TM 9-2320-242-34

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT,

MAINTENANCE MANUAL

FOR

TRUCK, CARGO: 1-1/4 TON, 6x 6, M561

(2320-873-5407)

TRUCK, AMBULANCE: 1-1/4 TON, 6x6 , M 792

(2310-832-9907)

HEADQUARTERS , DEPARTMENT OF THE ARMY

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Technical Manual 1

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HEADQUARTERS,
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Washington, D.C., 3 *April 1970*

DIRECT SUPPORT AND GENERAL SUPPORT,

MAINTENANCE MANUAL

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains instructions for the use of, direct support and general support, maintenance personnel maintaining the Truck, Cargo: 11/4 ton, 6x6, M561; Truck, Ambulance: 1 1/4 ton, 6x6, M792; and their special purpose kits as allocated by the Maintenance Allocation Chart. It provides information on the maintenance of the equipment which is beyond the scope of the tools, equipment, personnel, or supplies normally available to the organizational level of maintenance.

1-2. Forms and Records

a. DA Forms and records used for equipment maintenance will be only those prescribed in TM38-750.

b. Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to the Commanding General, U.S. Army Tank-Automotive Command, Warren, Michigan 48090: Attn : AMSTA-MTP.

Section II. DESCRIPTION AND DATA

1-3. Description

A general description of the M561 Cargo Truck and M792 Ambulance (figs 1-1 through 1-4), and information pertaining to the identification plates are contained in TM 9-2320-242-20. A more detailed description of specific components and assemblies is contained in the applicable section (s) of this manual. Detailed descriptions of the components of the M561 Cargo Truck and the M792 Ambulance, are provided in the applicable maintenance paragraphs of this manual.

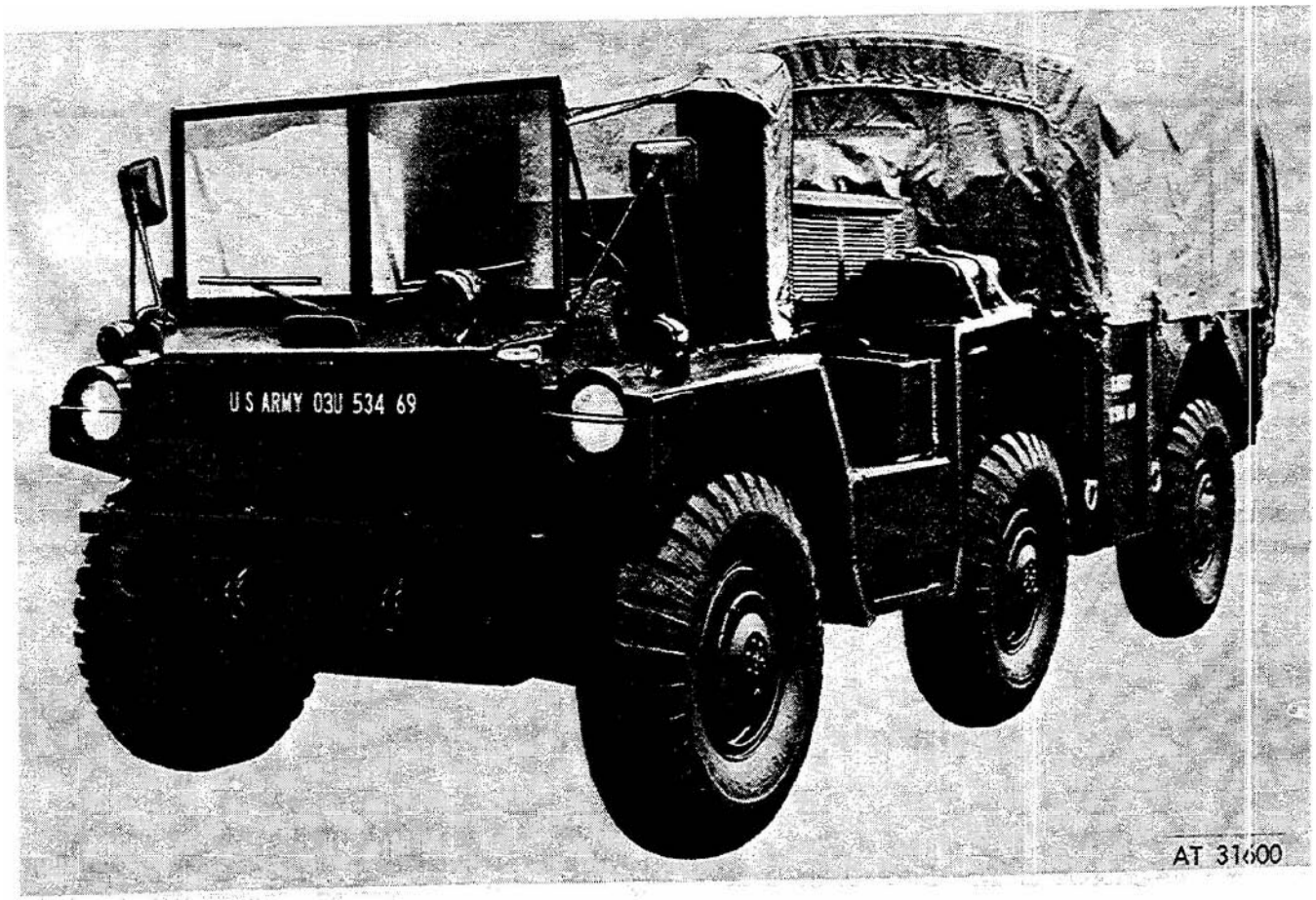
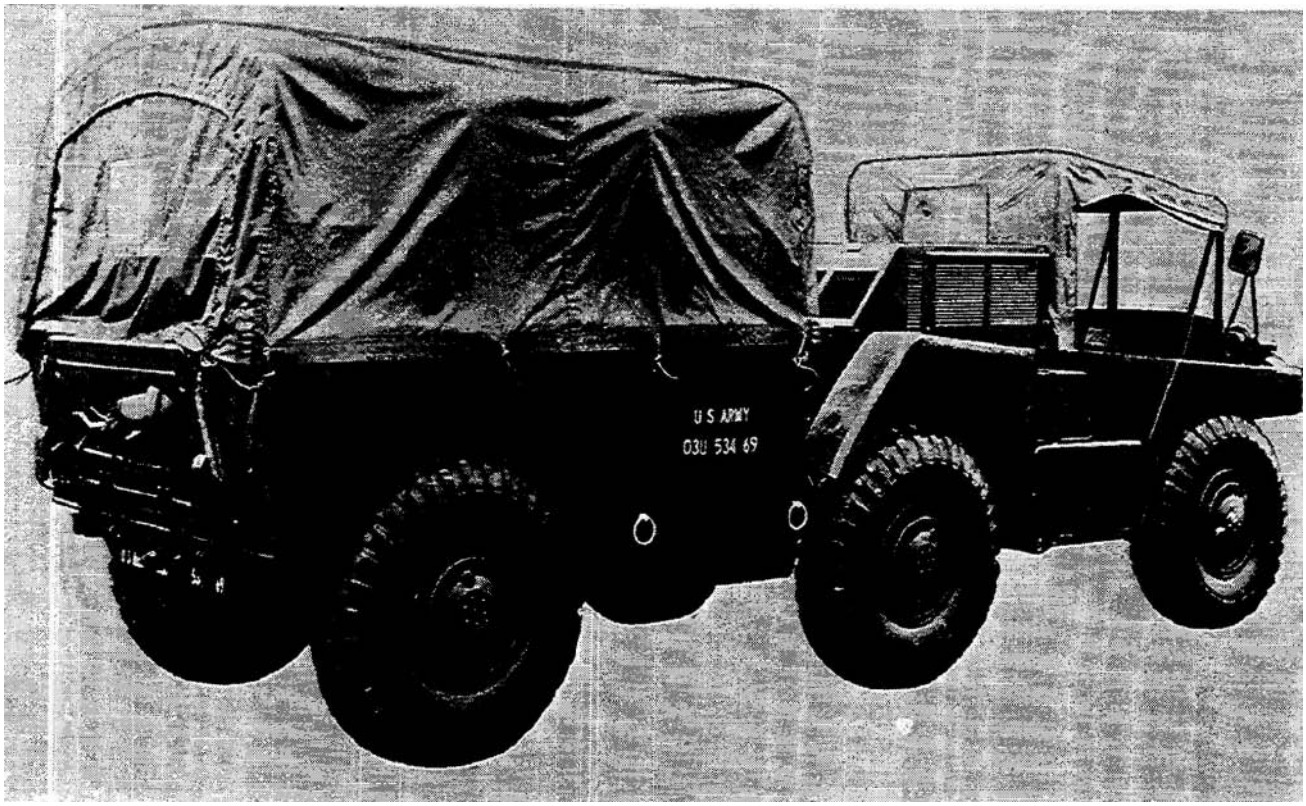


Figure 1-1. Truck, cargo, 1¼ ton, 6x6, M5f I left front view.



AT 31601

Figure 1-2. Truth, cargo, 1 $_4$ ton, 6x6. M561 right rear view.

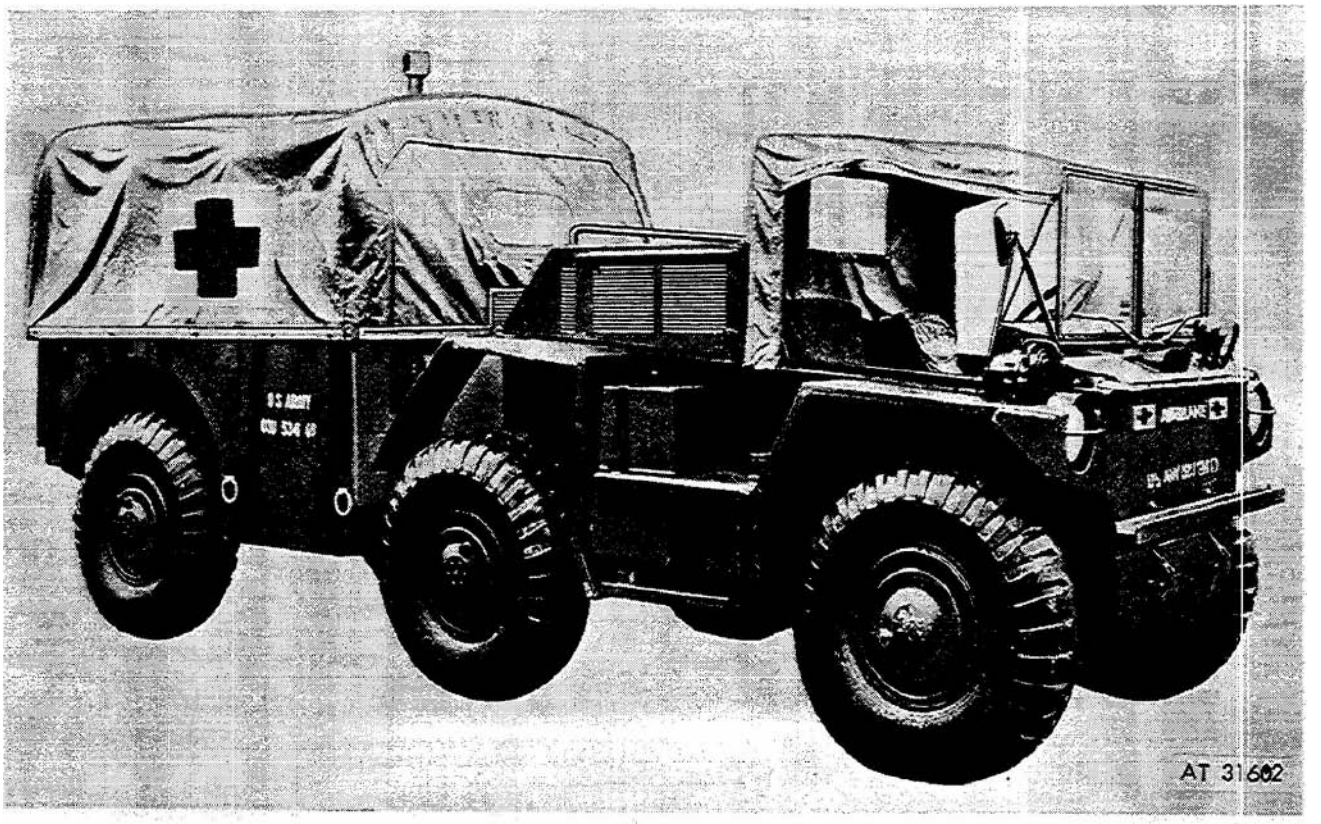


Figure 1-3. Truck, ambulance: 1¼ ton, 6x6, M792 right front view.

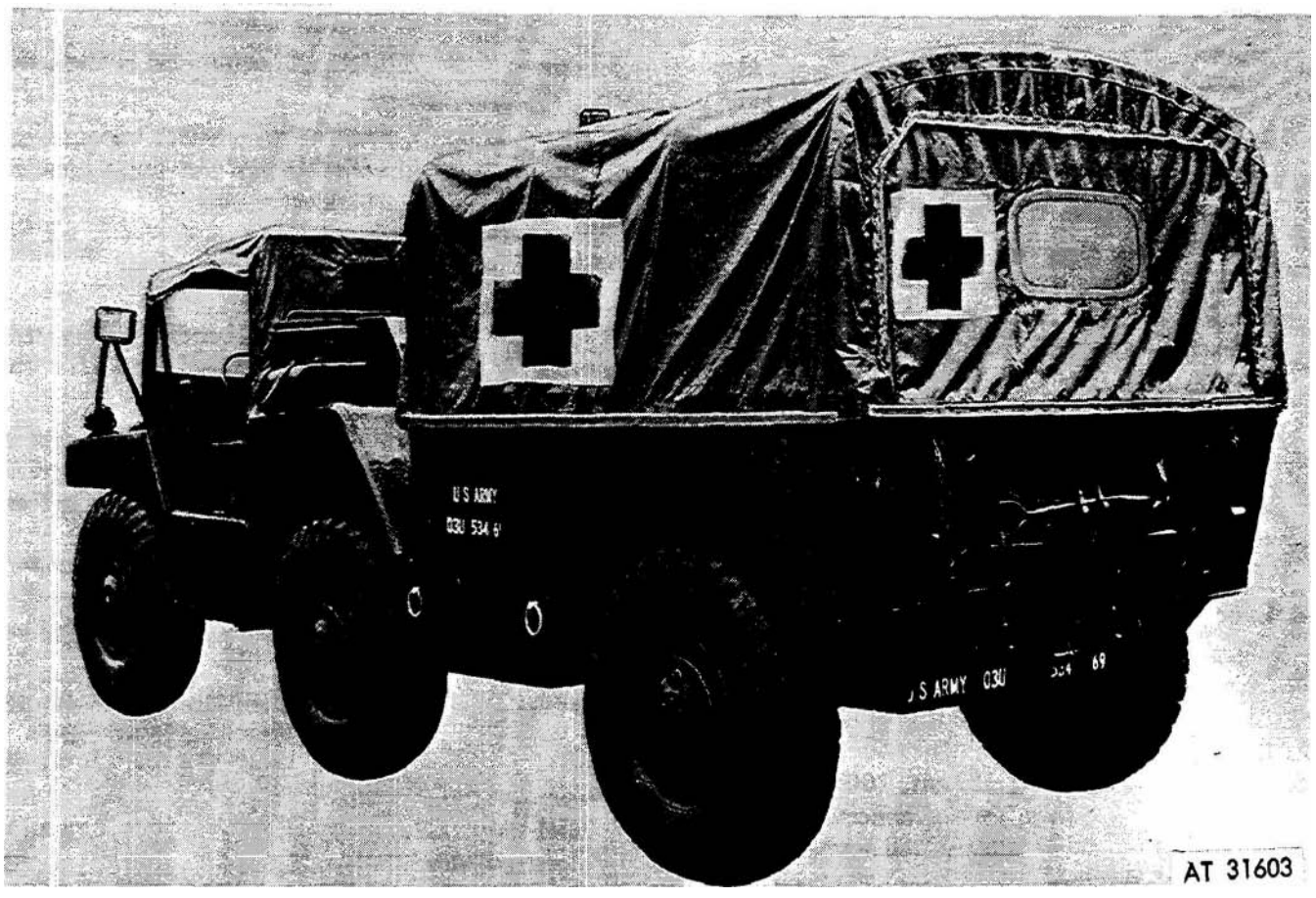


Figure 14. Truck, ambulance: 1¼ ton, 6x6, M792 left rear view.

1-4. Tabulated Data

a. General. This paragraph contains all maintenance data pertinent to direct and general support maintenance personnel.

b. M561 Cargo Truck and M792 Ambulance.

(1) Weights

Curb weight	7, 300 lbs.
Payload	2,900 lbs.
Gross weight	10,200 lbs.
Front axle GVW	2,745 lbs.
Center axle GVW	3,900 lbs.
Rear axle GVW	3,555 lbs.
Center of gravity	Based on rated payload

(2) Dimensions

Length	226.6 in.
Width	83.80 in.
Height (GVW)	90.80 in.
Reducible height (GVW)	65.00 in.
Tread	72.00 in.
Ground clearance	15.00 in.

c. Engine.

Make	Detroit Diesel
Series	3-53
Type	Liquid cooled, vertical in-line, two cycle, three cylinder diesel
Displacement	159.3 cubic in.
Horsepower	103 HP at 2,800 RPM
Torque	*217* lbs-ft. at 1500 RPM
Firing order	1-3.2

d. Transmission.

Type	Manual shift
Speeds	Four forward, one reverse
Synchromesh shift	Second, third, four *gears*
Ratios	
First gear	7.06:1
Second gear	3.58:1
Third gear	1.71:1
Fourth	1.00:1
Reverse gear	6.78:1
Lubricant capacity	5.5 pints

e. Transfer.

Ranges	High - low
Ratios	
High	1:1
Low	1.79:1
Torque rating	2,500 lbs-ft.
Lubricant capacity	•4.5 pints

f. *Differentials.*

(1) Front

Type	Dual pack limited slip
Ratio	5.57:1
Lubricant capacity	4 pints

(2) *Center*

Type	Dual pack limited slip
Ratio	5.57:1
'Lubricant capacity	12 pints

(3) *Rear*

Type	Dual pack limited slip
Ratio	5 57:1
Lubricant capacity	4 pints

g. *Electrical System*

Voltage	24 volts DC
Amperage	60 amperes
Battery	
Type	6TN, 12 volt, 100 ampere hours
Quantity	Two, series connected
Alternator	24 volts AC 60 amperes

h. Fuel System.

Capacity	40 gallons (2 tanks, 20 gal/tank)
Recommend fuel	
Diesel	VV-F-800
Jet	MIL-J-5624
CITE	MIL-F-45121A

i. Cooling System.

Capacity	19 qts (including surge tank)
Normal operating temperature	160-200°F
Normal operating pressure	7-14 PSI (MAX)

j. Steering System.

Type	Mechanical front and rear, simultaneously operated
Steering ratio	24:1
Turning radius	29 **feet**

k. Suspension.

Front and rear	Independent coil springs at each wheel.
Center	Single leaf sprin[g] and swing axle

1. *Service Brakes.*

Type	Hydraulic, internal expanding, sealed drum Duo-servo master cylinder.
Air pressurization (Sealed drum cavity)	5 'PSI

m. Bilge Pump.

Type	Electrically operated
Rating	54 GPM at 27.5 volts,

n. Articulation.

Roll at center axle	±15 degrees
Roll at rear axle	±30 degrees
Pitch at rear axle	±40 degrees
Wall climb (vertical)	18 in.
Angle of approach	62 degrees
Angle of departure	45 degrees
Hump angle	140 degrees

o. Tires.

Type	Shreaded wire, tubless, non-directional, cross country
Size	11:00 X 18, 6 ply rated
Pressure	
Highway	22 PSI
Cross-country	18 PSI
Snow	12 PSI

p. Standard Torque Data. Refer to TM 9-2320-242-20 for standard torque data. Refer to Appendix B for special torque requirements.

q. Fuel System Diagram. Figure 1-5 shows the engine fuel system diagram for the M561 Cargo Truck and M792 Ambulance.

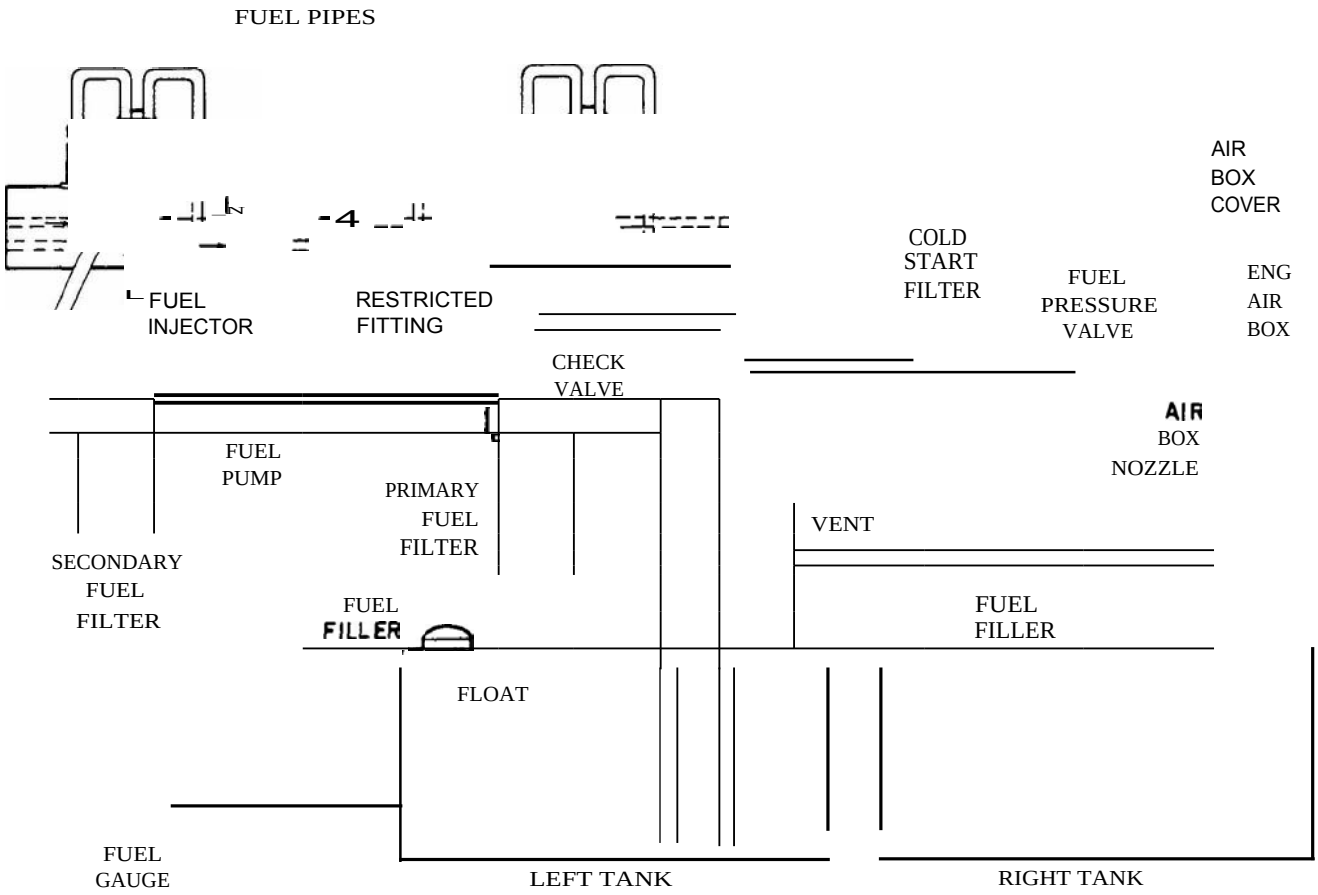


Figure 1-5. Engine fuel system diagram.

r. *Cold Weather Starting Aid System Simplified Electrical Schematic.* Figure 1-6 shows the cold weather starting aid system simplified electrical schematic for the M561 Cargo Truck and M792 Ambulance.

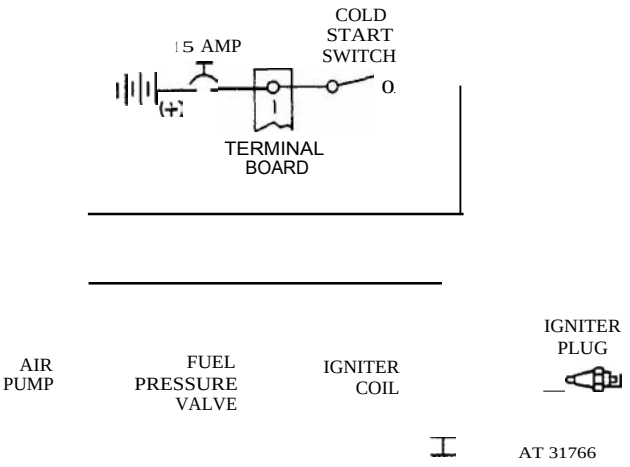


Figure 1-6. Cold weather starting aid system simplified electrical schematic.

s. *Cooling System Flow Diagram.* Figure 1-7 shows the cooling system flow diagram kr the M5b1 Cargo Truck and M792 Ambulance.

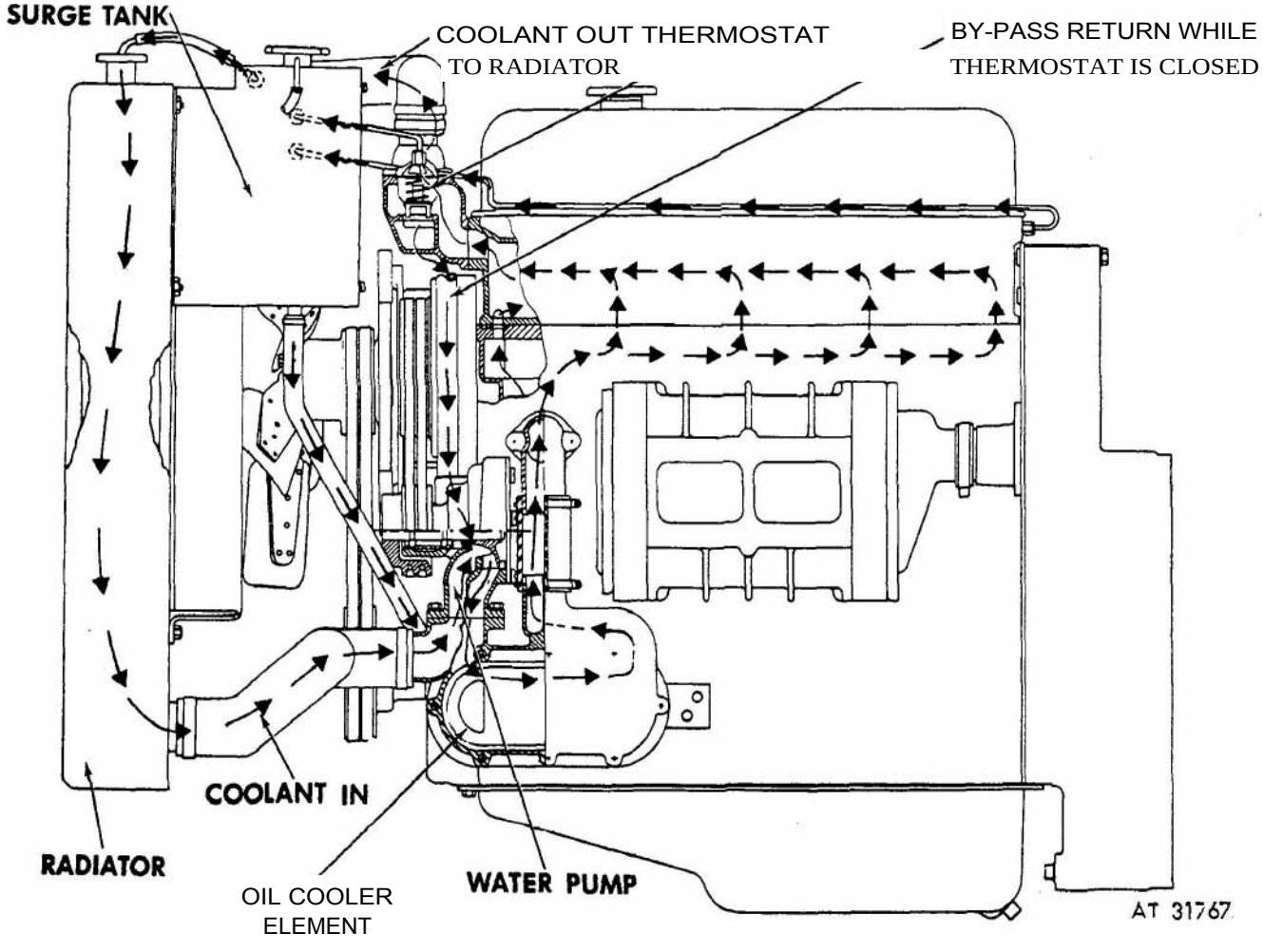


Figure 1-7. Cooling system flow diagram.

t. *Schematic Wiring Diagrams.* Figure 1-8 shows the schematic wiring diagram common to the M561 Cargo Truck and M792 Ambulance. Figure 1-9 shows the additional system wiring for the M792 Ambulance.

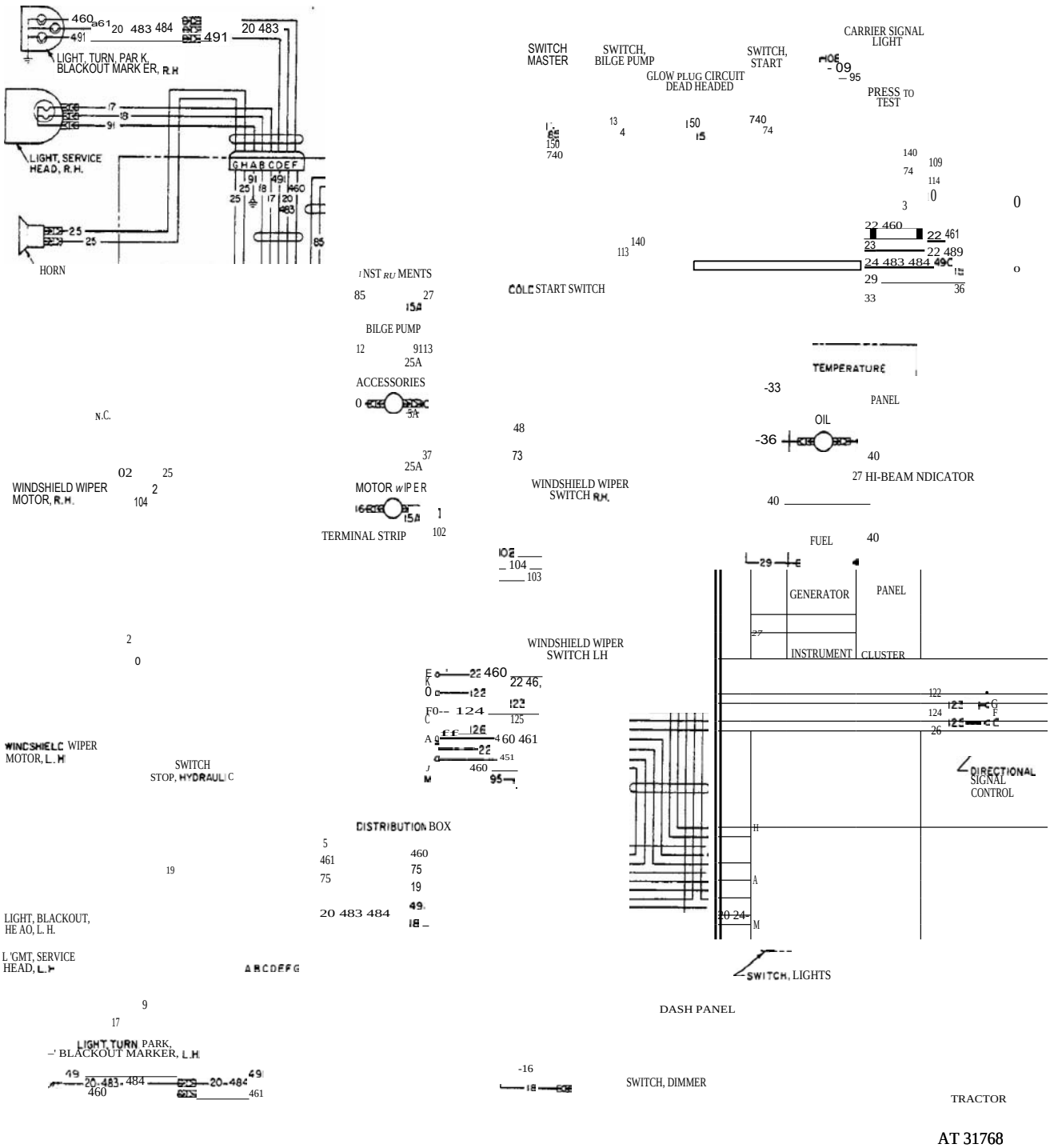


Figure 1-8. Schematic wiring diagram.

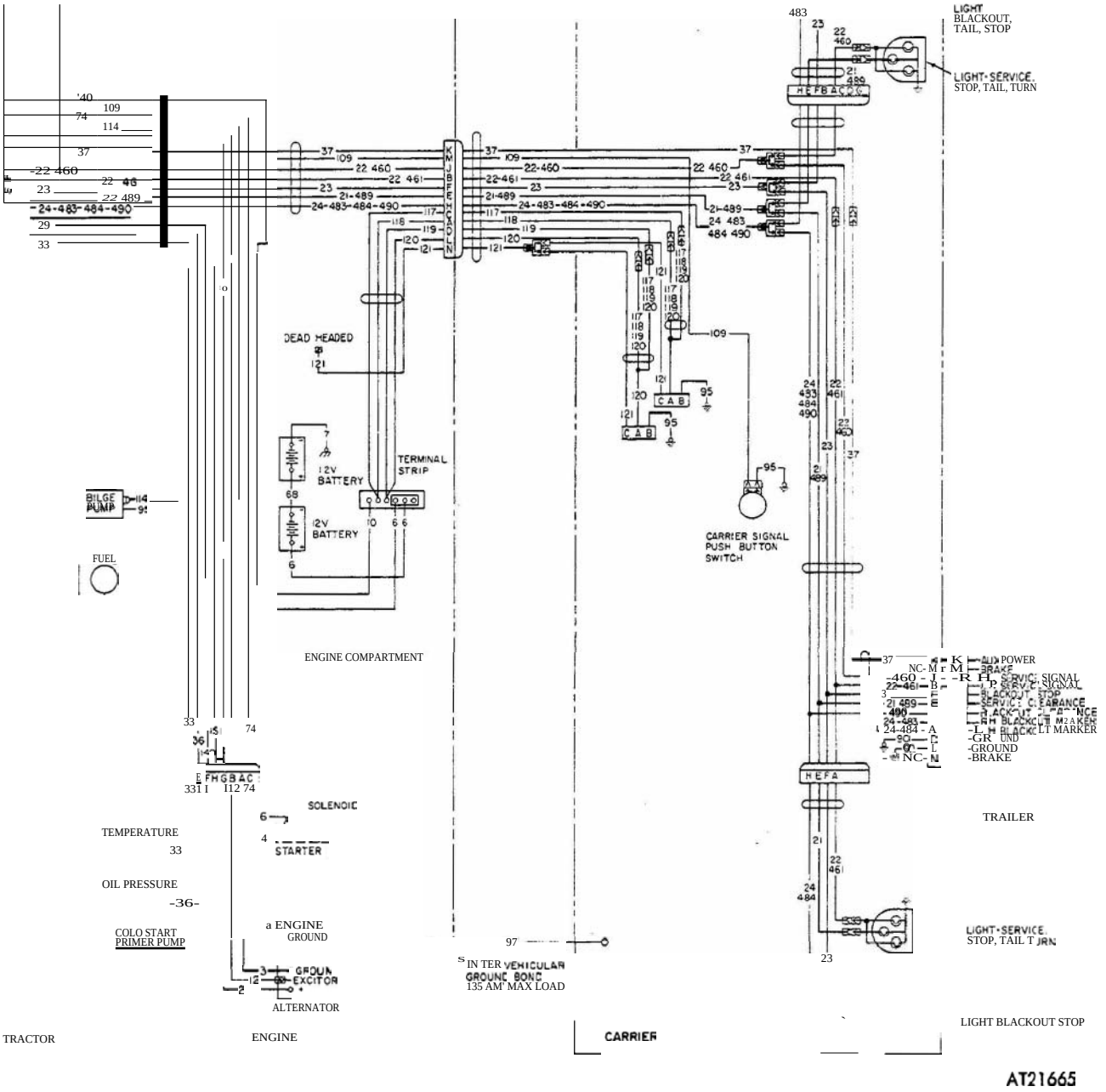


Figure 1-8. Schematic wiring diagram.

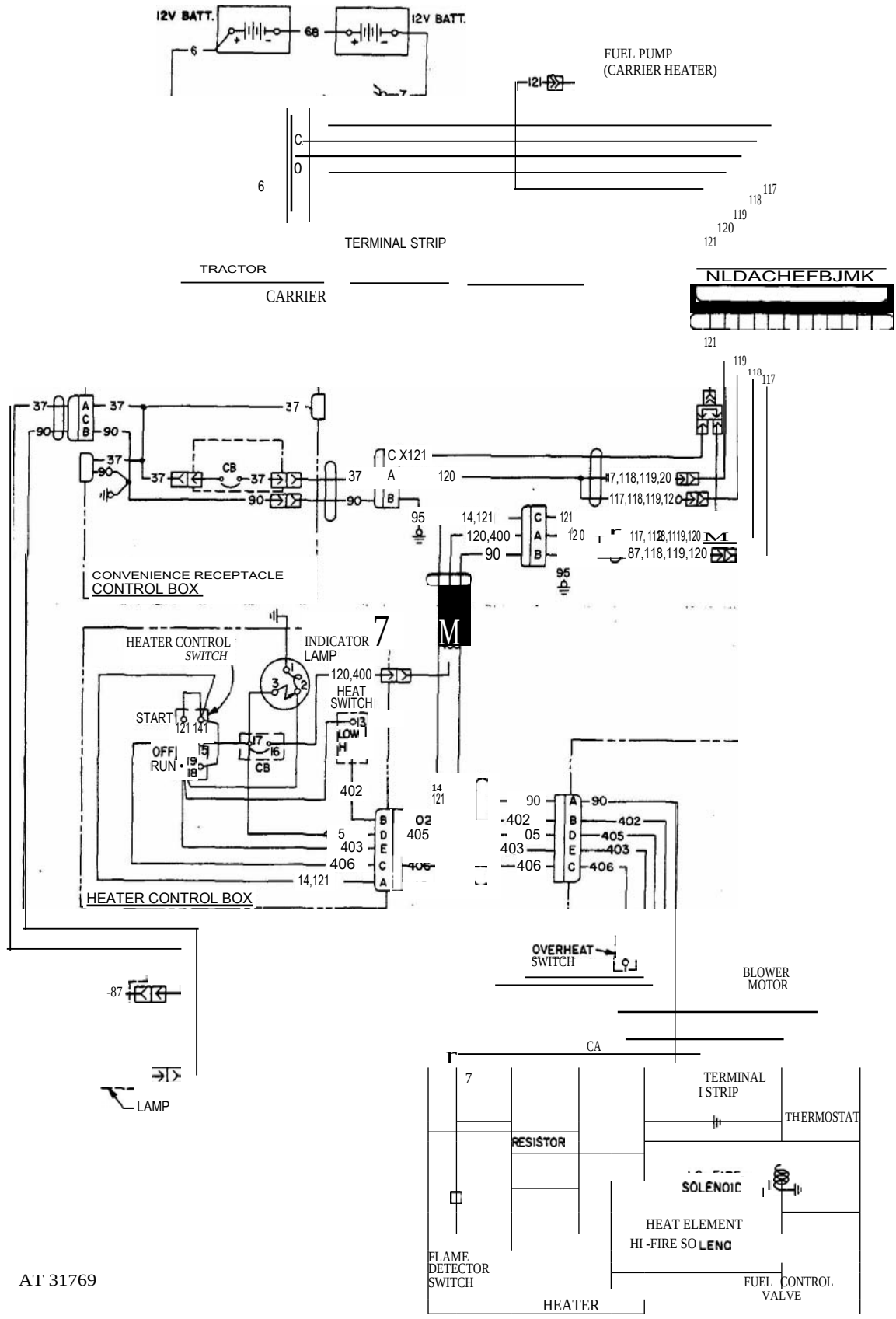


Figure 1-9. Schematic wiring diagram for additional system wiring on M792 ambulance.

u. *Service Brake and Air Pressurization Systems Line Diagram.* Figure 1-10 shows the service brake and air pressurization systems line diagram for the M561 Cargo Truck and M792 Ambulance.

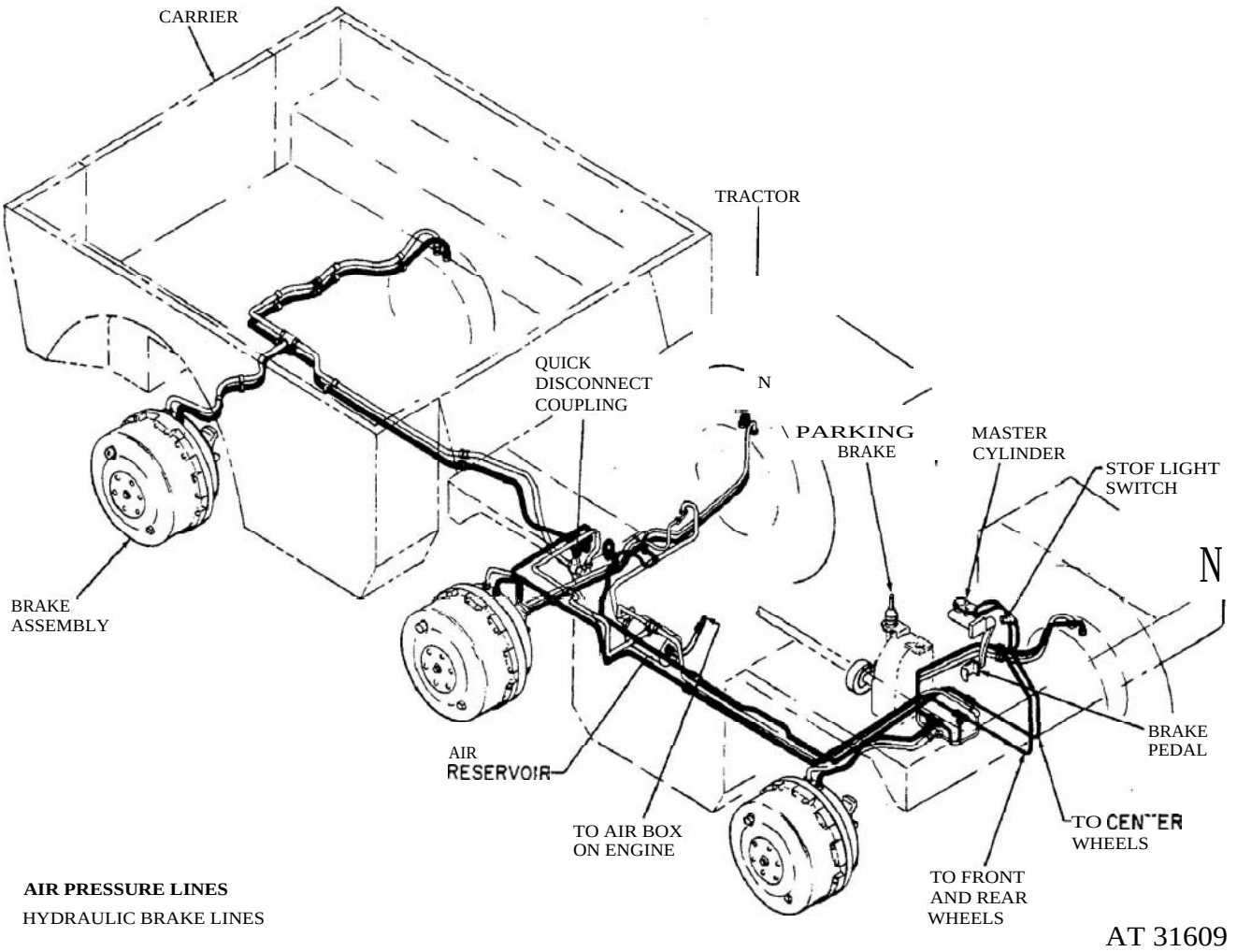


Figure 1-10. ***Service brake and air pressurization systems line diagram.***

v. *Steering System Diagram.* Figure 1-11 shows the steering system diagram for the M561 Cargo Truck and M792 Ambulance.

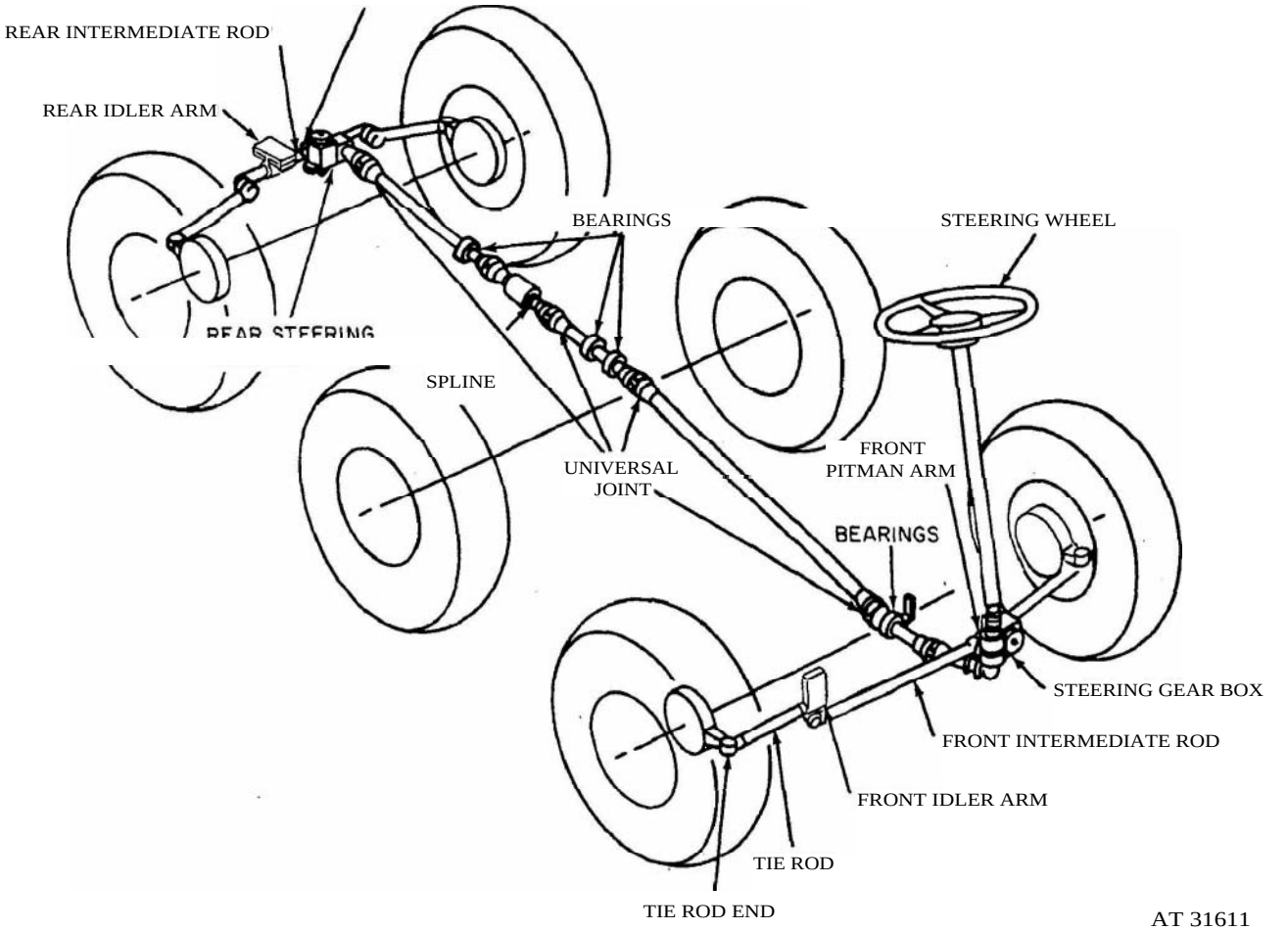
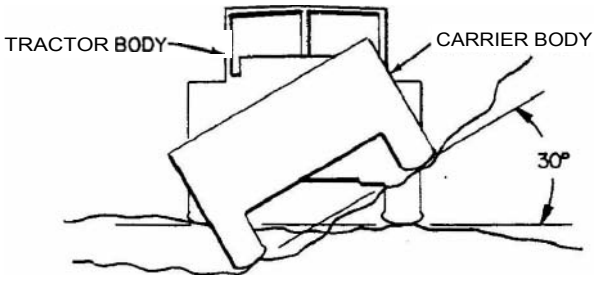
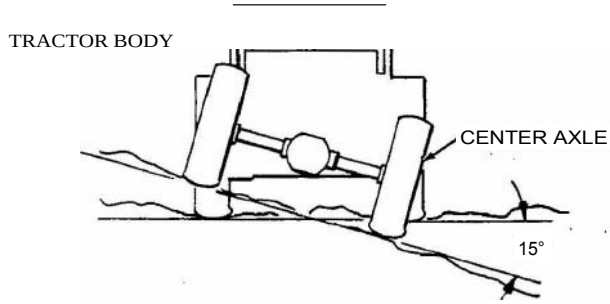


Figure 1-11. Steering system diagram.

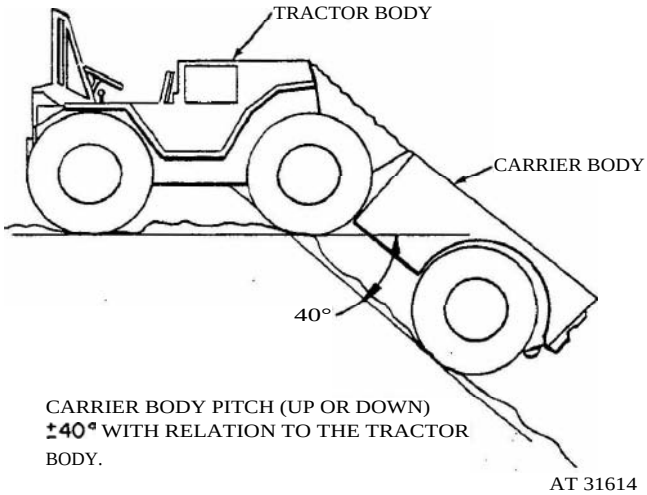
w. *Articulation Principle.* Figure 1-12 shows the articulation principle for the M561 Cargo Truck and M792 Ambulance.



CARRIER BODY ROLL (LEFT OR RIGHT) ± 30° WITH RELATION TO THE TRACTOR BODY.



CENTER AXLE ROLL (LEFT OR RIGHT) ±15° WITH RELATION TO TRACTOR BODY. MOVEMENT INDEPENDENT OF ROLL CAUSED BY SPRING DEFLECTION.



CARRIER BODY PITCH (UP OR DOWN) ±40° WITH RELATION TO THE TRACTOR BODY.

Figure 1-12. Articulation principle.

x. *M792 Ambulance Heater Fuel System Diagram.* Figure 1-13 shows the M792 Ambulance heater fuel system diagram.

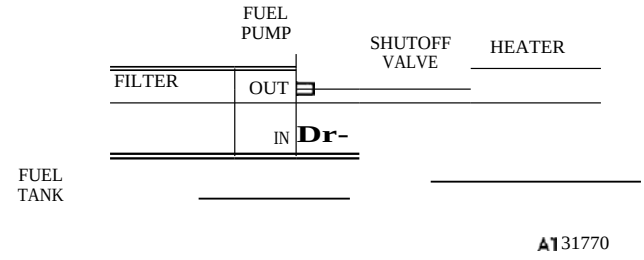


Figure 1-13. M792 Ambulance heater fuel system diagram.

y. *Repair and Replacement Standard.* Repair. and replacement standards are provided in Appendix C.

z. *Time Standards.* Time standards are provided in Appendix D.

CHAPTER 2
GENERAL MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

2-1. Special Tools and Equipment

a. The special tools required to perform direct support and general support maintenance on the M561 Cargo Truck and the M792 Ambulance are listed in Table 2-1 and illustrated in figures 2-1, 2-2, and 2-3. References and illustrations indicating the use of these tools are listed in the table.

b. No special equipment is required by direct or general support maintenance personnel for performing maintenance on the M561 Cargo Truck and the M792 Ambulance.

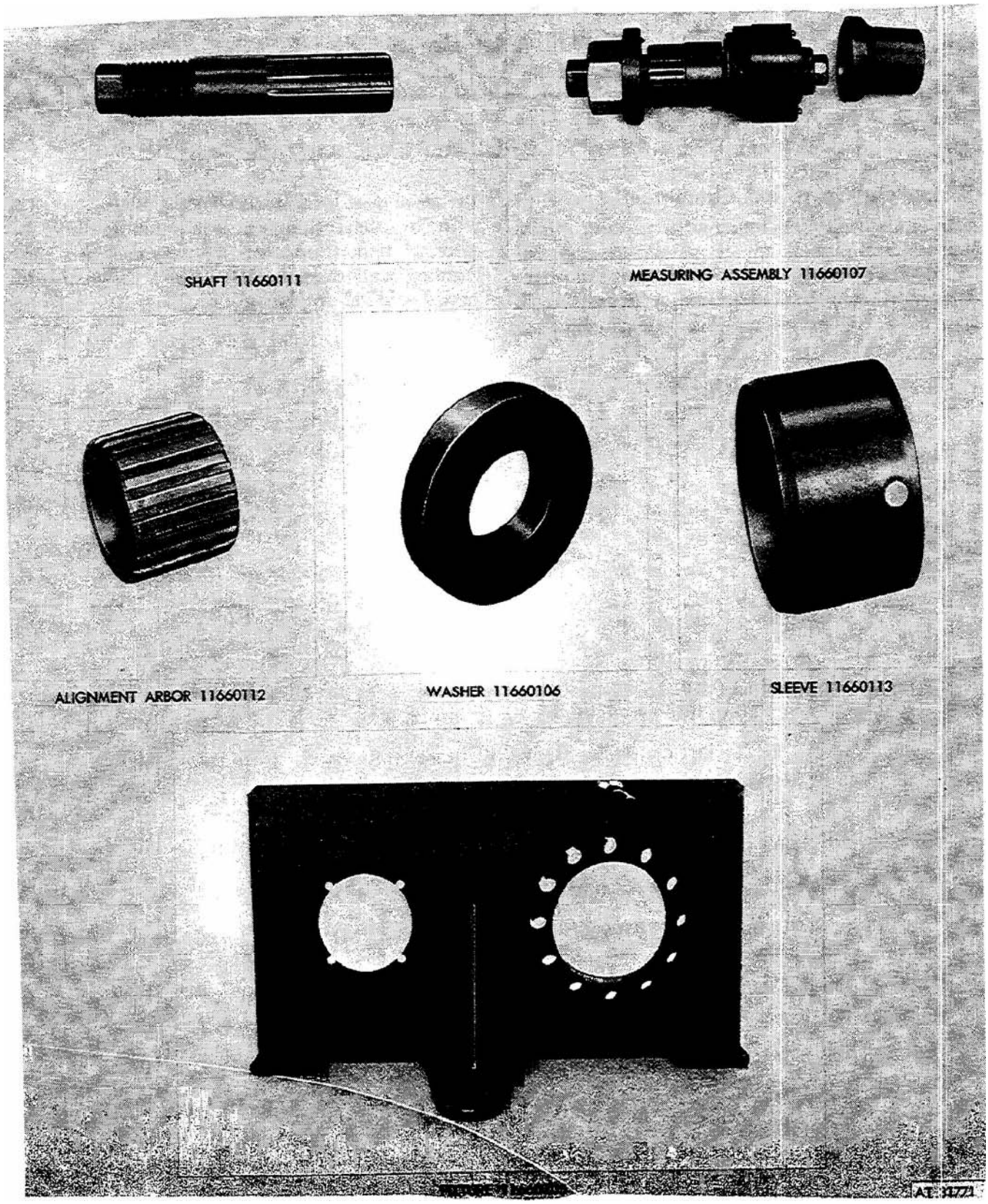


Figure 2-1. Special tools.

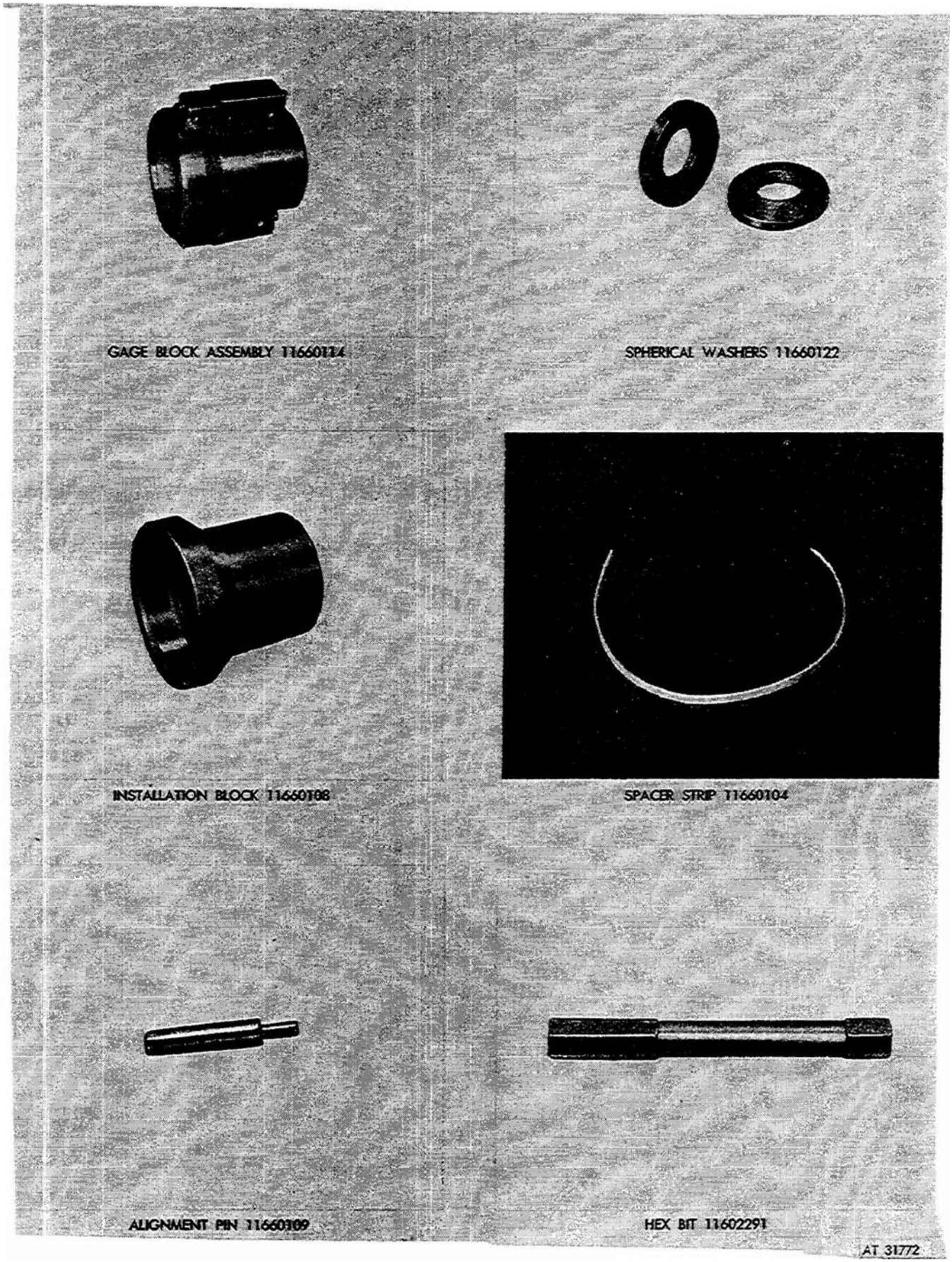


Figure 2-2. Special tools.

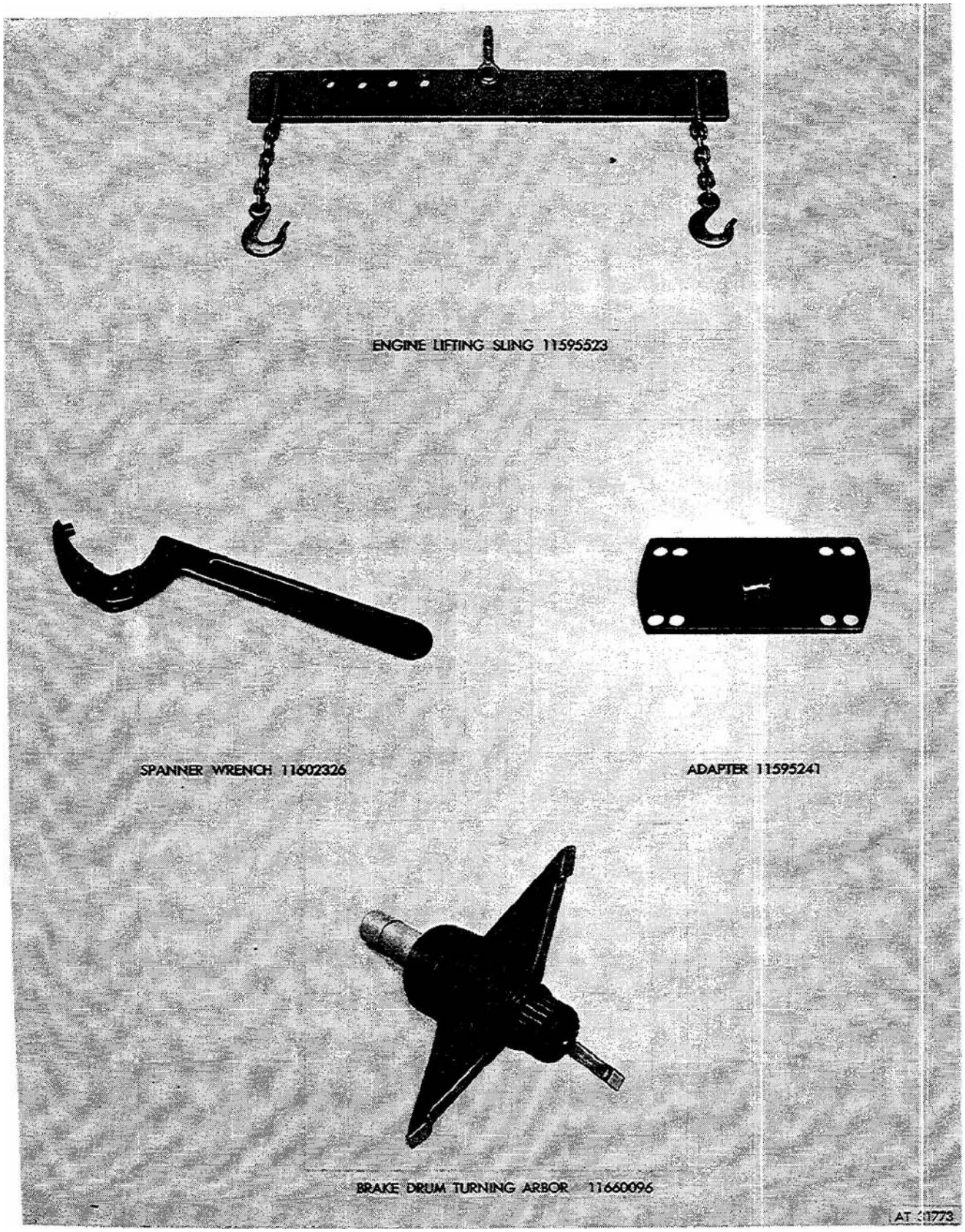


Figure 2-3. Special tools.

2-2. Direct Support and General Support Maintenance Repair Parts

Direct support and general support maintenance repair parts are listed and illustrated in TM 9. 2320-242·35P which is the authority for requisitioning replacements.

2-3. Specially Designed (Fabricated) Tools and Equipment

There are no specially designed tools or equipment required to be fabricated for direct or general support maintenance personnel to perform maintenance on the M561 Cargo Truck and the M792 Ambulance.

Table 2-1. Special Tools

Item	FSN or Part No.	Reference		Use
		Fig	Para	
Engine lifting sling	(19207) 11595523	2-5	2-8	Clutch assembly removal and installation.
Fixture	(19207) 11660105	3-100 3-101	3-40	Disassemble and assemble equalizer assembly.
Measuring assembly	(19207) 11660107	3-102,	3-4	Assemble equalizer assembly.
Shaft	(19207) 11660111	3-102	3-4	Assemble equalizer assembly.
Washer	(19207) 11660106	3-102	340	As semble equalizer assembly.
Alignment arbor	(19207) 11660112	3-102	3-4	Assemble equalizer assembly.
Sleeve	(19207) 11660113	3-102	3-40	Assemble equalizer assembly.
Gage block assembly	(19207) 11660114	3.102	3-40	Assemble equalizer assembly.
Spherical washers	(19207) 11660122	3-102	3-40	Assemble equalizer assembly.
Installation block	(19207) 11660108	3-102	3-40	Assemble equalizer assembly.
Spacer strip	(19207) 11660104	3-110	340	Assemble equalizer assembly.
Alignment pin	(19207) 11660109	3-113	340	Assemble equalizer assembly.
Adapter	(19207) 11595241	3-118	3-40	Checking new equalizer assembly running torque.
		3.146	3-42	Checking center differential equalizer or assembly bearing preload.
		3-179	344	Checking rear differential equalizer assembly bearing preload.
Hex bit	(19207) 11602291	3-190	3-55	Remove and install suspension arm mounting bracket bolts.
Brake drum turning arbor	(19207) 11660096	3-192	3-58	Mount brake drum in brake drum turn-down machine.
Spanner wrench	(19207) 11602326	3-227	3-6e	Install articulating yoke bearings.

Section II. TROUBLESHOOTING

2-4. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the M561 Cargo Truck and the M792 Ambulance components. Malfunctions which may occur are listed in table 2-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

2-5. Troubleshooting Procedures

Troubleshooting procedures for the fuel system. exhaust system, cooling system, suspension, steering system, brake system, and electrical system are outlined in TM 9-2320-242-20. Troubleshooting procedures for the engine and its components are outlined in TM 9-2815-214-34. Troubleshooting procedures for the components of the 100-ampere power kit are outlined in TB 9-2300-206-15.

Table 2-2. Troubleshooting

Malfunction	Probable causes	Corrective action
	Clutch Assembly	
1. Clutch chatters or grabs.	a. Grease or oil on clutch disc.	a. Replace clutch disc. Clean pressure plate and flywheel (para 3-3).
	b. Clutch linkage binding or defective.	b. Clean, inspect, and check for proper linkage adjustment (TM 9-23 20-242-20).
	c. Defective clutch disk.	c. Replace clutch disk.
	d. Defective pressure plate.	d. Replace pressure plate.
	e. Defective or loose engine mounts.	e. Tighten engine mounts (TM 9-2220-242-20).
	f. Clutch disc binding on transmission shaft.	f. Inspect clutch disc and transmission splines (para 3-4).
2. Clutch slips.	a. Improper clutch adjustment.	a. Adjust clutch properly (TM 9-2320 242-20).
	b. Clutch linkage binding or defective.	b. Clean and inspect linkage (TM. 9-2320-242-20).
	c. Defective pressure plate.	c. Replace pressure plate.
	d. Grease or oil on clutch disc.	d. Replace clutch disc. Clean pressure plate and flywheel (para 3-3).
	e. Worn clutch disc.	e. Replace clutch disc.
3. Clutch drags.	a. Improper clutch adjustment.	a. Adjust clutch properly (TM 9-2320-242-20).
	b. Defective clutch disc.	b. Replace disc.
	c. Bent release fork.	c. Replace release fork.
	d. Clutch linkage binding or defective.	d. Clean and inspect linkage (TM 9-2320-242-20).
4. Clutch will not disengage when clutch pedal is depressed.	a. Release fork not connected to ball stud.	a. Connect release fork to ball stud.
	b. Defective release fork or ball stud.	b. Replace release fork or ball stud.
	c. Defective release bearing.	c. Replace release bearing.
	d. Clutch linkage binding or defective.	d. Clean, inspect, and check for proper linkage adjustment (TM 9-2320-242-20).
5. Clutch noisy when clutch pedal is depressed.	a. Defective release bearing.	a. Replace release bearing.
	b. Defective pilot bearing.	b. Replace pilot bearing.

(1) Removal and installation procedures for the clutch assembly are outlined in paragraph 2.8, cleaning and inspection procedures are outlined in Section III of Chapter 3.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable cause	Corrective action
	Cold Weather Starting Aid System	
6. No fuel enters engine air box when cold start switch is positioned to ON.	a. Electrical malfunction.	a. Troubleshoot electrical system (TM 9-2320-242-20).
	b. Clogged or defective air box nozzle.	b. Clean or replace Nozzle.
	c. Defective fuel pressure valve.	c. Replace fuel pressure valve (para 2-111.
7. Fuel in engine air box will not ignite when cold start switch is positioned to ON.	a. Electrical malfunction.	a. Troubleshoot electrical system (TM 9-2320-242-20).
	b. Defective igniter coiL	b. Replace igniter coil (para 2-13).
	c. Defective igniter coil high tension lead.	c. Replace lead (TM 9-2320-242-201.
	d. Defective or improperly gapped igniter plug.	d. Gap .. replace igniter plug (para 3-22).
	e. Clogged air pump hose.	e. Clean or replace hose.
	f. Insufficient air supply.	f. Replace air pump (para 2-10)
8. Fuel and ignition in engine air box but system will not aid engine starting.	System actuated too long.	Refer to TM 9-2320-242-1.0 for proper utilization of system.
	(21	
	Transmission	
9. Hard shifting in all gears.	Binding mechanism in shifting cover.	Overhaul shifting mechanism in cover.
10. Hard shifting first gear	a. Binding mechanism in shifting cover.	a. Overhaul shifting mechanism in cover.
	b. First and reverse sliding gear binding on mainshaft.	b. Hone first and reverse gear splines on mainshaft and / or first and reverse gear.
	c. Binding friction ring.	c. Replace friction ring and / or friction ring compression strip.
11. Hard shifting second gear.	a. Binding *mechanism in* shifting cover.	a. Overhaul shifting mechanism in cover.
	b. Internal teeth in first gear hub.	b. Replace first and reverse sliding gear assembly.
	c. External teeth on second speed gear.	c. Replace second speed gear.
12. Hard shifting third gear.	a. External teeth on third gear hub.	a. Replace third gear.
	b. Internal teeth in collar and / or external hub teeth of third and fourth speed clutch.	b. Replace third and fourth speed clutch collar and / or collar and hub assembly.
13. Hard shifting fourth gear	a. Binding mechanism in shifting cover.	a. Overhaul shifting mechanism in cover.
	b. Internal teeth in collar and / or external hub teeth on third and fourth	b. Replace third and fourth clutch collar and / or collar and hub assembly.
	c. External teeth on clutch gear.	c. Replace clutch *gear.*

(2) Maintenance procedures for the transmission are outlined in paragraph 3.36:

Table 2-2. Troubleshooting - Continued

Malfunction	Probable cause	Corrective action
	Transmission - Continued	
14. Hard shifting reverse.	a. Binding mechanism in shifting cover.	a. Overhaul shifting mechanism in cover.
	b. Bent reverse shift lever.	b. Replace lever.
	c. Reverse shift lever binding on eccentric shaft.	c. Replace lever and / or shaft.
	d. Reverse idler gear binding on shaft	d. Replace gear bushings and / or staff
15. Jumps out of first gear.	a. Damaged or stuck first and second gear shift shaft detent ball.	a. Free or replace ball.
	b. Broken or weak first and second gear shift shaft detent ball spring.	b. Replace spring.
	c. Worn friction ring in first and reverse sliding gear.	c. Replace ring and / or compression strip.
	d. Worn first gear teeth on first and reverse sliding gear.	d. Replace gear.
	e. Worn first gear teeth on countershaft.	e. Replace countershaft.
	f. Worn or bent first and second gear shifter fork.	f. Replace fork.
	g. Worn or bent shifter inner lever.	g. Replace lever.
1.6. Jumps out of second gear.	a. Damaged or stuck first and second gear shift shaft detent ball.	a. Replace ball.
	b. Broken or weak first and second gear shift shaft ball spring,	b. Replace spring.
	c. Worn teeth on second speed gear hub.	c. Replace second gear.
	d. Worn teeth in first and second reverse sliding gear hub.	d. Replace first gear.
	e. Worn second gear teeth.	e. Replace second gear.
	f. Worn second speed countergear teeth	f. Replace second speed countergear.
	g. Worn or bent first and second gear shifter fork.	g. Replace fork.
	h. Worn or bent shifter inner lever.	h. Replace lever.
17. Jumps out of third gear.	a. Damaged or stuck third and fourth speed gear shift shaft detent ball.	a. Replace ball.
	b. Broken or weak third and fourth speed gear shift shaft detent ball spring.	b. Replace spring.
	c. Worn extenal teeth on third speed gear hub.	c. Replace third speed gear.
	d. Worn internal teeth in third and fourth speed clutch collar.	d. Replace collar.
	e. Worn third speed teeth.	e. Replace third speed gear.
	f. Worn third speed countergear teeth.	f. Replace third speed countergear.
	g. Worn or bent third and fourth speed shifter fork.	g. Replace fork.
	h. Worn or bent shifter inner lever.	h. Replace lever.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable cause	Corrective action
	Transmission - Continued	
18. Jumps out of fourth gear.	a. Damaged or stuck third and fourth speed gear shift shaft detent ball.	a. Replace ball.
	b. Broken or weak third and fourth speed gear shift shaft detent ball spring.	b. Replace spring.
	c. Worn internal teeth in third and fourth speed clutch collar.	c. Replace collar.
	d. Worn external teeth on hub of clutch gear.	d. Replace clutch gear.
	e. Worn or bent third and fourth speed shifter fork.	e. Replace fork.
	f. Worn or bent shifter inner lever.	f. Replace lever.
19. Jumps out of reverse gear.	a. Damaged or stuck reverse speed shift shaft detent ball.	a. Replace ball.
	b. Broken or weak reverse speed shift shaft detent ball spring.	b. Replace spring.
	a Worn teeth on reverse countergear.	c. Replace reverse countergear.
	d. Worn teeth on reverse idler gear.	d. Replace reverse idler gear.
	e. Worn teeth on first and reverse sliding gear.	e. Replace first and reverse sliding gear.
	f. Reverse shift lever out of adjustment.	f. Adjust reverse *shift* lever.
	g. Bent or worn reverse shifter head.	g. Replace reverse shifter head.
	h. Bent or worn shifter inner lever.	h. Replace lever.
20. No power at output shaft.	a. Shifting mechanism in shift cover.	a. Overhaul mechanism in shift cover.
	b. Shifter shaft splines stripped and / or broken external shift lever clamp bolt.	b. Replace shifter lever shaft and / or bolt.
21. Gear clashing from first to second gear.	a. Worn or broken second gear synchronizer ring.	a. Replace ring.
	b. Worn or broken second gear synchronizer cone.	b. Replace cone.
	c. Broken synchronizer energizer springs.	c. Replace springs.
22. *Gear* clashing from second to third gear.	a. Worn or broken third gear synchronizer cone.	a. Replace cone.
	b. Broken third and fourth speed clutch keys.	b. Replace clutch keys.
23. Gear clashing from third to fourth gear.	a. Worn or broken clutch gear synchronizer cone.	
	b. Broken third and fourth speed clutch keys.	b. Replace clutch keys.
24. Oil leakage.	a. Loose drain plug.	a. Tighten plug.
	b. Loose filler plug.	b. Tighten plug.
	c. Clutch gear bearing retainer gasket defective or loose retainer screws.	c. Tighten retainer screws. Replace gasket. Seal screw threads with Permatex No. 2 or equivalent.
	d. Cracked or porous clutch gear retainer.	d. Replace clutch gear retainer.
	e. Clutch gear bearing oil seal.	e. Replace seal.
	f. Transmission shift cover loose, defective gaskets, defective seals, or loose plugs.	f. Tighten screws. Replace cover gasket. Seal and restake plugs. Replace shifter shaft seal. Replace selector shaft seal.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable causes	Corrective action
24. Oil leakage continued	g. Rear bearing retainer screws loose, defective gasket or seal.	g. Tighten retainer screws. Reseal screw threads with Permatex No. 2 or *equivalent.* Replace *gasket.* Replace oil seal.
	h. Universal joint front *flange seal.*	h. Replace rear bearing retainer oil seal or flange.
	i. *Power take-off* cover *screws loose* or defective gasket.	i. Tighten screws. Reseal screw threads with Permatex No. 2 or equivalent Straighten cover seal flange. Replace gasket.
	j. Defective transmission case.	j. Replace case.
	TransferAssembly (3)	
25. Jumps out of six wheel drive position.	a. Defective shift lever. b. Defective shafts. c. Defective gears. d. Defective shift fork. e. Defective clutch.	a. Replace shift lever. b. Replace shafts. c. Replace gears. d. Replace shift fork. e. Replace clutch.
26. Shift lever sticks or hard to shift	a. Low lubricant level. b. Defective shift shaft. c. Defective shift fork.	a. Fill to proper level (LO 9-23 20-242-12). b. Replace shift shaft. c. Replace shift fork.
27. Transfer runs excessively hot.	a. Low lubricant levei. b. Defective oil pump. c. Defective bearing.	a. Fill to proper level (LO 9·23 20-242-121. b. Repair oil pump. c. Replace bearing.
28. *Transfer* noisy during drive.	a. Low lubricant level. b. Defective bearing. Defective gear.	a. Fill to proper level (LO 9-23 20-242-12). b. Replace bearing. c. Replace gear.
29. Lubricant leakage.	a. Defective seals, shims, or gaskets. b. Loose component attacking hardware. c. Loose filler or drain plug,	a. Replace seals, shims, or gaskets. b. Tighten hardware. c. Tighten plugs.
	Front Differential (4)	
30. Differential noisy during drive and coast.	a. Backlash not adjusted properly. b. Defective pinion or ring *gear.* c. Defective bearings. d. Defective gears. e. Defective propeller shafts. f. Improper pinion and ring gear tooth contact. g. Improper lubricant level or lubricant.	a. Adjust backlash. b. Replace *pinion* and *ring par.* c. Replace bearings. d. Replace gears. e. Replace propeller shafts. f. Adjust for proper tooth contact. g. Check lubricant level or type of lubricant (LO 9-2320-242-12).
31. Differential runs excessively hot.	*a.* Improper lubricant level or lubricant. b. Defective bearings.	a. Check lubricant level or type of lubricant (LO 9-2320-242-12). b. Replace bearings.

(3) Maintenance procedures for the transfer assembly are outlined in paragraph 3-38.
(4) Maintenance procedures tor me tram differential are outlined paragrapy 3.40.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable causes	Corrective action
	Front Differential - Continued	
32. Differential clanks when starting.	a. Excessive backlash. b. Loose propeller shafts bearing housings. c. Worn propeller shafts. d. Defective equalizer assembly. e. Defective bearings. f. Defective yoke sleeve.	a. Adjust backlash. b. Tighten housing screws. c. Replace propeller shafts. d. Repair or replace equalizer assembly. e. Replace bearings. f. Replace sleeve.
33. One wheel slips while the other stands still.	a. Improperly adjusted equalizer assembly. b. Defective equalizer assembly. c. Broken propeller shaft.	a. Adjust equalizer assembly. b. Repair or replace equalizer assembly. c. Replace propeller shaft.
34. Lubricant leakage.	a. Defective seals, shims or gaskets. b. Loose component securing hardware. c. Loose filler or drain plug. d. Excessive lubricant level.	a. Replace seals, shims, or gaskets. b. Tighten hardware. c. Tighten filler or drain plug. d. Drain lubricant to proper level.
	Center Differential (5)	
33. Differential noisy during drive and coast.	a. Backlash not adjusted properly. b. Defective pinion or ring gear. c. Defective bearings. d. Defective gears. e. Defective propeller shafts. f. Improper pinion and ring gear tooth contact. g. Improper lubricant level or lubricant h. Defective thru-shaft. i. Defective equalizer assembly.	a. Adjust backlash. b. Replace pinion and ring gear. c. Replace bearings. d. Replace gears. e. Replace propeller shafts. f. Adjust for proper tooth contact. g. Check lubricant level or type lubricant (LO 9-2320-242-12). h. Replace shaft. i. Repair or replace equalizer assembly.
36. Differential runs excessively hot	a. Improper lubricant level or lubricant.	a. Check lubricant level or type of lubricant (LO 9-2320-242-12).
37. Differential clanks when starting.	b. Defective bearing. a. Excessive backlash. b. Loose propeller shafts bearing housings. c. Worn propeller shafts. d. Defective equalizer assembly. e. Defective input shaft gears. 1. Defective bearings. g. Defective thrushaft.	b. Replace bearings. a. Adjust backlash. b. Tighten housing screws. c. Replace propeller shafts. d. Repair or replace assembly. e. Replace gears. f. Replace bearings. g. Replace thrushaft.
38. One wrieel slips while the other stands still.	a. Improperly adjusted equalizer assembly. b. Defective equalizer assembly. c. Defective propeller shaft.	a. Adjust equalizer assembly. b. Repair or replace equalizer assembly. c. Replace propeller shaft.

(5) Maintenance procedures for the center differential are outlined in paragraph 3-42

Table 2-2. Troubleshooting - Continued

Malfunction	Probable causes	Corrective action
	Center Differential - Continued	
39. Differential will not engage or disengage rear differential.	a. Defective lever. b. Defective shifter forks on shafts. c. Defective thrushaft sleeve.	a. Replace lever. b. Replace shifter forks on shafts. c. Replace sleeve.
40. Lubrication leakage.	a. Defective seals, shims, or gaskets. b. Loose component securing hardware. c. Loose filler or drain plug. d. Excessive lubricant level.	a. Replace seals, shims, or gaskets. b. Tighten hardware. c. Tighten filler or drain plug. d. Drain lubricant to proper level.
	Rear Differential (6)	
41. Differential noisy during drive and coast.	a Backlash not adjusted properly. b. Defective pinion or ring gear. c. Defective bearings. d. Defective gears. e. Defective propeller shafts. f. Improper pinion and ring gear tooth contact. g. Improper lubricant level or lubricant.	a. Adjust backlash. b. Replace pinion and ring gear. c. Replace bearings. d. Replace gears. e. Replace propeller shafts. f. Adjust for proper tooth contact. g. Check lubricant level or type of lubricant (LO 9-2320-242-12).
42. Differential runs excessively hot.	a Improper lubricant level or lubricant. b. Defective bearings.	a. Check lubricant level or type of lubricant (LO 9-2320-242-12). b. Replace bearings.
43. Differential clanks when starting.	a. Excessive backlash. b. Loose propeller shafts bearing housing. c. Worn propeller shafts. d. Defective equalizer assembly. e. Defective bearings.	a. Adjust backlash. b. Tighten housing screws. c. Replace propeller shafts. d. Repair or replace equalizer assembly. e. Replace bearings.
44. One wheel slips while the other stands still.	a. Improperly adjusted equalizer assembly. b. Defective equalizer assembly. c. Defective propeller shaft.	a. Adjust equalizer assembly. b. Repair or replace equalizer assembly. c. Replace propeller shaft.
45. Lubrication leakage.	a. Defective seals, shims, or gaskets. b. Loose component securing hardware. c. Loose filler or drain plug. d. Excessive lubricant level.	a. Replace seals, shims, or gaskets. b. Tighten hardware. c. Tighten filler or drain plug. d. Drain lubricant to proper level.
	Front Steering Gear Box (7)	
46. Steering gear box binds.	a No lubricant. b: Improper adjustment c. Defective retainers or ball cups. d. Defective bushing. e. Defective worm gear. f. Defective shaft. g. Defective or improperly adjusted gears. h Improper worm gear preload.	a. Fill gear box with lubricant (LO 9-2320-242-12). a. Adjust steering gear box. c. Replace retainers and ball cups. d. Replace bushings. e. Replace worm gear. f. Replace shaft g. Adjust or replace gears. h Adjust worm gear preload.

(6) Maintenance procedures for the rear differential are outlined in paragraph 3-44.
(7) Maintenance procedures for the front steering gear box are outlined in paragraph 3-65.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable causes	Corrective action
	Front Steering Gear Box - Continued	
A Excessive play in center position.	a. Defective shaft or worm gear. b. Improper adjustment. c. Covers are loose.	a. Replace shaft or worm gear. h. Adjust steering gear box. c. Tighten covers.
48. Lubricant leakage.	a. Defective seals, gaskets, or shims. b. Loose filler or drain plug.	a. Replace seals, gaskets, or shims. b. Tighten filler or drain plug.
	Rear Steering Gear Box (8)	
49. Steering gear box binds.	a. No lubricant.	a. Fill gear box with lubricant (LO 9-2320-242-12).
	b. Improper adjustment c. Defective retainers or ball cups. d. Defective bushing. e. Defective worm gear. f. Defective shaft. g. Improper worm gear preload.	b. Adjust steering gear box. c. Replace retainers and ball cups. d. Replace bushings. e. Replace worm gear. f. Replace shaft. g. Adjust worm gear preload.
50. Excessive play in center.	a. Defective shaft or worm gear. b. Improper adjustment. c. Covers are loose.	a. Replace shaft or worm gear. b. Adjust steering gear box. Tighten covers.
51. Lubricant leakage.	a. Defective seals, gaskets, shims, or knock out plug. b. Loose filler or drain plug.	a. Replace seals, gaskets, shims or knockout plugs. b. Tighten filler or drain plug.
	(9) *Articulation Yoke*	
52. Carrier does not track.	a. Loose or defective bearing. b. Loose mounting hardware. Defective bearing support. d. Defective yoke.	a. Tighten or replace bearing. b. Tighten hardware. a Replace support. d. Replace yoke.
53. Noise from yoke when travelling over rough terrain.	a. Loose mounting hardware. b. Defective bearing support. c. Lof se or defective bearing.	a. Tighten hardware. b. Replace support. a Tighten or replace bearing.
	Ambulance Heater (10)	
54. Heater will not operate.	Defective heater control box.	Trouble shoot control box (TM 9 2320-242-20).
55. Heater blower operates but heater will not ignite.	a. Defective igniter. b. Defective resistor. c. Clogged orifice. d. Clogged fuel lines. e. Fuel shutoff valve not open. f. Clogged heater fuel filter. g. Defective heater fuel pump. h. Defective regulator valve. i. Low voltage.	a. Test igniter. b. Test resistor. a Clean or replace orifice. d. Clean fuel lines. e. Open fuel shutoff valve. f. Clean or replace fuel filter element (TM 9-2320-242-20). g. Test fuel pump (para 3-99). h. Repair or replace regulator valve. Check supply voltage.
56. Blower runs when seitch is in off position.	a. Defective quartz rod. b. Flame switch out of adjustment	a. Replace quartz rod. b. Properly adjust flame switch.
57. Heater ignites and then shuts down.	a. Lack of fuel. b. Defective flame micro-switch. c. Defective overheat switch.	a. Check fuel supply. b. Replace flame switch. a Replace switch.

(8) Maintenance procedures for the rear steering gear box are outlined in paragraph 3-66.
(9) Maintenance procedures for the articulation yoke are outlined in paragraph 3-68.
(10) Maintenance procedures for the ambulance heater are outlined in paragraph 3-95.

Table 2-2. Troubleshooting - Continued

Malfunction	Probable causes	Corrective action
	Ambulance Heater - Continued	
58. Ignition does not stop when switch is positioned to off.	a. Defective regulator valve. b. Flame switch stuck open or defective.	a. Replace regulator valve. b. Adjust or replace flame switch.
59. Heater combustion surges.	a. Defective regulator valve. b. Defective fuel pump.	a. Replace regulator valve. b. Replace fuel pump (para 349).
60. Blower does not operate.	Defective electrical motor.	Replace motor.
61. Heater will not operate in high fire position.	a. Defective wiring to regulator valve. b. Defective regulator valve.	a. Check wiring. b. Replace regulator valve.
	Bilge Pump (11)	
62. Bilge pump will not operate.	a. Electrical malfunction. b. Defective connector. c. Defective brushes assembly. d. Defective wiring. e. Defective rotor assembly. f. Defective field windings. g. Defective insulators.	a. Refer to TM 9-2320-242-20. b. Replace connector. c. Replace brushes assembly. d. Replace wiring. e. Replace rotor assembly. f. Replace field windings. g. Replace insulators.
63. Bilge pump will not discharge water.	a. Inlet screen, inlet or outlet ports blocked. b. Defective impeller. c. Defective impeller key. d. Defective rotor assembly shaft.	a. Clean screen, inlet, or outlet ports. b. Replace impeller. c. Replace key. d. Replace rotor assembly.
64. Bilge pump leaks during operation.	a. Defective packings, seals, or gaskets. b. Cracked housings.	a. Replace packings, seals, or gaskets. b. Replace housings.
65. Bilge pump output is below normal.	a. Improper supply voltage. b. Worn brushes. c. Defective wiring. d. Defective rotor assembly. e. Defective bearings. f. Partially blocked inlet screen	a. Refer to TM 9-2320-242-20. b. Replace brushes. c. Replace wiring. d. Replace rotor assembly. e. Replace bearings. f. Clean screen.
	Winch (12)	
66. Winch will not hold lead when power is interrupted.	Defective or improperly adjusted brake.	Adjust or replace brake.
67. Winch will not operate with *lever in* proper position.	a. Defective lever. b. Defective brake. c. Defective or missing lever key. d. Defective shifter shaft. e. Defective shifter fork. f. Defective shifter fork key. g. Defective clutch h. Defective drum shaft keys. i. Defective worm input shaft. j. Defective drum shaft.	a. Replace lever. b. Replace brake. c. Replace lever key. d. Replace shifter shaft. e. Replace shifter fork. f. Replace shifter fork key. g. Replace clutch. h. Replace drum shaft keys. i. Replace shaft. j. Replace drum shaft.
68. Winch noisy during operation.	a. Defective bushing. b. Defective worm input shaft bearings. c. Defective *worm* gear or worm input shaft gear.	a. Replace bushings. b. Replace bearings. c. Replace gears.

(11) Maintenance procedures for the bilge pump are outlined in paragraph 3-102.
(12) Maintenance procedures for the winch are outlined in Paragraph 4-7.

Table 2-2. Troubleshooting - Continued

Winch - Continued		
Malfunction	Probable causes	Corrective action
69. Winch clanks when starting.	a. Worn clutch. b. Defective drum. c. Defective worm input shaft bearings. d. Worn drum bushing.	a. Replace clutch. b. Replace drum. c. Replace bearings. d. Replace drum bushings.
70. Water runs out of winch after fording or swimming.	Defective drum or shifter shaft seals.	Replace seals.
	Power Takeoff (13)	
71. Power takeoff will not operate with lever properly positioned.	a. Defective sliding clutch. b. Defective clutch yoke. c. Defective clutch yoke key. d. Defective clutch yoke shaft. e. Defective output shaft. f. Defective transfer assembly output shaft.	a. Replace sliding clutch. b. Replace clutch yoke. c. Replace clutch yoke key. d. Replace clutch yoke shaft. e. Replace output shaft. f. Replace shaft (para 3-38).
72. Power takeoff noisy during operation.	Defective bearings.	Replace bearings.

(13) Maintenance procedures for the power takeoff are outlined in paragraph 4-10.

Section III. REMOVAL *AND* INSTALLATION OF COMPONENTS

2-6. General

This section contains instructions for removal and installation of components of the M561 Cargo Truck and the M792 Ambulance.

2-7. Engine

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-8. Clutch assembly

a. *Removal*

(1) Remove transmission. (Refer to TM 9-2320-242-20.1

(2) Disconnect release bearing (6, fig 2-4) and spring (23) from release fork (26). Disconnect adjustment rod (22) by removing nuts (24 and 25). Disengage release fork from ball stud (18) by sharply bumping fork toward engine. Remove ball stud from clutch housing (10).

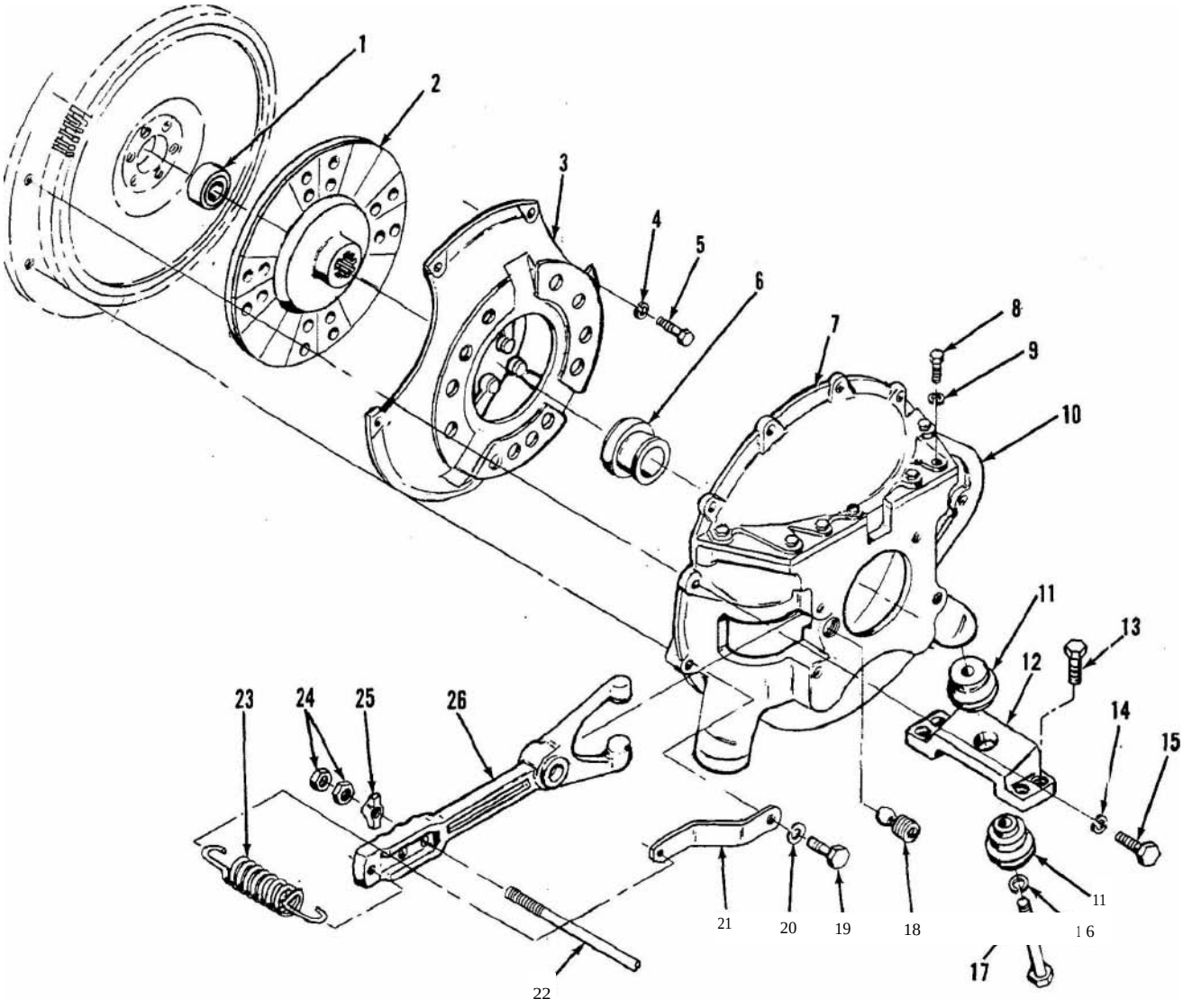


Figure 2-4. CFLUTCH ASSEMBLY, REMOVAL AND INSTALLATION

LEGEND to fig. 2-4:

1 Pilot bearing
2 - Clutch disc
3 - Pressure plate
4 - Lock washer
5 - Screw
6 - Release bearing
7 - Cover
8 - Screw
9 - Lock washer
10 - Clutch housing
11 - Isolator
12 - Isolator bracket
13 - Screw
14 - Lock washer
15 - Screw
16 - Lock washer
17 - Screw
18 - Ball stud
19 - Screw
20 - Lock washer
21 - Bracket
22 - Adjustment rod
23 - Spring
24 - Lock nut
25 - Adjustment nut
26 - Release fork

(3) Disconnect insolator brackets (12) from hull by removing screws (13). Install engine lifting sling (11595523) on engine. Attach chain hoist to sling and apply a slight strain on engine (fig 2-5). Disconnect bracket (21) by removing screw (191 and lock washer (20). Remove spring (23) from bracket.

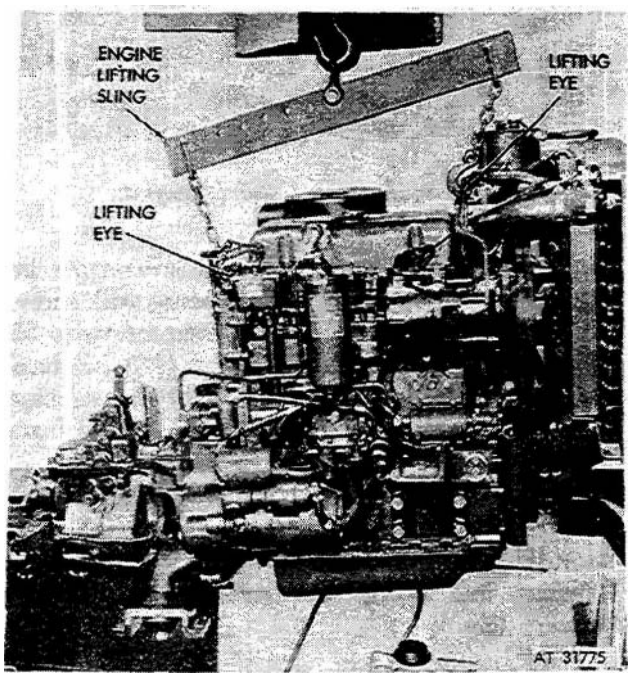


Figure 2-5. Engine lifting sling.

(4) Disconnect cover (7) and clutch housing (10) by removing screw (15) and lock washer (14). Remove release fork (26). Separate cover and clutch housing by removing screw (8) and lock washer (9). Disconnect isolator (11) and isolator bracket (12) from clutch housing (10) by removing screws (17) and lock washers (16).

(5) Disconnect clutch disc (2) and pressure plate (3) by removing screw (5) and lockwasher (4). Using a suitable puller, remove pilot bearing (1) from flywheel (fig 2-6).

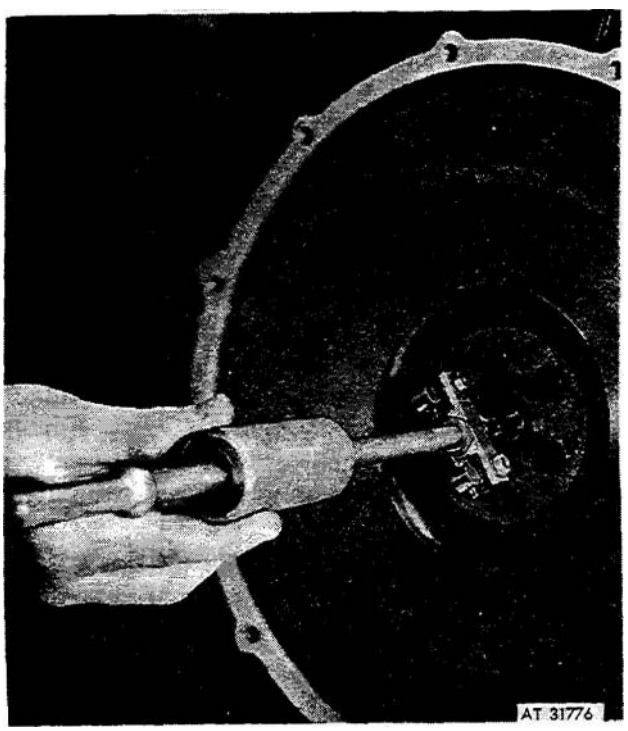


Figure 2-6. Removing pilot bearing

b. *Installation.*

(1) Clean pilot bearing recess in engine flywheel. Refer to figure 2-7 and install pilot bearing (1, fig 2-4).

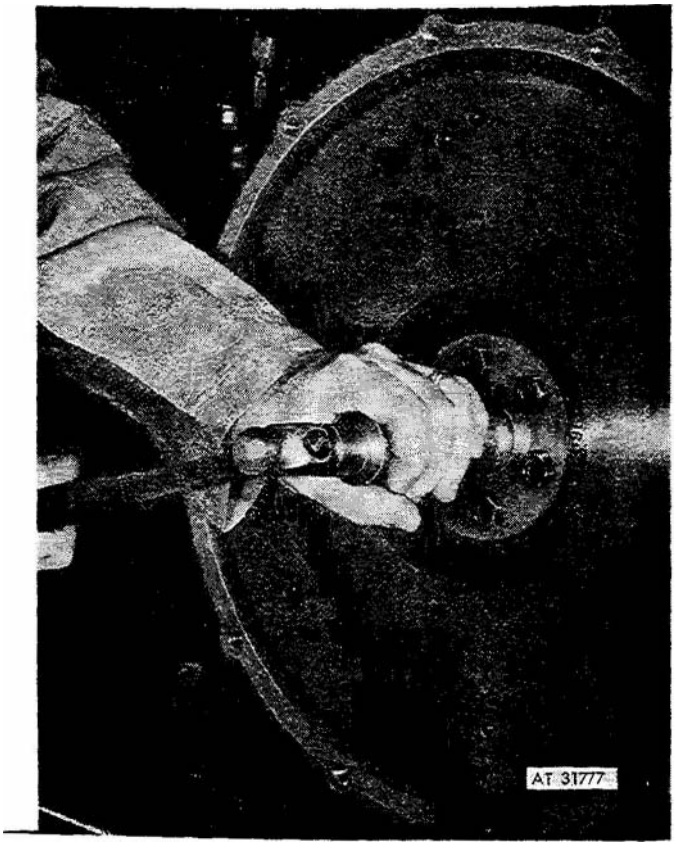


Figure 2-7. Installing pilot bearing.

(2) Position clutch disc (2, fig 2-4) with side marked "TRANS" away from the flywheel. Install a suitable clutch alignment tool through center of clutch disc into pilot bearing (1) as shown in figure 2-8.

(3) Position pressure plate (3, fig 2-4) over clutch disc and secure to flywheel with screw (5) and lock washer (4). Remove clutch alignment tool.

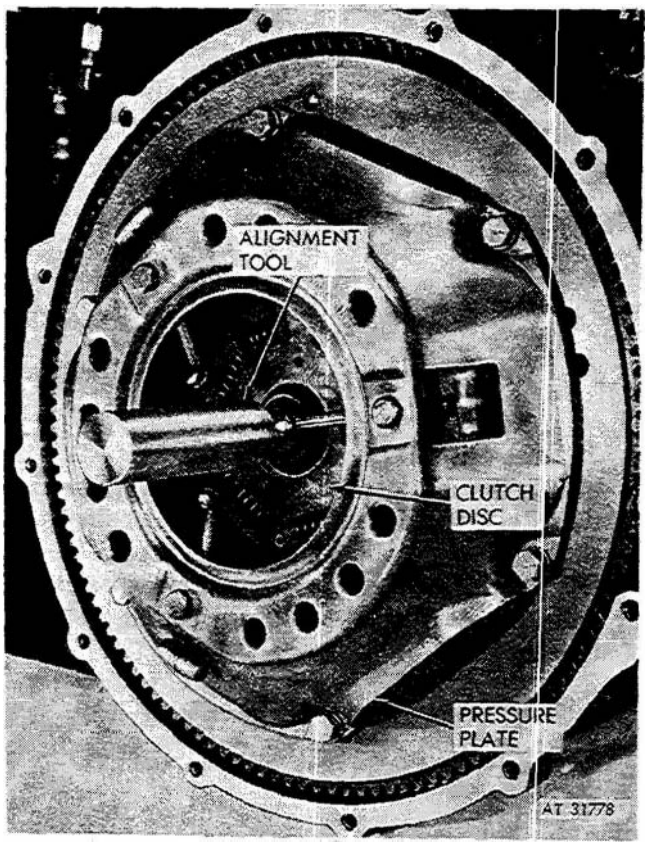


Figure 2-8. Clutch disc alignment.

(4) Connect isolator 111) and isolator bracket (12) to clutch housing (10) and secure with screws (17) and lock washers (16). Tighten screws to 55-65 lbs-ft. torque. Install ball stud (18) in clutch housing. Install release fork (26) in housing. Connect clutch housing to flywheel housing and secure with screw (15) and lock washer (14).

(5) Lower engine and connect isolator brackets (12) to hull with screws (13). Remove engine lifting sling (11595523). Connect bracket (21) to clutch housing and secure with screw (19) and lock washer (20).

(6) Snap release fork (26) on ball stud (18). Connect adjustment rod (22) to release fork and secure with nuts (24 and 25). Connect spring (23) to release fork and bracket (21). Connect release bearing (6) to release fork with bearing face' towards the engine (fig 2-9).

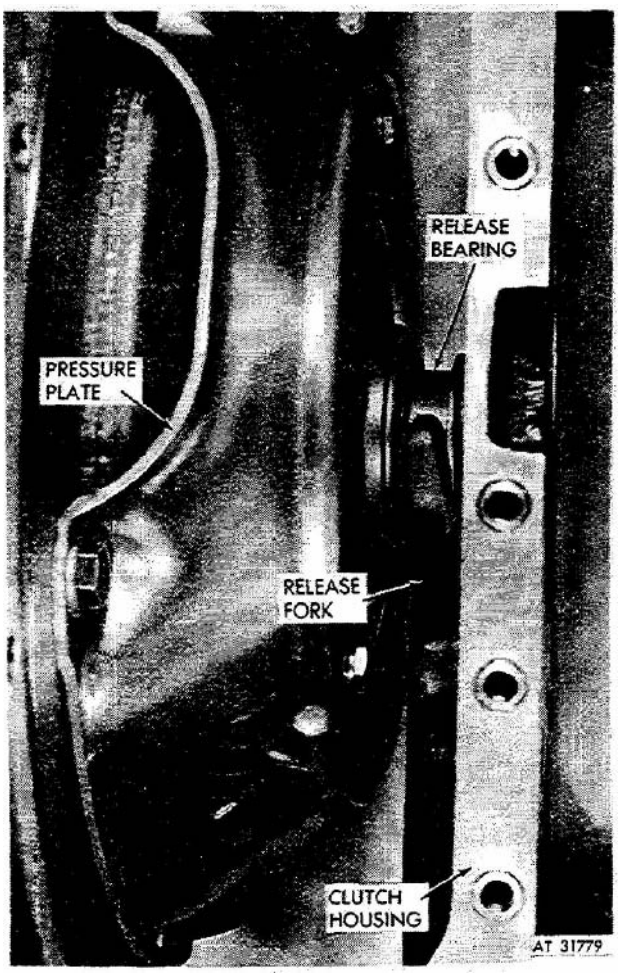


Figure 2-9. Proper installation of release bearing

(7) Connect cover (7) to clutch and flywheel housings and secure with screws (8 and 15) and lock washers (9 and 14).

(8) Install transmission and adjust clutch (refer to TM 9-2320-242-20).

2-9. Fuel Tank

a. Removal. (Refer to TM 9-2320-242-20.)

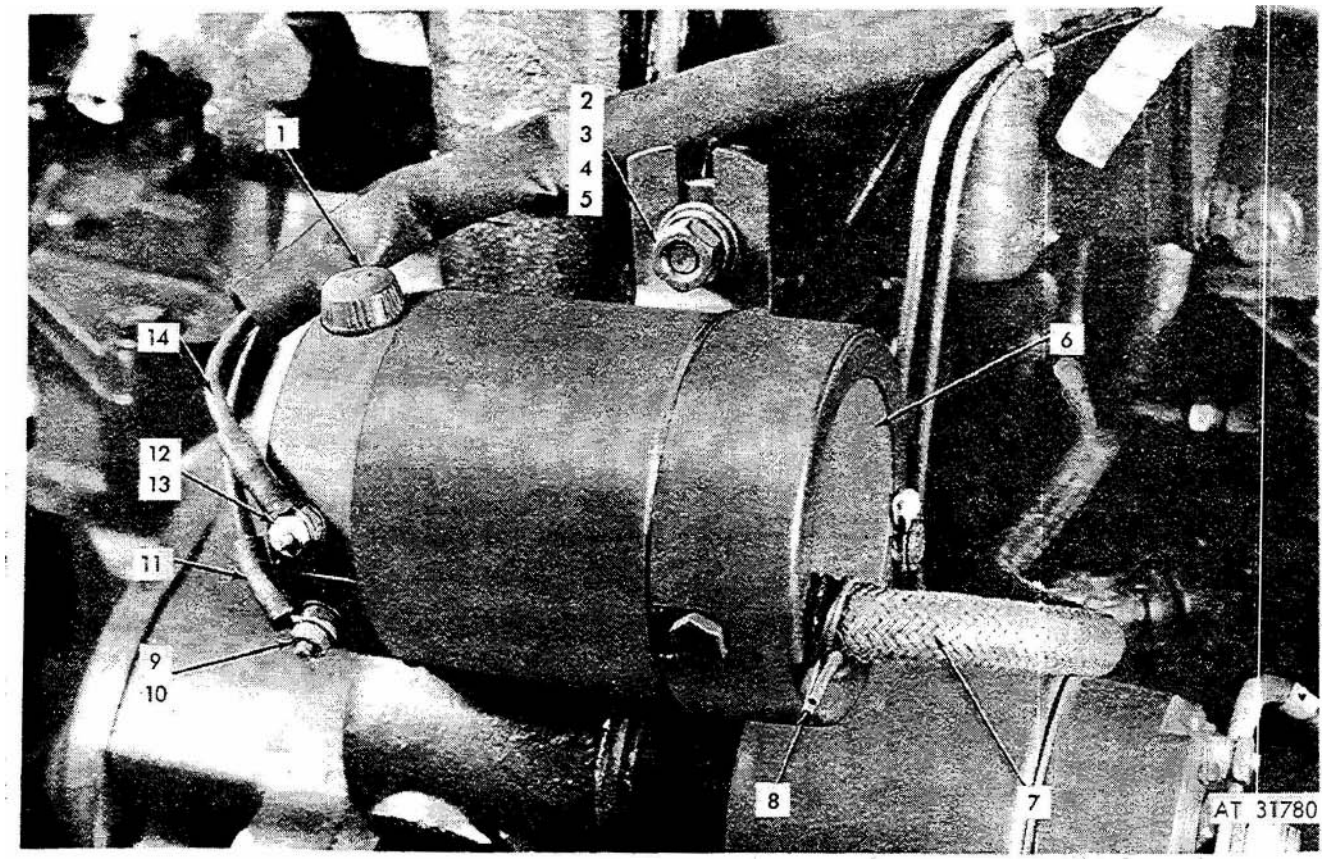
b. Installation. (Refer to TM 9-2320-242-20.)

2-10. Air Pump

a. Removal.

(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Disconnect clamp (8, fig 2-10) and hose (7) from pump outlet port. Tag and disconnect wires (11 and 14) by removing nuts (9 and 12) and washers (10 and 13).



1 - Air pump inlet
2 - Bolt
3 - Nut
4 - Washer
5 - Lock washer
6 - Air pump
7 - Hose
8 - Clamp
9 - Nut
10 - Washer
11 - Wire
12 - Nut
13 - Washer
14 - Wire

Figure 2-10. Air pump, removal and installation.

(3) Disconnect air pump (6) from mounting bracket by removing bolt (2), nut (3), washer (4), and lock washer (5).

b. *Installation.*

(1) Connect air pump (6) to mounting brackets and secure using bolt (2), nut (3), washer (4), and lock washer (5).

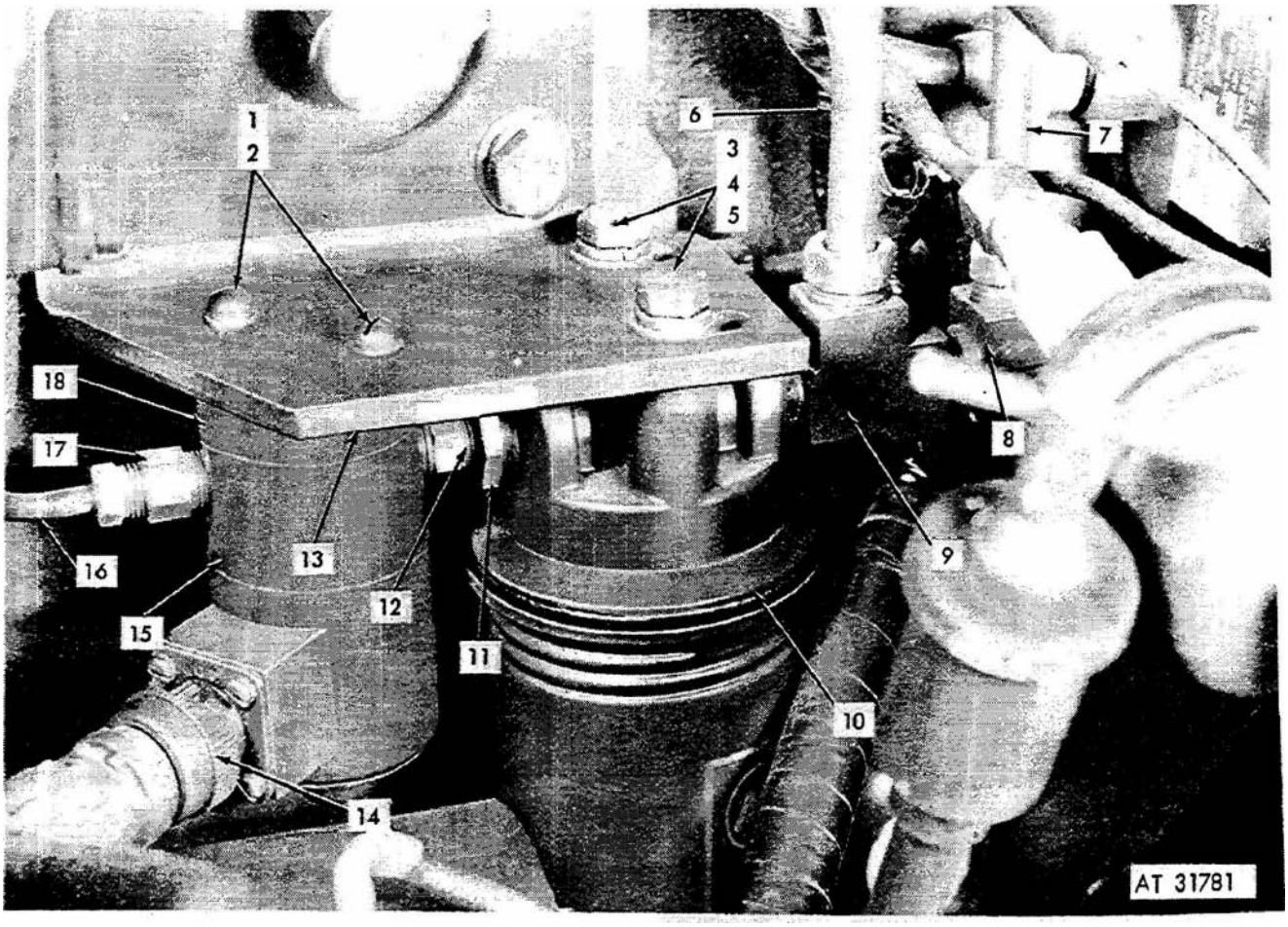
(2) Connect wires (11 and 14) to pump and secure using nuts (9 and 12) and washers (10 and 13). Connect hose (7) to pump outlet port and secure with clamp (8).

2-11. Fuel Pressure Valve and Cold Start Filter

a. *Removal.*

(1) engine cover (refer to TM 9-2320-242

(2) Disconnect tubes (6, 7, and 16, fig 2-11) and plug openings in tubes and components.



LEGEND to fig 2-11:
1 - Screw
2 - Washer
3 - Bolt
4 - Washer
5 - Lock washer
6 - Tube
7 - Tube
8 - Elbow
9 - Tee
10 - Cold start filter
11 - Reducer
12 - Nipple
13 - Bracket
14 - Electrical connector
15 - Fuel pressure valve
16 - Tube
17 - Fitting
18 - Spacer

Figure 2-11. Fuel pressure valve and cold start filter, removal and installation

(3) Disconnect electrical connector (14) and fitting (17) from fuel pressure valve (15).

(4) Disconnect cold start filter (10), fuel pressure valve (15), and spacer (18) from bracket (13) by removing screw (1), bolt (3), washers (2 and 4), and lock washer (5).

5) Unscrew and remove fuel pressure valve (15) from nipple (12).

6) Remove elbow (8), tee (9), reducer (11), and nipple (12) from cold start filter (10).

b. *Installation.*

(1) Install elbow (8), tee (9), reducer (11), and nipple (12) in cold start filter (10).

(2) Screw fuel pressure valve (15) on nipple (12).

(3) Position cold start filter (10), fuel pressure valve (15), and spacer (18) under bracket (13) and secure with screw (1), bolt (3), washers (2 and 4), and lock washer (5).

(4) Connect electrical connector (14) to fuel pressure valve (15) and install fitting (17).

(5) Connect tubes (6, 7, and 16).

(6) Start engine and hold air box heater switch in the ON position and check for fuel leaks.

(7) Close engine cover (refer to TM 9-2320-242-10).

Note: Do not hold switch in ON Position for more than one minute.

2-12. Igniter Plug

a. *Removal.*

(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Remove high tension lead (fig 2-12) from igniter plug and unscrew plug from air box cover.

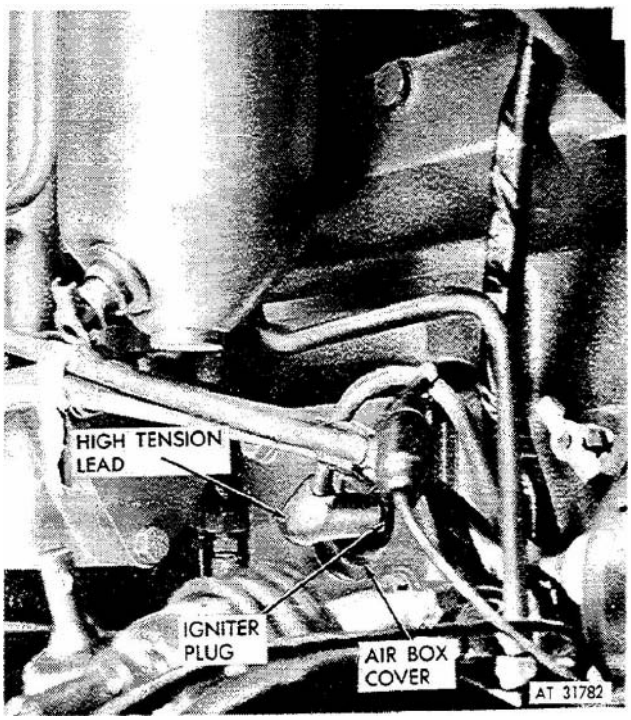


Figure 2-12. Igniter plug, removal and installation.

b. *Installation.*

(1) Install igniter plug in air box cover and connect high tension lead to plug.

(2) Close engine cover (refer to TM 9-2320-242-10).

2-13 Igniter Coil

a. *Removal.*

(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Unscrew and remove electrical connector (fig 2-13) and high tension lead from igniter coil.

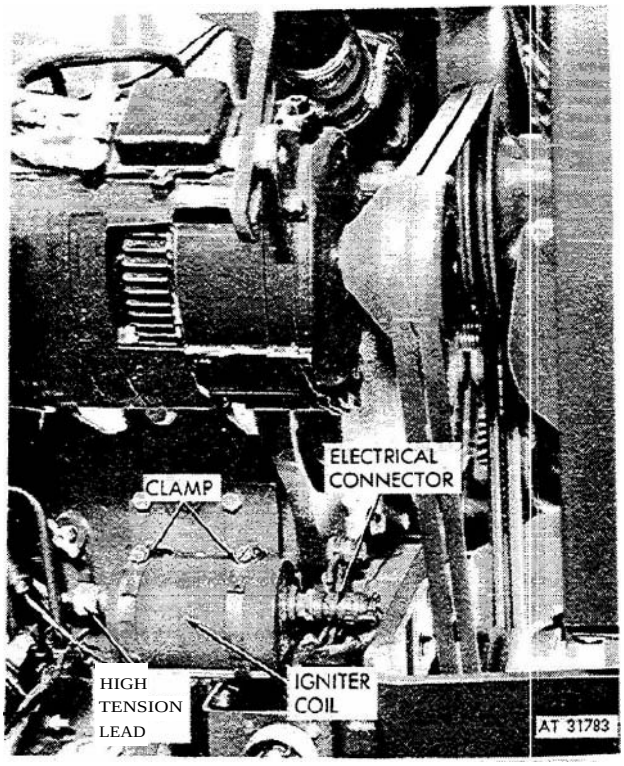


Figure 2-13. Igniter coil, removal and installation

(3) Disconnect clamps and remove igniter coil.

b. *Installation.*

(1) Position igniter coil to engine and secure with clamps.

(2) Connect electrical connector and high tension lead to igniter coil.

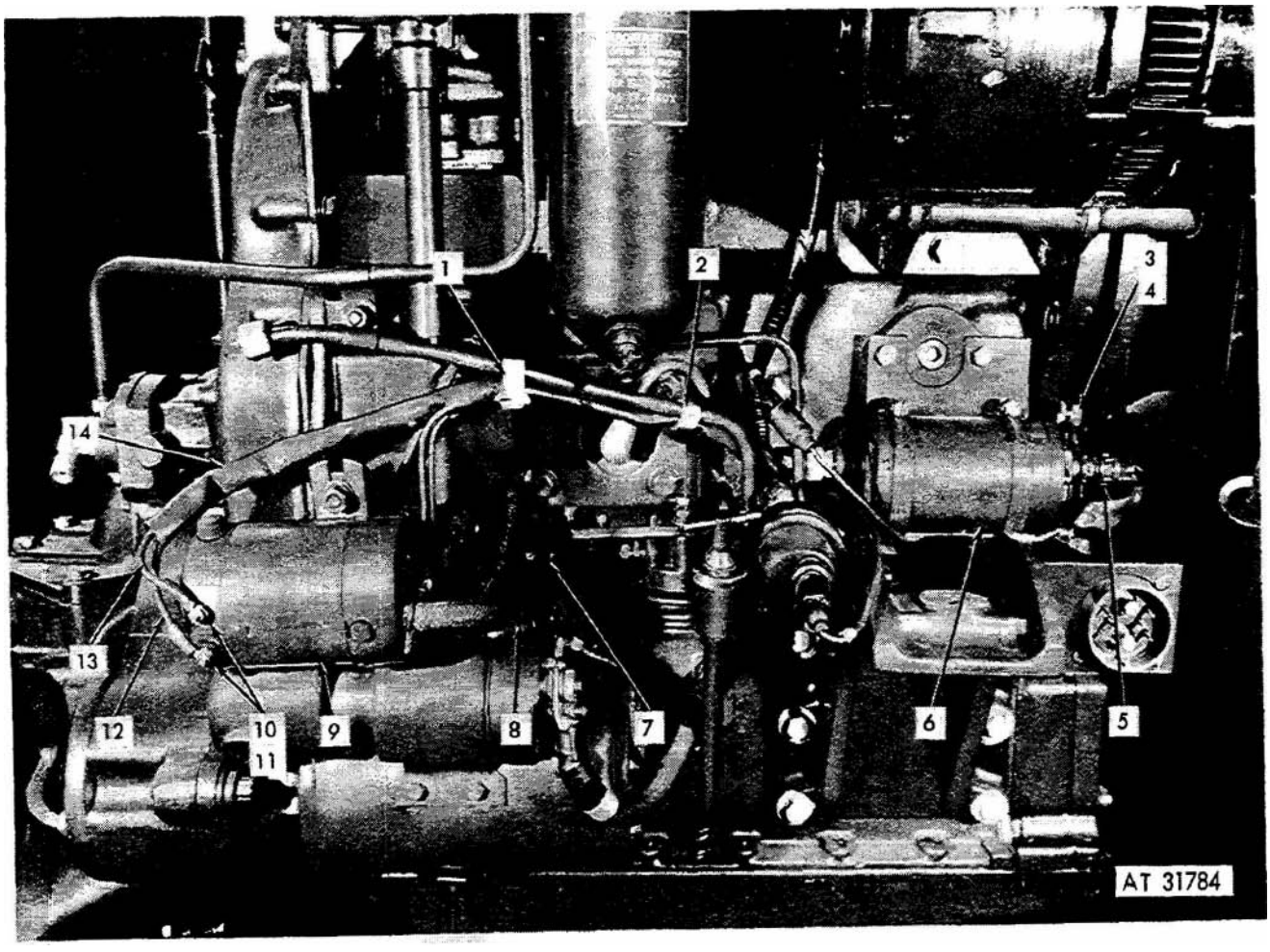
(3) Close engine cover (refer to TM 9-2320-242-10).

2-14. **Harness**

a. *Removal.*

(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Disconnect harness wires from engine by removing bolt (3, fig 2-14) and lock washer (4).



LEGEND to fig 2-14:
1 - Strap
2 - Strap
3 - Bolt
4 - Lock washer
5 - Electrical connector
6 - Igniter coil
7 - Fuel pressure valve
8 - Electrical connector
9 - Air pump
10 - Nut
11 - Washer
12 - Wire
13 - Wire
14 - Harness

Figure 2-14. ***Harness, removal and installation.***

(3) Disconnect electrical connectors (5 and 8) from igniter coil (6) and fuel pressure valve (7).

(4) Tag and disconnect wires (12 and 13) from air pump (9) by removing nuts (10) and washers (11).

(5) Disconnect straps (1 and 2) and remove harness (14).

b. *Installation.*

(1) Connect wires (12 and 13) to air pump (9) and secure with nuts (10) and washers (11).

(2) Connect electrical connectors (5 and 8) to igniter coil (6) and fuel pressure valve (7).

(3) Connect harness wires to engine and secure with bolt (3) and lock washer (4).

(4) Secure harness (14) with straps (1 and 2).

(5) Close engine cover (refer to TM 9-2320-242-10).

2-15. Air Box Heater Nozzle and Line

a. *Removal.*

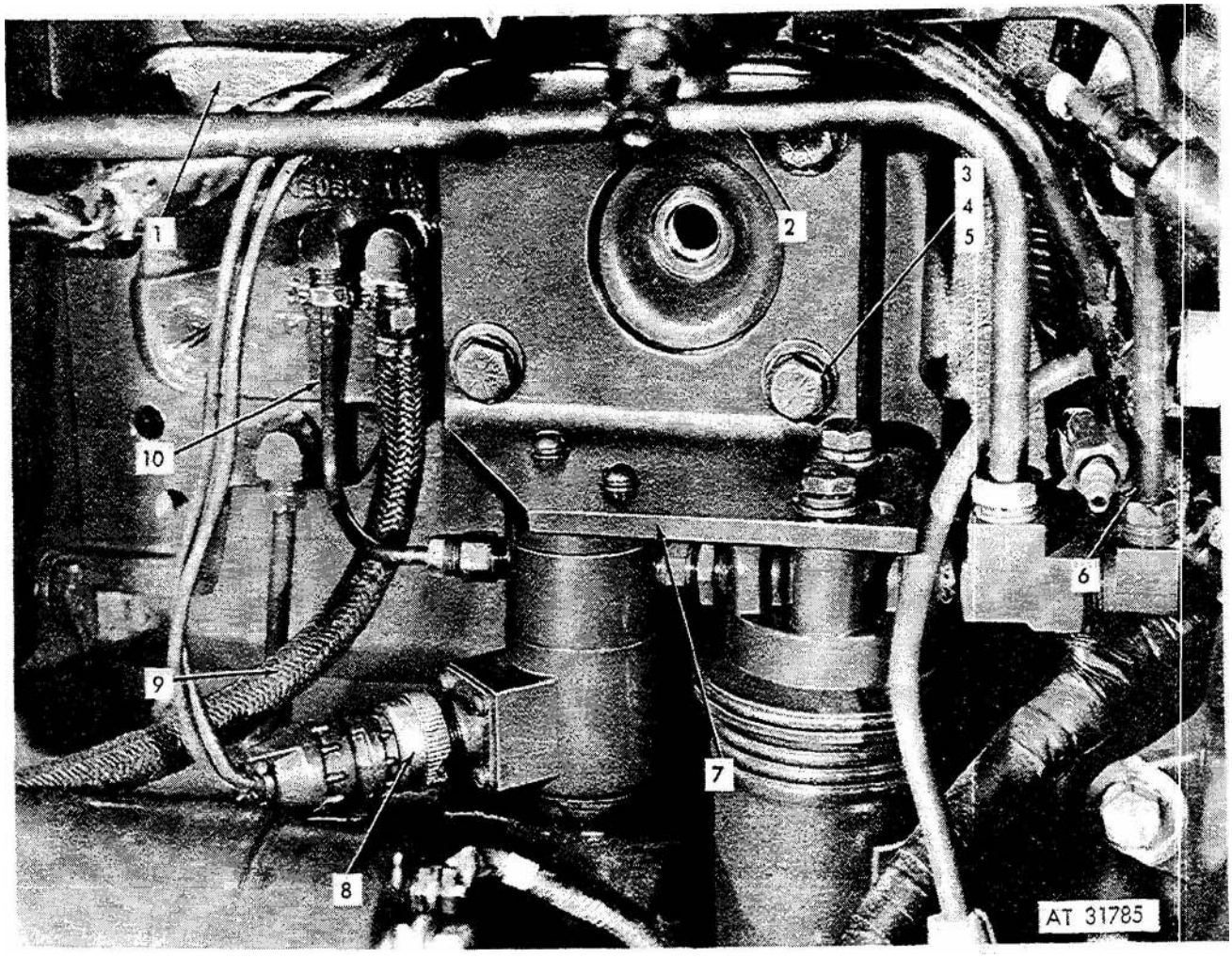
(1) Open engine cover (refer to TM 9-2320-242-10).

