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# TM 9-1817

WAR DEPARTMENT TECHNICAL MANUAL

K2-14

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

TM 9-1817

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Power Train, Chassis,  
and Body for 5- to 6-Ton  
Ponton Tractor Truck  
(Autocar Model U8144T)



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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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(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.

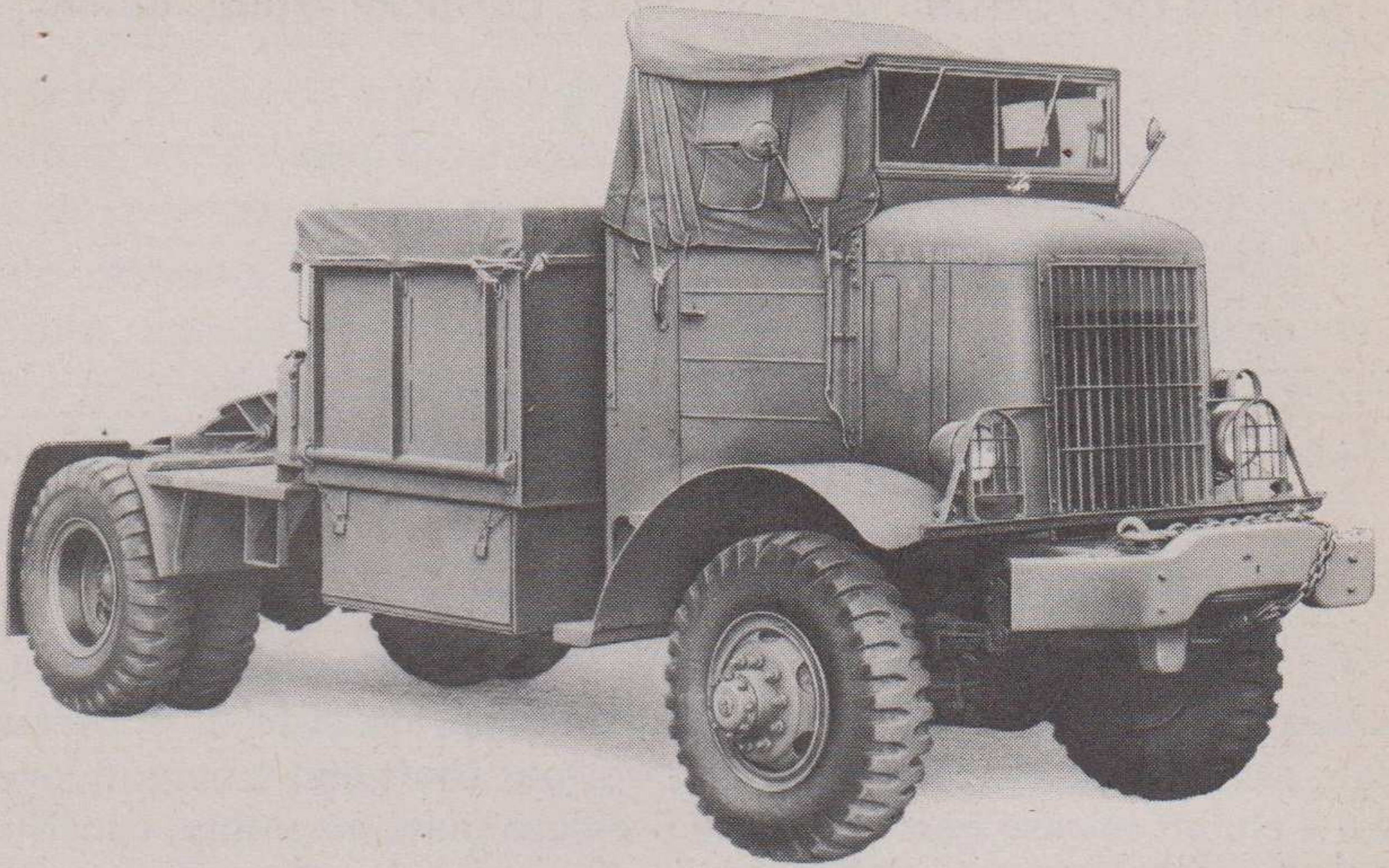
e. TM 9-1825B contains a description of, and procedures for disassembly, inspection, repair, and assembly of the cranking motor and generator used on this vehicle.

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.



**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)****CHAPTER 2****CLUTCH**

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**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 1 $\frac{1}{4}$  in. height..... 535 lb

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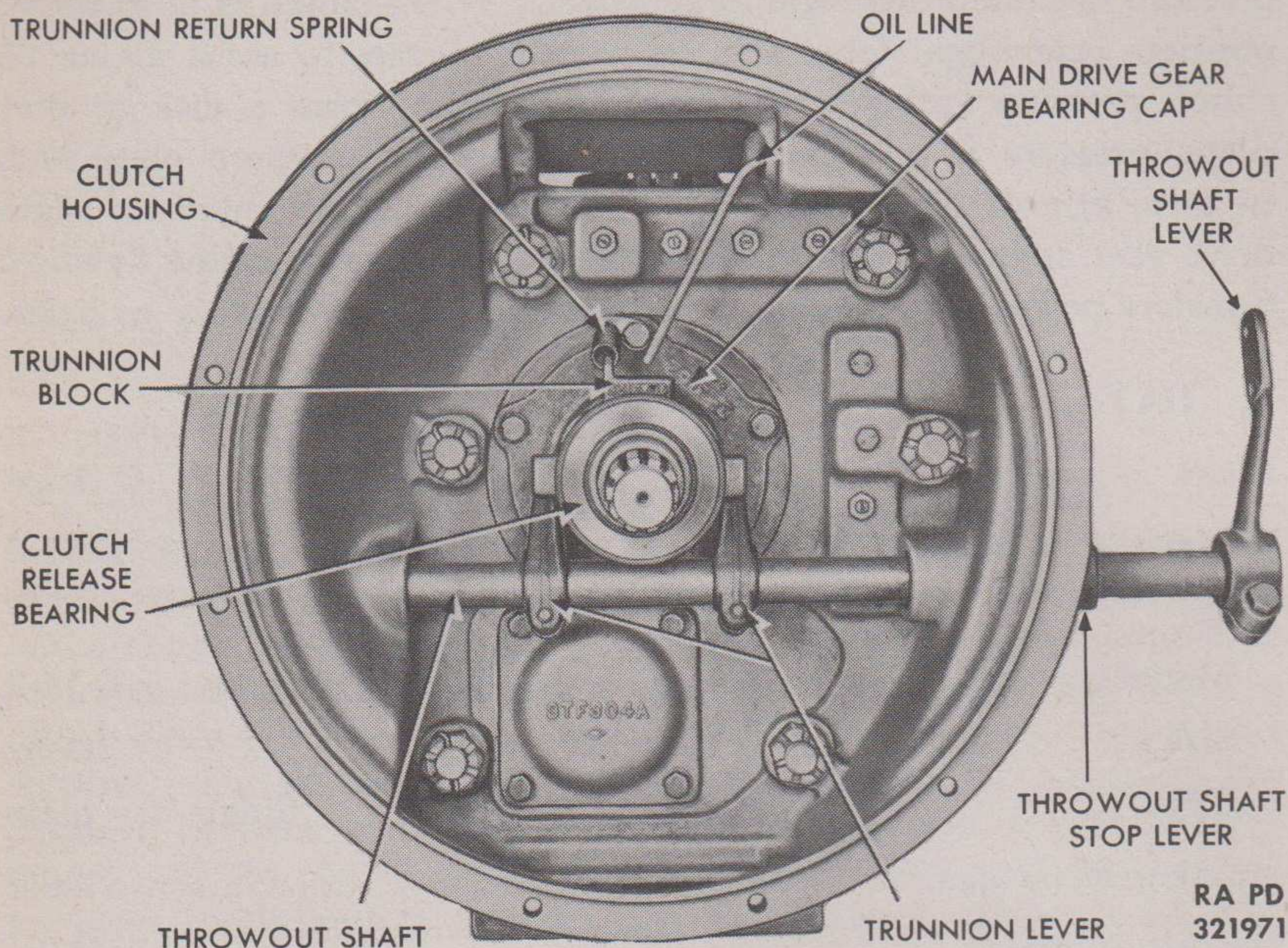
### Section II

## 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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5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)**



**Figure 2 — Clutch Housing Assembly**

**Section III**

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

**6. CLUTCH HOUSING.**

**a. Disassembly (fig. 3).**

(1) **REMOVE THROUOUT 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 THROUOUT 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 THROUOUT SHAFT BUSHINGS.** Tap bushings out of clutch housing.

## CLUTCH

(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 burrs, 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.**

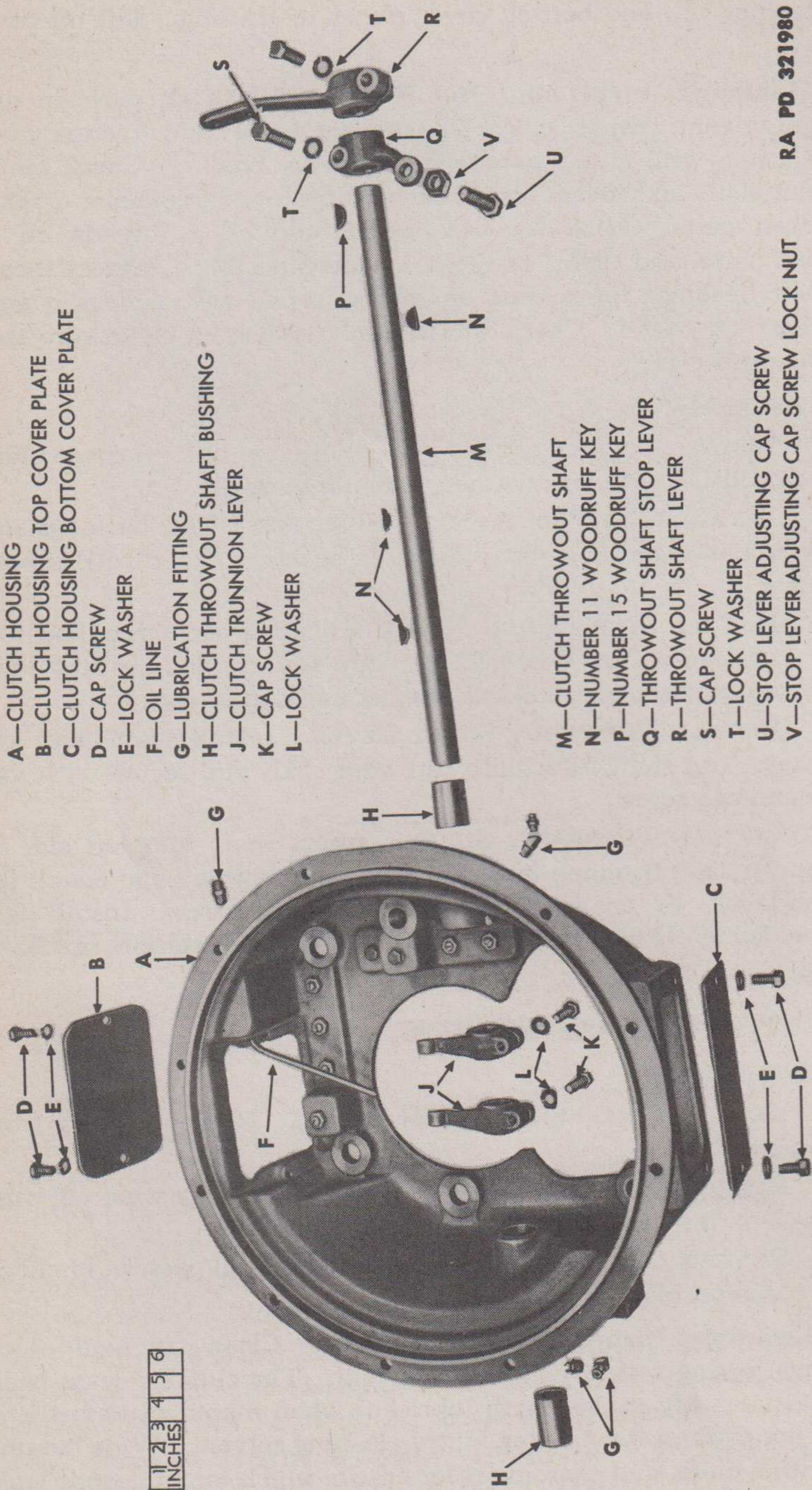
(1) **REMOVE TRUNNION RETURN SPRING.** Remove spring from trunnion block.

(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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5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)**



**Figure 3 — Clutch Housing Disassembled**

## CLUTCH

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.

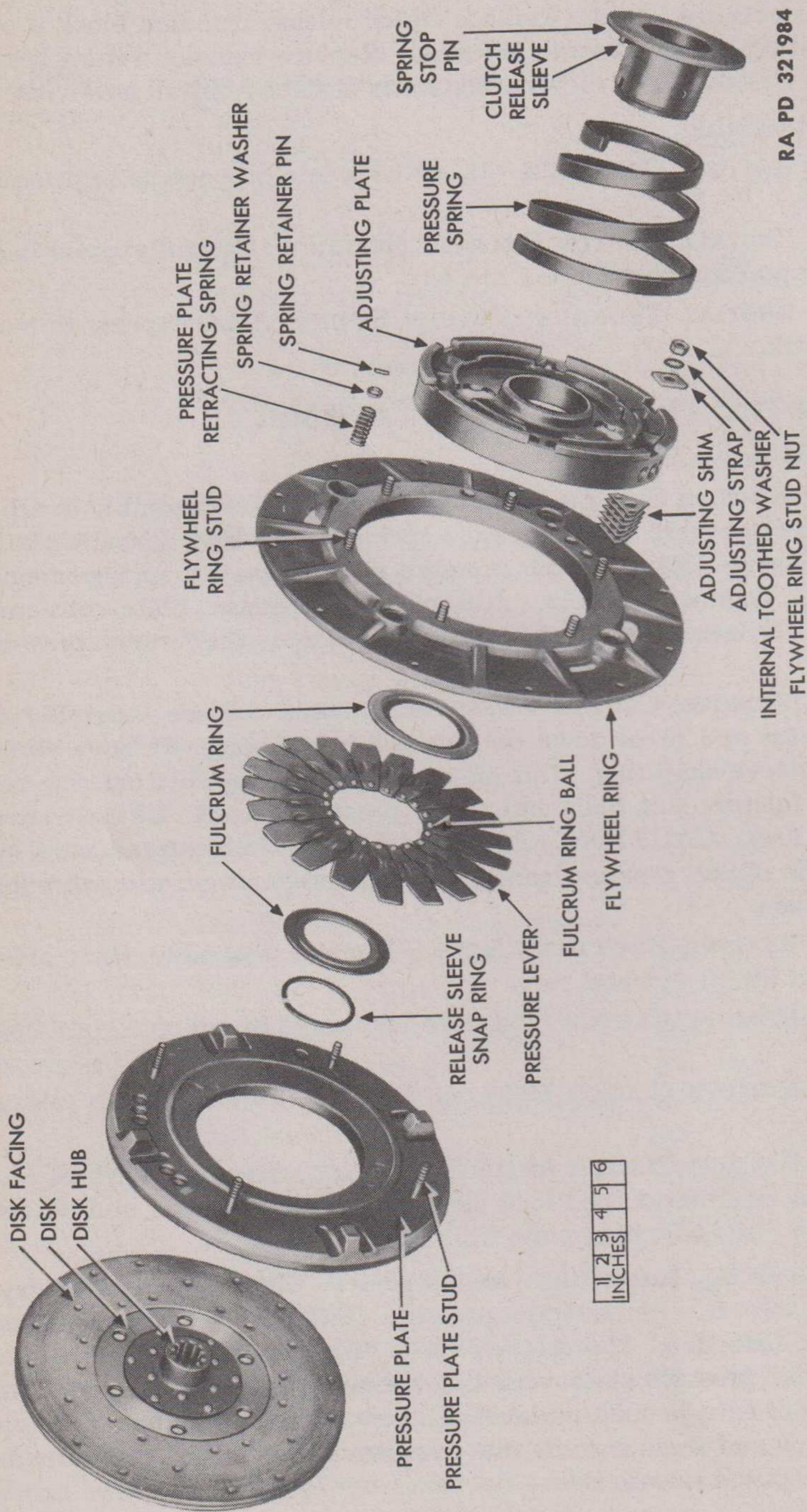
(4) **REMOVE CLUTCH PRESSURE SPRING.** Lift out clutch pressure spring.

(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

## CLUTCH

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.*



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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.

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### 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  $1\frac{1}{2}$  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  $1\frac{1}{8}$  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  $1\frac{1}{8}$  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

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

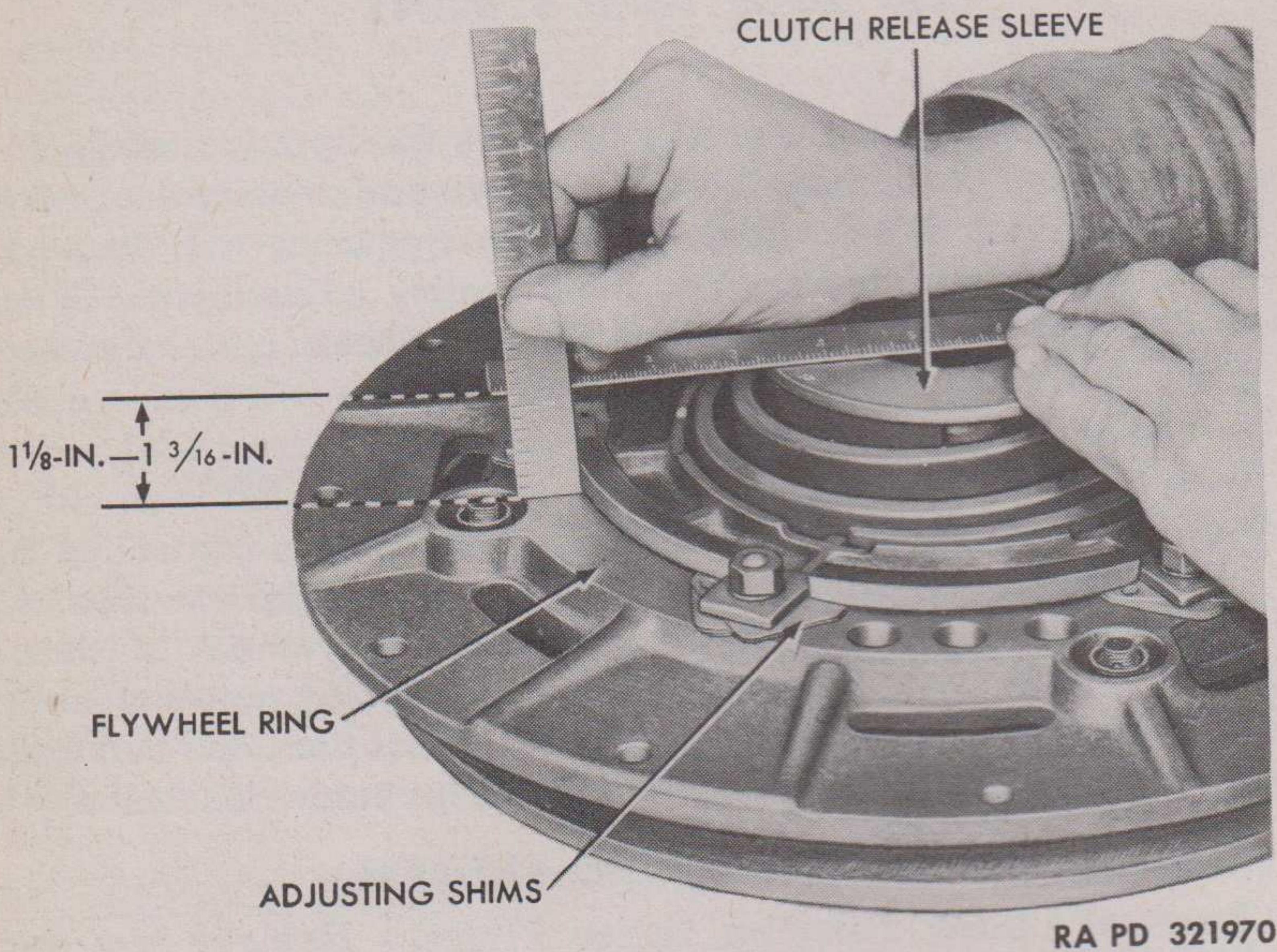


Figure 5 — Clutch Adjustment

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.
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## CHAPTER 3

# TRANSMISSION

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### 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.

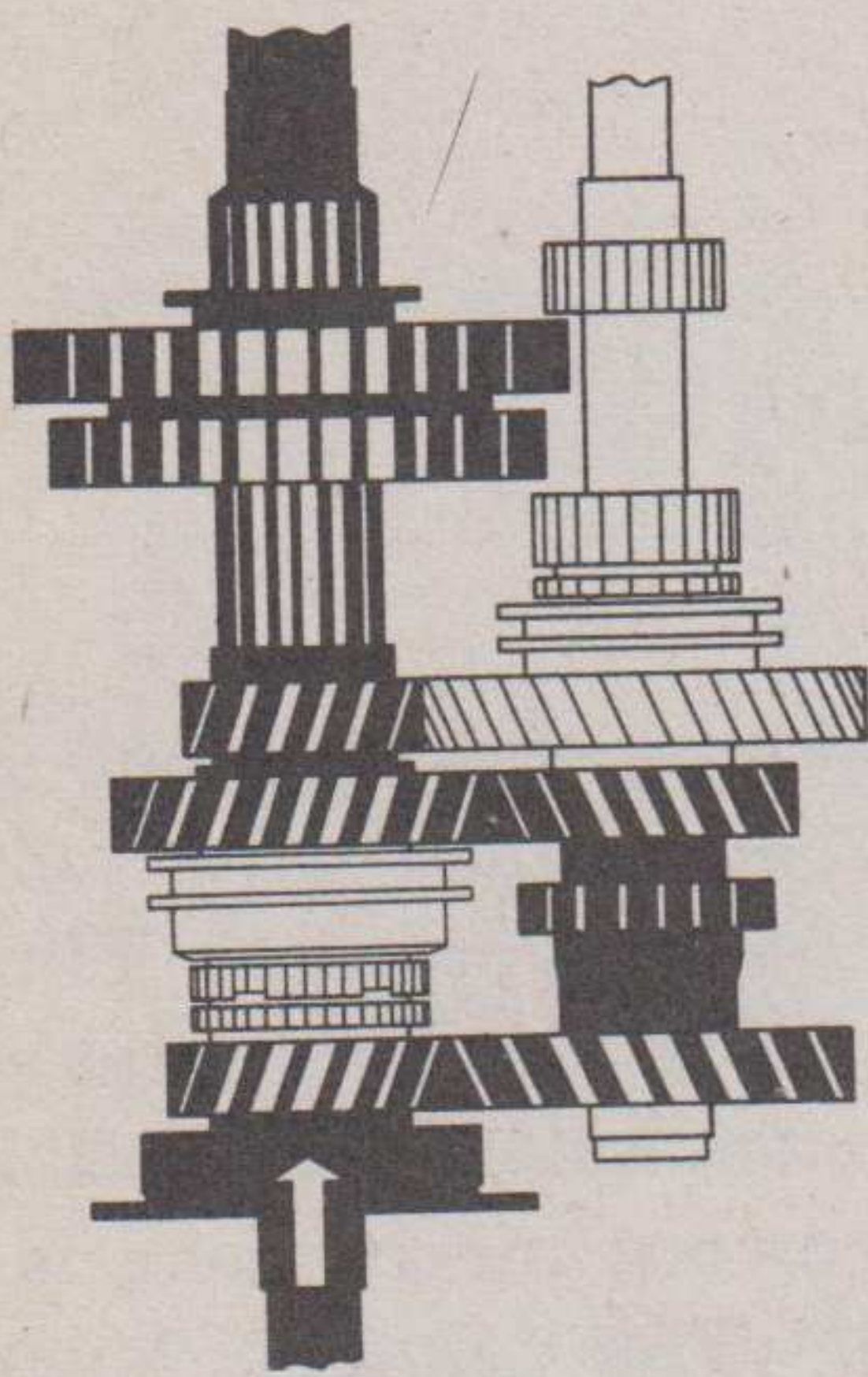
b. **Operation.** Engine power is transmitted through the clutch to the main drive gear. Power flow through transmission in various gear speeds follows: **NOTE:** *All key letters in this subparagraph refer to figure 6.*

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

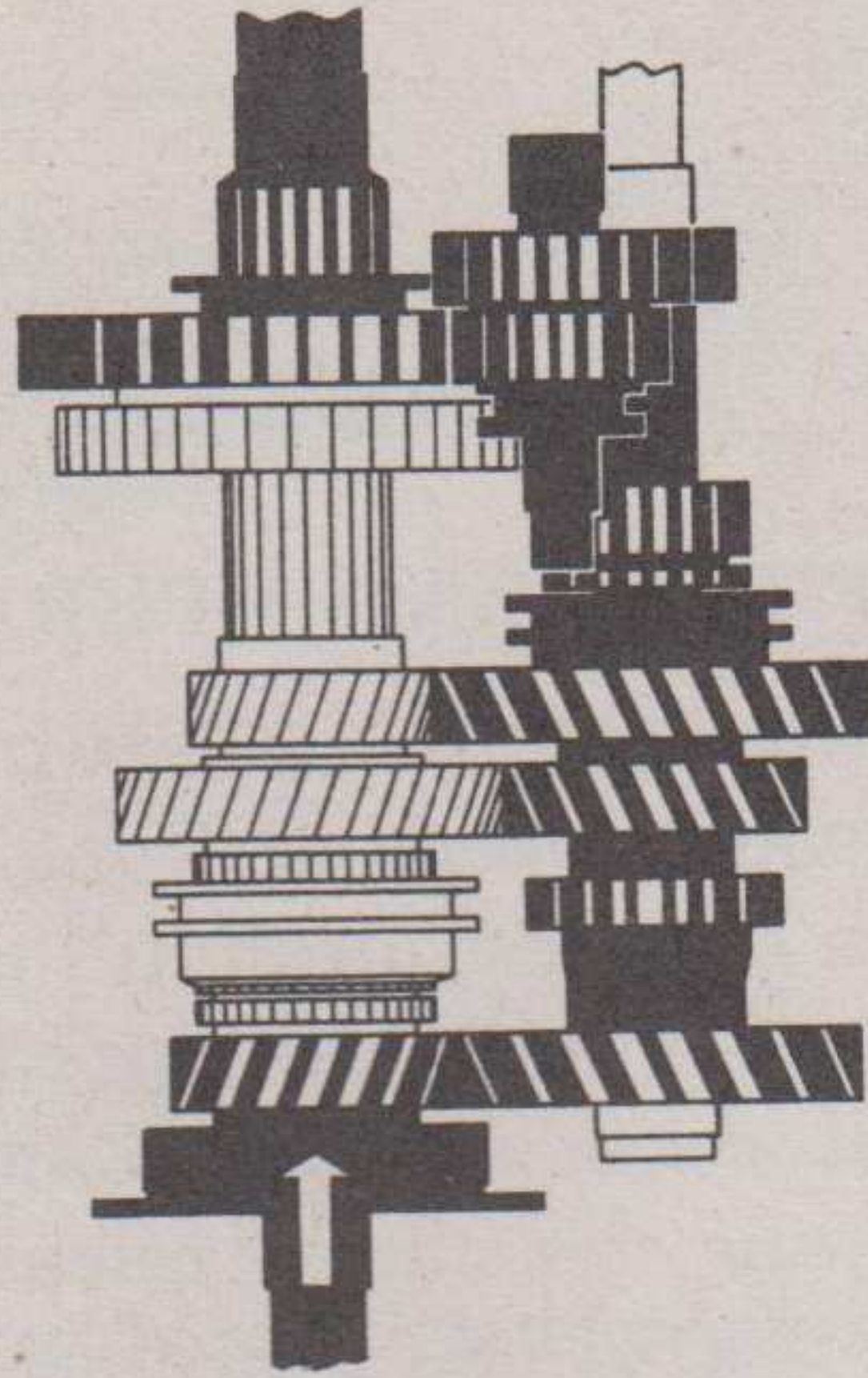
(2) **SECOND SPEED (B).** Main drive gear to countershaft drive gear, through countershaft, up to second speed slide gear on mainshaft, and out.

(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

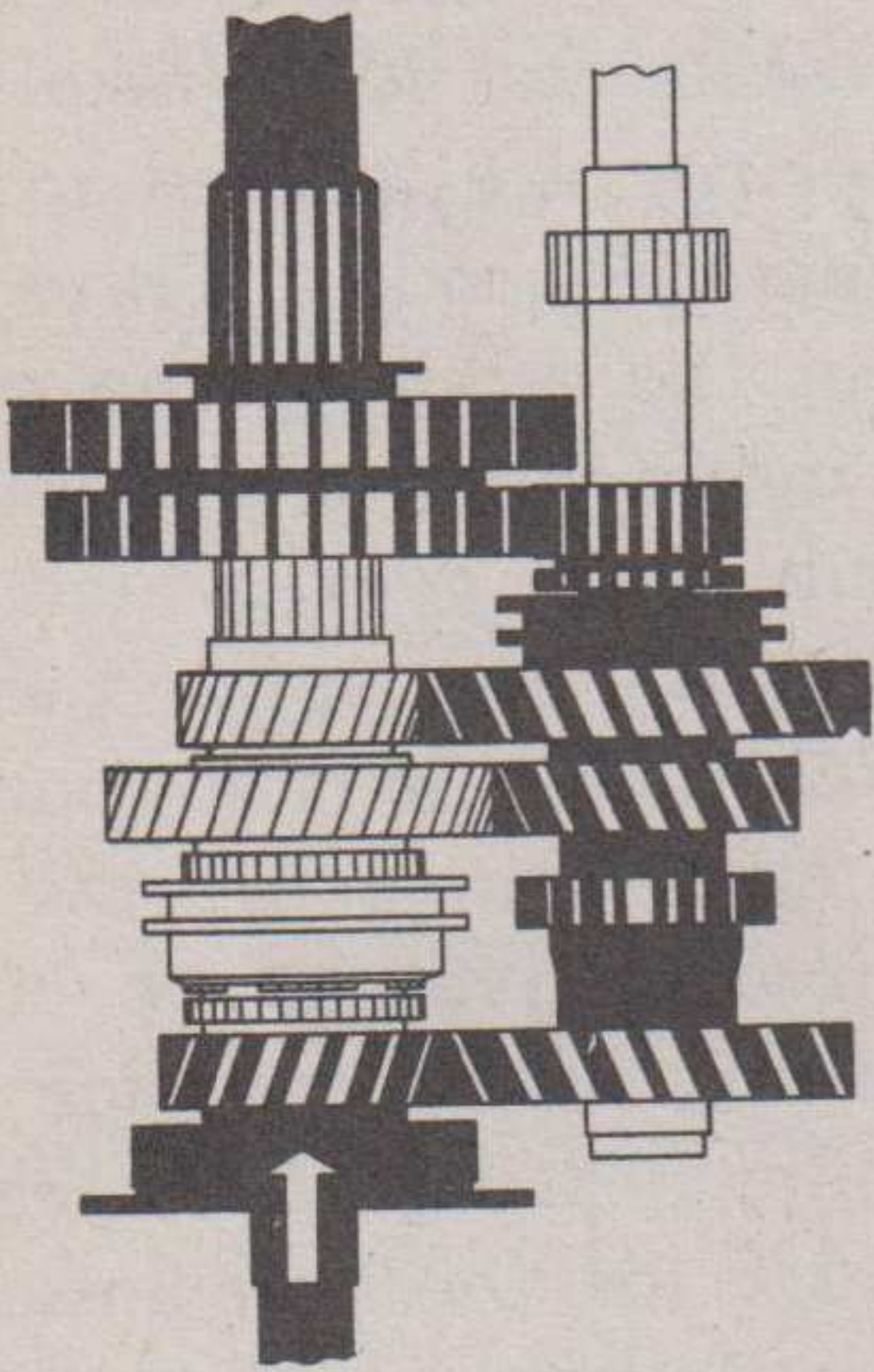
ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)



