DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

HAMMER, PILE DRIVER, SELF-POWERED, DIESEL (KOEHRING MODEL DA35) FSN 3895-4434696

Headquarters, Department of the Army, Washington, D.C.

29 January 1970

SAFETY PRECAUTIONS

WARNING

Never attempt to clean, adjust, fill fuel tank, or oil tank while a hammer is in operation.
Insert transport plug before removing hammer from leads.
Stand clear of hammer when it is being lifted, to prevent injury if lifting device should fail.
Always report or correct any condition that may result in injury to personnel if operation is to be continued.
Remove transport plug before attempting to start the hammer.
Do not engage the trip mechanism at any time while the hammer is in operation.
Keep a full charged carbon dioxide (C02) fire extinguisher in good working order, mounted inside the crane cab, and ready for quick use.

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. These instructions are published for the use of support maintenance personnel maintaining the MKT Model DA35 Diesel Pile Hammer. They provide information on the maintenance of equipment, which is beyond the scope of the tools, equipment, personnel or supplies normally available to using organizations.

b. Forms and Records. Report all equipment improvement recommendations as prescribed by TM 38-570.

c. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changed to Publications) and forwarded direct to Commanding General, U.S. Army Mobility Equipment Command, ATTN,: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Section II. DESCRIPTION AND DATA

1-2. Description

A general description of the hammer, the location and description of the identification and instruction plates, and information on differences in models are contained in Chapter 1, Operator and Organizational Maintenance Manual, TM 5-3895-332-12.

1-3. Tabulated Data

a. General. This paragraph contains all the overhaul data pertinent to Direct and General Support Maintenance personnel.

b. Fuel Pump Repair and Replacement Standards. Make the following measurement while the fuel pump is mounted on hammer with the ram-piston down:

(1) Control cam and cam stop measurements.

(a) Measure the distance from under the cam stop head to top nut. If measurement is more than 17/ 32, check cam stop head height (table 1-1).

(b) If cam stop head height is not in accordance with dimensional limits shown in table 1-1, replace control cam.

c. Nut and Bolt Torque Data.

Trip mechanism access cover bolts	100 ft. lb.
Lubricating oil pump mounting nuts	60 ft. lb.
Fuel pump mounting nuts	60 ft. lb.
Fuel pump check valve nut	150 ft. lb.
Fuel pump top nut	40 ft. lb.
Fuel pimp lock plate cap screws	40 ft. lb.
Fuel and oil line hex nuts	30 ft. lb.
Guide bracket bolts-	100 ft. lb.

d. Repair and Replacement Standards. Table 1-1 lists manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearances. Refer to figure 1-1 for compression ring, end gap.

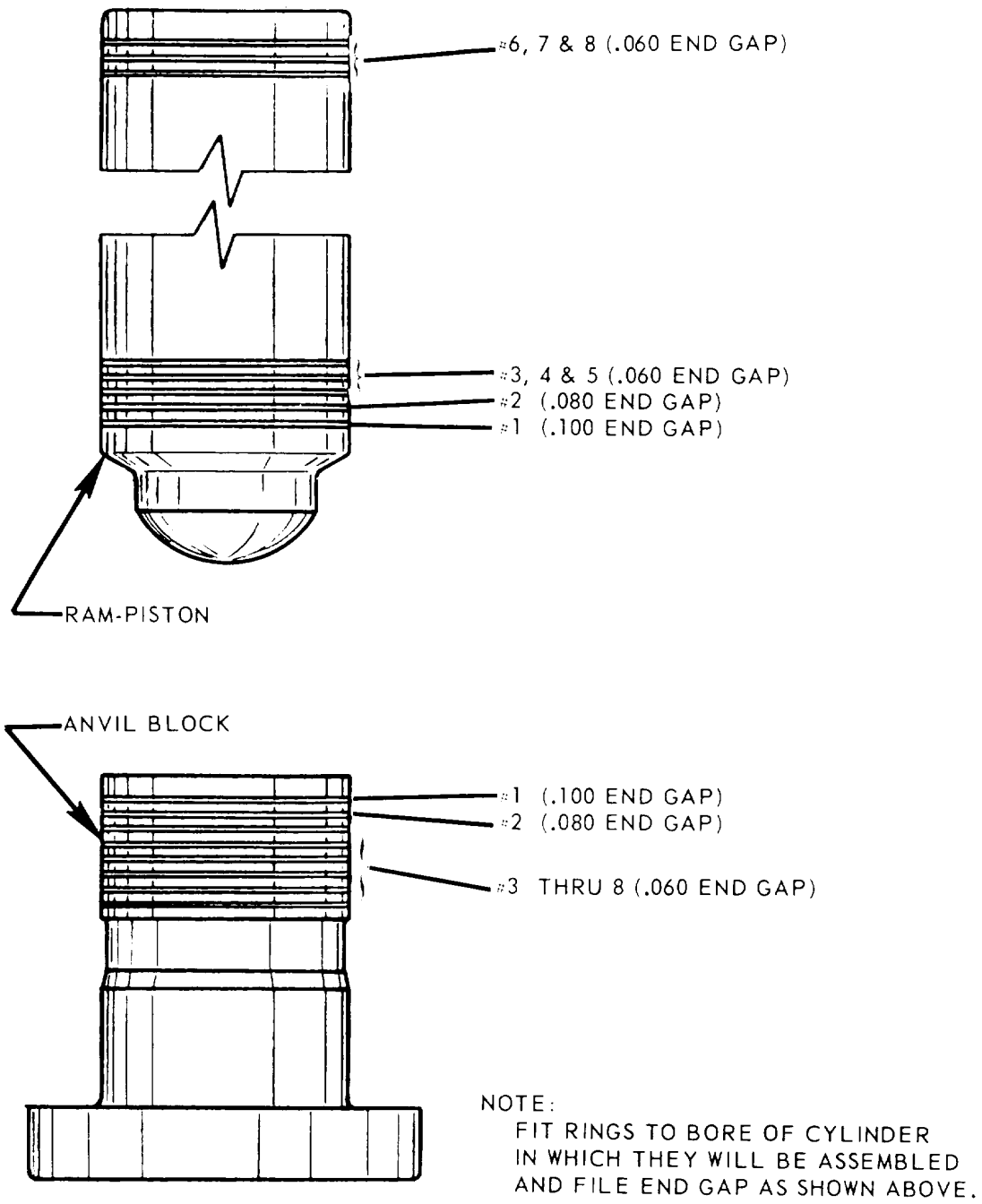


Figure 1-1. Compression ring, end gap.

