

ORGANIZATIONAL MAINTENANCE MANUAL

CRANE-SHOVEL BASIC UNIT

**TRUCK MOUNTED: 20 TON, 3/4
CU YD; GASOLINE DRIVEN, 6x6
(QUICKWAY MODEL M-200)**

NON-WINTERIZED

**CRANE SERIAL NUMBERS 20-026 THROUGH 20-500
CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C
FSN 3810-542-4982**

WINTERIZED TO MINUS 65 DEGREES

**CRANE SERIAL NUMBERS 20-001 THROUGH 20-025
CARRIER SERIAL NUMBERS 59--001C THROUGH 59-025C
FSN 3810-542-4980**



C1, C 2, C 3, C 4, and C 5

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL MANUAL

TM 5-3810-207-20
TO 36C23-3-37-12

TM 5-3810-207-20
TO 36C23-3-37-12
Changes No. 5

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
Washington D.C., 28 February 1992

ORGANIZATIONAL MAINTENANCE MANUAL

CRANE, BASIC UNIT: TRUCK MOUNTED; 20 TON: 3/4 CU YD: GASOLINE DRIVEN 6X6 (QUICKWAY MODEL M-200) NON-WINTERIZED, NSN 3810-00-542-4982; WINTERIZED TO MINUS 6 DEGREES, NSN 3810-00-542-4980

TM 5-3810-207-20/TO 36C23-3-37-12, 31 May 1962 is changed as follows:

Cover: The manual title is changed to read as shown above.

Add the following WARNING to the Safety Precautions, *page iii*; preceding paragraph 20 of Section III, Preventive Maintenance Services (as superseded by Change No. 1), *page 18*; preceding paragraph 22 of Section IV, Troubleshooting, *page 20*; preceding paragraph 59 of Section V, Field Expedient Repairs, *page 24*; preceding

paragraph 244, Engine Air Cleaner, *page 186*; and preceding paragraph 337, Preparation of Equipment For Shipment, *page 273*:

WARNING

If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC Officer or NBC NCO for appropriate handling or disposal instructions.

By Order of the Secretaries of the Army and the Air Force:

Official:

MILTON H. HAMILTON
*Administrative Assistant to the
Secretary of the Army*
00483

GORDON R. SULLIVAN
*General, United States Army
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Official:

CHARLES C. McDONALD
*General, United States Air Force
Commander, Air Force Logistics Command*

MERRILL A. McPEAK
*General, United States Air Force
Chief of Staff*

Distribution:

To be distributed in accordance with DA Form 12-25-E, Block 0536, Unit maintenance requirements for TM 5-3810-207-20.

Approved for public release; distribution is unlimited.

Changes in force C1, C2, C3, and C4

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL MANUAL

TM 5-3810-207-20
TO 36C23-3-37-12
C 4

TM 5-3810-207-20
TO 36C23-37-12
Change No. 4

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
Washington, D.C., 2 August 1971

Organizational Maintenance Manual

**CRANE, BASIC UNIT: TRUCK MOUNTED; 20 TON: 3/4 CU YD: GASOLINE DRIVEN:
6x6 (QUICKWAY MODEL M-200) NON-WINTERIZED, FSN 3810-542-4982; WINTERIZED
TO MINUS 6 DEGREES, FSN 3810-542-4980**

TM 5-3810-207-20P/TO 36C23-3-37-12, 31 May 1962 is changed as follows:
Page 279, Appendix II. Maintenance Allocation Chart is superseded.

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CHANGE

No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 22 January 1969

Organizational Maintenance Manual

**CRANE-SHOVEL, BASIC UNIT, TRUCK MOUNTED: 20 TON,
3/4 CU YD, GASOLINE DRIVEN 6X6, (QUICKWAY MODEL M-200)
NON-WINTERIZED, FSN 3810-542-4982; WINTERIZED TO MINUS 65
DEGREES, FSN 3810-542-4980**

TM 5-3810-207-20, 31 May 1962, is changed as follows:

Cover page and contents page are changed as shown above.

Page 3. Paragraph 1d is superseded as follows:

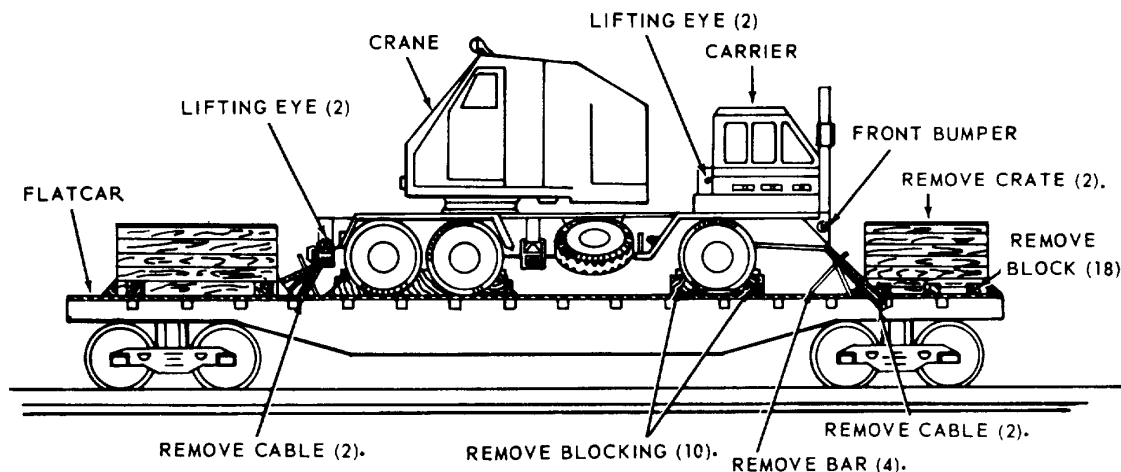
d. The Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended

Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Mobility Equipment Command, ATTN: ANSME MPP, 4300 Goodfellow Boulevard, St. Louis, Mo., 63120.

Paragraph 1e is superseded as follows:

e. Report all equipment improvement recommendations as prescribed by TM 38-750.

Page 12. Figure 2 is superseded as follows:



ME 3810-207-20/2 C3

Figure 2. Crane-shovel blocking and tiedown, removal.

Page 212. Section VI.1, CARRIER ENGINE
ROCKER ARM AND PUSH RODS ASSEMBLY,

and figure 163.1 and figure 163.2 are added as follows:

Section VI.1. CARRIER ENGINE ROCKER ARM AND PUSH RODS ASSEMBLY

266.1 General

An overhead valve system is used on the carrier engine. Cam actuated push rods operate the rocker

arms mounted on the engine cylinder head and inclosed within oil-tight covers. The action of the rocker arms opens and closes the valves during each

engine cycle. Drilled passages in the cylinder head provide lubrication for the rocker arm assemblies, and ports on the side of the engine provide passages for fuel vapors and exhaust gases.

266.2 Carrier Engine Rocker Arm and Push Rods Assembly, Removal and Disassembly

a. Removal.

(1) Remove the intake and exhaust manifolds by referring to paragraph 104.

(2) Remove the water manifold by referring to paragraph 260.

(3) Remove the spark plugs by referring to paragraph 202.

(4) Remove the rocker arm covers by referring to paragraph 265.

(5) Remove the carrier engine rocker arm and push rods assembly as instructed on figure 163.1.

b. *Disassembly.* Disassemble the carrier engine rocker arm and push rods assembly in numerical sequence as illustrated on figure 163.2.

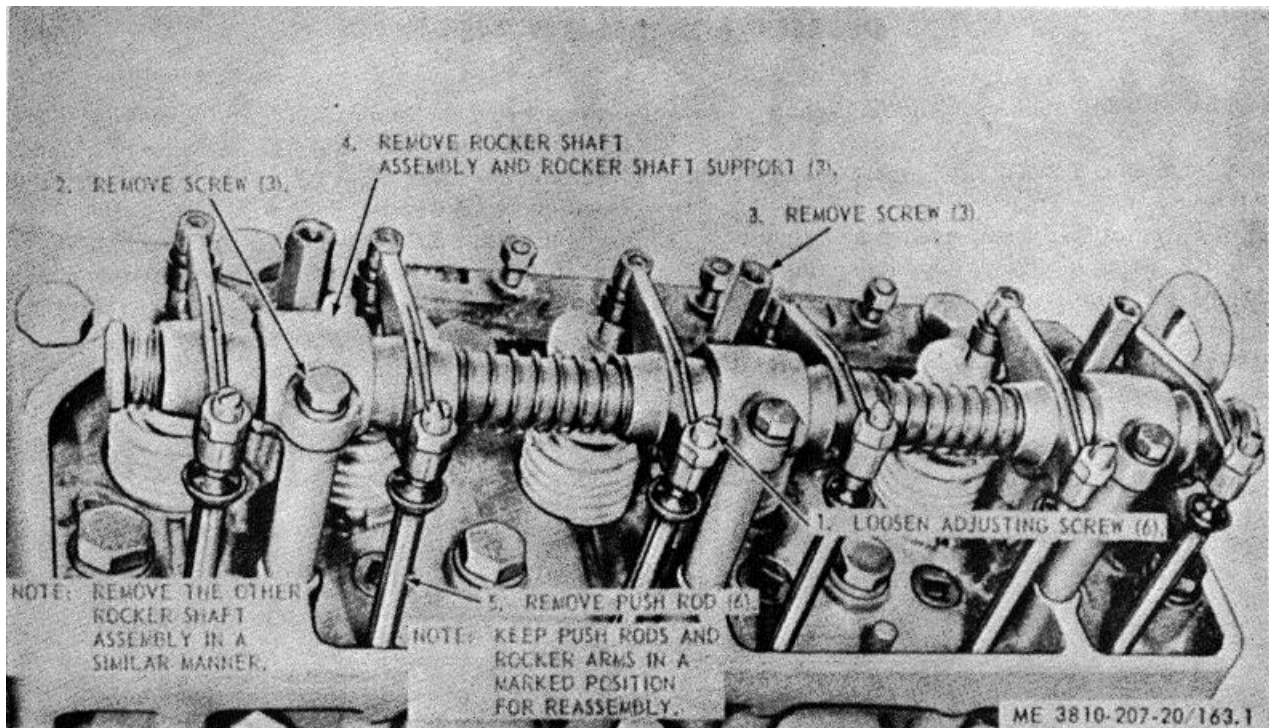


Figure 163.1. Carrier engine rocker arm shaft and push rod assembly, removal and installation

266.3 Carrier Engine Rocker Arm and Push Rods Assembly Cleaning, Inspection, and Repair

a. *Cleaning.* Clean all parts with an approved cleaning solvent and dry thoroughly.

b. *Inspection and Repair.* Inspect all parts of excessive wear, defects, and damage. Replace or repair all damaged or defective parts. Inspect the rocker arm-to-shaft clearance. The clearance should measure from 0.005 to 0.0015 inch.

266.4 Carrier Engine Rocker Arm and Push Rods Assembly Reassembly and Installation

a. *Reassembly.* Reassemble the carrier engine rocker arm and push rods assembly in the reverse of the numerical sequence as illustrated on figure 163.2.

b. Installation.

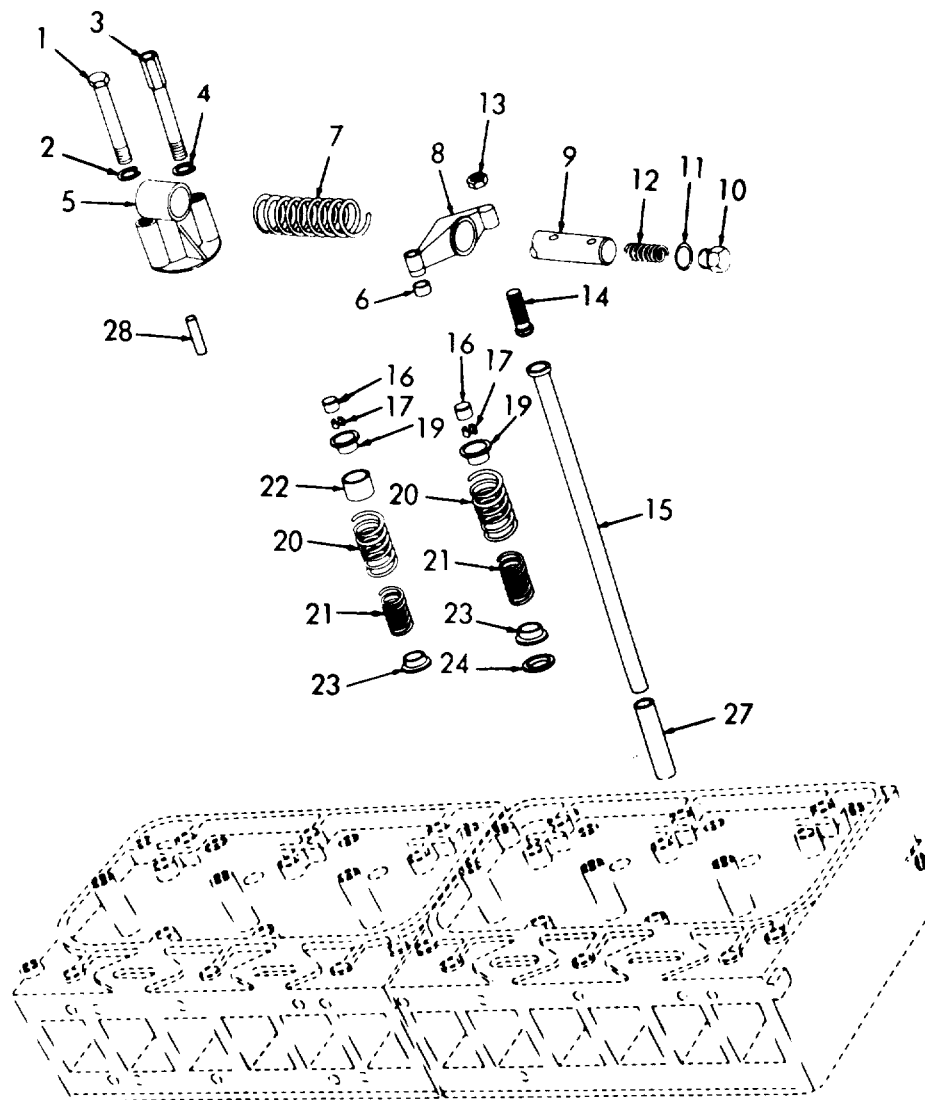
(1) Install the carrier engine rocker arm and push rods assembly as illustrated on figure 163.1.

(2) Install the rocker arm covers by referring to paragraph 265.

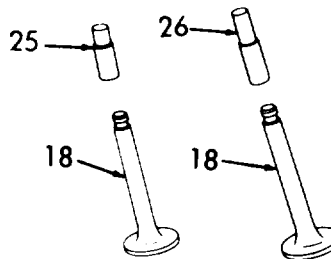
(3) Install the spark plug by referring to paragraph 202.

(4) Install the water manifold by referring to paragraph 260.

(5) Install the intake and exhaust manifolds by referring to paragraph 104.



- 1 Shaft support screw, 3/8-16 x 4 (6)
- 2 Washer, lock, 3/8 in. (6)
- 3 Shaft support screw, special (6)
- 4 Washer, lock, 3/8 in. (6)
- 5 Rocker shaft support (6)
- 6 Ball socket (12)
- 7 Spring, long (4)
- 8 Rocker arm (12)
- 9 Rocker arm shaft (2)
- 10 Rocker arm shaft plug (4)
- 11 Oil plug gasket (4)
- 12 Spring, short (4)
- 13 Adjusting screw nut (12)
- 14 Adjusting screw (12)
- 15 Push rod (12)
- 16 Valve stem cap (12)
- 17 Valve spring retainer lock (24)
- 18 Valve, intake and exhaust (12)
- 19 Valve spring upper retainer (12)
- 20 Outer valve spring (12)
- 21 Inner valve spring (12)
- 22 Valve stem inlet guard (6)
- 23 Valve spring lower retainer (12)
- 24 Exhaust valve spacer (6)
- 25 Intake valve stem guide (6)
- 26 Exhaust valve stem guide (6)
- 27 Push rod tube (12)
- 28 Dowel, rocker shaft to support (2)



ME 3810-207-20/163.2

Figure 163.2. Carrier engine rocker arm and push rod assembly, exploded view.

APPENDIX II
MAINTENANCE ALLOCATION CHART
Section 1. INTRODUCTION

1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III (Not Applicable).

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

2. Explanation of Columns in Section II

a. *Group Number, Column (1).* The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. *Functional Group, Column (2).* This column contains a brief description of the components of each functional group.

c. *Maintenance Functions, Column (3).* This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew

O—Organizational maintenance

F—Direct support maintenance

H—General support maintenance

D—Depot maintenance

The maintenance functions are defined as follows:

A—Inspect: To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B—Test: To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—Service: To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.

D—Adjust: To rectify to the extent necessary to bring into proper operating range.

E—Aline: To adjust specified variable elements of an item to being to optimum performance.

F—Calibrate: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G—Install: To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—Replace: To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I—Repair: To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

J—Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K—Rebuild: To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. *Tools and Equipment, Column (4).* This column is provided for referencing by code the special tools and test equipment (Sec. III) required to perform the maintenance functions (Sec. II).

e. *Remarks, Column (5).* This column is provided for referencing by code the remarks (Sec. III) pertinent to the maintenance functions.

3. Explanation of Columns in Section IV

a. *Reference Code.* This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references Column (5) and the second letter references a maintenance function, Column (3), A through K.

b. *Remarks.* This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

Section IV. REMARKS

| Reference code | Remarks | Reference code | Remarks |
|----------------|--|----------------|--|
| A—B | Test Includes operational and compression. | F—I | Repair of generator includes replacing brushes only. |
| B—A | Includes micrometer measurement. | G—I | Repair of starter includes replacing brushes and solenoid only. |
| C—I | Includes refacing as necessary. | H—I | Repair of distributor includes replacing, contact set, capacitor and rotor only. |
| D—I | Repair of crankshaft includes metalizing, alining, grinding. | | |
| E —I | Repair of flywheel, includes replacing ring gear. | | |

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
*Major General, United States Army,
 The Adjutant General.*

W. C. WESTMORELAND,
*General, United States Army,
 Chief of Staff.*

Distribution:

To be distribution in accordance with DA Form 12-25, Section II, (qty rqr block No. 362) organizational maintenance requirements for Crane, Shovels, Truck Mounted 20 Ton.

☆U. S. GOVERNMENT PRINTING OFFICE: 1974--548781

Organizational Maintenance Manual

**CRANE-SHOVEL, BASIC UNIT TRUCK MOUNTED: 20 TON, 3/4 CU YD;
GASOLINE DRIVEN, 6 x 6 (QUICKWAY MODEL M-200) NONWINTERIZED
(FSN 3810-542-4982) CRANE SERIAL NUMBERS 20-026 THROUGH 20-500
CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C WINTERIZED TO
-65° (FSN 3810-542-4980) CRANE SERIAL NUMBERS 20-001 THROUGH
20-025 CARRIER SERIAL NUMBERS 59-001C THROUGH 59-025C**

CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 16 December 1963

TM 5-3810-207-20, 31 May 1962, is changed as follows:

Page :3. Delete paragraph 1*d* and 1*e* and substitute as follows:

d. The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to the Commanding Officer, U. S. Army Mobility Support Center, ATTN: SMOMS-MM, P. O. Box 119, Columbus, Ohio 43216. One information copy will be provided

to the individual's immediate supervisor (officer, noncommissioned officer, supervisor etc.)

e. Report all equipment improvement recommendations as prescribed by TM 38-750.

Page 15, paragraph 11*b*, Note, line 3. After "rack " add " install the antirotation bars."

Add note as follows:

.Note. Fabricated bars are to be from a good grade of steel not less than 1 1/4 inch in diameter bracket from a good grade of steel and large enough to withstand shock loads. Brackets and bars are installed and stowed in a manner, similar to illustrated figures 2.1 and 2.2.

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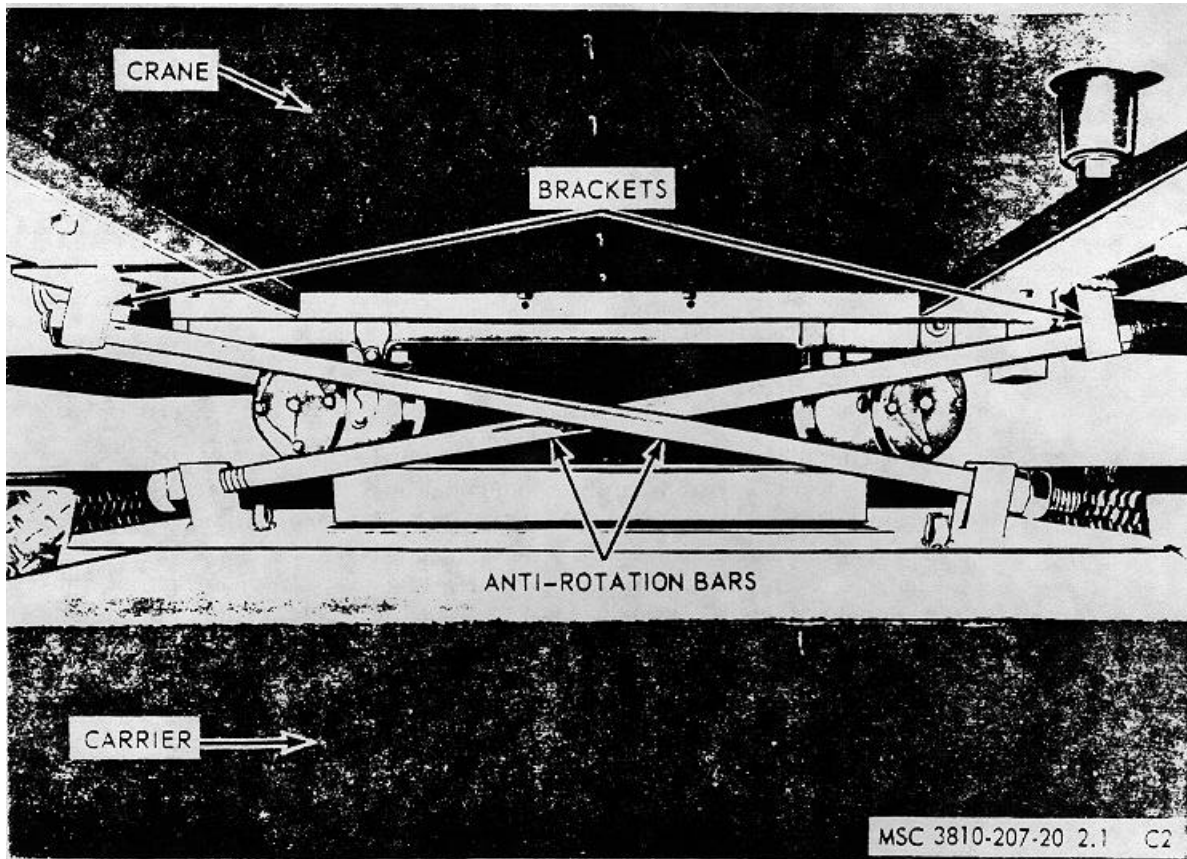


Figure 2.1. (Added) Antirotation bars, installed.

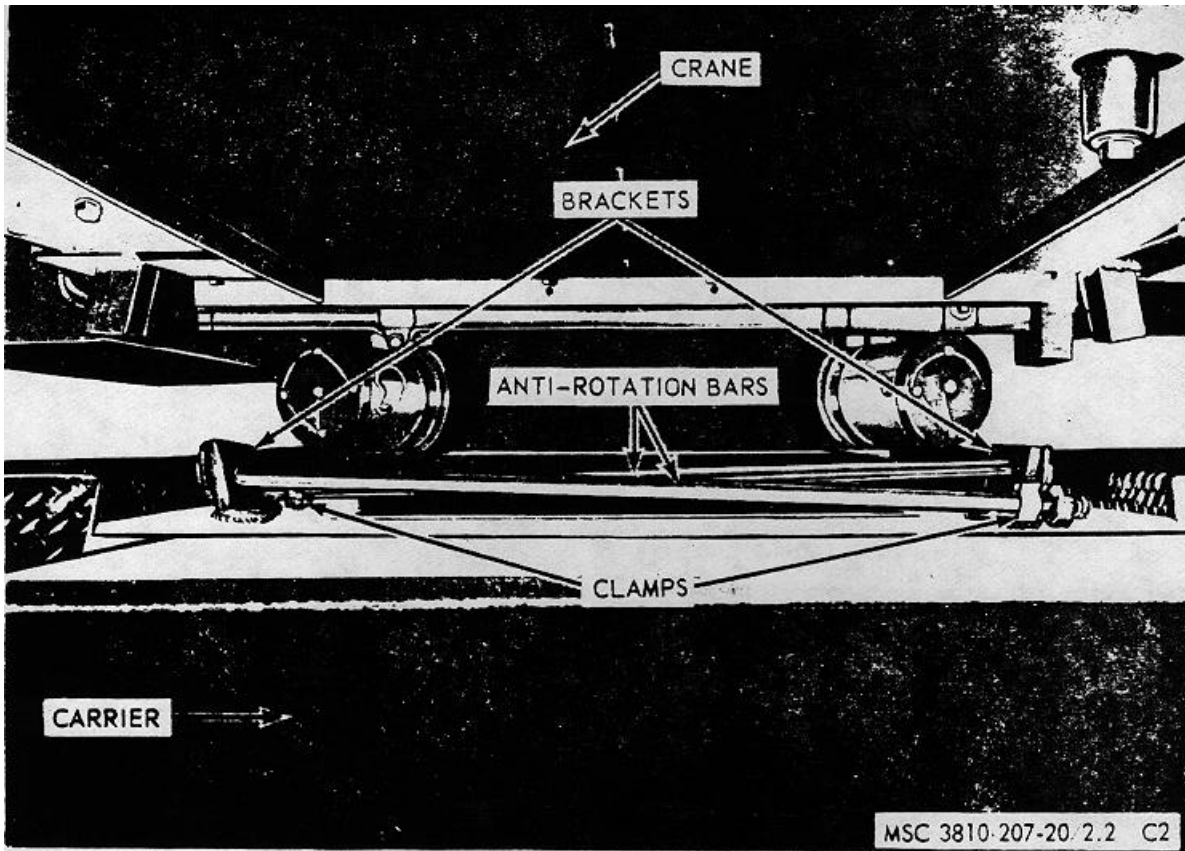


Figure 2.2. (Added) Antirotation bars, stowed.

Page 307, Appendix II, Maintenance Allocation Chart, Functional Group 6004.3 ENGINE OR EQUIPMENT HEATERS, See Group 6000.1, is superseded as follows:

| Functional group | Components and related operation | Echelons of maintenance | | | | | Remarks |
|------------------|----------------------------------|-------------------------|---|---|---|---|---------|
| | | 1 | 2 | 3 | 4 | 5 | |
| 6000.3 | ENGINE OR EQUIPMENT HEATERS | | | | | | |
| | Heater, Engine | | | | | | |
| | Service | X | | | | | |
| | Inspect | | X | | | | |
| | Replace | | X | | | | |
| | Repair | | X | | | | |
| | Controls and control box | | | | | | |
| | Replace | | X | | | | |
| | Repair | | X | | | | |

BY ORDER OF THE SECRETARY OF THE ARMY:

EARLE G. WHEELER,
*General, United States Army,
Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,
The Adjutant General.*

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| Chicago Proc Ofc (10) | 9-57 |

TAGO 7124A

9-87
9-167
9-211.
9-227
9-367
10-377
17
17-100
29-105
29-107

37-100
39-61
55-117
56-260
55-445
55-468
55-469
55-600
(JB)
57-100

NG: State AG (3).

USAR: Same as Active Army except allowance is one (1) copy to each unit.

For explanation of abbreviations used, see AR 310-50.

*U. S. GOVERNMENT PRINTING OFFICE: 1982 - 381-312
PIN: 012234-002

Organizational Maintenance Manual

CRANE-SHOVEL, BASIC UNIT TRUCK MOUNTED: 20 TON, 3/4 CU YD; GASOLINE DRIVEN, 6X6 (QUICKWAY MODEL M-200) NON-WINTERIZED (FSN 3810-542-4982) CRANE SERIAL NUMBERS 20-026 THROUGH 20-500 CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C WINTERIZED TO -65° (FSN 3810-542-4980) CRANE SERIAL NUMBERS 20-001 THROUGH 20-025 CARRIER SERIAL NUMBERS 59-001C THROUGH 59-025C.

TM 5-3810-207-201
TO 36C23-3-37-12
CHANGES No. 1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D.C., 24 October 1962

TM 5-3810-207-20/TO 36C23-3-37-12, 31 May 1962, is changed as follows:

Page 11. Paragraph 6b

(2) (Superseded) Perform preventive maintenance services (TM 5-3810-207-10).

Pages 18 and 19.

Section III. PREVENTIVE MAINTENANCE SERVICES (Superseded)

19. General

a. Preventive maintenance is performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equivalent to 3 calendar months or 250 hours of operation, whichever occurs first.

b. The preventive maintenance services to be performed at quarterly intervals are listed consecutively and are described in paragraph 20. The item numbers indicate the sequence of minimum inspection requirements. DA Form 2404 Equipment Inspection and Maintenance Work-Sheet will be prepared when inspection reveals any deficiencies.

c. Lubrication shall be as prescribed in TM 5-3810-207-10.

20. Quarterly Preventive Maintenance Services

The preventive maintenance inspections and services to be performed by organizational maintenance personnel are listed and illustrated on figure 4.1.

Note.

Detailed instructions for applicable maintenance procedures are referenced by the paragraph numbers listed.

Page 54. Paragraph 92e(3) line 2. Delete "80 to 85 psi" and substitute "125 psi with no more than 15 psi variation on all cylinders".

Page 212. Paragraph 266a. Following paragraph 266a, add paragraph 266a.1 as follows:

a.1. . Remove spark plugs and test engine compression, Insert compression gage in spark plug hole and crank engine with starting motor. Correct reading is 90 psi with no more than 15 psi variation between cylinders.

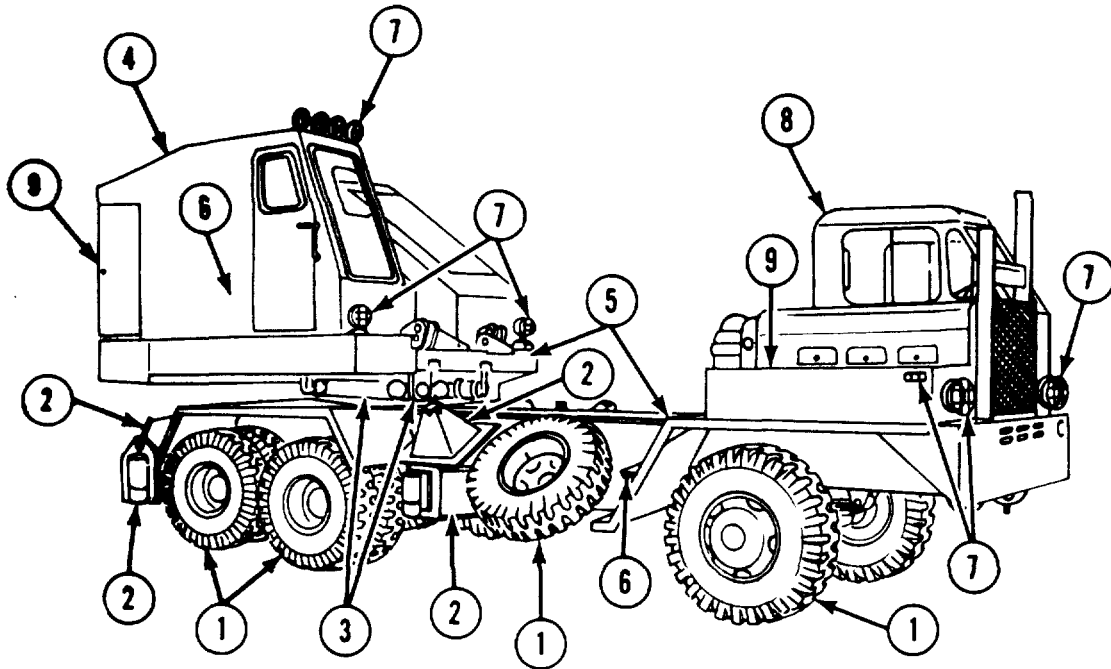
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PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



CRANE AND CRANE CARRIER

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION, ORDER

| Item | | Par. Ref. |
|------|---|-----------|
| 1 | <u>TIRES AND WHEELS.</u> Inspect tires for correct pressure (80 psi). Check for excessive wear, cuts, breaks, imbedded foreign matter, and missing valve caps. Tighten wheel nuts and check wheel bearing adjustment. | 284 |
| 2 | <u>OUTRIGGERS AND FLOATS.</u> Inspect for cracks, breaks, ants, and free operation. | |
| 3 | <u>CONICAL ROLLERS AND ROLLER PATH.</u> Inspect for wear, cracks, and damage. Check the rollers and roller path adjustment. | 144,145 |

(1) Items 1 thru 9

Figure 4.1. Quarterly preventive maintenance services.

| | | |
|---|--|--|
| 4 | <p><u>CRANE CAB.</u> Inspect all glass for breaks and cracks. Inspect hinges, locks, hasps, and mounting hardware for cracks, breaks, and damage. Inspect crane cab and doors for missing parts, dents, cracks, and damage. Inspect the wiper for secure mounting and proper operation.</p> | |
| 5 | <p><u>CARRIER AND CRANE FUEL TANKS.</u> Check fuel level. Check strainers for damage and cleanliness, and check tank for leaks.</p> | |
| 6 | <p><u>FIRE EXTINGUISHERS.</u> Check the condition and Inspect for full charge, proper working condition, and secure mounting. The monobromotrifluoromethane type must be weighed every six months and the cylinder replaced if the gross weight has decreased 4 ounces or more. For replacement of cylinder, see TM 5-3810-207-10.</p> | |
| 7 | <p><u>HEADLIGHTS, FLOODLIGHTS, DOMELIGHTS, BLACKOUT, AND MARKER LIGHTS.</u> Inspect these items for damage, missing parts, secure mounting, and proper operation. Inspect the wiring and connections for damage.</p> | |
| 8 | <p><u>CARRIER CAB.</u> Inspect all glass for breaks and cracks. Inspect the seal strips for deterioration and signs of leaking. Inspect the windshield wiper for secure mounting and proper operation.</p> | |
| 9 | <p><u>BATTERIES.</u> Inspect for cracked or leaking cases. Inspect the cables, terminals, posts, and straps for damage. The specific gravity should read 1.275 to 1.300. Readings of 1.225 or below indicate the battery should be recharged or replaced. Electrolyte level should be 3/8 inch above the plates. Do not add water in freezing weather unless the engine is to be operated immediately. Clean all dirt and corrosion from the top of the batteries, battery cables, and terminals. Replace damaged cables or batteries.</p> | |

EMC 3810-207-20/4.1 (1)

**(1) Items 1 thru 9
Figure .1. Quarterly preventive maintenance services Continued.**

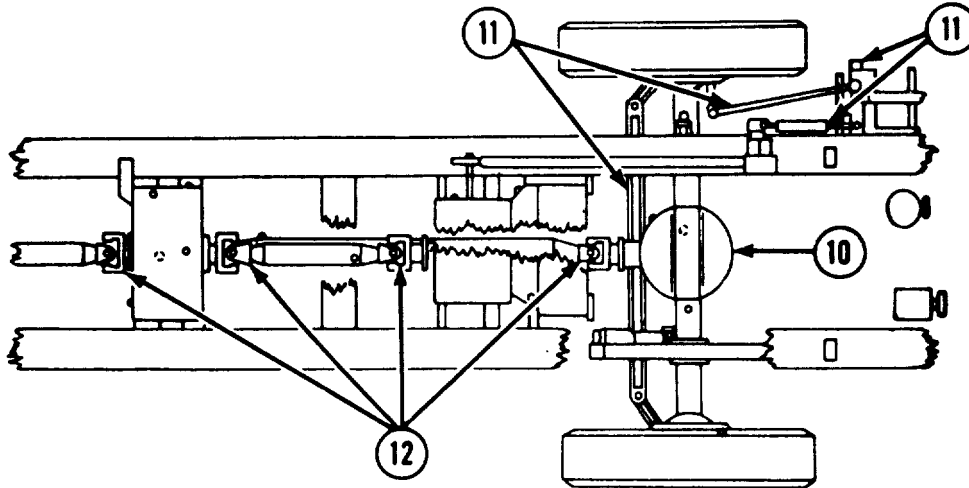
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PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



FRONT FRAME AND AXLE

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | Par. Ref. |
|------|--|
| 10 | <u>FRONT AXLE AND DIFFERENTIAL ASSEMBLY.</u> Inspect for cracks, breaks, missing parts, leaks, and secure mounting. Check lubricant level. |
| 11 | <u>STEERING GEAR. DRAG LINK, TIE ROD, STEERING VALVE, AND CYLINDER.</u> Inspect for wear, cracks, breaks, leaks, and missing parts. |
| 12 | <u>UNIVERSAL JOINTS AND PROPELLER SHAFTS.</u> Inspect for wear, breaks, missing parts, and secure mounting. |

EMC 381-207-204.1 (2)

(2) Items 10 thru 12

Figure 4.1. Quarterly preventive maintenance services-Continued.

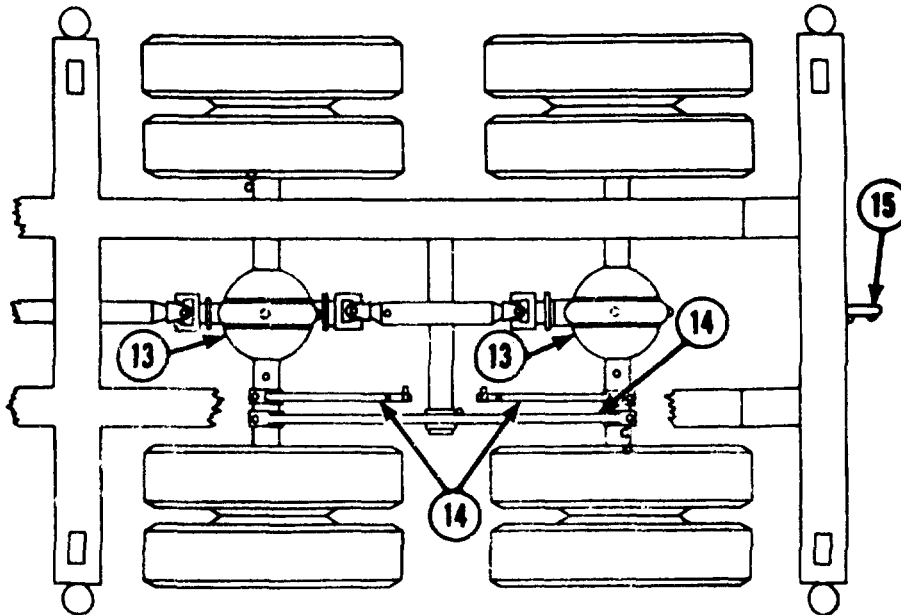
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PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



REAR FRAME AND AXLE

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | | Par. Ref. |
|------|---|-----------|
| 13 | <u>REAR AXLES AND DIFFERENTIALS.</u> Inspect for damage, missing parts, and secure mounting. Inspect for leaks around gaskets and seals. Check oil level. (See LO). | |
| 14 | <u>REAR AXLE BEAMS AND TORQUE RODS.</u> Inspect for cracks, breaks, missing parts, defects, and damage. | |
| 15 | <u>PINTLE HOOK.</u> Inspect the pintle hook for breaks, cracks, missing parts, damage, and secure mounting. | |

EMC 3810-207-20/4.1 (3)

Items 13 thru 15

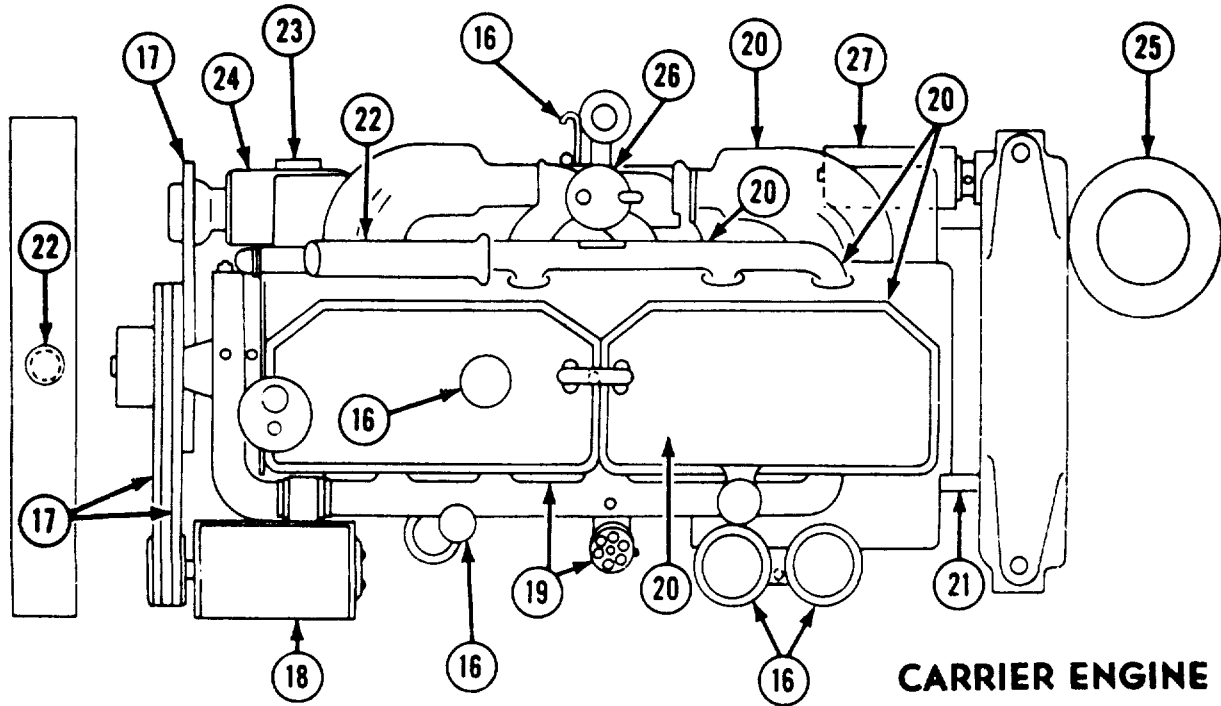
Figure 4.1. Quarterly preventive maintenance services-Continued.

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | | Par. Ref. |
|------|---|-----------|
| 16 | <u>CARRIER ENGINE LUBRICATION SYSTEM.</u> Check oil level. Inspect the oil filters, oil pan, valve covers, oil lines, and crankcase for leaks, broken lines, and damage. Inspect the crankcase breather and filler cap for clogged condition. (See LO). | |
| 17 | <u>CARRIER BELTS AND PULLEYS.</u> Check for excessively worn, cracked, or frayed belts. Check belt tension and condition and alinement of pulleys. The belt is properly adjusted when, without undue pressure, it can be depressed 3/4 to 1 inch from a normal position at a point midway between pulleys. Replace and adjust a defective belt. Replace defective pulleys as necessary. | |

(4) Items 16 thru 27

Figure 4.1. Quarterly preventive maintenance services--Continued.

| | | |
|----|---|-----|
| 18 | <u>CARRIER ENGINE GENERATOR.</u> Inspect for secure mounting, defects, and damage. | |
| 19 | <u>CARRIER ENGINE DISTRIBUTOR AND SPARK PLUGS.</u> Inspect for defects, damage, and secure mounting. (See LO). Contact point gap 0.020 In. Spark plug gap 0.025 in. | |
| 20 | <u>CARRIER ENGINE CYLINDER HEAD, INTAKE AND EXHAUST MANIFOLDS. AND VALVE COVERS.</u> Inspect for leaks and secure mounting. Tighten cylinder head to 145-155 lb torque. | |
| 21 | <u>CARRIER ENGINE OIL PAN.</u> Inspect for leaks, damage, and secure mounting. | |
| 22 | <u>CARRIER ENGINE COOLING SYSTEM.</u> Inspect the radiator, fan hose, lines, water manifold, water pump, and thermostat housing for leaks, damage, and secure mounting. Fill radiator to 3/4 inch above baffle. | |
| 23 | <u>HYDRAULIC STEERING PUMP.</u> Inspect for wear, leaks, cracks, defects, damage, and secure mounting. Check oil level. (See LO) | |
| 24 | <u>AIR COMPRESSOR.</u> Inspect for oil leaks, defects, damage, secure mounting, and proper operation. | |
| 25 | <u>CARRIER ENGINE AIR CLEANER.</u> Inspect for damage, missing parts, and secure mounting. Check oil level. (See LO). | |
| 26 | <u>CARRIER ENGINE CARBURETOR.</u> Inspect for cracks, missing parts, damage, secure mounting, and adjustment. | 246 |
| 27 | <u>CARRIER ENGINE STARTER.</u> Inspect for secure mounting, defects, and damage. | |

EMC 3810-207-20/4.1 (4)

(4) Items 16 thru 27
Figure 4.1. Quarterly preventive maintenance services-Continued.

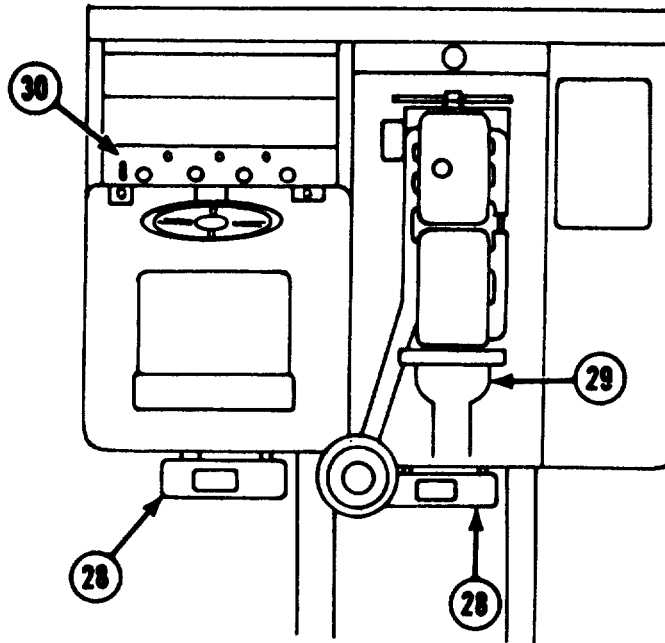
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PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



CARRIER CAB

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER | Par. Ref. |
|------|---|-----------------|
| 28 | <u>CARRIER WINTERIZATION HEATERS, FUEL PUMPS, AND FILTERS.</u> Inspect for damage, defects, missing parts, and secure mounting. | 326,328, 329 |
| 29 | <u>CARRIER ENGINE CLUTCH.</u> Inspect for breaks, missing parts, damage, and adjustment. | 268 |
| 30 | <u>CARRIER INSTRUMENTS AND CONTROLS.</u> Inspect for damage and secure mounting. Correct Instrument readings are: Battery generator indicator Green. Oil pressure warning light Out with engine running. Coolant temperature warning light Out with engine at normal temperature. Oil pressure 50 to 60 psi. Air pressure 80 to 105 psi . | |

EMC 3810-207-20/4.1 (5)

(5) Items 28 thru 30

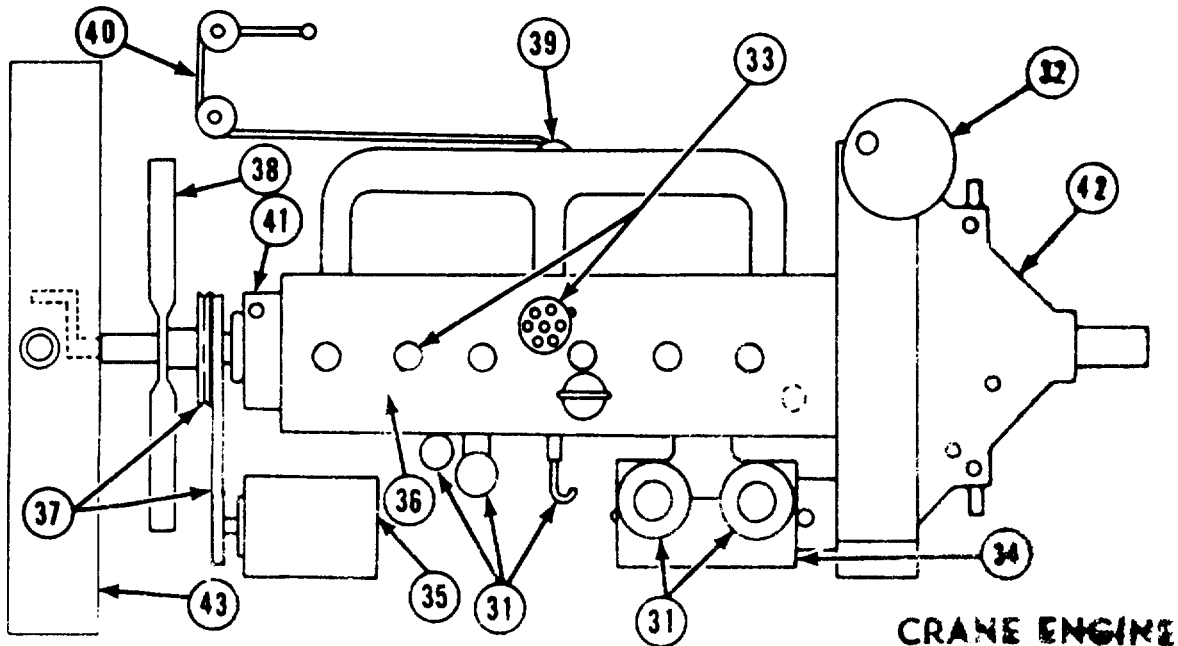
Figure 4.1. Quarterly preventive maintenance services-Continued.

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



CRANE ENGINE

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | | Par. Ref. |
|------|---|-----------|
| 31 | <u>CRANE ENGINE LUBRICATION SYSTEM.</u> Check oil level. Inspect oil filters, valve covers, and crankcase for leaks. damage, and secure mounting. (See LO). | |
| 32 | <u>CRANE ENGINE AIR CLEANER.</u> Inspect for cracks, breaks, missing parts, damage, and secure mounting. Service as required. (See LO). | |
| 33 | <u>CRANE ENGINE DISTRIBUTOR AND SPARK PLUGS.</u> Inspect for defects, damage, and secure mounting. (See LO). Contact point gap 0.020 inch Spark plug gap 0.035 inch | |
| 34 | <u>CRANE ENGINE STARTER AND SOLENOID.</u> Inspect for defects, damage, and secure mounting. (See LO). | |

(6) Items 31 thru 48

Figure 4.1. Quarterly preventive maintenance services—Continued.

| | | |
|----|---|-------|
| 35 | <u>CRANE ENGINE GENERATOR AND REGULATOR.</u> Inspect for defects, damage, and secure mounting. | |
| 36 | <u>CRANE ENGINE CYLINDER HEAD.</u> Inspect for leaks, damage, and secure mounting. Tighten head to 70-75 lbs torque. | |
| 37 | <u>CRANE ENGINE BELTS AND PULLEYS.</u> Inspect for wear, breaks, and adjustment. Belt tension is correct when it can be deflected 1/4 to 1/2 inch midway between pulleys. Inspect pulleys for wear, damage, and proper alignment. | |
| 38 | <u>CRANE ENGINE FAN.</u> Inspect for bent, cracked, or damaged blades and secure mounting. | |
| 39 | <u>CRANE ENGINE CARBURETOR.</u> Inspect for leaks, cracks, damage, missing parts, secure mounting, and proper adjustment | 106 |
| 40 | <u>CRANE ENGINE THROTTLE CONTROL.</u> Inspect the cables for wear, defects, and secure connections. Inspect pulleys for wear, defects, and secure mounting. Adjust cables as required. | |
| 41 | <u>CRANE ENGINE WATER PUMP.</u> Inspect for leaks, cracks, and secure mounting. | 101 |
| 42 | <u>CRANE ENGINE CLUTCH ASSEMBLY.</u> Inspect for worn pins and linkage, worn clutch facings, damage, and adjustment. | 118 |
| 43 | <u>CRANE ENGINE COOLING SYSTEM.</u> Inspect for leaks, deteriorated hose, loose clamps, and secure mounting. Check coolant level. Fill radiator to 3/4 inch above baffle. | 95,99 |

EMC 3810-207-20/4.1 (6)

(6) Items 31 thru 43

Figure 4.1. Quarterly preventive maintenance services-Continued.

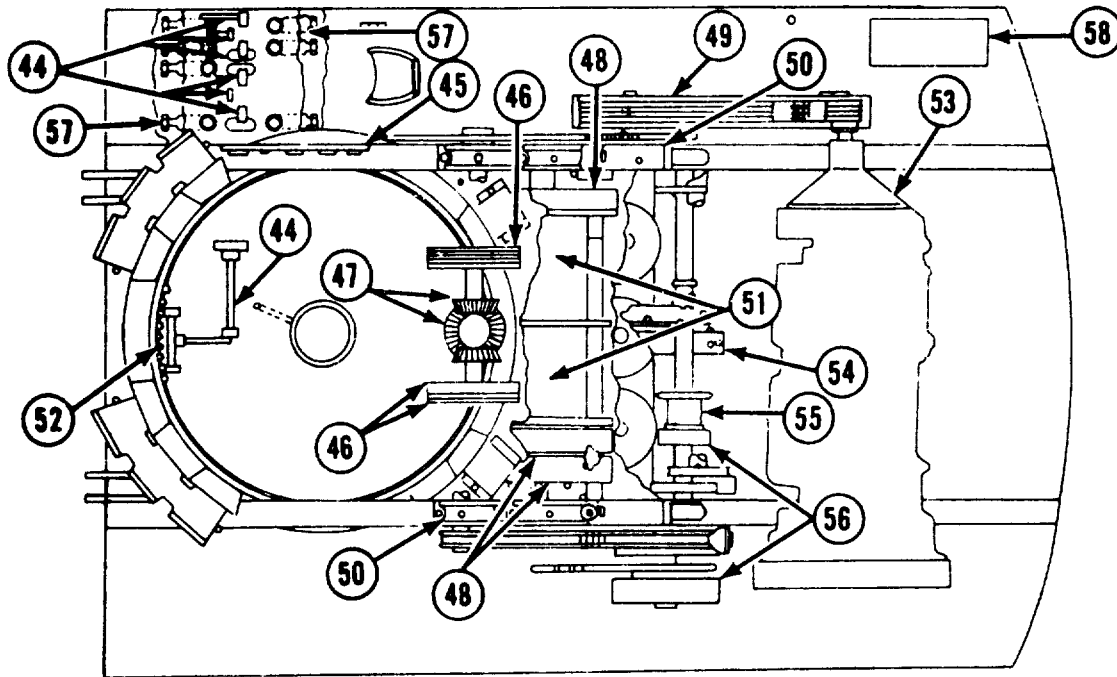
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PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM 5-3810-207-20

CRANE-SHOVEL, QUICKWAY MODEL M-200



MACHINERY DECK

LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

| Item | | Par. Ref. |
|------|---|-----------|
| 44 | <u>CRANE CONTROL LEVERS, SWING LOCK, AND BRAKE PEDALS.</u> Inspect these items for cracks, breaks, damage, and proper operation. | |
| 45 | <u>CRANE ENGINE SWITCHES, INSTRUMENTS, AND GAGES.</u> Inspect for cracks, breaks, defects, missing parts, and secure mounting. Normal readings are: Ammeter 2 to 40 amperes, Coolant temperature - 180° F, Oil pressure - 40 to 50 psi. | |
| 46 | <u>SWING CLUTCHES AND BRAKE.</u> Inspect for wear, cracks, breaks, missing parts, and secure mounting. Check adjustments | 138,141 |

(7) Items 44 thru 58

Figure 4.1. Quarterly preventive maintenance services-Continued.

| | | |
|----|--|---------|
| 47 | BEVEL GEARS. Inspect for wear, defects, broken or chipped teeth, and other damage. | |
| 48 | HOIST CLUTCHES AND BRAKES. Inspect for wear, defects, missing parts, damage, secure mounting, and adjustment. | 138,141 |
| 49 | MAIN DRIVE, CHAIN AND CHAIN CASE. Inspect for leaks, cracks, damage, and secure mounting. Correct chain adjustment is 1 inch sag midway between sprockets. | |
| 50 | MACHINERY SIDE FRAMES. Inspect for cracks, breaks, and damage. | |
| 51 | HOIST DRUM LAGGING. Inspect for cracks, breaks, damage, and secure mounting. | |
| 52 | PATH GEAR AND PINION. Inspect for wear, cracks, chipped or worn teeth, and other damage. | |
| 53 | CRANE ENGINE CLUTCH HOUSING. Inspect for cracks, breaks, damage, and secure mounting. | |
| 54 | BOOM HOIST POWER-DOWN GEARCASE. Inspect for leaks, cracks, breaks, damage, and secure mounting. Service as required. (See LO). | |
| 55 | BOOM HOIST DRUM. Inspect for cracks, breaks, damage, and secure mounting. | |
| 56 | BOOM HOIST CLUTCHES AND BRAKE. Inspect for wear, cracks, breaks, missing parts, damage, and secure mounting. Check adjustments. | 138,139 |
| 57 | CRANE HYDRAULIC SYSTEM. Inspect the cylinders for damage, secure mounting, leaks, and proper operation. Service as required. (See LO). | 129 |
| 58 | CRANE WINTERIZATION HEATER, FUEL PUMP. AND FILTER. Inspect for damage, secure mounting, missing parts, and proper operation. | 184,187 |

EMC 3810-207-20/4.1 (7)

(7) Items 44 thru 68

Figure 4.1. Quarterly preventive maintenance services-Continued.

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Engr Sec, GENDEP (OS) (10)
Engr Dep (OS) (10)
OSA (2)
Engr Dist (2) except
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 Detroit (1)

Alaska (1)
Los Angeles (1)
New Orleans (1)
New York (1)
Louisville (1)
Pittsburgh (1)
San Francisco (1)
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Kansas City (1)
Baltimore (1)
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Eastern Ocean (1)
Philadelphia (1)
Rock Island (1)
St Louis (1)
St Paul (1)
Div Engr (2) except
 Lower Miss Valley (none)
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Engr Fld Maint Shops (2)
Engr Cen (5)
AMS (3)
USA Engr Proc Ofc (10)
EMC (26)
ESCO (10)
Fld Comd, DASA (8)
Def Log Svc Cen (1)
USACOMZEUR (2)
USAREUR Engr Sup Com Agcy (10)
USAREUR Engr Proc Cen (2)
USA Corps (1)
MAAG (1)
JBUSMC (1)
USA Trans Tmr Comd (2)
Army Tml (2)
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NG: State AG (3); units— same as Active Army except allowance is one copy to each unit.

USAR: Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

TAGO 6782-A

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SAFETY PRECAUTIONS

BEFORE OPERATION

See that all adjustments are properly made and never operate a machine that is not properly adjusted.

Do not fill the fuel tank while the engine is running. When handling gasoline, always provide a metallic contact between the container and the tank. This will prevent a spark from being generated as gasoline flows over the metallic surfaces.

Before starting the engine, make certain that the master clutch lever is disengaged.

Do not add water to a battery in freezing temperatures unless the battery is to be charged immediately. If water is added and the battery is not charged, the water will freeze and damage the battery.

Do not smoke or allow open flame at or near vicinity when servicing the battery.

DURING OPERATION

When operating the crane-shovel, be guided by the simple and fundamental rules of safety. Always take all the necessary precautions to insure the safety of others as well as yourself.

Avoid careless operating habits which will cause accidents to personnel.

Watch the dipper or load while it is moving. When dumping into trucks, direct the swing over the tailgate of the truck; never swing the dipper or load over the truck cab.

Never leave the crane-shovel with the bucket or any crane load in a raised position. The brakes may loosen just enough to cause the load to fall or allow the front end attachment to lower on personnel.

Always keep loaded buckets and crane loads at a safe working range.

Keep the equipment on a firm base while operating, or use mats under the carrier.

Always lower the load to the ground before leaving the machine; don't leave the machine; don't leave the load hanging in the air.

Don't take chances on worn or frayed cables; replace them at once.

Don't leave the machine while the machinery is idling; shut off the engine or disengage the engine clutch.

Don't allow personnel to ride in the cab or on the load while the equipment is in operation.

Never lift a load unless satisfied that it is hooked properly.

Keep the equipment free of grease, oil, and dirt.

Always block the wheels of the carrier when parking on a grade, no matter how slight.

When making heavy lifts with a high boom, use extreme care and try the load after lifting it off the ground to see that the brakes will hold the load.

Never move loads over personnel or equipment.

Under no circumstances exceed maximum, permissible speed.

Be sure revolving frame is stopped before attempting to ewe swing lock, and release lock before attempting to swing the crane.

Keep lift height to minimum when handling close to maximum loads.

Start and stop revolving frame slowly when swinging heavy loads.

Always keep machine stationary and use outriggers when lifting maximum loads.

Be sure there is adequate clearance before attempting to move machine under low objects.

Apply brakes and engage clutches carefully. Sudden engagement of clutches or application of brakes causes undue strain on the machine.

When traveling across bridges, check to make sure they will carry a load equal to the machine's weight.

Always keep boom at least 10 feet away from all overhead wires.

If boom should hit overhead wires, stay on the machine until boom is cleared or current is shut off. Keep everyone on the ground away from the machine. If you must leave the machine jump; do not step off.

Always use handline for guiding loads.

Never get on or off a machine in motion.

Check to be sure slings, ties, and hooks are properly placed and secure before raising op" lowering loads.

Stop the engine when greasing, oiling, or making any adjustments to the engine.

Never add coolant to an overheated engine. Allow engine to cool first; then add coolant with the engine running. Never put a full load or speed on a cold engine.

Make sure the choke valve is wide open when the engine is running at operating temperature.

Do not operate the engine in a closed building unless the exhaust gas is piped to the outside. The exhaust gases contain carbon monoxide, a colorless, odorless, deadly poison.

Keep hands clear of cables feeding in on sheaves or drums.

Inspect all cables and clamps weekly.

AFTER OPERATION

Never leave a crane overnight with boom raised; lower the boom to the ground.

Don't leave the equipment on a bank or unstable parking place overnight.

When flushing the radiator, avoid excessive water pressure as it may damage the core.

Keep brake and clutch lining free of oil and grease.

TECHNICAL MANUAL
No. 5-3810-207-20
TECHNICAL ORDER
No. 36C23-3-37-12

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D.C., 31 May 1962

ORGANIZATIONAL MAINTENANCE MANUAL

CRANE-SHOVEL, BASIC UNIT TRUCK MOUNTED: 20 TON, 3/4 CU YD; GASOLINE DRIVEN, 6x6 (QUICKWAY MODEL M-200) NON-WINTERIZED (FSN 3810-542-4982) CRANE SERIAL NUMBERS 20-026 THROUGH 20-500 CARRIER SERIAL NUMBERS 59-026C THROUGH 59-500C WINTERIZED TO-65° (FSN 3810-542-4980) CRANE SERIAL NUMBERS 20-001 THROUGH 20-025 CARRIER SERIAL NUMBERS 59-001C THROUGH 59-025C

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*This manual supersedes TM 5-3810-207-20, 10 December 1959, including C 1, 9 October 1961.

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CHAPTER 1 INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of the personnel to whom the Quickway Model M-200 Crane-shovel and the M-1200 KW Dart Carrier are issued. They provide information on organizational maintenance of the equipment, its accessories, and auxiliaries. This manual also includes instructions for shipment and limited storage.

b. Appendix I contains a list of publications applicable to this manual. Appendix II contains the maintenance allocation chart. The organizational maintenance repair parts and special tools lists are in TM 5-3810-207-20P.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomenclature callouts on illustrations indicate the preferred maintenance sequence.

d. Report all deficiencies in this manual on DA Form 2028. Submit recommendations for changes, additions, or deletions to commanding officer, U.S. Army Engineer Maintenance Center, Corps of Engineers, ATTN: EMCDM-S, P. O. Box 119, Columbus 16, Ohio. Direct communication is authorized.

e. Report unsatisfactory equipment performance and suggestions for equipment improvement as specified in AR 750-5.

2. Record and Report Forms

For record and report forms applicable to organizational maintenance, refer to TM 38-750.

Note.

Applicable forms, excluding Standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

Section II. DESCRIPTION AND DATA

3. Description

TM 5-3810-207-10 provides a general description of the Quickway Crane-shovel. Specific and detailed descriptions of the components of the Quickway Crane-shovel are provided in the applicable maintenance paragraphs of this manual.

4. Identification and Tabulated Data

a. *Identification.*

(1) Crane-shovel.

(a) *Starter identification plate.* This plate is attached to the starter on the left-rear side of the engine and gives the name of the manufacturer, model, serial number, voltage, and amperage of the starter.

(b) *Generator identification plate.* This plate is attached to the generator on the left-front side of the engine. The plate states the name of the manufacturer, model, serial number, voltage, and amperage of the generator.

(c) *Clutch identification plate.* This plate is attached to the clutch assembly on the top side and is located at the rear of the engine. This plate names the manufacturer and gives the model, serial number, and type of clutch assembly.

(d) *Fuel pump identification plate.* This plate is attached to the side of the fuel pump and is mounted on the top of the clutch housing at the

rear of the engine. The plate gives manufacturer's name and model number only.

- (e) *Heater identification plate.* This plate is attached to the top side of the heater and gives the manufacturer's name, model, serial number, and size of the heater. The heater is mounted on the floor of the revolving frame at the left-rear side of the engine..
- (f) *Ignition unit distributor identification plate.* This plate is mounted on the ignition unit and states the manufacturer's model and serial number. The ignition unit is mounted on the top center of the engine.
- (g) *Windshield wiper motor identification plate.* This plate is located on the windshield wiper body and states the voltage and the manufacturer's number. The windshield wiper is mounted on the left-upper side of the operator's cab.
- (h) *Generator regulator identification plate.* This plate is mounted on the generator regulator cover. It gives the manufacturer's name, model, ordnance number, serial number, specification number, voltage, amperage, type of ground, and military standard number. The generator regulator is mounted on top of the engine.

(2) *Carrier.*

- (a) *Engine governor identification plate.* This plate is mounted on the side of the engine governor housing. It lists the manufacturer's name, model, and serial number.
- (b) *Air compressor identification plate.* This plate is mounted on the left side of the air compressor crankcase. It lists the manufacturer's name, compressor plate number, type, and serial number. The air compressor is mounted on the right side of the engine.

- (c) *Generator regulator identification plate.* This plate is mounted on the generator regulator cover. It gives the manufacturer's name, model, ordnance number, serial number, specification number, voltage, amperage, type of ground, and military standard number. The generator regulator is mounted on the carrier engine hood.
- (d) *Generator identification plate.* This plate is mounted on the side of the generator. It gives the name of the manufacturer, model, serial number, voltage, and amperage. The generator is located on the left side of the engine.
- (e) *Starter identification plate.* This plate is attached to the starter. This plate gives the name of the manufacturer, model, serial number, voltage, and the amperage of the starter.
- (f) *Ignition unit identification plate.* This plate is attached to the ignition unit. It gives the manufacturer's model and serial number. The ignition unit is mounted on the left side of the engine on top of the auxiliary drive housing.
- (g) *Personnel heater identification plate.* This plate is attached to the side of the heater and gives the manufacturer's name, model and serial numbers, voltage, and capacity output. This heater is mounted on the outside rear of the operator's cab.
- (h) *Engine heater identification plate.* This plate is attached to the heater door on the side of the heater and gives the manufacturer's name, model and serial numbers, voltage, and capacity output. This heater is mounted on the rear of the engine compartment.
- (i) *Windshield wiper motor identification plate.* This plate is located on the windshield wiper motor body

and gives the manufacturer's name, model number, and voltage.

b. Tabulated Data. This listing contains information pertinent to organizational maintenance.

(1) *Crane.*

(a) *General.*

Manufacturer Quick-Way Truck Shovel Company
 Model number M-200
 Designed use Trench hoe, crane, clam-shell, dragline, shovel, and piledriver

(b) *Engine.*

Manufacturer Continental Motors Corporation
 Model number BS 415
 Type Gasoline
 Serial numbers 20-001 through 20-600
 Number of cylinders 6
 Firing order 12-4
 Oil pressure 40 psi (pounds per square inch)
 Governed speed 1,800 rpm (revolutions per minute)
 Horsepower 110 at 1,800 rpm
 Cooling Liquid cooled
 Bore 4-1/4 in. (inches)
 Stroke 4-7/8 in.
 Compression at cranking speed 80 to 85 psi speed.

(c) *Starting motor.*

Make Delco-Remy, Division of General Motors Corporation
 Model 1113822
 Volts 24

(d) *Battery charging generator.*

Make DelcoRemy, Division of General Motors Corporation
 Model 1117478
 Volts 24

(e) *Generator regulator.*

Make Delco-Remy, Division of General Motors Corporation
 Model 1118558
 Type Fungus and corrosion resistant
 Amperes 40

(f) *Distributor.*

Make Delco-Remy, Division of General Motors Corporation
 Model 1111647
 Volts 24

(g) *Air cleaner.*

Make Donaldson Company, Inc.
 Model P-11112
 Type Oil bath

(h) *Lubrication oil filter.*

Make Fram Corporation
 Model F-40
 Cartridge C-30P

(i) *Battery.*

Make Western Battery and Supply Company
 Type 6 TN
 Volts 12
 Ampere hours 100

(j) *Engine heater.*

Make Perfection Industries, Inc.
 Model E 510 A
 Volts 24
 Btu (British thermal units) 60,000 units).

(k) *Windshield wiper motor.*

Manufacturer American Bosch Arma Corporation
 Drawing number WWC
 Volts 24
 Type of control Remote or manual

(l) *Engine governor.*

Manufacturer Novi Equipment Company, Inc.
 Model 54670A
 Type Flyball

(2) *Carrier.*

(a) *General.*

Manufacturer KW Dart Truck Company
 Model number M-1200
 Designed use Carrier for crane

(b) *Engine.*

Manufacturer Continental Motors Corporation
 Model number QPL-SS6749
 Type Gasoline
 Serial numbers 59001-C through 59500-C
 Number of cylinders 6
 Firing order 1-5-3-6-2-4
 Governed speed 160 rpm
 Horsepower 227 hp (horsepower) at 2,600 rpm
 Cycle 4
 Cooling Liquid
 Bore 5-3/8 in.
 Stroke 5 1/2 in.
 Total displacement 749 cu in. (cubic inches)
 Compression at cranking speed 80 to 85 psi speed.
 Rotation at flywheel end Counterclockwise

(c) *Starting motor.*

Make Delco-Remy, Division of
 General Motors
 Corporation
 Model number 1113816
 Volts 24
 Rotation Clockwise at drive end
 Brush tension, new 24 to 28 oz (ounces)
 brushes.

(d) *Battery charging generator.*

Make Delco-Remy, division of
 General Motors
 Corporation
 Model 1117478
 Volts - 24

(e) *Generator regulator.*

Make Delco-Remy, Division of
 General Motors
 Corporation
 Model 1118558
 Volts 24
 Type..... Fungus and corrosion
 resistant
 Amperes 40

(f) *Distributor.*

Make Delco-Remy, Division of
 General Motors
 Corporation
 Model 1111561
 Volts 24

(g) *Air cleaner.*

Make Donaldson Company, Inc.
 Model..... E-79754
 Type..... Oil bath

(h) *Lubrication oil filter.*

Make Fram
 Model..... 5267
 Cartridge..... -F-36-P

(i) *Battery.*

Model..... Delco-Remy, Division of
 General Motors
 Corporation
 Type 6 TN
 Volts 12
 Ampere hours 100

(j) *Personnel heater.*

Manufacturer Perfection Industries, Inc.
 Model MH 15 B2
 Volts 24
 Type of control Remote
 Temperature selection Thermostatic

(k) *Engine heater.*

Manufacturer Perfection Industries, Inc.
 Model E510A
 Volts 24
 Type of control Remote
 Temperature selection Manual

(l) *Windshield wiper motor.*

Manufacturer..... American Bosch Arma
 Corporation
 Drawing number WWC
 Volts 24
 Type of control Remote or manual

(m) *Carrier engine governor.*

Manufacturer..... Piercece Governor Company
 Model MA-1818A
 Type..... Balanced weight

(n) *Carrier hydraulic pump.*

Manufacturer..... Eaton Mfg. Co., Pump
 Division

(o) *Nut and bolt torque data.* The nut and bolt torque wrench tension is a general guide to indicate foot-pounds of torque to be applied to various sizes of common hardware.

| <i>Diameter in inches</i> | <i>Foot-pounds</i> |
|---------------------------|--------------------|
| 3/8 | 60-70 |
| 7/16 | 75-85 |
| 1/2 | 95-105 |
| 9/16 | 125-135 |
| 5/8 | 150-160 |
| 11/16 | 195-200 |
| 3/4 | 210-230 |
| 13/16 | 230-250 |
| 7/8 | 245-275 |
| 1 | 285-315 |
| 1 1/8 | 325-350 |

(3) *Adjustments.*

(a) *Carrier valve adjustment.*

Tappet clearance, intake0.020 in.
 exhaust0.024 in.

(b) *Crane valve adjustment.*

Tappet clearance, intake0.017 in.
 exhaust0.022 in.

(c) *Distributor point adjustment.*

Points-(carrier and
 crane engine) . 0.020 in.

(d) *Spark plug adjustment.*

Carrier engine, clearance ...0.025 in.
 Crane engine, clearance0.035 in.

(e) *Generator regulator adjustment.*

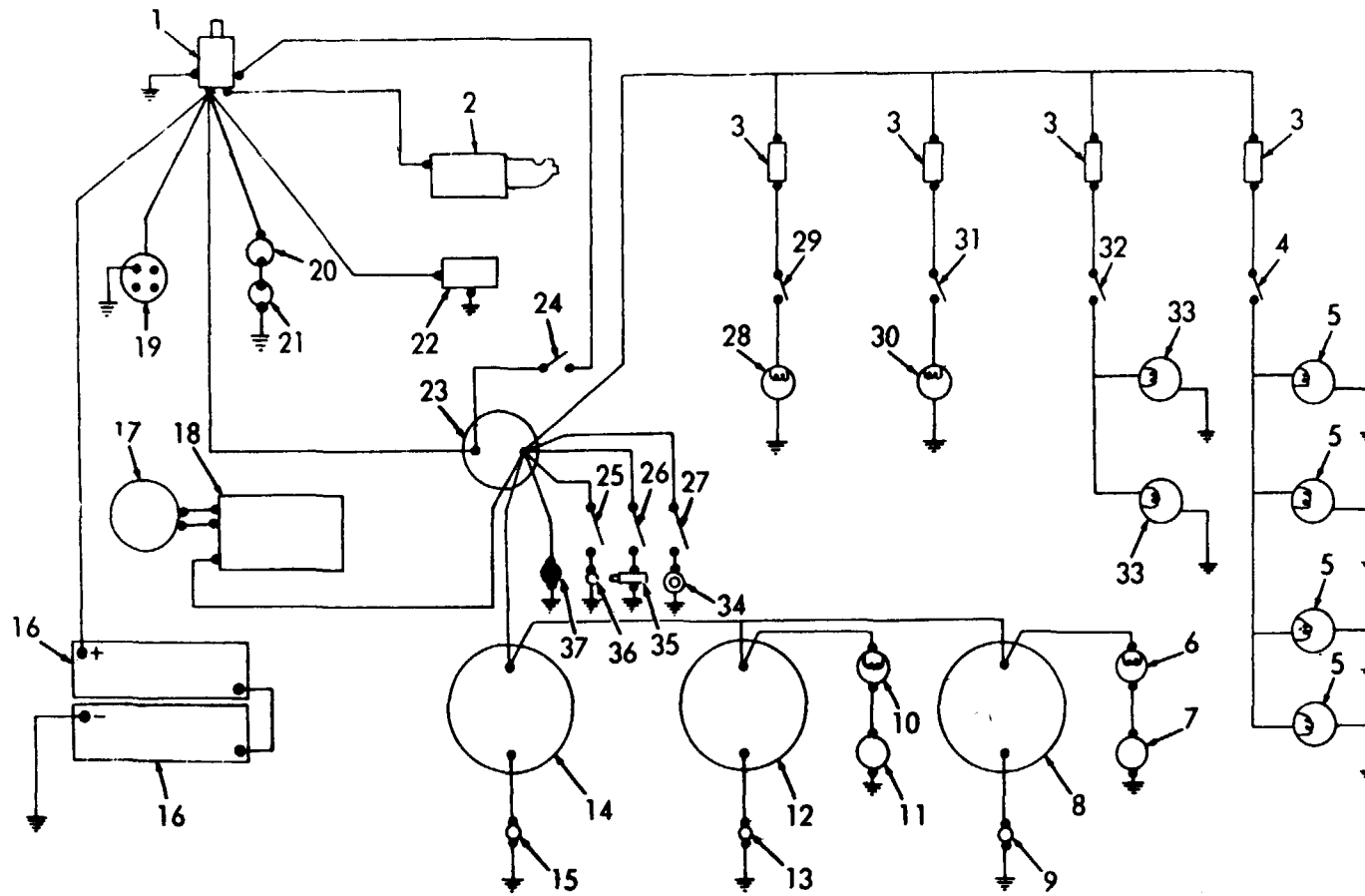
Mechanical adjustments.

Cutout relay air gap0.048 in.
 Contact points0.035 in.
 Voltage regulator0.084 in.
 airgap.

Electrical adjustments

Cutout relay closing 26 volts
 voltage.
 Voltage regulator 29.2 volts
 opening voltage.
 Current regulator 40 amp (amperes)
 maximum amperage.

(4) *Wiring diagrams.* See figure 1.



+ POSITIVE
 - NEGATIVE
 ⊥ GROUND

A

EMC 3810-207-20/1 ①

Figure 1. Crane-shovel and carrier wire diagrams.

- | | | | |
|----|--|----|------------------------------|
| 1 | Magnetic switch | 19 | Slave receptacle |
| 2 | Starting motor | 20 | Hour-meter |
| 8 | Circuit breaker (4 rqr) | 21 | Sending unit, hour-meter |
| 4 | Upper floodlight switch | 22 | Heater control |
| 6 | Upper floodlight (4 rqr) | 21 | Ammeter |
| 6 | Warning light, high engine temperature | 24 | Starter switch |
| 7 | Sending unit, high engine temperature | 25 | Ignition switch |
| 8 | Water temperature gage | 26 | Windshield wiper switch |
| 9 | Sending unit, water temperature gage | 27 | Horn button |
| 10 | Warning light, low oil pressure | 28 | Instrument panel light |
| 11 | Sending unit, low oil pressure | 29 | Instrument panel light witch |
| 12 | Oil pressure gage | 30 | Cab light |
| 18 | Sending unit, oil pressure gage | 31 | Cab light witch |
| 14 | Fuel gage | 32 | Upper height switch |
| 15 | Sending unit, fuel gage | 38 | Upper headlight (2 rqr) |
| 16 | Battery, 12-volt (2 rqr) | 34 | Horn |
| 17 | Generator | 35 | Windshield wiper motor |
| e. | Generator regulator | 36 | Ignition coil |
| | | 37 | Trouble light socket |

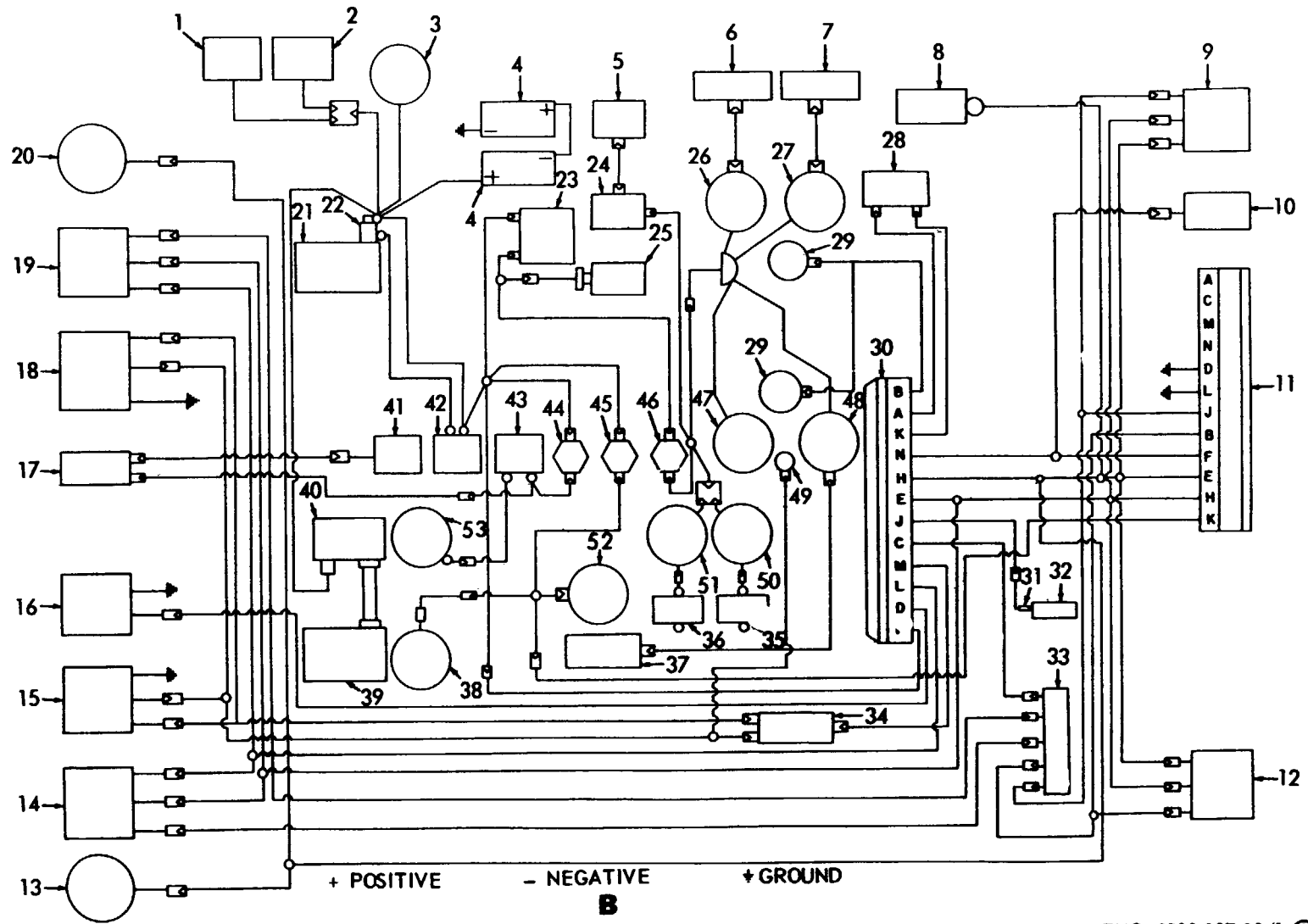
A-Crane shovel wiring diagram

Figure 1. - Continued

5. Differences in Models

This manual covers the Quickway Model M-200 Crane-shovel mounted on the KW Dart Model M-1200 Carrier, winterized to -65°. Twenty-five units are winterized to -65°,

crane serial numbers 20-001 through 20-025 and carrier serial numbers 59-001C through 5-025C, FSN 3810-542-4980. Four hundred and seventy-five units are non-winterized, crane serial numbers 20-026C through 50-500C, FSN 3810-542-4982.



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Figure 1 - Continued.

- | | |
|------------------------------------|---|
| 1 Cab heater control | 28 Stoplight switch |
| 2 Engine heater control | 29 Instrument panel light (2 rqr) |
| 3 Emergency start receptacle | 30 Light switch |
| 4 12-volt battery (2 rqr) | 31 Fuse (6 amp) |
| 5 Low air pressure buzzer | 32 Flasher unit |
| 6 Fuel gage sending unit | 33 Flasher switch |
| 7 Oil pressure sending unit | 34 Headlight dimmer switch |
| 8 Crane clearance light receptacle | 35 Water high temperature switch |
| 9 Taillight, rh | 36 Low oil pressure switch |
| 10 Blackout stoplight | 37 Water temperature sending unit |
| 11 Trailer receptacle | 38 Dome light |
| 12 Taillight, lh | 39 Generator |
| 13 Clearance light, lh | 40 Generator regulator |
| 14 Marker light, lh | 41 Horn switch |
| 15 Headlight, lh | 42 Starting motor switch |
| 16 Blackout driving light | 43 Windshield wiper switch |
| 17 Horn | 44 Horn circuit breaker |
| 18 Headlight, rh | 45 Auxiliary power circuit |
| 19 Marker light, rh | 46 Instrument circuit breaker |
| 20 Clearance light, rh | 47 Battery charging indicator |
| 21 Starting motor | 48 Water temperature gage |
| 22 Magnetic switch | 49 Headlight high beam indicator light |
| 23 Ignition switch | 50 Water high temperature warning light |
| 24 Low air pressure switch | 51 Low oil pressure warning light |
| 25 Igniter | 52 Auxiliary power receptacle |
| 26 Fuel gage | 53 Windshield wiper motor |
| 27 Oil pressure gage | |

B—Carrier wiring diagram

Figure 1 - Continued.

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. Unloading Crane-Shovel

a. *Blocking and Tiedown Removal.* Remove the blocking and tiedowns as instructed on figure 2.

b. *Ramp Unloading.*

- (1) Construct an unloading ramp as illustrated on figure 3.
- (2) Perform all before-operation services (TM 5-3810-207-100).
- (3) Drive the crane-shovel off the ramp (TM 5-3810-207-10).

c. *Lifting the Crane-Shovel.* Attach the necessary slings and spreaders to the lifting eyes (fig. 2) of the crane-shovel and to the hook of a suitable lifting device. Lower the crane-shovel and remove the slings.

d. *Unloading Attachments.* Unload the attachments as instructed on figure 4.

7. Unpacking New Equipment

a. *Unpacking.*

- (1) *Crane accessories.* Crane accessories such as lights, batteries, windshield wiper, and rearview mirror will arrive in boxes packed in waterproof paper. Use care in removing cover from boxes; pull nails to remove boards. Gouging with a bar might damage contents of boxes. The remaining items are wrapped in waterproof and pressure-sensitive tape and stored in the toolbox.
- (2) *Crane components.* Crane components such as hoist cable, tag line winder, chain tightener, shovel boom crowd chain, and crowd lagging are packed in wooden crates (fig. 2). Remove the components from the crates.

- (3) Inspect the equipment against the packing list and report all discrepancies to the proper authority.

b. *Removal of Protective Material and Devices.* Prepare the crane-shovel for inspection and/or operation as outlined on DA Form 2258, attached on or near the operator's controls.

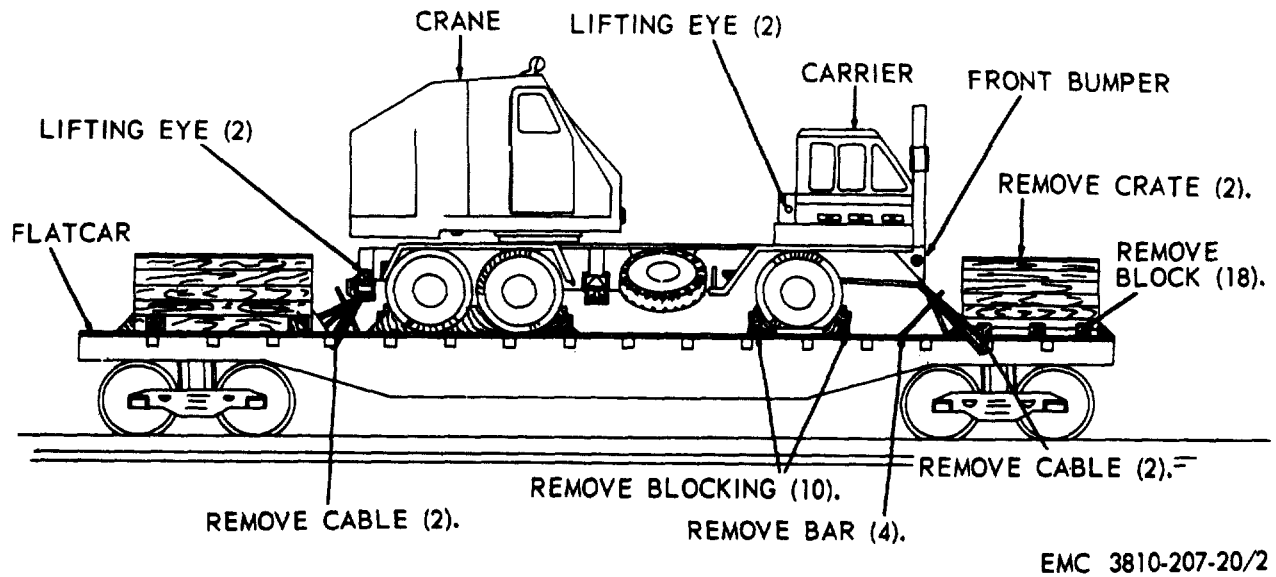
8. Inspecting and Servicing New Equipment

a. *Inspecting New Equipment.*

- (1) Make a complete visual inspection to make sure the required tools, repair parts, and publications are with the equipment (TM 5-3810-207-10).
- (2) Visually inspect the carrier and crane engines and mounted components for missing items or damage that may have occurred during loading, shipment, or unloading (TM 5-3810-207-10).
- (3) Inspect wiring, fuel and oil lines, radiator and hoses, fuel tanks, gages, instruments, and lights for missing items and broken, loose, or damaged parts (TM 5-3810-207-10).
- (4) Inspect the drain plugs, breathers, filler caps, and draincocks to be sure they are secured and not leaking or damaged (TM 5-3810-207-10).
- (5) Inspect the tires, airbrake hoses, and electrical leads for cuts, breaks, cracks, or signs of deterioration. Correct or report any deficiencies noted and not corrected to field maintenance.

b. *Servicing New Equipment.*

- (1) Perform the preventive maintenance services (par. 20).



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Figure 2. Crane-shovel and tiedown, removal.

- (2) When the crane-shovel is received with new, dry-charge batteries and electrolyte is packed separately, perform the following services:
- (a) Remove the battery box cover and filler caps (TM 5-4810-207-10).
 - (b) Pour electrolyte into each battery cell to a depth of 3/8 inch above the separators.
 - (c) Install the fillercaps and battery box cover (TM 5-3810-207-10).

Caution:

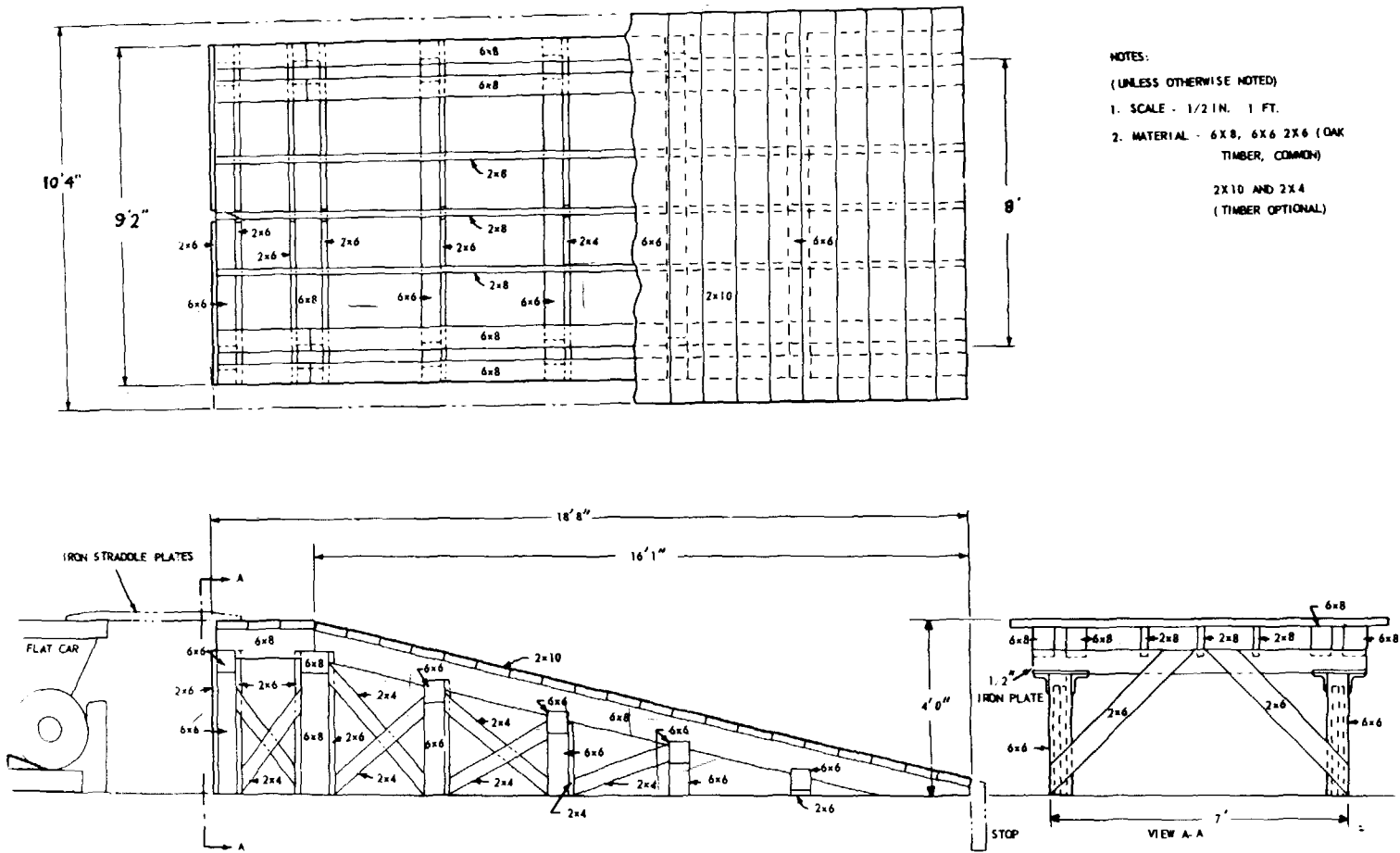
Exercise care when filling the batteries with electrolyte to prevent

splashing or spilling the acid on clothing and body.

Note.

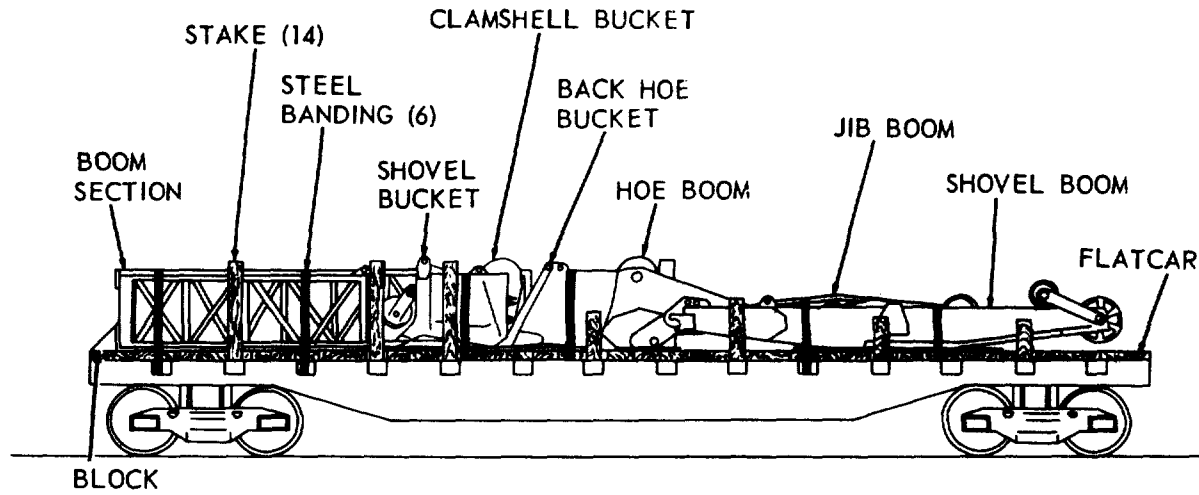
The carrier and crane batteries are serviced in the same manner.

- (3) When the crane-shovel is received with wet batteries, service the batteries (TM 5-3810-207-10). For information on battery test and maintenance, refer to TM 9-6140-200-15.
- (4) When the crane-shovel is received in cold weather, fill the crane and carrier engine cooling systems with antifreeze solution to protect the system to the lowest expected temperature. Refer to table I and TB ENG-60 as a guide.

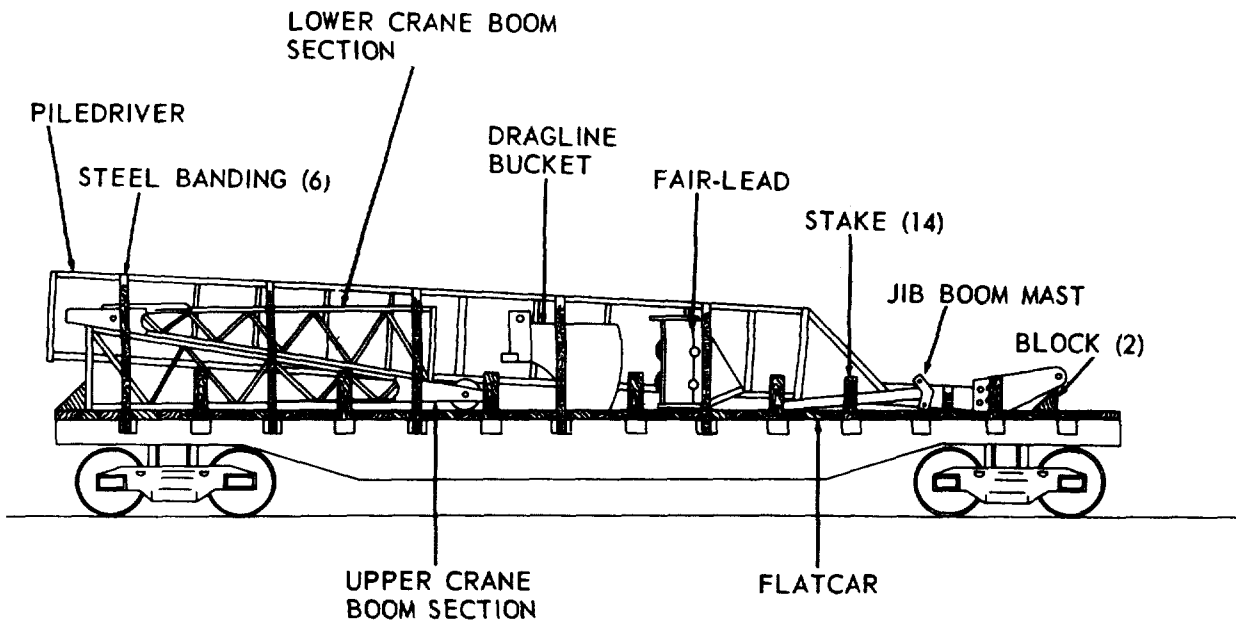


EMC 5-3810-207-20/3

Figure 3. Unloading ramp construction



NOTE: REMOVE BANDING, STAKES, AND BLOCKS SECURING ATTACHMENTS. REMOVE ATTACHMENTS WITH SUITABLE LIFTING DEVICE.



EMC 3810-207-20/4

Figure 4. Attachments, removal.

Table I. Freezing Points, Composition, and Specific Gravities of Military Antifreeze Materials

| Lowest expected ambient temp. °F. | Pints of inhibited glycol per gal of coolant ¹ | Compound, Antifreeze, Arctic ² | Ethylene glycol coolant solution specific gravity at 68° F. ³ | |
|-----------------------------------|---|--|--|--|
| + 20 | 1-1/2 | Issued full strength and ready mixed for 0° F. to -65° F. Temperatures for both initial installation and replenishment of losses | 1.022 | |
| +10 | 2 | | 1.036 | |
| 0 | 2-3/4 | | 1.047 | |
| -10 | 3-1/4 | | 1.055 | |
| -20 | 3-1/2 | | 1.062 | |
| -30 | 4 | | 1.067 | |
| -40 | 4-1/4 | | 1.073 | |
| -50 | Arctic | | DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE | |
| -60 | Antifreeze | | | |
| -75 | Preferred | | | |

¹ Maximum protection is obtained at 60 percent by volume (4.8 pints of ethylene glycol per gallon of solution).

² Military Specification MIL-C-11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling system of liquid-cooled internal combustion engines. It is used for protection against freezing, primarily in Arctic regions where the ambient temperature remains for extended periods close to -40° F. or below. to as low as -90° F.

³ Use an accurate hydrometer. To test hydrometer. use 1 part ethylene glycol antifreeze to 2 parts water. This should produce a hydrometer reading of 0° F.

Note:

Fasten a tag near the radiator filler cap indicating the type antifreeze.

9. Installation of Separately Packed Components

a. Carrier Batteries. Install the carrier batteries as instructed in paragraph 209.

b. Crane Batteries. Install the crane batteries as instructed in paragraph 70.

c. Floodlight. Install floodlights as instructed in paragraph 86.

d. Windshield Wiper. Install the windshield wiper as instructed in paragraph 336.

e. Rearview Mirror. Install the rearview mirror as instructed in paragraph 318.

f. Fire Extinguishers. Install the fire extinguishers (TM 5-3810-207-10).

10. Installation or Setting-Up Instructions

The crane-shovel is shipped semi-assembled. Installation or setting-up instructions consist of installing the desired front end attachment on the basic unit. Refer to TM 5-3810-20710.

Section II. MOVEMENT TO NEW WORKSITE

11. Dismantling for Movement

a. No dismantling for movement is necessary on the crane-shovel. Stow and secure all parts and equipment.

Note.

Normally, the crane-shovel will be driven short distances to a new worksite.

b. For movement other than short distances, position the crane-shovel on a flatcar as illustrated on figure 2.

Note.

When transporting the crane, keep the counterweight to the rear of the carrier and the boom in its rack.

12. Reinstallation After Movement

Reassembly of the crane-shovel is not required after movement to a new worksite. The unit must be inspected and serviced (TM 5-3810-207-10).

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

13. Special Tools and Equipment

There are no special tools or equipment for organizational maintenance of the crane-shovel.

14. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-3810-207-20P.

Section II. LUBRICATION

15. General

This section contains instructions for the lubrication of the carrier wheel bearing assemblies and for starter service. Refer to the current lubrication order for the proper time interval and type and grade of lubricant to be used.

16. Lubricating Wheel Bearing Assemblies

a. Front Wheel Removal and Disassembly. Remove and disassemble the front wheel as instructed in paragraph 284.

b. Cleaning, Inspection, and Lubrication.

- (1) Clean the wheels, hubs, and bearing assemblies with an approved cleaning solvent. Dry all parts thoroughly with a clean, lint-free cloth.
- (2) Inspect all wheel parts for wear and damage. Replace unserviceable parts.
- (3) Pack the wheel bearing assemblies with the type of grease indicated on the current lubrication order.

c. Front Wheel Reassembly and Installation. Reassemble and install the front wheel as instructed in paragraph 284.

17. Starter (Crane)

a. Starter Removal. Remove the crane starter as instructed in paragraph 78.

b. Cleaning, Inspection, and Lubrication.

- (1) Clean the starter with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the starter for breaks and other damage. Replace defective starter.
- (3) Lubricate the starter with the type lubricant specified on current lubrication order.

c. Starter Installation. Install the crane starter as instructed in paragraph 78.

18. Starter (Carrier)

a. Starter Removal. Remove the carrier starter as instructed in paragraph 204.

b. Cleaning, Inspection, and Lubrication.

- (1) Clean the starter with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the starter for breaks and other damage. Replace a defective starter.
- (3) Lubricate starter with the type lubricant specified on current lubrication order.

c. Starter Installation. Install the carrier starter as instructed in paragraph 204.

Section III. PREVENTIVE MAINTENANCE SERVICES

19. General

a. Preventive maintenance is performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equivalent to three calendar months, or 250 hours of operation, whichever occurs first.

b. The preventive maintenance procedures to be performed at quarterly intervals are listed consecutively (starting with number 1) and are described in paragraph 20. Noticed deficiencies will be recorded on DA Form 2404.

Note.

Detailed instructions for applicable maintenance service and inspection procedures are referenced by the paragraph numbers listed.

c. Lubrication shall be as prescribed in LO 5-3810-207-20.

20. Quarterly Organizational Maintenance Procedures

| <i>Item</i> | <i>Before starting engine</i> | <i>Paragraph</i> |
|-------------|---|------------------|
| 1 | Pintle hook, outriggers, outrigger floats, wheels and tires, roller path and hook rollers, spare wheel, steering valve, steering arm, tie rods, steering cylinder, and steering knuckles. Inspect these items for wear, cracks, damage, missing parts, leaks, and adjustment. Normal tire pressure is 80 psi. Correct clearance between hook rollers and roller path is 0.036 inch. | 144,145 |
| 2 | Carrier fuel tank, fuel lines, headlights, taillights, marker lights, boom cradle, carrier engine air cleaner, front axle assembly, differentials, drive shafts, universal joints, carrier frame. Inspect the items for leaks, cracks, wear, damage, and missing parts. | |
| 3 | Carrier radiator, hose, fan, fan guard, shroud, fan belts, generator belt, hydraulic steering pump belt, air compressor belts, water pump, thermostat housing. Inspect these items for breaks, wear, damage, missing parts, and adjustment. Carrier fan, generator, compressor, and steering pump belt deflections are 3/4 to 1 inch midway between pulleys. | TM 5-3810-207-10 |

Note.

The three fan drive belts must be replaced as a set.

| | | |
|----|---|------------------|
| 4 | Check carrier fire extinguisher, engine oil level, fuel tank level, transmission, transfer case and differential lubricating oil levels. Winterization equipment-radiator shutter, space heater, heater control panel, cab heater thermostat, heater fuel pump, coolant pump, coolant heater safety relief valve, coolant heater, coolant lines, space and coolant heater igniters, coils, relays, battery box thermostat control. Inspect and check winterization equipment for breaks, wear, missing parts, leaks, and operation. | |
| 5 | Carrier cab assembly-cab door, windshield, windows, back glass, seat and frame, toolbox and tools, floorboards and mats, windshield wiper, blade, and arm. Inspect these items for breaks, wear, leaks, missing parts, and cleanliness. | |
| 6 | Crane cab, doors, glass, cab panels, gantry, frame, toolbox and tools, operator's seat and frame, control levers, pedals, guards, machinery side frames. Inspect these items for breaks, wear, leaks, missing parts and cleanliness. | |
| 7 | Crane engine, radiator, hose, lines, fittings, thermostat housing, water pump, fan, fan belts, fan guard and shroud, generator belt. Inspect these items for leaks, breaks, wear, missing parts, and adjustment. Fan and generator belt deflection is 1/4 to 1/2 inch deflection between pulleys. | TM 5-3810-207-10 |
| 8 | Boom hoist brake, hoist brake, swing brake, crowd brake, boom hoist clutch, hoist clutch, swing clutches, crowd and retract clutches, master clutch. Inspect these items for wear, breaks, damage, and adjustment. | |
| 9 | Check engine oil level, boom hoist power-down lubricating oil level, power transfer gearcase lubricating oil level, hydraulic control cylinders oil level. Inspect the items for breaks, leaks, and damage. | |
| 10 | Hoist shaft, crowd shaft, horizontal swing shaft, vertical swing shaft, jack-shaft, bevel pinions, drive chains, jaw clutches, linkage and pins. Inspect these items for wear, breaks, damage, and adjustment. | |

Item *Before starting engine* *Paragraph*

11 Crane winterization equipment-radiator shutter, batteries, heater control panel, cab heater, thermostat, defroster, windshield wiper, motor, cab insulation, heater fuel pumps, lines, and filters, coolant pump, coolant heater safety relief valve, coolant heater, space and coolant heater igniters, coils, and relays, battery box, thermostat control, and heater piping. Inspect these items for wear, leaks, damage, breaks, missing parts, and operation.

Start engine

12 With engine running at normal operating temperature, listen for unusual noises; inspect cylinder head, manifold, exhaust pipe, muffler, and gaskets for leaks. Check governor linkage for excessive wear and proper operation under varied loads. Check engine clutch for proper operation. Inspect fuel and oil lines, hydraulic system, and fuel and oil filters for leaks. Check all gages, instruments, and controls for proper readings and operation. Normal gage readings are:

Crane:

- Ammeter+0-60 amp
- Coolant temperature..... 180° F. (Fahrenheit)
- Oil pressure.....40-50 psi

Carrier:

- Oil pressure warning light Out, with engine running
- Coolant temperature..... 160-180° F.
- Air pressure..... 80-105 psi
- Oil pressure.....40-50 psi
- Coolant temperature warning light Out, with engine at normal temperature
- Battery generator indicator In green area

Operational test

13 Engine-during the operational test, notice in particular if the engine has normal power, proper acceleration in varied speed ranges, tendency to stall. Listen for any unusual noises when engine is under load. Look for excessive black or blue smoke from exhaust.

14 Carrier transmission, differentials, transfer case, clutch, and brakes. Check for clutch braking effect, vibration, and clutch engagement. All forward and reverse speed ranges. Notice if all shifts are smooth and without vibration or unusual noises. Check steering mechanism, operating controls, and brakes for proper operation and adjustment.

15 Check carrier instruments, gages, switches, horn, and lights. Notice if lights are correctly aimed and securely mounted.

16 Crane master clutch, swing clutch, hoist clutch, boom hoist clutch, crowd and retract clutches, and brakes. Check for proper engagement, and operation. Notice if clutches chatter or vibrate excessively. Check brakes under load for proper operation and adjustment. With crane machinery operating listen for unusual noises in the hoist, crowd, jack, and swing shafts. Listen for unusual noises in the power transfer case and chain drives.

After-operational test

17 Temperatures-carrier transmission, differentials, transfer case, clutch housing, crane clutch housing, power transfer case, bearing housings. Immediately after operational test, inspect these components for excessive heat. An overheated housing indicates internal maladjustment, damage, or inadequate lubrication.

18 Leaks-engine oil, fuel, water, hydraulic system, transmission, differentials, transfer cases, grease seals, and gaskets. Inspect the equipment for fuel, coolant, lubricant, hydraulic fluid leaks from seals, gaskets, lines, hose connections, radiator, fuel tanks, or other sources.

19 Check identification plates, paint, and marking for condition and secure mounting.

20 Service and lubricate in accordance with LO 5-3810-207-20.

Section IV. TROUBLESHOOTING

21. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the crane-shovel and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to field maintenance, 3d echelon.

22. Engine Lacks Power

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|---|
| Air cleaner choked | Replace or repair air cleaner (pars. 107 and 244). |
| Fuel pump clogged | Replace or repair fuel pump (pars. 108 and 247). |
| Air in fuel system | Tighten all fuel line connections. Replace defective lines (pars. 110 and 250). |
| Faulty fuel | Drain and replace fuel. |

23. Starting Motors Fail to Operate

| <i>Probable cause</i> | <i>Possible remedy</i> |
|----------------------------|---|
| Poor electrical connection | Clean and tighten battery cables and other electrical connections. Replace if necessary (pars. 70 and 209). |
| Starter button defective | Replace button (pars. 79 and 210). |
| Faulty batteries | Replace batteries (pars. 70 and 209). |
| Faulty starter | Replace starter (pars. 78 and 204). |
| Starter brushes worn | Replace brushes (pars. 78 and 205). |

24. Engines Fail to Start

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--|---|
| Improper valve clearance | Adjust valves (pars. 92 and 266). |
| Batteries too low to turn over engine. | Charge or replace batteries (pars. 70 and 209). |
| Defective starter | Replace starter (pars. 78 and 204). |
| Defective spark plugs | Replace spark plugs (pars. 76 and 202.) |

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-------------------------------|--|
| Carburetor out of adjustment. | Adjust carburetor (TM 5-3810-207-10). |
| Defective distributor points. | Replace distributor points (pars. 75 and 201). |
| Defective fuel pump | Replace fuel pump (pars. 108 and 247). |

25. Engine Miss or Vibrate Excessively

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---------------------------------|---|
| Faulty carburetor | Replace defective carburetor (pars. 106 and 246). |
| Governor out of adjustment. | Adjust the governor (pars. 93 and 245). |
| Leaking fuel line | Replace defective fuel line (pars. 110 and 250). |
| Faulty distributor points. | Replace distributor points (pars. 75 and 201). |
| Distributor not timed properly. | Time distributor (pars. 75 and 201). |
| Defective spark plugs | Replace spark plugs (pars. 76 and 202). |
| Broken fan blade | Replace fan (par. 100). |

26. Engines Stall Frequently

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--------------------------------------|--|
| Idling speed too low | Adjust idling speed to a minimum of 600 rpm (pars. 106 and 246). |
| Operating water temperature too low. | Replace thermostat (pars. 98 and 259). |
| Governor hunting | Correct governor adjustment (pars. 93 and 245). |

27. Engines Overheat

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--|---|
| Loose fan belt | Adjust fan belt (TM 5-3810-207-10). |
| Defective thermostat | Replace thermostat (pars. 98 and 259). |
| Collapsed hose or loose hose connections. | Check condition of hose. Tighten hose connections. Replace defective hose (pars. 96 and 257). |
| Coolant low in radiator | Fill radiator with proper coolant. |
| Insufficient oil in crankcase. | Check oil level; fill as necessary (LO 5-3810-207-20). |
| Water pump and generator drive belt loose or slip. | Adjust belt (TM 5-3810-207-10). Replace worn or damaged belt (pars. 100 and 254). |

| <i>Probable cause</i> | <i>Possible remedy</i> |
|----------------------------|--|
| Faulty water pump | Replace water pump (pars. 101 and 258). |
| Thermostat defective | Replace defective thermostat (pars. 98 and 259). |
| Hose leaks | Tighten clamps. Replace defective hose (pars. 96 and 257). |
| Loose or open drain plugs. | Inspect and tighten. Replace defective drain plug. |
| Fan belt loose | Tighten fan belt (TM 5-3810-207-10). |

28. Excessive Block Smoke From Exhausts

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------------|--|
| Faulty carburetor | Replace carburetor (pars. 106 and 246). |
| Air cleaner clogged | Clean air cleaner. Replace a faulty air cleaner (pars. 107 and 244). |
| Excessive oil in crankcase. | Drain oil and fill crankcase (LO 5-3810-207-20). |

29. Engine Temperature Fails to Rise

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------------|--|
| Thermostat defective | Replace defective thermostat (pars. 98 and 259). |
| Shutter open | Close shutter. |
| Defective temperature gage. | Replace temperature gage (pars. 79 and 218). |

30. Engine Starts But Will Not Run

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-------------------------------|--|
| Low compression | Adjust valve clearance (pars. 92 and 266). |
| Defective carburetor | Replace carburetor (pars. 106 and 246). |
| Air intake clogged | Remove obstructions (pars. 107 and 244). |
| Defective fuel pump | Replace fuel pump (pars. 108 and 247). |
| Defective distributor points. | Replace distributor points (pars. 75 and 201). |

31. Engine Clutches Slip

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|---|
| Incorrect adjustment | Adjust clutch (TM 5-3810-207-10). |
| Control linkage loose or out of adjustment. | Adjust control linkage (pars. 118 and 268). |

32. Engine Clutches Will Not Engage

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|-----------------------------------|
| Incorrect adjustment | Adjust clutch (TM 5-3810-207-10). |

| <i>Probable cause</i> | <i>Possible remedy</i> |
|------------------------------------|---|
| Control linkage out of adjustment. | Adjust control linkage (pars. 118 and 268). |

33. Engine Clutches Slip or Will Not Engage Properly

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|--|
| Incorrect clutch adjustment. | Adjust clutches (TM 5-3810-207-10). |
| Control linkage loose or out of adjustment. | Tighten or adjust control linkage (pars. 118 and 268). |
| Clutch pedal and cross-shaft defective. | Replace a damaged clutch pedal and cross-shaft (par. 269). |

34. Carrier Engine Clutch Slips

| <i>Probable cause</i> | <i>Possible remedy</i> |
|----------------------------|--|
| Improper pedal adjustment. | Adjust to provide free pedal travel of 1 to 1-1/2 inches (TM 5-3810-207-10). |
| Clutch out of adjustment. | Adjust clutch (TM 5-3810-207-10). |

35. Fuel Consumption Excessive

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|---|
| Fuel tanks and lines leak or are defective. | Replace fuel tank. Report to field maintenance. Replace fuel lines (pars. 110 and 250). |
| Carburetor faulty or out of adjustment. | Adjust or replace carburetor (pars. 106 and 246). |
| Faulty fuel pumps | Replace fuel pumps (pars. 108 and 247). |

36. Lights Fail

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--------------------------------|--|
| Defective or burned out lamps. | Replace lamps (TM 5 6810-207-10). |
| Short in wiring | Replace wiring (pars. 89 and 227). |
| Defective switch | Replace switch (pars. 79 and 219). |
| Loose wiring connectings. | Tighten connections (pars. 79, 219, 237, and 238). |

37. Lights Dim

| <i>Probable cause</i> | <i>Possible remedy</i> |
|----------------------------|----------------------------------|
| Lenses dirty or tarnished. | Clean lenses (pars. 86 and 231). |
| Loose wiring | Check wiring. |

38. Engine Head Indicators Inoperative

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-------------------------------------|--|
| Thermometer head or tube defective. | Replace thermometer head or tube. |
| Defective sending unit. | Replace sending unit (pars. 80 and 233). |

39. Ammeter Gages Inoperative

| <i>Probable cause</i> | <i>Possible remedy</i> |
|------------------------------------|--|
| Battery cables loose at terminals. | Tighten terminal connections (pars. 70 and 209). |
| Gage defective | Replace gage (pars. 79 and 215). |
| Wire lead connections loose. | Tighten connections. |

40. Oil Pressure Gages Inoperative

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|--|
| Loose gage connection | Tighten connection (pars. 79 and 212). |
| Defective gage | Replace gage (pars. 79 and 212). |

41. Heaters Do Not Ignite

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|---|
| Lack of fuel | Fill fuel tank (TM 5-3810-207-10). |
| Clogged fuel filter | Clean or replace fuel filter (pars. 187 and 329). |
| Faulty igniter | Replace igniter (pars. 186 and 327). |
| Faulty fuel pump | Replace fuel pump (pars. 187 and 329). |

42. Heaters Do Not Keep Burning

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|--|
| Faulty igniter | Replace igniter (pars. 186 and 327). |
| Lack of fuel | Fill fuel tank (TM 5-3810-207-10). |
| Defective receptacles | Replace receptacles (pars. 193 and 330). |
| Clogged filters | Service filters (TM 5-3810-207-10). |

43. Main Chain Drive Excessively Noisy

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-----------------------|--|
| Defective chain | Replace chain (report this condition to field maintenance, 3d echelon). |
| Worn sprocket | Replace sprocket (report this condition to field maintenance, 3d echelon). |
| Improper adjustment | Adjust main drive chain (par. 147). |

44. Cables Tend to Flatten

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-------------------------------------|---|
| Sheave channel clearance too great. | Replace sheaves (pars. 158, 159, 162, 164, 167, 168, 170, 173, 174, and 177 - 181). |
| Defective cables | Replace cables (TM 5-3810-207-10). |
| Incorrect cable size | Install correct cable (TM 5-3810-207-10). |

45. Revolving Frame Teeters or Will Not Swing

| <i>Probable cause</i> | <i>Possible remedy</i> |
|------------------------------------|---|
| Conical rollers out of adjustment. | Adjust rollers (pars. 144 and 145). |
| Worn rollers | Replace hook rollers (pars. 144 and 145). |
| Swing clutch out of adjustment. | Adjust swing clutch (TM 5-3810-207-10). |
| Worn rollers shaft | Replace roller shaft (pars. 144 and 145). |

46. Continuous Humming Noise in Front Axle When Driving

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--|--|
| Wheel bearings too tight. | Inspect and adjust wheel bearings (par. 284). |
| Lack of lubrication or use of improper grade of lubricant in universal joints, wheel bearings, transmission, or transfer case. | Check lubricant for correct amount and proper grade as specified in LO 5-3810-207-20). |

47. Steering Assembly Cracks When Turning

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|---|
| Knuckle bearing rollers and cups scored or worn | Inspect and lubricate (LO 5-3810-207-20) as necessary. |
| Wheel bearing rollers and cups scored or worn. | Inspect wheel bearings and replace as necessary (par. 284). |
| Defective shock absorbers. | Replace shock absorbers (pars. 288). |

48. Steering Hard

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--|--|
| Tires not inflated to proper pressure. | Check and inflate all tires to proper pressure (80 psi) (TM 5-3810-207-10). |
| Excessive friction in tie rod or drag link joints. | Inspect and adjust (pars. 279 and 281) and lubricate as required (LO 5-3810-207-20). |

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|---|
| Excessive friction in steering gear assembly. | Adjust steering gear (par. 277). |
| Loose pump belt or pulley. | Adjust pump belt and replace a faulty belt or pulley if necessary (pars. 272 and 254). |
| Ruptured or weak spot in tire. | Inspect tube for rupture and replace tire and tube if necessary (par. 287). |
| Lack of fluid | Tighten all lines and fittings and replace a defective line or fitting. Fill to level with proper hydraulic oil as specified in LO 6-3810-207-20. |
| Faulty operation of steering valves. | Clean and adjust steering valves. Replace as necessary (par. 275). |
| Steering wheel creeps | Adjust control valve or replace if necessary (par. 275). |
| Shock absorber defective. | Replace a defective shock absorber (par. 288). |

49. Improper Air Pressure

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|--|
| Air pressure in system is above normal. | Check governor settings. Adjust air compressor unloading valves. Replace governor if necessary (par. 245). |
| Air reservoir damaged. | Inspect air reservoir and replace if necessary (par. 301). |

50. Carrier Handbrake Does Not Hold When Applied

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--------------------------------------|------------------------------------|
| Handbrake linkage out of adjustment. | Adjust linkage (TM 5-3810-207-10). |

51. Carrier Brake Action Insufficient

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|--|
| Improper brakeshoe adjustment. | Adjust brakeshoes (pars. 304 and 305). |
| Worn brake linings | Adjust for lining wear or replace brakeshoes (pars. 304 and 305). |
| Blocked, bent, or broken tubing or hose. | Remove obstruction in line or replace faulty tubing (par. 291). |
| Brake valve delivery pressure below normal. | If brake valve is defective, replace unit (pars. 297, 298, and 300). |

52. Brakes Release Too Slowly with Pedal Released

| <i>Probable cause</i> | <i>Possible remedy</i> |
|---|---|
| Insufficient brakeshoe clearance. | Adjust brakeshoes if clearance is insufficient (pars. 304 and 305). |
| Weak or broken valve diaphragm return spring. | Replace brake valve (pars. 297, 298, and 300). |
| Defective quick release valve. | Replace quick release valve (par. 296). |

53. One Brake Drags with Pedal Released

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--|---|
| Insufficient brakeshoe clearance. | Adjust brakeshoe clearance (pars 304 and 305). |
| Blocked or defective brake valve or quick release valve. | Clean or replace faulty unit (pars. 296, 297, 298, and 300) |
| Weak or broken brake-shoe return spring. | Replace faulty spring (pars. 304 and 305). |
| Brakeshoe binds on anchor pin. | Remove shoe; clean and lubricate anchor pins (pars. 304 and 305). |

54. Brakes Grab When Pedal is Depressed

| <i>Probable cause</i> | <i>Possible remedy</i> |
|--------------------------------|---|
| Brakeshoe clearance too great. | Adjust clearance (pars. 304 and 305). |
| Grease or oil on linings. | Clean linings or replace brakeshoes (pars. 304 and 305). |
| Drums out-of-round | Replace drum (pars. 284 and 286). |
| Defective brake valve | Replace faulty unit (pars. 297, 298, and 300). |
| Brakes need relining | Replace brakeshoes (pars. 304 and 305). |
| Brake chamber diaphragm leaks. | Tighten all fittings. If caused by broken or faulty unit, replace brake chamber (par. 295). |

55. Carrier Transmission and Transfer Case Excessively Noisy in Operation

| <i>Probable cause</i> | <i>Possible remedy</i> |
|-------------------------------------|---|
| Insufficient or improper lubricant. | Fill to level with proper lubricant as specified in LO 5-3810-207-20. |
| Rods and lever out of adjustment. | Adjust the alinement (pars. 308 and 309). |
| Unit out of line | Tighten all mountings securely. |

56. Carrier Transmission and Transfer Case Overheat

| | |
|--|---|
| <i>Probable cause</i> Insufficient or improper lubricant. | <i>Possible remedy</i> Fill to level with proper lubricant (LO 5-3810-207-20). |
| Rods and levers out of adjust. | Adjust the alinement (pars. 308 and 309). |

57. Carrier Differentials Excessively Noisy While Driving

| | |
|--|---|
| <i>Probable cause</i> Wheel bearings worn | <i>Possible remedy</i> Replace wheel bearings (pars. 284 and 286). |
| Lack of lubricant or use of improper grade of lubricant in differential. | Check lubrication for proper grade and amount as specified in LO 5-3810-207-20. |
| Differential gears worn or out of adjustment. | Report to field maintenance. 3d echelon. |

Section V. FIELD EXPEDIENT REPAIRS

58. General

Organizational maintenance troubles may occur while the crane-shovel is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient repairs may be used in emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible and properly repaired before being placed in operation again.

| | |
|---------------------------------|--|
| Gasket broken on sediment bowl. | Remove sediment bowl and make new gasket from a piece of heavy paper; use until a new gasket can be installed. |
|---------------------------------|--|

59. Air Cleaner Does Not Function

| | |
|---------------------------------------|--|
| <i>Trouble</i> Air cleaner clogged | <i>Expedient remedy</i> Remove the filter element (TM 5-3810-207-10) and operate engine until new filter element can be obtained. |
|---------------------------------------|--|

62. Engine Overheats

| | |
|--|--|
| <i>Trouble</i> Defective thermostat | <i>Expedient remedy</i> Remove defective thermostat and operate without thermostat until a new one can be installed (pars. 98 and 259). |
|--|--|

60. Radiator Hose Looks

| | |
|------------------------------|--|
| <i>Trouble</i> Hose leaks | <i>Expedient remedy</i> Tape hose and operate engine until a new hose can be installed. |
|------------------------------|--|

63. Ignition Switch Fails to Make Contact

| | |
|--|---|
| <i>Trouble</i> Defective ignition switch. | <i>Expedient remedy</i> Install a jumper wire across the ignition switch terminals and operate until a new ignition switch can be installed. |
|--|---|

61. Loss of Fuel

| | |
|-------------------------------------|--|
| <i>Trouble</i> Cracked fuel line | <i>Expedient remedy</i> Tape fuel line and operate until a new line can be installed. |
|-------------------------------------|--|

64. Light Switch Will Not Operate

| | |
|---|---|
| <i>Trouble</i> Defective light switch. | <i>Expedient remedy</i> Use same procedure as in paragraph 63. |
|---|---|

Section VI. RADIO INTERFERENCE SUPPRESSION

65. General Methods Used to Attain Proper Suppression

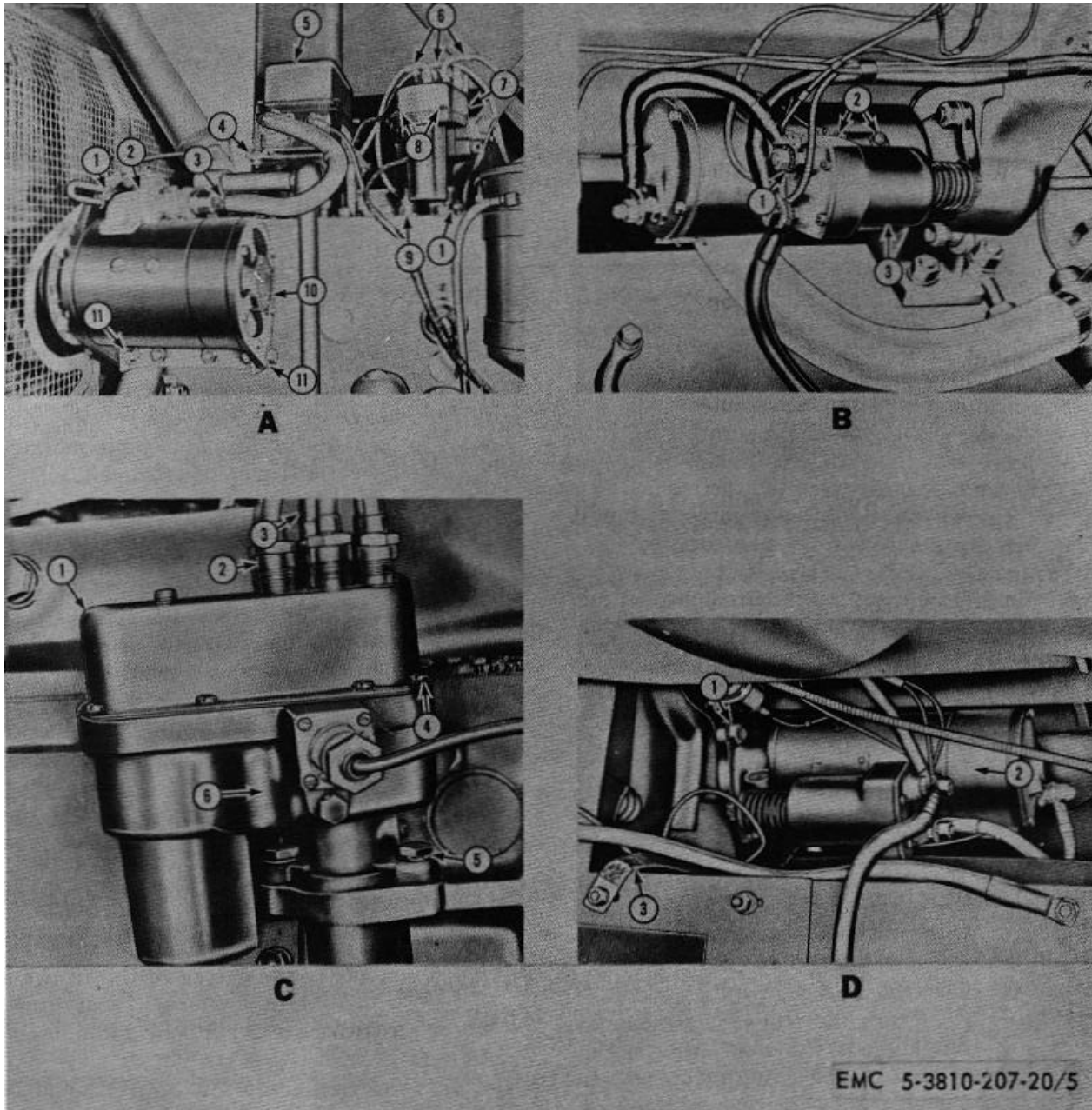
Essentially, suppression is attained by providing a low resistance path to ground for the stray currents. The methods used include shielding the ignition and high-frequency wires, grounding the frame with bonding straps, and using capacitors and resistors. For general

information on radio interference suppression see TM 11-483.

66. Interference Suppression Components

a. Primary Suppression Components.

- (1) The interference ground strap is illustrated on figure 5.



EMC 5-3810-207-20/5

- | | | | |
|---|---|----|---|
| 1 | Tooth-type lockwasher, 3/8 in. (4 rqr) | 7 | Distributor |
| 2 | Suppression receptacle | 8 | Tooth-type lockwasher, No. 10 (8 rqr) |
| 3 | Woven-type shielded cable | 9 | Spark plug (6 rqr) |
| 4 | Tooth-type lockwasher, 5/16 in. (4 rqr) | 10 | Generator |
| 5 | Generator regulator | 11 | Tooth-type lockwasher, 7/16 in. (6 rqr) |
| 6 | Ignition cables (6 rqr) | | |

A-Crane generator, generator regulator, and distributor, radio suppression

- | | | | |
|---|--|---|----------|
| 1 | Tooth-type lockwasher, 1/2 in. (3 rqr) | 3 | Solenoid |
| 2 | Tooth-type lockwasher, 1/4 in. (2 rqr) | | |

B-Crane and carrier starter motor and solenoid

Figure 5. Radio suppression components.

- | | | | |
|---|-------------------------|---|--|
| 1 | Cover, suppression | 4 | External tooth-type lockwasher, No. 10 (8 rqr) |
| 2 | Nut, connector (6 rqr) | 5 | Internal tooth-type lockwasher, 3/8 in. (2 ,rqr) |
| 3 | Ignition cables (8 rqr) | 6 | Distributor |

C-Crane and carrier distributor

- | | | | |
|---|---|---|---------------------------|
| 1 | External tooth-type lockwasher, 5/8 in. (3 rqr) | 3 | Strap, ground suppression |
| 2 | Starter motor | | |

D-Carrier starter motor

Figure 5 - Continued.

- (2) The suppression cover is illustrated on figure 5.
- (3) The suppression receptacle is illustrated on figure 5.

b. Secondary Suppression Components (crane)

- (1) *Tooth-type lockwashers.*
 - (a) The crane generator is mounted on the left side of the engine and is grounded by internal-external tooth lockwashers to suppress radio interference.

Note.

If there is excessive sparking at the brushes, it will be necessary to clean the commutator and install new brushes (par. 72).

- (b) The crane generator regulator is mounted on top of the engine and is grounded by internal-external lockwashers.
- (c) The crane distributor is mounted to the engine head and is grounded with internal-external type lockwashers to suppress radio interference.
- (d) The crane starter is mounted on the lower-left side of the engine and is grounded with internal-external type lockwashers to suppress radio interference.
- (e) The starter solenoid is mounted on the starter and is grounded by internal-external tooth-type lockwashers and is suppressed from solenoid to starter motor with a ground lead.
- (f) The crane engine is equipped with

special shielded and suppressed spark plugs to suppress radio interference.

- (g) Instructions for replacement of the above suppression components will be found in the applicable maintenance section of this manual.

(2) *Shielded cables.*

- (a) The crane generator is equipped with a shielded cable connecting the generator and the generator regulator.
- (b) The ignition cables that connect the spark plugs to the distributor are of the shielded type.

c. Secondary Suppression Components (Carrier).

(1) *Tooth-type lockwashers.*

- (a) The carrier generator is mounted on the left side of the engine and is grounded by internal-external tooth-type lockwashers to suppress radio interference.
- (b) The generator regulator is mounted on the top-rear side of the firewall with internal-external tooth-type lockwashers to suppress radio interference.
- (c) The carrier distributor is mounted in the left side of the engine and is grounded with internal-external tooth-type lockwashers to suppress radio interference.
- (d) The starter motor and solenoid are mounted on the lower-rear right side of the engine with internal and external tooth-type lockwashers and ground strap to suppress radio interference.

- (e) The carrier engine is equipped with special suppressed spark plugs to suppress radio interference.
- (f) Instructions for replacement of the above suppression components will be found in the applicable maintenance section of this manual.

