluster was removed from transmission case with Arbor W-193 installed in hub, replacing countershaft. As arbor is removed, roller bearings and washers will fall out; therefore, be careful not to lose them during disassembly.

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

(b) Remove Arbor W-193, countershaft gear roller bearings and countershaft gear bearing spacer from gear cluster hub.

14. Disassemble transmission mainshaft assembly. The mainshaft assembly includes the low and reverse sliding gear, the second and high synchronizer unit, and the second speed idler gear. Proceed with the disassembly as follows:

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

(b) Using Snap Ring Pliers KF-97, remove synchronizer snap ring and slide the second and high gear synchronizer unit off mainshaft (Fig. 131).

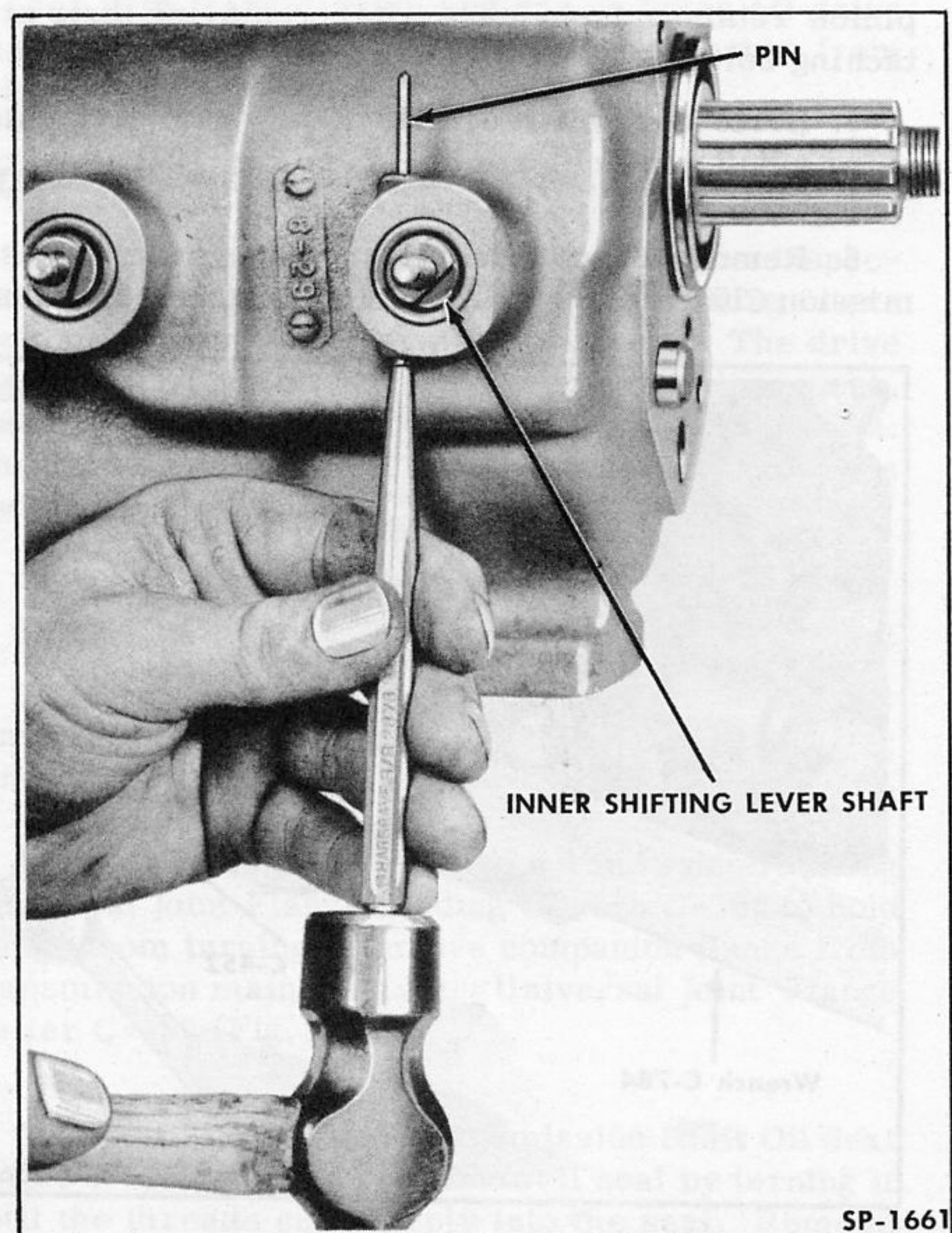


Fig. 130—Removing Inner Shifting Levers

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

15. Disassemble the synchronizing unit. Tools are not required — it may be easily pulled apart by hand.

(a) Remove synchronizer sleeve blocking rings. **NOTE: THE FRONT BLOCKING RING MAY HAVE BEEN REMOVED WITH THE DRIVE PINION ASSEMBLY.**

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

(c) Remove two snap rings from synchronizer hub.

16. Disassemble the drive pinion assembly. The hub at gear end of pinion assembly contains mainshaft roller bearings. When disassembling, roller bearings should be removed from hub to prevent their loss.

(a) Remove roller bearings from hub of pinion.

(b) Remove pinion bearing snap ring using Snap Ring Pliers KF-97.

(c) Remove pinion bearing and slinger from shaft.

b. Standard Transmission Inspection

Prior to inspection and repair of 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.

Inspect the case for cracks, warpage, and damage caused by broken gears. Replace the case if any of these faults are evident. 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 rear bearing retainer if cracked or damaged. Replace bushing at rear of retainer if it is worn or scored. After bushing is installed, check it by using propeller shaft front yoke as a gauge to make sure bushing was not damaged when installing. 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 PROBABLE WORN AND SHOULD BE CHECKED AND REPLACED IF NECESSARY.** Replace gears that have chipped, worn or broken teeth.

Check second speed idler gear on mainshaft. If the check discloses excess clearance, replace gear and/or shaft, whichever is worn. Position the first and reverse sliding gear on mainshaft. Check gear for looseness (rocking action) on spline of shaft within the distance the gear normally travels when installed in transmission. If excessive looseness is noted and transmission has been creeping out of first gear, replace gear and/or shaft, whichever is worn. Replace mainshaft, drive pinion, countershaft or idler gear if bearing surfaces are scored or damaged.

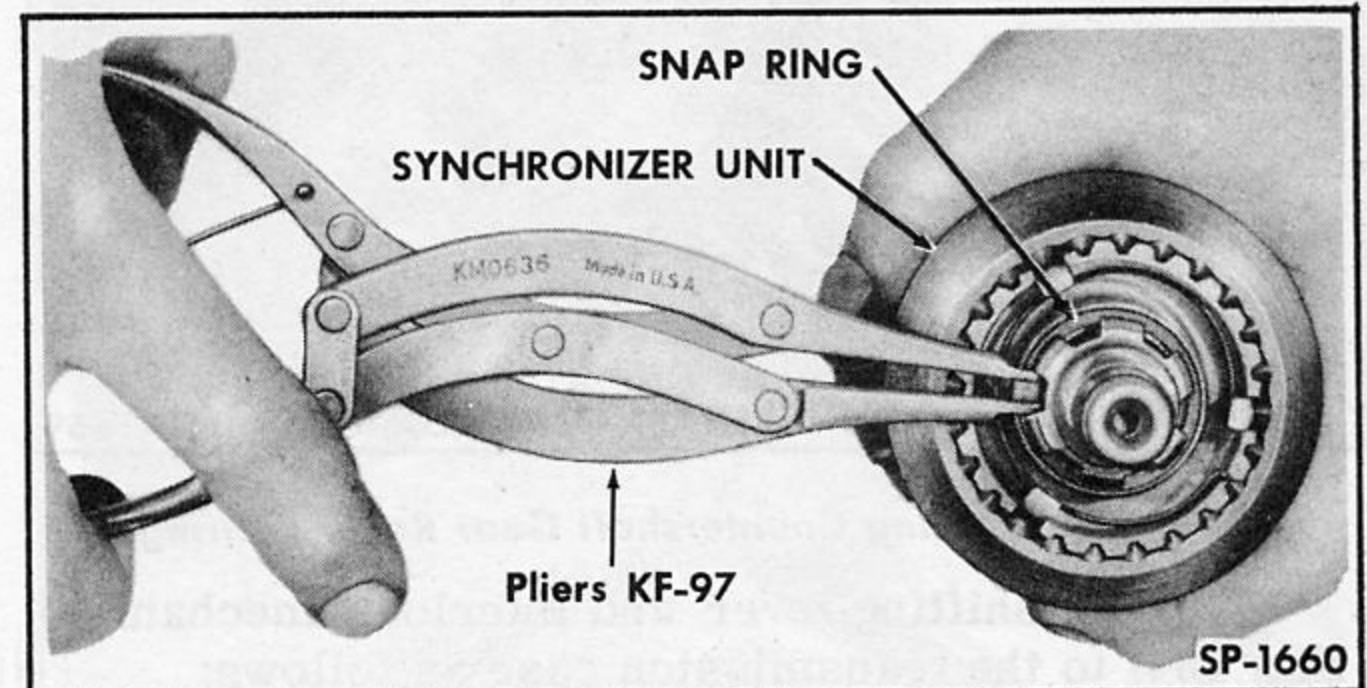


Fig. 131—Removing Synchronizer Unit

c. Standard Transmission Assembly

Assemble the transmission in the reverse sequence of disassembly, except as noted. Care must be exercised when installing and adjusting the components in the transmission case.

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

1. Assemble and install the countershaft gear as follows:

(a) Install countershaft gear bearing spacer on Arbor W-193 and insert in hub of gear cluster.

(b) Install 20 countershaft gear roller bearings in each end of hub around arbor. (Fig. 132).

(c) Install countershaft bearing washer at each end of hub.

(d) Apply a thin coat of grease to gear side of thrust washers and position them on arbor.

(e) Install assembly in transmission case by driving out Arbor W-193, using countershaft as a driver. Make sure slot in countershaft is facing reverse idler gear shaft hole.

(f) Check countershaft gear end-play between the two thrust washers as shown in Fig. 133. The end-play should be .005 - .018 inch. If not, the thrust washers are probably worn and should be replaced.

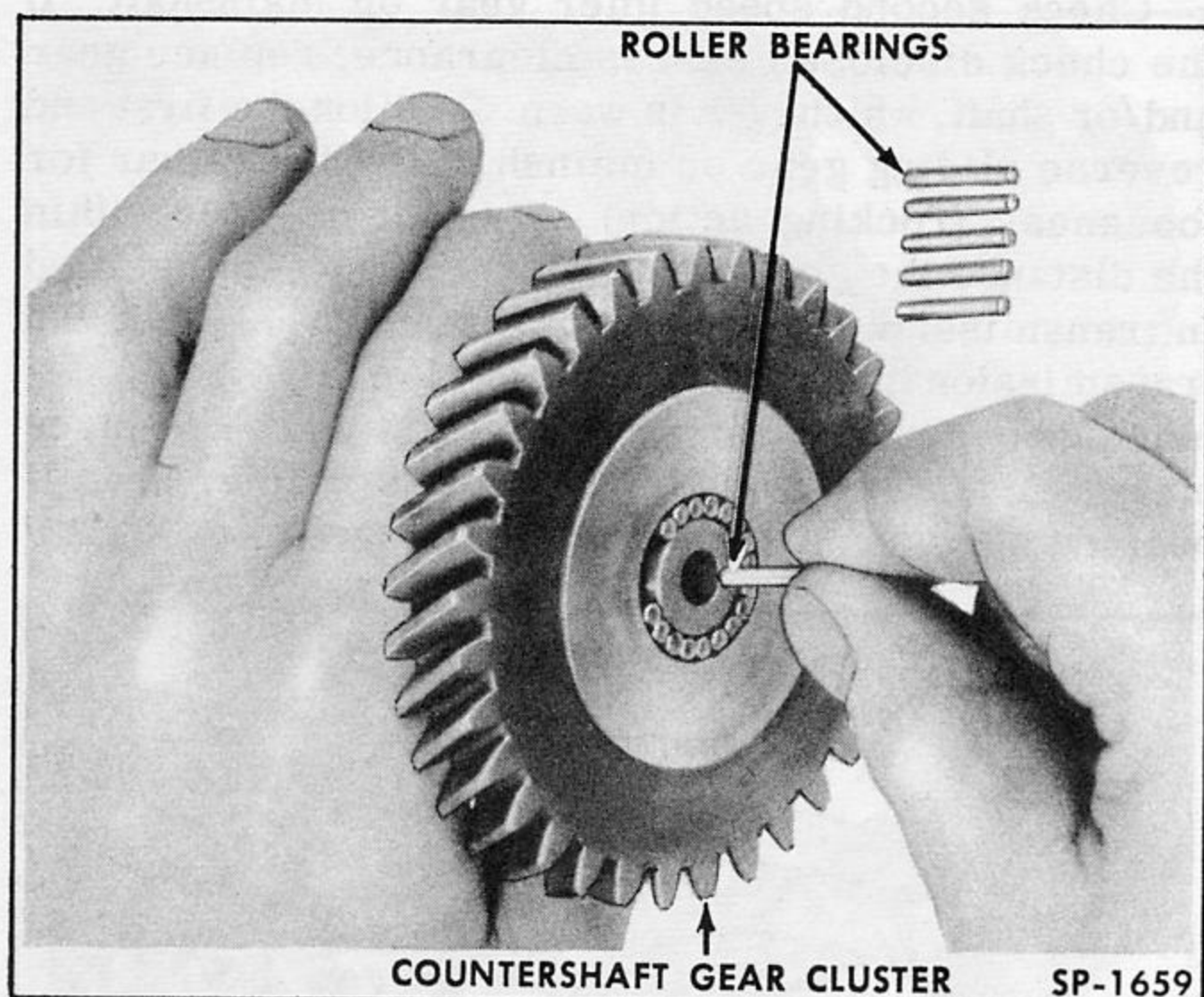


Fig. 132—Installing Countershaft Gear Roller Bearings

2. Install shifting lever and interlock mechanism (Fig. 134) to the transmission case as follows:

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

(b) Install the low and reverse shifting lever and shaft, pin, outer shifting lever, flat washer, lock