Table 1-1. Repair and Replacement Standards

	Manufacturer's dimensions and tolerance in inches		Desired clearance		Maximum allowable wear and clearance
Component	Minimum	Maximum	Minimum	Maximum	
CYLINDER					
Diameter of bore	11.9950	12.0000	----	----	.0120
THRUST BEARING					
Diameter of bearing surface	12.1150	12.1200	----	----	.0100
RAM-PISTON					
Diameter at compression rings	11.9450	11.9500	----	----	.0100
Compression rings (end gap at 12.000 dia.) --_ -	----	----	----	----	.0300
(Free gap)	----	----	.7500	1.0000	.0620
ANVIL BLOCK	----	----			
Dia, to mate with cyl. bore	11.9450	11.9500	----	----	.0100
Dia, to mate with thrust bearing	12.0850	12.0900	----	----	.0100
Compression rings (End gap at 12.0000 dia.)	----	----	----	----	.0300
(Free gap)	----	----	.7500	1.0000	.0620
VIBRATION DAMPER	2.3590	2.3910	----	----	.5000
FUEL PUMP					
Cam	----	----	----	----	Refer to para 1-3b.
Piston-cyl.	.7480	.7490	.0003	.0004	.0005
Cam Stop					
Height of head	.1875	.2188	----	.0320	
Distance under head to top nut	----	----	----	----	Refer to para 1-3b.
OIL PUMP					
Plunger	.1870	.1875	.0002	.0004	.0002

CHAPTER 2

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

2-1. Maintenance Repair Parts
Repair parts and equipment are listed and illustrated in the repair parts and special tools list covering organizational maintenance for this equipment located in TM 5-3895-332-25P.

2-2. Special Tools
The only special tool required by Direct and General Support Maintenance personnel for performing maintenance on this hammer is the Ram Lifting tool as indicated in the MAC, Section III, Appendix B of the Operator and Organizational Maintenance Manual, TM 5-3895-332-12.

2-3. Specially Designed Tools and Equipment
No specially designed tools or equipment are required by Direct and General Support Maintenance personnel for performing maintenance on this hammer.

Section II. TROUBLESHOOTING

2-4. General
This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the hammer or any of its components. Each trouble symptom stated is followed by a list of probable causes of trouble. The possible remedy recommended is described opposite the probable cause.

Troubleshooting Chart

Malfunction	Probable cause	Corrective action
1. Hammer hard to start or fails to start.	Worn compression rings.	Replace compression rings. (para. 2-8, 2-11)
2. Hammer lacks power.	a. Worn compression rings.	a. Replace compression rings. (para. 2-8, 2-11)
	b. Worn vibration damper.	b. Replace vibration damper. (para 2-9)
	c. Scored walls in cylinder.	c. Replace cylinder. (para 2-13)

Section III. GENERAL MAINTENANCE

2-5. Repair Instructions

a. Cylinder. When the hammer has been used extensively, cracks may develop in the welds and structural parts of the cylinder. These cracks should be rewelded to prolong the life of the hammer. However, discretion should be used in repair welding. When welding is to be done where members connect to the tubular portion of the cylinder, the welding should be done gradually so the heat build-up will not be excessive. Excessive heat will distort the cylinder bore and render the cylinder unusable.

b. Fuel and Oil Tanks. Cleaning of these tanks is important to prolonged life of the filters and pumps. After cleaning these tanks should be checked for leaks. Plug all openings and pump air pressure (approx. 80 P.S.I.) into the tanks. Observe for pressure drop. If leaks are detected, repair by best available means.

c. General. Before reassembly of the hammer or its components, care should be taken to insure that all parts are clean and the assembly instructions are followed as outlined in the manual.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

2-6. General

The cylinder is a stress relieved weldment, made from steel tubing and plate with the bore specially chrome plated. The shape of the weldment forms the fuel and oil tanks.

2-7. Buffer Assembly

a. General. The six buffer assemblies hold the anvil block to the cylinder and dampen the over-travel of the anvil block when the driving is easy.

1). Removal. Remove the buffer assembly in numerical sequence. (fig. 2-1)

c. Cleaning, Inspection and Repair.

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

Note. **Do not clean belleville washers unless there Is evidence of and or dirt in grease.**

(2) Inspect all parts for cracks, breaks and other damage. Replace a damaged or defective part.

(3) If belleville washers are cleaned, repack with automotive and artillery grease which is in accordance with military specification MIL-G10924.

d. Belleville Washers. The shock of the anvil is absorbed by a set of 75 to 80 belleville washers assembled 3 in a series parallel, except for 2 in a series parallel at the ends and middle. This sequence must be maintained when the hammer is repaired. (fig. 2-2) The free length of all stacks should be equal at 7-3. 4 inches. Adjust free length by removing washers from end of stack. This determines the clearance between bolt head and anvil which should not be less than 3,/4 inch. This dimension should govern the height of the belleville washer stack. To adjust this clearance, remove or add washers at top of stack equally on all buffers.

e. Installation. Install the buffer assembly in the reverse of the numerical sequence. (fig. 2-1).

2-8. Anvil Block

a. Removal. Remove the anvil block. (fig. 2-3).

b. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks and other damage. Replace a damaged or defective part.

(3) Check compression rings for wear in accordance with table 1-1, Repair and Replacement Standards. Remove any sharp edges from anvil block compression rings.

(4) Lubricate the anvil block and compression rings with a light coat of lubricating oil.

c. Installation. Install the anvil block (fig. 2-3).

2-9. Vibration Damper and Shroud

a. General. The vibration damper is located under a shroud and isolates the cylinder from the shock vibration produced by the anvil block.

b. Removal. Remove the vibration damper and shroud. (fig. 2-3)

c. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks and other damage. Replace a damaged or defective part.

(3) Check vibration damper wear in accordance with table 1-1, Repair and Replacement Standards. Replace a worn vibration damper.

d. Installation. Install the vibration damper and shroud. (fig. 2-3)

2-10. Thrust Bearing

a. General. Radial thrust or side thrust to the hammer is transmitted to the leads through the thrust bearing.

b. Removal. Remove thrust bearing by tackwelding two "L" shaped flame cut plates, 1 inch thick or greater, to thrust bearing, 180° apart. Plate to be long enough to allow for height of jack between bottom flange of hammer cylinder and plate ear. Jack evenly on both sides to remove thrust bearing. A cross tie bar between the two plates may be necessary at times to prevent them from bending inward (fig. 2-4).