(2) Remove governor assembly (refer to TM 9-2815-214-34).

(3) Remove air pumps (refer to para 2-10).

(4) Remove igniter plug (refer to para 2-12).

(5) Disconnect tubes (2, 6, and 10, fig 2-15) and electrical connector (8) from filter bracket components.



LEGEND to fig 2-15:
1 - Air box cover
2 - Tube
3 - Screw
4 - Washer
5 - Lock washer
6 - Tube
- Filter bracket
8 - Electrical connector
9 - Hose
10 - Tube

Figure 2-15. Assembled filter bracket, removal and installation.

(b) Disconnect assembled filter bracket by removing screw (3), washer (4), and lock washer (5).

(7) Disconnect hose (9) and tube (10) from elbows on air box cover (1).

(8) Disconnect elbows (fig 2-16) from air box cover. Disconnect air box cover by removing countersunk screws.

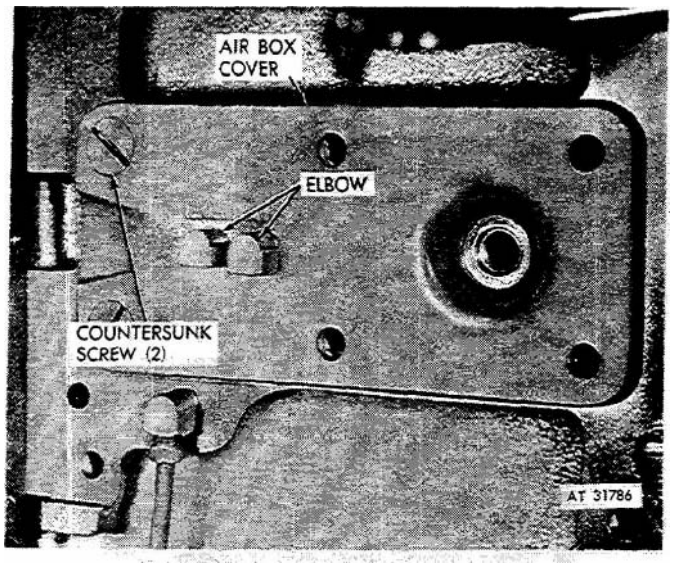


Figure 2-16. Air box cover, removal and installation.

(9) Disconnect air box heater nozzle (fig 2-17} from air box cover. Remove preformed packing from nozzle. Remove gasket from air box cover.

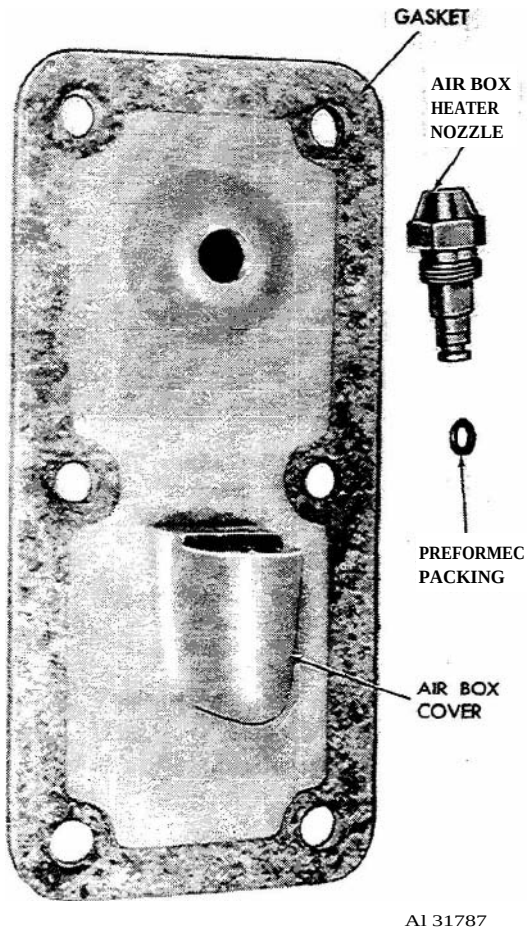


Figure 2-17. Air box heater nozzle, removal and installation.

b. ***Installation.***

(1) Connect gasket (fig 2-17) to air box cover. Position preformed packing on air box heater nozzle and install nozzle in air box cover.

(2) Connect assembled air box cover (fig 2-16) to engine and secure with countersunk screws. Connect elbows to air box cover.

(3) Connect hose (9, fig 2-15) and tube (10) to air box cover elbows.

(4) Connect assembled filter bracket (7) to air box cover (1) and secure with screw (3), washer (4), and lock washer (5).

(5) Connect tubes (2, 6, and 10) and electrical connector (8) to filter bracket components.

(6) Install igniter plug (refer to para 2-12).

(7) Install air pump (refer to para 2-10).

(8) Install governor assembly (refer to TM 9-2815-214-34).

(9) Close engine cover (refer to TM 9-2320-242-10).

2-16. Surge Tank

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-17. Radiator

a. ***Removal.*** **(Refer** to TM 9-2320-242-20.)

b. Installation. **(Refer to TM** 9-2320-242-20.)

2-18. Radiator Shroud

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. **(Refer to TM** 9-2320-242-20.)

2-19. Sixty Ampere Alternator

a. Removal. (Refer to TM 9-2320-242-20).

b. Installation. **(Refer** to TM 9-2320-242-20.)

2-20. Alternator Mounting Bracket

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. **(Refer** to TM 9-2320-242-20.)

2-21 Directional Signal Relay Distribution Box

a. Removal (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-22. Battery

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. **(Refer** to TM 9-2320-242-20.)

2-23. Transmission Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

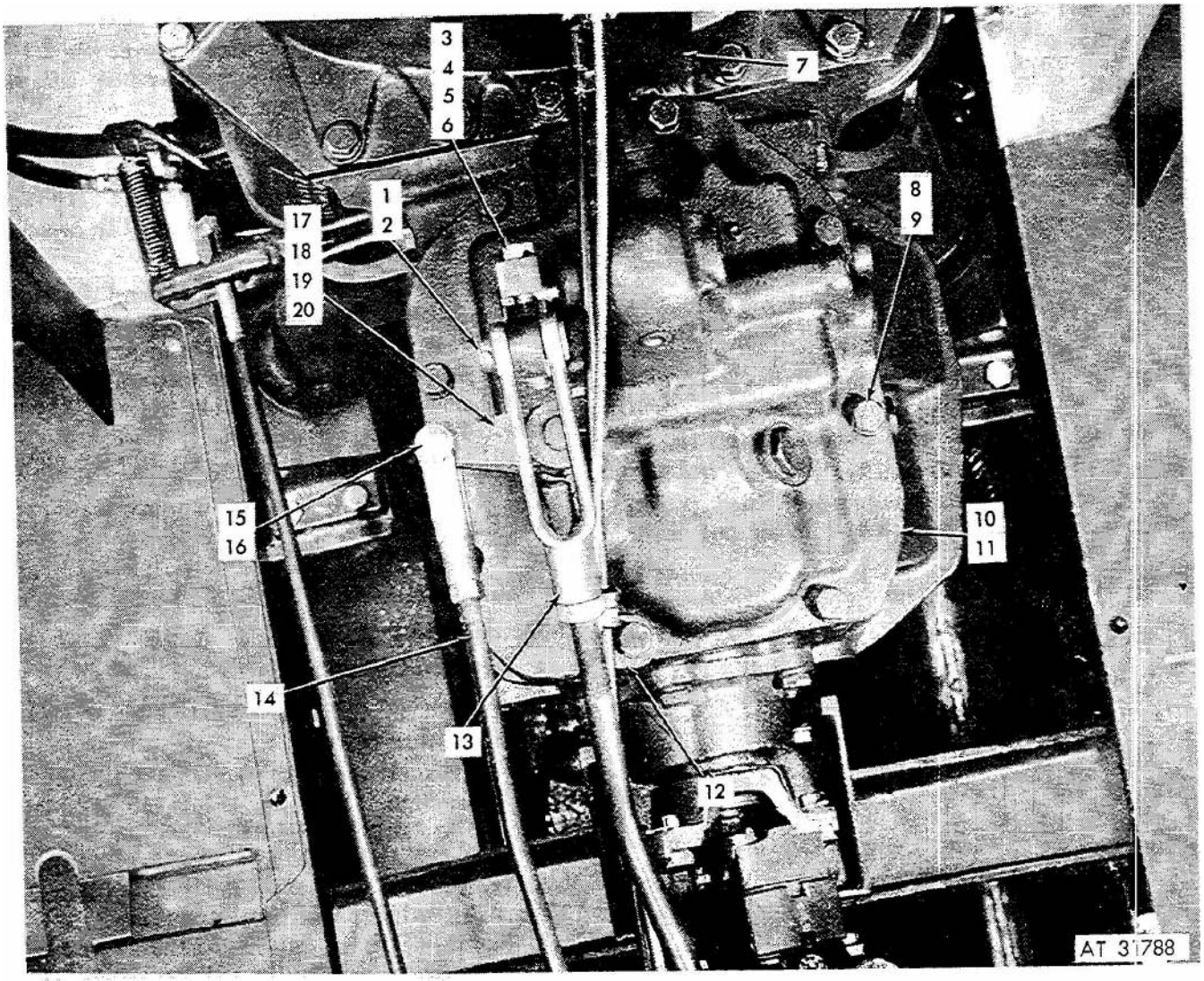
b. Installation. (Refer to TM 9-2320-242-20.)

2-24. Transmission Top Cover

a. *Removal.*

(1) Remove console (refer to TM 9-2320-242-20).

(2) Disconnect linkages (13 and 14, fig 2-18) by removing pins (1 and 15) and cotter pins (2 and 16).



LEGEND to fig 2-18:

1 - Pin
2 - Cotter pin
3 - Lever
4 - Screw
5 - Nut
6 - Lock washer
7 - Bracket
8 - Screw
9 - Lock washer
10 - Top cover
11 - Gasket
12 - Bracket
13 - Linkage
14 - Linkage
15 - Pin
16 - Cotter pin
- Lever
18 - Screw
19 - Nut
20 - Lock washer

Figure 2-18. Transmission top cover, removal and installation.

(3) Mark alignment marks on levers (3 and 17) and cover shafts. Disconnect levers from shafts by removing screws (4 and 18), nuts (5 and 19), and lock washers (6 and 20).

(4) Disconnect top cover (10) and gasket (11) by removing screw (8) and lock washer (9).

(5) Position brackets (7 and 12) and control cables away from top cover (10) and remove cover and gasket (11). Discard gasket (11).

b. *Installation.*

(1) Position top cover (10) and new gasket (11) on transmission, making sure that shifter forks are properly engaged.

(2) Position brackets (7 and 12) on top cover (10). Secure top cover and brackets to transmission with screw (8) and lock washer (9).

(3) Align marks on levers (3 and 17) with cover shafts and install levers on shafts. Secure levers with screws (4 and 18), nuts (5 and 19) and lock washers (6 and 20).

(4) Position linkages (13 and 14) over levers (3 and 17) and secure with pins (1 and 15) and cotter pins (2 and 16).

Note: If linkages require adjustment, refer to TM 9-2320-242-20.

(5) Install console. (Refer to TM 9-2320-242-20.)

2-25. Transfer Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

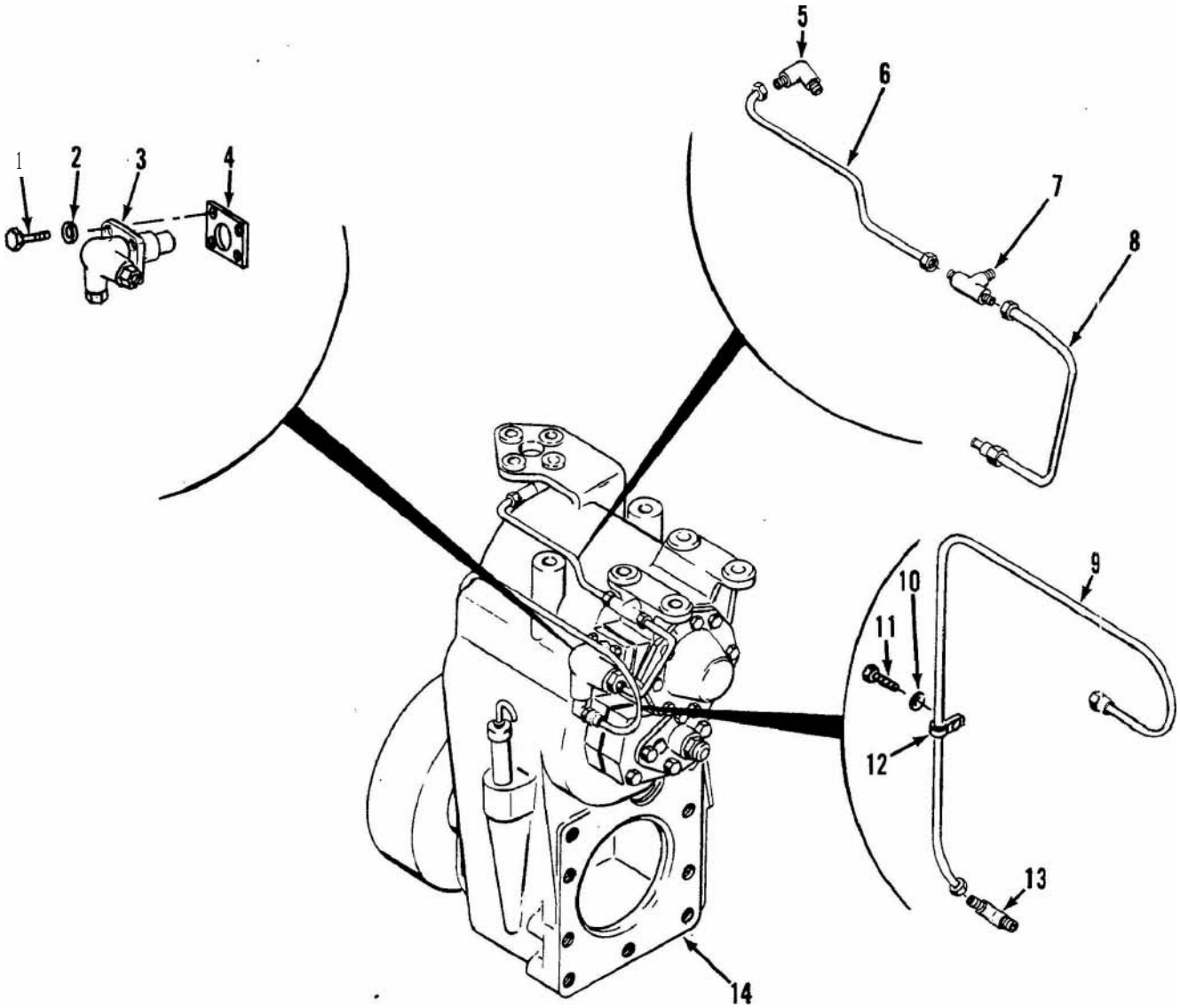
b. Installation. (Refer to TM 9-2320-242-20.)

2-26. Transfer Assembly Oil Pump, Lines, and Fittings

a. *Removal.*

(1) Remove console (refer to TM 9-2320-242-20).

(2) Disconnect tube (6, fig 2-19) from elbow (5) and tee (7). Disconnect tube (8) from tee (7) and oil pump (3).



LEGEND to fig 2-19:
1 - Screw
2 - Washer
3- Oil pump
4 - Gasket
5 - Elbow
6 - Tube
7 - Tee
8 - Tube
9 - Tube
10 - Lock washer
11 - Screw
12 - Clamp
13 - Elbow
14 - Transfer assembly-

Figure 2-19. Transfer assembly oil pump, lines, and fittings; removal and installation.

(3) Remove elbow (5) and tee (7) from transfer assembly (14).

(4) Disconnect clamp (12) from tube (9) by removing screw (11) and lock washer (10).

(5) Disconnect tube (9) from oil pump (3) and elbow (13). Remove elbow (13) from transfer assembly (14).

(6) Disconnect oil pump (3) and gasket (4) from transfer assembly (14) by removing screw (1) and washer (2).

b. *Installation.*

(1) Connect oil pump (3) and gasket (4) to transfer assembly (14) and secure with screw (1) and washer (21.

Note: Prior to installation of oil pump, fill oil pump and intake line with proper lubricant. Refer to LO 9-2320-242-12.

(2) Install elbow (13) in transfer assembly (14) and connect tube (9) to oil pump (3) and elbow (13). Secure tube (9) to transfer assembly with clamp (12), screw (11), and lock washer (10).

(3) Install elbow (5) and tee (7) in_ transfer assembly (14).

(4) Connect tube (6) to elbow (5) and tee (7). Connect tube (8) to oil pump (3) and tee (7).

(5) Install console (refer to TM 9-2320-242-20).

2-27. **Front Differential Assembly**

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-28. Front Differential Vent Lines and Fittings

a. *Removal.*

(1) Remove seats, console, and air duct panel (refer to TM 9-2320-242-20).

(2) Disconnect tube (2, fig 2-20) from elbow (1) and bulkhead union (3).

(3) Disconnect elbow (1) from front differential (9).

(4) Remove tube (8) from bulkhead union (3).

(5) Disconnect bulkhead union (3) from tractor floor (5) by removing nut (7) and washers (4 and 6).

b. *Installation.*

(1) Position washer (4) on bulkhead union (3) and install union in tractor floor (5). Secure union with nut (7) and washer (6).

(2) Connect tube (8) to bulkhead union (3).

(3) Connect elbow (1) to front differential (9).

(4) Connect tube (2) to elbow (1) and bulkhead union (3).

(5) Install seats, console, and air duct panel (refer to TM 9-2320-242-20).

2-29. Center Differential Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

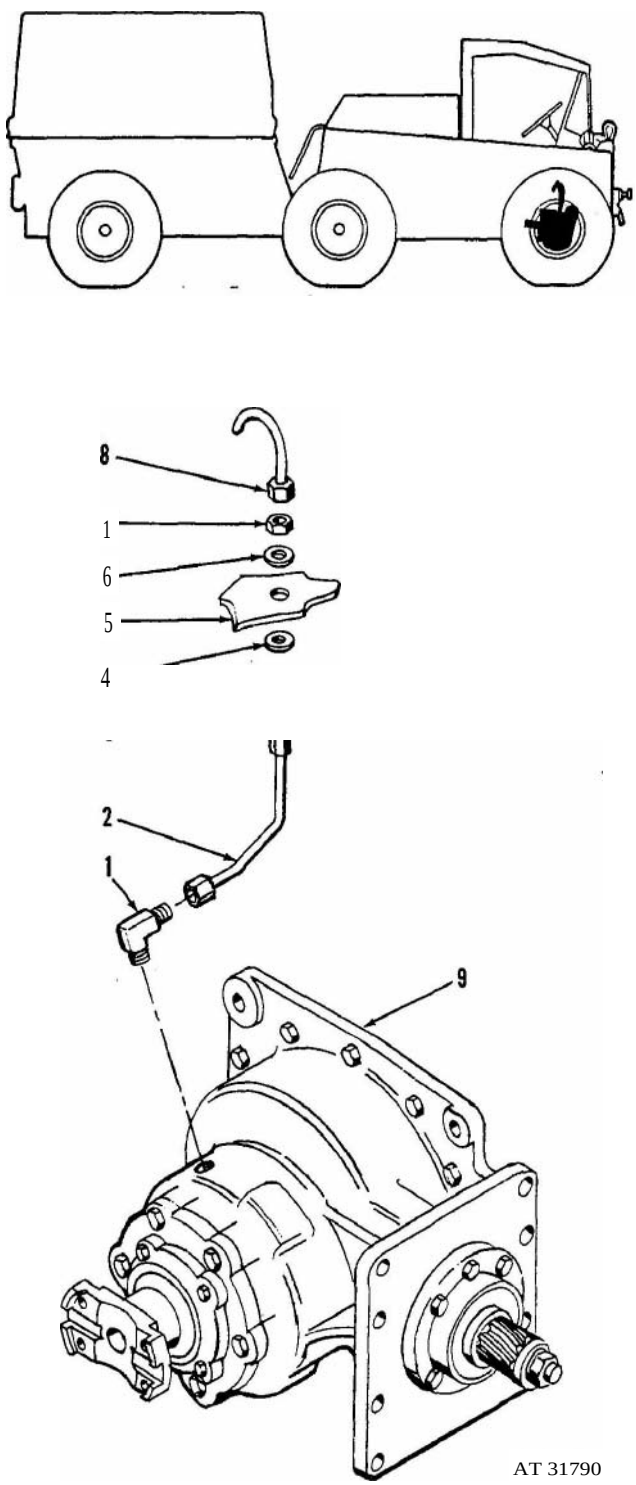
b. Installation. (Refer to TM 9-2320-242-20.)

2-30. Center Differential Vent Lines and Fittings

a. *Removal.*

(1) Open engine cover (refer to TM 9-2320-242-10).

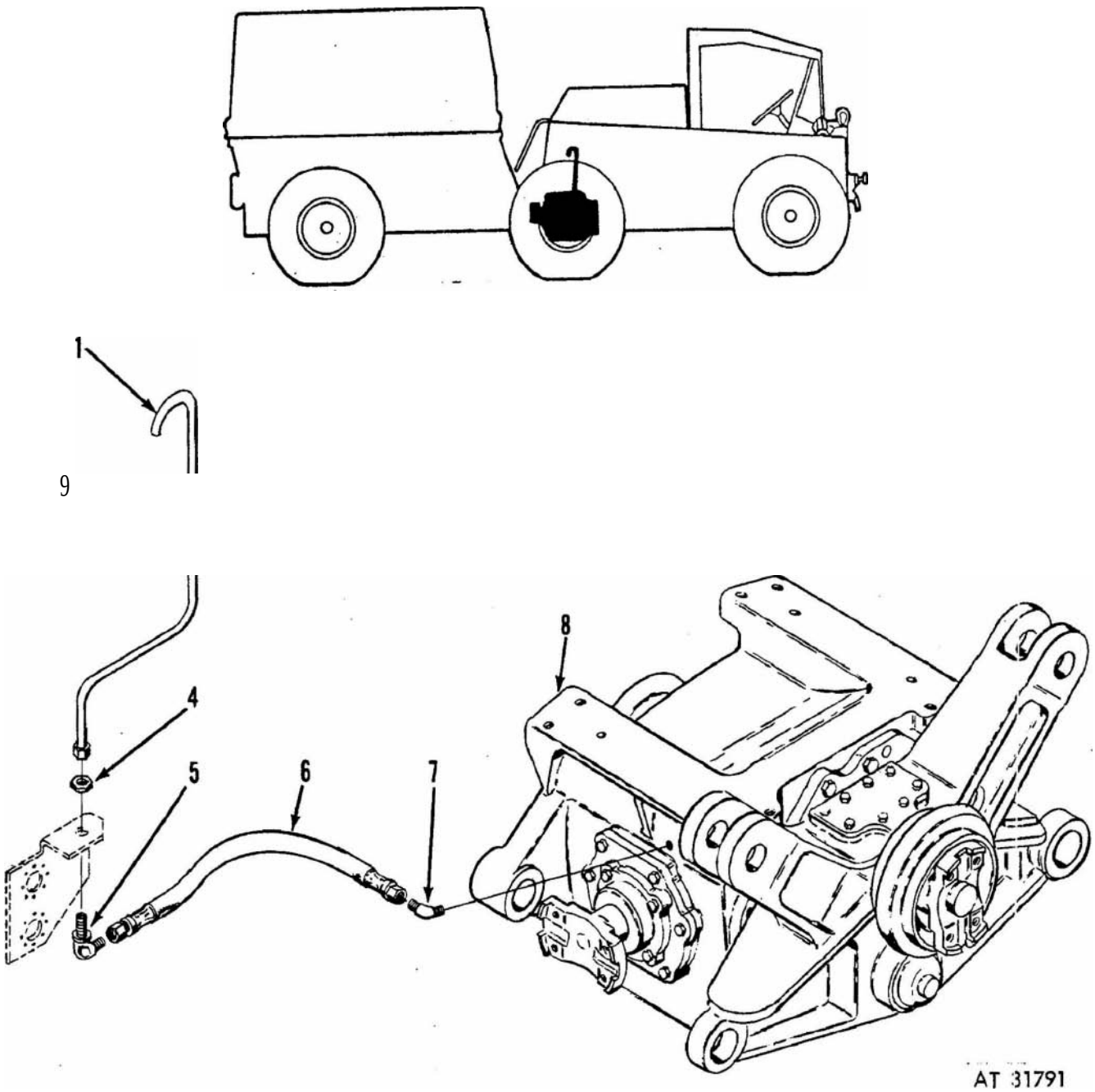
(2) Disconnect clamp (2, fig 2-21) from tube (1) by removing screw (3) and nut (9).



LEGEND to fig 2-20:

1 - Elbow
2 - **Tube**
3 - **Bulkhead union**
4 - **Washer**
5 - **Tractor floor**
6 - Washer
7 - Nut
8 - **Tube**
9 - **Front differential**

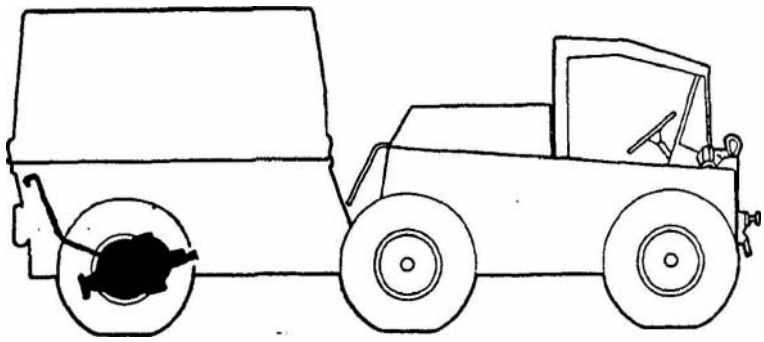
Figure 2-20. Front differential vent lines and fittings, removal and installation.



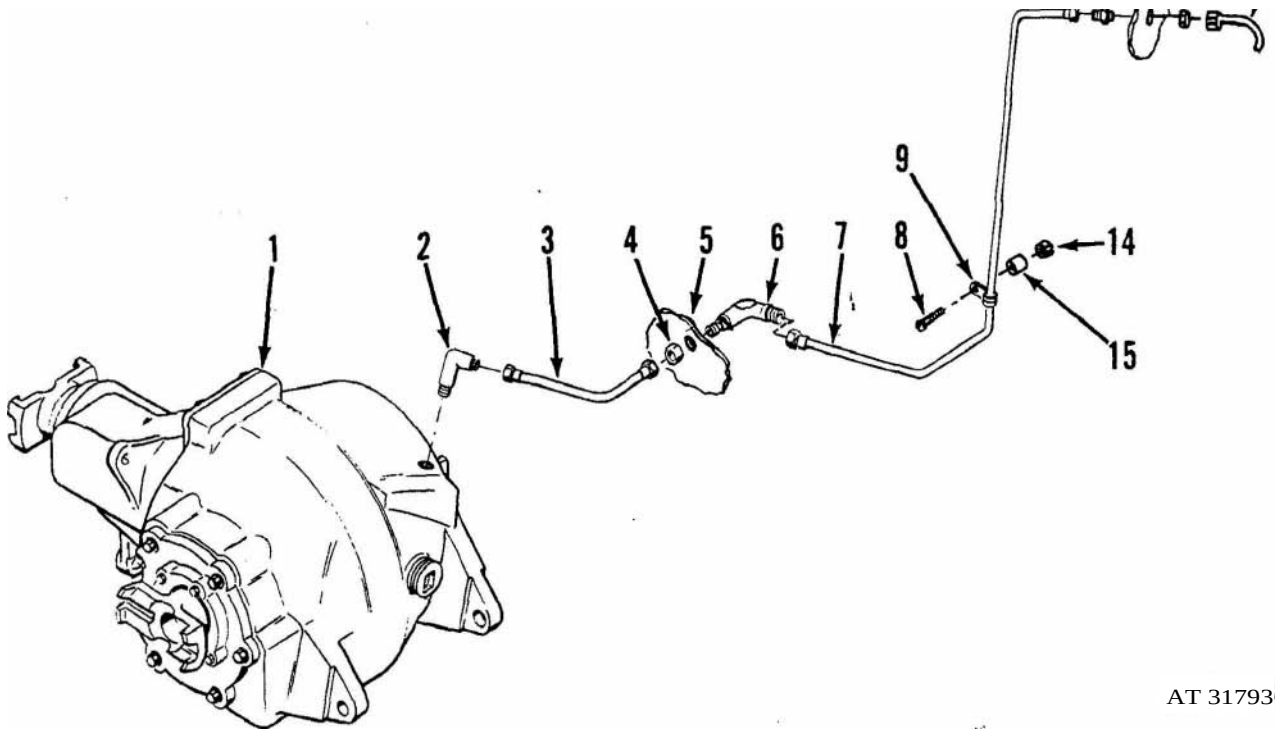
LEGEND to fig 2-21:

1 - Tube
2 - Clamp
3 - Screw
4 - Nut
5 - Elbow
6 - Hose
7 - Elbow
8 - Center differential
9 - Nut

Figure 2-21. Center differential vent lines and fittings, removal and installation.



10 11 12 13



LEGEND to fig 2-23:

1 - Rear differential
2 - Elbow
3 - Tube
4 - Nut
5 - Side fender well
6 - Elbow
7 - Tube
8 - Screw
9 - Clamp
10 - Bulkhead union
11 - Rear fender well
12 - Nut
13 - Tube
14 - Nut
15 - Spacer

Figure 2-23. Rear differential vent lines and fittings, removal and installation.

(3) Disconnect tube (1) from elbow (5).

(4) Disconnect hose (6) from elbows (5 and 7). Remove elbow (7) from center differential (8).

(5) Disconnect elbow (5) from tractor floor by removing nut (4).

b. *Installation*

(1) Position elbow (5) in tractor floor and secure with nut (4).

(2) Install elbow (7) in center differential (8) and connect hose (6) to elbows (5 and 7).

(3) Connect tube (1) to elbow (5) and secure tube with clamp (2), screw (3), and nut (9).

(4) Close engine cover (refer to TM 9-2320 242-10).

2-31. Rear Differential Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-32 Rear Differential Vent Lines and Fittings

a. *Removal.*

(1) Disconnect right carrier access panel from carrier by removing screws (fig 2-22).

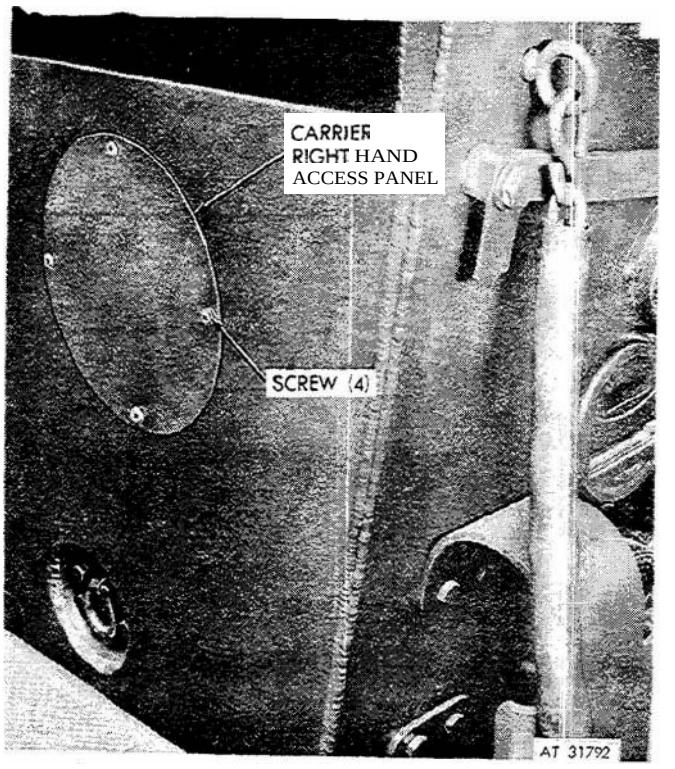


Figure 2-22. Carrier right hand access panel, removal and installation.

(2) Disconnect tube (13, fig 2-23)., from bulkhead union (10).

(3) Disconnect clamp (9) from tube (7) by removing screw (8), nut (14), and spacer (15). Disconnect tube (7) from elbow (6) and bulkhead union (10).

(4) Disconnect bulkhead union (10) from rear fender well (11) by removing nut (12).

(5) Disconnect tube (3) from elbows (2 and 6).

(6) Disconnect elbow (6) from side fender well (5) by removing nut (4).

(7) Disconnect elbow (2) from rear differential (1).

b. *Installation.*

(1) Connect elbow (2) to rear differential (1).

(2) Position elbow (6) in side fender well (5) and secure with nut (4). Connect tube (3) to elbows (2 and 6).

(3) Position bulkhead union (10) in rear fender well (11) and secure with nut (12).

(4) Connect tube. (7) to elbow (6) and bulkhead union (10) and secure tube with clamp (9), screw (8), nut (14), and spacer (15).

(5) Connect tube (13) to bulkhead union (10).

(6) Position right carrier access panel to carrier and secure with screws (fig 2-22).

2-33. Service Brake Shoes

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-34. Brake Drun. Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-35. Air Reservoir

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-36. Tires

a. Removal. (Refer to TM 9-2320-242-10.)

b. Installation. (Refer to TM 9-2320-242-10.)

2-37. Front Steering Gear Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

2-38. Rear Steering Gear Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Installation. (Refer to TM 9-2320-242-20.)

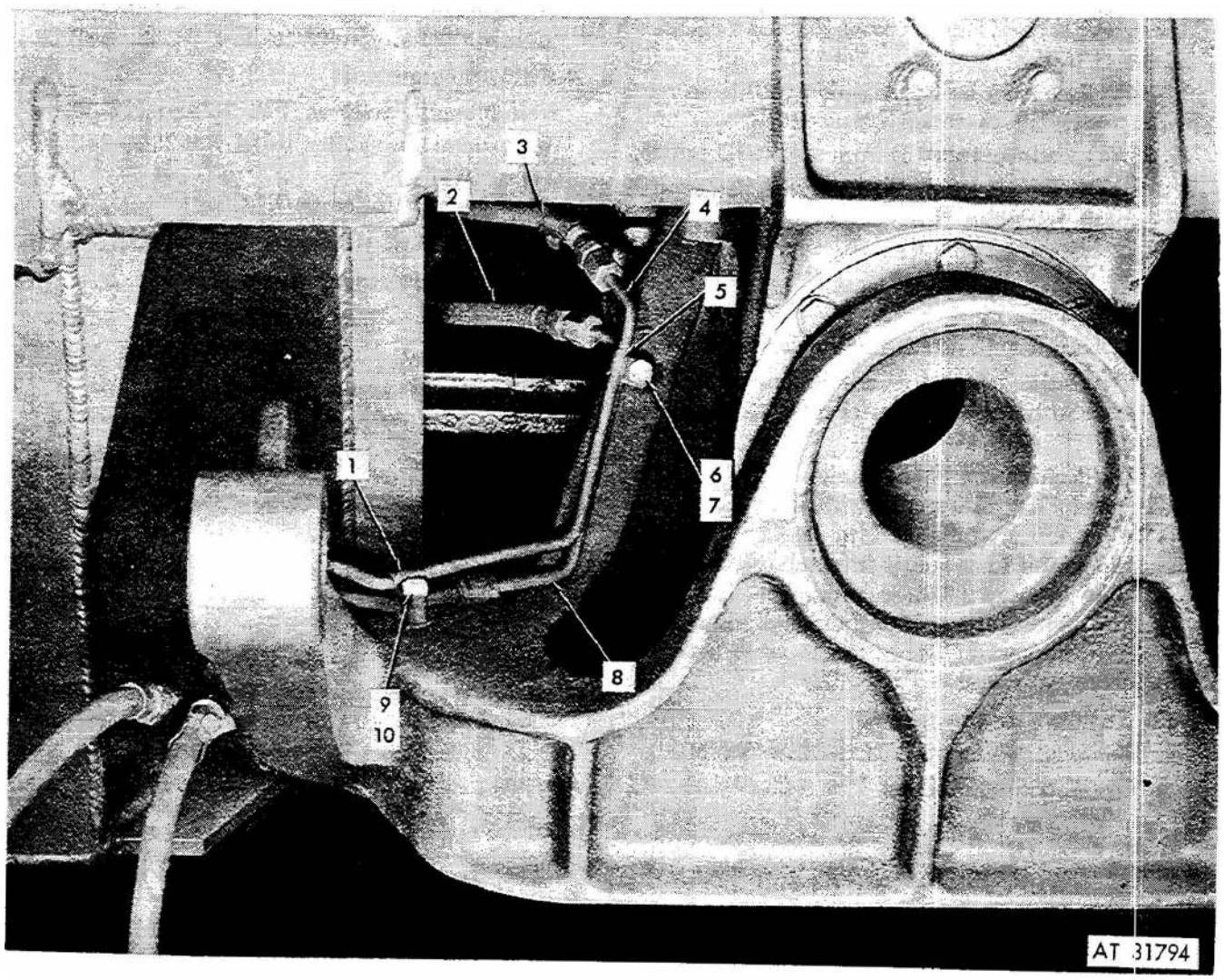
2-39 Articulation Yoke Assembly

a. Removal.

(1) Separate carrier and tractor and block front corners of carrier to prevent tipping (refer to TM 9-2320-242-20).

(2) Remove carrier propeller and steering shafts from articulation yoke assembly (refer to TM 9-2320-242-20).

(3) Disconnect clamps (1 and 5, fig 2-24) by removing screws (6 and 9) and spacers (7 and 10).



LEGEND to fig 2.24:

- Clamp
2 - Hose
3 - Hose
4 - Tube
5 - Clamp
6 - Screw
7 - Spacer
8 - Tube
9 - Screw
10 - Spacer

Figure 2.24. Service brake plumbing, removal and installation.

(4) Disconnect tubes (4 and 8) from hoses (2 and 3) and plug openings in hoses.

(5) Using *a* suitable hydraulic jack, support the weight of the yoke assembly (fig 2-25).

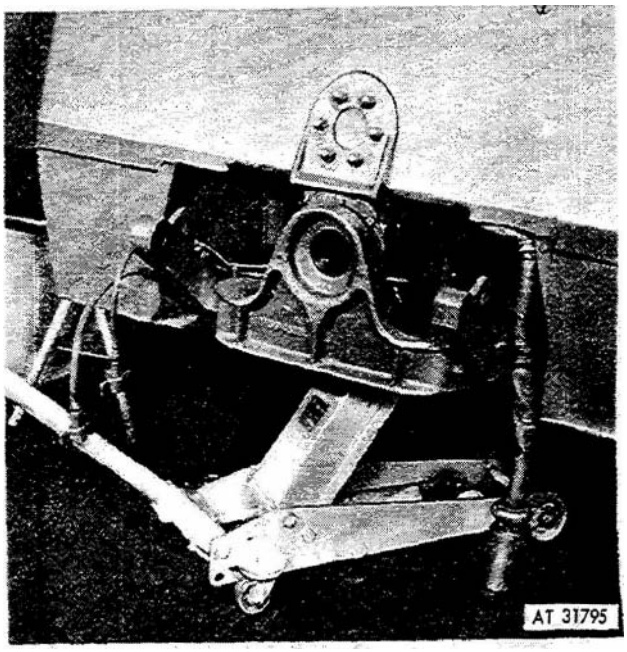
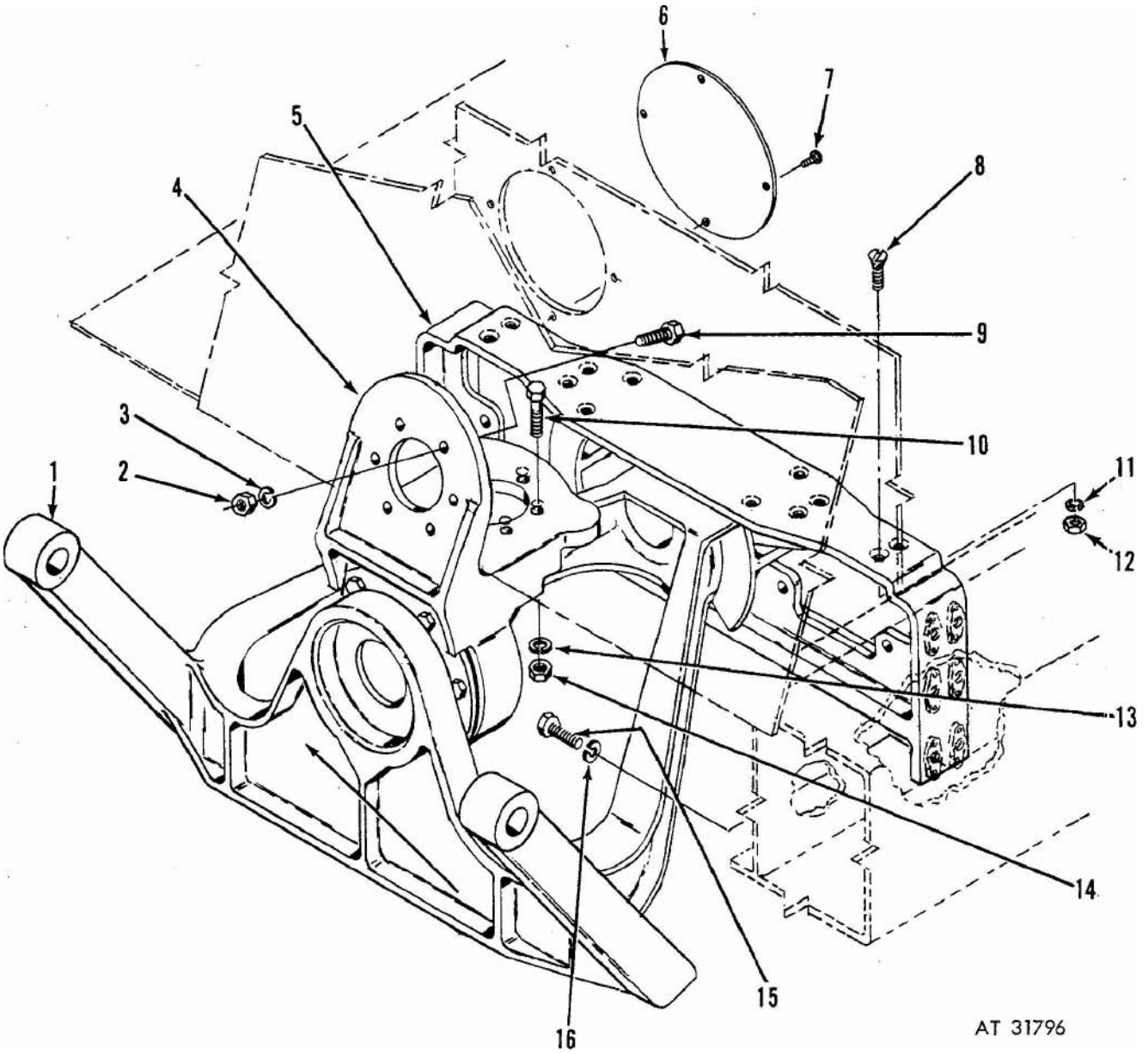


Figure 2-25. Supporting articulation yoke assembly for removal

16) M792 **Ambulance** only, remove heater, heater mount, and shroud (refer to TM 9-2320-242-20).

(7) Disconnect access cover (6, fig 2-26) from inside front panel of carrier by removing screw (7).



LEGEND to fig 2-26:

1 - Articulation yoke
2 - Nut
3 - Lock washer
4 - Front support
5 - Rear support
6 - Access cover
7 - Screw
8 - Screw
9 - Bolt
10 - Bolt
11 - Lock washer
12 - Nut
13 - Lock washer
14 - Nut
15 - Bolt
16 - Lock washer

Figure 2-26. Articulation yoke assembly, removal and installation.

(8) Disconnect rear support (5) from carrier by removing screw (8), bolt (15), nut (12), and lock washers (11 and 16).

(9) Disconnect front support (4) from carrier by removing bolts (9 and 10), nuts (2 and 14), and lock washers (3 and 13).

(10) Support yoke assembly and lower jack.

b. *Installation.*

(1) Position articulation yoke assembly on a suitable hydraulic jack and jack yoke assembly into position.

12) Align bolt holes in carrier with holes in front support (4) and secure support to carrier with bolts (9 and 10), nuts (2 and 14), and lock washers (3 and 13).

(3) Connect rear support (5) to carrier with screw (8), bolt (15), nut (12), and lock washers (11 and 16).

(4) Connect access cover (6) to inside front panel of carrier and secure with screw (7).

(5) M792 Ambulance only, install heater mount, heater shroud, and heater (refer to TM 9-2320.242-20).

(6) Lower and remove jack.

(7) Connect tubes (4 and 8, fig 2-24) to hoses (2 and 3). Secure tubes to articulation yoke with clamps (1 and 5), screws (6 and 9), and spacers (7 and 10).

(8) Install carrier propeller and steering shafts (refer to TM 9-2320-242-20).

(9) Remove blocks from front corners of carrier and connect carrier to tractor (refer to TM 9-2320-242-20).

2-40. Body and Accessories

For removal and installation of the following items, refer to TM 9-2320-242-20: Right and left hand fenders; windshield assembly; tractor left and right seat assemblies; console assembly; engine cover assembly; liquid container hold-down brackets; tractor brush guards; access panels; tractor and carrier bows; tractor canopy; cargo truck canopy, front and rear curtain; ambulance carrier canopy; carrier troop seats ; tailgate and pioneer brackets; ambulance tailgate step and brackets; tie-down and safety straps; ambulance carrier head pad assembly; ambulance attendant seat; ambulance dispenser bracket assembly; ambulance heater control box; ambulance heater; ambulance heater mount and shroud; ambulance heater inlet and outlet ducts and grills; ambulance heater exhaust pipe; ambulance heater fuel pump; ambulance heater fuel shutoff valve ; bilge pump.

CHAPTER 3
REPAIR INSTRUCTIONS

Section I. GENERAL GUIDES FOR REPAIR

3-1. General

This section contains general information for disassembly, cleaning, inspection, repair, and assembly for component parts of the M561 Cargo Truck and the M792 Ambulance. Specific instructions for individual component maintenance are covered in the appropriate component paragraphs.

3-2. Disassembly

These instructions are based on exploded views. It is recommended that groups of related parts be kept together,preferably in a tray, to prevent their being lost. Parts which are riveted together should be separated only if, during inspection, they are judged to be unserviceable.

3-3. Cleaning

All parts except bearings are to be cleaned as specified in TM 9-208-1 or TM9-247. Bearings should be cleaned as specified in TM 9-214.

3-4. Inspection

The importance of carefully inspecting disassembled parts cannot be over-emphasized since reassembly of substandard or defective parts: can result in needless troubleshooting and rework. Inspection procedures must be performed by experienced personnel using good, shop practices.

Good shop practice includes the compilation of complete and accurate inspection records as specified in TM38-750. Such records not only expedite reworking of the equipment but ensure a complete and thorough overhaul. Inspection records should be based upon the requirements outlined in this paragraph. Parts requiring repair or replacement should be so tagged and a notation of the disposition of these parts should be entered in the inspection records.

All micrometers, gages, indicators, and other measuring and testing equipment must be checked periodically and, when required, accurately calibrated in accordance with Military Standard MIL-STD-120, TB 750-236, or in accordance with the recommendations of the equipment manufacturer.

Note: Parts marked serviceable at inspection should be treated with an approved preservative if they are not to be reassembled immediately.

a. Metallic Parts. The below listed procedures are standard procedures that should be followed when inspecting metallic parts. After performing the procedures below, refer to table 1-1 and check that all parts are within dimensional limits.

(1) Ferrous parts. All ferrous parts should be inspected for cracks by performing a magnetic particle test as specified in Military Specification, MIL-I-6868C.

(2) Non-ferrous parts. All non-ferrous parts should be inspected for cracks by performing a penetrant test as specified in Military Specification, MIL-I-25135C.

(3) Rust. Inspect all ferrous parts for rust. Rust on mating surfaces is cause for reject of both mating parts.

(4) Burrs. Inspect gear teeth, retaining ring grooves, and mating surfaces for burrs.

(5) Nicks and scratches. Inspect mating and polished surfaces for nicks and scratches. Nicks and scratches on mating or polished surfaces are cause for rejection.

(6) Parts with external threads. Inspect these parts for damaged threads, if threads are damaged the part must be replaced.

(7) Threaded holes. Inspect all threaded holes for damaged threads and obstructions which may be wedged at the bottom of the hole.

(8) Sheet metal parts. Inspect all sheet metal parts for bent corners, distortion, cracks, tears, broken corners and defective welds.

(9) Helical inserts. Inspect all helical inserts for proper installation and for thread damage.

(10) Wear. All parts should be inspected for wear using suitable measuring instruments, refer to table C-1 for repair and replacement standards.

b. *Non-Metallic Parts.* No inspection is prescribed for non-metallic parts such as packings, gaskets, seals, non-metallic washers, filter elements, and locknuts of the fiber-inserted type. All such parts are automatically classified as unserviceable when removed during disassembly and should be discarded unless otherwise specified.

c. *Bearings.* Inspect bearings as prescribed in TM 9-214.

d. *Springs.* Inspect springs for distortion, broken ends and proper spring rate.

e. *Hardware.* Discard all cotter pins, roll pins, and lock washers during disassembly. Inspect all nuts, bolts, and screws for damaged threads and heads that could prevent proper wrenching. Replace all damaged hardware.

f. *Gears.*. In many cases, the experience and good judgment of the inspector will determine whether a gear must be replaced. The following are a few of the more common inspection procedures to be used when inspecting gears.

(1) Nicks and burrs. Inspect gear teeth, splines, and bearing contact surfaces for nicks and burrs. Nicks and burrs that extend below the hardened surface of the gear teeth are cause for rejection of the gear.

(2) Gear hubs. Inspect hubs for scores, gouges, burrs, and nicks.

(3) Gear splines. Inspect splines for twisting and scores.

(4) Gear bearing journals. Inspect bearing journals for scores and galled spots. Reject gear if journal is scored or galled.

(5) Wear. All gears should be checked for wear using suitable measuring instruments, refer to table C-1 for repair and replacement standards.

g. *Electrical Components.* The below listed procedures should be accomplished when inspecting electrical components.

(1) Wiring. Inspect wiring for defective insulation, continuity, and proper connection.

(2) Electrical connectors. Inspect electrical connectors for damaged threads; bent, loose, or missing pins; and for shorts.

(3) Terminal lugs. Inspect terminal lugs for security and condition.

(4) Terminal boards and blocks. Inspect terminal boards and blocks for cracked insulation, stripped threads, and missing jumper strips.

(5) Component casings and housings. Inspect component casings and housings for dents, cracks, and defective potting.

(6) Switches. Check switches for continuity.

h. *Canvas Parts.* Inspect all canvas parts for tears, fraying, defective stitching, loose eyelets and fasteners, and illegible markings.

i. *Filters and Strainers.* Inspect filter elements and strainers for tears, distortion, and holes.

3-5. Repair

Parts that are within the repair and replacement standards of table 1-1 may be repaired to remove minor imperfection if it does not impair the strength of the parts. The following are a few of the more common repair procedures that may be used.

a. Cracks. Parts that are cracked may be repaired by welding as long as it does not distort or impair the strength of the part. Heat treated parts cannot be welded or heated unless otherwise specified. Welding procedures should be accomplished as specified in TM 9-237.

b. Rust. Rust on polished non-mating surfaces may be removed with a fine oxide abrasive paper and the surface polished with crocus cloth. After repair remove all abrasive deposits and rust by cleaning part as specified in paragraph 3-3. After removal of rust deposits, verify that the part is within the limits specified in table C-1.

c. Burrs. Burrs should be removed from gear teeth, retaining ring grooves, and mating surfaces. A smooth file or hone may be used.

d. Threaded Holes. Damaged threaded holes may be repaired by retapping the hole. If this is undesirable or ineffective, the hole may be drilled oversize, a suitable insert or bushing installed, and then drilled and tapped to the original thread size.

e. Sheet Metal Parts. Sheet metal parts that are damaged may be repaired as long as there are no damaging effects (refer to TM 10-450).

f. Helical Inserts. The only repair for helical inserts is to replace a defective or improperly installed insert.

g. Nicks and Burrs on Gears. Small nicks and / or burrs on the engaging ends of the teeth may be removed with a small honing stone. This is only practical for minor defects. Fractures that extend below the hardened surface of the teeth are cause for rejection.

h. Gear Hubs. Minor imperfections may be smoothed out by honing.

i. Painted Surfaces. Damaged painted surfaces should be repainted as soon as possible to prevent corrosion. Painting procedures should be accomplished as specified in TM 9-213.

j. Canvas. All canvas parts should be repaired in accordance with TM 10-269.

3-6. Assembly

Step-by-step procedures for assembly of the M561 Cargo Truck and M792 Ambulance components are provided in appropriate paragraphs of this chapter and Chapter 4. In addition, observe the following practices.

a. Preformed Packings. Lubricate all preformed packings and their associated grooves with hydraulic fluid, MIL-H-5606.

b. Metallic Parts. Lubricate all metallic parts with lubricant utilized in the component during operation (refer to LO 9-2320-242-12).

c. Locking Procedures. Installation of cotter pins and lockwire shall be accomplished as specified in MS 33540.

d. Torque Values. Critical torque values are specified in the assembly procedures. When not specified, bolts, screws, and nuts are to be tightened in accordance with TM 9-2320-242-20.

e. Hydraulic and Fuel Components. All hydraulic and fuel components must be kept thoroughly clean at all times. Plug all open ports until the component is installed in the vehicle.

f. Gasket, Shims, and Screws. All gaskets, shims, and screws should be coated with an approved gasket and sealing compound prior to *final installation.*

g. Oil Seals. When replacing lip-type seals, place spring-loaded side toward oil. Coat housing contact surface with a non-hardening sealer to prevent leaks. Lightly coat lips of seals with grease (GAA).

h. Pressing Operations. All , pressing operations should be accomplished using a press and adapters unless otherwise specified.

3-7. Lubrication

Lubricate the M561 Cargo Truck and M792 Ambulance in accordance with LO 9-2320-242-12.

Section II. ENGINE ASSEMBLY

3-8. General

The engine assembly is a Detroit Diesel 3-53 series that is equipped with a gear type oil pump, lobe oil cooler, replaceable element-type fuel and lubricating oil filters, double weight limiting speed mechanical governor, water pump, and starting motor. The engine is a three cylinder, two cycle, liquid cooled diesel engine that has a displacement of 159.3 cubic inches, a compression ratio of 21 to 1, and maximum speed of 2800 RPM. It delivers 103 HP at 2800 RPM and 217 lbs-ft. torque at 1500 RPM. For a detailed description and maintenance procedures of the engine and its components, refer to TM 9-2815-214-34.

Section III. CLUTCH ASSEMBLY

3-9. General

The clutch assembly (fig 3-1) is a mechanical connection between the engine and transmission and consists of a release fork, ball stud, release bearing, pressure plate, clutch disc, pilot bearing, and housing. When the vehicle clutch pedal is depressed, the release fork pivots on the ball stud forcing the release bearing against the pressure plate levers, compressing the pressure plate springs. When the springs are compressed, pressure on the clutch disc is removed and the disc moves away from the engine flywheel. When the clutch disc moves away from the flywheel, the transmission is disengaged from the engine, permitting changing of the transmission gears. The pilot bearing maintains the transmission input shaft in its proper position and provides a smooth running surface for the shaft. The housing encloses the clutch, incorporates the rear engine mounts, and permits access for clutch inspection. When the clutch pedal is released a constant pressure is maintained on the clutch disc by the pressure plate spring. This pressure holds the disc against the engine flywheel connecting the engine and transmission.

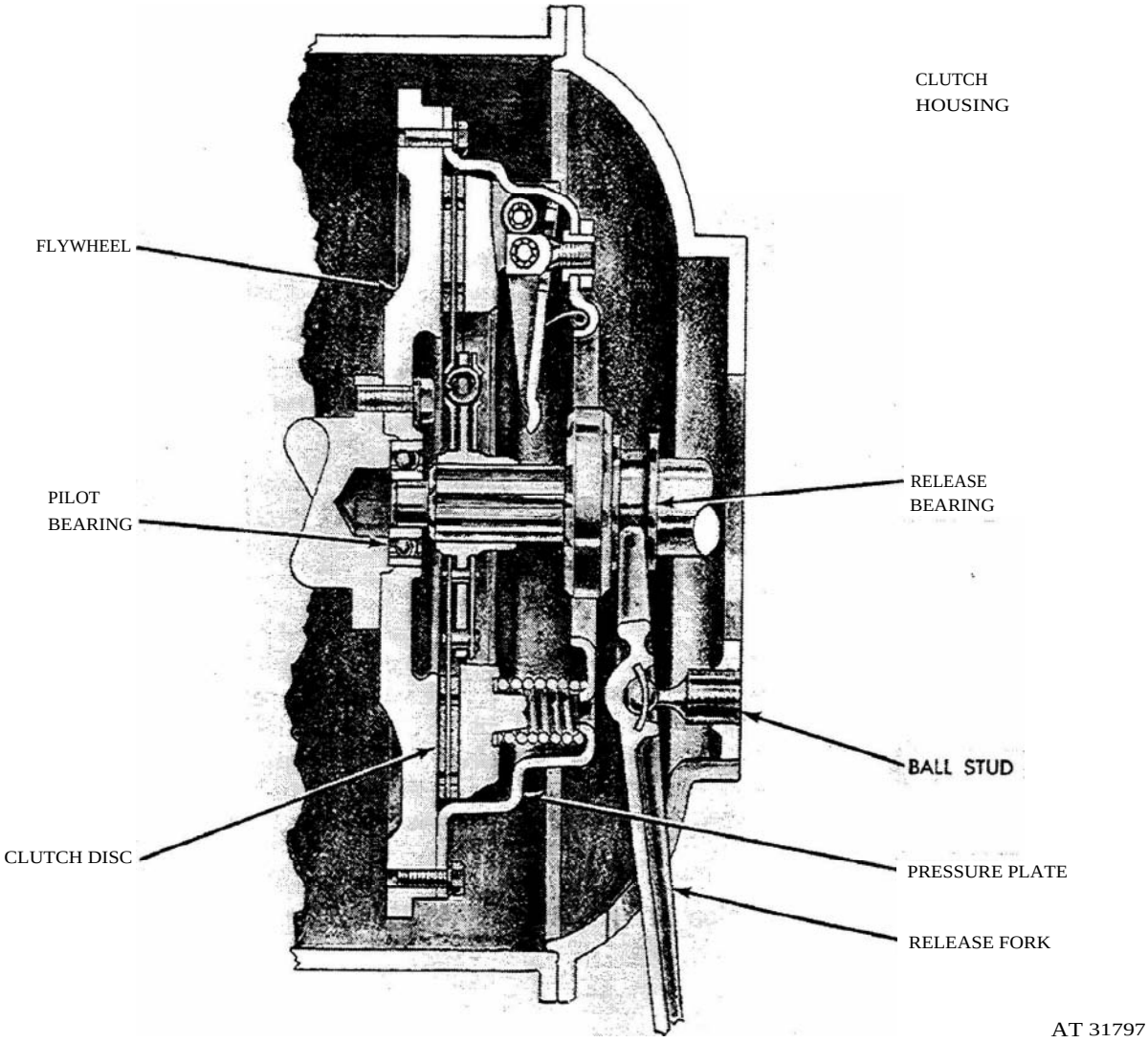


Figure 3-1. Clutch assembly, cross sectional view.

3-10. Clutch Bearing Release Fork and Ball Stud

a. Removal. (Refer to para 2-8a.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Installation. (Refer to para 2-8E)

3-11. Clutch Release Bearing

a. Removal. (Refer to para 2-8a.)
b. Cleaning. (Refer to para 3-3.)

Caution: This bearing is permanently packed with lubricant and should not be immersed in cleaning solvent.

c. Inspection. (Refer to TM 9-214.)
d. Installation. (Refer to para 2-8b.)

3-12. Clutch Pressure Plate

a. Removal. (Refer to para 2-8a.)
b. Cleaning. (Refer to para 3.3.)
c. Inspection. (Refer to para. 3-4.)
d. Installation. (Refer to para 2-8b.)

3-13. Clutch Disc

a. Removal. (Refer to para 2-8a.)
b. Cleaning. Wipe clutch disc clean, use no solvent.
c. Inspection. Inspect clutch disc for worn, loose or oil soaked facings, and splines in hub for wear.
d. Installation. (Refer to para 2-8b.)

3-14. Pilot Bearing

a. Removal. (Refer to para 2-8a.)
b. *Cleaning.* (Refer to para 3-3.)

Caution: Pilot bearing is permanently packed with lubricant and should not be immersed in cleaning solvent.

c. Inspection. (Refer to TM 9-214.)
d. Installation. (Refer to para 2-8b.)

3-15. Clutch Housing

a. Removal. (Refer to para 2-8a.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Installation. (Refer to para

Section IV. FUEL SYSTEM

3-16. General

The fuel system (fig 1-5) supplies a continuous flow of fuel for operation of the diesel engine. Fuel is pumped from the fuel tank through the primary and secondary fuel filters to the engine injectors by the engine driven, positive-displacement, gear-type fuel pump. The fuel filters remove water and contaminants from the fuel prior to reaching the injectors. The injectors force metered amounts of fuel to each engine cylinder for combustion. Fuel not required for combustion cools the injectors as it is returned to the fuel tanks by means of the return manifold and return line. Maintenance procedures for the engine injectors and fuel pump are provided in TM 9-2815-214-34. Maintenance procedures for the primary and secondary fuel filters, lines, and fittings are provided in TM 9-2320-242-20.

3-17. Fuel Tank

a. *Removal.* (Refer to TM 9-2330-242-20.)

b. *Cleaning.*

(1) Clean fuel tank externally (refer to para 3-3).

(2) Clean fuel tank internally (refer to TB ORD 1047).

c. *Inspection.* Inspect tank for dents, tears, cracks and rust.

Warning: Inspect tank in daylight away from open flame, sparks and other hazards.

d. *Repair.* Weld in accordance with TM 9-237.

Warning: Prepare tank before welding to remove any explosion hazard (refer to TM 9-237).

e. *Installation.* Refer to TM 9-2320-242-20.

Section V. COLD WEATHER STARTING AID SYSTEM

3-18. General

The cold weather starting aid system (figs 1-5 and 1-6) accomplishes the preheating of fuel and air in the engine air box to aid in engine starting during cold weather. It is energized by 'actuation of the cold start switch located on the left side of the instrument panel. Actuation of the cold start switch starts the air pump which forces air into the engine air box. It also actuates the fuel pressure valve which permits fuel from the fuel system return line to flow through the cold start filter and pumps it to the air box nozzle. Fuel leaving the nozzle is in a spray condition and mixes with the air supplied by the air pump. Simultaneously electrical power flows through the harness to the igniter coil which energizes the igniter plug. The igniter plug ignites the mixture of fuel and air in the engine air box. The preheated mixture is forced from the air box into the engine cylinders to be compressed and ignited with fuel supplied by the engine injectors, to start the engine. Maintenance procedures for the cold start switch are provided in TM 9-2320-242-20.

3-19. Air Pump

a. *Removal.* (Refer to para 2-10a.)
b. *Cleaning.* (Refer to para 3-3.)
c. *Inspection.*

(1) Inspect pump for cracks, wear, and other damage.

(2) Inspect hose and wire insulation for serviceable condition. Check wire terminal ends for security and serviceable condition.

(3) Inspect electrical connector for damage.

d. *Installation.* (Refer to para 2-10b.)

e. *Test.*

(1) Connect a suitable air pressure gage to air pump outlet port.

(2) Hold air box heater switch in ON position.

(3) Gage should indicate a minimum of 4.4 PSI, if not, replace air pump.

(4) Release air box heater switch to normal position and shut down engine.

3-20. Fuel Pressure Valve

a. Removal. (Refer to para 2-11a.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Test. Intermittently connect a source of 24 volts direct current to the solenoid and verify valve opening when voltage is applied and valve closing when voltage is removed.

e. Installation. (Refer to para 2-11b.)

3-2L Cold Start Filter

a. Removal. (Refer to para 2-11a.)

b. Disassembly. Unscrew filter bowl (fig 3-2) and remove packing from filter head.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly. Position packing on filter head and screw filter bowl to filter head.

f. Installation. (Refer to para 2-11b.)

3-22. Igniter Plug

a. Removal. (Refer to para 2-12a.)

b. Cleaning.

(I) Clean external portion of igniter plug with dry clean cloth.

(2) Clean carbon from electrodes using a suitable spark plug cleaning machine.

c. Inspection. Inspect igniter plug insulation for cracks and serviceable condition. Inspect electrodes for condition.

d. Adjust. Using a suitable spark plug gage, adjust igniter plug electrode gap to 0.023 to 0.028 of an inch.

e. Test. Position igniter plug in a suitable spark plug testing machine and observe electric arc at spark plug tip. Arc should be steady with a slight crackling noise.

f. Installation. (Refer to para 2-12E)

3-23. **Igniter Coil**

a. Removal. (Refer to para 2-13a.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Installation. (Refer to para 2-13b.)

3-24. Harness

a. *Removal.* (Refer to para 2-14a.)

b. *Cleaning, Inspection, and Repair.*

(1) Clean harness with a clean cloth moistened with an approved cleaning solvent.

(2) Inspect wire insulation for condition. Inspect terminal lugs for condition and security.

(3) Repair harness by replacing defective wires and terminal lugs.

c. *Installation.* (Refer to para 2-14b.)

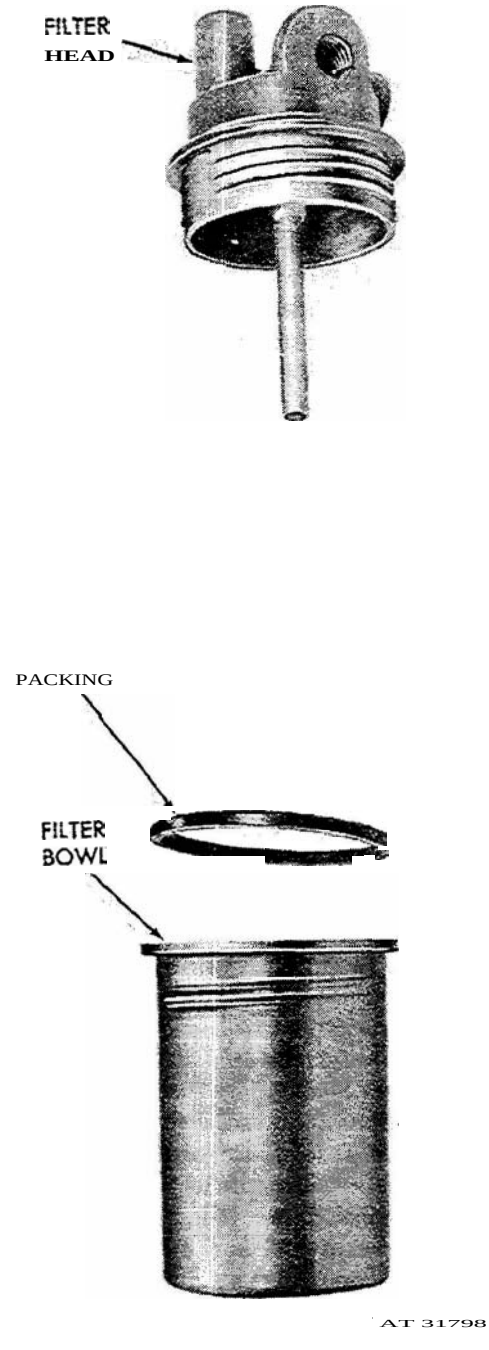


Figure 3-2. Cold start filter, exploded view.

3-25. Air Box Heater Nozzle and Line

a. Removal. (Refer to para 2-15a.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Installation. (Refer to para 2-15b.)

Section VI. COOLING SYSTEM

3-26: General

The cooling system (fig 1-7) dissipates heat from combustion and operation of the engine. It also maintains the engine temperature at 170°F to insure efficient engine operation. The system consists of a belt driven water pump, fan, thermostat, radiator, radiator shroud, surge tank, and lubricating oil cooler. Coolant is forced through the system by the engine mounted water pump. Temperature of the coolant is automatically controlled by thermostat which regulates the coolant flow through the system. As the engine temperature increases, the thermostat opening increases, which increases coolant flow through the system. As the coolant passes through the radiator core, heat is transferred from the core to the air forced through the radiator by the fan. The radiator shroud insures that air drawn by the fan is forced through the radiator. The surge tank bleeds air from the system to prevent overflow of coolant. The lubricating oil cooler provides a means of cooling the lubricating oil. Maintenance procedures for the water pump, fan, thermostat, and lubricating oil cooler are provided in TM 9-2815-214-34.

3-27. Surge Tank

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning.
(1) Clean outside of surge tank (refer to para 3-3).
(2) Clean inside of surge tank (refer to TM 10-450).
c. Inspection. (Refer to TM 10-450.)
d. Repair.
(1) Prepare tank surface for welding.
(2) Weld cracks (refer to TM 9-237).
(3) Check tank for leaks.
e. Installation. (Refer to TM 9-2320-242-20.)

3-28. Radiator

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning.
(1) Clean outside of radiator (refer to para 3-3).
(2) Clean inside of radiator (refer to TM 10-450).
c. Inspection.
(1) Inspect to see that all radiator fins are parallel and that tubes are not bent.
(2) Inspect soldered connections and seams for cracks and damage.
d. Repair. (Refer to TM 10-450.)
e. Installation. (Refer to TM 9-2320-242-20.)

3-29. Radiator Shroud

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Repair.
(1) Remove dents.
(2) Weld cracks (refer to TM 9-237).
e. Installation. (Refer to TM 9-2320-242-20.)

Section VII. ELECTRICAL SYSTEM

3-30. General

The electrical system (figs 1.8 and 1-9) is a 24 volt, negative ground system. Primary power for the system is supplied by two 12 volt, 100 ampere batteries that are connected in series. A 24 volt, 60 ampere, belt driven alternator with self-contained rectifier and regulator, charges the batteries when the engine is operating. The alternator also aids the batteries in supplying the system when the system is under load. For a detailed description of the electrical system and maintenance procedures for electrical components other than those below, refer to TM 9-2320-242-20.

3-31. Sixty Ampere Alternator

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning, Inspection, and Repair. (Refer to TM 9-2920-225-35.)
c. Test and Adjustment. (Refer to TM 9-2920-225-35.)

d. *Installation.* (Refer to TM 9-2320-242-20.)

3-32. Alternator Mounting Bracket

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Repair. (Refer to TM 9-237.)
e. Installation. (Refer to TM 9-2320-242-20.)

3-33. Battery

a. *Removal.* (Refer to TM 9-2320-242-20.)

b. *Cleaning, Inspection, and Repair.* (Refer to TM 9-6140-200-15.)

c. *Installation.* (Refer to TM 9-2320-242-20.)

3-34. Directional Signal Relay Distribution Box

a. *Removal.* (Refer to TM 9-2320-242-20.}

b. *Disassembly.*

(1) Disconnect panel assembly (fig 3-3) from cover by removing screws.

(2) Remove seal from cover.

(3) Remove flasher by grasping it in the center and pulling it *away* from the panel assembly.

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.*

(1) Inspect terminal strip insulation for breaks and cracks.

(2) Inspect seal for cracks and condition.

(3) Inspect flasher contact areas for corrosion.

(4) Inspect wiring for loose connections and defective insulation.

e. *Repair.* Repair of the directional signal relay distribution box is limited to repair by replacement of the flasher, illustrated in figure 3-3. If replacement of the flasher does not make the distribution box full operational, replace distribution box with the solid state flasher (refer to TM 9-2320-242-20.)

f . *Assembly.*

(1) Install flasher on panel assembly.

(2) Place seal on cover and secure panel assembly to cover with screws.

g. *Installation.* (Refer to TM 9-2320-242-20.)

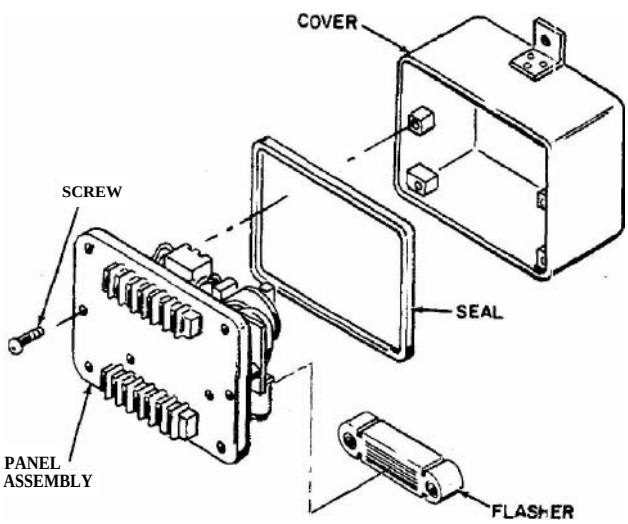


Figure** 3-3. **Directional signal relay distribution box, repair.

Section VIII. TRANSMISSION ASSEMBLY

3-35. General

a. The transmission (fig 3-4) provides four forward speeds and one reverse speed. It incorporates synchromesh, action in second, third, and fourth forward gears.

b. All gears in the transmission are helical except first and reverse. The clutch gear is supported by a heavy duty ball bearing. The forward end of the main shaft is supported by a loose roller type bearing inside the clutch gear, while the rear end is supported by a heavy duty ball bearing in the transmission case. The counter shaft is supported at the rear by a heavy duty ball bearing, and by a roller bearing at the front.

c. The synchromesh action incorporated in the transmission permits gears to be selected without clashing by synchronizing the speeds of mating parts before they engage (fig 3-5). It employs a combination of metal-to-metal friction synchronizing cones and clutch gears to achieve proper engagement of these parts. Movement of the clutch sleeve, in either direction, will engage an external and internal faced friction cone. This will bring the driving and driven members to the same speed, after which the clutch sleeve can be engaged, with the main driving gears without clashing.

d. In the neutral position (fig 3-6), the input clutch gear drives the constant mesh countershaft drive gear. The second and third speed main shaft gears, which are in constant mesh with their respective countershaft gears, are free running and therefore no drive is applied to the main shaft. In the first gear position (fig 3-7), the first and reverse sliding gear, which is controlled by the first and

second speed shifting fork, is moved rearward to mesh with, and be driven by, the countershaft first speed gear. In the second gear position (fig 3-8), the first and reverse sliding gear is moved forward to disengage it from the first speed countershaft gear. As the sliding gear continues forward, its synchonizing ring mates with the synchronizer cone, which is being driven by the second speed gear, and brings it up to speed. Continued forward travel will engage the internal teeth of the sliding gear with the spur gear section of the second speed gear which is being driven by the countershaft. A Portion of the sliding gear remains in contact with the spline to drive the mainshaft. In passing from the second to the third gear position (fig 3-9), the first and reverse sliding gear is moved rearward to its neutral position. The third and fourth speed clutch sleeve is then moved rearward by the third and fourth speed shifting fork to engage with the third speed gear. As the clutch sleeve starts its rearward travel, the clutch keys force the synchronizing cone to mate with the external synchronizing ring on the third gear bringing all parts up to speed. Continued rearward travel engages the clutch sleeve with the spur gear section of the third speed gear which is being driven by the countershaft. Power is transmitted from the clutch sleeve to the clutch hub which is splined to the mainshaft. In passing from the third to the fourth gear position (fig 3-10), the clutch sleeve is moved forward by its shifting fork to engage with the input clutch gear. Synchronizing action is the same as in the third gear position. Power flow is now direct from the input shaft. In the reverse gear position (fig 3-11), the reverse idler gears are moved rearward on the reverse idler shaft by the reverse shifting lever. They engage with the reverse countershaft gear and the mainshaft first and reverse gear. The constant driven countershaft reverse gear will drive the number one reverse idler gear; number two reverse idler gear will drive the mainshaft through the first and reverse sliding gear, but in the opposite direction from the input clutch shaft. Gear ratios are: first gear - 7.06: 1, second gear - 3.58:1, third gear - 1.71:1, fourth gear - 1.00: 1, and reverse gear 6.78:1.

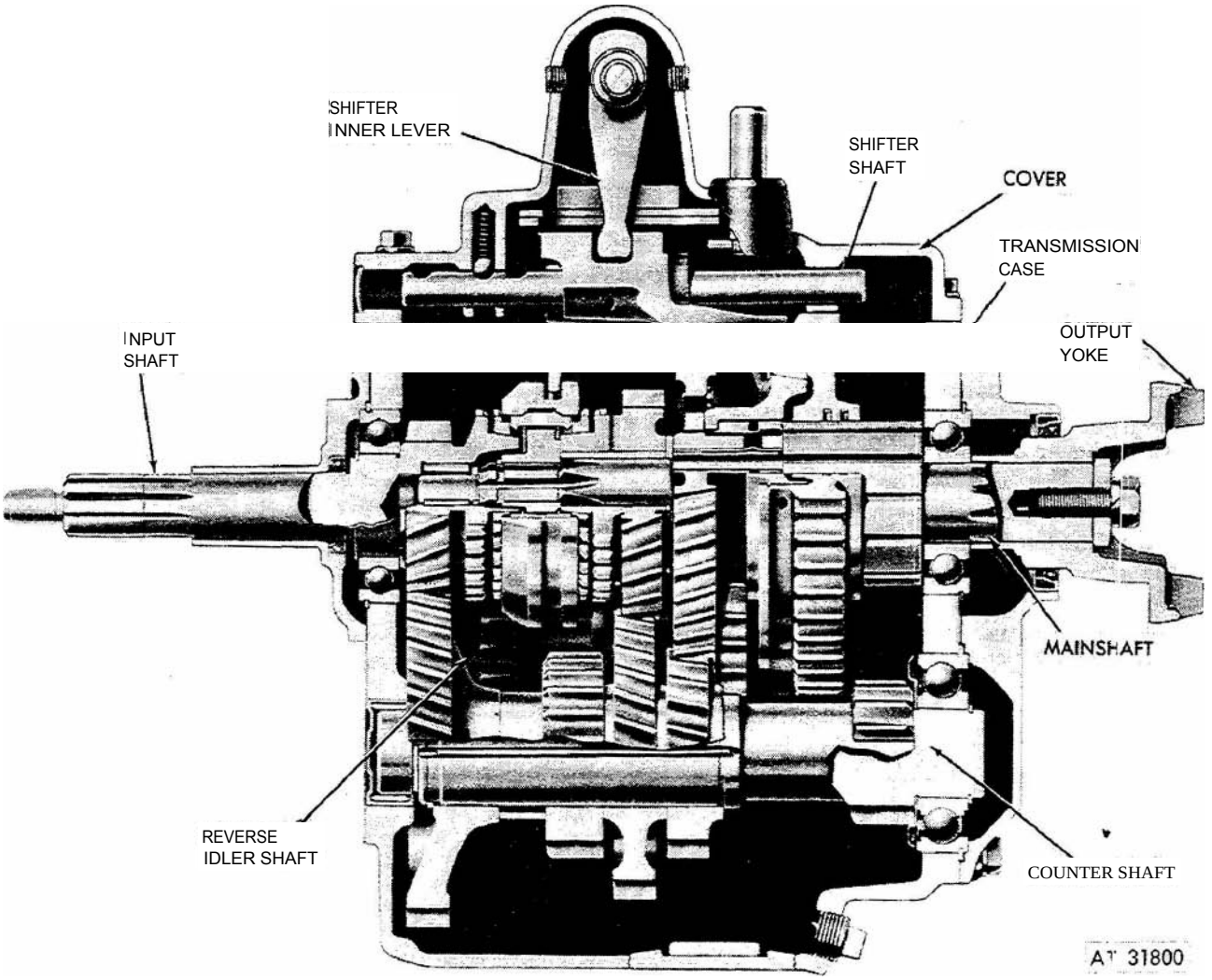


Figure 3-4. Transmission, crass section view.

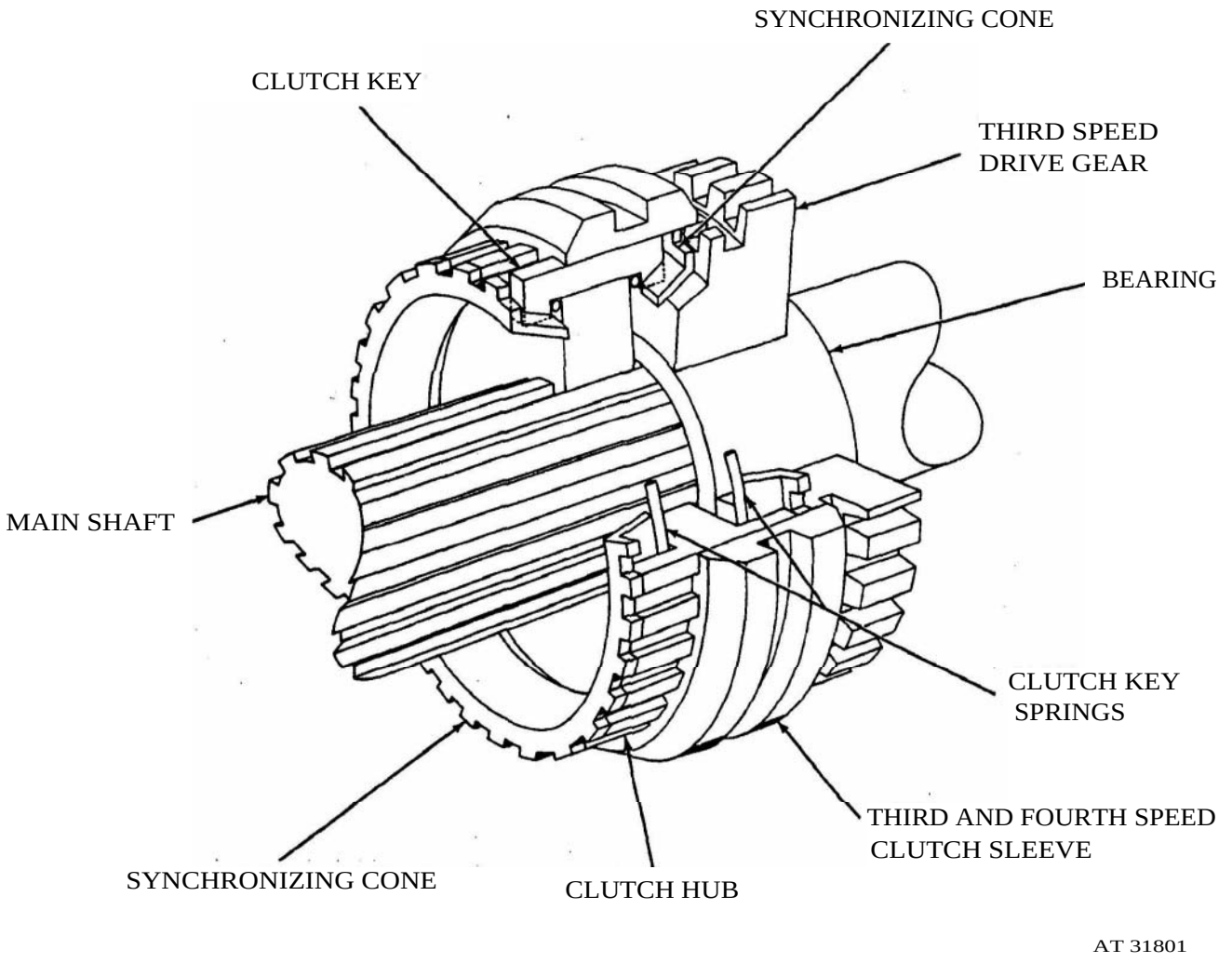


Figure 3-5. Transmission synchromesh gear action.

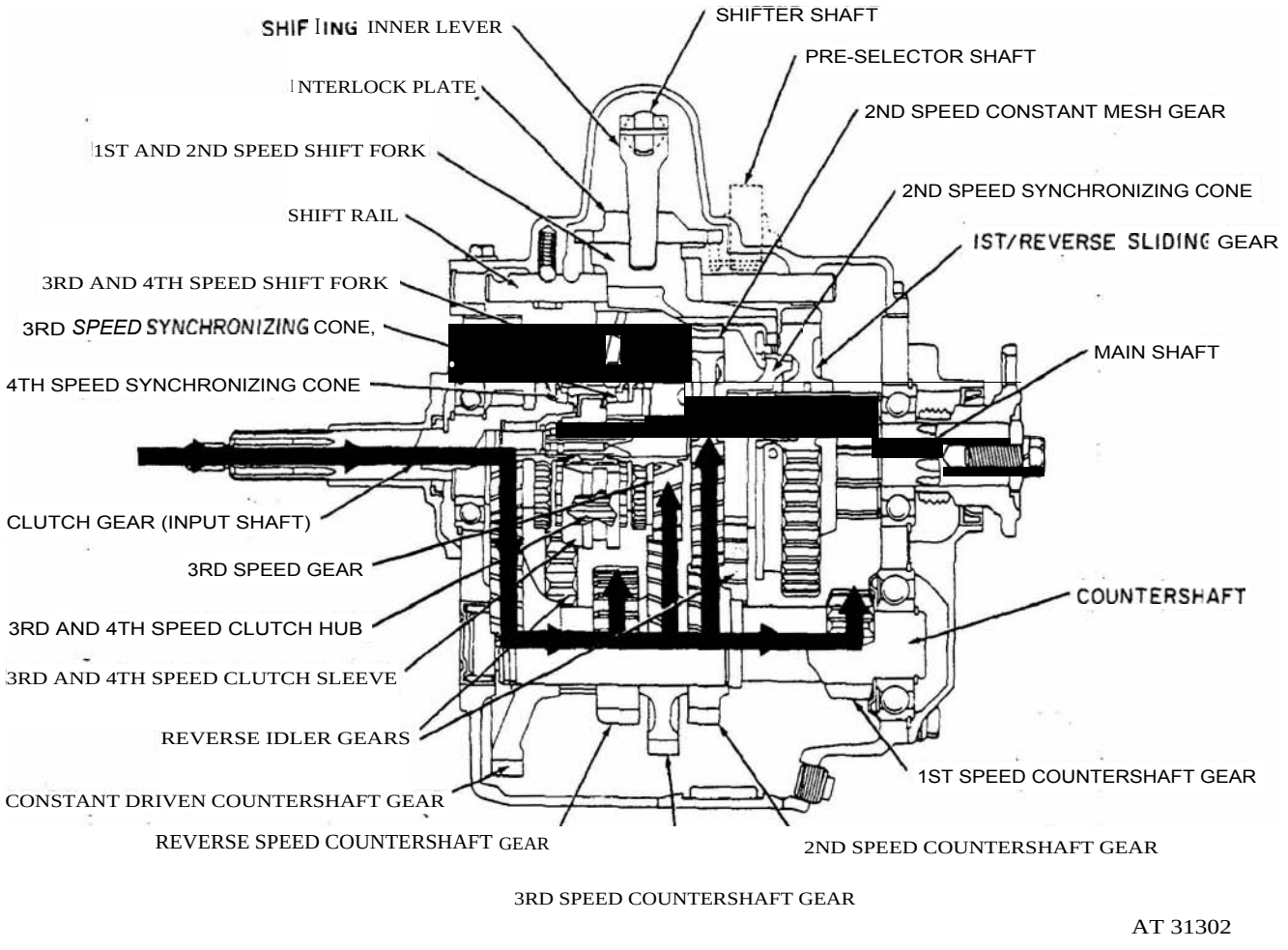


Figure 3-6. Transmission power flow in neutral position,

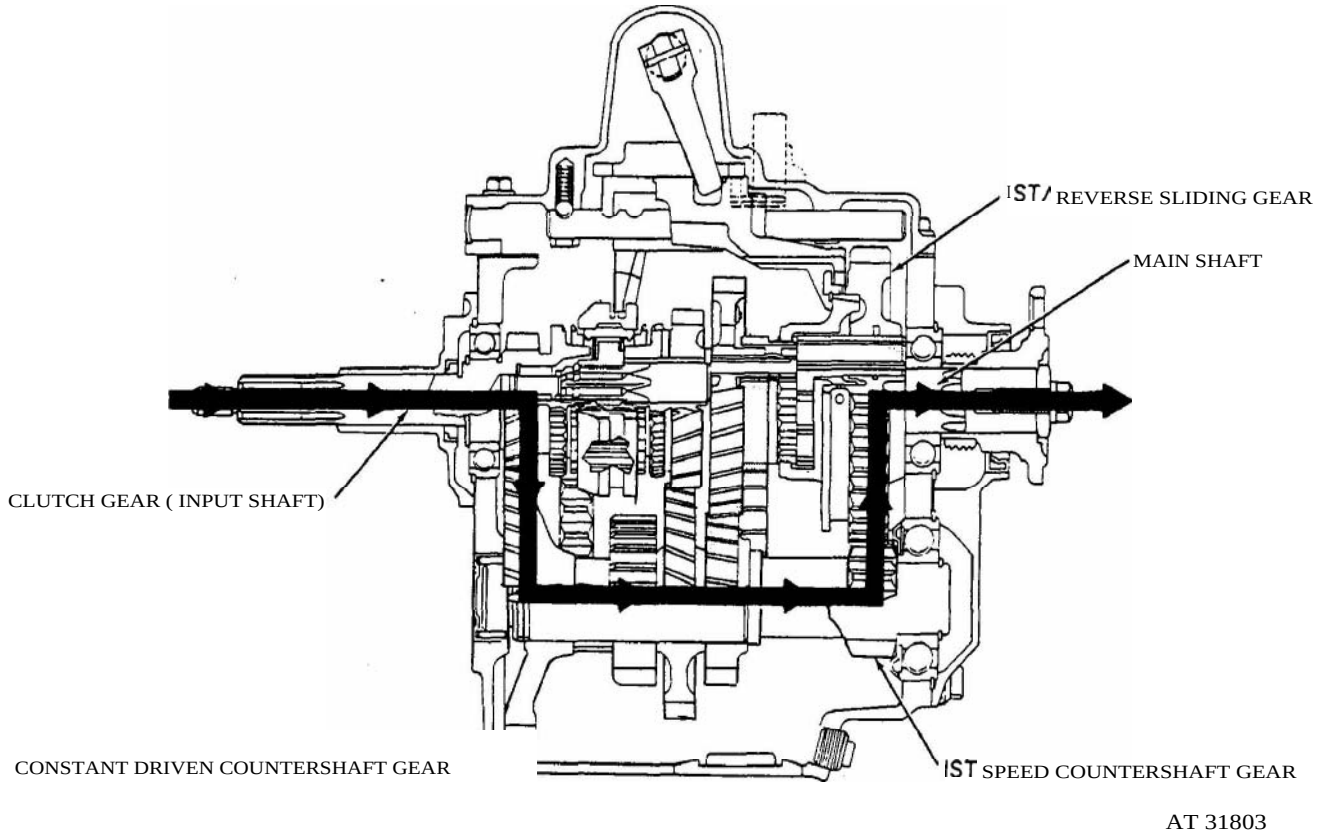


Figure 3-7. Transmission power flow in first gear position.

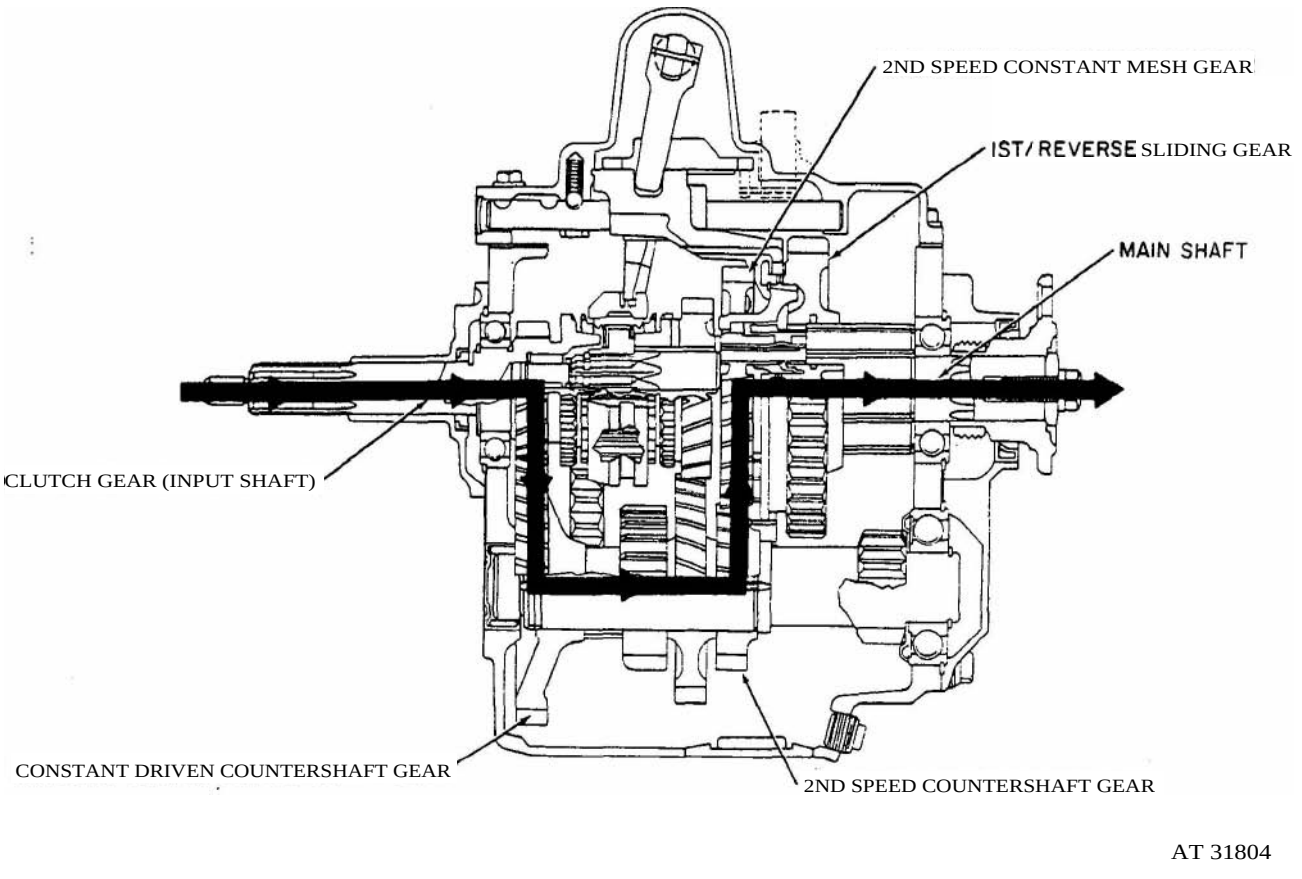


Figure 3-8. Transmission power flow in second gear position.

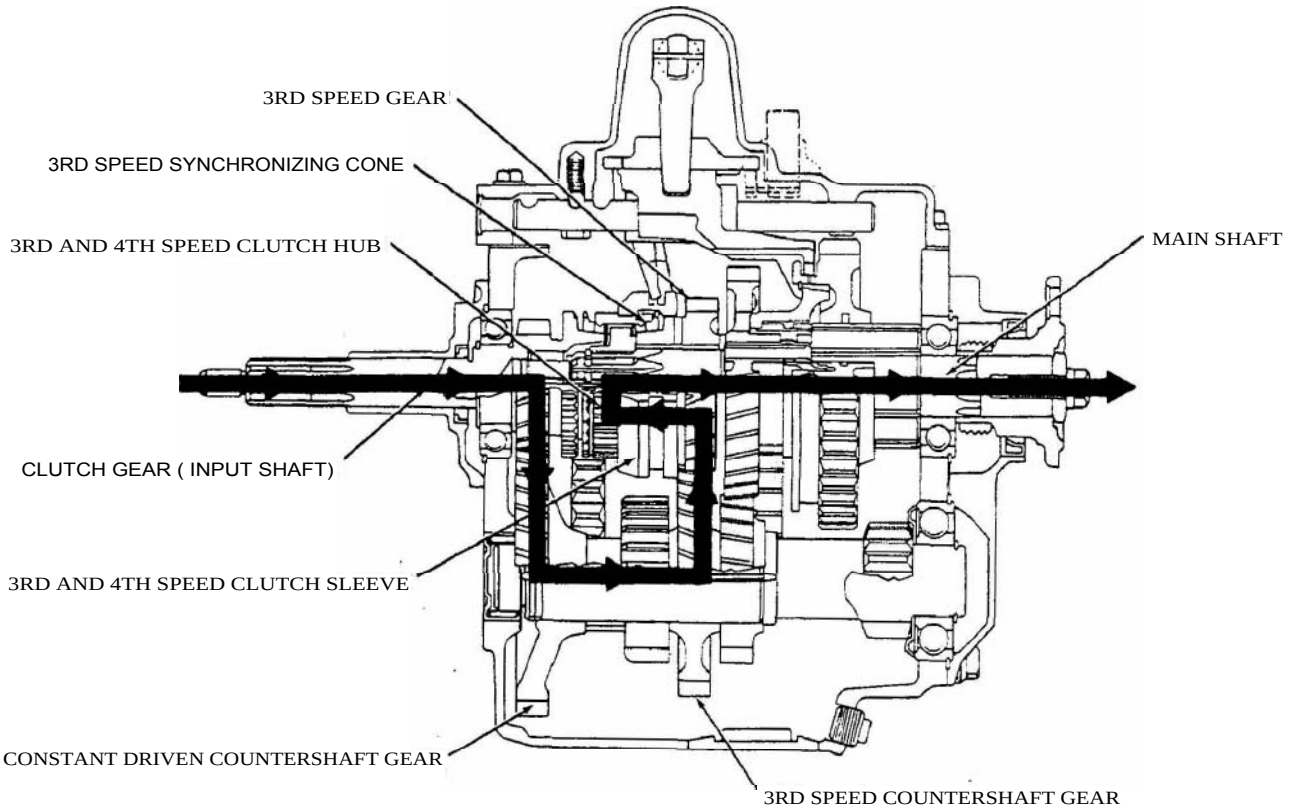


Figure 3-9. Transmission power flow in third gear position.

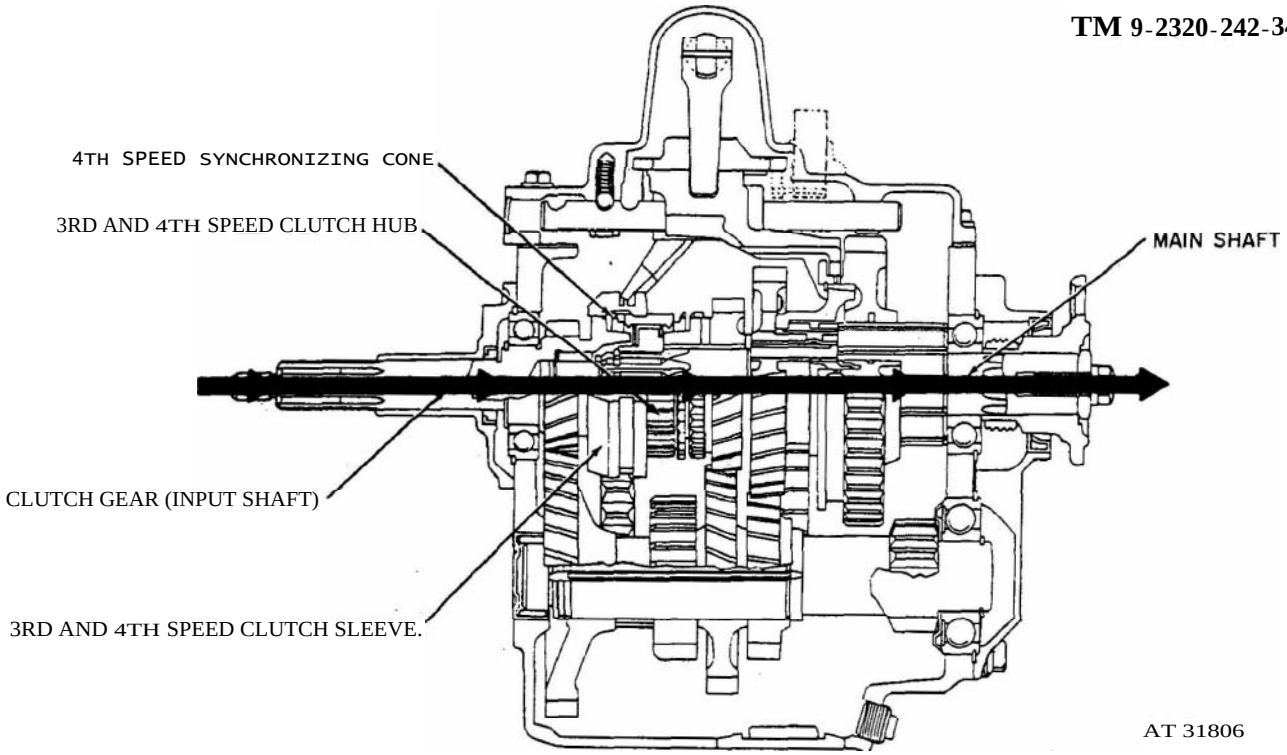


Figure 3-10. Transmission power flow in fourth gear position.

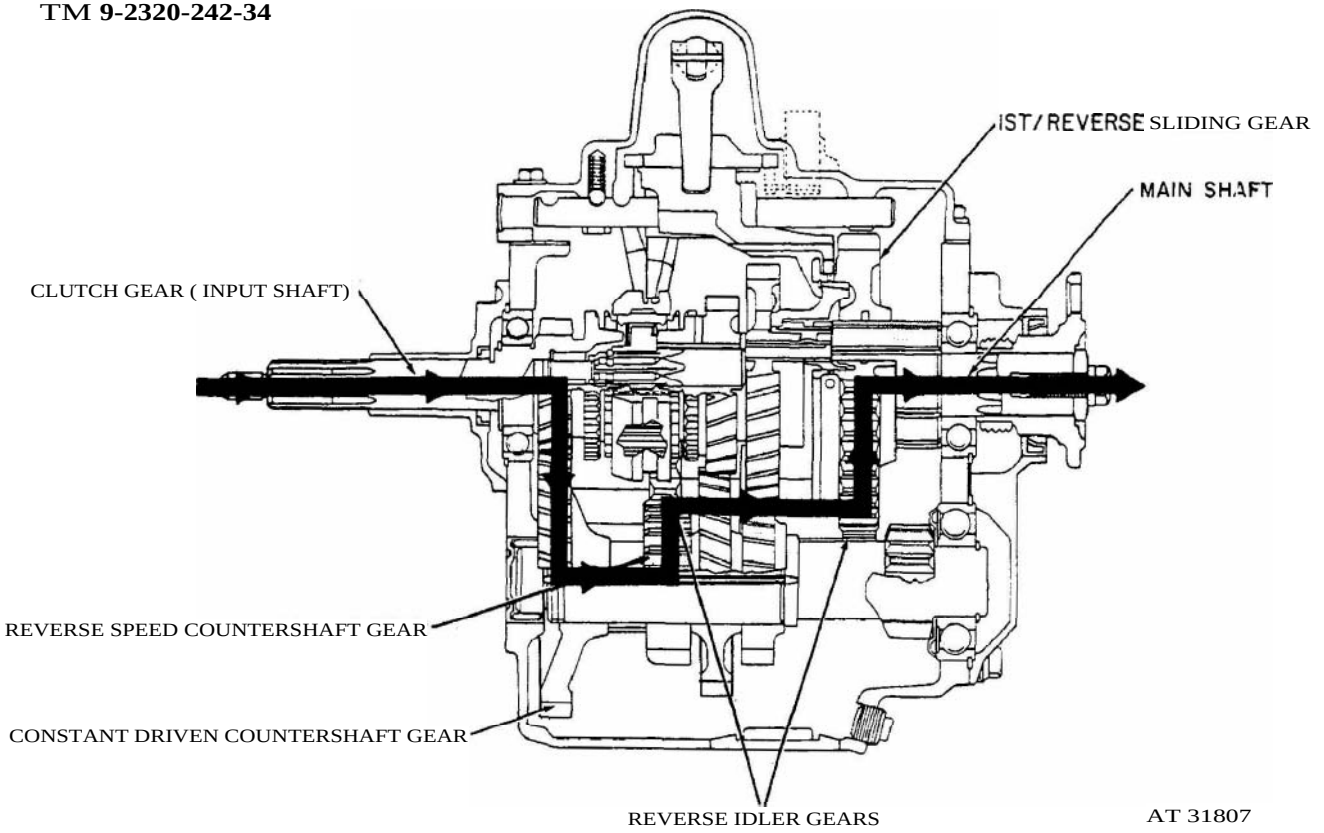


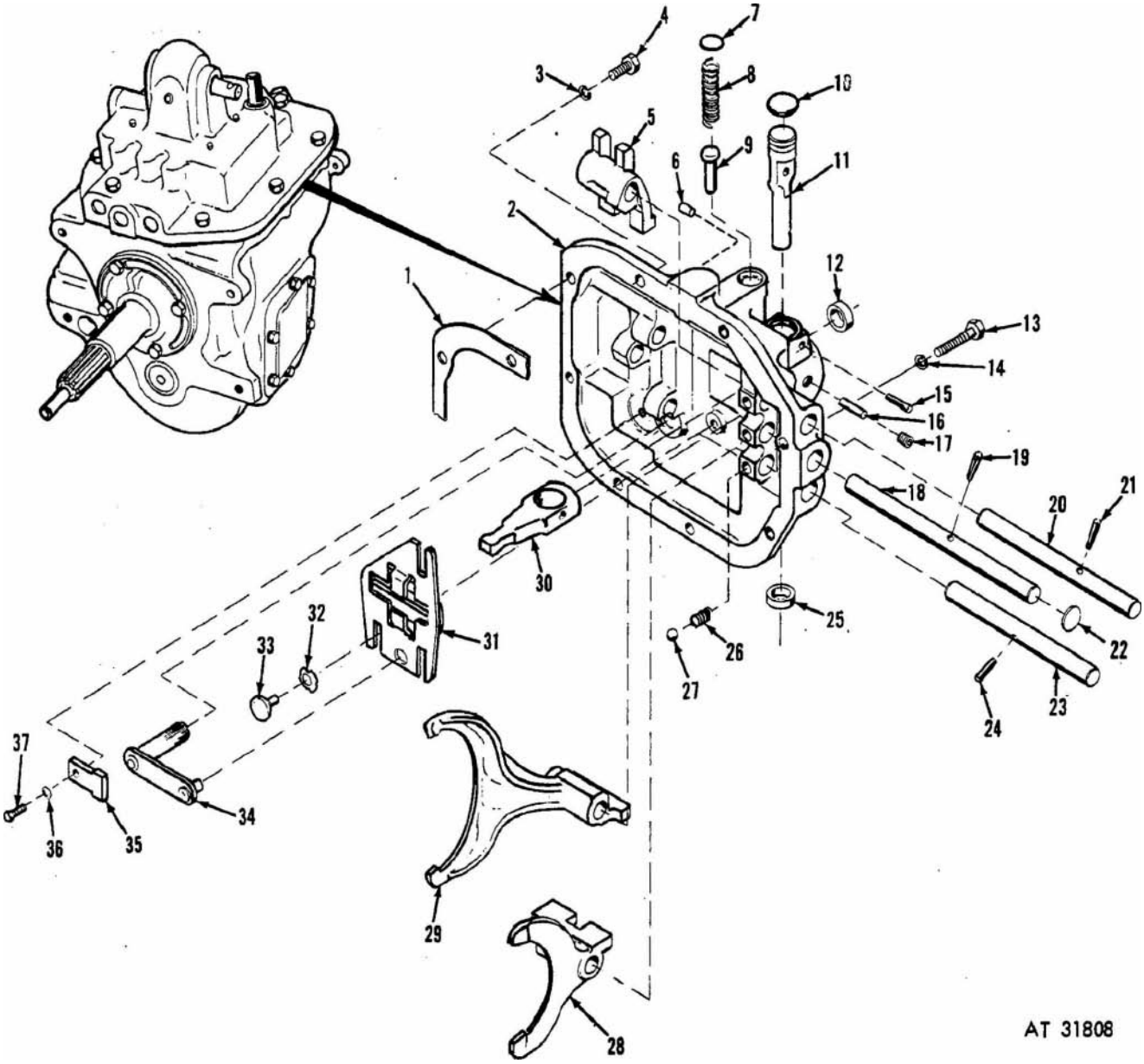
Figure 3-11. Transmission power flow in reverse gear position.

3-36. Transmission Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect transmission cover (2, fig 3.12) and gasket (1) from transmission by removing screw (13) and lock washer (141.



1 - **Gasket**
2 - Transmission cover
3 - Lock washer
4 - Screw
5 - Reverse shifter head
6 - Vent fitting
7 - Expansion plug
8 - Compression pin spring
9 - Compression pin
10 - Expansion plug
11 - Shifter inner lever shaft
12 • Selector shaft seal
13 - Screw
14 - Lock washer
15 - Pin
16 - **Pin**
17 - Pipe plug
18 - First and second shifter shaft
19 - Lock pin
20 - Reverse shifter shaft
21 • Lock pin
22 - Expansion plug
23 - Third and fourth shifter shaft
24 - Lock pin
25. - Shifter inner lever shaft seal
26 - Detent spring
27 - Detent ball
28 - Third and fourth shifter fork
29 - First and second shifter fork
30 - Shifter inner lever
31 - Interlock plate assembly
32 - Washer
33 - Pin
34 - Selector lever assembly
35 - Selector lever support
36 - Washer
37 - Screw

*Figure 3-12. **Transmission cover assembly,exploded** view*

(2) Disconnect reverse shifter head (5) and shifter forks (28 and 29) from shafts (18, 20, and 23) by driving lock pins (19, 21, and 24) out with a suitable punch and hammer.

(3) Mark exposed ends of shifter shafts t18. 20, and 23) and transmission cover (2) with sharp scribe using different marks for each shaft location, to assure proper reassembly (fig 3-131.

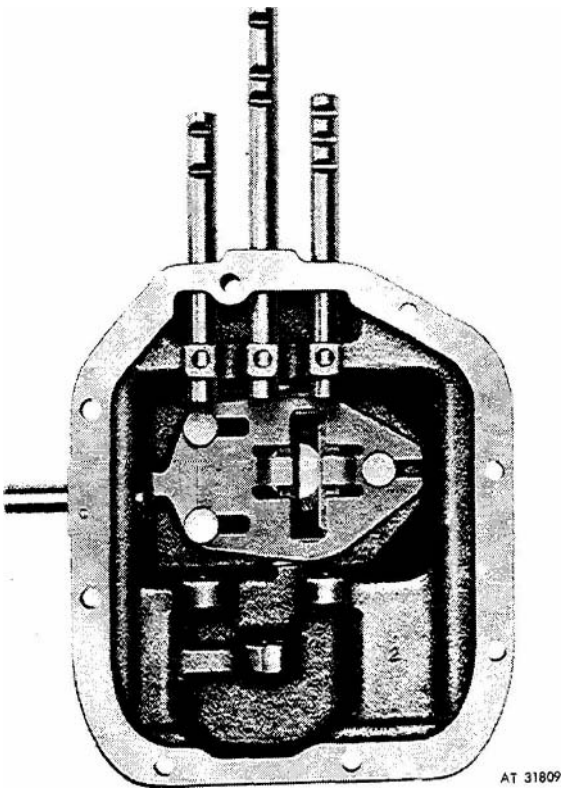


Figure 3-13. Shifter shafts

(4) Rotate shifter shafts (18, 20, and 23, fig 3-12) one half turn to disengage locking detent balls (27) from detents in shafts. Using a suitable hammer and soft drift punch, drive shifter shafts forward through shifter forks (28 and 29), and reverse shifter head (5) out of cover (2). As shafts are driven forward, they will pop shaft hole expansion plugs (22) out of seats in transmission cover. Remove reverse shifter head (5) and shifter forks (28 and 29) from cover.

Caution: Detent balls and springs are under spring tension. Exercise care when removing shafts.

(5) Remove three detent balls (27) and detent springs (26).

(6) Disconnect selector lever assembly (34) and selector lever support (35) from transmission cover (2) by removing screw (37) and washer (36). Remove selector shaft seal (12) from transmission cover.

(7) Disconnect interlock plate assembly (31) from transmission cover (2) by cutting ends of pin (33) with a suitable hammer and chisel. Remove pin and washer (32) by driving pin from transmission cover with drift punch and hammer.

(8) Remove expansion plug (7).

Warning: Exercise care when removing expansion plug — it is under pressure exerted by compression pin spring (8).

(9) Remove compression pin spring (8) and compression pin (9).

(10) Remove vent fitting (6) from front, and pipe plug (17) from rear of tower on transmission cover (2). Drive out pin (16) from shifter inner lever (30), shifter inner lever shaft (11), and transmission cover with drift punch and hammer.

(11) Remove expansion plug (10). Remove shifter inner lever shaft (11) from shifter inner lever (30) and transmission cover (2) by driving out shifter lever shaft with plastic or lead faced hammer. Remove shifter inner lever shaft seal (25) from transmission cover.

112) Disconnect reverse shifter lever eccentric shaft (16, fig 3-14) and reverse shifter lever (15) by removing lock spring (13) and nut (14).

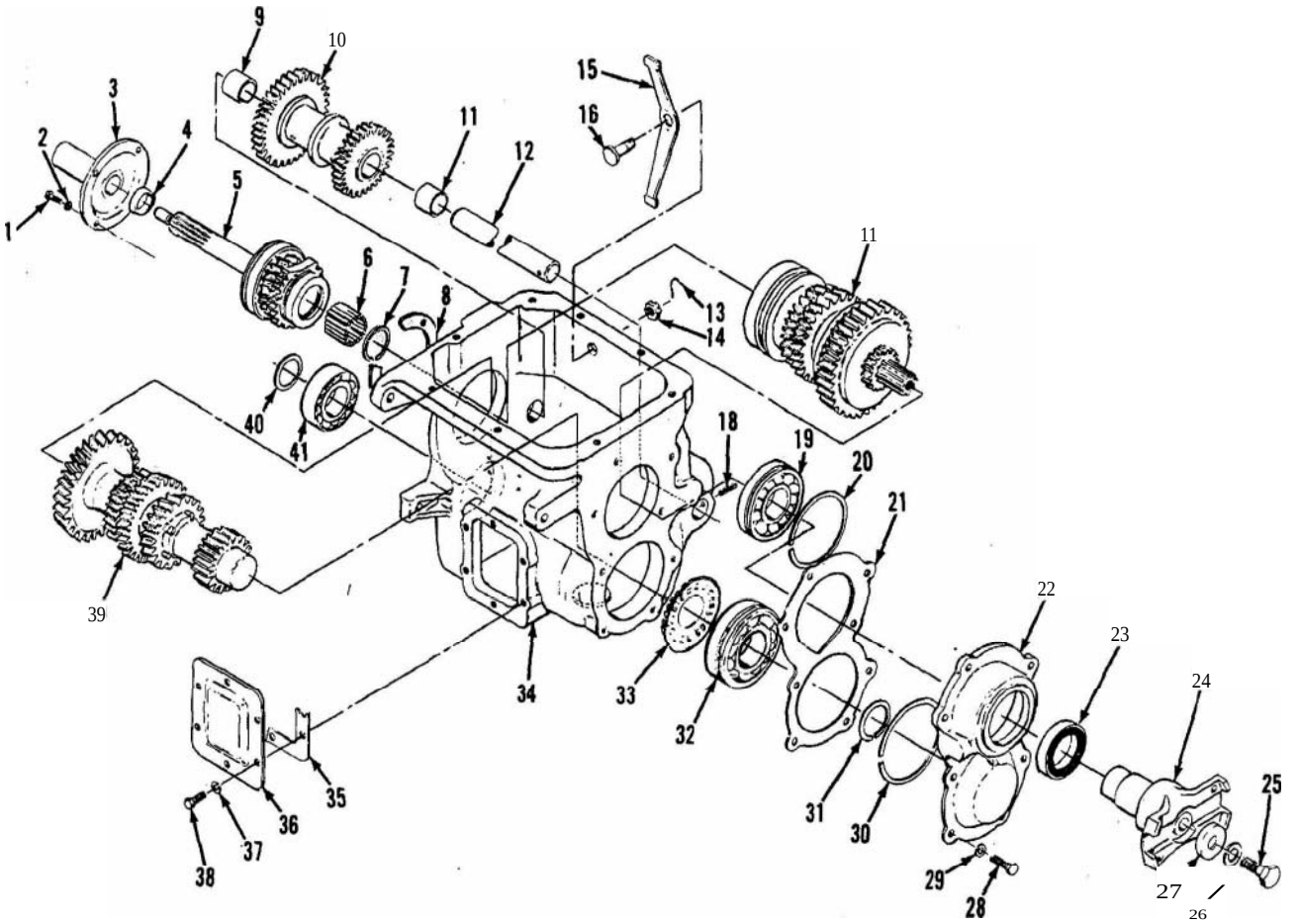


Figure 3-14. Transmission assembly, exploded view.

1 - Screw
2 - Lock washer
3 - Retainer
4 - Seal
5 - Clutch gear
6 - Pilot roller bearing
7 . Retainer ring
8 - Gasket
9 - Idler bearing bushing
10 - Reverse idler gear
11 - Idler bearing bushing
12 - Idler gear shaft
13 - Lock spring
14 - Nut
15 - Reverse shifter lever
16 - Reverse shifter lever eccentric shalt
17 - Mainshaft assembly
18 - Roll pin
19 - Mainshaft rear bearing
20 - Bearing locating snap ring
21 - Gasket
22 - Rear bearing retainer
23 - Seal
24 - Universal flange
25 - Screw
26 - Lock washer
27 - Special washer
28 - Screw
29 - Lock washer
30 - Bearing locating snap ring
31 - Snap ring
32 - Countershaft rear bearing
33 - Oil deflector
34 - Transmission case
35 - Gasket
36 - Cover
37 - Lock washer
38 - Screw
39 - Countershaft assembly
40 - Snap ring
41 - Countershaft front bearing

(13) Lock transmission gears rotation by sliding two gears into mesh simultaneously. Disconnect universal joint front flange (24) -by removing screw (25), lock washer (26), and special washer (27).

(14) Disconnect rear bearing retainer (22) from transmission case (34) by removing screw (28) and lock washer (29). Remove gasket (21) and bearing locating snap ring (30) and snap ring (31) from rear bearing retainer.

(15) Remove seal (23) from rear bearing retainer (22).

(16) As shown in figure 3-15, use a suitable puller to pull mainshaft assembly (17, fig 3-14) and mainshaft rear bearing (19) rearward until mainshaft bearing is free of transmission case (34).

(17) Remove puller and manually pull mainshaft assembly (17) and mainshaft bearing (19) rearward from transmission case as far as it will come.

(18) Using suitable puller *as* shown *in figure* 3-16, remove mainshaft bearing (19, fig 3-14) from mainshaft assembly (17).

(19) Disconnect clutch gear bearing retainer (3) and gasket (8) by removing screw (1) and lock washer (2).

(20) Pry seal (4) from clutch gear bearing retainer (3).

(21) Remove clutch gear bearing assembly (5, 6, and 7) from transmission case (34) by carefully tappipg on outer race of bearing from inside transmission case with hammer and soft punch.

Caution: Index cut out segment of clutch gear with counter-shaft driven gear to obtain clearance for removing clutch gear from transmission case (see fig 3-17).

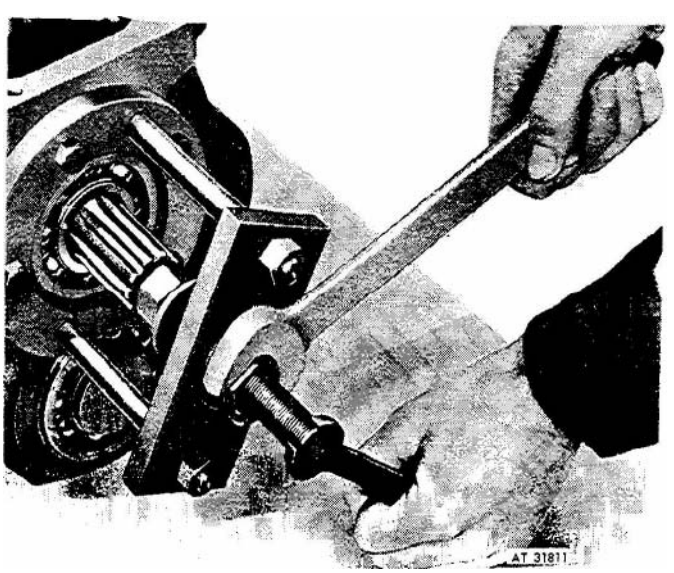


Figure 3-15. Removing mainshaft.

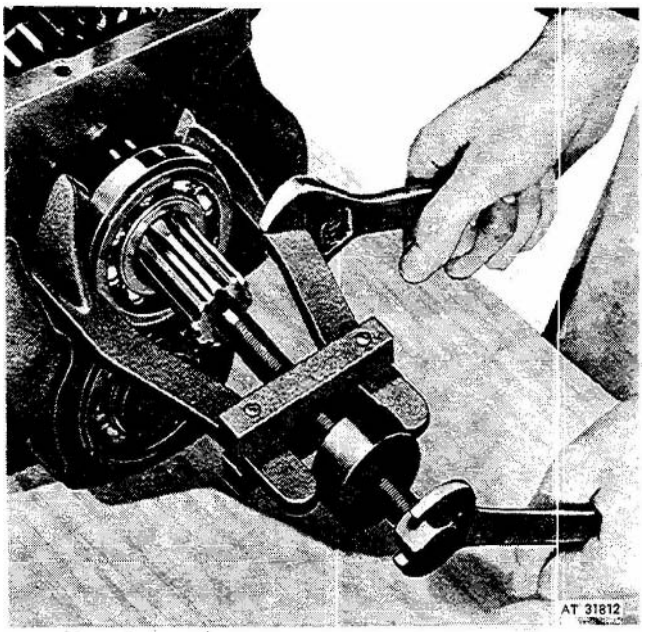


Figure 3-16. Removing mains haft bearing.

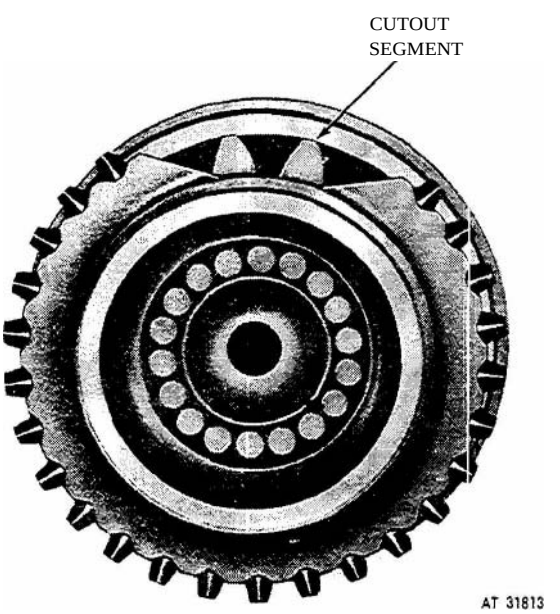


Figure 3-17. Segment index of clutch gear.

(22) Remove retainer ring (7, fig 3-14) and eighteen pilot roller bearings (6) from clutch gear (5).

(23) Remove bearing retainer ring (fig 3-18) securing bearing on shaft of clutch gear.

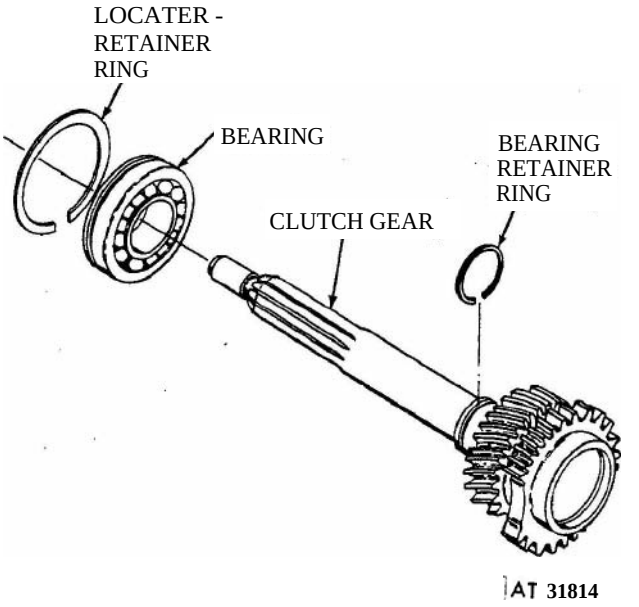


Figure 3-18. Clutch gear assembly, exploded view.

(24) Press bearing from clutch gear shaft (fig 3-19).

(25) Remove mainshaft assembly (17, fig 3-14) from transmission case (34) by first moving assembly rearward as far as possible and then lifting front end out through top opening of -transmission case.

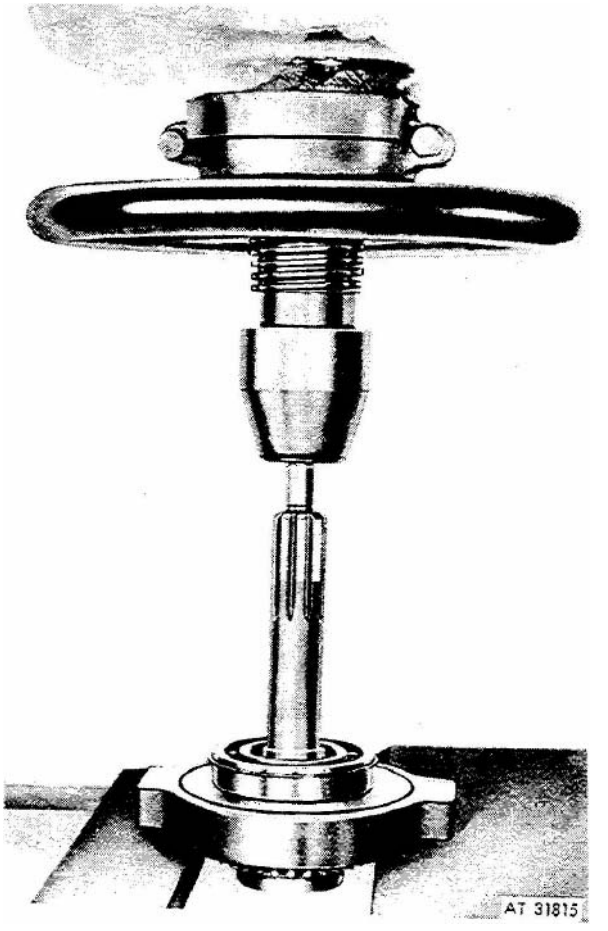


Figure 3-19. Removing clutch gear bearing.

(26) Remove spacer (2, fig 3-20) from pilot end of mainshaft assembly.

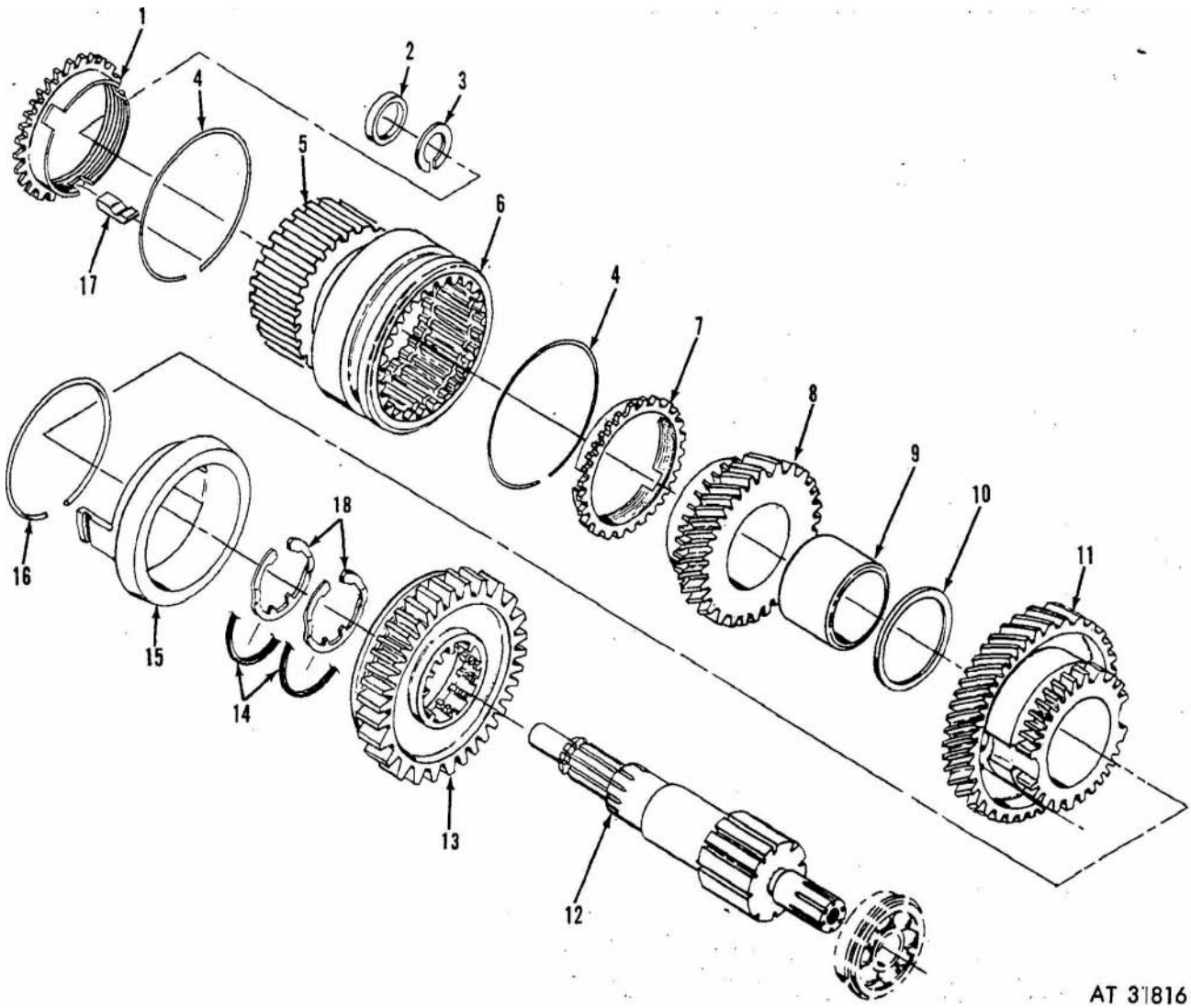


Figure 3-20. Mainshaft assembly, exploded view.