(2) *Shielded cables.*

- (a) The carrier generator is equipped with a shielded cable connecting the generator to the generator regulator.
- (b) The ignition cables that connect the spark plugs to the distributor are of the shielded type.

Note.

Do not pull on the cable or twist the braided shielding. Gently work the cable from side to side and free the rubber seal. Do not use sharp metal tools to install the rubber seal.

67. Replacement of Suppression Components

a. General. For replacement, suppression components must be identical to the original part. Capacitors must be the same size and have the same microfarad and voltage rating as the part being replaced. Special care must be taken to be certain there is a good metal-to-metal contact with washers and bonding straps.

b. Primary Suppression Components.

- (1) *Ground straps.* Replace ground straps as illustrated on figure 5.
- (2) *Suppression cover.* Replace suppression cover as illustrated on figure 5.
- (3) *Suppression receptacle.* Replace suppression receptacle as illustrated on figure 5.

c. Secondary Suppression Components (Crane).

- (1) *Tooth-type lockwashers.*
 - (a) Replace the generator tooth-type lockwashers (par. 72).

- (b) Replace the generator regulator tooth-type lockwashers (par. 73).
- (c) Replace the distributor tooth-type lockwashers (par. 74).
- (d) Replace starter and solenoid tooth-type lockwashers (pars. 77 and 78).
- (e) Replace the spark plugs (par. 76).

(2) *Shielded cables.*

- (a) Replace the shielded generator-to-generator regulator cable (pars. 72 and 73).
- (b) Replace the spark plug-to-distributor ignition cables (par. 76).

d. Secondary Suppression Components (Carrier).

(1) *Tooth-type lockwashers.*

- (a) Replace the generator tooth-type lockwashers (par. 206).
- (b) Replace the generator regulator tooth-type lockwashers (par. 208).
- (c) Replace the distributor tooth-type lockwashers (par. 200).
- (d) Replace the starter and solenoid tooth type lockwashers (pars. 203 and 204).
- (e) Replace the spark plugs (par. 202).

(2) *Shielded cables.*

- (a) Replace the shielded generator-to-generator regulator cable (pars. 206 and 208).
- (b) Replace the spark plug-to-distributor ignition cables (par. 202).

68. Testing or Radio Interference Suppression Components

Test the capacitors for leaks and shorts on a capacitor tester; replace defective capacitors. If test equipment is not available and interference is indicated, isolate the cause of interference by trial-and-error method of replacing each capacitor in turn until the cause of interference is located and eliminated.

CHAPTER 4

CRANE ENGINE MAINTENANCE INSTRUCTIONS

Section I. CRANE ELECTRICAL SYSTEM

69. Description

The crane-shovel 24-volt electrical system consists of two 12-volt batteries connected in series, a starter, generator, generator regulator, ignition coil, distributor, spark plugs, lights, gages, and the necessary wiring to operate all components of the electrical system. The generator regulator prevents overworking of the generator and overcharging of the batteries. The ignition coil transforms energy into high tension current which flows to the distributor and is distributed to the spark plugs. For proper removal and installation of all wiring on the crane, refer to the wiring diagram (fig. 1).

70. Batteries, Cables, and Battery Box*a. Removal.*

- (1) Remove the battery box cover (TM 5-3810-207-10).
- (2) Remove the batteries, cables, and box in a numerical sequence as instructed on figure 6.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts and inspect for defects.
- (2) Replace defective parts.

c. Test. Test the batteries with a hydrometer. If the specific gravity reads below 1.225, recharge the batteries. Test the batteries after recharging. A fully charged battery should read between 1.280 and 1.300. Replace a battery that will not take or hold a charge.

d. Installation.

- (1) Install the battery box, batteries, and cables in reverse numerical sequence as instructed on figure 6.
- (2) Install the battery box cover (TM 5-3810-207-10).

71. Generator Drive Belt

a. Removal. Remove the drive belt as instructed on figure 7.

b. Cleaning and Inspection.

- (1) Clean the drive belt with a cloth dampened with an approved cleaning solvent.
- (2) Inspect the drive belt for cracks, breaks, and frayed or stretched condition. Replace defective drive belt.

c. Installation. Install the generator drive belt as illustrated on figure 7.

d. Adjust the generator drive belt (TM 5-3810-207-10).

72. Generator Assembly

a. Removal. Remove the generator assembly as instructed on figure 7.

b. Cleaning and Inspection. Clean and inspect the generator and mounting. Replace defective generator and mounting.

c. Installation. Install the generator assembly as illustrated on figure 7.

d. Test.

- (1) Hook voltmeter (par. 73).
- (2) Start engine and slowly build up rpm to operating speed. Observe voltmeter. The minimum voltage is 27.5 volts.
- (3) If voltage is not built up to required value, generator is bad; replace generator.

e. Brush Replacement. Replace generator brushes as instructed on figure 8.

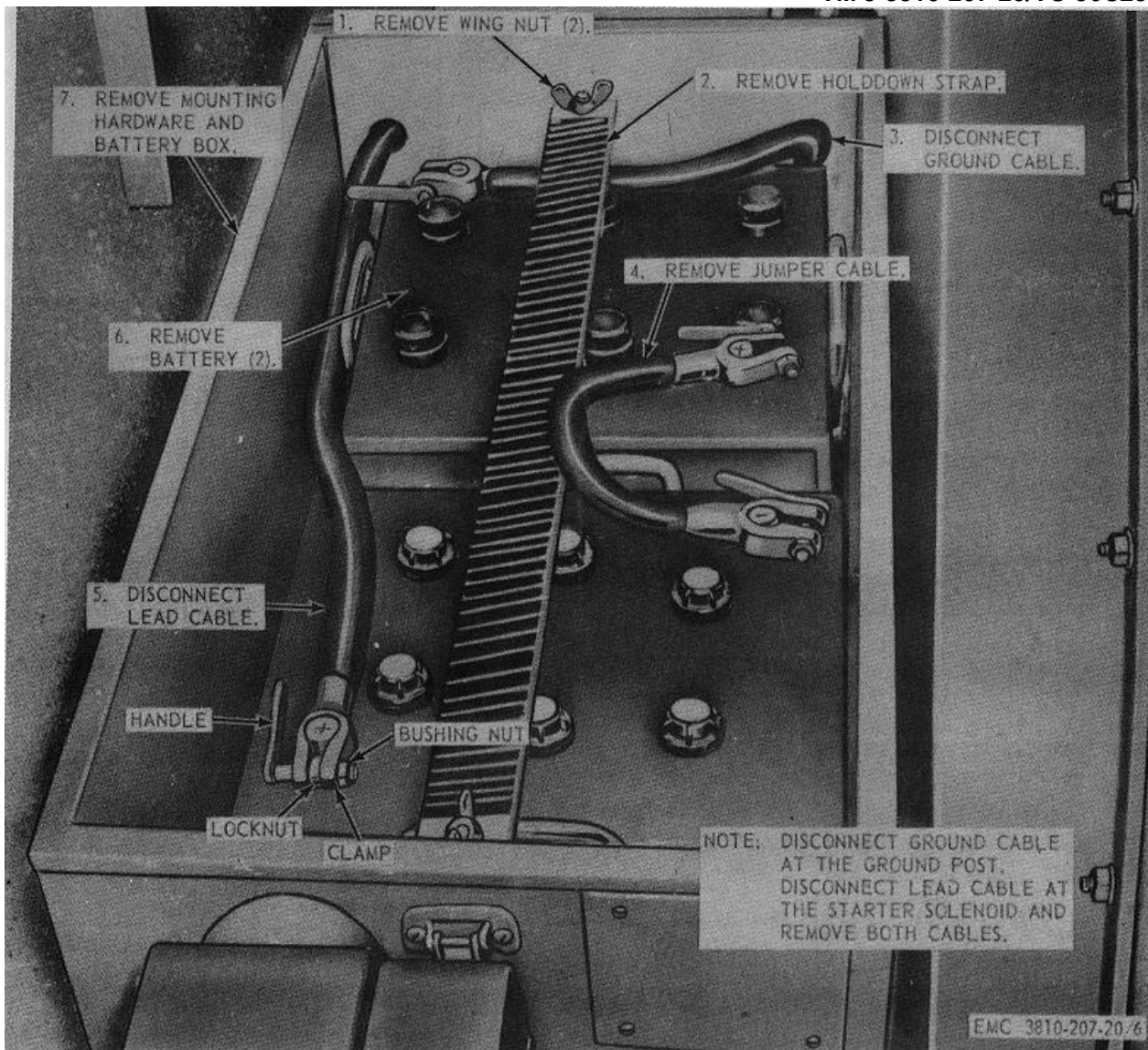


Figure 6. Crane batteries, cables, and box, removal and installation.

73. Generator Regulator

a. *Removal.* Remove the generator regulator as instructed on figure 9.

b. *Cleaning and Inspection.*

- (1) Clean the generator regulator with a lint-free cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the generator regulator for breaks and other damage. Replace defective generator regulator.

c. *Installation.* Install the generator regulator as illustrated on figure 9.

Note.

The engine generator must be polarized whenever the leads to the

generator or regulator have been removed or any adjustments have been made to the generator regulator. Failure to polarize the generator may cause the regulator contacts to be damaged by vibration, heavy arcing, and burning.

Note.

Polarize the generator by disconnecting the field lead at the regulator and momentarily connecting a jumper lead between the generator field terminal and the regulator battery terminal. Remove the jumper lead and connect field lead to the regulator (C, fig. 9).

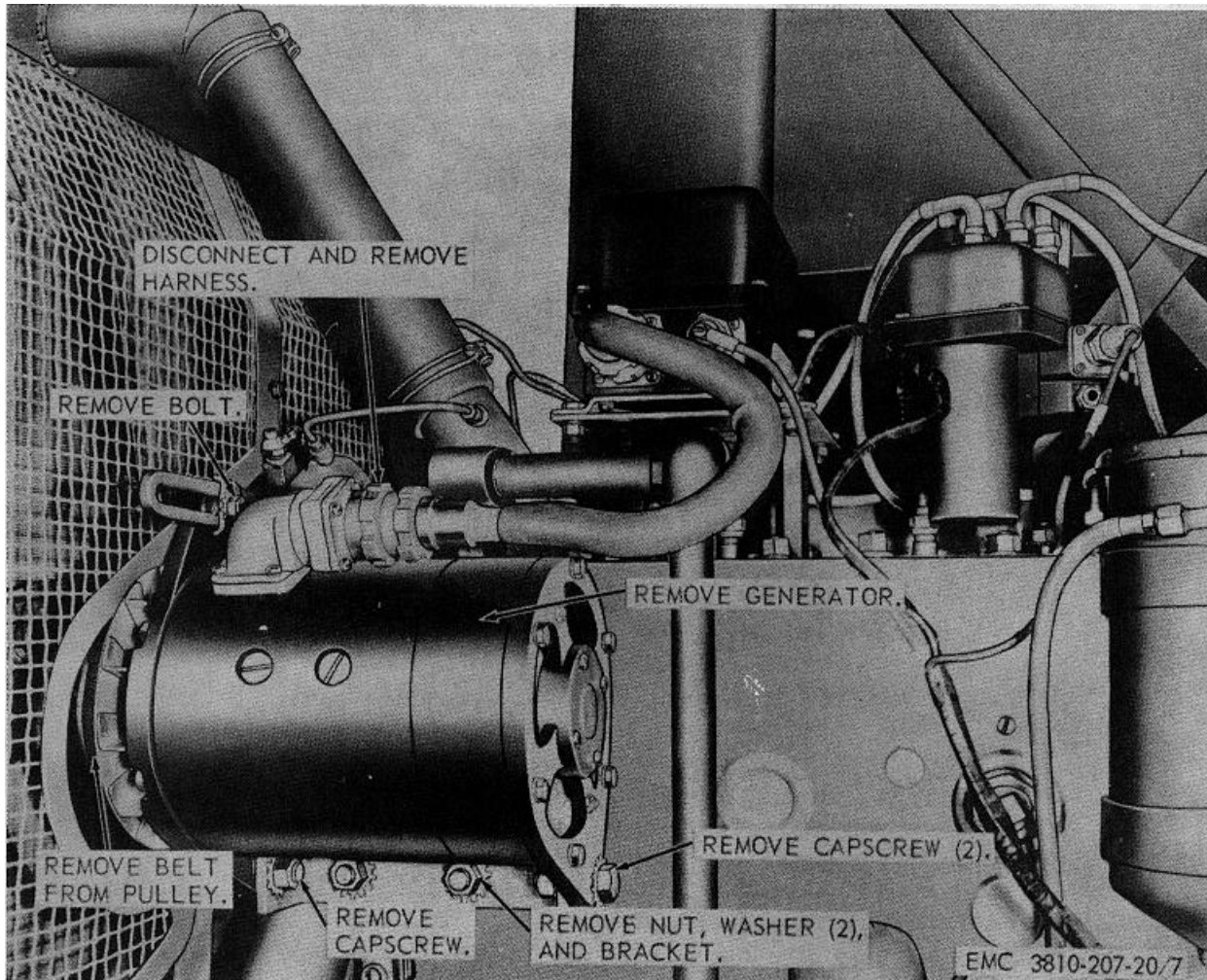


Figure 7. Generator assembly, removal and installation.

d. *Test and Adjustment.*

(1) *Mechanical adjustments.*

- (a) Disconnect regulator to battery cable.
- (b) Remove regulator cover (A, fig. 9).
- (c) Press down on the cutout relay armature (B, fig. 9) until the contact points are barely touching. Measure the airgap between the coil core and the armature. The correct airgap for the cutout relay is 0.048 inch.

Note.

Do not measure the cutout relay airgap between the brass residual pin in the coil and the armature.

- (d) Should the cutout relay airgap not be as specified, bend the armature stop up or down to obtain the proper clearance.

Caution:

Make certain the cutout relay contact bracket is in proper position to allow both contact points to close simultaneously.

- (e) Measure the clearance between the contact points. The proper cutout relay point opening is 0.035 inch.
- (f) If the cutout relay point opening is not as specified, loosen the two screws securing the cutout relay contact bracket to the cutout relay and raise or lower the cutout relay

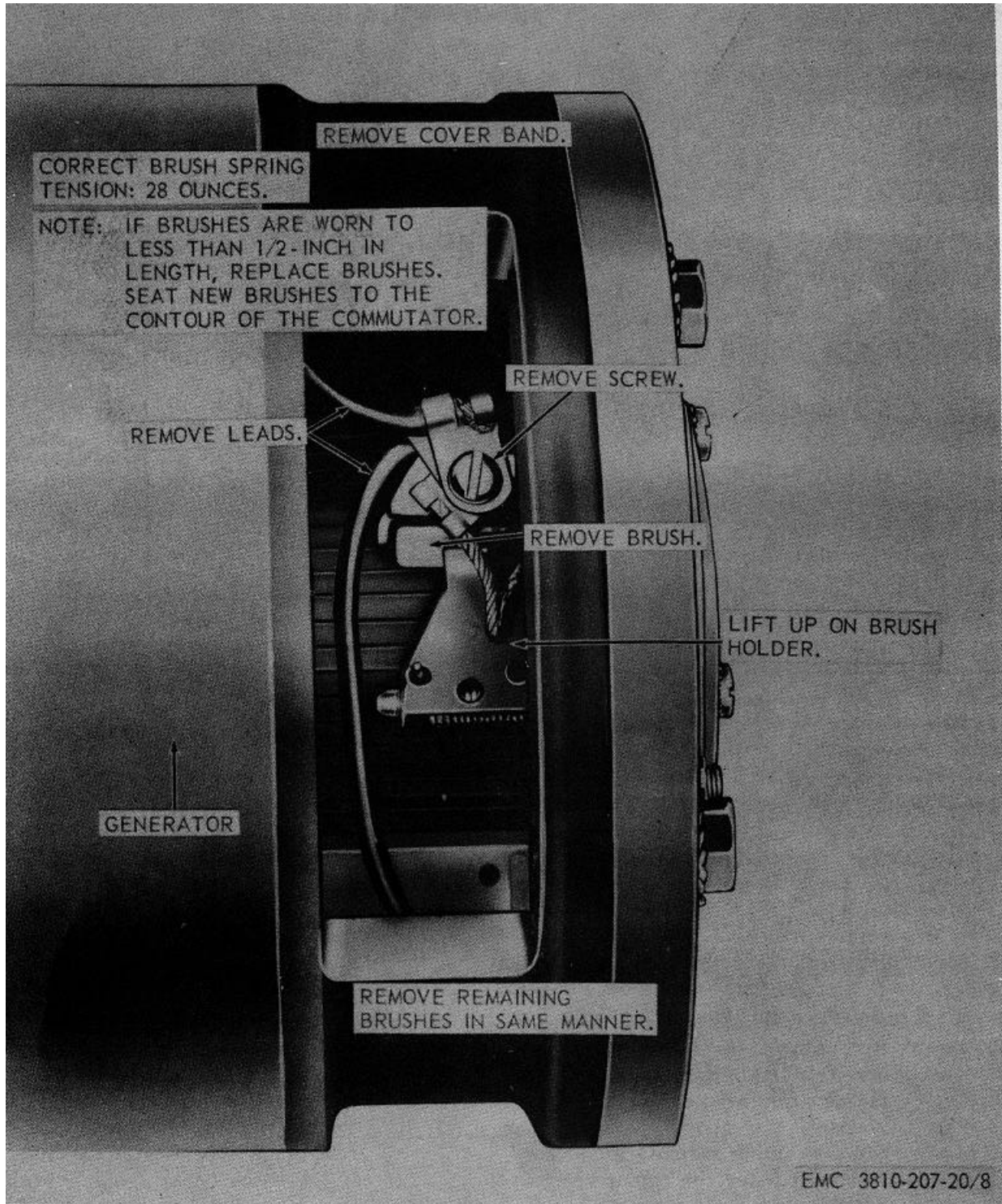
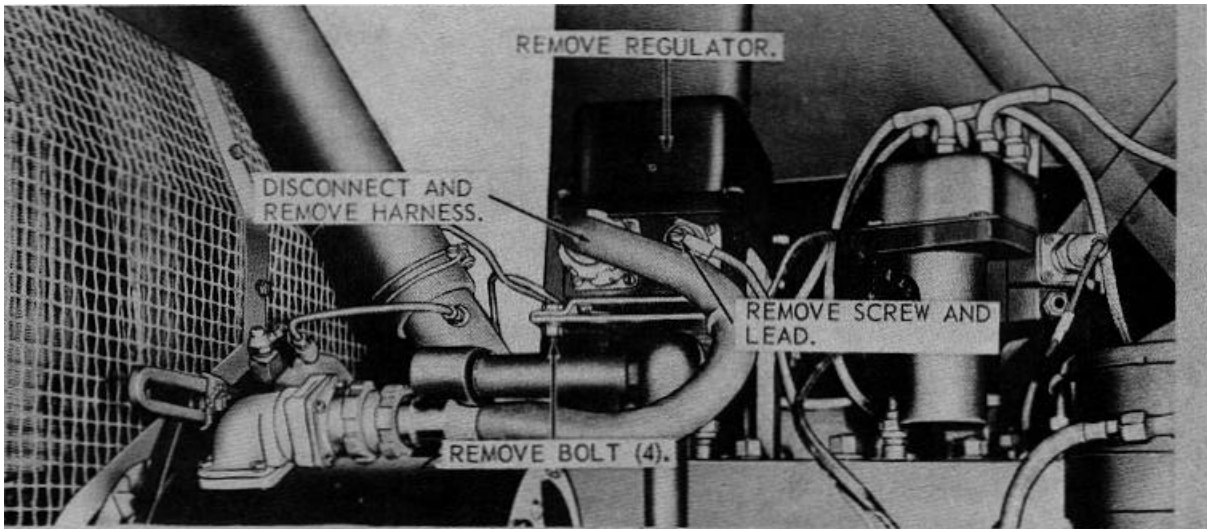
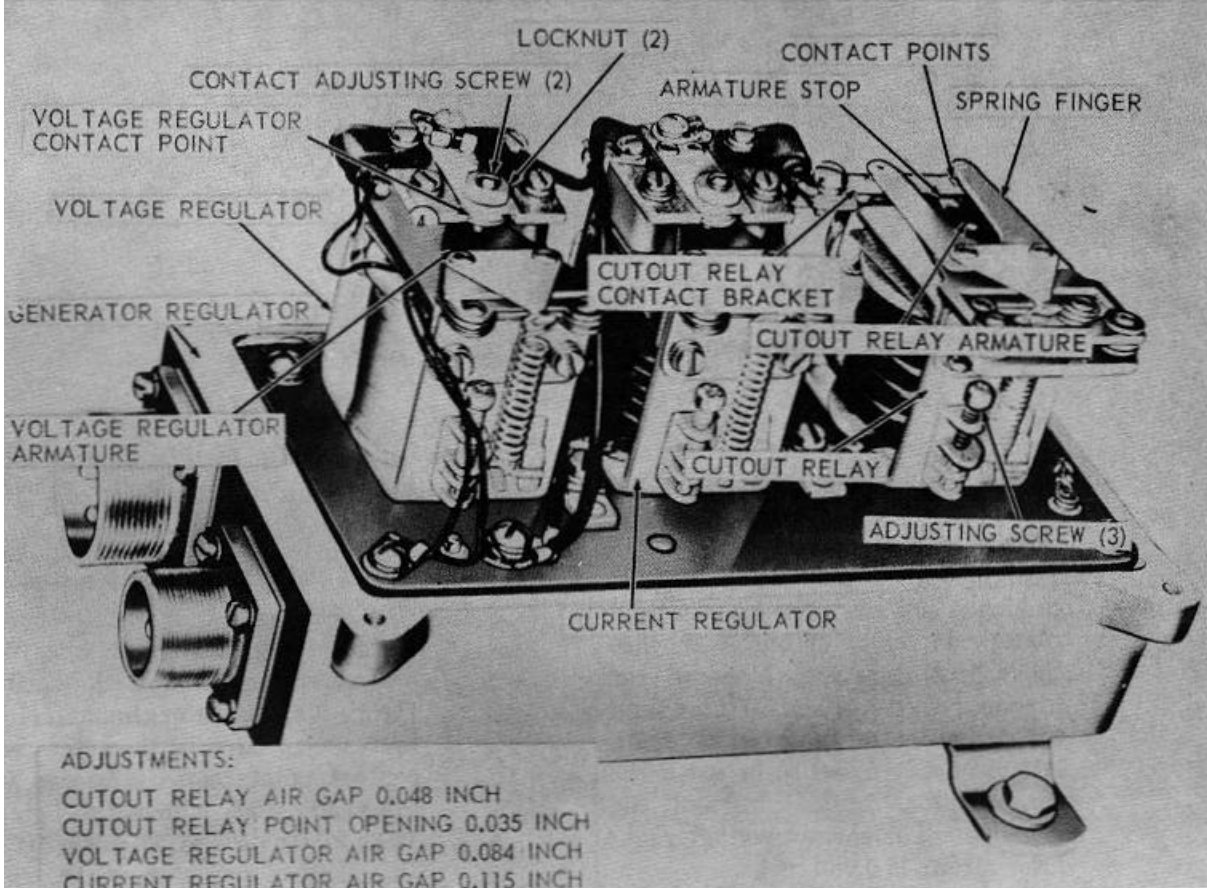


Figure 8. Generator brushes, removal and installation.



A

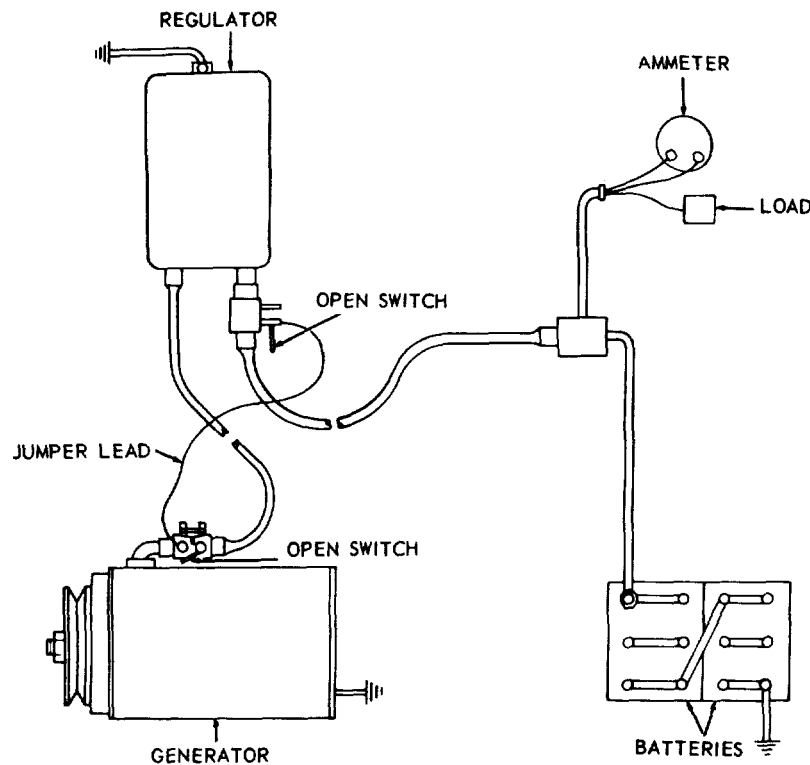


B

A-Generator regulator, removal

EMC 3810-207-20/9(1)
 B-Generator regulator, adjustment points

Figure 9. Generator regulator removal, adjustment, and test wiring diagram.



C

EMC 3810-207-20/9 ②

C-Electrical connections for polarizing generator

Figure 9 - Continued.

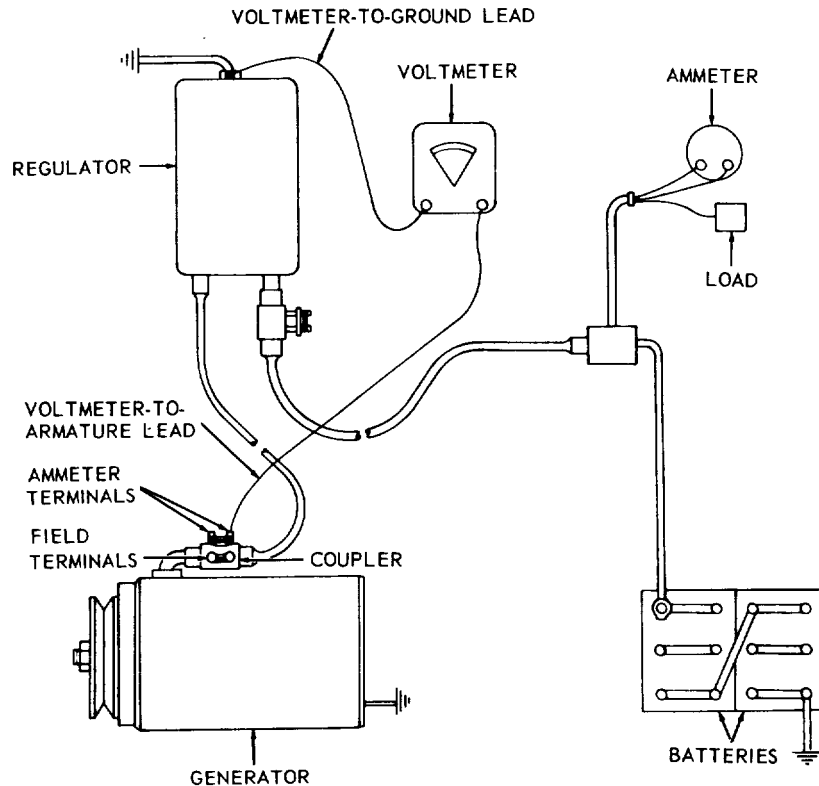
- contact bracket until the specified airgap is obtained. Secure the adjustment by tightening the two screws.
- (g) Push down on the voltage regulator armature until the voltage regulator contact point barely touches the adjusting screw. Measure the airgap between the coil core and the armature of the voltage regulator. Do not measure between the core residual brass pin and the armature. The correct voltage regulator airgap is 0.084 inch.
 - (h) Adjust the correct regulator airgap to 0.115 inch in the same manner as for the voltage regulator unit described in g above.

- (2) *Electrical adjustments.* Install set of test adapters as illustrated on figure 9.

Note.

Refer to C figure 9 and polarize the generator.

- (a) *Cutout relay closing voltage.* With voltmeter connected as shown in D, figure 9 start the engine and slowly increase speed until the cutout relay contact points close. Observe voltage reading at which this occurs. It should be 25 to 27 volts. If adjustment is necessary turn cutout relay adjusting screw clockwise to increase or counterclockwise to decrease the closing voltage. Set closing voltage at 26 volts.



- STEP 1. CONNECT THE VOLTMETER TO THE GENERATOR ARMATURE AND GROUND.
- STEP 2. START THE ENGINE.
- STEP 3. THE VOLTMETER SHOULD INDICATE BETWEEN 28 AND 32 VOLTS.
- STEP 4. STOP THE ENGINE AND REMOVE THE VOLTMETER AND LEADS.

D

EMC 3810-207-20/9 ③

D-Electrical connections for testing cutout relay and generator

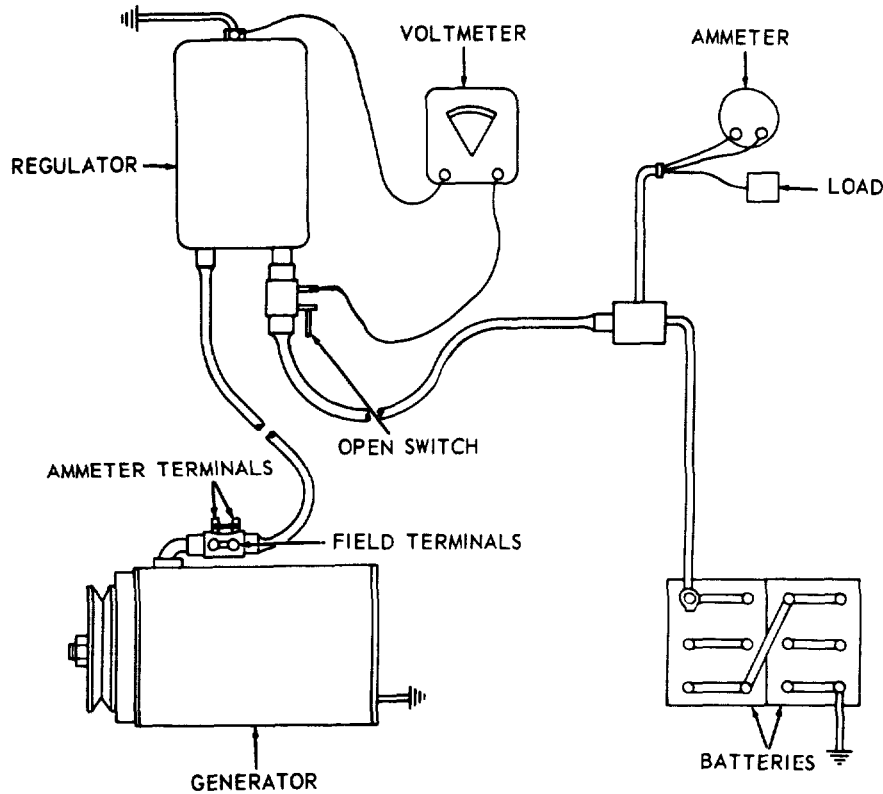
Figure 9 - Continued.

- (b) *Voltage regulator opening voltage.* With voltmeter connected as shown on E, figure 9 increase rpm to operating speed. Observe reading on voltmeter. It should read 27.5 to 29.5 volts. If adjustment is necessary turn the voltage regulator adjusting screw clockwise to increase and counterclockwise to decrease. Set voltage at 29.2 volts.
- (c) *Current regulator maximum amperage.* With ammeter connected as shown on F, figure 9 and either the test set carbon pile load set up at 25 to 30 amps, or first having operated the starter for 10 or

15 seconds to provide the load, increase rpm to operating speed, observe reading on ammeter at which points first vibrate. This should be 38 to 42 amperes. If adjustment is necessary, adjust the current regulator to 40 amperes in the same manner as the voltage regulator.

- (d) Replace generator regulator cover and repeat all tests before removing adapters. Run regulator voltage and amperage output through several cycles of increasing and decreasing engine speed from idle

NOTE: VOLTMETER READING
27-1/2 TO 29-1/2 VOLTS



E

EMC 3810-207-20/9 ④

E-Electrical connections for testing voltage regulator

Figure 9 - Continued.

to operating to idle speed to make sure adjustments are stable.

- (e) Remove adapters and connect cables.

74. Distributor

a. *Removal.* Remove the distributor as instructed on figure 10.

Note.

Before removing the distributor, for reassembly place identification marks on the distributor housing in relation to the distributor rotor.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean the distributor with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the distributor for cracks, breaks,

and other damage. Replace defective distributor.

- (3) Lubricate the distributor (LO 5-3810-207-20).

c. *Installation.* Refer to the identification marks placed on the distributor housing and install the distributor as illustrated on figure 10.

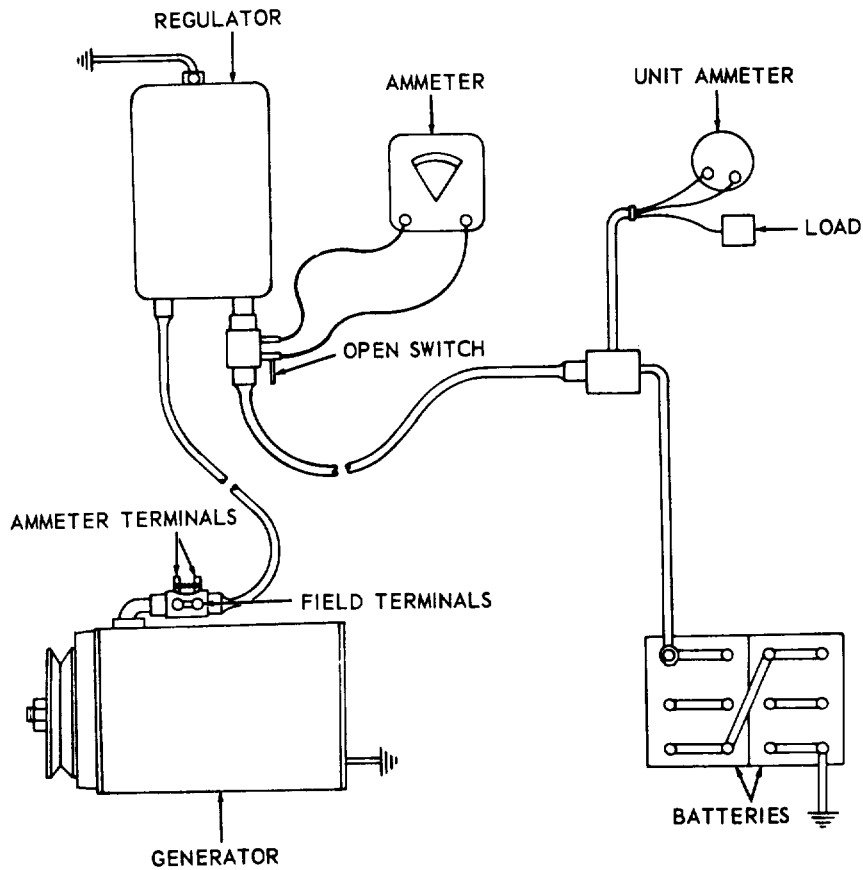
75. Distributor Points, Coil, Condenser, Resistor, and Rotor Cap

a. *Removal.*

- (1) Remove the distributor (par. 74).
- (2) Disassemble the distributor as illustrated on figure 11.

b. *Cleaning, Inspection, and Repair.*

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



F

EMC 3810-207-20/9(5)

F-Electrical connections for testing current regulator

Figure 9 - Continued.

- (2) Inspect the points for excessive burning, pits, and other damage. Replace defective points.
- (3) Using a coil and condenser tester, test the coil and condensers. Replace defective coil, condensers, or resistor.

c. Coil Testing.

- (1) Test with a test lamp as follows: Test the coil for open or grounded circuits by using a test lamp. Check the primary circuit by placing the test points on the two primary terminals. If the lamp does not light, the primary circuit is open. Check the

secondary circuit by placing one test point in the high tension terminal and the second test point on one of the primary terminals. The lamp will not light, but sparks will be noted as the test points, are rubbed over the terminals if the secondary winding is not open. If no sparks occur the secondary is open.

- (2) Test spark gap with a testing instrument as follows: Attach the leads from the testing instrument to the two primary terminals. Turn the distributor so the points will open and close to

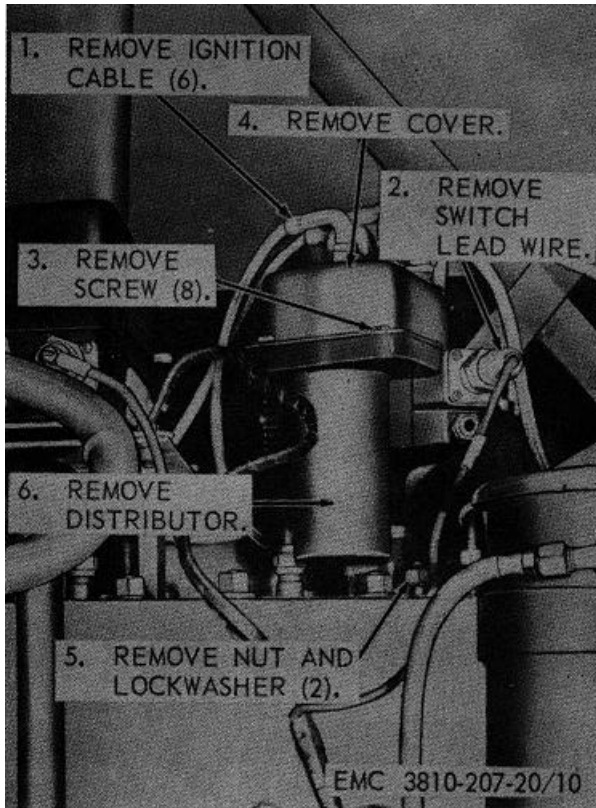


Figure 10. Distributor, removal and installation.

obtain a reading on the meter. When an instrument is used, test another coil which is known to be good. The two coils should have the same reading on the meter.

Note.

Do not touch the test instrument to the unit as the case is internally grounded and a faulty reading will occur.

d. Reassembly and Installation.

- (1) Reassemble the distributor in the reverse order illustrated on figure 11.
- (2) Adjust the points as instructed on figure 11.
- (3) Lubricate the distributor (LO 5-3810-207-20).
- (4) Install the distributor (par. 74).

e. Engine Timing.

- (1) Loosen screw and raise cover (fig. 12).

- (2) Disconnect spark plug cable from spark plug installed in number 1 cylinder.
- (3) Connect a neon timing light between number 1 spark plug and cable.
- (4) Loosen the distributor mounting screws and start the engine.
- (5) Hold the timing light directly in front of the flywheel opening in the flywheel housing.
- (6) Rotate the distributor in either direction until the timing mark aligns with the center of the hole in the flywheel housing. Tighten the distributor mounting screws. Repeat adjustment as necessary.
- (7) Stop the engine, disconnect the neon light, and connect the spark cable to the spark plug.
- (8) Close the cover and tighten the screw (fig. 12).

76. Spark Plugs and Cables

a. Removal.

- (1) Remove all dirt and foreign matter from the cylinder head around the spark plug openings.
- (2) Remove the cables and spark plugs as instructed on figure 13.

b. Cleaning and Inspection.

- (1) Clean the spark plugs -and cables with a lint-free cloth dampened with an approved cleaning solvent and dry thoroughly. Clean the spark plug points with an approved spark plug cleaning machine.
- (2) Inspect the insulators for chips and cracks. Replace plugs having defective insulators.
- (3) Inspect the electrodes for burns, pits, and alignment. Replace defective plugs.

Note.

The outside or grounded electrode must be directly aligned with the inside or insulated electrode.

- (4) Inspect the spark plug cables for corrosion, frayed or broken insulation or shielding, and proper connection. Replace defective cables.

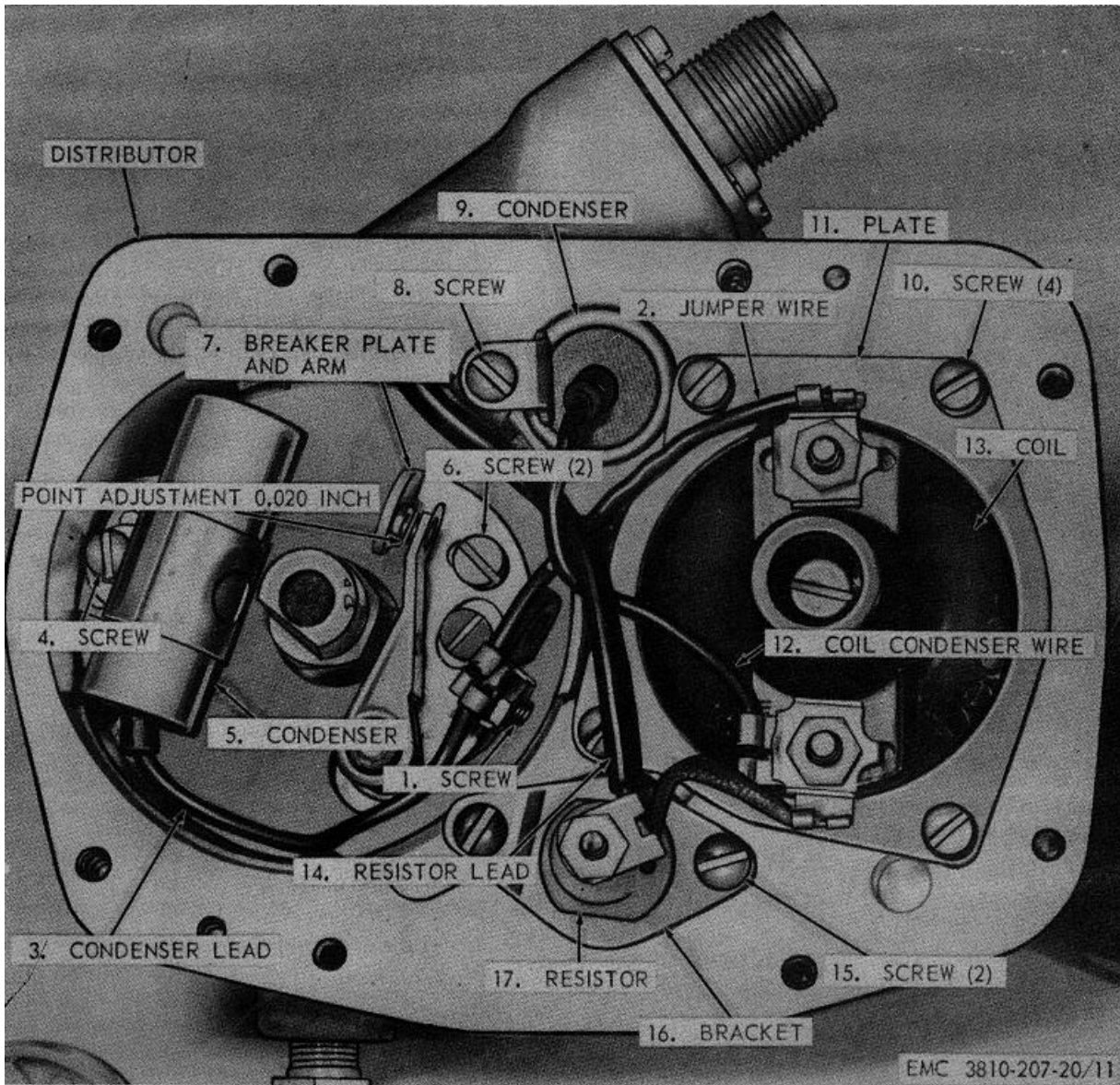


Figure 11. Distributor, coil, points, condenser, and resistor, removal, adjustment, and installation.

c. *Adjustment.* Place a feeler gage between the center electrode and the ground electrode of the spark plug. Set the clearance at 0.035 inch. Adjust the clearance by bending the ground electrode.

Note.

Spark plug clearance for carrier engine is 0.025 inch.

Note.

Do not damage the insulation surrounding the center electrode.

d. *Test.* Test the spark plugs with an approved testing machine. Replace all defective plugs.

e. *Installation.* Install the spark plugs and cables as illustrated on figure 13.

77. Starter Solenoid

a. *Test.* Test the solenoid and starter assembly as instructed on figure 14.

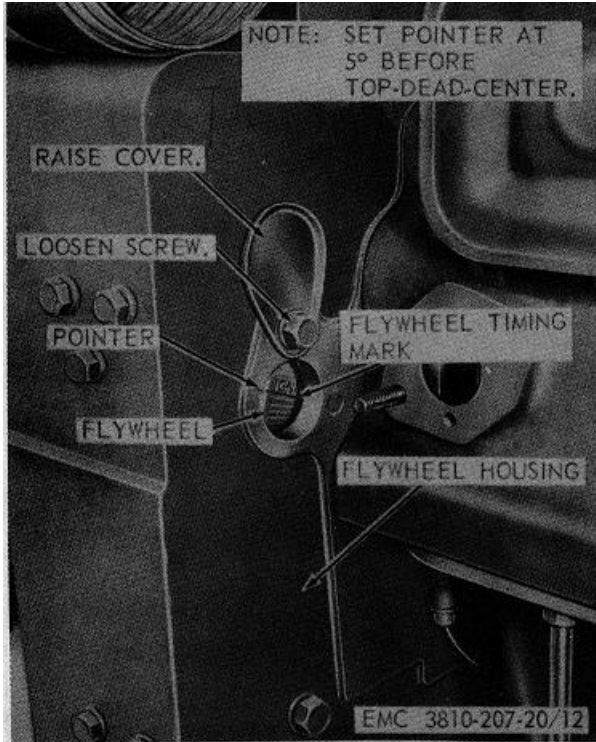


Figure 12. Engine flywheel timing works.

b. Removal. Remove the starter solenoid assembly as instructed on figure 15.

c. Cleaning and Inspection.

- (1) Clean the starter solenoid with a cloth dampened with an approved cleaning solvent.
- (2) Inspect the solenoid for proper operation and other damage. Replace defective solenoid.
- (3) Inspect the wiring for frayed, broken, or worn conditions. Replace wiring as necessary.

d. Installation. Install the starter solenoid as illustrated on figure 15.

78. Starter Assembly

a. Removal.

- (1) Remove the starter solenoid (par. 77).
- (2) Remove the starter as instructed on figure 15.

b. Cleaning and Inspection.

- (1) Clean the starter assembly with a 40 cloth dampened with an approved cleaning solvent (2) Rotate the drive

pinion to see that the armature turns freely and does not bind.

- (3) Remove the cover band and inspect the brushes. If brushes are worn to less than 1/2 inch of the original length, replace brushes.
- (4) Inspect starter assembly for proper operation, wear, and other damage. Replace defective starter.
- (5) Inspect the commutator for pits, burns, and other damage. If commutator is defective, replace starter.

c. Installation. Install the starter assembly as illustrated on figure 15.

d. Brush Replacement.

(1) *Removal.*

- (a) Remove the starter as instructed on figure 15.
- (b) Remove the cover band.
- (c) Remove the brushes as instructed on figure 16.

(2) *Installation.*

- (a) Install the brushes as illustrated on figure 16. Fit brushes to commutator.
- (b) Install the cover band.
- (c) Install the starter -as illustrated on figure 15.

79. Instrument Panel Components

a. Removal. Remove the instrument panel components as instructed on figure 17.

b. Cleaning and Inspection. Clean and inspect. Replace damaged or defective instrument panel components.

c. Installation. Install the instrument panel components as illustrated on figure 17.

80. Oil Pressure Sending Unit, Safety Switch, and Pressure Switch

a. Removal. Remove the oil pressure sending unit, safety switch, and pressure switch as instructed on figures 17 and 18.

b. Cleaning and Inspection. Clean and inspect. Replace defective sending unit and switches.

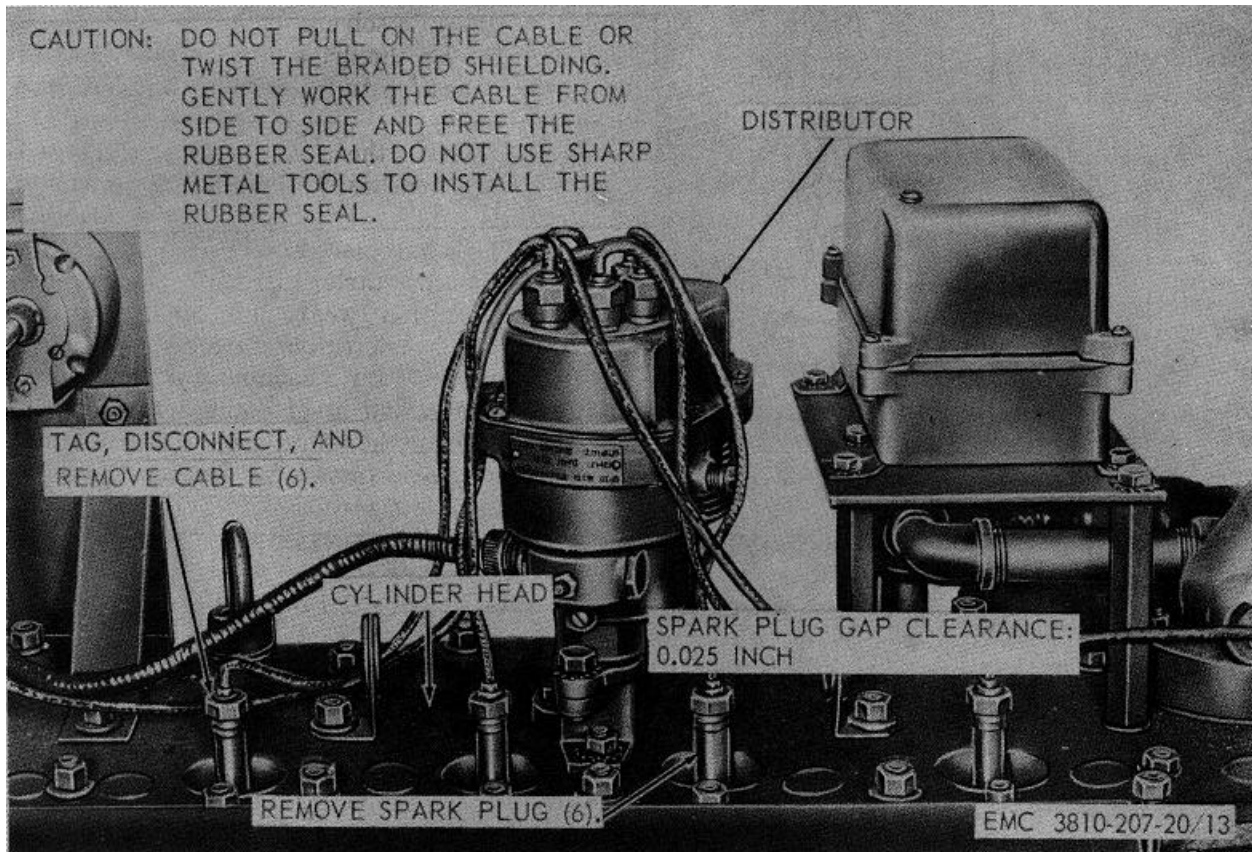


Figure 13. Spark plugs and cables, removal and installation.

c. Installation. Install the oil pressure sending unit, safety switch, and oil pressure switch as illustrated on figures 17 and 18.

81. Water Temperature Sending Units

a. Removal. Remove the water temperature sending units as instructed on figures 17 and 19.

b. Cleaning and Inspection. Clean and inspect. Replace defective sending units.

c. Installation. Install the water temperature sending units as illustrated on figures 17 and 19.

82. Fuel Tank Sending Unit

a. Removal. Remove the fuel tank sending unit as instructed on figures 17 and 20.

b. Cleaning and Inspection. Clean and inspect. Replace defective fuel tank sending unit.

c. Installation. Install the fuel tank sending unit as illustrated on figures 17 and 20.

83. Slave Receptacle

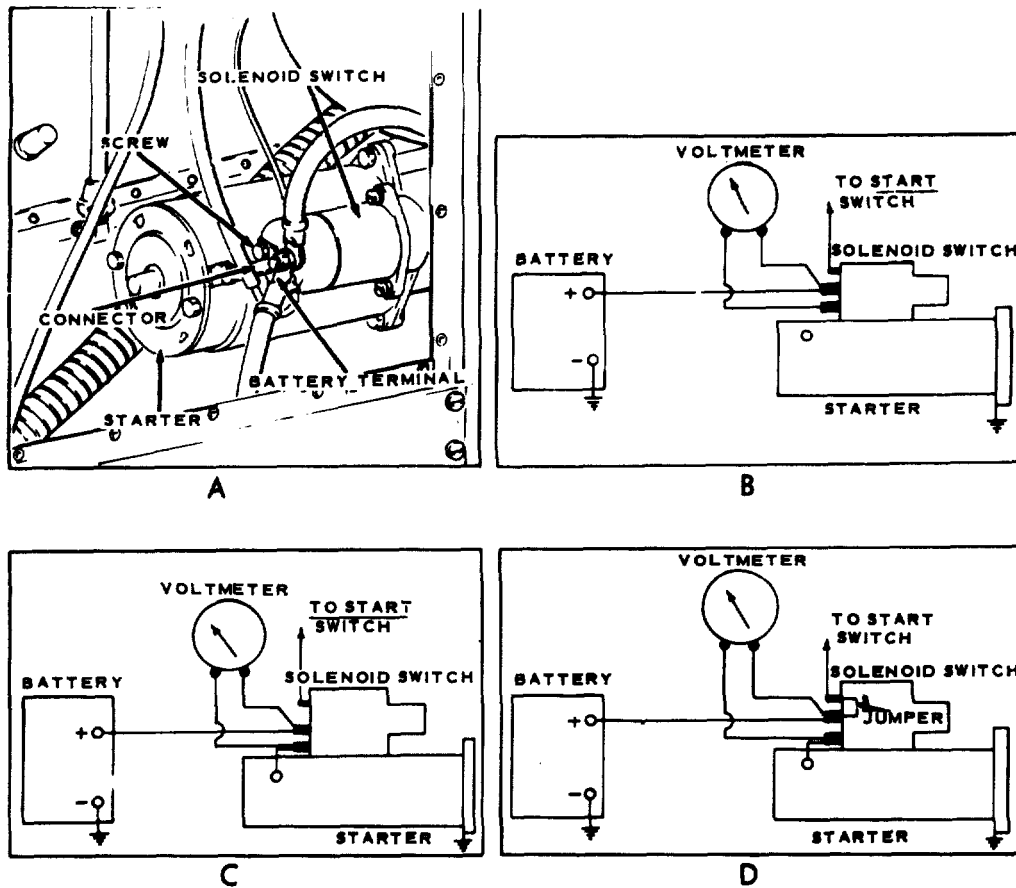
a. Removal. Remove the slave receptacle as instructed on figure 21.

b. Cleaning and Inspection.

(1) Clean the slave receptacle with a cloth dampened with an approved cleaning solvent.

(2) Inspect the slave receptacle for breaks, frayed or broken leads, and other damage. Replace defective slave receptacle.

c. Installation. Install the slave receptacle as illustrated on figure 21.

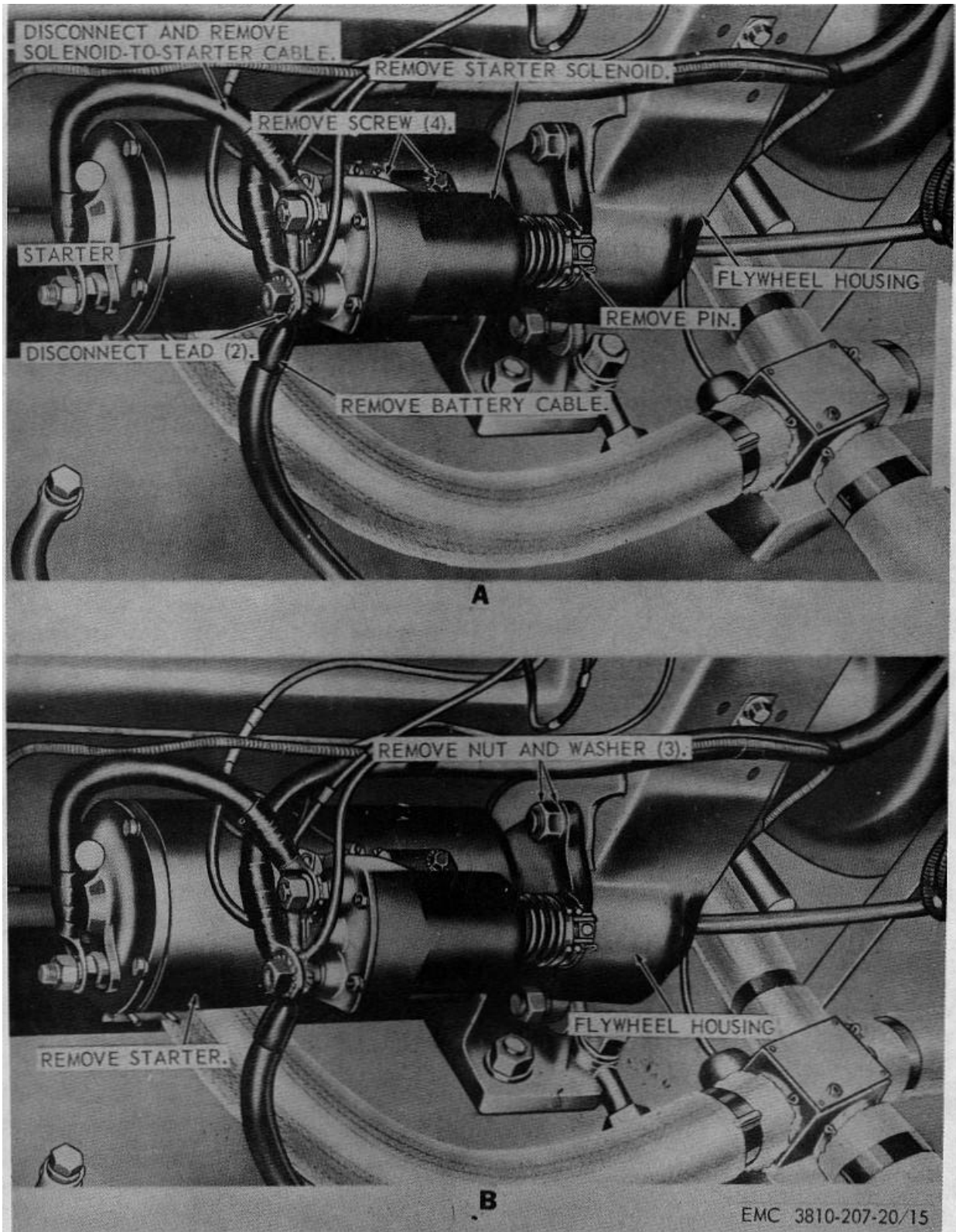


- STEP 1. DETERMINE THAT BATTERY IS FULLY CHARGED AND THAT ALL BATTERY AND STARTER CABLES ARE SERVICEABLE AND PROPERLY INSTALLED.
- STEP 2. REMOVE SCREW AND INSULATE SOLENOID-TO-STARTER CONNECTOR FROM SOLENOID SWITCH TERMINAL. CONNECT VOLTMETER AS SHOWN IN B ABOVE. IF VOLTAGE IS INDICATED, SOLENOID SWITCH IS DEFECTIVE AND STARTER WITH SOLENOID SWITCH MUST BE REPLACED.
- STEP 3. INSTALL THE SOLENOID-TO-STARTER CONNECTOR.
- STEP 4. CONNECT VOLTMETER AS SHOWN IN C ABOVE. IF BATTERY VOLTAGE (24 VOLTS) IS NOT INDICATED, THE STARTER IS DEFECTIVE AND MUST BE REPLACED.
- STEP 5. MOMENTARILY CONNECT A JUMPER AS SHOWN IN D ABOVE. THE VOLTMETER READING SHOULD DROP TO ZERO AND STARTER SHOULD CRANK ENGINE. IF VOLTMETER READING DOES NOT DROP TO ZERO, SOLENOID SWITCH IS DEFECTIVE AND STARTER WITH SOLENOID SWITCH MUST BE REPLACED. IF VOLTMETER READING DROPS TO ZERO BUT STARTER FAILS TO CRANK ENGINE, STARTER IS DEFECTIVE AND MUST BE REPLACED.

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- A—Starter and solenoid, installed view
- B—Solenoid test wiring diagram
- C—Starter test wiring diagram
- D—Jumper test diagram

Figure 14. Starter and solenoid test wiring diagram.



A—Starter solenoid, installed view

B—Starter, installed view

Figure 15. Solenoid and starter, removal and installation.

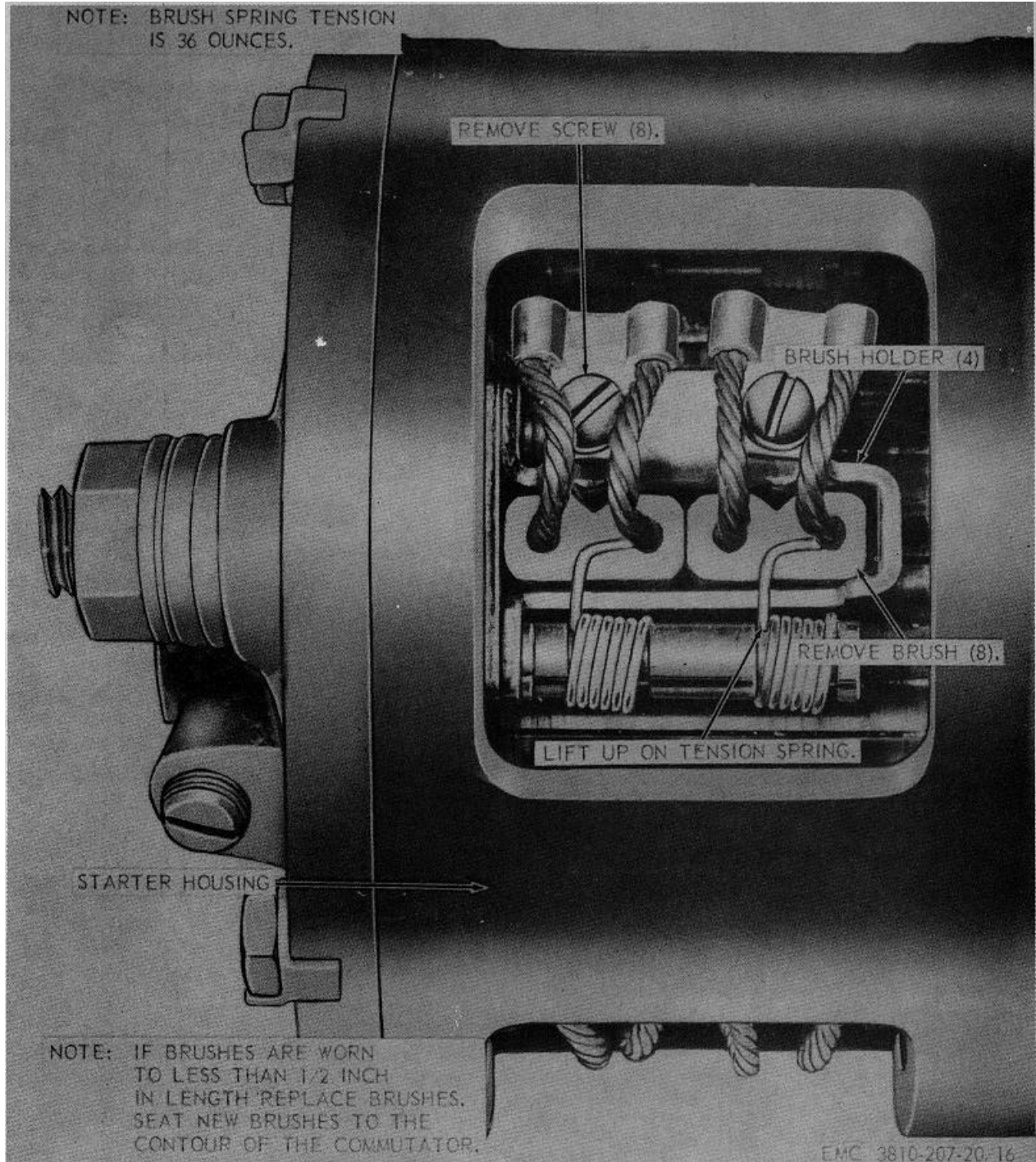


Figure 16. Starter brush, replacement.

84. Hour-Meter

a. *Removal.* Remove the hour-meter as instructed on figure 22.

b. *Cleaning and Inspection.*

- (1) Clean the hour-meter with a cloth dampened with an approved cleaning solvent.

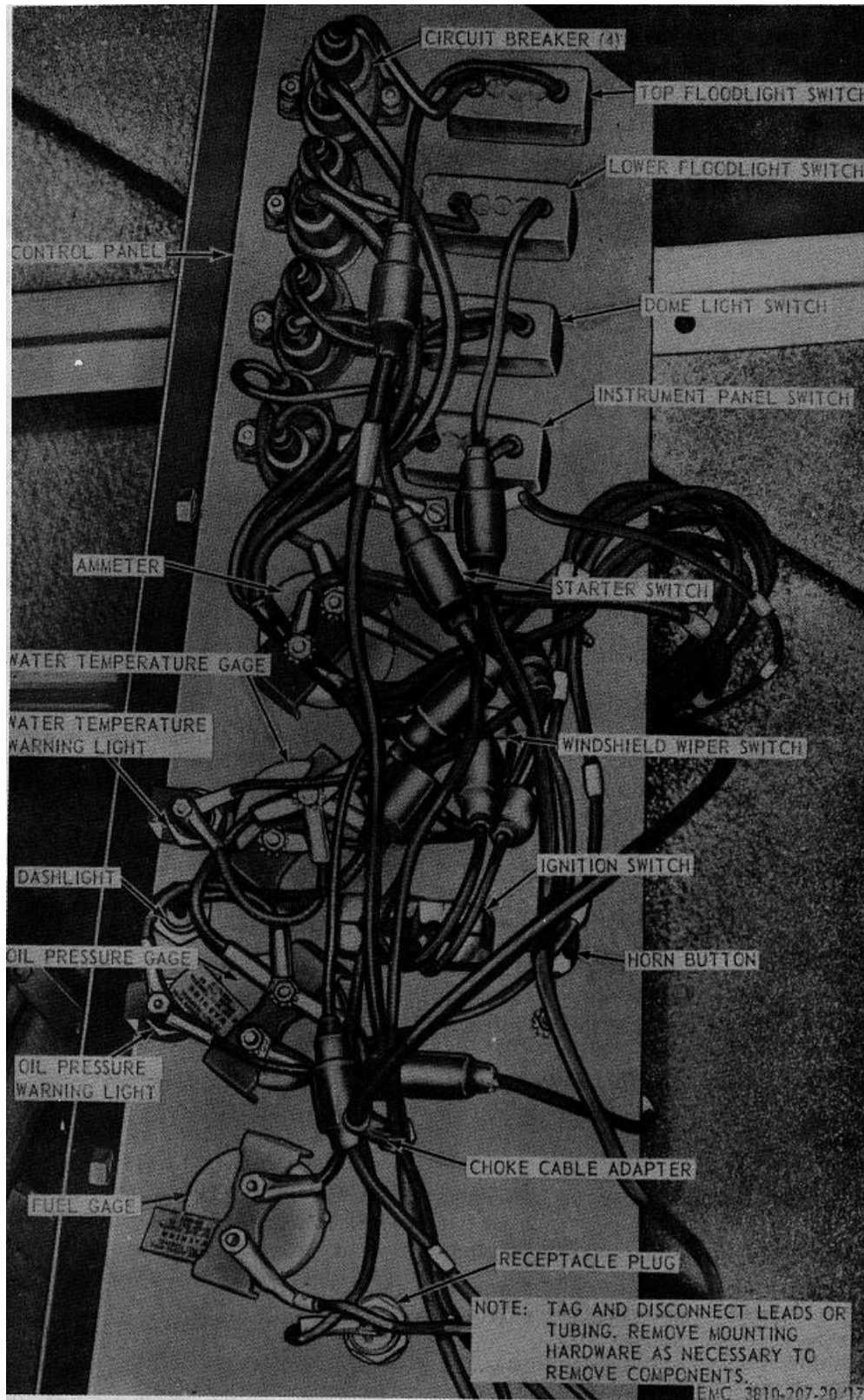


Figure 17. Instrument panel and components, removal and installation.

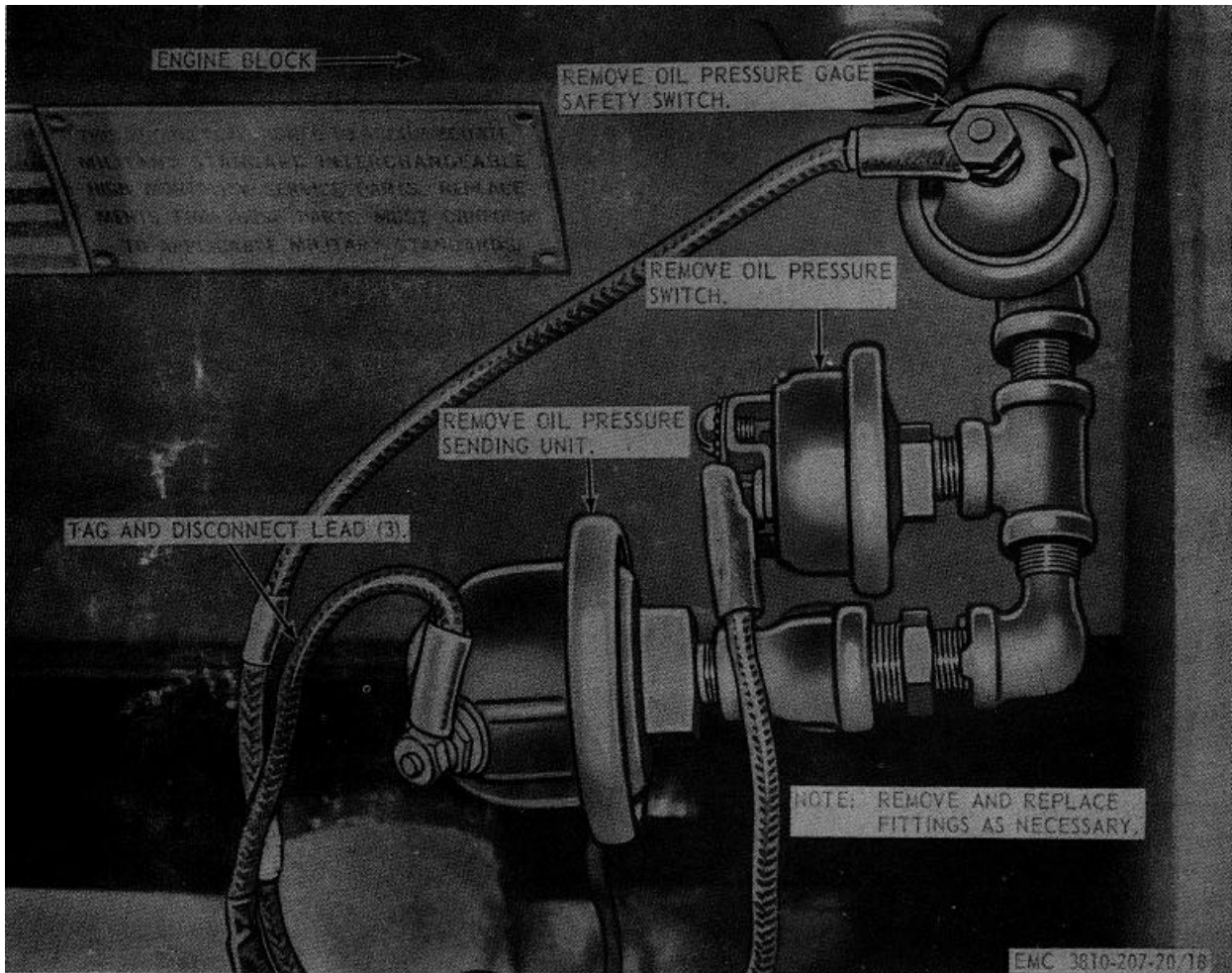


Figure 18. Oil pressure sending unit, safety switch, and oil pressure switch, removal and installation

- (2) Inspect the hour-meter for breaks, proper operation, and other damage. Replace defective hour-meter.

c. *Installation.* Install the hour-meter as illustrated on figure 22.

85. Horn Assembly

- a. Remove the horn as instructed on figure 23.
- b. Check and replace horn button as illustrated on figure 17.
- c. Clean and inspect. Replace defective horn assembly.
- d. Install the horn assembly as illustrated on figure 23.

86. Floodlights

- a. Remove the floodlight as instructed on figure 24.
- b. Check and replace switch as illustrated on figure 17.
- c. Disassemble the floodlight in the numerical sequence as illustrated on figure 25.
- d. Clean and inspect all parts. Replace or repair defective parts.
- e. Reassemble the floodlight in the reverse of the numerical sequence as illustrated on figure 25.
- f. Install the floodlight on the crane in reverse of the instructions on figure 24.

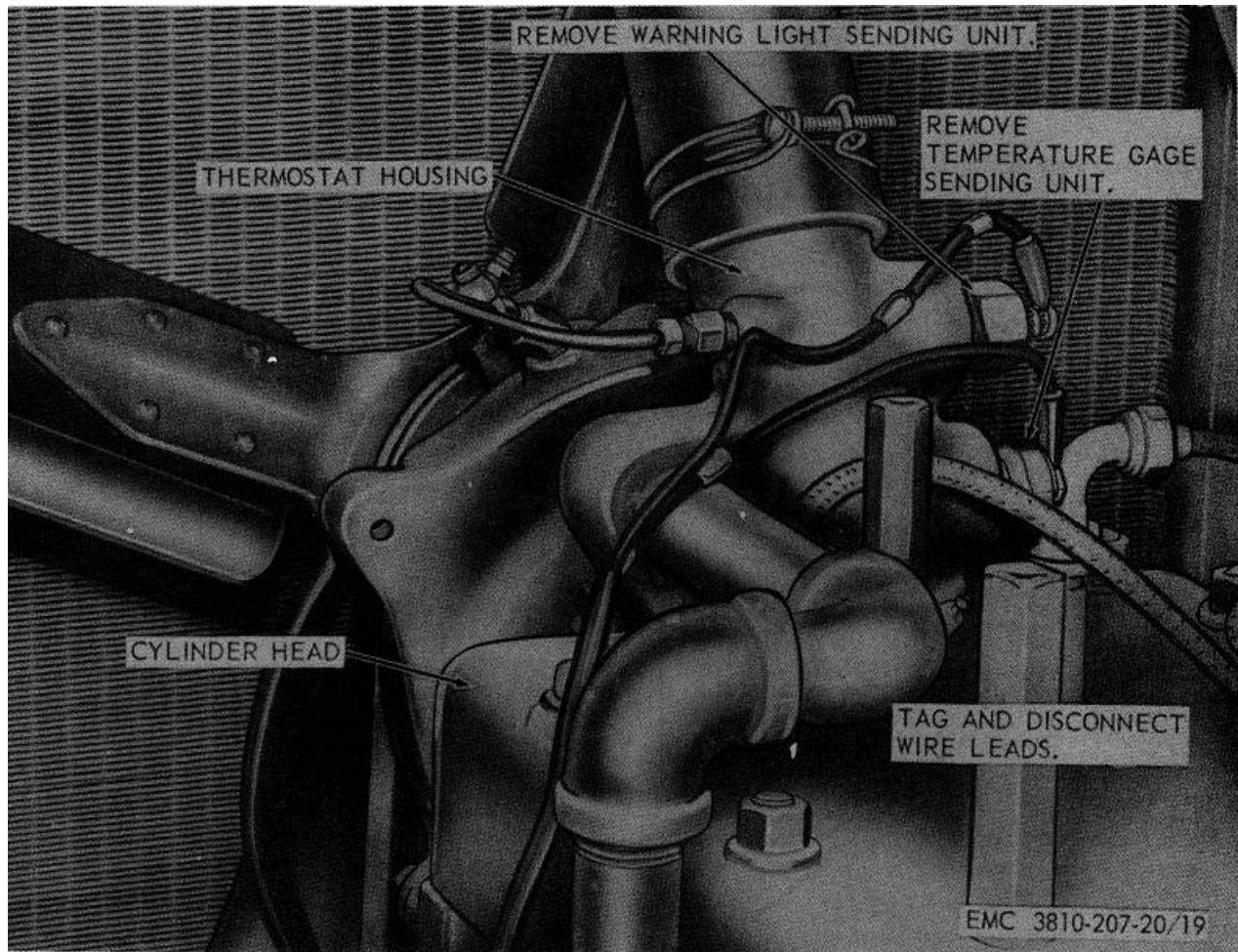


Figure 19. Water temperature sending units, removal and installation.

87. Cab Dome Light

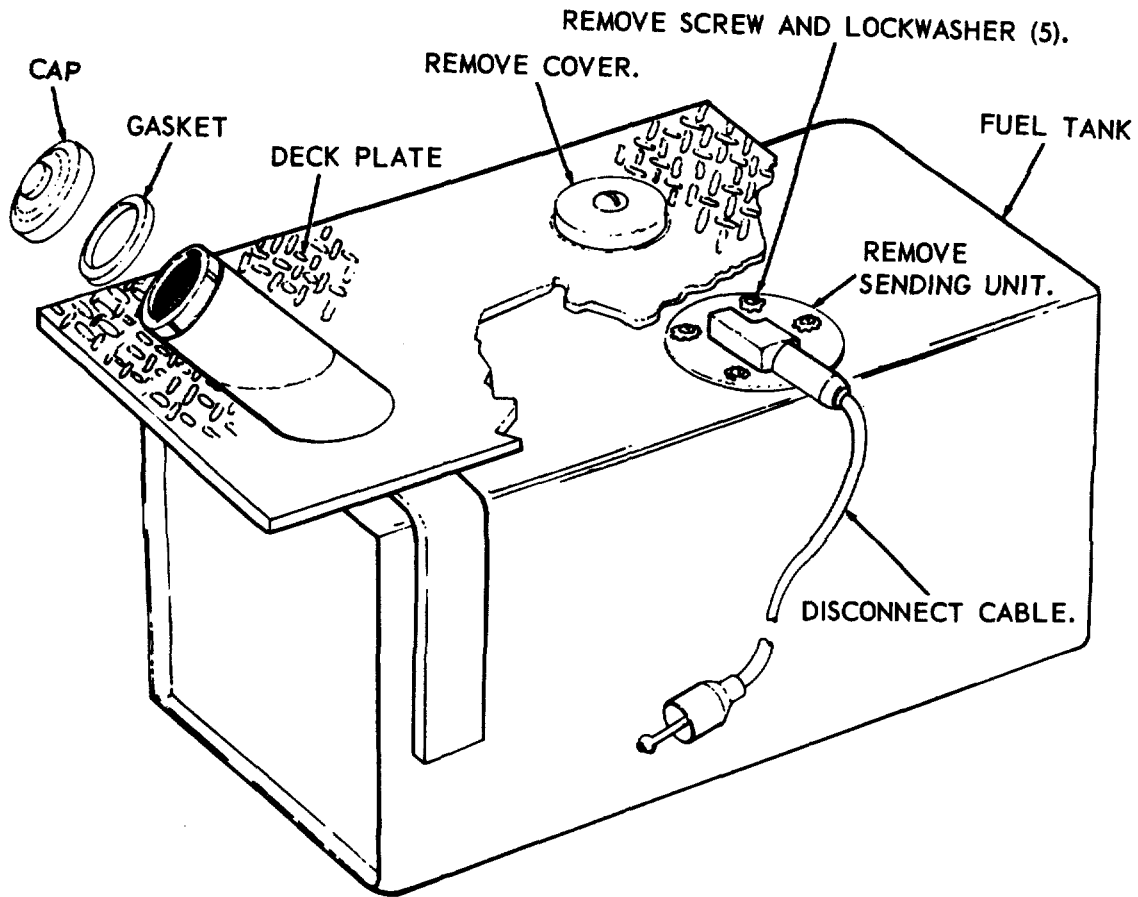
- a. Remove the dome light as instructed on figure 26.
- b. Check and replace switch as illustrated on figure 17.
- c. Disassemble the dome light in the numerical sequence as illustrated on figure 27.
- d. Clean and inspect all parts. Replace or repair defective parts.
- e. Reassemble the dome light in the reverse of the numerical sequence illustrated on figure 27.
- f. Install the dome light as illustrated on figure 26.

88. Clearance Light

- a. *Removal and Disassembly.* Remove and disassemble the clearance light as instructed on figure 28.
- b. *Cleaning and Inspection.* Clean the clearance lights with an approved cleaning solvent.
- c. *Reassembly and Installation.* Install the clearance light in reverse order as instructed on figure 28.

89. Cab Wiring Harness

- a. *Inspection.* Inspect the wiring for oilsoaked, cracked, or frayed insulation, for broken wires, and for loose or corroded connections.



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Figure 20. Fuel tank sending unit, removal and installation.

b. Repair.

(1) *Harness repair.* Repair a broken wire by cutting a length of wire and taping it along the harness. Install two clips at either end and remove the broken wire of the harness. Secure the end of the new wire to the connection.

(2) *Cab wiring repair.* Remove the broken wire from the connection. Splice on the length of wire needed for the repair, making sure the splice is taped sufficiently to prevent any short circuit in the wiring. Position the spliced section of wire and secure to the connection.

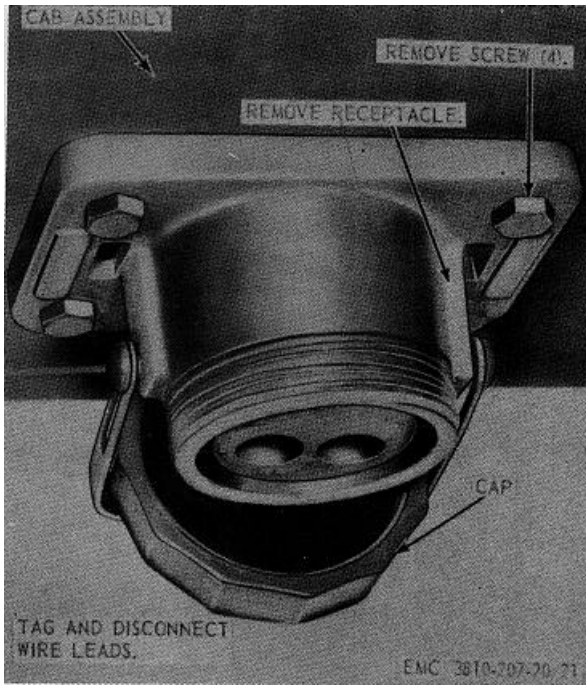


Figure 21. Slave receptacle, removal and installation.

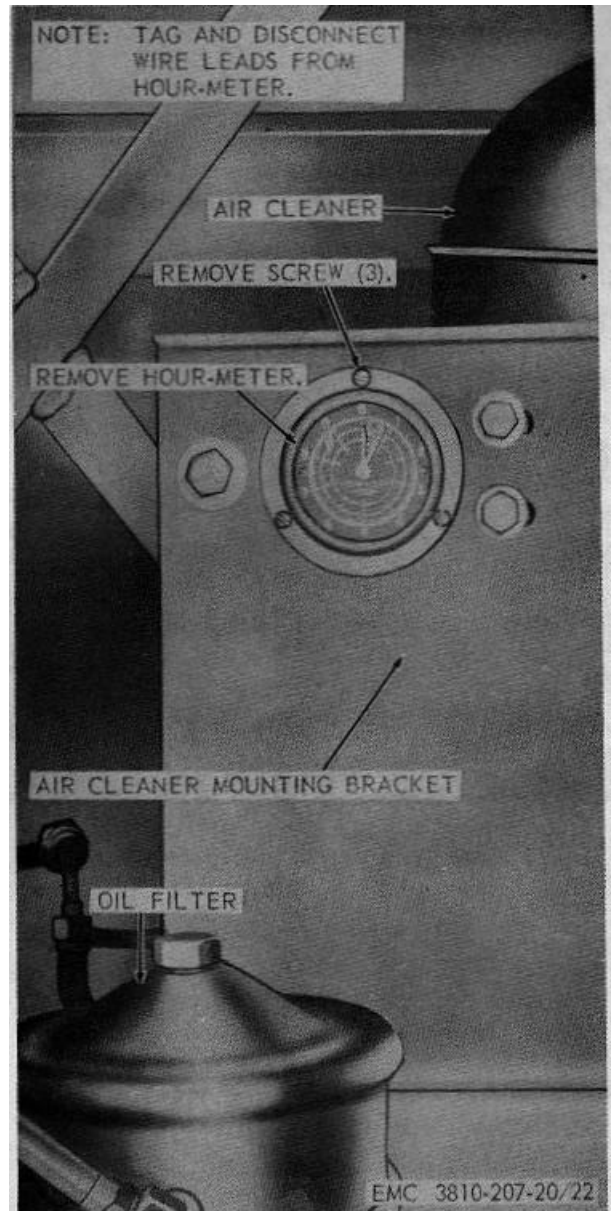


Figure 22. Hour-meter, removal and installation.

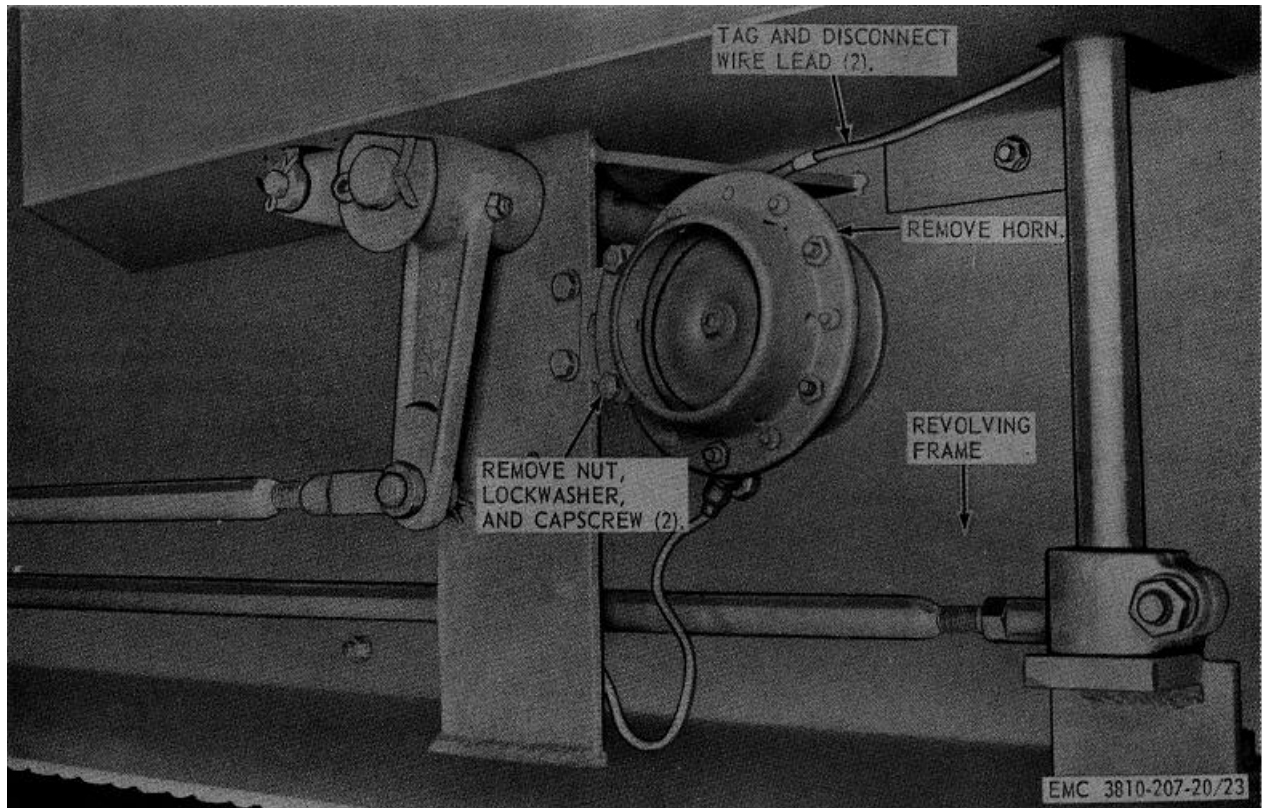


Figure 23. Horn, removal and installation.

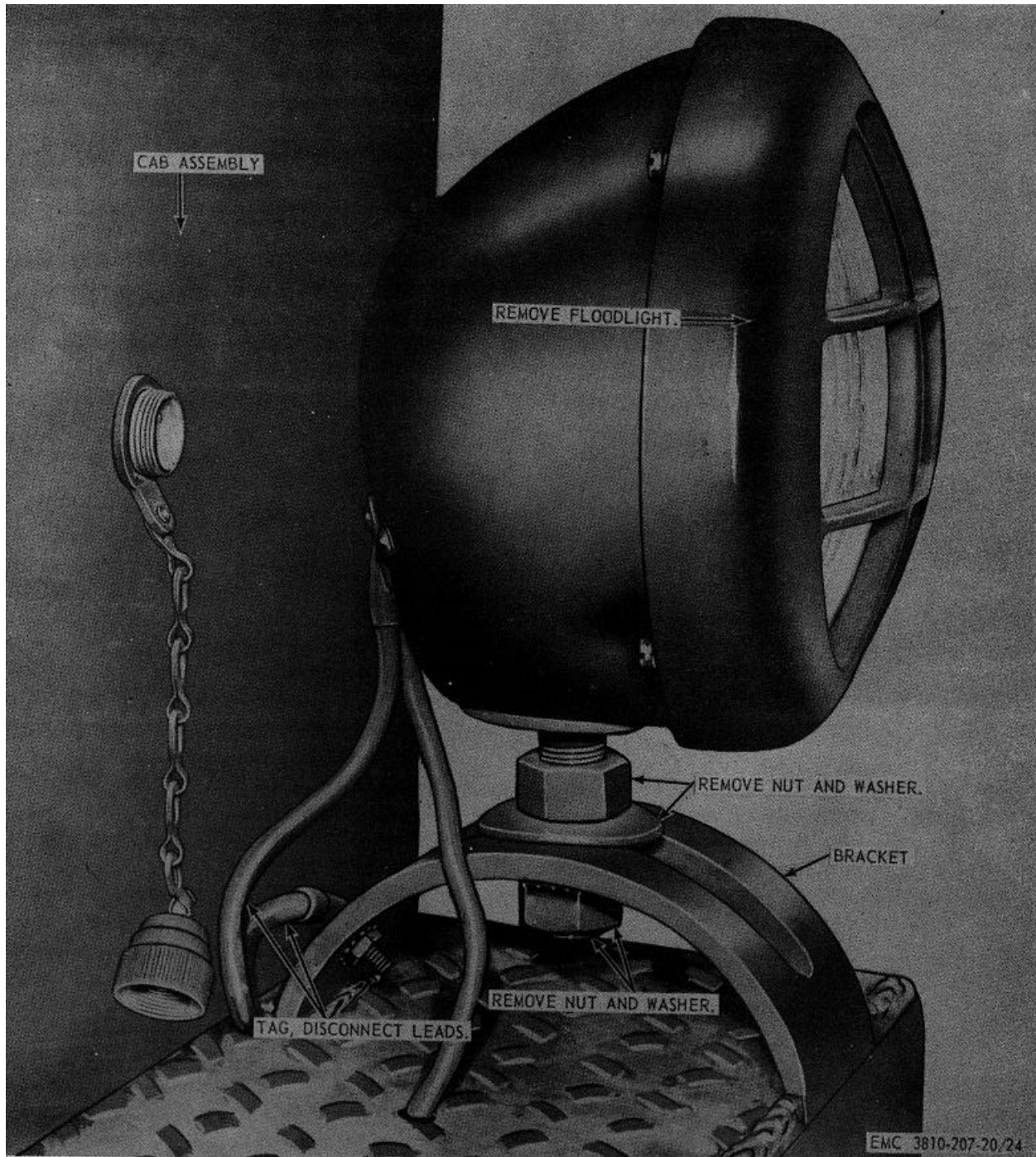
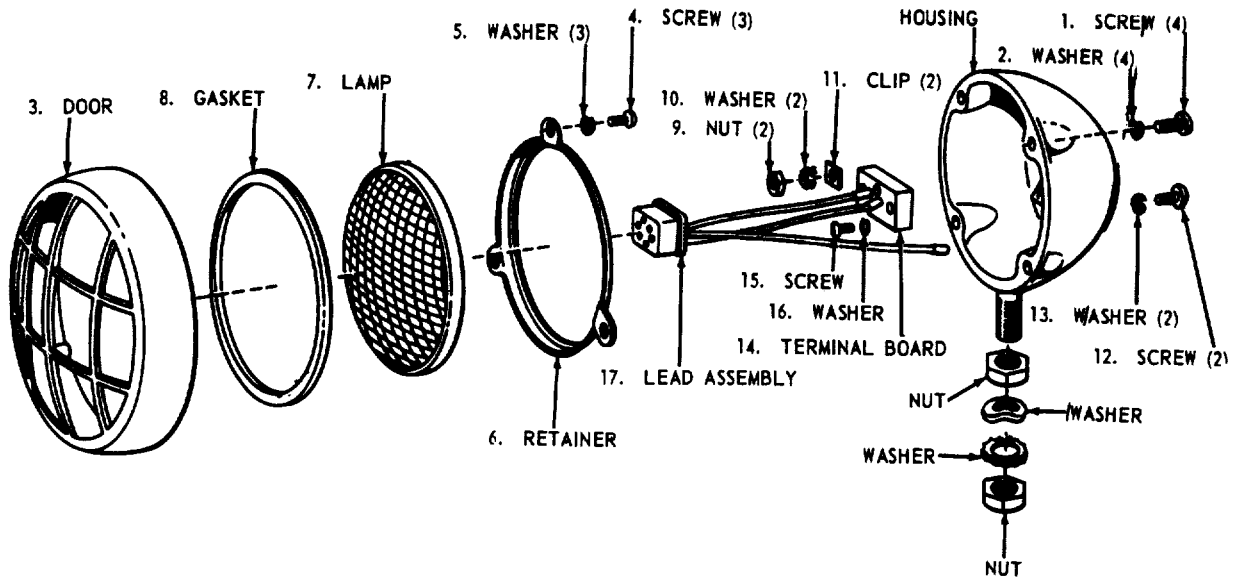


Figure 24. Floodlight, removal and installation.



TAG, DISCONNECT
LEAD ASSEMBLY.

MC 3810-207-20/25

Figure 25. Floodlight, exploded view.

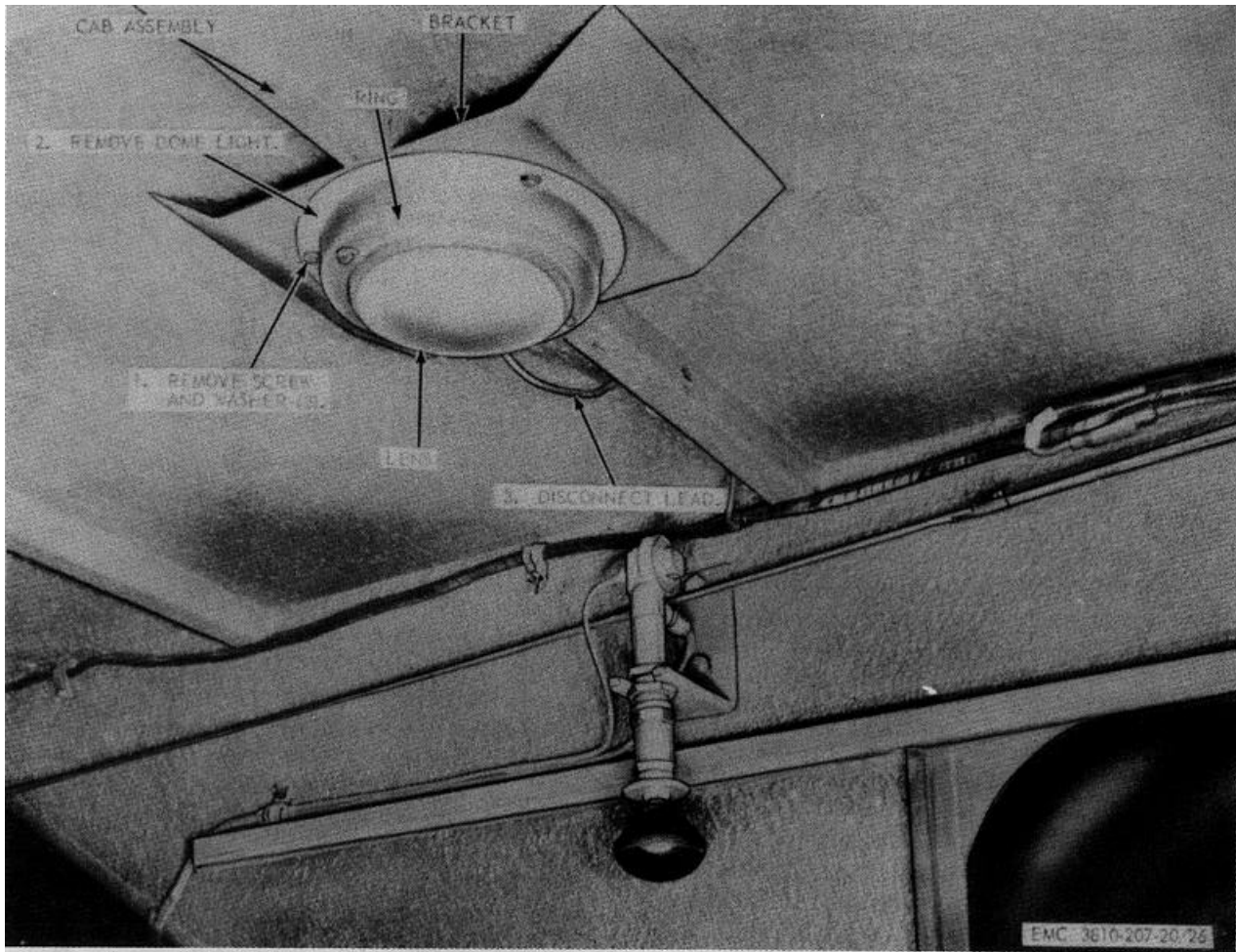
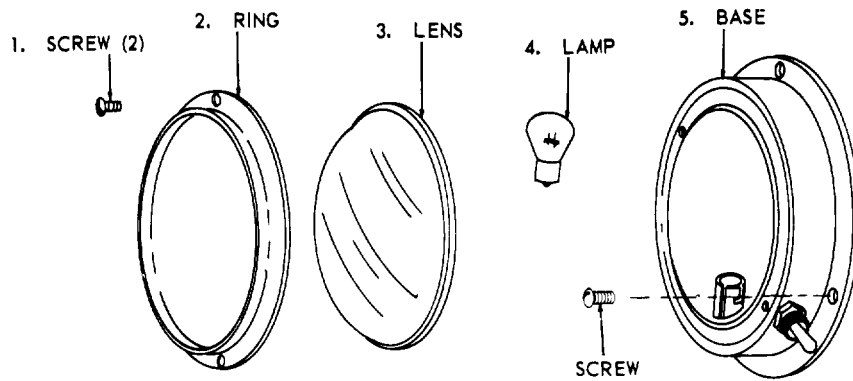


Figure 26. Dome light, removal and installation.



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Figure 27. Dome light, exploded view.

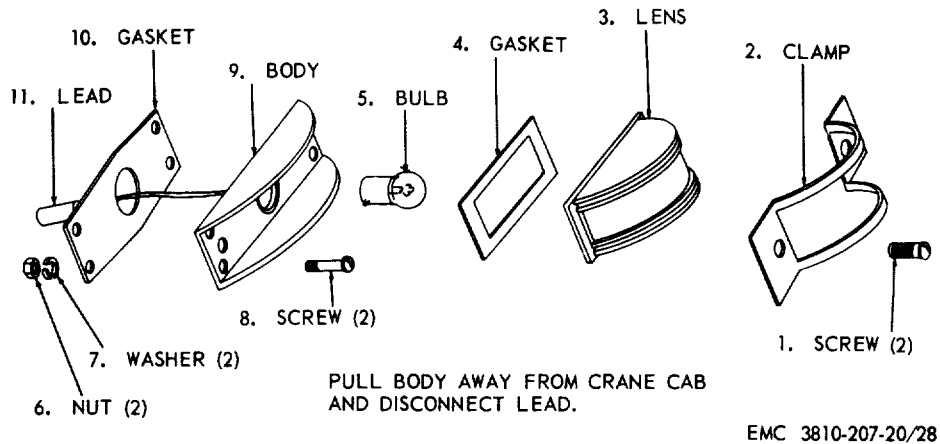


Figure 28. Clearance light, removal, disassembly, reassembly, and installation.

Section II. CRANE ENGINE ASSEMBLY

90. General

The six intake and six exhaust valves are located in the cylinder block on the right side of the engine and are raised and lowered by tappets in contact with the camshaft. Adjusting screws in the tappets provide the means of adjusting the valve clearance. The stem of each valve rides within a valve guide pressed in the block. Intake valves control the admission of the fuel-air mixture to the cylinders, while the exhaust valves permit the expulsion of exhaust gases from the cylinder. The engine governor is a centrifugal unit gear-driven from the camshaft and connected to the carburetor through adjustable linkage which controls the speed of the engine.

91. Valve Cover Assembly

a. *Removal.* Remove the valve cover assembly as instructed on figure 29.

b. *Cleaning and Inspection.*

(1) Clean all parts with an approved cleaning solvent. Remove the old gasket from the valve cover.

(2) Inspect the valve cover for cracks, breaks, bends, and other damage. Replace defective cover and gasket.

(3) Inspect the bypass tube for cracks, breaks, and other damage. Replace defective bypass tube. Replace cover gasket.

c. *Installation.* Install the valve cover assembly as illustrated on figure 29.

92. Valve Adjustment

a. Remove the valve covers from the engine (par. 91).

b. Start the engine, allowing it to heat to normal operating temperature (TM 5-3810-207-10).

c. Adjust the valves as instructed on figure 30.

d. Install the valve covers (par. 91).

e. The compression test is as follows:

(1) Remove the spark plug (par. 76).

(2) Place a suitable cylinder compression tester in the spark plug hole and crank the engine with the starter.

(3) The compression gage reading should be from 80 to 85 psi.

(4) Install the spark plug (par. 76).

(5) Test the remaining cylinders in a similar manner.

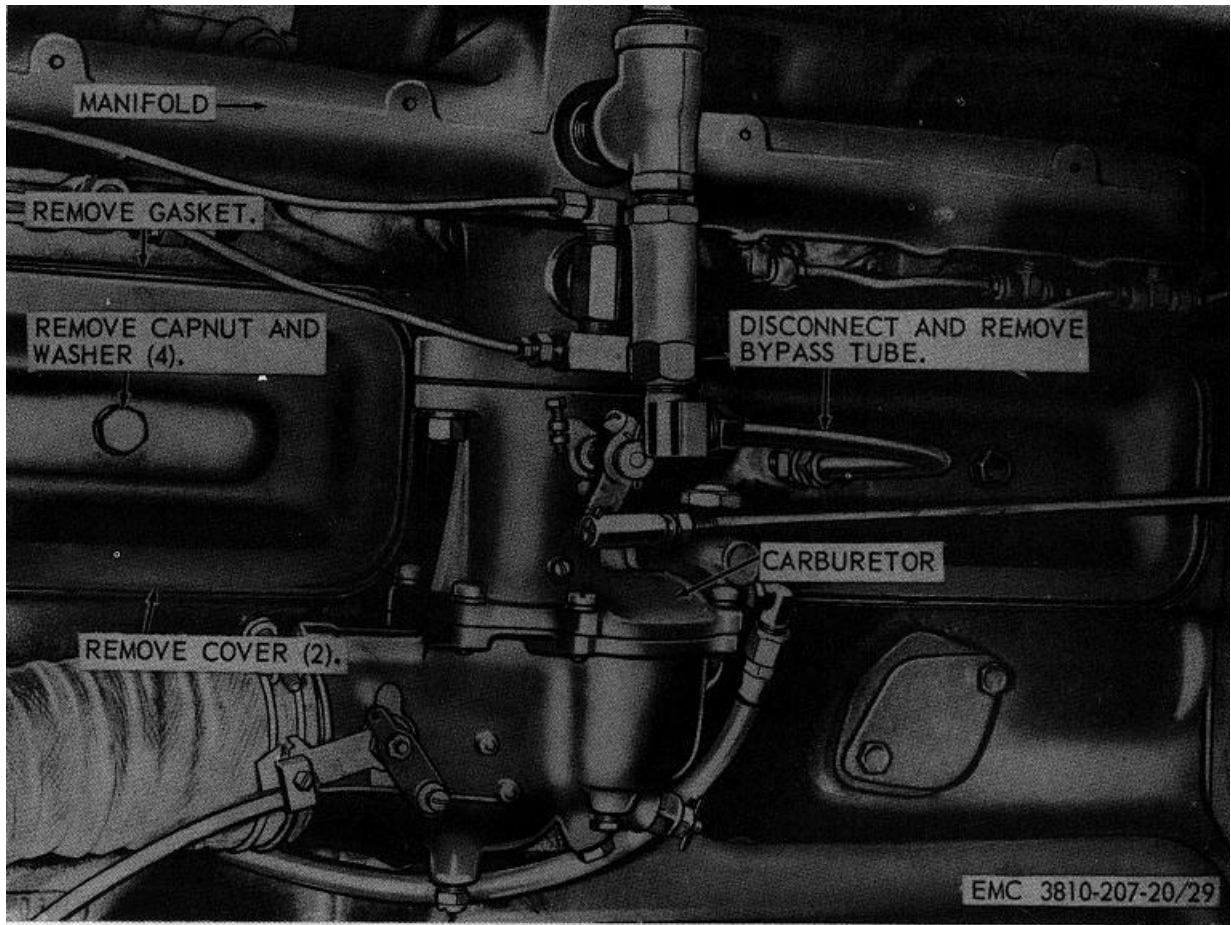


Figure 29. Valve cover assembly, removal and installation.

93. Engine Governor Assembly

a. *Removal.* Remove the crane engine governor assembly as instructed on figure 31.

b. *Cleaning and Inspection.*

- (1) Clean the governor assembly with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the governor assembly for cracks, breaks, proper operation, and other damage. Replace defective governor assembly.

c. *Installation.* Install the governor assembly as illustrated on figure 31.

d. *Adjustment.* Adjust governor assembly (par. 94).

94. Governor Adjustment

a. Engine Speed Governor Adjustment.

- (1) Start the engine and allow it to operate until it reaches normal operating temperature (TM 5-3810-207-10).
- (2) Loosen locknut on governor adjusting screw (fig. 32) and back out on the adjusting screw several turns to make sure it does not affect the engine speed.
- (3) Use a tachometer and check the engine speed with the engine pulling its rated load. If the desired engine speed cannot be obtained, increase or decrease the tension of the governor spring by loosening the adjusting nut and lowering or raising the adjusting eyebolt to obtain desired speed range.
- (4) Secure the adjusting eyebolt in place with the locknut.
- (5) If the governor surges at no-load speed after spring tension is adjusted,

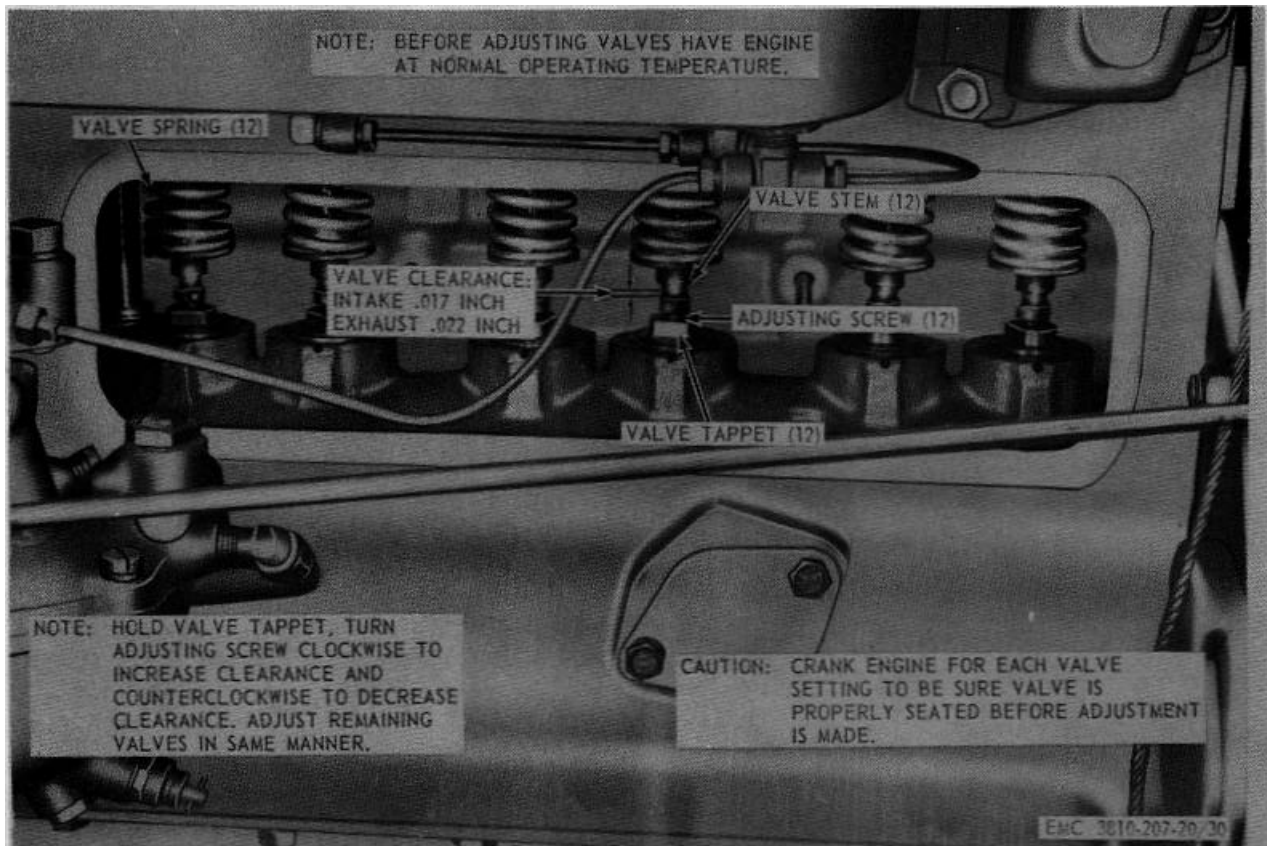


Figure 30. Crane engine, valve adjustment.

turn the adjusting capscrew in until surge is eliminated;
secure with locknut.

b. Control Rod Adjustment.

- (1) Remove the control rod from the carburetor (par. 106).
- (2) With the governor lever in its normal position and under spring tension, loosen

the locknut on the control rod and turn in or out of the ball joint on the governor lever to increase or decrease the throttle speed; secure with locknut.

- (3) Install the control rod on the carburetor (par. 106).

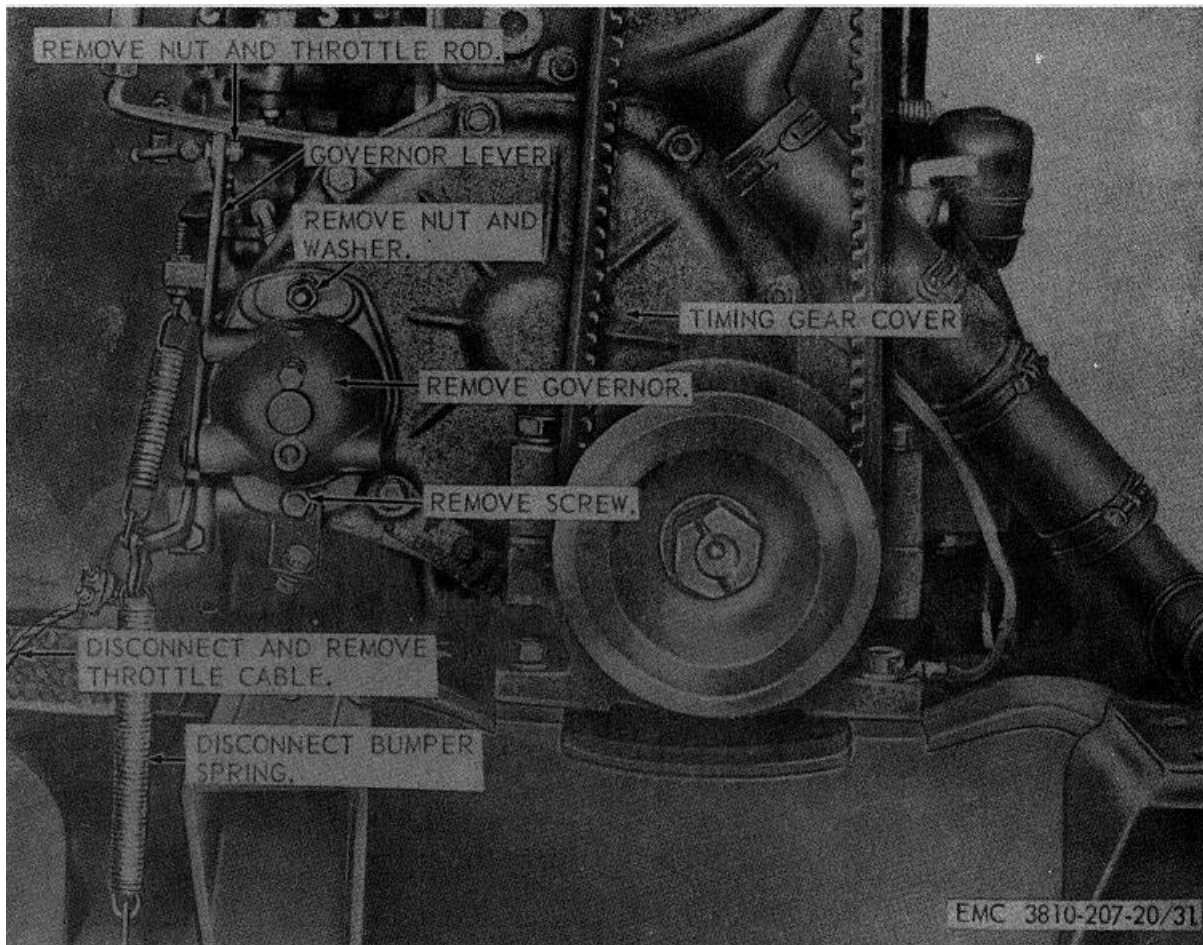


Figure 31. Crane engine governor assembly, removal and installation.

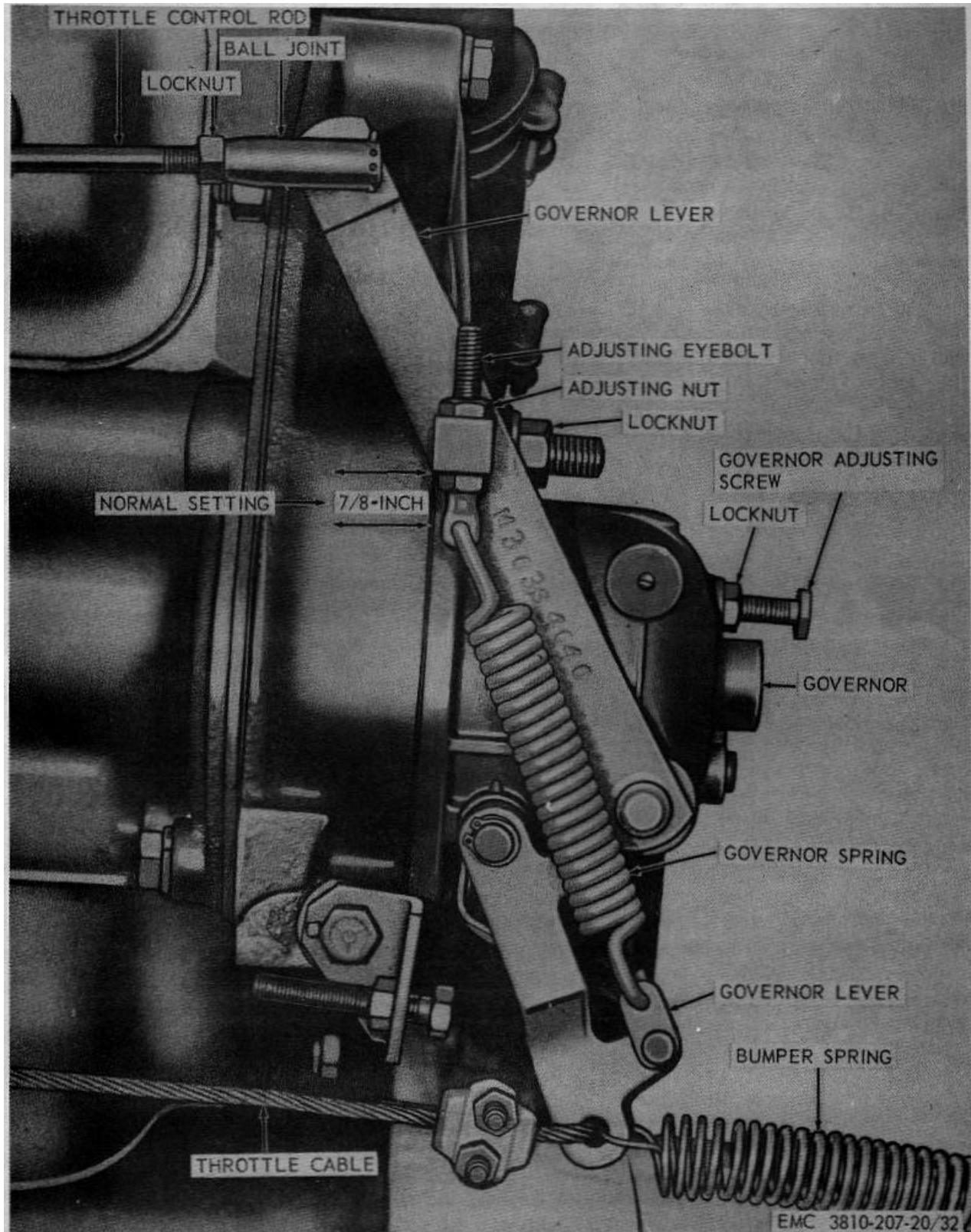


Figure 32. Engine speed governor and control rod adjustment.

Section III. CRANE ENGINE COOLING SYSTEM

95. General

The engine temperature is controlled by the circulation of coolant through the coolant pump, which forces the coolant through the engine water jackets and back into the radiator for cooling. Until the engine is up to operating temperature, all or part of the coolant leaving the engine is bypassed, by means of a thermostat, directly to the pump for recirculation. Draincocks are located on the bottom of the radiator and on the forward, left side of the engine block.

96. Hose, Lines, and Fittings

a. Removal.

- (1) Drain the cooling system (TM 5 3810-207-10).
- (2) Remove the hose, lines, and fittings as instructed on figure 33.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect hose and fittings for cracks, breaks, and other damage. Replace all defective parts.

c. Installation.

- (1) Install the hose, lines, and fittings as illustrated on figure 33.
- (2) Fill radiator with coolant (TM 5-3810-207-10).

97. Thermostat Housing Assembly

a. Removal.

- (1) Remove the radiator-thermostat housing hose and pipe assembly (par. 96).
- (2) Remove the thermostat housing as instructed on figure 34.

b. Cleaning and Inspection.

- (1) Clean all parts thoroughly.
- (2) Inspect the thermostat housing for breaks, cracks, and other damage. Replace defective thermostat housing.

c. Installation.

- (1) Install the thermostat housing as illustrated on figure 34.
- (2) Install the pipe assembly and radiator-to-thermostat housing hose (par. 96).

98. Thermostat Assembly

a. Removal.

- (1) Remove the thermostat housing (par. 97).
- (2) Remove the thermostat assembly as instructed on figure 35.

b. Cleaning and Inspection.

- (1) Clean the thermostat in an approved cleaning solvent.
- (2) Inspect the thermostat and gasket for proper function and other damage. Replace defective thermostat.

c. *Test.* Test the thermostat for opening and closing range of 165° to 180° F. by placing the thermostat in a container of water that can be heated and checked with an accurate thermometer. If the thermostat opens before 165° F., closes after 180° F., or does not open or close at all, replace the thermostat.

d. Installation.

- (1) Install the thermostat as illustrated on figure 35.
- (2) Install the thermostat housing (par. 97).

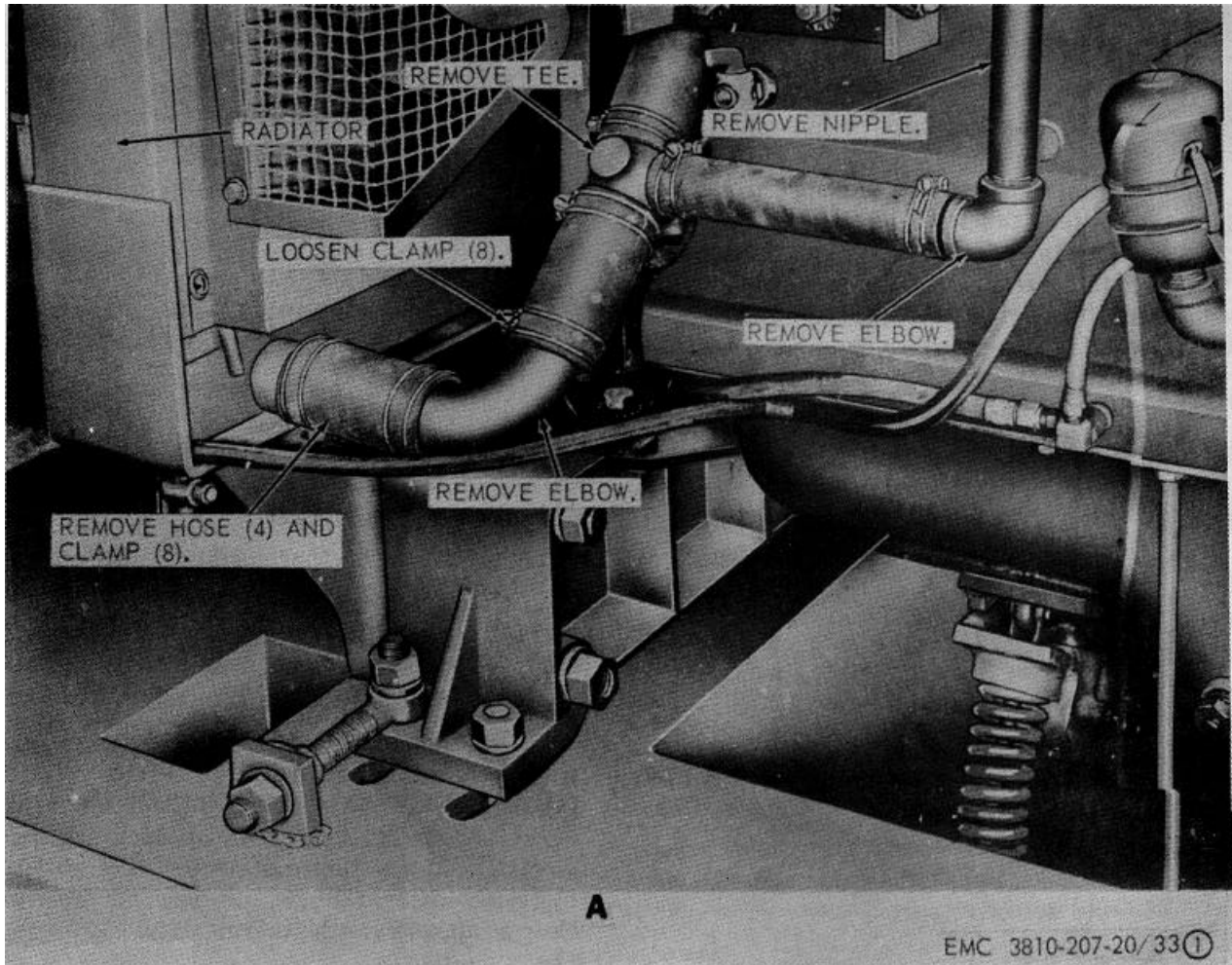
99. Radiator Shroud and Fan Guard

a. *Removal.* Remove radiator shroud and fan guard as instructed on figure 36.

b. Cleaning and Inspection.

- (1) Clean the radiator shroud and fan guard with an approved cleaning solvent.
- (2) Inspect the shroud for breaks, bends, and other damage. Replace defective shroud.

c. *Installation.* Install the radiator shroud and fan guard as illustrated on figure 36.



A¾ Lower hose, lines, and fittings, installed view

Figure 33. Hose, lines, and fittings, removal and installation.

100. Fan and Fan Belt

a. Removal.

- (1) Remove the radiator shroud and fan guard (par. 99).
- (2) Remove the fan and fan belt as instructed on figure 37.

b. Cleaning and Inspection.

- (1) Clean the fan and fan belt with an approved cleaning solvent.
- (2) Inspect the fan for breaks, bends, and other damage. Replace defective fan.
- (3) Inspect the fan belt for breaks, fraying, cracks, and other damage. Replace defective fan belt.

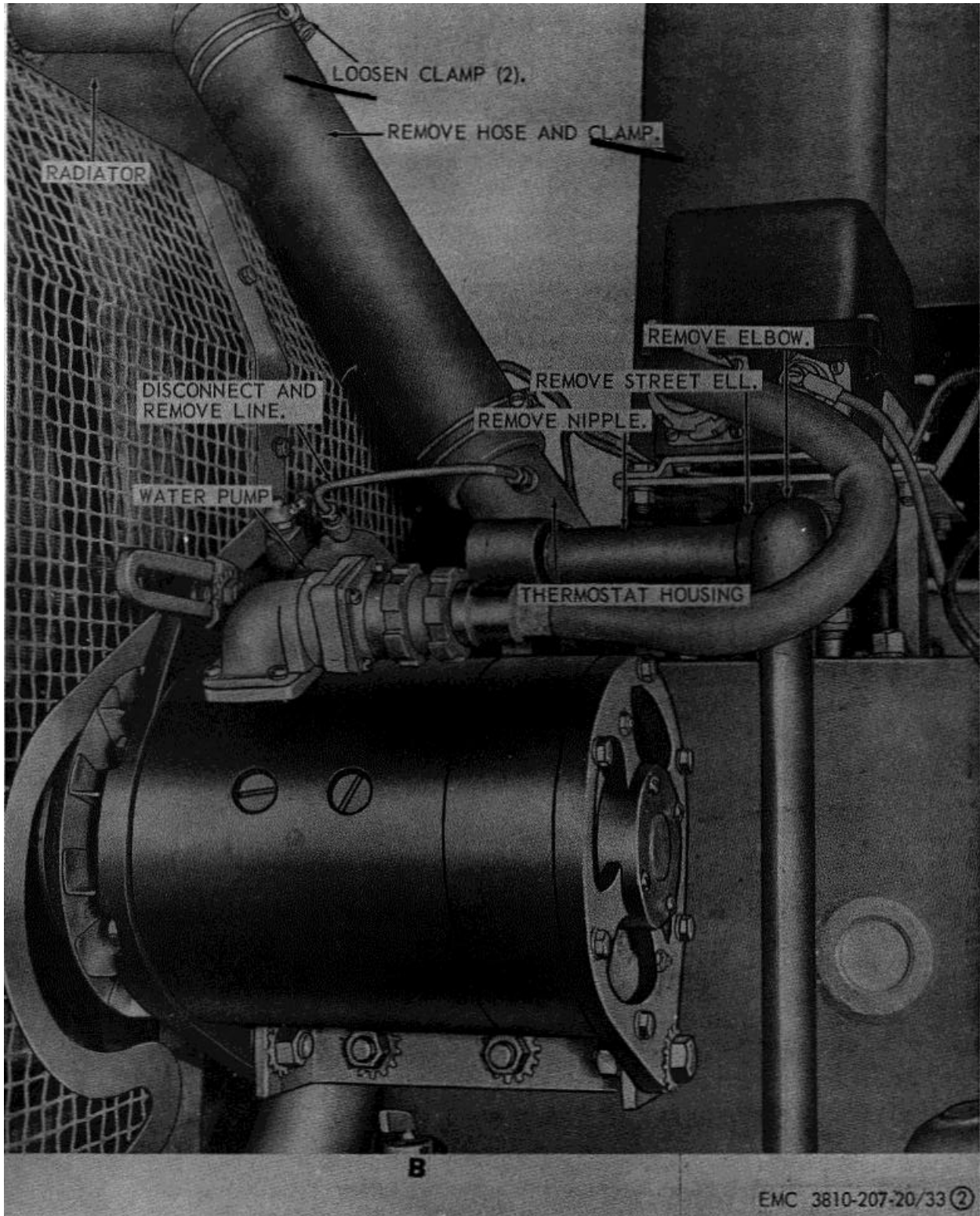
c. Installation.

- (1) Install the fan belt and fan as illustrated on figure 37.
- (2) Install the radiator shroud and fan guard (par. 99).

101. Water Pump Assembly

a. Removal.

- (1) Drain the cooling system (TM 5-3810-207-10).
- (2) Remove the fan guard (par. 99).
- (3) Remove the generator belt (par. 71).
- (4) Remove the fan and fan belt (par. 100).



B³/₄ Upper hose, lines, and fittings, installed view

Figure 33 - Continued.

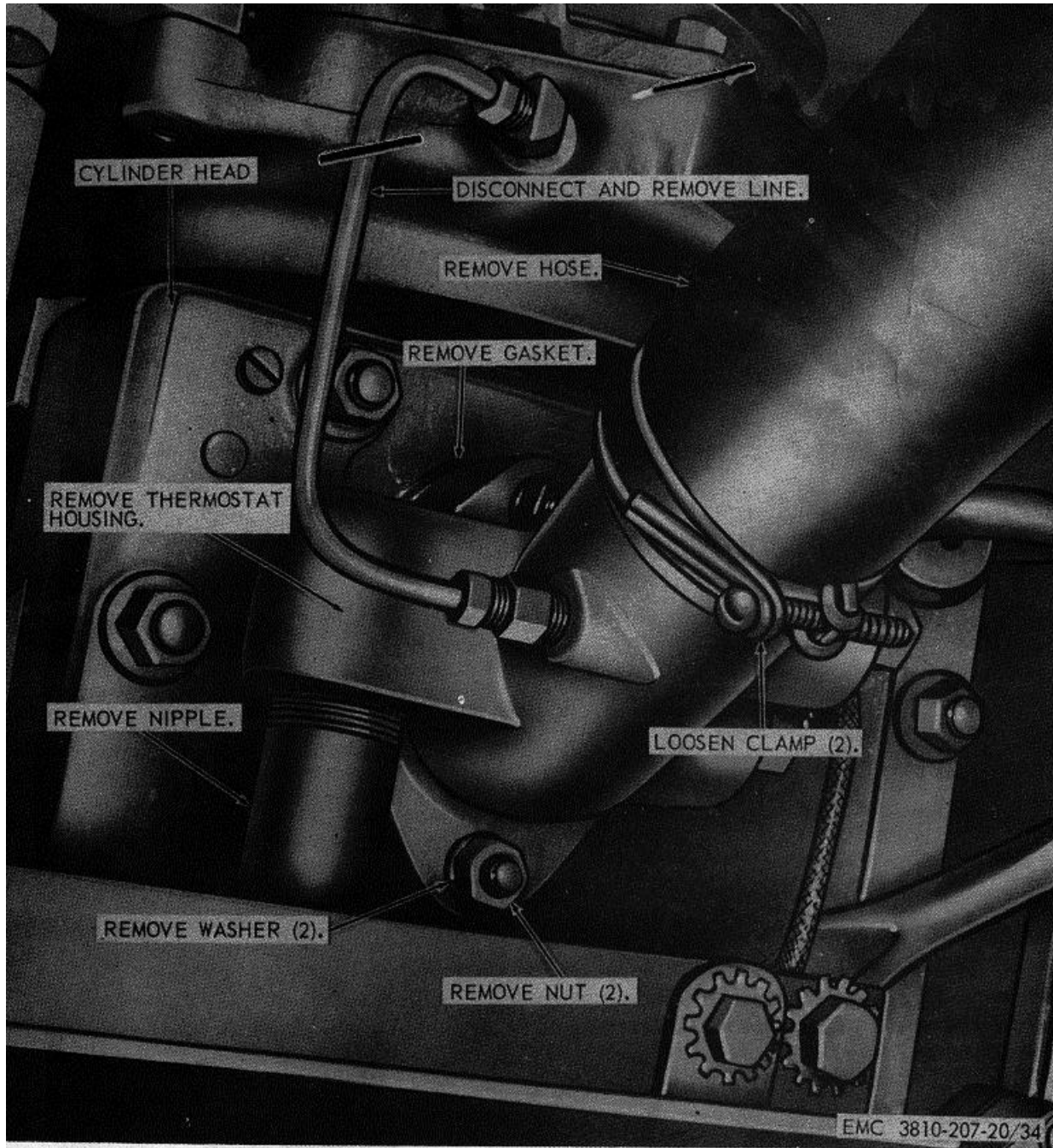


Figure 34. Thermostat housing assembly, removal and installation.

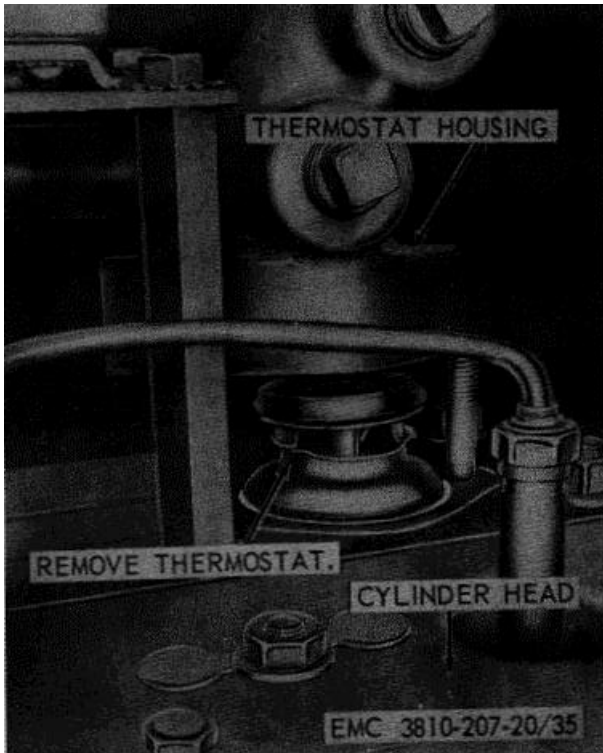


Figure 35. Thermostat, removal and installation.

(5) Remove the water pump as instructed on figure 37.

b. Cleaning and Inspection.

- (1) Clean the water pump assembly with an approved cleaning solvent.
- (2) Inspect the water pump assembly for breaks, proper operation, and other damage. Replace defective water pump.

c. Installation.