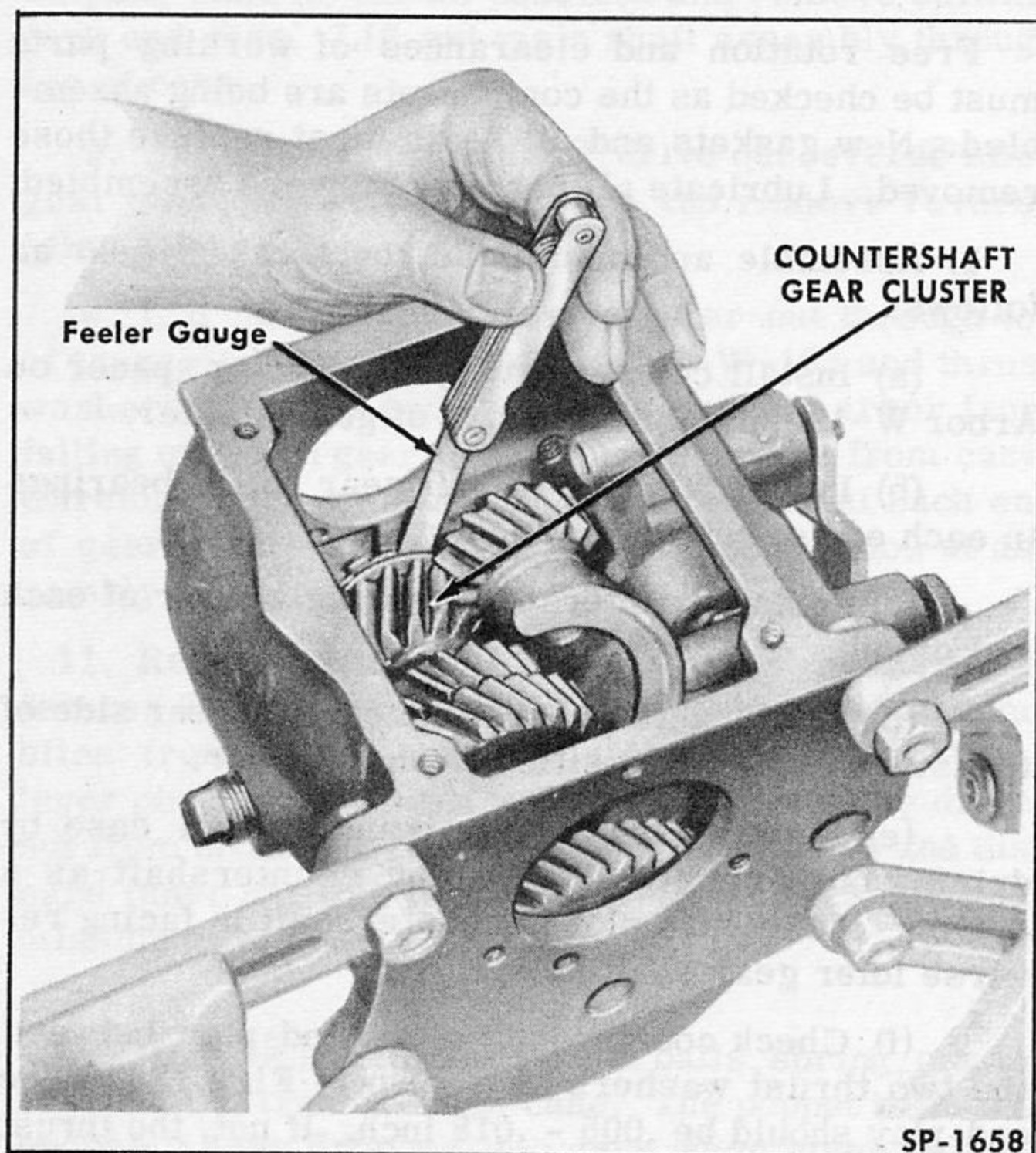


Fig. 133—Checking Countershaft Gear End-Play

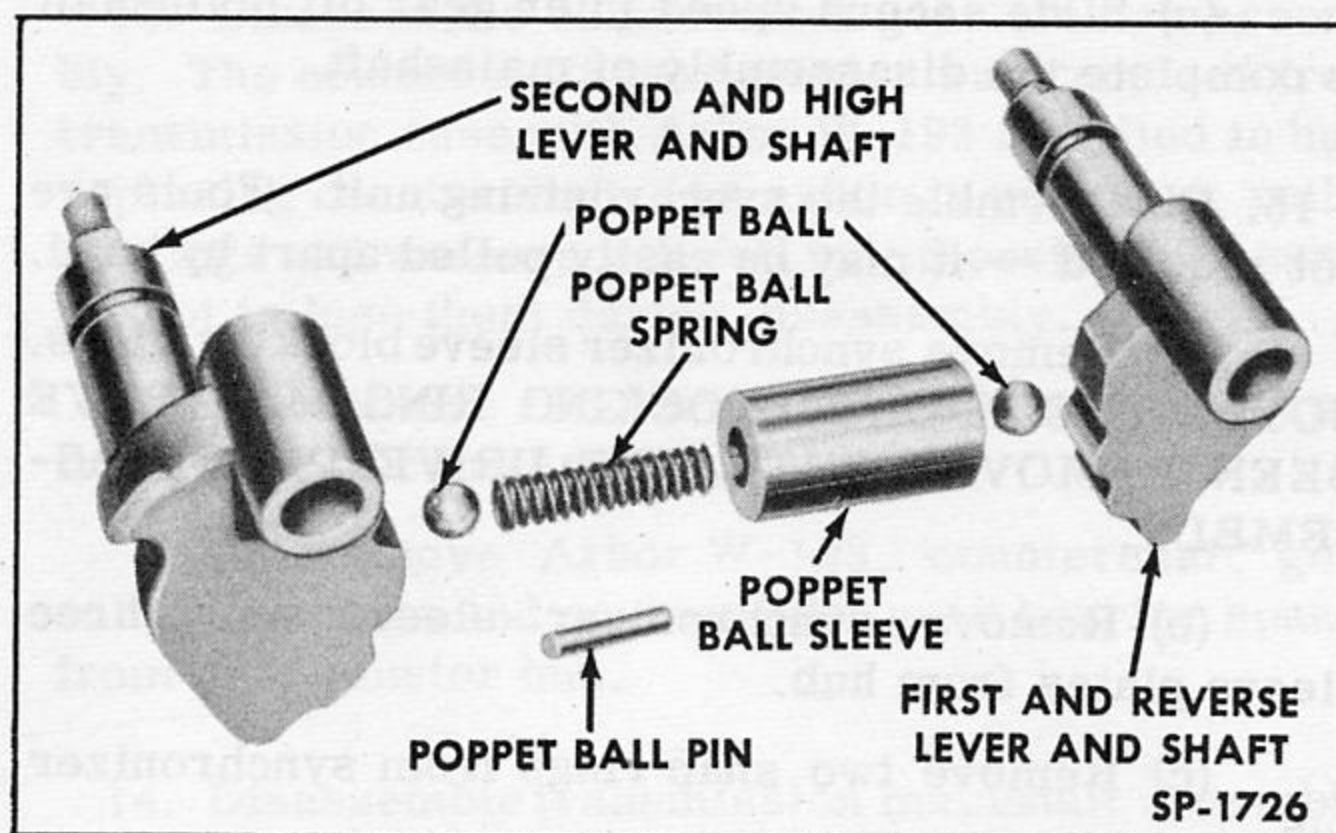


Fig. 134—Interlock Components—Exploded View

washer and nut. Be careful not to damage seal when inserting the low and reverse shifting lever shaft.

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

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

(e) Move the lever and shaft toward side of transmission case. Install the second poppet ball by pressing it into position and pulling the shifting lever to its normal position.

(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. 135).

With one shift lever in the neutral position and the

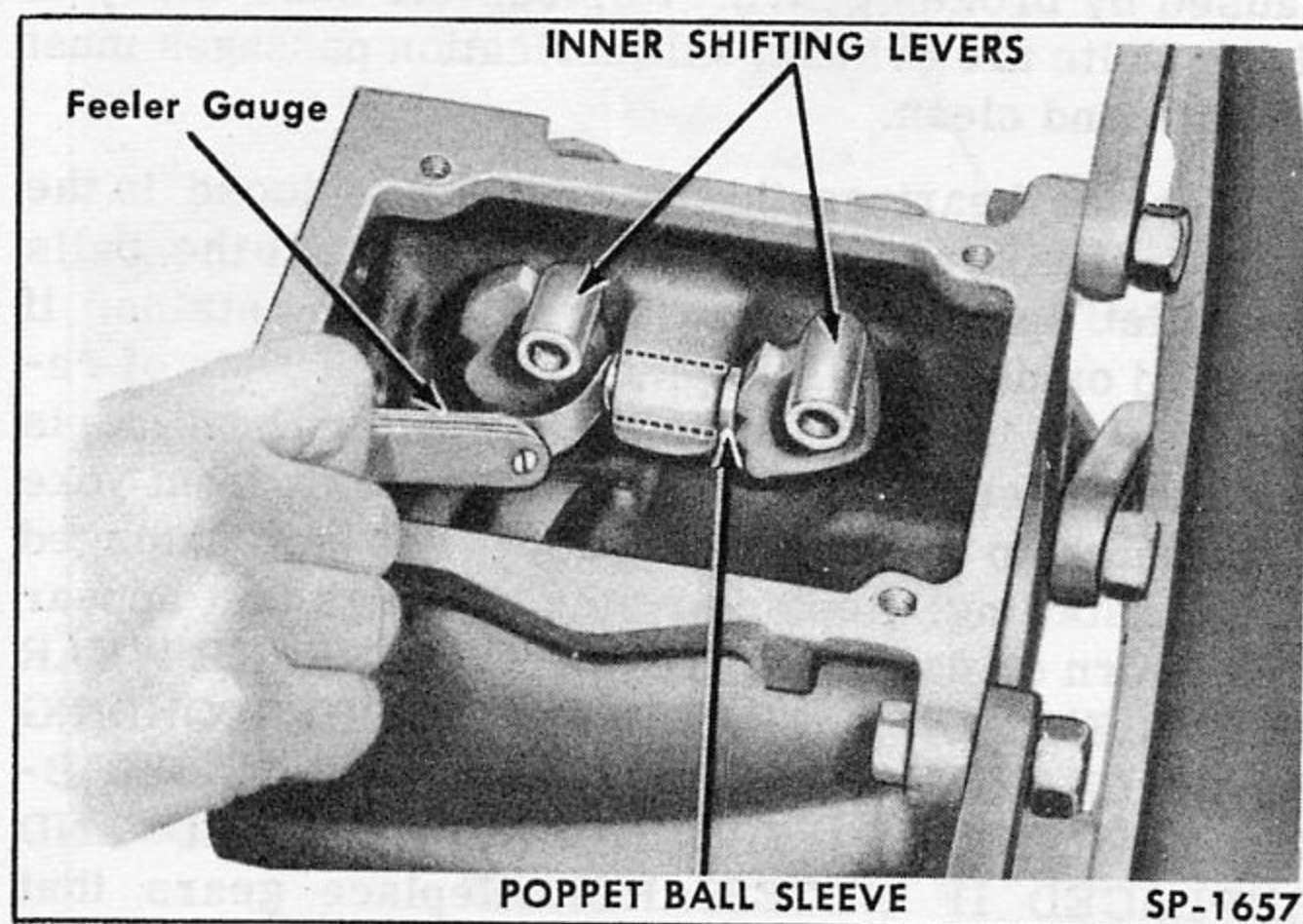


Fig. 135—Checking Interlock Sleeve Clearance

other shifted into gear, so the poppet balls are seated in the respective lever detents, a clearance of .001 - .007 of an inch as determined with a feeler gauge must exist between the lever ramp and the poppet sleeve.

If improper clearance is evident, the sleeve must be removed and replaced. Poppet ball sleeves are available in various lengths to provide selective fitting for proper clearance.

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

3. Install the reverse idler gear by holding it in position in case with longest offset end of gear facing towards front of case. Install reverse idler gear shaft in case making sure the slot in shaft is opposite slot in countershaft. Install idler gear lock plate. Refer to Fig. 128.

4. Assemble the synchronizer unit as follows:

(a) Install synchronizer hub snap rings in hub.