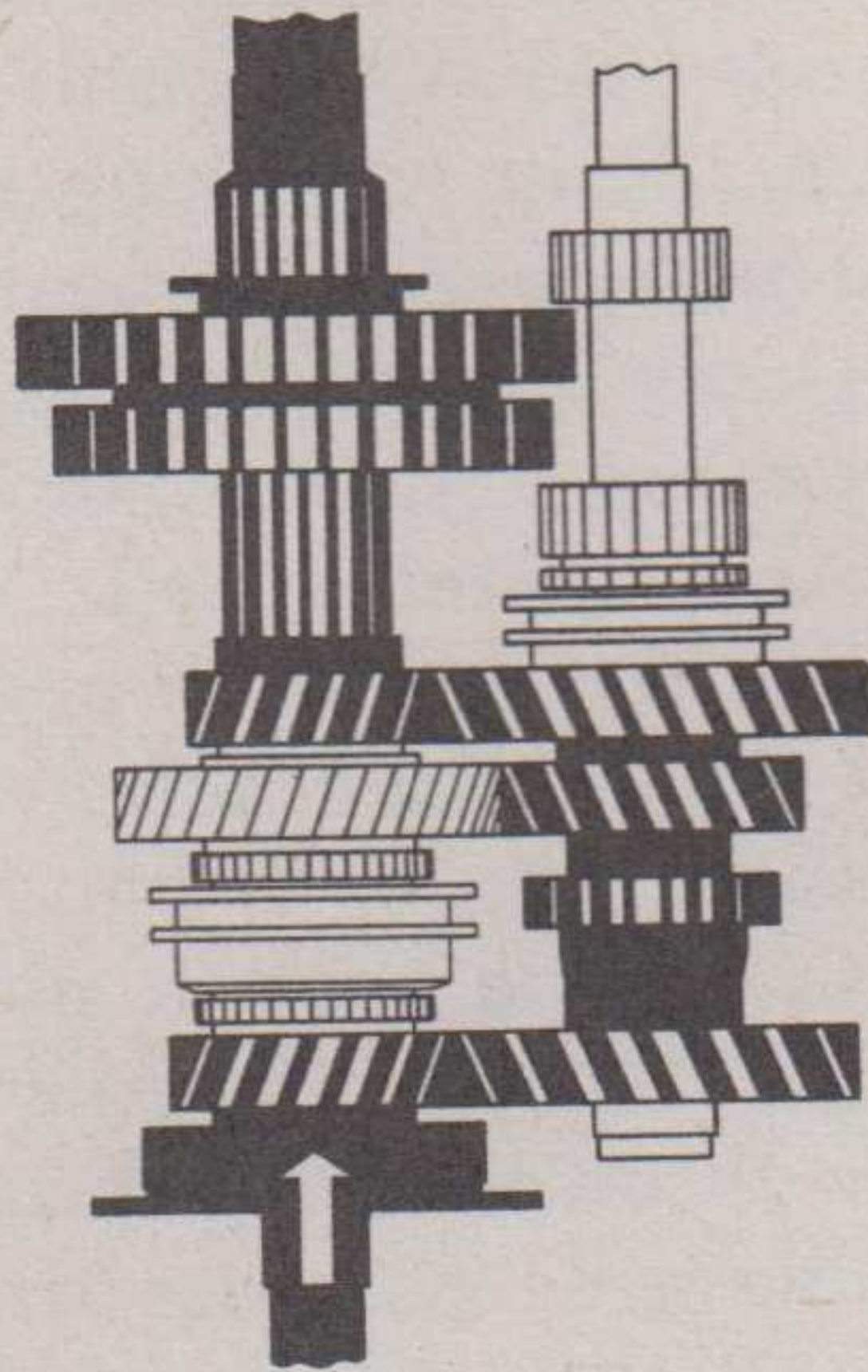
C — THIRD SPEED



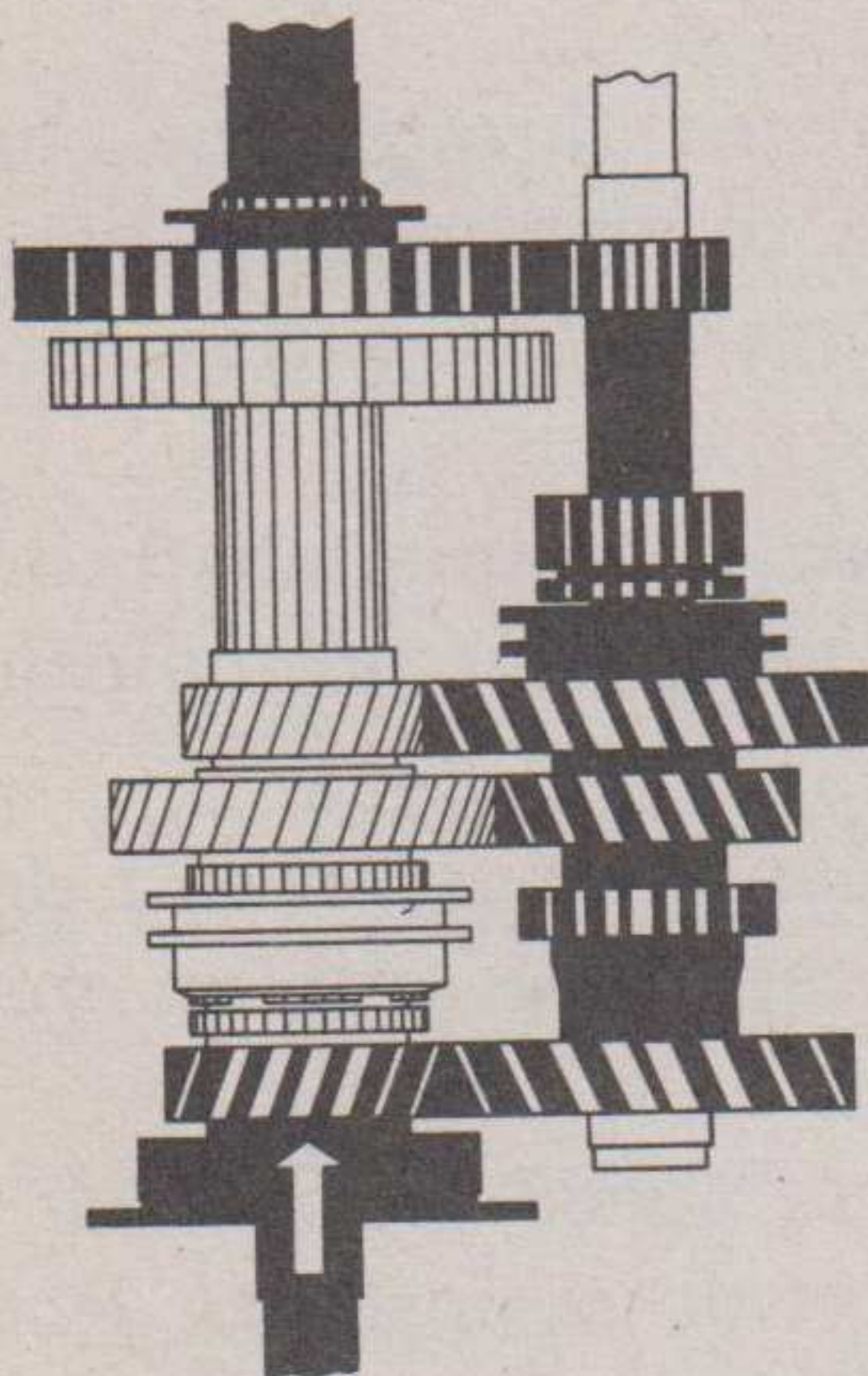
F — REVERSE



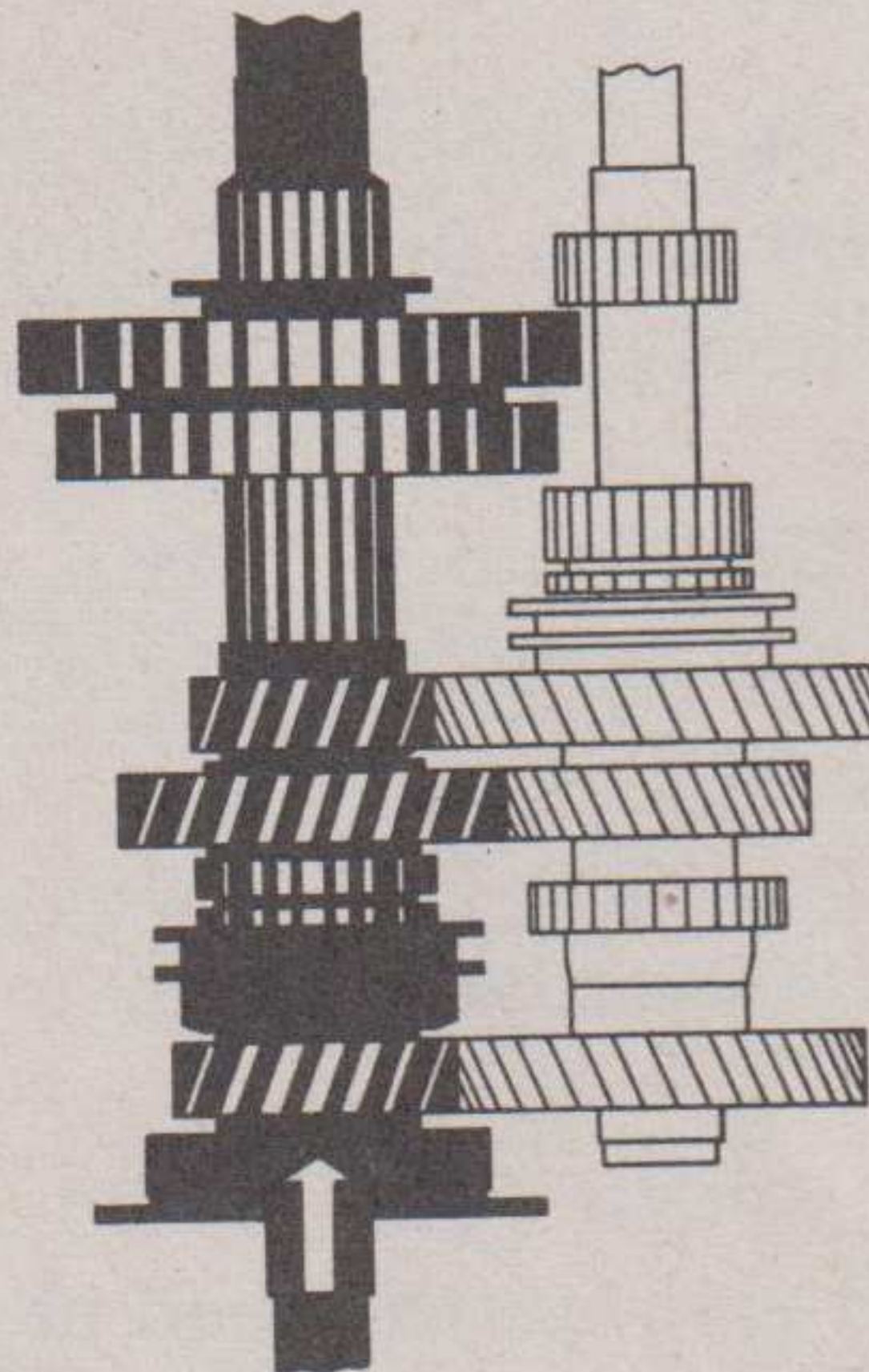
B — SECOND SPEED



E — OVERDRIVE



A — FIRST SPEED



D — FOURTH SPEED

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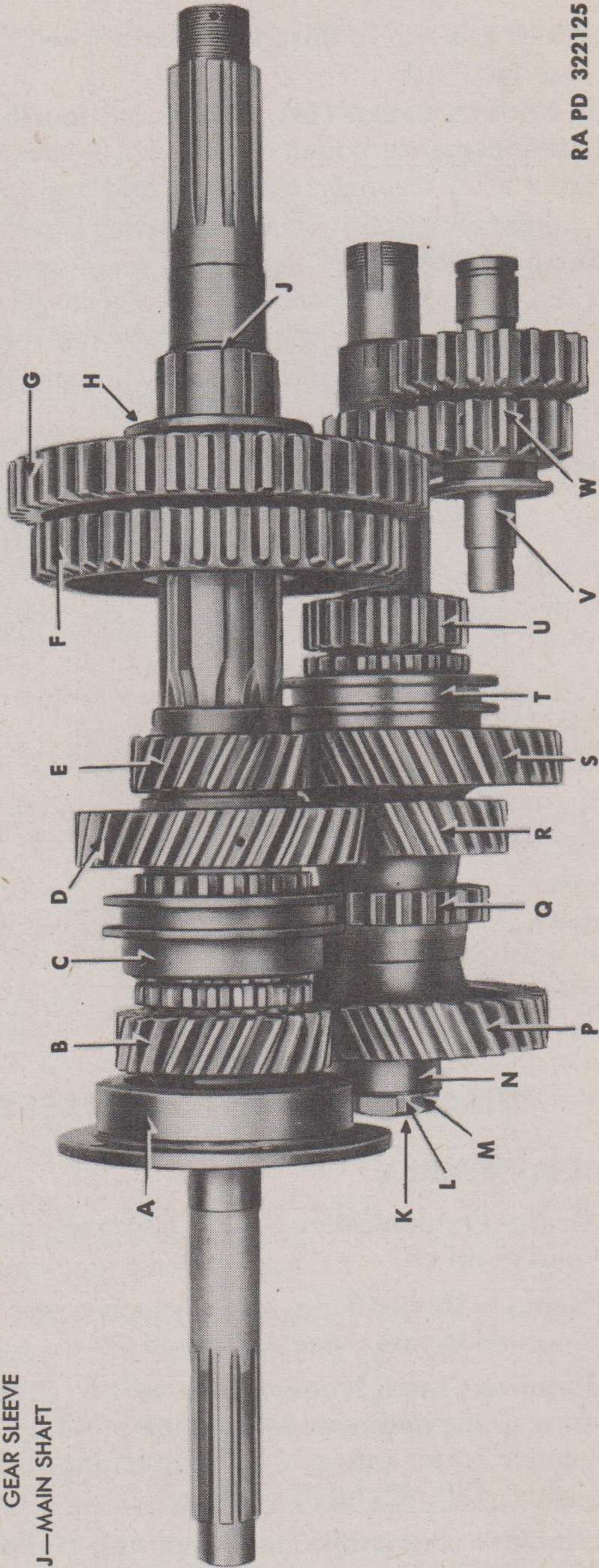
Figure 6 — Transmission Power Flow

TRANSMISSION

- R—THIRD SPEED COUNTERSHAFT GEAR
- S—OVERDRIVE COUNTERSHAFT GEAR
- T—OVERDRIVE COUNTERSHAFT GEAR CLUTCH RING
- U—COUNTERSHAFT
- V—REVERSE GEAR SHAFT
- W—REVERSE GEAR

- 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

- 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



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Figure 7 — Transmission Gears and Shafts

**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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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

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**Section II**

**DISASSEMBLY INTO SUBASSEMBLIES**

**18. DISASSEMBLY.**

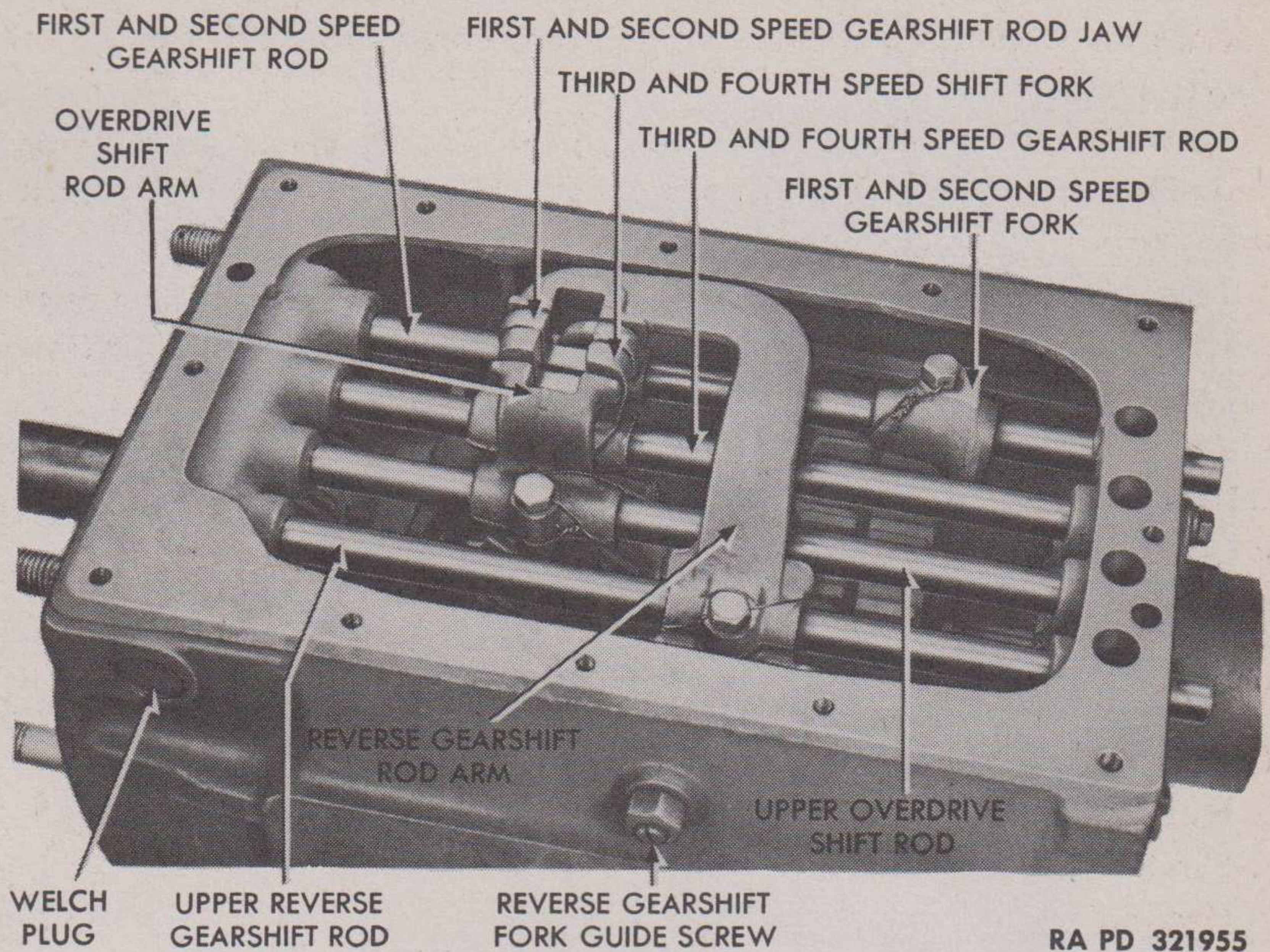
a. **Drain Transmission Case.** Remove drain plug from bottom of case and drain oil.

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



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

- 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

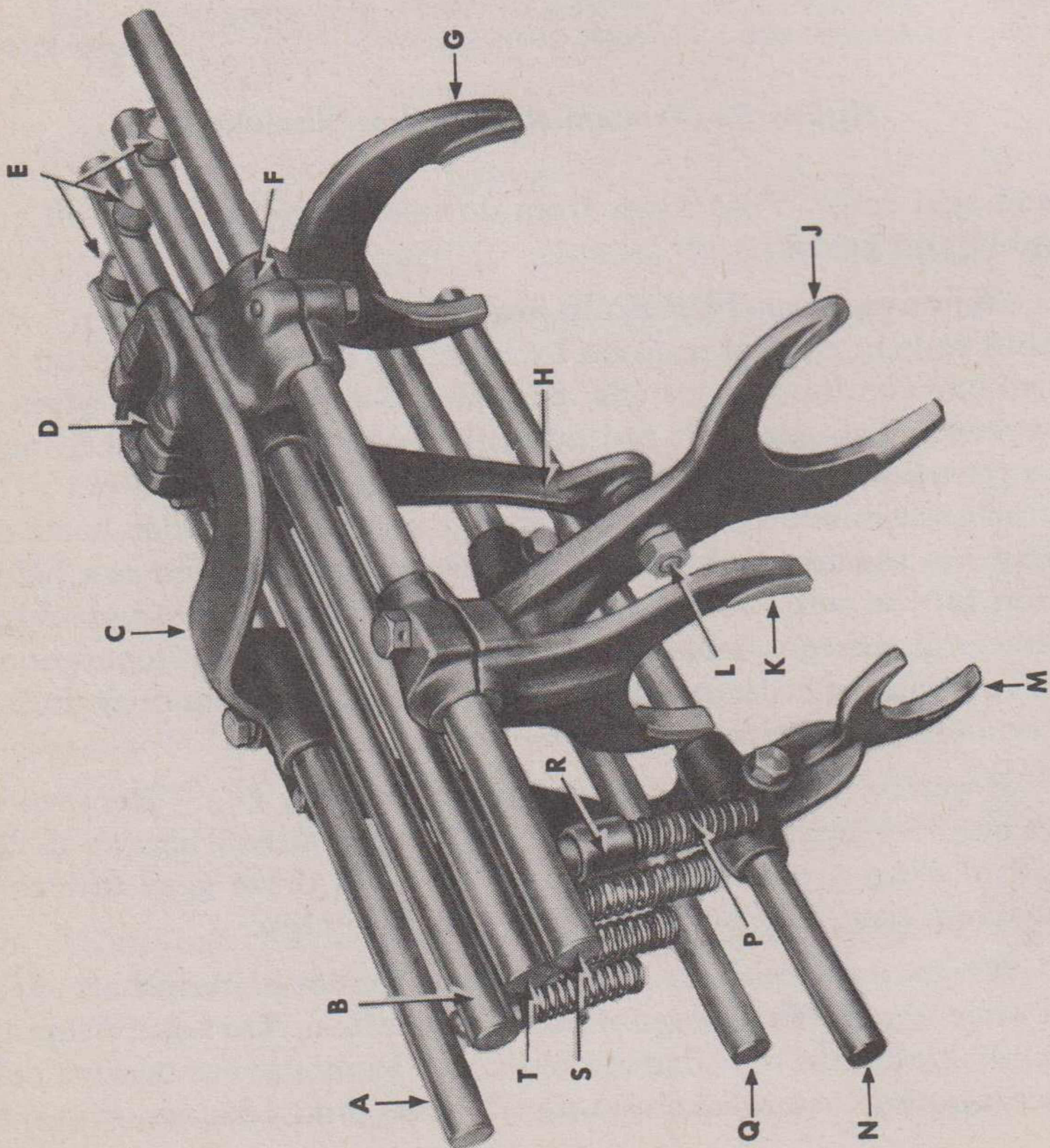
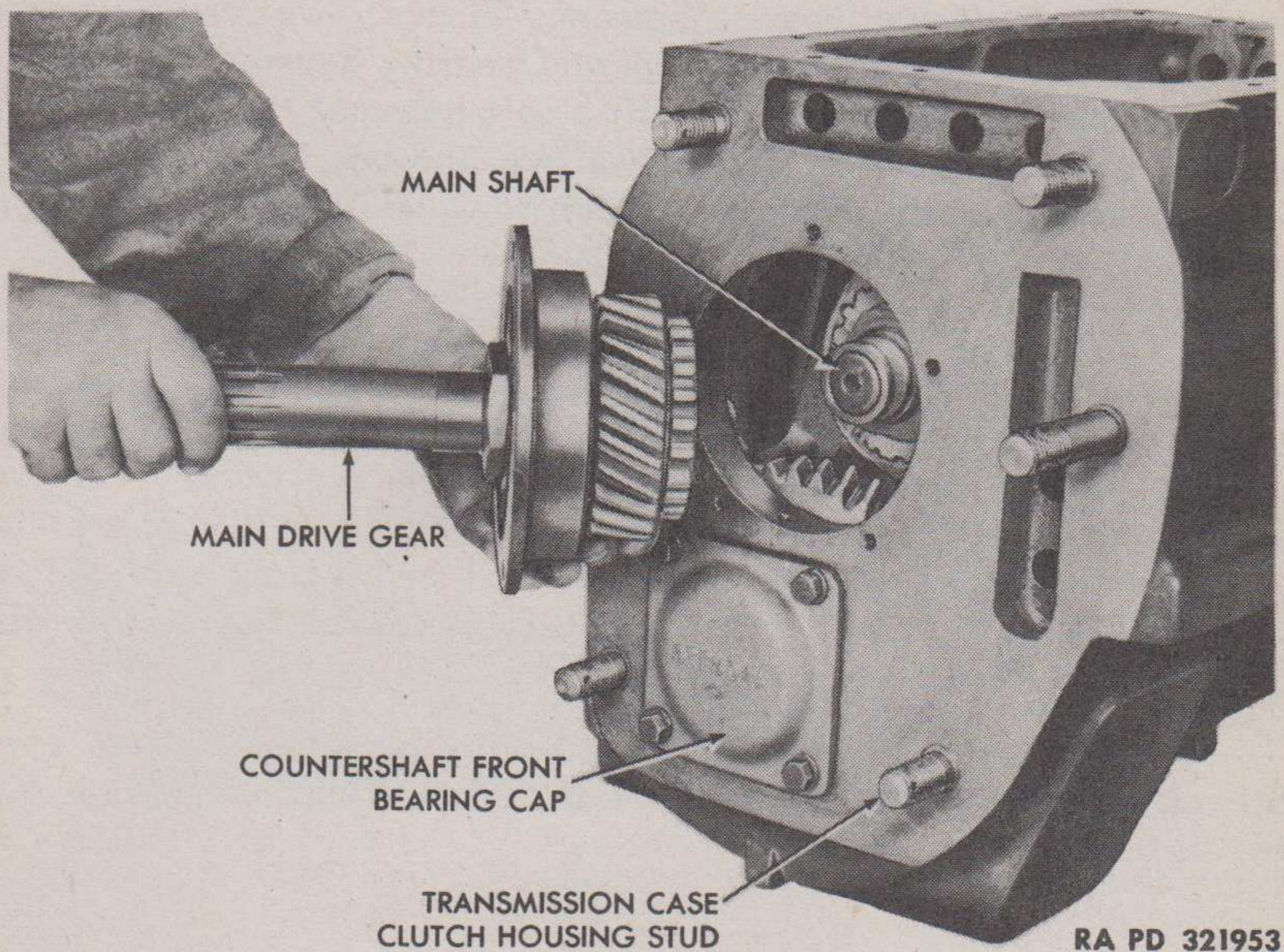


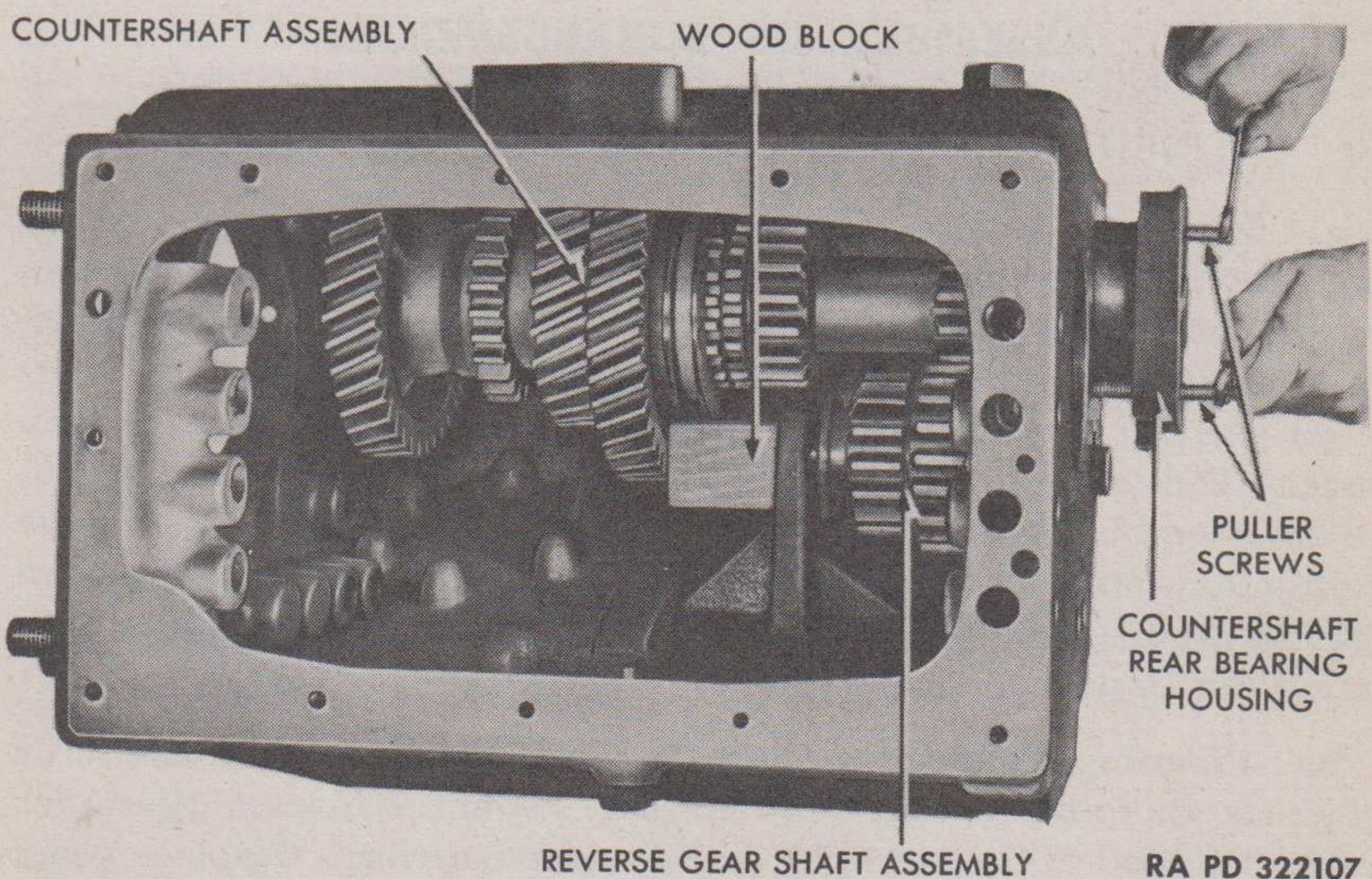
Figure 9 — Transmission Gearshift Rods and Arms

### TRANSMISSION



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**Figure 10 – Removing Main Drive Gear**



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**Figure 11 – Removing Countershaft Rear Bearing Housing**

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

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 half-way 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.

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**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 over-speed 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

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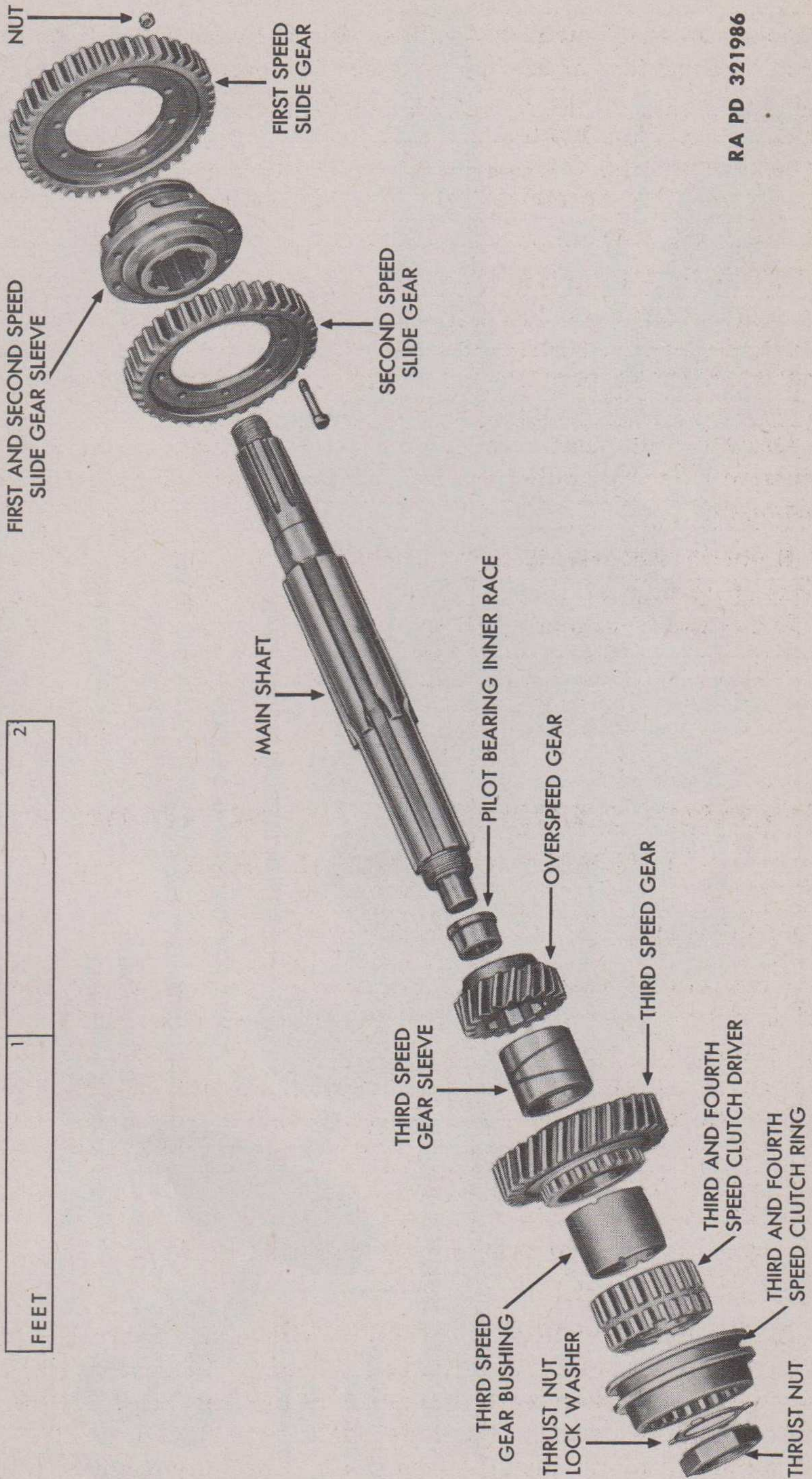


Figure 12 — Mainshaft Disassembled

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

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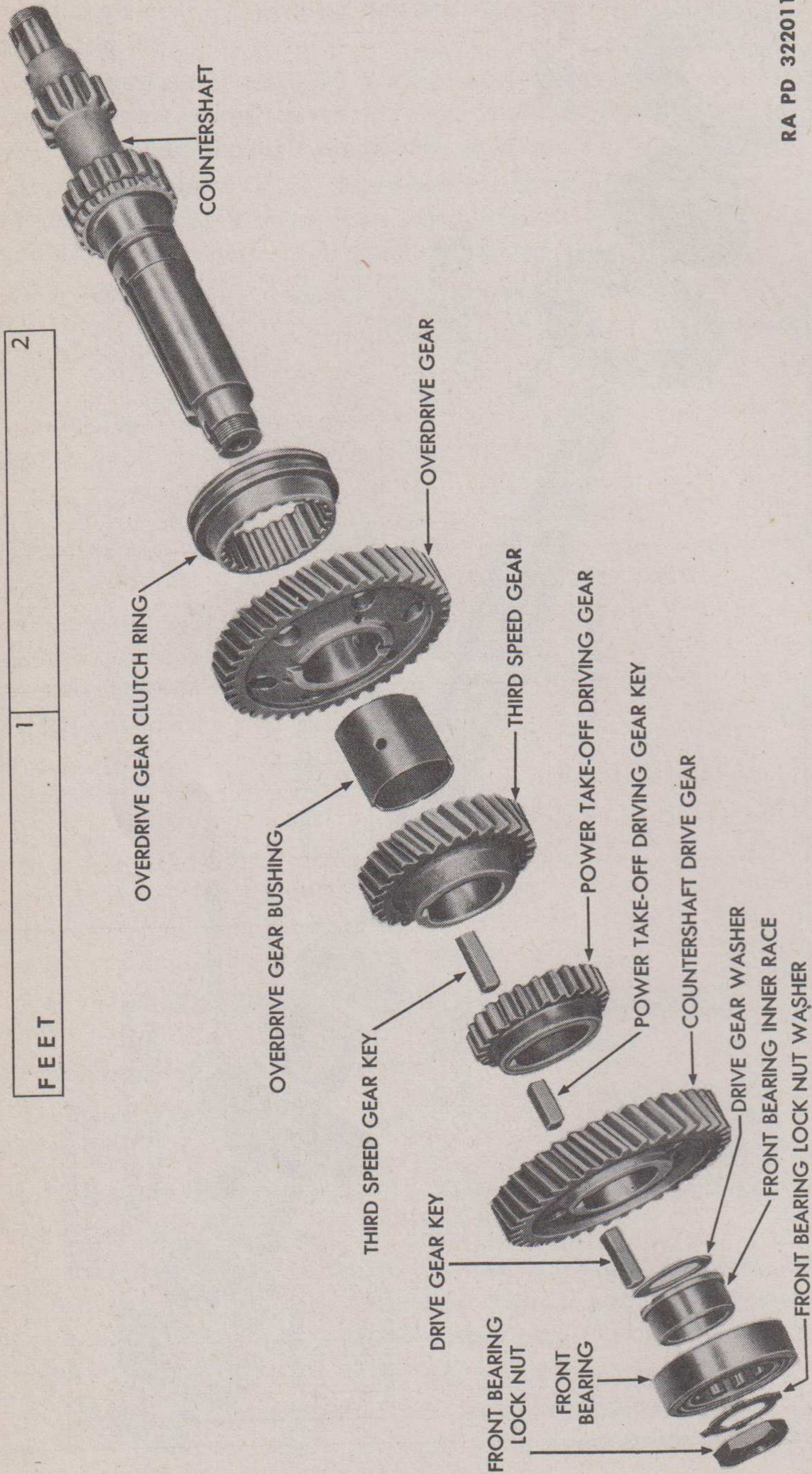


Figure 13 — Countershaft Disassembled

## TRANSMISSION

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 burrs 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 burrs 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 burrs 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.