- (1) Install the water pump as illustrated on figure 37.
- (2) Install the fan and fan belt (par. 100).
- (3) Install the generator belt (par. 71).
- (4) Install the fan guard (par. 99).
- (5) Fill the cooling system (TM 5-3810-207-10).

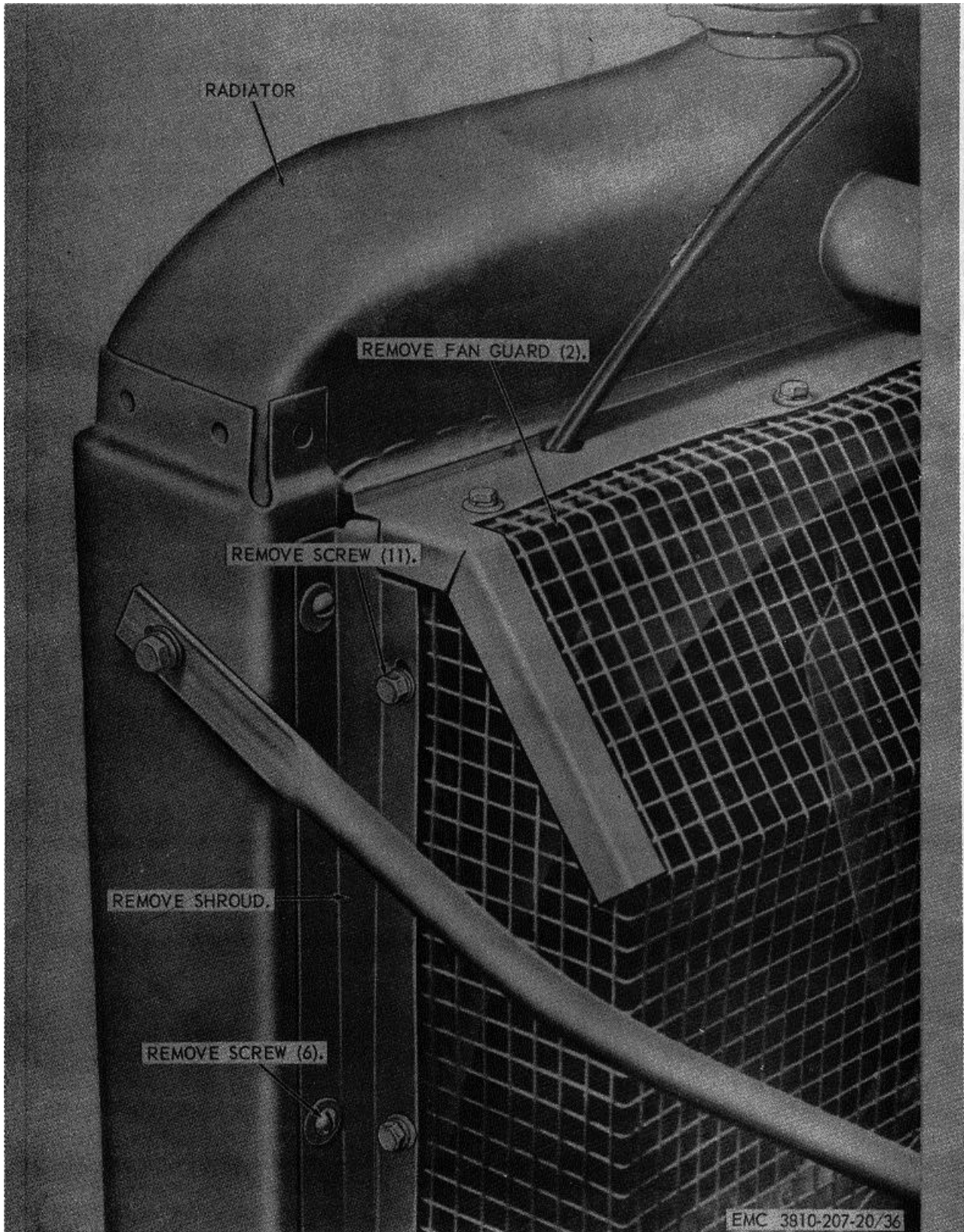


Figure 36. Radiator shroud and fan guard, removal and installation.

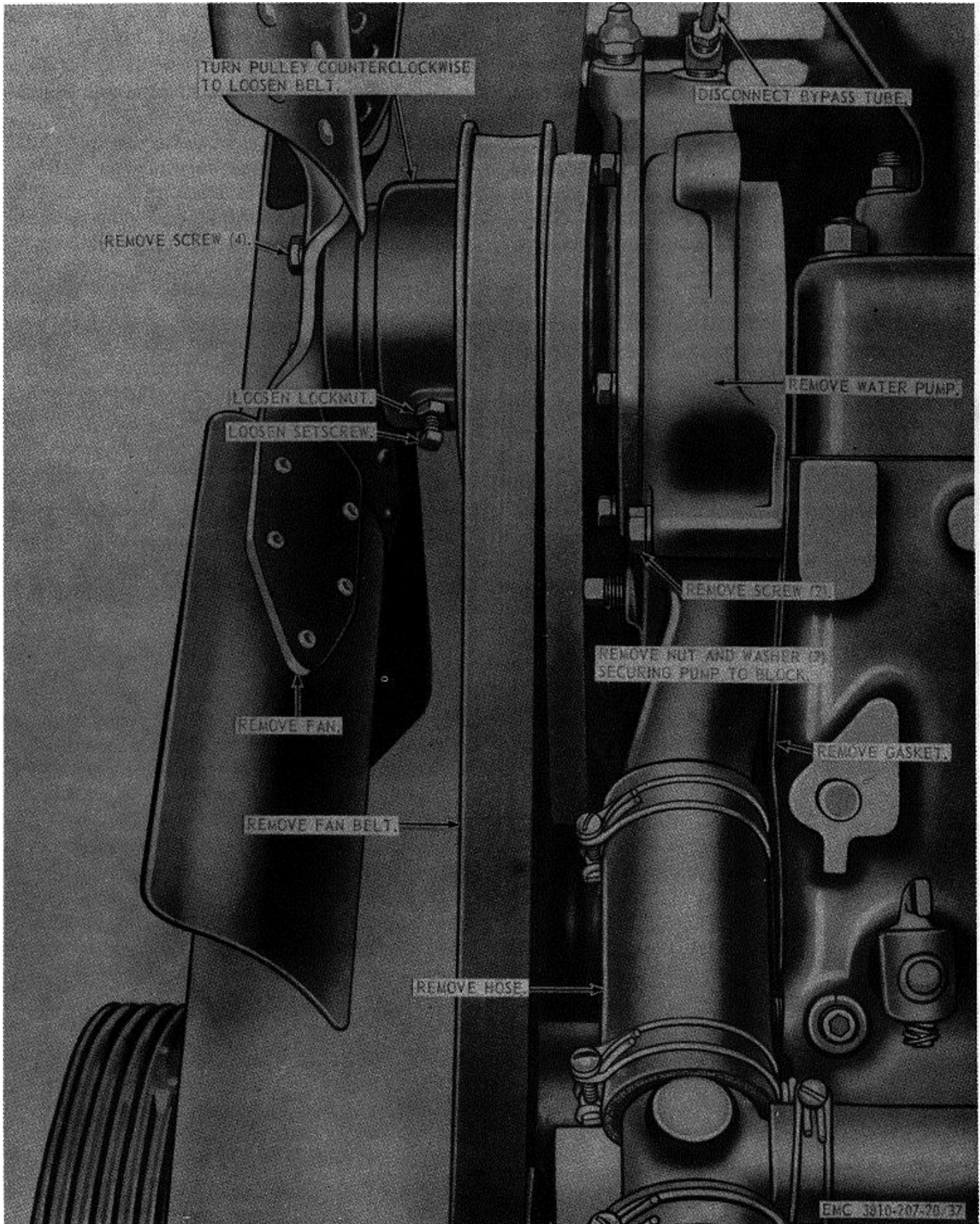


Figure 37. Fan, fan belt, and water pump, removal and installation.

Section IV. CRANE ENGINE INTAKE AND EXHAUST SYSTEM

102. General

The crane engine intake and exhaust system consists of the intake and exhaust manifolds, muffler, and exhaust pipe. The intake manifold provides an individual passage for each cylinder to deliver the fuel-air mixture from the carburetor. The exhaust manifold carries the exhaust gases from the combustion chambers to the muffler and discharges them into the atmosphere.

103. Muffler and Pipe

a. Remove the exhaust pipe and muffler as instructed on figure 38.

b. *Cleaning and Inspection.*

- (1) Clean the muffler and exhaust pipe with a wire brush.
- (2) Inspect the muffler and exhaust pipe for breaks, bends, burned out condition, and other damage. Replace defective muffler and exhaust pipe.

c. *Installation.* Install the muffler and exhaust pipe as illustrated on figure 38.

104. Intake and Exhaust Manifolds

a. Removal.

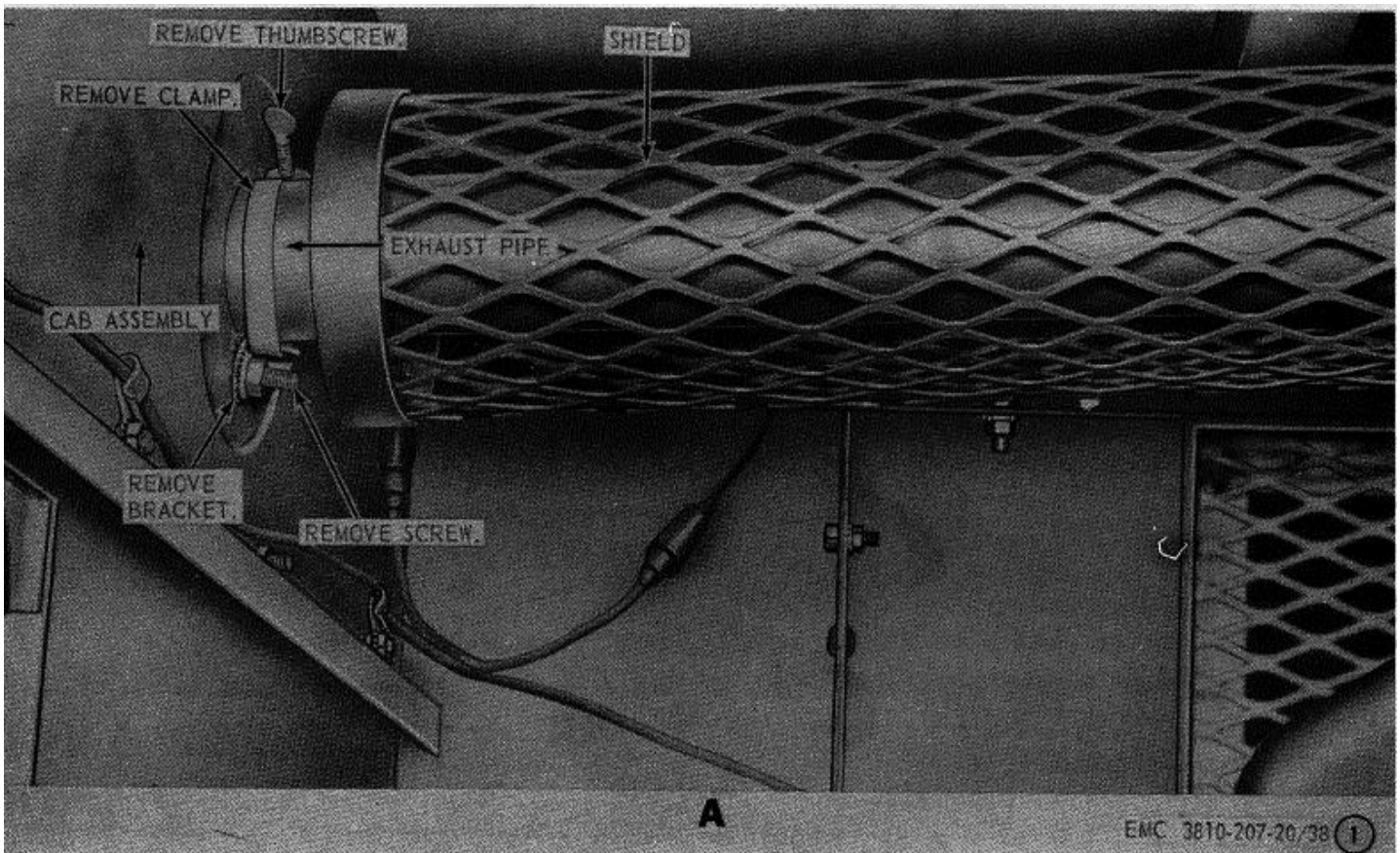
- (1) Remove the exhaust pipe and muffler (par. 103).
- (2) Remove the heat deflector (par. 107).
- (3) Remove the carburetor (par. 106).
- (4) Remove the primer lines (par. 109).
- (5) Remove the intake and exhaust manifolds as instructed on figure 39.

b. *Cleaning and Inspection.*

- (1) Clean the manifolds with a wire brush.
- (2) Inspect the manifolds for cracks, breaks, and other damage. Replace defective manifolds, gaskets, and mounting hardware.

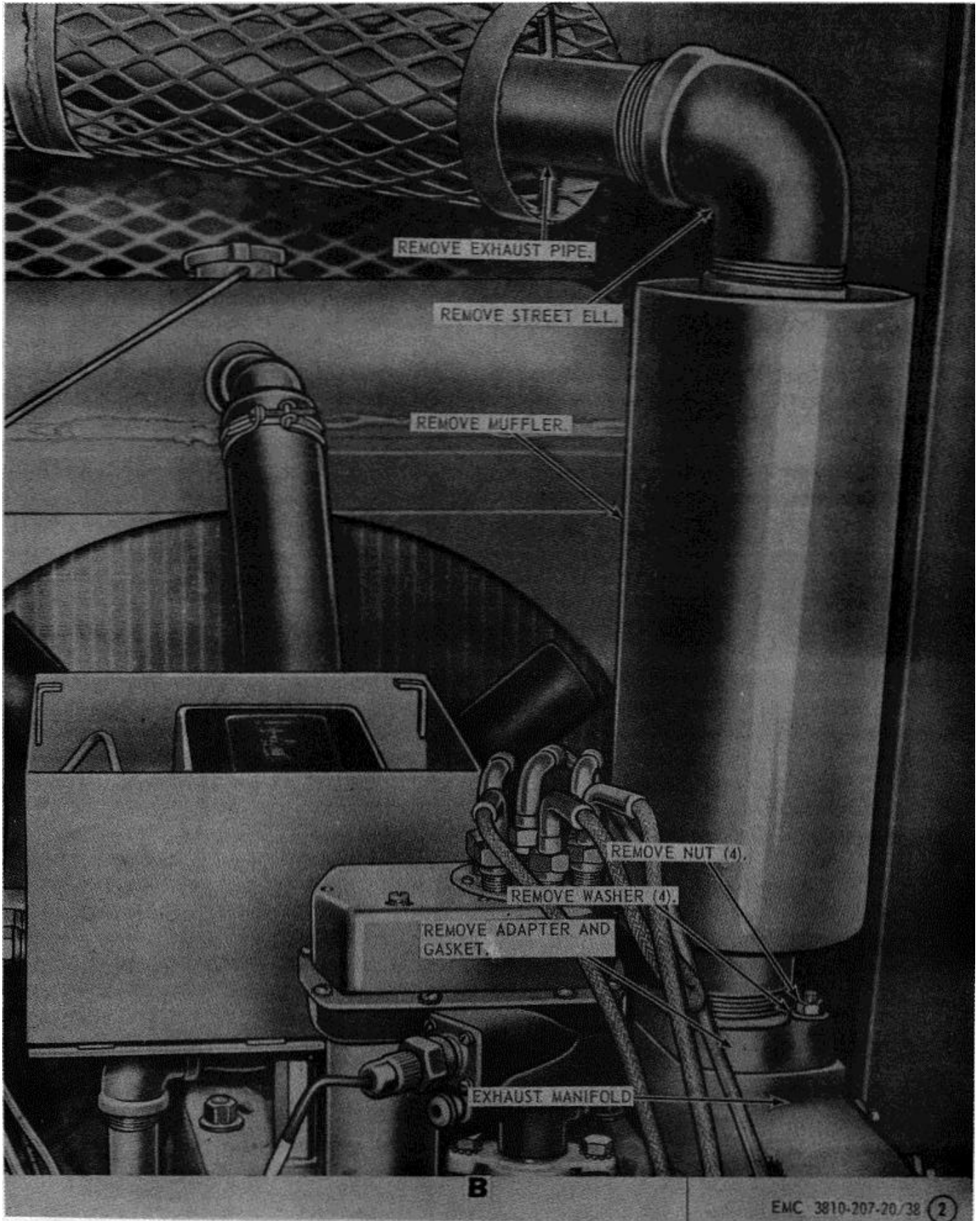
c. *Installation.*

- (1) Install the manifolds as illustrated on figure 39.
- (2) Install the heat deflector (par. 107).
- (3) Install the primer lines (par. 109).
- (4) Install the carburetor (par. 106).
- (5) Install the muffler and exhaust pipe (par. 103).



A-Exhaust pipe, installed view

Figure 38. Exhaust pipe and muffler, removal and installation.



B-Muffler, installed view
Figure 38-Continued.

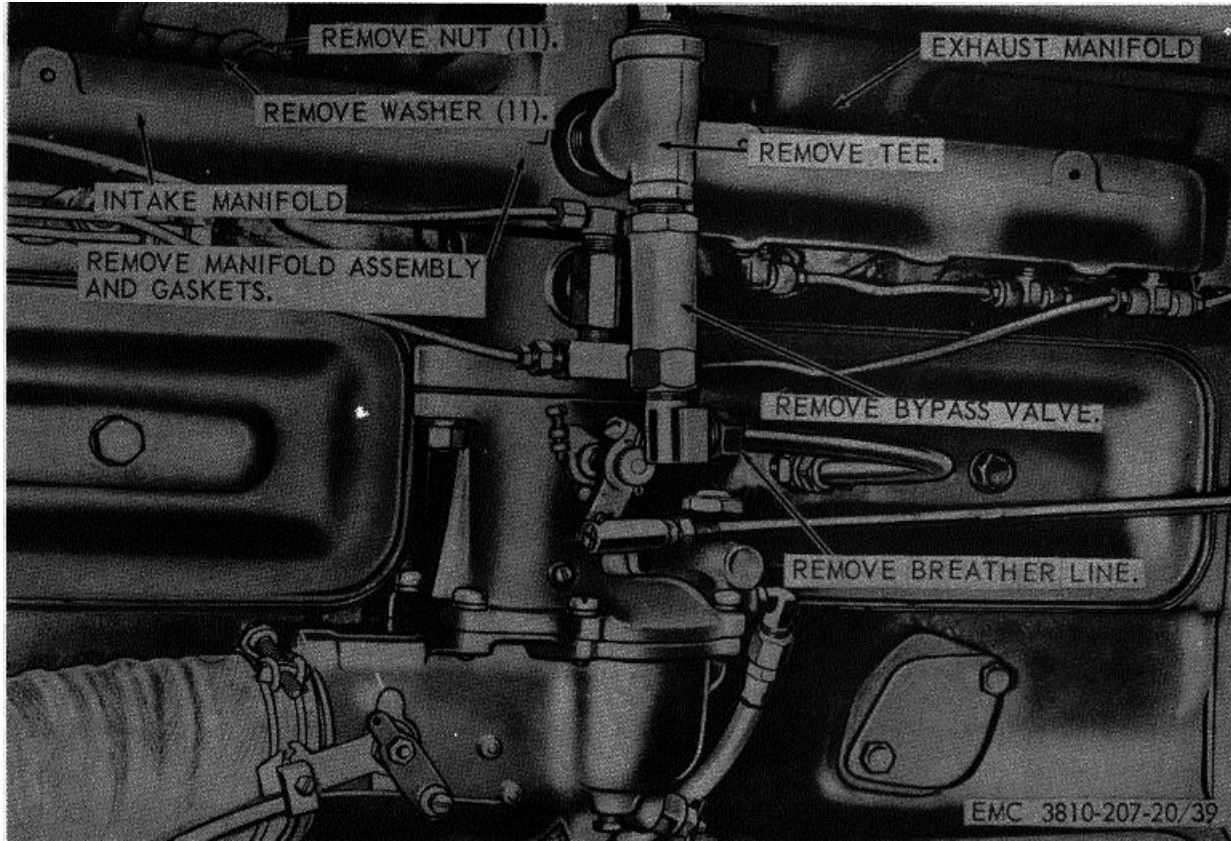


Figure 39. Manifolds, removal and installation.

Section V. CRANE ENGINE FUEL SYSTEM

105. General

The fuel system consists of a 50-gallon fuel tank, fuel pump, carburetor, air cleaner, primer pump, lines, and fittings. The crane engine fuel tank is mounted underneath the machinery deck, on the left side of the crane cab. The tank is filled through the machinery deck at the left-front, outside corner of the cab. A fuel line with a shutoff cock connects the tank to a diaphragm-type fuel pump, mounted on the right-rear side of the engine block. A fuel line connects to an updraft-type carburetor, mounted on the right side of the engine. An oil-bath type air cleaner is mounted on the bracket at the rear of the engine with a connecting hose from the air cleaner to the bottom of the carburetor. During operation, clean air passes from the air cleaner to the carburetor. At the carburetor the air picks up a spray of gasoline and the gasoline-air mixture is drawn into the cylinders where it is ignited by the spark plugs. A line from the fuel tank connects the primer pump, which is mounted on the cab behind the operator's seat, with a line leading directly to the engine. The primer is for cold-weather starting.

106. Carburetor

- a. *Removal.* Remove the carburetor as instructed on figure 40.
- b. *Cleaning and Inspection.*
 - (1) Clean the carburetor with an approved cleaning solvent.
 - (2) Inspect the carburetor for wear, improper operation, and other damage. Replace defective carburetor.
- c. *Installation.* Install the carburetor as illustrated on figure 40.
- d. *Adjust.* Adjust carburetor (TM 5-3810-207-10).

107. Air Cleaner and Heat Deflector

- a. *Removal.*
 - (1) Remove the air cleaner and heat deflector as instructed on figure 41.
 - (2) Drain the oil from the air cleaner (TM 5-3810-207-10).
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts of the air cleaner with an approved cleaning solvent.

- (2) Inspect all parts for bends, cracks, and other damage. Repair or replace all defective parts.

c. *Installation.*

- (1) Install the air cleaner and heat deflector as illustrated on figure 41.
- (2) Service the air cleaner (TM 5-3810 207-10).

108. Fuel Pump

- a. Remove the fuel pump as instructed on figure 42.
- b. *Cleaning and Inspection.*
 - (1) Clean the fuel pump with an approved cleaning solvent.
 - (2) Inspect the fuel pump for breaks, proper operation, and other damage. Replace defective fuel pump.
- c. *Installation.* Install the fuel pump as illustrated on figure 42.
- d. *Test.*
 - (1) Remove the pump-to-carburetor fuel line.
 - (2) Operate primer handle until fuel flows.

Note

If fuel does not flow, pump is defective or tank-to-pump fuel line is clogged. Replace defective pump.

109. Priming Pump, Lines, and Fittings

- a. *Removal.* Remove the priming pump, lines, and fittings as instructed on figure 43.
- b. *Cleaning and Inspection.*
 - (1) Clean the priming pump, lines, and fittings with an approved cleaning solvent.
 - (2) Inspect the priming pump, lines, and fittings for breaks, cracks, and other damage. Replace defective priming pump, lines, and fittings.
- c. *Installation.* Install the priming pump, lines, and fittings as illustrated on figure 43.
- d. *Test.*
 - (1) Remove the primer fuel line at the intake manifold.

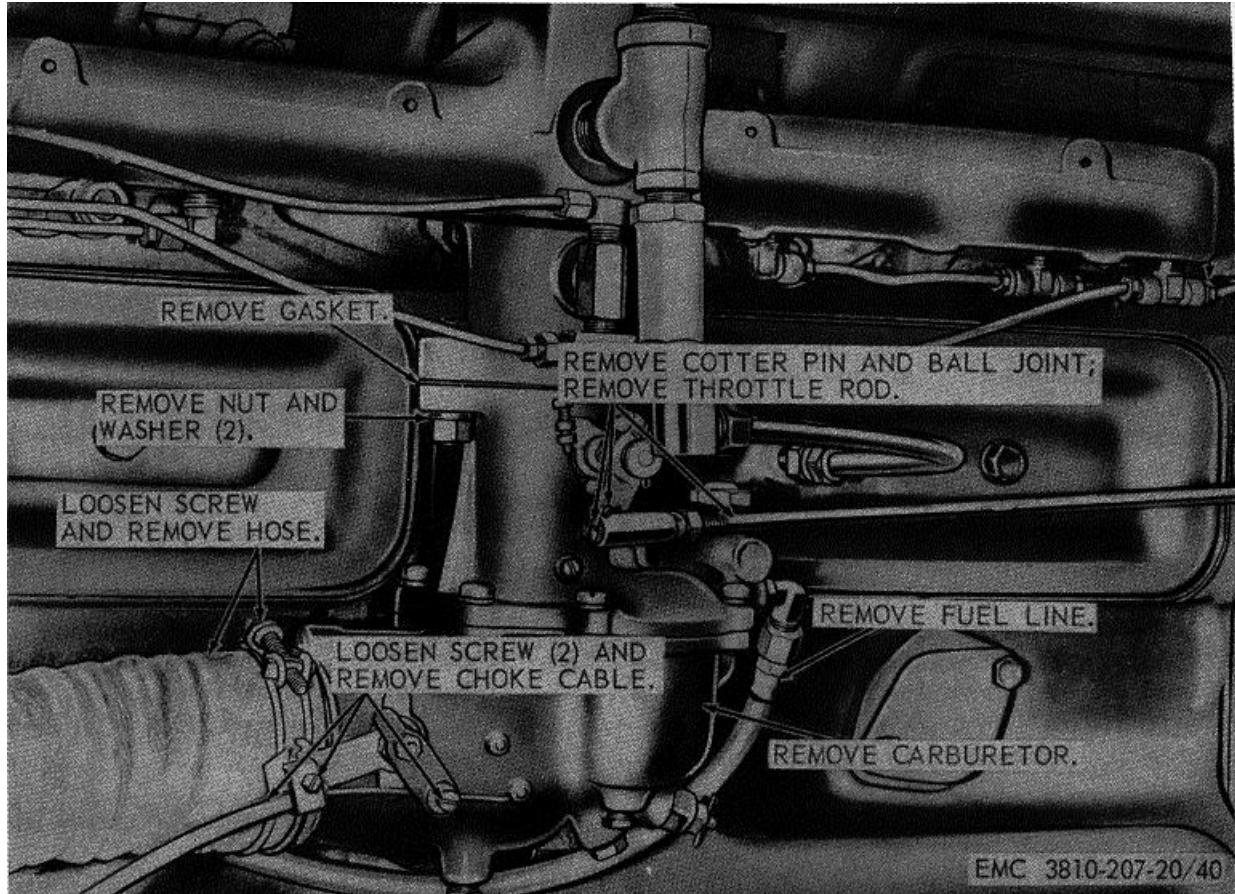


Figure 40. Carburetor, removal and installation.

- (2) Operate the primer pump several times. If no fuel appears, primer pump is defective or fuel line is clogged. Replace a defective pump and clean fuel line.

110. Fuel Lines and Fittings

a. *Removal.* Tag, disconnect, and remove all fuel lines and fittings as illustrated on figure 44.

b. *Cleaning and Inspection.*

- (1) Clean all fuel lines and fittings with an approved cleaning solvent.
- (2) Inspect all lines and fittings for breaks, cracks, and other damage. Replace all defective lines and fittings as necessary.

c. *Installation.* Refer to identification tags placed on lines and fittings and install lines and fittings in their proper positions as illustrated on figure 44.

111. Throttle Control Lever

a. *Removal.* Remove throttle control lever as instructed on figure 45.

b. *Cleaning and Inspection.* Clean and inspect the throttle lever and cable for breaks and other damage. Replace defective throttle control lever and cable.

c. *Installation.* Install throttle control lever as illustrated on figure 45.

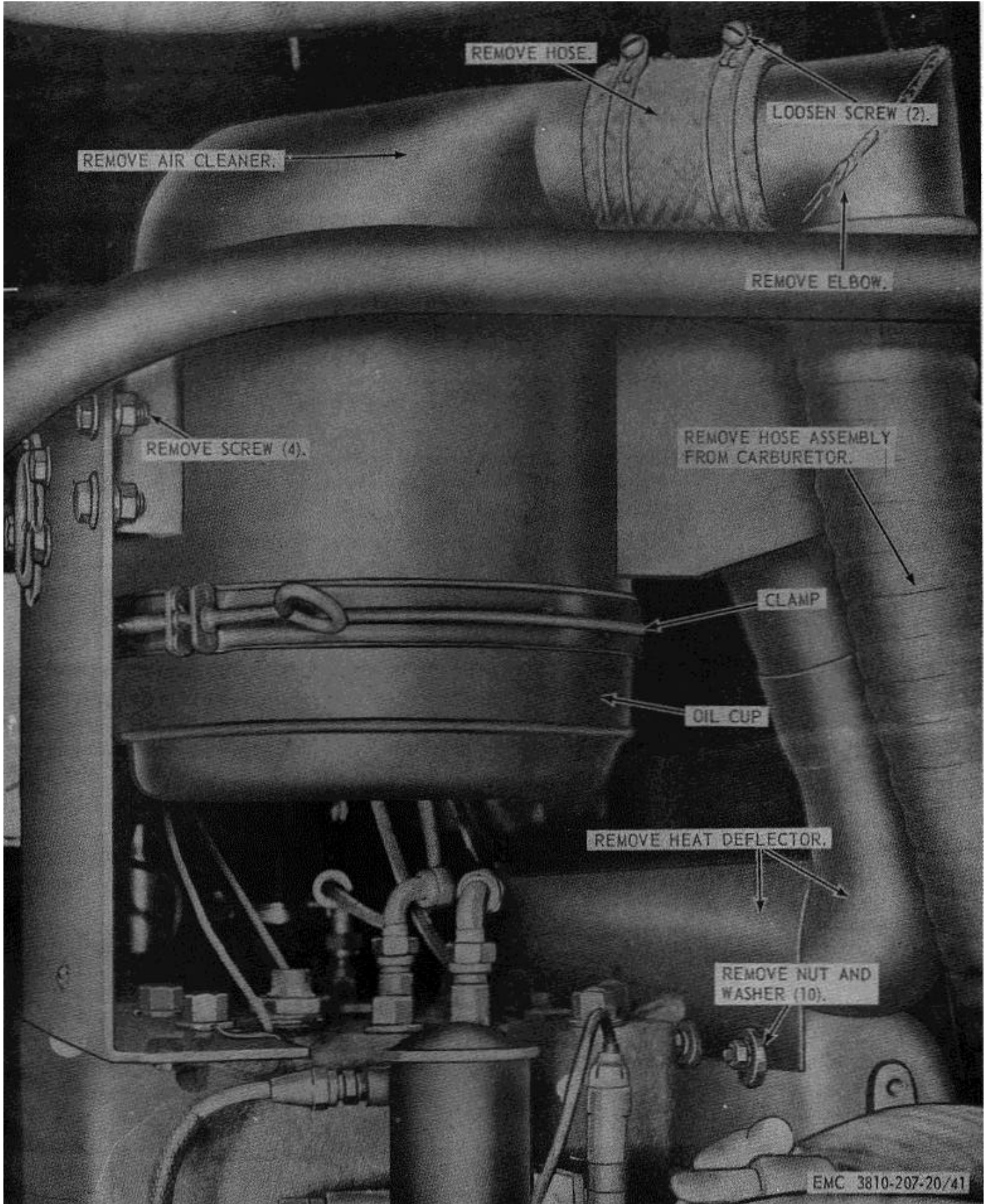


Figure 41. Air cleaner and heat deflector, removal and installation.

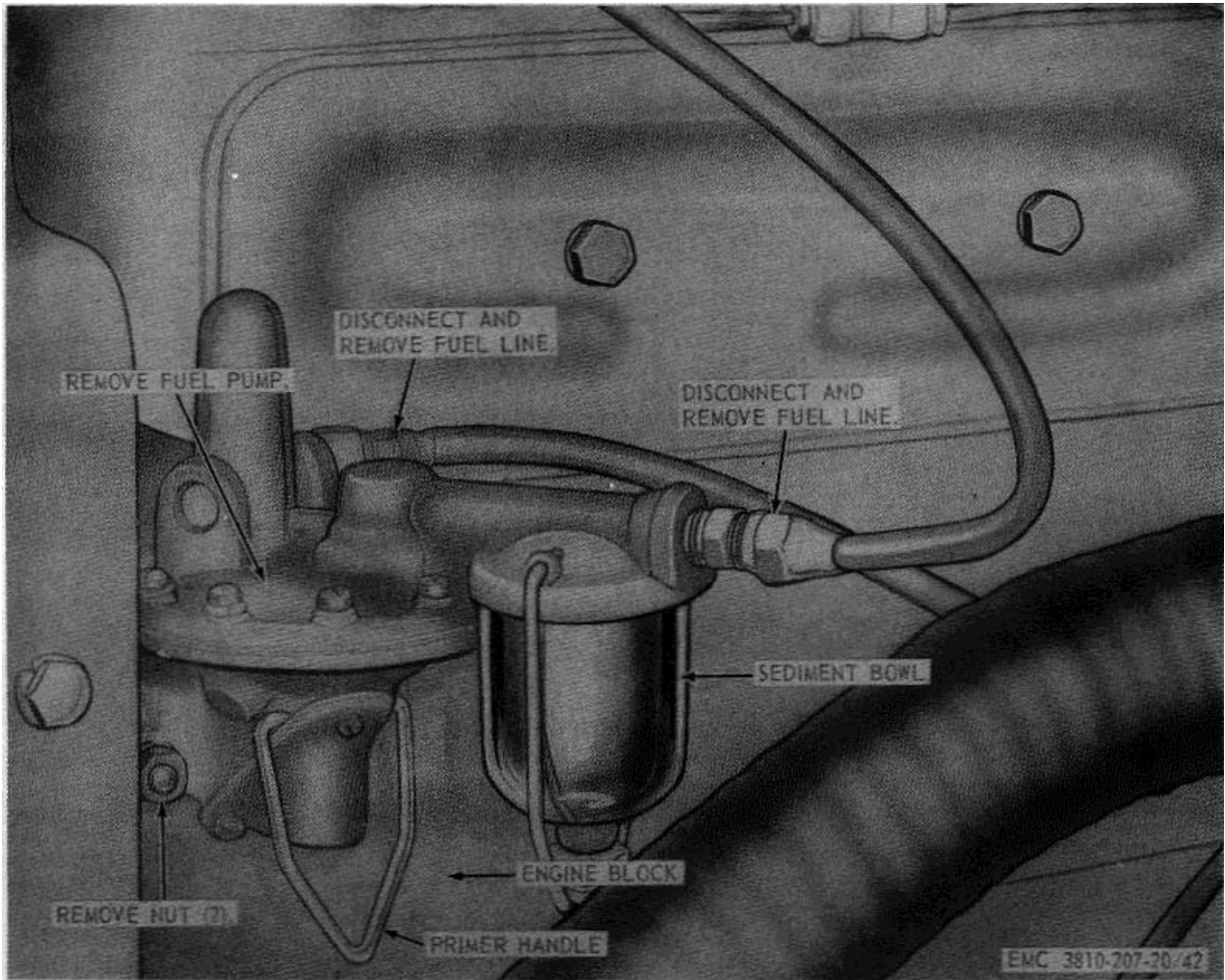
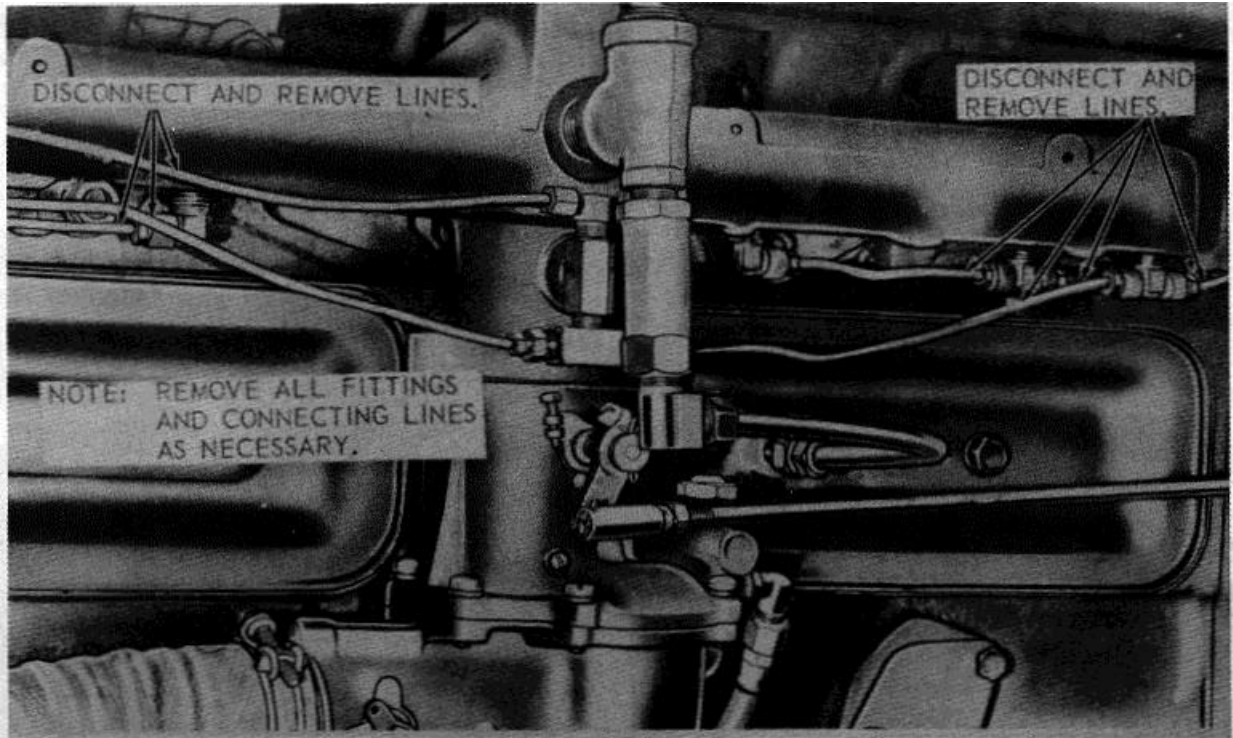
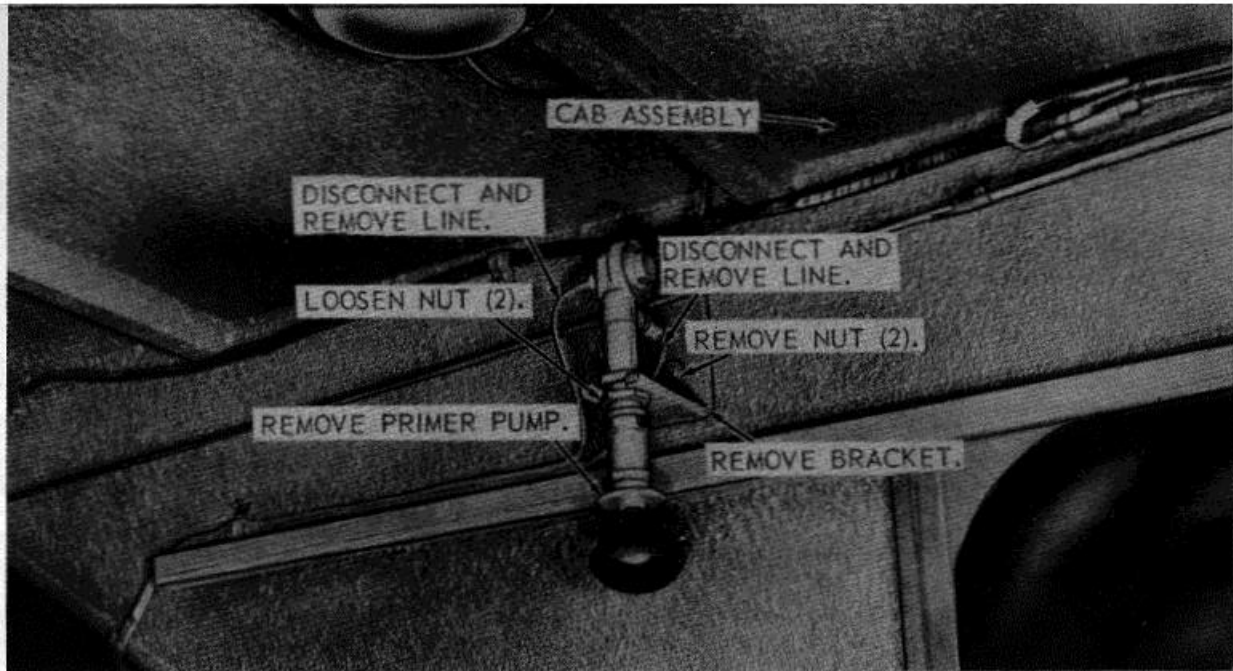


Figure 42. Fuel pump, removal and installation.



A



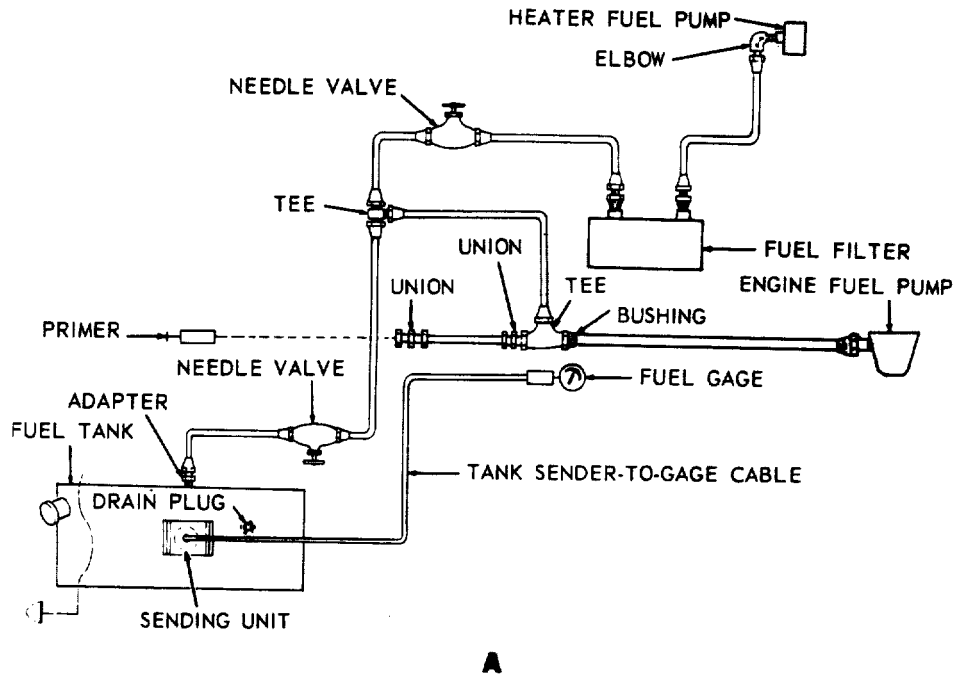
B

EMC 3810-207-20/43

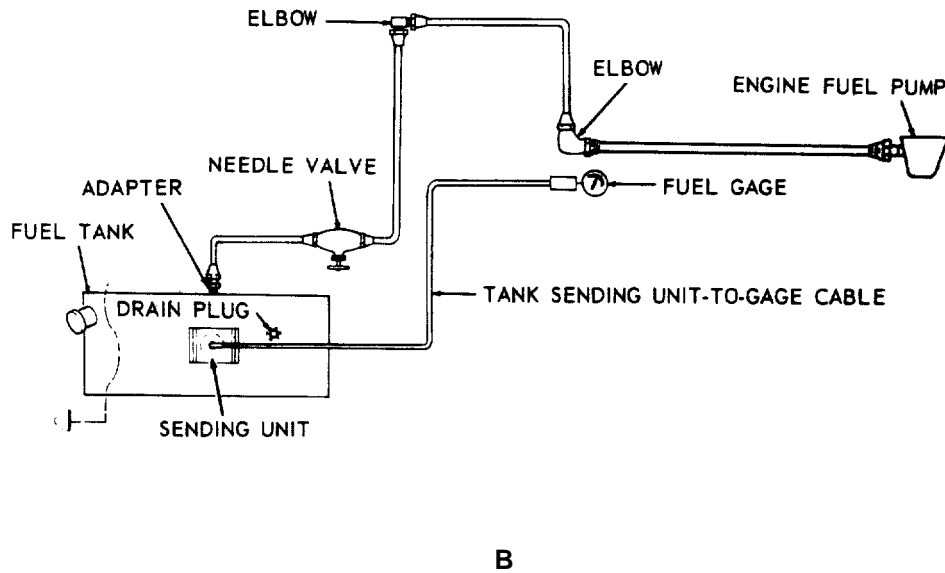
A-Priming lines and fittings, installed view

B-Priming pump, installed view

Figure 43. Priming pump, lines, and fittings, removal and installation.



A



B

A-Fuel lines and fitting (winterized units)

B-Fuel lines and fitting (non-winterized units)

Figure 44. Fuel lines and fittings, removal and installation.

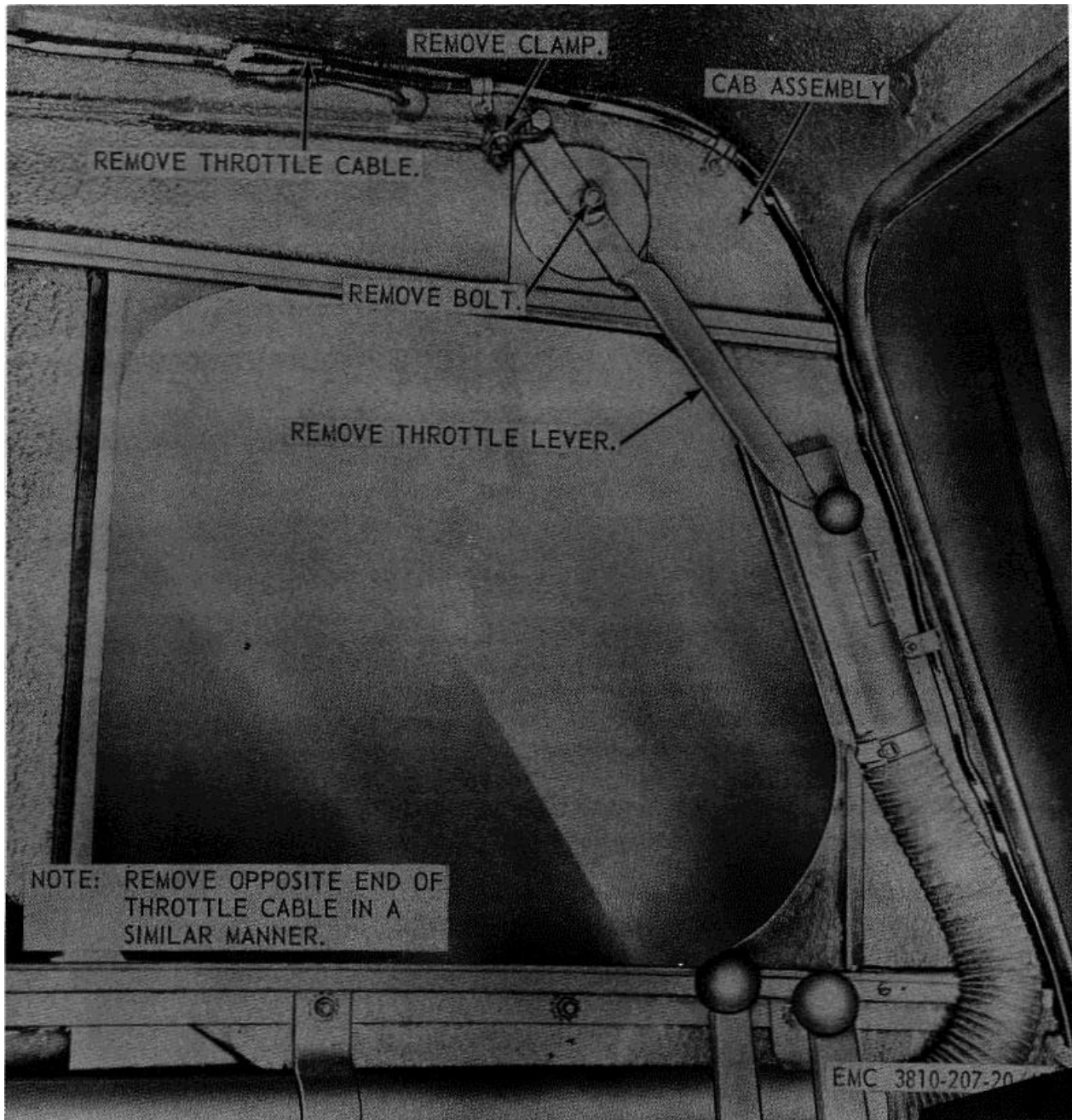


Figure 45. Throttle control lever and cable, removal and installation.

Section VI. CRANE ENGINE LUBRICATION SYSTEM

112. General

The internal parts of the engine are pressure-lubricated. The oil is forced by a pump from the crankcase to the two oil filters, through the oil cooler, and back to the crankcase. The oil filters are equipped with replaceable elements.

113. Oil Filters

a. Removal. Remove the oil filter as instructed on figure 46.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all lines and fittings for damage. Replace defective lines and fittings.
- (3) Inspect the oil filter bodies and mountings for dents, breaks, and other damage. Repair or replace all defective parts.
- (4) Replace filter elements and gaskets.

c. Installation.

- (1) Install the oil filter as illustrated on figure 46.
- (2) Service the oil filters (TM 5-3810207-10).

114. Crankcase Filler and Breather

a. Removal. Remove the crankcase filler and breather as instructed on figure 46.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, and other damage. Replace all defective parts.

c. Installation. Install the crankcase filler and breather as illustrated on figure 46.

115. Pressure Relief Valve

a. Removal. Remove the pressure relief valve as illustrated on figure 47.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for excessive wear, breaks, and other damage. Replace all defective parts.

c. Adjustment. Adjust the pressure relief valve by installing the correct number of shims in plunger to obtain the correct spring tension to regulate the operating oil pressure to 40-50 pounds. Add shims to increase pressure; remove shims to decrease pressure.

d. Installation. Install the pressure relief valve as illustrated on figure 47.

116. Oil Cooler

a. Removal.

- (1) Drain the lubricating system (TM 5-3810-207-10).
- (2) Remove the oil cooler as instructed on figure 48.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the valve for proper operation. Replace defective valve.
- (3) Inspect the oil cooler for bent fins, holes, cracks, and other damage. Replace defective oil cooler.
- (4) Inspect lines, fittings, and mounting hardware for bends, breaks, and other damage. Replace defective lines, fittings, and mounting hardware.

c. Installation.

- (1) Install the oil cooler as illustrated on figure 48.
- (2) Fill the lubricating system (LO 5-3810-207-20).

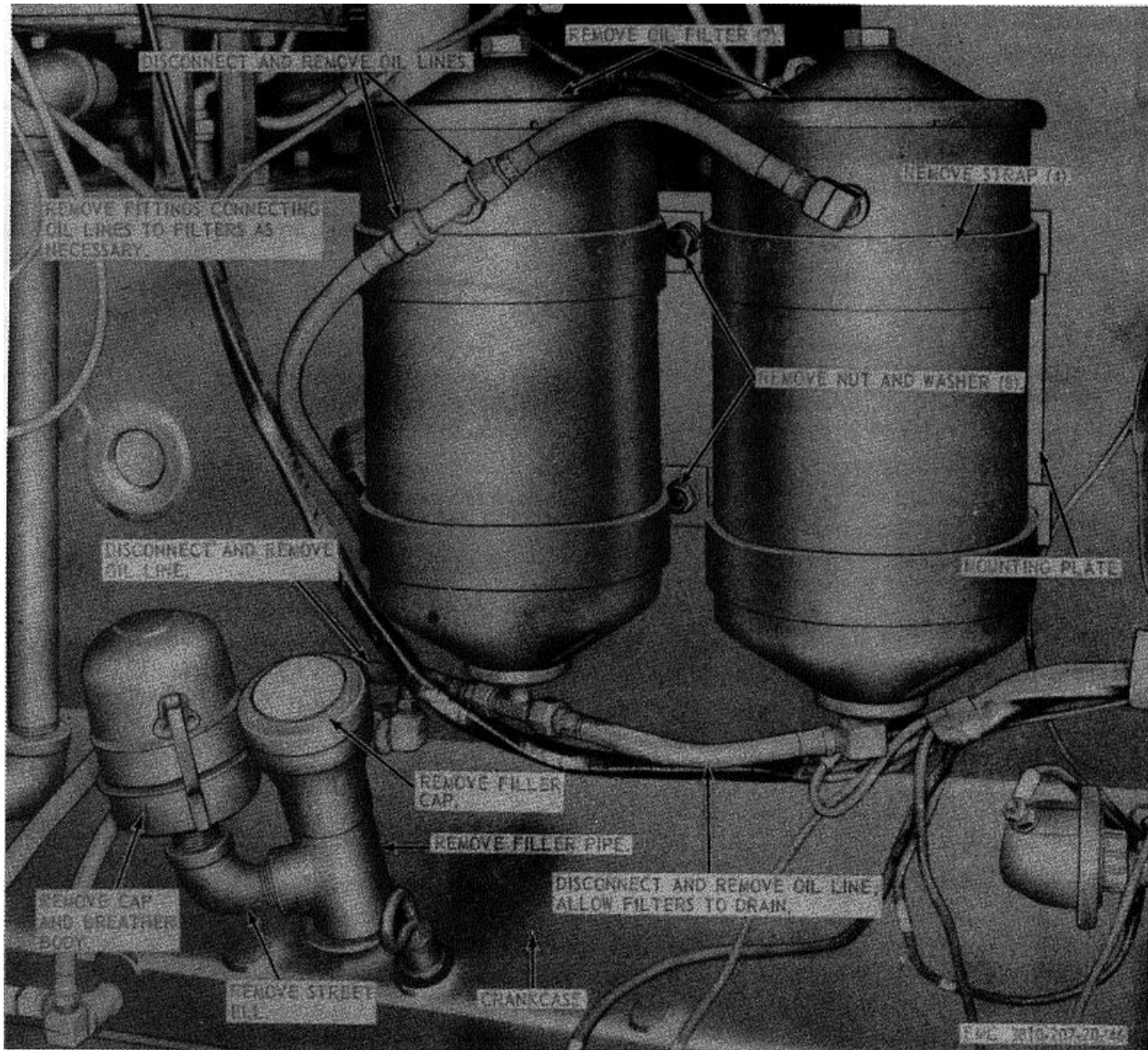


Figure 46. Oil filters, crankcase filler, and breather, removal and installation.

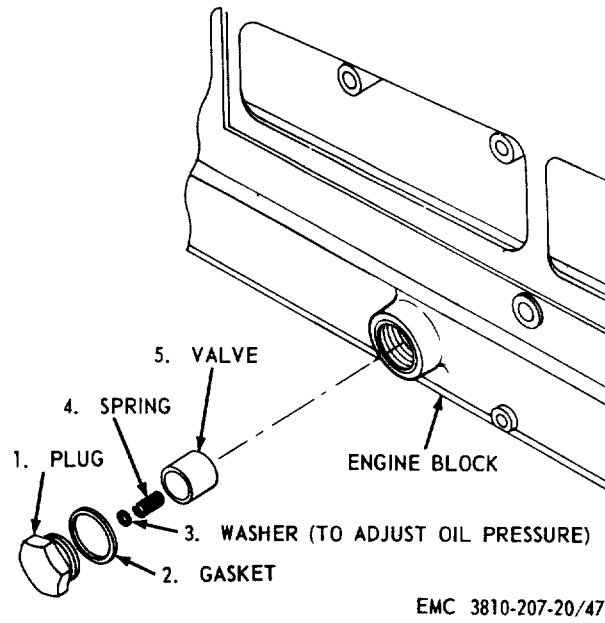


Figure 47. Pressure relief valve, exploded view.

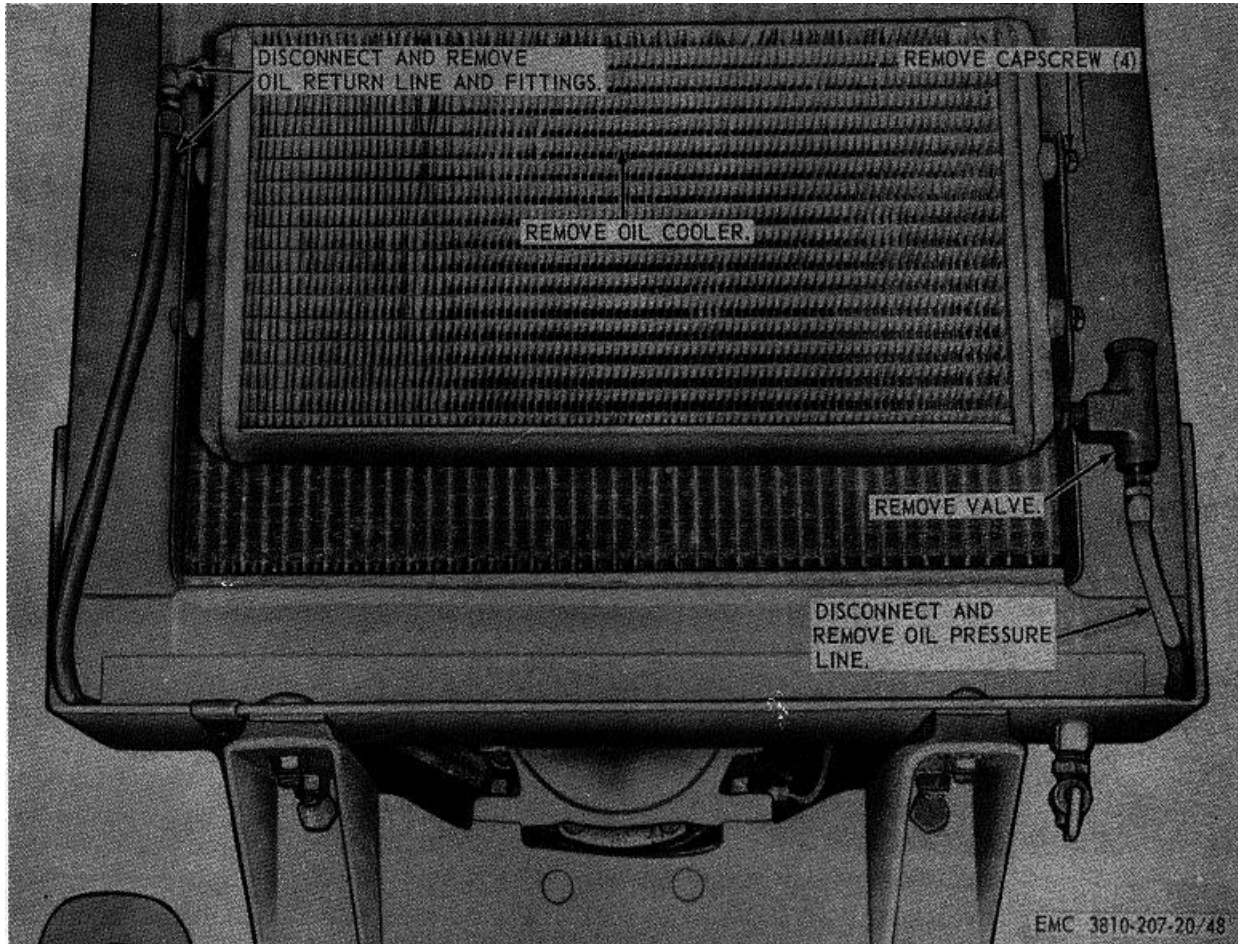


Figure 48. Oil cooler, removal and installation.

Section VII. CRANE ENGINE CLUTCH ASSEMBLY**117. General**

When the engine clutch assembly is engaged, power is transferred from the engine to the power takeoff shaft which drives the operating mechanisms. The clutch is controlled, through adjustable linkage, from the operator's cab. If the engine clutch slips or will not pull the load or if the operating lever will not stay engaged, the clutch requires adjusting.

118. Clutch Lever and Linkage

a. Removal. Remove the clutch lever and linkage as instructed on figure 49.

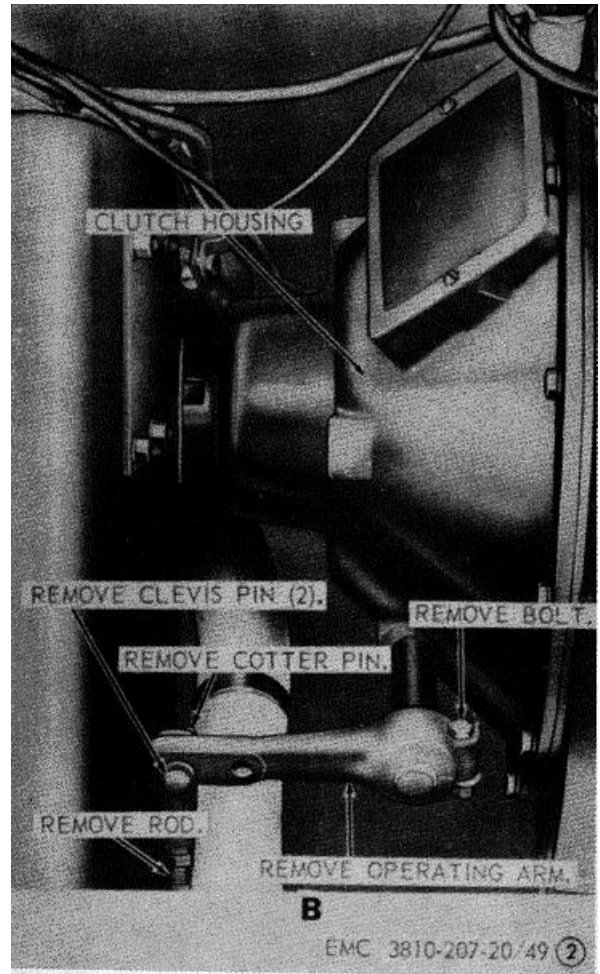
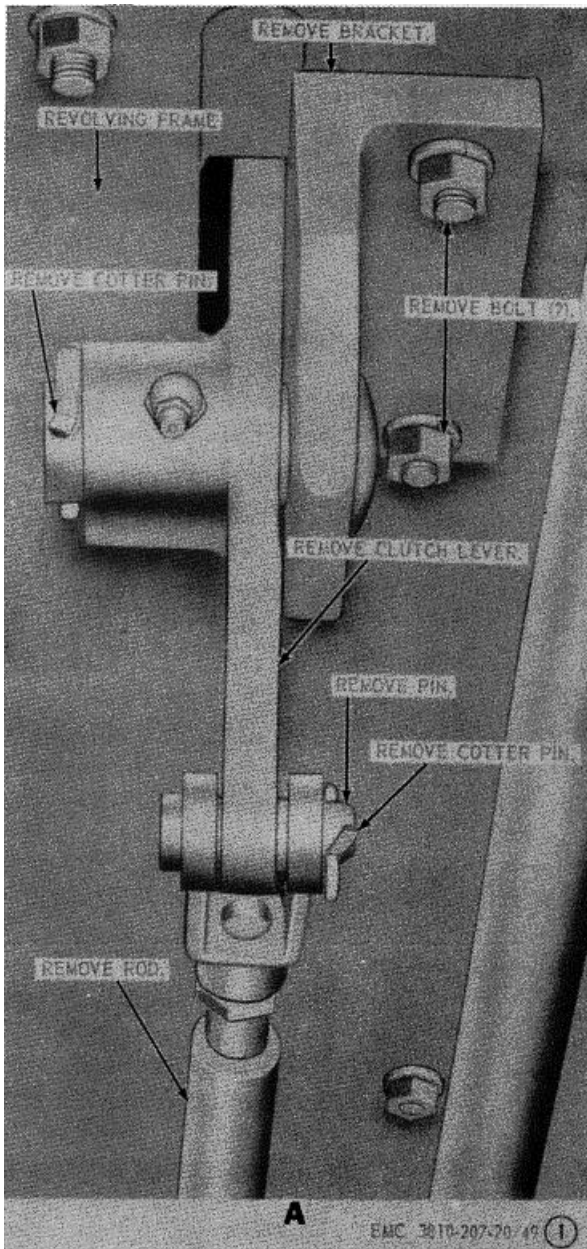
b. Cleaning, Inspection, and Repair.

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

(2) Inspect all parts for bends, breaks, cracks, and other damage. Straighten, weld, or replace all defective parts.

c. Installation. Install the clutch lever and linkage as illustrated on figure 49.

d. Adjustment. Adjust clutch linkage (TM 5-3810-207-10).



A-Clutch lever and linkage, installed view

B-Clutch rod and linkage, installed view
Figure 49 - Continued.

Figure 49. Clutch lever and linkage, removal and installation.

CHAPTER 5 CRANE MAINTENANCE INSTRUCTIONS

Section I. CRANE CAB ASSEMBLY

119. General

The crane cab is located on the revolving frame and encloses the revolving frame shaft assemblies, A-frame, engine with accessories, and all levers, pedals, and linkage controls. It is constructed of sheet-steel welded panels and doors, has glass windows, and is fastened to the floor of the revolving frame with capscrews and lockwashers.

120. Operator's Door

a. Removal.

- (1) Open the operator's door.
- (2) Remove the operator's door as instructed on figure 50.

b. Cleaning and Inspection.

- (1) Clean the operator's door with an approved cleaning solvent.
- (2) Inspect the door for bends, broken glass, and other damage. Replace defective operator's door or glass.

c. *Installation.* Install the operator's door as illustrated on figure 50.

121. Operator's Cab Left-Hand Window

a. *Removal.* Remove the operator's cab left-hand window as instructed on figure 51.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the window and track for breaks, cracks, and other damage. Replace defective window and tracks.

c. *Installation.* Install the tracks and window as illustrated on figure 51.

122. Door Window and Windshield Glass

a. Removal.

- (1) Insert the hook end of the rubber channel tool (fig. 52) in the rubber channel seal strip at the seam and slide tool around the channel to break the seal.
- (2) After seal has been broken, insert the straight end of the rubber channel tool between the rubber channel and the glass and move it slowly around the rubber channel to break the seal.
- (3) Press glass gently while breaking the seal and glass will slide out of the panel as soon as the seal is completely broken.
- (4) To remove front window, repeat (1) through (3) above.

b. Cleaning, Inspection, and Repair.

- (1) Clean the edges of the window panel with an approved cleaning solvent.
- (2) Inspect the rubber channel for weather cracks and other damage. Replace defective rubber channel.
- (3) Inspect the panels for dents, bends, and other damage. Repair or replace as necessary.
- (4) Replace all cracked or broken glass.

c. Installation.

- (1) Start the rubber channel (fig. 52) along the side of the window opening.
- (2) Fit the narrow edge of the rubber channel over the edge of the door panel and continue the strip around the window opening and back to the starting point with a 1/4-inch overlap.

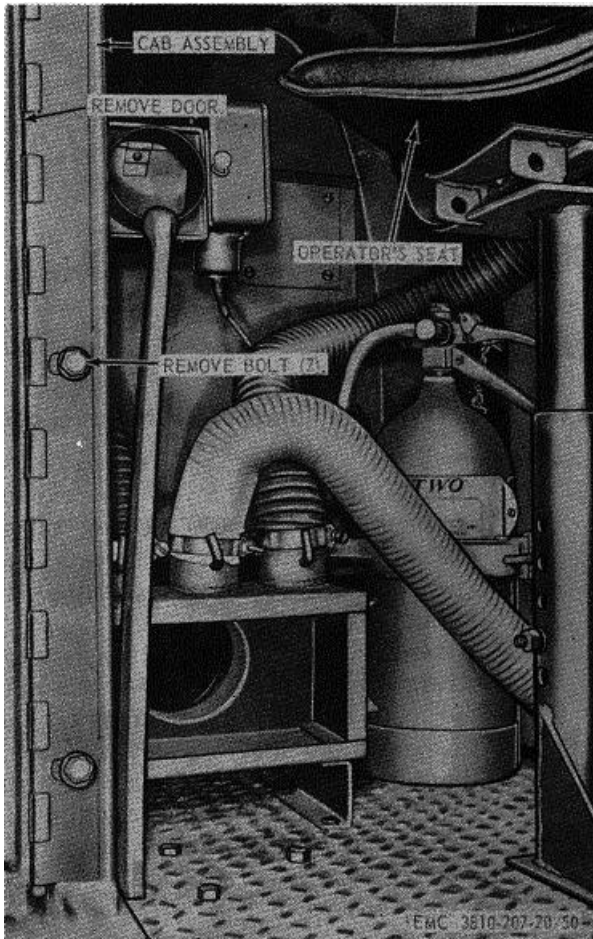


Figure 50. Operator's door, removal and installation.

- (3) Place the ends of the rubber channel together and press into place to obtain a tight, smooth joint.
- (4) Start the door glass in one of the lower corners of the rubber channel. Use the straight end of the rubber channel tool to lift the channel, allowing the glass panel to slip into position.
- (5) Insert the hooked end of the rubber channel tool in the rubber channel and force the locking strip into place.

Note.

Do not begin the locking operation at the strip joint. Start around the corners to avoid buckling or crimping the rubber channel.

- (6) To install front window, repeat (1) through (5) above.

123. Rear Sliding Doors

a. *Removal.* Remove the rear sliding doors as instructed on figure 53.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the doors and tracks for bends, breaks, and other damage. Repair or replace defective doors.

c. *Installation.* Install the rear sliding doors as illustrated on figure 53.

124. Louver Panel

a. *Removal.* Remove the louver panel as instructed on figure 54.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean the louver panel with an approved cleaning solvent.
- (2) Inspect the louver panel for breaks, cracks, and other damage. Repair or replace defective louver panel.

c. *Installation.* Install the louver panel as illustrated on figure 54.

125. Cable Housing Panel

a. *Removal.* Remove the cable housing panel as instructed on figure 55.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean the cable housing panels with an approved cleaning solvent.
- (2) Inspect the panels for bends, breaks, and other damage. Repair or replace panels as necessary. Paint panels as necessary.

c. *Installation.* Install the cable housing panel as illustrated on figure 55.

126. Top-Front Cab Door

a. *Removal and Disassembly.* Remove and disassemble the top-front cab door as instructed on figure 56.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for bends, cracks; breaks, and other damage. Repair or replace as necessary.

c. *Reassembly and Installation.* Reassemble and install top-front cab door as illustrated on figure 56.

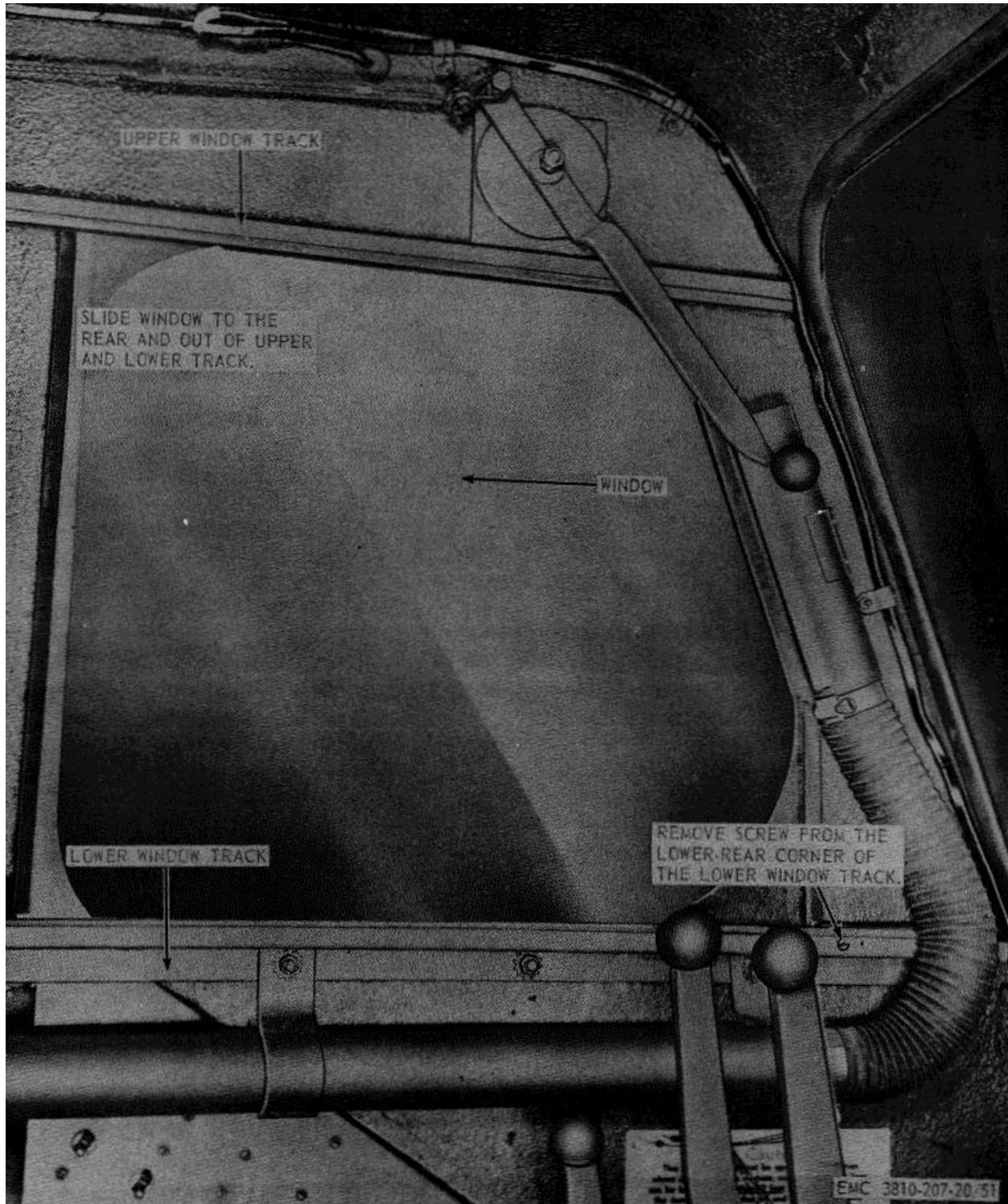


Figure 51. Operator's cab left-hand window, removal and installation.

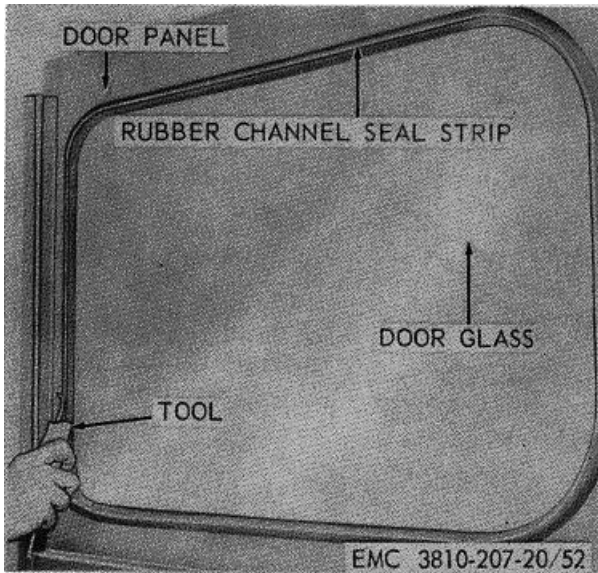


Figure 52. Door window and windshield glass, replacement.

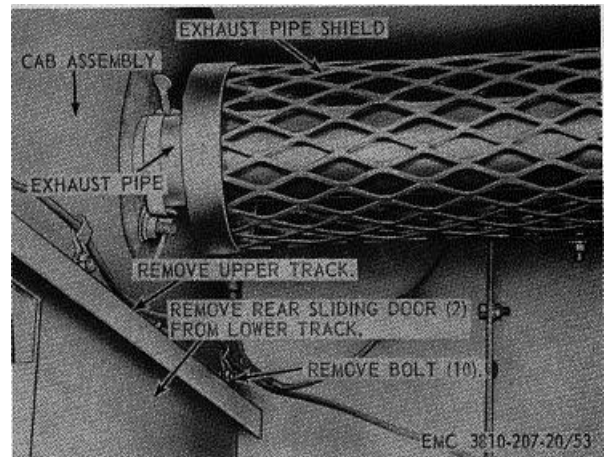


Figure 53. Rear sliding doors, removal and installation.

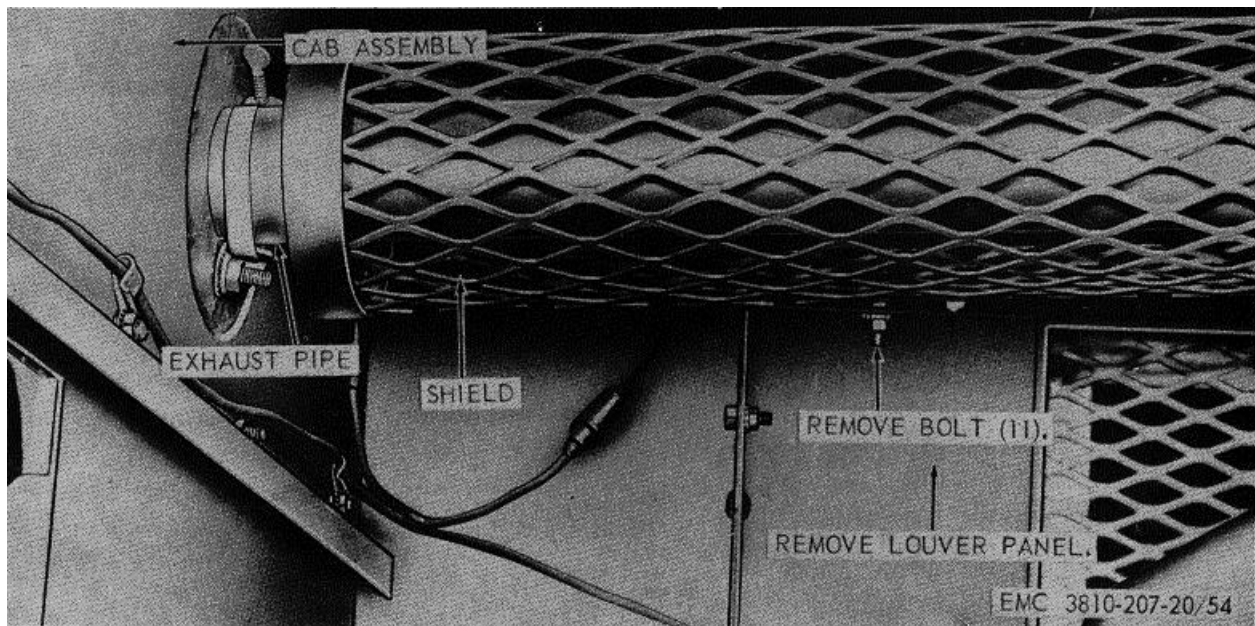


Figure 54. Louver panel, removal and installation.

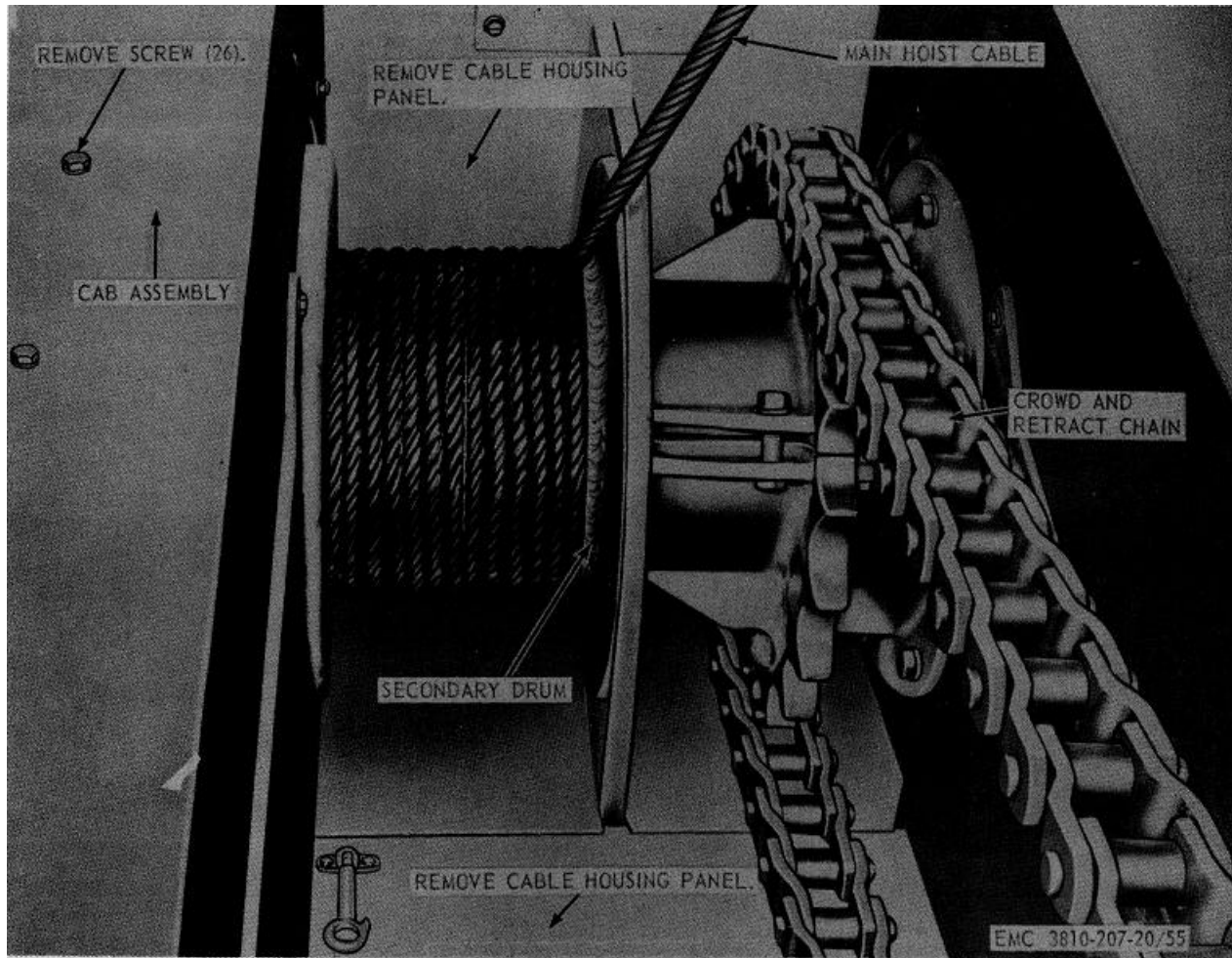


Figure 55. Cable housing panel, removal and installation.

127. Operator's Seat

a. *Removal.* Remove the operator's seat as instructed on figure 57.

b. *Disassembly.* Disassemble the operator's seat as illustrated on figure 58.

c. *Cleaning, Inspection, and Repair.*

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

(2) Inspect the seat and backrest for torn, bent, or broken conditions. Replace damaged seat or backrest.

(3) Inspect all other parts for breaks, bends, and other damage. Repair or replace as necessary.

d. *Reassembly.* Reassemble the operator's seat as illustrated on figure 58.

e. Install the operator's seat as illustrated on figure 57.

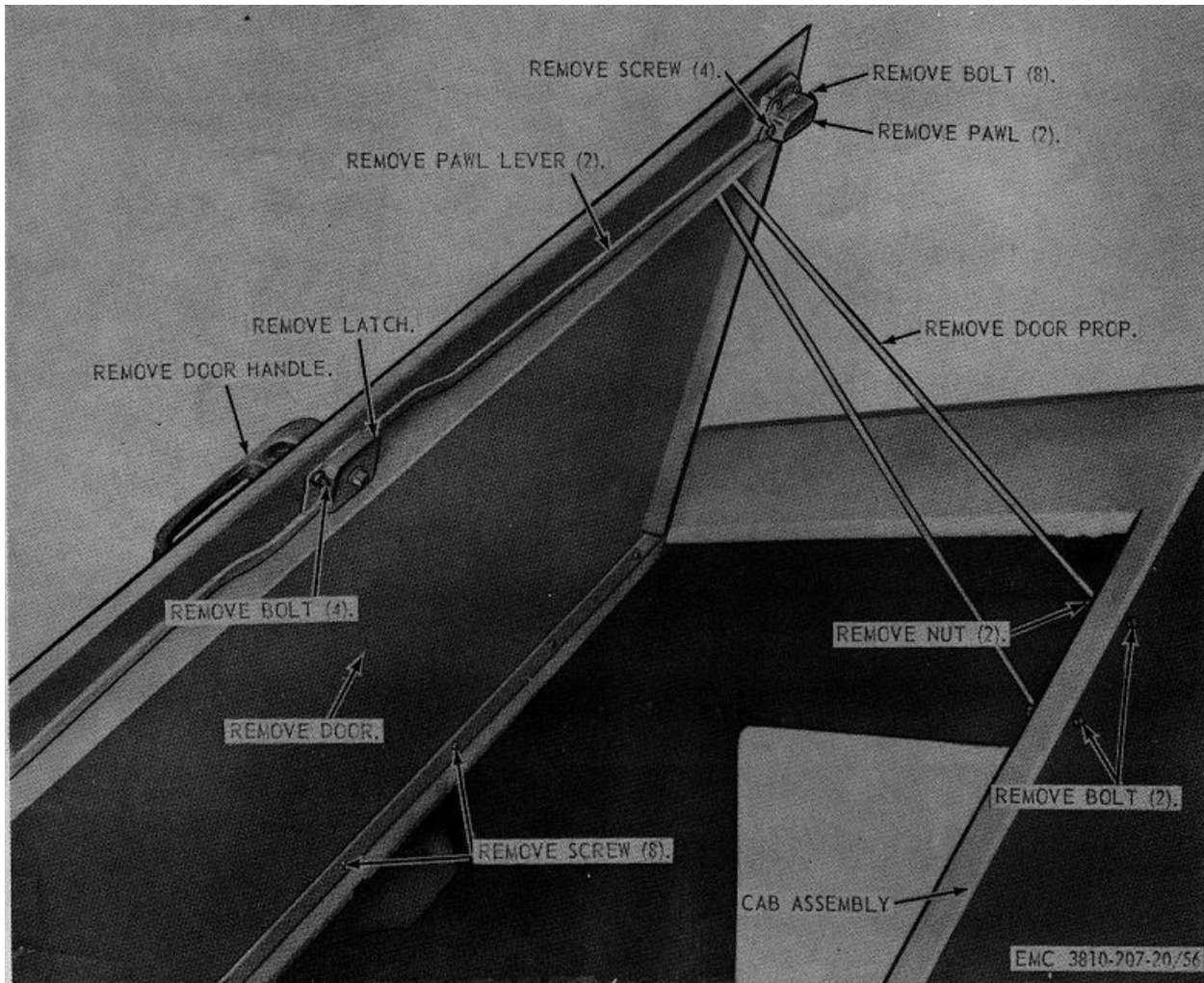


Figure 56. Top-front cab door, removal, disassembly, reassembly, and installation.

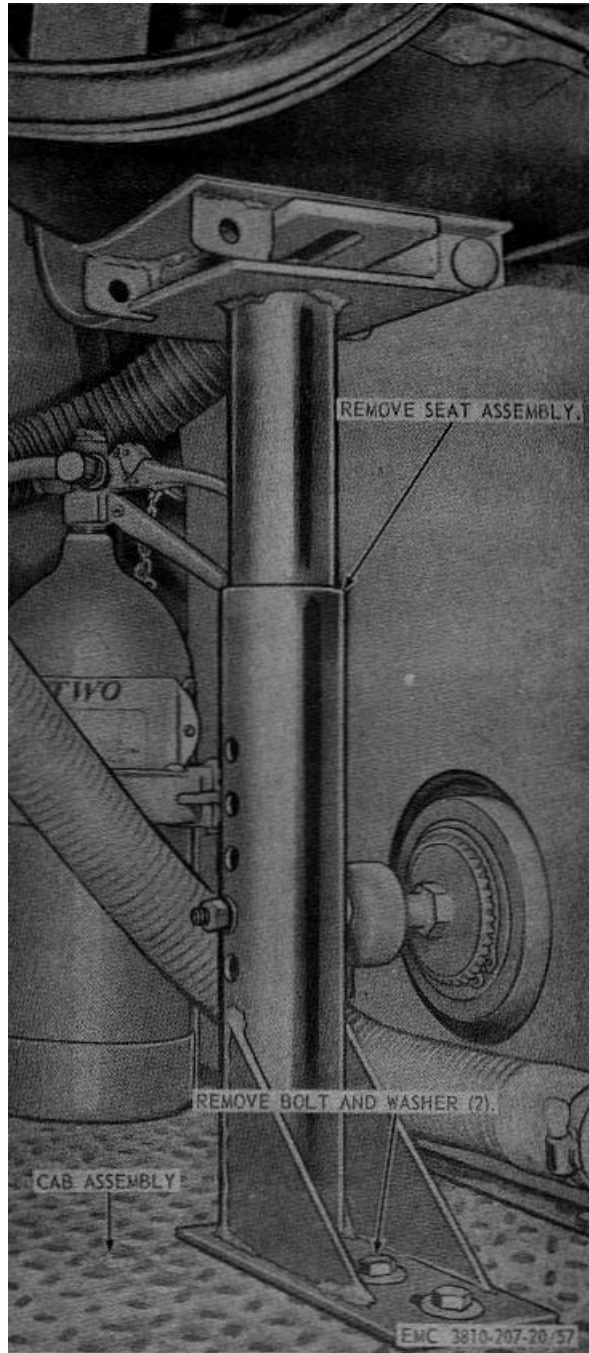
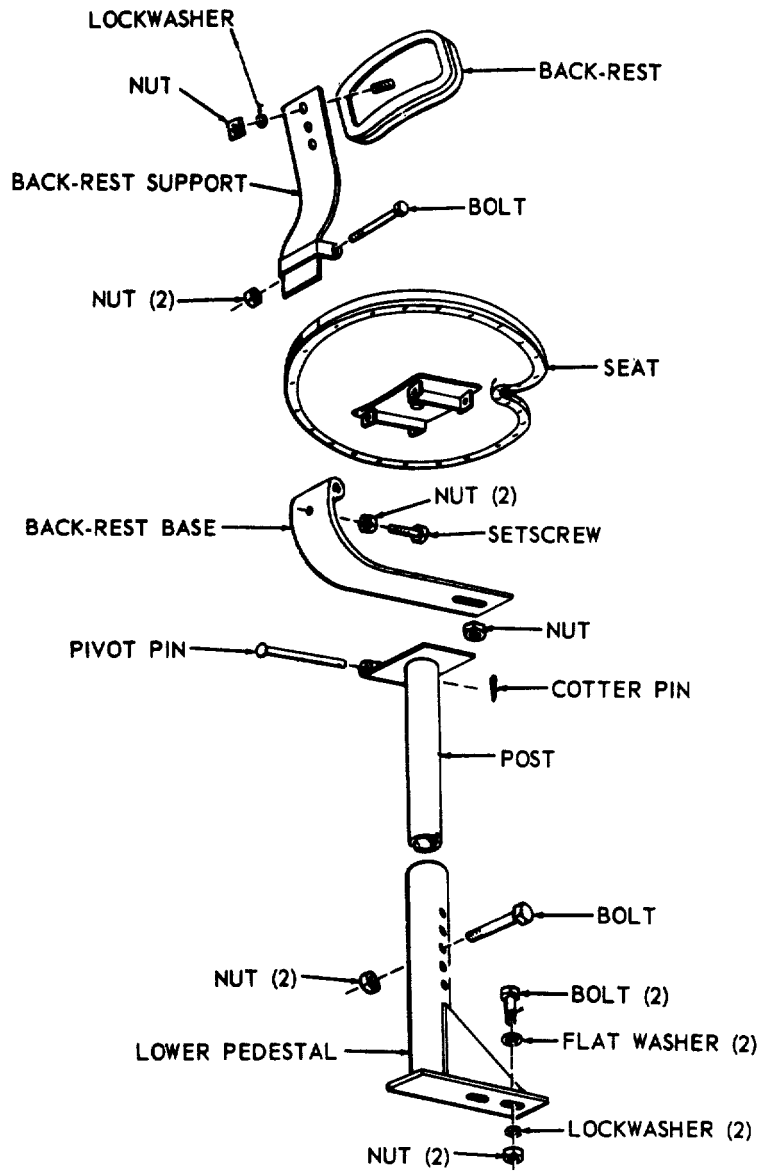


Figure 57. Operator's seat, removal and installation.



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Figure 58. Operator's seat, exploded view.

Section II. CRANE HYDRAULIC SYSTEM

128. General

Each hydraulically controlled lever is mechanically connected to a master cylinder. Each master cylinder is connected to a hydraulic cylinder by a hydraulic line, and in turn each 90 cylinder is connected to a clutch by

mechanical linkage. Movement of a lever actuates the position in the corresponding cylinder. Actuation of a piston in the cylinder causes hydraulic pressure in the connecting line and cylinder. As a result, a piston in the cylinder is actuated

and in turn actuates the clutch through cylinder linkage. When pressure is released, a return spring causes the cylinder piston to return to its normal position, and fluid is returned through the connecting line -to the master cylinder.

129. Master Cylinder

a. Removal.

- (1) Drain master cylinder.
- (2) Remove the master cylinder as instructed on figure 59.

b. Cleaning, Inspection, and Repair.

Caution:

Make sure the working area is clean and dust-free, wherever hydraulics or their principles are involved.

Cleanliness is the greatest factor of good hydraulic operation.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, leaks, and other damage. Replace as necessary.

c. Installation.

- (1) Install the hydraulic master cylinder as illustrated on figure 59.
- (2) Fill the master cylinder with hydraulic oil (LO 5-3810-207-20).
- (3) Bleed the hydraulic system (par. 133).

130. Boom Hoist Brake Hydraulic Cylinder

a. Removal.

- (1) Drain boom hoist brake hydraulic cylinder.

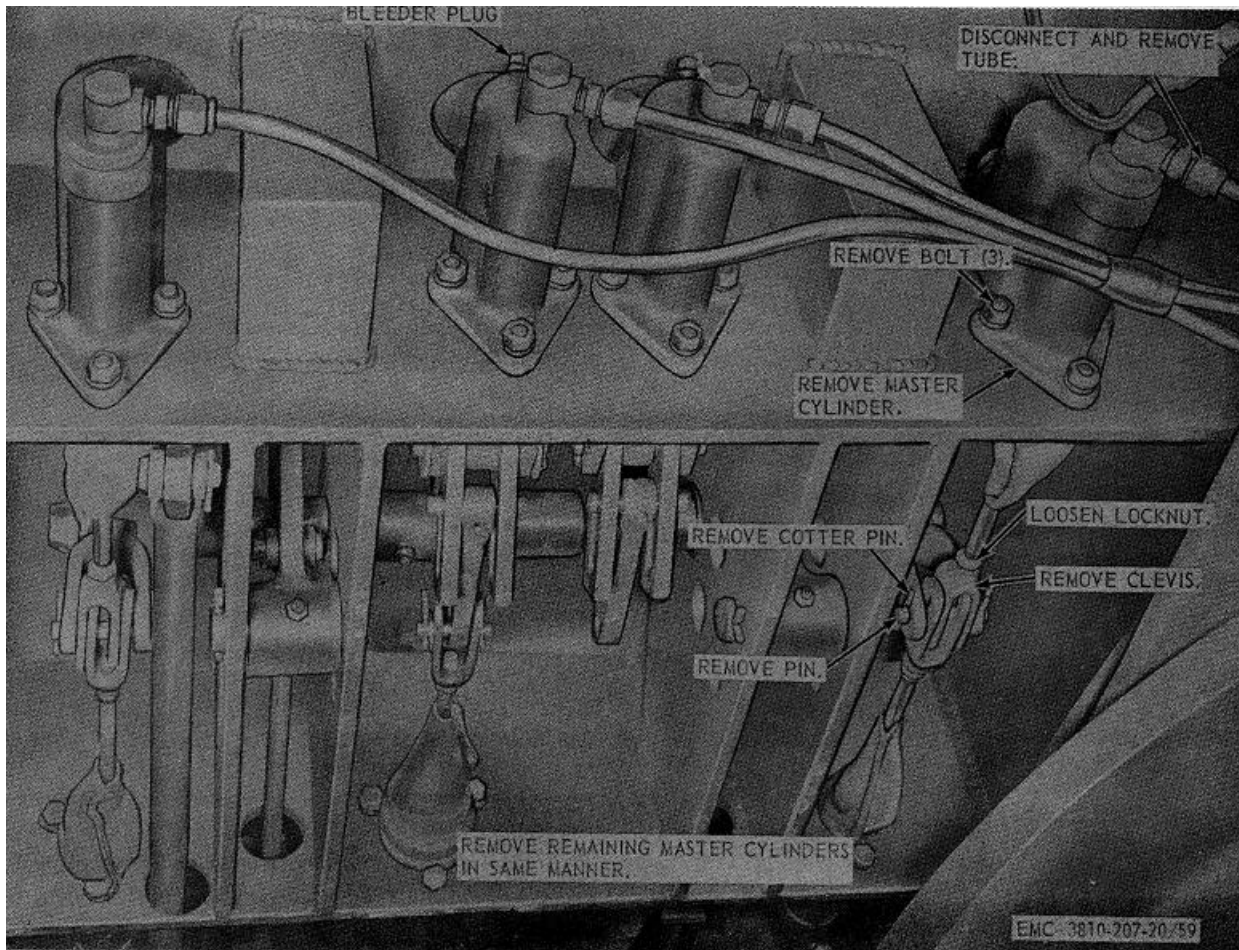


Figure 59. Hydraulic master cylinder, removal and installation.

- (2) Remove the boom hoist brake hydraulic cylinder as instructed on figure 60.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect all parts for leaks, breaks, and other damage. Repair or replace all defective parts.
- c. *Installation.*
 - (1) Install the boom hoist brake hydraulic cylinder as illustrated on figure 60.
 - (2) Add hydraulic fluid to master cylinder for boom hoist brake (LO 5-3810-207-20).
 - (3) Bleed brake cylinder and lines (par. 133).

131. Boom Hoist Clutch Hydraulic Cylinder

- a. *Removal.*
 - (1) Drain boom hoist clutch hydraulic cylinder.
 - (2) Remove the boom hoist clutch hydraulic cylinder as instructed on figure 61.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect all parts for breaks, leaks, and other damage. Repair or replace all defective parts.
- c. *Installation.*
 - (1) Install the boom hoist clutch hydraulic cylinder as illustrated on figure 61.

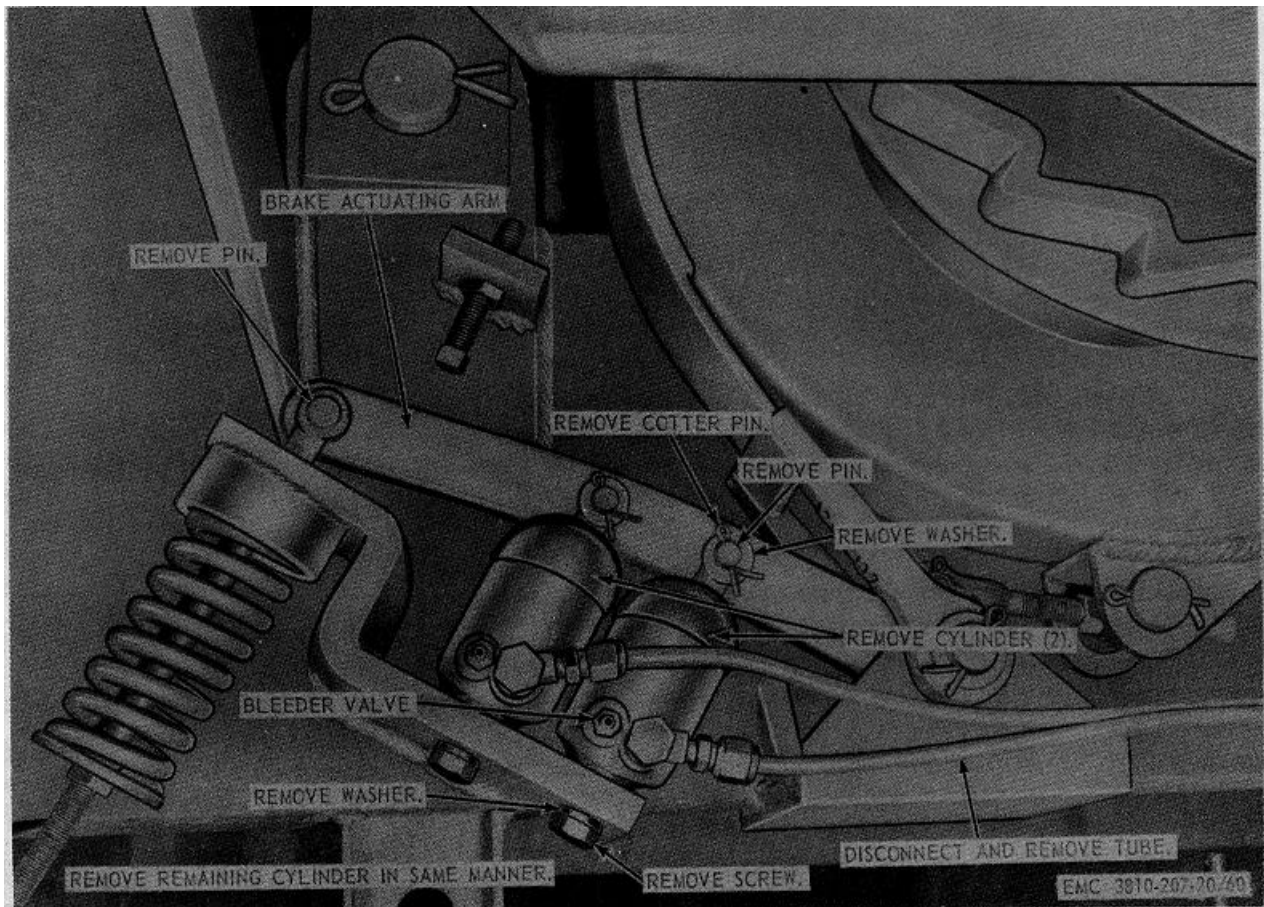


Figure 60. Boom hoist brake hydraulic cylinder, removal and installation.

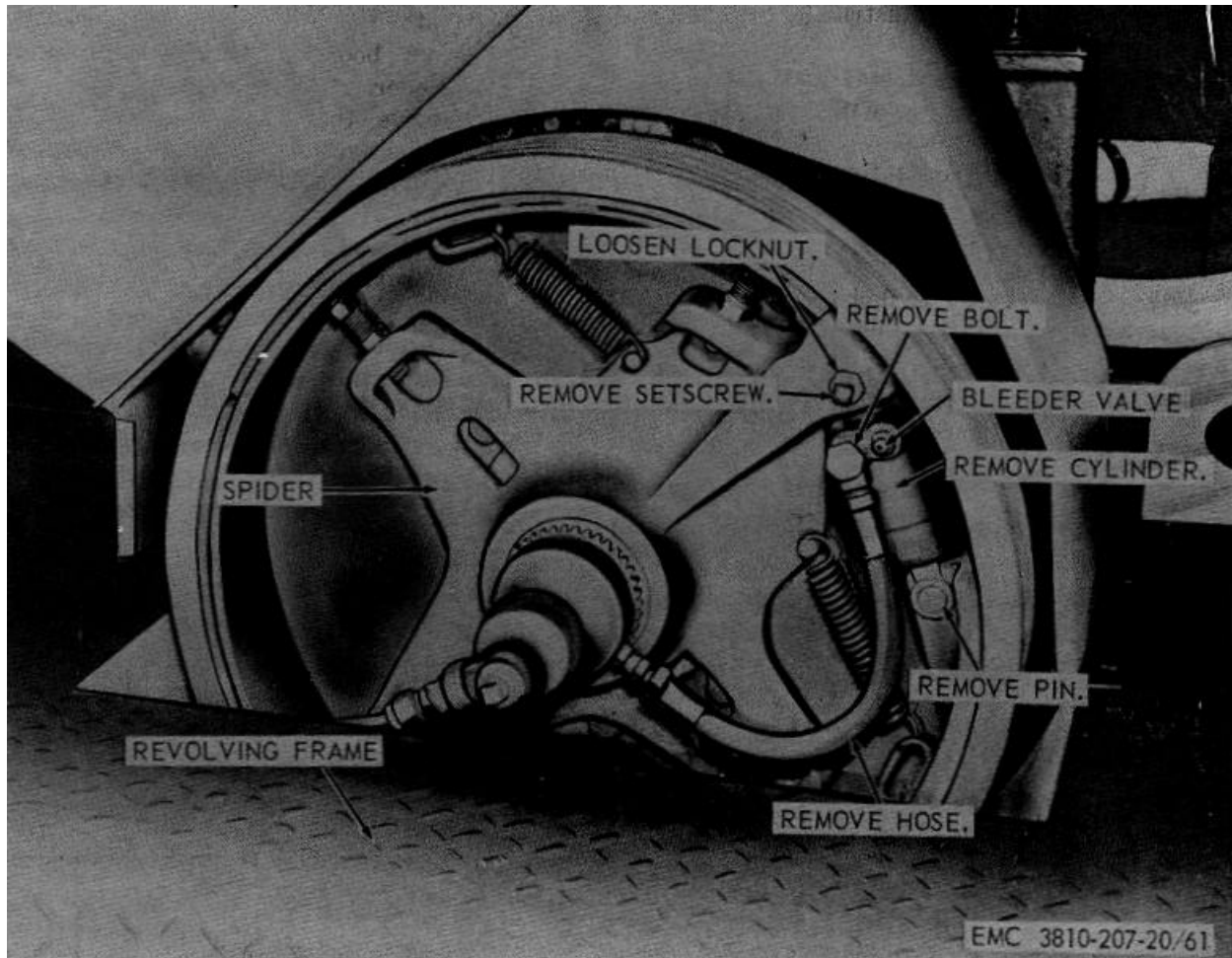


Figure 61. Boom hoist clutch hydraulic cylinder, removal and installation.

- (2) Add hydraulic fluid to master cylinder for boom hoist clutch (LO 5-3810-207-20).
- (3) Bleed the boom hoist clutch hydraulic cylinder and lines (par. 133).

132. Shaft Packing Gland

a. Removal. Remove the shaft packing gland as instructed on figure 62.

b. Disassembly. Disassemble the shaft packing gland as illustrated on figure 63.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for cracks, leaks, excessive wear, and other damage. Repair or replace all defective parts.

d. Reassembly. Reassemble the shaft packing gland as illustrated on figure 63.

e. Installation.

- (1) Install the shaft packing gland as illustrated on figure 62.
- (2) Bleed packing gland and lines (par. 133).

133. Hydraulic Tubes and Fittings

a. Removal.

- (1) Drain lines and master cylinder.
- (2) Remove the hydraulic tubes and fittings as instructed on figure 64.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.

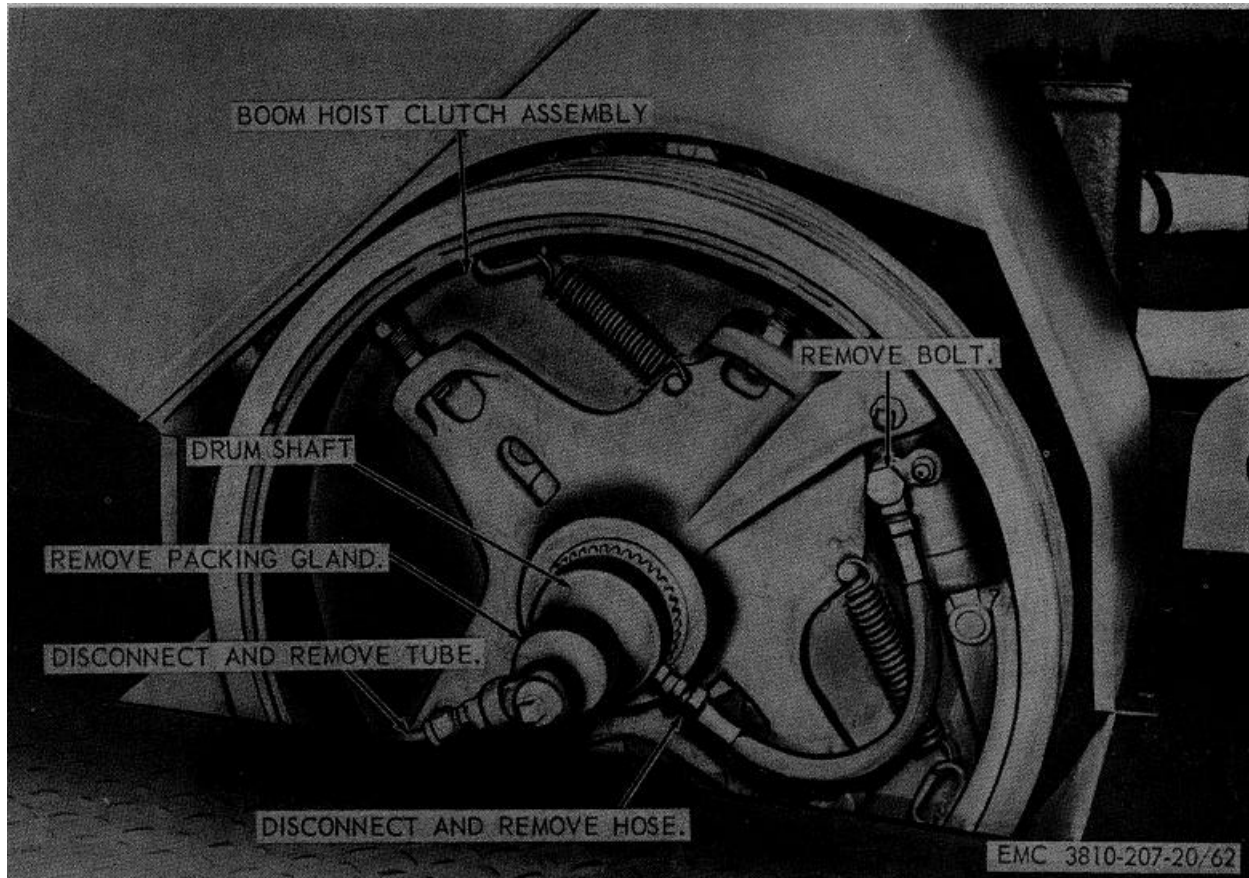


Figure 62. Packing gland, removal and installation.

- (2) Inspect all parts for cracks, breaks, leaks, and other damage. Replace all parts as necessary.

c. Installation.

- (1) Install the hydraulic tubes and fittings as illustrated on figure 64.
- (2) Bleed the hydraulic system as in d below.

d. Bleeding Hydraulic System.

- (1) Fill the master cylinder to proper level (LO 5-3810-207-20).
- (2) Fully engage the hand lever which is affected and leave it engaged.
- (3) Loosen bleeder valve on the hydraulic cylinder affected and allow air to escape.
- (4) Tighten the bleeder valve before releasing the hand lever, so no air will be drawn into the hydraulic cylinder.
- (5) Engage lever for proper operation.

- (6) Repeat (1) through (5) above until hydraulic line and cylinder are fully bled.
- (7) Repeat (1) through (6) above for bleeding all hydraulic cylinders and lines.

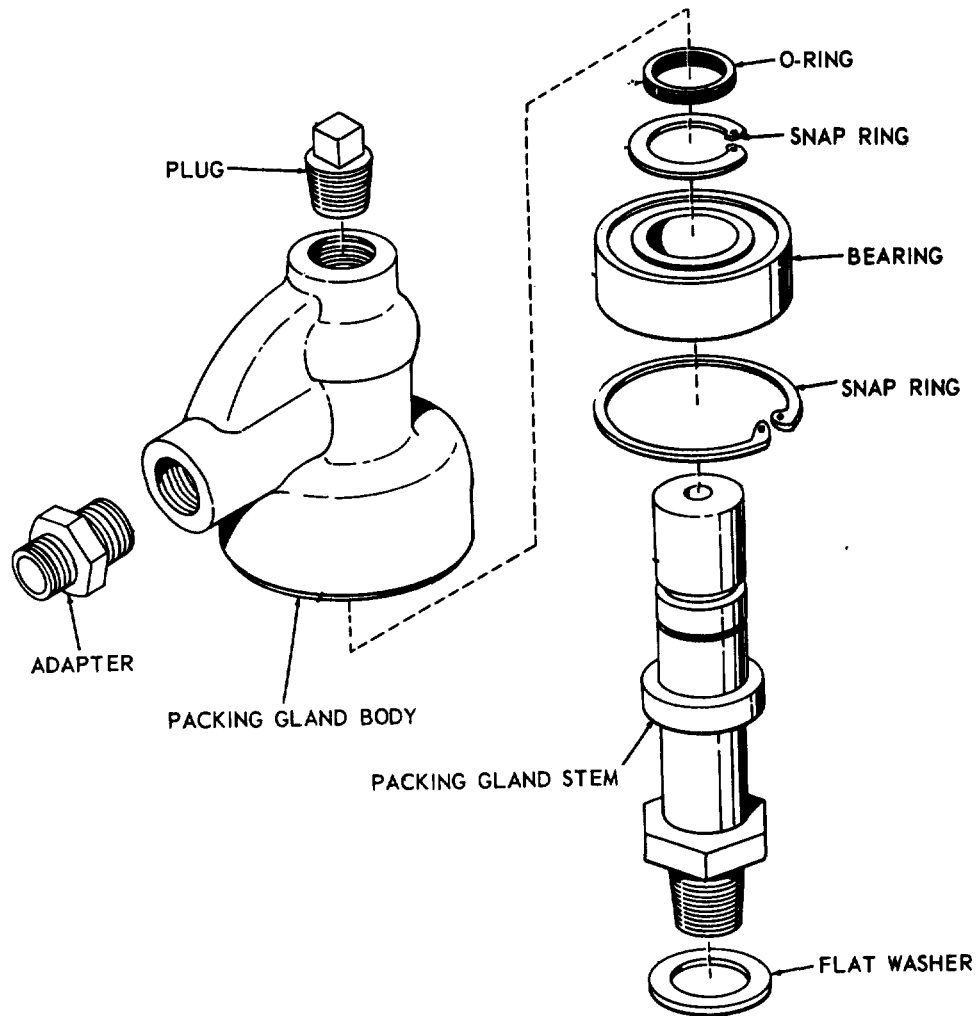
Note.

Recheck master cylinders and fill to proper level.

134. Power-Down Boom Lever, Primary Drum Clutch Lever, Secondary Drum Clutch Lever, and Swing Clutch Control Lever

a. Removal.

- (1) Remove the dust shield from revolving frame.
- (2) Remove the master cylinder linkage from the swing clutch control lever (par. 129).



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Figure 63. Packing gland, exploded view.

- (3) Remove the swing clutch control lever as instructed on figure 65.
- (4) Remove the power-down boom lever, primary drum clutch lever, and secondary drum clutch lever in the same manner.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for excessive wear, breaks, cracks, and other damage. Repair by welding or replace all defective parts.

c. Installation.

- (1) Install the swing clutch control lever as illustrated on figure 65.
- (2) Install the master cylinder linkage to the swing clutch control lever (par. 129).
- (3) Install the dust shield to the revolving frame.
- (4) Install the power-down boom lever, primary drum clutch lever, and secondary drum clutch lever in the same manner.

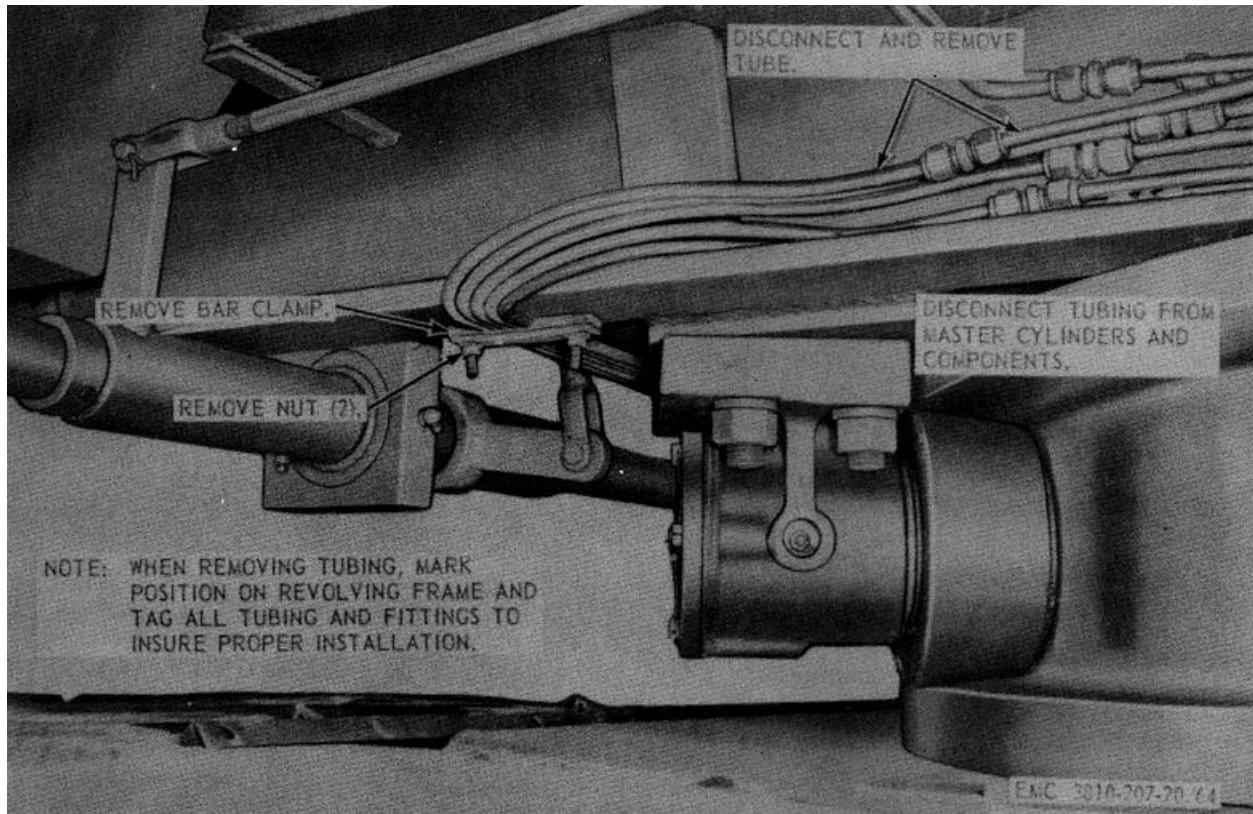


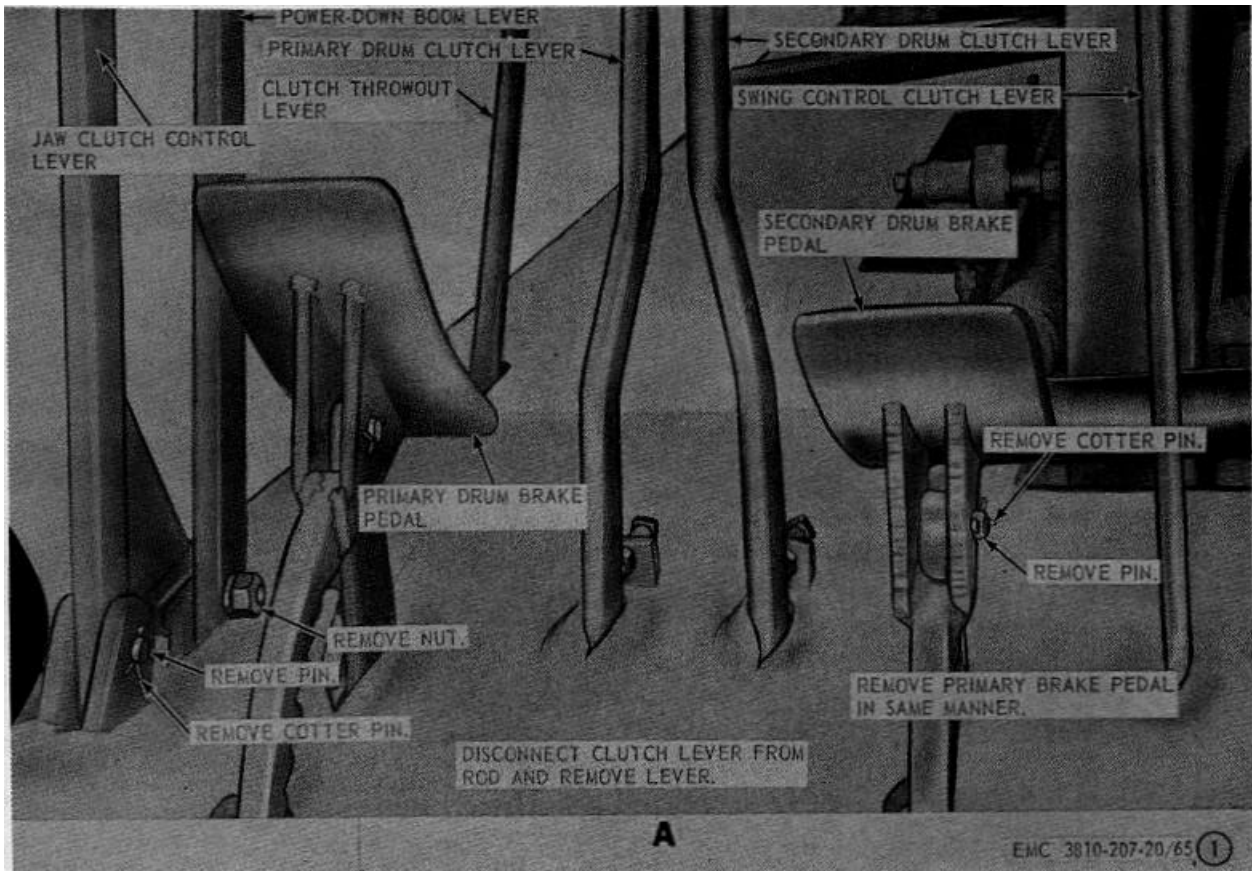
Figure 64. Hydraulic tubes and fittings, removal and installation.

135. Jaw Clutch Lever

- a. *Removal.* Remove jaw clutch lever as instructed on figure 65.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts of the jaw clutch control lever with an approved cleaning solvent.
 - (2) Inspect all parts of the jaw clutch control lever for breaks, bends, and other damage. Repair by welding or replace all defective parts.
- c. *Installation.* Install the jaw clutch lever as illustrated on figure 65.

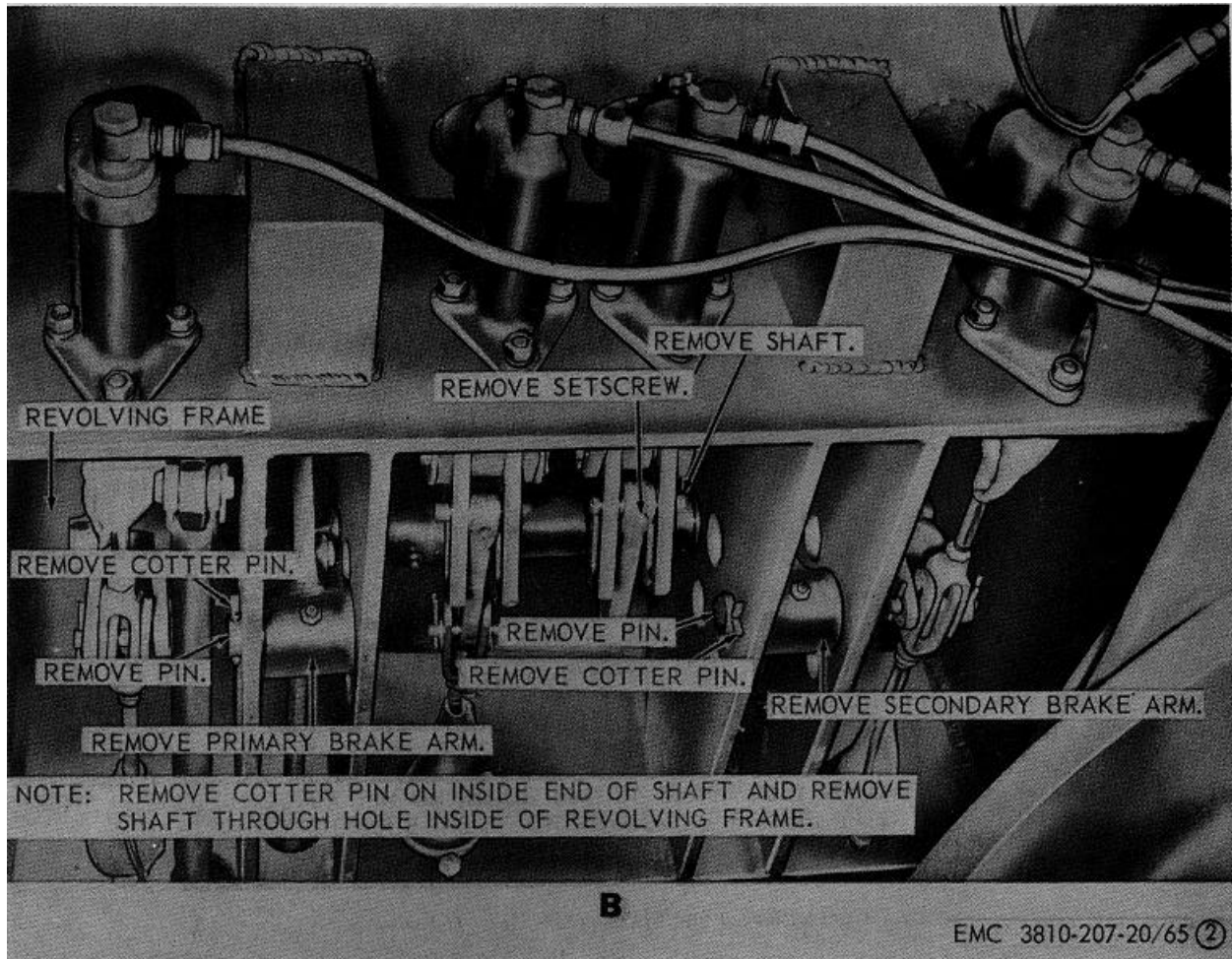
136. Primary and Secondary Drum Brake Pedal

- a. *Removal.* Remove the primary and secondary drum brake pedals as instructed on figure 65.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair by welding or replace defective parts.
- c. *Installation.* Install the primary and secondary drum brake pedals as illustrated on figure 65.



A-Control levers and brake pedals, installed view

Figure 65. Control levers and brake pedals, removal and installation.



B-Control levers and brake pedals, removal points

Figure 65-Continued.

Section III. CRANE BRAKE AND CLUTCH BAND ASSEMBLIES

137. General

The operating clutches are of the internal expanding type and controlled hydraulically. The band assemblies are composed mainly of a clutch shoe with lining, a clutch actuating arm and actuating arm retracting spring, and a band retracting spring. The brakes are of the external-contracting type mounted on the outside of the clutch drums. They consist chiefly of a two-part hinged-attached brake assembly with lining. One end of the band assembly is anchored and the other is actuated. The boom hoist brake is held in the engaged position by a spring and released hydraulically

when the boom hoist clutch is actuated. The main hoist and haul-back brakes are controlled mechanically and are engaged by pressure on the brake pedals.

138. Boom Hoist Clutch Band

a. Removal.

- (1) Remove the boom hoist hydraulic cylinder (par. 131).
- (2) Remove the boom hoist clutch band as instructed on figure 66.

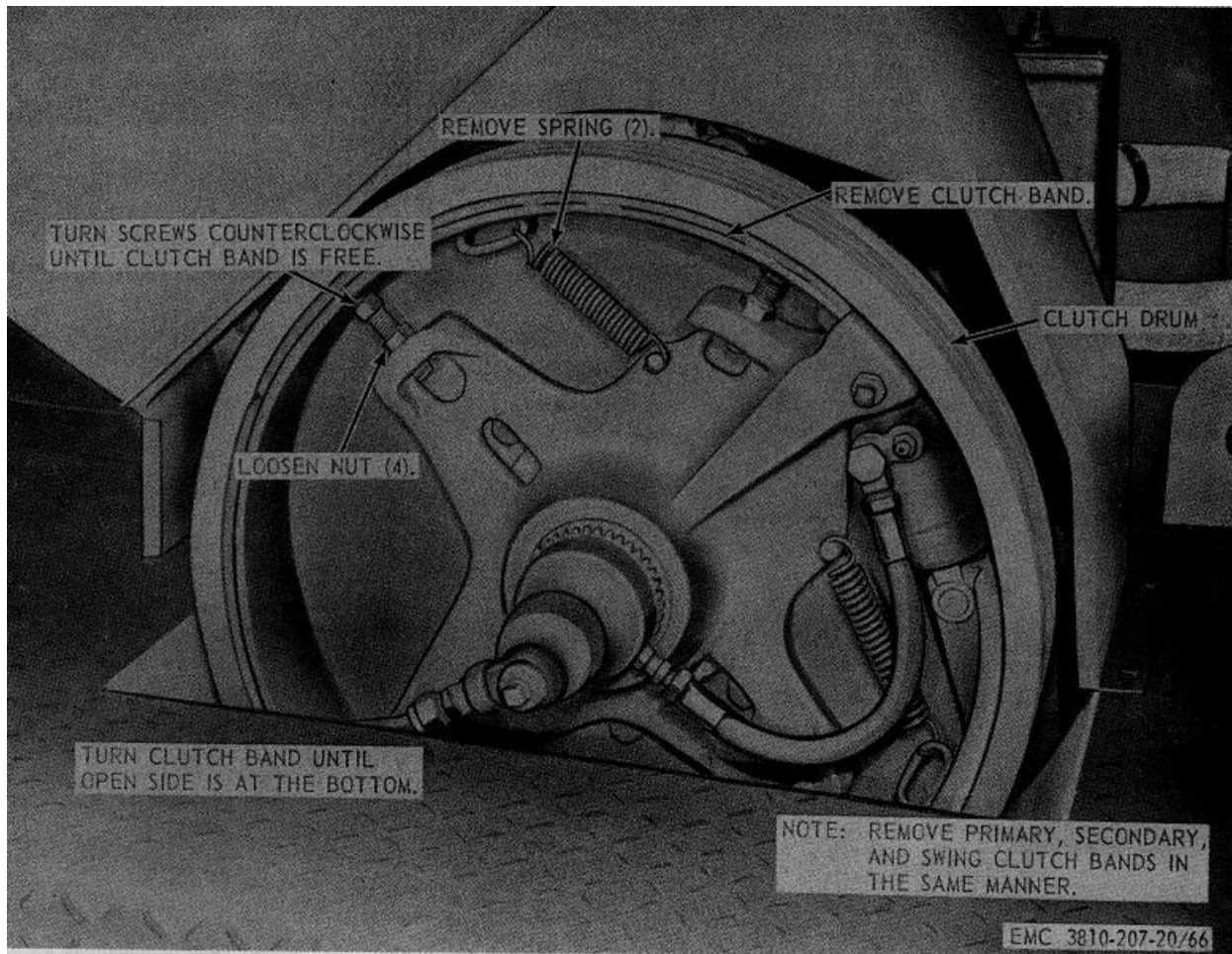


Figure 66. Boom hoist clutch band, removal and installation.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect clutch band lining for excessive wear and glazing. Remove glazing with a wire brush. Replace a clutch band having worn or defective lining.
- (3) Inspect all other parts for breaks, cracks, and other damage. Replace all defective parts.

c. Installation.

- (1) Install the boom hoist clutch band as illustrated on figure 66.
- (2) Install the boom hoist hydraulic cylinder (par. 131).
- (3) Adjust the boom clutch band (TM 5-3810-207-10).

139. Boom Hoist Brakeband

a. Removal.

- (1) Remove the boom hoist brakeband as instructed on figure 67.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the lining for excessive wear, glazing, and other damage. Replace a brakeband having a defective lining.
- (3) Inspect all other parts for excessive wear, breaks, and other damage. Replace parts and brakeband as necessary.

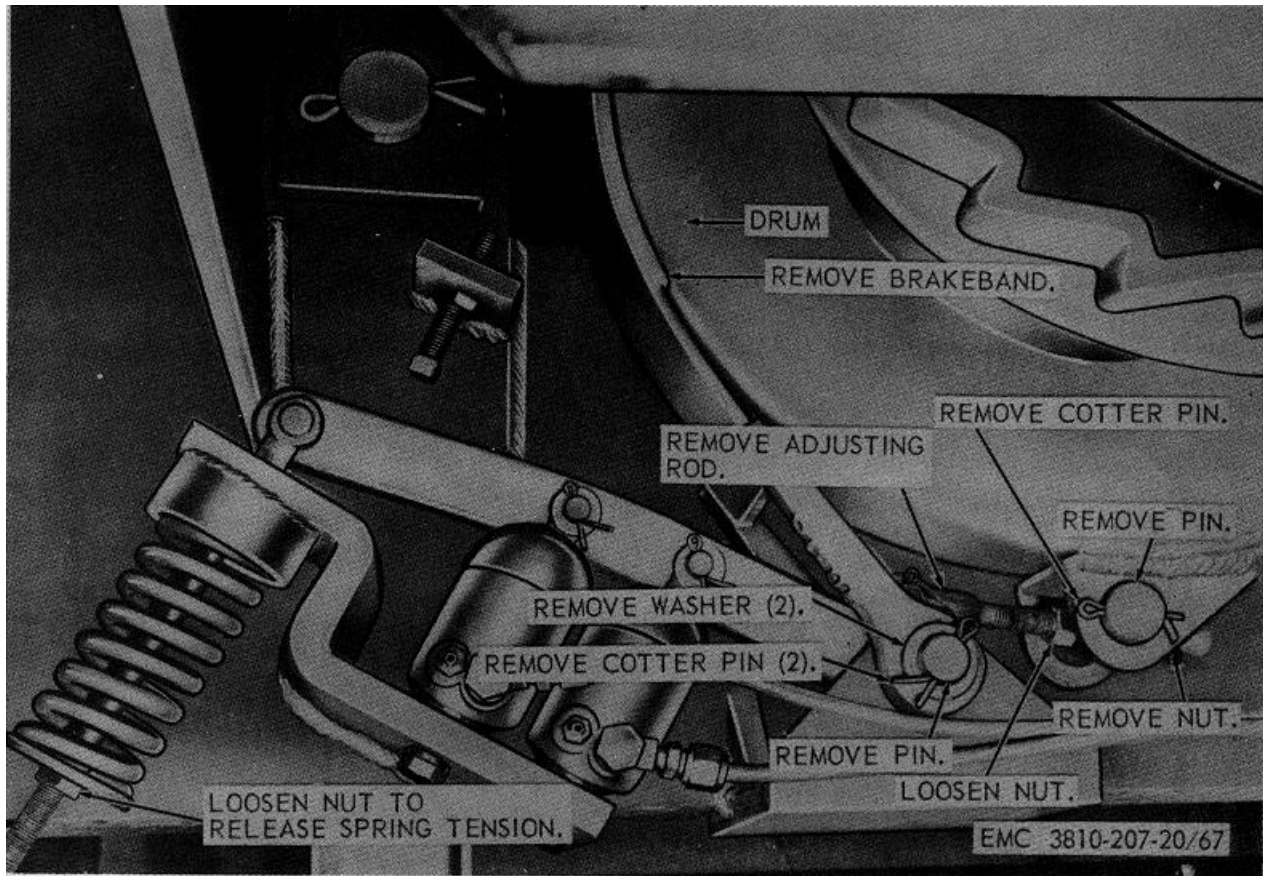


Figure 67. Boom hoist brakeband, removal end installation.

c. Installation.