(b) Install three synchronizer sleeve plates on hub and apply lubricant to hold the plates in place.

(c) Install synchronizer sleeve on hub. NOTE: The etched lines at rear of synchronizer hub and sleeve must be in line with each other to assure a close fit. The sleeve must be free to slide on hub splines.

(d) Install blocking rings.

5. Assemble the mainshaft and place in transmission case as follows:

(a) Install second speed idler gear on mainshaft with tapered end of gear facing towards front of shaft.

(b) Install synchronizer unit and rear blocking ring on shaft. The long end of synchronizer hub must be facing toward front of shaft.

(c) Install snap ring on shaft to secure synchronizer and second speed idler gear.

(d) Install the low and reverse sliding gear on shaft with the shifting shoe groove facing towards front of shaft.

(e) Place mainshaft assembly in transmission case, install shifting fork and shoe and engage them in place on the mainshaft assembly.

6. Assemble and install drive pinion assembly as follows:

(a) Install roller bearings in hub of drive pinion, using grease to hold them in place. Slide pinion assembly into transmission case and guide end of mainshaft into drive pinion hub.

(b) Place oil slinger on drive pinion shaft with cupped side facing rear of case and slide bearing in place on shaft using Transmission Pinion Bearing Driver KF-128 (Fig. 136). Use care not to damage synchronizer or blocking rings.

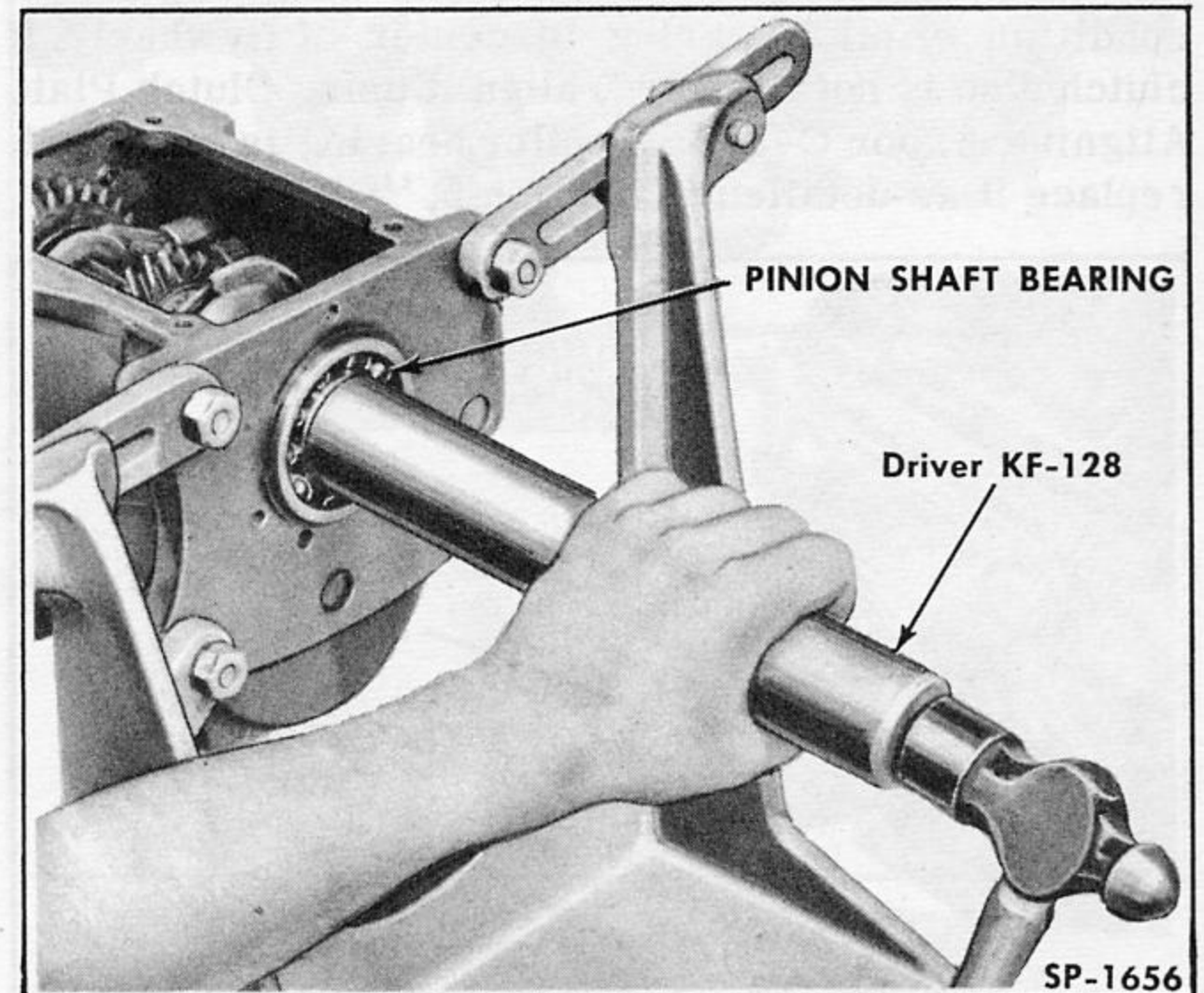


Fig. 136—Installing Drive Pinion Bearing

(c) Install the thickest drive pinion bearing snap ring (various sizes are available) that will fit in groove of drive pinion shaft. This snap ring controls end-play in mainshaft.

7. Place mainshaft rear bearing in position and drive it into place using Driver KF-128, being careful not to damage synchronizer unit. Select proper thickness snap ring (various sizes are available) for minimum mainshaft end-play.

8. Install speedometer drive gear on mainshaft.

9. Install drive pinion bearing retainer and mainshaft bearing retainer, using new gaskets.

10. Install new mainshaft oil seal in mainshaft bearing retainer using Transmission Rear Oil Seal Installing Driver C-3105 as shown in Fig. 137.

11. Install transmission case cover, using new gasket.

12. Install propeller shaft companion flange to mainshaft with Universal Joint Flange Installer KF-14.

13. Install nut and washers. Use Wrench C-784 to hold flange while tightening nut to 100-140 foot-pounds torque.

STANDARD TRANSMISSION INSTALLATION

The transmission can be installed to the vehicle as follows:

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1. Place clutch release bearing on drive pinion shaft and attach return spring to transmission case. Put transmission "in gear" by moving outer shifting levers.

2. On the vehicle, check clutch disc location and condition of pilot bearing in center of flywheel. If clutch disc is not centered, align it using Clutch Plate Aligning Arbor C-360. If pilot bearing is damaged, replace it as detailed in Section 5, "Clutch."

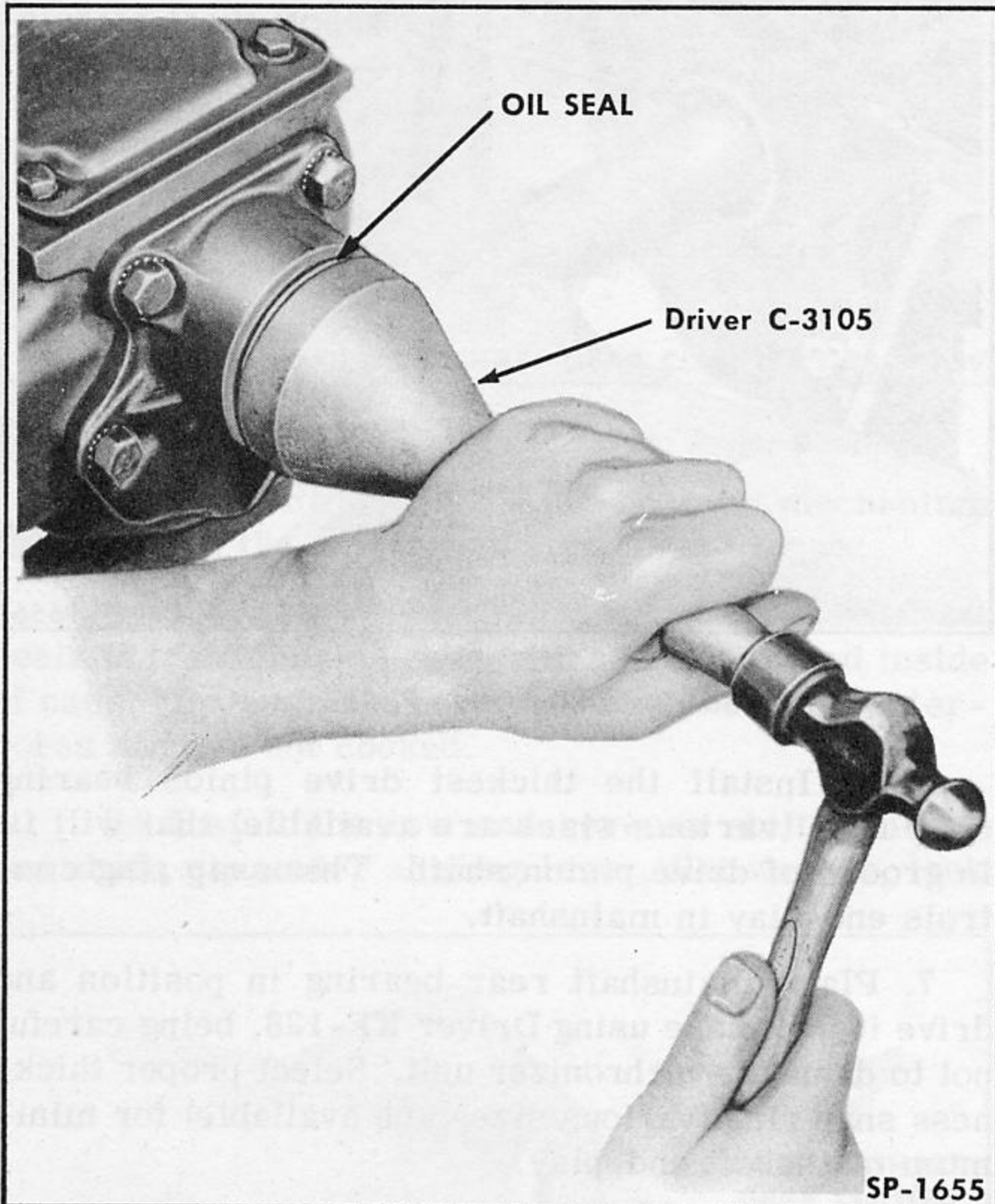


Fig. 137—Installing Mainshaft Oil Seal

3. Install transmission by carefully inserting drive pinion shaft into clutch while companion flange is being rotated back and forth to align pinion shaft splines to clutch disc splines. When transmission is almost in position, remove cover plate from side of clutch housing and guide clutch release fork into position on clutch release bearing. Push transmission in place and install attaching bolts.

4. Install bolts attaching mounting insulator to frame crossmember.

5. Attach propeller shaft to companion flange on transmission.

6. Attach clutch cross shaft support to underside of transmission, bell crank to clutch housing, speedometer cable to transmission, and gearshift rods to shifting levers on transmission.

7. Fill transmission as specified in Section 17, "Lubrication."

8. Check shifting levers for proper adjustment.

OVERDRIVE TRANSMISSION

The overdrive transmission is essentially a standard transmission with an overdrive unit attached. The transmission used with the overdrive unit differs from the standard transmission in respect to the case and the mainshaft, therefore it is not interchangeable with the standard transmission. The overdrive unit simply "gears up" the output shaft, thereby decreasing engine speed by 30 percent while maintaining the same forward speed of the vehicle. This allows greater operating economy and less engine noise at a slight loss in power.

The overdrive is essentially a planetary gear set consisting of a sun gear, a pinion cage with three pinion gears, and a ring gear (Fig. 138). The pinion case is splined to the transmission mainshaft while the ring gear is engaged to the overdrive unit mainshaft. The sun gear is used to control the operation of the other two components. When the sun gear is held stationary and the pinion cage is revolved around it, the pinion gears will rotate which in turn will force the ring gear to rotate at an even faster rate than the pinion cage. This is the means of obtaining overdrive.