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

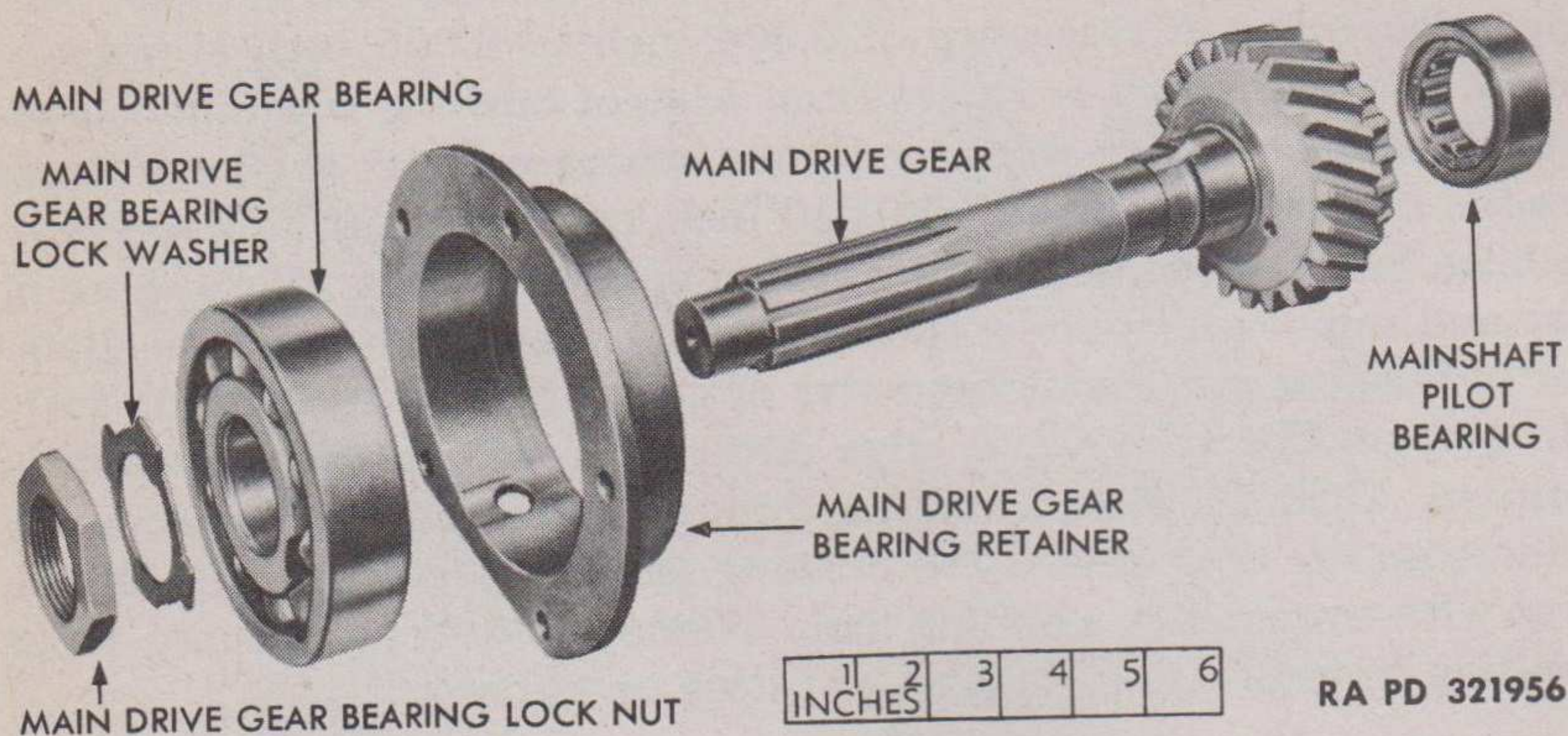


Figure 14 — Main Drive Gear Disassembled

## 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.

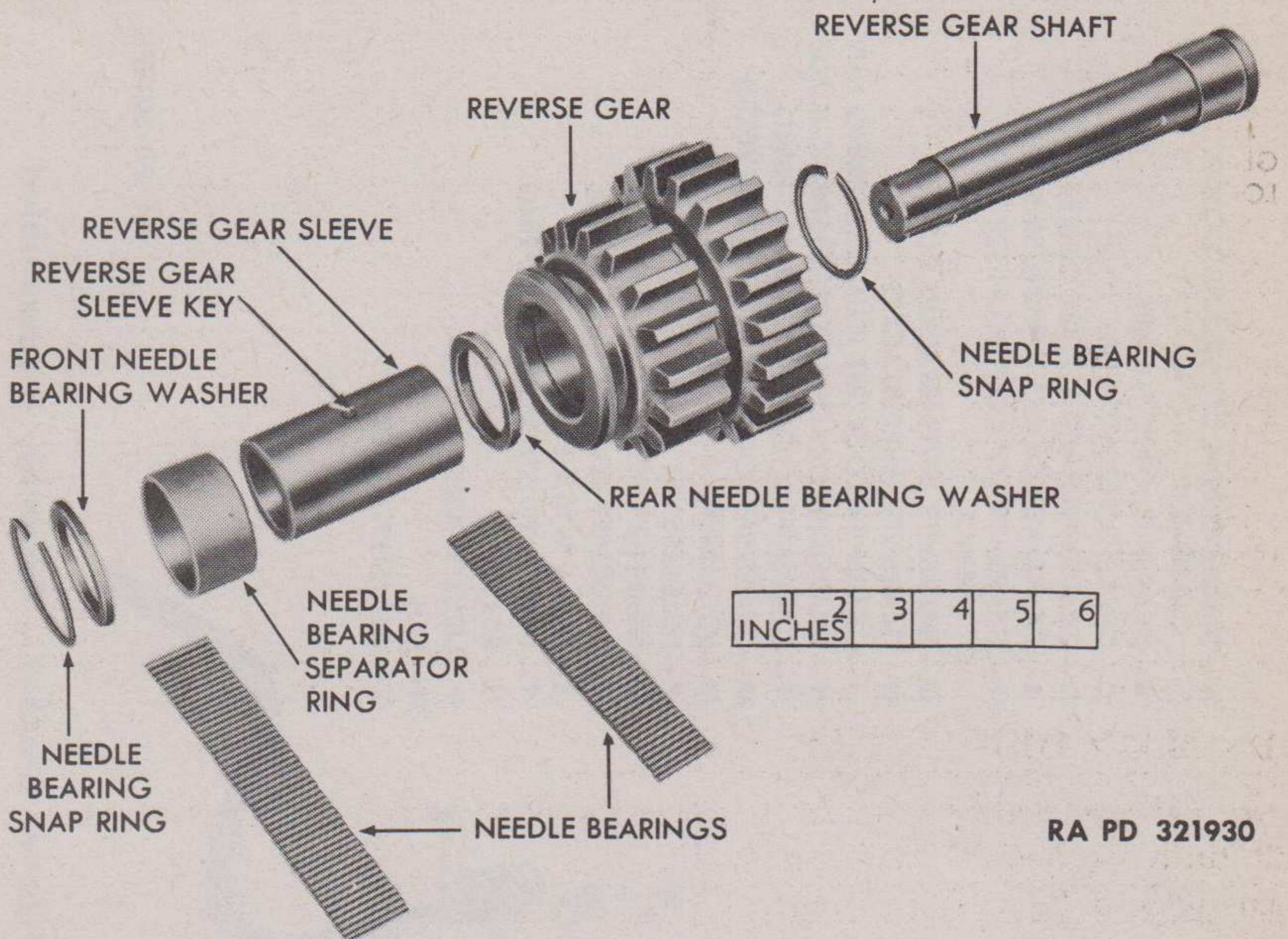
b. **Cleaning, Inspection, and Repair.** Wash all parts in dry-cleaning solvent. Immerse bearings in dry-cleaning solvent in which no other parts have been previously cleaned, keeping them in dry-cleaning solvent long enough to dissolve heavy particles of coagulated lubricant. Rotate bearings while holding 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



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**Figure 15 – Reverse Gear Disassembled**

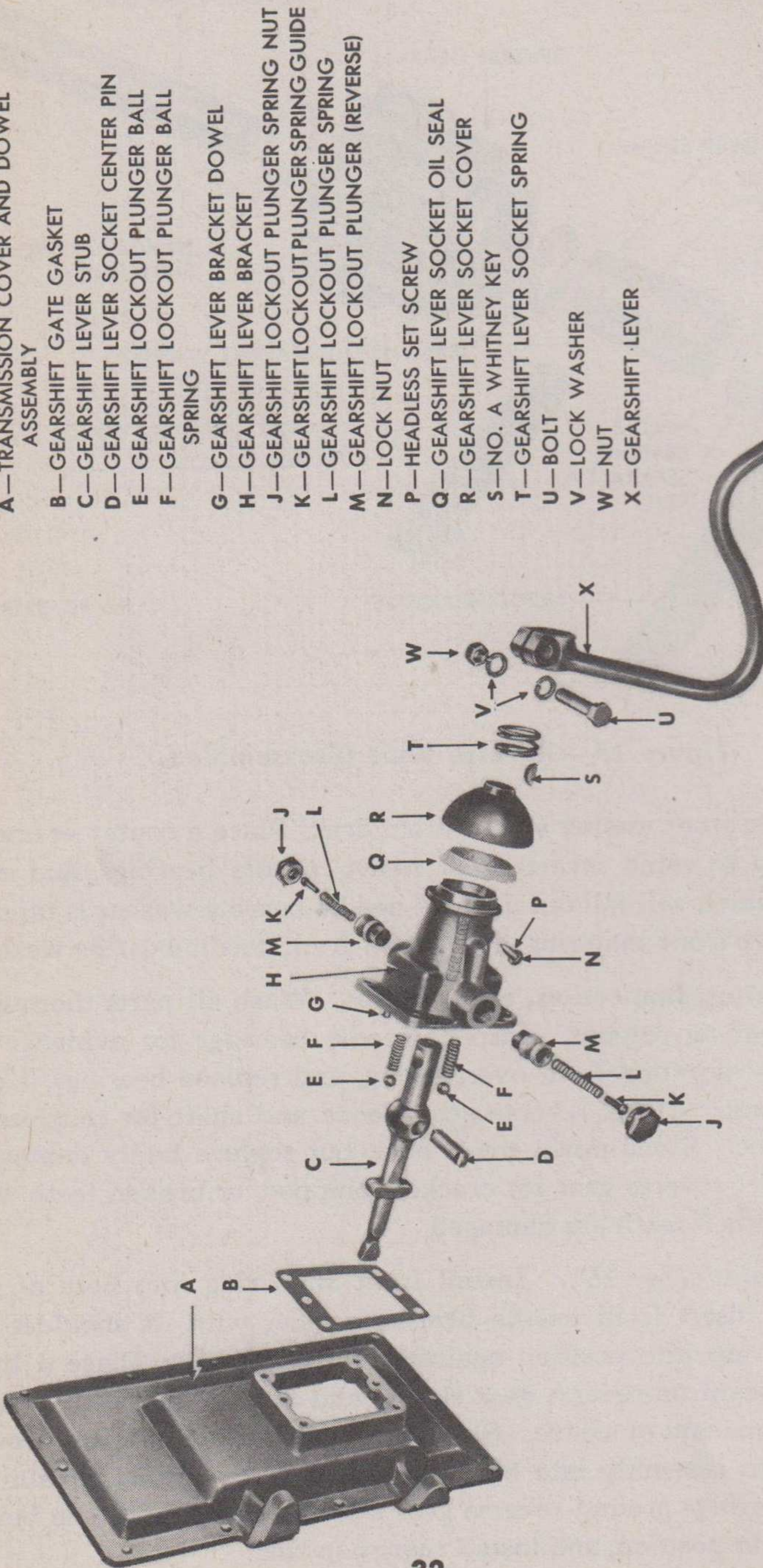
by tapping on front washer with a brass drift. Place a container under the assembly to catch reverse gear sleeve, needle bearings, and separator ring which will fall out as front needle bearing washer is tapped free. Remove front snap ring, and tap off front needle bearing washer.

**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.



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



- 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

RA PD 321978

FEET 1 2

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

## TRANSMISSION

### 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.

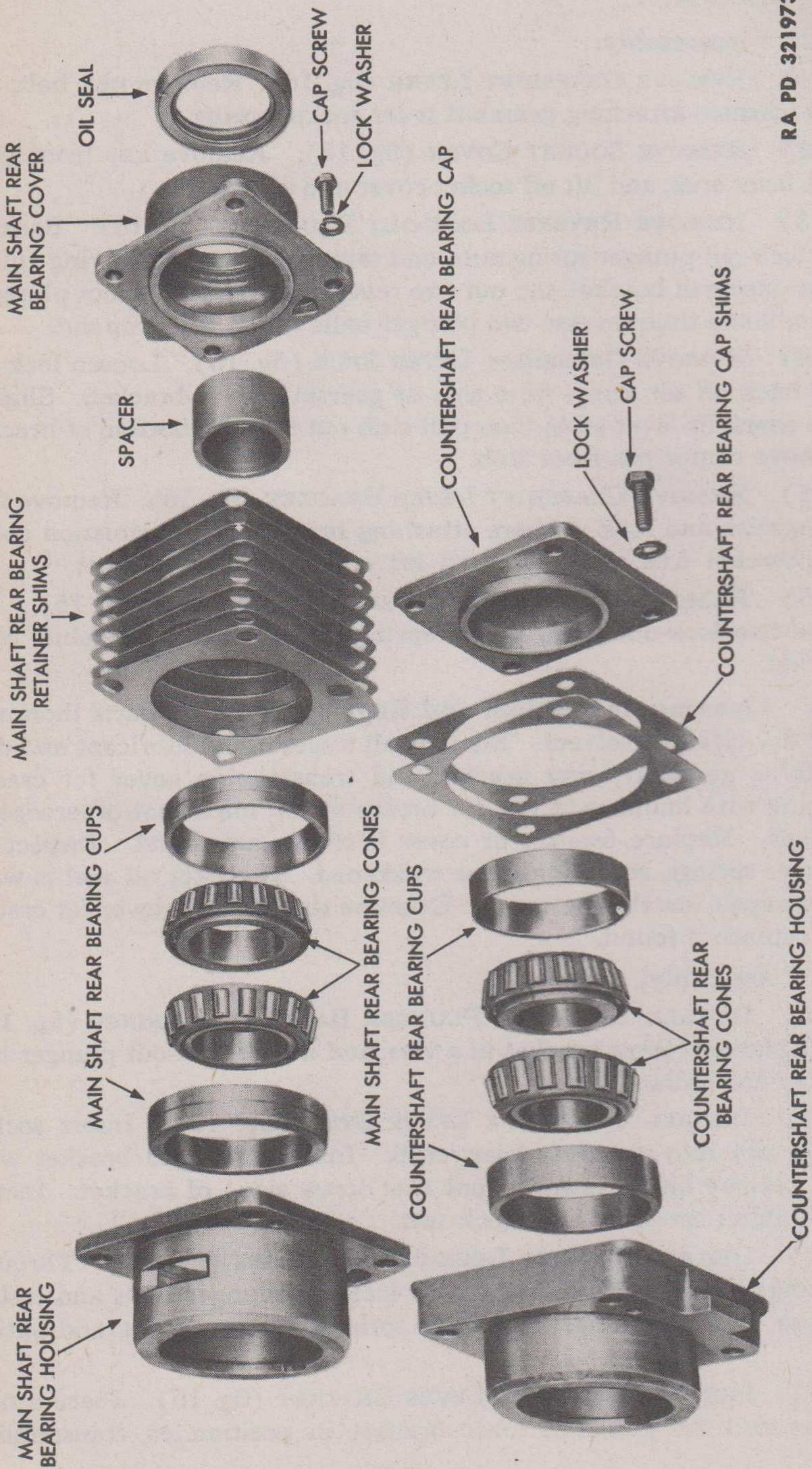
(1) INSTALL LOCK-OUT PLUNGER BALLS AND SPRINGS (fig. 16). Hold gearshift lever bracket in a vise, and install lock-out plunger ball springs and balls.

(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

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



RA PD 321973

Figure 17 — Mainshaft and Countershaft Rear Bearing Disassembled

## TRANSMISSION

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

**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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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.

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**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-

## TRANSMISSION

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.

**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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- 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.

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**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 $1\frac{5}{16}$ in.....	40 to 45 lb

## CHAPTER 4

# POWER TAKE-OFF

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### Section I

## DESCRIPTION AND DATA

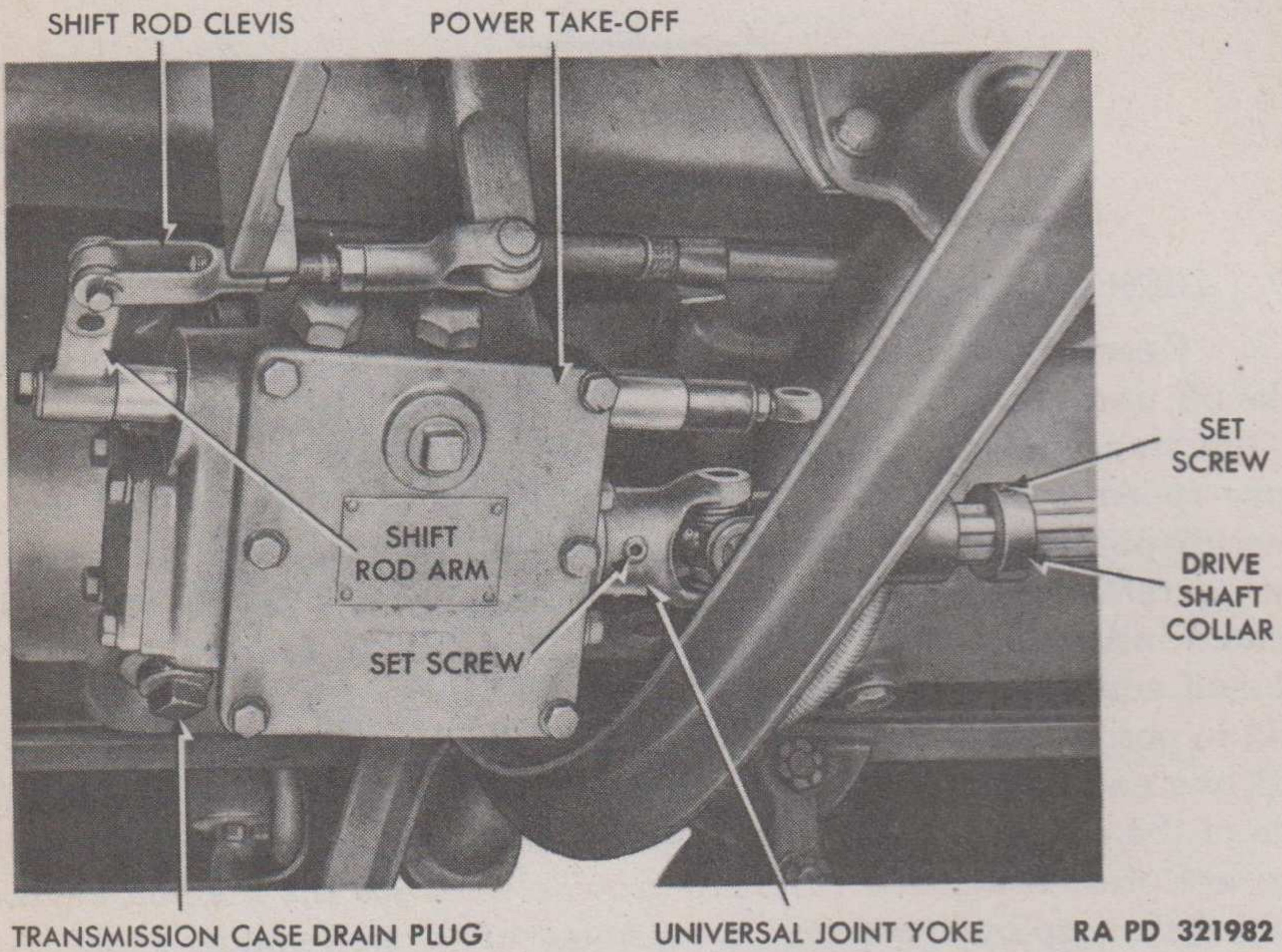
### 29. DESCRIPTION AND OPERATION.

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 1/2-inch cable on the drum is 21 1/2 feet per minute in low gear, 47 1/2 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

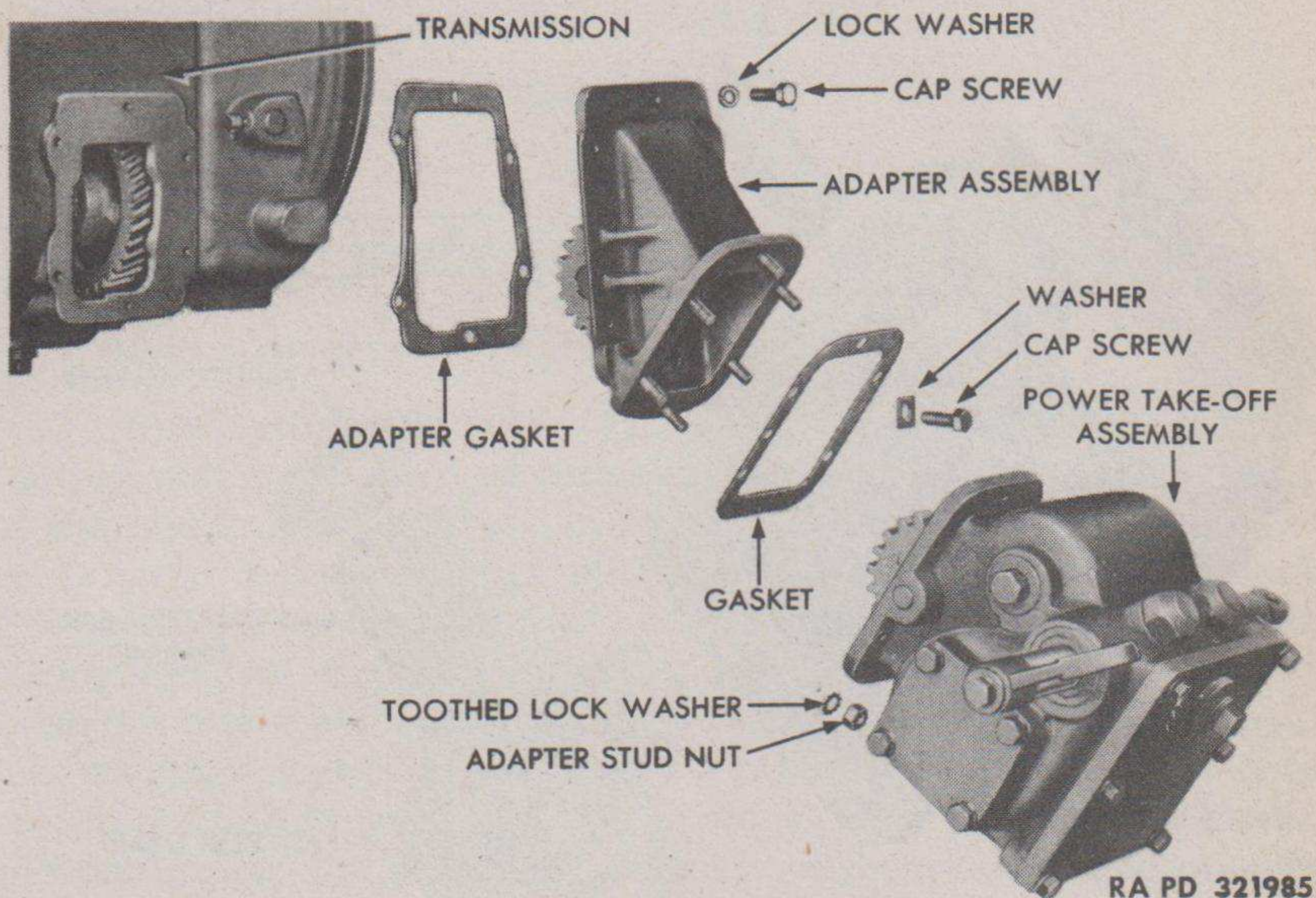
**Section II**

**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.

**POWER TAKE-OFF**



**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**

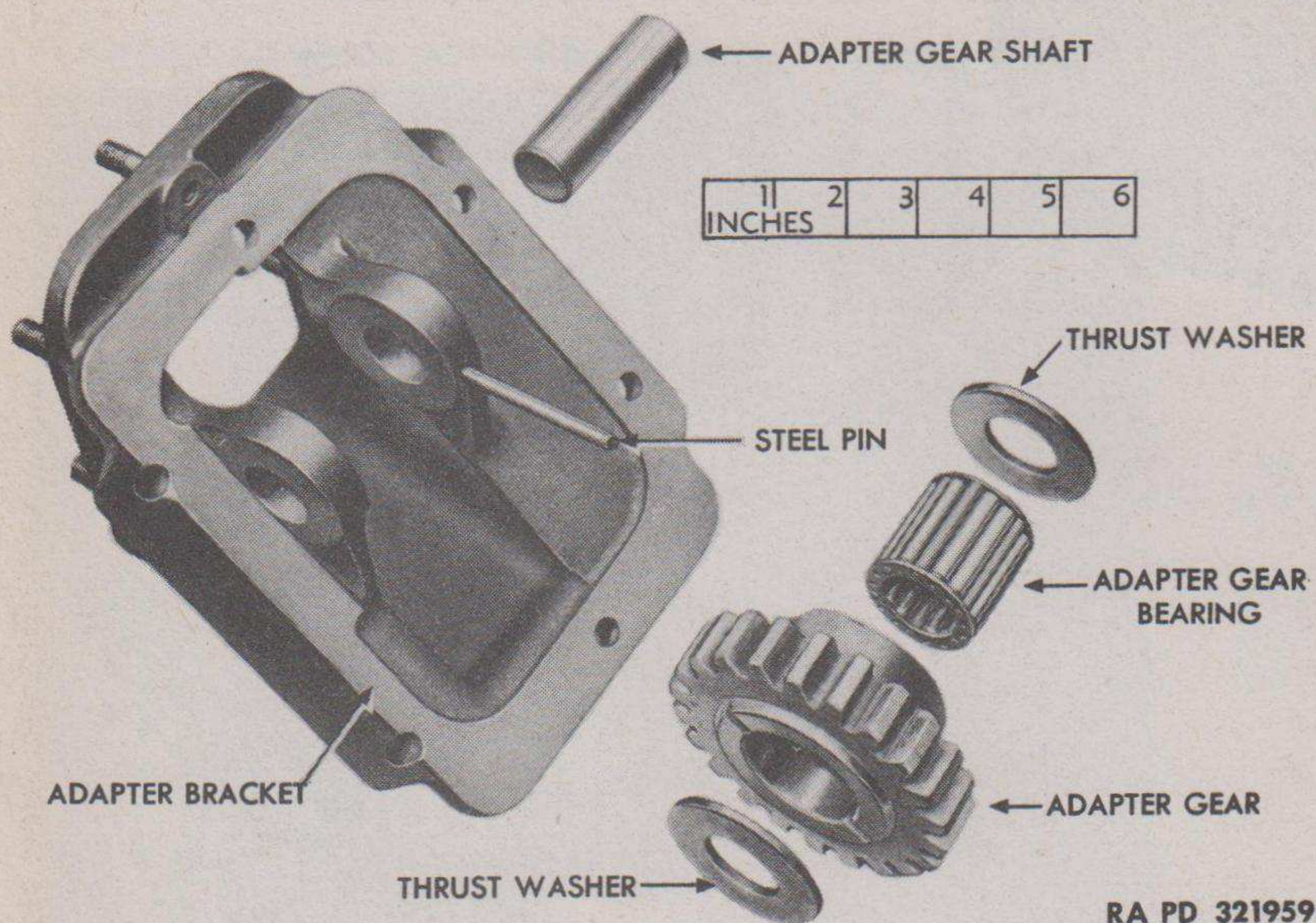
**DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY OF SUBASSEMBLIES**

**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.

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**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 burrs 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.

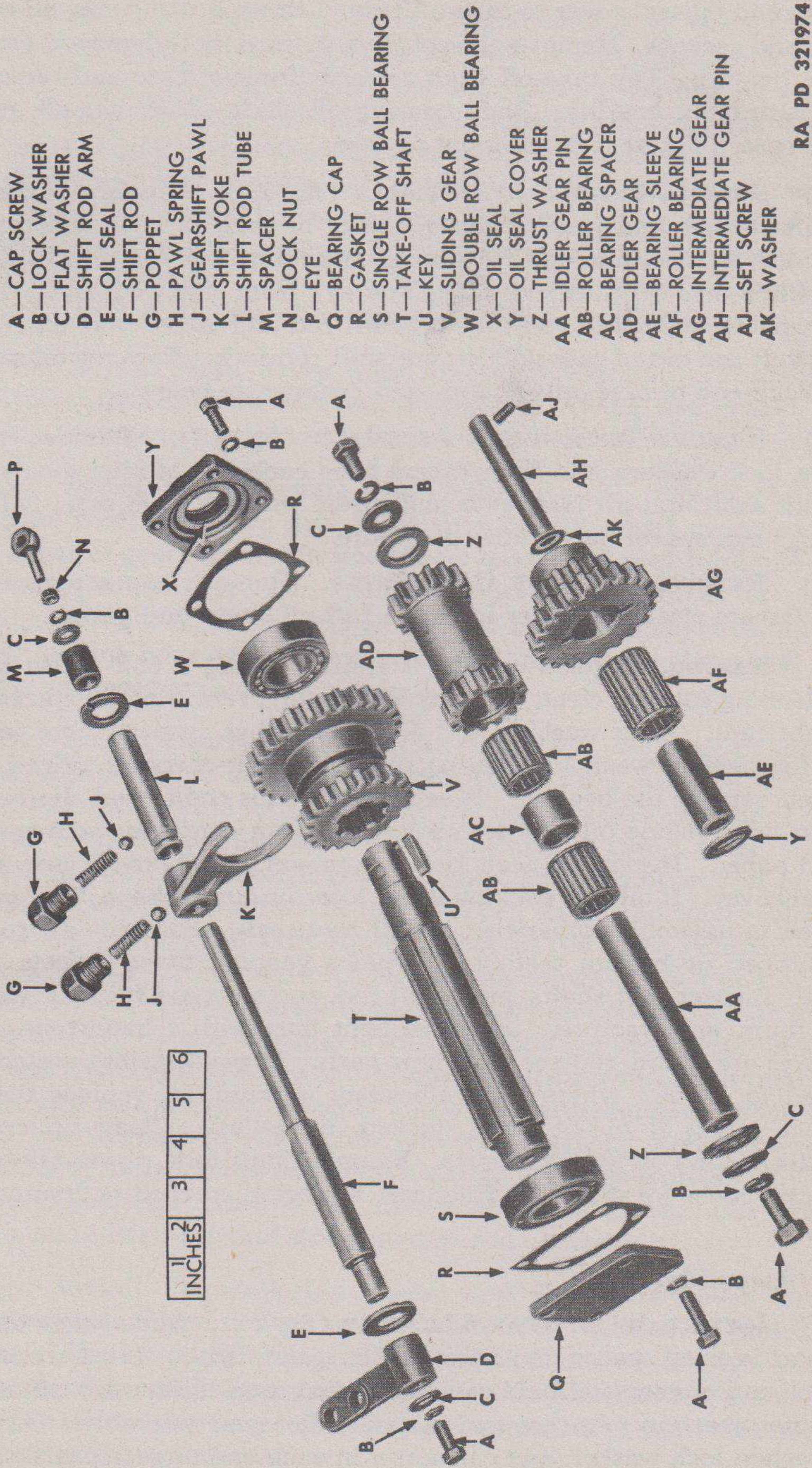
### 33. POWER TAKE-OFF.

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-

POWER TAKE-OFF



- 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

**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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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 threaded 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.

## POWER TAKE-OFF

(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.

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### 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.

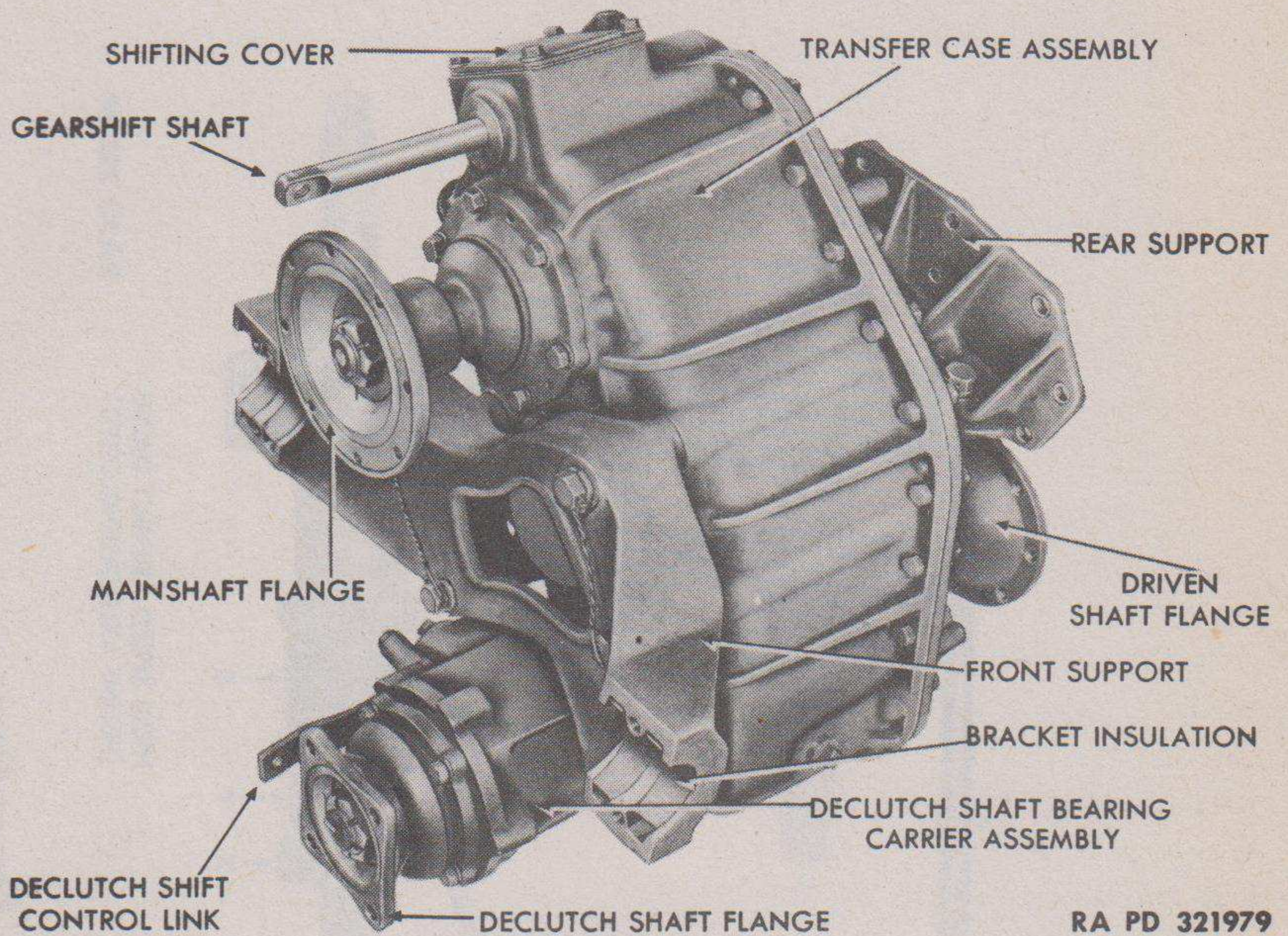
d. **Attach Shift Rod** (fig. 18). Attach shift rod to shift rod arm with clevis pin and cotter pin.

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

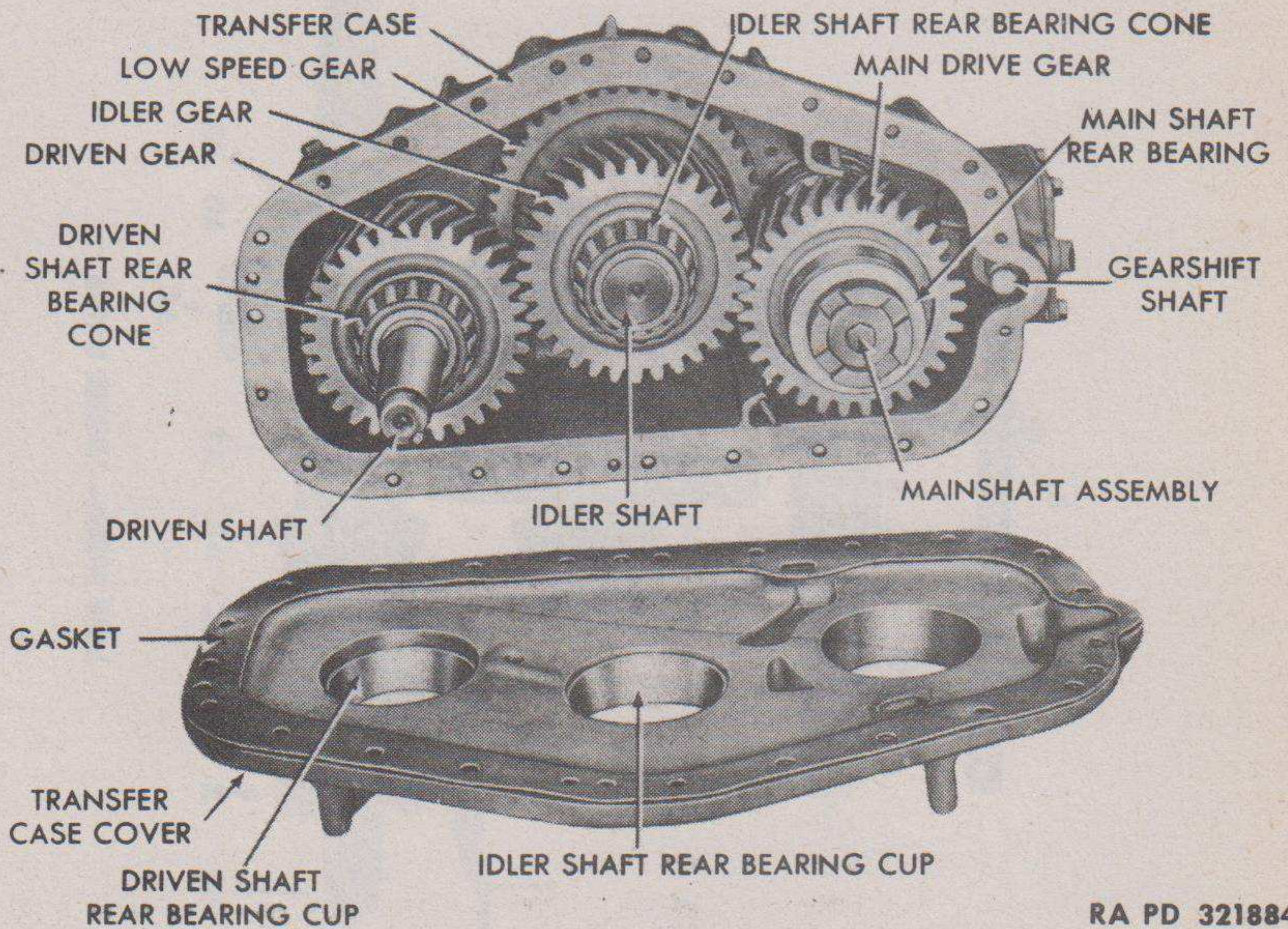
**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)****CHAPTER 5  
TRANSFER CASE****Section I****DESCRIPTION AND DATA****35. DESCRIPTION AND OPERATION.**

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**

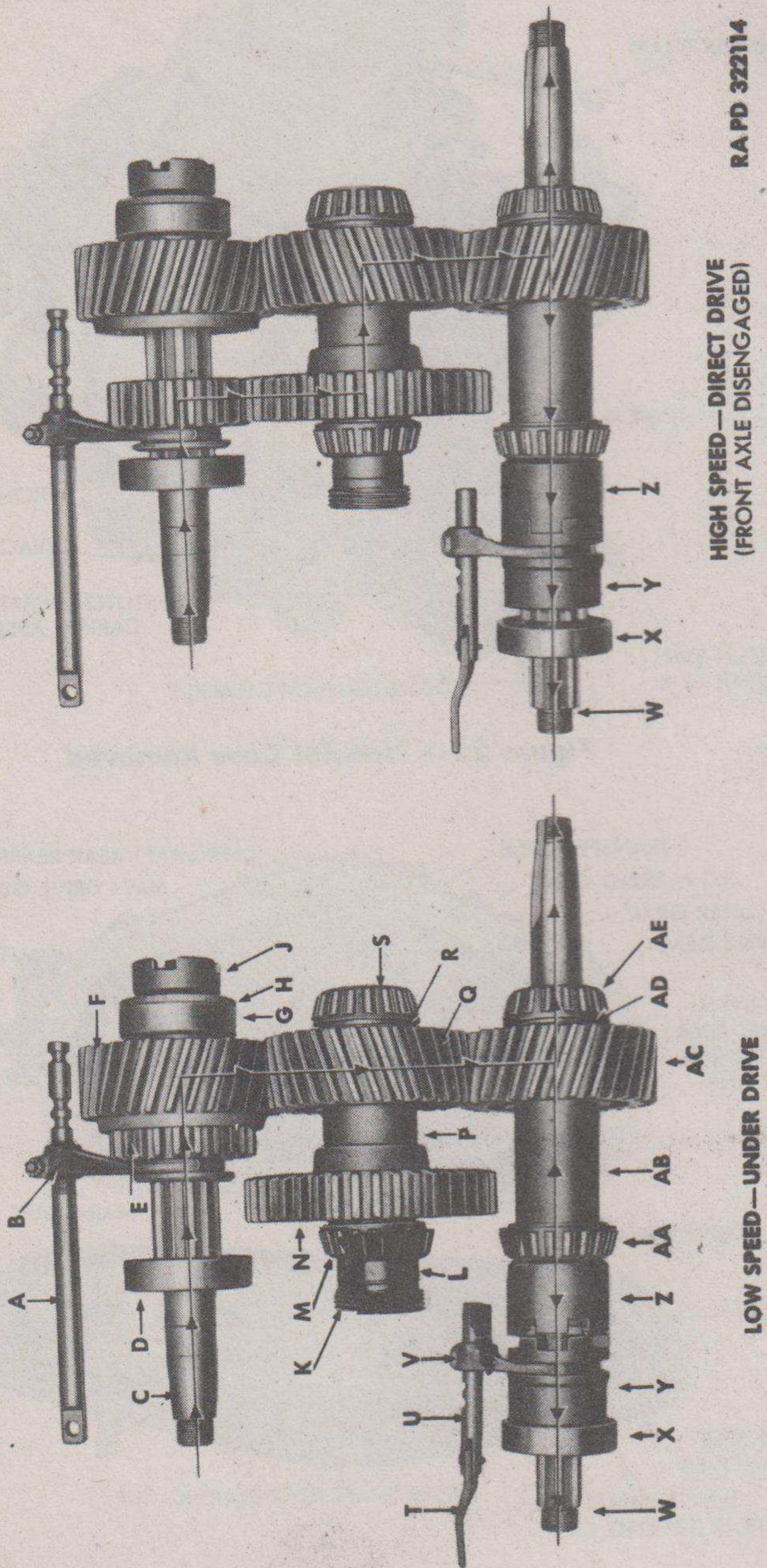


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**Figure 23 — Transfer Case Cover Removed**



ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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RA PD 322114

Figure 24 — Transfer Case Power Flow

TRANSFER CASE

RA PD 322114B

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

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

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**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.

