TM 9-1817

WAR DEPARTMENT TECHNI

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ORDNANCE MAINTENANCE

Power Train, Chassis, and Body for 5- to 6-Ton Ponton Tractor Truck

(Autocar Model U8144T)

WAR DEPARTMENT • *28 APRIL 1944*

FOR ORDNANCE PERSONNEL ONLY

WAR DEPARTMENT TECHNICAL MANUAL

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Washington 25, D. C., 28 April 1944

TM 9-1817, Ordnance Maintenance: Power Train, Chassis, and Body for 5- to 6-Ton Ponton Tractor Truck (Autocar Model U8144T), is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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The Adjutant General.

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(For explanation of symbols, see FM 21-6.)

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★This manual supersedes pertinent information from TB ORD 20, dated 24 January 1944; TB 800-21, dated 30 November 1943; and TB 10-1000-27, dated 6 August 1943. This manual, together with TM 9-817 and TM 9-1832A, supersedes TM 10-1497, dated 1 July 1942.

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ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

CHAPTER 1

INTRODUCTION

1. SCOPE.

a. The instructions contained in this manual are for the information and guidance of personnel charged with the maintenance and repair of the 5- to 6-ton, 4 x 4 Ponton Tractor Truck (Autocar Model U8144T). These instructions are supplementary to Field Manuals and Technical Manuals prepared for the using arms. This manual does not contain information which is intended primarily for the using arms, since such information is available to ordnance maintenance personnel in 100-series Technical Manuals or Field Manuals.

b. This manual contains a description of, and procedure for, disassembly, cleaning, inspection, repair, and assembly of the following vehicle components: clutch, transmission, power take-off, transfer case, drive shafts, drive shaft hand brake shoes, front axle, rear axle, service (air) brake shoes, wheels, hubs and tires, steering gear, springs and shock absorbers, frame, cab and body, winch, fifth wheel, fuel tanks, radiator, fan and hub.

c. TM 9-817 contains a description of the 5- to 6-ton, 4 x 4 Ponton Tractor Truck (Autocar Model U8144T) and technical information required for the identification, use and care of the materiel. Part one of TM 9-817 contains vehicle operating instructions. Part two contains vehicle maintenance instructions for using arm personnel charged with the responsibility of doing maintenance work within their jurisdiction. Part three contains instructions for storage and shipment of the materiel, references to all Standard Nomenclature Lists, Technical Manuals, and other publications for the materiel covered by this manual, and an index of the manual arranged alphabetically.

d. TM 9-1832A contains a description of, and procedures for disassembly, inspection, repair, and assembly of the engine used on this vehicle.

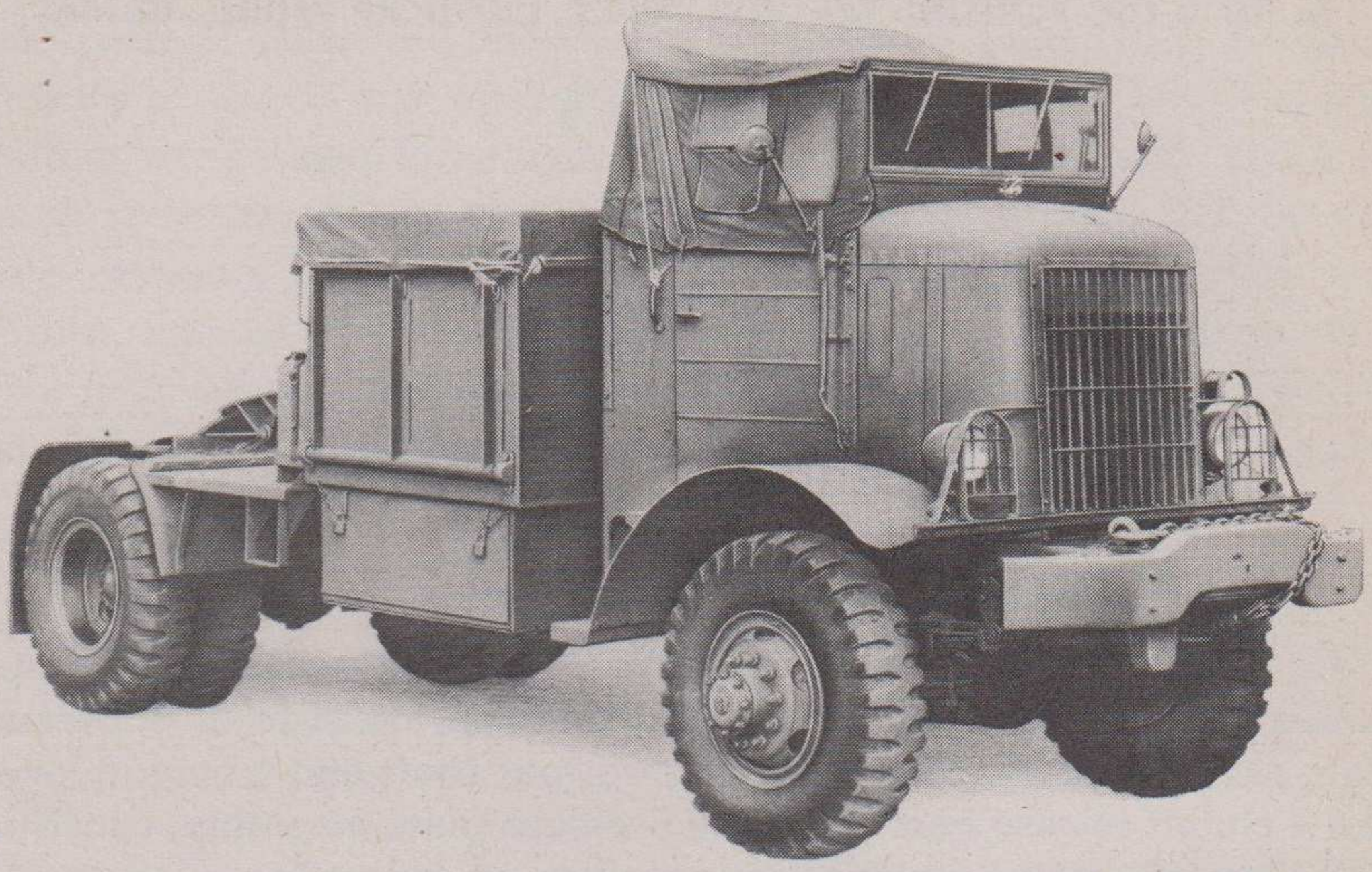
e. TM 9-1825B contains a description of, and procedures for disassembly, inspection, repair, and assembly of the cranking motor and generator used on this vehicle.

f. TM 9-1826C contains a description of, and procedures for disassembly, inspection, repair, and assembly of the carburetor used on this vehicle.

g. TM 9-1828A contains a description of, and procedures for disassembly, inspection, repair, and assembly of the fuel pump used on this vehicle.

h. TM 9-1827A contains a description of, and procedures for

INTRODUCTION



RA PD 321945

Figure 1 — Right Side — 5- to 6-ton 4 x 4 Ponton Tractor Truck (Open Cab) — Front Side View

disassembly, inspection, repair, and assembly of components of the air brake system on this vehicle.

2. VEHICLE MODIFICATION RECORDS.

a. MWO and Major Unit Assembly Replacement Record.

(1) DESCRIPTION. Every vehicle is supplied with a copy of A.G.O. Form No. 478 which provides a means of keeping a record of each MWO completed, or major unit assembly replaced. This form includes spacer for the vehicle name and U.S.A. registration number, instructions for use, and information pertinent to the work accomplished. It is very important that the form be used as directed, and that it remain with the vehicle until the vehicle is removed from service.

(2) INSTRUCTIONS FOR USE. Personnel performing modifications or major unit assembly replacements must record clearly on the form a description of the work completed and must initial the form in the columns provided. When each modification is completed, record the date, hours, and/or mileage, and MWO number. When major unit assemblies, such as engines, transmissions, and transfer cases, are replaced, record the date, hours, and/or mileage, and nomenclature of the unit assembly. Minor repairs, minor parts, and accessory replacements need not be recorded.

(3) EARLY MODIFICATIONS. Upon receipt by a third or fourth echelon repair facility of a vehicle for modification or repair, maintenance personnel will record the MWO numbers of modifications applied prior to the date of A.G.O. Form No. 478.

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CHAPTER 2

CLUTCH

Section I

DESCRIPTION AND DATA

3. DESCRIPTION AND OPERATION.

a. Description (figs. 2 and 4). The single-disk type clutch, located between the engine and transmission, consists of a pressure plate assembly, disk, pilot bearing, throwout shaft and trunnion levers, and a clutch release bearing. The pressure plate assembly, consisting of a conical spring compressed against an adjusting plate and a clutch release sleeve, is attached to the clutch flywheel ring by six flywheel ring adjusting straps and nuts. Shims for adjusting the distance between the clutch release sleeve and the rear of the flywheel ring are placed under these adjusting straps. Twenty clutch pressure levers with a fulcrum ring ball in each lever are held in position between two fulcrum rings and secured to clutch release sleeve by a snap ring. The pressure levers rest against the clutch pressure plate with studs protruding through flywheel ring. Pressure plate retracting springs are placed over pressure plate studs and secured with retaining pins and washers. The clutch disk facings, composed of an asbestos composition reinforced with copper wire, are attached to the clutch disk with rivets. The splined bore of the disk hub rests on the main drive gear spline. A clutch pilot bearing (which is packed with a special heat-resistant grease) is pressed into the bore of the flywheel and provides a seat for the main drive gear. The clutch throwout shaft and trunnion levers are located in the clutch housing attached to the transmission. Bushings are used for seats of the throwout shaft. The clutch release bearing is pressed into a trunnion block which is seated on the main drive gear bearing cap. A return spring is attached to the trunnion block and a cap screw on the main drive gear bearing cap.

b. Operation. The clutch engages and disengages engine power with the transmission. When the clutch pedal is depressed, motion is transmitted by linkage to the trunnion block and clutch release bearing, which is brought forward against clutch release sleeve. This applies pressure on clutch pressure spring and, through an arrangement of interlocked pressure levers and fulcrum ring balls, creates a centrifugal force which opposes action of clutch pressure spring.

CLUTCH

This permits backward movement of pressure plate, thus releasing pressure of clutch disk against flywheel. When clutch is in engaged position, centrifugal force acts on pressure levers to assist action of clutch pressure spring; and, since these levers form a disk or dial plate, pressure is uniformly distributed against pressure plate and, in turn, against clutch disk. The clutch disk is mounted on main drive gear splines; therefore, pressure of disk against engine flywheel transfers power from engine to transmission and eventually to axles.

4. DATA.

Make	W. C. Lipe
Model	L-42-S
Disk:	
Model	L-15-2
Size	15 in.
Type	Single dry plate
Number of facings	2
Outside diameter	15 in.
Inside diameter	8 in.
Spring pressure at 1¼ in. height	535 lb

Section II

REMOVAL

5. REMOVAL.

a. **Remove Transmission.** Refer to TM 9-817.

b. **Remove Clutch Pressure Plate Assembly, Disk, and Pilot Bearing.** Refer to TM 9-817.

c. **Remove Clutch Release Bearing** (fig. 2). Free the clutch release trunnion return spring. Slide trunnion block with attached clutch release bearing off main drive gear bearing cap.

d. **Remove Clutch Housing Assembly** (fig. 2). Remove cotter pins and nuts attaching clutch housing to transmission case. Lift off clutch housing.

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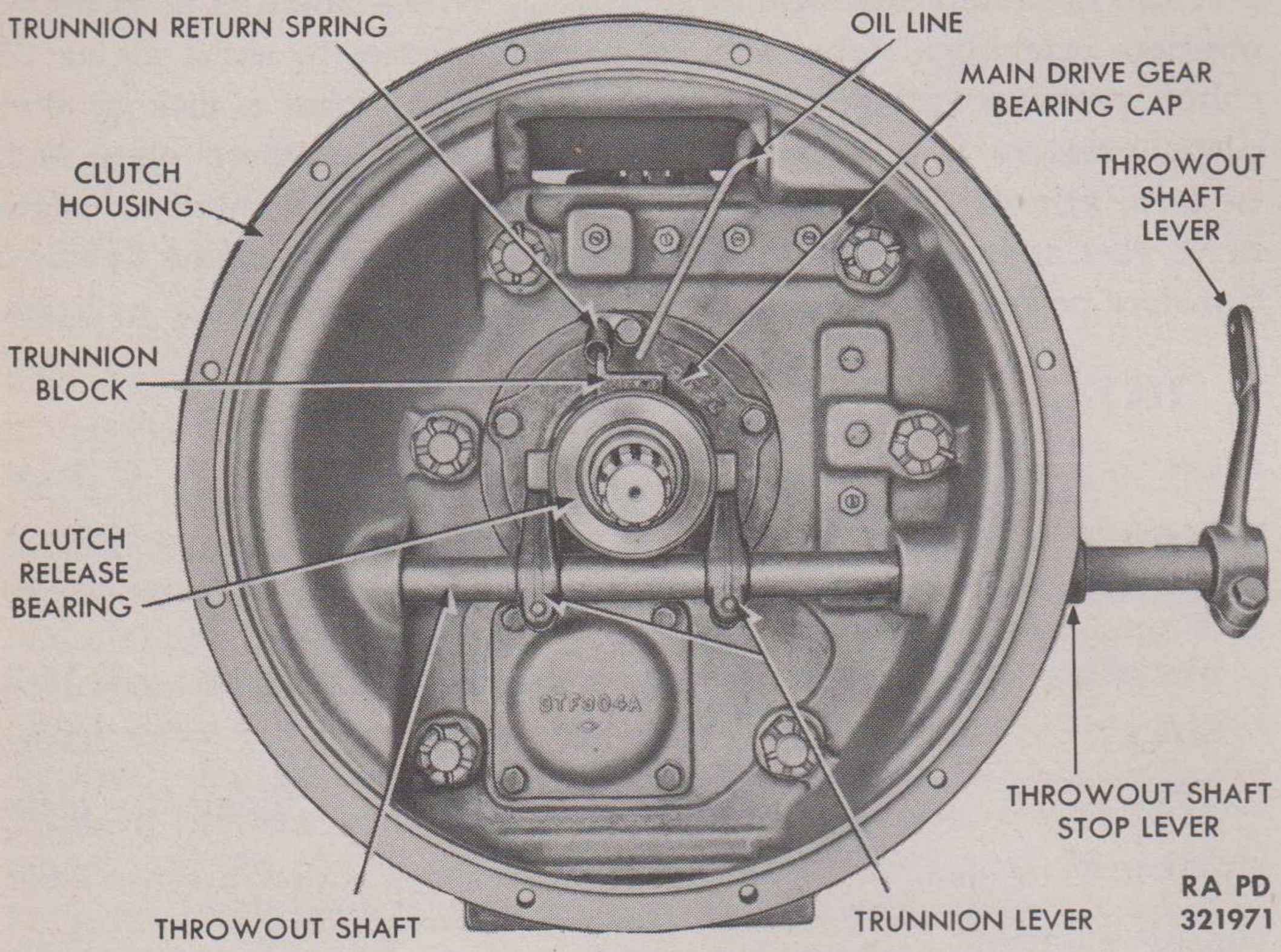

Figure 2 — Clutch Housing Assembly

Section III

DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY OF SUBASSEMBLIES

6. CLUTCH HOUSING.

a. Disassembly (fig. 3).

(1) REMOVE THROWOUT SHAFT. Remove trunnion lever cap screws and lock washers. Tap off trunnion levers and remove Woodruff keys. Slide clutch throwout shaft out of clutch housing.

(2) REMOVE THROWOUT SHAFT LEVER. Remove cap screw and lock washer securing shaft lever to throwout shaft. Tap off shaft lever and remove Woodruff key.

(3) REMOVE STOP LEVER. Remove cap screw and lock washer attaching stop lever to throwout shaft. Tap off stop lever. Remove adjusting cap screw and lock nut from stop lever.

(4) REMOVE THROWOUT SHAFT BUSHINGS. Tap bushings out of clutch housing.

(5) REMOVE COVER PLATES. Remove cap screws and lock washers attaching top and bottom cover plates to housing. Lift off cover plates.

b. Cleaning, Inspection, and Repair. Wash all parts in dry-cleaning solvent. Inspect clutch housing for cracks and fractures, tapping housing with a soft hammer to test for cracks. Check clutch throwout shaft and levers for cracks and fractures, replacing cracked or broken parts. Look for burs, nicks, and cross threads on all threaded parts, and repair or replace damaged parts. Inspect throwout shaft bushings for scoring or galling, replacing bushings if such conditions are found. Check lubrication passages to make sure they are open and clean.

c. Assembly (fig. 3).

(1) INSTALL COVER PLATES. Attach top and bottom cover plates to clutch housing with lock washers and cap screws.

(2) INSTALL THROWOUT SHAFT BUSHINGS. Tap bushings into position in clutch housing with oilholes in bushings alined with oilholes in housing.

(3) INSTALL STOP LEVER. Install adjusting cap screw and lock nut on stop lever. Tap Woodruff key into keyway and tap stop lever onto throwout shaft. Install lock washer and cap screw.

(4) INSTALL THROWOUT SHAFT LEVER. Install shaft lever key in keyway. Tap shaft lever onto throwout shaft and secure with lock washer and cap screw.

(5) INSTALL THROWOUT SHAFT. Insert shaft into left side of housing. Tap left trunnion lever key into shaft keyway and install left trunnion lever. Secure with lock washer and cap screw. Install right trunnion lever. Push throwout shaft fully into position in clutch housing.

7. CLUTCH RELEASE BEARING.

a. Disassembly.

(1) REMOVE TRUNNION RETURN SPRING. Remove spring from trunnion block.

(2) REMOVE CLUTCH RELEASE BEARING. Pull bearing off trunnion block with a bearing puller.

(3) REMOVE OIL WICK. Remove wick from oil passage in clutch release trunnion block.

b. Cleaning, Inspection, and Repair. Clean trunnion block and return spring with dry-cleaning solvent. The clutch release bearing is permanently packed with lubricant when manufactured; therefore, do not wash or dip bearing in dry-cleaning solvent. Wipe bearing clean with a cloth, and examine it for cracks which might permit leak-

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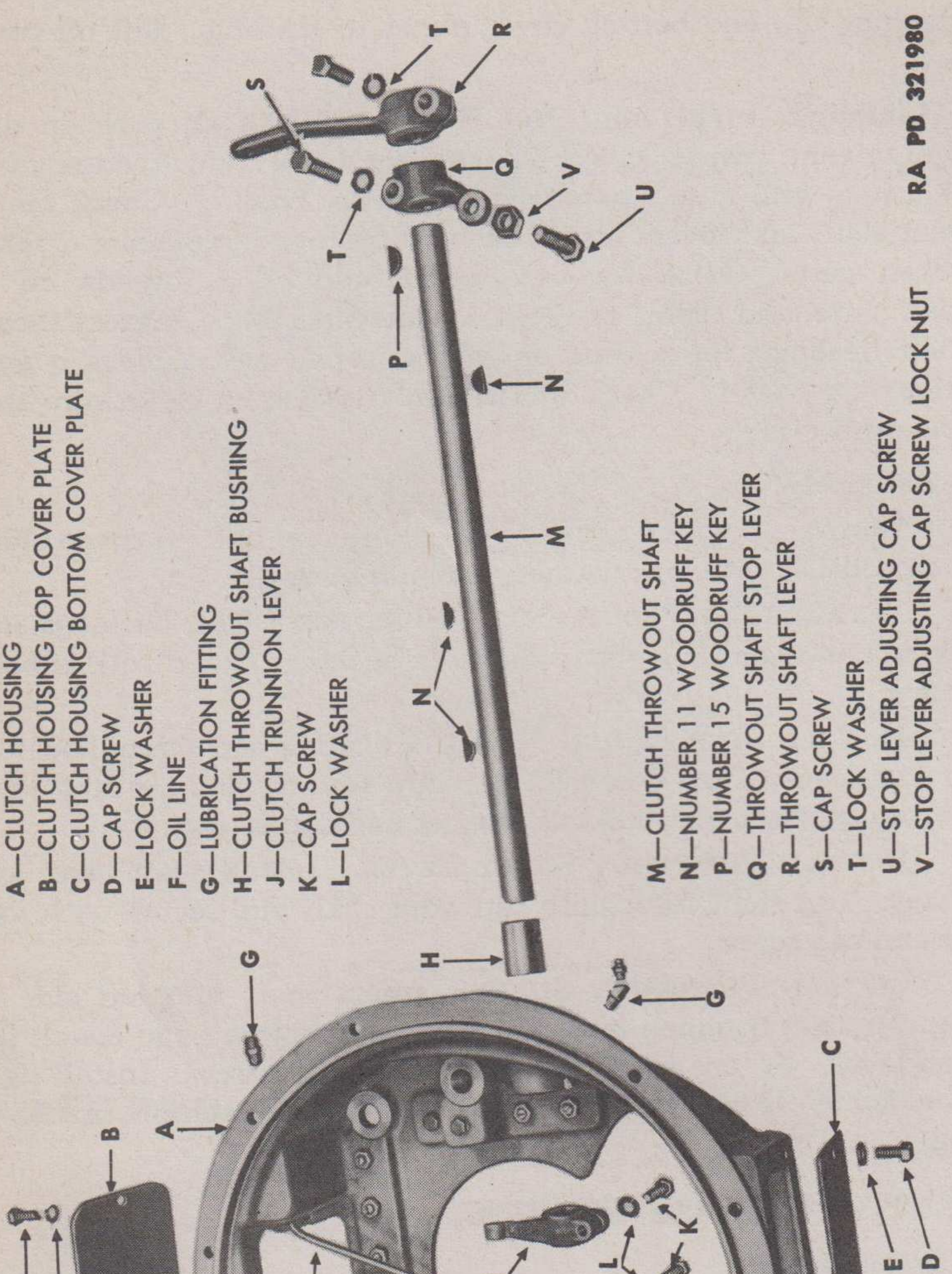

Figure 3 — Clutch Housing. Disassembled

age of lubricant. Check bearing for roughness, replacing bearing if these defects are found. Replace clutch release trunnion block if evidence of cracks or fractures is found. Replace trunnion return spring if it has weakened. If oil wick is gummy or flabby, install new wick.

c. Assembly.

(1) INSTALL OIL WICK. Insert wick into oil passage in trunnion block.

(2) INSTALL CLUTCH RELEASE BEARING. Carefully press bearing into position on trunnion block.

(3) INSTALL TRUNNION RETURN SPRING. Attach spring to trunnion block.

8. CLUTCH PRESSURE PLATE ASSEMBLY.

a. Disassembly (fig. 4).

