

TECHNICAL MANUAL

**DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE MANUAL
DRILL, PNEUMATIC DRIFTER;
BOOM-TYPE,
CRAWLER MOUNTED,
SELF-PROPELLED,
(JOY MODEL
RAM-MS-5/450A DR)**

NSN 3820-00-445-3766

HEADQUARTERS, DEPARTMENT OF THE ARMY

28 NOVEMBER 1975

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional. Failure to do so could cause *serious injury* to personnel.

WARNING

Should a break occur in the feed chain, the drill engine will slide down the feed and strike the centralizer, which could cause *serious injury* to the operator. While operating the rock drill the operator must always *stand in a position away from the drill*.

WARNING

The spring return mechanism on the tramming controls must operate freely at all times. Frequent and proper lubrication and cleaning of these components is an absolute necessity to insure that they will always return the valves to the completely OFF position. Malfunctioning spring return mechanism can cause unexpected tramming activity resulting in *death* or *serious injury*.

WARNING

Always make sure that the safety wire line is secured to the main air supply line before turning on the air supply. *Death* or *serious injury* could result if the hose should come loose.

WARNING

Under normal operation, the line oiler system is pressurized to 90 psi. Do not open filler cap until all air pressure has been completely eliminate-i from the air system. The cap could blow off under pressure and cause *serious injury* to personnel.

WARNING

Dry cleaning solvent, PD 680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. The flash point of solvent is 100° F.- 138° F.

CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 11 May 1992

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL

DRILL, PNEUMATIC, DRIFTER: BOOM-TYPE;
CRAWLER-MOUNTED, SELF-PROPELLED
JOY MODEL RAM-MS-5/450A DR
NSN 3820-00-445-3766

NOTE

The equipment/system described herein is non-metric and does not require metric common or special tools; therefore, metric units are not supplied. For clarity, operator and maintenance instructions will also remain non-metric.

PURPOSE

The purpose of this change is to incorporate operation and maintenance data for the 220-lb class crawler-mounted drifter drill retrofit kit.

HOW TO USE THIS CHANGE

To determine if your crawler-mounted drill is equipped with the retrofit kit, check the part number stamped on the gearbox mounting plate. If the part number is "20010", your unit is equipped with the retrofit kit. Follow the instructions included in this change package for maintenance of the feedshell assembly and drifter.

TM 5-3820-241-34, 28 November 1975, is changed as follows:

Page *i*.

Add the following to the Table of Contents immediately before Appendix A:

CHAPTER 7. MAINTENANCE INSTRUCTIONS
FOR UNITS EQUIPPED WITH RETROFIT KIT

Section I. Pneumatic System, paragraphs 7-1 – 7-2

Section II. Lift and Swing Mechanism, paragraph 7-3

Section III. Feed and Leveling Mechanism, paragraphs 7-4 – 7-6

Add the following to the Table of Contents immediately after Appendix A:

APPENDIX B. ILLUSTRATED LIST OF MANUFACTURED ITEMS

Page 2-1. Add the following references to Table 2-1:

Malfunction 1.

Step 1, Corrective Action statement. Add reference to paragraph 7-3.

Step 2, Corrective Action statement. Add reference to paragraph 7-1.

Step 3, Corrective Action statement. Add reference to paragraph 7-3.

Malfunction 2.

Step 1, Corrective Action statement. Add reference to paragraph 7-3.

Step 2, Corrective Action statement. Add reference to paragraph 7-1.

Malfunction 3.

Step 1, Corrective Action statement. Add reference to paragraph 7-1.

Step 2, Corrective Action statement. Add reference to paragraph 7-5.

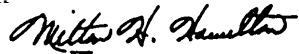
Step 3, Corrective Action statement. Add reference to paragraph 7-5.

Approved for public release; distribution is unlimited.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army

01881

Distribution:

To be distributed in accordance with DA Form 12-25-E (Block 0696) Direct and General Support maintenance requirements for TM5-3820-241-34.

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 16 April 1990

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL

DRILL, PNEUMATIC, DRIFTER: BOOM-TYPE,
CRAWLER MOUNTED, SELF-PROPELLED
JOY MODEL RAM-MS-5/450A-DR
NSN 3820-00-445-3766

TM 5-3820-241-34, 28 November 1975, is changed as follows:

Page 1-1.

Paragraph 1-2 is superseded as follows:

1-2. Maintenance Forms and Records

Maintenance forms, records, and reports which are used by maintenance personnel at all levels are listed in and prescribed by DA PAM 738-750.

Paragraph 1-3 is superseded as follows:

1-3. Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

By Order of the Secretary of the Army:

Official:

CARL E. VUONO
General, United States Army
Chief of Staff

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Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A (Block No. 0696), Direct Support and General Support maintenance requirements for Drill, Pneumatic, Drifter, Boom-Type, Crawler-Mounted, Model RAM-MS-5/450A-DR.

TECHNICAL MANUAL }
 No. 5-3820-241-34 }

HEADQUARTERS
 DEPARTMENT OF THE ARMY
 WASHINGTON, DC, 28 November 1975

**DIRECT SUPPORT AND GENERAL SUPPORT
 MAINTENANCE MANUAL
 DRILL, PNEUMATIC, DRIFTER:
 BOOM-TYPE, CRAWLER MOUNTED,
 SELF-PROPELLED, JOY MODEL RAM
 MS 5 / 450 A-DR NSN 3820-00-445-3766**

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*This manual supersedes TM 5-3820-241-34, 29 September 1971, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual contains instructions for direct and general support maintenance personnel maintaining the pneumatic rock drill as allocated by the Maintenance Allocation Chart. It provides information on the maintenance of the equipment which is beyond the scope of tools, equipment, personnel, or supplies normally available to the operator and organizational levels.

1-2. Maintenance-Forms and Records

Maintenance forms and records you are required to use are explained in TM 38-750 (The Army Maintenance Management System (TAMMS)).

1-3. Recommendation for Maintenance Publications Improvements

You can improve this manual by recommending

improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and mailing the form direct to Commander, US Army Tank-Automotive Command, ATTN: AMSTA-MSP(NMP), Warren, MI 48090. A reply will be furnished direct to you.

1-4. Equipment Serviceability Criteria

This equipment is not covered by an equipment serviceability criteria.

1-5. Destruction of Army Material to Prevent Enemy Use

Refer to TM 5-244-3 (Procedures for Destruction of Equipment to Prevent Enemy use) for information and instructions on destruction of equipment to prevent enemy use.

Section II. DESCRIPTION AND DATA

1-6. Description

A general description of the pneumatic rock drill and information pertaining to the identification plates are contained in TM 5-3820-241-12. A more detailed description of specific components and assemblies is contained in the applicable sections of this manual.

1-7. Tabulated Data

a. *General.* This paragraph contains main-

tenance data pertinent to direct support and general support maintenance personnel.

b. *Tabulated Data.* Refer to TM 5-3820-241-12 for tabulated data applicable to the pneumatic rock drill.

c. *Nut and Bolt Torque Data.* Table 1-1 lists the specific nut and bolt torque data.

Table 1-1. Nut and Bolt Torque Data

<i>Item</i>	<i>Size</i>	<i>Torque Ft-lb</i>
Transmission cover	1/2-13	45-50
Transmission to frame	1/2-13	45-50
Transmission to brake housing and air motor	1/2-13	45-50
Brake cylinder to brake housing	3/8-16	28-83
Brake cover	3/8-16	18-21
Clutch housing to transmission	3/8-16	18-21
Drive sprocket to transmission (wheel nuts)	5/8-18	300-320
Pillow block to side frame	5/8-11	75-85
Pillow block to side frame	3/4-10	125-135
Equalizer bar to equalizer arm	5/8-11	125-135
Equalizer arm to side frame	1-8	140-150
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Holler shaft to side frame (U-bolt)	1/2-13	68-73
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CHAPTER 2

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

2-1. Tools and Equipment

Tools and equipment and repair parts issued with, or authorized for the pneumatic rock drill are listed in TM 5-3820-241-34P.

2-2. Special Tools and Equipment

No special tools and equipment are required by direct and general support maintenance personnel

for performing maintenance on the pneumatic rock drill.

2-3. Maintenance Repair Parts

Repair parts and equipment authorized for direct and general support maintenance is listed in TM 5-3820-241-34P.

Section II. TROUBLESHOOTING

2-4. Introductory Information

This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop during operation of the pneumatic rock drill. Each malfunction for an individual component, unit or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective

actions to take. You should perform the tests, inspections and corrective actions in the order listed.

2-5. Troubleshooting Table

Table 2-1 lists the direct and general support maintenance troubleshooting malfunctions, tests, inspections and corrective actions.

Table 2-1 Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1 DRILL MOTOR IS INOPERATIVE	Step 1. Check for gummed oil or dirt in motor operating parts.	Disassemble and clean drill motor (para 5-10, 5-12).
	Step 2. Check for defective feed control valve.	Replace feed control (para 5-13, 5-16).
	Step 3. Check for defective drill motor repair or replace drill motor (para 5-9, 5-12).	
2 DRILL OPERATES SLUGGISHLY OR ERRATICALLY	Step 1. Check for gummed oil or dirt in drill operating parts.	Disassemble and clean drill motor (para 5-10, 5-12).
	Step 2. Check for defective feed control valve.	Repair or replace feed control valve (para 5-14, 5-16).
3 DRIFTER DRILL FAILS TO TRAVEL ON CARRIAGE OR TRAVELS TOO SLOW	Step 1. Check for defective feed control valve.	Replace feed control valve (para 5-14, 5-15).
	Step 2. Check for defective feed transmission.	Repair or replace feed transmission (para 5-6, 5-8).
	Step 3. Check for defective feed motor.	Repair or replace feed motor (para 5-2, 5-4).
4 TRAMMING MOTORS FAIL TO TRAM ROCK DRILL OR TRAM TOO SLOW	Step 1. Check for defective tramping throttle valve.	Repair or replace throttle valve (para 4-10, 4-12).
	Step 2. Check for defective tramping motor final drive.	Repair or replace final drive (para 6-6, 6-8).

Table 2-1. Troubleshooting-continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 3. Check for defective tramming motors.	Repair or replace tramming motor (para 6-2, 6-4).
5 AIR MOTOR INOPERATIVE OR OPERATES TOO SLOW	Step 1. Check for defective air pressure regulator.	Repair air pressure regulator (para 4-6, 4-8).
	Step 2. Check for defective air motor.	Repair or replace air motor (para 4-2, 4-4).
6 HYDRAULIC SYSTEM INOPERATIVE OR OPERATES ERRATICALLY	Step 1. Check for defective control valve.	Repair or replace control valve (para 5-14, 5-16).
	Step 2. Check for defective hydraulic pump.	
	Step 3. Check for defective air motor.	Check for defective hydraulic pump.
7 FEED EXTENSION CYLINER WILL NOT OPERATE	Step 1. Check for defective feed control valve.	Repair or replace feed control valve (para 5-14, 5-16).
	Step 2. Check for defective feed extension cylinder (para 3-14, 3-16).	Repair or replace feed lift (para 3-14, 3-16).
8 BOOM LIFT CYLINDER WILL NOT OPERATE	Step 1. Check for defective boom lift control valve.	Repair or replace boom lift control valve (para 5-14, 5-16).
	Step 2. Check for defective boom lift cylinder.	Repair or replace boom lift cylinder (para 3-5, 3-7).
9 FEED SWING CYLINDER WILL NOT OPERATE	Step 1. Check for defective feed swing control valve.	Repair or replace feed swing control valve (para 5-14, 5-16).
	Step 2. Check for defective feed swing cylinder.	Repair or replace feed swing cylinder (para 3-8, 3-10).
10 BOOM SWING CYLINDER WILL NOT OPERATE	Step 1. Check for defective boom swing control valve.	Repair or replace boom swing control valve (para 5-14, 5-16).
	Step 2. Check for defective boom swing cylinder.	Repair or replace boom swing cylinder (para 3-11, 3-13).
11 FEED EXTENSION CYLINDER WILL NOT OPERATE	Step 1. Check for defective feed extension control valve.	Repair or replace feed extension control valve (para 5-14, 5-16).
	Step 2. Check for defective feed extension cylinder.	Repair or replace feed extension cylinder (para 3-14, 3-16).
12 TILT OR SWING ACTION IS INOPERATIVE	Step 1. Check for defective tilt or swing control valve.	Repair or replace control valve (para 5-14, 5-16).
	Step 2. Check for defective air motor.	Repair or replace air motor (para 4-2, 4-4).
	Step 3. Check for defective hydraulic pump.	Repair or replace hydraulic pump (para 3-18, 3-20).
	Step 4. Check for defective tilt or swing cylinder.	Repair or replace tilt cylinder (para 3-2, 3-4), feed swing cylinder (para 3-8, 3-10), or boom swing cylinder. (para 3-11, 3-13).
13 LIFT INOPERATIVE OR ERRATIC	Step 1. Check for defective control valve.	Repair or replace hydraulic control valve (para 3-22, 3-24).
	Step 2. Check for defective hydraulic pump.	Repair or replace hydraulic pump (para 3-18, 3-20).
	Step 3. Check for defective motor.	Repair or replace air motor (para 4-2, 4-4).
	Step 4. Check for defective swing cylinder.	Repair or replace swing cylinder (para 3-8, 3-10).
14 DRIFTER DRILL FAILS TO TRAVEL ON CARRIAGE OR TRAVELS TOO SLOW	Step 1. Check for defective feed motor.	Repair or replace feed motor (para 5-10, 5-12).
	Step 2. Check for defective drill motor.	Repair or replace feed motor (para 5-10, 5-12).
	Step 3. Check for defective feed control valve.	Repair or replace feed control valve (para 5-14, 5-16).
	Step 4. Check for defective feed transmission.	Repair or replace feed transmission (para 5-6, 5-8).

Section III. GENERAL MAINTENANCE INSTRUCTIONS

2-6. General

a. This section provides general cleaning, inspection, and repair instructions that are common to components used with the pneumatic rock drill.

b. Special cleaning, inspection and repair instructions applicable to any individual component is covered with that component in the applicable sections of this manual.

2-7. General Cleaning Instructions

a. Metal Parts.

(1) Prior to removal or disassembly of major components, clean off excess oil or dirt with a cleaning solvent (Fed Spec P-D-680) or steam clean.

(2) Use a cleaning solvent (Fed Spec P-D-680) to clean metal parts and hardware.

(3) Use brushes to clean irregular shaped surfaces: Use wooden pegs to clean ports and orifices. Use a lint free cloth to wipe parts clean.

(4) Exercise care when handling machined and polished surfaces to avoid nicks and other damage. Do not immerse more than one metal machined part in solvent at the same time unless such parts are separated or protected from contacting each other.

b. *Cables.* Wipe cables clean with a cloth dampened with cleaning solvent (Fed Spec P-D-680).

2-8. General Inspection Instructions

a. *General.* Perform an inspection of all parts as soon as possible after cleaning. Instructions for specific inspection procedures are included in the text at the point in overhaul procedures where the inspection must be performed.

b. *Visual Inspection.* Visually inspect all machined and polished areas. Use a strong light to shine across polished surfaces to inspect for scoring, cracks, breaks or excessive wear.

2-9. General Repair Instructions

a. *Thread Repair.* Use the proper size tapping tool to repair tapped holes. Discard and replace all hardware that has defective threads.

b. Press Fit Parts.

(1) Bushings may require the use of pneumatic or hand operated arbor press.

(2) Preheat all press-fit parts before reassembly if specified. Use a lubricant if necessary to reduce abrasive action.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

2-10. General

This section contains instructions for removal and installation of major components of the pneumatic rock drill assembly to facilitate the repair and overhaul procedures. Complete repair and overhaul instructions are covered in subsequent sections of this manual.

2-11. Tilt and Swing Boom Assembly Removal

a. Refer to TM 5-3820-241-12 and remove the

feed control valve and feed assembly from the trunnion.

b. Attach a suitable hoist with at least 2,000 lbs capacity and remove the tilt and swing boom assembly in numerical sequence as illustrated in figure 2-1.

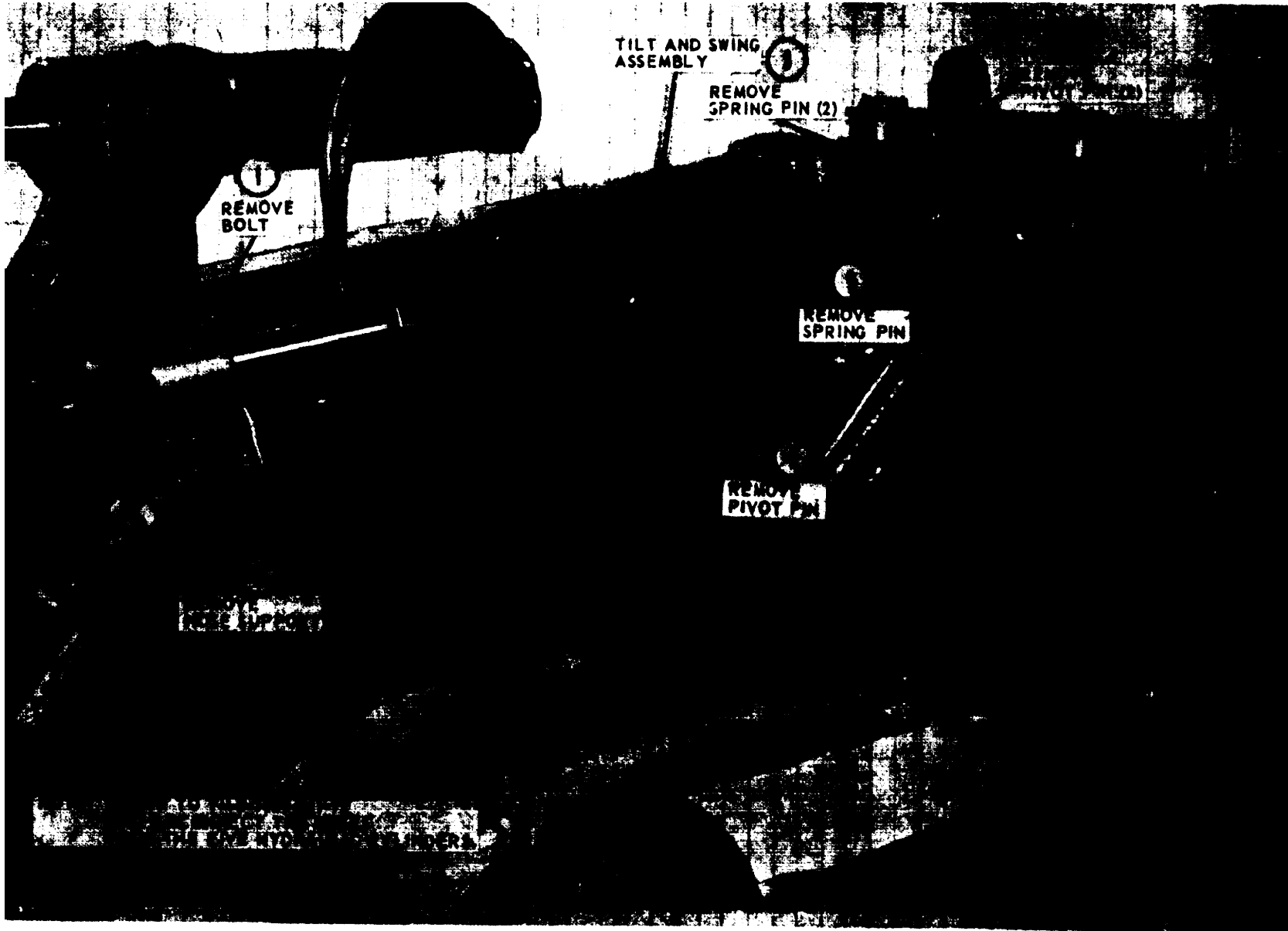


Figure 2-1. Tilt and swing boom assembly removal and installation.

2-12. Tilt and Swing Boom Assembly Installation

a. Attach a suitable hoist with at least a 2,000 lb capacity and install the tilt and swing boom assembly in the reverse of numerical sequence as illustrated in figure 2-1.

b. Refer to TM 5-3820-241-12 and install the feed control valve and feed assembly.

2-13. Tramming Motor Removal

a. Refer to LO 5-3820-241-12 and drain the tramming motor.

b. Remove the tramming motor in numerical sequence as illustrated in figure 2-2.

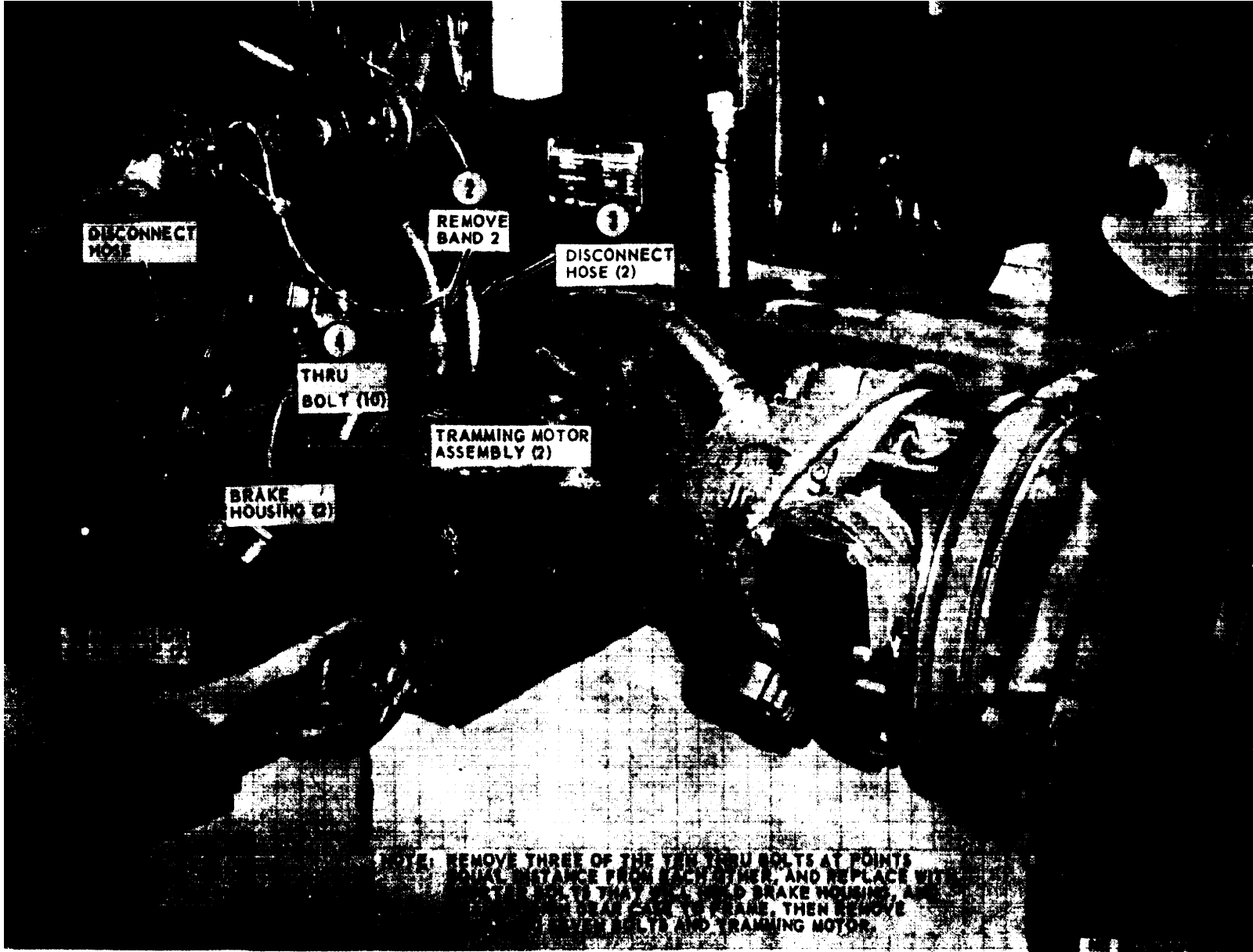


Figure 2-2. Trimming motor, removal and installation.

2-14. Trimming Motor Installation

a. Install the trimming motor assembly in the reverse of numerical sequence as illustrated in figure 2-2.

b. Refer to LO 5-3820-241-12 and service motor.

2-15. Crawler Track Removal

a. Refer to TM 5-3820-241-12 and release the track tension by opening the relief fitting.

b. Remove the rock drill crawler track in numerical sequence as illustrated in figure 2-3.

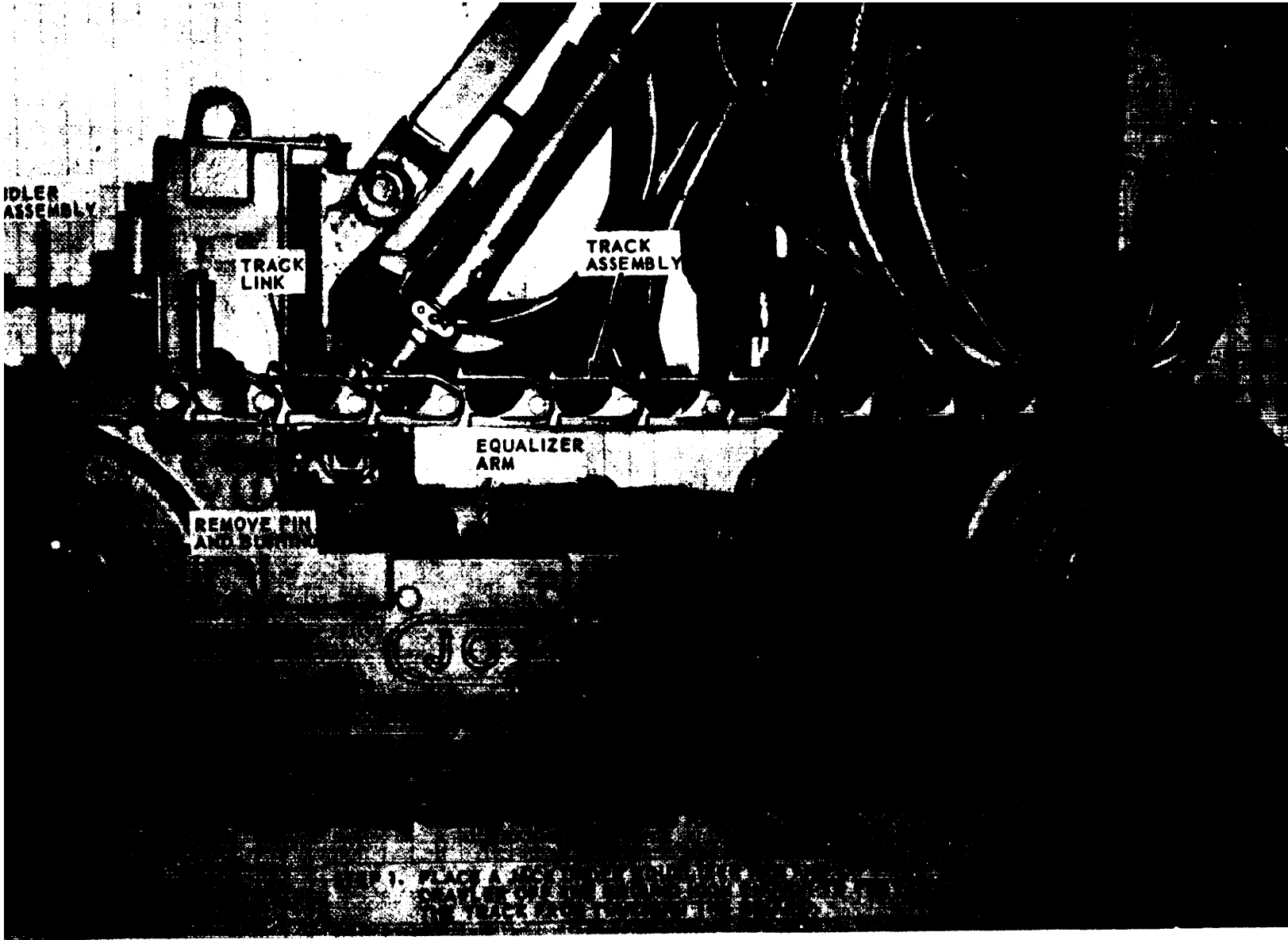


Figure 2-3. Rock drill crawler track, removal and installation.

2-16 Crawler Track Installation

a. Install the rock drill crawler track in the reverse of numerical sequence as illustrated in figure 2-3.

b. Refer to TM 5-3820-241-12 and adjust the crawler track tension.

2-17. Tramming Transmission and Brake Housing Removal

a. Remove the crawler track assembly (para 2-15).

b. Remove the tramming transmission and brake housing in numerical sequence as illustrated in figure 2-4.



Figure 2-4. Tramming transmission removal and installation (sheet 1 of 2).

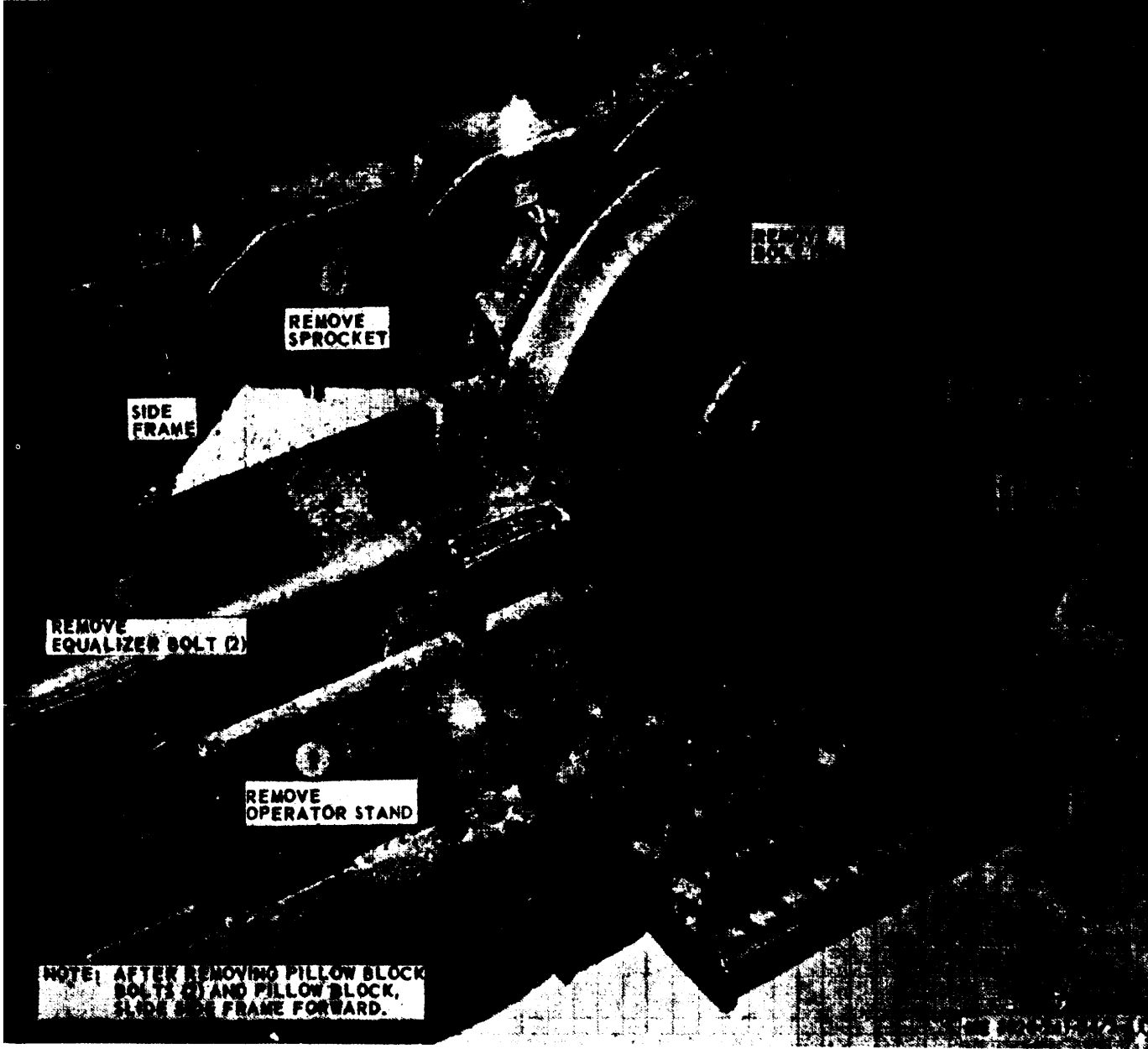


Figure 2-4. Trimming transmission, removal and installation (sheet 2 of 2).

2-18. Tramming Transmission and Brake Housing Installation

a. Install the tramming transmission and brake housing in the reverse of numerical sequence as illustrated in figure 2-4.

b. Install the crawler tracks (para 2-16).
c. Refer to LO 5-3820-241-12 and service the rock drill.

CHAPTER 3

MAINTENANCE OF THE HYDRAULIC SYSTEM

Section I. HYDRAULIC CYLINDERS

3-1. General

The pneumatic rock drill is equipped with five hydraulic cylinders, one each for feed lift, boom lift, feed swing, boom swing, and feed extension. All hydraulic cylinders are double acting and self-locking when not in operation. Additional protection is provided by pilot check valves that prevent cylinder movement, except when intended or in the event of line breakage.

3-2. Feed Tilt Cylinder Removal and Disassembly

a. Removal.

- (1) Lower the rock drill feed mechanism to rest on the ground.
- (2) Loosen hose connections and allow hydraulic oil to bleed into a container.
- (3) Remove the feed tilt cylinder in numerical sequence as illustrated in figure 3-1.

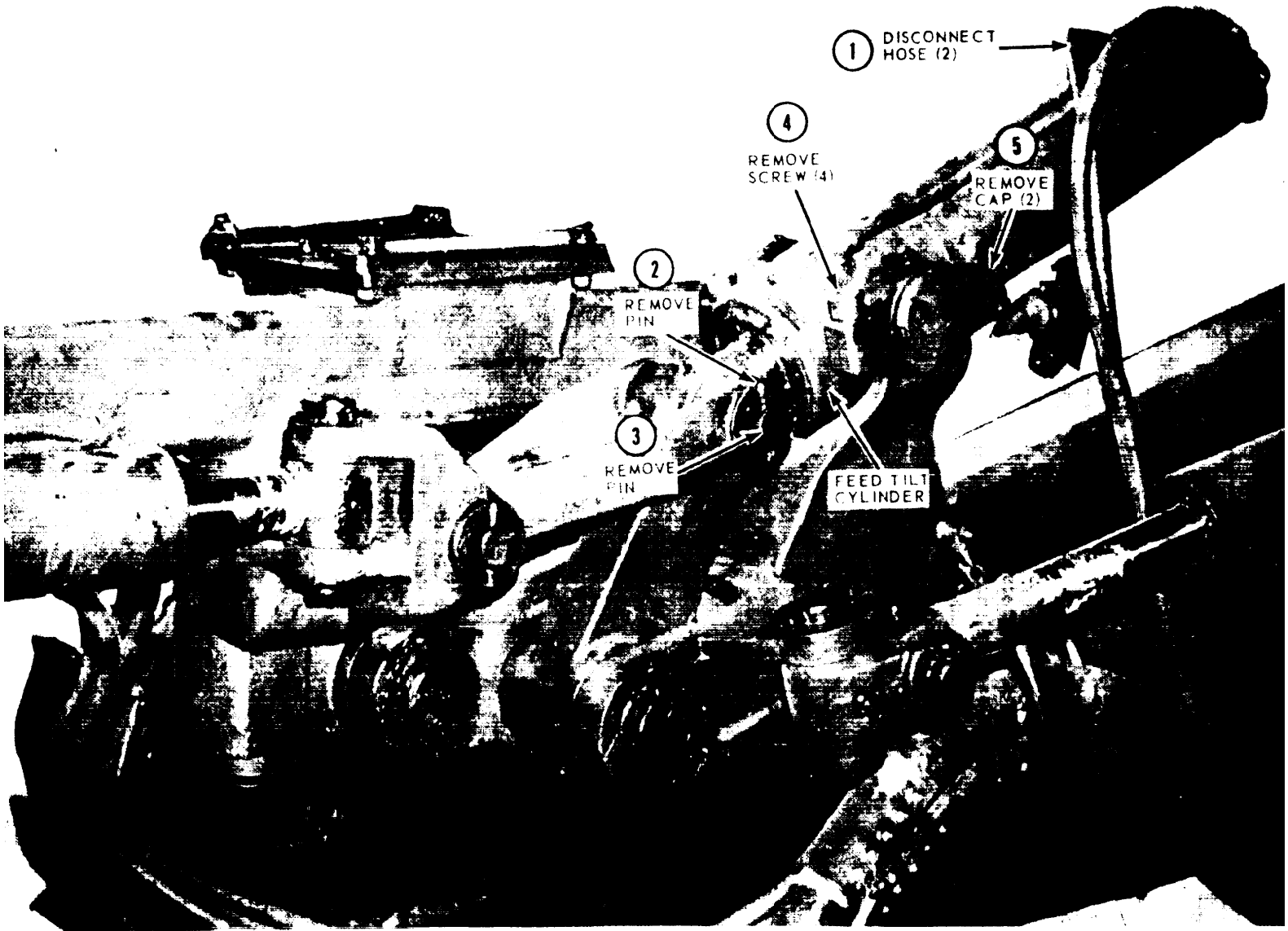
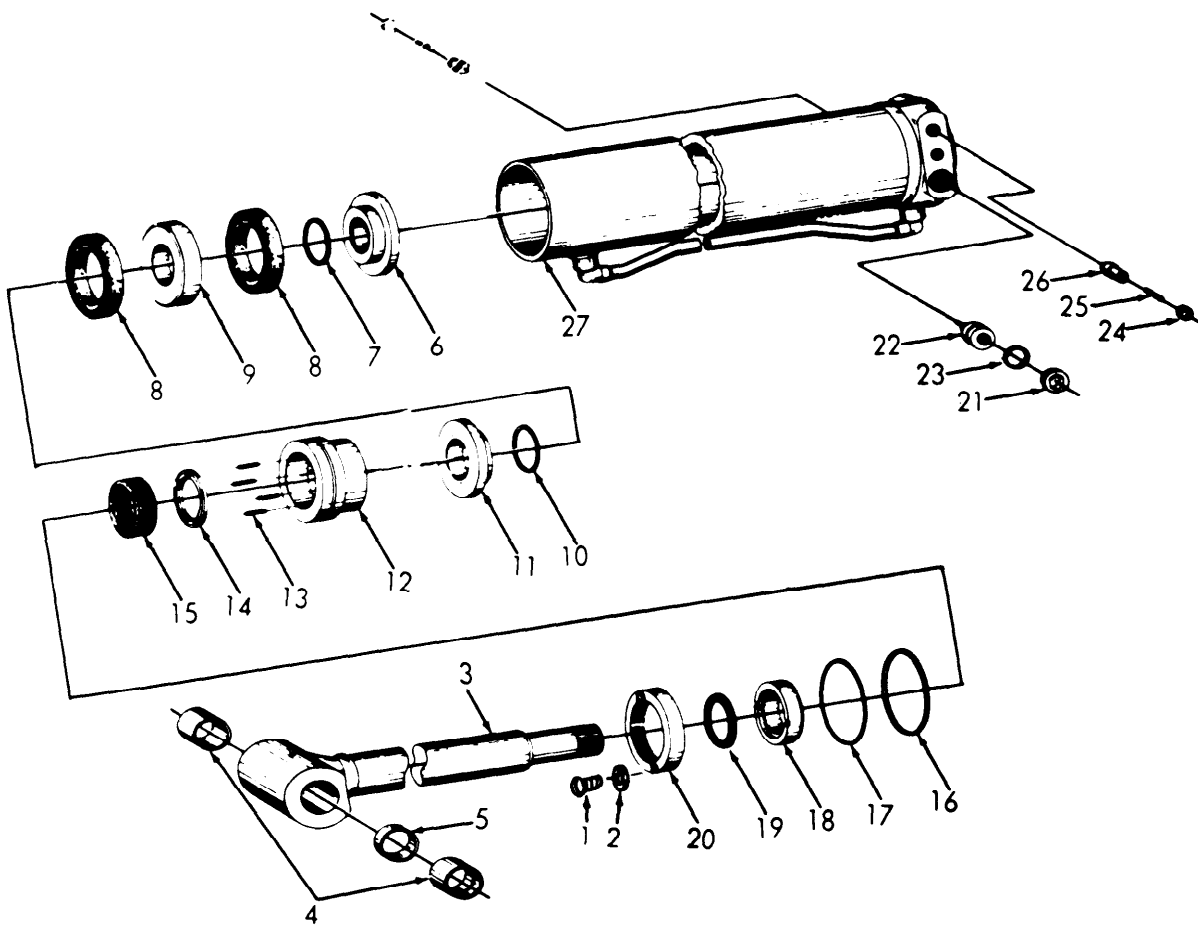


Figure 3-1. Feed tilt cylinder, removal and installation.

b. Disassembly.