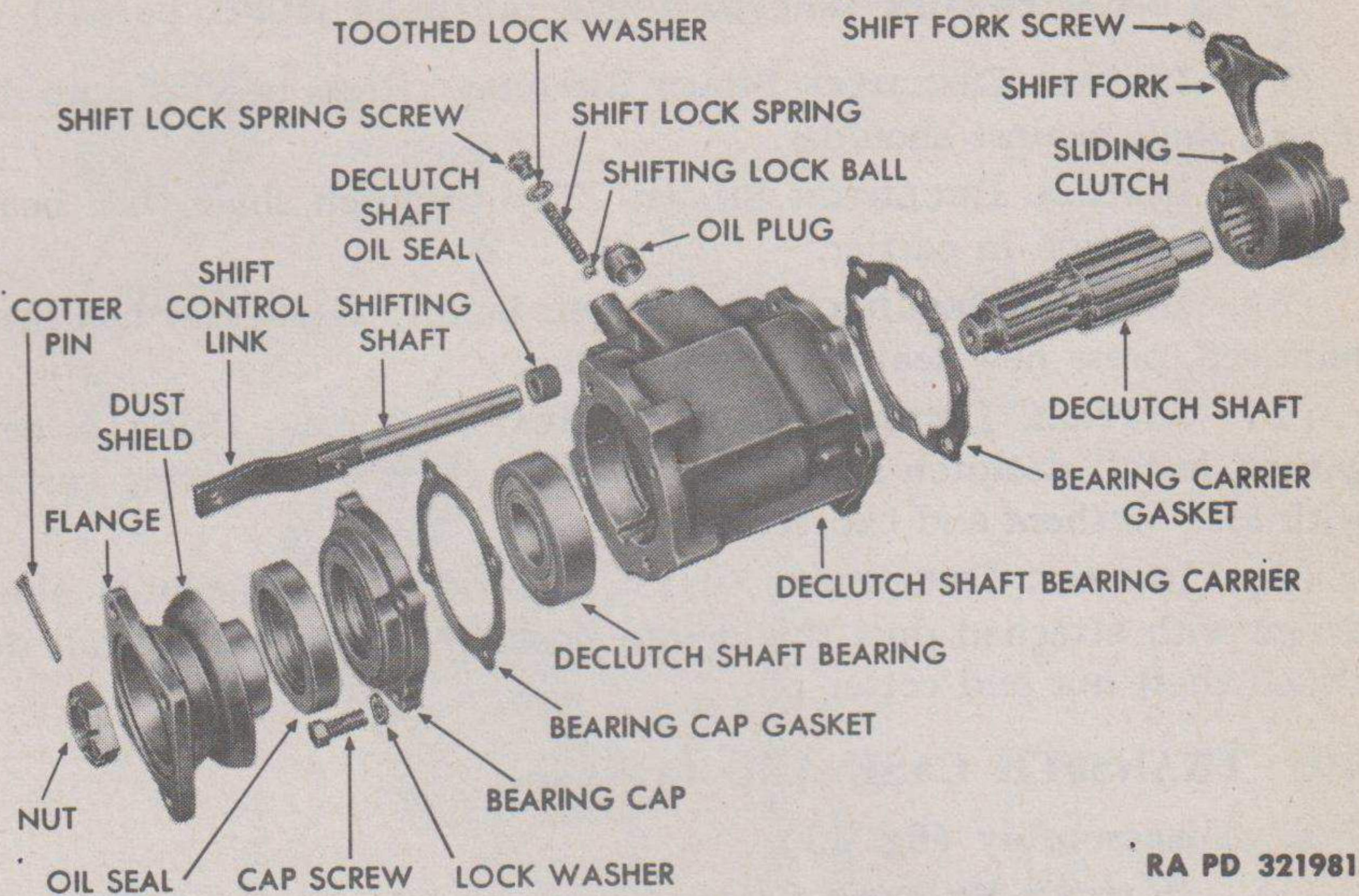
(6) **REMOVE DECLUTCH SHIFT LOCK SPRING AND BALL.** Remove cap screws and toothed lock washer securing spring and ball in carrier. Spring and ball will fly out on removal of cap screw.

(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



RA PD 321981

**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.

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

(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

RA PD 321960

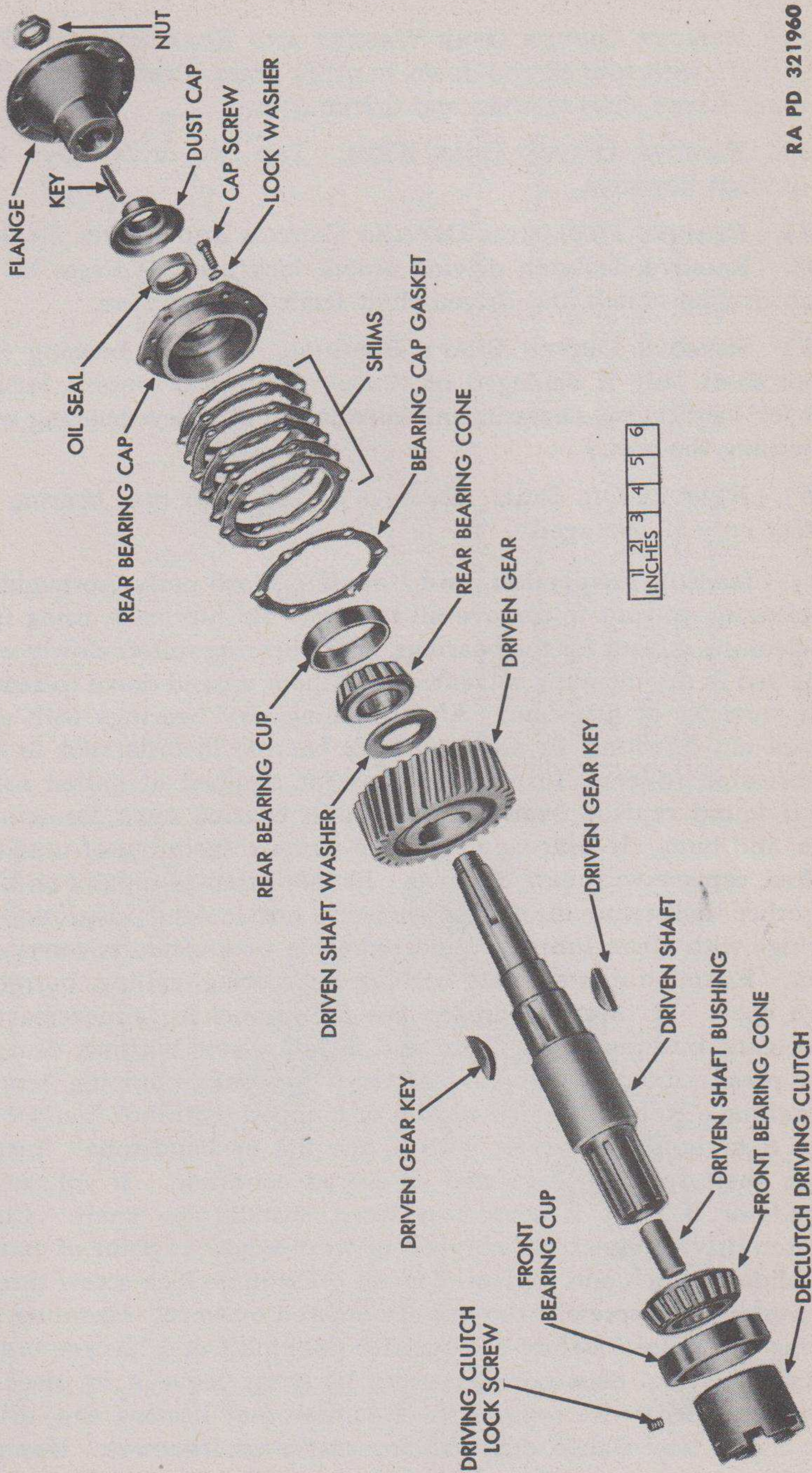


Figure 26 — Driven Shaft Disassembled



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

(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.

TRANSFER CASE

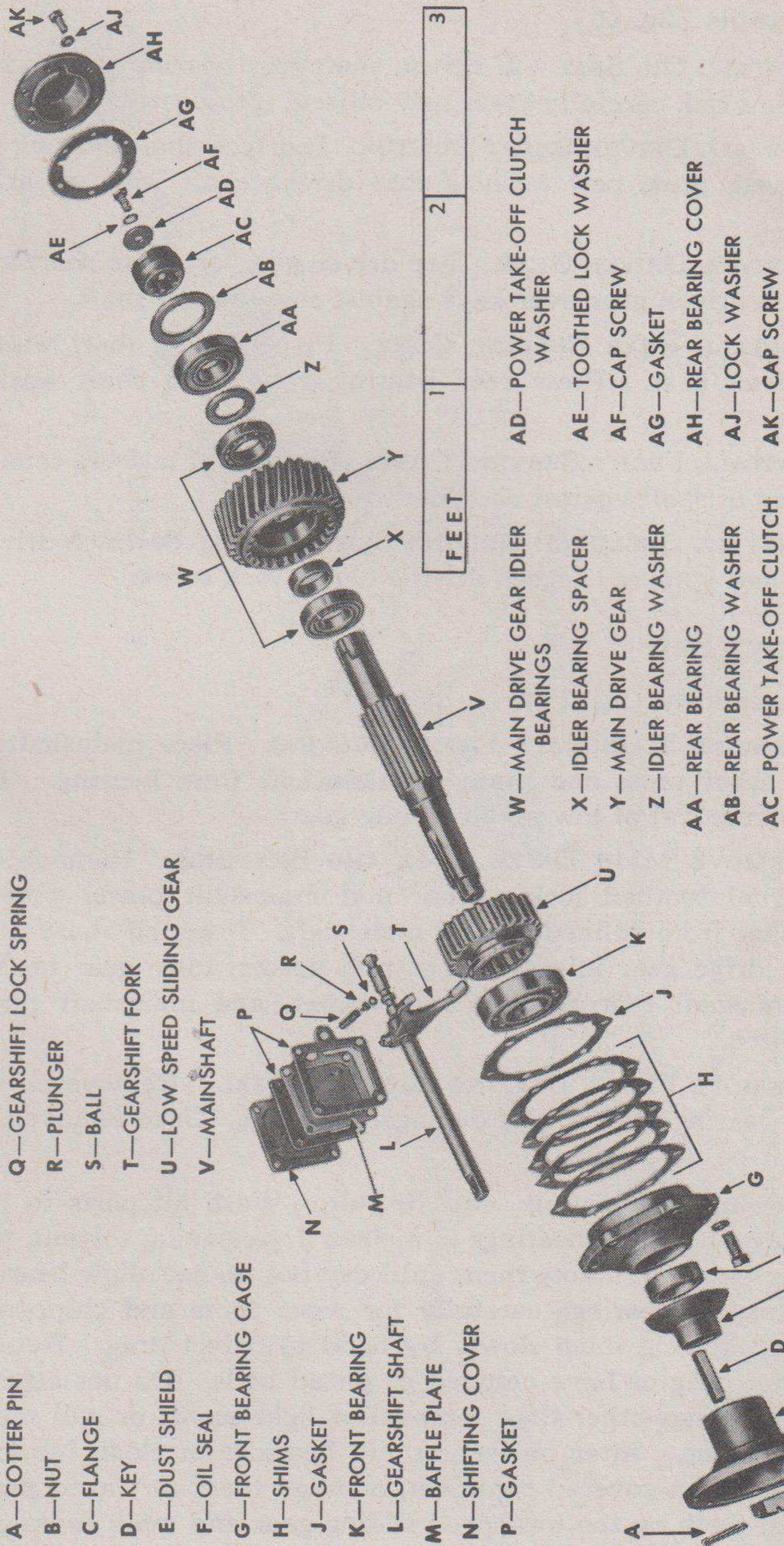


Figure 27 — Mainshaft Disassembled

RA PD 321957

TRANSFER CASE

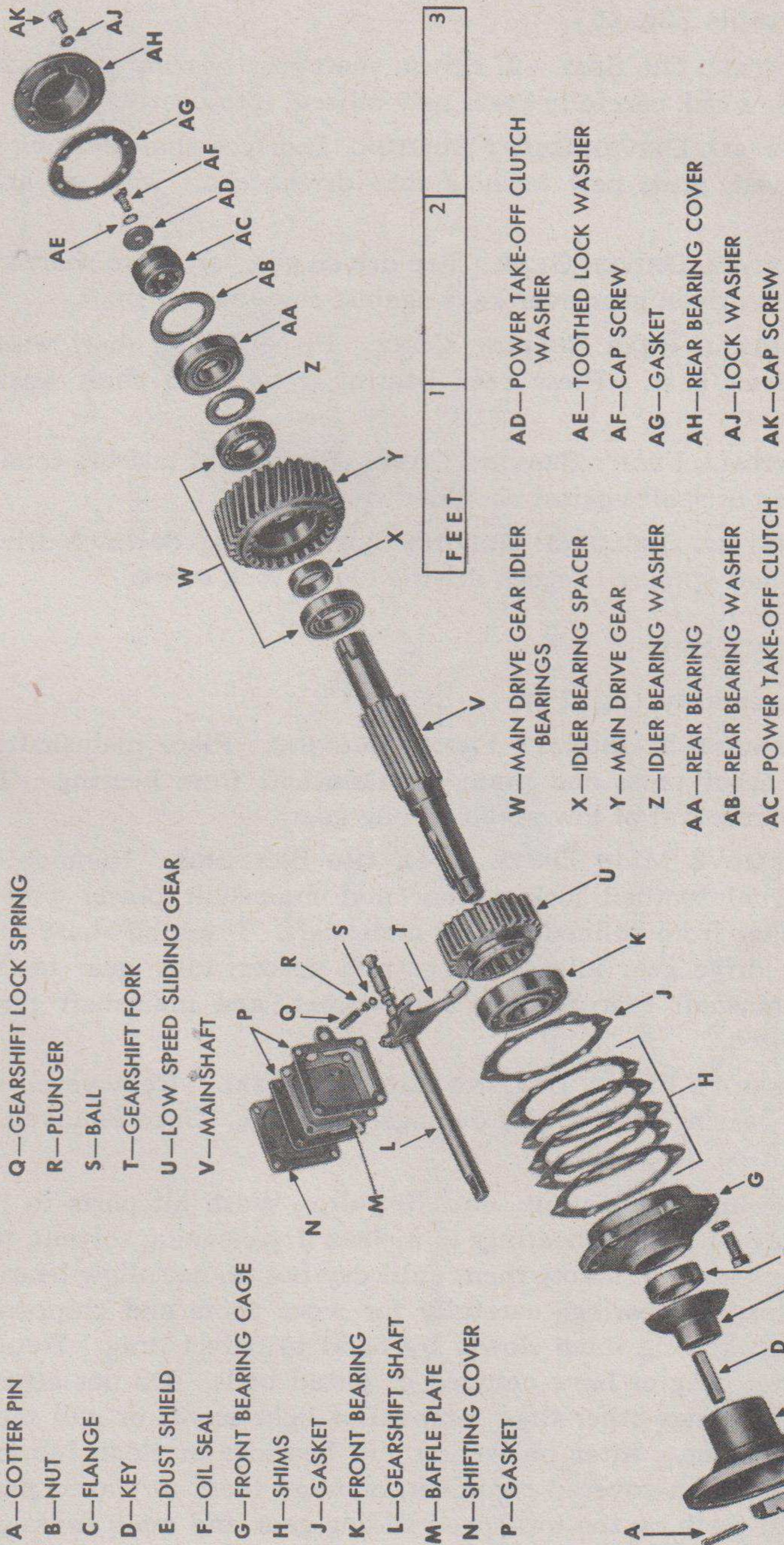


Figure 27 — Mainshaft Disassembled

TRANSFER CASE

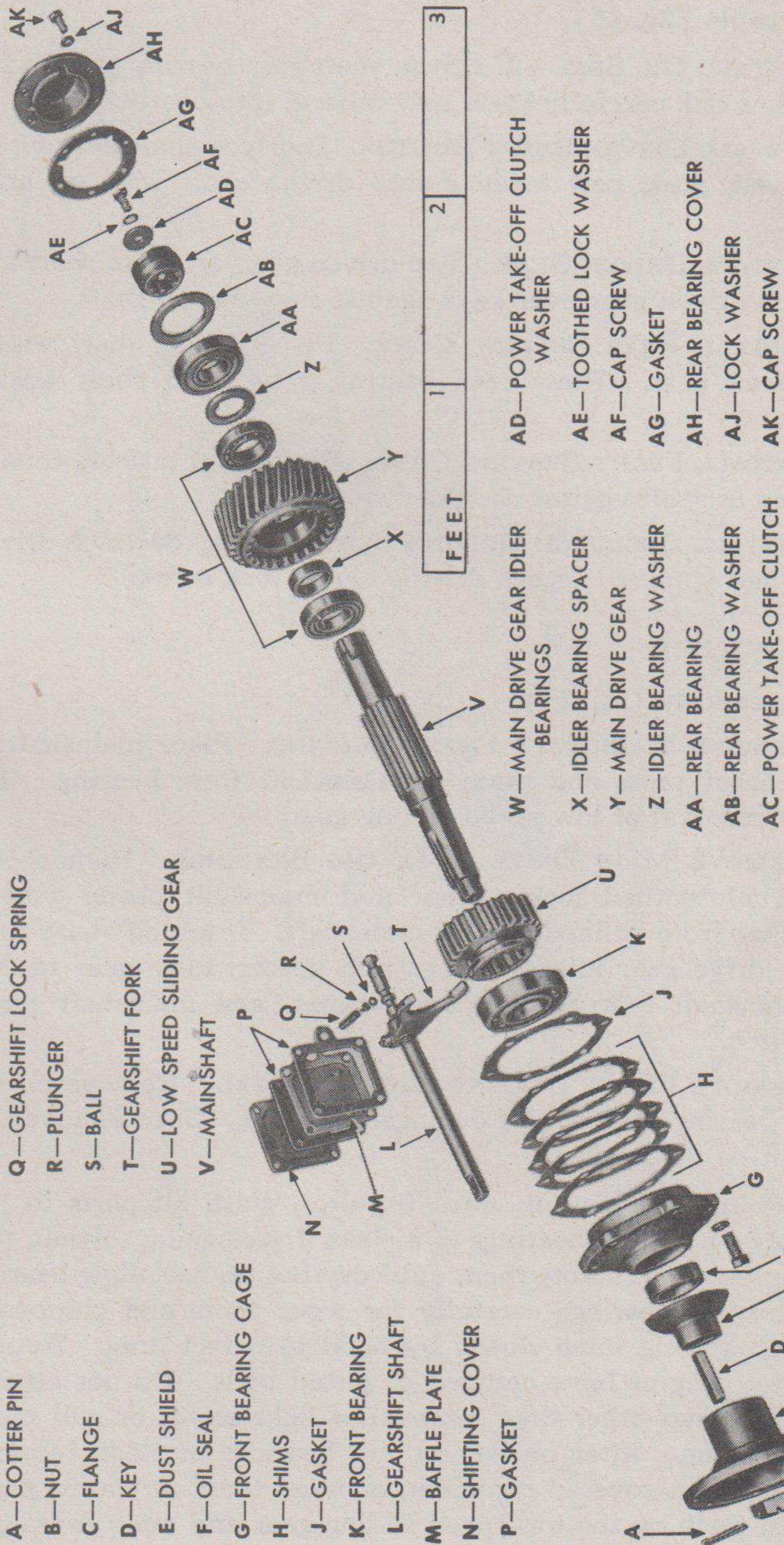


Figure 27 — Mainshaft Disassembled

RA PD 321957

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

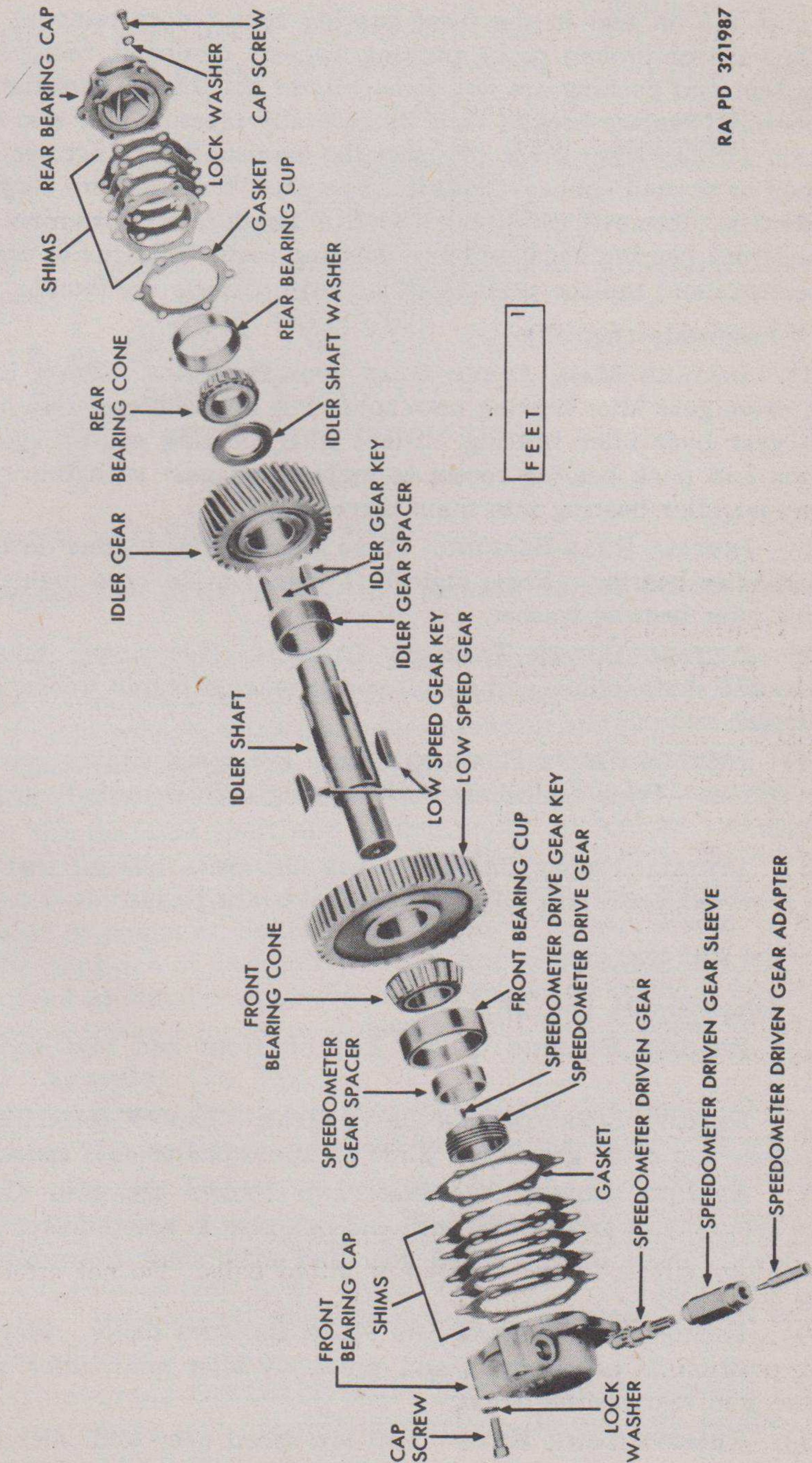
(1) **REMOVE MAINSHAFT FRONT BEARING.** Place mainshaft assembly in arbor press and press off mainshaft from bearing. This will permit removal of low speed sliding gear.

(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.

### TRANSFER CASE



RA PD 321987

Figure 28 — Idler Shaft Disassembled

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

d. **Install Driven Shaft Rear Bearing Cap.** Using a new gasket, install bearing cap and shims. Secure with lock washers and cap screws.

e. **Install Mainshaft Rear Bearing Cover.** Using a new gasket, secure bearing cover to transfer case with lock washers and cap screws.

f. **Install Mainshaft Front Bearing Cage.** Using a new gasket, install bearing cage and shims. Secure with lock washers and cap screws.

g. **Install Mainshaft Flange.** Tap dust shield onto mainshaft and install mainshaft flange key. Tap flange onto mainshaft. Install mainshaft nut and cotter pin.

h. **Install Driven Shaft Flange.** Install dust cap and flange key. Tap flange into position, and install nut and cotter pin.

i. **Install Speedometer Drive Gear.** Place speedometer gear spacer on idler shaft. Tap gear key into shaft keyway, and install speedometer drive gear.

j. **Install Idler Shaft Front Bearing Cap.** Using a new gasket, install bearing cap and shims. Secure with lock washers and cap screws.

k. **Install Speedometer Driven Gear.** Install driven gear, gear sleeve, and adapter in opening on idler shaft front bearing cap.

l. **Install Declutch Shaft and Bearing Carrier Assembly.** Using a new gasket, attach carrier assembly to transfer case with lock washers and cap screws.

m. **Install Front and Rear Supports.** Attach supports to transfer case with lock washers and cap screws. Install lock wire through cap screw heads.

---

**Section V**

**FITS AND TOLERANCES**

**44. SERVICE INFORMATION.**

a. **Bearing Adjustments.** Shafts must have slight bearing drag with no perceptible end play when rotated by hand.

b. **Gear Backlash.**

Spur .....	0.005 to 0.010 in.
Helical .....	0.005 to 0.008 in.

**TRANSFER CASE**

**c. Mainshaft.**

Bearing adjustment method .....	Shims under front bearing cap
Available shim thickness .....	0.003, 0.005, 0.010 in.
Main drive gear bearing adjustment .....	Spacer between bearings
Thickness of bearing spacer .....	0.685 to 0.690 in.
Mainshaft rear bearing washer thickness .....	0.185 to 0.187 in.
Low-speed sliding gear to shifting fork clearance ....	0.003 to 0.017 in.
Low-speed sliding gear to mainshaft clearance .....	0.031 to 0.043 in.

**d. Idler Shaft.**

Bearing adjustment method .....	Shims under front and rear bearing caps
Available shim thickness .....	0.003, 0.005, and 0.010 in.

**e. Declutch Shaft.**

Bearing adjustment method .....	None—roller bearing type
Sliding clutch to fork clearance .....	0.031 to 0.043 in.
Declutch shift lock spring free length .....	2 in.
Pressure at 1 in. ....	40 to 50 lb

**f. Gearshift Shaft.**

Lock spring free length .....	2 in.
Pressure at 1 in. ....	50 to 60 lb



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

**CHAPTER 6  
DRIVE SHAFTS**

**Section I**

**DESCRIPTION AND DATA**

**45. DESCRIPTION AND DATA.**

a. **Description** (fig. 29). The intermediate, front, and rear drive shafts are similar, each consisting of a shaft, a slip joint assembly, and a needle bearing universal joint on each end of the shaft. The universal joint consists of a journal mounted into two yokes on four needle bearings, which are kept in place by bearing caps and lock plates. A fixed joint flange on each universal joint attaches the respective shafts to the companion flanges of the transmission, transfer case, and front and rear axles. The winch drive shaft consists of a shaft with a universal joint at each end. Bushings held in place by snap rings are used in both universal joints. The rear yoke of the winch drive shaft is connected to the power take-off by means of a key and a set screw, the front yoke being attached to the winch worm shaft with a shear pin.

**b. Data.**

**Intermediate drive shaft:**

Make ..... Spicer  
 Model ..... Series 1,600  
 Length of stubshaft .....  $17\frac{15}{16}$  in.

**Front drive shaft:**

Make ..... Spicer  
 Model ..... Series 1,500  
 Length of stubshaft .....  $52\frac{11}{16}$  in.

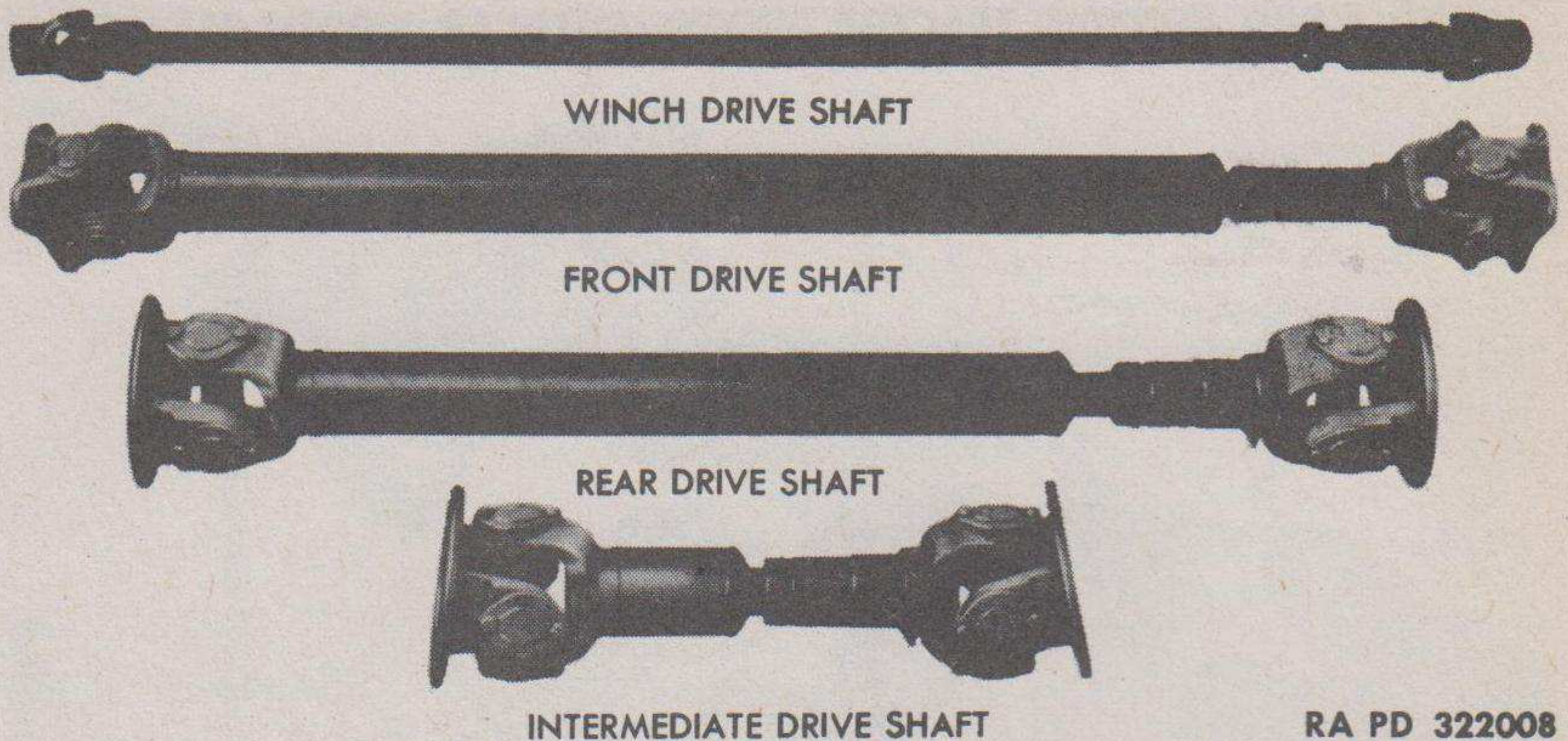
**Rear drive shaft:**

Make ..... Spicer  
 Model ..... Series 1,600  
 Length of stubshaft .....  $40\frac{7}{16}$  in.

**Winch drive shaft:**

Make ..... Gar Wood

## DRIVE SHAFTS



RA PD 322008

*Figure 29 — Drive Shafts*

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## Section II

## DISASSEMBLY

### 46. INTERMEDIATE, FRONT, AND REAR DRIVE SHAFTS.

#### a. Disassembly (fig. 30).

(1) **MARK STUBSHAFT AND SLIP JOINT SLEEVE.** If arrows on stubshaft and slip joint sleeve are not visible, mark shaft and sleeve with chalk or a punch so that they can be quickly and properly re-assembled. The original alinement is necessary to preserve the balance of the drive shaft assembly.

(2) **REMOVE LUBRICATION FITTING.** Unscrew and remove fitting from journal to prevent damage in disassembly.

(3) **REMOVE UNIVERSAL JOINT.** Unscrew dust cap from slip joint sleeve yoke. Slide universal joint off stubshaft splines. Slide dust cap, cork washer, and steel washer off splines.

(4) **REMOVE NEEDLE BEARINGS CAPS.** Straighten lock plate ends which are bent over cap screws. Remove cap screws, lock plates, and needle bearing caps.

(5) **REMOVE NEEDLE BEARINGS.** Tap journal, yoke, and joint flange around bearing seats with a soft hammer until bearings are free. Remove bearings and journal.

### 47. WINCH DRIVE SHAFT.

#### a. Disassembly.

(1) **REMOVE UNIVERSAL JOINTS (fig. 31).** Slide worm joint off drive shaft splines. Loosen drive shaft collar set screw and slide collar off drive shaft splines. Loosen set screw on take-off joint yoke

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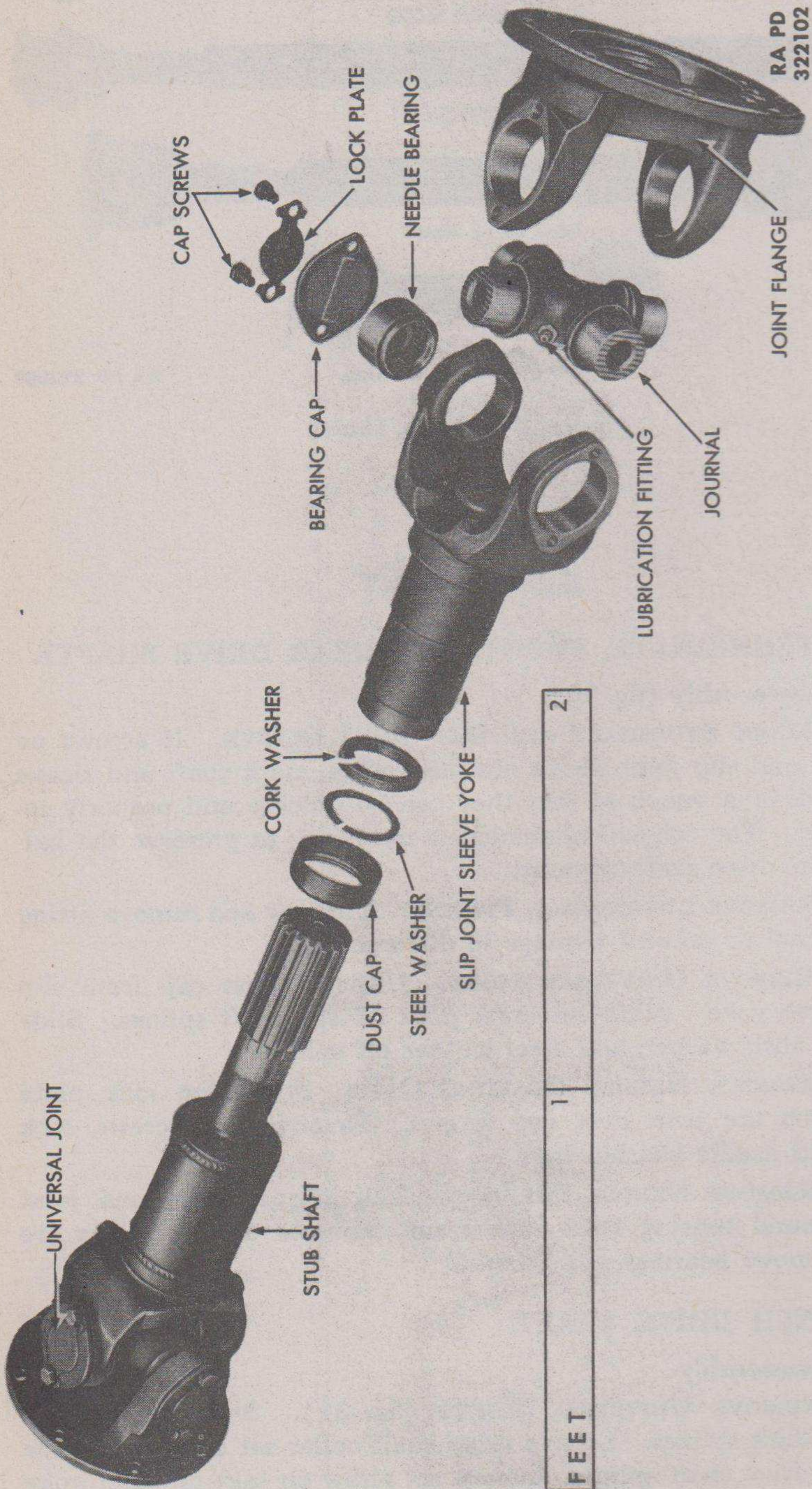
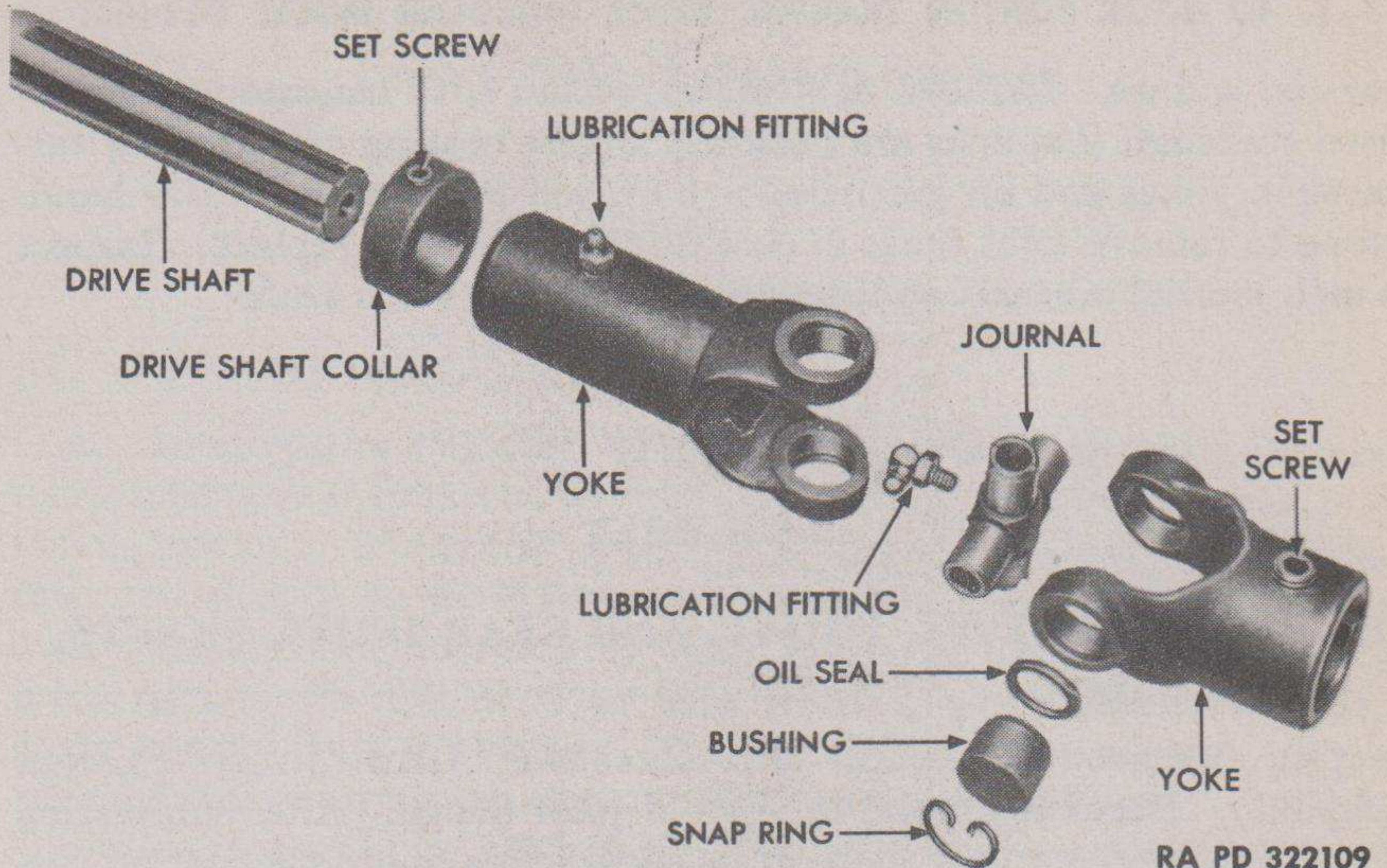


Figure 30 — Intermediate Drive Shaft Universal Joint Disassembled

## DRIVE SHAFTS



**Figure 31 – Winch Drive Shaft Worm Joint Disassembled**

and tap yoke off drive shaft. Tap drive shaft key out of shaft keyway.