- (1) Install the boom hoist brakeband as illustrated on figure 67.
- (2) Adjust the boom hoist brakeband (TM 5-3810-207-10).

- (3) Inspect all other parts for breaks, excessive wear, and other damage. Replace all defective brakebands and parts.

140. Secondary, Primary, and Load Lowering Brakebands

a. Removal.

- (1) Remove the secondary brakeband as instructed on figure 68.
- (2) Remove the primary and load lowering brakebands in a similar manner.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the brake lining for excessive wear, glazing, and other damage. Replace all brakebands having defective lining.

c. Installation.

- (1) Install the secondary brakeband as illustrated on figure 68.
- (2) Install the primary and load lowering brakebands in a similar manner.
- (3) Adjust secondary, primary, and load lowering brakebands (TM 5-3810-207-10).

141. Swing Brake and Linkage

a. Removal.

- (1) Remove the swing brakeband yoke as instructed on figure 69.

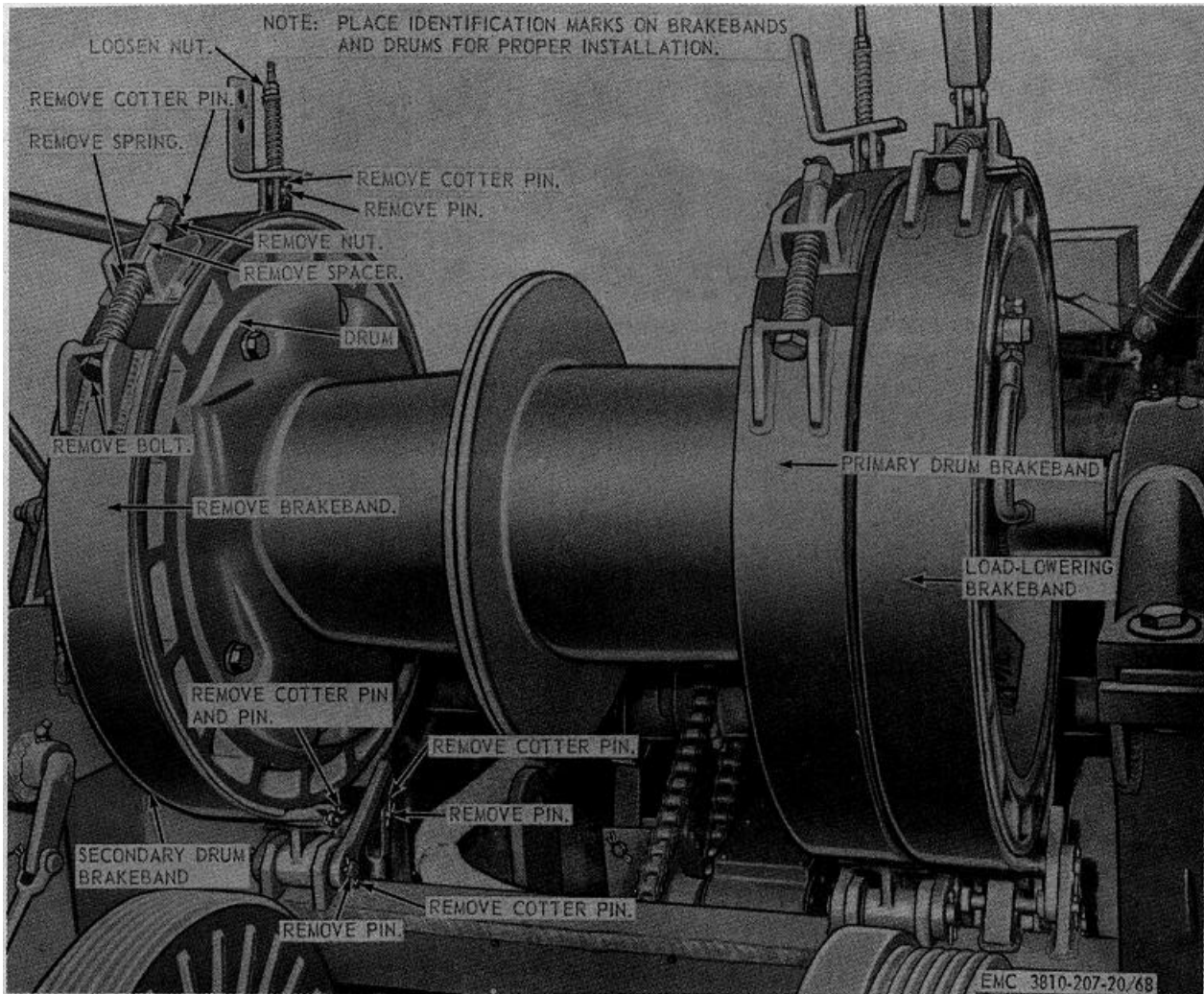


Figure 68. Secondary, primary, and load lowering brakebands, removal and installation.

- (2) Remove the swing brake and linkage as instructed on figure 69.

- (2) Adjust the brakeband (TM 5-3810-207-10).
- (3) Install the swing brakeband yoke as illustrated on figure 69.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the brake lining for excessive wear, glazing, and other damage. Replace a brakeband having defective lining.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Replace all defective parts.

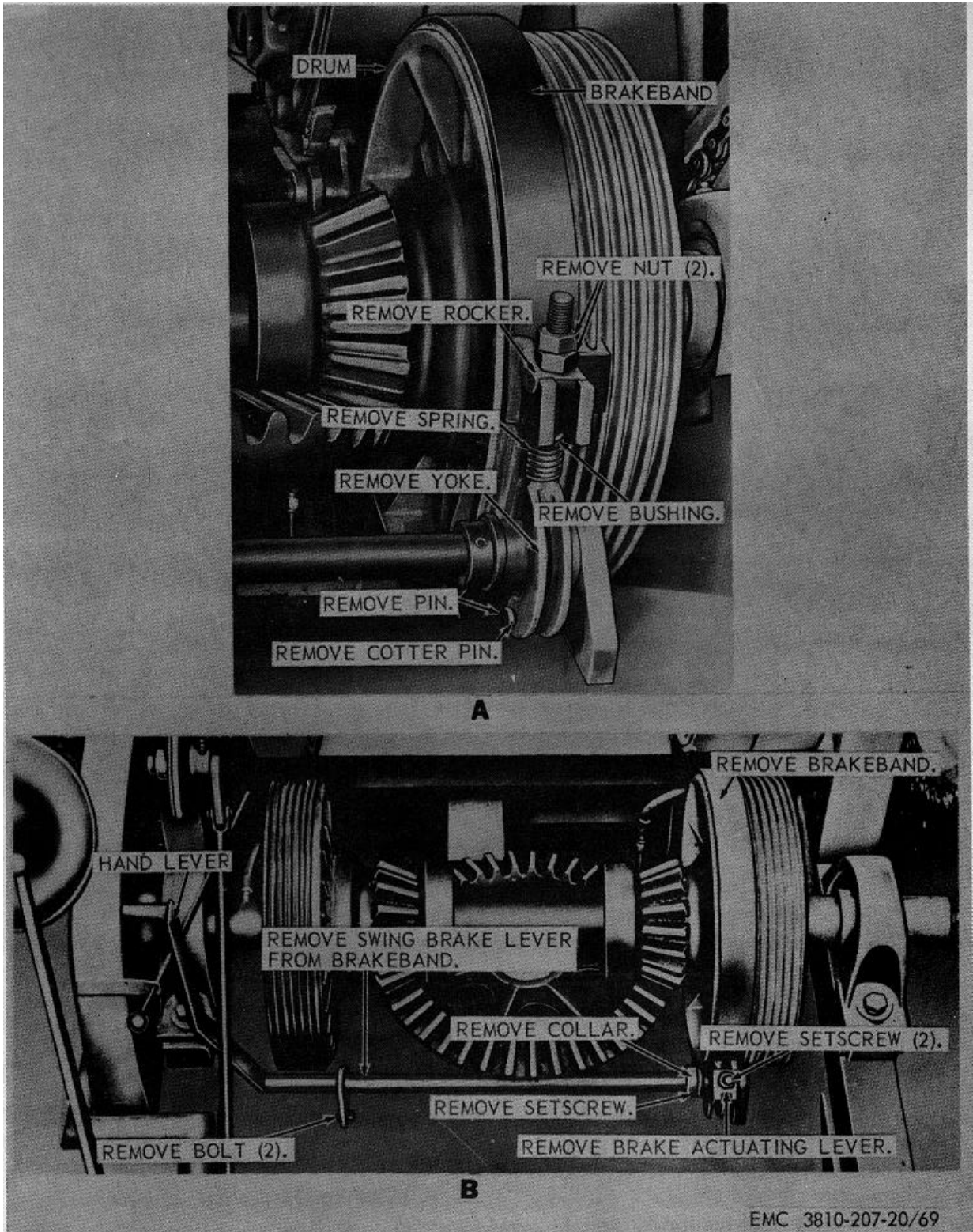
142. Swing Lock Assembly

- a. *Removal.* Remove the swing lock assembly as instructed on figure 70.

- b. *Disassembly.* Disassemble the swing lock lever as illustrated on figure 71.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.



A-Swing brakeband yoke, installed view
B-Swing brakeband and linkage, installed view

Figure 69. Swing brake and linkage, removal and installation

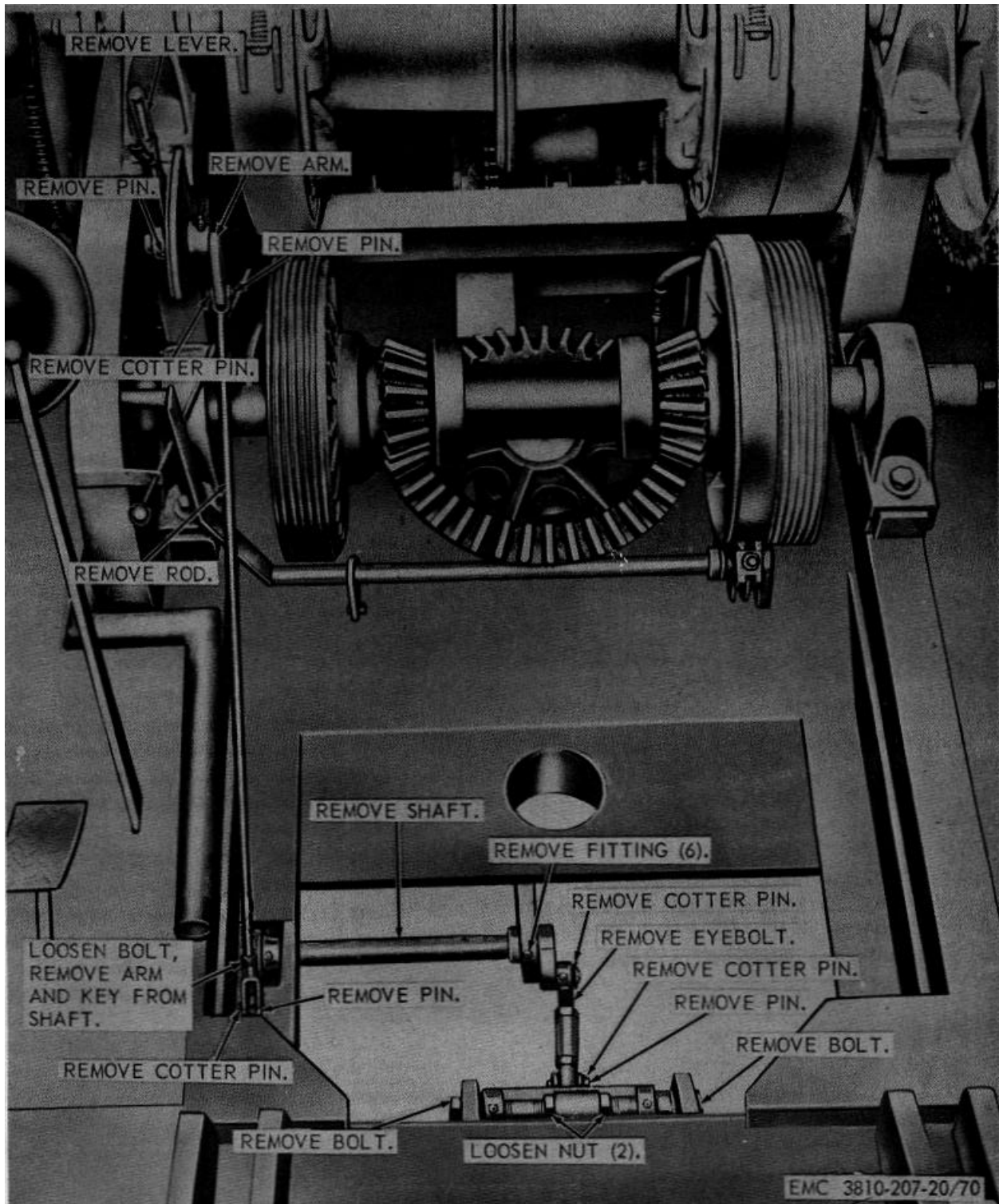
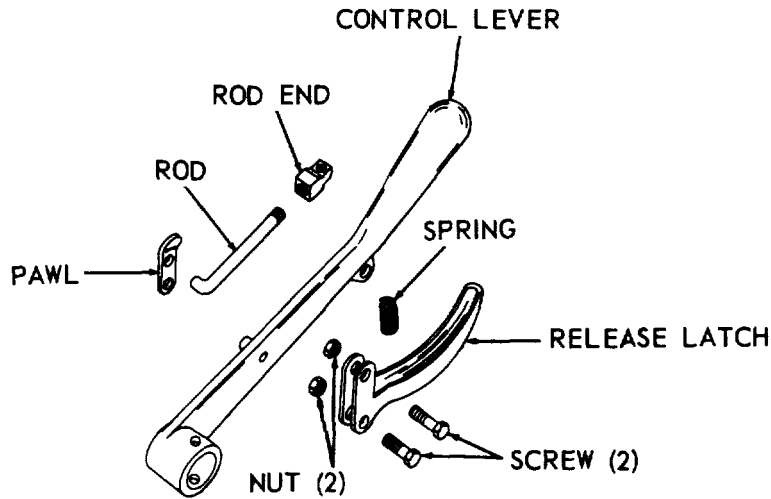


Figure 70. Swing lock, removal and installation.



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Figure 71. Swing lock lever, exploded view.

(2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace parts as necessary.

d. *Reassembly.* Reassemble the swing lock lever as illustrated on figure 71.

e. *Installation.* Install the swing lock assembly as illustrated on figure 70.

f. *Adjustment.*

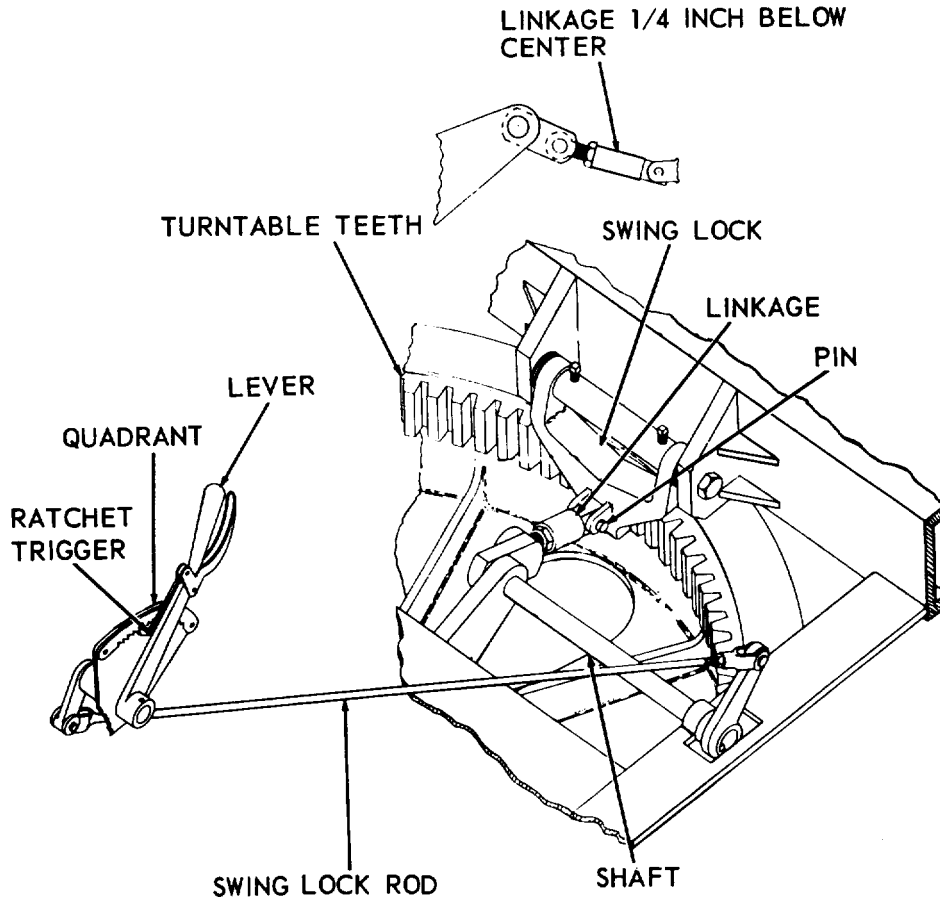
- (1) When swing lock (fig. 72) and turntable teeth are fully engaged, the linkage should be 1/4 inch below centerline between pin and shaft.

Lengthen or shorten linkage as necessary.

- (2) With teeth fully engaged, adjust swing lock rod so that the ratchet trigger engages in the second or third segment on quadrant (forward position).

Caution

After adjusting swing lock always make certain there is ample clearance between swing kick and turntable teeth when the lever is in fully released position (back).



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Figure 72. Swing lock assembly, adjustment.

Section IV. CONICAL ROLLERS

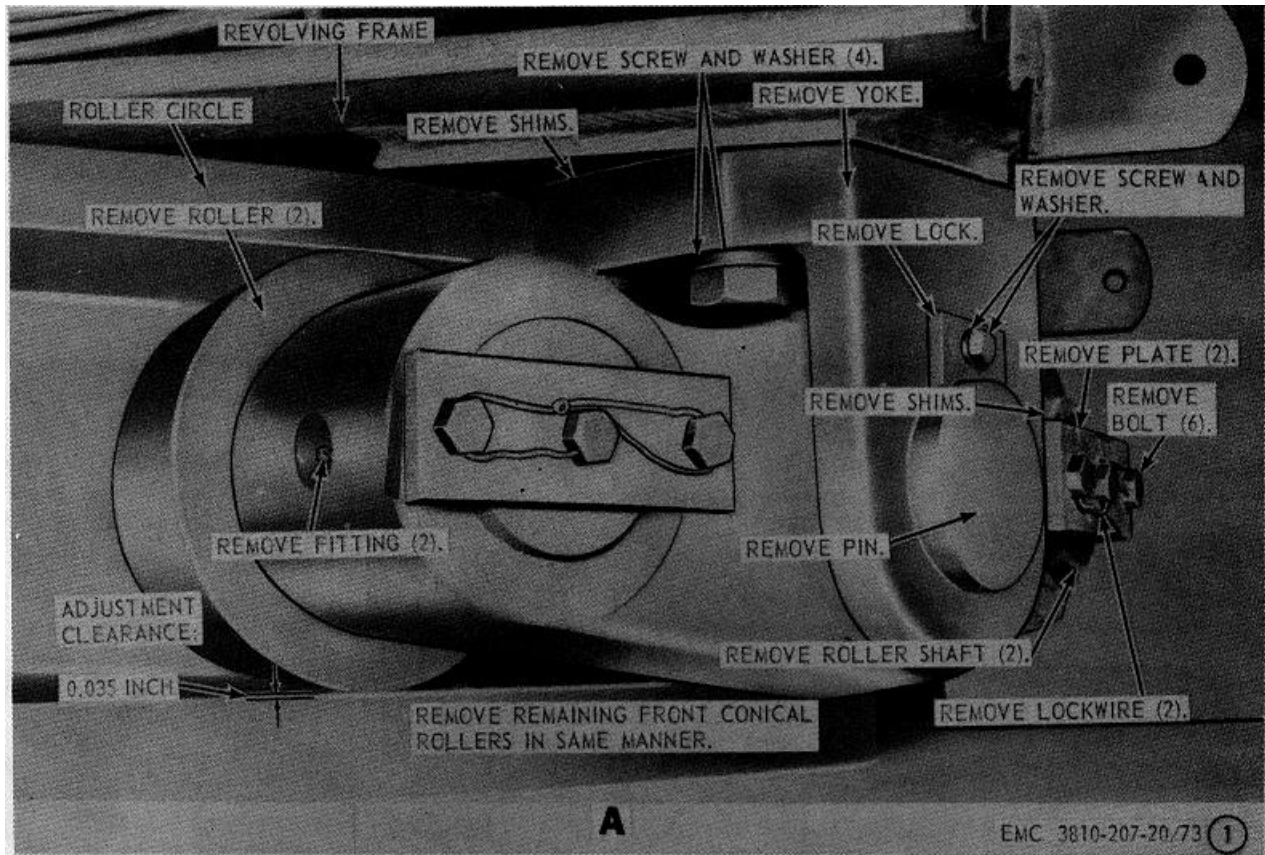
143. General

The crane is equipped with two sets of rollers. Two double rollers are mounted on the front of the revolving frame, and two single rollers are mounted in the rear. The rollers serve two functions, securing the crane assembly to the turntable and supporting the entire weight of the crane load.

144. Front Conical Rollers

a. Removal.

- (1) Place adequate cribbing between carrier frame and rear underside of main frame.
- (2) Remove the front conical rollers as instructed on figure 73.



A—Removal and adjustment clearance

Figure 73. Front conical rollers, removal, disassembly, reassembly and installation.

b. Disassembly. Disassemble the front conical rollers in numerical sequence as illustrated on figure 73.

c. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for excessive wear, breaks, cracks, and other damage. Replace all defective parts.

d. Reassembly. Reassemble the front conical rollers in the reverse sequence as illustrated on figure 73.

e. Installation. Install the front conical rollers as illustrated on figure 73.

f. Adjustment. When installing the roller plates, install the required amount of shims to obtain 0.035 inch clearance between the rollers and roller circle.

145. Rear Conical Rollers

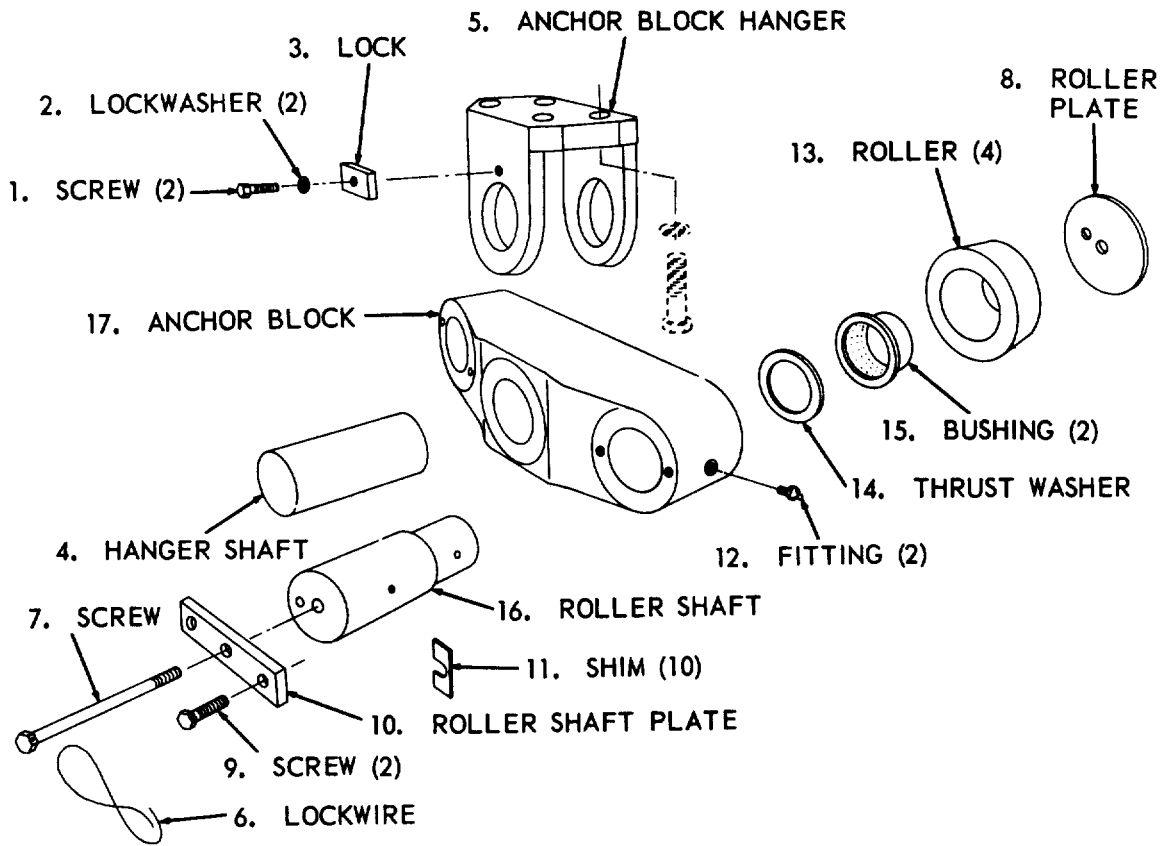
a. Removal.

- (1) Place adequate cribbing between carrier frame and rear underside of main frame.
- (2) Remove the rear conical rollers as instructed on figure 74.

b. Disassembly. Disassemble the rear conical rollers in numerical sequence as illustrated on figure 74.

c. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for excessive wear, breaks, cracks, and other damage. Replace defective parts.



B

EMC 3810-207-20/73 ②

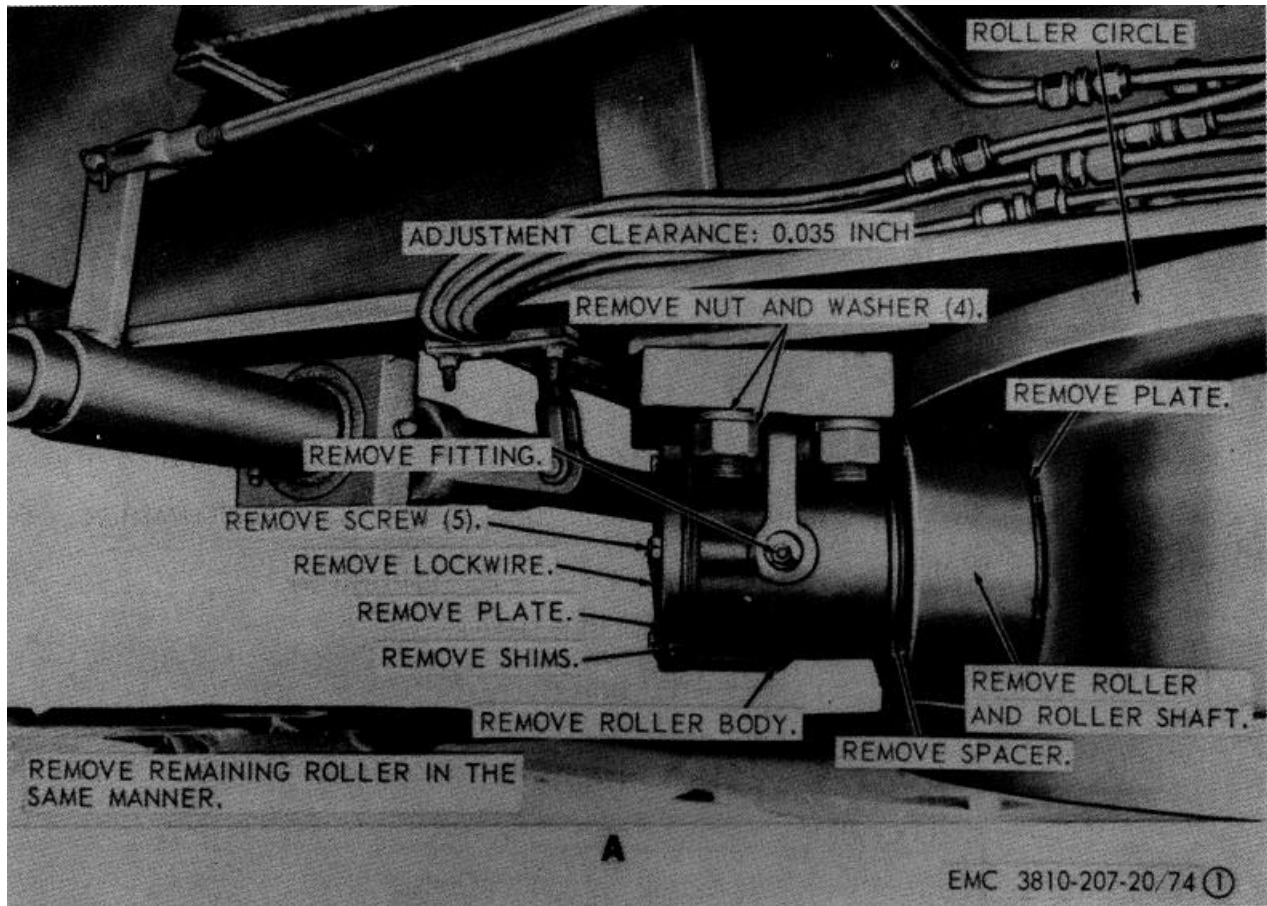
B—Front conical rollers, disassembly and reassembly, exploded view

Figure 73—Continued.

d. Reassembly. Reassemble the rear conical rollers in the reverse sequence as illustrated in figure 74.

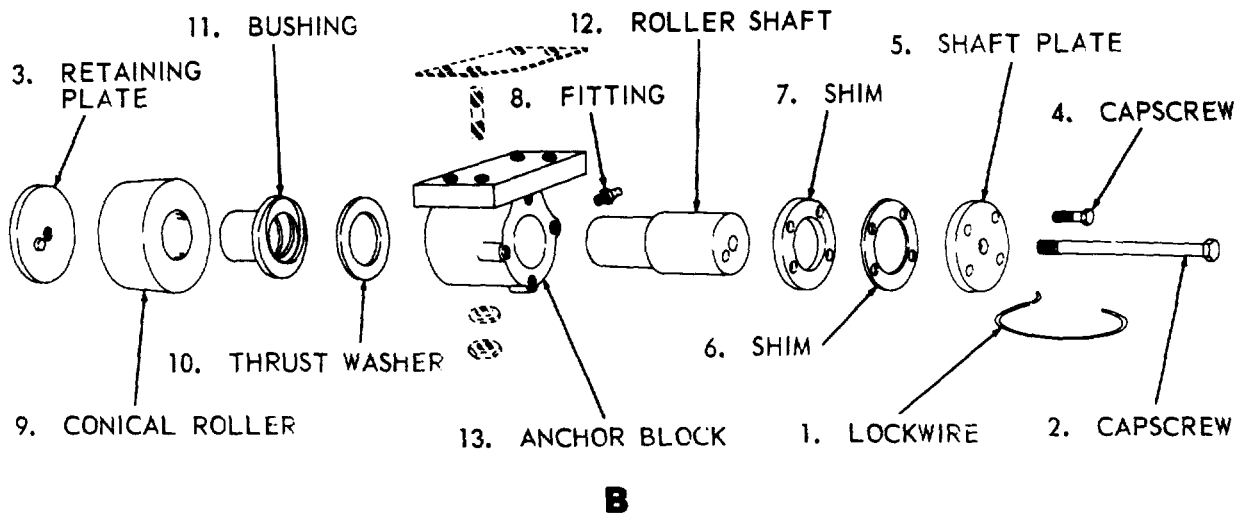
f. Adjustment. Adjust rear conical rollers in a manner similar to the adjustment of the front conical rollers (par. 144).

e. Installation. Install the rear conical rollers as illustrated on figure 74.



A—Rear conical rollers, removal and installation

Figure 74. Rear conical rollers, removal, disassembly, reassembly, and installation.



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B—Rear conical rollers, disassembly and reassembly, exploded view

Figure 74—Continued.

Section V. POWER TRANSFER ASSEMBLY

146. General

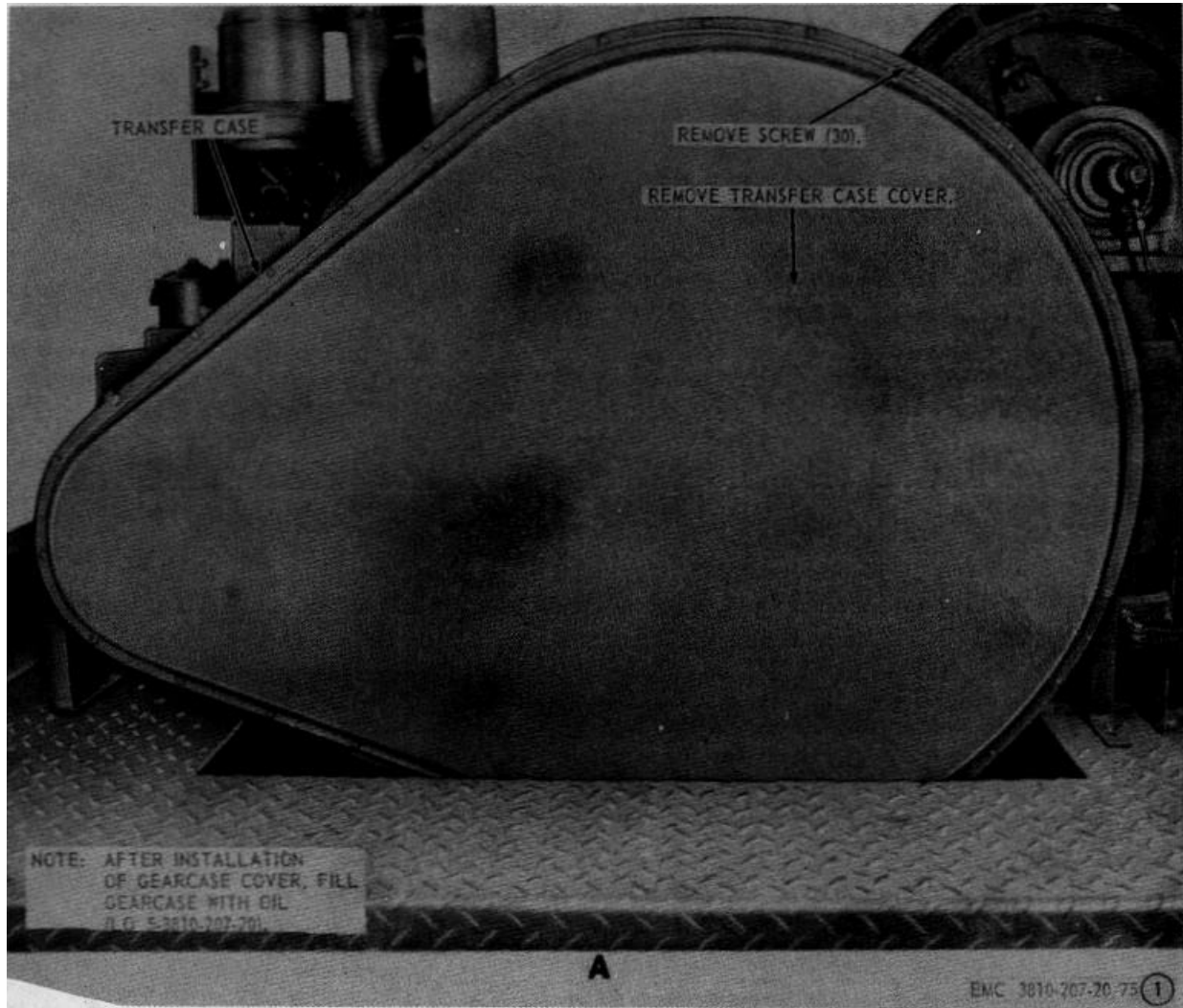
The power transfer drive chain assembly is located at the right-rear side of the crane-shovel, inside the cab. The transfer chain, input sprocket, and jackshaft sprocket are inclosed by the main drive chain case. The input sprocket and jackshaft sprocket are connected by the transfer chain which is a multiple-strand roller chain.

147. Power Transfer Chain Adjustment

Adjust the power transfer chain assembly as instructed on figure 76.

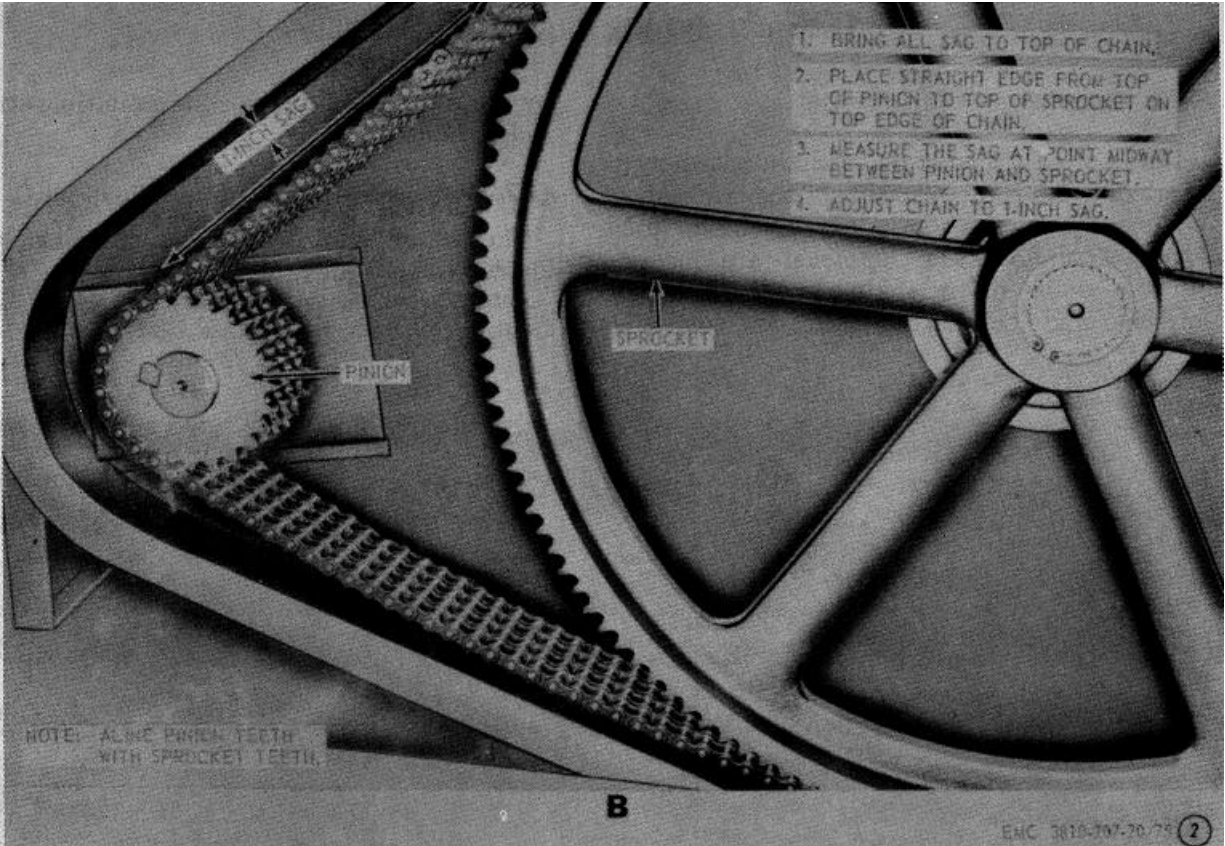
Note.

Before removal of transfer gearcase cover, drain the oil from the gearcase (TM 5-3810-207-1).



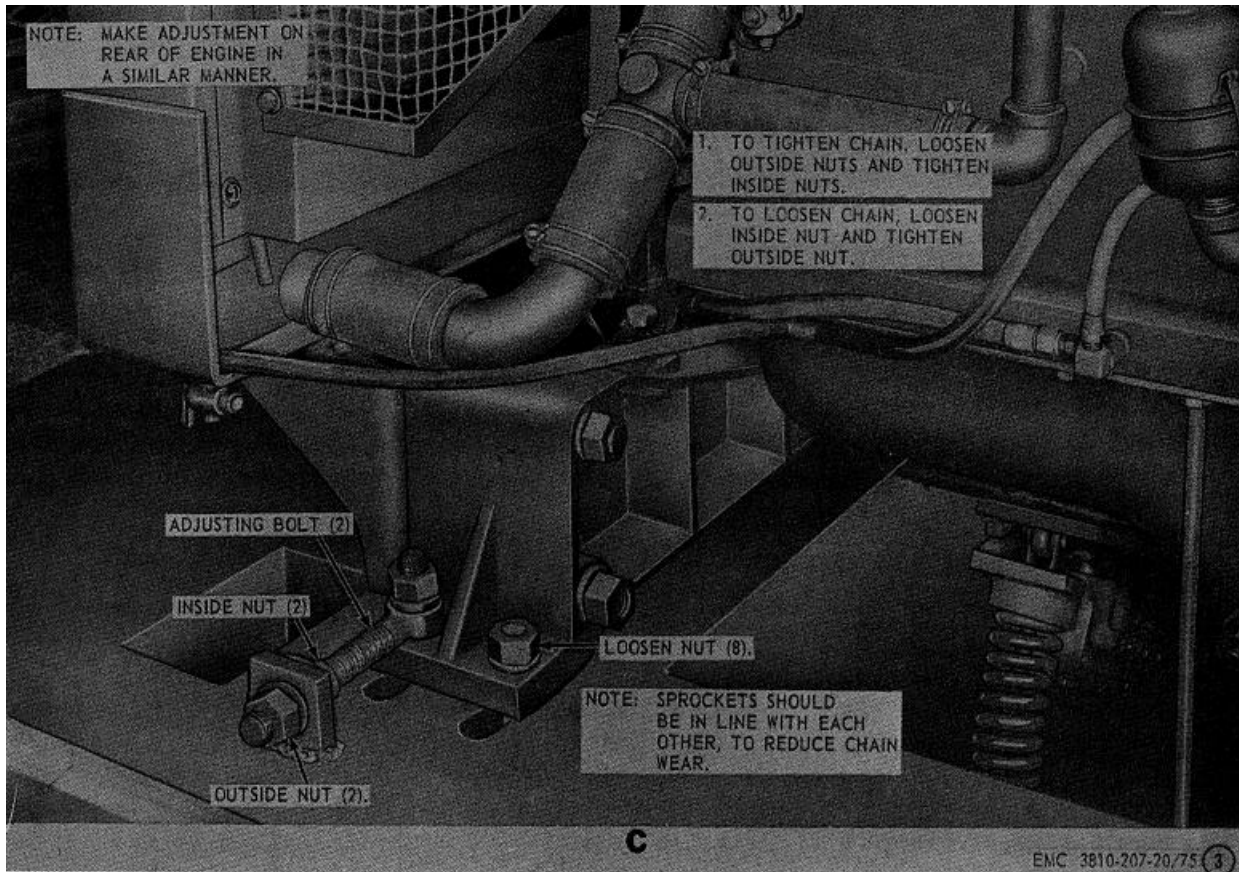
A—Transfer case cover, removal and installation

Figure 75. Power transfer chain, removal, adjustment, and installation



B—Transfer chain, adjustment

Figure 75—Continued.



C—Transfer chain, adjustment point

Figure 75—Continued.

Section VI. SWING SHAFT DRIVE ASSEMBLY

148. General

The swing shaft drive assembly is located at the right-front side of the crane-shovel, inside the cab. The swing shaft drive chain, the main shaft swing drive sprocket, the swing shaft drive sprocket, and the chain tightener are covered by the swing gear guard. The main shaft swing drive sprocket and the swing shaft drive sprocket are connected by a single-strand chain.

149. Swing Gear Guard

a. Removal.

- (1) Remove the boom hoist safety pawl rod from gear guard (par. 155).

- (2) Remove the swing gear guard as instructed on figure 76.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the guard for breaks, bends, and other damage. Repair or replace defective guard and hardware.

- c. *Installation.* Install the swing gear guard as illustrated on figure 76.

150. Swing Shaft Drive Chain and Tightener

a. Removal.

- (1) Remove the swing gear guard (par. 149).

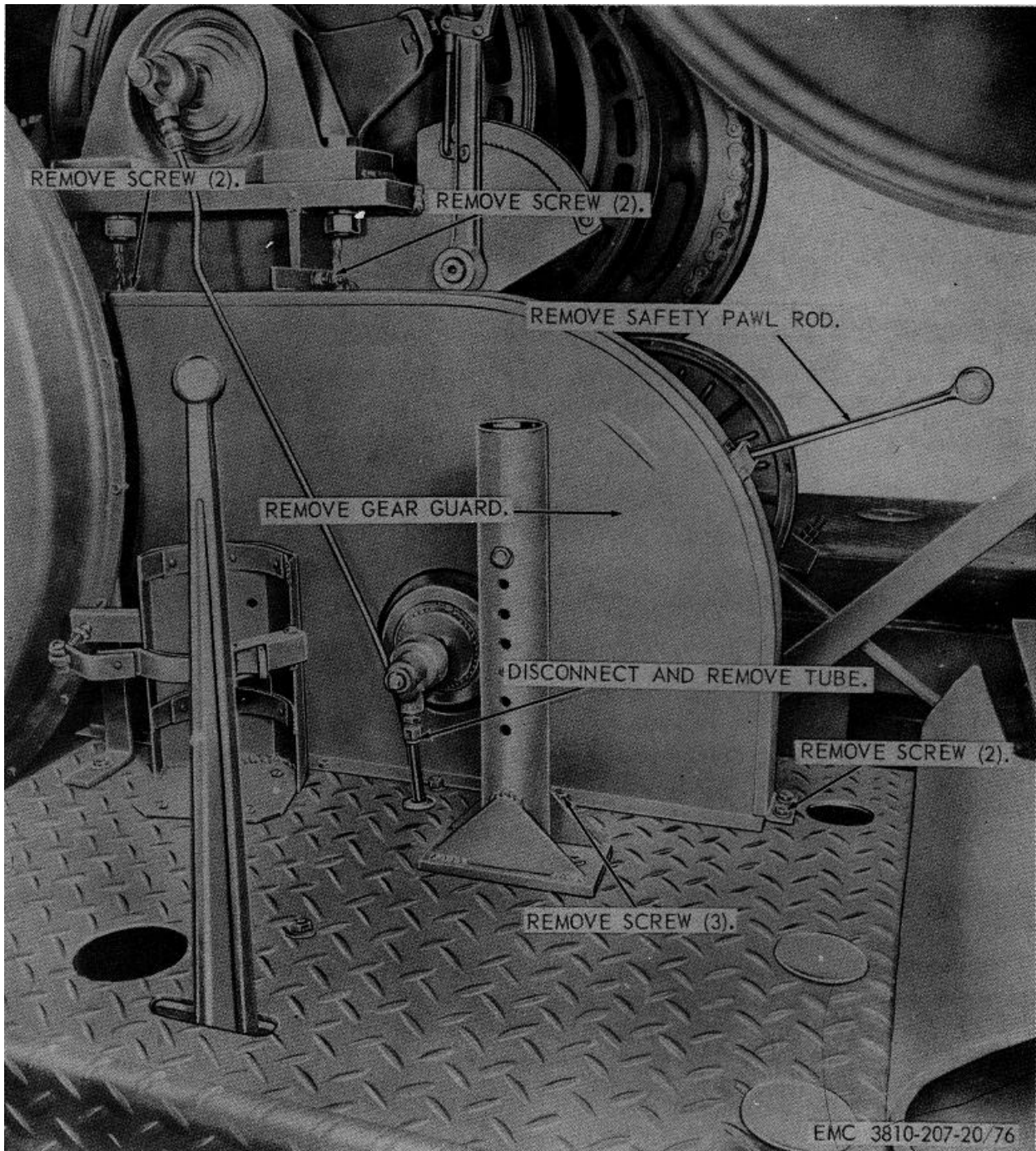


Figure 76. Swing gear guard, removal and installation.

(2) Remove the swing shaft drive chain and tightener as instructed on figure 77.

b. Cleaning, Inspection, and Repair.

(1) Clean the chain and chain tightener with an approved cleaning solvent.

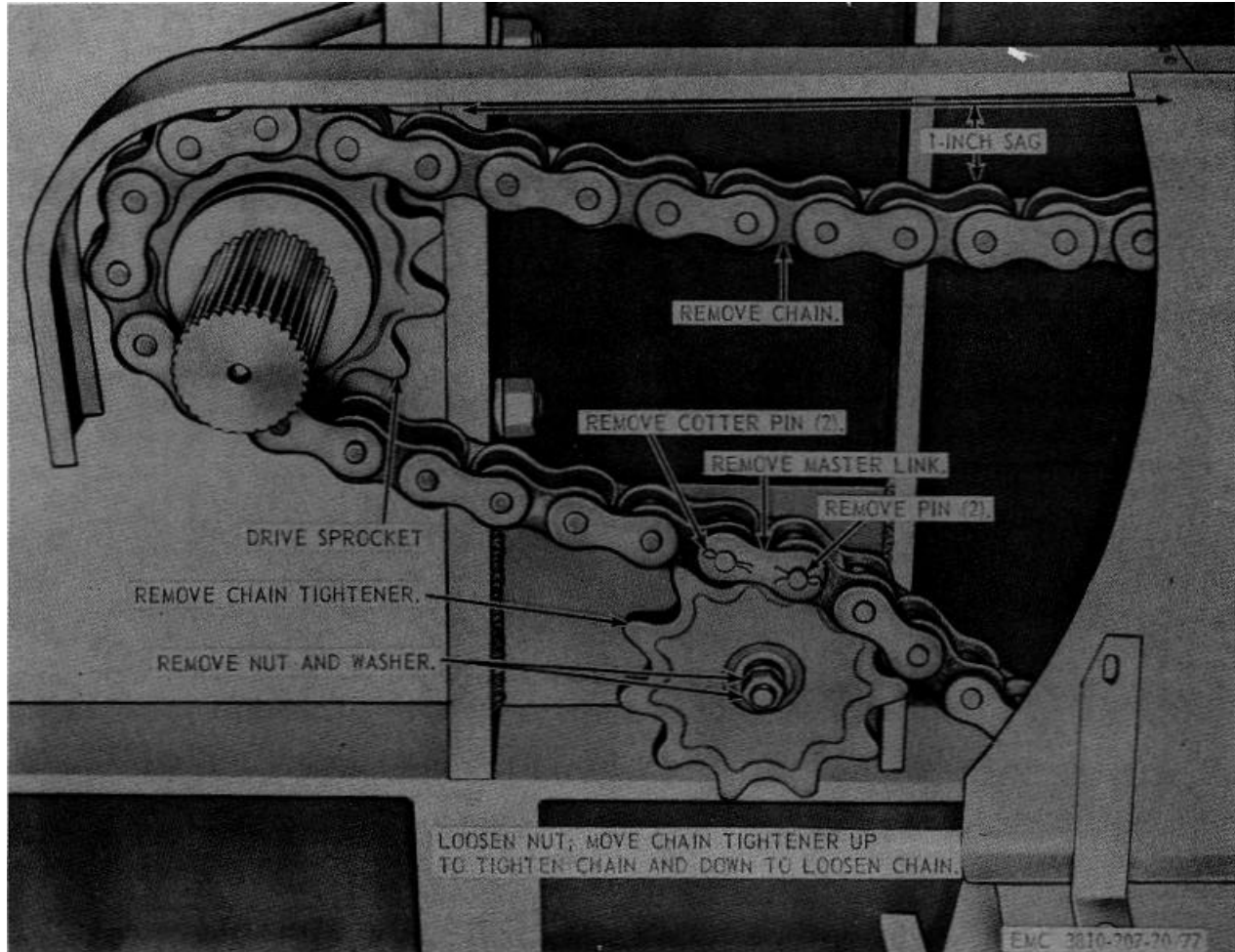


Figure 77. Swing shaft drive chain and tightener, removal and installation .

- (2) Inspect the chain for breaks, bent links, defective rollers, and other damage. Repair the chain by installing new links or replace defective chain.
- (3) Inspect the chain tightener for broken teeth, worn bushing, and other damage. Replace defective chain, tightener.

c. Installation and Adjustment.

- (1) Install the drive chain and chain tightener as illustrated on figure 77.
- (2) Adjust the drive chain as instructed on figure 77.
- (3) Install the swing gear guard (par. 149).

Section VII. MAIN AND BOOM HOIST DRIVE ASSEMBLY

151. General

The main and boom hoist drive assembly is located at the front-left side of the crane-shovel, inside the cab. The main hoist drive sprocket, boom hoist drive

sprocket, main drive sprocket, boom hoist shaft sprocket, main hoist drive chain, and boom hoist drive chain are inclosed by the main drum drive guard. The main hoist drive sprocket and the main drum drive

sprocket are connected by the main hoist drive chain which is a double-strand, roller-type chain. The boom hoist drive sprocket and boom shaft drive sprocket are connected by a single-strand, roller-type drive chain.

152. Main Drum Drive Chain Guard

a. *Removal.* Remove the main drum drive chain guard as instructed on figure 78.

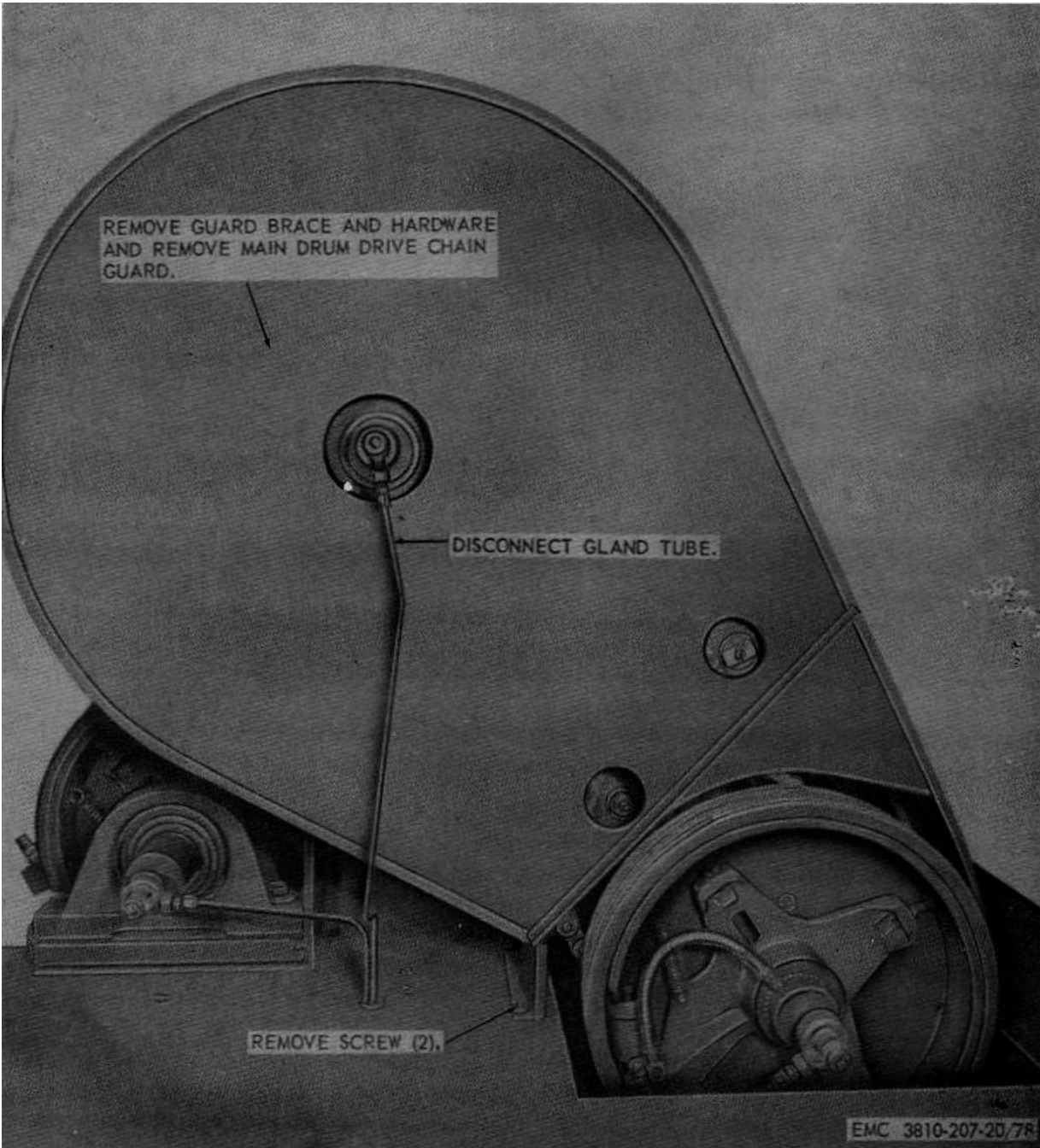


Figure 78. Main drum drive chain guard, removal and installation.

b. *Cleaning, Inspection, and Repair*

- (1) Clean all parts of the main drum drive chain guard with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, and other damage. Repair or replace defective parts.

c. *Installation.* Install the main drum drive chain guard as illustrated on figure 78.

153. Main Hoist and Boom Hoist Drive Chains

a. *Removal.*

- (1) Remove the main drum drive chain guard (par. 152).

- (2) Remove the main hoist and boom hoist drum chains as instructed on figure 79.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean the chains with an approved cleaning solvent.
- (2) Inspect the chains for breaks, bent links, defective rollers, and other damage. Repair the chains by replacing defective links and rollers, or replace defective chains.

c. *Installation.*

- (1) Install the main hoist and boom hoist drum chains as illustrated on figure 79.

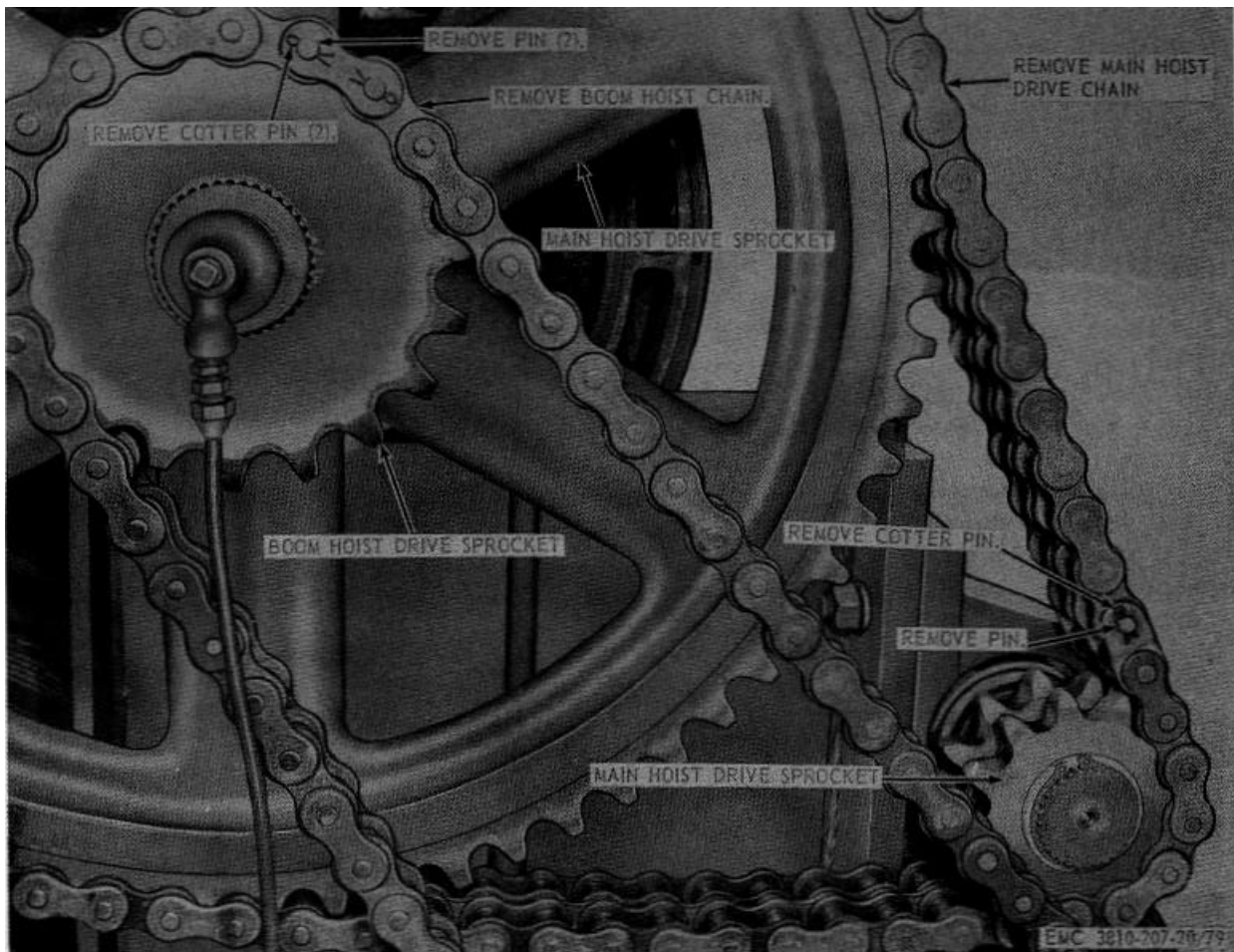


Figure 79. Main hoist and boom hoist drive chains, removal and installation.

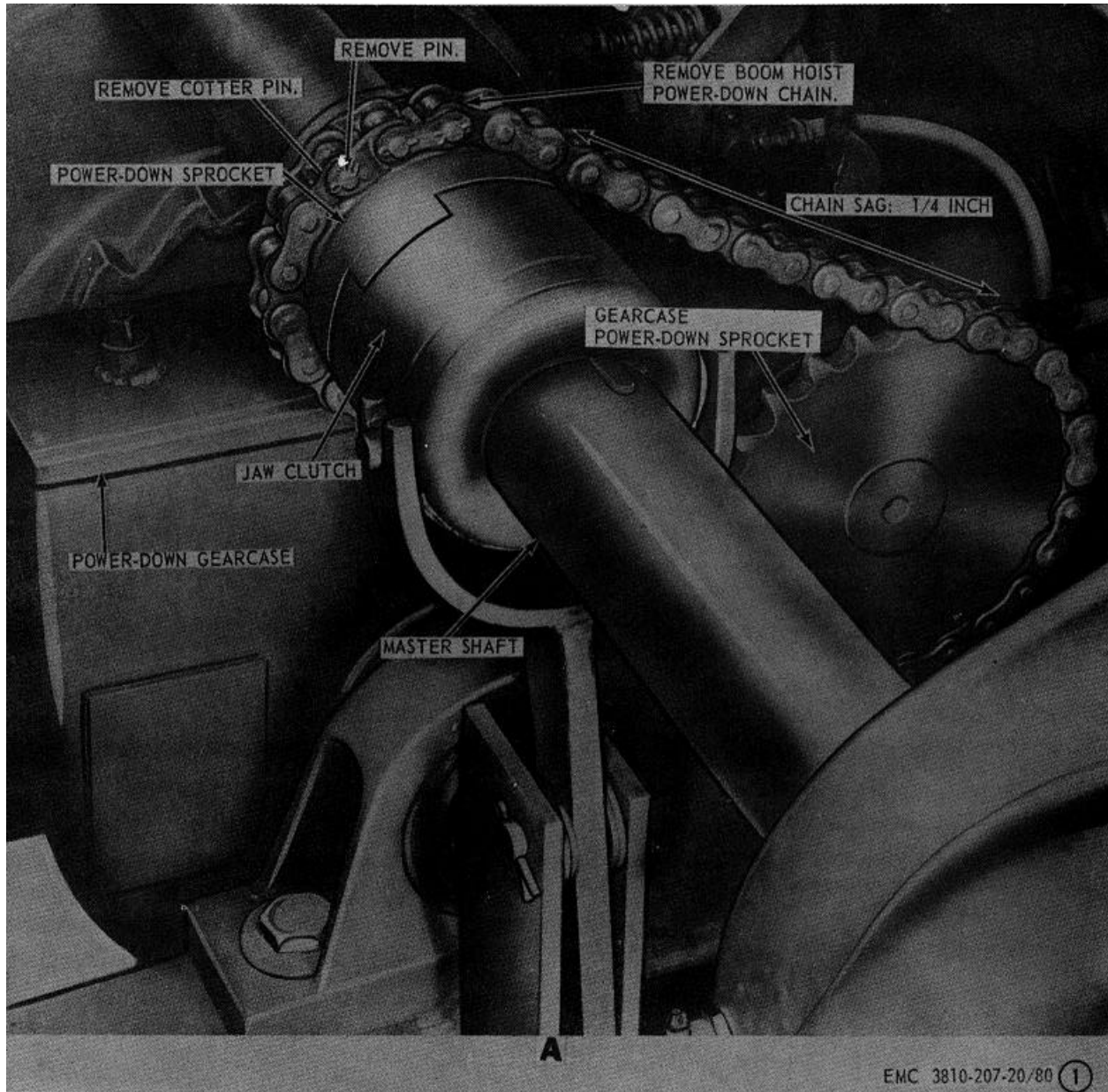
- (2) Install the main drum drive chain guard (par. 152).

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts of the chain with an approved cleaning solvent.
- (2) Inspect the chain for breaks, bent links, defective rollers, and other

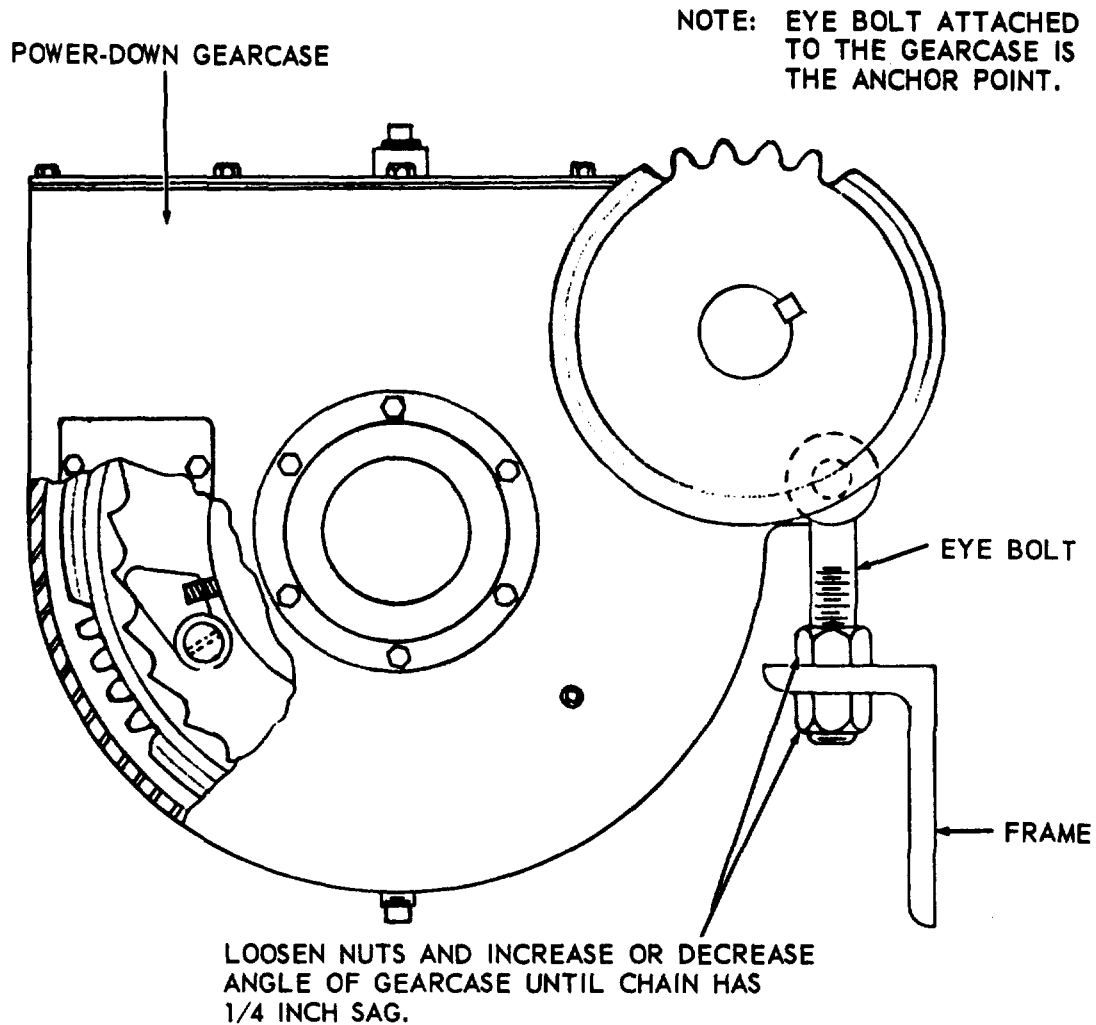
154. Boom Hoist Power-Down Chain

a. *Removal.* Remove the boom hoist power-down chain as instructed on figure 80.



A^{3/4} Boom hoist power-down chain, installed view

Figure 80. Boom hoist power-down chain, removal and installation.



B

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B^{3/4}Power-down gearcase, chain, adjustment point

Figure 80 - Continued.

damage. Repair or replace defective chain.

c. *Installation.* Install the boom hoist power-down chain as illustrated on figure 80.

d. *Adjustment.* Adjust the boom hoist power-down chain as instructed on figure 80.

155. Safety Pawl Lever and Linkage

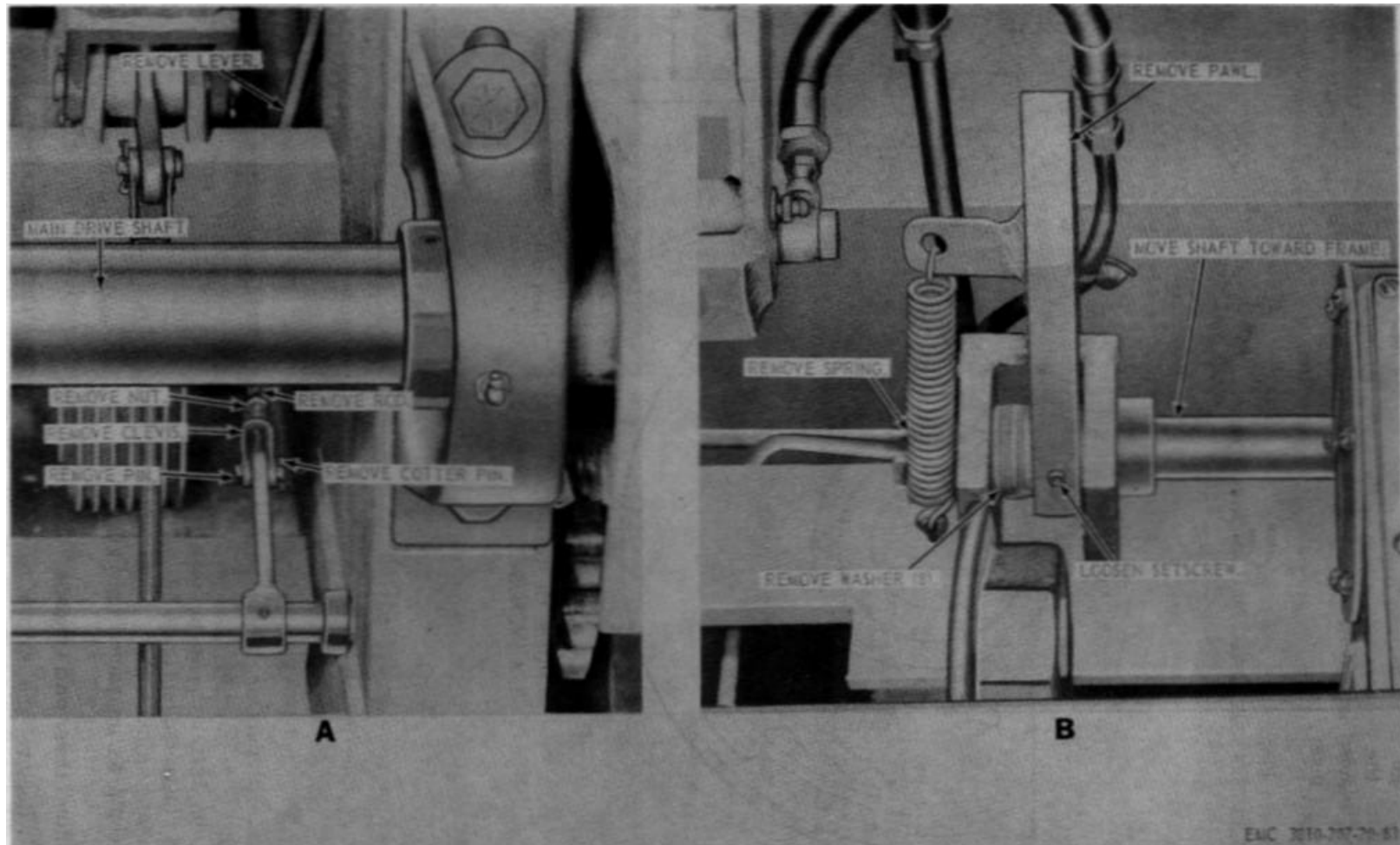
a. *Removal.* Remove the safety pawl and linkage as instructed on figure 81.

b. *Cleaning, Inspection, and Repair.*

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

(2) Inspect all parts for breaks, bends, and other damage. Repair or replace defective parts as necessary.

c. *Installation.* Install the safety pawl and linkage as illustrated on figure 81.



A³/₄ Lever and linkage, installed view

B³/₄ Safety pawl, installed view

Figure 81. Safety pawl, lever, and linkage, removal and installation.

d. *Adjustment.* Engage the pawl in the boom hoist drum with the control lever over center. Adjust the clevis, as necessary, to shorten or lengthen the lever rod.

156. Jaw Clutch Lever Linkage.

a. *Removal.*

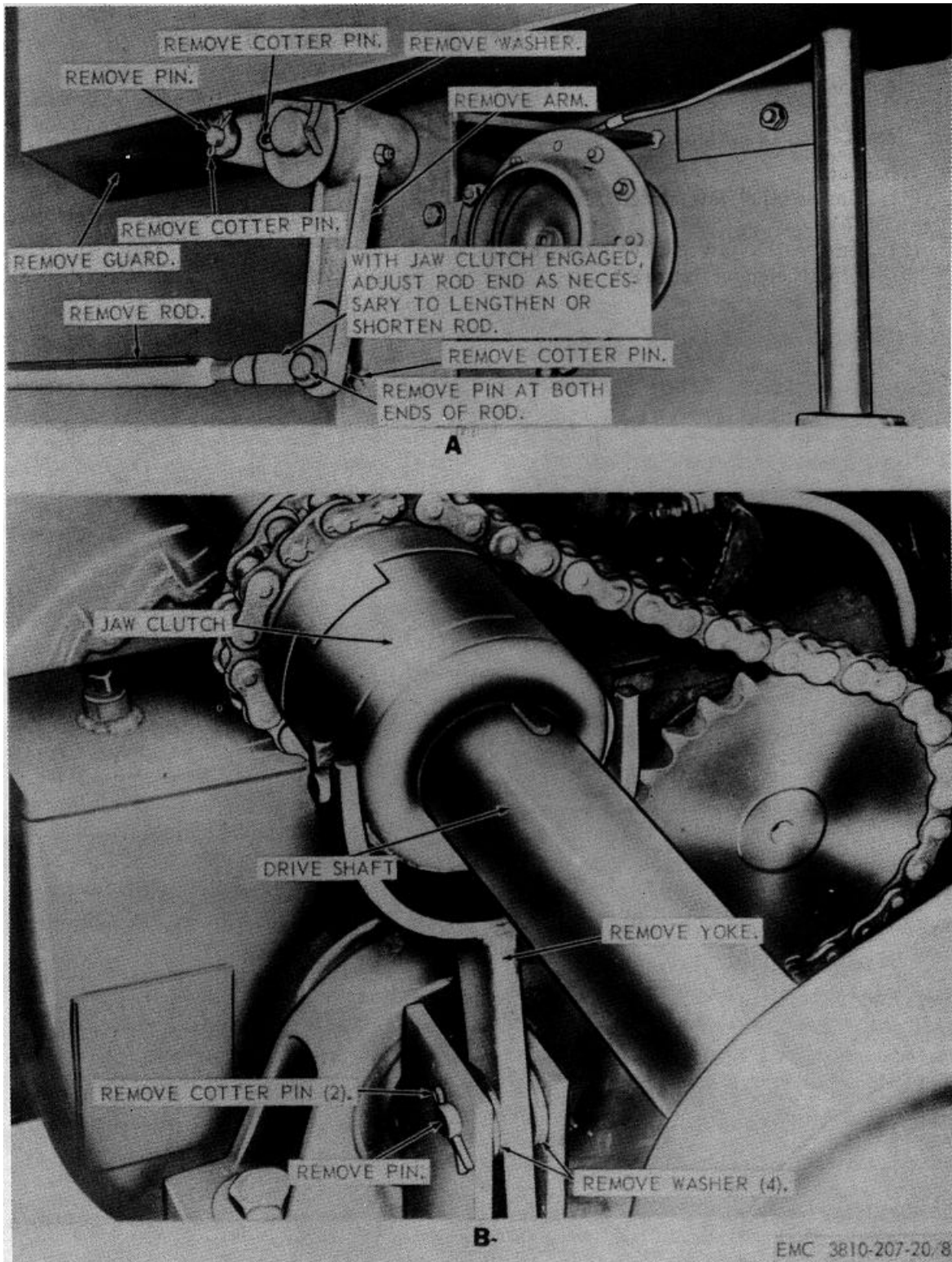
- (1) Remove the jaw clutch lever (par. 185).
- (2) Remove the jaw clutch lever linkage as instructed on figure 82.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the linkage for breaks, bends, and other damage. Repair or replace linkage as necessary.

c. *Installation.*

- (1) Install the jaw clutch lever linkage as illustrated on figure 82.
- (2) Install the jaw clutch lever (par. 135).



A³/₄ jaw clutch linkage, installed view

B³/₄ Jaw clutch yoke, installed view

Figure 82. Jaw clutch lever linkage, removal and installation.

CHAPTER 6

**AUXILIARY EQUIPMENT AND MAINTENANCE OF
ATTACHMENTS AND ACCESSORIES USED IN CONJUNCTION
WITH THE CRANE-SHOVEL**

Section I. SHOVEL FRONT ATTACHMENT

157. General

The shovel front attachment consists of the boom, dipper handles, dipper, bail sheave, dipper bail, dipper trip mechanism, saddle blocks, shipper shaft, crowd and retract mechanism, sprocket, and cables. The dipper is attached to the end of the dipper handle, which slides through the saddle block located near the center of the boom.

158. Shovel Dipper*a. Removal.*

- (1) Remove all reeving from the shovel front attachment (TM 5-810-20710).
- (2) Remove the shovel dipper as instructed on figure 83.

Note

When removing front end attachments, always use a suitable lifting device.

b. Disassembly. Disassemble the shovel dipper as illustrated on figure 83.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent
- (2) Inspect all parts for breaks, cracks, excessive wear, and other damage. Repair by welding or replace all defective parts.

d. Reassembly. Reassemble the shovel dipper as illustrated on figure 83.

e. Installation.

- (1) Install the shovel dipper as illustrated on figure 83.
- (2) Install all reeving to the shovel front attachment (TM 5-3810-207-10).

159. Bail Block*a. Removal.*

- (1) Remove the reeving from the bail block (TM 5-3810-207-10).
- (2) Remove the bail block as instructed on figure 83.

b. Disassembly. Disassemble the bail block as illustrated on figure 84.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, excessive wear, and other damage. Repair by welding or replace all defective parts.

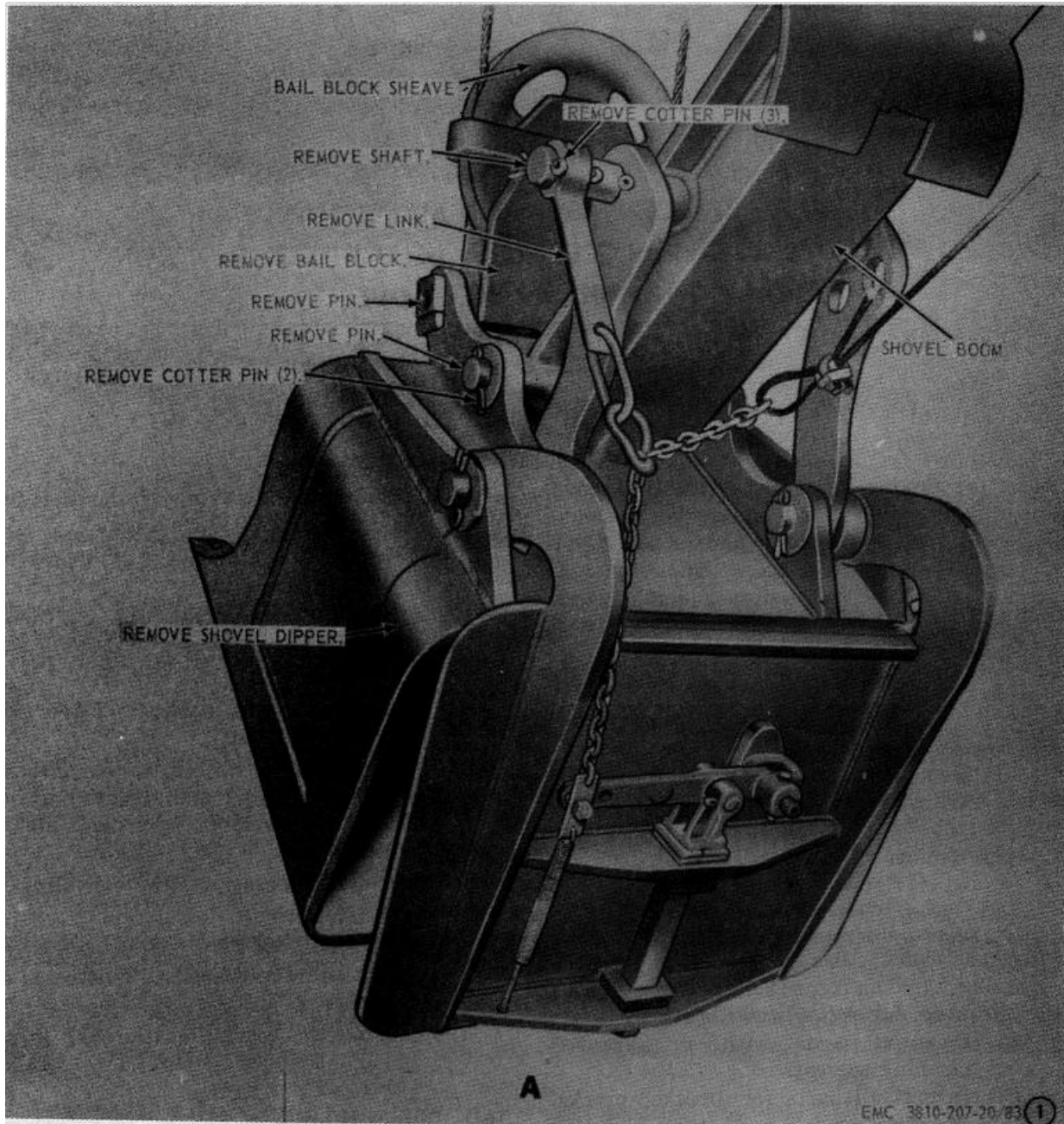
d. Reassembly. Reassemble the bail block as illustrated on figure 84.

e. Installation.

- (1) Install the bail block as illustrated on figure 83.
- (2) Install the reeving to the bail block (TM 5-3810-207-10).

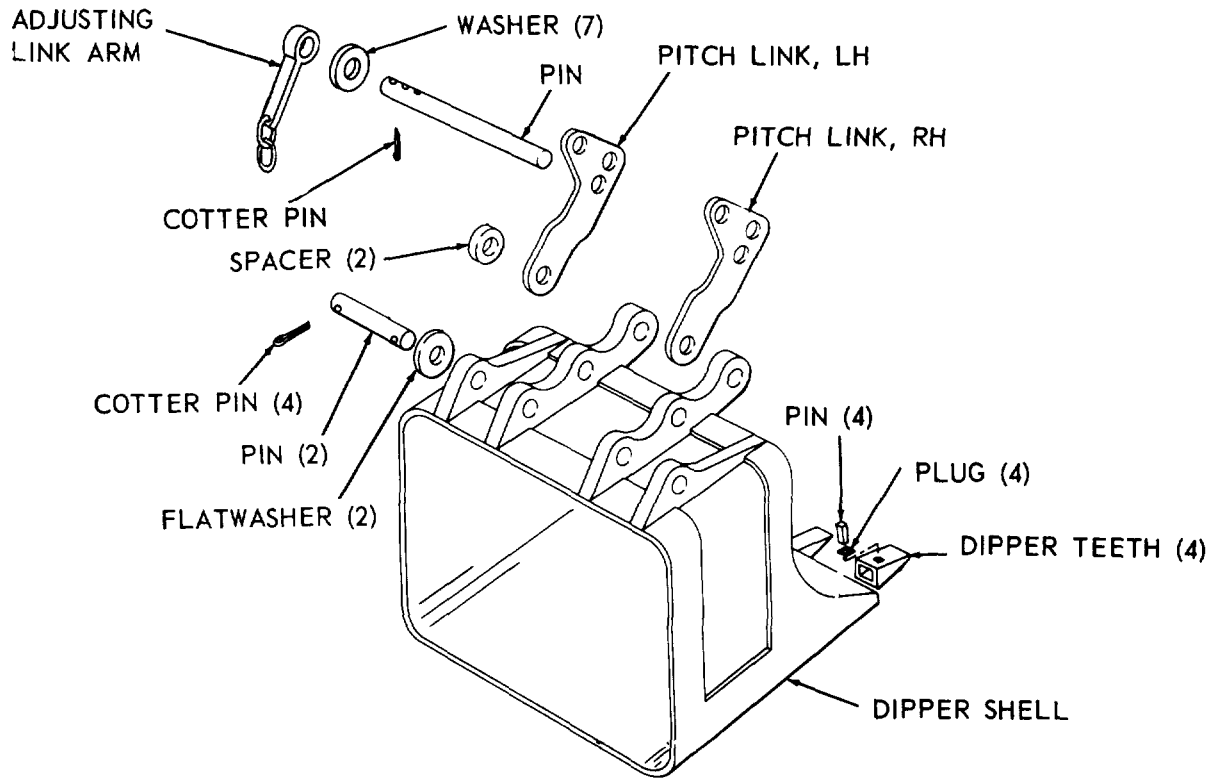
160. Dipper Handle*a. Removal.*

- (1) Remove all reeving from shovel front attachment (TM 5-3810-207-10).
- (2) Remove the shovel dipper (par. 158).
- (3) Remove crowd chain from boom (TM 5-3810-207-10).
- (4) Remove the dipper handle as instructed on figure 85.



A¾ Shovel dipper, removal and installation

Figure 83. Shovel dipper assembly.



B

EMC 3810-207-20/83 ②

B¾ Shovel dipper, partially exploded view

Figure 83 - Continued.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, or other damage. Replace all defective parts.

c. Installation.

- (1) Install the dipper handle as illustrated on figure 85.
- (2) Install crowd chain on boom (TM 5-3810-207-10).
- (3) Install shovel dipper (par. 158).
- (4) Install all cable reeving to shovel front attachment (TM 5-3810-207-10).

161. Shipper Shaft Sprocket

a. Removal.

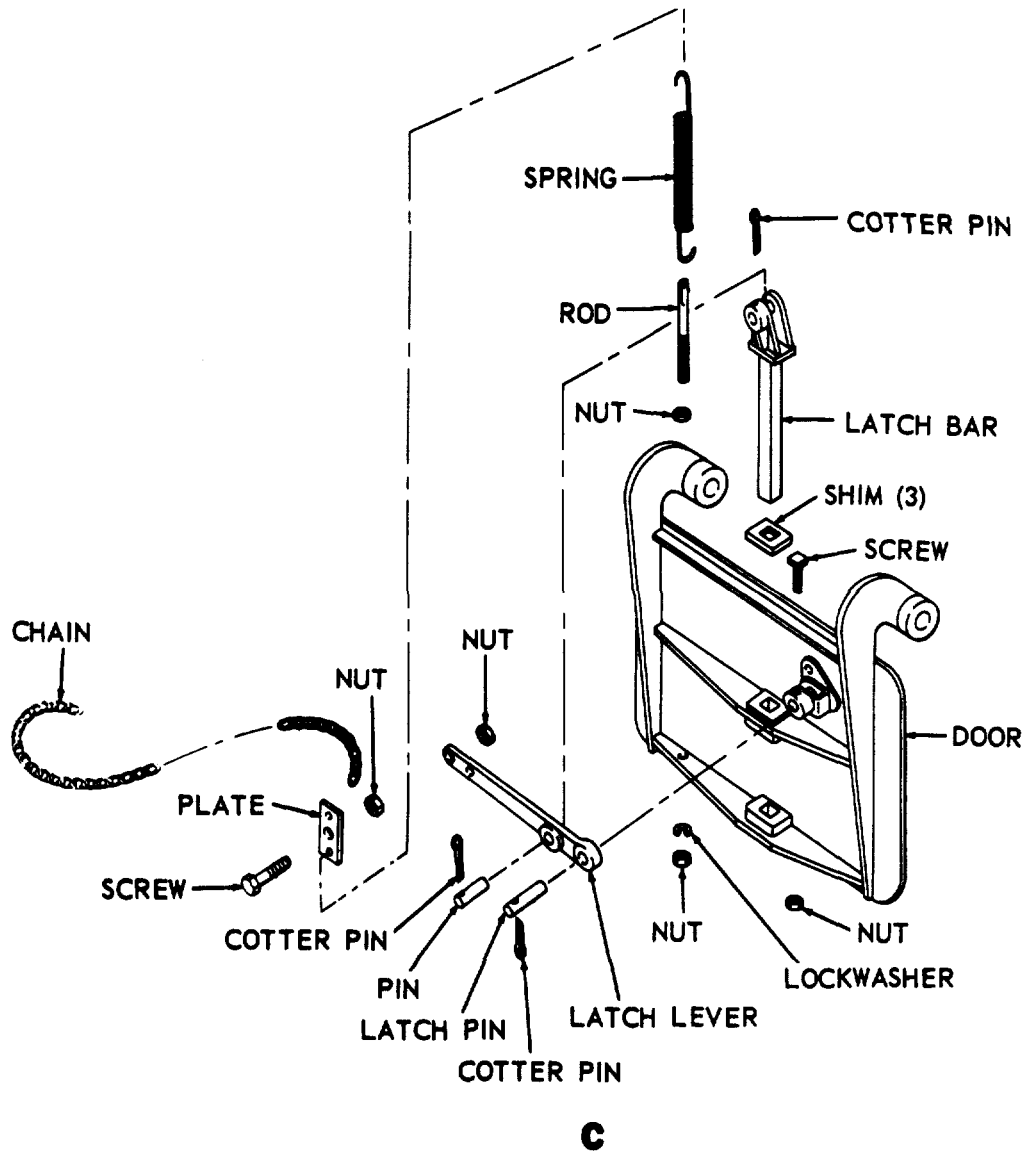
- (1) Remove the boom crowd chain (TM 5-3810-207-10).
- (2) Remove the shipper shaft sprocket as instructed on figure 86.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the sprocket for broken teeth, breaks, and other damage. Replace all defective parts.

c. Installation.

- (1) Install the shipper shaft sprocket as illustrated on figure 86.
- (2) Install the boom crowd chain (TM 5-3810-207-10).



EMC 3810-207-20/83 ③

C³/₄ shovel dipper, partially exploded view

Figure 83 - Continued.

162. Shovel Boom

a. *Removal.* Remove the shovel boom (TM 58810-207-10).

b. *Disassembly.* Disassemble the shovel boom as illustrated on figure 87.

c. *Cleaning, Inspection, and Repair.*

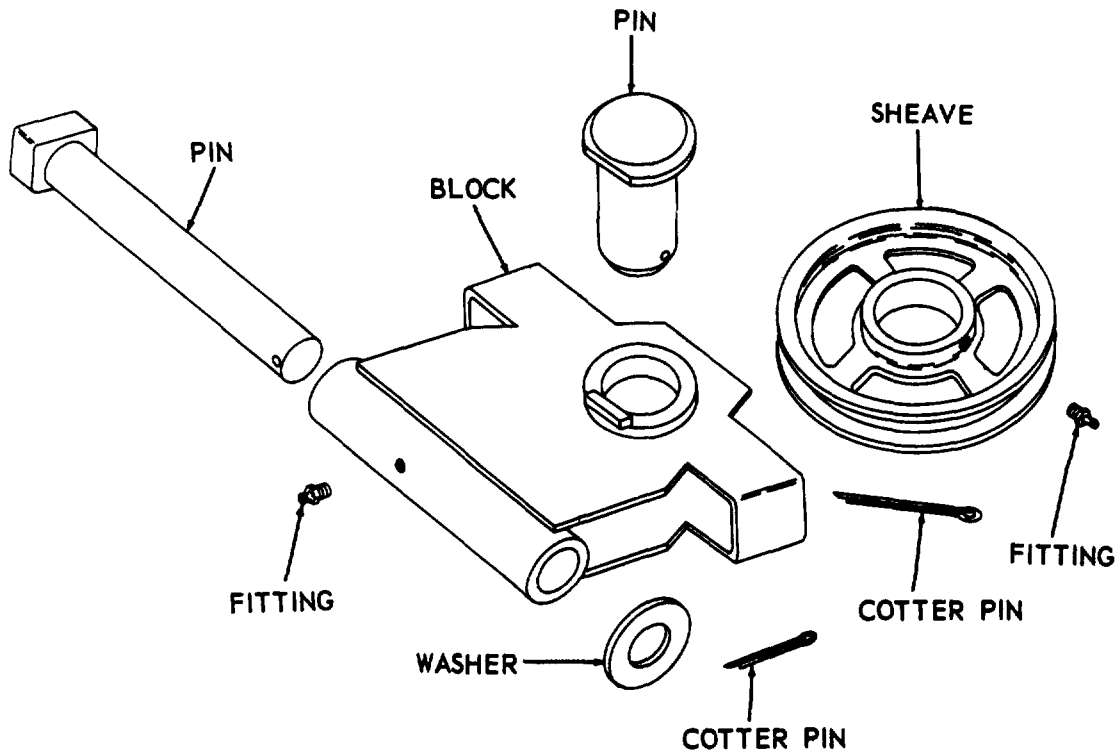
- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive

wear, and other damage. Replace all defective parts.

- (3) Inspect the shovel boom for bent, cracked, or broken conditions. Weld cracks and breaks or replace boom.

d. *Reassembly.* Reassemble the shovel boom as illustrated on figure 87.

e. *Installation.* Install the shovel boom (TM 5-3810-207-10).



EMC 3810-207-20/84

Figure 84. Bail block, exploded view.

163. Crowd and Retract Mechanism

a. Removal. Remove the crowd chains and crowd and retract mechanism from the revolving frame (TM 5-3810-207-10).

b. Disassembly. Disassemble the crowd and retract mechanism and chains as illustrated on figure 88.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Repair or replace all defective parts as necessary.

d. Reassembly. Reassemble the crowd and retract mechanism and chains as illustrated on figure 88.

e. Installation. Install the crowd and retract mechanism and chains (TM 5-3810-207-10).

- (1) Remove the boom trip drum cable (TM 5-3810-207-10).

- (2) Remove the boom trip drum as instructed on figure 89.

b. Disassembly. Disassemble the boom trip as illustrated on B, figure 89.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Replace all defective parts.

d. Reassembly. Reassemble the boom trip as illustrated on B, figure 89.

e. Installation.

- (1) Install the boom trip drum as illustrated on figure 89.

- (2) Install the boom trip drum cable (TM 5-3810-207-10).

164. Boom Trip Drum

a. Removal.

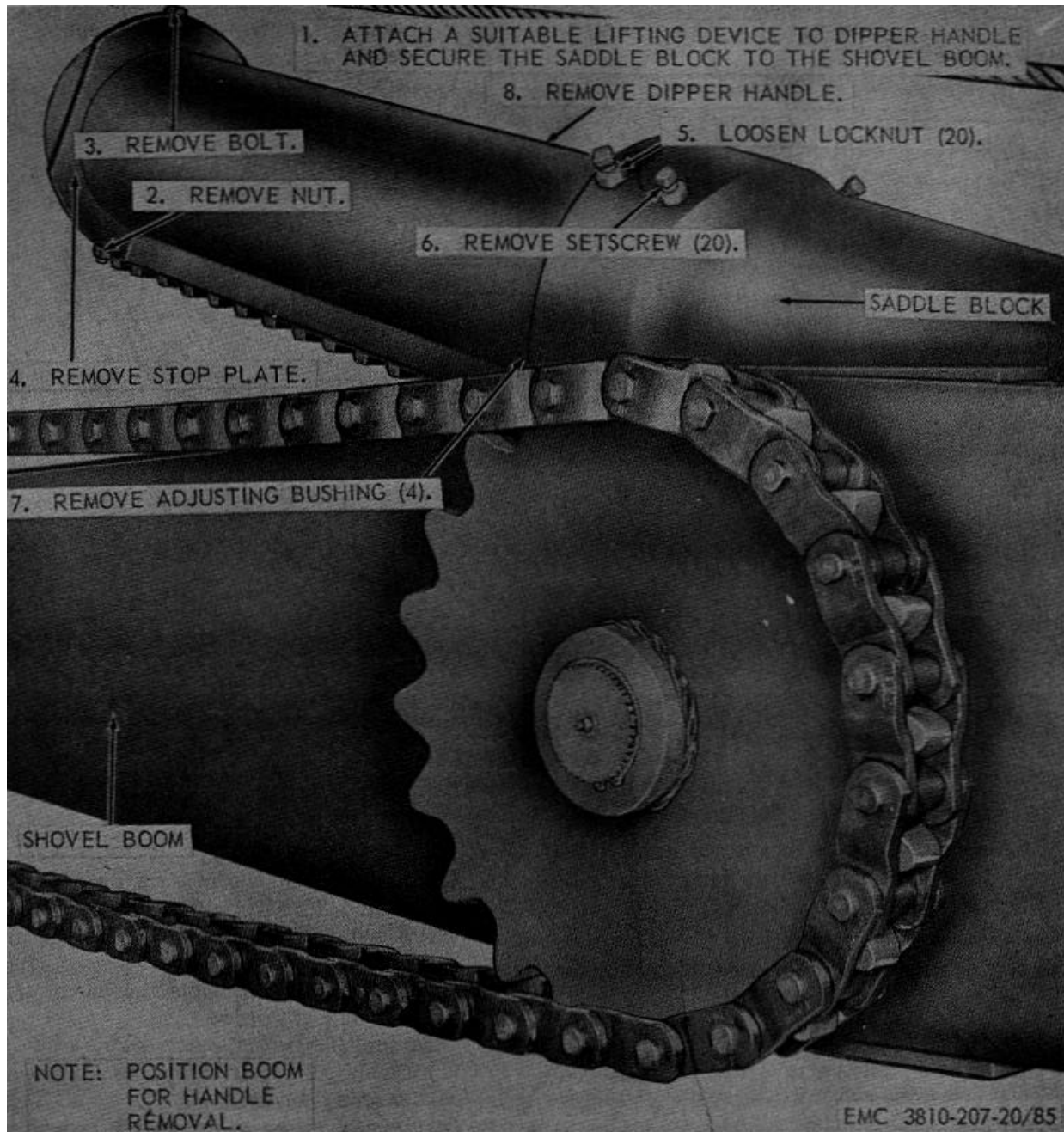


Figure 85. Dipper handle, removal and installation.

165. Dipper Trip Assembly

a. Removal.

- (1) Remove the cables from the dipper trip assembly (TM 53810207-10).
- (2) Remove the dipper trip assembly from the revolving frame as instructed on figure 90.

b. Disassembly. Disassemble the dipper trip assembly in numerical sequence as illustrated in figure 90.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.

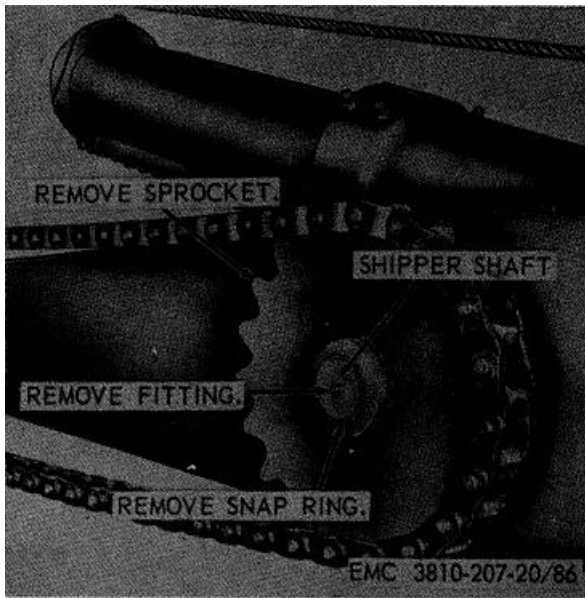


Figure 86. Shipper shaft sprocket, removal and installation.

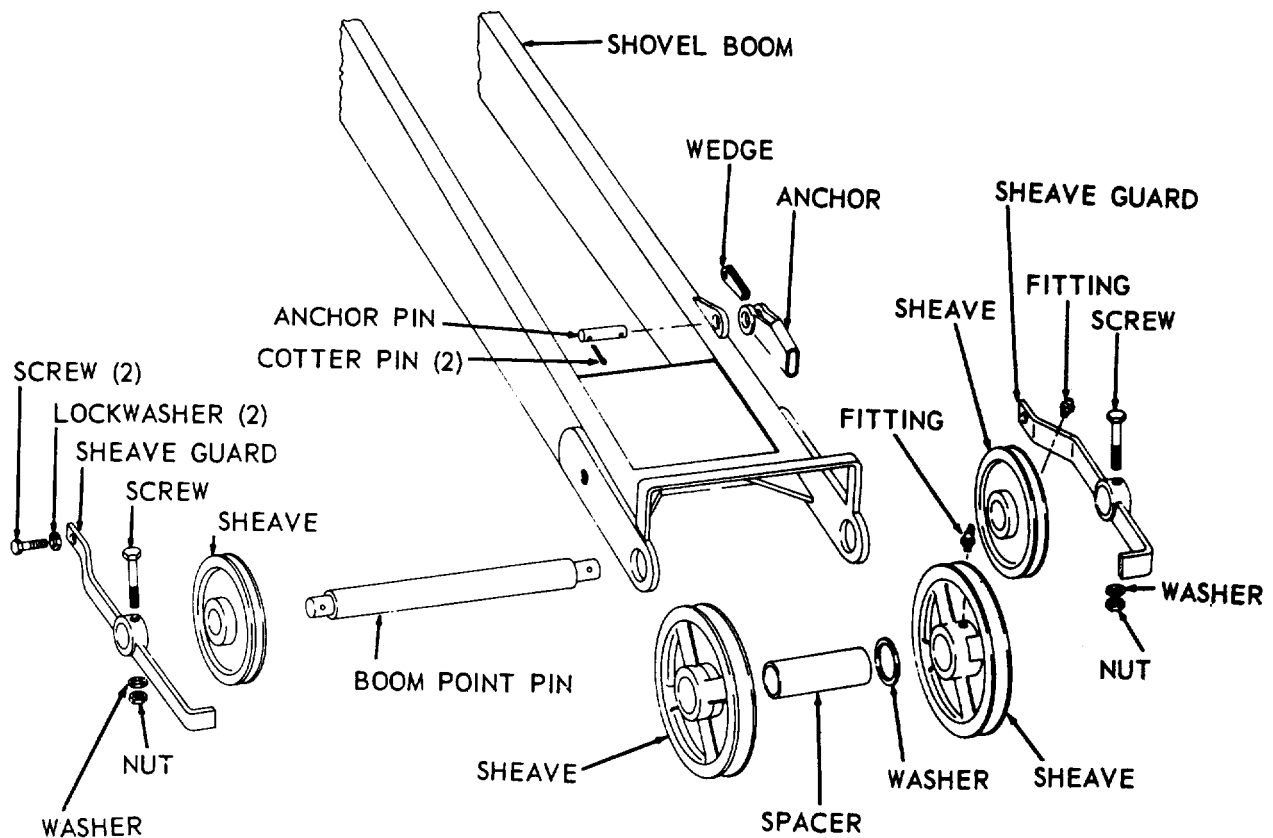
(2) Inspect all parts for breaks, excessive wear, and other damage. Replace all defective parts.

d. *Reassembly.* Reassemble the dipper trip assembly in reverse numerical sequence as illustrated on figure 90.

e. *Installation.*

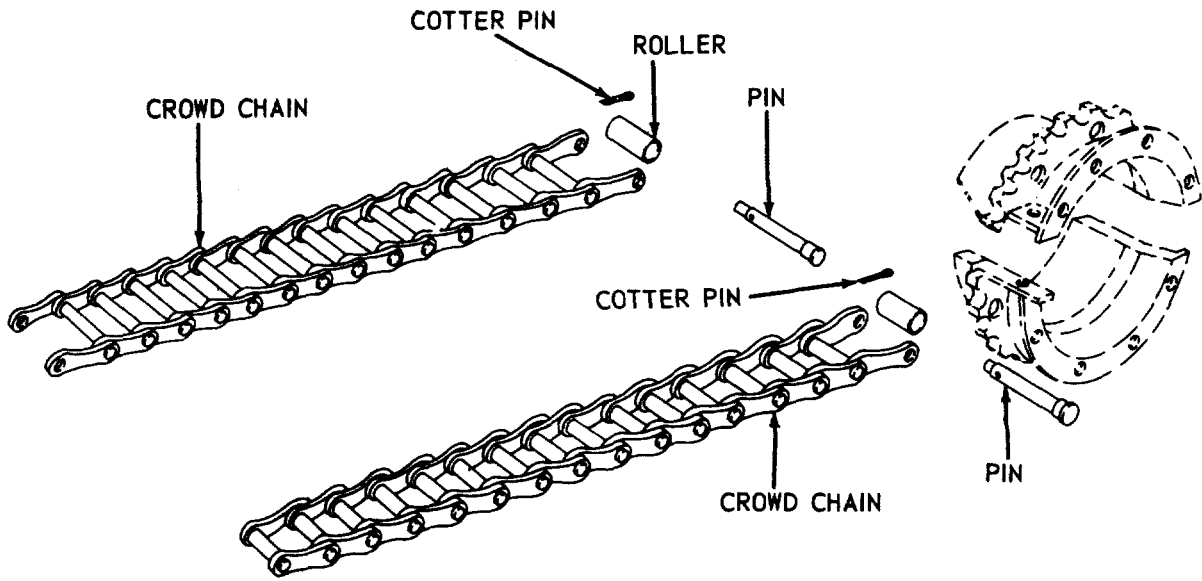
(1) Install the dipper trip assembly as illustrated on figure 90.

(2) Install the cables on the dipper trip assembly (TM 5-3810-207-10).



EMC 3810-207-20/87

Figure 87. Shovel boom, partially exploded view.

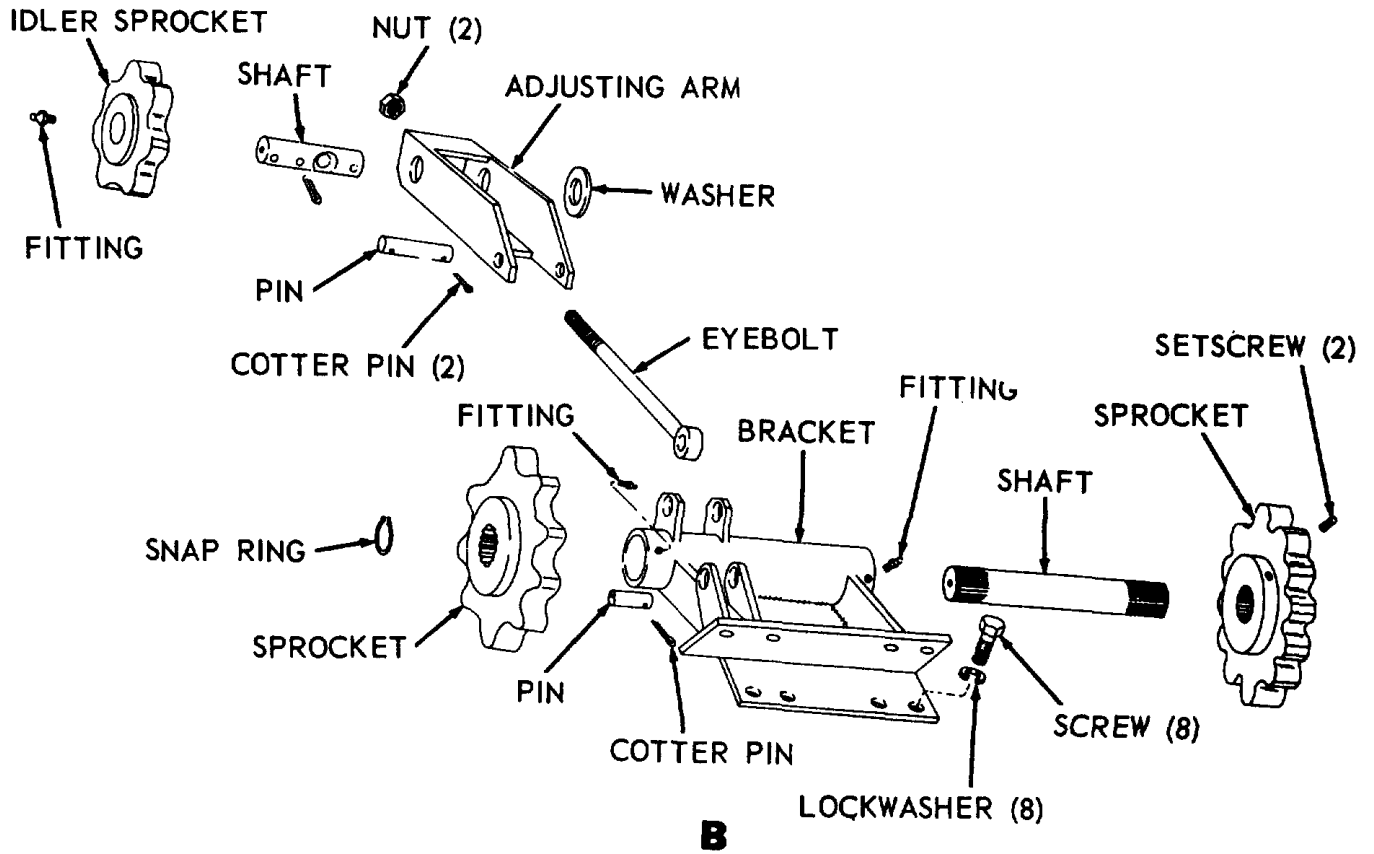


A

EMC 3810-207-20/88 (1)

A^{3/4}Crowd chains, exploded view

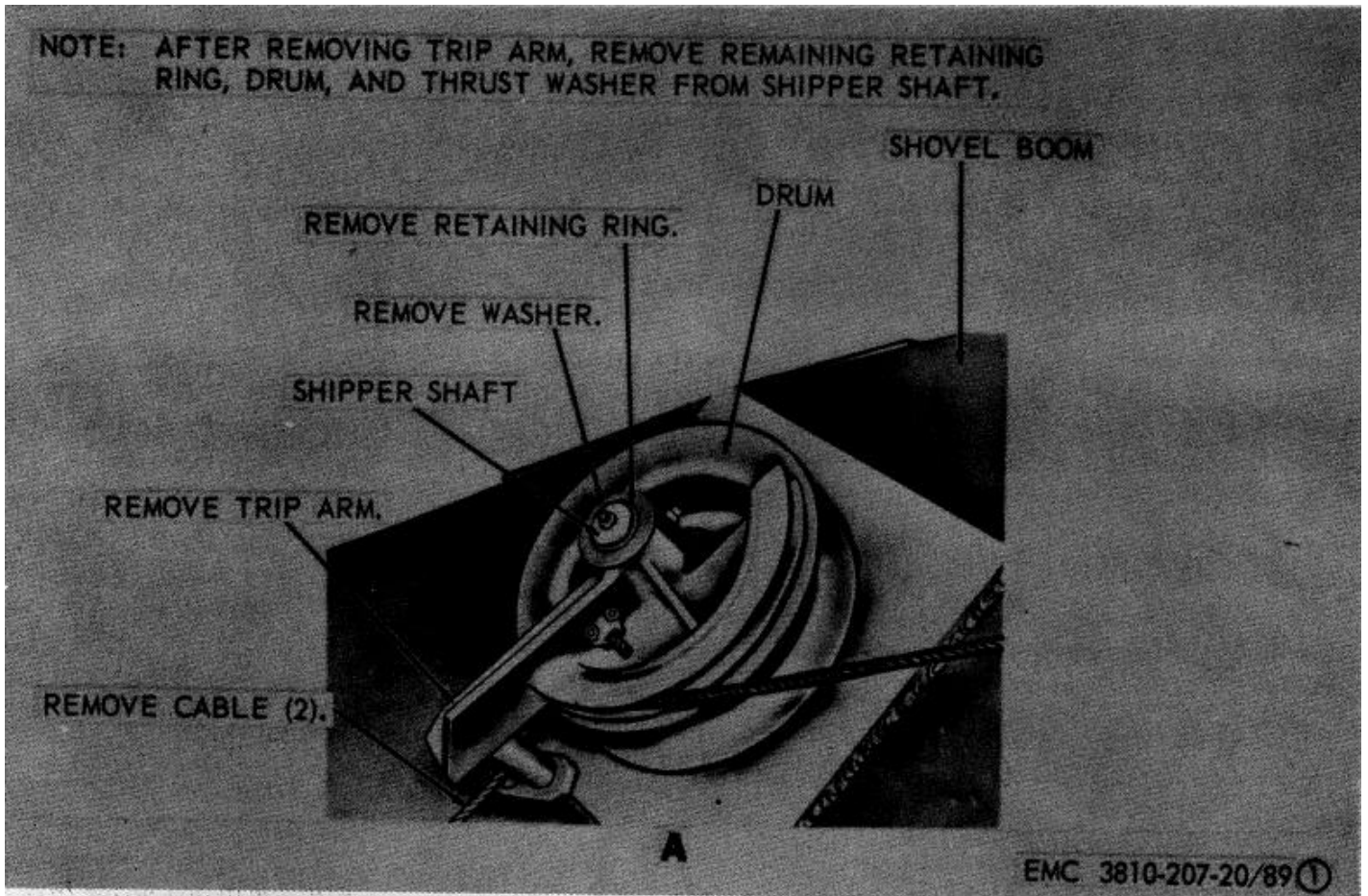
Figure 88. Crowd and retract mechanism and chains, disassembly and reassembly.



EMC 3810-207-20/88 ②

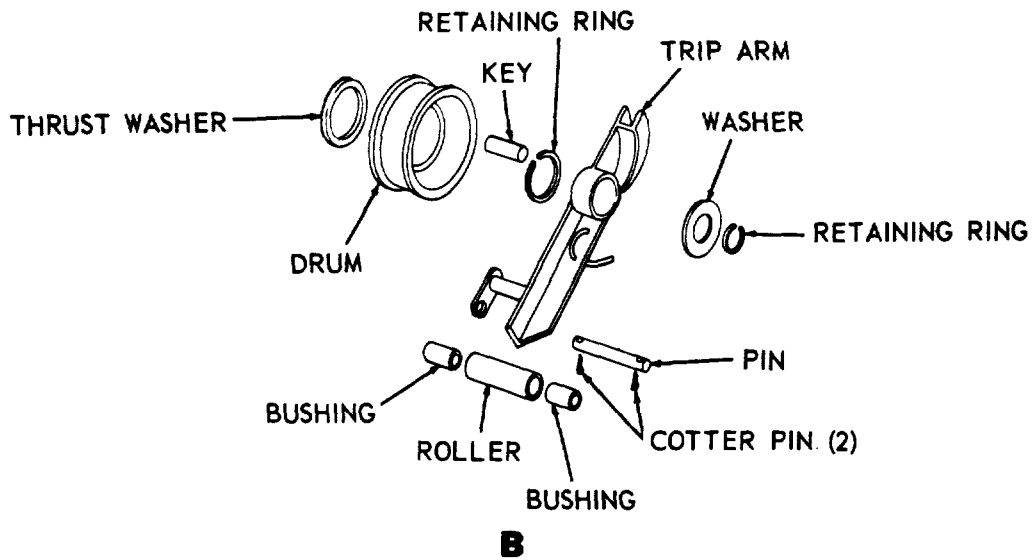
B-Crowd and retract mechanism, exploded view.

Figure 88-Continued.

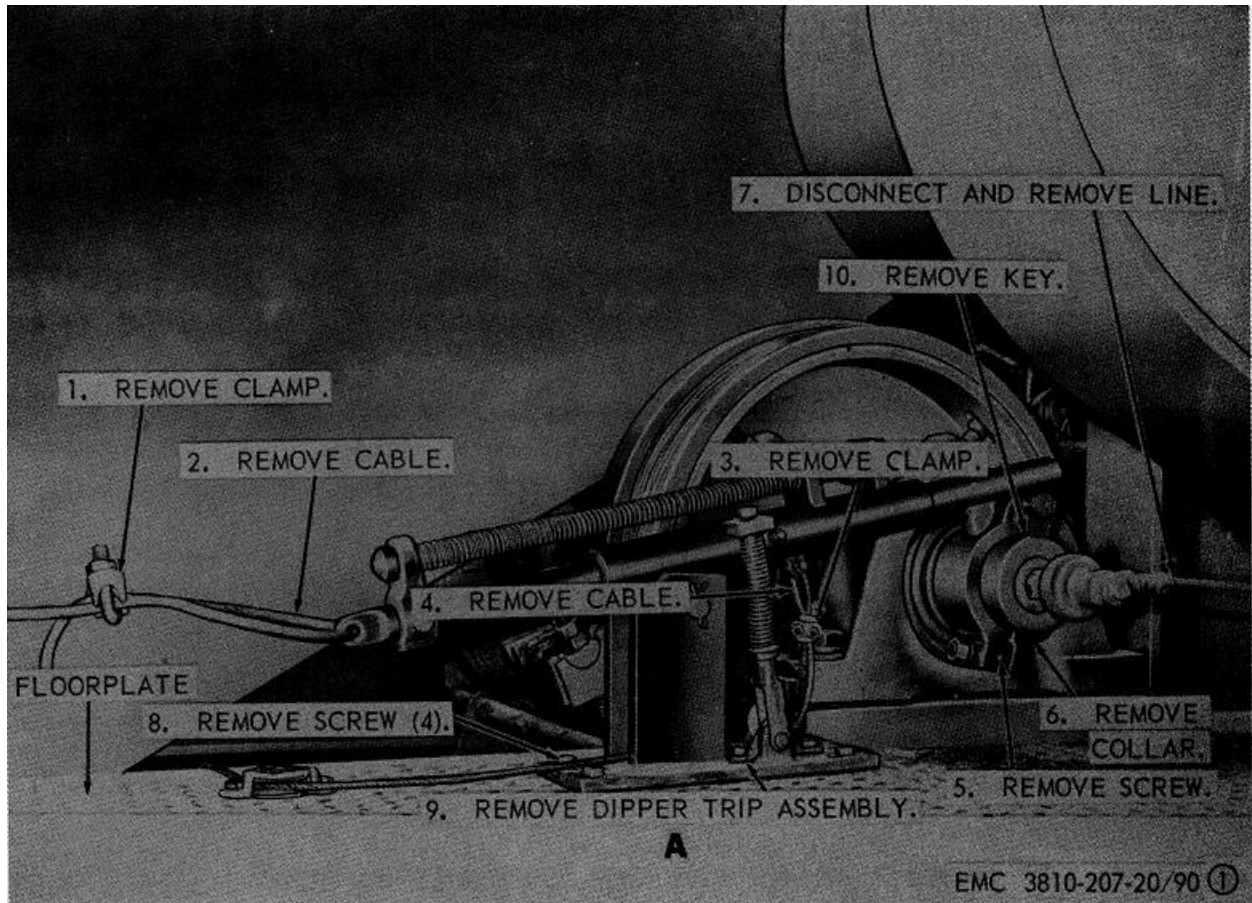


A-Boom trip drum, removal and installation

Figure 89. Boom trip drum assembly.

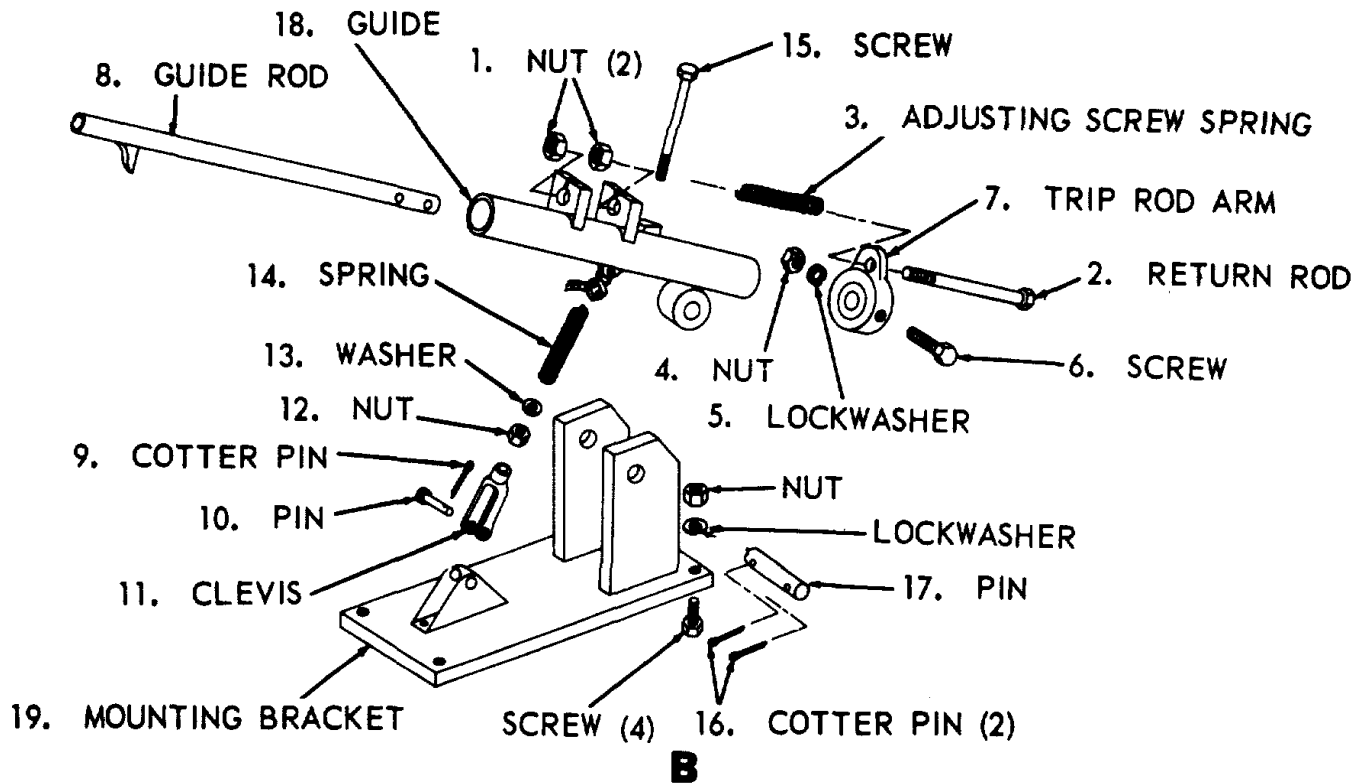


B-Boom trip drum, exploded view



A-Dipper trip assembly, removal and installation

Figure 90. Dipper trip assembly.



EMC 3810-207-20/90 (2)

B-Dipper trip assembly, exploded view

Figure 90-Continued.

Section II. CRANE, DRAGLINE, OR CLAMSHELL BOOM

166. General

The boom for crane, dragline, and clamshell operations is the same. The lower boom section is connected by two boom footpins to the revolving frame. The upper boom section carries the boom point sheave assembly. A 10-foot center section can be used to extend the length of the boom. The boom is of welded construction.

167. Crane Boom

a. Removal.

- (1) Remove all reeving from the crane boom (TM 5-3810-207-10).
- (2) Remove the crane boom from the revolving frame (TM 5-3810-207-10).

b. Disassembly. Disassemble the crane boom as instructed on figure 91.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts of the crane boom with an approved cleaning solvent.

- (2) Inspect the crane boom for broken welds, bends, and other damage. Repair or replace the crane boom as necessary.

- (3) Inspect the boom point sheaves and rollers and all other parts for breaks, excessive wear, and other damage. Repair or replace all defective parts as necessary.

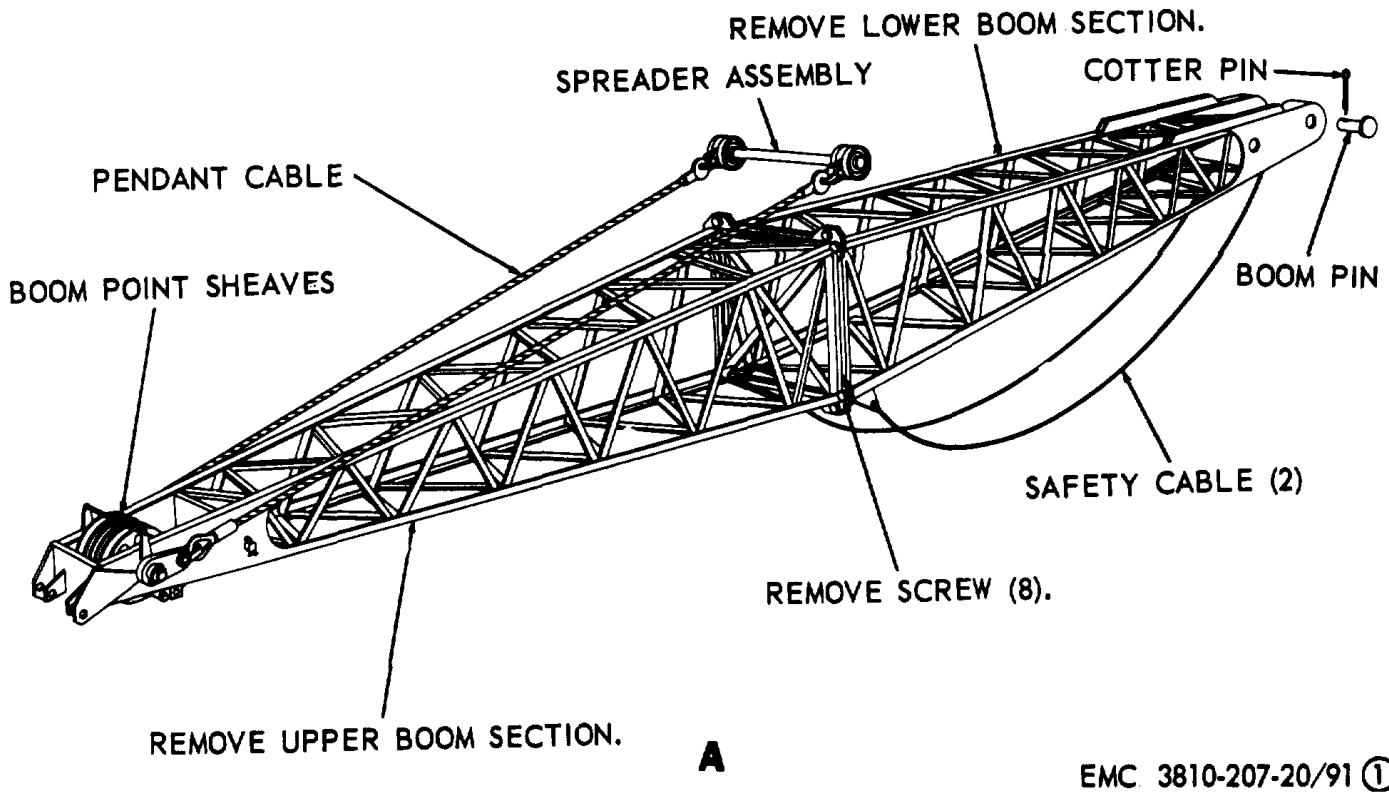
d. Reassembly. Reassemble the crane boom as illustrated on figure 91.

e. Installation.

- (1) Install the crane boom on the revolving frame (TM 5-4810-207-10).
- (2) Install the reeving on the crane boom (TM 5-3810-207-10).

168. Fair-Lead

a. Removal. Remove the fair-lead from the foot section of the crane boom (TM 5-3810-207-10).



A-Crane boom

Figure 91. Crane boom, disassembly and reassembly.

b. *Disassembly.* Disassemble the fair-lead as illustrated on figure 92.

c. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Repair or replace all parts as necessary.

d. *Reassembly.* Reassemble the fair-lead as illustrated on figure 92.

e. *Installation.* Install the fair-lead in the foot section of the crane boom (TM 5-3810-207-10).

169. Boom Harness

a. *Removal.* Remove the boom harness from the crane boom (TM 5-3810-207-10).

b. *Disassembly.* Disassemble the crane boom harness as illustrated on figure 93.

c. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace defective parts as necessary.

d. *Reassembly.* Reassemble the crane boom harness as illustrated on figure 98.

e. *Installation.* Install the boom harness on the crane boom (TM 5-3810-207-10).

170. Tag Line Winder

a. *Removal.*

- (1) Remove the tag line winder from the boom (TM 5-3810-207-10).
- (2) Remove cable from tag line winder drum (TM 5-3810-207-10).

b. *Disassembly.* Disassemble the tag line winder as illustrated on figure 94.

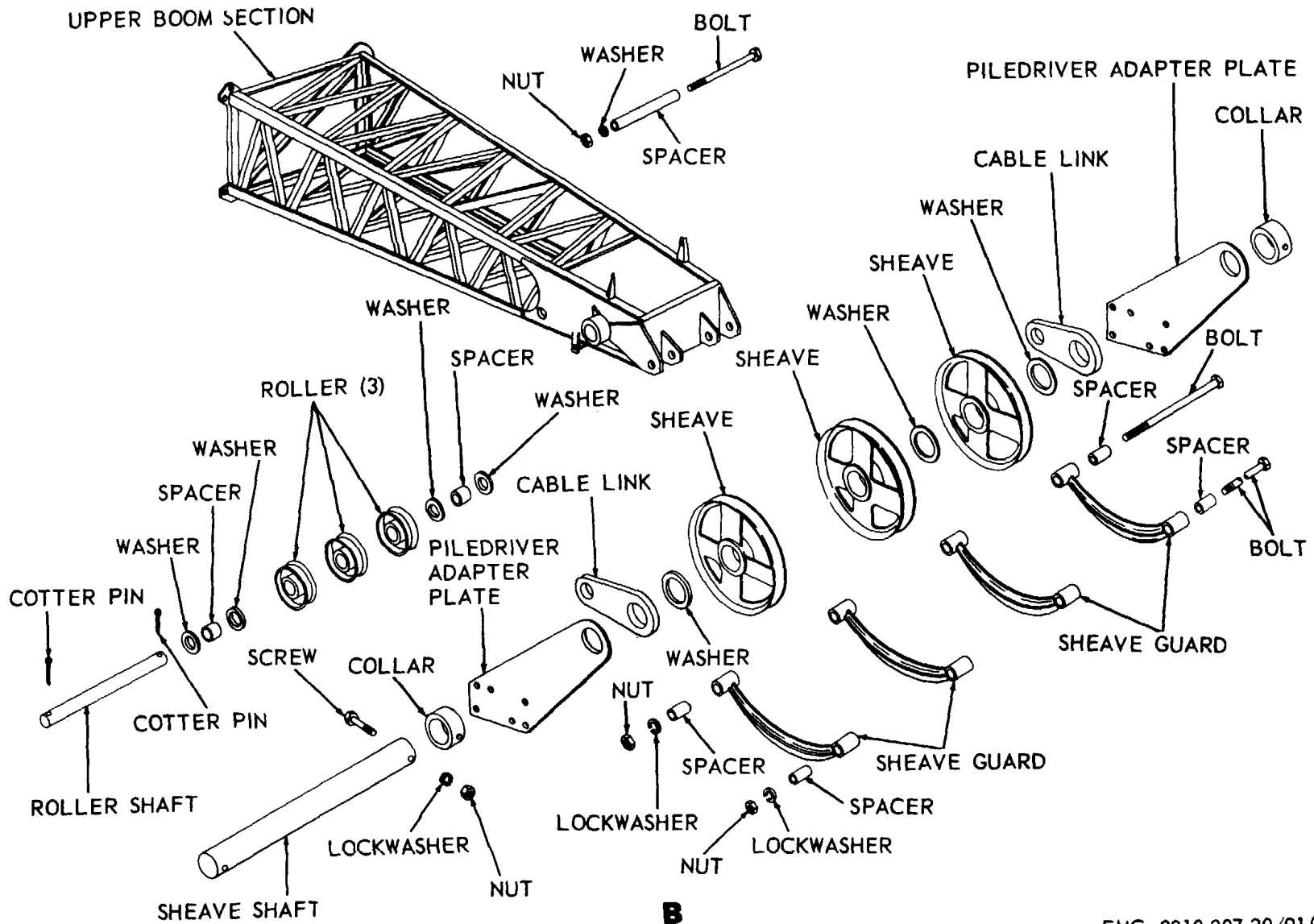
c. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Repair or replace all parts as necessary.

d. *Reassembly.* Reassemble the tag line winder as illustrated on figure 94.

e. *Installation.*

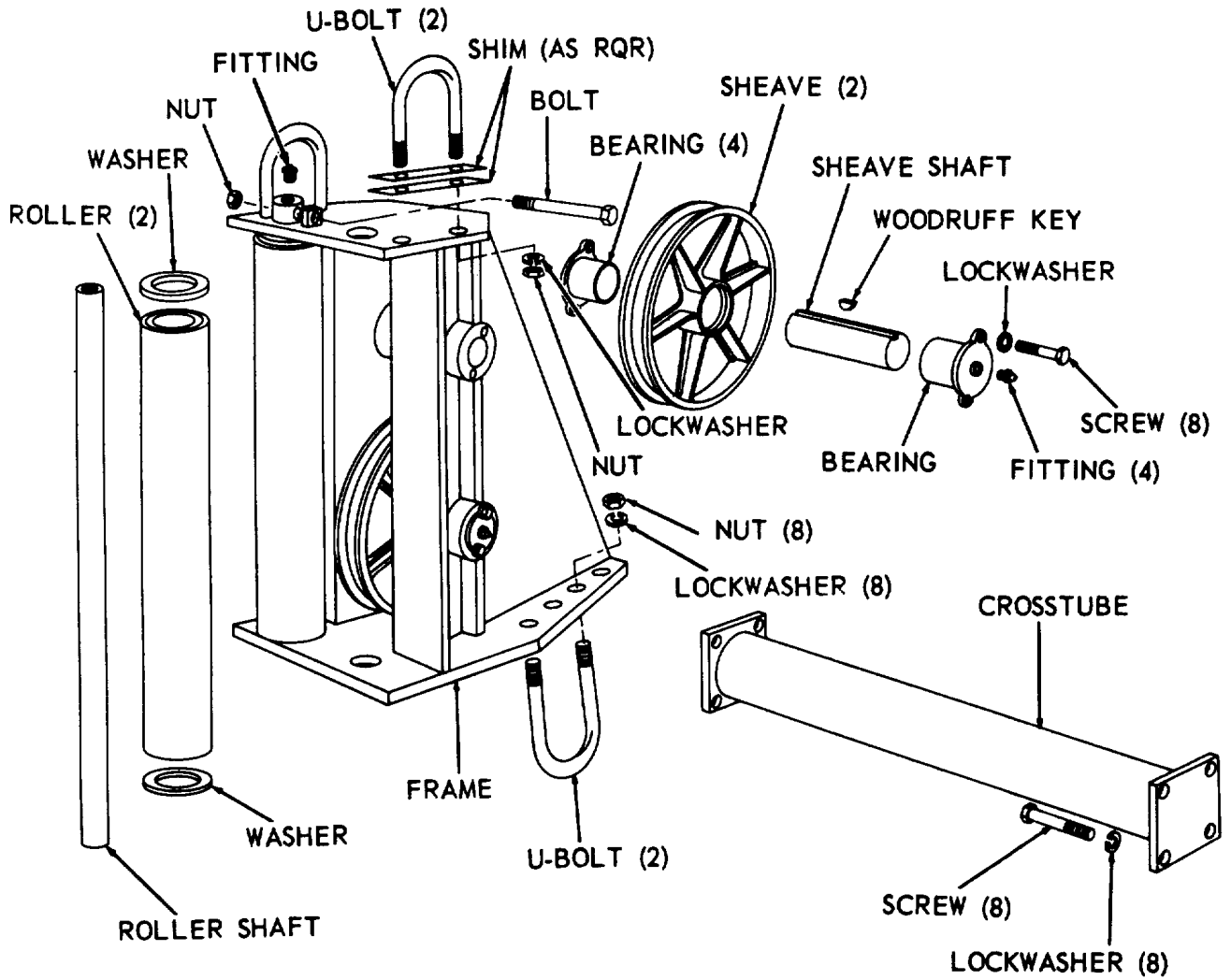
- (1) Install the tag line winder on the boom (TM 5-3810-207-10).