1 - Synchronizer cone
2 - Spacer
3 - Snap ring
4 - Clutch key spring
5 - Clutch hub
6 - Clutch sleeve
7 - Synchronizer cone
8 - Third speed gear
9 - Bushing
10 - Thrust washer
11 - Second speed gear assembly
12 - Mainshaft
13 - First and reverse gear
14 - Compression strip
15 - Syr chronizing ring
16 - Snap ring
17 - Clutch key
18 - Friction ring

(271 Remove snap ring (3, fig 3-20) synchronizer cone (1), and clutch key (17).

(28) Support mainshaft assembly on first and reverse sliding gear (13) in a suitable press and, using *a* suitable adapter smaller in diameter than the mainshaft pilot, carefully press mainshaft through gear cluster catching shaft before it drops (fig 3-21).

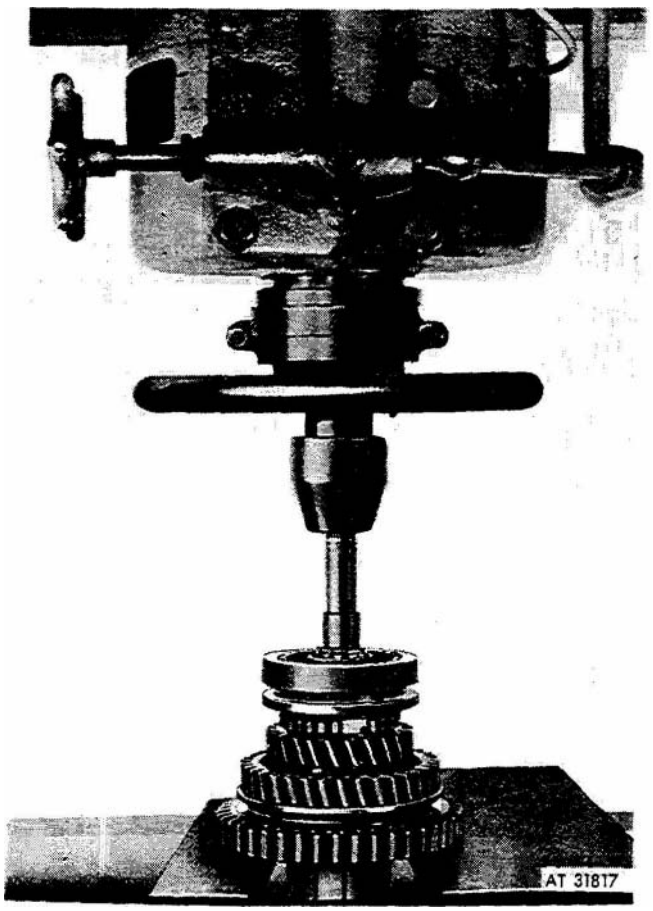


Figure 3-21. Disassembly of mainshaft assembly.

(29) Carefully remove third and fourth speed clutch assembly from mainshaft (12, fig 3-20). Remove the clutch sleeve (6) from clutch hub (5) after first having removed clutch key spring (4) and clutch key (17).

(30) Remove third speed gear synchronizer cone (7) from third speed gear (8).

(31) Lift off third speed gear (8) and bushing (9).

(32) Slide bushing (9) out of third speed gear (8).

(33) Remove thrust washer (10) from mainshaft (12).

(34) Remove second speed *gear assembly* (11) from synchronizer *ring lugs.*

(35) Remove snap ring (16) and lift second speed gear synchronizing ring (15) from first and reverse gear (13).

(36) Remove friction ring (18) and friction ring compression strip (14) from first and reverse gear (13).

(37) Using a suitable hammer and small drift punch, drive roll pin (18, fig 3-14) into shaft from outside of transmission case (34).

(38) Using a suitable hammer and soft metal drift rod, drive reverse **idler** gear shaft (12) through transmission case from front to rear.

Note: Salvage shaft by extracting retainer roll pin.

(39) Lift *reverse* idler *gear* (10) out through top of *transmission case.*

(40) Press idler bearing bushings (9 and 11) from reverse idler *gear* (fig 3-22).

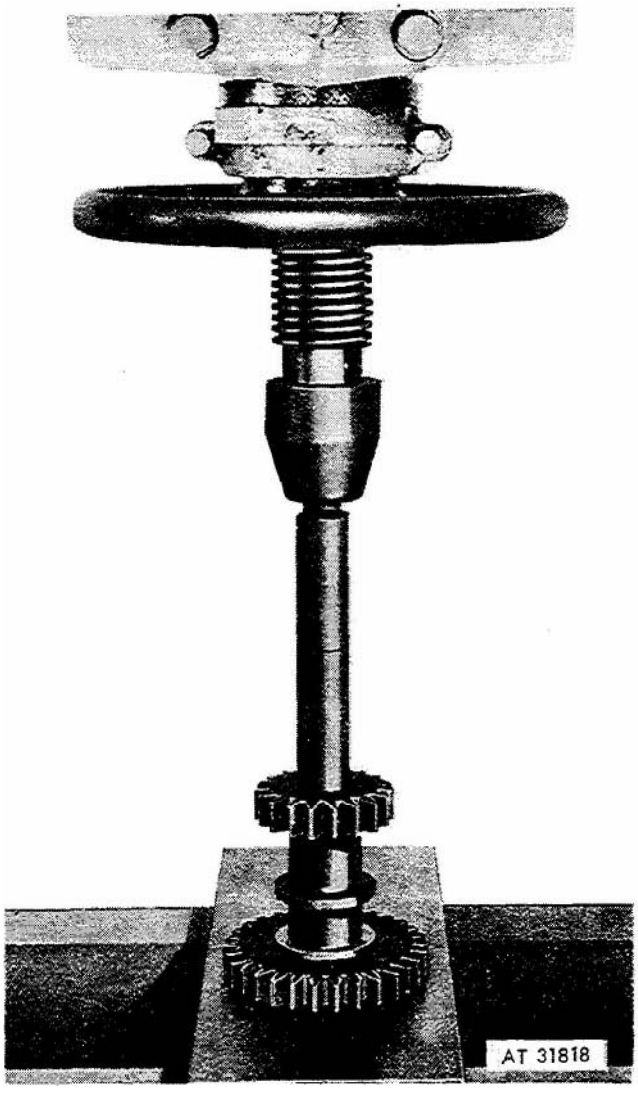


Figure 3-22. Removing and installing reverse idler gear bushing.

(41) Using a suitable hammer and long soft metal drift rod of slightly smaller diameter than the bore of the countershaft bearings (32 and 41, fig 3-41), drive countershaft assembly (39) along with front and rear bearings sufficiently rearward so rear bearing is driven out of transmission ease.

(42) Remove countershaft rear bearing (32) using *a* suitable puller (fig 3-23).

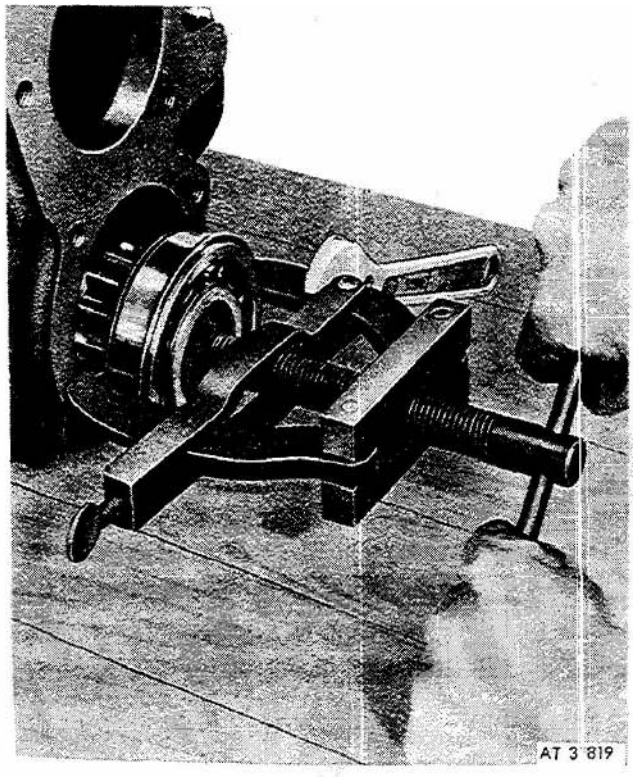


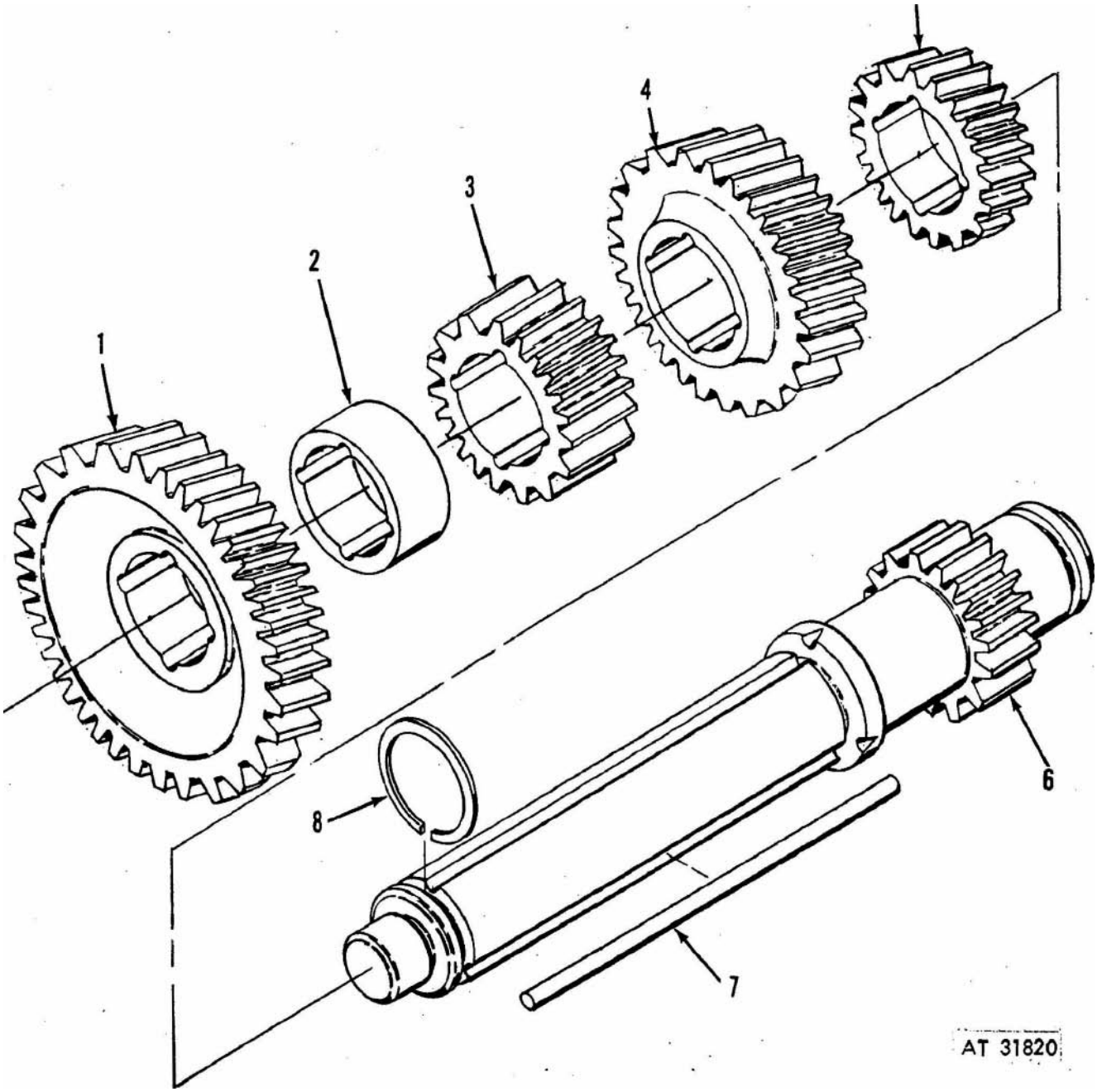
Figure 3-23. Removing countershaft rear bearing.

(43) Remove countergear shaft rear bearing oil deflector (33, fig 3-14) from rear of countershaft assembly (39).

(44) Raise front end of countershaft assembly (39) including front bearing (41) and lift assembly out of transmission case through top opening.

(45) Remove countershaft front bearing (41) from countershaft assembly (39).

(46) Remove countergear snap ring (8, fig 3-24) from countergear shaft (6).



LEGEND to fig 3-24:

1 - Driven gear
2 - Spacer
3 - Reverse speed gear
4 - Third speed gear
5 - Second speed gear
6 - **Countergear** shaft
- Drive pin
8 - Snap ring

Figure 3-24. Countergear shaft assembly, exploded view.

(47) Remove countergears (1, 3, 4, and 5) and spacer (2) from countergear shaft (fig 3-25).

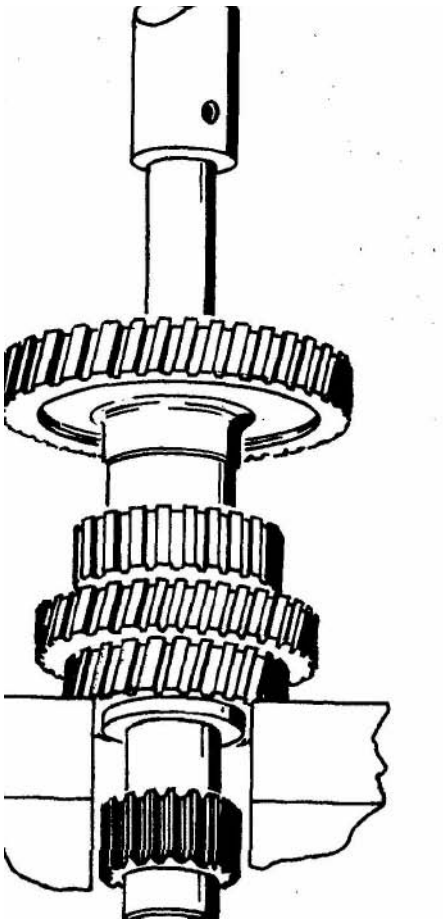


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Figure 3-25. Removing countergear shaft.

(48) Remove four countergear drive pins (7, fig 3-24).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Press new idler bearing bushing (9 and 11), fig 3-14) into reverse idler gear (10) until ends of bushings are flush with end of gear (fig 3-22).

Caution: When installing reverse idler gear bushings, position bushing split line 90 degrees from staking holes in gear hub.

(2) Using a suitable staking tool, stake both reverse idler gear bushings securely in place at two places on each bushing.

(3) Line ream idler bearing bushings (9 and H, fig 3-14) to 1.2455 - 1.2465 of an inch (fig 3-26).

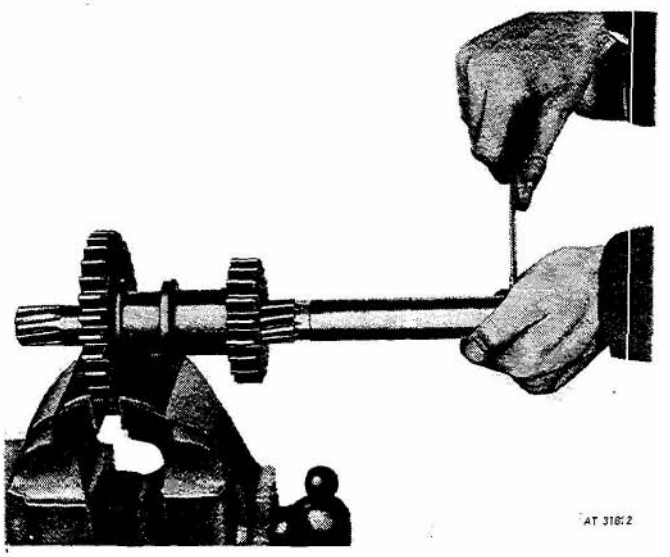


Figure 3-26. Reaming reverse idler gear bushing

(4) After bushings have been line reamed, *wash* gear assembly in *an* approved cleaning solvent. Blow out bore with compressed air and wipe dry .

f. *Assembly.*

(1) Install countershaft front bearing (41, fig 3-14) *into* bore in transmission case (34), using flat tool larger in diameter than bearing. Drive in bearing until flush with transmission case.

(2) Place countergear shaft (6, fig 3-24) in suitable press with *gear* end down, install drive pin (7) and press on gears as follows: second speed gear (5), third speed *gear (* 4), reverse speed gear (3), spacer (2), and driven gear (1) as shown in figure 3-27. Select and install *a* retainer snap ring (8, fig 3-24) that will provide a maximum end clearance of 0.010 inch *between* rear face of snap ring and front face of driven gear hub.

Note: Front end of all four countershaft drive pins (7) must be flush within 1 /32 of an inch below front face of (riven gear hub.

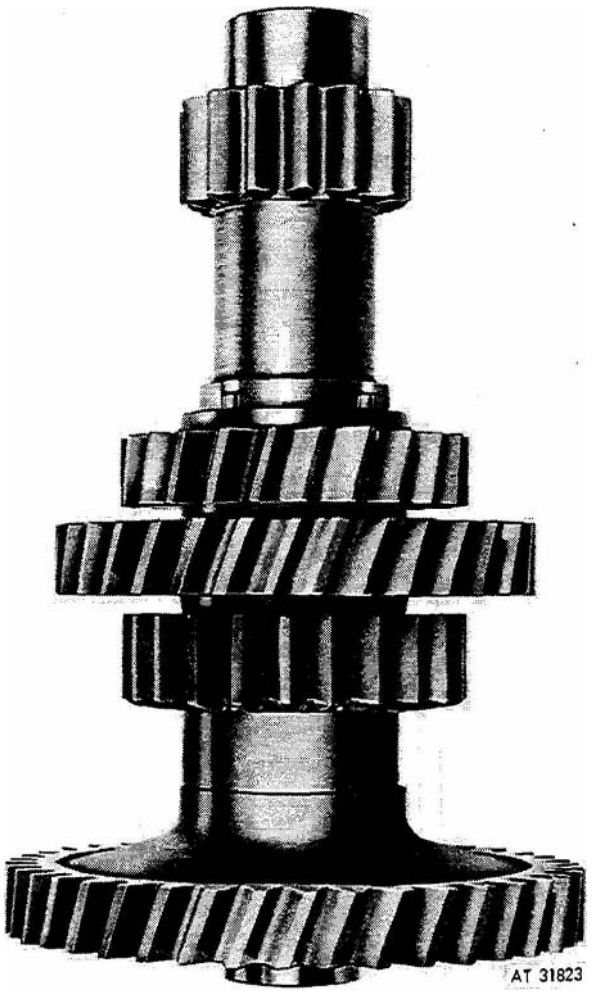


Figure 3-27. Proper installation of countershaft gears.

(3) Install countershaft assembly (39, fig 3-14) in transmission case (34) with rear bearing hub extending through rear bearing bore in transmission case.

(4) Install rear bearing oil deflector (33) over rear bearing hub on countershaft so projections on deflector nest between teeth of countershaft first gear.

(5) Install countershaft rear bearing locating snap ring (30) in groove on outside diameter of outer race on countershaft rear bearing (32).

(6) Install countershaft rear bearing (32) on countershaft so bearing locating snap ring (30) on bearing outer race is toward rear of shaft.

(7) Install bearing retainer snap ring (31) on shaft (fig 3-28).

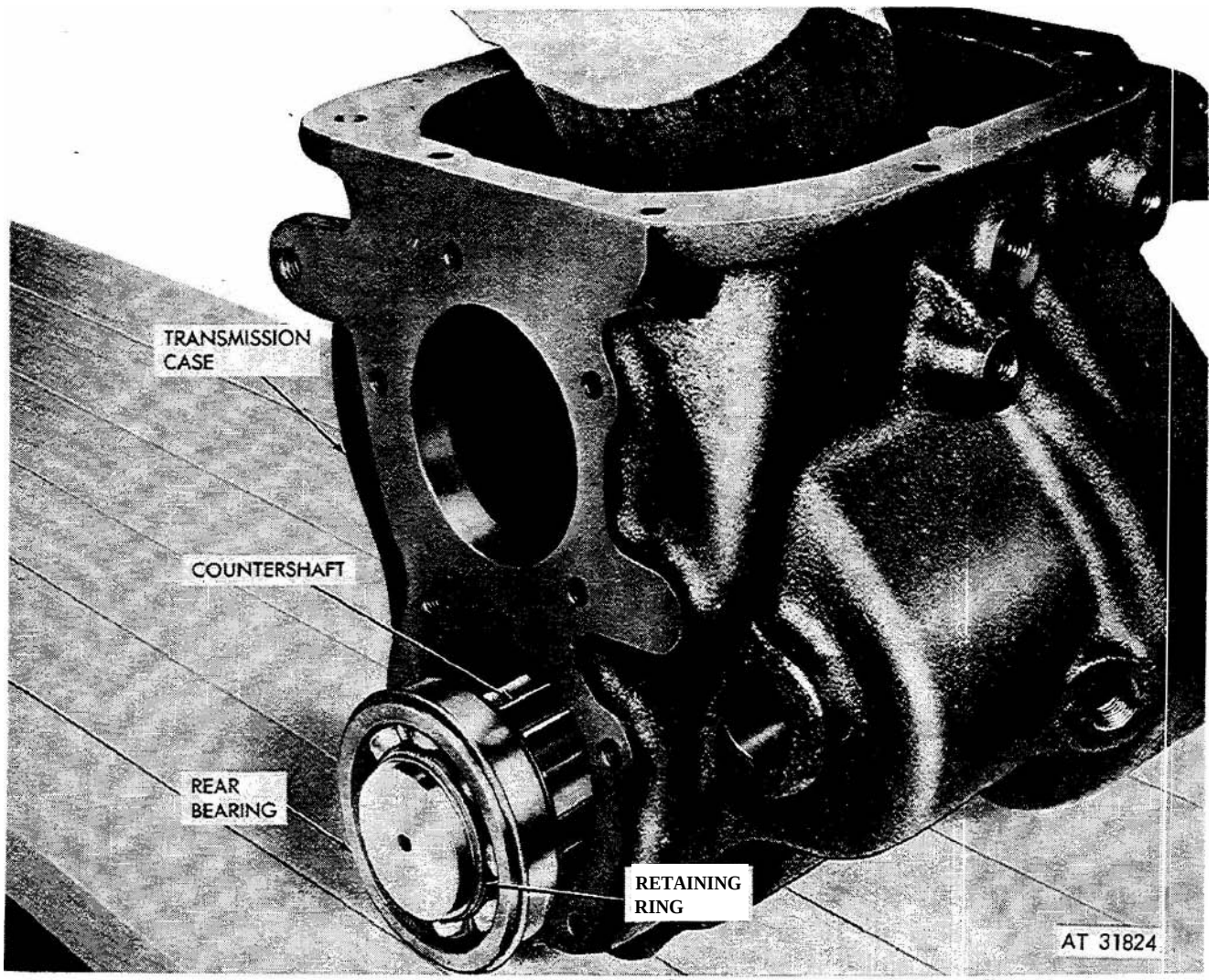


Figure 3-28. Countershaft installation.

(8) Start countershaft front bearing hub into front bearing (41, fig 3-14) in transmission case and, pressing on outer race of countershaft rear bearing (32), push entire countershaft assembly (39) and bearing assembly forward until rear bearing locating snap ring (30) is in contact with rear face of transmission case.

(9) Place reverse idler gear (10) in transmission case with larger diameter gear toward front of trnsmission case.

(10) Insert reverse idler gear shaft (12) in rear of transmission case through reverse idler gear (10) and into hole in front of transmission case. Rotate shaft until retainer pin hole lines up with pin hole in transmission case. Drive idler gear shaft (12) with soft faced hammer into rear of transmission case until retainer pin hole in shaft lines up with pin hole in transmission case.

(11) Drive roll pin (18) through hole in transmission case and into shaft until outer end of pin is flush with transmission case.

(12) Assemble mainshaft assembly (17) in the following sequence.

(a) Install second speed gear synchronizer ring (15, fig 3-20) into recess in front side of first and reverse gear (13) and install snap ring (16). **Be** sure snap ring is fully seated in first and reverse *gear.*

(b) Install new compression strip (14) and friction ring (18) in friction groove on inside diameter of first and reverse gear (13).

(c) Slide first and reverse gear (13) on the splined hub on the **mainshaft** (12) with second gear synchronizer side of gear toward front end of shaft.

(d) Install second speed gear assembly (11) on mainshaft (12) with synchronizer energizer

springs toward rear end of shaft facing synchronizing ring (15) **in** first and reverse **gear (13).** Position gear so two slots on hub of gear index with prongs on synchronizing ring (15) in first and reverse sliding gear.

(e) Install thrust washer (10) on mainshaft (12).

(f) Support mainshaft in a suitable press on rear face of splined hub behind first and reverse gear (13) and press mainshaft bushing (9) onto mainshaft until it bottoms against second speed gear thrust washer (fig 3-29).

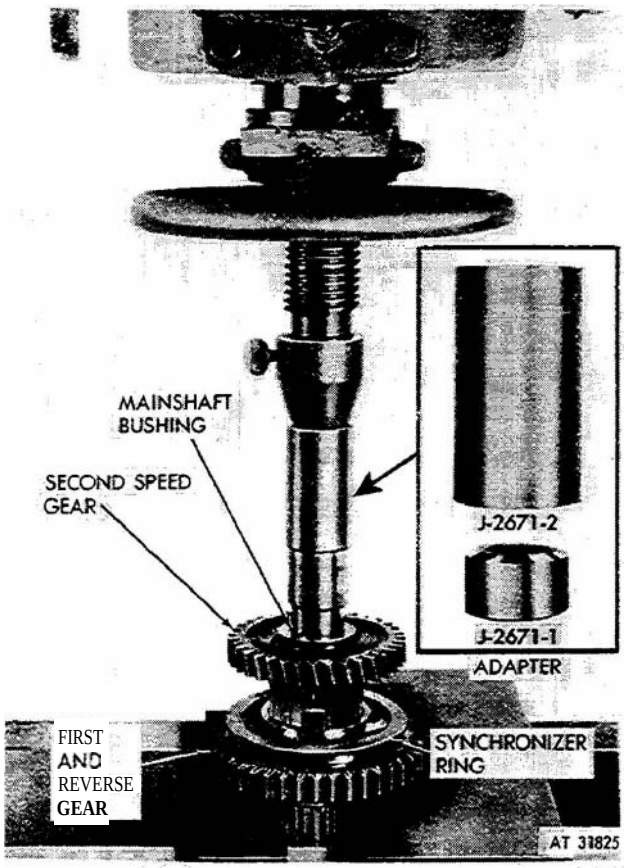


Figure 3-29. Pressing on mainshaft bushing:

Caution: Use grease on shaft journal and inside diameter of mainshaft bushing while pressing onto shaft to insure initial lubrication and ease of assembly. Inspect bushing for cracks after installation. Check outside diameter of bushing after installation for proper running clearance to third speed gear.

(g) Check end play of second speed gear assembly (11, fig 3-20) on mainshaft (12). This play should be 0.009 - 0.015 of an inch.

(h) Install third speed gear (8) over mainshaft bushing so tapered hub end of gear is toward front of mainshaft.

(i) Install third speed gear synchronizer cone (7) on tapered hub of third speed gear (8).

(j) Assemble third and fourth speed clutch sleeve (6) over third and fourth speed clutch hub (5) so wide land on outside diameter of sleeve faces same direction as longer shoulder on hub. Slide three clutch keys (17) into position between clutch hub (5) and clutch sleeve (6), inserting keys from the rear of assembly with key retainer ring grooves in keys facing inward and toward front (long shoulder) end of hub. Install two clutch key springs (4) seated in keys, one on either side of the clutch hub, making sure springs fit under keys holding them out against inside diameter of clutch sleeve.

Caution: Both clutch key springs (4) must be in same relative position in clutch hub to provide equal tension to each clutch key (17) as shown in figure 3-30.

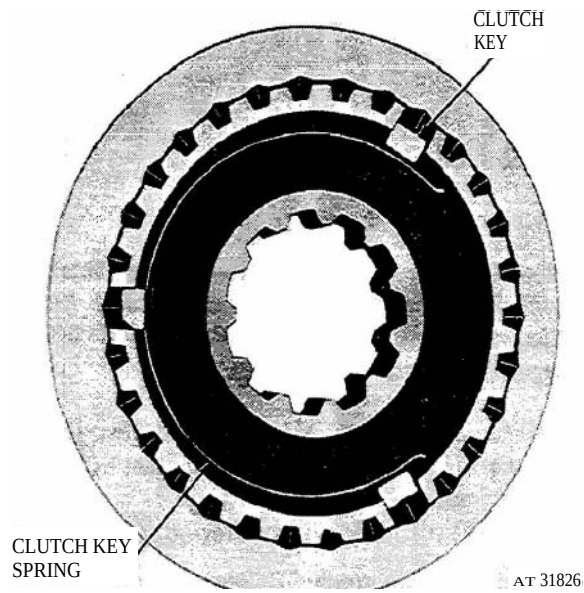


Figure 3-30. Proper clutch key spring installation.

(k) Support transmission mainshaft assembly in suitable press on rear face of splined hub behind first and reverse gear (13, fig 3-20) and press on third and fourth gear clutch assembly with the wider land on clutch sleeve outside diameter and longer shoulder on the hub toward front end of mainshaft until rear of hub bottoms against hub of third speed gear (fig 3-31).

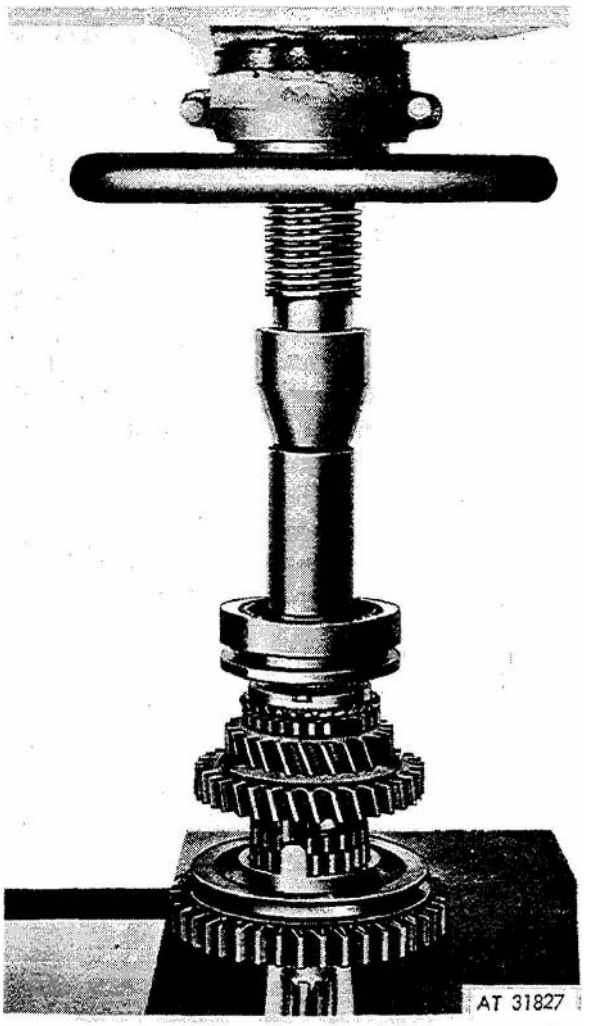


Figure 3-31. Pressing on clutch hub.

Caution: When installing third and fourth speed clutch assembly, exercise care that clutch keys index in slots of third speed gear synchronizer ring.

(1) Check end play of third speed gear (8, fig 3-20) on mainshaft. This play should be 0.010 to 0.014 of *an* inch.

(m) Install clutch hub snap ring (2).

Note: Snap rings are supplied in four thicknesses, 0.083, 0.087, 0.091, and 0.095 of an inch. Select ring that, when installed, will provide a maximum of 0.007 of an inch clearance between rear face of ring and front face of third and fourth speed clutch hub (fig 3-32).

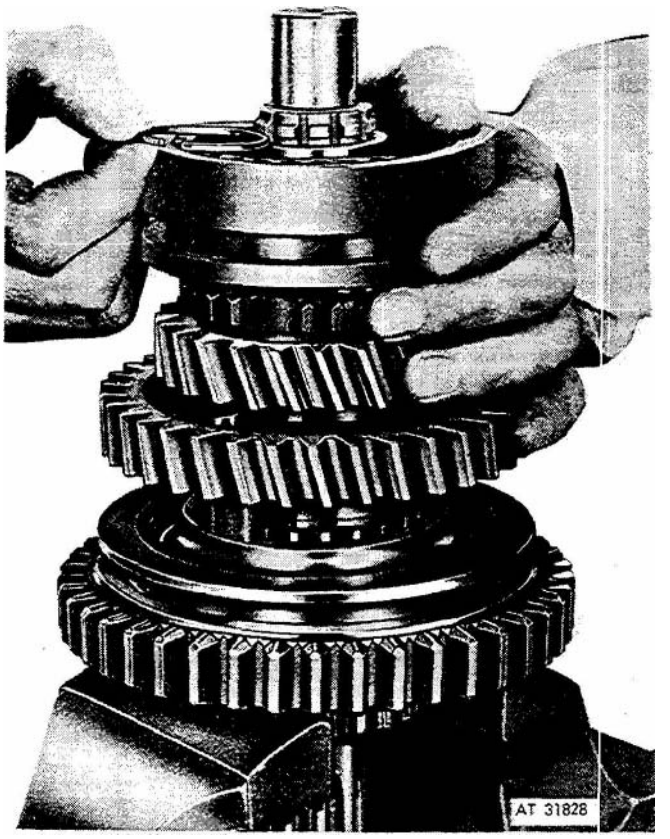


Figure 3-32. Selecting proper snap ring.

(13) Insert transmission mainshaft assembly (17, fig 3-14 into transmission case raising front of shaft and leading rear of shaft out through the mainshaft bearing bore in rear of transmission case.

(14) Install bearing locating snap ring (20) in groove diameter of outer race .of mainshaft rear bearing (19).

(15) Press mainshaft rear bearing (19) onto mainshaft assembly (17), position so that locating ring is toward rear end of main shaft (fig 3-33).

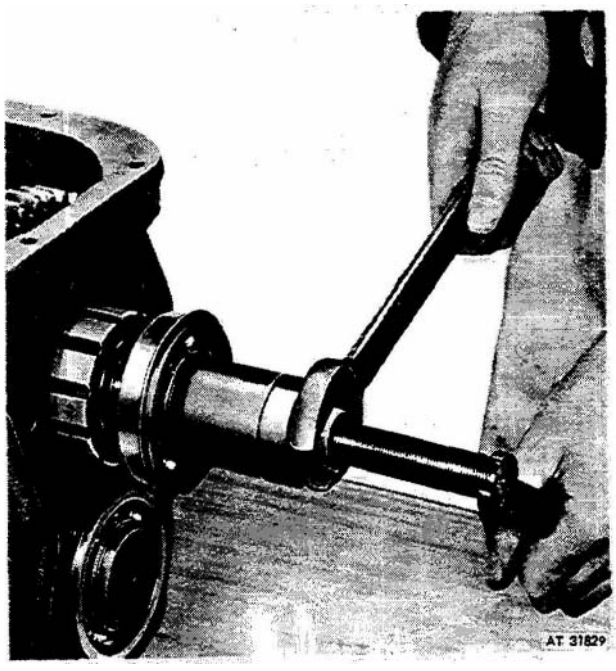


Figure 3-33. ***Pressing on mainshaft rear bearing.***

116) Install mainshaft pilot bearing spacer (3, fig 3-20) on front end of mainshaft.

(17) Install clutch gear synchronizer cone (1) with three clutch key notches to rear end of mainshaft. Set cone in front end of third and fourth speed clutch assembly.

(18) Move **mainshaft** assembly forward in transmission case until third and fourth speed clutch assembly on mainshaft (12) clears over and forward of third speed gear on the countershaft assembly (39, fig 3-14).

(19) Install locator ring (fig 3-18) in groove on outside diameter of outer race of clutch gear bearing.

(20) Press clutch gear bearing onto clutch gear, position so that locating ring is toward shaft end of clutch gear (fig 3-34).

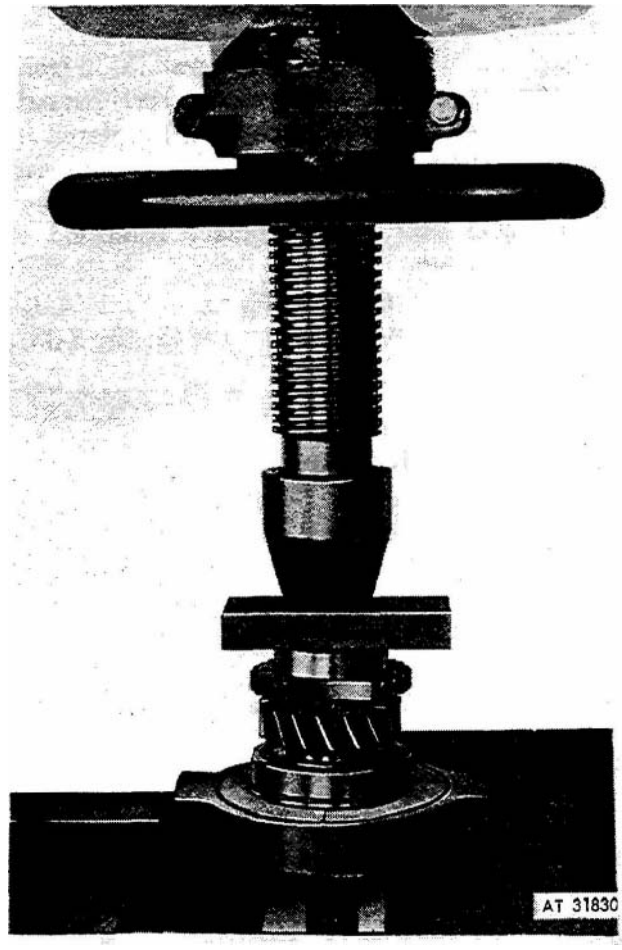


Figure 3-34. Pressing on clutch gear bearing.

Caution: Bearing must turn as free after press on shaft as it did before installation.

(21) Install clutch bearing retainer ring (fig 3-18) and make sure it is completely seated in groove.

(22) Apply a small amount of grease inside mainshaft pilot bearing bore in clutch gear assembly and carefully install eighteen pilot roller bearings (6, fig 3-14). Insert roller bearing retainer ring (7).

(23) Install assembled clutch gear (5) in front end of transmission case (34), making sure that cut-out portion of teeth on clutch gear is indexed to clear teeth on countershaft driven gear as shown in figure 3-18. Press in until locating ring on outer race of clutch gear bearing contacts front end of transmission case.

(24) Using a suitable tool install oil seal (4, fig 3-14) in clutch gear bearing retainer (3) (fig 3-35).

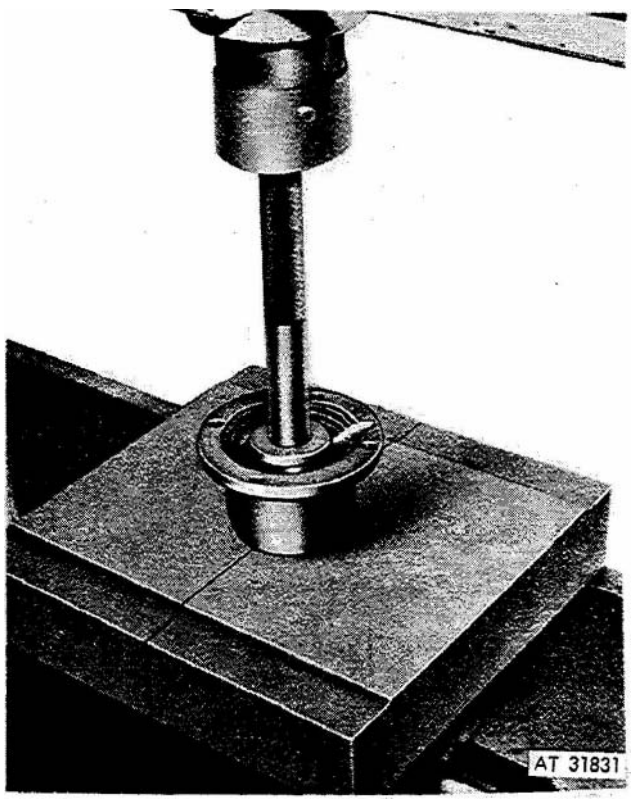


Figure 3-35. Pressing in clutch bearing retainer oil seal

Note: When installing oil ***seal,*** *lip on* ***seal*** *is to be toward rear of bearing retainer.*

(25) Position clutch gear bearing retainer (3, fig 3-14) and gasket (8) to transmission case (34) and secure with screw (1) and lock washer (2). Tighten screws to 15-18 lbs-ft. torque.

(26) Manually align pilot on front end of mainshaft assembly (17) and insert into pilot roller bearings (6) in pilot bore of clutch gear (5).

(27) Press mainshaft assembly (17) and bearing assembly into rear of case until bearing locating snap ring (20) on outer race of bearing contacts rear face of case (fig 3-36).

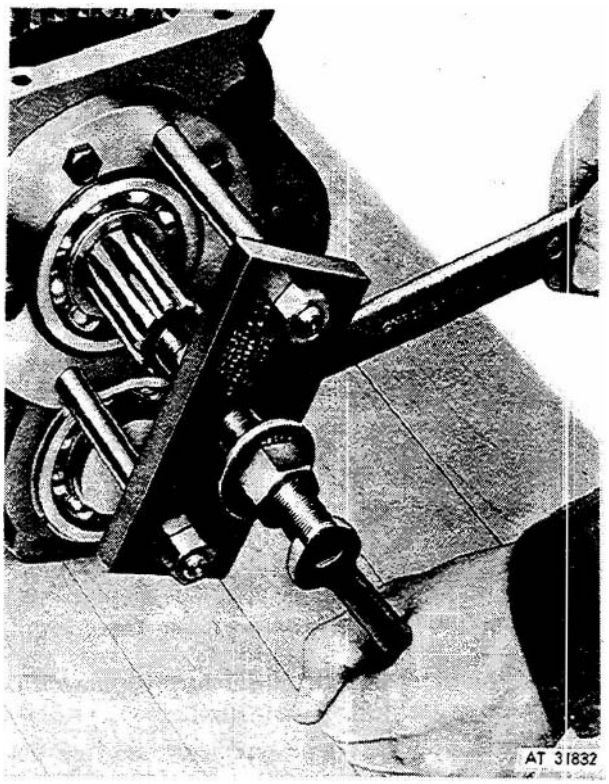


Figure 3-36. Pressing ***mainshaft*** ***into case.***

(28) Using a suitable press, support gasket face of transmission rear bearing retainer and press in rear bearing oil seal (23, fig 3-14).

Note: Position oil seal so that ***seal*** *lip faces gasket side of bearing retainer.*

(29) Install rear bearing retainer (22) and gasket (21), secure with screw (28) and lock washer (29). Tighten screws to 20-25 lbs-ft. torque.

30) Place reverse shifter lever (15) into position in transmission case and insert shifter lever eccentric shaft (16) through lever and transmission case from inside of transmission case. Install special slotted hex nut (14) on eccentric shaft and tighten finger tight.

(31) Install universal joint front flange (24) in place on rear end of transmission mainshaft assembly (17). Install flange retainer screw (25), lock washer (26), and special washer (27). Engage two transmission gears to prevent rotation and tighten screw to 60-65 lbs-ft. torque.

(32) Press oil seals (12 and 25, fig 3-12) into transmission cover (2) until seals bottom.

(33) Install shifter inner lever shaft (11) through cover (2) and shifter inner lever (30). Make sure retainer groove on shaft is lined up with retainer pin hole in transmission cover.

(34) Install and stake shifter shaft retainer pin (15) in transmission cover (2).

(35) Sighting through access hole in transmission cover (2), align retainer pin holes in shifter inner lever (30) with hole in shifter inner lever shaft (11). Install and stake retainer pin (16).

(36) Install vent fitting (6) and pipe plug (17) in tower of transmission cover (2).

(37) Install shifter shaft access hole expansion plug (10) in transmission cover and stake securely.

(38) Install shifter interlock plate assembly (31) in transmission cover using three new mounting pins (33) and spring washers (32). Support heads of mounting pins after installation in transmission cover and stake outer ends securely to transmission cover, using standard ¼ inch rivet header or ball peen hammer.

(39) Install selector lever assembly (34) into transmission cover.

(40) Clamp transmission cover (2) upside down in vise. Install detent spring (26) and detent ball (27) into center hole in transmission cover. Insert first and second shifter shaft (18) into cover with detent notches facing up. Depress detent spring and ball with small punch or probe and push shaft *over* detent ball. Position first and second shifter fork (29) and push shifter shaft through shifter fork and into cover until lock pin hole in shaft lines up with hole in shifter fork. Rotate shaft to *engage* detent ball in detent notch on shaft. Install lock pin (19) through shifter fork and into shaft with hammer and appropriate size drift punch.

(41) Repeat procedure outlined in (40) above, to install reverse shifter shaft (20), reverse shifter head (5), third and fourth shifter shaft (23), and third and fourth shifter fork (28).

Caution: Three shifter shafts all have different lengths. Make certain proper shafts are used in each location by matching scribe marks made during disassembly on shifter shafts and transmission case (fig 3-13).

(42) Install expansion plug (22, fig 3-12) in transmission cover. Press plug in until securely expanded in seat and stake in place.

(43) Install compression pin (9), compression pin spring (8) and expansion plug (7) in transmission cover. Drive expanision plug securely in place and stake to cover.

(44) Adjust reverse idler gear (refer to g. below).

(45) Install transmission cover (2, fig 3-12) and gasket (1) on transmission case, making sure shifter forks are properly engaged. Secure cover with screw (13) and lock washer (14). Tighten screws to 20-25 lbs-ft. torque.

g. *Reverse Idler gear Adjustment.* With transmission fully assembled, except for installation of transmission cover, proceed with reverse idler gear position adjustment as outlined in (1) thru (4) below.

(1) Loosen nut (fig 3-31). Rotate eccentric shaft with screw driver until dots near end of slot on shaft are toward rear of transmission to put reverse idler gear (10, fig 3-14) in extreme rearward (fully engaged) position when transmission is shifted into reverse.

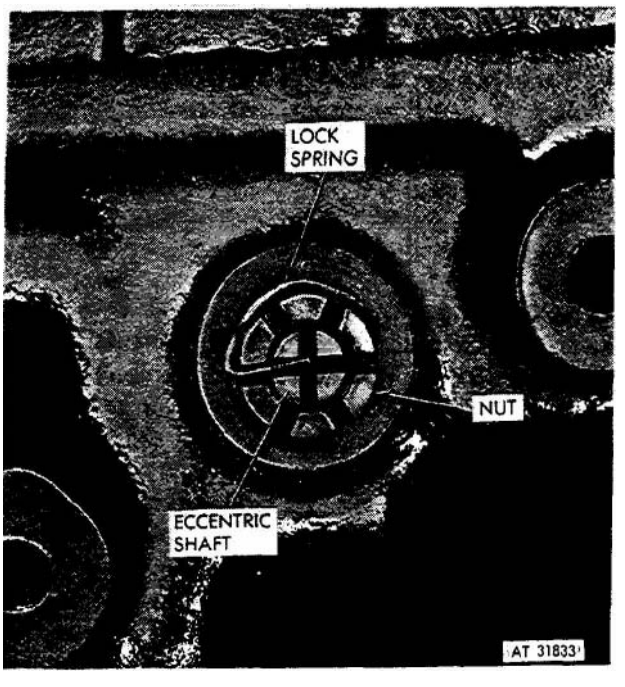


Figure 3-37. Reverse idler gear adjustment.

(2) Shift transmission into second gear and check for interference between reverse idler gear and first and reverse gear. If interference occurs, rotate eccentric shaft in counterclockwise direction to obtain 1 / 32 of an inch running clearance between gears.

(3)) Shift transmission into reverse and check for clearance between reverse idler gear and rear of transmission case. If interference occurs, continue to rotate eccentric shaft counterclockwise until reverse idler gear has approximately 1 / 64 of an inch running clearance with transmission case.

(4) Hold eccentric shaft (fig 3-37) in adjusted position and tighten nut to 40 lbs-ft. torque or slightly higher until nearest slot in nut aligns with one of slots in eccentric shaft. Install lock spring to engage both eccentric shaft and nut.

h. Install Transmission Cover. (Refer to f. (45) above.)

i. Installation. (Refer to TM 9-2320-242-20.)

Section IX. TRANSFER ASSEMBLY

3-37. General

a. The two range manually operated transfer assembly (fig 3-38) is equipped with a differential clutch gear which can be operated by separate shift levers. In addition, it is equipped with an oil pump and speedometer drive gear assembly. The main input and power take-off shafts are mounted on ball bearings. The idler shaft, intermediate shaft, and axle drive shaft are all mounted on roller bearings. All gears are of the helical design except for the two sliding spur gears.

b. In high range, the hi-lo sliding gear is moved to the rear of the splined input shaft by the shifting fork to engage with and drive the input shaft free running constant mesh gear. Power is then transmitted to the axle drive shaft through the constant mesh idler gear to the intermediate gear and then to the output drive gear (fig 3-39).

c. In low range, the hi-lo sliding gear is moved forward by the shifting fork, to engage with and drive the low range idler gear which is splined to its shaft. Power is then transferred through the constant mesh gears to the axle drive shaft (fig 3-40).

d. In neutral position, the hi-lo sliding gear is positioned by the shifting fork to a point between the input shaft constant mesh gear and the low range idler gear. Since the input shaft constant mesh gear is not splined to its shaft, the output drive shaft will not be driven.

e. In six wheel drive, the differential clutch gear is moved rearward by the differential shifter fork to engage the internal teeth of the constant mesh drive gear. The sliding gear will drive the front axle through the splined shaft which is an integral part of the front differential pinion drive shaft assembly. The removal of the front differential pinion drive shaft will allow the differential clutch sliding gear to fall to the bottom of the transfer case unless the transfer assembly is in six-wheel drive. It is possible that this could happen without detection until after the units are reinstalled and six-wheel drive is attempted with no results.

Caution: Ensure that transfer is in six wheel drive prior to removal or installation to prevent loss of differential clutch sliding gear.

f. The speedometer drive assembly is located at the forward end of the idler shaft. Its drive gear is attached to a shaft which mates with the slotted end of the idler shaft. The larger driven gear is attached to a tubular shaft which mates with and drives the speedometer cable. The parking brake assembly consists of two internal expanding brake shoes and an operating mechanism mounted on a backing plate. The entire assembly is attached to the rear flange of the output shaft housing. Actuation of the parking brake lever forces the two brake shoes against the brake drum, which is bolted to the output shaft flange, and in this manner prevents rotation of the output shaft and the wheels. Located on the upper right side of the transfer case is a plunger type oil pump which is driven by a cam on the input drive shaft. Combined action of the cam and the plunger spring forces the plunger back and forth into compression and suction strokes. On the suction stroke the spring extends and the inlet check valve opens permitting oil to flow into the chamber. On the compression stroke the input shaft cam forces the plunger against its spring, forcing the oil through the outlet check valve and back into the transfer case. Oil is pumped from the bottom of the transfer case to two inlet ports located above the main input shaft to provide constant lubrication for the gears.

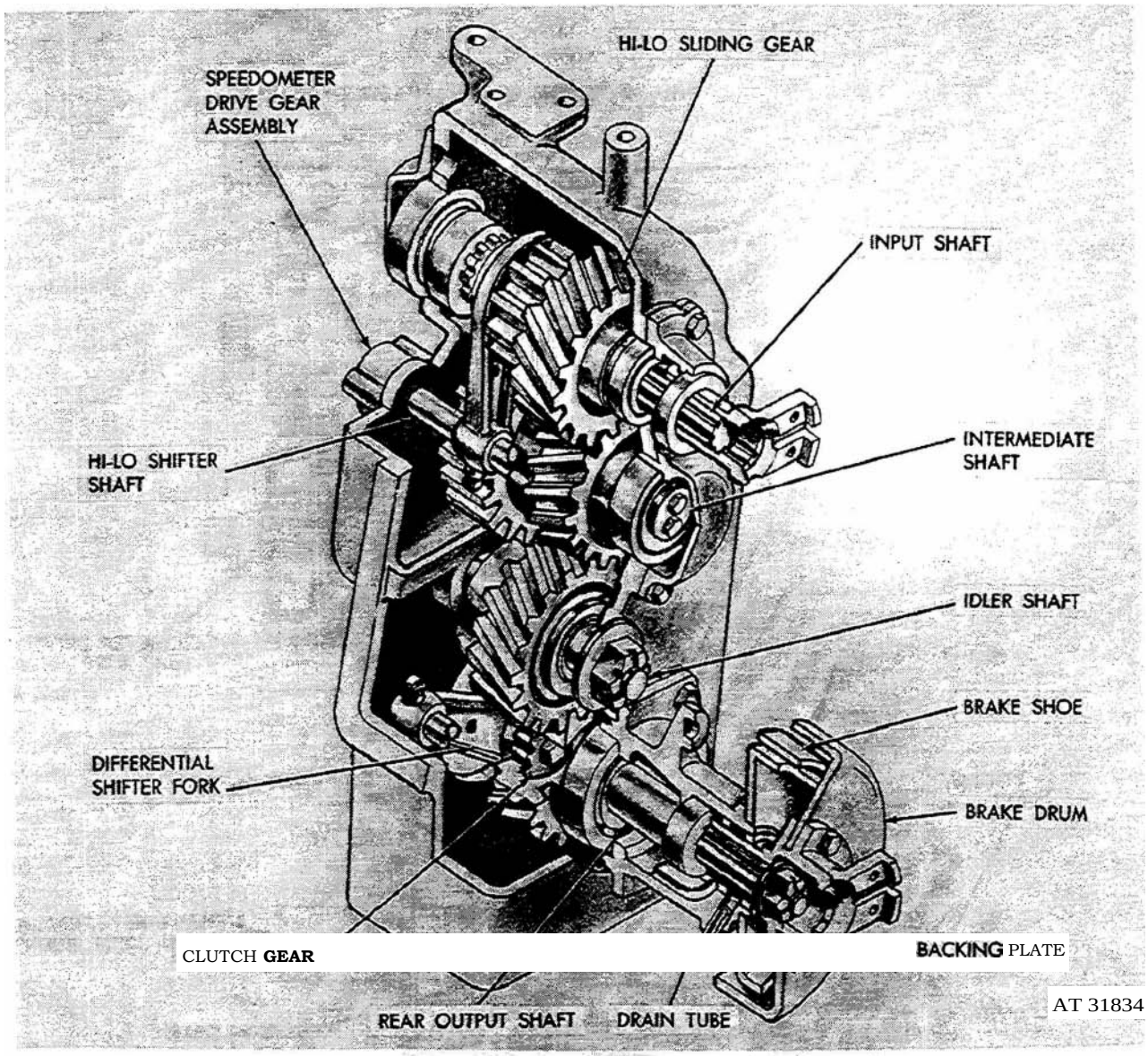


Figure 3-38. Transfer assembly, cross sectional view.

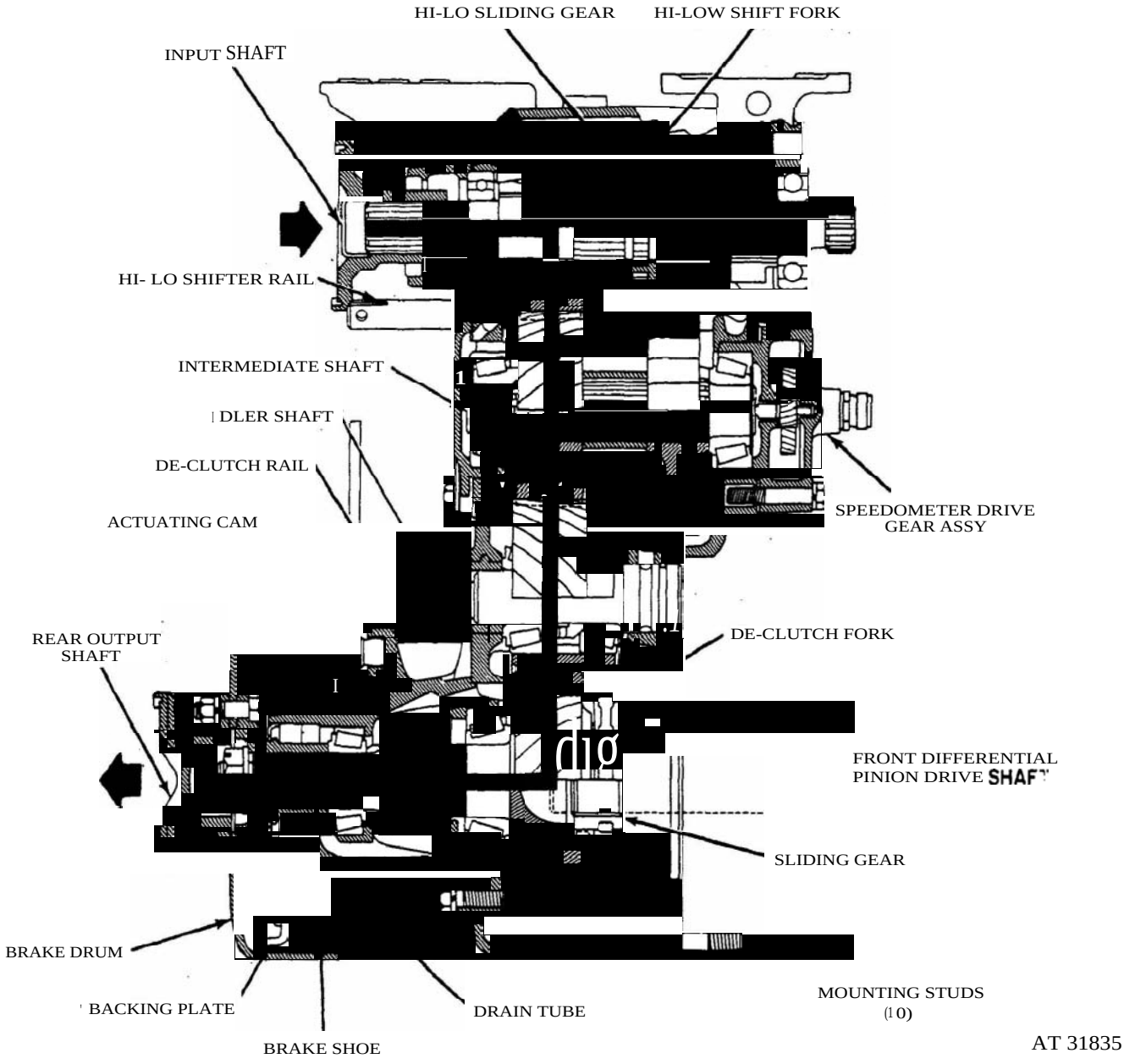


Figure 3-39. High range power flow.

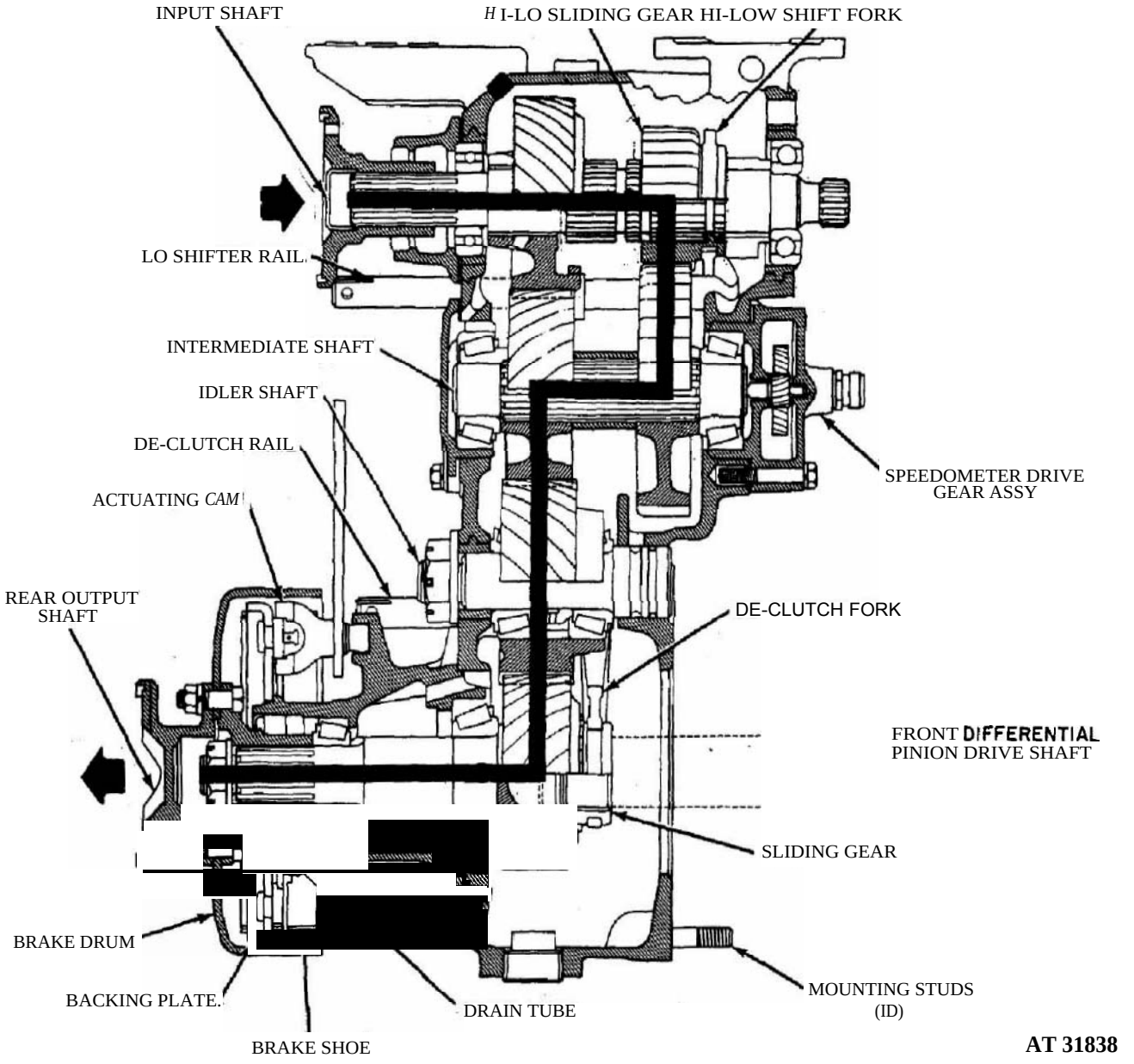


Figure 3-40. Low range power flow.

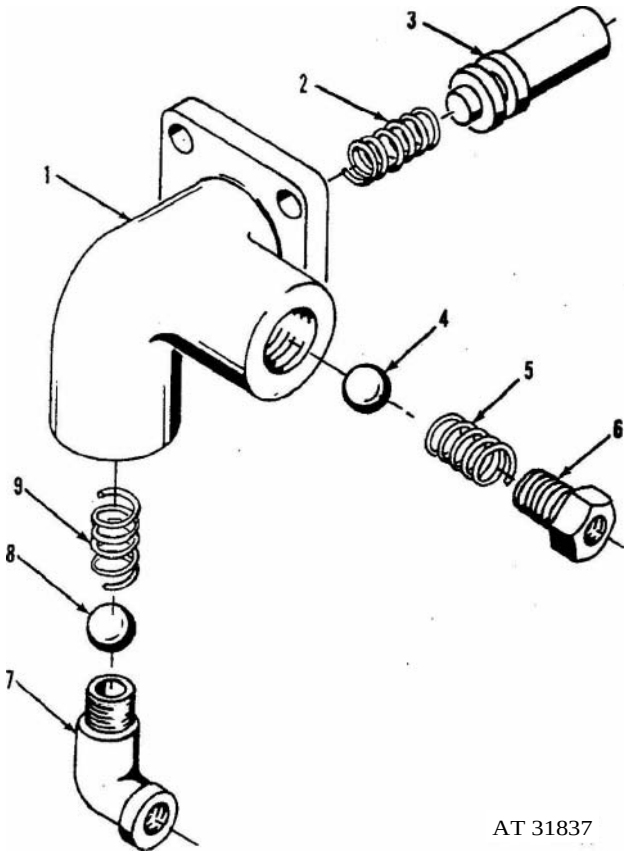
3-38. Transfer Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Remove oil pump and lines (refer to para 2-26a).

(21 Disassemble oil pump by removing plunger (3, fig 341) and spring 2). Unscrew reducer (6) and elbow (7) then remove balls (4 and 8) and springs (5 and 9).



LEGEND to fig 3-41:

1 - Housing
2 - Spring
3 - Plunger
4 - Ball
5 - Spring
6 - Reducer
7 - Elbow
8 - Ball
9 - Spring

Figure 3-41. Oil pump, exploded view.

LEGEND to fig 3-42:

1 - Bolt
2 - Washer
3 - Cover
4 - Gasket
5 - Splash plate
6 - Screw
7 - Spring
8 - Ball
9 - Transfer case
10 - Parking brake assembly
11 - Output yoke
12 - Plug
13 - Ball
14 - Spring
15 - Lock washer
16 - Screw
17 - Washer
18 - Bolt
19 - Screw
20 - Lock washer
21 - *Seal*
22 - Shifter shaft (HI-LO)
23 - Setscrew
24 - Shifter fork (HI-LO)
25 - Gasket
26 - Cover
27 - Setscrew
28 - Shifter fork (differential)
29 - Clutch gear
30 - Seal
31 - Shifter shaft (differential)

(3) Unscrew bolts (1 and 18, fig 3-42) and remove washers (2 and 17) and springs (7 and 14).

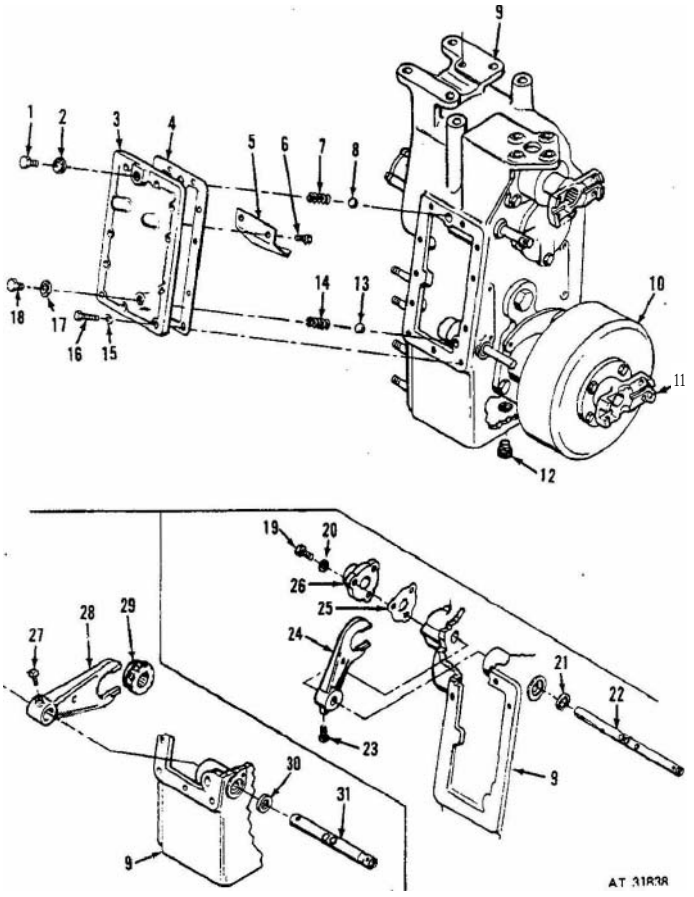


Figure 342. Transfer shifter shafts and related parts, exploded view.

(4) Disconnect cover (3) and gasket (4) from transfer case (9) by removing screw (16) and lock washer (15). Remove balls (8 and 13) from transfer case. Disconnect splash plate (5) from cover by removing screw (6).

(5) Remove parking brake assembly (10) and output yoke (11). (Refer to TM 9-2320-242-20.)

(6) Disconnect cover (26) and gasket (25) by removing screw (19) and lock washer (20). Remove setscrew (23) from HI-LO shifter fork (24) and tap HI-LO shifter shaft (22) from transfer case using a suitable hammer and drift. Remove shifter fork.

(7) Remove clutch gear (29) from differential shifter fork (28) and remove setscrew (27). **Tap** differential shifter shaft (31) from transfer case using a suitable hammer and drift. Remove shifter fork.

(8) Using a suitable puller, remove seals (21 and 30) from transfer case (fig 3-43).

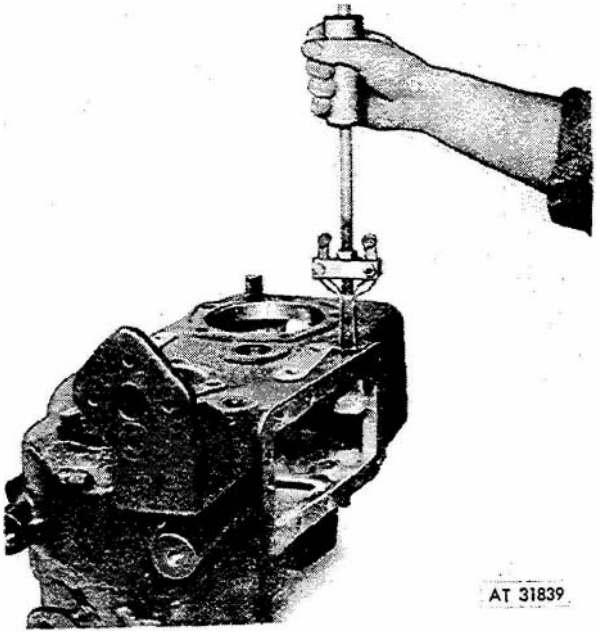
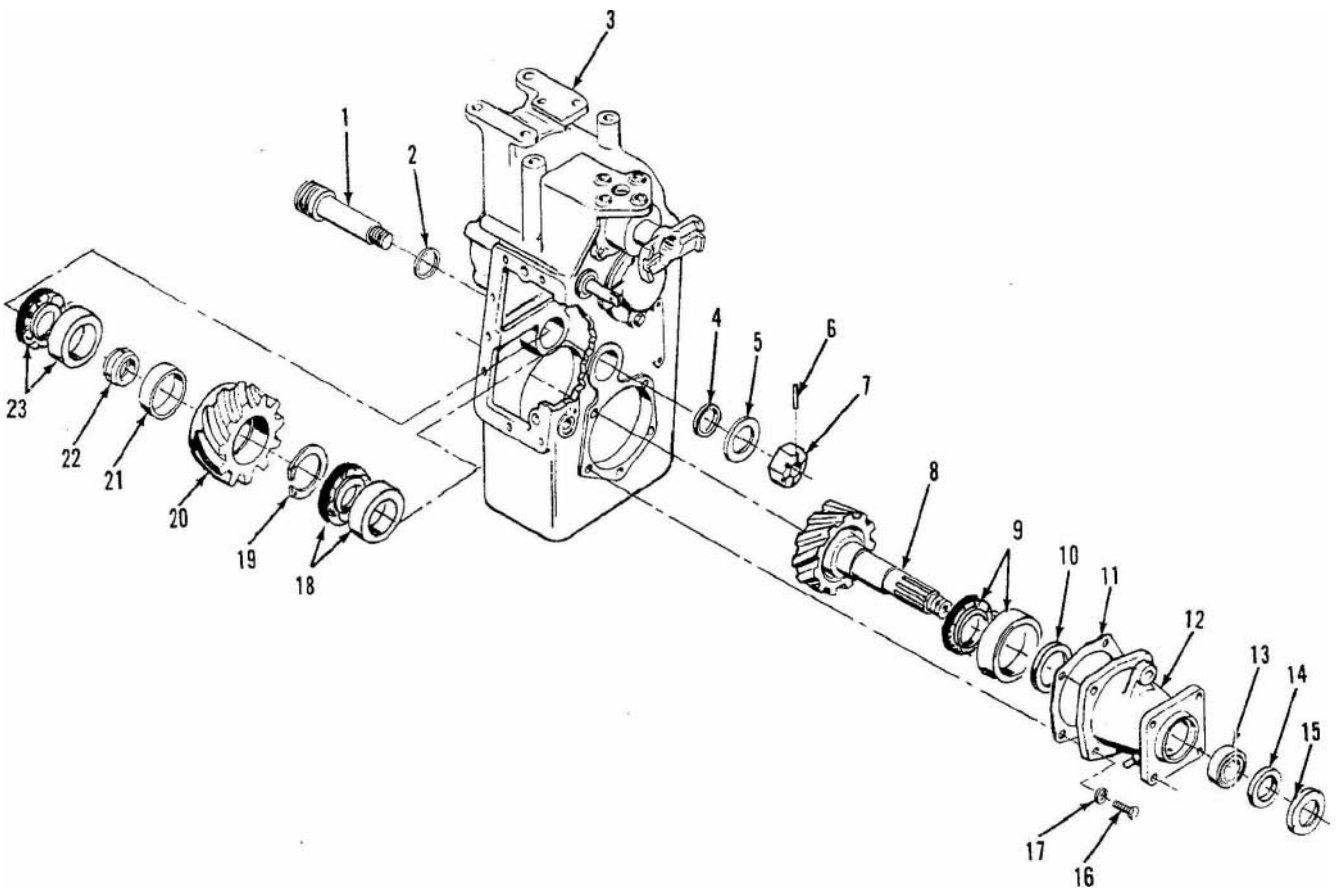


Figure 3-43. Removing shifter shaft seals.

(9) Disconnect nousing (12, fig 3-44) and gasket (11) from transfer case (3) by removing screw (16) and lock washer (17).



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LEGEND to fig 3-44:

1 - Idler shaft
2 - Packing
3 - Transfer case
4 - Packing
S - Washer
6 - Cotter pin
7 - Nut
8 - Output shaft
9 - Bearing
10 - Spacer
11 - Gasket
12 - Housing
13 - Bearing
14 - Seal
15 - Seal
16 - Screw
17 - Lock washer
18 - Bearing
19 - Retaining ring
20 - Idler gear
21 - Spacer
22 - Shim
23 - Bearing

Figure 3-44. *Transfer output shaft assembly, exploded view.*

(10) Press output shaft (8) from housing (12) and remove bearing cup of bearing (9), bearing (13), and seals (14 and 15) from housing.

(11) Remove spacer (10) from output shaft (8) and press bearing (9) from shaft (fig 345).

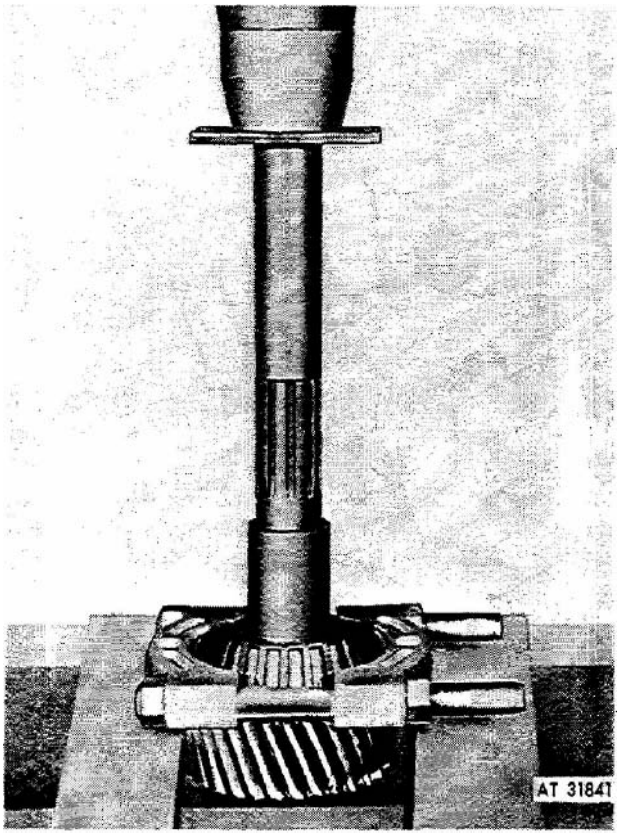


Figure 345. Pressing bearing from transfer output shaft.

(12) Remove cotter yin (6, fig 3-44), nut (7), washer (5), and packing (4) from idler shaft (1). Using a suitable mallet, tap shaft from transfer case and idler gear (20) and bearings (18 and 23).

(13) Remove retaining ring (19), spacer (21), and shim (22). Position a flat plate across bearing cup of bearing (18) and press bearing cup from idler gear (20) (fig 3-46). Turn gear over and press bearing cup of bearing (23, fig 3-44) out of gear in the same manner.

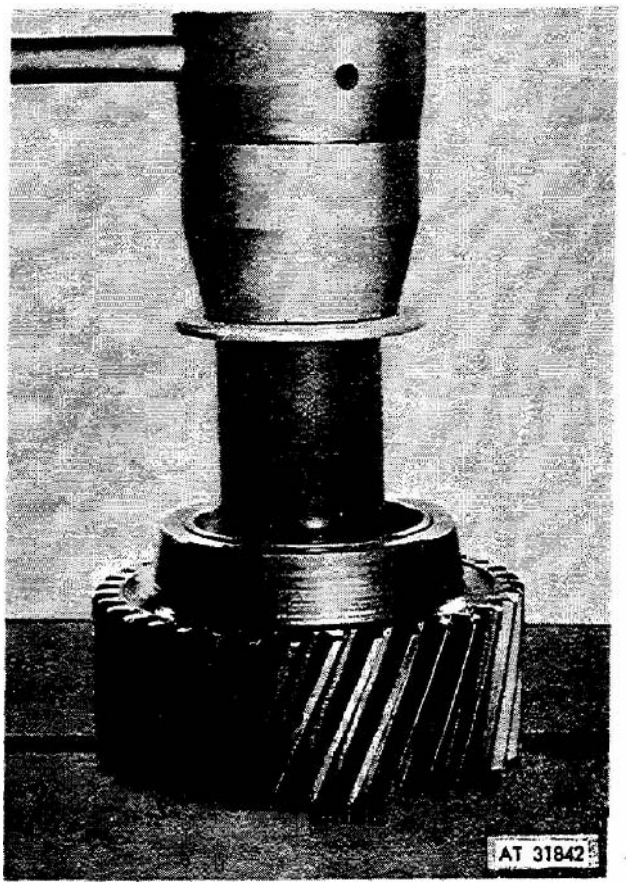


Figure 346. Pressing bearing cup from idler gear.

(14) Disconnect assembled speedometer housing (50, fig 3-47) and shim (49) by removing screws (1, 3, and 56), lock washers (2, 4, and 57), and jack screwing housing from transfer case (42, fig 3-47) as shown in figure 3-48.

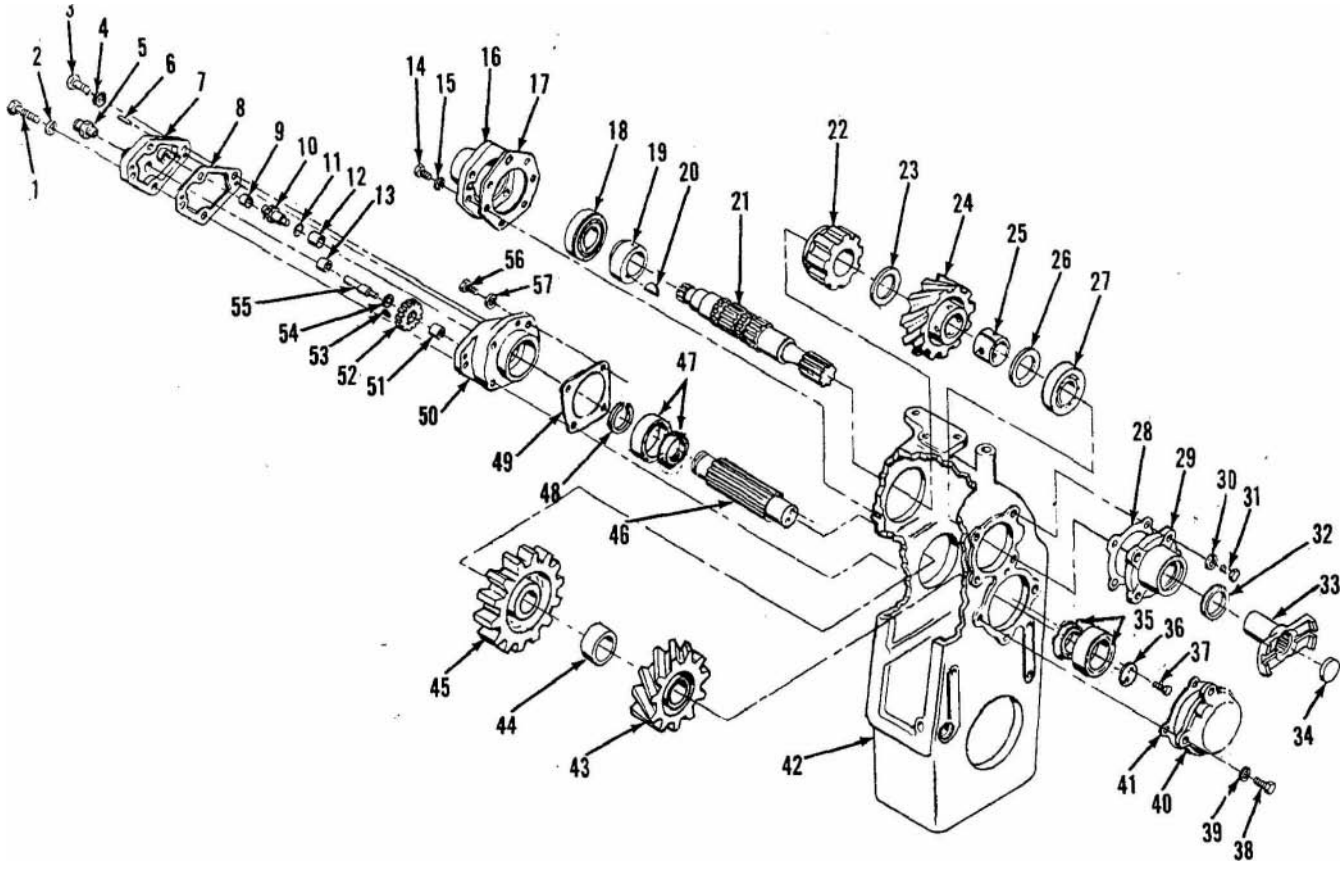


Figure 3-47. **Transfer** ***input and intermediate shafts, exploded view.***

LEGEND to fig 3-47:

1 - Screw
2 - Lock washer
3 - Screw
4 - Lock washer
5 - Cover fitting
6 - Alignment pin
7 - Speedometer gear cover
8 - Gasket
9 - Bushing
10 - Drive gear
11 - Washer
12 - Bushing
13 - Bushing
14 - Screw
15 - Lock washer
16 - Input cover
17 - Gasket
18 - Bearing
19 - Oil pump cam
20 - Woodruff key
21 - Input shaft
22 - Low speed gear
23 - Washer
24 - Input gear
25 - Bushing
26 - Washer
27 - Bearing
28 - Shim
29 - Retainer
30 - Lock washer
31 - Screw
32 - Seal
33 - Input yoke
24 - Yoke cover
35 - Bearing
36 - Retainer
37 - Screw
38 - Screw
39 - Lock washer
40 - Cover
41 - Shim
42 - Transfer case
43 - High speed gear
44 - Spacer
45 - Low speed gear
46 - Intermediate shaft
47 - Bearing
48 - Retaining ring
49 - Shim
50 - Speedometer housing
51 - Bushing
52 - Speedometer gear
53 - Key
54 - Washer
55 - Speedometer gear shaft
56 - Screw
57 - Lock washer

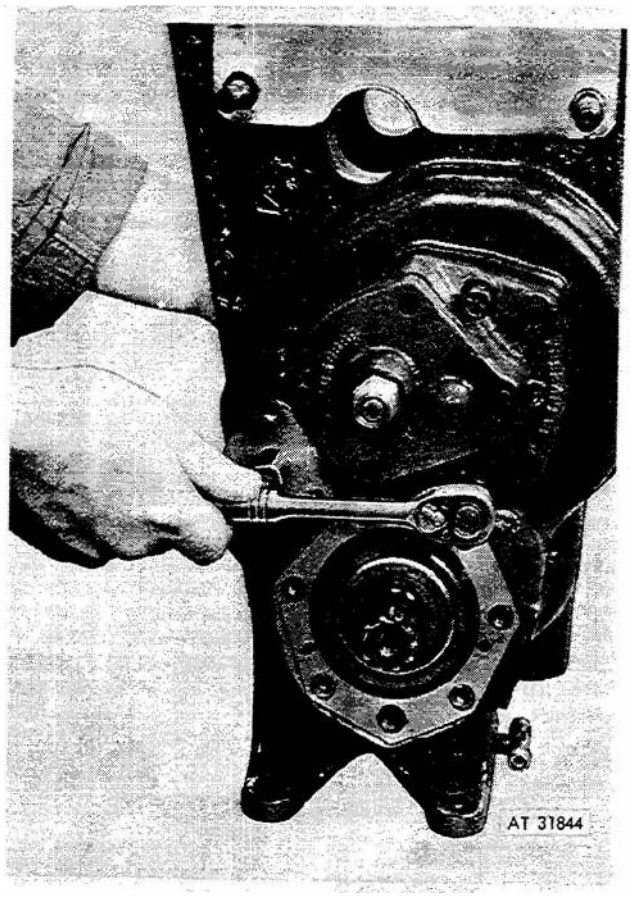


Figure 3-48. Jack screwing speedometer housing from transfer case.

(15) Separate speedometer gear cover (7, fig 3-47) and gasket (8) from speedometer housing (50) and remove cover fitting (5). Press bushing (13 from cover (fig 3-49).

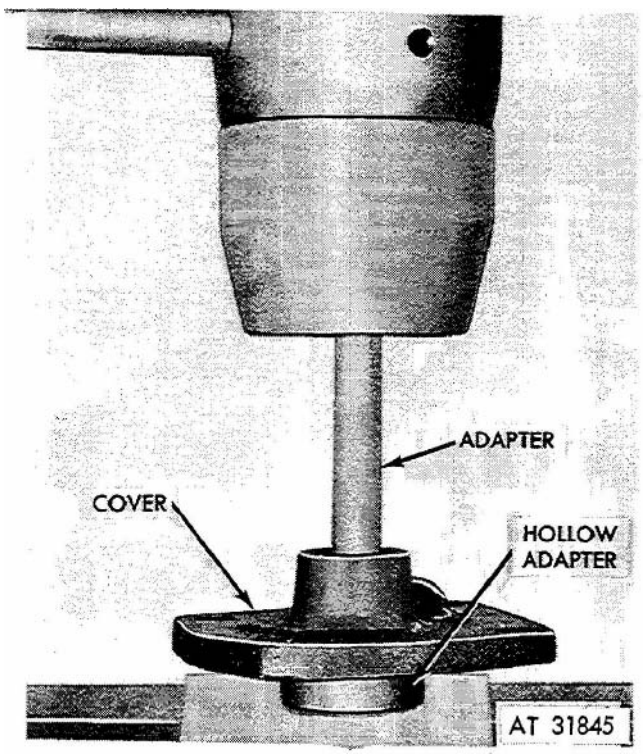


Figure 3-49. Pressing bushing from speedometer cover.

(16) Remove drive gear (10, fig 3-47), washer (11), and assembled speedometer gear shaft (55) from speedometer housing (50). Press bushing (12) from speedometer housing (fig 3-50).

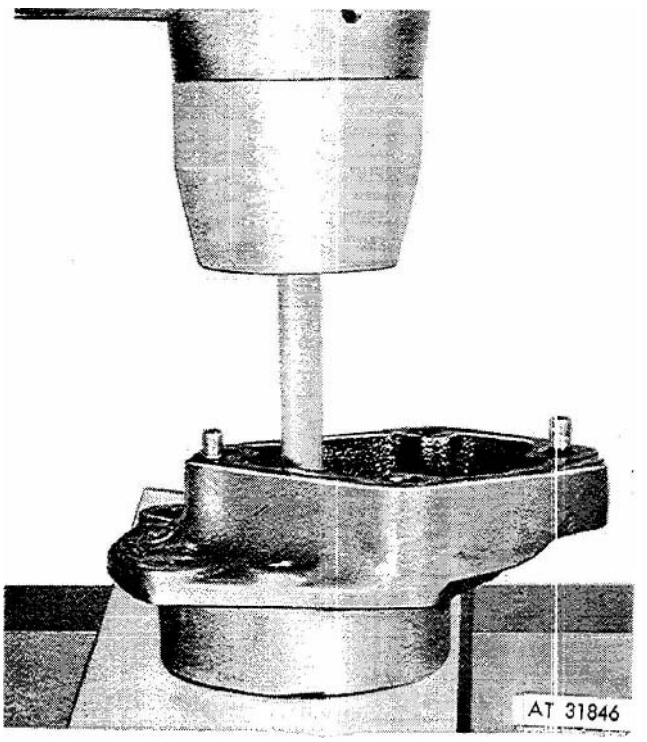


Figure 3-50. Pressing bushing from speedometer housing.

(17) Using a suitable puller, remove bearing cup of bearing (47, fig 3-47) from speedometer housing (50) as shown in figure 3-51.

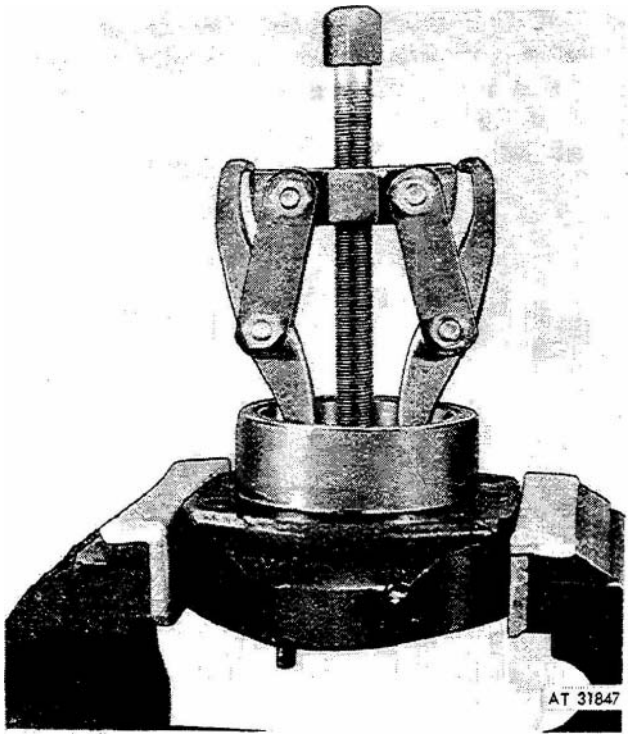


Figure 3-51. Removing bearing cup from speedometer housing.

(18) Disconnect cover (40, fig 3-47) and shim (41) by removing screw (38), lock washer (39), and jack screwing cover from transfer case (fig 3-52).

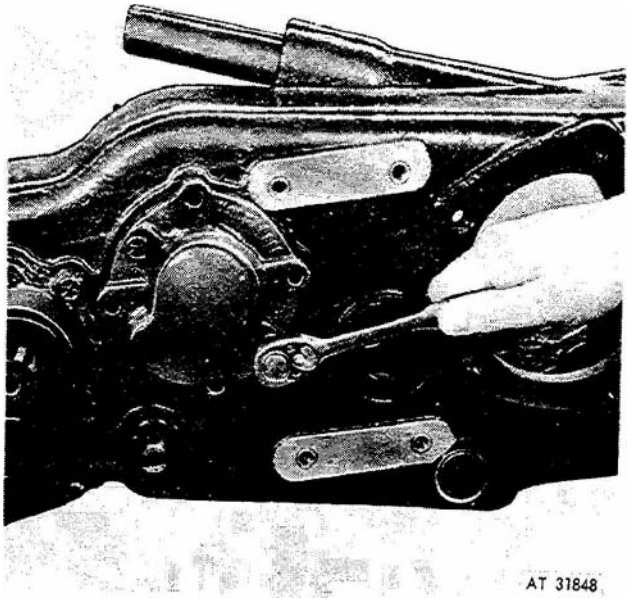


Figure 3-52. Jack screwing cover from transfer case.

(19) Using a suita le puller, remove bearing cup of bearing (35, fig 3-47) from cover (40) as shown in figure 3-53.

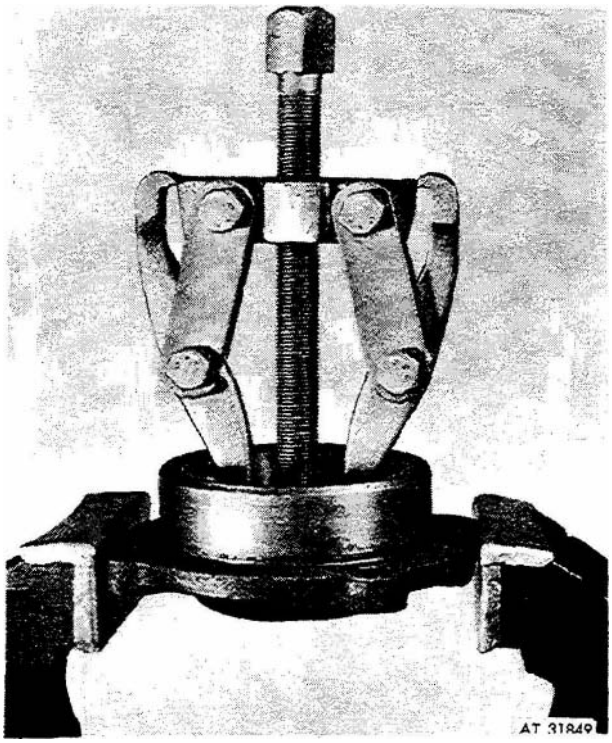


Figure 3-53. Removing bearing cup from cover.

(20) Disconnect retainer (36, fig 3-47) from intermediate shaft (46) by removing screw (37). Remove retaining ring (48) from shaft.

(21) Position transfer case in press and position a suitable hollow adapter, with an opening large enough for bearing (35) to pass through, against high speed gear (43). Press intermediate shaft (46) from transfer case (fig 3-54).

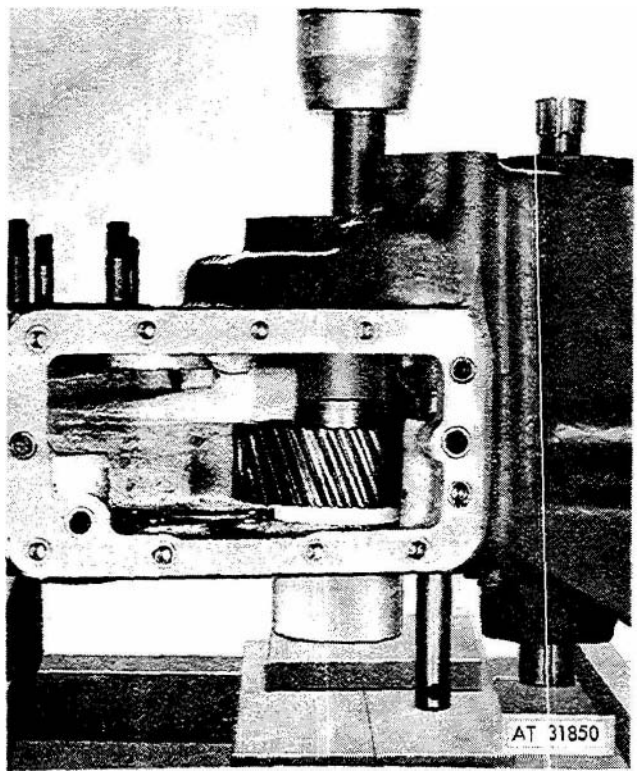


Figure 3-54. Pressing intermediate shaft from transfer case.

(22) Remove high speed and low speed gears (43 and 45, fig 3·47), spacer (44), and bearing (47) from transfer case.

(23) Press bearing (35) from intermediate shaft (46) as shown in figure 3-55.

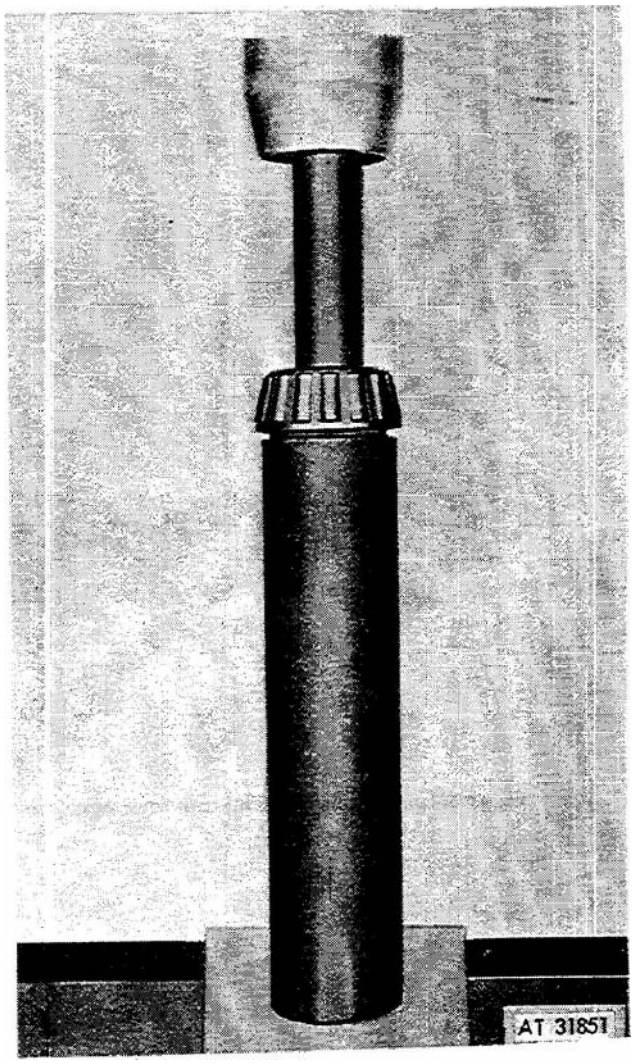


Figure 3-55. Pressing bearing from intermediate shaft.

(24) Remove input yoke (33, fig 3-47). Disconnect retainer (29) and shim (28) by removing screw (31) and lock washer (30). Using a suitable punch and hammer, knock seal (32) from retainer (fig 3-56).

Figure 3-56. Removing input shaft oil seal.

(25) Disconnect input cover (16, fig 3-47) and gasket (17) by removing screw **(14) and lock** washer (15).

(26) Using a suitable puller, remove bearing (18) and oil pump cam (19) from input shaft (21) as shown in figures 3-57 and 3-58. Remove woodruff key (20, fig 3-47).

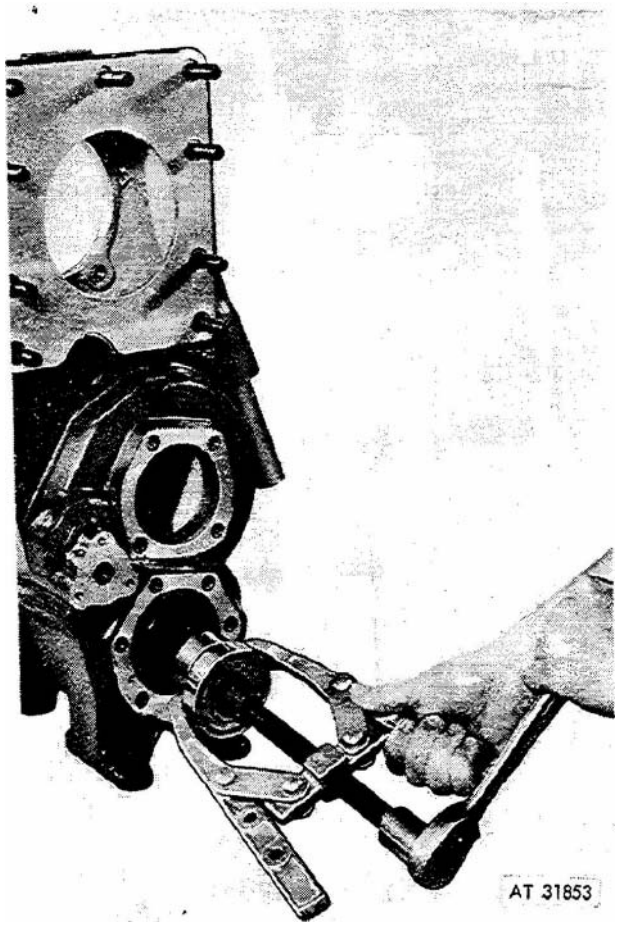
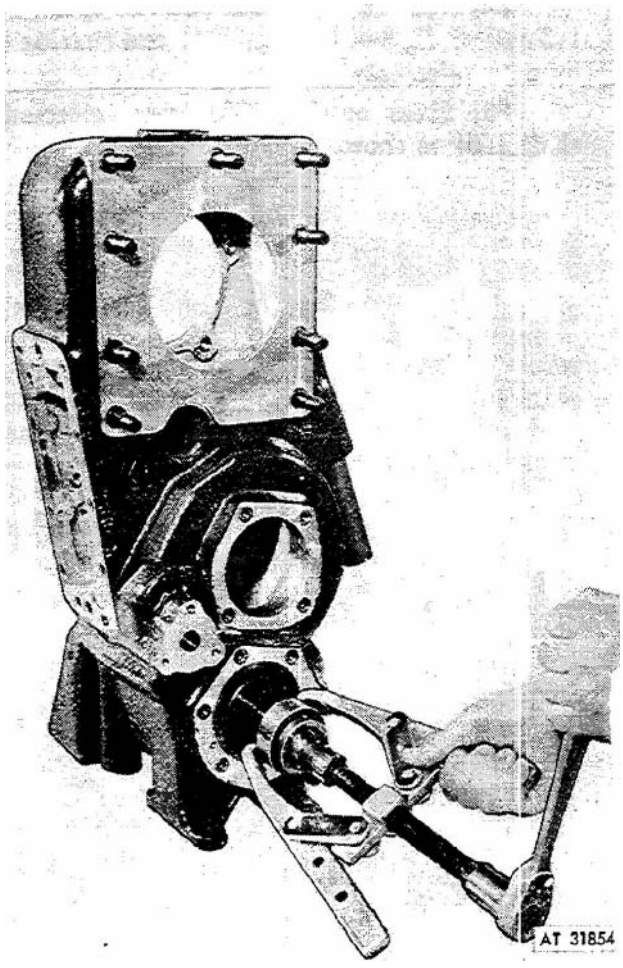


Figure 3-57. Pulling input shaft bearing from input shaft.



igure *3-58. Pulling oil pump cam from input shaft.*

(27) Position transfer case in press and press input shaft (21) from transfer case (fig 3-59).

(28) Remove low speed and input gears (22 and 24, fig 3-47), washers (23 and 26), and bearing (27) from transfer case.

(29) Press bushing (25) from input gear (24, fig 3-60).

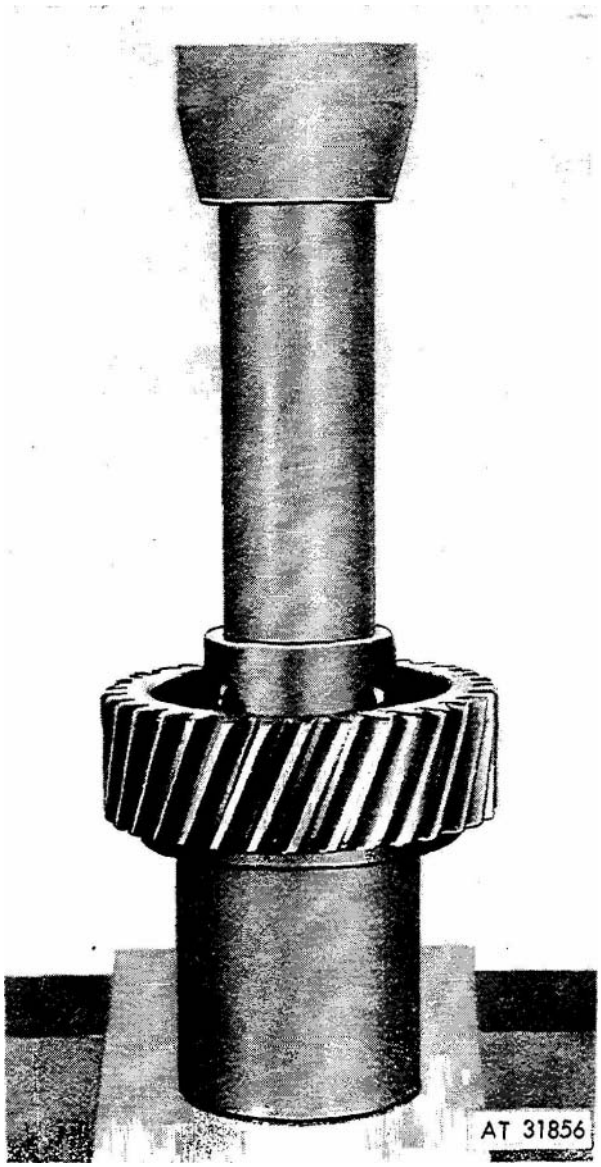


Figure 3-59. Pressing input shaft from transfer case.

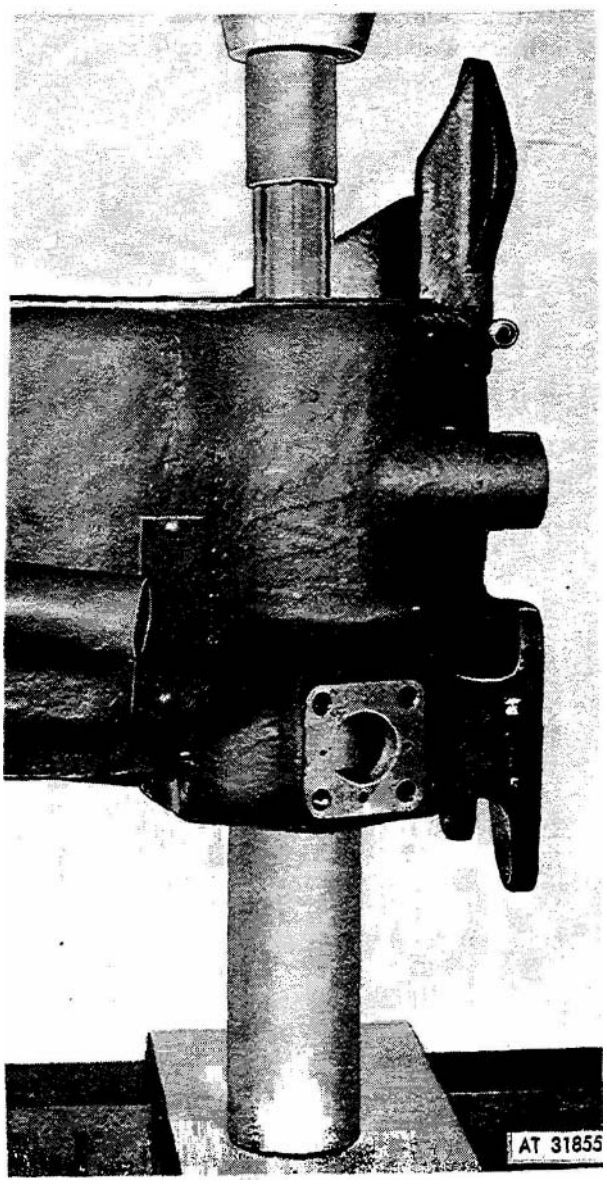


Figure 3-60. Pressing bushing from input gear.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly.

(1) Insert woodruff key (20, fig 3-47) in input shaft (21) and press oil pump cam (19) and bearing (18) on shaft (figs 3-61 and 3-62).

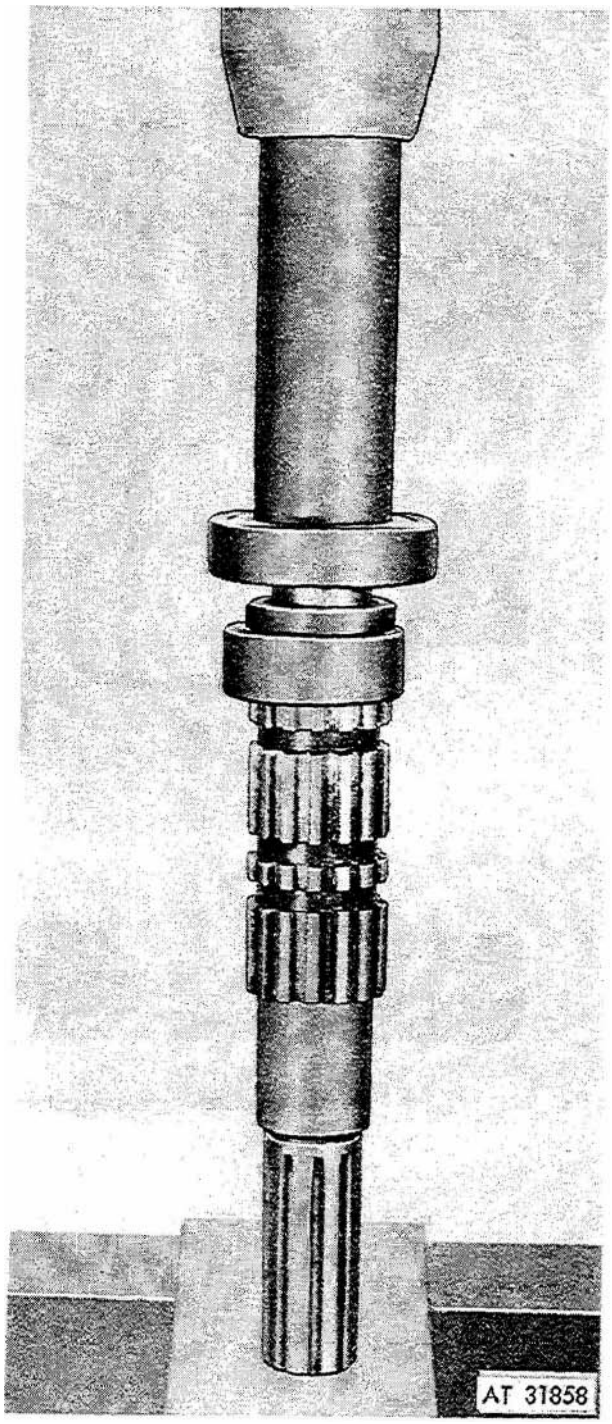


Figure 3-61. Pressing oil pump cam on input shaft.

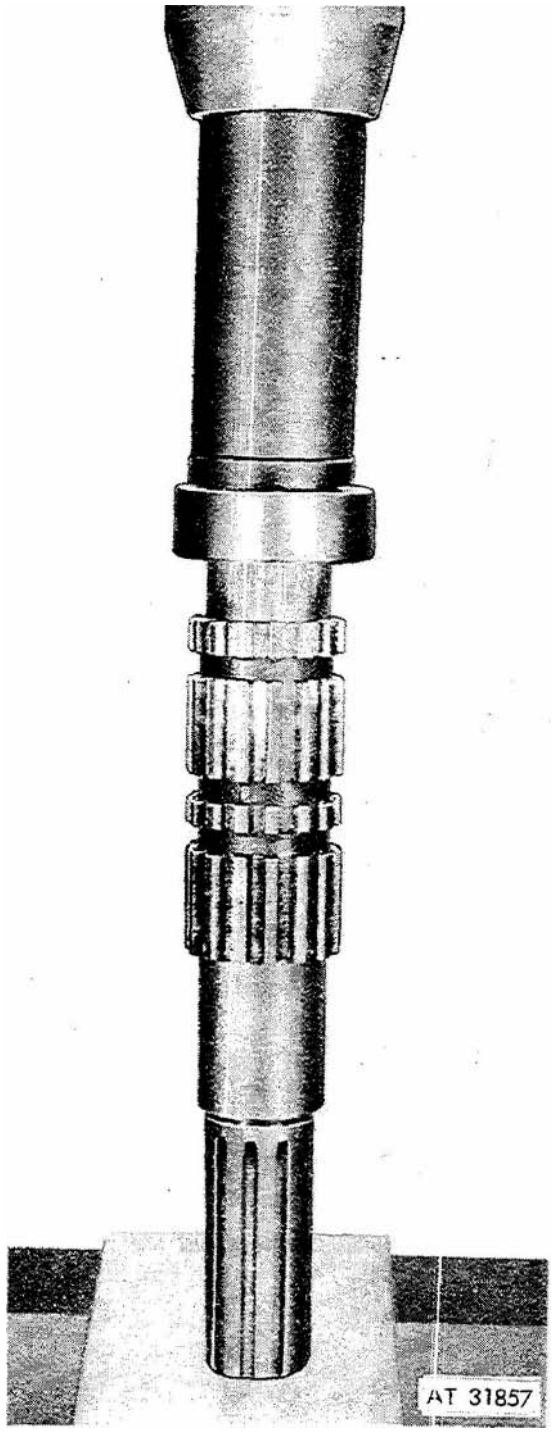


Figure 3-62. Pressing bearing on input shaft.

(2) Align lubrication holes in bushing (25, fig 3-47) with holes in input gear (24) and press bushing into gear (fig 3-63).

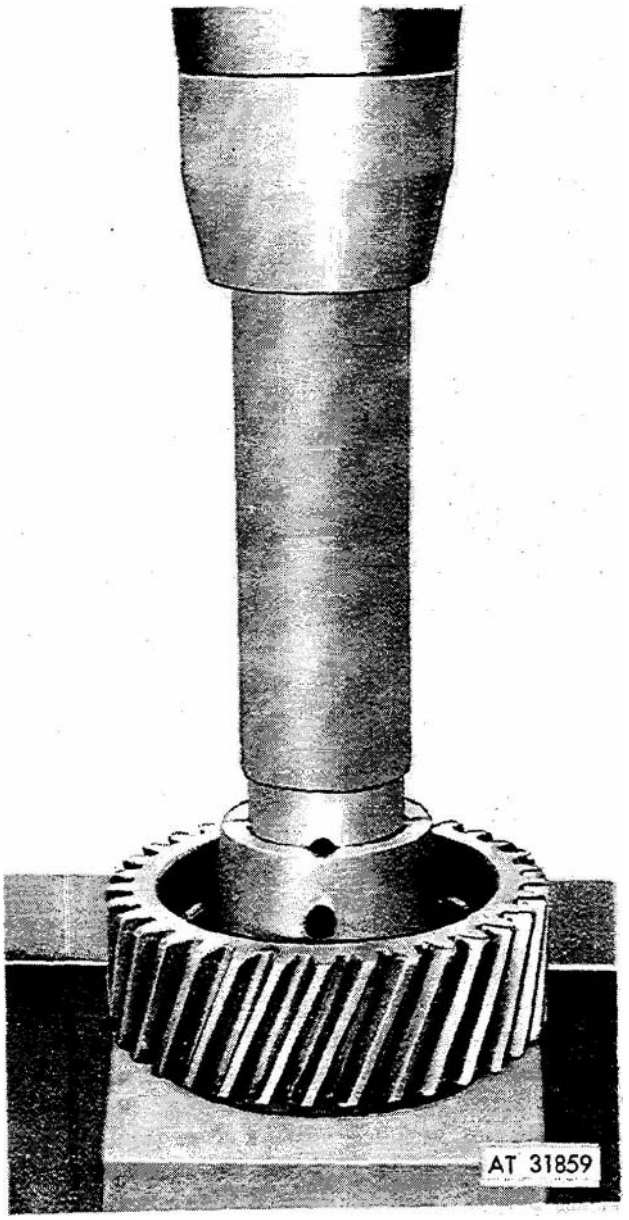


Figure 3-63. Pressing bushing into input gear.

i3) Positon low speed and input gears (22 and 24, fig 3-47) and washers (23 and 26) into transfer case and press input shaft (21) and bearing (27) in place (fig 3-64).

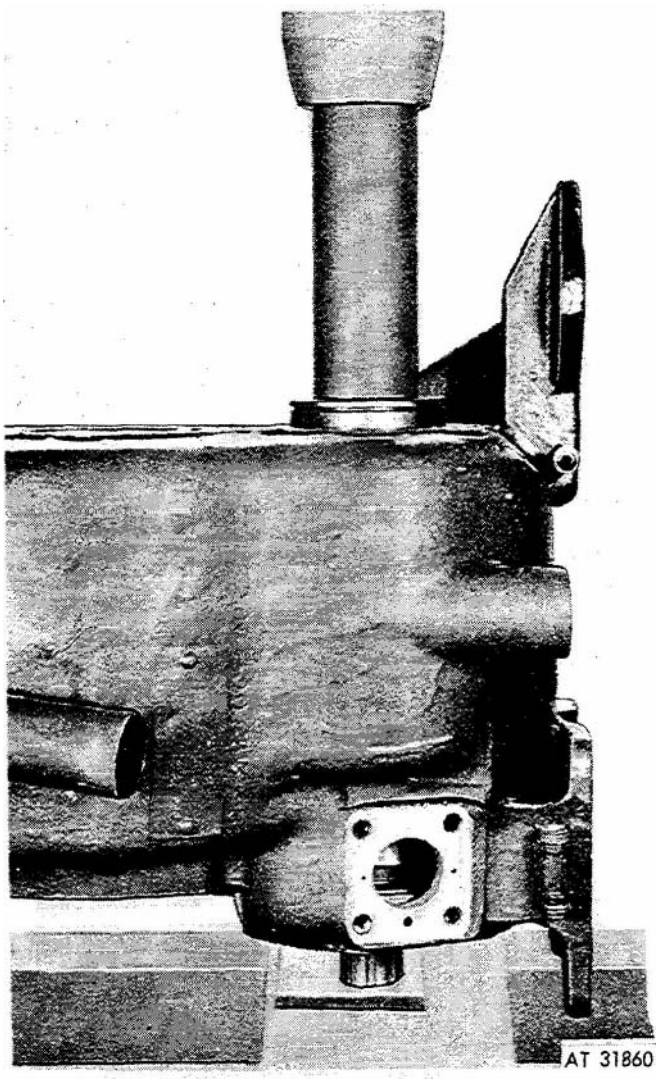


Figure 3-64. Pressing input shaft and bearing in transfer case.

(4) Connect input cover (16, fig 3-47) and gasket (17) and secure with screw (14) and lock washer (15).

(5) Press seal (32) into retainer (29) as shown in figure 3-65.

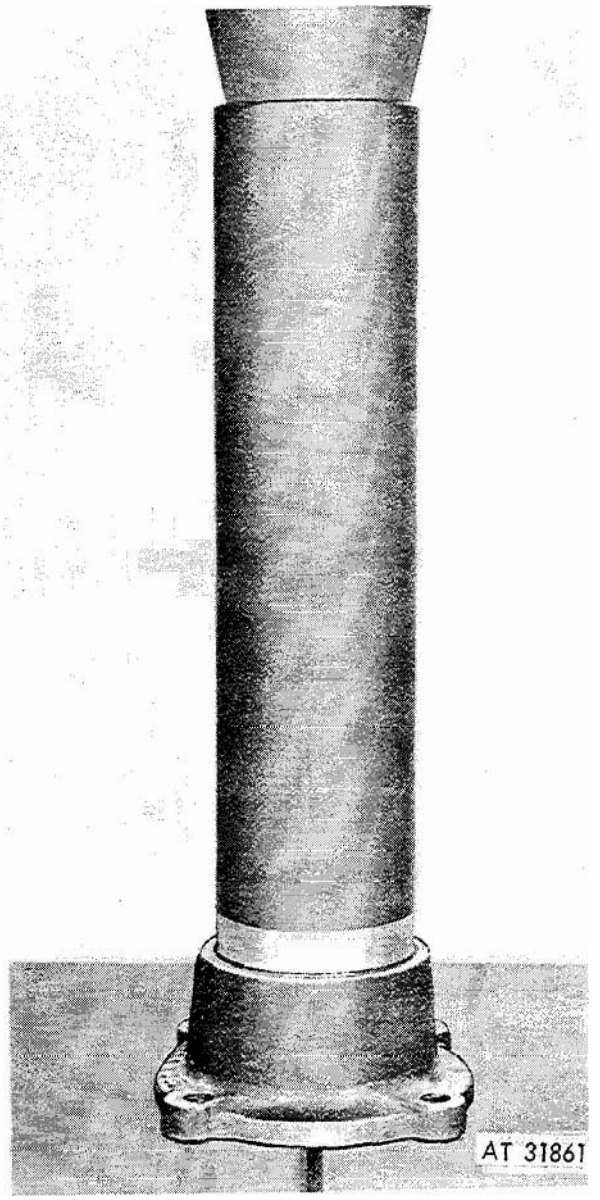


Figure 3-65. Pressing input shaft oil seal into retainer.

(6) Connect shim (28, fig 3-47) and retainer (29) and secure with screw (31) and lock washer (30). Inspect gears for proper installation (fig 3-66).

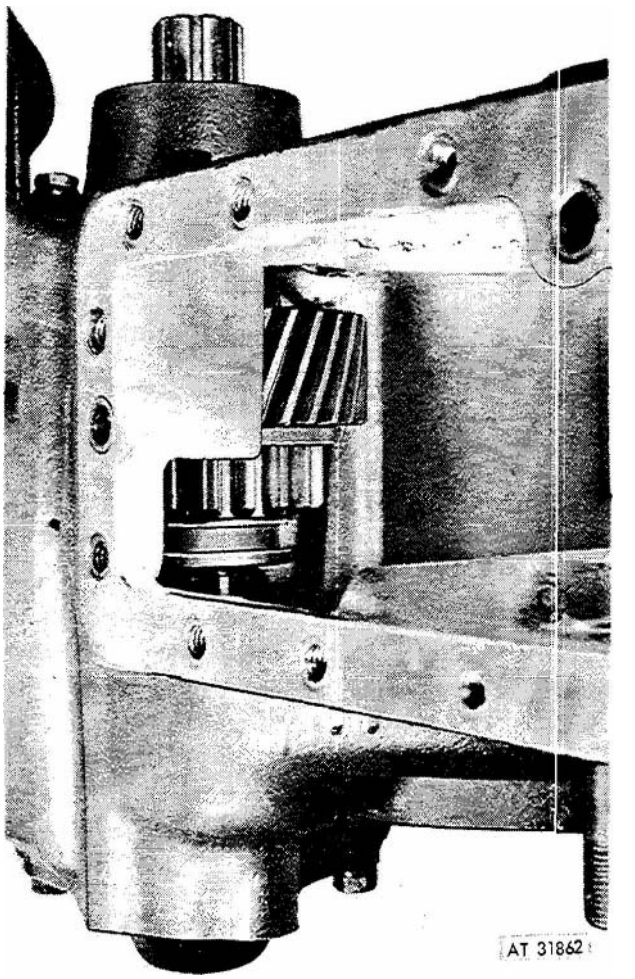


Figure 3-66. Proper installation of input shaft gears.

(7) Attach a dial indicator to transfer case and position tip of indicator to end of input shaft as shown in figure 3-67. Check input shaft end-play. **End-play** shoud be 0.008 - 0.010 of an inch, ii' not adjust end-play by varying the amount of shims (28, fig 3-47).

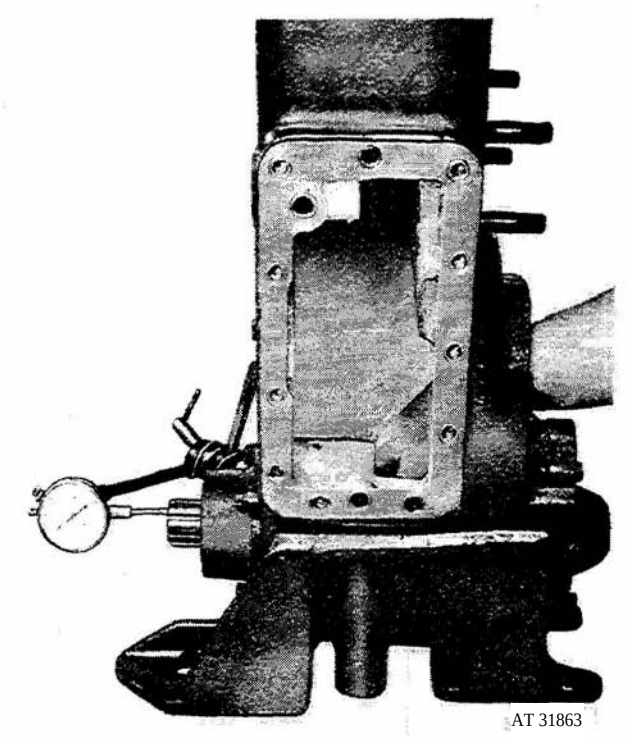


Figure 3-67. Checking input shaft end-play.

(8) Press bearing (35) on intermediate shaft (46) (fig 3-68).

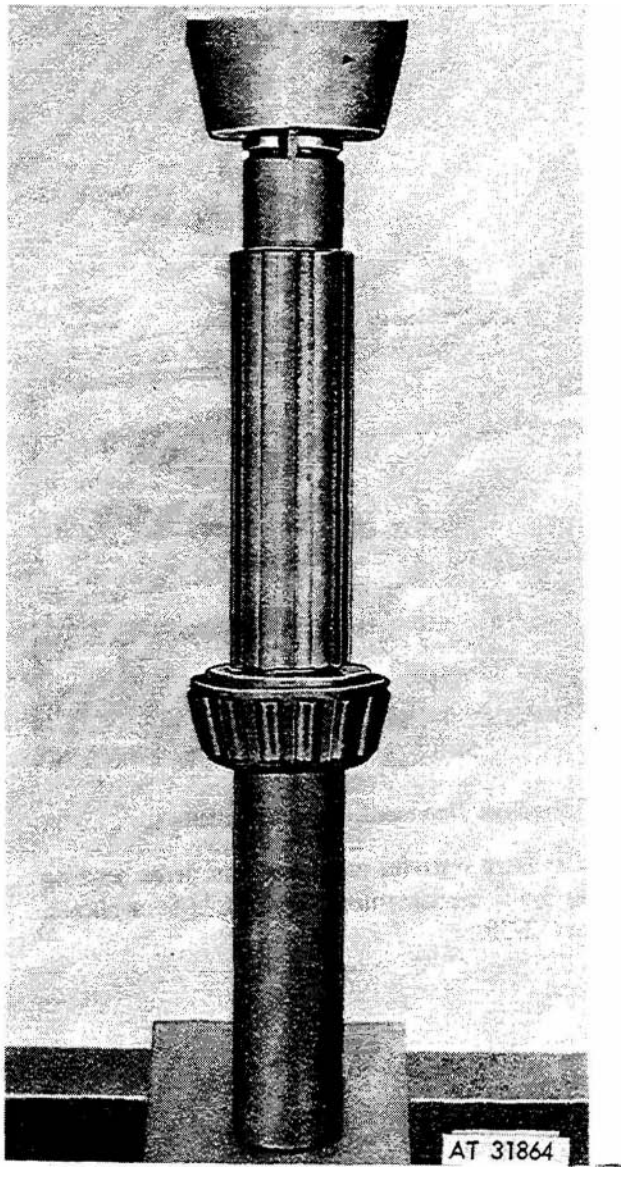


Figure 3-68. Pressing bearing on intermediate shaft.

(9) Position high speed and low speed gears (43 and 45, fig 3-47) and spacer (44) into transfer case and press intermediate shaft (46) in place (fig 3-691.

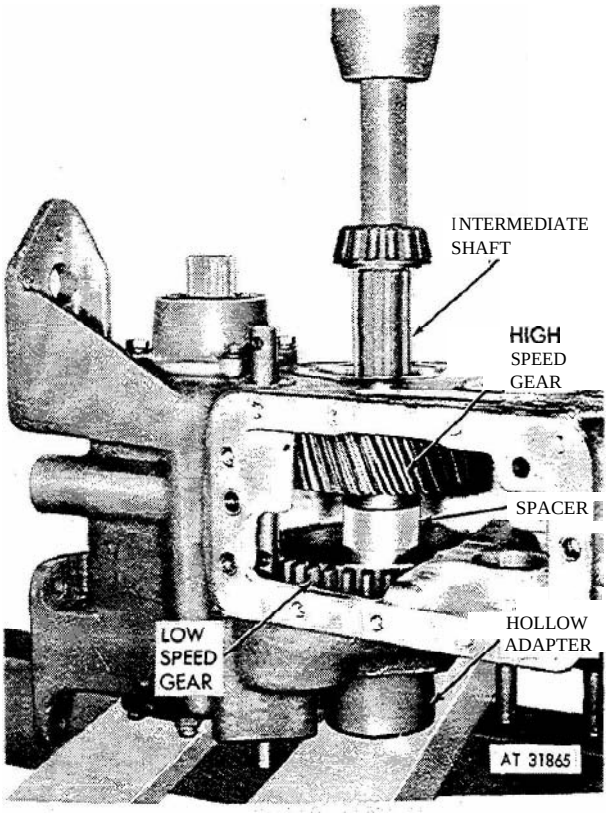


Figure 3-69. Intermediate shaft installation.

(10) Turn transfer case over and press bearing (47, fig 3·47) on intermediate shaft (46) as shown in figure 3-70.

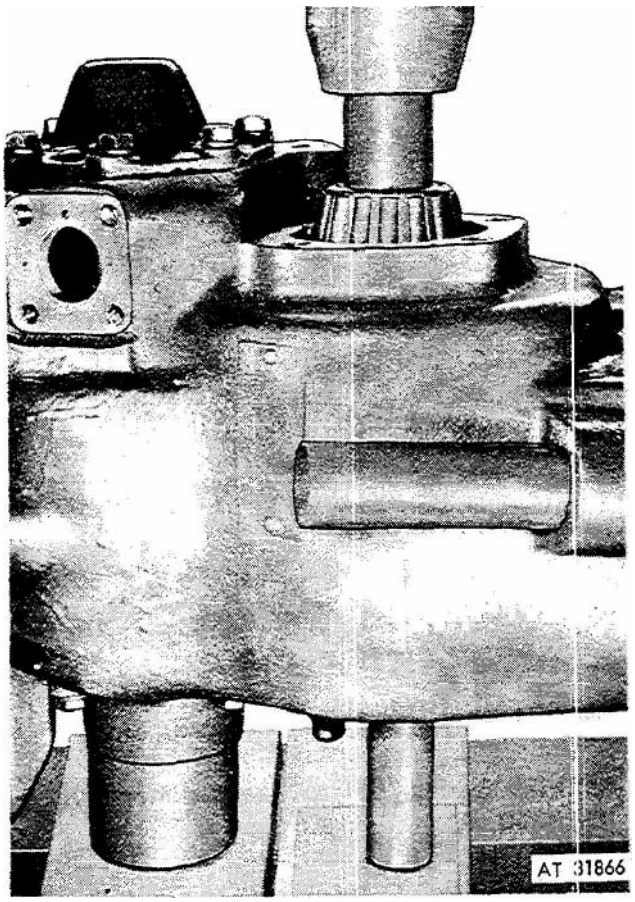


Figure 3-70. Pressing front bearing on intermediate shaft.