(2) **REMOVE LUBRICATION FITTINGS** (fig. 31). Remove fittings from journal and yoke sleeve to prevent damage in disassembly.

(3) **REMOVE BUSHING** (fig. 31). Remove snap rings securing bushings in yokes (fig. 31). Tap yokes around bushing seats with a soft hammer to free bushings.

(4) **REMOVE JOURNAL** (fig. 31). Lift out journal. Slide oil seals off seats on journal.

### Section III

## CLEANING, INSPECTION, AND REPAIR

### 48. CLEANING, INSPECTION, AND REPAIR.

a. **Cleaning.** Wash all parts in dry-cleaning solvent, using clean solution for needle bearings and bushings. Keep bearings immersed in dry-cleaning solvent long enough to dissolve hardened particles of old lubricant.

b. **Inspection and Repair.** Carefully examine all bearings and bushings for evidence of damage or wear, and replace if defects are found. Work a small amount of lubricant into bearings and try them on the journal. A slight side movement is permissible, but if there is enough movement to cause backlash or jerky action, replace bearing. Inspect yokes and stubshafts for cracks or fractures and replace if found. Inspect stubshaft splines for nicks, burs, and

**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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twisted splines. Remove light nicks or burs with handstone, but discard stubshaft if splines are twisted. Check bearing and bushing surfaces in yokes and on journals for burs and score marks. Use handstone to remove light burs; in case of other damage, replace. Inspect winch journal oil seals and replace damaged or worn seals.

---

**Section IV****ASSEMBLY****49. INTERMEDIATE, FRONT, AND REAR DRIVE SHAFTS.****a. Assembly.**

(1) **INSTALL JOURNAL AND BEARINGS INTO JOINT FLANGE** (fig. 30). Position journal in yoke of joint flange. After lubricating bearings, tap them into position in joint flange and onto bearing surfaces of journal. Install bearing caps, lock plates, and cap screws. Bend ends of lock plates over cap screw heads.

(2) **INSTALL SLIP JOINT SLEEVE YOKE** (fig. 30). Position joint flange with installed journal in slip joint sleeve yoke. Tap bearings into seats in yoke and onto remaining two bearing surfaces of journal. Install bearing caps, lock plates, and cap screws. Bend ends of lock plates over cap screw heads.

(3) **ATTACH ASSEMBLY TO STUBSHAFT** (fig. 30). Slide dust cap and steel and cork washers on splines of stubshaft. Line up arrows or marks on stubshaft and slip joint sleeve and insert spline into sleeve. Thread dust cap on end of slip joint sleeve.

(4) **INSTALL LUBRICATION FITTING** (fig. 30). Thread fitting into opening in journal.

**50. WINCH DRIVE SHAFT.****a. Assembly.**

(1) **INSTALL JOURNAL AND BUSHINGS** (fig. 31). Slide oil seals into place on journal. Insert journal into yoke. Lubricate bushings and tap them into yoke and on bearing surfaces of journal. Install snap rings.

(2) **INSTALL YOKE** (fig. 31). Position second yoke over journal. Install remaining two bushings and snap rings.

(3) **INSTALL LUBRICATION FITTINGS** (fig. 31). Install fittings into openings in journal and yoke sleeve.

(4) **ATTACH UNIVERSAL JOINTS TO DRIVE SHAFT** (fig. 31). Slide drive shaft collar and the worm joint on shaft splines. Install drive shaft key on other end of shaft. Tap take-off joint onto shaft and tighten set screw.

CHAPTER 7

DRIVE SHAFT HAND BRAKE

Section I

DESCRIPTION

51. DESCRIPTION.

a. **Description** (fig. 32). The drive shaft hand brake is an auxiliary mechanical brake to be used for holding the vehicle when it is not in motion. It consists of a disk mounted between the transfer case and rear drive shaft with two brake shoes on each side of the disk. These shoes, operated by cams, levers, and springs, alternately press against the disk or draw back from it, according to operation of the control lever in the cab. Because of the strain imposed on the entire power train by the operation of the brake while the vehicle is in motion, it should be used in this way only when absolutely necessary.

Section II

BRAKE SHOES

52. DESCRIPTION AND DATA.

a. **Description** (fig. 32). Braking power is obtained by the action of four brake shoes against the brake disk, a shoe being attached to each side of the front of the brake and to each side of the back of the brake. These shoes are flat and elliptical, and brake lining is attached to each shoe with eight rivets.

b. **Tabulated Data.**

Manufacturer .....	American Cable
Brake shoe, part No. (Autocar).....	10S0913
Lining, part No. (Autocar).....	10S0912

53. DISASSEMBLY, CLEANING, INSPECTION, REPAIR, AND ASSEMBLY.

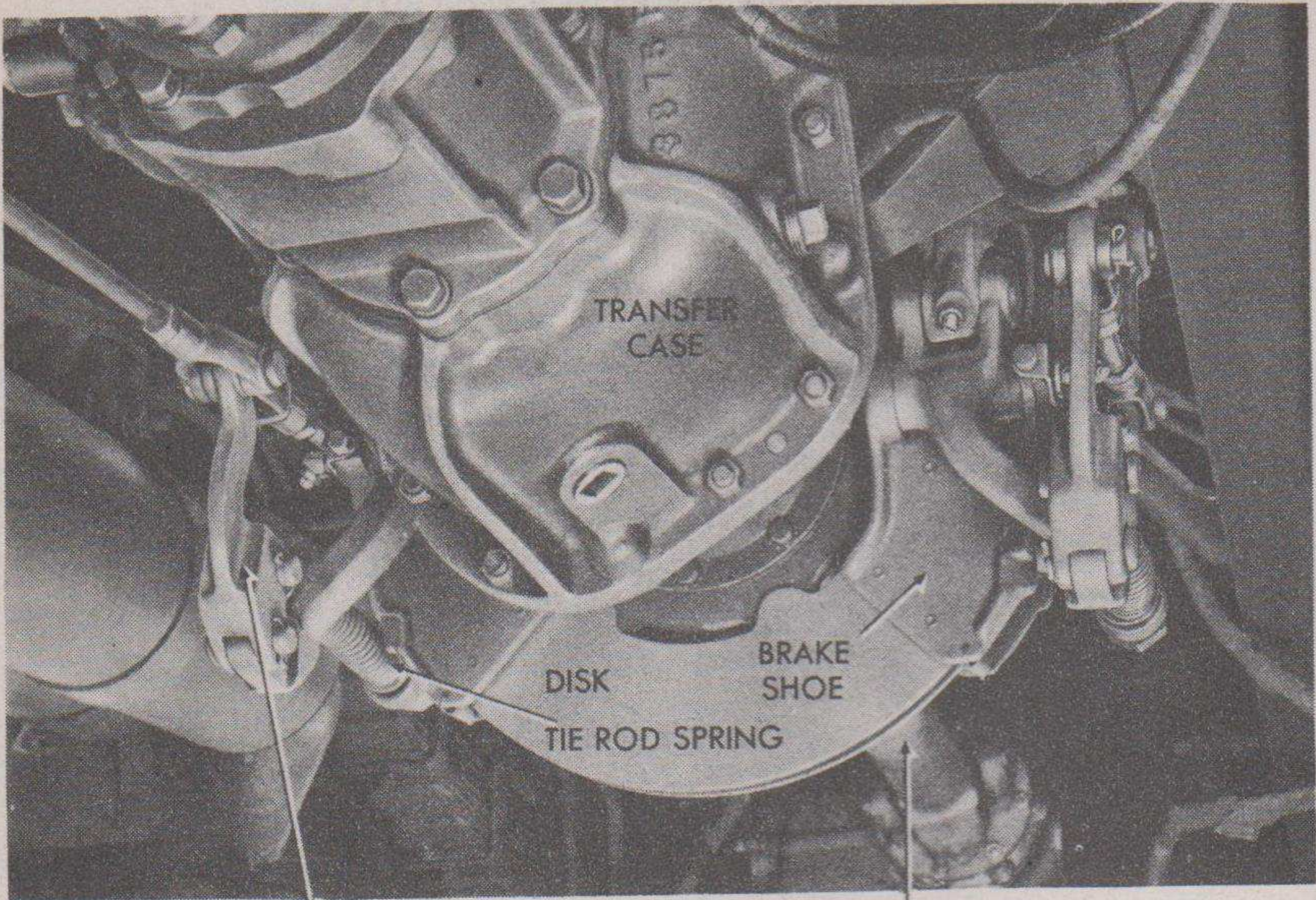
a. **Disassembly.**

(1) **REMOVE BRAKE LINING.** Place brake shoe in a vise, drive out lining rivets, and lift off lining.

(2) **REMOVE BRAKE SHOE BUSHINGS.** Remove bushings only if they are damaged or worn (subpar. b, below).

b. **Cleaning, Inspection, and Repair.** Clean brake shoes with dry-cleaning solvent, but do not permit dry-cleaning solvent to get on brake lining. Examine shoes for cracks or fractures and replace if

ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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FRONT VIEW

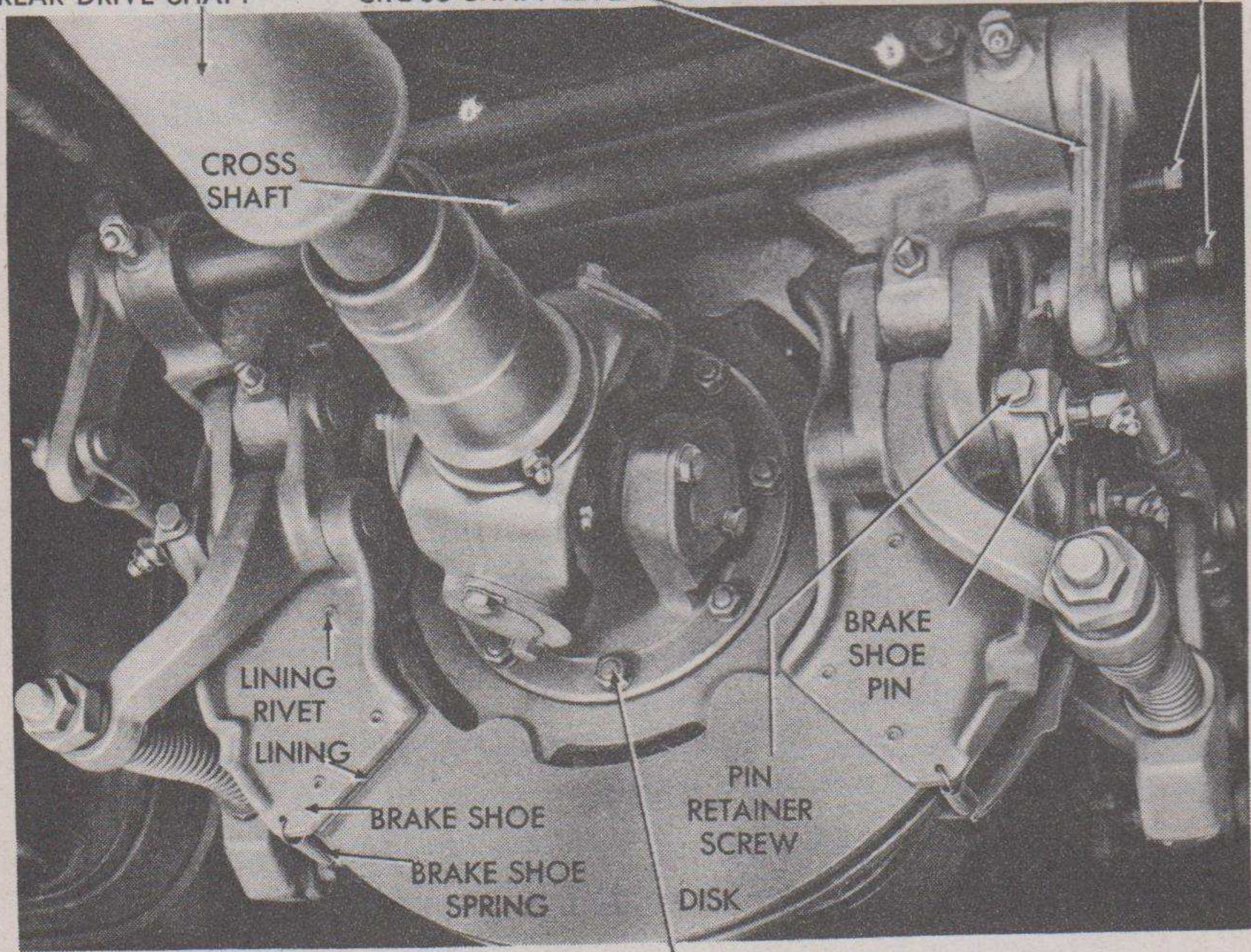
OPERATING LEVER

REAR DRIVE SHAFT

REAR DRIVE SHAFT

CROSS SHAFT LEVER

BRAKE SHOE ADJUSTING SET SCREW



REAR VIEW

DISK TO DRIVING FLANGE BOLT

RA PD 321905

Figure 32 — Drive Shaft Hand Brake

**DRIVE SHAFT HAND BRAKE**

cracks or fractures are found. Inspect brake shoe bushings for scoring and wear by placing a brake shoe pin in bushing. If there is more than 0.0010-inch side play between pin and bushing, remove bushing and press new bushing into shoe. Inspect all four brake shoe linings, measuring thickness of each lining. If worn to one-eighth inch or less, discard all four linings. If there is a difference of more than one thirty-second inch or more in thickness of any of the four linings, discard all four and install a new set. **NOTE:** *Always replace brake shoe linings in sets of four.*

**c. Assembly.**

(1) **INSTALL BRAKE SHOE BUSHINGS.** If bushing was removed, press new bushing into seat in brake shoe.

(2) **INSTALL BRAKE LINING.** Attach lining to brake shoe with eight rivets, using a brake riveting machine for the operation.

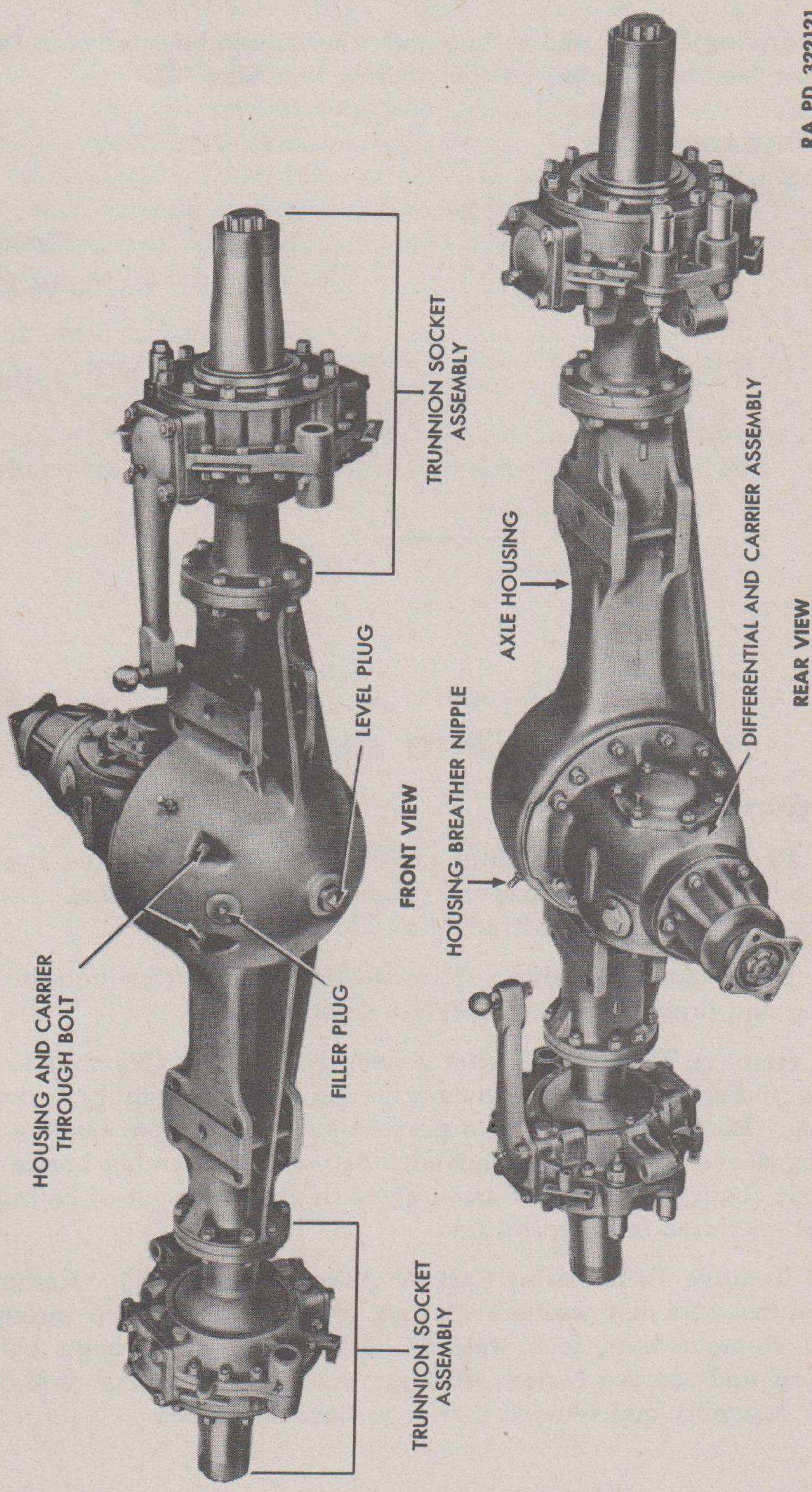


**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
5- TO 6-TON PONTON TRACTOR TRUCK (AUTOCAR MODEL U8144T)****CHAPTER 8  
FRONT AXLE****Section I****DESCRIPTION AND DATA****54. DESCRIPTION AND OPERATION.**

a. **Description.** This front axle employs a double-reduction type of differential carrier which is detachable from the axle housing as a unit. The axle housing is full floating and jointed at outer ends to permit steering action of the wheels through constant-velocity type steering-driving joints. The carrier unit is mounted on a housing to the left of the axle center, permitting the front drive shaft to pass to the left of the engine and thus maintain full road clearance. The differential and spur gear are mounted between cast legs on the carrier supported by opposed tapered roller bearings held in place by carrier caps and adjusting rings. The differential assembly is composed of two halves with the spur gear attached to case flanges. The inner surfaces of both halves of the differential case are recessed to provide a seat for the differential spider on which the pinion and side gears are mounted. The bevel gear is pressed on splines of the spur pinion, which is supported by opposed tapered roller bearings. Tooth contact between the bevel gear and bevel pinion is adjusted by shims between bearing cages and carrier. The trunnion socket assemblies are attached to the axle housing ends. Oil seals at the outer ends of the housing retain differential lubricant within the housing. Steering knuckles are supported by tapered roller bearings which are pressed on the upper and lower pins of the trunnion sockets, these bearings being adjusted by shims under upper and lower bearing caps. The universal joint is mounted within the steering knuckle with the axle shaft end locked in position by means of a retainer plate and screws. A full floating hub is mounted upon the steering knuckle by means of tapered roller bearings. This construction enables the wheel, hub, spindle, trunnion socket, and axle housing to carry the load independent of the axle shaft.

b. **Operation.** Power is taken from the front drive shaft by the bevel pinion through a drive flange, and is transmitted by the pinion to the bevel gear, causing spur pinion and spur gear to rotate. Motion is then transmitted to spider pinion gears, which rotate as a unit, and to pinion side gears, which are splined to ends of axle shafts. Axle shafts transmit motion to the constant-velocity type universal joints,

FRONT AXLE



RA PD 322121

Figure 33 — Front Axle Assembly

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

to the driving flanges, and to hub and wheel assemblies which rotate on roller bearings located on the steering knuckles.

**55. DATA.**

**a. Front Axle.**

Make ..... Timken  
Model ..... F3100-W-X-5  
Ratio ..... 8.148 to 1  
Type ..... Full floating

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**Section II**

**DISASSEMBLY INTO SUBASSEMBLIES**

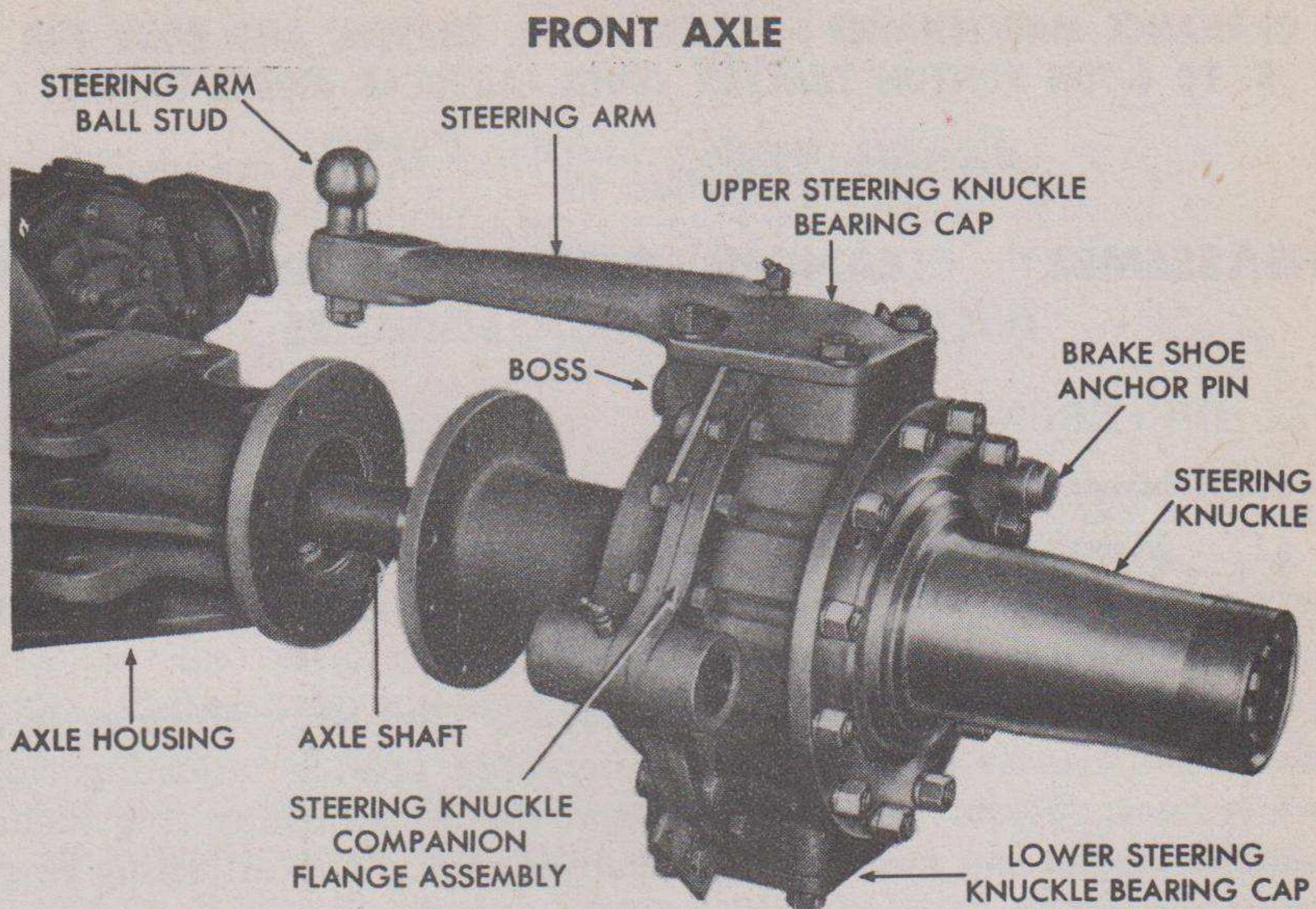
**56. DISASSEMBLY.**

**a. Preliminary Instructions.** Remove wheels and tires, brake slack adjusters and diaphragms, drum and hub assemblies, wheel bearings, and tie rod, as instructed in TM 9-817.

**b. Drain Axle Housing.** Remove drain plug from bottom of housing and drain lubricant. Replace drain plug.

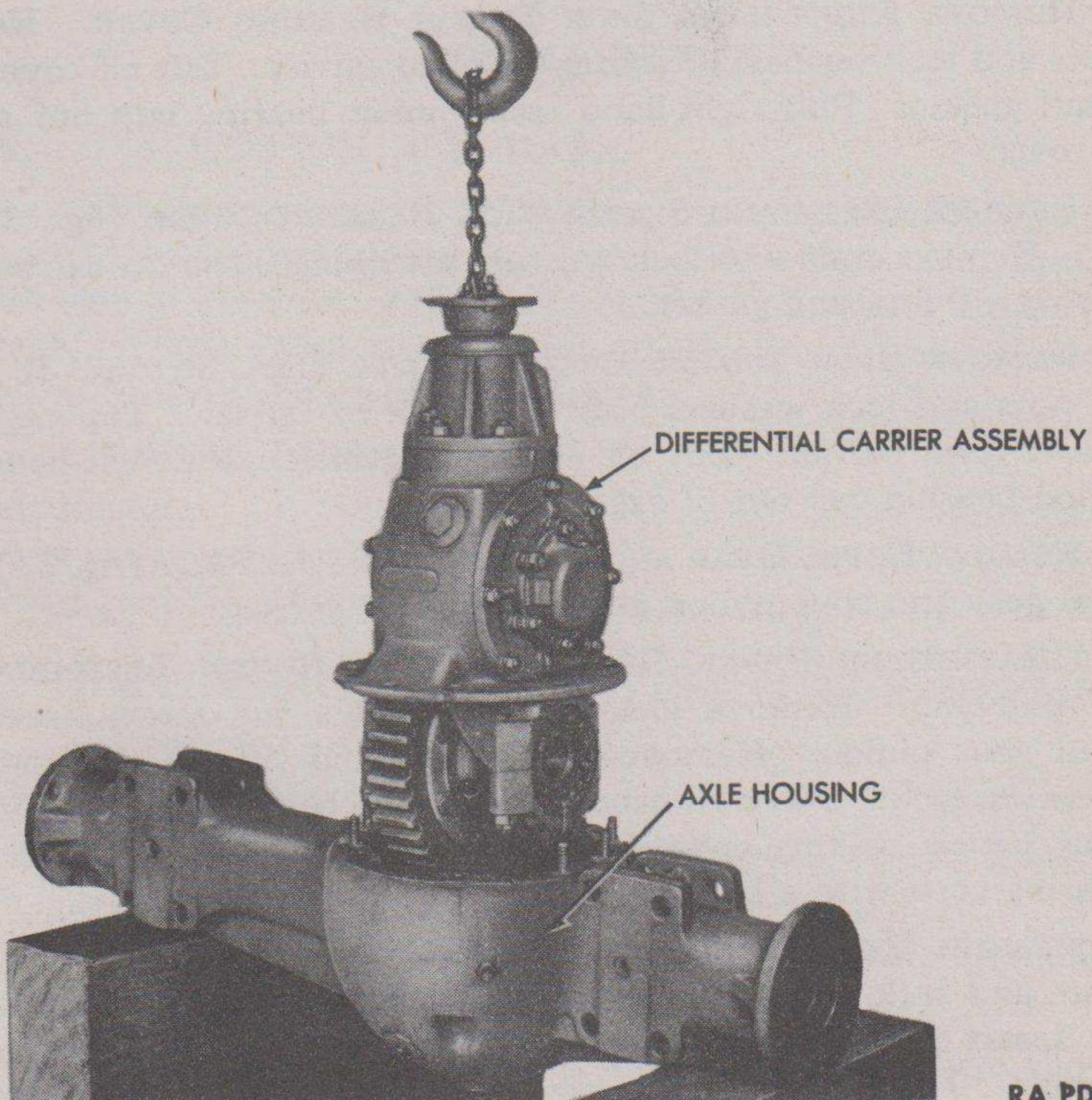
**c. Remove Trunnion Socket Assembly (fig. 34).** Remove nuts, lock washers, and bolts attaching trunnion socket assembly to axle housing. Block up assembly to prevent axle shafts from binding in housing sleeve while being removed. Tap socket assembly bosses to free axle shaft. Slide socket assembly with axle shaft out of housing. Repeat operation for opposite side.

**d. Remove Differential Carrier Assembly (fig. 35).** Remove cotter pins, nuts, flat washers, and gaskets from lower two through bolts. Remove nuts, lock washers, and upper two through bolts. Back off and remove carrier stud nuts and lock washers. Lift out carrier assembly and remove carrier to housing gasket.



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**Figure 34 — Removing Trunnion Socket Assembly**



RA PD 322009

**Figure 35 — Removing Differential Carrier Assembly**

**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****57. DIFFERENTIAL CARRIER.****a. Disassembly.**

(1) **MARK CARRIER AND CARRIER CAPS** (fig. 36). Punch-mark carrier and carrier caps on both sides to assure correct fit when unit is assembled.

(2) **REMOVE DIFFERENTIAL ASSEMBLY** (fig. 36). Remove lock wires from carrier cap nuts and differential bearing adjusting ring lock screws. Remove lock screws and lift off adjusting ring locks. Remove carrier cap nuts. Tap off carrier caps. Tap adjusting rings out of threads in carrier. Lift out differential assembly.

(3) **DISASSEMBLE DIFFERENTIAL ASSEMBLY** (figs. 50 and 51). Refer to paragraph 73 a (2).

(4) **REMOVE RIGHT-HAND SPUR PINION BEARING COVER**. Remove nuts and lock washers attaching cover to carrier. Lift off cover, shims, and gasket. Pull right-hand spur pinion bearing cup out of bearing cover.

(5) **REMOVE LEFT-HAND SPUR PINION BEARING COVER** (figs. 36 and 38). Remove nuts and lock washers attaching cover to carrier. Lift off cover, shims, and gasket.

(6) **REMOVE SPUR PINION BEARING CAGE** (figs. 36 and 38). Remove nuts and lock washers attaching cage to carrier. Tap cage to loosen it from carrier. Lift off cage and gasket. Pull left-hand spur pinion bearing cup out of cage.

(7) **REMOVE BEVEL GEAR AND SPUR PINION ASSEMBLY** (fig. 37). Lift bevel gear and spur pinion assembly out of carrier.

(8) **DISASSEMBLE BEVEL GEAR AND SPUR PINION ASSEMBLY** (figs. 37 and 38). Remove lock wire from two cap screw heads on end of spur pinion. Remove cap screws and lift off the spur pinion bearing lock. Using an arbor press, press bevel gear and left-hand spur pinion bearing cone off the spur pinion. Remove right-hand bearing cone with a bearing puller.

(9) **REMOVE BEVEL PINION ASSEMBLY** (figs. 37 and 38). Remove nuts and lock washers attaching bevel pinion bearing cage to carrier. Insert puller screws into two threaded holes on opposite sides of cage. Turn puller screws evenly and draw bearing cage out of carrier. Remove shims and gasket.