(1) REMOVE CLUTCH PRESSURE PLATE. Place assembly in arbor press and compress clutch pressure spring by pressing down on clutch release sleeve. Remove four pressure plate retracting spring retainer pins and retainer washers. Lift off four pressure plate retracting springs. Release assembly from arbor press and lift off clutch pressure plate.

(2) REMOVE CLUTCH PRESSURE LEVERS. Place assembly in arbor press and press down on clutch flywheel ring. Remove clutch release sleeve snap ring. Lift off top clutch release fulcrum ring and remove fulcrum ring balls and clutch pressure levers. Lift out lower fulcrum ring. CAUTION: *This must be done with extreme care, because the clutch pressure spring exerts a pressure of approximately 600 pounds.*

(3) REMOVE FLYWHEEL RING. Remove assembly from arbor press and lift off flywheel ring.

(4) REMOVE CLUTCH PRESSURE SPRING. Lift out clutch pressure spring.

(5) REMOVE CLUTCH RELEASE SLEEVE. Lift out clutch release sleeve.

(6) REMOVE CLUTCH ADJUSTING PLATE. Remove flywheel ring stud nuts, internal-toothed lock washers, adjusting straps, and adjusting shims. Lift adjusting plate from flywheel ring.

b. Cleaning, Inspection, and Repair. Clean all parts in dry-cleaning solvent. Place clutch pressure plate on a surface plate and check for distortion. If pressure plate is dished, install new plate. Inspect clutch pressure plate retracting springs. If springs are stretched so that gaps exist in coils, replace with new springs. Examine pressure plate studs and replace studs that are bent or have damaged threads. Examine clutch release sleeve fulcrum rings for worn or scored condi-

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Figure 4 — Clutch Disassembled

tion in cup side and for warpage. If warped or badly worn, replace. Inspect all fulcrum ring balls for wear or flat spots, replacing any balls that are out-of-round. Check the 20 clutch pressure levers for wear at points of contact with adjusting plate, pressure plate, and fulcrum ring. If scored or bent, replace with new levers. Inspect clutch release sleeve snap ring for fractured or out-of-round condition. If snap ring is not in perfect condition, use a new ring in assembly. Examine flywheel ring for cracks or fractures, and for burs on machined surfaces. Replace cracked or broken parts; remove burs with handstone. Replace any studs on flywheel ring that are damaged. Examine adjusting plate and pressure spring for fractures and replace if broken. Inspect bore of clutch release sleeve for burs, removing burs with handstone. Test fit of sleeve in adjusting plate which should be an easy fit, not so tight that it must be tapped into adjusting plate. Thrust surface of sleeve must be free of any ridges or scores. Replace sleeve if worn or damaged.

c. Assembly (fig. 4).

(1) INSTALL CLUTCH ADJUSTING PLATE. Install six flywheel ring adjusting shims on each of six flywheel ring studs. Stagger shims so they alternately face right and left. Aline slots in adjusting plate with flywheel ring studs and place adjusting plate into seat and on top of adjusting shims. Place adjusting straps on each stud and secure adjusting plate to flywheel ring with internal-toothed lock washers and stud nuts.

(2) INSTALL CLUTCH PRESSURE SPRING. Place small end of pressure spring on clutch release sleeve, with end of spring against sleeve spring stop pin. Place flywheel ring and adjusting plate assembly on large end of spring, with end of spring against stop in adjusting plate. Using an arbor press, push down on flywheel ring and install bottom fulcrum ring over clutch sleeve. Position pressure levers around pressure plate with drilled ends in fulcrum ring. Install fulcrum ring balls, top fulcrum ring, and clutch release sleeve snap ring. Remove assembly from arbor press.

(3) INSTALL CLUTCH PRESSURE PLATE. Install clutch flywheel ring on pressure plate studs. Place pressure plate retracting springs and spring retainer washers on studs. Press down on washers and springs, and insert retainer pins through pressure plate studs.

9. CLUTCH DISK.

a. Disassembly (fig. 4).

(1) REMOVE DISK FACINGS. Drill out rivets holding disk facings to disk, drilling from smooth side of rivet. Lift facings from disk. CAUTION: *Do not use a brake relining machine to remove rivets as it is likely to spring disk.*

b. Cleaning, Inspection, and Repair. Inspect all rivets for tightness, replacing loose rivets. Place flywheel side of disk on a surface plate to make sure it lies flat without bend or distortion. If it does not, replace disk. Examine ends of splines in hub of disk. Dress off any burs with a file or handstone. Place disk on splines of main drive gear and note fit of splines; which should allow disk splines to slide easily on splines of main drive gear without binding and with very little side play. If side play is more than barely perceptible, replace disk.

c. Assembly.

(1) INSTALL DISK FACINGS (fig. 4). Place the 2 facings on clutch disk. Rivet facings to disk with 30 clutch disk facing rivets. Make certain all rivets are pressed to a uniform thickness. Rivets must be below surface of facings on both sides of disk. Examine disk to be certain it has not been bent or distorted during riveting operation. Replace disk if bent or distorted.

10. CLUTCH PILOT BEARING.

a. Cleaning, Inspection, and Repair. Clean clutch pilot bearing in dry-cleaning solvent. After drying, turn bearing by hand. If it runs roughly or if balls appear to be worn, replace bearing. This bearing is packed with heat-resistant grease when clutch is assembled and does not require further attention except when replaced, at which time it must be repacked.

Section IV
INSTALLATION

11. INSTALL CLUTCH.

a. Install Clutch Housing (fig. 2). Attach clutch housing to transmission case with nuts and cotter pins.

b. Install Clutch Release Bearing (fig. 2). Slide trunnion block with installed clutch release bearing onto main drive gear bearing cap. Attach trunnion return spring to main drive gear bearing cap cap screw. Test clutch trunnion levers (par. 14).

c. Install Clutch Pilot Bearing, Disk, and Pressure Plate Assembly. Refer to TM 9-817.

d. Install Transmission. Refer to TM 9-817.

CLUTCH

Section V

TEST AND ADJUSTMENT

12. GENERAL.

a. Original setting of the clutch provides for approximately 1½ inch of free pedal movement between pedal and toeboard or stop. Clutch readjustment is necessary when this clearance is reduced to three-fourths inch or less. Do not make pedal adjustment. Check distance between clutch release sleeve and rear face of clutch flywheel ring. When clutch is properly adjusted, this distance will measure 1⅛ to 1$\frac{3}{16}$ inches (fig. 5). It is not safe to depend on free pedal movement alone without checking this dimension. Distance between clutch release sleeve and rear face of clutch flywheel ring is controlled by flywheel ring adjusting shims. On this clutch, one shim moves the clutch release sleeve seven sixty-fourths inch. Movement of sleeve should not be less than one-half inch, and not more than nine-sixteenths inch in order to obtain proper clutch release. If less than one-half inch, add one shim; if more than nine-sixteenths inch, remove one shim.

13. ADJUSTMENT OF INSTALLED CLUTCH.

a. Remove Clutch Housing Cover Plates. Remove top and bottom clutch housing cover plates.

b. Disconnect Linkage. Disconnect clutch control rod clevis from clutch throwout shaft lever by removing cotter pin and clutch control rod clevis pin.

c. Block Lever in Release Position. Block clutch throwout shaft lever in full-release position.

d. Turn Engine. Use hand crank to turn engine until adjusting strap and shim pack are accessible through clutch housing opening.

e. Loosen Adjusting Nuts. With clutch in released position, back off the six adjusting (clutch flywheel ring stud) nuts about five full turns.

f. Remove Blocking. Remove blocking from clutch throwout shaft lever. This will move clutch adjusting plate away from shims.

g. Remove Shims. Remove shims as necessary to obtain 1⅛ to 1$\frac{3}{16}$ inches clearance between face of clutch release sleeve and rear face of clutch flywheel ring. To ensure full contact between pressure plate and disk, always remove same number of shims from each pack.

14. TEST OF CLUTCH TRUNNION LEVERS.

a. Check Contact of Levers (fig. 2). Check contact of clutch trunnion levers and lugs on clutch release trunnion block. Insert a feeler between each lug and lever at the same time. Uneven contact will not permit the block to slide freely and poor clutch engagement

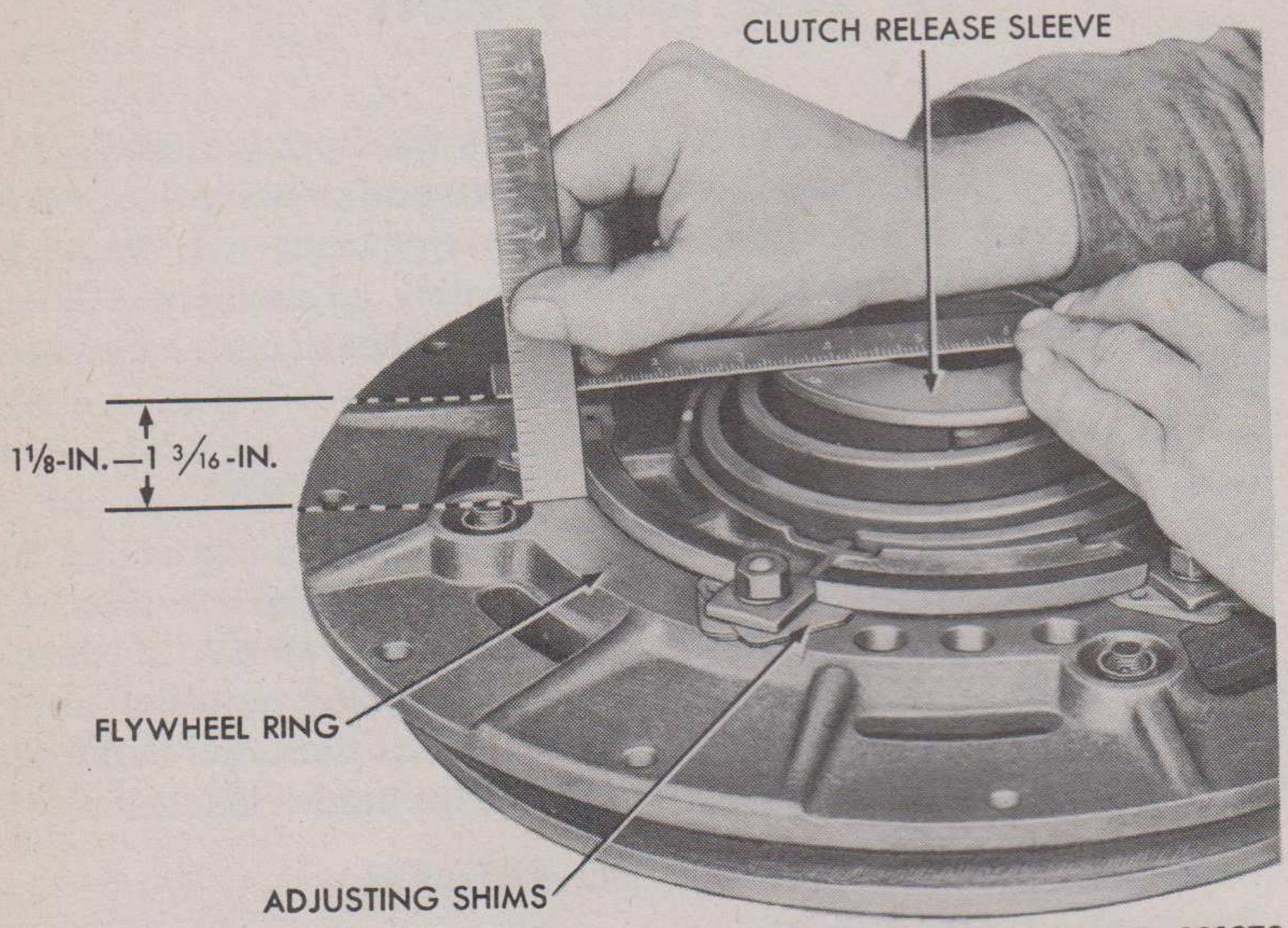

Figure 5 — Clutch Adjustment

will result. If necessary, file trunnion lever to provide even contact with trunnion block lugs.

Section VI

FITS AND TOLERANCES

15. FITS AND TOLERANCES.

a. Clutch Disk.

Hub to shaft spline clearance	0.001 to 0.005 in.
Out-of-true (warp) measured 1½ in. from outer edge	0.002 to 0.003 in.

b. Pressure Plate.

Driving lugs to slots in flywheel ring	0.004 to 0.006 in.
Out-of-true (warp) maximum	0.015 in.
Adjusting shims, quantity used under each strap with new facings	8
Pressure spring pressure at 1¼-in. height	535 lb

c. Clutch Pedal.

Toeboard clearance	1 in.

CHAPTER 3

TRANSMISSION

Section I

DESCRIPTION AND DATA

16. DESCRIPTION AND OPERATION.

a. Description (fig. 6). This transmission, a selective-gear type having five forward speeds and one reverse, is equipped with helical gears running in constant mesh in third speed and overdrive. Fourth speed is direct drive and fifth speed is overdrive. A power take-off opening is located on right-hand side of transmission case. A bell housing, containing the clutch release or throwout mechanism, is attached to the front of the transmission case. The gearshift lever is attached to a stub which is mounted in a bracket on the transmission cover and extends into slots in shifting rod arms and forks attached to gearshift rods. Four rod plungers and springs are located in the rear of transmission case underneath the gearshift rods. Three interlock plungers are placed between rods in the front of the case, and lock in place any rods that should not move when transmission is shifted into any desired speed. The main drive gear, which receives power from the engine through the clutch, has a splined shaft for engagement with splined hub in the clutch disk. It is supported in the transmission case by a ball bearing housed in a bearing retainer. This retainer is held in place by main drive gear bearing cap which serves as a pilot for the bell housing and a seat for the clutch release or throwout mechanism. A roller bearing in the recess of the main drive gear provides front support for the transmission mainshaft. A ball bearing in a bearing retainer supports the mainshaft at the rear.

b. Operation. Engine power is transmitted through the clutch to the main drive gear. Power flow through transmission in various gear speeds follows: NOTE: *All key letters in this subparagraph refer to figure 6.*

(1) FIRST SPEED (A). Main drive gear to countershaft drive gear, through countershaft, up to first speed slide gear on mainshaft, and out.

(2) SECOND SPEED (B). Main drive gear to countershaft drive gear, through countershaft, up to second speed slide gear on mainshaft, and out.

(3) THIRD SPEED (C). Third and fourth speed clutch ring engages with third and fourth speed clutch driver on mainshaft. Power flows from main drive gear to countershaft drive gear, to third speed

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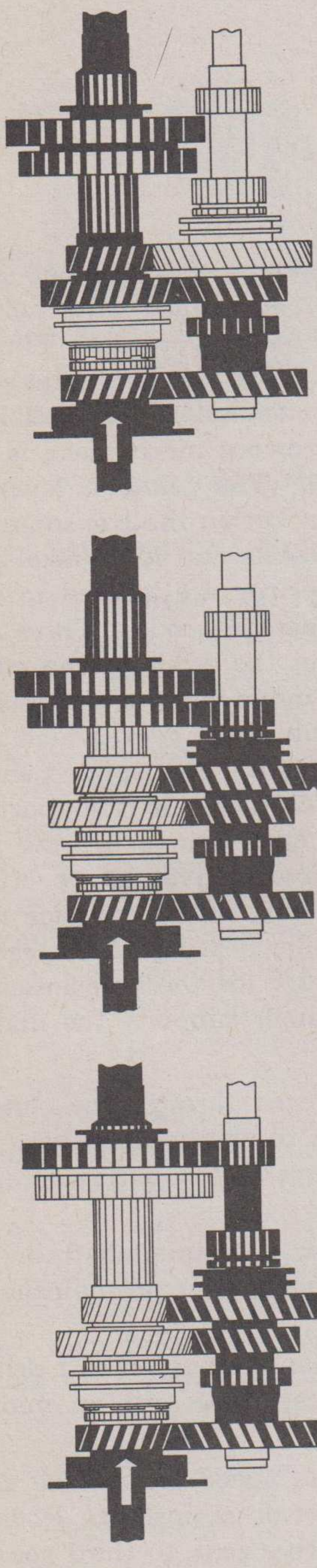
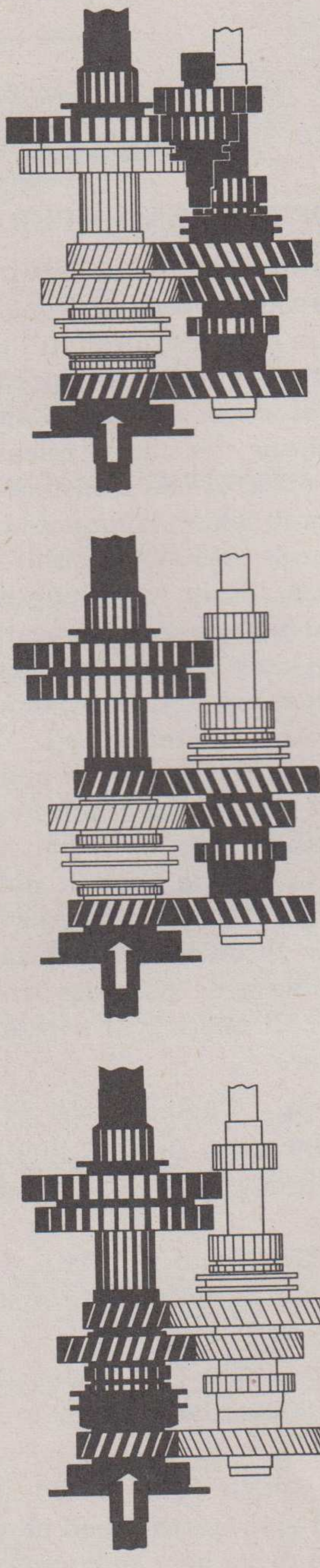


C—THIRD SPEED



F—REVERSE

B—SECOND SPEED

E—OVERDRIVE

A—FIRST SPEED

D—FOURTH SPEED

RA PD 322124

Figure 6 — Transmission Power Flow

A—MAIN DRIVE GEAR BEARING RETAINER
B—MAIN DRIVE GEAR
C—THIRD AND FOURTH SPEED CLUTCH RING
D—THIRD AND FOURTH SPEED CLUTCH DRIVER
E—MAIN SHAFT OVERSPEED GEAR
F—SECOND SPEED SLIDE GEAR
G—FIRST SPEED SLIDE GEAR
H—FIRST AND SECOND SPEED SLIDE GEAR SLEEVE
J—MAIN SHAFT
K—COUNTERSHAFT FRONT BEARING LOCK NUT
L—PLAIN WASHER
M—LOCK NUT WASHER
N—COUNTERSHAFT FRONT BEARING INNER RACE
P—COUNTERSHAFT DRIVE GEAR
Q—POWER TAKE-OFF DRIVING GEAR
R—THIRD SPEED COUNTERSHAFT GEAR
S—OVERDRIVE COUNTERSHAFT GEAR
T—OVERDRIVE COUNTERSHAFT GEAR CLUTCH RING
U—COUNTERSHAFT
V—REVERSE GEAR SHAFT
W—REVERSE GEAR

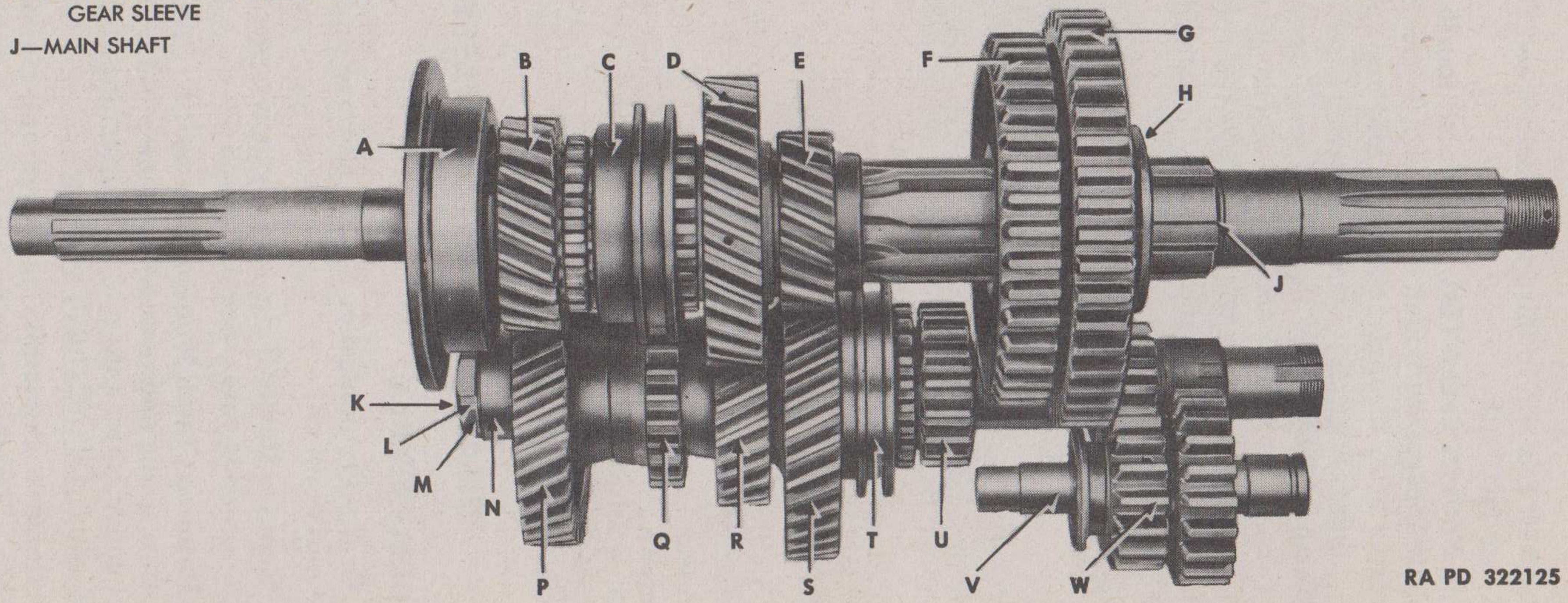


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Figure 7 — Transmission Gears and Shafts

countershaft gear, up to third and fourth speed clutch driver on mainshaft, and out.

(4) FOURTH SPEED (D). Third and fourth speed clutch ring on mainshaft engages with main drive gear. Power flows directly through main drive gear, through mainshaft, and out.

(5) OVERDRIVE (E). Overdrive countershaft clutch ring engages with countershaft. Power flows from main drive gear to countershaft drive gear, up through mainshaft overspeed gear, and out.

(6) REVERSE (F). Main drive gear to countershaft drive gear, through countershaft reverse gear, up through first speed sliding gear on mainshaft, and out.