(1) Disassemble the feed tilt cylinder in numerical sequence as illustrated in figure 3-2.



ME 3820-241-34/3-2

Figure 3-2. Feed tilt cylinder, disassembly and reassembly.

Legend for Fig. 3-2:

1 Hex head capscrew	15 V-packing
2 Lockwasher	16 O-ring
3 Piston rod assembly	17 Back up ring
4 Piston rod bushing	18 Gland nut
5 Piston rod spacer	19 Rod wiper
6 Backing plate	20 Retaining ring
7 O-ring	21 Pipe plug
8 U-cup	22 Piston check pilot
9 Piston	23 Piston ring
10 O-ring	24 Pipe plug
11 Backing plate	25 Spring
12 Cylinder head	26 Poppet
13 Spring	27 Barrel assembly
14 Male adapter	

(2) Use a suitable drift and drive out bushings (4) and spacers (5).

3-3. Feed Tilt Cylinder Cleaning, Inspection and Repair

a. Cleaning.

(1) Wash all parts except O-rings and packings with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace O-rings and packings.

b. Inspection and Repair.

(1) Inspect the piston and rod for bent condition, scratches or dents.

(2) Inspect the barrel bore for deep dents or scoring.

(3) Inspect all threaded areas for damaged threads.

(4) Inspect the piston check pilot for excessive wear or other damage.

(5) Inspect the remaining parts for excessive wear or other damage.

(6) Repair by replacement of all defective parts.

3-4. Feed Tilt Cylinder, Reassembly and Installation

a. Reassembly.

(1) Reassemble the feed tilt cylinder in the reverse of numerical sequence as illustrated in figure 32.

(2) Align the holes in spacer (5) with the hole in the piston rod (3). Lubricate and press spacer (5) and bushings (4) into position.

b. Installation.

(1) Install the feed tilt cylinder in reverse of numerical sequence as illustrated in figure 3-1.

(2) Refer to LO 5-3820-241-12, service the hydraulic reservoir.

3-5. Boom Lift (Cylinder Removal and Disassembly)

a. Removal.

(1) Lower the boom to rest on the ground, Loosen hose connections and allow hydraulic oil to bleed into a drain pan.

(2) Remove the boom lift cylinder in numerical sequence as illustrated in figure 3-3.

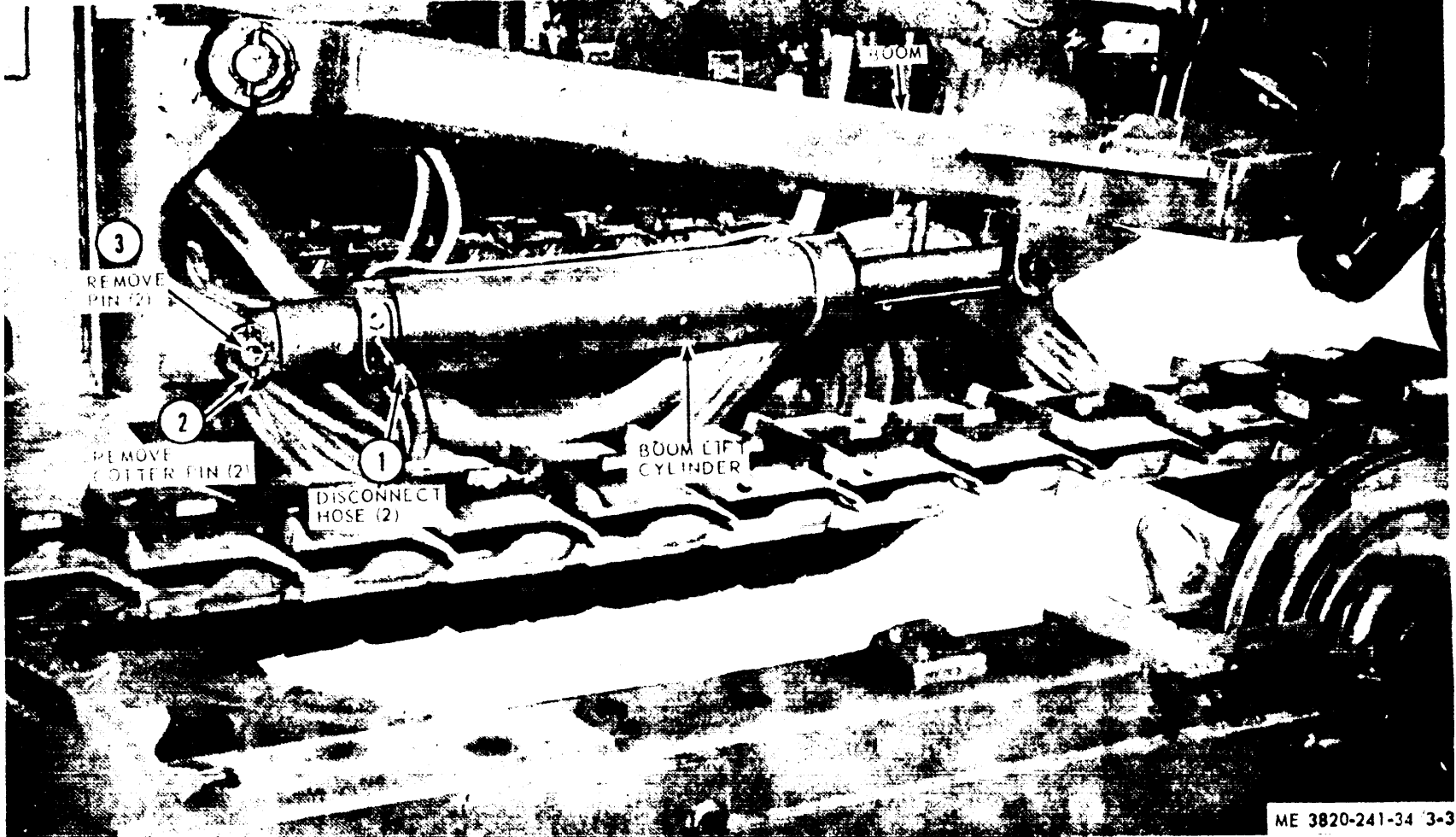
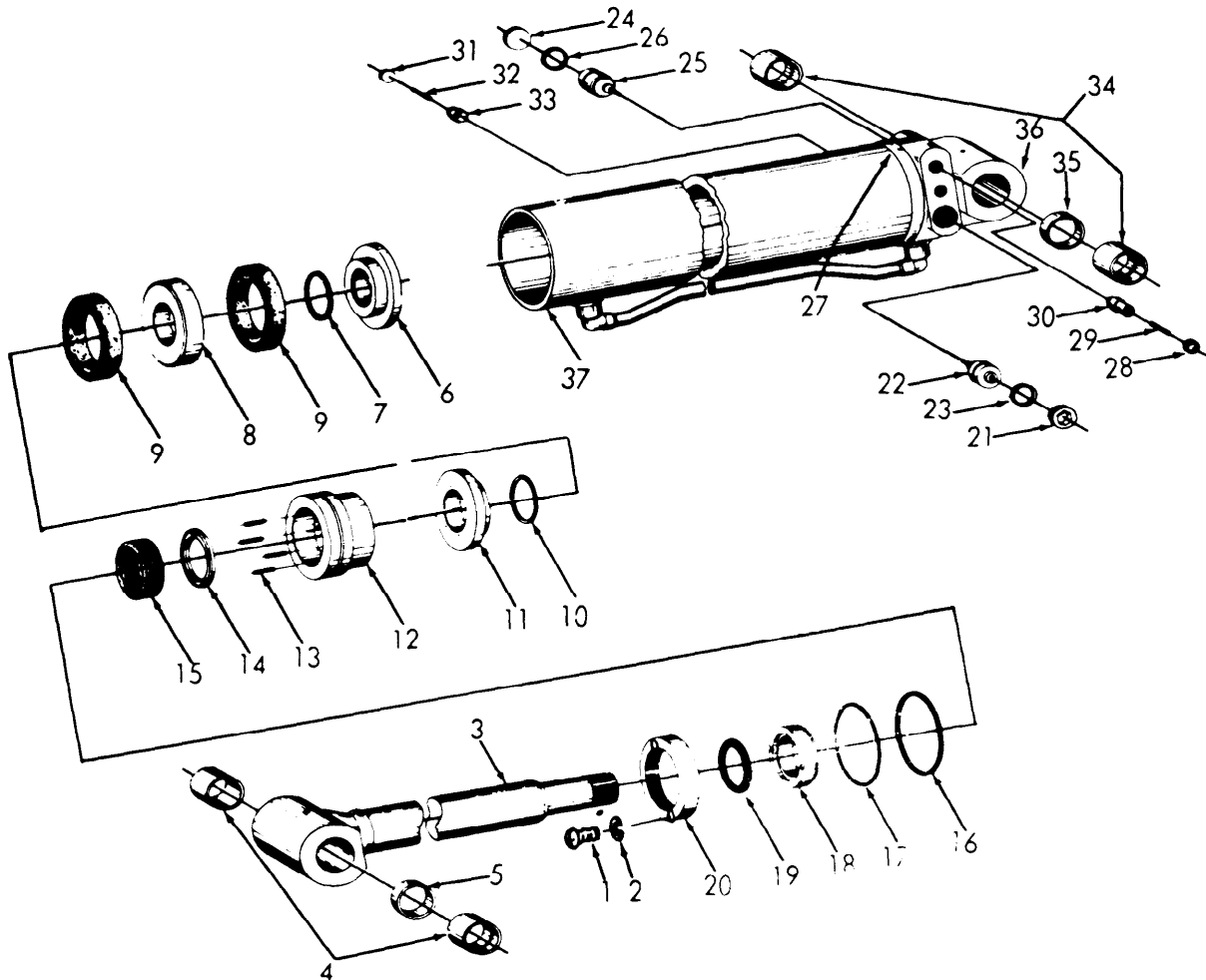


Figure 3-3. Boom lift cylinder, removal and installation.

b. Disassembly.

(1) Disassemble the boom lift cylinder in numerical sequence as illustrated in figure 3-4.



- | | | | |
|------------------------|--------------------|-----------------------|----------------------|
| 1 Button head capscrew | 10 O-ring | 19 Rod wiper | 28 Pipe plug |
| 2 Lockwasher | 11 Backing plate | 20 Retaining ring | 29 Spring |
| 3 Piston rod assembly | 12 Cylinder head | 21 Pipe plug | 30 Poppet |
| 4 Piston rod bushing | 13 Spring | 22 Pilot check piston | 31 Pipe plug |
| 5 Piston rod spacer | 14 Male adapter | 23 Piston ring | 32 Spring |
| 6 Back up plate | 15 Packing | 24 Pipe plug | 33 Poppet |
| 7 O-ring | 16 O-ring | 25 Pilot check piston | 34 Head cap bushing |
| 8 Piston | 17 Back up ring | 26 Piston ring | 35 Head cap spacer |
| 9 U-cup | 18 Gland nut | 27 Pipe plug | 36 Cylinder head cap |
| | 37 Barrel assembly | | |

ME 3820-241-34/3-4

Figure 3-4. Boom lift cylinder, disassembly and reassembly.

(2) Use a suitable drift to drive out bushings (4 and 34) and spacers (5 and 35).

3-6. Boom Lift Cylinder Cleaning, Inspection and Repair

Clean, inspect and repair the boom lift cylinder in a similar manner as outlined in paragraph 3-3.

3-7. Boom Lift Cylinder, Reassembly and Installation

a. Reassembly.

(1) Reassemble the boom lift cylinder in the reverse of numerical sequence as illustrated in figure 3-4.

(2) Align the holes in spacers (5 and 35) with holes in the piston rod and head cap. Lubricate and press spacers (5 and 35) and bushings (4 and 34) into position.

b. Installation.

(1) Install the boom lift cylinder in reverse of numerical sequence as illustrated in figure 3-3.

(2) Refer to LO 5-3520-241-12 and service the hydraulic reservoir.

3-8. Feed Swing Cylinder, Removal and Disassembly

a. Removal.

(1) Lower the rock drill boom to rest on the ground. Loosen hose connections and allow oil to bleed into a suitable container.

(2) Remove the feed swing cylinder in numerical sequence as illustrated in figure 3-5.

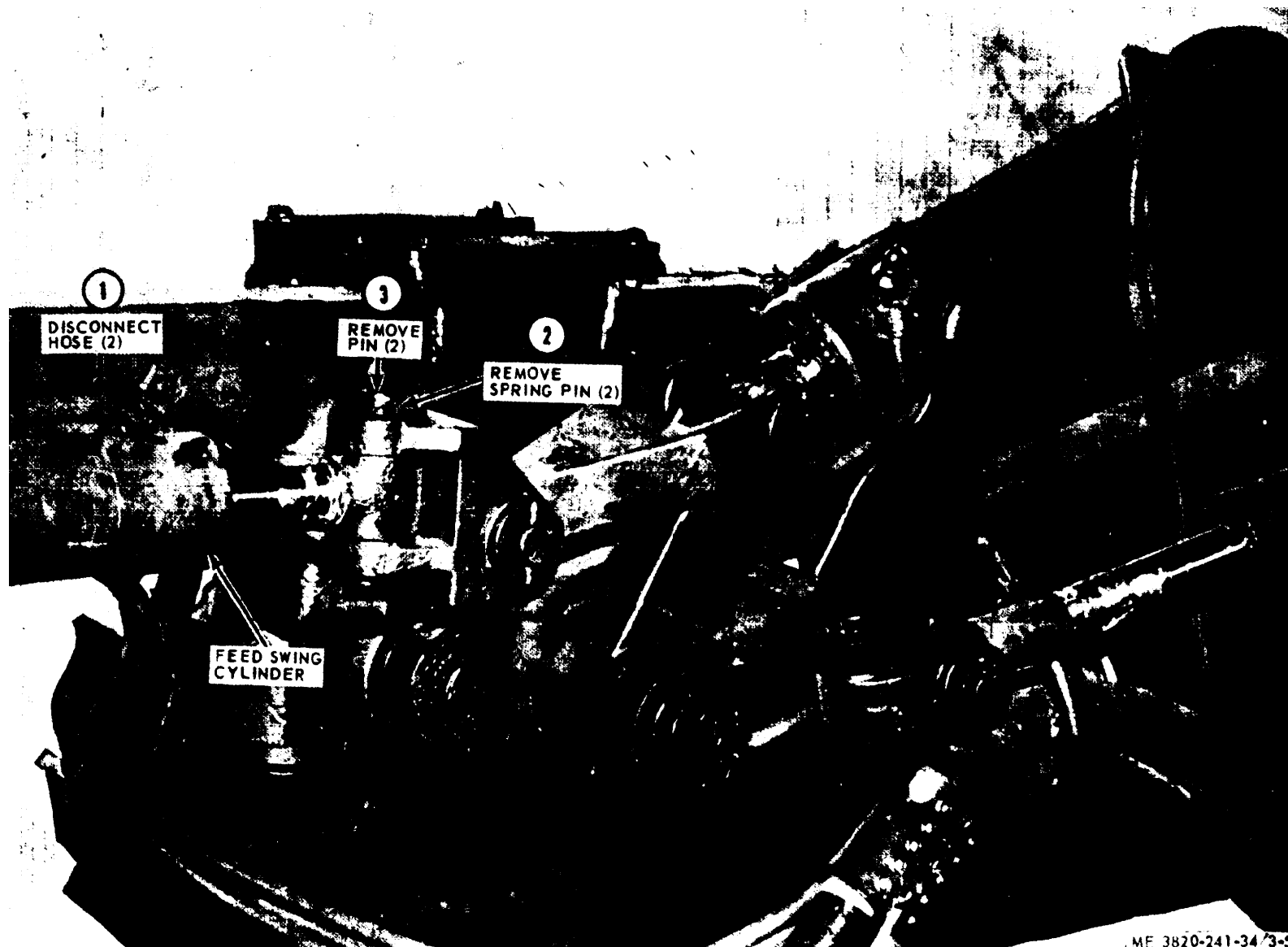
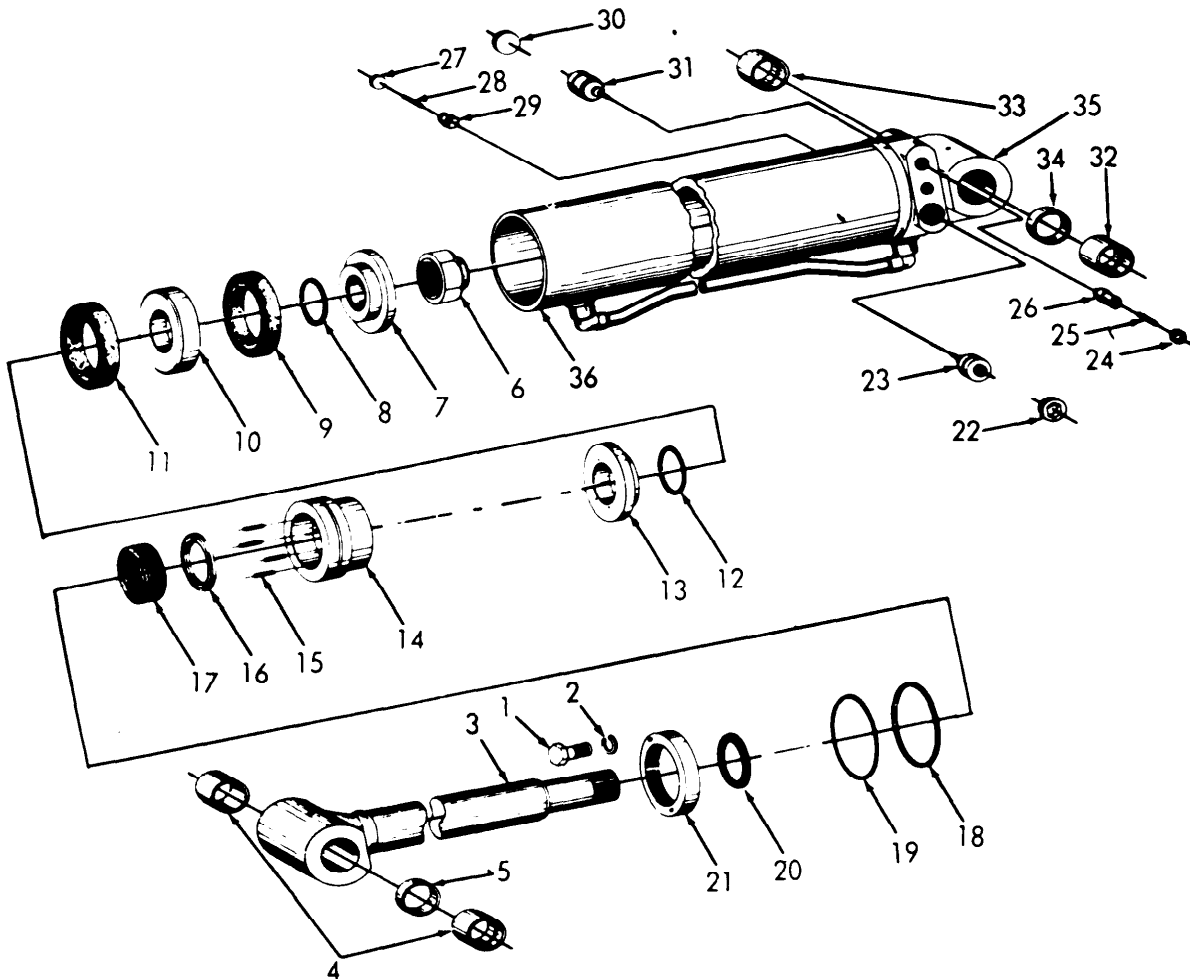


Figure 3-5. Feed swing cylinder, removal and installation.

b. Disassembly.

(1) Disassemble the feed swing cylinder in numerical sequence as illustrated in figure 3-6.



ME 3820-241-34/3-6

- | | | | |
|------------------------|-------------------------|-----------------------|-----------------------|
| 1 Button head capscrew | 10 Piston | 19 Back up ring | 28 Spring |
| 2 Lockwasher | 11 U-cap | 20 Gland nut | 29 Poppet |
| 3 Piston rod assembly | 12 O-ring | 21 Rod wiper | 30 Pipe plug |
| 4 Rod end bushing | 13 Backing plate | 22 Pipe plug | 31 Pilot check piston |
| 5 Rod end spacer | 14 Cylinder head | 23 Pivot check piston | 32 Bushing |
| 6 Lock nut | 15 Cylinder head spring | 24 Pipe plug | 33 Bushing |
| 7 Backing plate | 16 Male adapter | 25 Spring | 34 Spacer |
| 8 O-ring | 17 Packing | 26 Poppet | 35 Barrel head |
| 9 U-cup | 18 O-ring | 27 Pipe plug | 36 Barrel assembly |

Figure 3-6. Feed swing cylinder, disassembly and reassembly.

(2) Use a suitable drift to drive out bushings (2 and 33) and spacers (3 and 34).

3-9. Feed Swing Cylinder Cleaning, Inspection and Repair

Clean, inspect and repair the feed swing cylinder in a similar manner as outlined in paragraph 3-3.

3-10. Feed Swing Cylinder Reassembly and Installation

a. Reassembly.

(1) Reassemble the feed swing cylinder in the reverse of numerical sequence as illustrated in figure 3-6.

(2) Align the holes in spacers (5 and 34) with the holes in piston rod (3) and barrel head (35). Lubricate and press spacers (5 and 34) and bushings (4, 32, and 33) into position.

b. Installation.

(1) Install the feed swing cylinder in reverse of numerical sequence as illustrated in figure 3-5.

(2) Refer to LO 5-3820-241-12 and service the hydraulic reservoir.

3-11. Boom Swing Cylinder Removal and Disassembly

a. Removal.

(1) Lower the boom to rest on the ground. Loosen cylinder hose connections and allow the hydraulic oil to bleed into a suitable container.

(2) Remove the boom swing cylinder in numerical sequence as illustrated in figure 3-7.

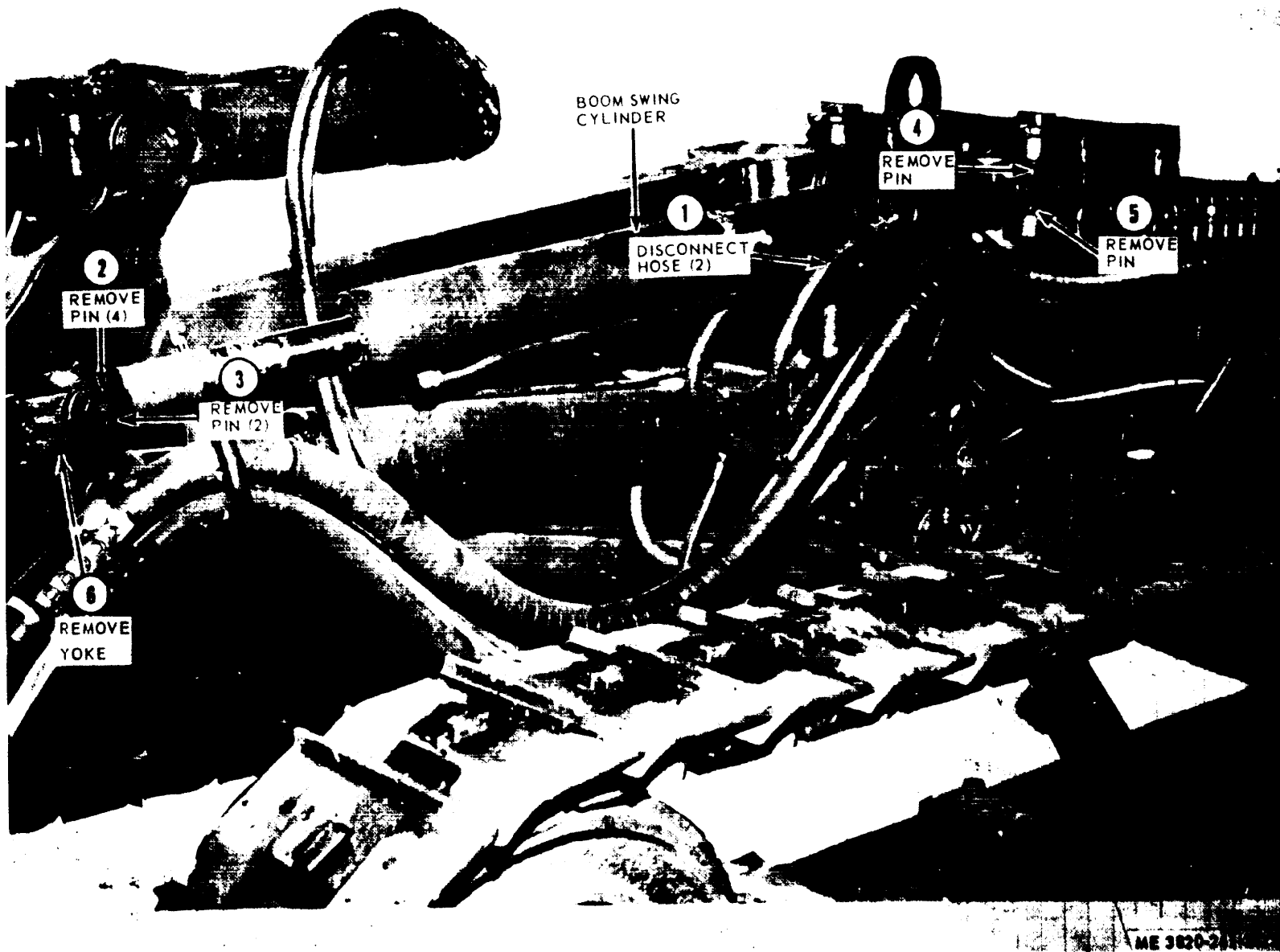
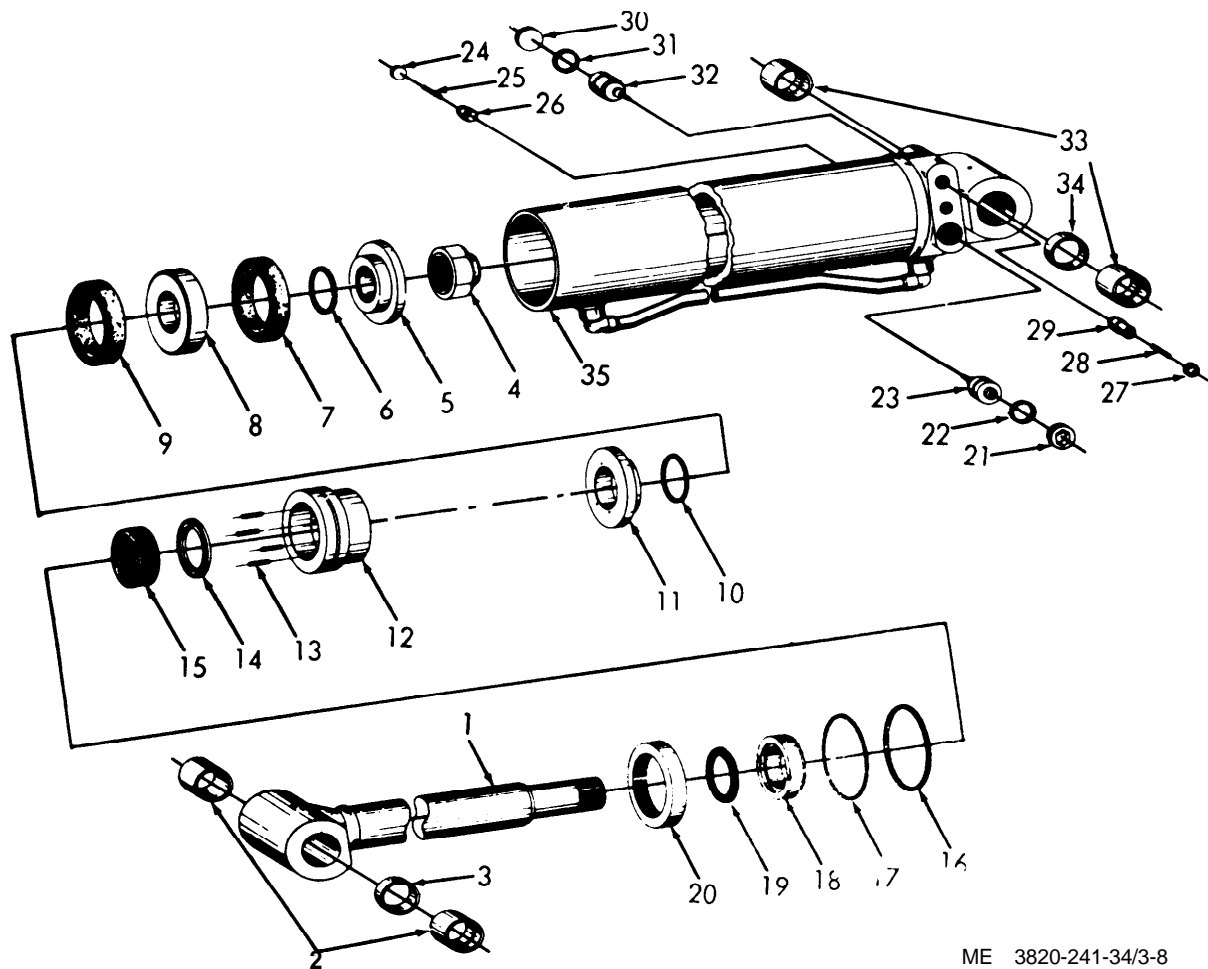


Figure 3-7. Boom swing cylinder, removal and installation.

b. Disassembly.

(1) Disassemble the boom swing cylinder in numerical sequence as illustrated in figure 3-8.



ME 3820-241-34/3-8

- | | | | |
|-----------------------|------------------|-----------------------|-----------------------|
| 1 Piston rod assembly | 10 O-ring | 19 Wiper rod | 28 Spring |
| 2 Piston rod bushing | 11 Backing plate | 20 Ring retainer | 29 Poppet |
| 3 Piston rod spacer | 12 Cylinder head | 21 Pipe plug | 30 Pipe plug |
| 4 Lock nut | 13 Spring | 22 Piston ring | 31 Piston ring |
| 5 Backing plate | 14 Male adapter | 23 Pilot check piston | 32 Pilot check piston |
| 6 O-ring | 15 V-packing | 24 Pipe plug | 33 Barrel bushing |
| 7 U-cup | 16 O-ring | 25 Spring | 34 Barrel spacer |
| 8 Piston | 17 Back up ring | 26 Poppet | 35 Barrel assembly |
| 9 U-cup | 18 Gland nut | 27 Pipe plug | |

Figure 3-8. Boom swing cylinder, disassembly and reassembly.

(2) Use a suitable drift and drive out bushings (2) and (33) and spacers (3) and (34).

3-12. Boom Swing Cylinder Cleaning, Inspection and Repair

Clean, inspect and repair the boom swing cylinder in a similar manner as outlined in paragraph 3-3.

3-13. Boom Swing Cylinder, Reassembly and Installation

a. Reassembly.

(1) Reassemble the boom swing cylinder in

the reverse of numerical sequence as illustrated in figure 3-8.

(2) Align the holes in spacers (3) and (34) with holes in piston rod (1) and barrel assembly (35). Lubricate and press spacers (3) and (34) and bushings (2) and (33) into position.

b. Installation.

(1) Install the boom swing cylinder in the reverse of numerical sequence as illustrated in figure 3-7.

(2) Refer to LO 5-3820-241-12 and service the hydraulic reservoir.

3-14. Feed Extension Cylinder, Removal and Disassembly

a. Removal.

(1) Refer to TM 5-3820-241-12 and operate the rock drill to place the feed mechanism in a

horizontal position. Collapse cylinder with feed extension control and block the cylinder with wood blocks to prevent it from falling.

(2) Refer to TM 5-3820-241-12 and remove the rock drill feed mechanism.

(3) Remove the feed extension cylinder in numerical sequence as illustrated in figure 3-9.

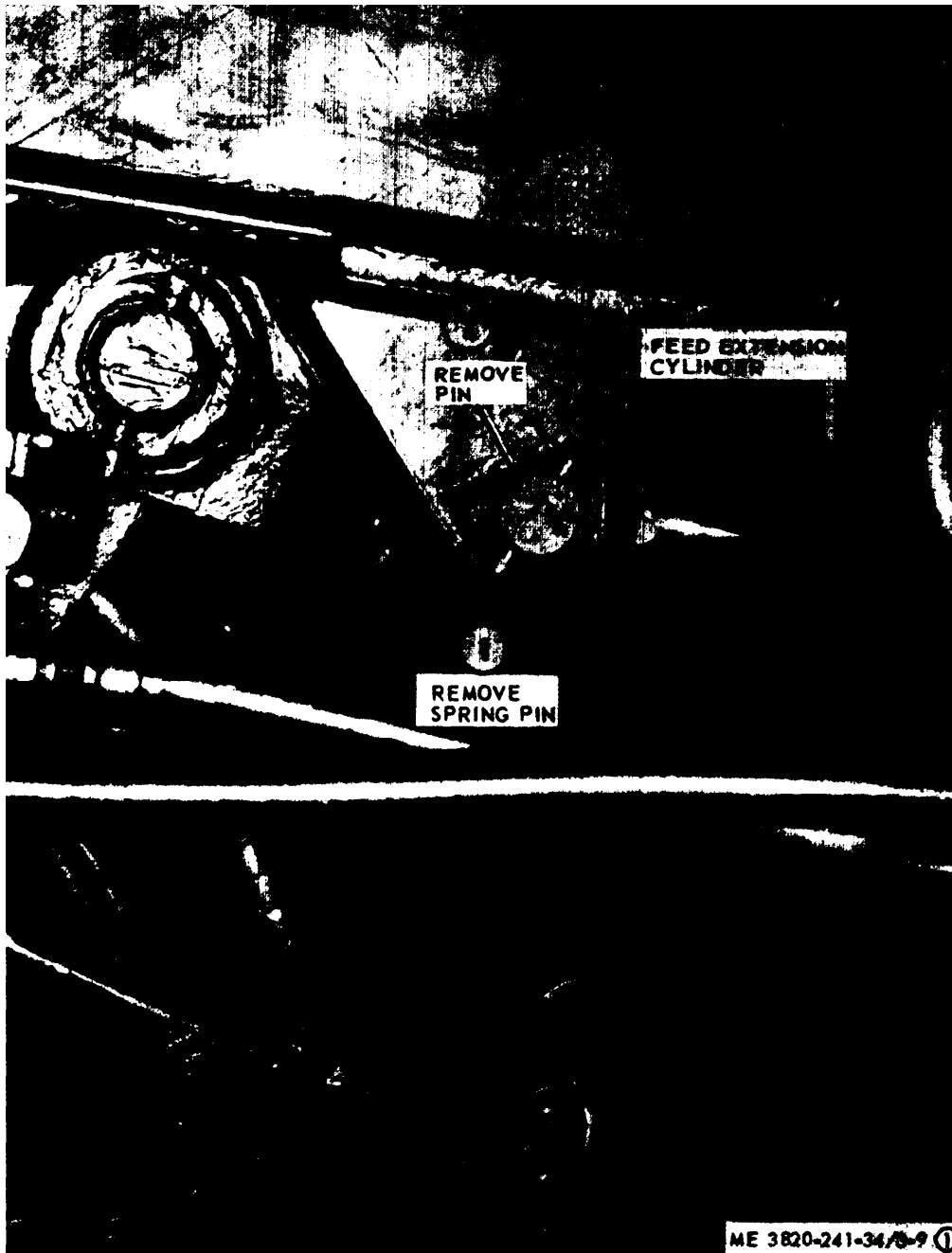
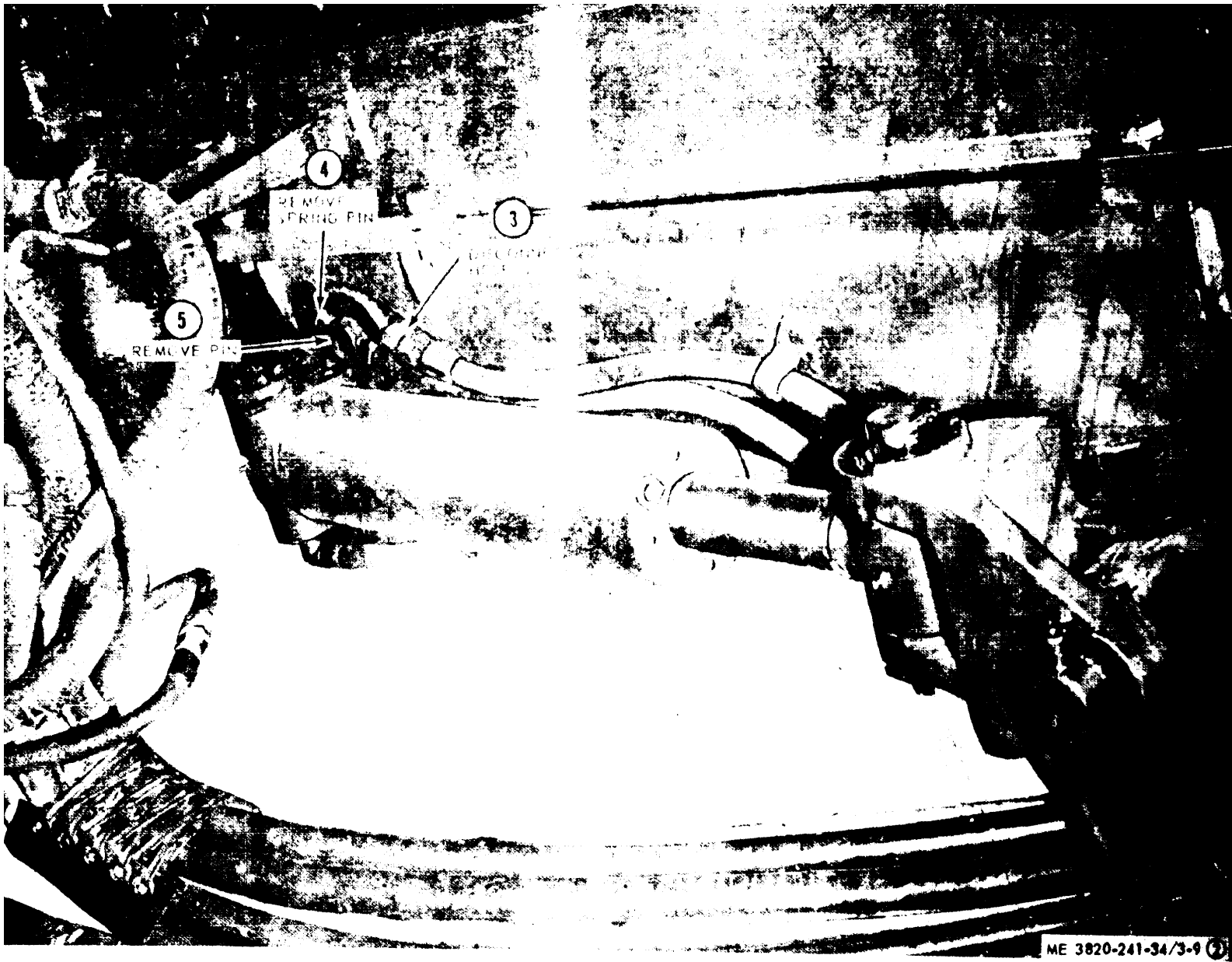


Figure 3-9. Feed extension cylinder, removal and installation (sheet 1 of 2).