FRONT AXLE

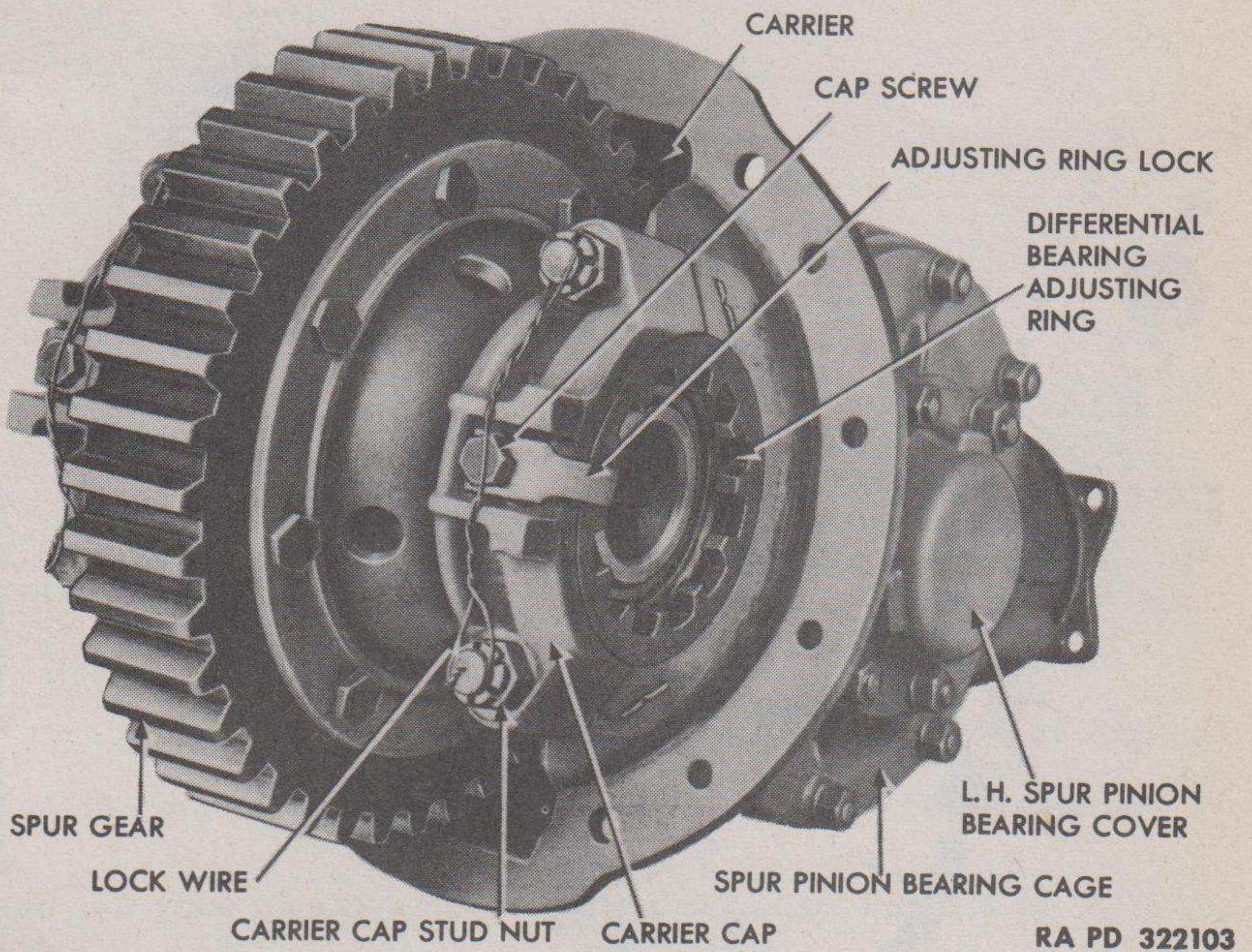


Figure 36 — Front Axle Differential Carrier Assembly

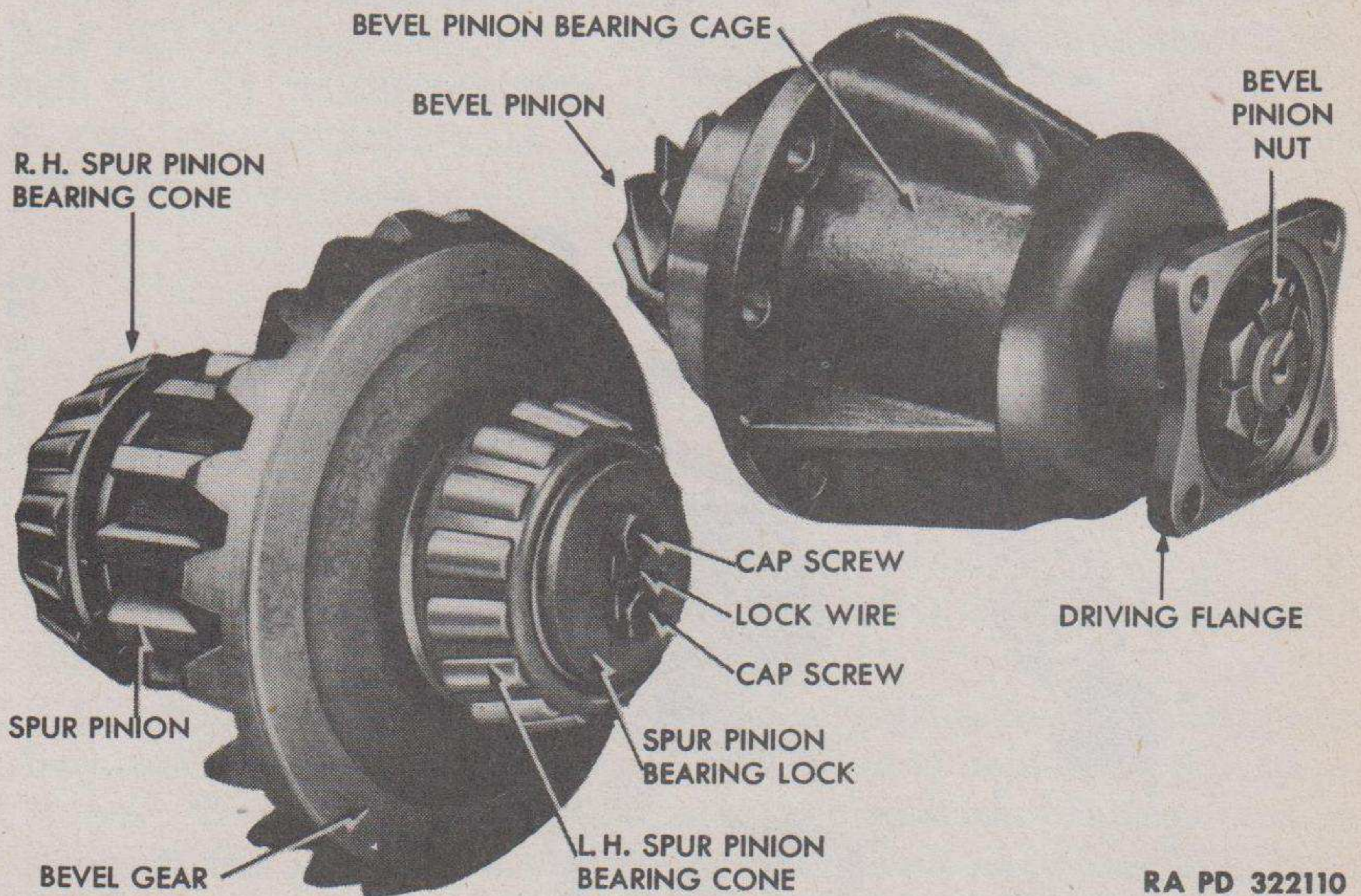


Figure 37 — Front Axle Gear Assemblies Removed

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

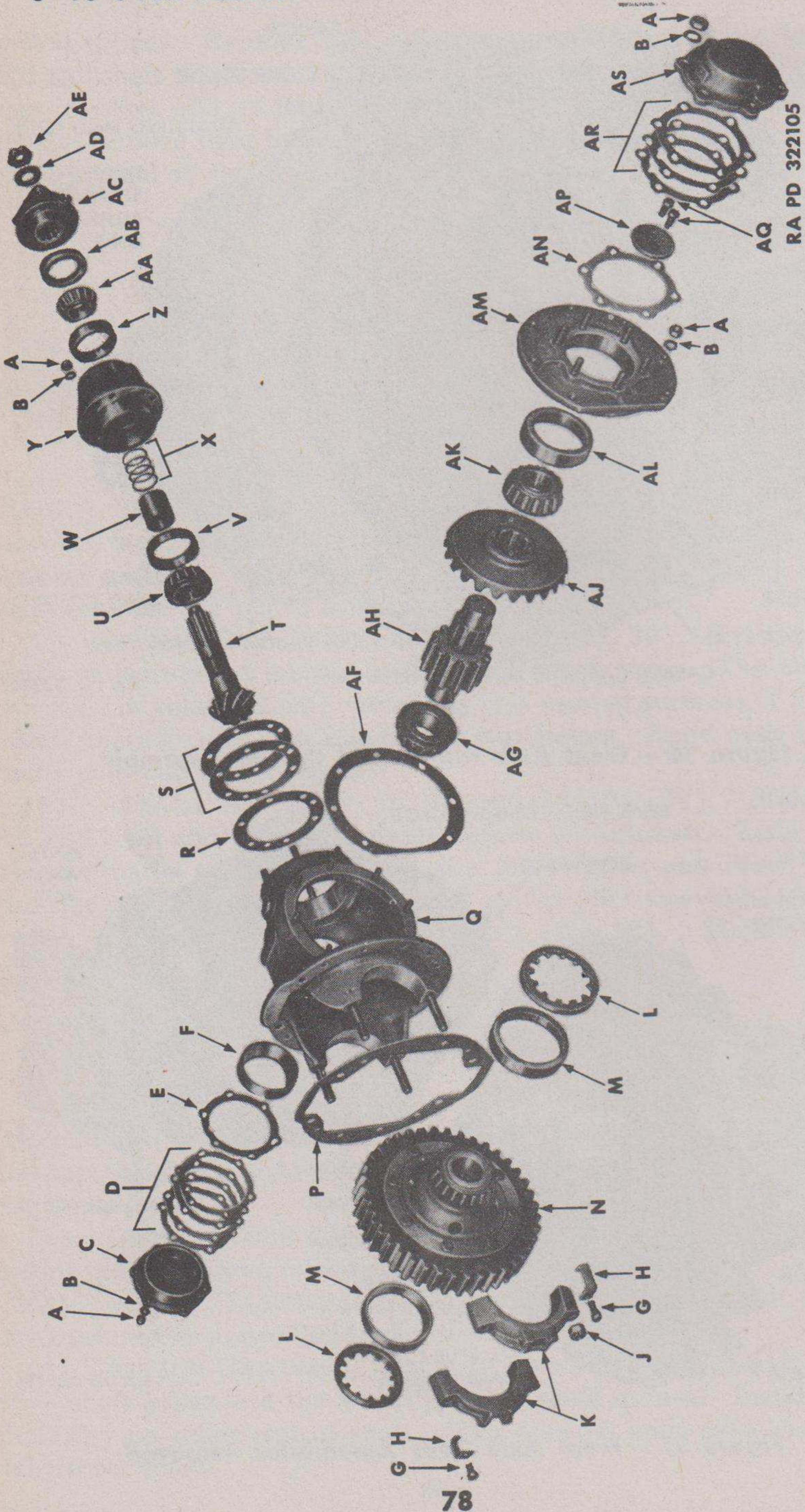


Figure 38 — Front Axle Differential Carrier Disassembled

FRONT AXLE

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| A—NUT                                 | X—BEVEL PINION BEARING SHIMS          |
| B—LOCK WASHER                         | Y—BEVEL PINION BEARING CAGE           |
| C—R.H. SPUR PINION BEARING COVER      | Z—REAR BEVEL PINION BEARING CUP       |
| D—SHIMS                               | AA—REAR BEVEL PINION BEARING CONE     |
| E—GASKET                              | AB—BEVEL PINION BEARING CAGE OIL SEAL |
| F—R.H. SPUR PINION BEARING CONE       | AC—DRIVING FLANGE                     |
| G—ADJUSTING RING LOCK SCREW           | AD—BEVEL PINION NUT WASHER            |
| H—ADJUSTING RING LOCK                 | AE—BEVEL PINION NUT                   |
| J—CARRIER AND CAP STUD NUT            | AF—GASKET                             |
| K—CARRIER CAP                         | AG—R.H. SPUR PINION BEARING CONE      |
| L—DIFFERENTIAL BEARING ADJUSTING RING | AH—SPUR PINION                        |
| M—DIFFERENTIAL BEARING CUP            | AJ—BEVEL GEAR                         |
| N—DIFFERENTIAL ASSEMBLY               | AK—L.H. SPUR PINION BEARING CONE      |
| P—CARRIER TO HOUSING GASKET           | AL—L.H. SPUR PINION BEARING CUP       |
| Q—DIFFERENTIAL CARRIER                | AM—SPUR PINION BEARING CAGE           |
| R—GASKET                              | AN—GASKET                             |
| S—SHIMS                               | AP—SPUR PINION BEARING LOCK           |
| T—BEVEL PINION                        | AQ—SPUR PINION BEARING LOCK SCREW     |
| U—FORWARD BEVEL PINION BEARING CONE   | AR—SHIMS                              |
| V—FORWARD BEVEL PINION BEARING CUP    | AS—L.H. SPUR PINION BEARING COVER     |
| W—BEVEL PINION BEARING SPACER         |                                       |

RA PD 322105B

Legend for Figure 38 — Front Axle Differential Carrier Disassembled



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

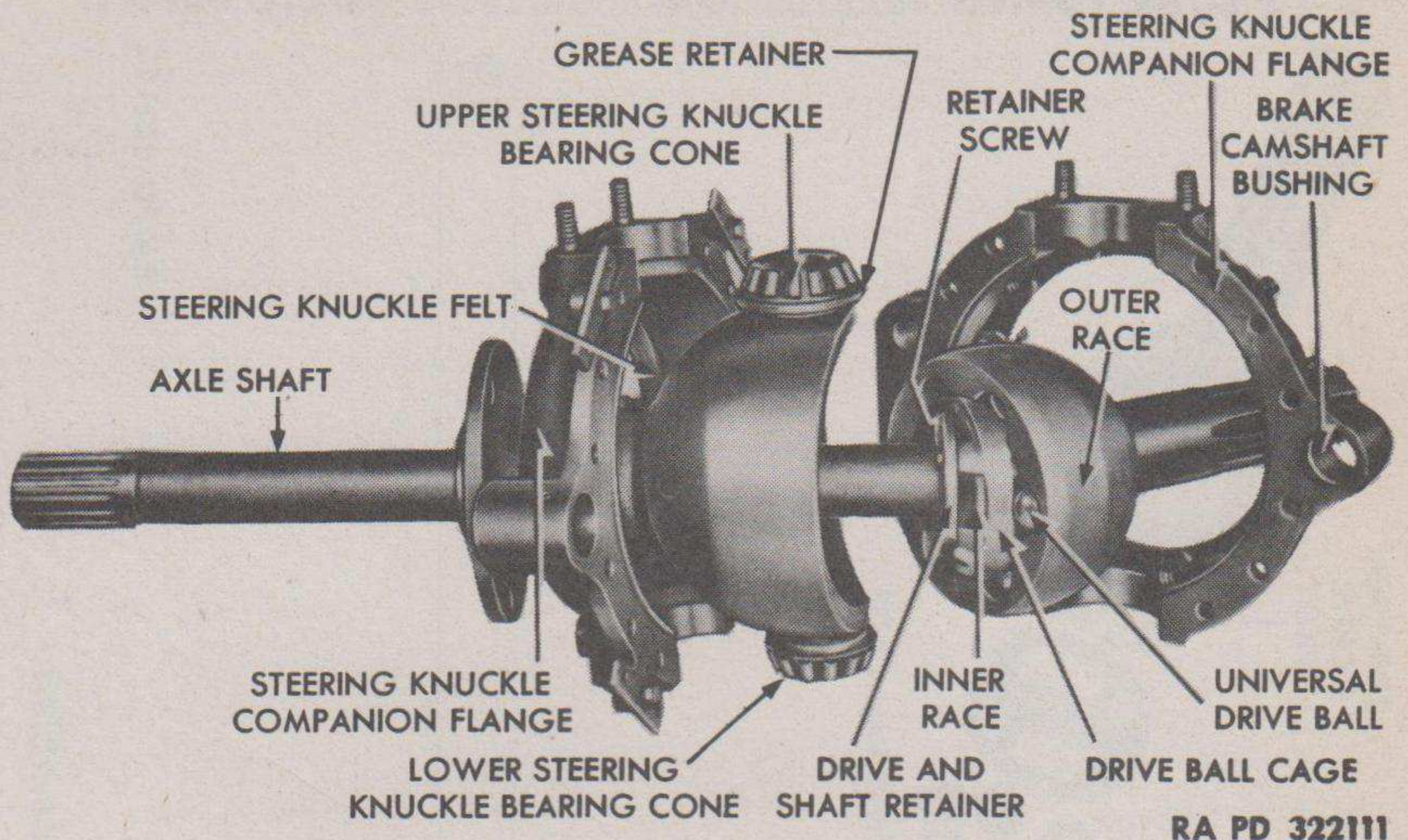
(10) **DISASSEMBLE BEVEL PINION ASSEMBLY** (figs. 37 and 38). Remove cotter pin, bevel pinion nut, and washer. Support shoulder of bearing cage in an arbor press. Press down on flange end of bevel pinion and press pinion forward bearing cone, bearing spacer, and shims out of drive flange and bevel pinion bearing cage. Slide spacer and shims off pinion. Pull forward bearing cone off bevel pinion with replacer 41-R-2384-115. Pull oil seal out of bearing cage, and lift out rear bearing cone. Pull forward and rear bearing cups out of bearing cage.

**b. Cleaning, Inspection, and Repair.** Wash all parts in dry-cleaning solvent before inspection, scrubbing with brush to remove all particles of old lubricant. Immerse bearings into clean dry-cleaning solvent and allow them to remain long enough to loosen hardened lubricant. Revolve bearings slowly below the surface of the liquid. When bearings are clean, dry them with compressed air, directing air across and through bearings so they do not spin. Inspect rollers and bearing cups for chipping, cracks, or worn spots. Do not attempt repairs on bearings other than removal of light burs with a handstone. After inspection, dip bearings in lubricant and store in a clean covered container, or wrap in paper until needed for assembly. Examine all gears for chipped, cracked, or scored teeth and replace damaged gears. If bevel pinion is found damaged, replace bevel pinion and bevel gear. (This is necessary because bevel pinion and bevel gear are a matched and lapped set.) Check fit of differential pinion gears on spider. If damaged pinion gear is found, install a new set of four gears. Examine differential side gears for proper fit of gear hubs in halves of differential case. If gears are worn or damaged, replace the set. Inspect thrust washers for wear and replace thrust washer if wear exceeds limit of 0.048 inch. Inspect bevel pinion bearing cage oil seal for misshaped inner diameter and looseness of packing. Replace seal if such conditions are found.

**c. Assembly.**

(1) **ASSEMBLE BEVEL PINION ASSEMBLY** (fig. 38). Press forward bearing cone onto bevel pinion against bevel pinion gear teeth. Slide bearing spacer onto bevel pinion with flat edge of spacer against forward bearing cone. Slide shims against bearing spacer. Press forward bearing cone into bevel pinion bearing cage until it is flush with outer edge of cage. Press rear bearing cone into cage against shoulder. Lubricate rear bearing cone and place it in seat in rear cup. Press oil seal into cage until flush with outer edge. Position bevel pinion with forward bearing cone, spacer, and shims in bearing cage. Press drive flange onto splines of bevel pinion and install bevel pinion washer, nut, and cotter pin.

FRONT AXLE



**Figure 39 – Trunnion Socket Partly Disassembled**

(2) **ASSEMBLE BEVEL GEAR AND SPUR PINION ASSEMBLY** (fig. 38). Press bevel gear onto splines of spur pinion against spur gear teeth. Press left-hand bearing cone on spur pinion against back of bevel gear. Install spur pinion bearing lock, two cap screws, and lock wire. Press right-hand bearing cone on spur pinion against spur pinion gear teeth.

(3) **ASSEMBLE DIFFERENTIAL ASSEMBLY** (figs. 50 and 51). Refer to paragraph 73, c (8).

(4) **INSTALL BEVEL PINION ASSEMBLY**. Position a new gasket on carrier studs. Place shims against gasket. Install assembly in carrier and secure with lock washers and nuts.

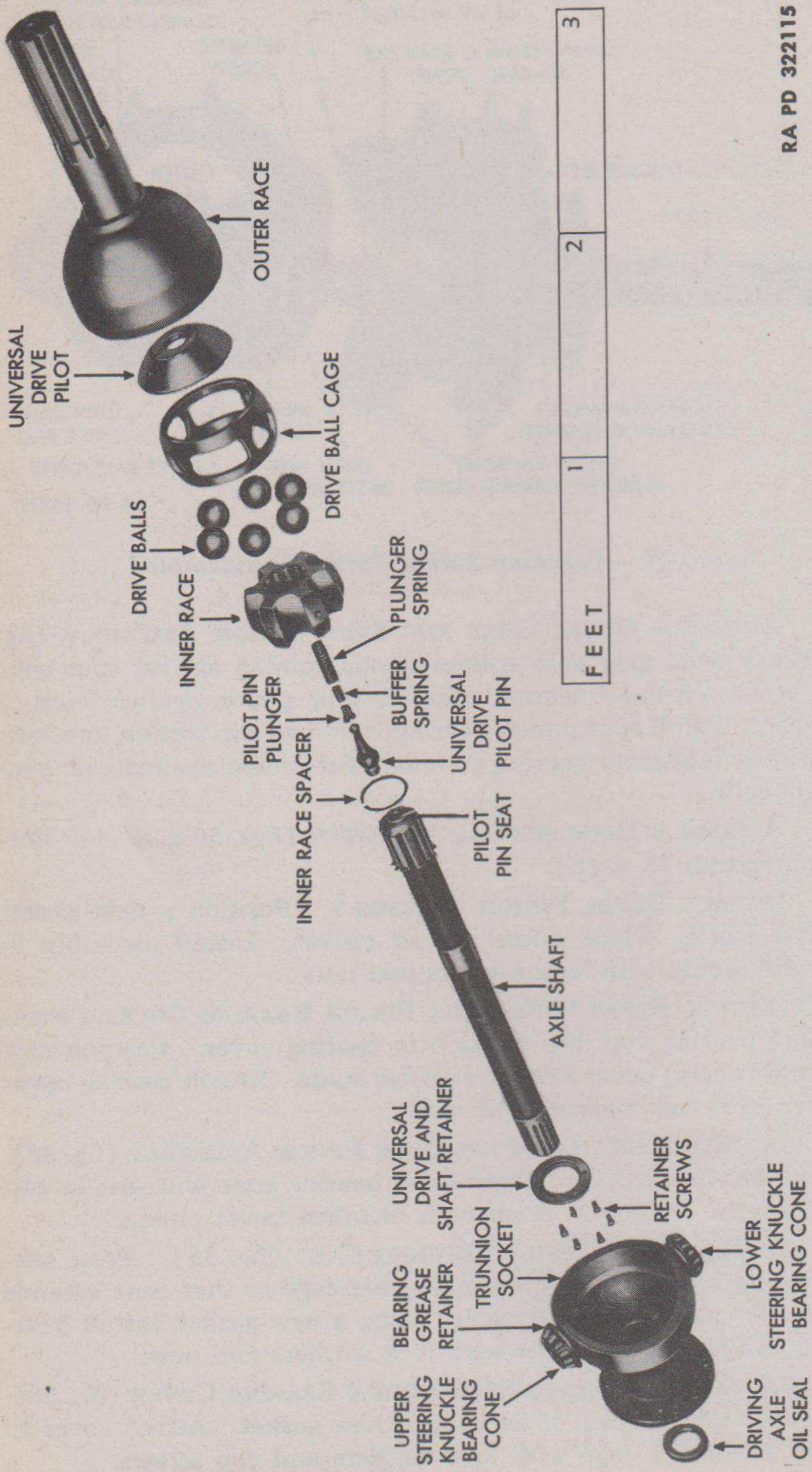
(5) **INSTALL RIGHT-HAND SPUR PINION BEARING COVER**. Press right-hand bearing cup into position in bearing cover. Position new gasket and bearing cover shims on carrier studs. Attach bearing cover to carrier with lock washers and nuts.

(6) **INSTALL BEVEL GEAR AND SPUR PINION ASSEMBLY** (fig. 38). Lift assembly into carrier. Right-hand bearing cone will seat in cup and bevel gear will be in mesh with installed bevel pinion.

(7) **INSTALL SPUR PINION BEARING CAGE** (fig. 38). Press left-hand bearing cone into position in bearing cage so that cone extends  $\frac{1}{8}$  inch over outside edge of cage. Using a new gasket, install bearing cage and secure to carrier with lock washers and nuts.

(8) **INSTALL LEFT-HAND SPUR PINION BEARING COVER** (fig. 38). Install shims and bearing cover using a new gasket. Attach cover to spur pinion bearing cage with lock washers and cap screws.

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Figure 40 — Front Axle Universal Joint Disassembled

## FRONT AXLE

(9) CHECK BEARING ADJUSTMENT AND TOOTH CONTACT OF BEVEL GEAR AND BEVEL PINION (fig. 68). Refer to paragraph 76.

(10) INSTALL DIFFERENTIAL ASSEMBLY (figs. 36 and 38). Place differential bearing cups on the bearing cones, and lift assembly into position in carrier. Differential spur gear must mesh with spur pinion. Place bearing adjusting rings against bearings with threads in rings engaged with threads in carrier. Install carrier caps, making certain that threads in caps are engaged with threads in adjusting rings. Install carrier cap nuts. Check differential bearing adjustment (par. 75 c), and install bearing adjusting lock and lock screw. Install lock wire.

### 58. TRUNNION SOCKET.

#### a. Disassembly.

(1) REMOVE STEERING KNUCKLE (figs. 34 and 40). Remove nuts and lock washers attaching steering knuckle to steering knuckle companion flange assembly. Lift off steering knuckle.

(2) REMOVE UPPER STEERING KNUCKLE BEARING CAP (fig. 34). Remove nuts and lock washers attaching bearing cap (which is a part of steering arm) to top of companion flange assembly. Tap off bearing cap and remove shims.

(3) REMOVE STEERING ARM BALL STUD (fig. 34). Remove cotter pin and ball stud nut. Tap out steering arm ball stud.

(4) REMOVE LOWER STEERING KNUCKLE BEARING CAP (fig. 34). Remove cap screws and lock washers attaching bearing cap to companion flange assembly. Lift off bearing cap and shims.

(5) REMOVE BRAKE SHOE ANCHOR PINS (fig. 34). Remove anchor pin nuts and lock washers. Pull out anchor pins.

(6) REMOVE STEERING KNUCKLE COMPANION FLANGES (figs. 34 and 39). Remove cap screws, nuts, lock washers, and bolts holding two halves of companion flanges together. Tap flanges apart. Remove flanges, upper and lower steering knuckle bearing caps, and trunnion socket. Remove felt and felt retainer from inside of right half of companion flange.

(7) REMOVE STEERING KNUCKLE BEARINGS (figs. 39 and 40). Using a bearing puller, remove lower bearing cone and upper bearing cone with its grease retainer from seats on trunnion socket. Remove driving axle oil seal only if damaged or worn (subpar. h, below).

(8) REMOVE AXLE SHAFT (figs. 39 and 40). Remove lock wire which is threaded through heads of universal drive and shaft retainer screws. Remove retainer screws and retainer. Pull axle shaft out of universal drive inner race. Lift universal drive pilot pin out of pilot pin seat in end of axle shaft.

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(9) **REMOVE UNIVERSAL DRIVE BALLS** (figs. 39 and 40). Lift inner race spacer off edge of inner race. Revolve drive ball cage and inner race within seat in universal drive outer race into positions which will permit removal of the six drive balls.

(10) **REMOVE INNER RACE AND DRIVE BALL CAGE** (figs. 39 and 40). Revolve inner race and drive ball cage until universal drive pilot is accessible. Lift out drive pilot; then lift out inner race and drive ball cage.

(11) **REMOVE PLUNGER SPRING** (fig. 40). Lift universal drive pilot pin plunger, plunger spring, and buffer spring out of outer race. Pull plunger out of plunger spring and remove buffer spring from inside of plunger spring.

**b. Cleaning, Inspection, and Repair.** Wash parts in dry-cleaning solvent before inspection. Immerse bearings in dry-cleaning solvent in which no other parts have been cleaned, and allow them to remain until hardened lubricant is loosened. Slush bearings up and down and revolve them slowly below the surface of the liquid. When bearings are clean, dry them by directing compressed air across and through bearings, but do not allow unlubricated bearings to spin. Examine rollers and cups for cracks or worn spots and replace damaged or worn bearings. Do not attempt repairs on bearings other than removal of light scores with a handstone. After inspection, dip bearings in lubricant and store in a clean covered container or wrap in waxed paper. Examine the driving axle oil seal while it is installed in the trunnion socket. If seal is damaged, or if packing is loose and flabby, remove it and install a new seal. Inspect brake camshaft bushings in both halves of steering knuckle companion flanges for burrs and score marks and remove light burrs with handstone. Test fit of camshaft in bushings, replacing bushings if side play is in excess of 0.0010 inch. Check condition of bushing in steering knuckle and replace bushing if inner diameter is scored, worn, or out of shape. Inner diameter is held to a tolerance of 2.770 inches and has a clearance on the shaft of 0.0010 to 0.0012 inch. Examine steering knuckle felt for flabby or torn condition, replacing worn or damaged felt. Examine axle shaft and shaft on universal joint outer race for signs of cracks, fractures, or twisting of splines, replacing axle shaft or outer race if such defects are found. Inspect inner race and universal drive balls for rough spots and gall marks. Stone down small burrs; replace drive balls if they measure under 1.623 inches. Check condition of drive ball cage. Replace cage if cracked or scored.

**c. Assembly.**

(1) **INSTALL PLUNGER SPRING** (fig. 40). Place buffer spring

## FRONT AXLE

inside of plunger spring. Insert universal drive pilot pin plunger into end of plunger spring and install this assembly into the outer race. Be sure the curved socket end of plunger faces upward.

(2) **INSTALL DRIVE BALL CAGE** (figs. 39 and 40). Place cage into outer race with elongated slots in cage over opposite ribs in outer race.

(3) **INSTALL INNER RACE** (figs. 39 and 40). Rotate cage to a vertical position and insert inner race. To do so, line up any two opposite ribs of the inner race with the two elongated slots in the cage and rotate inner race into position. **CAUTION:** *Exercise extreme care in this assembly. Do not force or jam parts together. They will slip together easily when properly installed.*

(4) **INSTALL UNIVERSAL DRIVE PILOT** (fig. 40). Rotate drive ball cage so that shaft retainer screw holes in inner race face toward bottom of outer race. Place universal joint pilot on the cage and rotate assembly back to its normal position. Pilot is now on the bottom and inner race retainer screw holes on top.

(5) **INSTALL LUBRICANT.** Pack entire assembly with general purpose grease.

(6) **INSTALL UNIVERSAL DRIVE BALLS** (figs. 39 and 40). Tilt inner race and drive ball cage to bring one of the ball sockets of the cage in line with a raceway in joint of outer race and upward sufficiently to allow one drive ball to be dropped into place. Tilt inner race and cage to other five positions and install remaining drive balls.

(7) **INSTALL PILOT PIN** (fig. 40). Drop universal joint pilot pin into the assembly with small end down so it will seat on head of pilot pin plunger in bottom of outer race.

(8) **INSTALL AXLE SHAFT** (figs. 39 and 40). Place inner race spacer on top of inner race. Insert axle shaft into splines of inner race. Slide universal drive and shaft retainer over axle shaft into position on inner race. Install retainer screws and lock wire.

(9) **ASSEMBLE TRUNNION SOCKET** (fig. 40). If oil seal has been removed, press a new seal into position in trunnion socket. Place bearing grease retainer on upper knuckle bearing pin. Press upper bearing cone on bearing pin against grease retainer. Press lower bearing cone on bottom knuckle bearing pin.

(10) **INSTALL STEERING KNUCKLE COMPANION FLANGES** (fig. 39). Slide steering knuckle assembly over axle shaft and onto universal joint assembly. Install felt and felt retainer into recess in right half companion flange; then position flange over trunnion socket assembly. Position left half companion flange to meet right half around upper and lower knuckle bearing cones. Hold assembly together by installing four bolts, lock washers, and nuts.

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(11) **LUBRICATE KNUCKLE BEARINGS** (fig. 39). Pack upper and lower knuckle bearing cones with general purpose grease.

(12) **INSTALL KNUCKLE BEARING CAPS** (fig. 34). Tap upper and lower steering knuckle bearing cups into position and install remaining companion flange cap screws, bolts, lock washers, and nuts. Position shims over lower bearing cap opening. Install lower bearing cap with cap screws and lock washers. Tap steering arm ball stud into end of steering arm, and install stud nut and cotter pin. Install upper bearing cap shims and the bearing cap which is a part of the steering arm. Secure cap to companion flanges with lock washers and stud nuts.

(13) **INSTALL STEERING KNUCKLE** (fig. 34). Slide steering knuckle with installed bushing over shaft of outer race. Attach knuckle to companion flange assembly with lock washers and stud nuts.

(14) **INSTALL BRAKE SHOE ANCHOR PINS** (fig. 34). Insert anchor pins through companion flange assembly, and install lock washers and anchor pin nuts.

## **59. FRONT AXLE HOUSING.**

### **a. Disassembly.**

(1) **REMOVE PLUGS.** Unscrew and remove drain, filler, and level plugs from axle housing.

(2) **REMOVE BREATHER NIPPLE.** Remove breather nipple reducer and breather nipple from axle housing. Thread nipple out of reducer.

(3) **REMOVE HOUSING SLEEVES.** It usually is advisable to replace the complete housing if a worn or damaged sleeve is found. If necessary to remove sleeve and replace with new sleeve, use an axle housing sleeve puller.

**b. Cleaning, Inspection, and Repair.** Wash parts thoroughly with dry-cleaning solvent, scrubbing with a stiff brush to remove all traces of hardened lubricant. Examine axle housing for cracks and fractures, tapping with hammer to test for cracks which might otherwise not be evident. Weld small cracks; replace housing if badly fractured. Examine all threaded parts for burrs, cross threading, and bent studs. Remove light burrs with a handstone. Replace damaged studs.

### **c. Assembly.**

(1) **INSTALL HOUSING SLEEVES.** If sleeves have been removed, press new sleeves into position in axle housing.

## FRONT AXLE

- (2) **INSTALL BREATHER NIPPLE.** Thread nipple into nipple reducer. Thread this assembly into opening in axle housing.
- (3) **INSTALL PLUGS.** Thread drain, filler, and level plugs into opening in axle housing.

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### Section IV

## ASSEMBLY OF FRONT AXLE

### 60. ASSEMBLY.

- a. **Install Differential Carrier Assembly (fig. 35).** Position a new carrier to housing gasket over carrier studs. Lower differential carrier assembly into housing and install four through bolts. Use gaskets, flat washers, nuts, and cotter pins on lower through bolts; lock washers and nuts on upper through bolts. Install lock washers and carrier stud nuts.
- b. **Install Trunnion Socket Assembly (fig. 35).** Lift assembly and slide axle shaft into axle housing. If necessary, rotate driving flange to mesh splines of axle shaft and differential. Attach flange of trunnion socket to flange on axle housing with bolts, lock washers, and nuts. Follow same procedure to install opposite trunnion socket assembly.
- c. **Install Lubricant.** Refer to TM 9-817 for quantity and type of lubricant to be installed.
- d. **Install Front Axle.** Install tie rod, wheel bearings, drum and hub assemblies, brake slack adjusters and diaphragms, wheels and tires, and complete assembly as instructed in TM 9-817.

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### Section V

## TESTS AND ADJUSTMENTS

### 61. TESTS AND ADJUSTMENTS.

- a. **Adjustment of Bearings.**
  - (1) **SPUR PINION SHAFT BEARINGS (fig. 38).** These tapered roller bearings are adjusted by means of shims located between the spur shaft bearing cages and carrier. To adjust, remove shims until bearings bind; then add a 0.001-inch or 0.002-inch shim to provide an adjustment of 0 to 0.002 inch, tight.
  - (2) **STEERING KNUCKLE BEARINGS.** Turn steering knuckle; if



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steering knuckle bearings bind, add shims under bearing caps (fig. 34). The bearings must not be over 0.002 inch, loose.

(3) **BEVEL PINION BEARINGS** (fig. 38). The tapered roller bearings are adjusted by the bearing shims between bearing spacer and rear bearing cone. Assemble bevel pinion assembly (par. 57 c (1) ), and turn pinion shaft. Shaft should turn with no appreciable end play. To adjust, disassemble bevel pinion assembly (par. 57 a (10) ), add or remove shims, reassemble, and test for end play.

b. **Adjustment of Spiral Bevel Axle Gears.** Backlash adjustment of front axle gears is the same as for rear axle (par. 76).

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**Section VI**

**FITS AND TOLERANCES**

**62. SERVICE INFORMATION.**

**a. Differential.**

Bearing adjustment .....	0.000 to 0.002 in. tight
Gear to pinion backlash .....	0.005 to 0.015 in.
Spur gear eccentricity .....	0.000 to 0.004 in.
Case run-out .....	0.000 to 0.004 in.
Pinion to spider clearance .....	0.000 to 0.006 in.
Side gear to axle shaft splines .....	0.002 to 0.006 in.
Side gear thrust washers:	
New limits .....	0.058 to 0.062 in.
Worn limits .....	0.048 in.
Pinion gear thrust washers:	
New limits .....	0.058 to 0.062 in.
Worn limits .....	0.048 in.

**b. Axle Alinement.**

Toe-in .....	$\frac{3}{16}$ to $\frac{5}{16}$ in.
Camber angle .....	0 deg
Caster .....	4 to 5½ deg

**c. Right-hand Turning Angle.**

Right wheel .....	28 deg
Left wheel .....	24 deg

**d. Left-hand Turning Angle.**

Left wheel .....	28 deg
Right wheel .....	24 deg

## FRONT AXLE

### Section VII

## FRONT END ALINEMENT

### 63. PRELIMINARY INSTRUCTIONS.

a. Five main points must be considered in correct front end alinement (sometimes called steering geometry). These five points are camber, caster, turning radius, kingpin inclination, and toe-in of front wheels. These five points should be checked since all are related. The checking of these five points can be done on a combination frame straightener and wheel alinement machine, or on a level floor, using two turning radius plates. Procedure is identical in either case.

b. Make the following general inspection before checking front end alinement:

(1) Inflate all tires to 70 pounds. Check the front wheel bearing adjustments and, if correct, make the adjustment given in TM 9-817.

(2) Check for looseness of the wheel at the knuckle. The knuckle bushing should have a clearance of 0.0010 to 0.0012 inch on the shaft. If the clearance exceeds these figures, permitting excessive looseness at this point, tap out old bushing and replace.

(3) Check for looseness at the steering arm drag link, and adjust the drag link if necessary. Refer to TM 9-817.

(4) Check for looseness in the steering gear, and adjust if necessary. Refer to TM 9-817.

(5) Check shock absorber action, and correct if necessary TM 9-817.