EMC 3810-207-20/91 (2)

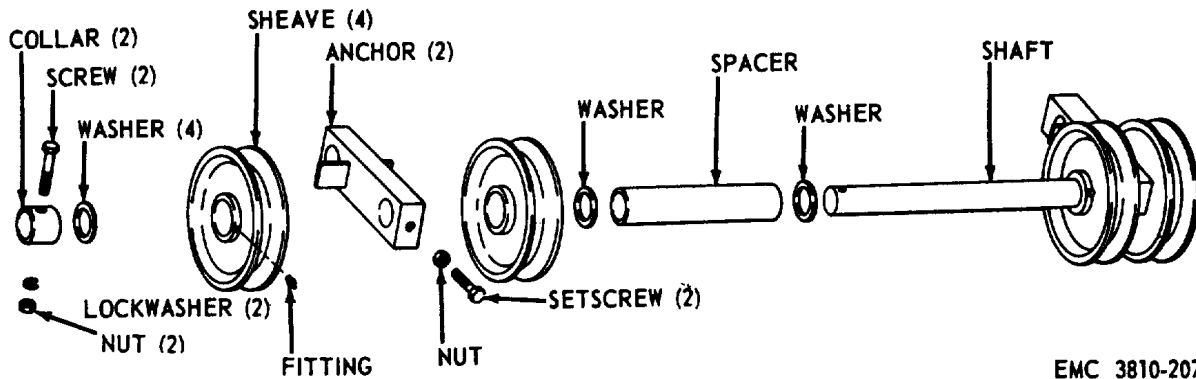
B-Crane boom, exploded view

Figure 91-Continued.



EMC 3810-207-20/92

Figure 92. Fair-lead, exploded view.



EMC 3810-207-20/93

Figure 93. Boom harness, exploded view.

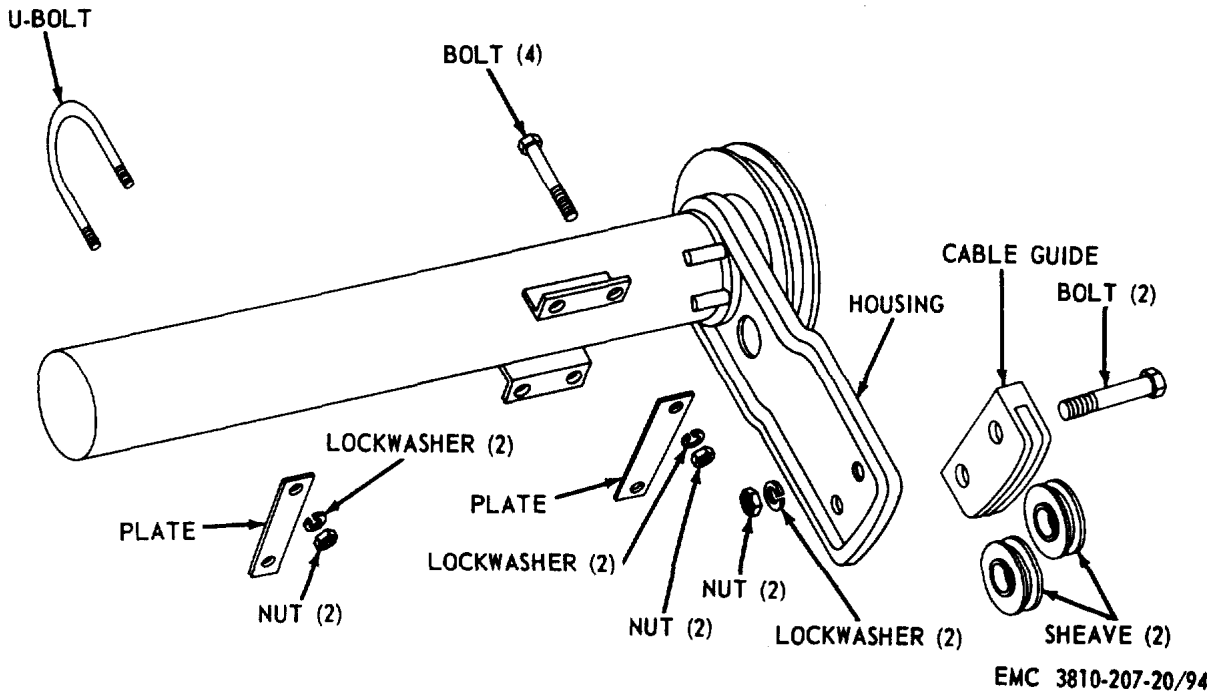


Figure 94. Tag line winder, partially exploded view.

(2) Install the cable to tag line winder drum (TM 5-3810-207-10).

(2) Inspect all parts for breaks, excessive wear, and other damage. Repair or replace all defective parts as necessary.

171. Boom Cradle

a. Removal. Remove the boom cradle as instructed on figure 95.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace all parts as necessary.

c. Installation. Install the boom cradle as illustrated on figure 95.

172. Radius Indicator

a. Removal and Disassembly. Remove and disassemble the radius indicator in the numerical sequence as instructed on figure 96.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.

c. Reassembly and Installation. Reassemble and install the radius indicator in the reverse of the numerical sequence as illustrated on figure 96.

173. Jib Boom

a. Removal. Remove the jib boom from the crane boom (TM 5-3810-207-10).

b. Disassembly. Disassemble the jib boom in numerical sequence as illustrated on figure 97.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace all parts as necessary.

d. Reassembly. Reassemble the jib boom in reverse numerical sequence as illustrated on figure 97.

e. Installation. Install the jib boom on the crane boom (TM 5-3810-207-10).

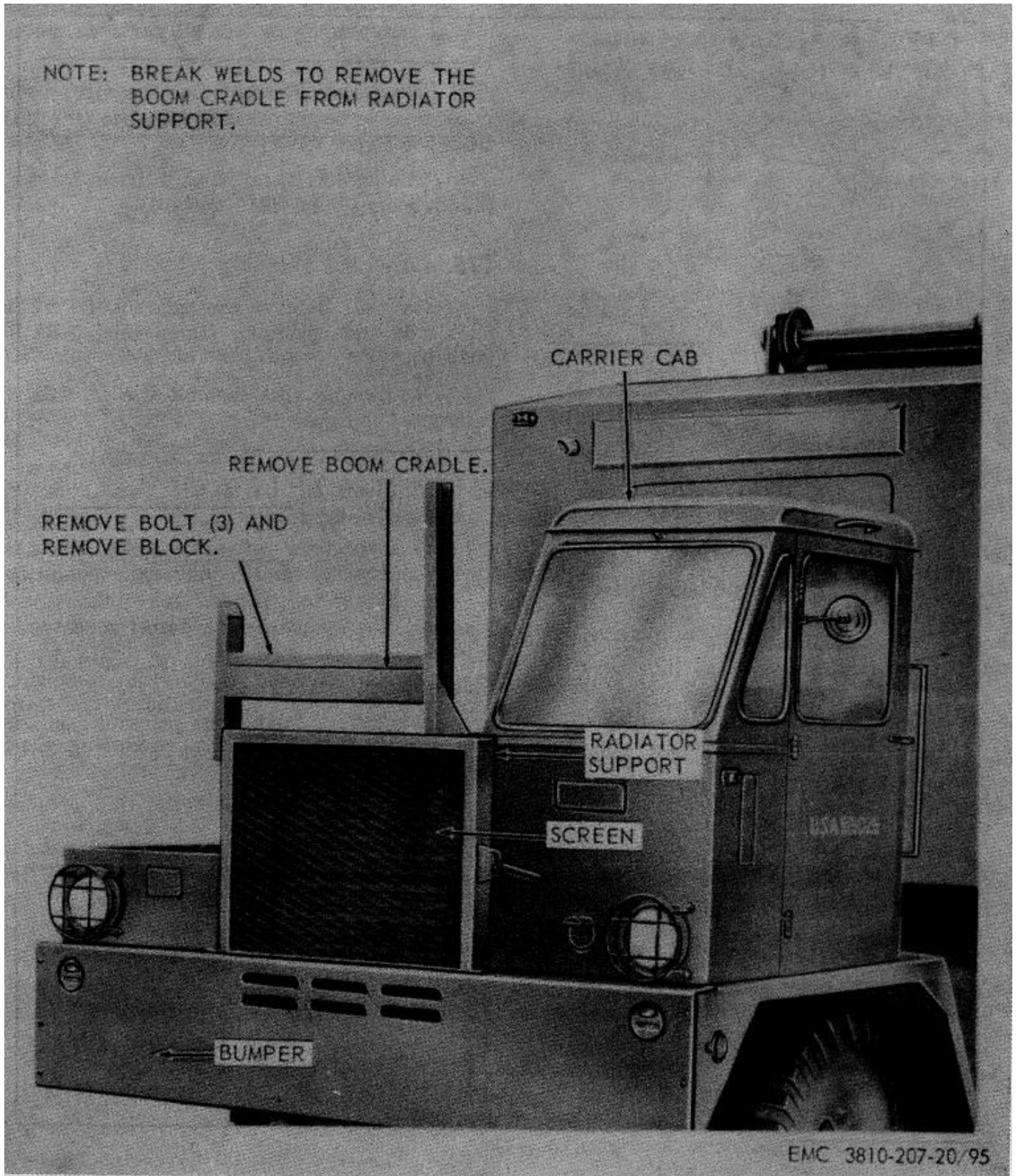
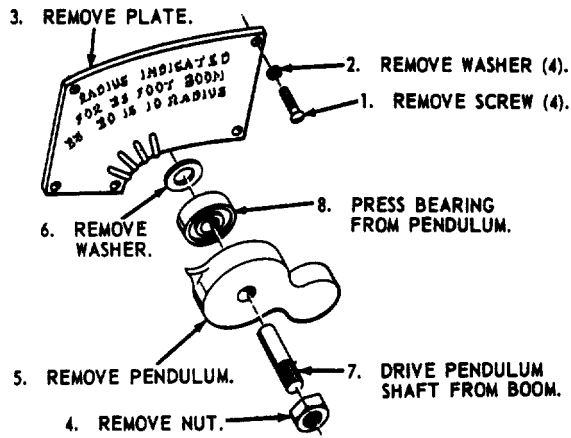


Figure 95. Boom cradle, removal and installation



EMC 3810-207-20/96

Figure 96. Radius indicator, removal, disassembly, reassembly and installation.

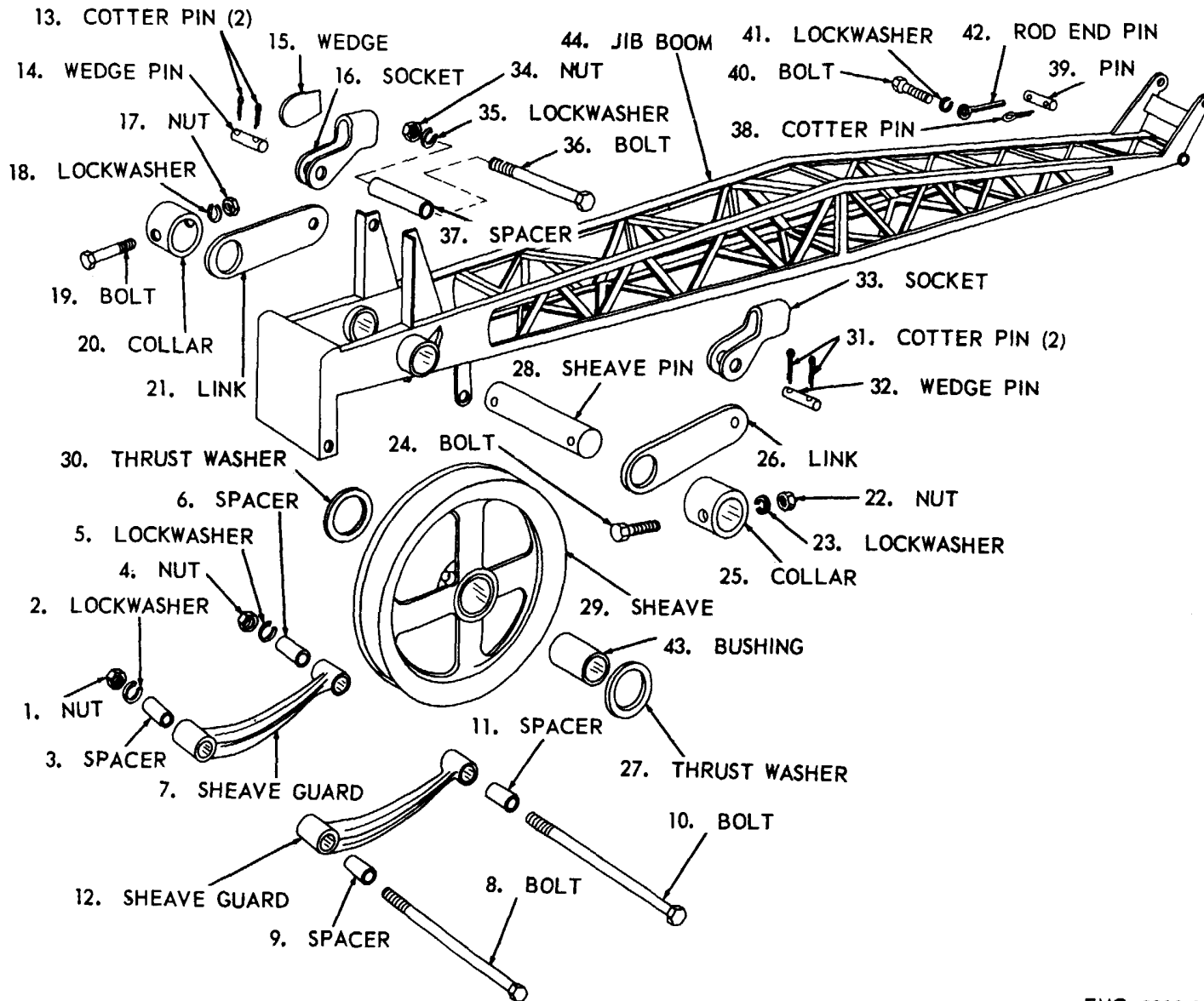
174. Jib Boom Mast

- a. *Removal.* Remove the jib boom mast from the jib boom (TM 5-3810-207-10).
- b. *Disassembly.* Disassemble the jib boom mast in numerical sequence as illustrated on figure 98.
- c. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleansing solvent.

- (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace all parts as necessary.
- d. *Reassembly.* Reassemble the jib boom mast in reverse numerical sequence as illustrated on figure 98.
- e. *Installation.* Install the jib boom mast on the jib boom (TM 5-3810-207-10).

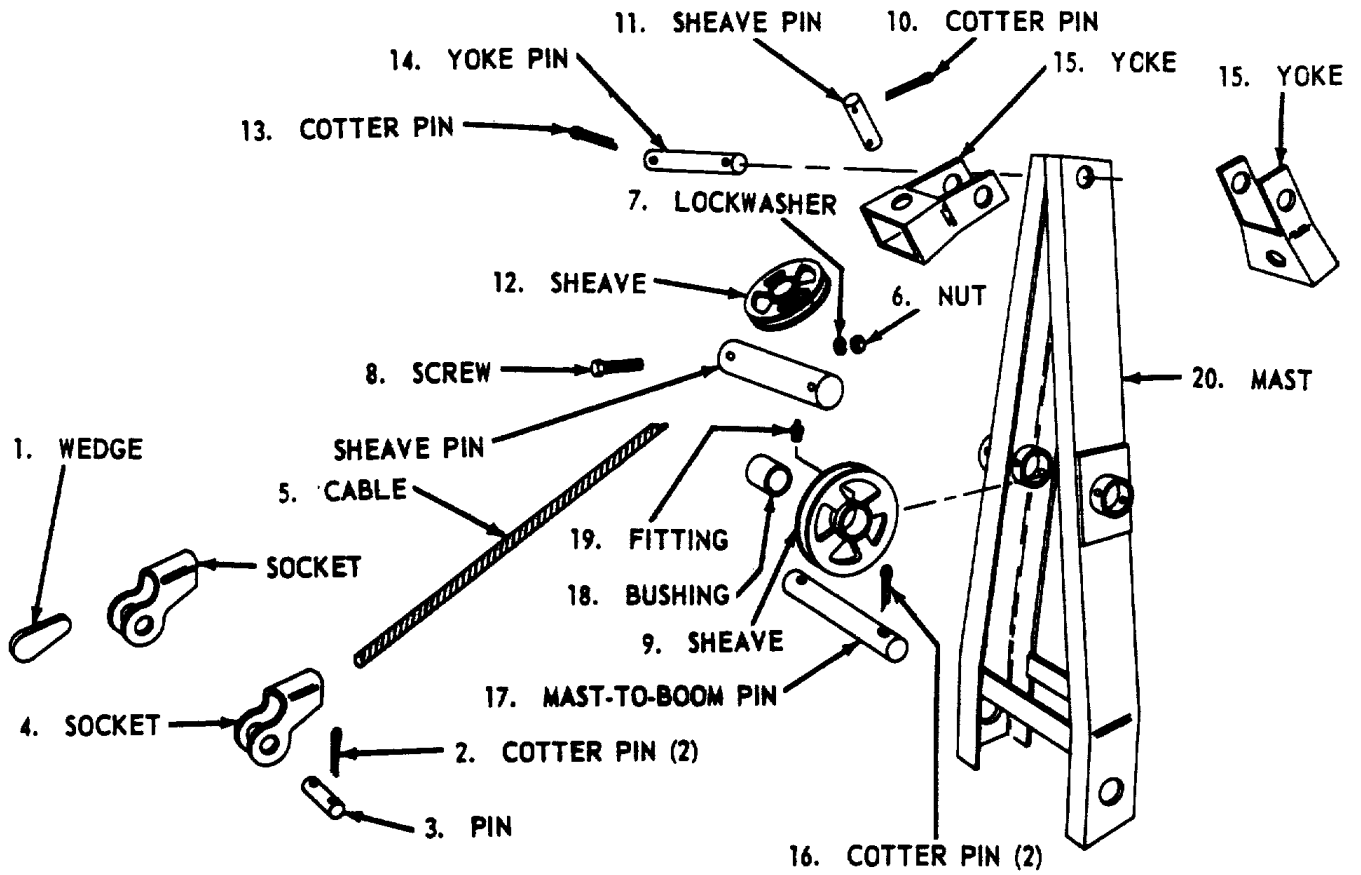
175. Catwalk

- a. *Removal.* Remove the catwalk from the pile leads and revolving frame (TM 5-3810-207-10).
- b. *Disassembly.* Disassemble the catwalk as instructed on figure 99.
- c. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect the catwalk for bends, cracks, breaks, and damaged condition. Straighten bends, weld breaks and cracks, or replace defective catwalk.
- d. *Reassembly.* Reassemble the catwalk as illustrated on figure 99.
- e. *Installation.* Install the catwalk on the revolving frame and pile leads (TM 5-3810-207-10).



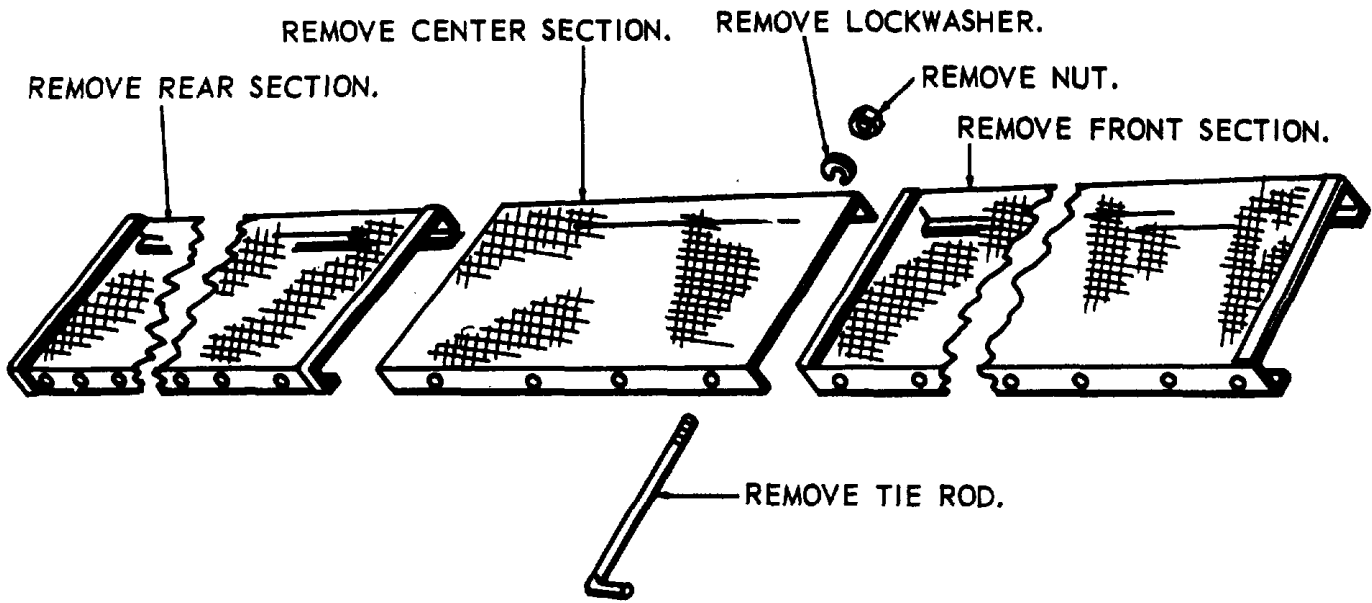
EMC 3810-207-20/97

Figure 97. Jib boom exploded view.



EMC 3810-207-20/98

Figure 98. Jib boom mast, exploded view.



EMC 3810-207-20/99

Figure 99. Catwalk for the pile leads, exploded View.

Section III. BACK HOE ASSEMBLY

176. General

The back hoe boom is an one-piece welded construction. The hoe bucket is attached to the hoe handle which pivots at the end of the boom. An auxiliary gantry is attached at the foot of the hoe boom to support the hoist cable. The boom is attached to the revolving frame by means of a hinge shaft extending through both boom foot hinges.

c. Installation.

- (1) Install the bridle block on the hoe handle in the reverse of the numerical sequence as illustrated on figure 100.
- (2) Install the back hoe assembly on the revolving frame (TM 5-3810-207-10).
- (3) Install the cables (TM 53810-207-10).

177. Back Hoe Bridle Block

a. Removal.

- (1) Remove the back hoe assembly from the revolving frame. (TM 5-3810-207-10).
- (2) Remove the cables from the back hoe (TM 5-3810-207-10).
- (3) Remove the bridle block from the hoe handle in the numerical sequence as instructed on figure 100.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, excessive wear, and other damage. Repair or replace all parts as necessary.

178. Back Hoe Ball Block, Bucket, and Handle

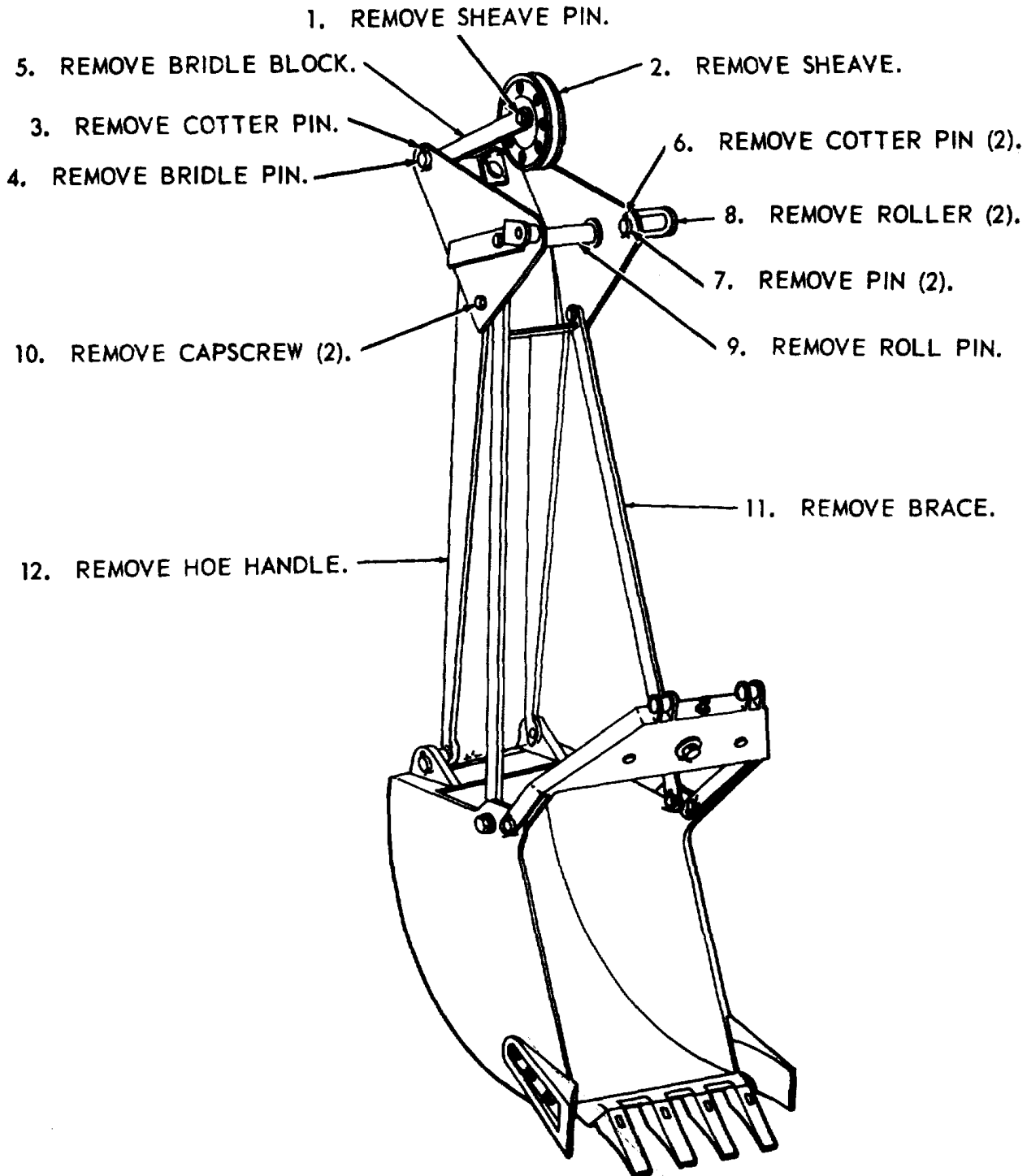
a. Removal.

- (1) Remove the cables from back hoe assembly (TM 5-3810-207-10).
- (2) Remove the bridle block (par. 177).
- (3) Remove the bail block, bucket, and handle in the numerical sequence as instructed on figure 101.

b. Disassembly. Disassemble the bail block in the reverse numerical sequence as illustrated on figure 102.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.

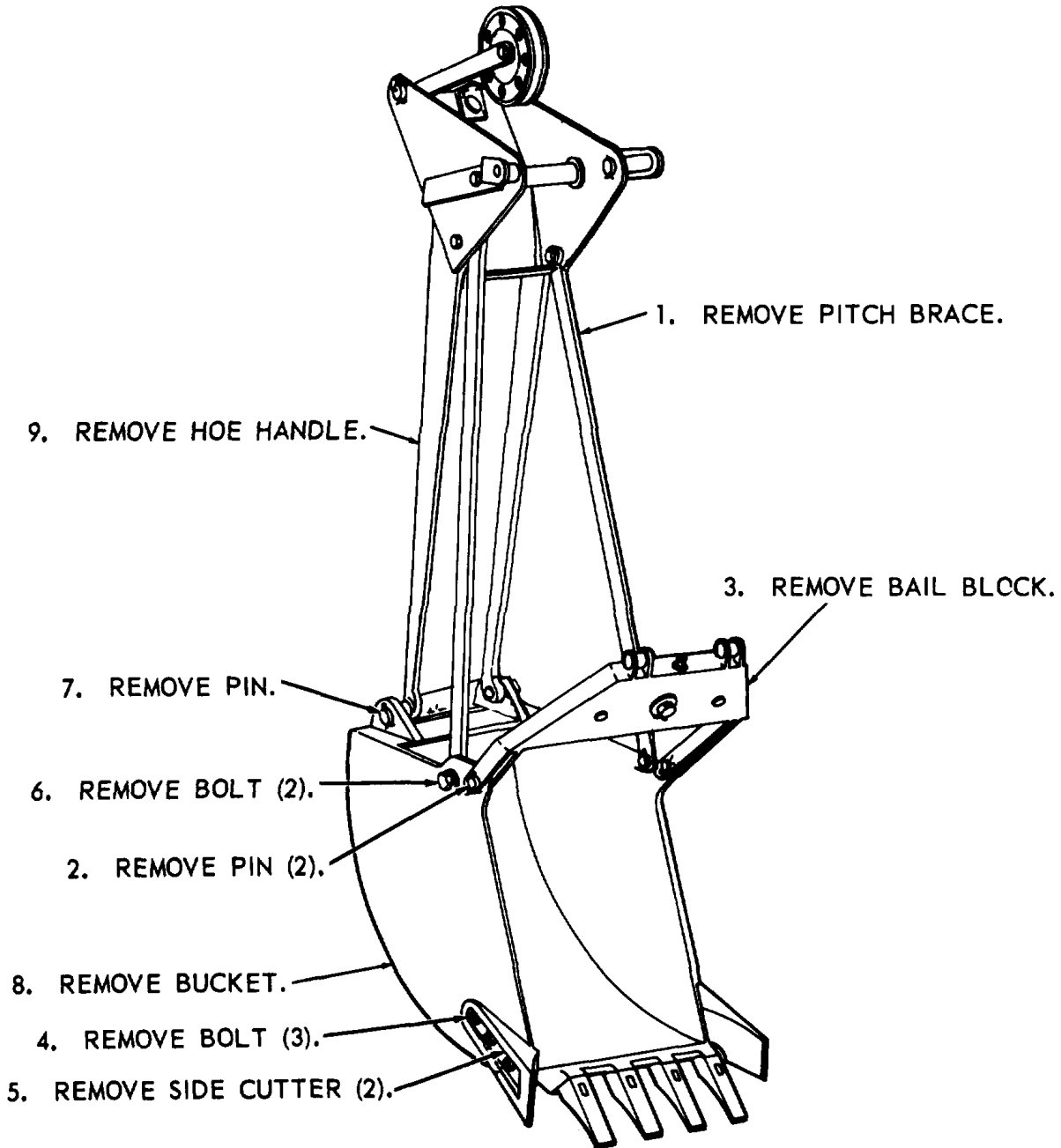


EMC 3810-207-20/100

Figure 100. Back hoe bridle block, removal and installation.

(2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace parts as necessary.

d. *Reassembly.* Reassemble the bail block in the reverse numerical sequence as illustrated on figure 102.



EMC 3810-207-20/101

Figure 101. Back hoe bail block, bucket, and handle, removal and installation.

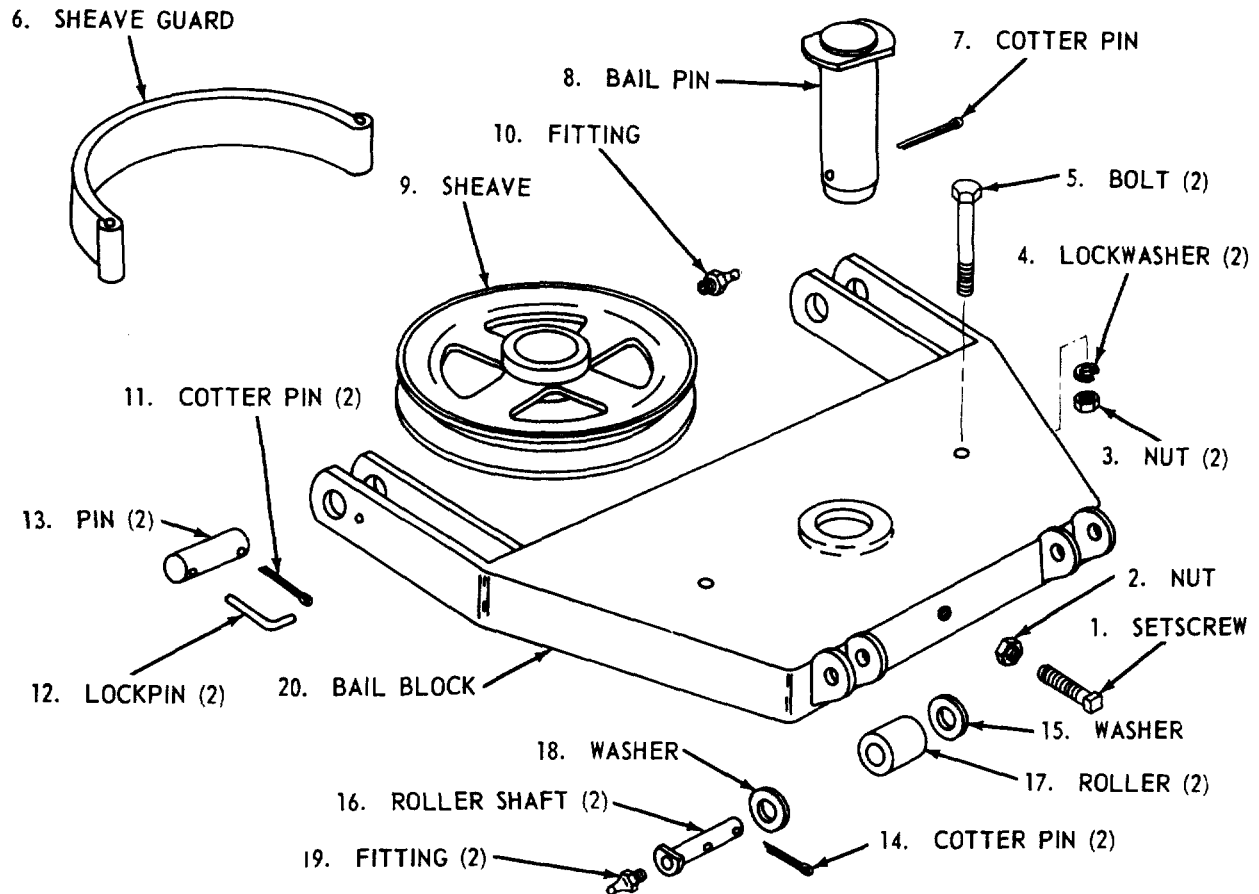
e. Installation.

- (1) Install the bail block, bucket, and handle in the reverse numerical sequence as illustrated on figure 101.
- (2) Install the bridle block (par. 177).
- (3) Install the cables to the back hoe assembly (TM 5-3810-207-10).

179. Back Hoe Boom Mast

a. Removal.

- (1) Remove the back hoe assembly from the revolving frame (TM 5-3810-207-10).
- (2) Remove the two setscrews and pins securing the back hoe boom mast to



EMC 3810-207-20/102

Figure 102. Back hoe bail block, exploded view.

the back hoe boom and remove the hoe boom mast.

b. Disassembly. Disassemble the back hoe boom mast in the numerical sequence as illustrated on figure 103.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, excessive wear, and other damage. Repair or replace all defective parts as necessary.

d. Reassembly. Reassemble the back hoe boom mast in the reverse numerical sequence as illustrated on figure 103.

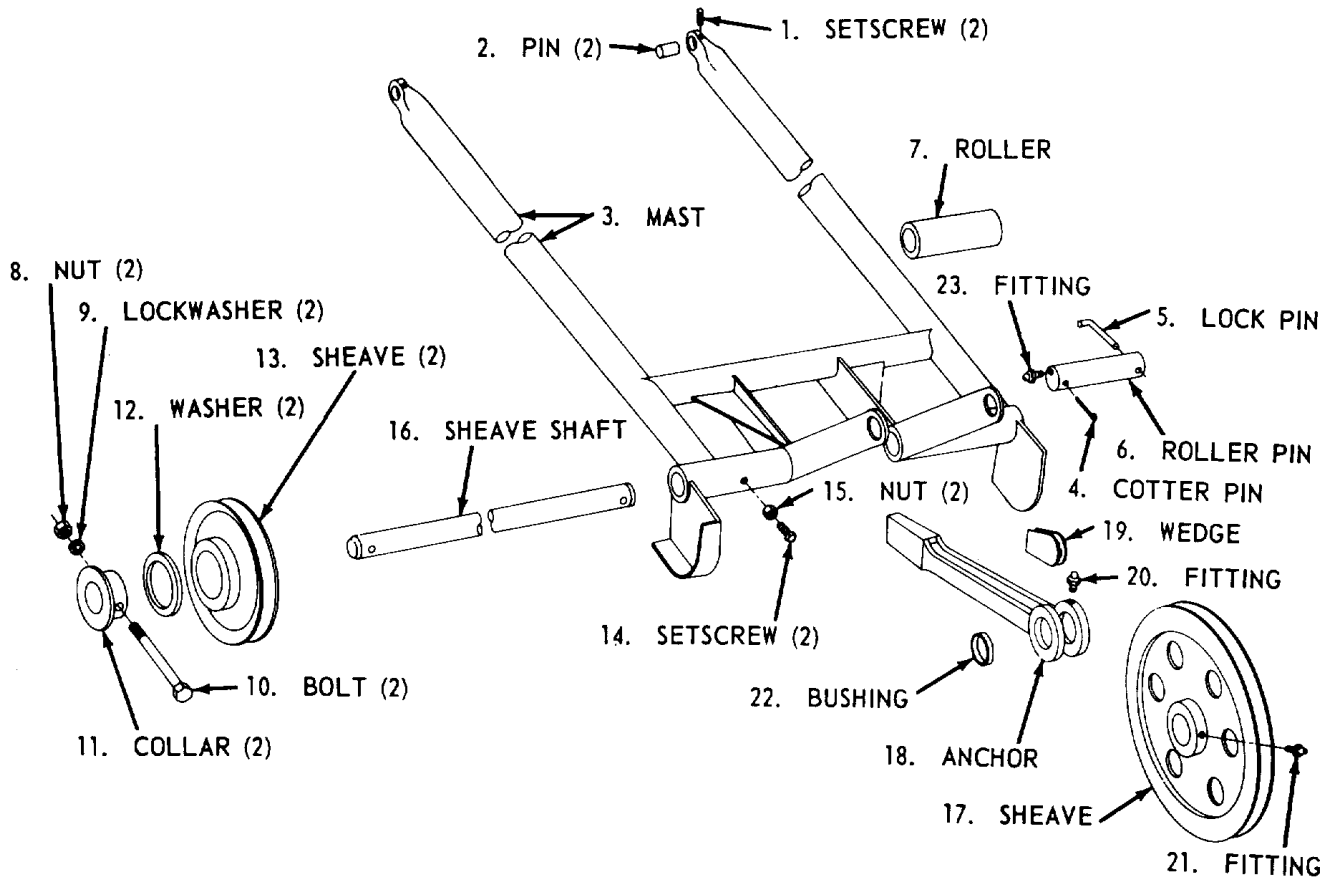
e. Installation.

- (1) Position the back hoe boom mast on the back hoe boom and secure with the two pins and setscrews.
- (2) Install the back hoe assembly on the revolving frame (TM 5-3810-20710).

180. Back Hoe Boom

a. Removal.

- (1) Remove the back hoe assembly from the revolving frame (TM 5-3810-207-10).
- (2) Remove the back hoe handle and bucket from the boom (par. 178).



EMC 3810-207-20/103

Figure 103. Back hoe boom mast, exploded view.

b. Disassembly. Disassemble the back hoe boom in the numerical sequence as illustrated on figure 104.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, excessive wear, and other damage. Repair or replace all parts as necessary.

d. Reassembly. Reassemble the back hoe boom in the reverse numerical sequence as illustrated on figure 104.

e. Installation.

- (1) Install the back hoe handle and bucket on the back hoe boom (par. 178).
- (2) Install the back hoe assembly on the revolving frame (TM 5-3810-207-10).

181. Back Hoe Gantry Sheaves

a. Removal.

- (1) Remove the reeving from the back hoe gantry (TM 5-3810-207-10).
- (2) Remove the back hoe gantry sheaves in the numerical sequence as instructed on figure 105.

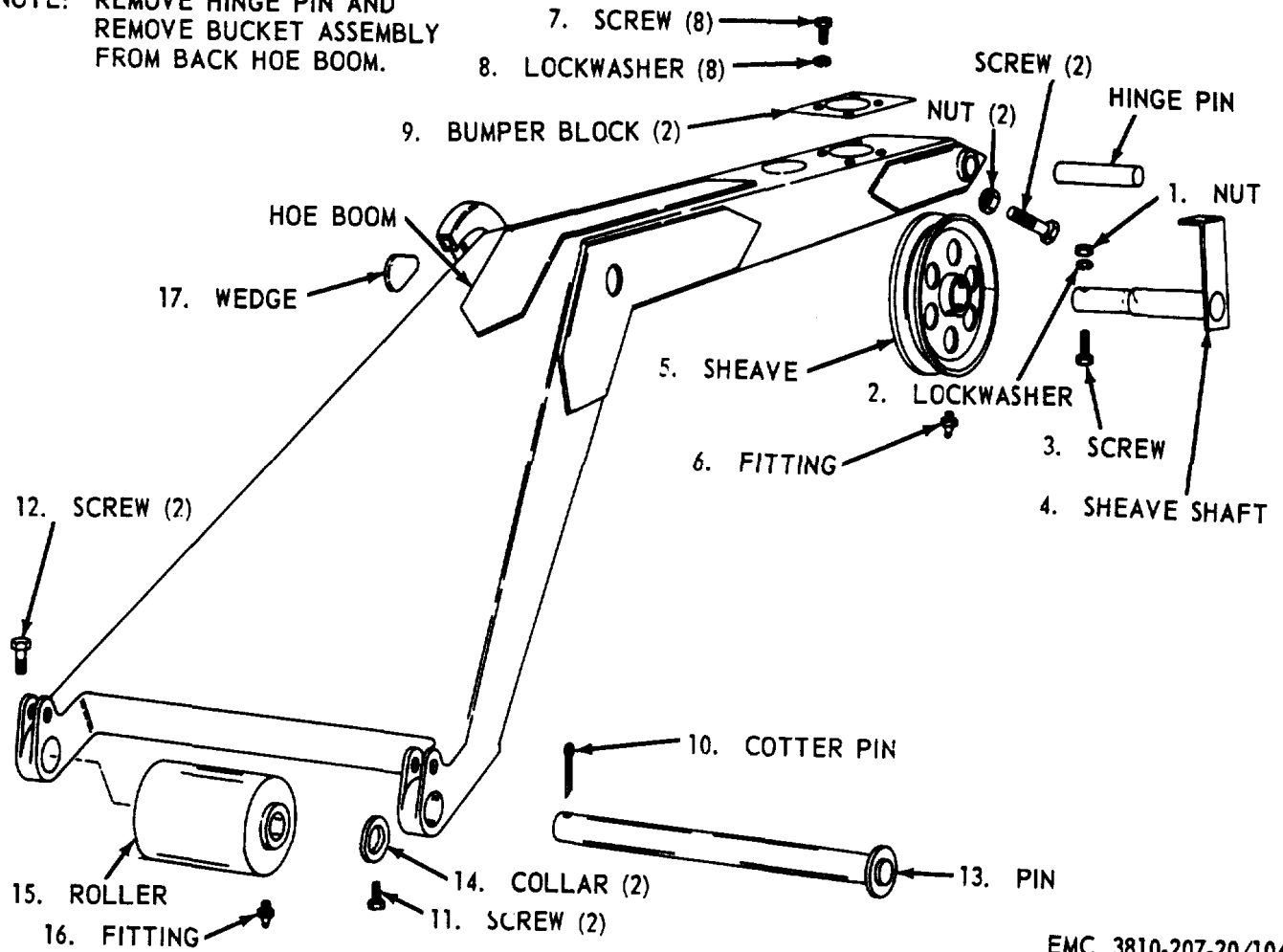
b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, excessive wear, and other damage. Replace all parts as necessary.

c. Installation.

- (1) Install the gantry sheaves in the reverse numerical sequence as illustrated on figure 105.
- (2) Install the reeving to back hoe gantry (TM 5-3810-207-10).

NOTE: REMOVE HINGE PIN AND REMOVE BUCKET ASSEMBLY FROM BACK HOE BOOM.



EMC 3810-207-20/104

Figure 104. Back hoe boom, exploded view.

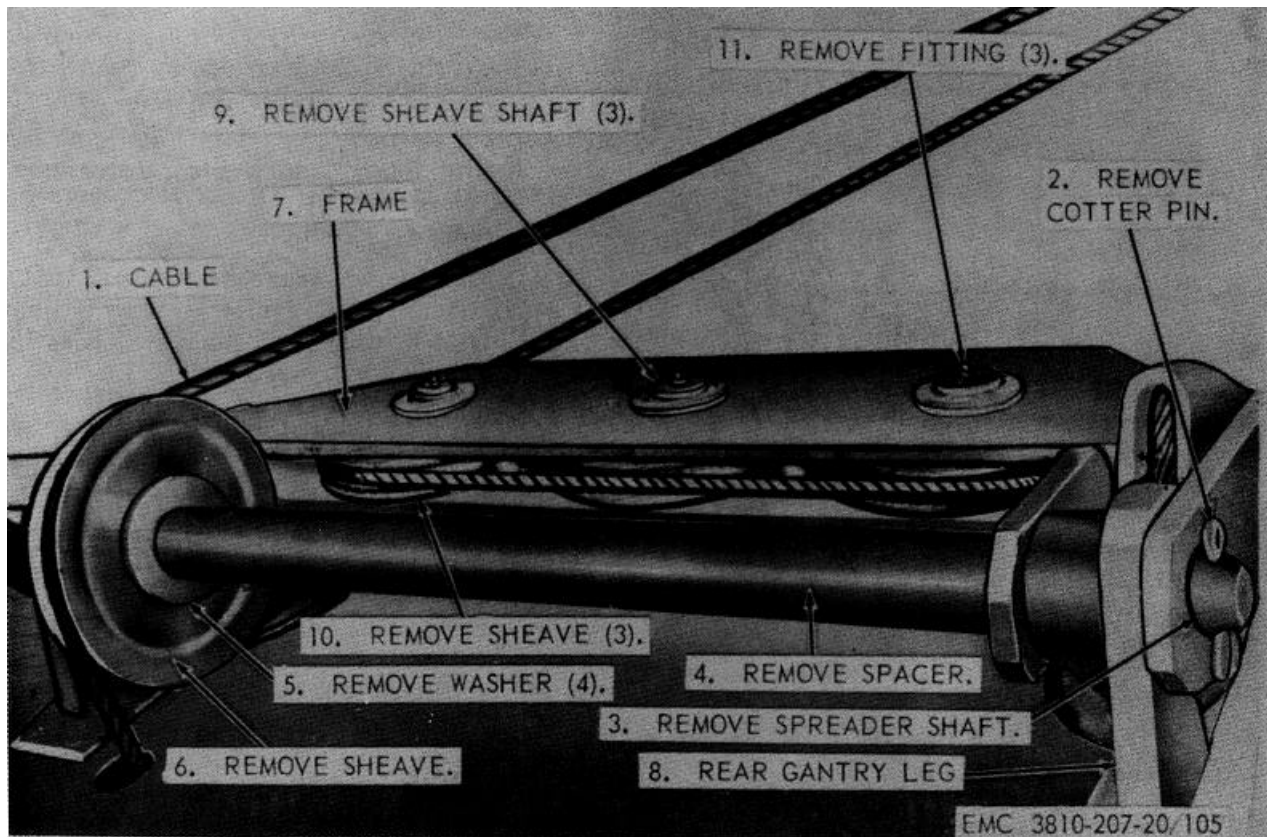


Figure 105. Back hoe gantry sheaves, removal and installation.

Section IV. CRANE WINTERIZATION EQUIPMENT

182. General

The heater assembly, mounted in the crane-shovel cab, is used as a cold-weather, engine starting aid and, by the use of deflectors, hose, and controls, is used to heat the operator's cab, battery box, and window defrosters. The 24-volt electrical system furnishes the power to control the heater assembly either manually or by the use of thermostats. A fuel pump, lines, and fittings furnish fuel for the heater assembly. A radiator shutter is supplied and is also used as a cold-weather, engine starting aid.

183. Radiator Shutter

a. *Removal.* Remove the radiator shutter as instructed on figure 106.

b. *Cleaning and Inspection.*

- (1) Clean the radiator shutter with an approved cleaning solution.

- (2) Inspect the radiator shutter for breaks, bends, and other damage. Repair or replace damaged radiator shutter and mounting hardware as necessary.

c. *Installation.* Install the radiator shutter as illustrated on figure 106.

184. Crane Heater Assembly

a. *Removal.*

- (1) Remove the control box cover.
- (2) Remove the crane heater assembly as instructed on figure 107.

b. *Cleaning and Inspection.*

- (1) Clean the heater and mounting hardware with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the heater and mounting hardware for breaks, bends, and other damage.

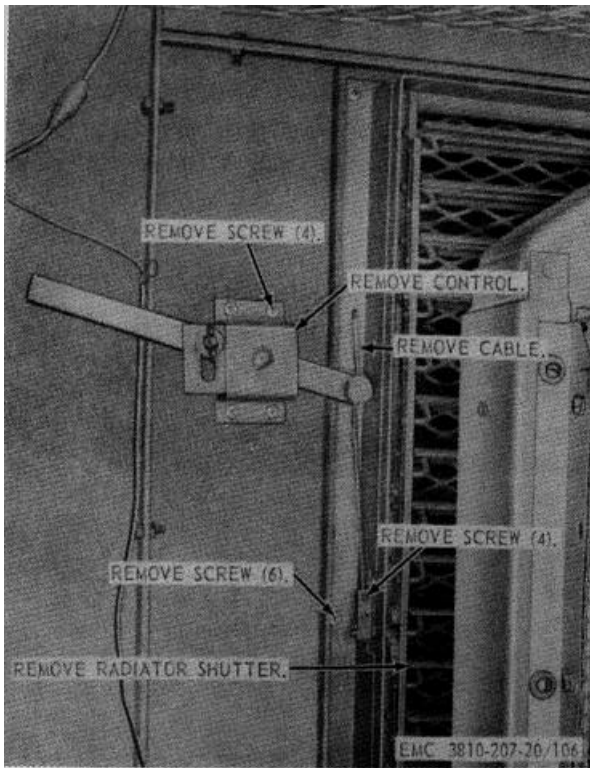


Figure 106. Radiator shutter, removal and installation.

- (3) Inspect the heater for proper operation.
- (4) Replace or repair mounting hardware as necessary.
- (5) Replace a defective heater as necessary.

c. Installation.

- (1) Install the crane heater assembly as illustrated on figure 107.
- (2) Install the control box cover.

185. Resistor, Filter, and Terminal Block

a. Removal.

- (1) Remove the control box cover.
- (2) Remove the resistor, filter, and terminal block as instructed on figure 108.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solution and dry thoroughly.
- (2) Inspect all parts for bends and other damage. Replace damaged parts as necessary.

c. Installation.

- (1) Install the resistor, filter, and terminal block as illustrated on figure 108.
- (2) Install the control box cover.

186. Igniter, Relay, Limit Switch, Valve, and Microswitch

a. Removal.

- (1) Remove the crane heater (par. 184).
- (2) Remove the igniter, relay, limit switch, valve, and microswitch as instructed on figure 109.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for bends, breaks, and other damage. Replace or repair damaged parts as necessary.

c. Installation.

- (1) Install the igniter, relay, limit switch, valve, and microswitch as illustrated on figure 109.
- (2) Install the crane heater (par. 184).

187. Fuel Pump and Filter

a. Removal. Remove the fuel pump and filter as instructed on figure 110.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all mounting hardware for damage. Replace damaged mounting hardware as necessary.
- (3) Inspect the fuel pumps and filters for breaks, bends, and other damage. Replace or repair fuel pumps and filters as necessary.
- (4) Inspect the fuel pump for proper operation. Replace a defective fuel pump.

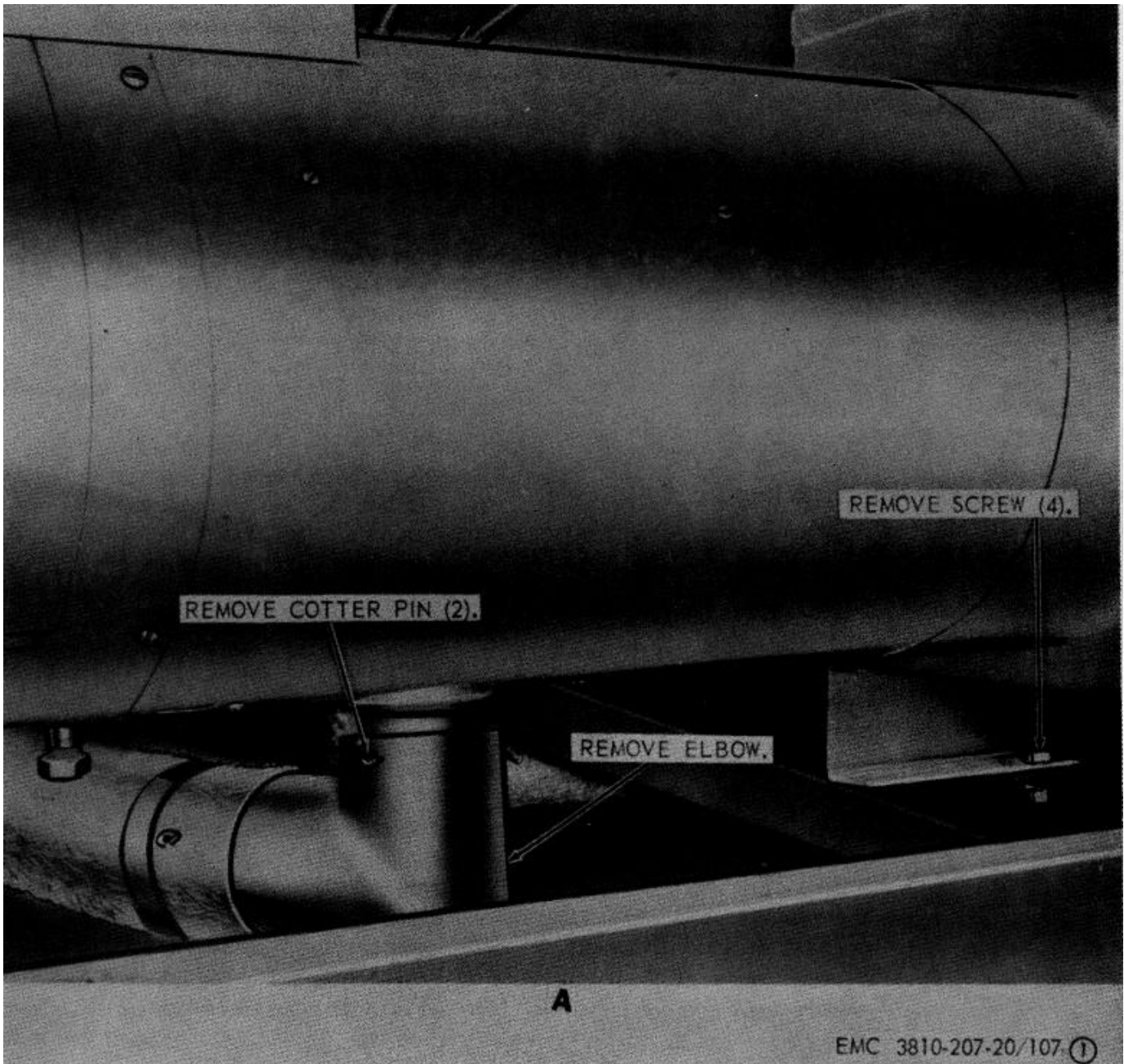
c. Installation. Install the fuel pump and filter as illustrated on figure 110.

188. Hoses and Clamps

a. Removal. Remove the heater hoses and clamps as instructed on figure 111.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.



A-Exhaust elbow, installed view

Figure 107. Crane heater assembly, removal and installation.

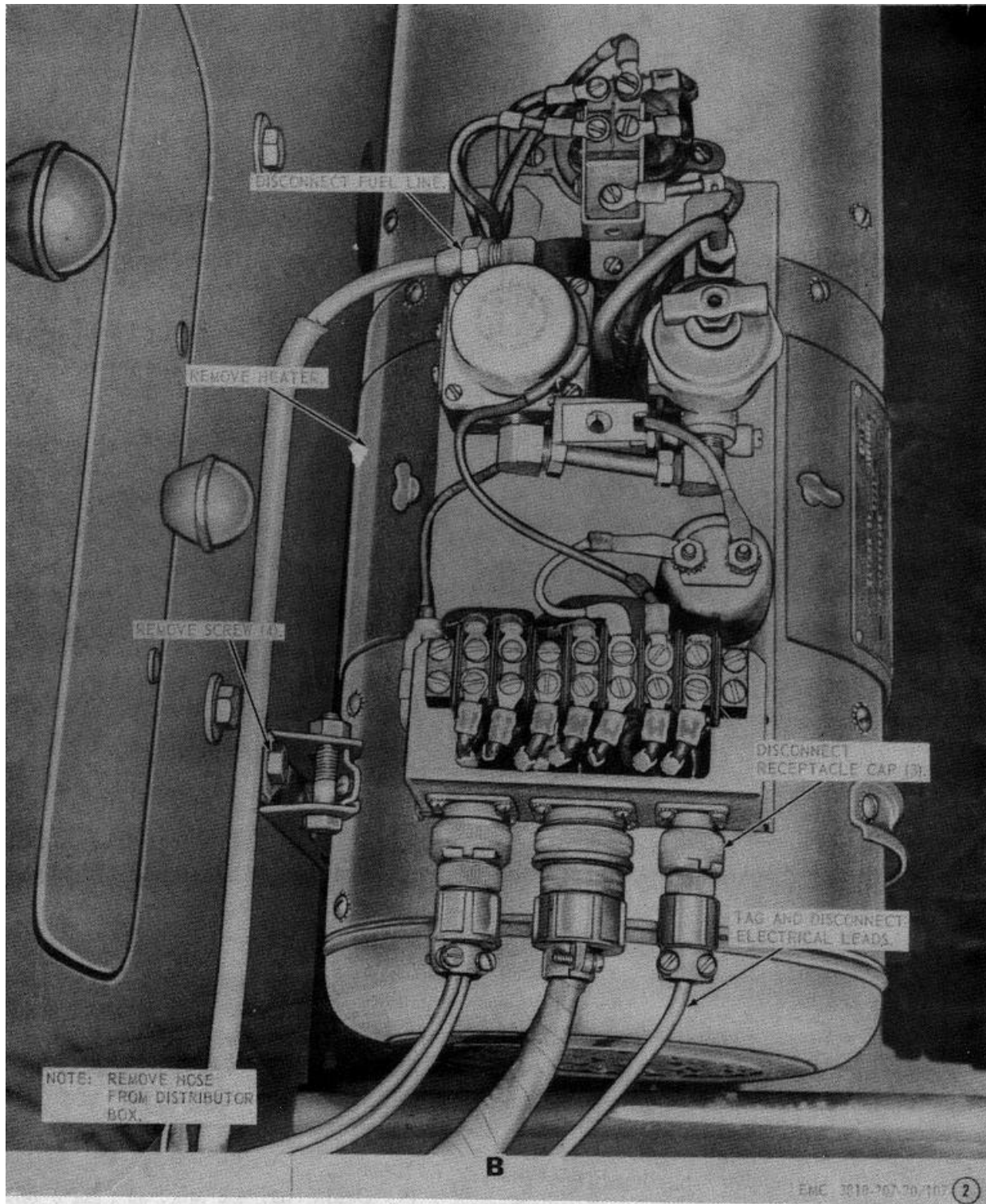
- (2) Inspect the hose for torn insulation or kinks. Repair or replace hose as necessary.
- (3) Inspect all mounting hardware for damage. Repair or replace all damaged hardware.

c. Installation. Install the hoses and clamps as illustrated on figure 111.

189. Thermocouple

a. Removal.

- (1) Drain engine crankcase (TM 5-3810-207-10).
- (2) Remove the thermocouple as instructed on figure 112.



B-Crane heater, installed view

Figure 107-Continued.

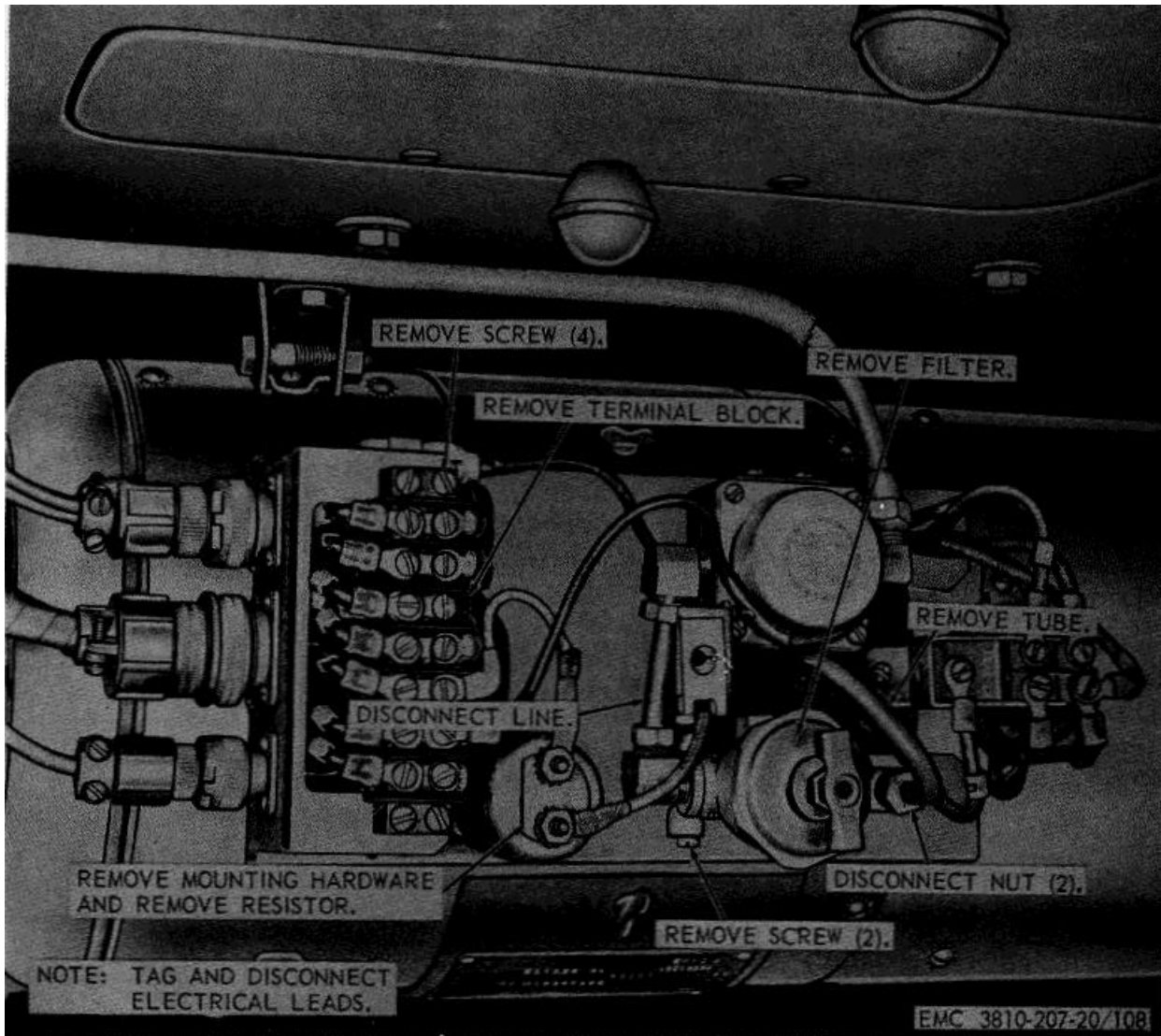


Figure 108. Resistor, filter, and terminal block, removal and installation.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the thermocouple for proper operation. Replace a defective thermocouple.
- (3) Inspect the thermocouple tube for breaks, bends, or damage. Replace a defective thermocouple tube.

c. Installation.

- (1) Install the thermocouple as illustrated on figure 112.
- (2) Fill engine crankcase (LO 5-3810-207-20).

190. Distributor Box

a. Removal.

- (1) Remove the hoses and clamps (par. 188).
- (2) Remove the distributor box as instructed on figure 113.

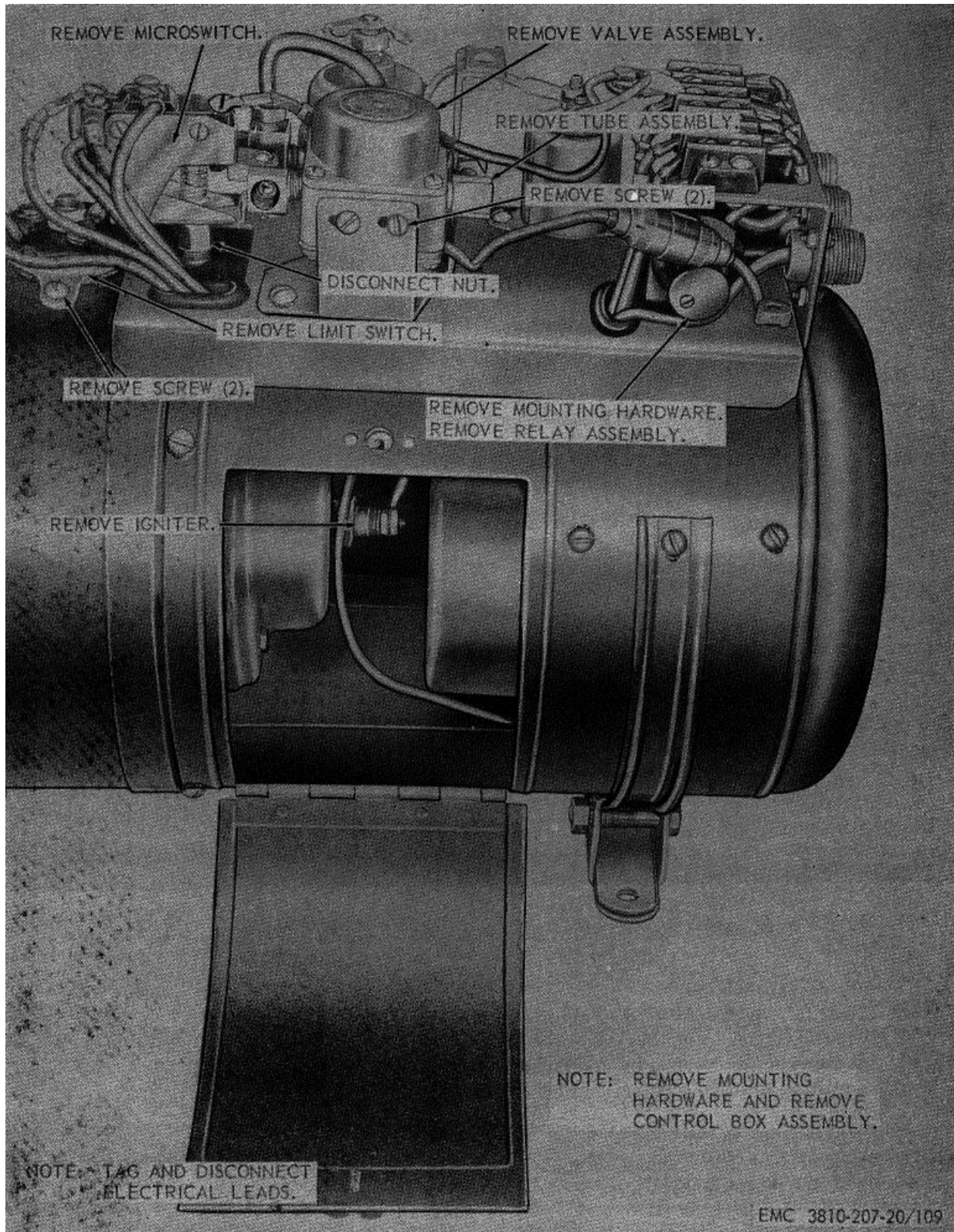


Figure 109. Igniter, relay, limit switch, valve, and microswitch, removal and installation.

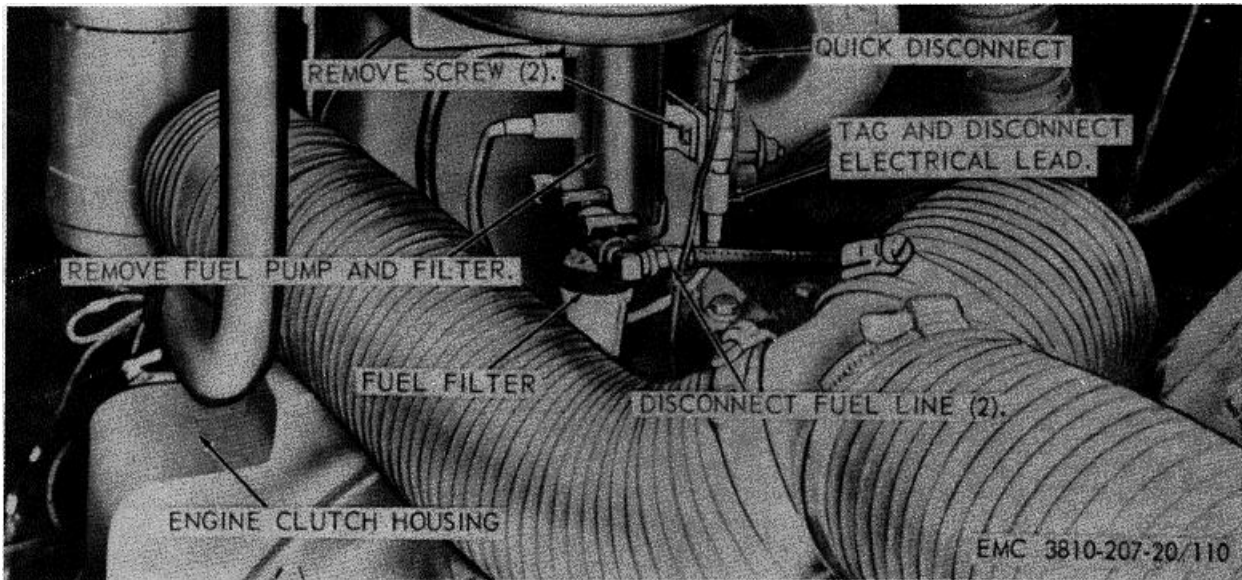


Figure 110. Fuel pump and filter, removal and installation.

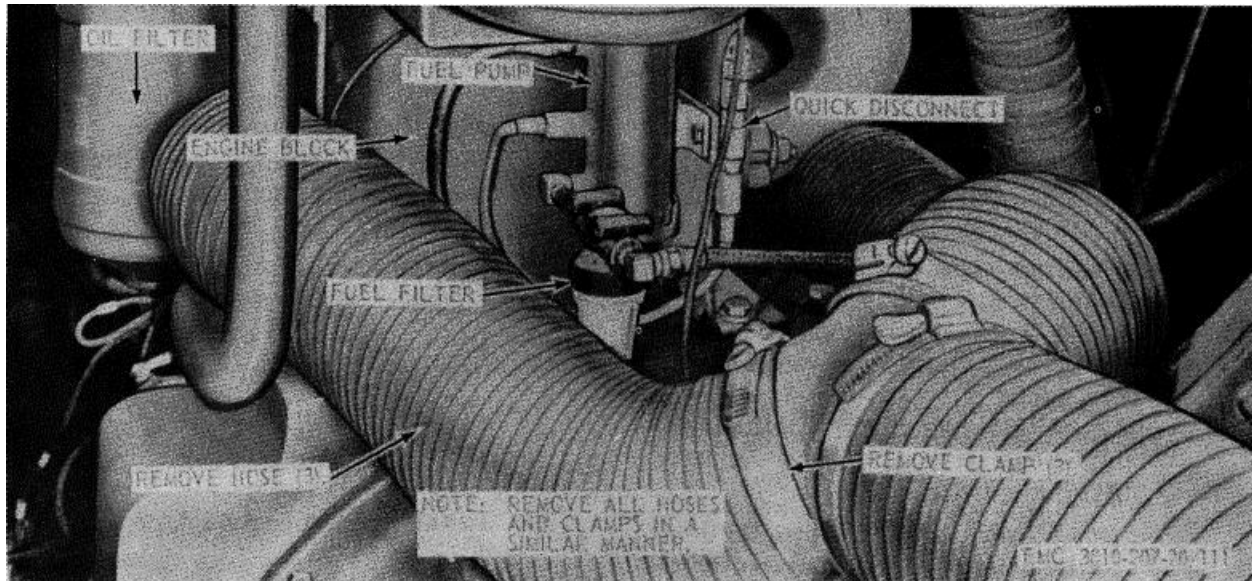


Figure 111. Hoses and clamps, removal and installation.

b. Cleaning, Inspection, and Repair.

- (1) Clean the distributor box with an approved cleaning solvent.
- (2) Inspect for breaks, bends, and other damage. Repair or replace as necessary.

c. Installation.

- (1) Install the distributor box as illustrated on figure 113.
- (2) Install the hoses' and clamps (par. 188).

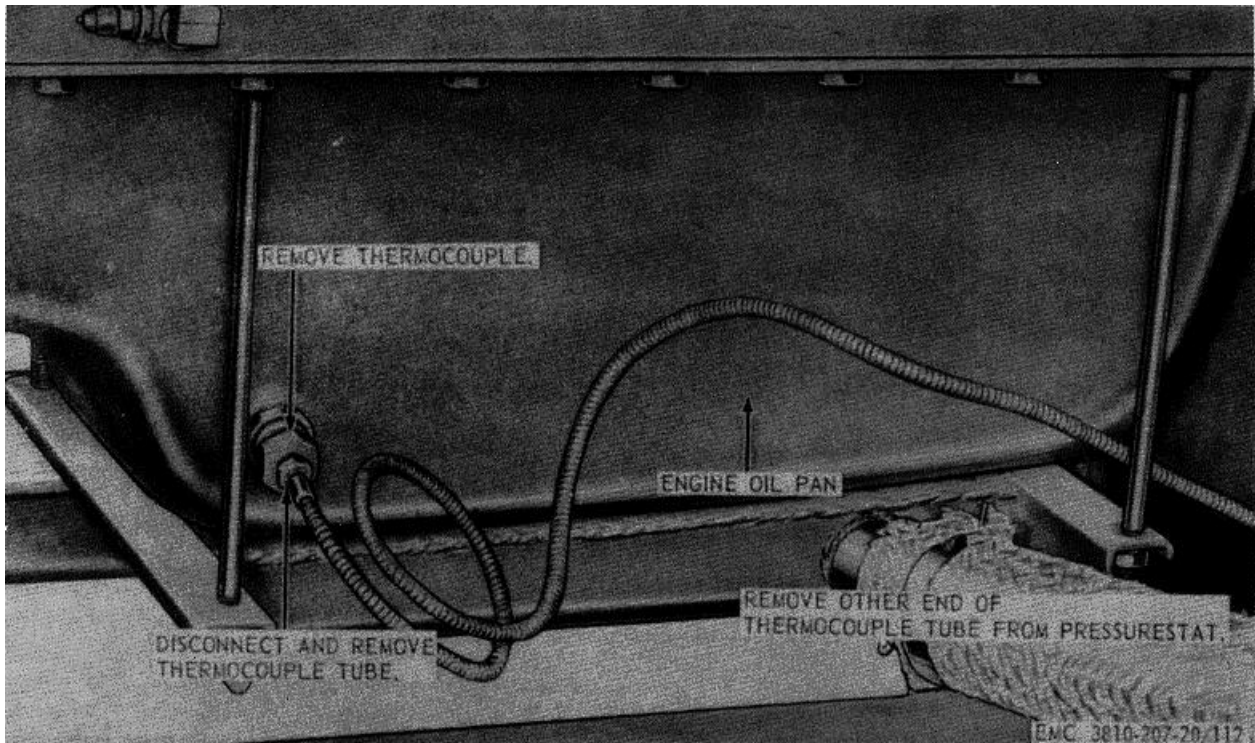


Figure 112. Thermocouple, removal and installation.

191. Distributor Switch

a. Removal. Remove the distributor switch and bracket as instructed on figure 114.

b. Cleaning, Inspection, and Repair.

- (1) Clean the distributor switch and bracket with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the distributor switch for proper operation. Replace a defective distributor switch.
- (3) Inspect a mounting hardware for damage. Repair or replace damaged hardware as necessary.

c. Installation. Install the distributor switch and bracket as illustrated on figure 114.

192. Oil Pan Shroud

a. Removal.

- (1) Remove the thermocouple (par. 189).
- (2) Remove the oil pan shroud as instructed on figure 115.

b. Cleaning, Inspection, and Repair.

- (1) Clean the oil pan shroud with an approved cleaning solvent.
- (2) Inspect for bends, breaks, and other damage. Repair or replace damaged oil pan shroud as necessary.
- (3) Inspect hardware for damage. Replace damaged hardware.

c. Installation.

- (1) Install the oil pan shroud as illustrated on figure 115.
- (2) Install the thermocouple (par. 189).

193. Heater Switchbox

a. Removal. Remove the heater switchbox as instructed on figure 116.

b. Disassembly. Disassemble the heater switchbox in the numerical sequence as illustrated on figure 117.

c. Cleaning, Inspection, and Repair.

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

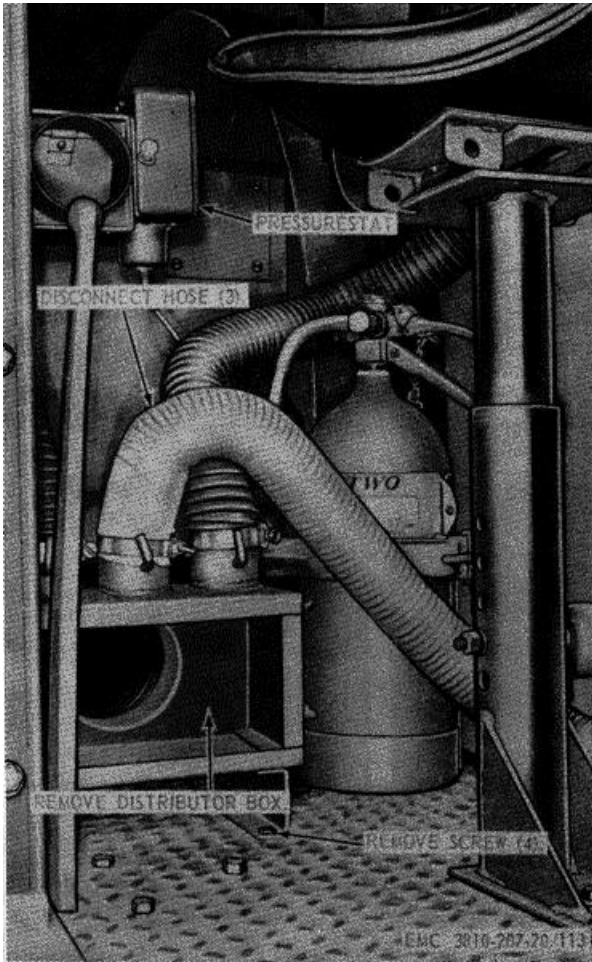


Figure 113. Distributor box, removal and installation.

- (2) Inspect all parts for breaks, damage, and proper operation. Replace or repair damaged parts as necessary.

d. Reassembly. Reassemble the heater switchbox in the reverse of the numerical sequence as illustrated on figure 117.

e. Installation. Install the heater switchbox as illustrated on figure 116.

194. Defrosters

a. Removal.

- (1) Remove hoses and clamps (par. 188).
- (2) Remove defrosters as instructed on figure 118.

b. Cleaning, Inspection and Repair.

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

- (2) Inspect the defroster assembly for bends, breaks, or other damage. Repair or replace a defective defroster assembly as necessary.

- (3) Inspect all mounting hardware for damage. Replace damaged mounting hardware as necessary.

c. Installation.

- (1) Install the defrosters as illustrated on figure 118.
- (2) Install the hoses and clamps (par. 188).

195. Heater Blower Assembly

a. Removal.

- (1) Remove the crane heater assembly (par. 184).
- (2) Remove the crane heater blower assembly as instructed on figure 119.

b. Disassembly. Disassemble the crane heater blower in the numerical sequence as illustrated on figure 120.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solution and dry thoroughly.
- (2) Inspect all parts for operation, bends, and other damage. Replace or repair damaged parts, as necessary.

d. Reassembly. Reassemble the crane heater blower in the reverse numerical sequence as illustrated on figure 120.

e. Installation.

- (1) Install the crane heater blower assembly as illustrated on figure 119.
- (2) Install the crane heater assembly (par. 184).

196. Cab Heater Wiring Harness Repair

a. Inspection. Inspect the crane cab heater wiring harness for breaks, burned insulation, bare wire, and damaged connectors.

b. Repair. Use an approved method to remove damaged wire as necessary. Replace with a suitable length and type of wire using an approved method of connecting broken, cut, or damaged wires; connect the wires and insulate the wires and connections with an approved insulating material. Replace damaged connectors as necessary.

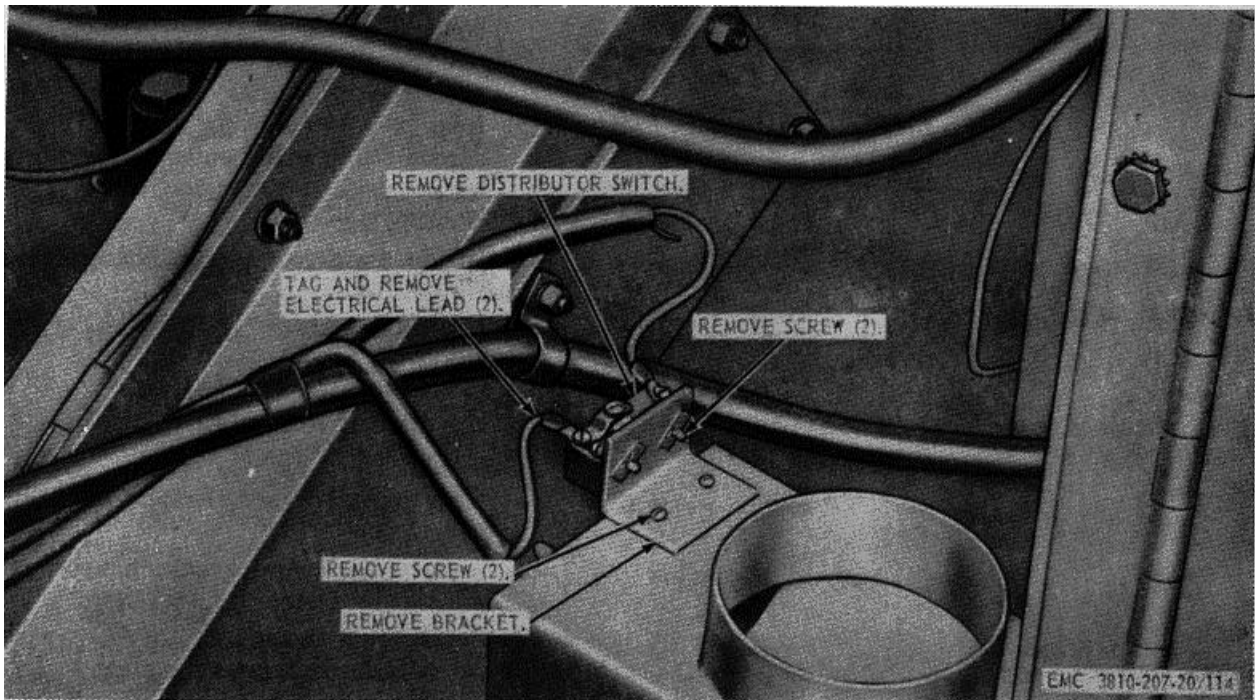


Figure 114. Distributor switch and bracket, removal and installation

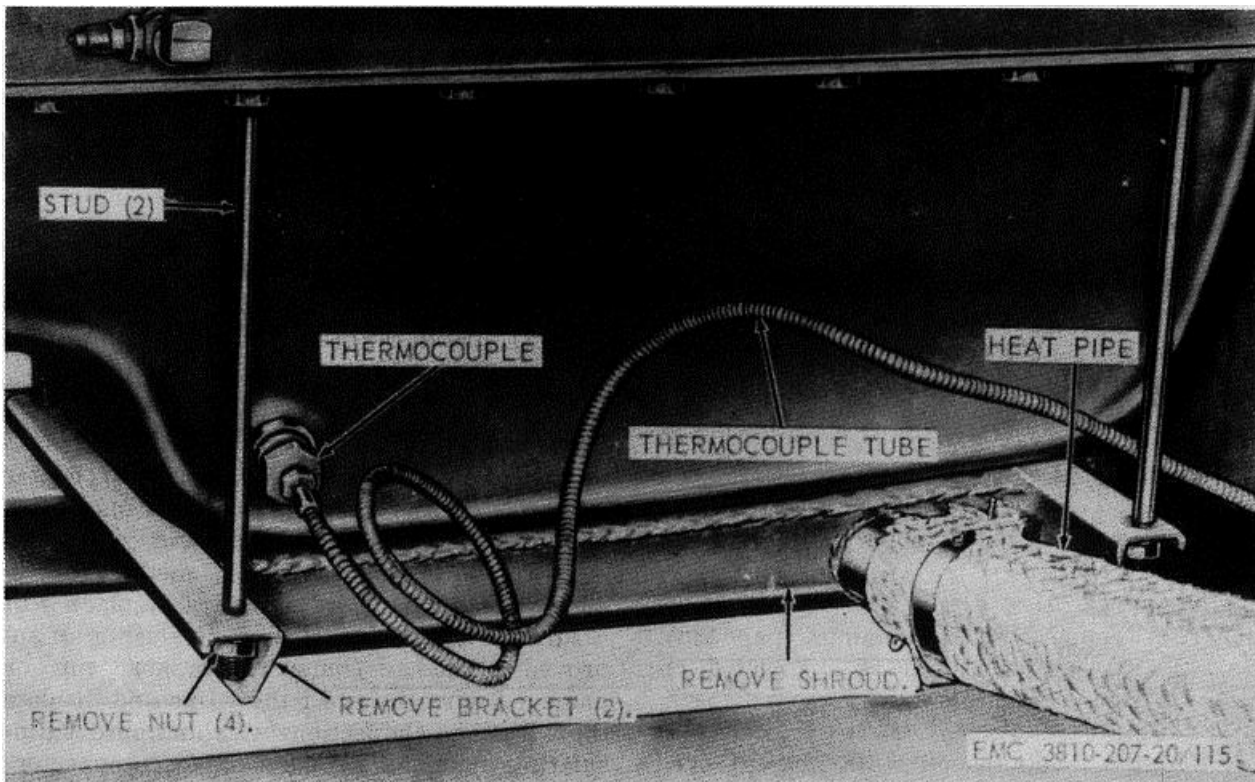


Figure 115. Oil pan shroud, removal and installation.

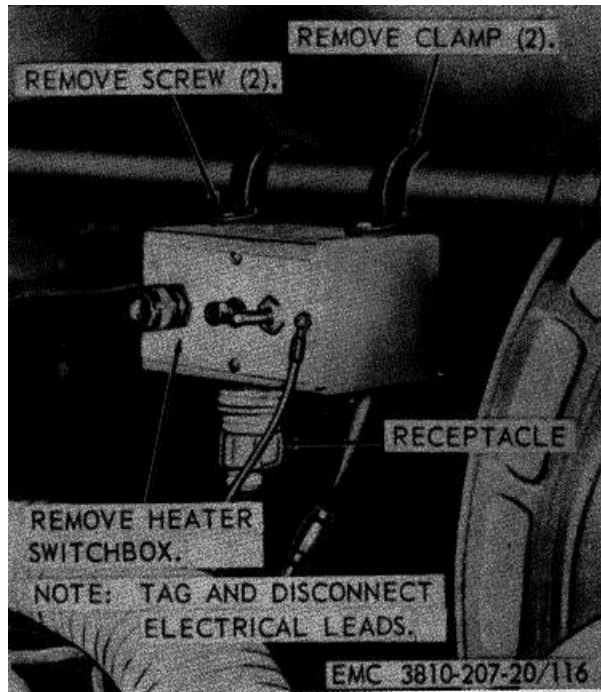


Figure 116. Heater switchbox, removal and installation.

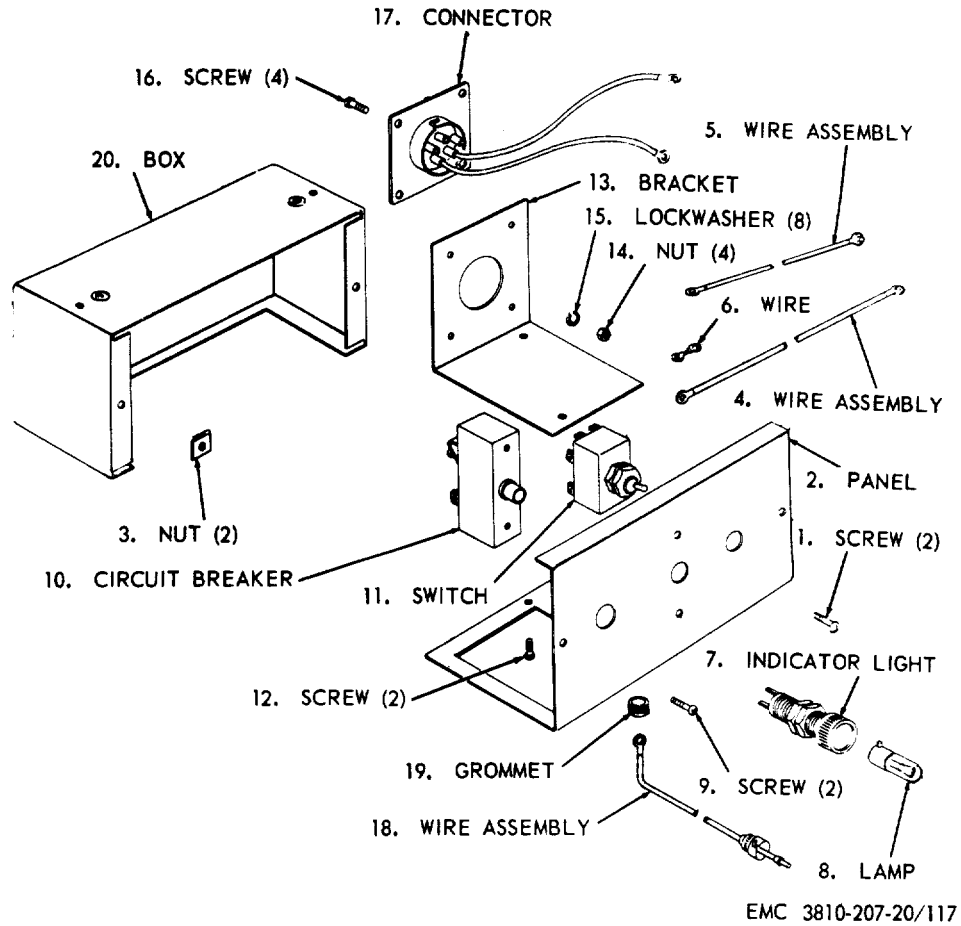


Figure 117. Heater switchbox, exploded view.

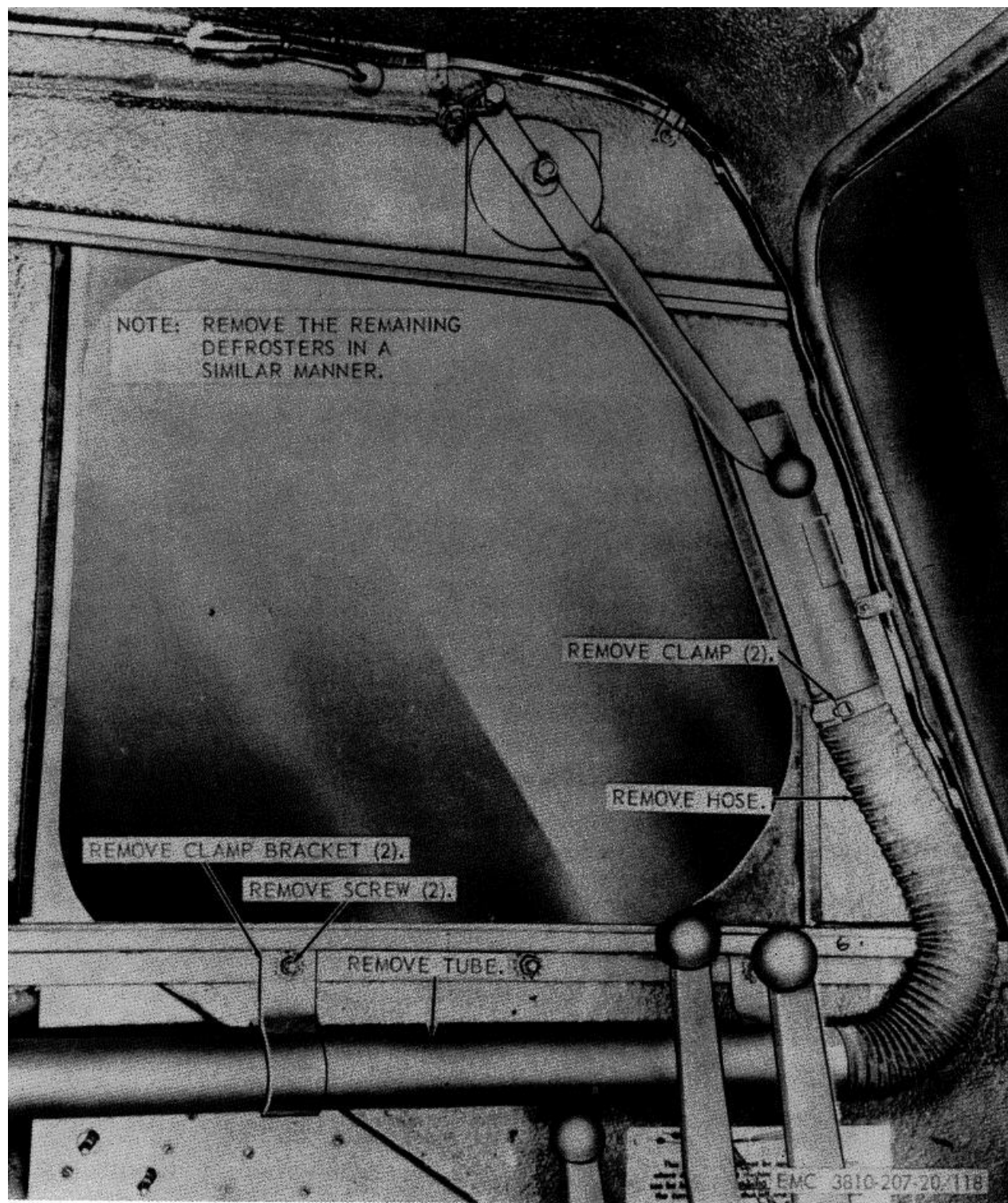


Figure 118. Defroster, removal and installation.

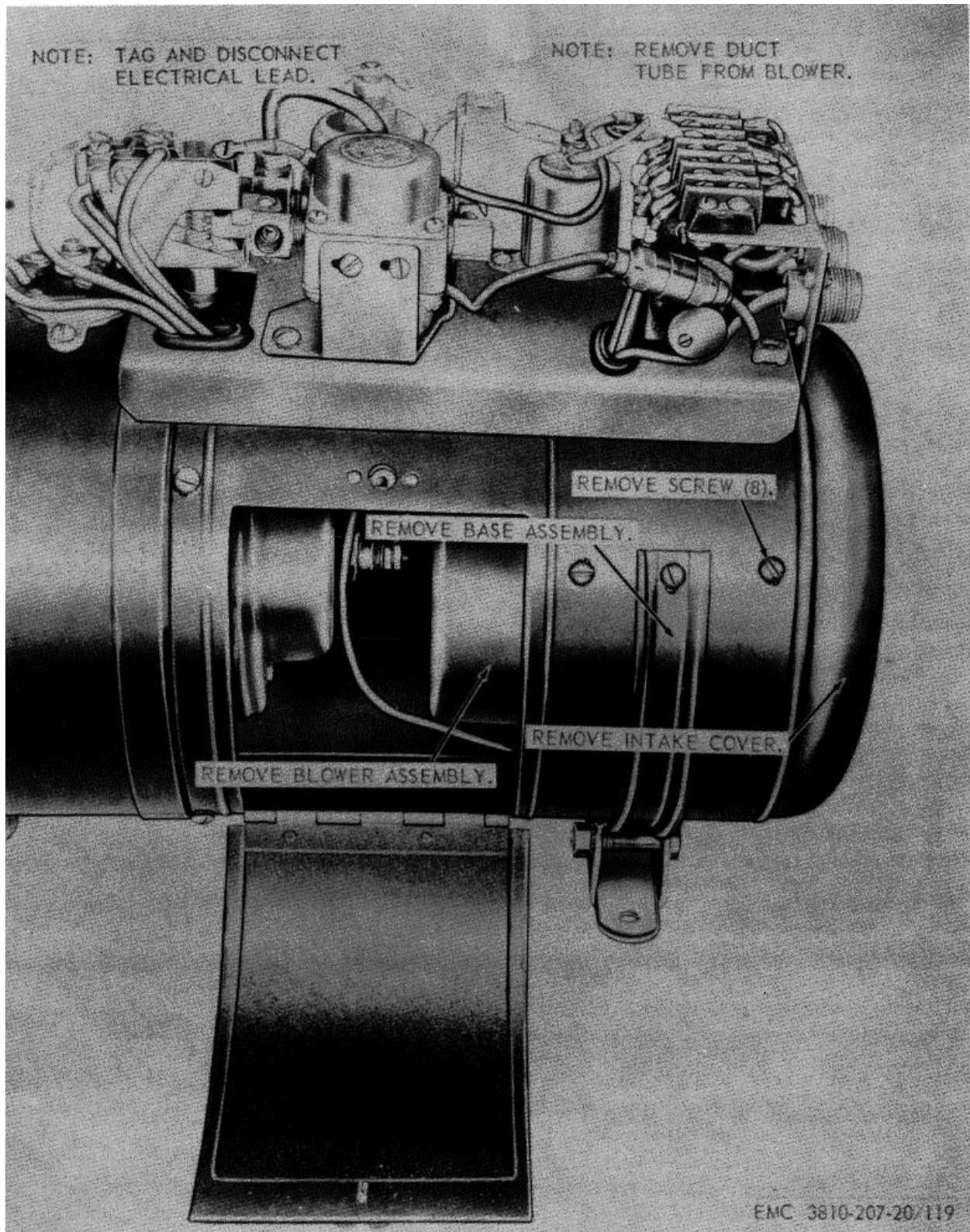


Figure 119. Blower assembly, removal and installation.

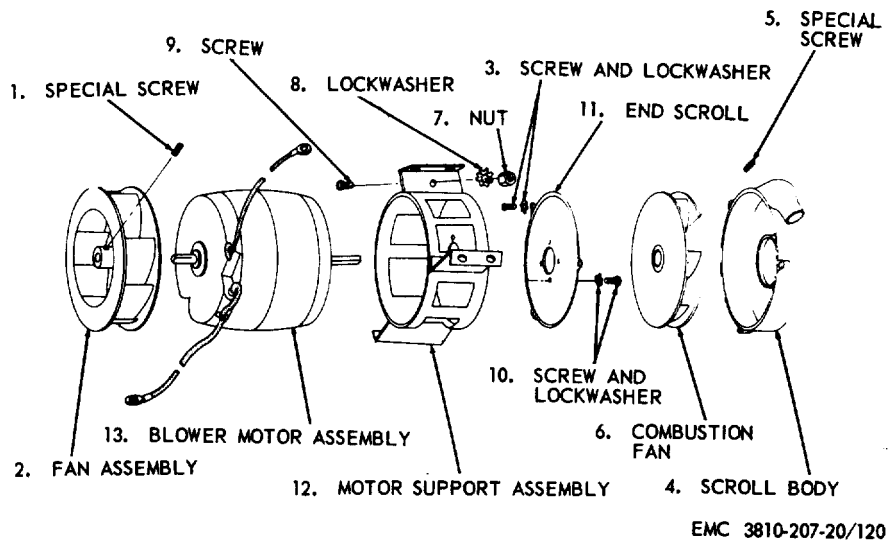


Figure 120. Blower, exploded view.

Section V. ACCESSORY EQUIPMENT

197. General

Accessory equipment of the crane consists of a windshield wiper. The 24-volt electrical system furnishes electrical power for the windshield wiper. The windshield wiper motor is mounted in the operator's cab to the left-front of the operator and is controlled from the operator's control panel.

198. Windshield Wiper

a. Removal. Remove the windshield wiper as instructed on figure 121.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the windshield wiper for breaks, bends, or other damage. Repair or replace damaged hardware.
- (3) Inspect the motor for proper operation. Replace a defective motor.

c. Installation. Install the windshield wiper as illustrated on figure 121.

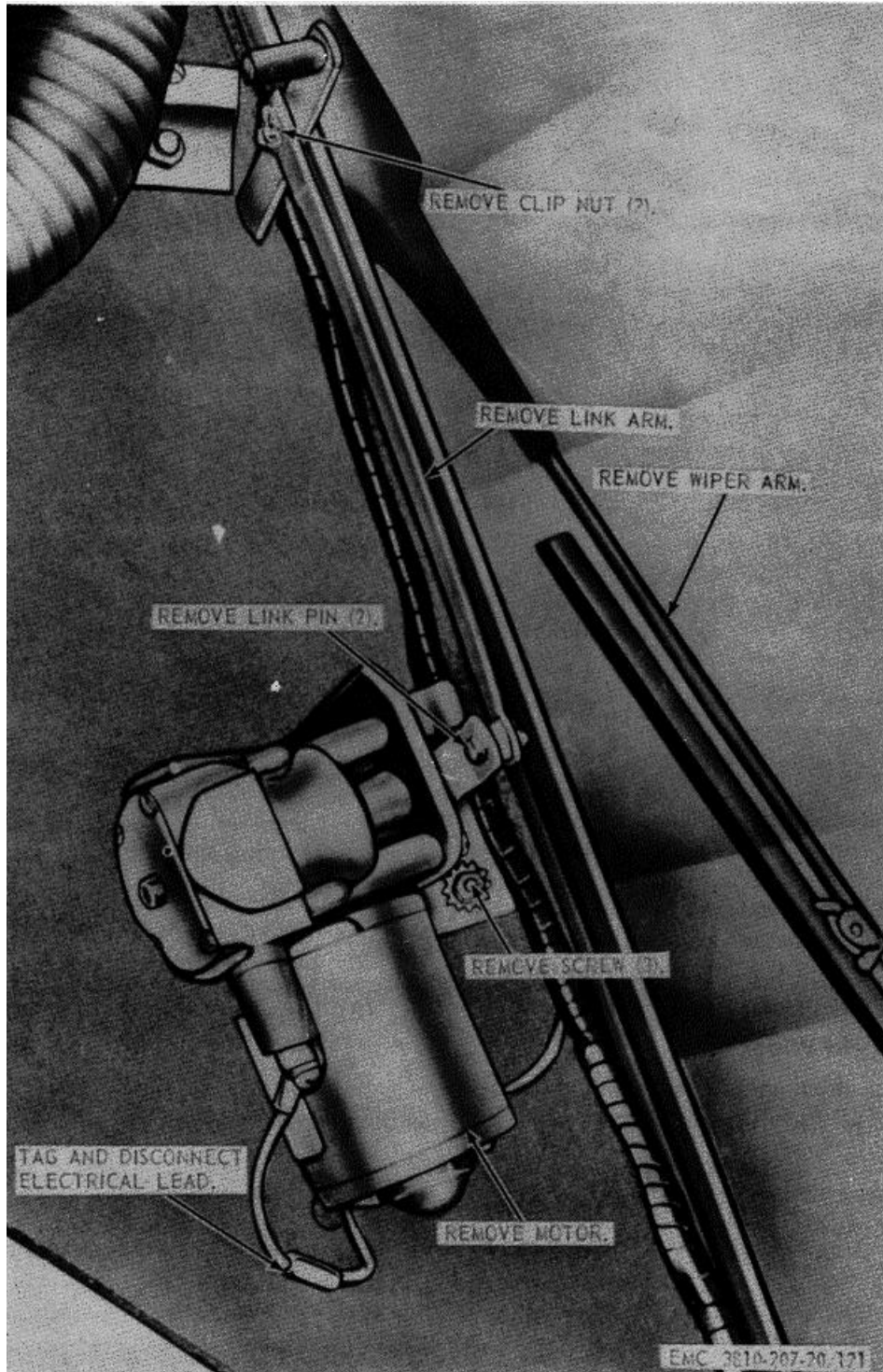


Figure 121. Windshield wiper, removal and installation.

CHAPTER 7

CARRIER ENGINE MAINTENANCE INSTRUCTIONS

Section I. CARRIER ENGINE ELECTRICAL SYSTEM

199. General

The electrical system is a 24-volt system and consists of two 12-volt batteries, a generator, generator regulator, starter and starter solenoid, distributor, six spark plugs, lighting system, heater control system, panel switches and gages, and wires and wire cables. Electrical energy to crank the engine flows from the batteries to the starter solenoid and starter. The generator and generator regulator supply the current to keep the battery at the proper charge. The distributor and coil supply the electrical power to the engine spark plugs. Current flows from the batteries to the panel switches which control the lights and electrical accessory items. For proper removal and installation of all electrical wiring on the carrier refer to the wiring diagram, figure 1.

200. Carrier Engine Distributor*a. Removal.*

- (1) Remove engine access panel (par. 316).
- (2) Remove the distributor in a similar manner as described in paragraph 74.

b. Cleaning and Inspection. Clean and inspect the distributor (par. 74).

c. Installation.

- (1) Install the distributor in a similar manner as described in paragraph 74.
- (2) Install engine access panel (par. 316).

d. Service. Service the distributor (LO 5-3810-207-20).

201. Distributor Coil, Points, Condenser, Resistor, and Rotor Cap

a. Removal. Remove the distributor coil, points, condenser, resistor, and rotor cap in a similar manner as described in paragraph 75.

b. Cleaning and Inspection. Clean and inspect the distributor coil, points, condenser, resistor, and rotor cap (par. 75).

c. Installation. Install the distributor coil, points, condenser, resistor, and rotor cap (par. 75).

d. Test. Test the coil (par. 75).

e. Engine Timing. Time the engine (par. 75).

202. Spark Plugs and Cables

a. Removal. Remove spark plugs and cables in a similar manner as described in paragraph 76.

b. Cleaning and Inspection. Clean and inspect spark plugs and cables (par. 76).

c. Test. Test the spark plugs (par. 76).

d. Installation. Install the spark plugs and cables (par. 76).

e. Adjustment. Service the spark plugs (par. 76).

203. Starter Solenoid

a. Removal. Remove the starter solenoid assembly as instructed on figure 122.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the starter solenoid assembly for proper operation. Replace a defective starter solenoid assembly and hardware as necessary.

c. Installation. Install the starter solenoid assembly as illustrated on figure 122.

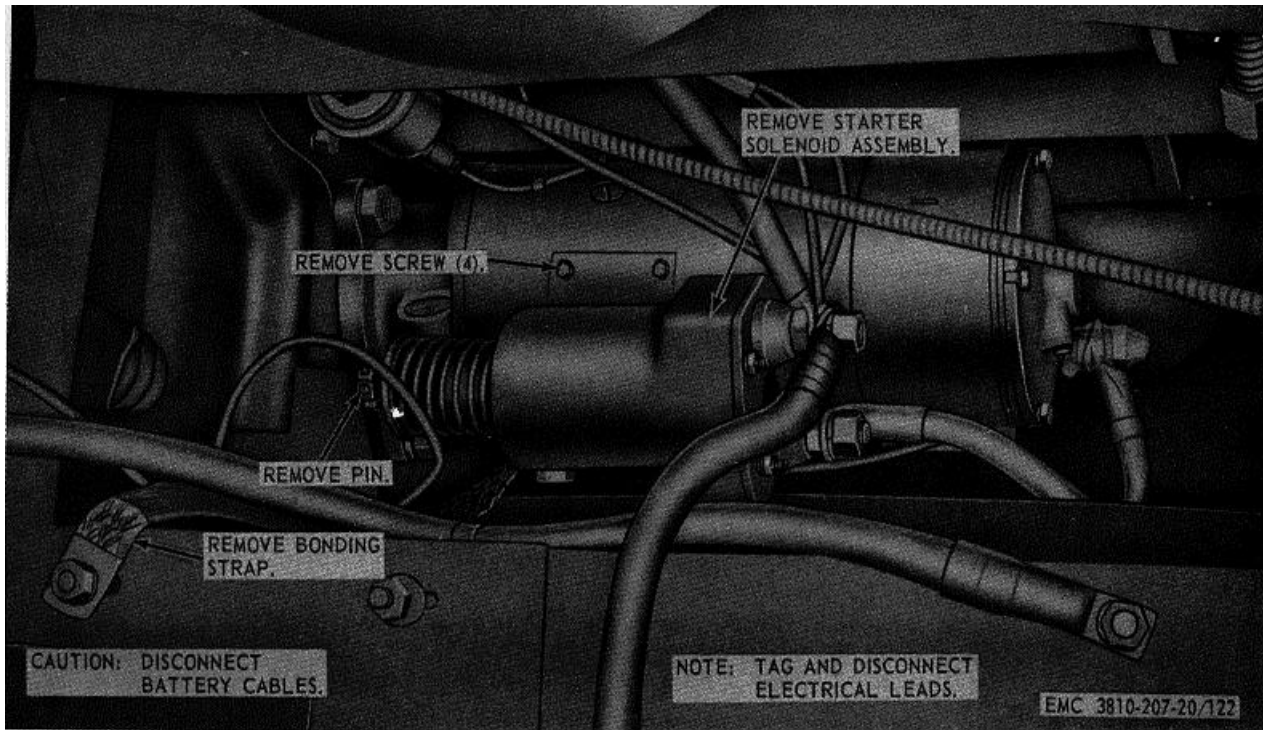


Figure 122. Starter solenoid assembly, removal and installation.

204. Starter Assembly

a. *Removal.* Remove the starter assembly as instructed on figure 123.

b. *Cleaning and Inspection.*

- (1) Clean the starter assembly with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the starter assembly for proper operation. Replace a defective starter as necessary.

c. *Installation.* Install the starter assembly instructed on figure 123.

d. *Test.* Test the starter assembly in a similar manner as described in paragraph 77.

205. Starter Brushes

a. *Removal.*

- (1) Remove the starter (par. 204).
- (2) Remove the brushes in a similar manner as described in paragraph 78.

b. *Cleaning and Inspection.* Clean and inspect the starter brushes (par. 78).

c. *Installation.*

- (1) Install the starter brushes (par. 78).
- (2) Install the starter (par. 204).

206. Generator

a. *Removal.* Remove the generator in a similar manner as described in paragraph 72.

b. *Cleaning and Inspection.* Clean and inspect the generator (par. 72).

c. *Installation.* Install the generator (par. 72).

207. Generator Brushes

a. *Removal.* Remove the generator brushes in a similar manner as described in paragraph 72.

b. *Cleaning and Inspection.* Clean and inspect the generator brushes (par. 72).

c. *Installation.* Install the generator brushes (par. 72).

d. *Test.* Test the generator (par. 72).

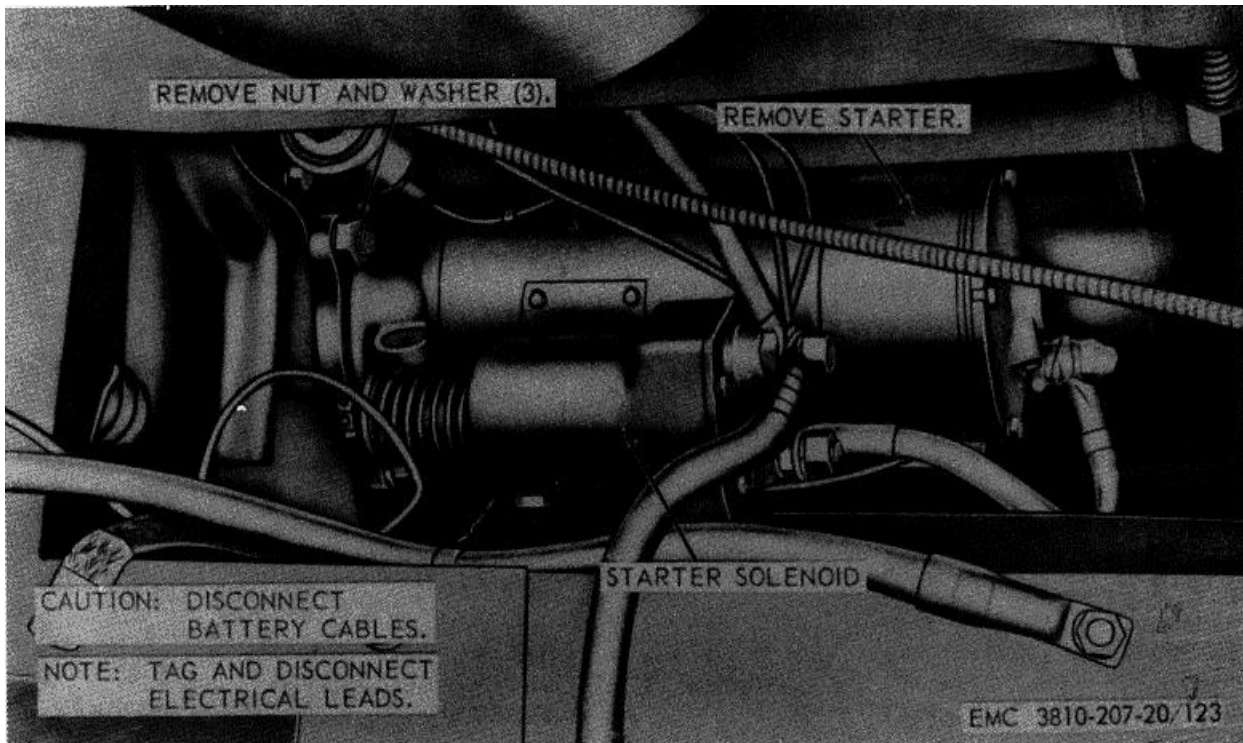


Figure 123. Starter assembly, removal and installation.

208. Generator Regulator

- a. *Removal.* Remove the generator regulator in a similar manner as described in paragraph 73.
- b. *Cleaning and Inspection.* Clean and inspect the generator regulator (par. 73).
- c. *Installation.* Install the generator regulator (par. 73).
- d. *Test.* Test the generator regulator (par. 73).

209. Batteries, Cables, and Battery Box

- a. *Test.*
 - (1) Test the batteries with a hydrometer.
 - (2) For hydrometer specific gravity temperature corrections, refer to TM 5-6140-200-15.
 - (3) Hydrometer readings should be taken before adding a battery solution or after adding a solution and charging the battery.
 - (4) Replace a defective battery as necessary.

Warning:

Do not smoke or allow open flame near charging batteries. Serious

injury from explosion may result. Avoid spilling battery solution on flesh or clothing.

- b. *Adjustment of Cable Lugs.*
 - (1) Place the lug clamp handle in the UP position.
 - (2) Loosen or tighten the adjusting nut on the lug clamp to make a friction-fit on the battery post; tighten the locknut.
 - (3) Push the lug clamp handle down parallel to the lug clamp.
- c. *Removal.* Remove the batteries, cables, and battery box as instructed on figure 124.
- d. *Cleaning, Inspection, and Repair.*
 - (1) Clean the batteries, cables, and battery box with an approved solvent and dry thoroughly.
 - (2) Inspect the batteries for cracks, leaks, or other damage. Replace a defective battery as necessary.

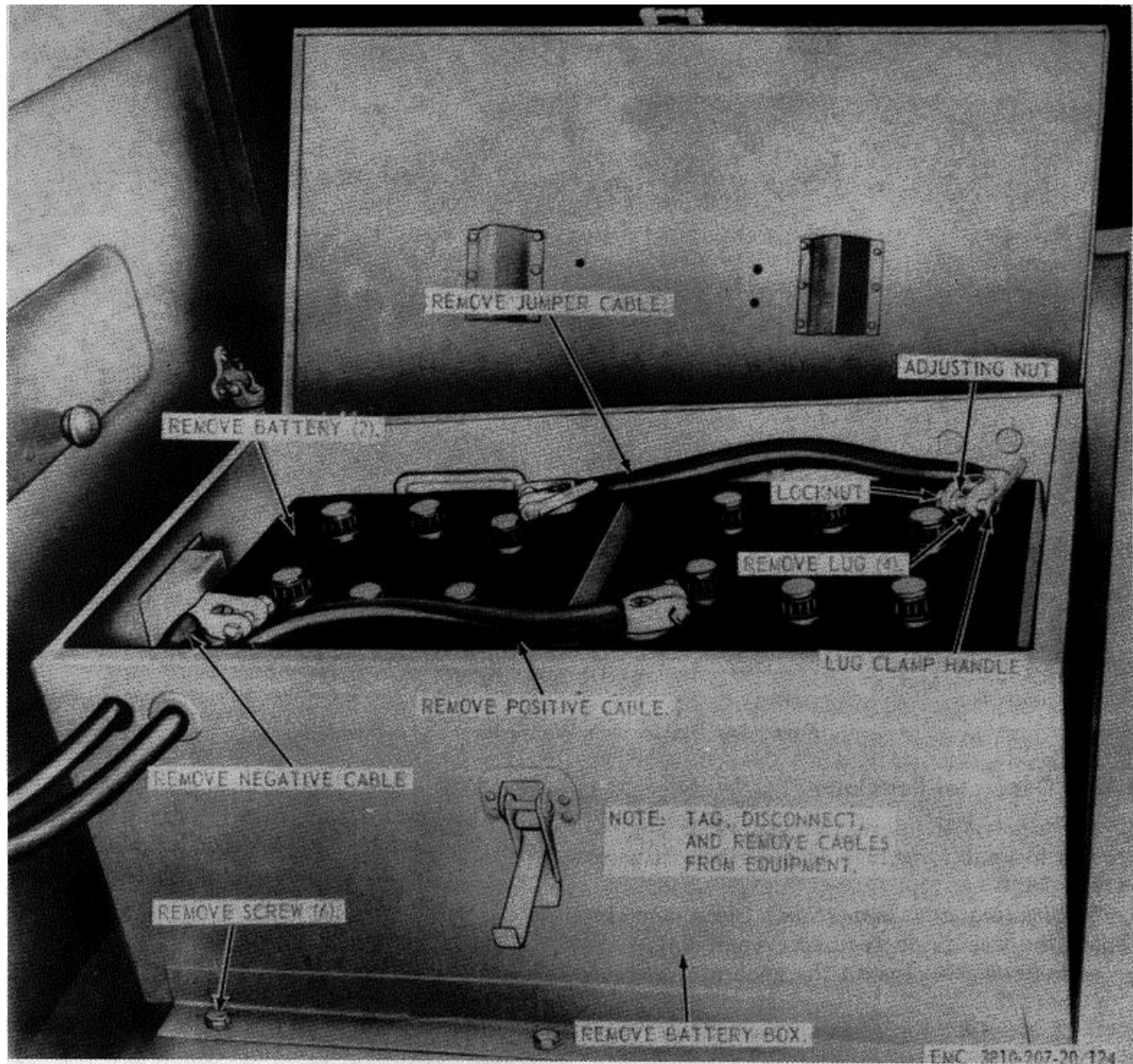
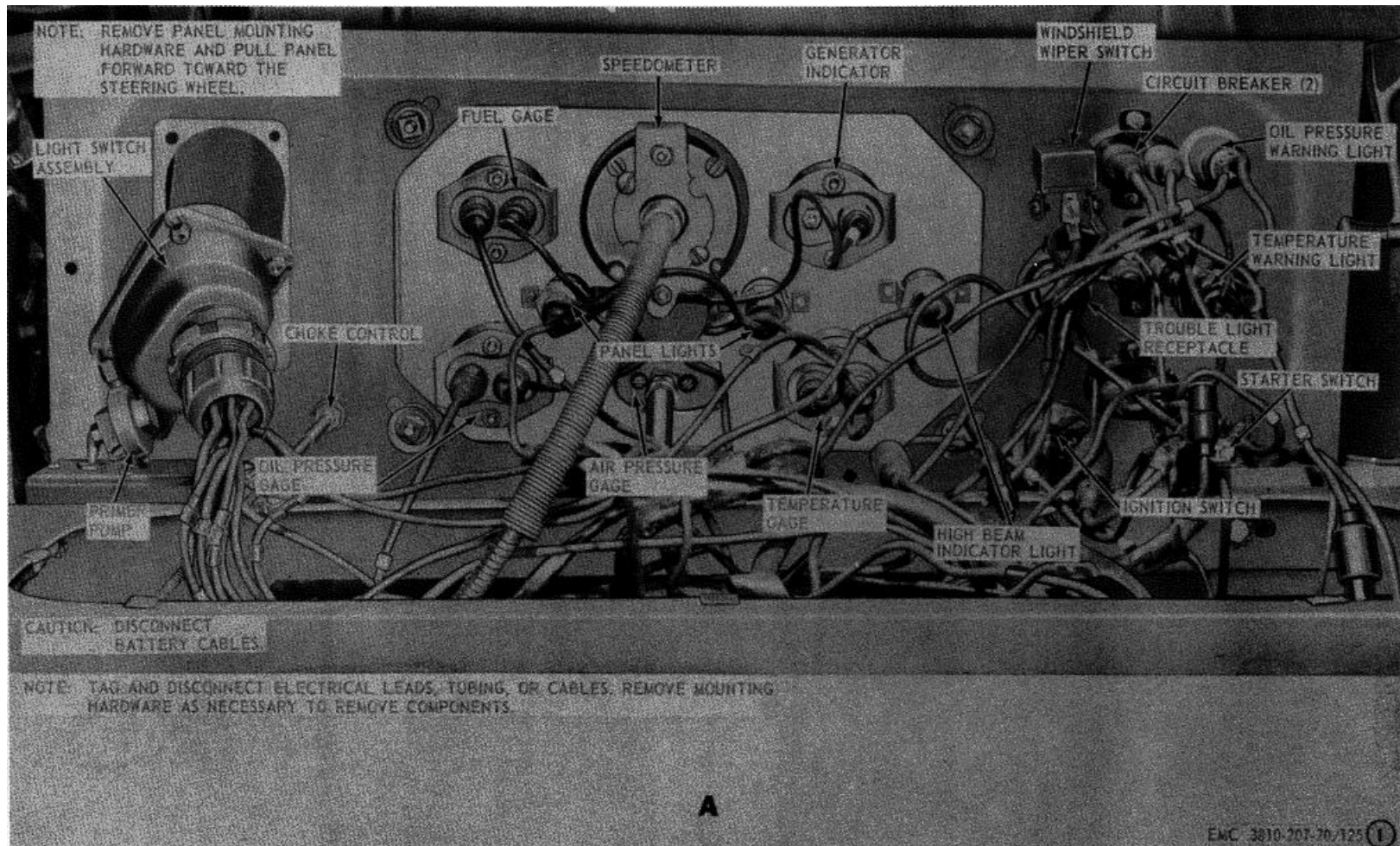


Figure 124. Batteries, cables, and battery box, removal and installation.

- (3) Inspect the cables for frayed insulation, broken wires, bent or broken lugs, and other damage. Repair or replace damaged cables as necessary.
- (4) Inspect the battery box for bends, breaks, and other damage. Repair or replace a damaged battery box as necessary.
- e. *Installation.* Install the battery box, batteries, and cables as illustrated on figure 124.

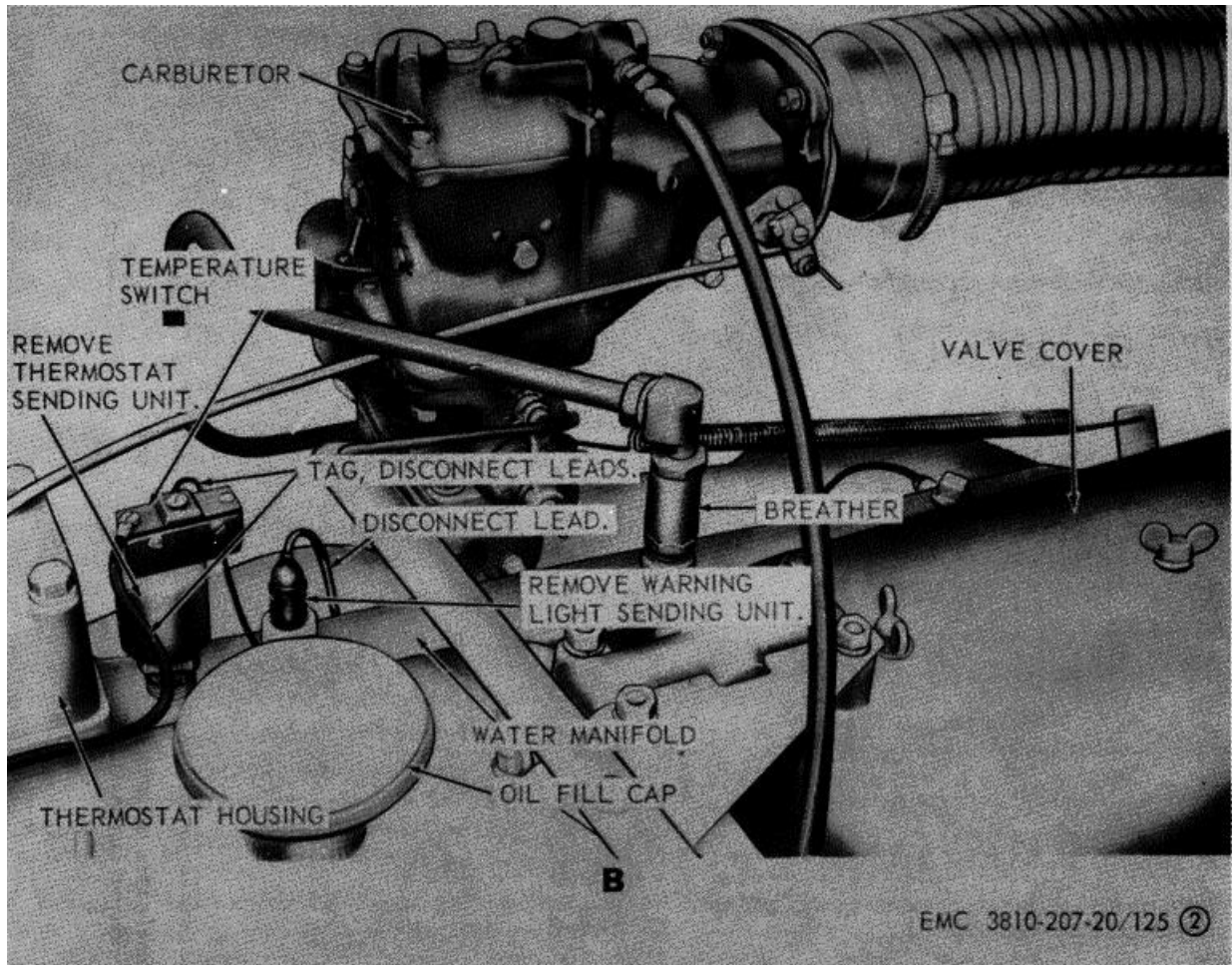
210. Starter Button Switch

- a. *Removal.* Remove the starter switch as instructed on figure 125.
- b. *Cleaning and Inspection.*
 - (1) Clean the starter switch with an approved cleaning solvent and dry thoroughly.
 - (2) Inspect the starter switch for proper operation. Replace a defective switch.



A--Carrier engine instrument panel

Figure 125. Instrument panel gages, controls, and temperature sending units, removal and installation.



B--Carrier engine temperature thermostat and warning light sending units
Figure 125. Continued.

c. Installation. Install the starter switch as illustrated on figure 125.

211. Oil Pressure Warning Light Assembly

a. Removal.

- (1) Remove the lamp (TM 5-3810-207-10).
- (2) Remove the oil pressure warning light assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the oil pressure warning light assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.

- (2) Inspect the oil pressure warning light assembly for proper operation. Replace a defective light assembly.

c. Installation.

- (1) Install the oil pressure warning light assembly as illustrated on figure 125.
- (2) Install the lamp (TM 5-3810-207-10).

212. Oil Pressure Gage Assembly

a. Removal. Remove the oil pressure gage assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the oil pressure gage assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the oil pressure gage for proper operation. Replace a defective oil pressure gage.

c. Installation. Install the oil pressure gage assembly as illustrated on figure 125.

213. Ignition Switch Assembly

a. Removal. Remove the ignition switch assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the ignition switch assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the ignition switch assembly for proper operation. Replace a defective ignition switch assembly.

c. Installation. Install the ignition switch assembly as illustrated on figure 125.

214. Trouble Light Receptacle Assembly

a. Removal. Remove the trouble light receptacle assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the trouble light receptacle assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the trouble light receptacle assembly for proper operation. Replace a defective trouble light receptacle.

c. Installation. Install the trouble light receptacle assembly as illustrated on figure 125.

215. Generator Indicator

a. Removal. Remove the generator indicator as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the generator indicator with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the generator indicator for proper operation. Replace a defective generator indicator.

c. Installation. Install the generator indicator as illustrated on figure 125.

216. Circuit Breakers

a. Removal. Remove the circuit breakers as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the circuit breakers with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the circuit breakers for proper operation. Replace a defective circuit breaker.

c. Installation. Install the circuit breakers as illustrated on figure 125.

217. Water Temperature Warning Light and Sending Unit

a. Removal.

- (1) Remove the lamp (TM 5-3810-207-10).
- (2) Remove the water temperature warning light and sending unit as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the water temperature warning light and sending unit with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the water temperature warning light and sending unit for proper operation. Replace a defective warning light or sending unit.

c. Installation.

- (1) Install the water temperature warning light and sending unit as illustrated on figure 125.
- (2) Install the lamp (TM 5-3810-207-10).

218. Temperature Gage and Thermostat Sending Unit

a. Removal. Remove the temperature gage and thermostat sending unit as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the temperature gage and thermostat sending unit with a cloth dampened with an approved cleaning solvent and dry thoroughly.

- (2) Inspect the temperature gage and thermostat sending unit for proper operation. Replace a defective temperature gage and defective thermostat sending unit.

c. Installation. Install the temperature gage and thermostat sending unit as illustrated on figure 125.

219. Light Switch

a. Removal. Remove the carrier light switch as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the carrier light switch with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the carrier light switch for proper operation. Replace a defective carrier light switch.

c. Installation. Install the carrier light switch as illustrated on figure 125.

220 Fuel Gage

a. Removal. Remove the fuel gage as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the fuel gage with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the fuel gage for proper operation. Replace a defective fuel gage.

c. Installation. Install the fuel gage as illustrated on figure 125.

221. Speedometer

a. Removal. Remove the speedometer as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the speedometer with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the speedometer for proper operation. Replace a defective speedometer.

c. Installation. Install the speedometer as illustrated on figure 125.

222. Windshield Wiper Switch

a. Removal. Remove the windshield wiper switch as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the windshield wiper switch with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the windshield wiper switch for proper operation. Replace a defective windshield wiper switch.

c. Installation. Install the windshield wiper switch as illustrated on figure 125.

223. Panel Light Assembly

a. Removal.

- (1) Remove the lamp (TM 5-810-207-10).
- (2) Remove the panel light assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the panel light assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the panel light assembly for proper operation. Replace a defective panel light assembly.

c. Installation.