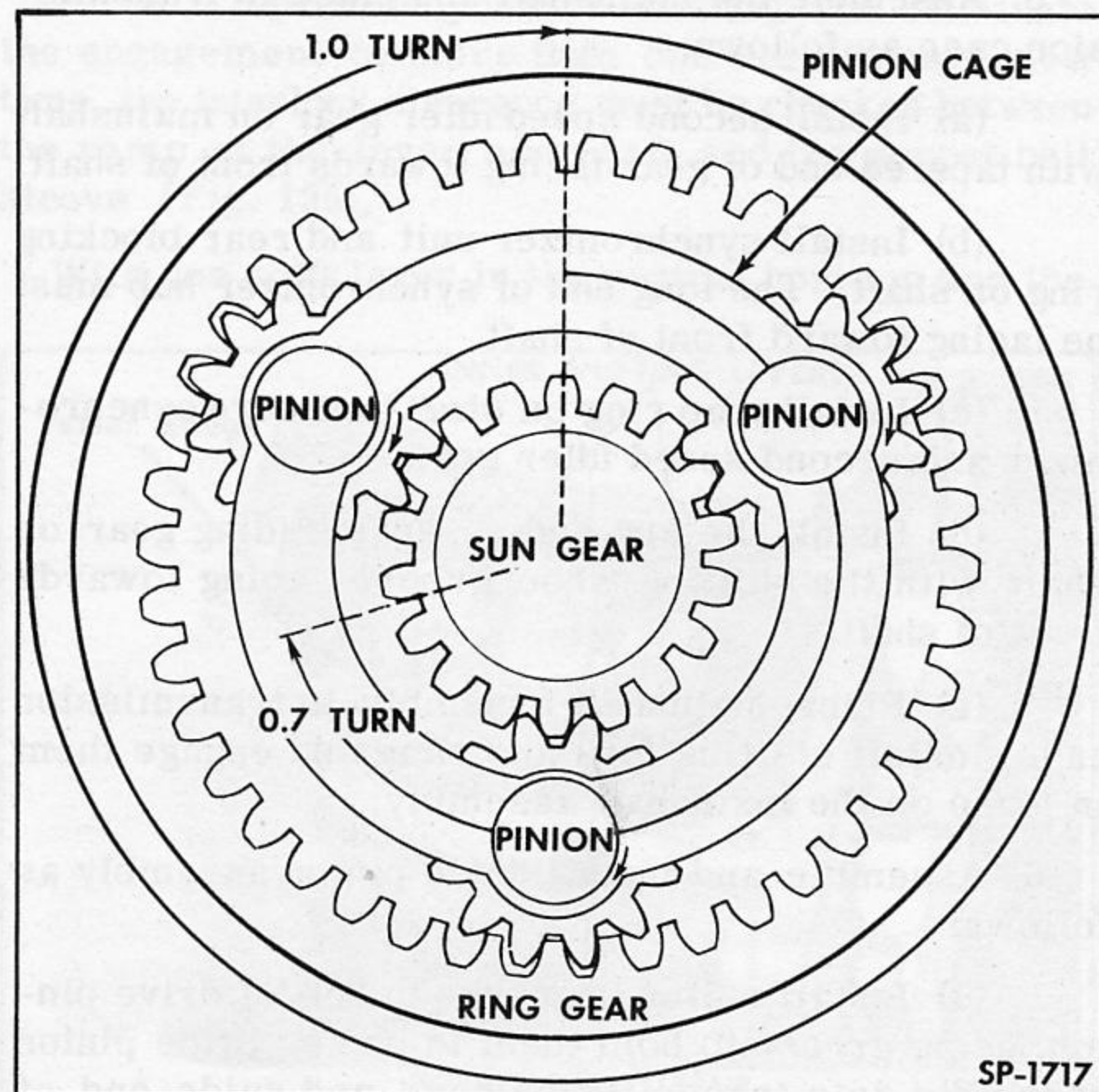


Fig. 138—Planetary Gear Set

When the sun gear is interlocked and turning with the pinion cage, the pinion gears cannot turn, thus the entire planetary gear set will revolve as a single unit. This is the method of obtaining conventional drive with the overdrive transmission.

OVERDRIVE OPERATION

The engagement and disengagement of the overdrive are automatic but effective only at the discretion 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 control knob all the way in. **IT IS RECOMMENDED THAT THE OVERDRIVE CONTROL KNOB BE OPERATED ONLY WHEN THE CAR IS AT A STANDSTILL.**

If the vehicle is to be started by pushing or towing, or if it is parked on an incline, the overdrive control knob must be pulled out so the transmission is in conventional drive, otherwise the overrunning clutch cam would not allow the drive shaft to engage the engine. Use conventional drive also when pushing another vehicle to prevent damage to the overdrive.

a. Overdrive Disengaged

When the overdrive control knob is out, the vehicle is in conventional drive. In this position, the sun gear is moved forward (by the control rod) and engages teeth on the pinion cage. Power flow, therefore, is from transmission mainshaft A (Fig. 139) through the planetary gear set, which will revolve as a single unit, and out through the overdrive unit mainshaft B.

b. Overdrive Engaged

When the overdrive control knob is pushed in, the vehicle is in overdrive. The control rod closes a "rail lockout switch" to energize the overdrive control circuit. The action of the unit will not be controlled by the speed of the vehicle (through the governor switch) and the accelerator pedal as follows:

1. FAST SPEEDS. When the vehicle speed is over 29 MPH, the overdrive governor switch closes to energize the overdrive solenoid. The solenoid pushes a pawl into a blocker ring (Fig. 140).

The blocker ring slows down the freely rotating control plate and sun gear. When the accelerator pedal is temporarily let up, the torque change from the engine will reverse the rotation of the blocker ring slightly and allow the pawl to slide smoothly into a notch on the control plate, thus holding the control plate and the sun gear stationary. Power flow (Fig. 141) will then be from transmission mainshaft A to pinion cage C. With sun gear held stationary, pinion gears will transmit power to ring gear D and out through overdrive unit mainshaft B.

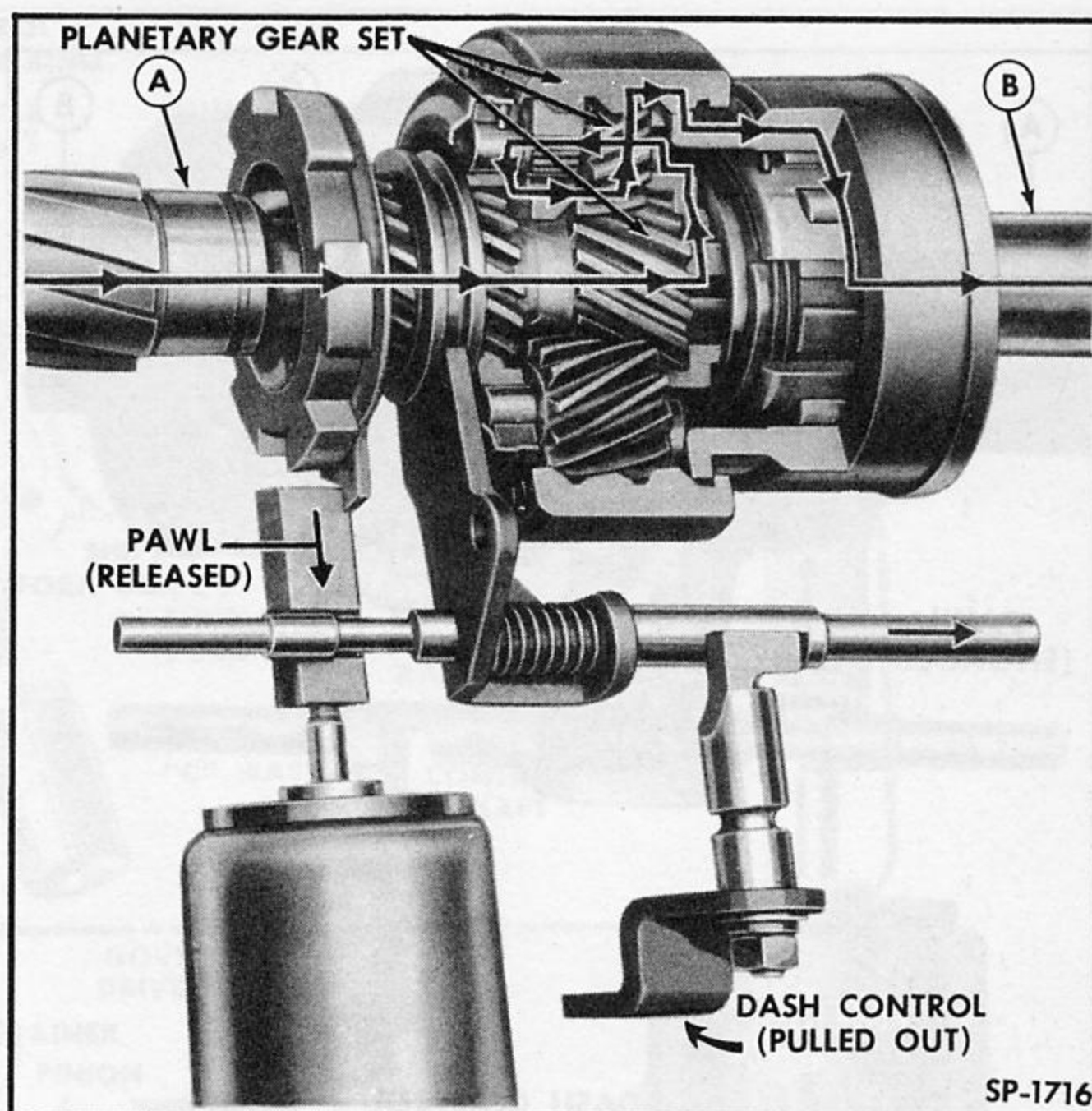


Fig. 139—Conventional Drive Power Flow

2. SLOW SPEEDS. When the vehicle has not reached 29 MPH or has slowed down below 23-1/2 MPH, the governor switch will be open, therefore the solenoid operated pawl will not be engaged. Power flow will start from transmission mainshaft A (Fig. 142) to pinion cage C. The sun gear is not held stationary by the pawl, therefore the pinion gears cannot exert any power on the ring gear to drive the output shaft. In this case, an overrunning clutch cam E, which is splined to shaft A, rotates and wedges its rollers against clutch outer race which is part of overdrive unit mainshaft B. When the accelerator pedal is let up and the rear wheels tend to overrun engine speed, the rollers merely fall back off ramps on the cam and allow rear wheels to "free wheel."