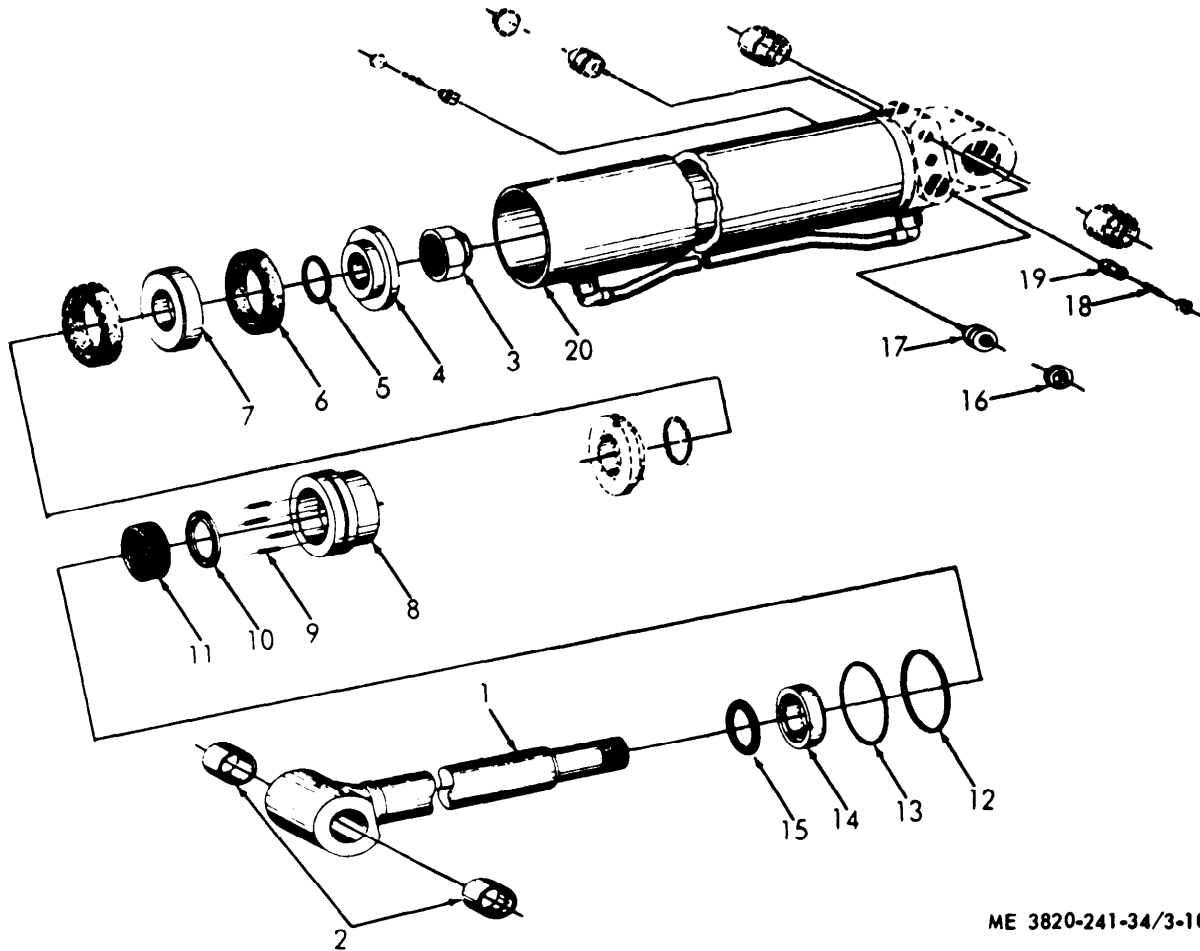


ME 3820-241-34/3-9

Figure 3-9. Feed extension cylinder, removal and installation (sheet 2 of 2)

b. Disassembly.

(1) Disassemble the feed extension cylinder in numerical sequence as illustrated in figure 3-10.



ME 3820-241-34/3-10

- | | | | |
|-----------------------|-----------------|-----------------|-------------------------|
| 1 Piston rod assembly | 6 U-cup | 11 V-packing | 16 Pipe plug |
| 2 Piston rod bearing | 7 Piston | 12 O-ring | 17 Check valve piston |
| 3 Lock nut | 8 Cylinder head | 13 Back up ring | 18 Spring |
| 4 Backing plate | 9 Spring | 14 Gland nut | 19 Poppet check plunger |
| 5 O-ring | 10 Male adapter | 15 Rod wiper | 20 Barrel assembly |

Figure 3-10. Feed extension cylinder, disassembly and reassembly.

(2) Use a suitable drift to drive out bushings (2).

3-15. Feed Extension Cylinder, Cleaning, Inspection and Repair

Clean, inspect and repair the feed extension cylinder in a similar manner as outlined in paragraph 3-3.

3-16. Feed Extension Cylinder, Reassembly and Installation

a. Reassembly

(1) Reassemble the feed extension cylinder in

the reverse of numerical sequence as illustrated in figure 3-10.

(2) Lubricate bushings (2) and press into position in the piston rod (3).

b. Installation.

(1) Install the feed extension cylinder in the reverse of numerical sequence as illustrated in figure 3-9.

(2) Refer to TM 5-3820-241-12 and service the hydraulic reservoir.

Section II. HYDRAULIC PUMP AND DRIVE COUPLING

3-17. General

This section contains repair instructions for the hydraulic pump and drive coupling. The hydraulic pump is a high capacity vane type pump, driven by an air motor through a coupling. The pump provides all power for the hydraulic system.

3-18. Hydraulic Pump and Drive Coupling, Removal and Disassembly

a. Removal.

(1) Block the rock drill boom and feed mechanism in the horizontal position.

(2) Loosen a hose connection at the pump and allow hydraulic oil to bleed into a suitable container.

(3) Refer to TM 5-3820-241-12 and remove the air motor.

(4) Remove the hydraulic pump and pump drive coupling in numerical sequence as illustrated in figure 3-11.

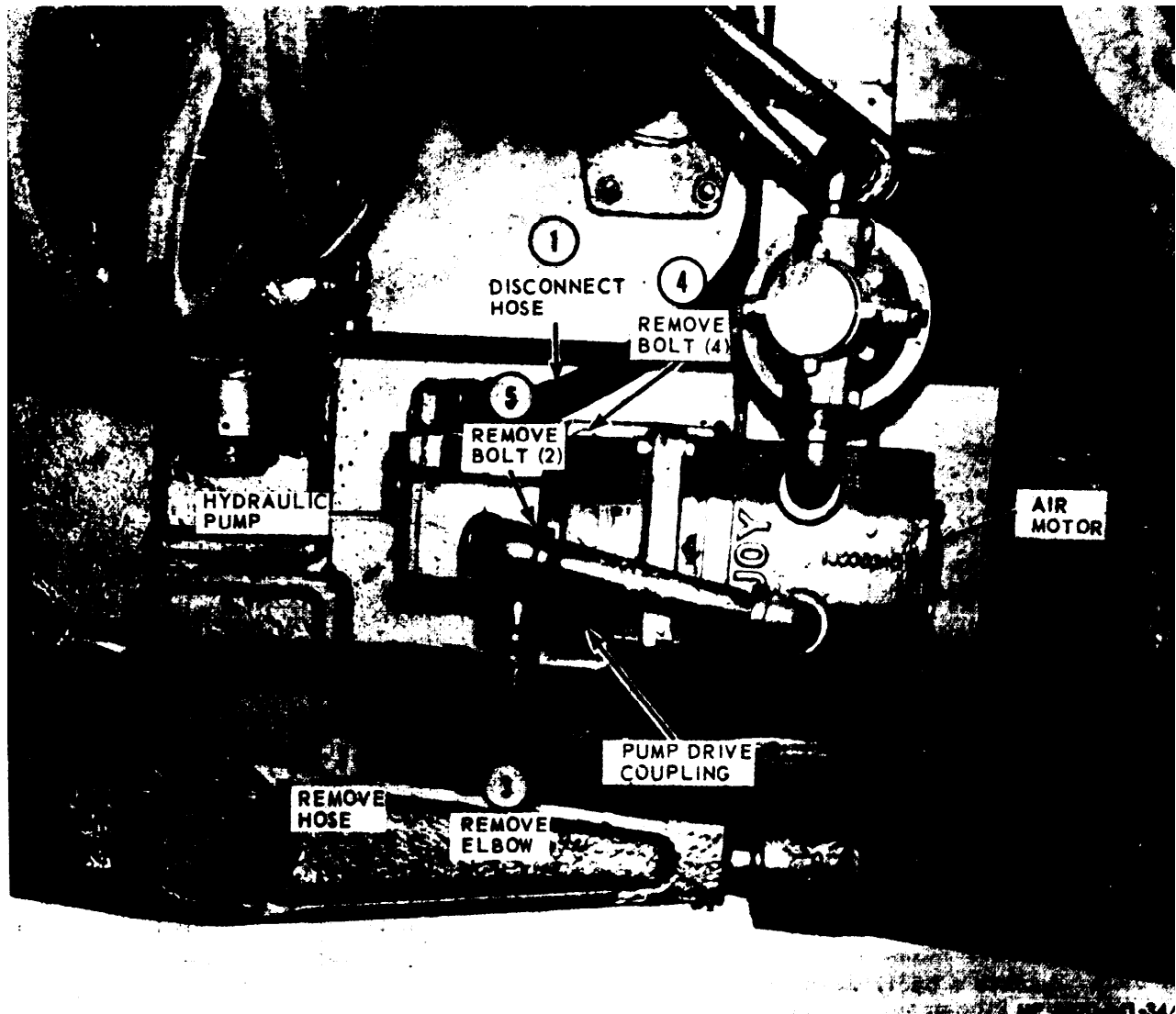
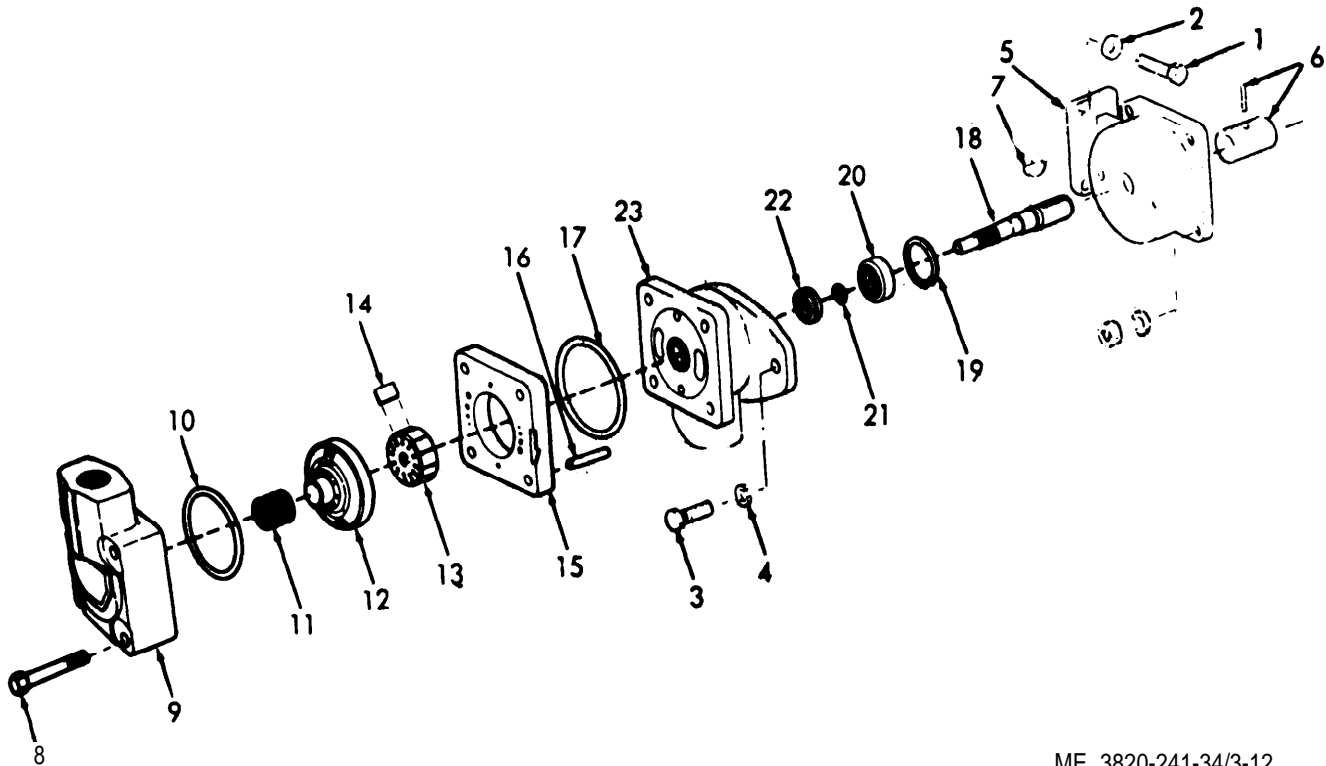


Figure 3-11. Hydraulic pump and drive coupling, removal and installation.

b. Disassembly. Disassemble the hydraulic pump and pump coupling in numerical sequence as illustrated in figure 3-12.



ME 3820-241-34/3-12

- | | | | |
|-------------------------|------------------------|-----------------|------------------|
| 1 Hex head capscrew | 7 Drive shaft key | 13. Pump rotor | 19 Snap ring |
| 2 Lockwasher | 8 Cover mounting screw | 14 Rotor vane | 20 Shaft bearing |
| 3 Hex head capscrew | 9 Pump cover | 15 Ring | 21 Snap ring |
| 4 Lockwasher | 10 O-ring | 16 Straight pin | 22 seal |
| 5 Pump mounting bracket | 11 Spring | 17 O-ring | 33 Pump body |
| 6 Pump coupling | 12 Pressure plate | 18 Pump shaft | |

Figure 3-12. Hydraulic pump and drive coupling, disassembly and reassembly.

3-19. Hydraulic Pump and Drive Coupling, Cleaning Inspection and Repair

a. Cleaning.

- (1) Clean all parts except O-rings in cleaning solvent (Fed Spec PD 680) and dry thoroughly.
- (2) Discard and replace all O-rings.

b. Inspection and Repair.

- (1) Inspect shaft bearing for excessive wear, roughness or binding while rolling on shaft.
- (2) Inspect rotor vanes for chips and excessive wear. If any vane is defective, replace them all with a rotor repair kit.
- (3) Inspect the rotor for cracks, scores and rough spots. Remove minor rough spots with emery cloth. Replace a badly worn rotor.
- (4) Inspect the pump housing and covers for cracks, nicks and burrs on machined surfaces. Remove small nicks with a fine emery cloth.

- (5) Inspect the pump shaft keyway and key for damage or excessive wear.
- (6) Inspect all hardware and threaded areas for damage. Replace defective hardware.
- (7) Repair by replacement of all defective parts.

3-20. Hydraulic Pump and Drive Coupling, Reassembly and Installation

a. *Reassembly.* Reassemble the hydraulic pump in the reverse of disassembly sequence as illustrated in figure 3-12.

b. Installation.

- (1) Install the hydraulic pump and drive coupling in the reverse of numerical sequence as illustrated in figure 3-11.
- (2) Refer to LO 5-3820-241-12 and service the hydraulic reservoir.

Section III. HYDRAULIC CONTROL VALVE

3-21. General

a. The hydraulic control valve assembly is mounted on the left side of the pedestal. It is made up of five individual control valve sections assembled in a bank and connected internally to common pressure and return passages. Each section contains a sliding spool with centering springs and a check valve. The control valves are used to direct oil flow for operating each of the hydraulic cylinders. A relief valve is mounted at the inlet port and set to open at 2500 psi to protect the hydraulic components.

b. Each control system has two operating positions and a neutral position. Each valve is double acting; it directs the flow to and from both cylinder- ports. In the neutral or OFF position, the spool lands block the cylinder ports and the main pressure passage. Oil flow is blocked at the valve and thereby prevents flow through the system. However, when the valve spool is shifted, oil is immediately available for proper operation.

c. When the spool is shifted in, flow is directed over the check valve and through the pressure chamber to the working port and to the cylinder being operated. Oil returning from the cylinder enters the opposite working port, passes through the hollow center of the spool and through the outlet to the oil reservoir. With the spool shifted out, flow is directed through the working port. The opposite port is open to the oil reservoir.

3-22. Hydraulic Control Valve Removal and Disassembly

a. Removal.

- (1) Block the drill boom and feed mechanism in a horizontal position.
- (2) Loosen a hose connection at the control valve and allow hydraulic oil to bleed into a suitable container.
- (3) Remove the hydraulic control valve in numerical sequence as illustrated in figure 3-13.

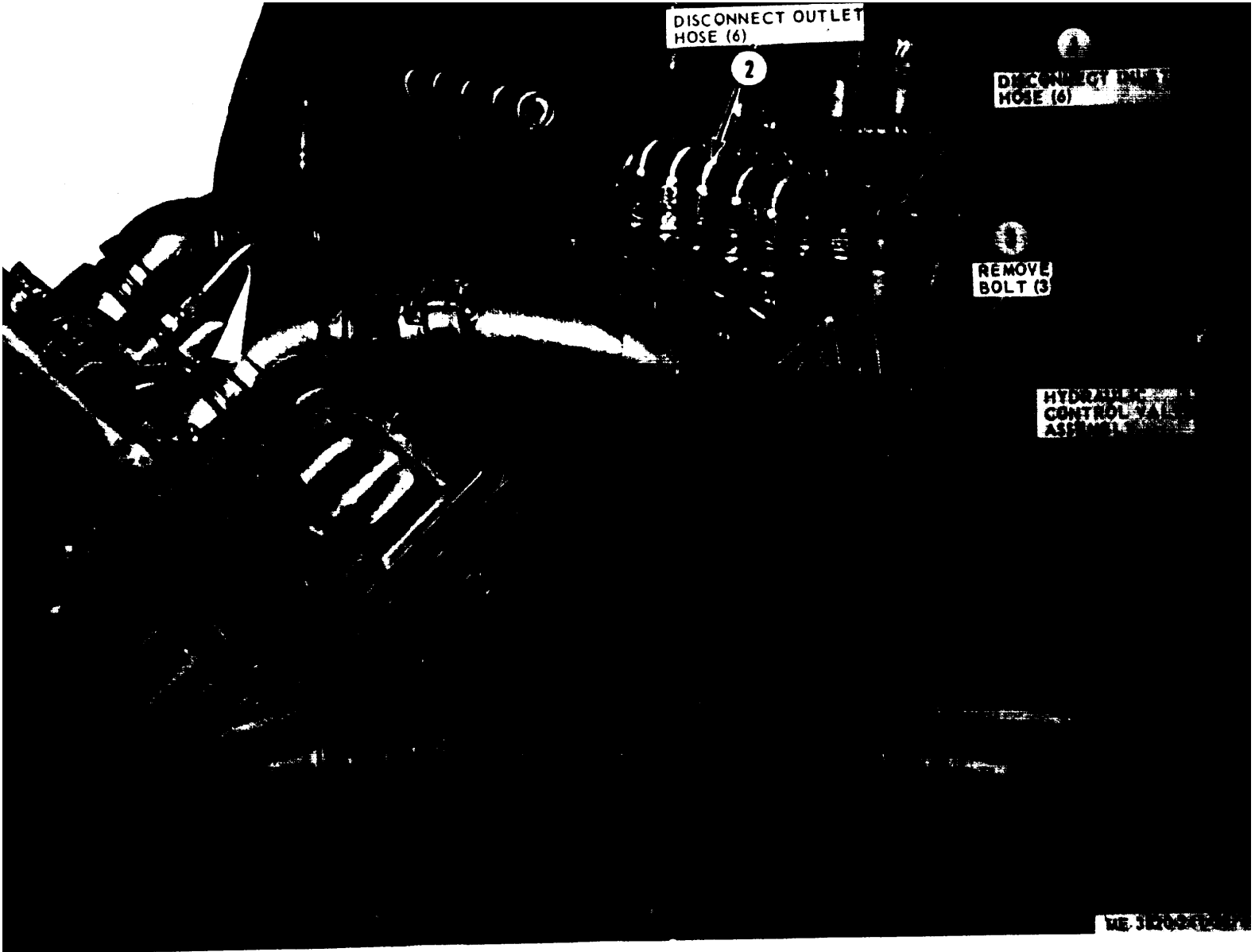
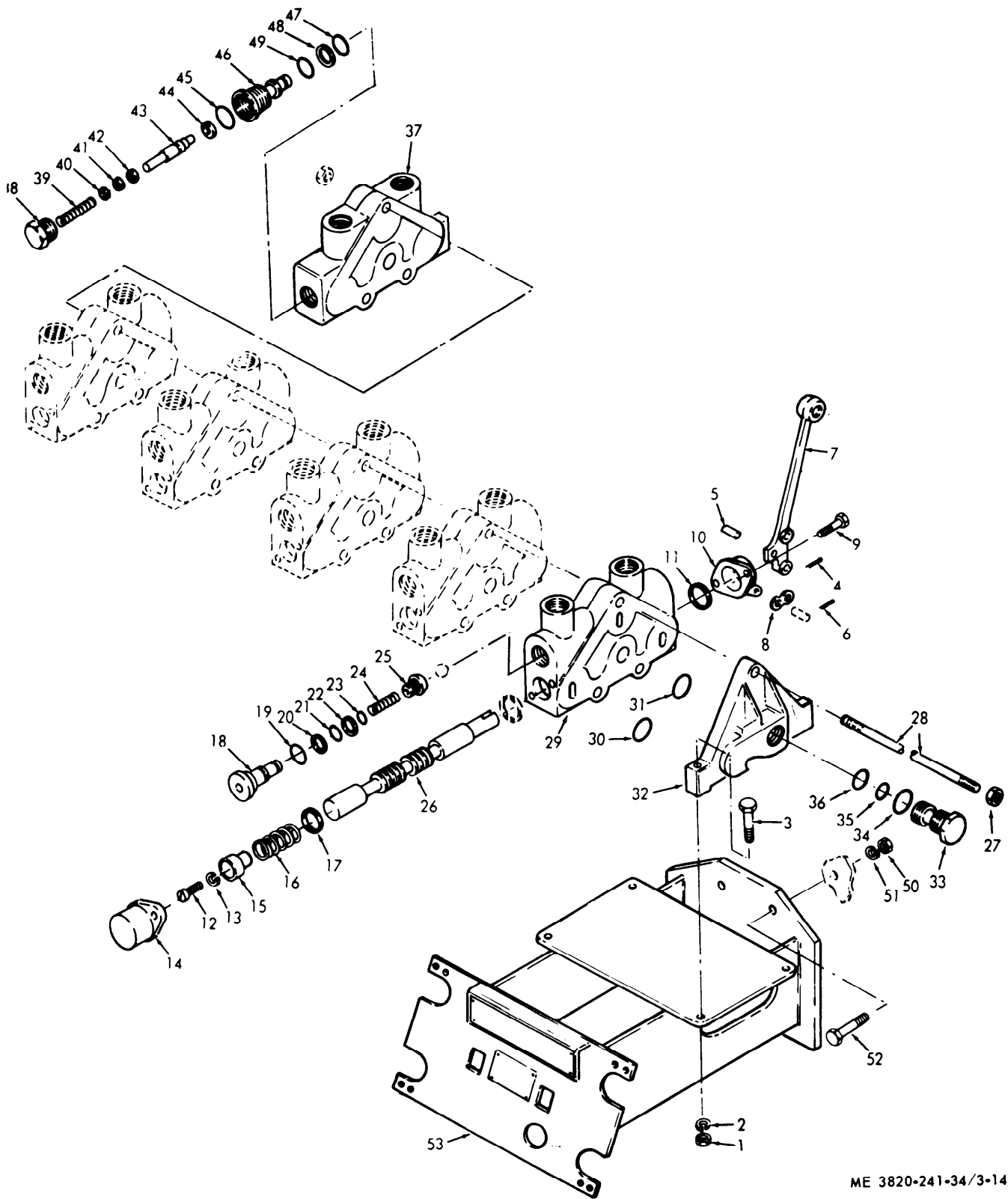


Figure 3-13 Hydraulic control valve, removal and installation.

6. *Disassembly.* Disassemble the hydraulic control valve in numerical sequence as illustrated in figure 3-14.



ME 3820-241-34/3-14

Figure 3-14. Hydraulic control valve, disassembly and reassembly.

Legend for Fig. 3-14:

1 Hex nut	27 Plain hex nut
2 Lock washer	28 Valve retaining stud
3 Hex head capscrew	29 Valve housing
4 Cotter pin	30 Seal
5 Link to handle pin	31 Seal
6 Cotter pin	32 Valve cover
7 Valve handle	33 Closed center plug
8 Handle link	34 Seal
9 Handle screw	35 Back up washer
10 Handle bracket	36 O-ring
11 Wiper seal	37 Cover plate
12 Machine screw	38 Relief cap
13 Lockwasher	39 Spring
14 Bonnet	40 Shim
15 Collar stop	41 Shim
16 Spool collar	42 Shim
17 Spool seal	43 Poppet
18 Check plug	44 Piston ring
19 O-ring	45 O-ring
20 Outer back up washer	46 Relief valve body
21 O-ring	47 O-ring
22 Inner back up washer	48 Back up seal
23 O-ring back up washer	49 O-ring
24 O-ring	50 Plain hex nut
25 Poppet	51 Lockwasher
26 4-way spool	52 Hex head capscrew
	53 Control valve bracket

3-23. Hydraulic Control Valve Cleaning, Inspection and Repair

a. *Cleaning.*

(1) Clean all parts except O rings with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace all O-rings and seals.

b. *Inspection and Repair.*

(1) Inspect all spools for excessive wear, nicks or burrs. Remove light scratches with a fine polishing cloth. If defective replace the spool and body in matched sets.

(2) Inspect all hardware and threaded areas for crossed threads. Retap threaded holes or replace part. Replace all defective hardware.

(3) Inspect all spring, back up rings, and snap rings for cracks or breaks.

(4) Repair by replacement of defective parts.

3-24. Hydraulic Control Valve, Reassembly and Installation

a. *Reassembly.*

(1) Coat all parts with a light coat of hydraulic oil before reassembly.

(2) Reassemble the hydraulic control valve in the reverse of numerical sequence as illustrated in figure 3-14.

b. *Installation.*

(1) Install the hydraulic control valve in reverse of numerical sequence as illustrated in figure 3-13.

(2) Refer to LO 5-3820-241-12 and service the hydraulic reservoir.

CHAPTER 4

MAINTENANCE OF AIR SYSTEM COMPONENTS

Section I. AIR MOTOR (Hydraulic Pump Drive Motor)

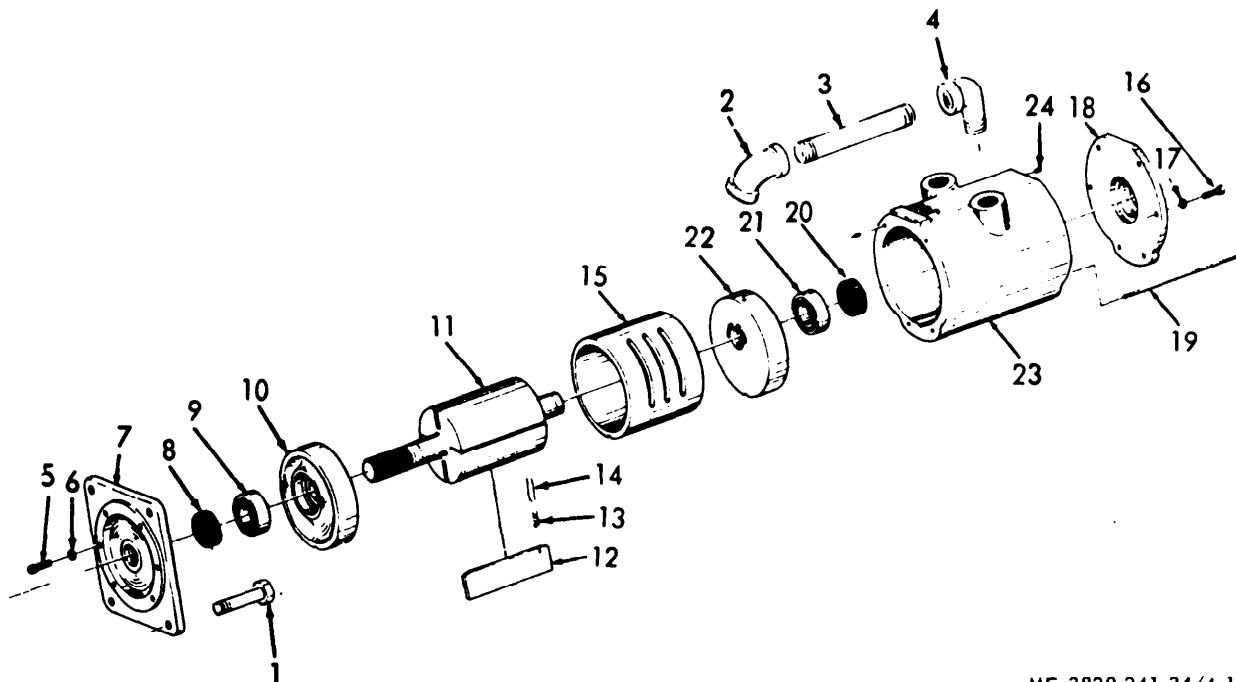
4-1. General

This section covers repair instructions for the air motor. The air drive motor is a pressure regulated, vane type motor used to drive the hydraulic system. Pressure is regulated at 65 psi, by a spring type control that regulates the amount of air to the pump drive motor.

4-2. Air Motor Removal and Disassembly

a. *Removal.* Refer to TM 5-3820-241-12 and remove the air motor.

b. *Disassembly.* Disassemble the air motor in numerical sequence as illustrated in figure 4-1.



ME 3820-241-34/4-1

- | | | | |
|---------------------|---------------------------|-------------------------|----------------------|
| 1 Hex head capscrew | 7 Forward flange | 13 Rotor vane spring | 19 Locator pin |
| 2 Exhaust elbow | 8 Forward flange oil seal | 14 Rotor shuttle pin | 20 Oil seal |
| 3 Exhaust nipple | 9 Ball bearing | 15 Rotor stator | 21 Ball bearing |
| 4 Exhaust elbow | 10 End plate | 16 Socket head capscrew | 22 End plate |
| 5 Hex head capscrew | 11 Rotor assembly | 17 Lockwasher | 23 Motor housing |
| 6 Lockwasher | 12 Rotor vane | 18 Rear flange | 24 Housing set screw |

Figure 4-1. Air motor, disassembly and reassembly.

4-3. Air Motor Cleaning, Inspection and Repair

a. *Cleaning.*

(1) Wash all parts with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace oil seals.

b. *Inspection and Repair.*

(1) Inspect the rotor bearings for excessive wear, rough spots or binding. Replace defective bearings.

(2) Inspect the rotor vanes for chips and excessive wear. If any vane is defective, replace them all with a rotor vane kit.

(3) Inspect the rotor and rotor stator for cracks, scores and rough spots. Remove minor rough spots with a fine emery cloth. Replace a defective rotor or stator.

(4) Inspect the motor housing, forward flange, rear flange, and end plates for cracks,

nicks, and burrs. Remove small nicks with a fine emery cloth.

(5) Inspect all hardware and threaded areas for damage. Replace defective hardware retap threaded areas or replace defective part.

4-4. Air Motor, Reassembly and Installation

a. *Reassembly.* Reassemble the air motor in

the reverse of numerical sequence as illustrated in figure 3-15.

b. *Installation.* Refer to TM 5-3820-241-12 and install the air motor.

Section II. AIR PRESSURE REGULATOR

4-5. General

The air pressure regulator is an adjustable spring diaphragm type control that regulates the amount of air supplied to the hydraulic pump aid drive motor. It is mounted just above the air motor and is normally set at 65 psi.

4-6. Air Pressure Regulator, Removal and Disassembly

a. *Removal.* Refer to TM 5-3820-241-12 and remove the air pressure regulator.

b. *Disassembly.* Disassemble the air pressure regulator in numerical sequence as illustrated in figure 4-2.

4-7. Air Pressure Regulator Cleaning, Inspection and Repair

a. *Cleaning.*

(1) Clean all parts except O-rings and diaphragm assembly in cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace all O-rings and the diaphragm assembly.

b. *Inspection and Repair.*

(1) Inspect the valve and valve seat for excessive wear or other damage.

(2) Inspect the strainer for holes or signs of excessive strain.

NOTE

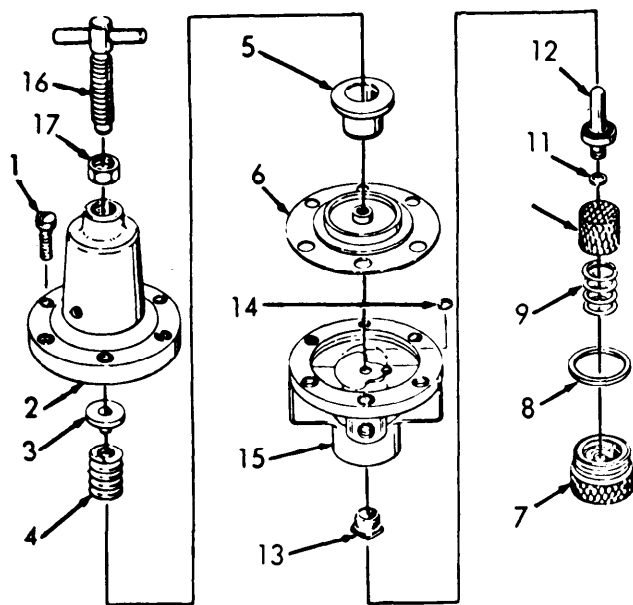
Most pressure regulator failures can be corrected by the installation of a new diaphragm assembly, O-rings, valve strainer and springs.

(3) Repair by replacement of defective parts.

4-8. Air Pressure Regulator, Reassembly and Installation

a. *Reassembly.* Reassemble the air pressure regulator in the reverse of numerical sequence as illustrated in figure 4-2.

b. *Installation.* Refer to TM 5-3820-241-12 and install the air pressure regulator.



ME 3820-241-34/4-2

- | | |
|----------------------|--------------------|
| 1 Bonnet set screw | 9 Spring |
| 2 Bonnet | 10 Air strainer |
| 3 Spring rest | 11 O-ring |
| 4 Bonnet spring | 12 Valve |
| 5 Diaphragm rest | 13 Valve seat |
| 6 Diaphragm assembly | 14 O-ring |
| 7 Plug | 15 Bonnet boot |
| 8 O-ring | 16 Adjusting screw |
| | 17 Locknut |

Figure 4-2. Air pressure regulator. disassembly and reassembly.

Section III. TRAMMING THROTTLE CONTROL VALVE

4-9. General

The tramping throttle control valve is an air operated, plug type control valve mounted on the control console. The tramping valve controls the amount of air admitted to the tramping motors to control tramping speed.

4-10. Tramping Motor Throttle Control Valve, Removal and Disassembly

a. Removal.

(1) Disconnect the air supply at the lubrication fitting, open the blow handle, and release all air from the system.

(2) Remove the tramping throttle motor control valve (throttle control) in numerical sequence as illustrated in figure 4-3.

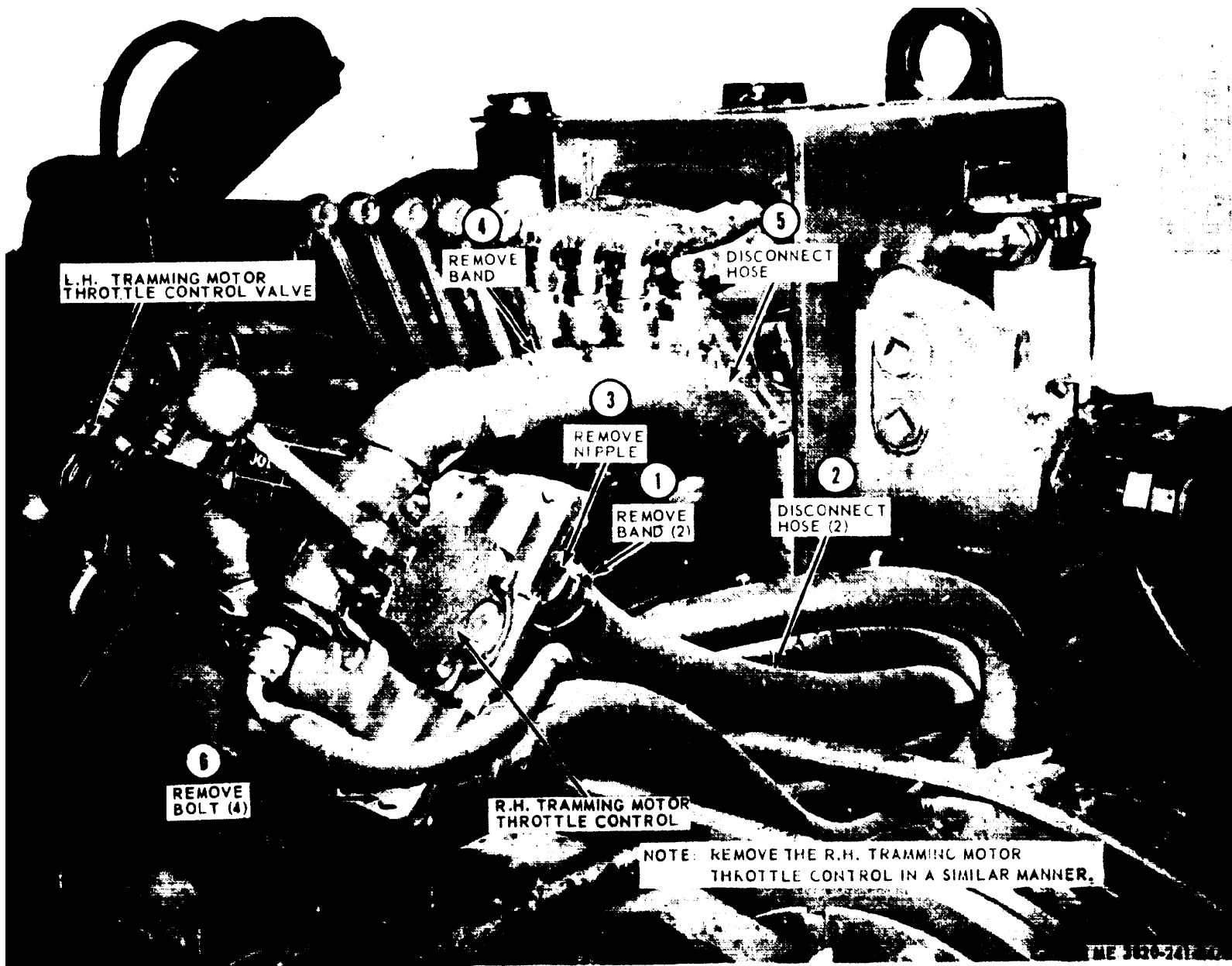
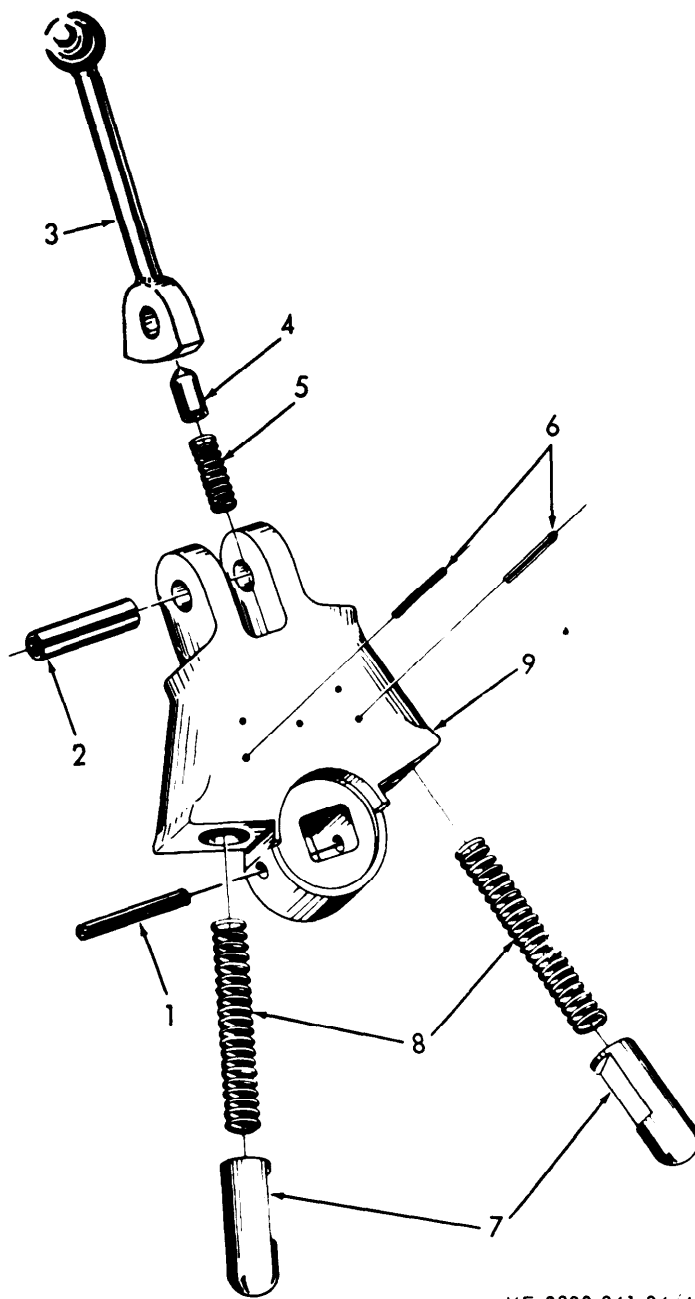


Figure 4-3. Trimming motor throttle control valve removal and installation.

b. Disassembly.