### 64. CHECKING FRONT WHEEL CAMBER AND WHEEL RUN-OUT.

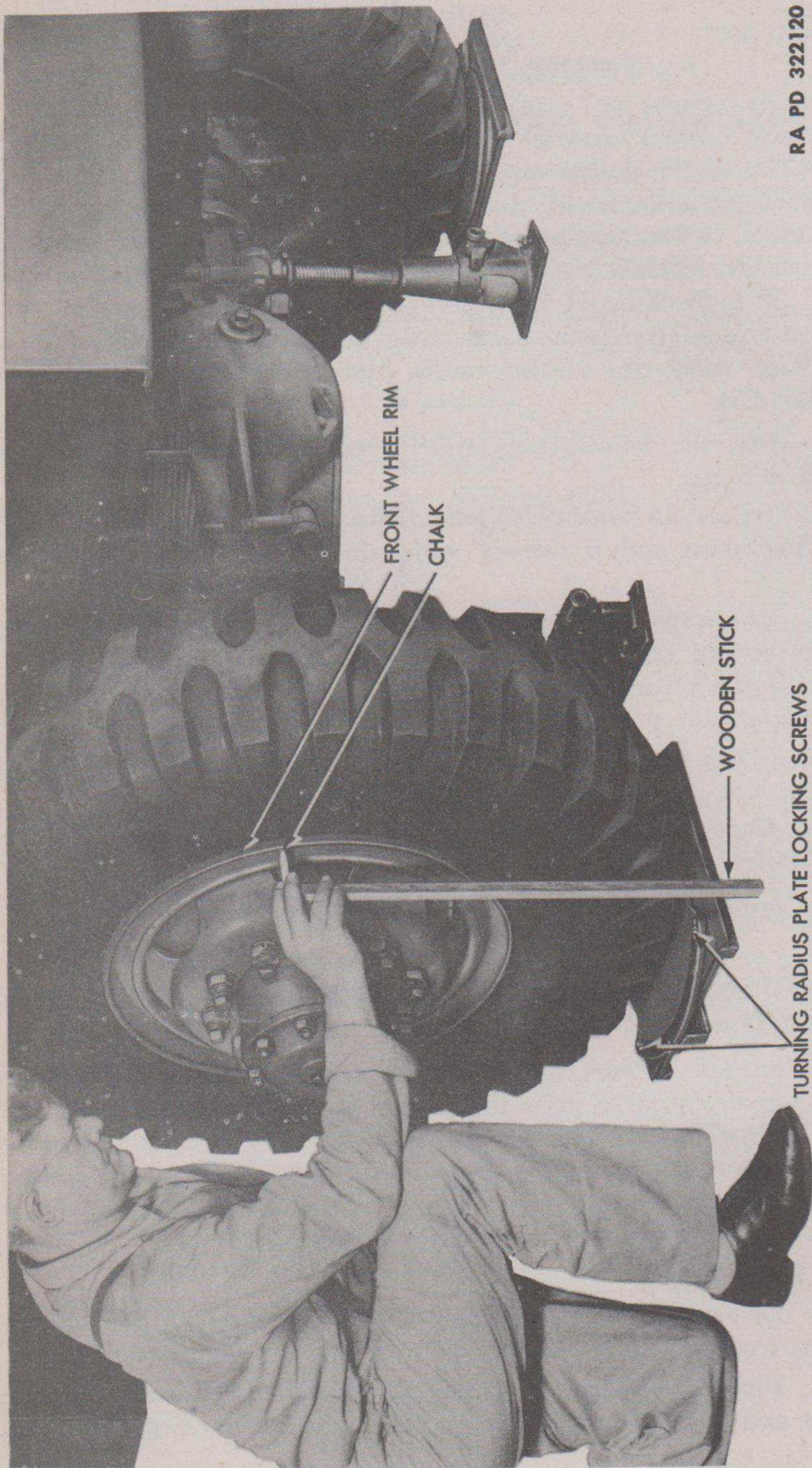
a. **General.** Wheel camber is the outward tilt of the front wheels at the top designed to keep the center of the tire tread in contact with the road. Although this tilt is built into the front axle, it is necessary to check camber to determine whether the front axle housing has been sprung or bent, thereby affecting the camber of the wheels and causing wear of the front tires.

b. **Preliminary.**

(1) Drive onto the two turning radius plates. Stop the vehicle with the front wheels resting on the center of the plates (fig. 41).

(2) Place the hydraulic jacks under each end of the front axle housing and raise both front wheels about one-half inch off the plates (fig. 41).

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Figure 41 — Marking Wheel Run-out

## FRONT AXLE

### c. Check Wheel Run-out.

(1) Before checking camber it is necessary to check front wheel run-out (wobble) because camber cannot be accurately checked if the wheel does not run true. The caster, camber, and kingpin gage used to check camber cannot give an accurate check if the gage is placed against any portion of the wheel that is bent or out of line.

(2) To check wheel run-out, hold a piece of chalk so that it is just about to touch the rim of the wheel and spin the wheel by hand (fig. 41), using any piece of stick or rod to support the hand and hold it steady. The point where the chalk marks the wheel rim is where the wheel is bent or wheel run-out exists. If wheel run-out is over one-sixteenth inch, replace it before proceeding with the camber test.

### d. Checking Camber.

(1) If run-out is less than one-sixteenth inch, stop the wheel so that the section of the wheel marked with chalk is at the rear.

(2) Make certain wheels are in a straight-ahead position, and remove the turning radius plate locking screws (fig. 41).

(3) Release the hydraulic jacks, allowing the front wheels to rest on the center of the plates (fig. 41). The plates will move a little when the screws are removed.

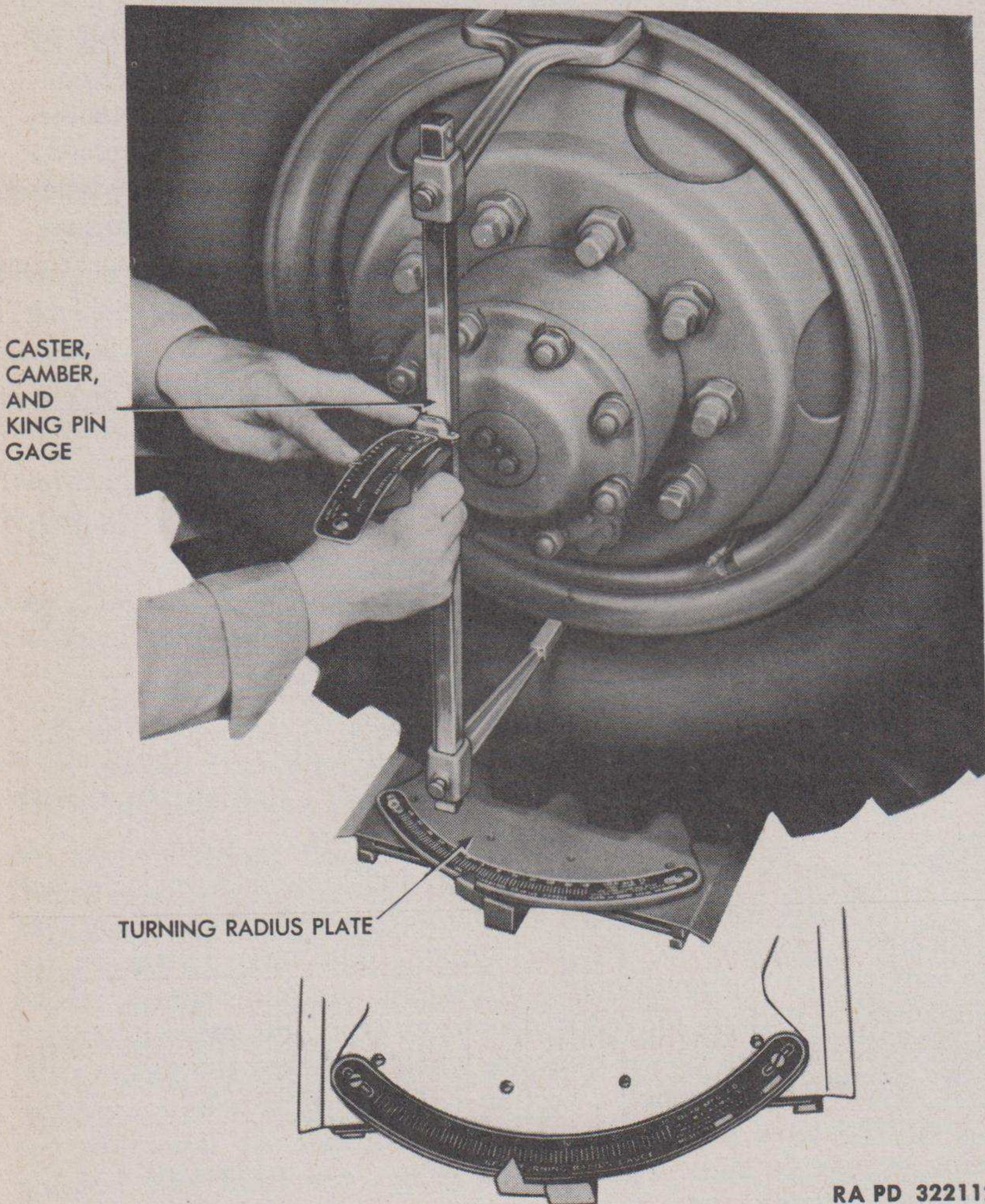
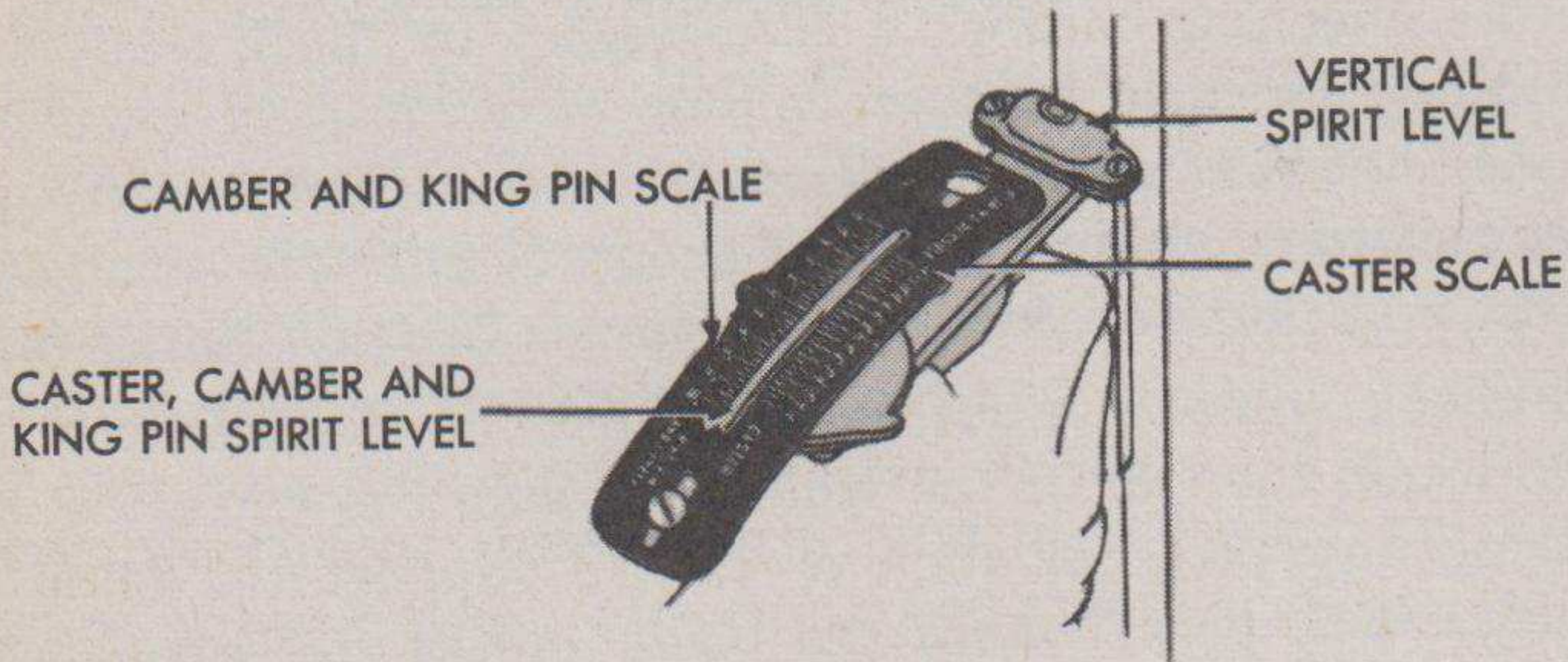
(4) Hold the caster, camber, and kingpin gage against the wheel (fig. 42), with feet of gage adjusted up or down so that they touch the wheel rim.

(5) Observe the bubble in the vertical spirit level (fig. 42), and move the gage clockwise or counterclockwise until the bubble shows the gages to be vertical.

(6) Next, loosen the screws in the camber and kingpin scale (fig. 42), and slide the scale in or out until zero on the scale is opposite the red line at the side of the scale. Tighten the screws.

**e. Reading Camber and Kingpin Scale.** If the front wheel has camber, the bubble in the caster, camber, and kingpin spirit level will move toward the wheel. If the bubble moves away from the wheel, it indicates a negative or reverse camber. The large marks on the scale are degrees, the small marks in between are half-degrees. Read the degrees the bubble moved and note in which direction it moved. Repeat this operation on the opposite wheel and note the degrees the bubble moved and in which direction. If the inspections covered in paragraph 63 have been made and all conditions are favorable, the reading should be zero degree. If it is not, the front axle housing probably is sprung and must be straightened or replaced to obtain the zero reading.

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Figure 42 — Checking Camber

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f. **Camber Adjustment.** Replace front axle housing if necessary and recheck camber and wheel run-out.

### 65. CHECKING CASTER OF FRONT WHEELS.

a. **General.** The caster of front wheels is obtained by tilting the front axle backward at the top and forward at the bottom. This tilting is engineered into the front axle at manufacture and is obtained by the proper relation of the spring seat on the axle to the front springs. Correct caster makes steering easy because it provides a pivot ahead of the contact point of the wheel. Too much negative or positive caster makes steering difficult.

b. **Preliminary.**

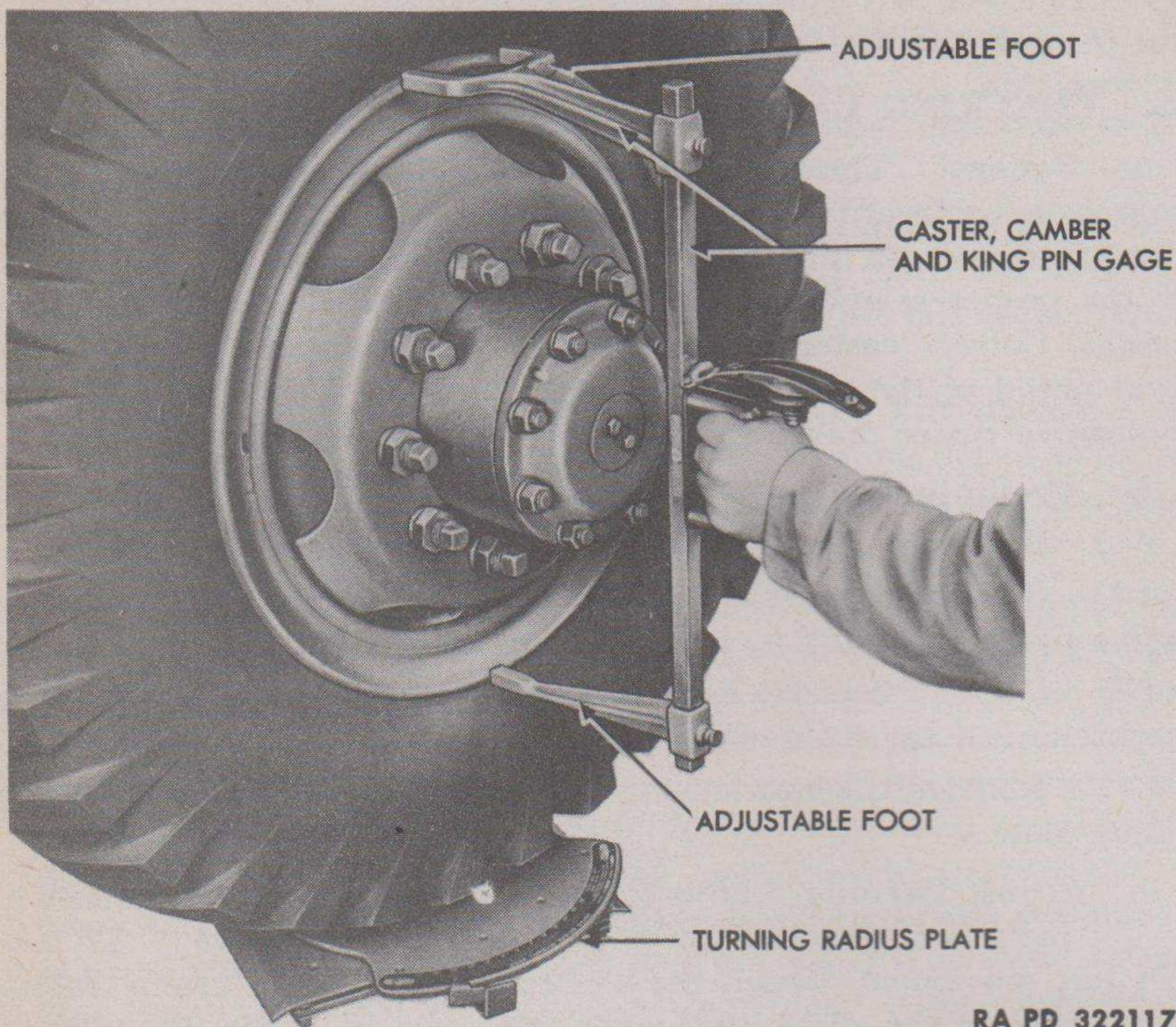
- (1) Drive on the two turning radius plates.
- (2) The front wheels must rest on the center of the turning radius plates (fig. 68) in a straight-ahead position.
- (3) Install the pedal depressor tool on the brake pedal, locking the brakes on the front wheels.
- (4) Remove the two locking screws (fig. 41) from each turning radius plate.

c. **Adjust Turning Radius Plates.** The turning radius plates will always move a little when the locking screws are removed. To correct this movement, loosen the screws that hold the turning radius plate scale to the plate, then slide the scale in either direction to bring the zero in line with the pointer at the side of the scale, and tighten the screws.

d. **Check Caster of Right Front Wheel.**

- (1) Check the caster on the right front wheel by turning the steering wheel as though you were making a left turn. Turn until the turning radius plate scale reads 20 degrees.
- (2) Hold the caster, camber, and kingpin gage against the wheel (fig. 43). The feet of the gage should be adjusted up or down so that they touch the wheel rim.
- (3) Observe the bubble in the vertical spirit level (fig. 43), and move the gage clockwise or counterclockwise until the bubble shows the gage to be vertical.
- (4) Loosen the screws in the caster scale. Push the caster scale in or out until zero on the caster scale is opposite the bubble of the caster, camber, and kingpin spirit level (fig. 43). Tighten the screws.
- (5) Remove the gage from the right wheel, but do not alter the position of the caster scale. Turn the steering wheel as though making a right turn until the turning radius plate scale reads 20 degrees.
- (6) Place the caster, camber, and kingpin gage against the right wheel again. The caster, camber, and kingpin spirit level bubble

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**Figure 43 — Checking Caster**

will move. When the bubble moves toward the wheel, the wheel has a positive caster. When the bubble moves away from the wheel, it indicates a negative or reverse caster. The large marks on the scale are degrees; the small marks in between are half-degrees. Read the degrees the bubble moved on the caster scale. The degree mark that is opposite the center of the bubble is the amount of caster in the right wheel.

e. **Check Caster of Left Front Wheel.** Repeat the above operation on the left wheel, starting with the left wheel turned as though making a right turn.

f. **Caster Adjustment.** The correct amount of caster is indicated by a reading of exactly 5 degrees. If the caster is incorrect, loosen the front spring U-bolts, pry loose the front axle from the front spring, and adjust with shims (subpar. g, below).

g. **Installing Shim.**

(1) Correct adjustment is obtained by the use of special wedge-shaped shims of 1, 2, or 3 degree thickness. Now insert a wedge-

## FRONT AXLE

shaped shim, thick end first, so that the groove in the shim fits around the spring center bolt. The shim is inserted from the front to tilt the axle backward and from the rear to tilt the axle forward. Tilting the axle backward increases caster, and tilting it forward decreases caster.

(2) Again check caster with the caster, camber, and kingpin gage. Change thickness of wedge if 5-degree reading is not obtained.

(3) Always check the camber after adjusting caster.

## 66. CHECKING TURNING RADIUS.

### a. General.

(1) Turning radius (also called toe-out on curves) determines the circles that the front wheels make in completing a right or left turn. The inside wheel turns at a sharper angle and rolls around in a smaller circle than the outer wheel.

(2) Turning radius is built in at manufacture by the installation of two turning radius set screws on the front axle. These set screws serve as stoppers to limit the turning arc of the wheels to the right or left. The screws are adjustable, and the setting can be altered by loosening nut and turning the screw to reduce turning radius. It is necessary to check the turning radius to discover whether or not either of the two knuckle steering arms is bent. If the check shows the turning radius to be incorrect, one or both of the knuckle steering arms must be straightened or replaced.

### b. Preliminary.

(1) Drive on the two turning radius plates. The front wheels must rest on the center of the turning radius plates in a straight-ahead position.

(2) Remove the two turning radius plate locking pins from each plate.

(3) Loosen the screws holding the turning radius plate scale to the plate. Then slide the scale in either direction to bring the zero in line with the pointer at the side of the scale. Tighten the screws.

### c. Checking Left Turning Radius.

(1) Turn the steering wheel to the left until turning radius plate scale under right wheel reads 20 degrees.

(2) Now read the scale on the turning radius plate under the left wheel. It should read  $22\frac{1}{2}$  degrees, with an allowable variation of plus 10 degrees. No minus degree variation is permissible. If the reading varies from these limits, the knuckle steering arm on the right side is bent.



**ORDNANCE MAINTENANCE — POWER TRAIN, CHASSIS, AND BODY FOR  
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(1) Turn the steering wheel to the right until the turning radius plate scale under the left wheel reads 20 degrees ahead of the zero mark on the scale.

(2) Now read the scale on the turning radius plate under the right wheel. It should read 22½ degrees, with an allowable variation of plus 1 degree. No minus degree variation is permissible. If the reading varies from these limits, the knuckle steering arm on the left side is bent.

**e. Turning Radius Adjustment.** If possible, replace bent knuckle steering arms with new knuckle steering arms. If new knuckle steering arms cannot be obtained, the bent arms can be straightened cold or hot. Straighten the bent arm until the distance from the knuckle ball on the steering arm to the wheel or brake backing plate measures the same as the opposite arm. As a further check, measure the distance from the arm to the frame or any other convenient point from which a measurement can be made. If both steering arms are bent, make frequent checks on the turning radius plates while the arms are being straightened. When the arms are straight, the turning radius plates will show the correct turning radius. **NOTE:** *For cold and hot straightening, see paragraph 68.*

**67. CHECKING KINGPIN INCLINATION ANGLE.**

**a. General.** Kingpin inclination is the outward tilt at the bottom of the kingpins in the trunnion socket. The inclination is set at manufacture in order to counteract the camber angle and help put the center of the tire tread in contact with the road. There is no adjustment of kingpin inclination angle. The check is made to show whether the steering knuckle is bent, or whether the knuckle bearings are worn.

**b. Preliminary.**

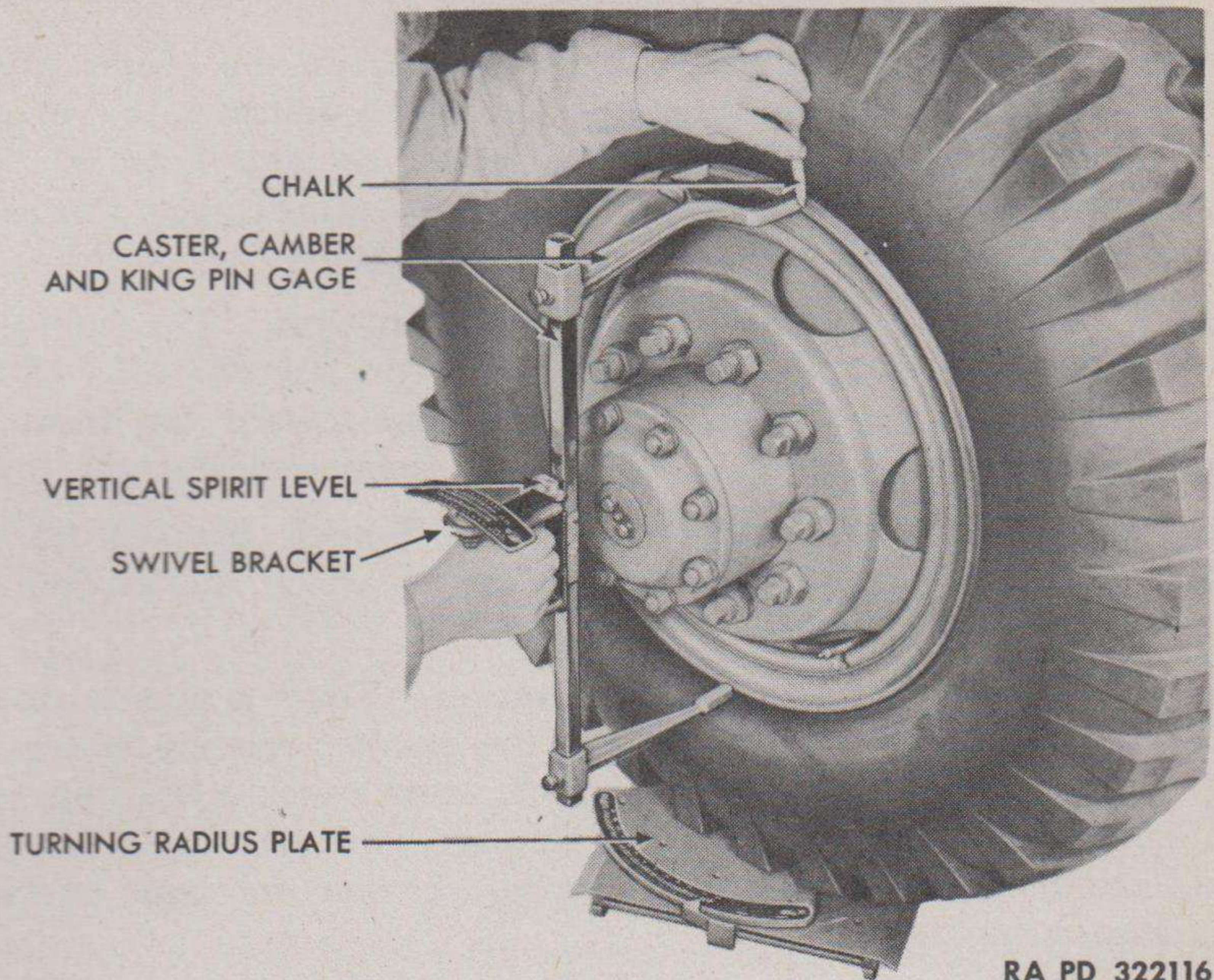
(1) Drive on two turning radius plates. The front wheels must rest on the center of the turning plate in a straight-ahead position.

(2) Remove the two turning radius plate locking pins from each plate.

(3) Install the pedal depressor tool on the brake pedal, locking the brakes on the front wheels.

**c. Adjust Turning Radius Plates.** Loosen the screws holding the scale to the plate; then turn the scale in either direction to bring the zero on the scale in line with the pointer at the side of the scale in place.

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**Figure 44 – Checking Kingpin Inclination**

d. **Set Wheels for Right Turn.** Turn the steering wheel to the right until it cannot be turned any further; then turn back until the turning radius plate scale under the right wheel reads 25 degrees. This will take up any existing slack in the front wheel braking system.

e. **Check Kingpin Inclination on Right Wheel.** Place the caster, camber, and kingpin gage against the right wheel rim. Adjust the feet of the gage up or down so that they touch the wheel rim. Observe the bubble in the vertical spirit level, and move the gage clockwise or counterclockwise until the bubble in the level shows the gage to be vertical. Turn the swivel bracket so that the camber and kingpin scale is parallel to the wheel. Loosen the screws in the camber and kingpin scale and slide the scale until zero on the scale is opposite the center of the scale spirit level bubble. Tighten the screws. Mark with chalk the location of the feet of the gage at the top and bottom of the wheel rim. Remove the gage from the wheel, being careful not to alter the position of the camber and kingpin scale. Turn the steering wheel to the left until the turning radius plate scale under the right wheel reads 25 degrees ahead of the zero mark on the scale. Place the feet of the caster, camber, and kingpin gage against the right wheel at the same spots previously marked with chalk. This time disregard the vertical spirit level, because the gage is not setting in a vertical position when reading kingpin in-

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clination. Read the number of degrees opposite the center of the bubble on the camber and kingpin scale, which indicates the amount of kingpin inclination. The reading should be zero degrees. The large marks on the camber and kingpin scale are degrees; the small marks in between are half-degrees.

**f. Positive and Negative Kingpin Inclination.** The bubble in the camber and kingpin scale will move toward the rear of the wrecker for positive kingpin inclination, and toward the front for negative inclination.

**g. Check Kingpin Inclination of Left Wheel.** Repeat the procedure outlined in the previous six steps to check the kingpin inclination of the left wheel.

**h. Adjustment of Kingpin Inclination.** There is no adjustment for incorrect kingpin inclination. If the camber reading is correct, but the kingpin inclination is incorrect, worn knuckle bearings or a bent steering knuckle is indicated. Replace worn bearings. If available, install new steering knuckle as replacement for bent knuckle; otherwise straighten it.

**68. STRAIGHTENING BENT AXLE PARTS.**

**a. Procedure.** The following straightening operations should be performed only in an emergency or when replacement parts are not available. In all cases, replace parts at the first opportunity.

(1) **COLD STRAIGHTENING.** If possible, all bending should be done cold (without any heat being applied to the part), because in this way all hardening or tempering of the part is retained. However, cold bending more than 1 degree is unsafe because it may cause a fracture of the steel. Cold straightening also varies with the ductility of the heat-treated part. Thus axle shafts, which possess little ductility, are almost impossible to straighten; axle housings and steering knuckles, which possess greater ductility, can be straightened.

(2) **HOT STRAIGHTENING.** An acetylene torch or an electric arc must be carefully used when heating a bent part, because overheating will reduce the strength of the part by as much as 90 percent. Always use the lowest heat possible to accomplish the straightening. Do not heat knuckle steering arms, axle housings, and steering knuckles over 1,200° F, which corresponds to a very dull red, barely perceptible in the daytime and dull in the dark. All heated parts must be quenched and tempered, and not allowed to cool in the air. The type of quenching and tempering must be decided by someone experienced in heat treating. Inspect each heat-treated part for hardness after straightening.

CHAPTER 9  
REAR AXLE

Section I  
DESCRIPTION AND DATA

69. DESCRIPTION AND OPERATION.

a. **Description** (fig. 45). This rear axle is the double-reduction type in which the first reduction is obtained through a set of spiral bevel gears and the second through a set of straight spur gears. The entire gear set is mounted in a carrier (fig. 49) and is detachable from the axle housing as a unit. The spur pinion, through shaft, and differential are mounted on roller bearings, the bevel gear being pressed on the hub of the spur pinion and locked in position with a key. The differential and spur gear are mounted between cast legs on the carrier. They are supported by opposed tapered roller bearings held in place by adjusting rings and locks. The differential assembly (fig. 50) is composed of two halves with the spur gear attached to case flanges by means of bolts, castle nuts, and cotter pins. The inner surfaces of both halves of the differential case are recessed to provide a seat for the differential spider on which the pinion and side gears are mounted (fig. 51). The through shaft and bevel pinion gear are mounted on tapered roller bearings. The rear bearing is pressed directly on the shaft and the front bearing is pressed on the hub of the bevel pinion gear, which in turn is pressed on splines of through shaft. The axle housing (fig. 48) is a large 1-piece steel casting with inserted sleeves which carry the weight and provide for a full floating drive.

b. **Operation.** Power is taken from the rear drive shaft by the through shaft bevel pinion through the drive flange. From the through shaft pinion, power is transmitted to the bevel gear which in turn rotates the differential case and spider pinion gears. Spider pinion gears rotate as a unit and transmit motion to side gears and thence to axle shafts to which pinion side gears are splined. Motion is transmitted by axle shafts to wheel hubs to which flanges on ends of axle shafts are attached.

70. DATA.

a. **Rear Axle Assembly.**

Make .....	Timken
Model .....	R-3100-W-X-2
Ratio .....	8.148 to 1
Type .....	Double-reduction, full-floating

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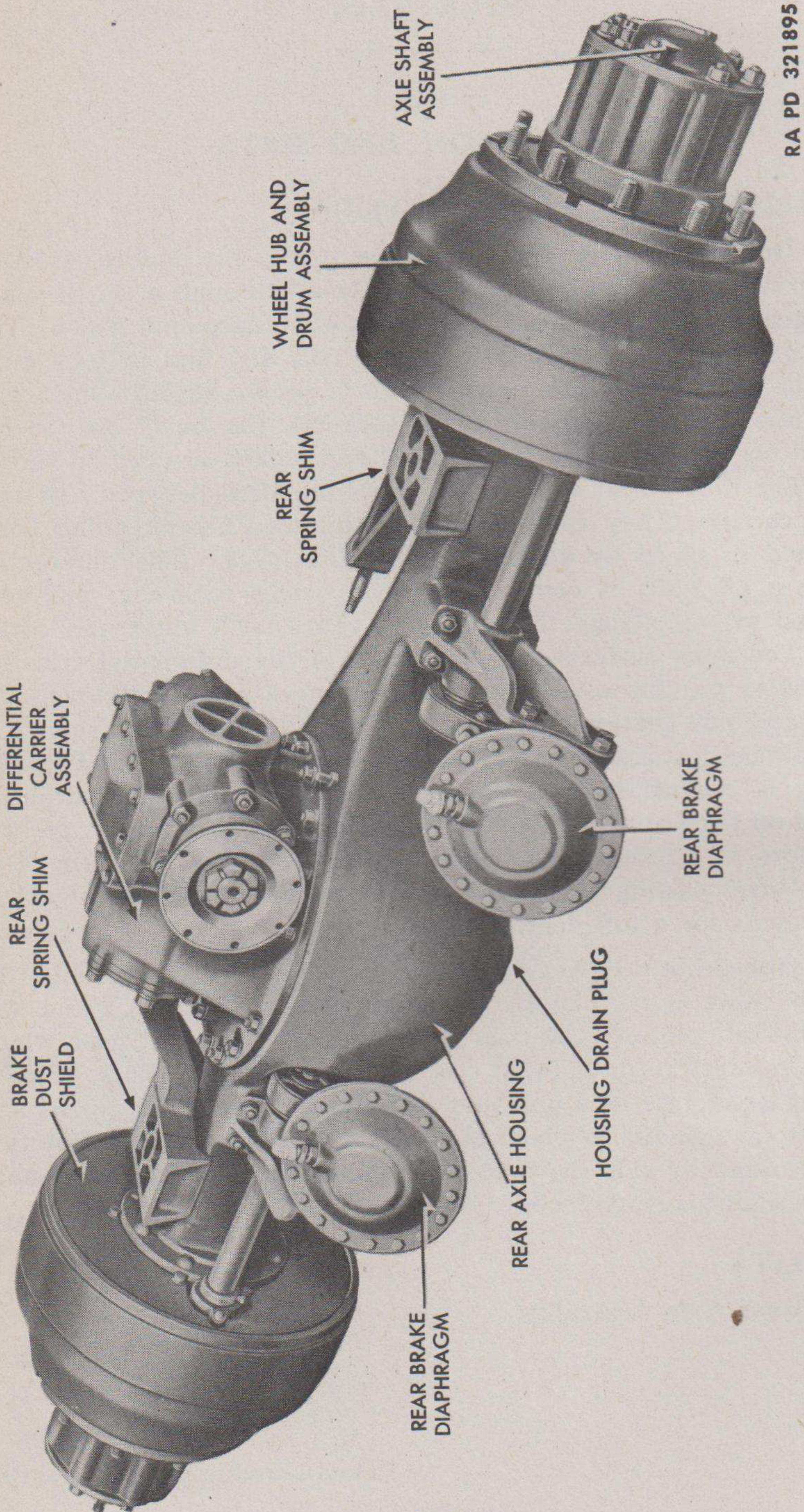
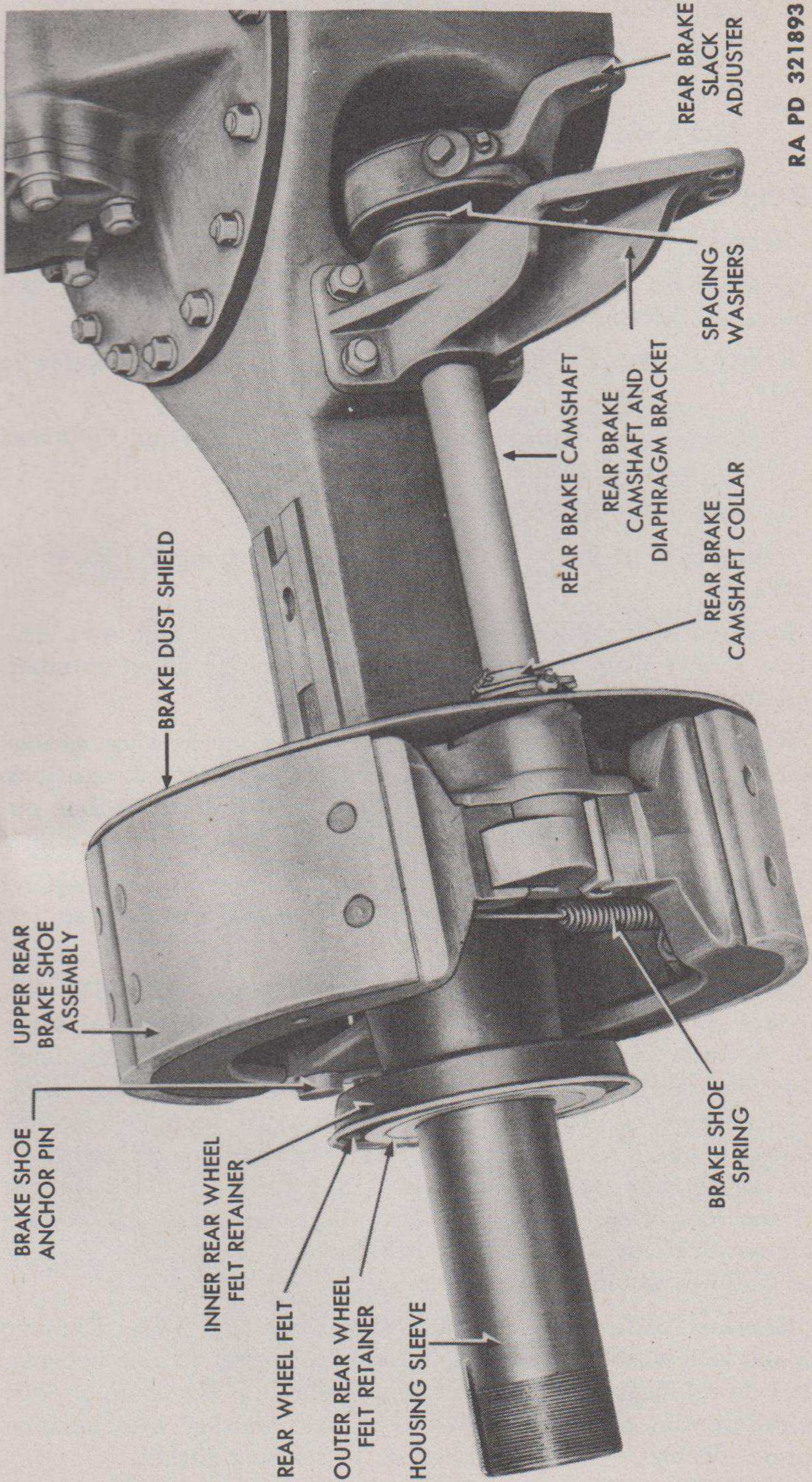


Figure 45 — Rear Axle Assembly Removed

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Figure 46 — Rear Brake Assembly — Wheel Hub and Drum Removed

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- a. **Remove Rear Axle Assembly.** Refer to TM 9-817.
- b. **Drain Rear Axle (fig. 45).** Remove housing drain plug and drain lubricant. Remove lubrication fittings.
- c. **Remove Rear Brake Diaphragms (fig. 45).** Refer to TM 9-817.
- d. **Remove Rear Spring Shims (fig. 45).** Tap left and right rear spring shims off axle housing.
- e. **Remove Axle Shaft.** Refer to TM 9-817.
- f. **Remove Wheels, Wheel Hubs, and Bearings.** Refer to TM 9-817.
- g. **Remove Rear Wheel Felt and Felt Retainers (fig. 46).** Remove two screws from outer felt retainer. Slide rear felt retainer, felt, and front retainer off axle housing sleeve.
- h. **Remove Brake Shoes (fig. 46).** Release brake shoe springs from spring pins and remove springs. Remove cap screw and lock washer securing brake shoe anchor pin lock, and tap out anchor pin lock. Tap out top and bottom anchor pins and lift off brake shoes.
- i. **Remove Brake Dust Shields (fig. 46).** Remove cap screws and lock washers attaching top and bottom dust shields to brake spider. Lift off dust shields.
- j. **Remove Brake Slack Adjuster and Camshaft (fig. 46).** Remove cotter pin and slack adjuster washer. Mark position of slack adjuster in relation to camshaft splines with chalk or light punch marks to facilitate assembly. Remove lock wire and back off camshaft collar screw two turns. Tap camshaft until enough clearance is obtained to lift slack adjuster and spacing washers off camshaft splines; then tap camshaft out of its seat in camshaft and diaphragm bracket and rear brake spider. *NOTE: Components and procedure for their removal are identical for either side of rear axle. Repeat steps as outlined above for opposite side.*
- k. **Remove Differential Carrier Assembly (fig. 47).** Remove 16 nuts and lock washers attaching differential carrier to axle housing. Pry out 1 dowel located on carrier to housing stud. Tie chain or rope around differential carrier and lift out of axle housing with hoisting equipment. Remove differential carrier to housing gasket.