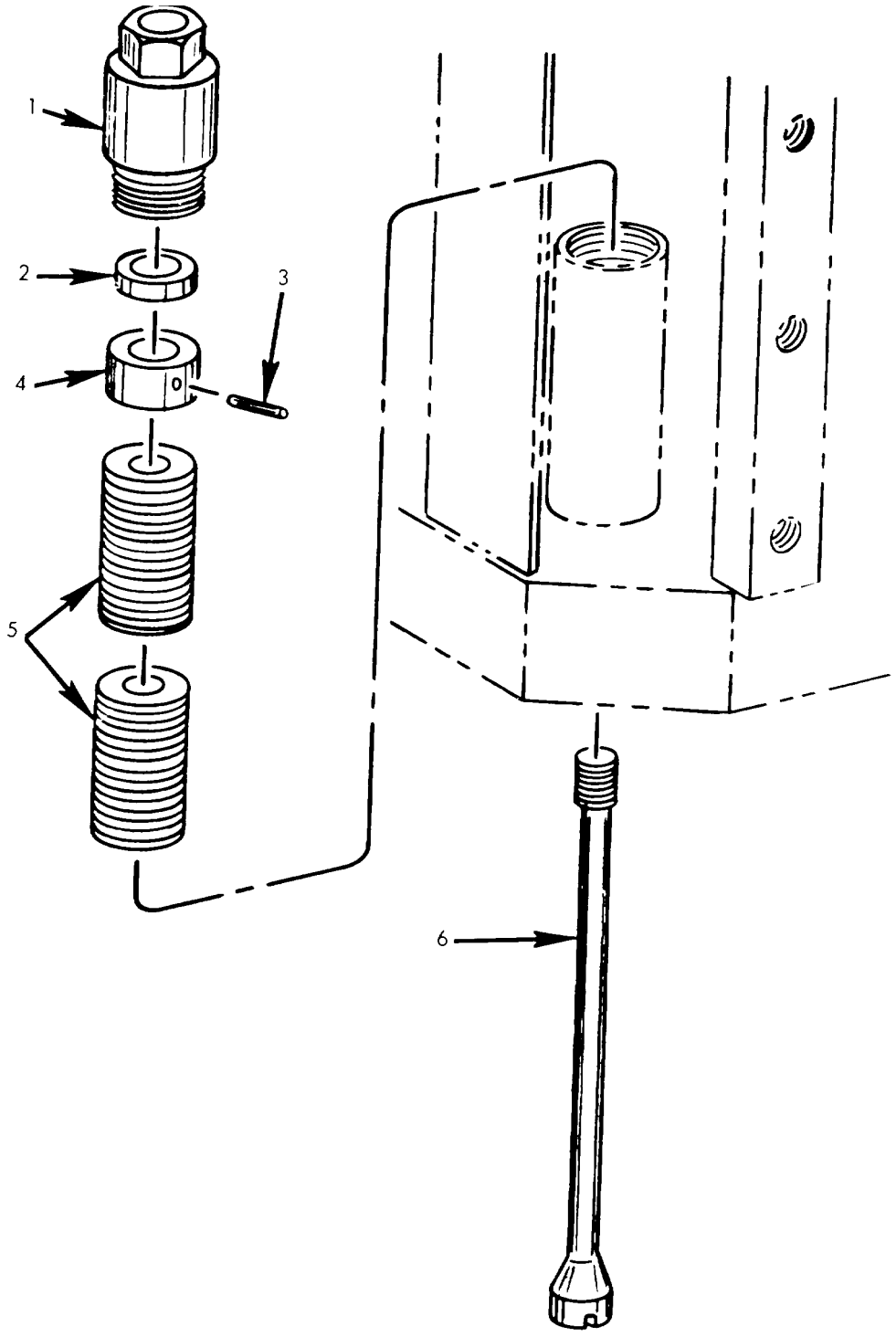
c. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks, and other damage. Replace a damaged or defective part.

(3) Check thrust bearing wear in accordance with table 1-1, Repair and Replacement Standards. Replace worn thrust bearing.

(4) Lubricate the bearing surface with a light coat of lubricating oil.



1. Buffer housing cap (6 Rqr)
2. Buffer bumper (6 Rqr)
3. Pin, groove (6 Rqr)
4. Buffer nut (6 Rqr)
5. Belleville washer assembly (6 Rqr)
6. Buffer bolt (6 Rqr)

Figure 2-1. Buffer assembly, removal and installation.

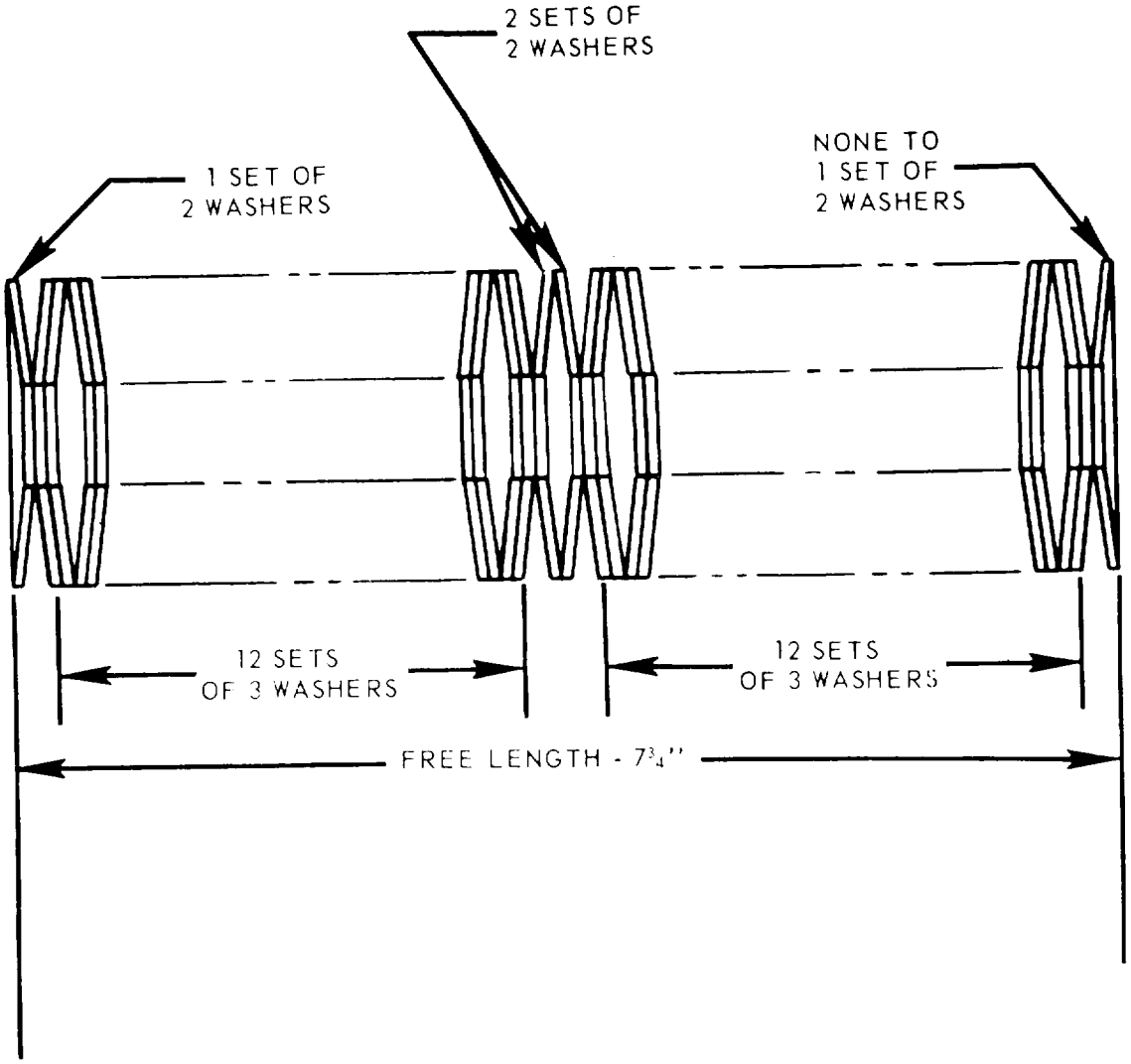


Figure 2-2. Belleville washer sequence.

d. Installation. Prepare for installation by soaking 2-3 hours in a well insulated container filled with dry ice. Heat cylinder walls on two opposite sides with heating torches. Quickly insert thrust bearing into cylinder. This must be done quickly before the temperature of the two parts changes. There will be .010 clearance between the thrust bearing and cylinder when they are in the heated and cooled conditions. Lock in place with retaining screws (fig. 2-3).