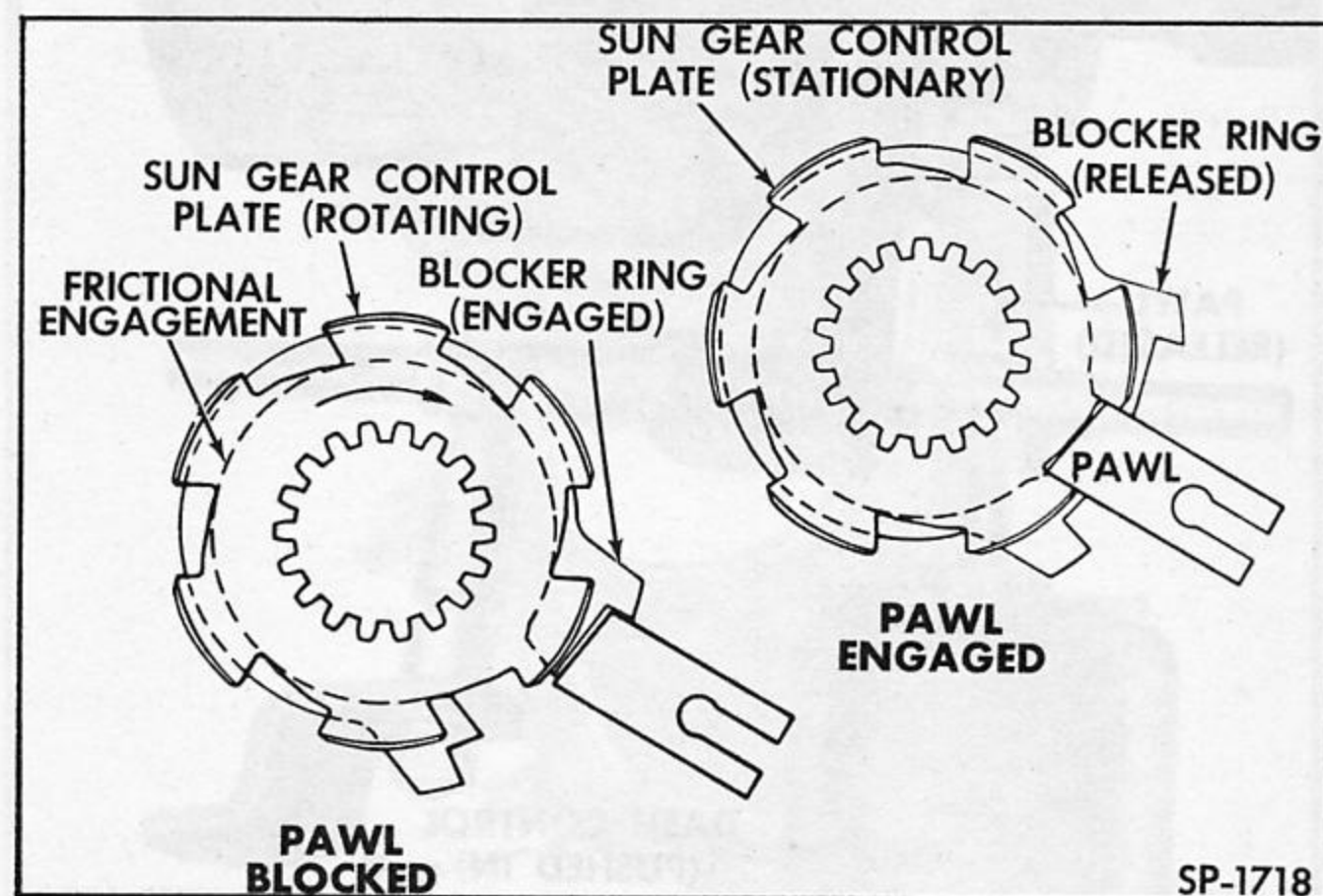


Fig. 140—Operation of Pawl

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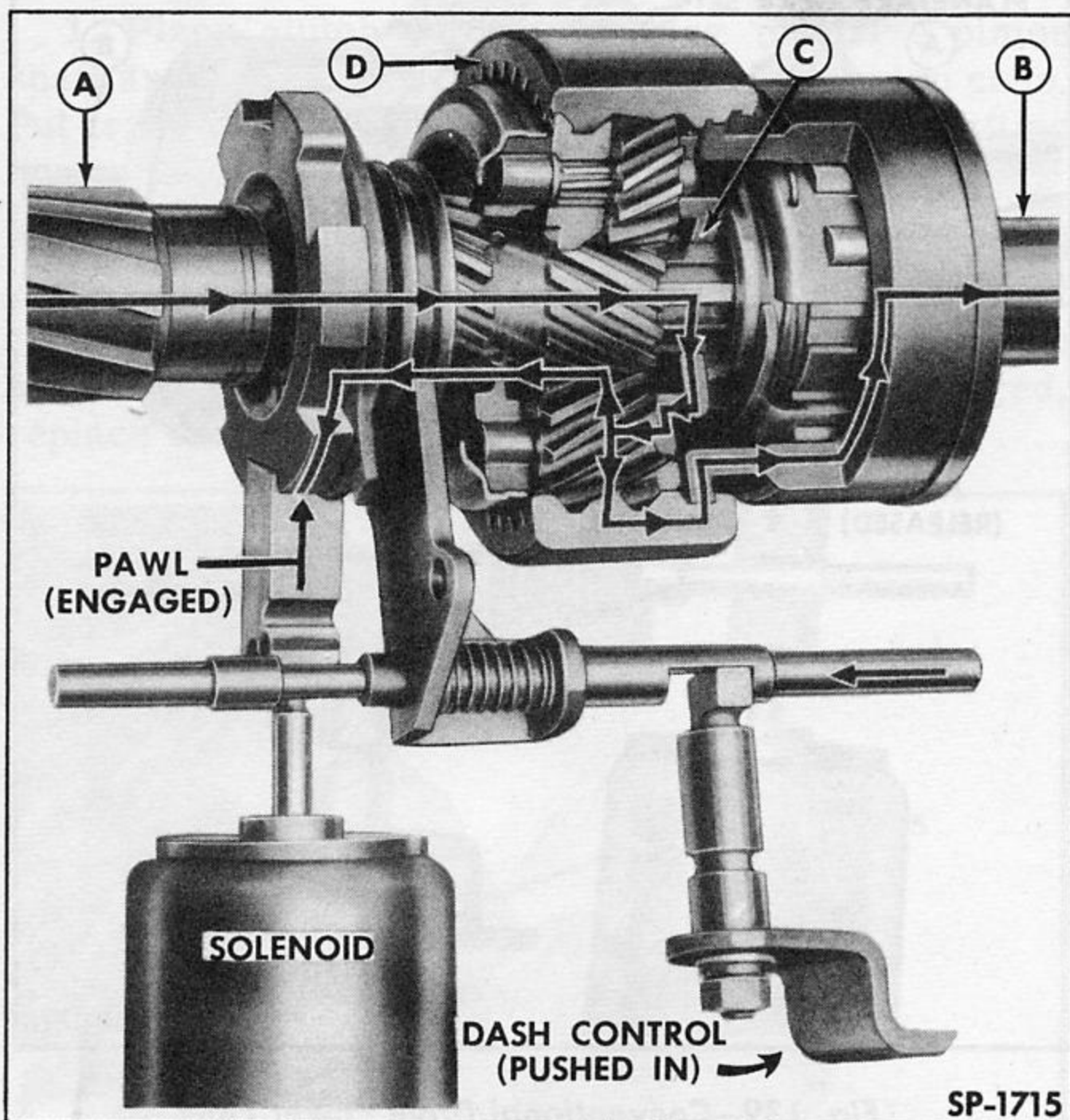


Fig. 141—Overdrive Power Flow

3. **KICKDOWN AT FAST SPEEDS.** At any time below 55 MPH when the vehicle is in overdrive operation and sudden acceleration is needed, conventional drive can be obtained by fully depressing the accelerator. This operates a "kickdown switch" which breaks

the overdrive control circuit to disengage the pawl. The pawl will not disengage, however, until there is a momentary let up in engine torque, therefore the kickdown switch has another set of contacts whereby it can break the engine ignition circuit for a fraction of a second until the overdrive solenoid releases. The overdrive unit will now be inoperative, and the vehicle will accelerate in third gear until the accelerator pedal is again lifted momentarily, thus engaging the overdrive.

4. **REVERSE.** When the overdrive unit is engaged and reverse gear is desired, it is necessary only to operate the gearshift lever below the steering wheel.

A shift fork rail from the overdrive unit extends into the transmission unit and rests against the low and reverse inner shifting lever. When this inner shifting lever is moved to reverse gear position, it acts as a cam and pushes the overdrive shift fork rail and shift fork rearward, moving the sun gear to interlock with the pinion cage and opening the lockout switch to prevent overdrive engagement. This is the same position the overdrive is in during conventional drive.

OVERDRIVE TRANSMISSION REMOVAL

Internal repair or overhaul of the overdrive transmission will necessitate removal of the transmission from the vehicle. The overdrive transmission and the overdrive are removed as a unit. A thorough diagnosis should precede the removal to determine as far as possible the nature of the trouble and the necessity for repair. Remove the overdrive transmission from the vehicle as follows:

1. Remove drain plug from overdrive housing and drain lubricant.
2. Disconnect overdrive control cable from control shaft lever and hold down clips.
3. Disconnect overdrive wiring from shift fork rail switch and solenoid.
4. Disconnect speedometer cable from overdrive housing.
5. For remaining removal operations, refer to "Standard Transmission Removal" in this section.

OVERDRIVE TRANSMISSION REPAIR

The overdrive transmission and the overdrive unit, after removal 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 rails 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.

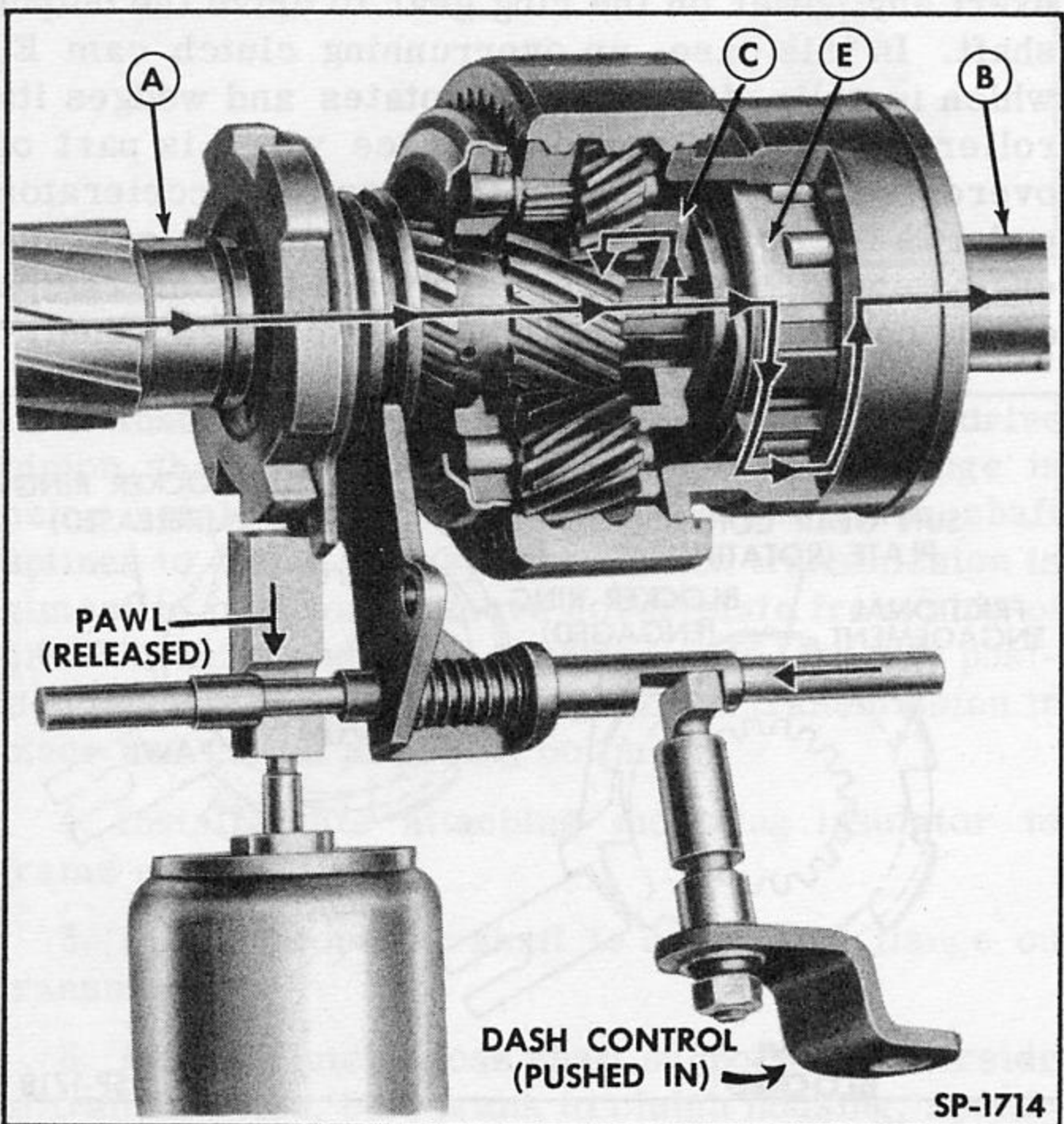


Fig. 142—Free Wheeling Direct Drive

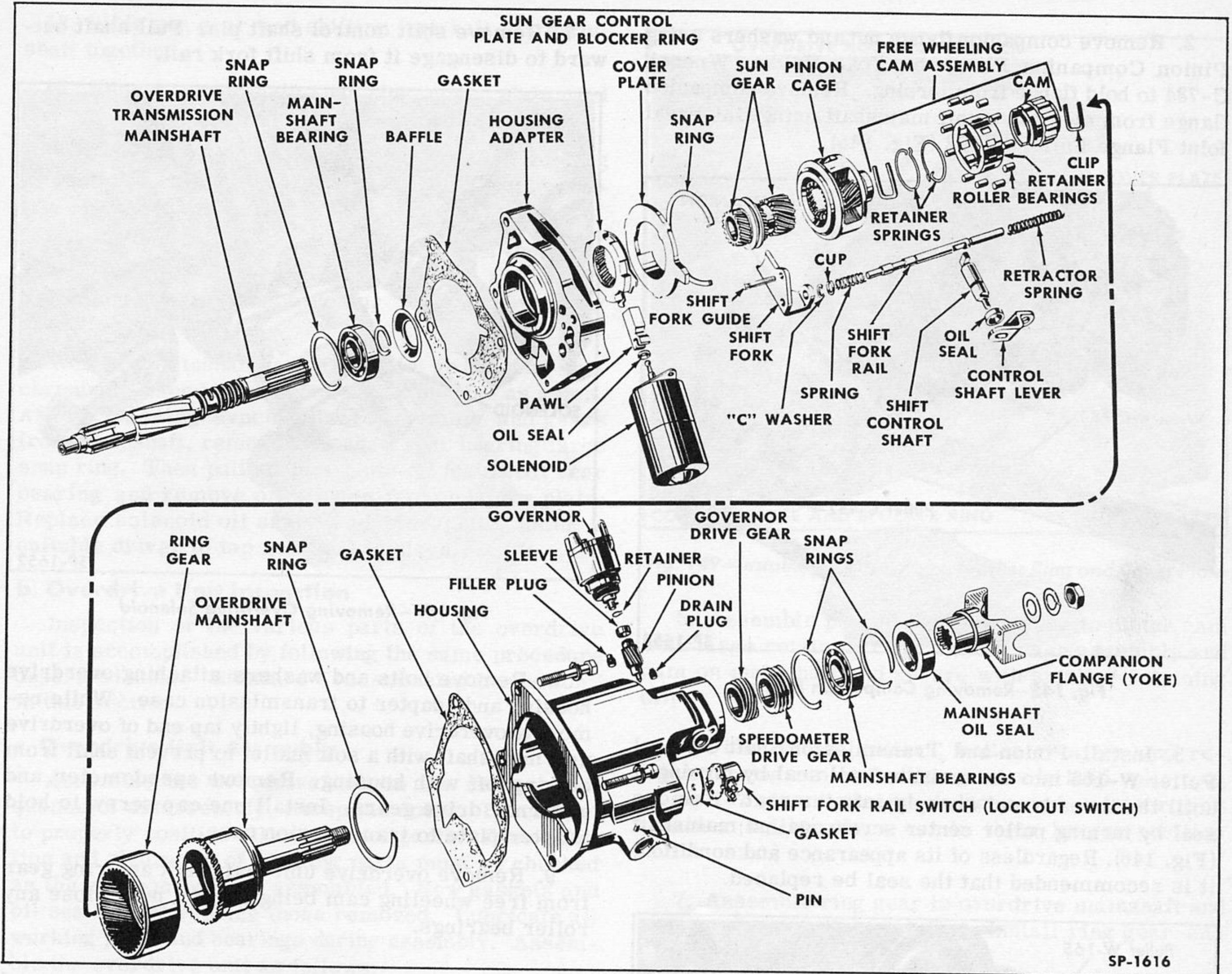


Fig. 143—Overdrive Unit—Exploded View

The transmission can be repaired by following the procedure given under "Standard Transmission Repair" in this section. 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.