(1) Disassemble the tramping valve handle

components in numerical sequence as illustrated in figure 4-4.



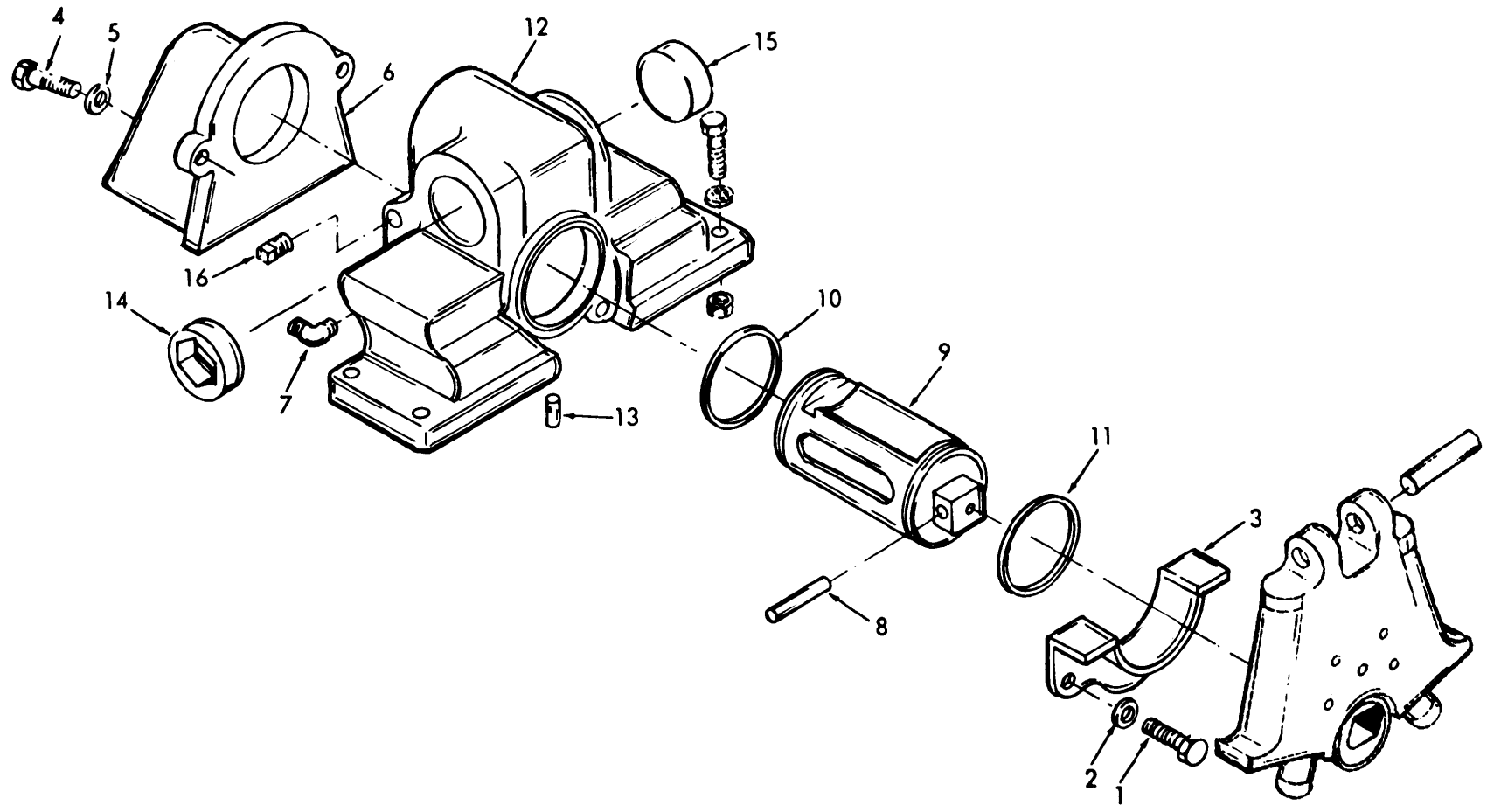
ME 3820-241-34 / 4-4

- | | | |
|------------------|------------------|------------------|
| 1 Spring pin | 4 Plunger | 7 Plunger |
| 2 Spring pin | 5 Plunger spring | 8 Plunger spring |
| 3 Control handle | 6 Spring pin | 9 Control body |

Figure 4-4. Tramping throttle valve handle. disassembly and reassembly.

(2) Disassemble the tramping throttle valve in numerical sequence as illustrated in figure 4-5.

4-6



ME 3820-241-34/4-5

- | | | | |
|--------------------------|------------------|---------------------------|-------------------|
| 1 Head cap screw | 5 Lockwasher | 9 Valve throttle | 13 Pin |
| 2 Lockwasher | 6 Cover plate | 10 Valve compression ring | 14 Body pipe plug |
| 3 Valve mounting bracket | 7 Grease fitting | 11 Valve compression ring | 15 Body pipe plug |
| 4 Hex head cap screw | 8 Roll pin | 12 Valve body | 16 Pipe plug |

Figure 4-5. Trimming throttle valve, disassembly and reassembly.

4-11. Tramming Motor Throttle Control Valve, Cleaning, Inspection and Repair

a. *Cleaning.* Clean all parts with cleaning solvent (Fed Spec PD 680) and dry thoroughly

b. *Inspection and Repair.*

(1) Inspect the control handle plungers for scratches or excessive wear, remove minor scratches with a fine emery cloth.

(2) Inspect the plunger springs for breaks or excessive wear.

(3) Inspect the valve body, valve and compression rings for nicks, cracks, or burrs. Polish minor nicks or scratches with a fine abrasive cloth. Replace compression rings if cracked or chipped.

(4) Replace all defective parts.

4-12. Tramming Motor Throttle Valve, Reassembly and Installation

a. *Reassembly.*

(1) Reassemble the tramming throttle valve in the reverse of numerical sequence as illustrated in figure 4-5.

(2) Reassemble the tramming valve handle components in the reverse of numerical sequence as illustrated in figure 4-4.

b. *Installation.* Install the tramming motor throttle control valve in the reverse of numerical sequence as illustrated in figure 4-3.

Section IV. LUBRICATOR FITTING

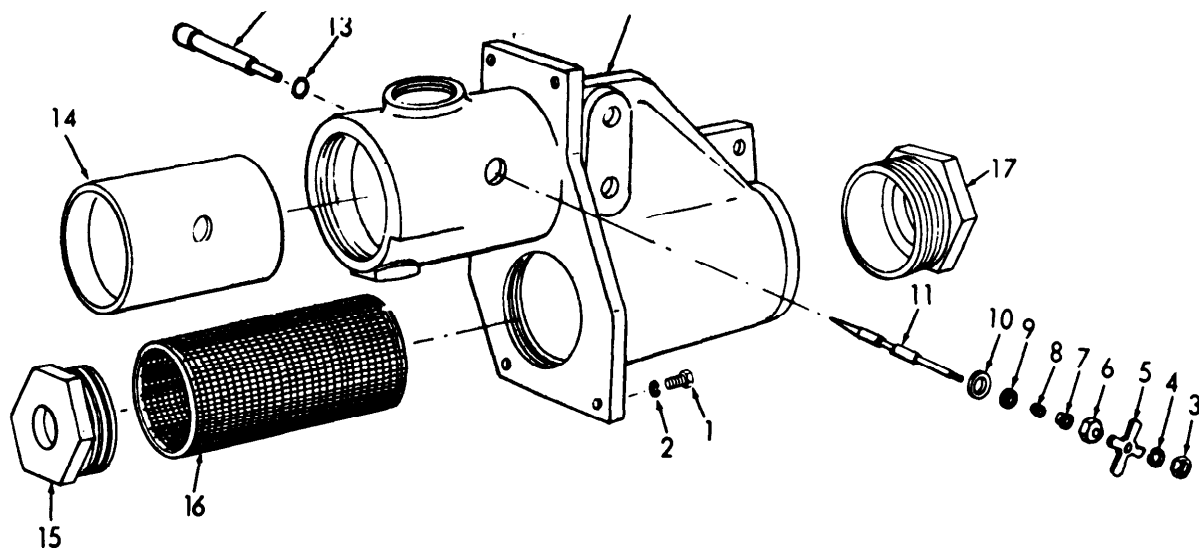
4-13. General

The lubricator fitting, mounted at the rear center of pneumatic rock drill is an adjustable fitting that filters the air and controls the amount of air and oil that is introduced into the air system.

4-14. Lubricator Fitting Removal and Disassembly

a. *Removal.* Refer to TM 5-3820-241-12 and remove the lubricator fitting.

b. *Disassembly.* Disassemble the lubricator fitting in numerical sequence as illustrated in figure 4-6.



ME 3820-241-34/4-6

- | | | |
|---------------------|-----------------|---------------------|
| 1 Hex head capscrew | 7 Stem follower | 13 O-ring |
| 2 Lockwasher | 8 Stem packing | 14 Oiler bushing |
| 3 Hex nut | 9 Stem washer | 15 Pipe hushing |
| 4 Lockwasher | 10 Stem seal | 16 Oiler screen |
| 5 Adjusting handle | 11 Stem | 17 Reducing bushing |
| 6 Plain hex nut | 12 Valve body | 18 Lubricator body |

Figure 4-6. Lubricator fitting, disassembly and reassembly.

4-15. Lubricator Fitting, Cleaning, Inspection and Repair

a. Cleaning.

(1) Clean all parts with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace the O-ring, packing and seal.

b. Inspection and replace the O-ring, packing and seal.

(1) Inspect the oiler screen for corrosion, holes or other damage.

(2) Inspect valve body and valve stem for scratches or excessive wear.

(3) Repair by replacement of defective parts

4-16. Lubricator Fitting Reassembly and Installation

a. Reassembly. Reassemble the lubricator fitting in the reverse of numerical sequence as illustrated in figure 4-6.

b. Installation. Refer to TM 5-3820-241-12, install and adjust the lubricator fitting.

CHAPTER 5

MAINTENANCE OF THE FEED SYSTEM COMPONENTS

Section I. FEED MOTOR

5-1. General

The rock drill feed motor is a four cylinder, reversing air powered motor, driven through a 16:1 reduction transmission attached to a sprocket chain drive. The motor pulls the drill up or down along the feed assembly.

5-2. Feed Motor Removal and Disassembly

a. Removal.

(1) Position the rock drill boom in the horizontal position.

(2) Disconnect the air supply at the lubricator fitting, open the blow handle and release all air from the system.

(3) Remove the feed motor in numerical sequence as illustrated in figure 5-1.

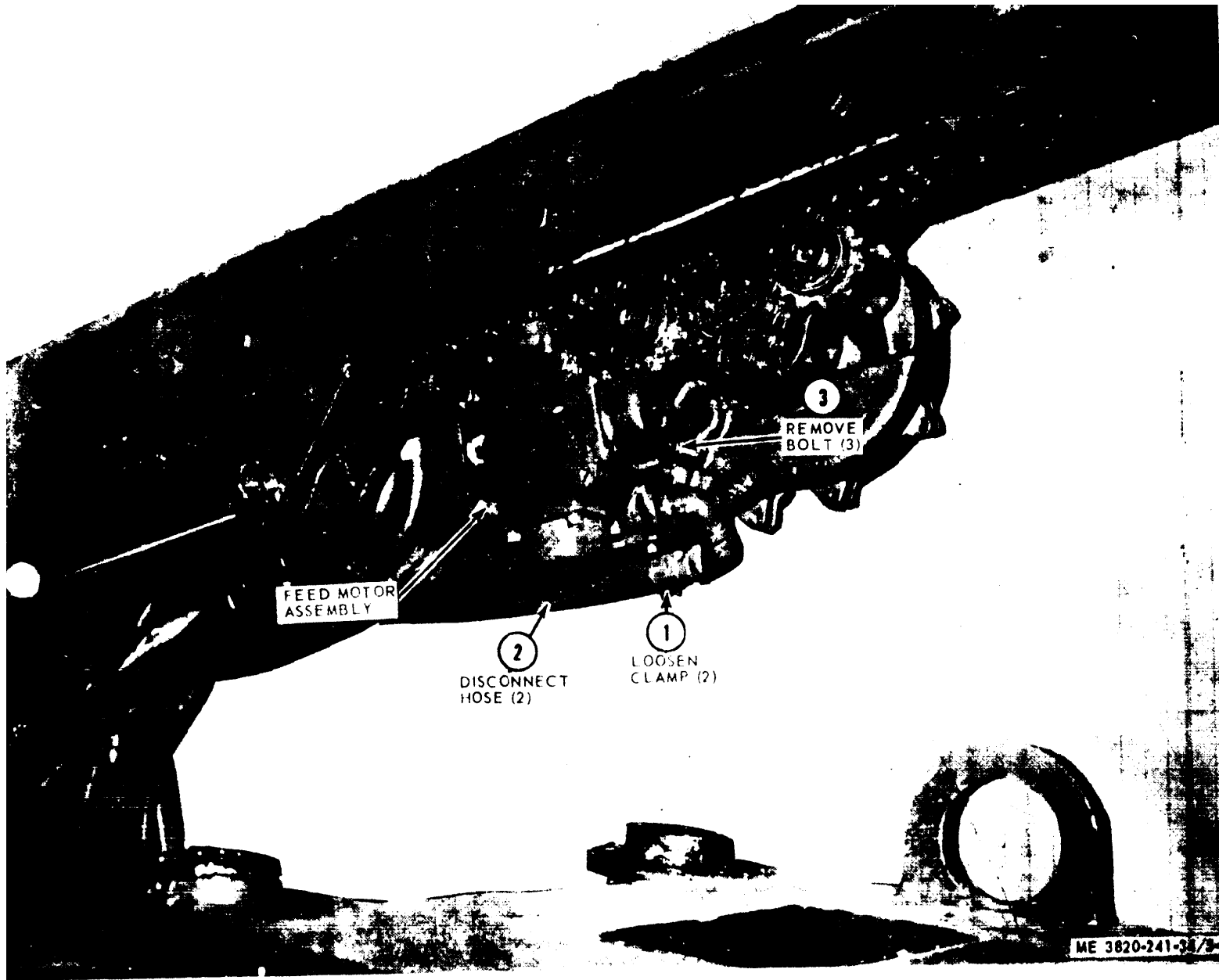
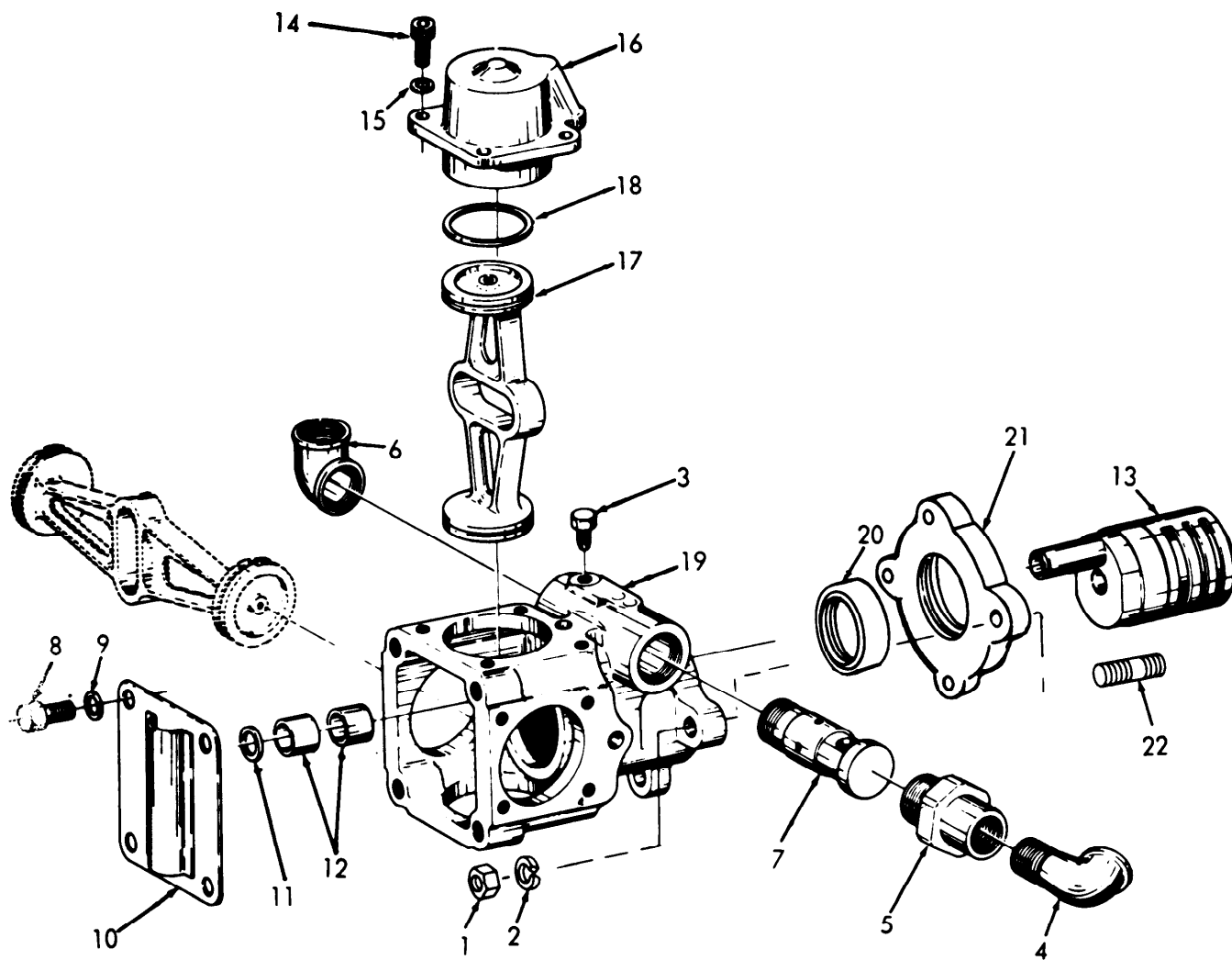


Figure 5-1. Feed motor, removal and installation.

b. *Disassembly.* Disassemble the feed motor in numerical sequence as illustrated in figure 5-2.



ME 3820-241-34/5-2

- | | | | |
|---------------------|---------------------|----------------------------------|------------------|
| 1 Plain hex nut | 7 Plug valve | 12 Roller | 17 Piston |
| 2 Lockwasher | 8 Hex head capscrew | 13 Valve and crankshaft assembly | 18 Piston ring |
| 3 Line up screw | 9 Lockwasher | 14 Hex head capscrew | 19 Motor housing |
| 4 Steet elbow | 10 Air motor cover | 15 Lockwasher | 20 Hearing |
| 5 Air inlet bushing | 11 Retaining ring | 16 Cylinder head | 21 Adapter |
| 6 90 degree elbow | | | 22 Housing stud |

Figure 5-2. Feed motor, disassembly and reassembly.

5-3. Feed Motor Cleaning, Inspection and Repair

a. *Cleaning.* Wash all parts with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

b. *Inspection and Repair.*

(1) Inspect the hoses fittings, hardware, and threaded areas for damaged threads.

(2) Inspect the pistons and piston rings for scoring or scratches. Remove minor scratches with a fine abrasive cloth.

(3) Inspect the cylinder heads for scoring and excessive wear.

(4) Inspect the valve and crankshaft, bearings and rollers for excessive wear or other damage.

(5) Repair by replacement of defective parts

5-4. Feed Motor Reassembly and Installation

a.. *Reassembly.*

(1) Coat all parts with a light coat of engine Oil.

(2) Insert the plug valve (7, Fig. 5-2) in the motor housing (19) and align with the line up screw (3).

(3) Install the piston rings (18) on the pistons (17).

(4) Reassemble the remaining components in the reverse of numerical sequence as illustrated in figure 5-2.

b. Installation. Install the feed motor assembly in the reverse of numerical sequence as illustrated in figure 5-1.

Section II. FEED TRANSMISSION

5-5. General

The rock drill is equipped with a positive acting, gear type, transmission which is fully enclosed and grease lubricated. The transmission has a 16:1 gear reduction train.

5-6 Feed Transmission, Removal and Dis-assembly

a. Removal.

(1) Position the rock drill feed mechanism in the horizontal position.

(2) Disconnect the air supply at the lubricator fitting. Open the blow handle and release all air from the system.

(3) Refer to TM 5-3820-241-12 and remove the feed chain.

(4) Remove the feed motor (para 5-2).

(5) Remove the feed transmission as illustrated in figure 5-3.

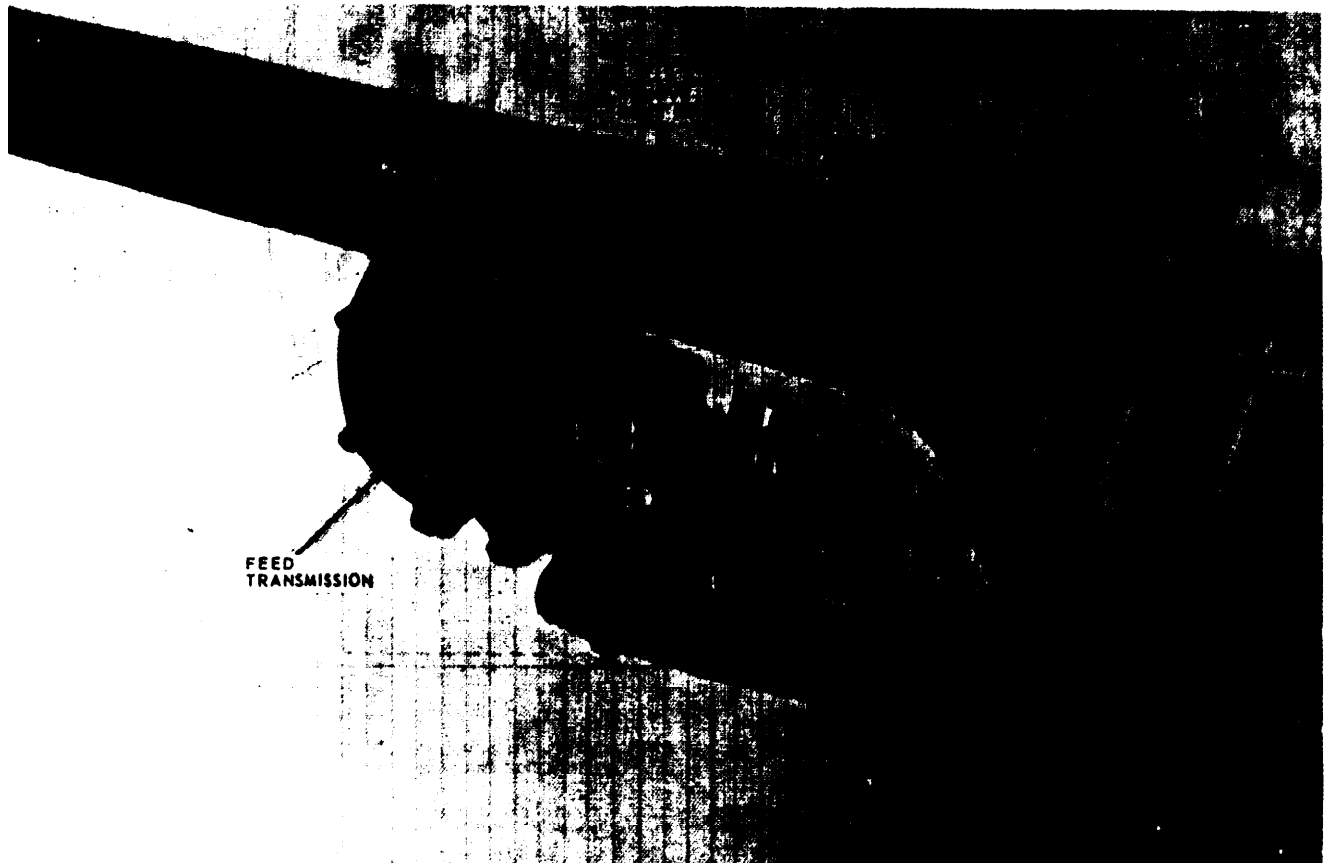
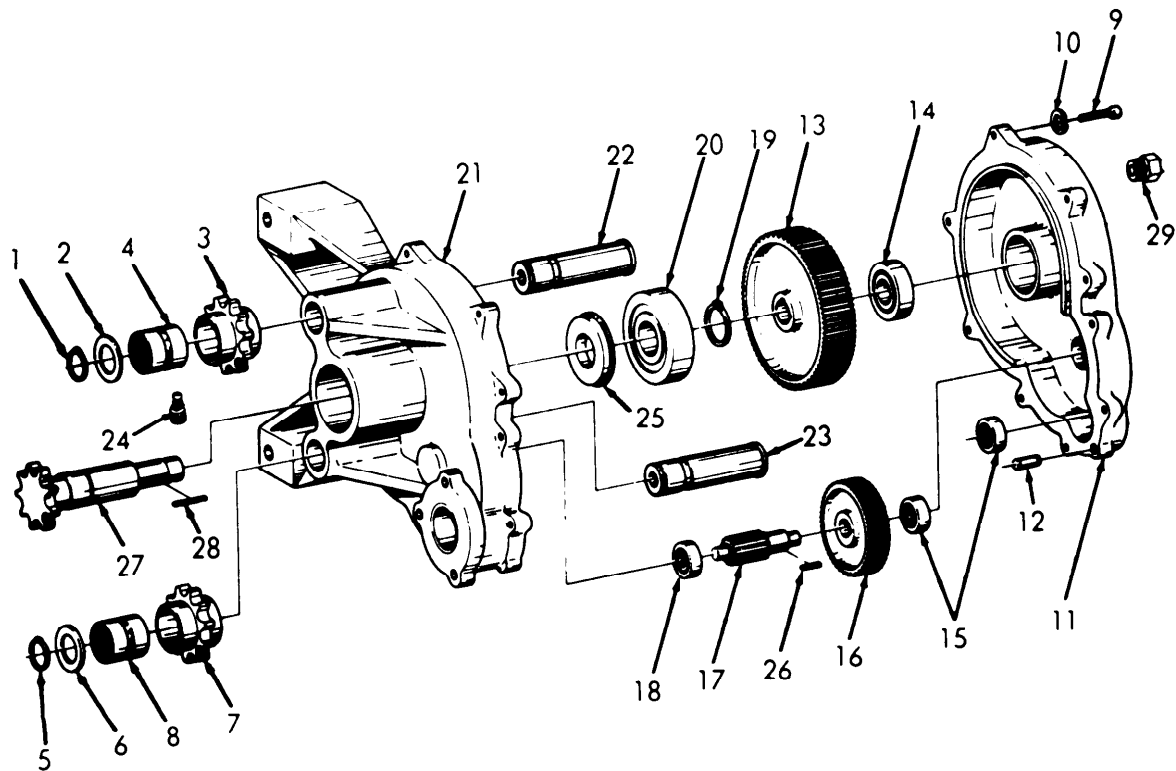


Figure 5-3. Feed transmission, removal and installation.

b. Disassembly. Disassemble the feed transmission in numerical sequence as illustrated in figure 5-4.



ME 3820-241-34/5-4

- | | | | |
|-------------------|-----------------------|-------------------------|------------------------|
| 1 Snap ring | 8 Roller bearing | 15 Ball bearing | 22 Idler gear shaft |
| 2 Sprocket washer | 9 Hex head capscrew | 16 Spur gear | 23 Idler gear shaft |
| 3 Sprocket idler | 10 Lockwasher | 17 Spur gear | 24 Lubrication fitting |
| 4 Roller bearing | 11 Transmission cover | 18 Ball bearing | 25 Shield |
| 5 Snap ring | 12 Dowel pin | 19 Snap ring | 26 Gear to shaft key |
| 6 Sprocket washer | 13 Main drive gear | 20 Ball bearing | 27 Drive sprocket |
| 7 Sprocket idler | 14 Ball bearing | 21 Transmission housing | 28 Drive sprocket key |
| | 29 Vented plug | | |

Figure 5-4. Feed transmission, disassembly and reassembly.

5-7. Feed Transmission, Cleaning, Inspection and Repair

a. *Cleaning.* Clean all parts with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

b. *Inspection and Repair.*

(1) Inspect all gears for cracks, chipped teeth or excessive wear.

(2) Inspect the bearings for rough spots or excessive wear.

(3) Inspect the transmission cover and housing for cracks, breaks or other damage.

(4) Inspect the idler gear shafts for excessive wear.

(5) Inspect shaft keys and keyway in shafts for excessive wear.

(6) Repair by replacement of defective parts.

5-8. Feed Transmission, Reassembly and Installation

a. *Reassembly.*

(1) Lubricate all components with a light weight engine oil.

(2) Reassemble the feed transmission in the reverse of numerical sequence as illustrated in figure 5-4.

b. Install the feed transmission as illustrated in figure 5-3.

(2) Refer to TM 5-3820-241-12 and install the feed motor and feed chain.

(3) Refer to LO 5-3820-241-12 and service the feed transmission.

Section III. DRIFTER DRILL

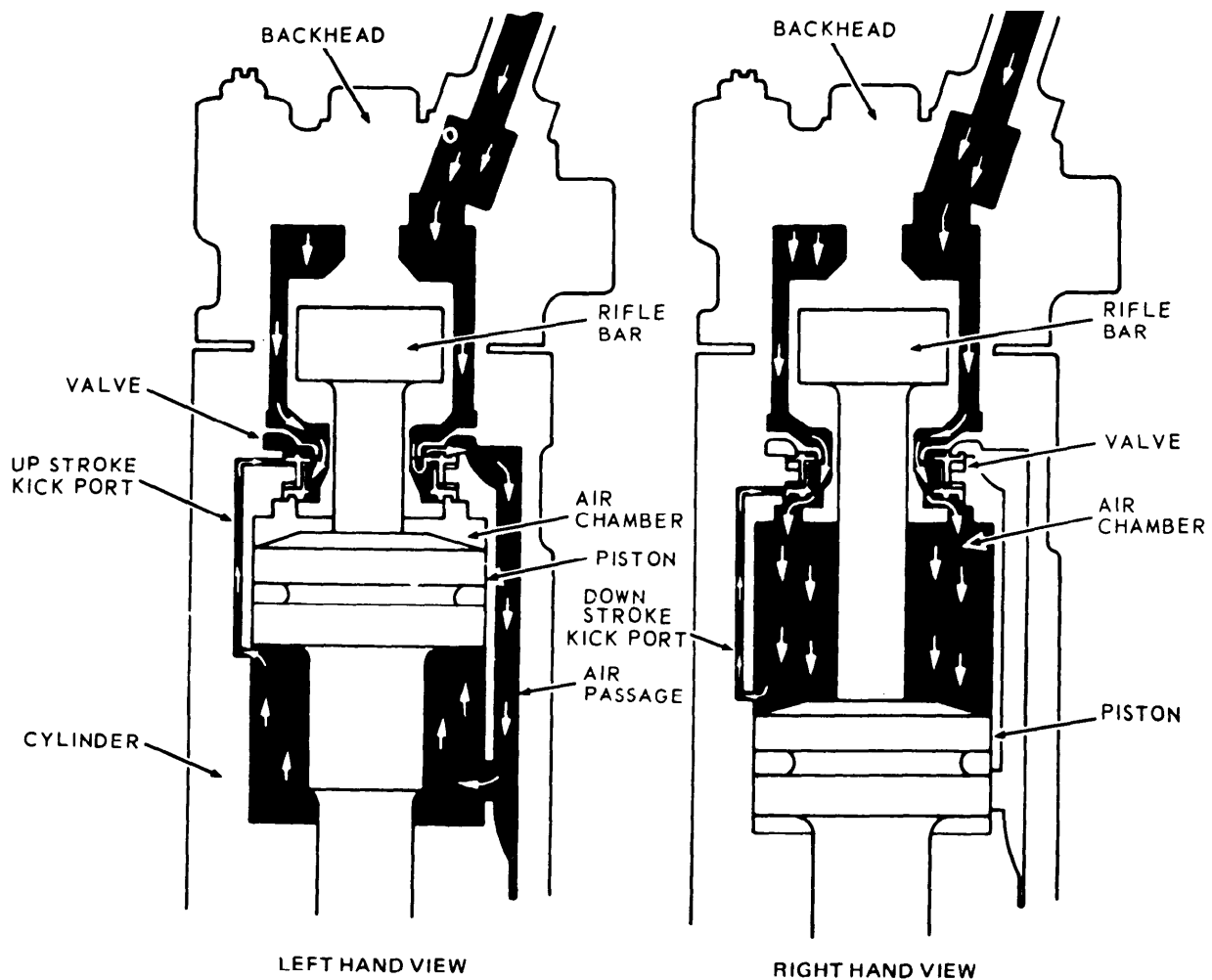
5-9. General

a. *Description.* The pneumatic drill engine is a heavy duty percussion machine designed for deep hole drilling in hard rock. The drill incorporates a dual rotation assist unit integral with the drill to provide a fast method for coupling and uncoupling the drill steels, and to furnish a power assist to normal rifle bar rotation. The dual rotation unit consists of an independent vane type air motor geared to rotate the chuck in either direction. Operating controls for the drill and allied functions are mounted on the feed.

b. *Theory of Operation.* There are two basic

operating principles involved in the action of the drill engine. First, the principle that makes the piston reciprocate in the cylinder, and second, the principle that causes the drill steel to rotate.

(1) *Piston Reciprocation.* Back and forth movement of the piston is affected by a self-acting or automatic valve that admits air to the proper instant, first to one end of the cylinder then to the other end. Figure 5-5 illustrates the involved portion of the drill engine in cross section. The left hand view shows the piston at the top part of the cycle, and in the right hand view, the piston is in the bottom part of the cycle.



ME 3820-241-34/5-5

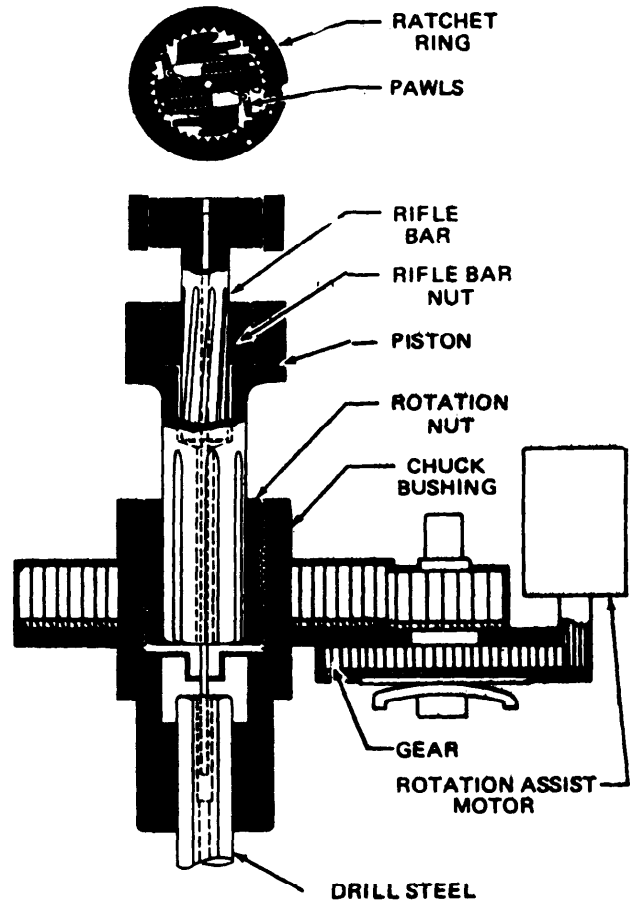
Figure 5-5. Drifter drill valve operation.

(2) *Value Operation.* In figure 5-5 (left hand view) the piston is shown moving to the uppermost part of the cycle. Just before it reaches the top of the chamber it uncovers the air kick

port that allows air to flow through the kick port to the backside of the valve. This pressure causes the valve to close the air supply to the back end of the cylinder and to admit air to the front end

through air passage. Instantly, the exhaust port opens and the pressure in the air chamber drops to near atmospheric. Similarly, on the return stroke (right hand view) the piston uncovers the kick port which admits air pressure to the front side of the valve, shutting off the air supply to the back end of the cylinder.

(3) *Rotation System (figure 5-6)*. Shows a line assembly for parts that cause rotation of the drill steel. Starting at the bottom, the hexagonal drill steel fits into a hexagonal hole in the chuck which in turn engages the chuck bushing. The chuck nut in the bushing engages the straight splines on the shank of the piston, hence, rotation of the piston will cause rotation of the drill steel. The rifle nut in the head of the piston engages the spiral flutes on the rifle bar. If the rifle bar were not held still as the piston travels back and forth in the cylinder, it would rotate first in one direction on the power stroke and the opposite direction on the return stroke. The ratchet mechanism permits the rifle bar to rotate while the piston is making its power stroke, but prevents it from turning while the piston makes its return stroke. Consequently, the piston must rotate as it makes the return stroke, and since it is connected to the drill steel through the chuck nut and chuck the drill steel also rotates.



ME 3820-241-34/5-6

Figure 5-6. Drifter drill rotation system.

(4) *Assist Rotation Motor.* To assist the rifle bar rotation, the drill engine has an air driven vane motor. The motor is geared to the chuck bushing to provide additional torque.

(5) *Reverse Rotation.* The vane air motor is a reversing motor. When the reverse rotation lever is activated, a rotation release ring collars the ratchet mechanism allowing the rifle bar to rotate in either direction. The same control reverses the rotation of the vane air motor which is geared to the chuck bushing resulting in reverse rotation. It should be noted that in reverse rotation, all the torque is provided by the vane air motor only.