(11) Install retaining ring (48, fig 3-47) on intermediate shaft (46). Connect retainer (36) to shaft and secure with screws (37). Tighten screws to proper torque and lockwire (fig 3-71).

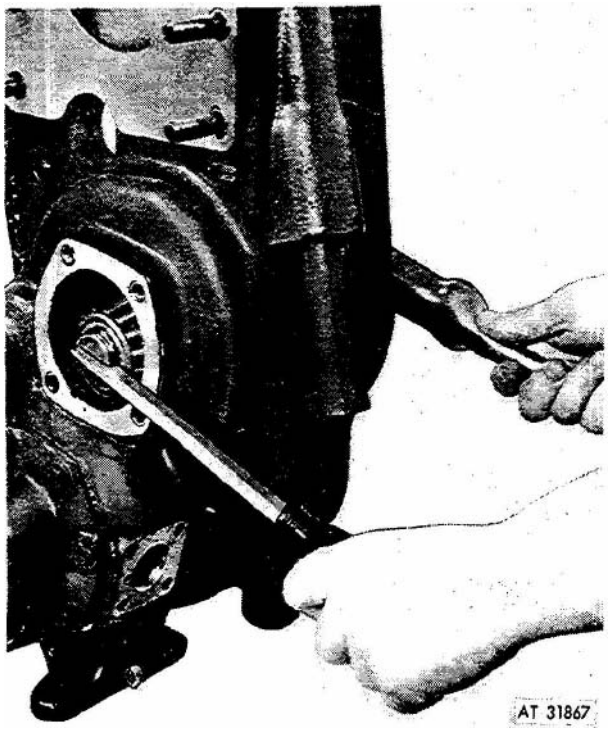


Figure 3-71. Tightening intermediate shaft retainer screws.

(12) Press bearing cup of bearing (47, fig 3-47) and bushing (51) into speedometer housing (50) as shown in figures 3-72 and 3-73.

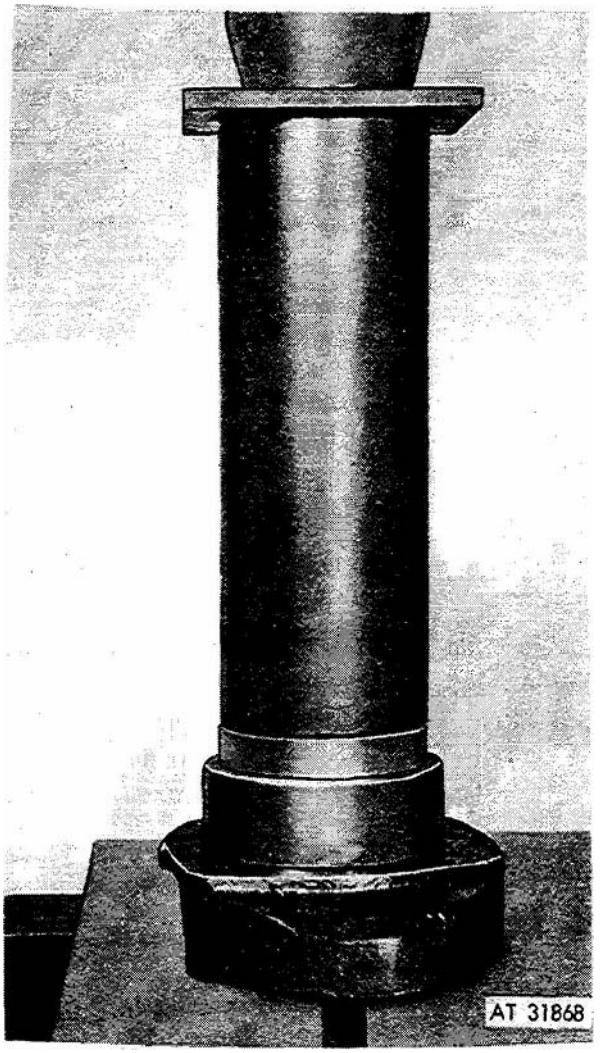


Figure 3-72. Pressing bearing cup into speedometer housing.

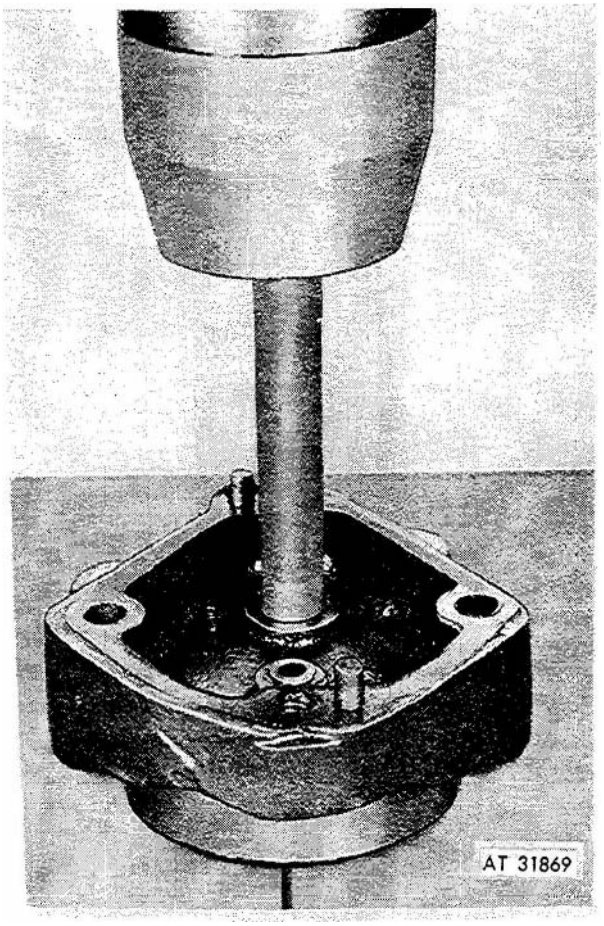


Figure 3-73. ***Pressing bushing into*** **speedometer** ***housing.***

(13) Press bearing cup of bearing (35, fig 3-47) into cover (40) as shown in figure 3-74.

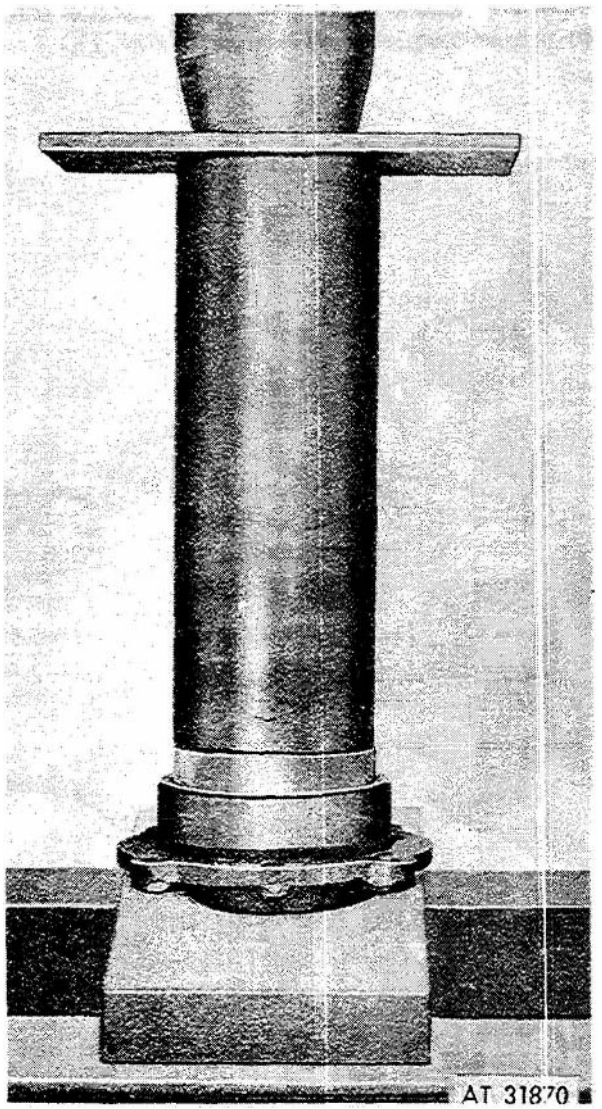


Figure 3-74. Pressing bearing cup into cover.

(14) Connect cover (40, fig 3-47) and shim t4 1) and secure with screw (38) and lock washer (39). Support intermediate shaft and connect shim . (49) and speedometer housing (50). Secure housing with screw (56) and lock washer (57). Tighten screws to 38-42 lbs.-ft. torque.

(15) Connect a dial indicator to transfer case and connect tip of indicator to intermediate shaft (fig 3-75). Check intermediate shaft end-play. End-play should be 0.001 - 0.002 of an inch, if not, adjust end-play by varying the amount of shims (41 and 49, fig 3-47).

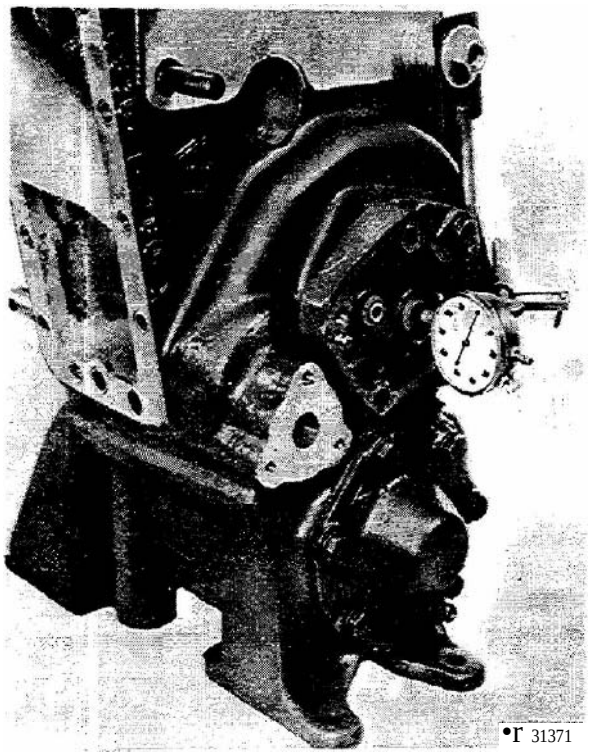


Figure 3-75. Checking intermediate shaft end-play.

(16) Press bushing (13) into speedometer gear cover (7) as shown in figure 3.76.

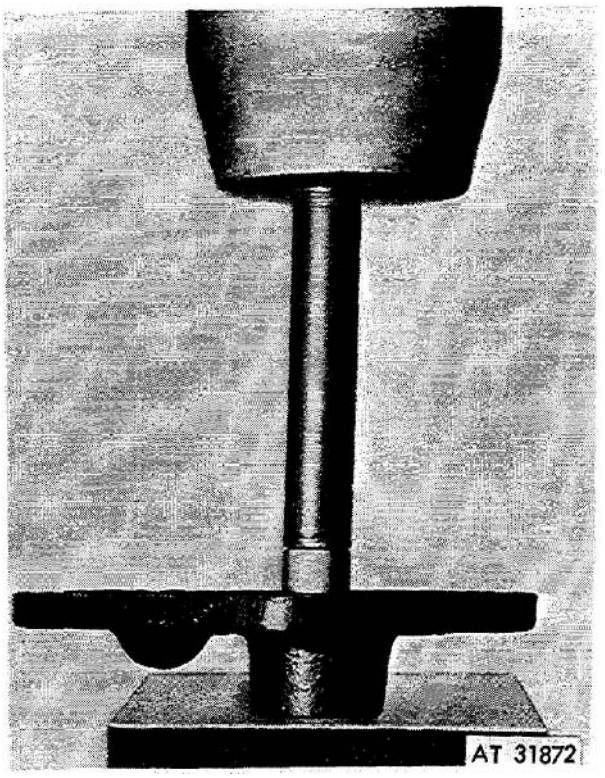


Figure 3-76. Pressing bushing into speedometer gear cover.

(17) Position key (53, fig 3-47) and washer (54) on speedometer gear shaft (55) and press gear on shaft.

(18) Position drive gear (10) and washer (11) in speedometer housing (50). Position assembled speedometer gear shaft (55) in housing (fig 3-77).

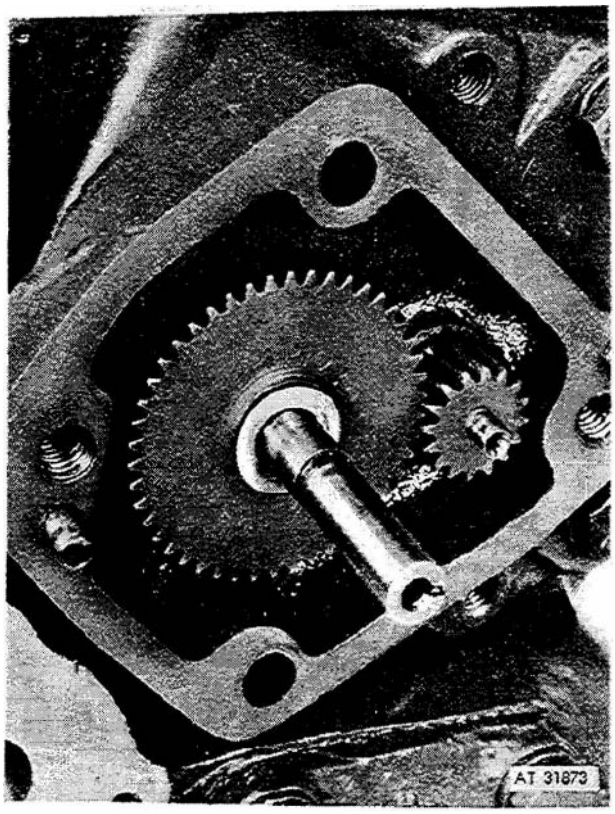


Figure 3-77. Proper installation of speedometer gears.

(19) Position speedometer gear cover (7, fig 3-47) and gasket (8) on speedometer housing (50) and secure with screws (1 and 3) and lock washers (2 and 4). Tighten screws to 38-42 lbs.-ft. torque. Connect cover fitting (5) to cover.

(20) Install retaining ring (19, fig 3-44) in idler gear (20). Press bearing cup of bearing (18) into idler gear (fig 3-78). Turn idler gear over. Insert spacer (21, fig 3-44) and press bearing cup of bearing (23) into idler gear in the same manner as bearing cup of bearing (18).

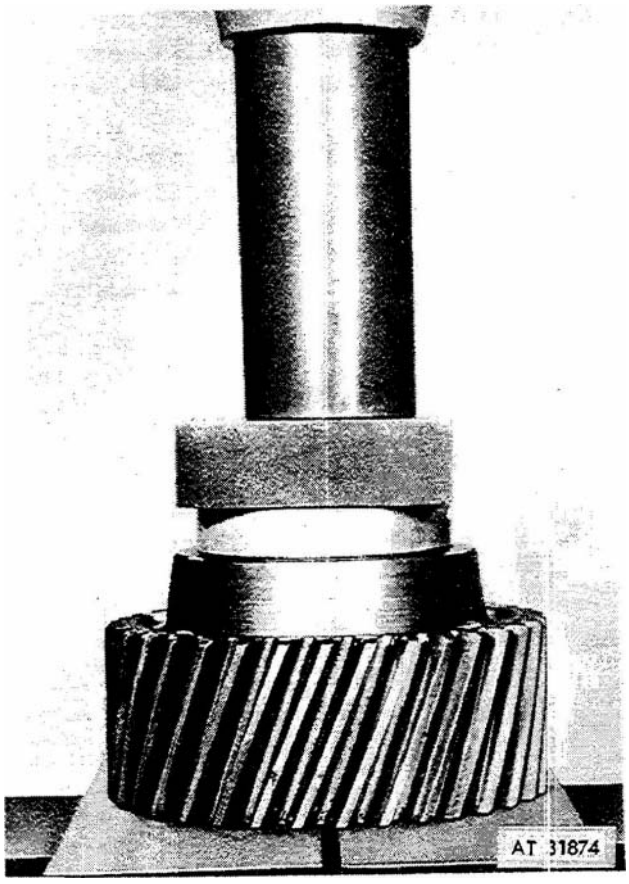


Figure 3-78. Pressing bearing cup into idler gear.

(21) Install bearings (18 and 23) and shim (22) into idler gear (20). Vary the thickness of shim (22) to obtain end-play of 0.004 - 0.006 of an inch. Position assembled idler gear in transfer case (fig 3-79).

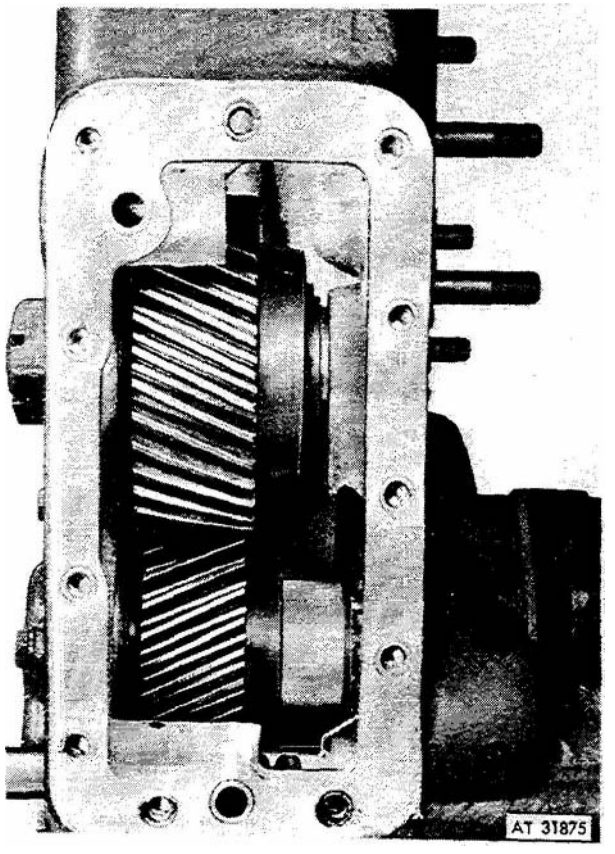


Figure 3-79. Proper installation of idler gear.

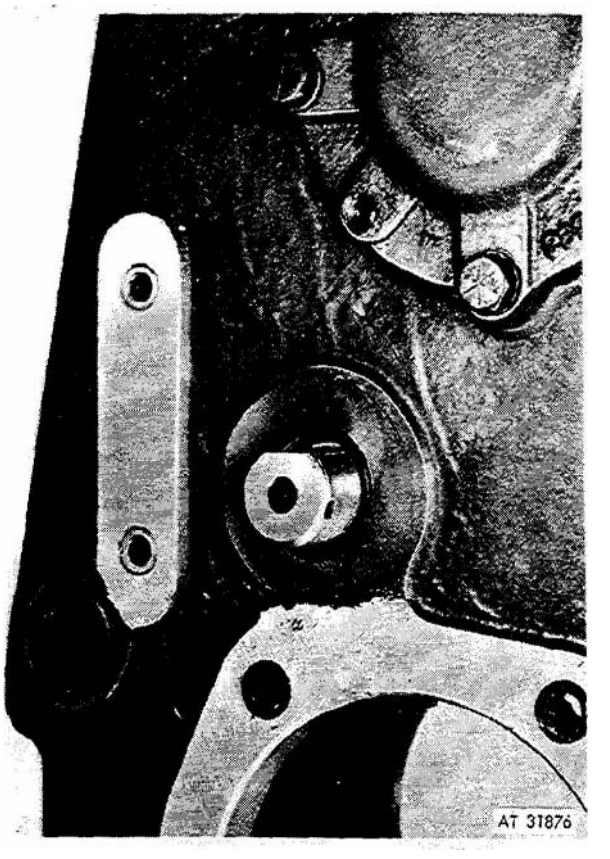


Figure 3-80. Correct installation of idler shaft.

122) Position packing (2, fig 3-44) on idler shaft (1) and install shaft in transfer case through assembled gear with flat on shaft end *in* horizontal position (fig 3-80).

(23) Position packing (4, fig 3-44) around idler shaft (1) and secure shaft with washer (5) and nut (7). Tighten nut to 350 - 400 lbs.-ft. torque, aligning cotter pin hole. Install cotter pin (6).

(24) Press bearing (9) on output shaft (8) as shown in figure 3-81.

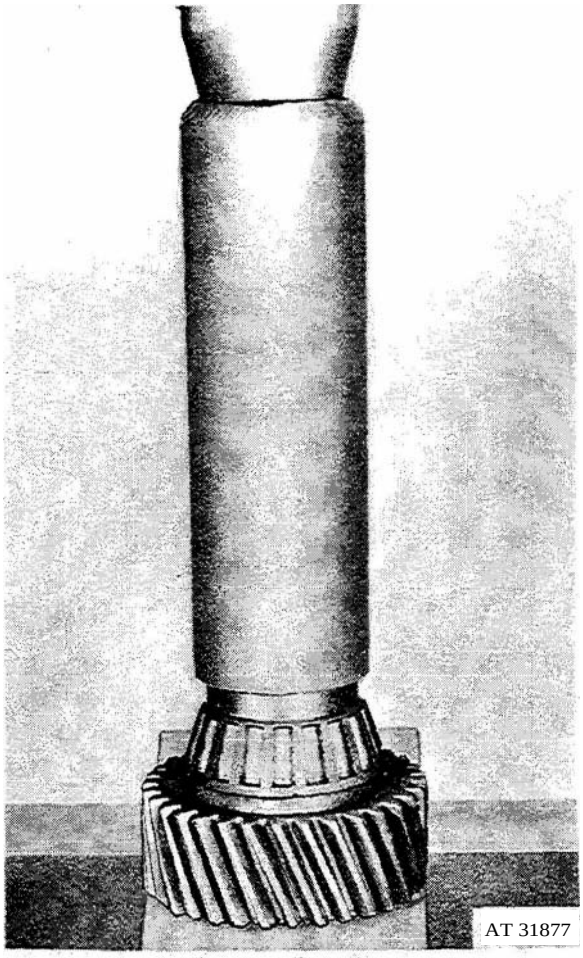


Figure 3-81. Pressing bearing on output shaft.

(25) Press bearing cup of bearing (9, fig 3-44), bearing (13), and seals (14 and 15) into housing (12).

(26) Position spacer (10) on output shaft (8) and press output shaft into housing (12). Check output shaft end-play. End-play should be 0.001 - 0.002 of an inch, if not vary the thickness of spacer (10) to obtain proper end-play.

(27) Secure assembled housing (12) and gasket (11) to transfer case and secure with screw (16) and lock washer (17).

(28) Refer to TM 9-2320-242-20 and install parking brake assembly (10, fig 3-42) and output yoke (11).

(29) Using a suitable hammer and adapter, install seals (21 and 30) in transfer case (fig 3-82).

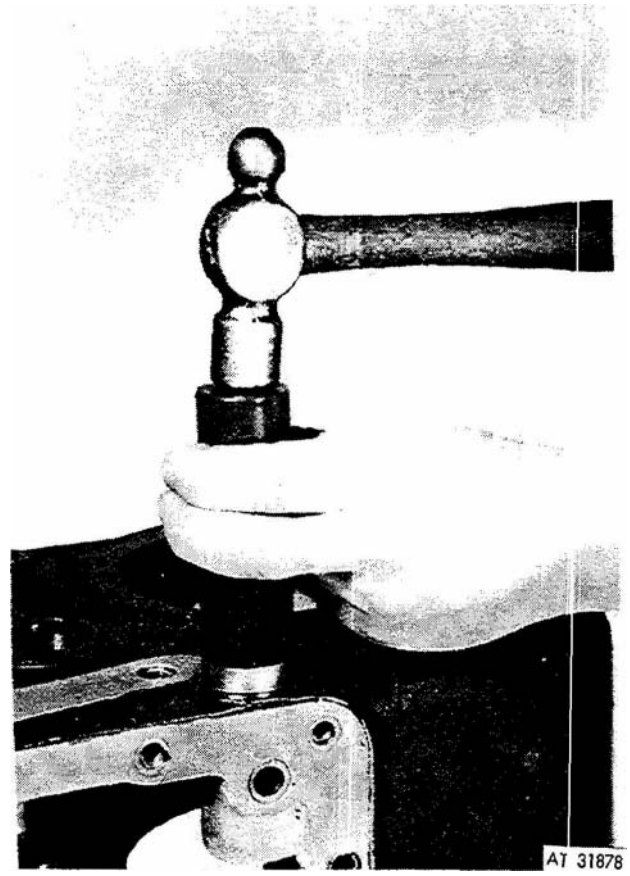


Figure 3-82. Installing shifter shaft seals.

(30) Install HI-LO and differential shifter forks (24 and 28, fig 3-42) into transfer case and install HI-LO and differnetial shifter shafts (22 and 31) into transfer case through shifter forks (fig 3-83).

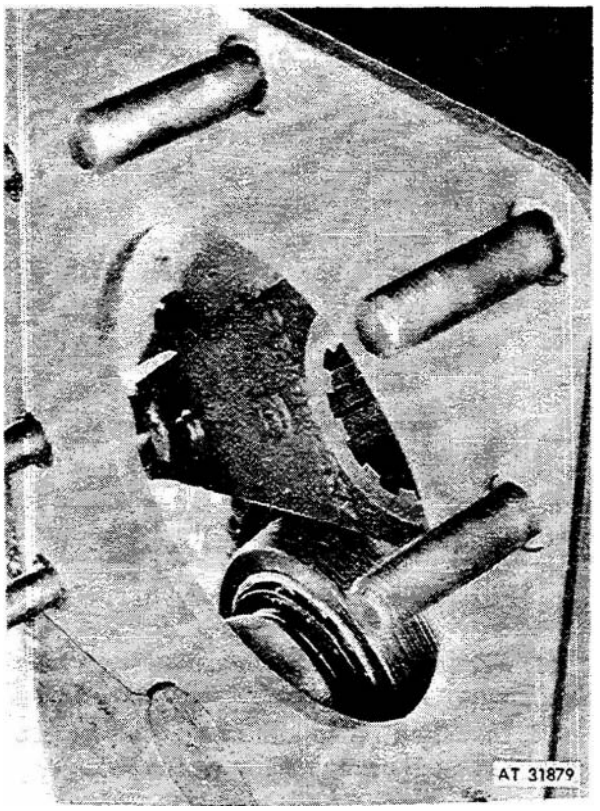


Figure 3-83. Proper position of differential shifter fork.

(31) Secure HI-LO and differential shifter forks (24 and 28, fig 3-42) to HI-LO and differential shifter shafts (22 and 31) and secure with setscrews (23 and 27). Lockwire setscrews.

(32) Connect gasket (25) and cover (26) to transfer case (9) and secure with screw (19) and lock washer (20).

(33) Connect splash plate (5) to cover (3) and secure with screw (6). Lockwire screws.

134) Connect cover (3) and gasket (4) to transfer case (9) and secure with screw (16) and lock washer (15).

(35) Insert balls (8 and 13) and springs (7 and 14) through cover (3) into transfer **case** (9) and secure with bolts (1 and 18) and washers (2 and 17).

(36) Position clutch gear (29) on differential shifter fork (28) *as* shown in figure 3-84.

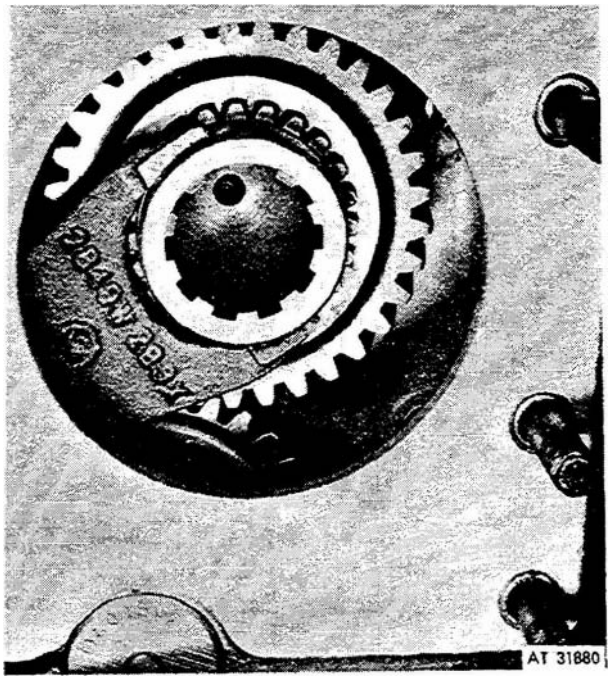


Figure 3-84. Proper installation of clutch gear.

(37) Assemble oil pump by inserting ball (4, fig 3-41) and spring (5) in housing (1) and secure with reducer (6).

(38) Insert spring (9) and ball (8) in housing (1) and secure with elbow (7). Install spring (2) in housing and insert plunger with step toward: housing (fig 3-85).

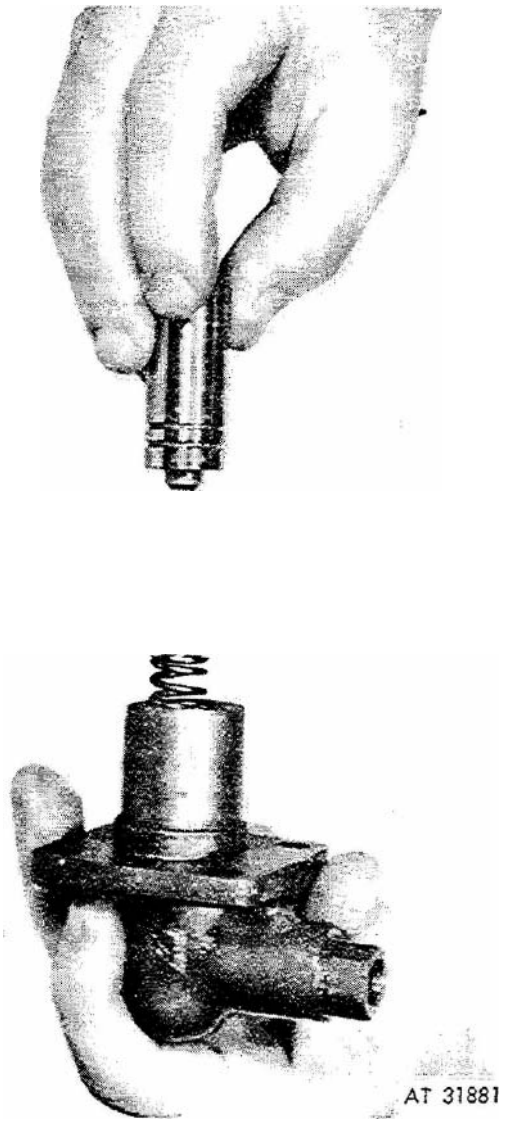


Figure 3-85. Proper oil pump plunger installation.

(39) Install drain plug (12, fig 3-42) and fill transfer case with proper lubricant. (Refer to LO 9-2320-242-12.)

(40) Connect oil pump suction line (fig 3-86) from base of transfer case to oil pump.

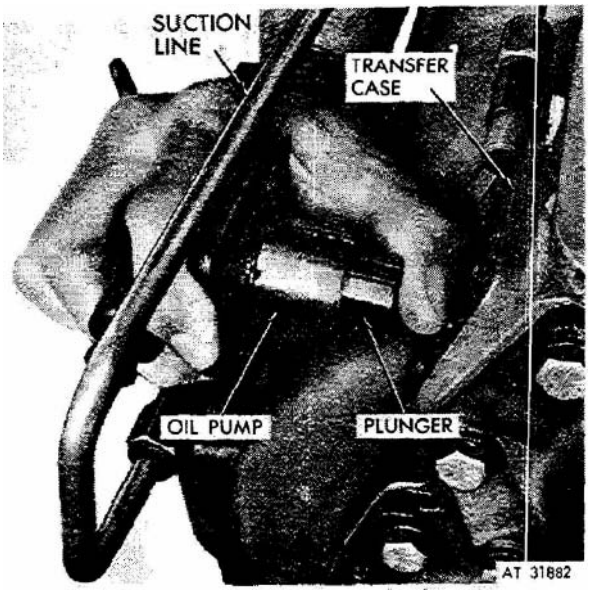


Figure 3-86. Priming oil pump.

(41) Prime oil pump by manually operating pump plunger until oil appears at outlet fitting.

(42) Install oil pump and connect outlet line (8, fig 2 19) from pump to transfer case.

Caution: Oil pump must be primed as unit is not self priming.

f. *Test.*

(1) Transfer assembly shall be subjected 10 a ten minute break-in test and be checked for grinding, clanking, and other unusual noise.

(2) During test inspect for external leakage. There shall be no leakage.

(3) Test shall be over a range of input torque of 0-217 lbs.-ft. at 500 to 2800 RPM in both drive and coast condition.

(4) Transfer assembly shall demonstrate ease of shifting.

(5) Drain and strain lubricant. No metal chips, shavings, or other foreign matter shall be evident in the lubricant or at the drain plug.

g. *Installation. (Refer* to 9-2320-242-20.)

Section X. FRONT DIFFERENTIAL ASSEMBLY

3-39. General

The front differential (fig 3-87) is a dual-limited slip type with a 5.57:1 spiral-bevel gear ratio. It is utilized to drive the front tractor wheels when the vehicle is operating in six-wheel drive. It is driven by direct engagement of its pinion with the transfer case by the transfer clutch gear. Power flow of the differential is identical to that of a conventional differential with addition of the limited slip feature which takes effect as driving conditions demand. The limited slip feature is provided by the equalizer assembly which contains a slip pack in each housing half. Each slip pack consists of alternately stacked drive discs and driven discs. These discs along with drive shims and spacer washers are compressed inside each equalizer housing by drive springs (cup shaped discs). The driven discs have internal teeth which mate with the external slots cut into the hub of each bevel gear. Since the drive and driven discs are compressed together, they cannot rotate independently until the frictional force that is exerted on them by the drive springs is overcome. Since the level gears and both sections of the equalizer assembly are respectively engaged to these same discs, they also cannot rotate independently of one another, until they exceed this fractional force. The torque or driving force required to overcome this frictional force, or in other words, break the slip packs, is approximately — four hundred foot pounds. The slip packs must be broken before differential action can take place.

When both wheels are rotating at the same speed the differential bevel gears serve only to lock all parts in the equalizer assembly, making them rotate as a unit. Therefore, the slip packs are not utilized during normal operation. They are utilized, however, whenever the vehicle begins to lose traction. As a comparison, consider having the inner driving wheel resting on dry pavement and the outer wheel resting on ice. The torque or diving force is divided equally between both driving axles at all times. The outer drive wheel, which is on ice, exerts the same rotational resistance as before, but the differential action which must take place before it can spin is now restricted by the slip packs. If the inner wheel was to remain stationary, the torque required to rotate the ring gear and attached equalizer assembly would have to exceed the frictional force of the slip pack on the inner wheel bevel gear. The frictional force of the slip pack on the outer wheel bevel gear would also have to be overcome due to normal differential action. The outer wheel and its bevel gear must rotate faster than the ring gear and equalizer assembly, if one wheel was to remain stationary. Therefore, a much larger driving force or torque is required before the wheel which is resting on ice can spin. Since the driving force or torque is always distributed evenly between both wheels, the torque to the wheel which has traction is sufficient to propel the vehicle. This feature permits the vehicle to travel over almost any type of terrain without becoming immobile.

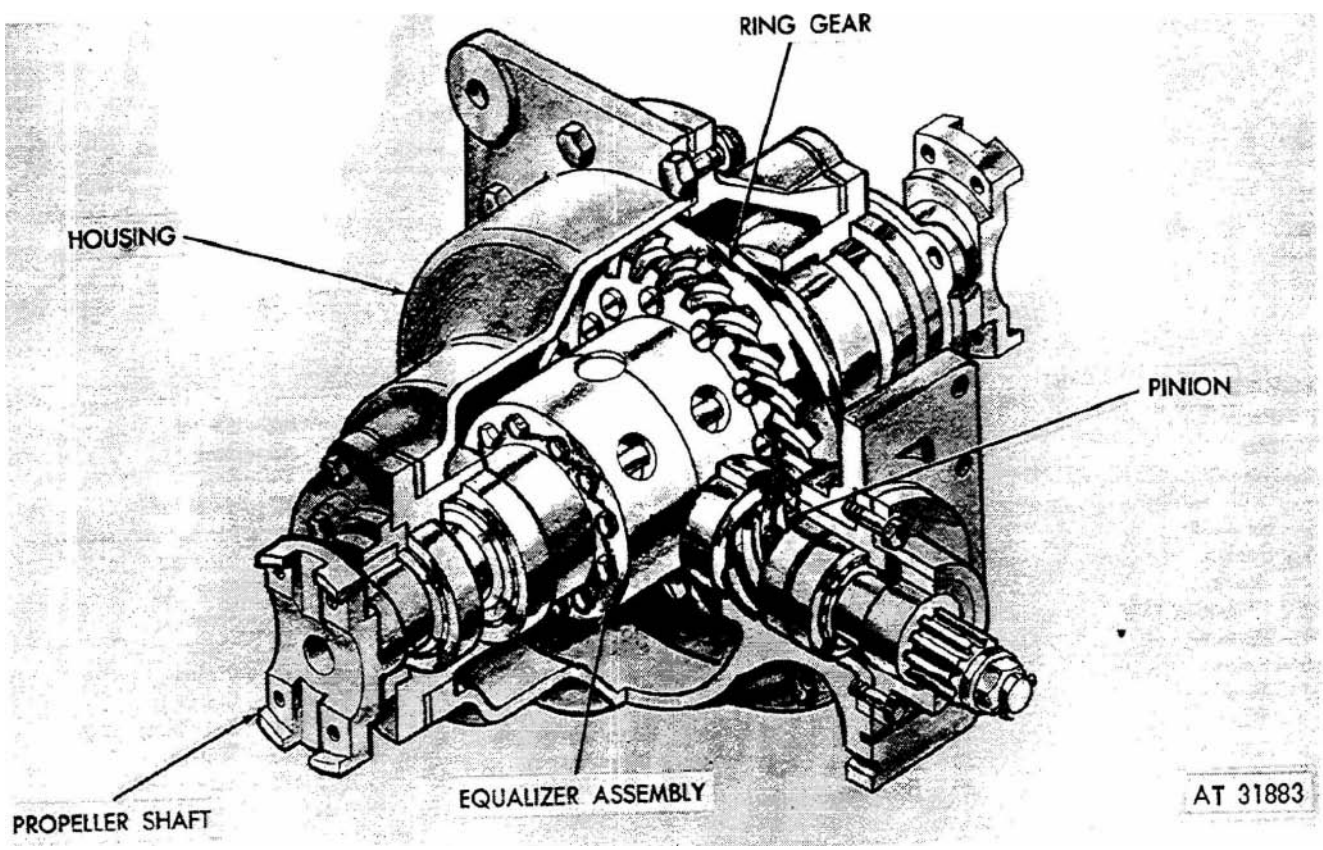


Figure 3-87. Front differential, cross sectional view.

3-40. Front Differential

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect housings (15 and 23, fig 3-88) and gasket (22) by removing screw (13), nut (25), and washers (14 and 24). Remove equalizer assembly (18) from housings.

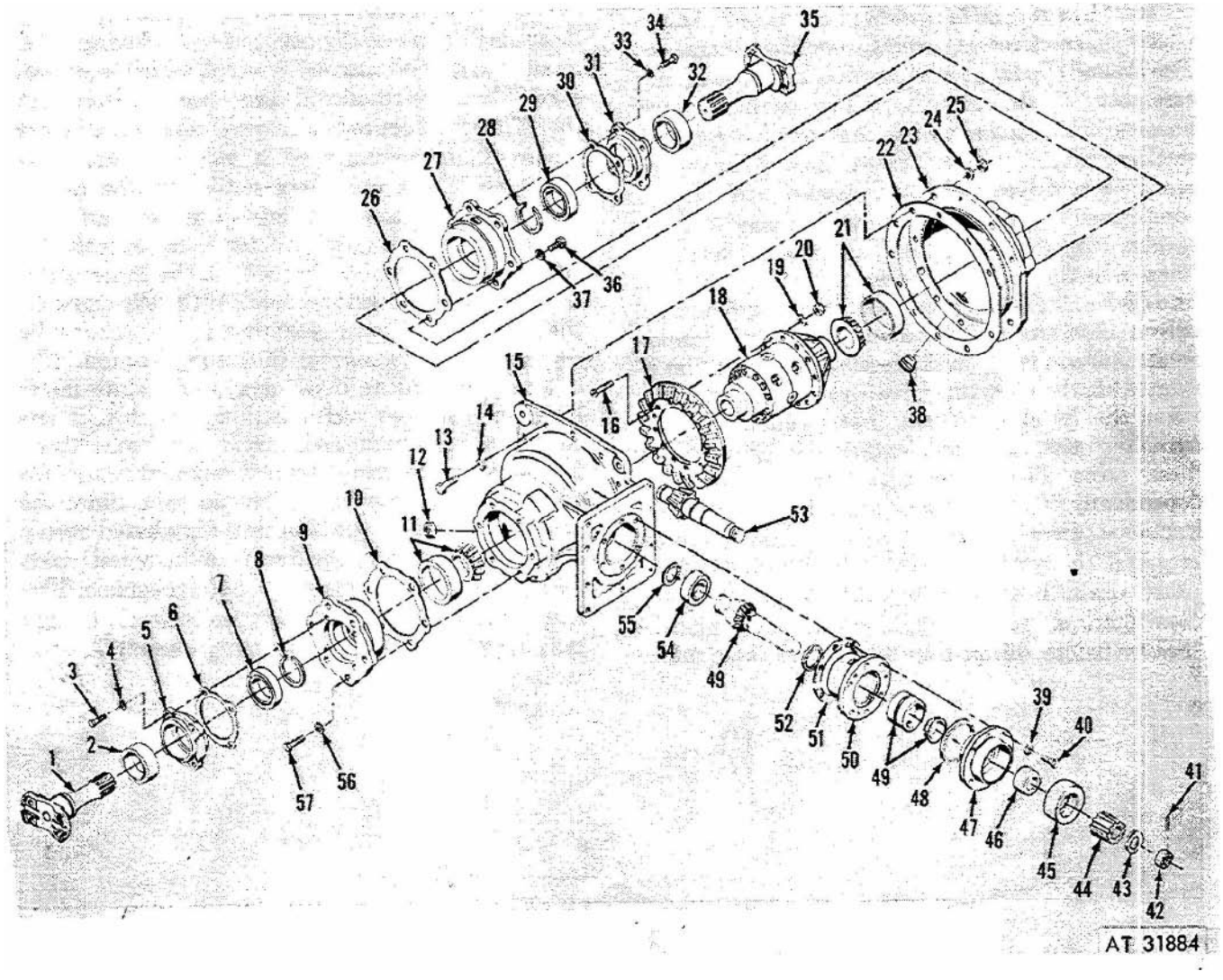


Figure 3-88. Front differential, exploded view.

LEGEND TO FIG - 3-88

1 - Propeller shaft
2 - Seal
3 - Screw
4 - Lock washer
5 - Retainer
6 - Gasket
7 - Bearing
8 - Retaining ring
9 - Housing
10 - Shim
11 - Bearing
12 - Plug
13 - Screw
14 - Washer
15 - Housing
16 - Bolt
17 - Ring gear
18 - Equalizer assembly
19 - Lock washer
20 - Nut
21 - Bearing
22 - Gasket
23 - Housing
24 - Washer
25 - Nut
26 - Shim
27 - Housing
28 - Retaining ring
29 - Bearing
30 - Gasket
31 - Retainer
32 - Seal
33 - Lock washer
34 - Screw
35 - Propeller shaft
36 - Screw
37 - Washer
38 - Plug
39 - Washer
40 - Screw
41 - Cotter pin
42 - Nut
43 - Washer
44 - Sleeve
45 - Seal
46 - Spacer
47 - Retainer
48 - Preformed packing
49 - Bearing
50 - Housing
51 - Shim
52 - Shim
53 - Pinion
54 - Bearing
55 - Retaining ring
56 - Washer
57 - Screw

(2) Disconnect retainers (5 and 31) and gaskets (6 and 30) from housings (15 and 23) by removing screws (3 and 34) and lock washers (4 and 33).

(3) Disconnect retaining rings (8 and 28) from propeller shafts (1 and 35). Press bearings (7 and 29) from propeller shafts (fig 3-89).

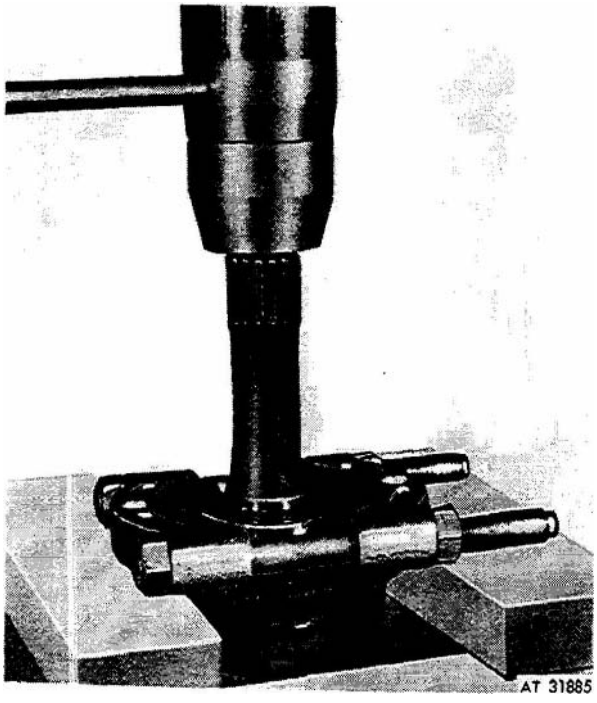


Figure 3-89. Pressing *bearing from* ***propeller shaft.***

(4) Remove propeller shafts from retainers (5 and 31, fig 3-88) and press seals (2 and 32) from retainers (fig 3-90).

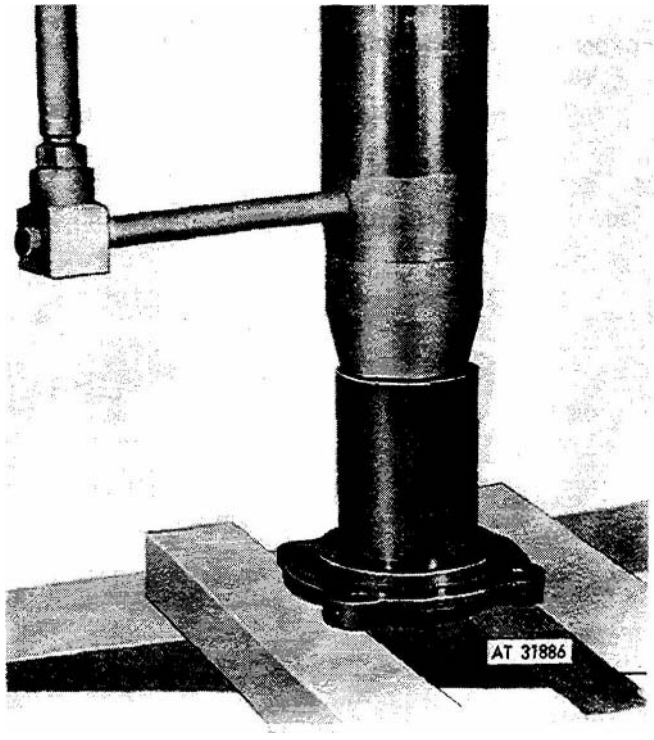


Figure 3-90. Pressing seal ***from retainer.***

(5) Disconnect housing (9, fig 3-88) and shim (10) from housing (15) by removing screw (57) and washer (56). Tie shims together and tag with location. Using a suitable puller, remove bearing cup of bearing (11) from housing (9) as shown in figure 3-91.

Figure 3-91. Removing bearing cup *from housing.*

(6) Disconnect housing (27, fig 3-88) and shim (26) from housing (23) by removing screw (36) and washer (37). Tie shims together and tag with location. Using a suitable puller, remove bearing cup of bearing (21) out of housing (27) as shown in figure 3-91.

(7) Disconnect retainer (47, fig 3-88) from housing (15) by removing screw (40) and washer (39). Remove preformed packing (48) from retainer. Press seal (45) from retainer (fig 3-92).

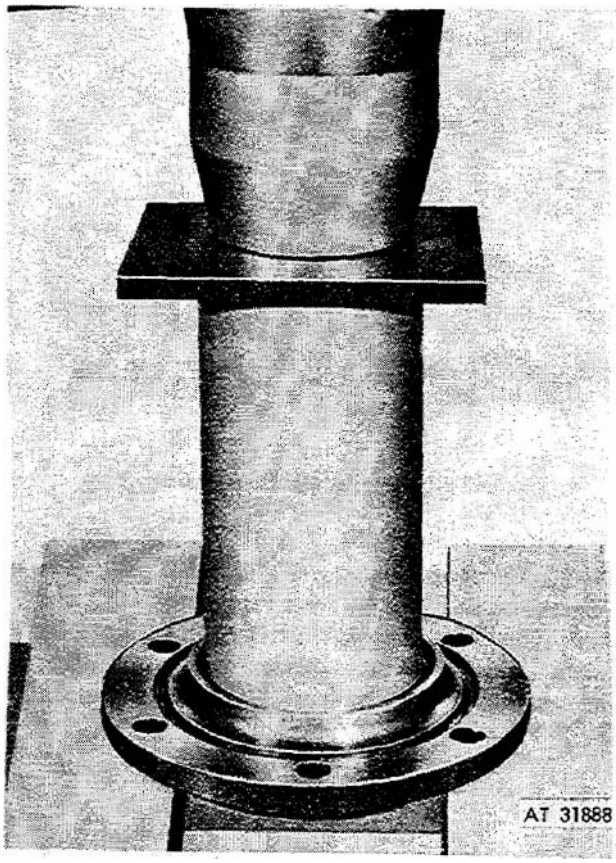


Figure 3-92. Pressing seal from pinion retainer.

(8) Remove assembled housing (50, fig 3-88) from housing (15) by installing three screws in housing jack screw holes, tighten screws evenly, this will back housing (50) from housing (15) as shown in figure 3-93. Remove shim (51, fig. 3-88).

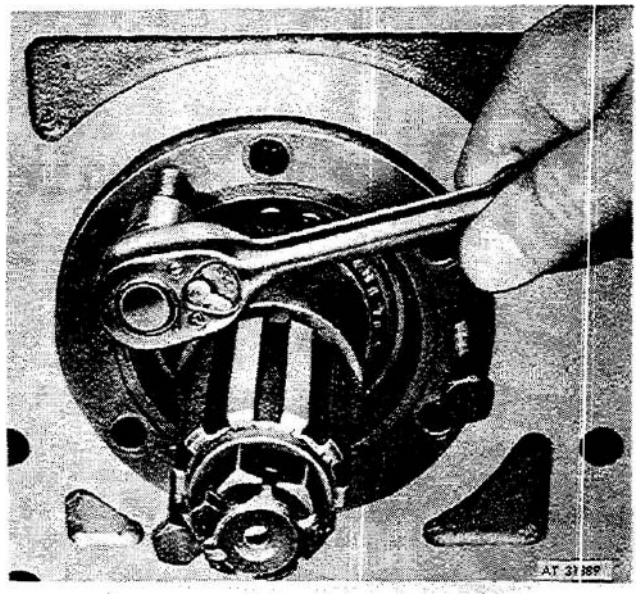


Figure 3-93. Removing assembled housing.

(9) Remove cotter pin (41) and nut (42) from pinion. Secure housing (50) in a suitable vise. Using a suitable puller, remove sleeve (44), bearing cone of bearing (49), shim (52), and assembled pinion (53) from housing (fig 3-94).

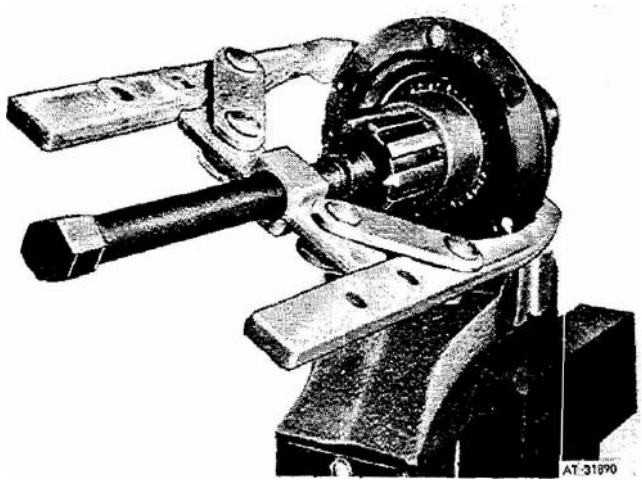


Figure 3-94. Removing pinion from housing.

(10) Press bearing cup of bearing (49, fig 3-88) from housing (50) as shown in figure 3-95.

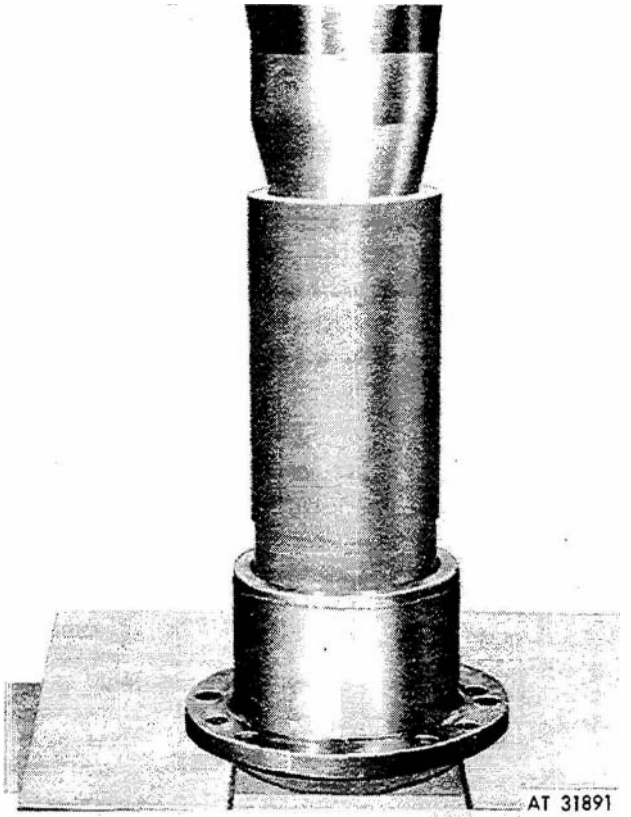


Figure 3-95. Pressing bearing cup from housing.

(11) Remove retaining ring (55, fig 3-88) and press bearings (49 and 54) from pinion (53) as shown in figures 3-96 and 3-97.

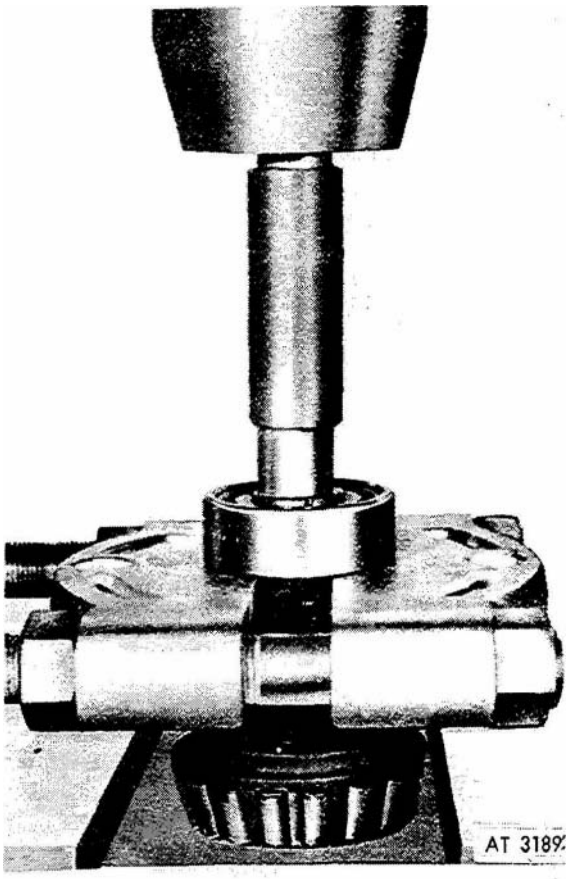


Figure 3-96. Pressing front bearing from pinion.

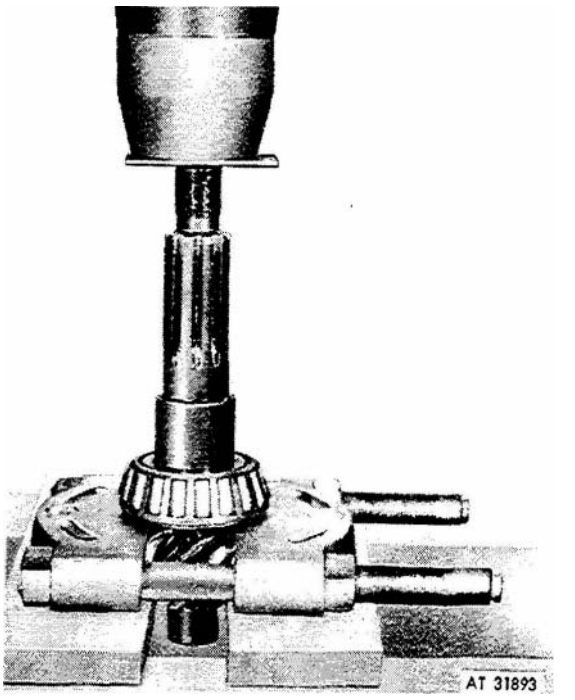


Figure 3-97. Pressing rear bearing from pinion.

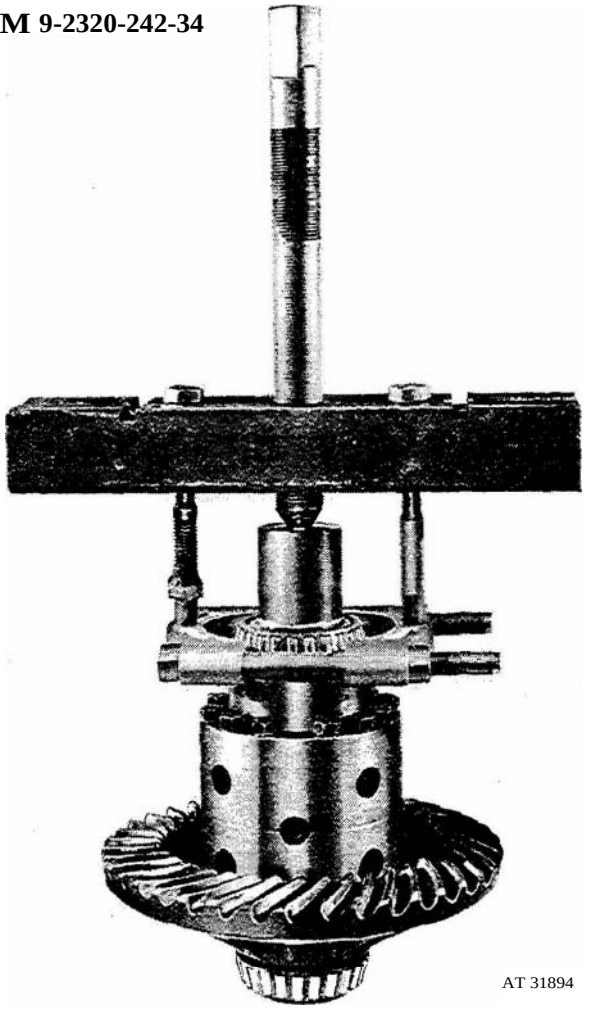


figure *3-98. Removing bearing from equalizer assembly.*

(12) Remove *plugs* (12, *and* 38, *fig* 3-88).

(13) Using a suitable puller, remove *bearings* (11 and 21) from equalizer assembly (18) as shown in figure 3-98. As an alternate method remove with a suitable drift.

(14) Disconnect ring gear (17, figure 3-88) from equalizer assembly by removing bolt (16), nut (20), and lock washer (19).

(15) Disassemble equalizer assembly by performing (17) through (25) below.

(16) Mark indexing marks on housings (3 and 18, fig 3-99) to make sure the housing will be assembled in the same position.

LEGEND to fig *3-99.*

1 - Screw
2 - Washer
3 - Housing
4 - Drive disc
5 - Driven disc
6 - Drive shim
7 - Drive disc
8 - Drive spring
9 - Spacing washer
10 - Retaining ring
11 - Snap ring
12 • Roll pin
13 - Thrust washer
14 - Bevel gear
15 - Thrust washer
16 - Pinion gear
17 - Spider
18 - *Housing*

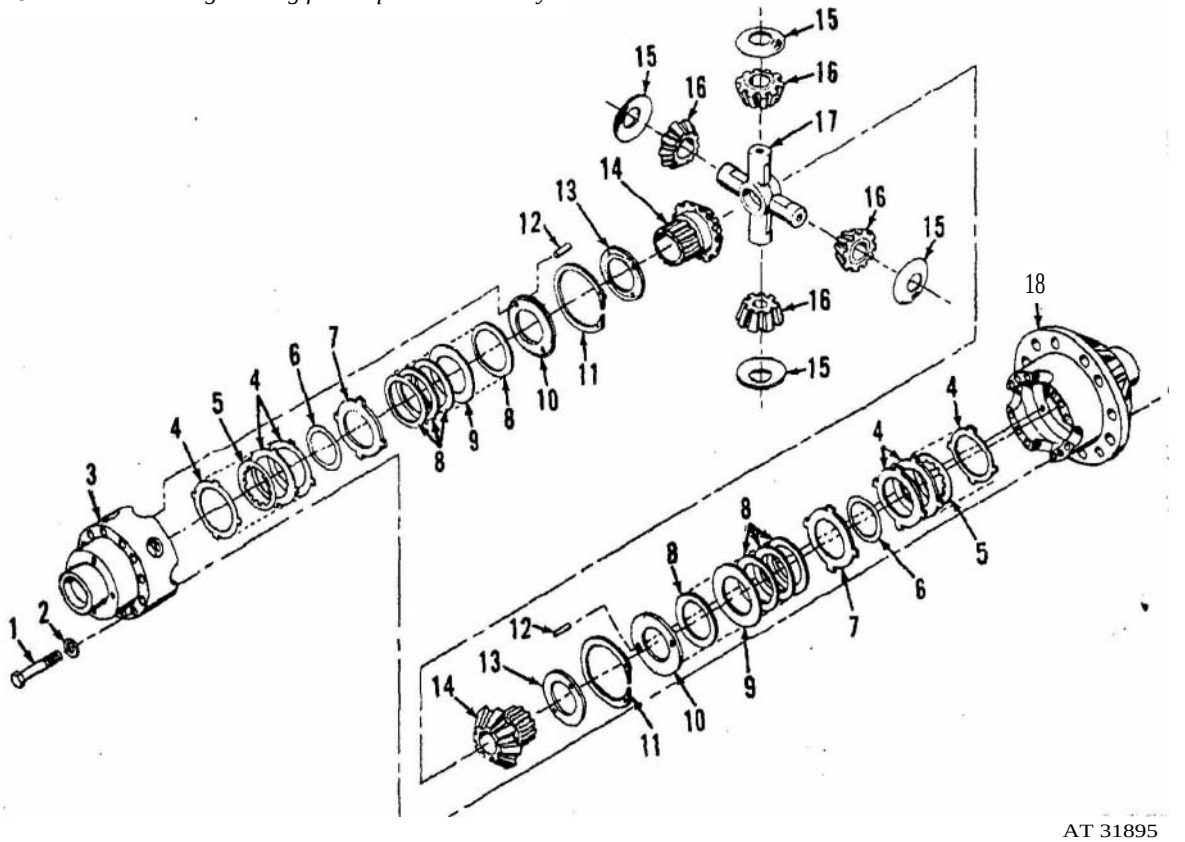


Figure 3-99. Equalizer assembly, exploded view.

(17) Positon equalizer assembly in large hole of fixture (11660105) as shown **in figure 3-100.**

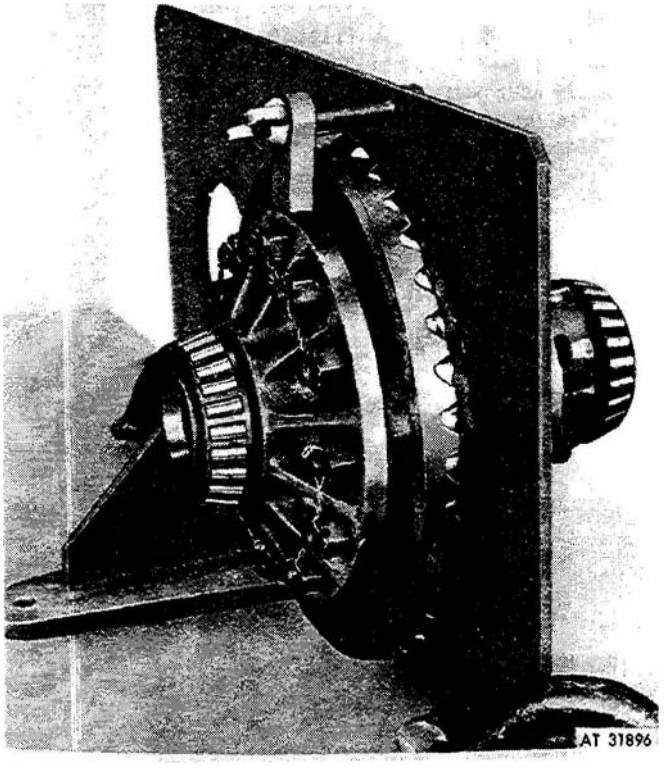


Figure 3-100. Equalizer assembly in fixture (11660105).

(18) Disconnect housings (3 and 18, fig 3-99) by removing screw (1) and washer (2). Separate housings and remove thrust washer (15), pinion gear (16), and spider (17).

(19) Position housing (3) in small hole of fixture (11660105) and secure with four screws (1, fig 3-99) and proper size nuts (fig 3-101).

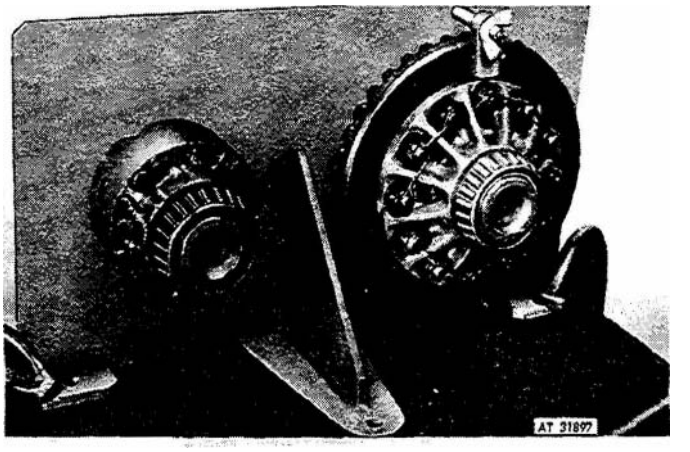


Figure 3-101. Equalizer housings positioned in fixture (11660105).

(20) Remove bevel gear (14, fig 3-99) and thrust washer (13) from housings (3 and 18).

(21) Assemble washer (3, fig 3-102) and nut (2) on threaded end of shaft (1). Insert shaft into bearing bore of housing (18, fig 3-99) with washer against outside face of bearing. Position installation block (9, fig 3-102) on splined end of shaft and secure with spherical washers (7) and shoulder screw (8). Flat face of concave washer butts against installation block and concave face mates with convex face of other washer. Compress drive spring (8, fig 3-99) in housing by tightening nut securely (approximately 100 lbs-ft.) using a suitable wrench and keeping shaft from rotating by using a suitable 1⅛ inch socket wrench (fig 3-103).

LEGEND to fig 3-102
1. - Shaft (11660111)
2 - Nut (MS51967-42)
3 - Washer (11660106)
4 - Alignment arbor (11660112)
5 - Sleeve (11660113)
6 - Gage block assembly (11660114)
7 - Spherical washers (11660122)
8 - Shoulder screw (MS51975-51)
9 - Installation block (11660108)
10 - Measuring assembly (11660107)

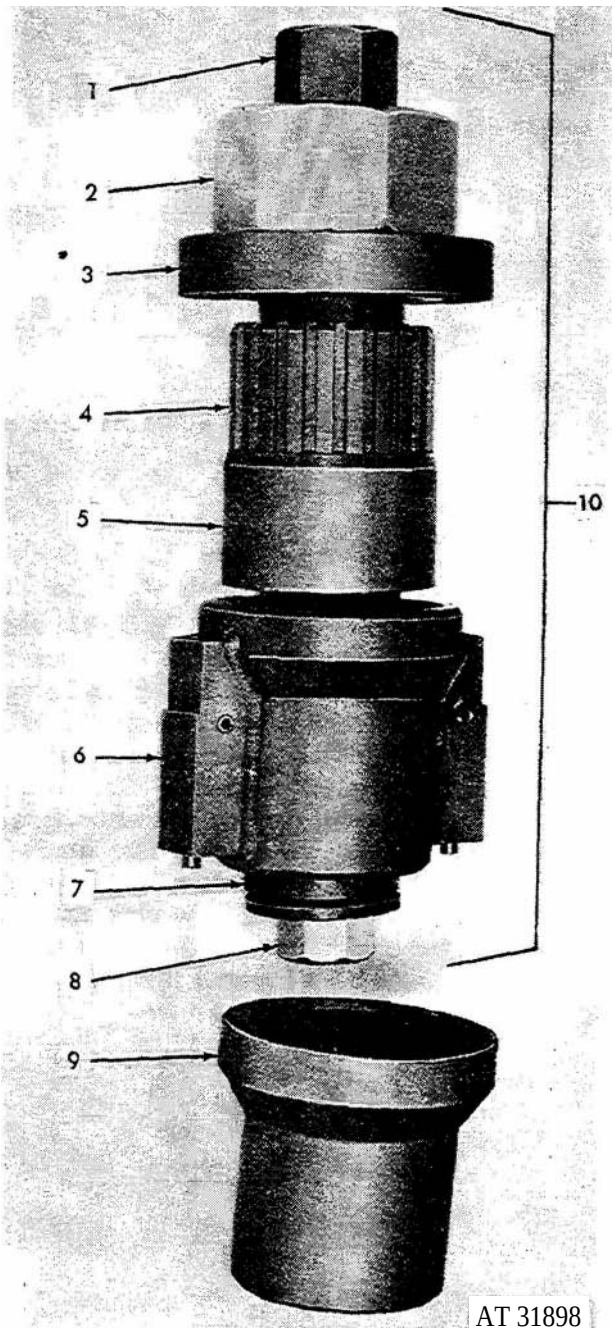


Figure 3-102. Measuring assembly (11660107) and installation block (11660108).

Figure 3-103. Tightening shaft nut to compress drive springs for removal.

(22) Remove snap ring (11, fig 3-99). Loosen nut (2, fig 3-102) to permit access to retaining ring (10, fig 3-99) and pry retaining ring from roll pins (12).

Warning: Make sure retaining ring (10) is free of roll pins (12) before removing shaft (1, fig 3-102) from housing (18, fig 3-99).

(23) Remove shoulder screw (8, fig 3-102), spherical washer (7), and installation block (9) from shaft (1). Remove shaft from housing (18, fig 3-99). Remove retaining ring (10), drive discs (4, and 7), driven disc (5), drive shim (6), drive spring (8). spacing washer (9), and roll pin (12) from housing.

(24) Remove components from housing (3) in the same manner outlined in (21) through (23) above except do not remove housing (3) from fixture.

(25) Mark alignment of ring gear (17, fig 3-88) and housing (18, fig 3-99). Disconnect ring gear from housing by removing bolt (16, fig 3-88), nut (20), and lock washer (19). Press ring gear from housing (fig 3-104).

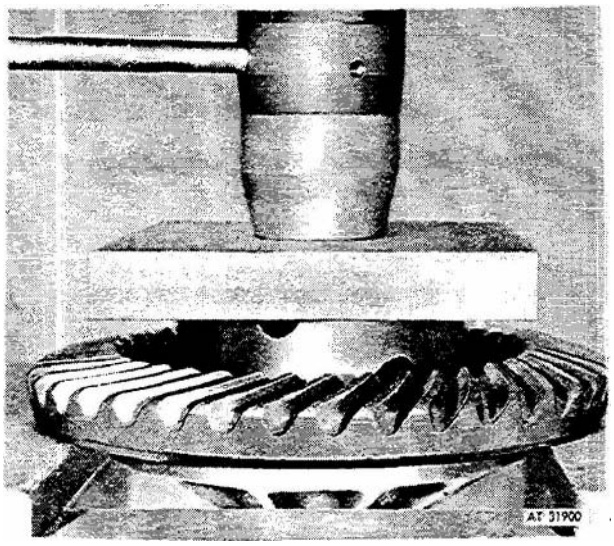


Figure 3-104. Pressing ring gear from equalizer housing

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

Note: Ring gear (17, fig 3-88) and pinion (53) are a matched set and must be replaced as a set. If housings (3 and 18, fig 3-99) are defective, the whole equalizer assembly must be replaced.

e. Assembly.

(1) Assemble the equalizer assembly by performing (2) through (23) below.

(2) Position three equally spaced alignment rods 1/4 inches in diameter and 3 inches long, made of drill stock or other similar material, in bolt holes of ring gear (17, fig 3-88). Mating alignment marks on ring gear and housing (18, fig 3-99), align bolt holes in housing with alignment rods and press housing onto ring gear (fig 3-105).

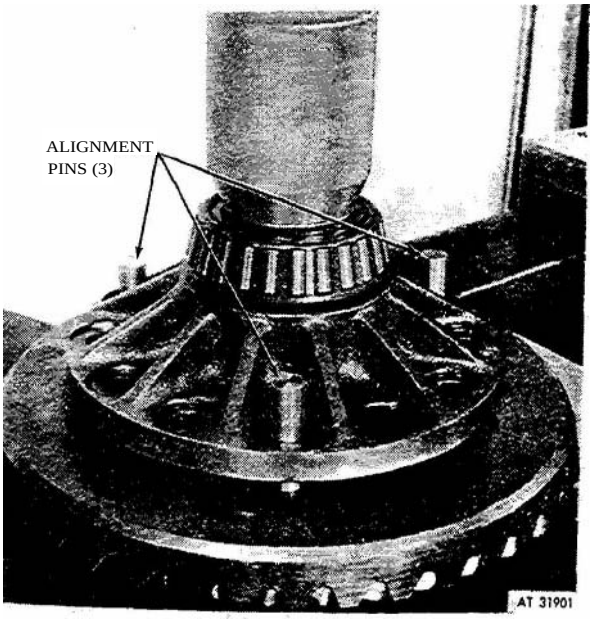


Figure 3-105. Pressing equalizer housing onto ring gear.

(3) Secure ring gear (17, fig 3-88) to equalizer housing (18, fig 3-99) with bolt (16, fig 3-88), nut (20), and lock washer (19). Tighten bolts to 105 - 130 lbs-ft. torque and lockwire bolts.

(4) Insert roll pins (12, fig 3-99) in housings (3 and 18), making sure pins are bottomed.

(5) Install housing (18) in fixture (11660105) as shown in figure 3-100.

(6) Assemble disc pack on alignment arbor (4, fig 3-102) starting with a drive disc (4, fig 3-99) and alternating with a driven disc (5) until ten drive discs and nine driven discs are on alignment arbor. Position two additional drive discs and a driven disc on the alignment arbor (fig 3-106).

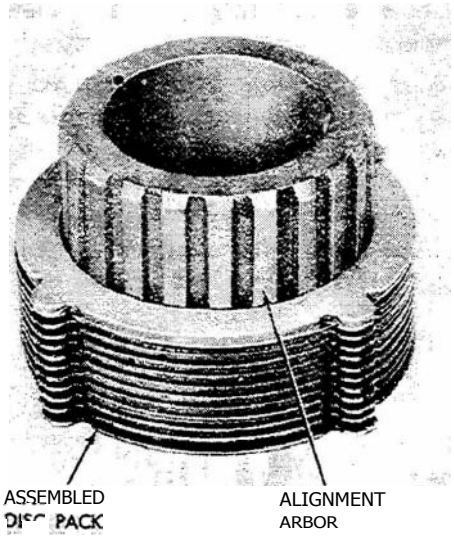


Figure 3-106. Assembled disc pack on alignment arbor (11660112).

(7) Attach nut (2, fig 3-102) and washer (3) on shaft (1). Insert spline end of shaft into bearing end of housing (18. fig 3-99) and bottom washer on bearing end of housing.

(8) Slide alignment arbor (4, fig 3-102) and assemble disc pack on spline end of shaft (1). Align external splines of the disc pack with grooves in housing bore and bottom disc pack (fig 3-107).

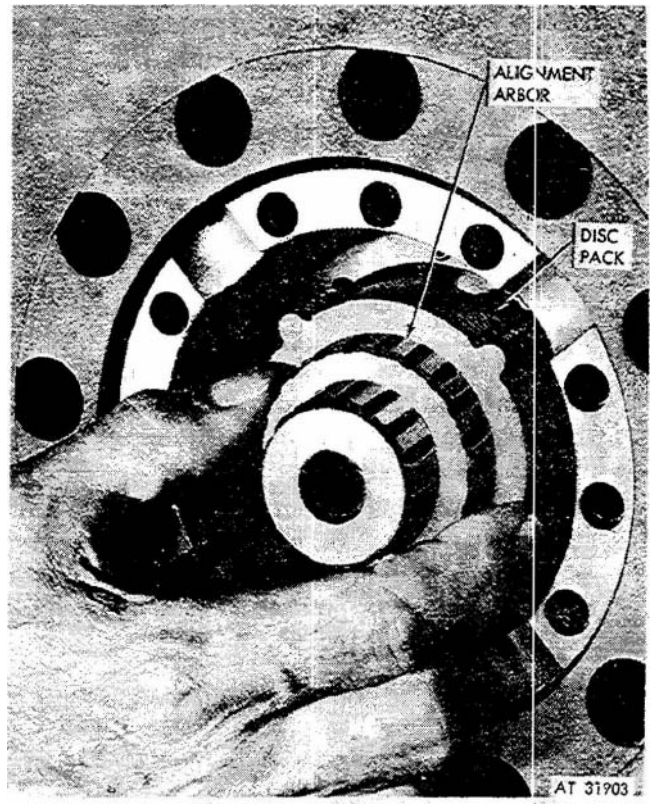


Figure 3-107. Aligning disc pack using alignment arbor (1166112).

(9) Arrange five stacks of drive springs (8, fig 3.99) with concave surfaces all in *same* direction.

(10) Position a stack of three drive springs (8) with concave surfaces facing out, followed by *a* spacing washer (9), on sleeve (5, fig 3-102). Position another stack of springs with concave surfaces facing in, followed by a spacing washer. Repeat procedure until all five stacks of drive springs are installed on sleeve, alternating direction , of concave surfaces of the stacks of drive springs (fig 3-108).

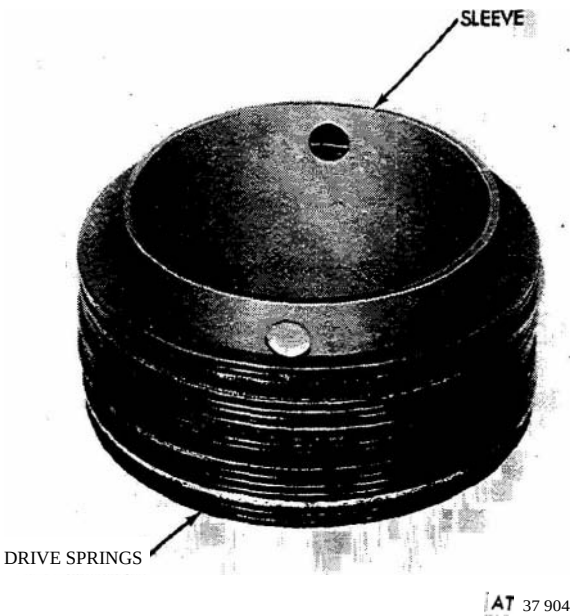


Figure 3-108. Drive springs assembled on sleeve (11660113)

(11) Slide drive springs (8, fig 3-99) and sleeve (5, fig 3-102) on alignment arbor (4) and position springs in bore of housing (18, fig 3-99) as shown in figure 3-109.

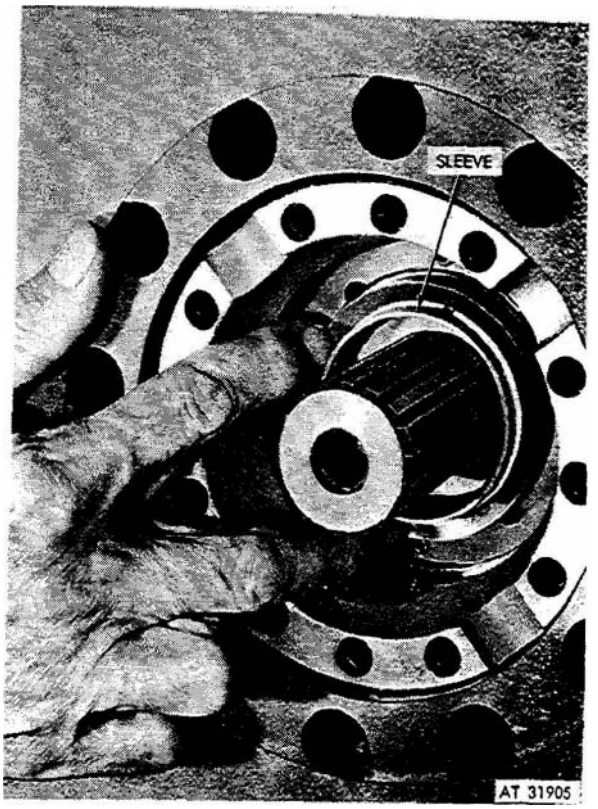


Figure 3-109. Inserting drive springs using sleeve (11660113).

(12) Position spacer strip (11660104) between last stack of drive spring (8, fig 3-99) and sleeve (5, fig 3-102) to center drive spring on sleeve *(fig* 3-110).

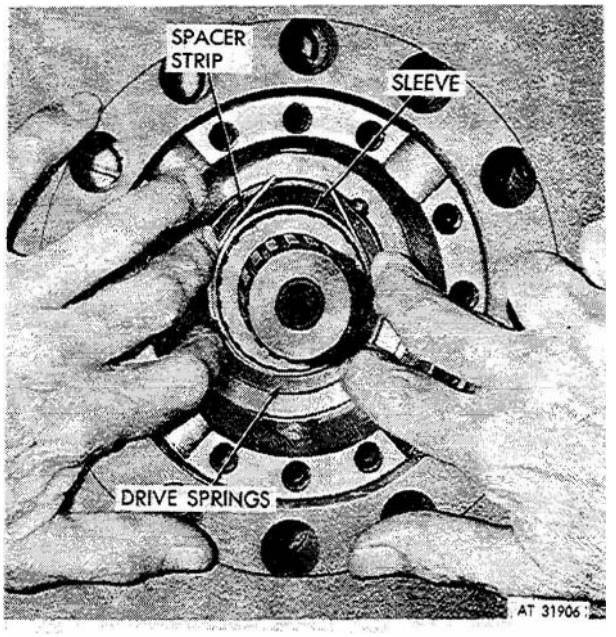


Figure 3-110. Installing spacer strip (11660104) between drive springs and sleeve (11660113).

(13) Position *gage* block assembly (6, fig 3-102 on shaft (1) and secure block assembly to shaft with shoulder screw (8) and spherical washers (7). Fiat face of concave washer goes against gage block end-face and concave face mates with convex face of other washer. Hold shaft (1) with a suitable 11/8 inch socket wrench and tighten nut (2) securely, approximately 100 lbs-ft. torque, with a suitable end wrench to compress drive springs (8, fig 3-99) as shown in figure 3-111.

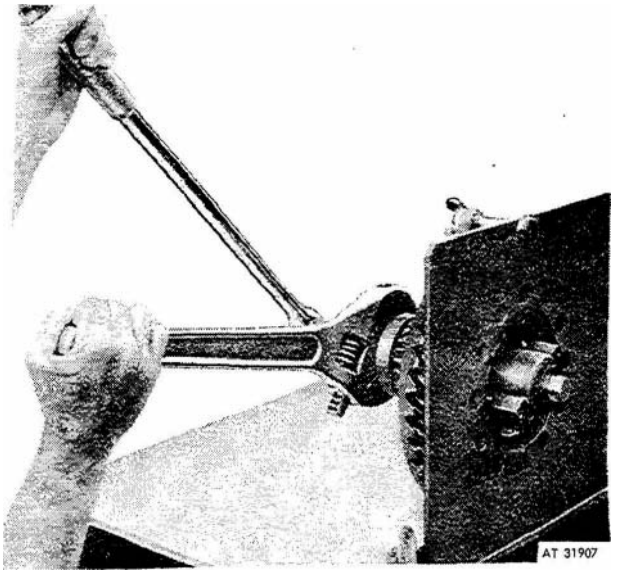


Figure 3-111. Compressing drive springs prior to measurement.

(14) Determine the distance from the top of the compressed drive springs (8, fig 3-991 to the shoulder of the housing (18) containing the two roll pins (12) by using a suitable depth gage and measuring the distance from the top of the gage block assembly (6, fig 3-102) to the top of the gage block measuring pin. The distance should be 0.150 to 0.155 of an inch (fig 3-112).

. .Note: Take readings for both gage block measuring pins and use average of readings.

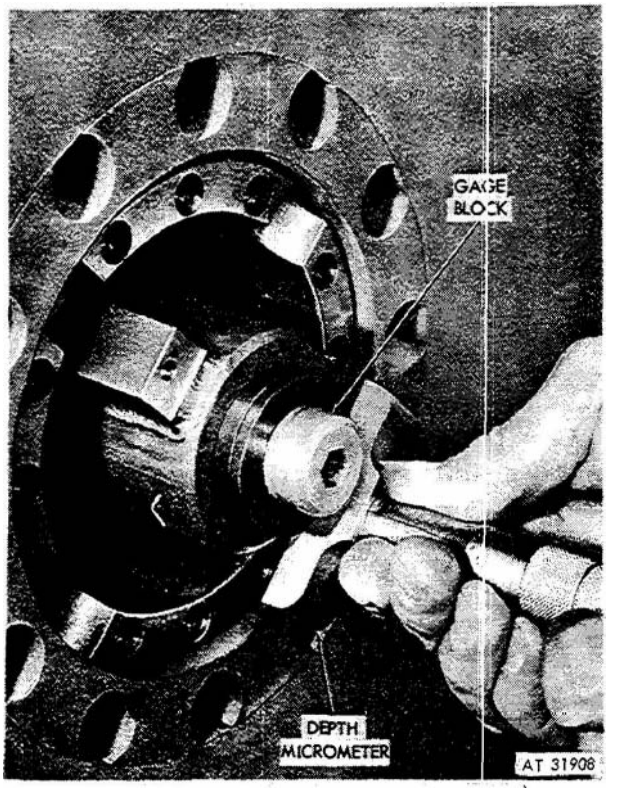


Figure 3-112. Taking measurement at gage block assembly (11660114).

(15) If measuring pin depth is 0.112 of an inch or smaller; remove gage block assembly (6, fig 3-102), drive springs (8, fig 3-99), and drive discs (4, 5, and 7). Install another drive disc (4) below drive disc (7). Reassemble and install gage block assembly. When distance is larger than 0.112 of an inch, but less than 0.150 of an inch; remove gage block assembly, drive springs, and drive discs. Install an appropriate drive shim (6) below drive disc (7). Reassemble and install gage block assembly. When dimension is larger than 0.155 of an inch; remove gage block assembly, drive discs, and drive springs. Remove top drive disc (4) and add shims (6) as required to obtain proper dimension. Remove gage block assembly.

Note: When measurement of 0.150 to 0.155 of an inch has been obtained, the dimension from the drive springs to the housing shoulder containing the roll pins will be from 0.002 to 0.007 of an inch.

(16) Remove gage block assembly (6, fig 3-102) from shaft (1) and install alignment pins (11660109) in the inside diameter of the roll pins (12, fig 3-99). Position retaining ring (10) inside housing (18) with bevel side of ring facing into housing. Align pin holes in retaining ring with alignment pins (fig 3-113).

Caution: Be sure alignment arbor and sleeve are firmly bottomed in bore of housing so that position of drive discs and drive springs will not be distrubed when removing gage block assembly and installing retaining ring.

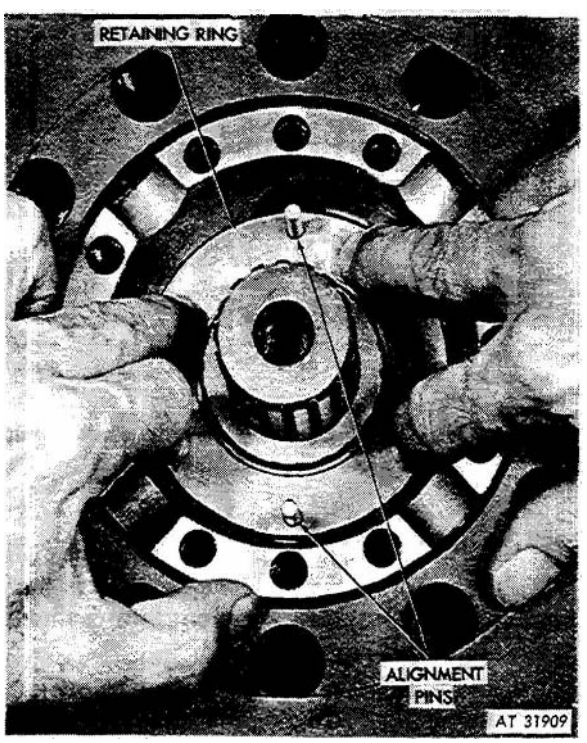


Figure 3-113. Installing retaining ring using alignment pins (11660109).

(17) Position installation block (9, fig 3-102) on shaft (1) and secure with spherical washers (7) and shoulder screw (8). Flat face of concave washer should be located against installation block end face and concave face should mate with convex face of other washer. Tighten nut (2) until retaining ring (10, fig 3-99) sets firmly against shoulder of housing (18). Remove two alignment pins (11660109). Install snap ring (11, fig 3-99) as shown in figure 3-114.

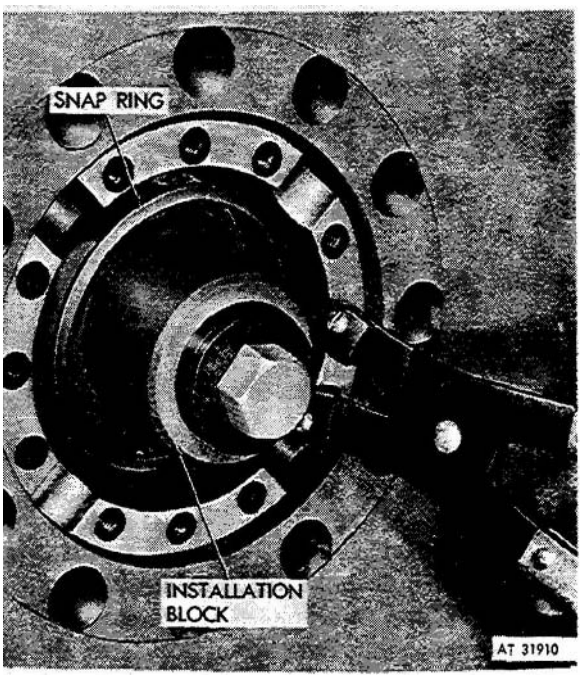


Figure 3-114. Using installation block (11660108) to install snap ring.

(18) In the following sequence, remove shoulder screw (8, fig 3-102), spherical washers (7), installation block (9), shaft (1), sleeve (5), and alignment arbor (4). When removing sleeve, install a suitable puller in the two ¼ inch holes provided in the sleeve (fig 3-115). Remove spacer strip (11660104).

Caution: Make sure spacer strip (11660104) is removed before continuing with assembly procedure.

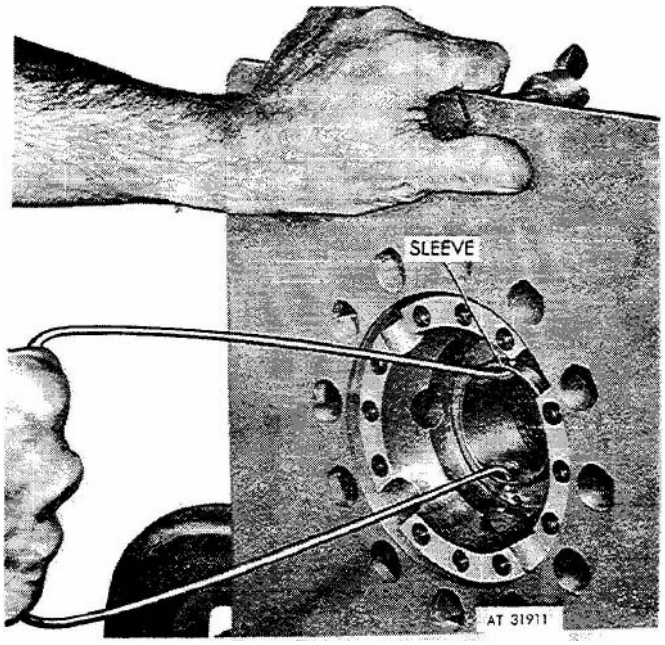


Figure 3-115. Removing sleeve (11660113) using puller in holes of sleeve.

(19) Insert shaft (1, fig 3-102) into housing (18, fig 3-99). Install thrust washer (13) and bevel gear (14) into housing making sure that gear splines engage all of the drive discs. Use alignment arbor (4, fig 3-102) as a spacer and loosely screw components to shaft using shoulder screw (8) and convex spherical washer (7) as shown in figure 3. 116.

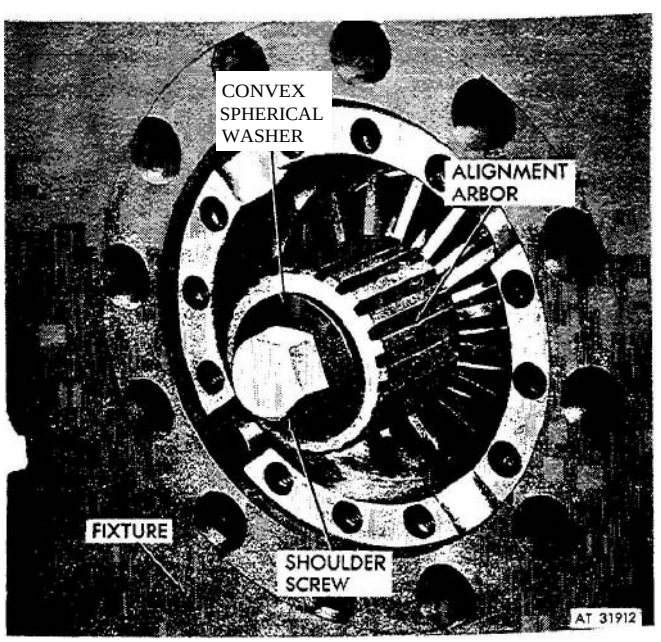


Figure 3-116. Stack up of shaft (11660111) and alignment arbor (11660112) as spacer for torque check.

(20) Insert a suitable ½ inch drive torque wrench on shaft (1, fig 3-102) and check breakaway torque. Torque should be a minimum of 300 lbs-ft. (fig 3-117).

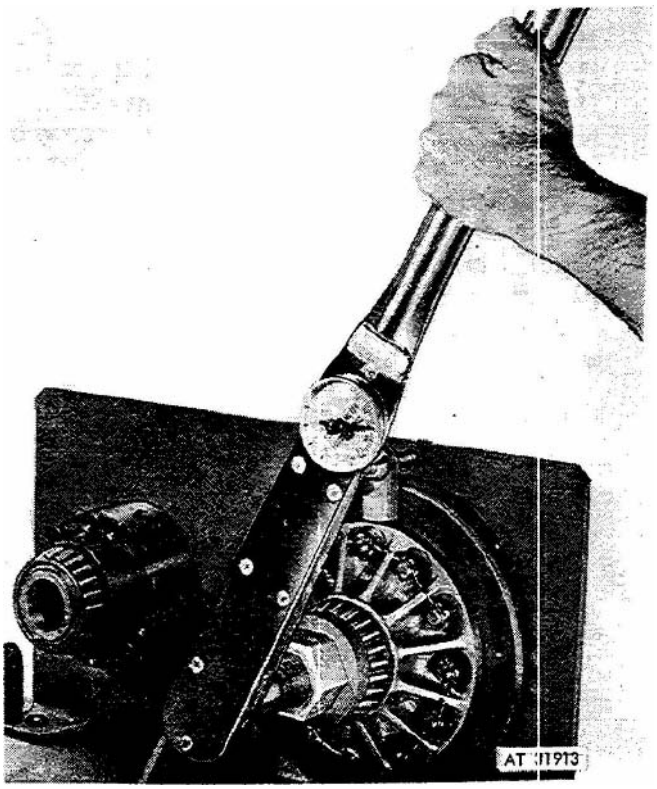


Figure 3-117. Measuring breakaway torque using torque wrench installed on shaft (11660111).

(21) With torque wrench, rotate shaft (1., fig 3-102) three revolutions. Monitor torque wrench reading during rotation. Running torque should be a minimum of 200 lbs-ft.

(22) Remove shaft (1) and alignment. arbor (4) from housing (18, fig 3-99).

(23) Install components in housing (3) as outlined in (4) through (20) above.

(24) Remove housing (3) from fixture (11660105).

(25) Position thrust washers (15) and pinion gears (16) on spider (17). Position assembled spider between housings (3 and 18). Make sure index marks on housings are in alignment. Rotate gears as necessary to obtain proper alignment of pinion gears (16) and bevel gears (14). Secure housing (3) to housing (18) with screw (1) arid lock washer (2). Tighen screws to 39 - 40 lbs-ft. torque and lockwire screws.

(26) Remove equalizer assembly from fixture (17660105).

(27) Prior to installing a new equalizer assembly, check equalizer assembly running torque. Install equalizer assembly in fixture (11660105) and insert propeller shaft (1, fig 3-88) in equalizer assembly. Secure adapter (11595241) and a suitable torque wrench to propeller shaft and check running torque by rotating adapter a minimum of three revolutions and monitoring torque wrench readings. Running torque should be a minimum of 400 **lbs-ft.** (fig 3-118).

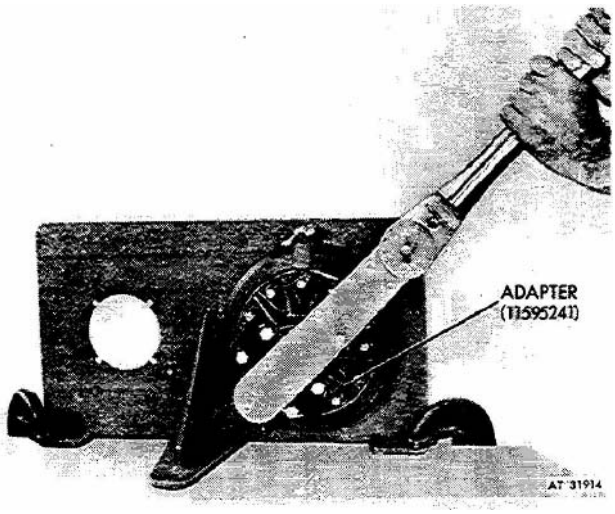


*Figure 3-118. Checking new **equalizer assembly** running torque.*

(28) Press bearings (11 and 21, fig 3-88) onto equalizer assembly (fig 3-119).

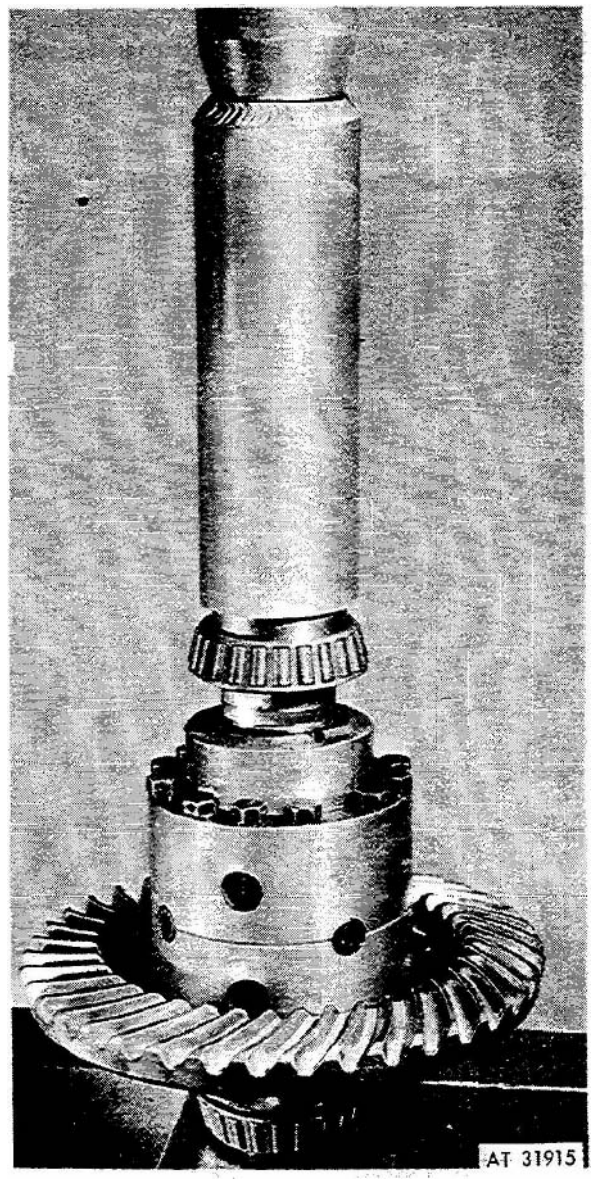


*Figure 3-119. Pressing bearing onto **equalizer assembly.***

(29) Press bearing (49, fig 3-88) onto pinion (53) as shown in figure 3-120. Press bearing (54, fig 3-88) onto pinion (53) and secure with retaining ring (55) as shown in figure 3-121.

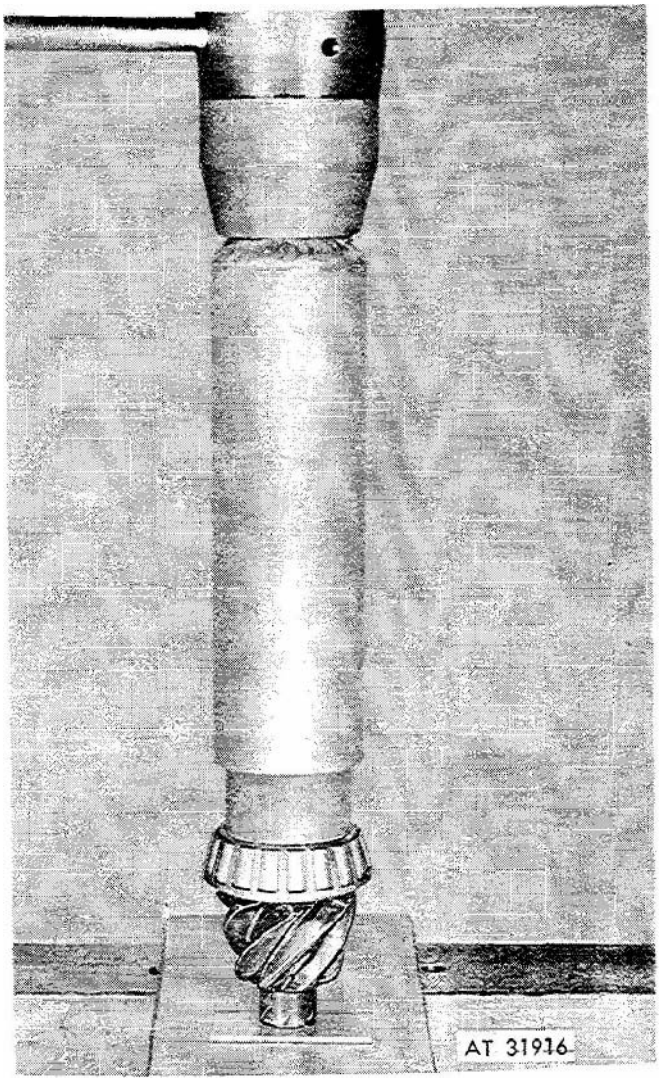


Figure 3-120. Pressing rear bearing onto pinion.

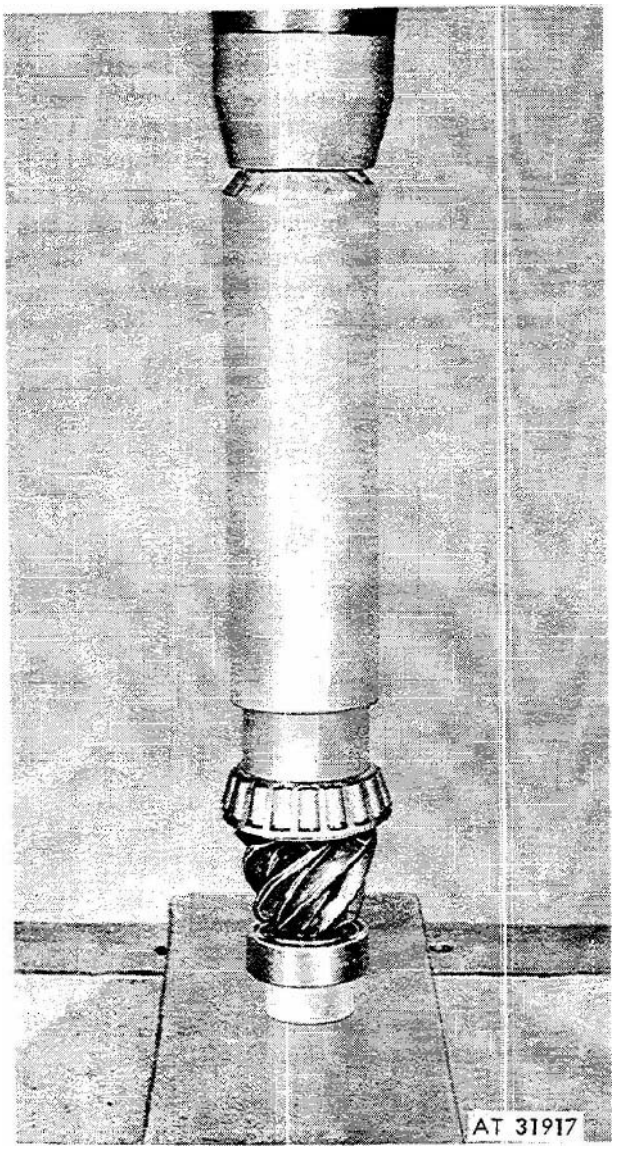


Figure 3-121. Pressing front bearing onto pinion.

(30) Press bearing cup of bearing (49, fig 3-88) into housing (50) as shown in figure 3-122. Position shim (52, fig 3-88) on pinion (53) and install pinion in housing. Position spacer (46) and sleeve (44) on pinion and secure with nut (42) and wahser (43). Tighten nut to 175-250 lbs-ft. torque and install cotter pin (41).

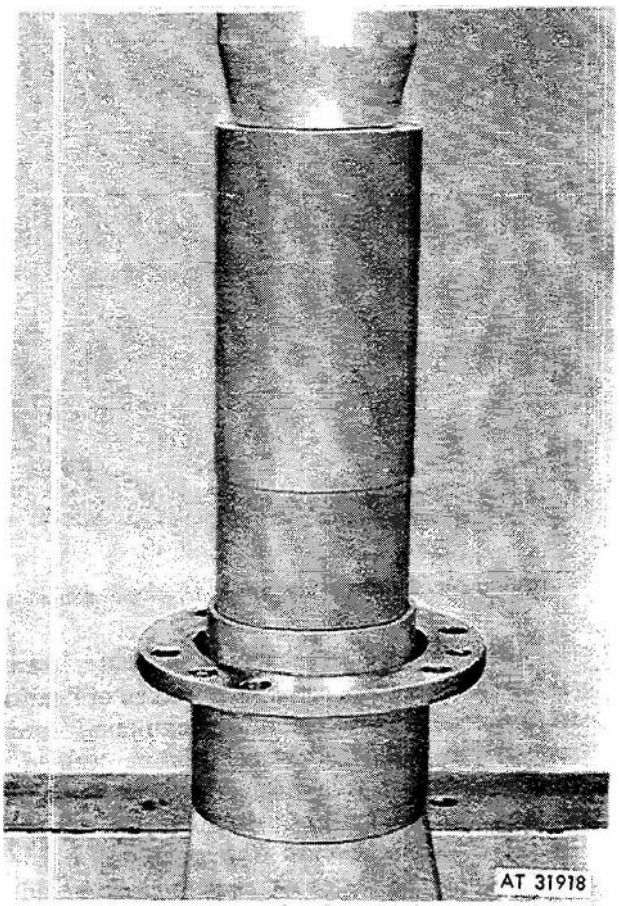


Figure 3-122. Pressing bearing cup into housing.

(31) Position retainer (47), housing (50), shims (51), and assembled pinion (53) in housing (15) and secure with three equally spaced screws (40) and washers (39).

Caution: Make sure that lubrication port in housing (50) is aligned with lubrication port in housing (15) during installation.

(32) Measure pinion preload using a suitable inch-pound torque wrench (fig 3-123). Preload should be 5-15 **if not, add or** *subtract the* number of shims (52, fig 3-88) to obtain proper preload. Reassemble and check preload; record *final* preload.

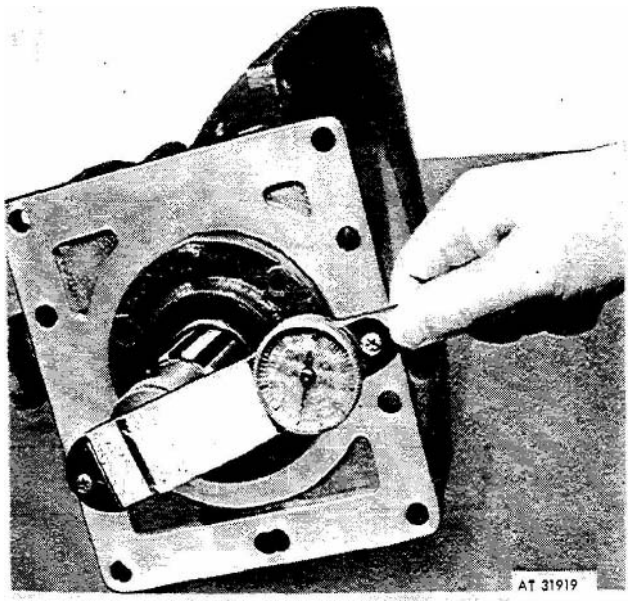


Figure 3-123. Checking pinion preload.

(33) Disconnect three screws (40), washers (39), and retainer (47) from housing (15). Press **seal** (45) into *retainer (fig* 3-124). Install preformed packing (48, fig 3-88) and secure assembled retainer to housing with screws (40) and washers (39).

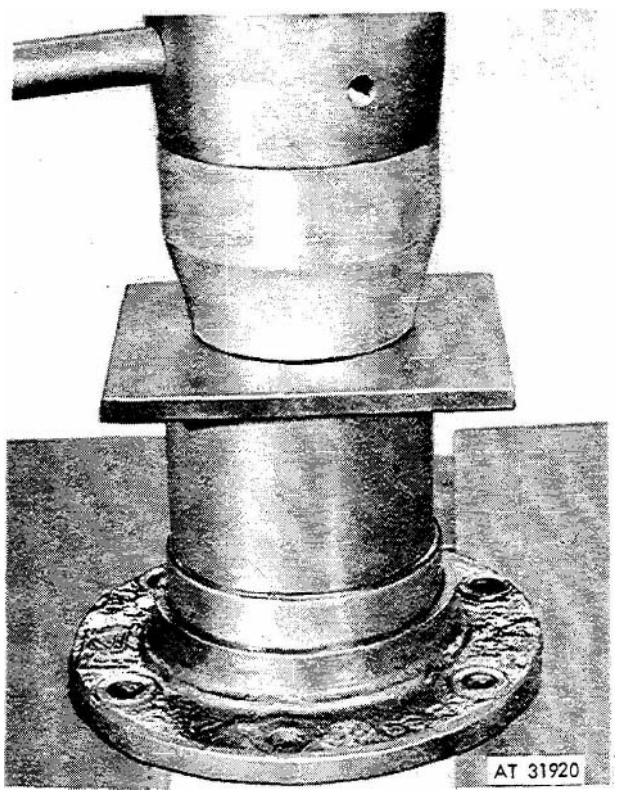


Figure 3-124. Pressing seal into pinion retainer.

(34) Press bearing cups of bearings (11 and 21) into housings (9 and 27) as shown in figure 3-125. Position housings (9) and 27, fig 3-88) to housings (15 and 23) and secure with screws (36 and 57) and washers (37 and 56).

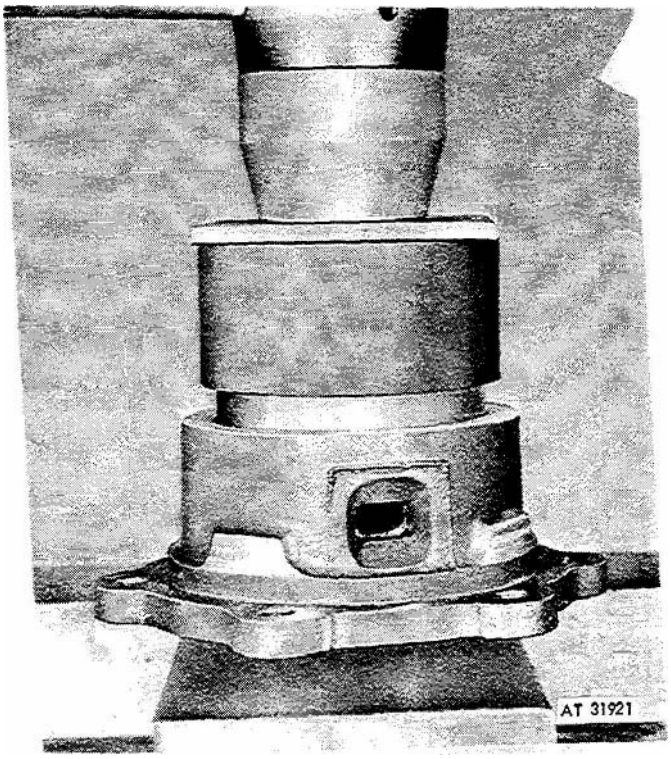


Figure 3-125. Installing ***bearing cups into housing.***

(35) Paint ten teeth of ring gear (17) with oily white lead (fig 3-126). Position assembled equalizer assembly (18, fig 3-88) between housings (15 and 23). Secure housings and gasket (22) using screws (13), nuts (25), and washers (14 and 24).

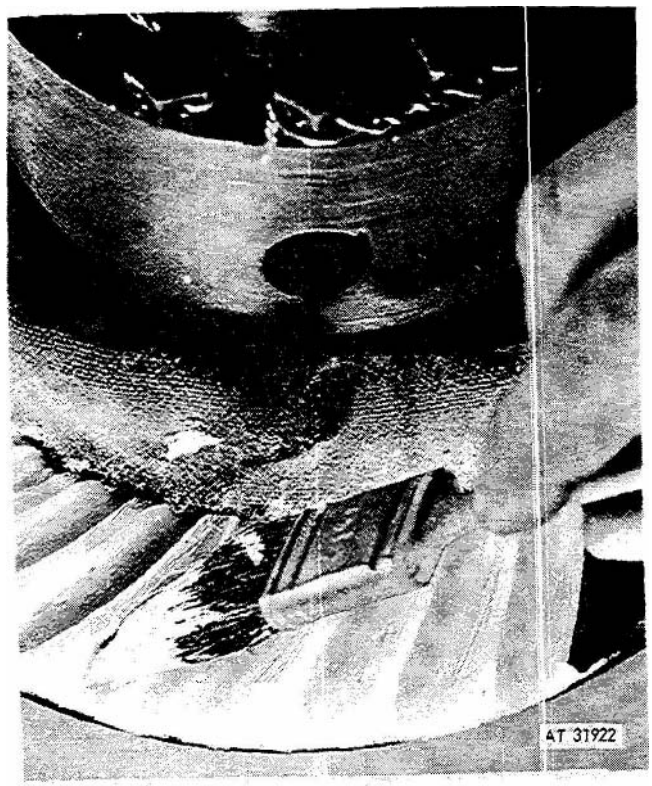


Figure 3-126. *Painting ring gear teeth with oily white lead.*

(36) Check equalizer assembly bearing preload by measuring combined preload of bearings and pinion using a suitable inch-pound torque wrench (fig 3-127). Subtract pinion preload as noted in (32) above and divide the remaining preload by 5.57. The result is the equalizer assembly bearing preload which should be 15-35 lbs-in. Adjust preload to its proper value by adding or removing shims under housing (9 and 27, fig 3-88).

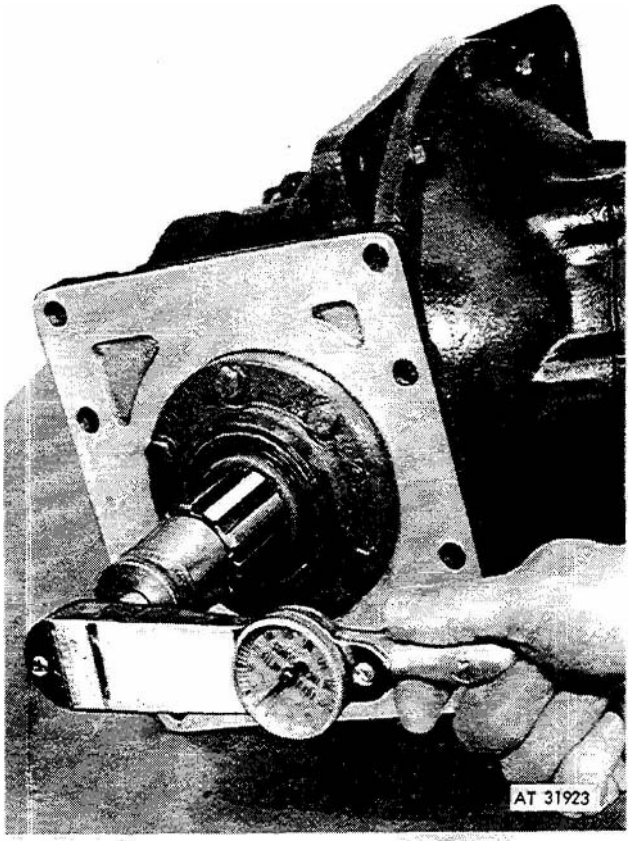


Figure 3-127. Checking equalizer assembly bearing preload.

(37) Mount a dial indicator on housing (50) and place the stem of the indicator on the flat of nut (42) as shown in figure 3-128. Rotate shaft slightly to feel backlash on gears and monitor dial indicator backlash reading; record backlash. Backlash must be 0.006 - 0.012 of an inch. To decrease backlash remove a shim (10, fig 3-88) from under housing (9) and place it under housing (27). To increase backlash remove a shim (26) from under housing (27) and place it under housing (9).

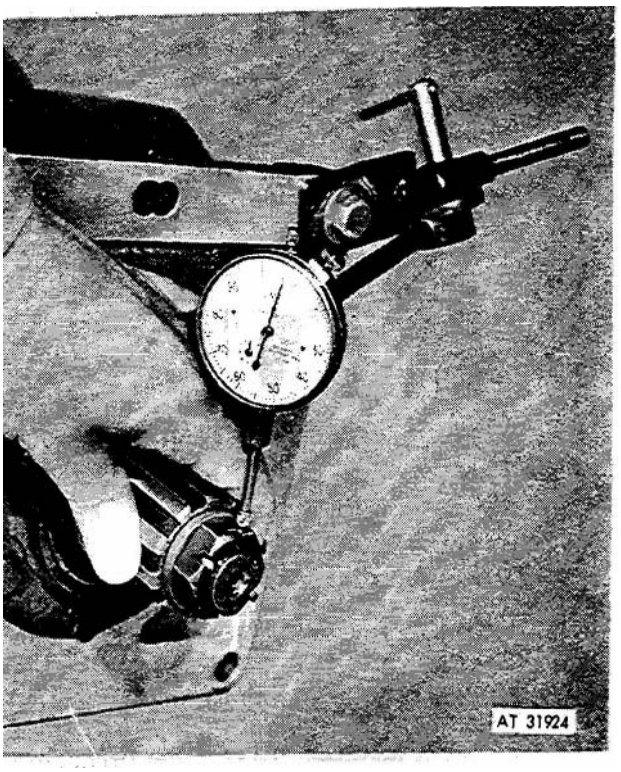


Figure 3-128. Checking backlash.

(38) Rotate pinion. Remove equalizer assembly and observe tooth contact pattern (fig 3-129). Tooth contact pattern should start near toe of gear tooth and run approximately three-quarters the length of gear tooth. It should be centered between top and root of gear tooth, neither running over top nor digging into root. Adjust tooth contact pattern by adding or subtracting the number of shims (51, fig 3-88). After adjusting tooth contact pattern, recheck backlash as per (37) above.

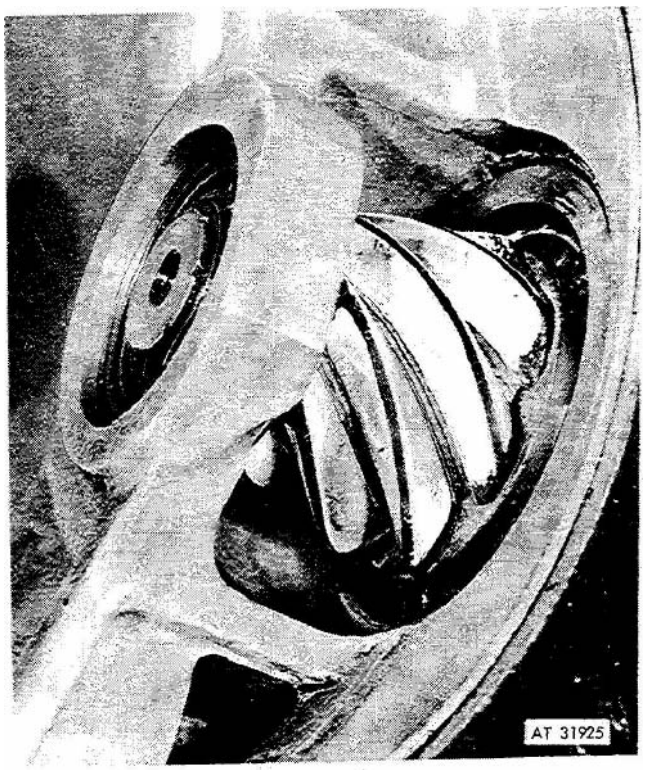


Figure 3-129. Proper tooth contact pattern.

(39) Press seals (2 and 32) into retainers (5 and 31) as shown in figure 3-130. Lightly coat seals with grease (GAA) and install propeller shafts (1 and 35, fig 3-88) in retainers. Press bearings (7 and 29) onto propeller shafts and secure with retaining rings (8 and 28) as shown in figure 3-131.

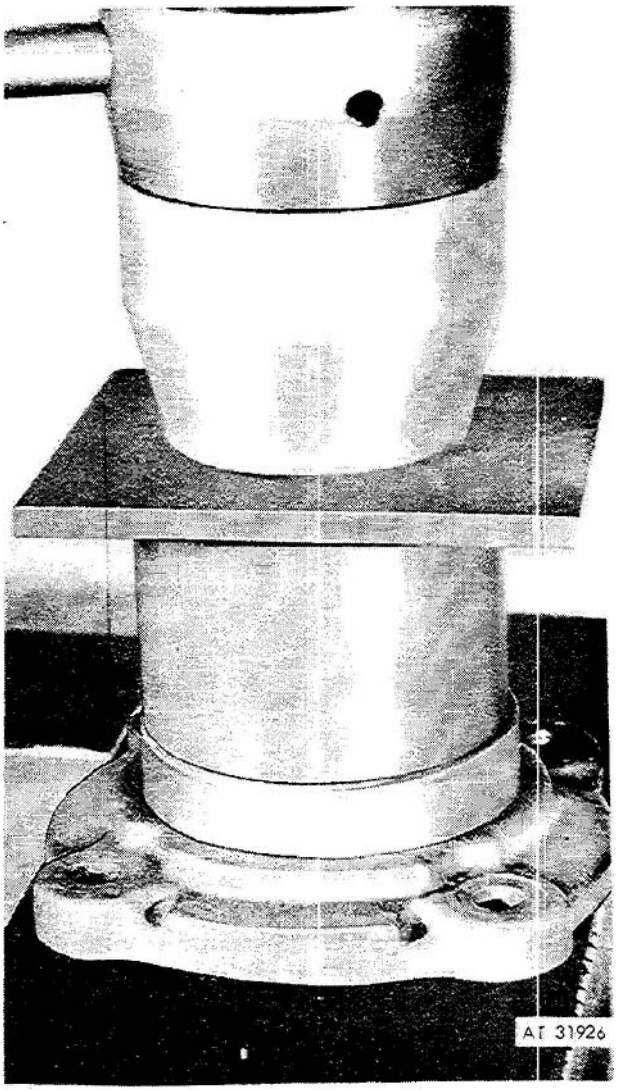


Figure 3-130. Pressing seals into retainer.

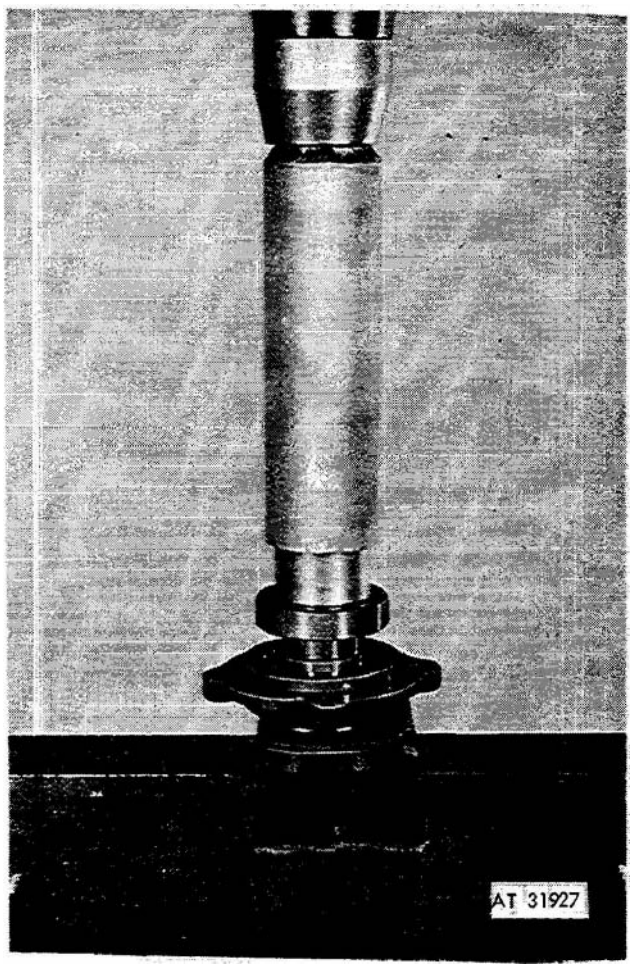


Figure 3-131. Pressing bearing onto propeller shaft.

(40) Position retainers (5 and 31, fig 3·88) and gaskets (6 and 30) and secure to housings (9 **and** 27) with screws (3 and 34) and lock washers (4 and 33).

(41) Install plug (38) and fill differential assembly with proper lubricant, refer to LO 9-2320-242-12. Install plug (12).

f. *Test.*

(1) Front differential shall be subjected to a ten munite break-in test and be checked for grinding, clanking, and other unusual noise.

(2) During test inspect for external leakage. There shall be no leakage.

(3) Test shall be over a range of input torque from 0 to 1200 lbs-ft. at 200 RPM and 0 to 200 lbs-ft. at 2800 RPM in both drive and coast.

(4) Lock input shaft and rotate each output shaft three revolutions. Each output shaft must transmit a minimum of 400 lbs-ft. running torque.

(5) Drain and strain lubricant. No metal chips, shavings, or other foreign matter shall **be evident in** the lubricant or at the drain plug.

g. *Installation.* (Refer to TM 9-2320-242-20.)

Section XI. CENTER DIFFERENTIAL ASSEMBLY

3-41. General

a. The center differential (fig 3-132) is a dual-limited slip type with a 5.57:1 hypoid gear ratio. It is utilized to drive the rear tractor wheels when the vehicle is operating in two-wheel or six-wheel drive and also powers the rear differential when in six-wheel drive. The input shaft of the center differential assembly is connected to and driven by the propeller shaft which is driven by the transfer assembly. Power from the center differential input shaft is transferred to the ring gear and equalizer assembly by two constant mesh spur gears. One gear is attached to the input shaft and the other gear to the pinion drive shaft. Located directly behind and aligned with the input shaft, is the thru-shaft which transfers power from the input shaft to the rear carrier propeller shaft when six-wheel drive is selected.

b. When the vehicle is shifted into six-wheel drive, a splined sliding collar on the thru-shaft is moved forward by its shifting fork and linkage until the collar engages the splined end of the input shaft. This connection of the input and thru-shafts permits the center differential to drive the rear carrier propeller shaft which in turn drives the rear differential. The rear carrier propeller shaft is connected to the center differential output shaft by a double universal joint and to the rear differential pinion drive shaft by a single universal joint. When the vehicle is shifted into two-wheel drive, the sliding collar on the thru-shaft is moved rearward by its shifting fork and attached linkage until it is disengaged from the splined end of the input shaft; disengaging the rear differential.

c. The equalizer assembly which provides the limited slip feature of this differential is the same as the one in the front differential and its operation as described in paragraph 3-39.