The overdrive unit can be repaired with the unit assembled to the transmission. Proceed as follows:

a. Overdrive Unit Disassembly

Disassemble the overdrive unit as described below:

1. Mount transmission and overdrive on Transmission Repair Stand KF-100 (Fig. 144), or some other suitable holding fixture.

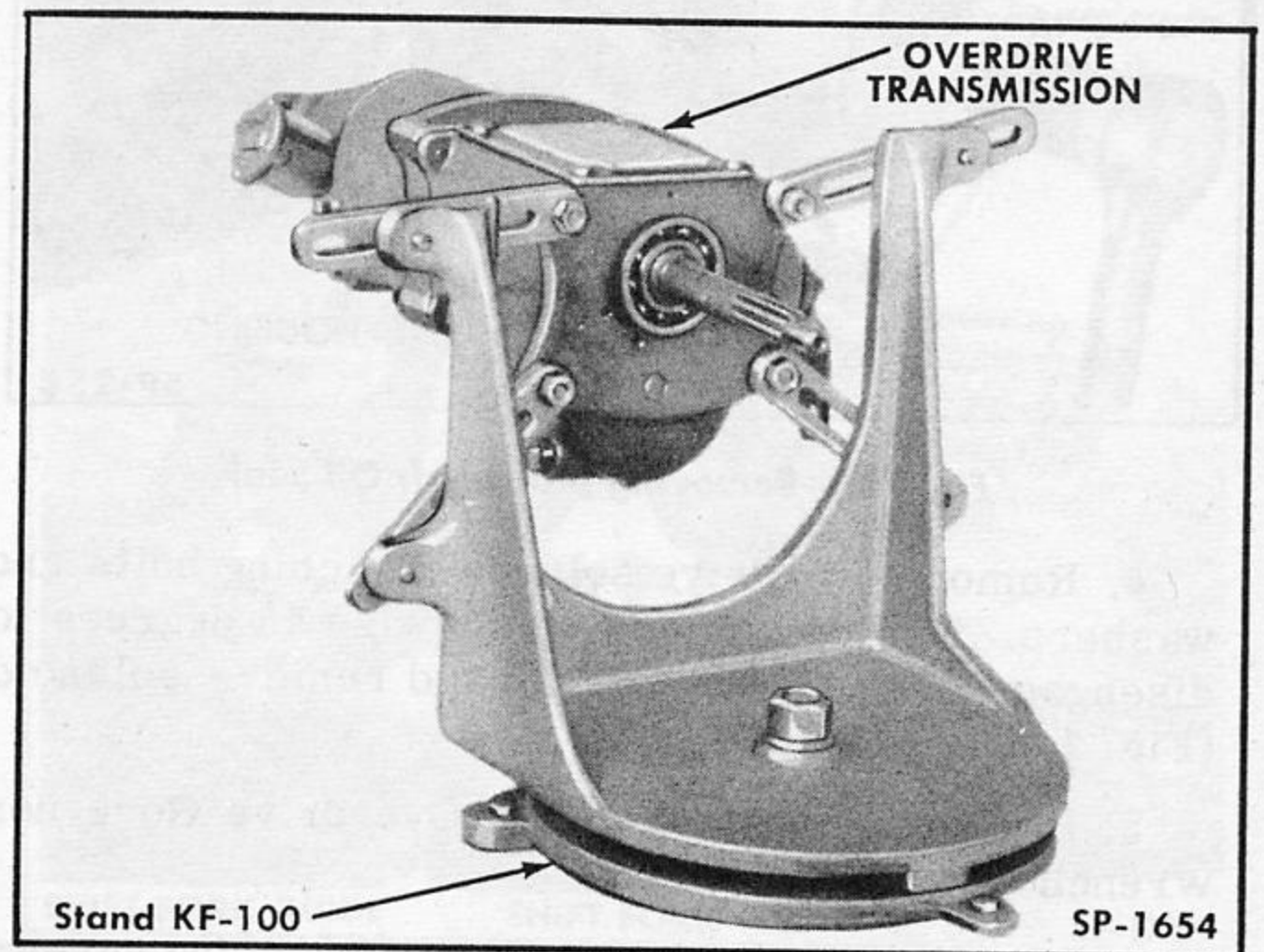


Fig. 144—Overdrive Transmission in Fixture

HENRY J SHOP MANUAL

2. Remove companion flange nut and washers using Pinion Companion Flange or Yoke Holding Wrench C-784 to hold flange from turning. Remove companion flange from overdrive unit mainshaft using Universal Joint Flange Puller C-452 (Fig. 145).

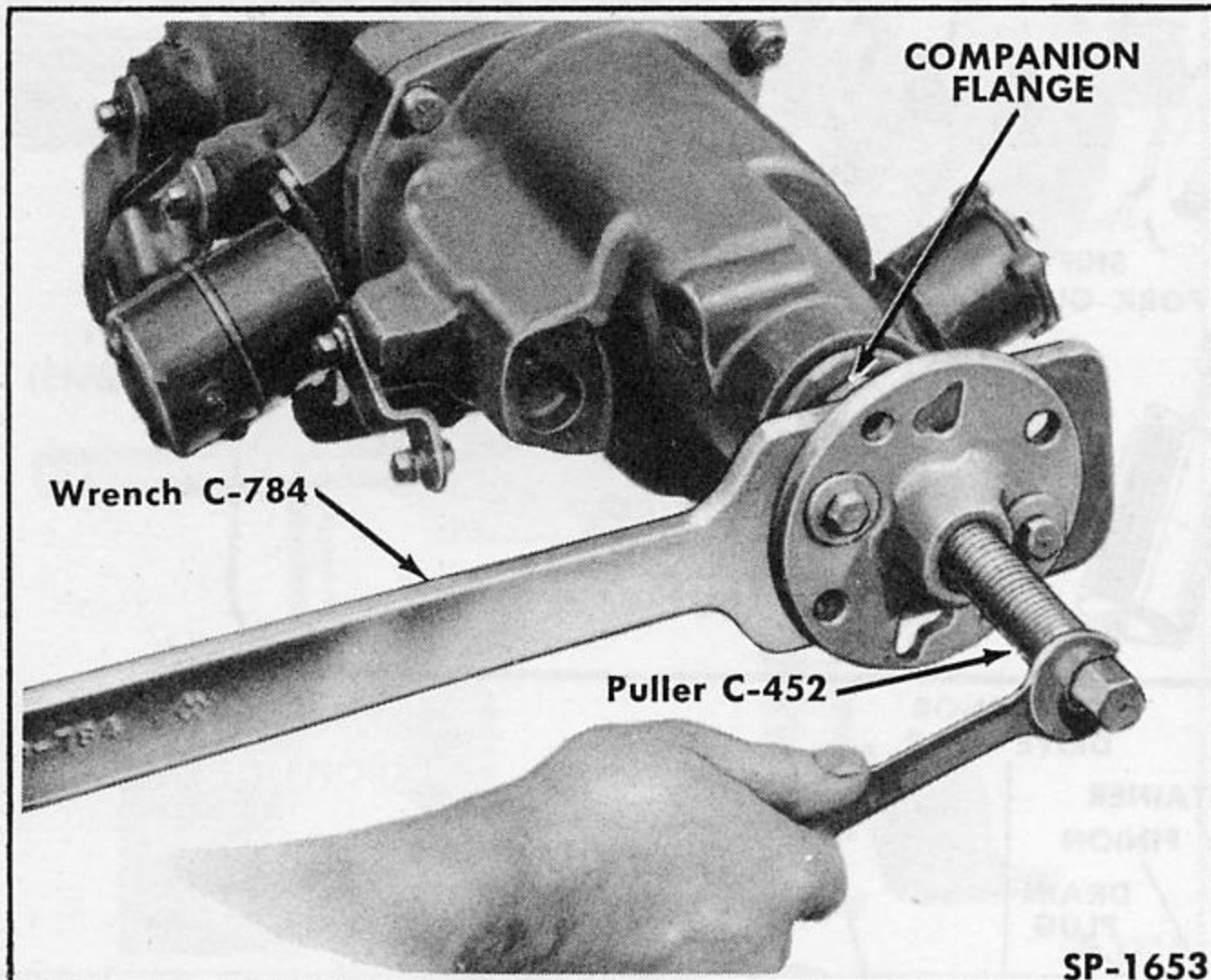


Fig. 145—Removing Companion Flange

3. Install Pinion and Transmission Shaft Oil Seal Puller W-165 into the mainshaft oil seal by turning it until the threads cut sharply into the seal. Remove seal by turning puller center screw against mainshaft (Fig. 146). Regardless of its appearance and condition, it is recommended that the seal be replaced.

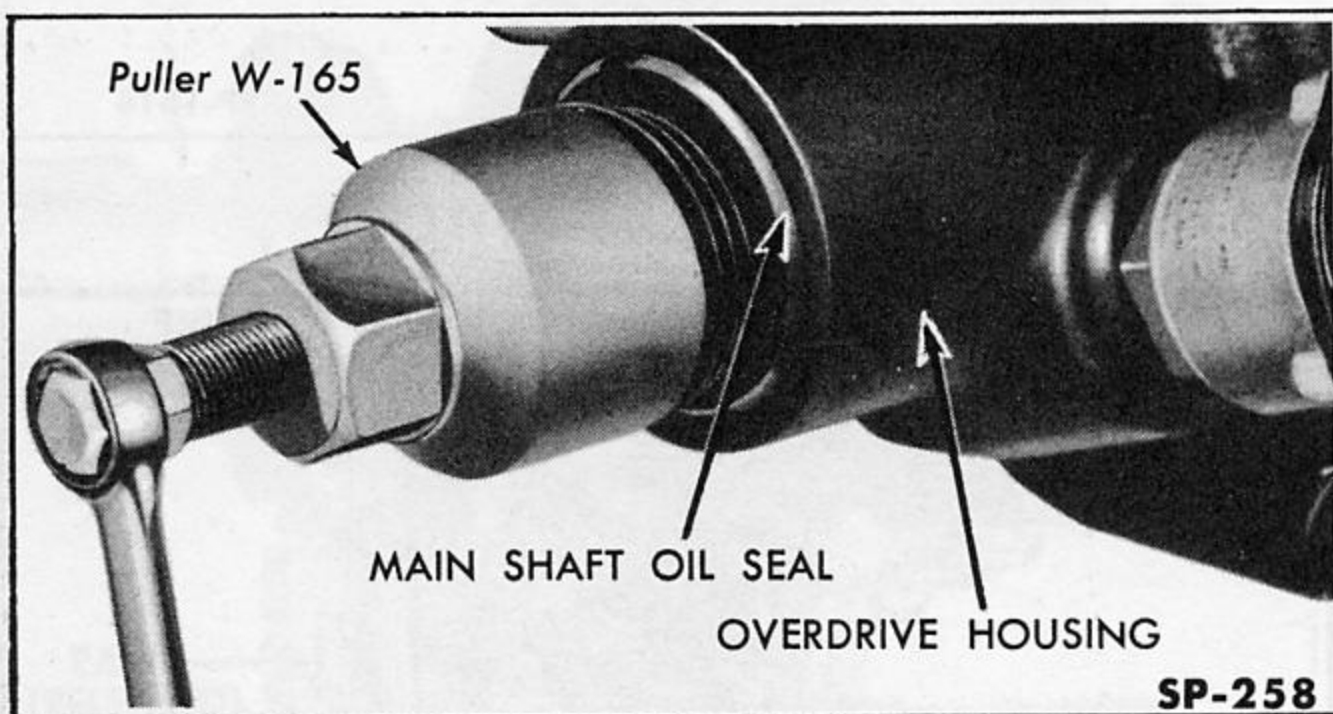


Fig. 146—Removing Mainshaft Oil Seal

4. Remove overdrive solenoid attaching bolts and washers. Rotate solenoid clockwise 45 degrees to disengage plunger from pawl and remove solenoid (Fig. 147).