- (1) Install the panel light assembly as illustrated on figure 125.
- (2) Install the lamp (TM 5-3810-207-10).

224. Air Pressure Gage Assembly

a. Removal. Remove the air pressure gage as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the air pressure gage with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the air pressure gage for proper operation. Replace a defective air pressure gage.

c. Installation. Install the air pressure gage as illustrated on figure 125.

225. High Beam Indicator Light Assembly

a. Removal.

- (1) Remove the lamp (TM 5-3810-207-10).

- (2) Remove the high beam indicator light assembly as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean the high beam indicator light assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the high beam indicator light assembly for proper operation. Replace a defective high beam indicator light assembly.

c. Installation.

- (1) Install the high beam indicator light assembly as illustrated on figure 125.
- (2) Install the lamp (TM 5-3810-207-10).

226. Horn Button Assembly

a. Removal. Remove the horn button assembly as instructed on figure 126.

b. Cleaning and Inspection.

- (1) Clean the horn button assembly with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the horn button assembly for proper operation. Replace a defective horn button assembly as necessary.

c. Installation. Install the -horn button assembly as illustrated on figure 126.

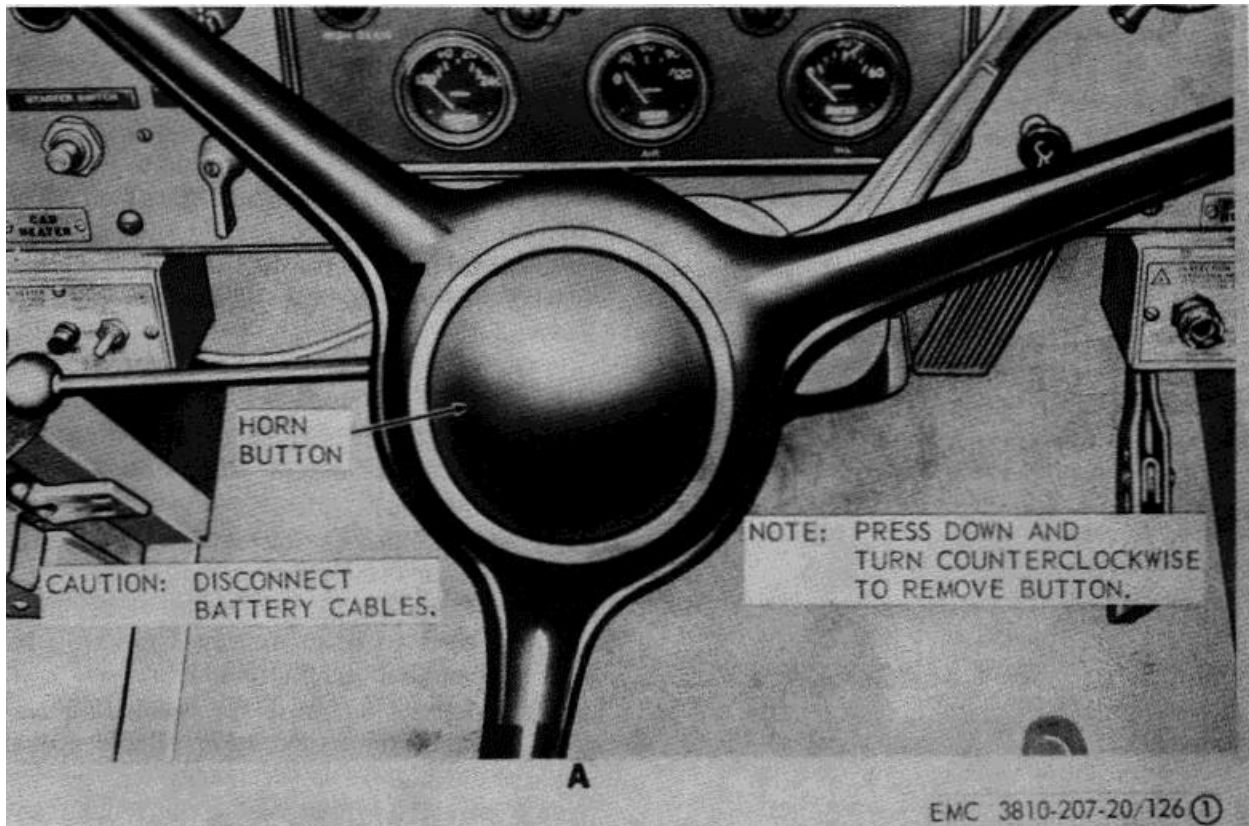
227. Cab and Chassis Wiring Harness Repair

Inspect and repair carrier cab and chassis wiring harness in a similar manner as for crane cab wiring harness (par. 89).

228. Blackout Stoplight

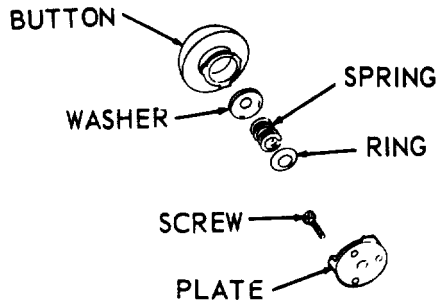
a. Removal. Remove the blackout stoplight as instructed on figure 127.

b. Disassembly. Disassemble the blackout stoplight as illustrated on figure 128.



A-Horn button

Figure 126. Horn button assembly.



B

EMC 3810-207-20/126 ②

**B-Horn button, exploded view
Figure 126-Continued.**

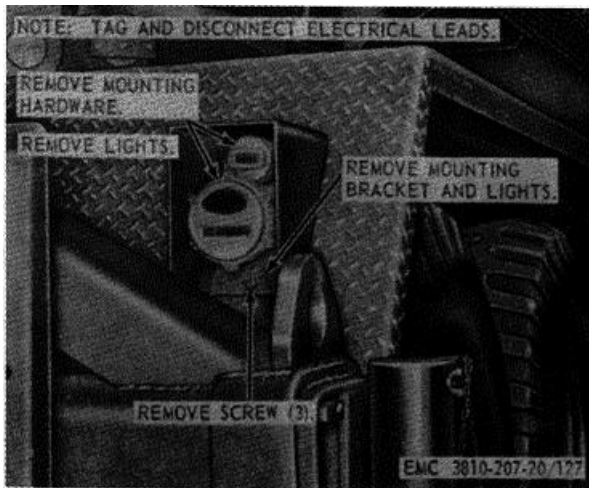
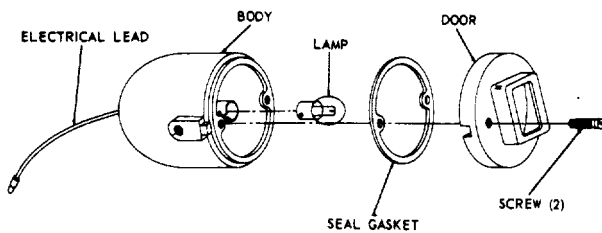


Figure 127. Blackout stoplight, removal and installation



EMC 3810-207-20/128

Figure 128. Blackout stoplight, exploded view.

c. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, damage, and proper operation. Replace damaged parts as necessary.

d. Reassembly. Reassemble the blackout stoplight as illustrated on figure 128.

e. Installation. Install the blackout stoplight as illustrated on figure 127.

229. Front and Rear Blackout Service Lights

a. Removal. Remove the front or rear blackout service light as instructed on figure 129.

b. Disassembly. Disassemble the front or rear blackout service light as illustrated on figure 130.

c. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, damage, and proper operation. Replace damaged parts as necessary.

d. Reassembly. Reassemble the front or rear blackout service light as illustrated on figure 130.

e. Installation. Install the front or rear blackout service light as illustrated on figure 129.

230. Front Blackout Headlight

a. Removal. Remove the front blackout headlight as instructed on figure 181.

b. Disassembly. Disassemble the front blackout headlight as illustrated on figure 132: .

c. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, damage, and proper operation. Replace damaged parts as necessary.

d. Reassembly. Reassemble the front blackout headlight as illustrated on figure 132.

e. Installation. Install the front blackout headlight as illustrated on figure 131.

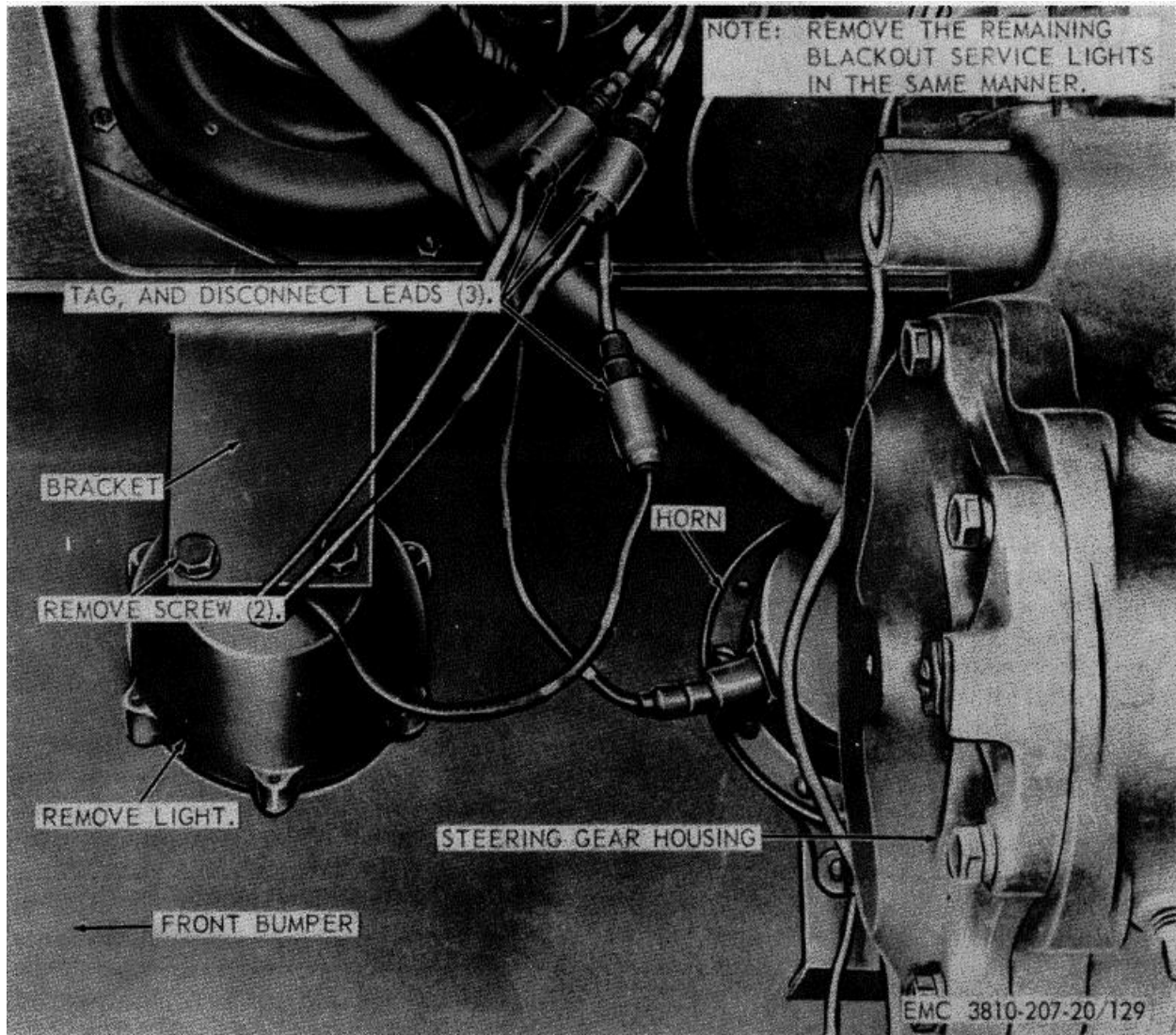


Figure 129. Blackout service light, removal and installation.

231. Headlight

a. *Removal.* Remove the headlight as instructed on figure 133.

b. *Disassembly.* Disassemble the front headlight in the numerical sequence as illustrated on figure 134.

c. *Cleaning and Inspection.*

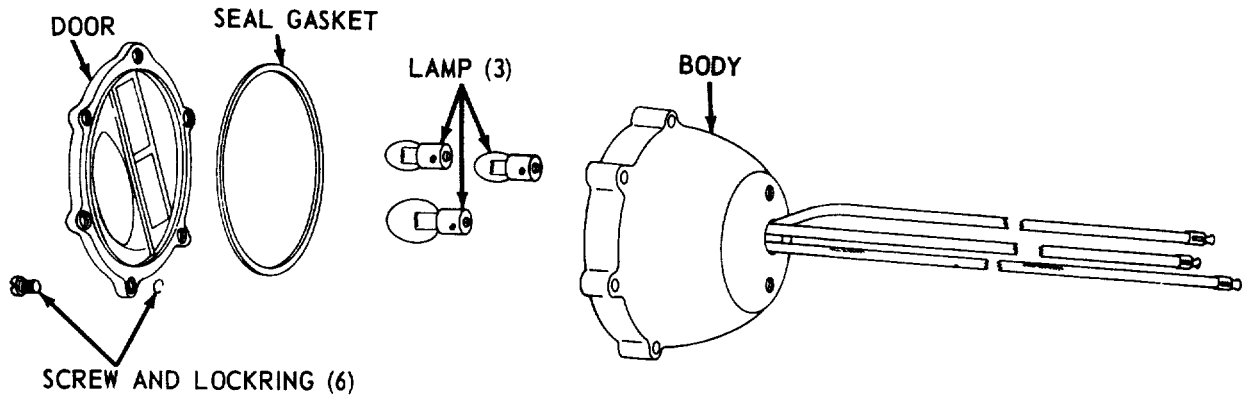
- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, damage, and proper operation. Replace damaged parts as necessary.

d. *Reassemble.* Reassemble the headlight in the reverse numerical sequence as illustrated on figure 134.

e. *Installation.* Install the headlight as illustrated on figure 133.

f. *Adjustment.*

- (1) Headlights must be adjusted properly to prevent a blinding glare to the operator of an oncoming vehicle.
- (2) Position the unloaded equipment on a flat and level surface at right angles to, and 25 feet from, a suitable vertical surface.



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Figure 130. Blackout service light, exploded view.

Measure the distance from the surface the equipment is upon to the center of the headlight; mark a horizontal line the same distance on the vertical surface; mark horizontal lines on the vertical surface as illustrated on figure 135.

- (3) Remove the headlight door.
- (4) Turn the top screw in or out for vertical adjustment and turn the side screw for horizontal adjustment of the sealed beam. Use a suitable cover and cover one headlight while aiming the other.
- (5) Replace the headlight door.

b. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for leaks, breaks, and other damage.
- (3) Replace damaged parts as necessary.

c. Installation. Install the oil pressure sending unit and gage as illustrated on figure 137 and as instructed in paragraph 212.

232. Dome Light

a. Removal. Remove the dome light as instructed on figure 136.

b. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks and other damage.
- (3) Replace damaged parts as necessary.

c. Installation. Install the dome light as illustrated on figure 136.

233. Oil Pressure Sending Unit and Gage

a. Removal. Remove the oil pressure sending unit and gage as instructed on figure 137 and in paragraph 212.

234. Clearance. Marker Lights

a. Removal. Remove the marker lights in a similar manner as described in paragraph 88.

b. Cleaning and Inspection. Clean and inspect the marker lights (par. 88).

c. Installation. Install the marker lights (par. 88).

235. Horn

a. Removal. Remove the horn as instructed on figure 138.

b. Cleaning and Inspection.

- (1) Clean the horn. with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the horn for proper operation. Replace a defective horn.

c. Installation. Install the horn as illustrated on figure 138.

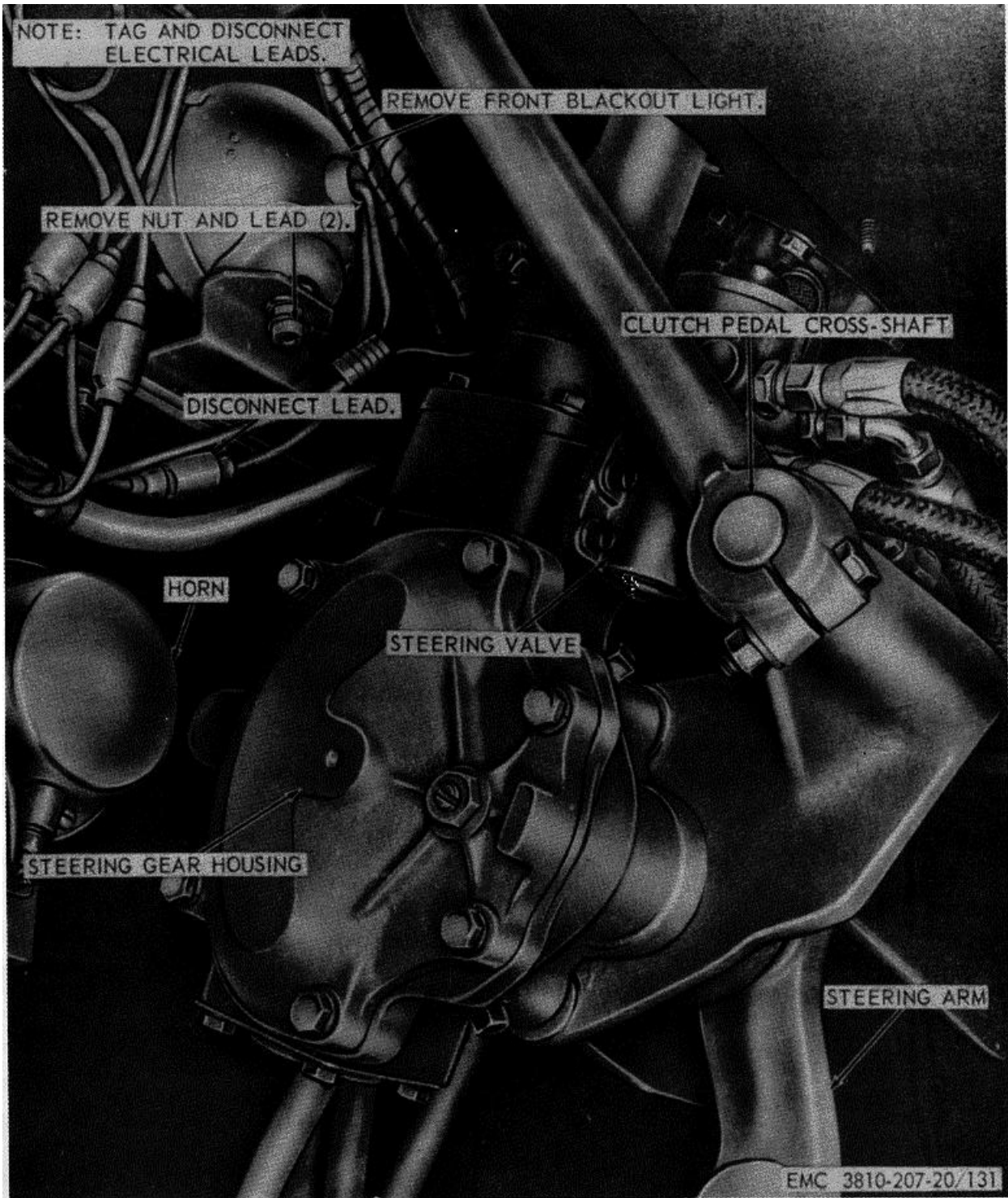


Figure 131. Front blackout headlight, removal and installation.

236. Slave Receptacle

a. *Removal.* Remove the slave recycle as instructed on figure 139.

b. *Cleaning and Inspection.*

- (1) Clean the slave receptacle with an approved cleaning solvent and dry thoroughly.
- (2) Inspect for breaks, bends, and proper operation. Replace a damaged or defective slave receptacle.

c. *Installation.* Install a slave receptacle as illustrated on figure 139.

237. Stoplight Switch

a. *Removal.* Remove the stoplight switch as instructed on figure 140.

b. *Cleaning and Inspection.*

- (1) Clean the stoplight switch with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the stoplight switch for proper operation. Replace a defective stoplight switch.

c. *Installation.* Install the stoplight switch as illustrated on figure 140.

238. Turn Signal Switch

a. *Removal.*

- (1) Remove the horn button (par. 226).
- (2) Remove steering wheel (par. 278).
- (3) Remove the turn signal switch as instructed on figure 141.

b. *Cleaning and Inspection.*

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for wear, breaks, and other damage. Replace worn and damaged parts as necessary.

c. *Installation.*

- (1) Install the turn signal switch as illustrated on figure 141.
- (2) Install steering wheel (par. 278).
- (3) Install the horn button (par. 226).

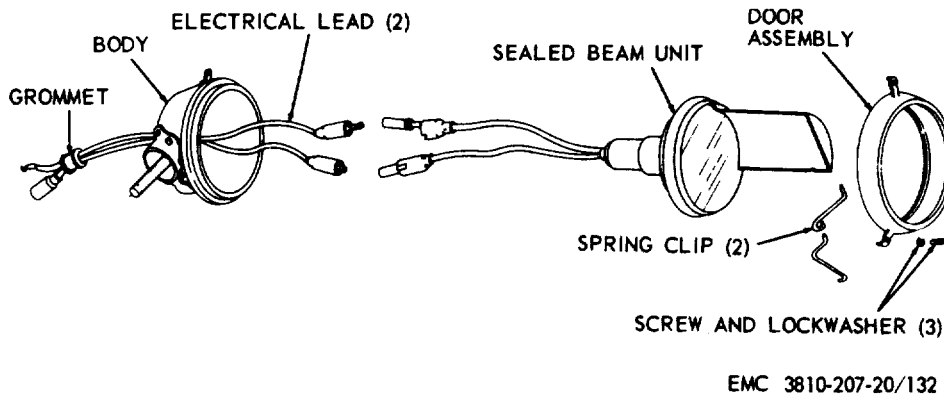


Figure 132. Front blackout headlight, exploded view.

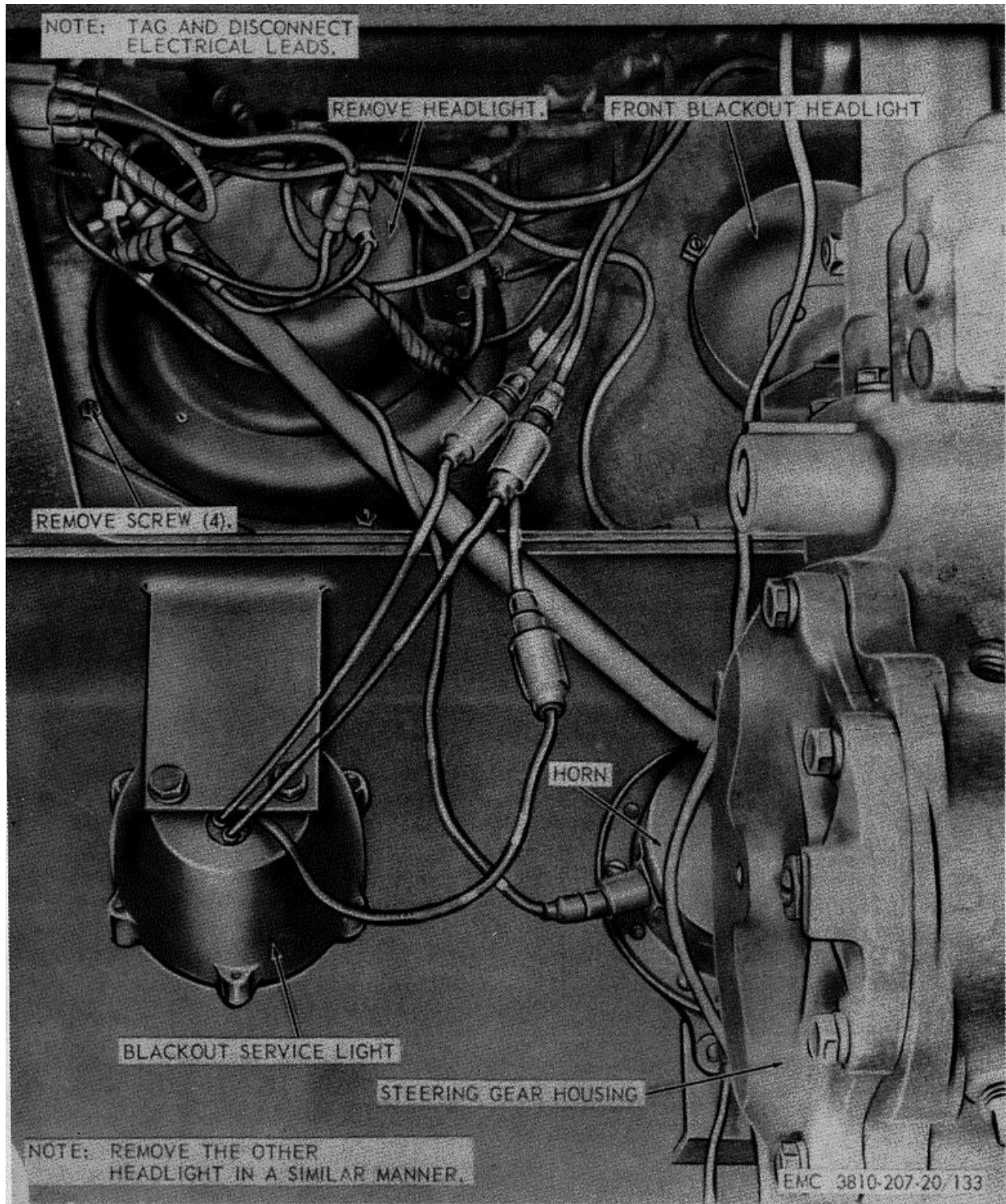
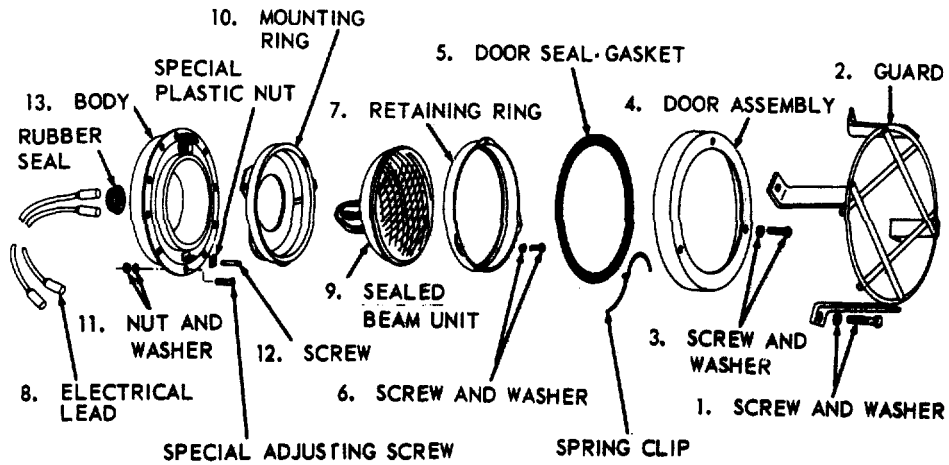


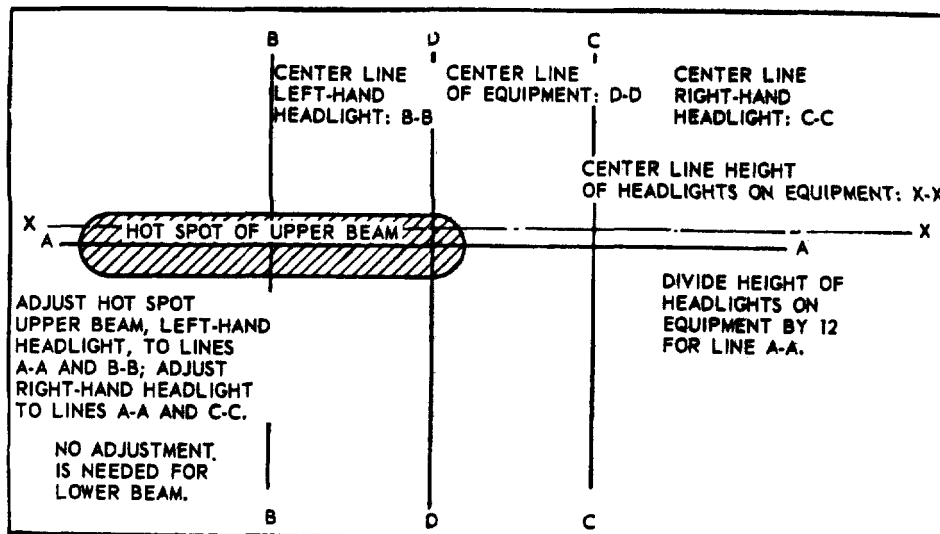
Figure 133. Headlight, removal and installation.



NOTE: TAG AND DISCONNECT ELECTRICAL LEADS.

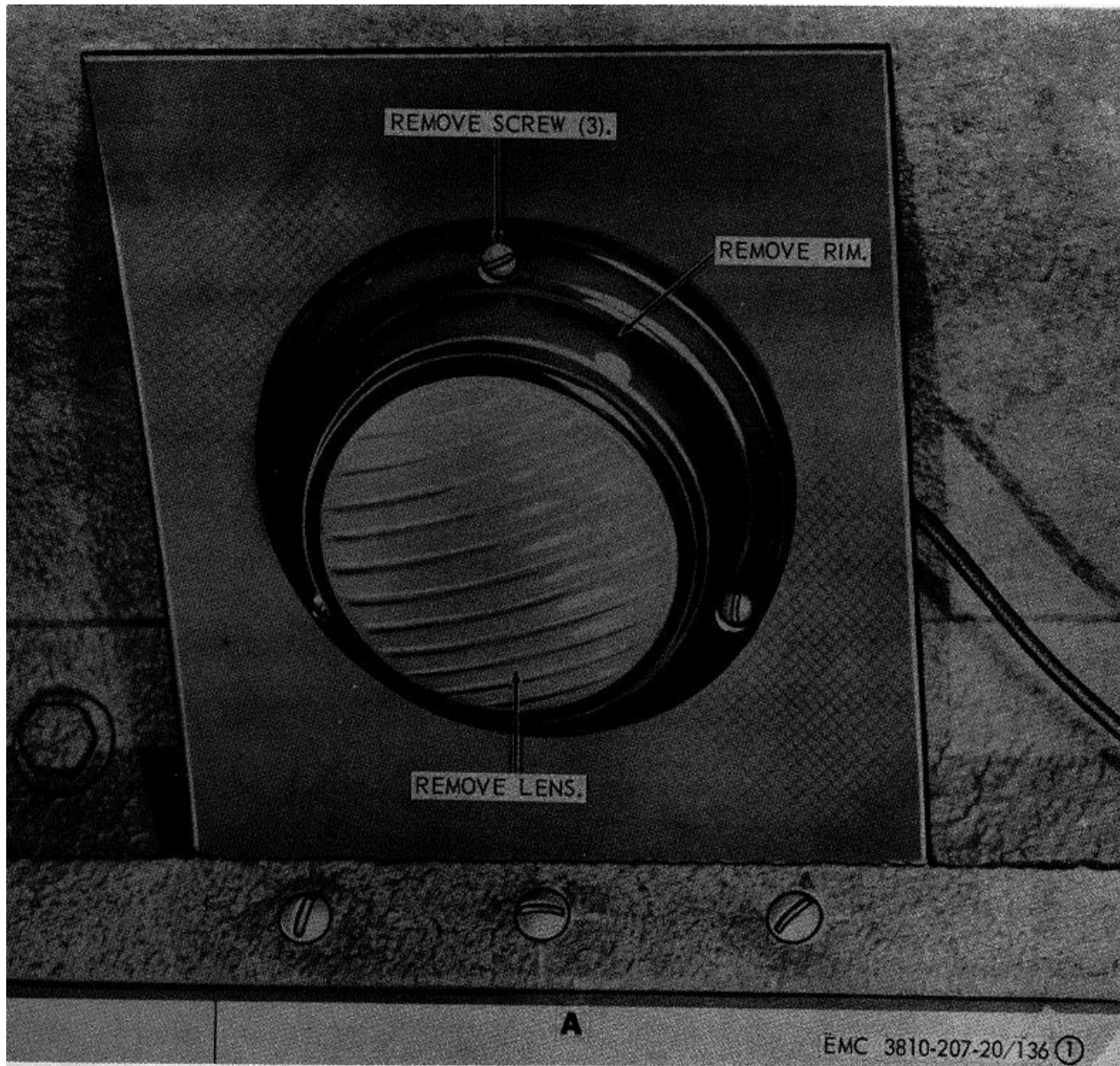
EMC 3810-207-20/134

Figure 134. Headlight, exploded view.



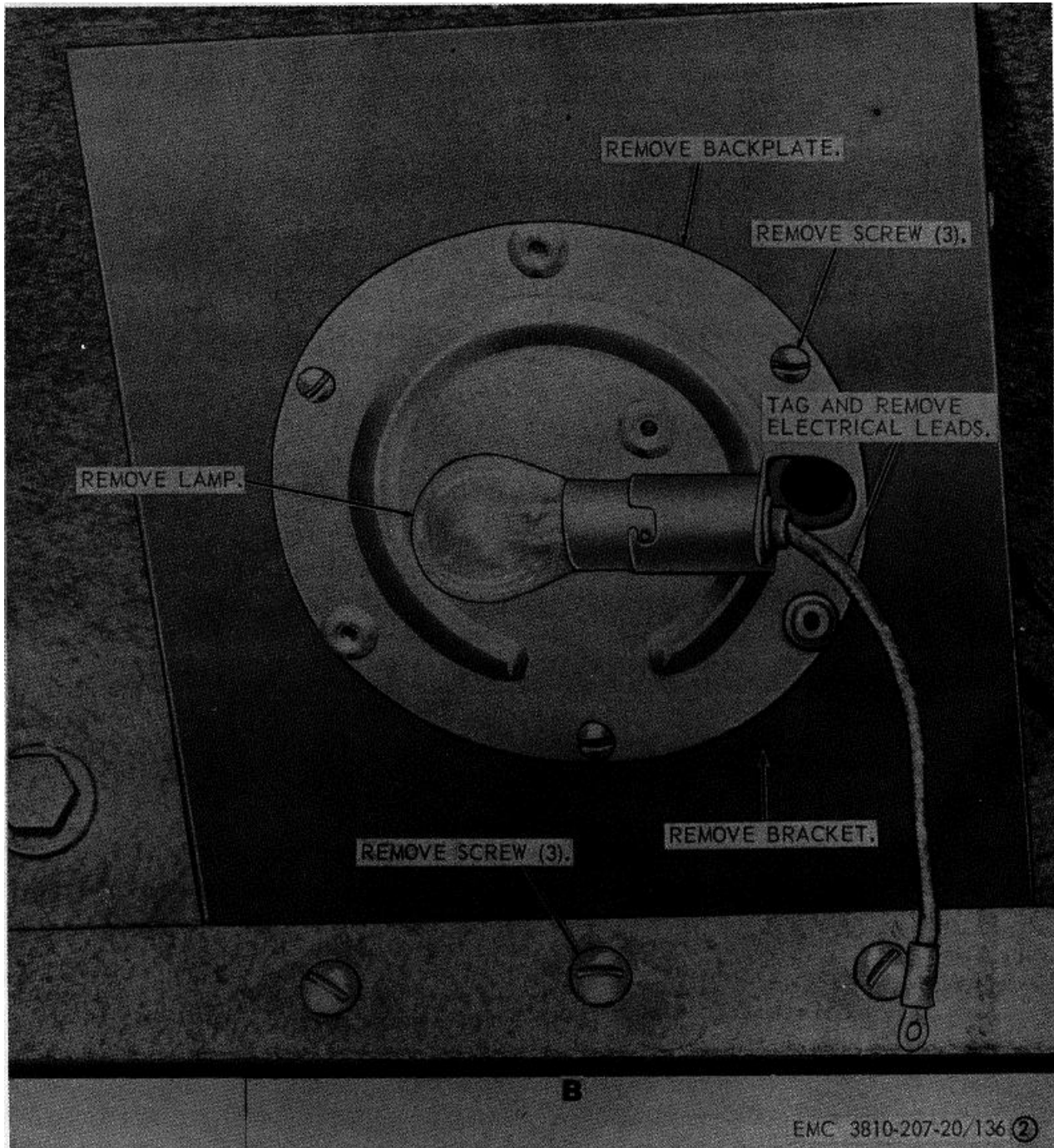
EMC 3810-207-20/135

Figure 135. Headlight, adjusting diagram



A-Lens, removal and installation

Figure 136. Dome light, removal and installation.



B--Backplate and mounting bracket, removal and installation

Figure 136-Continued.

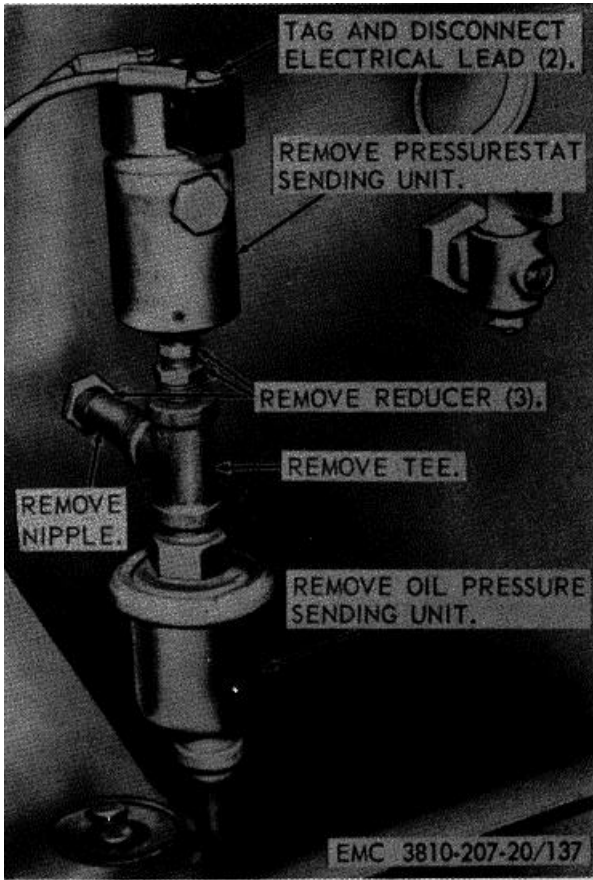


Figure 137. Oil pressure sending unit, removal and installation.

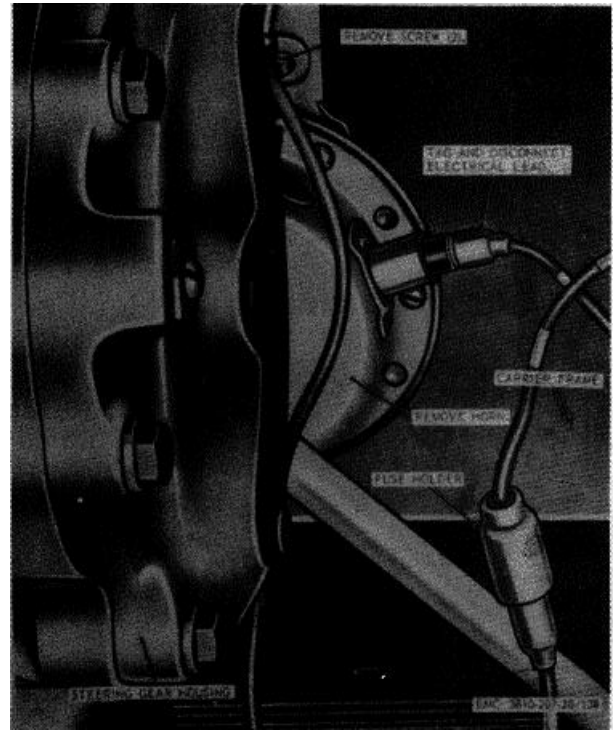


Figure 138. Horn, removal and installation.

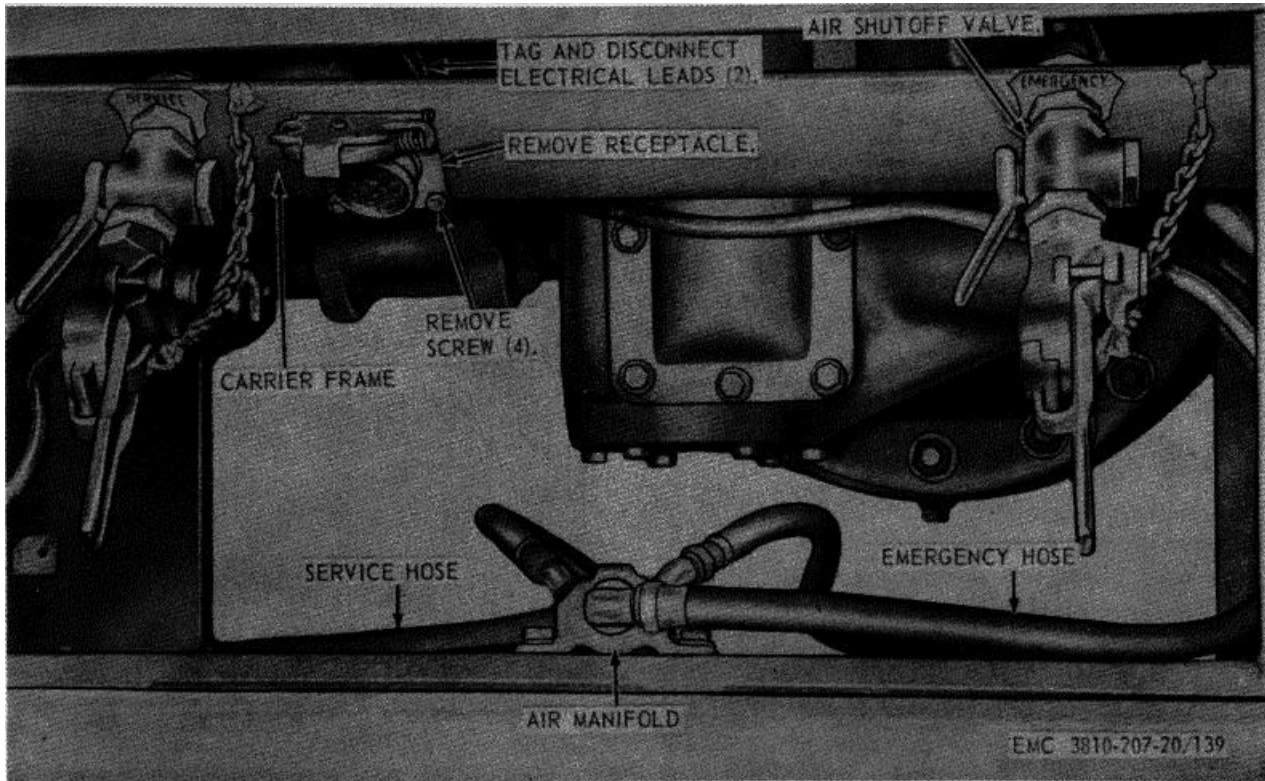


Figure 139. Slave receptacle, removal and installation.

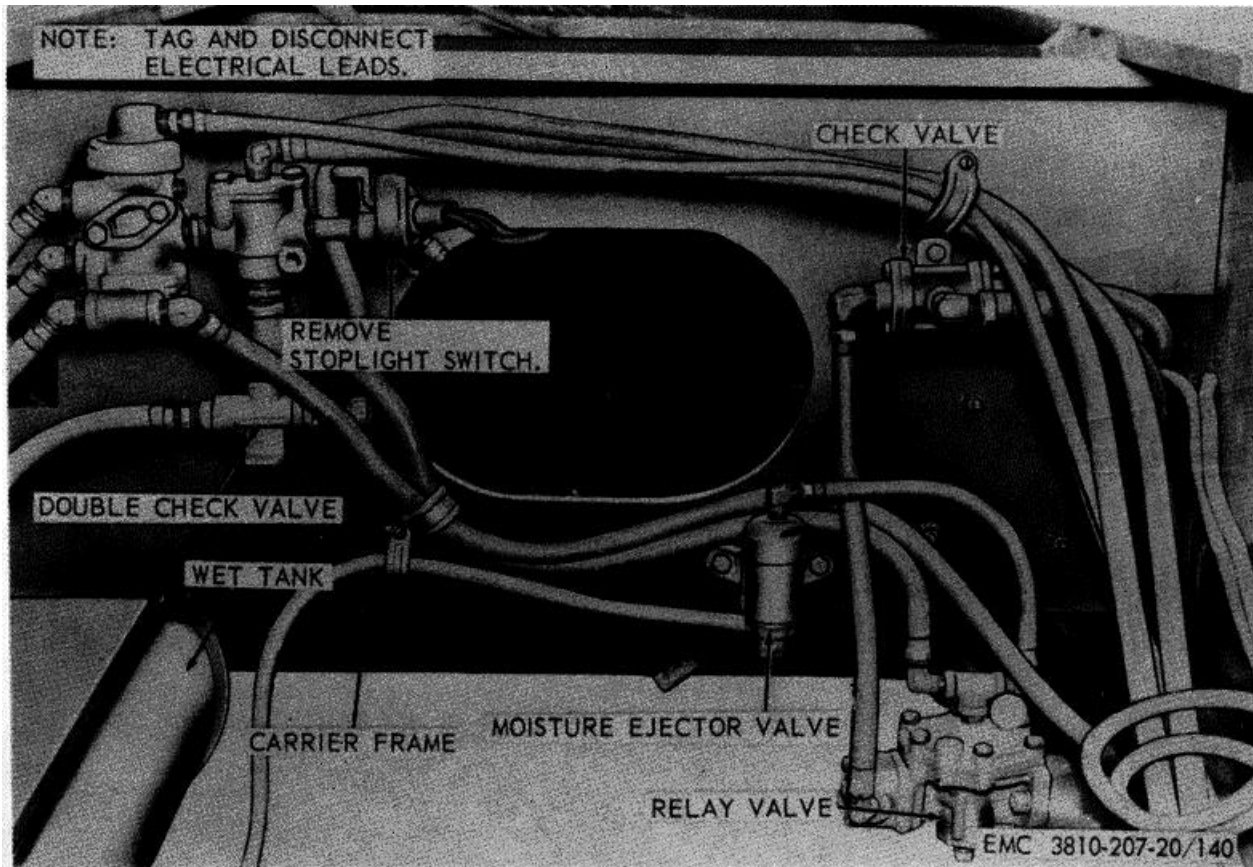
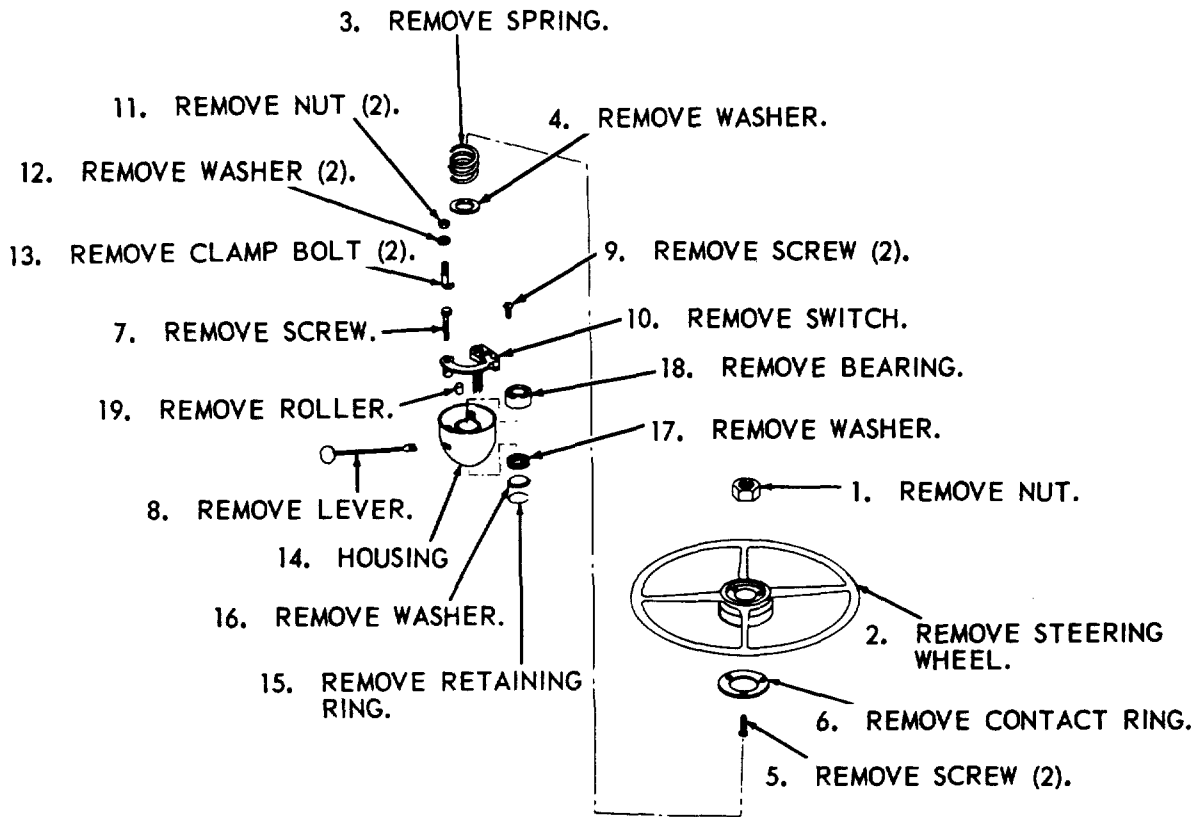


Figure 140. Stoplight switch, removal and installation.



NOTE: TAG AND DISCONNECT ELECTRICAL LEADS.

EMC 3810-207-20/141

Figure 141. Turn signal switch, removal and installation, exploded view.

Section II. CARRIER LUBRICATION SYSTEM

239. General

Engine lubrication is furnished by a geartype, recirculating oil pump which is driven from the camshaft. The pump is located in the crankcase and forces oil through the oil filter to the main gallery line and is distributed to the main bearings and other lower parts of the engine. Oil to the rocker arms is fed up through the front cam journal, through a passage in the front of the block leading through the head gasket, into the front cylinder head, to the front rocker arm shaft, through the front rocker arm shaft, then down to a passage in the block, and up to the rear cylinder head. From the rear cylinder head the oil travels through the rear rocker arm

shaft, down through the block, through the filter, into the cooler, and back to the crankcase.

240. Crankcase Breather

a. *Removal.* Remove the breather as instructed on figure 142.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, leaks, dents, and other damage. Repair or replace all damaged parts as necessary.

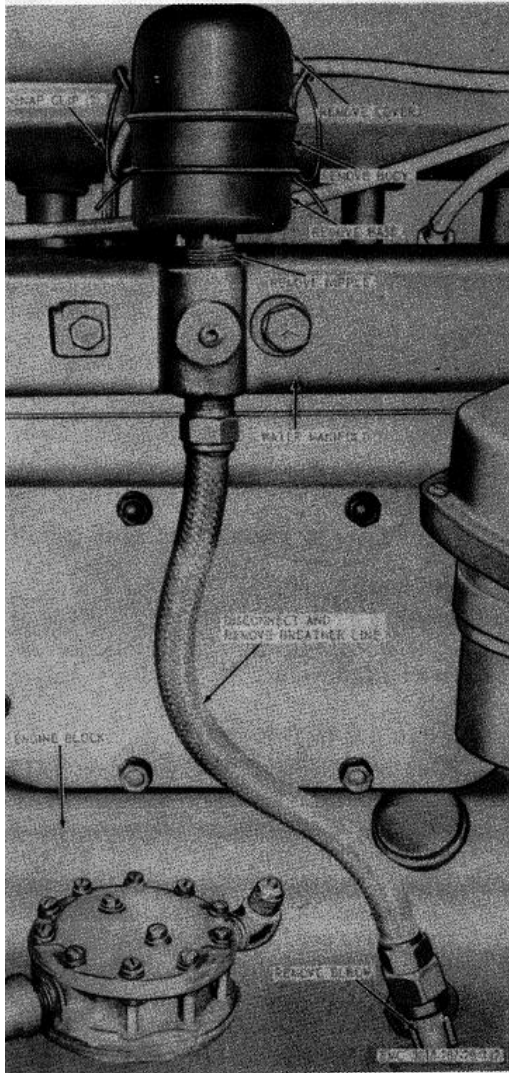


Figure 142. Carrier engine crankcase breather, removal and installation

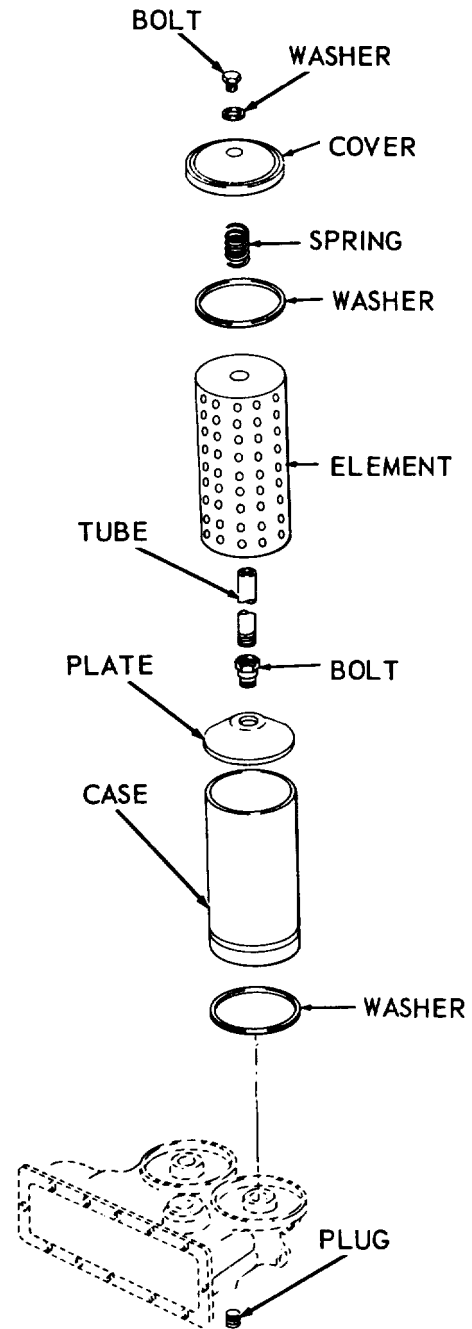
c. *Installation.* Install the breather as illustrated on figure 142.

241. Oil Filter

a. *Removal.*

- (1) Remove engine access panel (par. 316).
- (2) Remove the drain plug and allow the oil to drain from the filter.

(3) Remove the filter as illustrated on figure 143.



EMC 3810-207-20/143

Figure 143. Carrier engine oil filter, exploded view.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for dents, fractures, and other damage.
- (3) Repair or replace all damaged parts as necessary.

Note

If the filter cover is removed, for any reason, the gasket must be replaced.

c. Installation.

- (1) Install the oil filter as illustrated on figure 143.

- (2) Install the drain plug in the filter base.
- (3) Start the engine and check the filters for leaks.
- (4) Fill crankcase to proper operating level (LO B-381-207-20).
- (5) Install the engine access panel (par. 316).

242. Engine Pressure Relief Valve

The pressure relief valve, located on the right side of the engine block, is the same as the relief valve on the crane engine and is re moved, repaired, adjusted, and installed in the same manner (par. 115).

Section III. CARRIER FUEL SYSTEM

243. General

The fuel system consists of a 78-gallon tank mounted on the left side of the carrier frame; a fuel shutoff valve connected to the tank; a fuel line connected to the diaphragm-type fuel pump, mounted forward on the lower-left side of the block; a connecting fuel line leading to the downdraft-type carburetor, mounted on the right side of the engine; and an oil-bath type air cleaner, mounted behind the engine on the outside of the firewall, with a connecting hose from the air cleaner #to the rear of the carburetor. A gear-driven governor is connected to the right side of the carburetor and regulates the engine speed by increasing or decreasing the amount of fuel mixture entering the cylinder. This governor is powered by a cable leading from the bottom of the governor to the lower end of the distributor shaft. A fuel line leads from the fuel tank to the primer pump on the dash of the cab with a line leading directly to the engine. The primer is for cold-weather starting.

- (3) Repair or replace damaged parts as necessary.

d. Reassembly. Reassemble the air cleaner as illustrated on figure 145.

e. Installation. Install the air cleaner as illustrated on figure 144.

245. Engine Governor

a. Removal. Remove the governor as instructed on figure 146.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for damaged or defective condition.
- (3) Repair or replace all deranged or defective parts.

c. Installation and Adjustment. Install and adjust the governor, as illustrated on figure 146, so engine operates at 1,650 rpm at full throttle.

244. Engine Air Cleaner

a. Removal. Remove the air cleaner as instructed on figure 144.

b. Disassembly. Disassemble the air cleaner as illustrated on figure 145.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) all parts for fractures and other damage.

246. Carburetor

a. Removal.

- (1) Remove air cleaner hose and flange (par. 244).
- (2) Remove the engine speed governor (par. 245).
- (3) Remove the carburetor as instructed on figure 147.

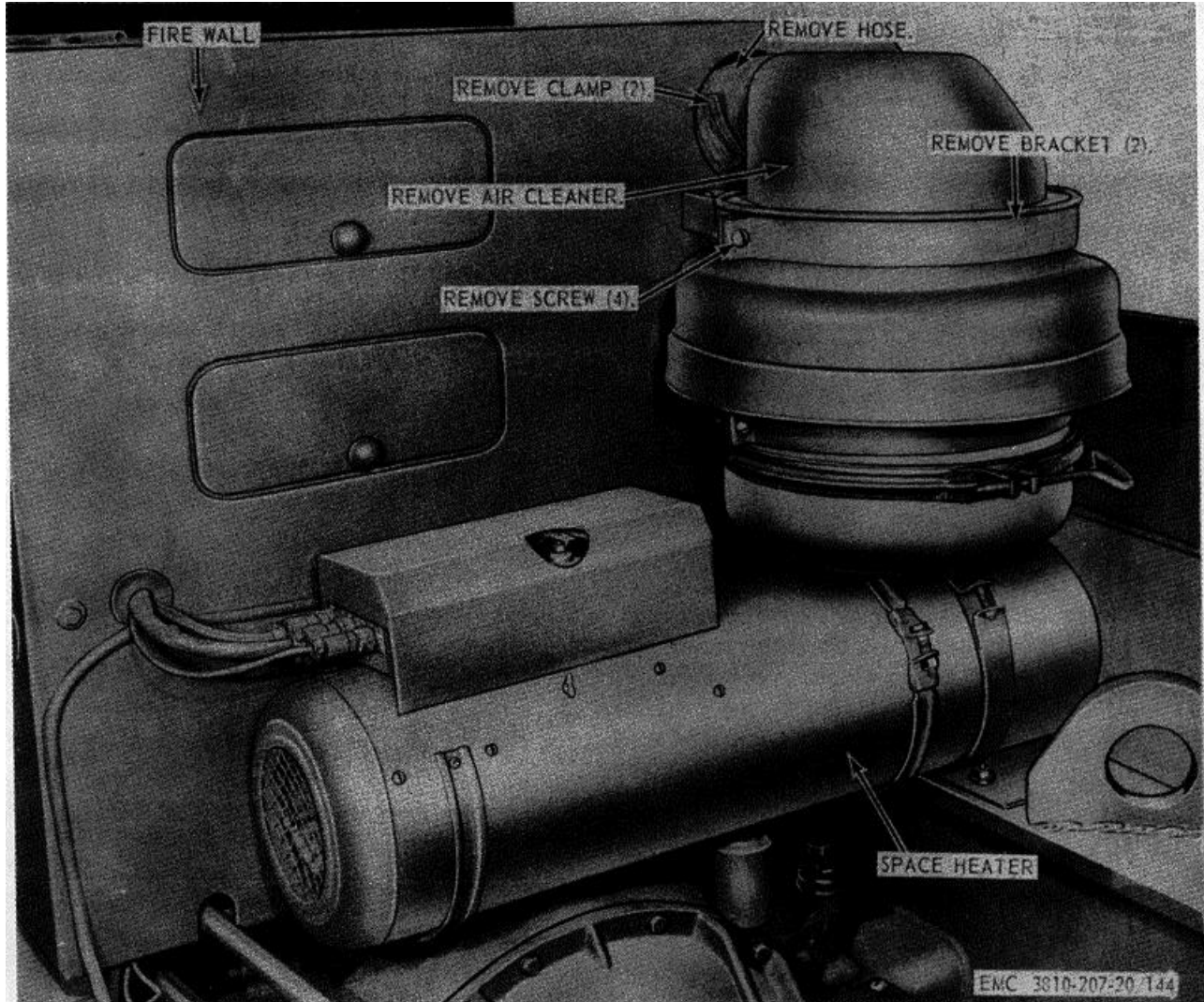


Figure 144. Carrier engine air cleaner, removal and installation.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for excessive wear, fractures, and other damage.
- (3) Repair or replace a defective or unserviceable part.

c. Installation.

- (1) Install the carburetor as illustrated on figure 147.
- (2) Install the governor (par. 245).
- (3) Install the flange and air cleaner hose (par. 211).

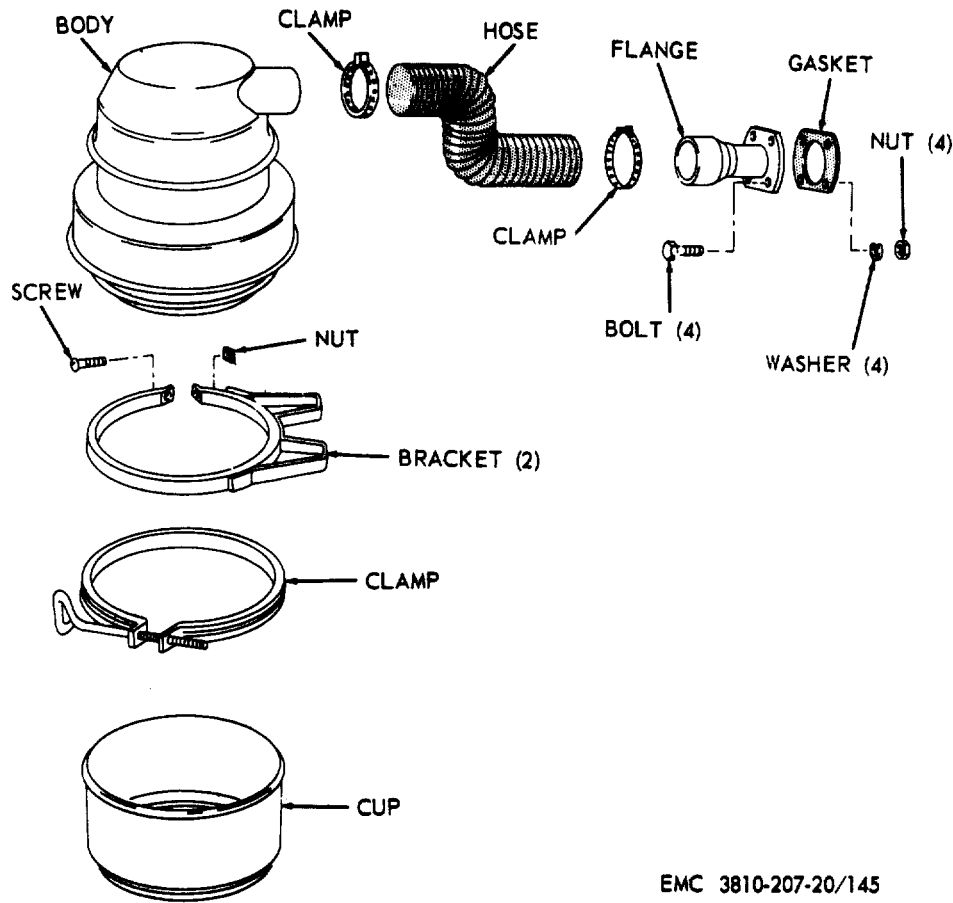
- (4) Adjust the carburetor (TM 5-3810-207-10).

247. Fuel Pump

a. Removal. Remove the carrier engine fuel pump as instructed on figure 148.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.
- (3) Repair or replace damaged parts as necessary.



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Figure 145. Carrier engine air cleaner, exploded view.

c. *Installation.* Install the Her engine fuel pump as illustrated on figure 148.

d. *Test.* Test the fuel pump in a manner similar to crane fuel pump test (par. 108).

248. Accelerator Pedal

a. *Removal.* Remove the carrier engine accelerator pedal as instructed on figure 149.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.
- (3) Repair or replace damaged parts as necessary.

c. *Installation.* Install the carrier engine accelerator pedal as illustrated on figure 149.

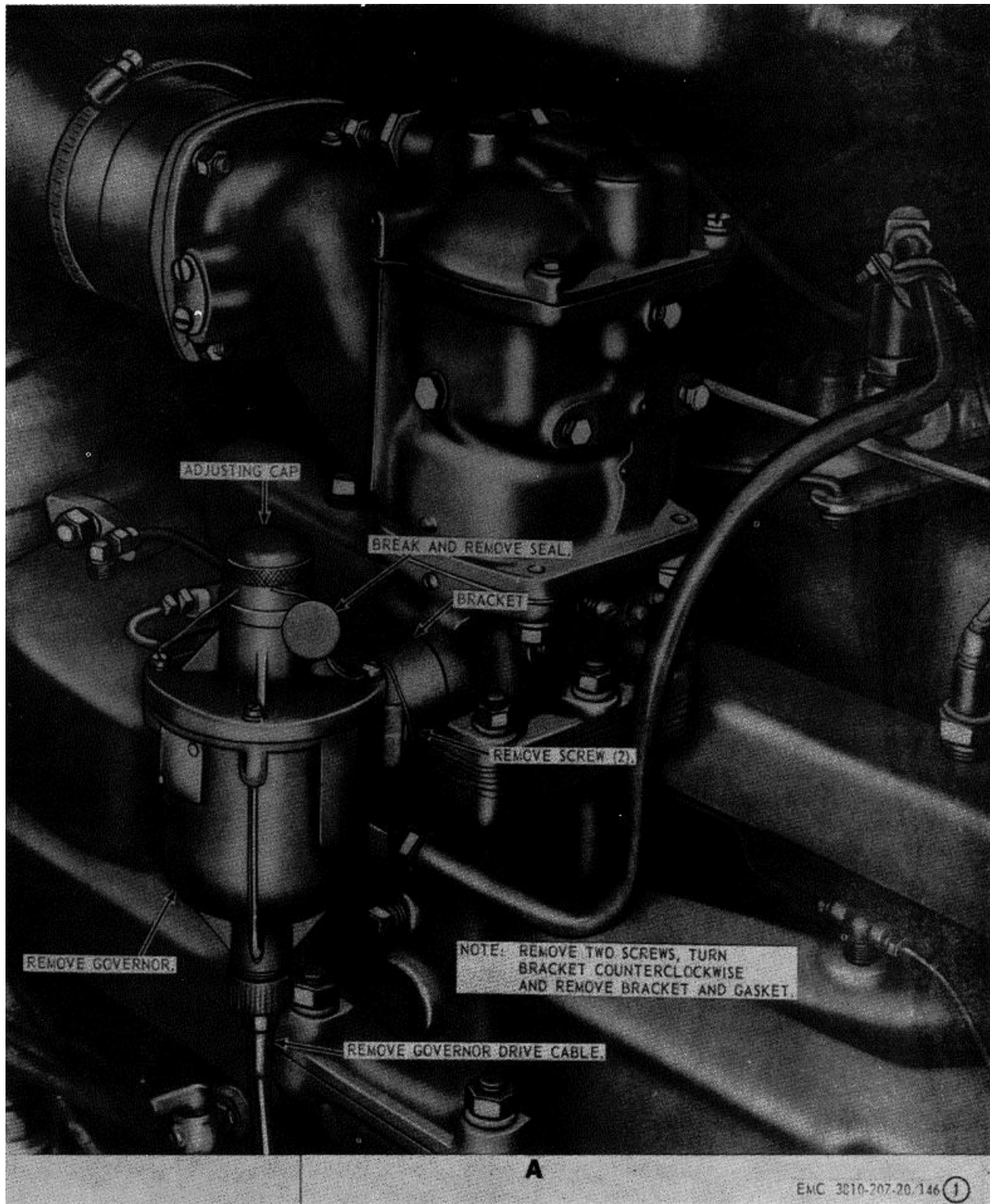
249. Accelerator Linkage.

a. *Removal.* Tag, disconnect, and remove the carrier engine accelerator linkage in numerical sequence as instructed on figure 150.

b. *Cleaning, Inspection, and Repair.*

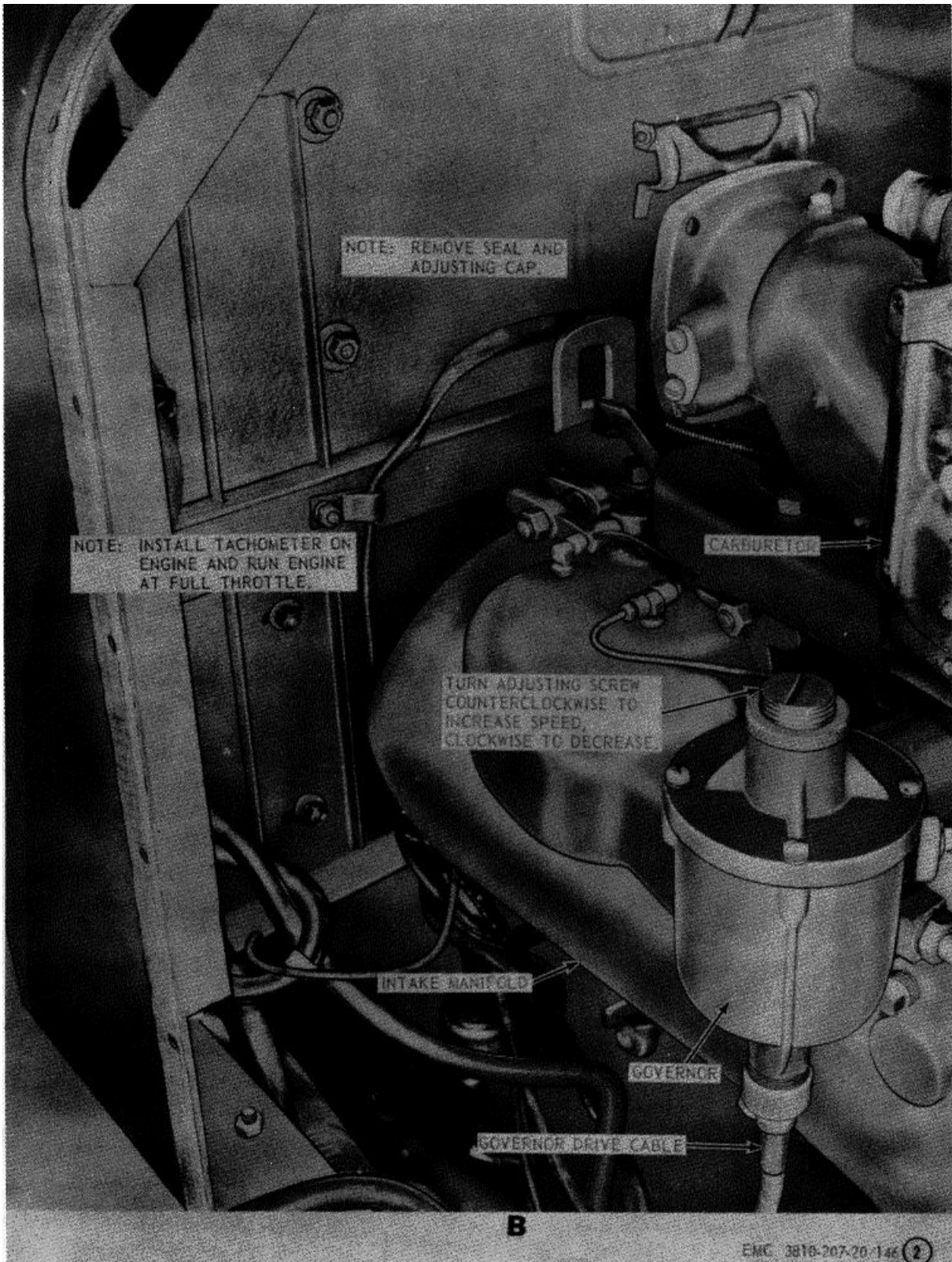
- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.
- (3) Repair or replace damaged parts as necessary.

c. *Installation.* Install and connect the carrier engine accelerator linkage in the reverse of the numerical sequence as illustrated on figure 150.



A-Carrier engine governor, removal and installation

Figure 146. Carrier engine governor, removal, installation, and adjustment.



B-Carrier engine governor adjustment

Figure 146-Continued.

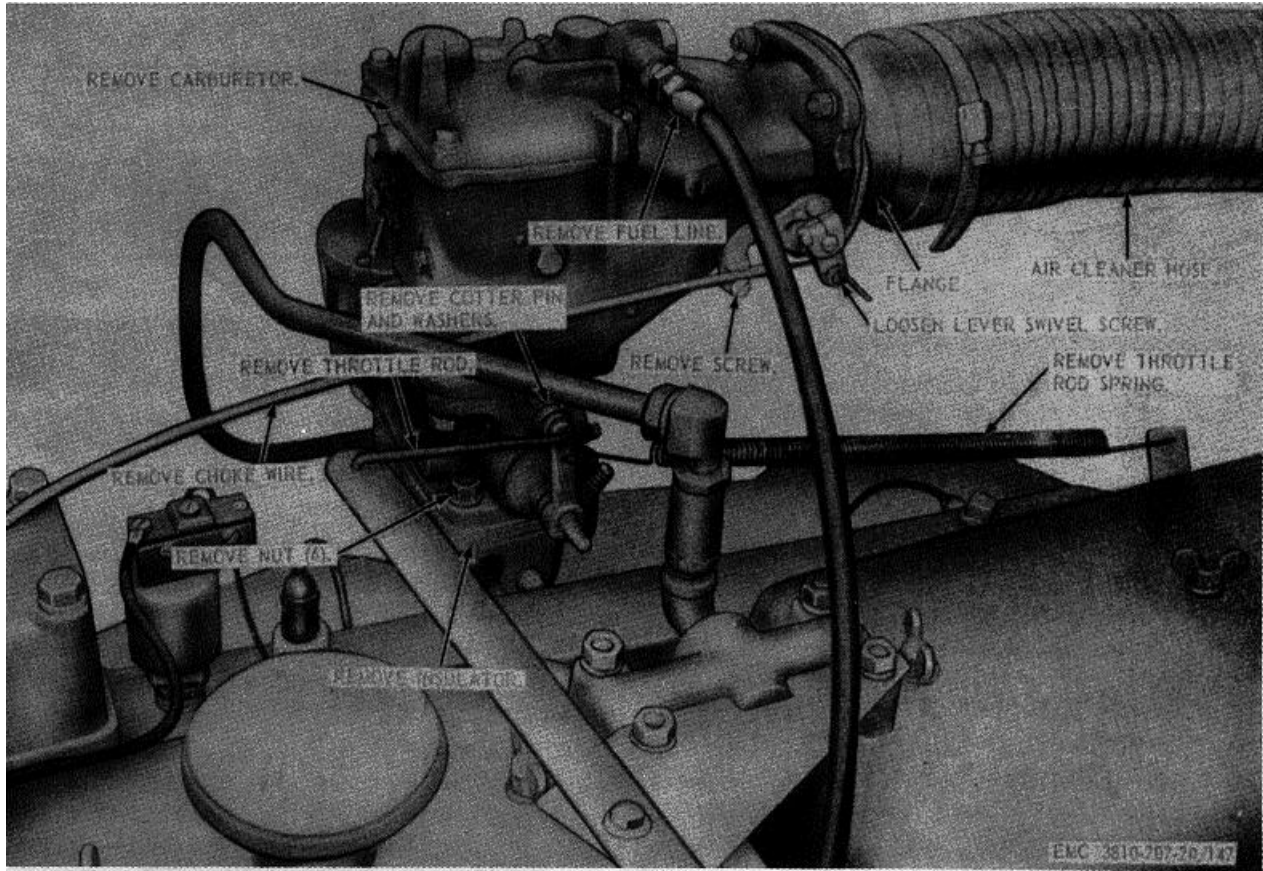


Figure 147. Carrier engine carburetor, removal and installation.

250. Fuel Tank and Fittings

a. Removal. Remove the carrier engine fuel tank and fittings as instructed on figure 151.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.
- (3) Repair or replace damaged parts as necessary. Replace all gaskets.

c. Installation. Install the carrier engine fuel tank and fittings as illustrated on figure 151.

251. Primer Pump

a. Removal. Remove the carrier engine primer pump as instructed on figure 152.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.
- (3) Repair or replace damaged parts as necessary.

c. Installation. Install the carrier engine primer pump as illustrated on figure 152.

d. Test. Test the priming pump in a manner similar to the crane priming pump test (par. 109).

252. Primer Pump Fittings and Lines

a. Removal. Tag, disconnect, and remove the carrier engine primer pump fittings and lines as instructed on figure 152.

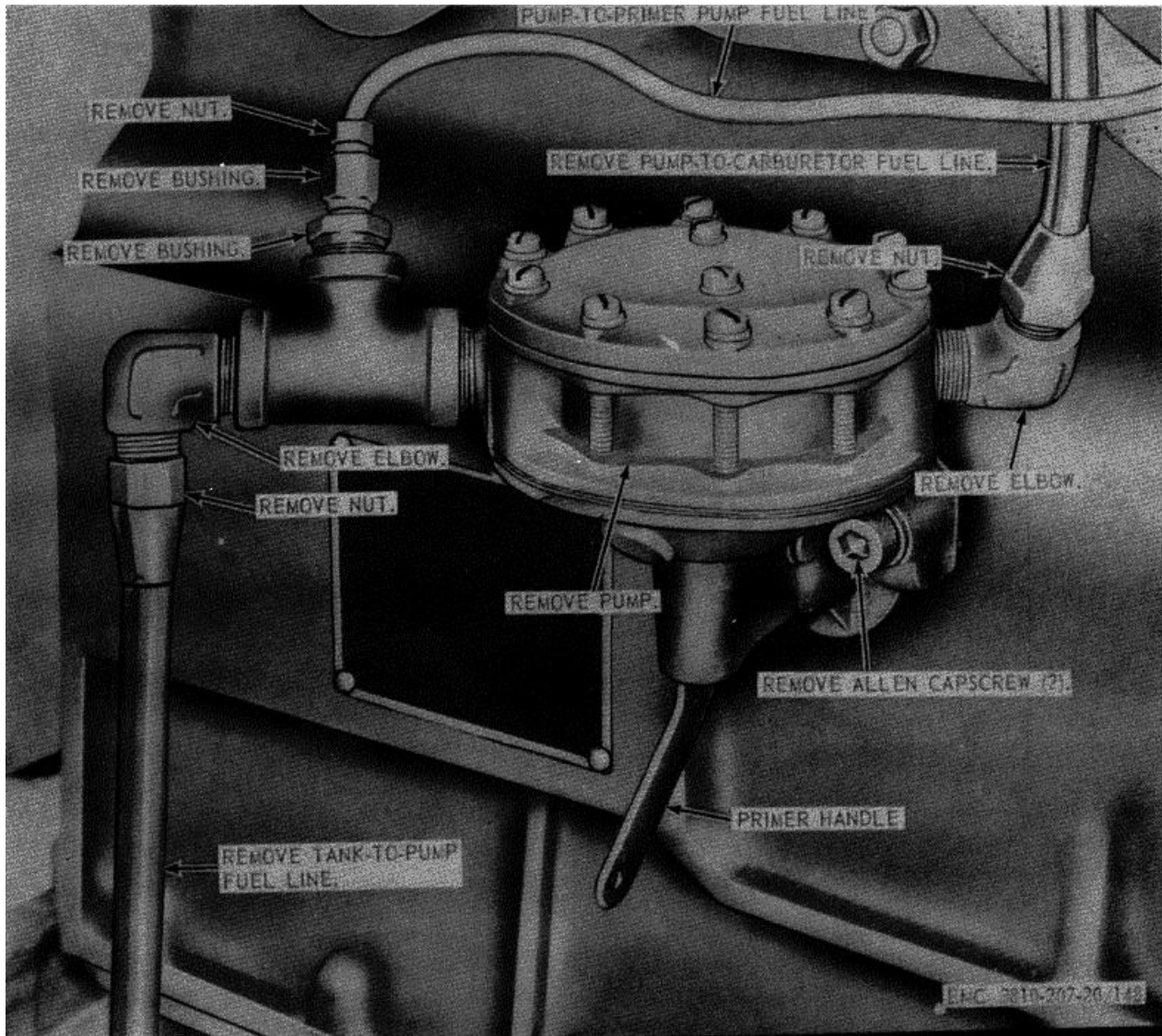


Figure 148. Carrier engine fuel pump, removal and installation.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective condition.

- (3) Repair or replace damaged parts as necessary.

c. Installation. Install the carrier engine primer pump fittings and lines as illustrated on figure 152.

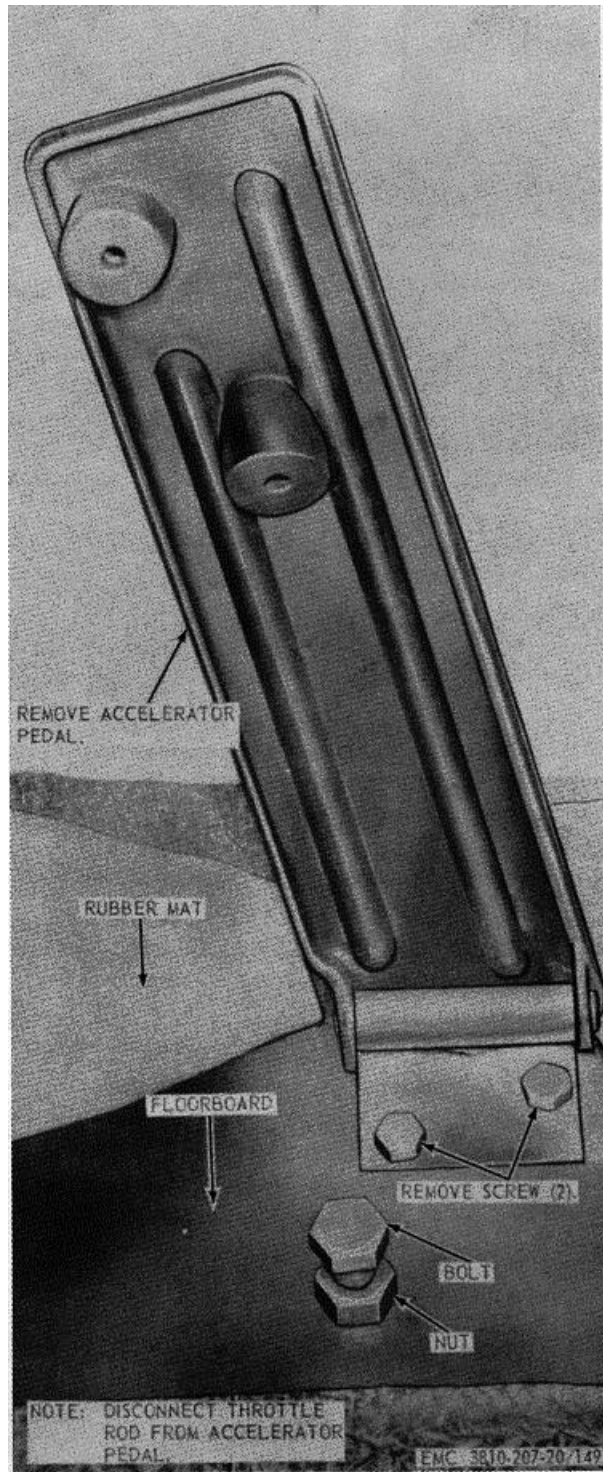
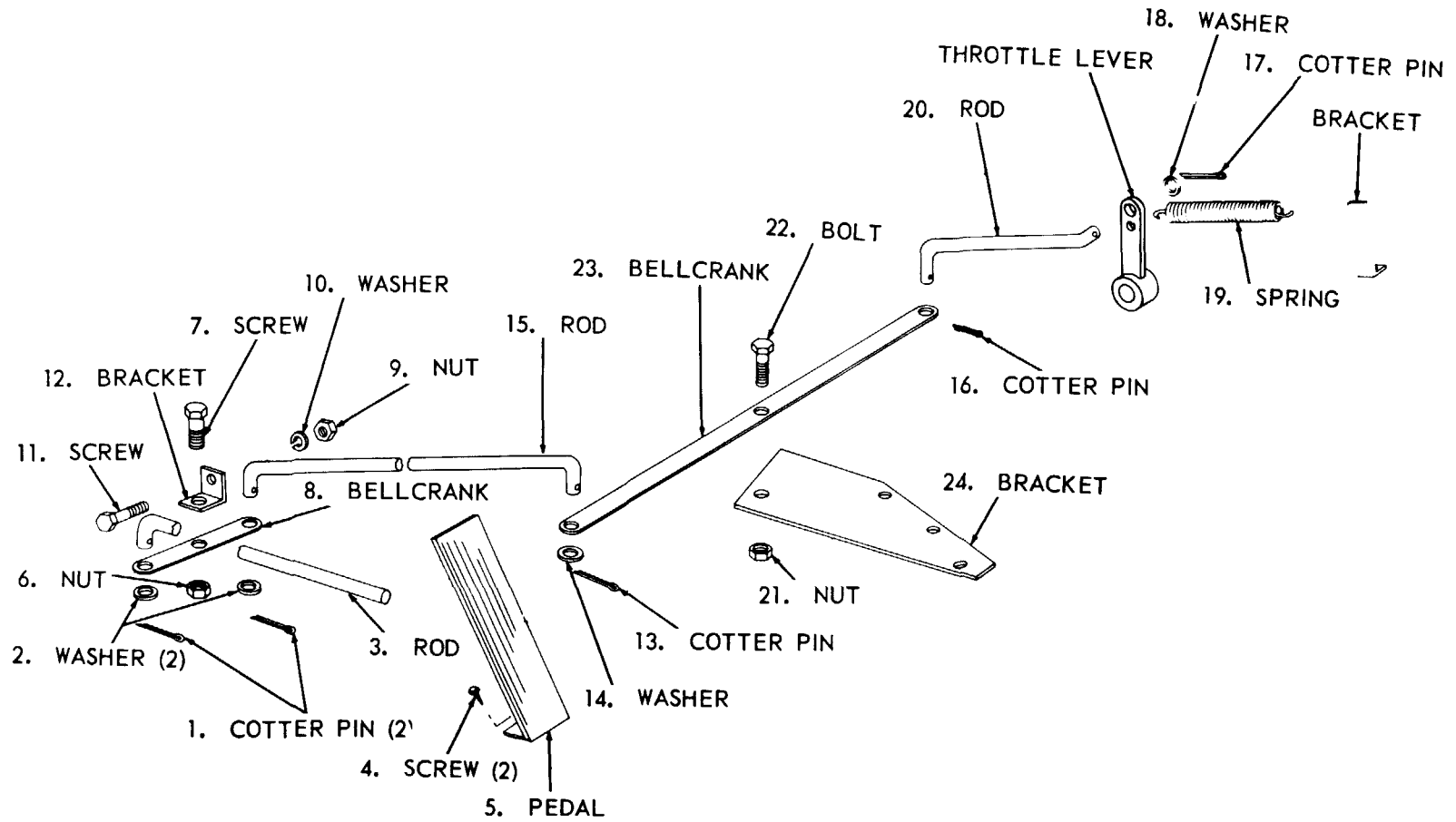
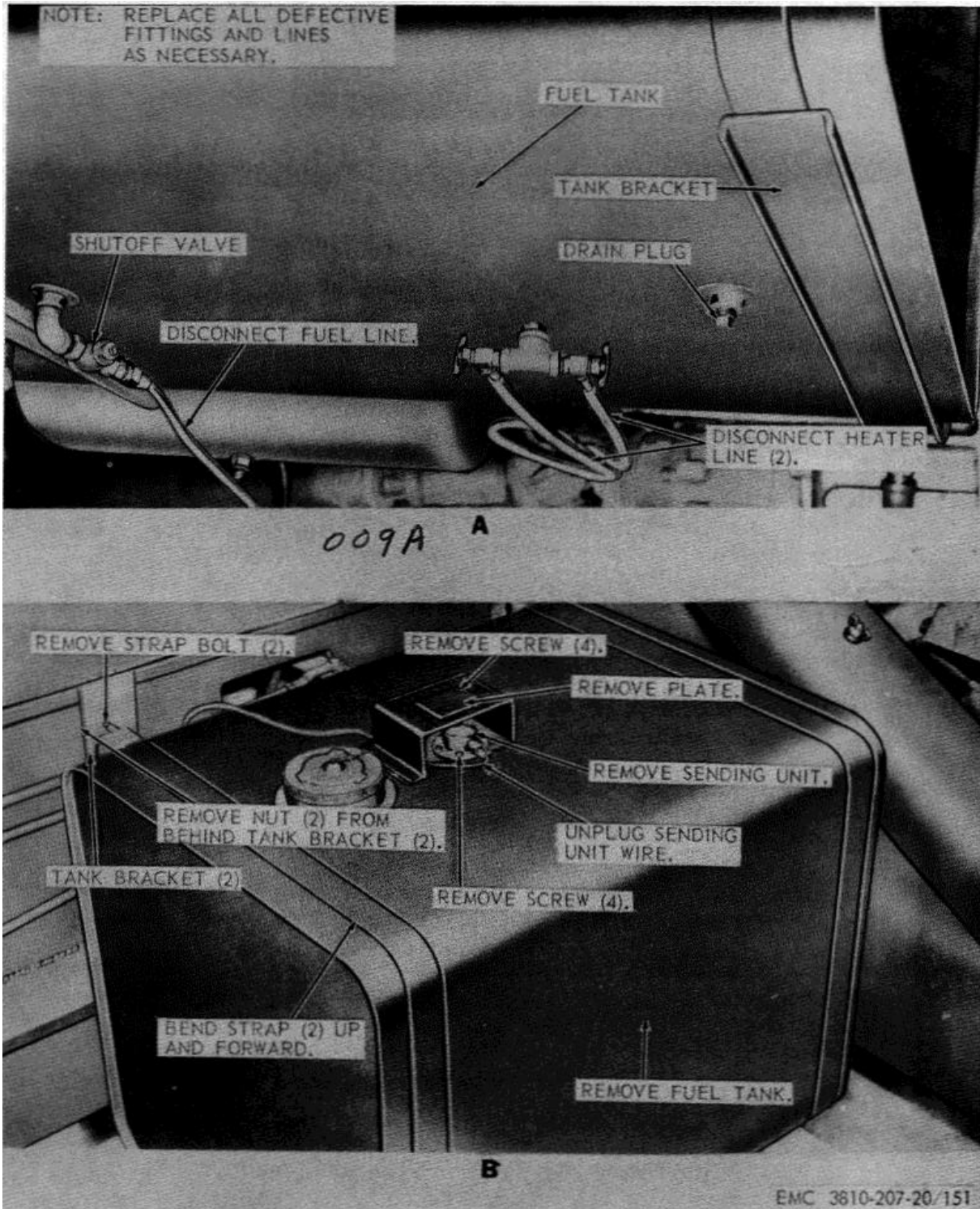


Figure 149. Carrier engine accelerator pedal, removal and installation.

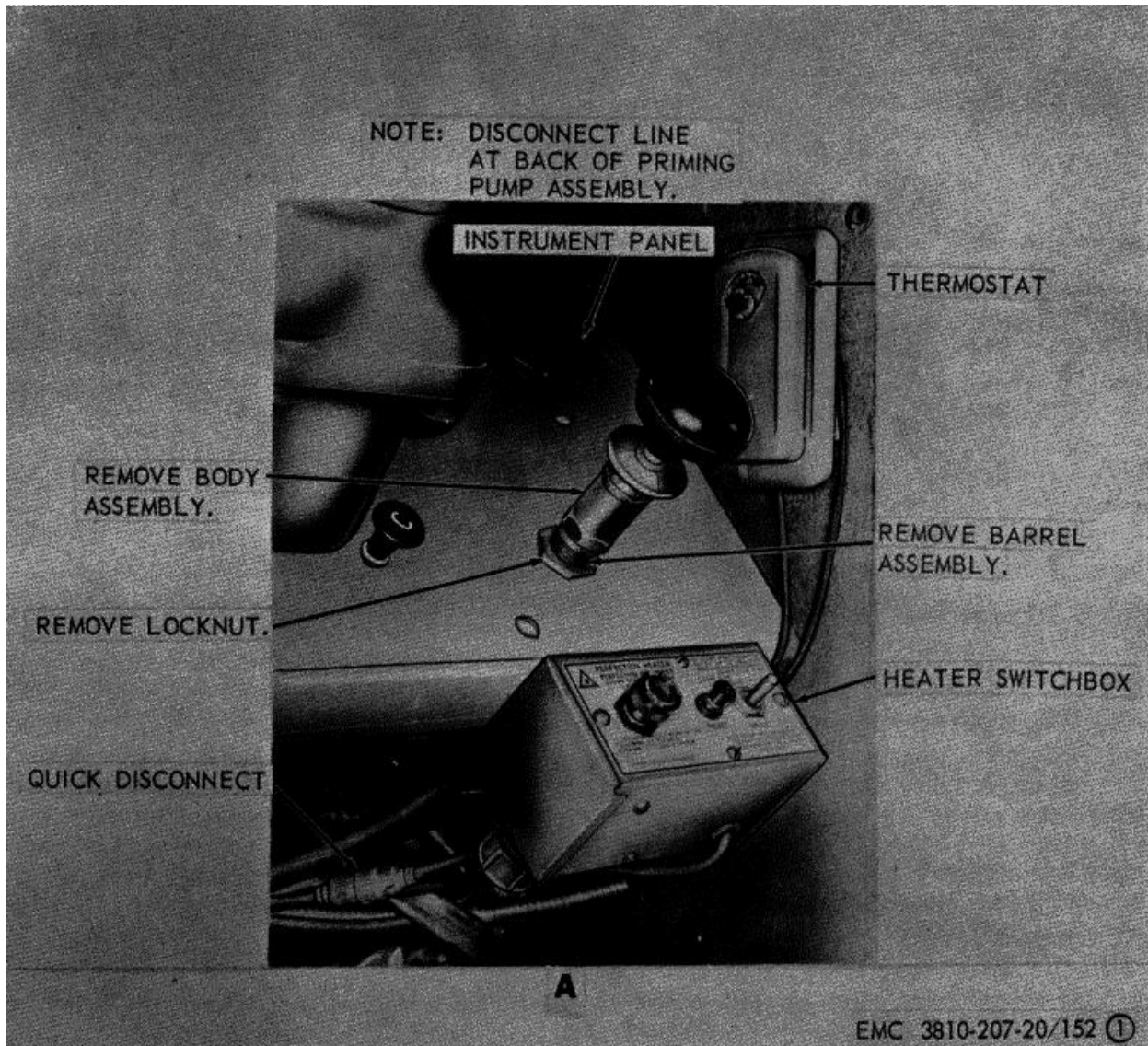


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Figure 150. Carrier engine accelerator linkage, removal and installation.



A-Fuel tank lines and fittings
B-Fuel tank and sending unit, removal
Figure 151. Carrier engine fuel tank, removal and installation.

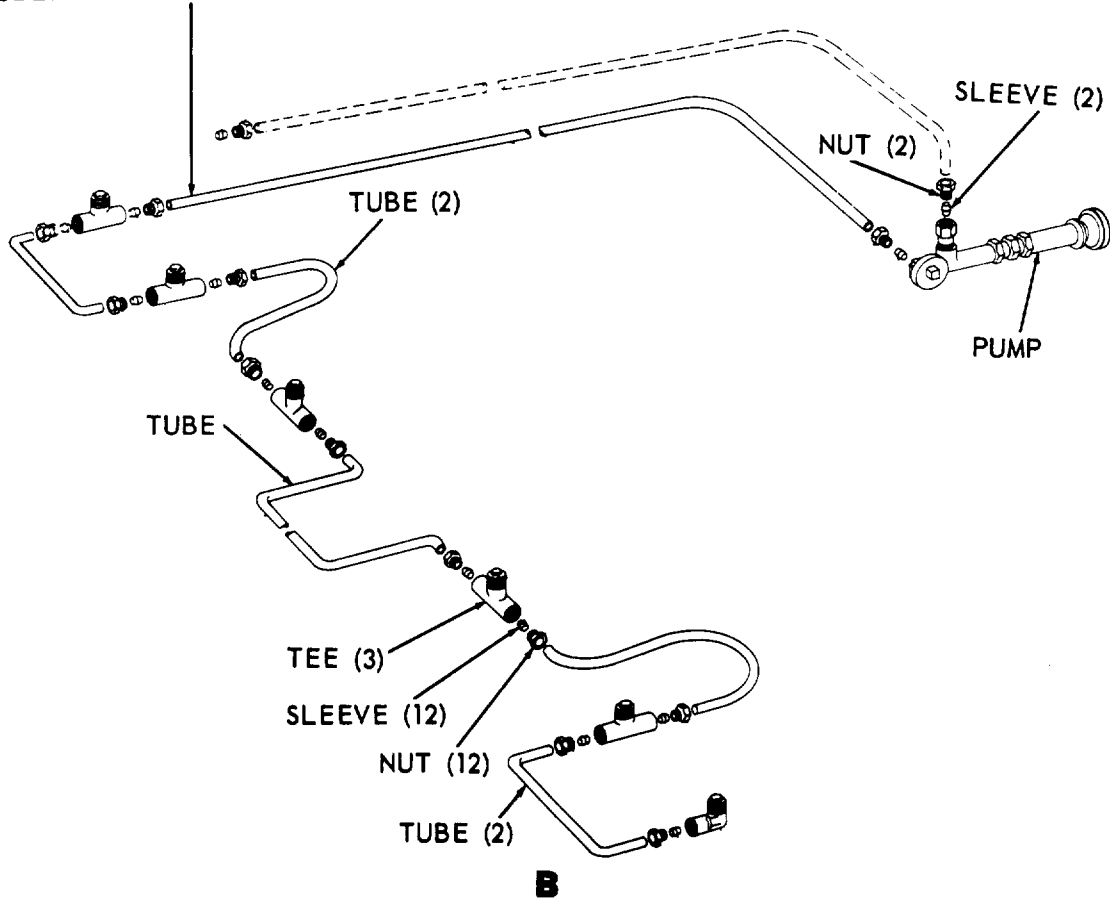


A-Carrier engine primer pump, removal and installation

Figure 152. Carrier engine primer pump, lines, and fittings, removal and installation.

**NOTE: REMAINING TUBES AND FITTINGS
CONNECT TUBE FROM PRIMER PUMP
TO INTAKE MANIFOLD.**

TUBE: FROM PRIMER PUMP-TO-INTAKE MANIFOLD.



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B-Carrier engine primer pump, lines, and fittings, exploded view

Figure 150-Continued.

Section IV. CARRIER ENGINE COOLING SYSTEM

253. General

The carrier engine has a pressure cooling system. Water from the radiator is forced by the water pump through the engine water jackets and back into the radiator for cooling. Until the engine reaches

operating temperature, all or part of the water leaving the engine jackets is bypassed by means of thermostats, directly to the water pump for recirculation. Draincocks are located on the bottom of the water pump and at the lower-right, rear side of the engine block.

254. Fan Belt and Hydraulic Steering Pump Belt

a. Removal.

- (1) Remove the three fan belts from the generator and crankshaft pulley in numerical sequence as instructed on figure 153.
- (2) Remove the hydraulic steering pump belt in numerical sequence as instructed on figure 153.

b. Cleaning and Inspection.

- (1) Clean belts with a cloth dampened with an approved cleaning solvent.
- (2) Inspect belts for fraying, breaks, cracks, and other damage. Replace belts as necessary.

c. Installation.

- (1) Install the hydraulic steering pump belt in the reverse of the numerical sequence as illustrated on figure 153.
- (2) Install the three fan belts on the generator and crankshaft pulley in the reverse of the numerical sequence as illustrated on figure 153.
- (3) Adjust the hydraulic steering pump and fan belts (TM 5-3810-207-10).

255. Fan

a. Removal. Remove the carrier engine fan as instructed on figure 154.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for cracks, breaks, and other damage. Replace defective fan.

c. Installation. Install the carrier engine fan as illustrated on figure 154.

256. Radiator Shroud

a. Removal.

- (1) Drain the cooling system (TM 5-3810-207-10).
- (2) Remove the carrier engine fan (par. 255).
- (3) Remove the carrier engine radiator shroud as instructed on figure 155.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for bends, breaks, and other damage. Replace defective parts as necessary.

c. Installation.

- (1) Install the carrier engine radiator shroud as illustrated on figure 155.
- (2) Install the carrier engine fan (par. 255).
- (3) Fill the cooling system to proper level (TM 5-3810-207-10).

257. Water Tubes, Hoses, and Fittings

a. Removal.

- (1) Drain the cooling system (TM 5-3810-207-10).
- (2) Remove the carrier engine water tubes, hoses, and fittings as instructed on figure 156.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the tubes, hoses, and fittings for leaks, cracks, breaks, and other damage. Replace defective parts as necessary.

c. Installation.

- (1) Install the carrier engine water tubes, hoses, and fittings as illustrated on figure 156.
- (2) Fill the cooling system to proper level (TM 5-3810-207-10).

258. Water Pump, Fan Pulley, and Hydraulic Steering Pump

a. Removal.

- (1) Drain the cooling system (TM 5-3810-207-10).
- (2) Remove the three fan belts and the hydraulic steering pump belt (par. 254).
- (3) Remove the carrier engine water tubes and hoses from the water pump (par. 257).
- (4) Remove the fan from the fan pulley (par. 255).

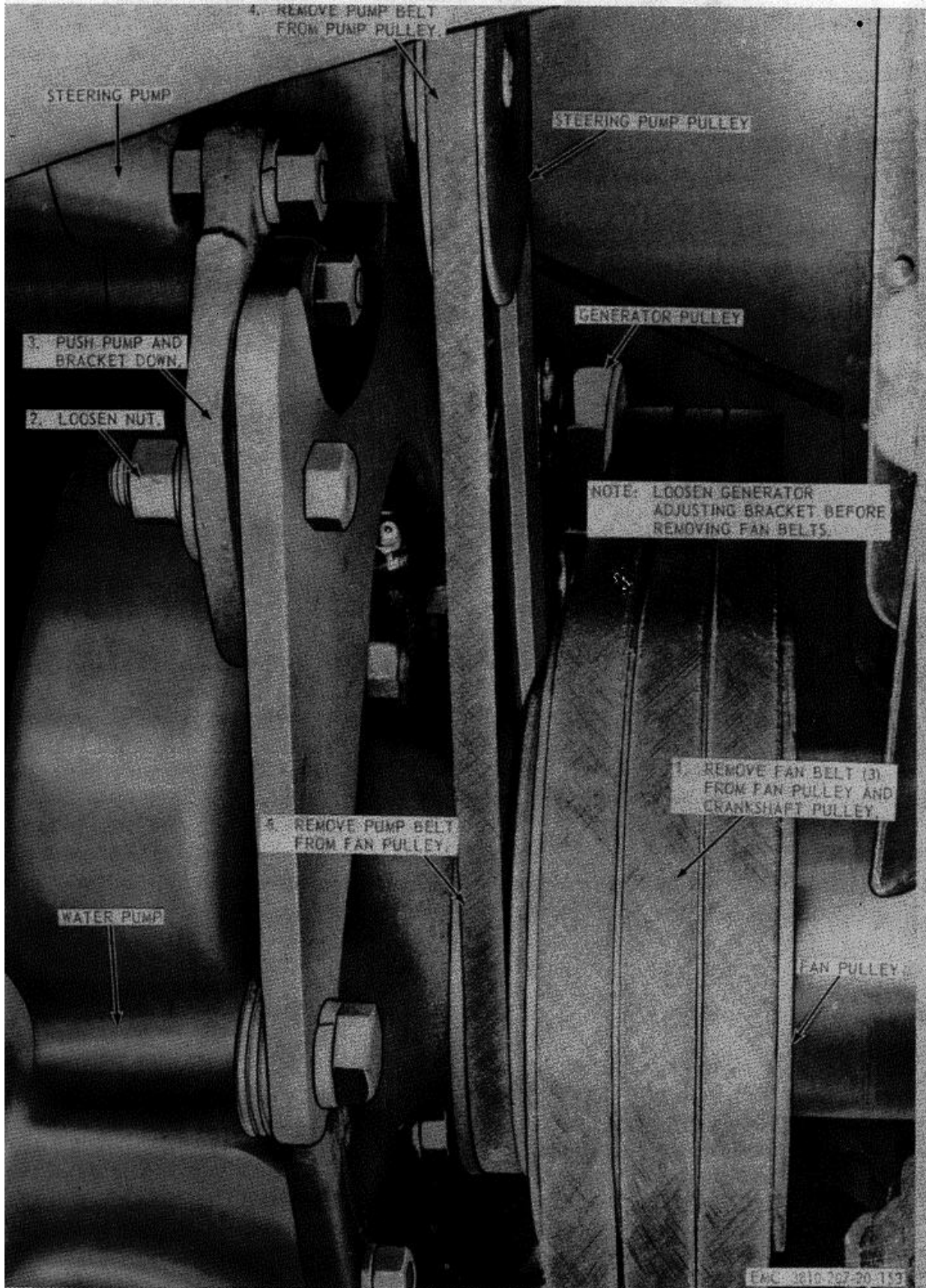


Figure 153. Fan belts and hydraulic steering pump belt, removal and installation.

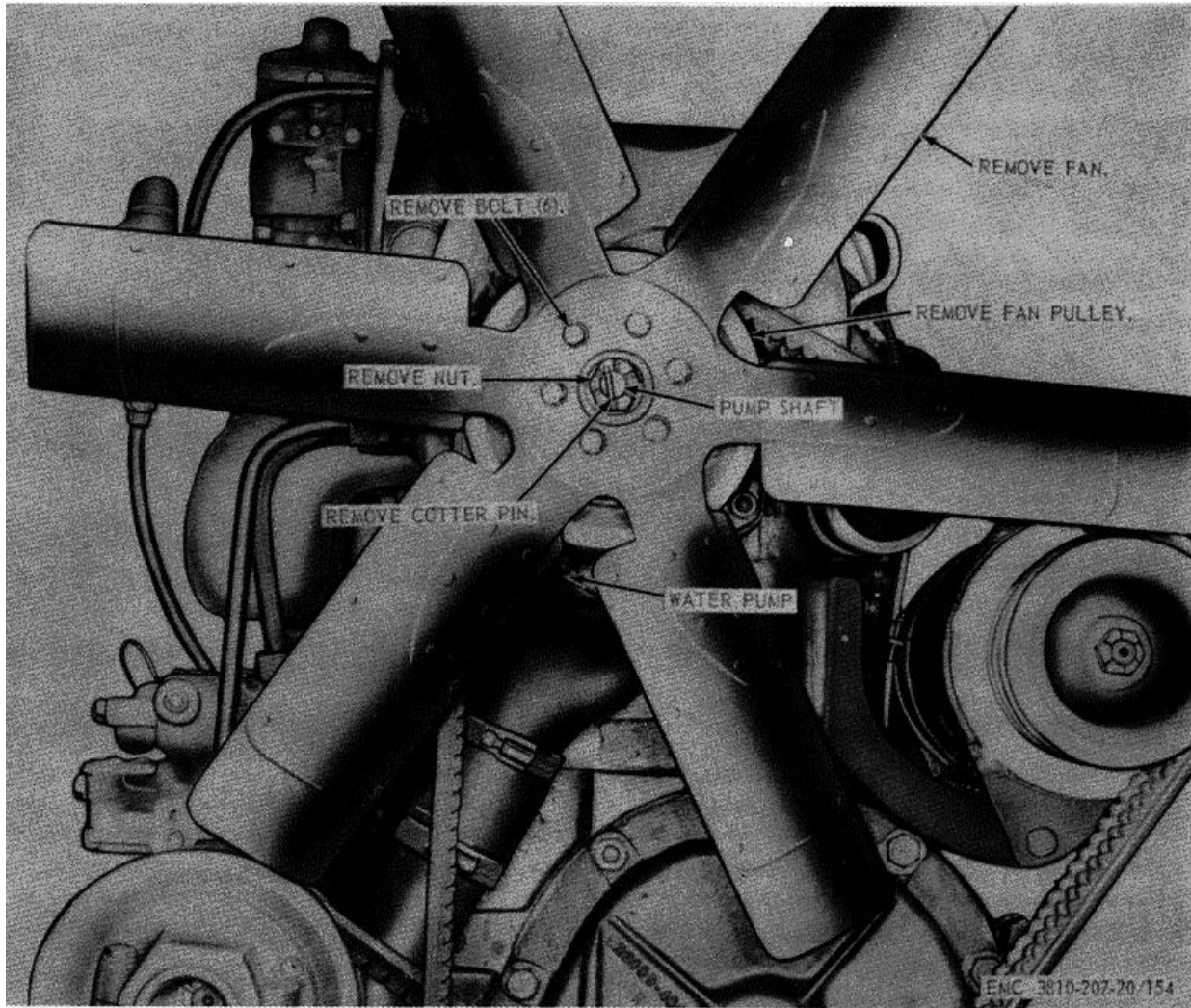


Figure 154. Carrier engine fan, removal and installation.

- (5) Remove the carrier engine water pump, fan pulley, and hydraulic steering pump as instructed on figure 157.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the water pump, fan pulley, and hydraulic steering pump for breaks, leaks, cracks, and other damage. Replace defective pumps and pulley as necessary.

c. Installation.

- (1) Install the carrier engine water pump, fan pulley, and hydraulic steering pump as illustrated on figure 157.
- (2) Install the fan to the fan pulley (par. 255).
- (3) Install the carrier engine water tubes and hoses to the water pump (par. 257).
- (4) Install the three fan belts and the hydraulic steering pump belt (par. 254).

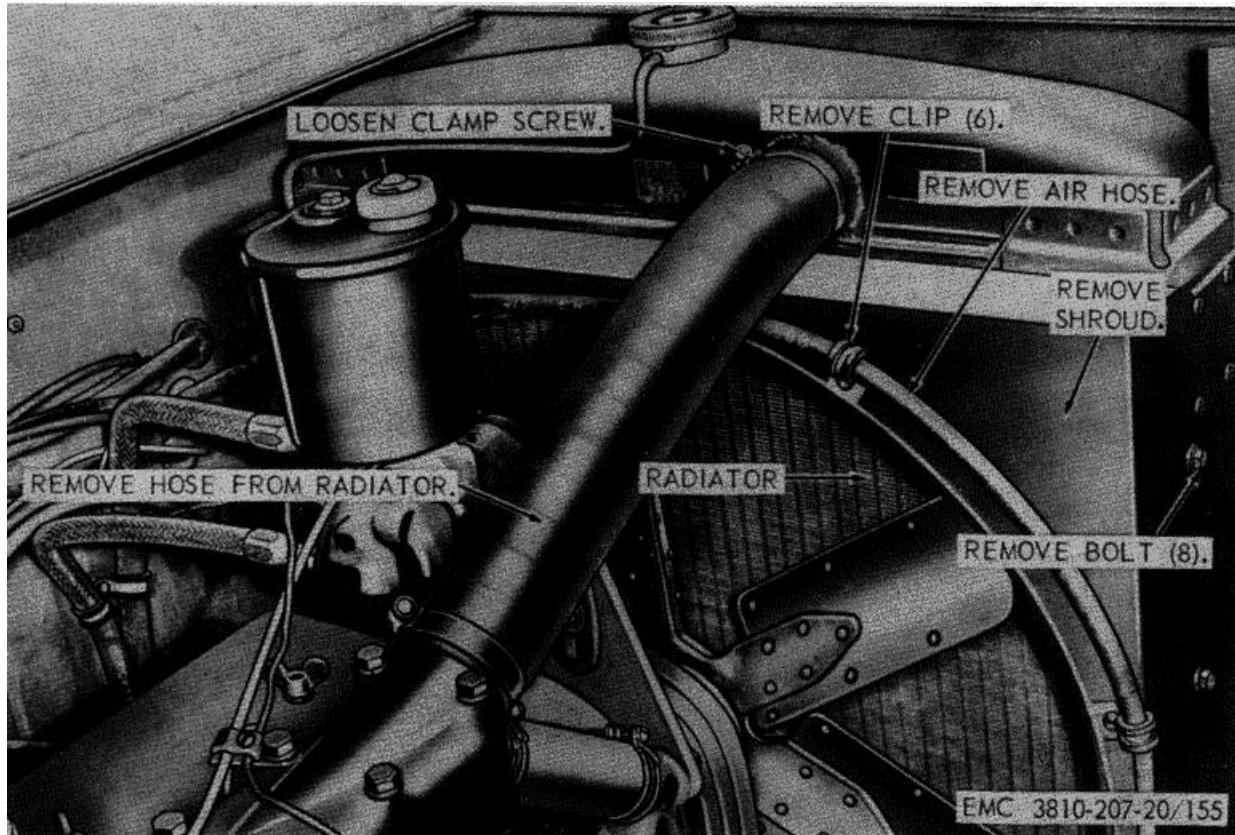


Figure 155. Carrier engine radiator Shroud, removal and installation.

- (5) Adjust the hydraulic steering pump belt and the three fan belts (TM 5-3810-207-10).
- (6) Fill the cooling system to proper level (TM 5-3810-207-10).

259. Thermostat Cover and Thermostats

a. Removal.

- (1) Drain the cooling system (TM 5-3810-207-10).
- (2) Remove the hoses from the thermostat cover, radiator, and water pump (par. 257).
- (3) Remove the carrier engine thermostat cover and the two thermostats as instructed on figure 158.

b. Test.

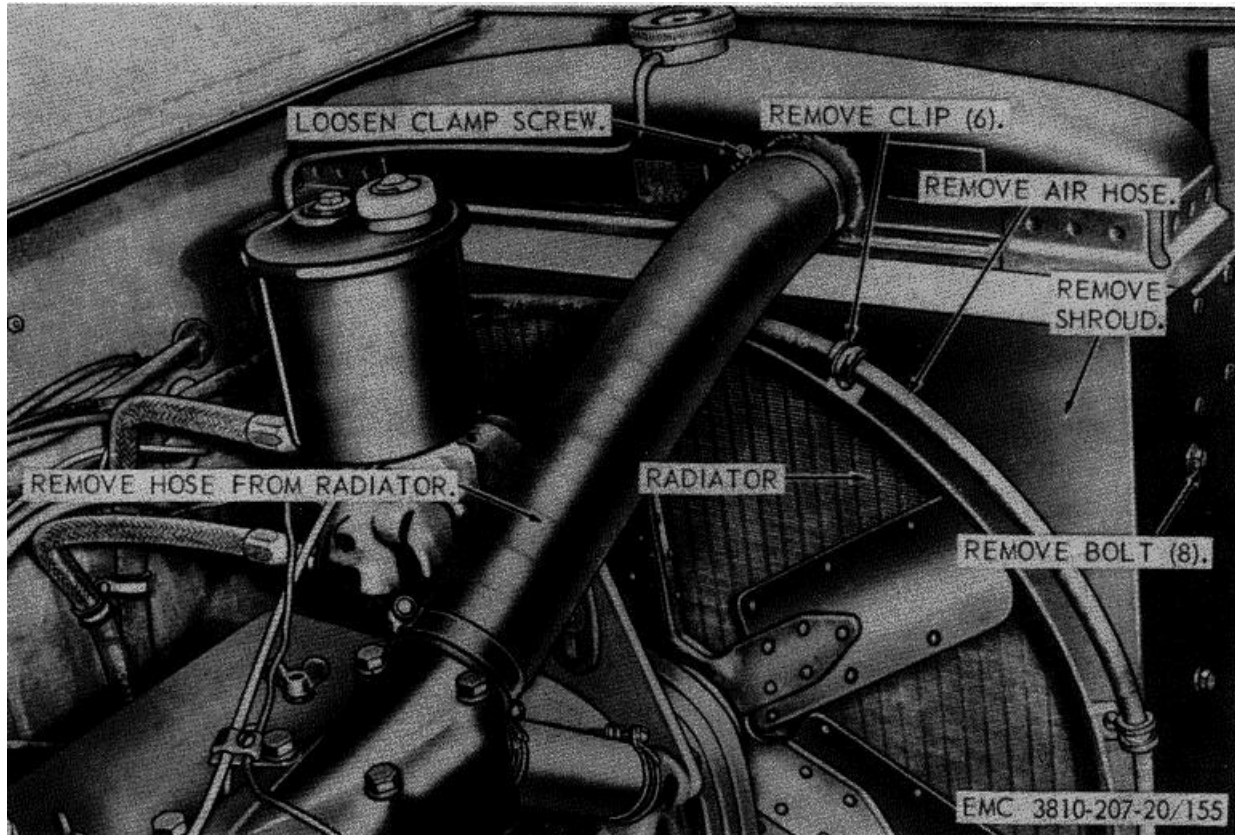
- (1) Place the thermostats in a pan of water and heat the water until the thermostats

start to open. They should start to open at 160° F. and should be fully opened at 180° F.

- (2) Allow water to cool with the thermostats in it. Test the temperature of the water at the time the thermostats start to close and again when they are fully closed. The thermostats should start to close at 175° F. and be fully closed at 155° F.

c. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the thermostats for proper operation and other damage. Replace defective thermostats.
- (3) Inspect all other parts for cracks, breaks, and other damage. Replace all defective parts.



A-Upper hose, water tubes, and fittings

Figure 156. Carrier engine water tubes, hoses, and fittings, removal and installation.

d. Installation.

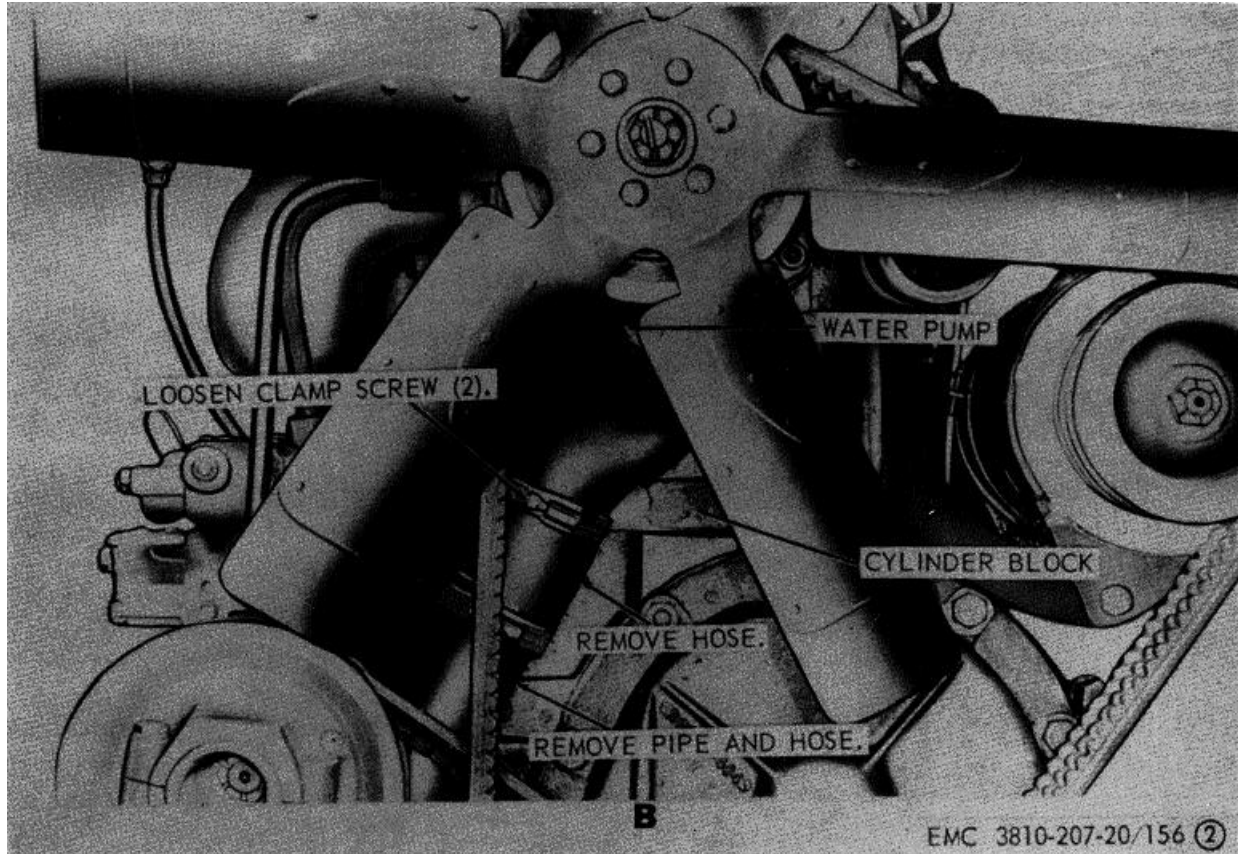
- (1) Install the two carrier engine thermostats and the thermostat cover as illustrated on figure 158.
- (2) Install the hoses on the thermostat cover, radiator, and water pump (par. 257).

- (3) Fill the cooling system to proper level (TM 5-3810-207-10).

260. Water Manifolds

a. Removal.

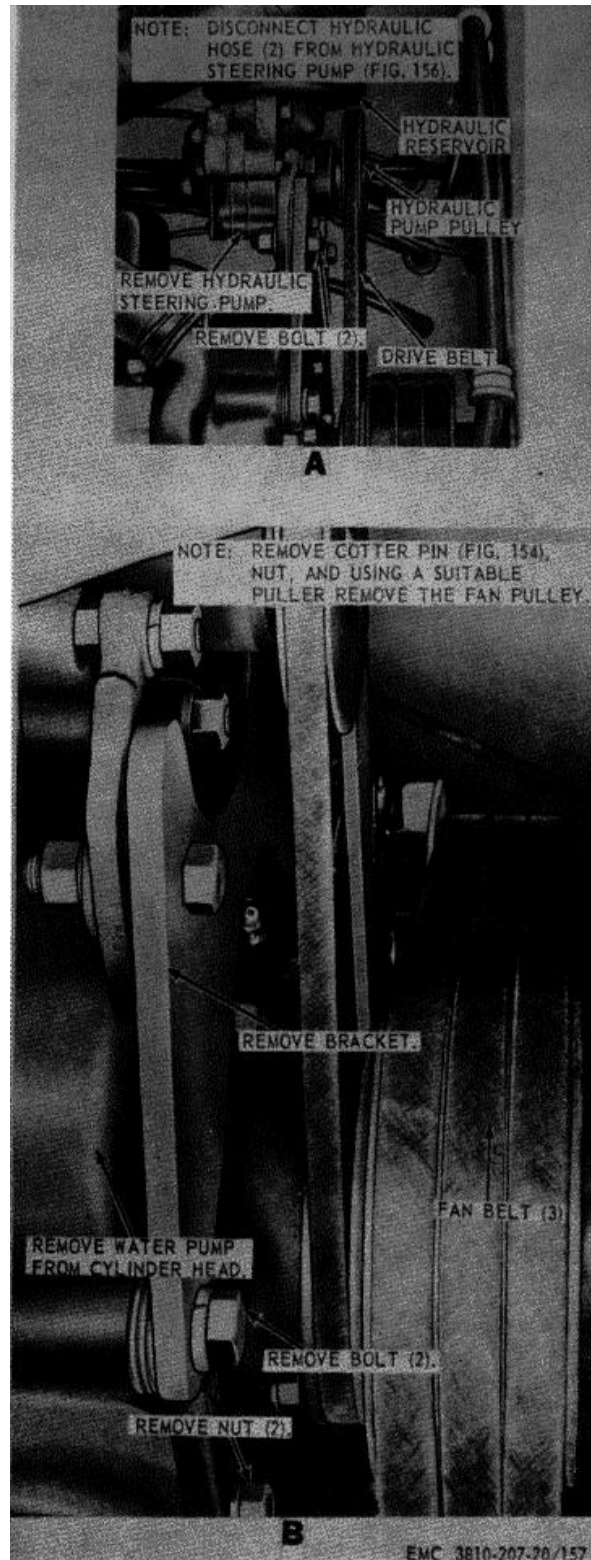
- (1) Drain the cooling system (TM 5-3810-207-10).



B-Lower hose, pipe, and fittings

Figure 156-Continued.

- (2) Remove the hoses from the thermostat cover, radiator, water pump, and water manifolds (par. 257).
 - (3) Remove the thermostat cover and two thermostats (par. 259).
 - (4) Remove the thermostat sending unit and temperature warning light sending unit (pars. 217 and 218).
 - (5) Remove the carrier engine water manifolds as instructed on figure 159.
- b. Cleaning and Inspection.*
- (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect all parts for breaks, cracks, leaks, and other damage. Replace all defective parts and gaskets.
- c. Installation.*
- (1) Install the carrier engine water manifolds as illustrated on figure 159.
 - (2) Install the two thermostats and the thermostat cover (par. 259).
 - (3) Install the hoses on the thermostat cover, water pump, radiator, and water manifolds (par. 257).
 - (4) Install the thermostat sending unit and temperature warning light sending unit (pars. 217 and 218).
 - (5) Fill the cooling system to proper level (TM 5-3810-207-10).



A-Hydraulic steering pump, installed view

B-Water pump, installed view

Figure 157. Carrier engine water pump, fan pulley, and hydraulic steering pump, removal and installation.

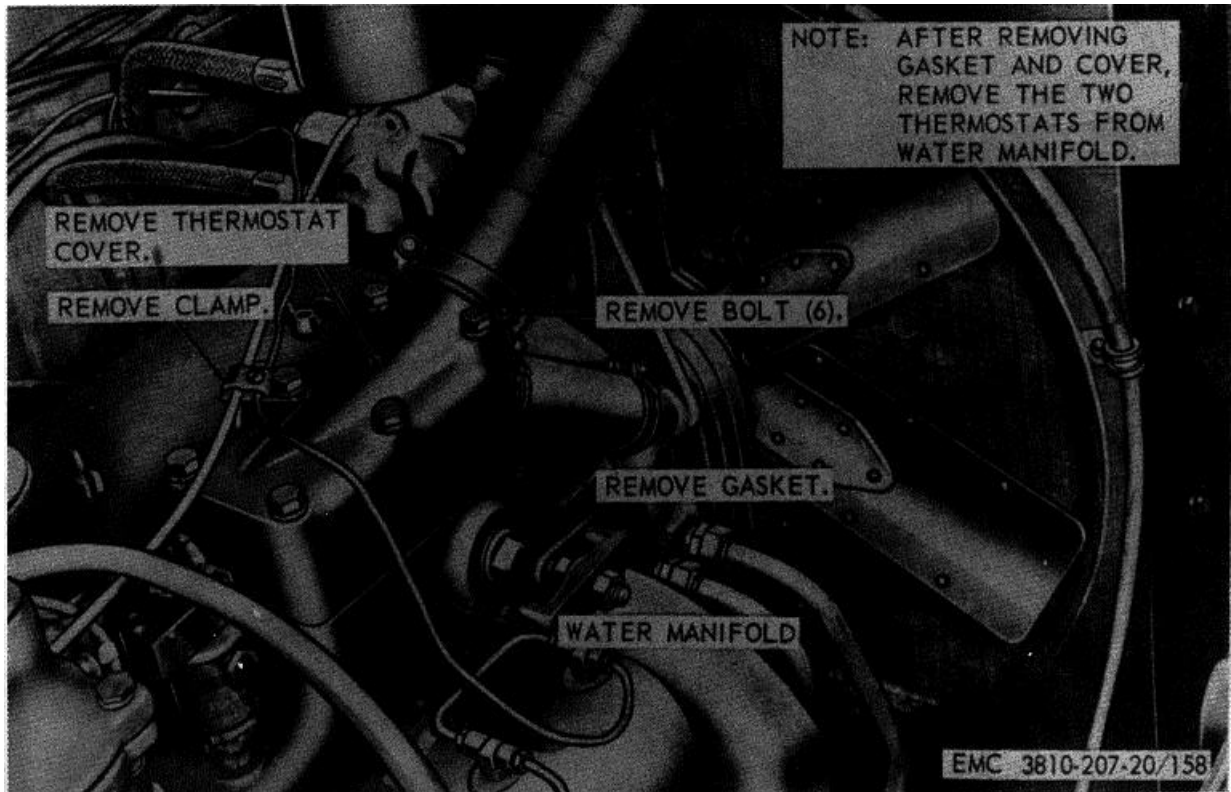
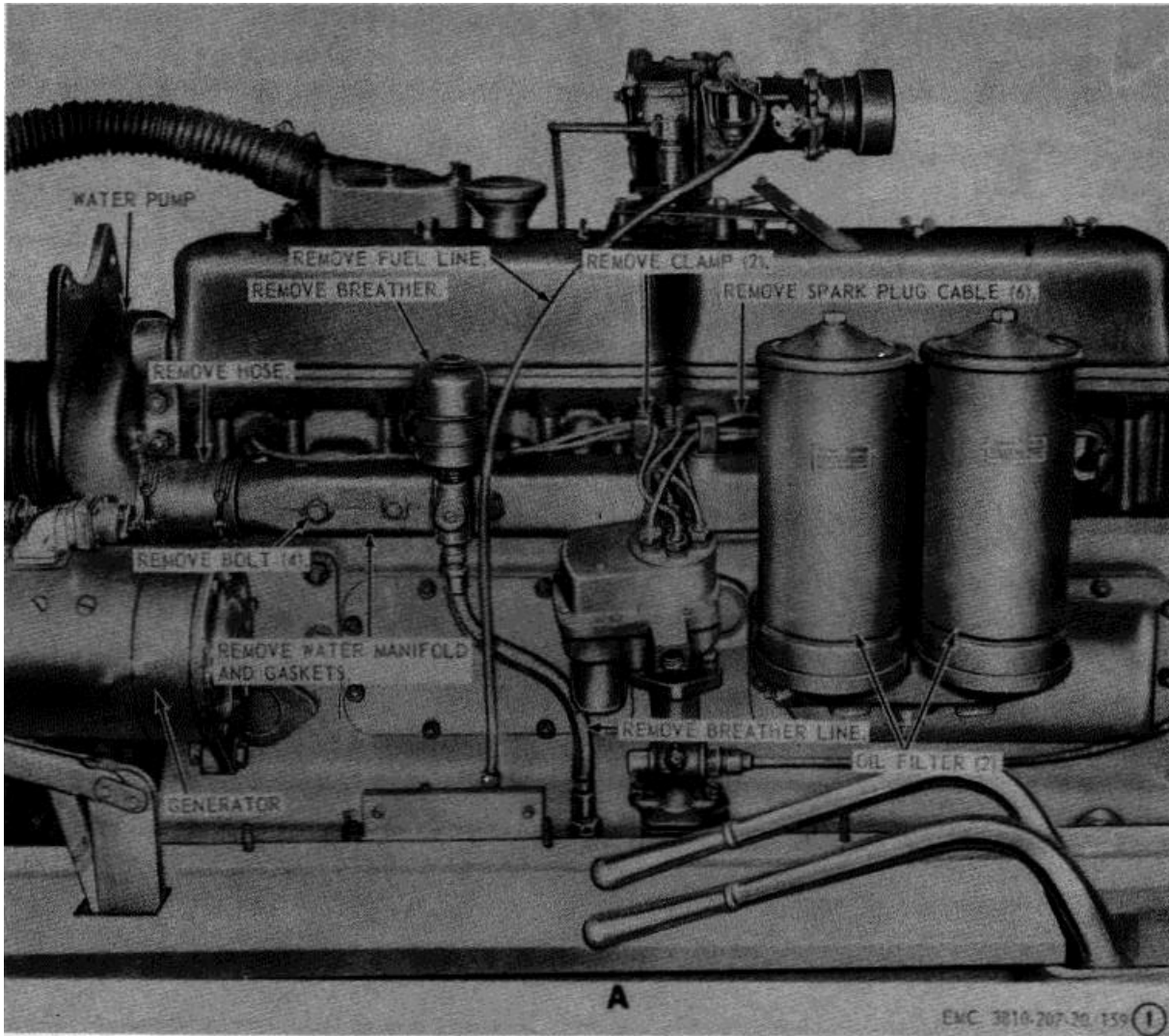
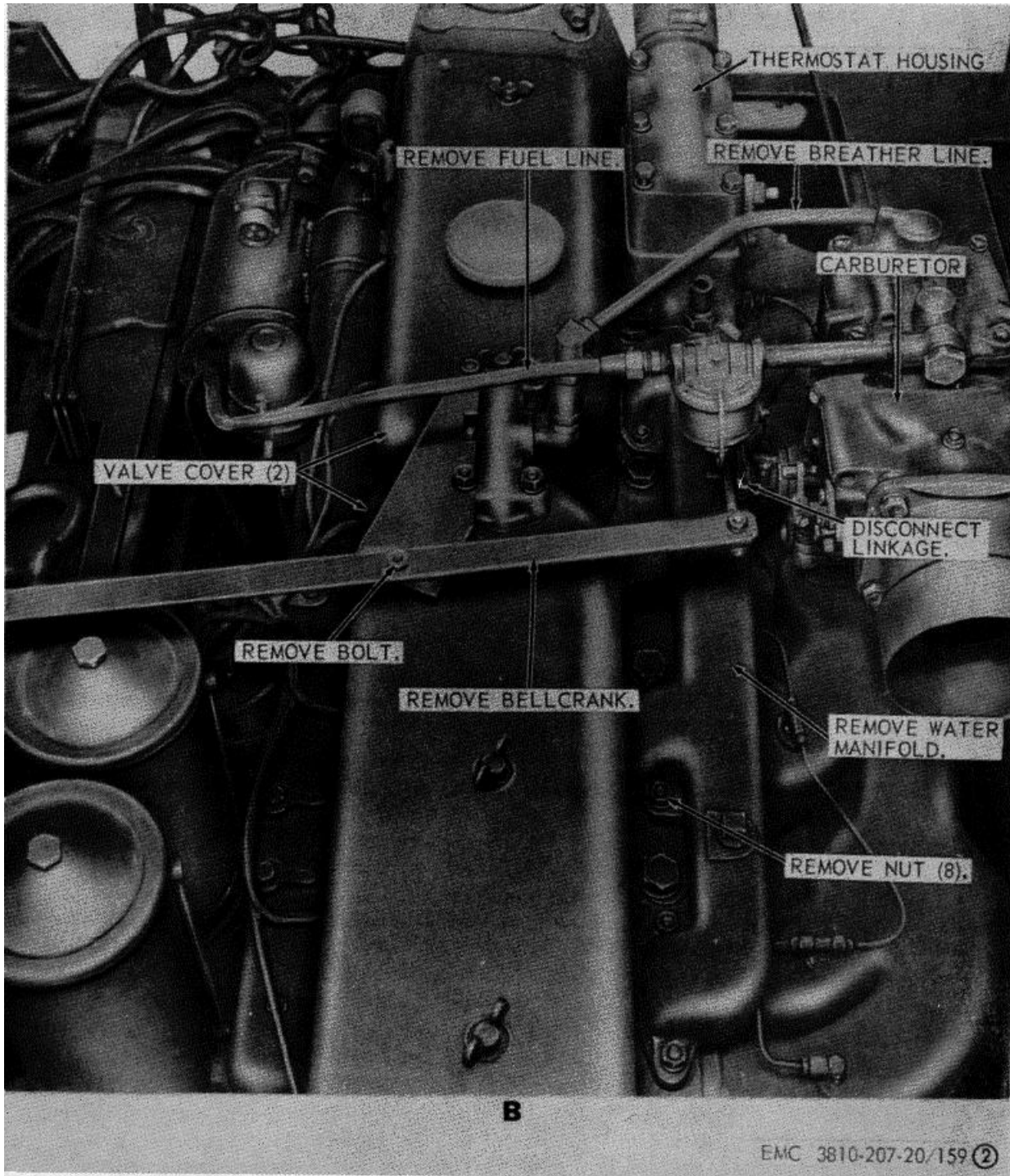


Figure 158. Carrier engine thermostat cover and thermostat, removal and installation.