(6) *Upstroke Rotation.* The drill engine has a 40 upstroke rotation. As explained in paragraph 5 b (3), the rotation system rotates the piston on the up or return stroke. The down or power stroke has the single purpose of imparting the maximum

ft-lb blow to the drill steel shank. This is known as upstroke rotation. The 40 designates the total travel of the piston required to make one full revolution. Since the rifle bar governs rotation of the piston and the steel, this can be expressed in another manner. If a rifle bar were made long enough, the spiral flutes would make one complete turn around the bar in 40 inches.

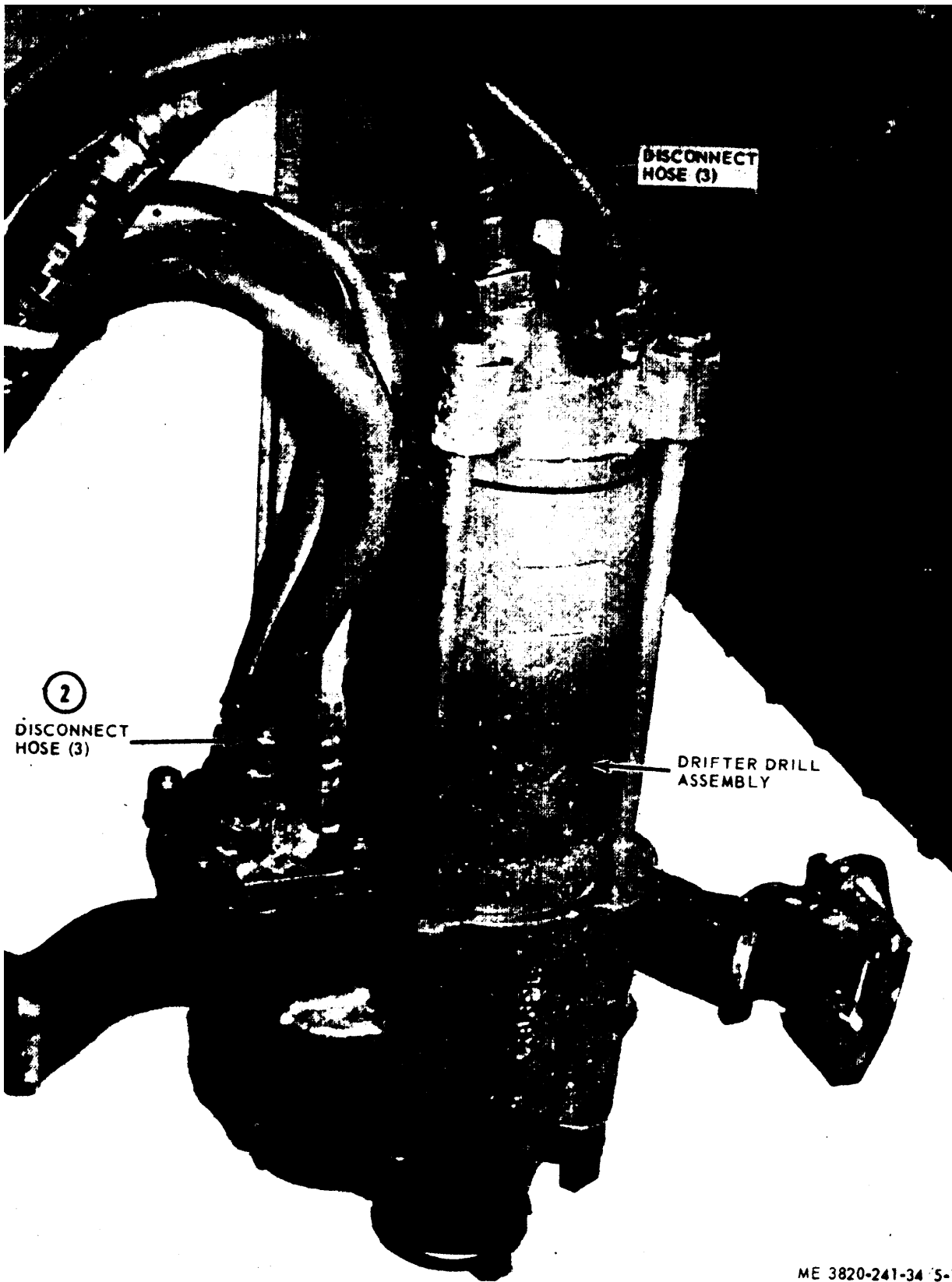
5-10. Drifter Drill Removal and Disassembly

a. Removal.

(1) Position the rock drill feed mechanism in the horizontal position.

(2) Disconnect the air supply at the lubricator fitting. Open the blow handle and release all air from the system.

(3) Remove the drifter drill assembly in numerical sequence as illustrated in figure 5-7.



ME 3820-241-34 5-7

Figure 5-7. Drifter drill, removal and installation (sheet 1 of 2).

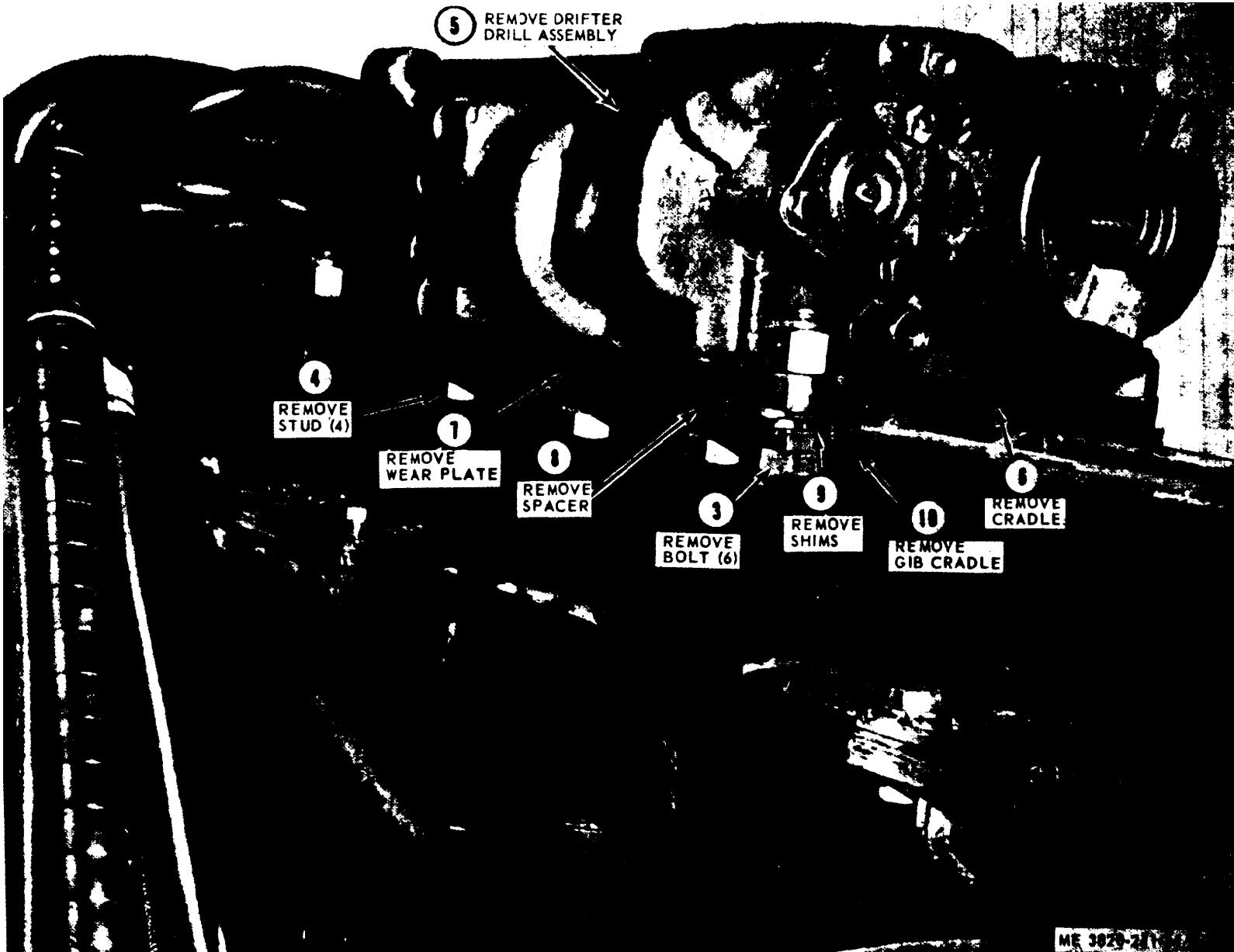


Figure 5-7 Drifter drill, removal and installation (sheet 2 of 2).

b. Disassembly.

NOTE

When disassembling the drill engine, always keep the working area clean. Clean all disassembled parts and place the small items in a box to prevent loss. Handle parts carefully; they may be chipped or broken if dropped on a hard surface.

(1) Clamp the drill securely to a clean bench.

(2) Disassemble the drifter drill assembly in numerical sequence as illustrated in figure 5-8.

Legend for Fig. 5-8:

- | | | | |
|------------------------------|--------------------------|-----------------------------|------------------------------|
| 1 Striking bar retainer | 14 Spring retainer | 27 Support ring | 56 Clutch gear |
| 2 Swivel bushing | 15 Back head spring | 28 Chuck housing | 57 Friction plate |
| 3 Air and water swivel | 16 O-ring | 29 Rotating chuck | 58 Friction back-up plate |
| 4 Air inlet swivel | 17 Plunger | 30 Locating pin | 59 Gear hub assembly |
| 5 Gland plug | 18 O-ring | 31 Valve block cover | 60 Self locking nut |
| 6 Air tube | 19 Pin | 32 Outside valve | 61 Hex head capscrew |
| 7 Air tube packing | 20 Rotation release ring | 33 Valve block | 62 Lockwasher |
| 8 Hose connector | 21 Rifle bar | 34 Valve seat assembly | 63 Motor cap |
| 9 Plain hex nut | 22 Rifle bar O-ring | 35 Valve seat | 64 Motor cap vented plug |
| 10 Side rod | 23 Ratchet pawl | 36 Spacer bushing | 65 Spring pin |
| 11 Back head assembly | 24 Pawl plunger | 37 Inside valve | 66 Shaft |
| 12 Jam nut | 25 Pawl spring | 38 Cylinder and buffer ring | 67 Spring pin |
| 13 Back head adjusting screw | 26 Ratchet ring | 39 Cylinder assembly | 68 Spring |
| | | 40 Buffer ring assembly | 69 Vane motor cover assembly |
| | | 41 Piston | 70 Bearing |
| | | 42 Rifle nut | 71 Hose nipple |
| | | 43 Thrust plate | 72 Bandit hose nipple |
| | | 44 Support ring | 73 Hose nipple |
| | | 45 Chuck assembly | 74 Motor cover |
| | | 46 Chuck bushing | 75 Bearing support |
| | | 47 Locating pin | 76 Bearing retaining ring |
| | | 48 Retainer bushing | 77 Needle bearing |
| | | 49 Yoke | 78 Stator |
| | | 50 Counter gear assembly | 79 Packing |
| | | 51 Socket head capscrew | 80 Rotor and pinion |
| | | 52 Lock nut | 81 Rotor vane |
| | | 53 Lockwasher | 82 Cap |
| | | 54 Spring | 83 Motor cover stud |
| | | 55 Back-up friction plate | |

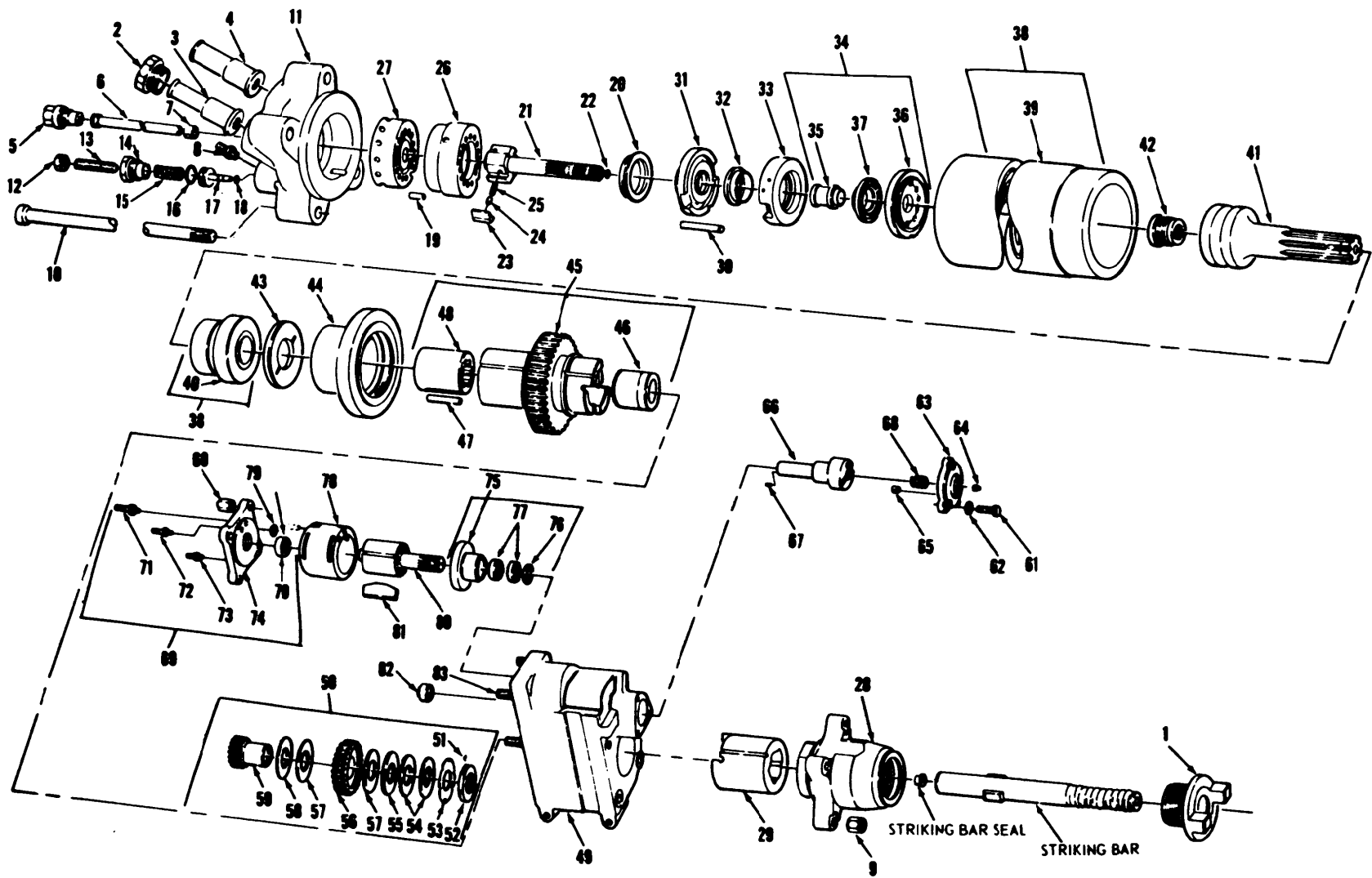


Figure 5-8. Drifter drill, disassembly and reassembly.

ME 3820-241-34/5-8

(3) Use a soft drift to drive out bushing and other parts that would otherwise be damaged.

(4) To remove the piston (41), rotation release ring (20) rifle bar (21) and valve seat assembly (34). insert a brass rod through the front end of yoke (49) and tap against the striking end of the piston.

(5) To remove cylinder and parts use a brass drift pin approximately 2-5/8 in. diameter, apply force against the end of chuck bushing to remove the thrust plate (43), support ring (44) and chuck assembly (45).

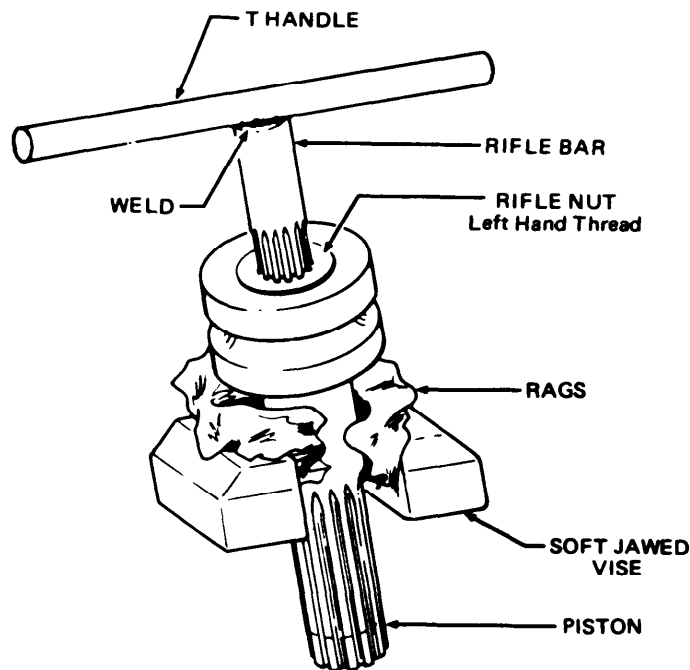
(6) To remove the support ring (27) and ratchet ring (26) use a drift pin through the opening in the gland plug (5).

(7) To remove valve assembly, tap the

spacer bushing (36), where it fits through the valve seat (34), freeing the spacer bushing (36) and valve seat (34), push out inside valve (37) and outside valve (32).

(8) To remove ratchet pawls (23), press the end of pawl to compress pawl spring (25). Hold hand over pawl and remove the spring and pawl.

(9) To remove the rifle nut, wrap the stem of the piston with a cloth as shown in figure 5-9 and clamp into a soft jawed vise. Cut off the top of an old rifle bar and weld a "T" handle to the bar as illustrated in figure 5-9. Insert the adapted rifle bar into the rifle nut and unscrew the rifle nut. The rifle nut has a left hand thread. Rifle nuts with excessive wear may have to be machined out with a lathe.

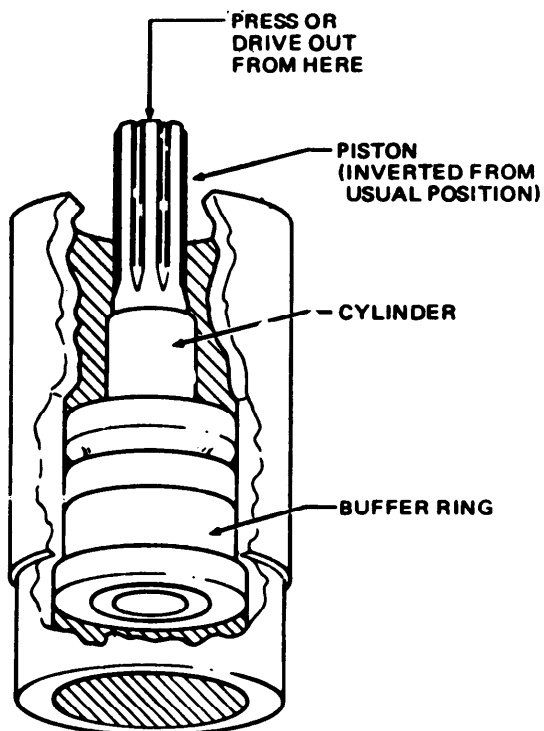


ME 3820-241-34/5-9

Figure 5-9. Removing the rifle nut.

(10) To remove the buffer ring assembly, reverse the ring from its operating position and

insert the piston into the cylinder as shown in figure 5-10. Press or drive out the buffer ring.



ME 3820-241-34/5-10

Figure 5-10. Removing buffer ring assembly.

5-11. Drifter Drill Cleaning, Inspection and Repair

a. *General.* The drifter engine should be disassembled for cleaning and inspection at regular intervals, short of time when breakdown may occur. Because of varied operation conditions, inspection periods cannot be determined. They can only be arrived at with accumulated experience of the user, until safe cleaning and inspection intervals can be established. Drills in daily service must be returned to direct and general support maintenance for disassembly, inspection and repair as required. In addition a routine inspection for signs of excessive wear, scoring, broken or cracked parts must be made.

b. *Cleaning.*

(1) Clean all parts except O-rings with cleaning solvent (Fed Spec PD 680) and dry thoroughly.

(2) Discard and replace all O-rings and seals.

c. *Inspection and Repair.*

(1) *Buffer Ring Cylinder and Piston.*

(a) The most frequent reason for poor drill performance is that the piston, cylinder or buffer ring lining have worn to such an extent that the clearance between them has increased beyond the allowable wear limits. Excessive clearance destroys the air cushion between the buffer ring

and piston, and allows the piston to strike the buffer ring with considerable impact, and often breaking the the piston.

(b) Check the piston, cylinder, or buffer ring for excessive wear by applying the cushion test. This is accomplished by dropping the free piston in the cylinder. The piston should bounce or cushion on the air trapped between the piston head and buffer ring. If the piston strikes the buffer ring hard, the piston, cylinder lining or buffer ring is defective and worn beyond safe limits and they must be replaced.

(2) *Piston Striking Face.*

(a) Inspect the piston striking face to make sure it is not chipped or cupped excessively. A defective piston will damage every striking bar with which it comes in contact. A stripped or damaged striking bar will quickly spoil a good piston.

(b) If the piston striking face damage has not progressed so far, it can be repaired. If the piston has never been reground, the striking face must be squared up and flattened by careful grinding. Perform the grinding operation slowly to avoid overheating and annealing of the hardened cast. Do not grind off more than 1/16-in. of metal.

(3) *Rifle Nut and Chuck.*

(a) Inspect the raffle bar for a good fit in the rifle nut, allowable wear depends to some extent on drilling conditions. Lock the rifle nut when you can slide a 1/8-in. shim between the flutes when these parts are engaged.

(b) Inspect the splines in the chuck nut for excessive wear. The piston bears on the splines in the chuck nut in the direction of rotation only, so more nut wear can be tolerated. Replace the chuck nut if wear exceeds 1/2 the thickness of the splines.

(4) *Chuck Parts.*

(a) Inspect the chuck and chuck bushing for excessive wear. When the chuck or bushing is worn, alignment of the drill with the striking bar cannot be maintained. It will also cause chipping of the piston or striking bar and may shear off or punch the air tube.

(b) Replace a chuck bushing if worn oversize or bell-mounted.

(5) *Motor Vanes.*

(a) Inspect the motor vanes for excessive wear. If the laminations show any sign of separating, discard and replace with an complete new set.

(b) Inspect the sides of the vanes for indication of excessive milling. When a maximum of 1/8-in. of the original vane width is worn away,

replace the complete set. Determine the extent of wear by comparison with a new vane.

(6) *Gears and Bearings.*

(a) Inspect the motor shaft needle bearings for excessive wear or other damage.

(b) Inspect all gears for chipped teeth, excessive wear, or other damage.

(c) Inspect the bronze bushing in the counter gear for excessive wear by rocking the counter gear. Any excessive angular play will cause rapid wear so the bushing must be replaced.

5-12. Drifter Drill, Reassembly and Installation

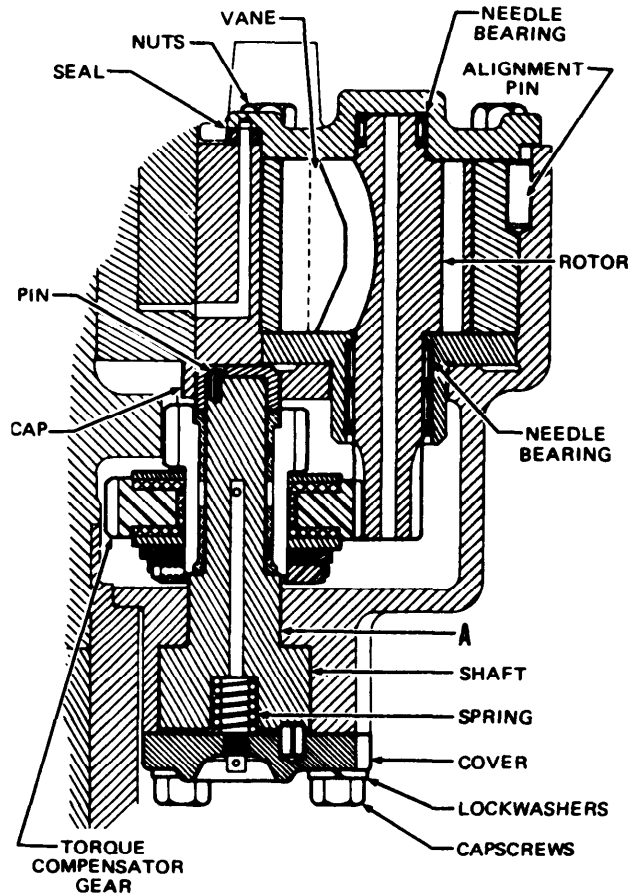
a. Reassembly.

(1) Coat all parts with a light film of oil before reassembly. With the exception of press fit bushings, all parts go together easily and will not be forced.

(2) Reassemble the drifter drill in the reverse of numerical sequence as illustrated in figure 5-8.

(3) When assembling the torque compensator counter (fig. 5-11) apply rock drill oil on both sides of friction plates. Tighten locknut until springs are flattened out completely. Then, back off locknut approximately one flat until the set screw hole matches the flat on the gear hub. Install setscrew using Loctite Retaining Compound. Lock screw tightly and place a drop of Loctite on both back and front of setscrew. Bend ears of lockwasher around locknut as shown in figure 5-11.

(4) To assemble the dual rotation unit refer to figure 5-11 and proceed as follows:



ME 3820-241-34/5-11

Figure 5-11. Reassembly of drill rotation unit.

(a) Insert shaft (fig. 5-11) through opening, through the torque compensator gear and into cap.

(b) Turn shaft until pin dowels into the hole in the cap. Install spring, cover and secure with four lockwashers and capscrews.

(c) Assemble needle bearings into motor bearing support. Install motor bearing support into housing, align support and housing and install aligning pin.

(d) Install vanes in rotor, assemble needle bearing on rotor, and install the rotor in the housing. Make sure the seal in back cover is in place and install back cover on the housing and secure with four nuts.

(5) To assemble the chuck parts refer to figure 5-12 and proceed as follows:

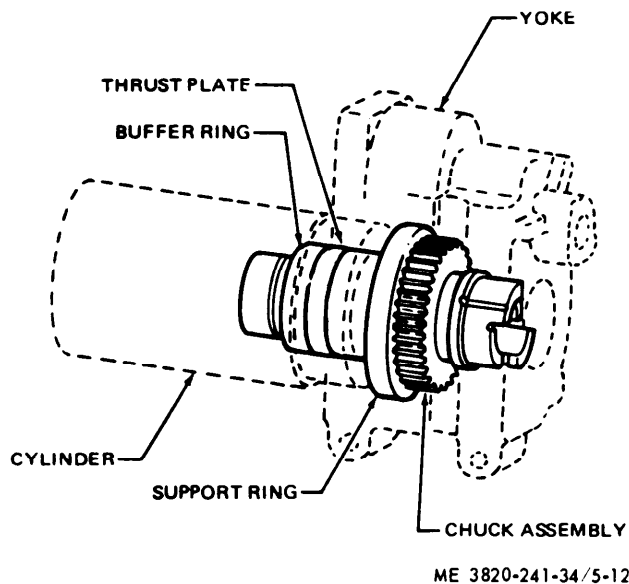


Figure 5-12. Reassembly of chuck assembly.

(a) Assemble the support ring (fig. 5-12) to the chuck. Install this assembly into the yoke and tap into place until the support ring shoulders in the housing. Install buffer ring in the cylinder.

(b) Position the thrust plate in the cylinder against the buffer ring. Position cylinder in yoke (exhaust port towards the cradles) and tap lightly until cylinder bottoms on yoke.

(6) Reassemble the piston, valve and rotation parts as follows:

(a) Position the piston (41, fig. 5-8), in the cylinder assembly (39), with flutes on piston entered in slots on chuck nut.

(b) Hold locating pin (30) in the groove in the cylinder assembly (39), line up slots in the valve seat assembly (34) and valve block (33) with locating pin (30) and assemble the valve into the cylinder assembly (39). Tap into position until the valve assembly seats on the cylinder lining.

(c) Install pawl spring (25), pawl plunger (24) and pawls (23) into rifle bar (21).

(d) Install the rifle bar flutes into the rifle nut (42) and install rotation release ring (20), into ratchet ring (26). Line up ratchet ring with locating pin (19) and tap into position against the valve cover. Install support ring (27).

(7) Tighten nuts (9) alternately and uniformly to 125 ft. lb. torque.

b. Installation.

(1) Install the drifter drill assembly in reverse of numerical sequence as illustrated in figure 5-7.

(2) Refer to LO 5-3820-241-12 and service the rock drill.

Section IV. DRILL AND FEED CONTROL VALVE

5-13. General

The drill and feed control valve controls the drill feed, blow, and rotation functions and is mounted on the front end of the feed assembly.

5-14. Drill and Feed Control Valve, Removal and Disassembly

a. *Removal.* Refer to TM 5-3820-241-12 and remove the drill and feed control valve.

b. *Disassembly.* Disassemble the drill and feed control valve in disassembly sequence as illustrated in fig. 5-13.

Legend for Fig. 5-13:

1 Roll pin	22 Hex head capscrew
2 Drill valve handle	23 Lockwasher
3 Roll pin	24 End plate
4 Blow valve handle	25 Feed valve
5 Spring pin	26 Hex head capscrew
6 Rotation valve handle	27 Valve cap
7 Valve detent	28 Stem seal
8 Roll pin	29 Clevis seal
9 Feed valve handle	30 Driver
10 Valve detent	31 Body seal
11 Hex head capscrew	32 Disc
12 Lockwasher	33 Hex head capscrew
13 Drill section cap	34 Lockwasher
14 Stem seal	35 Feed valve body
15 Seal clevis	36 Rotation valve body
16 End plate pin	37 Hex head capscrew
17 Hex head capscrew	38 Lockwasher
18 Lockwasher	39 Manifold
19 End plate	40 Driver
20 Rotation valve	41 Body seal
21 End plate pin	42 Disc
	43 Valve body

5-15. Drill and Feed Control Valve Cleaning, Inspection and Repair

a. Cleaning.

(1) Clean all parts except O-rings with cleaning solvent (FED SPEC PD 680) and dry thoroughly.

(2) Discard and replace all O-rings and seals.

b. Inspection and Repair.

(1) Inspect the machined surfaces on the valves and the inside of the valve bodies for nicks, scratches or excessive wear. Remove light scratches with a fine polishing cloth.

(2) Inspect the manifold mating surfaces for scratches or excessive wear. Inspect the manifold ports to make sure they are open.

(3) Inspect all hardware and threaded areas for crossed threads. Retap threaded holes or replace part. Replace all defective hardware.

5-16. Drill and Feed Control Valve Manifold and Installation

a. Reassembly. Reassemble the drill and feed control valve in the reverse of numerical sequence as illustrated in figure 5-13.

b. Installation.

(1) Refer to TM 5-3805-253-12 and install the drill and feed control valve.

(2) Refer to LO 5-3805-253-12 and service the rock drill.

Section V. BOOM AND FEED PIVOT MECHANISM

5-17. General

a. The chain feed assembly is operated by a heavy duty roller chain powered by a piston air motor which drives a worm gear transmission.

b. The boom and feed pivot mechanism is of a heavy steel construction. It is operated by five double acting, self locking, hydraulic cylinders, one each for feed, lift, boom lift, feed swing and boom swing. All boom and pivot points are equipped with bronze bushings.

5-18. Feed and Feed Chain Removal and Disassembly

a. Removal. Refer to TM 5-3820-241-12 and remove the feed mechanism.

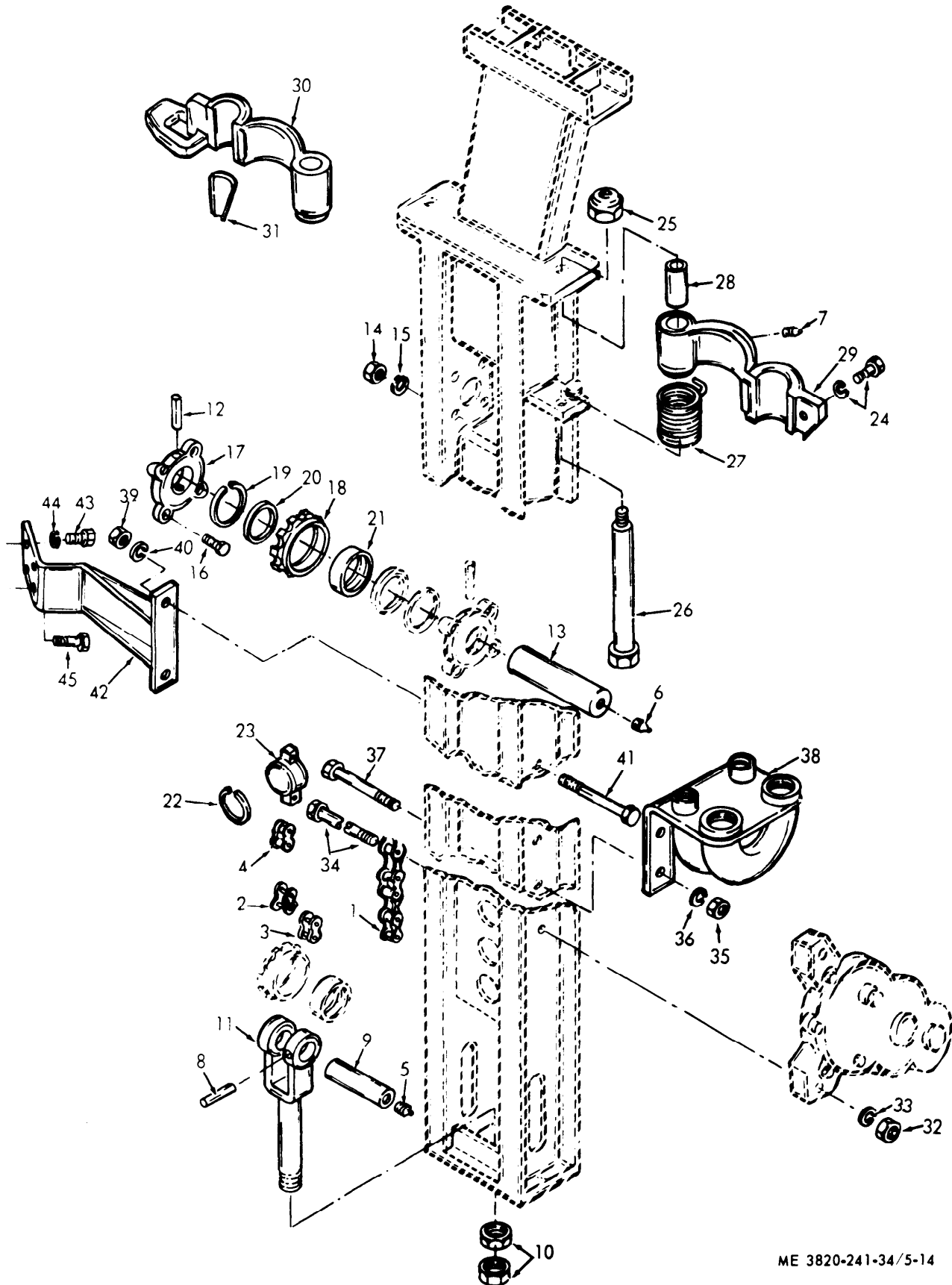
b. Disassembly.

(1) Refer to TM 5-3820-241-12 and remove the centralizer assembly, the drill and feed control valve, and feed assembly.

(2) Remove the feed transmission (para 5-6).

(3) Remove the drifter drill engine (para 5-10).

(4) Disassemble the feed and feed chain mechanism in numerical sequence as illustrated in figure 5-14.



ME 3820-241-34/5-14

Figure 5-14. Feed and feed chain, disassembly and reassembly.

Legend for Fig. 5-14:

1 Feed chain assembly	23 Connector
2 Roller line	21 Hex head capscrew
3 Connecting link	25 Self locking nut
4 Off-set link	26 Machine bolt
5 Lubrication fitting	27 Spring
6 Lubrication fitting	28 Bushing
7 Lubrication fitting	29 Centralizer half
8 Spring pin	30 Centralizer half
9 Pin	31 Bushing
10 Plain hex nut	32 Plain hex nut
11 Adjusting yoke	33 Lockwasher
12 Spring pin	34 Machine bolt
13 Pin	35 Plain hex nut
14 Plain hex nut	36 Lockwasher
15 Lockwasher	37 Hex head capscrew
16 Flex head capscrew	38 Manifold
17 Bushing	39 Plain hex nut
18 Sprocket	40 Lockwasher
19 Snap ring	41 Hex head capscrew
20 Oil seal	42 Bracket
21 Bearing	43 Hex head capscrew
22 Snap ring	44 Hex head capscrew

5-19. Feed and Feed Chain, Cleaning, Inspection and Repair

a. *Cleaning.* Clean all parts in cleaning solvent (FED SPEC PD 680) and dry thoroughly.

b. *Inspection and Repair.*

(1) Inspect the chain and chain drive sprockets for cracks, breaks or excessive wear.

(2) Inspect all bushings and bearings for rough spots or excessive wear.

(3) Inspect all hardware for damaged threads. Replace defective hardware.

(4) Repair by replacement of defective parts.

5-20. Feed and Feed Chain, Reassembly and Installation

a. *Reassembly.*

(1) Reassemble the feed and feed chain mechanism in the reverse of numerical sequence as illustrated in figure 5-14.

(2) Install the feed transmission (para 5-8).

(3) Install the drifter drill engine (para 5-12).

(4) Refer to TM 5-3820-241-12 and install the rock drill feed assembly, centralizer and the feed control valve.

(5) Refer to LO 5-3820-241-12 and service the rock drill.

5-21. Boom Pivot Mechanism, Removal and Disassembly

a. *Removal.*

(1) Refer to TM 5-3820-241-12 and remove the rock drill feed assembly.

(2) Remove the feed tilt cylinder (para 3-2).

(3) Remove the boom lift cylinder (para 3-5).

(4) Remove the feed swing cylinder (para 3-8).