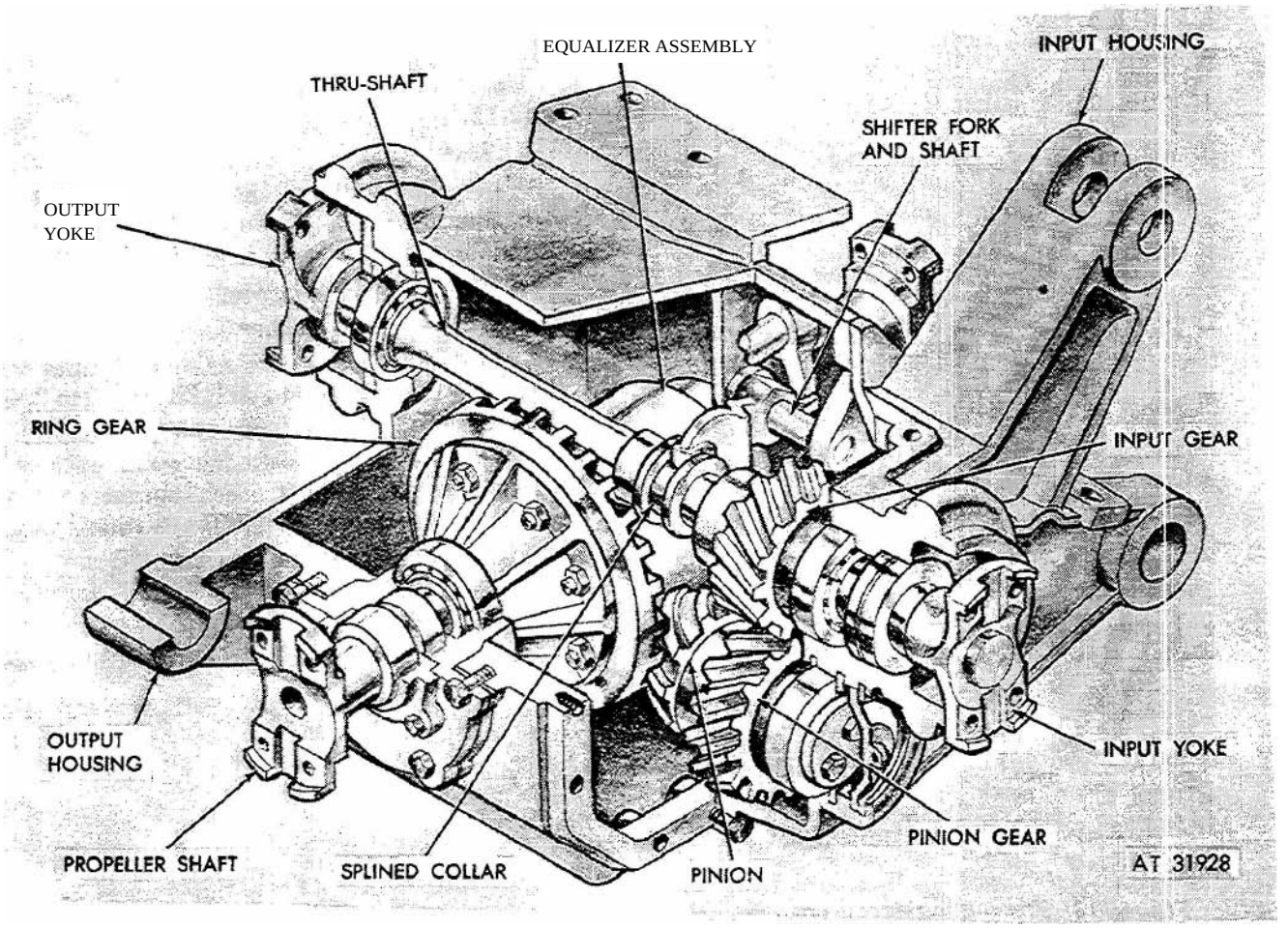


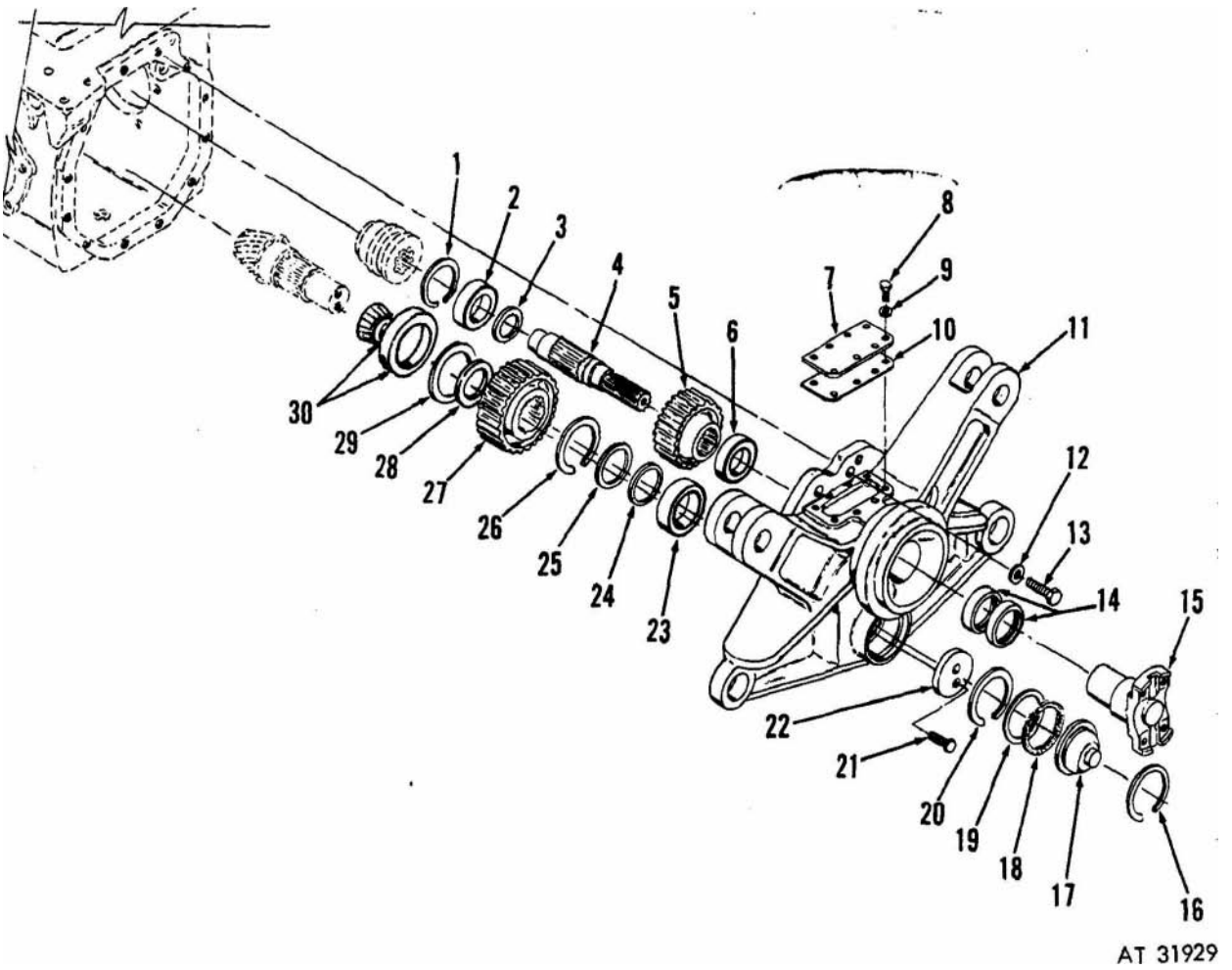
Figure 3-132. Center differential, cross sectional view.

3-42. Center Differential

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect housing (11, fig 3-133) from differential housing by removing screw (13) and washer (12). Disconnect cover (7) and cap (10) by removing screw (8) and lock washer (9). Remove yoke assembly (15) from shaft (4).



1 - Retaining ring
2 - Bearing
3 - Spacer
4 - Shaft
5 - Gear
6 - Bearing
7 - Cover
8 - Screw
9 - Lock washer
10 - Cap
11 - Housing
12 - Washer
13 - Screw
14 - Seal
15 - Yoke assembly
16- Snap ring
17 - Cover
18 - Preformed packing
19 - Washer
20 - Snap ring
21 - Screw
22 - Cap
23 - Bearing
24 - Shim set
25 - Shim **set**
26 - Snap ring
27 - Gear
28 - Spacer
29 - Shim set
30 - Bearing

Figure 3433. Center differential assembly input housing, exploded view.

(2) Disconnect retaining ring (1) from housing (11) and remove shaft from housing. Press bearing (2) from shaft as shown in figure 3-134, and remove spacer (3, fig 3-133).

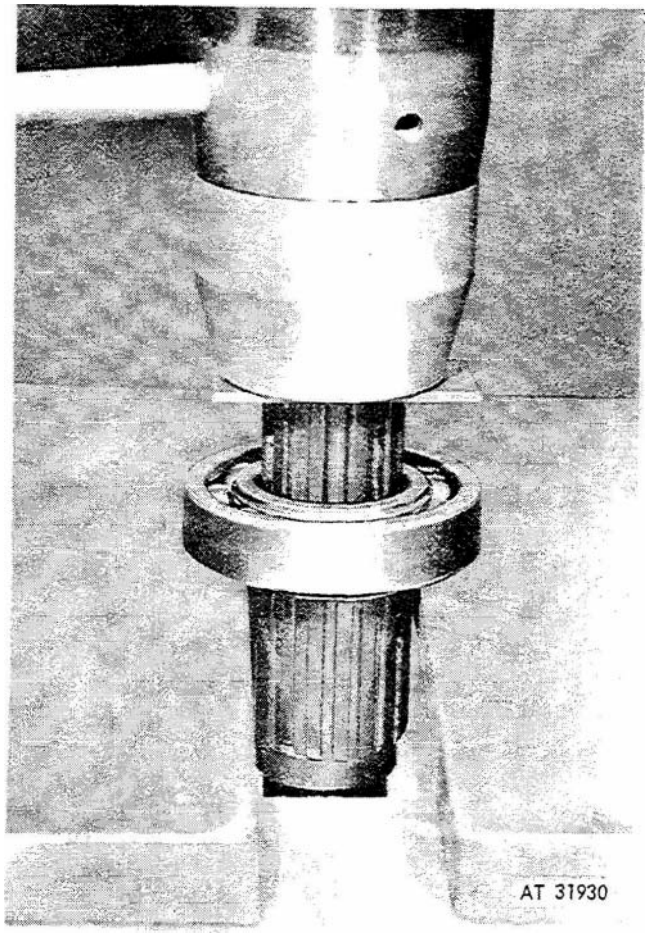


Figure 3-134. Pressing bearing from shaft.

(3) Remove gear (5) from housing (11). Using a suitable puller remove bearing (6) from housing (fig 3-135).

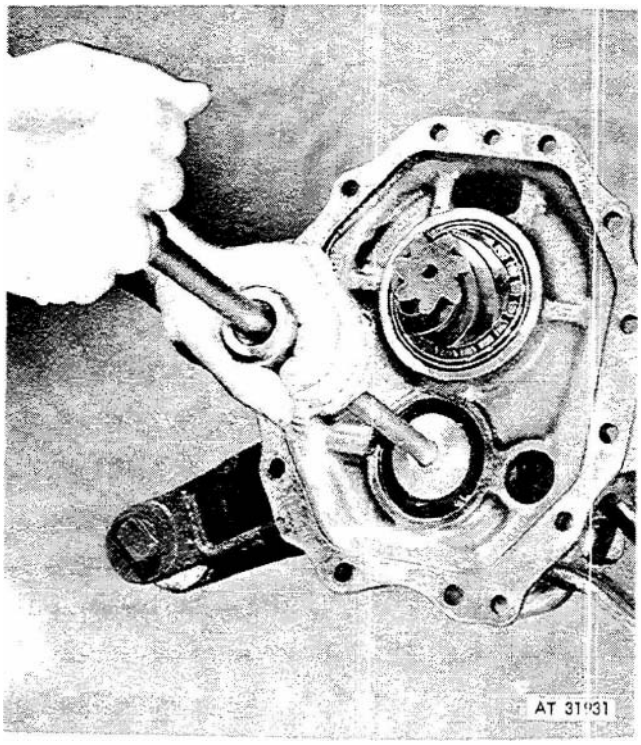


Figure 3-135. Removing bearing from input housing.

(4) Disconnect cover (17, fig 3-133) by removing snap ring (16). Remove preformed packing (18), washer (19), and snap ring (20). Disconnect cap (22) by removing screws (21). Press pinion from housing (fig 3-136).

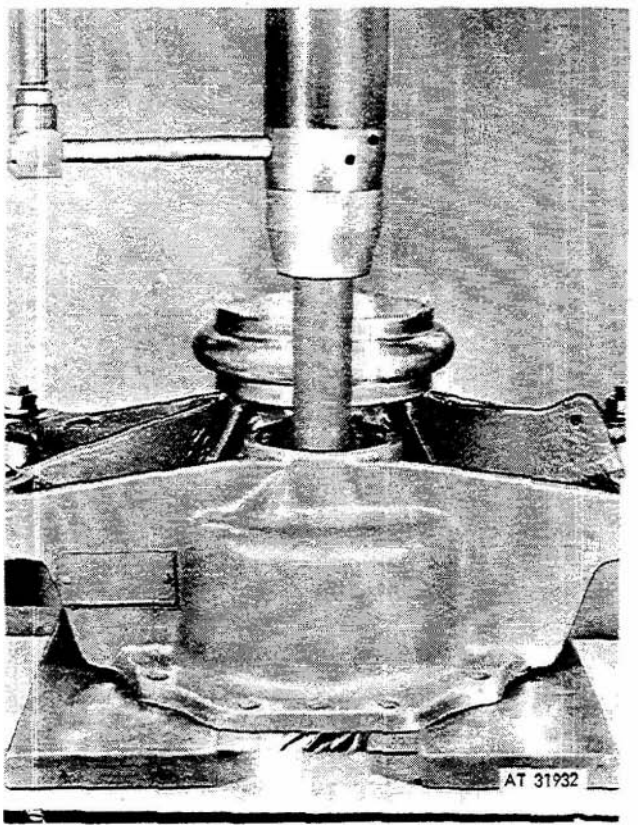


Figure 3-136. Pressing pinion from input bearing.

(5) Remove spacer (28, fig 3-133) from pinion and press bearing (30) from pinion (fig 3-137).

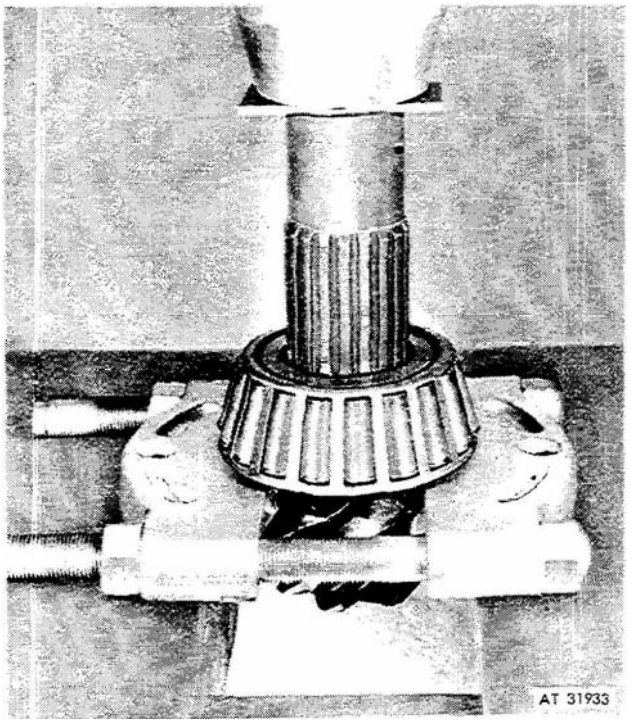


Figure 3-137. **Pressing bearing from center differential pinion.**

(6) Remove gear (27, fig 3-133) and shims (24 and 25) from housing through cover (7) opening.

(7) Using a suitable puller, remove seals (14) from housing (11) as shown in figure 3-138.

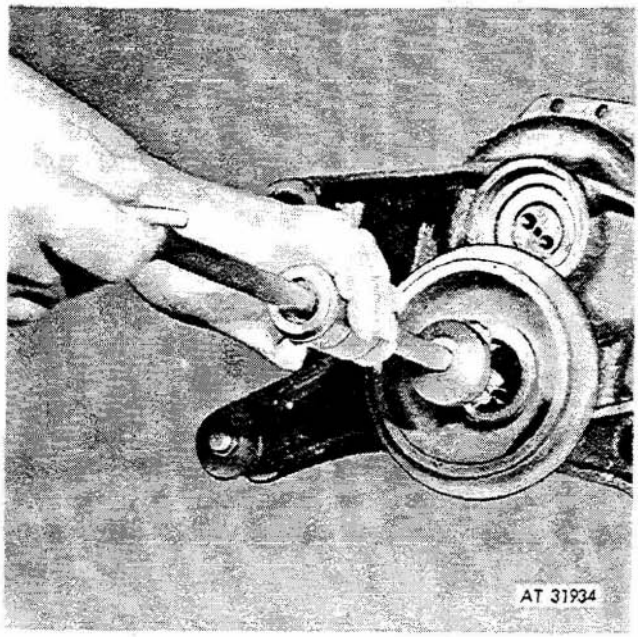


Figure 3-138. Removing seals from input housing.

(8) Using a suitable puller and plate, remove bearing cup of bearing (30, fig 3-133) from housing (11) as shown in figure 3-139. Remove shims (29. fig 3-133) from housing (11).

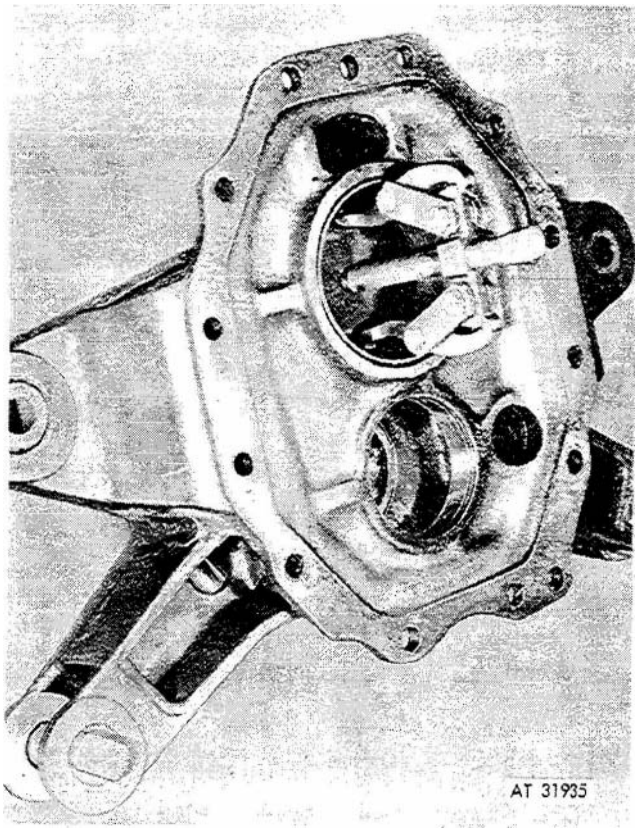


Figure 3-139. Removing bearing cup from input housing.

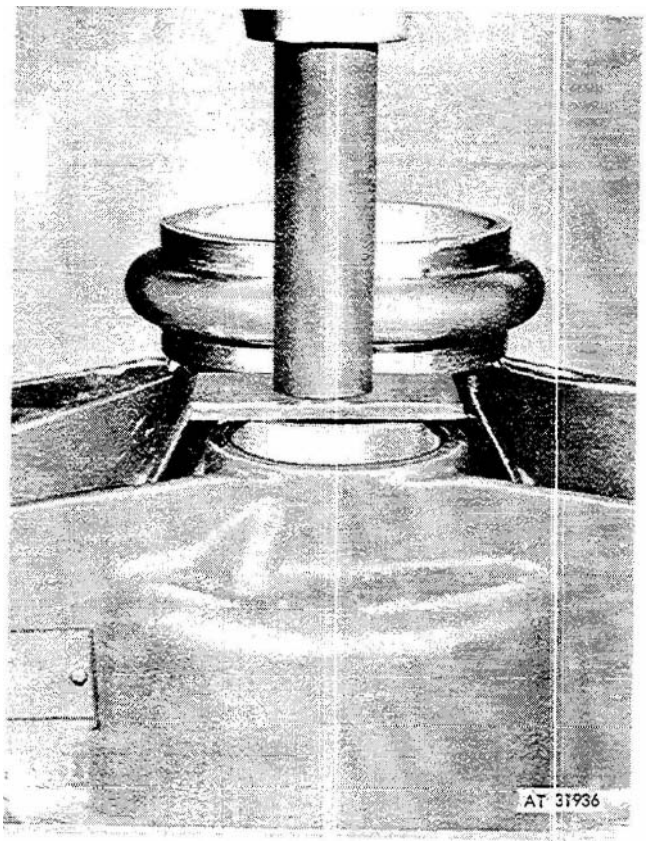


Figure 3-140. Pressing bearing cup from input housing.

(9) Remove snap ring (26) and press bearing (23) from housing (11) as shown in figure 3-140.

(10) Disconnect yoke (4, fig 3-141) by removing cotter pin (1), nut (2), and washer (3). Using a suitable puller, remove yoke from shaft (11) as shown in figure 3-142.

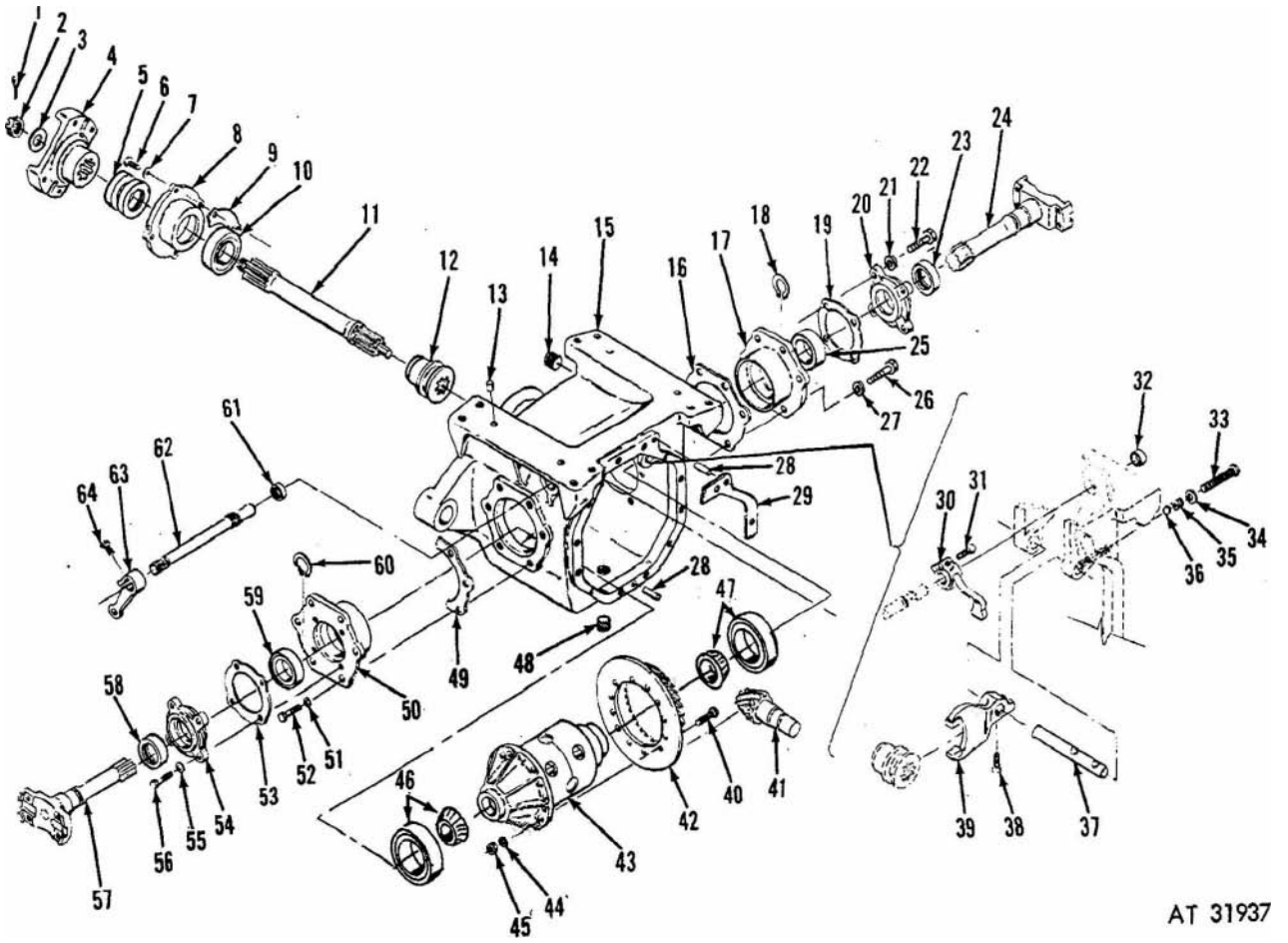


Figure 3-141. Center differential assembly output *shaft, exploded view.*

LEGEND to fig 3-141:

1 - Cotter pin
2 - Nut
3 - Washer
4 - Yoke
5 - Seal
6 - Bolt
7 - Lock washer
8 - Retainer
9 - Gasket
10 - Bearing
11 - Shaft
12 - Sleeve
13 - Pin
14 - Plug
15 - Housing
16 - Shimset
17 - Housing
18 - Retaining ring
19 - Gasket
20 - Retainer
21 - Washer
22 - Screw
23 - Seal
24 - Propeller shaft
25 - Bearing
26 - Screw
27 - Lock washer
28 - Pin
29 - Gasket
30 - Shifter fork
31 - Screw
32 - Cap
33 - Bolt
34 - Washer
35 - Spring
36 - Ball
37 - Shaft
38 - Setscrew
39 - Shifter fork
40 - Bolt
41 - Pinion
42 - Ring gear
43 - Equalizer assembly
44 - Lock washer
45 - Nut
46 - Bearing
47 - Bearing
48 - Plug
49 - Shim set

LEGEND to fig 3-141 -
Continued :
50 - Housing
51 - Lock washer
52 - Screw
53 - Gasket
54 - Retainer
55 - Washer
56 - Screw
57 - Propeller shaft
58 - Seal
59 - Bearing
60 - Retaining ring
61 - Seal
62 - Shaft
63 - Lever
64 - Screw

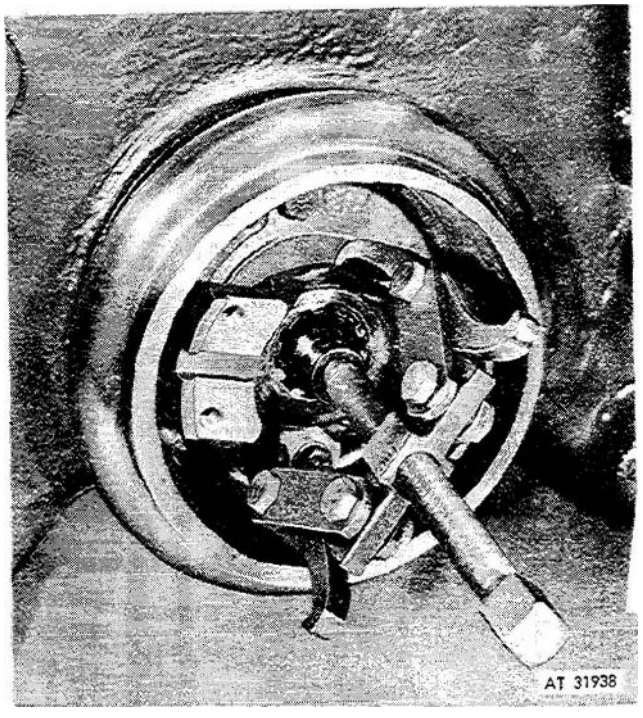


Figure 3-142. Removing yoke from thru-shaft.

(11) Disconnect retainer (8, fig 3-141), gasket (9), and shaft (11) from differential housing (15) as an assembly by removing bolt (6) and lock washer (7). Remove shaft from retainer and press bearing (10) from shaft (fig 3-143).

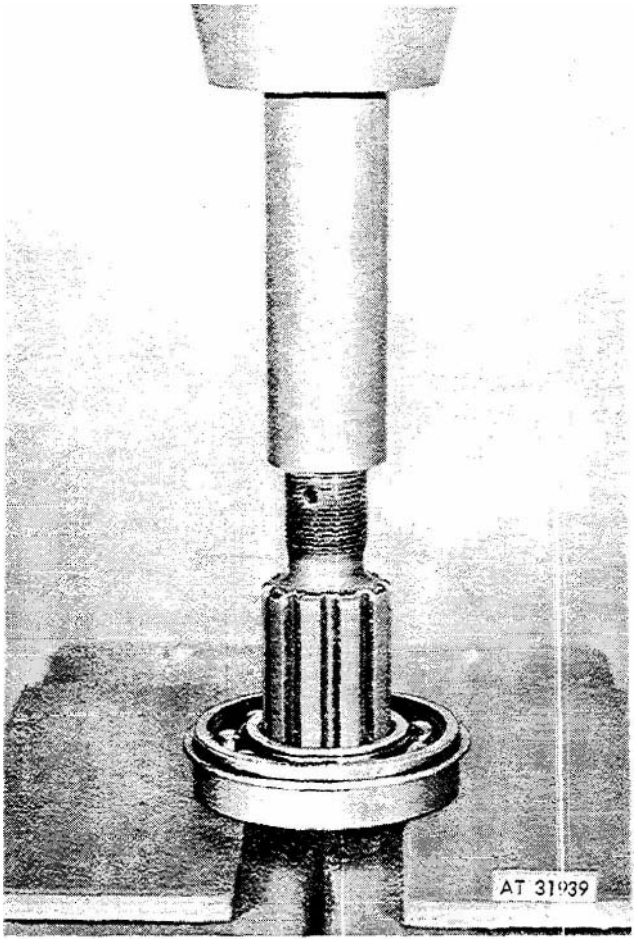


Figure 3-143. Pressing bearing from thru-shaft.

(12) Remove sleeve (12, figure 3 · 141) from differential housing (15). Press seal (5) from retainer (81 as shown in figure 3-144.

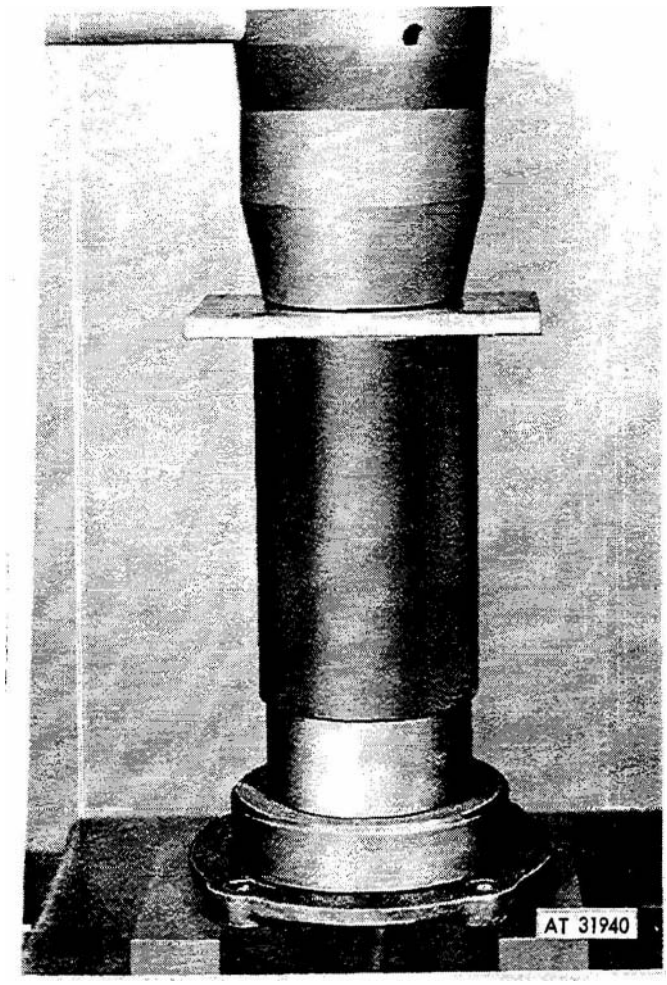


Figure 3-144. Pressing seals from thru-shaft retainer.

(13) Disconnect retainers (20 **and 54, fig** 3-141) and gaskets (19 and 53) by removing screws (22 and 56) and washers (21 and 55). Disconnect retaining rings (18 and 60) from propeller shafts (24 and 57). Press bearings (25 and 59) from propeller shafts (fig 3-89). Remove propeller shafts from retainer and press seals (23 and 58, fig 3-141) from retainers (fig 3-90).

(14) Support equalizer assembly (43, fig 3-141) and disconnect housings (17 and 50) and shim sets (16 and 49) by removing screws (26 and 52) and lock washers (27 and 51). Tie each shim set together and tag with location. Using *a* suitable puller, remove bearing cups of bearings (46 and 47) from housings (17 and 50) as shown in figure 3-91.

(15) Remove equalizer assembly (43, fig 3-141(from housing (15). Using *a* suitable puller, remove bearings (46 and 47) from equalizer **assembly (fig 3-98).**

(16) Disconnect ring gear (42, fig 3-141) from equalizer assembly (43) by removing bolt (40), nut (45), and lock washer (44).

(17) Disconnect spring (35) and ball (36) by removing bolt (33) and washer (34). Disconnect shifter fork (39) by removing setscrew (38), and remove shaft (37) and shifter fork (39) from housing (15).

(18) Mark alignment marks on shaft (62) and lever (63). Disconnect shifter fork (30) and lever (63) by removing screws (31 and 64). Remove shaft (62) and shifter fork from housing (15). Remove lever (63) from shaft (62).

(19) Using a suitable puller, remove seal (61) from housing (15) as shown in figure 3-145.

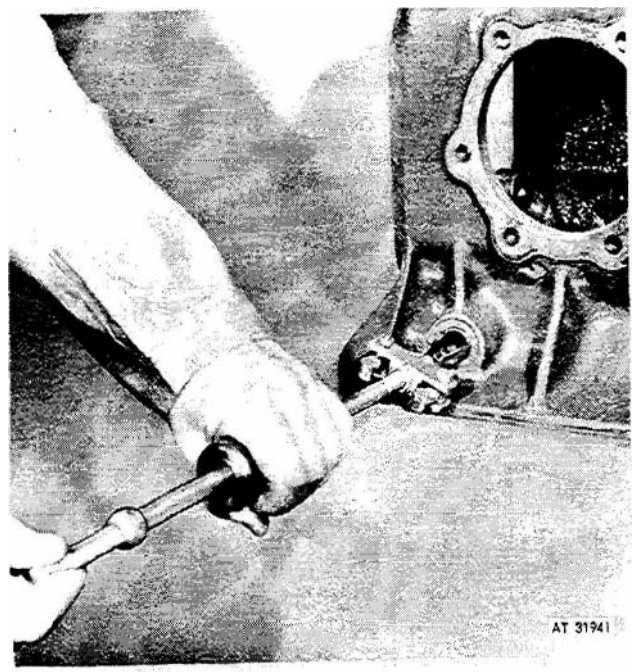


Figure 3-145. Removing shaft seal from housing.

(20) Remove plugs (14 and 48, fig 3-141) from housing (15).

(21) Refer to paragraph 3-40b (15) to disassemble the equalizer assembly.

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

(1) Pinion (41, fig 3-141) and ring gear (42) are a matched gear set. If during inspection the pinion or ring gear is found defective they shall both be replaced.

(2) If an equalizer housing is found defective during inspection, the whole equalizer assembly shall be replaced.

e. *Assembly.*

(1) Refer to paragraph 3-40e (1) to assemble the equalizer assembly.

(2) Prior to installing a new equalizer

assembly, check equalizer assembly running torque. Install equalizer assembly in fixture (11600105) and a propeller shaft (24, fig 3-141) in equalizer assembly. Secure adapter (11595241) with a suitable torque wrench to propeller shaft and check running torque by rotating adapter a minimum of three revolutions and monitoring torque wrench readings. Running torque should be a minimum of 400 lbs-ft.

(3) Press bearings (46 and 47, fig 3-141) onto equalizer assembly (fig 3-119).

(4) Press bearing cups of bearings (46 and 47, fig 3-141) into housings (17 and 50) as shown in figure 3-125.

(5) Position housings (17 and 50) and shims (16 and 49) and secure to housing (15) using screws (26 and 52) and lock washers (27 and 51).

(6) Position an output shaft in equalizer assembly (43) and attach adapter (11595241) and a suitable pound-inch torque wrench to output shaft (fig 3-146). Measure bearing preload. Bearing preload should be 5-15 lbs-in., if not, adjust preload by adding or subtracting the number of shims (16 and 49, fig 3-141) under housing (17 and 50).

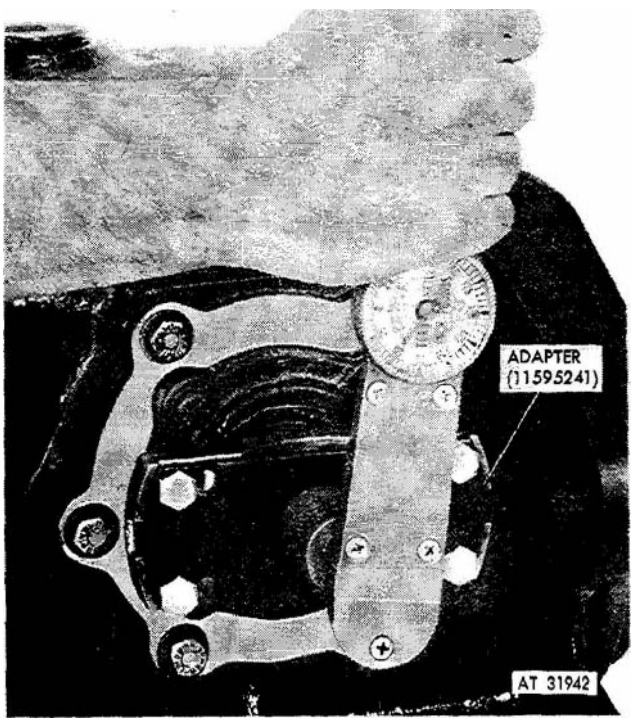


Figure 3-146. Checking center differential equalizer assembly bearing p reload.

(7) Using a suitable tool, install seal (61) in housing (15) as shown in figure 3-147.

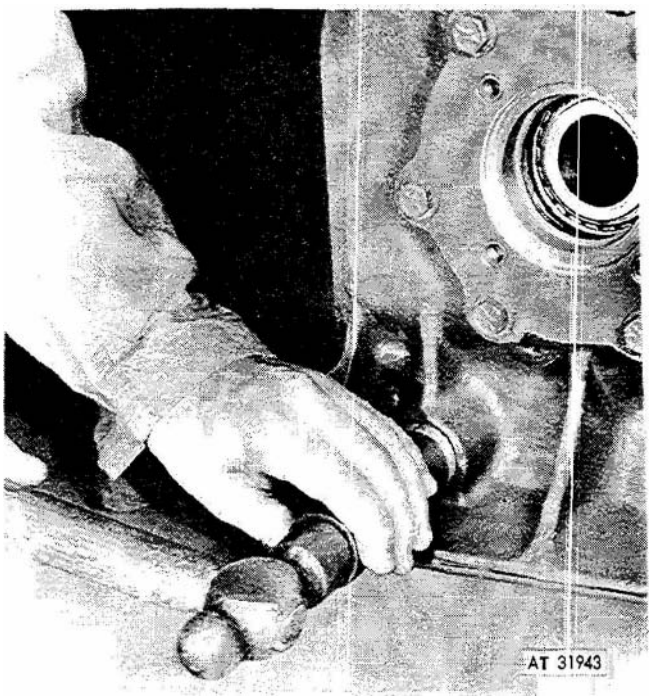


Figure 3-147. Installing seal in housing.

(8) Slide shaft (62, fig 3-141) into housing (15) and position shifter fork (30) on shaft. Align shifter fork (30) with recess in shaft (62) and secure shifter fork with screw (31) ; lockwire screw.

(9) Slide shaft (37) into housing (15) and position shifter fork (39) on shaft. Align shifter fork (39) with hole in shaft (37) and secure shifter fork with setscrew (38); lockwire setscrew. Make sure shifter fork (30) engages shifter fork (39) as shown in figure 3-148.

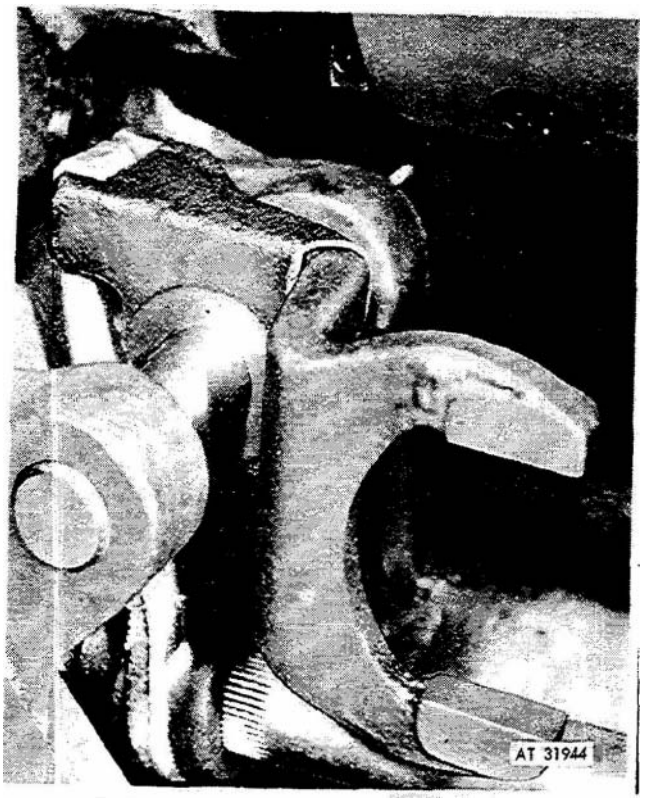


Figure 3-148. Proper installation of shifter forks.

(10) Align alignment marks on shaft (62, fig 3-141) and lever (63) and position lever on shaft. Secure lever to shaft with screw (64); lockwire screw.

(11) Press bearing (23, fig 3-133) into housing (1) as shown in figure 3-149). Install snap ring (26, fig 3-133).

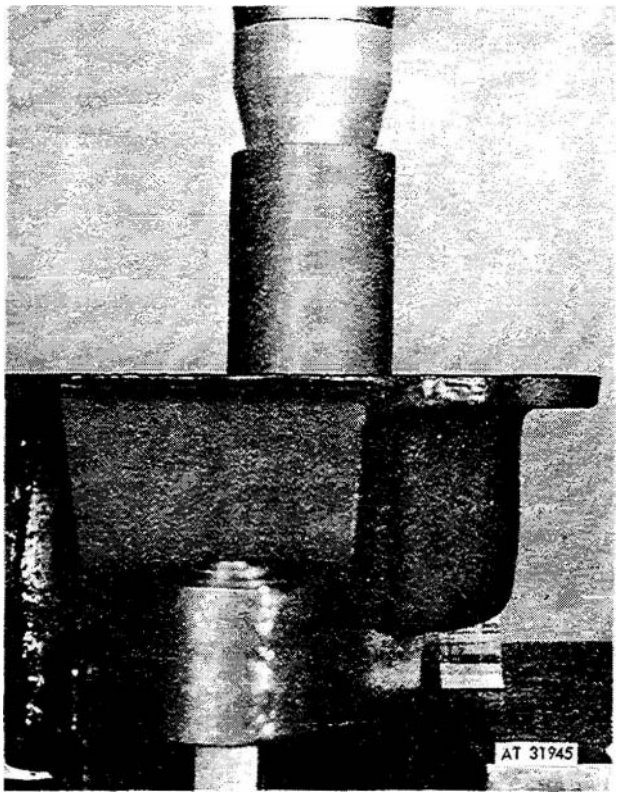


Figure 3-149. Pressing outer bearing cup into input housing.

(12) Position shims (29, fig 3-133) in housing (11) and press bearing cup of bearing (30) into housing (fig 3-150).

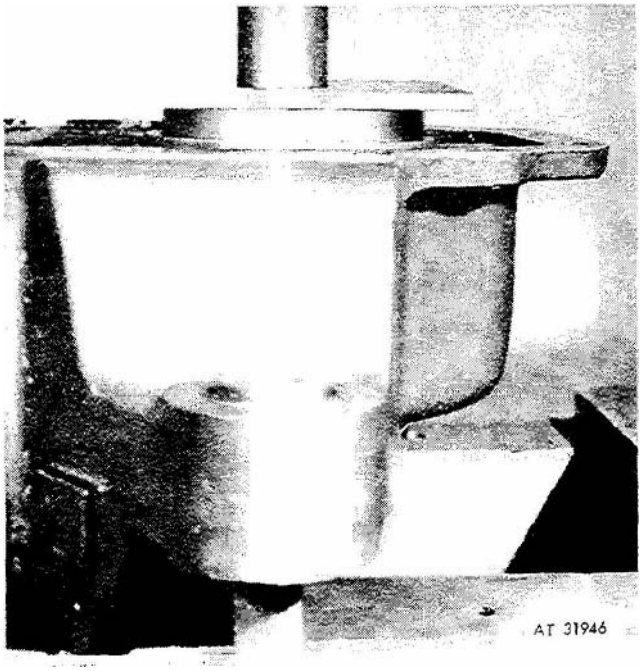


Figure 3-150. Pressing inner bearing cup into input housing.

(13) Press bearing (30, fig 3-133) on pinion (fig 3-151). Position spacer (28, fig 3-133) on pinion.

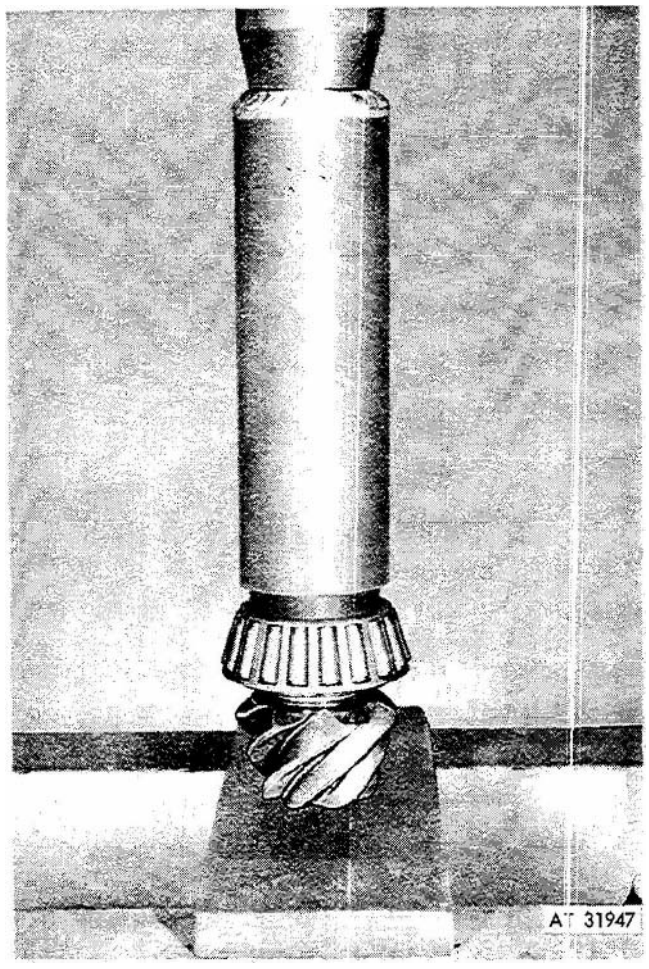


Figure 3-151. Pressing bearing on center differential pinion.

(14) Position shims (24 and 25) and gear (27) in housing (11) as shown in figure 3-152. Align shims and gear, and press pinion into housing (fig 3-153).

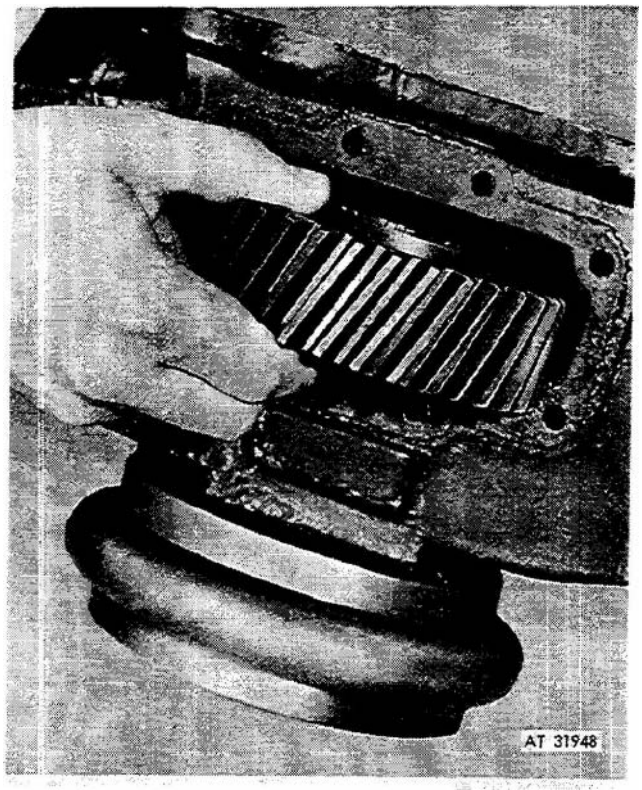


Figure 3-152. Proper installation of pinion gear.

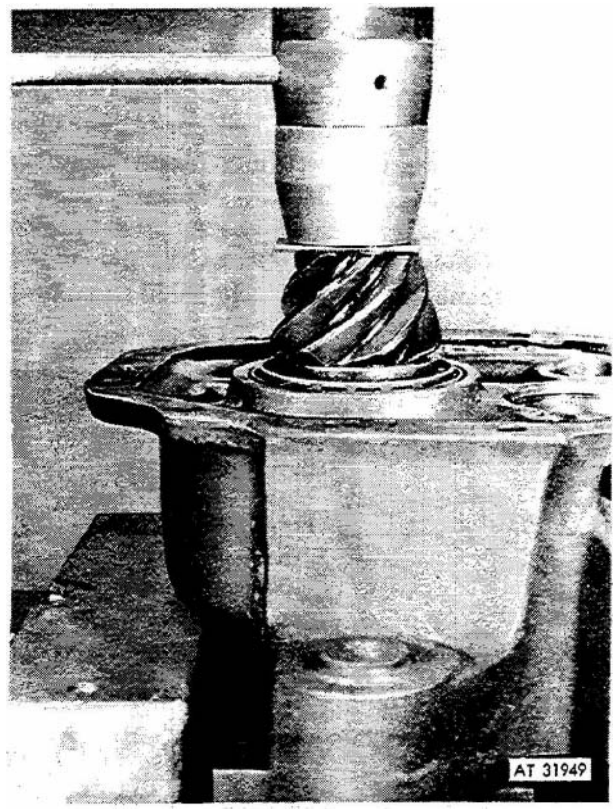


Figure 3-153. Pressing pinion into input housing.

(15) Position cap (22, fig 3-133) on pinion and draw pinion into proper position by tightening screws (21). Remove screws and cap.

(16) Wrap a cord around gear (27), a minimum of three wraps, and measure pinion preload by pulling cord with a suitable inch-pound scale (figs 3-154 and 3-155). Multiply scale indication times 2.5, which will be the pinion preload. Preload should be 5-15 lbs-in., if not, add or subtract shims (24 and 25, fig 3-133) to obtain proper preload.

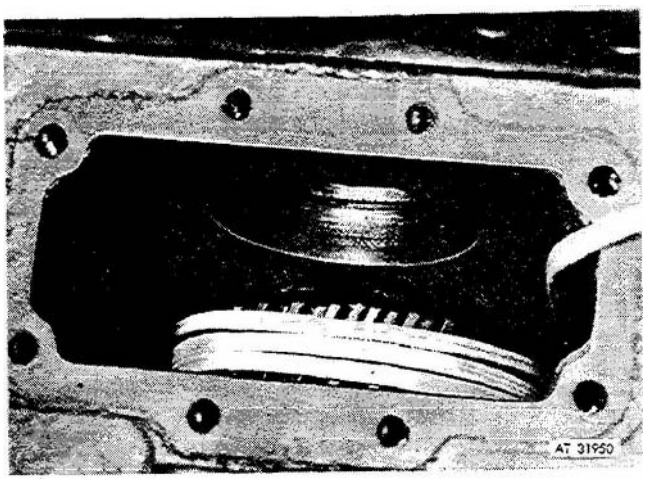


Figure 3-154. Cord ***wrapped around pinion gear.***

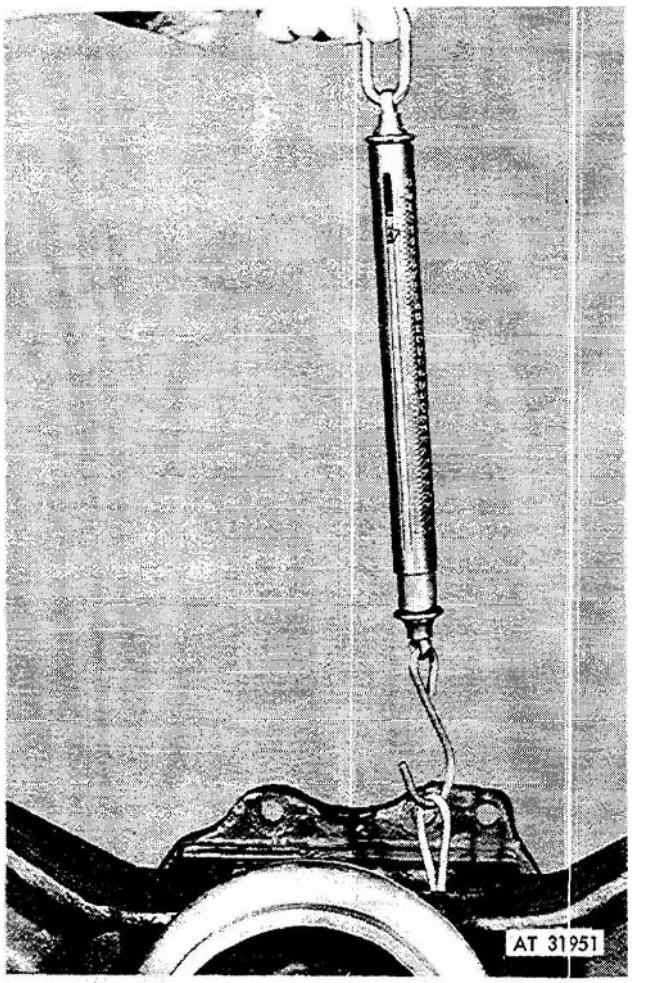


Figure 3-155. Measuring pinion preload.

(17) Paint ten teeth of ring gear (42, fig 3-141) with oily white lead (fig 3-126).

(18) Position gasket (29, fig 3-141) on housing (15). Align pins (28) with holes in housing (11, fig 3-133), as shown in figure 3-156, and fasten housings together using screw (13, fig 3-133) and washer (12).

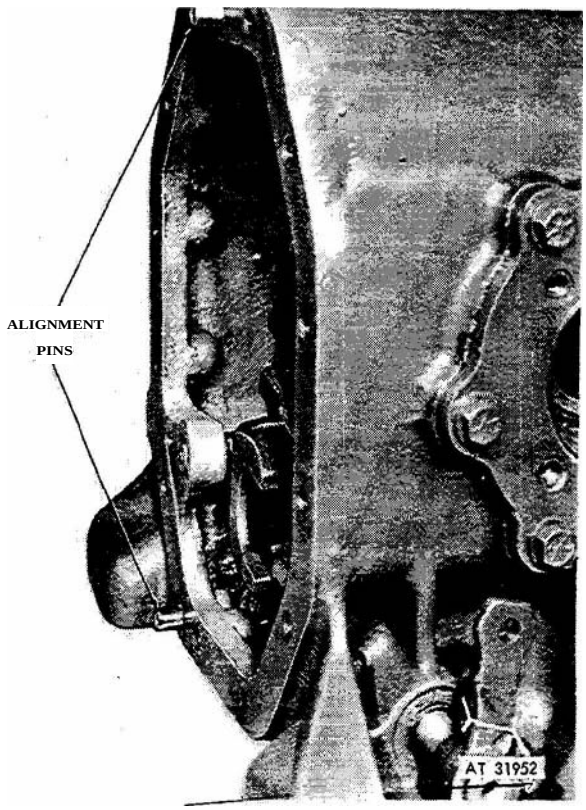


Figure 3-156. Location of housing alignment pins.

(19) Position a dial indicator on differential housing (15, fig 3-141) and place stem of the dial indicator on pinion (41) as shown in figure 3-157. Move pinion slightly to feel backlash (movement between gear teeth) and monitor dial indicator backlash reading. Backlash should be 0.006 - 0.012 of an inch. To decrease backlash remove a shim (16, fig 3-141) from under housing (17) and place it under housing (50). To increase backlash remove shims (49) from under housing (50) and place it under housing (17). Remove dial indicator.

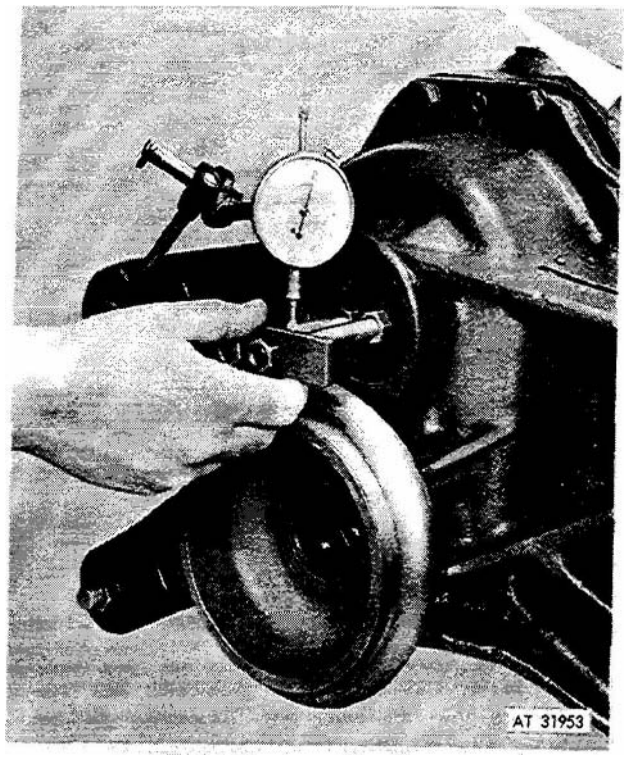


Figure 3-157. Checking center differential backlash.

(20) Rotate pinion (41). Disconnect housing (11, fig 3-133) and observe tooth contact pattern on pinion. Tooth contact pattern should run just off the toe of tooth and about $\frac{5}{8}$ inch toward the root. The contact should be centered on the tooth and neither running over the top nor digging in the root. To increase tooth contact, increase the number of shims (29) and decrease the number of shims (24 and 25) to equal the same dimension. To decrease tooth contact, decrease the number of shims (29) and increase the number of shims (24 and 25) to equal the same dimension. Recheck backlash as outlined in (19) above (fig 3-129).

(21) Pack seal (5, fig 3-141) with grease(GAA) and press seal into retainer (8) as shown in figure 3-158.

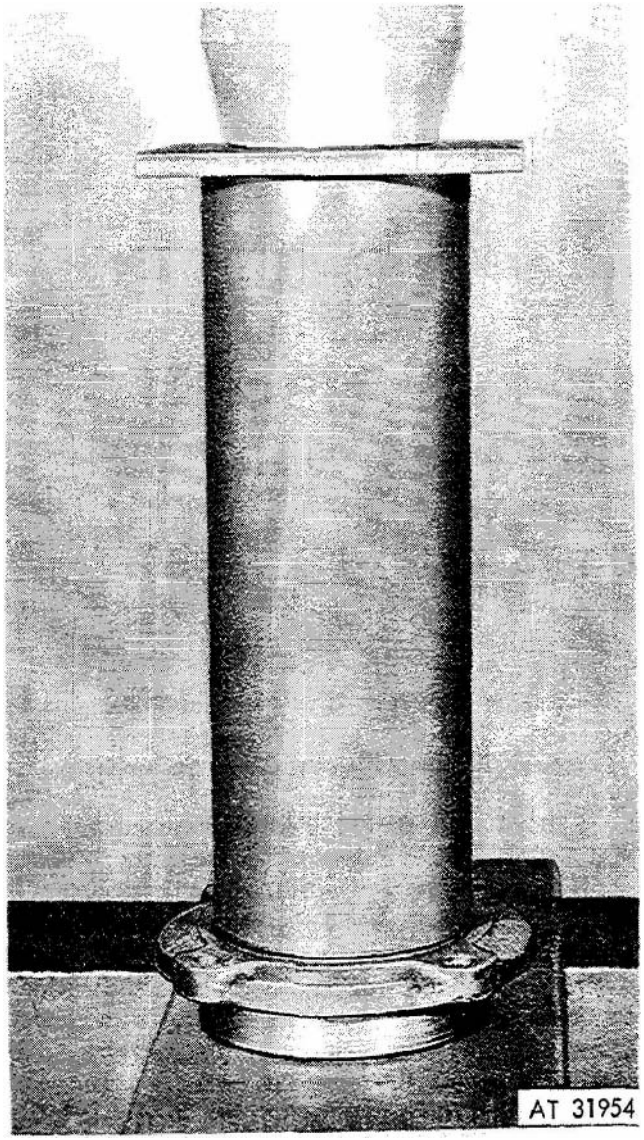


Figure 3-158. Pressing seal into thru-shaft retainer.

(22) Press bearing (10, fig 3-141) on shaft (11) with retaining ring side toward center of shaft (fig 3-159).

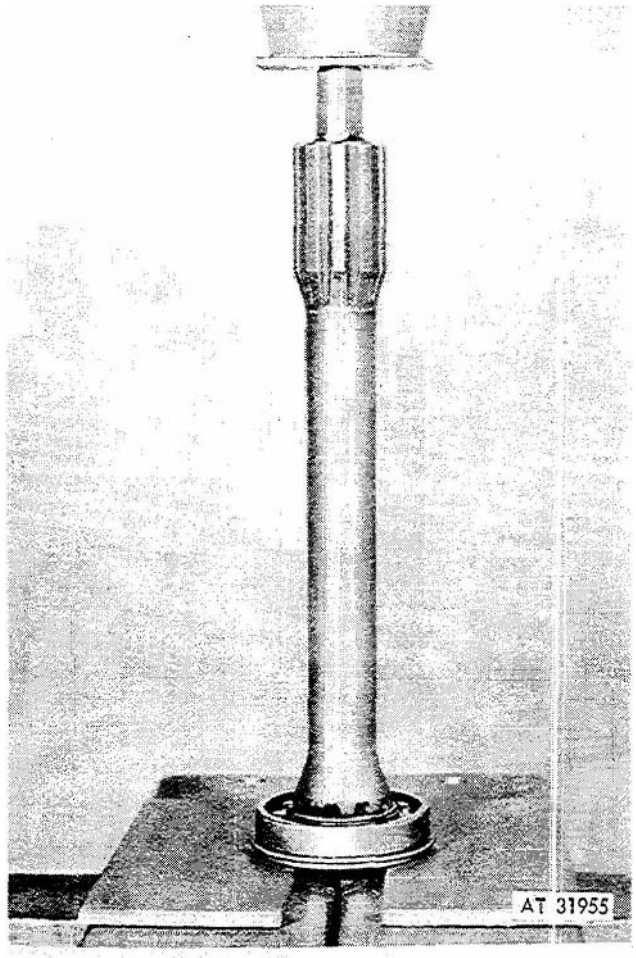


Figure 3-159. Pressing bearing on thru-shaft.

(23) Position yoke (4, fig 3-141) and retainer (8) on shaft (11) and secure with nut (2) and washer (3). Tighten nut to 175-250 leas-ft. torque and install cotter pin (1) as *shown* in figure 3-160.

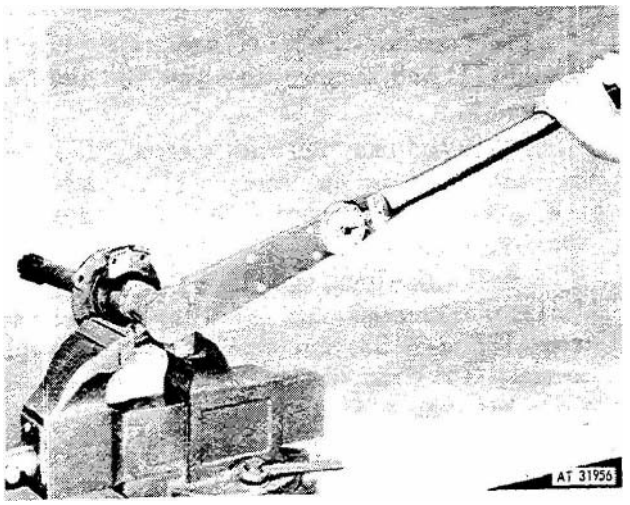


Figure 3-160. Securing yoke to thru-shaft.

(24) Position sleeve (12, fig 3-141) on shifter fork (39) as shown in figure 3-161. Position assembled retainer (8, fig 3-141) and gasket (9) to housing (15), making sure that shaft (11) engages sleeve (12). Secure retainer using bolt (6) and lock washer (7). Install ball (36) and spring (35) and secure with bolt (33) and washer (34).

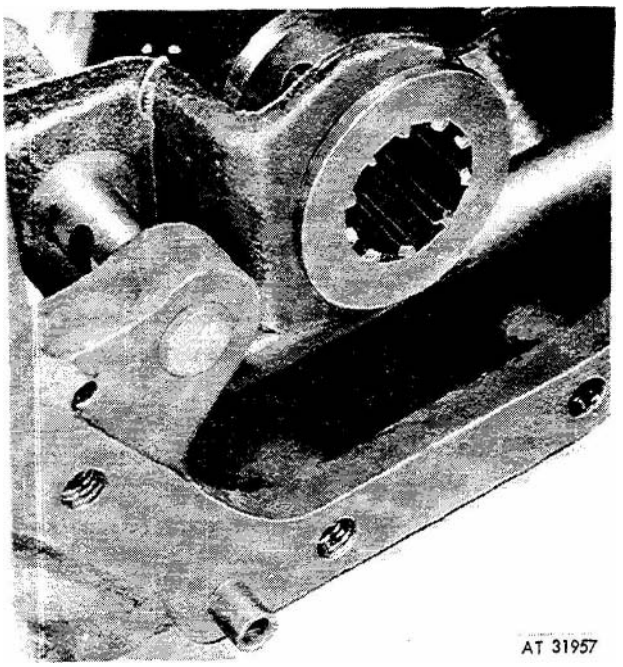


Figure 3-161. Proper installation of sleeve.

(25) Position spacer (3, fig 3-133) on shaft (4) and press bearing (2) on shaft (fig 3-162).

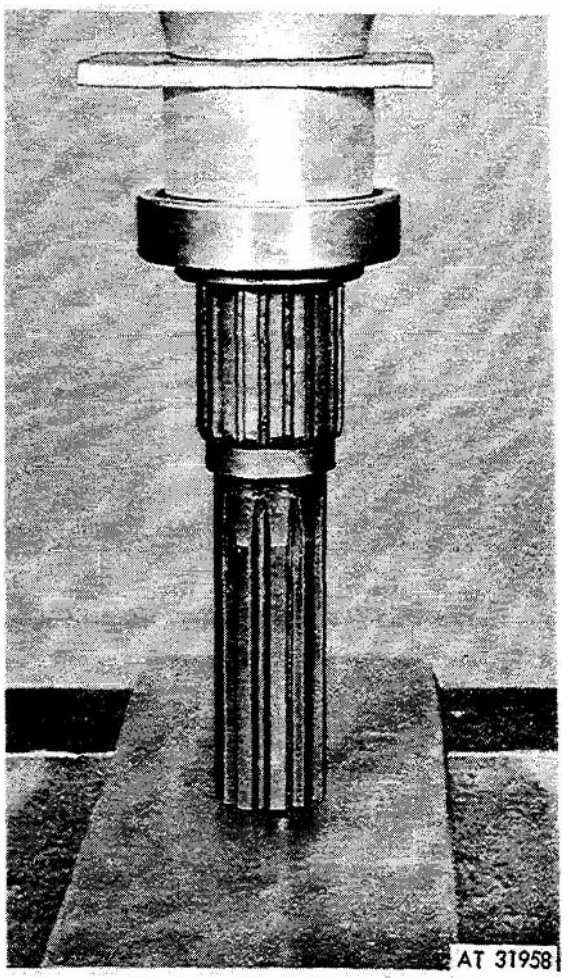


Figure 3-162. Pressing bearing on shaft.

(26) Pack seal (14, fig 3-133) with grease (GAA) and install seal in housing (11). Install bearing (6) in housing (11). Position gear (5) into housing (fig 3-163) and install assembled shaft (4, fig 3-133) as shown in figure 3-164. Install retaining ring (1, fig 3-133).

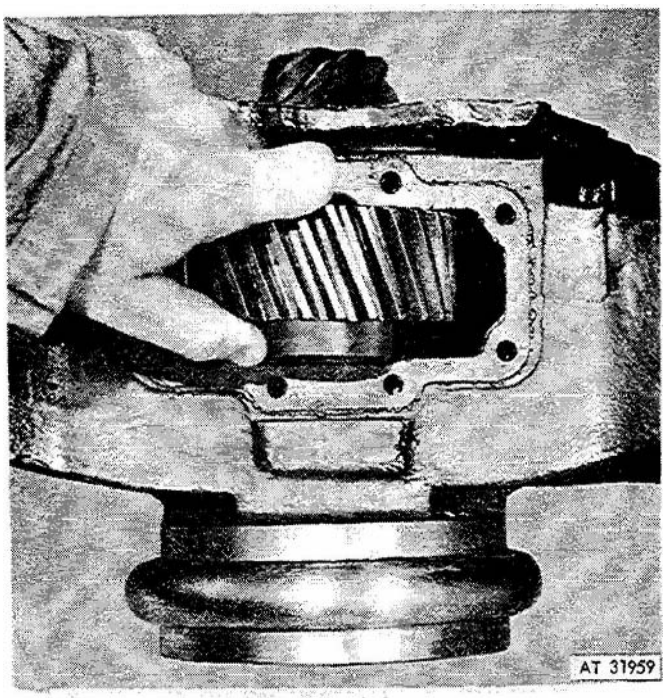


Figure 3-163. Installing gear in input housing.

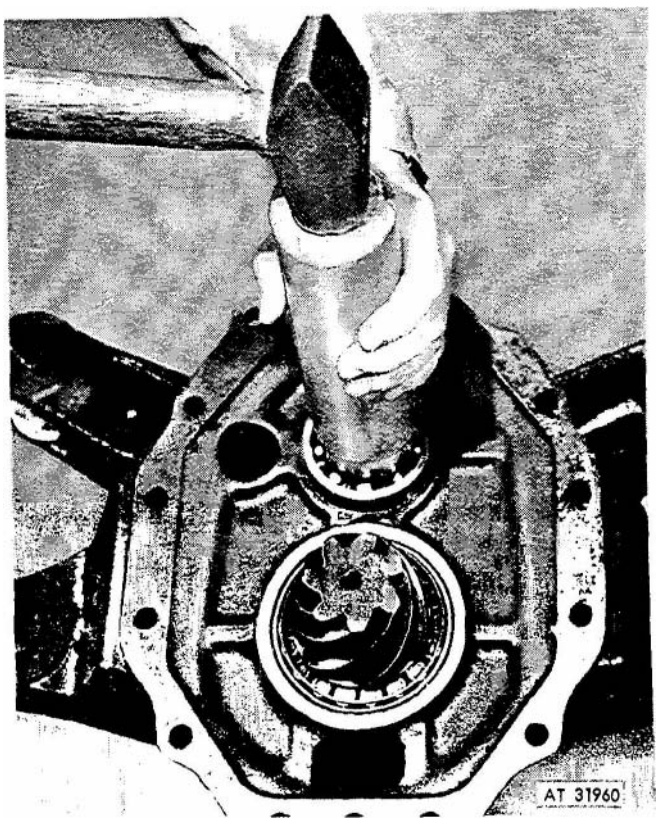


Figure 3-164. Installing assembled shaft in input housing.

(27) Position cover (7) and cap (10) on housing (11) and secure with screw (8) and lock washer (9)

(28) Install cap (22) with screws (21) ; lockwire screws. Position cover (17), preformed packing (18), and washer (19) and secure with snap ring (16).

(29) Position housing (11) and gasket (29, fig 3-141) to differential housing (15) and secure with screw (13, fig 3-133) and washer (12). Slide yoke assembly (15) on input shaft (4) being careful not to damage seals (14).

(30) Press seals (23 and 58, fig 3-141) into retainers (20 and 54) as shown in figure 3-130. Pack seals with grease (GAA) and position propeller shafts (24 and 57, fig 3-141) in retainers.

(31) Press bearings (25 and 59) on propeller shafts (24 and 57) as shown in figure 3-131. Install retaining rings (18 and 60, fig 3-141) on propeller shafts.

(32) Position assembled retainers and gaskets (19 and 53) to housing and secure with screws (22 and 56) and washers (2) and 55).

(33) Install plug (48) and fill differential assembly with proper lubricant, refer to LO 9-2320-242-12. Install plug (14).

f. *Test.*

(1) Center differential shall be subjected to *a* ten minute break-in test and be checked for grinding, clanking, and other unusual noise.

(2) During test inspect for external leakage. There shall be no leakage.

(3) Test shall be over *a* range of input torque from 0 to 1200 lbs-ft. at 200 RPM and 0 to 200 lbs-ft. at 2800 RPM in both drive and coast.

(4) Center differential shall demonstrate ease of shifting.

(5) Lock input shaft and rotate each output shaft three revolutions. Each output must transmit a minimum of 400 lbs-ft. running torque.

(6) Drain and strain lubricant. No metal chips, shavings, or other foreign matter shall be evident in the lubricant or at the drain plug.

g. *Installation.* (Refer to **TM 9-2320-242-20.**

Section XII. REAR DIFFERENTIAL ASSEMBLY

3-43. General

The rear differential (fig 3.165) is *a* dual-limited slip type with a 5.57:1 hypoid gear ratio. It is utilized to drive the carrier wheels when the vehicle *is* operating in six-wheel drive. It is driven by the carrier propeller shaft that is engaged when the center differential's input and thru-shafts are connected by the thru-shaft's sliding collar. The equalizer assembly which provides the limited slip feature of this differential is the same as the one utilized in the front differential and its operation is described in paragraph 3-39.

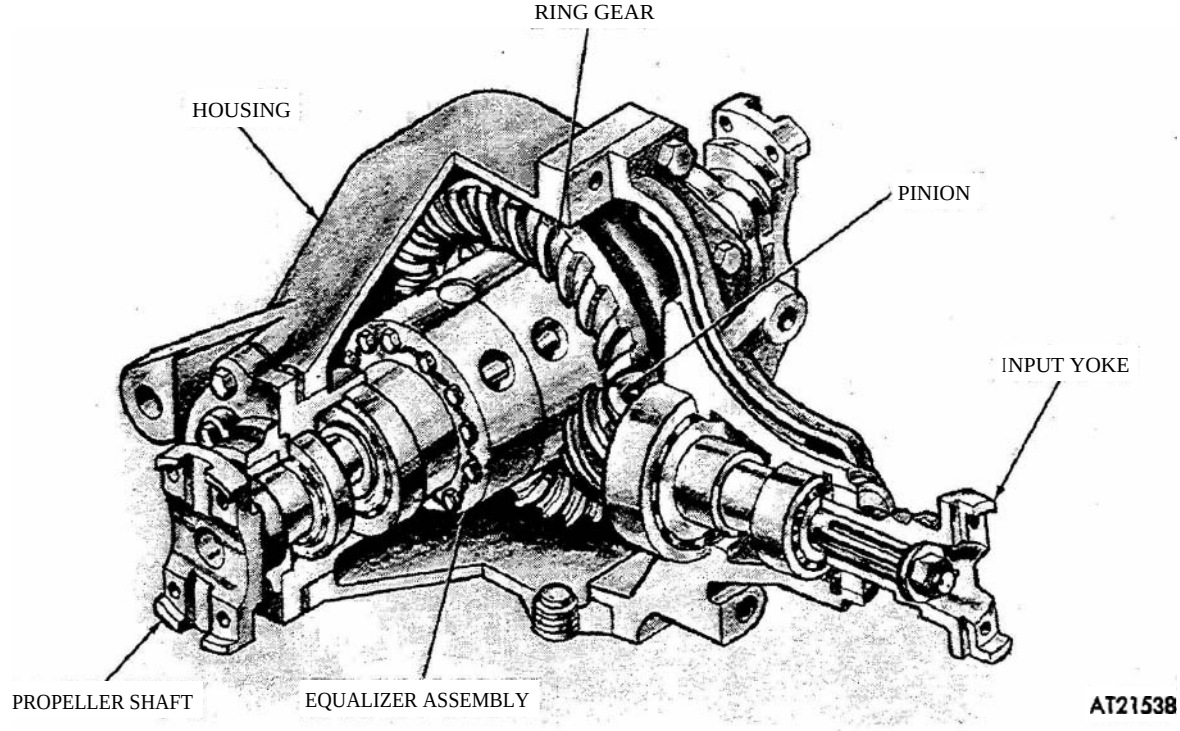


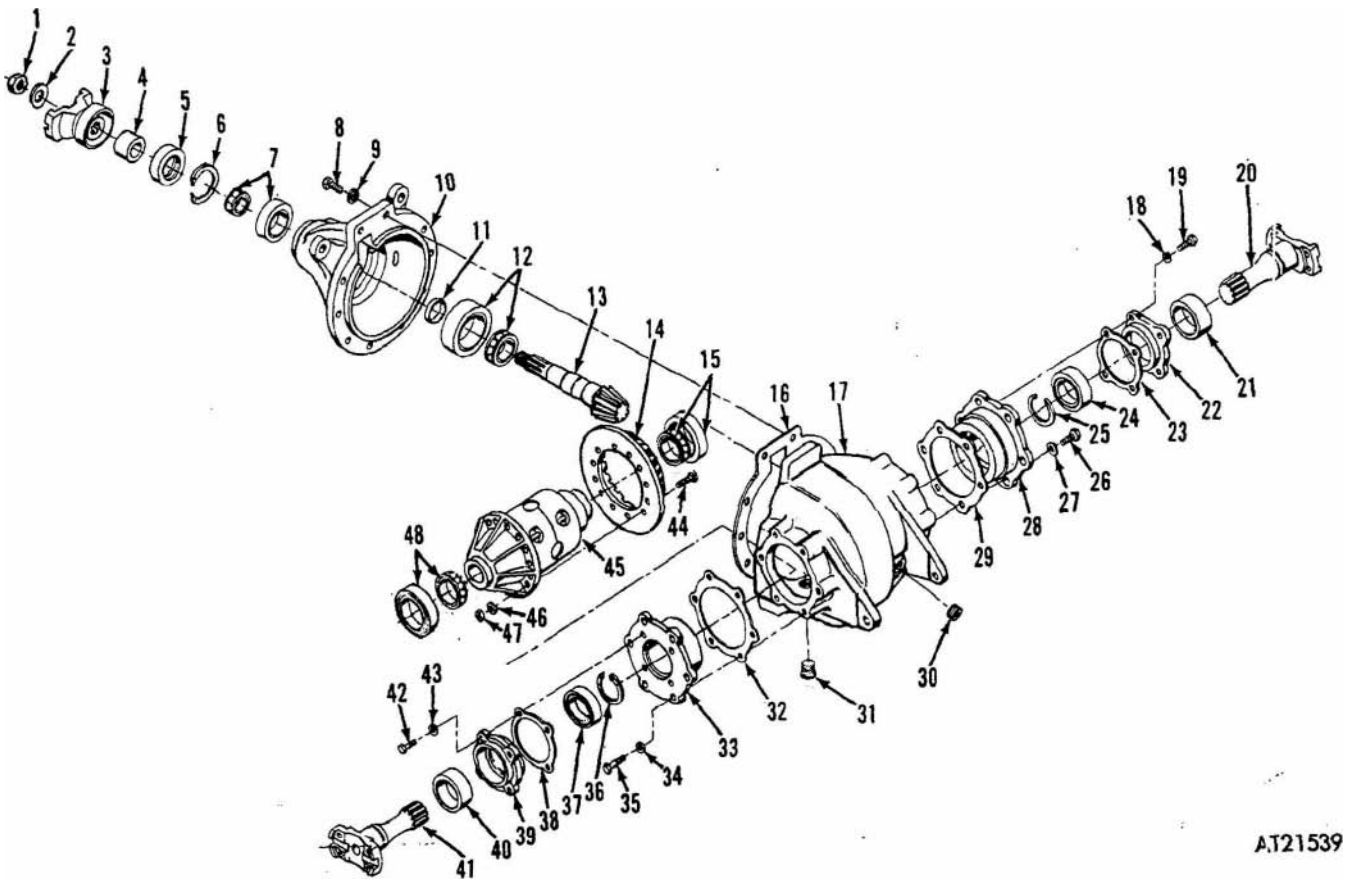
Figure 3-165. Rear differential, cross sectional view.

3-44. Rear Differential

a. Removal. (Refer to TM 9-2320-242-20)

b. Disassembly.

(1) Disconnect housing (10, fig 3 · 166) from housing (17) by removing screw (8) and washer (9). Remove shims (16). Tie shims together and tag to indicate location.



LEGEND to fig 3-166:

1 - Nut
2 - Washer
3 - Yoke
4 - Spacer
5 - Seal
6 - Retaining ring
7 - Bearing
8 - Screw
9 - Washer
10 - Housing
11 - Spacer
12 - Bearing
13 - Pinion
14 - Ring gear
15 - Bearing
16 - Shim
17 - Housing
17 - Housing
18 - Lock washer
19 - Screw
20 - Propeller shaft
21 - Seal
22 - Retainer
23 - Gasket
24 - Bearing
25 - Retaining *ring*
26 - **Screw**
27 - Washer
28 - **Housing**
29 - Shim
30 - Plug
31 - Plug
32 - Shim
33 - Housing
34 - Washer
35 - Screw
36 - Retaining ring
37 - Bearing
38 - Gasket
39 - Retainer
40 - Seal
41 - Propeller shaft
42 - Screw
43 - Lock washer
44 - Bolt
45 - Equalizer assembly
46 - Lock washer
47 - Nut
48 • Bearing

Figure 3-166. Rear differential exploded view.

(2) Disconnect nut (1) and washer (2) from pinion (13). Using a suitable puller, remove yoke (3) as shown in figure 3-167.

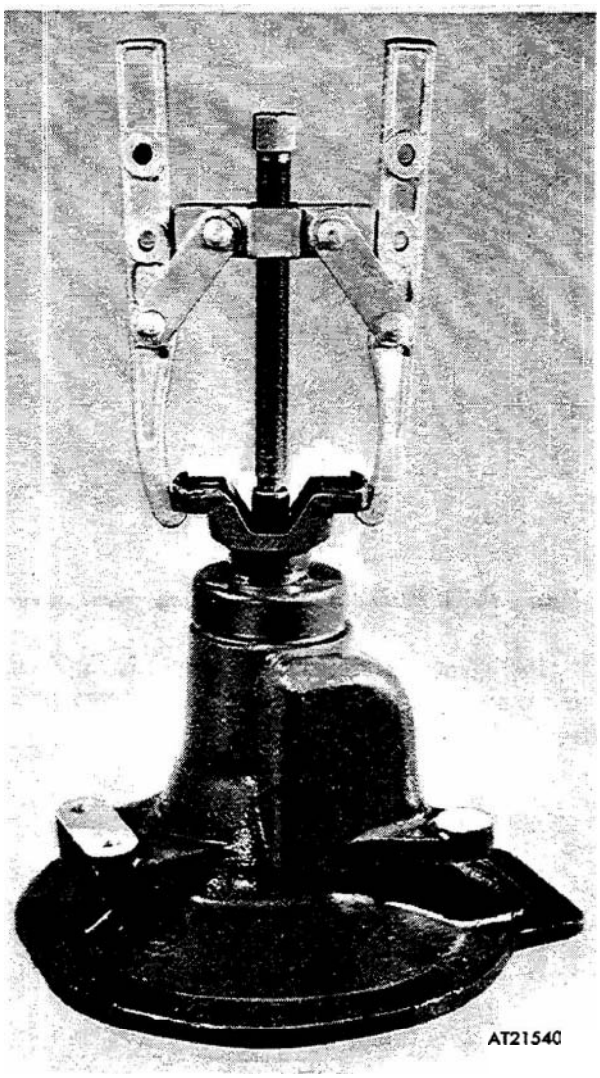


Figure 3-167. Removing yoke from pinion.

(3) Press pinion (13, fig 3-166) from housing (10) (fig 3-168). Remove spacer (4, fig 3-166).

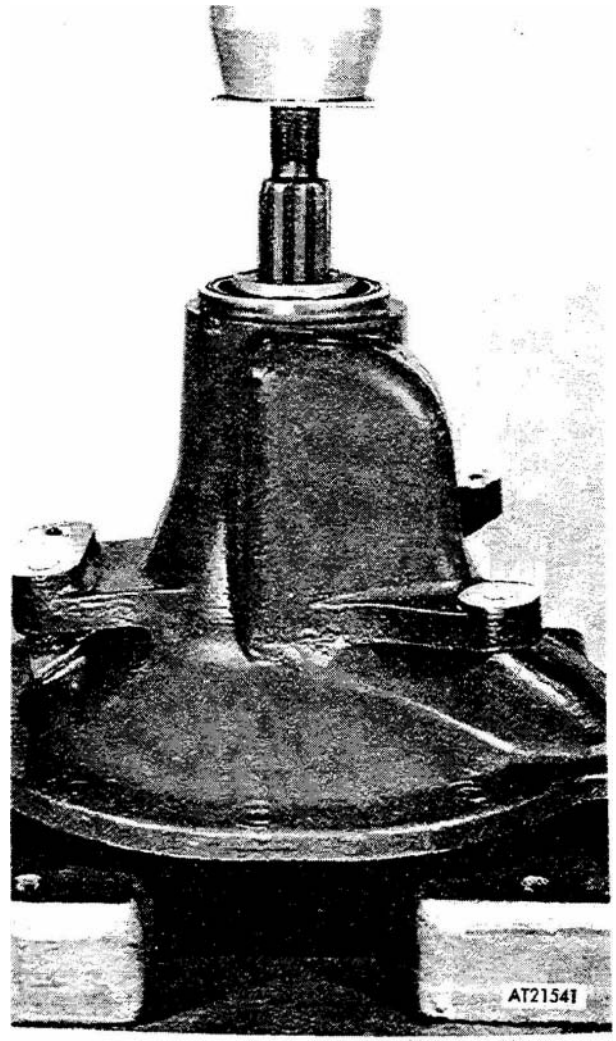


Figure 3-168. Pressing pinion from rear differential

(4) Using a suitable puller, remove seal (5) from housing (10) as shown in figure 3-169.

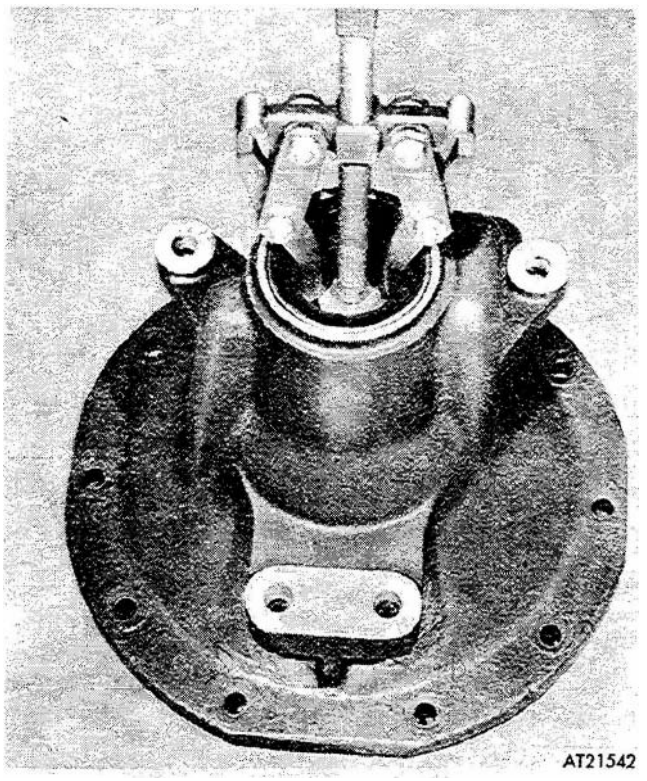


Figure 3-169. Removing pinion seal.

(5) Remove retaining ring (6, fig 3-166) and bearing (7) from housing (10). Using a suitable puller, remove bearing cups of bearings (7 and 12) from housing (fig 3-1701.

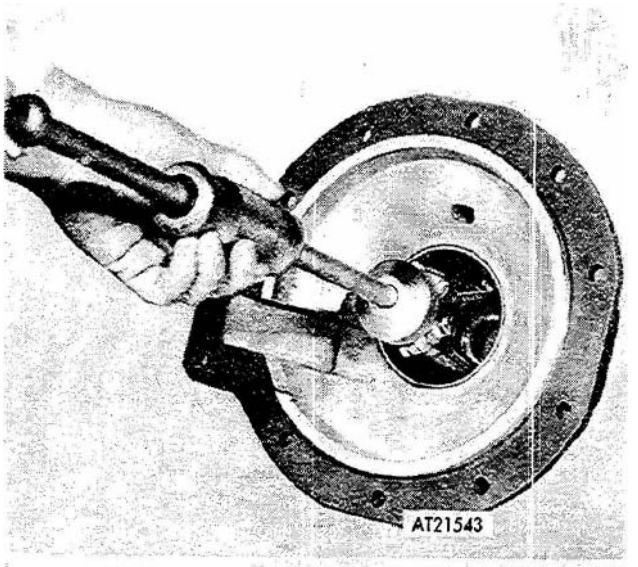


Figure 3-170. Pulling inner bearing cup from housing.

(6) Remove collapsible spacer (II, fig 3-166) from pinion (13). Press bearing (12) from pinion (fig 3-171)

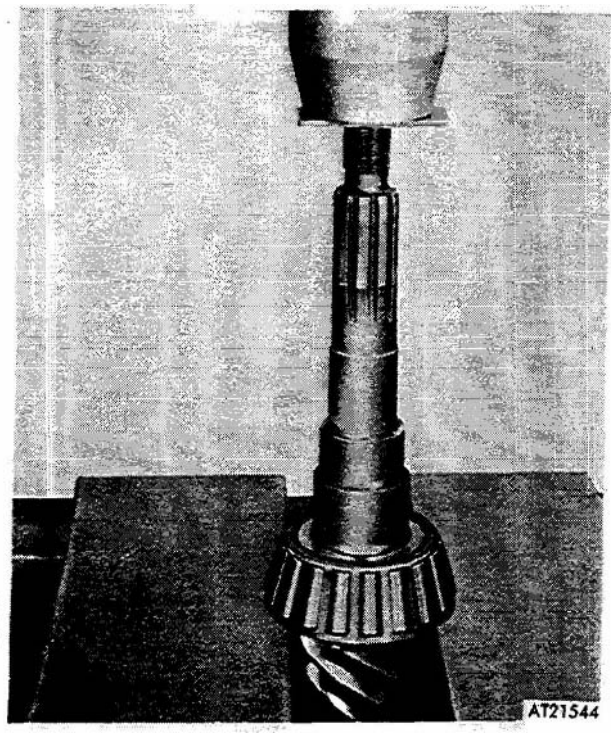


Figure 3-171. ***Pressing bearing from rear differential pinion.***

(7) Disconnect propeller shafts (20 and 41), fig 3-166), retainers (22 and 39), and gaskets (23 and 38) by removing screws (19 and 42) and lock washers (18 and 43). Remove retaining rings (25 and 36).

(8) Press bearing (24 and 37) from propeller shafts (20 and 41) as shown in figure 3-89.

(9) Remove propeller shafts from retainers (22 and 39, fig 3-166). Press seals (21 and 40) from retainers (fig 3-90).

(10) Position housing (17, fig 3-166) so that housing (28) is on top. Disconnect housing (28) and shims (29) by removing screw (26) and washer (27). Tie shims together and tag indicating location. Remove equalizer assembly (45).

(11) Position housing (17) so that housing (33) is on top. Disconnect housing (33) and shims (32) by removing screws (35) and washers (34). Tie shims together and tag indicating location.

12 Using a suitable puller, remove bearing cups of bearings (15 and 48) from housings (28 and 33) as shown in figure 3-91.

(13) Remove plugs (30 and 31).

(14) Using a suitable puller, remove bearings (15 and 48, fig 3-166) from equalizer assembly (45) as shown in figure 3-98.

(15) Disconnect ring gear (14, fig 3-166) from equalizer assembly (45) by removing bolt (44), nut (47) and lockwashers (46).

(16) Refer to paragraph 3-40b (15) and disassemble equalizer assembly.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

Note: Pinion (13, fig 3-166) and gear (14) are a matched set and must be replaced as a set. If equalizer assembly housings are defective, the whole equalizer assembly must be replaced

e. Assembly.

(1) Refer to para 3-40e. (1), and assemble equalizer assembly except when securing gear (14, fig 3-166) use bolts (44), nuts (47), and lock washers (46). Tighten bolts to 105-130 lbs-ft. torque and lockwire.

(2) Prior to installing a new equalizer assembly, check equalizer assembly running torque. Install equalizer assembly in fixture (11660105) and insert propeller shaft (20, fig 3-166) in equalizer assembly. Secure adapter (11595241) and a suitable torque wrench to propeller shaft and check running torque a minimum of three revolutions and monitoring torque readings (fig 3-118). Running torque should be a minimum of 400 lbs-ft.

(3) Press bearings (15 and 48, fig 3-166) on equalizer assembly (fig 3-119).

(4) Press bearing (12, fig 3-166) on pinion (13) (fig 3-172).

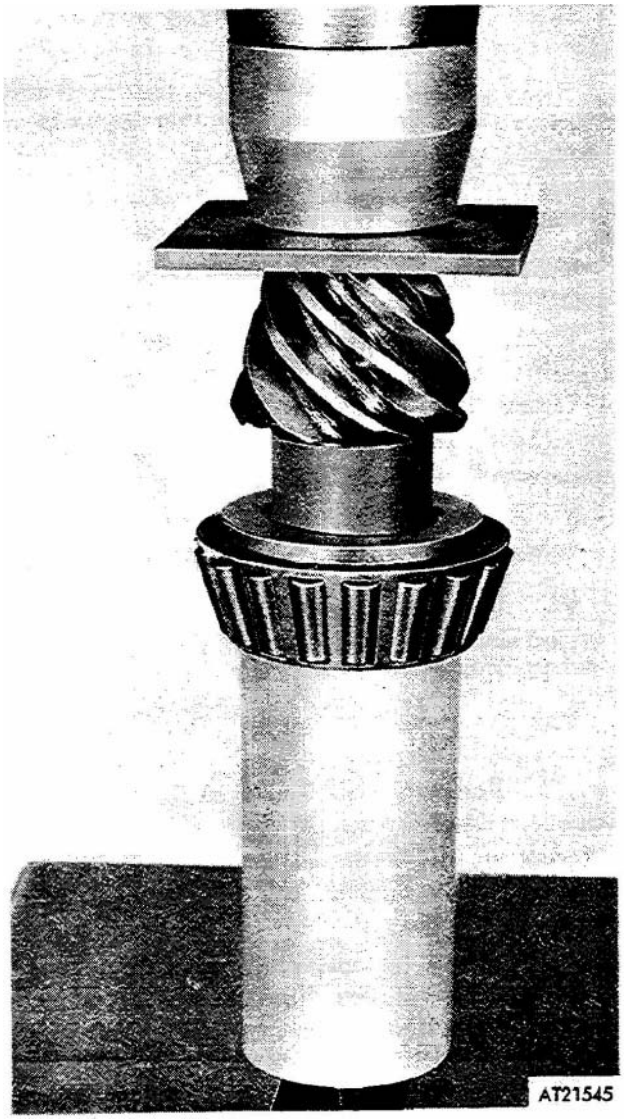


Figure 3-172. Pressing bearing on rear differential pinion.

(5) Press bearing cups of bearings (7 and 12,. fig 3-166) into housing (10) as shown in figure 3-173 and 3-174.

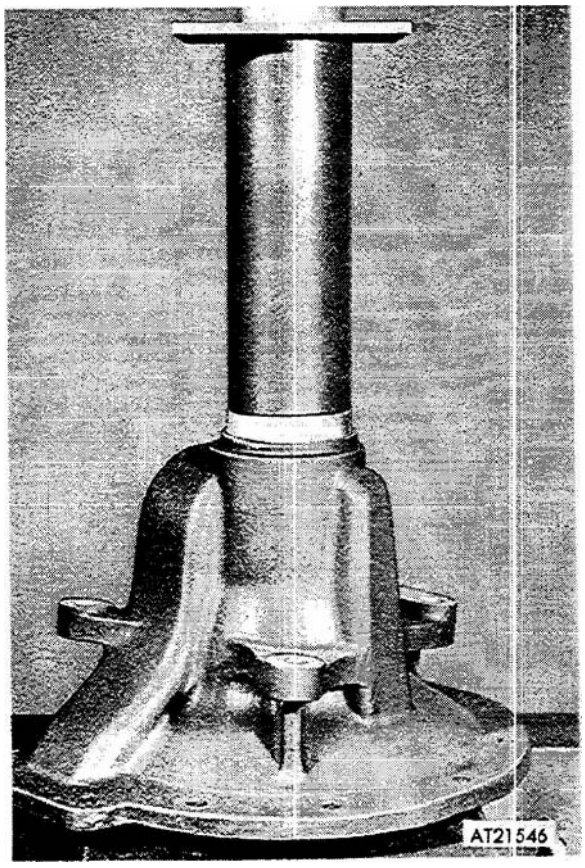


Figure 3-173. Pressing outer bearing cup into housing.

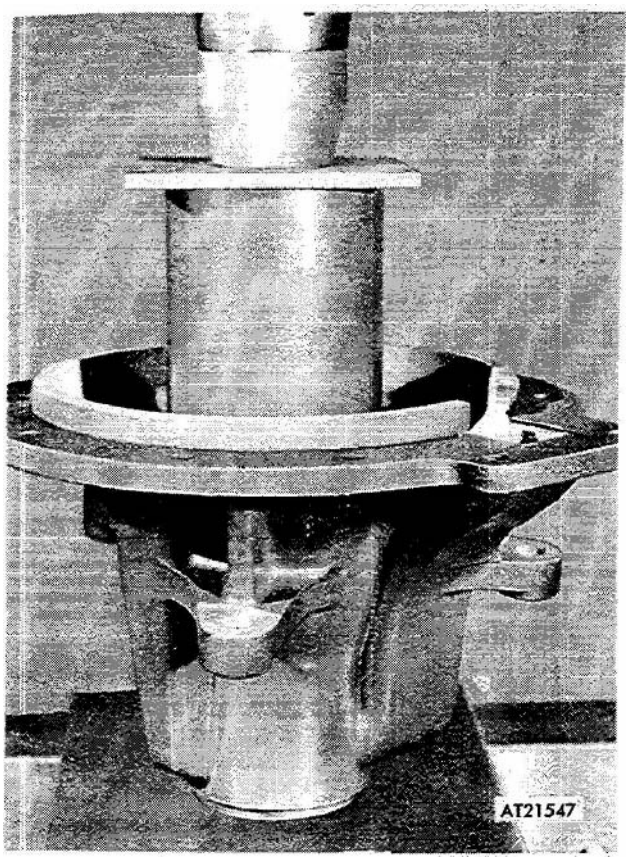


Figure 3-174. Pressing inner bearing cup into housing.

(6) Position pinion (13, fig 3-166) into housing (10). Position bearing (7) on pinion. Position a suitable adapter on bearing (7), that has a hole large enough for pinion (13) to pass through and press bearing on pinion (fig 3-175).

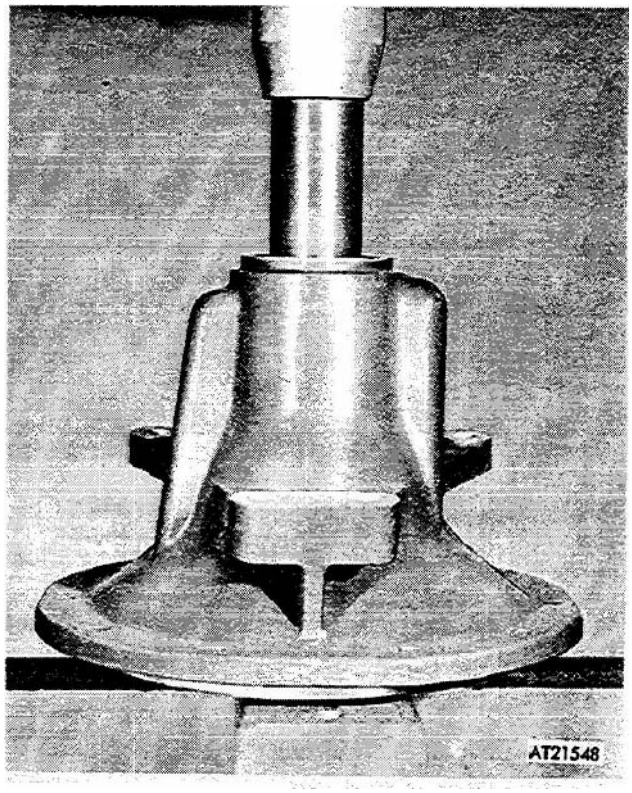


Figure 3-175. Pressing outer bearing onto pinion.

(7) Install retaining ring (6, fig 3-166) in housing (10).

(8) Position spacer (4) and yoke (3) on pinion (13) and secure with nut (1) and washer (2). Tighten nut to 175-250 lbs-ft. torque {fig 3-176).

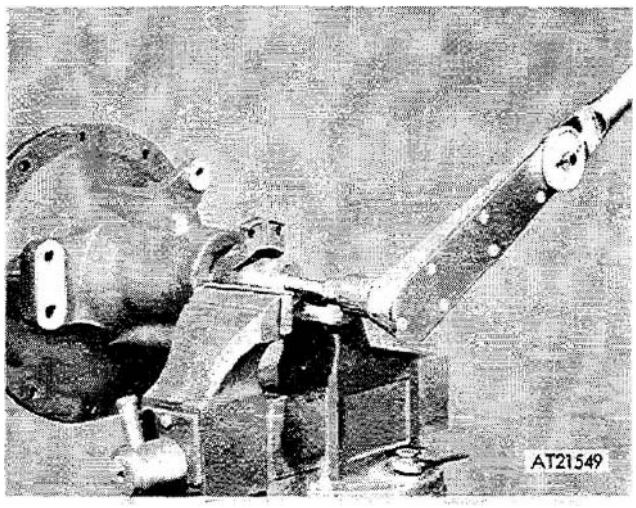


Figure 3-176. Tightening pinion yoke nut.

(9) Using a suitable inch-pound torque wrench, measure pinion preload (fig 3-177). Preload should be 5-15 lbs-in., if not, vary torque on nut (1, fig 3-166) to obtain proper preload. Record torque.

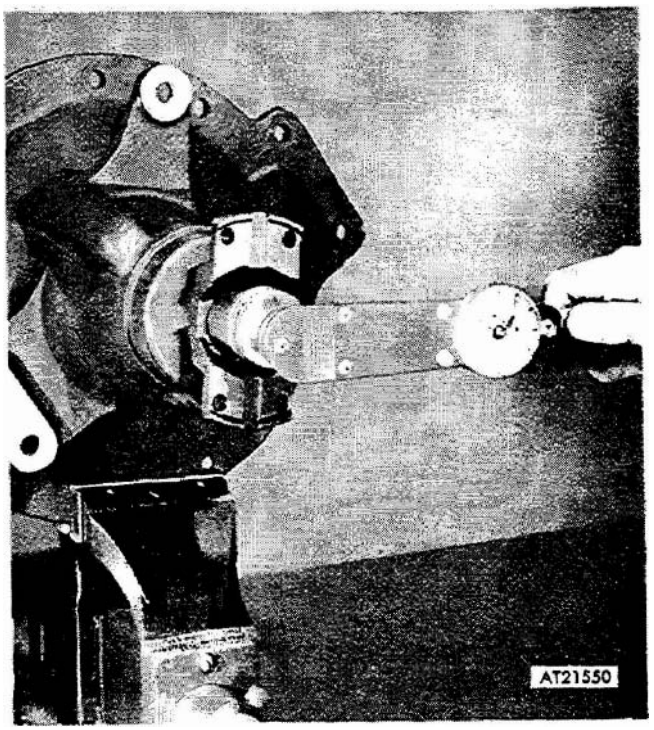


Figure 3-177. Checking rear differential pinion preload.

(10) Remove nut (1), washer (2), yoke (3), and spacer (4). Press seal (5) in housing (10) making sure it is bottomed on retaining ring (6) as shown in figure 3-178.

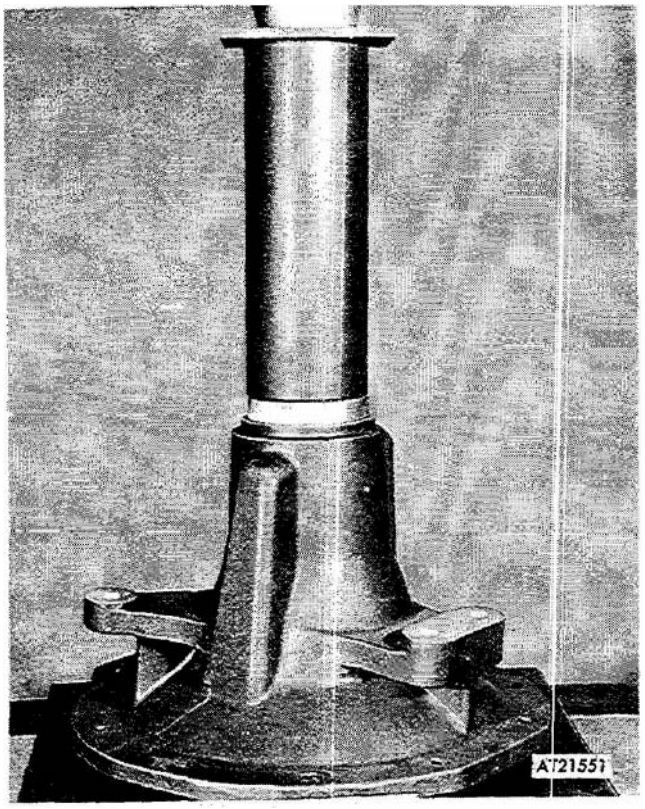


Figure 3-178. Pressing pinion seal into housing.

(11) Position spacer (4, fig 3-166) and yoke (3) on pinion (13) and secure with nut (1) and washer (2). Tighten nut (1) to torque value recorded in (9) above.

(12) Press bearing cups of bearings (15 and 48) into housings (28 and 33) as shown in figure 3-125. Position housing (28, fig 3-166) and shims (29) to housing (17) and secure with screw (26) and washer (27).

(13) Position equalizer assembly (45) into housing (17). Position housing (33) and shins (32) to housing (17) and secure with screw (35) and washer (34).

(14) Insert *a* propeller shaft into equalizer assembly and attach adapter (11595241) to shaft. Using a suitable inch-pound torque wrench measure bearing preload (fig 3-179). Bearing preload should be 15-35 lbs-in. Add shirrs under housings (28 and 33, fig 3·166) to obtain proper preload.

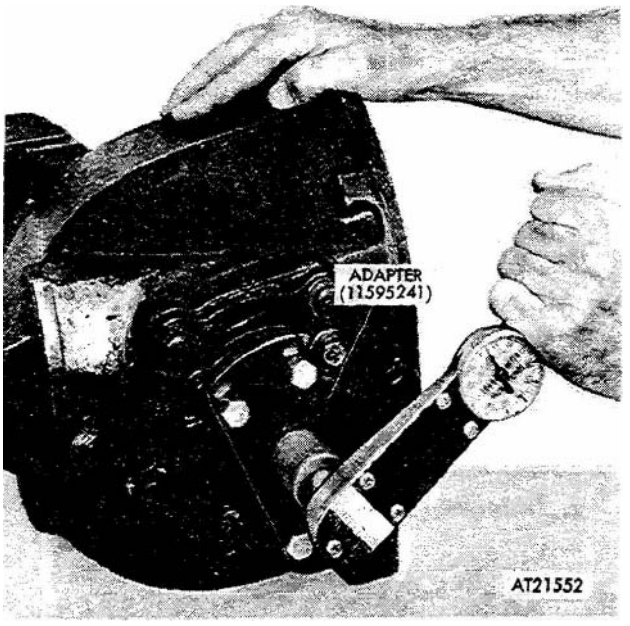


Figure 3-179. Checking rear differential equalizer assembly bearing preload.

(15) Paint ten teeth of ring gear (14) with oily white lead (fig 3-126). Attach assembled housing (10. fig 3-166) and shims (16) to housing (17) using screw (8) and washer (9).

(16) Mount a dial indicator on housing (10) and place stem of dial indicator on flat side of yoke (3), one inch from the center of pinion (13) shaft. Rotate yoke slightly to feel backlash (fig 3-180). Backlash should be 0.006-0.012 of an inch. To increase backlash remove shims from under housing (28, fig 3-166) and place them under housing (33). To decrease backlash remove shims from under housing (33) and place them under housing (28).

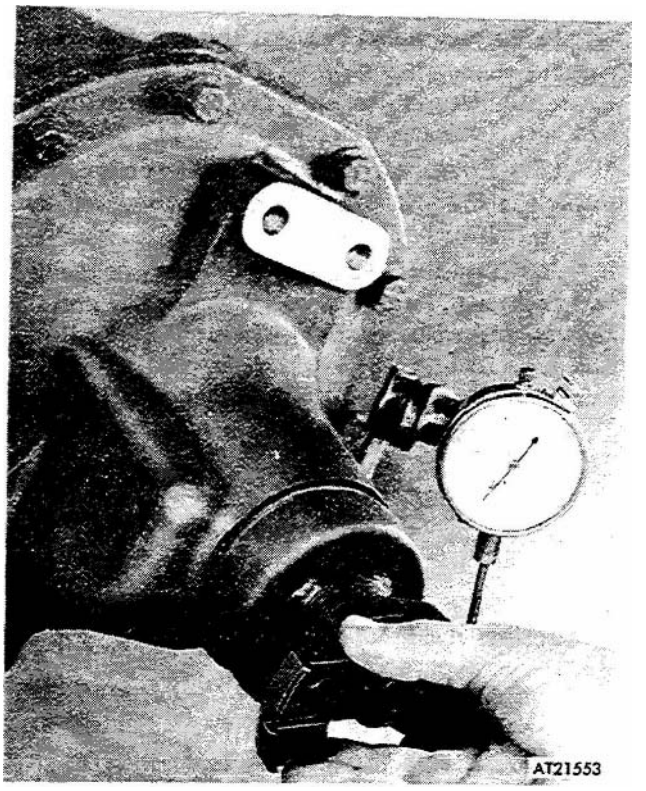


Figure 3-180. Checking rear differential backlash.

(17) Rotate yoke (3). Remove housing (10) from housing (17) and inspect gear tooth contact pattern (fig 3-129). Tooth contact pattern should start near toe of gear tooth and run approximately three-quarters the length of gear tooth. It should be centered between top and root of gear tooth, neither running over top nor digging into root. Adjust tooth contact by adding or subtracting shims (16, fig 3-166). After adjustment has been made, re-install housing (10). Recheck backlash as outlined in (16) above.

(18) Press seals (21 and 40) into retainers (22 and 39) as shown in figure 3-130). Pack seals with grease (GAA) and position propeller shafts (20 and 41, fig 3-166) into retainers.

(19) Press bearing (24 and 37) on propeller shafts (fig 3-131). Install retaining rings (25 and 36, fig 3-166).

(20) Position assembled retainers (22 and 39) and gaskets (23 and 38) on housings (28 and 33) and secure with screws (19 and 42) and lock washers (18 and 43).

(21) Install plug (31) and fill differential assembly with proper lubricant, refer to LO 9-2320-242-12. Install plug (30).

f. *Test.*

(1) Rear differential shall be subjected to a ten minute break-in test and be checked for grinding, clanking, and other unusual noise.

(2) During test inspect for leakage. There shall be no leakage.

(3) Test shall be over a range of input torque from 0 to 1200 lbs-ft. at 200 RPM and 0 to 200 lbs-ft. at 2800 RPM in both drive and coast.

(4) Lock input shaft and rotate each output shaft three revolutions. Each output shaft must transmit a minimum of 400 lbs-ft. running torque.

(5) Drain and strain lubricant. No metal chips, shavings, or other foreign matter shall be evident in the lubricant or at the drain plug.

g. *Installation.* (Refer to TM 9-2320-242-20.)

Section XIII. TRANSMISSION, TRANSFER, AND DIFFERENTIAL SEALS

3-45. General

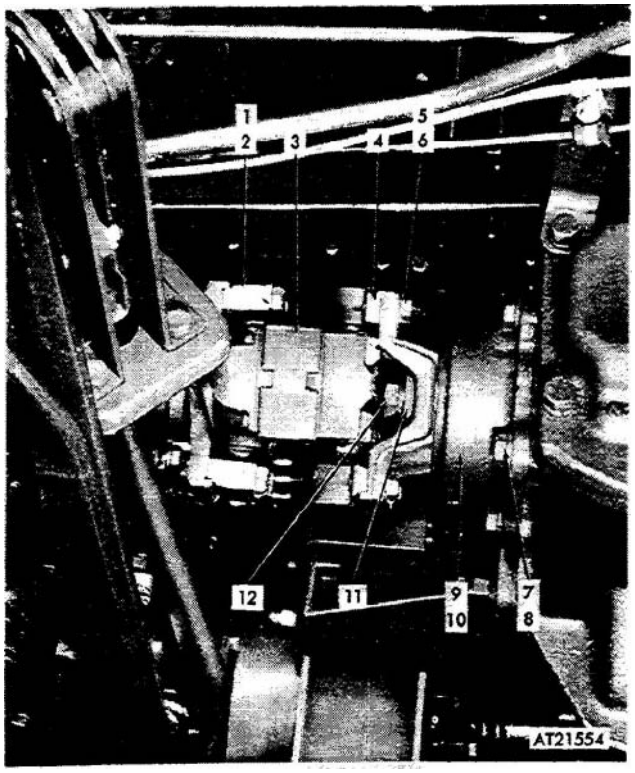
Leaky or defective lubrication seals of the transmission; transfer; or front, center, and rear differentials may be removed without complete disassembly of the component. Some of the seals may be removed while the component is in the vehicle. Good judgement and standard shop practice should be followed while performing the below listed procedures.

3-46. Transmission Output Yoke Seal

a. *Removal.*

(1) Remove console and drain lubricant from transmission (refer to TM 9-2320-242-20).

(2) Disconnect universal joint (3, *fig* 3-181) by removing screws (1 and 5) and lock plates (2 and 6).



LEGEND to fig 3-181:

1 - Screw
2 - Lock plate
3 - Universal joint
4 - Transmission output yoke
5 - Screw
6 - Lock plate
- Screw
8 - Lock washer
9 - Retainer
10 - Seal
11 - Washer
12 - Bolt

Figure 3-181. ***Transmission output yoke seal, removal and installation.***

(3) Hold transmission output yoke (4) and remove bolt (12) and washer (11). Remove yoke.

(4) Using a suitable screwdriver, pry seal (10) from retainer (9).

(5) If seal (10) cannot be removed as stated in (4) above, disconnect retainer (9) by removing screw (7) and lock washer (8).

(6) Position retainer (9) in a suitable vise and drive seal (10) from retainer using a suitable hammer and punch.

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Installation.

(1) Using a suitable diameter sleeve, tap seal (10) into retainer (9).

(2) If retainer (9) was removed, connect retainer and new gasket to transmission and secure with screws (7) and lock washers (8).

(3) Lightly coat the inside of seal (10) with grease (GAA). Position transmission output yoke (4) on transmission shaft and secure with bolt (12) and washer (11).

(4) Position universal joint and secure with screws (1 and 5) and lock plates (2 and 6). Bend lock plates against screw heads and yoke.

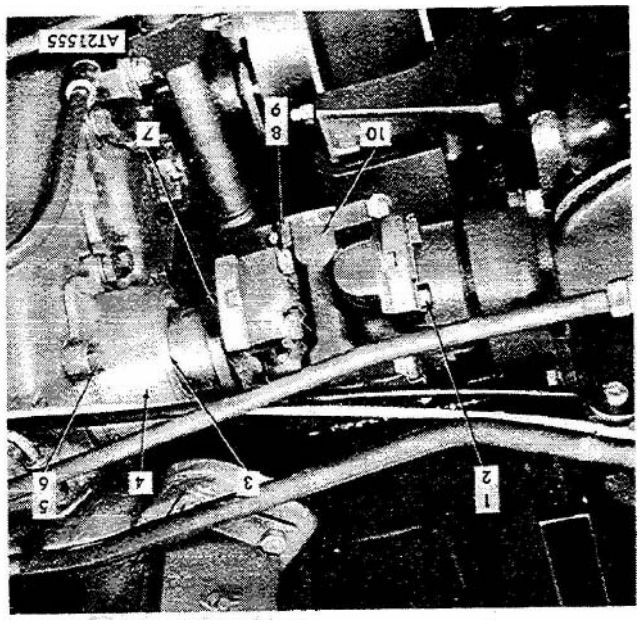
(5) Fill transmission with proper lubricant and install console (refer to TM 9-2320-242-20).

3-47. Transfer Input Yoke Seal

a. *Removal.*

(1) Remove console (refer to TM 9-2320-242-20).

(2) Disconnect universal joint (10, fig 3-182) by removing screws (1 and 8) and lock plates (2 and 9).



LEGEND to fig 3-182:

1 - Screw
2 - Lock plate
3 - Seal
4 - Transfer retainer
5 - Screw
6 - Lock washer
7 - Transfer input yoke
8 - Screw
9 - Lock plate
10 - Universal joint

Figure 3-182. Transfer input yoke seal, removal and installation.

(3) Remove transfer input yoke (7) from transfer.

(4) Using a suitable screwdriver pry seal (3), from transfer retainer (4).

(5) If seal (3) cannot be removed as stated in (4) above, disconnect transfer retainer (4) by removing screw (5) and lock washer (6).

(6) Position retainer (4) in a suitable vise and drive seal (3) from transfer retainer using a suitable hammer and punch.

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Installation.

(1) Using a suitable diameter sleeve, tap seal (3) into transfer retainer (4).

(2) If transfer retainer (4) was removed, connect transfer retainer and new gasket to transmission and secure with screw (5) and lock washer (6).

(3) Lightly coat the inside of seal (3) with grease (GAA). Position transfer input yoke (7) on transfer shaft.

(4) Position universal joint (10) and secure with screws (1 and 8) and lock plates (2 and 9). Bend lock plates against screw heads and yoke.

(5) Install console (refer to TM 9-2320-242-20).

3-48. Transfer Shifter Shaft Seals

a. Removal.

(1) Remove transfer (refer to TM 9-2320-242-20).

(2) Drill two holes in seal casing, 180 degrees apart, and install a sheet metal screw with a flat washer in each drilled hole.

(3) Using a suitable pry bar, pry seal from transfer by prying against flat washers.

b. Cleaning. (Refer to para 3-3.)

c. *Inspection.*

(1) Inspect shifter shaft seal contact area for burrs or rough surface that may damage new seal.

(2) Inspect shifter shaft lever connection groove for sharp edges.

d. Repair. Remove sharp edges from shifter shaft lever connection groove using a file or stone.

e. Installation.

(1) Lightly coat the inside of seal with grease (GAA).

(2) Position seal over shifter shaft and tap in place using a suitable diameter sleeve.

(3) Install transfer (refer to TM 9-2320-242-20).

3-49. Differential Propeller Shaft Seal

***Note: Replacement** of the front, center, and rear differential propeller shaft seals **is accomplished** in **the same** manner.*

a. Removal.

(1) Using a suitable jack, jack and block vehicle.

(2) Drain lubricant from differential (refer to TM 9-2320-242-10).

(3) Disconnect drive axle (fig 3-183) from differential propeller shaft. (Refer to TM 9-2320-242-20.)

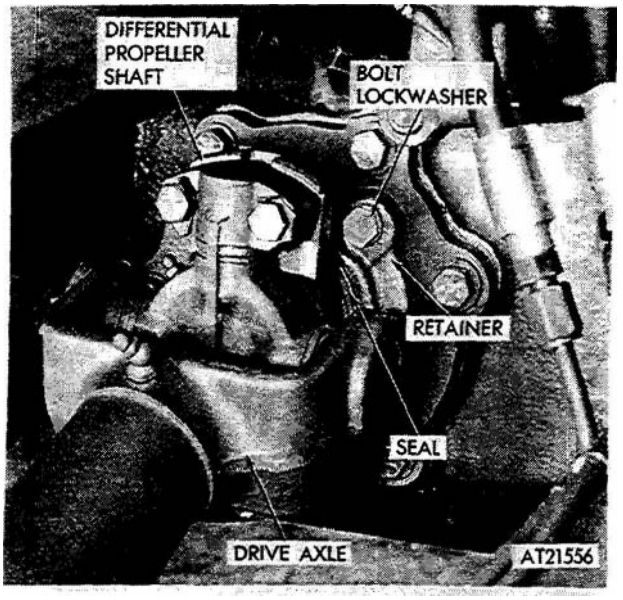


Figure 3-183. Differential propeller shaft seal, removal and installation.

(4) Disconnect retainer and propeller shaft from differential by removing four bolts and lock washers. Remove assembled retainer from differential.

(5) Remove retaining ring from propeller shaft and press bearing from shaft (fig. 3-89). Remove propeller shaft from retainer.

(6) Press seal from retainer (fig. 3-90).

b. Cleaning. (Refer to **para** 3-3.)

c. Inspection. (Refer to **para** 3-4.)

d. Installation.

(1) Press seal into retainer (fig. 3-130).

(2) Position propeller shaft into retainer and press bearing on propeller shaft (fig. 3-131). Install retaining ring on propeller shaft.

(3) Position assembled retainer and *new gasket* to differential and secure with four bolts and lock washers (fig. 3-183).

(4) Connect drive axle to differential propeller shaft. (Refer to TM 9-2320-242-20.)

(5) Remove blocks from vehicle and lower jack. Remove jack.

(6) Fill differential with proper lubricant (refer to LO 9-2320-242-12).

3-50. Front Differential Pinion Seal

a. Removal.

(1) Remove front differential (refer to TM 9-2320-242-20).

(2) Disconnect six bolts and lock washers (fig. 3-184) securing retainer to differential and remove retainer and gasket.

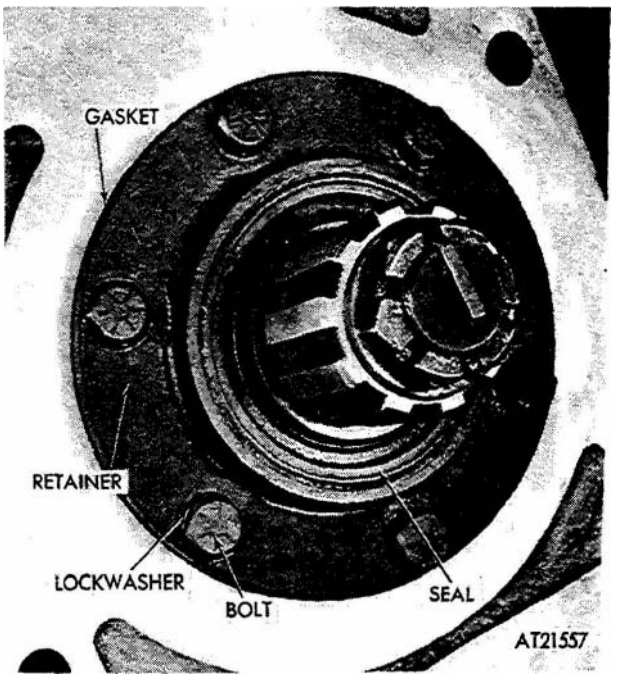


*Figure 3-184. Front differential pinion seal, **removal** and installation.*

(3) Press seal from retainer (fig. 3-92).

b. Cleaning. (Refer to **para** 3-3.)

c. Inspection. Inspect seal contact surfaces for burrs and rough finish that may damage new seal.

d. Installation.

(1) Press seal into retainer (fig. 3-124).

(2) Lightly coat inside of seal (fig. 3-184) with grease (**GAA**).

(3) Slide new gasket and retainer over differential shaft and secure with six bolts and lock washers.

(4) Install front differential (refer to TM 9-2320-242-20).

3-51. Center Differential Input Yoke Seal

a. Removal.

(1) Remove center differential (refer to TM 9-2320.242-20).

(2) Remove input yoke (fig. 3-185) from differential.

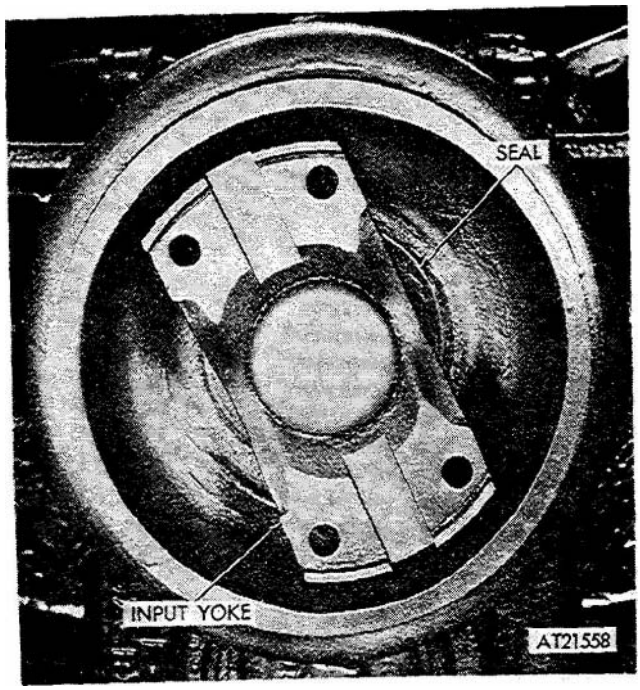


Figure 3-185. Center *differential input* yoke *seal, removal and installation.*

(3) Using a suitable pry bar, remove seal from differential.

b. Cleaning. (Refer to para 3-3.)

c. Inspection. Inspect seal contact surface of input yoke for burrs and rough finish.

d. Installation.

(1) Using a suitable diameter sleeve, tap seal into differential.

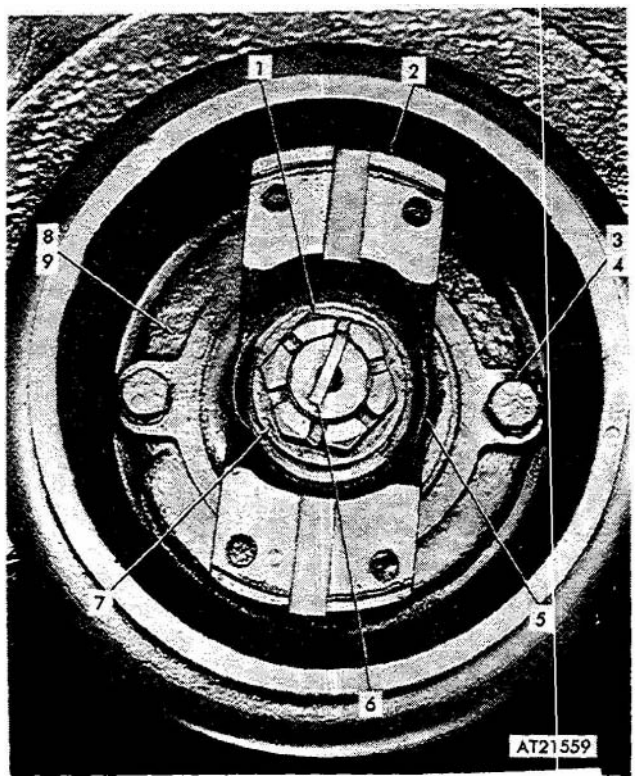
(2) Lightly coat inside of seal with grease (GAA) and insert input yoke.

3-52. Center Differential Output Yoke Seal

a. Removal.

(1) Remove center differential (refer to TM 9-2320-242-20).

(2) Remove cotter pin (6, fig 3-186). Hold output yoke (2) and remove nut (1) and washer (7).



LENGEND to fig 3-186:

1 - Nut
2 - Output yoke
3 - Screw
4 - Lock washer
5 - Seal
6 - Cotter pin
7 - Washer
8 - Retainer
9 - Gasket

Figure 3-186. Center differential output yoke seal, removal and installation,

(3) Using a suitable puller, remove yoke (2) as shown in figure 3-142.

(4) Disconnect retainer (8, fig 3-186) and gasket (9) by removing screws (3) and lock washers (4).

(5) Press seal (5) from retainer (8) as shown in figure 3-144.

b. Cleaning. (Refer to para 3-3.)

c. Inspection. Inspect seal contact surface of yoke for burrs and rough finish.

d. Installation.

(1) Press seal (5, fig 3-186) into retainer (8) as shown in figure 3-158.

(2) Lightly coat inside of seal (5, fig 3-186) with grease (GAA).

(3) Position retainer (8) and new gasket (9) to differential and secure with screws (3) and lock washers (4).

(4) Position output yoke (2) on differential and secure with nut (1) and washer (7). Tighten j nut to 175-250 lbs-ft. torque and install cotter pin (6).

(5) Install center differential (refer to TM 9-2320-242.20).

3-53. Center Differential Shifter Shaft Seal

a. Removal.