A-Carrier engine left-side water manifold

Figure 159. Carrier engine water manifolds, removal and installation.



B-Carrier engine right-side water manifold
Figure 159-Continued.

Section V. CARRIER ENGINE INTAKE AND EXHAUST SYSTEM

261. General

The intake and exhaust system consists of the intake and exhaust manifolds, muffler, and pipe. The exhaust manifold expels burned exhaust gas from the cylinders, through the exhaust pipe and muffler, to the atmosphere. The intake manifold delivers the air and fuel mixture to each cylinder.

262. Muffler

a. Removal. Remove the carrier muffler as instructed on figure 160.

b. Cleaning and Inspection.

- (1) Clean all parts in an approved cleaning solvent with a wire brush.
- (2) Inspect muffler for cracks, holes, leaks, and other damage.
- (3) Inspect the tailpipe for bends, cracks, rust, and other damage.
- (4) Inspect all clamps and mounting hardware. Replace all defective muffler parts as necessary.

c. Installation. Install the muffler as illustrated on figure 160.

263. Intake and Exhaust Manifold

a. Removal.

- (1) Remove the muffler (par. 262).

- (2) Remove the carburetor from the intake manifold (par. 246).
- (3) Remove the fuel priming lines and fittings (par. 251).
- (4) Remove the intake and exhaust manifold in numerical sequence as instructed on figure 161.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the intake manifold and exhaust manifold and sections and center sections for cracks, breaks, or warps. Replace as necessary.
- (3) Inspect all capscrews, nuts, and studs for stripped or burred threads. Replace as necessary.

c. Installation.

- (1) Install the intake and exhaust manifold in the reverse of the numerical sequence as illustrated on figure 161.
- (2) Install the fuel primer lines and fittings (par. 251).
- (3) Install the carburetor on the intake manifold (par. 246).
- (4) Install the muffler (par. 262).

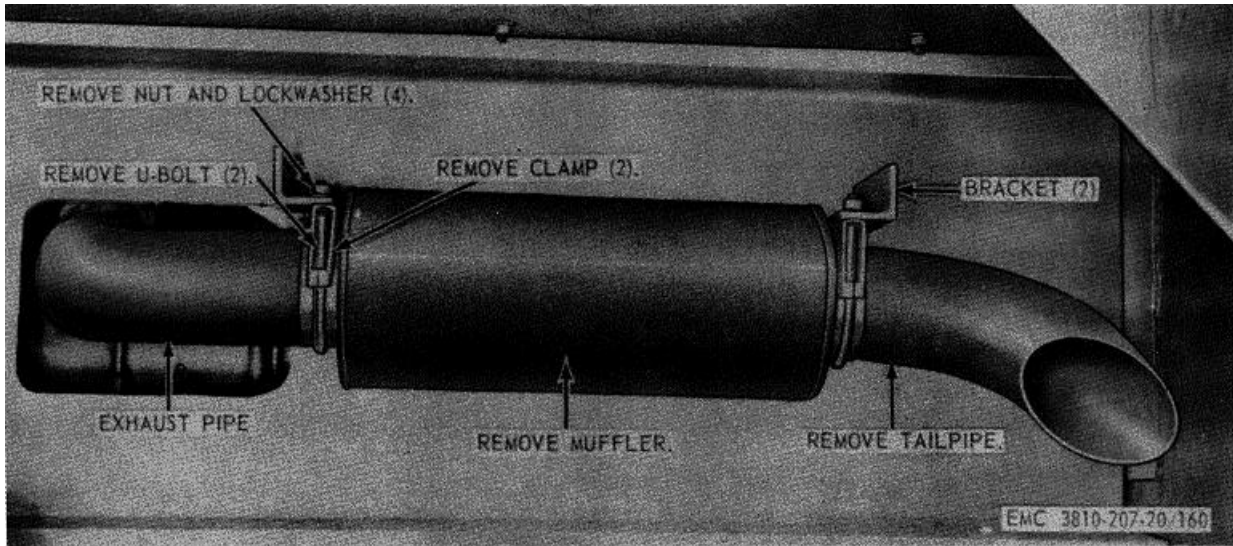
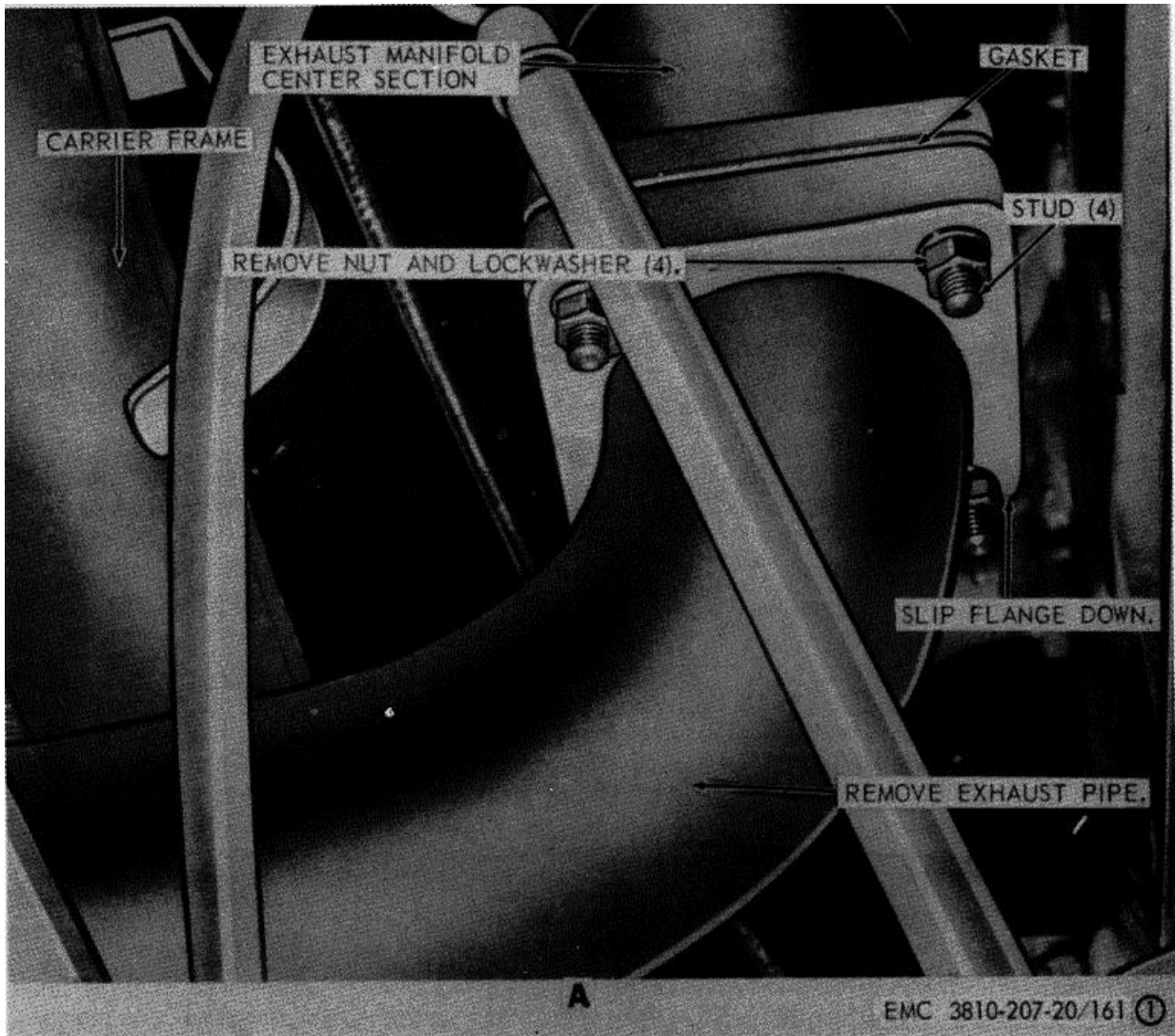
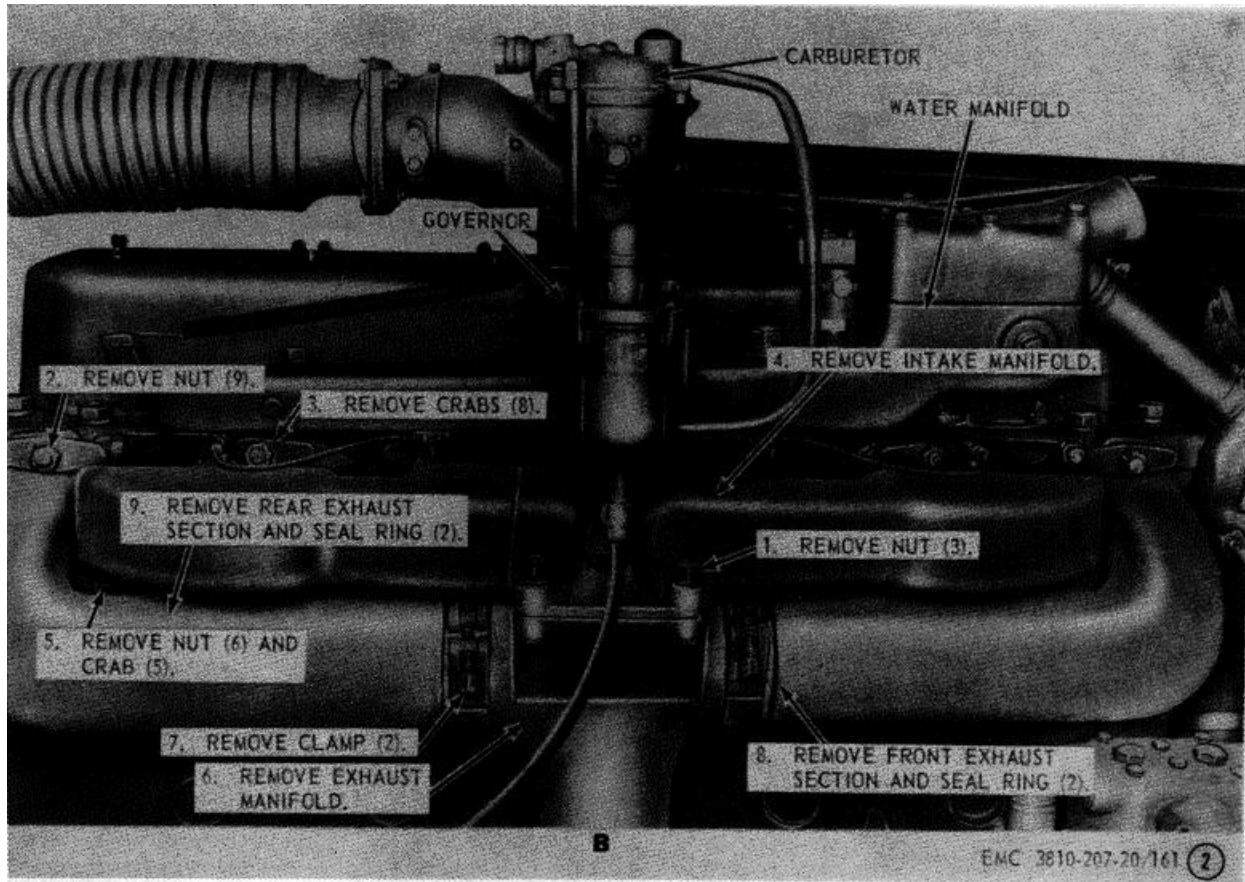


Figure 160. Carrier muffler, removal and installation.



A-Manifold exhaust pipe, removal
Figure 161. Intake and exhaust manifold, removal and installation.



B-Intake and exhaust manifold, removal
Figure 161-Continued.

Section VI. CARRIER ENGINE AND EXHAUST VALVES

264. General

The six intake and six exhaust valves are located in the cylinder heads and are actuated by the camshaft through the tappets, push rods, and rocker arms. Adjusting screws in the rocker arms provide the means of adjusting the valve clearance. The stem of each valve slides within a guide pressed into the cylinder heads. The intake valves control the admission of the fuel-air mixture to the cylinders, while the exhaust valves permit the expulsion of gases from the cylinders.

265. Valve Cover

a. Removal.

- (1) Remove the breather tube from the valve cover assembly (par. 240).
- (2) Remove the accelerator bellcrank (par. 249).

- (3) Remove the rocker arm valve covers as instructed on figure 162.
- b. Cleaning and Inspection.*
- (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect the valve cover for dents, elongated holes, and other damage.
 - (3) Replace damaged parts as necessary.
- c. Installation.*
- (1) Install the rocker arm valve covers as illustrated on figure 162.
 - (2) Install the accelerator bellcrank (par. 249).
 - (3) Install the breather tube on the valve cover assembly (par. 240).

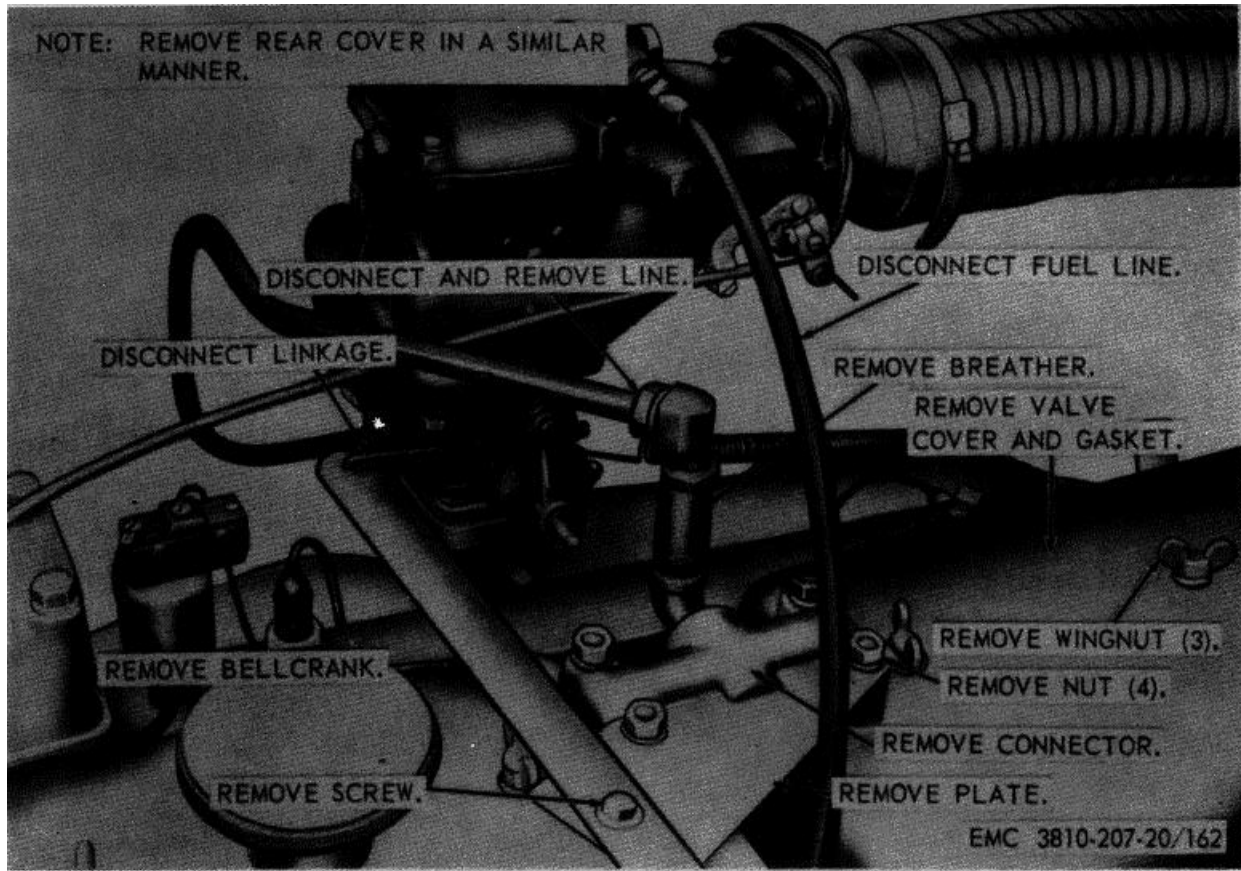


Figure 162. Valve cover, removal and installation.

266. Valve Clearance Adjustment

a. Remove the rocker arm valve covers (par. 265).

b. Adjust the intake and exhaust valve clearances as instructed on figure 163.

c. Install the front and rear valve covers (par. 265).

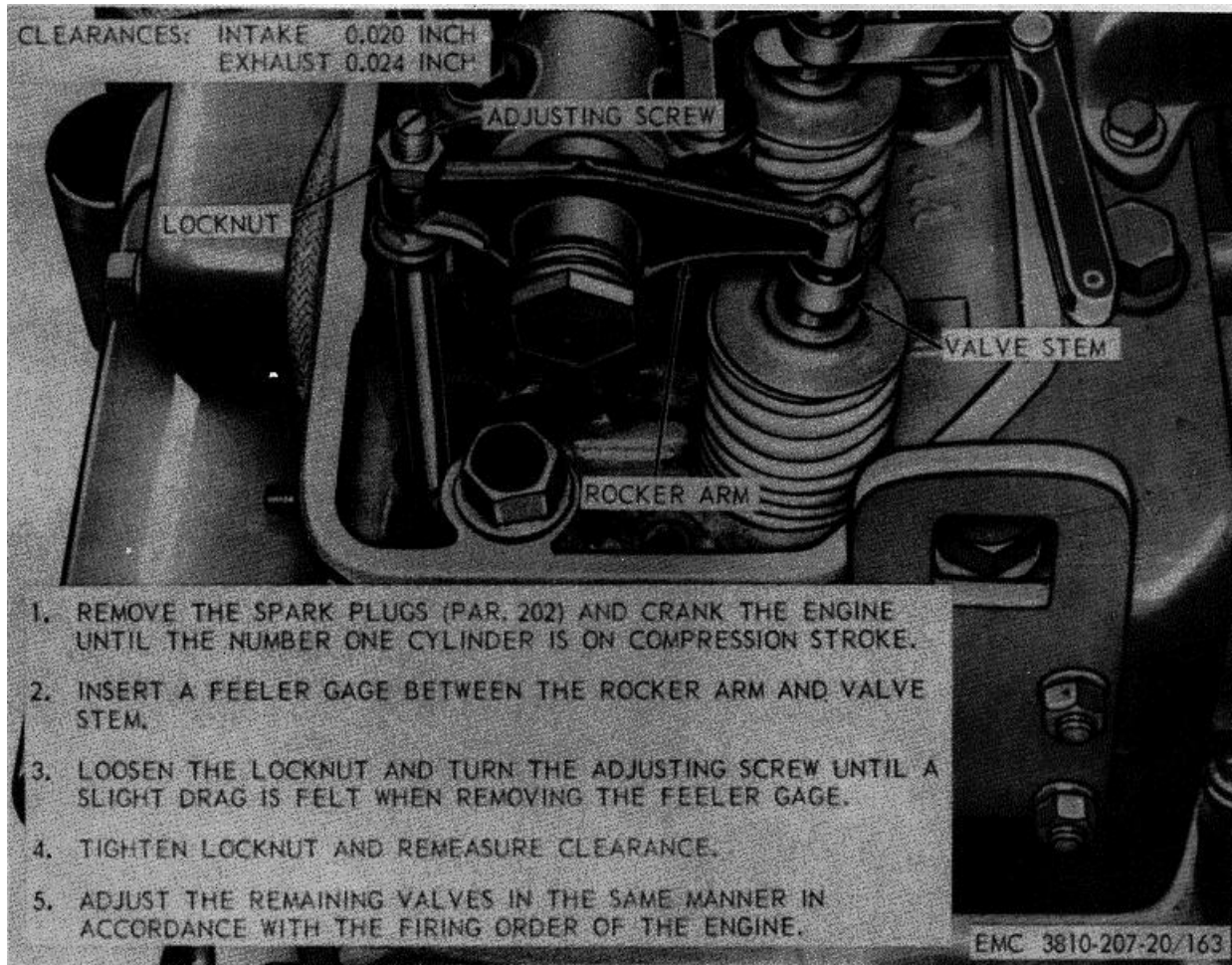


Figure 163. Valve clearance, adjustment.

Section VII. CARRIER ENGINE CLUTCH ASSEMBLY

267. General

The carrier engine clutch is a multiple-lever type and is of the adjustable, dry-disk, push-type construction. No special tools are required for maintenance. Adjustment is accomplished by removing shims to compensate for facing wear. The clutch is operated by mechanical linkage from the operator's cab. This mechanical linkage must be kept in proper adjustment.

268. Carrier Clutch Adjustment and Linkage Assembly

a. Removal.

- (1) Remove the floorboard from the cab (par. 319).

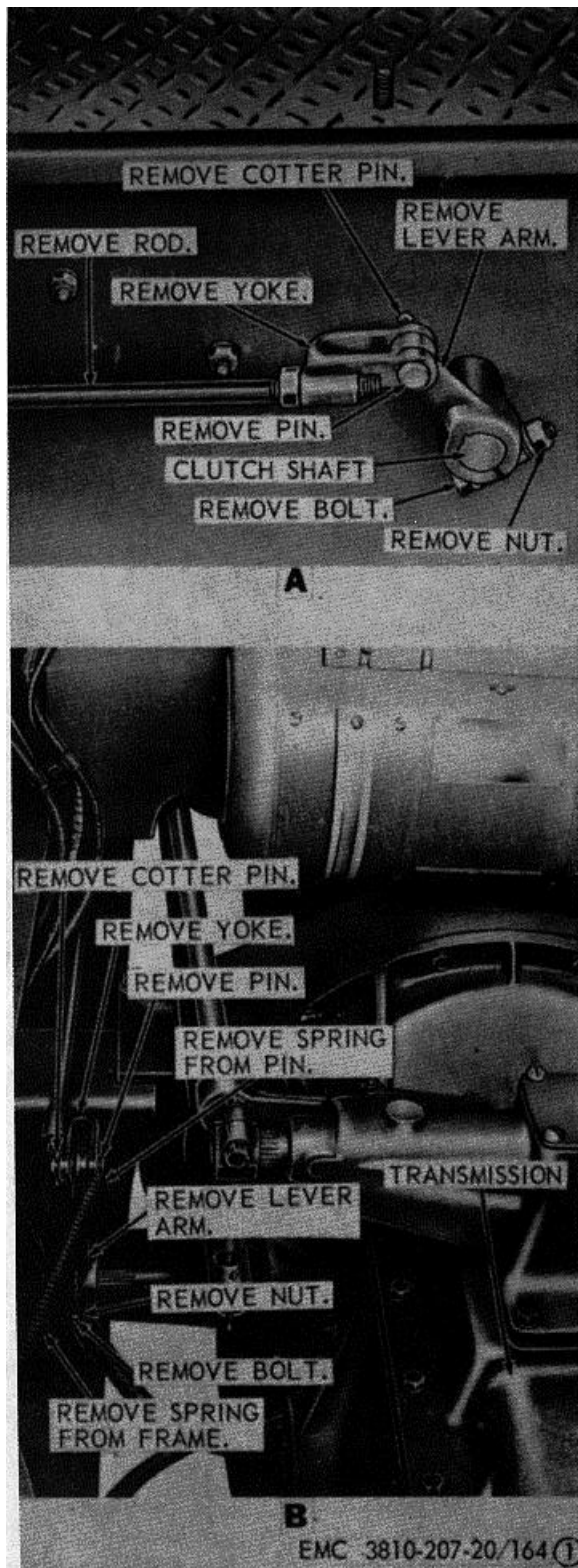
- (2) Remove the clutch linkage assembly from the carrier as instructed on figure 164.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the control rod, lever arm, and yoke for bent, cracked, or broken condition. Weld all cracks and breaks.
- (3) Repair or replace all damaged parts as necessary.

c. Installation.

- (1) Install the clutch linkage assembly on the carrier in reverse of the instructions on figure 164.



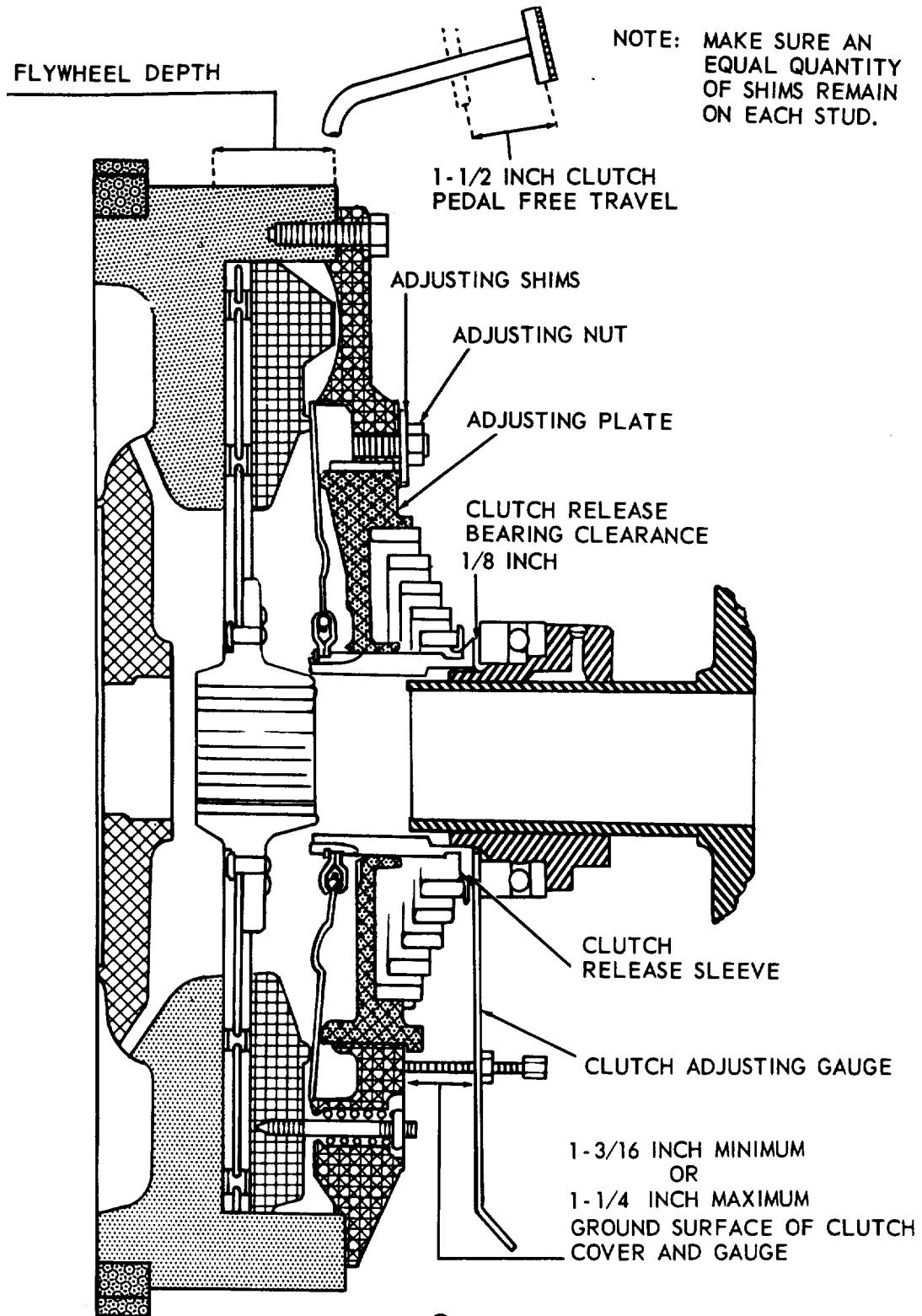
A-Clutch linkage control rod
 B-Clutch lever arm and spring

Figure 164. Clutch adjustment and linkage assembly, removal, installation, and adjustment.

- (2) Install the floorboard in the cab (par. 319).
- d. *Adjustment.*
 - (1) Measure dimensions "A" (C, fig. 164).
 - (2) If adjustment is needed, add or remove shims to obtain 1 3/16 inch minimum measurement or 1 1/4 inch maximum measurement as instructed on D, figure 164.
 - (3) Adjust linkage (TM 5-810-207-10) to obtain the 1/8 inch clearance shown on C, figure 164.

269. Clutch Pedal and Cross-Shaft

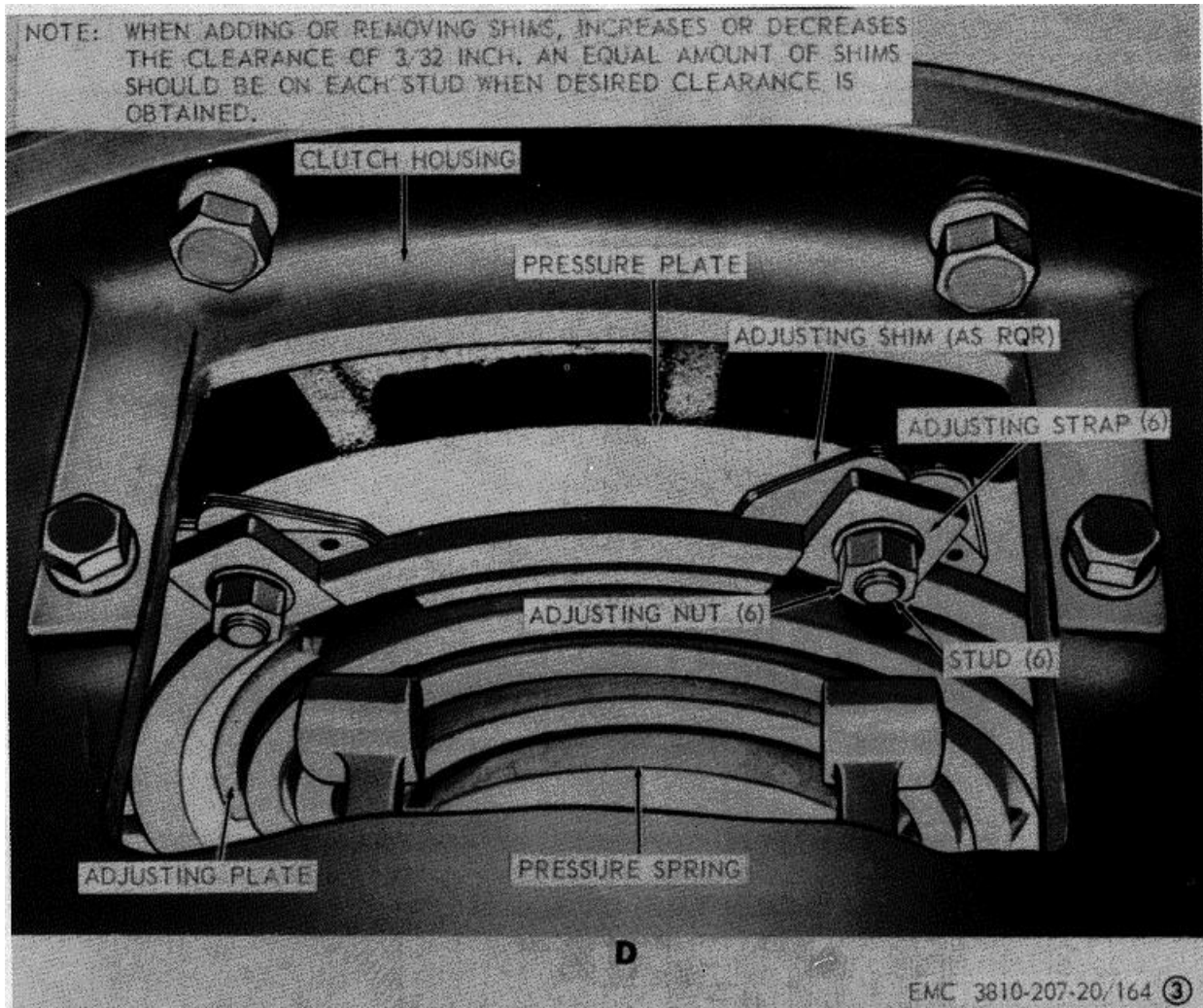
- a. *Removal.*
 - (1) Remove the clutch linkage from the cross-shaft (par. 268).
 - (2) Remove the clutch pedal and cross-shaft in the numerical sequence as instructed on figure 165.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect the cross-shaft and bushings for straightness or excessive wear. Replace a defective cross-shaft.
 - (3) Repair or replace damaged parts as necessary.
- c. *Installation.*
 - (1) Install the clutch pedal and cross-shaft in the reverse of the numerical sequence as illustrated on figure 165.
 - (2) Install the clutch linkage on the cross-shaft (par. 268).



C

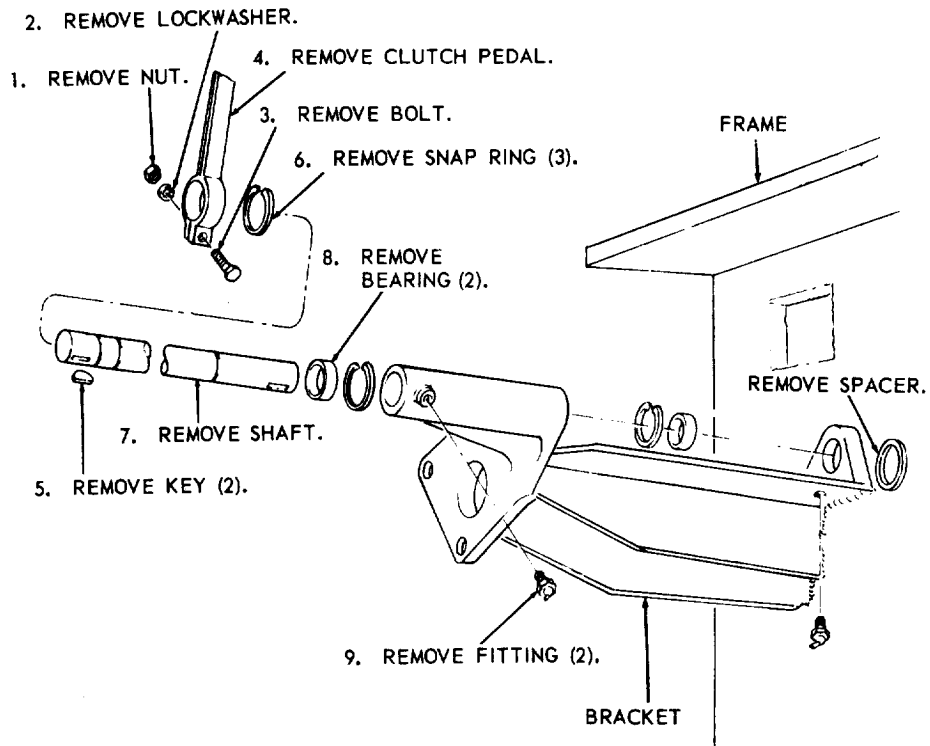
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C-Engine clutch measurement
Figure 164-Continued.



D-Engine clutch adjustment

Figure 164-Continued.



EMC 3810-207-20/165

Figure 165. Clutch pedal and cross-shaft, removal and installation.

CHAPTER 8

CARRIER MAINTENANCE INSTRUCTIONS

Section I. STEERING ASSEMBLY

270. General

The carrier hydropower steering gear is a cam and lever-gear design with a control valve to provide no-lag, fingertip control. It is a compact semi-integral assembly with a hydraulic cylinder installed in the linkage to apply the necessary power for steering.

271. Hydraulic Steering Pump*a. Test.*

- (1) Disconnect the pressure hose from the steering valve.
- (2) Insert a pressure gage in the discharge hose. Pressure should be 700 to 900 pounds per square inch with the engine idling and wheels against stops.
- (3) Position the pressure hose on the steering valve and secure with the connector nut.

b. Removal.

- (1) Tag, disconnect, and drain pump lines.
- (2) Remove the hydraulic pump and drive belt (pars. 254 and 258).

c. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the steering pump for breaks, leaks, and other damage. Replace defective pump.
- (3) Inspect the drive belt for breaks, fraying, and other damage. Replace defective drive belt.

d. Installation.

- (1) Install the hydraulic pump and drive belt (par. 254).
- (2) Adjust drive belt (TM 5-3810-20710).
- (3) Install pump lines and replenish hydraulic oil (LO 5-3810-207-20).

272. Steering Pump Pulley*a. Removal.*

- (1) Remove the steering pump drive belt (par. 254).
- (2) Remove the steering pump pulley as instructed on figure 166.

b. Cleaning and Inspection.

- (1) Clean the pulley with an approved cleaning solvent.
- (2) Inspect the pulley for breaks, cracks, and other damage. Replace defective pulley.

c. Installation.

- (1) Install the pump pulley as illustrated on figure 166.
- (2) Install the drive belt (par. 254).
- (3) Adjust the drive belt (TM 5-3810-207-10).

273. Steering Pump Reservoir*a. Removal.*

- (1) Remove the cover and filter element from the reservoir (TM 5-3810-20710).
- (2) Drain the reservoir (TM 54810207-10).
- (3) Remove the steering pump reservoir as instructed on figure 166.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for bends, cracks, and other damage. Replace or repair all defective parts.

c. Installation.

- (1) Install the steering pump reservoir as illustrated on figure 166.

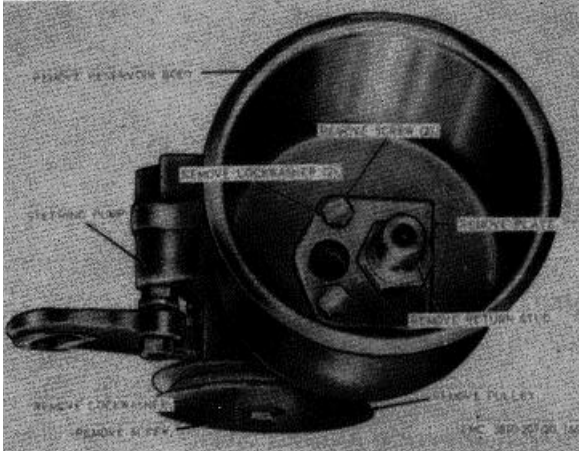


Figure 166. Steering pump pulley and reservoir, removal and installation.

- (2) Fill the reservoir to proper level (LO 5-3810-207-20).
- (3) Install the filter element and cover (TM 5-3810-207-10).

274. Steering Pump Relief Valve

a. *Removal.* Remove the steering pump relief valve as illustrated on figure 167.

b. *Cleaning and Inspection.*

- (1) Clean all parts of the relief valve with an approved cleaning solvent.
- (2) Inspect all parts for corrosion, breaks, excessive wear, and other damage. Replace defective parts.

c. *Installation.* Install the relief valve as illustrated on figure 167.

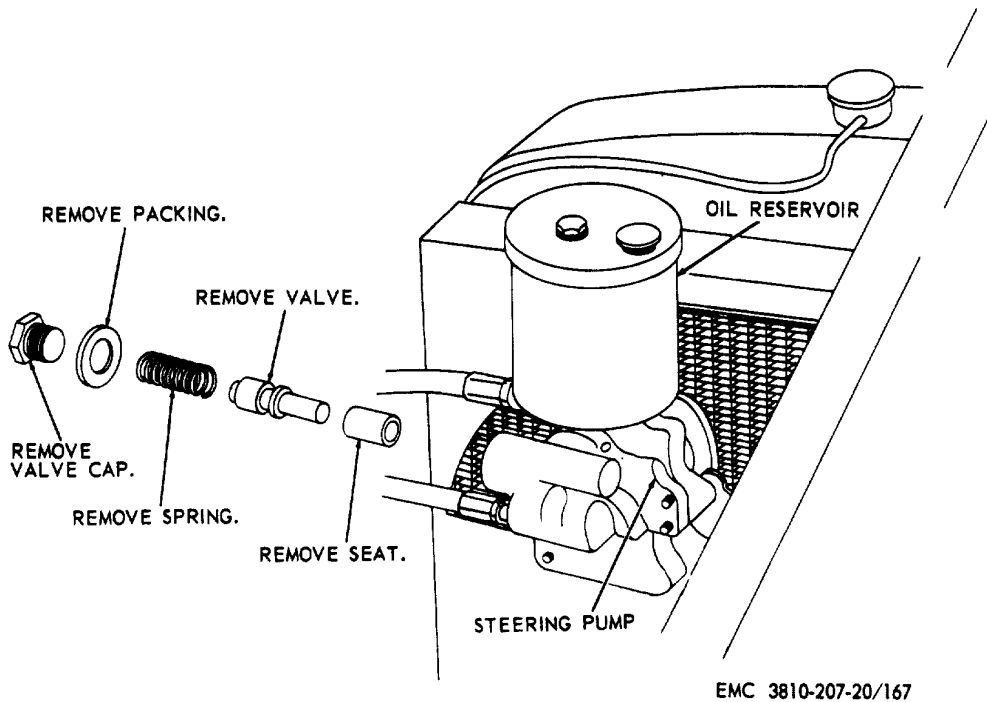
275. Steering Valve

a. *Removal.* Remove the steering valve as instructed on figure 168.

b. *Cleaning and Inspection.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the steering valve for leaks and proper operation. Replace defective valve.
- (3) Inspect the hose for frayed, cracked, or broken condition. Replace defective hoses.

c. *Installation.* Install the steering valve as illustrated on figure 168.



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Figure 167. Carrier steering pump relief valve, removal and installation.

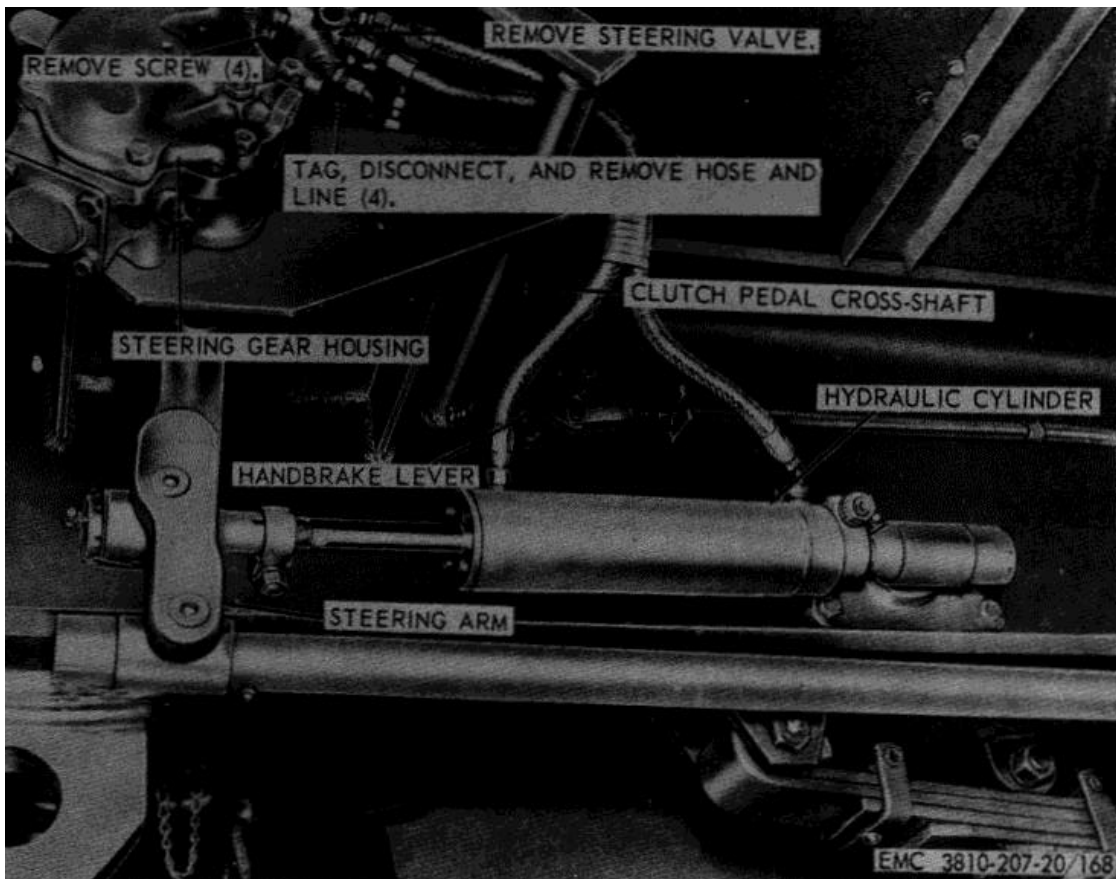


Figure 168. Carrier steering valve, removal and installation.

276. Hydraulic Cylinder

a. *Removal.* Remove the hydraulic cylinder as instructed on figure 169.

b. *Cleaning and Inspection.*

- (1) Clean the hydraulic cylinder with an approved cleaning solvent.
- (2) Inspect the hydraulic cylinder for leaks, breaks, and other damage. Replace defective hydraulic cylinder.

c. *Installation.* Install the hydraulic cylinder as illustrated on figure 169.

277. Steering Assembly Backlash Adjustment

a. To adjust steering assembly backlash, loosen locknut (fig. 169) and tighten side cover adjusting screw

until a very slight drag is felt when moving the steering wheel through mid position.

b. Hold the adjusting screw and tighten locknut.

c. Check adjustment through full travel of the steering wheel.

278. Steering Wheel

a. *Removal.*

- (1) Remove the horn button assembly (par. 226).
- (2) Remove the steering wheel as instructed on figure 170.

b. *Cleaning and Inspection.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, and other damage.

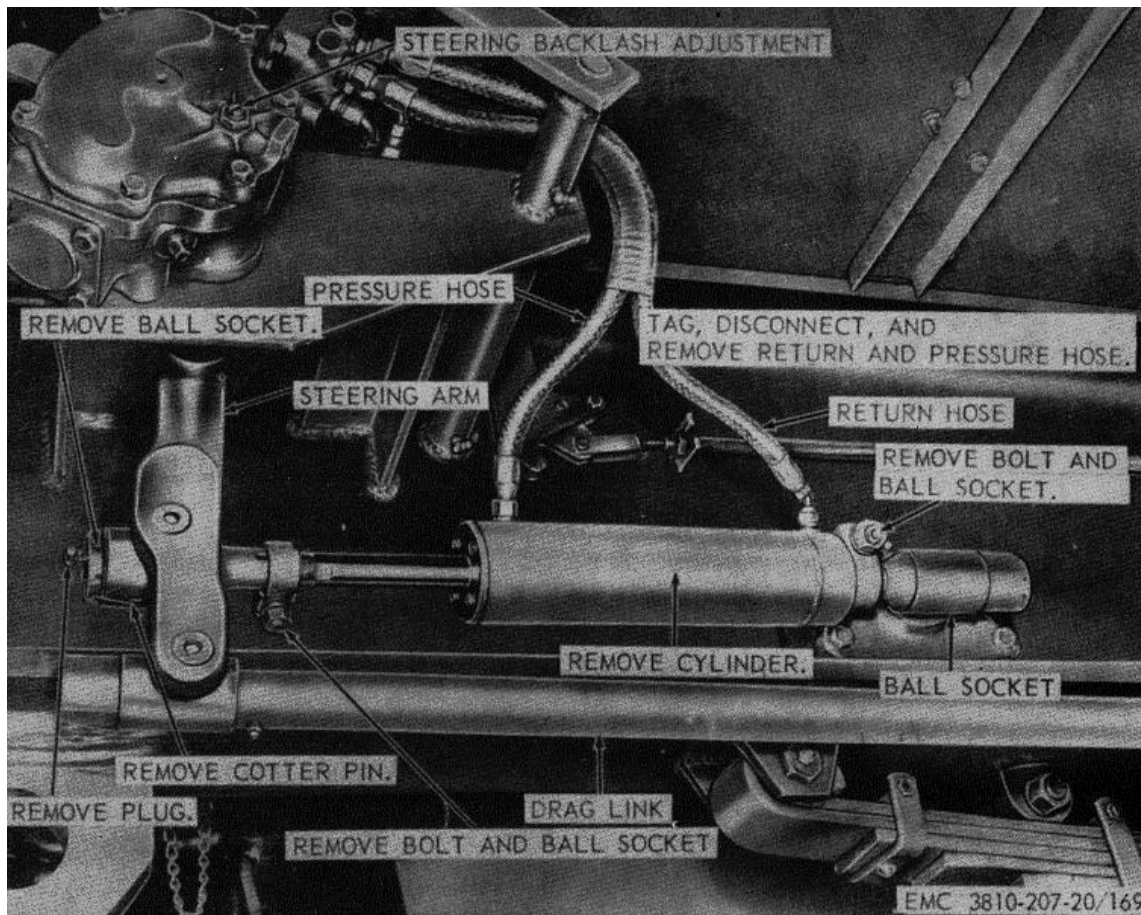


Figure 169. Carrier hydraulic cylinder, removal and installation.

c. Installation.

- (1) Install the steering wheel as illustrated on figure 170.
- (2) Install the horn button assembly (par. 226).

279. Drag Link

a. Removal. Remove the drag link assembly as instructed on figure 171.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for bends, breaks, excessive wear, and other damage. Replace defective parts as necessary.

c. Installation. Install the drag link assembly as illustrated on figure 171.

280. Steering Arm

a. Removal.

- (1) Remove the hydraulic cylinder (par. 276).
- (2) Remove the drag link (par. 279).
- (3) Remove the steering arm as instructed on figure 172.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, cracks, or other damage. Replace defective parts as necessary.

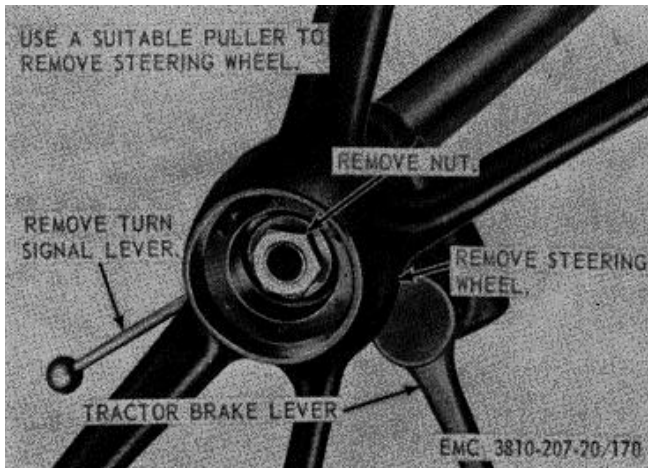


Figure 170. Steering wheel, removal and installation.

- c. *Installation.*
 - (1) Install the steering arm as illustrated on figure 172.
 - (2) Install the drag link (par. 279).
 - (3) Install the hydraulic cylinder (par. 276).

281. Steering Tie Rod

- a. *Removal.* Remove the tie rod as instructed, on figure 173.
- b. *Cleaning and Inspection.*
 - (1) Clean all parts with an approved cleaning solvent.
 - (2) Inspect the tie rod for breaks, bends, excessive wear, and other damage. Replace defective tie rod.
- c. *Installation.* Install the tie rod as illustrated on figure 173.

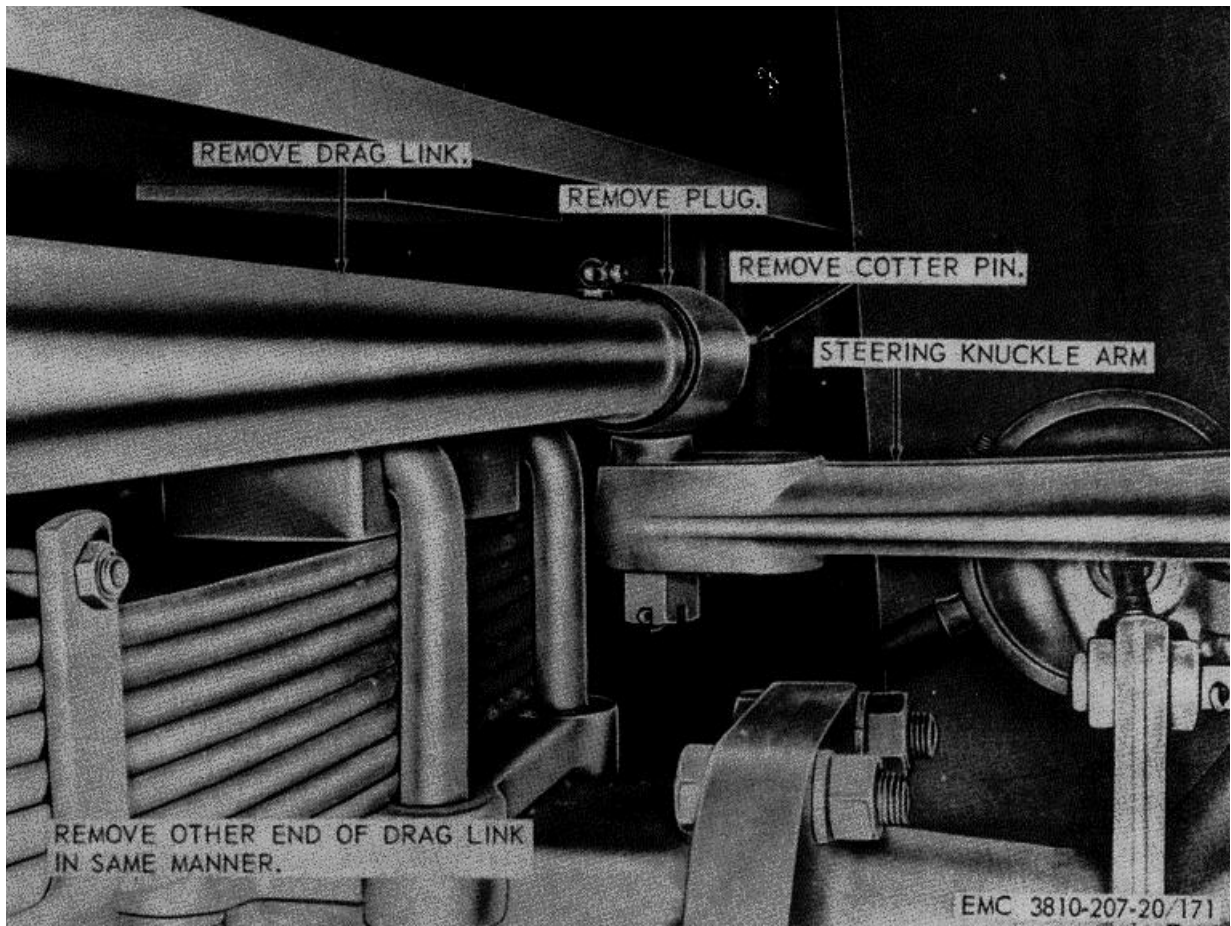


Figure 171. Drag link, removal and installation.

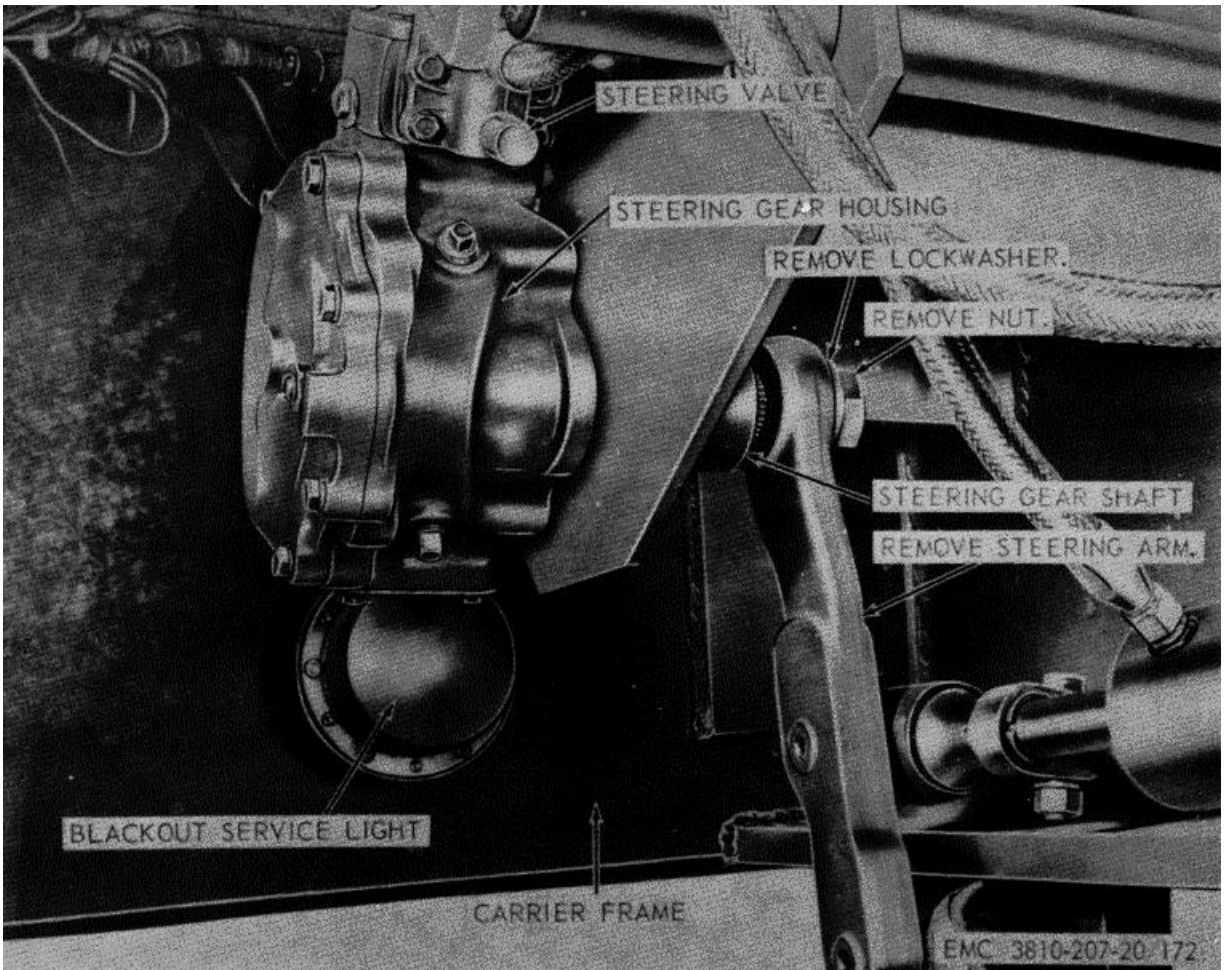


Figure 172. Steering arm, removal and installation.

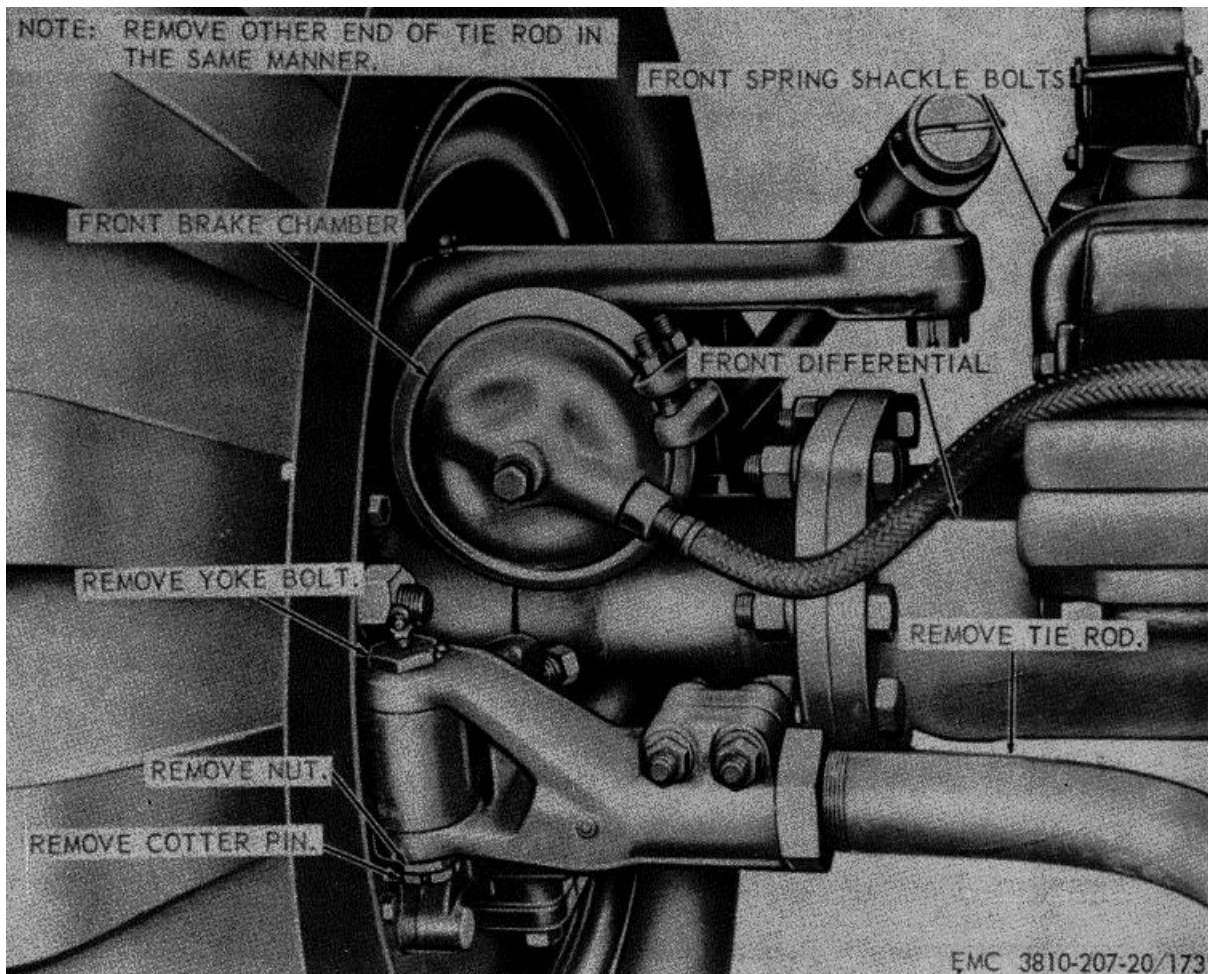


Figure 173. Steering tie rod assembly, removal and installation.

Section II. WHEELS, TIRES, AND SHOCK ABSORBERS

282. General

The carrier is equipped with eleven 12:00 x 20, 14-ply rubber tires, eight on the rear, two on the front, and one spare. All wheels and tires on the carrier are interchangeable and can be mounted in any position on the axle. All studs and nuts are marked right or left and must be installed accordingly on the proper side of the carrier. The carrier has shock absorbers mounted on the front axle of the carrier frame.

283. Front Wheel

- a. *Removal.* Remove the front wheel as instructed on figure 174.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean the wheel assembly with an approved cleaning solvent.
 - (2) Inspect the wheel assembly for bends, worn mounting holes, and other damage. Replace or repair defective wheel assemblies.
- c. *Installation.* Install the front wheel as illustrated on figure 174.

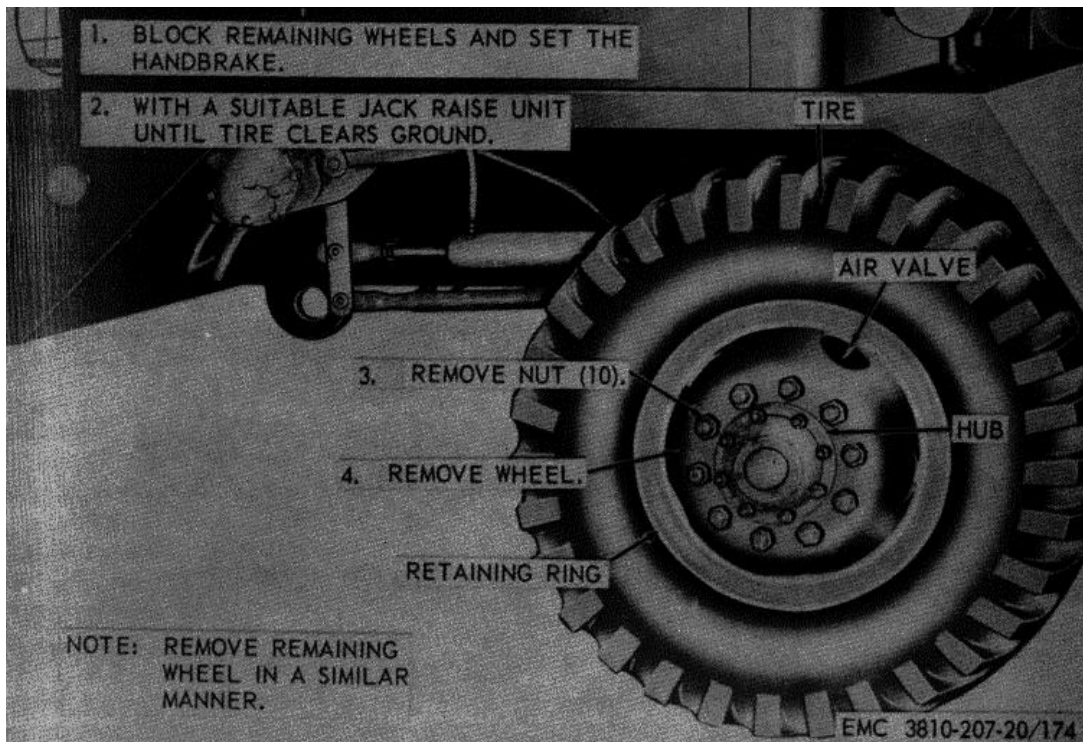


Figure 174. Front wheel, removal and installation.

284. Front Wheel Bearing, Hub, and Drum

a. Removal.

- (1) Remove the front wheel (par. 283).
- (2) Remove the front wheel hub, drum, and bearings in the numerical sequence as instructed on figure 175.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the locknut, lockring, key washer, and bearing adjusting nut for damage. Replace as necessary.
- (3) Inspect the bearings and races for damage and excessive wear (TM 9-214). Replace bearings as necessary.
- (4) Inspect all other parts for breaks, cracks, excessive wear, and other damage. Replace all parts and gaskets as necessary.

c. Installation.

- (1) Pack the wheel bearings, using the

prescribed lubricant (LO 5-3810-207-20).

- (2) Install the wheel bearings, hub, and drum in the reverse of the numerical sequence as illustrated on figure 175.
- (3) Install front wheel (par. 283).

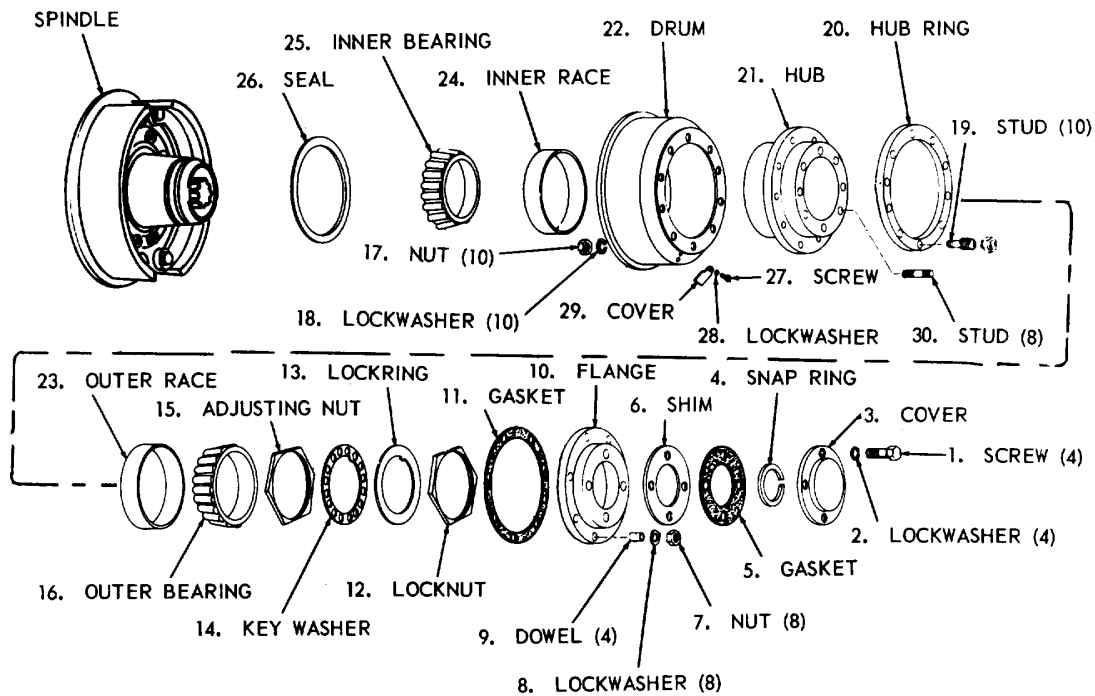
NOTE

When installing the bearing, tighten the bearing adjusting nut until the wheel locks; then back off on the adjusting nut until the wheel turns freely.

285. Rear Wheel

- a. Removal.* Remove the rear wheels as instructed on figure 176.
- b. Cleaning and Inspection.*

- (1) Clean the rear wheels with an approved cleaning solvent.



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Figure 175. Front wheel bearings, hub, and drum, exploded view.

- (2) Inspect the rear wheels for bent condition and other damage. Replace rear wheels as necessary.

c. *Installation.* Install the rear wheels as illustrated on figure 176.

286. Rear Wheel Bearings, Drum, Hub, and Axle Shaft

a. *Removal.*

- (1) Remove the rear wheel (par. 285).
- (2) Remove the axle shaft, wheel bearings, drum, and hub in the numerical sequence as instructed on figure 177.

b. *Cleaning and Inspection.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the wheel bearings and races for excessive wear and other damage (TM 9-214).
- (3) Inspect all other parts for breaks, excessive wear, and other damage. Replace all defective parts as necessary.

c. *Installation.*

- (1) Pack the bearings using the prescribed lubricant (LO 5-3810-207-20).
- (2) Install the wheel bearings, hub, drum, and axle shaft in the reverse of the numerical sequence as illustrated on figure 177.

NOTE

When installing the bearings, tighten the bearings adjusting nut until the wheel locks; then back off on the adjusting nut until the wheel turns freely.

- (3) Install the rear wheel (par. 285).

287. Tires and Tubes

a. *Removal.*

- (1) Remove the wheel from the carrier (par. 283 and/or 285).
- (2) Deflate tire by removing valve core. Insert pry bar in slot of retaining ring near split. Pry end of ring out over edge of rim, and remove ring from rim.

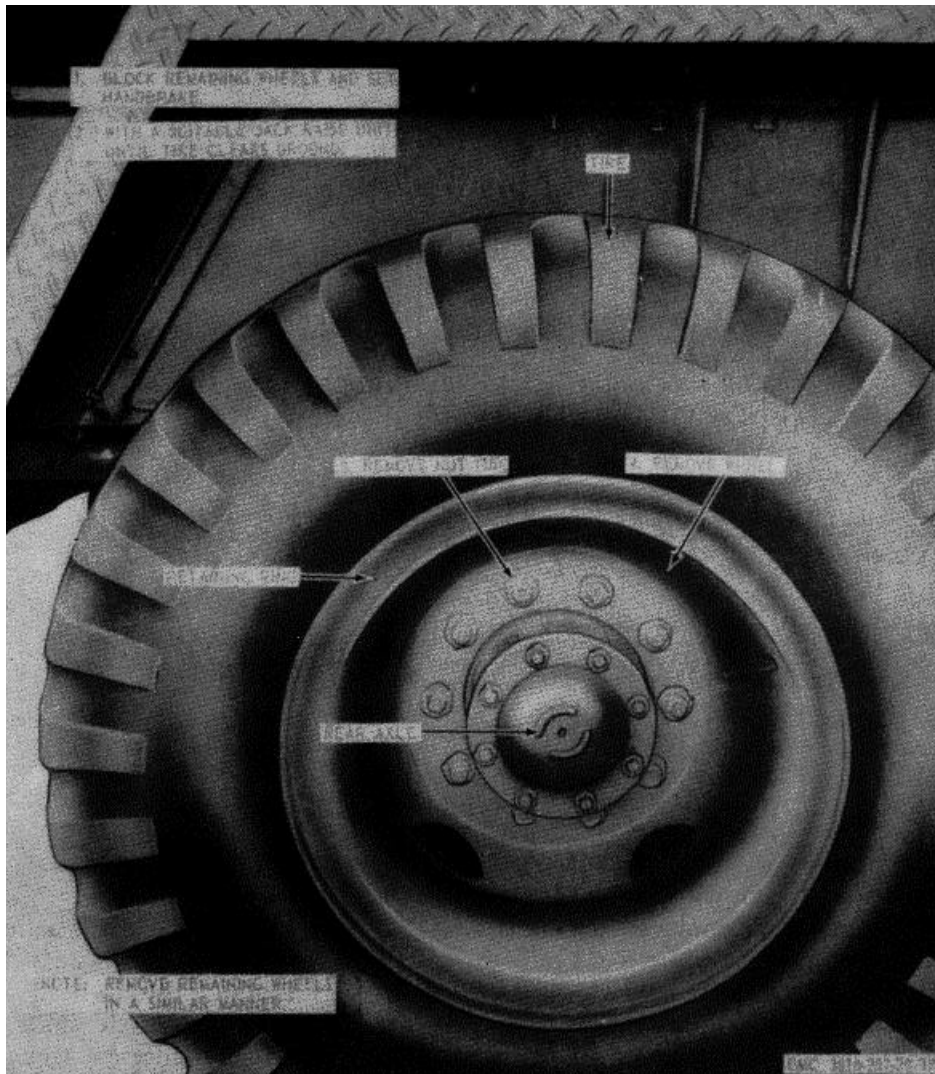


Figure 176. Rear wheel, removal and installation.

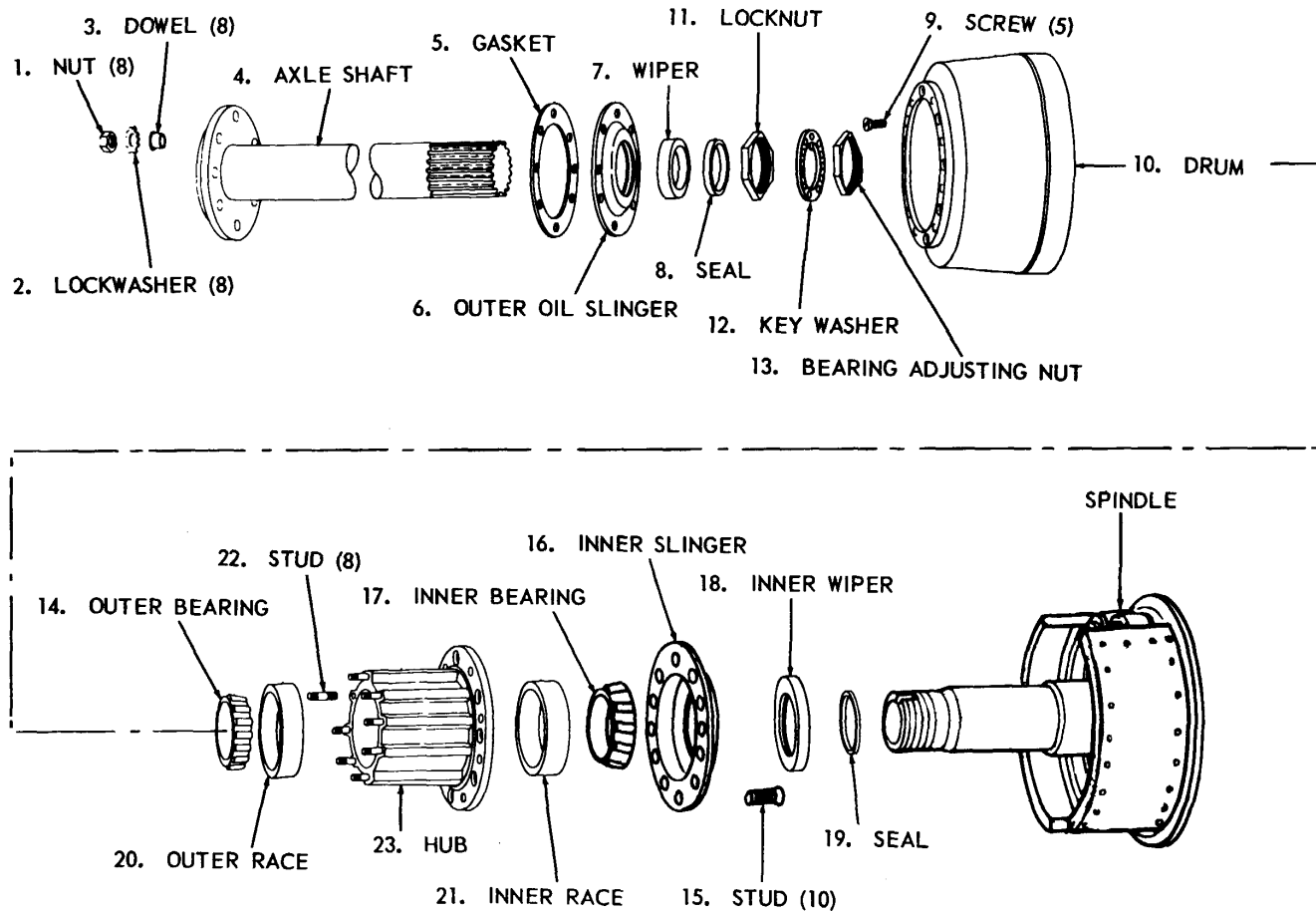
CAUTION

Do not attempt to remove tire retaining ring until tire is completely deflated.

- (3) Remove the tire from the rim and remove the tube liner and tube from the tire.
- b. *Cleaning, Inspection, and Repair.*
 - (1) Clean the rim with an approved cleaning solvent.
 - (2) Inspect the tire for breaks, cuts, excessive wear, and other damage.

Repair or replace tire as necessary.

- (3) Inspect the tube and liner for cuts, punctures, and other damage. Repair or replace tube and liner as necessary.
- (4) Inspect the retaining ring for bends and other damage. Replace defective retaining ring.
- c. *Installation.*
 - (1) Install the tube in the tire so the valve stem is in line with the balancing mark on the tire.
 - (2) Install the liner in the tire and inflate tube slightly to prevent the liner



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Figure 177. Rear wheel bearings, axle, drum, and hub exploded view.

from falling out and the tube from being pinched.

- (3) Install the tire on the rim and secure with the retaining ring.
- (4) Inflate the tire to 80 psi.

Caution:

Lay tire with the retaining ring down and secure the wheel with a chain to a beam or other solid object while inflating tire to avoid injury.

- (5) Install the wheel on the carrier (par. 283 and/or 285).

288. Right-Front Shock Absorber

a. Removal.

- (1) Remove the shock absorber as instructed on figure 178.
- (2) Remove the left-front shock absorber in a similar manner.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the shock absorber for proper operation and other damage. Replace defective shock absorber.
- (3) Inspect the mounting hardware for breaks, excessive wear, and other damage. Replace defective hardware.

c. Illustration.

- (1) Install the right-front shock absorber as illustrated on figure 178.
- (2) Install the left-front shock absorber in a similar manner.

289. Ventilation Breathers

a. Removal.

- (1) Remove the front differential breather as instructed on figure 178.
- (2) Remove rear differential breathers in a similar manner.
- (3) Remove the transfer case breather in a similar manner.

b. Cleaning and Inspection.

- (1) Clean the breathers with an approved cleaning solvent.
- (2) Inspect the breathers for bends, breaks, and other damage. Replace defective breathers as necessary.

c. Installation.

- (1) Install the front differential breather as illustrated on figure 178.
- (2) Install the remaining breathers in a similar manner.

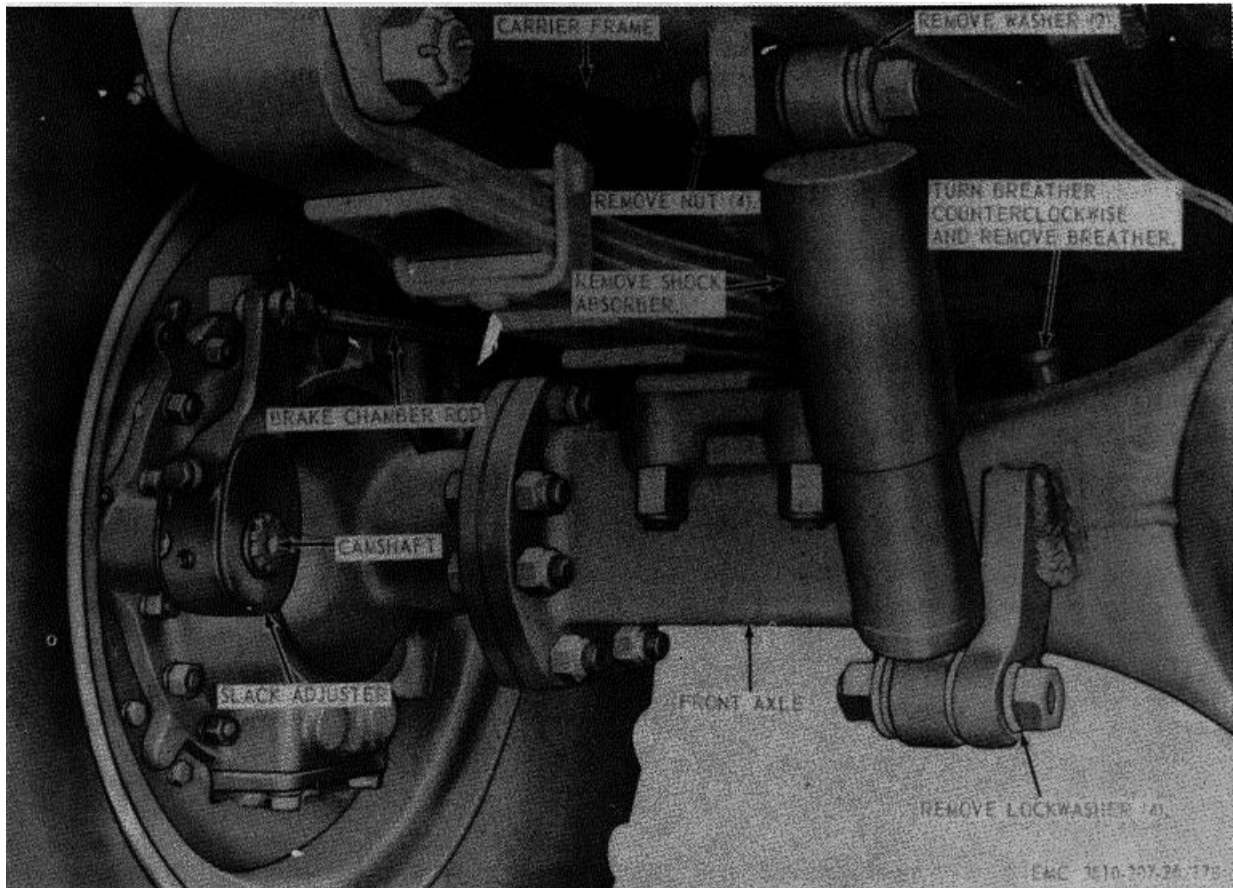


Figure 178. Right-front shock absorber and differential breather, removal and installation.

Section III. CARRIER AIRBRAKE SYSTEM

290. General

The carrier is equipped with service brakes on all six wheels, controlled by the airbrake system. In this airbrake system, the brakes are set by the power of compressed air and set faster and more effectively than manual footbrakes. The air system consists of an air compressor, valves, reservoirs, brake chambers, and connecting hoses, tubes, and fittings. The air compressor furnishes the compressed air needed to operate the brakes. The compressor is a two-cylinder, engine-lubricated, watercooled, single-acting, reciprocating type located on the right-front side of the engine, and driven by a V-belt from the engine crankshaft.

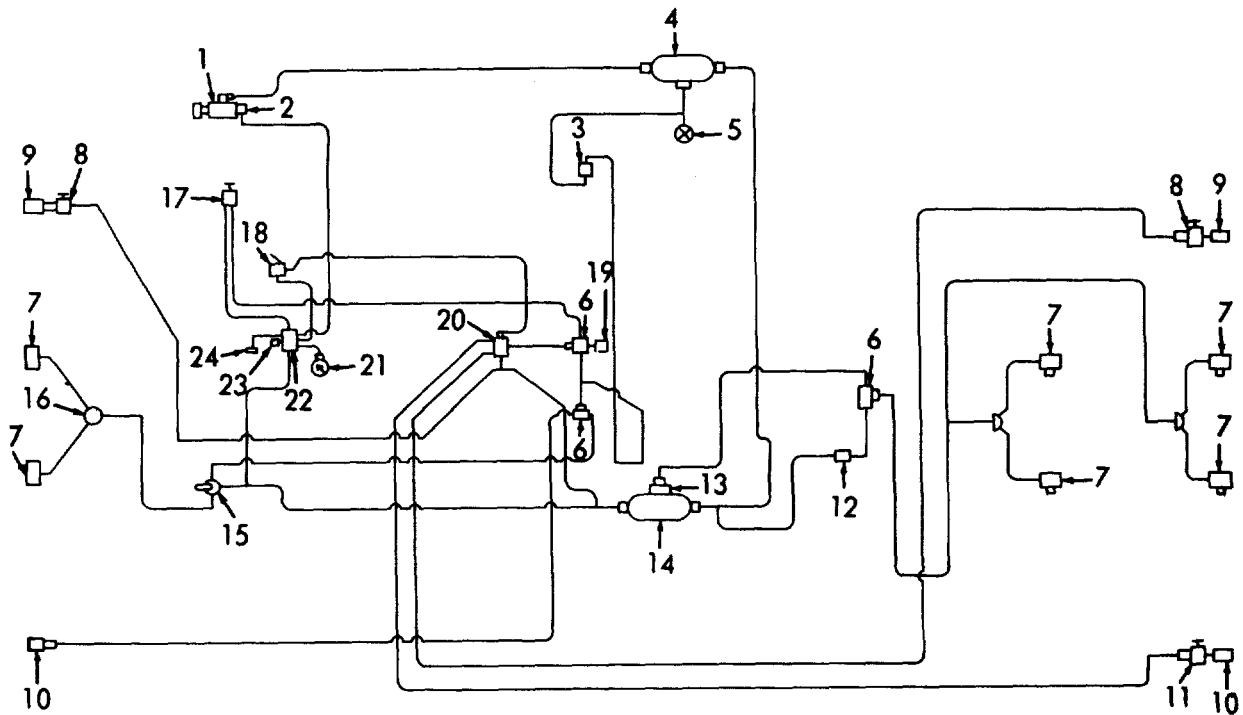
291. Air Lines, Hoses, and Fittings

a. Removal.

- (1) Remove the screws and clamps securing airhoses and lines to carrier frame.
- (2) Disconnect the air hoses and lines from the valves, brake chambers, and air compressor; remove lines and hoses. Refer to the carrier airbrake system piping diagram (fig. 179).

b. Cleaning and Inspection.

- (1) Clean all lines and hoses with an approved cleaning solvent.
- (2) Inspect the lines for dents, breaks, and wear.



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- | | |
|-----------------------------------|--------------------------------|
| 1 Air compressor | 13 Relay valve |
| 2 Governor | 14 Dry air tank receiver |
| 3 Moisture ejector | 15 Treadle brake valve |
| 4 Wet air receiver | 16 Quick release |
| 5 Draincock | 17 Trailer brake valve |
| 6 Double check valve (3 rqr) | 18 Protector control valve |
| 7 Brake chamber (6 rqr) | 19 Stoplight switch |
| 8 Emergency shutoff valve (2 rqr) | 20 Protector valve |
| 9 Emergency coupling (2 rqr) | 21 Air pressure gage |
| 10 Service coupling (2 rqr) | 22 Manifold |
| 11 Service shutoff valve | 23 Safety valve |
| 12 Air assist valve | 24 Low pressure warning switch |

Figure 179. Carrier airbrake system, piping diagram

- (3) Inspect the airhoses for cracks, breaks, and deterioration.
- (4) Inspect the line and hose fittings for damaged threads. Replace all defective lines, hoses, and fittings as necessary.

c. *Installation.*

- (1) Install and connect lines and airhoses to the compressor, valves, and brake chambers.

- (2) Secure the lines and airhoses to the carrier frame with the clamps and screws.

292. Air Buzzer and Low Pressure Valve

a. *Removal.* Remove the air buzzer and low pressure valve as instructed on figure 180.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.

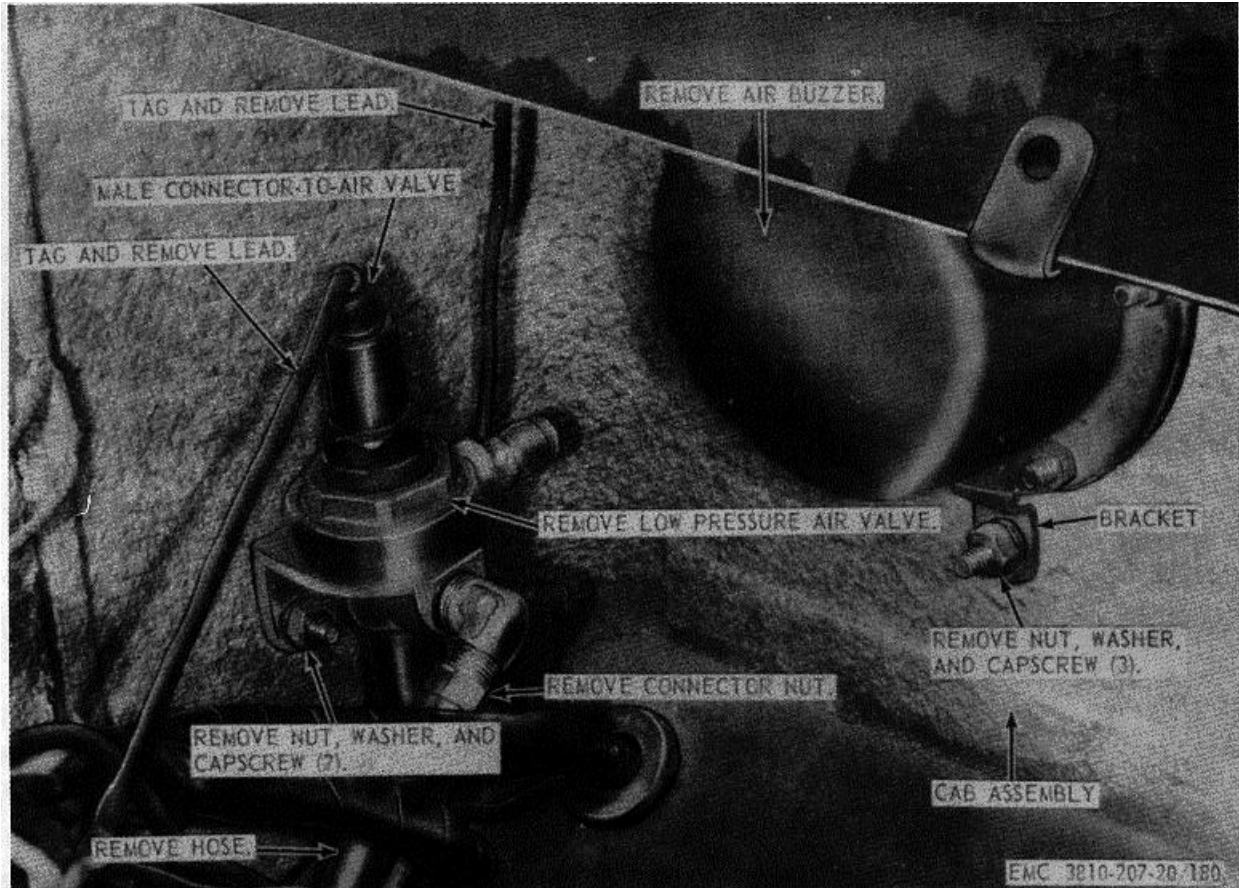


Figure 180. Air buzzer and low pressure valve, removal and installation.

- (2) Inspect the air buzzer for improper operation. Repair or replace an inoperative air buzzer.
- (3) Inspect the male connector for improper operation or damage. Replace an inoperative or damaged male connector as necessary.
- (4) Inspect the low pressure valve for improper operation. Replace or repair an inoperative low pressure valve.
- (5) Inspect all mounting hardware for stripped or damaged threads. Replace as necessary.

c. Installation. Install the low pressure valve and air buzzer as illustrated on figure 180.

293. Air Pressure Gage

a. Removal. Remove the air pressure gage as instructed on figure 125.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the air pressure gage for cracked or broken glass. Replace as necessary.
- (3) Inspect the air pressure gage for proper operation. Replace an inoperative air pressure gage.
- (4) Inspect all mounting hardware for stripped or damaged threads. Replace as necessary.

c. Installation. Install the air pressure gage as illustrated on figure 125.

294. Air Compressor

Adjust the air compressor belt (TM 5-3810-207-10).

295. Front and Rear Brake Chambers

a. Removal.

- (1) Disconnect the brake chamber rod from slack adjuster (par. 304).
- (2) Remove the front and rear brake chambers as instructed on figure 181.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the brake chamber for proper working condition. Replace a defective brake chamber as necessary.
- (3) Inspect brake chamber and hose for cracks, holes, and deterioration of hose.
- (4) Replace all defective parts as necessary.

c. Installation.

- (1) Install the front and rear brake chambers as illustrated on figure 181.
- (2) Connect the brake chamber rod to the slack adjuster (par. 304).

296. Quick Release Valve

a. *Removal.* Remove the quick release valve as instructed on figure 182.

b. Cleaning and Inspection.

- (1) Clean the quick release valve with an approved cleaning solvent.
- (2) Inspect the quick release valve for breaks, damaged threads, proper operation, and other damage. Replace defective quick release valve and mounting hardware.

c. *Installation.* Install the quick release valve as illustrated on figure 182.

297. Tractor Protection Valve

a. *Removal.* Remove the tractor protection valve as instructed on figure 183.

b. Cleaning and Inspection.

- (1) Clean the protection valve with an approved cleaning solvent.
- (2) Inspect the protection valve for damaged thread holes and proper operation. Replace a damaged or defective protection valve as necessary.

(3) Inspect all mounting hardware for stripped or damaged threads.

(4) Replace all defective parts as necessary.

c. *Installation.* Install the tractor protection valve as illustrated on figure 183.

298. Check Valves

a. Removal.

- (1) Disconnect hoses and remove tractor protection valve (par. 297).
- (2) Remove the stoplight switch (par. 237).
- (3) Remove the lower double check valve (fig. 188) by turning counterclockwise out of the tee.
- (4) Remove the upper check valve by turning counterclockwise out of the protection valve.

b. *Cleaning and Inspection.* Inspect the double check valve for proper operation and damaged fitting holes. Replace a damaged or defective double check valve as necessary.

c. Installation.

- (1) Install the upper check valve to the tractor protection valve by turning clockwise in the nipple (fig. 183).
- (2) Install the lower check valve to the upper check valve by turning clockwise in the tee.
- (3) Install the tractor protection valve and connect hoses (par. 297).
- (4) Install the stoplight switch (par. 237).

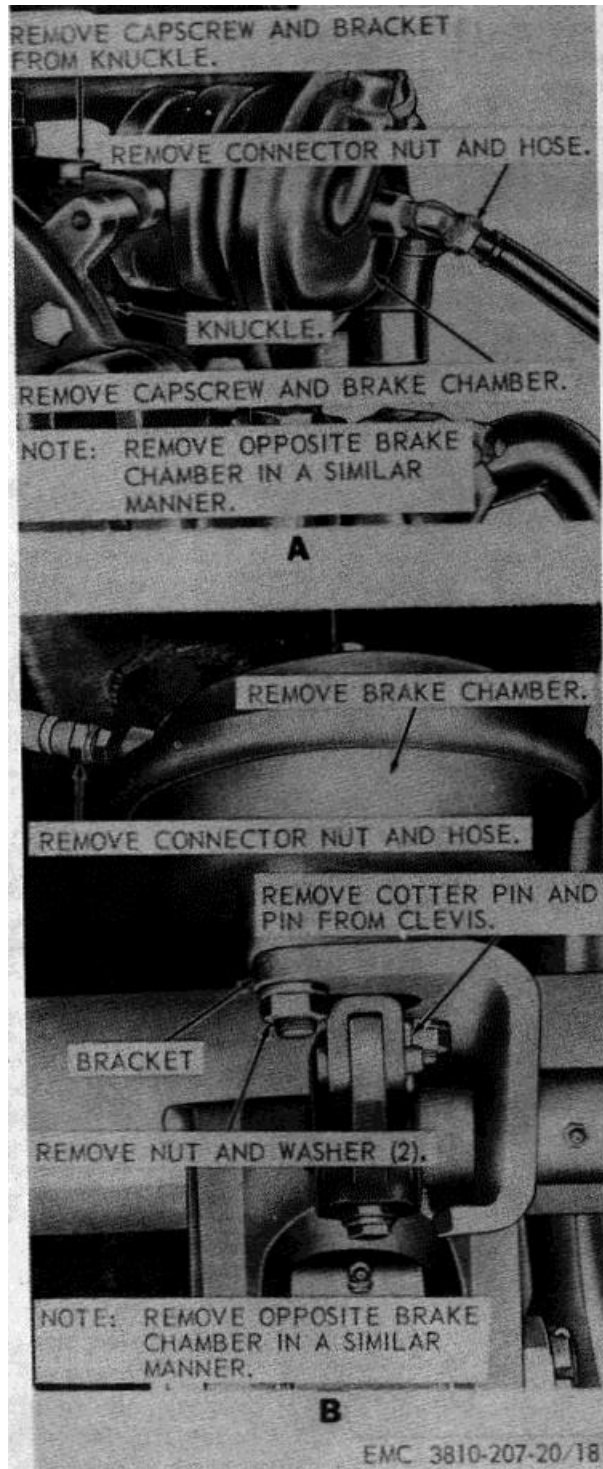
299. Moisture Ejector Valve

a. *Removal.* Remove the moisture ejector valve as instructed on figure 183.

b. Cleaning and Inspection.

- (1) Clean the moisture ejector valve with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the moisture ejector valve for proper operation. Replace a defective moisture ejector valve as necessary.
- (3) Inspect all fittings and mounting hardware for stripped or damaged threads. Replace all parts as necessary.

c. *Installation.* Install the moisture ejector valve as illustrated on figure 183.



A-Front brake chamber, installed view

B-Rear brake chamber, installed view

Figure 181. Front and rear brake chambers, removal and installation.

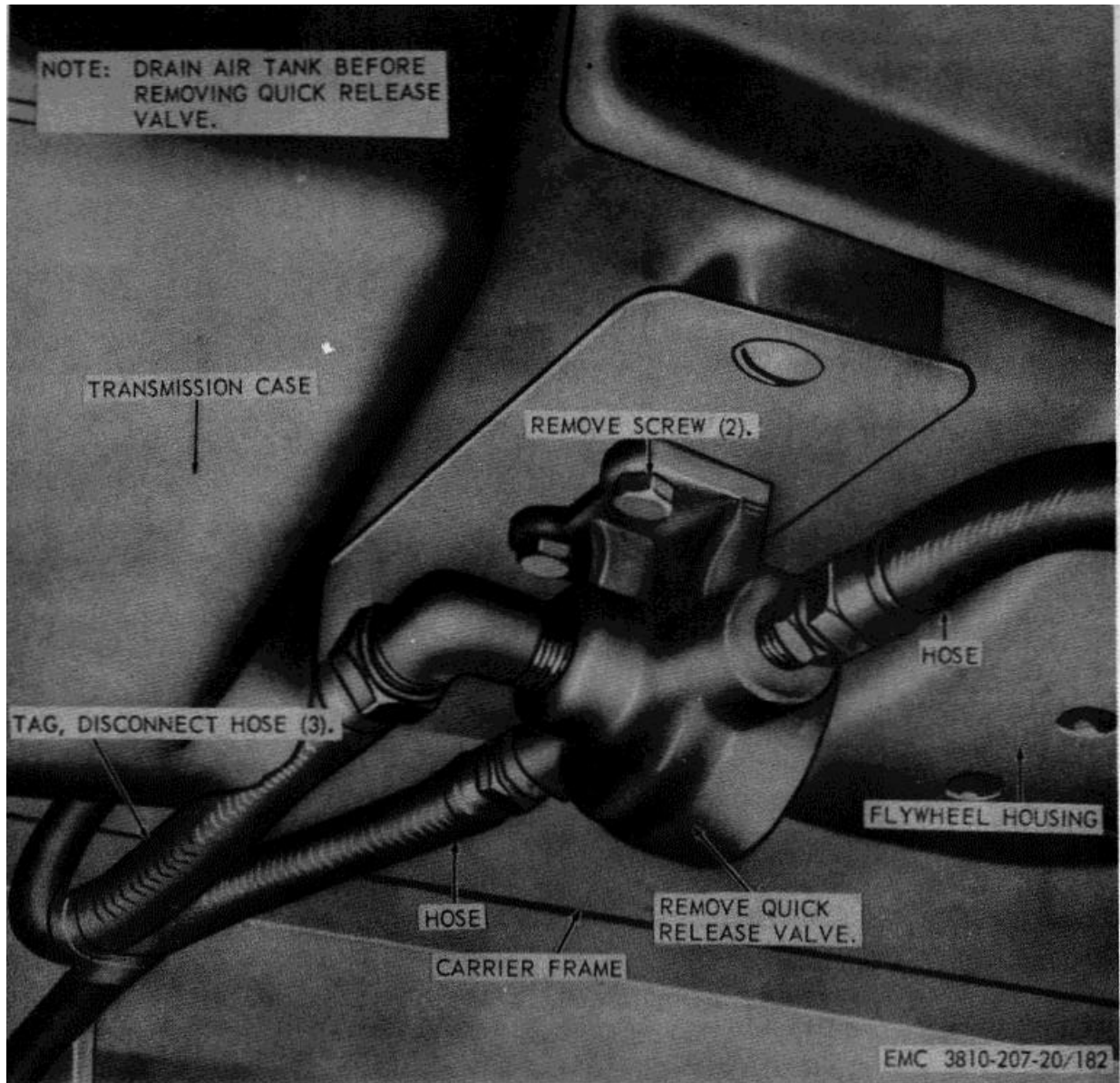


Figure 182. Quick release valve, removal and installation.

300. Relay Valve

a. Removal. Remove the relay valve as instructed on figure 183.

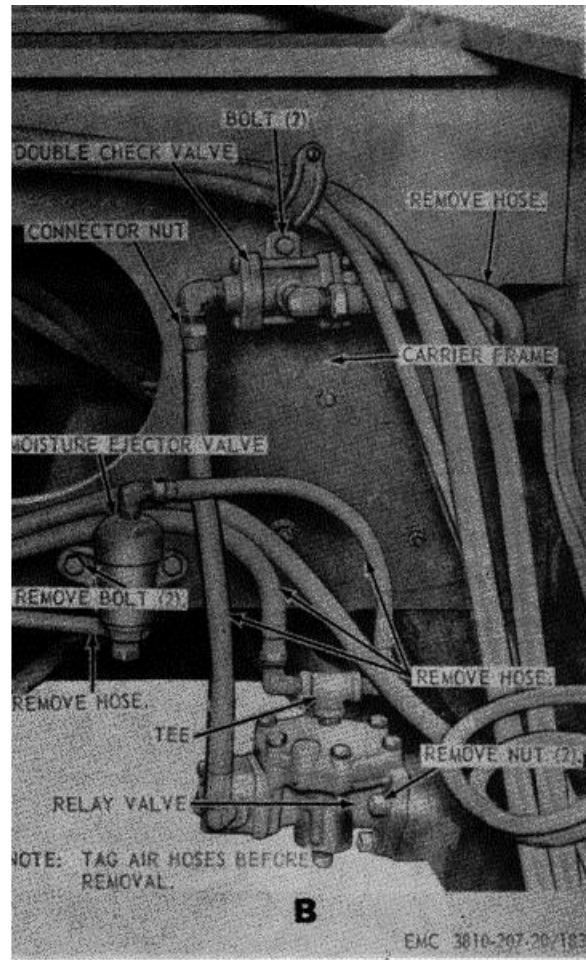
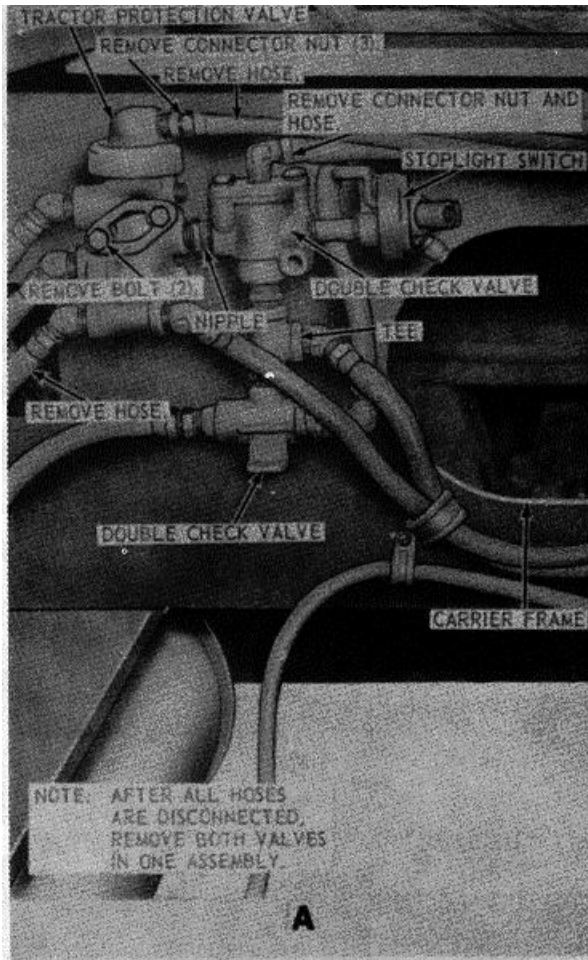
b. Cleaning and Inspection.

(1) Clean the relay valve with an approved cleaning solvent.

(2) Inspect the relay valve for proper operation. Replace a defective relay valve as necessary.

(3) Inspect all fittings and mounting hardware for stripped or damaged threads. Replace all parts as necessary.

c. Installation. Install the relay valve as illustrated on figure 183.



A-Airbrake protection valve, check valve, and stoplight switch, installed view.

B-Airbrake moisture ejector valve and relay valve, installed view.

Figure 183. Airbrake valves, removal and installation.

301. Wet and Dry Air Tank

a. *Removal.* Remove the wet and dry air tanks as instructed on figure 184.

b. *Cleaning and Inspection.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the wet and dry tanks for cracks, holes, or other damage. Replace a defective wet or dry tank.
- (3) Inspect all fittings and mounting hardware for stripped or damaged threads. Replace as necessary.

(4) Inspect all hoses for cracks, breaks, and deterioration. Replace all defective hoses as necessary.

c. *Installation.* Install the wet and dry air tanks as illustrated on figure 184.

302. Rear Air Manifold

a. *Removal.* Remove the rear air manifold as instructed on figure 185.

b. *Cleaning and Inspection.*

- (1) Clean all parts with an approved cleaning solvent.

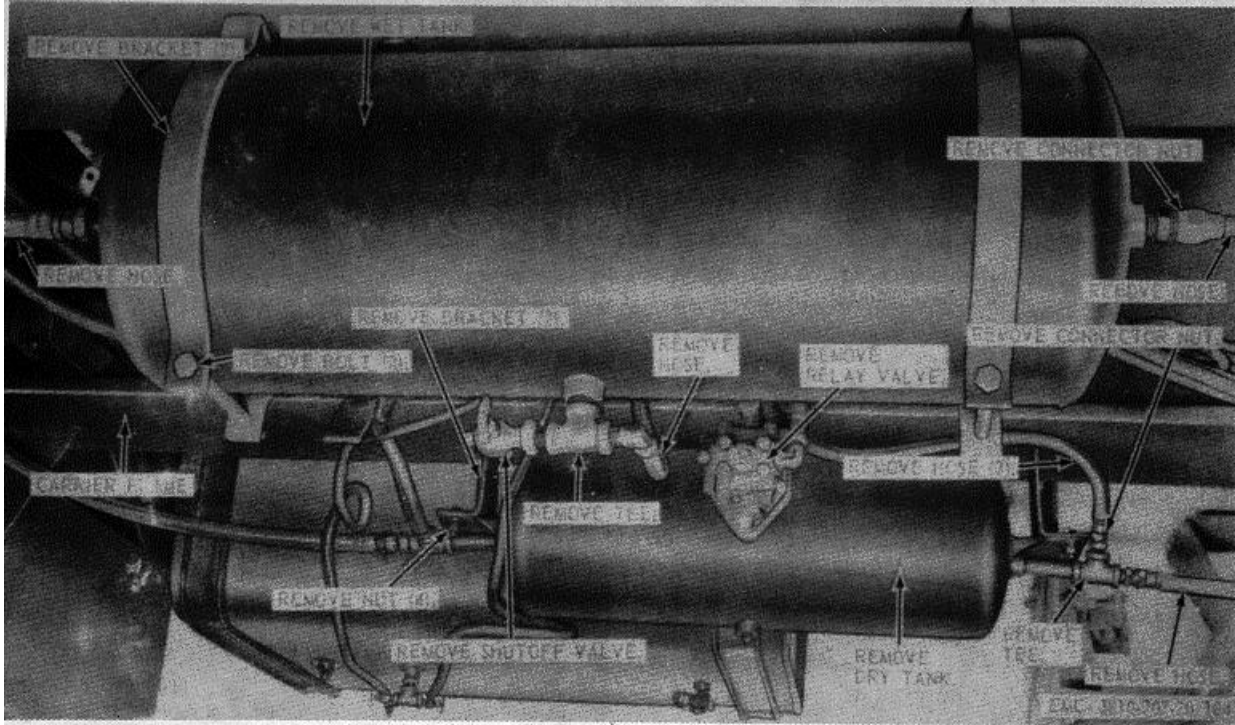


Figure 184. Wet and dry air tank, removal and installation.

- (2) Inspect the air manifold for proper operation. Replace a defective air manifold.
- (3) Inspect all fittings and mounting hardware for stripped or damaged threads. Replace as necessary.
- (4) Inspect all hoses for cracks, breaks, and deterioration. Replace as necessary.

c. Installation. Install the rear air manifold as illustrated on figure 185.

303. Air Emergency and Service Shutoff Valves

a. Removal. Remove the air emergency and service shutoff valves as instructed on figure 185.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the air emergency and service valves for proper operation. Replace defective valves as necessary.
- (3) Inspect all nipples and mounting hardware for stripped or damaged threads. Replace all defective parts as necessary.

- (4) Inspect the coupling for breaks and other damage. Replace coupling and defective parts.

c. Installation. Install the air emergency and service shutoff valves as illustrated on figure 185.

304. Front Brakeshoes

a. Brakeshoes Removal.

- (1) Remove the wheel and drum from brakeshoe assembly (par. 283).
- (2) Remove the front brakeshoes as instructed on figure 186.

b. Slack Adjuster Removal. Remove the slack adjuster as instructed on figure 187.

c. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent except the brake lining, and dry thoroughly.
- (2) Inspect the brake lining for excessive wear and glazing. Remove glazing by brushing with a wire brush.

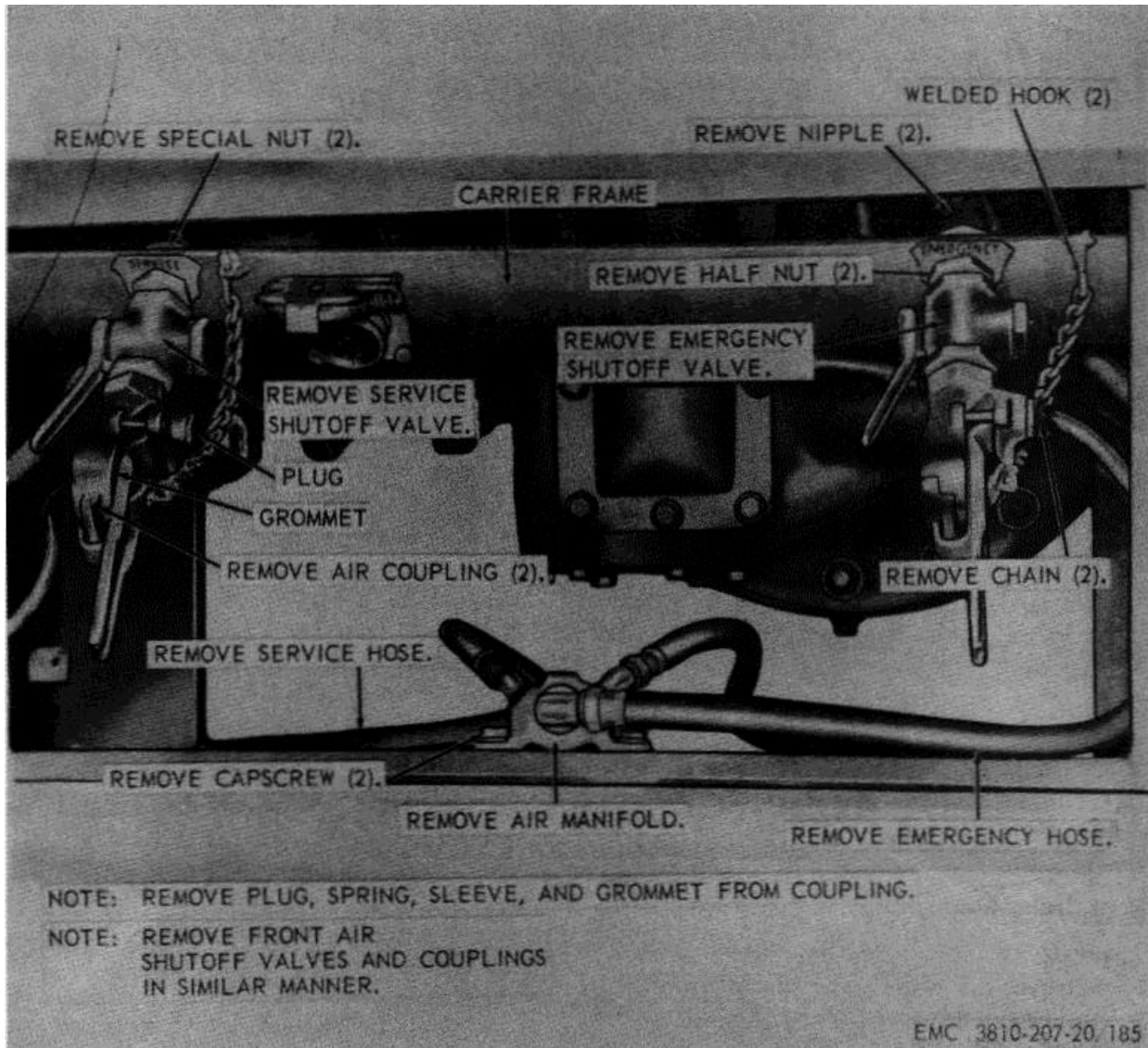


Figure 185. Rear air shutoff valves and air manifold, removal and installation.

- (3) Inspect the brakeshoes for cracks, breaks, and excessive pinhole wear. Replace damaged brakeshoes as necessary.
- (4) Inspect the springs for broken or weak tension and inspect all pins for wear. Replace all mounting hardware as necessary.
- (5) Inspect the slack adjuster for breaks, excessive wear, and other damage. Replace defective slack adjusters.

d. Installation.

- (1) Install the brakeshoes as illustrated on figure 186.
- (2) Install the drum and wheel (par. 283).
- (3) Install the slack adjusters as illustrated on figure 187.

e. Brake Adjustment. Adjust the brakes as instructed on figure 187.

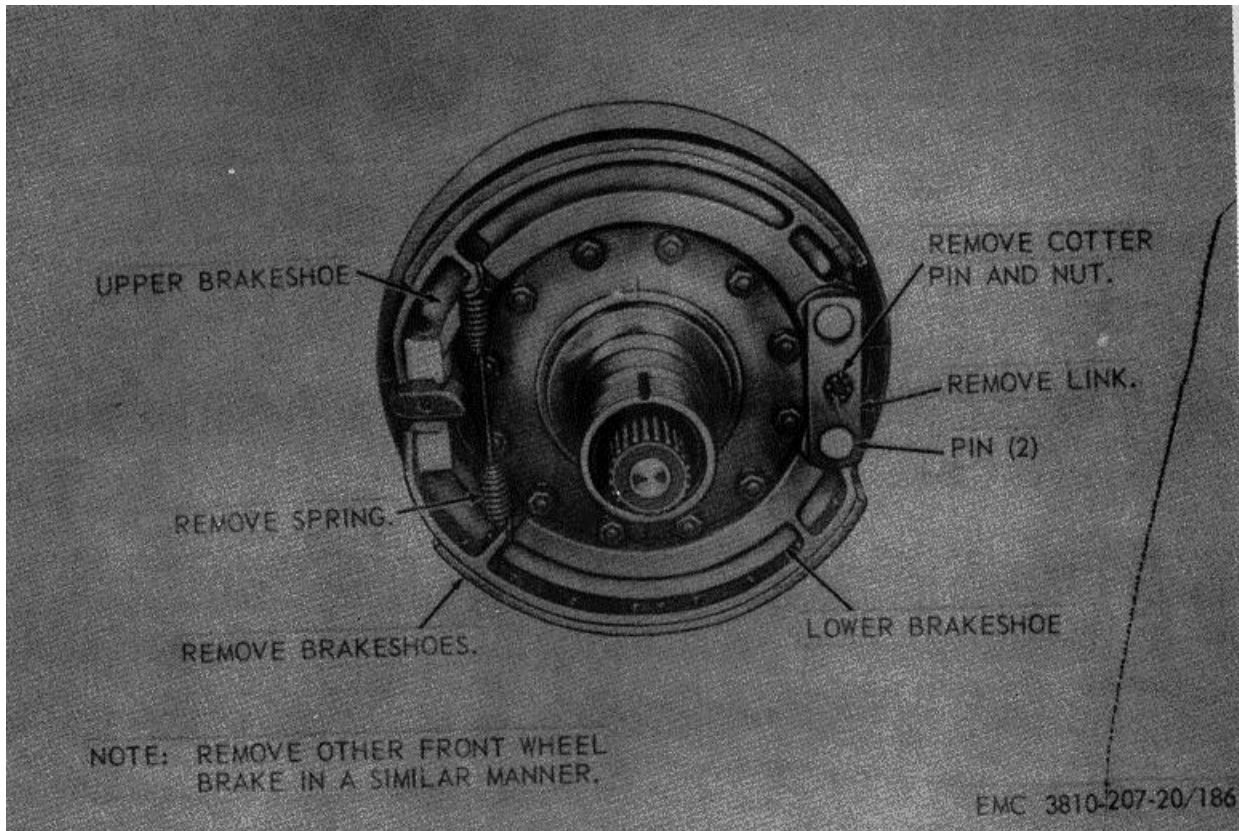


Figure 186. Front brakeshoes, removal and installation.

305. Rear Brakeshoes

a. Removal.

- (1) Remove the wheel and drum from brake assembly (par. 285).
- (2) Remove the rear brakeshoes as instructed on figure 188.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent except the brake lining, and dry thoroughly.
- (2) Inspect the brake lining for excessive wear and glazing. Remove the glazing by brushing with a wire brush.

- (3) Inspect the brakeshoes for cracks, breaks, and excessive pinhole wear. Replace damaged brakeshoes as necessary.
- (4) Inspect the spring for tension and inspect all pins for wear. Replace all mounting hardware as necessary.

c. Installation.

- (1) Install the rear brakeshoes as illustrated on figure 188.
- (2) Install the drum and wheel (par. 285).

d. Adjustment. Adjust the rear brakeshoes in a similar manner as for front brakeshoes (par. 304).

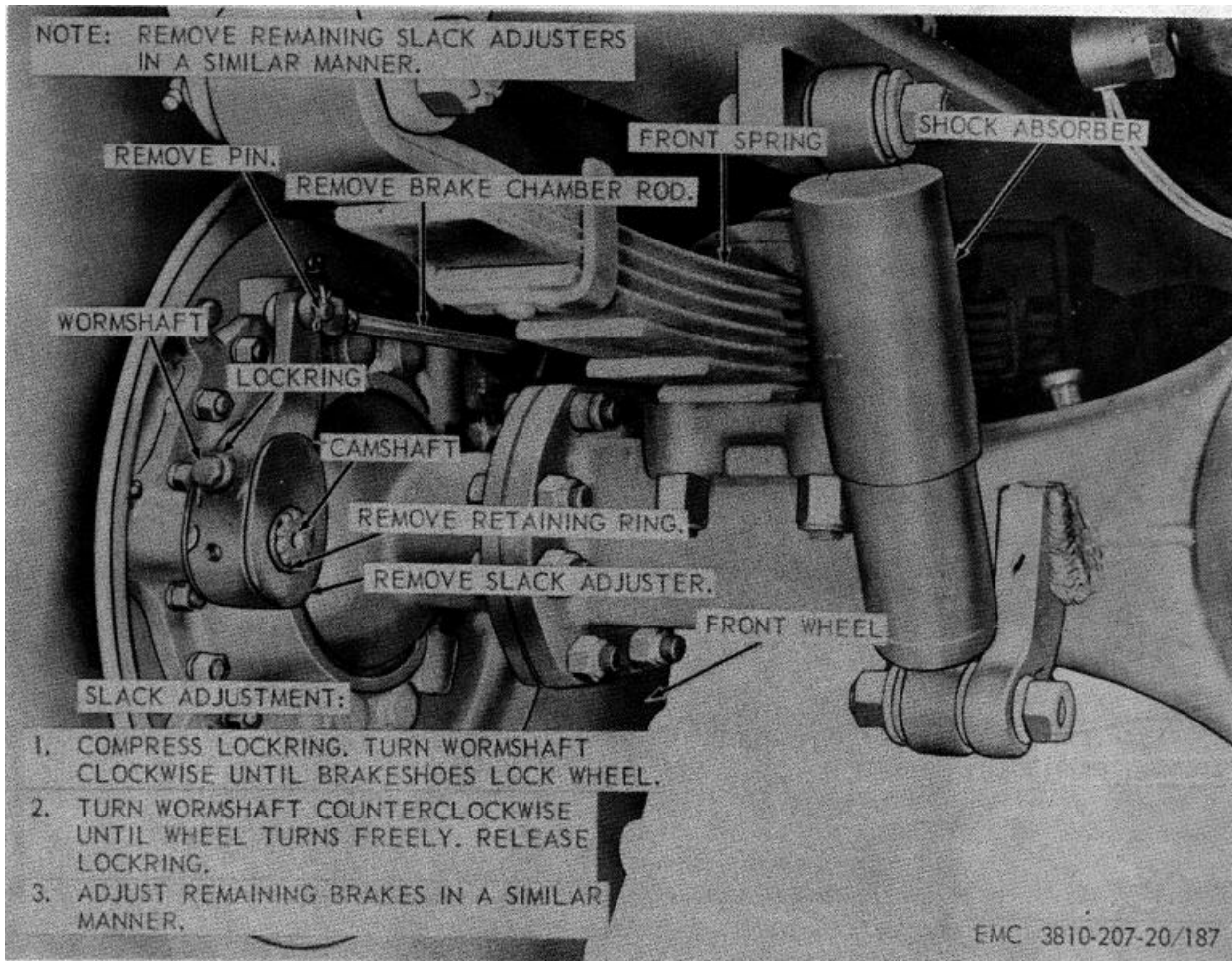


Figure 187. Slack adjuster removal, installation, and adjustment.

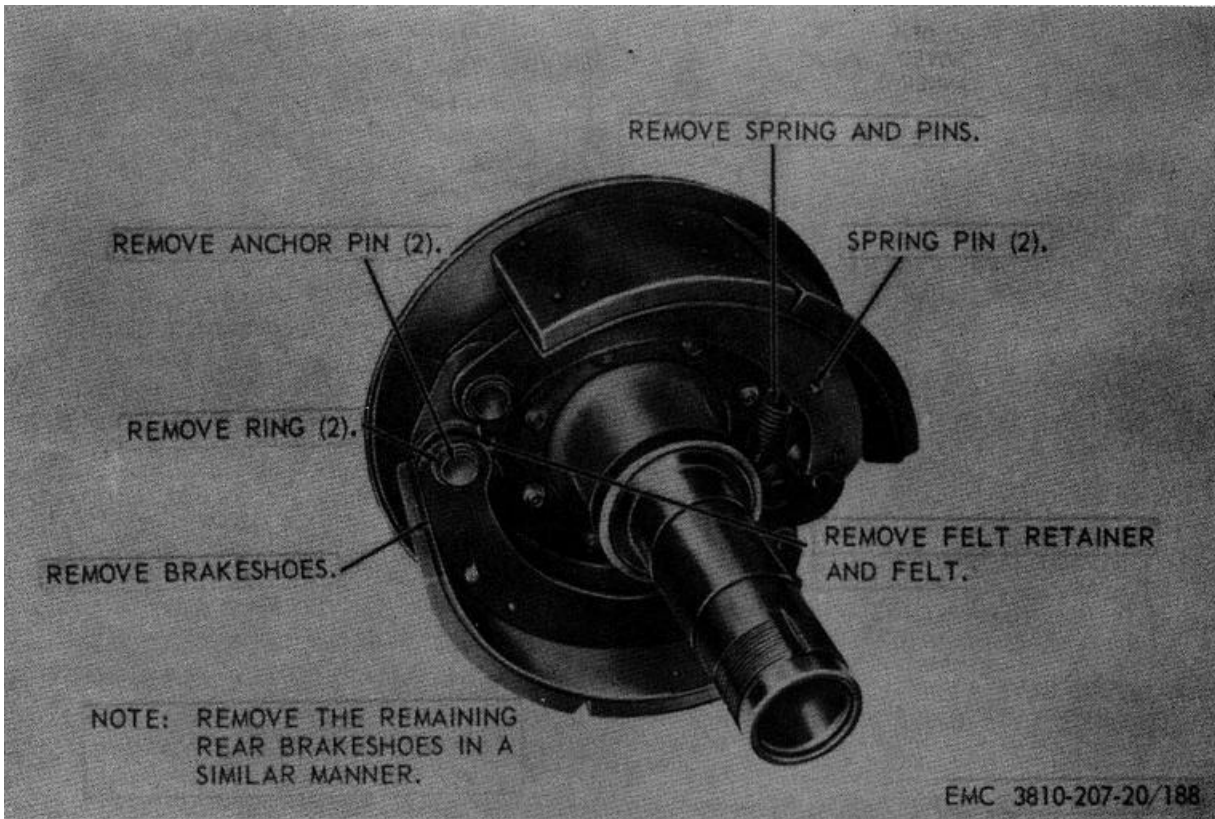


Figure 188. Rear brakeshoes, removal and installation.

Section IV. PROPELLER SHAFTS AND CONTROLS

306. General

The carrier is equipped with four propeller shafts. Each propeller shaft is equipped with two universal joints and one slip joint. Each has two flanged yokes for connecting to driving and driven components. The propeller shafts are of tubular-type construction.

307. Transmission-to-Transfer Case Propeller Shaft

a. Removal.

- (1) Remove the transmission-to-transfer case propeller shaft in the numerical sequence as instructed on figure 189.
- (2) Remove the rear axle, the tandem, and the front axle propeller shafts in a similar manner.

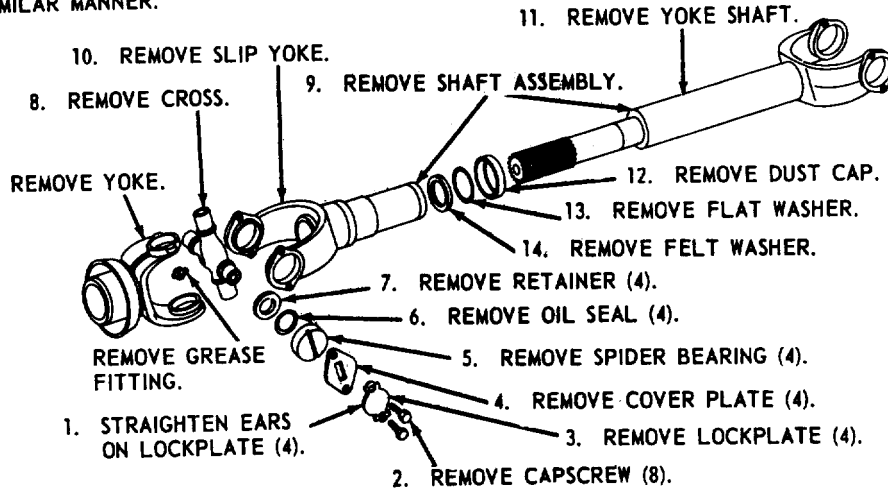
b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the spider bearings for excessive wear and other damage. Replace spider bearings as necessary.
- (3) Inspect all other parts for breaks, cracks, and other damage. Replace defective parts as necessary.

c. Installation.

- (1) Install the transmission-to-transfer case propeller shaft in the reverse of the numerical sequence as illustrated on figure 189.
- (2) Install the front axle, the tandem, and the rear axle propeller shaft in a similar manner.
- (3) Service propeller shafts (LO 5-3810-207-20).

NOTE: OPPOSITE END OF SHAFT IS REMOVED IN A SIMILAR MANNER.



NOTE: THE SLIP YOKE AND YOKE SHAFT ARE MARKED WITH ARROWS FOR ALINEMENT AT REASSEMBLY.

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Figure 189. Propeller shaft and universal joint, removal and disassembly, exploded view.

308. Transmission Control Rod

a. *Removal and Disassembly.* Remove and disassemble the transmission control rods in the numerical sequence as illustrated on figure 190.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for excessive wear, bends, breaks, and other damage. Replace or repair all defective parts as necessary.

c. *Reassembly and Installation.*

- (1) Reassemble and install the control rod assembly in the reverse of the numerical sequence as illustrated on figure 190.

(2) Service the propeller shafts (LO 5 3810-207-20).

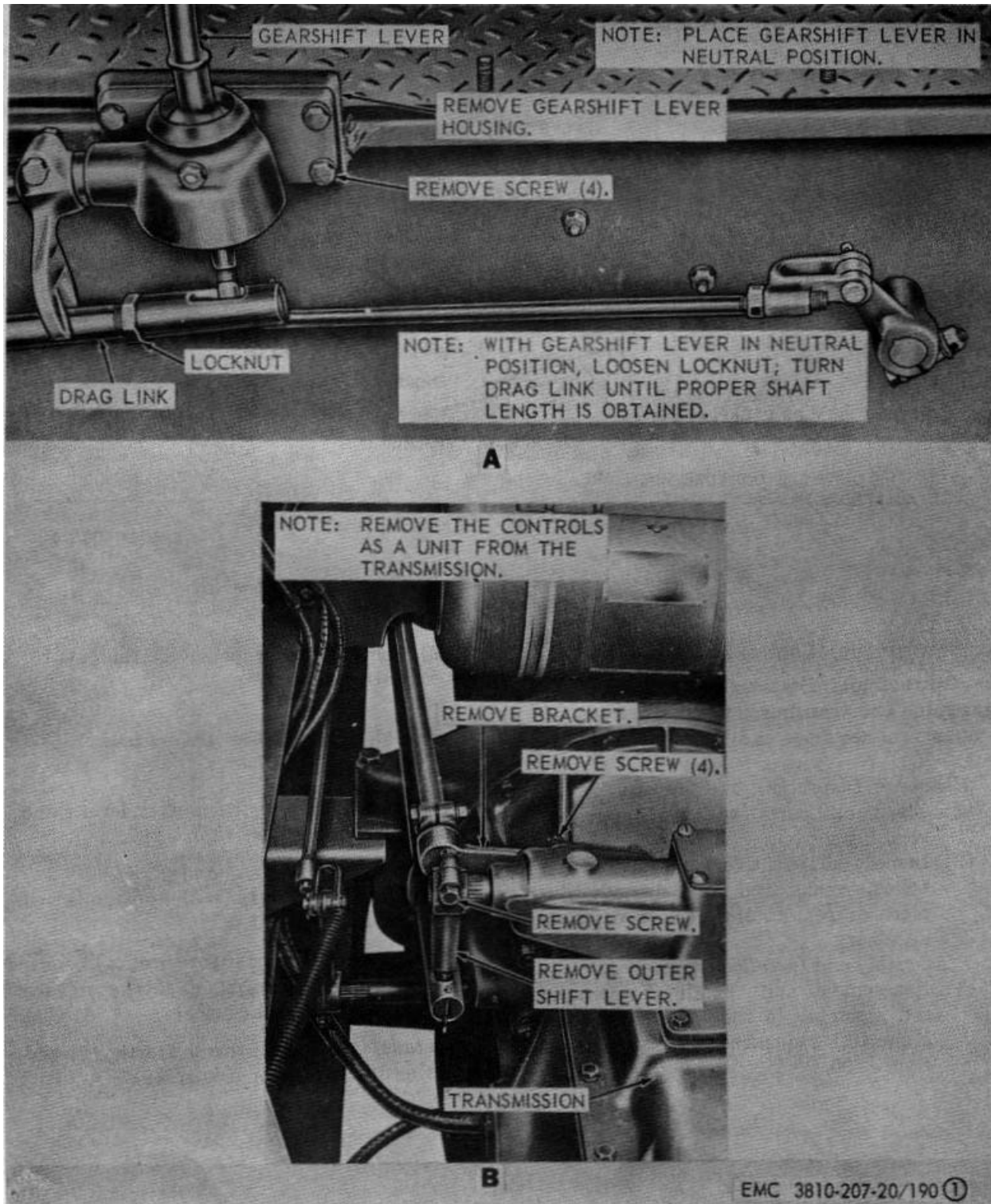
309. Transfer Case Shifter Levers and Controls

a. *Removal.* Remove the shifter levers and controls as instructed on figure 191.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for breaks, bends, and other damage. Repair or replace all parts as necessary.