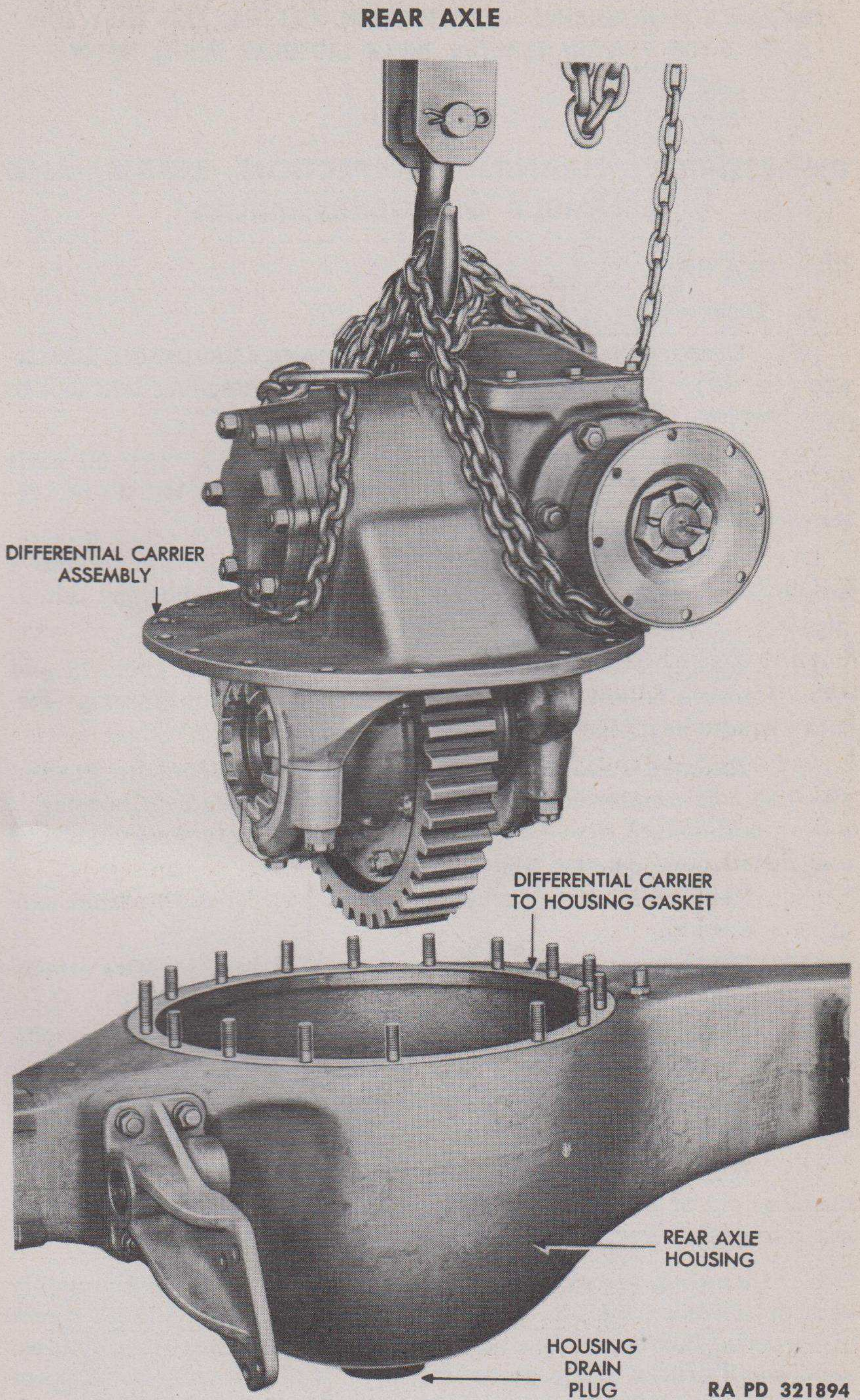


Figure 47 — Removing Differential Carrier Assembly



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Section III

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

**72. HOUSING.**

**a. Disassembly.**

(1) REMOVE REAR BRAKE CAMSHAFT AND DIAPHRAGM BRACKETS (fig. 48). Remove nuts and lock washers attaching brackets to axle housing. Lift off brackets.

(2) REMOVE AXLE SHAFT OIL SEALS (fig. 48). Pry oil seals out of housing sleeves if seals are damaged or worn, but do not remove them if in good condition.

(3) REMOVE HOUSING BREATHER NIPPLE (fig. 48). Remove nipple from axle housing, and back breather nipple bushing out of nipple.

(4) REMOVE HOUSING DRAIN AND FILLER PLUGS (figs. 45 and 48). Remove hollow-head drain plug from bottom of housing. Remove square-head filler plug from rear of housing.

(5) REMOVE REAR BRAKE SPIDER AND AXLE HOUSING SLEEVE (fig. 48). It usually is advisable to replace the complete housing if a worn or damaged sleeve is found. If necessary to remove old sleeve and install new one, use the following procedure:

(a) Remove housing sleeve retaining screw (fig. 48) from side of axle housing.

(b) Remove six rivets, two cap screws, and lock washers attaching rear brake spider to axle housing (fig. 48).

(c) Using an axle housing sleeve puller, pull housing sleeve with attached brake spider out of rear axle housing (fig. 48).

(d) Place housing sleeve in arbor press and press off rear brake spider.

(6) REMOVE REAR BRAKE SPIDER BUSHINGS (fig. 48). Tap bushings out of seat in brake spider if replacement is required, but do not remove otherwise.

**b. Cleaning, Inspection, and Repair.** Wash all parts thoroughly with dry-cleaning solvent, using a stiff brush and removing all traces of hardened lubricant. Examine axle housing for cracks or fractures; weld small cracks, but replace housing if badly fractured. Inspect axle shaft oil seals while installed in housing. If inner diameter is out of shape or felt is loose or flabby, remove oil seals and install new

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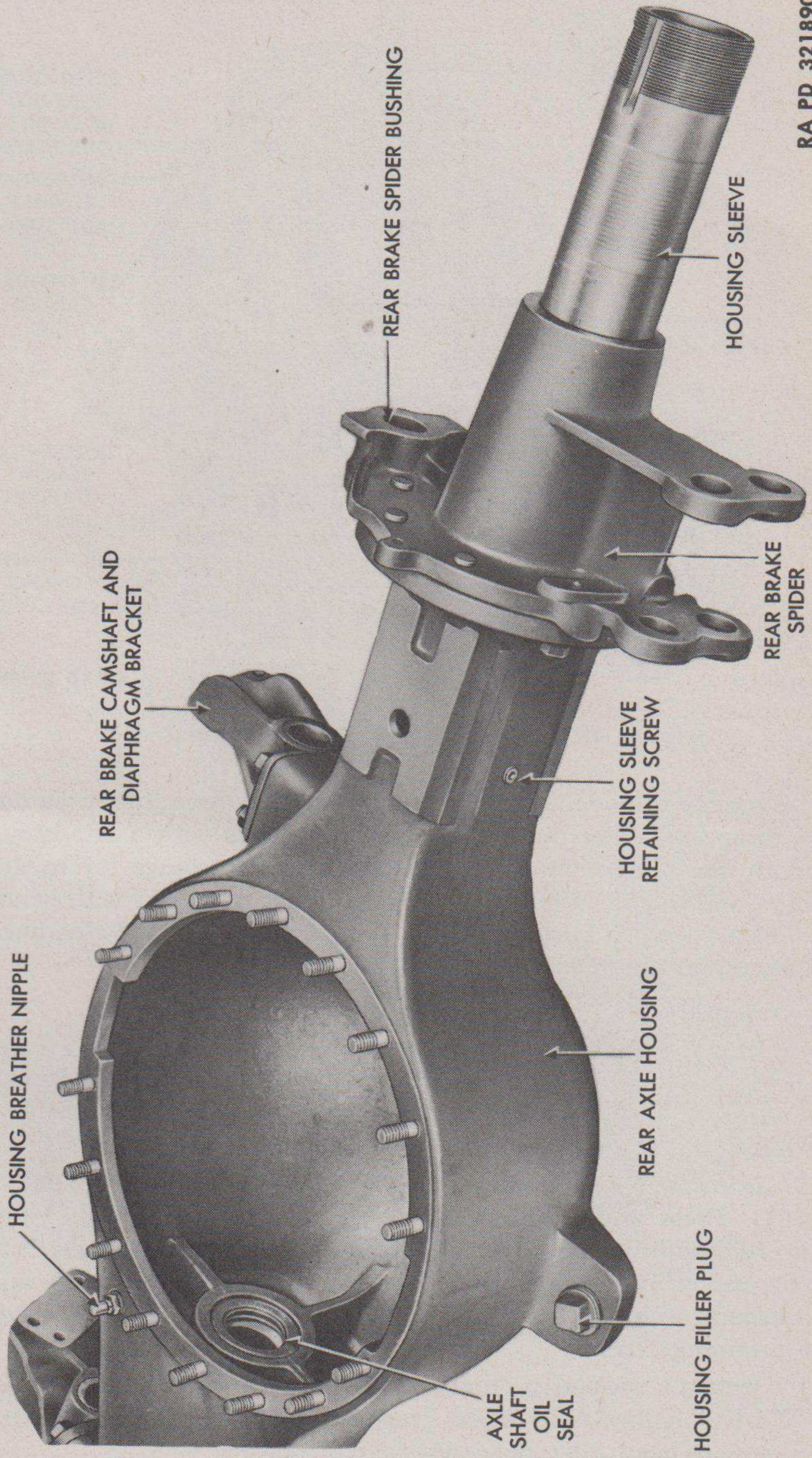
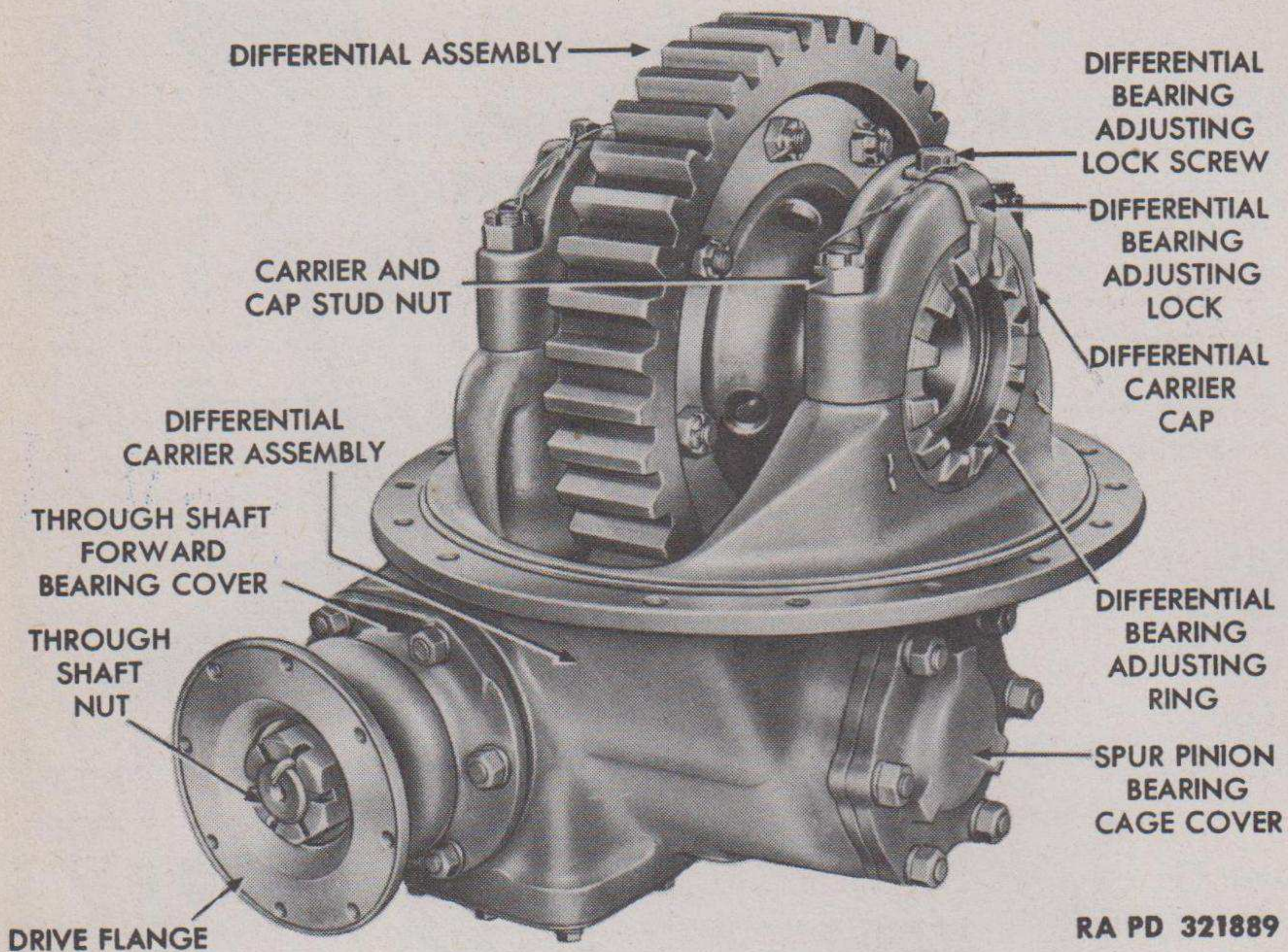


Figure 48 - Rear Axle Housing and Sleeve Assembly

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**Figure 49 — Differential Carrier Removed**

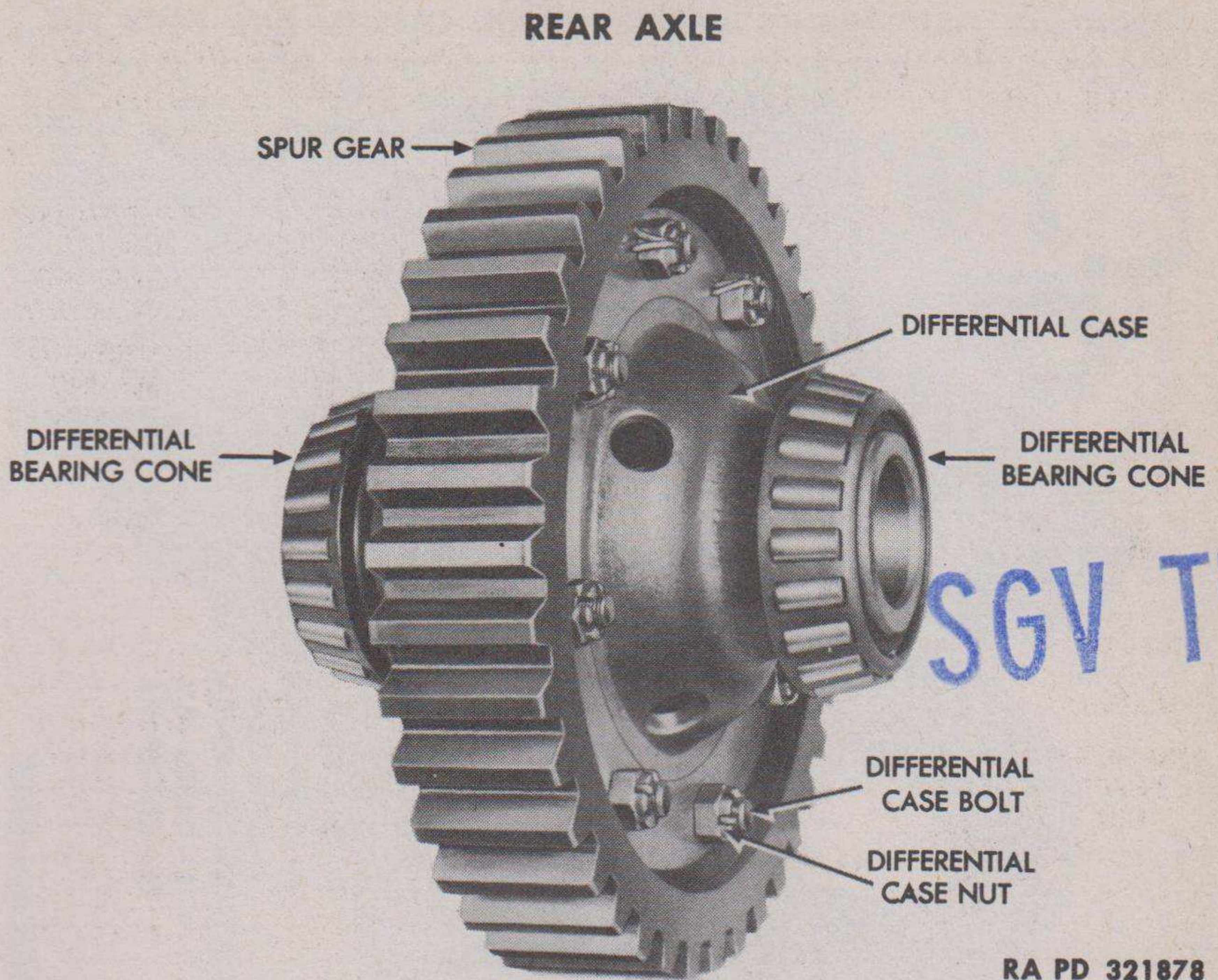
seals. Examine threaded openings in housing and threads on breather nipple, drain, and filler plugs. Remove light burs with a handstone or smooth file. Examine edges of brake spider bushings for roughness, burs, and ridges. Remove burs and light score marks with handstone. Replace worn bushings which show an excess radial clearance when brake camshaft is installed.

**c. Assembly.**

(1) **INSTALL REAR BRAKE SPIDER BUSHINGS** (fig. 48). Carefully press bushings into brake spider with an arbor press. Break sharp edges of bushings and remove burs resulting from pressing operation.

(2) **INSTALL REAR BRAKE SPIDER AND AXLE HOUSING SLEEVE** (fig. 48). Press brake spider into position on axle housing sleeve. Line up rivet and bolt holes in spider with holes in axle housing, and drive the assembly into axle housing. Install rivets, cap screws, and lock washers securing assembly to axle housing. Install housing sleeve retaining screw.

(3) **INSTALL HOUSING DRAIN AND FILLER PLUGS** (figs. 45 and 48). Thread hollow-head drain plug into bottom of axle housing. Thread square-head filler plug into rear of housing.



**Figure 50 – Differential Removed**

(4) **INSTALL HOUSING BREATHER NIPPLE** (fig. 48). Thread breather nipple into nipple bushing. Thread this assembly into top of axle housing.

(5) **INSTALL AXLE SHAFT OIL SEALS** (fig. 48). Tap oil seals into position in axle housing.

(6) **INSTALL REAR BRAKE CAMSHAFT AND DIAPHRAGM BRACKETS** (fig. 48). Attach brackets to axle housing by installing lock washers and stud nuts.

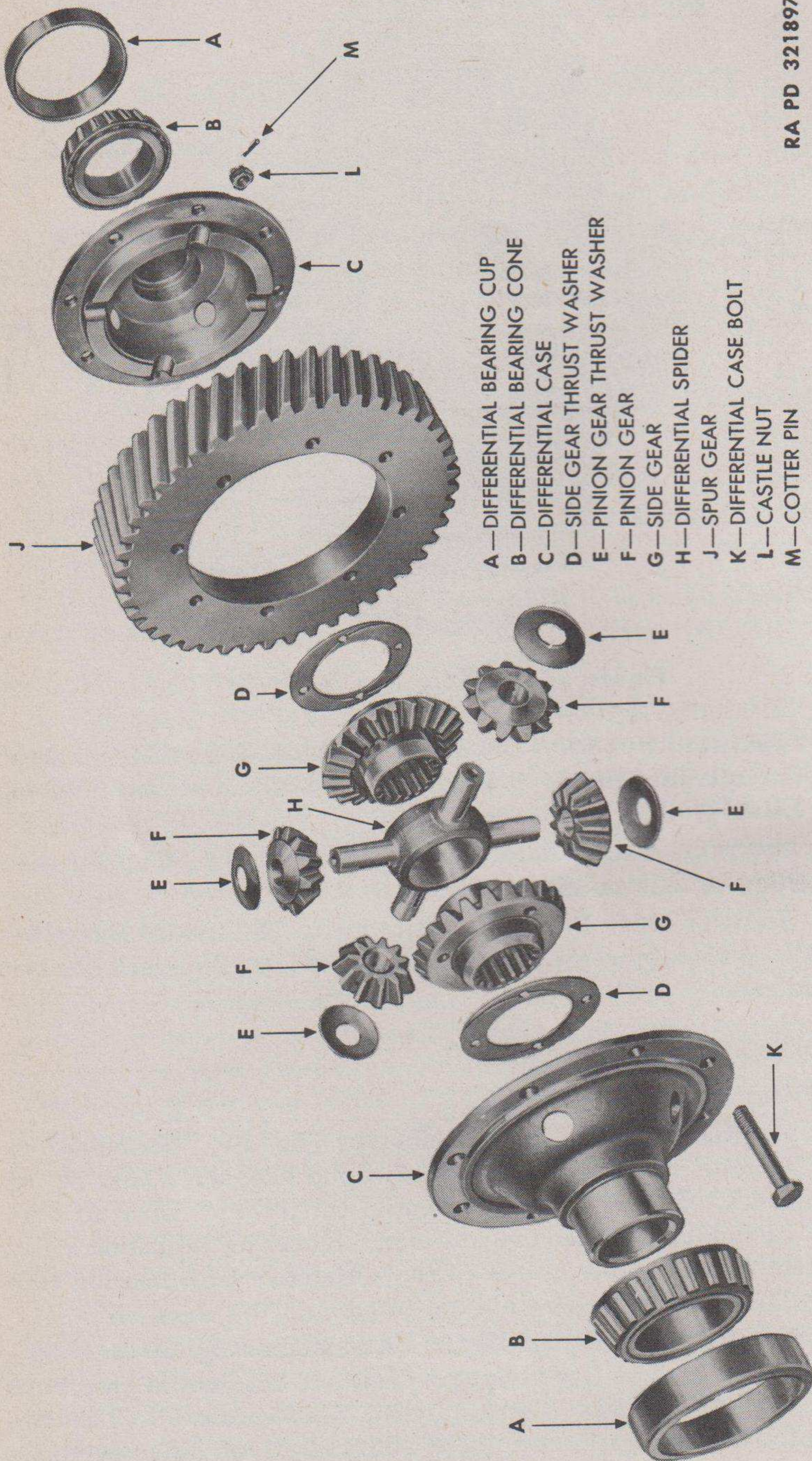
### **73. DIFFERENTIAL CARRIER.**

#### **a. Disassembly.**

(1) **REMOVE DIFFERENTIAL ASSEMBLY** (fig. 49). Remove lock wires. Remove differential bearing adjusting lock screw and lift off adjusting lock. Remove four differential carrier and cap stud nuts. Lift off carrier caps. Remove differential bearing adjusting rings. Lift differential assembly out of carrier. Remove both bearing cups which will be free when assembly is lifted.

(2) **DISASSEMBLE DIFFERENTIAL ASSEMBLY** (fig. 50 and 51). Remove cotter pins and castle nuts. Tap out differential case bolts and lift off the thin case with attached bearing cone. (The two halves of the differential case have bolt flanges of different thick-

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Figure 51 — Differential Disassembled

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nesses.) Place assembly on bench with open end up and lift out side gear thrust washer and side gear. Lift with a screwdriver and remove the spider and pinion gears and the remaining side gear and thrust washer. Tap opposite side case with attached bearing cone out of differential spur gear. Using replacer 41-R-2384-165, pull bearing cones from both halves of case.

(3) **REMOVE TOP COVER AND INSPECTION PLUG** (fig. 52). Remove lock wire attached to top cover and inspection plug. Remove cap screws and lock washers securing top cover to carrier case. Lift off top cover and gasket. Unscrew and lift off inspection plug, and remove inspection plug gasket.

(4) **REMOVE THROUGH SHAFT BEARING COVERS** (fig. 52). Through top cover opening, place a hardwood block or a soft piece of metal between bevel and pinion gear. Remove through shaft cotter pin and nut. Tap off drive flange and attached dust shield. Remove stud nuts and lock washers attaching forward bearing cover to carrier case. Lift off bearing cover, shims, and gasket. Remove stud nuts and lock washers attaching rear bearing cover to carrier. Lift off rear bearing cover, shims, and gasket.

(5) **REMOVE THROUGH SHAFT FORWARD BEARING COVER OIL SEAL** (fig. 52). Tap oil seal out of bearing cover if damaged, but do not remove otherwise.

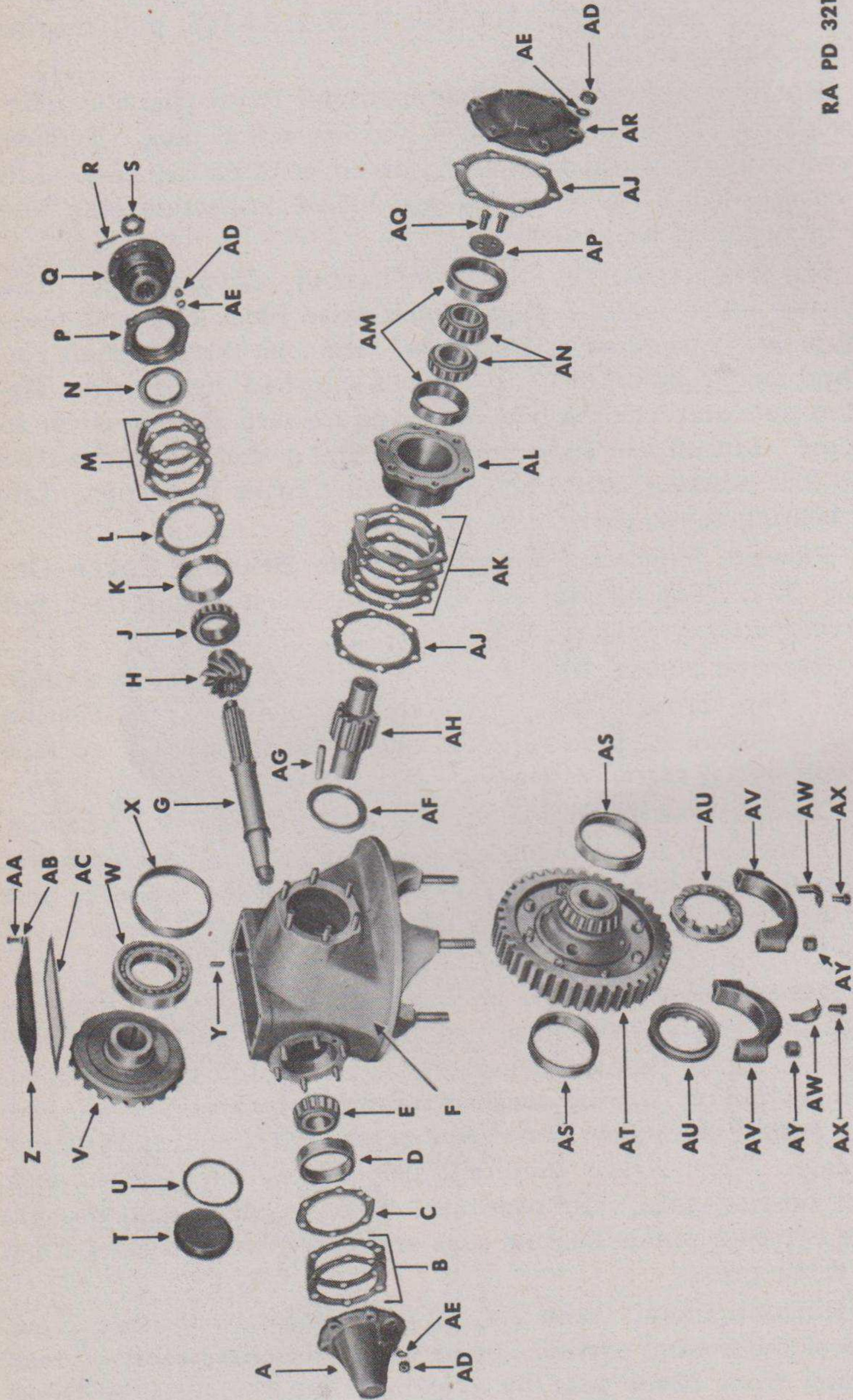
(6) **REMOVE BEVEL PINION AND THROUGH SHAFT ASSEMBLY** (fig. 52). Tap through shaft with bevel pinion gear, rear bearing cone, and front bearing cone and cup out of carrier case. Tap rear bearing cup out of carrier case.

(7) **DISASSEMBLE BEVEL PINION AND THROUGH SHAFT ASSEMBLY** (fig. 52). Using an arbor press, remove rear bearing cone which is pressed on shoulder at tapered end of shaft. Turn the assembly and press off bevel pinion and attached front bearing cone. Press bevel pinion out of bearing cone.

(8) **REMOVE SPUR PINION BEARING CAGE** (fig. 52). Remove stud nuts and lock washers attaching bearing cage cover to carrier case. Lift off cover shims and gasket. Remove lock wire attached to two spur pinion bearing washer screws. Remove screws and washers. Install two puller screws into threaded holes in spur pinion bearing cage. Turn screws simultaneously against carrier case, and draw out bearing cage with bearings. Remove shims and gasket. Press the two spur pinion bearing cups and cones out of bearing cage with an arbor press.

(9) **REMOVE BEVEL GEAR** (fig. 52). Remove bevel gear screw from top of differential carrier. Place carrier in arbor press. Press spur pinion from bevel gear by pressing through inspection plug opening in carrier. Lift out bevel gear with bearing, bearing spacer,

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Figure 52 — Differential Carrier Disassembled

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- A—THROUGH SHAFT REAR BEARING COVER
- B—THROUGH SHAFT REAR BEARING COVER SHIMS
- C—THROUGH SHAFT REAR BEARING COVER GASKET
- D—THROUGH SHAFT REAR BEARING CUP
- E—THROUGH SHAFT REAR BEARING CONE
- F—DIFFERENTIAL CARRIER
- G—THROUGH SHAFT
- H—BEVEL PINION
- J—THROUGH SHAFT FORWARD BEARING CONE
- K—THROUGH SHAFT FORWARD BEARING CUP
- L—THROUGH SHAFT FORWARD BEARING COVER GASKET
- M—THROUGH SHAFT FORWARD BEARING COVER SHIMS
- N—THROUGH SHAFT FORWARD BEARING COVER OIL SEAL
- P—THROUGH SHAFT FORWARD BEARING COVER
- Q—DRIVE FLANGE
- R—THROUGH SHAFT NUT COTTER PIN
- S—THROUGH SHAFT NUT
- T—DIFFERENTIAL CARRIER INSPECTION PLUG
- U—DIFFERENTIAL CARRIER INSPECTION PLUG GASKET
- V—BEVEL GEAR
- W—BEVEL GEAR BEARING
- X—BEVEL GEAR BEARING SLEEVE
- Y—BEVEL GEAR SCREW
- Z—DIFFERENTIAL CARRIER TOP COVER
- AA—CAP SCREW
- AB—LOCK WASHER
- AC—DIFFERENTIAL TOP COVER GASKET
- AD—NUT
- AE—LOCK WASHER
- AF—BEVEL GEAR BEARING SPACER
- AG—BEVEL GEAR KEY
- AH—SPUR PINION
- AJ—SPUR PINION BEARING CAGE AND COVER GASKET
- AK—SPUR PINION BEARING SHIMS
- AL—SPUR PINION BEARING CAGE
- AM—SPUR PINION BEARING CUP
- AN—SPUR PINION BEARING CONE
- AP—SPUR PINION BEARING WASHER
- AQ—SPUR PINION BEARING WASHER SCREWS
- AR—SPUR PINION BEARING CAGE COVER
- AS—DIFFERENTIAL BEARING CUP
- AT—DIFFERENTIAL ASSEMBLY
- AU—DIFFERENTIAL BEARING ADJUSTING RING
- AV—DIFFERENTIAL CARRIER CAP
- AW—DIFFERENTIAL BEARING ADJUSTING LOCK
- AX—DIFFERENTIAL BEARING ADJUSTING LOCK SCREW
- AY—DIFFERENTIAL CARRIER CAP NUT



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

and bearing sleeve. Remove bevel gear key from spur pinion. Support bevel gear in a vise and remove bearing from hub of bevel gear with a bearing puller.

**b. Cleaning, Inspection, and Repair.** Wash all parts thoroughly in dry-cleaning solvent before inspection, immerse bearings in a clean solution until hardened lubricant is removed. Rotate bearings slowly under surface of dry-cleaning solvent. When bearings are clean, dry them with compressed air directed across and through bearings so unlubricated bearings do not spin. Inspect rollers and bearing cups for chipping, cracks, or worn spots, replacing bearings if such defects are found. Do not attempt repairs on bearings other than removal of light burs with a handstone. After inspection, dip bearings in lubricant and store in clean, covered containers, or wrap in clean paper. Check all gears for chipped, cracked, or scored teeth. If bevel pinion gear on through shaft is damaged, replace both bevel pinion and bevel gear. Check fit of differential pinion gears on spider. If damaged pinion gear is found, a new set of four gears must be installed. Examine differential side gears for damaged teeth and determine if gear hubs fit properly in halves of differential case. If gears are worn or damaged, replace the set. Inspect thrust washers for wear, and replace worn washers. Inspect through shaft forward bearing cover oil seal for misshapen inner diameter and looseness of packing before removal from bearing cover. Do not remove if seal is not damaged. Examine axle shafts for evidence of twisting at either end, noting condition of splines. Replace shaft if splines are worn or damaged.

**c. Assembly.**

(1) **INSTALL BEVEL GEAR** (fig. 52). Press bevel gear bearing on hub of bevel gear. Tap bevel gear spacer against bearing. Install bevel gear bearing sleeve into carrier with slot in sleeve at top. Install bevel gear screw. Tap bevel gear key into keyway in spur pinion. Position bevel gear in carrier. Press spur pinion into bevel gear.

(2) **INSTALL SPUR PINION BEARING CAGE** (fig. 52). Press one of the two bearing cups into bearing cage. Place a new gasket and spur pinion bearing cage shims in position on studs; then press bearing cage to seat in carrier. Press each of the two bearing cones on spur pinion, the first with taper slanting toward spur pinion and the second with taper slanting away. Press outer bearing cone into bearing cage. Install spur pinion bearing washer and screws into end of spur pinion. Install lock wire through screwheads. Using new gasket, install bearing cage cover. Secure with lock washers and stud nuts. Check bearing adjustment (par. 75 a).