17. DATA.

Make	Autocar
Gear ratios:	
Reverse	7.37 to 1
First	5.90 to 1
Second	3.60 to 1
Third	1.84 to 1
Fourth (direct)	1.00 to 1
Fifth (overdrive)	0.75 to 1
Oil capacity:	
Summer	8 qt
Winter	10 qt

Section II

DISASSEMBLY INTO SUBASSEMBLIES

18. DISASSEMBLY.

a. Drain Transmission Case. Remove drain plug from bottom of case and drain oil.

b. Remove Power Take-off. Detach power take-off and adapter from transmission case. See paragraph 31.

c. Remove Clutch Housing Assembly. Free clutch release trunnion return spring and remove trunnion block and clutch release bearing. Remove cotter pins and nuts attaching clutch housing to transmission case. Lift off clutch housing.

d. Remove Transmission Cover and Gearshift Lever Bracket Assembly. Remove cap screws and lock washers attaching cover to

TRANSMISSION

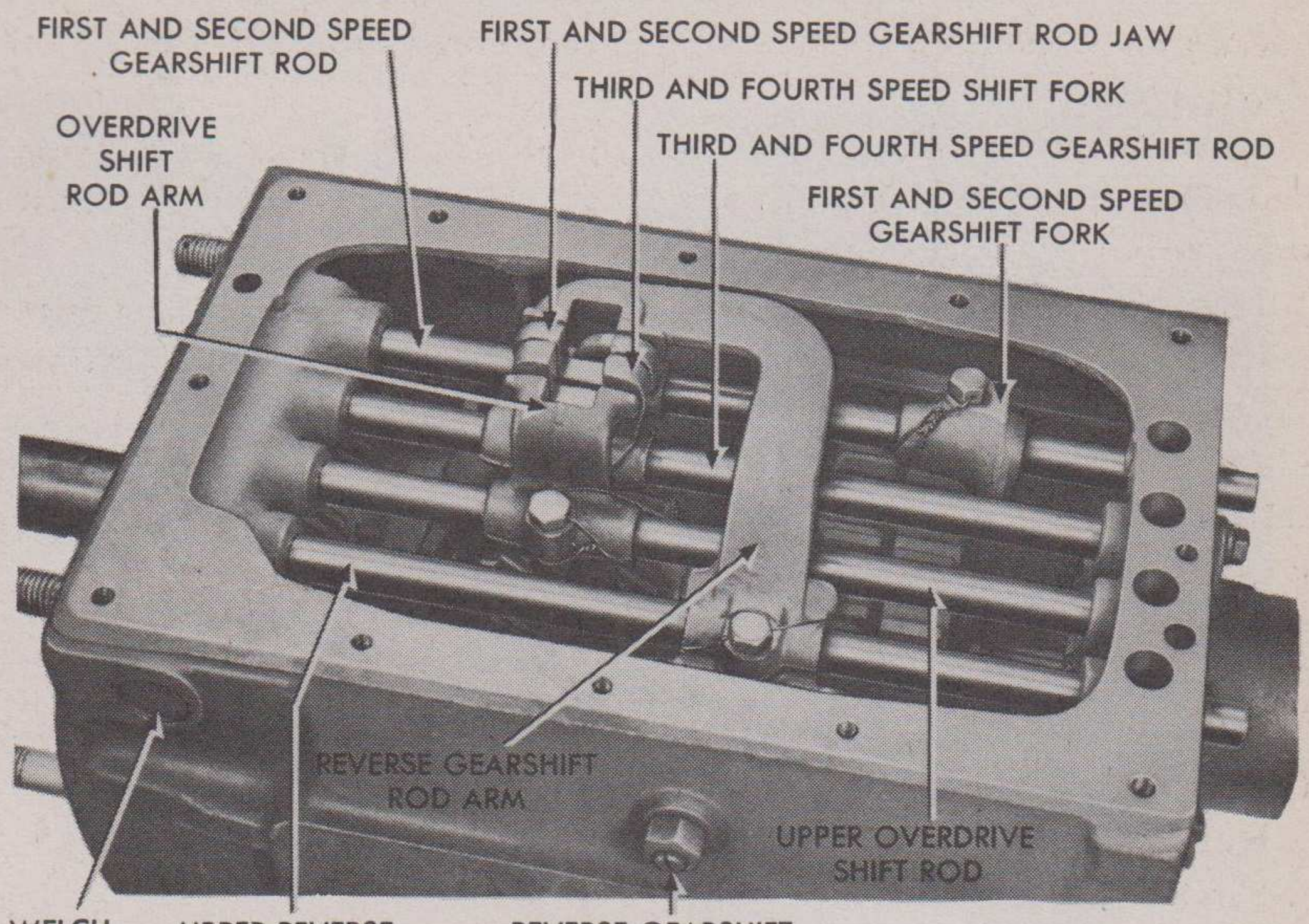


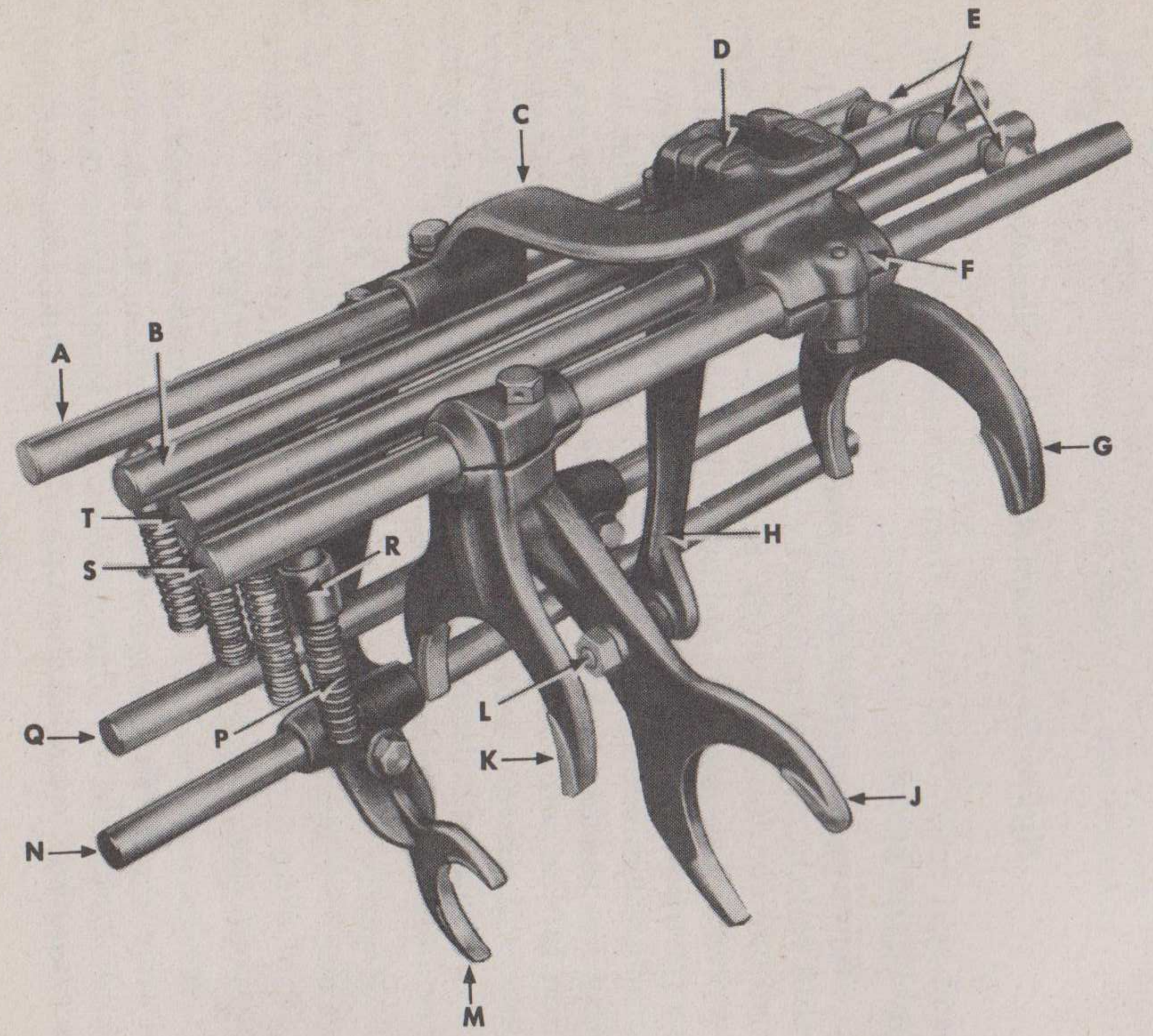
Figure 8 — Transmission Cover Removed

transmission case. Free cover from dowels by prying. Lift off cover assembly and gasket.

e. Remove Gearshift Rods and Arms (figs. 8 and 9). Place gearshift rods in neutral position by lining up slots in shifting rod arms to form one continuous slot (fig. 8). Remove rod arm lock wires and cap screws. Tap gearshift rod out either end of case about 5 inches. Grasp protruding end of rod with one hand and pull rod out of rod arm and transmission case, at the same time placing other hand over opening in case to catch rod plunger and spring, which are held in position by the rod and will pop out when rod is pulled out of case. Remove rod plunger from other end of case. Repeat operation to remove remaining rods and arms. NOTE: *No plungers or springs are used on lower overdrive and reverse rods.*

f. Remove Main Drive Gear Assembly (fig. 10). Remove cap screws and lock washers attaching main drive gear bearing cap to case. Lift off bearing cap and gasket. Tap on main drive gear to free assembly from case. Lift off main drive gear assembly.

g. Remove Mainshaft Assembly. Remove mainshaft flange cotter pin and nut. Tap flange of mainshaft spline. Do not use a puller, as it is likely to bend the edge of the flange. Remove rear bearing cover cap screws and lock washers. Lift off cover and retainer shims and



A—UPPER REVERSE GEARSHIFT ROD
B—UPPER OVERDRIVE SHIFT ROD
C—REVERSE GEARSHIFT ROD ARM
D—OVERDRIVE SHIFT ROD ARM
E—GEARSHIFT ROD INTERLOCK PLUNGERS
F—FIRST AND SECOND SPEED GEARSHIFT ROD JAW
G—THIRD AND FOURTH SPEED SHIFT FORK
H—OVERDRIVE SHIFT ROD ARM
J—OVERDRIVE SHIFT FORK
K—FIRST AND SECOND SPEED GEARSHIFT FORK
L—OVERDRIVE SHIFT ROD ARM AND FORK CONNECTING PIN
M—REVERSE GEARSHIFT FORK
N—LOWER REVERSE GEARSHIFT ROD
P—GEARSHIFT ROD SPRING
Q—LOWER OVERDRIVE SHIFT ROD
R—GEARSHIFT ROD PLUNGER
S—FIRST AND SECOND SPEED GEARSHIFT ROD
T—THIRD AND FOURTH SPEED GEARSHIFT ROD

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Figure 9 — Transmission Gearshift Rods and Arms

TRANSMISSION

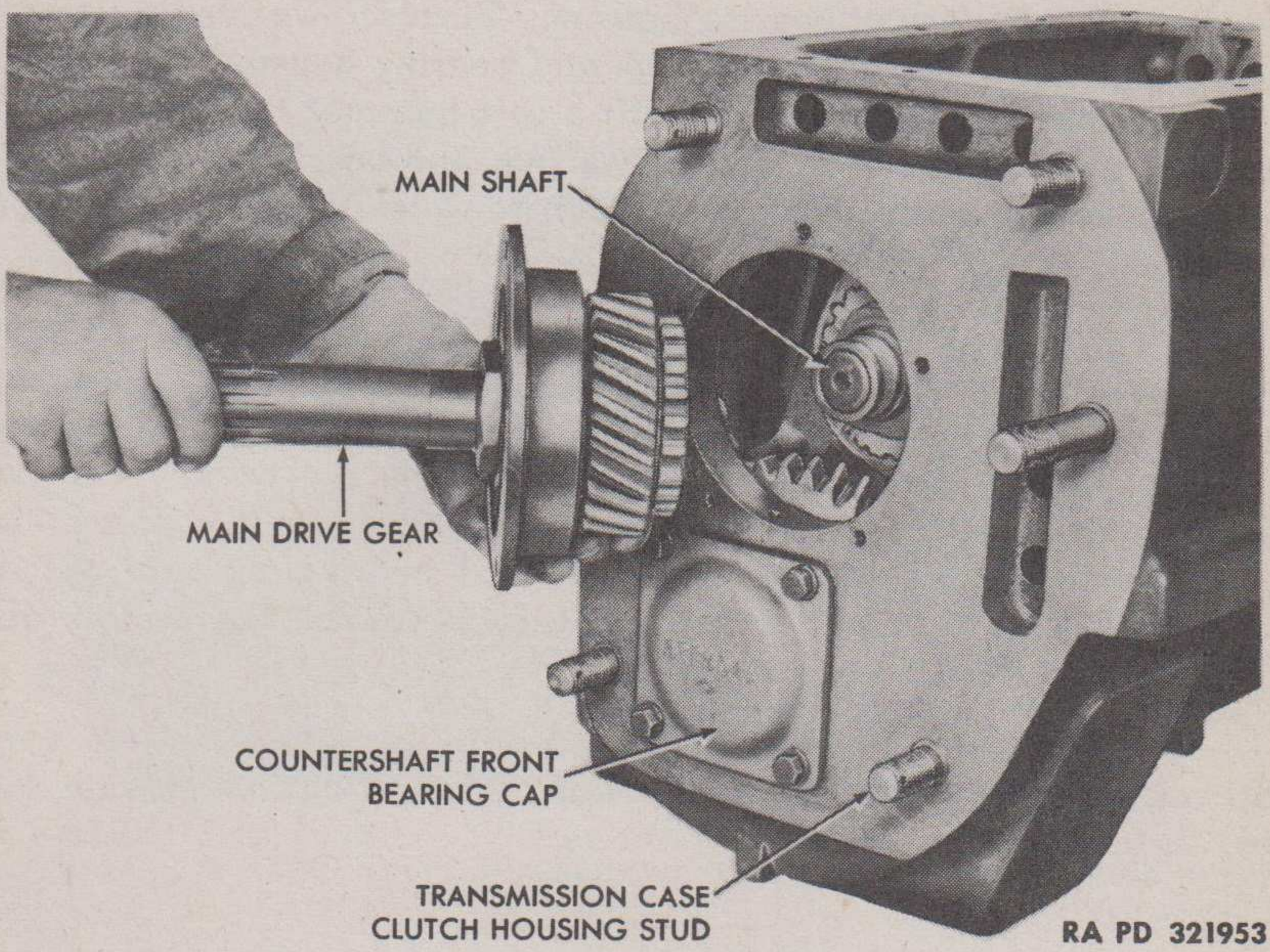


Figure 10 — Removing Main Drive Gear

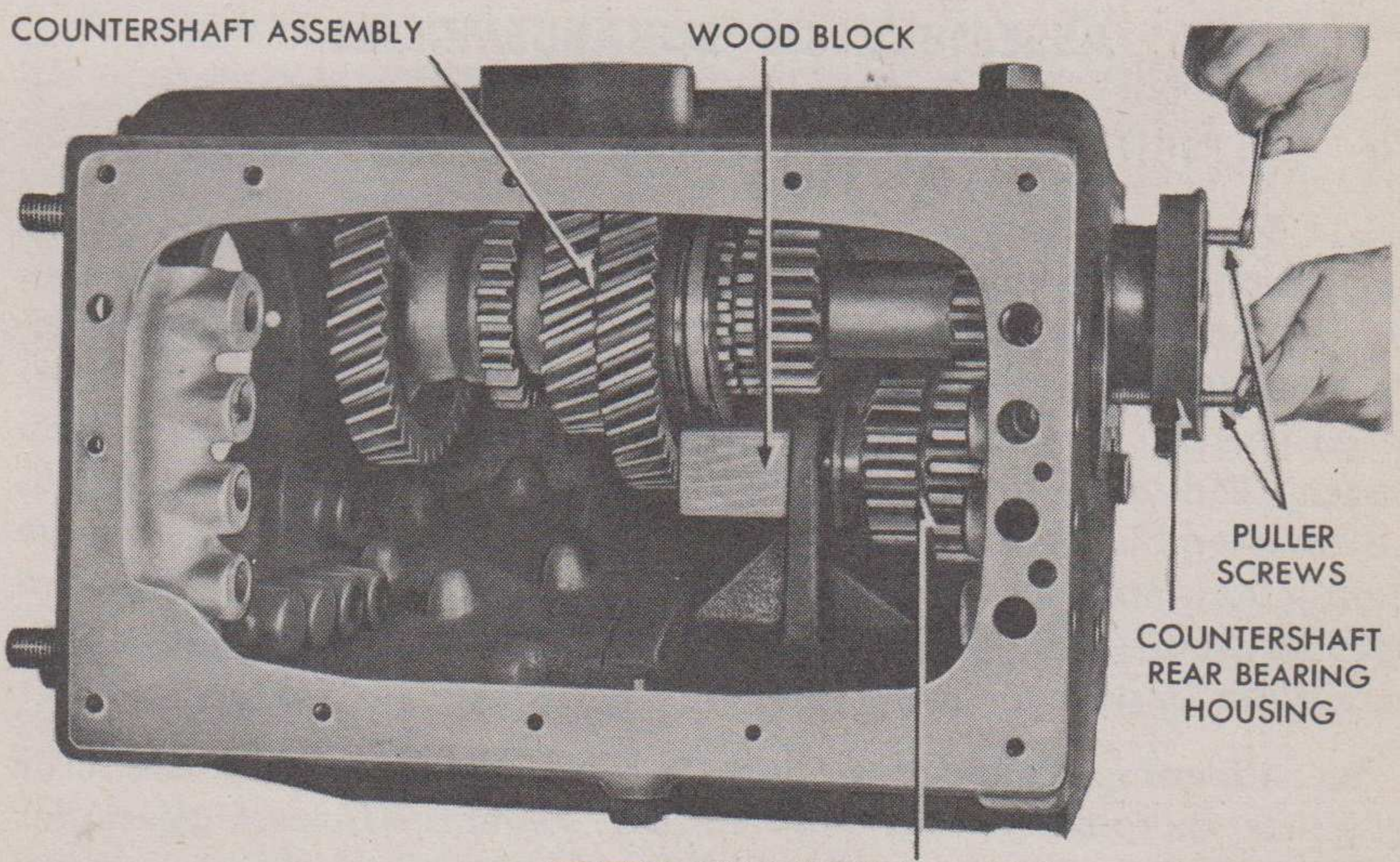


Figure 11 — Removing Countershaft Rear Bearing Housing

slide flange spacer off mainshaft spline. Insert puller screws into two threaded holes on face of bearing housing. Turn screws evenly against transmission case, and draw bearings and bearing housing about halfway out of case. Tap mainshaft with a soft hammer to free bearings from shaft; then finish drawing out bearings and bearing housing. Lift mainshaft assembly up and out through top opening of transmission case.

h. Remove Countershaft Assembly (fig. 11). Remove cap screws and lock washers attaching front and rear countershaft bearing caps to transmission case. Lift off caps and shims. Remove rear bearing nut, lock washer, and plain washer. Place a wood block between overdrive countershaft gear and reverse gear shaft support (fig. 11). Draw countershaft rear bearings and bearing housing out of transmission case with puller screws. Lift countershaft assembly out of transmission case.

i. Remove Reverse Gear Shaft Assembly. Tap reverse gear shaft out of its support, through bore of gear, and out of transmission case. Lift out reverse gear.