(1) Remove center differential (refer to TM 9-2320-242-20).

(2) Mark alignment marks on shifter shaft and shifter lever. Disconnect shifter lever from shaft by removing screw (fig. 3-187).

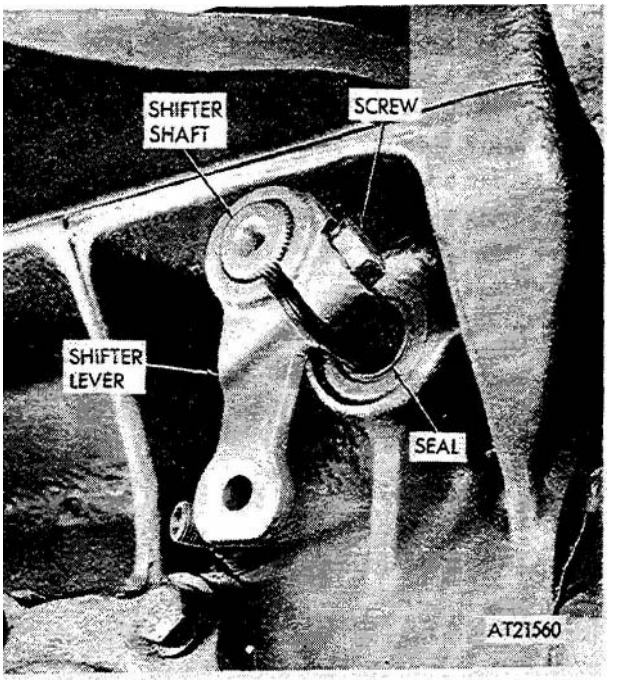


Figure 3-187. Center differential shifter shaft seal, removal and installation.

(3) Drill two holes in seal casing, 180 degrees apart, and install a sheet metal screw with a flat washer in each drilled hole.

(4) Using a suitable pry bar, pry seal from differential by prying against flat washers.

b. Cleaning. (Refer to para 3-3.)

c. Inspection. Inspect shifter shaft seal contact surface for burrs and rough finish that may damage new seal.

d. Installation.

(1) Lightly coat the inside of seal with grease (GAA).

(2) Position seal over shifter shaft and tap in place using a suitable diameter sleeve.

(3) Align alignment marks on shifter shaft and shifter lever and install lever on shaft. Secure lever with screw and lockwire screw.

(4) Install center differential (refer to TM 9-2320-242-20).

3-54. Rear Differential Input Yoke Seal

a. Removal.

(1) Using a suitable jack, jack and block vehicle.

(2) Drain lubricant from differential by removing drain plug (fig 3-188). Catch lubricant in a suitable container and replace drain plug.

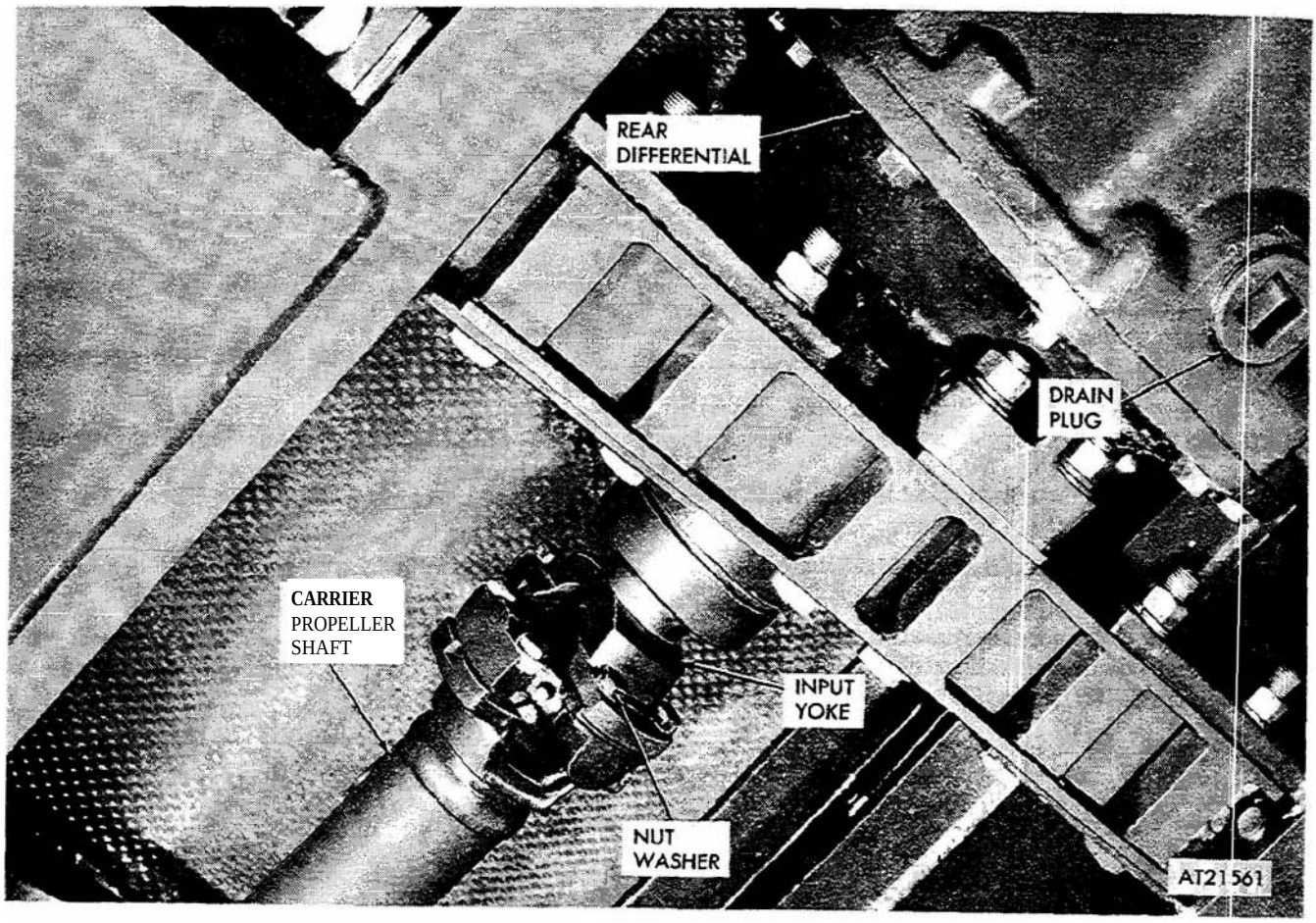


Figure 3-188. Rear differential input yoke sea4 removal and installation.

(3) Disconnect carrier propeller shaft (refer to TM 9-2320-242-20).

(4) Hold input yoke and loosen nut using a suitable foot pound torque wrench. Record torque on nut. Remove nut and washer. Using a suitable puller, remove input yoke.

(5) Drill two holes in seal casing, 180 degrees, apart. Remove any metal chip from around input of differential.

(6) Remove sleeve from differential input shaft and install sheet metal screws and flat washers in holes drilled in seal casing.

(7) Using a suitable pry bar, pry seal from differential by prying against the flat washers.

b. Cleaning.

(1) Clean all metal chips from differential input.

(2) Clean seal contact area with an approved dry-cleaning solvent.

c. Inspection. Inspect differential sleeve for rough seal contact surface and burrs that may damage new seal.

d. Installation.

(1) Using a suitable diameter sleeve, tap seal into differential.

(2) Lightly coat the inside of seal with grease (GAA) and install sleeve.

(3) Position input yoke (fig. 3-188) on differential and secure with nut and washer. Using a suitable foot-pound torque wrench, tighten nut to torque value recorded in a. (4) above.

(4) Connect carrier propeller shaft (refer to TM 9-2320-242-20).

(5) Remove blocks from vehicle and lower jack. Remove jack.

(6) Fill differential with proper lubricant. (Refer to LO 9-2320-242-12.)

Section XIV. SUSPENSION ALIGNMENT

3-55. General

After performing maintenance on the suspension' system or when tires show irregular wear, the suspension system should be checked for alignment. Correct alignment involves balancing all of the forces created by friction, gravity, centrifugal force, and momentum while the vehicle is in motion. Proper motion balance developed by proper alignment will make a vehicle run smoother, have better road-holding characteristics, have better steerability, and operate with more stability while running in a straight line and around curves. It also eliminates unnecessary road friction which causes abnormal tire wear. Never attempt to align a vehicle with poor tires. If the thread of one front or rear tire is worn smooth, it has more rubber in contact with the road than another tire with less worn thread. The worn tire will have more rolling friction than the other tire and will tend to create drag, causing the vehicle to pull to the side. An under-inflated tire will cause the same condition. To align the suspension system, the front tractor wheels and the carrier wheels should be adjusted for proper camber and caster (fig. 3-189 View A) and for toe-in. Procedures for proper adjustment of toe-in are provided in TM 9-2320-242-20.

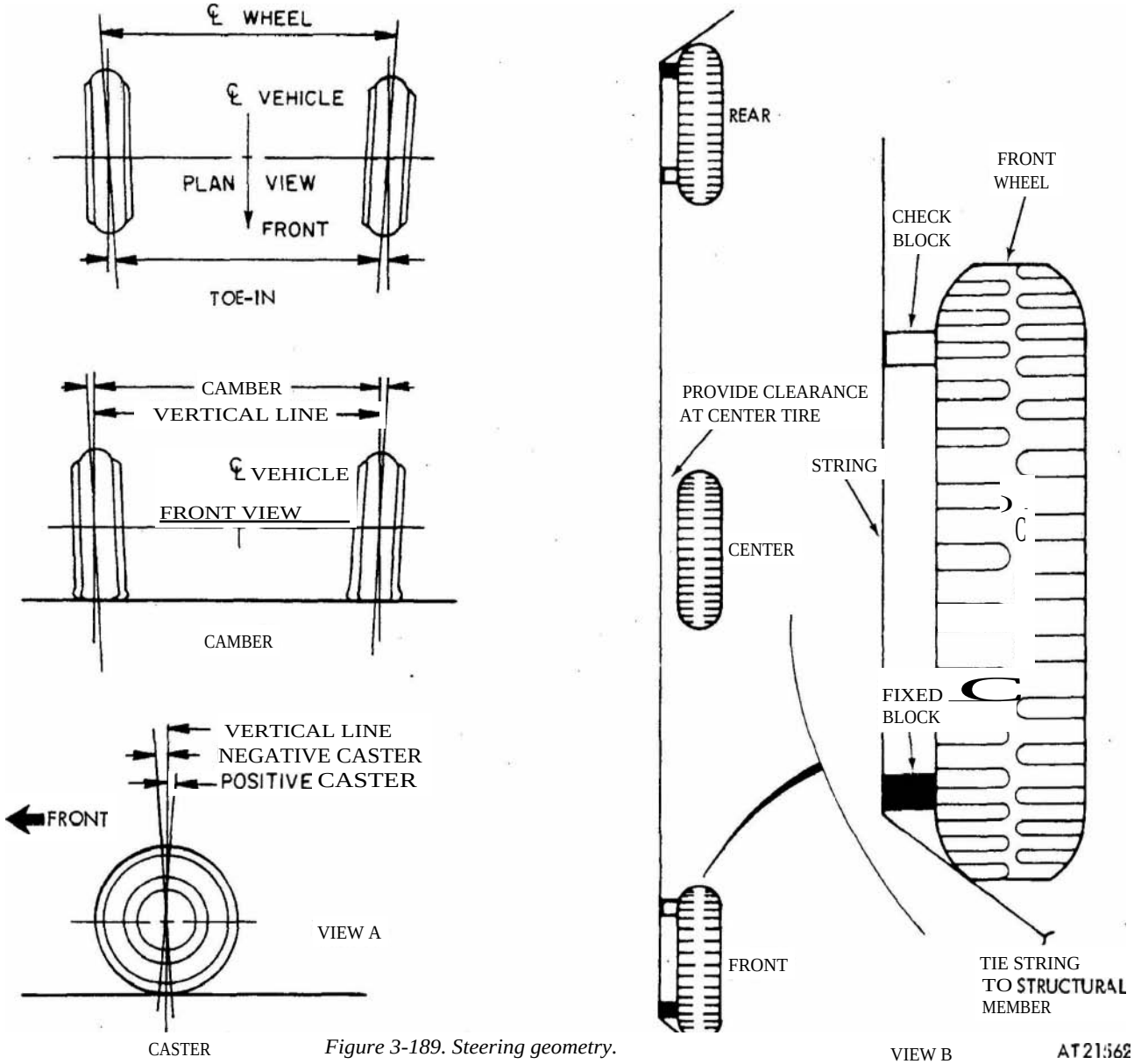


Figure 3-189. Steering geometry.

a. Vehicle Preparation.

(1) Position vehicle on a suitable wheel alignment machine and make sure the vehicle is straight by utilizing procedures specified by the alignment machines manufacturer or the string method as illustrated in figure 3-189 View B. Place a chalk alignment mark on steering wheel hub and steering column.

Note: To place the front wheels in a straight-ahead position at any time during the alignment procedures, align the chalk marks.

(2) Check tire pressure in all tires and adjust to 22 psi.

(3) Make the vehicle as level as possible. If possible remove load to lever vehicle, if not, use approved jacking points on vehicle hull and level vehicle with suitable jacks.

Caution: When jacking on tractor or carrier to relieve load from suspension system, use only approved jacking points. Distortion or puncturing of the aluminum hull may occur if other areas are used. Refer to TM 9-2320-242-10 for proper jacking points.

(4) Refer to TM 9-2320-242-20 for front and rear wheel swing arc adjustment.

(5) Refer to Table 3-1 for a listing of alignment specifications.

Table 3-1. Alighnment specifications.

Specification	Tractor Front Wheel Alignment	Carrier Rear Wheel Alignment
Caster * (Degrees)	+3° to +4°	
Caster ** (Degrees)	+3° to +4°	** *.3° to -4°
Camber (Degrees)	0 to +½°	+0 to 1 / 2 °
Camber (Degrees)	+½° to +1°	+1/2 to 1°
Toe in (Inches)	1/16" to 1/8"	1/16" to 1/8"
Steering axis inclination * (Degrees)	8° 30' ±30'	
Steering axis inclination ** (Degrees)		8°30' ± 30'
Toe out on turns (Degrees)	8'30'	8°30' ±30'
Steering stop adjustments	With outer wheel at 20 °inner wheel should read 21° to 23° Inner wheel at 23'	With outer wheel at 10 °inner wheel should read 10-1 / 2' to -12°

Maximum variation between wheel is 1 degree.
Specification is for tractor with body jacked level and suspension arms in full rebound position.
Specification is for carrier with body jacked level and suspension arms in full rebound position.
Maxi umum variation between wheels is 1 / 2 degree.
Specification is tor tractor and carrier with body jacked level and suspension arms in full rebound position.

b. Camber Adjustment, Tractor and Carrier.

(1) Adjust camber to 0 degree, 0 minute to 1/2 degree by performing (2) through (5) below.

(2) To adjust camber, jack up the vehicle hull to relieve tension on the suspension arms. Using hex bit (11602291), loosen four lower suspension arm mounting bracket bolts (fig. 3-190). Add or remove equal thickness shims under both front and rear mounting brackets.

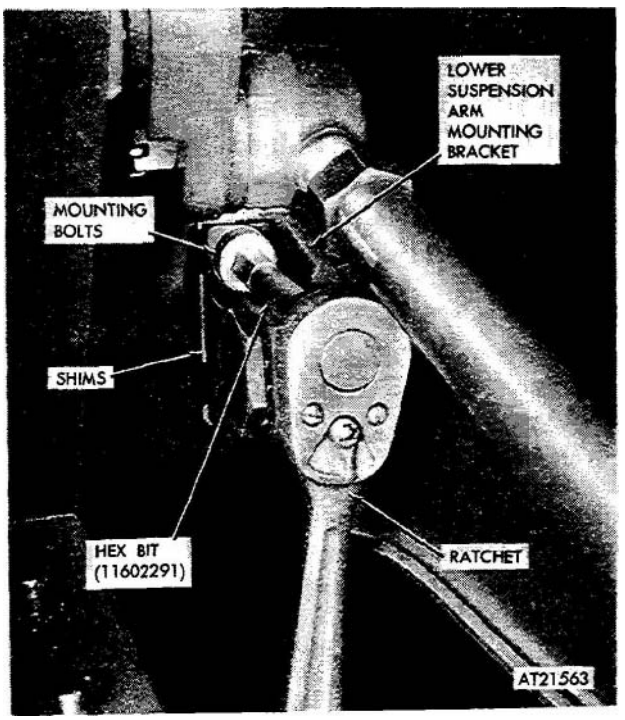


Figure 3-190. Suspension shimming procedure.

Note: One 0.03 inch shim has approximately a 0 degree, 10 minute effect on the camber adjustment.

(3) Using a suitable pound-foot torque wrench, tighten suspension arm mounting bracket bolts to 92 to 110 lbs-ft. torque. Lower jacks, bounce vehicle to settle suspension, and recheck camber.

Note: Steps (4) and (5) below provide an alternate method for adjusting camber.

(4) Level vehicle hull using suitable jacks, With suspension arms in full rebound position and power train in two-wheel drive position, check camber.

Caution: When adjusting camber using the alternate method, the vehicle must be level front to rear and right to left.

(5)) Adjust camber to + ½ degree to +1 degree, as indicated in (2) and (3) above.

c. Front Tractor Wheels Caster Adjustment.

(1) Adjust front tractor wheels caster to +4 degrees, 0 minutes to +3 degrees, 0 minutes by performing (2) through (5) below.

(2) To adjust caster, jack up the tractor hull to relieve tension on the suspension arms. Using hex bit (11602291), loosen four lower suspension arm mounting bracket bolts (fig. 3-190). Add or remove shims from under either front or rear suspension arm mounting brackets.

Note: One 0.03 inch shim has approximately a 0 degree, 20 minute effect on the caster adjustment

(3) Using a suitable foot-pound torque wrench, tighten suspension arm mounting bracket bolts bolts to 92 to 110 lbs-ft. torque. Lower jack, bounce vehicle to settle suspension, and recheck caster.

Note: Steps (4) and (5) below provide an alternate method for adjusting caster.

(4) Level vehicle hull with suspension arms in full rebound position, using suitable jacks.

Caution: When adjusting caster using the alternate method, the vehicle must be level, front to rear and right to left.

(5) Adjust caster by performing (1) through (3) above.

d. Carrier Wheel Caster Adjustment.

(1) Level carrier hull with suspension arms in full rebound position, using suitable jacks.

(2) Align chalk marks on the steering wheel.

(3) Disconnect steering shaft universal joint between tractor and carrier (refer to TM 9-2320-242-20). Place alignment marks on universal joint and torque tube.

(4) Adjust carrier wheels caster to -4 degrees, 0 minute to -3 degrees, 0 minutes by performing (5) through (8) below.

(5) Adjustment of the caster is accomplished by loosening the four lower suspension arm mounting bracket bolts (fig 3-190). Add or remove shim from under either front or rear mounting bracket.

Note: One 0.03 inch shim has approximately a 0 degree, 20 minute effect on the caster adjustment.

(6) Using a suitable foot-pound torque wrench, tighten suspension arm mounting bracket bolts to 92 to 110 lbs-ft. torque. Recheck caster.

(7) Align chalk marks on steering shaft with mark on torque tube. Connect steering shaft universal joint. (Refer to TM 9-2320-242-20.)

(8) Remove jacks.

Section XV. SERVICE BRAKE SYSTEM

3-56. General

The service brake system (fig 1-10) is a conventional hydraulic type that has its drum and wheel brake mechanism sealed and pressurized with air to prevent contamination from outside elements. The dual network system consists of a brake pedal, a master cylinder with two pistons in tandem, wheel cylinders, brake shoes, brake drums, adjusters, lines, and fittings, When the brake pedal is depressed, the master cylinder pistons move, forcing fluid under pressure to each wheel cylinder. One master cylinder piston routes fluid to the front tractor wheels and carrier wheels and the other piston routes fluid to the rear tractor wheels. The fluid under pressure displaces the wheel cylinder pistons causing them to travel down the cylinder bore which, in turn forces the brake shoes against the brake drum, stopping the vehicle. The brake shoes must be manually adjusted to compensate for wear by extending the length of the adjuster. For a description of the air pressurization system, refer to paragraph 3-59.

Maintenance procedures for the brake system components not mentioned below are provided in TM 9-2320-242-20.

Note: Information pertaining to the parking brake is covered in TM 9-2320-242-20.

3-57. Service Brake Shoe

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning and Inspection.

(1) Cleaning (refer to TM 9-208-1).

(2) Inspect for wear and contamination by grease and oil.

c. *Repair.*

(1) Remove linings from brake shoes by removing rivets and clean lining contact area thoroughly.

(2) Using a suitable riveting machine attach new lining to shoe using proper size rivets. Install the linings in a manner to prevent gaps between the lining and shoe and in accordance with pattern illustrated in figure 3-191.

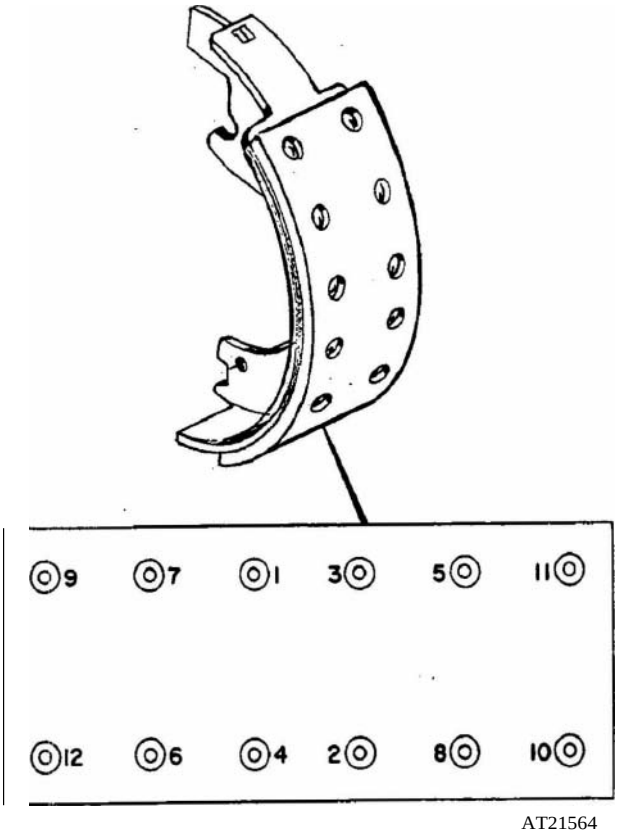


Figure 3-191. Brake lining rivet installation pattern.

Note: If shoes are to be used with a brake drum that has, been turned down, use proper size shim with lining and rivet as indicated above.

(3) Make sure that lining fits firmly against shoe and that all rivets are properly seated.

(4) Using a suitable lining grinder, radius grind lining to obrain maximum braking efficiency.

d. Installation. (Refer to TM 9-2320-242-20.)

3-58. Brake Drum Assembly

a. *Removal.* (Refer to TM 9-2320-242-20.)

h. Cleaning and Inspection.

(1) Cleaning (refer to para 3-3).

(2) Inspect brake drum for warpage, scores, roughness, cracks, out-of-roundness, and uneven wear.

c. *Repair.*

(1) Install arbor 01660096) in *a* suitable brake drum turning lathe and place brake drum on arbor (fig. 3-192).

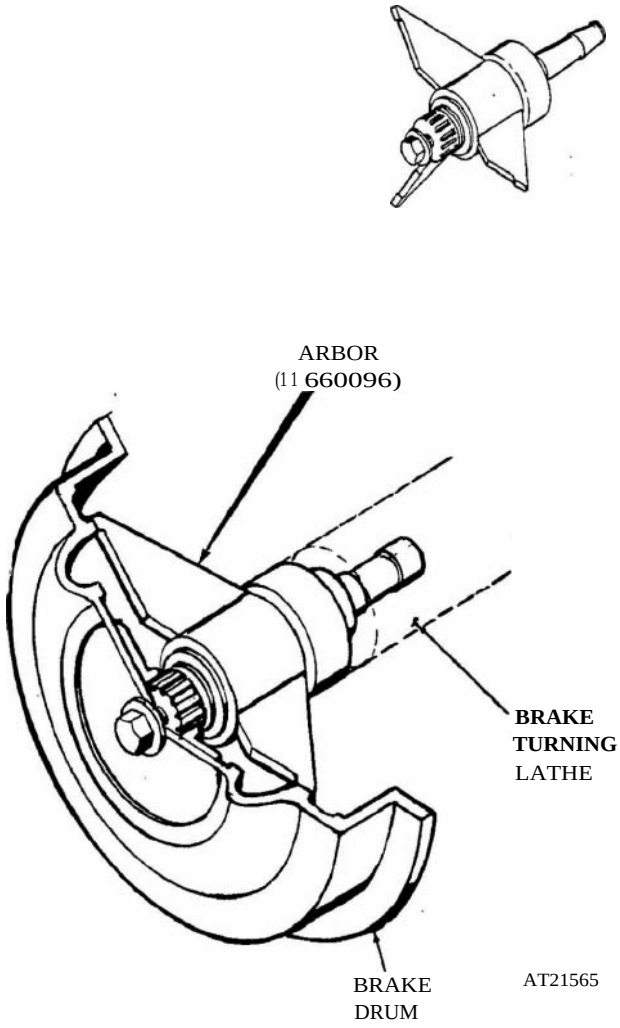


Figure 3-192. Brake drum assembly installed on arbor (11660096).

(2) Remove defective surface from drum shoe contact area and measure drum inside diameter using a suitable drum micrometer. The drum diameter should not exceed 13.1875 of an inch; if it does, the drum must be replaced.

Note: Brake drum may be turned down as required as long as drum inside diameter does not exceed 13.1875 of an inch.

d. Installation. (Refer to TM 9-2320-242-20.)

Section XVI. SERVICE BRAKE AIR PRESSURIZATION SYSTEM

3-59. General

The service brake air pressurization system (fig 1-10) pressurizes each sealed brake assembly to approximately 5 PSI whenever the engine is operating. The system consists of an air reservoir ; check valve; and interconnecting hoses, tubes, and fittings. Air pressure for the system is obtained from the engine air box. It is routed to the air reservoir which prevents any surges or pressure variations and supplies a constant rate of flow to each brake. Air pressure in the air reservoir is prevented from re-entering the engine air box by the check valve which is mounted in the air reservoir inlet port. The system is designed to keep dust, dirt, sand, and water out of each brake assembly. Maintenance procedures for the check valve, hoses, tubes, and fittings are provided in TM 9-2320-242-20.

3-60. Air Reservoir

a. Removal. (Refer to TM 9-2320-242-20.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. (Refer to para 3-4.)
d. Repair. Weld cracks (refer to TM 9-237.)
e. Installation. (Refer to TM 9-2320-242-20.)

Section XVI I. TIRES AND WHEELS

3-61. Genera I

The wheels used on this vehicle are low carbon steel split bead type and are balanced to 2 ounces or 20 inch ounces. They are secured to the spindle by eight nuts. The nuts are positioned alternately_ between the brake drum securing nuts which are in groups of two. The tires are shreaded wire, tubeless, non-directional cross country type; size 11:00 x 18, six ply rated. During fording and swimming operations, the tires and wheels are used for propulsion of the vehicle.

3-62. Tire

a. Removal. (Refer to TM 9-2320-242-20.)
b. Repair. (Refer to TM 9-2320-242-20.)
c. Rebuild. (Refer to TM 9-1871.)
d. Installation. (Refer to TM 9-2320-242-20.)
d. Assembly and Installation. (Refer to TM 9-2320-242-20.)

3-63. Wheels

a. Removal and Disassembly. (Refer to TM 9-2320-242-20.)
b. Cleaning. (Refer to para 3-3.)
c. Inspection. Inspect wheels for run out, bends, and elongated mounting bolt holes, as well as applicable steps in paragraph 3-4.
d. Assembly and Installation . (Refer to TM 9-2320-242-20.)

Section XVIII. STEERING SYSTEM

3-64. Genera I

The steering system is a non-powered mechanical type that changes the direction of the front tractor wheels and the carrier wheels. When the steering wheel is turned, motion is transmitted through the steering column shaft to the input shaft of the front steering gear and through the gear box worm and sector to the two output shafts. One output shaft motion is transmitted through the pitman arm, the intermediate rod, the tie rod assemblies, and the idler arm to the front wheels. Simultaneously, the other output shaft transmits motion through the steering torque tubes to the rear steering gear box. Motion is transmitted from the rear steering gear box to the wheels through 'a similar linkage. This permits the front wheels to turn 21 ± 1 degrees and the carrier wheels to turn 10 h ½ degree simultaneously, but in opposite directions. Turning the rear wheels in a direction opposite from the front is accomplished through bevel gears attached to the bottom of the front steering gear worm. Front and rear wheel steering improves operator control on highway, cross-country, or snow and ice covered terrain. The primary reason for this dual steering system is to reduce the turning radius of the vehicle without fear of upsetting the vehicle in tight turns. Maintenance procedures for the steering wheel and column, pitman arms, intermediate rods, idler arms, and tie-rods are provided in TM 9-2 320-242-20.

a. Front Steering Gear Box. The front steering gear box (fig 3-193) is a worm and sector type with an additional gear and shaft assembly that is utilized to transmit power to the rear steering gear box. The worm gear is supported by ball bearings and when rotated the sector moves across the worm gear, rotating its attaching shaft. Rotation of the shaft is transmitted to the pitman arm which actuates the front steering system. Simultaneously the bevel gear secured to the end of the worm gear shaft rotates the gear and shaft assembly which transmits power to the rear steering gear box.

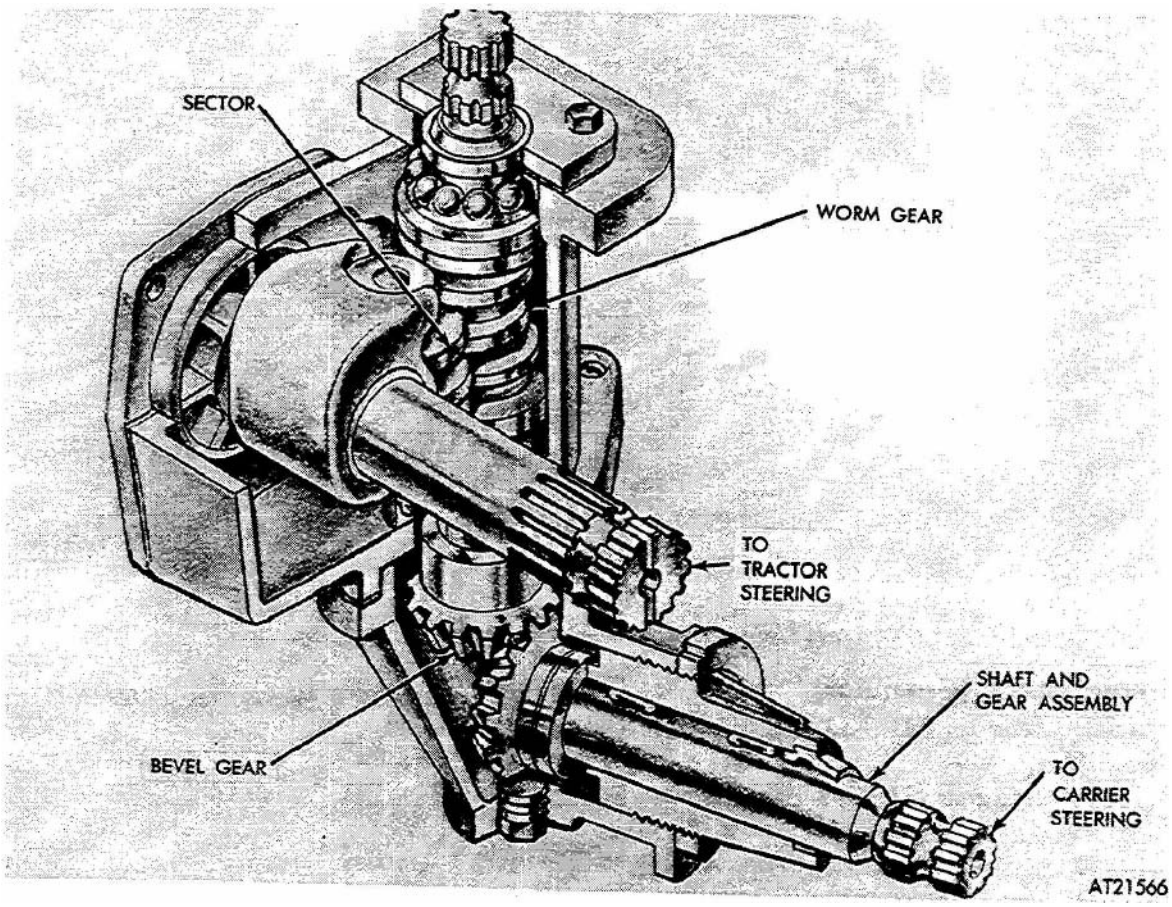


Figure 3-193. Front steering gear box, cross sectional view.

b. *Rear Steering Gear Box.* The rear steering gear box (fig 3-194) is a worm and sector type. Power supplied by the front steering gear box rotates the ball bearing supported worm gear. Rotation of the worm gear moves the sector across the worm gear, rotating its attaching shaft. This shaft rotation is transmitted to the pitman arm which actuates the rear steering system.

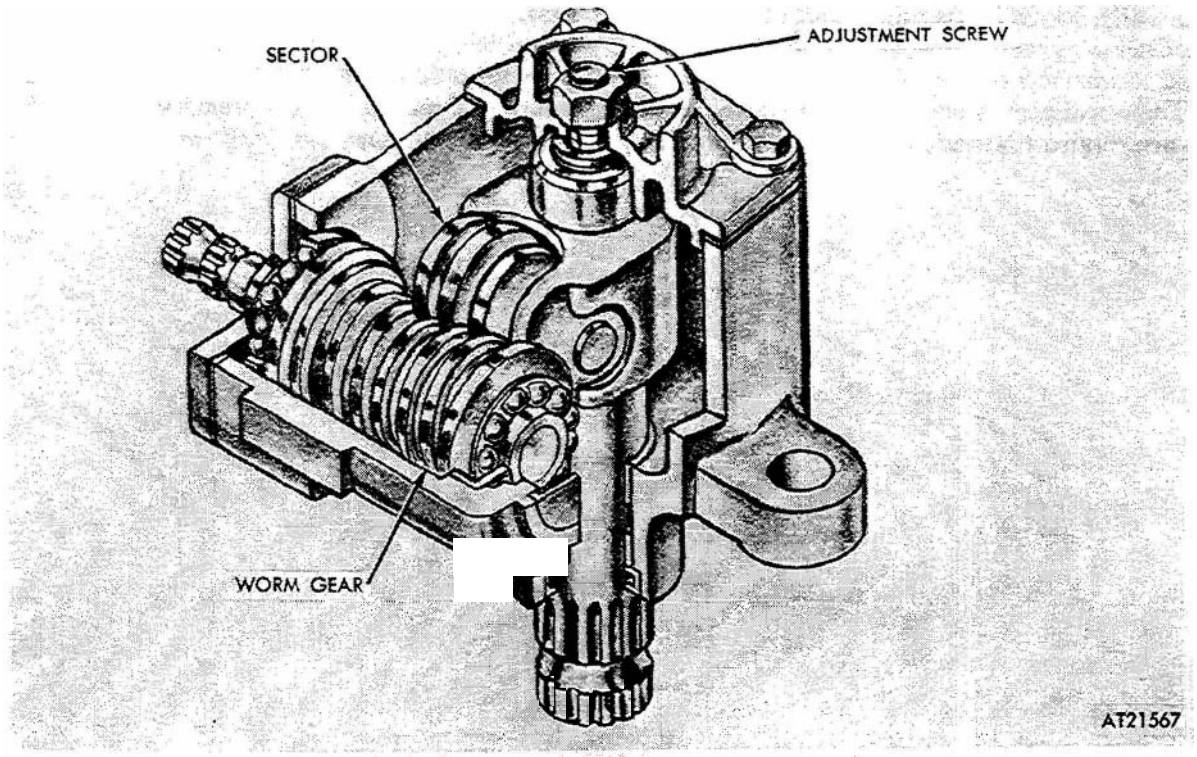


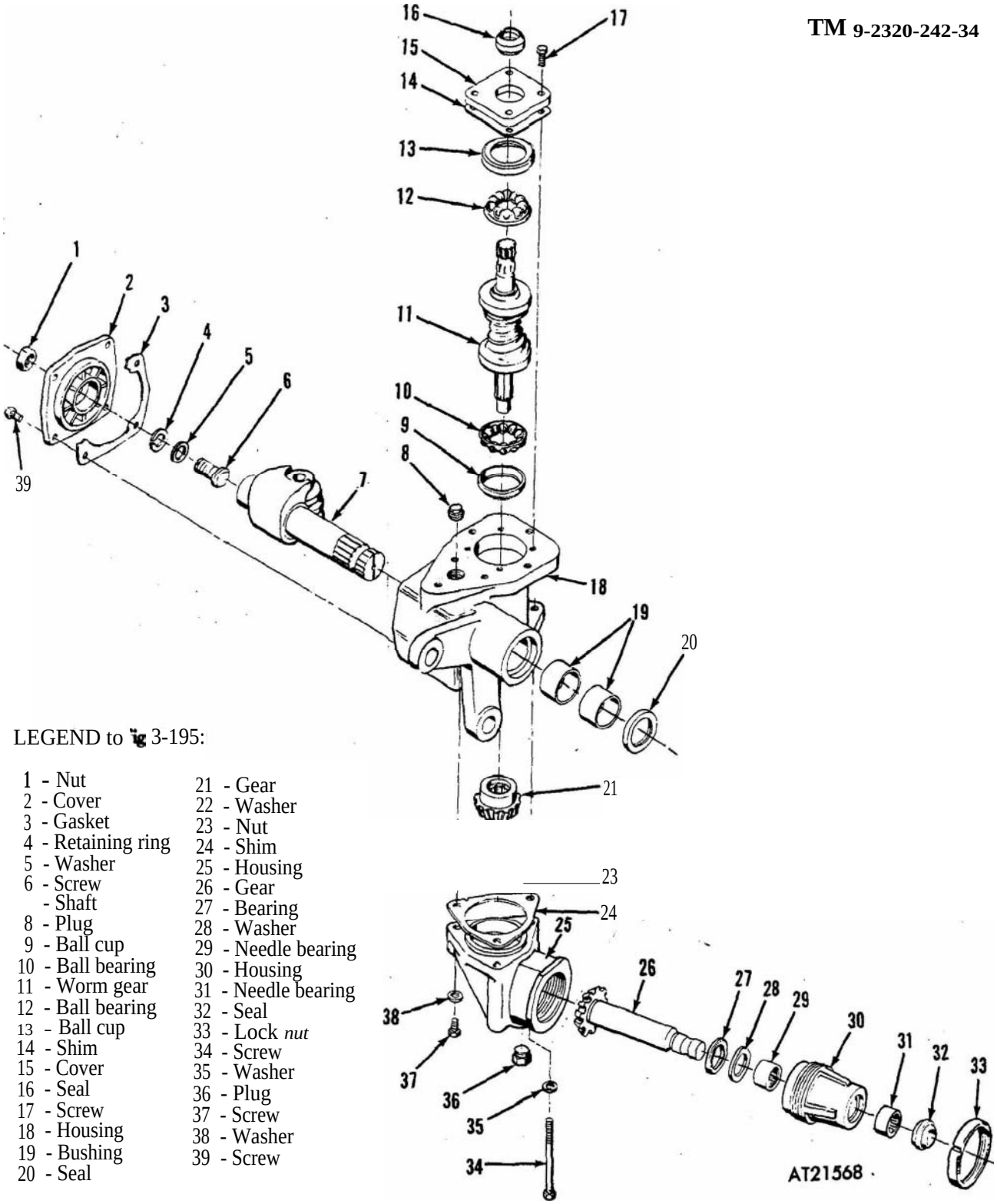
Figure 3-194. Rear steering gear box cross sectional view.

3-65. Front Steering Gear Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Diassembly.

(1) Rotate worm gear (11, fig 3-195) to center shaft (7) on worm gear. Disconnect cover (2) and gasket (3) by removing screws (39). Remove assembled cover, gasket, and shaft (7) from housing (18).



LEGEND to Fig 3-195:

1 - Nut
2 - Cover
3 - Gasket
4 - Retaining ring
5 - Washer
6 - Screw
7 - Shaft
8 - Plug
9 - Ball cup
10 - Ball bearing
11 - Worm gear
12 - Ball bearing
13 - Ball cup
14 - Shim
15 - Cover
16 - Seal
17 - Screw
18 - Housing
19 - Bushing
20 - Seal
21 - Gear
22 - Washer
23 - Nut
24 - Shim
25 - Housing
26 - Gear
27 - Bearing
28 - Washer
29 - Needle bearing
30 - Housing
31 - Needle bearing
32 - Seal
33 - Lock *nut*
34 - Screw
35 - Washer
36 - Plug
37 - Screw
38 - Washer
39 - Screw

Figure 3-195. Front steering gear box, exploded view.

(2) Remove nut (1) and unscrew cover (2) from screw (6). Disconnect screw (6) from shaft (7) by removing retaining ring (4) and washer (5).

(3) Disconnect housing (25) and shims (24) from housing (18) by removing screws (34 and 37) and washers (35 and 38). Remove plug (36).

(4) Disconnect assembled housing (30) from housing (25) by loosening lock nut (33) and unscrewing housing.

(5) Remove gear (26), bearing (27), washer (28), and lock nut (33) from housing (30).

(6) Using a suitable puller, remove seal (32) from housing (30) as shown in figure 3-196. Press needle bearings (29 and 31, fig 3-195) from housing (fig 3-197).

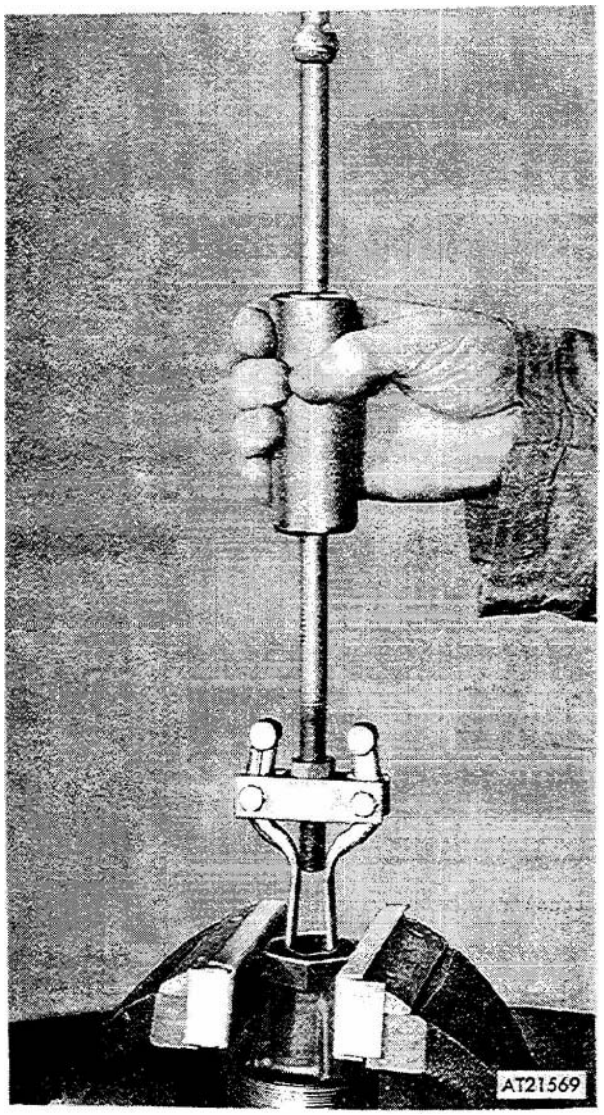


Figure 3-196. Removing seal from gear housing.

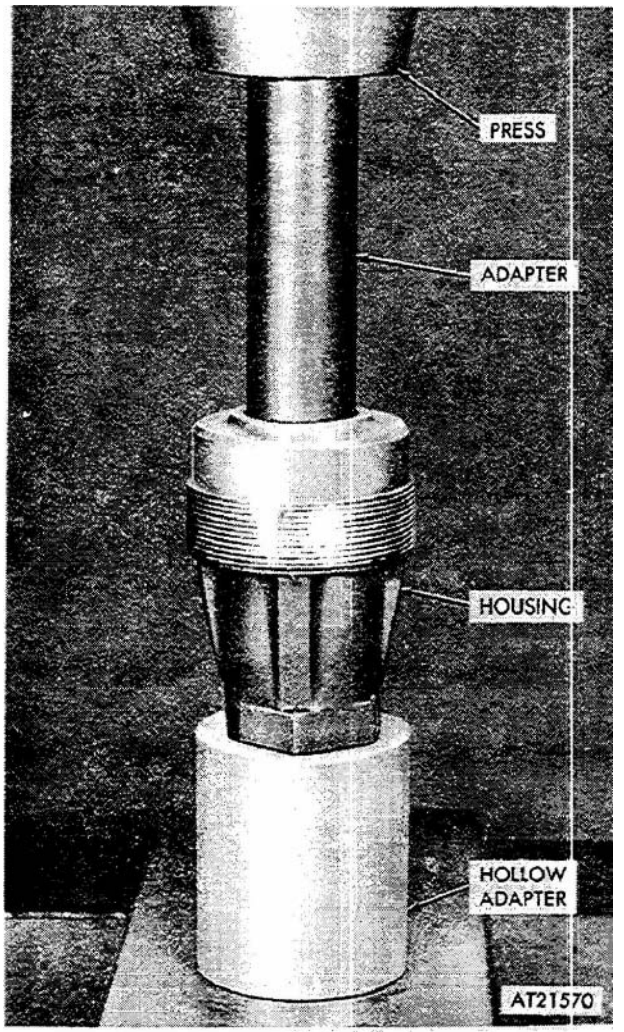


Figure 3-197. Pressing needle bearing from gear housin &

(7) Disconnect gear (21, fig 3-915) from worm gear (11) by removing nut (23) and washer (22). Remove gear (21) using a suitable puller (fig 3-198).

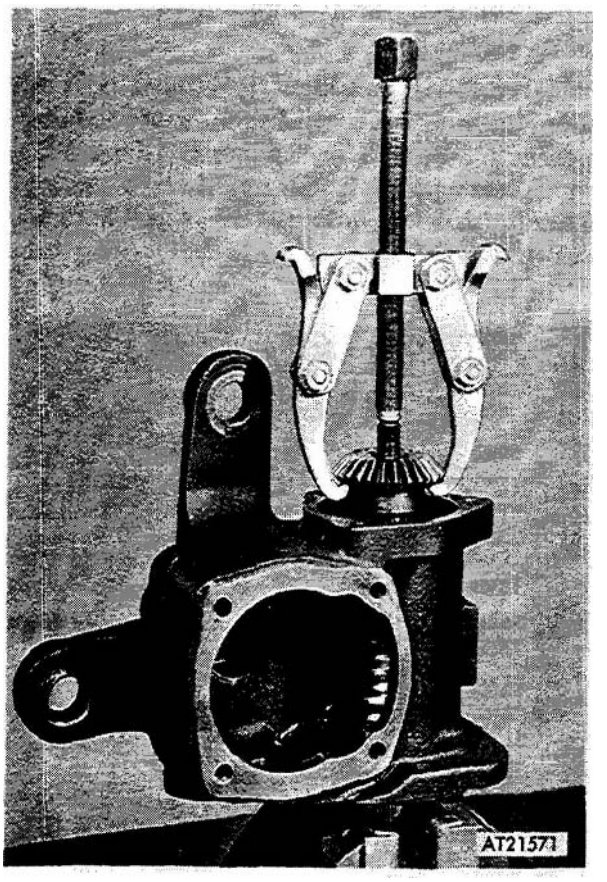


Figure 3-198. Removing gear from worm gear.

(8) Disconnect cover (15, fig 3-195) and shims (14) from housing (18) by removing screws (17). Using a suitable punch and hammer, remove seal (16) from cover (fig 3-199).

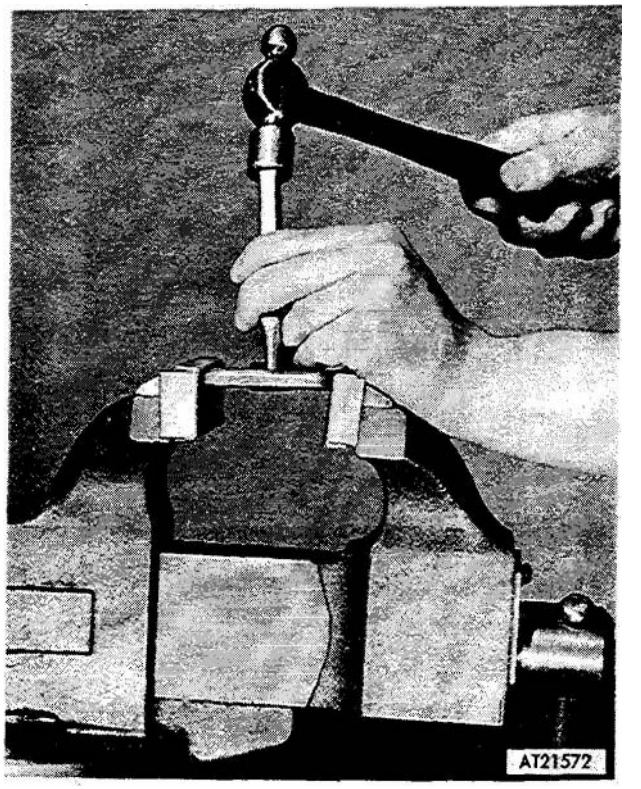


Figure 3-199. Removing seal from cover.

(9) Remove plug (8, fig 3-195), ball cups (9 and 13), ball bearings (10 and 12) and worm gear (11) from housing (18). Remove seal (20) from housing (fig 3-200).

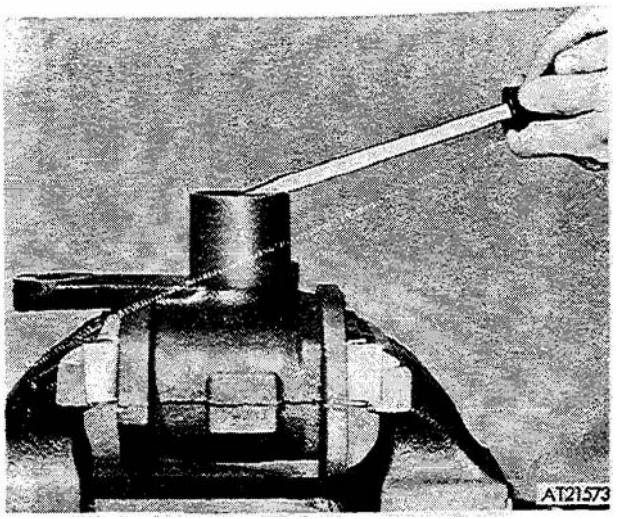


Figure 3-200. Removing seal from worm gear housing. '

(10) Press bushings (19 fig 3-195) from housing (fig .3-201).

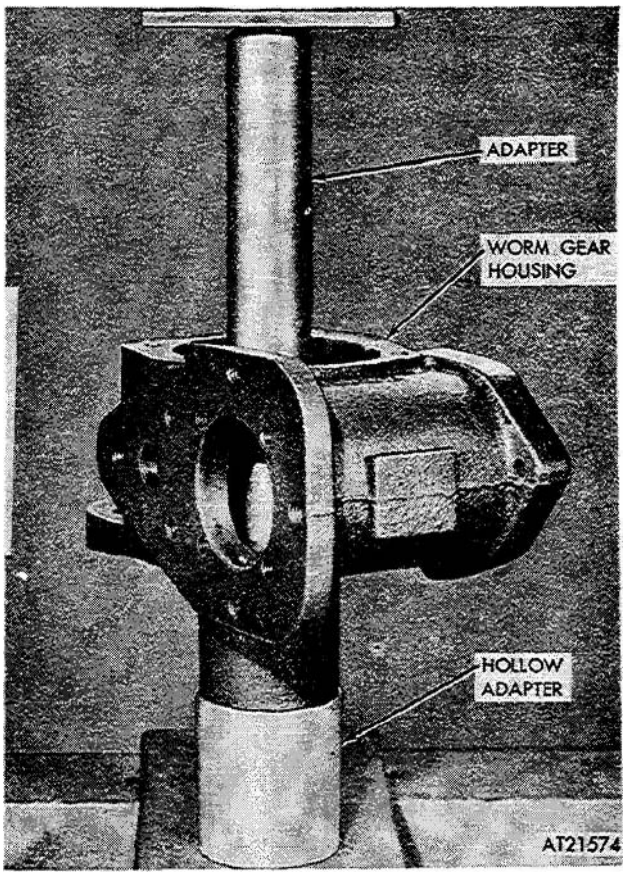


Figure 3-201. Pressing bushings from worm gear housing.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly.

(1) Press one bushing (19, fig 3-195) into housing (18) until it is just below the seal retaining shoulder (fig. 3-202). Turn housing (18, fig 3-1.95) over and press remaining bushing (19) into housing until it is flush with housing. Press seal (20) into housing (fig. 3-203).

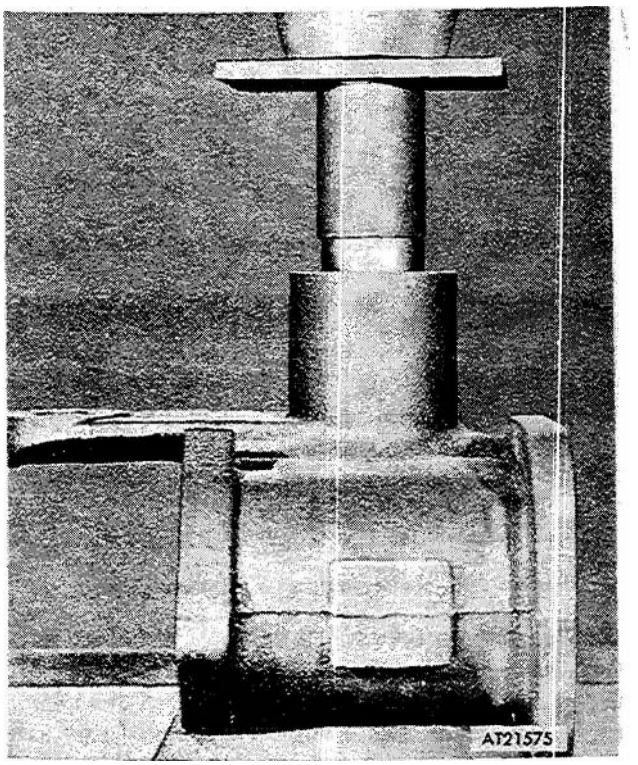


Figure 3-202. Pressing bushing into worm gear housing.

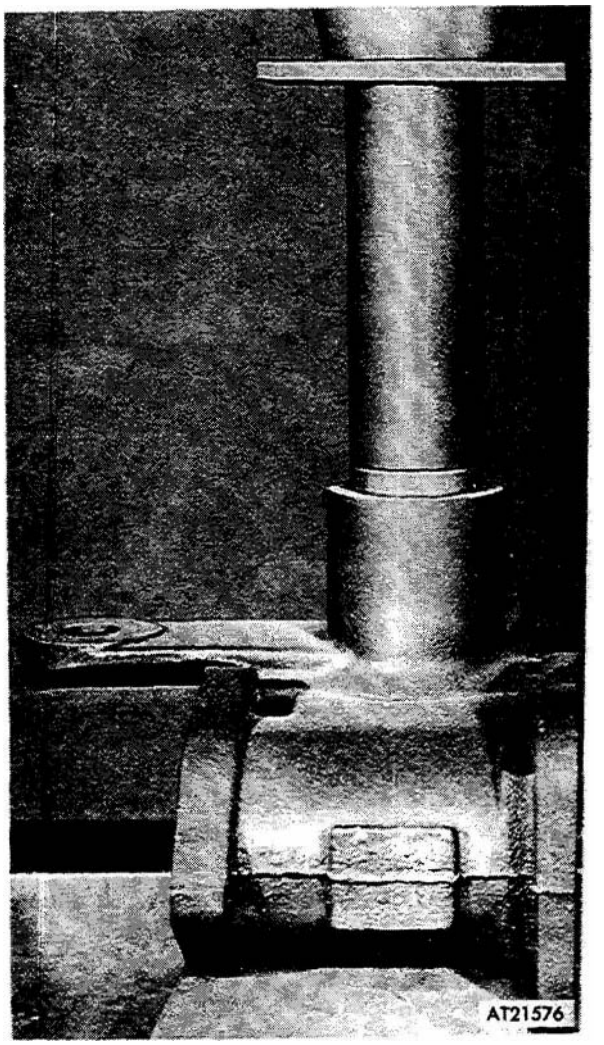


Figure 3-203. Pressing seal into worn gear housing.

(2) Position ball cup (9, fig 3-195), ball bearing (10), and worm gear (11) in housing. Position ball bearing (12) and ball cup (13) on worm gear.

(3) Press seal (16) into cover (15) *as* shown in figure 3-204. Secure cover (15, fig 3-195) and shms (14) to housing (18) with screws (17). Tighten screws to 18-22 lbs-ft. torque.

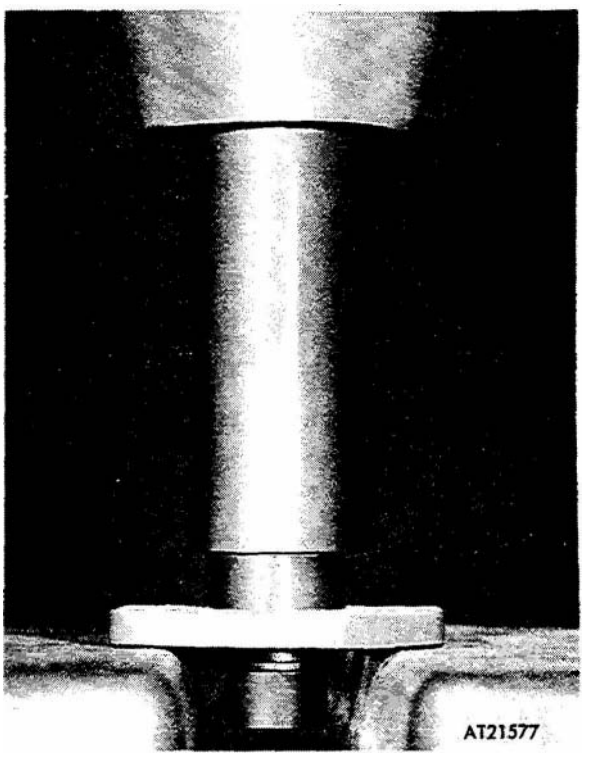


Figure 3-204. Pressing seal into cover.

(4) Check worm gear preload using a suitable inch-pound torque wrench (fig 3-205). Preload should be $\frac{5}{8}$-1-$\frac{1}{4}$ lbs-in., in *a nine* inch radius, if not, add or subtract the number of shims (14, fig 3-195) to obtain proper preload.

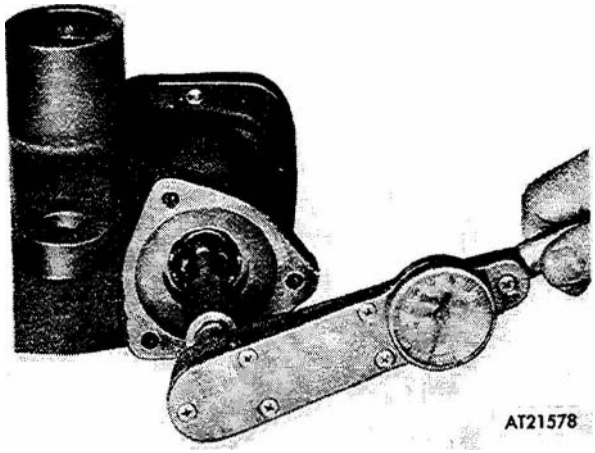


Figure 3-205. Checking worm gear preload.

(5) Position screw (6) in shaft (7) and secure with washer (5) and retaining ring (4). Screw cover (2) on screw (6) and install nut (1).

(6) Position assembled cover (2), gasket (3), and shaft (7) to housing (18) and secure with screws (39). Tighten screws to 25-30 lbs. ft. torque.

(7) Check for proper number of turns of worm gear. The number of turns right or left of center should be a minimum of 3 and 7 / 32 of an inch and maximum of 3 and 15 / 32 of an inch.

(8) Position gear (21) on worm gear (11) and secure with nut (23) and washer(22). Position shims (24), with notch toward cover (2) as shown in figure 3-206. Position housing (25, fig 3-195) to housing (18) and secure with screws (34 and 37) and washers (35 and 38). Tighten screws to 22-27 lbs-ft. torque. Install plug (36).

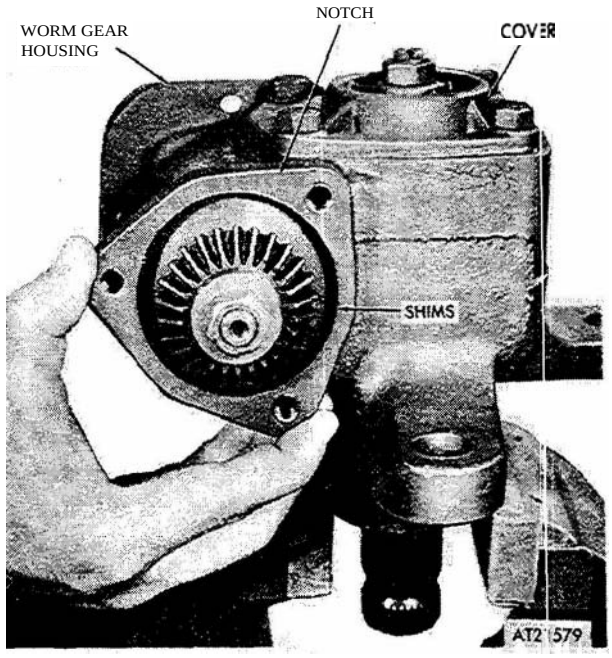


Figure 3-206. Proper installation of shims.

(9) Position bearing (27) and washer (2 B) on gear (26). Press needle bearing (29) into housing (30) as shown in figure 3-207. Turn housing (30, fig 3-195) over and press needle bearing (31) into housing until it is below seal retaining shoulder. Press seal (32) into housing (fig. 3-208).

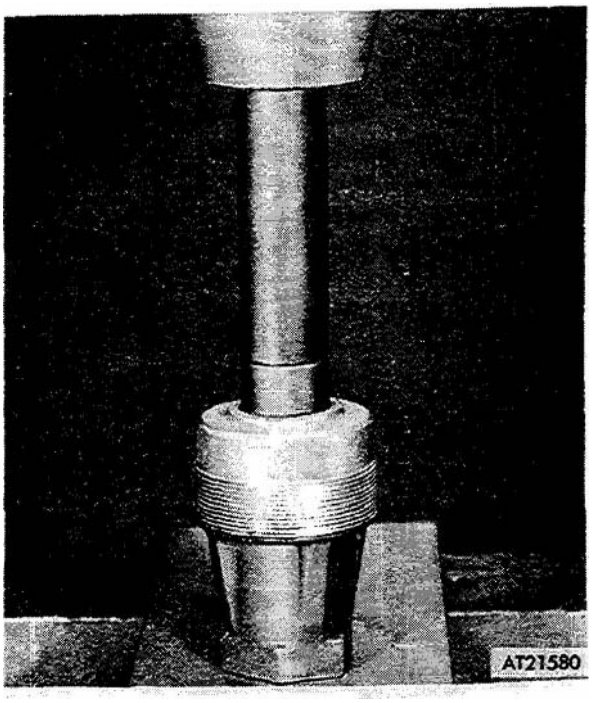


Figure 3-207. Pressing needle bearing into gear housing.

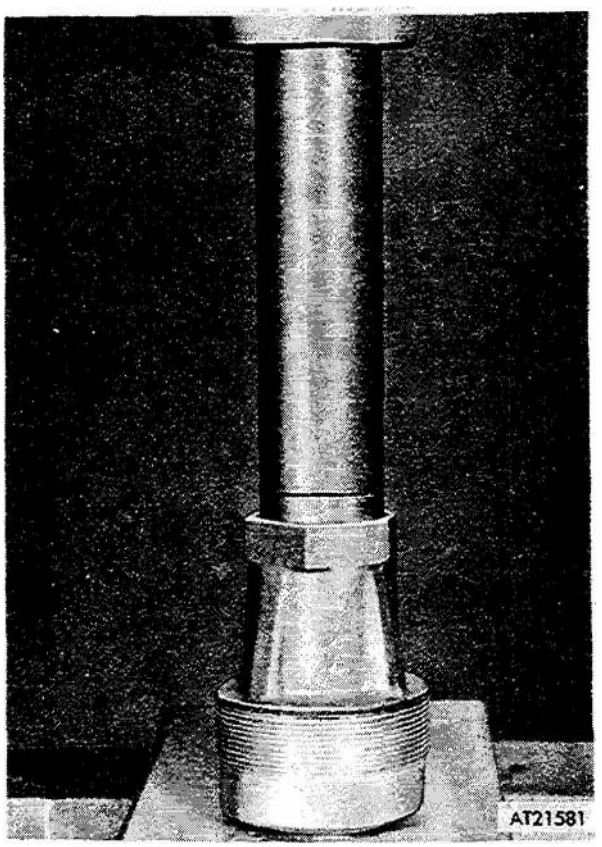


Figure 3-208. Pressing seal into gear housing.

(10) Position gear (26, fig 3-195) in housing (30) and connect lock nut (33). Align gear teeth of gear (21) and gear (26) and screw housing (30) into housing (25)

(11) Adjust for proper tooth contact of gear (21) and gear (26). Initial adjustment is accomplished by adding or subtracting the number of shims (24). Final adjustment is accomplished by screwing housing (30) in until it bottoms and backing it off just enough to remove any binding. After final adjustment, tighten lock nut (33) making sure that all threads of lock nut are in contact with threads of housing (30), if not, decrease the number of shims (24) and readjust.

(12) Fill steering gear box with proper lubricant (refer to LO 9-2320-242-12). Install plug (8).

f. *Adjust.*

(1) Center shaft in steering gear box by rotating worm gear and counting revolutions.

(2) Using a suitable inch-pound torque wrench and adapter, rotate worm gear shaft and note preload in center position (fig 3-209). Preload should be 15-29 lbs-in., if not, adjust preload by performing (3) and (4) below.

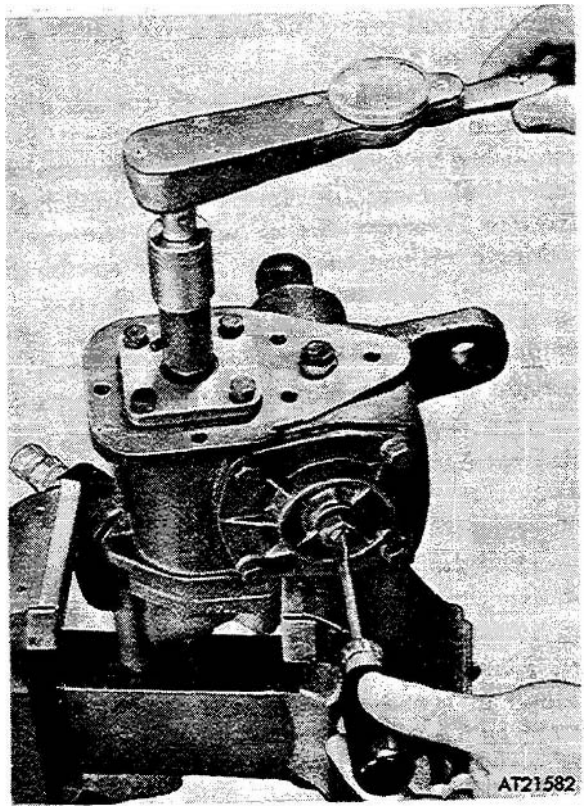


Figure 3-209. Adjusting front steering gear box.

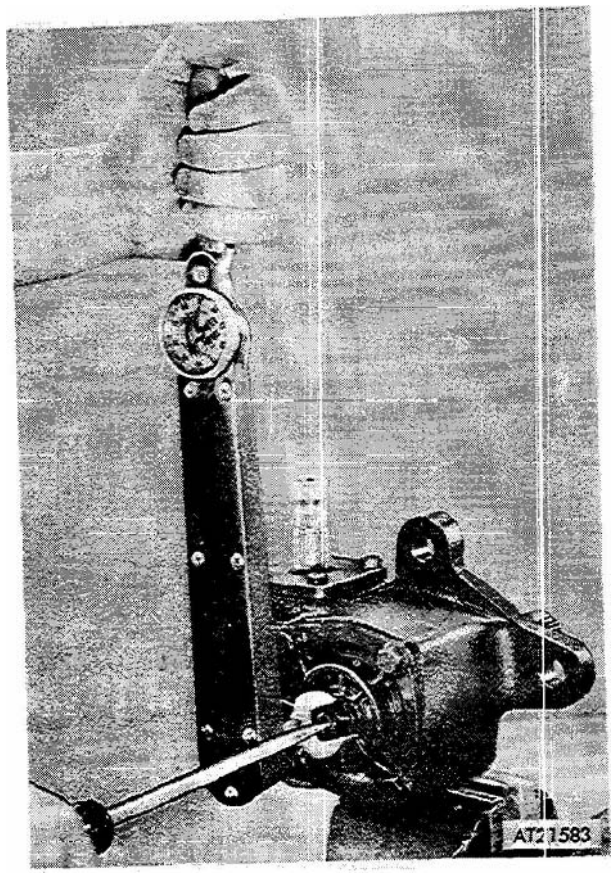


Figure 3-210. Securing front steering gear box adjustment screw.

(3) Loosen nut (1, fig 3-195). Using a suitable screwdriver, turn screw (6) clockwise to increase preload or counterclockwise to decrease preload.

(4) Turn screw (6) and recheck preload until proper preload is obtained. Hold screw stationary and tighten nut (1) to 16-20 lbs-ft. torque (fig 3-210).

g. *Test.*

(1) Using suitable plugs, plug three openings in housing (fig. 3-211).

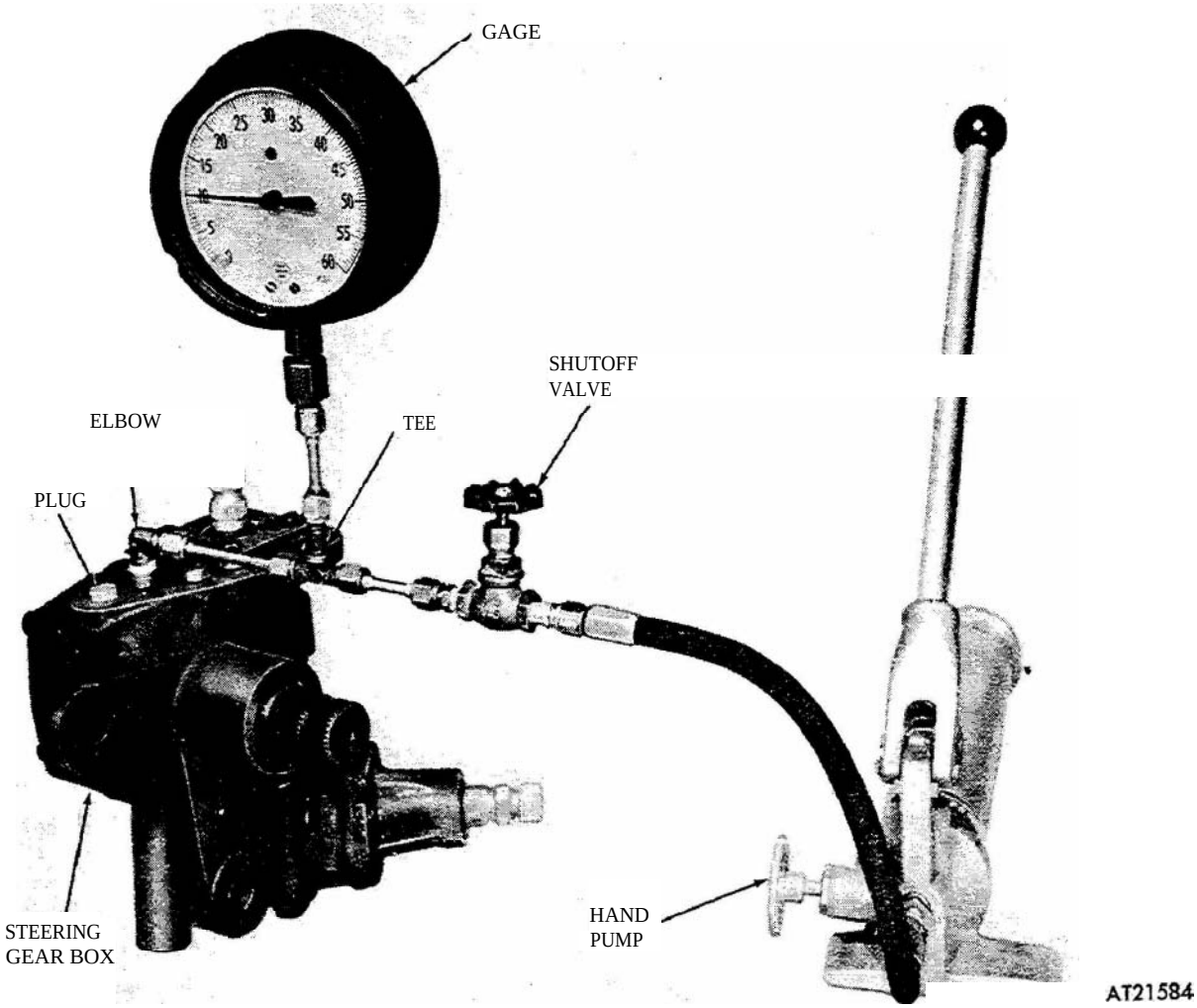


Figure 3-211. Pressure testing front steering gear box.

(2) Using suitable test equipment apply 10 PSI to steering gear box for five minutes. There shall be no leakage or seepage.

(3) Remove three plugs and test equipment from front steering gear box.

Note: The above test is performed to insure the front steering gear box will be watertight during fording and swimming operations.

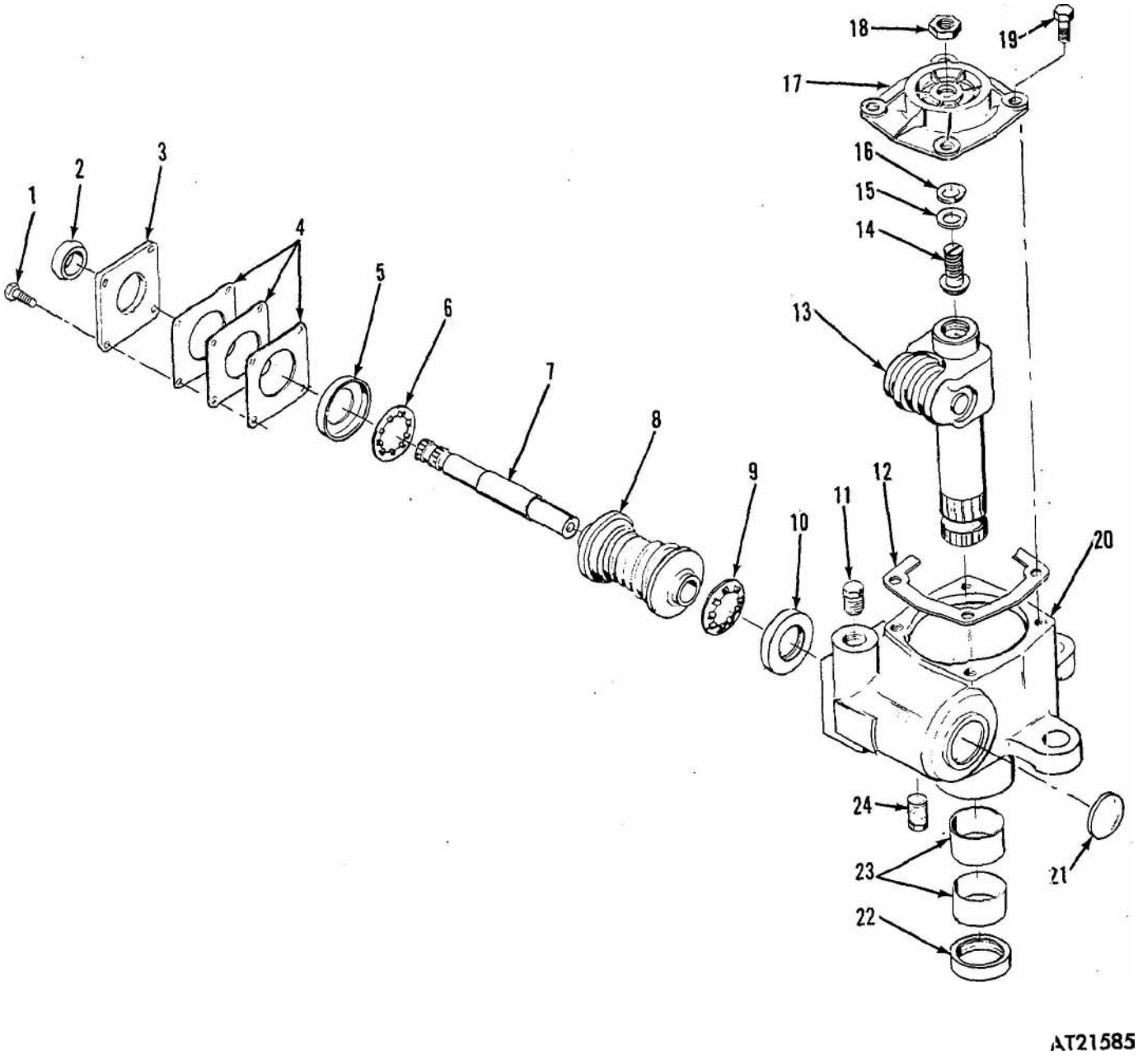
h. *Installation.* (Refer to TM 9-2320-242-20).

3-66. Rear Steering Gear Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Rotate worm gear (8, fig 3-212) to center shaft (13) on worm gear. Disconnect cover (17) and gasket (12) by removing screw (19). Remove assembled cover (17), gasket (12), and shaft (13) from housing (20).



1 - Screw
2 - Seal
3 - Cover
4 - Shim
5 - Ball cup
6 - Retainer
7 - Shaft
8 - Worm *gear*
9 - Retainer
10 - Ball cup
11 - Plug
12 - Gasket
13 - Shaft
14 - Screw
15 - Washer
16 - Retaining ring
17 - Cover
18 - Nut
19 - Screw
20 - Housing
21 - Plug
22 - Seal
23 - Bushing
24 - Plug

Figure 3-212. Rear steering gear box, exploded view.

(2) Remove nut (18) and unscrew cover (17) from screw (14). Disconnect screw (14) from shaft (13) by removing retaining ring (16) and washer (15).

(3) Disconnect cover (3) and shims (4) from housing (20) by removing screw (1). Using a suitable punch and hammer, remove seal (2) from cover (fig 3-199).

(4) Remove ball cup (5, fig 3-212), retainers and 9), and assembled shaft (7) and worm gear (8) from housing (20). Using a suitable puller, remove ball cup (10) from housing (fig 3-213). Press shaft (7, fig 3-212) from worm gear (3) as shown in 3-214.

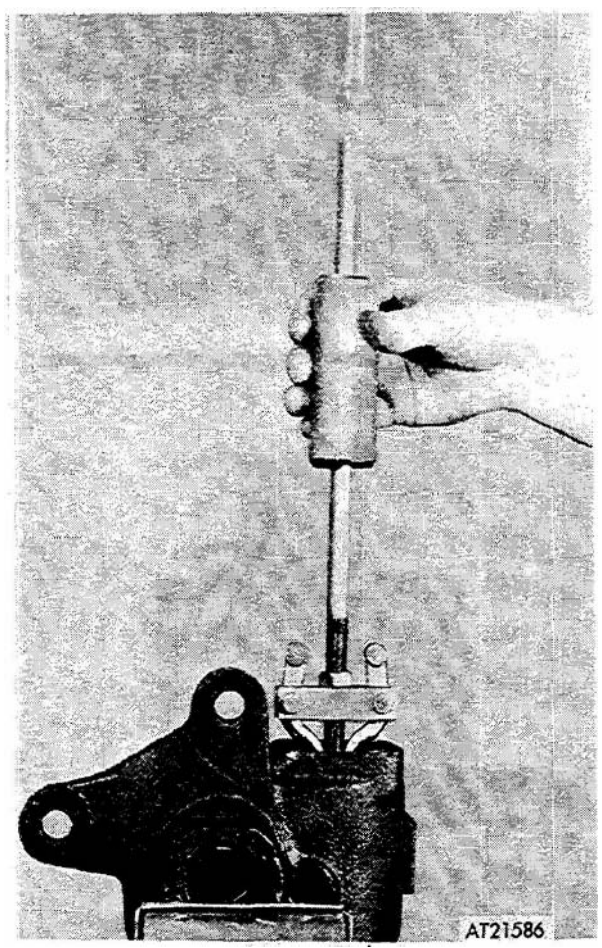


Figure 3-213. Removing ball cup from housing.

(5) Using a suitable punch and hammer, remove plug (21, fig 3-212) from housing (20) as shown in figure 3-215. Remove plugs (11 and 24, fig 3-212).

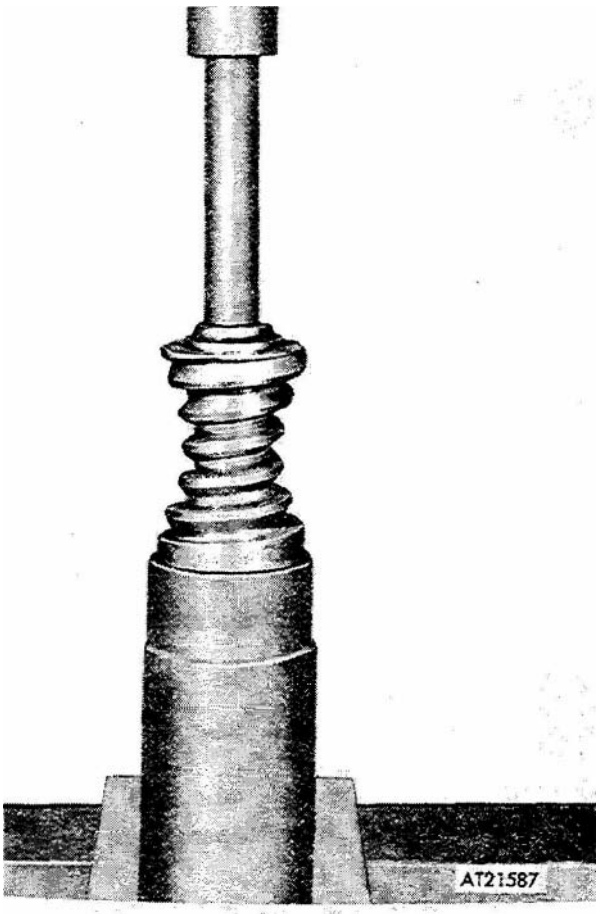


Figure 3-214. Pressing shaft from worm gear.

(6) Remove seal (22) from housing (20) as shown in figure 3-216. Press bushings (23, fig 3-212) from housing (fig 3-217).

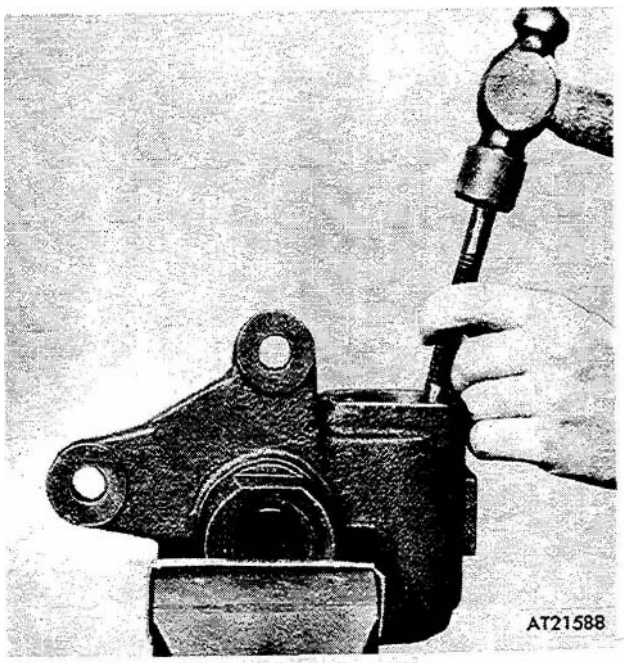


Figure 3-215. Removing plug from housing.

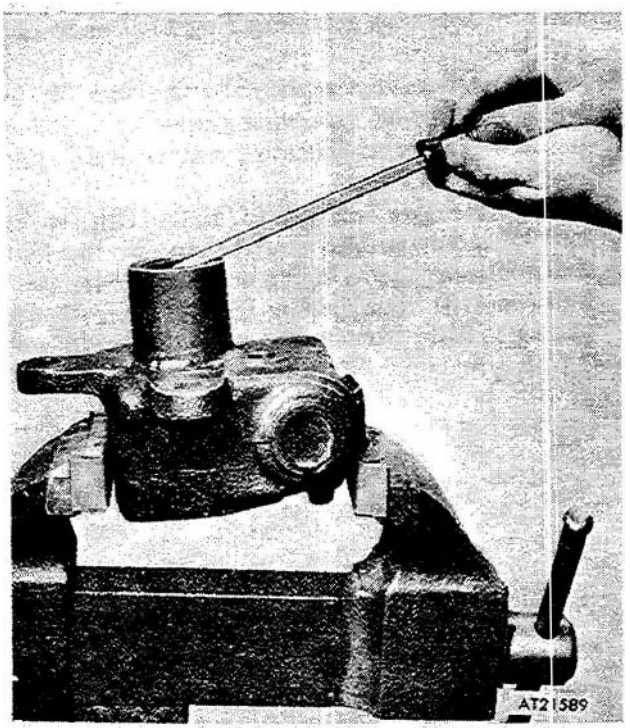


Figure 3-216. Removing shaft seal from housing

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly.

(1) Position plug (21, fig 3-212) and secure by peening the center of plug with a suitable hammer (fig 3-218). Install plug (24, fig 3-212).

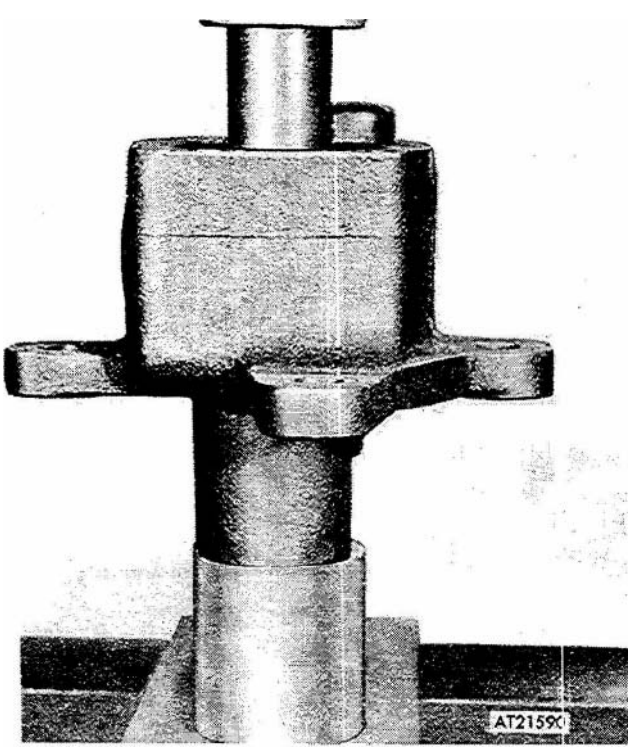


Figure 3-217. Pressing shaft bushings from housing.

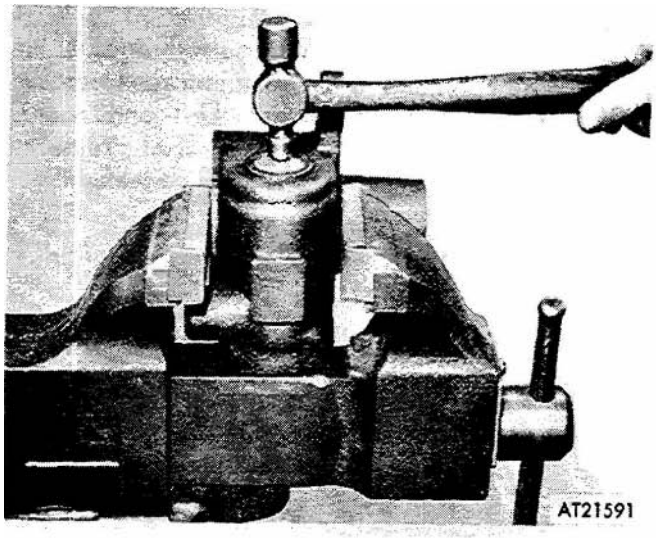


Figure 3-218. Plug installation.

(2) Press one bushing (23) into housing (20) until it is just below the seal retaining shoulder (fig 3-219). Turn housing (20, fig 3-212) over and press remaining bushing (23) into housing until it is flush with housing. Press seal (22) into housing (fig 3-220).

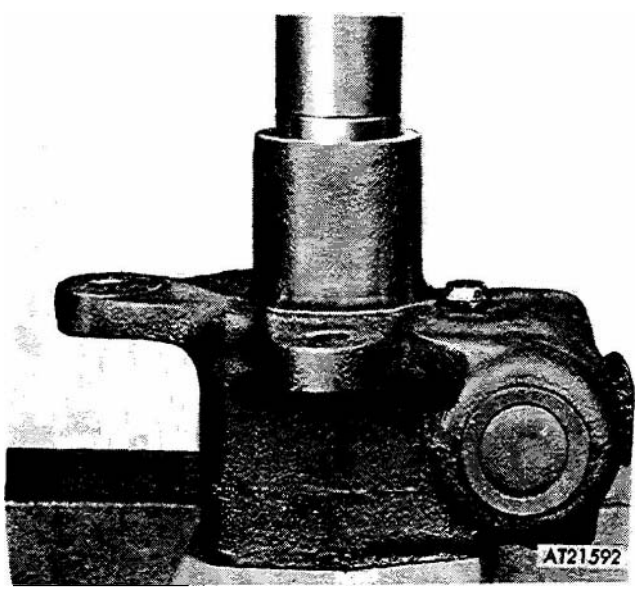


Figure 3-219. Pressing shaft bushing into housing.

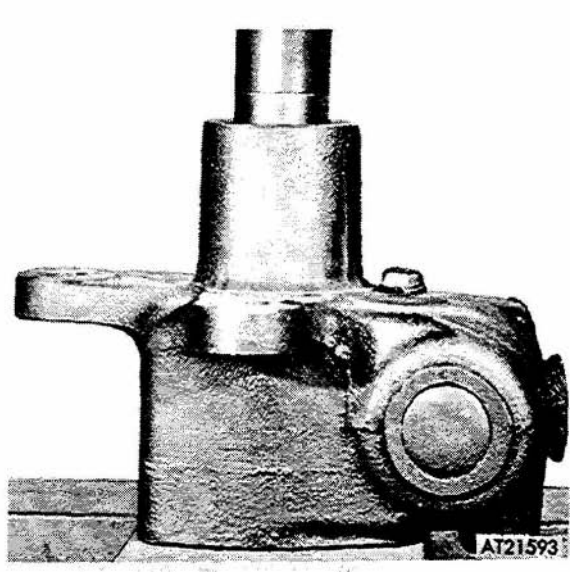


Figure 3-220. Pressing shaft seal into housing.

(3) Press shaft (7, fig 3-212) into worm gear (8) *as* shown in figure 3-221.

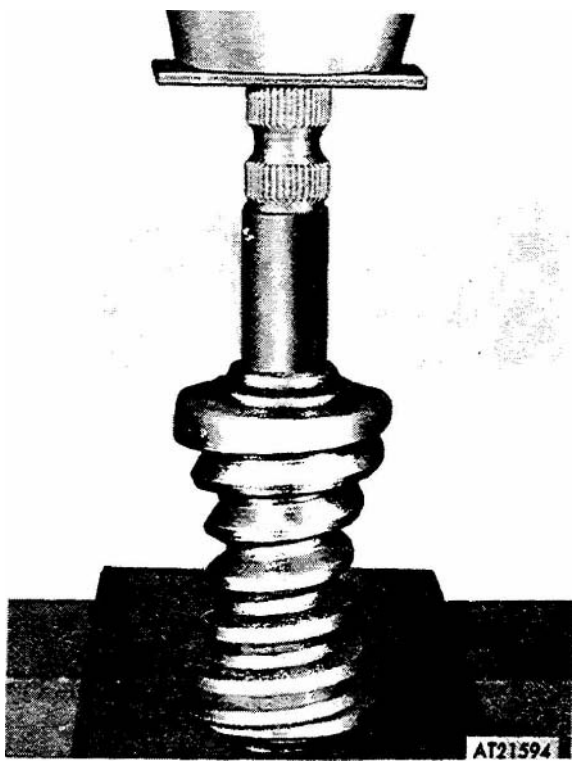


Figure 3-221. Pressing shaft into worm gear,

(4) Position ball cup (10, fig 3-212) into housing (20) and tap into place using a block of wood. Position ball cup (5), retainers (6 and 9), and assembled worm gear (8) into housing.

(5) Press seal (2) into cover (3) as shown in figure 3-204. Position cover (3, fig 3-212) and shims (4) to housing (20) and secure with screw (1). Tighten screws to 18-22 lbs-ft. torque.

(6) Check worm gear preload using *a* suitable adapter and inch-pound torque wrench (fig 3-222). Preload in a nine inch radius, should be **⅜-1-¼ lbs-in.,** if not, add or subtract the number of shims (4, fig 3-212) to obtain proper preload.

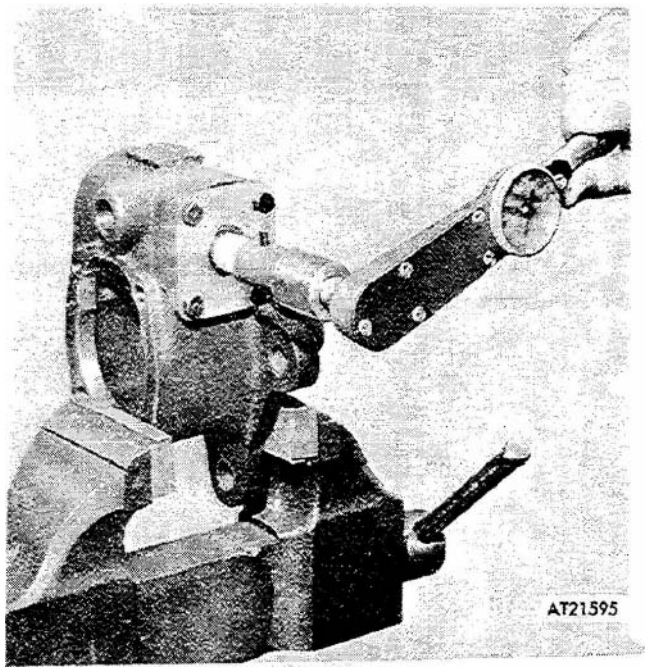


Figure 3-222. ***Checking rear steering gear box worm gear preload.***

(7) Position screw (14) in shaft (13) and secure with washer (15) and retaining ring (16). Screw cover (17) on screw (14) and install nut (18).

(8) Position assembled cover (17), gasket (12) and shaft (13) to housing (20) and secure with screw (19). Tighten screws to 25-30 lbs-ft. torque.

(9) Check for proper number of turns of the worm gear. The number of turns right or left of center should be a minimum of 3 turns and 7 /32 of an inch and maximum of 3 turns and 15 / 32 of an inch.

(10) Fill steering gear box with proper lubricant (refer to LO 9-2320-242-12). Install plug (11).

f. *Adjust.*

(1) Center shaft in steering gear box by rotating worm gear and counting revolutions.

(2) Using a suitable inch-pound torque wrench and adapter, rotate worm gear shaft and note preload in center position (fig 3-223). Preload should be 15-29 lbs-in., if not, adjust preload by performing (3) and (4) below.

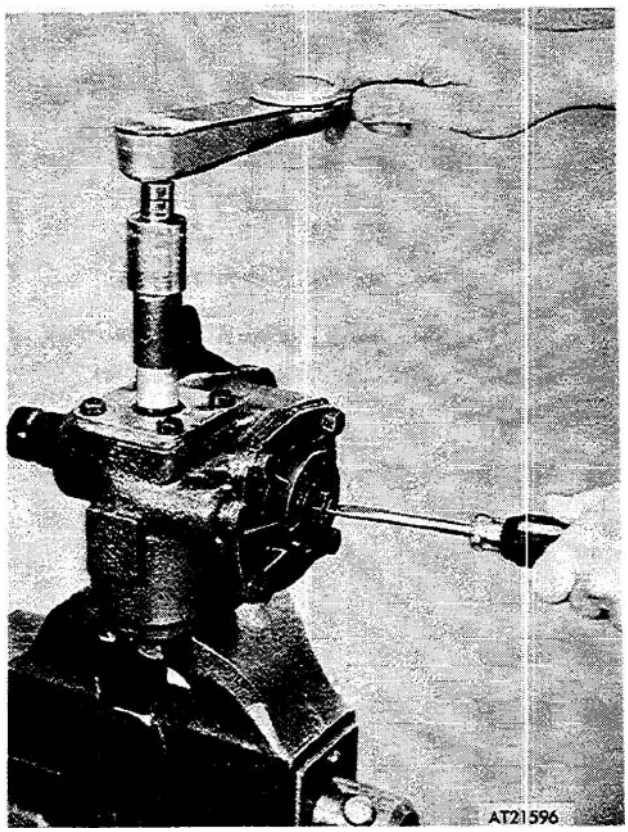


Figure 3-223. Adjusting rear steering gear box.

(3) Loosen nut (18, fig 3-212). Using a suitable screwdriver, turn screw (14), clockwise to increase preload and counterclockwise to decrease preload.

(4) Turn screw (14) and recheck preload until proper preload is obtained. Hold screw stationary **and tighten nut (18) to 16-20** lbs-ft. torque (fig 3-224).

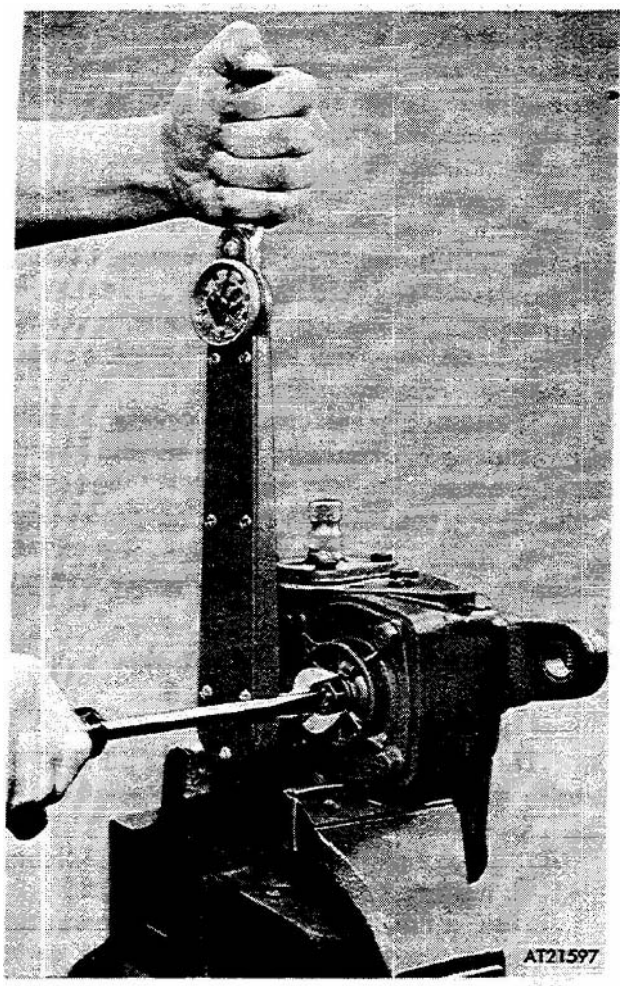


Figure 3-224. Securing rear steering gear box adjustment screw.

g. Test. Using suitable test equipment apply 10 PSI to steering gear box for five minutes. There shall be no leakage or seepage (fig 3-225).

Note: The above test is performed to insure the rear steering gear box will be watertight during fording and swimming operations.

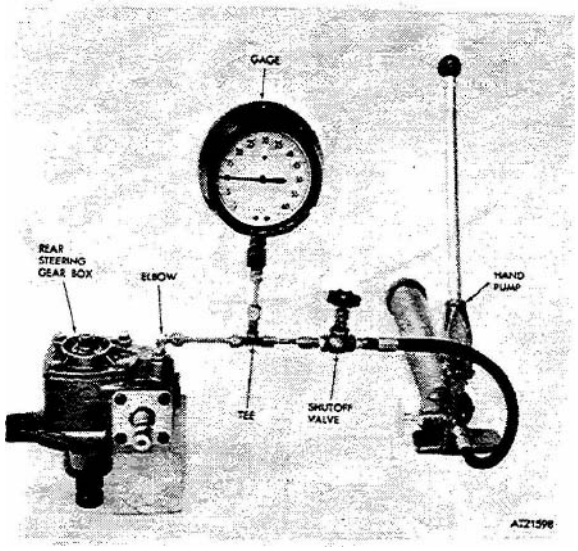


Figure 3-225. Pressure testing rear steering gear box.

h. *Installation.* (Refer to TM 9-2320-242-20.)

Section XIX. ARTICULATION YOKE ASSEMBLY

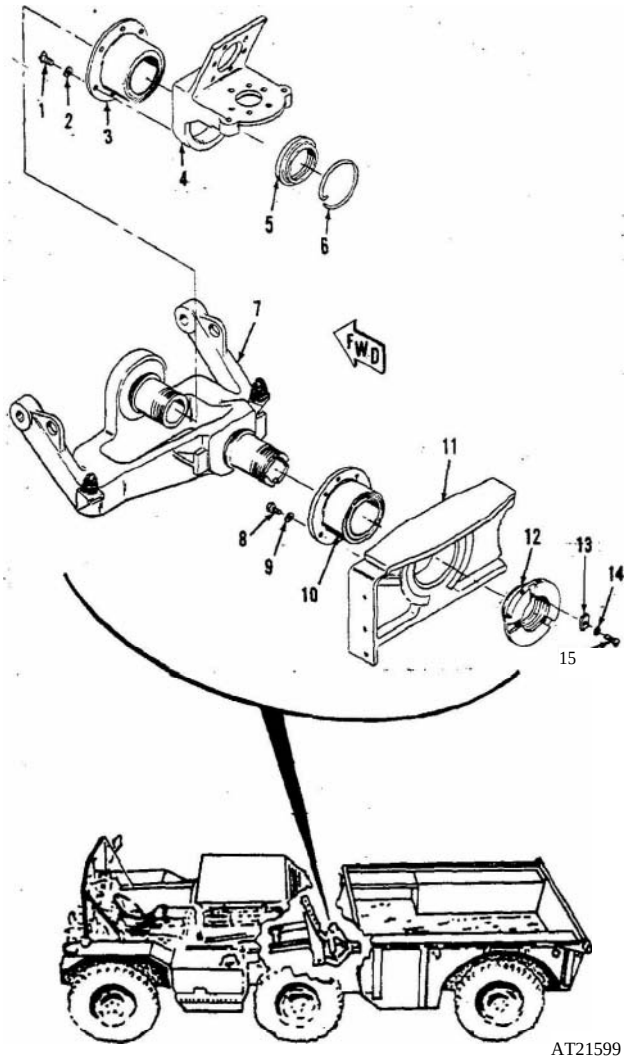


Figure 3-226. Articulation yoke ***assembly, exploded mew.***

LEGEND to fig 3-226:

1 - Screw
2 - Lock washer
3 - Bearing
4 - Front bearing support
5 - Bearing nut
6 - Lock ring
- Yoke
8 - Screw
9 - Lock washer
10 - Bearing
11 - Rear bearing support
12 - Bearing nut assembly
13 ▪ Lock plate
14 - Lock washer
15 - Screw

3-67 Genera I.

a. The purpose of the articulation joint is to allow the tractor and carrier to pitch and roll independently of one another. The articulation joint houses the propeller shaft for the rear differential and supports the rear wheel steering torque tube. The articulation hitch incorporates two torsilastic rubber bearing assemblies. The articulation action comes from the torsional movement of the rubber bushings, which are bonded between steel bushings in bearings (3 and 10, fig 3-226). The bushing eliminates the lubrication requirement, minimizes the static friction effect, and stabilizes the carrier during the swimming operation.

b. The arrangement of the coupling assembly allows the carrier to pitch 40 degrees with respect to the tractor, and to roll 30 degrees at the rear axle. This concept, coupled with the ability of the center axle to rotate ±15 *degrees, allows* the vehicle to maintain uniform ground contact over virtually any type of rough terrain.

3-68. Articulation Yoke Assembly

a. *Removal.* (Refer to para 2-39a.)

b. *Disassembly.*

(1) Disconnect lock plate (13, fig 3-226) from bearing nut assembly (12) by removing screws (15) and lock washers (14).

(2) Unscrew bearing nut assembly (12) from yoke (7) using spanner wrench (11602326).

(3) Disconnect lock ring (6) from bearing nut (5) and unscrew nut using spanner wrench (11602326).

(4) Remove front and ear bearing supports (4 and 11) and bearings (3 and 10) from yoke (7). Disconnect bearings from Dearing supports by removing screws (1 and 8) and lock washers (2 and 9).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Assembly.*

(1) Apply a light film of grease (G AA) to bearing contact surfaces of front and rear bearing supports (4 and 11) and yoke threads.

(2) Insert bearing (3) to front bearing support (4), align screw holes and secure with screw (1) and lock washer (2).

(3) Insert bearing (10) into rear bearing support (11), align screw holes and secure with screw (8) and lock washer (9).

(4) Install bearings (3 and 10) and front and rear bearing supports (4 and 11) on yoke (71.

(5) Connect bearing nut (5) to yoke (7) and tighten nut with spanner wrench (116023f6) until serrations on bearing are fully engaged (fig 3-227).

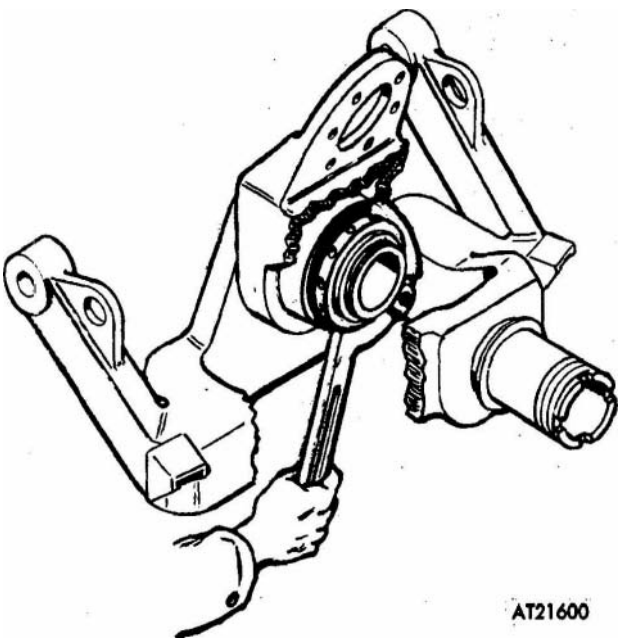


Figure 3-227. Tightening front bearing nut.

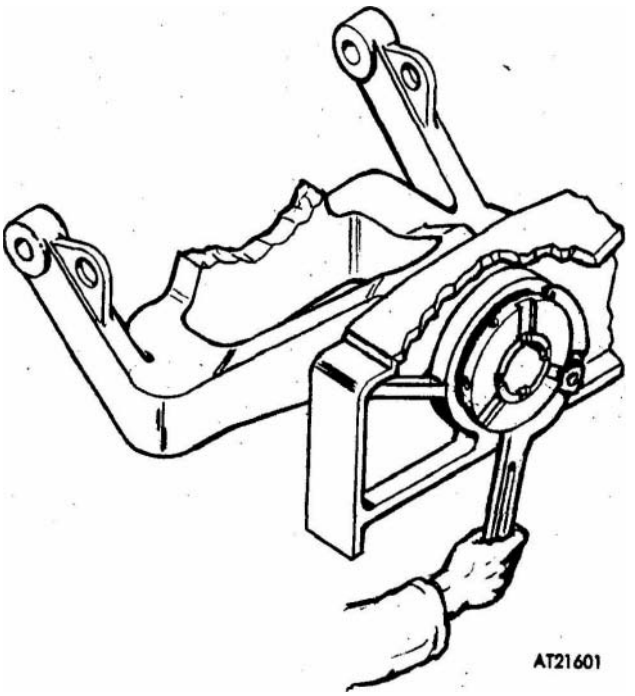


Figure 3-228. Tightening rear bearing nut.

(6) Use nearest accessible pilot hole on bottom of bearing nut (5, fig 3-226) and drill a 3 / 32 inch hole in yoke (7). Install lock ring (6) with tang in hole drilled into yoke.

(7) Connect bearing nut (12) to yoke (7) and tighten nut with spanner wrench (11602326) until serrations are fully engaged. Continue tightening nut until a slot in nut is in alignment with a slot in yoke (fig 3-228).

(8) Install lock plate (13, fig 3-226) engaging yoke (7) and bearing nut (12) and secure with screws (15) and lock washers (14).

f. *Installation.* (Refer to para. 2-39b.)

Section XX. BODY AND ACCESSORIES

3-69. General

The tractor and carrier bodies are of single unit hull type welded aluminum construction and are sealed, providing the floatation characteristics necessary for swimming operations with full payload. The lightweight aluminum also facilitates air transport and airdrop. Lifting and tie-down fittings are provided on the vehicle in addition to a towing pintle mounted on the rear of the carrier body. The vehicle is equipped with a removable, folding windshield which consists of two pieces of heavy-duty safety plate glass, rigidly supported by an aluminum frame. Storage for the windshield is provided in the engine cover. Vehicle tractor seats are constructed of a tubular aluminum frame, a one-piece moulded fiberglass seat shell and two foam cushions. The drivers seat is adjustable, forward and back. Access panels located below the water line provide entrance to watertight compartments and must be resealed when installed. To protect personnel during inclement weather conditions, the carrier and tractor are equipped with waterproof heavy-duty canopies. To facilitate removal and replacement other accessories are bolted to the bodies.

3-70. Right Hand Fender

a. *Removal.* (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Remove dents and bends (refer to TM 10-450).

(2) Weld tears and cracks (refer to TM 9-237).

e. *Installation.* (Refer to TM 9-2320-242-20.)

3-71. Left Hand Fender

a. Removal. (Refer to TM 9-2320-242-20.)
b. *Cleaning.* (Refer to para 3-3.)
c. *Inspection.* (Refer to para 3-4.)
d. *Repair.*
(1) Remove dents and bends (refer to TM 10-450).
(2) Weld tears and cracks (refer to TM 9-237).
e. *Installation.* (Refer to TM 9-2320-242-20.)

3-72. Windshield Frame and Glass

a. Removal. (Refer to TM 9-2320-242-10.)
b. Disassembly. (Refer to 'FM 9-2320-242-20.)
c. Cleaning. (Refer to para 3-3.)
d. Inspection. (Refer to para 3-4.)
e. Repair.
(1) Straighten frame (refer to TM 10-450).
(2) Weld cracks in frame (refer to TM 9-237).
(3) Using a suitable *glass* cutter, cut new windshield from material conforming to Military Specification, MIL-G-3787, class 1, type A, 1/4 of an inch thick (fig 3-229).

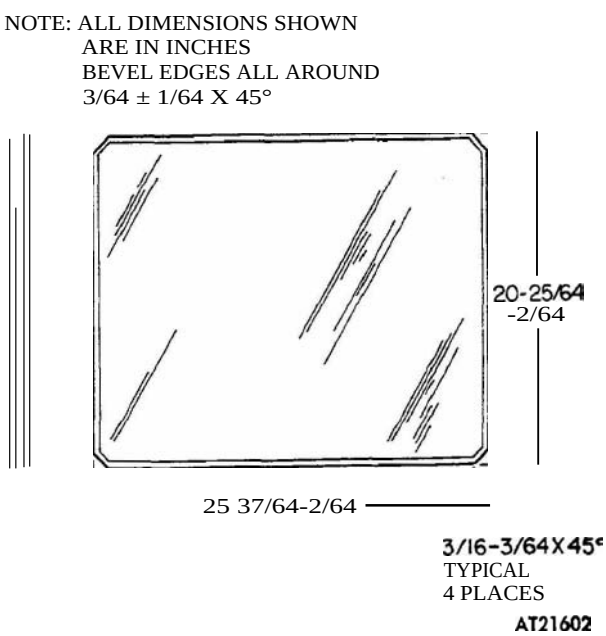


Figure 3-229. Windshield dimensions and fabrication data.

f. Assembly. (Refer to TM 9-2320-242-20.)
g. Installation. (Refer to TM 9-2320-242-10.)

3-73. Tractor Left Seat Assembly

a. Removal. (Refer to TM 9-2320-242-20.)
b. Disassembly.
(1) Slide back cushion (2, fig 3-230) up and off seat shell (5).

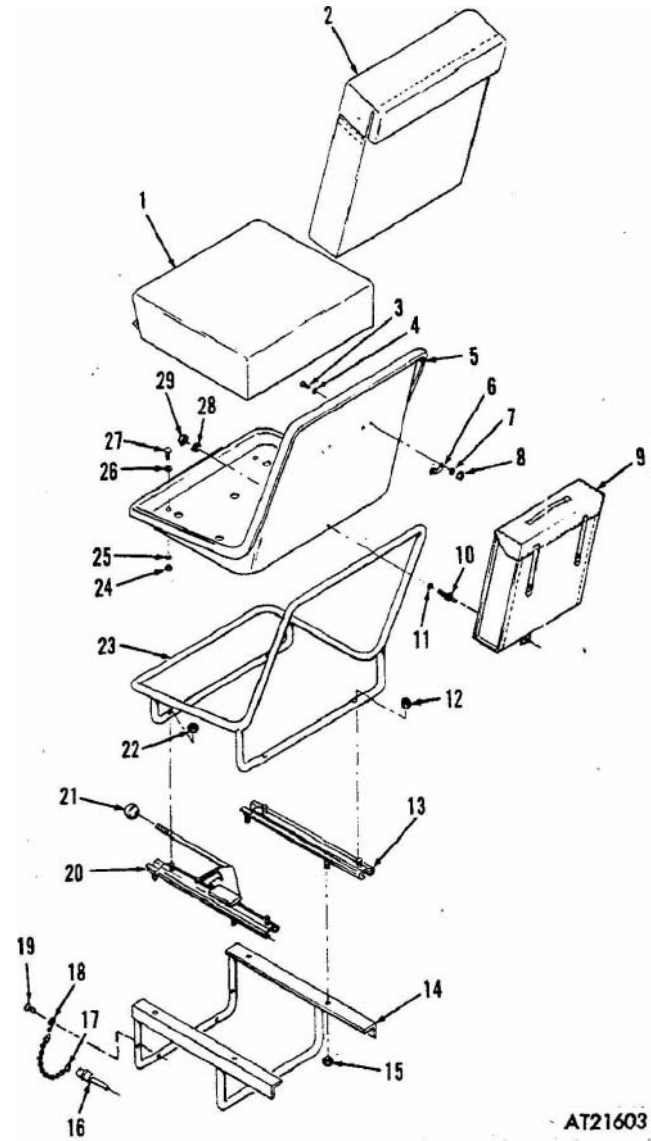


Figure 3-230. Tractor left seat assembly, exploded view.

LEGEND to fig 3-230:

1 - Seat cushion
2 - Back cushion
3 - Screw
4 - Washer
5 - Seat shell
6 - Clip
7 - Washer
8 - Nut
9 - Pamphlet bag
10 - Stud
11 - Washer
12 - Nut
13 - Right adjuster
14 - Support assembly
15 - Nut
16 - Pin
17 - Chain
18 - Hook
19 - Screw
20 - Left Adjuster
21 - Knob
22 - Nut
23 - Seat frame
24 - Nut
25 - Washer
26 - Washer
27 - Stud
28 - Washer
29 - Nut

(2) Unsnap seat cushion (1) from studs (27) and remove cushion from seat shell (5).

(3) Unsnap pamphlet bag (9) from stud (10) and remove bag from clips (6).

(4) Remove seat shell (5) from seat frame (23). Remove clips (6) from seat shell by removing screws (3), nuts (8), and washers (4 and 7). Disconnect studs (10 and 27) by removing nuts (24 and 29) and washers (11, 25, 26, and 28).

(5) Disconnect seat frame (23) from right adjuster (13) and left adjuster (20) by removing nuts (12 and 22).

(6) Disconnect right adjuster (13) and left adjuster (20) from support assembly (14) by removing nut (15). Remove knob (21).

(7) Disconnect pin (16) and chain (17) from support assembly (14) by removing screw (19). Remove pin and hook (18) from chain.

c. Cleaning (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Repair.

(1) Repair cushions (refer to TM 10-269).

(2) Straighten distorted parts (refer to TM 10-450).

(3) Weld cracks (refer to TM 9-237).

f. Assembly.

(1) Install pin (16) and hook (18) on chain (17) and secure assembled chain to support assembly (14) with screw (19).

(2) Install knob (21) on left adjuster (20) and connect left adjuster (20) and right adjuster (13) to support assembly (14) and secure with nut (15).

(3) Connect seat frame (23) to adjusters and secure with nuts (12 and 22).

(4) Connect studs (10 and 27) to seat shell (5) and secure with nuts (24 and 29) and washers (11, 25. 26, and 28). Connect clip (6) and secure with screw (3), nut (8), and washers (4 and 7). Install seat shell on seat frame (23).

(5) Position pamphlet bag (9) on clip (6) and secure to stud (10).

(6) Snap seat cushion (1) on studs (27) and slide back cushion (2) over seat shell.

g. ***Installation.*** (**Refer** to TM 9-2320-242-20.)

3-74. Tractor Right Seat Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Slide back cushion (2, fig 3-231) up and off seat shell (3).

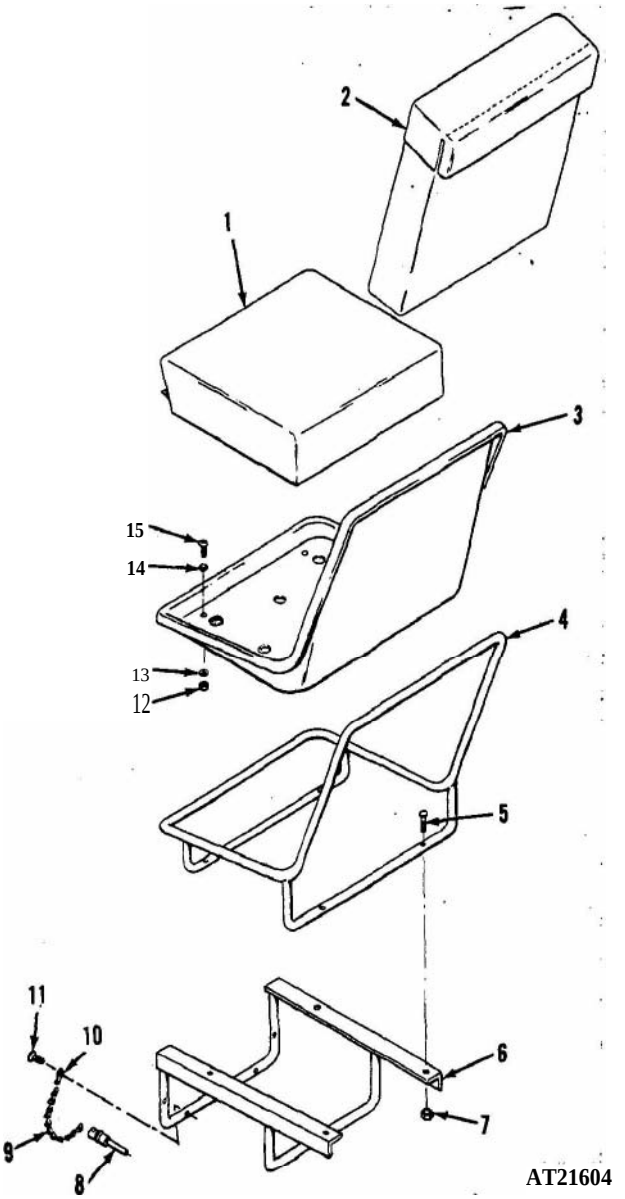


Figure 3-231. Tractor right seat assembly, exploded view.

LEGEND to fig 3-231:

1 - Seat cushion	9 - Chain
2 - Back cushion	10 - Hook
3 - Seat shell	11 - Screw
4 - Seat frame	12 - Nut
5 - Screw	13 - Washer
6 - Support assembly	14 - Washer
7 - Nut	15 - Stud
8 -	

(2) Unsnap seat cushion (1) from studs (15) and remove cushion from seat shell (3).

(3) Remove seat shell (3) from seat frame (4). Disconnect stud (15) from seat shell by removing nut (12) and washers (13 and 14).

(4) Disconnect seat frame (4) from support assembly (6) by removing screw (5) and nut (7).

(5) Disconnect pin (8) and chain (9) from support assembly (6) by removing screw (11). Remove pin and hook (10) from chain.

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Repair cushions (refer to TM 10-269).

(2) Straighten distorted parts (refer to TM 10 450).

(3) Weld cracks (refer to TM 9-237).

f. *Assembly.*

(1) Connect pin (8) and hook (10) to chain (9) and secure chain to support assembly (6) with screw (11).

(2) Connect seat frame (4) to support assembly (6) and secure with screw (5) and nut (7).

(3) Connect stud (15) to seat shell (3) and secure with nut (12) and washers (13 and 14). Connect seat shell to seat frame (4).

(4) Position seat cushion (1) in seat shell (3) and snap seat cushion on stud (15). Slide back cushion (2) over seat shell.

g. *Installation.* (**Refer** to TM 9-2320-242-20.)

3-75. Console Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect plates (2, 3, and 18, fig 3-232) from console (5) by removing blind rivets (1, 19, and 20).

(2) Remove boots (4 and 17).

(3) Disconnect seal (9) and retainer (10) by removing screw (16), nut (11), and washer U5). Remove seal from retainer.

(4) Disconnect stud (6) by removing pin (8) and washer (7).

(5) Remove seals (12, 13, and 14).

c. *Cleaning.* (Refer to para 3-4.)

d. *Inspection.*

(1) Inspect plates for legibility.

(2) Inspect boots for tears, holes, and hardness of rubber.

(3) Inspect console for cracks, broken corners, fractures, and elongated holes.

e. *Repair.* Repair damaged console with high density polyethylene material conforming to Military Specification MIL-P-22748, c ass C, grade 3, black, with ultraviolet stabilizer.

f. *Assembly.*

(1) Attach seals (12, 13, and 14) to console (5) with rubber adhesive conforming to Military Specification MIL-A-5092, type II.

(2) Connect stud (6) and washer (7) to console and secure with pin (8).

(3) Attach seal (9) to retainer (10) with rubber adhesive conforming to Military Spec ification MIL-A-5092, type II.

(4) Connect boots (4 and 17) to console. Make sure that contact rig is fully engaged.

(5) Connect plates (2, 3, and 18) and secure with blind rivets (1, 19, **and 20).**

g. Installation. (**Refer to TM** 9-2320-242-20).

3-76. Engine Cover Assembly

a. Removal. (Refer to TM 9-2320-242-20).

b. Disassembly.

(1) Disconnect arms (17 and 22, fig 3-233) and rod (24) by removing cotter pins (16, 20, and 23) and pins (18, 19, and 21).

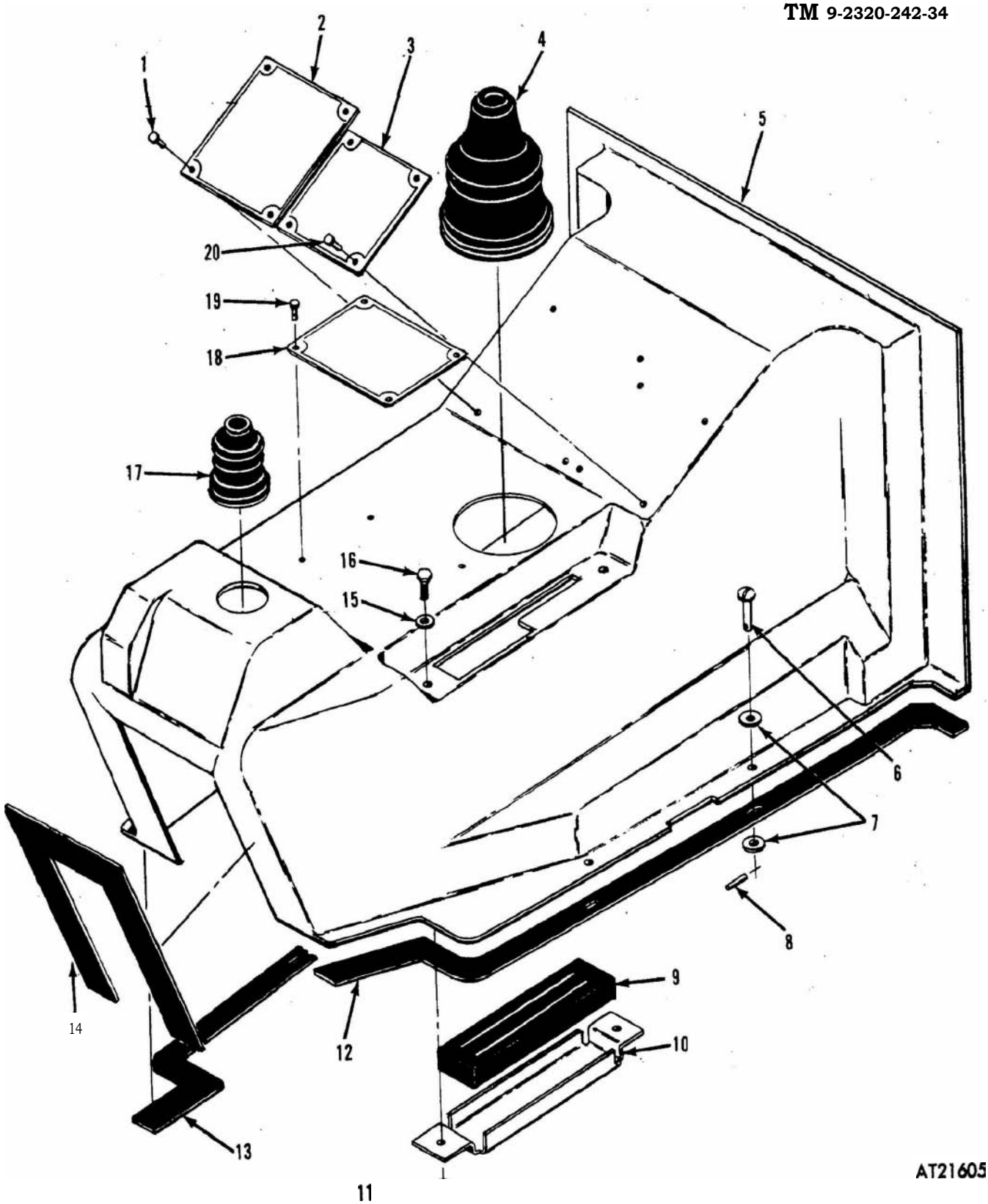


Figure 3-232. Console, exploded view.

1 • Blind rivet
2 - Plate
3 - Plate
4 - Boot
5 • Console
6 - Stud
7 • Washers
8 - Pin
9 - Seal
1.0 - Retainer
11 - Nut
12 - Seal
13 - Seal
14 - Seal
15 - Washer
16 - Screw
17 - Boot
18 - Plate
19 - Blind rivet
20 - Blind rivet

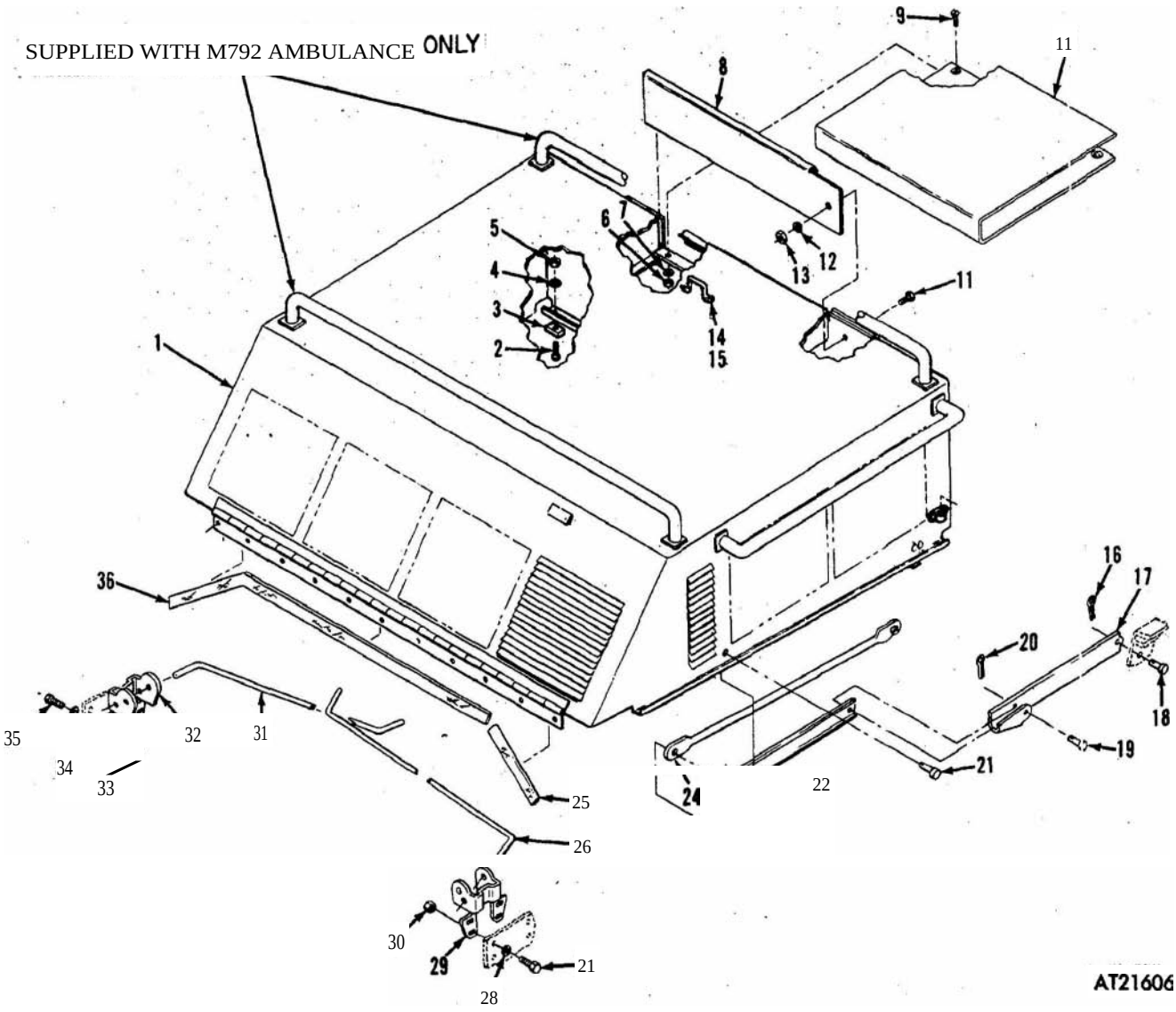


Figure 3-233. Engine cover assembly, exploded view.