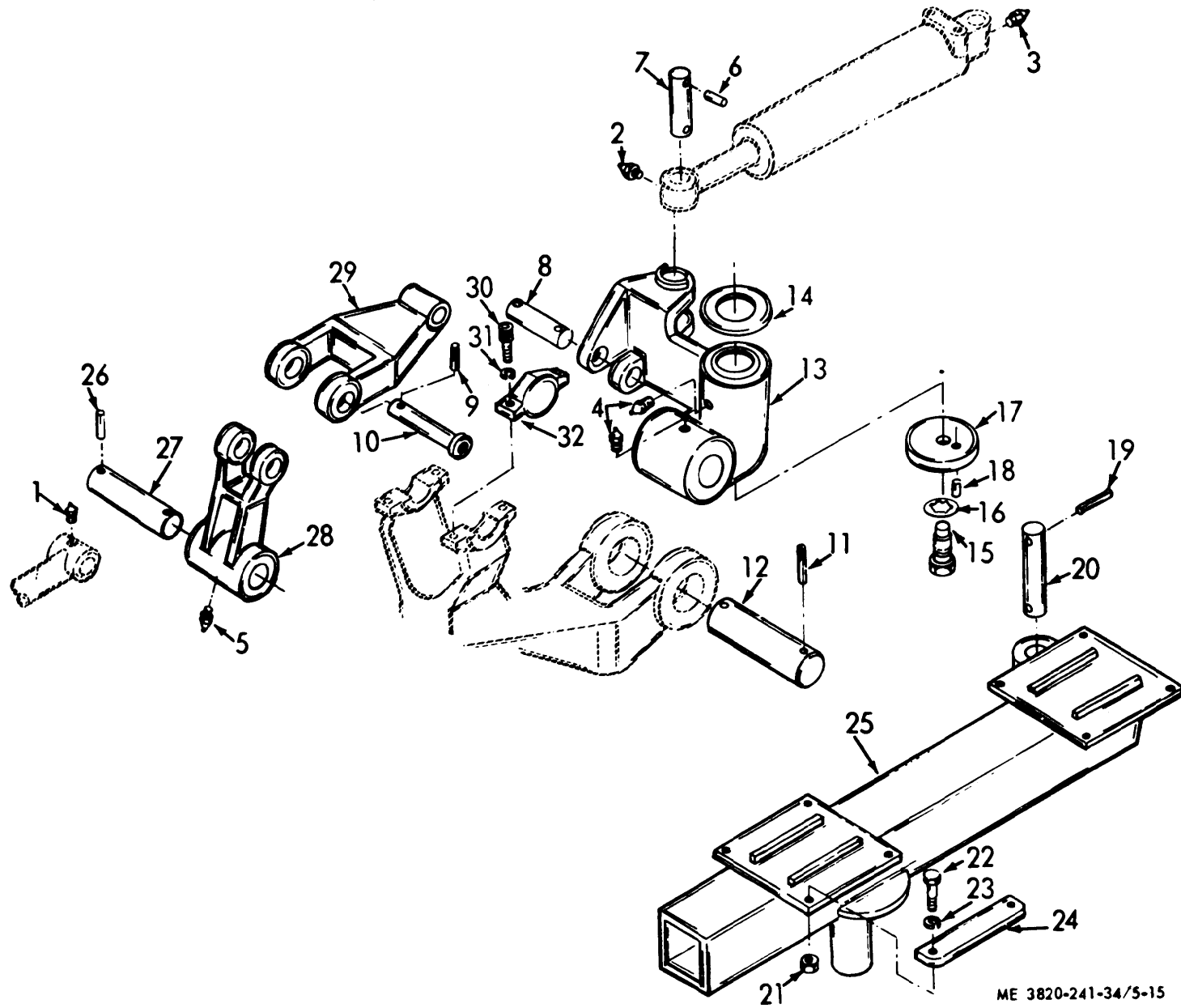
(5) Remove the boom swing cylinder (para 3-11).

(6) Remove the feed extension cylinder (para 3-14).

(7) Remove the tilt and swing boom assembly (para 2-11).

b. *Disassembly.*

(1) Disassemble the boom tilt and swing mechanism in numerical sequence as illustrated in figure 5-15.



ME 3820-241-34/5-15

Figure 5-15. Boom, tilt and swing mechanism, disassembly and reassembly.

Legend for Fig. 5-15:

- | | |
|-----------------------|----------------------|
| 1 Lubrication fitting | 17 Cap |
| 2 Lubrication fitting | 18 Spring pin |
| 3 Lubrication fitting | 19 Spring pin |
| 4 Lubrication fitting | 20 Pivot pin |
| 5 Pipe plug | 21 Plain hex nut |
| 6 Spring pin | 22 Hex head capscrew |
| 7 Pivot pin | 23 Lockwasher |
| 8 Pivot | 24 Gibs |
| 9 Spring pin | 25 Trunnion |
| 10 Pivot pin | 26 Spring pin |
| 11 Spring pin | 27 Pivot pin |
| 12 Pivot pin | 28 Pivot arm |
| 13 Support | 29 Link assembly |
| 14 Flat washer | 30 Hex head capscrew |
| 15 Hex head capscrew | 31 Lockwasher |
| 16 Lockwasher | 32 Cap |

(2) Disassemble the boom components in numerical sequence as illustrated in figure 5-16.

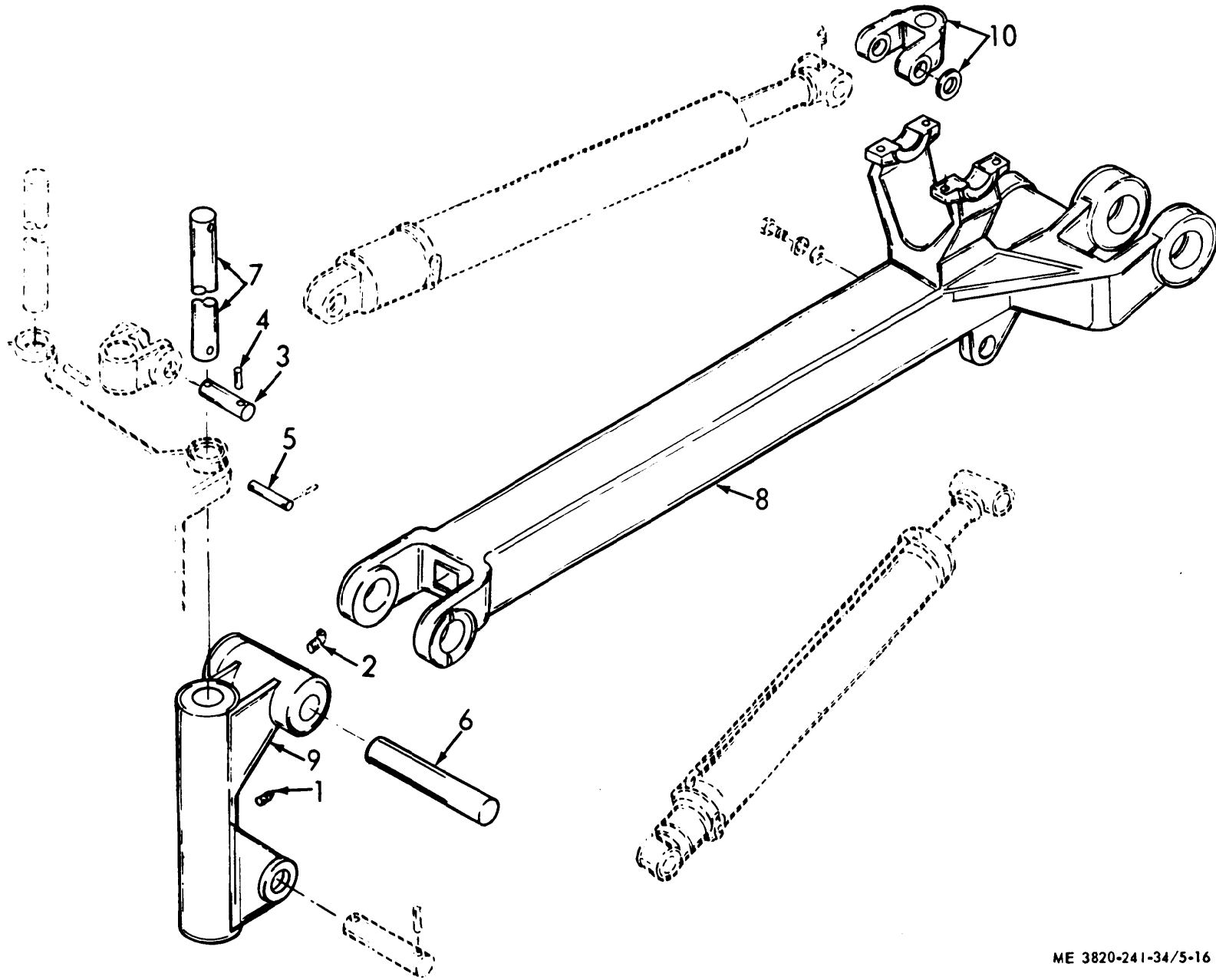


Figure 5-16. Boom mechanism, disassembly and reassembly.

ME 3820-241-34/5-16

Legend for Fig. 5-16:

1 Lubrication fitting	6 Pivot shaft
2 Lubrication fitting	7 Pivot pin
3 Pivot pin	8 RH boom
4 Spring pin	9 Support pivot
5 Spring pin	10 Universal joint

5-22. Boom Pivot Mechanism Cleaning, Inspection and Repair

a. Cleaning. Clean all parts with cleaning solvent (FED SPEC PD 680) and dry thoroughly.

b. Inspection and Repair.

(1) Inspect the boom, boom supports joints, arms and links for cracks breaks or other damage.

(2) Inspect bushings at the pivot points for excessive wear.

(3) Inspect the hardware for damaged threads.

(4) Repair by replacement of defective parts.

5-23. Boom Pivot Mechanism, Reassembly and Installation

a. Reassembly.

(1) Reassemble the boom components in the reverse of numerical sequence as illustrated in figure 5-16.

(2) Reassemble the boom tilt and swing mechanism in the reverse of numerical sequence as illustrated in figure 5-15.

b. Installation.

(1) Install the tilt and swing boom assembly (para 2-12).

(2) Install the feed extension cylinder (para 3-15).

(3) Install the boom swing cylinder (para 3-13).

(4) Install the feed swing cylinder (para 3-10).

(5) Install the boom lift cylinder (para 3-7).

(7) Refer to TM 5-3820-241-12 and install the rock drill feed assembly.

(8) Refer to LO 5-3820-241-12 and lubricate the rock drill.

CHAPTER 6

MAINTENANCE OF THE ROCK DRILL

CRAWLER AND CARRIER

Section I. TRAMMING MOTOR

6-1. General

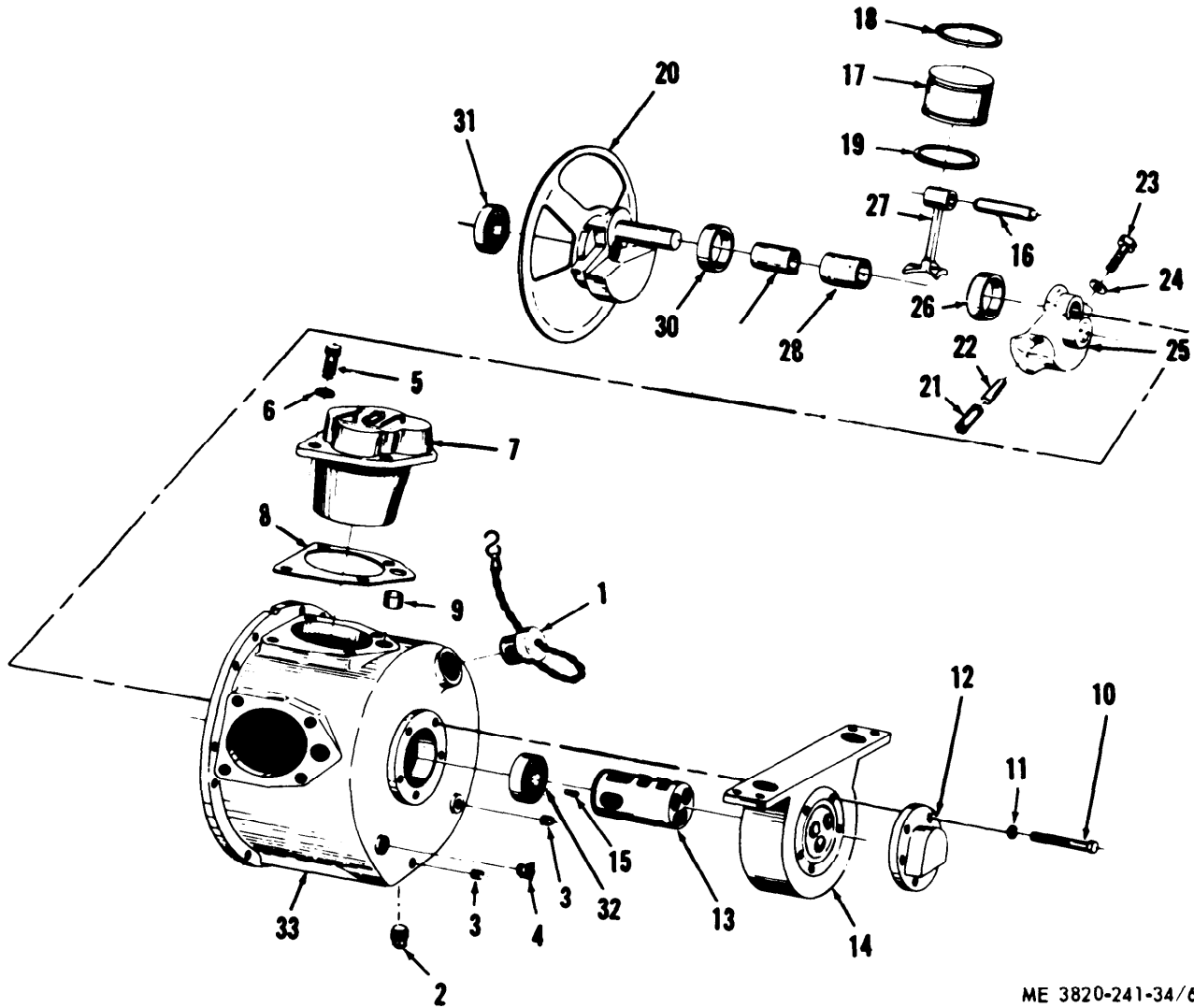
The pneumatic rock drill is equipped with two, 11 horsepower, 5 cylinder reversing air motors used to power the drill carrier through two 35:1 gear reduction transmissions.

6-2. Tramming Motor Removal and Disassembly

a. Removal. Remove the tramming motor (para 2-13).

b. Disassembly.

(1) Disassemble the tramming motor in numerical sequence as illustrated in figure 6-1.



ME 3820-241-34/6-1

- | | | |
|---------------------------|--------------------------|----------------------|
| 1 Oil filler cap assembly | 12 Exhaust cap deflector | 23 Hex head capscrew |
| 2 Oil drain pipe plug | 13 Valve assembly | 24 Washer |
| 3 Oil level pipe plug | 14 Rotary valve housing | 25 Counterbalance |
| 4 Oil level cock | 15 Straight pin | 26 Retaining ring |
| 5 Hex head capscrew | 16 Piston pin | 27 Connecting rod |
| 6 Lockwasher | 17 Piston | 28 Bushing |
| 7 Cylinder assembly | 18 Compression ring | 29 Sleeve |
| 8 Cylinder gasket | 19 Oil ring | 30 Retaining ring |
| 9 Air orifice | 20 Crankshaft assembly | 31 Ball bearing |
| 10 Hex head capscrew | 21 Headless setscrew | 32 Ball bearing |
| 11 Lockwasher | 22 Taper pin | 33 Motor housing |

Figure 6-1. Trimming motor, disassembly and reassembly.

(2) Wedge two screw drivers between the valve housing (14) and motor housing (33) to pry the valve housing loose.

(3) If cylinder (7) is tight in the housing, use a rubber or plastic mallet to free them.

(4) Rotate the crankshaft (20) to bring each piston pin (16) above the motor housing (33), then push out the pin and remove the piston (17).

(5) Pull the crankshaft (20) with attached

connecting rods (27) out of the motor housing (33) by shifting the connecting rods to clear the cylinder holes.

6-3. Trimming Motor, Cleaning, Inspection and Repair

a. *Cleaning.* Clean all parts except the bearings and gasket in cleaning solvent (FED SPEC PD 680) and dry thoroughly.

*b. Inspection and Repair.**(1) Cylinder Compression Test.*

(a) Place the cylinder upside down on a bench and seal off the air port into the cylinder.

(b) Remove the rings from the piston, then drop the piston into the cylinder. The piston should move slowly into the cylinder. If the piston falls into the cylinder it is defective and must be replaced.

(2) Piston, Ring Gap.

(a) Place one ring at a time in cylinder, making sure it is not tilted.

(b) Use a feeler gage and measure the ring cap. If the gap exceeds .015 in. it is defective and must be replaced.

(c) Each new ring must also pass the above test. If the ring will not turn over in the cylinder, file the gap slightly so the ring will turn over.

NOTE

A close cap clearance in air motors presents no problem in air motors since there is no expansion of parts due to heat.

(3) *Connecting Rod Bushing.* Inspect the connecting rod retaining rings for cracks or breaks. Replace rings if cracked.

(4) Rotary Valve Drive Pins.

(a) Check, the three drive pins on the crankshaft end of the rotary valve for a snug fit into the holes of the crankshaft.

(b) If the holes in the crankshaft are enlarged, the crankshaft must be replaced. The tramping motor cannot develop its rated horsepower if the porting in the rotary valve does not match the timing of the piston strokes.

(5) Oil Seals and Bearings.

(a) Inspect the bearings for excessive wear. Replace defective bearings.

(b) Discard and replace all oil seals.

(6) *Rotary Valve.* Check the clearance between the rotary valve and the valve bushing. When wear exceeds .010 inch, replace the housing and bushing.

6-4. Tramping Motor Reassembly and Installation*a. Reassembly.*

(1) Coat all parts with a light film of oil before reassembly.

(2) Reassemble the tramping motor in the reverse of numerical sequence as illustrated in figure 6-1.

(3) Install the connecting rod retaining rings (26) and (30) with the chamfered side next to the connecting rod (27).

b. Installation.

(1) Install the tramping motor (para 2-14).

(2) Refer to LO 5-3820-241-12 and lubricate the rock drill.

Section II. TRAMMING TRANSMISSION, BRAKE AND CRAWLER DRIVE**6-5. General**

The tramping motor brake assembly is mounted between the tramping motor and the transmission gear case. The brake is a deadman type and when the tramping motor is off. The transmission is a planetary type with a 35:1 gear reduction.

6-6. Tramping Transmission, Brake and Crawler Drive Removal and Disassembly*a. Removal.*

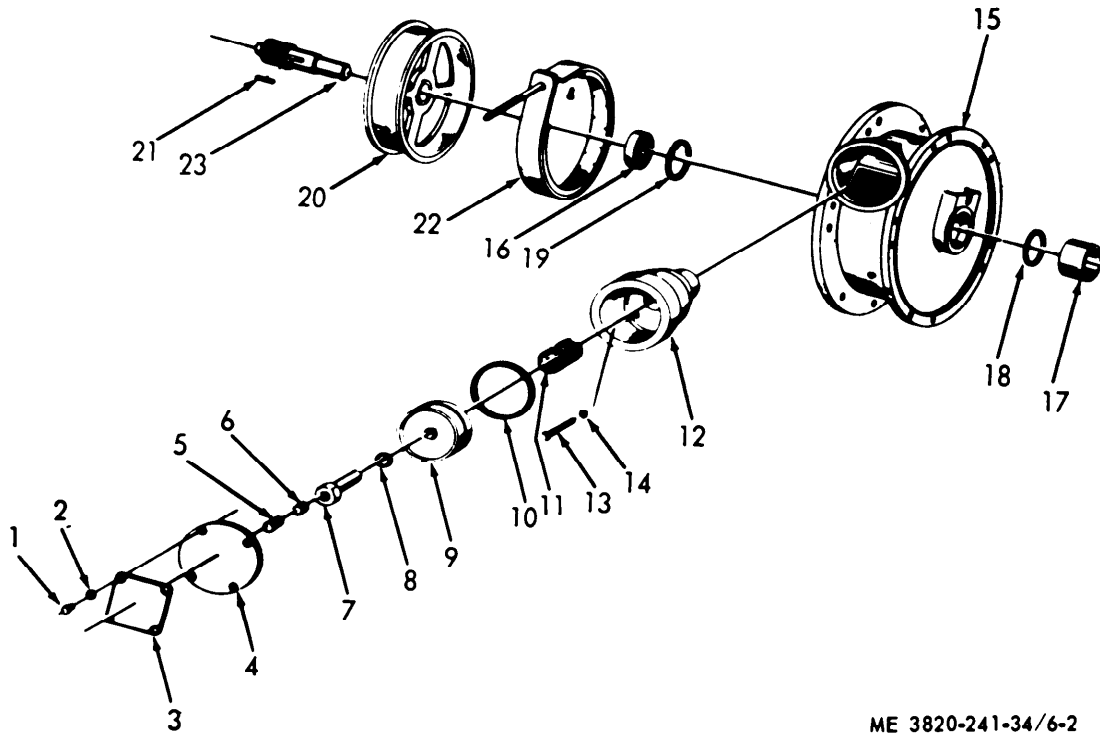
(1) Remove the tramping motor (para 2-13).

(2) Remove the tramping transmission and brake housing (para 2-17).

b. Disassembly.

(1) *Tramping Brake.*

(a) Disassemble the tramping transmission brake in a numerical sequence as illustrated in figure 6-2.



ME 3820-241-34/6-2

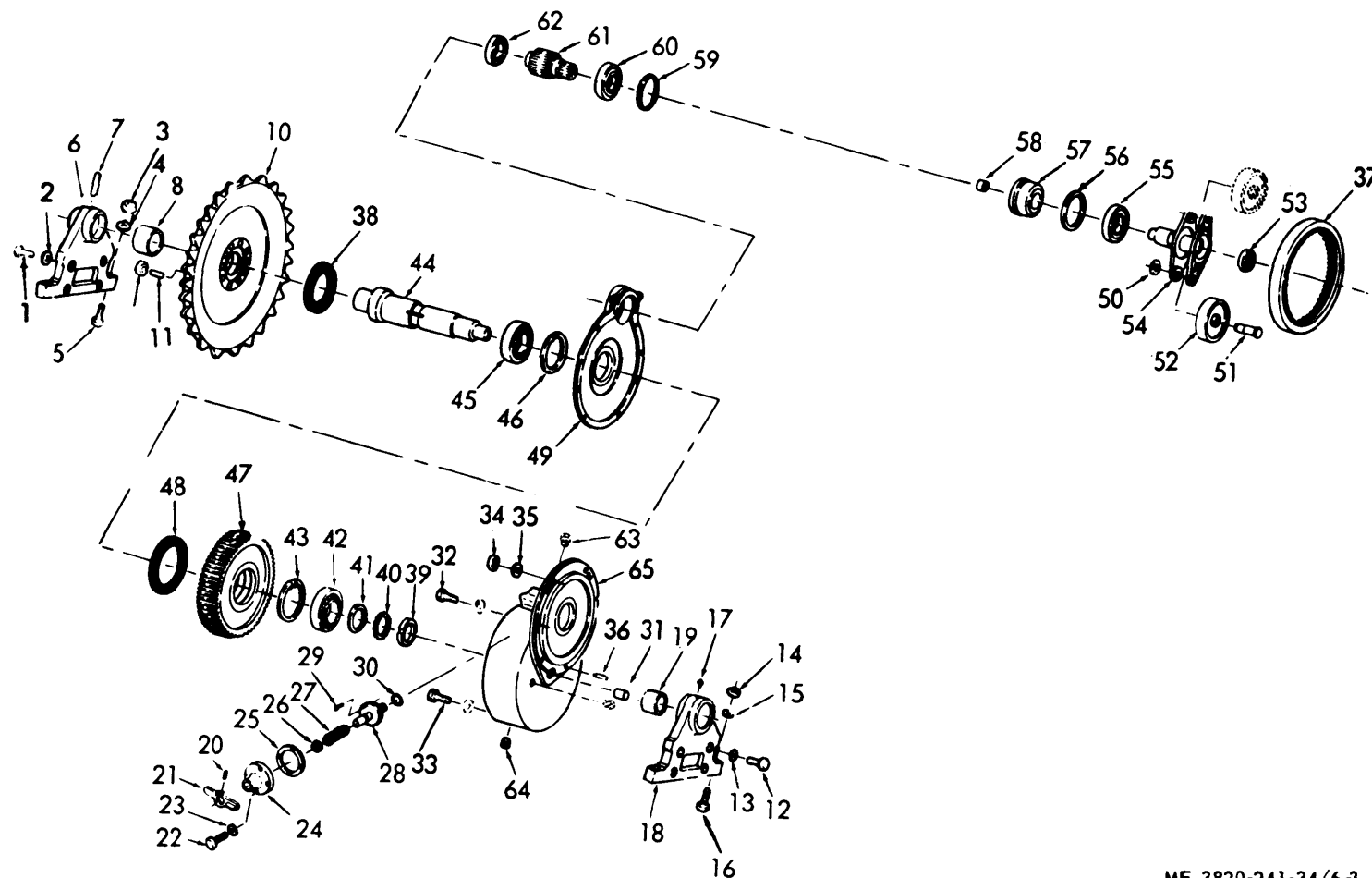
- | | | | |
|---------------------|------------------|---------------------------|---------------------------|
| 1 Hex head capscrew | 7 Adjusting nut | 13 Hex head capscrew | 19 Hearing retaining ring |
| 2 Lockwasher | 8 O-ring | 14 Lockwasher | 20 Bearing retaining ring |
| 3 Name plate | 9 Piston | 15 Gear and brake housing | 21 Brake band assembly |
| 4 Air motor cover | 10 Piston O-ring | 16 Breather vent plug | 22 Brake drum |
| 5 Pipe plug | 11 Spring | 17 Housing bearing | 23 Brake drum shaft |
| 6 Set screw | 12 Cylinder head | 18 Housing bearing | 24 Brake drum shaft key |

Figure 6-2. Trimming transmission, brake, disassembly and reassembly

(b) To remove the brake band (21) from the brake (22), expand the brake band sufficiently to clear the flange on the brake drum.

(2) *Trimming Transmission.*

(a) Disassemble the trimming transmission gear case, and the carrier gears in numerical sequence as illustrated in figure 6-3.



ME 3820-241-34/6-3

- | | | | | | |
|------------------------|-------------------------|----------------------|----------------------------|--------------------------------|-----------------------------|
| 1 Hex head capscrew | 12 Hex head capscrew | 23 Lockwasher | 34 Plain hex nut | 45 Bearing cone | 56 Internal retaining ring |
| 2 Lockwasher | 13 Lockwasher | 24 Clutch bracket | 35 Lockwasher | 46 Internal retaining ring | 57 Clutch coupling |
| 3 Plain hex nut | 14 Plain hex nut | 25 Gasket | 36 Dowel pin | 47 Drive gear | 58 Bronze bearing |
| 4 Lockwasher | 15 Lockwasher | 26 O-ring | 37 Internal planetary gear | 48 Oil seal | 59 Internal retaining ring |
| 5 Hex head capscrew | 16 Hex head capscrew | 27 Clutch spring | 38 Cover oil seal | 49 Cover | 60 Roller bearing |
| 6 Pillow block | 17 Lubrication fitting | 28 Clutch shaft | 39 Bearing lock nut | 50 Idler gear to pin snap ring | 61 Second stage gear pinion |
| 7 Lubrication fitting | 18 Pillow block | 29 Bronze bearing | 40 Bearing locknut washer | 51 Idler gear pin | 62 Roller bearing |
| 8 Pillow block bushing | 19 Pillow block bushing | 30 O-ring | 41 Bearing washer | 52 Idler gear | 63 Vent plug breather |
| 9 Sprocket nut | 20 Spring pin | 31 Pin | 42 Bearing | 53 Ball bearing | 64 Pipe plug |
| 10 Drive sprocket | 21 RH clutch handle | 32 Hex head capscrew | 43 Bearing retaining ring | 54 Planetary carrier | 65 LH gear housing |
| 11 Sprocket stud | 22 Hex head capscrew | 33 Hex head capscrew | 44 Axle shaft | 55 Ball bearing | |

Figure 6-3. Trimming transmission and crankshaft, e. disassembly and reassembly.

(b). Use a suitable press to move bearings (42) and (45) from shaft (44)

6-7. Trimming Transmission Brake and Crawler Drive Cleaning, Inspection and repair

a. Cleaning.

(1) Clean all parts except O-rings and seals with cleaning solvent (FED SPEC PD 680) and dry thoroughly.

(2) Discard and replace all seals and O-ring.

b. Inspection and Repair.

(1) *Tramming Brake.*

(a) Insert the brake piston (9, fig. 6-2) into the cylinder head (12) and check to make sure it moves freely.

(b) Inspect the brake lining for excessive wear, if lining is less than 1/32-in. thick above rivet head, replace the lining.

(c) Inspect the brake drum for excessive wear or scoring. Replace a defective drum.

(d) Inspect all hardware and threaded areas for crossed threads, retap threaded holes and replace defective hardware.

(2) *Tramming Transmission.*

(a) Inspect all gears for missing or broken teeth.

(b) Inspect all bearings for excessive wear other damage.

(c) Inspect pillow block bushings for excessive wear.

(d) Inspect all hardware and threaded areas for crossed threads. Retap threaded holes and replace defective hardware.

(e) Repair by replacement of defective parts.

6-8. Trimming Transmission Brake and Crawler Drive, Reassembly and Installation

a. Reassembly.

(1) *Tramming Transmission.*

(a) Reassemble the tramming transmission gear case in the reverse of numerical sequence as illustrated in figure 6-3.

(b) Use a suitable press to install bearings on shafts and in housing.

(2) *Tramming Brake.* Reassemble the tramming brake in the reverse of numerical sequence as illustrated in figure 6-2.

b. Installation.

(1) Install the tramming transmission assembly and brake housing (para 2-18).

(2) Install the tramming motor (para 2-14).

(3) Refer to TM 5-3820-241-12 and adjust the tramming brake.

(4) Refer to LO 5-3820-241-12 and lubricate the rock drill.

Section III. CRAWLER SIDE FRAME AND EQUALIZER

6-9. General

The main frame assembly or track section of the rock drill carrier is made up of two box sections welded together. The larger section runs the width of the rock drill and houses a 13 gallon hydraulic oil tank on the right side and a five gallon rock drill oil reservoir on the left side. It also mounts the two tramming motors and tramming transmissions.

6-10. Crawler Side Frame and Equalizer, Removal and Disassembly

a. Removal.

(1) Remove the tramming motor (para 2-13).

(2) Remove the tramming transmission and brake housing (para 2-17).

(3) Remove the crawler drive side frame in numerical sequence as illustrated in figure 6-4.

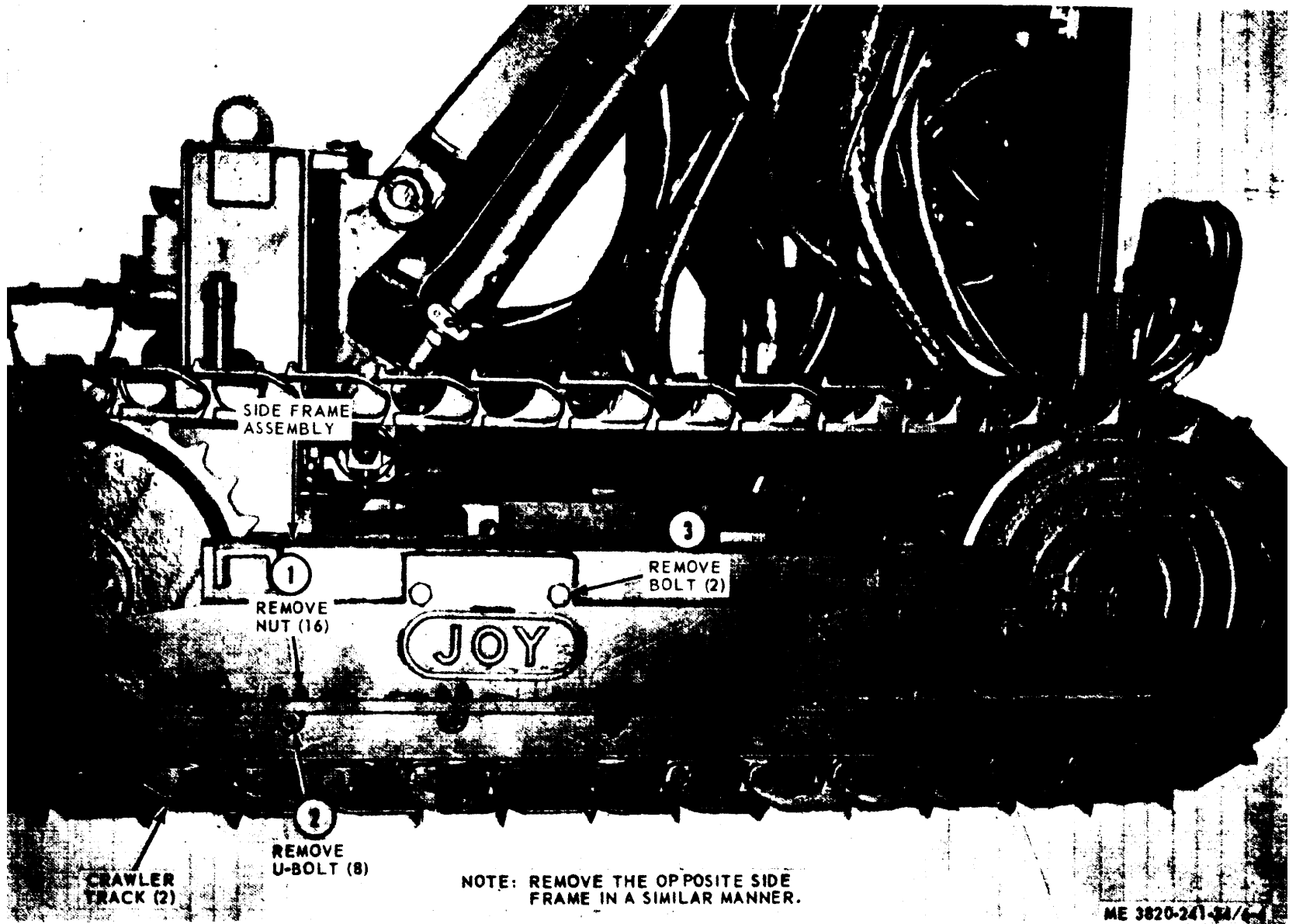


Figure 6-4. Crawler side frame, removal and installation

(4) Remove the equalizer bar and arm as illustrated in figure 6-5.

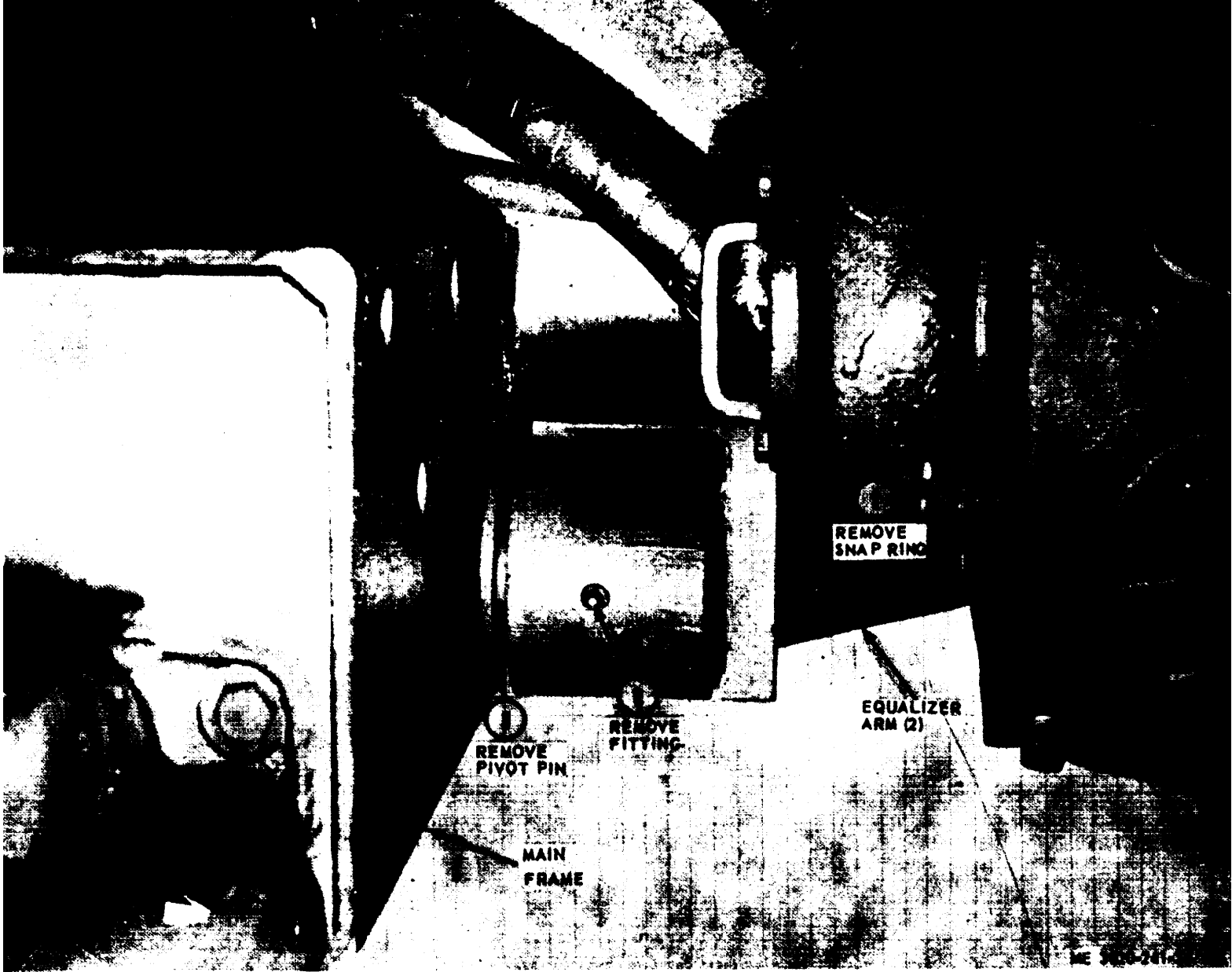


Figure 6-5. Equalizer arm and bar, removal and installation (sheet 1 of 2).