2-11. Ram-Piston

a. Removal. Remove the ram-piston (fig. 2-3).

b. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks and other damage. Replace a damaged or defective part.

(3) Check compression rings for wear in accordance with table 1-1, Repair and Replacement Standards. Replace worn rings and stagger the gap. Remove any sharp edges from ram-piston compression rings.

(4) Lubricate the ram-piston and compression rings with a light coat of oil.

c. Installation. Install the ram-piston (fig. 2-3).

2-12. Spud-Guide Bracket

a. Removal. Removal spud-guide brackets and bolts (fig. 2-3).

b. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks, and other damage. Replace a damaged or defective part.

c. Installation. Install spud-guide brackets and bolts (fig. 2-3).

2-13. Cylinder

a. Removal. Remove cylinder (fig. 2-3).

b. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks, and other damage. Replace a damaged or defective part.

c. Cylinder Bore. Check cylinder bore for wear in the area immediately below the exhaust ports.
The maximum allowable diameter on the cylinder bore is 12.inches.

d. Installation. Install the cylinder (fig. 2-3).

2-14. Lubricating Oil Pump

a. Removal. Remove the lubricating oil pump (fig. 2-5).

b. Disassembly. Disassemble the lubricating oil pump in numerical sequence (fig. 2-6).

c. Cleaning, Inspection and Repair.

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

(2) Inspect all parts for cracks, breaks or other damage. Replace a damaged or defective part.

d. Reassembly. Reassemble the lubricating oil pump in the reverse of the numerical sequence.(fig. 2-6).

e. Installation. Install the lubricating oil pump (fig. 2-5).

2-15. Fuel Pump

a. Removal. Remove access cover. Remove the fuel pump (fig. 2-7).

b. Disassembly. Disassemble the fuel pump in numerical sequence (fig. 2-8).

c. Cleaning, Inspection and Repair.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, and other damage. Replace a damaged or defective part.

d. Reassembly. Reassemble the fuel pump in the reverse of the numerical sequence (fig. 2-8).

e. Installation . Install the fuel pump (fig. 2-7).

2-16. Remote Control Transmitter

a. Removal. Disconnect control hose from fuel pump (fig. 2-9).

b. Disassembly Disassemble the transmitter in numerical sequence fig. 2-10).

c. Cleaning, Inspection and Repair.

(1) (Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks and other damage. Replace a damaged or defective part.

d. Reassembly. Reassemble the transmitter in the reverse of the numerical sequence (fig. 2-10).

e. Installation. Connect the control hose to fuel pump (fig. 2-9).

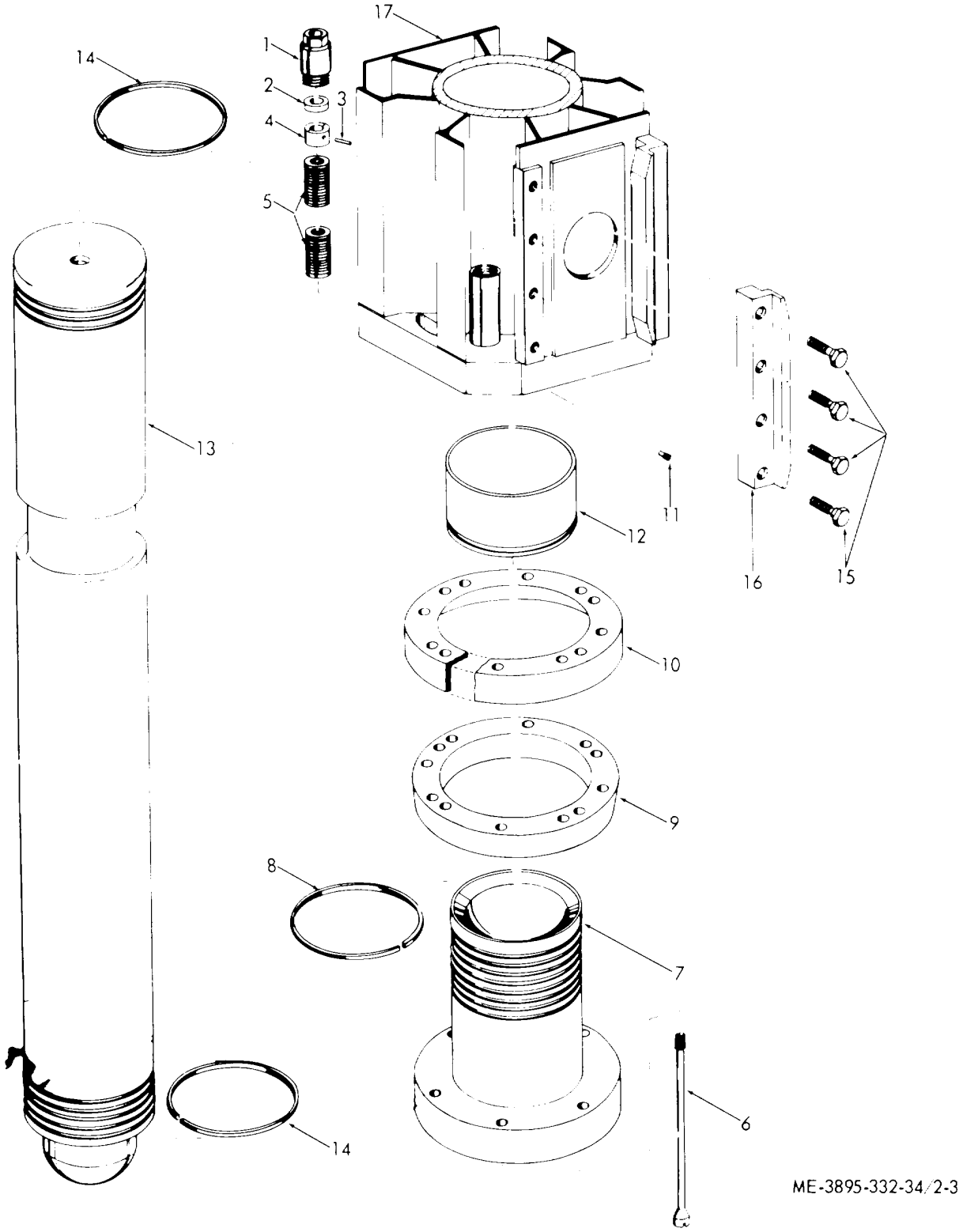


Figure 2-3. Cylinder and components, exploded view.