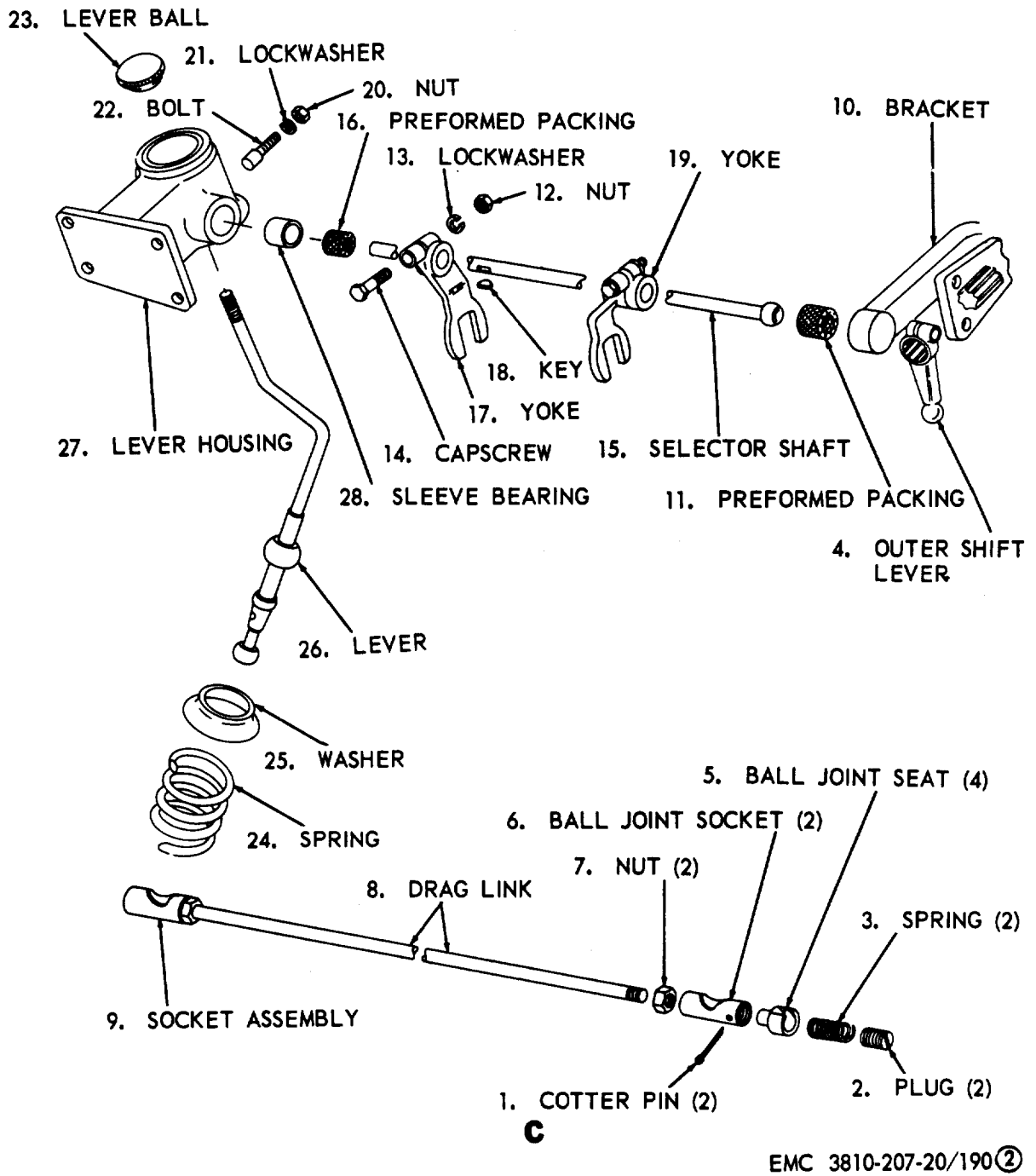
c. *Installation.* Install the shifter levers and controls as illustrated on figure 191.



A—Transmission control lever

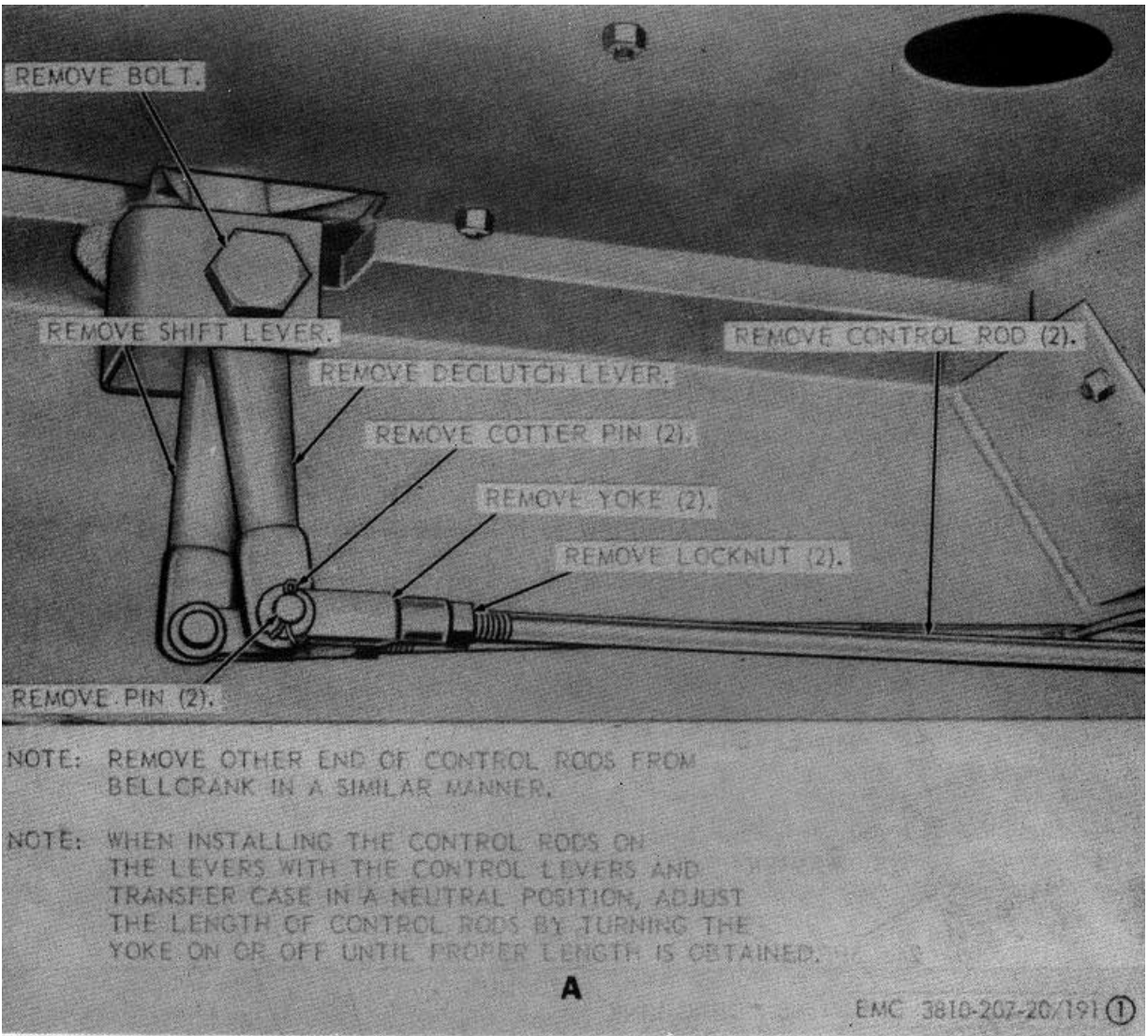
B—Transmission control rod assembly

Figure 190. Transmission control rod assembly.



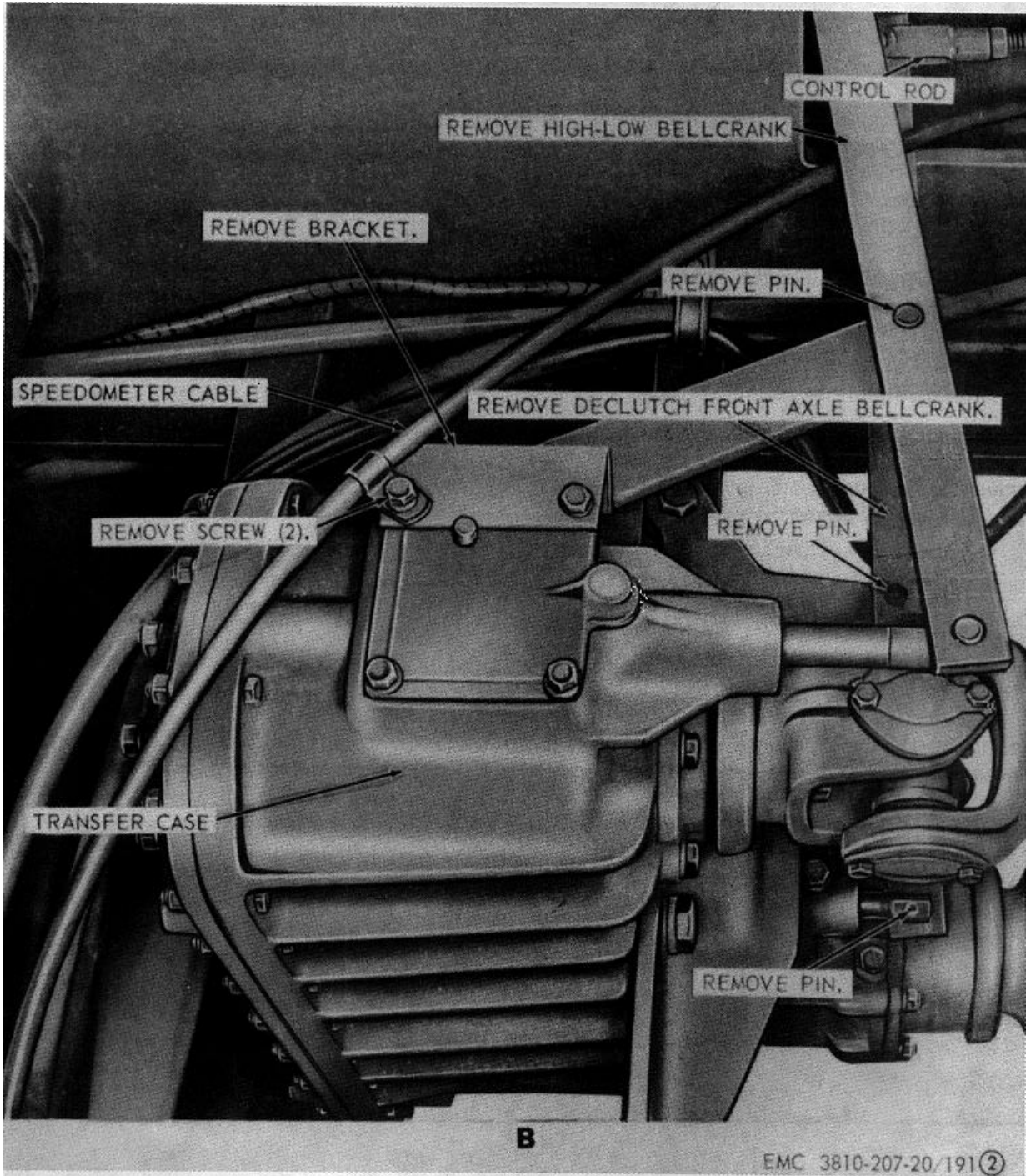
C—Transmission controls, exploded view.

Figure 190—Continued.



A—Transfer case levers and control rods

Figure 191. Transfer case levers, control rods, and bellcranks, removal and installation.



B—Transfer case bellcranks

Figure 191—Continued.

Section V. CARRIER FRAME**310. General**

The carrier frame is an all welded-steel structure with crossmembers, supporting brackets, and front outrigger frame welded integrally with the frame. The rear outrigger assembly is mounted at the back of the frame and is removable. The carrier frame supports and carries the crane and all components. A pintle hook is mounted on the rear outrigger assembly for towing purposes.

311. Pintle Hook

a. Removal and Disassembly. Remove and disassemble the pintle hook in the numerical sequence as instructed on figure 192.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective conditions.
- (3) Repair or replace damaged parts as necessary.

c. Reassembly and Installation. Reassemble and install the pintle hook in the reverse of the numerical sequence as illustrated on figure 192.

312. Rear Outrigger Assembly

a. Removal.

- (1) Remove the floats from the rear outrigger assembly (TM 5-3810-207-10).
- (2) Remove the rear outrigger assembly from the frame (TM 53810-207-10).

b. Disassembly. Disassemble the rear outrigger assembly and the front outrigger beams as instructed on figure 193.

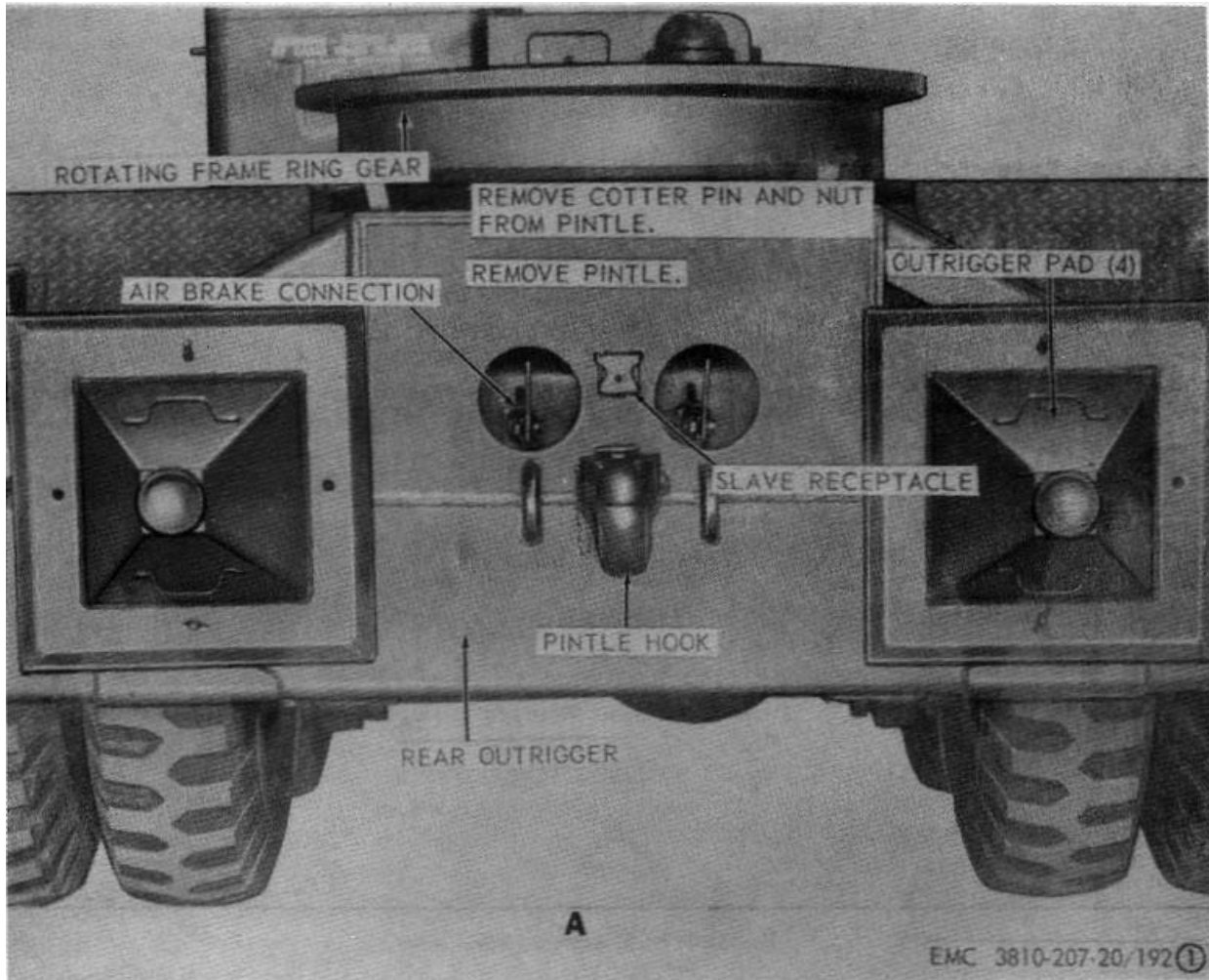
c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect all parts for defective conditions
- (3) Repair or replace damaged parts as necessary.

d. Reassembly. Reassemble the front outrigger beams and the rear outrigger assembly as illustrated on figure 193.

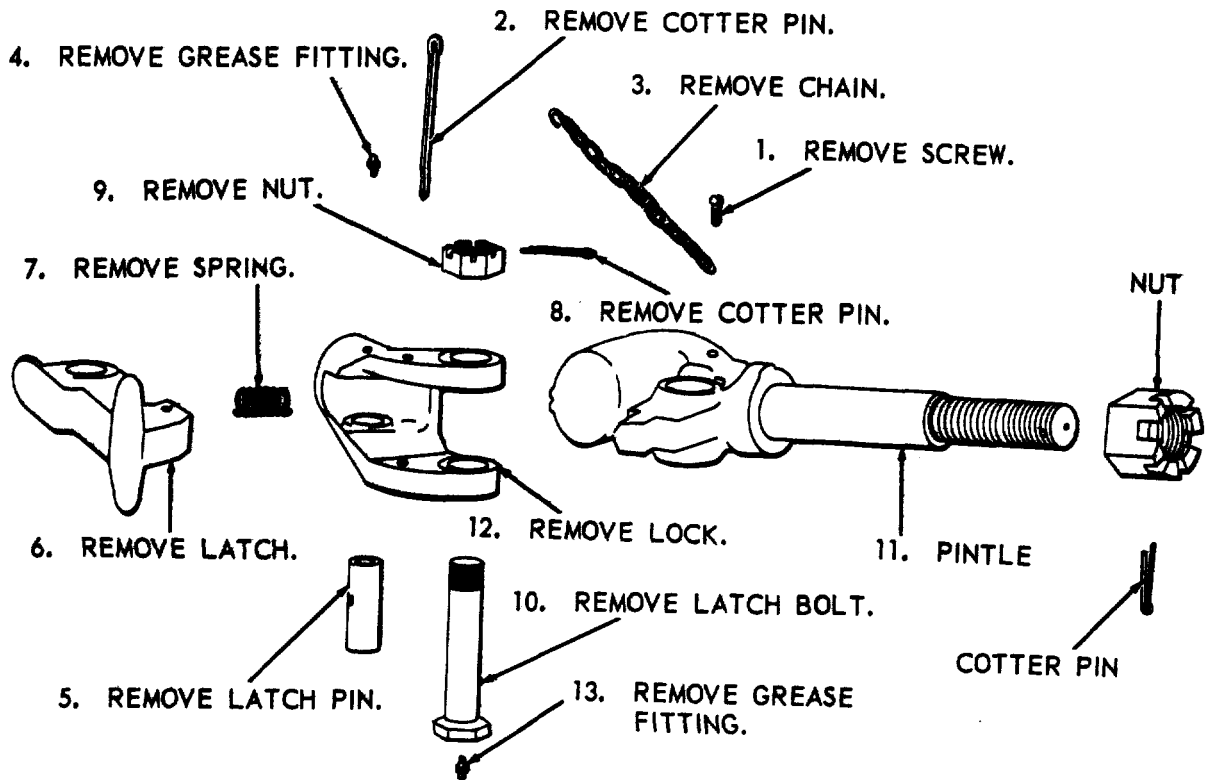
e. Installation.

- (1) Install the rear outrigger assembly on the carrier frame (TM 53810-207-10).
- (2) Install the floats on the rear outrigger assembly (TM 53810-207-10).



A—Pintle hook, installed view

Figure 192. Pintle hook assembly.

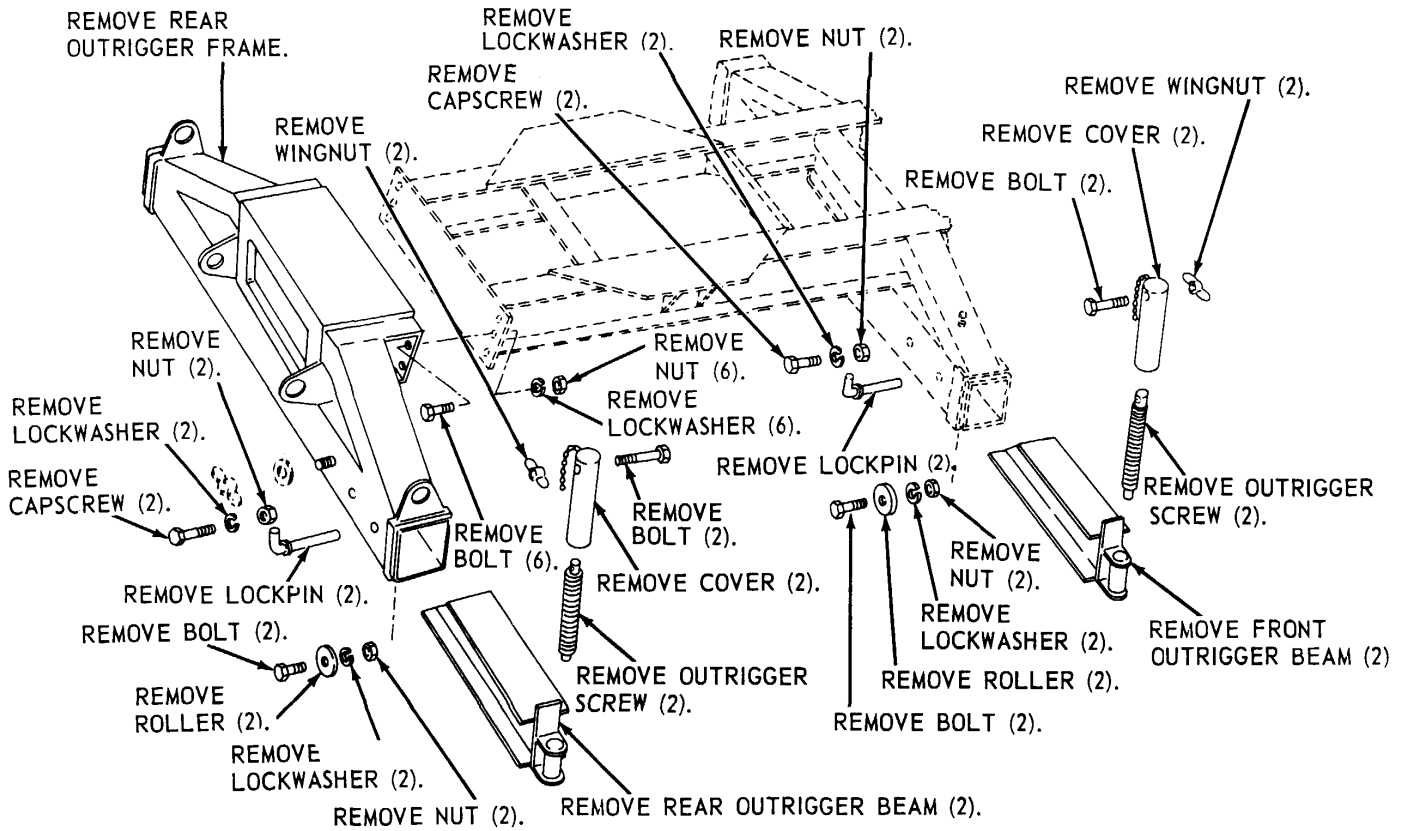


B

EMC 3810-207-20/192 ②

B—Pintle hook, exploded view

Figure 19—Continued.



EMC 3810-207-20/193

Figure 193. Outrigger assembly, exploded view.

Section VI. CARRIER CAB AND FENDERS**313. General**

The pressed steel-constructed carrier cab is mounted on the left-front side of the carrier frame. It is designed to accommodate only the driver. It can be removed as a complete unit. The front fenders are belted in place and can be removed, if necessary, to facilitate overhaul of the carrier. The rear fenders are bolted to the side rails. A heavy-duty guard shields the front of the radiator. A sandshield is bolted to the right-front fender to protect the battery box and hood assembly.

314. Windshield, Side Triangular Glass, and Rear Glass

a. Removal. The windshield, side triangular glass, and rear glass are removed in the same manner as the door window and windshield glass in the crane (par. 122).

b. Installation. The windshield, side triangular glass, and rear glass are installed in the same manner as the door window and windshield glass in the crane (par. 122).

315. Side Window Glass

a. Removal. Remove the side window glass as instructed on figure 194.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the window mounting gasket for damage and inspect glass for cracks and chipped edges.
- (3) Replace damaged parts as necessary.

c. Installation. Install the side window glass as illustrated on figure 194.

316. Engine Access Panel

a. Removal. Remove the engine access panel as instructed on figure 195.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the access panel for cracks, bends, and dents. Weld all cracks. Replace an unrepairable panel.
- (3) Repair or replace damaged parts as necessary.

c. Installation. Install the engine access panel as illustrated on figure 195.

317. Operator's Seat

a. Removal. Remove the operator's seat from the cab as instructed on figure 196.

b. Disassembly. Disassemble the operator's seat in the numerical sequence as instructed on figure 197.

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent, except the cushions. Use soap and water for cleaning cushions.
- (2) Inspect the cushions for torn or ripped covers and broken springs. Replace a damaged cushion as necessary.
- (3) Inspect the seat frame and suspension for cracks, breaks, and bends. Straighten bends and weld all cracks or breaks.
- (4) Repair or replace all defective parts as necessary.

d. reassembly. Reassemble the operator's seat in the reverse of the numerical sequence as illustrated on figure 197.

e. Installation. Install the operator's seat as illustrated on figure 196.

318. Cab Operator's Door

a. Removal. Remove the carrier cab operator's door as instructed on figure 198.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect door for bends, dents, or broken hinges. Replace a defective door as necessary.
- (3) Repair or replace damaged parts as necessary.

c. Installation. Install the carrier cab operator's door as illustrated on figure 198.

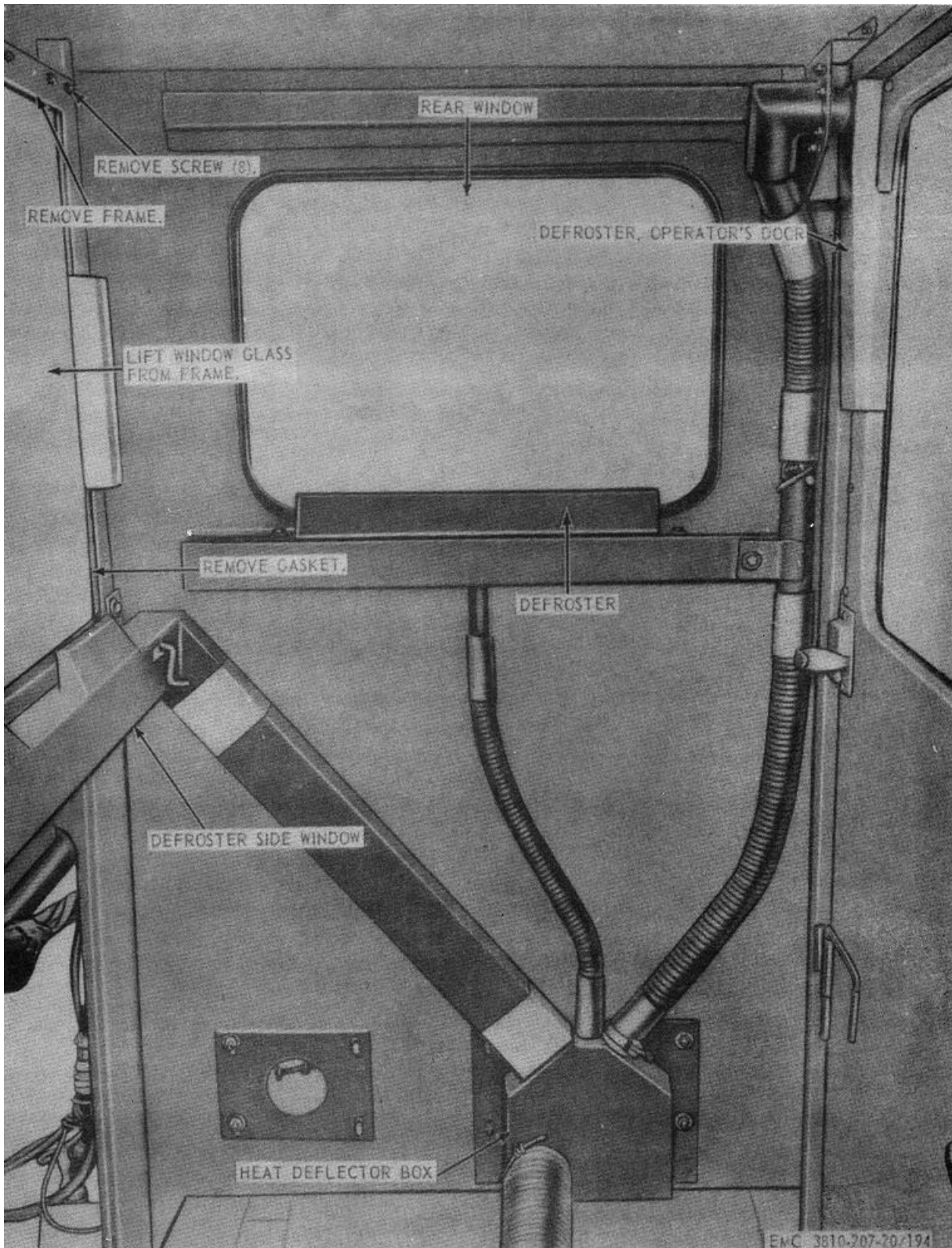


Figure 194. Side window glass, removal and installation.



Figure 195. Engine access panel, removal and installation.

319. Cab Floorboard

a. Removal.

- (1) Remove floormat.
- (2) Remove the fourteen screws mounting the floorboard to the frame.
- (3) Remove the floorboard from the frame.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.

- (2) Inspect floorboard for bends, cracks, rust, and other damage.
- (3) Replace or repair all defective parts as necessary.

c. Installation.

- (1) Position the floorboard on the frame.
- (2) Install the fourteen screws in the floorboard, securing the floorboard to the frame.
- (3) Install the floormat.

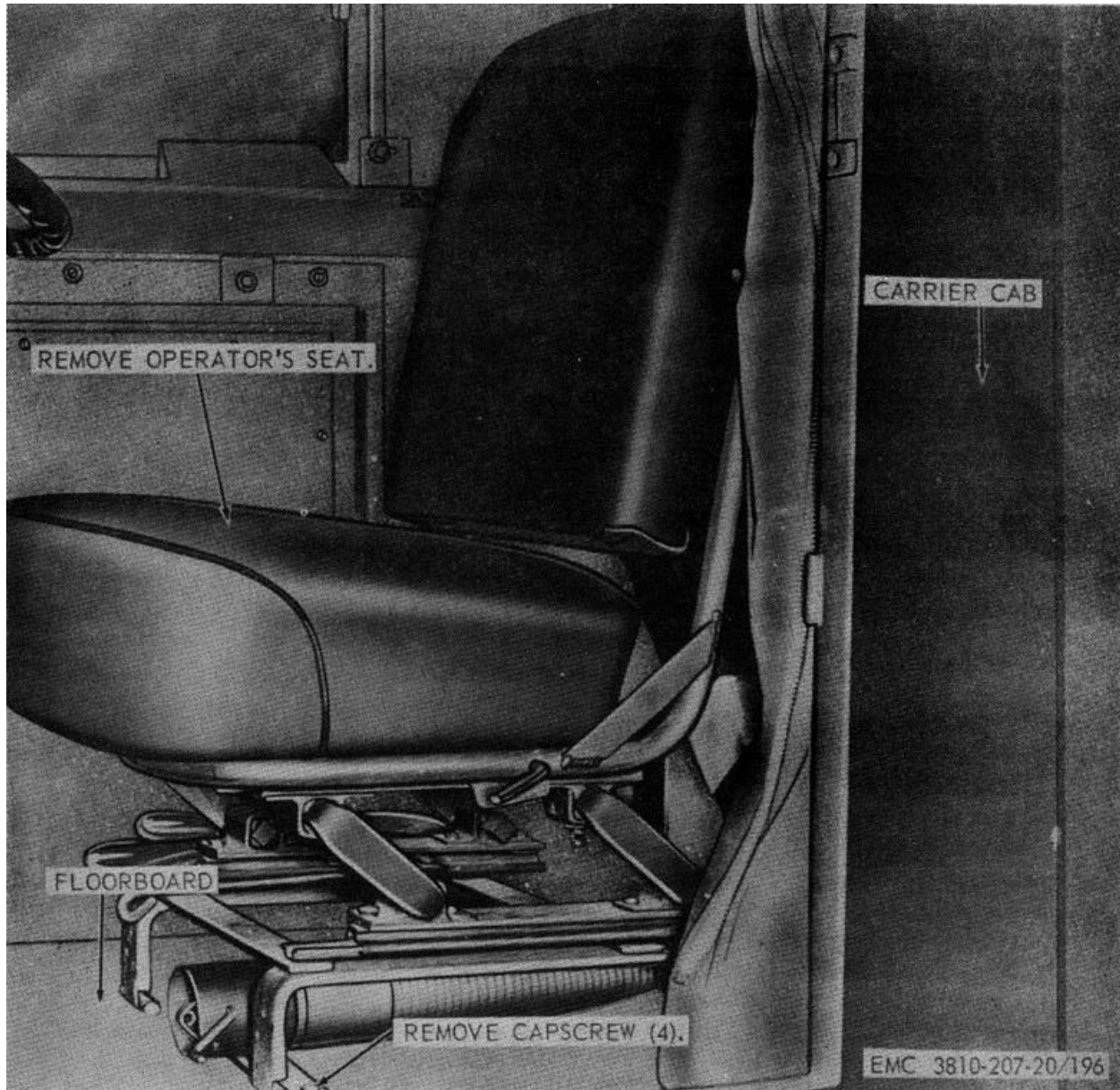


Figure 196. Operator's seat, removal and installation

320. Sand Shield

a. *Removal.* Remove the sand shield as instructed on figure 199.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the sand shield for breaks, cracks, or bends. Replace a damaged sand shield as necessary.

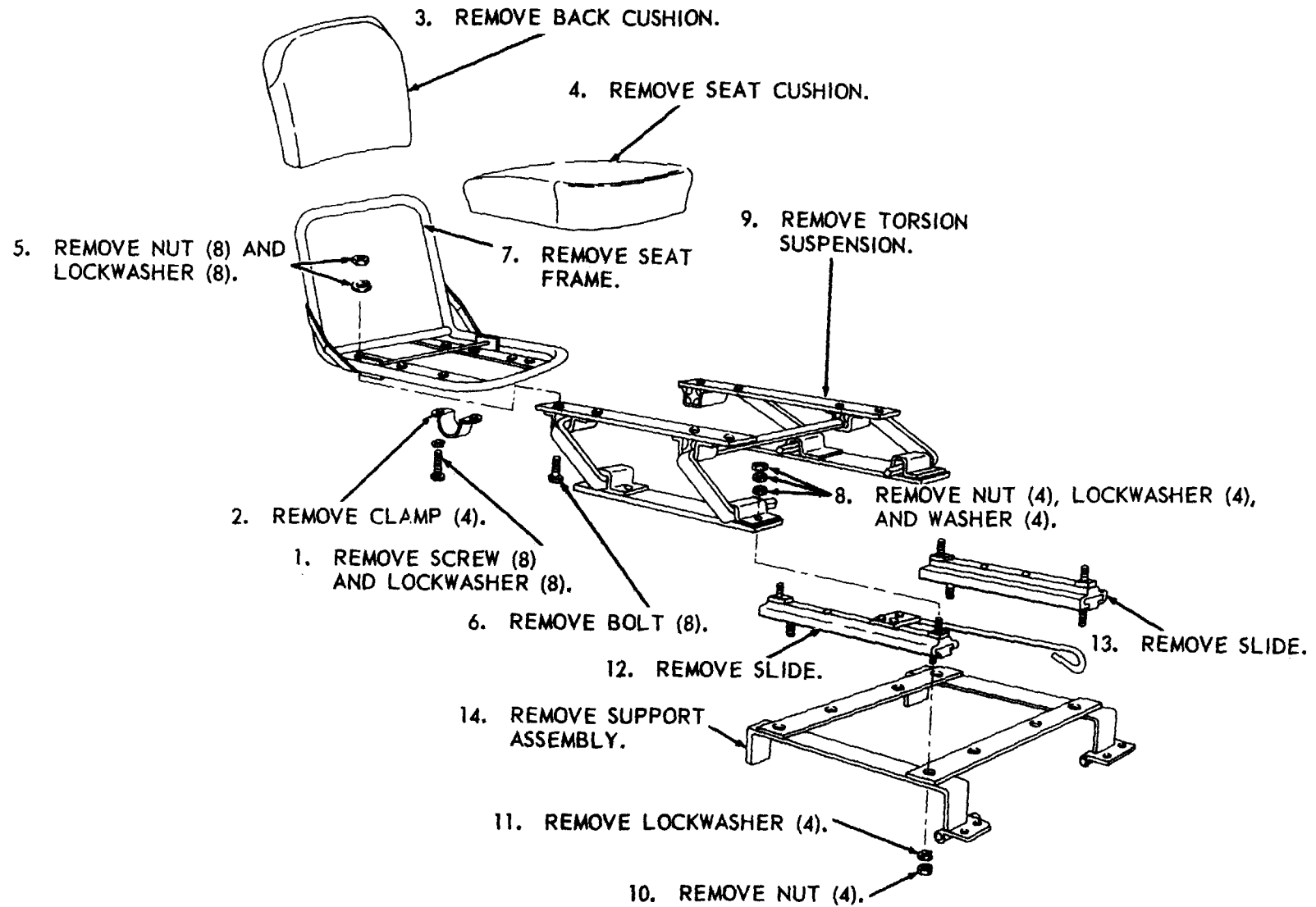
(3) Repair or replace damaged parts as necessary.

c. *Installation.* Install the sand shield as illustrated on figure 199.

321. Engine Hood and Side Panel

a. *Removal.*

- (1) Remove the battery cables and box (par. 209).



EMC 3810-207-20/197

Figure 197. Operator's seat, disassembly and reassembly.

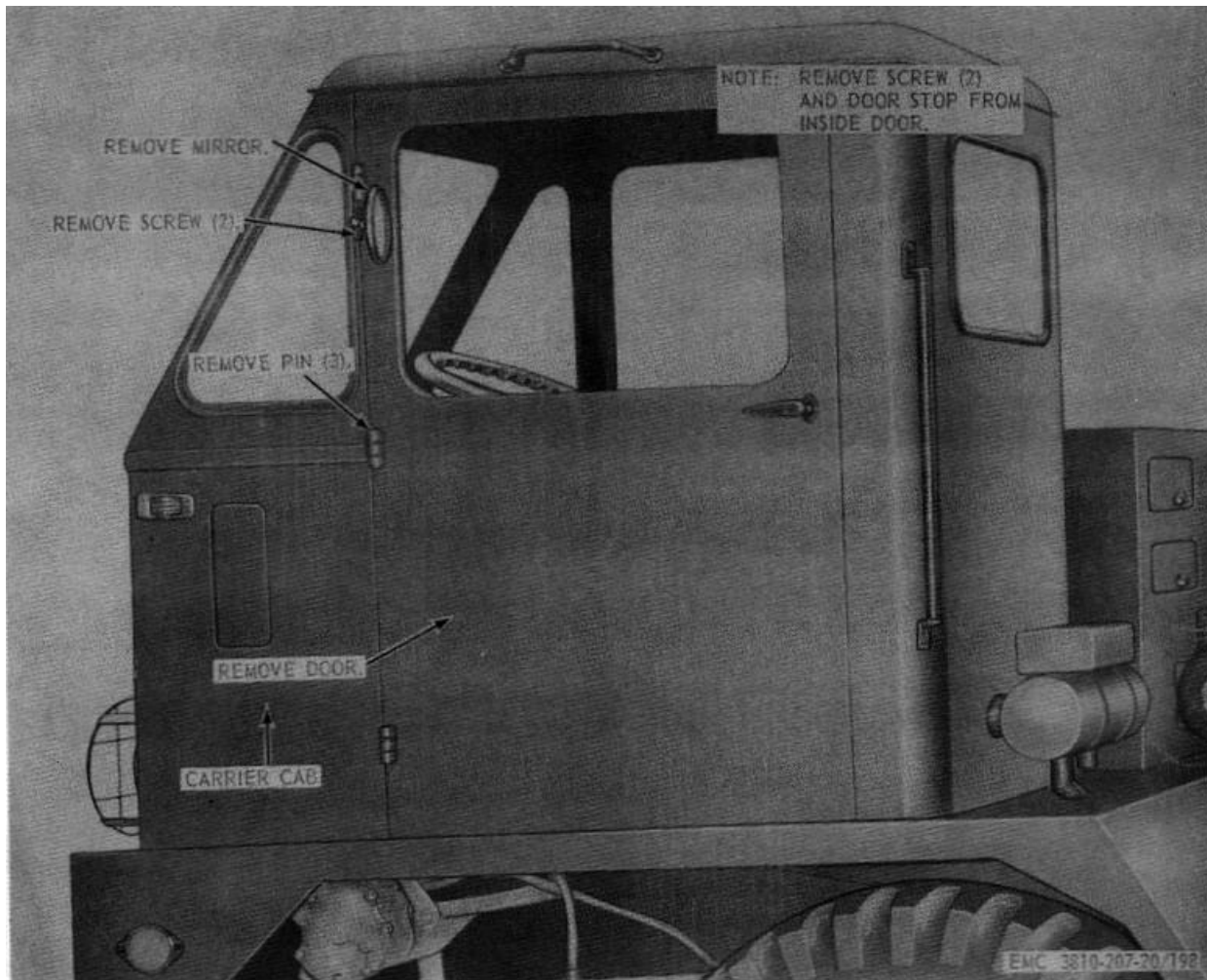


Figure 198. Carrier cab operator's door, removal and installation.

- (2) Remove the engine hood and side panel as instructed on figure 200.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the hood panels for cracks or dents. Pound out dents and weld all cracks as necessary.
- (3) Repair or replace damaged parts as necessary.

c. Installation.

- (1) Install the engine hood and side panel as illustrated on figure 200.
- (2) Install the battery box and cables (par. 209).

322. Right-Front Fender

a. Removal.

- (1) Remove the battery box (par. 209).
- (2) Remove the engine hood and side panel (par. 321).
- (3) Remove the sand shield (par. 320).
- (4) Remove the right-front fender as instructed on figure 201.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the fender for damage. Replace a damaged fender.

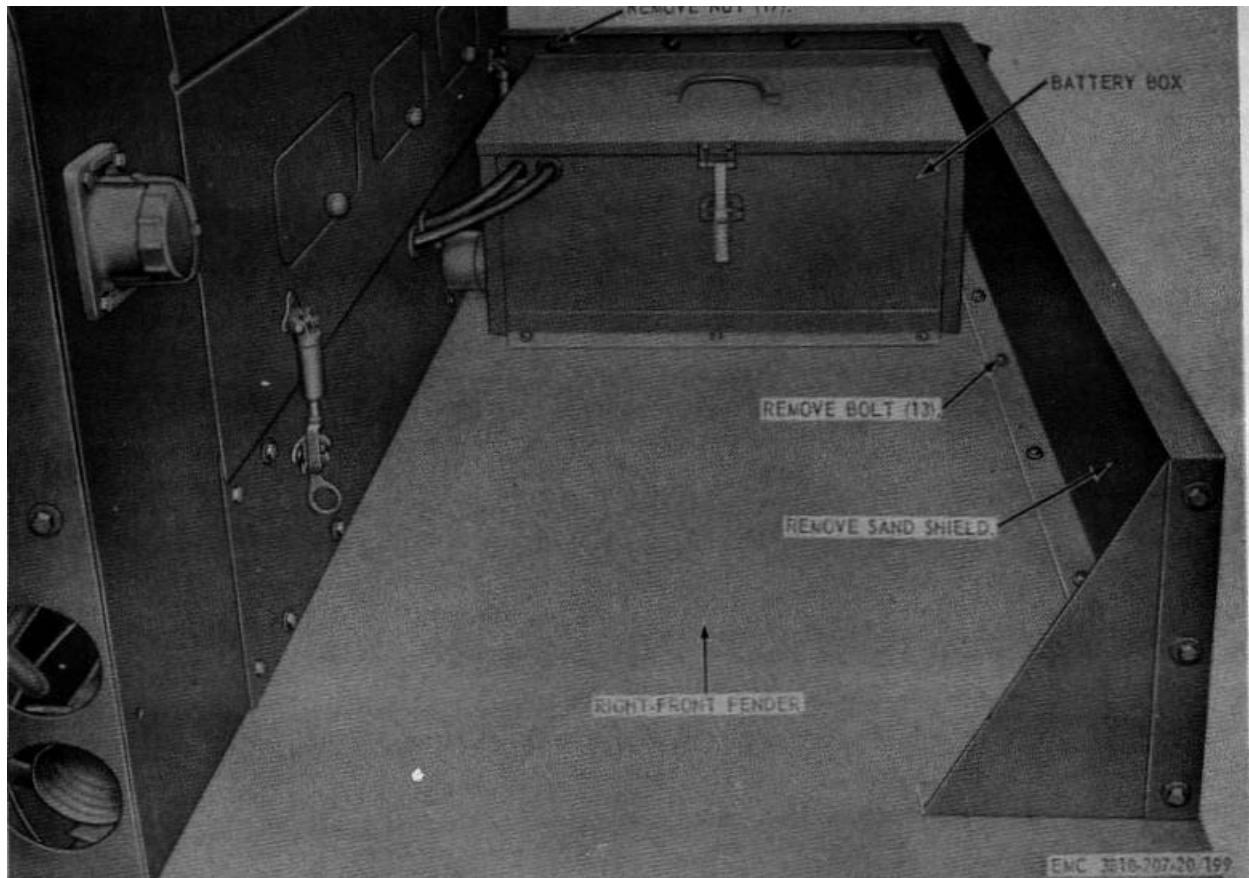


Figure 198. Sand shield removal and installation.

- (3) Inspect the braces for cracks or breaks. Replace a damaged brace.
- (4) Repair or replace damaged parts as necessary.

Note.

Minor bends or dents may be straightened and breaks welded.

c. Installation.

- (1) Install the right-front fender as illustrated on figure 201.
- (2) Install the sand shield (par. 320).
- (3) Install the engine hood and side panel (par. 321).
- (4) Install the battery box (par. 209).

323. Rear Fenders

a. Removal. Remove the carrier rear fenders as instructed on figure 202.

b. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved cleaning solvent.
- (2) Inspect the fender for cracks, breaks, or bends. Replace a damaged fender.
- (3) Repair or replace damaged parts as necessary.

c. Installation. Install the carrier rear fenders as illustrated on figure 202.

324. Cab and Left-Front Fender

a. Inspection. Inspect the cab and left-front fender for breaks, cracks, dents, holes, rust, and broken braces.

b. Repair. Weld all cracks, breaks, holes, and broken braces of the cab and left-front fender. Remove all dents and refer to TM 92851 for painting a repaired cab or fender.

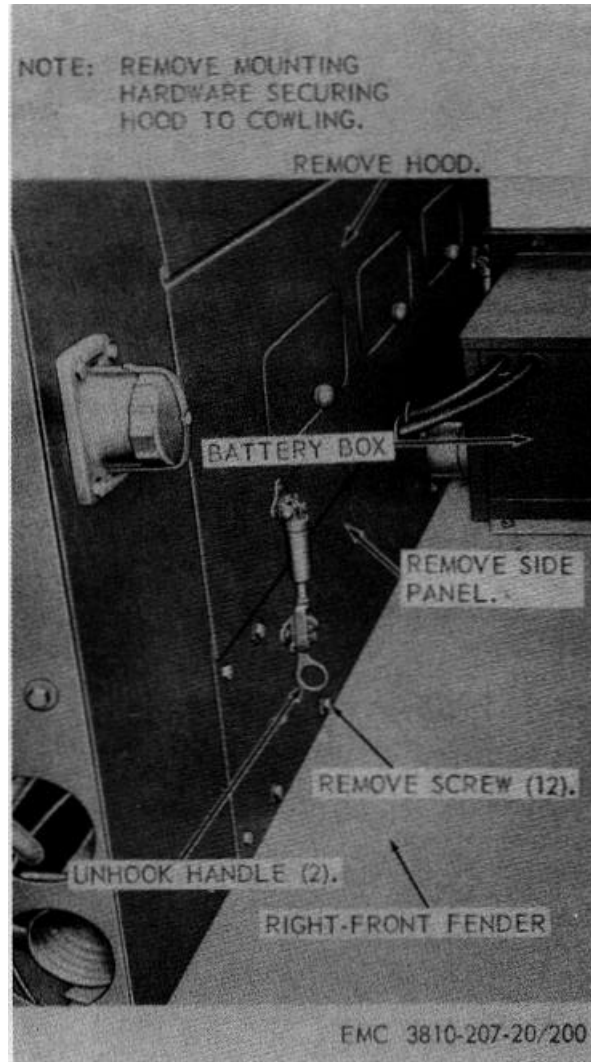


Figure 200. Engine hood and side panel, removal and installation.

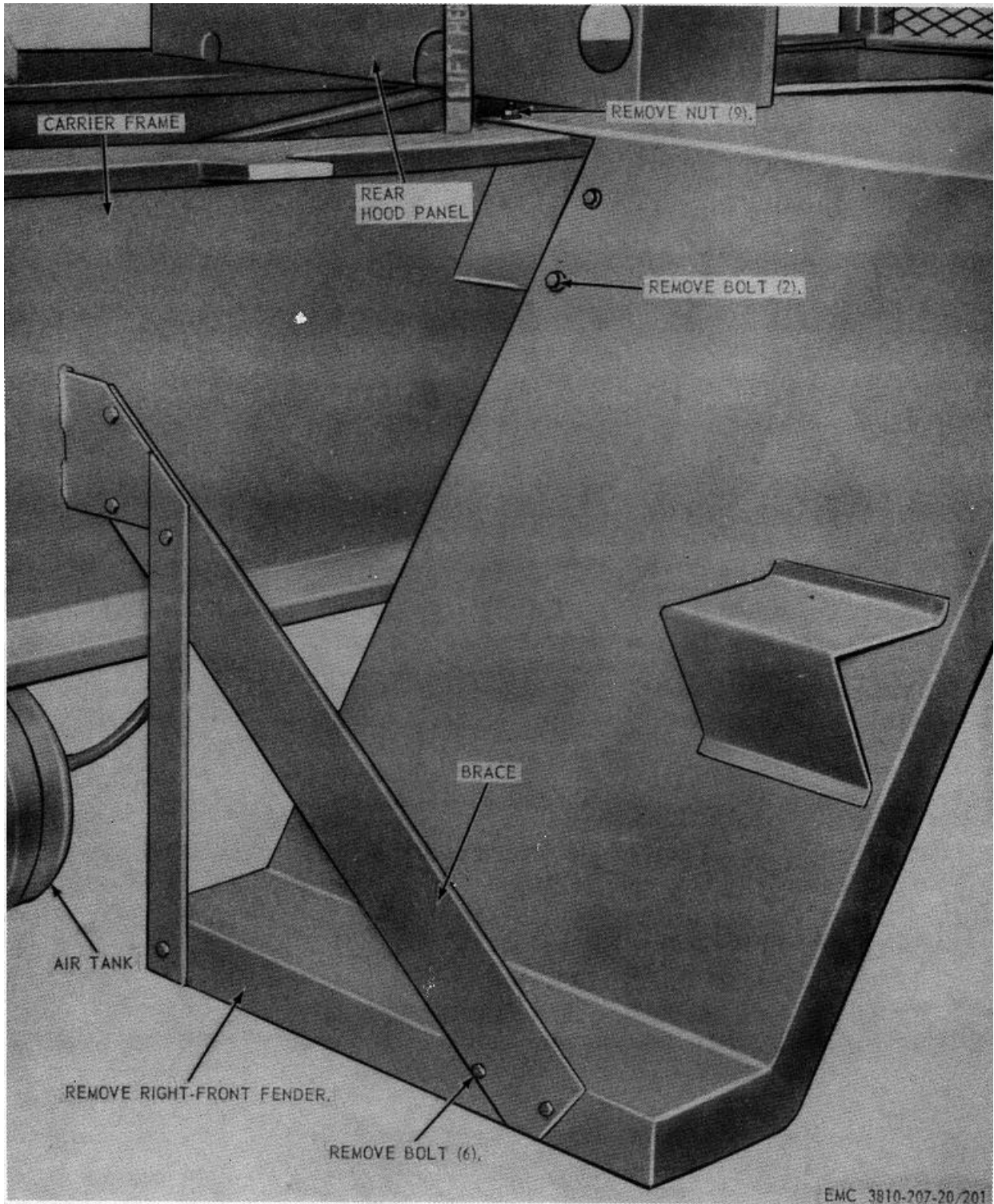


Figure 201. Carrier right-front fender, removal and installation.

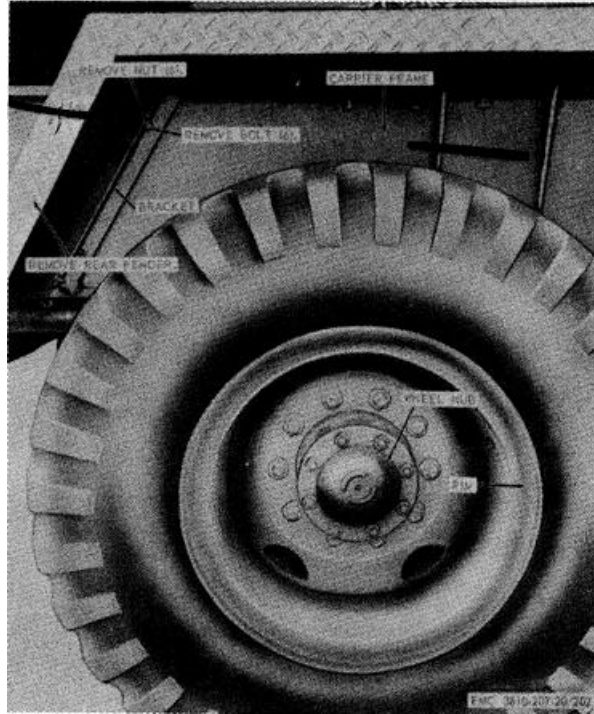


Figure 202. Carrier rear fender, removal and installation.

CHAPTER 9

**AUXILIARY EQUIPMENT AND MAINTENANCE OF
ACCESSORIES USED IN CONNECTION WITH THE CARRIER**

Section I. CARRIER WINTERIZATION EQUIPMENT

325. General

The heater assembly, mounted on the exterior of the operator's cab, furnishes hot, fresh air into the operator's cab and to the defrosters. The heater assembly, mounted on the carrier engine housing, is similar to the crane heater assembly used as a cold-weather starting aid. The 24-volt electrical system furnishes power to both heaters. The fuel system is similar to the crane heater fuel system. The radiator winter front is used as a cold-weather starting aid. The two heaters are controlled by switches, thermostats, and control boxes.

326. Engine Heater

a. Removal. Remove the carrier engine heater (par. 184).

b. Cleaning and Inspection. Clean and inspect the carrier engine heater in a manner similar to the crane heater (par. 184).

c. Illustration. Install the carrier engine heater in a manner similar to the crane heater (par. 184).

327. Resistor, Filter, Terminal Block, Igniter, Relay, Limit Switch, Valve, and Microswitch

a. Removal. Remove the resistor, filter, terminal block, igniter, relay, limit switch, valve, and microswitch (pars. 185 and 186).

b. Cleaning and Inspection. Clean and inspect the carrier heater resistor, filter, terminal block, igniter, relay, limit switch, valve, and microswitch in the same manner as the corresponding parts in the crane heater (pars. 185 and 186).

c. Installation. Install the carrier heater resistor, filter, terminal block, igniter, relay limit switch, valve,

and microswitch in the same manner as the corresponding parts in the crane heater (pars. 185 and 186).

328. Cab Heater

a. Removal. Remove the carrier cab heater in the numerical sequence as instructed on figure 203.

b. Cleaning and Inspection.

- (1) Clean the carrier cab heater and mounting hardware with an approved cleaning solvent and dry thoroughly.
- (2) Inspect the heater and mounting hardware for breaks, bends, and other damage.
- (3) Inspect the heater for proper operation.
- (4) Replace mounting hardware as necessary.
- (5) Replace a defective heater as necessary.

c. Installation. Install the carrier cab heater in the reverse of the numerical sequence as illustrated on figure 203.

329. Fuel Pump and Filter

a. Removal. Remove the fuel pumps and filters as instructed on figure 204.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all mounting hardware for damage. Replace damaged mounting hardware as necessary.

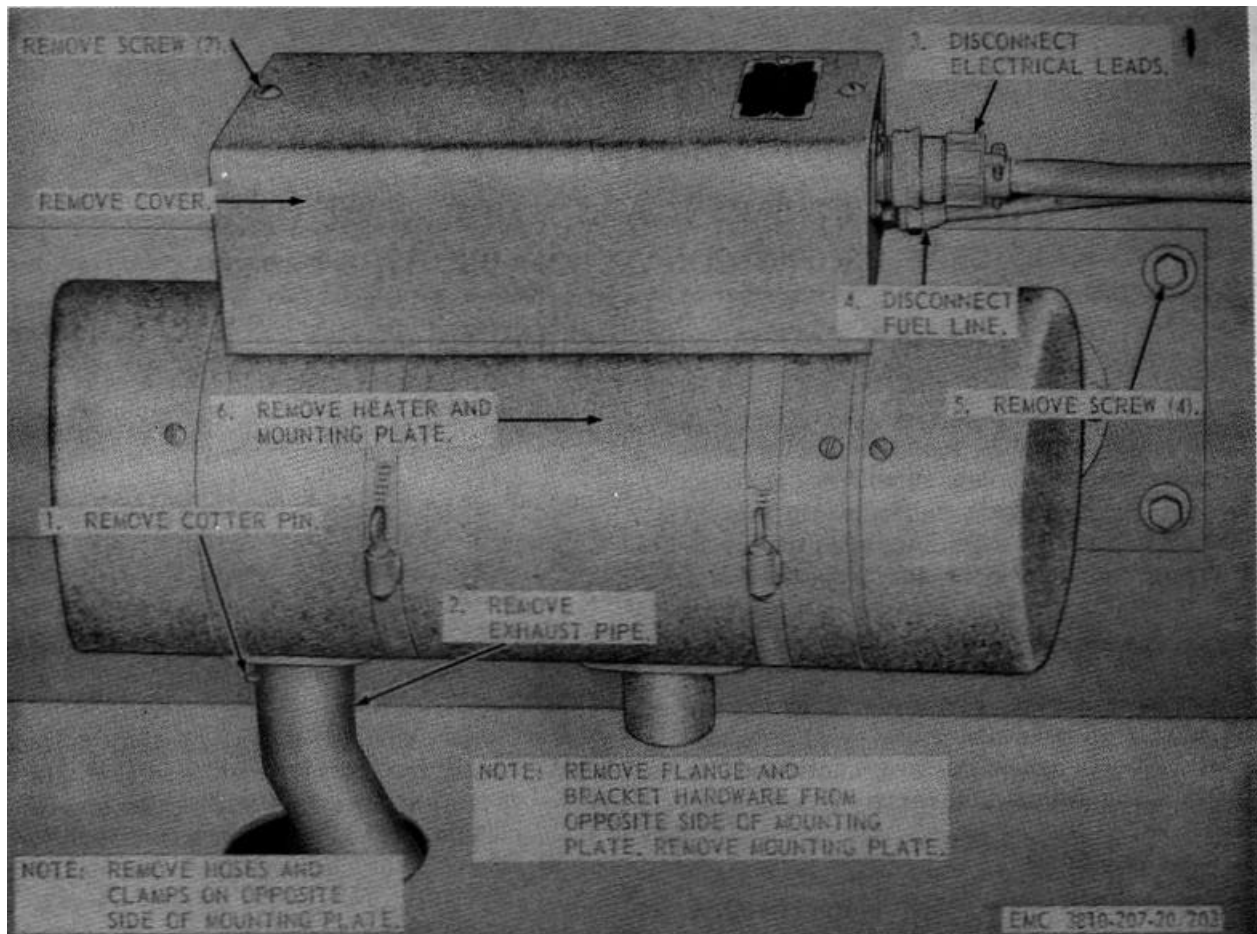


Figure 203. Carrier cab heater, removal and installation.

- (3) Inspect the fuel pumps and filters for breaks, bends, and other damage. Replace fuel pumps and filters as necessary.

- (4) Inspect the fuel pump for proper operation. Replace a defective fuel pump.

c. Installation. Install the fuel pumps and filters as illustrated on figure 204.

330. Cab Her Control box

a. Removal. Remove the cab heater control box as instructed on figure 205.

b. Cleaning, Inspection, and Repair.

- (1) Clean each part with an approved cleaning solvent and dry thoroughly.

- (2) Inspect each part for proper operation and for damage. Replace or repair a damaged or defective part as necessary.

c. Installation. Install the cab heater control box as illustrated on figure 205.

331. Heater Switchbox

a. Removal. Remove the heater switchbox as instructed on figure 206.

b. Disassembly. Disassemble the carrier heater switchbox in a manner similar to the crane heater switchbox (par. 193).

c. Cleaning, Inspection, and Repair.

- (1) Clean all parts of the heater switchbox with a cloth dampened with an approved cleaning solvent and dry thoroughly.

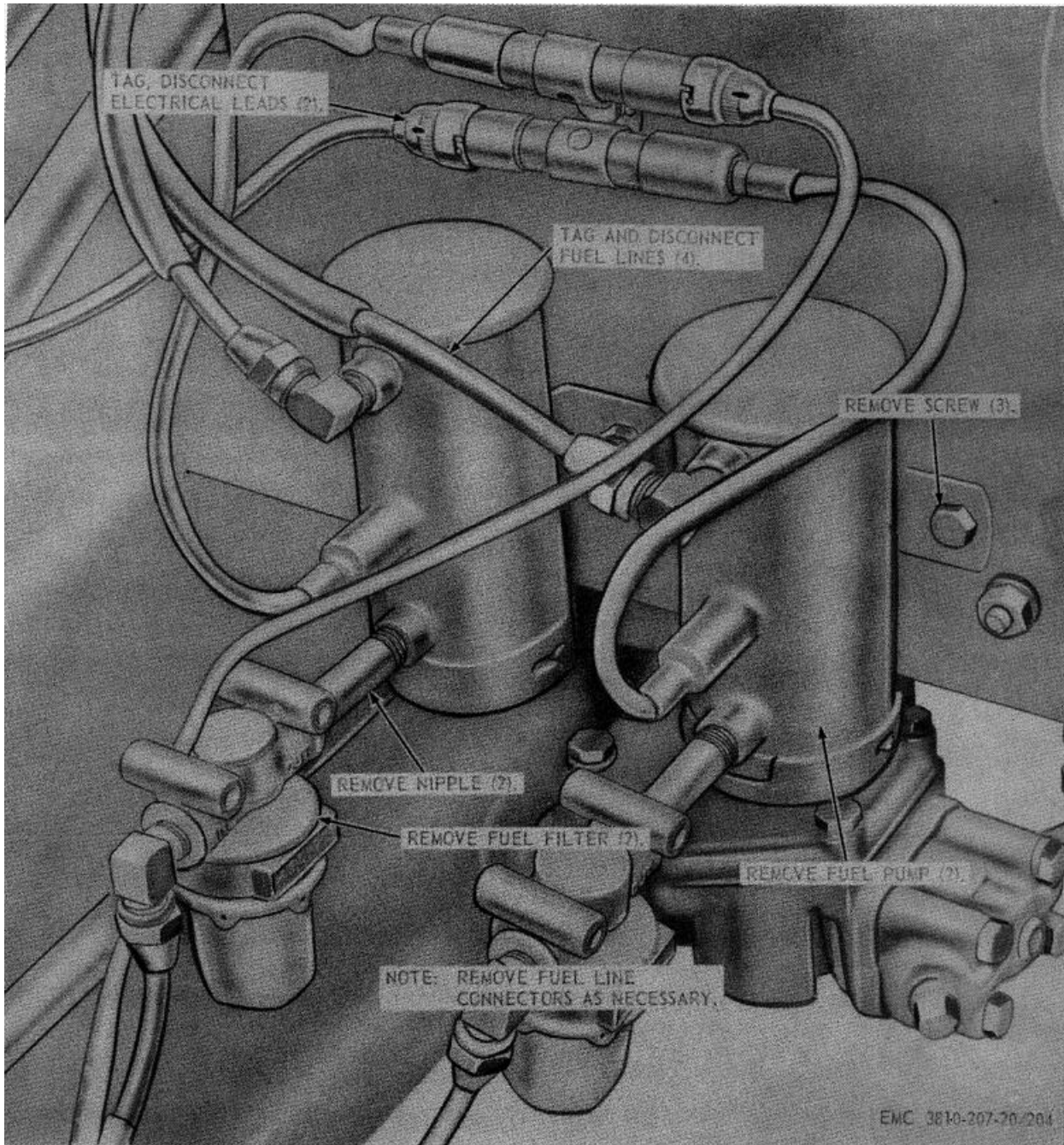


Figure 204. Fuel pumps and filters, removal and installation.

- (2) Inspect all parts for damage and for proper operation. Replace or repair damaged or defective heater switchbox as necessary.

d. Reassembly. Reassemble the carrier heater switchbox in a manner similar to the crane heater switchbox (par. 193).

e. Installation. Install the heater switchbox as illustrated on figure 206.

332. Thermocouple and Oil Pan Shroud

a. Removal.

- (1) Drain engine crankcase (TM 5-3810207-10).

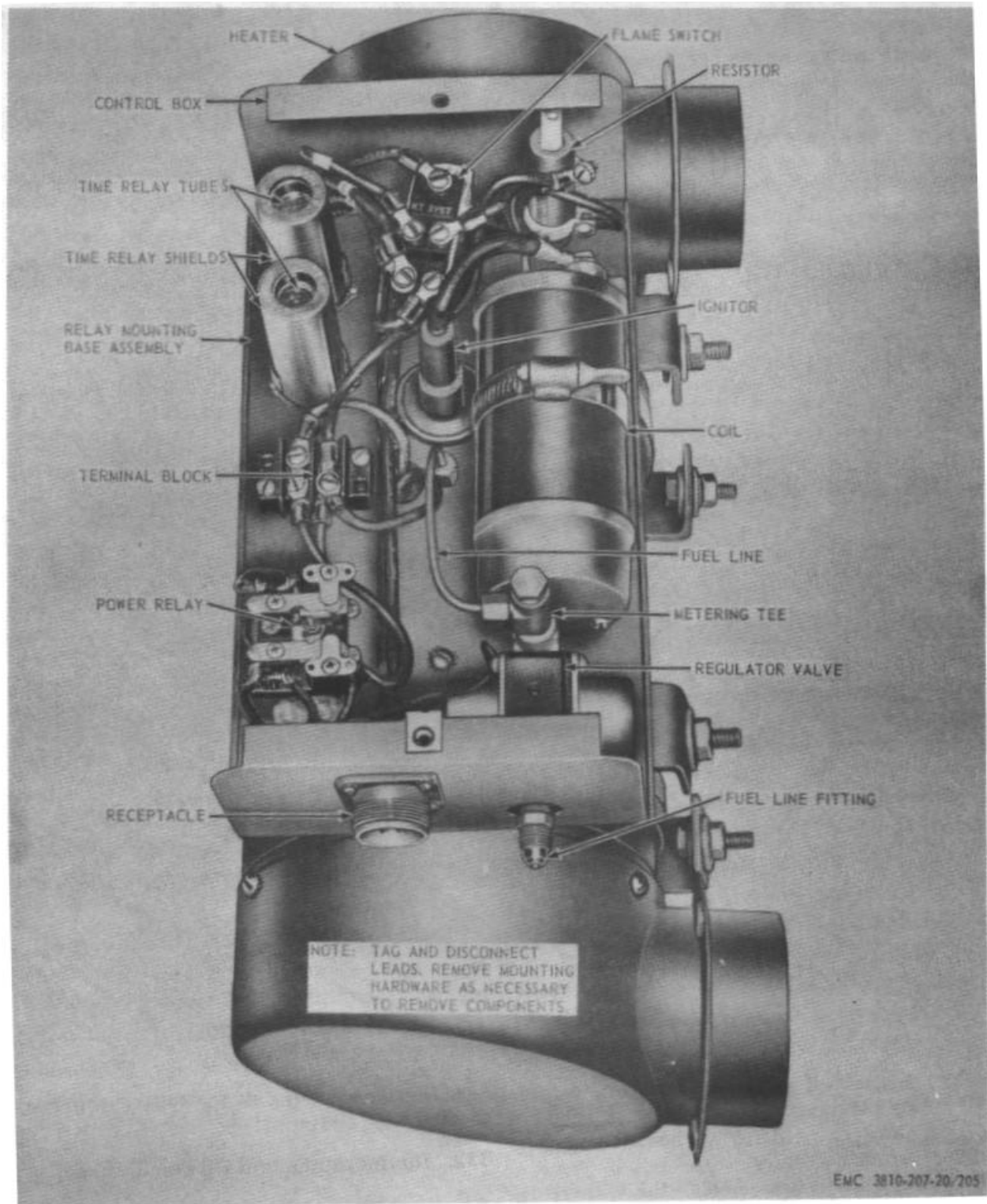


Figure 205. Cab heater control box, removal and installation.

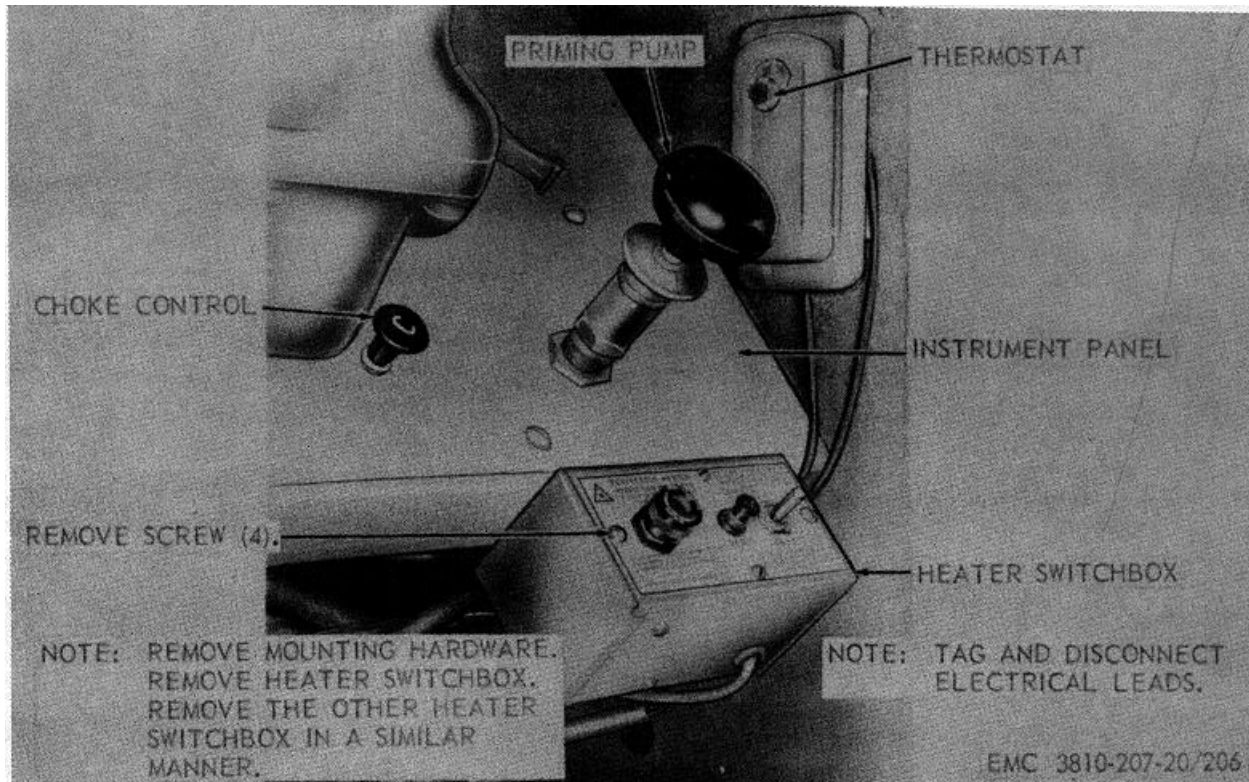


Figure 206. Heater switchbox, removal and installation.

- (2) Remove the thermocouple and oil pan shroud as instructed on figure 207.

b. Cleaning and Inspection.

- (1) Clean the parts with an approved cleaning solution and dry thoroughly.
- (2) Inspect the thermocouple for proper operation. Replace as necessary.
- (3) Inspect the oil pan shroud for bends, breaks, and other damage. Replace the oil pan shroud as necessary.

c. Installation.

- (1) Install the thermocouple and oil pan shroud as illustrated on figure 207.
- (2) Fill engine crankcase (LO 5-3810-207-20).

333. Deflector Box, Defrosters, Air Ducts, Hoses, and Clamps

a. Removal. Remove the deflector box, defrosters, air ducts, hoses, and clamps as instructed on figure 208.

b. Cleaning and Inspection.

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for breaks, dents, and other damage. Replace damaged parts as necessary.

c. Installation. Install the deflector box, defrosters, air ducts, hoses, and clamps as illustrated on figure 208.

334. Thermostat

a. Removal. Remove the thermostat as instructed on figure 209.

b. Cleaning and Inspection.

- (1) Clean the thermostat with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect for proper operation. Replace a defective thermostat.

c. Installation. Install the thermostat as illustrated on figure 209.

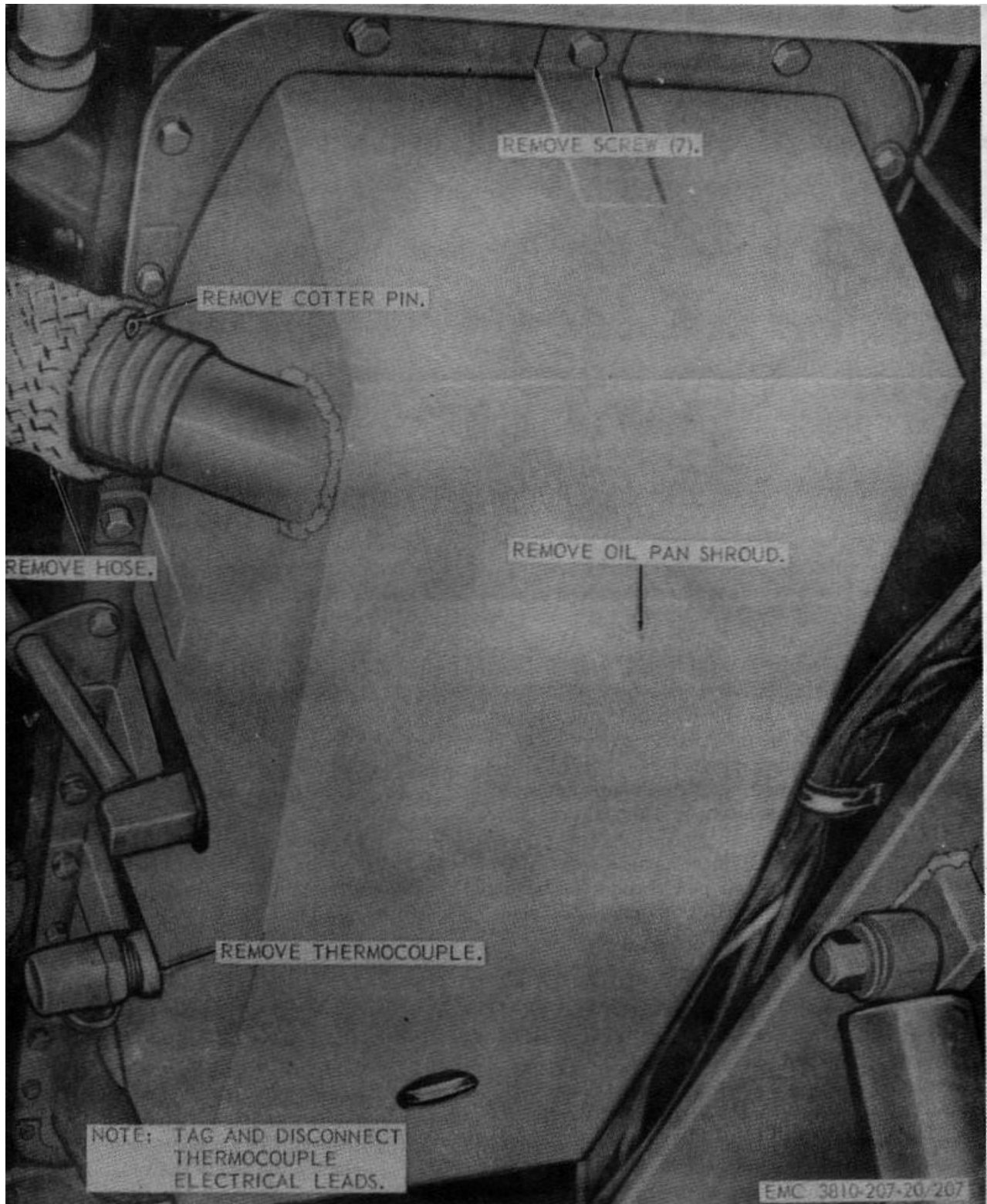


Figure 207. Thermocouple and oil pan shroud, removal and installation

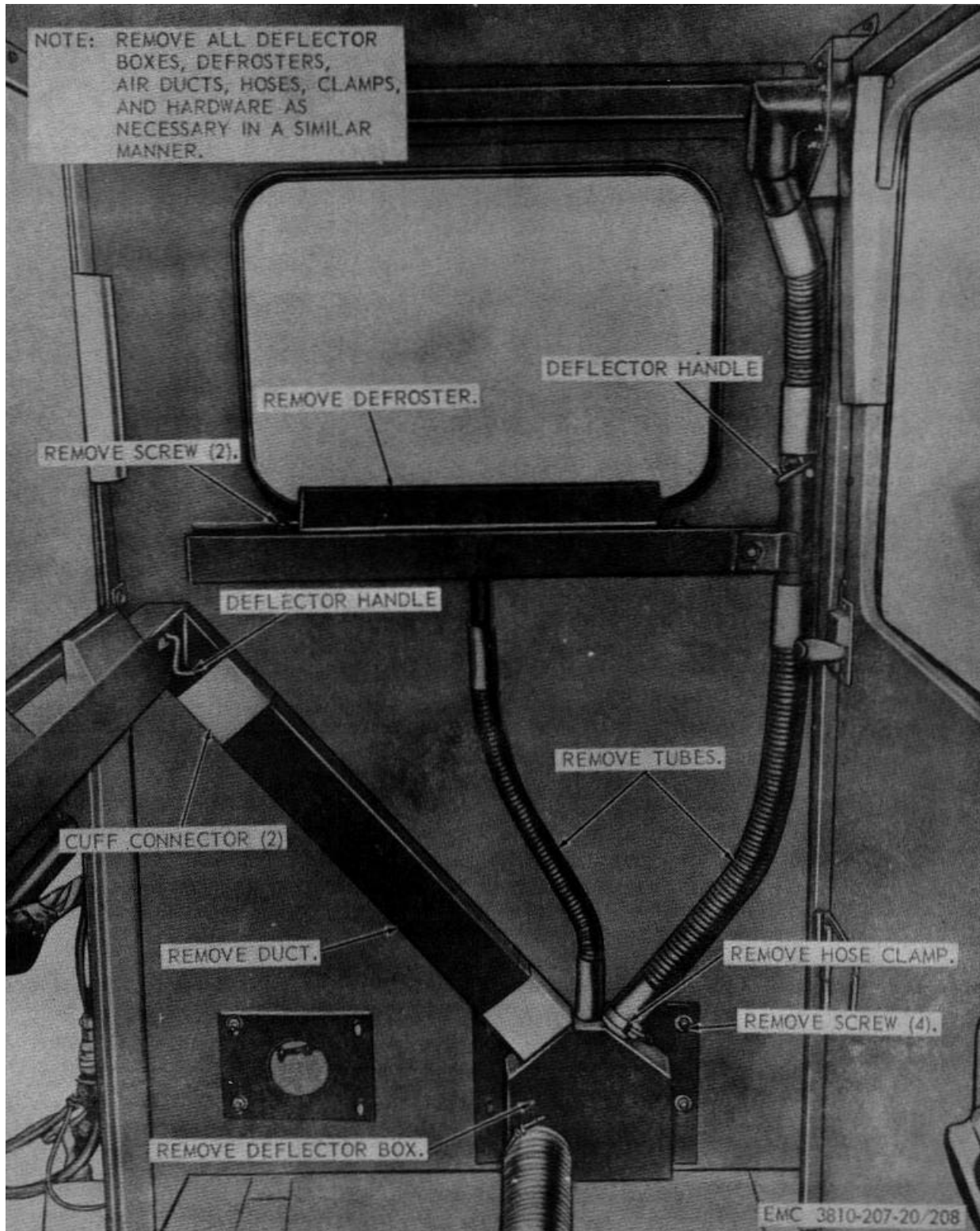


Figure 208. Deflector box, defrosters, air ducts, hoses, and clamps, removal and installation.



Figure 209. Thermostat, removal and installation.

Section II. CARRIER ACCESSORY EQUIPMENT

335. Winter Front

a. Removal.

- (1) Remove boom cradle (par. 171).
- (2) Remove carrier engine winter front as instructed on figure 210.

b. Cleaning and Inspection.

- (1) Clean all parts with an -approved cleaning solvent and dry thoroughly.
- (2) Inspect for breaks, bends, and other damage. Replace damaged winter front as necessary.
- (3) Inspect for proper operation. Replace a defective winter front as necessary.

c. Installation.

- (1) Install the carrier engine winter front as illustrated on figure 210.
- (2) Install the boom cradle (par. 171).

336. Cab Windshield Wiper

a. *Removal.* Remove the windshield wiper as instructed on figure 211.

b. Cleaning and Inspection.

- (1) Clean all parts with a cloth dampened with an approved cleaning solvent and dry thoroughly.
- (2) Inspect for breaks, bends, and other damage. Replace damaged parts as necessary.
- (3) Inspect for proper operation. Replace defective windshield wiper as necessary.

c. *Installation.* Install the windshield wiper as illustrated on figure 211.

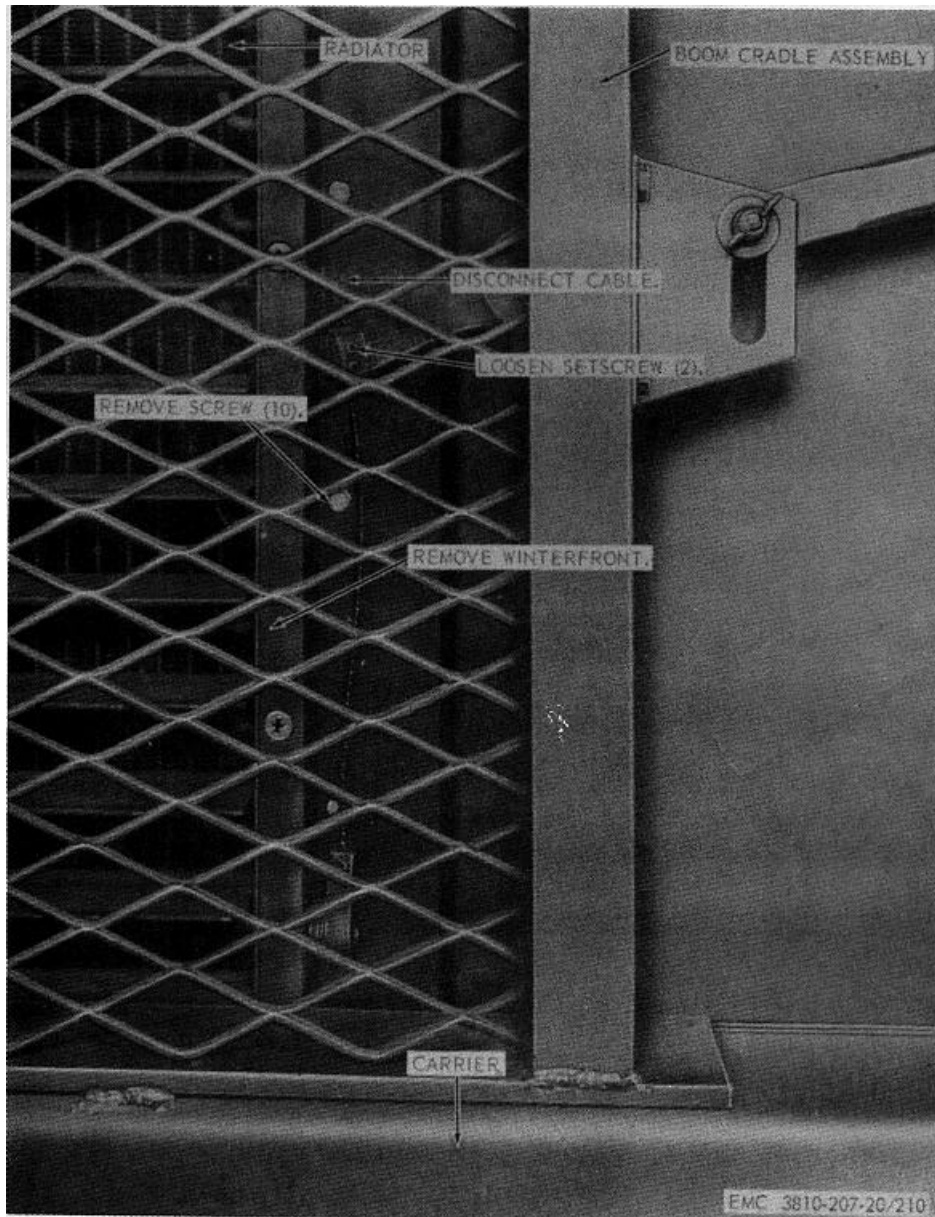


Figure 210. Carrier engine winter front, removal and installation.

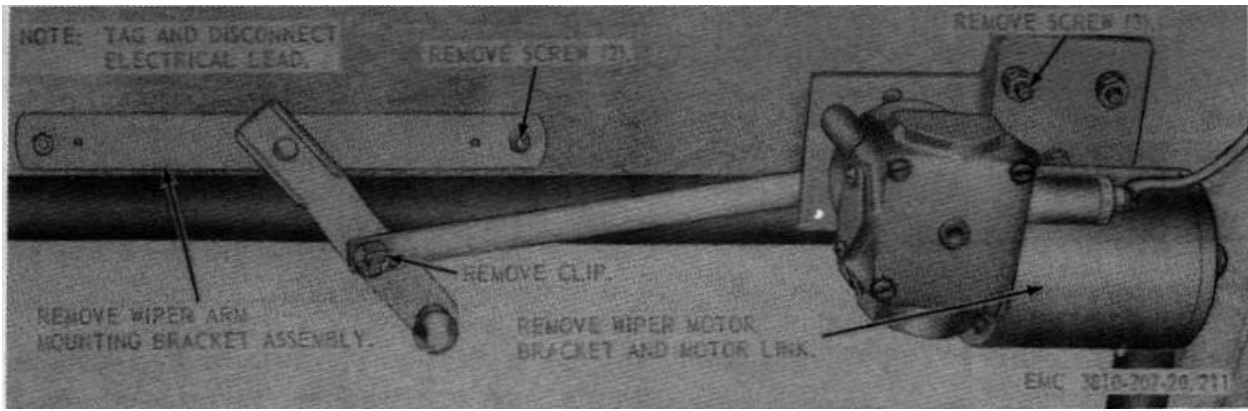


Figure 211. Carrier cab windshield wiper, removal and installation.

CHAPTER 10

SHIPMENT AND LIMITED STORAGE

Section I. SHIPMENT WITHIN ZONE OF INTERIOR

337. Preparation of Equipment For Shipment

a. General. Detailed instructions for the preparation of the crane-hovel for domestic shipment are outlined within this paragraph. Preservation will be accomplished in sequence that will not require the operation of previously preserved components.

b. Inspection. The crane-shovel will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. DA Form 2404 (Work sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment) will be executed on the equipment.

c. Cleaning and Drying. Thorough cleaning and drying by an approved technique is the first essential procedure in any effective preservation process. Approved methods of cleaning and drying, types of preservatives, and methods of application are described in TM 38230.

d. Painting. Paint all surfaces when the paint has been removed or damaged. Refer to TB ENG-60 for detailed cleaning and painting instructions.

e. Depreservation Guide. DA Form 2258 (Depreservation Guide of Engineer Equipment).

- (1) A properly annotated depreservation guide will be completed concurrently with preservation for each item of mechanical equipment with any peculiar requirements outlined in the remarks column. The complete depreservation guide will be placed with the crane-shovel in a waterproof envelope, marked "Depreservation Guide", and fastened in a conspicuous location on or near the operator's controls.

- (2) Prior to placing the crane-shovel in operation or to the extent necessary for inspection, depreservation of the item shall be performed as outlined on the Depreservation Guide.

f. Cooling Systems. Determine that cooling system is filled to the proper level with a clean solution of 50 percent water and 50 percent ethyleneglycol conforming to Specification OA-548, type I.

Note

It is not necessary to drain and refill cooling system if the solution is clean and checks to a -25°F. If temperatures below -25°F. are expected, antifreeze conforming to Specification MIL-C-11755 shall be used in its undiluted condition.

g. Lubrication Systems. Check level of lubricant. Operate the engines at a fast idle until lubricant has been circulated throughout the system.

h. Sealing of Openings. Openings that will permit the direct entry of water into the interior of the gasoline engine-driven equipment, starting motor, etc., shall be sealed with pressure-sensitive tape conforming to Specification PPP-T-60, type III, class 1.

i. Fuel Tanks. If the fuel tank is empty, it will be fogged with type P-10, grade 2 engine preservative oil conforming to MIL-L-21260. It is not required to drain the tank of operating fuels.

j. Exterior Surfaces. Coat exposed machined ferrous metal surfaces with preservative (P-6) conforming with Specification MIL-C-11796, class 3. If preservation is not available, cup grease may be used.

k. Marking. Shall conform to MIL-STD-129.

l. Batteries and Cables. Batteries shall be secured in the battery compartment. Battery shall be filled and fully charged. Cables shall be disconnected, ventholes sealed, and all terminals wrapped and secured with type III, class 1 pressure-sensitive tape conforming to Specification PPP-T-60.

m. Pneumatic Tires. Tires shall be inflated to their normal required operating pressure.

n. Air Cleaners. Drain the air cleaners and seal all openings that permit the direct entry of water. Use type III, class 1, waterproof, pressure-sensitive adhesive tape conforming to PPP-T60.

o. Disassembly, Disassembled Parts, Basic Issue Items.

- (1) Disassembly shall be limited to the removal of parts and projecting components that tend to increase the overall profile of the equipment and that which is subject to pilferage.

- (2) Disassembled items shall be packed with the publications in the toolbox if possible. Otherwise, items will be packed in a suitable container and secured to the equipment to prevent loss or pilferage.

338. Loading Equipment for Shipment

a. Construct a ramp of suitable material as illustrated on figure 3 and back the crane-shovel on a flatcar or trailer. Block and secure the crane-shovel as illustrated on figure 2. If the crane-shovel is on a flatcar, cover red and amber lamps and reflectors with pressure-sensitive tape conforming to Specification PPP-T60, type III, class 1.

b. If a loading ramp or material is not available and a suitable lifting device is used, the equipment shall be loaded as follows:

- (1) Attach a cable sling into the lifting eyes.
- (2) Lift the crane-shovel and center it on the flatcar.
- (3) Remove the cable sling from the lifting eyes. Block and secure the crane-shovel to the flatcar as illustrated on figure 2.

Section II. LIMITED STORAGE

339. Preparation of Equipment for Storage

a. General. Detailed instructions for preservation and maintaining equipment in limited storage are outlined in this paragraph. Limited storage is defined as storage not to exceed 6 months. Refer to AR 743-505.

b. Inspection. Refer to paragraph 337*b.*

c. Cleaning and Drying. Refer to paragraph 337*c.*

d. Painting. Refer to paragraph 337*d.*

e. Depreservation Guide. Refer to paragraph 337*e.*

f. Cooling System. Refer to paragraph 337*f.*

g. Lubrication. Refer to paragraph 337*g.*

h. Sealing of Openings. Refer to paragraph 337*h.*

i. Fuel Tanks. Tanks will be drained and sprayed or fogged with type P-10, grade 2 engine preservative oil, MIL-21260.

j. Exterior Surfaces. Refer to paragraph 337*j.*

k. Batteries and Cables. Refer to paragraph 337*l.*

l. Pneumatic Tires. Pneumatic tires standing in storage under load will be inflated to the proper

pressure. When the equipment is blocked and all weight is removed from the tires, deflate tires to two-thirds normal -tire pressure.

m. Disassembly, Disassembled Parts, Basic Issue Items. Refer to paragraph 337*o.*

n. Weatherproofing. When suitable shelter is not available, select a firm level, well-drained storage location, protected from prevailing winds. Position the crane-shovel on heavy planking or other solid surfaces. Block the equipment in a manner to remove all weight from tires. Cover the crane-hovel with a tarpaulin or other suitable waterproof covering and tie down securely.

340. Inspection and Maintenance of Equipment In Storage

a. Exercising. Every 90 days equipment will be inspected as outlined in paragraph 20 and

operated long enough to bring it up to its operating temperature and for complete lubrication of gears, bearings, etc. After each exercising period the equipment will be represerved.

b. Represervation. At completion of inspection and exercising, the crane-shovel will be represerved to meet the requirements of paragraph 337.

APPENDIX I REFERENCES

1. Dictionaries of Terms and Abbreviations

| | |
|-----------|--|
| AR 320-5 | Dictionary of United States Army Terms |
| AR 320-50 | Authorized Abbreviations and Brevity Codes |

2. Fire Protection

| | |
|-----------|--|
| TM 5-687 | Repairs and Utilities: Fire Protection Equipment and Appliances; Inspections, Operations, and Preventive Maintenance |
| TM 9-1799 | Ordnance Maintenance: Fire Extinguishers |

3. Lubrication

| | |
|------------------|-------------------|
| LO 5-3810-207-20 | Lubrication Order |
|------------------|-------------------|

4. Operating Instructions

| | |
|------------------|-------------------|
| TM 5-3810-207-10 | Operator's Manual |
|------------------|-------------------|

5. Painting and Preservation

| | |
|-----------|---|
| TB ENG-60 | Preservation and Painting of Serviceable Corps of Engineers Equipment |
| TM 9-2851 | Painting Instructions for Field Use |
| TM 38-230 | Preservation, Packaging, and Packing of Military Supplies and Equipment |

6. Preventive Maintenance

| | |
|------------------|---|
| AR 750-5 | Maintenance Responsibilities and Shop Operation |
| TB ENG 347 | Winterization Techniques for Engineer Equipment |
| TM 5-764 | Electric Motor and Generator Repair |
| TM 9-207 | Operation and Maintenance of Ordnance Materiel in Extreme Cold Weather (0° to-65° F.) |
| TM 9-214 | Inspection, Care, and Maintenance of Antifriction Bearings |
| TM 9-6140-200-15 | Storage Batteries, Lead-Acid Type |
| TM 38-750 | Army Equipment Records System and Procedures |

7. Publication Indexes

| | |
|--------------|--|
| DA Pam 108-1 | Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings |
| DA Pam 310-1 | Index of Administrative Publications |
| DA Pam 310-2 | Index of Blank Forms |

DA Pam 310-8 Index of Training Publications
DA Pam 310-4 Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders
DA Pam 310-5 Index of Graphic Training Aids and Devices
DA Pam 310-25 Index of Supply Manuals-Corps of Engineers
TM 5-460 Carpentry and Building Construction

8. Radio Interference Suppression

TM 11-483 Radio Interference Suppression

9. Shipment and Limited Storage

AR 743-505 Limited Storage of Engineers Mechanical Equipment

10. Supply Publications

SM 10-1-C4-1 Petroleum, Petroleum-Base Products, and Related Material
TM 5-3810-207-20P Organizational Maintenance Repair Parts and Special Tool Lists

11. Training Aids

FM 5-25 Explosives and Demolitions
FM 21-5 Military Training
FM 21-6 Techniques of Military Instruction
FM 21-30 Military Symbols

APPENDIX II

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

2. Explanation of Columns in Section II

a. *Group Number, Column 1.* The assembly group is a numerical group assigned to each assembly.

b. *Assembly Group, Column 2.* This column contains a brief description of the components of each assembly group.

c. *Maintenance Function, Column 3.* This column lists the various maintenance functions (A through K) and indicates the lowest maintenance level authorized to perform these functions. The symbol designations for the various maintenance levels are as follows:

- C- Operator or crew
- O Organizational maintenance
- F- Direct support maintenance
- H- General support maintenance
- D- Depot maintenance

The maintenance functions are defined as follows:

a - Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b - Test. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

c - Service. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air.

d - Adjust. To rectify to the extent necessary to bring into proper operating range.

e - Align. To adjust specified. variable elements of an item to bring to optimum performance.

f - Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g - Install. To set up for use in an operational environment such as an emplacement, site, or vehicle.

h - Replace. To replace unserviceable items with serviceable like items.

i - Repair. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each level of maintenance.

j.--Overhaul. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul does not return an item to like new, zero mileage, or zero, hour condition.

k.--Rebuild. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance level. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

d. *Tools and Equipment. Column 4.* Not Applicable.

e. *Remarks. Column 5.* This column is provided

for referencing by code the remarks (Section IV) pertinent to the maintenance functions.

3. Explanation of Columns in Section III

- a. *Reference Code.* Not Applicable.
- b. *Maintenance Category.* Not Applicable.
- c. *Nomenclature.* This column lists the name or identification of the tool or test equipment.
- d. *Tool Number.* Not Applicable.

4. Explanation of Columns in Section IV

a. *Reference Code.* This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. *Remarks.* This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e f u n c t i o n s | | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|---------------------------------|--|--|-----|
| | | A | B | C | D | E | F | G | H | I | J | K | | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | R E B U I L D | | | |
| 01 | CRANE SECTION | | | | | | | | | | | | | | |
| 0100 | ENGINE | | | | | | | | | | | | | | |
| 0101 | Engine Assembly | C | O | C | | | | | F | O | H | | | | A-B |
| | Crankcase, Block, Cylinder Head: | | | | | | | | | | | | | | |
| | Block, engine | H | | | | | | | H | H | | | | | |
| | Cylinder head | F | | | | | | | F | F | H | | | | |
| 0102 | Crankshaft | | | | | | | | | | | | | | |
| | Crankshaft assembly | H | | | | | | | H | H | D | | | | B-K |
| 0103 | Flywheel assembly | F | | | | | | | H | H | | | | | C-I |
| 0104 | Pistons, Connecting Rods | H | | | | | | | H | H | | | | | |
| 0105 | Valves, Camshafts and Timing System | | | | | | | | | | | | | | |
| | Arm assembly rocker | O | | | O | | | | F | F | | | | | |
| | Camshaft assembly | H | | | | | | | H | O | | | | | |
| | Cover, rocker arm | O | | | | | | | O | F | | | | | |
| | Spring valve | O | F | | | | | | O | F | | | | | |
| | Valve, poppet | F | | | | | | | F | F | | | | | D-I |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|--|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | | |
| 0106 | Engine Lubrication System | | | | | | | | | | | | | | | | |
| | Cooler assembly, oil | O | | O | | | | | | O | | | | | | | |
| | Filter assembly, oil; breather assembly oil | C | | C | | | | | | O | | | | | | | |
| | Hose, assembly, oil | C | | | | | | | | O | | | | | | | |
| | Line assembly, oil | C | | | | | | | | O | | F | | | | | |
| | Pump assembly, oil; pan, oil | F | | | | | | | | F | | F | | | | | |
| 0108 | Valve, relief | O | | | O | | | | | O | | | | | | | |
| | Manifolds | C | | | | | | | | O | | | | | | | |
| 02 | CLUTCH | | | | | | | | | | | | | | | | |
| 0200 | Clutch Assembly | | | | | | | | | | | | | | | | |
| | Clutch assembly; power take-off assembly | | | C | O | | | | | F | | F | | | | | |
| 0202 | Clutch Release Mechanism | | | | | | | | | | | | | | | | |
| | Thrust and crow shaft | | | | | | | | | F | | | | | | | |
| | Levers, rods control | C | | | O | | | | | F | | | | | | | |
| | Shaft, yoke | | | | | | | | | O | | | | | | | |
| | Clutch pedal | O | | | | | | | | O | | | | | | | |
| 03 | FUEL SYSTEM | | | | | | | | | | | | | | | | |
| 0301 | Carburetor, Fuel | | | | | | | | | | | | | | | | |
| | Injector | | | | | | | | | | | | | | | | |
| | Carburetor assembly | | | | O | | | | | O | | O | F | | | | |
| | Insulator, heat | O | | | | | | | | O | | | | | | | |
| 0302 | Fuel Pumps | C | O | C | | | | | | O | | O | | | | | |
| 0304 | Air Cleaner | C | | C | | | | | | O | | O | | | | | |
| 0306 | Tanks, Lines, Fittings | | | | | | | | | | | | | | | | |
| | Fenders | | | | | | | | | | | | | | | | |
| | Cap, fuel tank | C | | | | | | | | O | | | | | | | |
| | Lines, fuel | | | | | | | | | O | | O | | | | | |
| | Tank, fuel | C | | C | | | | | | O | | O | | | | | |
| 0808 | Engine Sped Governor and Controls | | | | | | | | | | | | | | | | |
| | Governor assembly | C | | | O | | | | | O | | F | D | | | | |
| 0311 | Engine Starting Aids | | | | | | | | | | | | | | | | |
| | Line Assembly, primer | C | | | | | | | | O | | O | O | | | | |
| | Pump, hand primer | C | | | | | | | | O | | | | | | | |
| 0812 | Accelerator, Throttle or Choke Control | C | | | O | | | | | O | | | | | | | |
| 04 | EXHAUST SYSTEM | | | | | | | | | | | | | | | | |
| 0401 | Muffler and Pipes. | C | | | | | | | | O | | | | | | | |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|-----|
| | | A | B | C | D | E | F | G | H | I | J | | | K | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | |
| 05 | COOLING SYSTEM | | | | | | | | | | | | | | |
| 0501 | Radiator, Evaporative Cooler, or Heat Exchanger | | | | | | | | | | | | | | |
| | Radiator assembly | C | F | C | | | | | | O | H | | | | |
| | Seal, winter front | C | | | | | | | | O | | | | | |
| | Cap, pressure | C | O | | | | | | | O | | | | | |
| | Shutter assembly | | | | | | | | | O | O | | | | |
| | Thermostat, shutter, control | | | | | | | | | O | | | | | |
| 0502 | Cowling, Deflectors | | | | | | | | | | | | | | |
| | Air Ducts, Shrouds | | | | | | | | | | | | | | |
| | Shroud, fan | C | | | | | | | | O | | | | | |
| 0503 | Water Manifolds, Heaters, Thermostats and Housing | | | | | | | | | | | | | | |
| | Thermostat, flow control | O | O | | | | | | | O | | | | | |
| 0504 | Water Pump | | | | C | | | | | | | | | | |
| 0505 | Pan assembly | | | | C | | | | | | | | | | |
| | Belt, "V" fan | | | | | | | | | O | | | | | |
| | Fan, coolant; pulley grooved | C | | | | | | | | O | | | | | |
| 06 | ELECTRICAL SYSTEM | | | | | | | | | | | | | | |
| 0601 | Generator, Alternator | | | | | | | | | | | | | | |
| | Belt, "V" special drive | C | | C | | | | | | O | | | | | |
| | Generator assembly | C | O | | | | | | | O | O | F | | | E-I |
| | Generator Regulator | | | | | | | | | | | | | | |
| 0602 | (Voltage) | | O | | O | | | | | O | | | | | |
| | Starting Motor | O | O | C | | | | | | O | O | F | | | E-I |
| 0603 | Relay, solenoid | | | | | | | | | O | | | | | |
| | Ignition Components | | | | | | | | | | | | | | |
| 0605 | Distributor assembly | | O | O | O | | | | | O | O | | | | E-I |
| | Distributor adapter | | | | | | | | | O | | | | | |
| | Spark plugs | | O | O | O | | | | | F | | | | | |
| | Wire assembly, spark plug | C | O | | | | | | | O | | | | | |
| 0607 | Instrument or Engine Control Panel | | | | | | | | | | | | | | |
| | Circuit breaker; receptacle, ammeter; gages | C | O | | | | | | | O | | | | | |
| | Lamps, incandescent | C | | | | | | | | O | | | | | |
| | Lights, indicator | C | | | | | | | | O | | | | | |
| | Panel, assembly, instrument | C | O | | | | | | | F | O | | | | |
| 0608 | Miscellaneous Items | | | | | | | | | | | | | | |
| | Cable assembly, electrical connector; receptacle | C | | | | | | | | O | | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | |
| 0609 | Lights | | | | | | | | | | | | | | | |
| | Lamp, incandescent | C | | | | | | | C | | | | | | | |
| | Lights, marker and dome | C | | | | | | | O | O | | | | | | |
| 0612 | Batteries, Storage | | | | | | | | | | | | | | | |
| | Battery, storage | C | O | C | | | | | O | O | | | | | | |
| | Box assembly, battery | C | | | | | | | O | O | | | | | | |
| | Cable assembly | C | | | | | | | O | O | | | | | | |
| 0613 | Hull or Chassis Wiring | | | | | | | | | | | | | | | |
| | Ham. | | | | | | | | | | | | | | | |
| | Wiring harness cab | C | O | | | | | | O | O | | | | | | |
| 0615 | Radio Interference | | | | | | | | | | | | | | | |
| | Suppress. | | | | | | | | | | | | | | | |
| | Strap, bonding | C | | | | | | | O | | | | | | | |
| 18 | BODY, CAB, HOOD AND HULL | | | | | | | | | | | | | | | |
| 1801 | Body, Cab, Hood, Bull Assemblies | | | | | | | | | | | | | | | |
| | Cab assembly | | | | | | | | H | O | | | | | | |
| | Doors, cab | C | | | | | | | O | O | | | | | | |
| 1806 | Upholstery Seats and Carpets | | | | | | | | | | | | | | | |
| | Seat assembly, cab | C | | | | | | | O | O | | | | | | |
| 22 | BODY, CHASSIS OR HULL AND ACCESSORY ITEMS | | | | | | | | | | | | | | | |
| 2202 | Accessory Items | | | | | | | | | | | | | | | |
| | Horn assembly; motor, windshield wiper | C | O | | | | | | O | | | | | | | |
| | Manifold, defroster, reflector, clearance | C | | | | | | | O | | | | | | | |
| | Tube assembly, flexible | C | | | | | | | O | O | | | | | | |
| 2207 | Winterization Equipment | | | | | | | | | | | | | | | |
| | Box assembly, heat distribution; hose assembly, metal | C | | | | | | | O | O | | | | | | |
| | Box assembly, heater control; wiring assembly, heater | C | O | | | | | | O | O | | | | | | |
| | Filter assembly, fuel | C | | C | | | | | O | | | | | | | |
| | Heater assembly, engine | C | H | C | O | | | | O | F | | | | | | |
| | Burner assembly, chamber assembly and air duct hose | | | | | | | | | F | | | | | | |
| | Lead assembly, electrical, tube assembly, fuel | C | | | | | | | O | O | | | | | | |
| | Pump assembly, fuel | C | O | C | | | | | O | O | | | | | | |
| | Shields, shrouds, heat | C | | | | | | | O | O | | | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) Assembly Group | (3) Maintenance Functions | | | | | | | | | | (4) Tools and equipment | (5) Remarks | | |
|--|---|---------------------------------|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|-------------------------------|----------------|---------------------------------|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | |
| 2210 | Winterization Equipment (continued) | | | | | | | | | | | | | | |
| | Switch, thermostatic; control assy, temperature | C | O | | | | | | | O | O | | | | |
| | Valve assembly, regulating | O | | | | | | | | O | | | | | |
| | Valve assembly, solenoid | O | O | | | | | | | O | | | | | |
| 43 | Plate, Data | | | | | | | | | O | | | | | |
| | Plate, Identification | | | | | | | | | O | | | | | |
| | Plate, Caution | | | | | | | | | O | | | | | |
| 4301 | HYDRAULIC, FLUID, AIR AND VACUUM SYSTEM | | | | | | | | | | | | | | |
| | Strainers, Filter, Hose, Pipe Fittings, Tubing | | | | | | | | | | | | | | |
| | Gland assembly, packing; line assemblies | C | | | | | | | | O | O | | | | |
| 4305 | Hose assembly Manifold and/or Control Valves | C | | | | | | | | O | | | | | |
| | Cylinder assembly, hydraulic Fluid control | C | O | | C | | | | | O | F | | | | |
| 4307 | Hydraulic Cylinder Cylinder assembly boom hoist brake | F | F | | | | | | | O | F | | | | |
| 4309 | Hydraulic Control, and/or Manual Controls | | | | | | | | | | | | | | |
| | Lever link control | C | | | | | | | | O | | | | | |
| | Rod control | O | | | O | | | | | O | | | | | |
| 74 | Shafts control | O | | | | | | | | O | O | | | | |
| | CRANES, SHOVELS AND EARTH WORKING EQUIP COMPONENTS | | | | | | | | | | | | | | |
| 7410 | Shovel Front Attach- ments | | | | | | | | | | | | | | |
| | Block assembly, bail | C | | C | | | | | | O | O | | | | |
| | Boom assembly, shovel | | | C | | | | | | F | O | | | | |
| | Bracket assembly, idler | C | | C | | | | | | F | F | | | | |
| | Chain assembly, drive | C | | C | | | | | | O | O | | | | |
| | Dipper assembly | C | | | | | | | | O | O | | | | |
| | Guard, chain | C | | | | | | | | O | O | | | | |
| | Pulley, bail block | C | | C | | | | | | O | F | | | | |
| | Rod, arm adjusting | C | | | O | | | | | O | | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|
| | | A | B | C | D | E | F | G | H | I | J | | | K |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D |
| 7411 | Shovel Front Attachments (continued) | | | | | | | | | | | | | |
| | Shaft, idler, sprocket and brackets | C | | | | | | | O | | | | | |
| | Shipper shaft assembly | C | | C | | | | | F | O | | | | |
| | Stick, dipper | C | | | | | | | O | O | | | | |
| | Tooth point | C | | | | | | | C | O | | | | |
| | Crane, Dragline or Clamshell Attachments | | | | | | | | | | | | | |
| | Block, book | | | | | | | | O | O | | | | |
| | Boom, crane and jib- | C | | C | | | | | O | O | | | | |
| | Bushing, boomfoot | C | | | | | | | O | | | | | |
| | Cable, hoist and trip | C | | C | | | | | F | | | | | |
| 7412 | Fairleads, crane; bucket, clamshell | | | | | | | | O | O | | | | |
| | Indicator assembly; mast, boom, stop assembly, safety | C | | | | | | | O | O | | | | |
| | Sheave and rollers | C | | C | | | | | O | O | | | | |
| | Tagline, clamshell | C | | C | | | | | C | O | | | | |
| | Teeth, bucket, spreader assembly, harness | | | | | | | | C | O | | | | |
| | Back Hoe Attachments | | | | | | | | | | | | | |
| | Boom assembly, back-hoe; block, assembly bail | C | | C | | | | | O | O | | | | |
| | Bridle block assembly. | C | | C | | | | | O | O | | | | |
| | Bushings, pulley and boom | F | | | | | | | F | | | | | |
| | Cutting-edge bucket; teeth bucket | C | | | | | | | C | O | | | | |
| 7418 | Gantry, assembly, backhoe; block boom support; bucket, back hoe. | | | | | | | | O | O | | | | |
| | Handle, bucket; roller assy; pulley, gantry | C | | | | | | | O | F | | | | |
| | Shaft, pulley, and roller; guard; pulley | C | | | | | | | O | | | | | |
| | Pile Drive Attachments | | | | | | | | | | | | | |
| | Adapter pile driver | C | | | | | | | O | F | | | | |
| | Base Deck | | | | | | | | | | | | | |
| | Basic revolving superstructure | C | | C | | | | | H | | | | | |
| | Bushing deck | H | | | | | | | H | | | | | |
| | Conical rollers & bracket | C | | C | O | | | | O | O | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|
| | | A | B | C | D | E | F | G | H | I | J | | | K |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D |
| | Base Desk (continued) | | | | | | | | | | | | | |
| 7416 | Cat walk | C | | | | | | | O | O | | | | |
| | Deck, main | C | | | | | | | F | F | | | | |
| | Roller assembly swing | C | | C | | | | | O | O | | | | |
| | Shafts | | | | | | | | | | | | | |
| | Chain, drive, engine to jack shaft | | | | | | | | F | F | | | | |
| | Chain, drive, jack shaft to swing shaft | | | C | O | | | | O | O | | | | |
| | Clutches, jack and swing shaft | | | | | | | | H | H | | | | |
| | Band, clutch | | | | O | | | | O | O | | | | |
| | Bands, brake | | | | O | | | | O | O | | | | |
| | Idler assembly | | | C | | | | | O | O | | | | |
| | Shaft assembly, jack | C | | C | | | | | H | H | | | | |
| | Shaft assembly swing | H | | | | | | | H | H | | | | |
| 7419 | Shields, gear and chains | O | | | | | | | O | | | | | |
| | Turntable | | | | | | | | | | | | | |
| | Brake, swing | O | | O | | | | | O | O | | | | |
| | Lining, swing brake | F | | | | | | | O | | | | | |
| 7420 | Lock, swing | C | | | | | | | O | O | | | | |
| | Machinery Gear Case or Frame | | | | | | | | | | | | | |
| | Guards chain and gear | | | | | | | | | | | | | |
| | Guard, outer | O | | | | | | | O | | | | | |
| 7421 | Guard inner | O | | | | | | | F | | | | | |
| | Independent or precision Boom Host | | | | | | | | | | | | | |
| | Band assembly, brake | O | | | O | | | | O | F | | | | |
| | Chain assembly | C | | C | | | | | O | O | | | | |
| | Driver, boom hoist, clutch | C | | | | | | | H | | | | | |
| | Hoist, assembly, boom | C | | C | | | | | H | H | | | | |
| 7422 | Power down assembly | H | | C | | | | | H | H | | | | |
| | Machinery Mechanism | | | | | | | | | | | | | |
| | Controls | | | | | | | | | | | | | |
| | Control assembly, boom hoist pawl & jaw clutch | C | | | O | | | | O | O | | | | |
| 7423 | Brake pedal controls | C | | | | | | | O | O | | | | |
| | Gantry | | | | | | | | | | | | | |
| | Gantry assembly | C | | C | | | | | F | F | | | | |
| 7426 | Pulley's grooved | C | | C | | | | | O | F | | | | |
| | Mounting Base | | | | | | | | | | | | | |
| | Trunion, base gear | | | | | | | | H | H | | | | |
| 01 | CARRIER SECTION | | | | | | | | | | | | | |
| | ENGINE | | | | | | | | | | | | | |
| 0100 | Engine assembly | C | O | C | | | | | F | O | H | | | A-B |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|--|----|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | | |
| 0101 | Crankcase, block, cylinder head | | | | | | | | | | | | | | | | |
| | Cylinder & crankcase assy | H | | | | | | | H | H | | | | | | | |
| | Head assembly, cylinder | F | | | | | | | F | F | H | | | | | | |
| 0102 | Crankshaft . | H | | | | | | | H | D | | | | | | | BK |
| 0103 | Flywheel Assembly | F | | | | | | | F | F | | | | | | | CI |
| 0104 | Pistons, Connecting Rods | H | | | | | | | H | H | | | | | | | |
| 0105 | Valves, Camshafts & Timing System | | | | | | | | | | | | | | | | |
| | Arm assembly, rocker | O | | | O | | | | F | F | | | | | | | |
| | Camshaft assembly. | H | | | | | | | F | F | | | | | | | |
| | Valve, poppet. | F | | | | | | | F | F | | | | | | | DI |
| 0106 | Engine Lubrication System | | | | | | | | | | | | | | | | |
| | Breather assembly, oil | C | | C | | | | | O | | | | | | | | |
| | Cooler assembly, oil | O | | C | | | | | O | | | | | | | | |
| | Filter assembly oil | C | | C | | | | | O | O | | | | | | | |
| | Hose assembly, oil | C | | | | | | | O | O | | | | | | | |
| | Tube assembly, oil | C | | | | | | | O | O | | | | | | | |
| | Pump assembly, oil; pan, oil | F | | | | | | | F | F | | | | | | | |
| | Valve, relief | O | | | O | | | | O | O | | | | | | | |
| 0108 | Manifolds | C | | | | | | | O | O | | | | | | | |
| 02 | CLUTCH | | | | | | | | | | | | | | | | |
| 0200 | Clutch Assembly | | | | | | | | | | | | | | | | |
| | Clutch assembly, disk. | O | | C | O | | | | F | F | | | | | | | |
| | Disk, clutch; housing clutch | F | | | | | | | F | | | | | | | | |
| | Plates, pressure and adjusting; bearings, pilot and Shaft. | F | | | | | | | F | F | | | | | | | |
| 0202 | Ring, driving | | | | | | | | F | F | | | | | | | |
| | Clutch Release Mechanism | | | | | | | | | | | | | | | | |
| | Bearings thrust and cross-shaft | F | | | | | | | F | F | | | | | | | |
| | Carrier assembly | | | | C | | | | F | F | | | | | | | |
| | Fork clutch shifter; shaft, cross and pedal | F | | | | | | | F | O | | | | | | | |
| | Lever; pedal, control | C | | | | | | | O | O | | | | | | | |
| | Pipe assembly oiler | | | | | | | | O | F | | | | | | | |
| | Rod assembly, control. | | | | C | | | | O | O | | | | | | | |
| 03 | FUEL | | | | | | | | | | | | | | | | |
| 0301 | Carburetor | | | | O | | | | O | F | | | | | | | |
| 0302 | Fuel Pumps | C | O | | | | | | O | | | | | | | | |
| 0304 | Air Cleaner | C | | C | | | | | O | O | | | | | | | |
| 0306 | Tanks, Lines, Fittings, Headers | | | | | | | | | | | | | | | | |
| | Cap, fuel tank | C | | | | | | | O | | | | | | | | |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | |
|--|---|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|-----|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | |
| | Tanks, Lines, Fittings, Readers (continued) | | | | | | | | | | | | | | | |
| 0308 | Line assembly, fuel Strainer, fuel tank. Tank, fuel | O C C | | C C | | | | | O O O | O O | | | | | | |
| 0311 | Engine Speed Governor and Controls Governor assembly | C | | | O | | | | O | D | | | | | | |
| 0312 | Engine Starting Aids Line assembly; pump assembly, primer. | C | | | | | | | O | O | | | | | | |
| 04 | Accelerator. Throttle or Choke Controls Cable assembly, choke; pedal, accelerator. | C C | | | O | | | | O O | | | | | | | |
| 0401 | EXHAUST SYSTEM Muffler and Pipes | C | | | | | | | O | | | | | | | |
| 05 | COOLING SYSTEM | | | | | | | | | | | | | | | |
| 0501 | Radiator, Evaporative Cooler or Heat Exchanger Cap, pressure Radiator assembly Winter front | C C C | O F | C | | C | | | O O O | | H O | | | | | |
| 0502 | Cowling, Deflectors, Air Ducts, Shrouds Shroud, fan | C | | | | | | | O | O | | | | | | |
| 0503 | Water Manifolds Headers, Thermostat & Housing Gaskets Clamp, . roses, headers manifolds. Thermostat, flow control | C O | O | C | | | | | O O | | F | | | | | |
| 0504 | Water Pump | | | | | | | | O | | | | | | | |
| 0505 | Fan assembly Belt, "V" fan Fan, collant; pulley grooved | C C | | | O | | | | O O | | | | | | | |
| 06 | ELECTRICAL SYSTEM | | | | | | | | | | | | | | | |
| 0601 | Generator | C | O | | | | | | O | O | F | | | | | E-I |
| 0602 | Generator Regulator (Voltage) | O | O | | O | | | | O | | | | | | | |
| 0603 | Starting Motor Relay solenoid | O O | O O | C | | | | | O O | | F | | | | | E-I |
| 0605 | Ignition Components Coil, Ignition Distributor assembly Leads, sparks plug Spark plugs | C O C | O O O | O O | O O | | | | O O O | | O | | | | | E-I |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | |
|--|--|---|-----------------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|
| | | A | B | C | D | E | F | G | H | I | J | | | K |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D |
| 0607 | Instrument or Engine Control Panel Ammeter, gages; circuit breaker Lamp, incandescent. Lights, indicator Panel assembly, instrument Switches, electrical | C C C C C | O O O | | | | | | O O O O O | O O | | | | |
| 0608 | Miscellaneous Items Cable assy, connector, receptacle Flasher, turn signal | C C | O O | | | | | | O O | | | | | |
| 0609 | Lights Headlamps and light units Lamp units | C O | | | | | | | O O | O O | | | | |
| 0611 | Horn | O | O | | | | | | O | O | | | | |
| 0612 | Batteries, storage Battery, storage Box assembly, battery Lead assembly, battery | C C C | O O | C | | | | | O O O | O O | | | | |
| 0613 | Hull or Chassis Wiring Harness Cab and chassis wiring | O | | | | | | | F | O | | | | |
| 0615 | Radio Interference Suppress. Capacitor, suppression Lead assembly, bonded | C C | O | | | | | | O O | | | | | |
| 07 | TRANSMISSION | | | | | | | | | | | | | |
| 0700 | Transmission Assembly | C | | C | | | | | F | F | H | | | |
| 0701 | Transmission Sate | H | | | | | | | H | | | | | |
| 0702 | Opposed Output | H | | | | | | | H | | | | | |
| 0704 | Trains Top Cover Assy Bars, blocks, , bearings Boots packing; shaft; rods; yokes; seats Housing, shifting bar | F O F | | | | | | | F O F | F | | | | |
| 08 | TRANSFER ASSEMBLY | | | | | | | | | | | | | |
| 0801 | Power Transfer Assembly cap, filler Housing assy transfer case Transfer case assembly | C H C | | | | | | | O F F | H | | | | |
| 0802 | Clutch and Clutch Controls Clutch, sliding; fork & shaft, clutch | | | | | | | | | | | | | |
| 0808 | Gear Shift and Controls Shifter shaft & gears Controls | H H O | | | | | | | H H O | | | | | |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|---------------------------------|--|--|--|--|
| | | A | B | C | D | E | F | G | H | I | J | K | | | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | R E B U I L D | | | | |
| 0804 | Lubrication Cooling, or hydraulic Components | | | | | | | | | | | | | | | |
| 09 | Breather, ventilation PROPELLER AND PROPELLER SHAFT | C | | C | | | | | | O | | | | | | |
| 0900 | Propeller Shaft | O | | C | | | | | | O | O | | | | | |
| 10 | FRONT AXLE | | | | | | | | | | | | | | | |
| 1000 | Front Axle Assembly | C | | C | | | | | | F | I | | | | | |
| 1002 | Differential: | | | | | | | | | | | | | | | |
| | Carrier assy, differential | F | | O | | | | | | F | F | | | | | |
| | Case assembly | F | | | | | | | | F | F | | | | | |
| 1004 | Steering and Leaning Wheel Mechanism' | | | | | | | | | | | | | | | |
| | Flange assy bearing | F | | | | | | | | F | F | | | | | |
| | Arm; rail; socket, trunnion, seal assy; , bearing tie rod | F | | | | | | | | | | | | | | |
| | Spindle assembly | C | | | | | | | | F | F | | | | | |
| | Breather, ventilation | | | | | | | | | O | | | | | | |
| | Drive flange | | | | | | | | | | | | | | | |
| 11 | REAR AXLE | | | | | | | | | | | | | | | |
| 1100 | Rear Axle Assembly | C | | C | | | | | | F | F | H | | | | |
| 1101 | Housing, Beams | | | | | | | | | | | | | | | |
| | Housing covers | | | | | | | | | | | | | | | |
| | Plug Seals | | | | | | | | | | | | | | | |
| | Housing assembly | | | | | | | | | H | H | | | | | |
| 1102 | Differential | | | | | | | | | | | | | | | |
| | Carrier assembly | H | | | | | | | | H | H | | | | | |
| | Differential assembly | H | | C | | | | | | H | H | | | | | |
| 1108 | Walking Beams Stub | | | | | | | | | | | | | | | |
| | Axles and Parts | | | | | | | | | | | | | | | |
| | Beam assy equalizing | H | | C | | | | | | H | H | | | | | |
| 12 | Brakes | | | | | | | | | | | | | | | |
| 1201 | Hand Brakes | | | | | | | | | | | | | | | |
| | Brake assembly hand | C | C | | O | | | | | F | F | | | | | |
| | Cable, operating | C | | | O | | | | | F | F | | | | | |
| 1202 | Service Brakes | | | | | | | | | | | | | | | |
| | Brake assembly | C | C | | O | | | | | F | F | | | | | |
| | Camshaft, brake shoe; bearings; deflec-tors; seats; lining | F | | | | | | | | F | | | | | | |
| | Shoe assembly, brake | | | | O | | | | | O | F | | | | | |
| 1206 | Mechanical Brake | | | | | | | | | | | | | | | |
| | System | | | | | | | | | | | | | | | |
| | Adjuster slack | | | C | O | | | | | O | | | | | | |
| 1206 | Air Brake System | | | | | | | | | | | | | | | |
| | Busser, low pressure | O | | | | | | | | O | | | | | | |
| | Chamber, air brake | C | | | O | | | | | O | F | | | | | |
| | Ejector, moisture | O | | O | | | | | | O | F | | | | | |
| | Hoses, assy, air lines | C | | | | | | | | O | F | | | | | |

Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | |
| 1209 | Air Brake System (continued) Switch, low pressure Valve assy, quick release | | O | | | | | | O | | | | | | | |
| | Air Compressor Assembly Compressor assembly, air Governor assembly | O | | | | | | | O | F | | | | | | |
| 1211 | Tanks, wet and dry Trailer Brake Connec- tions and Controls Couplings, quick disconnect | O | | C | | | | | F | F | | | | | | |
| | Manifold, tube Valves, relay and control | C | | | | | | | O | O | | | | | | |
| 13 | WHEELS AND TRACKS | C | | | | | | | O | F | | | | | | |
| 1311 | Wheel Assembly Hub and drum assembly Wheels, pneumatic tire | O | | O | | | | | O | O | | | | | | |
| | Tires Tube | C | | C | | | | | O | O | | | | | | |
| 14 | STEERING | | | | | | | | | | | | | | | |
| 1401 | Steering Assembly Gear assembly, steering Drag steering link assy | O | | C | | | | | F | F | | | | | | |
| | Rod, tie | | | C | O | | | | O | O | | | | | | |
| 1410 | Hydraulic Pump or Fluid Motor Assembly Belt, "V" pump drive. Pump assembly. hydraulic | C | | | C | | | | O | | | | | | | |
| | Shaft and bearing assy | C | O | | | | | | O | F | | | | | | |
| 1411 | Hoses, Fitting | F | | | | | | | F | F | | | | | | |
| 1412 | Hydraulic or Air Cylinder Cylinder assy, hydraulic | O | | | | | | | O | | | | | | | |
| | Piston and shaft | F | | | | | | | O | F | | | | | | |
| 1413 | Tanks, Reservoirs Reservoirs assembly | C | | C | | | | | O | O | | | | | | |
| 1414 | Steering System Valves Spring seat; valve; relief Valve, assembly, steering | O | | | | | | | O | | | | | | | |
| | | C | | | | | | | O | F | | | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | |
|--|---|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|
| | | A | B | C | D | E | F | G | H | I | J | | | K |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D |
| 15 | FRAME, TOWING ATTACHMENTS & DRAWBARS | | | | | | | | | | | | | |
| 1501 | Frame Assembly | F | | | | | | | H | | | | | |
| 1503 | Pintlee & Towing Attachments | | | | | | | | | | | | | |
| 1507 | Pintle assembly Landing Gears, Leveling Jacks | C | | C | | | | | O | O | | | | |
| | Beam, outrigger Outrigger assembly. | C | | | | | | | O | O | | | | |
| 16 | SPRINGS AND SHOCK ABSORBERS | C | | C | | | | | O | O | | | | |
| 1601 | Spring | | | | | | | | | | | | | |
| | Springs, front and rear; bumper; spacer | C | | C | | | | | F | | | | | |
| 1604 | Shock Absorber Equip ment | | | | | | | | | | | | | |
| | Shock absorber; bushing . | O | | | | | | | O | | | | | |
| 1605 | Torque, Radius, and Stabilizer Rods | | | | | | | | | | | | | |
| | Rod assembly, torque Socket assembly, rod | C | | C | F | | | | F | F | | | | |
| 18 | BODY, CAB, HOOD AND HULL | F | | | | | | | F | F | | | | |
| 1801 | Body, Cab, Hood, Hull Assy | | | | | | | | | | | | | |
| | Cab assembly, carrier | C | | | | | | | F | O | | | | |
| | Fenders, left front | C | | | | | | | H | O | | | | |
| | Fenders, right front and rear; hood assy side and top; door assy | | | | | | | | | | | | | |
| | Ventilator, cab | C | | | | | | | O | O | | | | |
| 1805 | Floors | C | | | | | | | O | O | | | | |
| 1806 | Upholstery, Seats and carpets | O | | | | | | | | | | | | |
| | Seat assembly, truck | C | | | | | | | O | O | | | | |
| 22 | BODY CHASSIS OR HULL AND ACCESSORY ITEMS | | | | | | | | | | | | | |
| 2202 | Accessory , Items | | | | | | | | | | | | | |
| | Arm assy; mirror; reflector; nozzle; defroster; clamp assy | C | | | | | | | O | | | | | |
| | Chamber, plenum, cab heater | C | | | | | | | O | O | | | | |
| | Thermostat, control | O | O | | | | | | O | O | | | | |
| | Wiper, windshield | C | | | | | | | O | O | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | | | |
|--|---|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|--|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | | | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | | | |
| 2207 | Winterization Equip- ment Control assy, battery box heat Cable any, electrical; wiring assy Heater any, engine Pump, fuel Filter, fuel Line any; tube assy, fuel Valve, solenoid . | C | O | | | | | | | | | | | | | | |
| 2210 | Data Plates & Instruct holders Plates ident. (A.I.P.) Plates, instruction | | | | | | | | | | | | | | | | |
| 47 | GAGES | | | | | | | | | | | | | | | | |
| 4701 | Instruments Speedometer assembly | C | O | | | | | | | | | | | | | | |
| 4702 | Gage Mountings, Lines and Fittings Gage, air pressure Hose assembly, air | C | | | | | | | | | | | | | | | |
| 50 | PNEUMATIC EQUIP MENT | | | | | | | | | | | | | | | | |
| 5001 | Crankcase, Block, Cylinder Head Block, assy, compressor Crankcase, com- pressor; head assy compressor | | | | | | | | | | | | | | | | |
| 5002 | Crankcase | F | | | | | | | | | | | | | | | |
| 5004 | Pistons, Connecting Rods and Rotors | F | | | | | | | | | | | | | | | |
| 5005 | Valve Camshaft and Timing Mechanism Valve guides, springs seats and discs. Valves, discharge | F | | | | | | | | | | | | | | | |
| 5007 | Compressor Drive: Belt, "V", com- pressor drive Pulley, drive | C | | | | | | | | | | | | | | | |
| 5008 | Air Intake Element, strainer | O | | | | | | | | | | | | | | | |
| 5009 | Unloader System Components Piton valve Springs, seats; guide; saddle | F | | | | | | | | | | | | | | | |
| | | F | | | | | | | | | | | | | | | |

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Section II. MAINTENANCE ALLOCATION CHART-Continued

| (1) G R O U P N U M B E R | (2) A s s e m b l y G r o u p | (3) M a i n t e n a n c e F u n c t i o n s | | | | | | | | | | (4) T o o l s a n d e q u i p m e n t | (5) R e m a r k s | | |
|--|--|---|------------------|---------------------------------|----------------------------|-----------------------|---|---------------------------------|---------------------------------|----------------------------|--------------------------------------|--|--|---------------------------------|--|
| | | A | B | C | D | E | F | G | H | I | J | | | K | |
| | | I N S P E C T | T E S T | S E R V I C E | A D J U S T | A L I G N | C A L I B R A T E | I N S T A L L | R E P L A C E | R E P A I R | O V E R H A U L | | | R E B U I L D | |
| 5010 | Compressor Cooling and Heating Cock drain; fittings, coolings | O | | | | | | | | | | | | | |

SECTION III

MAINTENANCE ALLOCATION CHART

FOR: _____

DATE: _____

PAGE: _____ OF _____

SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

| Reference code | Maintenance category | Nomenclature | Tool number |
|----------------|----------------------|--|-------------|
| | | Special tools and test equipment not required. | |

SECTION IV

MAINTENANCE ALLOCATION CHART

FOR: _____

DATE: _____

PAGE: _____ OF _____

| Reference code | Remarks |
|----------------|--|
| A-B | Test includes engine operation and compression. |
| B-K | Includes metalizing, regrinding and balancing. |
| C-I | Repair of flywheel includes replacing ring gear. |
| D-I | Repair of valves and inserts includes refacing. |
| E-I | Repair limited to installation of repair kit. |

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1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 decagram = 10 grams = .35 ounce
 1 hectogram = 10 decagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

| <i>To change</i> | <i>To</i> | <i>Multiply by</i> | <i>To change</i> | <i>To</i> | <i>Multiply by</i> |
|------------------|--------------------|--------------------|--------------------|---------------|--------------------|
| inches | centimeters | 2.540 | ounce-inches | Newton-meters | .007062 |
| feet | meters | .305 | centimeters | inches | .394 |
| yards | meters | .914 | meters | feet | 3.280 |
| miles | kilometers | 1.609 | meters | yards | 1.094 |
| square inches | square centimeters | 6.451 | kilometers | miles | .621 |
| square feet | square meters | .093 | square centimeters | square inches | .155 |
| square yards | square meters | .836 | square meters | square feet | 10.764 |
| square miles | square kilometers | 2.590 | square meters | square yards | 1.196 |
| acres | square hectometers | .405 | square kilometers | square miles | .386 |
| cubic feet | cubic meters | .028 | square hectometers | acres | 2.471 |
| cubic yards | cubic meters | .765 | cubic meters | cubic feet | 35.315 |
| fluid ounces | milliliters | 29.573 | cubic meters | cubic yards | 1.308 |
| pints | liters | .473 | milliliters | fluid ounces | .034 |
| quarts | liters | .946 | liters | pints | 2.113 |
| gallons | liters | 3.785 | liters | quarts | 1.057 |
| ounces | grams | 28.349 | liters | gallons | .264 |
| pounds | kilograms | .454 | grams | ounces | .035 |
| short tons | metric tons | .907 | kilograms | pounds | 2.205 |
| pound-feet | Newton-meters | 1.356 | metric tons | short tons | 1.102 |
| pound-inches | Newton-meters | .11296 | | | |

Temperature (Exact)

| | | | | |
|----|---------------------------|-------------------------------|------------------------|----|
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |
|----|---------------------------|-------------------------------|------------------------|----|

PIN: 012234-000