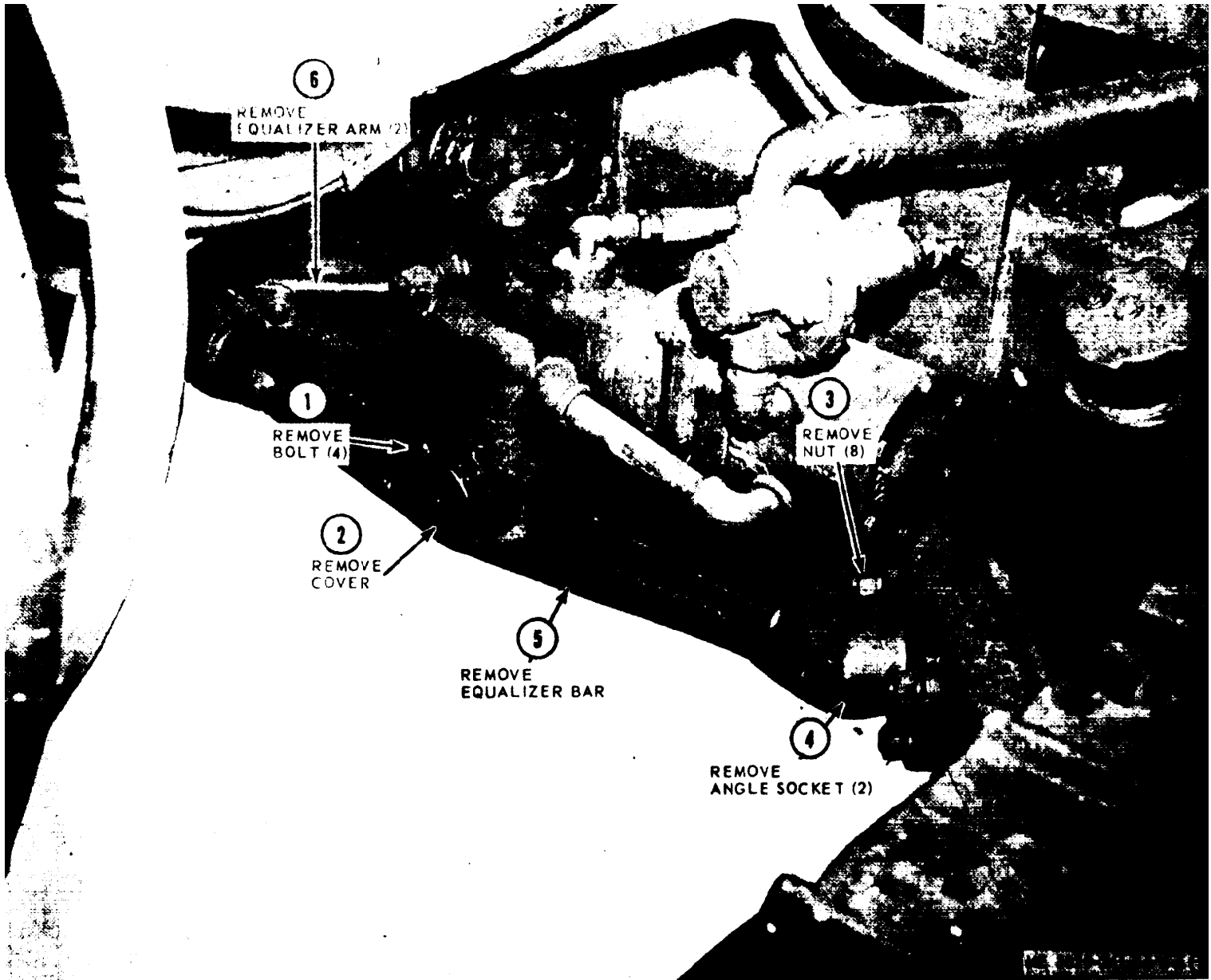
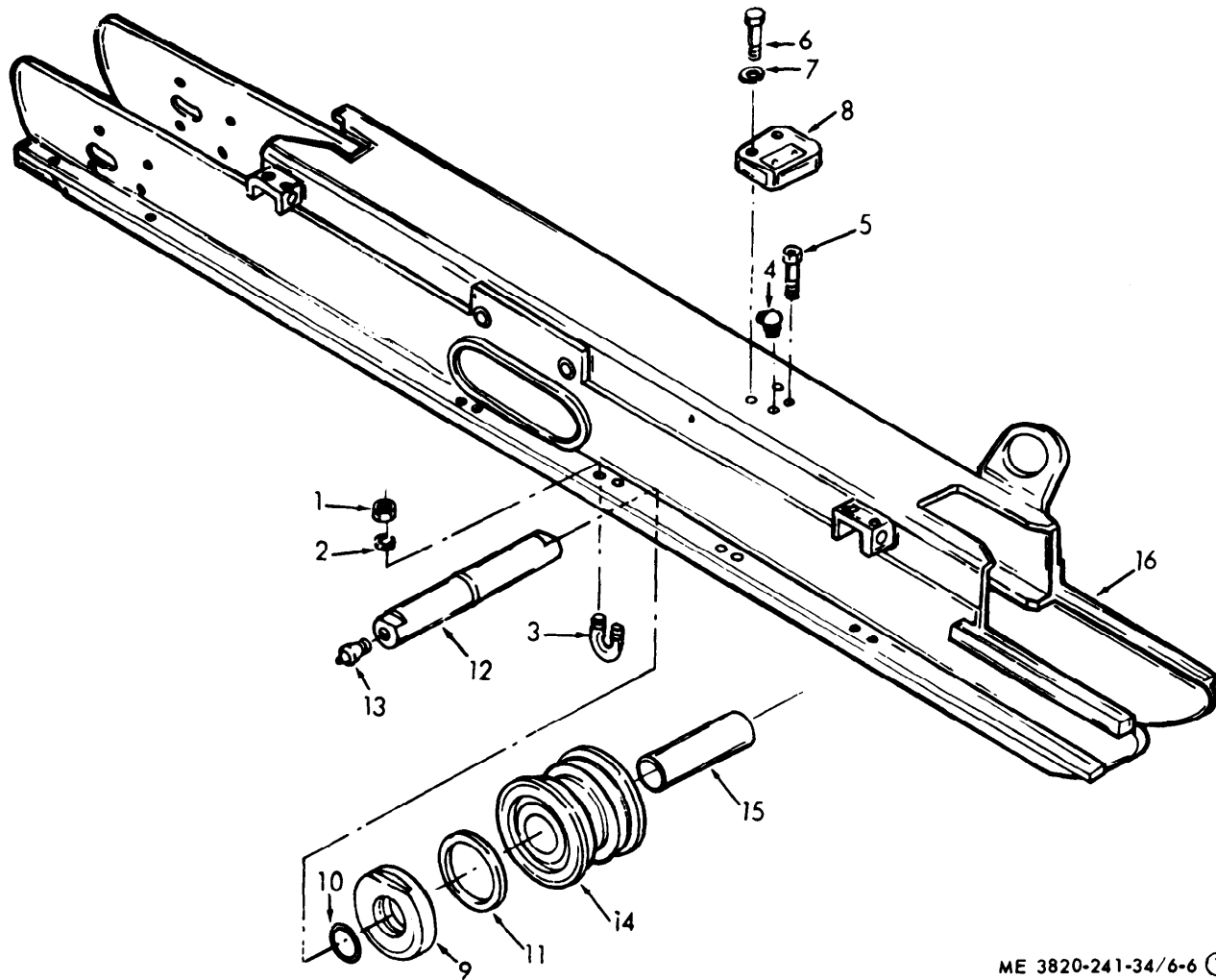


Figure 6-5. Equalizer arm and bar, removal and installation (sheet 2 of 2).

b. Disassembly.

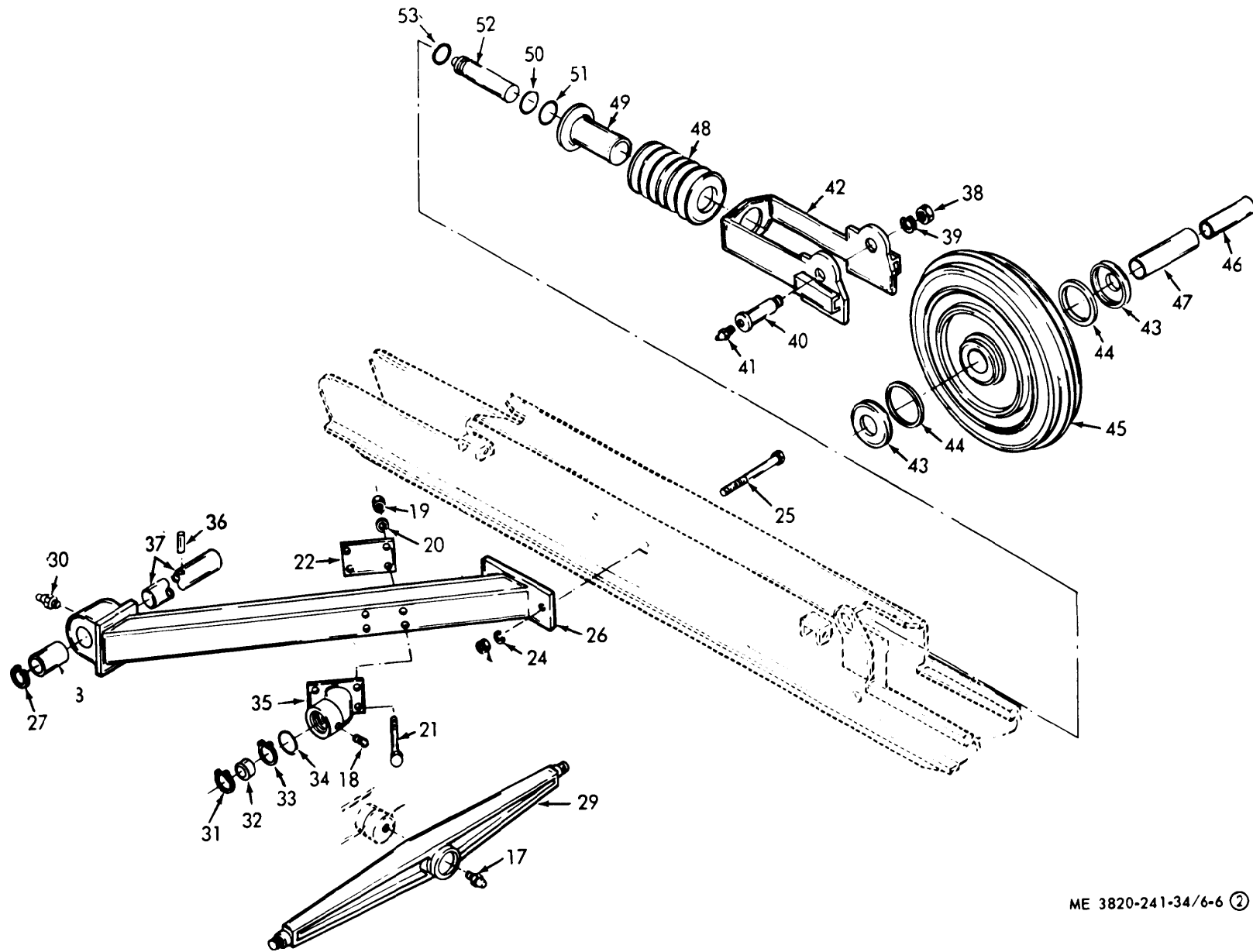
(1) Disassemble the crawler side frame in numerical sequence as illustrated in figure 6-6.



ME 3820-241-34/6-6 ①

- | | | | |
|-----------------------|-------------------------|-----------------|------------------------|
| 1 Plain hex nut | 5 Pressure relief screw | 9 Thrust washer | 13 Lubrication fitting |
| 2 Lockwasher | 6 Hex head capscrew | 10 O-ring | 14 Track roller |
| 3 Roller shaft U-bolt | 7 Lockwasher | 11 Oil seal | 15 Bronze bearings |
| 4 Lubrication fitting | 8 Roller cap | 12 Roller shaft | 16 Side frame weldment |

Figure 6-6. Crawler side frame, disassembly and reassembly (sheet 1 of 2).



ME 3820-241-34/6-6 ②

Figure 6-6. Crawler side frame, disassembly and reassembly (sheet 2 of 2).

Legend for Fig. 6-6: (Cont'd)	35 Angle socket
17 Lubrication fitting	36 Spring pin
18 Lubrication fitting	37 Pivot pin
19 Plain hex nut	38 Plain hex nut
20 Lockwasher	39 Lockwasher
21 Hex head capscrew	40 Yoke mounting shaft
22 Plate	41 Lubrication fitting
23 Plain hex nut	42 Yoke
24 Lockwasher	43 Thrust washer
25 Machine bolt	44 Idler oil seal
26 Equalizer arm	45 Idler
27 Snap ring	46 Bronze idler bearing
28 Bronze bearing	47 Idler spacer shaft
29 Equalizer bar	48 Spring
30 Lubrication fitting	49 Spring cap
31 Snap ring	50 Cap O-ring
32 Bearing	51 Backup leather ring
33 Snap ring	52 Shaft
34 Oil seal	53 Shaft O-ring

(2) Use a suitable press to remove bronze bearings from track roller (14), equalizer arm (26), and track idler (45).

6-11. Crawler Side Frame Cleaning Inspection and Repair

a. Cleaning.

(1) Clean all parts with cleaning solvent, (FED SPEC PD 680) and dry thoroughly.

(2) Discard and replace all oil seals and O-rings.

b. Inspection and Repair.

(1) Inspect all bronze bushings for excessive wear and proper fit on shafts.

(2). Inspect the side frame, equalizer arm,

equalizer bar and idler yokes for cracks breaks or other damage.

(3) Inspect the idler springs and the idler for cracks breaks or other damage.

(4) Inspect all hardware for damaged threads.

(5) Repair minor cracks on side frame equalizer arm and equalizer bar by welding.

(6) Replace defective hardware and other parts.

6-12. Crawler Side Frame and Equalizer, Reassembly and Installation

a. Reassembly.

(1) Reassemble the crawler side frame in the reverse of numerical sequence as illustrated in figure 6-6.

(2) Use a suitable press to install bronze bushings in the track rollers (14). equalizer arm (26) and idler (45).

b. Installation.

(1) Install the equalizer arm and bar as illustrated in figure 6-5.

(2) Install the crawler drive side frame as illustrated in figure 6-4.

(3) Install the tramming transmission and brake housing (para 2-18).

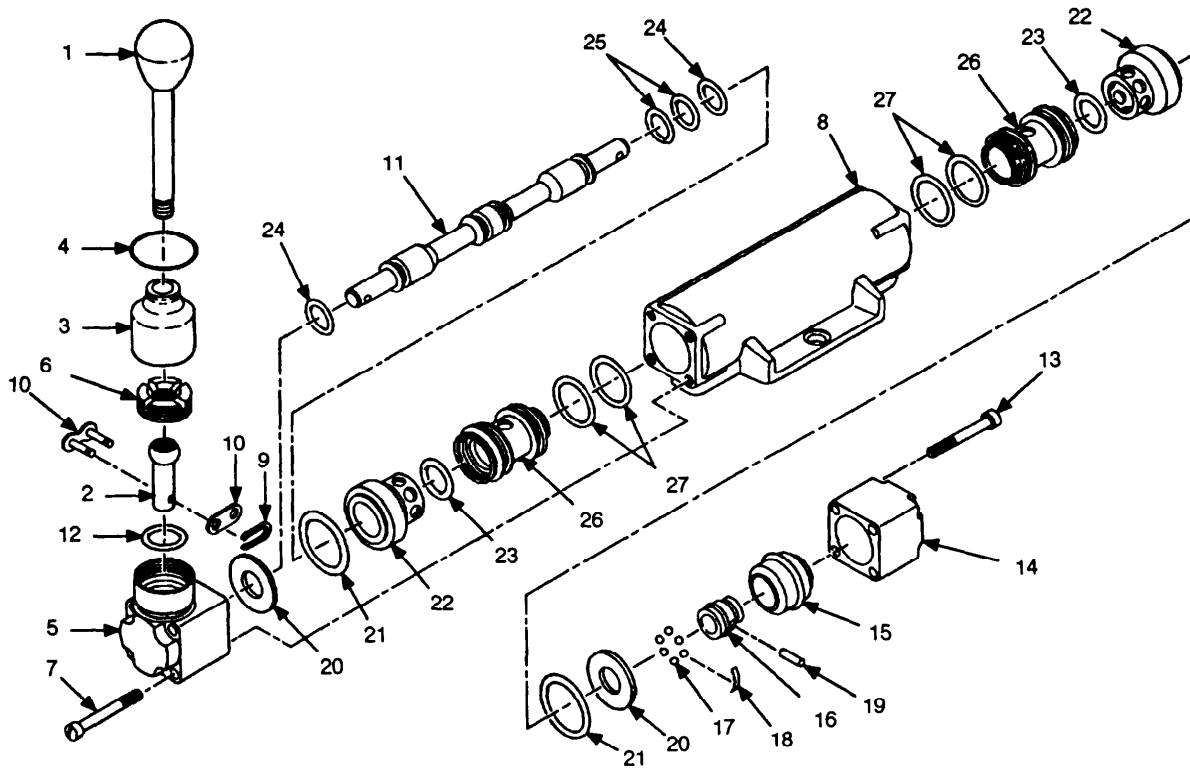
(4) Install the tramming motor (para 2-14).

(5) Refer to LO 5-3820-241-12 and lubricate the rock drill.

CHAPTER 7 MAINTENANCE INSTRUCTIONS FOR UNITS EQUIPPED WITH RETROFIT KIT

Section I. PNEUMATIC SYSTEM

7-1. Remote Control Valve Repair



a. Disassembly.

- (1) Remove valve (see TM 5-3820-241-12).
- (2) Unscrew and remove lever (1) from knuckle (2).
- (3) Remove boot (3) and clip (4) from lever cap (5).
- (4) Remove screw (6) from lever cap (5).
- (5) Remove four screws (7) securing lever cap (5) to body (8).
- (6) Partially remove lever cap (5) from body (8), then remove clip (9) from link assembly (10). Separate link assembly from plunger (11), then fully remove lever cap.
- (7) Remove knuckle (2) and link assembly (10) from lever cap (5).
- (8) Remove O-ring (12) from screw (6). Discard O-ring.

- (9) Remove four screws (13) securing spring cap (14) to body (8). Remove spring cap.
- (10) Remove cage (15) from detent (16) or spring cap (14), being careful not to lose six balls (17). Balls are packed in grease and should stay inside cage.
- (11) Remove spring clip (18) from detent (16).
- (12) Remove pin (19) securing detent (16) to plunger (11). Remove detent from plunger.
- (13) Remove washer (20) and O-ring (21) from each end of body (8). Discard O-rings.
- (14) Remove retainer (22) and O-ring (23) from each end of body (8). Discard O-rings.
- (15) Remove plunger (11) from body (8).
- (16) Remove O-ring (24) from each end of plunger (11). Discard O-rings.

(17) Remove two O-rings (25) from middle of plunger (11). Discard O-rings.

(18) Remove two bushings (26) from body (8).

(19) Remove two O-rings (27) from each bushing (26). Discard O-rings.

b. Inspection.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective gloves and use in a well ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. Do not use near open flame or excessive heat. The flash point is 100-138 degrees F (38-50 degrees C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

(1) Clean all parts with dry cleaning solvent and dry thoroughly.

(2) Check all parts for cracks, damage, and excessive wear. Replace all cracked, damaged, and worn parts.

(3) Inspect two bushings in accordance with TM 9-214. Replace if necessary.

c. Assembly.

(1) Install two new O-rings (27) in each bushing (26).

(2) Install two bushings (26) in body (8).

(3) Install two new O-rings (25) in middle of plunger (11).

(4) Install new O-ring (24) on each end of plunger (11).

(5) Lightly coat plunger (11) with GAA, then install in body (8).

(6) Install new O-ring (23) and retainer (22) in each end of body (8).

(7) Install new O-ring (21) and flatwasher (20) in each end of body (8).

(8) Slide detent (16) over plunger (11) and install pin (19). Secure pin in place with spring clip (18).

(9) Install cage (15) in spring cap (14).

(10) Lightly coat inside of cage (15) with GAA, then press balls (17) into place.

NOTE

Spring cap has an air hole drilled in it. Install spring cap on valve body with air hole facing port side of valve body.

(11) Install spring cap (14) over detent (16). Secure spring cap to body (8) using four screws (13).

(12) Install new O-ring (12) in lever cap (5).

(13) Install knuckle (2) in lever cap (5), then install screw (6). Leave screw loose.

(14) Position lever cap (5) for installation on body (8). Connect link assembly (10) to knuckle (2) and plunger (11) and secure with clip (9).

(15) Secure lever cap (5) to body (8) using four screws (7).

(16) Tighten screw (6).

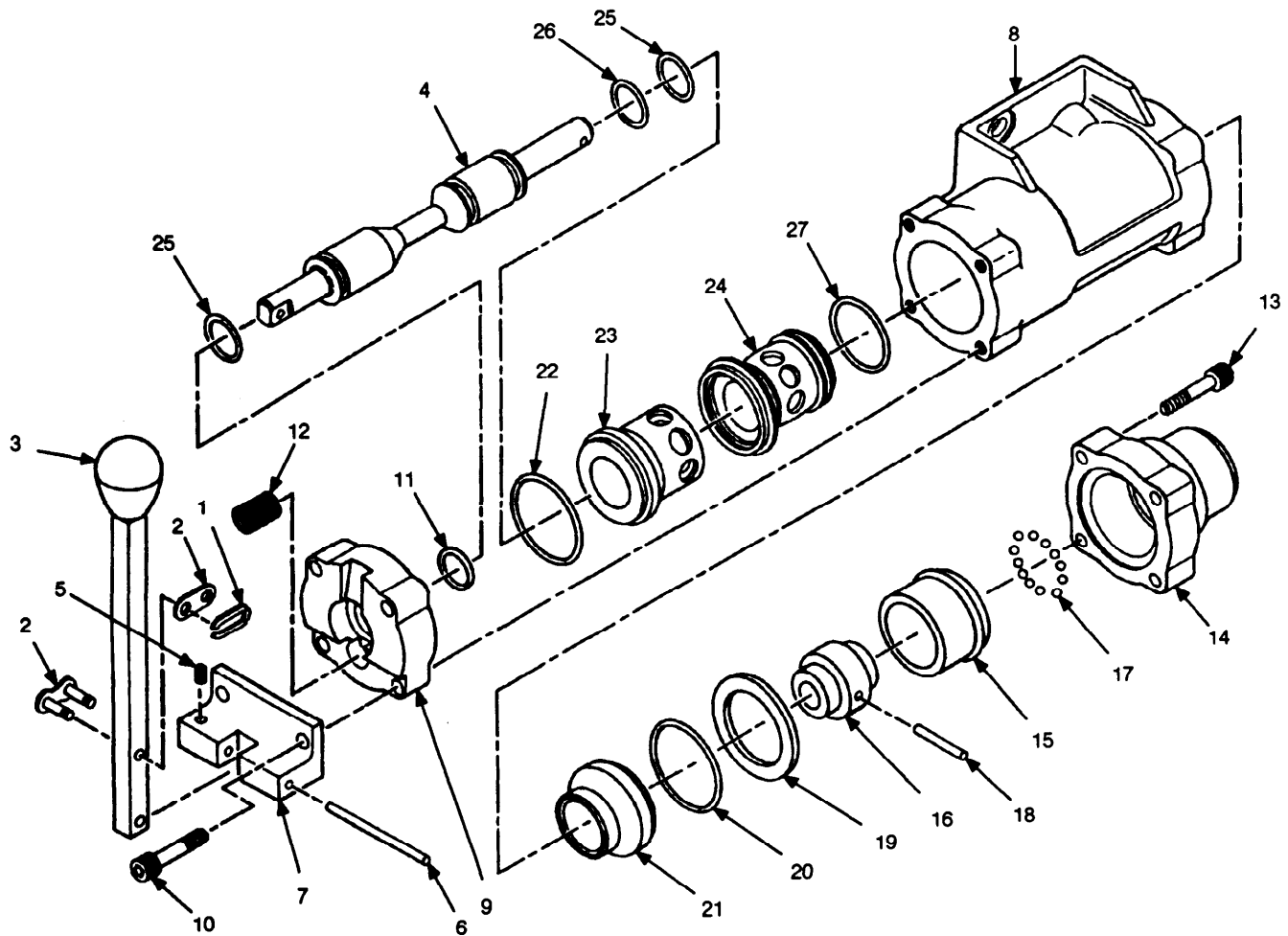
(17) Slide clip (4) and boot (3) over lever (1).

(18) Screw lever (1) into knuckle (2).

(19) Slide boot (3) over lever cap (5) and secure in place with clip (4).

(20) Install valve (see TM 5-3820-241-12).

7-2. Impact Valve Repair



a. Disassembly.

- (1) Remove impact valve (see TM 5-3820-241-12).
- (2) Remove clip (1) from link assembly (2). Remove link assembly from lever (3) and plunger (4).
- (3) Loosen setscrew (5). Remove pin (6), then remove lever (3) from bracket (7).
- (4) Scribe line on body (8) and lever cap (9) so that cap can be installed properly.
- (5) Remove four screws (10) securing bracket (7) and lever cap (9) to body (8). Remove bracket and lever cap from body.
- (6) Remove O-ring (11) and filter (12) from lever cap (9). Discard O-ring and filter.
- (7) Remove four screws (13) securing spring cap (14) to body (8). Remove spring cap.

- (8) Remove cage (15) from detent (16) being careful not to lose 12 balls (17). Balls are packed in grease and should remain inside cage.
- (9) Remove pin (18) securing detent (16) to plunger (4). Remove detent.
- (10) Remove washer (19), O-ring (20), and bearing (21) from body (8). Discard O-ring.
- (11) Remove O-ring (22) and retainer (23) from body (8). Discard O-ring.
- (12) Remove plunger (4) and bushing (24) from body (8).
- (13) Remove O-ring (25) from each end of plunger (4). Discard O-rings.
- (14) Remove O-ring (26) from middle of plunger (4). Discard O-ring.
- (15) Remove O-ring (27) from bushing (24). Discard O-ring.

b. Inspection.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective gloves and use in a well ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. Do not use near open flame or excessive heat. The flash point is 100-138 degrees F (38-50 degrees C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

(1) Clean all parts with dry cleaning solvent and dry thoroughly.

(2) Check all parts for cracks, damage, and excessive wear. Replace all cracked, damaged, and worn parts.

(3) Inspect bushing and bearing in accordance with TM 9-214. Replace if necessary.

c. Assembly.

NOTE

Bushing has only one O-ring.

(1) Install new O-ring (27) on smaller diameter end of bushing (24).

(2) Install bushing (24) in body (8). Install O-ring end first through front of body.

(3) Install new O-ring (26) on middle of plunger (4). Middle O-ring (26) is harder than the other two O-rings (25).

(4) Install new O-ring (25) on each end of plunger (4).

(5) Install plunger (4) in body (8). Install end with two O-rings first through front of body.

(6) Install retainer (23) and new O-ring (22) in body (8).

(7) Install bearing (21) in body (8).

(8) Install detent (16) over plunger (4) and secure with pin (18).

(9) Install new O-ring (20) and flatwasher (19) in body (8).

(10) Lightly coat inside of cage (15) with GAA and press 12 balls (17) into place. Install cage over detent (16).

NOTE

Spring cap has a notch cut into it. Install spring cap with notch facing port side of valve body.

(11) Install spring cap (14) on body (8) using four screws (13).

(12) Install new filter (12) and O-ring (11) in lever cap (9).

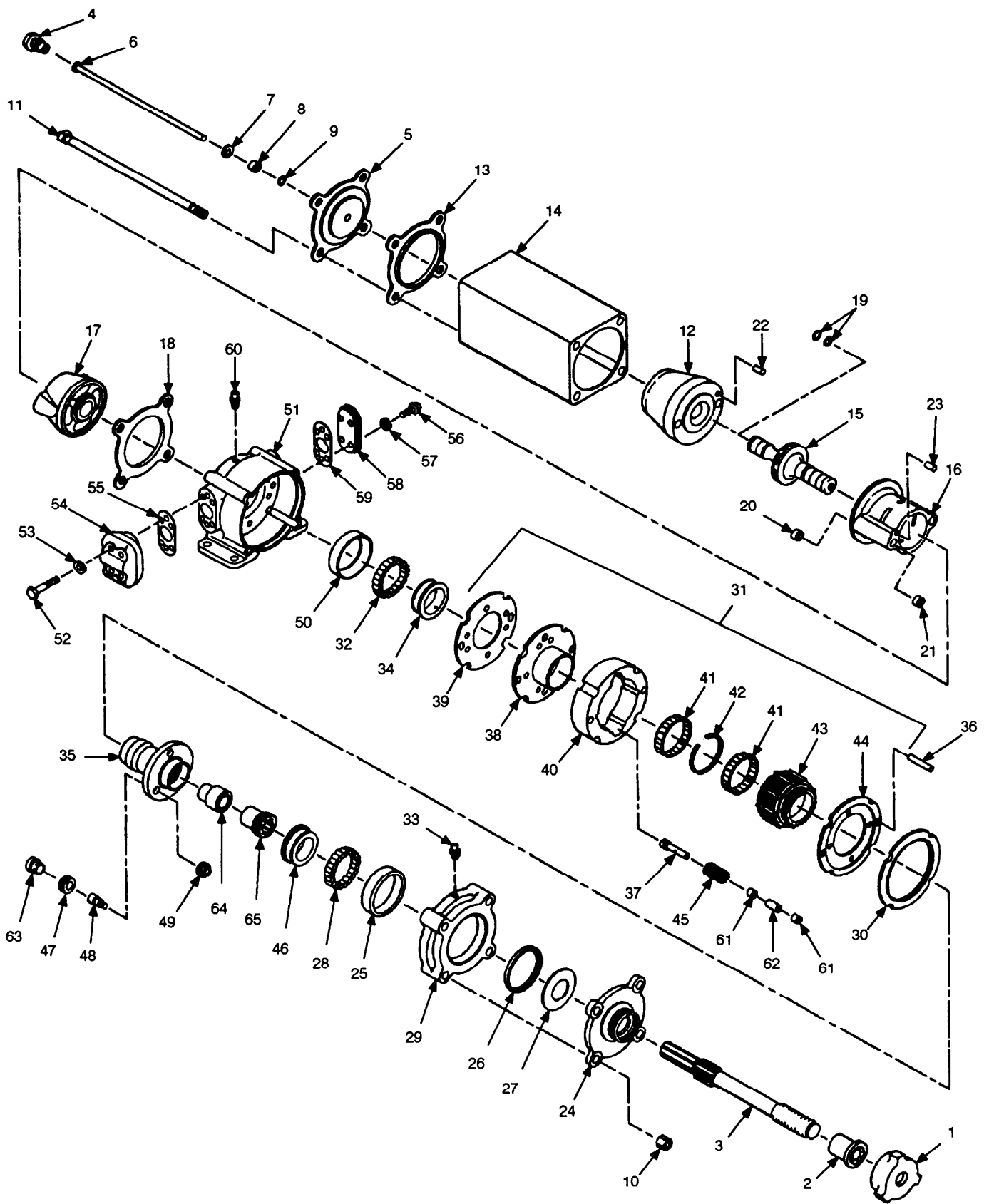
(13) Install lever cap (9) and bracket (7) on body (8) using four screws (10).

(14) Position lever (3) on bracket (7) and install pin (6).

(15) Tighten setscrew (5) in bracket (7).

(16) Connect link assembly (2) to lever (3) and plunger (4), then secure with clip (1).

(17) Install valve (see TM 5-3820-241-12).



7-3. Drifter Drill Repair

a. Disassembly.

- (1) Remove drifter drill (see TM 5-3820-241-12).

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective gloves and use in a well ventilated area. Avoid contact with shin, eyes, and clothes and do not breathe vapors. Do not use near open flame or excessive heat. The flash point is 100-138 degrees F (38-50 degrees C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

NOTE

Clean exterior of drifter drill before disassembly.

Use a babbitt hammer to drive off the heavier exterior parts.

Handle parts carefully. Hardened parts might chip or break if dropped on a hard surface. Other parts may be damaged by improper handling.

Clean disassembled parts in a solvent. Probe ports to loosen and remove foreign matter.

- (2) Unscrew front cap (1) and remove bushing (2) and striker bar (3).
- (3) Remove gland plug (4) from backhead (5).
- (4) Remove air tube (6), washer (7), packing (8), and O-ring (9). Discard packing and O-ring.
- (5) Remove four nuts (10) and side rods (11).
- (6) Lift off backhead (5) evenly and straight, being careful not to disturb upper distributor (12).
- (7) Remove seal (13) and muffler (14). Discard seal.
- (8) Remove and separate upper distributor (12), piston (15), cylinder (16), lower distributor (17), and lower muffler seal (18). Discard seal.
- (9) Remove and discard two O-rings (19) from piston (15).
- (10) Remove and discard two upper (20) and two lower (21) packings from cylinder (16).
- (11) If damaged, remove spring pin (22) from upper distributor (12) and remove spring pin (23) from cylinder (16).
- (12) Turn drifter drill so that front cover (24) faces up.
- (13) Remove front cover (24).

- (14) Remove bearing cup (25), retainer (26), and spring washer (27) from front cover (24).

- (15) Remove bearings (28).

- (16) Remove spacer cover (29), gear (30), air motor assembly (31), and roller bearings (32). If air motor assembly is stuck, lay the drifter drill on its side and gently tap out the air motor assembly with striker bar (3).

- (17) Remove grease fitting (33) from spacer cover (29).

- (18) Remove bearing cone (34) from carrier (35).

- (19) Remove two dowel pins (36), then remove carrier (35).

- (20) Press two shafts (37) out of flange (38). Separate upper plate (39), flange (38), motor housing (40), two bearings (41) and spacer (42), air motor gear (43), lower plate (44), and two gears (45).

- (21) Remove bearing cone (46) from carrier (35).

- (22) Remove three gears (47) from shafts (48).

- (23) Remove nut (49) from each shaft (48) and press shafts out of carrier (35).

- (24) Remove bearing cup (50) from main housing (51).

- (25) Remove four screws (52) and lo&washers (53) securing manifold (54) to main housing (51). Remove manifold and gasket (55). Discard gasket and lockwashers.

- (26) Remove four screws (56) and lo&washers (57) securing cover (58) to main housing (51). Remove cover and gasket (59). Discard gasket and lo&washers.

- (27) Remove grease fitting (60) from main housing (51).

b. Inspection and Repair.

- (1) Inspect all bushings, bearings, cups, and cones in accordance with TM 9-214.

- (2) If replacement is required, press two bearings (61) and bushing (62) out of each gear (45) and replace.

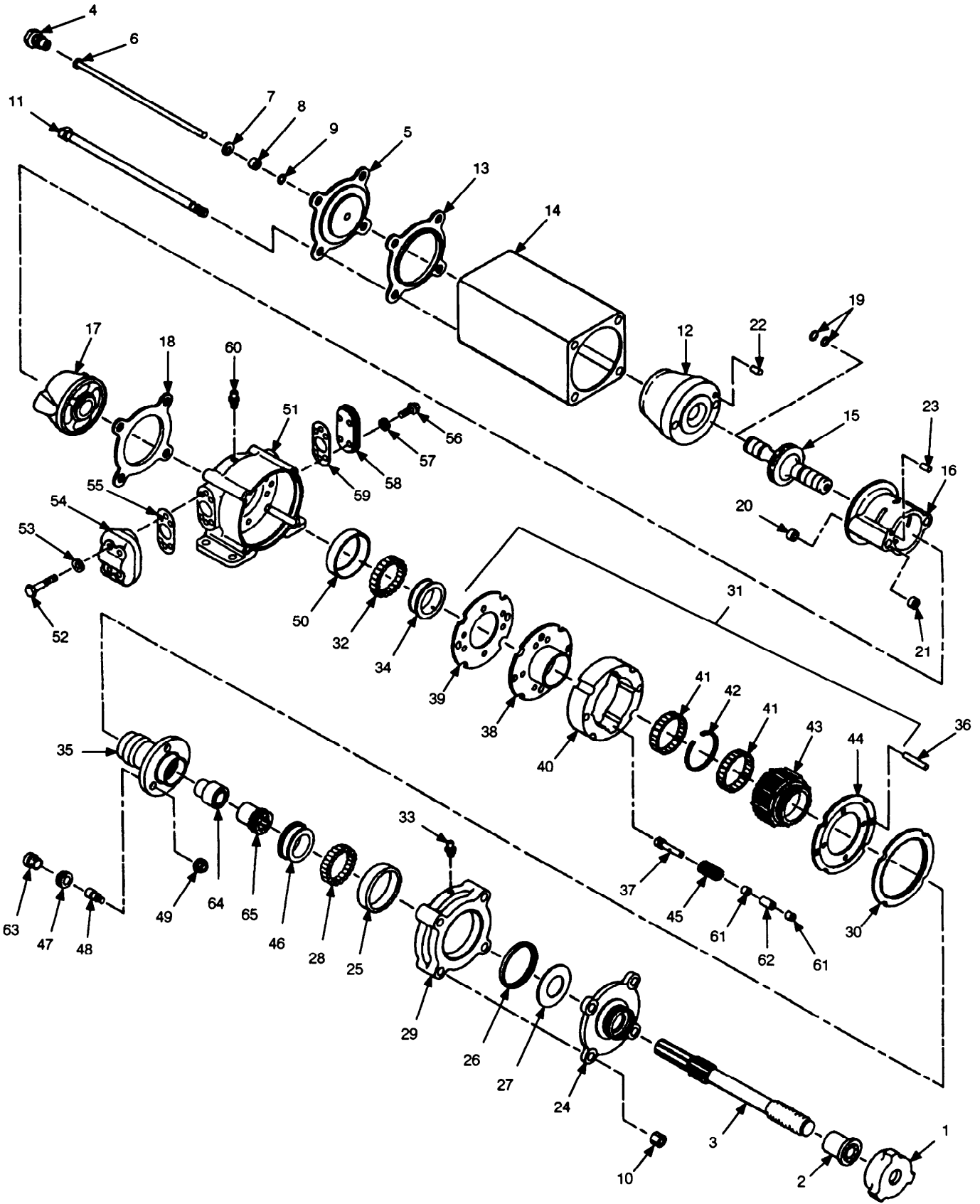
- (3) If replacement is required, press bushing (63) out of each gear (47) and replace.

- (4) Check striking face of piston (15). If wear is greater than 0.030 in., grind striking face square. If wear is greater than 0.050 in., replace piston.

- (5) Check clearance between piston head and cylinder (16). If total clearance is greater than 0.015 in., replace piston, cylinder, or both.

- (6) Check clearance between piston stems and upper and lower distributors (12 and 17). If total clearance is greater than 0.006 in., replace piston, distributors, or all three parts.

- (7) Check for gaulding and burning in the upper and lower distributors (12 and 17) and the cylinder (16). Hone to clean or replace.



(8) Carefully check air tube (6) for splits, cracks, scoring, or excessive wear, particularly in the first 4 in. where the air tube contacts striker bar. Replace cracked, split, scored, or worn air tube.

(9) Inspect plates (39 and 44) for sharp edges and wear. Remove all sharp edges and hone to clean.

(10) Check inside diameter of front bushing (2). If inside diameter is greater than 1.285 in., replace front bushing. If front bushing can no longer be kept tight because of excessive wear on inside face of front cap (1), replace cap.

(11) Check for wear on retainer (26) and both sides of spring washer (27). Replace if worn.

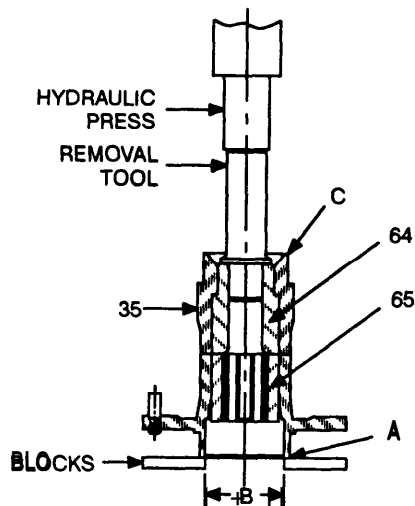
(12) Inspect gland plug (4) for damage and wear. Replace if damaged or worn.

(13) Inspect chuck bushing (64) inside carrier (35). If striking bar imprint is 0.050 in. or greater, replace chuck bushing (see step (16) below).

(14) Check inside diameter of chuck bushing (64). If inside diameter is greater than 1.405 in., replace chuck bushing (see step (16) below).

(15) Check splines on chuck driver (65). If splines are worn half through, replace chuck driver (see step (16) below).

(16) To remove chuck bushing (64) or chuck driver (65):



(a) Set carrier (35) in hydraulic press as shown. End A should rest on blocks set far enough apart and deep enough to allow clearance for the chuck bushing (64) and driver (65) to be pressed through B. Do not attempt to press out parts with carrier resting on face C.

(b) Insert fabricated removal tool (see Appendix B) between press and chuck bushing (64) as shown.

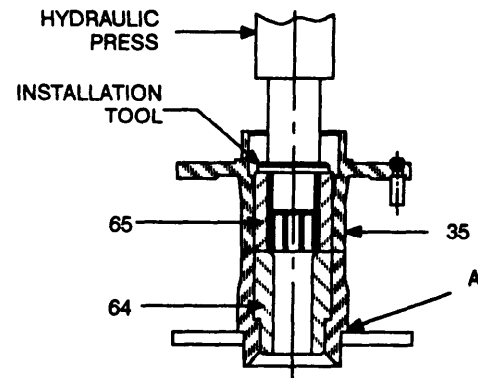
(c) Press chuck driver (65) and bushing (64) out of carrier (35).

(17) To install chuck bushing (64) and driver (65):

(a) Set carrier (35) in hydraulic press as shown. Rest face A on blocks.

(b) Using fabricated installation tool (see Appendix B), press chuck bushing (64), beveled face up, into carrier (35) until seated.

(c) Using fabricated installation tool, press chuck driver (65) into carrier (35), using the minor diameter of the spline marks as a guide.



c. Assembly.

(1) Tap bearing cup (50) into main housing (51).

(2) Install new gasket (59) and cover (58) on main housing (51) using four screws (56) and new lockwashers (57).

(3) Install new gasket (55) and manifold (54) on main housing (51) using four screws (52) and new lockwashers (53).

(4) Install grease fitting (60) in main housing (51).

(5) Press two shafts (37) into flange (38). Carefully orient ends of shafts so that they will properly key into slots in plate (39) when installed.

(6) Install gear (45) on each shaft (37).

(7) Place two bearings (41) and spacer (42) in between gears (45). Ensure that ends of bearings are slightly lower than surface of gears.

(8) Seat motor housing (40) on flange (38). Align two dowel pin holes and tap in two dowel pins (36).

(9) Install air motor gear (43) on flange (38).

(10) Install front plate (44) on dowel pins (36) and shafts (37) and gently tap in place.