Section III

DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY OF SUBASSEMBLIES

19. MAINSHAFT.

a. Disassembly (fig. 12). Slide third and fourth speed clutch ring off clutch driver. Slide first and second speed slide gear assembly off mainshaft. Remove mainshaft thrust nut and lock washer. Place assembly in an arbor press and press mainshaft through overspeed gear, third speed gear, and the third and fourth speed clutch driver. Pull main drive gear bearing inner race off end of mainshaft. To disassemble first and second speed slide gear assembly, remove eight nuts, tap out bolts, and pry gears off gear sleeve. Remove bushing from third speed gear only if damaged or worn. See subparagraph **b**, below.

b. Cleaning, Inspection, and Repair. Using a stiff brush, scrub all parts thoroughly with dry-cleaning solvent. Inspect gears for cracks, chipped or broken teeth, and evidence of wear. Replace gears if such defects are found. Examine shaft for chipped, scored, or twisted splines; if found, install a new shaft. Carefully examine third

TRANSMISSION

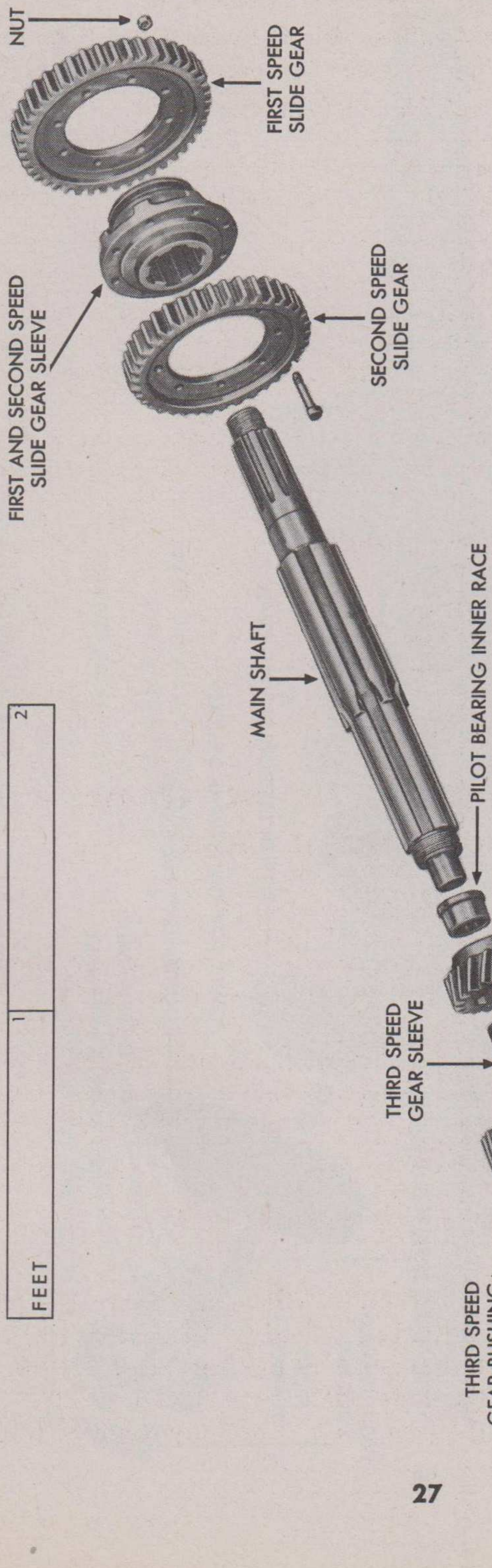


Figure 12 — Mainshaft Disassembled

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

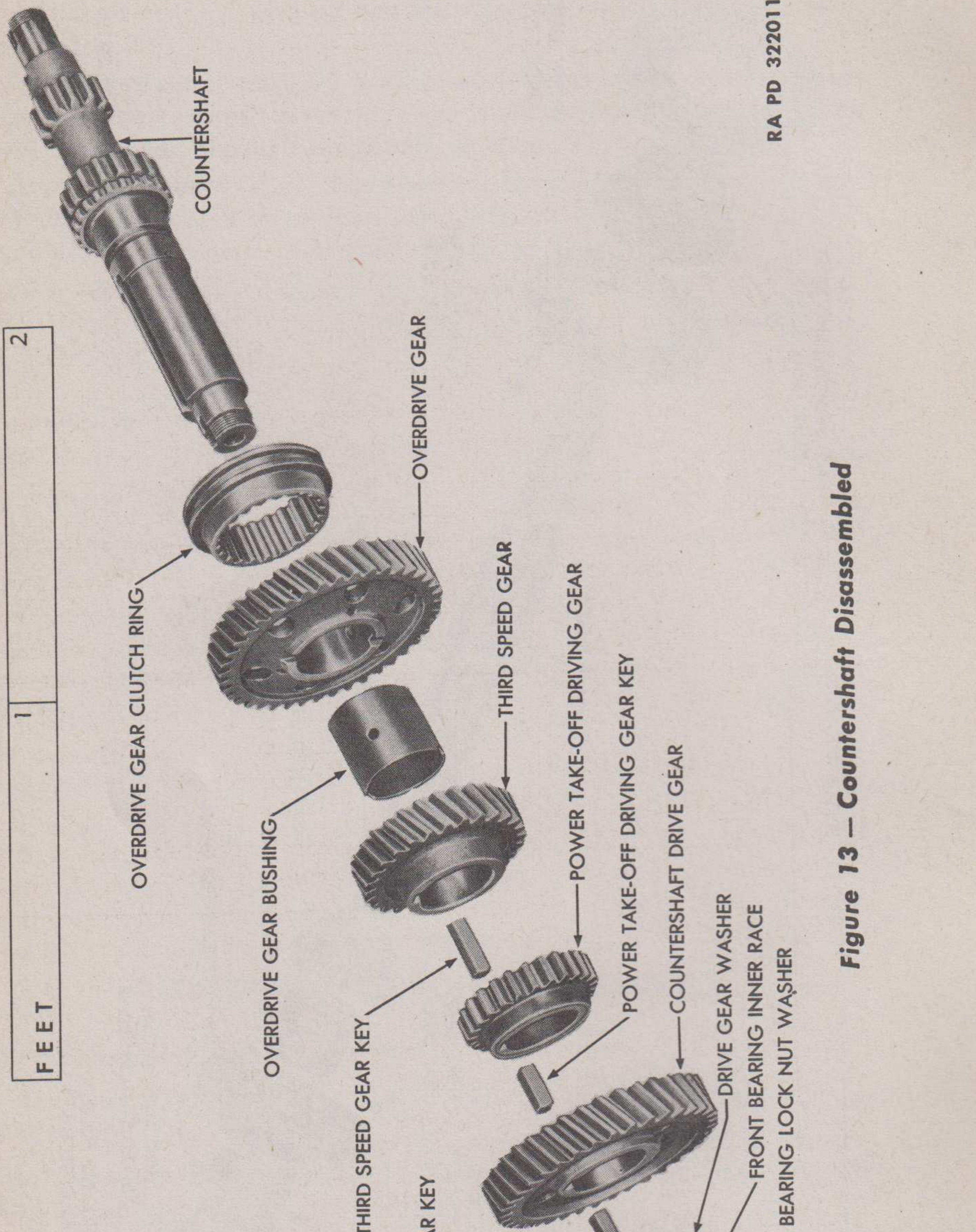


Figure 13 — Countershaft Disassembled

speed gear bushing and sleeve for clearance, scoring, and galling. Replace sleeve if end clearance of 0.004 inch to 0.006 inch is not obtained. Remove burs or ridges from edge of bushing with handstone. If bushing is scored or worn to a point where a feeler gage evidences a radial clearance in excess of 0.010 inch, replace it. To replace worn bushing, first remove old bushing, using an arbor press. Clean bore of gear and remove all burs with a handstone. Lubricate outside diameter of bushing and inside diameter of gear. Press new bushing fully into gear and bend over one edge into slot on gear to lock bushing in position. Drill oilholes in bushing through holes in gear. If necessary to increase the diameter of the bushing to fit it properly to the sleeve, do so with a reamer or a honing tool. Remove all burs and sharp edges resulting from pressing, drilling, or fitting operations.

c. Assembly (fig. 12). Press overspeed gear on shaft with an arbor press. Slide third speed gear sleeve in position on shaft. Slide third speed gear with installed bushing onto sleeve. Press third and fourth speed clutch driver on shaft. Install thrust nut lock washer and nut, tighten nut, and bend edge of lock washer over nut. Press main drive bearing inner race on end of shaft. Slide clutch ring over clutch driver. Assemble first and second speed slide gears by lining up both gears with bolt holes in gear sleeve, inserting bolts, and threading on nuts. Tighten nuts and peen over ends of bolts. Slide this assembly into position on shaft.

20. COUNTERSHAFT.

a. Disassembly (fig. 13). Remove front bearing lock nut and lock washer. Using an arbor press, press countershaft drive gear, drive gear washer, and front bearing inner race off shaft. Press off power take-off driving gear. Press off third-speed gear. Tap drive gear, power take-off, and third-speed gear keys out of countershaft keyway. Slide overdrive gear and clutch ring off shaft. Remove bushing from overdrive gear only if damaged or worn (subpar. **b**, below).

b. Cleaning, Inspection, and Repair. Follow cleaning, inspection, and repair procedure outlined for mainshaft assembly (par. 19 **b**). Fit, clearance, and replacement of countershaft overdrive gear bushing is the same as for mainshaft third speed gear (par. 19 **b**).

c. Assembly (fig. 13). Place overdrive gear clutch ring on overdrive gear, and slide this assembly on countershaft. Install third speed gear key in shaft keyway and press third-speed gear on shaft. Install power take-off gear key and press on power take-off driving gear. Install drive gear key and press drive gear on shaft. Position drive gear washer and press on front bearing inner race. Install front bearing lock nut washer and lock nut. Tighten nut and bend edge of washer over nut.

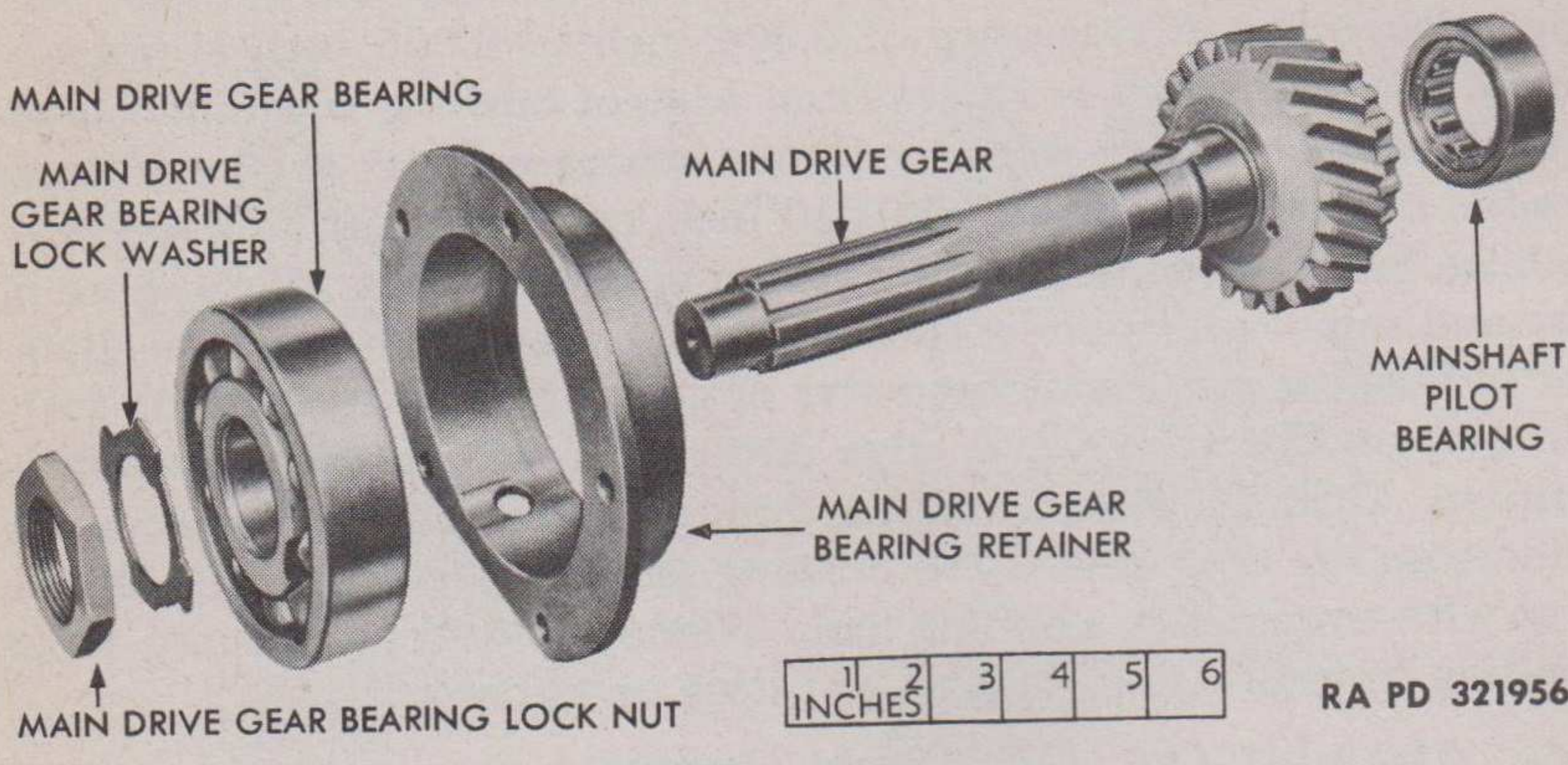


Figure 14 — Main Drive Gear Disassembled

21. MAIN DRIVE GEAR.

a. Disassembly (fig. 14). Remove main drive gear bearing lock nut and washer. Using an arbor press, press off main drive gear bearing and bearing retainer. Press bearing out of retainer. Using a brass drift through opening on back of main drive gear, tap out mainshaft pilot bearing.

b. Cleaning, Inspection, and Repair. Wash all parts in dry-cleaning solvent. Immerse bearings in dry-cleaning solvent in which no other parts have been previously cleaned, keeping them in dry-cleaning solvent long enough to dissolve heavy particles of coagulated lubricant. Rotate bearings while holding them in dry-cleaning solvent. Check bearings for out-of-round condition and for discoloration of balls or rollers caused by overheating. Except for stoning to remove light scores or gall marks, do not attempt to repair a bearing. After inspection, dip bearings in lubricant and set aside in a clean container, or wrap in paper. Inspect main drive gear for cracks, chipped or broken teeth, and scored or twisted spline. Replace gear if such conditions are found. Examine bearing retainer for cracks or fractures, and replace if such defects are found.

c. Assembly (fig. 14). Press mainshaft pilot bearing into recess in main drive gear. Press main drive gear bearing into bearing retainer, then press this assembly on main drive gear shaft. Install bearing lock washer and nut, tighten nut, and bend edge of washer over nut.

22. REVERSE GEAR.

a. Disassembly (fig. 15). Place assembly in a vise and remove rear needle bearing snap ring. Force out rear needle bearing washer

TRANSMISSION

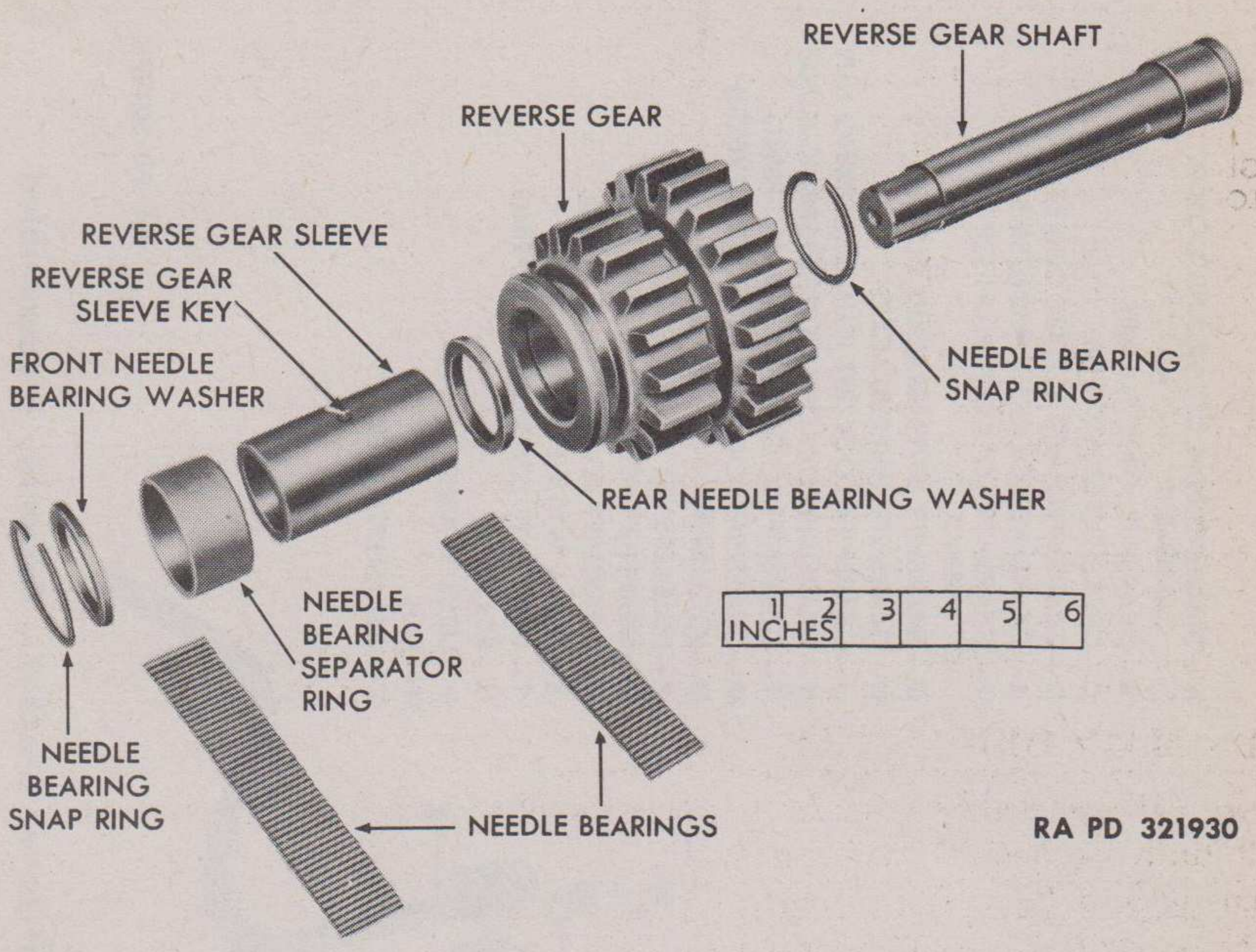
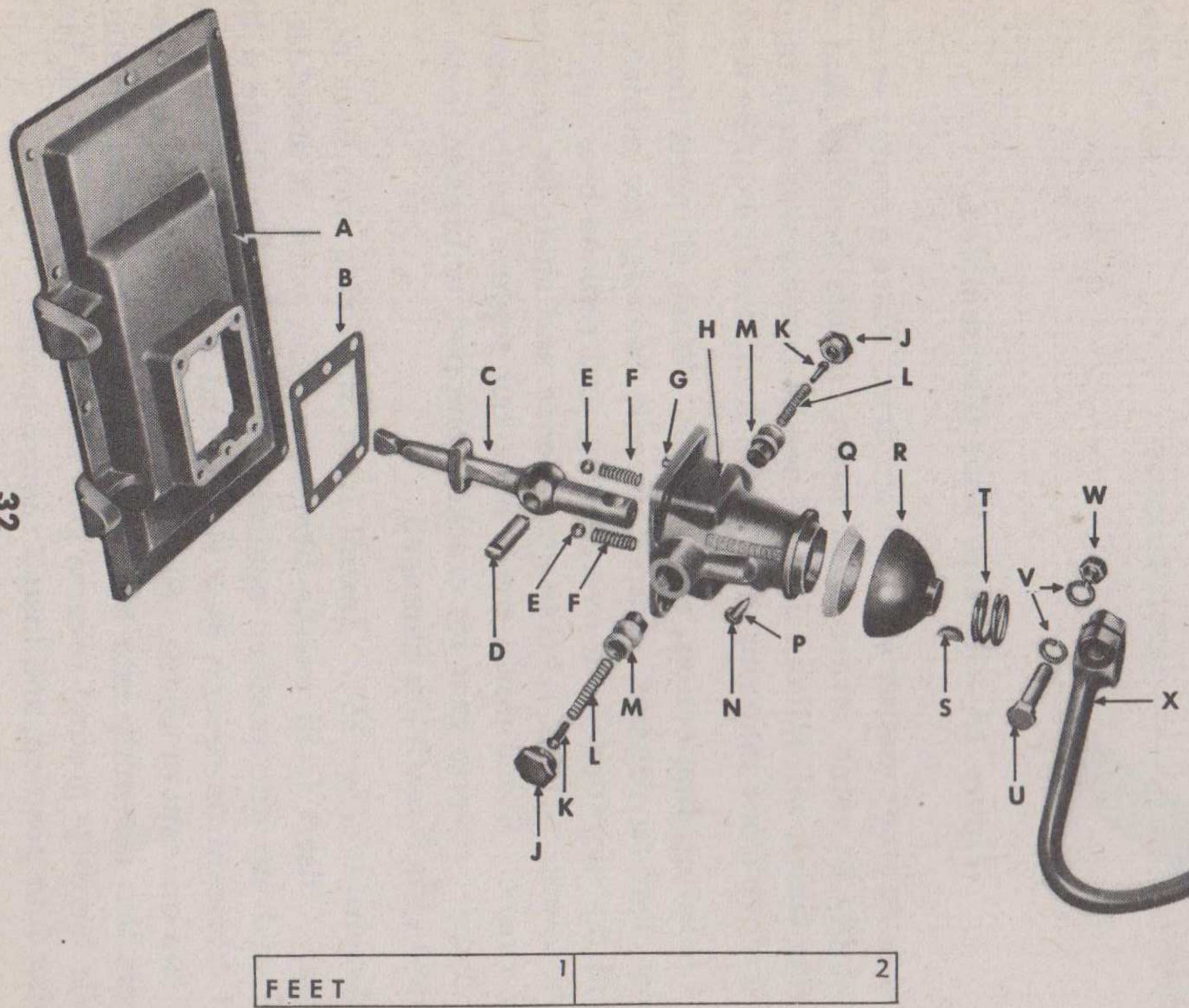


Figure 15 — Reverse Gear Disassembled

by tapping on front washer with a brass drift. Place a container under the assembly to catch reverse gear sleeve, needle bearings, and separator ring which will fall out as front needle bearing washer is tapped free. Remove front snap ring, and tap off front needle bearing washer.

b. Cleaning, Inspection, and Repair. Wash all parts thoroughly in dry-cleaning solvent. Inspect needle bearings for evidence of wear and discoloration from overheating, and replace bearings if defects are found. Check reverse gear sleeve and shaft for roughness, burs, or ridges. Stone down small burs, but replace badly damaged parts. Inspect reverse gear for cracked, chipped, or broken teeth and install new gear if teeth are damaged.

c. Assembly (fig. 15). Install front snap ring into bore of reverse gear. Insert front needle bearing washer with its shoulder to the rear and tap into position against front snap ring. Place a thin layer of lubricant on reverse gear sleeve, and arrange 53 needle bearings around one end of sleeve. Slide bearing separator ring on sleeve, and insert this assembly into bore of reverse gear. Install remaining 53 needle bearings around reverse gear sleeve. Tap rear needle bearing washer into position, and install rear snap ring.



A—TRANSMISSION COVER AND DOWEL ASSEMBLY
B—GEARSHIFT GATE GASKET
C—GEARSHIFT LEVER STUB
D—GEARSHIFT LEVER SOCKET CENTER PIN
E—GEARSHIFT LOCKOUT PLUNGER BALL
F—GEARSHIFT LOCKOUT PLUNGER BALL SPRING
G—GEARSHIFT LEVER BRACKET DOWEL
H—GEARSHIFT LEVER BRACKET
J—GEARSHIFT LOCKOUT PLUNGER SPRING NUT
K—GEARSHIFT LOCKOUT PLUNGER SPRING GUIDE
L—GEARSHIFT LOCKOUT PLUNGER SPRING
M—GEARSHIFT LOCKOUT PLUNGER (REVERSE)
N—LOCK NUT
P—HEADLESS SET SCREW
Q—GEARSHIFT LEVER SOCKET OIL SEAL
R—GEARSHIFT LEVER SOCKET COVER
S—NO. A WHITNEY KEY
T—GEARSHIFT LEVER SOCKET SPRING
U—BOLT
V—LOCK WASHER
W—NUT
X—GEARSHIFT LEVER

Figure 16 — Transmission Cover and Gearshift Lever Bracket — Assembly Disassembled

23 TRANSMISSION COVER AND GEARSHIFT LEVER BRACKET.

a. Disassembly.

(1) REMOVE GEARSHIFT LEVER (fig. 16). Remove nut, bolt, and lock washers attaching gearshift lever socket spring.

(2) REMOVE SOCKET COVER (fig. 16). Remove key from gearshift lever stub, and lift off socket cover and oil seal.

(3) REMOVE REVERSE LOCK-OUT PLUNGERS (fig. 16). Back off two lock-out plunger spring nuts, and remove springs and spring guides. From inside of bracket, tap out two reverse gearshift lock-out plungers. At the same time reverse two plunger balls which will drop out.

(4) REMOVE GEARSHIFT LEVER STUB (fig. 16). Loosen lock nut and back off set screw from side of gearshift lever bracket. Slightly turn gearshift lever stub; then pull stub out through bottom of bracket. Remove center pin from stub.