5. Remove governor, using Overdrive Governor Wrench KF-20 (Fig. 148).

6. Remove shift fork rail switch attaching screws and washers. Lift out switch and gasket.

7. Remove shift control shaft pin. Pull shaft outward to disengage it from shift fork rail.

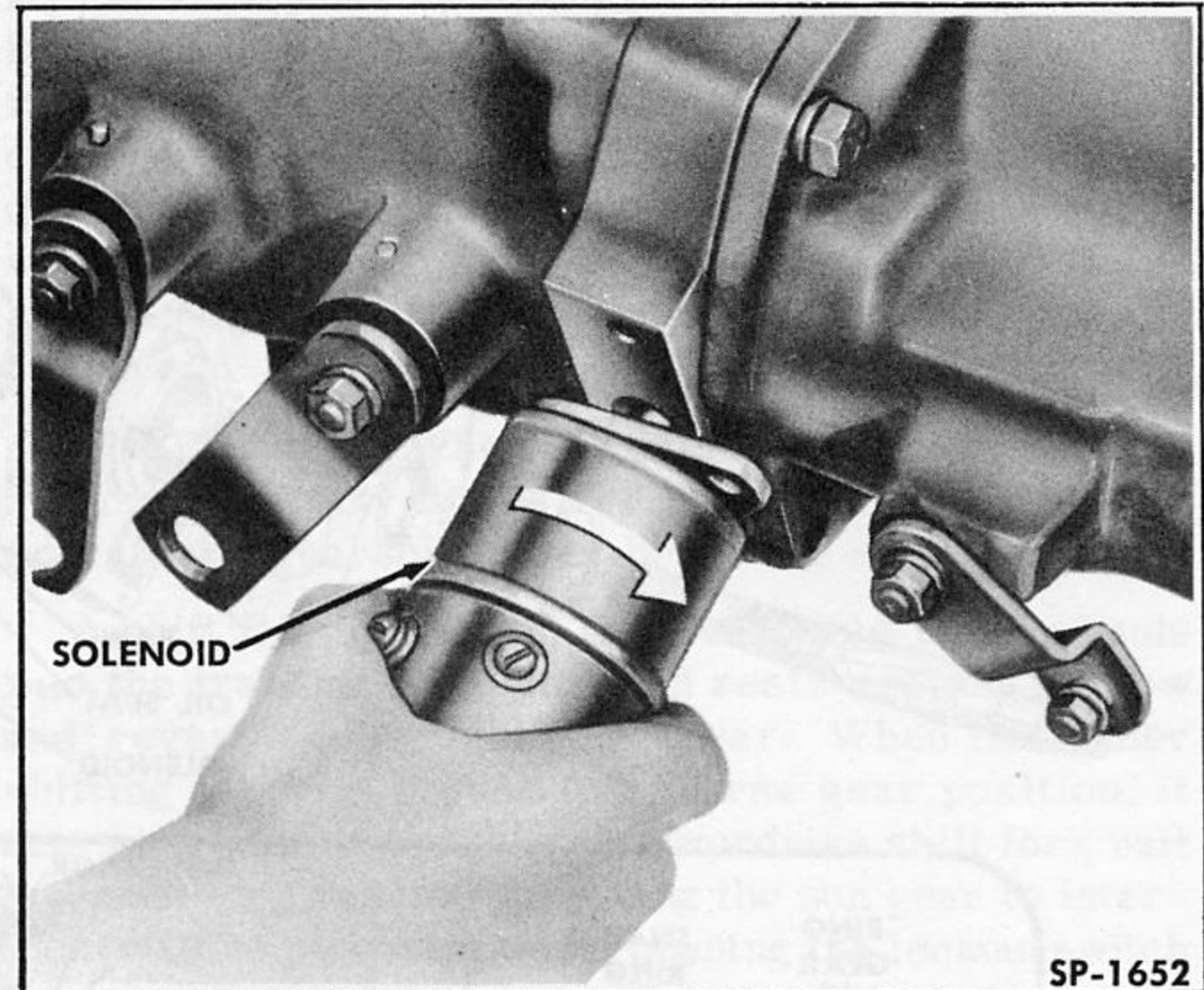


Fig. 147—Removing Overdrive Solenoid

8. Remove bolts and washers attaching overdrive housing and adapter to transmission case. While removing overdrive housing, lightly tap end of overdrive unit mainshaft with a soft mallet to prevent shaft from coming off with housing. Remove speedometer and governor drive gears. Install one cap screw to hold adapter plate to transmission case.

9. Remove overdrive unit mainshaft and ring gear from free wheeling cam being careful not to lose any roller bearings.

10. Remove clips and slide free wheeling cam and roller retainer off transmission mainshaft.

11. Slide pinion cage assembly from mainshaft.

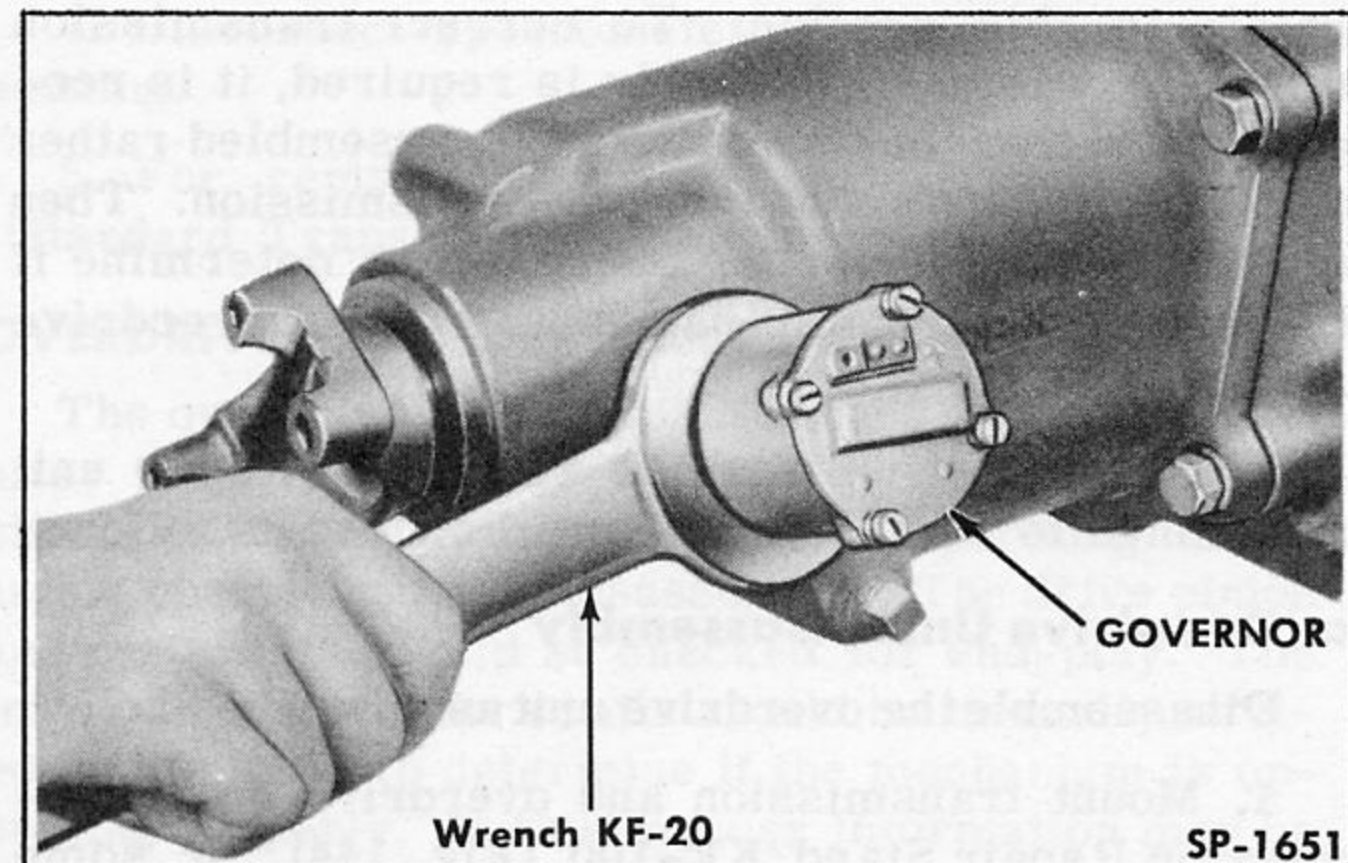


Fig. 148—Removing Overdrive Governor

12. Slide sun gear and shifting fork rail off mainshaft together.

13. Remove cover plate snap ring, cover plate pawl and the control plate and blocker ring assembly.

14. Disassemble overdrive housing by removing retractor spring, shift control shaft lever, shift control shaft and shift control shaft oil seal.

15. The procedure for the disassembly of the overdrive-equipped transmission is the same as that for the conventional transmission, with the following exception:

Remove mainshaft, adapter plate, gears, and synchronizer assembly from transmission case as a unit. After removing synchronizer assembly and gears from mainshaft, remove mainshaft rear bearing large snap ring. Then pull adapter plate off mainshaft rear bearing and remove oil slinger from adapter plate. Replace solenoid oil seal in adapter plate, using a suitable driver to tap new seal in place.

b. Overdrive Unit Inspection

Inspection of the various parts of the overdrive unit is accomplished by following the same procedure described under "Standard Transmission Inspection" in this section.

c. Overdrive Unit Assembly

Assemble the overdrive unit in the reverse sequence of disassembly, except as noted. Be careful to properly position all component parts. 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. Assemble the overdrive unit as follows:

1. If the transmission unit was disassembled, it must be completely assembled according to the procedure under "Standard Transmission Assembly" in this section, with the following exceptions:

Place oil slinger in adapter plate, insert mainshaft and rear bearing in adapter plate, and install large snap ring. After installing synchronizer assembly and gears on mainshaft, install adapter plate and mainshaft assembly in transmission case. Use new gasket on adapter plate. Then fasten adapter plate to case with one cap screw.

2. Install solenoid pawl to adapter plate with notched side up.

3. Install the control plate and blocker ring assembly, cover plate, and snap ring to adapter plate (Fig. 149).

4. Install sun gear and shift fork rail together (Fig. 150).

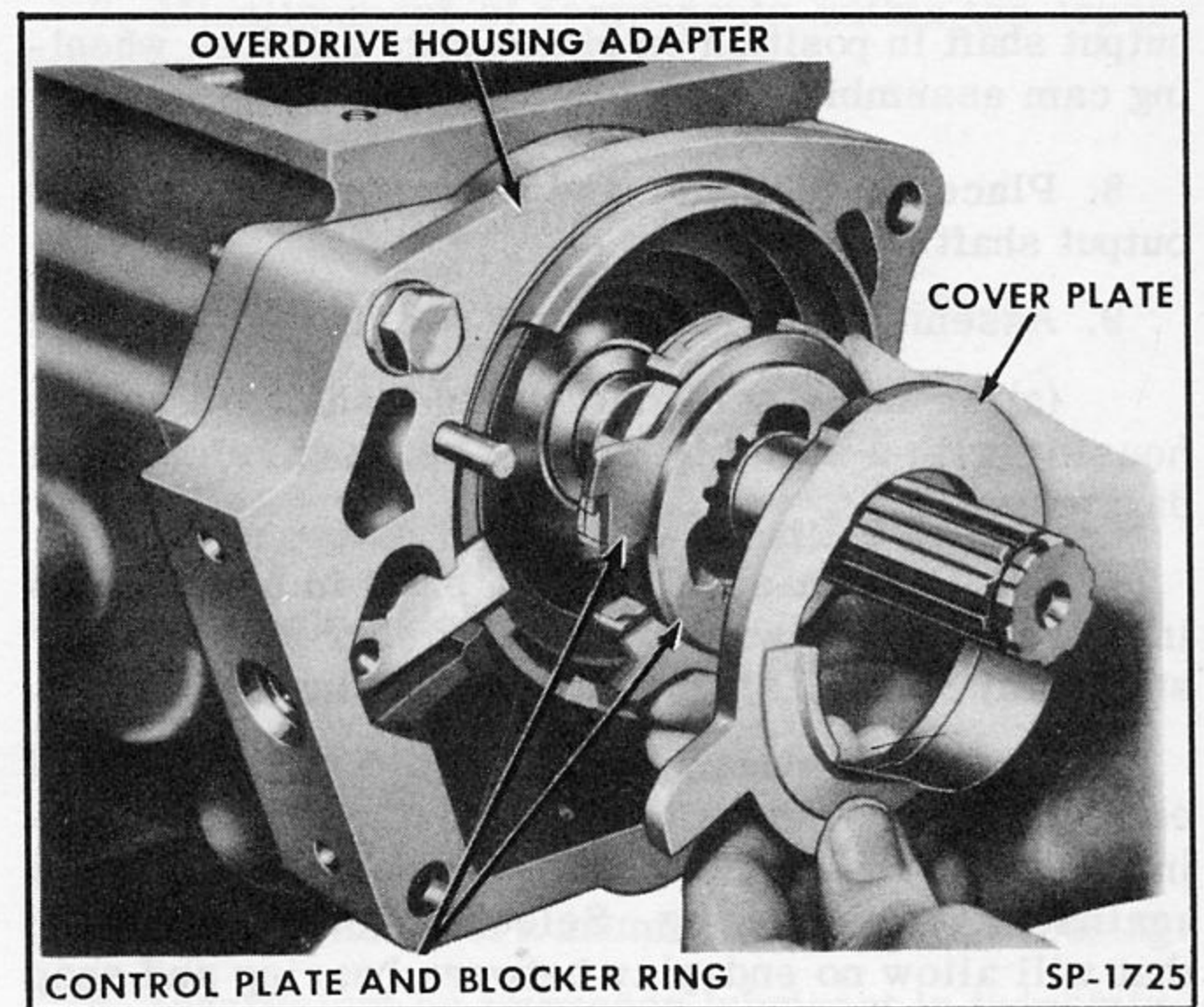


Fig. 149—Installing Control Plate, Blocker Ring and Cover Plate

5. Assemble pinion cage assembly to clutch cam with large retaining clip. Install cage assembly and cam on mainshaft and secure with smaller retaining clip.

6. Place clutch rollers, roller retainer and retainer springs on cam. Use grease to hold rollers in place. Put transmission in gear and rotate roller retainer until rollers are in their lowest position on the cam.