1. Buffer housing cap (6 Rqr)
2. Buffer bumper (6 Rqr)
3. Pin, groove (6 Rqr)
4. Buffer nut (6 Rqr)
5. Belleville washer assembly (12 Rqr)
6. Buffer bolt (6 Rqr)
7. Anvil block
8. Compression ring (8 Rqr)
9. Vibration damper
10. Shroud
11. Screw, cap, soc. hd. (6 Rqr)
12. Thrust bearing
13. Ram-piston
14. Compression ring (8 Rqr)
15. Bolt, spud, bracket (24 Rqr)
16. Bracket, spud-guide (6 Rqr)
17. Hammer cylinder

Figure 2-3,. Cylinder and components,, exploded view--Continued.

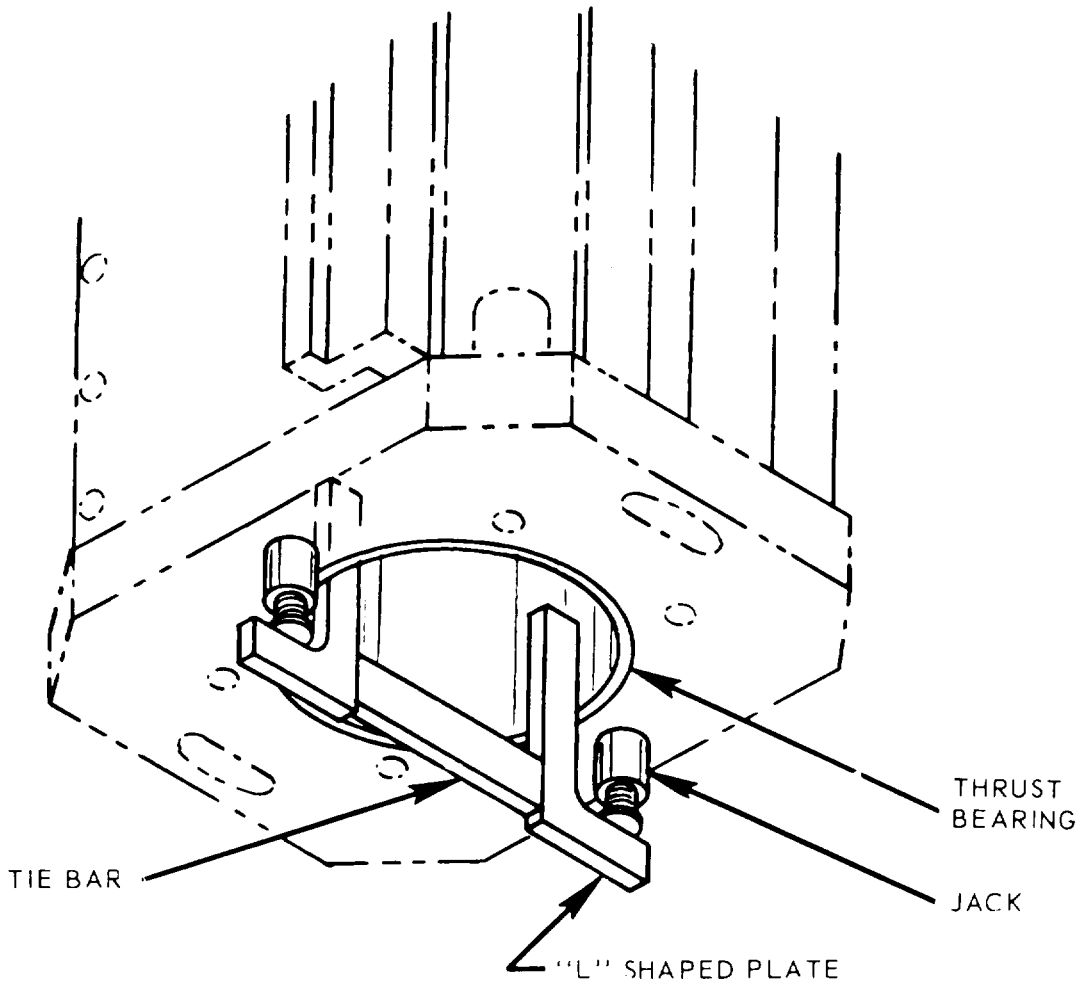


Figure 2-4. Thrust bearing, removal.

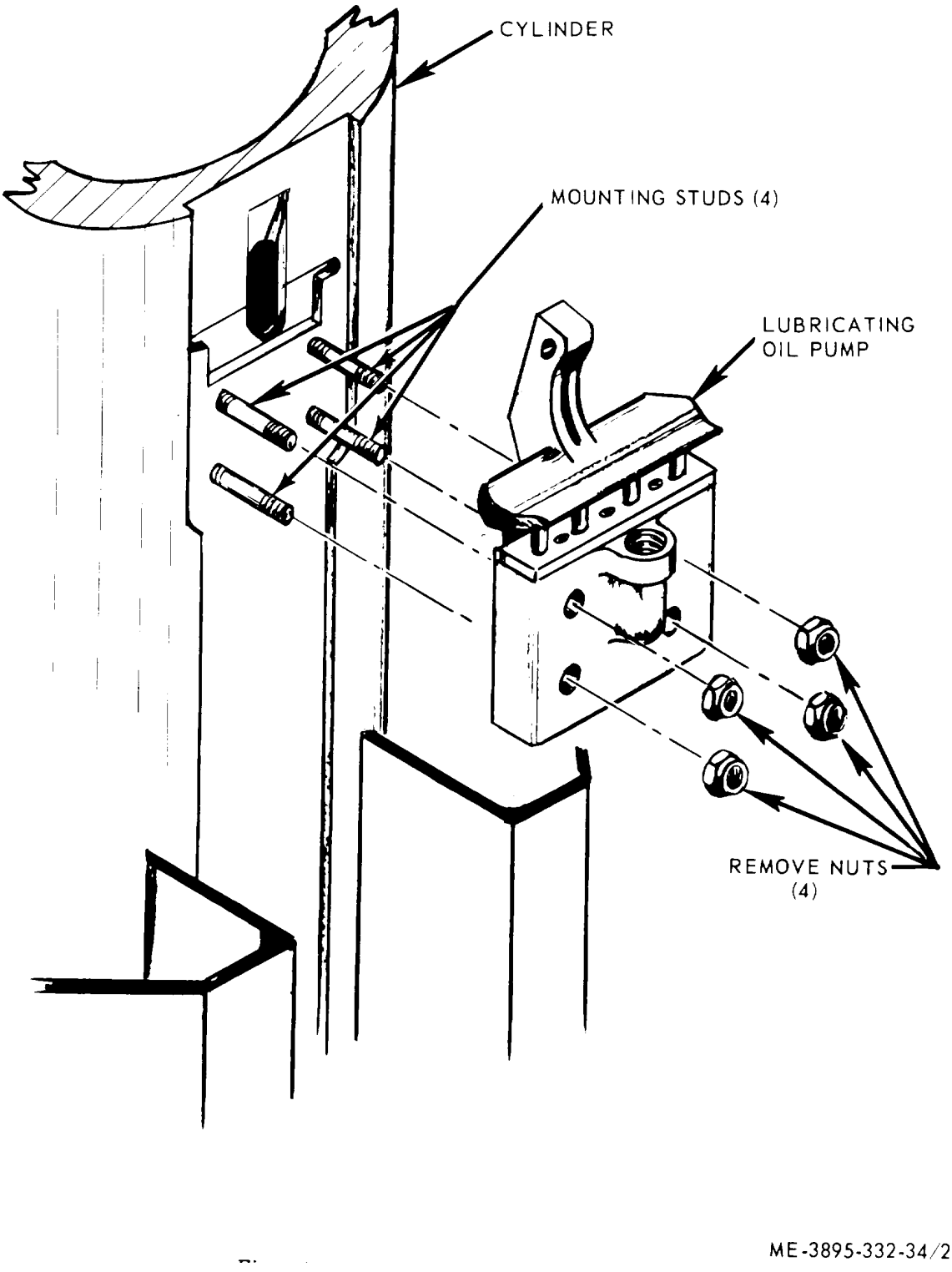


Figure 2-5. Lubricating oil pump, removal and installation.