(5) REMOVE GEARSHIFT LEVER BRACKET (fig. 16). Remove four cap screws and lock washers attaching bracket to transmission cover. Pry bracket free of dowels, and lift off bracket and gasket.

(6) REMOVE LOCK-OUT PLUNGER BALL SPRINGS (fig. 16). Remove two lock-out plunger ball springs from seats in gearshift lever bracket.

b. Cleaning, Inspection, and Repair. Wash all parts thoroughly in dry-cleaning solvent. Remove all traces of old lubricant and dirt. Examine gearshift lever bracket and transmission cover for cracks, tapping with hammer to test for breaks which might not otherwise be evident. Replace bracket or cover if cracks are found. Inspect all plunger springs, replacing those weakened. If socket oil seal is worn or damaged, install a new seal. Examine the gearshift lever for cracks, and replace if found.

c. Assembly.

(1) INSTALL LOCK-OUT PLUNGER BALLS AND SPRINGS (fig. 16). Hold gearshift lever bracket in a vise, and install lock-out plunger ball springs and balls.

(2) INSTALL GEARSHIFT LEVER STUB (fig. 16). Insert socket center pin into gearshift lever stub. Insert stub into bracket with stub keyway facing toward front (set screw side) of bracket. Install and tighten set screw and lock nut.

(3) INSTALL REVERSE LOCK-OUT PLUNGERS (fig. 16). Through openings in bracket, press down on lock-out plunger balls and install reverse lock-out plungers, plunger springs, spring guides, and spring nuts.

(4) INSTALL GEARSHIFT LEVER BRACKET (fig. 16). Place a new gasket and the gearshift lever bracket in position on transmission

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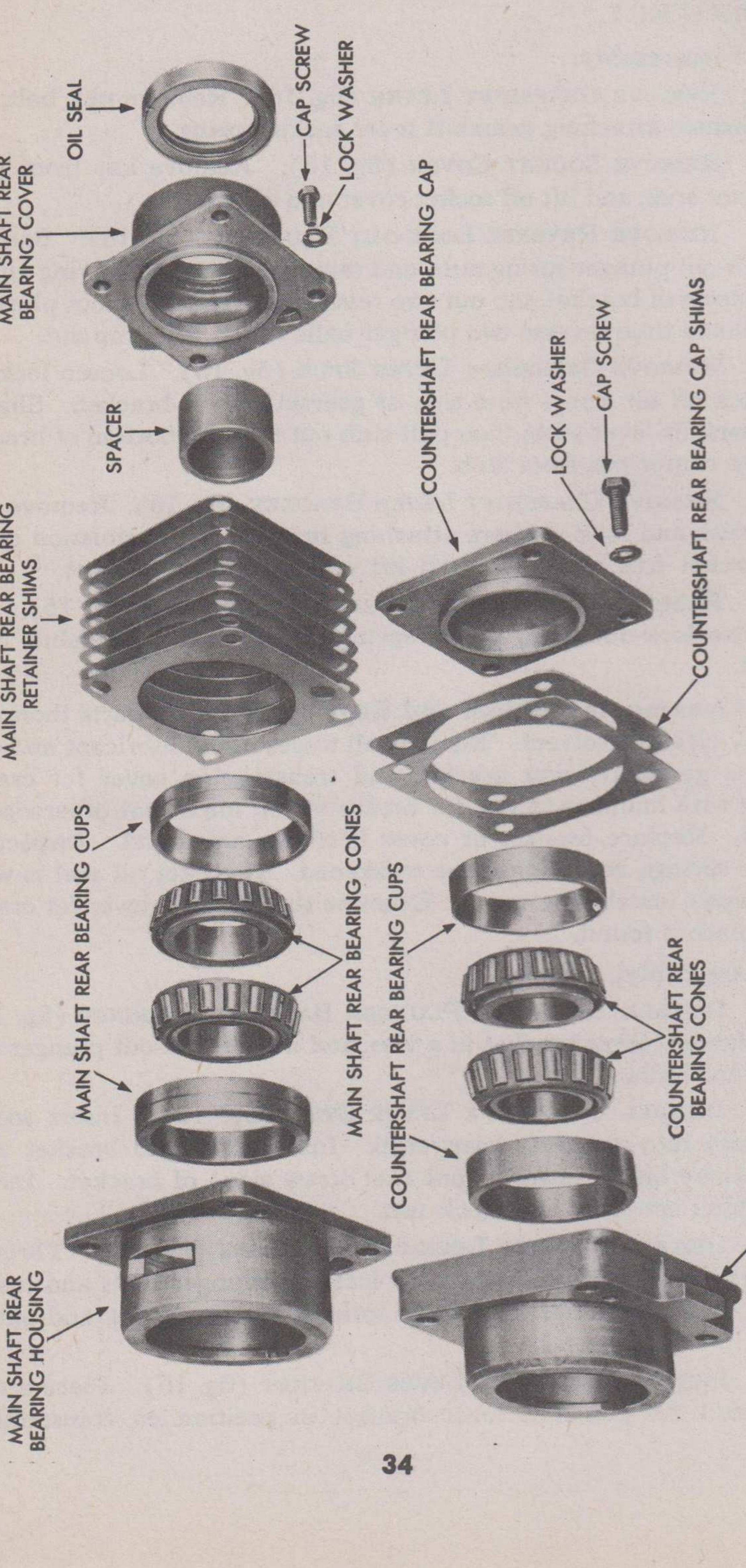

Figure 17 — Mainshaft and Countershaft Rear Bearing Disassembled

cover. Line up dowels with dowel holes and tap down. Install cap screws and lock washers.

(5) INSTALL SOCKET COVER (fig. 16). Place lever socket oil seal and socket cover in position over stub. Insert key into stub keyway, and position socket spring on cover.

(6) INSTALL GEARSHIFT LEVER (fig. 16). Aline keyway on gearshift lever with key on lever stub. Tap on lever until bolt holes in lever are in line with groove in stub. Install gearshift lever bolt, lock washers, and nut.

24. MAINSHAFT AND COUNTERSHAFT REAR BEARING.

a. Disassembly (fig. 17). Using an arbor press, press outer bearing cup out of bearing housing. Lift out both bearing cones; then press out inner bearing cup. Do not remove oil seal from rear bearing cover unless it is damaged (subpar. **b**, below).

b. Cleaning, Inspection, and Repair. Wash all parts in dry-cleaning solvent, immersing bearings in clean dry-cleaning solvent. Keep bearings in dry-cleaning solvent until old lubricant is completely dissolved; rotate rollers slowly while holding bearings in dry-cleaning solvent. After cleaning, dry bearings and inspect for evidence of wear or damage. Except for stoning to remove light scores or gall marks, do not attempt to repair bearings. Examine oil seal in bearing cover for distortion of inner diameter, tears, and flabby condition. If felt is worn or seal is otherwise damaged, remove seal from cover and install new oil seal. Inspect bearing cover and housing for cracks or fractures, replacing cracked or fractured parts.

c. Assembly (fig. 17). Press inner cup into bearing housing. Pack bearing cones with lubricant and insert against inner cup. Press outer bearing cup into housing.

25. TRANSMISSION CASE.

a. Disassembly.

(1) REMOVE COUNTERSHAFT FRONT BEARING. Tap countershaft front roller bearing out of transmission case.

(2) REMOVE REVERSE GEARSHIFT FORK GUIDE SCREW. Back off lock nut and remove guide screw from side of case.

(3) REMOVE PIPE PLUGS. Remove drain plug from bottom, and summer and winter level plugs from side of transmission case.

b. Cleaning, Inspection, and Repair. Wash transmission case with dry-cleaning solvent. Use a stiff brush to remove all traces of old lubricant and dirt from inner crevices. Examine case for fractures and cracks, tapping with hammer to test for cracks which might otherwise not be evident. Inspect all drilled passages to make sure

they are open and clean. Replace transmission case if fractured or cracked. Check reverse gearshift fork guide screw, all studs, and pipe plugs for nicks, burs, cross threads, and evidence of wear. Clean up light nicks, burs, and crossed threads; replace badly worn or damaged parts. Clean and inspect countershaft front roller bearing as outlined in paragraph 24 b.

c. Assembly.

(1) INSTALL PIPE PLUGS. Install drain plug and the summer and winter level plugs in transmission case.

(2) INSTALL REVERSE GEARSHIFT FORK GUIDE SCREW. Install guide screw and lock nut in side of case.

(3) INSTALL COUNTERSHAFT FRONT BEARING. Tap bearing into its seat in transmission case.

Section IV

ASSEMBLY OF TRANSMISSION

26. ASSEMBLY OF TRANSMISSION.

a. Install Reverse Gear Assembly. Hold reverse gear in position inside transmission case. Insert shaft through rear of case. Line up keyway on shaft with reverse gear sleeve key and tap shaft fully into position. Make certain that cutaway part on end of shaft is in vertical position facing countershaft opening in transmission case.

b. Install Countershaft Assembly (fig. 11). Lift countershaft assembly into transmission case, keeping it toward rear of case. Move assembly forward carefully and insert shaft into front bearing. Install shims and front bearing cap with oil drain in cap facing down. Secure cap with lock washers and cap screws. Tap countershaft rear bearing assembly into position in rear of transmission case, with lip on bearing housing over cutaway end of reverse gear shaft. After housing is in place, tap lightly on rear bearings to properly seat them on countershaft. Slide plain washer on countershaft and install rear bearing lock nut washer and lock nut. Bend lock washer over nut. Do not install rear bearing cap and shims until mainshaft and main drive gear assemblies have been installed, at which time the number of shims required will be determined.

c. Install Mainshaft Assembly. Lower assembly into transmission case, keeping sliding gears toward rear of case. Before installing mainshaft rear bearing assembly, it is necessary to determine the number of shims required between bearing housing and bearing cover. Place housing assembly in a vise, install shims between hous-

ing and cover, and tighten assembly with bolts and nuts. Enough shims must be installed so a very slight binding of bearings can be felt when turning bearings by hand. When this condition is reached, remove one 0.005-inch shim. Tap rear bearing housing into position in transmission case. Install predetermined number of shims against housing. Install rear bearing cover with lock washers and cap screws. Tap on front end of mainshaft until shaft is fully seated on rear bearings. Slide spacer into rear bearing housing and on mainshaft. Tap drive shaft flange on mainshaft spline far enough to be able to thread thrust nut on shaft. Tighten thrust nut as far as possible to press flange against spacer and install cotter pin.

d. Install Main Drive Gear Assembly (fig. 10). Tap assembly into transmission case and onto mainshaft. Using new gasket, install main drive gear bearing cap. Secure with lock washers and cap screws.

e. Install Countershaft Rear Bearing Cap. Check position of countershaft overdrive gear in relation to mainshaft overspeed gear. If edges of gears are not in line, shims must be moved from one end of countershaft to the other end until perfect alinement of gears is achieved. Place predetermined number of shims against countershaft rear bearing housing. Place rear bearing cap against shims and secure with lock washers and cap screws.

f. Install Gearshift Rods (figs. 8 and 9). Slide gears into neutral position before installing gearshift rods. First install lower reverse and lower overdrive rods, which do not use plungers or springs. Hold lower reverse gearshift fork inside transmission case. Insert rod into transmission case, through gearshift fork, and into other end of transmission case. Secure fork to rod with cap screw and safety wire. Install lower overdrive shift rod and fork in the same manner. Place gearshift rod springs and plungers into openings in back end of transmission case. Place gearshift rod interlock plungers in position in front end of case. Press down gearshift rod plunger, and insert first and second speed gearshift rod into transmission case and on through gearshift fork and jaw into the other end of transmission case. Secure fork and jaw to rod with cap screw and lock washer. Follow same procedure to install third and fourth speed, upper overdrive, and upper reverse gearshift rods and rod arms in the order given. Use new gaskets, and install top and side gearshift rod covers.

g. Install Transmission Cover and Gearshift Lever Bracket Assembly. Place a new transmission cover gasket in position on case. Lift cover assembly onto transmission case at an angle to properly place gearshift lever stub in position on gearshift rod arms. Line up dowels and tap cover assembly on transmission case. Install lock washers and cap screws.

h. Install Clutch Housing Assembly. Line up stud holes in clutch housing, and tap housing fully against transmission case. Install clutch housing, stud nuts, and cotter pins.

i. Install Power Take-off. Refer to paragraph 34.

Section V
TEST

27. TEST.

a. Road Test. Install transmission, and check operation in various gear speeds. Listen for excessive noise, and examine transmission case for oil leaks. If shifting into all speeds is accomplished easily and no excessive noise is apparent, correct assembly of transmission is indicated.

Section VI
FITS AND TOLERANCES

28. SERVICE INFORMATION.

a. Fits and Tolerances.

Sliding gears on mainshaft splines	0.005 to 0.0015 in.
Third and fourth speed clutch ring on clutch driver	0.005 to 0.0015 in.
Fork on clutch ring	0.005 to 0.0020 in.
Fork on slide gear sleeve	0.005 to 0.0020 in.
Mainshaft out-of-true	0.005 in. maximum
Poppet spring pressure at $^{15}/_{16}$ in.	40 to 45 lb

CHAPTER 4

POWER TAKE-OFF

Section I

DESCRIPTION AND DATA

29. DESCRIPTION AND OPERATION.

a. Description (fig. 18). For operation of the winch, a power take-off unit is mounted on a special adapter on the right-hand side of the transmission. Selection of two forward speeds and one reverse speed is made through operation of a shifter lever in the cab. The adapter bracket assembly and take-off assembly are separated during removal from transmission, as one attaching cap screw is located inside the adapter bracket. In the adapter bracket, a power take-off adapter gear is mounted on a roller bearing and a gear shaft, held in position by a steel pin. This pin is driven through the bracket and one end of the gear shaft. Thrust washers are placed on each side of the adapter gear. In the power take-off assembly, roller bearings are pressed into the case and provide seats for the take-off shaft. This shaft is splined to permit movement of take-off sliding gear. A shift yoke attached to a shift rod fits a slot on the sliding gear. This yoke is held in position on the shift rod by a shift rod tube which slides over one end of the shift rod, forcing the yoke against a shoulder on the rod. Grooves in the shift yoke and shift rod tube permit entry of gearshift pawls. These pawls are forced against the yoke and shift rod tube by pawl springs, which fit into poppets threaded into top of take-off case. An idler gear, in which two roller bearings, separated by a bearing spacer, are used, is mounted in the take-off case under the take-off sliding gear. Thrust washers are used on each end of the idler gear assembly. Cap screws, threaded into each end of the idler gear pin, hold the assembly in position. An intermediate gear which is in constant mesh with the idler gear rides on a roller bearing and a bearing sleeve. A set screw holds the intermediate gear pin in the take-off case.

b. Operation (fig. 21). Power is transmitted from the power take-off driving gear in the transmission. This gear is in constant mesh with the take-off adapter gear which, in turn, is in constant mesh with the intermediate gear in the take-off case. Shifting of control lever into low position engages the 28-toothed, sliding gear with the 14-toothed intermediate gear. With control in high position, 20-toothed sliding gear engages 22-toothed intermediate gear. In reverse position, 28-toothed sliding gear engages 14-toothed idler gear which is in constant mesh with 22-toothed intermediate gear. With

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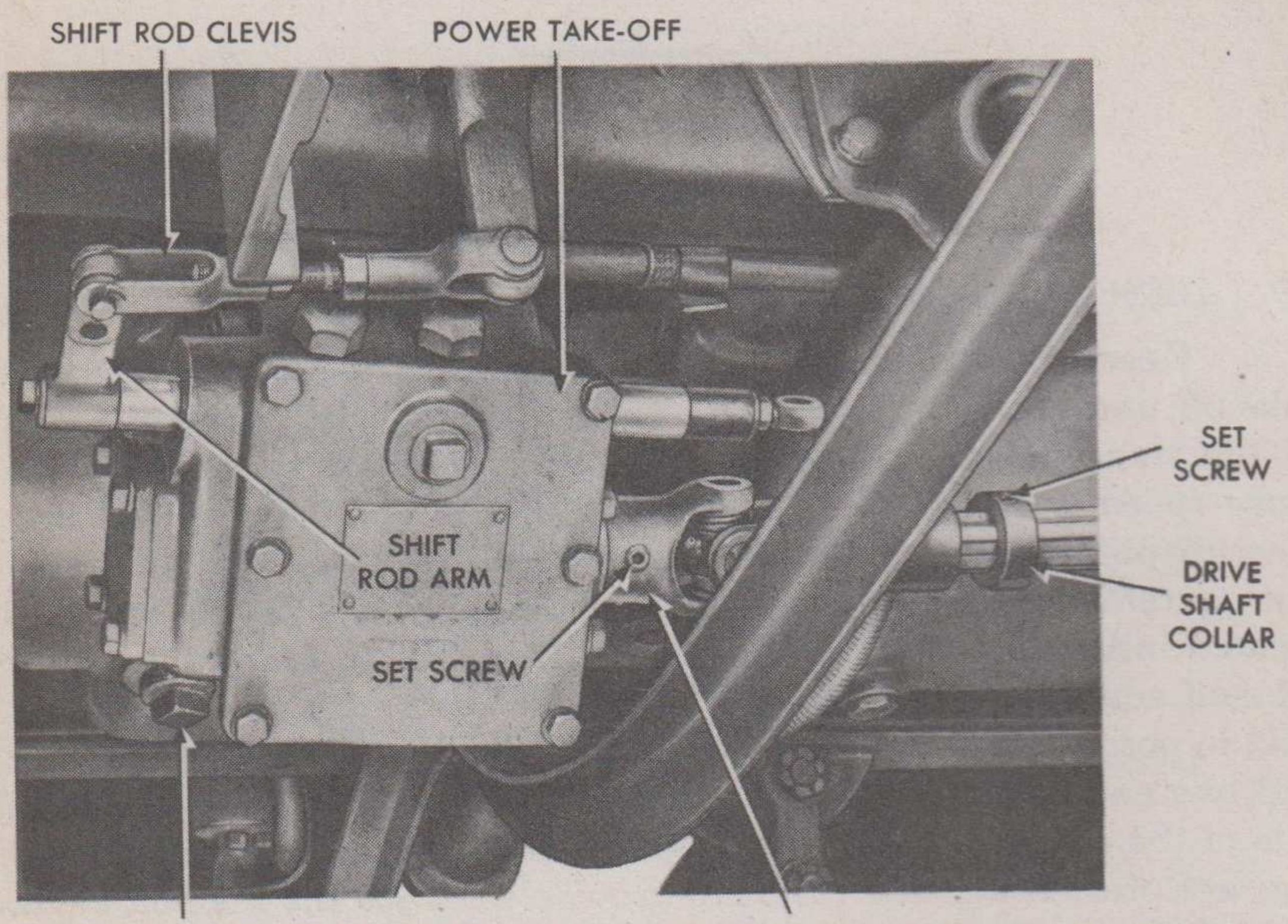


Figure 18 — Power Take-off Installed

engine operating at 1,000 revolutions per minute, the winch line speed on the first layer of ½-inch cable on the drum is 21½ feet per minute in low gear, 47½ feet per minute in high gear, and 34 feet per minute in reverse Neutral points are between each of the gear speeds. A lock for the control lever is provided to secure the take-off in one of these neutral points.

30. DATA.

Make	Gar Wood
Model	77 Y 6000
Gear ratio, high	1.10 to 1
Gear ratio, low	0.50 to 1
Gear ratio, reverse	0.78 to 1

Section II

REMOVAL

31. REMOVAL.

a. Drain Transmission and Power Take-off (fig. 18). Drain transmission by removing drain plug from bottom of transmission case. Remove bottom cover plate from take-off case to complete draining of power take-off unit.

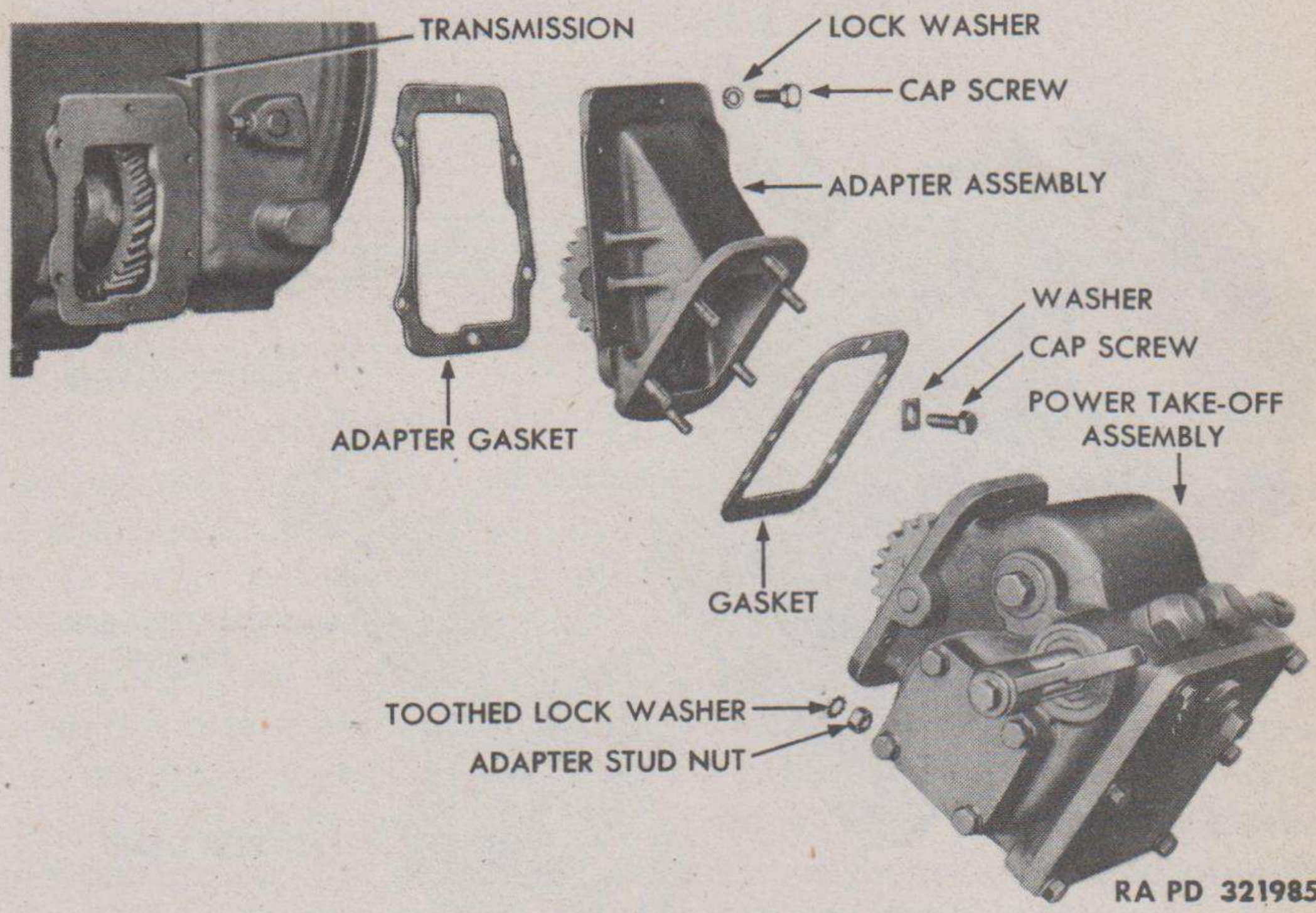


Figure 19 — Power Take-off and Adapter Removed From Transmission

b. Detach Shift Rod (fig. 18). Remove cotter pin and clevis pin attaching take-off shift rod clevis to shift rod arm.

c. Detach Winch Drive Shaft (fig. 18). Loosen set screws on universal joint yoke and drive shaft collar. Slide collar forward and tap universal joint off power take-off shaft.

d. Remove Power Take-off Assembly (fig. 19). Remove stud nuts and internal-toothed lock washers attaching take-off to take-off adapter. Lift off take-off assembly and gasket.

e. Remove Power Take-off Adapter Assembly (fig. 19). Remove one cap screw and square flat washer from inside of adapter. Remove five cap screws and lock washers attaching outer edge of adapter to transmission case. Lift off adapter and gasket.