LEGEND to fig 3-233:

1 - Cover
2 - Screw
3 - Pad
4 - Washer
- Nut
6 - Nut
7 - Washer
8 - Plate
9 - Screw
10 - Shield
11 - Screw
12 - Washer
13 - Nut
14 - Bracket
15 - Rivet
16 - Cotter pin
17 - Arm

LEGEND to fig 3-233 - Continued:
18 - Pin
19 - Pin
20 - Cotter pin
21 - Pin
22 - Arm
23 - Cotter pin
24 - Rod
25 - Seal
26 - Torsion bar
27 - *Screw*
28 - Washer
29 - Bracket
30 - Nut
31 - Torsion bar
32 - Bracket
33 - Nut
34 - Washer
35 - Screw
36 - Seal

(2) Disconnect pad (3) by removing screw (2), nut (5), and washer (4).

(3) Disconnect brackets (29 and 32) by removing screws (27 and 35), nuts (30 and 33), and washers (28 and 34). Remove torsion bars (26 and 31) from brackets.

(4) Disconnect plate (8) by removing screw (11), nut (13), and washer (12).

(5) Disconnect shield (10) by removing screw (9), nut (6), and washer (7).

(6) Disconnect bracket (14) by removing rivet (15).

(7) Remove seals (25 and 36).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Re-form distorted parts (refer to TM 10-450).

(2) Weld cracks and tears (refer to TM 9-237).

f. *Assembly.*

(1) Attach seals (25 and 36) to cover (1) with rubber adhesive conforming to Military Specification MIL-A-5092, type II.

(2) Connect bracket (14) and secure with rivet (15).

(3) Install shield (10) and secure with screw (9), nut (6), and washer (7).

(4) Connect plate (8) and secure with screws (11), nut: (13), and washers (12).

(5) Install torsion bars (26 and 31) in brackets (29 and 32) and secure brackets to cover (1) with screws (27 and 35), nuts (30 and 33) and washers (28 and 34).

(6) Connect pad (3) and secure with screw (2), nut (5), and washer (4).

(7) Connect arms (17 and 22) and rod (24) and secure with pins (18, 19, and 21) and cotter pins (16, 20, and 23).

g. *Installation.* (Refer to TM 9-2320-242-20.)

3-77. Tractor Liquid Container Hold-Down Bracket

a. Removal. (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Weld cracks (refer to TM 9-237).

(2) Straighten distorted parts (refer to TM 10-450).

e. *Installation.* (Refer to TM 9-2320-242-20.)

3-78. **Tractor Brush Guards**

a. Removal. (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Weld cracks (Refer to TM 9-237).

(2) Straighten distorted parts (Refer to TM 10-450).

e. *Installation. (Refer* to TM 9-2320-242-20.)

3-79. Access Panels

a. *Removal.* (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Re-form distorted parts (refer to TM 10-450).

(2) Weld cracks and tears (refer to TM 9-237).

e. *Installation.* (Refer to TM 9-2320-242-20.)

3-80. Tractor and Carrier Bows

a. *Removal.* (Refer to TM 9-2320-242-10.)

b. *Disassembly.* (Refer to TM 9-2320-242-20.)

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Straighten distorted parts (Refer to TM 10-450).

(2) Weld cracks (Refer to TM 9-237).

f. *Assembly.* (Refer to TM 9-2320-242-20.)

g. *Installation.* (Refer to TM 9-2320-242-10.)

3-81. Tractor Canopy

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. (Refer to TM 10-269.)

e. Installation. (Refer to TM 9-2320-242-20.)

3-82. Tractor Hull

a. Inspection. Inspect tractor hull for damage such as dents, bends, punctures, cracks and tears.

b. *Repair.*

(1) Straighten dents and bends (refer to TM 10-450).

(2) Weld punctures, cracks or tears (Refer to TM 9-237).

3-83. Cargo Truck Carrier Canopy, Front Curtain, and Rear Curtains

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to par; 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. (Refer to TM 10-269.)

e. Installation. (Refer to TM 9-2320-242-20.)

3-84. Ambulance Carrier Canopy

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. (Refer to TM 10-269.)

e. Installation. (Refer to TM 9-2320-242-20.)

3-85. **Carrier Troop Seat**

a. Removal and Disassembly. (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Straighten dents and bends (refer to TM 10-450).

(2) Weld cracks and tears (refer to TM 9-237).

e. *Assembly and Installation.* (Refer to TM 9-2320-242-20.)

3-86. Tailgate and Pioneer Brackets

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair.

(1) Straighten distorted parts (refer to TM 10-450).

(2) Weld cracks (refer to TM 9-237).

e. Installation. (Refer to TM 9-2320-242-20.)

3-87. Ambulance Tailgate Step and Bracket

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

(1) Re-form distorted parts (refer to TM 10-450).

(2) Weld cracks (refer to TM 9-237).

e. *Installation.* (Refer to TM 9-2320-242.20.)

3-88. Tie-down and Safety Straps

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. (Refer to TM 10-269.)

e. Installation. (Refer to TM 9-2320-242-20.)

3-89. Ambulance Carrier Head Pad Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly. Disconnect cushion (fig 3-234) from bracket by **removing screws and washers.**

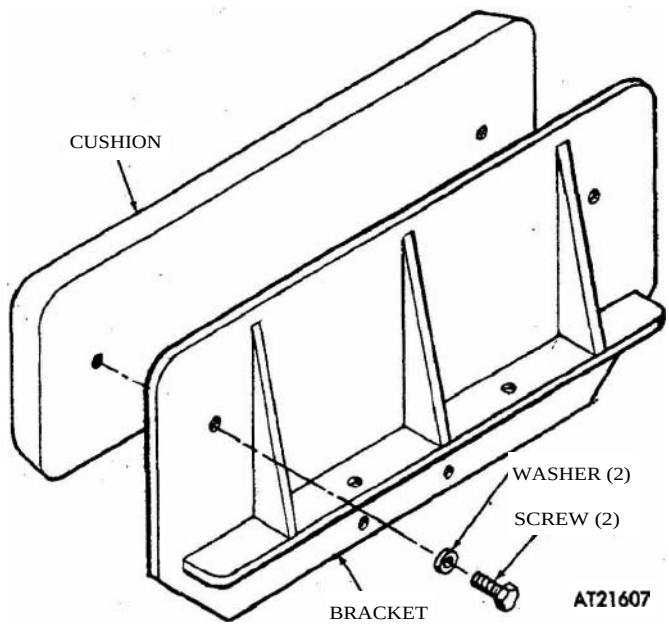


Figure 3-234. Ambulance carrier head pad assembly, exploded view.

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.*

(1) Inspect bracket for distortion, cracks, bends, and breaks.

(2) Inspect cushion for tears, defective stitching. Inspect insert for defective threads.

e. *Repair.*

(1) Repair defective cushion (refer to TM 10-269)-

(2) Weld cracks in bracket (refer to TM 9-2371.

f. Assembly. Secure cushion (fig 3-234) to bracket with screws and washers.

g. Installation. (Refer to TM 9-2320-242-20.)

3-90. Ambulance Attendant Seat

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect handle (12, fig 3-235) from bracket (11) by removing cotter pin (14), pin (10), and washer (13). Remove spring (15) from handle (12) and seat (9).

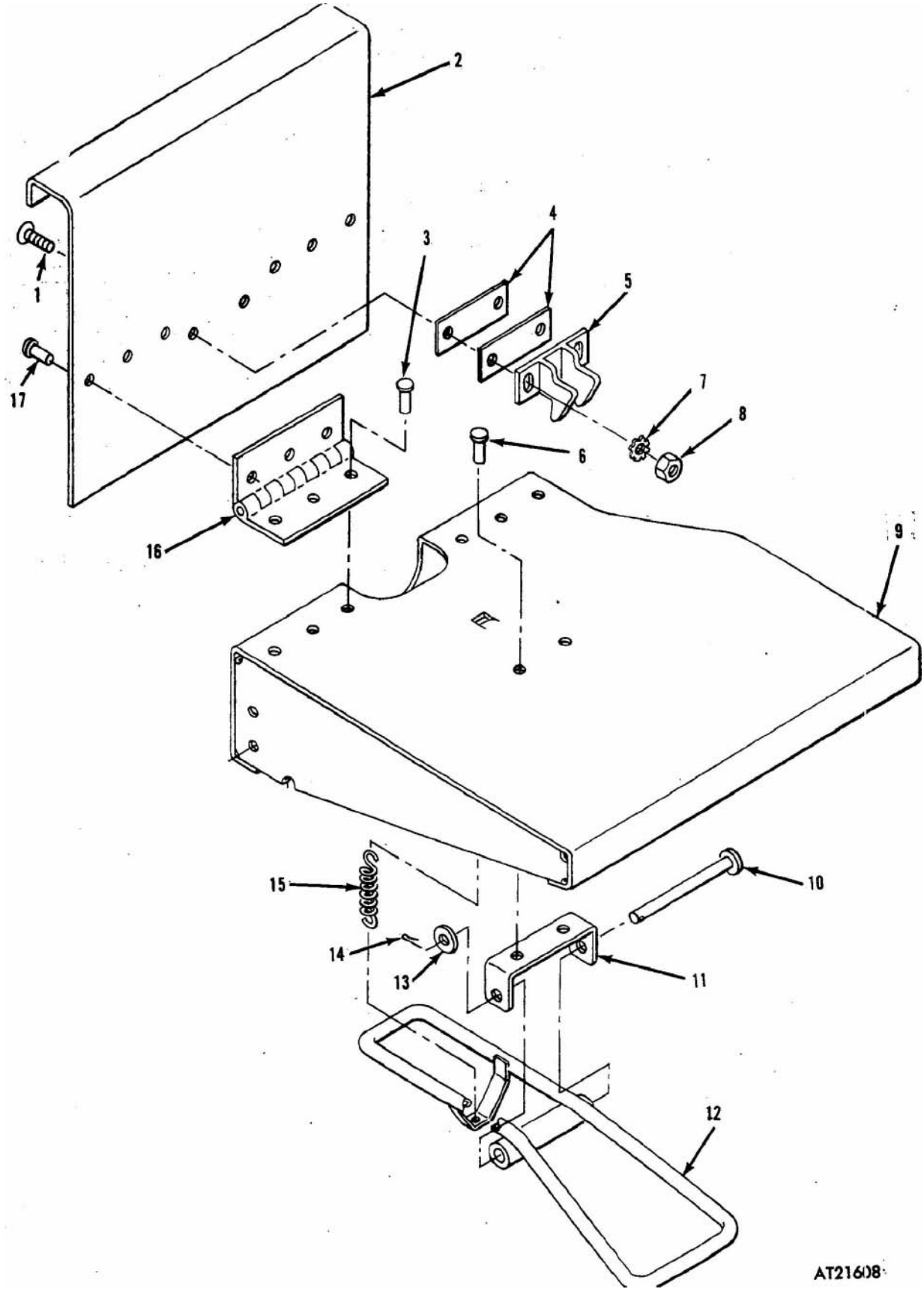


Figure 3-235. Ambulance attendant seat, exploded view.

LEGEND to fig 3-235:

1 Screw
2 - Seat back
3 - Rivet
4 - Shim
5 - Keeper
6 - Rivet
7 Washer
8 - Nut
9-Seat
10 - Pin
11 - Bracket
12 - Handle
13 - Washer
14 - Cotter pin
15 - Spring
16 - Hinge
17 - Rivet

(2) Disconnect keeper (5) and shim (4) by removing screw (1), nut (8), and washer (7).

(3) Disconnect hinge (16) from seat back (2) and seat (9) by removing rivets (3 and 17).

(4) Disconnect bracket (11) from seat (9) by removing rivet (6).

c. Cleaning. (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Repair dents and bends (refer to TM 10-450).

(2) Weld tears and cracks (refer to TM 9-237).

f. *Assembly.*

(1) Connect bracket (11) to seat (9) and secure with rivet (6).

(2) Connect hinge (16) to seat back (2) and seat (9) and secure with rivets (3 and 17).

(3) Connect handle (12) to bracket (11) and secure with pin (10), washer (13) and cotter pin (14).

(4) Connect keeper (5) and proper number of shims (4). to assure minimum locking clearance between keeper (5) handle (12), and secure with screw (1), nut (8), and washer (7).

(5) Connect spring (15) to seat (9) and handle (12).

g *Installation.* (Refer to TM 9-2320-242-20.)

3-91. Ambulance Dispenser Bracket Assembly

a. *Removal.* (Refer to TM 2320-242-20.)

b. *Disassembly.*

(1) Disconnect clamp (fig. 3·236) from bracket by removing knob assembly which consists of knob, stud, and roll pin.

(2) Remove strap from bracket.

(3) Disassemble knob assembly by removing roll pin with a suitable hammer and punch. Unscrew knob from stud.

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Repair strap (refer to TM 10-269).

(2) Weld cracks (refer to TM 9-237).

f. *Assembly.*

(1) Assemble knob assembly by screwing knob on stud and inserting roll pin.

(2) Position strap on bracket.

(3) Position clamp on bracket and secure with knob assembly.

g. Installation. (Refer to TM 9-2320-242-20.)

3-92. Carrier Hull

a. *Inspection.* Inspect carrier body for damage such as dents, bends, punctures, carcks and tears.

h. Repair.

(1) Straighten dents or bends (refer to TM 10-450).

(2) Weld punctures, cracks and tears (refer to TM 9-237).

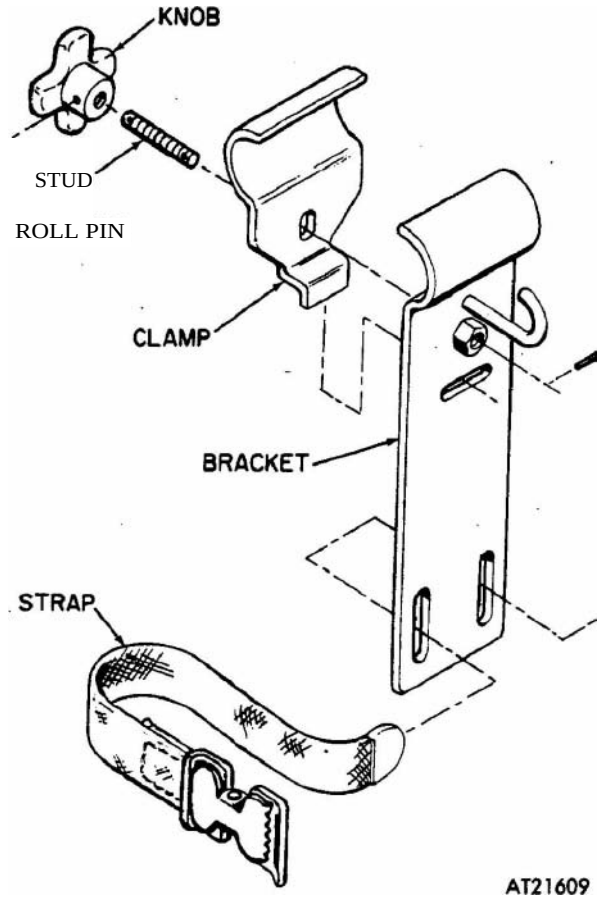


Figure 3-236. Ambulance dispenser bracket assembly, exploded view.

Section XXI. AMBULANCE HEATER INSTALLATION

3-93. General

The ambulance heater installation provides warmth for the comfort of patients in cold weather areas. The installation is composed of a heater and controls, inlet and outlet ducting, heater exhaust, and fuel system.

a. *Heater Controls.* The heater controls are located in the control box mounted above the heater and consist of a HI-LO switch, a START-OFF-RUN switch, a circuit breaker and an indicator light. The HI-LO switch controls the operation of the heater regulator valve which governs the amount of fuel delivered to the heater for combustion. The START-OFF-RUN switch permits starting of the heater and a means of stopping the heater. When the switch is positioned to OFF, the heater motor will continue to operate, for a period not to exceed four minutes, to purge heated air laid fuel from the heater. The circuit breaker is an automatic reset type that is rated at 15 amperes, it protects the heater circuitry in case of an overload. The indicator light illuminates to show that the heater is in operation.

b. *Heater.* The heater is clamped to a mount at the forward end of the carrier and is provided with a heat shroud for protection of personnel. It is a forced-fresh-air, fuel burning heater that will deliver 18,000 BTU in low fire condition and 30,000 BTU of heat in high fire condition. Operation of the heater is as follows (fig 3-237).

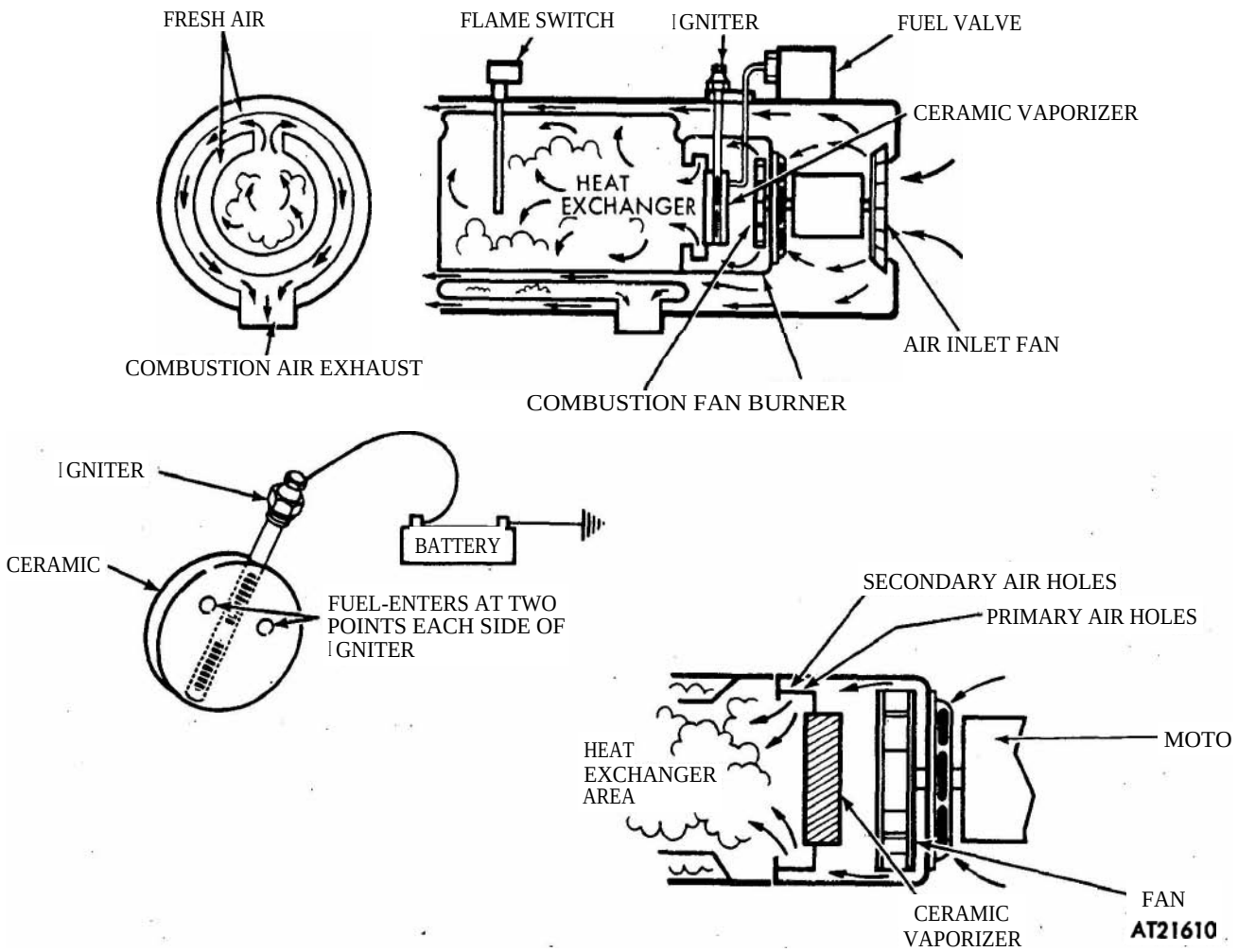


Figure 3-237. Ambulance heater, functional schematic.

(1) Blower fan forces air at high velocity through primary air holes impinging on hot ceramic and mixing with fuel vapors.

(2) Igniter flashes and ignites fuel (additional air added at secondary air holes).

(3) When flame is established, a flame sensing switch turns off the igniter.

(4) Fan continues to operatee as well as the fuel pump.

(5) Ceramic remains at extreme high temperature vaporizing fuel as it enters burner continuing the combustion process.

(6) The ventilating air fan which operates from the *same* motor forces fresh air across the heat exchanger producing 18,000 or 30,000 BTU to heat the ambulance carrier.

c. Inlet and Outlet Ducting. The amount of fresh air that is drawn into the inlet ducting is selected by positioning the intake assembly handle. Air is drawn through the inlet ducting to the heater by the heater electric motor. It is drawn through the heater across the heat exchanger and *then* forced through the outlet ducting mounted along the floor, inboard of the left carrier seats.

d. Heater exhaust. Exhaust gases are expelled from the bottom of the heater through the exhaust pipe which has a heat shroud where it exits through the canopy top.

e. Fuel system. The heater fuel system consists of a fuel filter, a 24 VDC fuel pump, a fuel shutoff valve, and related lines and fittings. Fuel for the system is supplied by the two main fuel tanks. Fuel from the tanks is drawn through the filter by the fuel pump and then pumped to the heater. The shutoff valve permits shutting off of fuel to the heater when it is not in use. Maintenance procedures for the filter are provided in TM 9-2320-242-20.

3-94. Ambulance Heater Control Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

Note: Prior to removing electrical wiring, tag wire and component with location.

(1) Disconnect panel (9, fig 3-238) from *case* (3) by removing screw (22).

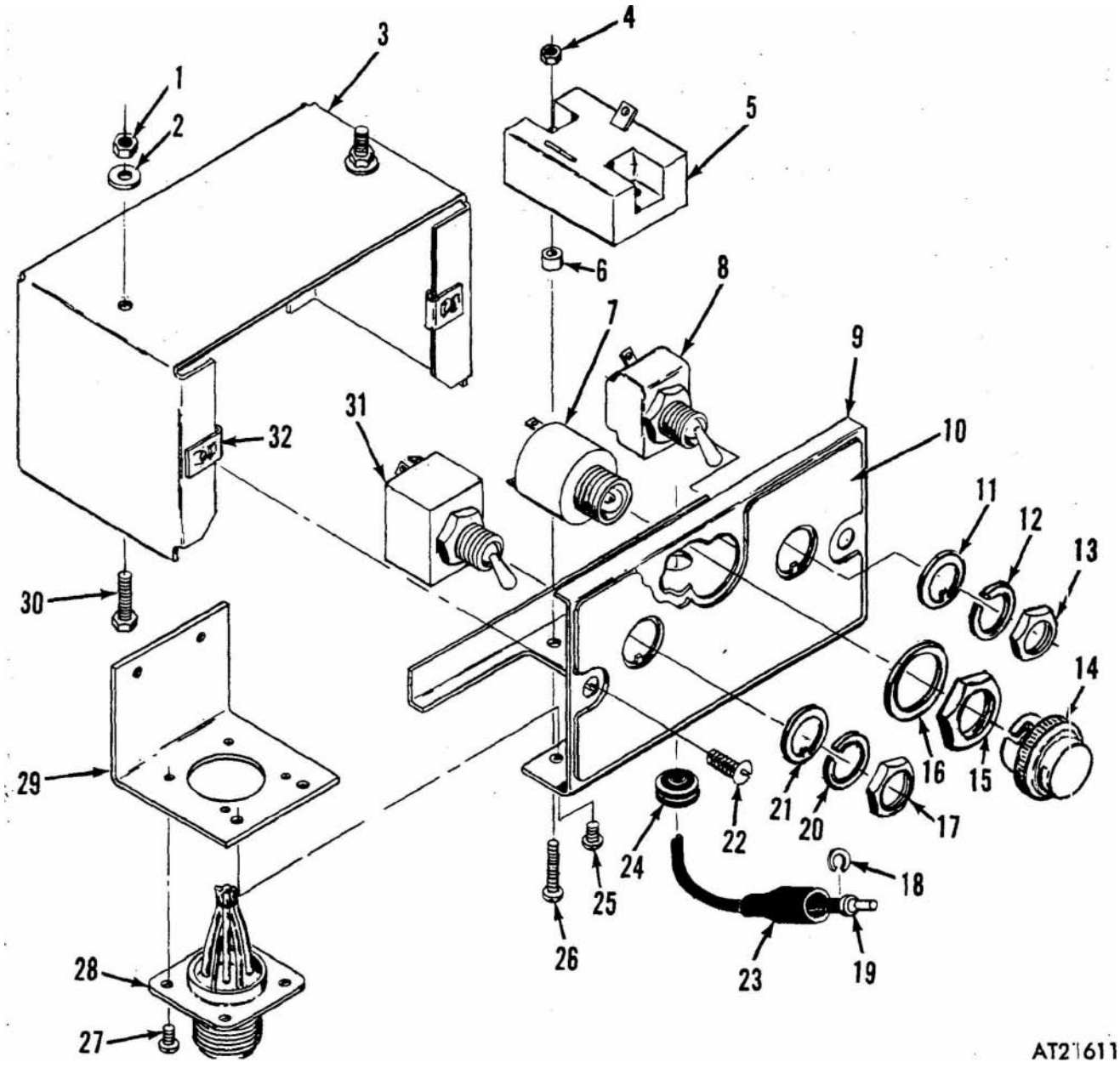


Figure 3-238. Ambulance heater control box, exploded view.

1 - Nut
2 - Washer
3 - Case
4 - Nut
5 - Circuit breaker
6 - Spacer
7 - Lamp
8 - Switch
9 - Panel
10 - Panel
11 - Keyed washer
12 - Washer
13 - Nut
14 - Lens
15 - Nut
16 - Washer
17 - Nut
18 - Washer
19 - Cable
20 - Washer
21 - Keyed washer
22 - Screw
23 - Shell
24 - Grommet
25 - Screw
26 - Screw
27 - Screw
29 - Cable assembly
29 - Bracket
30 - Screw
31 - Switch
32 - Tinnerman nut

(2) Remove electrical wires from switches (8 and 31). Disconnect switches from panels (9 and 10) by removing nuts (13 and 17), washers (12 and 20), and keyed washers (11 and 21).

(3) Remove electrical wires from lamp (7). Disconnect lamp from panels (9 and 10) by removing lens (14), nut (15) and washer (16).

(4) Remove electrical wiring from circuit breaker (5). Disconnect circuit breaker and spacer (6) from panel (9) by *removing screw* (26) *and* nut (4).

(5) Disconnect bracket (29) by removing screw (25). Disconnect cable assembly (28) from bracket by removing screw (27).

(6) Disconnect shell (23) from cable (19) by removing washer (18) and sliding shell from cable. Remove cable and grommet (24).

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Repair.

(1) Repair defective wiring.

(2) Re-form distorted parts (refer to TM 10-450).

(3) Weld cracks (refer to TM 9-237).

f. *Assembly.*

(1) Insert grommet (24) on cable (19) and insert cable and grommet in panel (9). Slide shell (23) on cable and install washer (18).

(2) Connect cable assembly (28) to bracket (29) and secure with screw (27). Connect bracket to panel (9) and secure with screws (25).

(3) Connect circuit breaker (5) and spacer (6) to panel (9) and secure with screw (26) and nut (4).

(4) Position lamp (7) through panel (9) and secure with nut (15) and washer (16). Install lens (14).

(5) Position switches (8 and 31) through panels (9 and 10) and secure with nuts (13 and 17) washers (12 and 20) and keyed washers (11 and 21).

(6) Install electrical wiring in accordance with tag designations or refer to figure 3-239.

(7) Connect assembled panel (9, fig 3-238) to case (3) and secure with screw (22).

g. *Installation. (Refer* to TM 9-2320-242-20.)

3-95. Ambulance Heater

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

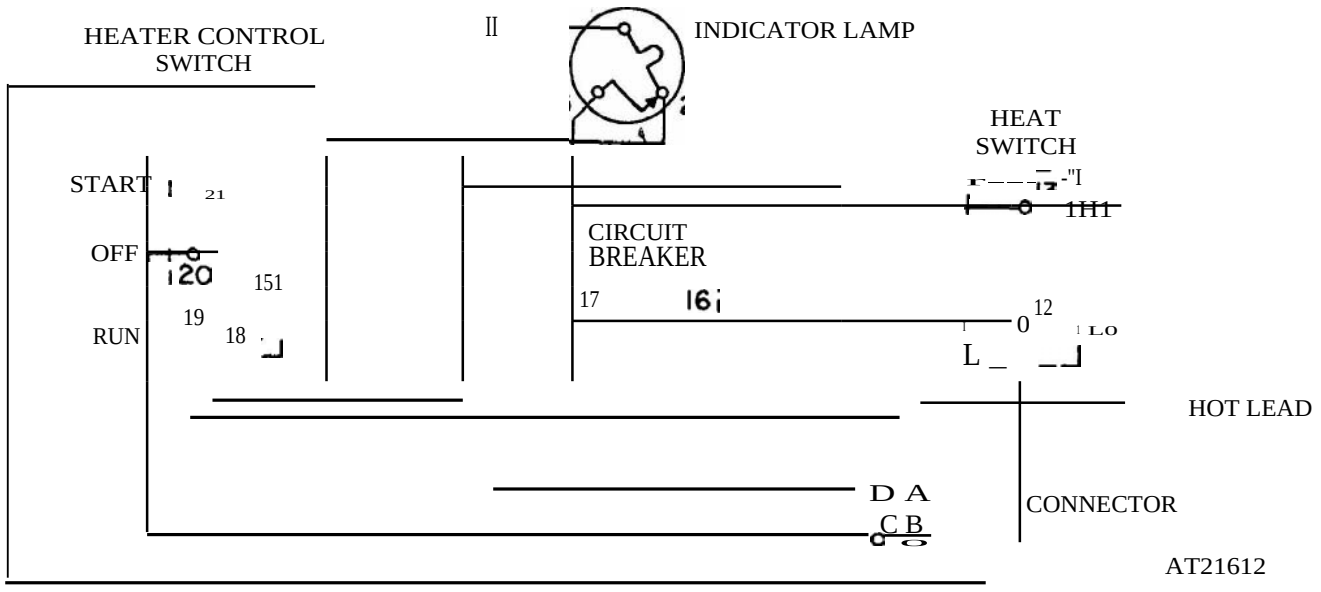
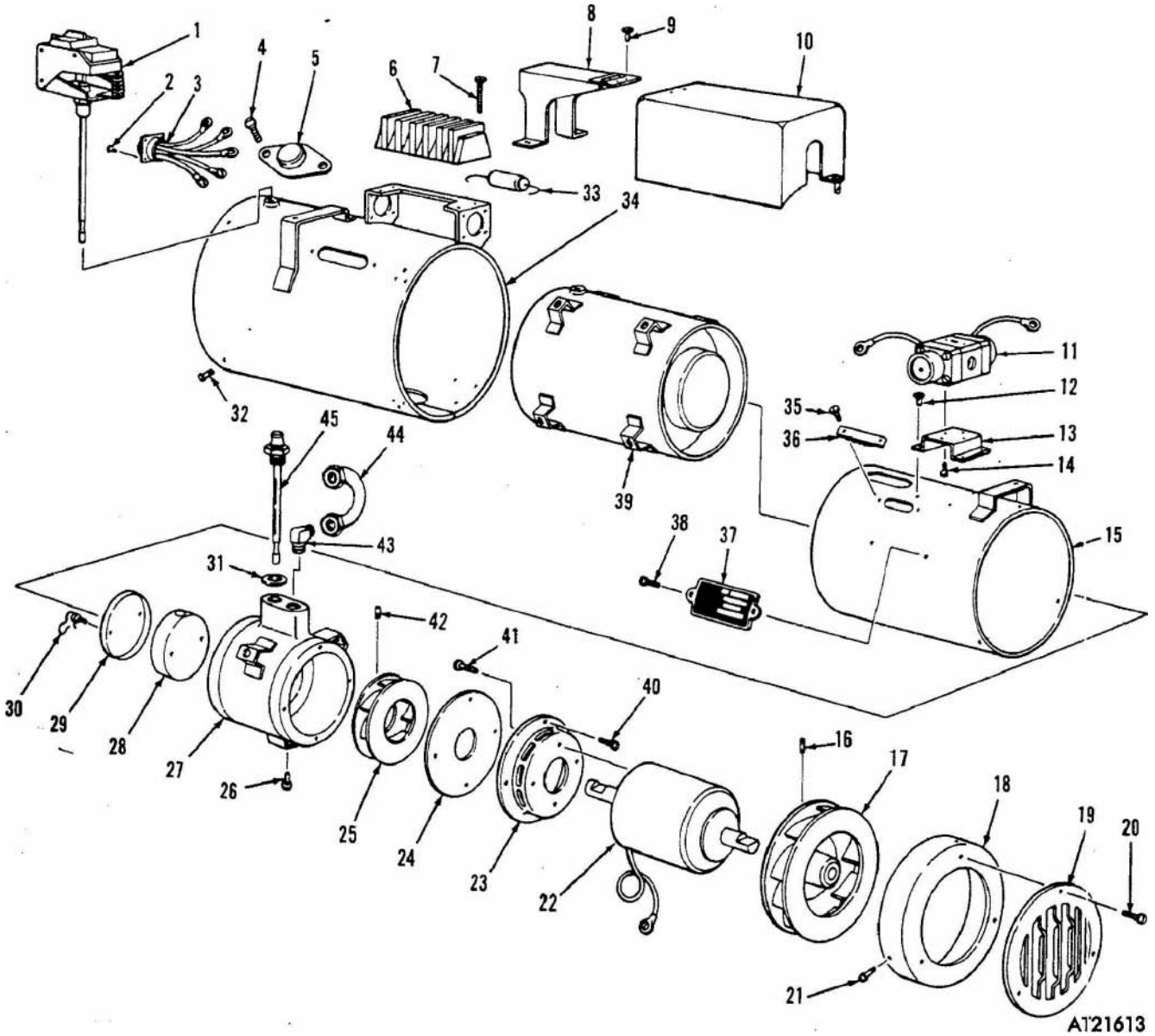


Figure 3-239. Ambulance heater *control box, wiring* ***diagram.***

(1) Remove cover (10, fig 3-240). Disconnect flame switch guard (8) by removing screws (9).

Note: Prior to removing components that have electrical leads connected to them, tag leads indicating location.



1 - Flame switch assembly
2 - Screw
3 - Receptacle
4 - Screw
5 - Limit switch
6 - Terminal block
7 - Screw
8 - Flame switch guard
9 - Screw
10 - Cover
11 - Regulator valve assembly
12 - Screw
13 - Bracket
14 - Screw
15 - Burner casing
16 - Setscrew
17 - Fresh air fan
18 - Cover
19 - Plate
20 - Screw
21 - Screw
22 - Electric motor
23 - Air inlet
24 - Inlet plate
25 - Combustion fan
26 - Screw
27 - Burner
28 - Vaporizer
29 - Retainer
30 - Screw
31 - Gasket
32 - Screw
33 - Capacitor
34 - Casing
35 - Screw
36 - Resistor
37 - Name plate
38 - Screw
39 - Combustion chamber
40 - Screw
41 - Screw
42 - Setscrew
43 - Elbow
44 - Fuel tube
45 - Igniter

Figure 3-240. Ambulance heater, exploded view.

(2) Disconnect electrical wires of receptacle (3) and disconnect receptacle by removing screw (2).

(3) Disconnect capacitor (33) from terminal block (6).

(4) Remove flame switch assembly (1).

(5) Disconnect terminal block (6) by removing screw (7). Disconnect limit switch (5) by removing screw (4).

(6) Disconnect casing (34) by removing screw (32). Remove combustion chamber (39) from (34.)

(7) Remove igniter (45) and gasket (31) from burner (27). Remove fuel tube (44) and elbow (43) from burner.

(8) Disconnect assembled bracket (13) and regulator valve assembly (11) from burner casing by removing screw (12). Disconnect bracket from regulator valve assembly by removing screw (14).

(9) Disconnect resistor (36) and name plate (37) by removing screws (35 and 38).

(10) Disconnect plate (19) from cover (18) by removing screw (20). Disconnect cover (18) by removing screw (21).

(11) Disconnect fresh air fan (17) by removing setscrew (16).

(12) Disconnect assembled electric motor (22) from burner (27) by removing screw (40).

(13) Disconnect combustion fan (25) from electric motor (22) by removing setscrew (42). Remove inlet plate (24) and disconnect air inlet (23) by removing screw (41).

(14) Disconnect burner (27) from burner casing (15) by removing screw (26). Disconnect vaporizer (28) and retainer (29) from burner by removing screw (30).

(15) Disassemble flame switch assembly (1) as indicated in (16) through (18) below.

(16) Remove adjusting screw (4, fig 3-2411, washer (5), and spring (6) from switch frame (7).

(17) Disconnect micro stitch (2), spring (3), and spring pad (9) from switch frame (7) by removing screw (8).

(18) Tip switch frame (7) over and carefully remove quartz rod (1).

Caution: To prevent breakage, use extreme care when handling quartz rod.

119) Disassemble regulator valve assembly (11, fig 3-240) as indicated in (20) through (22) below.

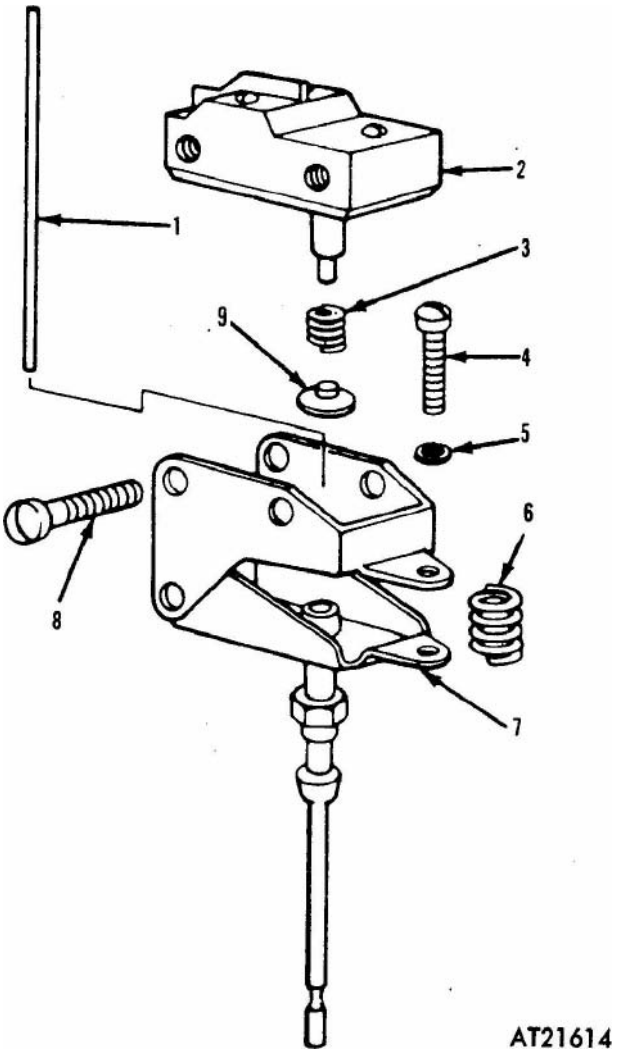


Figure 3-241. Flame switch assembly, exploded view.

1 - Quartz rod
2 - Micro switch
3 - Spring
4 - Adjusting screw
5 - Washer
6 - Spring
7 - Switch frame
8 - Screw
9 - Spring pad

(20) Disconnect sintered filter (1, fig 3-242), gasket (2), filter body (8), metering orifice (9), and plug (10) from regulator valve (5).

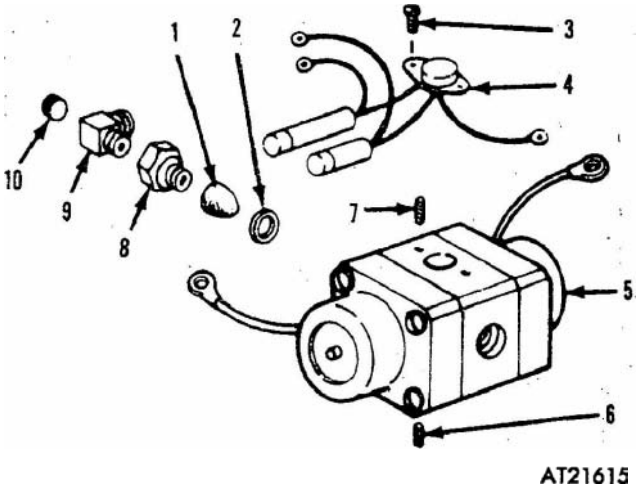


Figure 3-242. Regulator valve assembly, exploded view.

1 - Sintered filter
2 - Gasket
3 - Screw
4 - Heater valve assembly
5 - Regulator valve
6 - Setscrew
7 - Setscrew
8 - Filter body
9 - Metering orifice
10 - Plug

(21) Disconnect heater valve assembly (4) by removing screw (3).

(22) Remove setscrews (6 and 7).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.*

(1) Make a general inspection of parts as outlined in paragraph 3-4.

(2) Check receptacle for continuity between wires and terminal pins with a suitable ohmmeter.

(3) Inspect metering orifice for obstructions.

(4) Inspect quartz rod for cracks.

(5) Check regulator valve assembly for solenoid coil resistance using a suitable ohmmeter. Resistance of each coil should be 150 ohms.

(6) Check resistor for proper resistance, using a suitable ohmmeter. Resistance should be 0.17 ohm

(7) Check igniter for proper resistance, using a suitable ohmmeter. Resistance should be 2.2 ohms.

e. *Test.*

(1) Test the igniter by connecting a 24 volt dc power source with an ammeter to igniter terminal, ground the igniter. Apply 24 volts dc to igniter. The igniter should draw 10.5 amperes and heat to a bright red color in a few seconds.

Warning: Do not touch igniter during test and allow enough time for it to return to ambient temperature before removing test equipment, to prevent burns.

(2) Test motor by connecting a 24 volt dc power source with an ammeter to the motor. Apply 24 volts dc to motor and check motor RPM with a suitable strobe light. Motor should not draw more than 5.5 amperes and should turn 7700 to 8000 **RPM.**

(3) Test flame switch using an ohmmeter to check continuity of the micro-switch. Depress the micro-switch button (fig 3-243). This will be the "Ignition" or Start position of the switch. Continuity should be made between the two "NO" terminals and also between each of the "NO" terminals and the common terminal. There should be an open circuit between the two "NC" terminals, and also between the common terminal and the two "NC" terminals. Release the micro-switch button. This will be the "Run" position of the micro-switch. Continutiy should be made between the two "NC" terminals and the common terminal. There should be no continuity made between the "NO" "Ignition" or start terminals or with the "NO" terminals and the common terminal.

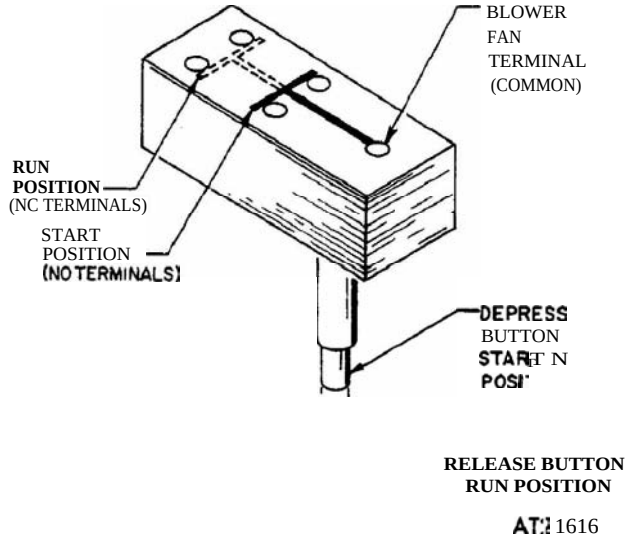


Figure 3-243. Continuity test of micro switch.

(4) Connect fuel regulator valve assembly to a fuel system as shown in figure 3-244 and connect a 24 volts dc power source to regulator valve assembly. Position a suitable graduated beaker at metering orifice outlet. Apply fuel pressure and 24 volts dc to regulator valve assembly, first to the number 1 low fire solenoid and then to number 2 high fire solenoid. The valve assembly should

operate and produce a steady stream of 14 to 16 cubic centimeters of fuel per minute for low fire operation and 21 to 23 cc per minute for high fire operation. If necessary, adjust valve to obtain proper fuel flow. (Refer to 1. (1) below.)

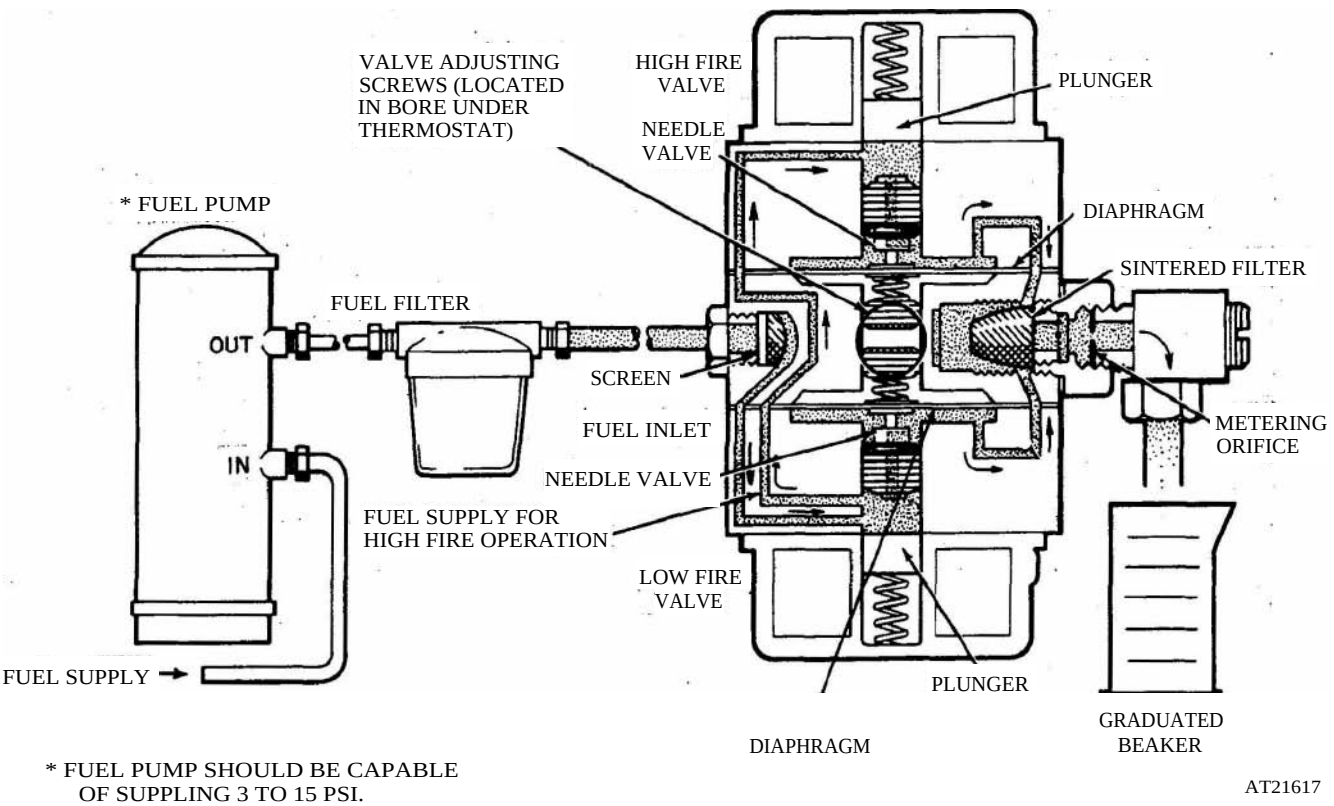


Figure 3-244. Fuel regulator valve assembly, testing.

f. *Adjust.*

(1) Adjust the fuel regulator valve by connecting the valve assembly as indicated in e. (4) above. Remove two screws and lift out thermostat. Adjusting screw heads are visible in this opening. With *fuel inlet* connected and fuel at the valve, apply 24 volts to the number 1 low fire solenoid. Use a stop watch and time the flow into a graduated beaker. Flow should measure 14 to 16 cc per minute. Turn low fire adjusting screw clockwise to increase flow rate, and counterclockwise to decrease flow rate. Next, apply 24 volts to number 1 low fire solenoid and number 2 high fire solenoid so that both valves *are* operating. Flow should measure 21 to 23 cc per minute. Turn number 2 valve (high fire) adjusting screw until this flow is obtained.

Caution: Make certain valve filter and orifice are flushed clean and clean fuel is used for setting fuel flow.

(2) Adjust flame micro switch by backing of: adjustment screw several turns counterclockwise (fig 3-244). Then turn adjusting screw clockwise slowly until a "click" is heard. Note the exact spot (screw slot position) that this happens, then give screw an additional $\frac{1}{2}$ turn.

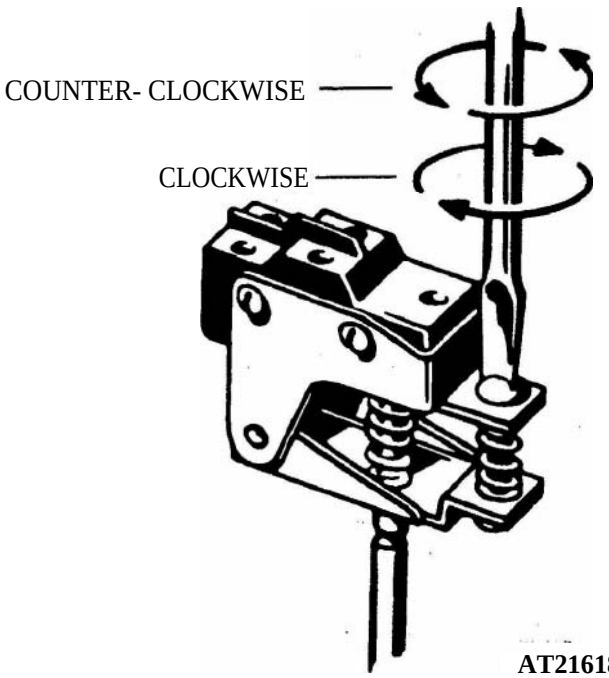


Figure 3-245. Adjusting flame micro switch.

g. *Assembly.*

Note: Vaporizer (28, fig ***3-240) should be replaced each time the heater is disassembled.***

(1) Assemble regulator valve assembly (11) by performing (2) through (4) below.

(2) Install setscrews (6 and *7,* fig 3-242).

(3) Connect heater valve assembly (4) to regulator valve (5) and secure with screw (3).

(4) Connect sintered filter (1), gasket (2), filter body (8), metering orifice (9), and plug (10) to regulator valve (5).

(5) Assemble flame switch assembly (1, fig 3-240) *as* indicated in (6) through (8) below.

(6) Position quartz rod (1, fig 3-241) in switch frame (7).

Caution: To prevent breakage, use extreme care when handling quartz rod.

(7) Position micro switch (2), spring (3), and spring pad (9) to switch frame (7) and secure with screw (8).

(8) Secure adjusting screw (4), washer (5), and spring (6) to switch frame (7).

(9) Connect new vaporizer (28, fig 3-240) and retainer (29) to burner (27) and secure with screw (30). Lockwire screws. Connect burner to burner casing and secure with screw (26).

(10) Position air inlet (23) on electric motor (22) and secure with screw (41). Position inlet plate (24) and combustion fan (25) on electric motor (22) shaft. Secure combustion fan to motor :;haft with setscrew (42).

(11) Position assembled electric motor (22) in burner (27) and secure with screw (40).

(12) Position fresh air fan (17) on electric motor (22) shaft and secure with setscrew (16).

(13) Connect cover (18) and plate (19) and secure with screws (20 and 21).

(14) Connect resistor (36) and name plate (37) and secure with screws (35) and 38).

(15) Connect bracket (13) to regulator valve assembly (11) and secure with screw (14). Connect assembled bracket and regulator valve assembly to burner casing and secure with screw (12).

(16) Install gasket (31), elbow (43), and ignitor (45) in burner (27). Connect fuel tube (44) to regulator valve assembly (11) and elbow (13).

(17) Connect burner casing (15), casing (34), and combustion chamber (39) and secure with screw (32).

(18) Connect limit switch (5) and terminal block (6) to combustion chamber (39) and secure with screws (4 and 7). Install flame switch assembly (1).

(19) Connect receptacle (3) and secure with screw (2).

(20) Connect capacitor (33) and electrical wiring in accordance with tag designations or refer to fig 3-246.

(21) Connect flame switch guard (8) and secure with screw (9). Install cover (10).

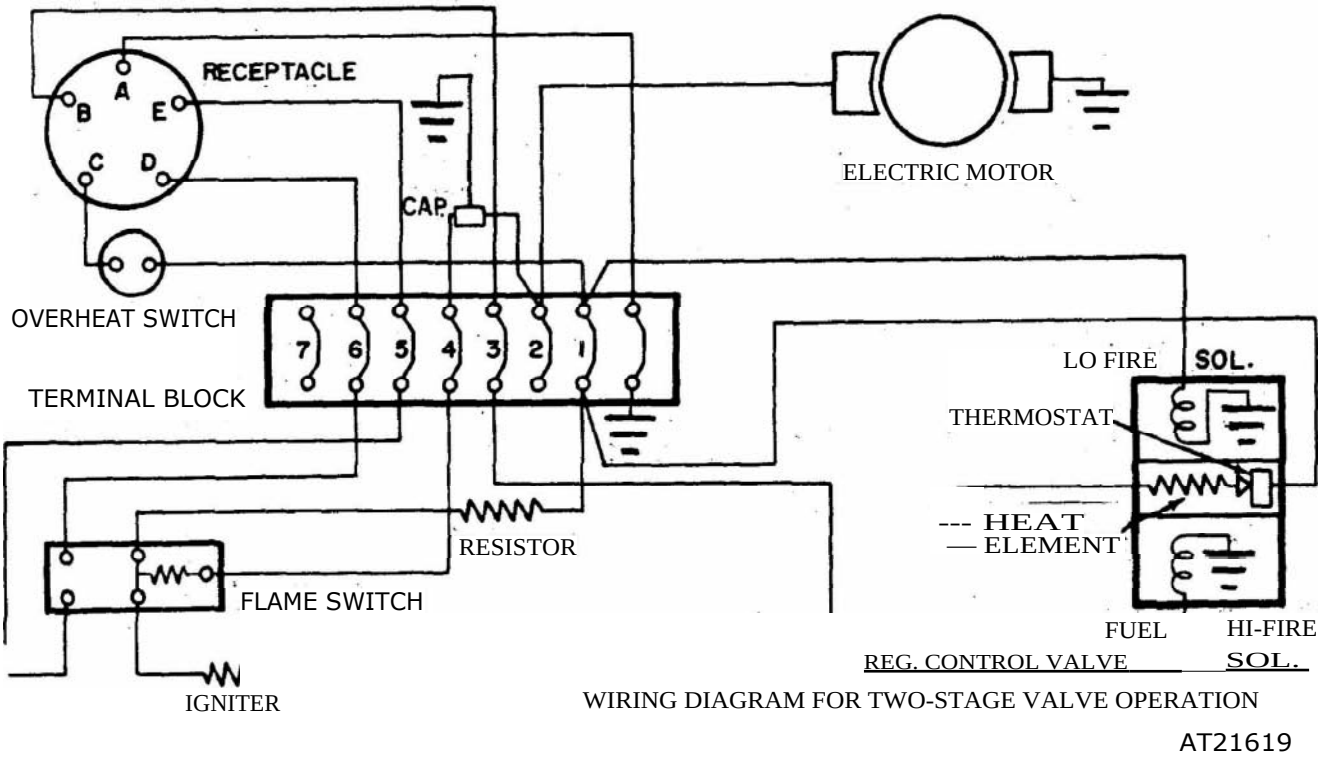


Figure 3-246. Ambulance heater wiring diagram.

h. *Bench Test and Adjustments.*

(1) Connect the heater assembly as shown in fig 3-247. Control box and harness should be the same as those used in vehicle.

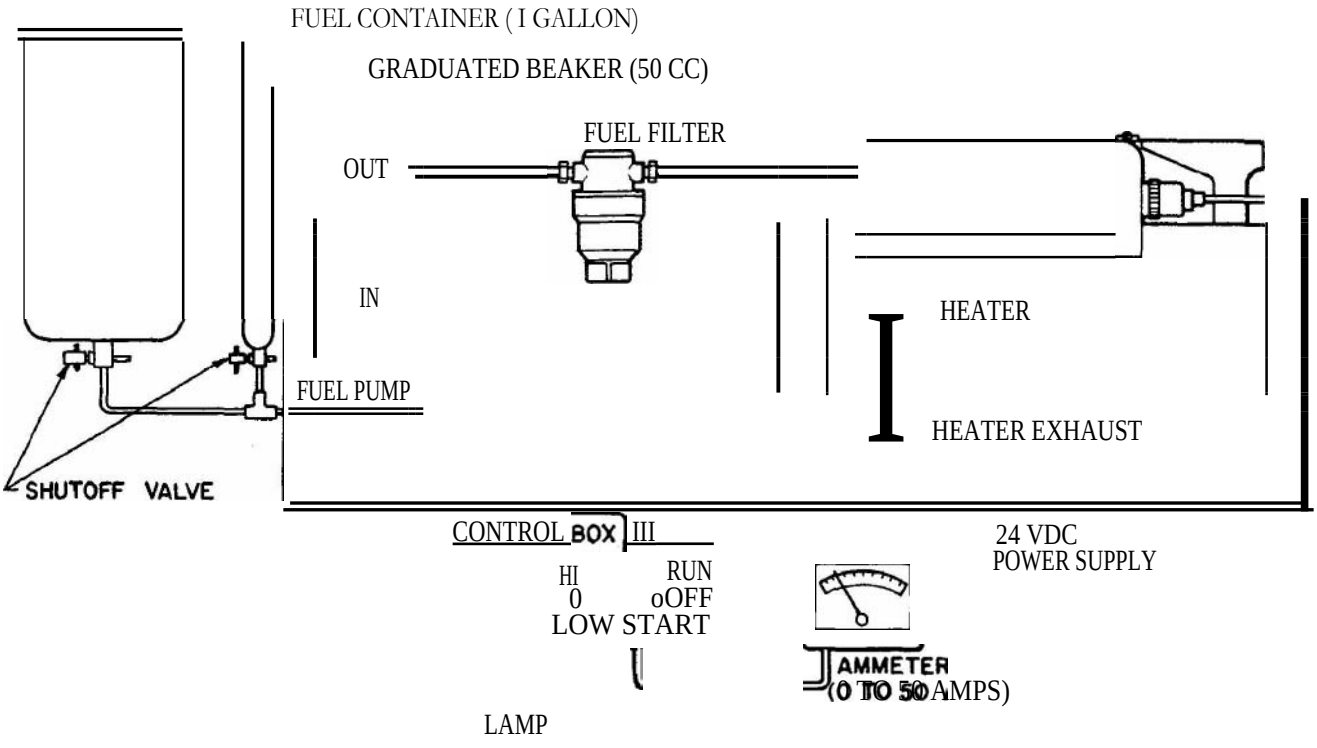


Figure 3-247. ***Ambulance*** *heater, bench test setup.*

Note: Prior to starting test, bleed air from fuel lines and route heater exhaust out of the test area.

(2) Close the shutoff valve on the graduated beaker and open the shutoff valve on the fuel container.

(3) With the H-LO switch in the LO position, apply 24 VDC to test setup. Hold the START-OFF-RUN switch in the START position and record ignition time. Ignition time is the time lapsed from positioning switch in START position until lamp on control box illuminates. Ignition time should not exceed 3 minutes.

(4) Record ignition amperage which should not exceed . 5 amperes, as indicated on ammeter.

(5) When lamp illuminates, position switch to RUN.

(6) Close shutoff valve on fuel container and open shutoff valve on graduated breaker. Permit heater to operate approximately 30 seconds and check fuel consumption for *one* minute using a suitable stop watch. Fuel consumption should be 14 to 16 cc (0.85 to 0.97 cubic inches) per minute.

(7) Position H-LO switch to HI and permit heater to stabilize. Refill graduated beaker and check fuel consumption for one minute. Fuel consumption should be 21 to 23 cc (1.28 to 1.40 cubic inches) per minute.

(8) Close shutoff valve on graduated beaker and open shutoff valve on fuel container.

(9) Record operating amperage as indicated on ammeter. Operating amperage should not exceed 5.5 amperes.

(10) Position START-OFF-RUN switch to OFF. Record purge time which is the time lapsed from positioning switch in OFF position until the lamp on the control box goes out. Purge time should not exceed 4 minutes.

(11) Start the heater and partially restrict the fresh air inlet with a piece of cardboard or sheet metal. The limit switch should actuate and shut-down the heater in less than 5 minutes.

(12) Permit heater to cool and restart heater. Make final adjustment of flame switch by turning adjusting screw clockwise until motor stops, then give screw an additional ½ turn (fig 3-245).

i. *Installation.* (Refer to TM9-2320-242-20.)

3-96. Ambulance Heater Mount and Shroud

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4)

d. *Repair.*

(1) Weld cracks and tears (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450).

e. *Installation.* (Refer to TM 9-2320-242-20.)

3-97. Ambulance Heater Inlet Duct, Outlet Duct, and Grills.

a. *Removal.* (Refer to TM 9-2320-242-20.)

b. *Cleaning.* (Refer to para 3-3.)

c. *Inspection.* (Refer to para 3-4.)

d. *Repair.*

(1) Weld cracks and tears (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450.)

e. *Installation.* (Refer to TM 9-2320-242-20.)

3-98. Ambulance Heater Exhaust Pipe

a. Removal. (Refer to TM 9-2320-242-20..)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. Weld cracks. (Refer to TM 9-237.)

e. Installation. (Refer to TM 9-2320-242-20.)

3-99. Ambulance Heater Fuel Pump

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Twist and remove bottom cover (fig 3-248) *and* cover gasket from cover and plunger assembly.

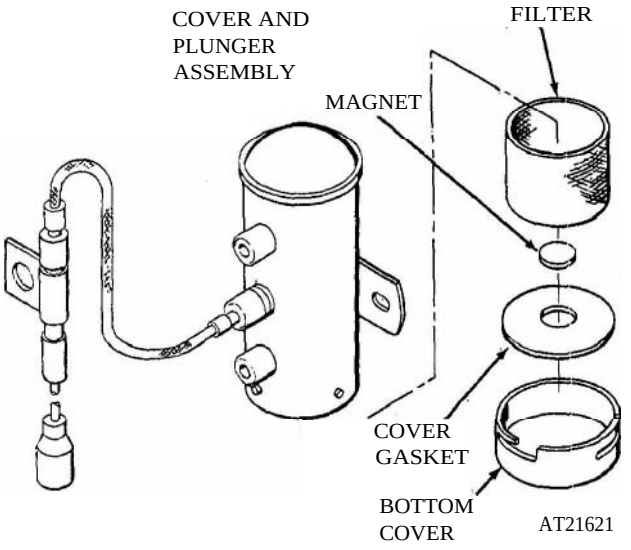


Figure 3-248. Ambulance heater fuel pump, exploded view.

(2) Carefully remove filter and magnet from cover and plunger assembly.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly

(1) Position magnet in cover and plunger assembly and carefully install filter.

(21 Install cover gasket and secure with bottom cover.

f. *Test.*

(1) Connect a fuel supply tank to the IN port of the fuel pump. Connect a tube and suitable 10 PSI gage to the OUT port.

(2) Bleed air from fuel pump and tube.

(3) Apply 24 volts dc to fuel pump and record pressure on gage. Pressure should **be** 7 **PSI+** 1/4 ½**PSI** and there should be no external leakage.

g. *Installation.* (Refer to TM 9-2320-242-20.)

3-100. Ambulance Heater Fuel Shutoff Valve.

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Unscrew nut (10, fig 3-249). Unscrew and remove handle and stem assembly consisting of handle (1), stem (2), washer (8), packing washer (9), and nut (10) from valve body (5).

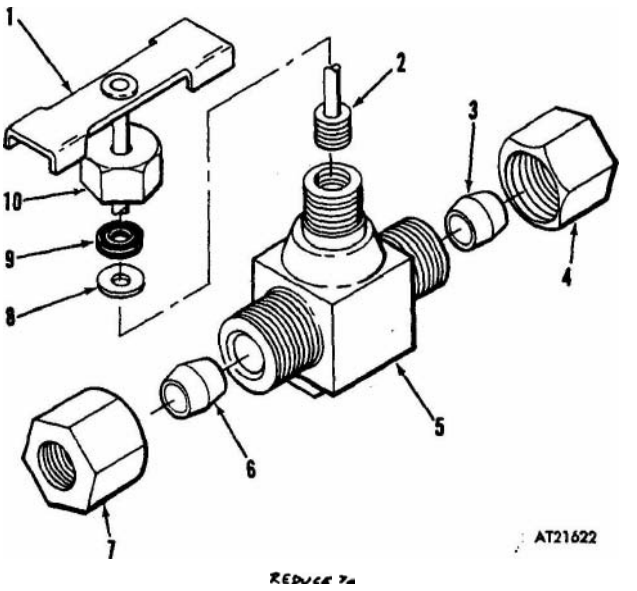


Figure 3-249. Ambulance heater fuel shutoff valve, exploded view.

1 - Handle
2 - Stem
3 - Sleeve
4 - Nut
5 - Valve body
6 - Sleeve
7 - Nut
8 - Washer
9 - Packing washer
10 - Nut

(2) Unscrew nuts (4 and 7) and remove sleeves (3 and 6) from valve body (5).

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to **para** 3-4.)

e *Assembly.*

(1) Position sleeves (3 and 6) to valve body (5) secure with nuts (4 and 7).

(2) Secure handle and stem assembly conk sisiting of handle (1), stem (2), washer (8), packing washer (9), and nut (10) into valve body (5) and secure by tightening nut (10).

f. *Test.*

(1) Connect a suitable tube to each port of the valve and connect a pressure regulated fuel system, capable of supplying 100 PSI, and a suitable gage to the tube connected to the inlet port.

Note: Inlet and outlet ports are in relation to the flow arrow on the valve body.

(2) Position the handle and stem assembly in the full open position and bleed air from valve and tubes. Plug tube in outlet port.

(3) Apply 100 PSI to valve. Leakage should not exceed 0.05 cc (0.003 cubic inches) per hours per hour.

(4) Dump pressure from valve and remove tube from outlet port. Position the handle and stem assembly in the blocked position and apply 100 PSI to valve. Leakage should not exceed 0.05 cc (0.003 cubic inches) per hour.

(5) Install tube in the outlet port and connect tube to the return line of the regulated fuel soiree. Lower pressure to 50 PSI and open and close valve 20 times.

(6) Repeat (2) through (4) above.

g. Installation. (Refer to TM 9-2320-242-20.)

Section XXII. BILGE PUMP ASSEMBLY

3-101. General

The bilge pump assembly (fig 3-250) is an electrically operated submergable type that consists of a sealed electric motor and impeller pump. The pump assembly is located in the left aft portion of tractor sump and is actuated by positioning the bilge pump switch, on the instrument panel, to ON. It is utilized to remove any water that may enter the tractor hull during swimming or fording operations at a rate of approximately 50 GPM.

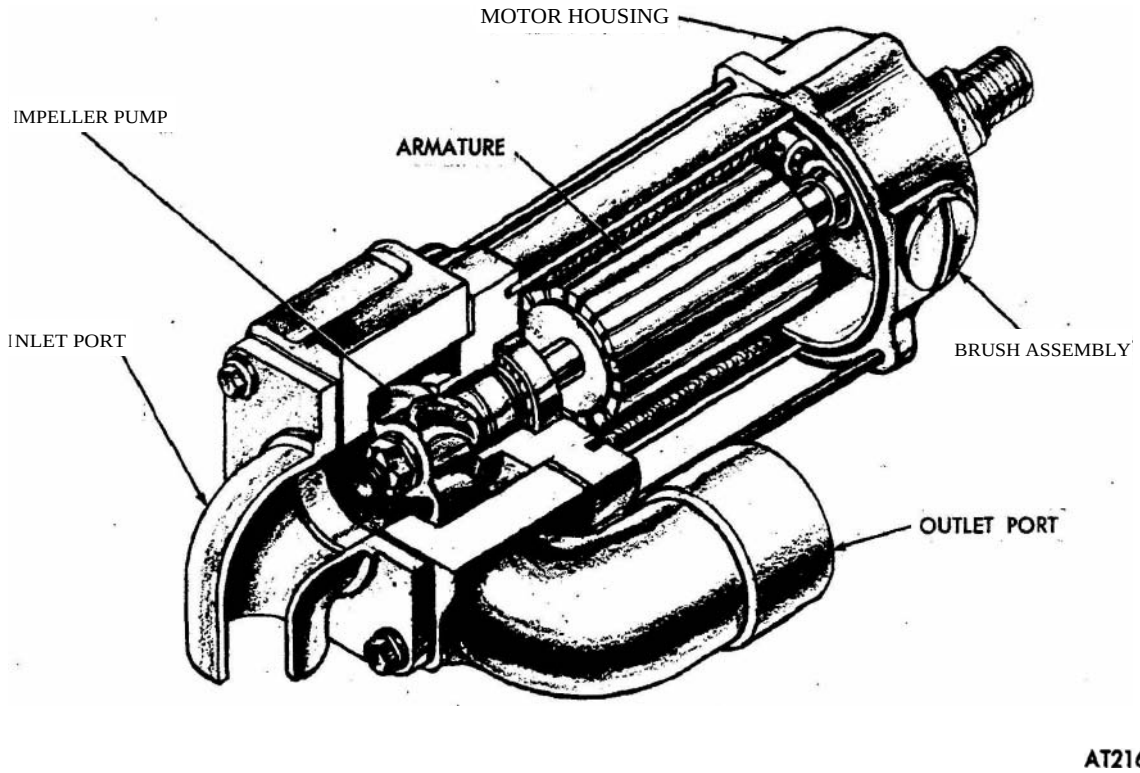


Figure 3-250. Bilge pump assembly, cross sectional view.

3-102. Bilge Pump Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect inlet flange (38, fig 3-251) and gasket (37) from outlet housing (36) by removing screw (41) and lock washer (42).

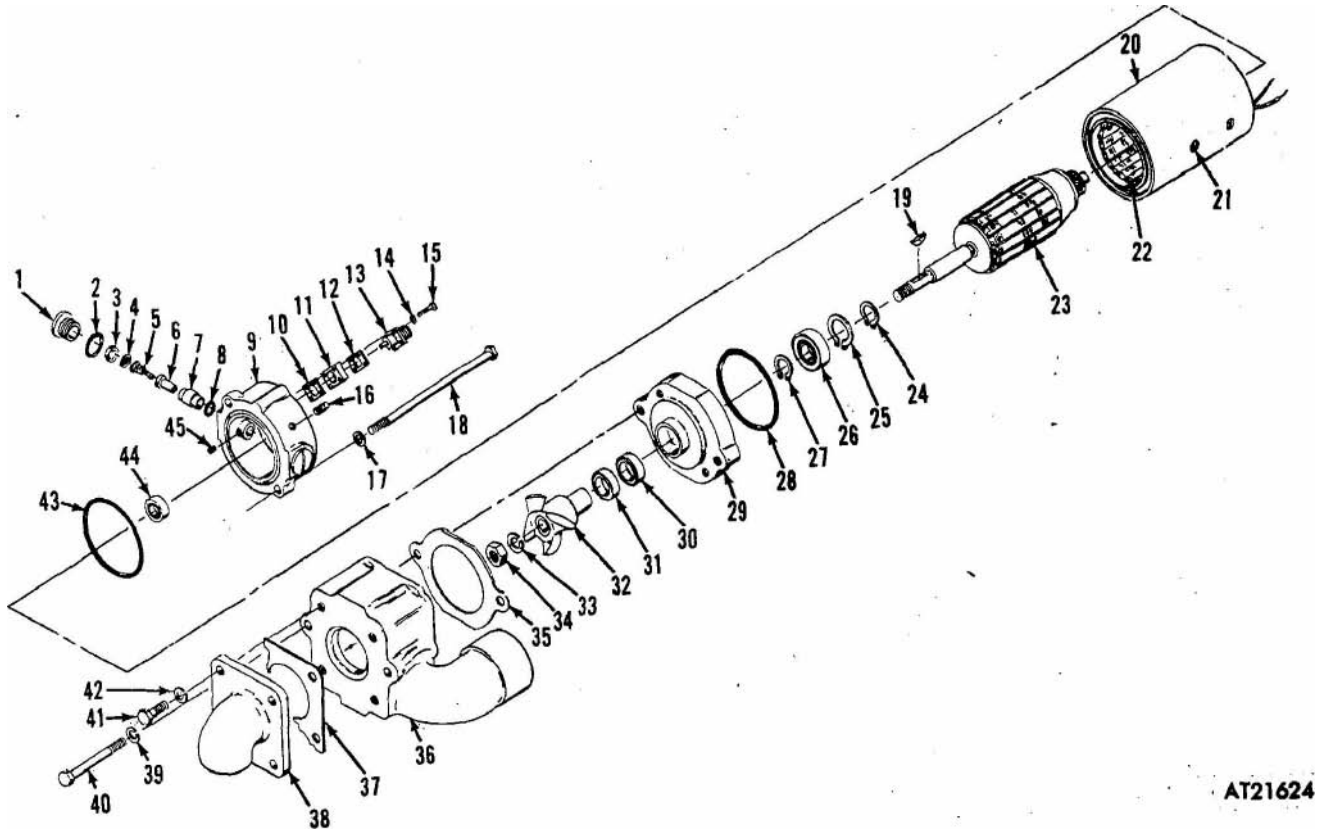


Figure 3-251. Bilge pump assembly, exploded view.

1 - **Brush cap**
2 - 0-ring
3 - Washer
4 - Insulator
5 - Brush
6 - Brush holder
7 - Brush holder insulator
8 - Snap ring
9 - Rear bell housing
10 - Gasket
11 - Spacer
12 - Gasket
13 - Connector
14 - Lock washer
15 - Screw
16 - Screw
17 - Lock washer
18 - Screw
19 - Key
20 - Rotor housing
21 - Screw
22 - Field coil
23 - Rotor
24 - Retaining ring
25 - Retaining ring
26 - Bearing
27 - Retaining ring
28 - 0-ring
29 - Front bell housing
30 - Seal
31 - *Seal*
32 - Impeller
33 - Lock washer
34 - Nut
35 - Gasket
36 - Outlet ***housing***
37 - Gasket
38 - Inlet flange
39 - Lock washer
40 - **Screw**
41 - Screw
42 - Lock washer
43 - *0-ring*
44 - Bearing
45 - Setscrew

(2) Disconnect outlet housing (36) and gasket (35) from front bell housing (29) by removing screw (40) and lock washer (39).

(3) Disconnect impeller (32) from rotor (23) by removing nut (34) and lock washer (33). Remove key (19) from rotor.

(4) Disconnect brush assemblies from rear bell housing (9) by removing brush cap(1), 0-ring (2), washer (3), insulator (4), brush (5), and brush holder (6). Remove 0-ring (2) from brush caps.

(5) Disconnect brush holder insulator (7) and snap ring (8) from rear bell housing (9) by removing setscrews (45). Remove snap ring (8) from from brush holdder insulator (7).

(6) Disconnect connector (13), gaskets (10 and 12), and spacer (11) from rear bell housing (9) by removing screw (15) and lock washer (14). Tag and unsolder leads from connector. Remove screw (16) from rear bell housing.

(7) Disconnect front bell housing (29), rotor (23), and rear bell housing (9) and rotor housing (20) by removing screw (18) and lock washer (17).

Note: If rotor housing and rear bell housing are not stamped with arrows, scribe line across rotor and rear bell housings before disconnecting to ensure proper assembly.

(8) Remove 0-ring (43) and bearing (44) from rear bell housing (9).

(9) Disconnect rotor (23) from front bell housing (29) by removing retaining ring (25). Remove 0-ring (28) and seals (30 and 31) from front bell housing.

(10) Remove retaining rings (24 and 27) and bearing (26) from rotor (23).

(11) Disconnect field coils (22) from rotor housing (20) by removing screw (21).

c. Cleaning. (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.* (Refer to TM 9-244.)

f. *Assembly*

(1) Assemble field coils (22) in rotor housing (20) and secure with screw (21).

(2) Connect bearing (26) to rotor (23) and secure with retaining rings (24 and 27), and install bearing (44) on other end of rotor.

(3) Place seals (30 and 31) and 0-ring (28) in front bell housing (29).

(4) Connect rotor (23) to front bell housing (29) and secure bearing (26) to bell housing with retaining ring (25).

(5) Install 0-ring (43) and screw (16) in rear bell housing (9).

(6) Connect rotor housing (20) and front bell housing (29) making sure to align screw holes in rotor and front bell housings.

(7) Connect rear bell housing (9) to rotor housing (20) making sure to align arrows or scribe marks on rotor and rear bell housings. Secure rear bell housing to front bell housing with screw 118) and lock washer (17).

(8) Connect gaskets (10 and 12), spacer 111) and connector (13) and solder leads to connector in accordance to their tag designations. Secure gaskets, spacer and connector to rear bell housing with screw (15) and lock washer (14).

(9) Place snap ring (8) on brush holder insulators (7), place brush holder insulator in rear bell housing (9) and secure with setscrews (45).

(10) Place 0-ring (2) on brush cap (1). Insert brush holder (6), brush (5). insulator (4), and washer (3) in rear bell housing (9) and secure with brush cap.

(11) Connect key (19) to rotor (23). Connect impeller (32) to rotor and secure with nut (34) and lock washer (33).

(12) Position gasket (35) on front bell housing (29). Connect outlet housing (36) and front bell housing and secure with screw (40) and lock washer (39).

(13) Position gasket (37) on outlet housing (36). Connect inlet flange (38) and outlet housing and secure with screw (41) and lock washer (42).

g. *Test.*

(1) Calibrate a 55 gallon drum at 10 gallon levels and fill with clean water.

(2) Connect a hose to bilge pump outlet nipple and route to a suitable drain.

(3) Connect a 24 volt dc power source to the pump with a suitable waterproof connector and an on-off switch between the power source and pump.

(4) Position pump in 55 gallon drum.

(5) Place switch in on position for one minute and check water level in drum. Pump should lower water level a minimum of 40 gallons.

Caution: Do not operate pump with an air lock for more than 20 seconds.

(6) Remove pump from test setup.

h. ***Installation.*** (**Refer** to TM 9-2320-242-20.)

CHAPTER 4

MATERIAL USED IN CONJUNCTION WITH MAJOR ITEM

(Special Purpose Kits.)

Section I. 100-AMPERE ALTERNATOR KIT

4-1. General

The 100-ampere alternator kit is used when the electrical requirements of special equipment, such as radio transmitters, exceed the capabilities of the standard charging system. The system consists of three major components: an alternator, regulator, and rectifier. The basic difference between this system and the standard system is that the alternator's output is alternating current rather than direct current. Since alternating current cannot be used to charge storage batteries or supply current directly to the vehicle electrical system, a rectifier is connected between the alternator and the regulator to convert the alternating current to direct current. The higher current produced by the system is carried directly to the electrical system by heavy gage cables. Shielded alternator-to-rectifier and rectifier-to-regulator cables replace the original vehicle wiring. All components of the kit are waterproofed or sealed to prevent damage to components.

a. Alternator. The alternator is a belt driven, waterproof unit that is cooled by a fan which is located at the rear of its housing.

b. Regulator. The regulator is a hermetically sealed unit and is not affected by water. It contains a load relay which connects the system to the vehicle batteries when the ignition switch is turned on. The load relay also connects the generator fields to the batteries for initial excitation. The regulator contains a carbon pile-type voltage limiter which controls the generator field current and thus limits the system voltage. The voltage regulator is adjusted after removing dust cover over regulator adjustment screw.

c. Rectifier. The rectifier is a full-wave type composed of six silicon diodes connected in a configuration which converts the three phase alternating current from the alternator to direct current. The unit is waterproof and is mounted on a support bracket inside the engine compartment on the left side of the vehicle. Air flow through the louvers of the engine compartment provide cooling for the rectifier fins.

4-2. Alternator

a. Removal. (Refer to TM 9-2320-242-20.)
b. Disassembly. (Refer to TM 9-2920-225-35.)
c. Repair. (Refer to TM 9-2920-225-35.)
d. Assembly. (Refer to TM 9-2920-225-35.)
e. Test. (Refer to TM 9-2320-242-20.)
f. Installation. (Refer to TM 9-2320-242-20.)

4-3. Rectifier

a. Removal. (Refer to TM 9-2320-242-20.)
b. Test. (Refer to TM 9-2320-242-20.)
c. Installation. (Refer to TM 9-2320-242-20.)

4-4. Regulator

a. Removal. (Refer to TM 9-2320-242-20.)
b. Test and Adjustment. (Refer to TM 9-2320-242-20.)
c. Installation. (Refer to TM 9-2320-242-20.)

Section II. WINCH KIT

4-5. General

a. The winch kit is mounted to the front of the tractor and is supported by the winch support assembly. The major components of the kit are a four-ton capacity winch assembly, drive shaft assembly, and power takeoff. The kit is utilized to assist the vehicle drive train in recovery operations of equipment and other disabled vehicles. Power for the winch assembly is supplied by the transfer assembly through the power takeoff. The power take-off is connected to the winch through a drive shaft assembly which connects the power takeoff output shaft to the input worm drive shaft of the winch. To prevent overload of the winch or its components, a brass shear pin secures the shaft assembly universal joint to the power takeoff. A

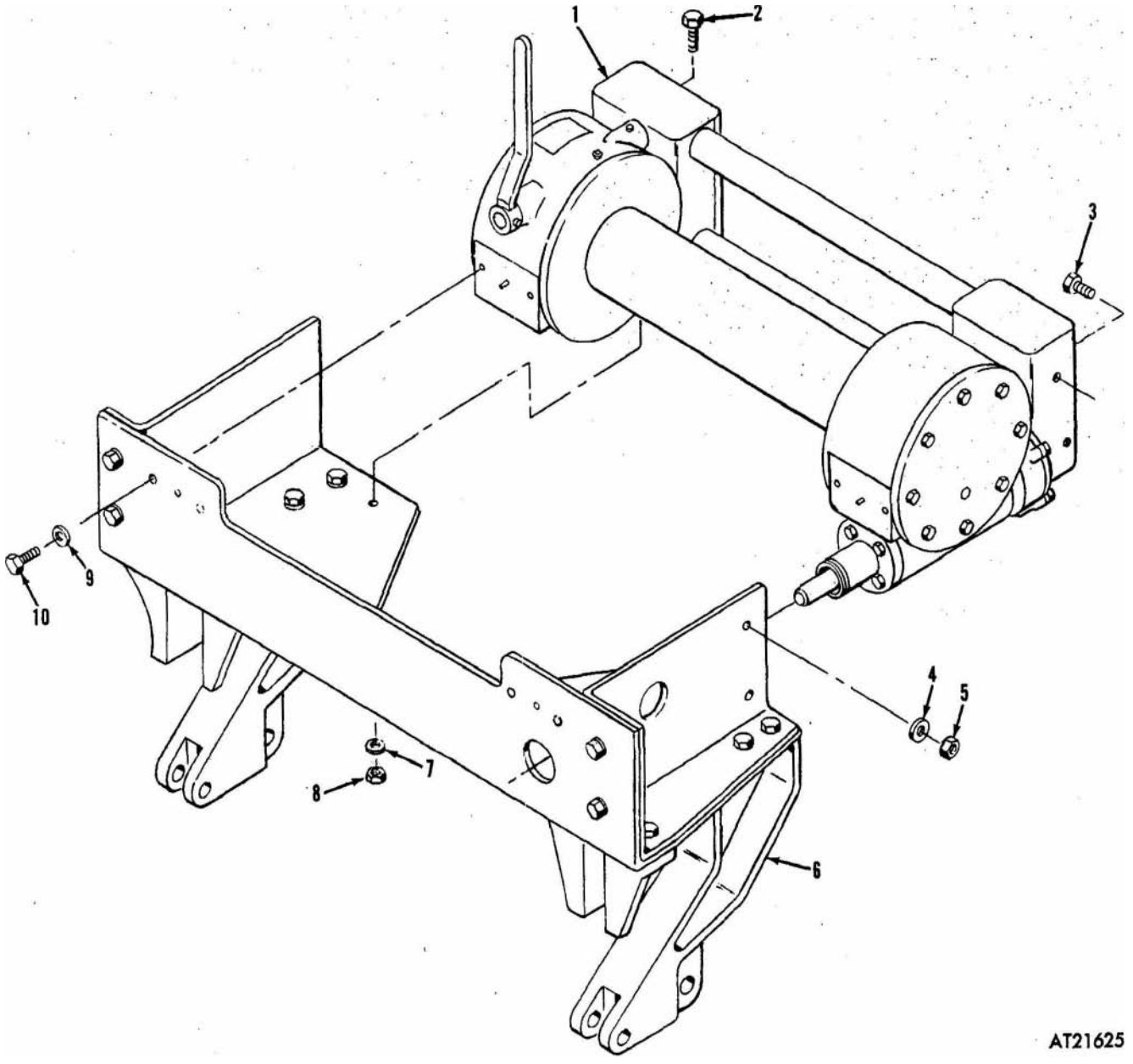
steel pin firmly secures the other universal joint to the winch shaft. The power takeoff is engaged or disengaged by means of a lever located on the forward right hand side of the console. The control lever is provided with a safety lock which insures positive engagement. The winch clutch lever is located on the left hand side of the winch. Its function is to engage *or* disengage the winch drum clutch jaw. Moving this lever away from the drum engages the clutch ; moving the lever toward the drum disengages the clutch.

b. The winch assembly is a jaw-clutch worm-gear type. The hand-operated sliding clutch is keyed to the worm gear shaft outside of the winch drum, and must be engaged with the jaws on the side of the winch drum when the winch is operated. Disengagement of the sliding clutch permits the drum to turn on the worm gear shaft. Two brakes are provided to control the winch drum. The worm shaft brake prevents the winch drum from rotating under load when the power takeoff is disengaged. The shifter bracket brake prevents the drum overrunning the cable when the cable is being unreeled. The winch has a rated capacity of 8000 pounds, a drum speed of 15 feet per minute, and is equipped with a release for freespooling of the drum.

4-6. Winch Assembly and Support Assembly

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly. Disconnect winch assembly (1, fig 4-1) from support assembly (6) by removing screws (2, 3, and 10), washers (4, 7, and 9), and nuts (5 and 8).



LEGEND to fig **4-1**

1 - Which assembly
2 - Screw
3 - Screw
4 - Washer
5 - Nut
6 - Support assembly
- Washer
8 - Nut
9 - Washer
10 - Screw

Figure 4-1. Winch assembly and support assembly, exploded view.

c. Cleaning. (Refer to para 3-3.)

d. Assembly. Connect winch assembly (1) to support assembly (6) and secure with screws (2, 3, and 10), washers (4, 7, and 9), and nuts (5 and 8).

e. Installation. (Refer to TM' 9-2320-242-20.)

4-7. Winch Assembly

a. Removal. (Refer to para 4-6).

b. Disassembly.

(1) Disconnect bracket assembly (fig 4-2) from winch by removing screws and washers.

(2) Pull clutch housing (5, fig 4-3) from winch.

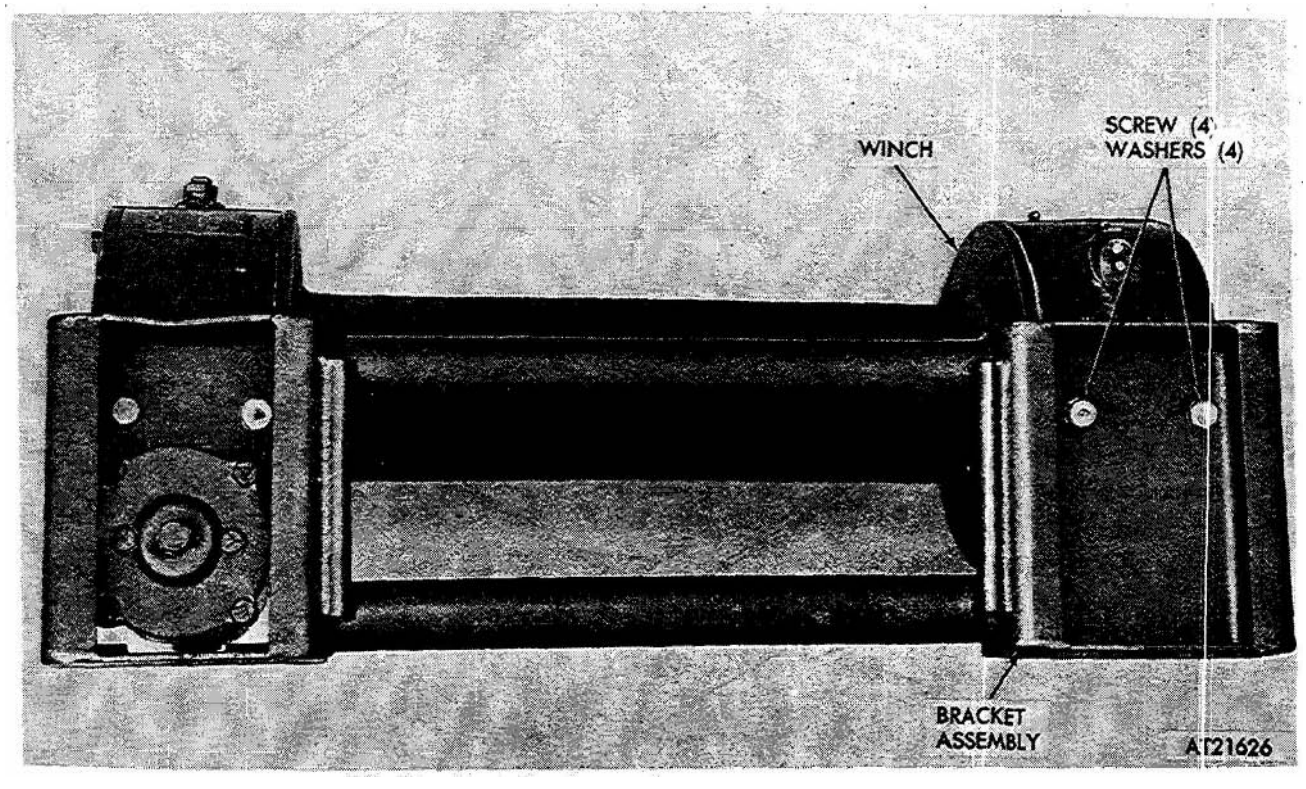
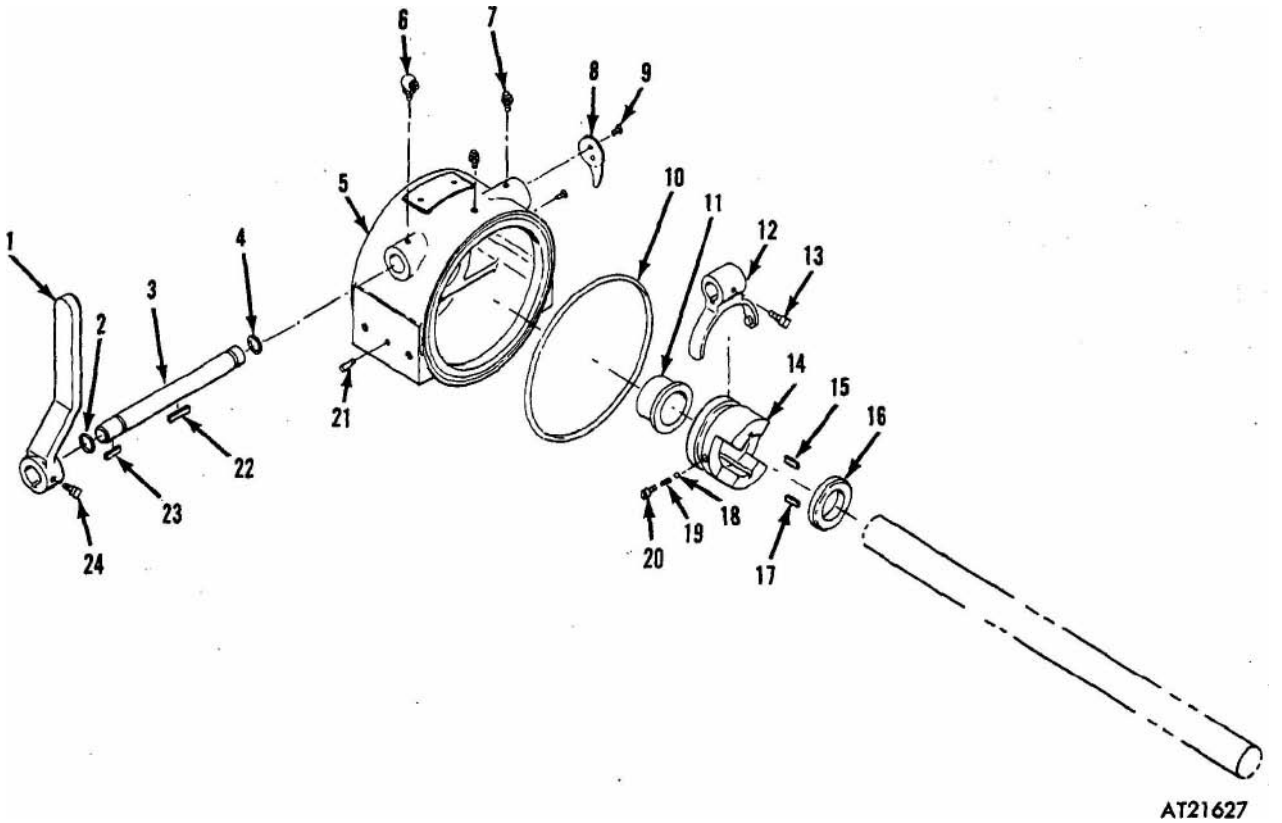


Figure 4-2. Bracket assembly, removal and installation.



LEGEND to fig 4-3:

1 - Lever
2 - Packing
3 - Shifter shaft
4 - Packing
5 - Clutch housing
6 - Grease fitting
7 - Grease fitting
8 - Pointer
9 - Rivet
10 - Packing
11 - Bushing
12 - Shifter fork
13 - Setscrew
14 - Clutch jaw
15 - Key
16 - Spacer
17 - Key
18 - Ball
19 - Spring
20 - Setscrew
21 - Alignment pin
22 - Key
23 - Key
24 - Setscrew

Figure 4-3. Clutch housing, exploded view.

(3) Remove keys (15 and 17) and spacer (16) from drum shaft.

(4) Remove clutch jaw (14) and ball (18) from clutch housing (5).

(5) Remove setscrew (20) and spring (19) from clutch jaw (14).

(6) Remove grease fittings (6 and 7) and packing (10) from clutch housing (5).

(7) Disconnect lever (1) from shifter shaft (31 by removing setscrew (24). Remove key (23) from shaft.

(8) Remove setscrew (13) from shifter fork 1 2). Tap fork off key (22) and remove key.

(9) Drive shifter shaft (3) from clutch housing (5) with a suitable hammer and punch. Remove shifter fork (12) from housing. Remove packings (2 and 4) from shaft.

(10) Remove bushing (11) from clutch housing (5).

(11) Remove drum (3, fig 4-4) from drum shaft (2). Remove brake disc (5) and spring (6).

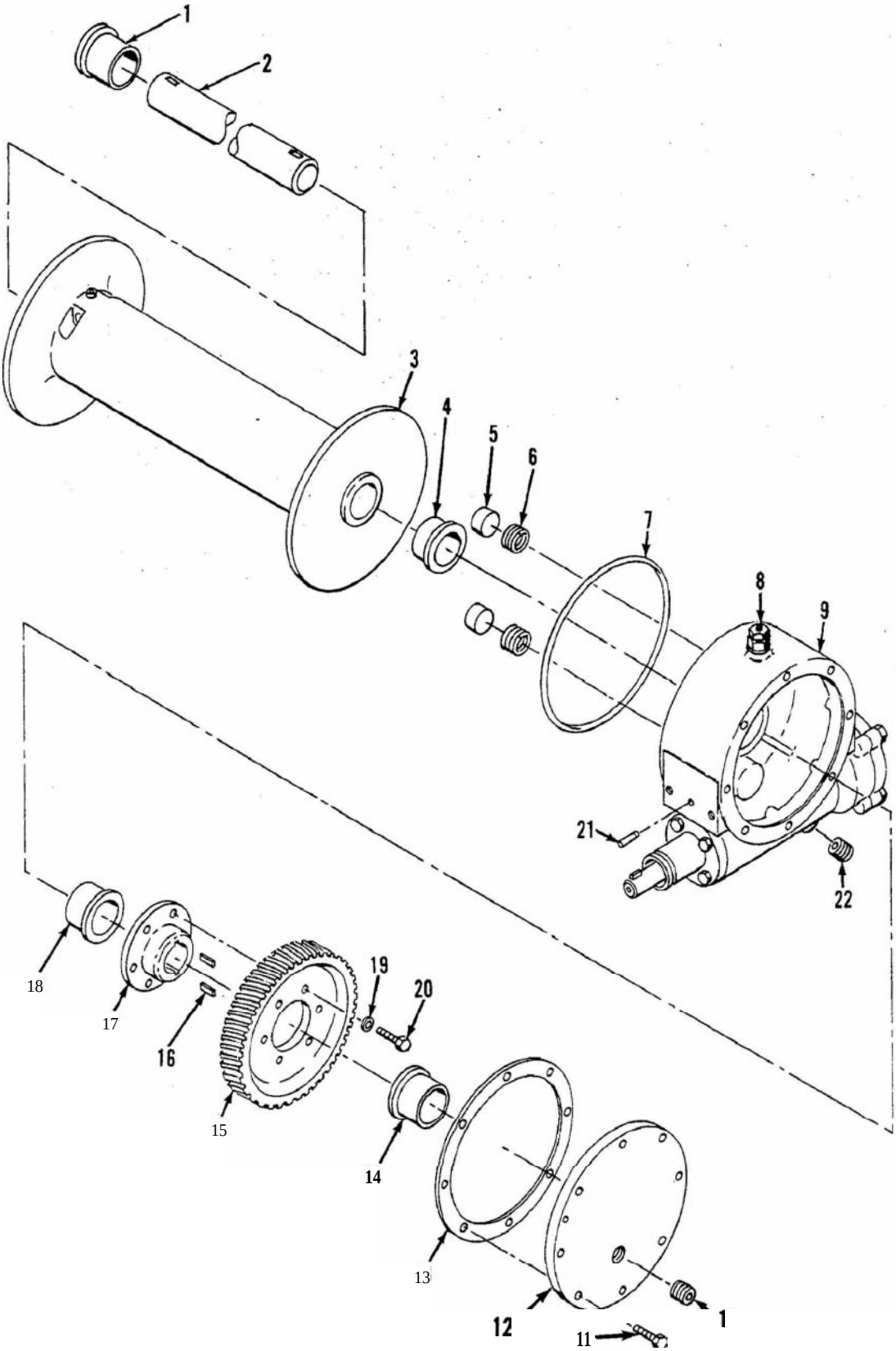


Figure 4-4. Winch drum and gear housing, exploded view.

AT21628

(12) Remove bushings (1 and 4) from drum (3) as shown in figure 4-5.

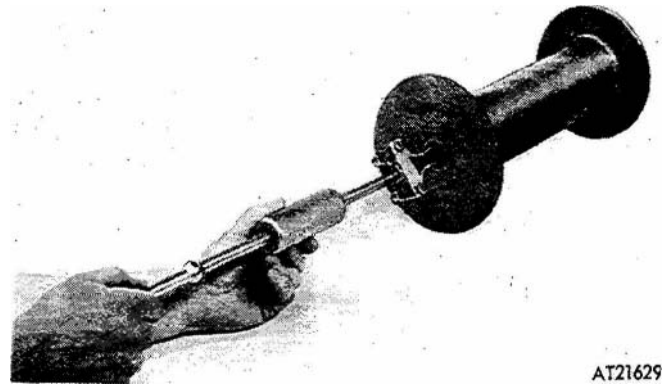


Figure 4-5. Removing drum bushings.

(13) Remove packing (7, fig 4-4), grease fitting (8), and drain plug (22) from gear housing (9).

(14) Remove drain plug (10) from housing cover (12). Disconnect housing cover and cover gasket (13) from gear housing (9) by removing screw (11). Jack screw cover from housing as shown in figure 4-6.

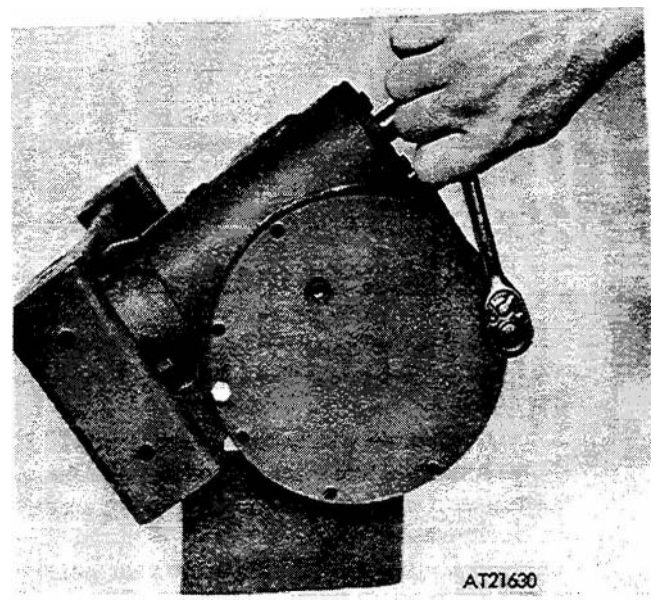


Figure 4-6. Jack screwing gear cover from gear housing.

LEGEND to fig 4-4:

1 - Bushing
2 - Drum shaft
3 - Drum
4 - Bushing
5 - Brake disc
6 - Spring
7 - Packing
8 - Grease fitting
9 - Gear housing
10 - Drain plug
11 - Screw
12 - Housing cover
13 - Cover gasket
14 - Bushing
15 - Worm gear
16 - Key
17 - Hub
18 - Bushing
19 - Lock washer
20 - Screw
21 - Alignment pin
22 - Drain plug

(15) Remove bushing (14, figure 4-4) from housing cover (12).

(16) Press drum shaft (2) partially through hub (17) and remove keys (16) from shaft (fig 4-7).

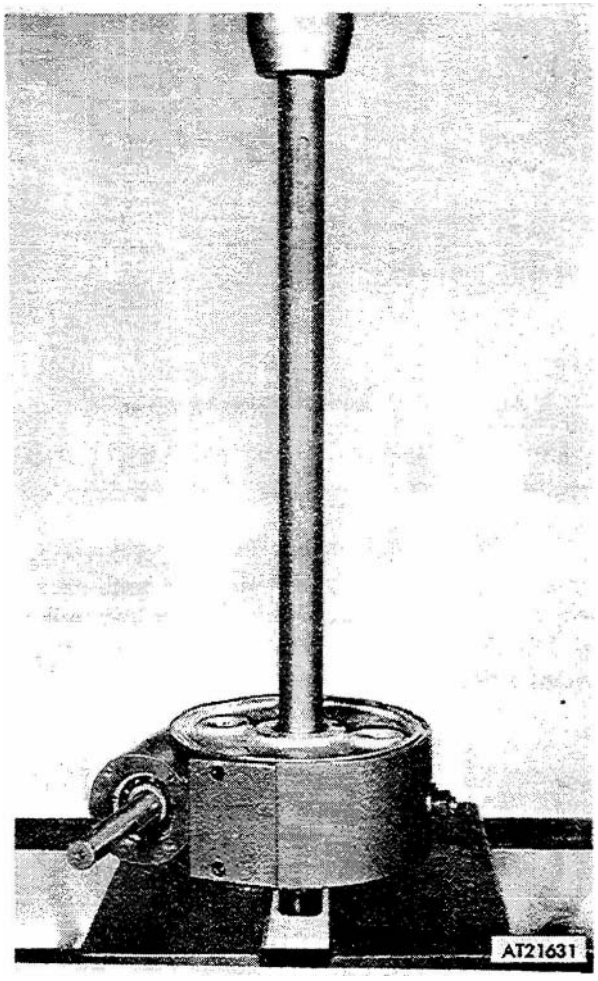


Figure 4-7. Pressing drum shaft for key removal.

(17) Turn gear housing (9, fig 4-4) over and press drum shaft (2) out of hub (17) as shown in figure 4-8.

(18) Remove assembled worm gear (15, fig 4-4) and hub (17) from gear housing (9). Disconnect worm gear (15) from hub by removing screw (20) and lock washer (19).

(19) Press bushing (18) from gear housing (9) as shown in figure 4-9.

(20) Disconnect safety brake cover (11, fig 4-10) and cover gasket (12) from safety brake housing (20) by removing screw (10).

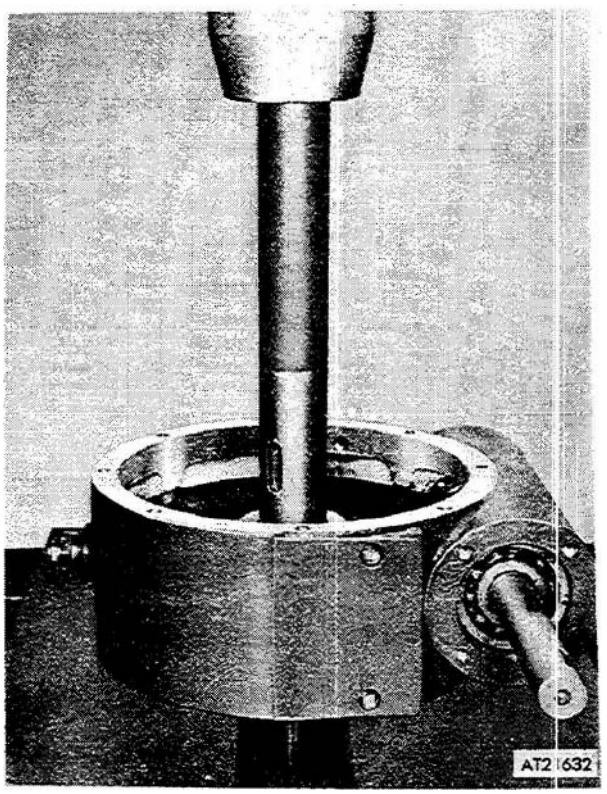


*Figure 4-8. Pressing drum **shalt** out of hum*

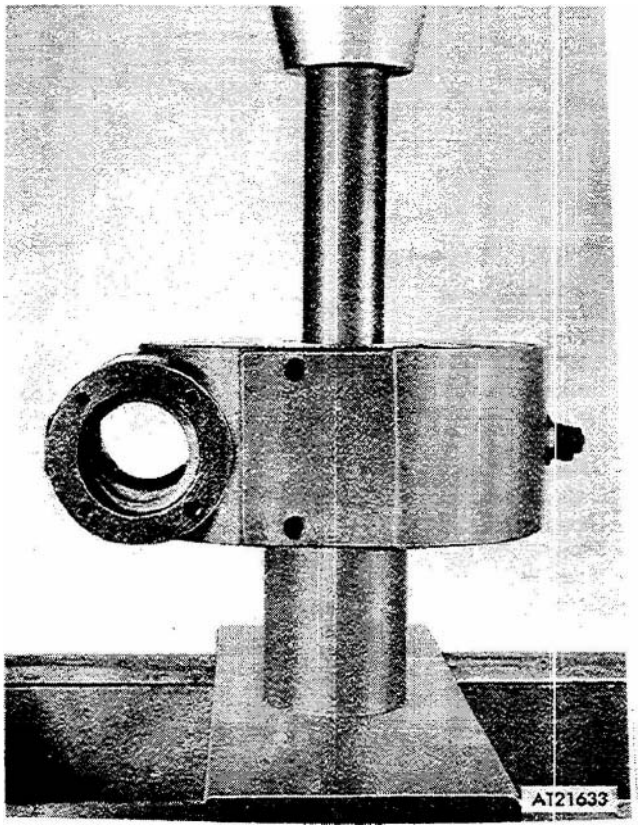


Figure 4-9. Pressing bushing from gear housing.

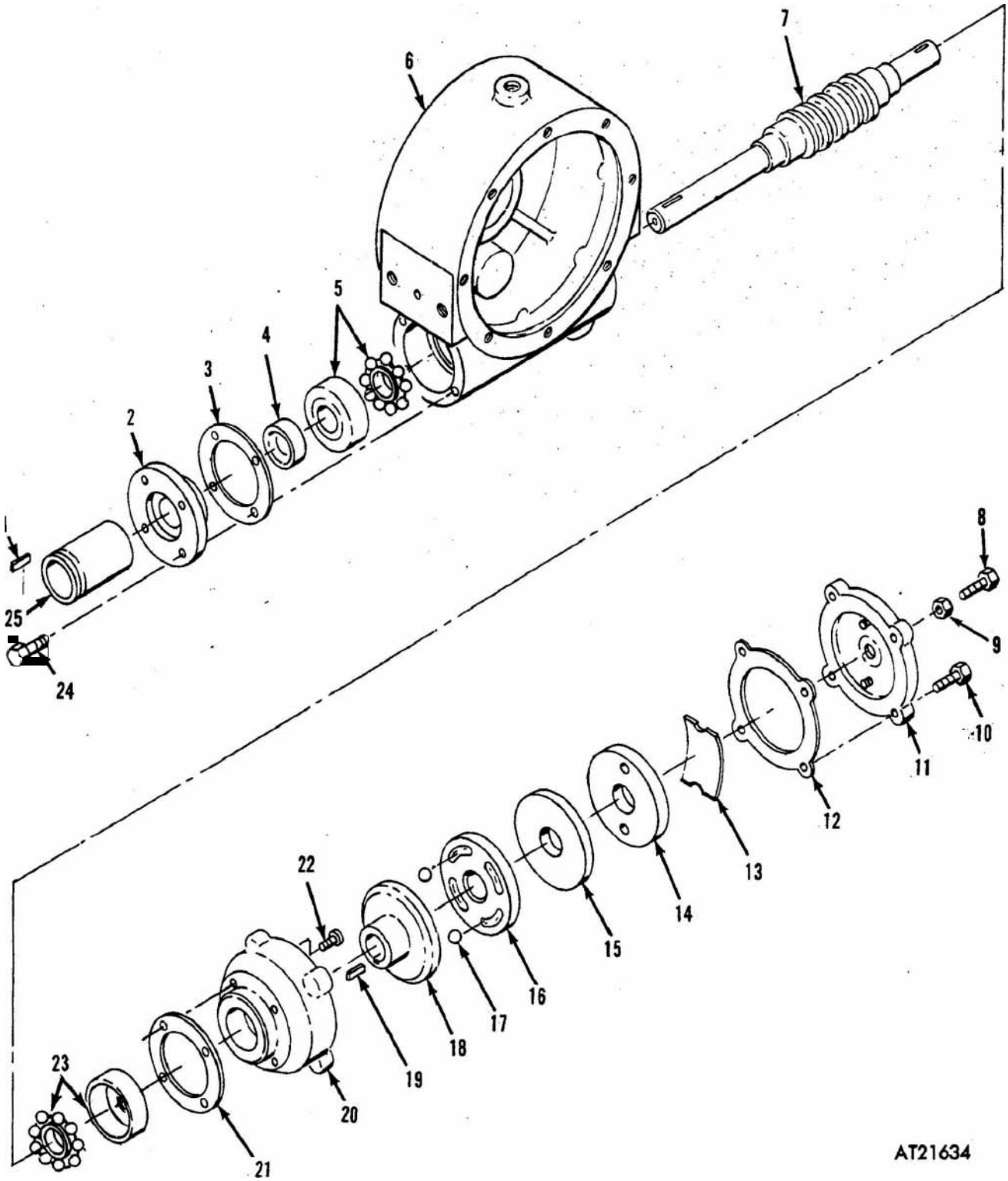


Figure 4-10. Input shaft and safety brake assembly, exploded view.

(21) Remove spring (13), retainer plate (14), disc (15), cam (16), and balls (17) from safety brake housing (20).

(22) Remove hub (18) from safety brake housing (20). Remove key (19) from worm input shaft (7).

(23) Disconnect safety brake housing (20) and brake housing gasket (21) from gear housing (6) by removing screw (22).

(24) Remove key (1) from worm input shaft (7).

(25) Remove sleeve (25) from bearing retainer (2) and disconnect bearing retainer (2) and bearing retainer gasket (3) from gear housing (6) by removing screw (24).

(26) Remove input shaft seal (4) from bearing retainer (2) as shown in figure 4-11.

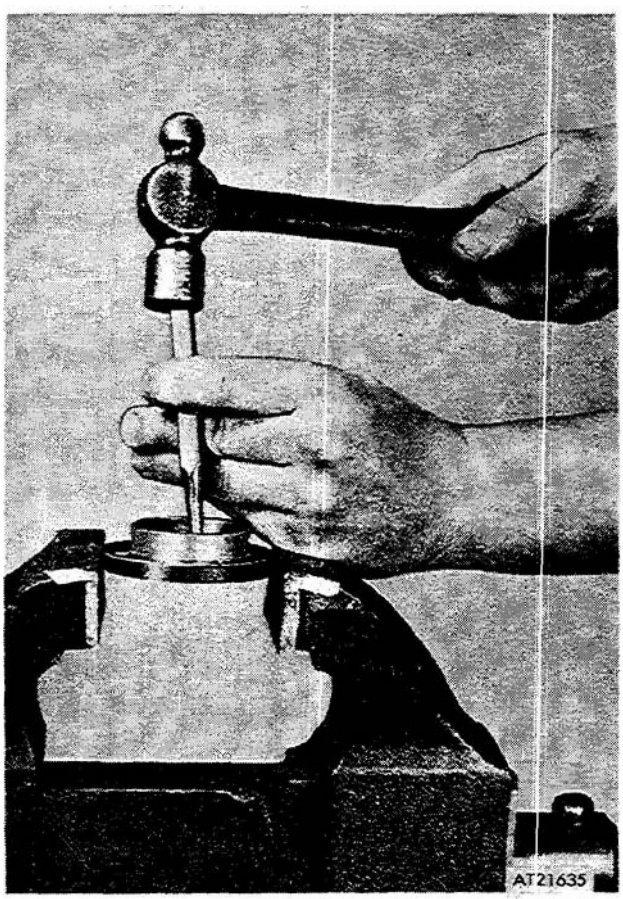


Figure 4-11. Removing input shaft seal.

(27) Remove assembled worm input shaft (7, fig 4-10) and input shaft bearings (5 and 23) from gear housing (6). Press bearings from shaft (fig 4-12).

LEGEND to fig 4-10:

- Key
2 - Bearing retainer
3 - Bearing retainer gasket
4 - Input shaft seal
5 - Input shaft bearing
6 - Gear housing
7 - Worm input shaft
8 - Screw
9 - Nut
10 - Screw
11 - Safety brake cover
12 - Cover gasket
13 - Spring
14 - Retainer plate
15 - Disc
16 - Cam
17 - Ball
18 - Hub
19 - Key
20 - Safety brake housing
21 - Brake housing gasket
22 - Screw
23 - Input shaft bearing
24 - Screw
25 - Sleeve

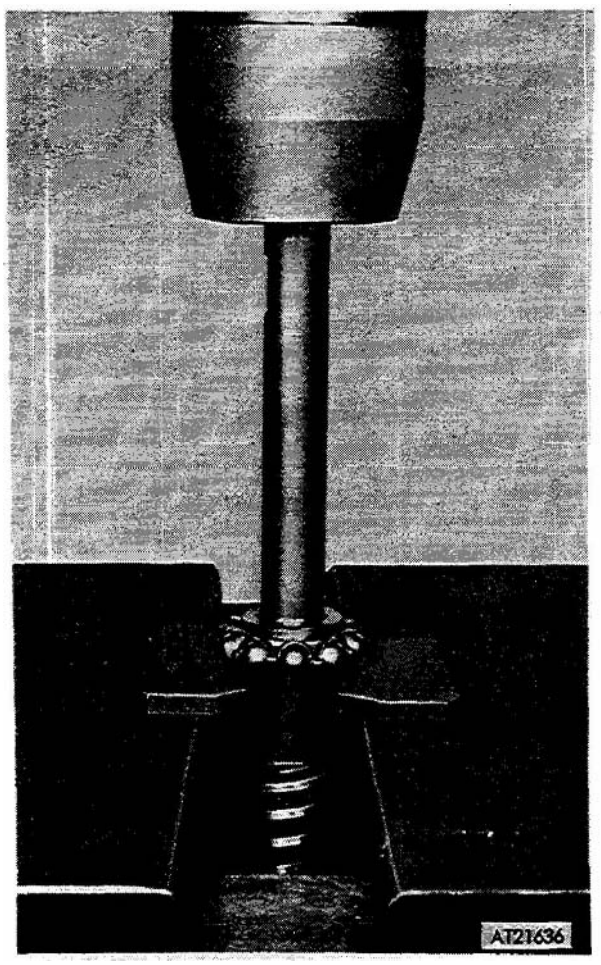


Figure 4-12. Removing worm shaft bearings.

(28) Remove bearing *races* of input shaft bearings (5 and 23, fig 4-10) from *gear housing* (6) as shown in figure 4-13.

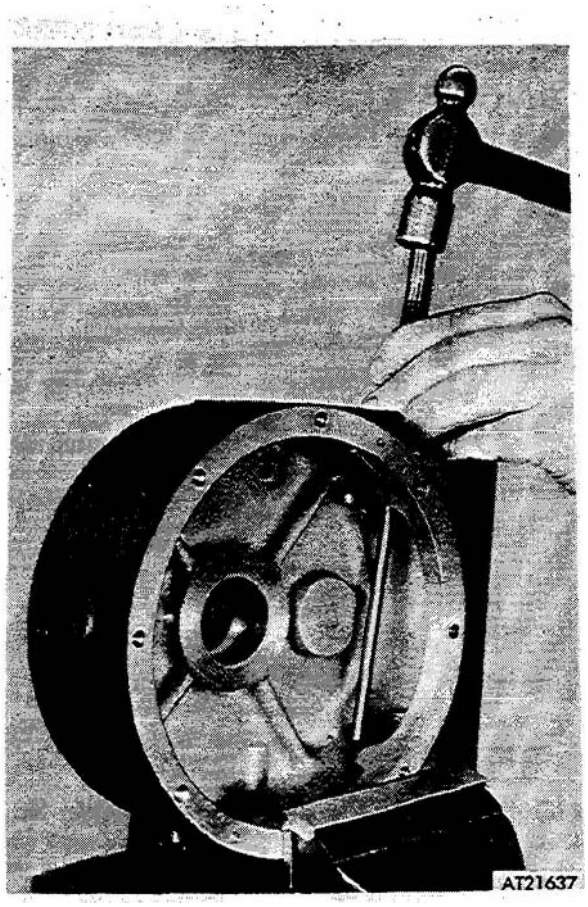


Figure 4-13. Removing bearing races.

c. Cleaning. (Refer to para 3-3.)
d. Inspection. (Refer to para 3-4.)
e. Assembly.

(1) Install bearing race of input shaft bearing (5, fig 4-10) in gear housing (6) as shown in figure 4-14.

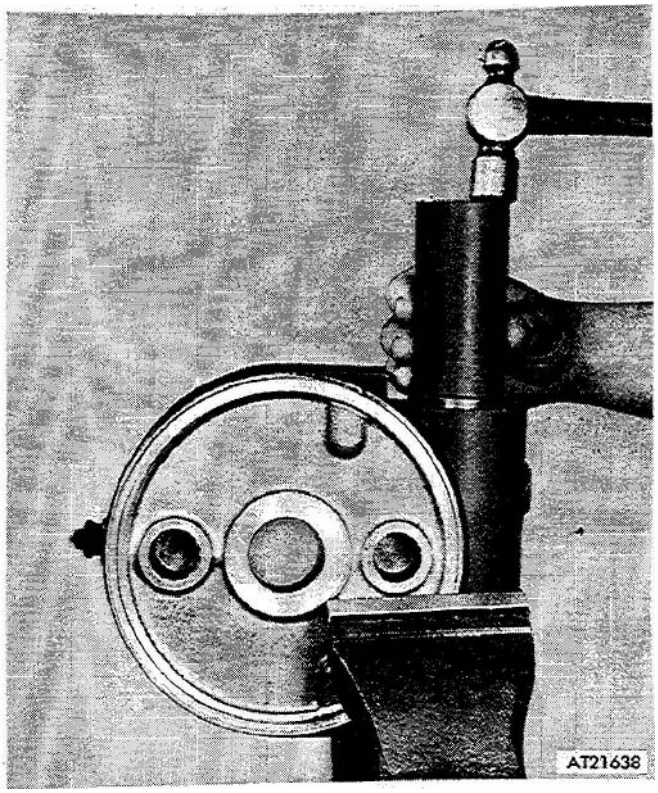


Figure 4-14. Installing bearing race.

(2) Press input shaft bearings (5 and 23, fig 4-10) on worm input shaft (7) as shown in figure 4-15.

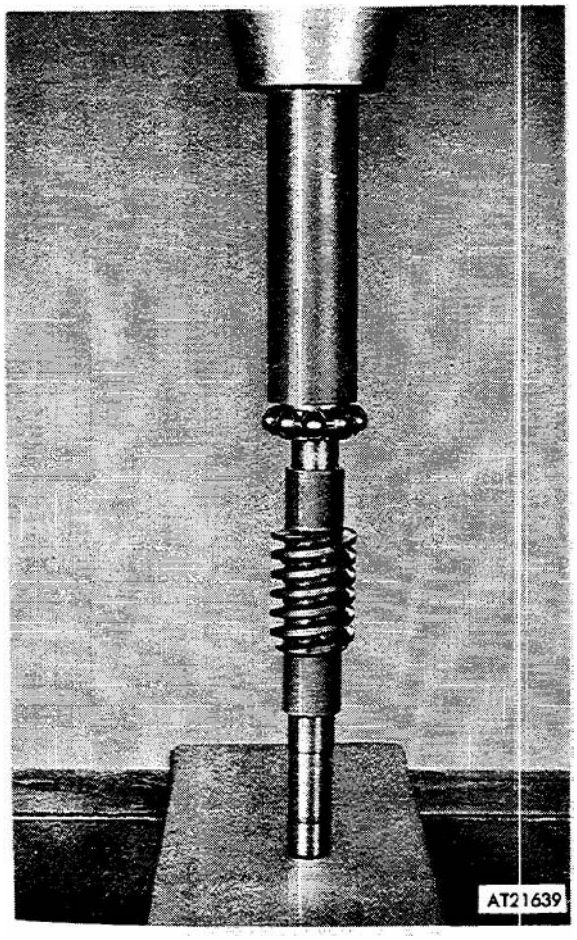


Figure 4-15. Installing bearings on worm input shaft.

(3) Position assembled worm input shaft (7, fig 4-10) and bearings in gear housing (6) and install bearing race of input shaft bearing (23) in gear housing (fig 4-16).

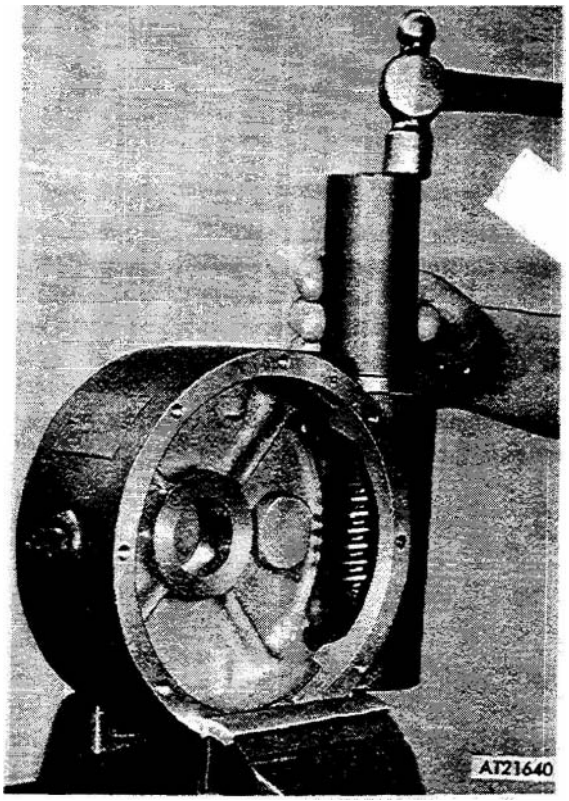


Figure 4-16. Installing bearing race over worm input shaft bearing.

(4) Press input shaft seal (4, fig 4-10) into bearing retainer (2) as shown in figure 4-17.

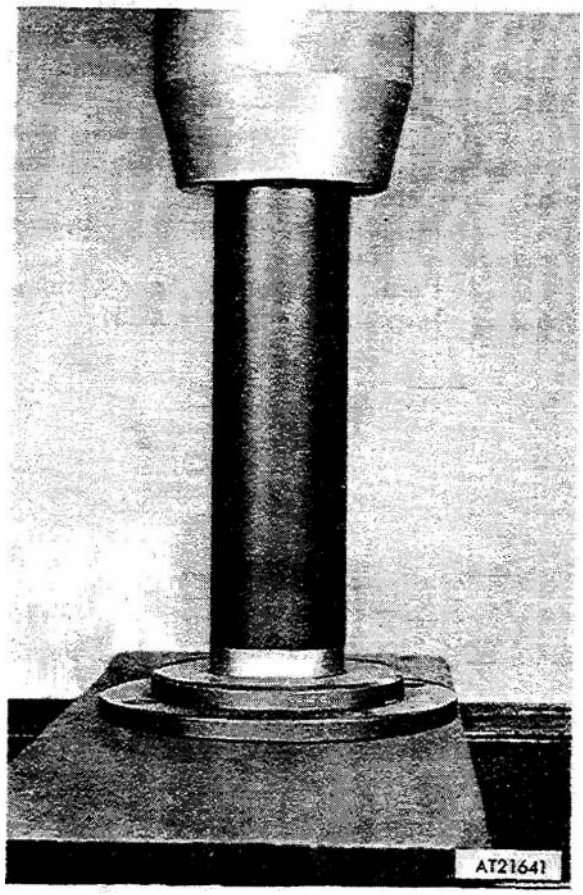


Figure 4-17. Installing input shaft seal.

(5) Connect bearing retainer gasket (3, fig 4-10) and bearing retainer (2) to gear housing (6) and secure with screw (24). Install sleeve (25) in bearing retainer (2) and position key (1) in worm input shaft (7).

(6) Connect brake housing gasket (21) and safety brake housing (20) to gear housing (6) and secure with screw (22).

(7) Position key (19) in worm input shaft (7) and connect hub (18) on shaft.

(8) Position balls (17) on hub (18) and connect cam (16) to worm input shaft (7), making sure balls are aligned with slots marked "2". Position disc (15) on worm input shaft.

(9) Position spring (13) between alignment screws in safety brake cover (11). Position retainer plate (14) on screws in cover.

(10) Connect cover gasket (12) and assembled safety brake cover (11) to safety brake housing (20) and secure with screw (10).

(11) Insert screw (8) and nut (9) in safety brake cover (11).

(12) Press bushing (18, fig 4-4) into gear housing (9) as shown in figure 4-18.

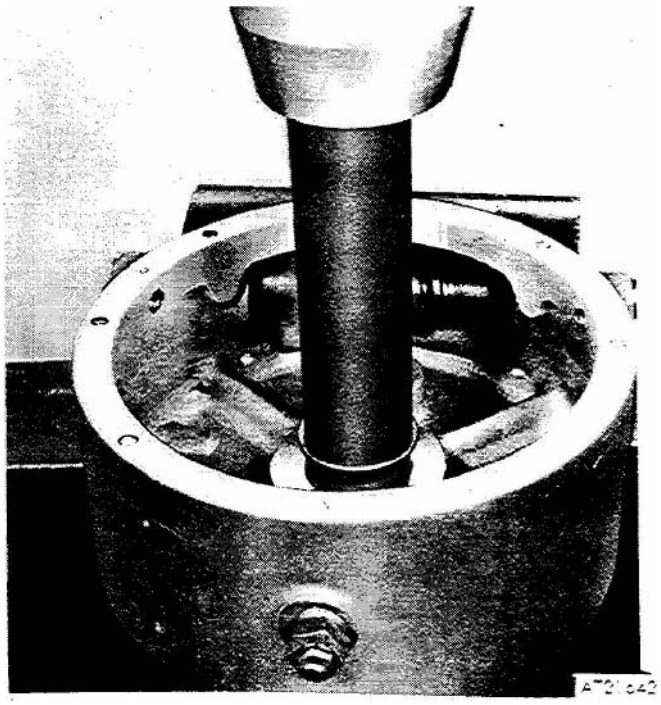


Figure 4-18. Pressing bushing into gear housing.