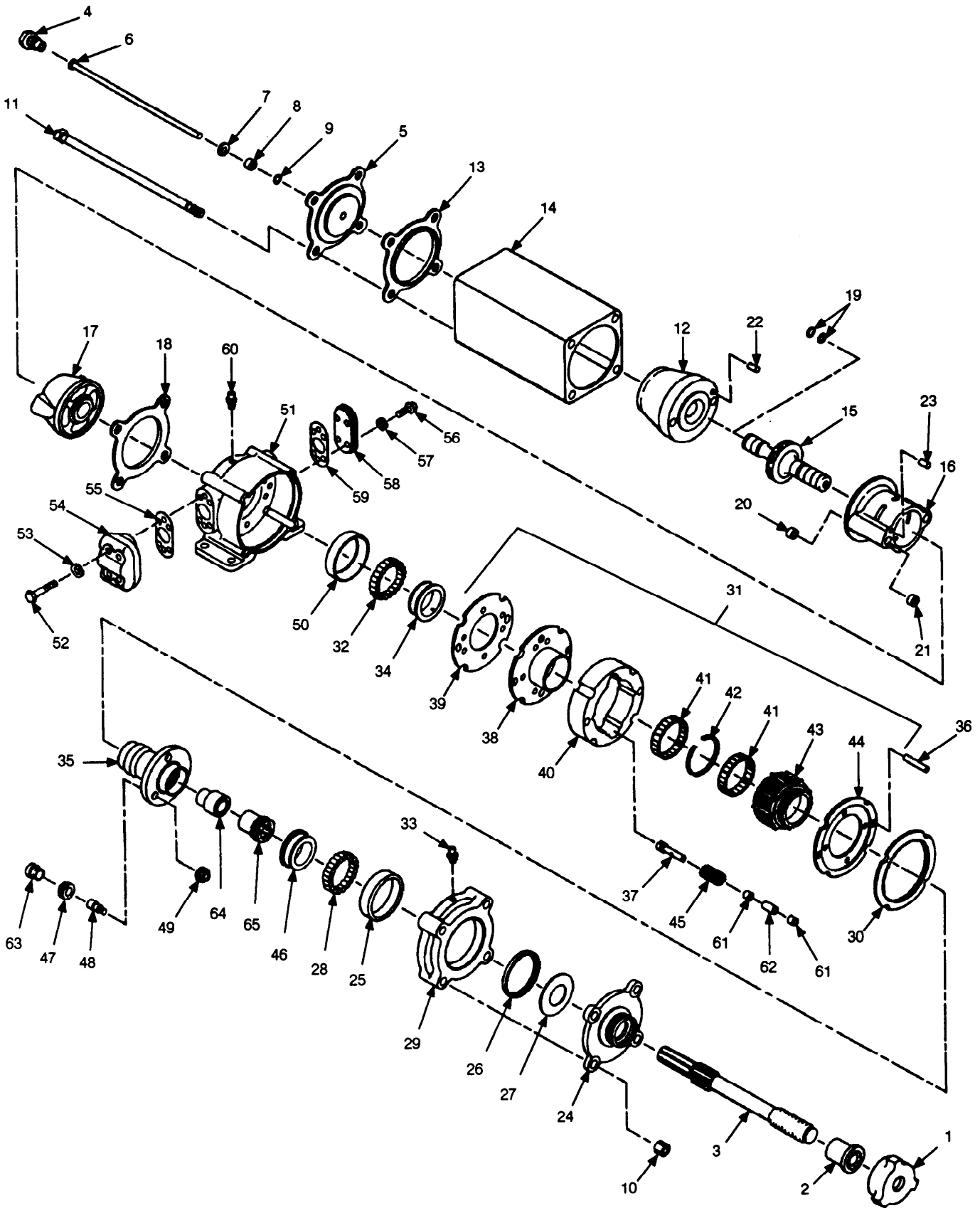
(11) Press three shafts (48) into carrier (35). Install three nuts (49) and secure with thread-locking compound.

(12) Press bearing cone (46) onto carrier (35).

(13) Slide gear (47) onto each shaft (48).

(14) Set carrier (35) face down and slide air motor assembly (31) onto carrier. Ensure gears mesh properly.

(15) Press bearing cone (34) onto carrier (35).



(16) Install plate (39), outer edge bevel facing up, on back of air motor assembly (31). Shafts (37) fit into slots on plate.

(17) Rack roller bearings (32) in accordance with TM 9-214 and install (small end up) on bearing cone (34).

(18) Install main housing (51) over air motor assembly (31). Ensure that shafts (37) are positioned correctly and aline with relief holes in main housing.

(19) Carefully turn main housing (51) over, keeping entire assembly tight to keep gears properly aligned.

(20) Install gear (30), ensuring that notches in gear aline with side rod holes.

(21) Pack roller bearings (28) in accordance with TM 9-214 and install (small end up) on bearing cone (46).

(22) Install grease fitting (33) in spacer cover (29).

(23) Install spacer cover (29) on main housing (51).

(24) Install cup (25) over roller bearing (28).

(25) Install retainer (26) and spring washer (27) on cup (25). Ensure that dished face of spring washer faces retainer.

(26) Install cover (24) on spacer cover (29).

(27) Lay drifter drill on its side and install two of the side rods (11). Align internal parts then remove side rods. Stand drill on front face.

(28) Install new seal (18) on main housing (51).

(29) Insert lower distributor (17) through seal (18) and into main housing (51).

(30) If removed, install spring pin (23) in cylinder (16).

(31) Install two new packings (21) in lower face of cylinder (16).

(32) Install cylinder (16) on lower distributor (17).

(33) Install two new packings (20) in upper face of cylinder (16).

(34) Install two new O-rings (19) in piston (15).

(35) Install piston (15) in cylinder (16), ensuring that striking face is down.

(36) If removed, install spring pin (22) in upper distributor (12).

(37) Install upper distributor (12) over piston (15) and into cylinder (16).

(38) Install muffler (14) and new seal (13). Install muffler so that exhaust port will face slabback when drifter is installed.

(39) Install backhead (5) into upper distributor (12). Install backhead so that port for blow hose elbow is on same side as manifold (54).

(40) Install four side rods (11).

(41) Lay drifter drill on its side and install four nuts (10). Tighten until snug.

(42) Install striker bar (3), bushing (2), and cap (1).

CAUTION

Side rod nuts must have the proper, equal torque to pretension side rods and prevent the nuts from working loose during use. Failure to apply proper torque equally on all nuts could cause equipment damage.

(43) Tighten side rod nuts (10) to 50-75 lb-ft.

NOTE

When drifter drill has been correctly assembled, all parts will operate freely. To check assembly, turn striker bar slowly by hand. It should revolve uniformly. With proper preload on bearings, striker bar can be rotated by hand, but with some difficulty.

(44) Rotate striker bar (3) and ensure that all parts turn freely, then tighten side rod nuts (10) to 100 lb-ft.

(45) Rotate striker bar (3) and ensure that all parts turn freely, then tighten side rod nuts (10) to 150 lb-ft.

(46) Install flatwasher (7), new packing (8), and new O-ring (9) on air tube (6).

(47) Install air tube (6) in drifter drill.

(48) Install gland plug (4).

(49) Install drifter drill (see TM 5-3820-241-12).

(50) Lubricate drifter drill (LO 5-3820-241-12).

Section II. LIFT AND SWING MECHANISM

7-4. Feedshell Maintenance

a. Removal.

(1) Remove the following components in the order listed:

(a) Drifter drill (see TM 5-3820-241-12).

(b) Slabback (see TM 5-3820-241-12).

(c) Feed chain (see paragraph 7-7).

(d) Chain adjuster (see TM 5-3820-241-12).

(e) Feed chain sprockets, bearings, and shafts (see TM 5-3820-241-12).

(f) Feed motor and gearbox assembly (see TM 5-3820-241-12).

(g) Centralizer (see TM 5-3820-241-12).

(h) Foot (see TM 5-3820-241-12).

- (i) Hose bulkhead (see TM 5-3820-241-12).
- (j) Control valves and manifold (see TM 5-3820-241-12).
- (k) Impact valve and manifold (see TM 5-3820-241-12).

(2) Remove feedshell slide bars and cylinder mount (see TM 5-3820-241-12). Once the slide bars and cylinder mount have been removed, the feedshell can be removed from the crawler.

b. Repair. Refer to TM 9-237 for instructions on welding repair.

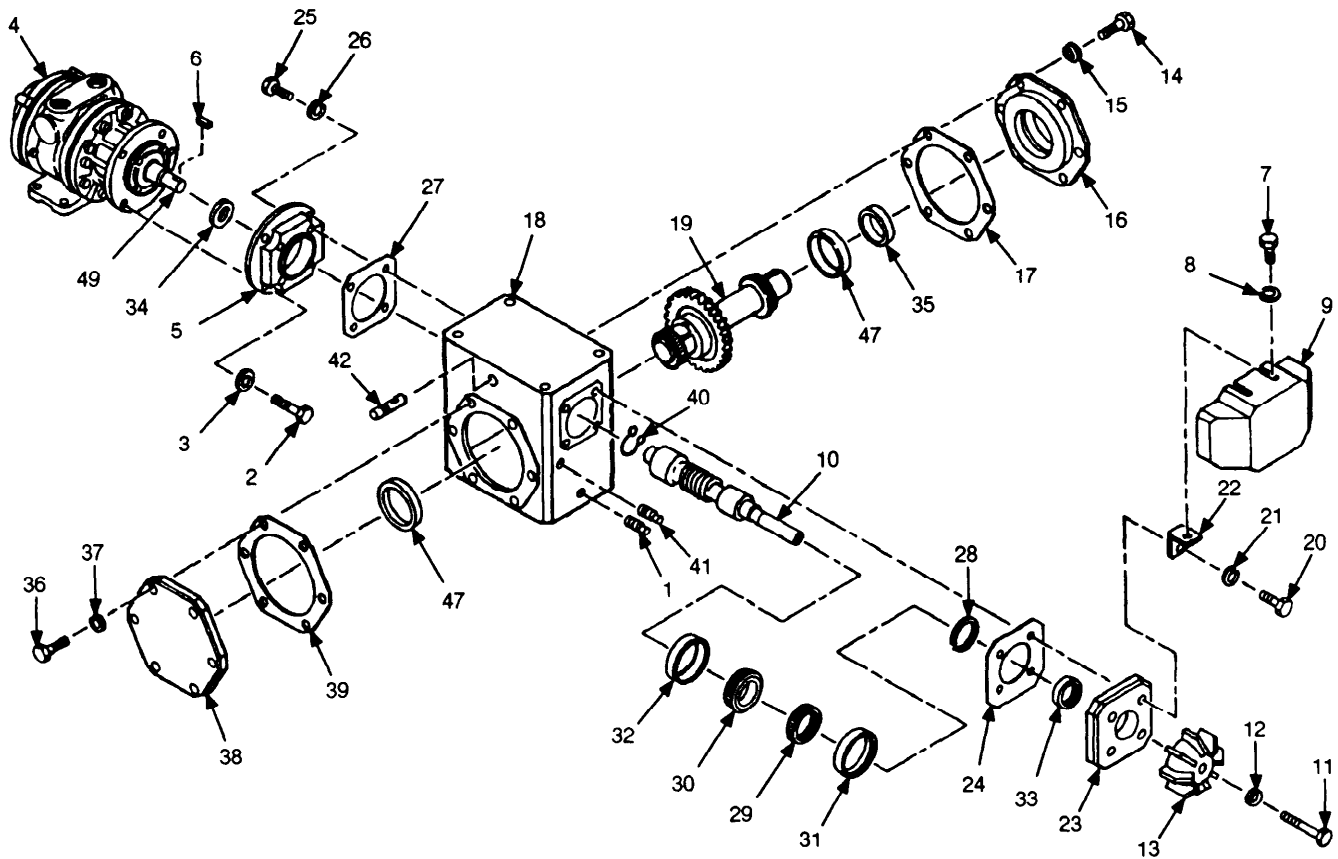
c. Installation.

(1) Install feedshell along with slide bars and cylinder mount (see TM 5-3820-241-12).

(2) Install the following components in the order listed:

- (a) Impact valve and manifold (See TM 5-3820-241-12).
 - (b) Control valves and manifold (see TM 5-3820-241-12).
 - (c) Hose bulkhead (see TM 5-3820-241-12).
 - (d) Foot (see TM 5-3820-241-12).
 - (e) Centralizer (see TM 5-3820-241-12).
 - (f) Air motor and gearbox assembly (see TM 5-3820-241-12).
 - (g) Feed chain sprockets, bearings, and shafts (see TM 5-3820-241-12).
 - (h) Chain adjuster (see TM 5-3820-241-12).
 - (i) Feed chain (see paragraph 7-6).
 - (j) Slabback (see TM 5-3820-241-12).
 - (k) Drifter drill (see TM 5-3820-241-12).
- (3) Adjust chain tension (see TM 5-3820-241-12).

Section III. FEED AND LEVELING MECHANISM



7-5. Gearbox Repair

a. Disassembly.

(1) Remove feed motor and gearbox assembly (see TM 5-3820-241-12).

(2) Remove drain plug (1) and allow oil to drain. Reinstall drain plug.

NOTE

Scribe feed motor and quill motor flange to ensure proper reassembly.

(3) Remove four screws (2) and lockwashers (3) securing feed motor (4) to quill motor flange (5). Remove feed motor and key (6). Discard lockwashers.

(4) Remove four screws (7) and flatwashers (8). Remove fan cover (9).

(5) Hold quill shaft (10) in place and remove screw (11) and lockwasher (12) securing fan (13) to quill shaft. Remove fan. Discard lockwasher.

NOTE

Gaskets on gearbox covers are laminated. Record thickness of gaskets after removing. Use the same thickness when installing gearbox covers.

(6) Remove six screws (14) and lockwashers (15). Remove cover (16) and gasket (17) from housing (18). Discard lockwashers and gasket.

(7) Remove shaft (19) from housing (18).

NOTE

Gaskets on gearbox covers are laminated. Record thickness of gaskets after removing. Use the same thickness when installing gearbox covers.

(8) Remove four screws (20) and lockwashers (21). Remove fan brackets (22), cover (23), and gasket (24) from gear housing (18). Discard lockwashers and gasket.

(9) Remove four screws (25) and lockwashers (26). Remove quill motor flange (5) and gasket (27) from gear housing (18). Discard lockwashers and gasket.

(10) Block gear housing (18) with fan end facing up.

(11) Remove retaining ring (28) from quill shaft (10).

(12) Press out quill shaft (10), removing two bearings (29 and 30) and two cups (31 and 32) when shaft is free.

(13) Remove and discard oil seal (33) from cover (23).

(14) Remove and discard oil seal (34) from quill motor flange (5).

(15) Remove and discard oil seal (35) from cover (16).

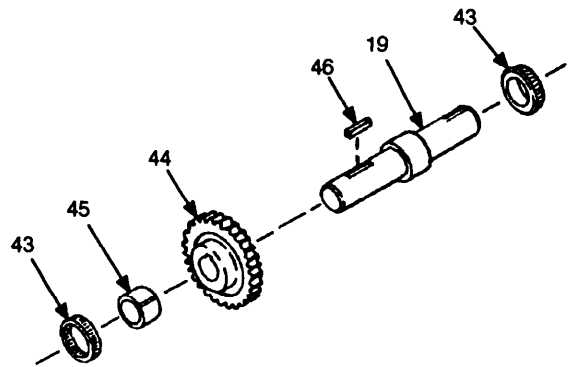
NOTE

Gaskets on gearbox covers are laminated. Record thickness of gaskets after removing. Use the same thickness when installing gearbox covers.

(16) Remove six screws (36) and lockwashers (37). Remove cover (38) and gasket (39) from housing (18). Discard lockwashers and gasket.

(17) Remove retaining ring (40) from housing (18).

(18) Remove drain plug (1), pipe plug (41), and vent plug (42) from housing (18).



b. Inspection.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Wear protective gloves and use in a well ventilated area. Avoid contact with shin, eyes, and clothes and do not breathe vapors. Do not use near open flame or excessive heat. The flash point is 100-138 degrees F (38-50 degrees C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

(1) Clean and inspect bearings (43) on shaft (19) in accordance with TM 9-214. If replacement is required, press out shaft or remove bearings using bearing puller. Press new bearings onto shaft.

(2) Inspect worm gear (44) for cracked, chipped, or broken teeth. If replacement is required, press out shaft (19) and remove bearings (43), spacer (45), worm gear, and key (46). Install key, new worm gear, and spacer on shaft, then press on two new bearings.

(3) Inspect quill shaft (10) for stripped or damaged threads. Replace if damaged.

(4) Clean and inspect bearing cups (47) in covers (16 and 38) in accordance with TM 9-214. Remove and install new bearing cups if required.

(5) Inspect all parts for cracks, breaks, and other signs of damage. Replace all damaged parts.

c. Assembly.

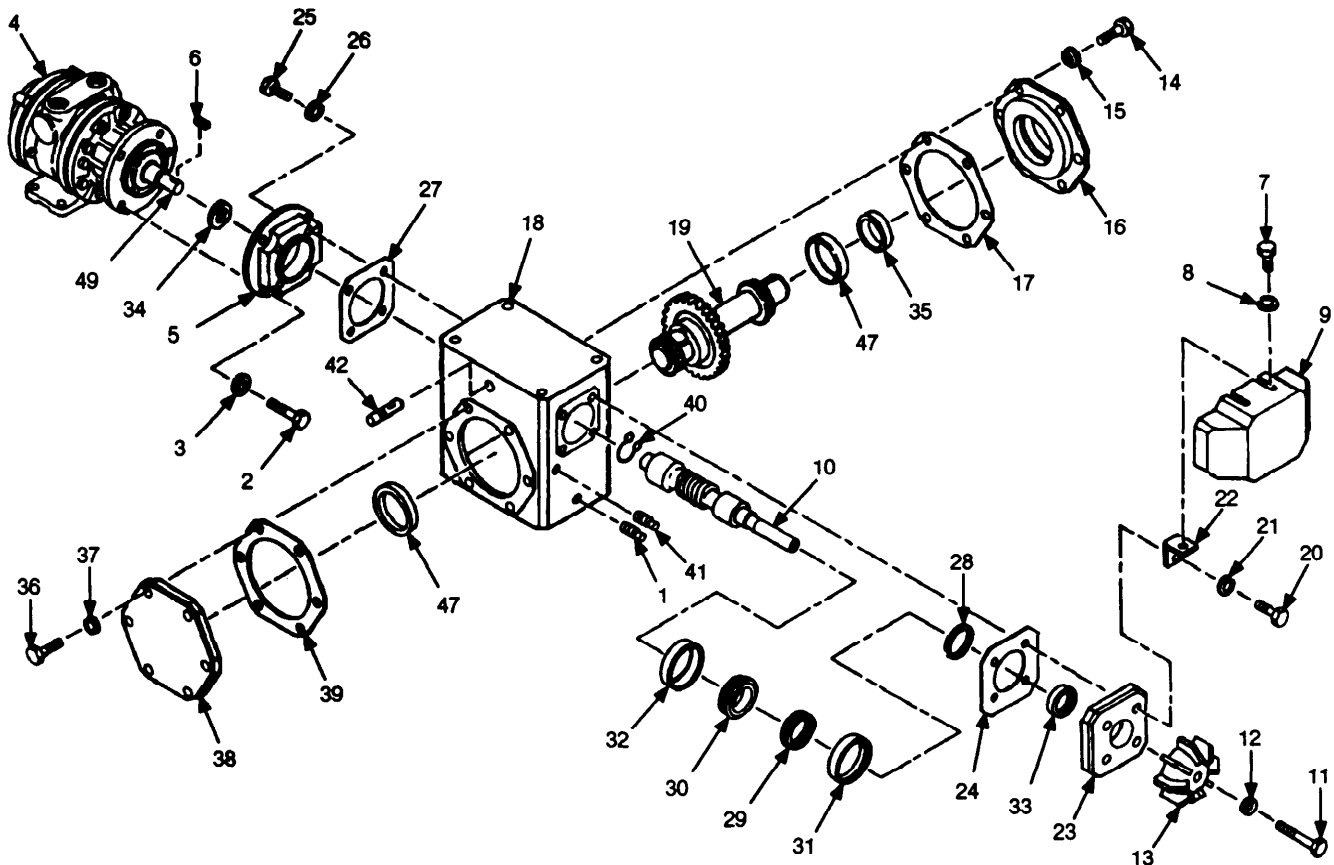
(1) Install vent plug (42), pipe plug (41), and drain plug (1) in gearbox housing (18).

(2) Install retaining ring (40) in gear housing (18).

(3) Install cover (38) and new gasket (39) on housing (18) using six screws (36) and new lockwashers (37).

(4) Insert quill shaft (10) from air motor side of gear housing (18).

(5) Turn gear housing (18) so that fan side is up.



(6) Install bearing cup (32), bearing (30), bearing (29), and bearing cup (31) on quill shaft (10).

(7) Install retaining ring (28).

(8) Install new oil seal (33) in cover (23).

(9) Install cover (23), new gasket (24), and fan brackets (22) on gear housing (18) using four screws (20) and new lockwashers (21).

(10) Install new oil seal (34) in quill motor flange (5).

(11) Install quill motor flange (5) and new gasket (27) on gear motor housing (18) using four screws (25) and new lockwashers (26).

(12) Install shaft (19) in gear housing (18).

(13) Install new oil seal (35) in cover (16).

(14) Install cover (16) and new gasket (17) on gear housing (18) using six screws (14) and new lockwashers (15). Snug two of the screws and then check end play on

shaft (19). Adjust thickness of shim (17) until there is no perceptible end play, then install and fully tighten screws and lockwashers.

(15) Install fan (13) on quill shaft (10) using screw (11) and new lockwasher (12).

(16) Install fan cover (9) on fan brackets (22) using four screws (7) and flatwashers (8).

(17) Position gear housing (18) upright.

(18) Install key (6) in feed motor output shaft (49).

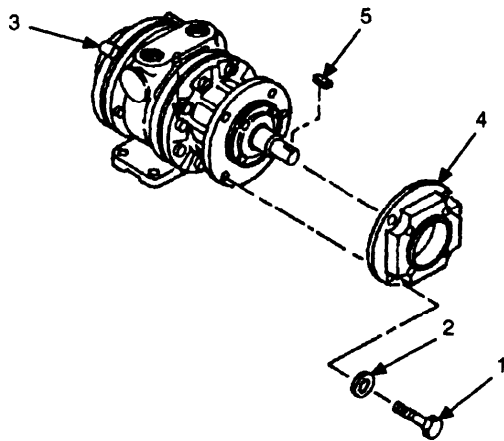
(19) Carefully position feed motor (4) for installation. Ensure that key (6) on feed motor output shaft (49) properly engages keyway in quill shaft (10).

(20) Secure feed motor (4) to quill motor flange (5) using four screws (2) and new lockwashers (3).

(21) Install feed motor and gearbox assembly (see TM 5-3820-241-12).

(22) Service gearbox (see LO 5-3820-241-12).

7-6. Feed Motor Repair



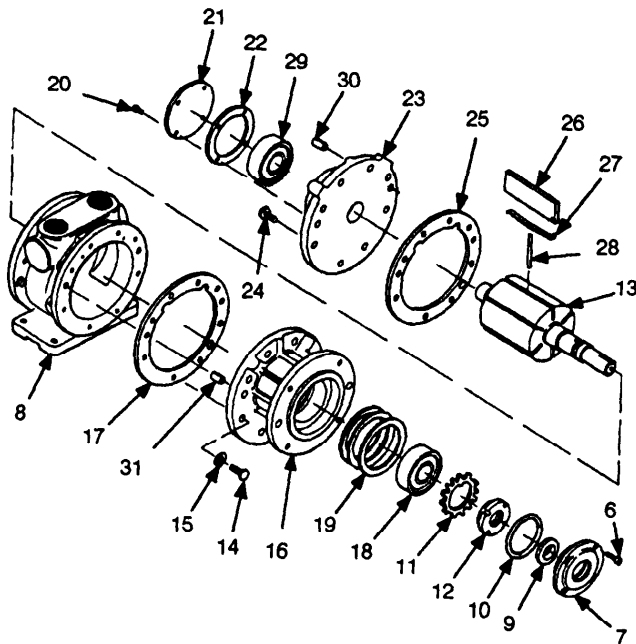
a. Disassembly.

(1) Remove hoses and fittings from feed motor (see TM 5-3820-241-12).

NOTE

Scribe feed motor and quill motor flange to ensure proper reassembly.

(2) Remove four screws (1) and lockwashers (2) securing feed motor (3) to quill motor flange (4). Remove feed motor and key (5). Discard lockwashers.



(3) Remove four screws (6). Remove drive end cap (7) from body (8).

(4) Remove and discard seal (9) and O-ring (10).

(5) Open tabs on lockwasher (11). Remove locknut (12) and lockwasher from rotor (13).

(6) Remove eight screws (14) and lockwashers (15). Remove drive end plate (16) and gasket (17) from body (8). Discard lockwashers and gasket.

(7) Remove bearing (18) and spacers (19) from inside drive end plate (16).

(8) Remove four screws (20). Remove dead end cap (21) and gasket (22) from dead end plate (23). Discard gasket.

(9) Remove eight screws (24). Remove dead end plate (23), gasket (25), and rotor (13) from body (8). Vanes (26) and springs (27) will come off as rotor is removed. Discard gasket.

(10) Remove three push pins (28) from rotor (13).

(11) Press bearing (29) and rotor (13) out of dead end plate (23).

(12) If damaged, remove two dowel pins (30) from dead end plate (23).

(13) If damaged, remove two dowel pins (31) from drive end plate (16).

b. Inspection.

(1) Clean and inspect bearings in accordance with TM 9-214.

(2) Inspect all parts for cracks, damage, and excessive wear. Replace all damaged and worn parts.

c. Assembly.

(1) If removed, install two dowel pins (31) in drive end plate (16).

(2) If removed, install two dowel pins (30) in dead end plate (23).

(3) Install rotor (13) in drive end plate (16).

(4) Install spacers (19) and bearing (18) over rotor (13).

(5) Install lockwasher (11) and locknut (12) over rotor. Ensure that tab on lockwasher engages rotor shaft.

CAUTION

Do not fully tighten locknut. Rotor must turn freely.

(6) Tighten locknut (12), then bend tabs on lockwasher (11) over locknut.

(7) Install new seal (9) in drive end cap (7).

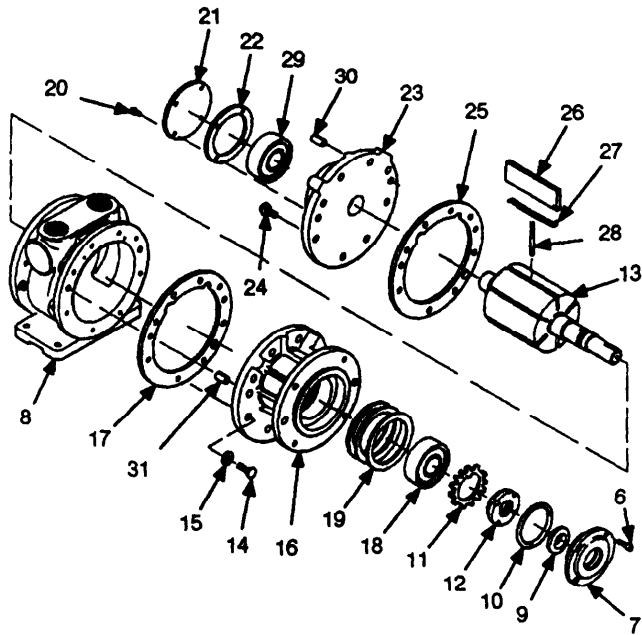
(8) Install drive end cap (7) and new O-ring (10) on drive end plate (16) using four screws (6).

(9) Install three push pins (28) in rotor (13).

(10) Install six springs (27) and vanes (26) in rotor (13). Install vanes with notches to front of feed motor.

(11) Compress springs (27) and vanes (26) and slide new gasket (17) and body (8) over rotor (13).

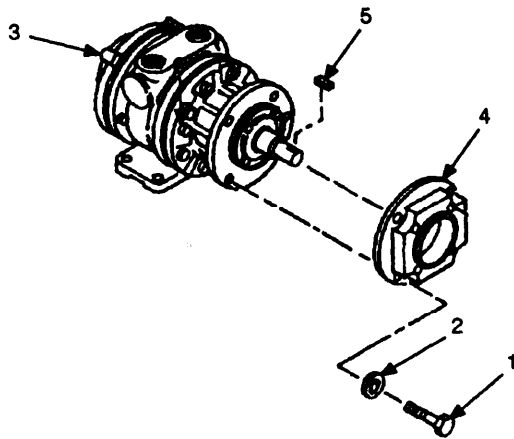
(12) Install eight screws (14) and new lockwashers (15) to secure drive end plate (16) to body (8).



(13) Install dead end plate (23) and new gasket (25) on body (8) using eight screws (24).

(14) Tap bearing (29) into place in dead end plate (23).

(15) Install dead end cap (21) and new gasket (22) on dead end plate (23) using four screws (20).



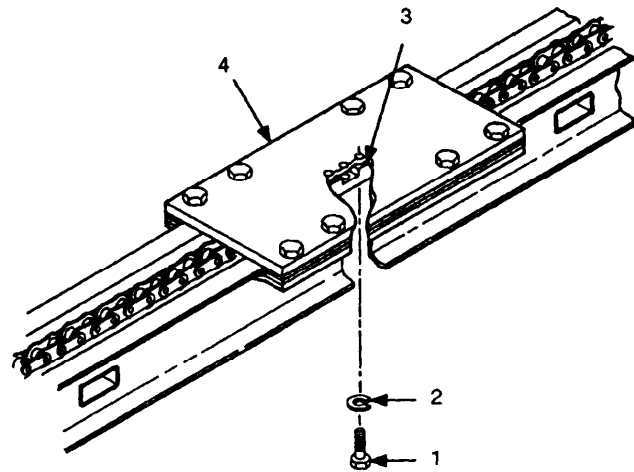
(16) Install key (5) in feed motor shaft.

(17) Carefully position feed motor (3) for installation. Ensure that key (5) on feed motor shaft properly engages keyway in gearbox shaft.

(18) Secure feed motor (3) to quill motor flange (4) using four screws (1) and new lockwashers (2).

(19) Install feed motor and gearbox assembly (see TM 5-3820-241-12).

7-7. Chain Replacement



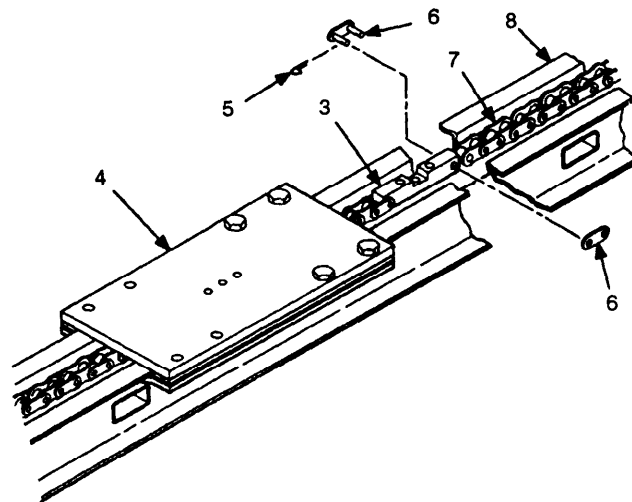
a. Removal.

WARNING

If feed shell is in operating position, fully lower drifter before removing chain. Failure to follow this warning could cause injury to personnel and damage to equipment.

(1) Fully loosen chain (see TM 5-3820-241-12).

(2) Remove three screws (1) and lockwashers (2). Remove chain mounting block (3) from slabback (4). Discard lockwashers.



(3) Move slabback (4) or chain mounting block (3) out of the way so that master links on chain are accessible.

(4) Remove two cotter pins (5) from each master link (6). Separate master links and remove from chain mounting block (3). Discard cotter pins.

(5) Remove chain (7) from feedshell (8).

b. *Installation.*

CAUTION

Do not grease chain.

- (1) Wrap chain (7) around sprockets. Ensure that chain properly engages all sprockets.
- (2) Connect two master links (6) on chain (7) to

chain mounting block (3). Secure using four new cotter pins (5).

(3) Install chain mounting block (3) on slabback (4) using three screws (1) and new lockwashers (2).

(4) Adjust chain (see TM 5-3820-241-12).

Page I-1. Appendix B is added before the index as follows:

APPENDIX B
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

B-1. Scope

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at direct support maintenance.

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure that covers fabrication criteria.

All bulk material needed for manufacture or an item are listed by part number or specification number in a tabular list on the illustration.

B-2. Manufactured Items Part Number Index

Part Number	Description	Figure No.
	Chuck bushing and driver removal tool	B-1
	Chuck bushing and driver installation tool	B-2

Section II. MANUFACTURED ITEMS ILLUSTRATIONS

NOTES:

1. ALL DIMENSIONS ARE IN INCHES
2. DULL ALL SHARP EDGES
3. MAKE FROM MILD STEEL

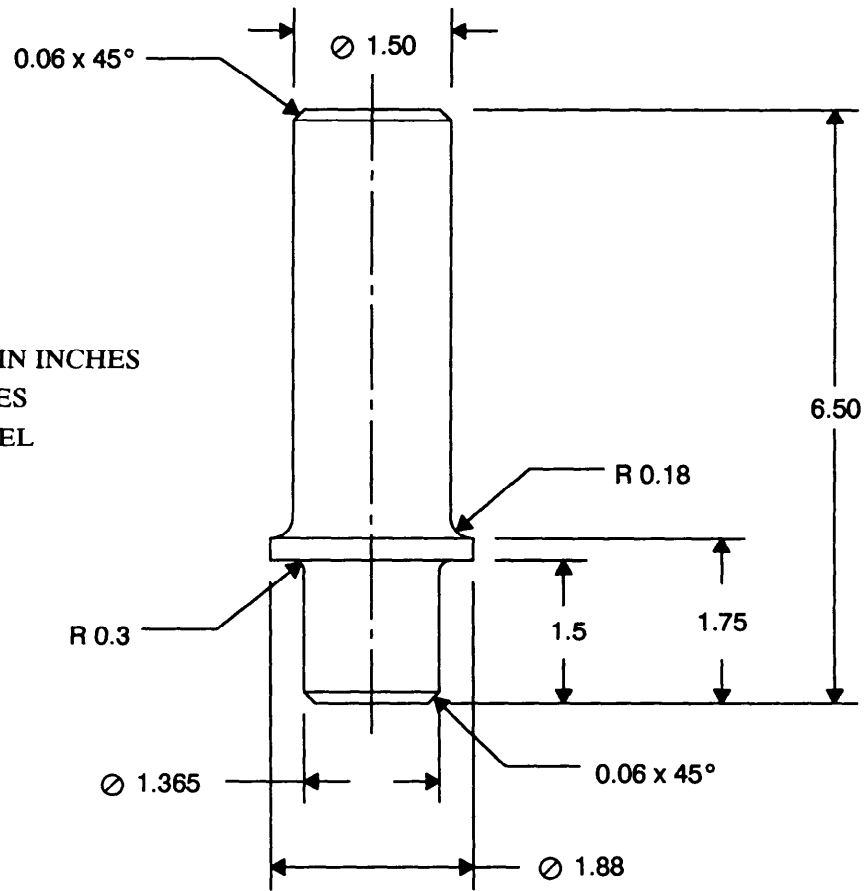


Figure B-2. Chuck bushing and driver removal tool.

NOTES:

1. ALL DIMENSIONS ARE IN INCHES
2. DULL ALL SHARP EDGES
3. MAKE FROM MILD STEEL

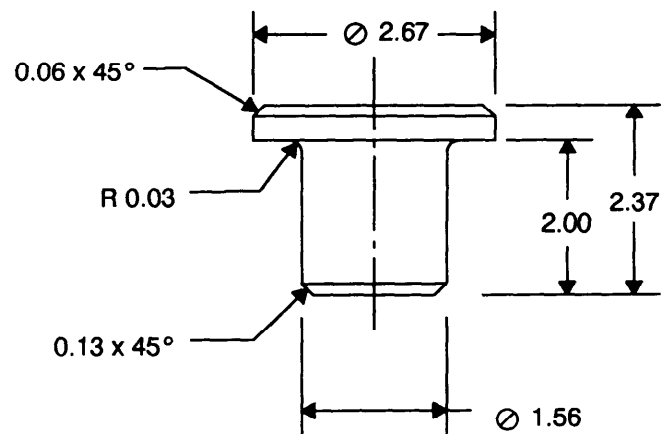


Figure B-2. Chuck bushing and driver installation tool.

APPENDIX A

REFERENCES

A-1. FIRE PROTECTION

TB 5-4200-200-10 Hand Portable Fire Extinguishers Approved for Army Use

A-2. LUBRICATION

C9100-IL Fuels, Lubricants, Oils and Waxes
 LO 5-3820-241-12 Lubrication Order, Drill Pneumatic, Drifter: Self-Propelled. Joy Model RAM-MS-5/450 A-DR

A-3. PAINTING

TM 9-213 Painting Instructions for Field Use

A-4. MAINTENANCE

TM 38-750 The Army Maintenance Management System
 TM 5-3820-241-20P Organizational Maintenance Repair Parts and Special Tools List, Drill, Pneumatic, Drifter: Boom-Type: Crawler Mounted; Self-Propelled, Joy Model RAM-MS-5/450A-DR
 TM 5-3820-241-34P Direct and General Support Maintenance Repair Parts and Special Tools List including Depot Maintenance Repair Parts, and Special Tools, Drill, Pneumatic, Drifter: Boom-Type: Crawler Mounted; Self-Propelled, Joy Model RAM-MS-5/450A-DR
 TM 5-3820-241-12 Operator and Organizational Maintenance Manual Drill, Pneumatic, Drifter: Boom-Type; Crawler Mounted; Self-Propelled, Joy Model RAM-MS-5/450A-DR
 TM 5-30-241-34 Direct and General Support Maintenance Manual. Drill, Pneumatic, Drifter: Boom Type; Crawler Mounted; Self Propelled Joy Model RAM-MS-5/450A-DR

A-5. Storage and Shipment

TB 740-97-2 Preservation of USAMECOM Mechanical Equipment for Storage
 TM 740-90-1 Administrative Storage of Equipment

A-6. Demolition

TM 750-244-3 Destruction of Equipment to Prevent, Enemy Use

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By Order of the Secretary of the Army:

Official:

PAUL T. SMITH
Major General, United States Army
The Adjutant General

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General, United States Army
Chief of Staff

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To be distributed in accordance with DA Form 12-25B (qty rqr block No. 451), Direct/General Support requirements for Rock Drilling Equipment.

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SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER

PUBLICATION DATE

PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.

PARA-GRAPH

FIGURE NO.

TABLE NO.

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

TEAR ALONG PERFORATED LINE

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER

SIGN HERE

THE METRIC SYSTEM AND EQUIVALENTS

WEIGHT MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

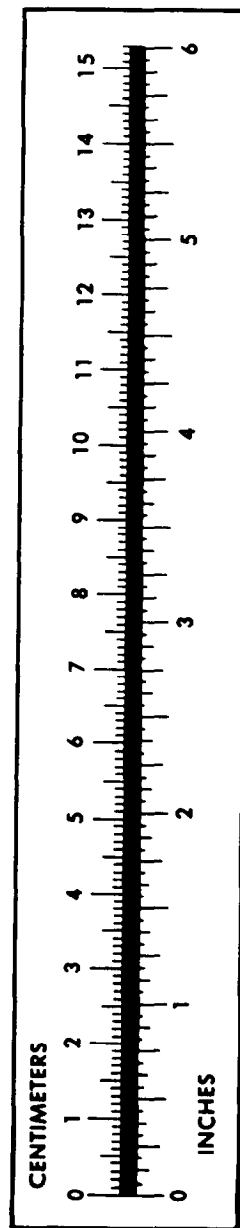
TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



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