Section III

DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY OF SUBASSEMBLIES

32. POWER TAKE-OFF ADAPTER.

a. Disassembly

(1) REMOVE ADAPTER GEAR (fig. 20). Tap steel pin out of adapter bracket and gear shaft. Tap out gear shaft and lift adapter gear and thrust washers out of bracket. Slide adapter gear bearing from bore of gear.

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

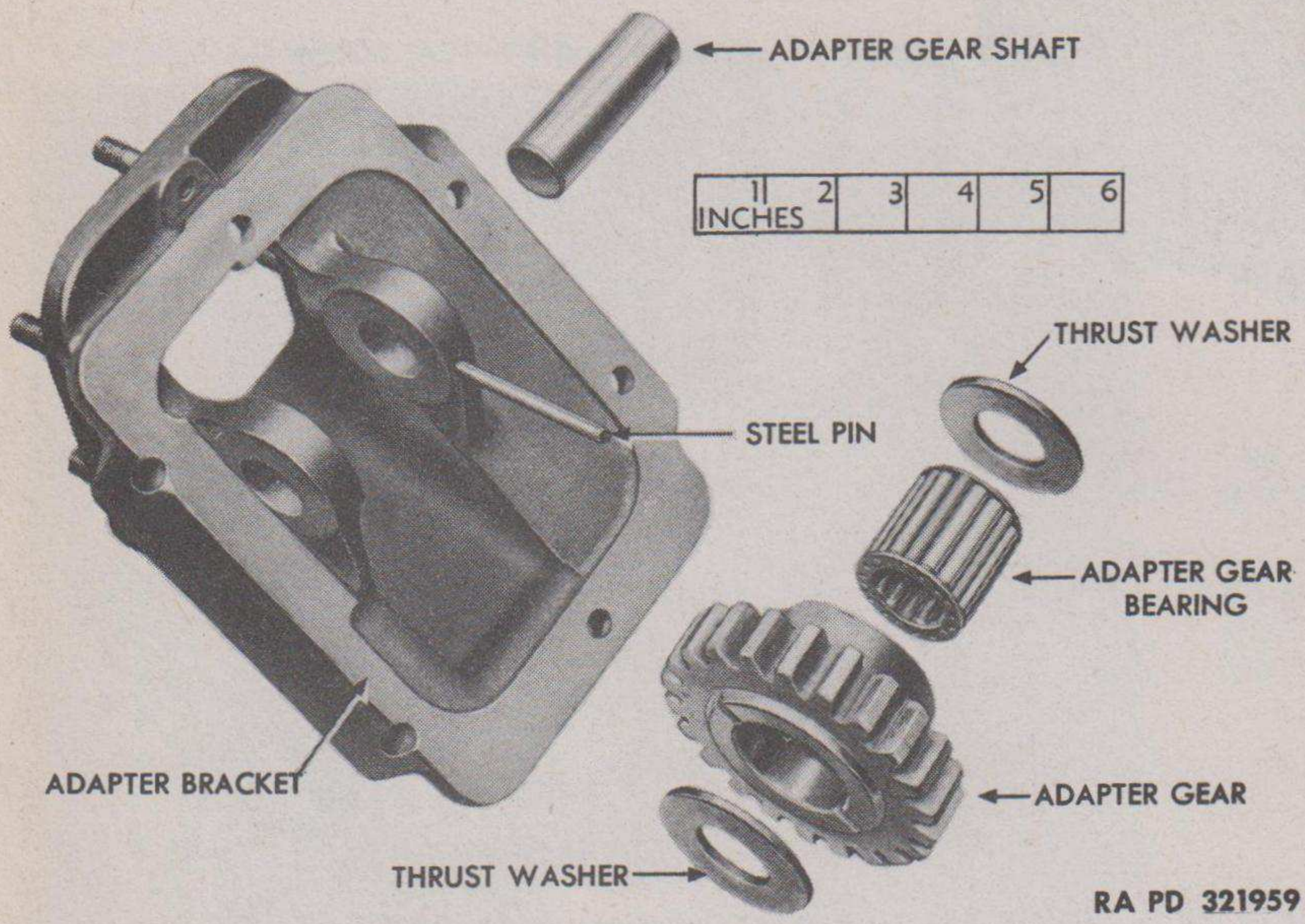


Figure 20 — Power Take-off Adapter Disassembled

b. Cleaning, Inspection, and Repair. Wash all parts in dry-cleaning solvent. Inspect bearing for wear or out-of-round condition of rollers. If bearing rollers are ridged, out-of-round, or cracked, replace bearing. After inspection, dip bearing in lubricant and set aside in a clean, covered container. Examine adapter bracket for cracks or fractures, replacing bracket if cracks or fractures are found. Inspect adapter gear shaft and thrust washers for burs and nicks, and repair with a handstone if necessary.

c. Assembly.

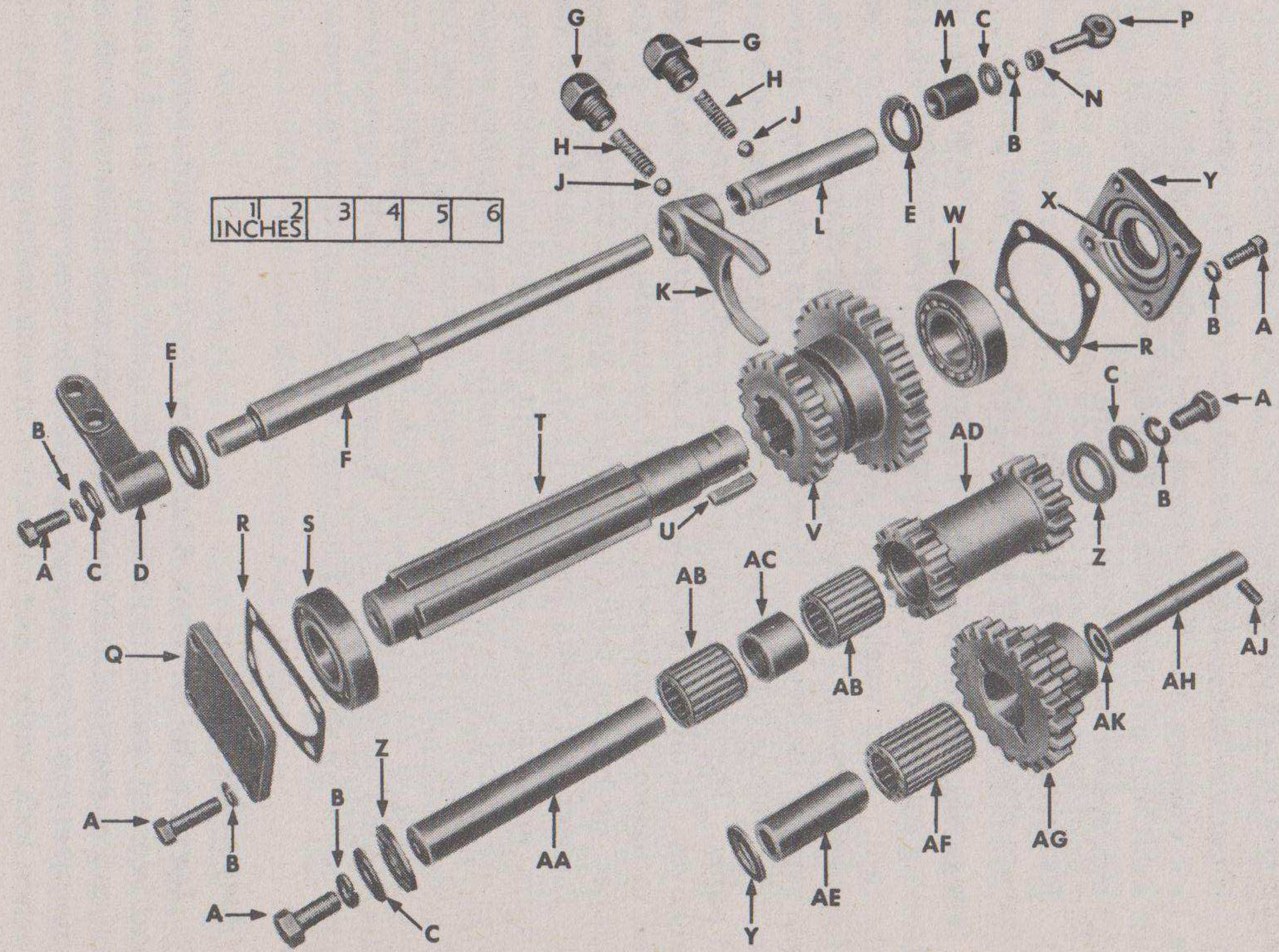
(1) INSTALL ADAPTER GEAR (fig. 20). Slide adapter gear bearing into bore of gear. Position thrust washers and gear in adapter bracket and install gear shaft. Tap steel pin through bracket and gear shaft. Peen both ends of pin.

33. POWER TAKE-OFF.

a. Disassembly.

(1) REMOVE INTERMEDIATE GEAR (fig. 21). Remove set screw securing intermediate gear pin in take-off case. Tap out gear pin and remove thrust washers and gear. Slide roller bearing and sleeve out of gear bore.

(2) REMOVE TAKE-OFF SHAFT ASSEMBLY (fig. 21). Tap key out of shaft keyway. Remove cap screws and lock washers attaching bear-



A—CAP SCREW
B—LOCK WASHER
C—FLAT WASHER
D—SHIFT ROD ARM
E—OIL SEAL
F—SHIFT ROD
G—POPPET
H—PAWL SPRING
J—GEARSHIFT PAWL
K—SHIFT YOKE
L—SHIFT ROD TUBE
M—SPACER
N—LOCK NUT
P—EYE
Q—BEARING CAP
R—GASKET
S—SINGLE ROW BALL BEARING
T—TAKE-OFF SHAFT
U—KEY
V—SLIDING GEAR
W—DOUBLE ROW BALL BEARING
X—OIL SEAL
Y—OIL SEAL COVER
Z—THRUST WASHER
AA—IDLER GEAR PIN
AB—ROLLER BEARING
AC—BEARING SPACER
AD—IDLER GEAR
AE—BEARING SLEEVE
AF—ROLLER BEARING
AG—INTERMEDIATE GEAR
AH—INTERMEDIATE GEAR PIN
AJ—SET SCREW
AK—WASHER

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Figure 21 — Power Take-off Shaft and Gear Disassembled

ing cap and oil seal cover to take-off case. Lift off bearing cup, oil seal cover, and gaskets. Remove oil seal from cover only if damaged (subpar. b, below). Tap take-off shaft towards front of case and remove shaft with front bearing. Slide bearing off shaft. Lift take-off gear out of case. Tap rear bearing out of case.

(3) REMOVE SHIFT ROD ASSEMBLY (fig. 21). Unscrew poppets and lift springs and pawls from openings in take-off case. Remove cap screw, lock washer, and flat washer attaching shift rod arm to shift rod. Slide arm off shift rod. Unscrew eye from shift rod tube. Remove spacer, slide shift rod tube off shift rod and out of take-off case. Slide shift rod out of case and lift out shift rod fork. Remove oil seals from each end of case only if damaged (subpar. b, below).

(4) REMOVE IDLER GEAR ASSEMBLY (fig. 21). Remove cap screws, lock washers, and flat washers from each end of idler gear pin. Tap out shaft and lift idler gear and thrust washers from case. Slide bearings and spacer out of idler gear bore.

(5) REMOVE TAKE-OFF CASE COVER. Remove cap screws and lock washers attaching cover to case. Lift off cover and gasket.

b. Cleaning, Inspection, and Repair. Using a stiff brush and dry-cleaning solvent, clean all parts thoroughly, removing all traces of old lubricant. After washing and drying bearings, inspect them carefully for signs of wear. If bearing rollers are out-of-round, ridged, or cracked, replace the bearing. When inspection is completed, dip bearings in light engine oil and set aside in a clean container or wrap in waxed paper. Inspect oil seals before removal from take-off case and oil seal cover. If oil seal packing is not loose or out of shape, they may be used in assembly; otherwise, install new seals. Examine all gears for chipped or broken teeth and replace gears if these defects are found. Inspect gear shafts, pins, shift rod, and shift rod tube for wear, nicks, burs, and fractures. Remove light burs with a handstone. If fractures are found, replace with new parts. If pawl springs are compressed to a point where their efficiency is impaired, replace them. Replace pawls if out-of-round, nicked, or galled. Clean up cross threading found on threated parts. Examine shift fork, power take-off case, and cover for cracks or fractures, replacing cracked or fractured parts.

c. Assembly.

(1) INSTALL IDLER GEAR ASSEMBLY (fig. 21). Slide roller bearings and bearing spacer into bore of idler gear. Place thrust washers on each end of gear and hold assembly in position inside take-off case. Tap idler gear pin into case and through idler gear assembly. Install flat washer, lock washer, and cap screw in each end of gear pin.

(2) INSTALL TAKE-OFF SHAFT ASSEMBLY (fig. 21). Tap single-row rear ball bearing into case. Hold sliding gear in position inside case. Slide take-off shaft into case, through gear, and into rear bearing. Slide double-row front ball bearing over shaft, and tap into case. Using a new gasket, install drive shaft cap and secure with lock washers and cap screws. If new oil seal is required, press seal into oil seal cover. Install a new gasket, and secure oil seal cover assembly to take-off case with lock washers and cap screws. Tap key into keyway on take-off shaft.

(3) INSTALL SHIFT ROD ASSEMBLY (fig. 21). If new oil seals are required, carefully press or tap new oil seals into position in take-off case. Place shift yoke on take-off gear and slide shift rod into case and through shift yoke. Slide shift rod tube into other end of case against shift yoke. Slide spacer onto end of shift rod against shift rod tube. Install flat washer, lock washer, and eye with lock nut into end of shift rod. Place shift rod arm on shift rod and secure with flat washer, lock washer, and cap screw. Insert gear shift pawls and pawl springs into opening in take-off case, and thread poppets firmly into position.

(4) INSTALL INTERMEDIATE GEAR ASSEMBLY (fig. 21). Insert roller bearing and bearing sleeve into bore of intermediate gear. Place thrust washers on each end of gear and hold assembly in position. Tap intermediate gear pin into case and through gear assembly. Thread set screw into case and intermediate gear pin.

(5) INSTALL TAKE-OFF CASE COVER. Using a new gasket, install cover. Secure with lock washers and cap screws.

Section IV

INSTALLATION

34. INSTALLATION.

a. Install Power Take-off Adapter Assembly (fig. 19). Using a new gasket, position adapter against transmission case. Make sure adapter gear is in mesh with transmission power take-off gear. Install cap screws and lock washers holding adapter to transmission case.

b. Install Power Take-off Assembly (fig. 19). Place a new gasket on adapter studs and position take-off assembly. Secure assembly to adapter with internal-toothed lock washers and stud nuts.

c. Attach Winch Drive Shaft (fig. 18). Position universal joint yoke on take-off shaft, and tighten yoke set screw. Slide drive shaft collar back to a distance of three-fourths inch from rear universal joint hub, and tighten collar set screw.

d. Attach Shift Rod (fig. 18). Attach shift rod to shift rod arm with clevis pin and cotter pin.

e. Install Lubricant. Fill transmission case with lubricant. Refer to TM 9-817 for quantity and type of lubricant.

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

CHAPTER 5

TRANSFER CASE

Section I

DESCRIPTION AND DATA

35. DESCRIPTION AND OPERATION.

a. Description (figs. 22 and 23). A transfer case provides a means of transferring power from the transmission to the front and rear propeller shafts. It is mounted behind the transmission and arranged for two speeds: one direct, and one underdrive, with a ratio of 1.72 to 1. Speed changes are controlled by a lever in the cab. A declutching device on the front of the lower shaft is used to cut out transmission of power to the front axle when traction on the front wheels is not required. This clutch also is controlled by a lever in the cab and is arranged so that the truck cannot be operated in low range with the front axle disengaged. Power is transmitted from transmission to transfer case by the intermediate drive shaft which is attached to transfer case mainshaft flange. Ball bearings support the mainshaft at the front and rear. The main drive gear is supported on the mainshaft by two idler bearings. A low-speed sliding gear rests on the splined part of the mainshaft. Fitted into a recess on this sliding gear is a gearshift fork which is attached to a gearshift shaft. Support for the idler shaft is provided by roller bearings in front and rear. The idler gear and low-speed gear are pressed onto the idler shaft and secured by two keys in each gear. A speedometer drive gear is attached to the front of the idler shaft. An opening in the idler shaft front bearing cap provides for entry of the speedometer driven gear which meshes with speedometer drive gear. Power is transmitted to the front axle by the front drive shaft attached to a flange on the declutch shaft. A ball bearing in the declutch shaft bearing carrier supports the front of the declutch shaft. A declutch sliding clutch rest on splines of the shaft and is recessed for engagement with a declutch shift fork attached to the declutch shifting shaft. Power to rear axle is transmitted by the rear drive shaft, which is attached to the drive shaft brake disk and a flange on the rear of the driven shaft. A declutch driving clutch is mounted on splines on the front of the driven shaft. A bushing in the driven shaft provides a seat for the rear of the declutch shaft. Roller bearings are used on front and rear of the driven shaft. The driven gear is pressed onto the shaft and locked in position with two keys.