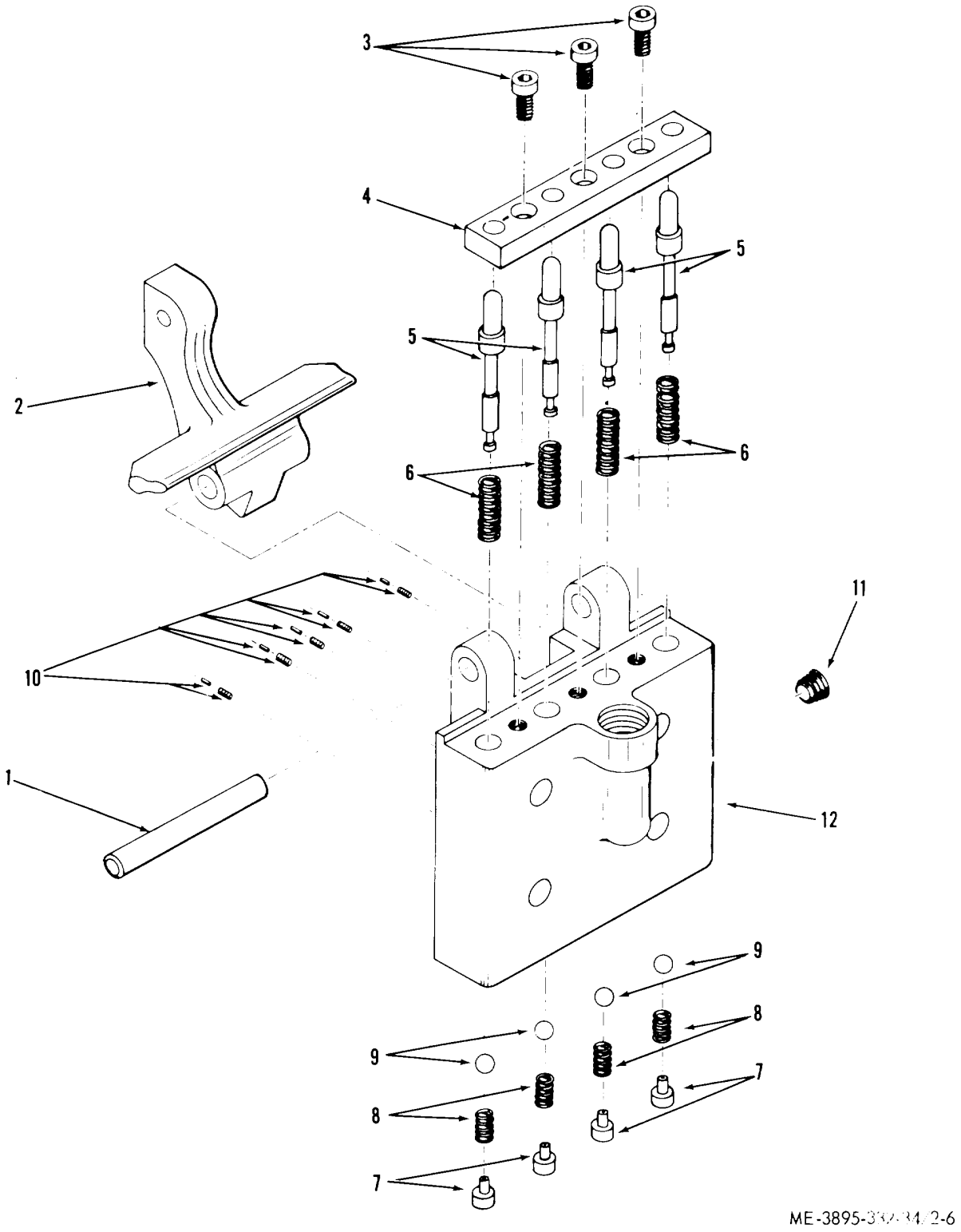


Figure 2-6. Lubricating oil pump, exploded view.

1. Pin
2. Cam
3. Screw, cap, soc. hd. (3 Rqr)
4. Keeper plate
5. Plunger (4 Rqr)
6. Plunger spring (4 Rqr)
7. Housing, ball valve (4 Rqr)
8. Ball valve spring (4 Rqr)
9 Valve, ball (4 Rqr)
10. Pin plug
11. Pipe plug
12. Housing

Figure 2-6. Lubricating oil pump, exploded view--Continued.