(13) Connect worm gear (15, fig 4-4) to hub (17) and secure with screw (20) and lock washer (19) Position assembled gear in gear housing (9) as shown in figure 4-19.

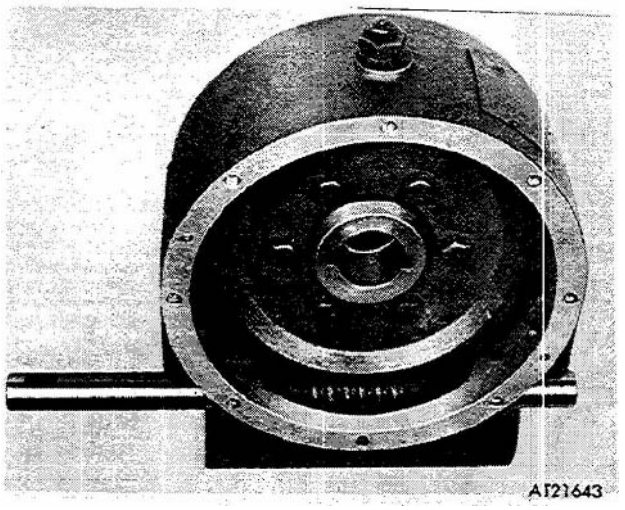


Figure 4-19. Proper installation of worm gear.

(14) Support worm gear (15, fig 4-4) in proper position in gear housing (9). Align key ways in hub (17) and key slots on drum shaft (2) and press shaft through gear until key slots on shaft are through hub.

(15) Turn over gear housing (9). Insert keys (16) in drum shaft (2) and press shaft into worm gear until keys are in proper position (fig 4-20 I.

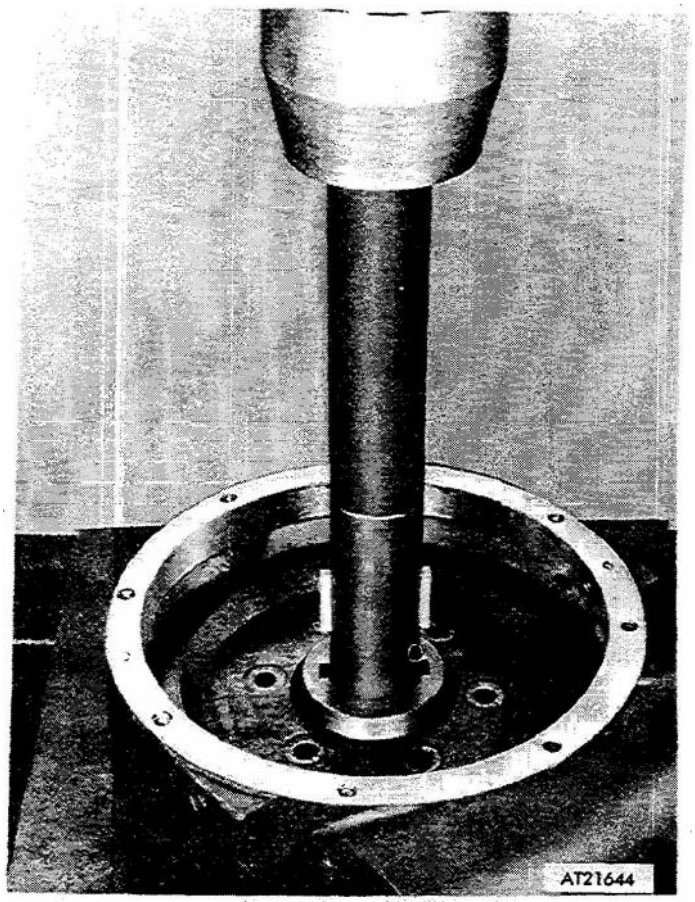


Figure 4-20. Pressing drum shaft into hub.

(16) Install bushing (14, fig 4-4) into housing cover (12). Connect cover gasket (13) and housing cover (12) to gear housing (9) and secure with screw (11).

(17) Install packing (7), grease fitting (8) and drain plug (22) into gear housing (9).

(18) Install spring (6) and brake disc (5) into gear housing (9) as shown in figure 4-21.

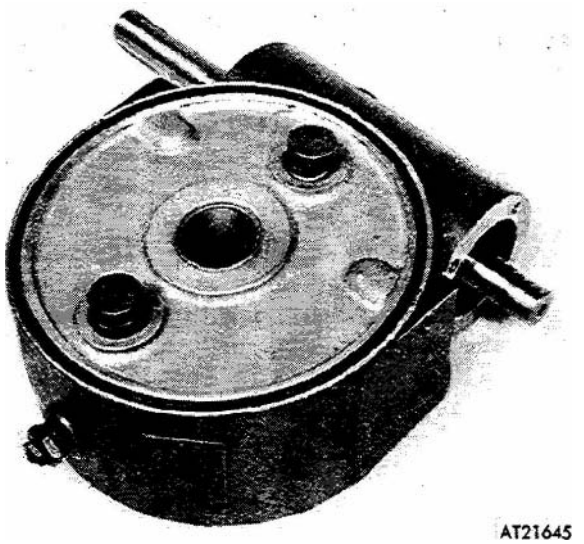


Figure 4-21. Proper installation of brake disc and springs.

(19) Install bushings (1 and 4, fig 4-4) in drum (3) as shown in figure 4-22.

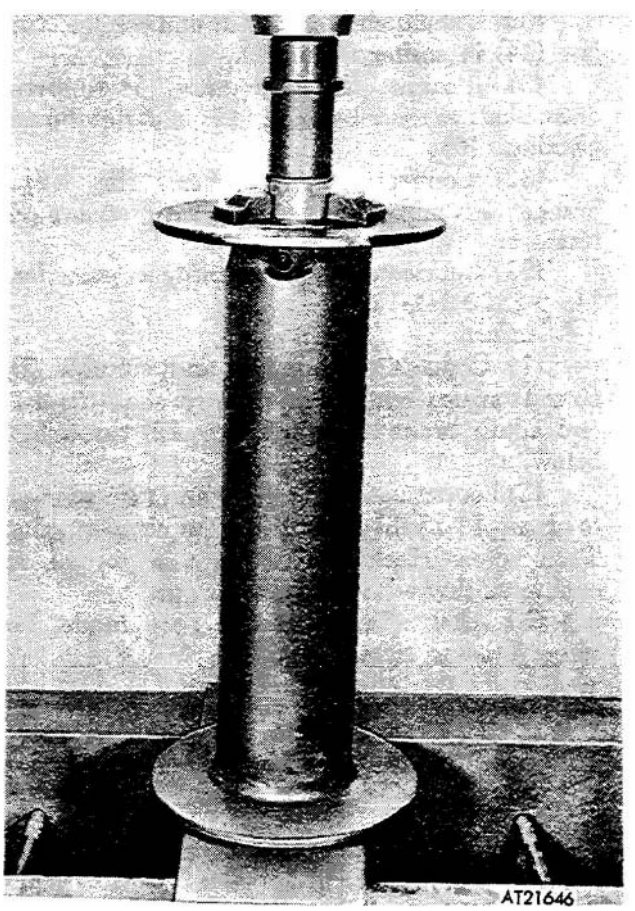


Figure 4-22. Pressing bushings into winch drum.

(20) Slide drum (3, fig 4-4) on drum shaft (2) against packing (7).

(21) Install spacer (16, fig 4-3) onto drum shaft and position keys (15 and 17) on drum shaft.

(22) Press bushing (11) in clutch housing (5).

(23) Secure pointer (8) to shifter shaft (3) with rivet (9). Install packing (4) in grove on shifter shaft (3).

(24) Position shifter fork (12) in clutch housing (5) and install shifter shaft (3) in housing through fork. Install packing (2) on shifter shaft and seat shaft in housing.

(25) Slide shifter fork (12) on shifter shaft (3) to expose key slot on shifter shaft and install key (22). Position shifter fork on shifter shaft and secure with setscrew (13).

(26) Insert key (23) on shifter shaft (3).

(27) Install lever (1) on shifter shaft (3) and secure with setscrew (24).

(28) Install packing (10) and grease fittings (6 and 7) in clutch housing (5).

(29) Install clutch jaw (14) on drum shaft until shaft covers ball hole in clutch. Install ball (18) and spring (19) and secure with setscrew (20).

(30) Tilt clutch housing (5) and engage clutch jaw *(14)* in shifter fork (12).

(31) Position clutch housing (5) to permit drum shaft to enter bushing (11) in clutch housing packing (10).

(32) Connect winch assembly (fig 4-2) to bracket assembly and secure with screws and washers.

(33) Lubricate winch assembly in accordance LO 9-2320-242-12.

f. *Adjust.*

(1) Connect an adapter and suitable foot-pound torque wrench to input worm shaft (fig 4-23) and adjust brake as indicated in (2) through (4) below.

(2) Loosen nut (9, fig 4-10) and turn screw (8) to obtain 12·15 lbs-ft. torque on input worm shaft. Turn screw clockwise to increase torque and counterclockwise to decrease torque.

(3) After adjustment has been made, hold screw (8) and tighten hut (9).

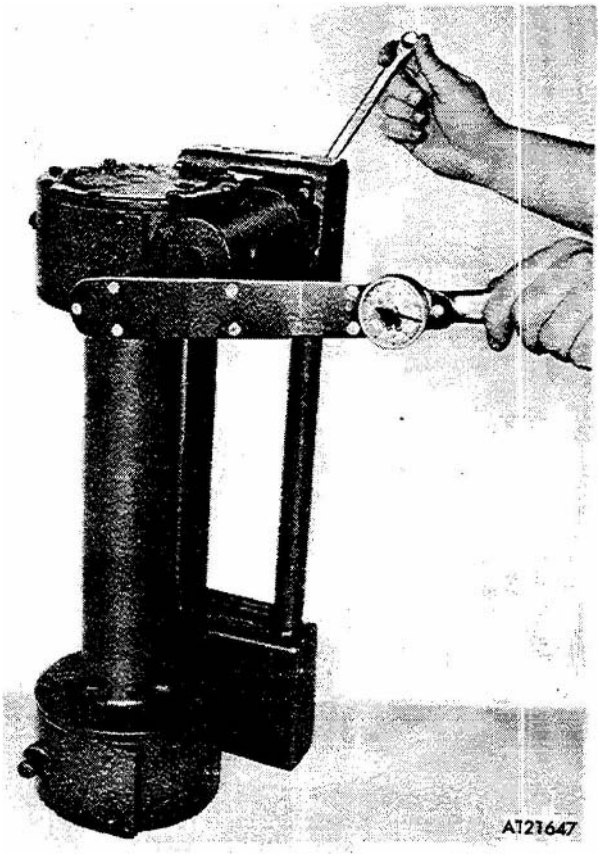


Figure 4-23. Adjusting winch safety brake.

(4) Remove torque wrench and adapter from input shaft.

g. *Installation.* (Refer to para 4-6).

4-8. Winch Support Assembly

a. Removal. (Refer to para 4-6.)

b. Disassembly.

(1) Disconnect brackets (7 and 42, fig 4-24) from bracket (21) by removing screws (3, 5, and 43), washers (1, 4, 6, 36, 41, and 44), and nuts (2, 35, and 40).

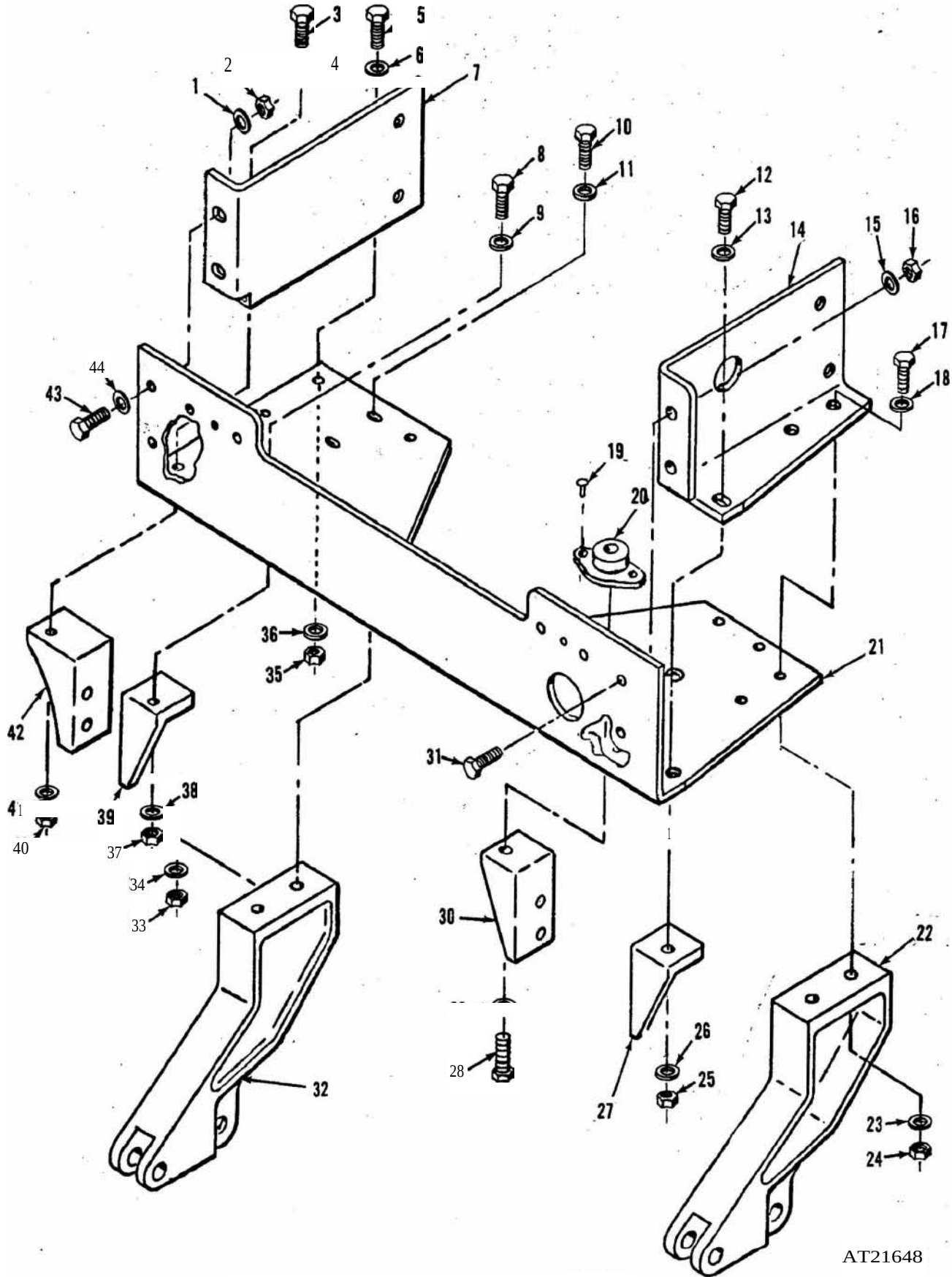


Figure 4-24. Winch support assembly, exploded view.

LEGEND to fig 4.24:
1 - Lock washer
2 - Nut
3 - Screw
4 - Washer
5 - Screw
6 - Washer
7 - Bracket
8 - Screw
9 - Washer
10 - Screw
11 - Lock washer
i2 - Screw
13 - Washer
14 - Bracket
15 - Lock washer
16 - Nut
17 - Screw
18 - Washer
19 - Rivet
20 - Cinch nut
21 - Bracket
22 - Bracket
23 - Lock washer
24 - Nut
25 - Nut
26 - Lock washer
27 - Bracket
28 - Screw
29 - Lock washer
30 - Bracket
31 - Screw
32 - Bracket
33 - Nut
34 - Lock washer
35 - Nut
36 - Lock washer
37 - Nut
38 - Lock washer
39 - Bracket
40 - Nut
41 - Lock washer
42 - Bracket
43 - Screw
44 - Washer

(2) Disconnect brackets (32 and 39) from bracket (21) by removing screws (8 and 10), washers (9, 11, 34, and 38), and nuts (33 and 37).

(3) Disconnect brackets (14, 22, and 27) from bracket (21) by removing screws (12, 17, and 31), washers (13, 15, 18, 23, and 26), and nuts (16, 24, and 25).

(4) Disconnect bracket (30) from bracket (21) by removing screw (28) and lock washer (29).

(5) Disconnect cinch nut (20) from bracket (21) by removing rivet (19).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.* Weld cracks. (Refer to TM 9-237.)

f. *Assembly.*

(1) Secure cinch nut (20, fig 4-24) to bracket (21) with rivet (19).

(2) Position bracket (30) to bracket (21) and secure with screw (28), washer (29) and cinch nut (20).

(3) Position brackets (14, 22, and 27) to bracket (21) and secure with screws (12, 17, and 31), washers (13, 15, 18, 23, and 26), and nuts (16, 24, and 25).

(4) Position brackets (32 and 39) to bracket (21) and secure with screws (8 and 10), washers (9, 11, 34, and 38), and nuts (33 and 37).

(5) Position brackets (7 and 42) to bracket (21) and secure with screws (3, 5, and 43), washers (1, 4, 6, 36, 41 and 44), and nuts (2, 35, and 40).

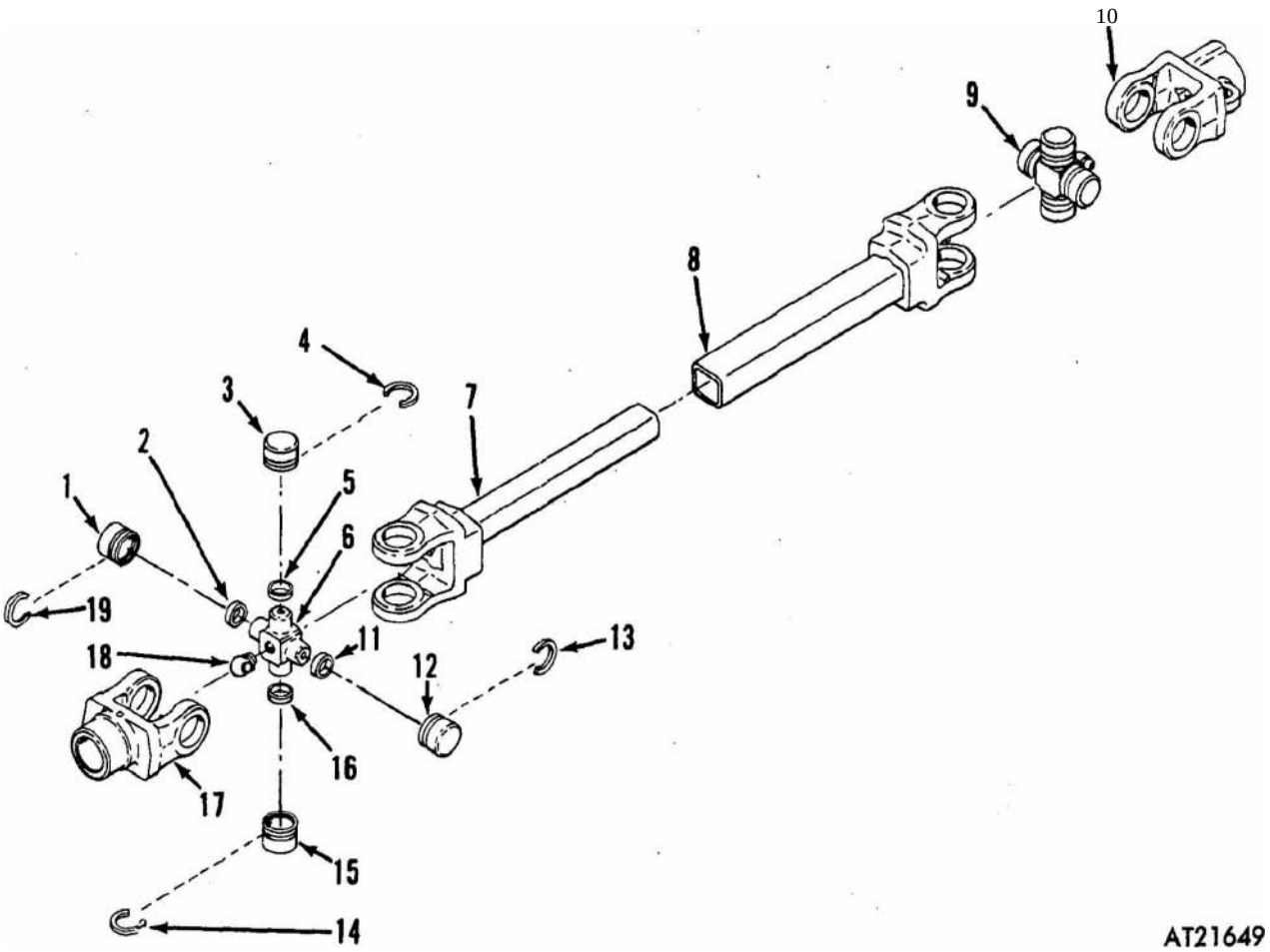
g. *Installation.* (**Refer** to para 4-6.)

4-9. Drive Shaft

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect shaft (7, fig 4-25) from shaft (8).



LEGEND to fig 4-25:

1 - Bearing
2 - Washer
3 - Bearing
4 - Retaining ring
5 - Washer
6 - Spider
7 - Shaft
8 - Shaft
9 - Spider and bearing assembly
10 - Yoke
11 - Washer
12 - Bearing
13 - Retaining ring
14 - Retaining ring
15 - Bearing
16 - Washer
17 - Yoke
18 - Grease fitting
19 - Retaining ring

Figure 4-25. Drive shaft assembly, exploded view.

(2) Position suitable adapters against bearings 1 and 12) and position yoke (17) and adapter in a suitable vise. Apply sufficient pressure to adapter to release pressure on retaining rings (13 and 19). Remove retaining rings.

(3) Using a suitable punch and hammer, drive bearings (1 and 12) from yoke (17). Remove yoke and washers (2 and 11) from spider (6).

(4) Position adapters against bearings (3 and 15) and position shaft (7) in vise. Apply sufficient pressure to adapters to release pressure on retaining rings (4 and 14). Remove retaining rings.

(5) Using a suitable punch and hammer, drive bearings (3 and 15) from shalt (7). Remove spider (6) from shaft and washers (5 and 16) from spider.

(6) Remove grease fitting (18) from spider (6).

(7) Disassemble spider and bearing assembly (9) from shaft (8) and yoke (10) as indicated in (2) through (6) above.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly.

(1) Install grease fitting (18) in spider (6).

(2) Position washers (5 and 16) on spider (6). Position spider in yoke of shaft (7).

(3) Start bearings (3 and 15) in yoke of shaft (7) and position shaft with adapters against bearings in a suitable, vise. Center spider and tighten vise, which will press bearings on spider. Apply sufficient pressure after bearings are bottomed to permit installation of retaining rings (4 and 14). Install retaining rings.

(4) Position washers (2 and 11) on spider (6).

(5) Start bearings (1 and 12) in yoke (17). Position yoke (17) over spider (6), position adapters against bearings (1 and 12) and position in vise. Center spider and tighten vise. Apply sufficient pressure after bearings are bottomed to permit installation of retaining rings (13 and 191. Install retaining rings.

(6) Assemble spider and bearing assembly (9) to shaft' (8) and yoke (I0) as indicated in (1) through (5) above.

(7) Slide shaft (7) into shaft (8).

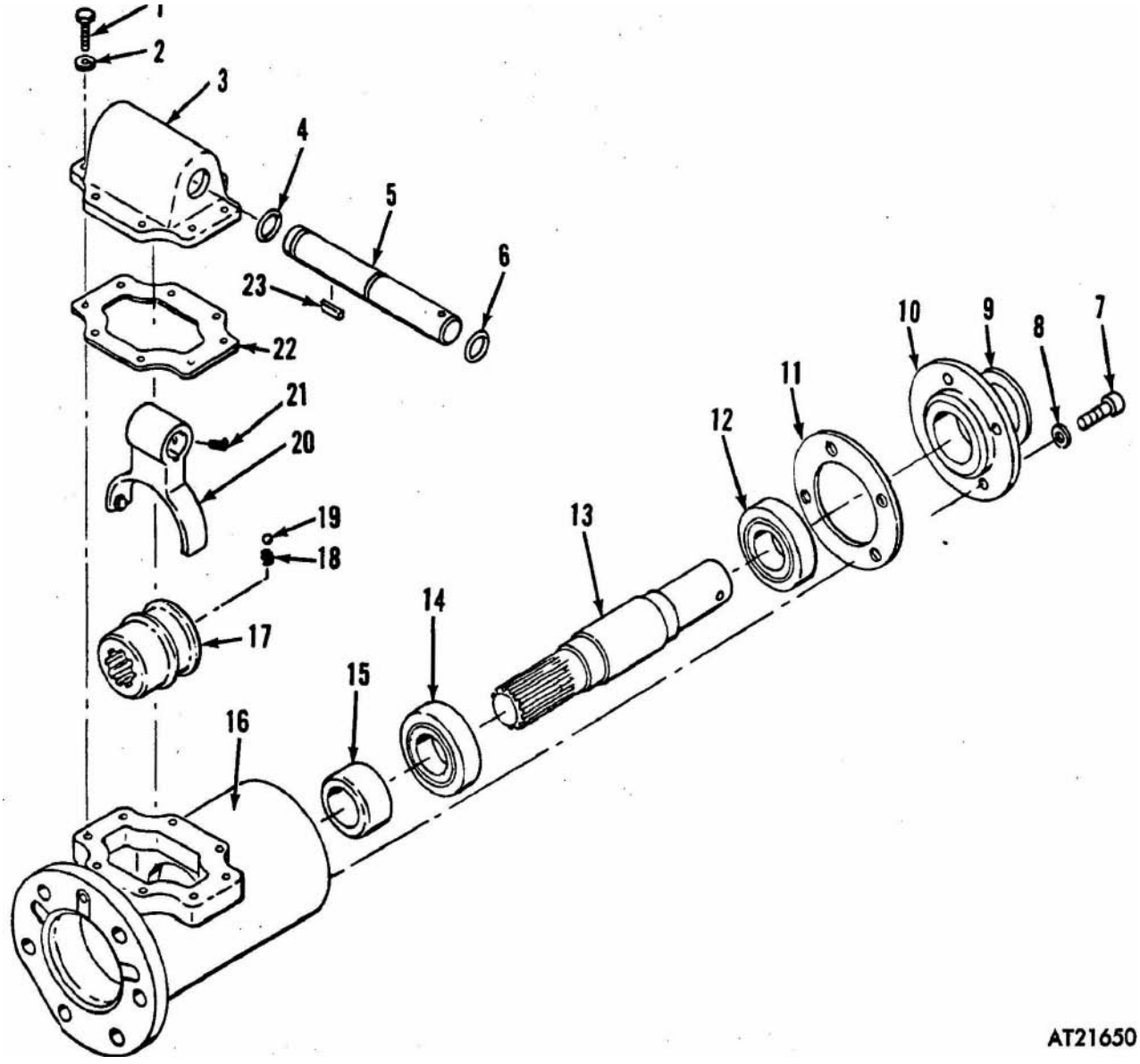
f. *Installation*. (Refer to TM 9-2320-242-20.)

4-10 **Power Takeoff**

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect clutch lever housing (3, fig 4-26) and housing gasket (22) from power takeoff housing (16) by removing screw (1) and lock washer (2).



LEGEND to fig 4-26:

1 - Screw
2 - Lock washer
3 - Clutch lever housing
4 - Packing
5 - Clutch yoke shaft
6 - Packing
- Screw
8 - Lock washer
9 - Seal
10 - Retainer cap
11 - Cap gasket
12 - Output shaft bearing
13 - Output shaft
14 - Output shaft bearing
15 - Spacer
16 - Power takeoff housing
17 - Sliding clutch
18 - Spring
19 - Ball
20 - Clutch yoke
21 - Setscrew
22 - Housing gasket
23 - Key

Figure 4-26. Power takeoff assembly, exploded view.

(2) Remove setscrew (21) from clutch yoke (20). Slide clutch yoke on clutch yoke shaft (5) and remove key (23). Remove shaft from clutch lever housing (3). Remove packings (4 and 6) from shaft. Remove clutch yoke from housing.

(3) Disconnect retainer cap (10) and cap gasket (11) from power takeoff housing (16) by removing screw (7) and lock washer (8).

(4) Remove seal (9) from retainer cap (10) as shown in figure 4-27.

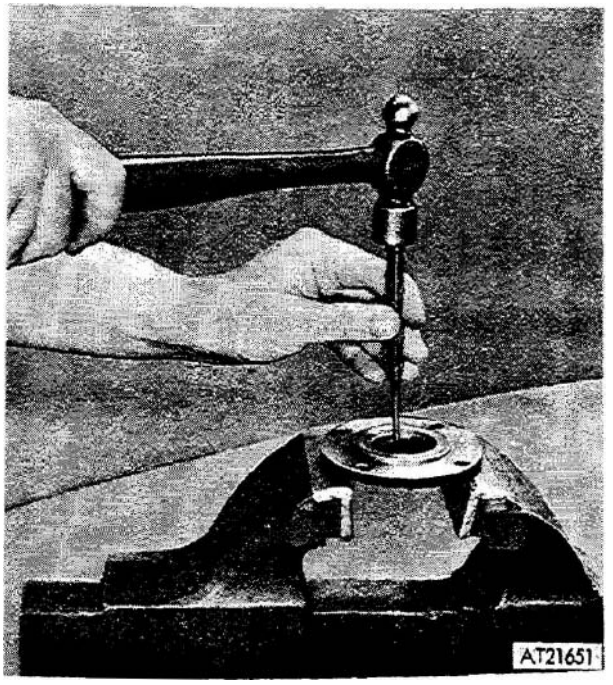


Figure 4-27. ***Removing oil seal.***

(5) Remove sliding clutch (17, fig 4-26) from output shaft (13). Remove ball (19) and spring (18) from sliding clutch.

(6) Remove spacer (15) and assembled output shaft (13) from power takeoff housing (16).

(7) Press output shaft bearings (12 and 14) from output shaft (13) as shown in figure 4-28.

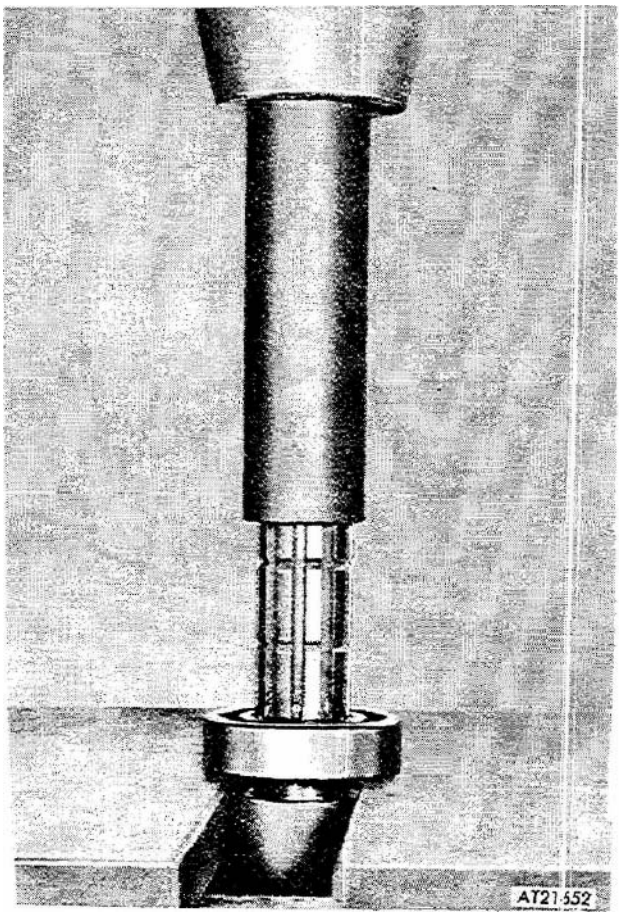


Figure 4-28. Pressing bearings from output shaft.

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Assembly.

(1) Press output shaft bearings (12 and 14, fig 4-26) onto output shaft (13) until they are flush with shoulders on shaft (fig 4-29).

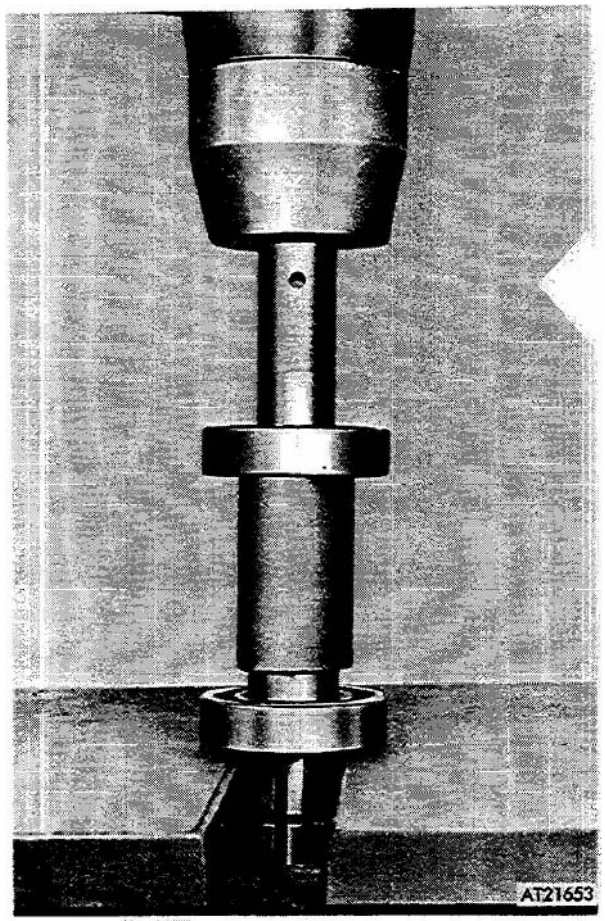


Figure 4-29. Pressing bearings onto output shaft.

(2) Install assembled output shaft (13, fig 4-261 into power takeoff housing (16) using a suitable adpater and hammer (fig 4-30).

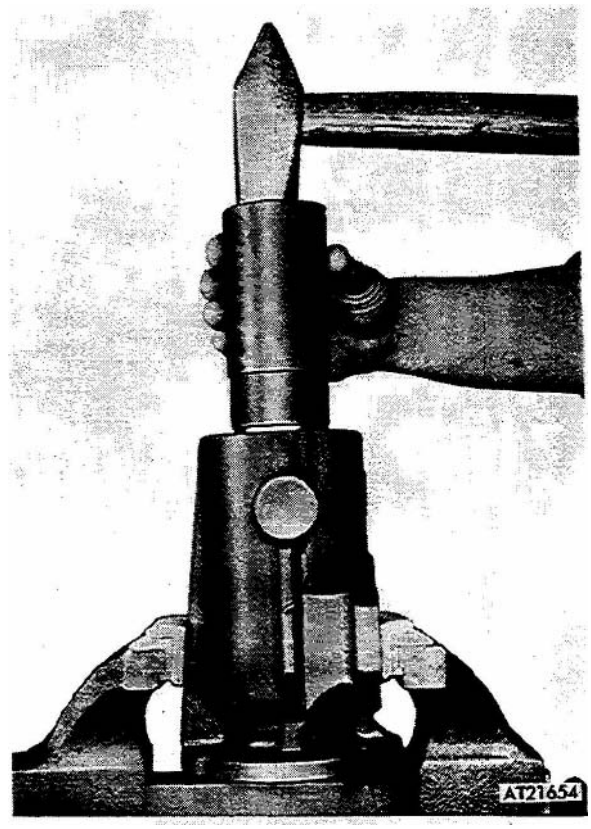


Figure 4-30. Installing assembled shaft in housing.

(3) Install spacer (15, fig 4-26) on shaft. Position spring (18) and ball (19) in sliding clutch (17) as shown in figure 4-31. Compress spring in ball and slide clutch on output shaft (13) as shown in figure 4-32.

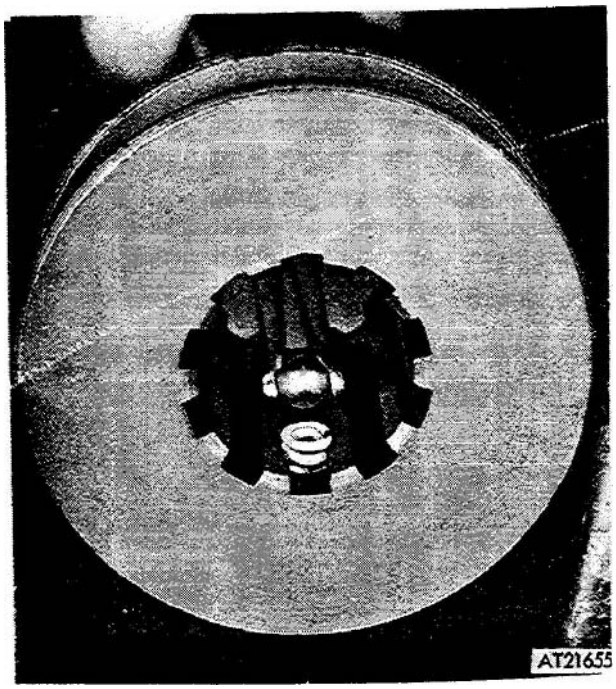


Figure 4-31. Installing ball in sprint.

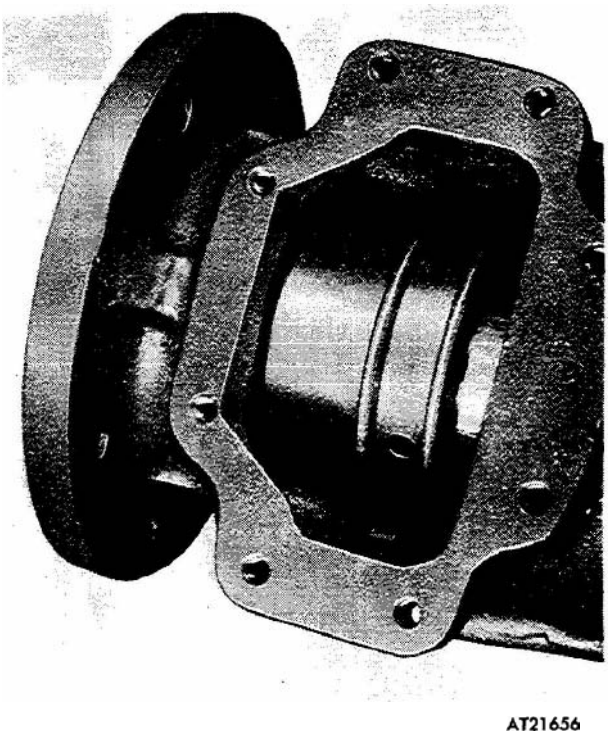


Figure 4-32. Proper sliding clutch installation.

(4) Press seal (9, fig 4-26) into retainer cap (10) as shown in figure 4-33.

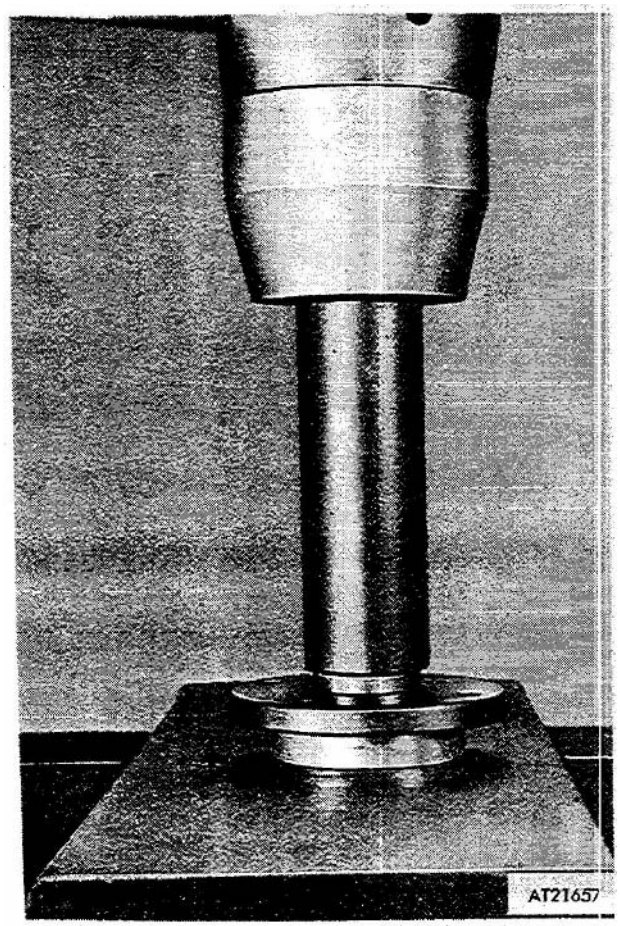


Figure 4-33. Installing oil seal.

(5) Connect cap gasket (11, fig 4-26) and retainer cap (10) to power takeoff housing (16) and secure with screw (7) and lock washer (8).

(6) Position clutch yoke (20) in clutch lever housing (3) and position clutch yoke shaft (5) in housing through fork. Install packings (4 and 6) on clutch yoke shaft and bottom shaft in housing.

(7) Slide clutch yoke (20) on clutch yoke shaft (5) and install key (23) in shaft. Slide yoke over key and secure with setscrew (21). Stake setscrew to yoke (fig 4-34).

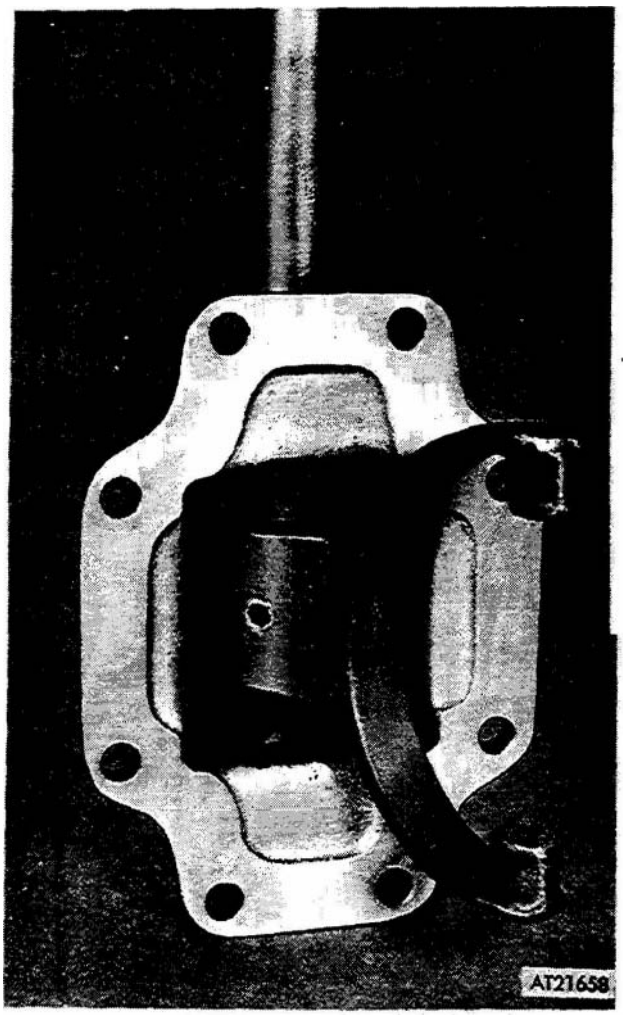


Figure 4-34. Staking clutch yoke setscrew.

(8) Position housing gasket (22, *fig* 4-26) and clutch lever housing (3) on power takeoff housing (16) and secure with screw (1) and lock washer (2).

f. *Installation.* (Refer to TM 9-2320-242-20.)

Section III. 7.62MM (M60) MACHINE GUN KIT

4-11 General

The 7.62 mm (M60) machine gun kit facilitates mounting for a 7.62mm (M60) machine gun on the tractor right front fender. It **also** provides an ammunition storage box rack for mounting on the right rear fender and securing straps on the engine cover for the stowage bag containing two spare barrels.

a. *Gun Mount Assembly.* The gun mount assembly consists of a gun mount base and a gun mount **weldment** (fig 4-351. The gun mount base is a four-by-five inch steel plate welded to *a s*hort length of steel tubing. The gun mount **weldment** is basically comprised of two short lengths of tubing which are welded to the ends of a third, longer length of tubing. One of the shorter tubes slips over the tube welded to the gun mount base and the other gun mount **weldment** tube receives the machine gun pivot shaft. Quick-release **lockpins** are provided to secure the mount to the base and. the M60 machine gun to the gun mount for the travel position.

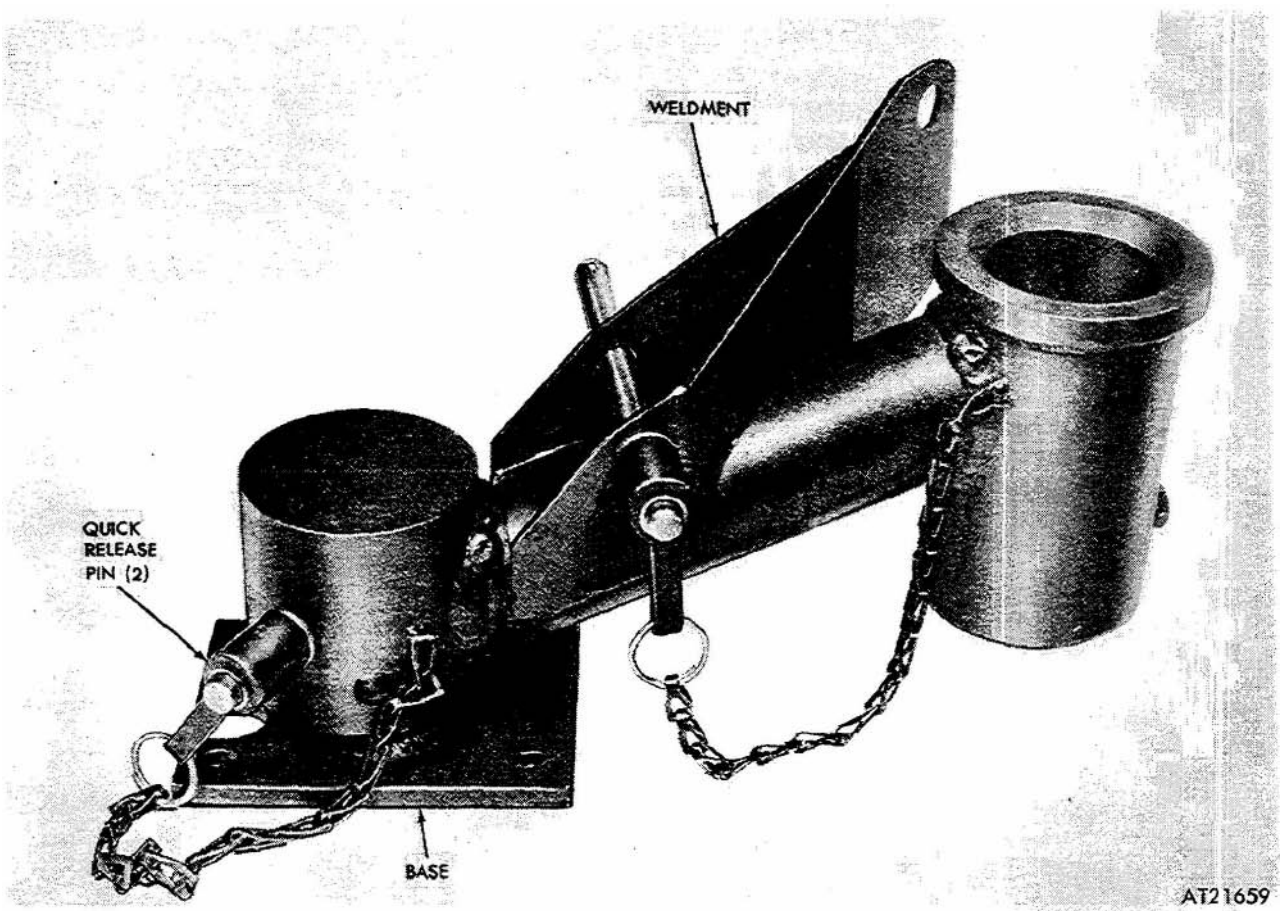


Figure 4-35. 7.62mm Machine gun mount assembly.

b. *Ammunition Stowage Box Rack.* The rack provides stowage for four standard ammunition stowage boxes. It is approximately 16. 3 inches long, 9.0 inches wide, and 7.3 inches high and attaches to the right rear tractor fender. Webbed straps are attached to the rack and fender to secure the ammunition boxes to the rack.

c. Spare Barrel Stowage Bag Securing Straps. The two webbed straps secure the spare barrel stowage bag to the engine cover, and are secured to the *cover* by four footman's loops.

4-12 7.62mm Machine Gun Mount Assembly

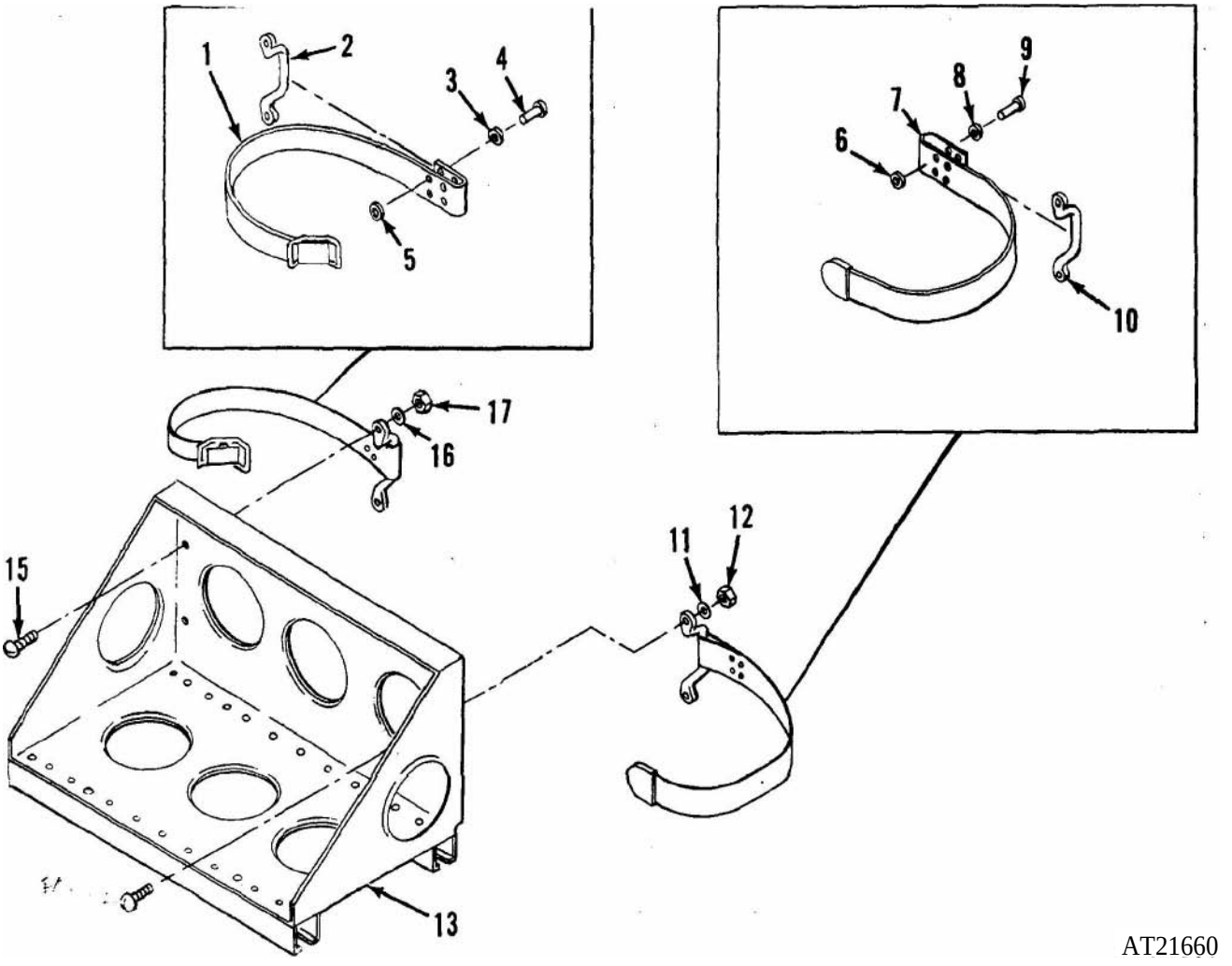
a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to Para 3-3.1

c. *Inspection.* (Refer to para 3-4.)
d. *Repair.*
(1) Weld cracks (refer to TM 9-237).
(2) Re-form deformed parts (refer to TM 10-450).
e. Installation. (Refer to TM 9-2320-242-20.)

4-13 7.62mm Ammunition Rack

a. Removal. (Refer to TM 9-2320-242-20.)
b. Disassembly.
(1) Disconnect loop (2, fig 4-36) **from rack** (13) by removing screw (15), washer (16), **and nut (17).**



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LEGEND to fig 4-36:
1 - Strap
2 - Loop
3 - Washer
4 - Rivet
5 - Washer
6 - Washer
7 - Strap
8 - Washer
9 - Rivet
10 - Loop
11 - Washer
12 - Nut
13 - Rack
14 - Screw
15 - Screw
16 - Washer
17 - Nut

Figure 4-36. 7.62mm Ammunition rack, exploded view.

(2) Disconnect loop (10) from rack (13) by removing screw (14), washer (11), and nut (12).

(3) Disconnect strap (1) from loop (2) by removing rivet (4) and washers (3 and 5).

(4) Disconnect strap (7) from loop (10) by removing rivet (9) and washers (6 and 8).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Weld cracks (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450).

(3) Strap repair (refer to TM 10-269).

f. *Assembly.*

(1) Connect strap (7) to loop (10) and secure with rivet (9) and washers (6 and 8).

(2) Connect strap (1) to loop (2) and secure with rivet (4) and washers (3 and 5).

(3) Connect loop (10) to rack (13) and secure with screw (14), washer (11), and nut (12).

(4) Connect loop (2) to rack (13) and secure with screw (15), washer (16), and nut (17).

g. Installation. (Refer to TM 9-2320-242.20.)

4-14. 7.62mm Machine Gun Spare Barrel Stowage Bag Securing Straps

a. Removal. (Refer to TM 9-2320-242-20.)

b. Cleaning. (Refer to para 3-3.)

c. Inspection. (Refer to para 3-4.)

d. Repair. Repair straps (refer to TM 10-269).

e. Installation. (Refer to TM 9-2320-242-20.)

Section IV. 81MM (M29) MORTAR KIT

4-15 General

The 81mm mortar kit is installed in the carrier to provide the necessary stowage and transport facilities for the 81mm mortar cannon M29, mount and base plates M23 and M23A1, eighty 81-mm mortar shells, and sighting and fire control equipment. The kit consists of a frame assembly, an ammunition box assembly, and brackets and attaching hardware required to secure the kit components to the carrier.

a. Frame *Assembly.* The frame assembly serves as *a* rigid support for the mortar components and is secured to the floor of the carrier by *means of* adapters and brackets.

b. *Ammunition Box Assembly.* The ammunition box assembly serves as storage container for 80 rounds of ammunition for the 81mm mortar. The ammunition box is bracketed to the forward carrier bulkhead and seat panels.

4-16. Frame Assembly

a. 81mm Mortar Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect bracket (27, fig 4-31) by removing screw (29), washer (28), lock washer (26), and nut (25).

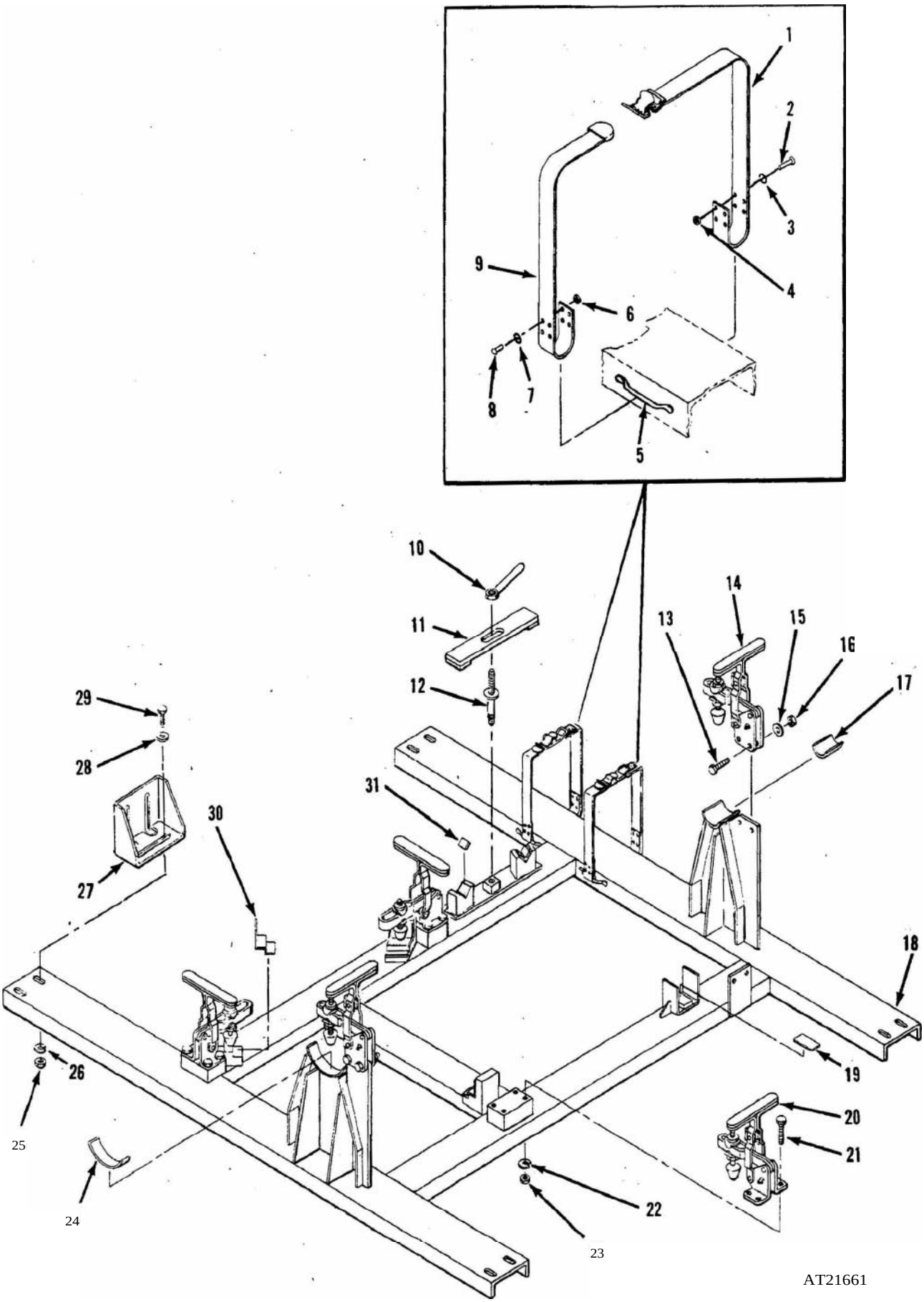


Figure 4-37. 81mm Mortar frame assembly, exploded view.

(2) Disconnect tube clamps (14) from frame (18) by removing screw (13), washer (15), and nut (16).

(3) Remove tube pads (17 and 24) from frame (18).

(4) Disconnect handle (10) from stud (12). Remove bar (11) from stud. Remove stud from frame (18).

(5) Disconnect base plate clamp (20) from frame (18) by removing screw (21), lock washer (22), and nut (23).

(6) Remove base plate pads (19, 30, and 31) from frame (18).

(7) Disconnect strap (1) from loop (5) by removing rivets (2) and washers (3 and 4).

(8) Disconnect strap (9) from loop by removing rivet (8) and washers (6 and 7).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Weld cracks (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450).

(3) Strap repair (refer to TM 10-269).

f. *Assembly.*

(1) Connect strap (9, fig 4-37) to loop (5) and secure with rivet (8) and washers (6 and 7).

(2) Connect strap (1) to loop and secure with rivet (2) and washers (3 and 4).

(3) Attach base plate pads (19, 30, and 31) to frame (18) with adhesive conforming to Military Specification MIL-A-5092, type II.

(4) Connect base plate clamp (20) to frame (18) and secure with screw (21), lock washer (22), and nut (23).

(5) Connect stud (12) to frame (18). Connect bar (11) and handle (10) to stud.

(6) Attach tube pads (17 and 24) to frame (18) with adhesive conforming to Military Specification MIL-A-5092, type II.

(7) Connect tube clamp (14) to frame (18) and secure with screw (13), washer (15), and nut (16).

(8) Connect bracket (27) to frame (18) and secure with screw (29), washer (28) lock washer (26), and nut (25).

g. *Installation.* (Refer to TM 9-2320-242-20.)

LEGEND to fig 4-37:

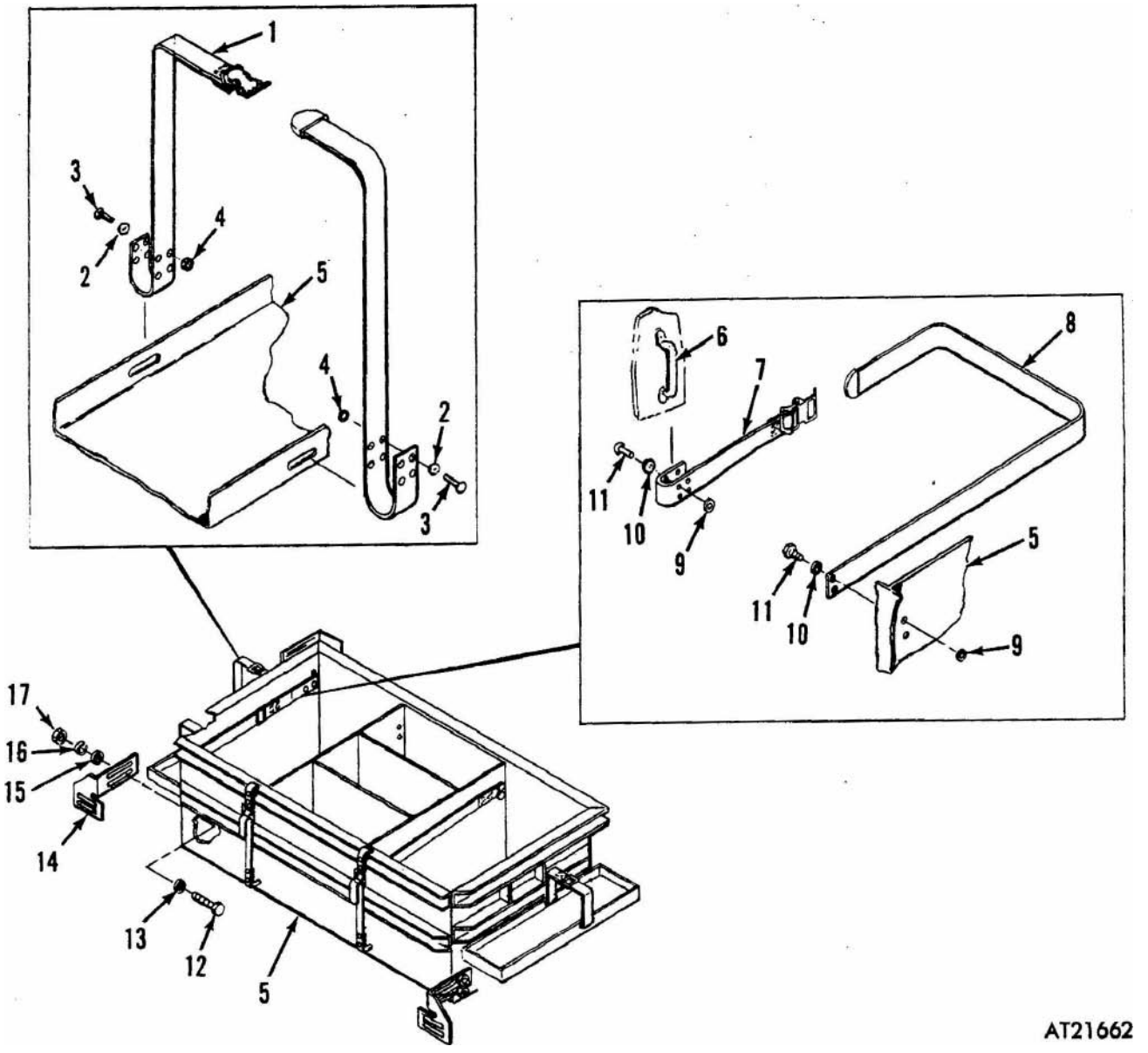
1 - Strap
2 - Rivet
3 - Washer
4 - Washer
5 - Loop
6 - Washer
7 - Washer
8 - Rivet
9 - Strap
10 - Handle
11 - Bar
12 - Stud
13 - Screw
14 - Tube clamp
15 - Washer
16 - Nut
17 - Tube pad
18 - Frame
19 - Base plate pad
20 - Base plate clamp
21 - Screw
22 - Lock washer
23 - Nut
24 - Tube pad
25 - Nut
26 - Lock washer
27 - Bracket
28 - Washer
29 - Screw
30 - Base plate pad
31 - Base plate pad

4-17. 81mm Mortar Ammunition Box

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect bracket (14, fig 4-38) from box (5) by removing screw (12), washers (13 and 15), lock washer (16), and nut (17).



LEGEND to fig 4-38:

1 - Strap
2 - Washer
3 - Rivet
4 - Washer
5 - Box
6 - Loop
7 - Strap
8 - Strap
9 - Nut
10 - Washer
11 - Screw
12 - Screw
13 - Washer
14 - Bracket
15 - Washer
16 - Lock washer
17 - Nut

Figure 4-38. 81mm Mortar ammunition box, exploded view.

(2) Disconnect strap (1) from box (5) by removing rivet (3) and washers (2 and 4).

(3) Disconnect strap (7) from loop (6) by removing screw (11), washer (10), and nut (9). Disconnect strap (8) from box (5) by removing screw (11), washer (10), and nut (9).

c. Cleaning. (Refer to para 3-3.)

d. Inspection. (Refer to para 3-4.)

e. Repair.

(1) Weld crack (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450).

(3) Repair straps (refer to TM 10-269).

f. *Assembly.*

(1) Connect strap (8) to box (5) and secure with screw (11), washer (10), and nut (9).

(2) Connect strap (7) to loop (6) and secure with screw (11), washer (10), and nut (9).

(3) Connect strap (1) to box (5) and secure with rivet (3) and washers (2 and 4).

g. *Installation.* (Refer to TM 9-2320-242-20.)

Section V. 4.2-INCH (XM95) MORTAR KIT

4-18 Genera I

The 4.2-inch mortar kit is installed in the carrier to provide the necessary stowage and transport facilities for the 4.2-inch mortar, mortar mount, and ammunition. The kit consists of a frame assembly, two ammunition holder assemblies, and the brackets required to mount these assemblies. The mortar mount consists of a rotator, bridge, standard, and base plate assemblies. Two lighting equipment chest-securing straps are also provided.

a. *Frame Assembly.* The frame assembly is secured to the floor and side panels of the carrier by four brackets. The frame assembly serves as a rigid stowage facility for the 4.2 mortar, mortar mount assembly, and base plate. Overcenter type clamps are provided on the frame to secure the base plate, mortar tube, and standard assembly during travel. Two removable pins secure the bridge assembly of the mortar mount to the frame.

b. *Ammunition Holder Assembly.* The kit is provided with two ammunition holder assemblies, each capable of stowing 12 rounds of ammunition for the 4.2-inch mortar. The holder assemblies are secured to bulkheads of the carrier by means of bracket assemblies.

4-19. **4.2-Inch Mortar Frame Assembly**

a. Removal. (Refer to TM 9-2320-242-20.)

b. Disassembly.

(1) Disconnect bracket (35, fig 4-39) from frame (44) by removing screw (37), washers (34 and 361. lock washer (33), and nut (32).

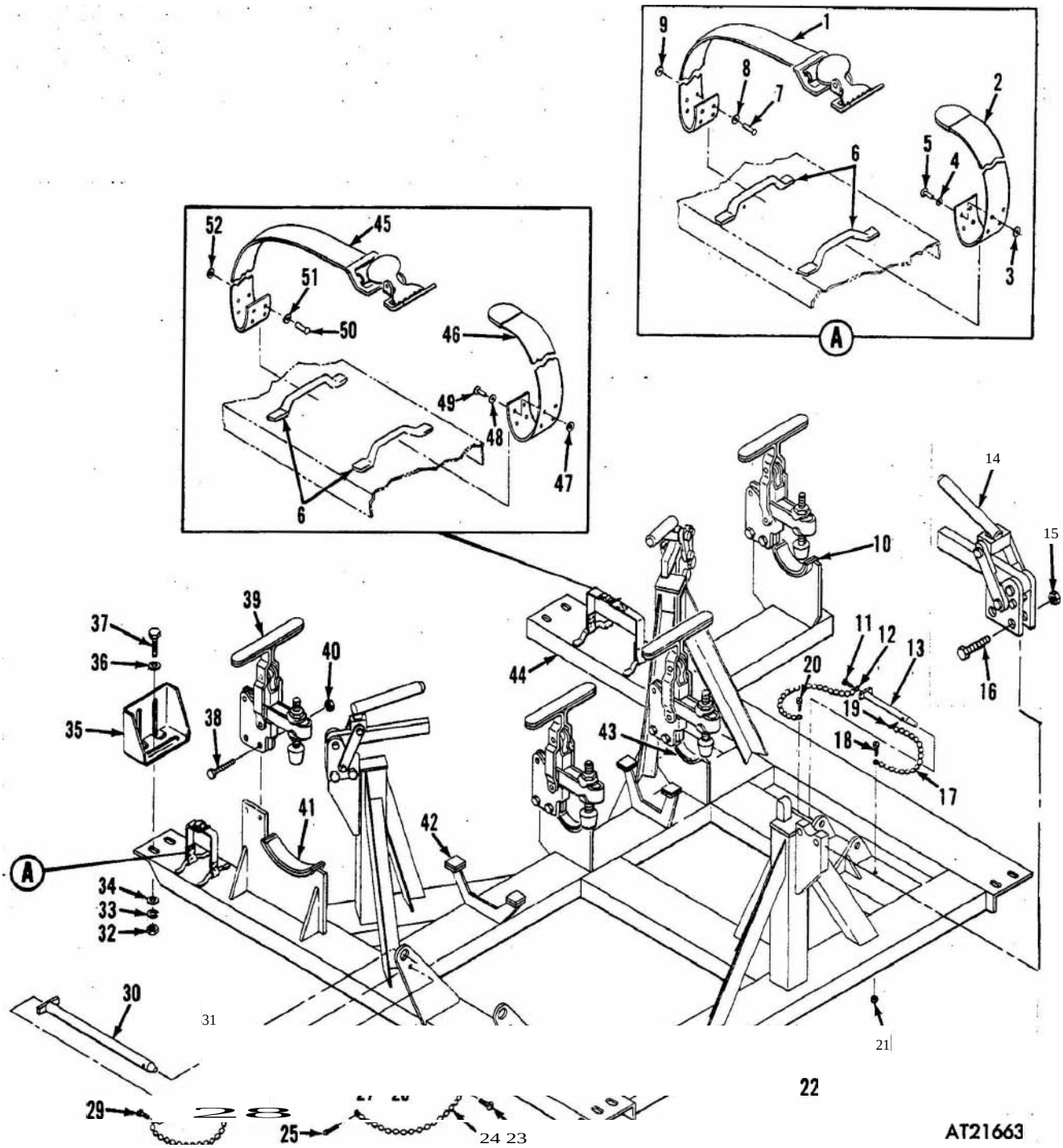


Figure 4-39. 4.2-inch Mortar frame assembly, exploded view.

LEGEND to fig 4-39:
1 - Strap
2 - Strap
3 - Washer
4 - Washer
5 - Rivet
6 - Loop
7 - Rivet
8 - Washer
9 - Washer
10 - Pad
11 - Screw
12 - Chain
13 - Pin
14 - Clamp
15 - Nut
16 - Screw
17 - Chain
18 - Screw
19 - Quick release pin
20 - Screw
21 - Nut
22 - Nut
23 - Screw
24 - Chain
25 - Quick release pin
26 - Nut
27 - Nut
28 - Chain
29 - Screw
30 - Pin
31 - Screw
32 - Nut
33 - Lock washer
34 - Washer
35 - Bracket
36 - Washer
37 - Screw
38 - Screw
39 - Clamp
40 - Nut
41 - Pad
42 - Pad
43 - Pad
44 - Frame
45 - Strap
46 - Strap
47 - Washer
48 - Washer
49 - Rivet
50 - Rivet
51 - Washer
52 - Washer

(2) Disconnect straps (1, 2, 45, and 46) from loops (6) on frame (44) by removing rivets (5, 7, 49, and 50), and washers (3, 4, 8, 9, 47, 48, 51, and 52).

(3) Remove quick release pins (19 and 25) from pins (13 and 30) and remove pins from frame (44). Disconnect chains (12 and 28) by removing screws (11, 20, 29, and 31) and nuts (22 and 27). Disconnect chains (17 and 24) by removing quick release pins (19 and 25), screws (18 and 23), and nuts (21 *and* 26).

(4) Disconnect clamps (14) by removing screw (16) and nut (15).

(5) Disconnect clamp (39) by removing screw (38) and nut (40).

(6) Remove pads (10, 41, 42, and 43).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair.*

(1) Weld cracks (refer to TM 9-237).

(2) Repair strap (refer to TM 10-269).

f. *Assembly.*

(1) Attach pads (10, 41, 42, and 43) to frame (44) with adhesive conforming to Military Specifications MIL-A-5092, type II.

(2) Connect clamp (39) to frame (44) and secure with screw (38) and nut (40).

(3) Connect clamp (14) to frame (44) and secure with screw (16) and nut (15).

(4) Connect chains (12, 17, 24, and 28) to frame (44) and secure with screws (18, 20, 23, and 31) and nuts (21, 22, 26, and 27).

(5) Attach quick release pins (19 and 25) to chains (17 and 24). Attach pins (13 and 30) to chains (12 and 28) and secure with screws (11 and 29). Insert pins (13 and 30) in holes in frame (44) and secure with quick release pins (19 and 25).

(6) Attach straps (1, 2, 45, and 46) to loops (6) and secure with rivets (5, 7, 49, and 50) and washers (3, 4, 8, 9, 47, 48, 51, and 52).

g. *Installation.* (Refer to TM 9-2320-242-20).

4-20 4.2-inch Mortar Ammunition Holder

a. Removal. (Refer to TM 9-2320-242-21)

b. Disassembly.

(1) Disconnect brackets (4 and 11, fig 4-40) from frame (14) by removing screws (12 and 16), washers (7, 10, 13, and 15), lock washers (6 and 9), and nuts (5 and 8).

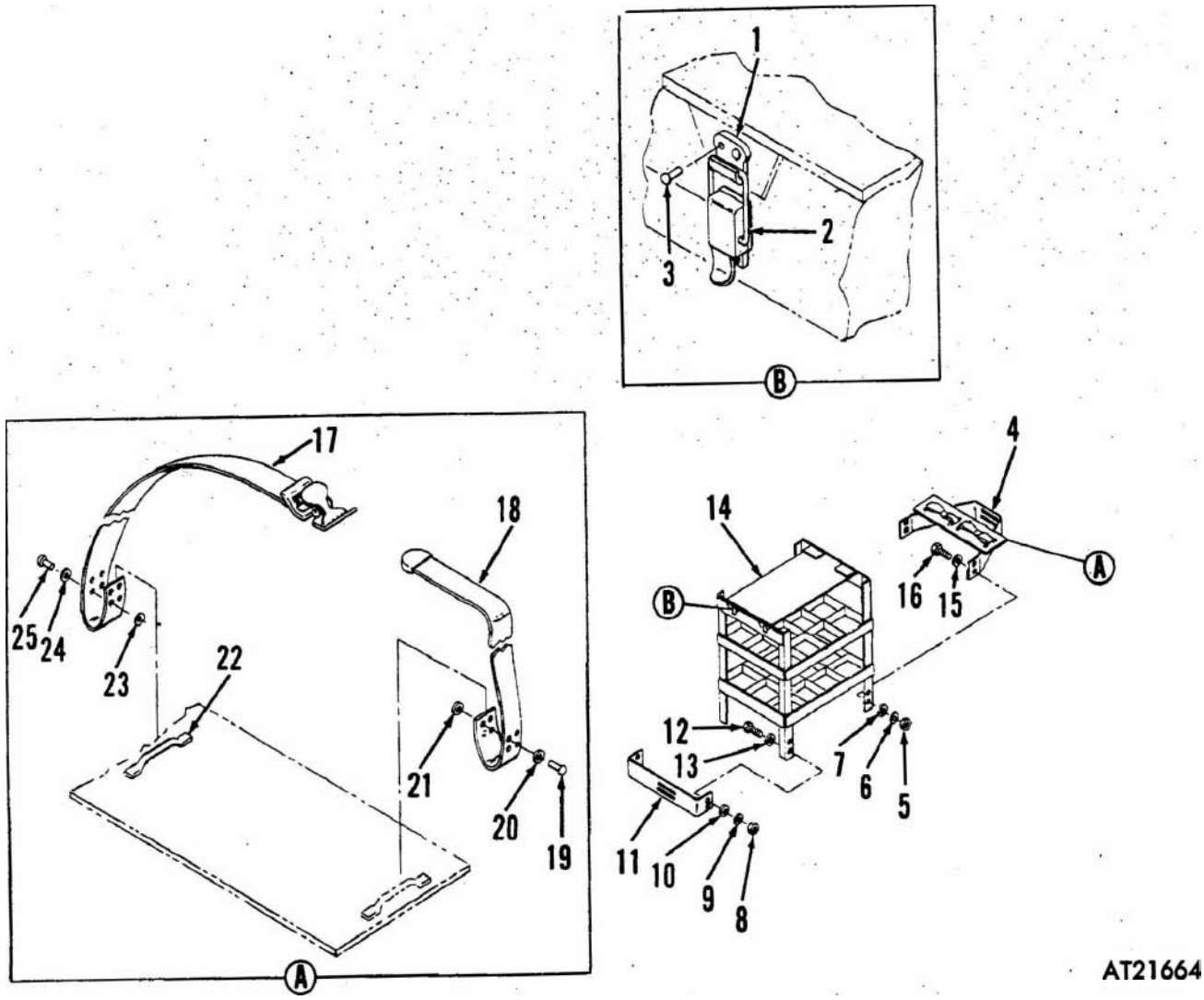


Figure 440.4.2 inch Mortar ammunition holder, exploded view.

(2) Disconnect fastners (1 and 2) front frame 14) by removing rivets (3).

(3) Disconnect straps (17 and 18) frora loops (22) by removing rivets (19 and 25) and washers (20, 21, 23, and 24).

c. *Cleaning.* (Refer to para 3-3.)

d. *Inspection.* (Refer to para 3-4.)

e. *Repair*

(1) Weld cracks (refer to TM 9-237).

(2) Re-form distorted parts (refer to TM 10-450).

(3) Repair straps (refer to TM 10-269).

f. *Assembly.*

(1) Secure straps (17 and 18) to loops (22) with rivets (19 and 25) and washers (20, 21, 23, and 24).

(2) Secure fasteners (1 and 2) to frame (14) with rivets (3).

(3) Secure brackets (4 and 11) to frame (14) with screws (12 and 16), washers (7, 10, 13, and 15), lock washers (6 and 9), and nuts (5 and 8).

g. *Installation.* (Refer to TM 9-2320-242-20.)

LEGEND to fig 4-40:

1 - Fastener
2 - Fastener
3 - Rivet
4 - Bracket
5 - Nut
6 - Lock washer
7 - Washer
8 - Nut
9 - Lock washer
10 - Washer
11 - Bracket
12 - Screw
13 - Washer
14 - Frame
15 - Washer
16 - Screw
17 - Swap
18 - Strap
19 - Rivet
20 - Washer
21 • Washer
22 • Loop
23 - Washer
24 - Washer
25 - Rivet

APPENDIX A

REFERENCES

A-1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to **materiel** covered in this manual.

Dictionary of United States Army Terms ..... AR 320-5
Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings ..... DA Pam 108-1
Military Publication Indexes (As applicable) ..... DA Pam 310-series
Military ..... FM 21-30
Military Terms, Abbreviations, and Symbols: Authorized Abbreviations and Brevity Codes ..... AR 320.50
Military Training ..... FM 21.5
Techniques of *Military* Instruction ..... FM 21-6

A-2. Forms

The following forms pertain to this materiel. (Refer to DA Pamphlet 310-2 for index of blank forms and to TM 38-750 for explanation of use.)

Recommended Changes to DA Publications ..... DA Form 2028
Maintenance Request ..... DA Form 2407
Equipment Log Book Assembly - Instruction for General Equipment ..... DA Form 2408

A-3. Other Publications

The following publications contain information pertinent of major item materiel and associated **equipment.**

a. *Camouflage.*

Camouflage, Materiels ..... TM 5-200 and FM 5-20

b. ***Decontamination.***

Decontamination ..... TM 3-220

c. *General.*

Basic Artic Manual ..... FM 31-70
Driver's Manual ..... TM 21-305
Driver's Selection and Training ..... TM 21-300
Operation and Maintenance of Army Materiel in Extreme Cold Weather (0° to -65°F) ..... TM 9.207
Lubrication of Ordance Materiel ..... TM 9-273
Operations in the Artic ..... FM 31-71
Use of Antifreeze Solutions and cleaning compounds in Engine Cooling System ..... TB 750-651

d. *Maintenance and Repair.*

Army Equipment Record Procedures ..... TM 38-750
Calibration of Measuring Tools ..... TB 750.236
Care and Maintenance of Pneumatic Tires ..... TM 9-1870-1
Cleaning of Ordance Materiel ..... TM 9-208-1
Deepwater Fording of Ordance Materiel 9-238
Direct and General Support Maintenance Manual for Engine Assembly Model GM 3-53 ..... TM 9-2815-214-34
Direct Support, General Support, and Depot Maintenance Repair parts and Special Tool Lists for Truck, Cargo, 1-¼ ton, 6x6, M561 and Truck, Ambulance: 1-¼ ton, 6x6, M792 ..... TM 9-2320-242-35P
DS, GS, and Depot Maintenance (Including Field and Depot Maintenance Rep Parts Lists) for Generator, Engine Assembly ..... TM 9-2920-225-35
Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks ..... TB ORD 1047

A-3. Other Publications - Continued

Equipment Servicability Criteria (ESC) for Truck, Cargo, 1-1/4 ton, 6x6, M561 and
ruck, Ambulance: 1-¼ ton, 6x6, M792 ..... TM 9-2320-242-ESC
General Repair for Canvas and Webbing ..... TM 10-269
Hight Capacity, ac-dc, 100-Ampere, 28-Volt Generating Systems : Test and Rebuild
of. Generating system • · TB 9.2300-206-15
Inspection, (are, and Maintenance of Antifriction Bearings ..... TM 9-214
Lubrication Order for Truck, Cargo, 1-¼ ton, 6x6, M561 and Truck Ambulance :
1-¼ ton, 6x6, M792 LO 9-2320-242-12
Materiels Used for Cleaning, Preserving, Abrading, and Cementing Ordance
Materiel and Related Materiels Including **Chemicals** ..... TM 9-247
Operation and Organizational, Field and Depot Maintenance: Storage Batterie
Lead-Acid Type ..... TM 9-6140-200-15
Operator's Manual for Truck, Cargo, 1-¼ Ton, 6x6, M561 and Truck Ambulance:
1-¼ ton, 6x6, M792, ... TM 9-2320-242-10
Operator's Manual: Welding Theory and Applications ..... TM 9-237
Drganizational Maintenance Manual for Truck, Cargo, 1-1/4 Ton, 6x6, M561 and Truck
Ambulance: 1-¼ Ton, 6x6 M792 ..... TM 9-2320-242-20
Painting Instructions for Field Use ..... TM 9-213
Sheet Metal Work; Body, Fender, and Raditor Repairs ..... TM 10-450
Use, Care, and Maintenance of Electric Motors ..... TM 9-244

APPENDIX B

TORQUE REQUIREMENTS

Specia I Torque Values

The following listed items are special torque requirements. They are torques of attaching hardware which are used for critical attachment and / or alignment of vehicle component parts. All the special torque items are listed in their appropriate paragraphs throughout the manual and listed in this appendix for the convenience of the user.

FUNC-TIONAL GROUP	OPERATION	REFERENCE (ITEM) FIG	REFERENCE PARA	TORQUE VALUE (LBS-FT.)
02	Connect isolators and isolator brackets to clutch housing with screws.	(16),24	2-8.b.(4)	55-65
07	Secure clutch gear bearing retainer and gasket to transmission *case* with screws.	(1),3-14	3-36.f.(25)	15-18
07	Secure rear bearing retainer and gasket to transmission case with screws.	(281,3-14	3-36.f.(29)	20-25
07	Secure universal joint front flange to transmission main shaft assembly with flange retainer screw.	(25),3-14	3-361(311	60.65
07	Secure cover and cover gasket to transmission case with screws.	(131,3-12	3-36.f.(45)	20-25
07	Secure eccentric shaft with nut.	3-37	3-36.g.(4)	40
08	Secure housing and shims to speedometer gear cover with screws.	(561,3-47	3-38.e.(14)	38-42
08	Secure speedometer gear cover and gasket to transfer housing with screws.	(1and3), 3-47	3-38.3. (10)	38-42
08	Secure idler shaft in transfer housing with nut.	(7),3-44	3-38.e.(23)	350-400
10	Secure ring gear to equalizer assembly with nuts.	(20),3-88	340.e.(3)	105-130
10	Secure equalizer housing with screws.	(11,3-99	3-40.e.(25)	3940
10	Secure spacer and sleeve to pinion gear with nut.	(421,3-88	3-40.e.(30)	175-250
10	Secure yoke and retainer to shaft with nut.	(2),3-141	3-42.3.(23)	175-250
10	Secure spacer and yoke to pinion gear with nut.	(11,3-166	3-44.3.(8)	175-250
11	Secure center differential output yoke to differential with nut.	(11,3-186	3-52.d.(4)	175-250
10 and 11	Tighten suspension arm mounting bracket bolts.	3-190	3-55.b.(3), 3-55.c.(3), 3-55.d.(6)	92-110
14	Secure front steering gear box cover to housing with screws.	(11),3-195	3-65.e.(3)	18-22
14	Secure front steering gear box cover to housing with screws.	(391,3-195	3-65.e.(6)	25-30
14	Secure front steering gear box housing with screws.	(34and37), 3-195	3-65.e.(8)	22-27
14	Secure front steering gear box adjustment screw with nut.	(11,3-195	3-65.f.(4)	16-20
14	Secure rear steering gear box cover and shims to housing with screws.	(11,3-212	3-66.e.(5)	18-22
14	Secure rear steering gear box cover and gasket to housing with screws.	(19),3-212	3-66.e.(8)	25-30
14	Secure rear steering gear box adjustment screw with nut.	(181,3-212	3-66.f.(4)	16-20

APPENDIX C

REPAIR AND REPLACEMENT STANDARDS

Genera l

Serviceability of a part subject to dimensional wear is determined by comparison with the statistical data provided in table C-1. To determine if a part is serviceable (within tolerance for reuse), add or subtract the maximum allowable wear dimension, as applicable, from the 'manufacturers' MIN-MAX dimensions in table C-1. To be serviceable, the part must not be worn beyond the manufacturer's dimension as altered by the maximum allowable wear dimension.

Table C-1. Repair and Replacement Standards

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear or clearance
	Min	Max	Min	Max	
TRANSMISSION:					
Shifter inner lever shaft major bearing diameter.	0.8715	0.873			0.001
Shifter inner lever shaft major bearing above diameter in top cover.	0.8750	0.8765	—		0.0005
Shifter inner lever shaft major bearing diameter running clearance in top cover.			0.002	0.005	0.0015
Shifter inner lever shaft minor bearing diameter.	0.6215	0-6230			0.0005
Shifter inner lever shaft minor bearing bore in top' cover.	0.6240	0.6255	—		0.0005
Shifter inner lever shaft minor bearing diameter running clearance to bore in top cover.			0.0010	0.0040	0.0010
Selector lever shaft bearing diameter.	0.6215	0.6230	—	—	0.0005
Selector lever shaft bearing bore diameter in top cover.	0.6240	0.6255	—		0.1)005
Selector lever shaft bearing diameter running clearance to bore in top cover.	—	—	0.001	0.004	0.0005
Shifter shafts diameter.	0.6215	0.6225	—		0.0010
Top cover shifter shafts bore diameter.	0.6240	0.6250	—		0.0005
Shifter shafts running clearance in top cover.			0.0015	0.0035	0.0005
Shifter forks and reverse shifter head shaft bore.	0.6230	0.6240	—		0.0005
Shifter forks and reverse shifter head to shifter shaft clearance.			0.0005	0.0025	0.0005
Shifter forks finger pad thickness.	0.3380	0.3430		—	0.1)010
Shifter forks finger pad alignment.	*				
Reverse shifter head span between inner lever contact fingers.	0.671	0.681		—	0.004
Reverse shifter head span between reverse shifter lever contact fingers.	0.758	0.763	—	—	0.001
Reverse shifter lever eccentric shaft hole diameter.	0.825	0.827	—	—	0.001
Reverse shifter lever coined thickness at shaft hole base.	0.227	0.232	—		0.001
Reverse shifter lever reverse shifter head contact.	0.750	0.755	—		0.001
Reverse shifter lever reverse idler gear contact.	1.117	1.122			0.001
Reverse shifter lever eccentric shaft minor diameter.	0.4965	0.4995	—		0.0005
Reverse shifter lever eccentric shaft eccentric shoulder diameter.	0.817	0.820	—		0.0045
Reverse shifter lever eccentric shaft eccentric shoulder thickness.	0.236	0.240	—		0.001
Reverse shifter lever eccentric shaft minor diameter clearance to hole in transmission case.			0.0005	0.0065	0.0010
Mainshaft second speed gear hub.	1.8134	1.8142	—	—	0.0002
First and reverse sliding gear fit on mainshaft hub (without friction ring). Fore and aft rock measured at major diameter of gear teeth.	0.010	0.020	—		0.002
First and reverse sliding gear shifter fork groove width.	0.352	0.357	—	—	0.001
Second speed gear hub length.	1.923	1.927	—		0.001

* Must pass between two parallel planes **mounted** square with shifter shaft bore in yoke and spaced 0.350 apart with yoke mounted on 0.6220-0.6225 diameter shaft.

Table *Repair and Replacement Standards - Continued*

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wow or clearance
	Min	Max	MNim	Max	
TRANSMISSION - Continued					
Second speed gear bushing inside diameter (installed in gear).	1.8152	1.8162		—	0.0005
Second speed gear bushing to mainshaft running clearance.	-	—	0.0010	0.0028	0.0005
Second speed *gear* thrust washer thickness.	0.155	0.157	—		0.0015
Second speed gear thrust washer inside diameter.	1.628	1.630			0.0005
Second speed gear thrust washer inside diameter clearance to third speed gear bushing hub on mainshaft.	—	—	0.0023	0.0048	0.0002
Third speed gear bushing inside diameter (out of gear).	1.6230	1.6238	—		0.0002
Third speed gear bushing interference fit on mainshaft.	0.0014	0.0027	—	—	0.0004
Third speed gear bushing length.	1.839	1.841	—	—	0.0001
Third speed gear bushing outside diameter when pressed on third speed gear bushing hub.	1.8995	1.9010	—	—	0.0005
Third speed gear hub length.	1.827	1.829	—	—	0.0005
Third speed gear inside diameter.	1.9025	1.9035	—	—	0.0005
Third speed gear running clearance on third speed gear bushing.	—	—	0.0015	0.004	0.0005
Third and fourth speed clutch hub length.	1.054	1.056	—	—	0.0005
Third and fourth speed clutch shifter fork groove width.	0.352	0.357	—	—	0.001
Transmission case reverse shifter lever eccentric shaft hole.	0.500	0.503	—	—	0.001
Second speed countergear hub length.	1.010	1.014	—	—	0.0005
Third speed countergear hub length.	1.123	1.127	—	—	0.0005
Reverse speed countergear hub length.	0.997	1.003	—	—	0.0005
Reverse speed countergear spacer length.	0.873	0.877	—	—	0.0005
Driven countergear hub length.	1.113	1.117	—	—	0.0005
Reverse idler gear bushing to reverse idler gear shaft.	—	—	0.0025	0.0045	0.0005
Reverse idler gear reverse shifter lever groove width.	1.1315	1.1235	—	—	0.002
Reverse idler gear bushing inside diameter (with bushing installed).	1.2455	1.2465	—	—	0.0005
TRANSFER:					
Input shaft high speed gear:					
External gear backlash.	—	—	0.0048	0.2044	—
Input shaft high speed gear bushing *inside diameter* (installed in gear).	1.6250	1.6255	—	—	0.001
Input shaft low speed gear:					
Hub length.	2.122	2.127	—	—	0.010
External gear backlash.	—	—	0.0047	0.0083	—
Width of fork groove.	0.373	0.378	—	—	0.010
High-low shifter fork:					
Shaft bore.	0.7495	0.7505	—	—	0.002
Fork opening.	2.370	2.380	—	—	0.010
High-low shifter fork shaft.	0.749	0.750	—	—	0.002
Input shaft:					
Bearing surface	1.3779	1.3784	—	—	0.001
External spline thickness.	0.1700	0.1740	—	—	0.005
High speed gear contact surface.	1.6235	1.6240	—		0.001
Intermediate shaft:					
Spline tooth thickness.	0.2530	0.2550	—	—	0.0015
Bearing contact surface.	1.3135	1.3140	—	—	0.001

Table GI. Repair and Replacement Standards - Continued

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear or clearance
	Min	Max		Max	
TRANSFER - Continued					
Intermediate ;haft highspeed gear:					
Hub lenth.	2.495	2.500			0.005
Gear backlash.			0.0049	0.0083	
Intermediate shaft lowspeed gear:.					
Hub length.	1.622	1.627			0.005
Gear backlash.			0.005	0.008	
Intermediate shaft spacer thickness.	1.070	1.075			0.005
Idler shaft:					
Minor diameter	1.4368	1.4373			0.001
Major diameter	1.8745	1.8750			0.001
Idler gear:					
Bearing bore.	2.998	2.999			0.0005
Gear backlash.			0.0049	0.0084	
Idler gear bear-shim thickness	0.996	1.015			**
Idler gear bearing shim inside diameter.	1.443	1.463			0.001
Output shaft housing:					
Major bearing bore.	3.7485	3.7495			0.0005
Minor bearing bore.	2.8735	2.8745			0.0005
Parking brake drum inside diameter.	8.995	9.015			0.060
Output gear:					
Shaft major bearing diameter.	1.9065	1.9067			0.0005
Shaft minor bearing diameter.	1.5005	1.5010			0.0005
Gear backlash.			0.0049	0.0084	
Output gear shaft spacer.	0.310	0.342			
Front axle sliding clutch *gear* fork groove width.	0.373	0.378			0.010
Differential shifter fork:					
Shifter shaft bore.	0.7495	0.7505			0.002
Fork opening.	2.245	2.255			0.010
Differential shifter fork shaft diameter.	0.7490	0.7500			0.002
Intermediate shaft cover:					
Bearing bore.	2.998	2.999			0.0005
Outside diameter.	3.499	3.500			0.001
Speedometer housing;					
Bearing bore.	2.998	2.999			0.0005
Outside diameter.	3.499	3.500			0.001
Bushing bore.	0.562	0.563			0.001
Speedometer gear shaft bushing:					
Length.	0.495	0.505,			0.005
Inside diameter	0.438	0.439			0.002
Outside diameter	0.564	0.565			0.0005
Speedometer gear shaft:					
Gear contact surface	0.3755	0.3765			0.001
Bushing contact surface.	0.4320	0.4335			0.0005
Speedometer drive gear:					
Bushing contact surface.	0.4320	0.4335			0.001
Gear backlash.			0.0020	0.0053	

** Shim set made up of 20 pieces varying 0.001 between each dash number with *a manufacturing* tolerance of ±0.0002. Thickness used should permit 0.004-0.006 end play of idler shaft gear.

+ Shim set made up of 7 pieces varying 0.005 between each dash number with a manufacturing tolerance of 0.002. Thickness used should permit 0.001-0.002 end play of output gear shaft.

Table C-1. Repair Replacement Standards – *Confirmed*

Component	Manufacturers dimensions and tolerances in inches		Desired clearance		Maximum allowable wear Or clearance
	Min	Max	Min	Max	
TRANSFER - Continued					
Speedometer drive gear bushing:					
Length.	0.495	0.505	—	—	0.005
Inside diameter,	0.438	0.439	—	—	0.002
Outside diameter.	0.564	0.565	—	—	0.0005
Oil pump plunger diameter.	0.7485	0.7490	—	—	0.0005
Oil pump housing plunger **bore.**	0.7495	0.7505		—	0.0005
Oil pump plunger spring **free** length.	1.750	--	—	—	++
Oil pump ball springs free length.	0.4844	—	—	—	++
Transfer housing:					
Input shaft minor bearing bore.	2.8344	2.8352	—	—	0.001
Input shaft major bearing bore.	3.1494	3.1502	—	—	0.001
Intermediate shaft cover bore.	3.499	3.500	—	—	0.001
Speedometer housing **bore.**	3.499	3.500	—	—	0.001
Idler shaft minor bore.	1.4358	1.4368	—	—	0.0005
Idler shaft major **bore.**	1.875	1.876	—	—	0.001
Output shaft housing bore.	5.124	5.125	—	—	0.001
FRONT DIFFERENTIAL:					
Pinion:					
Major bearing contact surface.	1.499	1.500		—	0.001
Minor bearing contact surface.	**0.9844**	0.9850		—	0.001
Spacer contact surface.	1.2425	1.2430		—	0.010
Gear backlash.		—	0.006	0.012	—
Pinion spacer:					
Outside diameter.	2.186	2.188		—	0.005
Inside diameter.	1.244	1.247		—	0.005
Pinion housing:					
Outside diameter.	3.6225	3.6265		—	0.002
Bearing bore.	3.1495	3.1510		—	0.002
Ring gear backlash.		—	0.006	0.012	—
Differential housing:					
Pinion **bearing** bore.	2.0477	2.0492	—	—	0.002
Pinion housing bore.	3.625	3.627	—	—	0.002
Propeller shaft housing **bore.**	5.250	5.252	—	—	0.002
Propeller shaft housing:					
Outside diameter.	5.248	5.249	—	—	0.002
Major bearing **bore.**	3.837	3.839	--	—	0.002
Minor bearing **bore.**	2.9527	2.9533	—	—	0.002
Propeller shaft bearing contact surface.	1.7716	1.7721	—	—	0.0015
CENTER DIFFERENTIAL:					
Input shaft:					
Minor bearing contact suface.	1.3779	1.3784		—	0.0005
Major bearing contact surface.	1.5747	1.5752		—	0.0005
Thru-shaft running **bore.**	0.7500	0.7510	—	—	0.0015
Gear spline tooth thickness..	0.1650	0.1670	—	—	0.0015
Sleeve spline tooth thickness.	0.2275	0.2295	—	—	0.010
Input gear hub length.	2.217	2.219	—	—	0.010
Pinion:					
Major bearing contact surface.	1.9385	1.9390	—	—	0.001
Minor bearing contact surface.	1.6255	1.6260	--	—	0.001
Gear contact surface	1.770	1.775	—	—	0.003
Pinion and ring gear backlash.	—	—	0.005	0.015	—

+ + Replace when spring takes a permanent set below minimum *free length.*

Table C-1. Repair and Replacement Standards - Continued

	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear or clearance
	Min	Max	Min	Max	
CANTER DIFFERENTIAL - Continued					
Input housing:					
Input shaft bearing bore.	3.1495	3.1501		—	0.002
Pinion minor bearing bore.	3.373	3.374			0.002
Pinion major bearing bore.	4.123	4.124			0.002
Differential main housing:					
Propeller shaft housing bore.	5.250	5.252	—	—	0.002
Thru-shaft bearing bore.	2.8345	2.8351	—		0.001
Truss bearing outside diameter.	7.250	7.260	—		0.005
Internal shifter shaft bore.	0.7505	0.7525		—	0.001
External shifter shaft bore.	0.8770	0.8790		—	0.001
Thru-shaft:					
Input shaft contact surface.	0.746	0.747			0.0015
Sleeve spline tooth thickness.	0.2275	0.2295		—	0.010
Bearing contact surface.	1.3779	1.3784	—		0.001
Thru-shaft engagement sleeve:					
Overall length.	1.97	2.03	—	—	0.030
Fork groove.	0.373	0.378	—	—	0.01C
Thru-shaft sleeve shifter fork:					
Fork opening.	1.870	1.880	—	—	0.010
Shaft bore.	0.7495	0.7505	—	—	0.002
Fork finger thickness.	0.358	0.363	—	—	0.010
Thru-shaft sleeve shifter fork shaft.	0.7475	0.7485	—	—	0.002
Shifter fork thickness.	0.28	0.34	—	—	0.010
Shifter shaft diameter.	0.871	0.875	—	—	0.001
Propeller shaft housing:					
Outside diameter.	5.248	5.249	—	—	0.002
Major bearing bore.	3.837	3.839	—	—	0.002
Minor bearing bore.	2.9527	2.9533	—	—	0.002
Propeller shaft bearing contact surface.	1.7716	1.7721		—	0.0015
REAR DIFFERENTIAL					
Pinion:					
Major bearing contact surface.	1.9390	1.9395	—	—	0.001
Minor bearing contact surface.	1.3140	1.3145	—	—	0.001
Spacer contact surface.	1.2425	1.2430	—	—	0.001
Gear backlash.			**0.006**	**0.012**	—
Pinion spacer:					
Inside diameter.	1.244	*1.247*	—	—	0.005
Outside diameter.	2.186	2.188		—	0.003
Pinion housing:					
Major bearing bore.	4.118	4.120	—	—	0.002
Minor bearing bore.	2.993	2.995	—	—	0.002
Ring gear. backlash.	—	—	0.006	0.012	
Differential housing propeller shaft housing bore.	5.250	5.252	—	—	0.002
Propeller shaft *housing:*					
Outside diameter.	5.248	5.249	—	—	0.002
Major bearing bore.	3.837	3.839	—	—	0.002
Minor bearing bore.	2.9527	2.9533	—	—	0.002
Propeller shaft bearing contact surface.	1.7716	1.7721	—		0.0015
EQUALIZER ASSEMBLY:					
Housings:					
Disk bore.	2.801	2.817	—	—	0.010
Bearing contact surface.	2.2535	2.2550	—	—	0.001
Bevel gears:					
Overall length.	2.590	2.650	—	—	0.010
External spline tooth thickness.	0.1690	0.1710	—	—	0.0015
Internal spline tooth thickness.	0.1560	0.1580	—	—	0.0015
Spider gear contact surface.	0.748	0.750	—	—	0.01.0
Spider pinion *gears* spider bore.	0.754	0.756	—	—	**0.005**

Table C-1. Repair and Replacement Standards - Continued

Cow	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear or clearance
	Mi				
EQUALIZER ASSEMBLY - Continued					
Bevel retaining washer:					
Thickness.	0.122	0.124			0.005
Pin hole diameter.	0202	0.208			0.002
ONT STEERING GEAR BOX:					
Worm gear:					
Backlash.	—		o		
Spline tooth thickness.	0.03,43	0.0356			0.0015
Output gear shaft:					
Bearing contact surface.	0.9995	1.000			0.002
Seal contact surface.	0.997	0.999	—	—	0.005
Gear backlash.		—	0.001	0.005	—
Output gear backlash.		—	0.001	0.005	—
Output housing bearing bore.	12495	1.2505	—	—	0.001
Steering box main housing sector shaft bushing bore.	1A985	1.4995	—	—	0.002
Sector shaft bushing inside diameter (installed in housing).	1.375	1.376		—	0.002
Sector shaft:					
Cover contact surface.	1.373	1.374	—	—	0.005
Bushing contact surface.	1.373	1.374	—	—	0.002
Gear backlash.	—	—	0.001	0.005	—
Sector shaft cover shaft contact surface.	1.3755	1.3765	—	—	0.005
'MAR STEERING GEAR BOX:					
Worm gear shaft worm *gear* contact surface.	0.884	0.888		—	0.001
Worm gear backlash.	—	—	0	0	—
Steering box main housing sector shaft bushing bore.	1.826	1.829	—	—	0.002
Sector shaft bushing inside diameter (installed inside of housing1.	1.375	1.376	—	—	0.002
Sector shaft:					
Cover contact surface.	1.373	1.374	—	—	0.005
Bushing contact surface.	1.373	1.374	—	—	0.002
Gear backlash.	—	—	0.001	0.005	—
Sector shaft cover shaft contact surface.	1.375	1.3765	—	—	0.005
NCH					
Drum:					
Overall length.	15.437	15.442	—	—	0.010
Bushing bore.	1.499	1.501	—	—	0.001
Drum shaft diameter.	1.249	1.250	—	—	0.002
Clutch housing:					
Length.	3.850	3.910	—		0.010
Bushing bore.	1.499	1.501	—	—	0.001
Shifter shaft bore.	0.752	0.754	—	—	0.002
Brake housing:					
Length.	3248	3.252	—	—	0.010
Bushing bore.	1.498	1.500	—	—	0.001
Brake cover housing bushing bore.	1.498	1.500	—	—	0.001
Worm input shaft:					
Bearing contact surface.	0.7873	0.7877	—	—	0.0005
Brake contact surface	0.748	0.749	—	—	0.001
Gear backlash.	—	—	0.003	0.012	—
Brake hub:					
Length.	1.062	1.093	—	—	0.010
Bore diameter.	0.832	0.842	—	—	0.002
Brake hub plate bore.	0.752	0.755	—	—	0.005
Brake disk bore.	0.766	0.811	—	—	0.005
Brake spring plate bore.	0.752	0.755	—	—	0.005
Worm gear backlash.	–	—	0.003	0.012	—

Table *Repair and Replacement Standards - Continued*

	Manufacturer's dimensions and tolerances *in inches*		Desired *clearance*		Maximum allowable *wear* or clearance
	Min	Max	Min	Max	
WINCH - Continued					
Wōrm gear hub bore diameter.	1.247	1.248	—	—	0.001
Drum shaft spacer thickness.	0.245	0.250	—	—	0.005
Clutch yoke:					
Shifter shaft bore.	0.750	0.752		—	0.001
Fork opening.	2.29	2.33		—	0.010
Shifter shaft diameter.	0.748	0.750		—	0.001
Jaw clutch:					
Drum shaft bore.	1.257	1.259	—	—	0.003
Fork groove.	0.406	0.421		—	0.010
Drum shaft key slot.	0.317	0.319	—	—	0.003
POWER TAKEOFF:					
Output shaft:					
Bearing contact surface.	1.1810	1.1814	—	—	0.0005
Spline tooth thickness.	0.191	0.192	—	—	0.002
Housing bearing bore.	2.4401	2A410	—	—	0.002
Clutch:					
Spline space width.	0.1940	0.1955		—	0.0005
Fork groove.	0.485	0.515	—	—	0.010
Fork shaft diameter.	0.748	0.750	—	—	0.002
Fork housing fork shaft bore.	0.751	0,752	—	—	0.001
Fork:					
Shaft bore.	0.751	0.752	—	—	0.001
Fork opening.	2282	2.342	—	—	0.010
POWER TAKEOFF DRIVE SHAFT ASSEMBLY:,					
Yoke:					
Fork opening.	1.444	1.448	—	—	0.010
Bearing bore.	0,968	0.969	—	—	0.003
Spider bearing contact surface.	0.480	0.481	—	—	0.002

APPENDIX D

TIME STANDARDS

General

Table A-1 lists the number of man-hours required under normal conditions to perform the indicated maintenance and repair for the M561 Cargo Truck and M792 Ambulance. Components are listed under the appropriate functional index. The times listed are not intended to be rigid standards. Under adverse conditions, the operations will take longer, but under ideal conditions with highly skilled mechanics, most of the operations can be accomplished in considerably less time.

Table .D-1. Time Standards

Maintenance operation	Man-hours
01 ENGINE	
010u POWER PLANT ASSEMBLY	
(to replace)	2.4
Engine assembly	
(to overhaul)	43.0
(to test)	4.6
(to replace)	8.0
Engine mounts	
(to replace)	3.0
0101 CYLINDER BLOCK	
(to overhaul)	24.0
Cylinder head	
(to overhaul)	9.5
(to replace)	3.5
Cylinder sleeve	
(to replace)	10.1
0102 CRANKSHAFT AND BEARINGS	
(to replace)	8.9
Crankshaft oil seal (front and rear)	
(to replace)	4.6
Drive pulley	
(to replace)	1.0
0103 FLYWHEEL ASSEMBLY	
(to replace)	4.4
Flywheel housing	
(to repair)	1.0
(to replace)	4.4
0104 PISTON AND CONNECTING RODS	
(to repair)	6.7
(to replace)	5.2
Rings and bearings	
(to replace)	5.2

Table D-1. Time Standards - Continued

Maintenance operation	Man-hours
0105 EXHAUST VALVES	
(to adjust)	0.5
(to replace)	2.5
(to repair)	2.5
Valve guides	
(to replace)	3.3
Rocker arm shaft	
(to replace)	L8
Rocker arm	
(to replace)	1.8
Valve seats	
(to replace)	3.6
(to repair)	4.0
0105 PUSH RODS	
(to replace)	4.1
Timing gear	
(to replace)	7.4
Camshaft and bearings	
(to replace)	10.0
0106 OIL PUMP	
(to replace)	4.9
(to repair)	2.2
Oil cooler assembly	
(to replace)	2.2
(to repair)	2.5
02 CLUTCH	
0200 CLUTCH ASSEMBLY	
Pilot bearing	
(to replace)	3.1
Clutch disk	
(to replace)	3.0
Clutch housing	
(to replace)	2.8
Pressure plate	
(to replace)	3.0
0202 CLUTCH RELEASE MECHANISM	
Release bearing	
(to replace)	2.3
Release fork	
(to replace)	2.0
Ball stud	
(to replace)	2.4
03 FUEL SYSTEM	
0306 FUEL TANK	
(to repair)	1.0
0311 COLD WEATHER STARTING AID SYSTEM	
Igniter coil	
(to replace)	0.2
Igniter plug	
(to replace)	0.1
(to test)	0.2
Harness	
(to replace)	0.3
(to test)	0.3
Lines and fittings	
(to replace)	0.5
Air pump	
(to replace)	0.2
(to test)	0.3

Table D-1. Time Standards - Continued

Maintenance operation	Man-hours
05 COOLING SYSTEM	
0501 RADIATOR	
(to test)	0.4
(to repair)	0.7
Surge tank	
(to test)	0.3
(to repair)	0.4
0502 RADIATOR SHROUD	
(to repair)	0.5
06 ELECTRICAL SYSTEM	
0601 60-AMPERE ALTERNATOR	
(to repair)	2.5
Mounting bracket	
(to repair)	0.3
0608 DIRECTIONAL SIGNAL **RELAY DISTRIBUTION BOX**	
(to repair)	0.7
0612 BATTERY	
(to repair)	1.5
07 TRANSMISSION	
0700 TRANSMISSION ASSEMBLY	
(to overhaul)	4.5
(to adjust)	0.5
0701 MAINSHAFT	
(to replace)	1.2
Countershaft	
(to replace)	0.9
Clutch gear assembly	
(to replace)	0.9
Transmission output yoke seal	
(to replace-in vehicle)	0.6
0704 TRANSMISSION TOP COVER	
(to replace-in vehicle)	0.6
(to repair)	1.4
08 TRANSFER	
0800 TRANSFER ASSEMBLY	
(to overhaul)	6.8
0801 OUTPUT SHAFT	
(to replace)	3.6
Intermediate shaft	
(to replace)	5.5
Idler shaft	
(to replace)	4.7
Transfer input yoke seal	
(to replace)	0.8
Transfer shifter shaft seals	
(to replace)	3.8
0804 OIL PUMP, LINES, AND FITTINGS	
(to replace)	0.5
10 FRONT AXLE	
1002 FRONT DIFFERENTIAL ASSEMBLY	
(to overhaul)	4.2
Vent lines and fittings	
(to replace)	0.9
Propeller shaft seals	
(to replace)	1.6
Pinion seal	
(to replace)	1.6
1004 SUSPENSION	
(to align)	1.0
11 REAR AXLE	

Table D-1.. Time Standards - Continued

Maintenance operation	Man-hours
1102 CENTER DIFFERENTIAL ASSEMBLY	
(to overhaul)	11.6
Center differential vent lines and fittings	
(to replace)	0.4
Propeller shaft seals	
(to replace)	1.1
Input yoke seal	
(to replace)	6.9
Output yoke seal	
(to replace)	6.8
Shifter shaft seal	
(to replace)	6.6
Rear differential assembly	
(to overhaul)	4.0
Rear differential vent lines and fittings	
(to replace)	0.6
Input yoke seal	
(to replace)	0.9
1104 SUSPENSION	
(m align)	1.0
12 **BRAKES**	
1202 SERVICE BRAKE SHOE	
(to repair)	0.3
Drum assembly	
(to repair)	0.3
13 WHEELS	
1313 TIRES	
(to rebuild)	1.5
14 STEERING	
1407 FRONT STEERING GEAR BOX	
(to overhaul)	2.8
(to adjust)	0.4
Rear steering gear box	
(to overhaul)	2.1
(to adjust)	0.4
15 FRAME AND TOWING ATTACHMENTS	
1503 ARTICULATION YOKE	
(to replace)	3.0
(to repair)	0.7
18 BODY, CAB, HOOD, AND HULL	
1801 RIGHT AND LEFT HAND FENDERS	
(to repair)	1.0
Windshield frame and glass	
(to repair)	0.7
Windshield frame and glass	
(to cut and replace glass)	0.8
Engine cover	
(to repair)	1.8
Console	
(to repair)	1.3
Tractor hull	
(to repair)	2.0
1806 TRACTOR SEATS	
(to repair)	1.0
1.808 STOWAGE RACK, BOWS AND STRAPS	
(to repair)	0.5
Tractor brush guard	
(to repair)	0.2
Tie down and safety straps	
(to repair)	0.3

Table D-1. Time Standards - Continued

Maintenance operation	Man-hours
1810 CARRIER AND BODY PARTS	
Troop seats	
(to repair)	0.8
Tailgate and pioneer brackets	
(to repair)	0.7
Ambulance tailgate step and bracket	
(to repair)	0.5
Carrier hull	
(to repair)	2.0
Access panels	
(to repair)	0.5
22 BODY CHASSIS OR HULL AND ACCESSORY ITEMS	
2201 CARGO TRUCK CARRIER CANOPY, FRONT CURTAIN, AND REAR CURTAIN	
(to repair)	2.0
Ambulance carrier canopy	
(to repair)	2.5
Tractor and carrier bows	
(to repair)	1.0
2202 AMBULANCE HEATER CONTROL BOX	
(to repair)	1.6
Ambulance heater	
(to repair)	1.5
(to test)	0.5
Ambulance heater mount and shroud	
(to repair)	0.6
Ambulance heater inlet duct, outlet duct, and grills	
(to repair)	1.0
Ambulance heater exhaust pipe	
(to repair)	0.5
Ambulance heater fuel pump	
(to repair)	0.4
(to test)	0.3
Ambulance heater fuel shutoff valve	
(to repair)	0.3
(to test)	0.5
Ambulance dispenser bracket assembly	
(to repair)	0.5
Ambulance attendant seat	
(to repair)	0.7
Ambulance carrier head pad assembly	
(to repair)	0.3
2205 BILGE PUMP	
(to repair)	1.6
33 SPECIAL PURPOSE KITS	
3307 100-AMPERE ALTERNATOR	
(to repair)	2.5
Regulator	
(to repair)	1.0
Winch assembly	
(to repair)	2.8
Winch power takeoff	
(to repair)	1.6
7.62 mm (M60) machinegun mounting kit	
(to repair)	1.5
81 *mm* (M29) mortar kit	
(to repair)	2.0
4.2 inch mortar kit	
(to repair)	2.1

APPENDIX E

TRANSMISSION OVERHAUL CHART

E-1. General

Table E-1 provides overhaul instructions in chart form for the transmission assembly utilized in the M561 Cargo Truck and M792 Ambulance.

a. The prime components for removal are listed in legend A. Disassembly is accomplished in the sequence of index number assigned to legend A. Reassembly is accomplished in the reverse sequence of index numbers.

b. Other components which must be removed prior to removal of prime component are listed in legend B.

c. To utilize table E-1 proceed as follows :

(1) Select **the component to be** removed in the "prime component for removal" column.

Note: Absence of numbers in the horizontal columns indicates which components may be bypassed or that the prime component may be removed alone.

(2) Move in a horizontal plane across the table, if numbers appear in the horizontal columns, trace the columns in a vertical plane to identify the components. These components must be removed in the sequence specified prior to the prime component.

E-2. Time Schedule

Table E-2 provides the time schedule required to perform each of the overhaul procedures listed in table E-1.

LEGEND A to table E-1 and E-2:

A1 - Remote shift cover assembly, cap screw and gasket
A2 - Reverse shifter head and retainer pin
A3 - Reverse shifter shaft and expansion plug
A4 - Reverse shifter shaft detent ball and spring
A5 - First and second speed shifter yoke and retainer pin
A6 - First and second speed shifter shaft and expansion plug
A7 - First and second speed shifter shaft detent ball and *spring*
A8 - Third and fourth speed shifter yoke and retainer pin
A9 - Third and fourth speed shifter shaft and expansion plug
A10 - Third and fourth speed shifter shaft detent ball and spring
All - Selector lever shaft assembly, support, and capscrew
A12 - Selector lever shaft oil seal
A13 - Shifter interlock plate compression pin, spring, and Plug
A14 - Shifter interlock plate assembly, retainer pins, and washers
A15 - Shifter inner *lever* shaft, *retainer pins, and plug*
A16 - Shifter inner lever
A17 - Shifter inner lever shaft on seal
A18 - Reverse shifter lever and eccentric shaft, nut, and lock spring
A19 - Universal joint front flange, capscrew, washer, and lock washer
A20 - Rear bearing, retainer assembly, gasket, capscrew, and lock washer
A21 - Rear bearing retainer oil seal
A22 - Mainshaft rear bearing, retainer ring, and locating ring
A23 - Clutch gear bearing retainer assembly, gasket, screw, and lock washer
A24 - Clutch gear bearing retainer oil seal
A25 - Clutch gear and bearing assembly
A26 - Mainshaft to clutch *gear* pilot bearing rollers and retainer
A27 - Clutch gear bearing, retainer pin, and locator ring
A28 - Mainshaft assembly
A29 - Third and fourth speed clutch assembly and retainer ring
A30 - Third and fourth speed clutch key retainer springs
A31 - Third and fourth speed clutch keys
A32 - Third and fourth speed clutch sleeve
A33 - Third and fourth speed clutch hub
A34 - Third speed gear synchronizer cone
A35 - Third speed gear
A36 - Third speed gear mainshaft bushing
A37 - Second speed thrust washer
A38 - Second speed gear assembly
A39 - Second speed gear synchronizer energizer springs and rivets
A40 - Second speed gear synchronizing ring and retainer plug
A41 - First and reverse sliding gear assembly
A42 - First and reverse sliding gear friction ring
A43 - First and reverse sliding gear friction ring compression strip
A44 - Mainshaft
A45 - Reverse idler gear, shaft, and retainer ring
A46 - Reverse idler gear assembly
A47 - Reverse idler gear bushing
A48 - Counter gear shaft rear bushing, retainer ring, and locating ring
A49 - Counter gear shaft rear bearing oil deflector
A50 - Counter gear shaft assembly
A51 - Counter gear shaft front bearing
A52 - Driven counter gear and retainer ring
A53 - Counter gear spacer
A54 - Reverse counter gear
A55 - Third speed counter gear
A56 - Second speed counter gear
A57 - Counter gear shaft
AS8 - Transmission cover, gasket, capscrews, and lock washers
A59 - Transmission case, fill plug, and drain plug

LEGEND B to table E-1:
B1 Remote shift cover assembly and gasket
B2 Reverse shifter head
B3 Reverse shifter shaft
B4 Reverse shifter shaft detent ball and spring
B5 First and second speed shifter yoke
B6 *First and* second speed shifter shaft
B? First and second speed shifter shaft detent ball and spring
B8 Third and fourth speed shifter yoke
B9 Third and fourth speed shifter shaft
B10 - Third and fourth speed shifter shaft detent ball and spring
B11 - Selector lever shaft assembly
B12 - *Selector lever* shaft oil seal
B13 - Shifter interlock plate compression pin and spring
B14 - Shifter interlock plate assembly
B15 - Shifter inner lever shaft
B16 - Shifter inner lever
B17 - Shifter inner lever shaft oil seal
B18 - Reverse shifter lever and eccentric shaft
B19 - Universal joint front flange
B20 - Rear bearing retainer assembly
B21 - Rear bearing retainer oil seal.
B22 - Mainshaft rear bearing
B23 - Clutch gear bearing retainer assembly
B24 - Clutch gear bearing retainer oil seal
B25 - Clutch gear and bearing assembly
B26 - Mainshaft to clutch gear pilot bearing rollers
B27 - Clutch gear bearing
B28 - Mainshaft assembly
B29 - Third and fourth speed clutch assembly
B30 - Third and fourth speed clutch key retainer spring
B31 - Third and fourth speed clutch keys
B32 - Third and fourth speed clutch sleeve
B33 - Third and fourth speed clutch hub
B34 - Third speed gear synchronizer cone
B35 - Third speed gear
B36 - Third speed gear mainshaft bushing
B37 - Second speed gear thrust washer
B38 - Second speed gear assembly
839 - Second *gear* synchronizer *energizer* springs
B40 - Second speed gear synchronizer ring
B41 - First and reverse sliding gear assemby
B42 - First and reverse sliding gear friction ring
B43 - First and reverse sliding gear friction ring compression strip
B44 - Mainshaft
B45 - Reverse idler gear shaft
B46 - Reverse idler gear assembly

LEGEND B to table E-1 - Continued

B47 - Reverse idler gear bushings n
B48 ▪ Counter gear shaft rear bearings
B49 - Counter gear shaft rear bearing oil deflector
B50 - Counter gear shaft assembly
B51 - Counter gear shaft front bearing
B52 - Driven counter gear
B53 - Counter gear *spacer*
B54 - Reverse counter gear
B55 - Third speed counter gear
B56 - Second speed counter gear
B57 - Counter gear shaft
B58 - Transmission cover

Table E-2. Transmission Overhaul Chart Time Schedule

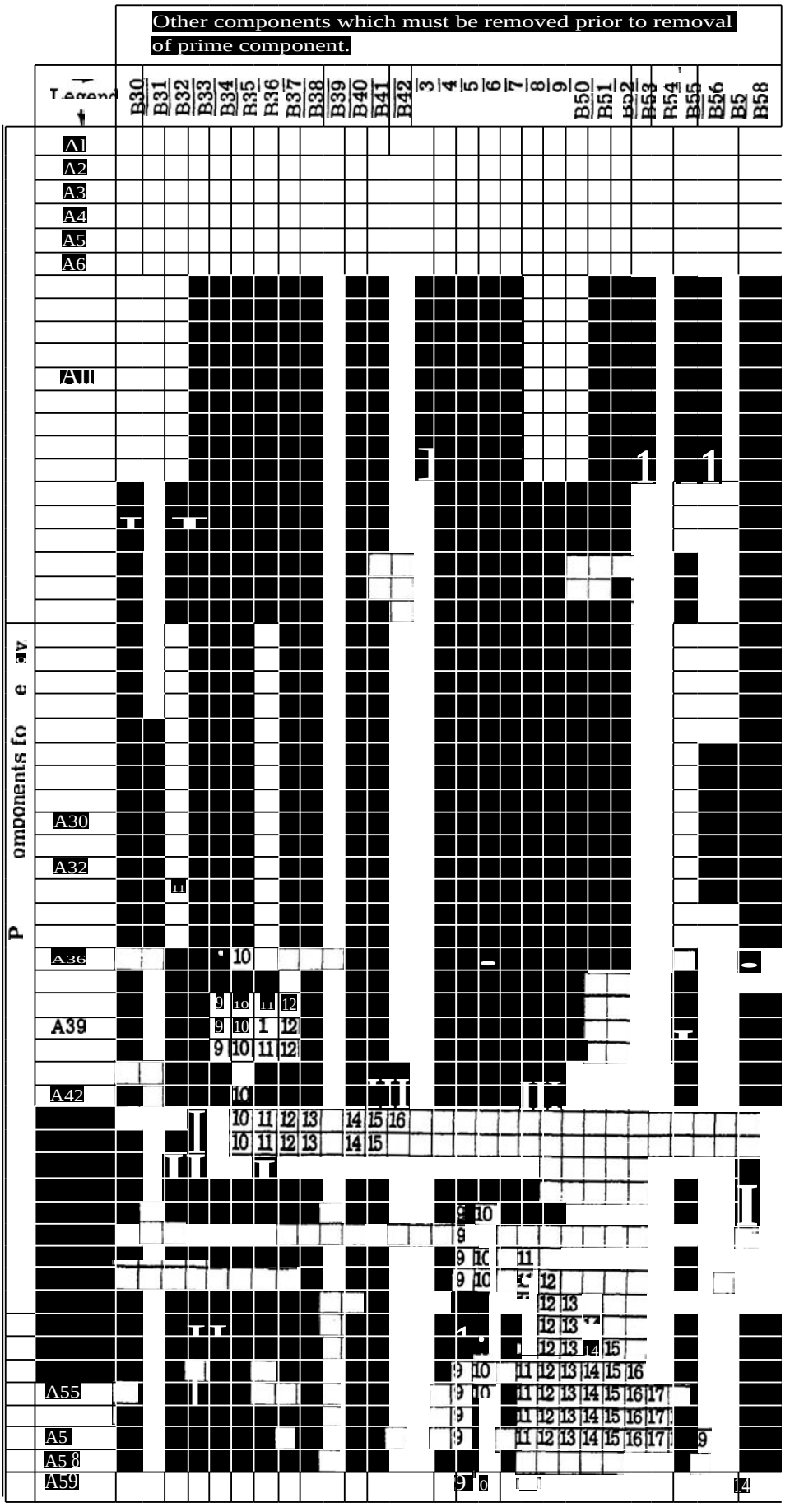
Legend	Disassembly time man-minutes: Unit	Disassembly time man-minutes: Total	Total time required to remove and replace prime components and reassemble (subassemblies removed and reassembled intact). Man-minutes	Legend	Disassembly time man-minutes: Unit	Disassembly time man-minutes: Total	Total time required to remove and replace prime components and reassemble (subassemblies removed and reassembled intact). Man-minutes
A1	2	2	6	A30	0.2	35.8	27
A2	1	3	10	A31	0.2	0.2	28
A3	1	4	11	A32	0.1	36.1	29
A4	0.1	4.1	12	A33	0.1	36.2	30
A5	1	5.1	10	A34	0.1	36.3	28
A6	1	6.1	11	A35	0.1	36.4	28
A7	0.1	6.2	12	A36	0.1	36.5	35
A8	1	7.2	10	A37	0.1	36.6	35
A9	1	8.2	11	A38	0.1	36.7	35
A10	0.1	8.3	12	A39	5	41.7	45
A11	2	10.3	23	A40	0.1	41.8	36
A12	1	11.3	25	A41	0.1	41.9	36
A13	3	13.3	35	A42	1	42.9	37
A14	0.5	13.8	5	A43	1	43.9	40
A15	3	16.8	45	A44	-	43.9	37
A16	0.2	17	45	A45	2	45.9	26
A17	1	18	47	A46	0.1	50	26
A18	2	20	6	A47	5	55	45
A19	2	22	5	A48	1	56	29
A20	2	24	5	A49	0.1	56.1	29
A21	1	25	9	A50	0.1	56.2	29
A22	2	27	20	A51	0.1	56.3	33
A23	2	29	6	A52	0.1	56.4	36
A24	1	30	10	A53	0.12	56.5	36
A25	1	31	14	A54	0.1	56.6	36
A26	1	32	20	A55	0.1	56.6	37
A27	3	35	20	A56	0.1	56.7	37
A28	0.5	35.5	22	A57	-	56.7	39
A29	0.1	35.6	27	A58	2	58.7	5
				A59	-	58.7	34

Table E-1. Transmission Overhaul Chart

Other components which must be removed prior to removal of prime component.

Legend →	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23	B24	B25	B26	B27	B28	B29
Prime component or remove																												
A1																												
A2	1																											
A3	1 2																											
A4	123																											
A5	.1																											
A6	1			2																								
A7	1			2	3																							
A8	1																											
A9	1					2																						
A10	1					2	3																					
All	1																											
A12										2																		
A13																												
A14	1											2																
A15	1											2	3															
A16	1											2	3	4														
A17	1											2345																
A18	1																											
Al9																												
A20																		1										
A21																		1										
A22	1																	2 3										
A23																												
A24																					1							
A25	1																				2							
A26	1																				2		3					
A27	1																				2		3					
A28	1																	2 3			4 5		6					
A29	1																	23			45		6			7		
A30	1																	23			45		6			7 8		
A31	1																	23			45		6			78		
A32	1																	23			45		6			78		
A33	1																	23			45		6			78		
A34	1																	2 3			4 5		6			7 8		
A35	1																	23			45		6			78		
A36	1																	2 3			4 5		6			7 8		
A37	1																	23			45		6			78		
A38	1																	23			45		6			78		
A39	1																	23			45		6			78		
A40	1																	23			45		6			78		
A41	1																	23			45		6			78		
A42	1																	23			45		6			78		
A43	1																	23			45		6			78		
A44	1																	23			45		6			78		
A45	1																234				56		7			8		
A46	1																2 3 4				5 6		7			8		
A47	1																234				56		7			8		
A48	1																234				56		7			8		
A49	1																234				56		7			8		
A50	1																234				56		7			8		
A51	1																234				56		7			8		
A52	1																234				5 6		7			8		
A53	1																234				56		7			8		
A54	1																234				56		7			8		
A55	1																234				56		7			8		
A56	1																234				56		7			8		
A57	1																234				56		7			8		
A58																												
A59	1																234				56		7			8		

Table E-l. Transmission Overhaul Chart - Continued



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