TRANSFER CASE

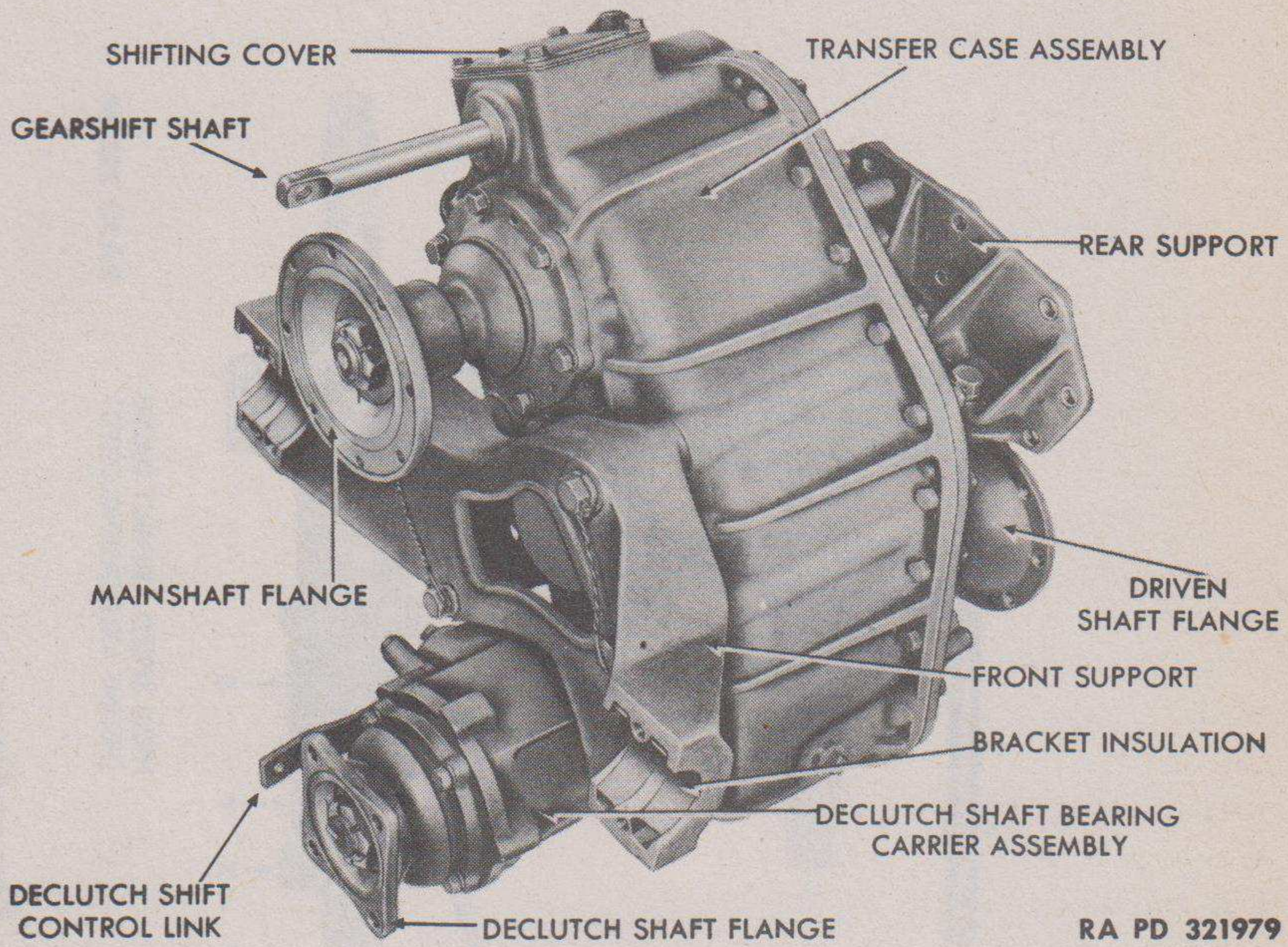

Figure 22 — Transfer Case Removed

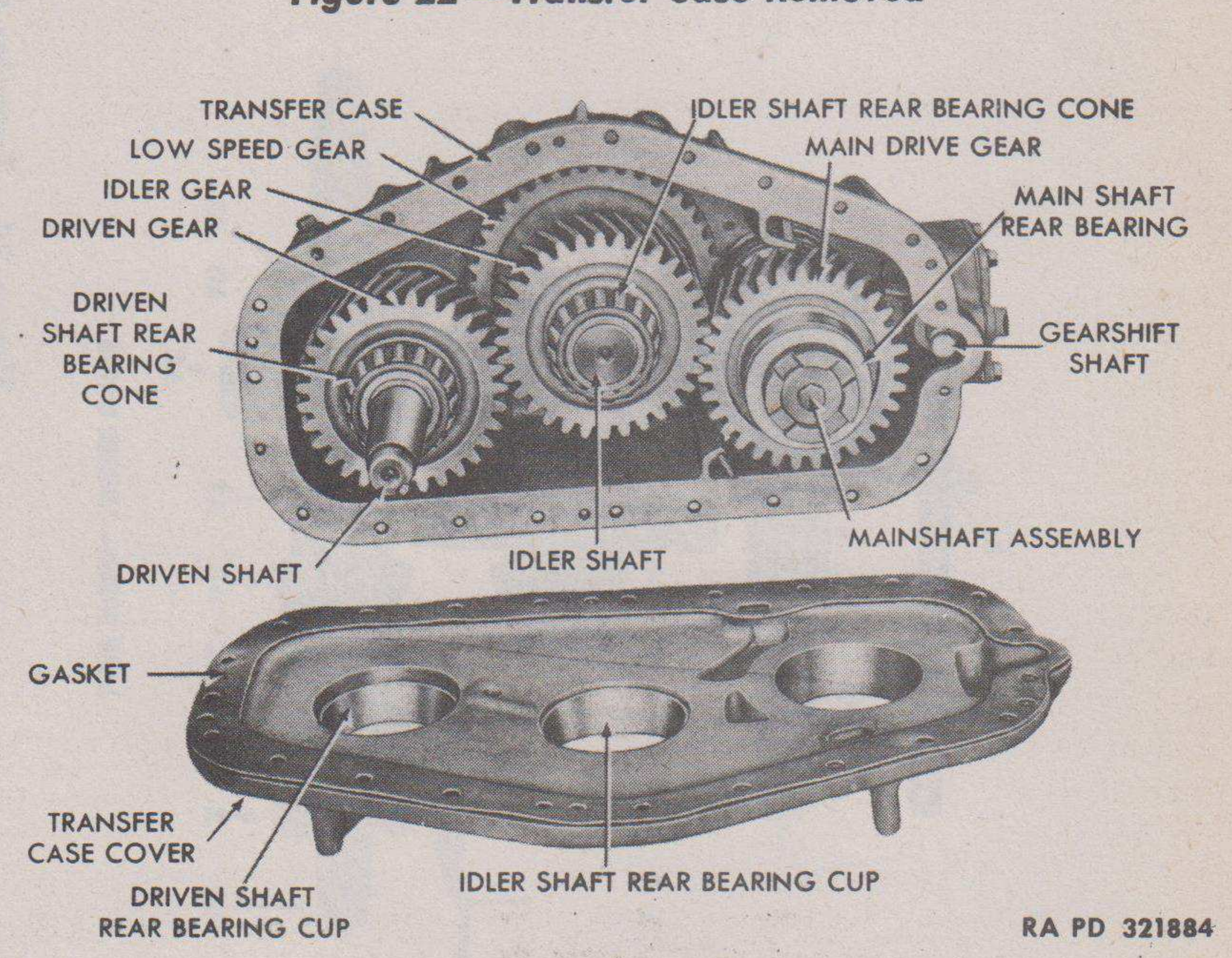

Figure 23 — Transfer Case Cover Removed

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

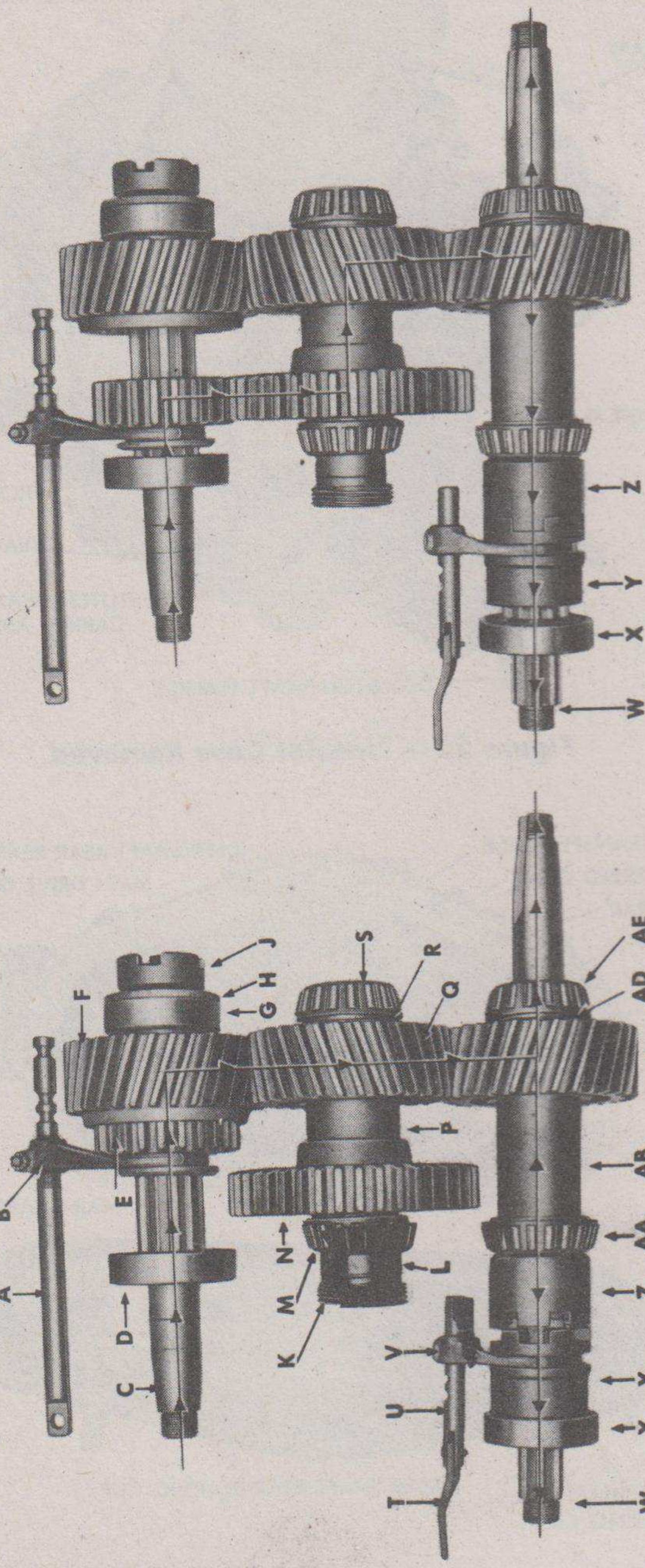

Figure 24 — Transfer Case Power Flow

A—GEARSHIFT SHAFT
B—GEARSHIFT FORK
C—MAIN SHAFT
D—MAIN SHAFT FRONT BEARING
E—MAIN SHAFT LOW-SPEED SLIDING GEAR
F—MAIN DRIVE GEAR
G—MAIN SHAFT REAR BEARING
H—MAIN SHAFT REAR BEARING WASHER
J—MAIN SHAFT POWER TAKE-OFF CLUTCH
K—SPEEDOMETER DRIVE GEAR
L—SPEEDOMETER DRIVE GEAR SPACER
M—IDLER SHAFT FRONT BEARING CONE
N—LOW-SPEED GEAR
P—IDLER SHAFT
Q—IDLER GEAR
R—IDLER SHAFT WASHER
S—IDLER SHAFT REAR BEARING CONE
T—SHIFT CONTROL LINK
U—SHIFTING SHAFT
V—SHIFT FORK
W—DECLUTCH SHAFT
X—DECLUTCH SHAFT BEARING
Y—DECLUTCH SLIDING CLUTCH
Z—DECLUTCH DRIVING CLUTCH
AA—DRIVEN SHAFT FRONT BEARING CONE
AB—DRIVEN SHAFT
AC—DRIVEN GEAR
AD—DRIVEN SHAFT WASHER
AE—DRIVEN SHAFT REAR BEARING CONE

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Legend for Figure 24 — Transfer Case Power Flow

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

b. Operation (fig. 24). When transfer case gearshift hand lever is moved into high position, the gearshift fork in the transfer case moves the mainshaft low speed sliding gear into mesh with inner teeth on main drive gear. Power is transmitted from main drive gear to idler shaft idler gear, to driven shaft driven gear, and out to rear drive shaft. With gearshift in low position, mainshaft low speed sliding gear moves to the rear and meshes with idler shaft low speed drive gear. Power is then transmitted to idler shaft idler gear, to driven shaft driven gear, out to rear drive shaft, as well as forward through declutch shaft and front drive shaft. The front axle is automatically engaged when gearshift hand lever is moved into low position by means of a lug which is a part of the gearshift lever. Movement of gearshift hand lever into low position forces this lug against the declutch shift hand lever, thereby engaging sliding clutch on declutch shaft with driving clutch on driven shaft.

36. DATA.

Make	Timken
Model	T-76-2
Type	2-speed with front axle declutching unit
Mounting	3-point, amidship of frame
High gear ratio	1.00 to 1
Low gear ratio	1.72 to 1

Section II

DISASSEMBLY INTO SUBASSEMBLIES

37. DISASSEMBLY.

a. Remove Transfer Case. Refer to TM 9-817.

b. Drain Transfer Case. Remove transfer case drain pipe plug and drain oil from transfer case.

c. Remove Rear Support (fig. 22). Remove lock wire and loosen cap screws connecting rear support to rear support member. Lift off transfer case rear support.

d. Remove Front Support (fig. 22). Remove lock wires, cap screws, and lock washers. Pry front support free of transfer case dowel pins and lift off.

e. Remove Driven Shaft Flange (fig. 22). Remove cotter pin and driven shaft nut. Tap off driven shaft flange.

f. Remove Mainshaft Flange (fig. 22). Remove cotter pin and mainshaft nut. Tap off mainshaft flange.

TRANSFER CASE

g. Remove Driven Shaft Rear Bearing Cap (fig. 26). Remove driven shaft key and driven shaft flange dust cap. Remove cap screws and lock washers attaching bearing cap to transfer case. Lift off bearing cap, shims, and gaskets.

h. Remove Idler Shaft Rear Bearing Cap (fig. 28). Remove cap screws and lock washers. Lift off bearing cap, shims, and gasket.

i. Remove Mainshaft Rear Bearing Cover (fig. 27). Remove cap screws and lock washers. Lift off cover and cover gasket.

j. Remove Speedometer Driven Gear (fig. 28). Detach and remove speedometer driven gear from idler shaft front bearing cap.

k. Remove Transfer Case Cover (fig. 23). Tap out three tapered pins and remove nuts, bolts, cap screws, and lock washers attaching cover to transfer case. Lift off cover and gasket.

l. Remove Mainshaft Front Bearing Cage (fig. 27). Tap mainshaft flange key off mainshaft. Remove flange dust cap. Remove bearing cage cap screws and lock washers. Install cap screws into three tapped holes in bearing cage. Turn cap screws evenly against transfer case and force out front bearing cage. Lift off shims and gasket.

m. Remove Idler Shaft Front Bearing Cap (fig. 28). Remove cap screws and lock washers. Pry off bearing cap and remove shims and gasket.

n. Remove Shifting Cover (figs. 22 and 27). Remove cap screws and lock washers attaching cover to transfer case. Lift off shifting cover, gaskets, and baffle plate. The gearshift lock spring and plunger will pop out when cover is lifted. Remove gearshift lock ball from opening in transfer case.

o. Remove Gearshift Shaft and Fork (fig. 27). Remove cotter pin and loosen nut securing shift fork to shaft. Screw gearshift shaft out of fork and slide shaft out of transfer case. Lift gearshift fork out of case.

p. Remove Shaft Assemblies (fig. 23). Lift mainshaft, idler shaft, and driven shaft assemblies out of transfer case.

q. Remove Declutch Shaft Bearing Carrier Assembly (figs. 22 and 25). Remove cap screws and lock washers attaching carrier to transfer case. Lift off carrier assembly and carrier gasket.

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR 5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)

Section III

DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY OF SUBASSEMBLIES

38. DECLUTCH SHAFT AND BEARING CARRIER.

a. Disassembly (fig. 25).

(1) REMOVE DECLUTCH SHAFT FLANGE. Remove cotter pin and declutch shaft nut. Tap off declutch shaft flange and attached dust shield.

(2) REMOVE DECLUTCH SHAFT BEARING CAP. Remove cap screws and lock washers attaching bearing cap to carrier. Lift off cap and gasket.

(3) REMOVE DECLUTCH SHAFT OIL SEAL. Remove oil seal from bearing cap only if damaged, using replacer 41-R-2393-525. Once removed, oil seals cannot be used again.

(4) REMOVE DECLUTCH SHAFT. Tap declutch shaft out of declutch sliding clutch and out of carrier.

(5) REMOVE DECLUTCH SHAFT BEARING. Press bearing off declutch shaft with an arbor press.

(6) REMOVE DECLUTCH SHIFT LOCK SPRING AND BALL. Remove cap screws and toothed lock washer securing spring and ball in carrier. Spring and ball will fly out on removal of cap screw.

(7) REMOVE DECLUTCH SHIFTING SHAFT. Remove bearing carrier oil plug. Through oil plug opening, loosen set screws securing declutch shift fork to shifting shaft. Lift declutch shifting shaft, sliding clutch, and shift fork out of carrier.

(8) REMOVE DECLUTCH SHIFTING SHAFT OIL SEAL. Remove oil seal only if damaged, using replacer 41-R-2392-350.

b. Cleaning, Inspection, and Repair. Wash all parts thoroughly in dry-cleaning solvent, using a stiff brush to remove all traces of old lubricant. Immerse the bearing in clean dry-cleaning solvent and slush it up and down to remove loose particles of lubricant. Rotate the balls slowly while holding bearing beneath the surface of the dry-cleaning solvent. After washing, dry the bearing with compressed air, directing air across bearing to avoid spinning balls. Inspect bearing carefully for signs of wear; turn bearing slowly by hand to test for worn spots or pitted balls; replace, if it drags or is chipped or pitted. Except for stoning to remove light scores or gall marks, do not attempt to repair a bearing. After inspection, dip bearing in clean lubricant and place in clean, covered container. Examine declutch shaft oil seal in the bearing cap and shifting shaft oil seal in the car-

TRANSFER CASE

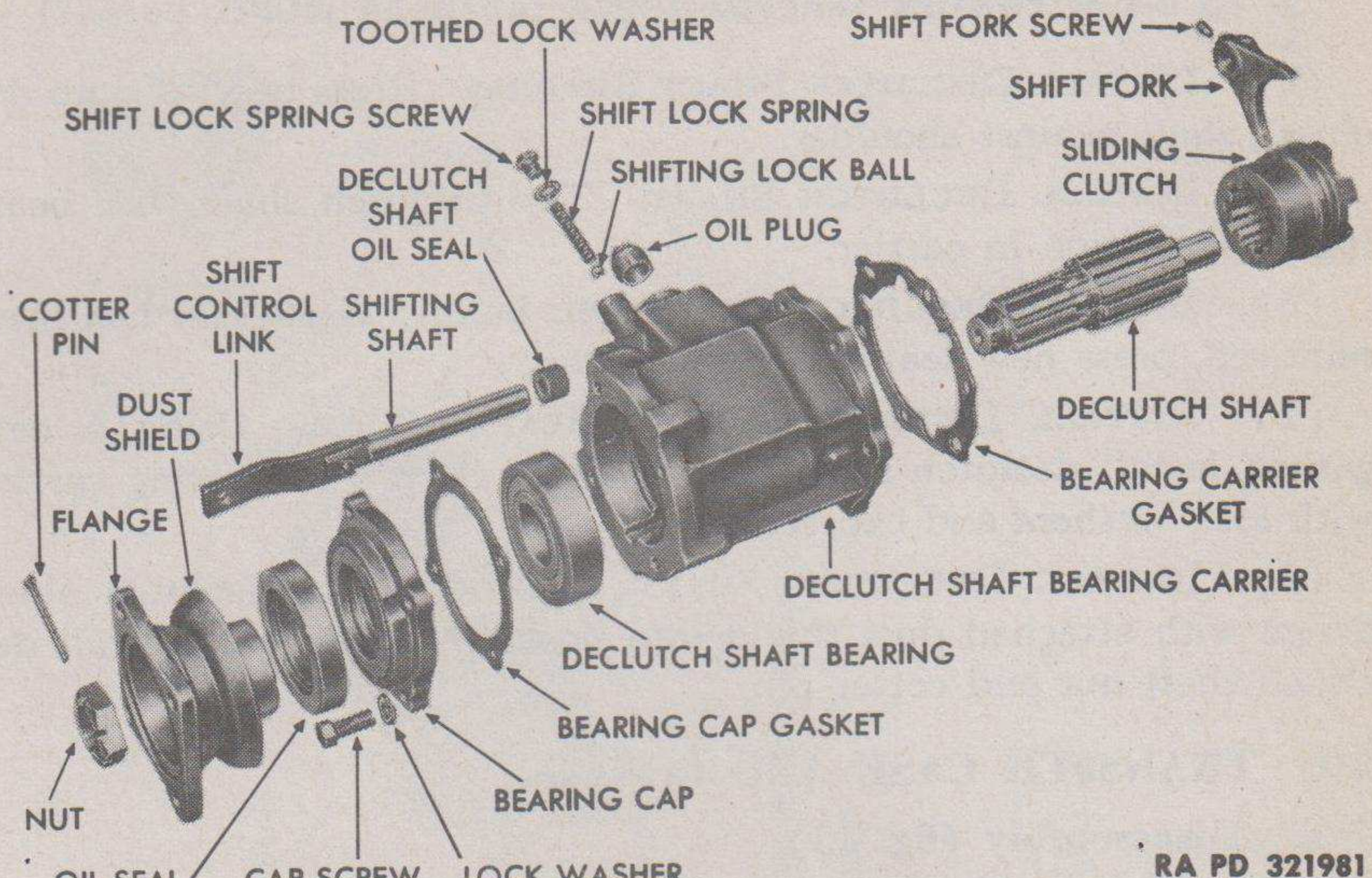

Figure 25 — Declutch Shaft and Bearing Carrier Disassembled

rier without disturbing installations. Inspect seals for looseness of packing, and distortion or fracture of packing retainers. If a seal requires replacement, break it to relieve tension and prevent damage to the bore; then pry it out. Examine the carrier, flange, and bearing cap for cracks and fractures, replacing cracked or broken parts. Inspect the declutch shaft and sliding clutch for cracks and chipped or twisted splines and replace if such defects are found. Examine the declutch shifting shaft and shift fork for fractures, scoring, or signs of wear at points of contact, and replace if broken, scored, or worn. Check condition of declutch shift lock spring and lock ball. Replace ball if out-of-round or otherwise damaged; replace spring if free length measures under 2 inches or if pressure at 1 inch is under 40 pounds.

c. Assembly (fig. 25).

(1) INSTALL DECLUTCH SHIFTING SHAFT OIL SEAL. If oil seal has been removed, press new seal into position in bearing carrier.

(2) INSTALL DECLUTCH SHIFTING SHAFT. Hold declutch sliding clutch in position inside carrier. Place declutch shift fork inside carrier into slot on sliding clutch. Slide declutch shifting shaft into carrier and through shift fork. Install shift fork screw through oil plug opening. Prick-punch screw to lock it in position. Install bearing carrier oil plug.

(3) INSTALL DECLUTCH SHIFT LOCK BALL AND SPRING. Insert ball and spring into opening in carrier. Secure with toothed lock washer and lock spring screw.

(4) INSTALL DECLUTCH SHAFT BEARING. Press bearing onto declutch shaft against shoulder.

(5) INSTALL DECLUTCH SHAFT. Tap declutch shaft with bearing into position in carrier.

(6) INSTALL DECLUTCH SHAFT OIL SEAL. If oil seal has been removed, press new seal into bearing cap.

(7) INSTALL DECLUTCH SHAFT BEARING CAP. Using a new gasket, install declutch shaft bearing cap. Secure to bearing carrier with lock washers and cap screws.

(8) INSTALL DECLUTCH SHAFT FLANGE. Tap declutch shaft flange with attached dust shield into position in carrier. Install declutch shaft nut and cotter pin.

39. TRANSFER CASE AND COVER.

a. Disassembly (fig. 23).

(1) REMOVE BEARING CUPS. Tap out idler shaft and driven shaft front bearing cups.

(2) REMOVE GEARSHIFT SHAFT OIL SEAL. Remove gearshift shaft oil seal from transfer case only if damaged.

(3) REMOVE BEARING CUPS FROM TRANSFER CASE COVER. Tap out driven shaft and idler shaft rear bearing cups.

b. Cleaning, Inspection, and Repair. Clean transfer case and cover with dry-cleaning solvent, using a stiff brush and scrubbing thoroughly to remove all traces of old lubricant. Examine case and cover for cracks, tapping with hammer to test for cracks which might otherwise not be evident. Weld cracks if small; otherwise replace parts. Inspect all threads for nicks, burs, or cross threading and remove small burs with handstone or smooth file. Always replace the cover gasket with new gasket.

c. Assembly (fig. 23).

(1) INSTALL BEARING CUPS IN TRANSFER CASE COVER. Press driven shaft and idler shaft rear bearing cup into position in transfer case cover.

(2) INSTALL GEARSHIFT SHAFT OIL SEAL. If oil seal has been removed, press new seal into position in transfer case.

(3) INSTALL BEARING CUPS. Press idler and driven shaft front bearings cups into position in transfer case.

40. DRIVEN SHAFT.

a. Disassembly (fig. 26).

(1) REMOVE BEARING CUPS. Lift off driven shaft front and rear bearing cups.