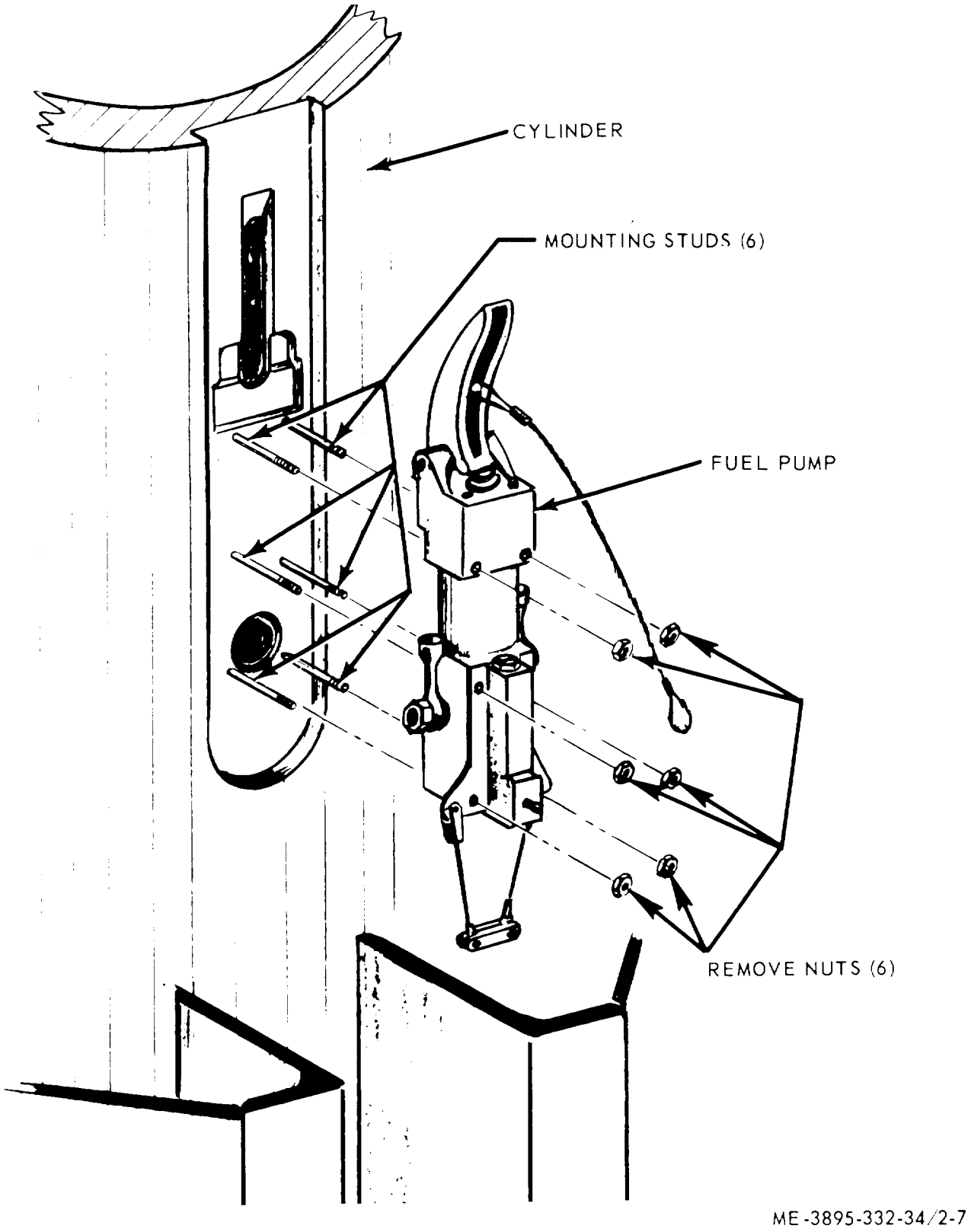


Figure 2-7. Fuel pump, removal and installation.

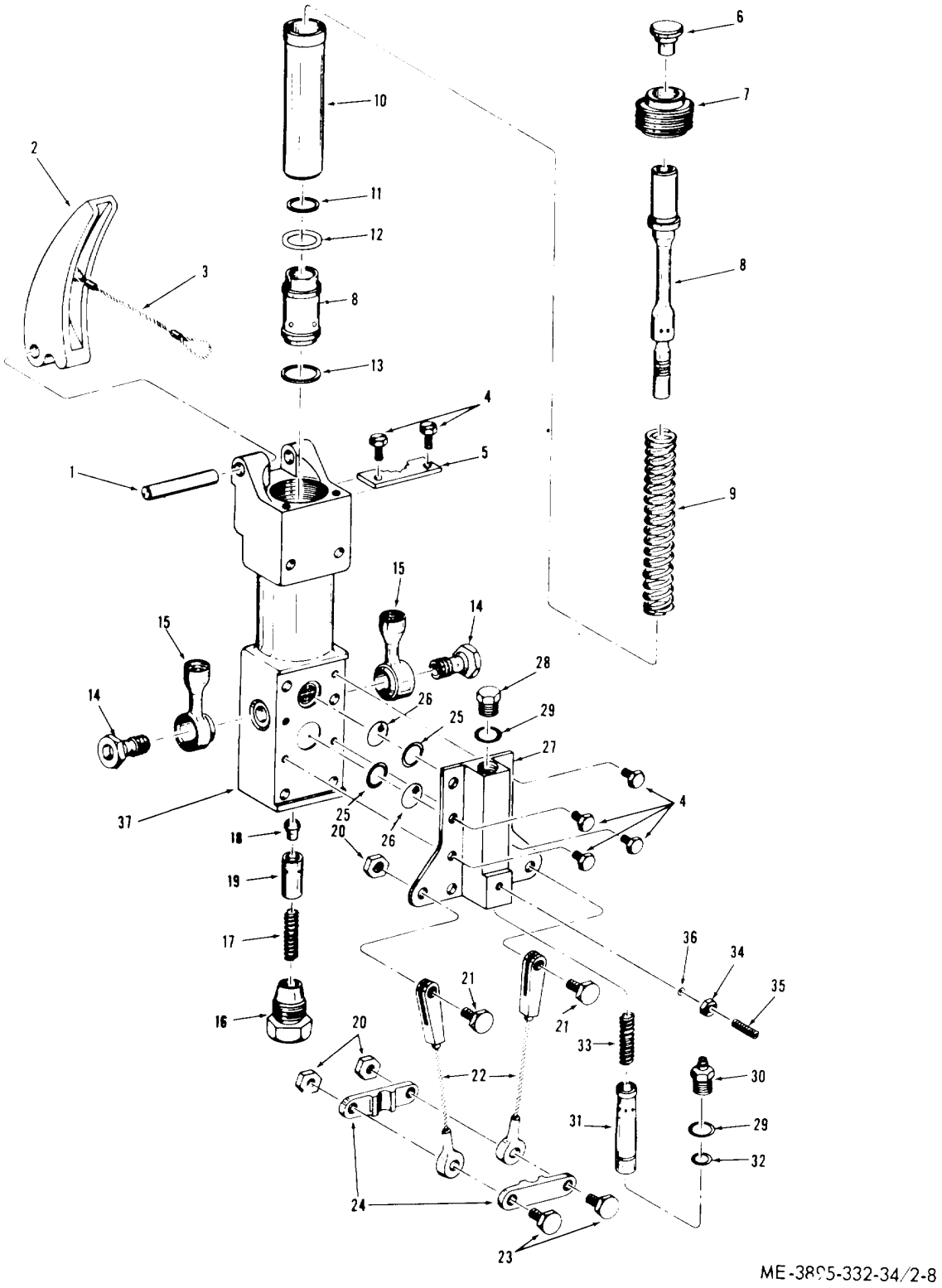


Figure 2-8. Fuel pump, exploded view.

1. Cam pin
2. Control cam
3. Control cable
4. Screw, cap, hex hd. (6 Rqr)
5. Lock plate
6. Cam stop
7. Top nut
8. Piston-cylinder ass'y
9. Main spring
10. Sleeve
11. Top gasket
12. "O" ring
13. Bottom gasket
14. Adapter bolt (2 Rqr)
15. Adapter fitting (2 Rqr)
16. Check valve nut
17. Check valve spring
18. Check valve
19. Check valve sleeve
20. Nut, hex. 5/16-18 (4 Rqr)
21. Screw, cap, hex hd. 5/16-18 x 1 in. (2 Rqr)
22. Wire assembly (2 Rqr)
23. Screw, cap, hex hd. 5/16-18 x 1-1/2 in. (2 Rqr)
24. Clamp, hose
25. "O" Ring (2 Rqr)
26. Screen, plunger (2 Rqr)
27. Remote control housing
28. Plug, hex hd.
29. "O" ring (2 Rqr)
30. Adapter fitting
31. Plunger
32. "U" seal
33. Plunger spring
34. Nut, hex. 1/4-20
35. Bleed valve
36. Drain seat
37. Fuel pump housing

Figure 2-8. Fuel pump, exploded view--Continued.