7. Assemble ring gear to overdrive mainshaft and lock in place with snap ring. Install ring gear and

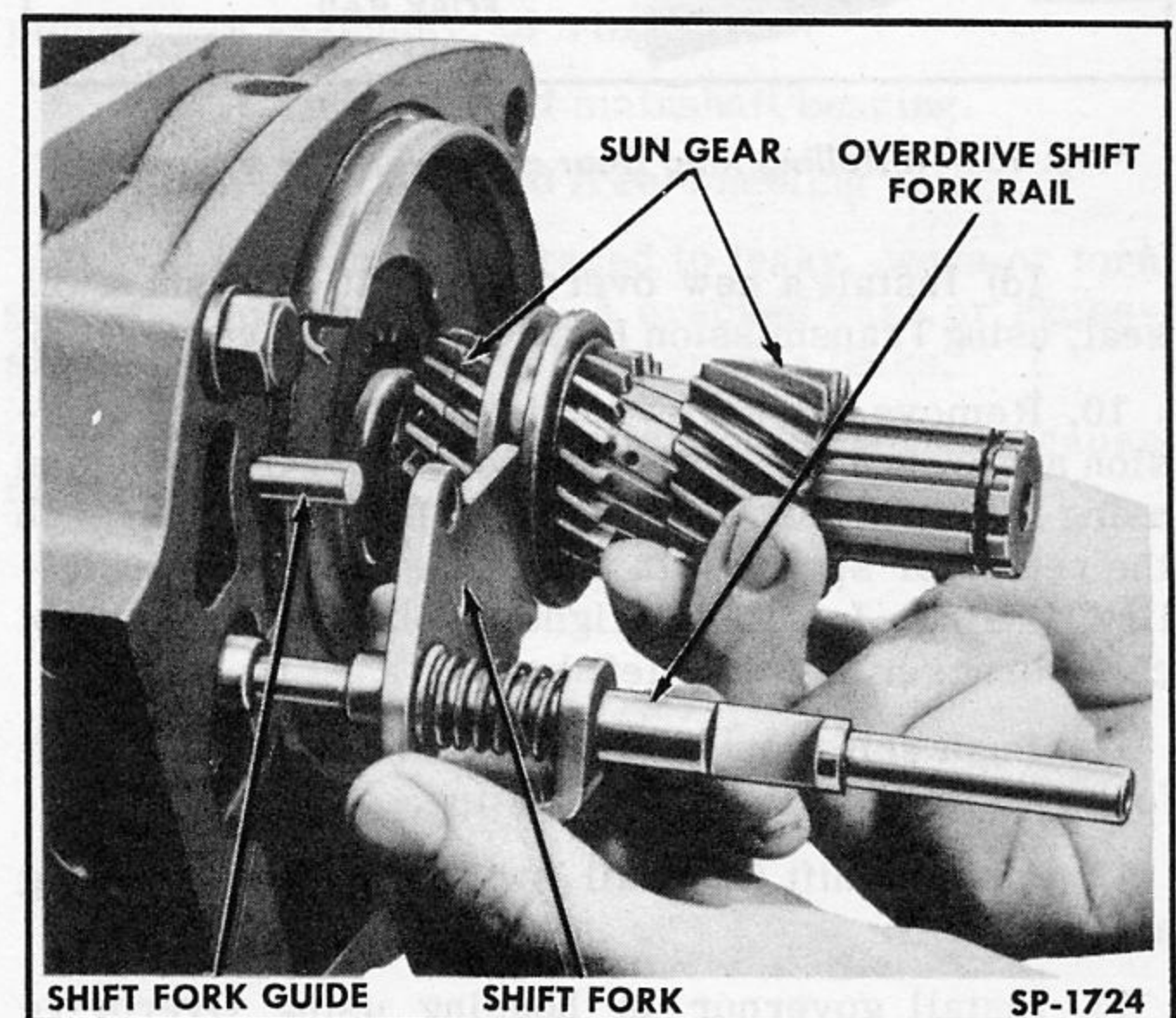


Fig. 150—Installing Sun Gear and Shift Fork Rail

HENRY J SHOP MANUAL

output shaft in position on pinion cage and free wheeling cam assembly (Fig. 151).

8. Place speedometer and governor drive gear on output shaft.

9. Assemble overdrive unit housing as follows:

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

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

(c) Install inner snap ring in housing. Install bearing in the housing with Transmission Pinion Bearing Driver KF-128, making sure bearing is seated against inner snap ring. Select an outer snap ring that will allow no end-play between bearing and snap ring. Snap rings are available in various thicknesses.

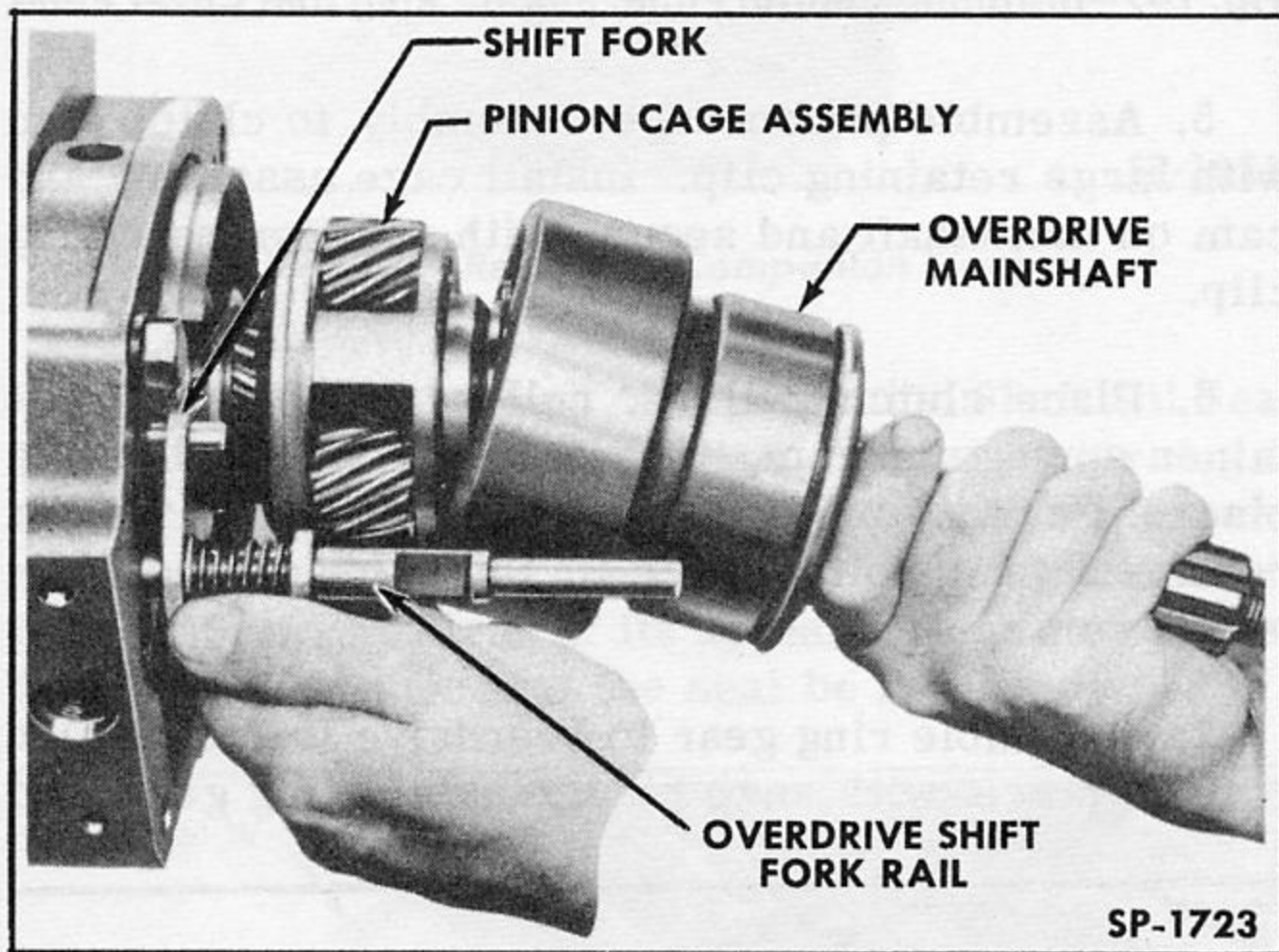


Fig. 151—Installing Ring Gear and Overdrive Mainshaft

(d) Install a new overdrive unit mainshaft oil seal, using Transmission Rear Oil Seal Driver C-3105.

10. Remove cap screw holding adapter to transmission and install overdrive unit housing to transmission using a new gasket. Guide the shift fork rail through the retractor spring with a suitable tool while installing housing. Install and tighten bolts. Place control cable bracket on lower left bolt.

11. Push shift control shaft inward to engage shift fork rail and install pin in housing.

12. Install shift fork rail switch to housing, using a new gasket.

13. Install governor to housing using Overdrive Governor Wrench KF-20. Install wire between shift fork rail switch and governor.

14. Install solenoid by turning solenoid counterclockwise to engage shaft in pawl. Install attaching bolts and washers.

15. Install companion flange to transmission mainshaft with Universal Joint Flange Installer KF-14.

16. Install companion flange nut and tighten to 100-140 foot-pounds torque.

OVERDRIVE TRANSMISSION INSTALLATION

The overdrive transmission, with the overdrive unit attached, can be installed to the vehicle as follows:

1. Install overdrive transmission as outlined under "Standard Transmission Installation" in this section.

2. Install speedometer cable to overdrive housing.

3. Connect overdrive wiring to shift fork rail switch and solenoid.

4. Connect overdrive control cable to control shaft lever and position cable bracket.

5. Fill overdrive unit and transmission as specified in Section 17, "Lubrication."

SPEEDOMETER GEARS

The speedometer pinion gear on the speedometer cable is attached to the right rear side of the transmission housing on standard transmissions. It is attached to the left rear side of the overdrive housing on overdrive transmissions. The spiral tooth drive gear on the transmission or overdrive mainshaft is designed to mesh with the teeth of the speedometer pinion gear. The ratio of the speedometer drive and pinion gears is coordinated with the rear axle gear ratio to provide accurate speedometer readings.

Whenever the rear axle gear ratio is changed it is also 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	SPEEDOMETER DRIVE GEAR (NO. OF TEETH)
6 Cyl.	4.1:1	Standard	16 T.
Late 4 Cyl.	4.27:1	Standard	17 T.
Early 4 Cyl.	4.55:1	Standard	18 T.
4 & 6 Cyl.	4.55:1	Overdrive	18 T.

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.

STANDARD AND OVERDRIVE TRANSMISSION

Transmission troubles are usually confined to the following:

a. Transmission Slipping Out of Gear

1. Improper linkage adjustment.
2. Insufficient throw or travel of upper clearance.
3. Interlock ramp worn, too much ramp clearance, or poppet spring too weak.
4. Excessive end-play in the power train preventing full gear engagement.

b. Transmission Sticking in Gear

1. Clutch not completely released.
2. Sliding gear tight on the mainshaft splines.
3. Improper linkage adjustment.
4. Insufficient chamfer at edges of interlock ramp ball detent.
5. Distorted, burred or otherwise damaged mainshaft splines.

c. Transmission Hard to Shift

1. Clutch not released.
2. Synchronizer unit sleeve too tight on the hub.
3. Synchronizer blocking ring too tight, caused by improper end-play between synchronizer and idler gear.
4. Mainshaft splines distorted, burred or otherwise damaged.
5. Improper linkage adjustment.
6. Interlock clearances too close between sleeve and ramp.

7. Misalignment of components within the transmission case.

d. Transmission Oil Leaks

1. Loose drain or filler plugs.
2. Leaky or missing gaskets and oil seals.
3. Cracked case.
4. Lubricant level too high.
5. Damaged or improperly installed oil slinger.

e. Transmission Noises

1. Worn or scored bearings.
2. Chipped, cracked, or broken gear teeth.
3. Excessive play in the power train.
4. Misalignment of transmission on clutch housing.
5. Insufficient or improper lubricant in transmission case.
6. Worn or damaged speedometer gears.

OVERDRIVE UNIT

Overdrive trouble is usually confined to the following:

1. Overdrive will not disengage to permit shifting into reverse. This is caused by failure of stationary gear pawl to disengage from blocker ring. Corrective measures will be found in Section 15, "Electrical."
2. Noise emanating from overdrive may be confined to free-wheeling unit or overdrive planetary gears.
 - (a) Worn, chipped, or broken teeth on sun 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.

SERVICE BULLETIN REFERENCE

- 1. Loose drain or filter plug.
 - 2. Leaky or missing gaskets and oil seals.
 - 3. Cracked case.
 - 4. Excessive level of engine oil.
 - 5. Damaged or improperly installed oil filter.
 - 6. Transmission struts.
 - 7. Worn or damaged synchronizers.
 - 8. Worn or damaged shiftshaft gears.
- OVERDRIVE UNIT
- 1. Overdrive will not engage.
 - 2. Sliding gear shift on the mainshaft.
 - 3. Idle gear shift on the mainshaft.
 - 4. Shift lever sticks in gear.