TRANSFER CASE

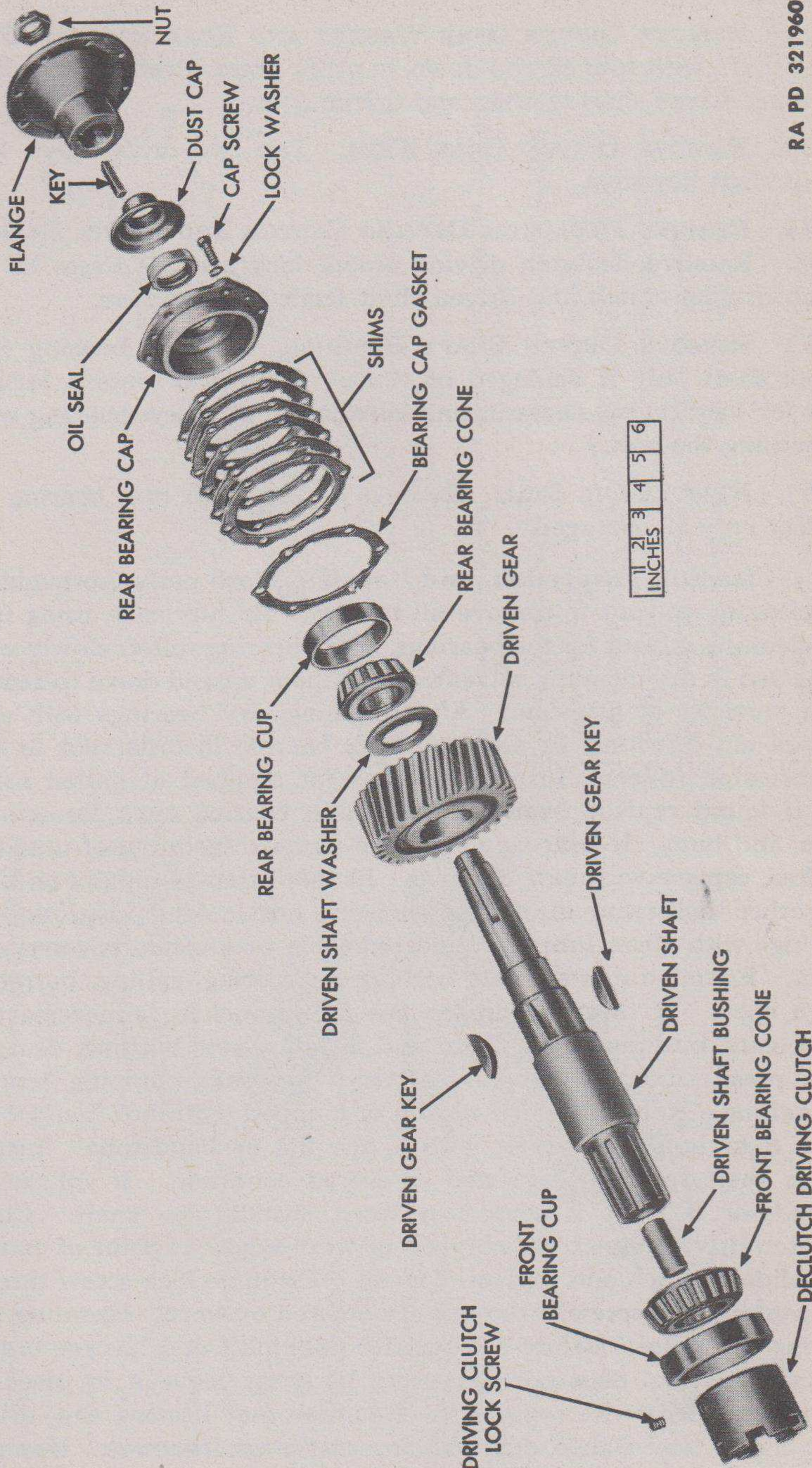

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Figure 26 — Driven Shaft Disassembled

(2) REMOVE DRIVEN GEAR WASHER AND REAR BEARING CONE. Place shaft, with splined end down, in arbor press. Press off rear bearing cone, driven shaft washer, and driven gear.

(3) REMOVE DRIVEN GEAR KEYS. Tap two driven gear keys out of shaft keyways.

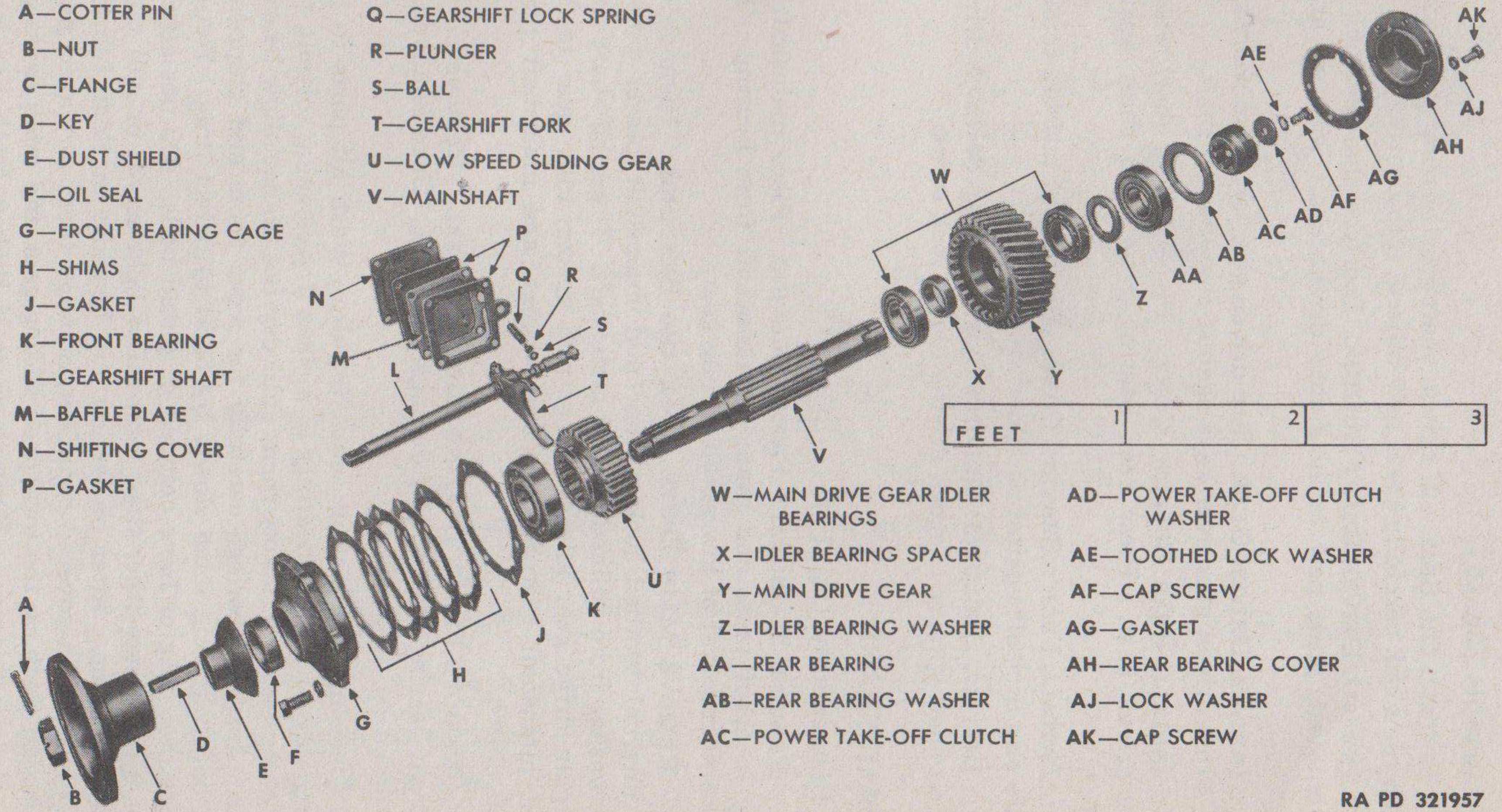
(4) REMOVE DECLUTCH DRIVING CLUTCH AND FRONT BEARING CONE. Remove declutch driving clutch lock screw. Press off declutch driving clutch and driven shaft front bearing cone.

(5) REMOVE DRIVEN SHAFT BUSHING. Remove bushing from driven shaft only if damaged or worn. (Removal renders bushing unfit for further use, necessitating installation of a new bushing when assembling the unit.)

(6) REMOVE OIL SEAL. Remove driven shaft rear bearing cap oil seal only if damaged.

b. Cleaning, Inspection, and Repair. Wash parts thoroughly in dry-cleaning solvent to remove all traces of old lubricant, using fresh dry-cleaning solvent for the bearings. Turn bearing rollers slowly while immersed in dry-cleaning solvent. Slush them up and down to remove loose particles of lubricant. After washing, dry bearings with compressed air, directing air stream across bearing in order not to spin unlubricated rollers. Inspect bearings for chipped or galled rollers and if found replace bearings. Examine bearing cups for scoring, nicks, and burs. If bearing rollers are worn, ridged, out-of-round, or cracked, replace with new bearings. Do not attempt repairs on bearings other than removal of light scores or burs. After inspection, oil bearings with clean lubricant and set aside in a clean, covered container. Examine driven shaft bushing for scoring, galling, burred or rough spots. If these conditions are found, making it necessary to replace the bushing, drive it out and install a new bushing, using an arbor press. Examine driven gear teeth for nicks, chipping, scoring, and galling. Replace gear if nicked or chipped teeth are found. Remove light burs and scores with a fine file or handstone. Inspect driven shaft splines for twisted or scored condition. If splines are twisted, or if shaft is scored or worn, install new shaft. Check declutch driving clutch for chipped or worn edges at point of contact with sliding clutch and replace if found. Examine lock screw threads and replace lock screw if threads are crossed or worn. Examine rear bearing cap oil seal before removal for flabbiness and bent or broken retainer. If seal does not appear to be worn, leave it in place for further use; otherwise replace it. Examine rear bearing cap, driven shaft flange, and flange dust cap for cracks or fractures. Use new parts if such defects are found.

A—COTTER PIN
B—NUT
C—FLANGE
D—KEY
E—DUST SHIELD
F—OIL SEAL
G—FRONT BEARING CAGE
H—SHIMS
J—GASKET
K—FRONT BEARING
L—GEARSHIFT SHAFT
M—BAFFLE PLATE
N—SHIFTING COVER
P—GASKET
Q—GEARSHIFT LOCK SPRING
R—PLUNGER
S—BALL
T—GEARSHIFT FORK
U—LOW SPEED SLIDING GEAR
V—MAINSHAFT



W—MAIN DRIVE GEAR IDLER BEARINGS
X—IDLER BEARING SPACER
Y—MAIN DRIVE GEAR
Z—IDLER BEARING WASHER
AA—REAR BEARING
AB—REAR BEARING WASHER
AC—POWER TAKE-OFF CLUTCH
AD—POWER TAKE-OFF CLUTCH WASHER
AE—TOOTHED LOCK WASHER
AF—CAP SCREW
AG—GASKET
AH—REAR BEARING COVER
AJ—LOCK WASHER
AK—CAP SCREW

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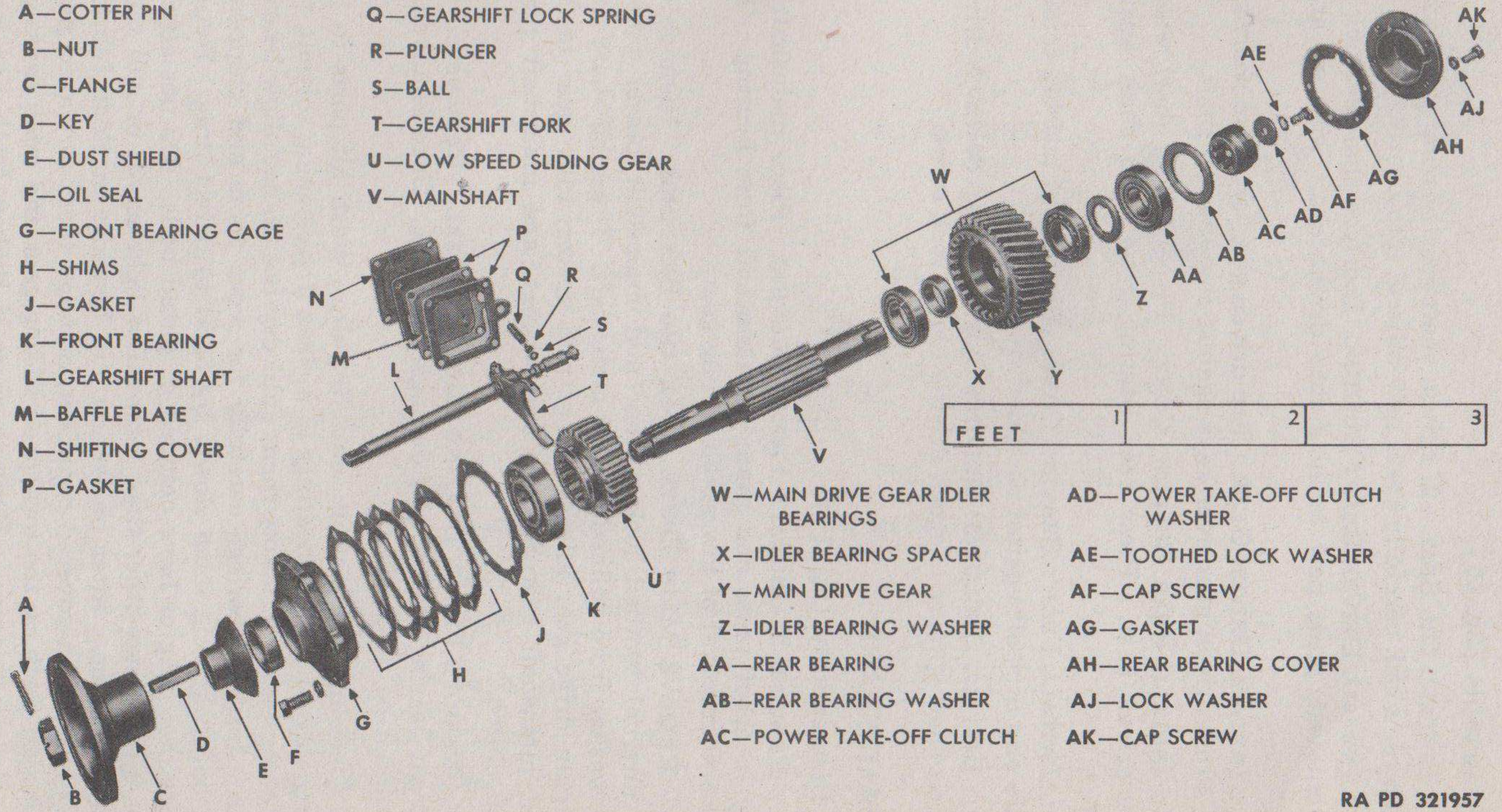
Figure 27 — Mainshaft Disassembled

A—COTTER PIN
B—NUT
C—FLANGE
D—KEY
E—DUST SHIELD
F—OIL SEAL
G—FRONT BEARING CAGE
H—SHIMS
J—GASKET
K—FRONT BEARING
L—GEARSHIFT SHAFT
M—BAFFLE PLATE
N—SHIFTING COVER
P—GASKET
Q—GEARSHIFT LOCK SPRING
R—PLUNGER
S—BALL
T—GEARSHIFT FORK
U—LOW SPEED SLIDING GEAR
V—MAINSHAFT



W—MAIN DRIVE GEAR IDLER BEARINGS
X—IDLER BEARING SPACER
Y—MAIN DRIVE GEAR
Z—IDLER BEARING WASHER
AA—REAR BEARING
AB—REAR BEARING WASHER
AC—POWER TAKE-OFF CLUTCH
AD—POWER TAKE-OFF CLUTCH WASHER
AE—TOOTHED LOCK WASHER
AF—CAP SCREW
AG—GASKET
AH—REAR BEARING COVER
AJ—LOCK WASHER
AK—CAP SCREW

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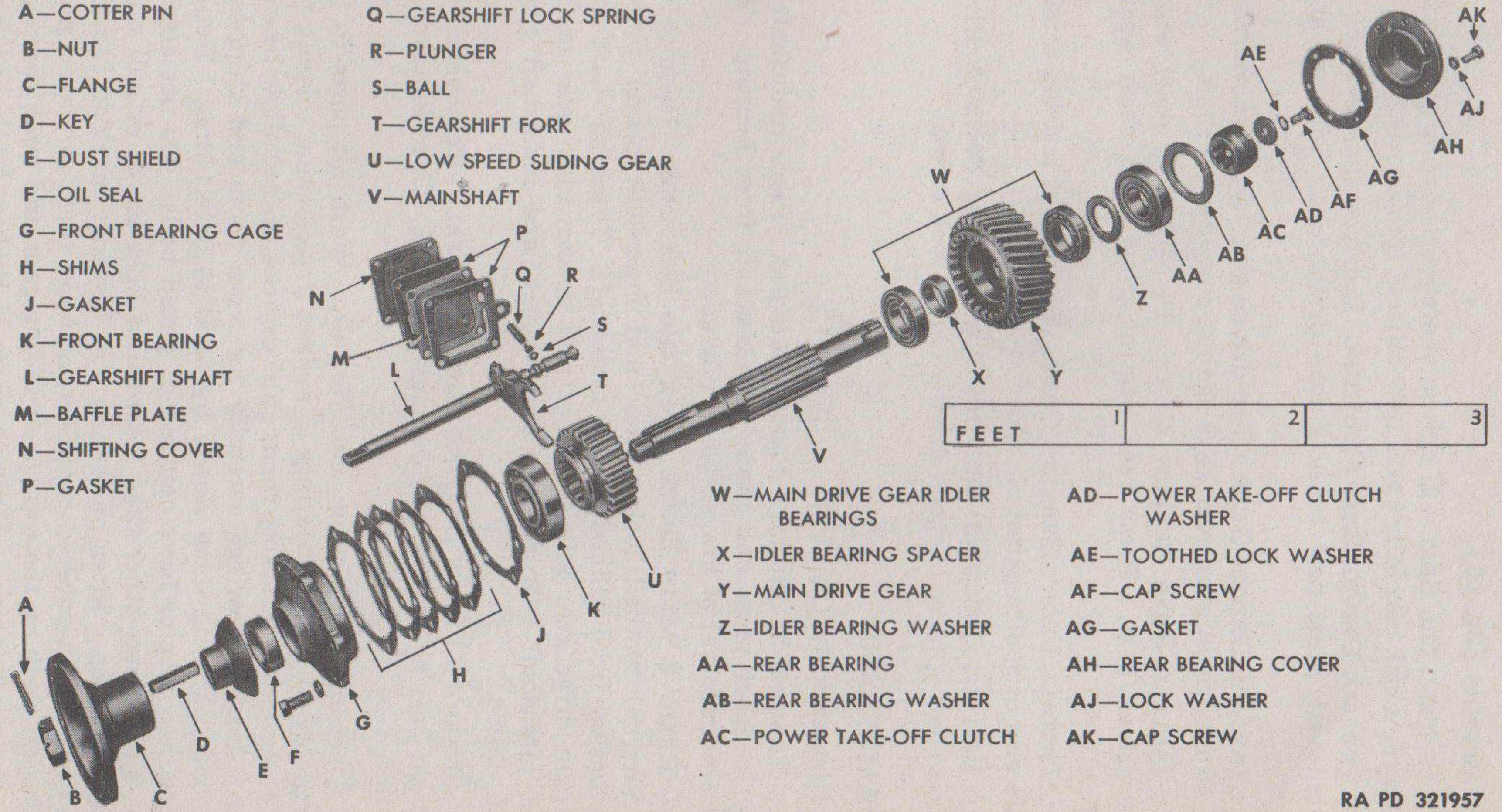
Figure 27 — Mainshaft Disassembled

A—COTTER PIN
B—NUT
C—FLANGE
D—KEY
E—DUST SHIELD
F—OIL SEAL
G—FRONT BEARING CAGE
H—SHIMS
J—GASKET
K—FRONT BEARING
L—GEARSHIFT SHAFT
M—BAFFLE PLATE
N—SHIFTING COVER
P—GASKET
Q—GEARSHIFT LOCK SPRING
R—PLUNGER
S—BALL
T—GEARSHIFT FORK
U—LOW SPEED SLIDING GEAR
V—MAINSHAFT



W—MAIN DRIVE GEAR IDLER BEARINGS
X—IDLER BEARING SPACER
Y—MAIN DRIVE GEAR
Z—IDLER BEARING WASHER
AA—REAR BEARING
AB—REAR BEARING WASHER
AC—POWER TAKE-OFF CLUTCH
AD—POWER TAKE-OFF CLUTCH WASHER
AE—TOOTHED LOCK WASHER
AF—CAP SCREW
AG—GASKET
AH—REAR BEARING COVER
AJ—LOCK WASHER
AK—CAP SCREW

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Figure 27 — Mainshaft Disassembled

c. Assembly (fig. 26).

(1) INSTALL OIL SEAL. If driven shaft rear bearing cap oil seal has been removed, carefully press new oil seal into bearing cap.

(2) INSTALL DRIVEN SHAFT BUSHING. If driven shaft bushing has been removed, press new bushing into driven shaft with an arbor press.

(3) INSTALL DRIVEN GEAR. Tap driven gear keys into shaft keyways. Press driven gear over keys against shoulder on shaft.

(4) INSTALL REAR BEARING CONE. Place driven shaft washer against driven gear. Press rear bearing cone onto shaft against washer.

(5) INSTALL FRONT BEARING CONE. Press front bearing cone on opposite end of shaft against shoulder.

(6) INSTALL DECLUTCH DRIVING CLUTCH. Tap declutch driving clutch on shaft splines. Install driving clutch lock screw.

41. MAINSHAFT.

a. Disassembly (fig. 27).

(1) REMOVE MAINSHAFT FRONT BEARING. Place mainshaft assembly in arbor press and press off mainshaft from bearing. This will permit removal of low speed sliding gear.

(2) REMOVE MAIN DRIVE GEAR AND BEARINGS. Remove cap screw internal toothed lock washer and mainshaft power take-off clutch washer from splined end of mainshaft. Press off main drive gear, main drive gear idler bearings and spacer, idler gear bearing washer, mainshaft rear bearing and washer, and mainshaft power take-off clutch.

(3) REMOVE FRONT BEARING CAGE OIL SEAL. Remove oil seal from front bearing cage only if damaged or worn. Once removed, oil seals cannot be used again.

b. Cleaning, Inspection, and Repair. Wash all parts in dry-cleaning solvent. Wash bearings in a clean dry-cleaning solvent, then direct compressed air across them until dry but do not allow bearings to spin. Inspect bearings carefully for worn spots and chipped or pitted balls, rotating them slowly by hand to detect drag. Replace bearings that drag or have chipped or pitted balls. Do not attempt repairs on bearings other than removal of light scores or gall marks with a handstone. After inspection, dip bearings in clean lubricant and set aside, in a covered container, or wrap them in waxed paper. Examine all teeth on the low-speed sliding gear and main drive gear for cracks or chipping. Replace gears if broken teeth are found.