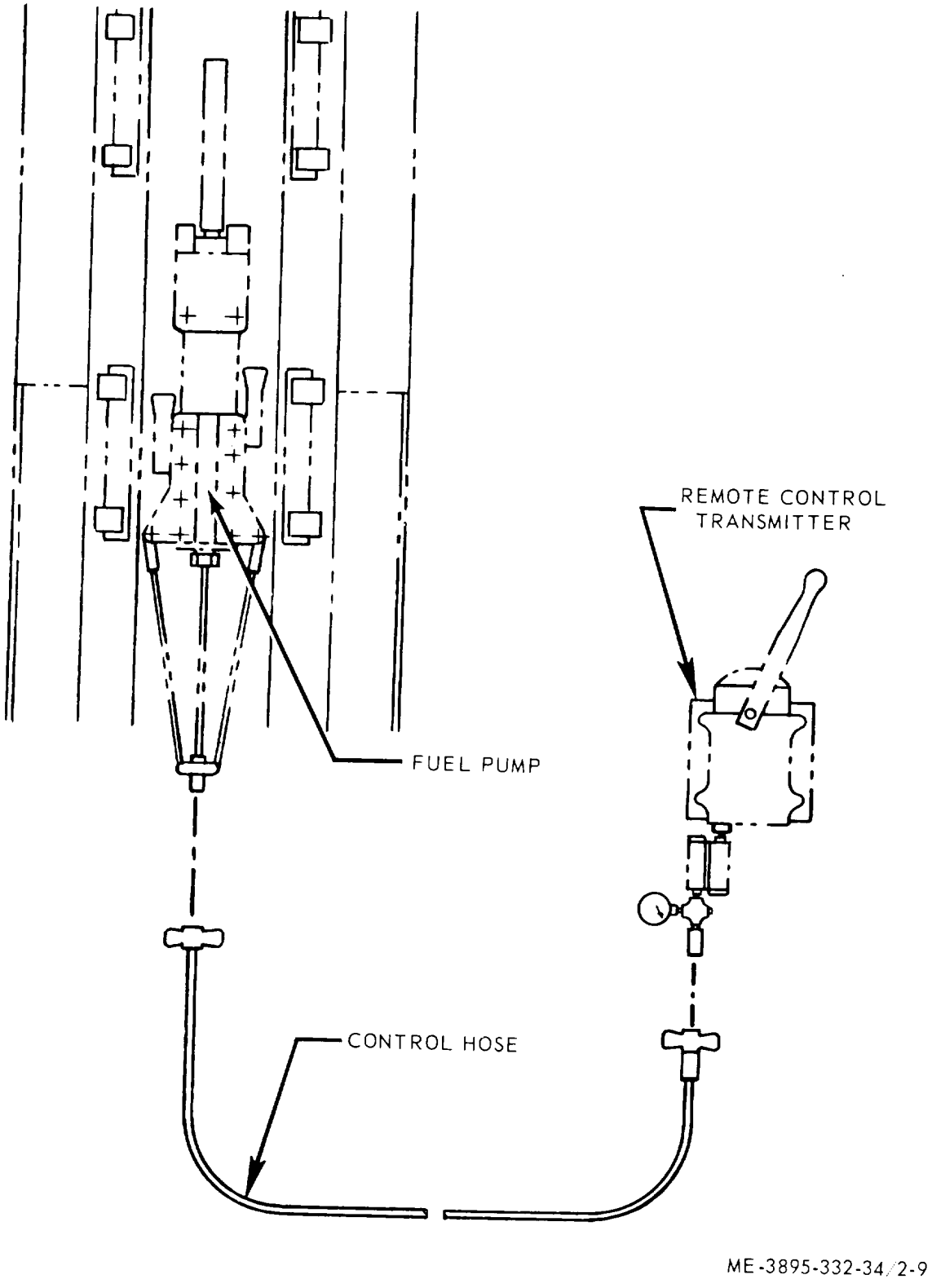


Figure 2-9. Control hose, removal and installation.

Graphic is unreadable on hard copy.

Figure 2-10. Remote control transmitter exploded view.

1. Hose assy
2. Quick Disconnect
3. Control hose (24 Ft, 5 rqr)
4. Nut
5. Washer
6. Bolt
7. Nut
8. Washer
9. Bolt
10. Mounting plate
11. Nipple
12. Bleed valve
13. Pressure gage (0 to 120 PSI)
14. Pipe, cross
15. Nipple
16. Bushing, reducer
17. Check valve assembly
18. Spring
19. Ball, viton
20. Connector
21. Nut, self-locking
22. Bolt
23. Handle assy
24. Fill cap
25. Gasket, copper
26. Screw
27. Washer
28. Latch segment
29. Bolt
30. Washer
31. Cover
32. Retaining ring
33. Pin
34. Piston assy
35. "O" ring
36. Bearing seal
37. Bearing
38. Rocker arm assy
39. Sync tube and filter assy
40. Transmitter body

Figure 2-10. Remote control transmitter, exploded view-Continued.

APPENDIX A

REFERENCES

A-1. Fire Protection

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

A-2. Lubrication

C9100IL	Fuels, Lubricants, Oils and Waxes

A-3. Painting

TM 9-213	Painting Instructions for Field Use

A-4. Records

TM 38-750	Army Equipment Record Procedures

A-5. Storage

TM 740-90-1	Administrative Storage

A-6. Demolition

TM 750-2443	Demolition of Army Material to Prevent Enemy Use

A-7. Maintenance

TM 5-3895-332-25P	Organizational, Direct and General Support and Depot Maintenance Repair Parts and Special Tools List

ALPHABETICAL INDEX

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. 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

'VEIGHTS

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

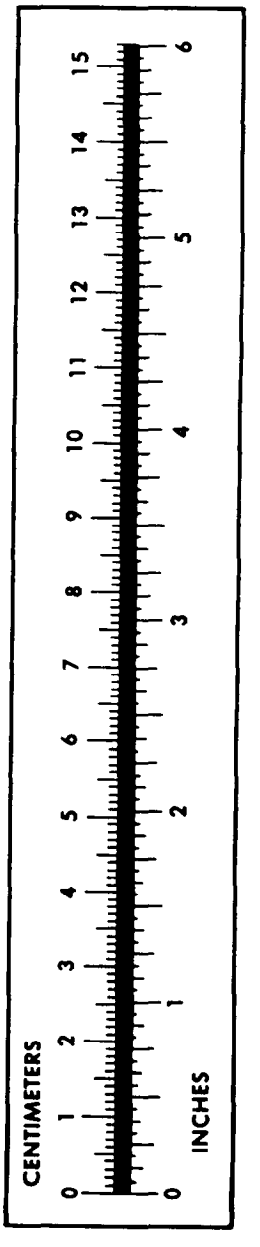
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°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
ıts	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
lometers per Liter	Miles per Gallon	2.354
›meters per Hour	Miles per Hour	0.621



PIN: 005615-000